Flora of Panama. Part V. Fascicle III

Annals of the Missouri Botanical Garden, Vol. 38, No. 1 (Feb., 1951), 1-94.

Stable URL:
http://links.jstor.org/sici?sici=0026-6493%28195102%2938%3A1%3C1%3AFOPPVF%3E2.0.CO%3B2-3

Annals of the Missouri Botanical Garden is currently published by Missouri Botanical Garden Press.

FLORA OF PANAMA

Part V. Fascicle 3

LEGUMINOSAE[1]

Subfamily CAESALPINOIDEAE (Caesalpinaceae of many authors)

Trees, shrubs, or less frequently vines or herbs. Leaves usually compound, mostly pinnate, not infrequently bipinnate or occasionally unifoliate. Inflorescence mostly terminal or subterminal, usually racemose or paniculate of several racemes. Flowers mostly yellow or red; calyx usually with a short tube scarcely distinguishable from the receptacular base, mostly polysepalous and 5-parted above, in *Swartzia* rupturing irregularly; petals 5, infrequently fewer or absent, imbricate, the uppermost within the others in bud; stamens usually 10, sometimes fewer, rarely more numerous; filaments usually not united; ovary free or adnate to the calyx-tube, sessile or stipitate. Legume of diverse types.

A subfamily of attractive plants well represented in the tropics, of which many genera are of significant economic or ornamental interest. This subfamily received considerable attention from Bentham, whose masterly comprehension of the genera has to a great extent been accepted in later works. Britton and Rose have worked out the "Caesalpinaceae" for the 'North American Flora', but it is difficult to accept the multitude of segregate genera recognized by these authors, many of which are poorly delimited and nearly impossible to locate with confidence by use of the keys.

a. Calyx entire, closed in bud, rupturing in anthesis; petals usually 1, sometimes lacking; leaflets 1- to 5-foliolate (in Panama), odd-pinnate (SWARTZIEAE) ..... 1. SWARTZIA

aa. Calyx synsepalous to polysepalous, opening normally in anthesis; petals various but usually 5 (if lacking, leaflets even-pinnate).

b. Leaves simple, 2-lobed, or rarely 2-foliolate from an apical petiolar callus (thus "leaflets" contiguous, epetiolulate, the leaf appearing profoundly 2-lobed) (BAUHINIEAE) ..... 2. BAUHINIA

bb. Leaves pinnate, bipinnate, or obviously 2-foliolate.

c. Leaves pinnate or 2-foliolate.

d. Anthers dorsifixed, versatile, longitudinally dehiscent.

e. Calyx without thickened base, synsepalous for at least a short distance above the receptacular portion.

f. Leaflets many, small (2 cm. or less); perfect stamens 10; ovary short-stipitate, the stipe adnate to one side of the calyx; legume membranaceous, indehiscent (POEPPIGIEAE). To be expected in Panama ..... 3. POEPPIGIA

ff. Leaflets few, large (6–18 cm.) in Panamanian species; stamens 10, or 5 and staminodes 5; ovary sessile or nearly so; legume woody, 2-valved.

g. Stamens 5, staminodes 5; flowers larger (about 6 mm. long), complete (MOREAE) ..... 4. MORA

[1]Issued March 22, 1951. Continued from Ann. Mo. Bot. Gard. 37:314 (Fl. Panama 5[2]:300). 1950.

gg. Stamens 10; flowers smaller (about 2.5 mm. long), apetalous (apparently complete because of calyx-like bracts) ..... 8. PRIORIA
ee. Calyx polysepalous above a thickened receptacular tube or disc-like base.
f. Calyx with a short or small receptacular base; ovary essentially free from the calyx or receptacle (CYNOMETREAE except Nos. 5 and 21).
g. Petals 5 or 3 (see PRIORIA).
h. Petals 3; filaments united basally; legume winged from upper suture; leaflets a few pairs, several cm. long (PHYLLOCARPEAE) ..... 5. PHYLLOCARPUS
hh. Petals 5; filaments free; legume not winged; leaflets either smaller or of a single pair.
i. Leaves mostly 6- to 8-foliolate; leaflets small, strongly obovate; legume thin, flat (CAESALPINIEAE) ..... 21. HAEMATOXYLON
ii. Leaves 2-foliolate; leaflets larger, elliptic; legume turgid ..... 6. CYNOMETRA
gg. Petals lacking (sepals simulating petals in PRIORIA).
h. Calyx 4-parted, ebracteate in anthesis; leaflets several, smaller ..... 7. COPAIFERA
hh. Calyx 5-parted, conspicuously bracteate; leaflets 4, large ..... 8. PRIORIA
ff. Calyx with a pronounced, gross, tube-like receptacular base, to which the stipe of the ovary is variously adnate (AMHERSTIEAE).
g. Leaflets 1 pair (in Panama); stipe of the ovary at least basally adnate to the stocky receptacular tube.
h. Petals 5, subequal; fertile stamens 10.
i. Stigma dilated; legume about 3 cm., 2-valved, ± compressed or flattened; flowers small ..... 9. PELTOGYNE
ii. Stigma small; legume large, indehiscent, terete; flowers large ..... 10. HYMENAEA
hh. Upper petal large, the others rudimentary or lacking; fertile stamens 3 ..... 11. MACROLOBIUM
gg. Mature leaflets 2 to many pair; stipe of the ovary adnate the length of the elongate receptacular tube.
h. Leaflets large, relatively few; inflorescence condensed, subcapitate, sheathed by large bracts; fertile stamens 10 or more.
i. Flowers with conspicuous calycine, ensheathing bractlets; stamens less than 12 (in Panama) ..... 12. BROWNEA
ii. Flowers without united ensheathing bractlets; stamens 14–16 (in Panama) ..... 13. BROWNEOPSIS
hh. Leaflets small, many; inflorescence expanded, racemose; fertile stamens 3 ..... 14. TAMARINDUS
dd. Anthers basifixed, opening by terminal pores or slits (CASSIEAE).
e. Petals 1–2 and minute, or lacking ..... 15. DIALIUM
ee. Petals 5 ..... 16. CASSIA
cc. Leaves bipinnate (CAESALPINIEAE).
d. Flowers very large, the petals about 6 cm. long; legume ligneous, elongate, frequently 4–6 dm. long. Introduced ornamental ..... 17. DELONIX
dd. Flowers smaller, the petals at most about 2 cm. long; legume scarcely ligneous, less than 1.5 dm. long.
e. Stigma peltate; legume narrowly winged on both margins; leaves and inflorescence densely ferruginous (in Panama). Introduced tree ..... 18. PELTOPHORUM
ee. Stigma not peltate nor expanded; legume not winged; leaves and inflorescence rarely ferruginous (in Panama in *Caesalpinia eriostachys* only).
f. Ovary unilaterally adnate to calyx-tube; calyx-tube appearing oblique or "lop-sided"; spatulate legume samaroid with a solitary apical seed; unarmed tree, the leaves very large.... 19. SCHIZOLOBIUM

ff. Ovary free in calyx-tube from basal insertion; calyx-tube equilateral; legume not spatulate and samaroid with a single apical seed; armed or unarmed tree, the leaves mostly moderate.
g. Plants unarmed or armed irregularly with recurved thorns; leaves with a conspicuous primary rachis several cm. long; outermost calyx-lobe cucullate or subcucullate (in Panama) ..... 20. CAESALPINIA
gg. Plants xeromorphic, usually prominently spined at the nodes; leaves with a reduced or obsolete primary rachis; calyx-lobes, except in *Haematoxylon*, about equal.
h. Outermost calyx-lobes cucullate; legume with a conspicuous excentric lateral suture; primary leaf rachis usually obsolete ..... 21. HAEMATOXYLON
hh. Outermost calyx-lobes about equal, not cucullate; legume with marginal sutures; primary leaf rachis mostly present although often modified.
i. Petiole and rachis distinct from nodal spines; rachis of pinna terete; legume flattened, not torulose; to be expected in Panama ..... 22. CERCIDIUM
ii. Petiole and rachis of leaf very short or almost obsolete, consisting at least in part of a prominent spine; rachis of pinna flat; legume torulose ..... 23. PARKINSONIA

1. SWARTZIA Schreb.

SWARTZIA Schreb. Gen. Pl. 2:518. 1791, nom. conserv.

Tounatea Aubl. Pl. Guian. Franc. 1:549, *pl. 218*. 1775.
Possira Aubl. loc. cit. 2:934, *pl. 355*. 1775.
Rittera Schreb. loc. cit. 1:364. 1789; Sw. Fl. Ind. Occ. 935, *t. 16*. 1800.
Hoelzelia Neck. Elem. 3:62. 1790.
Riveria HBK. Nov. Gen. & Sp. 7:266, *pl. 659*[2]. 1825.
Dithyria Benth. in Hook. Jour. Bot. 2:89. 1840.
Fairchildia Britt. & Rose, in N. Am. Fl. 23:348. 1930.

Several other synonyms have been given for *Swartzia* (vide Dalla Torre & Harms, Index Kew.).

Small trees, usually glabrous and with 1- to 5-foliolate leaves (in Panama). Smaller branches usually conspicuously lenticellate. Leaves monofoliolate or pinnate, stipulate, with petiole and rachis (if present) usually obsagittate-alate or at least angled; leaflets ovate to elliptic, membranaceous to coriaceous, prominently veined, with principal lateral veins anastomosing towards the margin; petiolules (in Panama) short and terete. Inflorescence few- to many-flowered, bracteate; buds diagnostic, clavate-pedicellate, globose, entire and (calyx) rupturing into 3–5 irregular sections at anthesis. Flower apetalous or 1-petalate, petal usually large and suborbicular, clawed; stamens usually many, generally of two sorts, fewer (less than 15) larger and longer ones ventrally, with many smaller and somewhat shorter ones above; anthers versatile, with conspicuous connective. Legume 1- to few-seeded, short or elongate, subterete to flattened.

A distinctive genus among Panamanian Leguminosae, easily recognized by the entire buds and mono- or apetalous flowers. However, specific bounds within sections of the genus have not been clear, and a number of "species" have had to be condensed here as S. *simplex*.

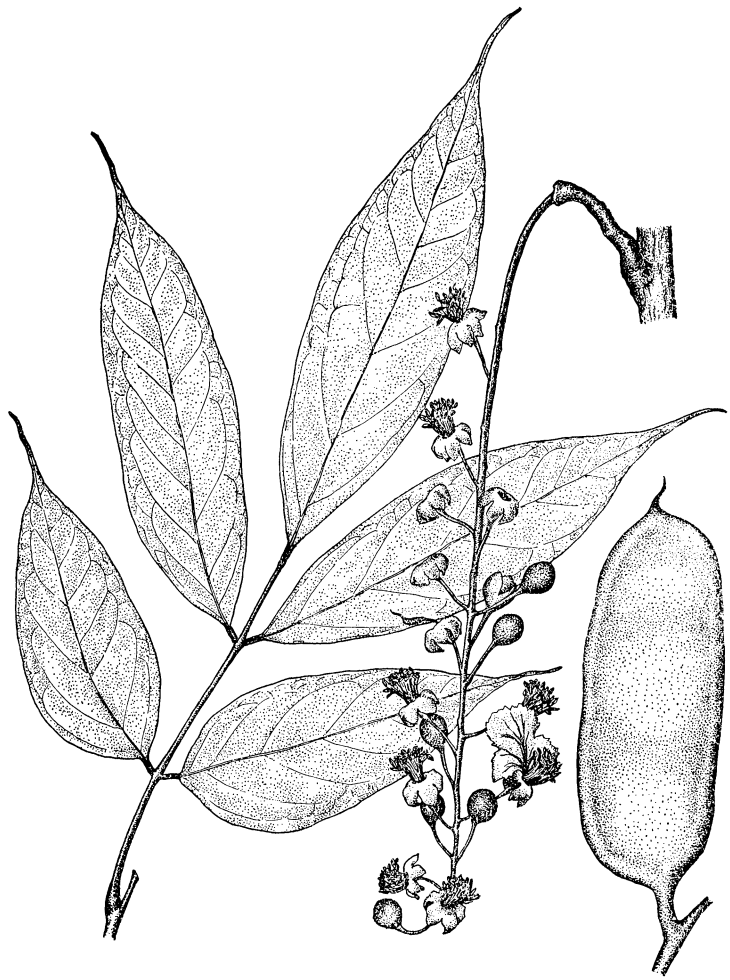

Fig. 105. *Swartzia panamensis*

Predominantly neotropical from Mexico to southern South America; Africa. Common in Amazon basin, especially along the upper Río Negro.

a. Flowers apetalous; leaves large, terminal leaflet generally 15–30 cm. long; legume elongate, slender ..... 2. S. NUDA
aa. Flowers monopetalate; leaves smaller, terminal leaflet generally 6–20 cm. long; legume short, or large and broad.
b. Inflorescence elongate, usually 20–40 cm. long, many-flowered; legume flat, broad ..... 1. S. PANAMENSIS
bb. Inflorescence short, usually less than 10 cm. long, few-flowered; legume subterete, turgid.
c. Petal little if any longer than the calyx; stamens relatively few (18–20) ..... 3. S. ARBORESCENS
cc. Petal much longer than the calyx; stamens many.
d. At least some leaves 3-foliolate; flowers relatively less robust,

petal usually less than 2.5 cm. wide ..... 4. S. SIMPLEX var. DARIENENSIS

dd. Leaves 1-foliolate; flowers robust, petal often more than 3 cm. wide ..... 5. S. SIMPLEX

1. SWARTZIA PANAMENSIS Benth. in Mart. Fl. Bras. 15^2:38. 1870.

Swartzia pinnata Seem. Bot. Voy. Herald, 113. 1853, nec Willd., nec Willd. ex Vog., nec *Rittera pinnata* Vahl.
Tounatea panamensis (Benth.) Taub. in Bot. Centralbl. 47:392. 1891.
Fairchildia panamensis (Benth.) Britt. & Rose, in N. Am. Fl. 23:348. 1930.

Trees to 20 m. tall, branchlets glabrous, conspicuously lenticellate. Leaves large, 5-foliolate; stipules lanceolate, 1–2 mm. long; petiole subterete to angular, 1–6 cm. long; rachis not winged, 2.5–9 cm. long; leaflets glabrous to lightly pubescent below along chief nerves, ovate-lanceolate to elliptic-lanceolate, long caudate-acuminate apically and broadly acute basally, 4–20 cm. long and 1.5–7 cm. broad, submembranaceous, prominently nerved beneath; petiolules gross, sulcate above, 3–7 mm. long. Inflorescence many-flowered, up to 40 cm. long; peduncle lightly pubescent, somewhat angled; pedicels 1.3–2.5 cm. long; mature buds globose, verrucose, 7–9 mm. in diameter. Flowers 1-petalate; petal yellow, irregularly orbicular, dentate-fimbriate marginally, up to about 3.8 cm. long and broad, claw about 7 mm. long; calyx rupturing irregularly into 3–5 reflexed lobes; stamens many, apparently subequal, 8 or so lower filaments thicker than the rest, up to 1.5 cm. long; anthers bilocular, apically acute-subcaudate, up to 5 mm. long in larger anthers. Legume large, broad, flat, beaked, 2–2.5 dm. long and up to 1 dm. wide, splitting first along the ventral suture, the valves thick and somewhat elastic; seeds few, large, flattened, oval, 6–8 cm. in diameter, exarillate.

Panama and Honduras.

CANAL ZONE: Gatún River valley, *Pittier 6511;* between R. Pequení and R. Indio, *Steyermark & Allen 16786;* Quebrada Ancha, *Dodge & Steyermark 16786a;* Trinidad River, *Pittier 4019.* DARIÉN: mouth of Río Yapé, *Allen 324.* SAN BLAS: Puerto Obaldía, *Pittier 4324.*

2. SWARTZIA NUDA Schery, in Ann. Mo. Bot. Gard. 30:92. 1943.

Glabrous trees with terete branches. Leaves 3- to 5-foliolate; petiole (with rachis) 10–13 cm. long, flattened above and 2–3 sulcate, swollen at the nodes; leaflets elliptic, 14–32 cm. long, 6–13 cm. broad, acute or obtuse basally, acute and briefly attenuate apically, with about 12–20 confluent, arcuate, scarious-pubescent, lateral nerves; petiolules terete, canaliculate above, 4–8 mm. long. Inflorescence axillary from non-foliate nodes, spicate, many-flowered, 5–16 cm. long, short-pubescent; pedicels 1–1.5 cm. long; buds globular, about 6 mm. in diameter. Flowers apetalous; calyx rupturing into 3–5 irregular lobes; stamens many, glabrous, in 2 series, shorter ones 1–1.5 cm. long, longer ones 1.9–2.1 cm. long; anthers bilocular, smaller ones 1.5–1.8 mm. long, larger ones 2–2.5 mm. long; ovary glabrous, linear-stipitate, including the style 2–3 cm. long; ovules about 13; style 6–7 mm. long; stigma truncate-capitate. Legume elongate, 12–20 cm. long, subterete, stipitate, apically attenuate; loculi 1–2, 1.3–2 cm. broad, interlocular constriction 0.2–1 cm. broad; seeds arillate, about 5 cm. long and 0.7 cm. broad.

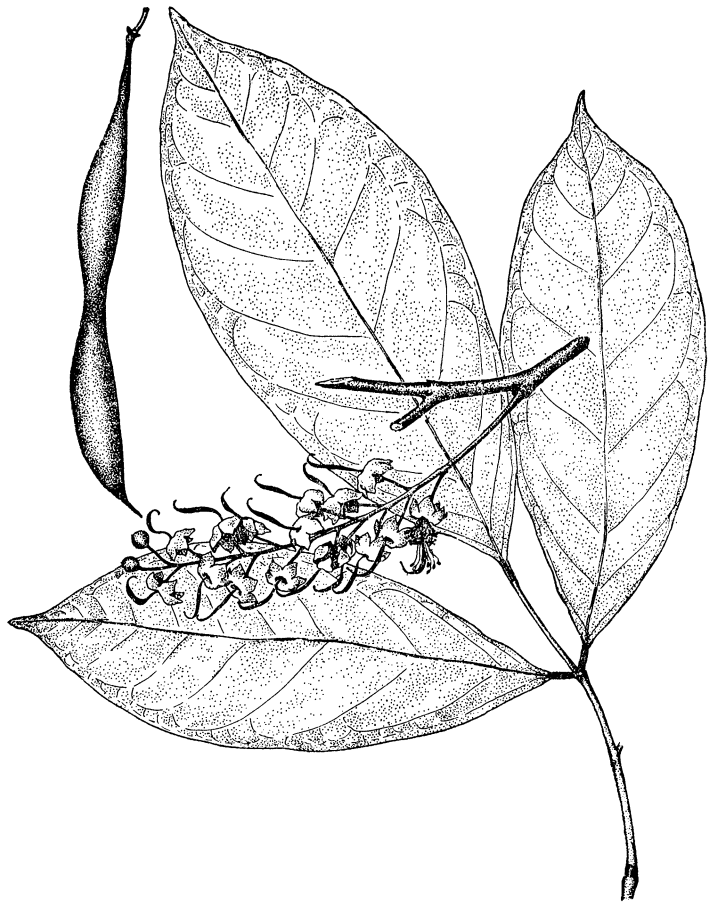

Fig. 106. *Swartzia nuda*

Northwestern Panama.

BOCAS DEL TORO: Isla Colón, *von Wedel 1073, 1107, 1224;* Water Valley, *von Wedel 909, 957, 1727.*

3. SWARTZIA ARBORESCENS (Aubl.) Pittier, in Jour. Wash. Acad. 11:157. 1921.

Possira arborescens Aubl. Pl. Guian. Franc. 2:934, *pl. 355.* 1775.
Possira triphylla Sw. Prodr. Veg. Ind. 82. 1788.
Rittera triphylla Sw. Fl. Ind. Occ. 937. 1800.
Swartzia triphylla Willd. Sp. Pl. 2:1220. 1800.
Swartzia parviflora DC. Mem. Leg. 403, *pl. 60.* 1825, fide Index Kew., Hemsley, Britton.
Tounatea arborescens (Aubl.) Britton, in Bull. Torrey Bot. Club 16:325. 1889.
Swartzia rariflora Hoehne, in Comm. Linh. Telegr. Estrat. Matto Grosso [Publ. 74] Annexo 5, Bot. pt. 12:16, *pl. 188.* 1922, fide Ducke.

Tree to 10 m., branchlets glabrous to pubescent. Leaves glabrous, 1- to 3-foliolate; stipules setaceous; petiole with rachis 1–4 cm. long; rachis narrowly winged, auriculate at least at articulation of terminal leaflet; leaflets ovate to ovate-elliptic, rounded or cuneate at the base, obtusely short-acuminate, subcoriaceous, lustrous, the terminal leaflet 5–10 cm. long. Inflorescence axillary or terminal; the short slender, glabrous peduncles with 2–4 flowers; pedicels filiform, 1–1.5 cm. long; bracts small, setaceous; buds glabrous, subglobose, hardly 4 mm. in diameter. Flowers 1-petalate; petal orbicular, unguiculate, a little longer than the calyx; stamens 18–20, almost all equal, twice longer than the calyx; anthers ovate; ovary stipitate, narrow, glabrous, 5- to 6-ovulate, attenuate to a short style; stipe a little shorter than the calyx. Legume short-stipitate, obliquely ovoid, long-acuminate, 4–5 cm. long, thick and carnose; seed obliquely ovoid, the aril lacerate.

Panama (fide Seemann); northern South America from Colombia to Brazil.

No Panamanian specimen of S. *arborescens* has come to our notice. Possibly the species was incorrectly reported from Panama by Seemann (Bot. Voy. Herald, 112. 1853), as S. *triphylla*, and does not really exist there. The above description is after Pittier (in Jour. Wash. Acad. 11:157. 1921).

4. SWARTZIA SIMPLEX (Sw.) Spreng. var. **darienensis** (Pittier) Schery, comb. nov.

Swartzia darienensis Pittier, in Jour. Wash. Acad. 11:159. 1921.
Swartzia myrtifolia Pittier, loc. cit. 158. 1921 (in part), not S. *myrtifolia* J. E. Smith, in Rees, Cycl. 34:no. 5. 1819, fide Britton.
?Swartzia trifolia Pittier, loc. cit. 158. 1921.
Tounatea subcoriacea Britt. in N. Am. Fl. 23:345. 1930.
Tounatea cuneata Britt. loc. cit. 346. 1930.

Trees 15 m. tall, upper branches glabrous, prominently lenticellate-dotted. Leaves glabrous, 1- to 5-foliolate; stipules linear, 1–5 mm. long; petiole narrowly obsagittate-winged, 0.5–3 cm. long, gross and terete near the axil, wing expanded and auriculate at insertion of petiolule(s); rachis, if present, similarly alate and more prominently so, wing at juncture of terminal leaflet 1.5–3 mm. wide, auricled; leaflets elliptic, abruptly acute or bluntly acuminate apically, cuneate to subobtuse basally, membranaceous or submembranaceous, prominently reticulate-veined; lateral leaflets (if present) usually about 4–8 cm. long and 2–5 cm. broad; terminal leaflet 6–20 cm. long and 3–7 cm. broad; petiolules 2 mm. or less long, terete. Inflorescence 3- to 8-flowered, bracteate, axillary or (less often) terminal on upper branchlets; bracts bidentate, dentae linear-lanceolate, about 1 mm. long; peduncles 1–6 cm. long, subterete, lightly pubescent; pedicels glabrous, 0.5–1.5 cm. long; buds globose, up to 8 mm. in diameter. Flowers 1-petalate, petal yellow, cordate-suborbicular, about 23 mm. wide; calyx splitting into 3–4 irregularly ovate sections up to 1 cm. long, scurfy within, glabrous without; stamens many; anthers bilocular, basally versatile, larger ones about 2 mm. long, with conspicuous dark connective; filaments glabrous, about 10 of them grosser and longer than the others, up to 2 cm. long; ovary stipitate, stipe 4–7 mm. long, up to 13-ovulate;

style glabrous, about 6 mm. long; stigma obscurely bilobate. Legume glabrous, obliquely ovoid, caudate-beaked, apparently 2-valved, about 3.2 cm. long, 1.6–1.8 cm. broad and 1.2–1.6 cm. thick; seed 1, reniform, conspicuously arillate, about 2.5 cm. long.

Endemic to Panama.

CANAL ZONE: Mamei Hill, *Pittier 3800* (TYPE). DARIÉN: vicinity of La Palma, *Pittier 6676;* near mouth of Río Yapé, *Allen 323.* PANAMÁ: vicinity of Campana, *Allen 2145;* Taboga Island, *Macbride 2801.* PEARL ISLANDS: Trapicho Island, *Allen 2621.*

The synonyms listed for S. *simplex* var. *darienensis* are mostly so interpreted from description analysis evaluated in the light of study of what specimens are available. In any group as polymorphous and inconstant as the "S. *myrtifolia*" group appears to be, it seems unjustifiable to base specific delimitation upon characters of rachis-wing venation, minor differences in leaf size and shape, distinction between subcoriaceous and membranaceous leaves, etc. Specimens seen show intergradation on all such characters, often on the same sheet.

Possibly complete monographic study would show S. *simplex* var. *darienensis* to be synonymous with some other name, perhaps older than the Pittier publication of S. *darienensis*. However, for the present there seems no practical alternative but to accept the Pittier name, reduced to varietal status, as inclusive of several newer Britton species, as well as (doubtfully) Pittier's S. *trifolia*. It is probable that S. *trifolia* should be listed as a separate variety of S. *simplex,* but inasmuch as the type is without flowers no such step is here taken. A clear-cut delimitation between S. *simplex* var. *darienensis* and S. *simplex* is virtually impossible.

5. SWARTZIA SIMPLEX (Sw.) Spreng. Syst. Veg. 2:567. 1825.

Possira simplex Sw. Prodr. Veg. Ind. 82. 1788.
Rittera simplex (Sw.) Vahl, Symb. 2:60. 1791.
Rittera grandiflora Vahl, Eclog. 2:37. 1798 (see Excluded Species).
Swartzia simplicifolia Willd. Sp. Pl. 2:1219. 1800.
Swartzia grandiflora (Vahl) Willd. Sp. Pl. 2:1220. 1800 (see Excluded Species).
Tounatea simplex (Sw.) Taub., in Bot. Centralb. 47:391. 1891.
Tounatea penomenensis Britt. N. Am. Fl. 23:343. 1930.
Tounatea Pittieri Britt. loc. cit. 344. 1930.
Tounatea gatunensis Britt. loc. cit. 344. 1930.
Tounatea Williamsii Britt. loc. cit. 345. 1930.
Tounatea Hayesii Britt. loc. cit. 345. 1930.

Small tree to 10 m. tall, branchlets glabrous. Leaves 1-foliolate, stipulate, glabrous; petiole 2–20 mm. long, terete (especially basally) to narrowly alate-auriculate (especially apically); leaflet usually subcoriaceous, elliptic to ovate-lanceolate, bluntly acute to acuminate apically, rounded to cuneate basally, 4–20 cm. long, 2–8 cm. broad, with chief lateral nerves subparallel but confluent marginally; petiolule about 1 mm. or less long, terete. Inflorescence 2- to 6-flowered, axillary or terminal, up to 10 cm. long, with axis lightly pubescent to glabrous; pedicels 5–20 mm. long, bearing globose buds about 8 mm. in diameter. Flower yellow, 1-petalate; petal irregularly orbicular, usually about 3 cm. tall and at least

Fig. 107. *Swartzia simplex*

as broad, claw about 5 mm. long; stamens of 2 types, 8–12 larger longer ones at least 2 cm. long, and many shorter smaller ones less than 1.5 cm. long; anthers oblong, truncate, basally versatile, larger ones about 2 mm. long, smaller ones about 1 mm. long; ovary arcuate, long-stipitate, glabrous. Legume sigmoid-ovoid to asymmetrically oblongoid, subterete, up to 6 cm. long, attenuate-beaked, usually 1-seeded; seed prominently arillate, oblong-ovoid.

Central America and West Indies.

BOCAS DEL TORO: Chiriquí Lagoon, *von Wedel 1400.* CANAL ZONE: Ancon, *Piper 6024;* Barro Colorado Island, *Shattuck 808, Standley 41013, 40839;* Fort Kobe Road, *Allen 1888;* Victoria Fill, *Allen 1710.* COCLÉ: Penonomé, *Williams 396.* COLÓN: Tumba Vieja, *Dodge, Steyermark & Allen 16925.* DARIÉN: Marraganti, *Williams 995.* PANAMÁ: Pacora, *Bro. Paul 333;* Chepo, *Kluge 2.* SAN BLAS: Perme, *Cooper 650.*

This species is listed as S. *simplex* following more or less the concept of Pittier (in Jour. Wash. Acad. 11:157. 1921). Several of the Britton species are listed as synonyms following Pittier and from description analysis, without the types having been seen. Again S. *simplex* may not be the correct name, but serves as a convenient catch-all until monographic study can determine more precisely the specific limits of certain ill-defined sections of the genus. The species as here considered

encompasses a number of intergrading and indefinite forms. It likewise grades into S. *simplex* var. *darienensis*, and some names and specimens that possibly could refer to the latter are included here.

EXCLUDED OR DUBIOUS SPECIES

SWARTZIA MYRTIFOLIA J. E. Smith in Rees, Cycl. 34:no. 5. 1819, was considered by Pittier (Jour. Wash. Acad. 11:158. 1921) as occurring in Panama. Britton, however, believed plants referred by Pittier to this name to be a new species *(Tounatea cuneata)*, which is here treated as a synonym of S. *simplex* var. *darienensis*. On the basis of plants seen and Britton's conclusion that the true S. *myrtifolia* does not occur in Panama, I hesitate to list S. *simplex* var. *darienensis* as synonymous with the older West Indian S. *myrtifolia*.

SWARTZIA GRANDIFLORA Willd. Sp. Pl. 2:1220. 1800, is referred to by Hemsley (Biol. Centr.-Am. Bot. 1:322. 1879–88) as occurring in Panama. However, neither Pittier (in Jour. Wash. Acad. 11:155–60. 1921) nor Britton and Rose (N. Am. Fl. 23:342–49. 1930) mention this name, even as a synonym, and Britton and Killip (in Ann. N. Y. Acad. Sci. 35:192. 1936) record it by name doubtfully in Colombia. 'Index Kewensis' (after? Benth. in Martius, Fl. Bras. 15^2:18. 1870) regards S. *simplex* as a synonym of S. *grandiflora*, and Vahl's description (as *Rittera grandiflora*) notes the great similarity of *R. grandiflora* and *R. simplicifolia* (= S. *simplex*). There seems little doubt but that S. *grandiflora* should be considered a synonym of S. *simplex*.

2. BAUHINIA L.

BAUHINIA [Plum.] L. Sp. Pl. 374. 1753 (originally in L. Gen. ed. 1:126. 1737).

Pauletia Cav. Ic. 5:5, *t. 409, 410*. 1799.
Amaria Mutis ex Caldas, in Seman. Nuov. Rein. Gran. 2:25. 1810.
Schnella Raddi, in Mem. Soc. Ital. Modena 18:411. 1820.
Lacara Spreng. Neue Entdeck. 3:56. 1822.
Casparea HBK. Nov. Gen. & Sp. 6:317. 1823.
Caulotretus Rich. ex Spreng. Syst. 4:Cur. Post. 406. 1827.
Perlebia Mart. Reise 2:555. 1828.
Binaria Raf. Sylva Tellur. 122. 1838.
Alvesia Welw. Apont. (587:n. 47. 1858), fide Ind. Kew.
Caspareopsis Britt. & Rose, in N. Am. Fl. 23:217. 1930.
Other synonyms occur for *Bauhinia*.

Shrubs or small trees, or more generally vine-like and climbing, supported by other vegetation, unarmed or less frequently armed; trunk or stem often flattened, usually with hard wood and longitudinally striate bark. Branchlets with conspicuous alternate nodes, often appearing somewhat zigzag-jointed, sometimes tendriled. Leaves diagnostic, inconspicuously caducous-stipulate, petiolate, simple but usually profoundly 2-lobed or sometimes 2-foliolate, rounded to cordate basally, conspicuously callused at insertion of leaf and petiole, bilobed apically, lobes more or less lanceolate. Inflorescence terminal or axillary near end of the branchlets, few- to many-flowered. Flowers usually whitish, conspicuous; calyx 5-parted,

with a short or long conspicuous tube, the limb often spathaceous; petals 5, free, small or large, mostly unequal, clawed; fertile stamens 10 or 5 or in introduced species 1 or 3; anthers versatile or subversatile, usually sagittate basally; ovary usually stipitate or substipitate; legume compressed, elastically dehiscent.

Old and New World tropics.

a. Leaves very large, 20–30 cm. long; inflorescence not known ..... 13. B. MANCA
aa. Leaves small to large, usually 5–15 cm. long.
b. Calyx elongate-tubular, limb subspathaceous or with elongate reflexed lobes in anthesis.
c. At least 5 stamens antheriferous; native plants.
d. Petals linear-filamentous.
e. Plants armed; leaves small, with rounded lobes; calyx in bud very narrow-tubular, less than 4 mm. wide in the upper portion ..... 1. B. PAULETIA
ee. Plants unarmed; leaves larger, with acute lobes; calyx in mature bud stockier, at least 4 mm. wide in upper portion ..... 2. B. UNGULATA
dd. Petals broader, elliptic to spatulate.
e. Twigs armed; leaves small, moderately cleft, 7- to 9-nerved .... 3. B. EMARGINATA
ee. Twigs unarmed; leaves larger, shallowly cleft, 11- to 13-nerved ..... 4. B. LIGULATA
cc. One or 3 stamens antheriferous; introduced cultivated plants.
d. Flower with 3 antheriferous stamens ..... 5. B. PURPUREA
dd. Flower with 1 antheriferous stamen ..... 6. B. MONANDRA
bb. Calyx campanulate to oblongoid, not spathaceous but toothed or truncate in anthesis.
c. Flowers small, calyx never over 1 cm. long; leaves entire but shallowly to deeply cleft.
d. Calyx teeth prominent, erect, lanceolate to subulate.
e. Leaves dull, often appressed-pubescent above, the lobes blunt; young twigs puberulent to subtomentose ..... 7. B. STANDLEYI
ee. Leaves shiny-glabrous above, the lobes acute; young twigs rufous-subhirsute or almost glabrous.
f. Leaves deeply cleft; calyx about 8 mm. long or longer; young twigs pubescent to glabrate ..... 8. B. CUMANENSIS
ff. Leaves cleft only ¼ their length; calyx about 6 mm. long; young twigs rufous-subhirsute ..... 9. B. STORKII
dd. Calyx teeth reflexed, expanded (obovate), or minute.
e. Calyx teeth rigidly reflexed, 5 mm. long, obovate-attenuate; branchlets and petioles dark red, subhirsute ..... 10. B. REFLEXA
ee. Calyx teeth not reflexed, obovate or minute; branchlets and petioles rusty, short-haired to subglabrous.
f. Calyx teeth manifest, obovate ..... 11. B. OBOVATA
ff. Calyx teeth minute, calyx undulate to subtruncate ..... 12. B. EXCISA
cc. Flowers large, calyx 1.5 cm. long or longer; leaves essentially 2-foliolate.
d. Mature pedicels longer than 1 cm.; antheriferous stamens 10 ..... 14. B. EUCOSMA
dd. Mature pedicels shorter than 1 cm.; antheriferous stamens 5 ..... 15. B. HYMENEAEFOLIA

1. BAUHINIA PAULETIA Pers. Syn. Pl. 1:455. 1805.

Pauletia aculeata Cav. Ic. 5:6, *pl. 410.* 1799.
Bauhinia spinosa Poir. in Lam. Encycl. Suppl. 1:599. 1810.
Bauhinia panamensis Spreng. Syst. Veg. 2:334. 1825.
Bauhinia parvifolia Seem. Bot. Voy. Herald, 113. 1852–7, non Hochst., fide Ind. Kew.
Bauhinia chlorantha Brandeg. in Zoe 5:200. 1905.
Bauhinia longiflora Rose, in Contr. U. S. Nat. Herb. 10:97. 1906.

Shrub or small tree to 6 m. tall, branchlets pubescent, armed with stout prickles at the base of the petioles. Leaves ovate-orbicular, up to 6 cm. long and broad, pubescent to glabrous (especially above), rounded to truncate basally, cleft apically

Fig. 108. *Bauhinia Pauletia*

up to ½ the length of the leaf, lobes rounded-obtuse; petioles short, pubescent, about 1 cm. long, callused at insertion of leaf; stipules linear. Inflorescence terminal, racemose, up to 25 cm. long. Flower large, greenish, up to 10 cm. long; calyx elongated spathaceous, tube about 1.5 cm. long; petals linear-elongated, up to 10? cm. long; fertile stamens 5, about 10 cm. long, with 5 smaller, narrower staminodes alternate with them; anthers linear, subbasally attached, sagittate basally, short-acuminate apically, about 2.5 cm. long or longer; ovary stipitate, pubescent; legume linear, compressed, long-stipitate, pubescent, up to 25 cm. long and 1.5 cm. wide.

Mexico to northern South America.

CANAL ZONE: vicinity of Miraflores Lake, *Pittier 2202*, *P. White 268*. HERRERA: vicinity of Chitré, *Allen 1086*. PANAMÁ: Juan Díaz, *Standley 30498*; Las Sabanas, *Standley 25841*, *31801*; Matías Hernández, *Pittier 6801*, *Standley 28914*. PROV. UNKNOWN: without locality, *Seemann 223*.

2. BAUHINIA UNGULATA L. Sp. Pl. 374. 1753.

Pauletia inermis Cav. Ic. 5:6, *pl. 409*. 1799.
Bauhinia inermis (Cav.) Pers. Syn. Pl. 1:455. 1805.
Bauhinia Cavanillei Millsp. in Field Mus. Publ. Bot. 1:364. 1898.

Unarmed shrub or small tree to 7 m. tall, branchlets brown-pubescent when young. Leaves ovate, glabrous above and pubescent below, conspicuously 9- to 11-nerved, up to 12 cm. long and almost as broad, cleft apically up to ½ their length, basally rounded to subcordate, lobes lanceolate, acute; petiole about 2 cm. long, calloused basally and at insertion of the blade. Inflorescence a terminal raceme up to 10 cm. long or longer, rufous-pubescent, with pedicels up to 2 cm. long. Flowers whitish, about 4.5 cm. long; calyx elongated, about 4.5 cm. long, subregular, tube about 1 cm. long; petals linear, elongated, about 3 cm. long; fertile stamens 10, up to 4 cm. long, in 2 series; anthers linear, basally sagittate, about 1 cm. long in bud; ovary stipitate, pubescent. Legume linear, lightly pubescent, stipitate, up to 20 cm. long and 1 cm. wide.

Mexico to northern South America.

CHIRIQUÍ: Gualaca, *Allen 5061*; San Felix, *Pittier 5281*. VERAGUAS: headwaters Río Cañazas, *Allen 181*.

3. BAUHINIA EMARGINATA Mill. Gard. Dict. ed. 8, no. 5. 1768.

?Bauhinia rotundata Mill. Gard. Dict. ed. 8, no. 7. 1768, fide Britt. & Killip.
Bauhinia mollicella Blake, Contr. Gray Herb. 53:32. 1918, fide Britt. & Killip.
Bauhinia mollifolia Pittier, Arbol. & Arbust. Venez. Dec. 6–8:88. 1927, fide Britt. & Killip.

Prominently armed shrub or small tree, with young branchlets pubescent. Leaves small, orbicular-oblong, up to 6 cm. long and about as wide, more or less glabrous above, pubescent below, 7- to 9-nerved, truncate-subcordate basally, cleft apically about ⅓ their length, lobes ovate, blunt, rounded, more or less spreading, with a subulate apicule at the base of the cleft; petiole pubescent, up to 1.5 cm. long, callused only at insertion of the leaf; stipules linear, caducous. Inflorescence terminal or subterminal, pubescent, with stout buds on short pedicels. Flowers conspicuous, white; calyx-tube about 5 mm. long, limb spathaceous, up to 3 cm. long; petals obovate-spatulate, clawed, pinnate-nerved, 3–4.5 cm. long, up to 1.5 cm. broad; fertile stamens 10, about 3–4 cm. long, the alternating ones somewhat shorter; anthers linear, basally subsagittate, 6–7 mm. long; ovary stipitate, hirsute, with elongated style and truncate-capitate stigma. Legume not seen.

Panama and northern South America.

COCLÉ: La Venta, *Muenscher 16319.* PANAMÁ: Pacora, *Woodson, Allen & Seibert 735 bis.*

Considerable uncertainty was experienced in selecting the name for the specimens cited. In general appearance they are much like *B. albiflora* Britt. & Rose of Salvador, but possess 10 fertile stamens whereas *B. albiflora* is described as with only 5. *B. Schultzei* Harms, of Colombia, is very similar but seems to have a more deeply cleft differing leaf. The older name, *B. emarginata,* was finally selected after comparison with some South American material, in the belief that this species in its broader sense would include the Panama specimens. Britton and Rose (N. Am. Fl. 23:203. 1930) do not list *B. emarginata* as occurring in Central America.

4. BAUHINIA LIGULATA Pittier, in Contr. U. S. Nat. Herb. 20:112. 1918.

A large tree with unarmed, glabrate twigs. Leaves broadly ovate, 4–10 cm. long and 4–7.5 cm. broad, glabrous and somewhat shining above, pale and puberulent beneath, coriaceous, prominently 11- to 13-nerved, basally subcordate, apically cleft for only about 1/6 their length; petioles about 2 cm. long, sulcate; stipules minute, caducous. Inflorescence terminal or axillary-subterminal, racemose to somewhat paniculate, with ferruginous-pubescent buds. Flowers lilac, about 3 cm. long, with ferruginous-pubescent pedicels 2–6 mm. long; calyx-tube (and receptacular portion) obconical, about 7 mm. long, the limb splitting after flowering into 5 narrow, reflexed lobes about 14 mm. long, often more or less adnate; petals 5, ovate-elliptic, apically acute, basally attenuate, about 3 cm. long and 6 mm. broad, short-clawed, sinuate-margined; fertile stamens 10, 5 long and 5 short, free, glabrous; filaments incurved, up to 25 mm. long; anthers ovate-elliptic, about 5 mm. long; ovary essentially glabrous, stipitate, basally adnate to tube of receptacle and surrounded by 2 spathaceous ligules, 5- to 6-ovulate; style thick, the stigma papillose and somewhat 3- to 5-lobed.

Panama.

SAN BLAS: near Puerto Obaldía, *Pittier 4334.*

Known only from the type *(Pittier 4334)* from the San Blas coast of Panama. Remarkable for its size, reported as a large tree up to 40 m. high and 80 cm. in trunk diameter. Named for the unusual ligules surrounding the base of the pistil.

5. BAUHINIA PURPUREA L. Sp. Pl. 375. 1753.

Bauhinia retusa Poir. in Lam. Encycl. Suppl. 1:599. 1810, fide Spreng.
Bauhinia triandra Roxb. Fl. Ind. 2:320. 1832, fide Ind. Kew.
Bauhinia platyphylla Zipp. ex Span. in Linnaea 15:201. 1841.

Introduced, unarmed, ornamental shrub, branchlets glabrous to lightly pubescent. Leaves broadly orbicular, cordate to truncate basally, usually prominently 9-veined, glabrous to lightly pubescent below, up to 13 cm. long and 16 cm. broad, shallowly cleft apically, lobes obtuse, rounded; petiole angled, callous-swollen apically and basally, up to 4 cm. long. Inflorescence terminal or subterminal,

Fig. 109. *Bauhinia Standleyi*

several- to many-flowered. Flowers conspicuous, 3–4 cm. long; calyx scarcely spathaceous, tube up to 1 cm. long, limb up to 2.5 cm. long; petals clawed, spatulate-obovate, about 3.5 cm. long; fertile stamens 3, glabrous; anthers linear-oblong, versatile, 7 mm. long in bud; ovary long-stipitate, densely pubescent, with a truncate stigma. Legume smooth, linear, up to about 30 cm. long.

Introduced to New World tropics from Asia.

CANAL ZONE: Balboa, *Steyermark s.n.* (Jan. 7, 1935); Barro Colorado Island, *Shattuck 176.*

6. BAUHINIA MONANDRA Kurz, in Jour. Asiat. Soc. Bengal 42^2:73. 1873.

Bauhinia Kappleri Sagot, in Ann. Sci. Nat. Bot. VI, 13:317. 1882.
Bauhinia Krugii Urban, in Ber. Deut. Bot. Ges. 3:83. 1885.
Caspareopsis monandra (Kurz) Britt. & Rose, in N. Am. Fl. 23:217. 1930.

Small cultivated tree with young branches lightly pubescent. Leaves ovate-orbicular, up to 20 cm. long and almost as wide, chartaceous to subcoriaceous, glabrous above, pubescent on veins below, basally cordate to truncate, apically cleft up to ⅓ the length of the leaf, lobes blunt, rounded; petiole lightly pubescent, up to 6 cm. long, with bilobate callus at insertion of the leaf. Inflorescence a terminal few-flowered raceme. Flowers large, showy; calyx about 3 cm. long,

spathaceous, pubescent without, tube (including pedicellar part) slender, 2–2.5 cm. long; petals obovate-oblanceolate, 4–5 cm. long, uppermost maculate; fertile stamen 1, arcuate, about 4 cm. long, other stamens rudimentary; anther linear, versatile, sagittate, about 5 mm. long; fruit reported linear, flat, up to 22 cm. long.

Naturalized in the West Indies and northern South America; native to India.

No specimens are recorded from Panama; the plant is reported in Colombia and likely may be cultivated in Panama as well.

7. BAUHINIA STANDLEYI Rose, in Jour. Wash. Acad. 17:166. 1927.

Schnella Standleyi (Rose) Britt. & Rose, in N. Am. Fl. 23:206. 1930.

Large tendrilled vine, sometimes armed basally, with pubescent branchlets. Leaves broadly ovate, 3–9 cm. long and broad, prominently 9-nerved, lightly appressed-pubescent above and more heavily so below, subcordate basally, notched apically for about ⅓–½ their length, with a subulate apicule at the base of the notch, both inner and outer margins of the lobes rounded; petiole terete, pubescent, 2–4 cm. long, callused at insertion of leaf, caducous-stipulate. Inflorescence terminal or subterminal, up to 10 cm. long, pubescent, linear-bracteate. Flowers whitish, 15–17 cm. long; calyx pubescent, more or less bilabiate, subulate teeth (2 above, 3 below), about 2.5 mm. long, tube 4–6 mm. long; petals oblanceolate, up to 17 mm. long and 7 mm. wide, hirsute within basally, smaller petal maculate; fertile stamens 10, glabrous, alternate ones longer (6 mm. long) and with thicker filaments; anthers ovate, versatile; ovary setose-hirsute. Legume spatulate, 6–7 cm. long.

Panama and Costa Rica.

CANAL ZONE: Miraflores Lake, *P. White 269;* Palo Seco, *Allen 2896;* Victoria Fill near Miraflores Locks, *Allen 1711;* without locality, *Seemann 222.* COCLÉ: Penonomé, *Williams 134.* PANAMÁ: vicinity of Pacora, *Allen 1125;* near Panamá, *Standley 26776;* near Punta Paitilla, *Standley 26247;* Taboga Island, *Macbride 2800.*

This species apparently differs little from *B. cumanensis* HBK. (?*B. glabra* Jacq.).

8. BAUHINIA CUMANENSIS HBK. Nov. Gen. & Sp. 6:321. 1824.

Bauhinia columbiensis Vogel, in Linnaea 13:313. 1839, fide Bentham.
Schnella brachystachya Benth. in Hook. Jour. Bot. 2:98. 1840.
Bauhinia brachystachya Walp. Rep. 1:852. 1842.
Schnella columbiensis (Vogel) Benth. Bot. Voy. Sulphur, 89. 1844.
?*Schnella heterophylla* Benth., Griseb. Cat. Pl. Cub. 81. 1866, non *B. heterophylla* HBK.

A scandent, usually tendrilled vine, the twigs pubescent to glabrate. Leaves ovate-orbicular, cordate, deeply lobed apically, 2–12 cm. long and almost as wide, glabrous and shining above, puberulent and pallid below, the lobes acutish, spreading; petioles up to 6 cm. long, glabrous. Inflorescence terminal, racemose, several-flowered, linear-bracteate. Flowers whitish; calyx pubescent, the tube about 8 mm. long, 10-ridged, the teeth linear, 4–6 mm. long; petals oblanceolate, 16–25 mm. long, rounded at apex, pubescent without; stamens up to 12 mm. long in 2

series; ovary densely brown-lanate; style short, glabrous; legume broadly oblong, 6–10 cm. long, 2–2.5 cm. wide, glabrate, short-stipitate, few-seeded.

Panama and northern South America to Venezuela and the Guianas; West Indies.

Hemsley (Biol. Cent.-Am. Bot.) records the species (as *B. columbiensis*) from Coiba Island, Panama; Seemann (Bot. Voy. Herald) records it (as *S. columbiensis*) from "mouth of the Rio Grande de Panama"; Bentham (Bot. Voy. Sulphur) lists it by the same name from "Panama." Neither authentic specimens of *B. cumanensis* nor *B. columbiensis* have been seen. Bentham's judgment (Martius, Fl. Bras. 15^2:212. 1874) that *B. columbiensis* is synonymous with *B. cumanensis* is accepted for convenience, even though Britton and Killip (Ann. N. Y. Acad. Sci. 35:163. 1936) consider it distinct, although possibly the same as *B. glabra* Jacq. *B. cumanensis* is included in this Flora only upon the basis of the references cited, and whether or not it really occurs in Panama as *B. cumanensis* is impossible to say at this time. The above description is taken from the original and that appearing in the 'North American Flora.'

9. BAUHINIA **Storkii** (Rose) Schery, comb. nov.

Schnella Storkii Rose, in N. Am. Fl. 23:206. 1930.

Tendrilled vine, branchlets densely rufous-pubescent. Leaves ovate-orbicular, 4–9 cm. long and 4–8 cm. broad, glabrous above, pubescent beneath, especially along the nerves, prominently 11-nerved, deeply cordate basally, obcuneate-notched apically for not more than ¼ the length, with a subulate apicule about 5 mm. long at base of the notch; lobes bounding notch cuneate-lanceolate to bluntly obtuse, rounded on outer margin, straighter on inner margin; petiole terete, rufous-tomentose, 2–3 cm. long, with a bilobate callus at insertion of the leaf; stipules linear, caducous. Inflorescence a terminal, several-flowered raceme, 2–6 cm. long, linear-bracteate, rufous-tomentose. Flowers pale pink, 12–15 mm. long; calyx pubescent without, more or less bilabiate, lower 3 and upper 2 dentae subulate, about 1.5 mm. long, tube 4–5 mm. long; petals linear-oblanceolate, 1.2–1.5 cm. long, up to 4 mm. wide, hirsute basally within, uppermost linear, smaller, maculate; stamens 10, all fertile alternate ones longer, 5 mm. vs. 4 mm. long; alternate filaments wider; anthers ovate-orbicular, versatile, bilocular; ovary setose-hirsute, short.

Western Panama.

BOCAS DEL TORO: *H. von Wedel 487*. PROV. UNKNOWN: "western Panama", *Stork 140*.

10. BAUHINIA **reflexa** Schery, sp. nov.

Frutex scandens inermis ramulis rufo-hirsutis; foliis orbicularibus usque ad 12 cm. longis latisque, 11–13-nervatis supra glabris subtus appresso-pubescentibus, base cordatis apice lobatis ad ¼–⅓ longitudinem folium, lobis margine exteriore rotundatis margine interiore rectis apice brevi-acuminatis inflexis; petiolis subhirsutis 3–7 cm. longis; inflorescentiis racemosis terminalibus dense pubescentibus, rachibus conspicue bracteatis, bracteis linearibus acuminato-attenuatis ca. 1 cm.

longis; calyce campanulato exteriore dense pubescente 15-nervato coriaceo, ca. 8 mm. longo latoque, dentibus ligulato-oblanceolatis reflexis valde coriaceis, ca. 5 mm. longis, terminaliter attenuatis; petalis obovatis ca. 2 cm. longis, exteriore setoso-pubescentibus, base carnosis angustatis prominente biauriculatis, auriculis 1.5 mm. longis; staminibus fertilibus 10, 5–6 mm. longis, filamentis glabris, antheris 1–1.5 mm. longis; ovario sessili setoso-hirsuto pauci-ovulato, stigmate obliquo.

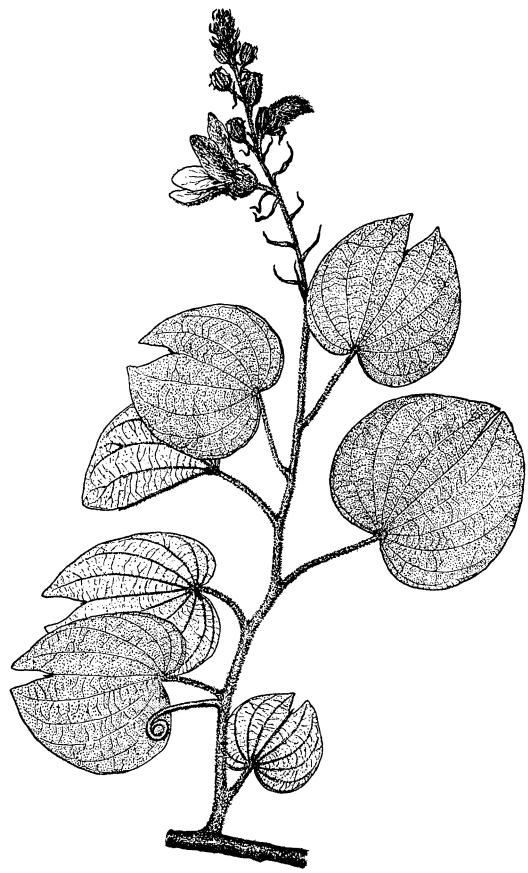

Fig. 110. *Bauhinia reflexa*

Unarmed woody vine, with subhirsute (young) branchlets. Leaves orbicular, 5–12 cm. long and broad, prominently 11- to 13-nerved, glabrous above and conspicuously reticulate, somewhat appressed-pubescent below (hirsute on principal veins), cordate basally, lobed apically for about ¼–⅓ their length, with a minute caudiform apicule 2–3 mm. long at base of the cleft, lobes rounded on the outer margin, straight on the interior, with acute to short-acuminate tips somewhat inflexed; petiole subhirsute, 3–7 cm. long, inconspicuously callous-rugose apically and

basally, with a typical bilobate callus at insertion of the leaf; stipules caducous. Inflorescence a terminal raceme, densely pubescent, rachis conspicuously bracteate, bracts subpersistent, linear, attenuate-acuminate, about 1 cm. long, lightly pubescent. Flowers pink, small, congested; calyx campanulate, densely pubescent without and very dark-hirsute-setose at insertion of pedicel and on main longitudinal ridges, glabrous within except at the base, thickly coriaceous, 15-ridged, about 8 mm. tall and broad, sinuately 5-lobed, each lobe about 1.5 mm. long and bearing a conspicuous reflexed fleshy tooth about 5 mm. long, the teeth pubescent, ligulate-oblanceolate, attenuate apically, about 2 mm. broad at insertion with lobe and bearing there on each margin a conspicuous fleshy horn about 0.5 mm. long; petals obovate, about 2 cm. long, densely setose without, especially laterally and near the middle, within only on the claw, claw thick-fleshy, linear, about 9 mm. long and 2 mm. wide, internally densely brown-setose on the margin and thus ridged down the middle, glabrous at the base, with a fleshy ridge towards either margin surmounted by a prominent brown-setose auricle about 1.5 mm. long; stamens 10, all antheriferous, those opposite the petals smaller, about 5 mm. long, those alternate with the petals larger, about 6 mm. long; filaments fleshy, glabrous; anthers small, bilocular, ovate-lanceolate, about 1.5 mm. long on larger stamens and 1 mm. long on smaller stamens; ovary sessile, setose-hirsute, few-ovulate, with an oblique, cleft, more or less sessile stigma. Legume unknown.

This species is especially marked by the leaf characters; the condensed, prominently bracteate inflorescence; the unusual calyx teeth; the auricled petal-claw; the subsessile ovary and stigma; and the long red-brown general pubescence. It is close to *B. Storkii* and *B. obovata.*

Panama.

CANAL ZONE: Barro Colorado Island, *Kenoyer 377, Salvoza 994, Woodworth & Vestal 515;* vicinity Salamanca Hydrographic Station, *Woodson, Allen & Seibert 1623* (Missouri Bot. Gard., TYPE); ?Río Chagres between Río Indio & Río Pequeni, *Steyermark & Allen 16782* (sterile).

11. BAUHINIA OBOVATA Blake, in Jour. Wash. Acad. 14:286. 1924.

Schnella obovata (Blake) Britt. & Rose, in N. Am. Fl. 23:207. 1930.

Unarmed vine, branchlets rufous-puberulous, soon glabrous. Leaves broadly ovate, up to 8 cm. long and as broad or broader, appressed-pubescent below, glabrous above, subcoriaceous, prominently 9- to 11-nerved, subcordate, bilobed for about ⅓ their length, with a minute apicule at base of cleft, lobes lanceolate, shortly acuminate-tipped, tips incurved; petioles up to 4 cm. long, pubescent, somewhat rugose-calloused apically and basally, with a prominent callus at insertion of leaf. Inflorescence racemose, dense, many-flowered, rufid-puberulous, up to 8 cm. long; bracts obovate, about 4 mm. long. Flowers with bibracteate pedicels 6–9 mm. long; calyx campanulate, densely pubescent, up to 10 mm. long, teeth obovate, about 3.5 mm. long; petals obovate, clawed, rufous-pilose without, about

12 mm. long; antheriferous stamens 10, unequal; filaments glabrous; ovary sessile, densely rufous-pilose; stigma small, oblique.

Panama.

DARIÉN: Sambú River, *Pittier 5568*.

12. BAUHINIA EXCISA (Griseb.) Hemsl. Biol. Centr.-Am. Bot. 1:337. 1880.

Schnella excisa Griseb. Fl. Brit. W. Ind. 214. 1860.
Bauhinia Thompsonii Johnston, in Sargentia 8:140. 1949.

A glabrescent vine, the old stem often flattened and perforated, branchlets puberulous. Leaves subcoriaceous, ovate-orbicular, up to 20 cm. long and almost as wide, glabrous above, minutely pubescent below, basally shallowly cordate, apically cleft to ¼ or more the length of the leaf, with a small apicule at base of the cleft, lobes bluntly acuminate-acute, the tips somewhat incurved; petiole up to 6 cm. long, basally and apically swollen and callous-rugose, with a bilobate callus at insertion of the leaf. Inflorescence racemose, many-flowered, with pedicels 1–4 mm. long. Flowers moderate; calyx pubescent, campanulate, ventricose in bud, subtruncate or broadly undulate, 5–6 mm. long and as broad, with 5 minute or shallow teeth; petals short, oblong, obtuse, 15 mm. long, externally villous; stamens 10, almost 1 cm. long; anthers about 1 mm. long; ovary sessile, villous; legume 6–7 cm. long, 2–2.5 cm. wide, apiculate, short-stipitate, compressed, arcuate.

Panama; Trinidad.

BOCAS DEL TORO: ?Changuinola Valley, *Dunlap 337* (mutilated: fruit only). CANAL ZONE: Balboa, *Gillespie P-26*. DARIÉN: La Palma, *Pittier 5500*. PEARL ISLANDS: San José, *Anderson s. n. (1852)*.

Exact application of this name (from Trinidad type) to Panamanian material awaits monographic study. Dr. I. M. Johnston is certain that the name *B. excisa* does not apply to the Panamanian citations, and indeed comparison with the original description of Grisebach would tend to support this view. Dr. Johnston has proposed the name *B. Thompsonii* to include the Panamanian entity. However, *Broadway 2218*, from Trinidad, is almost identical with the Panamanian material. Other specimens, likewise nearly identical, including some from Panama, have in the past been determined at various herbaria as *B. excisa*. Very similar also are *B. platycalyx* Benth. (to judge from herbarium material so determined), *B. umbriana* Britt. & Killip, *B. breviloba* Ducke (which is very similar to Panamanian material), and *B. sericella* Standl. In Johnston's several collections from San Jose Island of the Pearl Islands of Panama, considerable variation has been noted in the depth of the terminal notch or split of the leaf in what are obviously plants of the same species. Likewise leaves from the same plant may have differing numbers of prominent veins (i.e., either 9 or 11). Also variation in floral and leaf pubescence and in other floral characters can be noted. Perhaps Grisebach, in writing his original description, siezed upon a rather atypical form for the type. He did mention with the original description that the same species was known from Panama.

Until examination of the type is possible, along with abundant material from northern South America where the complex including the Panamanian entity seems to center, it is perhaps wisest to retain the name *B. excisa.*

13. BAUHINIA MANCA Standl. in Field Mus. Nat. Hist. Bot. 18:511. 1937.

Unarmed, cirriferous, climbing vine, branchlets more or less angled and pubescent. Leaves very large, to 30 cm. long, prominently 11- to 13-nerved, glabrous or pubescent below, subcoriaceous, when dry greenish above and brownish below, basally rounded-subcordate, deeply bilobed or essentially 2-foliolate, lobes lanceolate, up to 12 cm. wide, typically long-acuminate apically but often otherwise on same plant; petiole angled, about 12 cm. long, callous-thickened apically and basally. Inflorescence unknown.

Costa Rica and Panama.

Standley has described this species on vegetative characters alone, listing *Frost 112* and *Bailey 278* of Barro Colorado Island, Canal Zone, as probably conspecific with it. The species is distinct in the unusually large leaves, but exact specific delimitation and relationship is still in doubt.

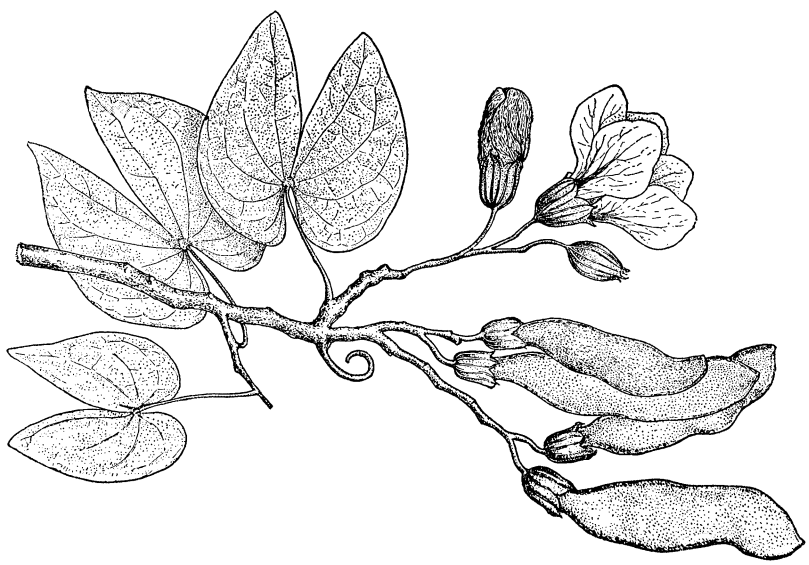

Fig. 111. *Bauhinia eucosma*

14. BAUHINIA EUCOSMA Blake, in Jour. Wash. Acad. 14:286. 1924.

Schnella eucosma (Blake) Britt. & Rose, in N. Am. Fl. 23:207. 1930.

Large tendrilled vine, with terete, glabrous stems. Leaves so profoundly bilobed as to be 2-foliolate, subchartaceous, glabrous except occasionally strigose below especially on veins, lobes ovate-lanceolate, up to 10 cm. long and 4.5 cm. wide, prominently 5-nerved, rounded basally, bluntly acute or obtuse apically, basal

sinus deep and narrow, apical sinus with a subulate apicule at base extending from the lower surface of the petiole and leaflets; petiole slender, glabrous, 3–6 cm. long, callous-rugose at base; stipules caducous. Inflorescence terminal, racemose, glabrous to lightly strigose, up to 10 cm. long or longer, bibracteate at base of pedicels. Flower white, fragrant; calyx large, campanulate, prominently longitudinally (15) ridged, 2–2.5 cm. long, with subulate teeth 3–4 mm. long; petals large, obovate, short-clawed, up to 5 cm. long, strigose without and on the claw within; antheriferous stamens 10, in 2 series, about 15 mm. long. Legume sessile, oblong to oblong-obovate, lightly strigose, up to 13 cm. long and 4 cm. wide.

Panama.

CANAL ZONE: vicinity Miraflores Lake, *G. White 150*. PANAMÁ: Casa Larga, *Allen 2968;* Matías Hernández, *Pittier 6782*.

15. BAUHINIA HYMENEAEFOLIA Triana, Hemsl. Diag. Pl. Nov. 48. 1880.

Schnella hymenaefolia (Triana) Britt. & Rose, N. Am. Fl. 23:208. 1930.

An unarmed vine, young branchlets puberulent. Leaves bifoliolate, the leaflets ovate to oblong, oblique, coriaceous, 5–7.5 cm. long, obtuse, glabrate, 5-nerved; petiole slender, glabrous, about 6 cm. long. Inflorescence racemose, terminal or lateral, few-flowered; pedicels short. Flowers large, white; calyx broad, 15 mm. long, 15-ridged, puberulent, lobes small, ovate-oblong; petals 3.5 cm. long, short-clawed, densely pubescent without; antheriferous stamens 5, free, alternating with 5 sterile ones; filaments glabrous; anthers barbate; ovary sessile, densely hirsute.

Panama and Colombia?

This species was described at Kew from the S. *Hayes 635* specimens from Panama, a photograph of which has been examined. No other Panamanian specimens representing this species have been seen. Thus its separation from the preceding species is maintained on the basis of its description, in which the species is listed as having only 5 antheriferous stamens.

SPECIES OF DOUBTFUL OCCURRENCE IN PANAMA

BAUHINIA SPLENDENS HBK. Nov. Gen. & Sp. 6:321. 1824.

BAUHINIA SUAVEOLENS HBK. loc. cit. 320. 1824.

Both are South American species, listed by Hemsley (Biol. Centr.-Am. Bot. 1:340) as occurring in Panama from reference to specimens in the Kew Herbarium. Not listed in more modern works as occurring in Central America nor Colombia.

Several sterile specimens, evidently *Bauhinia,* have been collected in Panama. On vegetative characters alone these appear different from any of the species here listed. Probably several additional species will eventually be known from Panama.

3. POEPPIGIA Presl

POEPPIGIA Presl, Symb. Bot. 1:15. 1830.

This genus, as represented by *P. procera* Presl, loc. cit., has not yet been reported from Panama, but is to be expected there. It is known from Colombia, Venezuela, Peru, Brazil, Cuba, northern Central America and Mexico.

4. MORA Schomb.

MORA Schomb. ex Benth. in Trans. Linn. Soc. 18:210, *t. 16.* 1839.

Unarmed, gregarious trees of low swampy areas. Young stems lenticellate. Leaves (in Panamanian species) simply conjugate-pinnate, short-petiolate, inconspicuously or not stipulate, with few, large, coriaceous leaflets. Inflorescence spicate, dense. Flowers small; the calyx campanulate, with a short tube and spreading 5-lobed limb; petals 5, small, subequal, imbricate; stamens 5, opposite the petals, free, equal, alternating with 5 apically dilated staminodes; anthers oblong, longitudinally dehiscent; ovary subsessile, free, few-ovulate, with a short style and small terminal stigma. Legume coriaceous to ligneous, compressed, 2-valved, with a large suborbicular seed.

This genus has been conservatively listed under *Dimorphandra* (Schott, in Spreng. Syst. 4, Cur. Post. 404. 1827). However, most modern treatments of the Leguminosae consider it sufficiently distinct (chiefly on the basis of simply pinnate leaves and large seed) to merit separate generic rank, based on Bentham's well-described type *Mora excelsa.*

A single species is known from Panama.

1. MORA OLEIFERA (Triana) Ducke, in Arch. Jard. Bot. Rio de Janeiro 4:45. 1925

Dimorphandra oleifera Triana ex Hemsl. Bot. Voy. Challenger 3:301. 1885.
Dimorphandra megistosperma Pittier, in Jour. Wash. Acad. 5:472. 1915.
Mora megistosperma (Pittier) Britt. & Rose, in N. Am. Fl. 23:218. 1930.

Erect tree to 45 m. high, with brown, glabrous branches. Leaves simply pinnate, bijugate; petioles and petiolules rugose-verrucose, the former 2–5 cm. long, the latter about 3 mm. long; rachis more or less plane above, terete below, 2.5–9.5 cm. long, glabrous; leaflets opposite, asymmetrically ovate to oblong-acuminate, 6–18 cm. long, 4–7 cm. wide, apically obtuse or acute, basally somewhat inequilateral, coriaceous, glabrous, reticulate, dull below. Inflorescence terminal or subterminal, densely spicate, 8–10 cm. long. Flowers white, sessile; calyx glabrous, with a short tube, the lobes orbicular, ciliate, unequal, 3–4 mm. long; petals oblong, attenuate basally, rounded-emarginate apically, about 6 mm. long and 2.5–3 mm. wide, marginally scarious-ciliate; fertile stamens 5, 7–8 mm. long, with thick filaments, the anthers lanose-barbate apically; ovary subsessile, lanose, 2- to 3-ovulate; style glabrous. Legume monoseminate, up to 25 cm. long and 13 cm. broad, glabrous, woody-coriaceous, dehiscent; seed up to 18 cm. long and 12 cm. broad.

Panama and Colombia.

DARIÉN: Sumacate, *Pittier 6593.* PANAMÁ: La Capitana, *Pittier 4582.*

An interesting species producing one of the largest Dicotyledonous seeds known. The ripe pods are said to twist open on the tree, letting the enormous seeds fall to the boggy soil below where they germinate almost immediately. Many trees have

huge, buttressed trunks, with flat primary roots extending outward on top of the ground for as much as 15 m. The species was originally described from a Panamanian collection of S. Hayes.

5. PHYLLOCARPUS Riedel

PHYLLOCARPUS Riedel, Endl. Gen. Suppl. 2:97. 1842.

Large, unarmed trees. Leaves once-pinnate; petiole and rachis eglandular; leaflets a few pairs, moderately large; stipules conspicuous, caducous. Inflorescence of several to many condensed racemes clustered on older branches. Flowers conspicuous, prominently pedicellate; calyx 4-parted, polysepalous above the short receptacular base, strongly imbricate; petals 3, imbricate, the uppermost smaller and obscured; stamens 10, diadelphous by basal fusion of (9) filaments, the filaments free above; anthers versatile, longitudinally dehiscent; ovary free from the calyx; style expanded or clavate apically. Legume flattened, winged along upper suture, indehiscent.

Northern Central America and Amazonia.

A single species is found in Panama, sometimes cultivated but according to Paul H. Allen definitely indigenous to the Madden Lake forests.

1. PHYLLOCARPUS SEPTENTRIONALIS Donn. Sm. in Bot. Gaz. 55:433. 1913.

Tree, the branchlets puberulent and often verrucose when older. Leaves moderate; petiole usually 1–2 cm. long, callous basally, canaliculate above, puberulent; rachis several cm. long, similar to petiole; stipules narrowly lanceolate-falcate, about 7 mm. long; leaflets 4–6 pairs, elliptic, mostly 6–8 cm. long and almost 3 cm. wide, acute (and tip blunt) or obtuse apically, rounded and inequilateral basally, glossy above, puberulent below especially on veins and marginally, finely reticulate. Racemes few-flowered, 2–3 cm. long, clustered on older wood; pedicels about 1 cm. long, bibracteate basally. Flowers red; calyx with a very short receptacular tube less than 1 mm. long; calyx-lobes 4, elliptic, about 8 mm. long, glabrous except ciliate marginally, coriaceous; petals 3, about as long as the sepals; stamens 10, long-exserted; filaments as much as 2.3 cm. long, the lowermost united basally for about ⅓ their length; anthers oblong, about 1 mm. long, bilocular; ovary short-stipitate, free, glabrous; style (with ovary) about 2 cm. long, clavate apically; stigma terminal. Legume (reported) oblong, 12–17 cm. long and 4.0–4.5 cm. wide, thin, 1- to 2-seeded, the wing from the upper suture about 1 cm. wide.

Guatemala and Honduras? to Panama; introduced into Florida, the Canal Zone and elsewhere.

CANAL ZONE: Summit (cultivated), *Allen 2053;* Tumba Vieja, *Steyermark & Allen 16742;* without locality, *Higgins 259.*

Reported to be an attractive ornamental, the abundant scarlet flowers rivaling in showiness those of the Royal Poinciana *(Delonix regia).* Paul H. Allen has the following to say about the occurence of this species in Panama: "The collection cited from Tumba Vieja was from wild trees which are quite common there in

areas of climax rain forest. They average about 90 feet in height, and are very conspicuous in December when they are in flower. The Allen and Higgins collections are from cultivated plants."

6. CYNOMETRA L.

(Reviewed by John D. Dwyer, Union University)

CYNOMETRA L. Sp. Pl. 382. 1753.

Iripa Adans. Fam. 2:508. 1763.

There occur two additional synonyms not concerning the genus in Central America.

Unarmed forest trees. Leaves evenly pinnate; leaflets a single pair (in American species), oblique, subcoriaceous, eglandular. Inflorescence racemose to fasciculate, axillary. Flowers small; calyx essentially polysepalous, the 3–5 lobes reflexed from a small, central, disc-like receptacle and often caducous, imbricate in bud; petals 5, subequal to somewhat unequal, inserted with the stamens upon the receptacle; stamens 10, free, the filaments glabrous; anthers small; ovary sessile to short-stipitate, mostly free, 1- to 2-ovulate; style filiform; stigma terminal, truncate or capitate. Legume rather small, usually oblique or curved, coriaceous, swollen; seeds arillate.

Mexico through Central America; West Indies; South America; Africa; Asia and Pacific islands.

Only a single species has been reported from Panama, unconfirmed by recent listings or specimens.

1. CYNOMETRA BAUHINIAEFOLIA Benth. in Hook. Jour. Bot. 2:99. 1840.

Cynometra crassifolia Benth. loc. cit. 100. 1840.

Tree with slender puberulent branches. Leaves 1-jugate, short-petiolate; leaflets 2, subovate, 2.5–4 cm. long, up to 2 cm. wide, glabrous, submembranaceous, obtuse, somewhat inequilateral, 2- to 3-nervate, pubescent on the nerves. Inflorescence fasciculate, axillary, short-pedunculate; bracts about 1 mm. long. Flowers pedicellate; pedicels pubescent, about 8 mm. long, ovate-bracteate basally; sepals 4, about 3 mm. long, membranaceous, deciduous; petals 5, contracted basally, unequal, inserted upon the disc-like receptacle; ovary pubescent; style glabrous, inflexed; stigma capitate. Legume small, plane-convex, fleshy, verrucose and pubescent without.

Panama?; Guianas to Colombia and Peru, Brazil and Argentina.

This species from a British Guiana type is reported by Hemsley (Biol. Centr.-Am. Bot. 1:342) as occurring in Panama, based upon a specimen *(S. Hayes 29)* at the Kew Herbarium. The genus is to be expected in Panama, having been reported from both Colombia and Costa Rica, but whether the name listed by Hemsley is strictly accurate is doubtful. The more recent 'North American Flora' gives no *Cynometra* from Panama, and *C. bauhiniaefolia* is neither listed from Costa Rica nor Colombia. No specimens of *Cynometra* from Panama nor of *C. bauhiniaefolia* have been examined, and the above description is taken from the original.

7. COPAIFERA L.

(Reviewed by John D. Dwyer, Union University)

COPAIFERA L. Sp. Pl. ed. 2, 557. 1762, nom. conserv.

Copaiva Jacq. Enum. Pl. Carib. 65. 1760.
Copaiba Adans. Fam. Pl. 2:341. 1763.
There also exist three African synonyms for *Copaifera.*

Unarmed trees up to 30 m. high, with glabrescent, distinctly lenticellate branchlets. Leaves simply pinnate, the petiole and rachis usually glabrous; leaflets one to many pairs, usually alternate except terminally, small, coriaceous to chartaceous, more or less inequilateral and falcate, commonly glabrous, reticulate, frequently punctate, short-petiolulate. Inflorescence a terminal or subterminal panicle of multiflowered spikes, the axis minutely caducous-bracteate. Flowers small, apetalous, reportedly yellow-white; calyx 4-parted, polysepalous, basally somewhat disc-like, subvalvate in bud, subtending bracts caducous except in very young bud; petals lacking; stamens usually 10, free, glabrous; anthers relatively large, bilocular; ovary free, substipitate, biovulate. Legume short, somewhat oblique, compressed to turgid, 2-valved, 1-seeded; seed large, arillate.

Panama, West Indies, South America; Africa. Center of New World distribution in Amazon valley of Brazil.

a. Leaflets generally 3–5 cm. long, short-acuminate; legume usually less than 2 cm. long ..... 1. C. PANAMENSIS
aa. Leaflets averaging larger (about 7 cm. long), long-acuminate; legume 3 cm. long or longer ..... 2. C. AROMATICA

1. COPAIFERA PANAMENSIS (Britt.) Standl. in Trop. Woods 34:41. 1933.

Copaiva panamensis Britt. in N. Am. Fl. 23:222. 1930.

Unarmed trees, with lenticellate, glabrous branchlets. Leaves essentially glabrous, 6- to 12 (generally 6- to 8)-foliolate; petiole short; leaflets obliquely ovate or ovate-elliptic, 3–5 cm. long, short-acuminate apically, obtuse or rounded basally, coriaceous, markedly reticulate, with a prominent midvein and many conspicuous lateral veins, usually alternate except terminally on leaf; petiolules flattened, rugose when dry. Inflorescence of many small flowers, as described for the genus. Flowers apetalous; calyx-lobes 4, narrowly ovate to elliptic or lanceolate, about 3 mm. long, subhirsute within, glabrous without, spreading; stamens usually 10, 7–8 mm. long; filaments slender, glabrous; anthers versatile, oblong, almost 2 mm. long; ovary suborbicular, flattened, hirsute marginally; style arcuate, up to 5 mm. long, bearing a capitate stigma. Legume orbicular or broadly ellipsoid, about 15 mm. broad, glabrous; seed almost enclosed by the aril.

Panama.

CANAL ZONE: vicinity of Miraflores Lake, *P. White 257;* R. Chagres, *Steyermark & Allen 16791.* COCLÉ: Nata, *Allen 816;* El Valle de Antón, *Allen 2005;* Penonomé, *Williams 50;* La Pintada, *Allen 3605.*

The species constitutes a source of the oleoresin "copaiba balsam", used medic-

inally and in the manufacture of varnishes. It is readily confused with *C. officinalis*, but has narrow-elliptic leaflets in 3–6 pairs, whereas the latter has wide-ovate leaflets in 2–4 pairs.

2. COPAIFERA AROMATICA Dwyer, in Trop. Woods 83:15. 1945.

Tree to 30 m. tall, with aromatic bark. Leaves 10–30 cm. long, with glabrous petioles; leaflets 8–12, alternate or opposite, distinctly inequilateral, narrowly ovate-oblong or broadly oblong, 2.5–9 cm. long, 1.3–3.5 cm. broad, falcate-acuminate, apically attenuate and minutely retuse, basally obtuse or cuneate, glabrous, often punctate, principal veins somewhat pubescent below. Flowers unknown. Legume (immature) obovate-rotund, about 3 cm. long and broad, obtuse apically and basally; seed obovate-oblong, 1.5 cm. long and 1.1 cm. broad, invested by a dark-red aril 1.7 cm. long.

Panama.

CHIRIQUÍ: Horconcitos, *Pittier 5118;* San Felix, *Pittier 5263.* DARIÉN: Pinogana, *Pittier 6989.* PANAMÁ: Bella Vista, *Macbride 2755.* VERAGUAS: *Karszenisz s. n.*

This species was described from fruiting (immature) material, and perhaps when flowering material becomes available specific delimitation will be more precise. Apparently it is intermediate between South American species *(C. guianensis)* and *C. panamensis.*

NAMES OF UNCERTAIN APPLICATION

Whether the name *C. officinalis* L., type for the genus, is at all applicable to Panamanian species of *Copaifera* cannot be stated certainly. Standley (Contr. U. S. Nat. Herb. 27:203. 1928) listed it (as *Copaiva officinalis*) as occurring in the Canal Zone, but other works tend to regard *C. officinalis* as restricted to the Antilles? and northern South America (although Britton & Killip, Ann. N. Y. Acad. 35:165. 1936 do not list it from Colombia).

Dr. Dwyer believes that two Standley specimens *(26185, 30608)*, both sterile, from Panama, are *C. guianensis* Desf. He states: "The leaflets of . . . . these collections . . . . are typically those of *C. guianensis.* From the labels, however, one learns that both specimens were taken from 'vines'. As all of the Copaiferas range in size from small to very large trees, this notation is certainly of great interest." We must thus regard the occurrence of *C. guianensis* in Panama as yet highly uncertain.

8. PRIORIA Griseb.

PRIORIA Griseb. Fl. Brit. W. Ind. 215. 1860.

Large unarmed tree, with glabrate to lightly pubescent branchlets. Leaves simply pinnate, bijugate except occasionally monojugate, short-petiolate; leaflets pellucid-punctate, coriaceous to submembranaceous, arcuate-oblique and thus somewhat asymmetrical, reticulate, glabrous; petiole and rachis lenticellate; petiolules short, callous-rugose. Inflorescence a terminal panicle of multitudinous spicate flowers. Flowers small, apetalous, apparently with petals (calyx-lobes) if subtending bracts are regarded as part of the perianth; calyx bibracteate (bracts sometimes lobed and simulating a calyx), essentially polysepalous but basally more or

less disciferous, the sepals 5, orbicular, imbricated in bud; stamens 10, free, subequal; ovary subsessile, 1- to 2-ovulate. Legume flattened verrucose, ligneous, tardily 2-valved, monoseminate.

The genus consists of a single species.

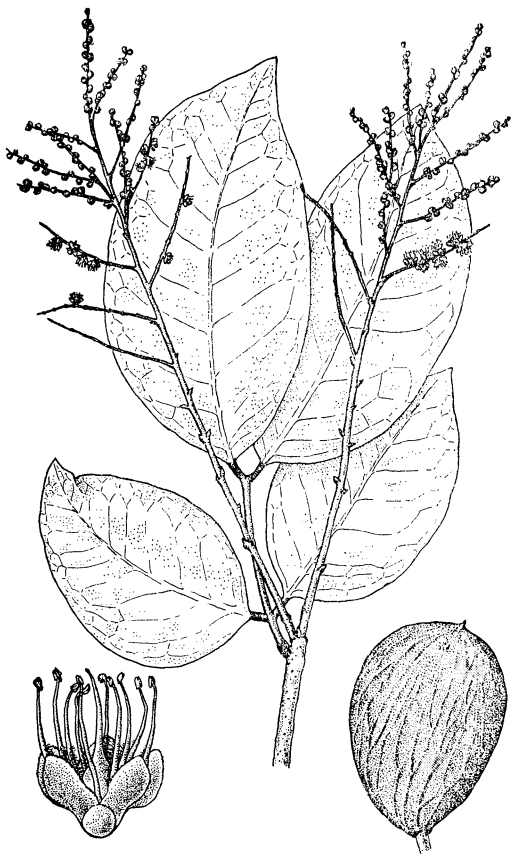

Fig. 112. *Prioria Copaifera*

1. PRIORIA COPAIFERA Griseb. Fl. Brit. W. Ind. 215. 1860.

Trees up to 40 m. high, with spreading crown and large trunk. Leaves 4-(2)-foliolate; petioles about 1–2 cm. long, basally callous-rugose; leaflets elliptic-lanceolate, 6–16 cm. long, 4–8 cm. wide, rounded-obtuse and somewhat unequal basally, bluntly short-acuminate apically; rachis 2–5 cm. long; petiolules 2–6 mm. long. Inflorescence a panicle of many flower-bearing spikes each up to 10 cm. long. Flowers white-yellow, basally bibracteate; bracts broadly orbicular, about 1.5 mm. long, ensheathing the disciferous part of the calyx, often lobed and simulating a calyx; sepals scarious-margined, ciliate, about 2.5 mm. long; petals lacking; stamens 10, about 5 mm. long; filaments basally and internally lightly lanose; anthers or-

bicular, bilocular, loculi markedly separated by the connective; ovary subsessile, lightly lanose marginally, with a short attenuate style and inconspicuous stigma. Legume suborbicular, up to 10 cm. long and almost as wide, prominently veined, verrucose, lepidote at least in youth; single seed large, flat, almost filling the pod.

Panama to Nicaragua; Colombia; West Indies.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater III.* CANAL ZONE: Barro Colorado Island, *Bangham 524, Salvoza 943;* Chagres River, *Allen 909;* Trinidad River, *Pittier 3971.* DARIÉN: vicinity of Pinogana, *Allen 277, 932.*

The species is a source of "Copaiba balsam", used medicinally and pharmacologically. With some specimens it is stretching the imagination to regard the flowers as apetalous, so much do the bracts simulate a calyx and the calyx a corolla.

9. PELTOGYNE Vogel

PELTOGYNE Vogel, in Linnaea 11:410. 1837.

Unarmed trees, the branchlets terete. Leaves simply pinnate, short-petiolate; leaflets one pair, coriaceous, punctate, short-petiolulate to subsessile, inequilateral. Inflorescence racemose, terminal or subterminal, few- to many-flowered. Flowers small, whitish; calyx receptacular and disc-like basally, the lobes 4, imbricate in bud; petals 5, sessile, punctate, subequal; stamens 10, free, glabrous; ovary few-ovulate, short-stipitate the stipe adnate to the receptacular portion of the calyx; style slender, with a peltate-capitate stigma. Legume 2-valved, flat.

Primarily a South American genus centered in northern Brazil.

A single species is known from Panama.

1. PELTOGYNE PURPUREA Pittier, in Jour. Wash. Acad. 5:471. 1915.

A tall forest tree with slender, glabrous branchlets and hard wood, usually found in localities with a dry season. Leaves deciduous, glabrous, reported with caducous, membranaceous, acuminate stipules about 1 cm. long; petiole to 2 cm. long; leaflets 2, 5–7 cm. long and 2–3 cm. broad, markedly reticulate, subfalcate, inequilateral, acuminate, obliquely rounded or obtuse basally, short-petiolulate, the petiolules 3–4 mm. long. Inflorescence as described for genus. Flowers not described nor examined. Legume pedicellate (about 8 mm.), broadly obovate, about 3 cm. long and 1.6 cm. broad, flattened, glabrous, verrucose-reticulate with narrow sutures, apically mucronulate, slightly arcuate above, rounded below, 1-seeded; seed almost 2 cm. long, obliquely ovate, depressed, persistent on the dehisced fruit hanging by the funicle; funicle dilated into a narrow, cupuliform aril.

Southern Darién, Panama; Costa Rica?

DARIÉN: La Palma, *Pittier 6621* (sterile); Patino, *Pittier 5708, 6610;* Yaviza, *Pittier 6586* (sterile).

As is common for the "purple heart" genus, the wood is very hard, with white sapwood and beautiful purple heartwood, valuable in various uses. Until recently the species has not been known in flower, and its exact placement and affinities unconfirmed. Paul H. Allen states that he has collected abundant flowering material

of presumably the same species from Costa Rica, but I have not had opportunity to examine these collections.

10. HYMENAEA L.

HYMENAEA L. Sp. Pl. 1192. 1753.

Courbari Adans. Fam. 2:317. 1763.
Hemenaea Scop. Introd. Hist. Nat. 296. 1777.
Courbaril Plum. ex Endl. Gen. 1317. 1841?.
Hymenia Griff. Notul. 4:449. 1854, fide Dalla Torre & Harms.

Tanroujou (Juss. Gen. 351. 1789) has also been given as a synonym for *Hymenaea*, referring to a Madagascar fruit.

Unarmed resinous trees, with spreading crown. Leaves 1-jugate, petiolate; leaflets 2, obliquely asymmetric, coriaceous, glandular-punctate, short-petiolulate to subsessile. Inflorescence terminal, short, subcorymbose. Flowers moderately large, with a short, gross, pedicel and thick receptacle; calyx 4-parted, the lobes imbricate; petals 5, slightly unequal, sessile, glandular; stamens 10, free, glabrous; anthers longitudinally dehiscent; ovary few-ovulate, short-stipitate, the stipe adnate to the receptacular portion of the calyx; style slender; stigma terminal. Legume ligneous, thick, indehiscent, few-seeded; seeds exarillate.

A neotropical genus, best represented in the Amazon valley.

A single species is known from Panama.

1. HYMENAEA COURBARIL L. Sp. Pl. 1192. 1753.

Hymenaea resinifera Salisb. Prodr. 327. 1796.
Hymenaea animifera Stokes, Bot. Mat. Med. 2:449. 1812, fide Index Kew.
Hymenaea Candolleana HBK. Nov. Gen. & Sp. 6:323, *t.* 566. 1824.
Hymenaea retusa Willd. ex Hayne, Darst. u. Beschreib. Arzneigew. 11:sub, *t.* 12. 1856.

Inga megacarpa (M. E. Jones, Contr. West. Bot. 15:140. 1929) is listed in the 'North American Flora' as a synonym of this species. Jones' description would preclude this possibility, but if Britton had reference to the actual type perhaps the description was incorrectly drawn by Jones. Description of the fruit would match *H. Courbaril*, but description of the leaves would not.

Tree to 30 m. tall, with smooth bark, the trunk to 2 m. in diameter, the wood hard and reasonably durable, the branchlets glabrous. Leaves glabrous; petiole about 1–2 cm. long, moderately thick, rugose when dry; stipules caducous; leaflets 2, narrowly oblong to elliptic-lanceolate, 4–10 cm. long, 2–5 cm. wide, obliquely asymmetric, the outer portion broadly rounded basally and without, the inner portion narrow and only slightly rounded, apically short-acuminate, subsessile, coriaceous, punctate, dull below, shiny above, with midvein very prominent below. Inflorescence articulate, several-flowered, the pedicels puberulent, the bracts caducous. Flowers whitish, gross, the receptacular portion (of calyx) about 8 mm. long; calyx-lobes ovate to oblong, about 15 mm. long, densely puberulent, verrucose, coriaceous, easily caducous; petals elliptic, up to 2 cm. long, membranaceous; stamens about 3 cm. long; anthers elliptic, versatile, bilocular; ovary elliptic, oblong or obovate, compressed, glandular, dark; style up to 2.5 cm. long, glandular. Legume oblong, turgid-compressed, 5–15 cm. long, few-seeded.

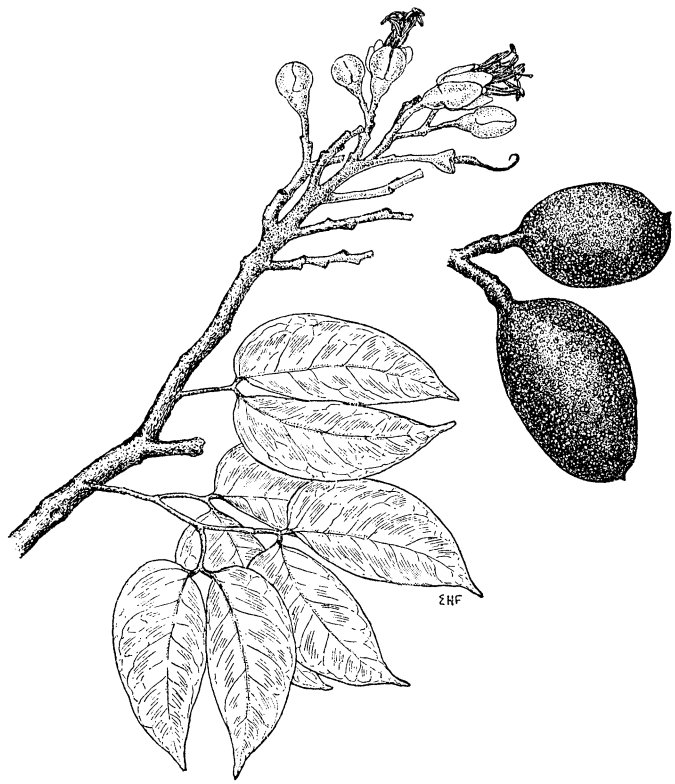

Fig. 113. *Hymenaea Courbaril*

Mexico through Central America; West Indies; northeastern South America.

CHIRIQUÍ: Caldera, *Pittier 3351*. COCLÉ: vicinity of El Valle, *Allen 1766;* Penonomé, *Williams 193*. VERAGUAS: headwaters Río Cañazas, *Allen 199*.

The species is of economic importance, both as timber and as a source of the resin "South American copal." The pulp of the fruit is edible. The strong, heavy wood is employed in various kinds of construction. The resinous exudation from the trunks is of use medicinally, in varnish manufacture, and as an incense. Indians are reported eating the fruit pulp, and using the bark in making canoes.

11. MACROLOBIUM Schreb.

MACROLOBIUM Schreb. Gen. 1:30. 1789, nom. conserv.

Vouapa Aubl. Hist. Pl. Guian. Franc. 1:25, *t. 7*. 1775.
Outea Aubl. loc. cit. 28, *t. 9*. 1775.
Kruegeria Scop. Introd. Hist. Nat. 314. 1777.
Anthonatha Beauv. Fl. d'Oware 1:70, *t. 42*. 1805, fide Dalla Torre & Harms.
Utea J. St.-Hil. Expos. Fam. 2:203. 1805.
Vuapa Ktze. Rev. Gen. 1:212. 1891
Pseudovouapa Britt. & Killip, in Ann. N. Y. Acad. 35:166. 1936.

Unarmed trees, of small or moderate size. Leaves pinnate, generally caducous-stipulate, with 2 to many leaflets (in Panamanian species a single pair); leaflets small or large, coriaceous or almost so, often unequal basally. Inflorescence usually racemose, terminal to axillary on older wood, bracteate but the bracts generally caducous. Flowers small to moderate, ensheathed to a greater or lesser extent by the (2) fused bracteoles, this bracteolar sheath cleft on one side; receptacular portion of calyx short; calyx-lobes 4 or rarely 5, slender, imbricate; visible petal 1, large, clawed to subsessile, folded-cucullate in bud, other petals squamiform or lacking; perfect stamens 3, elongate, free, in some species with up to 7 accompanying staminodia; ovary 2- to many-ovulate, subsessile to stipitate, the stipe or base of ovary adnate to the receptacle on one side; style slender, with a terminal small or capitate stigma. Legume flattened, 2-valved, small, orbicular to oblong; seeds 1 to few, large, ovate to orbicular.

Panama; South America, most abundant in the Amazon section of Brazil; Africa.

a. Petal about 1.3 cm. long ..... 1. M. MODICOPETALUM
aa. Petal about 4 cm. long ..... 2. M. PITTIERI

Fig. 114. *Macrolobium modicopetalum*

1. MACROLOBIUM MODICOPETALUM Schery, in Ann. Mo. Bot. Gard. 30:88. 1943.

Tree with subglabrous to glabrous branchlets. Leaves glabrous, 1-jugate; petiole short, terete, deeply canaliculate; leaflets subsessile, coriaceous, elliptic, basally unequal and subacute, apically short-attenuate and obtusely mucronate,

12–23 cm. long and 4–9 cm. wide, the veins prominent beneath and laterally confluent. Inflorescence spicate, glabrous or very short-pubescent, bracteate, arising laterally or subterminally from the branchlets. Flowers narrow-pedicellate; the sheath (fused bracteoles) obovate, about 7–9 mm. long, bilobate, the lobes about 4 mm. broad; sepals 4, oblong, about 6–7 mm. long and 2.5–4 mm. wide, obtuse, glabrous; petal 1, white, ovate-lanceolate, 12–13 mm. long and 6–8 mm. wide, concave, undulate-margined, briefly unguiculate; stamens 3, the filaments linear, 11–19 mm. long, the anthers ovate, about 3 mm. long; ovary compressed, marginally pubescent, substipitate, 4-ovulate; style glabrous, with the ovary up to 20 mm. long.

Northwestern Panama.

BOCAS DEL TORO: Fish Creek, *von Wedel 2209, 2226, 2291, 2399.*

2. MACROLOBIUM **Pittieri** (Rose) Schery, comb. nov.

Vouapa Pittieri Rose, in N. Am. Fl. 23:226. 1930.

Small tree. Leaves 2-foliolate, subsessile; leaflets broadly oblanceolate, 3–3.5 dm. long, sometimes 1 dm. broad, chartaceous, basally oblique, apically acute or acuminate. Inflorescence lateral, borne on older branches, 3–5 cm. long, short-pedunculate. Flowers pedicellate, the pedicels 4–6 mm. long, glabrous; sheath (fused bracteoles) 9–11 mm. long, glabrous, cleft for half its length; calyx glabrous, the lobes imbricate in bud, linear-oblong to linear-obovate and about 2 cm. long in anthesis; petal 1, elliptic, about 4 cm. long and 13 mm. wide, thin, erose-undulate margined, glabrous, short-clawed; ovary lightly pubescent on margins, the style glabrous; legume oblong, 15 cm. long and 5 cm. wide, glabrous, the valves twisting in age; seed oblong, 2 cm. long, flattened, rugose.

Northeastern Panama.

SAN BLAS: Puerto Obaldía, *Pittier 4355.*

12. BROWNEA Jacq.

BROWNEA Jacq. Enum. Pl. Carib. 6. 1760 (as *Browneae*), nom. conserv.

Hermesias Loefl. Iter Hisp. 278. 1758, hyponym.

Shrubs or trees, branchlets pubescent or glabrous. Leaves large, simply pinnate, few- to many-foliolate; leaflets in pairs, opposite to subalternate, large, entire, short-petiolulate. Inflorescence capitate to short-racemose, terminal to cauliflorous, bracteate, the bracts often colored and caducous. Flowers large, showy, ensheathed basally by the coalesced bractlets; calyx 4- to 5-parted, submembranaceous, with an elongate, thickened receptacular base; petals 4–5, membranaceous, clawed; stamens 10–15, basally connate. Ovary stipitate, the stipe adnate the whole length of the receptacular tube. Legume flat, 2-valved.

Panama to Brazil; southern West Indies; center of dispersion apparently interior Venezuela.

This striking genus is apparently in need of specific condensation. Plants from different localities (bearing different names) appear highly similar in the herbarium, and specific limits are poorly defined. The specimens are usually bulky and incomplete on herbarium sheets,—the sheets often being without reference to location of inflorescence or other so-called key characters, and with parts of the large inflorescence or flowers missing or caducous. The plants themselves are extremely variable in the number of leaflets on various leaves of the same plant. The specific names listed must temporarily serve until monographic study can determine their true reference and complete synonymy.

a. Leaflets elliptic to ovate, usually rounded or obtuse basally, essentially glabrous below; floral sheath mostly rusty-tomentose or tomentulose and scarcely 3 cm. long ..... 1. B. ROSA-DE-MONTE
aa. Leaflets narrowly elliptic, usually cuneate basally or narrowing below the middle, pubescent below, at least along the midvein; floral sheath canescent-tomentose, usually about 3.5 cm. long ..... 2. B. MACROPHYLLA

1. BROWNEA ROSA-DE-MONTE Berg. in Phil. Trans. Roy. Soc. London 63:174, *pls. 8 & 9.* 1773.

Brownea Rosa Pers. Syn. Pl. 2:237. 1807.
Brownea rosea Otto, in Otto & Dietr. Allg. Gartenzeit. 23:147. 1855, fide Index Kew.
Brownea Princeps Linden ex Otto, in Otto & Dietr. loc. cit. 1855, equals *B. Ariza,* fide Index Kew.
?Brownea Ariza Benth. Pl. Hartw. 171. 1857.
Brownea speciosa Rchb., Griseb. Fl. Brit. W. Ind. 212. 1860. (DC. Prodr. 2:477. 1825).
Brownea coccinea Loefl. ex Griseb. loc. cit. 1860, non *B. coccinea* Jacq.
Hermesias Rosa O. Ktze. Rev. Gen. 191. 1891.
Brownea rosa-montis Pittier, in Contr. U. S. Nat. Herb. 18:156. 1916.

Small tree, with lenticellate, glabrous (in Panama?) branchlets. Leaves few- to several-jugate, glabrous, short-petiolate; the rachis stout, lenticellate, up to 40 cm. long or longer; leaflets elliptic (lowermost on leaf usually ovate or subovate), up to 20 cm. long or longer, 2–9 cm. wide, dull, apically attenuate-cuspidate, basally obtuse to rounded, with a gland below to one side on base of the midrib; petiolules stout, 3–6 mm. long. Inflorescence on older branchlets, condensed, bracteate, the bracts puberulent, broadly ovate to linear, several cm. long; common peduncle 2–3 cm. long, tomentose; pedicels about 3–5 mm. long, pubescent. Flowers conspicuous, scarlet-red; bracteolar sheath relatively small, usually 2.5–3.0 cm. long, bilobed, tomentulose to tomentose, usually ferruginous; sepals (i.e. lobes) 4–5?, oblong to linear, up to 25 mm. long and 13 mm. wide, subglabrous, free, often caducous; petals 5, usually oblong, about 4 cm. long and 1–1.5 cm. wide, glabrous, clawed, claw about 1 cm. long; stamens 10–11, about 8 cm. long, glabrous, connate below for about 2 cm.; ovary tomentose, stipitate, with style about 8 cm. long.

Costa Rica to Northern South America and Trinidad.

CANAL ZONE: Ancón, *Pittier 2722;* R. Boqueron, *Steyermark & Allen 17226;* R. Indio, *Dodge & Allen 17309.* DARIÉN: El Real, *Allen 945.* SAN BLAS: Puerto Obaldía, *Pittier 4408.*

Fig. 115. *Brownea Rosa-de-monte*

Intergradation occurs between this and *B. macrophylla.* Intensive study of the genus in northern South America may show the differences to be of subspecific value only. *B. Ariza* (*B. Princeps,* fide Index Kew.) is tentatively listed as a synonym on what evidence can be ascertained from examination of Panamanian and South American specimens and its own brief description, but the type has not been seen. Standley (Contr. U. S. Nat. Herb. 27:202. 1928) and Pittier (Contr. U. S. Nat. Herb. 18:153? 1916) both list *B. Ariza* as occurring in Panama as a distinct species.

2. BROWNEA MACROPHYLLA Linden, Cat. no. 18:11. 1863; Mast. in Gard. Chron. *777, fig. 149.* 1873.

Brownea antioquensis Linden loc. cit. no. 23:3. 1869.

Small tree, the branchlets generally tomentulose. Leaves few- to several-jugate; the petiole stout, to 10 cm. long; the rachis puberulent to glabrous, elongate; leaflets narrowly elliptic to elliptic-oblanceolate (sometimes more or less ovate in basal pair), up to 30 cm. long and 9 cm. wide, apically long attenuate-cuspidate, basally acute to cuneate (infrequently obtuse or rounded), pubescent at least along the midvein below, dull, with a basal gland; petiolules to 5 mm. long, callous and often tomentose. Inflorescence axillary on older stems to subterminal, bracteate; the bracts to 7 cm. long, glabrous to lightly pubescent; common peduncle about 3 cm. long, tomentose, many-flowered; pedicels 4–7 mm. long, pubescent. Flowers large, red; bracteolar sheath about 3.5 cm. long, spathaceous and bilobate, usually canescent-tomentose; calyx-lobes 5, linear-oblanceolate to narrowly elliptic, 2.5–3.5 cm. long, up to 8 mm. wide, glabrous; petals 5, rounded apically, up to 4 cm. long, the claw about 1 cm. long; stamens 10–11, glabrous, basally connate, usually 8–9 cm. long; ovary narrow, stipitate, tomentose, including style about 10 cm. long.

Northern South America and Panama.

CANAL ZONE: Fort Randolph, *Standley 28731;* Fort Sherman, *Standley 31005;* France Field, *Stevens 987;* between France Field and Catival, *Standley 30195.* COLÓN: Porto Bello, *Peterson 6522.* DARIÉN: Boca de Pauarandó, *Pittier 5591;* Cerro Pirre, *Pittier 6973;* Pinogana, *Pittier 6571.* PANAMÁ: Juan Díaz, *Hunter & Allen 931.*

The original "description" and 'Gardeners' Chronicle' figure of *B. macrophylla* are nearly useless in determining correct application of this name. Inasmuch as the type specimen was not seen, I have followed generally Pittier's interpretation of the species (Contr. U. S. Nat. Herb. 18:155. 1916), except for *Peterson 6522* which seemed to have more affinities here than with *B. Rosa-de-monte.*

13. BROWNEOPSIS Huber

BROWNEOPSIS Huber, in Bol. Mus. Goeldi 4:565. 1906.

Tree to 30 or more meters. Leaves even-pinnate, short-petiolate, the rachis extended, the leaflets subopposite in pairs. Inflorescence terminal to cauliflorous, congested, in more or less conspicuously bracteate heads. Flowers ebracteolate, sessile; calyx with a thick basal, obconic, angular, receptacular portion, and 4-parted limb, 3 sepals similar, the fourth different, frequently circumscissile; petals 3 or 4, rudimentary to partially petaloid-expanded; stamens 12–16, the filaments connate below for about half their length, somewhat unequal; ovary slender, stipitate, the stipe completely adnate to the receptacular tube; style elongate, with a capitate stigma. Legume large, flat, 2-valved.

Panama to Brazil.

A genus allied to *Brownea,* in a section of the Leguminosae where generic limits are often difficult to determine. *Browneopsis* is separated from *Brownea* primarily because of the lack of a bracteolar sheath in the flowers of the former. Macbride (Field Mus. Bot. Ser. 13^3:135. 1943) has referred the species back to *Brownea.*

A single species is known from Panama.

1. BROWNEOPSIS EXCELSA Pittier, in Contr. U.S. Nat. Herb. 18:157, *pl. 63*. 1916.

Brownea excelsa (Pittier) Macbride, in Field Mus. Bot. Ser. 13^3:135. 1943.

Large unarmed tree, with terete, glabrous, lenticellate branchlets. Leaves 4- to 6-foliolate; petiole short, gross basally, with rachis up to 10 cm. long; rachis flattened and usually 1-sulcate above, glabrous; leaflets ovate to lanceolate or oblong, 5–11 cm. long, 2–5 cm. wide, apically usually very long-acuminate, basally truncate to obtuse to cuneate, glabrous, dull, chartaceous, minutely reticulate; petiolules about 6 mm. long. Inflorescence a condensed, short-peduncled, few-flowered, cone-like "head", terminal or axillary and subterminal; bracts broadly ovate, to 3.5 cm. long, ciliate, somewhat puberulent, longitudinally rugose, overlapping. Flowers cream to pinkish, showy; calyx with a thick basal receptacular portion about 8 mm. long, the 4 petaloid sepals (lobes) elliptic, one shorter than the other 3, to 2.5 cm. long, often caducous; petals 3 or 4, 2? of them narrowly elongate-obovate, about 3 cm. long, clawed, glabrous; stamens 14–16, monadelphous, glabrous, up to 3.5 cm. long; anthers linear-oblong, up to 1 cm. long, versatile, bilocular; ovary narrow, stipitate, densely pubescent, with style up to 4 cm. long or longer; style glabrous; stigma terminal, rounded. Legume linear-oblong, 15–20 cm. long, 3–4 cm. wide, thin and flattened, densely puberulent, obliquely attenuate-mucronate apically, long-stipitate basally, few-seeded.

Darién, Panama.

DARIÉN: Garachine, *Pittier 5511;* Marraganti, *Williams 1011;* between Pinogana and Yavisa, *Allen 261;* El Real, *Allen 946*.

14. TAMARINDUS L.

TAMARINDUS L. Sp. Pl. 34. 1753.

Medium-sized trees of lower elevations. Leaves evenly pinnate, moderate-sized, short-petiolate; stipules minute, caducous; leaflets small, numerous, sessile, paired. Inflorescence short, usually terminal, few-flowered, racemose. Flowers moderately large, attractive; calyx 4-parted, the lobes reflexed above the receptacular base, imbricate in bud; petals very unequal, the 3 uppermost expanded and the 2 lowermost rudimentary; stamens 3, monadelphous; staminodia minute; anthers longitudinally dehiscent; ovary stipitate, the stipe adnate to the receptacular tube; style elongate, with a terminal subcapitate stigma. Legume linear-oblong, curved, thick, indehiscent, septate between the obovate-orbicular seeds.

Native to the Far East but planted and naturalized throughout the world tropics.

The genus is monotypic.

1. TAMARINDUS INDICA L. Sp. Pl. 34. 1753.

Tamarindus occidentalis Gaertn. Fruct. 2:310, *t. 146*. 1791.
Tamarindus umbrosa Salisb. Prodr. 323. 1796.
Tamarindus officinalis Curt. Bot. Mag. *pl. 4563*. 1851.

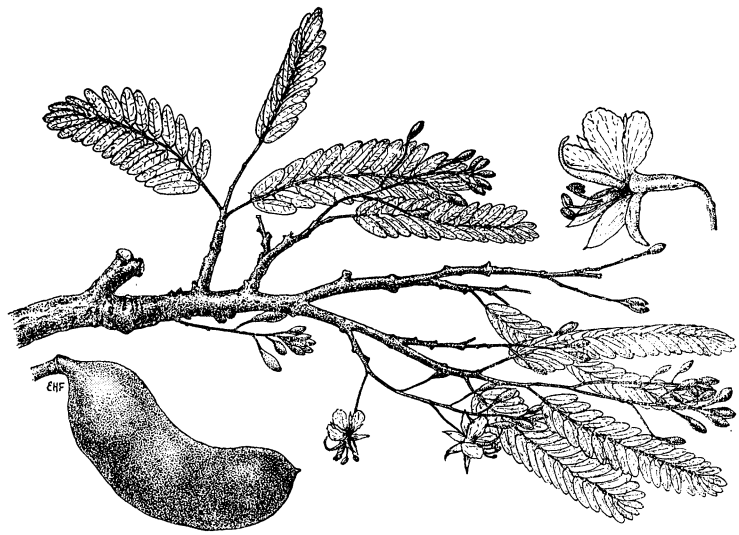

Fig. 116. *Tamarindus indica*

Unarmed, naturalized trees, with puberulent to glabrous branchlets, spreading crown, and rough, brown bark. Leaves 6–12 cm. long, glabrous or nearly so; leaflets 6–18 pairs, oblong, 1–2.5 cm. long, rounded to retuse apically, obliquely obtuse to subtruncate basally, chartaceous, reticulate. Inflorescence as described for the genus; pedicels slender, 6–10 mm. long. Flowers yellow striped with red; sepals 5, elliptic-lanceolate, 6–10 mm. long; larger petals 3, obovate, 8–12 mm. long, subfimbriate; stamens arcuate, investing the ovary below, up to 14 mm. long; anthers oblong, about 2 mm. long; ovary somewhat pubescent basally. Legume 5–15 cm. long, about 2 cm. thick, lepidote, with an acid pulp surrounding the seeds; seeds about 1 cm. wide.

World tropics.

PANAMÁ: Taboga, *Hayes 291*.

The species is commonly cultivated. The pulp of the fruit, said to be rich in formic and butyric acids, is used in preparation of a refreshing drink. The fruit is also reported to have medicinal properties, used as a laxative and in preparation of a gargle.

15. DIALIUM L.

DIALIUM L. Mant. 1:3. 1767.

Arouna Aubl. Pl. Guian. Franc. 1:16, *t. 5*. 1775.
Aruna Schreb. Gen. Pl. 1:26. 1789.
Cleyria Neck. Elem. 2:183. 1790.
Codarium Sol. ex Vahl, Enum. 1:302. 1805.

Unarmed trees, usually large. Leaves once-pinnate; leaflets few, moderately large, mostly alternate, coriaceous to submembranaceous; stipules caducous. Inflorescence paniculate, axillary or terminal. Flowers small, caducous-bracteate; calyx 5 (rarely 4)-lobed, the lobes imbricate, the receptacular portion short, thick; petals 1–2 and minute, or lacking; stamens 2 or rarely 3, distinct, with short filaments; anthers oblong, basifixed, erect, dehiscent by slits; ovary sessile or subsessile, generally 2-ovulate; style short, with terminal stigma. Legume subglobose to ellipsoid, sparingly fleshy, indehiscent; seed usually 1, somewhat compressed.

Essentially a genus of the Old World tropics; with a single species in the New World, ranging from Guatemala to eastern Brazil.

1. DIALIUM GUIANENSE (Aubl.) Sandwith, in Lloydia 2:184. 1939.

Arouna guianensis Aubl. Pl. Guian. Franc. 1:16, *t.* 5. 1775.
Aruna divaricata Willd. Sp. Pl. 1:156. 1798.
Dialium divaricatum Vahl, Enum. 1:303. 1805.
Dialium acuminatum Spruce ex Williams, in Field Mus. Publ. Bot. 15:201. 1936.

Tall tree, with glabrous or puberulent branchlets. Leaves mostly 5- to 7-foliolate, caducous-stipulate, short-petiolate; rachis about 5–8 cm. long, often puberulent; leaflets ovate to elliptic-lanceolate, apically attenuate, basally rounded to cuneate, 3–12 cm. long, 1.5–4 cm. wide, glabrous, conspicuously reticulate, alternate or subopposite; petiolules about 3 mm. long, flattened or sulcate above, somewhat callous. Inflorescence an extended, branching panicle, terminal or subterminal, puberulent to glabrous; bracts caducous; pedicels very short. Flowers small, inconspicuous, apetalous; calyx pubescent without, densely so in bud, the receptacular portion short and stocky, the 5 lobes expanded, imbricate, obtuse, up to 3 mm. long; petals lacking; stamens 2, short; anthers bilocular, erect and basifixed, dehiscing by slits from the apex, the connective conspicuous; ovary sessile or subsessile, pubescent, 2-ovulate; style short, with a small terminal stigma. Legume subglobose to ellipsoid, up to 2.5 cm. long, very short-stipitate, with a fragile exocarp and somewhat fleshy endocarp.

Central and South America, from Guatemala to Peru and Brazil.

DARIÉN: vicinity of La Palma, *Pittier 5486*. SAN BLAS: Permé, *Cooper 240*.

The species furnishes a very heavy, durable, brownish wood, used in construction and for posts, but difficult to work because of its hardness. The fruit is edible, and is often consumed by various animals.

At least one additional species of *Dialium*, presumably exotic *(Steyermark s. n.)*, is in cultivation at the Summit Plant Introduction Garden, Canal Zone.

16. CASSIA (Tourn.) L.

CASSIA (Tourn.) L. Sp. Pl. 376. 1753.
Senna (Tourn.) Mill. Gard. Dict. ed. 4. 1754.
Chamaecrista Moench, Meth. 272. 1794.
Cathartocarpus Pers. Syn. Pl. 1:459. 1805.
Grimaldia Schrank, in Denkschr. Akad. München, 103. 1808.

Bactyrilobium Willd. Enum. Hort. Berol. 1:439. 1809.
Cassiana Raf. in Am. Monthly Mag. 2:266. 1818.
Chamaecassia Link, Handb. 2:139. 1831.
Chamaefistula G. Don, Gen. Hist. Dichl. Pl. 2:451. 1832.
Adipera Raf. Sylva Tellur. 129. 1838.
Dialanthera Raf. loc. cit. 127. 1838.
Diallobus Raf. loc. cit. 128. 1838.
Disterepta Raf. loc. cit. 126. 1838.
Diplotax Raf. loc. cit. 129. 1838.
Ditremexa Raf. loc. cit. 127. 1838.
Emelista Raf. loc. cit. 1838.
Hepteireca Raf. loc. cit. 126. 1838.
Herpetica Raf. loc. cit. 123. 1838.
Isandrina Raf. loc. cit. 126. 1838.
Nictitella Raf. loc. cit. 128. 1838.
Octelisia Raf. loc. cit. 129. 1838.
Ophiocaulon Raf. loc. cit. 1838.
Panisia Raf. loc. cit. 128. 1838.
Peiranisia Raf. loc. cit. 127. 1838.
Scolodia Raf. loc. cit. 128. 1838.
Tagera Raf. loc. cit. 129. 1838.
Xamacrista Raf. loc. cit. 127. 1838.
Mac-Leayia Montr. in Mem. Acad. Lyon 10:198. 1860.
Chamaesenna Raf.; Pittier, Arbol. & Arbust. Legum. 130. 1928.
Cowellocassia Britt. in N. Am. Fl. 23:251. 1930.
Desmodiocassia Britt. & Rose, loc. cit. 244. 1930.
Earleocassia Britt. loc. cit. 247. 1930.
Echinocassia Britt. & Rose, loc. cit. 251. 1930.
Gaumerocassia Britt. loc. cit. 252. 1930.
Leonocassia Britt. loc. cit. 268. 1930.
Palmerocassia Britt. loc. cit. 253. 1930.
Phragmocassia Britt. & Rose, loc. cit. 245. 1930.
Pseudocassia Britt. & Rose, loc. cit. 230. 1930.
Psilorhegma (Benth.) Britt. & Rose, loc. cit. 255. 1930.
Pterocassia Britt. & Rose, loc. cit. 243. 1930.
Sciacassia Britt. loc. cit. 252. 1930.
Sericeocassia Britt. loc. cit. 246. 1930.
Tharpia Britt. & Rose, loc. cit. 1930.
Vogelocassia Britt. loc. cit. 258. 1930.
Xerocassia Britt. & Rose, loc. cit. 246. 1930.

Trees, shrubs or herbs, or sometimes vine-like. Leaves pinnate, 2- to many-foliolate or occasionally aphyllous, often with petiolar or rachial glands; leaflets entire, often inequilateral. Inflorescence bracteate, axillary or terminal, racemose or paniculate or the flowers rarely subsolitary. Flowers usually yellow, conspicuous; calyx with a disc-like base and 5 usually imbricate sepals; petals 5, distinct, expanded, often unequal; stamens 10–4, the 3 uppermost usually rudimentary or lacking, the 4 median similar, usually intermediate in size, often conspicuously rostrate; the 3 lowermost similar or dissimilar, rarely lacking, variously modified but usually rostrate, usually larger than the median stamens; anthers dehiscent by terminal or basal pores or sometimes (in addition) lateral slits, basifixed and erect; ovary sessile or stipitate, several- to many-ovulate. Legume dehiscent or sometimes indehiscent, terete or more often compressed or flattened, the seeds often horizontal, the funicle filiform to very short.

A very large natural genus of world-wide distribution, common mostly to the tropics and subtropics; very abundant in the Americas.

a. Leaves without petiolar or rachial glands.
  b. Leaves normally multifoliolate, with 4 (very infrequently) or more pairs of leaflets.
    c. Three lowermost stamens with slender filaments at least 5 times the length of the ovate anthers; anthers dehiscent basally as well as apically.
      d. Leaflets 8 or less pairs, large, 8–20 cm. long; flowers about 4 cm. broad; introduced tree ..... 1. C. FISTULA
      dd. Leaflets up to 20 pairs, small, 6 cm. or less long; flowers about 2 cm. broad.
        e. Calyx canescent-tomentulose without; median stamens 5, subequal, the anthers lightly pilose; ovary tomentose; flowers pink or white ..... 2. C. GRANDIS
        ee. Calyx puberulent to subglabrous without; median stamens 4, the anthers glabrous; ovary essentially glabrous; flowers yellow ..... 3. C. MOSCHATA
    cc. Lowermost stamens mostly with the oblong anthers longer than the filaments, but in no case the filaments more than about twice as long as the anther; anthers dehiscent apically.
      d. Three lowermost anthers very long-rostrate; leaflets normally 12–40 pairs, smaller (1–4 cm. long); unusual in Panama ..... 29. C. MULTIJUGA
      dd. Lowermost anthers short-rostrate; leaflets normally 6–15 pairs, larger (3–15 cm. long).
        e. Bracts of inflorescence small and narrow or caducous, not ensheathing the upper buds; lowermost lateral anthers about 7 mm. long, only slightly exceeding the median anthers; legume either turgid-quadrangular or, if flattened, relatively few-septate and undulate medianly.
          f. Leaflets ovate-oblong, blunt apically, minutely puberulent below; some filaments longer than the anther; ovary pubescent; legume flattened; introduced tree ..... 4. C. SIAMEA
          ff. Leaflets lanceolate, acute apically, lightly pubescent below; filaments shorter than the anthers; ovary glabrous; legume turgid-quadrangular ..... 5. C. SPECTABILIS
        ee. Raceme with large, subovate bracts (mostly 1–2.5 cm. long) ensheathing the buds; 2 lowermost lateral anthers 11 mm. long or longer, greatly exceeding the median anthers; legume flat (but winged laterally in *C. alata*), multiseptate.
          f. Leaflets narrowly elliptic or oblong, mostly less than 2 cm. wide, acute (occasionally obtuse) and markedly mucronate apically; stipules in native species foliaceous, obliquely reniform, about 3 cm. long.
            g. Leaflets pubescent; ovary tomentose; introduced ..... 6. C. DIDYMOBOTRYA
            gg. Leaflets glabrous; ovary glabrous ..... 7. C. NICARAGUENSIS
          ff. Leaflets oblong to obovate, mostly 2–8 cm. wide, rounded and blunt apically, sometimes mucronulate; stipules inequilaterally lanceolate, about 1 cm. long.
            g. Leaflets conspicuously tomentulose below, especially on the veins; legume not alate ..... 8. C. RETICULATA
            gg. Leaflets glabrous or nearly so; legume winged ..... 9. C. ALATA
  bb. Leaves normally 4- or 2-foliolate (occasional leaves up to 10-foliolate in *C. emarginata*).
    c. Shrub or small tree; mature leaf larger, most leaflets 3–8 cm. long; legume elongate, at least 15 cm. long; to be expected in Panama .... 10. C. EMARGINATA
    cc. Herbaceous or trailing; leaf smaller, the leaflets 0.5–3 cm. long; legume shorter, less than 8 cm. long.
      d. Leaflets normally 4; flowers in short terminal racemes; stipules minute.
        e. Leaves and flowers larger (sepals mostly 8 mm. long or longer); leaflets essentially glabrous below ..... 11. C. HISPIDULA

ee. Leaves and flowers smaller (sepals mostly 7 mm. long or shorter); leaflets more or less setulose or pubescent below..... 11a. C. HISPIDULA var. KILLIPII

dd. Leaflets normally 2; flowers 1–2 from the axils; stipules about as long as the petioles..... 12. C. ROTUNDIFOLIA

aa. At least most leaves with glands on petiole or rachis.

b. Glands borne on the petiole (below lowermost pair of leaflets).

c. Stamens similar (although unequal), the anthers erostrate and with a puberulent longitudinal ridge laterally; glands concave apically (stipitate or sessile), borne on mid or upper petiole; leaflets mostly 0.5–2.5 cm. long; "*Chamaecrista*".

d. Leaflets 1–3 pairs; stipules cordate-lanceolate.

e. Leaflets a single pair..... 13. C. DIPHYLLA

ee. Leaflets 2–3 pairs.

f. Plant mostly prostrate; petiolar gland stipitate; flower small, scarcely 1 cm. wide; legume small, about 1 cm. long..... 14. C. TAGERA

ff. Plant shrub-like; petiolar gland sessile; flower larger, at least 2 cm. wide; legume larger, about 3 cm. long..... 15. C. BREVIPES

dd. Leaflets many pairs; stipules linear-lanceolate.

e. Flowers borne from the leaf axils; stems flexuous..... 16. C. FLEXUOSA

ee. Flowers borne from the internode; stems scarcely flexuous.

f. Petiolar glands stipitate; stems usually pilose (in Panama), the long hairs spreading, at right-angles to the stem.

g. Flowers smaller (about 6 mm. long); largest anthers about 4 mm. long; ovary villous-pilose..... 17. C. STENOCARPA

gg. Flowers larger (normally 1 cm. long or longer); largest anthers 7–12 mm. long; ovary strigose-pilose or tomentose.

h. Flowers scarcely more than 1 cm. long; longer anthers about 7 mm. long; petiolar gland usually short-stipitate or thickened..... 17a. C. STENOCARPA var. STENOCARPOIDES

hh. Flowers mostly 12–15 mm. long; longer anthers usually 11–12 mm. long; petiolar gland usually slenderly stipitate..... 18. C. FLAVICOMA

ff. Petiolar glands sessile, patelliform; stem pubescence of mostly shorter, ascending hairs.

g. Leaflets pubescent, the surface (in dried material) appearing verrucose with the pustuliform hair bases; stem pubescence ascending..... 19. C. PATELLARIA

gg. Leaflets glabrous, the surface more or less smooth; stem pubescence appressed-ascending..... 20. C. SIMPLEX

cc. Stamens dissimilar, the anthers short-rostrate and glabrous; glands convex, usually borne close to petiolar insertion; leaflets mostly 2–10 cm. long.

d. Plant pubescent to hirsute; legume elongate and very narrow, about 4 mm. wide..... 21. C. LEPTOCARPA var. HIRSUTA

dd. Plant glabrous or puberulent; legume shorter and broader, about 6 mm. wide.

e. Petiolar gland globose; leaflets averaging slightly larger (2–10 cm. long)..... 22. C. OCCIDENTALIS (including C. SOPHERA)

ee. Petiolar gland elongate cylindric; leaflets averaging slightly smaller (1.5–6 cm. long)..... 23. C. LIGUSTRINA

bb. Glands borne on the rachis between the lowermost pair or pairs of leaflets or their scars.

c. Leaflets 3 or more pairs.

d. Leaflets only 3 pairs, pubescent below; legume usually strongly arcuate or falcate-curved.

e. Flowers larger, petal about 20–25 mm. long; at least some stamens elongate, with anthers 8–10 mm. long; legume flattened..... 25. C. LEIOPHYLLA

ee. Flowers smaller, petals up to 12 mm. long; all stamens short, the anthers 2–4 mm. long; legume subterete..... 26. C. TORA

dd. At least some leaves with more than 3 pairs of leaflets, mostly subglabrous or glaucous below (*C. bicapsularis*, occasionally with only 3 pairs of leaflets, has a broader legume usually 1 cm. or more wide; *C. laevigata*, with either 3 or 4 pairs of leaflets, has these glabrous); legume straight or inconstantly arcuate.
e. Upper stem usually hirsute with hairs about 8 mm. long; rachial glands long-stipitate; leaflets 30 or more pairs, linear (mostly 1.5–3.0 mm. wide) ..... 28. C. WILLIAMSII
ee. Upper stem when pubescent with hairs about 1 mm. long; rachial glands short-stipitate to subsessile; leaflets fewer (except often in *C. multijuga*), mostly oblong or wider (at least 5 mm. wide).
f. Leaflets normally 12–40 pairs, the rachis 10–25 cm. long; legume flat, about 15 mm. wide ..... 29. C. MULTIJUGA
ff. Leaflets 10 or fewer pairs, the rachis 1–14 cm. long; legume if flat not over 5 mm. wide, otherwise subterete.
g. Flowers borne in pairs on filiform pedicels from an axillary peduncle; lowermost anthers very long-rostrate; legume 5 mm. or less wide, flat ..... 30. C. BIFLORA
gg. Flowers racemose; lowermost anthers mostly moderately rostrate; legume 8 mm. or more wide, subterete.
h. Upper stems and lower surface of leaflets puberulent; lowermost lateral anthers long-rostrate ..... 31a. C. BICAPSULARIS var. PUBESCENS
hh. Upper stems and lower surface of leaflets glabrous; lowermost lateral anthers short-rostrate.
i. Leaflets obovate, rounded to subtruncate apically, mostly 3 cm. or less long; larger anthers conspicuously rostrate ..... 31. C. BICAPSULARIS
ii. Leaflets ovate, acute-acuminate, mostly 3–10 cm. long; anthers scarcely rostrate ..... 24. C. LAEVIGATA

cc. Leaflets only 2 pairs.
d. Typically herbaceous; legume very slender, only 3–4 mm. wide; pubescence of long hairs ..... 27. C. PILIFERA
dd. Trees or shrubs; legume 6–20 mm. wide; pubescence, if any, of short hairs. "CHAMAEFISTULA".
e. Large subfoliaceous bracts (and stipules) persistent; leaflets small (not over 4 cm. wide), inequilaterally subfalcate and acuminate.
f. Floral bracts about 2 mm. long ..... 32. C. UNICA
ff. Floral bracts about 8 mm. long or longer ..... 33. C. UNDULATA
ee. Bracts (and stipules) mostly caducous (if occasionally persistent in *C. Maxonii*, smaller and not foliaceous); leaflets with various but not all of the 3 characters listed above (e).
f. Leaflets only slightly inequilateral, acute, tomentulose below with raised hairs and prominent brownish veins.
g. Fertile stamens only 4 ..... 34. C. MAXONII
gg. Fertile stamens more than 4 ..... 35. C. OXYPHYLLA var. DARIENSIS
ff. Leaflets if acute markedly inequilateral, otherwise acuminate or caudate, puberulent below with very short or appressed hairs or glabrous; fertile stamens usually 7.
g. Leaflets markedly inequilateral, acute; lower 3 anthers dehiscent by a single terminal pore ..... 36. C. FRUTICOSA
gg. Leaflets not or but slightly inequilateral; all anthers dehiscent by paired terminal pores (although the pores often somewhat confluent in lower 3 anthers).
h. Leaflets acuminate; petioles short, usually about 3 cm. long; 3 lowermost anthers shorter than 4 median ones; lower leaf surface puberulous ..... 36a. C. FRUTICOSA var. GATUNENSIS
hh. Leaflets caudate; petioles almost 10 cm. long; 3 lowermost anthers longer than the 4 median ones; lower leaf surface glabrous ..... 37. C. CAUDATA

Fig. 117. *Cassia Fistula*

1. CASSIA FISTULA L. Sp. Pl. 377. 1753.

Cathartocarpus Fistula (L.) Pers. Syn. 1:459. 1805.
Bactyrilobium Fistula (L.) Willd. Enum. Hort. Berol. 1:440. 1809.
Cassia fistuloides Collad. Hist. Cass. 87, *t. 1.* 1816, fide Benth.
Cassia excelsa HBK. Nov. Gen. & Sp. 6:339. 1824, fide Benth.
Cassia Bonplandiana DC. Prodr. 2:490. 1825, fide Benth.
Cassia rhombifolia Roxb. Fl. Ind. 2:334. 1832, fide Benth.
Cathartocarpus excelsus (HBK.) G. Don, Gen. Hist. Dichl. Pl. 2:453. 1832.
Cathartocarpus rhombifolius (Roxb.) G. Don, loc. cit. 1832.
Cathartocarpus fistuloides (Collad.) G. Don, loc. cit. 454. 1832.

Tree up to 20 m., usually glabrous. Leaves large, several-foliolate; petiole about 5 cm. long, glabrous, eglandular; rachis usually 2–4 dm. long, like the petiole; stipules small, caducous; leaflets normally 4–8 pairs, large, 8–20 cm. long and up to 8 cm. wide, ovate to lanceolate, acute apically, very obtuse basally,

puberulent to glabrous above, lightly pubescent below; petiolules up to 1 cm. long. Inflorescence a large, graceful, pendent, many-flowered raceme; pedicels slender, usually 3–4 cm. long. Flowers large, showy, yellow; sepals 5, comparatively small (usually about 6 mm. long), ovate or oblong, puberulent; petals 5, large, about 2 cm. long or longer, ovate-orbicular, short-clawed, venose; stamens 3-morphic; the 3 lowermost almost 3 cm. long, the anthers ovate-oblong, 4–5 mm. long, glabrous, dehiscent apically and basally; the 4 median stamens about 1 cm. long, the anther ovate-oblong, sagittate, about 4 mm. long, dehiscent from the basal lobes (and apical pores); 3 uppermost stamens shorter and smaller, somewhat unequal, the anthers similar to the median ones; ovary slender, lightly pubescent. Legume (reported) cylindric, about 50 cm. long, indehiscent, with horizontal seeds.

Central America; West Indies; northern South America: native to Asia.

CANAL ZONE: Ancón, *Zetek 10;* Balboa, *Standley 30847* (sterile).

The tree, indigenous to Asia, is planted extensively as an ornamental in tropical America. The pulp of the fruit is sweetish, and is said to be useful as a purgative or laxative.

2. CASSIA GRANDIS L. f. Suppl. Pl. 230. 1781.

Cassia brasiliana Lam. Encycl. 1:649. 1785.
Cassia mollis Vahl, Symb. 3:57. 1794, fide Benth.
Cathartocarpus grandis Pers. Syn. Pl. 1:459. 1805.
Cathartocarpus brasilianus Jacq. Fragm. 58, *t. 85, fig. 3.* 1809.
Bactyrilobium molle Schrad. in Gött. Gelehr. Anz. 713. 1821, fide Benth.
Cassia regia Standl. in Contr. U. S. Nat. Herb. 18:103. 1916.

Tree to 30 m., the branchlets pubescent towards the tip, later glabrous. Leaves large, many-foliolate; petiole short, eglandular, tomentose, canaliculate above; rachis up to 30 cm. long, like the petiole; stipules small, linear, caducous; leaflets up to 20 pair, oblong, 3–6 cm. long and up to 1.5 cm. wide, rounded or obtuse apically and basally, somewhat inequilateral basally, entire, tomentose below, more lightly pubescent and darker above, with about 20 pairs of lateral veins; petiolules tomentose, 1–2 mm. long. Inflorescence of several- to many-flowered racemes, axillary from older wood to subterminal; racemes to 20 cm. long, tomentose, the bracts caducous; pedicels slender, about 2 cm. long in lower flowers. Flowers showy, reported pink to white; sepals 5, unequal, oblong, the larger about 8 mm. long and 5 mm. wide, rounded apically, canescent-tomentulose without; petals ovate-orbicular, to 12 mm. long, short-clawed, glabrous; stamens 3-morphic, the anthers lightly pilose, the filaments glabrous; 3 lowermost stamens about 2 cm. long, the filaments gracefully arcuate and thickened towards the middle, the anthers basifixed, short-oblong, about 3 mm. long and 2 mm. wide, subsagittate below, dehiscent both apically and basally; 5 median stamens about 1 cm. long, the filaments linear, the anthers ovate-orbicular, about 1.5 mm. long, more or less versatile and dehiscing basally; remaining 2 stamens rudimentary or obsolete; ovary linear, arcuate, tomentose. Legume very large, up to several dm. long and 5 cm. broad, subterete but margined, indehiscent, ligneous, transversely rugose.

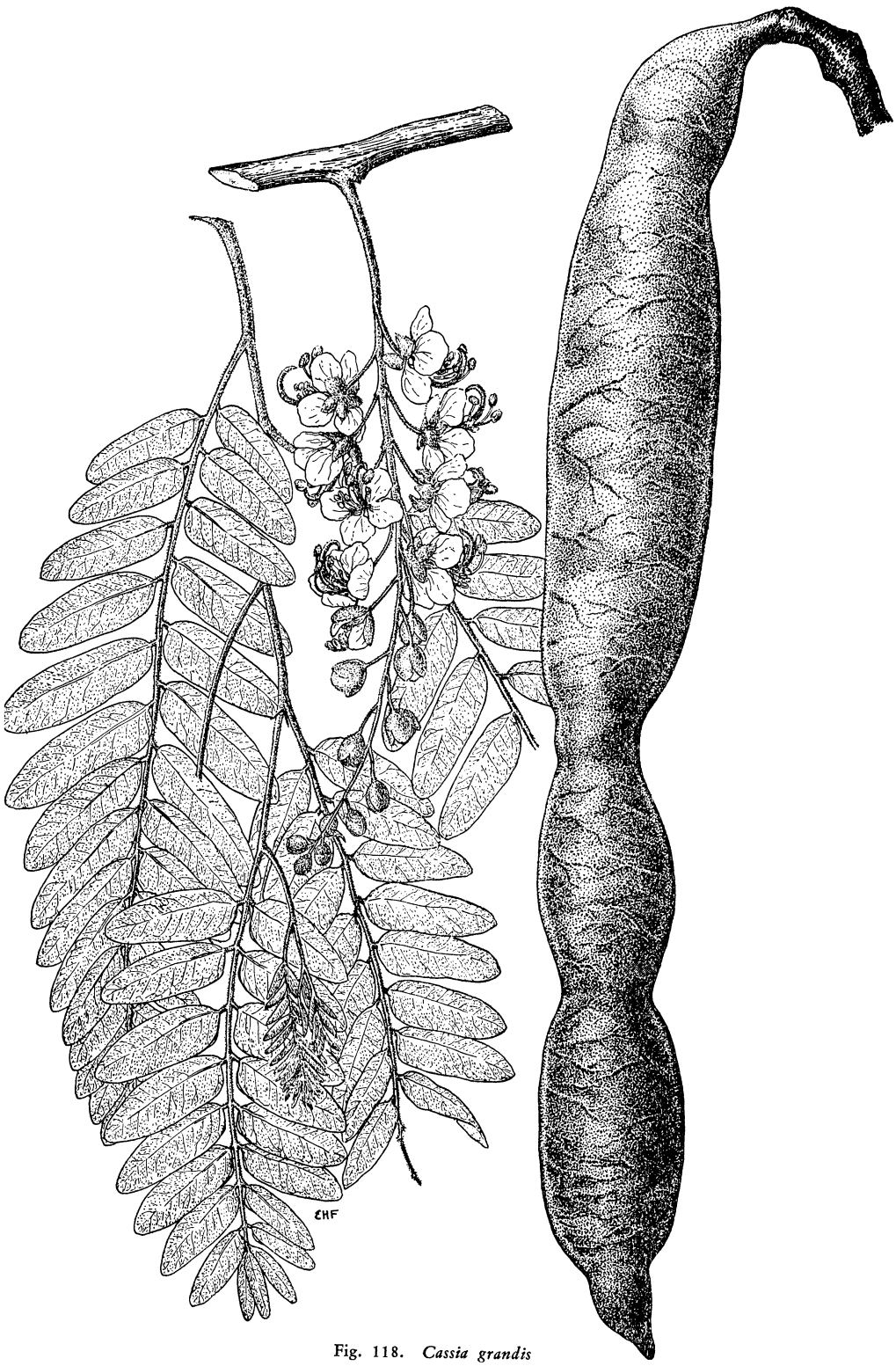

Fig. 118. *Cassia grandis*

Mexico to northern South America; West Indies.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater 133*. CANAL ZONE: Gatuncillo, *Piper 5127;* Miraflores Lake, *P. White 75a;* New Frijoles, *Christopherson 131;* Paraiso, *Pittier 2532;* near Vigia, *Dodge, Steyermark & Allen 16576*. COCLÉ: El Valle, ***Allen 4471***. DARIÉN: Marraganti, *Williams 643*. PANAMÁ: Chepo, *Kluge 46;* Chorrera, *Allen 4262;* Taboga Island, *Macbride 2807*.

Cassia regia Standley is included as a synonym of *C. grandis,* although differing in degree of pubescence and certain other minor ways. Examination of the type number *(Pittier 2532)* indicates gradation towards *C. moschata,* and Standley's type may have been a hybrid between *C. grandis* and *C. moschata,* a putative hybridization that seemingly has not again occurred (i.e. not represented by a second collection).

3. CASSIA MOSCHATA HBK. Nov. Gen. & Sp. 6:338. 1824.

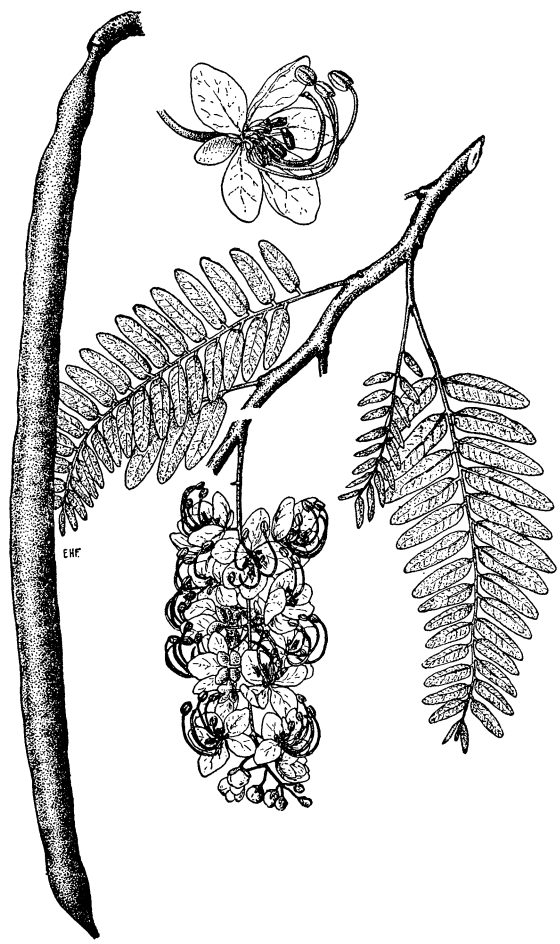

Fig. 119. *Cassia moschata*

Cathartocarpus moschatus G. Don, Gen. Hist. Dichl. Pl. 2:453. 1832.

Tree to 12 m., the young branchlets puberulent, longitudinally ridged. Leaves large, many-foliolate; petiole short, eglandular, puberulent; rachis up to 30 cm. long, like petiole; stipules triangular-bilobed, caducous; leaflets up to 20 pairs, oblong, 4–5 cm. long and up to 1.5 cm. wide, obtuse apically, rounded and unequal basally, puberulent below and above (more lightly so above), dull below, with about 20 pairs of lateral veins. Inflorescence terminal or axillary from upper branches; bracts caducous; pedicels 1–2 cm. long, lightly puberulent. Flowers yellow; sepals ovate to orbicular, about 7 mm. long, puberulent to glabrate, reflexed, dark; petals obovate to orbicular, up to 1.5 cm. long, short-clawed, somewhat venose; stamens 4-morphic, glabrous; the 3 lowermost gross, their anthers ovate-orbicular, 3–4 mm. long, with terminal pores; the 4 median anthers oblong, sagittate, 2–3 mm. long, with basal pores; 2 smaller, orbicular anthers less than 1 mm. long; and 1 stamen rudimentary; ovary essentially glabrous. Legume terete, elongate, up to 5 dm. long and 2 cm. wide, septate, glabrous.

Central America to British Guiana.

CANAL ZONE: Chivi-chivi Trail, *Piper 5137, Johansen 16;* Mojinga Swamp, *Allen 910.* PANAMÁ: vicinity of Chorrera, *Allen 1697;* Río Tapia, *Standley 28148.*

This species differs from *C. grandis* in the much more slender fruits, in the lesser degree of pubescence in both flower and vegetative parts, and in the longer, pendulous racemes of differing colored flowers.

4. CASSIA SIAMEA Lam. Encycl. 1:648. 1785.

Cassia florida Vahl, Symb. 3:57. 1794.
Cassia sumatrana Roxb. Hort. Beng. 31. 1814, fide Benth.
Cassia gigantea Bert. DC. Prodr. 2:492. 1825.
Senna sumatrana Roxb. Fl. Ind. 2:347. 1832.
Chamaefistula gigantea (DC.) G. Don, Gen. Hist. Dichl. Pl. 2:452. 1832.
Cassia arborea Macfad. Fl. Jam. 1:343. 1837.
Sciacassia siamea (Lam.) Britt. in N. Am. Fl. 23:252. 1930.

A moderate-size tree, the branchlets puberulent. Leaves moderately large, with several to many pairs of leaflets; petiole short, eglandular, puberulent; rachis eglandular, flattened and sulcate above, somewhat nodose and cross-partitioned at insertion of the petiolules; stipules small, caducous; up to 30 leaflets, ovate-oblong to oblong, usually about 6 cm. long and 2 cm. wide when well-developed, obtuse to rounded-subtruncate and slightly emarginate apically, obtuse basally, minutely puberulent below, lustrous above; petiolules about 3 mm. long. Inflorescence usually a terminal panicle of short racemes. Flowers rather short-pedicellate; yellow; sepals suborbicular, up to 6 mm. long, puberulent; petals up to 15 mm. long, clawed, glabrous; stamens 10, only 7 fertile, dehiscent by terminal pores, the pores somewhat confluent; 3 lowermost stamens larger (the center one somewhat smaller), the anthers up to 7 mm. long, short-rostrate apically, sagittate basally; 4 median stamens shorter, the anthers 5–6 mm. long, less noticably rostrate; 3 uppermost stamens small, the anthers up to 3 mm. long, apparently non-

functional; ovary pubescent. Legume linear, 2–3 dm. long and about 12 mm. wide, flattened, puberulent, undulate between the margins, dehiscent.

Native to East Indies; planted in American tropics.

CANAL ZONE: Balboa, *Allen 4555, Standley 30822;* "Canal Zone," *Johansen 30.* DARIÉN: Cana, *Williams 948.*

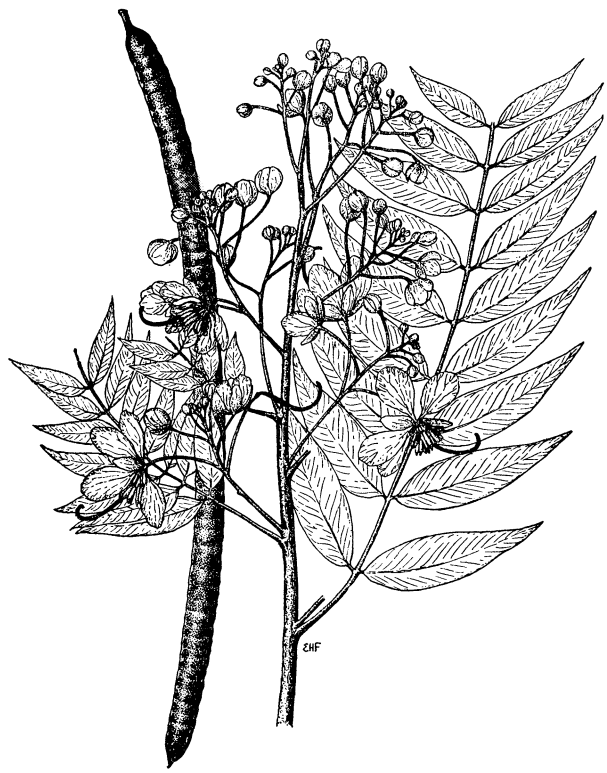

Fig. 120. *Cassia spectabilis*

5. CASSIA SPECTABILIS DC. Cat. Hort. Monsp. 90. 1813.

Cassia speciosa HBK. Nov. Gen. & Sp. 6:338. 1824; non Schrad., fide Benth.
Cassia Humboldtiana DC. Prodr. 2:489. 1825.
Cathartocarpus Humboldtianus Loud. Hort. Brit. 167. 1832.
Cathartocarpus speciosus G. Don, Gen. Hist. Dichl. Pl. 2:453. 1832.
Cathartocarpus Trinitatis G. Don, loc. cit. 1832.
Cassia Trinitatis Reichb. in Sieb. Pl. Trin. Exs. n. 57; Vogel, Syn. Cass. 46. 1837?, fide Benth.
Pseudocassia spectabilis (DC.) Britt. & Rose, in N. Am. Fl. 23:230. 1930.

Tree to 10 or more m. high, the branchlets usually tomentose when young. Leaves moderately large, an average leaf about 20-foliolate; petiole short, pubescent, eglandular; rachis usually about 2 dm. long, eglandular and otherwise like the

petiole; leaflets several to many pairs, lanceolate, 3–8 cm. long and usually about 2 cm. wide, acute apically, obtuse basally, pubescent below, especially along the veins, puberulent to subglabrous above and less dull than below, opposite on the rachis, with 10 or more pairs of prominent lateral veins; petiolules 2–3 mm. long, pubescent. Inflorescence of several terminal or subterminal several-flowered racemes; bracts lanceolate, a few mm. long, caducous. Flowers yellow; sepals 5, obovate-orbicular, markedly unequal, up to 1 cm. long and broad, glabrous to lightly puberulent; petals 5, mostly obovate, markedly unequal, up to 2.5 cm. long and 1.5 cm. broad, subglabrous, venose, short-clawed; stamens 10, 3-morphic; the 3 lowermost the largest, their anthers oblong, about 7 mm. long, short-rostrate apically and dehiscent by terminal pores, the loculi somewhat converging terminally; anthers of 4 median stamens 5–6 mm. long, similar to the 3 lowermost except the rostrum reflexed and the loculi divergent terminally; 3 uppermost stamens markedly dissimilar, more or less rudimentary, the anthers distinctly bilobed, each lobe reniform and dehiscent the length of its outer margin; ovary linear, glabrous. Legume linear, turgid-quadrangular, up to 2 dm. long and 1 cm. wide, transversely multiseptate, tardily dehiscent along one margin.

Mexico to northern South America; West Indies.

CHIRIQUÍ: San Felix, *Pittier 5133*.

The tree is often planted in sections of the American tropics.

6. CASSIA DIDYMOBOTRYA Fresen. in Flora 22^1:53. 1839.

Shrub or small tree, the branchlets puberulent. Leaves several- to many-foliolate, up to 3.5 cm. long; petiole about 3 cm. long, puberulent, eglandular; rachis similar to petiole; stipules ovate-rotund, acuminate, up to 12 mm. long; leaflets normally 8–16 pairs, oblong or elliptic, up to 5 cm. long and almost 2 cm. wide, basally inequilaterally obtuse, apically obtuse or acute and mucronate, subsessile, lightly pubescent, the hairs from a pustuliform base in dried material. Inflorescence of a few subterminal racemes up to 3 dm. long, the buds approximate and ensheathed by ovate bracts about 12 mm. long. Flower yellow; sepals elliptic, imbricate, sessile, about 15 mm. long; petals obovate to elliptic, up to 2 cm. long, markedly venose, short-clawed; stamens 4-morphic; anther of lowermost center stamen about 7 mm. long, with terminal pores and lateral slits, prominently hastate basally, this anther bounded on either side by a stamen with a large anther about 12 mm. long, similarly dehiscent, sagittate basally, arcuate; anthers of 4 median stamens subequal, about 5 mm. long, long-rostrate, sagittate, dehiscent as the lowermost; uppermost 2–3 stamens rudimentary, distorted; ovary tomentose. Legume broadly linear, up to about 10 cm. long and 1.5 cm. wide, flat, dehiscent, multiseptate; seeds transverse.

Native to northern Africa; introduced into American tropics, Hawaii, and elsewhere.

CANAL ZONE: in cultivation at summit, *Johansen s. n.*

If the Johansen specimen typifies the species, it is very little different from *C. nicaraguensis*. It differs chiefly in pubescence characters and in having smaller, different-shaped stipules. The plant is reported to emit an unpleasant odor when bruised.

Fig. 121. *Cassia nicaraguensis*

7. CASSIA NICARAGUENSIS Benth. in Trans. Linn. Soc. 27:552. 1871.

Cassia Seleriana Harms, in Bull. Herb. Boiss. 7:551. 1899, fide Britt. & Rose.
Chamaesenna nicaraguensis (Benth.) Britt. & Rose, in N. Am. Fl. 23:250. 1930.

Small, glabrous tree. Leaves many-foliolate, usually 20–30 cm. long; petiole elongate, basally rugose-callous; rachis flattened above, eglandular; stipules foliaceous, about 3 cm. long, rounded apically, acuminate-attenuate basally, indented on inner side at insertion, deciduous from older leaves; leaflets 5–20 pairs, oblong or elliptic, usually about 6 cm. long and 2 cm. wide, basally obtuse, apically obtuse or acute and mucronate, dull below, markedly reticulate; petiolules about 1 mm. long. Inflorescence of several racemes terminal or axillary from the upper petioles; bracts large, caducous; pedicels 1–2 cm. long. Flowers showy, yellow; sepals 5,

obovate to orbicular, up to 2 cm. long, imbricate, sessile, venose; petals obovate to elliptic, up to 2.5 cm. long, very short-clawed, strikingly venose, the veins very dark; stamens with short filaments, 4-morphic; the anther of the lowermost center stamen about 5 mm. long, with terminal pores and lateral slits, prominently hastate basally, this anther bounded on either side by a stamen with a very large anther about 1.5 cm. long, similarly dehiscent, basally unequally sagittate, the larger lobe on the inner side; 4 median stamens moderate, the anthers dehiscent by terminal pores and lateral slits, apically long-rostrate, basally briefly sagittate; uppermost stamens 2–3, rudimentary, distorted, about 3 mm. long; ovary linear, glabrous. Legume flat, broadly linear, margined, septate, up to 12 cm. long and 1.5 cm. wide.

Mexico and Central America.

CANAL ZONE: vicinity of Miraflores Lake, *G. White 190, P. & G. White 43;* R. Azote Caballo, *Dodge, Steyermark & Allen 16823.* PANAMÁ: Alhajuela, *Pittier 2363;* vicinity of Arraijan, *Allen 1625.* VERAGUAS: vicinity of Santiago, *Allen 1076.*

8. CASSIA RETICULATA Willd. Enum. Hort. Berol. 1:443. 1809.

Cassia strobilacea HBK. Nov. Gen. & Sp. 6:347. 1824, fide Benth.
Cassia Tarantan HBK. loc. cit. 348. 1824, fide Britt. & Rose.
Cassia dumetorum Bert.; DC. Prodr. 2:499. 1825.
Chamaesenna reticulata (Willd.) Pittier, in Trab. Mus. Com. Venez. 3:160. 1928.

Small tree, the branchlets puberulent, terete, stout, with a large pith. Leaves large, up to 24-foliolate; petioles relatively short, similar to the rachis; rachis up to 3 dm. long or longer, puberulent, flattened and longitudinally margined above, somewhat nodose and subseptate between insertion of the leaflets, eglandular; stipules lanceolate, up to 1 cm. long, spreading at the base and subauriculate by oblique insertion, puberulent, subpersistent; leaflets 8–12 pairs, oblong to obovate (uppermost), up to 10 cm. long and 5 cm. wide, apically rounded to subtruncate and mucronulate; basally rounded or obtuse and somewhat inequilateral, tomentulose below, puberulent above, dull, reticulate; petiolule about 1 mm. long. Inflorescence terminal or axillary from the upper nodes, puberulent or tomentulose, racemose, condensed above, the pedicels short; bracts persistent until anthesis, ovate-orbicular, up to 2 cm. long, usually cuspidate apically, finely reticulate, more or less imbricate and ensheathing the buds of the apical portion of the raceme. Flowers yellow, moderately large; sepals elliptic, up to 13 mm. long, delicately veined, the veins mostly longitudinal and subparallel; petals elliptic-orbicular, 16–17 mm. long, clawed, conspicuously dark-veined, glabrous; fertile stamens 6 (4 others present but rudimentary); the lowermost center one with a long filament (about 4 mm. long), its anther markedly sagittate, about 3 mm. long; anthers of the 2 lowermost lateral ones large, linear-elliptic, falcate, about 11 mm. long, dehiscent by a pair of terminal pores, apically short-rostrate and acute, basally unequally sagittate; 4 median anthers oblong, about 4 mm. long, prominently rostrate apically, dehiscent by a pair of terminal pores, basally sagittate; 3 uppermost stamens rudimentary, the anthers 2–3 mm. long; ovary linear, tomentulose.

Legume linear-oblong, up to 15 cm. long and 2 cm. wide, thin, septate, glabrous, short-stipitate, margined but not alate; seeds transverse linear.

Mexico to Brazil and Bolivia; Trinidad.

BOCAS DEL TORO: Changuinola River, *Dunlap 295;* Old Bank Island, *von Wedel 1862, 1988;* Water Valley, *H. von Wedel 1626, 1757.* CANAL ZONE: Ancón, *Mason 6;* "Chagres", *Fendler 95;* Gatún, *Maxon 4791;* Miraflores, *P. & G. White 44.* COCLÉ: Penonomé, *Williams 364.* DARIÉN: Garachiné, *Pittier 5509.* PANAMÁ: Juan Díaz, *Standley 30482;* R. Tapia, *Standley 28304;* Las Sabanas, *Standley 25833.*

9. CASSIA ALATA L. Sp. Pl. 378. 1753.

Cassia herpetica Jacq. Obs. Bot. 2:24, *t. 45, fig. 2.* 1767.
Cassia bracteata L. f. Suppl. 232. 1781, fide Benth.
Senna alata Roxb. Fl. Ind. 2:349. 1832.
Herpetica alata (L.) Raf. Sylva Tellur. 123. 1838.

Shrub to 3 m. tall, the branchlets minutely puberulent to subglabrous, stout, terete. Leaves large, up to 28-foliolate; petioles relatively short, like the rachis; rachis elongate, up to 3 or more dm. long, flattened and margined above, somewhat nodose and septate between the insertions of the paired leaflets, minutely puberulent, eglandular; stipules lanceolate-subulate, usually about 1 cm. long, basally subauriculate by oblique insertion; leaflets 5–14 pairs, oblong to obovate or the lowermost sometimes ovate, up to 17 cm. long and 9 cm. wide, the uppermost largest, apically rounded and mucronulate (occasionally subretuse), basally rounded-subtruncate and obliquely inequilateral, subglabrous above and below, dull below, chartaceous, reticulate; petiolules 1–2 mm. long. Inflorescence terminal or subterminal, the many-flowered raceme appearing spike-like because of the short pedicels; bracts foliaceous, ovate or oblong, up to 2.5 cm. long and 2 cm. wide, persistent until anthesis and ensheathing the upper raceme, minutely puberulent, imbricate. Flowers yellow, conspicuous; sepals oblong, up to 15 mm. long and 8 mm. wide, delicately reticulate-venose, minutely puberulent or subglabrous; petals obovate to orbicular, up to 2 cm. long and 12 mm. wide, prominently dark-veined, clawed; stamens 10, 4-morphic; center stamen of the 3 lowermost with an elongate filament 6–7 mm. long, the anther small (about 4 mm. long), obliquely rostrate and dehiscent by 2 terminal pores, subsagittate basally; 2 lateral stamens of the lowermost group large, falcate, the filaments 2–3 mm. long, the anthers 11–12 mm. long, unequally bilocular, apically obliquely short-rostrate and dehiscent by a pair of terminal pores, basally each loculus prolonged as a subulate tip; 4 median stamens with filaments about 2 mm. long, the anthers 3–4 mm. long and similar to that of the lowermost center stamen; upper 3 stamens minute, non-functional, twisted, about 2 mm. long; ovary densely puberulent, arcuate. Legume broadly linear, about 15 cm. long and 1.5 cm. wide, longitudinally alate from the middle of each valve (the wing about 5 mm. wide), dehiscent, septate, straight, chartaceous; seeds transverse, compressed, rhombic.

Mexico to Paraguay; Old World tropics.

CANAL ZONE: France Field, *Standley 30438*. COCLÉ: Olá, *Pittier 5088*. PANAMÁ: between Panamá and Chepo, *Dodge, Hunter, Steyermark & Allen 16646*; Río Tecúmen, *Standley 26677*; Taboga Island, *Macbride 2794*. VERAGUAS: Soná, *Allen 1075*.

Distinguished by the alate legume, foliaceous bracts, large lateral anthers, venose perianth, and the many subseptate, eglandular rachial (foliolar) nodes.

10. CASSIA EMARGINATA L. Sp. Pl. 376. 1753.

Cassia atomaria L. Mant. 68. 1767, fide N. Am. Fl.
Cassia arborescens Mill. Gard. Dict. ed. 8, no. 15. 1768, fide N. Am. Fl.
Cassia elliptica HBK. Nov. Gen. & Sp. 6:356. 1824.
Cassia canescens HBK. loc. cit. 357. 1824, fide Benth.
Isandrina arborescens Raf. Sylva Tellur. 126. 1838.
Cassia grisea A. Rich. in Sagra, Hist. Cuba Bot. 1:493. 1845, ex char., fide Benth.
Cassia chrysophylla A. Rich. loc. cit. 500. 1845, ex char., fide Benth.
Cassia emarginata subunijuga Robin. & Bartl. Proc. Am. Acad. 43:53. 1907, fide N. Am. Fl.
Isandrina emarginata (L.) Britt. & Rose; Britt. & Wilson, Scientif. Surv. Porto Rico & Virgin Isls. 5:374. 1924.

Shrub or small tree, the branchlets pubescent. Leaves small or moderate, usually 4-foliolate, petioles relatively long, up to 6 cm., more or less terete, tomentulose; rachis shorter than petiole (occasionally absent in 1-jugate leaves), up to 3 cm. long, similar to petiole, eglandular; stipules small, linear-lanceolate or subulate, 2–3 mm. long; leaflets ovate, obovate or elliptic, up to 10 cm. long and 5 cm. wide (but usually smaller), 1–5 pairs, apically rounded or obtuse and usually retuse or emarginate and mucronulate, basally rounded or obtuse, puberulent above, tomentulose beneath, secondary veins prominent and subparallel; petiolules 2–5 mm. long. Inflorescence racemose, axillary or subfasciculate from the upper nodes, short, few-flowered, pubescent; pedicels up to 3 cm. long; bracts lanceolate, about 3 mm. long, caducous. Flowers small, yellow; sepals ovate-orbicular, markedly unequal, the largest about 6–7 mm. long and 5 mm. broad; petals mostly elliptic or obovate, unequal, up to 15 mm. long and 1 cm. wide, glabrous; fertile stamens 7, similar but somewhat unequal; anthers usually 4–5 mm. long, linear-oblong, erostrate and subtruncate apically or essentially so, dehiscent by a pair of terminal pores; 3 uppermost stamens modified as staminodes or rudimentary, flat, about 2 mm. long, with lateral slits; ovary linear, subglabrous. Legume up to 3.5 dm. long and about 1 cm. wide, linear, straight or only slightly curved, glabrous, flattened, not impressed but the margins often undulate, indehiscent.

Mexico; Central America; West Indies; Colombia and Venezuela.

This species has not to my knowledge been collected in Panama, but certainly is to be expected there. It is found in the lowlands in both Costa Rica and Colombia.

11. CASSIA HISPIDULA Vahl, Eclog. 3:10. 1807.

Cassia procumbens Mill. Gard. Dict. ed. 8, no. 20. 1768, non L. Sp. Pl. 1753, fide N. Am. Fl.

Cassia hispida Collad. Hist. Cass. 118. 1816, fide Benth.
Cassia tetraphylla Collad. loc. cit. 130. 1816, non Desv. 1814, fide N. Am. Fl.
Cassia pauciflora HBK. Nov. Gen. & Sp. 6:360. 1824, fide N. Am. Fl.
Cassia lotoides HBK. loc. cit. 361. 1824, fide Benth.
Cassia fagonioides Vogel, Syn. Gen. Cass. 50. 1837, fide Benth.
Cassia leiantha Benth. in Hook. Jour. Bot. 2:78. 1840, fide Benth.
Grimaldia hispidula (Vahl) Britt. & Rose, in N. Am. Fl. 23:299. 1930.

Semiprostrate herb from a woody rootstock, the slender, frequently elongate branches viscid-pubescent, usually with both long and short hairs. Leaves small, typically 4-foliolate; petioles elongate, longer than the leaflets, 2–3 cm. long, pubescent like the stem but otherwise eglandular; rachis short, less than 1 cm. long, similar to the petiole although less pubescent; stipules linear-lanceolate, minute; leaflets ovate-orbicular to obovate-orbicular, up to 2 cm. long and almost as broad, obtuse or rounded both apically and basally, essentially glabrous, short-petiolulate. Inflorescence usually a few-flowered terminal raceme; the pedicels slender, pubescent like the stem, minutely bibracteate. Flowers yellow-orange, fairly conspicuous, about 2 cm. wide, borne in few-flowered terminal racemes; sepals ovate to ovate-lanceolate, about 1 cm. long, frequently setose without; petals obovate, 1.5–2 cm. long, rounded apically, subcuneate basally and narrowed into a claw-like base; stamens 10, all similar and subequal, the anthers linear, 5–7 mm. long, longitudinally pubescent laterally, dehiscent by paired terminal pores; ovary pilose, short. Legume linear or linear-oblong, 3–5 cm. long and about 7 mm. wide, flat, setose-hirsute, elastically dehiscent, the seeds obliquely transverse.

Mexico to Brazil and northern South America; West Indies.

The species is reported from Panama, and a specimen from Costa Rica has been examined.

11a. CASSIA HISPIDULA Vahl var. **Killipii** (Rose) Schery, comb. nov.

Cassia Killipii Rose, in Jour. Wash. Acad. 17:167. 1927.
Grimaldia Killipii (Rose) Britt. & Rose, in N. Am. Fl. 23:301. 1930.

Generally of smaller proportions than the species, the flower scarcely 1.5 cm. broad and the leaflets mostly 1 cm. or less in length. The leaflets are more or less pubescent or setulose below, the key character used by Britton & Rose (N. Am. Fl. 23:299. 1930) in separating *Grimaldia Killipii* from *G. hispidula*. This character alone seems to show some intergradation and lack of correlation with other characters, necessitating, in the author's opinion, reduction of *Cassia Killipii* to varietal status. Possibly *C. fagonioides* Vog., listed among synonyms for the species, is synonymous with this variety, being described as pubescent by Bentham.

British Honduras, Panama, Colombia.

COCLÉ: La Pintada, *Hunter & Allen 521;* Nata, *Allen 813;* Olá, *Pittier 5014;* Penonomé, *Williams 104.* PANAMÁ: Pacora, *Paul 258;* Río Tapia, *Killip 3281, Standley 28186, 30656.*

12. CASSIA ROTUNDIFOLIA Pers. Syn. Pl. 1:456. 1805.

Cassia bifoliata DC.; Collad. Hist. Cass. 120. 1816.
Cassia fabaginifolia HBK. Nov. Gen. & Sp. 6:363. 1824.
Cassia monophylla Vell. Fl. Flum. Ic. 4:*t. 61*. 1827, fide Benth.
Chamaecrista rotundifolia (Pers.) Greene, in Pittonia 4:31. 1899.

Additional synonyms are given by Bentham, especially for his South American varieties *bauhiniaefolia* and *grandiflora*.

Semiprostrate herb, normally of savanna habitat, the stems pubescent to subglabrous. Leaves bifoliolate, small; petiole short, not exceeding the stipules, eglandular, pubescent like the stem; stipules lanceolate-cordate, ciliate or glabrous, up to about 1 cm. long; leaflets 2, asymmetrically subrotund to broadly obovate, rounded apically, 0.5–3 cm. long, sometimes ciliate, epetiolulate. Flowers 1–2 from the axils, small, yellow, the pedicel more or less filiform; sepals lanceolate, usually ciliate, up to 5 mm. long; petals obovate, about 6 mm. long, glabrous, sessile; fertile stamens apparently 5, all similar although somewhat unequal, the filaments very short; the anthers linear-oblong, up to 2 mm. long, essentially glabrous and erostrate, dehiscent by paired terminal pores; ovary pubescent. Legume linear, 1.5–4 cm. long and 3–5 mm. wide, flat, elastically dehiscent, the seeds obliquely transverse.

Mexico; southern Central America; northern South America; West Indies.

CHIRIQUÍ: Boquete, *Davidson 700, Maxon 5131, Pittier 3311;* Gualaca, *Allen 5044.*

Possibly the Boquete specimens cited represent an undescribed variety of the species, all of them being more pilose, with smaller leaflets, and with shorter pods (fewer loculi) than is normal for South American, West Indian and Mexican specimens. Bentham, however, considered plants of larger proportions as varieties of the species, and it would perhaps be presumptuous to describe the Panamanian plants as a new variety without first comparing them with additional and more representative (European) material than is here available. Apparently the species, considered in its broadest sense, is quite variable.

13. CASSIA DIPHYLLA L. Sp. Pl. 376. 1753.

Chamaecrista diphylla (L.) Greene, in Pittonia 4:28. 1899.

Distinctive annual or perennial herb of open or seasonally dry areas such as savannas, the stems glabrous. Leaves small, bifoliolate, glabrous; petiole 5–6 mm. long, bearing 1–2 subcupuliform glands on the upper side towards the middle; stipules large, lanceolate-cordate, up to 15 or more mm. long, foliaceous and subensheathing the stems, membranaceous; leaflets asymmetrically obovate, usually about 2 cm. long and 1 cm. broad, the conspicuous veins subparallel, epetiolulate, with a broad (about 2 mm.), callous insertion. Flowers yellow, borne singly from the axils on elongate petioles, the petioles up to 5 cm. long; sepals 5, glumaceous, unequal, up to 1 cm. long and 1–2 mm. wide, glabrous, apiculate, the prominent veins subparallel; petals obovate, about as long as the sepals, glabrous to puberulent, sessile; stamens 10, all similar, the anthers linear although somewhat

Fig. 122. *Cassia diphylla*

wider basally than apically, truncate, dehiscent by paired terminal pores, subglabrous; ovary pilose, short. Legume linear, up to 9 cm. long and about 6 mm. wide, flat, oblique apically and basally, lightly pilose, dehiscent.

Mexico; Central America; West Indies; northern and eastern South America.

COCLÉ: Nata, *Allen 815.* PANAMÁ: R. Azote Caballo, *Dodge, Steyermark & Allen 16845;* El Vigia, *Pittier 2391;* Taboga Island, *Allen 109.*

A species very different from the tree forms of *Cassia*, easily distinguished by characteristic leaves and stipules and glumaceous sepals. It is similar in habit and generally savanna habitat to *C. brevipes, C. Tagera*, and *C. rotundifolia.*

14. CASSIA TAGERA L. Sp. Pl. 376. 1753.

Cassia ciliaris Collad. Hist. Cass. 98. 1816.
Cassia Kunthiana Cham. & Schlecht. in Linnaea 5:598. 1830, fide Benth.
Tagera filiformis Raf. Sylva Tellur. 129. 1838.
Chamaecrista Tagera Standl. in Contr. U. S. Nat. Herb. 18:104. 1916.

Prostrate herb or subshrub, the branchlets somewhat pubescent, at least near the tips. Leaves very small, the leaflets 2–3 pairs; petiole 5 mm. or less long, bearing a stipitate gland above the middle, usually pubescent or ciliate above; rachis about 2 mm. long, mucronulate apically; stipules lanceolate-cordate, 4–10 mm. long, subensheathing the stem, glabrous to ciliate; leaflets very small, at most 10 mm. long and 5 mm. wide, asymmetrically obovate or obcuneate, subglabrous to ciliate, epetiolulate, with 2–3 prominent primary veins. Flowers yellow, solitary from the axils, the pedicels usually exceeding the leaf; sepals 5, narrowly ovate-

lanceolate, about 3 mm. long and 1 mm. wide, unequal, acuminate; petals 5, obovate, up to 5 mm. long, glabrous or lightly ciliate; stamens 7 or less (usually only 4 or only 4 larger and fertile), unequal but similar, the anthers linear, up to 2 mm. long, truncate apically and dehiscent by paired terminal pores; ovary pilose, short. Legume oblong, scarcely 1 cm. long and 4 mm. wide, oblique apically and basally, flat, strigose, pubescent, 1- to 4-seeded, evidently dehiscent.

Mexico to northern South America.

CANAL ZONE: Las Cruces trail, *Hunter & Allen 754.* COCLÉ: Aguadulce, *Pittier 4854;* Penonomé, *Williams 105.* PANAMÁ: Capira-Potrero, *Dodge & Hunter 8606;* sabanas near Chepo, *Hunter & Allen 18;* Hacienda La Joya, *Dodge, Hunter, Steyermark & Allen 16911;* Pacora, *Killip 3243.* VERAGUAS: Soná, *Allen 1049.*

Panama plants of this species seem to have a consistently smaller legume than is common for plants from northern Central America.

15. CASSIA BREVIPES DC.; Collad. Hist. Cass. 119. 1816.

Chamaecrista brevipes (DC.) Greene, in Pittonia 4:31. 1899.

A shrub of open, seasonally dry places, the branchlets usually pilose-tomentose. Leaves small, bijugate; petiole about 5 mm. long, pubescent, bearing a sessile, cupuliform gland in the upper portion; rachis shorter than the petiole; stipules lanceolate-cordate, up to 1 cm. long, subensheathing the stem, venose with prominent subparallel veins; leaflets 4, asymmetrically obovate or obovate-elliptic, up to 2 cm. long and 5–10 mm. wide, subcoriaceous, glabrous to lightly pubescent, the prominent veins subparallel. Flowers arising singly from the axils, yellow, usually short-pedicellate; sepals 5, unequal, narrowly lanceolate, up to 1.5 cm. long and 5 mm. wide, scarious-coriaceous or almost glumaceous, the veins subparallel; petals 5, obovate, up to 23 mm. long and 13 mm. wide, glabrous, membranaceous; fertile stamens evidently 10 all similar, the anthers linear, 7–9 mm. long, puberulent laterally along the margins, dehiscent by paired terminal pores; ovary pilose, short. Legume oblong, up to 3.5 cm. long and 1.2 cm. wide, oblique apically and basally, flat, pilose, elastically dehiscent, the seeds transverse, linear.

Central America and northern South America.

COCLÉ: Olá, *Pittier 5013;* Penonomé, *Williams 126.*

16. CASSIA FLEXUOSA L. Sp. Pl. 379. 1753.

Cassia arenaria HBK. Nov. Gen. & Sp. 6:370. 1824, fide Benth.
Chamaecrista flexuosa (L.) Greene, in Pittonia 4:27. 1899.
Chamaecrista amplistipulata Rose, Contr. U. S. Nat. Herb. 12:267. 1909, fide N. Am. Fl.
Cassia picachensis Brandg. in Univ. Calif. Publ. Bot. 6:180. 1915, fide N. Am. Fl.

Small perennials of open slopes or moist savannas, erect from a woody root, the stems flexuous, glabrous or pubescent. Leaves moderate, multifoliolate; petioles short, scarcely 5 mm. long, usually pubescent above and bearing 1–2 glands, the glands sessile to stipitate, terete, expanded apically, concave at the apex; rachis up to 8 cm. long, flattened and somewhat sulcate above, more or less

cross-partitioned at insertion of the leaflets; stipules obliquely cordate, lanceolate, up to 1 cm. long and 5 mm. wide, erect, longitudinally venose; leaflets up to 50 pairs, linear, up to 1 cm. long and 1.5 mm. wide, inequilateral basally, obliquely mucronulate apically, with 2–3 prominent subparallel veins. Flowers mostly solitary from the axils, slender-pedicellate, yellow; sepals ovate-lanceolate, about 8 mm. long and 3 mm. wide, acute or acuminate apically; petals up to almost twice as long as the sepals, obovate, scarcely clawed; stamens 10, unequal but all apparently fertile; the anthers linear (although narrower apically), about 8 mm. long in the largest and scarcely 3 mm. long in the smallest, subsessile, dehiscent by paired terminal pores; ovary pubescent, linear. Legume linear, about 5 cm. long and 4–5 mm. wide, flat, scarcely stipitate, elastically dehiscent, transversely (obliquely so) several-seeded.

Mexico to Brazil, Paraguay and Bolivia; West Indies.

COCLÉ: Penonomé, *Williams 114.*

17. CASSIA STENOCARPA Vogel, Syn. Cass. 68. 1837.

Chamaecrista stenocarpa (Vogel) Standl. in Contr. U. S. Nat. Herb. 18:104. 1916.
Cassia Broughtonii Fawc. & Rend. in Jour. Bot. 55:37. 1917.
Chamaecrista riparia Britton, in Bull. Torrey Bot. Club. 44:11, in part. 1917, not *Cassia riparia* HBK. 1824.

A more or less erect annual or subperennial up to about 1 m. high, the branchlets pilose or subpilose with long spreading hairs. Leaves moderately small, multifoliolate; petiole short, usually 3–4 mm. long, pubescent, bearing on the upper side above the middle 1 (sometimes 2) gland, the glands stipitate, expanded or flaring and concave at the apex; rachis pubescent, sulcate above, more or less cross-partitioned at insertion of the petiolules; stipules lanceolate, up to 14 mm. long and scarcely 2 mm. wide, erect, acuminate apically, somewhat oblique basally; leaflets up to 25 pairs, linear-oblong, usually about 12 mm. long and 2–3 mm. wide, lightly pubescent or ciliate, the midvein excentric, mucronate apically, inequilateral basally, sessile. Peduncles short, 1- to 3-flowered, borne on the internode a short distance above the axils; pedicels about 15 mm. long, bibracteate. Flowers yellow, rather inconspicuous; sepals 5, ovate-lanceolate, about 7 mm. long, ciliate-pubescent, acuminate-attenuate; petals obovate, 6–7 mm. long, sessile; stamens evidently 10, similar although markedly unequal; the anthers linear, up to 4 mm. long, dehiscent by paired terminal pores; ovary linear, pilose. Legume linear, up to 6 cm. long and about 4 mm. wide, flat, lightly pubescent, elastically dehiscent, the seeds obliquely transverse.

Mexico to northern South America; West Indies.

CANAL ZONE: Balboa, *Standley 25231, 27142, 29239;* Cerro Gordo, *Standley 26031;* Culebra, *Pittier 2104;* Frijoles, *Pittier 6332, Standley 27657;* Gamboa, *Standley 28337.* PANAMÁ: Chepo, *Pittier 4749;* Matías Hernández, *Pittier 6874;* R. Tecúmen, *Standley 29475.*

The entity here considered as *C. stenocarpa* is scarcely distinct from many allied "species" of Central America, South America and the West Indies. For

example, no definite delimitation seems possible between specimens of *C. stenocarpa* compared with *C. riparia* (of HBK.), *C. glandulosa, C. Chamaecrista* and a number of Britton & Rose segregates as they are found in the herbaria. To avoid further confusion, most of these various species are here regarded as distinct as they are found in Panama; however, it is recognized that reference to types and intergrading forms from all of tropical America would likely necessitate extensive condensation and reduction. The name *C. glandulosa* L. or *C. Chamaecrista* L. might well profitably apply to this whole complex of similar forms, with a few varietal names maintained for certain localized "species."

Fig. 123. *Cassia stenocarpa* var. *stenocarpoides*

17a. CASSIA STENOCARPA Vog. var. **stenocarpoides** (Britt.) Schery, comb. nov.

Chamaecrista stenocarpoides Britt. in N. Am. Fl. 23:293. 1930.
Cassia stenocarpoides (Britt.) Lundell, in Phytologia 1:215. 1937.

Vegetative characters and inflorescence as described for *C. stenocarpa*, except the petiolar glands usually shorter or thicker. Flowers larger than in the species; sepals ovate-lanceolate, about 8 mm. long and 2–4 mm. wide; petals obovate, the

larger about 1 cm. long; stamens apparently 10, the filaments almost obsolete, the anthers all similar but markedly unequal; largest anthers about 7 mm. long, dehiscent by terminal pores and longitudinally pubescent-ridged laterally; ovary usually strigose-pilose. Legume as described for the species.

Costa Rica and Panama; probably northern Central America and northern South America as well.

CHIRIQUÍ: R. Chiriquí Viejo, *Peggy White 36.*

As stated in discussion of *C. stenocarpa,* correct application of the specific name cannot be certain without reference to types and additional collections not here available. While this variety seems fairly distinct in Costa Rica, both to the north and in South America various "species" appear doubtfully different.

18. CASSIA FLAVICOMA HBK. Nov. Gen. & Sp. 6:366. 1824.

Cassia stipulata G. Don, Gen. Hist. Dichl. Pl. 2:448. 1832, fide Benth.
Chamaecrista chiriquensis Britt. & Rose, in N. Am. Fl. 23:287. 1930.

Small suffrutescent shrub, the branchlets usually pilose with prominent yellow hairs. Leaves moderate, multifoliolate; petioles about 5 mm. long, heavily pubescent, bearing a solitary, stipitate, subpeltate gland above the middle; rachis usually 5–7 cm. long, pubescent like the petiole; stipules narrowly lanceolate, 1 cm. long or longer, acuminate, ciliate-margined; leaflets up to 30 pairs, linear, up to 18 mm. long and 2–3 mm. wide, membranous, glabrous or nearly so above, appressed-pubescent below, rounded and mucronate apically, inequilateral basally, the veins faint. Inflorescence borne from the internode, 1- to few-flowered, the peduncle very short; pedicels almost 1 cm. long, pubescent, bibracteolate above the middle. Flowers yellow, usually 12 or more mm. long; sepals ovate-lanceolate, 9–12 mm. long and mostly 1–2 mm. broad, strigose; petals obovate, unequal, up to 14 mm. long and 10 mm. broad; stamens 10, all similar but markedly unequal, the filaments essentially obsolete, the anthers dehiscent by paired terminal pores and with lateral pubescnt ridges; 3 longest anthers 11–12 mm. long, linear, strongly arcuate; remaining anthers 2–5 mm. long; ovary about 4 mm. long, subtomentose. Legume linear, about 5 cm. long and 6 mm. wide, dehiscent, oblique basally and apically, lightly pubescent to subglabrous on the valves; seeds obliquely transverse.

Mexico, Panama, South America, West Indies.

CHIRIQUÍ: San Felix, *Pittier 5216.*

The single specimen known from Panama is the type for *Chamaecrista chiriquensis* Britt. & Rose. There seems to be no definite, tangible difference between it and Mexican, West Indian and South American specimens listed in herbaria as *Cassia flavicoma, C. glandulosa* and *C. riparia.* In the absence of types, *C. flavicoma* is chosen as the name most appropriate to the specimen in question; but, as mentioned in discussion of *C. stenocarpa,* monographic work would perhaps show this to be best treated as a variety of some earlier name such as *C. glandulosa.*

19. CASSIA PATELLARIA DC.; Collad. Hist. Cass. 125. 1816.

Chamaecrista patellaria (DC.) Greene, Pittonia 4:32. 1899.

An herbaceous perennial (or annual?), erect, to a few dm. tall, the branchlets densely pubescent with ascending hairs. Leaves moderately small, multifoliolate; petiole short, 2–7 mm. long, pubescent, bearing on the upper side 1–2 sessile, patelliform glands about 1 mm. long; rachis usually 4–5 cm. long, sulcate above, more or less cross-partitioned at insertion of the petiolules; stipules linear-lanceolate, up to 13 mm. long, oblique basally, attenuate-acuminate apically, ciliate; leaflets 25 or fewer pairs, linear-oblong, up to 16 mm. long and 3 mm. wide, inequilateral basally, mucronate apically by extension of the midvein, strigose-pubescent, the hairs from a pustuliform base (in dried material), the midvein excentric. Flowers 1–4 from the internodes, yellow, the common peduncle very short, the pedicels at most 1 cm. long, bracteate; sepals ovate-lanceolate, about 5 mm. long, pubescent; petals obovate, up to 11? mm. long (usually about 5 mm. in Panama), glabrous, sessile; stamens usually 8–10, all similar although markedly unequal, the anthers linear or linear-oblong, 1–3.5 mm. long, longitudinally pubescent laterally, dehiscent by paired terminal pores; ovary densely pubescent. Legume linear, up to 5 cm. long and 5 mm. wide, flat, pubescent, elastically dehiscent, the seeds obliquely transverse.

Mexico to northern South America; West Indies.

CANAL ZONE: Balboa, *Standley 26437, 32154;* Corozal, *Standley 27390;* Culebra, *Pittier 4828;* Summit, *Standley 30053.* PANAMÁ: Camino de las Sabanas, *Bro. Heriberto 260;* Corozal road, *Standley 26798.*

The species is very similar to *C. simplex,* differing chiefly in the pronounced leaf pubescence.

20. CASSIA SIMPLEX (Standl.) Standl. in Contr. U. S. Nat. Herb. 27:199. 1928.

Chamaecrista simplex Standl. in Contr. U. S. Nat. Herb. 18:103. 1916.
Chamaecrista Browniana Britt. & Rose, in N. Am. Fl. 23:293. 1930.

An erect annual (or perennial?) to several dm. tall, the stems appressed-pubescent with short, incurved hairs. Leaves moderate, multifoliolate; petiole about 5 mm. long, pubescent like the stem, bearing on the upper side 1–2 sessile, patelliform glands about 1 mm. long; rachis similar to petiole, up to about 10 cm. long, more or less cross-partitioned at insertion of the petiolules; stipules linear-lanceolate, up to 15 mm. long, oblique basally, attenuate-acuminate apically, ciliate; leaflets up to 25 or more pairs, linear-oblong, usually about 8 mm. long and scarcely 2 mm. wide, glabrous, mucronate apically by extension of the excentric midvein, inequilateral basally. Flowers usually 2–3 from the internodes, yellow, the common peduncle very short, the pedicels up to 4 mm. long, bibracteate; sepals ovate-lanceolate, 5–9 mm. long, lightly pubescent; petals obovate, up to about 1 cm. long, sessile, glabrous; stamens 10 (sometimes less?), markedly unequal, all similar, the anthers linear, 2–5 mm. long, longitudinally puberulent laterally, de-

hiscent by paired terminal pores; ovary pilose. Legume linear, 3–4 cm. long and up to 5 mm. wide, flat, elastically dehiscent, pubescent, the seeds obliquely transverse.

Guatemala, Panama and Colombia.

CANAL ZONE: Ancón, *Killip 3023; Standley 25194, 26342.* PANAMÁ: Dormisolo, *Pittier 4655;* Hacienda La Joya, *Dodge, Hunter, Steyermark & Allen 16895;* Isla Taboga, *Woodson, Allen & Seibert 1439; Standley 28014;* between Pacora and Chepo, *Woodson, Allen & Seibert 1659;* Pacora, *Killip 3324;* R. Tecúmen, *Standley 22660.*

The species is very similar to *C. patellaria,* differing in having glabrous leaves and more appressed stem pubescence. Judging from material seen, these differences are constant and without significant intergradation. The *Dodge, Hunter, Steyermark & Allen 16895* specimen cited differs from most specimens in having larger, more abundant leaflets and the petiolar glands more or less oblong. It thus could be regarded as *Chamaecrista (Cassia) Browniana* Britt. & Rose, were that species to be considered valid. However, the only distinguishing feature of *Chamaecrista Browniana* seems to be the larger longitudinal proportions of the petiolar gland, a character scarcely of specific weight in a group where petiolar glands are notably variable. Unless further collections can prove the contrary, it would seem wise to include *Chamaecrista Browniana* as but a variation of *Cassia simplex.*

21. CASSIA LEPTOCARPA var. HIRSUTA Benth. in Trans. Linn. Soc. 27:531. 1871.

Ditremexa leptocarpa (Benth.) Britt. & Rose, in N. Am. Fl. 23:256. 1930 (in part).

Shrub to 2 m., with pubescent branchlets. Leaves pubescent (in Panama), several-foliolate; petiole up to 10 cm. long, angled, with a conspicuous basal gland about 6 mm. above the insertion; rachis lightly pubescent to hirsute; stipules linear, about 1 cm. long, caducous; leaflets usually about 5 pairs, ovate to ovate-lanceolate, acute and somewhat acuminate apically, obtuse to acute basally, 3–10 cm. long and up to 3.5 cm. wide. Inflorescence a terminal or axillary, several-flowered, condensed raceme; pedicels usually about 1.5 cm. long, pubescent. Flowers yellow; sepals elliptic to suborbicular, 6–8 mm. long, the outermost densely pubescent; petals obovate to suborbicular, up to 14 mm. long, venose, short-clawed; stamens 4-morphic, all dehiscent by apical pores, 7 fertile; the lowermost with a slender filament, with the anther oblong, about 3 mm. long, briefly sagittate basally, bounded on each side by a large stamen with a thick filament, with the anther 6–7 mm. long, very briefly sagittate basally, apically with an erect orbicular rostrum above the pores; 4 median stamens similar to large ones but their anthers 4–5 mm. long; 3 upper stamens non-functional, the anthers flat, orbicular-oblong, about 2 mm. long; ovary setose-hirsute; the style short. Legume linear, up to 30 cm. long and 3–4 mm. wide, thin, flattened, pubescent (in Panama), the margins ridged.

Mexico; Central America; West Indies; South America to Paraguay.

Fig. 124. *Cassia leptocarpa* var. *hirsuta*

BOCAS DEL TORO: Carreters, *von Wedel 13;* vicinity of Chiriquí Lagoon, *von Wedel 133, 1738;* Chorrera, *Porterfield s. n.*

Bentham's variety *hirsuta* is not recognized by Britton & Rose in the 'North American Flora.'

22. CASSIA OCCIDENTALIS L. Sp. Pl. 377. 1753.[1]

Cassia falcata L. loc. cit. 1753.
Cassia planisiliqua L. loc. cit. 1753, ex parte, fide Benth.
Cassia Sophera L. loc. cit. 379. 1753.
Cassia frutescens Mill. Gard. Dict. ed. 8, no. 2. 1768, fide Britt. & Rose.
Cassia longisiliqua L. f. Suppl. 230. 1781.
Cassia caroliniana Walt. Fl. Car. 134. 1788, fide Britt. & Rose.
Cassia linearis Michx. Fl. Bor. Am. 1:261. 1803.

[1]Britton and Rose (N. Am. Fl.) regarded *C. Sophera* as distinct from *C. occidentalis.* However, the specimens from Panama which they considered to be *C. Sophera* are scarcely different from the typical *C. occidentalis.* Indeed, comparison of West Indian material of "*Cassia Sophera*" with *C. occidentalis* (especially *Fendler 85*, cited by Benthem) would indicate that these two species are

Cassia foetida Pers. Syn. Pl. 1:457 (sub *C. occidentalis*). 1805, fide Benth.
Cassia ciliata Raf. Fl. Ludovic. 100. 1817, fide Britt. & Rose.
Cassia geminiflora Schrank, Hort. Monac. *t. 26*. 1819, fide Benth.
Cassia obliquifolia Schrank in Denkschr. Bot. Ges. Regensb. 2:40. 1822, ex char., fide Benth.
Senna occidentalis Link, Handb. 2:140. 1831.
Ditremexa occidentalis (L.) Britt. & Rose ex Britt. & Wilson, Scientif. Surv. Porto Rico & Virgin Isls. 5:372. 1924.

Glabrous shrub or herb to 2 m. tall. Leaves moderate, generally 10-foliolate; petiole 2–5 cm. long, somewhat flattened and sulcate, bearing a dark, sessile, globose gland a few mm. from the base; rachis up to 15 cm. long, sulcate, eglandular; stipules ovate to narrowly lanceolate, caducous; leaflets normally 4–6 pairs, ovate or ovate-lanceolate, up to 10 cm. long and 3 cm. wide, apically acuminate, basally rounded or obtuse and somewhat oblique, glabrous, obscurely reticulate, dull, membranaceous; petiolules about 2 mm. long, with a few short, curved hairs above.

not specifically distinct, and that *C. Sophera* (with its multitudinous synonyms) probably should be included among the synonyms of *C. occidentalis*, or at most merely as a variety of that species (into which *Fendler 85* and *Hayes 880* specimens would then seem to fall). As a variety, *C. Sophera* would be expected to have proportionally shorter, more turgid fruit; less coarseness; smaller average leaflet; and possibly smaller, narrower bracts of the inflorescence. There is, however, no good distributional tie-in with this separation. It would thus seem best to regard *C. Sophera* and *C. occidentalis* as conspecific until intensive subspecific research can indicate accurately if and how any further taxonomic breakdown may occur. *Cassia Sophera* carries with it a great number of synonyms not listed above. Included are *Senna Sophera* (L.) Roxb. Fl. Ind. 2:347. 1832, *Cassia proboscidea* Pollard, Bull. Torr. Club 23:381. 1896, and *Ditremexa Sophera* (L.) Britt. & Rose in Britt. & Wilson, Scientif. Surv. Porto Rico and Virgin Isls. 5:372. 1924. Bentham, in Trans Linn Soc. 27:532. 1871, further lists the following synonyms:
Cassia ruscifolia Jacq. Ic. Pl. Rar. 1, *t. 71*. 1781–86, ex icone.
Cassia Canca Cav. Descr. Pl. 132. 1802, ex char.
Cassia aegyptiaca Willd. Enum. Hort. Berol. 442. 1809, ex char.
Cassia robinioides Willd. loc. cit. 1809.
Cassia esculenta Roxb. Hort. Beng. 31. 1814.
Cassia sopheroides Collad. Hist. Cass. 133. 1816.
Cassia Barclayana Sweet, Fl. Austral. *t. 32*. 1828.
Chamaefistula Sophera G. Don, Gen. Hist. Dichl. Pl. 2:452. 1832.
Senna esculenta Roxb. Fl. Ind. 2:346. 1832.
Cassia schinifolia DC. in Mem. Soc. Phys. Genève 7:299. 1836.
Cassia atroviridis? Span. in Linnaea 15:201. 1841, ex char.
Cassia lanceolata Forsk. Fl. Aegypt.-arab., ex parte; Bisch. in Bot. Zeit. 897, *t. 10*. 1850, non aliorum.
Cassia ligustrina Forsk., in Herb. Mus. Brit.
For var. TORULOSA:
Cassia chinensis Jacq. Collect. 1:64. 1786.
Cassia torosa Cav. Descr. 131. 1802, ex char.
Cassia indica Poir. in Lam. Encycl. Meth. Suppl. 2:127. 1811.
Cassia torulosa Poir. loc. cit. 126. 1811.
Chamaefistula chinensis G. Don, Gen. Hist. Dichl. Pl. 2:452. 1832.
Chamaefistula torosa G. Don, loc. cit. 1832.
For var. LIGUSTRINOIDES:
Cassia frutescens Mill. Dict. ed. 8, n. 2. 1768.
Cassia patula Ait. Hort. Kew. ed. 1, 2:51. 1789.
Cassia coromandeliana Jacq. Fragm. Bot. 67, *t. 1000*. 1809, ex char.
Chamaefistula Coromandeliana G. Don, Gen. Hist. Dichl. Pl. 2:452. 1832.
For var. PURPUREA:
Cassia purpurea Roxb. Hort. Beng. 31. 1814.
Senna purpurea Roxb. Fl. Ind. 2:342. 1832.
Senna Sophera var. *purpurascens* Roxb. loc. cit. 347. 1832.

Fig. 125. *Cassia occidentalis*

Inflorescence terminal to axillary in lower leaves, few- to several-flowered, racemose or sometimes paniculate; bracts lanceolate, about 1 cm. long, caducous; pedicels rather short. Flowers yellow; sepals ovate to obovate, up to 9 mm. long, glabrous, imbricate; petals oblong or obovate, up to 15 mm. long, short-clawed, glabrous, venose, the veins scarcely reticulate; stamens 4-morphic, 6–7 of them fertile and dehiscent by a pair of approximate, oblique, apical pores; lowermost center stamen with a relatively long filament and small rostrate anther, the anther usually rudimentary; 2 lowermost lateral stamens with stout filaments, the anthers elliptic-subfalcate, about 7 mm. long, rostrate; 4 median anthers oblong, 4–5 mm. long, short-rostrate; uppermost 3 stamens rudimentary, represented by flattened, clawed, subspatulate staminodes; ovary linear, pubescent. Legume linear-oblong, up to 15 cm. long and 9 mm. wide, glabrous, flattened, margined, scarcely stipitate, septate, slightly curved; seeds transverse.

Southern United States to Paraguay; Old World tropics.

BOCAS DEL TORO: *von Wedel 269;* Isla Colón, *von Wedel 478;* "western Panama", *Stork 74.* CANAL ZONE: "Chagres", *Fendler 85;* Matachin, *Pittier 4055.* CHIRIQUÍ: Boqueté, *Davidson 794;* Puerto Armuelles, *Woodson & Schery 834.* PANAMÁ: Chepo, *Pittier 4456;* Juan Franco race track, *Standley 27746;* Las Sabanas, *Standley 25847;* Taboga Island, *Standley 27861;* R. Tapia, *Standley 28213.*

23. CASSIA LIGUSTRINA L. Sp. Pl. 378. 1753.

Cassia occidentalis var. *glabra* Stahl in Est. Puerto Rico 3:112. 1885, not DC., fide N. Am. Fl.

Ditremexa ligustrina (L.) Britt. & Rose, in Britt. & Wilson, Scientif. Surv. Porto Rico and Virgin Isls. 5:372. 1924.

Herb or subshrub to 2 m. high, the branchlets sparsely puberulent to glabrous. Leaves moderate, 8- to 18-foliolate; petiole up to 5 cm. long, somewhat flattened and sulcate above, bearing near the middle or base a slender elongate-cylindric gland 1–3 mm. long; rachis up to 15 cm. long, eglandular, similar to the petiole; stipules ovate or lanceolate, caducous; leaflets mostly about 7–8 pairs, narrowly ovate or lanceolate, 1.5–6 cm. long, up to 1.5 cm. wide, apically acuminate, basally rounded or obtuse and somewhat oblique, glabrous or often ciliolate, obscurely reticulate, dull, membranaceous or submembranaceous; petiolules mostly about 1 mm. long, puberulent above. Inflorescence terminal or axillary in upper leaves, several-flowered, paniculate (of several racemes); bracts ovate-lanceolate, about 5 mm. long, caducous; pedicels in age as long as the flowers. Flowers yellow; sepals ovate or oblong, about 7 mm. long and 5 mm. wide, subglabrous; petals oblong-obovate, 12–16 mm. long and up to 1 cm. wide, scarcely clawed, subglabrous, venose; stamens 4-morphic, 6–7 of them fertile, the anthers dehiscent by a pair of approximate, oblique, terminal pores; lowermost center stamen with a relatively long filament and small, short-rostrate, rudimentary? anther; 2 lowermost lateral stamens with stout filaments about as long as the anther, the anther subfalcate, about 6 mm. long, short-rostrate; 4 median anthers oblong, 4–5 mm. long, short-rostrate; uppermost 3 stamens rudimentary, represented by flattened, clawed, subspatulate staminodes; ovary pubescent. Legume linear, about 10 cm. long and 6–7 mm. wide, glabrous, flattened, margined, short-stipitate, septate, slightly curved, the seeds obliquely transverse.

Panama and West Indies.

BOCAS DEL TORO: Isla Colón, *von Wedel 517*.

The species is very similar to *C. occidentalis* (including *C. Sophera*) and *C. leptocarpa*. It differs primarily in the shape of the petiolar gland, a character which in final analysis may not be of specific value.

24. CASSIA LAEVIGATA Willd. Sp. Pl. 441. 1809.

Adipera laevigata (Willd.) Britt. & Rose, ex Britt. & Wilson, Scientif. Surv. Porto Rico & Virgin Isls. 5:371. 1924.

Additional synonyms listed by Bentham (Trans. Linn. Soc. 27:527. 1871) include: *Cassia aurata* Roxb., *Cassia corymbosa* Ort. (not Lam.), *Cassia elegans* HBK., *Cassia floribunda* Cav., in part, not Collad., *Cassia grandiflora* Desf., *Cassia Herbertiana* Lindl., *Cassia hybrida* Ten., *Cassia quadrangularis* Zolling, *Cassia septentrionalis* Zucc. ex Collad., *Cassia tropica* Vell., *Cassia vernicosa* Closs, ex char., *Chamaefistula floribunda* (Cav.) G. Don, *Chamaefistula Herbertiana* (Lindl.) G. Don, *Chamaefistula laevigata* (Willd.) G. Don, *Senna aurata* Roxb.

Small tree to subherbaceous, usually shrub-like, the branchlets terete, glabrous, unarmed. Leaves moderately large, once-pinnate; petioles mostly 3–6 cm. long, glabrous, eglandular, sulcate above, callous basally; rachis somewhat longer than the petiole, glabrous, bearing dark, conical-cylindric glands just above insertion of each pair of leaflets (occasionally lacking at terminal pair); opposite leaflets 6 or 8, ovate-lanceolate, 3–10 (mostly 5–6) cm. long and 1–3 cm. wide, pronouncedly acute-acuminate apically, cuneate to rounded basally, entire, glabrous, dull, short-petiolulate; stipules linear, caducous. Inflorescence of axillary and terminal short corymbose racemes; peduncle shorter than the leaves, usually about 5 cm. long, glabrous, the bracts caducous; pedicels about 2 cm. long in basal flowers, glabrous. Flowers yellow, conspicuous; sepals 5, free, ovate to obovate, very unequal, up to 1 cm. long, glabrous; petals 5, free, mostly obovate, up to 15 mm. long, conspicuously reticulate-venose; stamens 7 (plus 3 small staminodes), trimorphic; lower center stamen moderately filamented, the anther moderate; 2 lower lateral stamens long-filamented, large-anthered, the filament gross, about 12 mm. long, the anther about 8 mm. long, basifixed, dehiscing by confluent terminal pores; 4 central stamens short, the filaments 1–2 mm. long, the anthers about 5 mm. long, dehiscing by paired terminal pores; all anthers scarcely rostrate; staminodes orbicular, 1–2 mm. long; ovary slender, glabrous, the stigma obliquely terminal. Legume linear, 6–9 cm. long and at maturity about 1 cm. wide, turgid-terete, pulpy, glabrous, more or less bordered marginally, the seeds many, transverse.

Mexico to South America; West Indies. Introduced throughout World tropics.

PANAMÁ: "Island in Gulf of Panama, Wellesley Hills", *Purdie s. n.* (1887).

As far as is known, the sole record for the species in Panama consists of the cited specimen, from uncertain location. The species exhibits moderate variability, but is readily distinguished from other species of *Cassia* in Panama, particularly by the glabrous, few-foliolate leaves, without petiolar glands. In many places the species is a common weed of disturbed or cultivated ground. Standley and Steyermark report the seeds used as a substitute for coffee in Guatemala.

25. CASSIA LEIOPHYLLA Vogel, Syn. Cass. 25. 1837.

Cassia humilis Mart. & Gal. in Bull. Acad. Brux. 10^2:307. 1843, non Collad. 1816, fide N. Am. Fl.
Cassia pumila Mart. & Gal. loc. cit., non DC., fide Bentham.
Vogelocassia leiophylla (Vogel) Britt., in N. Am. Fl. 23:259. 1930.

Herbs or herbaceous shrubs or small trees up to a few m. tall, the branchlets glabrate to pubescent. Leaves small, normally 6-foliolate; petioles about 2 cm. long, ridged, usually somewhat pubescent; rachis up to 4 cm. long, glanduliferous between lower 2 pairs of leaflets; stipules linear, about 1 cm. long; leaflets obovate, up to 7 cm. long and 3.5 cm. wide, but usually 3–4 cm. long, rounded or obtuse and sometimes mucronulate apically, basally acute to irregularly rounded, dull, usually pubescent; petiolules 1–2 mm. long. Inflorescence few-flowered, usually axillary from the terminal leaves or upper branchlets, the short peduncles often

with only 1–2 flowers on slender, pubescent pedicels 1–3 cm. long. Flowers yellow; sepals unequal, ovate to obovate, up to about 1 cm. long; petals obovate, rounded, about 2–2.5 cm. long, short-clawed, venose; fertile stamens 7 (the others rudimentary), 2-morphic, glabrous, dehiscent by terminal pores; the 3 lowermost with linear-oblong anthers 8–10 mm. long, markedly rostrate; the 4 median stamens with short-beaked anthers about 6 mm. long; ovary linear, pubescent. Legume linear-falcate, up to 15 cm. long and 4 mm. wide, flattened, somewhat pubescent, the margins conspicuously ridged; the seeds oblique, prominent.

Mexico; Central America; South America to Peru and Brazil.

BOCAS DEL TORO: Talamanca Valley, *Carleton III*. CANAL ZONE: Las Cruces Trail, *Hunter & Allen 714*. DARIÉN: between Pinogana and Yavisa, *Allen 275*. PANAMÁ: between Capira and Potrero, *Dodge & Hunter 8600;* Juan Díaz, *Standley 30945;* Matías Hernández, *Standley 28765;* Panamá, *Standley 26831*. VERAGUAS: Sonâ, *Allen 1058*.

26. CASSIA TORA L. Sp. Pl. 376. 1753.

Cassia obtusifolia L. loc. cit. 377. 1753.
Cassia pentagonia Mill. Gard. Dict. ed. 8, no. 18. 1768.
Cassia Sunsub Forsk. Fl. Aegypt.-arab. 86. 1775, fide Benth.
Cassia Tagera Lam. Encycl. Meth. 1:643. 1783, fide Benth., non L.
Cassia foetida Salisb. Prodr. 325. 1796, fide Benth.
Cassia Tala Desv. in Jour. Bot. 3:73. 1814.
Cassia toroides Roxb. Hort. Beng. 31. 1814, fide Benth.
Cassia humilis Collad. Hist. Cass. 96. 1816.
Cassia gallinaria Collad. loc. cit. 1816, fide Benth.
Chamaefistula contorta G. Don, Gen. Hist. Dichl. Pl. 2:452. 1832, fide Benth.
Senna toroides Roxb. Fl. Ind. 2:341. 1832, fide Benth.
Senna Tora (L.) Roxb. loc. cit. 340. 1832.
Cassia contorta (Don) Vogel, Syn. Cass. 20. 1837, fide Benth.
Diallobus falcatus Raf. Sylva Tellur. 128. 1838.
Diallobus uniflorus Raf. loc. cit. 1838.
Cassia candenatensis Dennst. in Steud. Nom. Bot. ed. 2, 304. 1841, ex ic. cit., fide Benth.
Emelista Tora (L.) Britt. & Rose in Britt & Wilson, Scientif. Surv. Porto Rico & Virgin Isls. 5:371. 1924.

Annual herb or small shrub up to about 1 m. tall, the branches glabrous or nearly so. Leaves moderately small, normally 6-foliolate; petiole angled, subglabrous, flattened or sulcate above, 1–3 cm. long; rachis similar and about as long, bearing between the lowermost pair of leaflets a linear-subulate gland about 2 mm. long; stipules linear-subulate, about 1 cm. long, caducous in age; leaflets obovate, up to 4 cm. long and 2 cm. wide, apically obtuse to rounded or subtruncate and usually mucronulate, basally obtuse to subcuneate and unequal, glabrous above, glaucous and somewhat appressed-pubescent below, membranaceous, obscurely reticulate; petiolule about 1 mm. long. Inflorescence of 1–2 flowers from (each) upper nodes. Flowers yellow, moderate; sepals ovate to oblong, up to 8 mm. long and 4 mm. wide, unequal, scatteringly pubescent with few long hairs; petals ovate to obovate, up to 12 mm. long, venose, glabrous; fertile stamens 7, all dehiscent by a single terminal pore; anthers of the 3 lowermost rostrate, about 4 mm. long, with short filaments; anthers of the 4 median ones oblong, truncate, 2–3 mm. long,

with filaments only slightly shorter than in the lowermost stamens; ovary linear, pubescent. Legume linear, usually about 15 cm. long and 4 mm. wide, arcuate, subglabrous, dehiscent, margined-subterete; seeds obliquely longitudinal, shiny.

Cosmopolitan in world tropics and warmer temperate sections; native to India.

BOCAS DEL TORO: Isla Colón, *von Wedel 51*. CANAL ZONE: "Chagres", *Fendler 92*; Culebra, *Pittier 2116*, *Standley 26041*; Summit, *Standley 27310*. PANAMÁ: Bella Vista, *Standley 2315*; between Panamá and Chepo, *Dodge, Hunter, Steyermark & Allen 16627*; Panamá, *Bro. Paul 580*; Río Tapia, *Standley 28070*. VERAGUAS: Sonâ, *Allen 1060*.

27. CASSIA PILIFERA Vogel, Syn. Cass. 23. 1837.

?Cassia cubensis Hoffmansegg, Pfl. Verz. 1:209. 1824.
Cassia maritima Willd. in Vogel, loc. cit. 1837, fide Benth.
Emelista pilifera (Vog.) Pittier, in Jour. Wash. Acad. 19:176. 1929.

Shrub or large herb, the branchlets pilose or setose. Leaves moderate, normally 4-foliolate; petioles up to 4 cm. long, loosely pilose; rachis much shorter than the petiole, up to 1 cm. long, normally bearing between both pairs of leaflets a linear-subulate gland 3–4 mm. long; stipules linear-filiform, usually about 1 cm. long, pilose like the rachis and branches; leaflets elliptic to obovate, up to 6 cm. long and 3.5 cm. wide, apically narrowly rounded to obtuse or subacute, basally unequal and oblique, pubescent above and below, dull above and somewhat glaucous below, obscurely reticulate, membranaceous; petiolules 1–2 mm. long, pubescent like the petiole. Inflorescence of few axillary, subterminal flowers, often umbellate (up to 4-flowered) from a common peduncle in the lower axils. Flowers yellow, large; sepals relatively small, ovate to lanceolate, up to 9 mm. long and 4 mm. wide, very unequal, sparingly long-pubescent; petals ovate or suborbicular, up to 2.3 cm. long and almost as wide, clawed, venose, lightly pubescent to glabrous in age; fertile stamens 7, dehiscent by a pair of approximate terminal pores, the 3 lowermost unequal, linear-oblong, rostrate, arcuate, the anther of the largest about 1 cm. long with an elongate filament; 4 median stamens unequal, short-rostrate (the rostrum strongly reflexed), the largest anther about 5–6 mm. long; ovary linear, pubescent. Legume up to 16 cm. long while only 3–4 mm. wide, subquadrate, margined, dehiscent, arcuate, tomentulose to pilose; seeds longitudinal, rectangular, about 3 mm. long.

Mexico to Argentina; Cuba.

CANAL ZONE: Balboa, *Standley 26057, 27118, 29303*; Las Cruces Trail, *Standley 29010*. PANAMÁ: Alhajuela, *Pittier 2367*; between Capira and Potrero, *Dodge & Hunter 8610*; Chepo, *Mell s.n.*; Corozal road, *Standley 26880*; Matías Hernández, *Standley 28919, 31917*.

28. CASSIA WILLIAMSII (Britt. & Rose) Standl. Field Mus. Bot. Ser. [Fl. Costa Rica] 18:519. 1937.

Peiranisia Williamsii Britt. & Rose, in N. Am. Fl. 23:265. 1930.

Shrub or small tree to 3 m., the branchlets hirsute or pilose (the long hairs occasionally deciduous or lacking). Leaves elongate, multifoliolate; petioles short, glabrous below, puberulent and somewhat flattened above; rachis up to 20 or more

Fig. 126. *Cassia Williamsii*

cm. long, subglabrous, bearing between the lowermost (and usually second) pair of leaflets a prominent, stalked, clavate gland 4–5 mm. long, and between all or many of the remaining pairs of leaflets thin acicular glands; stipules linear-falcate, about 8 mm. long, caducous; leaflets 30–60 pairs, small, narrowly oblong, up to 15 mm. long and 3 mm. wide, apically rounded, basally inequilateral, few-veined, glabrous; petiolules less than 1 mm. long. Inflorescence axillary from the terminal or subterminal axils, few-flowered; peduncle up to 4 cm. long, subglabrous; pedicels (usually 3–4) up to 3 cm. long, condensed or subumbellate from the upper peduncle; bracts lanceolate, about 3 mm. long. Flowers large, yellow; sepals very unequal, ovate to obovate, the largest about 15 mm. long, glabrous, membranaceous, somewhat maculate especially basally; petals oblong-obovate to orbicular, unequal,

about 3 cm. long and (the largest) almost 2.5 cm. wide, glabrous, short-clawed; fertile stamens 7, with short filaments; anthers of the 3 lowermost linear-oblong, falcate, about 7 mm. long, long-rostrate and dehiscent by a pair of approximate terminal pores; anther of 4 median stamens about 6 mm. long, subtruncate apically by oblique reflexion of a short rostrum, dehiscent by a pair of terminal pores; uppermost 3 staminodes flat, 2–3 mm. long, clawed; ovary linear, arcuate, pubescent. Legume linear, about 14 cm. long and 4–5 mm. wide, glabrate, stipitate, septate between the seeds; seeds transverse, rhombic, 2–3 mm. long.

Panama and Costa Rica.

CHIRIQUÍ: Boquete, *Davidson 845;* Hato del Jobo, *Pittier 5406, 5407.* COCLÉ: Bismark, *Williams 567;* El Valle, *Allen 115, 1180, Hunter & Allen 301.*

Cassia Williamsii is closely related to C. *Mutisiana* of Colombia, which species, however, has the leaflets pubescent below.

29. CASSIA MULTIJUGA Rich. in Act. Soc. d'Hist. Nat. Paris 1:108. 1792.

Cassia calliantha G.F.W. Mey. Prim. Fl. Esseq. 169. 1818, fide Benth.
Cassia Richardiana Kunth, Mim. 139, *t. 42.* 1819, fide Benth.

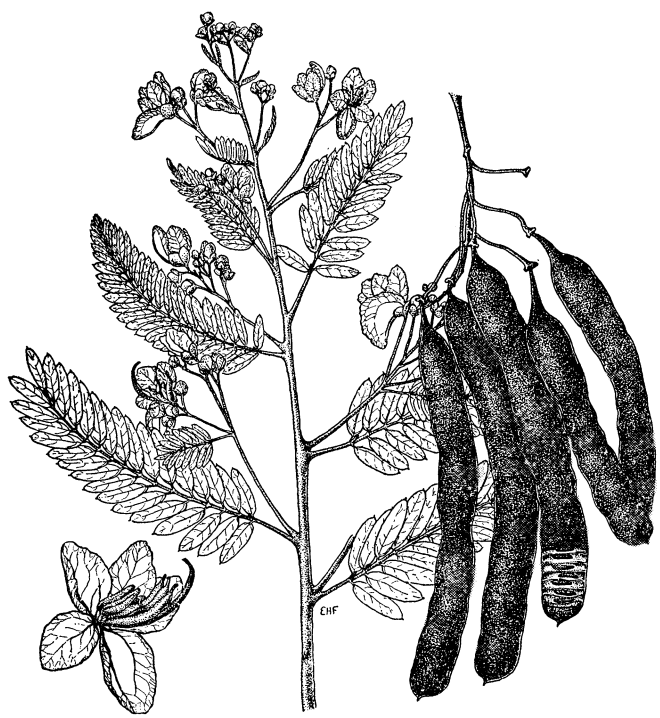

Fig. 127. *Cassia multijuga*

Cassia semifalcata Vell. Fl. Flum. Ic. 4:*t. 68.* 1827, fide Benth.
Cassia Selloi G. Don, Gen. Hist. Dichl. Pl. 2:442. 1832, fide Benth.
Cassia ampliflora Steud. in Flora 26:760. 1843, fide Benth.
Additional synonyms are given by Bentham.

Small tree, the branchlets puberulent or subglabrous. Leaves moderately large, multijugate; petiole relatively short, 1–2 cm. long, subsulcate above except baseward where more or less terete and callous; rachis 10–25 cm. long, sulcate above and cross-partitioned at insertion of the petiolules, usually puberulent marginally, bearing in most cases a prominent, elongate, cylindric-subconic gland between the lowermost pair of leaflets; stipules linear-acuminate, caducous; leaflets (on at least most leaves) 12–40 pairs, linear-oblong or oblong, 1–4 cm. long and up to 1 cm. wide, rounded and mucronulate apically, obtuse or rounded and slightly inequilateral basally, dull but conspicuously lighter below, glabrous or puberulent; petiolule about 2 mm. long. Inflorescence terminal or subterminal, paniculate of several racemes; bracts like the stipules, caducous; pedicels in age as long as 2.5 cm. Flowers yellow, showy; sepals ovate, up to 7 mm. long and 5 mm. wide, subglabrous; petals ovate to obovate or suborbicular, very unequal but the largest about 2 cm. long, clawed, glabrous or subglabrous; fertile stamens 7, of 2 sorts; 3 lowermost up to 13 mm. long, the anther linear-oblong, 7–10 mm. long, falcate, long-rostrate, dehiscent by paired terminal pores; 4 median anthers oblong, 5–6 mm. long, short-reflexed-rostrate, subsessile; 3 uppermost stamens rudimentary or lacking; ovary glabrous or nearly so. Legume broadly linear, up to 20 cm. long and about 1.5 cm. wide, flat, septate, shiny, short-stipitate, the seeds transverse.

Brazil, Peru, the Guianas; Colombia, Mexico and West Indies? fide Bentham, but not listed there in recent floras.

CANAL ZONE: Balboa, *Mell 12.*

This is apparently a new record for Panama. The specimen cited was likely from an introduced plant, having been collected in a populated area (Balboa). It had been determined incorrectly as *C. moschata,* and the label used had been designed originally for "Plants of Mexico." The species is rather widely planted as an ornamental.

30. CASSIA BIFLORA L. Sp. Pl. 378. 1753.

Cassia tenuissima L. loc. cit. 1753, fide N. Am. Fl.
Cassia galegifolia L. Syst. Nat. ed. 10, 1017. 1759, fide Benth.
Cassia Marimari Aubl. Pl. Guian. Franc. 382. 1775, ex ic. Plumieri cit., fide Benth.
Cassia crista Jacq. Icon. Pl. Rar. 1:8, *t. 74.* 1781–86, fide Benth.
Cassia frondosa Ait. Hort. Kew. ed. 1, 2:53. 1789, fide Benth.
Cassia pallida Vahl, Eclog. 3:12. 1807, fide N. Am. Fl.
Cassia semperflorens DC. Cat. Hort. Monsp. 90. 1813, fide N. Am. Fl.
Cassia geminiflora Moc. & Sessé; Collad. Hist. Cass. 103, *t. 3.* 1816, fide N. Am. Fl.
Cassia nemorosa HBK. Nov. Gen. & Sp. 6:353. 1824, fide N. Am. Fl.
Cassia acapulcensis HBK. loc. cit. 1824, fide N. Am. Fl.
Cassia venustula HBK. loc. cit. 352. 1824, fide Benth.
Cassia biflora var. *semperflorens* DC. Prodr. 2:496. 1825, fide N. Am. Fl.
Cassia Berteriana Balb. in DC. loc. cit. 1825, fide Benth.

Cassia oxyadena DC. loc. cit. 495. 1825, excl. syn. Desv. & Mill., fide Benth.
Cassia fulgens Macfad. Fl. Jam. 1:342. 1837, fide Benth.
Panisia biflora Raf. Sylva Tellur. 129. 1838.
?*Cassia xiphioidea* Bertol. Fl. Guatemal. 15. 1840, ex descr., fide Benth.
Cassia biflora angustisiliqua Griseb. Fl. Brit. W. Ind. 208. 1860.
Cassia pallidior Rose, in Jour. Wash. Acad. 17:167. 1927.
Peiranisia biflora (L.) Pittier, in Trab. Mus. Com. Venez. 158. 1928.

Small shrub to about 2 m., the branchlets lightly pubescent to glabrous. Leaves moderate, up to about 20-foliolate; petiole relatively short, usually lightly pubescent, flattened above, somewhat margined; rachis elongate, usually about 10 cm. long, similar to the petiole, nodose at insertion of the leaflets, bearing a prominent obovoid or clavate gland 2–3 mm. long between lowermost pair of leaflets, and a small, linear, terminal process; stipules linear-subulate, almost 1 cm. long; leaflets 4–10 pairs, mostly elliptic or oblong, up to 3.5 cm. long and 14 mm. wide, apically rounded and mucronulate, basally subcuneate and somewhat unequal, subglabrous, glaucous below, dull above; petiolules lightly pubescent, 1–2 mm. long. Inflorescence mostly axillary, the slender peduncle commonly divided into 2 filiform pedicels about 2 cm. long, frequently bearing 1–2 glands between the pedicels; bracts small, caducous. Flowers large, showy, yellow; sepals ovate to orbicular, up to 9 mm. long and broad, unequal, glabrous; petals ovate or obovate, 2–3 cm. long, short-clawed, glabrous, inconspicuously veined; fertile stamens 7, 2-morphic; anthers of the 3 lowermost oblong-falcate, 8–10 mm. long, very long-rostrate, the cylindric rostrum about 3 mm. long and dehiscent terminally by a pair of subconfluent pores; 4 median anthers oblong-subfalcate, 4–5 mm. long, apically obliquely truncate by strong reflexion and adnation of a short 2-pored rostrum; other stamens rudimentary or lacking; ovary linear, tomentose. Legume linear, 5–15 cm. long and 5 mm. wide, lightly margined, flat and very thin, impressed between the seeds, lightly pubescent to glabrous.

Mexico; Central America; West Indies; northern South America.

COCLÉ: Aguadulce, *Allen 4031*. HERRERA: Chitré, *Allen 1097*. PANAMÁ: Alhajuela, *Pittier 2343, 3465*. VERAGUAS: Santa Fe, *Allen 4426*.

The species is quite variable and undoubtedly subspecific entities could be established. Such variation is especially noticeable in vegetative characters. The specimens cited, for example, differ markedly in leaflet pubescence, the *Allen 1097* collection having quite pubescent leaflets tending towards the condition found in *C. velutina* Britt. & Killip, while the Pittier specimens have essentially glabrous leaflets (= *C. pallidior* Rose).

31. CASSIA BICAPSULARIS L. Sp. Pl. 376. 1753.

Cassia sennoides Jacq. Collect. 1:74. 1786.
Cassia coluteoides Collad. Hist. Cass. 102, *t. 12*. 1816.
Senna bicapsularis Roxb. Fl. Ind. 2:342. 1832.
Cassia Augusti Harms, in Fedde Rep. Sp. Nov. 18:93. 1922, fide Macbride.
Adipera bicapsularis (L.) Britt. & Rose, in Britt. & Wilson, Scientif. Surv. Porto Rico and Virgin Isls. 5:370. 1924.

In addition the following synonyms are apparently correctly given by Bentham in his classical work, Revision of the genus Cassia, in Trans. Linn. Soc. 27:503. 1871:
Cassia limensis Lam. Encycl. Meth. 1:643. 1783.
Cassia Chinensis Lam. loc. cit. 644. 1783, ex parte?
Cassia pendula Willd. Enum. Hort. Berol. 440. 1809.
Cassia alcaparillo HBK. Nov. Gen. et Sp. 6:355. 1824.
Cassia Berterii Colla, Hort. Ripul. 30, *t. 24.* 1824.
Cassia inflata Spreng. Syst. Veg. 2:336. 1825.
Cassia dormiens Vell. Fl. Flum. Ic. 4:*t. 67.* 1827.
Cassia Collae G. Don, Gen. Hist. Dichl. Pl. 2:442. 1832.
Chamaefistula inflata G. Don, loc. cit. 451. 1832.
Chamaefistula pendula G. Don, loc. cit. 1832.
Cassia chrysoloma DeNot. Ind. Sem. Hort. Bot. R. Arch. Gen. 1840 (ex Linnaea 15:Litt. Ber. 92. 1841, ex char.).
Cassia crassisepala Benth. in Linnaea 22:527. 1849.
Cassia glandulifera Reinw. in Blume, Cat. Hort. Bog. 68, ex Miq. Fl. Ind. Bat. 1^1:92. 1855.
Cassia Reinwardtii Hassk. Hort. Bog. (286. 1844), in Ann. Sci. Nat. Bot. II, 14:58. 1840, ex Miq. loc. cit. 1855.

Shrub or small tree, mostly glabrous throughout. Leaves moderately small, 6- to 10-foliolate; petiole up to 3 cm. long; rachis up to 4 cm. long, somewhat flattened or sulcate above, bearing between the lowermost pair of leaflets a stocky clavate gland 1–2 mm. long; stipules caducous; leaflets obovate, up to 3 cm. long and 1.5 cm. wide, the terminal pair largest, apically rounded to subtruncate, basally cuneate (upper pairs) to obtuse (lower pairs) and somewhat unequal, subsessile, glaucous below, dull above, obscurely reticulate. Inflorescence terminal to axillary from the upper leaves, the individual racemes several-flowered; bracts small, lanceolate, about 1 mm. long when caducous; pedicels about 1 cm. long at anthesis. Flowers yellow; sepals obovate to ovate or lanceolate, up to 12 mm. long, imbricate, unequal, greenish; petals oblong or obovate, up to 16 mm. long and 9 mm. wide, imbricate, glabrous, venose, sessile; fertile stamens 7, trimorphic; staminodes 3, flat, cuneate-deltoid, 4–5 mm. long, clawed, apically truncate; the lowermost-center anther linear, about 8 mm. long, apically rostrate and dehiscent by a single terminal pore, its filament about 4 mm. long; the two marginal anthers (of lowermost stamens) similar to the center one but more robust, with stout filaments up to 1 cm. long; 4 median anthers linear-oblong, about 5 mm. long, short-rostrate and dehiscent by 2 terminal pores, with short filaments; ovary linear, glabrous or pubescent, sessile. Legume linear-cylindric, about 12–15 cm. long and usually 1–1.3 cm. wide when mature, glabrous, dehiscent into 2 septate halves, stipitate, straight or only slightly curved.

Mexico to Paraguay and introduced into Old World tropics.

CANAL ZONE?: without locality, *Hayes 746, Seemann 529.* COCLÉ: Aguadulce, *Pittier 4963.*

31a. CASSIA BICAPSULARIS L. var. PUBESCENS Benth. in Trans. Linn. Soc. 27:525. 1871.

Cassia indecora HBK. Nov. Gen. & Sp. 6:344. 1824.
Chamaefistula indecora G. Don, Gen. Hist. Dichl. Pl. 2:452. 1832.
Cassia advena Willd. Herb. ex Vogel, Syn. Cass. 18. 1837.

Cassia ovalifolia Mart. & Gal. in Bull. Acad. Brux. 10[1]:305. 1843.
Cassia manzanilloana Rose in Contr. U. S. Nat. Herb. 1:325. 1895.
Cassia bicapsularis var. *indecora* Urban, Symb. Ant. 2:268. 1900.
Adipera indecora (HBK.) Britt. & Rose, in N. Am. Fl. 23:239. 1930.

The variety differs from the species in being more pubescent (upper twigs and lower leaflet surface usually puberulent) and in having the lowermost lateral stamens long-rostrate (beak 1–2 mm. long vs. 1 mm. or less in the species). While at their extremes the species and the variety are quite distinct in these characteristics, intermediacy on both the staminal and pubescence characters is not infrequent in northern Central America and Mexico. Furthermore, correlation between these two characters is imperfect. Thus it would seem wise to follow Bentham and Urban in considering the pubescent forms as of varietal rank (*C. bicapsularis* L. var. *pubescens* Benth.), and not of specific rank as do Britton and Rose (*C. indecora* HBK.).

Mexico to northern South America; West Indies.

CANAL ZONE: Summit, *Standley 30099*. COCLÉ: El Valle, *Hunter & Allen 337*.

32. CASSIA **unica** Schery, nom. nov.

Cassia falcinella Standley, in Contr. U. S. Nat. Herb. 18:102. 1916, non Oliver.
Chamaefistula falcinella (Standl.) Britt. & Rose, in N. Am. Fl. 23:238. 1930.

Shrub with terete or obscurely angled, cinereous-puberulent stems. Leaves 4-foliolate, small to moderate; petiole about 2.5 cm. long; rachis about 1 cm. long, usually subulate-tipped, bearing between each pair of leaflets a slender-cylindric, acute, black gland; stipules linear-falcate, about 1 cm. long and 1 mm. wide, cinereous-puberulent or subglabrous; leaflets oblong-obovate to elliptic-oblong, up to 9 cm. long and 4 cm. wide, abruptly long-acuminate apically, the tip up to 14 mm. long, acute, basally obtuse or rounded and unequal, chartaceous, glabrous, lustrous above. Inflorescence dense, many-flowered, paniculate, densely cinereous-puberulent; bracts small, about 2 mm. long, linear-lanceolate and not falcate. Flowers yellow; sepals oblong-ovate, up to 5 mm. long, obtuse, subequal, pubescent with short appressed, curved, yellow hairs; petals oblong, about 13 mm. long, obtuse, clawed, puberulent without; fertile stamens 7, anthers of the 3 lowermost slightly smaller, 5–7 mm. long, somewhat rostrate, dehiscent by a pair of subconfluent terminal pores; 4 median anthers oblong, about 8 mm. long, obliquely very short-rostrate and subtruncate, dehiscent by a pair of terminal pores; uppermost 3 stamens minute and rudimentary; ovary linear, arcuate, tomentose; stigma and upper style as wide or wider than the ovary, oblique. Legume not known.

Western Panama.

CHIRIQUÍ: vicinity of San Felix, *Pittier 5147*.

Unfortunately it has been necessary to provide a new name, *C. unica*, to *C. falcinella* Standley, in that a previous African species had been described as *C. falcinella* by Oliver (Fl. Trop. Afr. 2:281. 1871). Perhaps our species should not be distinct from *Cassia undulata*, although it is here listed separately because

C. undulata constantly has larger bracts. It would appear as though a minor variation were superimposed upon the "undulata complex", a variation that likely has not been able to perpetuate itself, in that no second collection of *C. unica* has appeared (type collected 1911).

33. CASSIA UNDULATA Benth. in Hook. Jour. Bot. 2:76. 1840.

Chamaefistula undulata (Benth.) Pittier, in Trab. Mus. Com. Venez. 3:151. 1928.

Small shrub, often vine-like, the older branchlets glabrous. Leaves small to moderate, 4-foliolate; petioles elongate, up to 5 cm. long, glabrous or very lightly pubescent; rachis somewhat angled, up to 3 cm. long, bearing a subconic gland between each pair of leaflets; stipules linear-falcate to lanceolate-falcate, about 7 mm. long, subpersistent; leaflets lanceolate-subfalcate, up to 11 cm. long and 3.5 cm. wide, inequilateral, apically usually attenuate-acuminate, basally obtuse or rounded, the margins somewhat undulate, glabrous, shiny above, not conspicuously reticulate; petiolules short, callous. Inflorescence racemose-paniculate, terminal or subterminal, several-flowered, puberulent; pedicels up to 2 cm. long; bracts ovate-lanceolate, about 8 mm. long, mucronate, persistent. Flowers yellow; sepals elliptic to obovate, 7–8 mm. long, puberulent; petals elliptic to obovate, up to 15 mm. long, puberulent, venose; stamens 7, of 2 sizes, essentially similar; anthers oblong, somewhat curved, glabrous, basally rounded-subtruncate, apically truncate but with oblique rostrate or subrostrate pores to one side, larger (4) anthers about 8 mm. long, smaller (3) anthers 4–5 mm. long; ovary appressed-tomentose, style short. Legume 10–20 cm. long, about 1 cm. thick, turgid, glabrous, basally obtuse.

Southern Mexico; Central America; Trinidad; northern South America.

CANAL ZONE: Ancón Hill, *Pittier 1724, Williams 15;* Bellavista, *Macbride 2734, Piper 5132;* "Chagres", *Fendler 86;* Culebra, *Pittier 2096;* Empire to Mandinga, *Piper 5138, 5141;* Frijoles, *Maxon 4704, Pittier 2688;* Las Cruces trail, *Standley 29231.* PANAMÁ: Bismark, *Williams 596;* Juan Díaz, *Standley 30572;* Panama City, *Macbride 2734;* Tumba Muerto road, *Standley 29704.* VERAGUAS: west of Soná, *Allen 1043.*

34. CASSIA **Maxonii** (Britt. & Rose) Schery, comb. nov.

Chamaefistula Maxonii Britt. & Rose, in N. Am. Fl. 23:234. 1930.
Chamaefistula Hayesiana Britt. & Rose, loc. cit. 235. 1930.
Chamaefistula anconis Britt. & Rose, loc. cit. 236. 1930.
Chamaefistula Williamsii Britt. & Rose, loc. cit. 236. 1930.

Small to moderate trees, the branchlets puberulent to glabrous. Leaves normally 4-foliolate, moderately large; petiole 2–4 cm. long, stout, puberulent to glabrous, somewhat sulcate above; rachis similar, usually about 3 cm. long, with a prominent subconic gland between the lower pair of leaflets and generally a smaller gland or protuberance apically; stipules linear-lanceolate, curved, about 1 cm. long; leaflets ovate to elliptic, up to 15 cm. long and 7 cm. wide, acute to acuminate apically, obtuse or rounded and slightly inequilateral basally, glabrous above, puberulent-tomentulose and with raised prominent veins below, the veins brown against a dull-green background. Inflorescence terminal or subterminal, of

1 to few usually flexuous racemes or panicles, puberulent; bracts linear-lanceolate, caducous; pedicels generally 2–3 cm. long. Flowers yellow, showy; sepals oblong to narrowly ovate, less than 8 mm. long, rounded apically, puberulent; petals larger, obovate, up to about 2 cm. long and 1.5 cm. broad, lightly puberulent; fertile stamens 4 (the median ones), all similar, the others more or less abortive or reduced or caducous; anthers oblong, about 8 mm. long, somewhat curved, apically short-rostrate, basally rounded-subtruncate, dehiscent by terminal pores; ovary linear, densely pubescent. Legume linear, angled-subterete, up to 25 cm. long and about 2 cm. wide, straight, smooth; seeds transverse.

Mexico; Central America; northern South America.

CANAL ZONE: Ancón, *Bro. Heriberto 38*, *Killip 12055*, *Williams 9*; Balboa, *Standley 25532, 26447, 28492*; Bellavista, *Macbride 2750*, *Piper 5357*, *Standley 25346*; near Culebra, *Pittier 2312*, *Standley 25957*; Empire to Mandinga, *Piper 5142*. COCLÉ: between Las Margaritas and El Valle, *Woodson, Allen & Seibert 1766*; Penonomé, *Williams 135*. PANAMÁ: Matías Hernández, *Standley 28960*; between Panamá and Chepo, *Dodge, Hunter, Steyermark & Allen 16647*; near Panamá, *Standley 26844, 27766*; Río Tapia, *Standley 28183*; Río Tecúmen, *Standley 26568*; Taboga Island, *Standley 27069, 27986*. SAN BLAS: Puerto Obaldia, *Pittier 4405*. UNKNOWN: "Panama", *Seemann 225*.

Central American specimens with only 4 large functional stamens are found distributed now and then as *C. bacillaris* (= *C. fruticosa*) and very frequently as *C. oxyphylla*. Drawing from specimens distributed under these two species (along with many specimens undetermined to species), markedly inequilateral leaves, usually larger buds and perianth parts, and appressed lower leaflet pubescence seem linked with a 7-stamen characteristic. Such characters would determine *C. fruticosa*, while *C. Maxonii* (often found in herbaria as *C. oxyphylla*) would then be distinguished by the reduced functional stamen number, the less inequilateral leaves, generally smaller petals and sepals, narrower buds, more tomentulose raised pubescence of lower surface of the leaflet, etc.

C. Maxonii seems to differ from *C. oxyphylla* of South America only in possessing 4 rather than 7 functional stamens. The writer was tempted to list *C. Maxonii* as a variety of *C. oxyphylla*, under the descriptive varietal name of *quadristaminea*, but refrained from so doing because: (1) the staminal difference would appear without intermediacy, and (2) the "tail would then wag the dog", the 4-stamen entity having been accumulated in the herbaria in a near absolute majority for Central America for almost a century (as *C. oxyphylla* following Bentham, or undetermined to species).

Unfortunately, on priority grounds the name *C. Maxonii* must be given this species, although *C. Maxonii* was described (as *Chamaefistula Maxonii*) inadequately and apparently without comprehension of the staminal difference separating it from *C. oxyphylla*. It thus may be more useful in analyzing the entity here resolved as *C. Maxonii* to refer to my description rather than to the original, and to regard most of the specimens cited as more "typical" of the entity than is the type *(Maxon & Harvey 6611)*. At an opposite extremity of "untypicalness" from "*Chamaefistula Maxonii*", but connected by intergradation within the entity, is

"*Chamaefistula anconis* Britt. & Rose". The latter was not selected as name-bringing synonym since its type is in fruit only. For the same reason, although more "typical" in foliage characters, "*Chamaefistula Williamsii* Britt." was not chosen. Another synonym, "*Chamaefistula Hayesiana* Britt. & Rose", was rejected because of poor condition of the type and "untypical" leaflet pubescence approaching that of *C. fruticosa* var. *dariensis*. Possibly monographic study will some day indicate an earlier name for this species, but inasmuch as most older descriptions, the types for which are not available to us, fail to stress the staminal characteristics, I am unable to list with certainty any name taking precedence over *C. Maxonii*.

35. CASSIA OXYPHYLLA Kunth. var. **dariensis** (Britt. & Rose) Schery, comb. nov.

Chamaefistula dariensis Britt. & Rose, in N. Am. Fl. 23:238. 1930.

Small or large trees, the branchlets usually puberulent. Leaves moderately large, 4-foliolate; petioles about 1–2 cm. long, puberulent, subterete; rachis similar, up to 4 cm. long, with a prominent subcylindric gland about 2 mm. long between lower pair of leaflets; stipules linear, caducous; leaflets ovate to elliptic, up to 15 cm. long and 7 cm. broad, acuminate apically, basally inequilaterally acute to obtuse, membranaceous, prominently reticulate, essentially glabrate above, pubescent and dull below; petiolules terete, about 3 mm. long, puberulent. Inflorescence a generally flexuous, terminal or subterminal, few- to several-flowered raceme or panicle; pedicels 1–2.5 cm. long, densely puberulent; bracts linear, small, caducous. Flower yellow; sepals relatively small, oblong to narrowly ovate, 5–8 mm. long, puberulent, reflexed in fruit; petals relatively large, oblong to ovate, up to 2.3 cm. long and 1 cm. wide, markedly venose with 3 prominent longitudinal veins, puberulent, very short-clawed; fertile stamens 7; anthers of the 3 lowermost smaller, oblong-falcate, about 6 mm. long, apically long-rostrate, dehiscent by 2 terminal pores, glabrous; anthers of the 4 median ones about 8 mm. long, obliquely rostrate apically but otherwise subtruncate and similar to the lowermost; ovary linear, tomentose, arcuate, the style thick and short. Legume (immature) tetragonal, rufous-puberulent, about 15? cm. long and 6? mm. wide, arcuate, not constricted, the seeds transverse.

Panama.

DARIÉN: Boca de Cupe, *Allen 910;* Pinogana, *Pittier 6579;* Río Yape, *Allen 327.* PANAMÁ: Río Tataré, *Woodson & Schery 1012.*

The Britton and Rose species, here reduced to a variety of *C. oxyphylla,* may not be, in final analysis, distinct from *C. oxyphylla.* The type of *C. oxyphylla* is not available for examination, but the original description with plate (Kunth, Mim. 129, *t. 39.* 1819) is excellent. Comparison of *C. oxyphylla* var. *dariensis* with it shows the variety to differ principally in having longer, narrower petals and broader leaflets than the species—characters which may not be beyond the range of variability of the species.

36. CASSIA FRUTICOSA Mill. Gard. Dict. ed. 8, no. 10. 1768; Vogel, in Linnaea 15:67. 1841.

?Mimosa nodosa L. Sp. Pl. 516. 1753, fide Benth.
Cassia bacillaris L. f. Suppl. 231. 1781, fide Benth.
Cathartocarpus Bacillus Pers. Syn. Pl. 1:459. 1805.
?Inga nodosa Willd. Sp. Pl. 4:1016. 1806, fide Benth.
Bactyrilobium bacillare Hornem. Hort. Bot. Hafn. 1:392. 1813.
Cassia puberula HBK. Nov. Gen. & Sp. 6:341. 1824, fide Benth.
Chamaefistula bacillaris (L. f.) G. Don, Gen. Hist. Dichl. Pl. 2:451. 1832.
Chamaefistula puberula (HBK.) G. Don, loc. cit. 1832.
Cassia carthaginensis Willd. Herb. ex Steud. Nom. Bot. ed. 2, 304. 1841.
Cassia Fockeana Miq. in Linnaea 18:579. 1844, fide Benth.
Chamaefistula fruticosa (Mill.) Pittier in Trab. Mus. Com. Venez. 3:152. 1928.
Chamaefistula Valerioi Britt. & Rose, in N. Am. Fl. 23:236. 1930, fide Standl.

Shrub or small tree up to 10 m. tall, the branchlets usually glabrous. Leaves large, 4-foliolate; petiole longer than the rachis, 2–6 cm. long, terete to somewhat angled or flattened above; rachis 1–4 cm. long, usually glabrous, bearing between the lower leaflets an oblong-conic gland; stipules linear, early caducous; leaflets large, inequilateral (the apical ones pronouncedly so), ovate to elliptic-lanceolate, up to 18 cm. long and 9 cm. wide, usually glabrous above and lightly short-puberulent below, acute and somewhat acuminate apically, obliquely rounded to obtuse basally, the veins prominent above and below, more or less concolorous with the background; petiolules stout, 3–4 mm. long. Inflorescence terminal or subterminal, paniculate or of several racemes from the upper axils, puberulent; bracts caducous; pedicels up to 4 cm. long, puberulent. Flowers yellow; sepals large, more or less oblong, up to 13 mm. long and 7 mm. wide, appressed-pubescent, persistent; petals oblong to obovate-orbicular, up to 3 cm. long and 2 cm. wide, short-clawed, puberulent, lightly venose; functional stamens normally 7, bimorphic; the 3 lowermost anthers conspicuously rostrate, falcate, 8–9 mm. long, the beak about 2 mm. long and dehiscent by a single upward-directed terminal pore; the 4 median anthers less curved, oblong, about 9 mm. long, subtruncate apically and basally, the short beak oblique and dehiscent by 2 terminal pores; other stamens rudimentary; ovary linear, sessile, tomentose. Legume elongate, linear, up to 30 cm. long and 1 cm. wide, terete or subterete, straight, glabrous, minutely verrucose; seeds transverse.

Tropical America from Mexico to Brazil.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater 109, 130;* Darkland, *von Wedel 2626;* Isla Colón, *von Wedel 93;* Shepherd Island, *von Wedel 2730;* Water Valley, *von Wedel 613.* CANAL ZONE: Barro Colorado Island, *Shattuck 54;* Bellavista, *Piper 5131;* "Chagres", *Fendler 87;* Fort Randolph, *Standley 28671, 28697;* Gatún, *Hayes 360, 369.* CHIRIQUÍ: San Felix, *Pittier 5146.* COCLÉ: Bismarck, *Williams 560.* PANAMÁ: Alhajuela, *Pittier 2319;* between Capira and Potrero, *Dodge & Hunter 8609;* Juan Díaz, *Standley 30546;* Pacora, *Allen 1119;* Q. Tranquilla, *Hunter & Steyermark 17213;* Río Tecúmen, *Hunter & Allen 236, Standley 26757, 29459.* UNKNOWN: "western Panama", *Stork 21?.*

Fig. 128. *Cassia fruticosa*

This species is more commonly located in the herbaria and literature under the name *C. bacillaris*, a name which it would be well to conserve were there any provision to do so in the international rules.

36a. CASSIA FRUTICOSA Mill. var. **gatunensis** (Britt.) Schery, comb. nov.

Chamaefistula gatunensis Britt. in N. Am. Fl. 23:234. 1930.

Small viney tree, the branchlets puberulent. Leaves moderate to large, 4-foliolate; petioles about 3 cm. long, the rachis similar and only slightly longer; gland between lowermost pair of leaflets cylindric-subconic, about 3 mm. long;

leaflets elliptic, only slightly inequilateral and differing from the species in this respect, puberulent below, more so and with slightly longer hairs than in the species, glabrous above and otherwise much as in the species. Inflorescence several- to many-flowered, puberulent; flowers moderately large, yellow; sepals oblong to elliptic-ovate, somewhat unequal, up to 1 cm. long; petals elliptic to obovate, up to 2.5 cm. long, tomentulose; functional stamens 7, the three lowermost smaller, about 8 mm. long, and more markedly rostrate, dehiscent by paired terminal pores; the 4 uppermost subtruncate, about 1 cm. long, dehiscent by paired terminal pores from a short, sharply reflexed rostrum; ovary linear, tomentose; fruit possibly somewhat broader than typical for the species.

Panama and Colombia?

CANAL ZONE: Barro Colorado Island, *Bangham 603, Kenoyer 381;* Gatún, *Hayes 548.* COLÓN: Río Indio de Fató, *Pittier 4253.*

This variety approaches *C. oxyphylla* var. *dariensis,* from which it may be distinguished in having the "fruticosa" lower leaf pubescence (shorter, more appressed hairs), while *C. oxyphylla* var. *dariensis* has the more tomentulose, raised-hair pubescence characteristic of *C. Maxonii* in Panama.

37. CASSIA CAUDATA Standl. in Contr. U. S. Nat. Herb. 18:102. 1916.

Chamaefistula caudata (Standl.) Britt. & Rose, in N. Am. Fl. 23:237. 1930.

Shrub or small tree, the branchlets terete, glabrous. Leaves large, 4-foliolate; petioles elongate, about 10 cm. long, subterete, glabrous; rachis like petiole, about 7 cm. long, bearing a prominent subconic gland between the basal leaflets and a smaller apical gland or protuberance; stipules linear, caducous; leaflets ovate to elliptic, up to 25 cm. long and 7 cm. wide, obtuse or rounded basally, acuminate apically into a caudate tip about 3 cm. long, glabrous above and below; petiolules about 5 mm. long, dark, rugose. Inflorescence axillary or terminal, paniculate, several-flowered, puberulent; bracts linear, inconspicuous, about 2 mm. long; pedicels slender, up to 4 cm. long. Flowers yellow, large and showy; sepals unequal, ovate to oblong-orbicular, up to 9 mm. long and 7 mm. wide, blunt or rounded, puberulent; petals mostly obovate, up to 3 cm. long and 17 mm. wide, venose, puberulent on the veins; fertile stamens 7; the 3 lowermost with large, oblong, markedly falcate anthers almost 1 cm. long, apically long-rostrate and dehiscent by a pair of terminal pores; 4 median anthers oblong, about 7 mm. long, only slightly falcate, short-rostrate, dehiscent by a pair of terminal pores; ovary linear, tomentose. Legume not known in maturity; seeds transverse.

Panama and Costa Rica.

PANAMÁ: upper Mamoni River, *Pittier 4491.*

NAMES OF UNCERTAIN APPLICATION TO CASSIA IN PANAMA

C. CONFUSA Rose. Apparently no description of this species ever appeared, although it is listed in the key in Standley's 'Flora of Panama Canal Zone' (Contr.

U. S. Nat. Herb. 27:199. 1928). The position in Standley's key might indicate the plant in mind to have been *C. leptocarpa* var. *hirsuta*, although this variety has not to our knowledge yet been reported from the Canal Zone. In any event, the specific name "*confusa*" would be untenable due to prior use in *Cassia*.

C. TRISTICULA HBK. (Nov. Gen. & Sp. 6:367. 1824). Hemsley reports this species from Panama, but no specimen so identified has come to my attention. Without reference to type material or without Hemsley's cited specimen, it is impossible to be certain whether or not the name has any reference to Panamanian material, as a synonym or otherwise. Judging from the original description, the species would fall close to *Cassia stenocarpa* in the "*Chamaecrista*" section of the genus. Kunth (HBK.) mentions its affinity to *C. patellaria*, but if the description be correct it differs from *C. patellaria* in having stipitate petiolar glands.

17. DELONIX Raf.

DELONIX Raf. Fl. Tellur. 2:92. 1836.

Moderate, unarmed trees. Leaves twice-pinnate, the pinnae several pairs and opposite on the rachis, each pinna with numerous opposite leaflets; petiole moderately short, expanded basally, eglandular; rachis elongate, flattened above, eglandular; stipules caducous; ultimate leaflets small, short-petiolulate. Inflorescence terminal or axillary, subcorymbose (of 1 to several racemes). Flowers showy; calyx-tube short; calyx-lobes subequal, much exceeding the tube, valvate; petals separate and spreading, long-clawed; stamens 10, subdeclinate, free, the anthers versatile and longitudinally dehiscent; ovary scarcely stipitate; style slender; stigma truncate. Legume thick-flattened, dehiscent, the valves ligneous; seeds transverse.

Africa and Madagascar.

1. DELONIX REGIA (Bojer) Raf. Fl. Tellur. 2:92. 1836.

Poinciana regia Bojer in Hook. Bot. Mag. *pl. 2884*. 1829.

Spreading tree, the branchlets subglabrous, lenticellate, corky in age. Leaves large; petiole usually about 10 cm. long, flattened and somewhat sulcate above, swollen basally; rachis up to 5 dm. long, somewhat nodose and cross-partitioned at insertion of the pinnae, tomentulose or puberulent; stipules sagittate-bifurcate (the lobes frequently dissected), caducous; pinnae up to about 20 pairs, spreading, the rachis about 12 cm. long, tomentulose; ultimate leaflets up to 40 pairs, oblong, usually nearly 1 cm. long and 3–4 mm. wide, inequilateral basally, rounded or obtuse apically, usually tomentulose or puberulent above and below especially along the veins, lighter below. Inflorescence as described for the genus; bracts ovate-lanceolate, about 6 mm. long; pedicels up to 10 or more cm. long in lowermost flowers. Flower red, very ornamental; calyx-tube from pedicellar articulation about 7 mm. tall, shallow within; calyx-lobes spatulate-lanceolate, 2.5–3 cm. long, valvate in bud, reflexed in age; petals large, about 6 cm. long, spreading, the claw about 3 cm. long, expanding apically, tomentulose within, the blade suborbicular,

usually 3–3.5 cm. wide, glabrous; stamens about 4 cm. long, tomentose basally; anthers ovate, 4–5 mm. long, bilocular; ovary linear, 1 cm. long or longer, lightly hirsute; style about 3 cm. long, glabrous; stigma terminal, pubescent, unexpanded. Legume broadly linear, frequently 4–6 dm. long and 5–7 cm. wide, scarcely curved, compressed, 2-valved, the valves ligneous; seeds oblong, transverse.

Native to Madagascar, introduced into world tropics and subtropics; commonly planted in Central America, West Indies and South America.

CANAL ZONE: Balboa, *Standley 30821;* Bellavista, *Macbride 2764.*

This colorful tree, the "Royal Poinciana" or "Flamboyant," is one of the most frequently planted tropical ornamentals. Its brilliance during the relatively short flowering season offers Temperate Zone visitors a taste of the expected but often lacking "floral splendor of the tropics."

18. PELTOPHORUM Walp.

PELTOPHORUM (Vogel) Walp. Rep. 1:811. 1842, nom. conserv.

Baryxylum Lour. Fl. Cochinch. 266. 1790.

Unarmed spreading trees. Leaves twice-pinnate; petiole and rachis eglandular; stipules small, caducous; pinnae several; ultimate leaflets numerous, relatively small. Inflorescence terminal, of few to several racemes. Flowers yellow; calyx-tube short, patelliform; calyx-lobes 5, imbricate, subequal; petals 5, spreading, subequal; stamens 10, inserted with petals on calyx-tube, similar; filaments free, pubescent basally; anthers versatile, longitudinally dehiscent, ovary free, usually stipitate; style elongate; stigma expanded, peltate. Legume indehiscent, winged on both margins, few-seeded.

West Indies, South America, Africa, eastern Asia, East Indies, and Pacific islands. A Far Eastern species has been introduced into Panama.

1. PELTOPHORUM INERME (Roxb.) Naves, ex Villar in Blanco, Fl. Filip. Nov. App. 69, *t. 335.* 1880.

Caesalpinia inermis Roxb. Fl. Ind. 2:367. 1832.
Caesalpinia ferruginea Decne. in Nouv. Ann. Mus. d'Hist. Nat. Paris 2:462. 1833; Miq. Fl. Ind. Bat. 1:111. 1855.
Caesalpinia arborea Zoll. in Nat. en Geneesk. Archief 3:65. 1846; Miq. loc. cit. 112. 1855, fide Villar in Blanco, loc. cit. 1880.
Peltophorum ferrugineum Benth. Fl. Austral. 2:279. 1864.

Tall tree, the branchlets puberulent to glabrous in age. Leaves large; petiole about 5 cm. long, ferruginous-tomentulose; rachis similar, up to 2 or more dm. long; pinnae several pairs, opposite, borne from flattened upper surface of rachis; ultimate leaflets several to many pairs to the pinna, oblong, about 15 mm. long and 6 mm. wide, markedly inequilateral basally, rounded-subtruncate apically, glabrous and darker above, ferruginous-puberulent to subglabrous below; stipules bifurcate, early caducous. Inflorescence densely ferruginous-tomentose, a terminal panicle of racemes up to a few dm. long, or the racemes axillary and subterminal; pedicels

less than 1 cm. long; buds globular. Flowers yellow; calyx-lobes elliptic, almost 1 cm. long, ferruginous-tomentulose without, glabrous within, imbricate; petals obovate, about 1.5 cm. long, contracted basally into a ferruginous-hirsute claw; stamens free, about 1 cm. long, the filaments densely pubescent basally, the anthers about 3 mm. long; ovary ferruginous-pubescent; stigma terminal, light in color, expanded and peltate. Legume narrowly elliptic, about 10 cm. long and 2 cm. wide, flat, indehiscent, longitudinally venose, with an undulate marginal wing 2–3 mm. wide; seeds longitudinal.

Endemic to Malayan area; introduced into New World tropics.

CANAL ZONE: Balboa, *Allen 4468, Standley 30852;* without locality, *Johansen 27.*

This ornamental shade tree is reported fairly common in the Canal Zone.

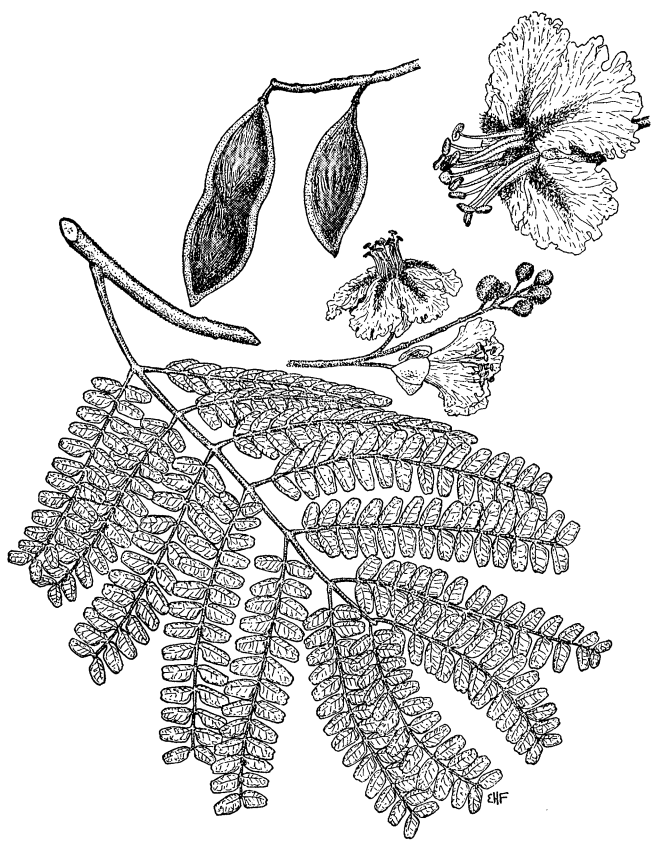

Fig. 129. *Peltophorum inerme*

19. SCHIZOLOBIUM Vogel

SCHIZOLOBIUM Vogel, in Linnaea 11:399. 1837.

Tall, unarmed trees, the leaves large, bipinnate, with numerous, small leaflets. Inflorescence axillary or terminal, racemose, or paniculate of several racemes; bracts small. Flowers yellow, perfect; calyx with a short, somewhat inequilateral tube, the lobes imbricate, longer than the tube, reflexed in anthesis; petals separate, imbricate, narrowed baseward, subequal; stamens 10, free, subdeclinate, inserted with the petals on upper portion of calyx-tube; the anthers all similar, small, bilocular, versatile, dehiscent by longitudinal slits; ovary stocky, tomentose, short-stipitate, affixed basally on lower side to the calyx-tube; style about twice as long as the ovary; stigma terminal, minute. Legume flattened, coriaceous, tardily dehiscent, bearing a single seed in the expanded apical portion.

The genus seemingly consists of a single species.

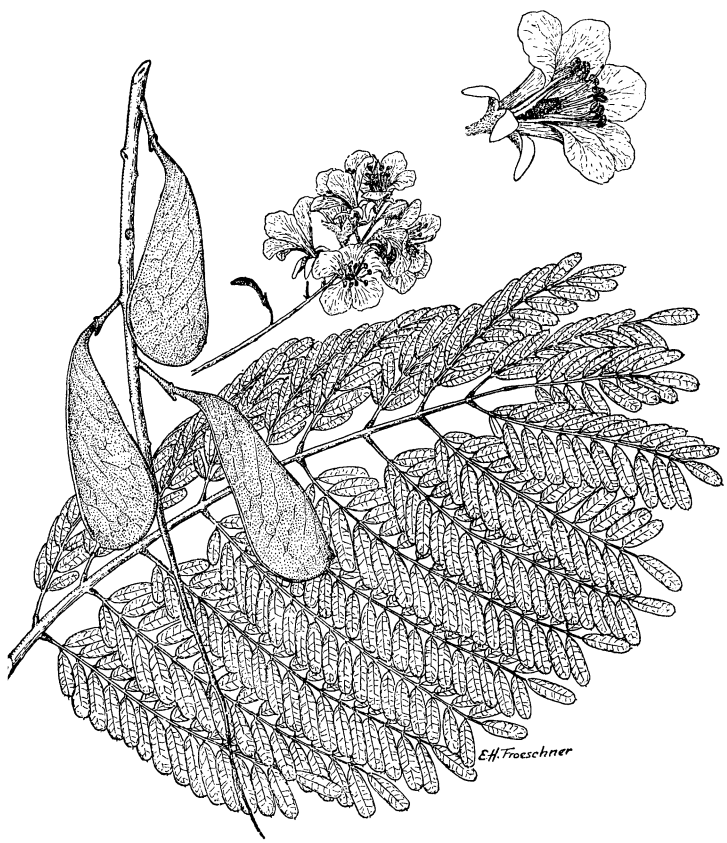

Fig. 130. *Schizolobium parahybum*

1. SCHIZOLOBIUM PARAHYBUM (Vell.) Blake, in Contr. U. S. Nat. Herb. 20:240. 1919.

Cassia parahyba Vell. Fl. Flum. 168. 1825; Ic. 4:*t. 71*. 1827.
Schizolobium excelsum Vogel, in Linnaea 11:399. 1837.
Schizolobium glutinosum Tul. in Archiv. Mus. d'Hist. Nat. Paris 4:157. 1844.
Caesalpinia parahyba Allem. Trab. Soc. Vell. 1:56. 1852.
Schizolobium Kellermannii Pittier, in Contr. U. S. Nat. Herb. 18:232. 1917.

A tall, buttressed tree to 25 m. or more, the branchlets subglabrous. Leaves very large, twice-pinnate, multifoliolate; petiole stout, 1 dm. or more long, evidently eglandular, glabrous or somewhat viscid, slightly flattened or sulcate above; secondary petioles similar, about 1 cm. long, callous basally; rachis several dm. long, eglandular, flattened and margined above, the pinnae (several to many) arising opposite in pairs on the upper side; stipules apparently small, caducous; leaflets several to many pairs on each pinna, oblong or linear-oblong, 1.5–3 cm. long, 4–7 mm. wide, rounded apically and basally, dark and puberulent to glabrous above, lighter and appressed-pubescent below, subcoriaceous, the midvein very prominent, the lateral veins obscure; ultimate petiolules about 1 mm. long. Inflorescence multiflorate, as described for the genus; bracts lanceolate, scarcely 2 mm. long; pedicels up to 1 cm. long in age, articulate above the middle. Flowers attractive, yellow; calyx-tube turbinate, 2–3 mm. long, dark and usually tomentulose without; calyx-lobes ovate-elliptic, about 6 mm. long and 3 mm. wide, puberulent; petals obovate-spatulate, almost 2 cm. long and usually 4–6 mm. wide, subglabrous, obscurely veined; stamens 10, as described for the genus, about as long as the petals, the filaments broader and scurfy basally, the anthers broadly elliptic, about 2 mm. long; ovary subfalcate, about 5 mm. long and 2 mm. broad, hispid-tomentose with dark hairs, few-ovulate. Legume obovate-spatulate, narrowed baseward, about 10 cm. long and 2.5–5 cm. wide, glabrous, bearing the solitary seed apically; seed flattened-ovoid, up to 2 cm. long.

Mexico; Central America; South America.

CANAL ZONE: along R. Chagres, *Steyermark & Allen 16785*. PANAMÁ: Chorrera, *Allen 1599*.

20. CAESALPINIA L.

CAESALPINIA L. Sp. Pl. 380. 1753.

Poinciana L. loc. cit. 380. 1753.
Guilandina L. loc. cit. 381. 1753.
Bonduc Adans. Fam. 2:318. 1763.
Hoffmanseggia Cav. Ic. 4:63, *t. 392*. 1797.
Libidibia Schlecht. in Linnaea 5:192. 1830.
Poincianella Britt. & Rose, in N. Am. Fl. 23:327. 1930.

Many other synonyms can be found for *Caesalpinia* considered in its broad sense. Some that have been so included, in addition to the ones cited above, are: *Adenocalyx* Bert.; *Balsamocarpon* Clos; *Biancaea* Todaro; *Brasilettia* (DC.) Kuntze; *Campecia* Adans.; *Cinclidocarpus* Zoll.; *Cladotrichum* Vog.; *Conzattia* Rose; *Coulteria* HBK.; *Erythrostemon* Link; *Guaymasia* Britt. & Rose; *Guilandia* P. Br.; *Larrea* Ortega; *Lebidibia* Griseb.; *Melanosticta* DC.; *Moparia* Britt. & Rose; *Nicarago* Britt. & Rose; *Pomaria* Cav.; *Pseudosantalum*

Mill.; *Russellodendron* Britt. & Rose; *Schrammia* Britt. & Rose; *Tara* Molino; *Ticanto* Adans. Granting that several of the synonyms can be segregated fairly distinctly, there nevertheless seems little advantage in so doing. Certainly such segregations intergrade sufficiently to warrant inclusion in one genus, while if considered as separate genera they cause in the herbarium considerable confusion and obscuring of the species, to say nothing of difficulties involved then in the almost impossible task of organizing a usable generic key. Thus, for purposes of the 'Flora of Panama,' *Caesalpinia* is regarded in its broader sense, essentially following Bentham.

Trees, shrubs or sometimes vine-like or subherbaceous, armed or unarmed. Leaves twice-pinnate; petioles and rachis eglandular, glabrous or variously pubescent; pinnae usually several and opposite or subopposite on the rachis; ultimate leaflets few to many, opposite in pairs, or less frequently alternate, in the pinna. Inflorescence mostly racemose, variously pubescent; bracts normally caducous. Flowers yellowish or less commonly pinkish; calyx with a conspicuous tube and 5 imbricate lobes, the outermost lobe more or less cucullate and enclosing the bud; petals free, nearly equal, inserted upon the upper calyx-tube; stamens normally 10, free, inserted with the petals on the calyx-tube, usually subdeclinate; filaments mostly pubescent, often glandular; anthers small, bilocular, longitudinally dehiscent, versatile; ovary free, sessile or short-stipitate, inserted at base of calyx-tube; stigma terminal, usually not dilated. Legume compressed or flattened, usually unarmed and dehiscent; seeds transverse.

Widely distributed, in tropics and subtropics of both hemispheres.

a. Shrubs or trees, lightly armed or unarmed; bracts of inflorescence inconspicuous or missing; legume unarmed, flattened or coiled.
  b. Inflorescence glabrous, large and showy; pedicels elongate, frequently 7–8 cm. long; stamens long-exserted, about 5 cm. long; plant often inconspicuously armed ..... 1. C. PULCHERRIMA
  bb. Inflorescence puberulent to tomentose, smaller; pedicels less than 2 cm. long; stamens short, less than 1.5 cm. long; plant unarmed.
    c. Racemes elongate, mostly 10 or more cm. long, with a ferruginous-stellate tomentum; flowers larger, 2–3 cm. wide; legume flat. (valves may coil after dehiscence) ..... 2. C. ERIOSTACHYS
    cc. Racemes condensed, mostly less than 4 cm. long, lightly pubescent or puberulent; flowers small, less than 8 mm. wide; legume coiled.. 3. C. CORIARIA
aa. Vine-like shrub of sea beaches, the stem and rachis heavily armed with recurved thorns; bracts of inflorescence about 1 cm. long, persistent at least until anthesis; legume armed, compressed, but not flat ..... 4. C. CRISTA

1. CAESALPINIA PULCHERRIMA (L.) Sw. Obs. 166. 1791.

Poinciana pulcherrima L. Sp. Pl. 380. 1753.
Poinciana bijuga Lour. Fl. Cochinch. 260. 1790, non L.
Poinciana elata Lour. loc. cit. 261. 1790.

Lightly or scarcely armed shrub or small tree, the branchlets glabrous. Leaves moderately large, twice-pinnate; petiole 2–8 cm. long, terete, eglandular, glabrous; rachis like petiole, up to 2 or more dm. long; stipules lanceolate, minute, caducous; pinnae up to 8 or more pairs, opposite on the rachis; leaflets about 10 pairs to the pinna, subopposite, mostly oblong, 10–23 mm. long and 5–10 mm. wide, rounded apically, obtuse and somewhat inequilateral basally, glabrous, membranaceous, petiolulate. Inflorescence usually terminal, a corymbose raceme, several- to many-

flowered; bracts similar to stipules, caducous; lower pedicels elongate, not uncommonly 7–8 cm. long, glabrous. Flowers ornamental, red to yellow; calyx-tube narrowly turbinate, 3–4 mm. long, the pedicellar stalk subarticulate a few mm. below the tube; mature calyx-lobes ovate or lanceolate to obovate, about 1 cm. long, glabrous, imbricate in bud, the outer calyx-lobe cucullate and somewhat larger; petals free, obovate, about 2 cm. long, glabrous, clawed; stamens 10, inserted with petals on rim of calyx-tube, strongly exserted; filaments free, about 5 cm. long, glabrous except basally where viscid-pubescent; anthers ovate, 1–2 mm. long, versatile, bilocular, longitudinally dehiscent; ovary linear, glabrous, stipitate from base of calyx-tube. Legume linear-oblong, up to 12 cm. long, usually somewhat wider apically than basally, obliquely acute both apically and basally, short-stipitate, flattened, glabrous, elastically dehiscent; seeds ovate, transverse.

Widely cultivated or escaped throughout world tropics; probably native in northern Central America.

BOCAS DEL TORO: Changuinola Valley, *Dunlap 423;* Old Bank Island, *von Wedel 1860.* CANAL ZONE: Balboa, *Standley 30834;* Paraiso, *Standley 30009.* PANAMÁ: Taboga Island, *Bro. Celestine 91.*

An attractive ornamental frequently seen in cultivation in the Canal Zone and other tropical regions. The legume is reported to contain abundant tannin, but it is not a recognized article of commerce as is the "divi-divi" (legume of *Caesalpinia coriaria*). The leaves have been reported used for fish poison.

2. CAESALPINIA ERIOSTACHYS Benth. Bot. Voy. Sulphur, 88. 1844.

Schizolobium Covilleanum Pittier, in Contr. U. S. Nat. Herb. 18:231. 1917.
Poincianella eriostachys (Benth.) Britt. & Rose, in N. Am. Fl. 23:332. 1930.

A small or moderate, unarmed tree of the Pacific slope, the branchlets usually stellate-pubescent. Leaves moderately large, twice-pinnate; petioles somewhat flattened above, up to 2 cm. long, ferruginous-stellate-pubescent and also with some lighter, simple hairs, eglandular; rachis 10–20 or more cm. long, similar to the petiole, usually bearing 11–21 pinnae; stipules oblong, about 6 mm. long, rounded at the apex, caducous; pinnae usually subopposite on the rachis, up to 8 cm. long; ultimate leaflets 14–29 to the pinna, alternate, more or less oblong, 5–10 mm. long and 3–5 mm. broad, strongly inequilateral basally, rounded apically, sessile, darker, and usually subglabrous above, pubescent with simple hairs or subglabrous below. Inflorescence terminal or subterminal, consisting of a number of several-flowered racemes, the peduncle and pedicels densely ferruginous-stellate-pubescent; bracts similar to stipules; mature pedicels 1–2 cm. long. Flowers yellow, ornamental, often appearing before the leaves; calyx-tube cupulate, 5–6 mm. long, densely ferruginous-stellate-pubescent; calyx-lobes ovate-elliptic, about 8 mm. long and 3–5 mm. broad, imbricate and outer one subcucullate in bud, ferruginous-stellate-pubescent without, light-tomentose within; petals suborbicular, up to 14 mm. long and 12 mm. broad, clawed, dark-dotted towards the middle, pubescent baseward on the claw; stamens 10, free, inserted with petals on the calyx-tube; fila-

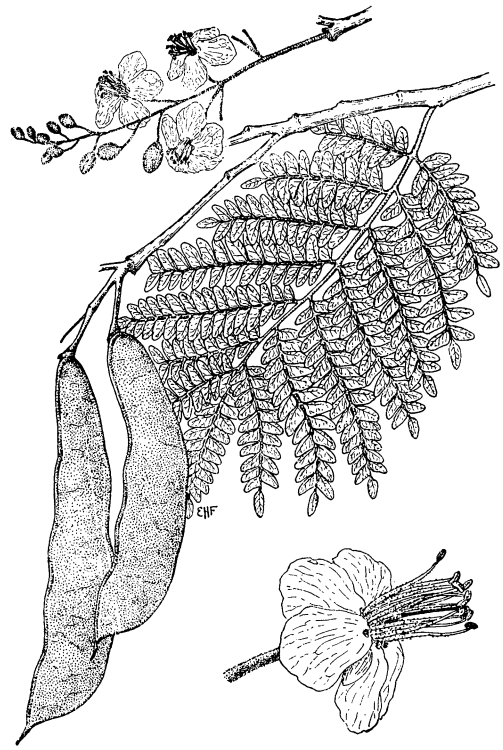

Fig. 131. *Caesalpinia eriostachys*

ments about 12 mm. long, more or less glandular-pubescent, densely pubescent basally; anthers ovate, 1–2 mm. long, longitudinally dehiscent, bilocular; ovary sessile from base of calyx-tube, short, pubescent, few-ovulate; style elongate; stigma terminal, small. Legume linear-obovate, about 10 cm. long and 2–3 cm. broad, flattened, elastically dehiscent, obliquely beaked apically, short-stipitate, puberulent or tomentulose; seeds few, oval, about 12 mm. long, obliquely transverse.

Northern Mexico to Panama; Cuba.

COCLÉ: Aguadulce, *Pittier 5105;* R. Mata Ahogado, *Allen 131.* PANAMÁ: Matías Hernández, *Pittier 6916;* San José Island, *Johnston 565.*

3. CAESALPINIA CORIARIA (Jacq.) Willd. Sp. Pl. 2:532. 1799.

Poinciana coriaria Jacq. Select. Stirp. Am. 123. 1763.
Caesalpinia thomaea Spreng. Syst. 2:343. 1825, fide N. Am. Fl.
Libidibia coriaria Schlecht. in Linnaea 5:193. 1830.

An unarmed, low, crooked, much-branching tree, the branchlets glabrous. Leaves moderate, twice-pinnate; petiole rather stout, usually 1–2 cm. long, lightly pubescent, eglandular, terete but somewhat flattened above, callous and expanded basally; rachis similar, nodose at insertion of the pinnae, eglandular; stipules cadu-

cous; pinnae usually about 15, 3–5 cm. long, opposite or subopposite on the rachis except for the (odd) terminal one; ultimate leaflets as many as 35 pairs to the pinna, linear-oblong, 3–9 mm. long and up to 2 mm. wide, rounded apically, inequilateral and subcordate basally, glabrous. Inflorescence a cluster or panicle of a few condensed racemes, the racemes several- to many-flowered, not exceeding the leaves; bracts caducous; pedicels scarcely 3 mm. long. Flowers small, yellow, fragrant; calyx-tube turbinate, about 2 mm. long, glabrous; calyx-lobes ovate, about 3 mm. long, imbricate and somewhat contorted in bud; petals suborbicular, 3–4 mm. long, short-clawed, glabrous; stamens 10, about 6 mm. long, inserted with petals on rim of calyx-tube; filaments expanded and pubescent basally; anthers ovate, scarcely 1 mm. long, bilocular, longitudinally dehiscent, versatile; ovary sublinear, glabrous, scarcely stipitate, inserted on base of calyx-tube; style glabrous, scarcely longer than the ovary; stigma truncate. Legume oblong, up to 6 cm. long and 2 cm. wide, flattened, thick, much coiled in age, apparently indehiscent.

Mexico to Panama; West Indies; northern South America.

CANAL ZONE: Exp. Gardens, *Lindsay 253;* Summit, *Mell 11.* COCLÉ: Aguadulce, *Pittier 4974.*

The legumes and bark of this tree are relatively rich in tannin, the pods reportedly having as much as 30 per cent tannin content. Besides being utilized locally in the preparation of dyes and inks, the pods are an item of considerable export interest from the tropical countries, especially the north coast of South America. The matured pods usually appear in the trade under the name "divi-divi," a commercial source of tannin for many years.

4. CAESALPINIA CRISTA L. Sp. Pl. 380. 1753.[2]

Guilandina Bonducella L. Sp. Pl. ed. 2, 545. 1762 (in part).
Guilandina semina Lour. Fl. Cochinch. 265. 1790.
?Caesalpinia Bonducella (L.) Fleming, Asiat. Res. 11:159. 1810 (Macbride).
Guilandina Bonduc var. *minus* DC. Prodr. 2:480. 1825.
Guilandina crista (L.) Small, Fl. Southeast. U. S. 591. 1903.

Vine-like shrub of sea beaches, heavily armed with recurved thorns and forming impenetrable thickets above tide level, the branchlets pubescent. Leaves large, twice-pinnate; petiole usually 5–10 cm. long, subterete except basally where swollen and flattened above, tomentose, armed like the stems; rachis 2 or more dm. long, eglandular, tomentose and armed like the petiole; stipules foliaceous, usually of 2 "leaflets" a few cm. long; pinnae about 7 pairs, up to 15 cm. long, opposite

[2]Dandy and Exell (Jour. Bot. 76:175–180. 1938) show that the name *C. crista* as commonly applied should refer to a different, smooth-fruited species. It should then be correctly replaced by *C. Bonduc* (L.) Roxb., and the species in recent times generally regarded as *C. Bonduc* should become *C. major* (Medic.) Dandy & Exell. Thus our gray-seeded, armed-fruited species here listed as *C. crista,* and so regarded in most 20th-century literature and in herbaria, is probably in reality *C. Bonduc,* while the *C. Bonduc* of 20th-century literature and most herbaria is *C. major.* Thus the names *C. crista* and *C. Bonduc* will both be found applying to either of two different species. I have followed here the established (incorrect, fide Dandy & Exell) practice of listing the gray-seeded nickar-nut as *C. crista.*

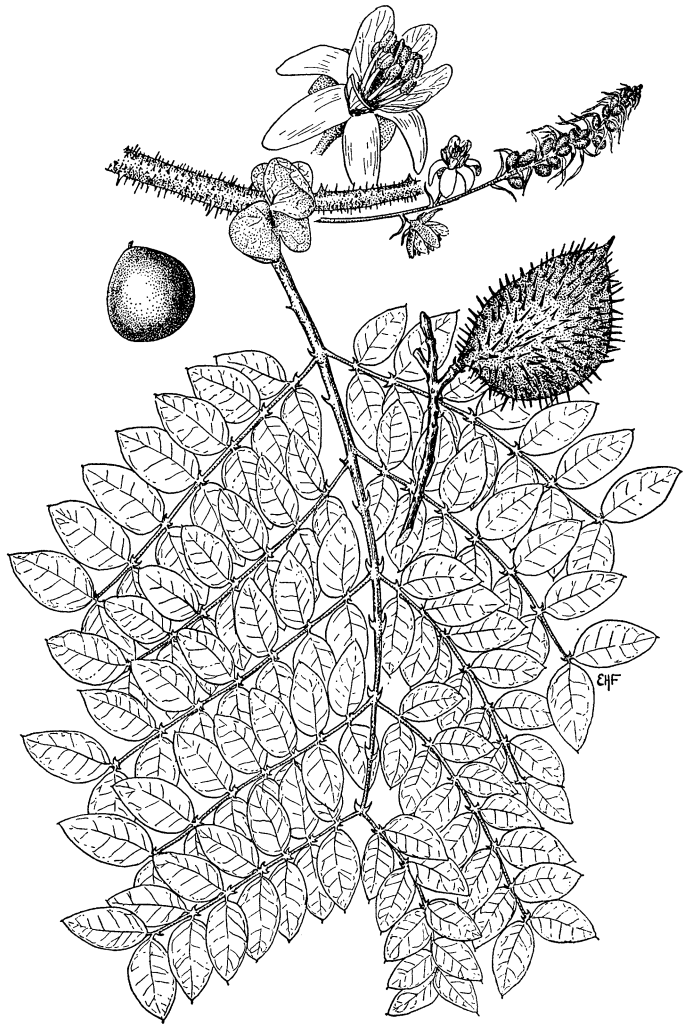

Fig. 132. *Caesalpinia crista*

from the upper surface of the rachis, armed, tomentose; ultimate leaflets about 8 pairs to the pinna, ovate-elliptic, 2–6 cm. long and 1–2.5 cm. wide, obtuse and mucronulate apically, rounded basally, puberulent on veins and margins. Inflorescence axillary or subaxillary, racemose, several- to many-flowered, the peduncle armed; bracts linear-acuminate, about 1 cm. long, subpersistent, reflexed, tomentose; pedicels about 4 mm. long, rufous-tomentose. Flowers moderately small, brownish-yellow; calyx-tube broadly turbinate or subcupulate, 2–3 mm. long, rufous-tomentose without; calyx-lobes ovate to obovate-elliptic, 5–8 mm. long, imbricate in bud, the outermost subcucullate, rufous-tomentose; petals narrowly

oblong, scarcely longer than the calyx-lobes, subglabrous, clawed; stamens 10, free, inserted with petals on rim of calyx-tube; filaments about 7 mm. long, pubescent; anthers ovate, about 1 mm. long, versatile, bilocular, longitudinally dehiscent; ovary ovate-oblong, stipitate from base of calyx-tube, pubescent, the style short, the stigma small. Legume oblong-orbicular, usually 5–6 cm. long and about 4 cm. wide, compressed, short-stipitate, densely covered with sharp prickles, tardily dehiscent; seeds usually 2, ovoid, about 2 cm. long, grayish.

Widely distributed in world tropics, apparently native to eastern Asiatic region.

CANAL ZONE: Fort Sherman, *Standley 31213*. CHIRIQUÍ: San Bartolomé, *Woodson & Schery 943*. COCLÉ: Santa Clara beach, *Woodson, Allen & Seibert 1703*. COLÓN: Fató, *Pittier 3938*. PANAMÁ: Bella Vista, *Killip 12005*, *Standley 25310;* San José Island of Pearl Islands, *Johnston 722*.

A very distinctive plant, easily distinguished from all other species in Central America except *C. Bonduc* (= *C. major*) by its strand habitat, dense armament, and characteristic legume. It often forms impassible thickets on the Pacific shores of Panama, where it is studiously avoided by the passer-by.

CAESALPINIA UROPHYLLA (Donn. Smith) Standl. (*C. bonducella* var. *urophylla* Donn. Sm.; *Guilandina urophylla* Britt. & Rose), armed much as is *Caesalpinia crista* L. of the coastal areas, has been found at high elevations in Costa Rica. Possibly this unusual vine will be found in western Panama also.

21. HAEMATOXYLON L.

HAEMATOXYLON L. Sp. Pl. 384. 1753.

Haematoxyllum Scop. Introd. Hist. Nat. 225. 1777.

Haematoxylon Brasiletto Karst. (Fl. Colomb. 2:27, *pl. 114.* 1862) is reported from both Costa Rica and Colombia, and is to be expected in Panama. It is a small armed tree, with leaves of about 3 pairs of obovate-cuneate, glabrous leaflets; small, yellow, long-pedicellate, short-racemose flowers; and a flat, thin, oblong legume. The wood is said to be employed for the same purposes as true logwood, *H. campechianum*. *H. boreale* S. Wats. is apparently a synonym of *H. Brasiletto*.

22. CERCIDIUM Tul.

The genus CERCIDIUM Tul. (Arch. Mus. d'Hist. Nat. Paris 4:133. 1844) (*Rhetinophloeum* Karst.), as represented by C. PRAECOX (R. & P.) Harms, may eventually be found in Panama. It has been collected in Colombia and other South American localities, and in Mexico. The plant is similar to PARKINSONIA, but bears the small bipinnate leaves distinct from the spines. The rachis of the pinna is terete and less than 4 cm. long. The inflorescence is a short corymb scarcely exceeding 3 cm., and the calyx-lobes are valvate or induplicate-valvate.

23. PARKINSONIA L.

PARKINSONIA L. Sp. Pl. 375. 1753.

Small trees or shrubs, the branches prominently armed. Leaves twice-pinnate,

although sometimes not obviously so because of (1) frequent fall of ultimate leaflets from flattened secondary rachis, and (2) extreme condensation of the primary rachis; pinnae few, approximate, almost "axillary" from the upper surface of a stout spine (spine = at least partially the modified petiole and primary rachis); stipules apparently modified as small lateral thorns from base of larger spine; leaflets of the pinna many, minute, often caducous; rachis of pinna flattened, green, eglandular. Inflorescence racemose, several-flowered, arising from the axils. Flowers moderate; calyx with a short, turbinate tube, the lobes imbricate, a few times longer than the tube; petals free, clawed, subequal; stamens 10, free, the anthers versatile and longitudinally dehiscent; ovary essentially free, straight, slender, subterete, scarcely stipitate. Legume tardily dehiscent, subterete and swollen at point of seed development, constricted and flattened between the seeds; seeds few, longitudinal.

American tropics and subtropics; Africa.

1. Parkinsonia aculeata L. Sp. Pl. 375. 1753.

Parkinsonia Thornberi M. E. Jones, Contr. West. Bot. 12:12. 1908, fide I. M. Johnston.

Xerophytic shrubs or small trees to several m. tall, the branchlets subglabrous, more or less flexuous and gnarled. Leaves multifoliolate, twice compound as described for the genus; petiole and rachis modified into a spine 5–15 mm. long, bearing from the upper side 1–3 pairs of pinnae; pinnae multifoliolate, the rachis linear, 2–3 dm. long and 1–2 mm. wide, flattened, green; ultimate leaflets about 25 pairs, linear-oblong, 2–8 mm. long and up to 2 mm. wide, often caducous. Racemes up to 2 dm. long, subglabrous; bracts lanceolate, about 1 mm. long; pedicels slender, 1–2 cm. long in age. Flowers yellow; calyx-tube turbinate, scarcely 2 mm. long; calyx-lobes ovate-lanceolate, 6–7 mm. long and about 3 mm. wide, subglabrous; petals 5, about 13 mm. long, the blade suborbicular. about 8 mm. long, claw pubescent at base, about 5 mm. long; stamens 8–9 mm. long, pubescent basally; ovary linear-oblong, about 4 mm. long, hispid; style linear, about equalling the stamens, glabrous; stigma terminal, minute. Legume linear, up to about 15 cm. long, nodose by constriction between the seeds, glabrous, striate-nerved; seeds about 1 cm. long.

Found escaped or planted in the Americas from southern United States to Argentina and West Indies; from uncertain (American: Mexican?) origin. The species has been reported from Panama, although no specimens collected there have yet come to our attention.

(Leguminosae to be continued in Part V, Fasc. 4)