

Flora of Panama. Part VI. Family 116. Bombacaceae



Andre Robyns

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FLORA OF PANAMA¹

Part VI

FAMILY 116. BOMBACACEAE²

By ANDRÉ ROBYNS³

Trees, infrequently shrubs, mucilaginous, armed or unarmed, glabrous or lepidote, or with stellate, tufted, or even simple hairs. *Leaves* alternate, simple or compound-digitate, stipulate, the stipules fugacious. *Inflorescences* cymose or racemose or flowers solitary, sometimes cauliflorous. *Flowers* often bracteolate, small or large, hermaphrodite, seldom imperfect, actinomorphic, rarely more or less zygomorphic, usually 5-merous, with or without epicalyx; receptacle glandular or not; calyx valvate, lobate or truncate, caducous, persistent or accrescent; petals none or 5, contorted, usually adnate to the base of the staminal column; stamens 5 to numerous, usually monadelphous, rarely free; anthers 1- to 2- to many-thecate, free or coherent, hippocrepiform to linear, sometimes anfractuose, usually longitudinally dehiscent, rarely porose; pollen porate, colpate or colporate, with reticulate sexine, provided or not with suprategillar elements or with tegillate and spinulate sexine; staminodes infrequently present; gynoecium with 2-5(-6) or 10(-15) syncarpous carpels; ovary superior, sometimes subinferior, 2- to 5(-6)- or 10(-15)-celled, with (1-)2-many ovules in each cell and with axile placentation; ovules anatropous; style simple; stigma capitate or divided. *Fruit* capsular, smooth or sometimes spinose or samaroid, usually opening by 3 or 5 valves, sometimes more or less long-lanate within, infrequently pulpy and indehiscent; seeds glabrous, sometimes alate or arillate, often oleaginous; albumen generally none or scant; embryo usually curved, sometimes straight; cotyledons epigeal, plane or folded, foliaceous or carnose.

A pantropical family of about 26 genera, particularly well developed in tropical America; nine genera are represented in Panama. The capsules of some genera (*Bombax* L., *Ceiba*, *Ochroma*) are filled with wooly fibers, commonly named kapok; *Adansonia* L., *Bombacopsis*, *Durio* Adans. and *Pachira* have edible seeds; and the genus *Ochroma* furnishes the well-known balsa wood.

- a. Leaves compound-digitate; capsule loculicidally dehiscent.
- b. Seeds not winged.
- c. Staminal column divided into many filaments, each bearing a single anther, these hippocrepiform to oblong-linear.

1. The Flora of Panama by Robert E. Woodson, Jr. and Robert W. Schery and Collaborators should be cited as: Ann. Missouri Bot. Gard., with volume number, pagination and date of the Annals.

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- d. Leaflets inarticulate; capsule densely long-lanate within1. PSEUDOBOMBAX
- dd. Leaflets articulate.
 - e. Deciduous trees; capsule densely long-lanate within; seeds numerous, 0.4-1 cm. long and 0.35-0.95 cm. wide.....2. BOMBACOPSIS
 - ee. Evergreen trees; capsule silky-villous within; seeds few, 2-3.2 cm. x 2.2-6 cm. x 2-2.2 cm.3. PACHIRA
- cc. Staminal column divided into 5 filaments, each bearing 2-3 anfractuose anthers or 2 superposed, linear and slightly flexuose anthers...4. CEIBA
- bb. Seeds broadly winged; stamens 5, the staminal column long, the anthers almost sessile, elongated, spirally twisted, vermiform5. GYRANTHERA
- aa. Leaves simple.
 - f. Capsule indehiscent.
 - g. Staminal column separating into many pentadelphous filaments, each bearing a single anther; ovary superior; capsule with 5 membranous wings much enlarged laterally6. CAVANILLESIA
 - gg. Staminal column undivided or shortly 5-dentate to 5-lobate, the anthers sessile to subsessile; ovary subinferior; capsule not winged7. QUARARIBEA
 - ff. Capsule loculicidally dehiscent.
 - h. Flowers small, up to 1.8 cm. long, either hermaphrodite or staminate; staminal column divided into many unequal filaments, each bearing a single anther; ovary and capsule 3-celled; capsule glabrous or nearly so within; seeds arillate8. HAMPEA
 - hh. Flowers large, up to 11-15 cm. long, hermaphrodite; staminal column shallowly 5-lobate, antheriferous from about the middle to the apex, the anthers sessile; ovary and capsule 5-celled; capsule densely lanate within; seeds not arillate9. OCHROMA

1. PSEUDOBOMBAX Dugand

PSEUDOBOMBAX Dugand, *Caldasia* 2: 65. 1943.

Trees or sometimes shrubs, deciduous, mostly unarmed, the trunk straight or spindle-shaped, the young branches generally whitish-pruinose. *Leaves* petiolate, compound-digitate or seldom simple; digitate leaves 3- to 9(-11)-foliolate, the leaflets inarticulate, sessile or petiolulate and entire; simple leaves with inarticulate and entire blade. *Inflorescences* cymose, the cymes 2- to 5-flowered, unipared or not, or flowers solitary. *Flowers* hermaphrodite, actinomorphic, pedicellate, 3-bracteolate, the bracteoles fugacious or not; receptacle mostly glandular; calyx cupuliform, campanulate or subtubiform, truncate to shortly 5-lobate, coriaceous, accrescent; petals 5, adnate to the base of the staminal column, fleshy, with tufted hairs, fugacious; stamens 150-1,500, apparently 1-whorled, the staminal column divided into many filaments or into 5-10 or 15 distinct phalanges, the anthers 1-thecate, hippocrepiform, medifixus, extrorse, longitudinally dehiscent; pollen colpate or colporate, the sexine reticulate; ovary superior, sessile, 5(-6-8)-celled, the cells many-ovulate, the ovules inserted on a central columella; style filiform; stigma capitate or 5(-6-8)-lobulate. *Capsules* subligneous, loculicidally 5(-6-8)-valvate, the central columella winged and persistent; seeds numerous, small, pyriform, imbedded in copious whitish to reddish kapok; cotyledons epigeal and expanded above the ground level, opposite, petiolate, equal, folded, foliaceous to slightly coriaceous, the primordial leaves simple.

A neotropical genus of 20 species of which only one occurs in Panama.

1. *PSEUDOBOMBAX SEPTENATUM* (Jacq.) Dugand, *Caldasia* **2**: 65. 1943; A. Robyns, *Bull. Jard. Bot. État Brux.* **33**: 32, *pl. 1*. 1963.—Fig. 1.

Bombax septenatum Jacq., *Enum. Syst. Pl.* 26. 1760.

Bombax heptaphyllum L., *Sp. Pl. ed. 2*, 960. 1763, non L., *Syst. Nat. ed. 12*, 457. 1767.

Pachira Barrigon Seem., *Bot. Voy. Herald* 83. 1853.

Bombax Barrigon (Seem.) Decne., *Fl. Serres* **23**: 44. 1880.

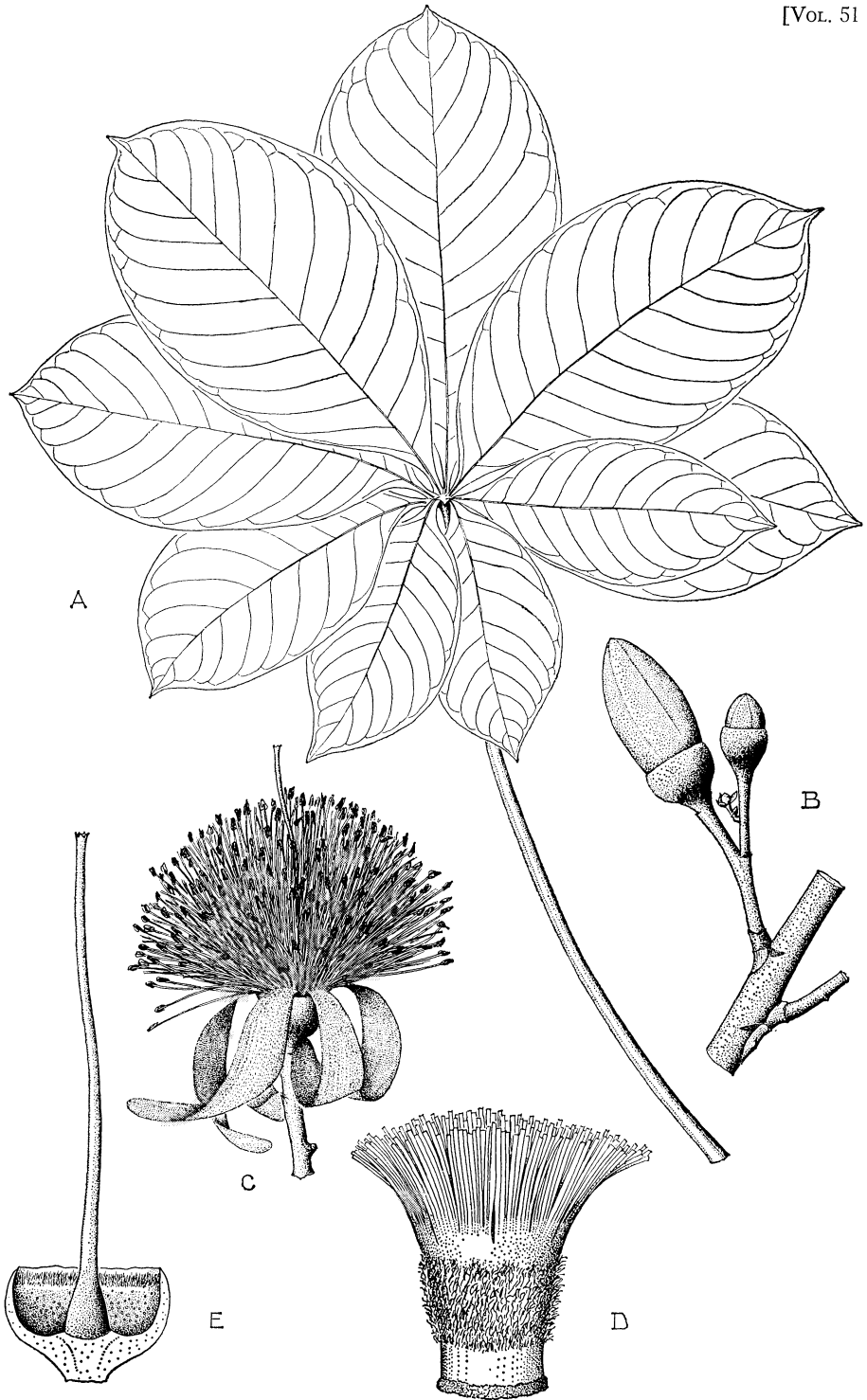
Bombax balanoides Ulbr., *Notizbl. K. Bot. Gart. Mus. Berlin* **6**: 156. 1914.

Bombax carabobense Pittier, *Bol. Com. Ind. Venezuela* **4**(34): 32. 1923.

Tree 6-20 m. tall, the trunk spindle-shaped, ca. 80 cm. in diam. at the base and 1.40 m. in diam. at the largest portion, the crown rounded, the branches more or less horizontal, the bark grayish with longitudinal, greenish furrows, glabrous and rimose, the branchlets whitish-pruinose. *Leaves* 5- to 9-foliolate, the petiole thick, slightly enlarged at the base, 8.5-34(-68) cm. long, the leaflets sessile to shortly petiolulate, the petiolule 0.4-1.2 cm. long and canaliculate above; blade obovate, elliptic to seldom oblong-elliptic, cuneiform and decurrent at the base, more or less bluntly apiculate at the apex, 5-29 cm. long and 2.6-14 cm. wide, glabrous above, glabrous or sometimes with scattered small lepidotes beneath, the nerves prominent beneath. *Inflorescences* cymose, the cymes 3-flowered and unipared, or flowers solitary. *Flowers* 7-10 cm. long, the pedicel 1.8-4(-6) cm. long and 0.3-0.5 cm. in diam., glabrous; receptacle provided with 1 or sometimes 2 whorls of glands, glabrous or sometimes lepidote; calyx cupuliform to cupuliform-campanulate, truncate, 0.8-1.4 cm. long and 1.9-3 cm. wide, generally reddish-lepidote without, silky-tomentellous within; petals linear-lanceolate, subacute, 6.5-9.5 cm. long and 1.8 cm. wide, pinkish to cream-colored, tomentellous outside, pubescent-striate inside; stamens 1,000-1,200, the staminal column 0.8-1.8 cm. long and 0.6-1.2 cm. in diam., glabrous at the base, elsewhere shortly silky to pubescent, divided into 5 dichotomous phalanges 4.3-6.5 cm. long; anthers ca. 2-2.5 mm. long; ovary conical, conical-oblong to subglobose, 5-angular or terete, 0.4-0.9 cm. long and 0.4-0.7 cm. in diam. at the base, generally papillate; style 6.5-10 cm. long, slightly enlarged at the apex, glabrous; stigma 5-lobulate, the lobes ca. 1 mm. long. *Capsule* ovoid-fusiform, 5-angular, 12-15 cm. long and 5-7 cm. in diam., sometimes papillate when young, quickly glabrate; seeds broadly pyriform, ca. 0.6 cm. long and 0.5 cm. wide, dark brown; kapok white-grayish.

From Nicaragua to Panama, Colombia, Venezuela, Brazil (Territorio do Acre) and Peru; on forested hills, in pastures, along roads, usually on sandy soil; often planted; known as *barrigón* in Panama.

CANAL ZONE: Chagres, Isthmus of Panama, *Fendler 312*; Gatun, *Hayes 718*; Barro Colorado Island, *Shattuck 614*, *Wetmore & Abbe 110*; around El Paraiso, alt. 30-100 m., *Pittier 2512*; around Culebra, alt. 50-150 m., *Pittier 2154*; Balboa, *Standley 28537*; locality unknown, *Harvey 5230*, *Johansen s.n.* DARIEN: vicinity of Pinogana, *Allen 4295*. PANAMA: Matias Hernández, Agricultural Experiment Station, *Pittier 6935*; near Matias Hernández, *Standley 28947*; Río Tocumen, *Standley 29460*; Sotto Caballo, near Madden Lake, *C. E. Smith, M. H. Smith & Arrauz 3320*; Taboga Island, *Seemann 1632*. PROVINCE UNKNOWN: *Dodge & Allen s.n.*



G. VAN ASSCHE DEL.

Figure 1. *PSEUDOBOMBAX SEPTENATUM* (Jacq.) Dugand: A, leaf ($\times \frac{1}{2}$); B, inflorescence ($\times \frac{1}{2}$); C, flower ($\times \frac{1}{2}$); D, staminal tube ($\times 2$); E, longitudinal section of calyx and gynoecium ($\times 1$) (from Bull. Jard. Bot. État Brux.).

2. BOMBACOPSIS Pittier

BOMBACOPSIS Pittier, Contr. U. S. Nat. Herb. **18**: 162. 1916.

Bombax L. sect. *Pachiroopsis* K. Schum. in Mart., Fl. Bras. **12**(3): 216. 1886, pro parte.

Pochota Ramirez Goyena, Fl. Nicaragüense 198. 1909.

Bombax sect. β *Ceiba* Bakh., Bull. Jard. Bot. Buitenz, ser. 3, **6**: 175. 1924, pro parte.

Shrubs or trees, deciduous or evergreen, unarmed or sometimes armed, the trunk buttressed or not. *Leaves* petiolate, the stipules lanceolate, the blade compound-digitate, the leaflets 3-11, articulate, sessile or petiolulate, entire. *Inflorescences* cymose, the cymes paniculiform and pauciflorous, or generally flowers axillary or subterminal, solitary, geminate or sometimes 3-nate. *Flowers* hermaphrodite, actinomorphic, 7-25.5 cm. long, pedicellate, 3-bracteolate, the bracteoles fugacious; receptacle glandular or not; calyx cupuliform to tubiform, truncate or 3- to 5-lobate, coriaceous or rarely spathaceous, persistent or accrescent; petals 5, oblong to narrowly ribboned, sometimes oblanceolate or spatulate-linear, adnate to the base of the staminal column, fleshy, with tufted hairs on both sides; stamens 100-1,000, 1- or apparently 2-whorled, the staminal column divided into 5 or 10 or 15 phalanges; anthers 1-thecate, oblong to linear, sometimes slightly curved or seldom hippocrepiiform, submedifixus, extrorse, longitudinally dehiscent; pollen zonicolate or zonicolporate, the sexine of the walls reticulate and often provided with rugulate elements, that of the mesocolpia sometimes echinulate; ovary superior, sessile, 5-celled, the cells many-ovulate, the ovules inserted on a central columella; style filiform; stigma 5-lobulate. *Capsules* subligneous to ligneous, loculicidally 5-valvate, the central columella winged and persistent; seeds few to numerous, small to large, pyriform to ovoid-angular, sometimes polyembryonate, imbedded in few to copious whitish to reddish kapok; cotyledons epigeal and expanded above the ground level, alternate to more or less opposite, petiolate or subsessile, unequal, coriaceous, the primordial leaves simple or compound-digitate.

A neotropical genus (one species, *Bombacopsis glabra* (Pasq.) A. Robyns, however, occurs in tropical America and in tropical Africa) of about 21 species of which only two are reported from Panama.

- a. Unarmed tree; flowers 13-24 cm. long; pedicel, receptacle and calyx without glabrous; stamens ca. 280; ovary tomentellous; capsule ellipsoid, caudate-acuminate at the apex; seeds 9-10 mm. long1. B. SESSILIS
- aa. Armed tree; flowers 7-11 cm. long; pedicel, receptacle and calyx without puberulous to tomentellous; stamens 100-166; ovary glabrous; capsule oblong-ovoid, emarginate and mucronulate at the apex; seeds ca. 4-5 mm. long2. B. QUINATA

1. BOMBACOPSIS SESSILIS (Benth.) Pittier, Contr. U. S. Nat. Herb. **18**: 162. 1916; A. Robyns, Bull. Jard. Bot. État Brux. **33**: 180. 1963.—Fig. 2.

Pachira sessilis Benth., Bot. Voy. Sulphur 70. 1844.

Pachira angusta Duchassaing ex Decne., Fl. Serres **23**: 52. 1880, nom. nud. in syn.

Bombax sessile (Benth.) Bakh., Bull. Jard. Bot. Buitenz. ser. 3, **6**: 180. 1924; Johnston, Sargentia **8**: 200. 1949.

Tree, deciduous, medium-sized to generally tall, up to 20-30 m. high, the trunk straight, 20-40(-50) cm. in diam. and buttressed, the crown narrow and loose, the branches more or less horizontal, the bark smooth, squamous and greenish. *Leaves* (4-)5- to 7- to 9-foliolate and glabrous, the petiole terete, slightly enlarged on both ends, 2.5-14.5 cm. long; leaflets sessile to subsessile, the blade oblanceolate to obovate, cuneiform at the base, emarginate and mucronulate or sometimes rounded to obtuse and mucronulate at the apex, 2.5-18.5 cm. long and 1.2-6.5 cm. wide, rigid and chartaceous, bright above, dull below, the nerves slightly prominent on both sides. *Flowers* precocious, clustered toward the tip of the branchlets, axillary, solitary, geminate or seldom 3-nate, 13-24 cm. long, the pedicel rounded, 0.5-1.8(-3.2) cm. long and glabrous; receptacle 5-glandular and glabrous; calyx cupuliform to campanulate-subtubiform, truncate or 5-lobulate to undulate and mucronulate, 0.7-1.2 cm. long and 0.85-1 cm. broad, glabrous without, silky-villose within; petals ribboned, acute, 13-24 cm. long and 0.55-0.95 cm. wide, puberulous on both sides; stamens ca. 280, the staminal column 6.5-9(-11.4) cm. long and 0.2-0.4 cm. in diam., glabrous or seldom with 5 narrow, vertical, scatteringly puberulent zones, divided into many pentadelphous filaments, the filaments 5.5-9 cm. long, glabrous and generally bifurcated near the apex; anthers oblong, ca. 0.15-0.2 cm. long; ovary ovoid, 5-angular, ca. 3 mm. long and 4.5 mm. in diam. at the base, tomentellous; style 13-21 cm. long, hirsute on the lower part; stigma obscurely 5-lobulate. *Capsule* ellipsoid, obtuse at the base, caudate-acuminate at the apex, 6-12.3(-15) cm. long and 3.5-5 cm. in diam., the valves yellowish-brown, scatteringly puberulous to glabrous; seeds numerous, subglobose, sometimes more or less angular, 0.9-1 cm. long and 0.7-0.95 cm. wide, the testa brownish; kapok copious and pale brown.

Costa Rica and Panama, at the edge and in deciduous and evergreen forests; often planted as shade tree; also cultivated in Cuba and Jamaica; called *ceibo* in Panama.

CANAL ZONE: Barro Colorado Island, *Shattuck* 647, *Standley* 40970, *Wetmore*, *Abbe & Shattuck* 80, *Wetmore & Abbe* 80A, *Woodworth & Vestal* 452; Obispo, *Standley* 31752; around Culebra, *Pittier* 2407, 2422, 2769a; Corozal, *Standley* 27370; Balboa, *Standley* 29312; Ancon, garden of the hospital, *Mason s.n.*; Ancon, *Pittier* 2726; locality unknown, *Harvey* 5229, *Johansen* 46. CHIRIQUÍ: around El Boquete, alt. 1,000-1,300 m., *Pittier* 3310. COCLÉ: Penonomé and vicinity, *R. S. Williams* 615. PANAMA: near Panama, *Hayes* 478; Santa Rita hills and Pueblo Liman, *C. E. Smith, Jr. & H. M. Smith* 3413; Islands Secas Group, *Elmore* G2; Taboga Island, *Hinds s.n.* (type); San José Island, *Johnston* 414, 493, 560, 607, 943, *Erlanson* 119. VERAGUAS: vicinity of Santa Fe, Río Santa Maria, alt. 1,000 ft., *Allen* 4416. PROVINCE UNKNOWN: *Duchassaing s.n.*

2. *BOMBACOPSIS QUINATA* (Jacq.) Dugand, *Contr. Hist. Nat. Colomb.* **1**: 2. 1938;
A. Robyns, *Bull. Jard. Bot. État Brux.* **33**: 224. 1963.

Bombax quinatum Jacq., *Enum. Syst. Pl.* 26. 1760; *Johnston*, *Sargentia* **3**: 198. 1949.
Pachira Fendleri Seem., *Bot. Voy. Herald* 83. 1853.
Pachira bracteolata Decne., *Fl. Serres* **23**: 51. 1880.
Bombax Fendleri (Seem.) Benth. ex Jackson, *Ind. Kew.* 320. 1895.
Pochota vulgaris Ramirez Goyena, *Fl. Nicaragüense* 199. 1909.
Bombax nicoyense Pittier, *Repert. Sp. Nov.* **13**: 315. 1914.
Bombacopsis Fendleri (Seem.) Pittier, *Contr. U. S. Nat. Herb.* **18**: 163, *pl.* 74-78. 1916;
Standley, *Contr. Arnold Arb.* **5**: *pl.* 7(A). 1933.

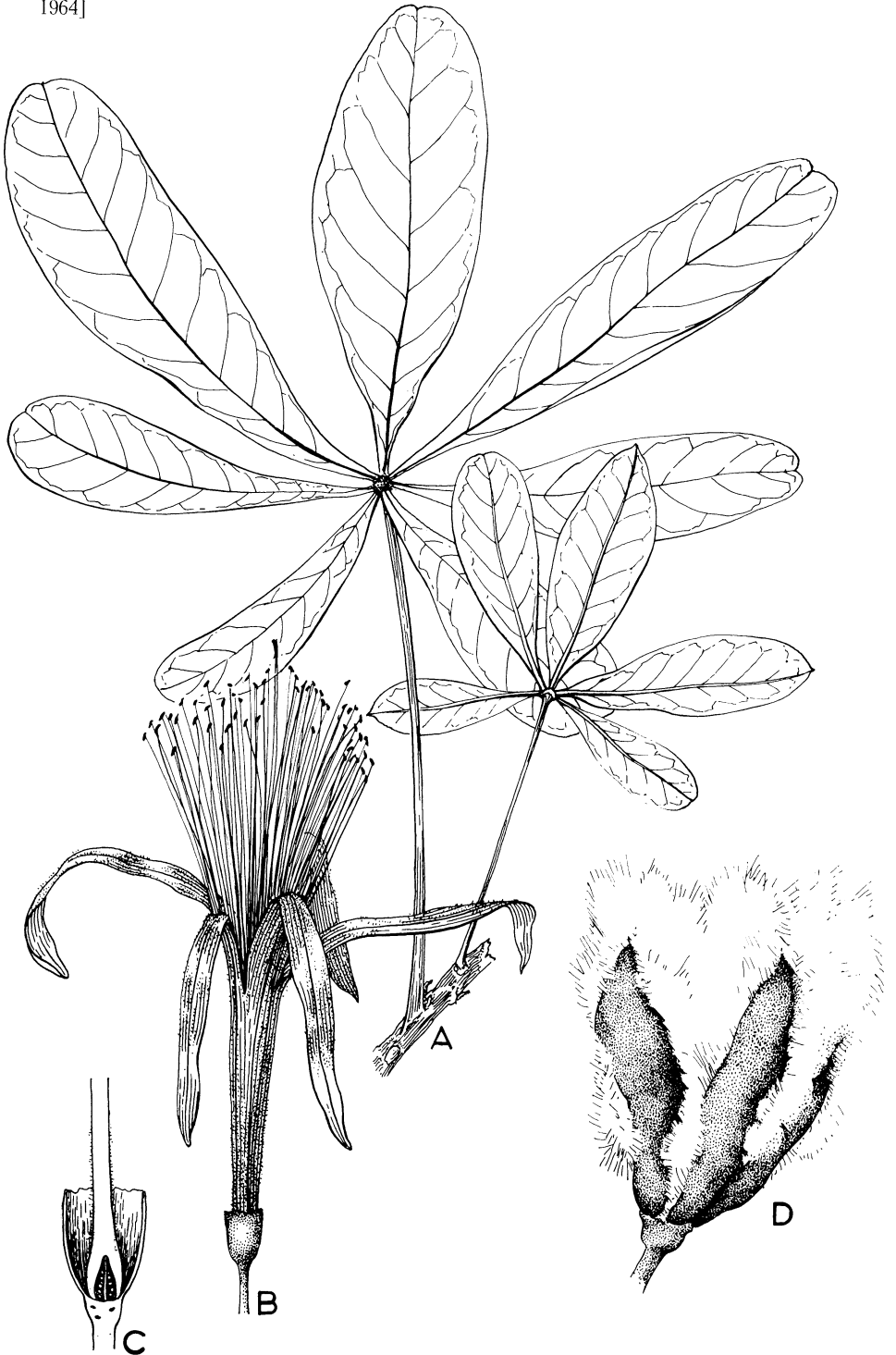


Figure 2. *BOMBACOPSIS SESSILIS* (Benth.) Pittier: A, leaves ($\times \frac{2}{3}$); B, flower ($\times \frac{2}{3}$); C, longitudinal section of calyx and ovary and base of style ($\times \frac{1}{3}$); D, dehiscent capsule and kapok ($\times \frac{2}{3}$).

Bombacopsis jaris Pittier, Bol. Com. Ind. Venezuela **2**(13): 434. 1921, nom. nud.

Bombacopsis sepium Pittier, Bol. Com. Ind. Venezuela **4**(34): 36. 1923.

Bombax Ceiba sensu Dugand, *Caldasia* **2**: 61. 1943, non L., Sp. Pl. 511. 1753.

Tree, deciduous, armed, 2.5-30(-40) m. high, the trunk sometimes spindle-shaped at the base, attaining 1-3 m. in diam., often buttressed, the crown broad and rounded, the branches more or less horizontal, the bark grayish to cinnamon, thick and rimose. *Leaves* (3-)5(-6-7)-foliolate and glabrous, the petiole more or less terete, slightly enlarged at both ends, 3-11 cm. long; leaflets petiolulate, the petiolule 0.2-0.8 cm. long, canaliculate above, the blade obovate to oblong-obovate, seldom elliptic, acute or cuneiform and narrowly decurrent at the base, caudate-acuminate or caudate-apiculate and often mucronulate at the apex, 4-17 cm. long and 1.5-7.2 cm. wide, chartaceous to subcoriaceous, the margins sometimes slightly recurved, pale green and bright above, glaucous and dull beneath, the nerves slightly prominent on both sides. *Inflorescences* cymose, the cymes paniculiform and pauciflorous, or flowers solitary. *Flowers* precocious, 7-11 cm. long, the pedicel 0.4-0.8 cm. long, shortly tufted-puberulous to tomentellous, seldom glabrate; receptacle generally 5-glandular, shortly tufted-puberulous to tomentellous; calyx campanulate to campanulate-tubiform, truncate and shortly 5-apiculate or sometimes more or less 5-undulate-apiculate, 0.7-1 cm. long and 0.6-1 cm. broad, shortly tufted-puberulous to tomentellous without, seldom glabrate, silky-villous within; petals linear, subobtusate to subacute, 7-11 cm. long and 0.5-0.8 cm. wide, brownish and densely scabrous-puberulous outside, whitish and arachnoid inside; stamens 100-166, 5.7-9.2 cm. long and whitish, the staminal column slightly dilated at both ends, 1.3-2.2 cm. long, glabrous or arachnoid and chiefly with simple hairs, divided into 5 phalanges, each phalanx with many unequal filaments, 3-7 cm. long; anthers more or less oblong to hippocrepiform, ca. 2-2.5 mm. long; ovary globose to pyriform, more or less 5-angular, ca. 2.5-3 mm. long and 2.2-3.2 mm. in diam. at the base, glabrous; style 6.7-9.5 cm. long and whitish; stigma 5-lobulate, the lobes ca. 1 mm. long. *Capsule* oblong-obovoid, 5-angular, narrowed at the base, truncate, emarginate and mucronulate at the apex, 4-10 cm. long and 2.7-5 cm. in diam., the valves smooth, brownish or cinnamon; seeds numerous, ovoid to subglobose, ca. 4-5 mm. long and 3.5 mm. wide, the testa brown and often grayish-dotted; kapok copious, yellowish-brown to pale brown.

Along the Pacific coast from Nicaragua to Panama, north of Colombia and Venezuela; characteristic tree of the deciduous forests, occasionally in the evergreen forests and dense thickets. One of the local names is *cedro espinoso*.

CANAL ZONE: near mouth of River Chagres, *Allen* 872; Chagres, *Fendler* 310; Barro Colorado Island, *Aviles* 102, *Shattuck* 510, *Woodworth & Vestal* 669; around Culebra, alt. 50-150 m., *Pittier* 2769; on the hill back of Paraiso, *Hayes* 119; Victoria Fill, near Miraflores Locks, *Allen* 1715. COCLÉ: Penonomé and vicinity, alt. 50-1,000 ft., *R. S. Williams* 227. PANAMA: Agricultural Experiment Station at Matías Hernández, *Pittier* 6940; forests of Juan Díaz, alt. 20-50 m., *Pittier* 2549; near Chepo, *Kluge* 11; Pedro Gonzalez Island, *Allen* 2600; San José Island, *Erlanson* 302, *Johnston* 215, 569, 1054, 1180.

3. PACHIRA Aubl.

PACHIRA Aubl., Hist. Pl. Gui. Fr. 725. 1775.

Sophia L., Pl. Surinam. n.86. 1775.

Carolinea L. f., Suppl. Pl. Syst. Veg. 51. 1781.

Bombax L. sect. *Pachira* (Aubl.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. **3**(6): 62. 1895.

Bombax L. sect. *Pachiroopsis* K. Schum. in Engl. & Prantl, loc. cit. 62. 1895.

Trees, evergreen, unarmed, the trunk sometimes buttressed. *Leaves* petiolate, the stipules lanceolate, the blade compound-digitate, the leaflets 5-9, articulate, sessile or petiolulate, entire or sometimes undulate, the margins sometimes more or less recurved. *Flowers* grouped toward the end of the branchlets, solitary or geminate, sometimes 3-nate, hermaphrodite, actinomorphic, up to 35 cm. long, pedicellate, 3-bracteolate, the bractlets fugacious; receptacle generally glandular; calyx broadly cupuliform, campanulate to subtubiform, truncate or undulate, coriaceous, persistent; petals 5, ribboned, adnate to the base of the staminal column, fleshy, with tufted hairs on both sides, fugacious; stamens 200-700, apparently 2-whorled, more or less long-monoadelphous, the anthers 1-thecate, oblong-linear, straight or curved, submedifixus, extrorse, longitudinally dehiscent; pollen colp(orate), the sexine of the walls reticulate and provided with baculate or spinulate, supratégillate elements, that of the mesocolpia sometimes echinulate; ovary superior, sessile, 5-celled, the cells many-ovulate, the ovules inserted on a central columella; style filiform; stigma 5-lobulate. *Capsules* ligneous, large, loculicidally 5-valvate, tufted-pubescent outside, pubescent and with simple hairs inside, the central columella winged and persistent; seeds few, very large and angular; cotyledons epigeal, surrounded by the testa and appressed against the ground level, alternate, sessile, quite unequal, very fleshy and green, the epicotyl provided with triangular cataphylls, the primordial leaves compound-digitate.

A neotropical genus of two species of which only one is reported from Panama.

1. PACHIRA AQUATICA Aubl., Hist. Pl. Gui. Fr. 726, *t.*291, 292. 1775; A. Robyns, Bull. Jard. Bot. État Brux. **33**: 234, *pl.* 8, *fig.* 9-11. 1963.—Fig. 3.

Carolinea princeps L. f., Suppl. Pl. Syst. Veg. 314. 1781.

Pachira grandiflora Tussac, Fl. Antilles **4**: 12, *pl.* 3, 4. 1827.

Carolinea macrocarpa Schlecht. & Cham., Linnaea **6**: 423. 1831.

Pachira macrocarpa (Schlecht. & Cham.) Walp., Rep. Bot. Syst. **1**: 329. 1842.

Pachira longiflora Hook., Curt. Bot. Mag. **76**: *t.*4549. 1850.

Pachira aquatica var. *α surinamensis* Decne., Fl. Serres **23**: 46. 1880.

Bombax aquaticum (Aubl.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. **3**(6): 62. 1895.

Bombax macrocarpum (Schlecht. & Cham.) K. Schum. in Engl. & Prantl, loc. cit. 62. 1895.

Pachira pustulifera Pittier, Repert. Sp. Nov. **13**: 315. 1914.

Pachira villosula Pittier, loc. cit. 316. 1914.

Bombax rigidifolium Ducke, Arch. Jard. Bot. Rio de Janeiro **4**: 127. 1925.

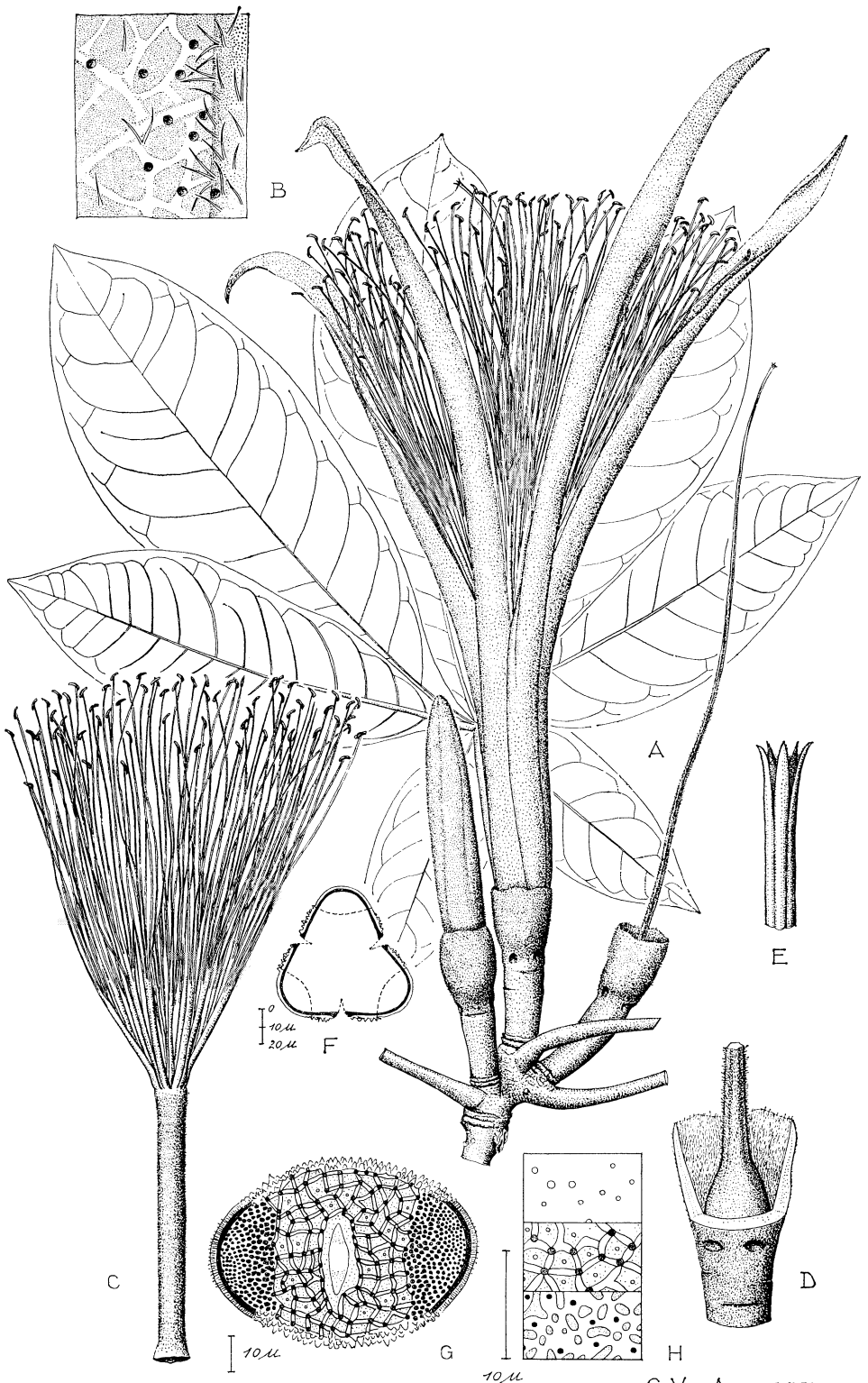
Pachira aquatica var. *occidentalis* Cuatr., Rev. Acad. Colomb. Cienc. **9**: 169. 1954.

Tree 5-23 m. high, the trunk attaining 25-60(-90) cm. in diam., sometimes buttressed, the crown spreading, the bark smooth, grayish to more or less brownish. *Leaves* 5- to 9-foliolate, the petiole terete, often longitudinally furrowed, dilated at

both ends, 4-23.5 cm. long, glabrous; leaflets petiolulate, the petiolule thick, 0.3-2.5 cm. long, often furrowed above and glabrous; blade elliptic to oblong, sometimes lanceolate or slightly obovate, acute or rounded and more or less decurrent at the base, caudate-acuminate, caudate-apiculate or rounded-apiculate and generally mucronulate at the apex, 5-28.5 cm. long and 2.5-14.5 cm. wide, chartaceous to coriaceous, the margins sometimes slightly recurved, generally bright and glabrous above, dull, glabrous or sometimes scatteringly reddish-lepidote or finely tufted-pubescent or seldom lepidote and puberulous beneath, the nerves prominent especially beneath. *Flowers* solitary or sometimes 2- to 3-nate, attaining 17.5-35 cm. long, the pedicel terete, 1-5.5 cm. long and 0.3-1.1 cm. thick, glabrous to shortly yellowish-brown-tufted-puberulous; receptacle 5-glandular, shortly puberulous to tomentellous with yellowish-brown tufted hairs; calyx campanulate, sometimes campanulate-tubiform, truncate or 5-apiculate, sometimes slightly 5-undulate-apiculate, 1.2-2.1 cm. long and 1.3-2 cm. in diam., shortly puberulous to tomentellous with yellowish-brown tufted hairs outside, silky-villose inside; petals acute to more or less obtuse, 17-34 cm. long and 0.8-2.1 cm. wide, greenish, yellowish or whitish, puberulous on both sides; stamens 200-260, 16-31 cm. long, whitish below and scarlet above, the staminal column 4.5-12 cm. long and 0.45-0.8 cm. in diam., tufted-puberulous; outer whorl with 5 dichotomous, epipetalous phalanges, each phalanx with numerous filaments; inner whorl with 5 episepalous phalanges, each phalanx with only 2-8 filaments; anthers ca. 3-5.5 mm. long, reddish; ovary pyriform, 5-sulcate, ca. 0.5-1 cm. long and 0.45-1 cm. broad, shortly whitish-villose; style more or less dilated and 5-sulcate at the base, 19-31 cm. long, white below and reddish above, villous on the third inferior; stigma lobulate, the lobes ca. 2-3 mm. long. *Capsule* subglobose, ellipsoid to oblong-ellipsoid, shallowly 5-sulcate longitudinally, rounded to obtuse and emarginate at the apex, 12.5-30 cm. long and 6-10(-12) cm. in diam., the valves to 1 cm. thick, yellowish-brown-scabrous-puberulous outside, silky-villose inside; seeds generally 4- to 5-angular, 2-3.2 cm. x 2.2-6 cm. x 2-2.2 cm., the testa brownish.

From southern Mexico (Veracruz, Oaxaca, Chiapas, Yucatan) through Central America to Ecuador, northern Peru (Loreto) and northern Brazil (Para, Maranhão); generally riparian, growing along the often (periodically) inundated river banks and lake shores or at the edge of woods, always on moist ground; often cultivated throughout tropical America and in some isles of the Antilles: Cuba, Jamaica, Haiti and Trinidad; also cultivated in Africa and Asia.

BOCAS DEL TORO: vicinity of Chiriquí Lagoon, Water Valley, *von Wedel* 1478, 1806, 2157; Western River, *von Wedel* 2703, 2783, 2792. CANAL ZONE: Chagres, Isthmus of Panama, *Fendler* 311; Mojinga swamp near mouth of River Chagres, below 1 m., *Allen* 857, 859; Gatun, *Hayes* 622; forest along the Río Indio de Gatun, near sea level, *Pittier* 2777; Barro Colorado Island, *Aviles* 40, *Frost* 149; Summit, Plant Introduction Gardens, *Harvey* 5275, *Steyermark* s.n.; Ahorca Lagarto to Culebra, *Cowell* 375. COLÓN: between France Field, Canal Zone and Catival, *Standley* 30382; along river at Portobelo, *Christopherson* 401. DARIEN: along Río Tuirá below El Real and Piriaque Island, *Stern*, *Chambers*, *Dwyer*, *Ebinger* 971. PANAMA: near Chepo, *Kluge* 29; banks of Mamoni River, below La Capitana, alt. 20-25 m., *Pittier* 4578.



G. VAN ASSCHE DEL.

Figure 3. *PACHIRA AQUATICA* Aubl.: A, flowering branch ($\times \frac{1}{2}$); B, indumentum of lower leaf-surface (lepidotes and simple hairs) ($\times 25$); C, androecium ($\times \frac{1}{2}$); D, receptacle, longitudinal section of calyx, ovary and base of style ($\times 1$); E, style-apex and stigma ($\times 5$); F, pollen grain, optical section of the equator in polar view; G, id., equatorial view; H, id., L. O. analysis (from Bull. Jard. Bot. Ét. Brux.).

4. CEIBA Mill.

CEIBA Mill., Gard. Dict. Abridg. ed. 4. 1754.

Eriodendron DC., Prodr. 1: 479. 1824.

Gossampinus Ham., Trans. Linn. Soc. London 15: 126. 1826, pro parte quoad *G. alba* Ham.

Erione Schott & Endl., Melet. Bot. 34. 1832.

Campylanthera Schott & Endl., loc. cit. 35. 1832.

Spirotheca Ulbr., Notizbl. K. Bot. Gart. Mus. Berlin 6: 159. 1914.

Trees, infrequently strangler epiphytes, generally tall, deciduous, armed or unarmed, the trunk buttressed or not. *Leaves* petiolate, compound-digitate; leaflets 5-9, articulate, the blade often denticulate near the apex. *Inflorescences* grouped toward the tip of the branchlets, axillary, fasciculate, or flowers solitary or geminate. *Flowers* hermaphrodite, actinomorphic, sometimes subzygomorphic, with tufted hairs, pedicellate, bracteolate, the bractlets fugacious; receptacle eglandular; calyx campanulate to more or less tubiform, truncate or irregularly lobed, persistent or accrescent; petals 5, adnate to the base of the staminal column, fleshy; stamens 5, the staminal column conical or the lower part cylindrical and thickened and the upper part conical, sometimes provided with one whorl of staminodia, the filaments bearing each 1-3 linear to anfractuose anthers; anthers 1- to 2(-4)-thecate, longitudinally dehiscent; pollen colpitate, the sexine reticulate; ovary superior to sub-inferior, sessile, 5-celled, the cells many-ovulate; style filiform or dilated upward; stigma capitate or 5-lobulate. *Capsules* coriaceous to ligneous, loculicidally 5-valvate, the central columella winged and persistent; seeds numerous, obovoid or subglobose, imbedded in copious kapok; cotyledons epigeal and expanded above the ground level, opposite, petiolate, folded and foliaceous.

A pantropical genus of which most of the species are native to tropical America; two species are reported from Panama.

- a. Flowers 2.5-4 cm. long; calyx campanulate, 1-1.2 cm. long and 0.9-1.2 cm. wide; staminal column conical, ca. 5-5.5 mm. long and glabrous, each filament bearing 2-3 anfractuose anthers, the anthers 1-thecate; style suddenly obliquely enlarged above the staminal column1. *C. PENTANDRA*
- aa. Flowers 6-9 cm. long; calyx cupuliform, 2.2-2.8 cm. long and 2-3 cm. wide; staminal column 2.5-7 cm. long, the lower part cylindrical, thickened and minutely and densely tomentellous, the upper part conical and glabrous, each filament bearing 2 superposed, linear and slightly flexuose anthers, the anthers 2-thecate; style midway suddenly dilated upward2. *C. ROSEA*

1. *CEIBA PENTANDRA* (L.) Gaertn., Fruct. Sem. 2: 244, t.133. 1791.

Bombax pentandrum L., Sp. Pl. 511. 1753.

Ceiba casearia Medic., Malv.-Fam. 16. 1787.

Eriodendron anfractuosum DC. var. α *indicum* DC., Prodr. 1: 479. 1824.

Eriodendron anfractuosum var. β *caribaeum* DC., loc. cit. 479. 1824.

Eriodendron anfractuosum var. γ *africanum* DC., loc. cit. 479. 1824.

Bombax orientale Spreng. in L., Syst. Veg. ed. 16, 3: 124. 1826.

Bombax occidentale Spreng. in L., loc. cit. 124. 1826.

Gossampinus alba Ham., Trans. Linn. Soc. London 15: 126. 1826.

Bombax guineense Thonning in Schumacher, Kong. Danske Vid. Selskabs Nat. Math.

Afhandl. 4: 76. 1829.

Eriodendron guineense (Thonning) G. Don ex Loud., Hort. Brit. 292. 1830.

- Eriodendron caribaeum* (DC.) G. Don ex Loud., loc. cit. 292. 1830.
Eriodendron occidentale (Spreng.) G. Don, Gen. Syst. Gard. Bot. **1**: 513. 1831.
Gossampinus Rumphii Schott & Endl., Melet. Bot. 35. 1832.
Eriodendron orientale (Spreng.) Kostel., Algem. Med.-Pharm. Fl. 1875. 1836.
Eriodendron pentandrum (L.) Kurz, Jour. As. Soc. Bengal **43**: 113. 1874.
Xylon pentandrum (L.) O. Ktze, Rev. Gen. Pl. **1**: 75. 1891.
Ceiba pentandra var. *clausa* Ulbr. f. *albolana* Ulbr., Notizbl. K. Bot. Gart. Mus. Berlin **6**: 30. 1913.
Ceiba pentandra var. *clausa* f. *grisea* Ulbr., loc. cit. 30. 1913.
Ceiba pentandra var. *dehiscens* Ulbr. f. *albolana* Ulbr., loc. cit. 31. 1913.
Ceiba pentandra var. *dehiscens* f. *grisea* Ulbr., loc. cit. 31. 1913.
Ceiba anfractuosa (DC.) Maza in Maza & Roig, Fl. Cuba 66. 1914.
Ceiba pentandra var. *caribaea* (DC.) Bakh., Bul. Jard. Bot. Buitenz. ser. 3, **6**: 196. 1924.
Ceiba pentandra var. *indica* (DC.) Bakh., loc. cit. 196. 1924.
Ceiba Thonningii A. Chev., Rev. Bot. Appl. Agr. Trop. **17**: 249. 1937.
Ceiba guineensis (Thonn.) A. Chev. var. *ampla* A. Chev., loc. cit. 262. 1937.
Ceiba guineensis var. *clausa* (Ulbr.) A. Chev., loc. cit. 264. 1937.
Ceiba caribaea (DC.) A. Chev., loc. cit. 266. 1937.

Tree up to 40 m. high, the trunk cylindric, often with strong buttresses, 0.8-2 m. in diam., aculeate or not, the crown spherical to pyramidal, the branches usually aculeate, the bark smooth and fibrous. Leaves 5- to 9-foliolate, glabrous, the petiole 5-23 cm. long; leaflets with a petiolule 0.5-1.2 cm. long, the blade oblong-lanceolate, slightly narrowed at the base, acuminate at the apex, 10-21 cm. long and 2.3-4.2 cm. wide, the margins sometimes denticulate near the apex. Inflorescences fasciculate, few- to many-flowered. Flowers 2.5-4 cm. long, the pedicel 2.5-3 cm. long, glabrous; calyx campanulate, 4- to 5-lobate and with more or less rounded lobes, 1-1.2 cm. long and 0.9-1.2 cm. wide, glabrous outside, silky-villous inside; petals obovate-oblong, rounded, 2.5-4 cm. long and 1-1.5 cm. wide, light yellow, villous to tomentose outside except the base, pubescent near the apex inside; staminal column conical, 5-5.5 mm. long, glabrous, the filaments ca. 2.5 cm. long, each bearing 2-3 anfractuose anthers, the anthers 1-thecate; ovary slightly subinferior, globose, glabrous; style filiform at the base, suddenly obliquely enlarged above the staminal column, slightly longer than the stamens; stigma capitate. Capsule subligneous, ellipsoid or fusiform, acute at both ends, 10-26 cm. long and 3-4 cm. in diam., dehiscent or not on the tree, the valves ca. 2 cm. wide; seeds numerous, subglobose, 5.5-7 mm. long and 4.4-5.5 mm. wide; kapok copious, grayish.

A pantropical, polymorphic tree growing chiefly in secondary forests, often cultivated and naturalized; the inner walls of the capsules bear the kapok which is used for stuffing pillows, mattresses, etc.; the seeds are oleaginous and used for illumination and soapmaking; the wood is light and sometimes used to make canoes.

CANAL ZONE: Barro Colorado Island, *Carpenter* 33, 40. CHIRIQUÍ: Progreso, *Cooper & Slater* 216.

2. *CEIBA ROSEA* (Seem.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. **3** (6): 63. 1895.—Fig. 4.

Chorisia rosea Seem., Bot. Voy. Herald 84. 1853.

Xylon roseum (Seem.) O. Ktze, Rev. Gen. Pl. **3**(2): 24. 1898.

Ceiba Allenii Woodson, Ann. Missouri Bot. Gard. **29**: 359. 1942.

Spirotheca Allenii (Woodson) Cuatr., Rev. Acad. Colomb. Cienc. **9**: 167. 1954.

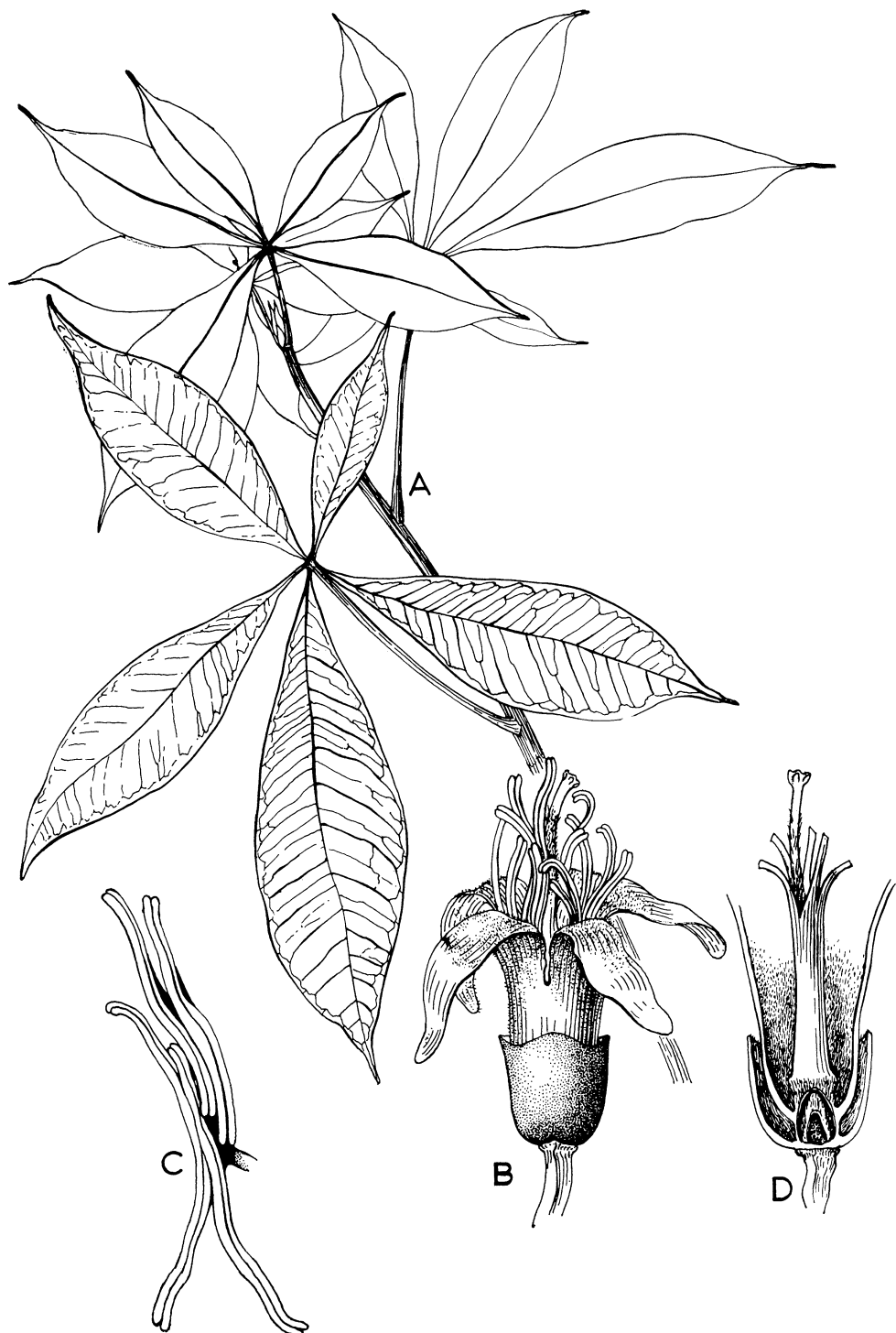


Figure 4. *CEIBA ROSEA* (Seem.) K. Schum.: A, leaves ($\times \frac{2}{3}$); B, flower ($\times \frac{2}{3}$); C, 2 anthers ($\times 2$); D, longitudinal section of flower, the anthers removed ($\times \frac{2}{3}$).

Tree, sometimes strangler epiphyte (according to *Allen 2924*), 10-22 m. tall, the trunk up to 40 cm. in diam., the branchlets thick, rimose and aculeate. *Leaves* 5- to 6-foliolate, glabrous, the petiole 5.5-11 cm. long; leaflets shortly petiolulate, the blade slightly obovate, acute and decurrent at the base, acuminate at the apex, 4.5-11.5 cm. long and 1.5-3.8 cm. wide, the nerves prominent especially beneath. *Flowers* grouped toward the apex of the branchlets, solitary or sometimes geminate, 6-9 cm. long, the pedicel thick, ca. 2 cm. long and 0.5-0.7 cm. broad, glabrous; calyx cupuliform, 2- to 5-lobulate, 2.2-2.8 cm. long and 2-3 cm. broad, glabrous outside, silky-villous inside, persistent; petals oblong, rounded, 6-9 cm. long and ca. 1.5 cm. wide, thick, old rose outside, creamy white inside, shortly tomentellous on both sides; staminal column 2.5-7 cm. long, the lower part cylindrical, thickened, 1-2.5 cm. long and ca. 1 cm. in diam., shortly tomentellous, the upper part conical, 1.5-4.5 cm. long and glabrous, the filaments 1.5-2 cm. long and bearing each 2 superposed anthers; anthers linear and slightly flexuose, 2-thecate, the thecae parallel, the upper anther ca. 1.8 cm. long and bilobulate at the apex, the lower one ca. 2.4-2.8 cm. long and deeply bifid at the base; ovary superior, oblong, 0.8-1.6 cm. high and 0.5-0.8 cm. in diam., shortly tomentellous; style more or less 5-angular, 3-4.5 cm. long, midway suddenly dilated upward, scatteringly and shortly velutinous near the base; stigma obscurely and bluntly lobulate. *Capsule* unknown.

Native to Panama, on hills and forested slopes.

COCLÉ: region north of El Valle de Antón, 800-1,000 m., *Allen 2924*; Cerro Pajita, 1,000-1,200 m., *P. & D. Allen 4193*. DARIEN: Cerro de Garagara, Sambu basin, 500-974 m., *Pittier 5673*. VERAGUAS: vicinity of Santa Fe, Cerro Tute, 2,500 ft., *Allen 4413*.

I have not seen the type specimen: Veraguas, Volcano of Chiriquí, *Seemann s.n.*

5. GYRANTHERA Pittier

GYRANTHERA Pittier, *Repert. Sp. Nov.* **13**: 318. 1914.

Trees, tall, deciduous, unarmed. *Leaves* petiolate, the stipules lanceolate, the blade compound-digitate, the leaflets 3-7 (articulate?), petiolulate, entire. *Inflorescences* terminal, unilaterally paniculate. *Flowers* large, hermaphrodite, actinomorphic or slightly zygomorphic, pedicellate, 3-bracteolate, the bracteoles very small and fugacious; receptacle eglandular; calyx tubiform, 2- or 3-lobulate, coriaceous, caducous; petals 5, adnate to the base of the staminal column, fleshy; stamens 5, the staminal column long, sometimes provided near the apex with 2 more or less regular whorls of staminodes, these simple, bifid or trifid, the anthers 5, subsessile to long-stipitate, dorsifixus, extrorse, elongated, spirally twisted, vermiform, 2-thecate, the thecae parallel, transversely septate (according to Pittier, *Jour. Wash. Acad. Sci.* **16**: 209. 1926), longitudinally dehiscent; ovary superior, sessile, 5-celled, the cells many-ovulate; style filiform, longer than the stamens; stigma briefly 5-parted. *Capsules* coriaceous or subligneous, unilocular, loculicidally dehiscent; seeds few, large, broadly winged, in 2 longitudinal, opposite series, with the wings alternately arranged, albuminous.



Figure 5. *GYRANTHERA DARIENENSIS* Pittier: A, leaves ($\times \frac{2}{3}$); B, flower, 1 petal removed ($\times \frac{2}{3}$); C, longitudinal section of ovary ($\times 2$).

A neotropical genus of only two species: *G. darienensis* Pittier, which is endemic in Panama, and *G. caribensis* Pittier (Bol. Com. Ind. Venezuela **2** (13): 432. 1921), which is native to Venezuela.

1. *GYRANTHERA DARIENENSIS* Pittier, Repert. Sp. Nov. **13**: 318. 1914.—Fig. 5.

Tree up to 25 m. high, the trunk straight, 0.40-1.20 m. in diam., the branchlets glabrous. *Leaves* 3- to 5-foliolate, the petiole terete, slightly enlarged at the base, 7-22 cm. long and glabrous, the stipules ca. 2 cm. long; leaflets with a petiolule 0.8-1.6 cm. long, the blade oblong-elliptic, sometimes slightly oblong-obovate, obtuse to subacute and narrowly decurrent at the base, bluntly caudate-acuminate at the apex, 11-21 cm. long and 3.5-9 cm. wide, coriaceous, glabrous above, very minutely reddish-lepidote to glabrous and with the nerves prominent beneath. *Flowers* ca. 16 cm. long, the pedicel 4-6 cm. long and ca. 0.5 cm. thick, shortly stellate-puberulous especially near the apex; calyx 2-lobulate, 7 cm. long and ca. 1.6 cm. in diam., the lobes more or less rounded and ca. 1.2 cm. long, shortly ferruginous-stellate-puberulous outside, silky-villous inside; petals oblong-linear, obtuse, 15 cm. long and ca. 2 cm. wide, white, stellate-puberulous especially outside; staminal column cylindric, 11-12.5 cm. long, stellate-puberulous to glabrous, without staminodes, the anthers almost sessile, the lower half adnate to the staminal column, ca. 5.5 cm. long; ovary subglobose, slightly 5-costate, ca. 4-5 mm. long and 5-6 mm. in diam., densely ferruginous-papillate; style up to 19-20 cm. long. *Capsule* unknown; seeds more or less angular, 2-2.6 cm. long, 1.7-2 cm. wide and 1-1.3 cm. thick, the testa dark brown, the wing more or less oblong, rounded to subacute, 12-13.5 cm. long and 3.5-4.5 cm. wide, brown and suberous.

SAN BLAS: high hills back of Puerto Obladia, alt. 50-200 m., *Pittier* 4322 (type); locality unknown, *Cooper III* 291.

6. *CAVANILLESIA* Ruiz & Pavon

CAVANILLESIA Ruiz & Pavon, Fl. Peruv. Chil. Prodr. 97, t.20. 1794.

Pourretia Willd. in L., Sp. Pl. ed.4[i.e. 5], **3**: 844. 1800, non Ruiz & Pavon, loc. cit. 46, t.7. 1794.

Trees, large, deciduous, unarmed, the trunk sometimes spindle-shaped. *Leaves* simple, petiolate, the stipules ovate, the blade entire or palmatilobate, sometimes cordate at the base. *Flowers* disposed in axillary, umbelliform cymes, hermaphrodite, actinomorphic, pedicellate, 3-bracteolate, the bractlets fugacious; receptacle eglandular; calyx campanulate, 5-lobate, coriaceous, tufted-pubescent outside, accrescent; petals 5, adnate to the base of the staminal column, fleshy, tufted-pubescent; stamens numerous, the staminal column cylindric, narrowed near the apex, divided into many pentadelphous filaments, the anthers 1-thecate, reniform, medifixus, extrorse, longitudinally dehiscent; ovary superior, sessile, 3- to 5-celled, the cells 2-ovulate; style simple and filiform; stigma capitate to 5-lobulate. *Capsules* samaroid, coriaceous, with 5 membranous wings much enlarged laterally, 3- to 5-celled, generally monospermous; seeds large, oblong-fusiform, the testa striate-rimose, surrounded by a weak pulp; cotyledons thick and contortuplicate.

A genus of only three species distributed from Panama to Peru; only one species occurs in Panama.

1. *CAVANILLESIA PLATANIFOLIA* (Humb. & Bonpl.) H. B. K., Nov. Gen. Sp. Pl. **5**: 306. 1823; Standley, Contr. U. S. Nat. Herb. **27**: pl. 48. 1928.—Fig. 6.

Pourretia platanifolia Humb. & Bonpl., Pl. Aequin. **2**: 162, t.133. 1817.

Tree up to 40-45 m. high, the trunk straight, generally somewhat swollen near the base, attaining 2.40 m. in diam., the crown rather small, loose and more or less rounded, the bark grayish, smooth and porous. *Leaves* grouped toward the tip of the branchlets, the petiole terete, enlarged at the base, 10-25 cm. long; blade ovate-cordate, 3- to 5- to 7-palmatilobate, seldom entire (young leaves?), up to 30 cm. long, the lobes ovate and shortly acuminate, glabrous or nearly so above, more or less densely puberulous and mostly with simple hairs on the lower surface, the nerves prominent especially beneath. *Flowers* precocious, the pedicel ca. 0.7-1.3 cm. long, shortly ferruginous-tomentellous; calyx campanulate, shortly 5-lobate, the lobes triangular and acute, ca 0.9 cm. long and 1 cm. wide, shortly ferruginous-tomentellous outside, silky-villous inside; petals linear-spatulate, long-adnate to the base of the staminal column and appendiculate just above, obtuse and somewhat asymmetric at the apex, ca. 2-2.5 cm. long and 0.6 cm. wide, reddish, ferruginous-tomentellous near the apex especially without; stamens reddish, the staminal column about half as long as the petals, glabrous, the filaments slender, the anthers ca. 1.5 mm. long; ovary subrotund-obovoid, 5-costate, ferruginous-tomentellous, 5-celled; style straight; stigma 5-lobulate. *Capsule* linear-fusiform, acute at both ends, 10-12 cm. long, the wings semicircular, 10-15 cm. high, 5.5-8 cm. wide, membranous and reticulate-veined, 5-celled; seeds large, oblong-linear and acute at both ends.

From Panama to Peru. Colloquial names reported in Panama are *cuipo*, *quipo*, *bongo* and *hamati*.

CANAL ZONE: Barro Colorado Island, *Carpenter 48*, *Kenoyer 640*, *Standley 40989*; near Gamboa, *Harvey 5272*; Las Cascadas Plantation, near Summit, *Standley 29505*; Red Tank, 4 miles north of Panama, *W. W. & H. E. Rowlee 407*. DARIEN: *Marraganti*, *R. S. Williams 998*; trail between Pinogana and Yavisa, ca. 15 m., *Allen 296*. PANAMA: around Alhajuella, Chagres Valley, alt. 30-100 m., *Pittier 3474*; Agricultural Experiment Station at Matias Hernández, *Pittier 6957*; Sabana de Dormisoló, near Chepo, alt. 60-80 m., *Pittier 4643*.

7. QUARARIBEA Aubl.

QUARARIBEA Aubl., Hist. Pl. Gui. Fr. 691. 1775

Gerberia Scop., Intr. Hist. Nat. 286. 1777.

Myrodia Sw., Nov. Gen. Sp. Pl. Prodr. 102. 1788.

Matisia Humb. & Bonpl., Pl. Aequin. **1**: 9. 1805.

Lexarza La Llave in La Llave & Lexarza, Nov. Veg. Descript. **2**: 12. 1825.

Trees or shrubs, unarmed. *Leaves* simple, petiolate, the blade generally entire, sometimes cordate at the base, penninerved or palminerved. *Flowers* axillary or oppositifolious, sometimes cauliflorous, solitary or fasciculate, hermaphrodite, actinomorphic, pedicellate, generally (2-)3-bracteolate, the bracteoles caducous or per-

sistent; receptacle eglandular; calyx campanulate or tubiform, irregularly dentate to lobate, sometimes longitudinally winged, coriaceous, lepidote or stellate-pubescent outside, accrescent; petals 5, adnate to the base of the staminal column, fleshy; stamens numerous, the staminal column elongate, undivided to 5-dentate or 5-lobate, the anthers sessile or subsessile near the apex of the staminal column or on the

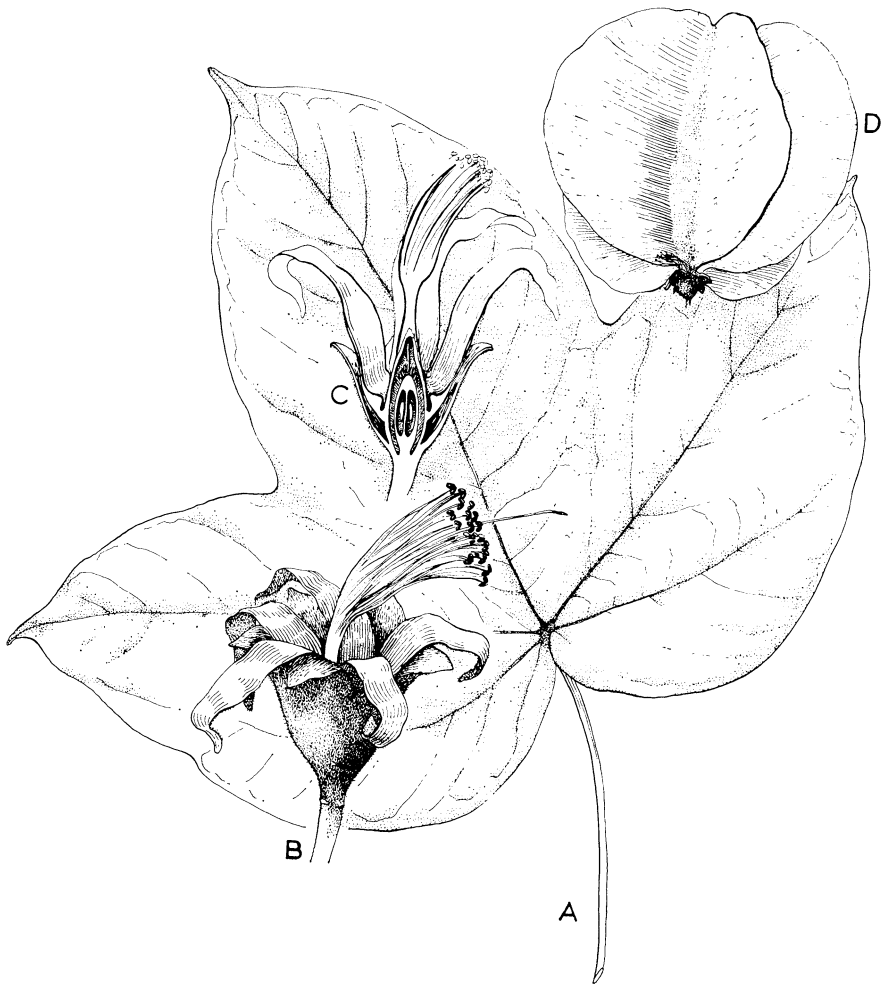


Figure 6. *CAVANILLESIA PLATANIFOLIA* (Humb. & Bonpl.) H. B. K.: A, leaf, upper surface ($\times \frac{1}{2}$); B, flower ($\times 1\frac{1}{2}$); C, id., longitudinal section ($\times 1\frac{1}{2}$); D, capsule ($\times \frac{1}{4}$).

lobes, 1-thecate, the thecae paired or not, free or sometimes more or less confluent at the apex, extrorse, longitudinally dehiscent; pollen porate or colporate, the sexine foveolate or ornate-reticulate; ovary subinferior, 2- or 4- or 5-celled, the cells 2-ovulate; style simple; stigma disk-shaped, sometimes shallowly sulcate or lobulate. *Capsules* drupaceous, indehiscent, the mesocarp coriaceous or fleshy-pulpy, 1- to 5-celled; seeds generally 1 in each cell; cotyledons fleshy and contortuplicate.

A neotropical genus of about 75 species of which six are found in Panama. In addition to these six, there are three collections (*Allen 3743*, *Dunlap 559*, *Pittier 4353*) "in fruit" which I am presently unable to determine specifically with certainty. Indeed, it is extremely difficult to determine *Quararibea* species when the flowers are lacking, the calyx being accrescent and in many cases changing considerably by the time of fruiting.

Like most contemporary authors, I agree, with Baillon (*Adansonia* **10**: 146-149. 1871) and Vischer (*Bull. Soc. Bot. Genève*, ser. 2, **11**: 199-210. 1919), that the genus *Matisia* Humb. & Bonpl. is a synonym of the genus *Quararibea* Aubl., the distinctive generic characters being quite variable (cf. for example, the number of cells in the ovary). Erdtman (*Pollen Morphology and Plant Taxonomy*, Angiosperms 76. 1952), however, in studying the pollen of about 30 species of the genus *Quararibea* sensu lato, has attracted attention to the fundamental differences between the pollen grains of the genus *Quararibea* (3-porate, sexine foveolate) and of the genus *Matisia* (3-colporate, sexine ornate-reticulate). An exhaustive comparative study both of the morphological characters and of the pollen grains of all the species will be necessary to decide whether *Matisia* should be separated or not.

- a. Calyx without longitudinal wings.
 - b. Leaves aequilateral; flowers bracteolate.
 - c. Leaves oblong-lanceolate, elliptic, oblong-obovate or slightly obovate, penninerved; ovary 2-celled.
 - d. Staminal column ca. 1.8-2 cm. long, divided into 5 antheriferous fleshy lobes ca. 2-3 mm. long1. *Q. ASTEROLEPIS*
 - dd. Staminal column ca. 5 cm. long, undivided, the upper part of ca. 7 mm. antheriferous2. *Q. PARVIFOLIA*
 - cc. Leaves cordate-suborbicular or ovate-cordate, 7- to 9-palminerved; ovary 5-celled3. *Q. CORDATA*
 - bb. Leaves oblique and much inaequilateral, 6- to 8-palmate-radiate-nerved; flowers ebracteolate; ovary 5-celled4. *Q. OBLIQUIFOLIA*
- aa. Calyx with 5 or 10 longitudinal wings; flowers bracteolate.
 - e. Leaves penninerved; calyx tubiform, 10-winged, 3.5-4 cm. long; petals 9.5-14 cm. long; staminal column 8-13 cm. long; ovary 4-celled; capsule (1-)2-celled5. *Q. PTEROCALYX*
 - ee. Leaves 3- to 5-palminerved; calyx tubiform-conical, 5-winged, 1.2-2 cm. long; petals 2-3 cm. long; staminal column ca. 3.5 cm. long; ovary 5-celled; capsule 5-celled6. *Q. BRACTEOLOSA*

1. *QUARARIBEA ASTEROLEPIS* Pittier, *Repert. Sp. Nov.* **13**: 316. 1914.—Fig. 7.

Quararibea stenophylla Pittier, loc. cit. 317. 114.

Quararibea Chodatii Vischer, *Bull. Soc. Bot. Genève*, ser. 2, **11**: 207, fig. 1(1), 2(1), 4, 5. 1919.

Trees 10-25 m. tall, the trunk angular and sometimes buttressed, the crown ovate-rounded or pyramidal, the bark grayish and smooth, the young branchlets fimbriate-lepidote. *Leaves* with a petiole 1-2.5 cm. long, often slightly arcuate, more or less densely fimbriate-lepidote; blade oblong-lanceolate to elliptic, sometimes slightly obovate, obtuse or rounded at the base, obtuse or caudate-acuminate at the apex, 7.5-25 cm. long and 3.5-10 cm. wide, subcoriaceous, slightly shining and glabrous to scatteringly fimbriate-lepidote above, more or less densely

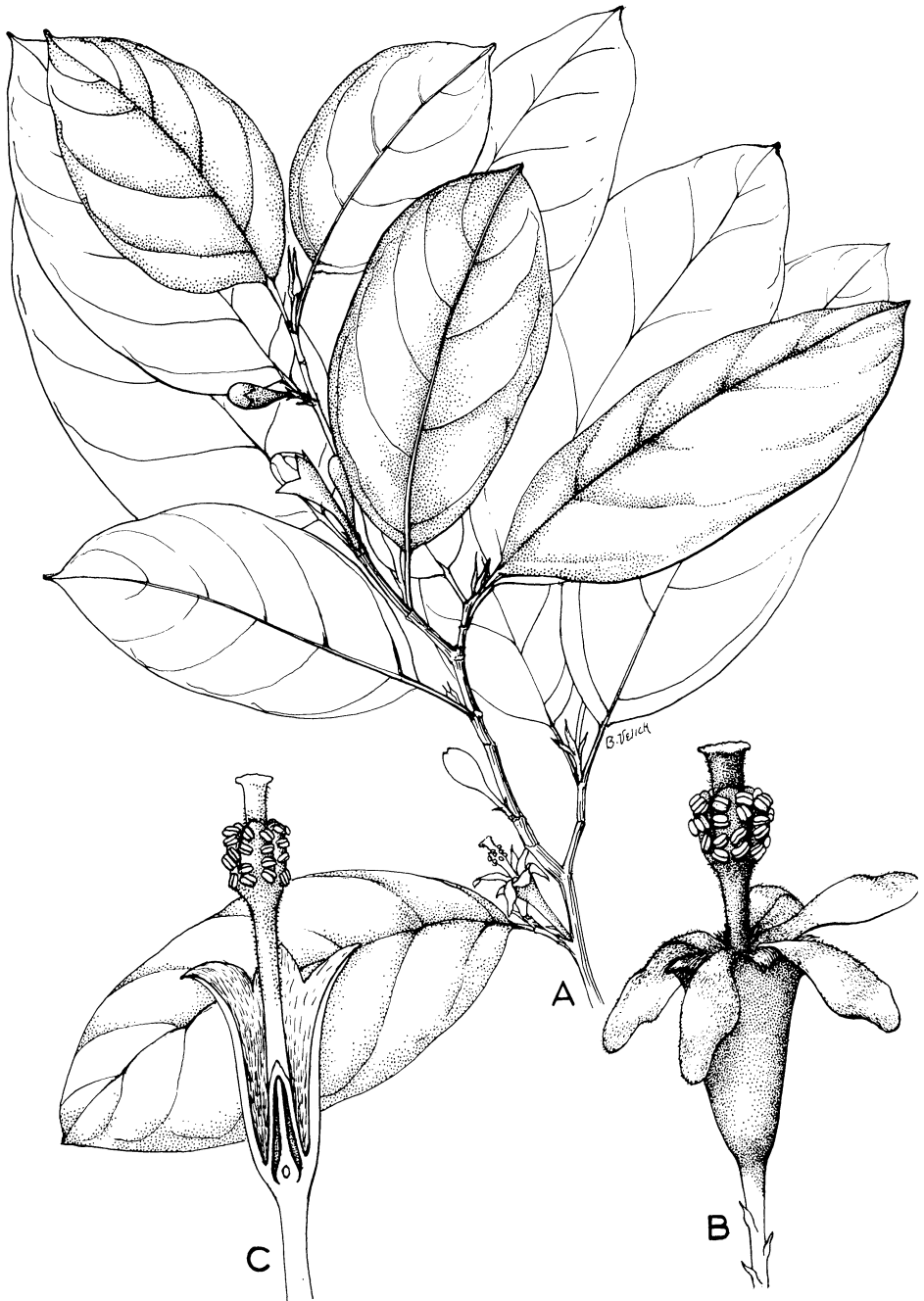


Figure 7. *QUARARIBEA ASTEROLEPIS* Pittier: A, flowering branch ($\times \frac{2}{3}$); B, flower ($\times \frac{2}{3}$); C, id., longitudinal section, the petals removed ($\times \frac{2}{3}$).

fimbrillate-lepidote beneath, seldom glabrous, penninerved, the nerves prominent beneath. *Flowers* mostly oppositifolious, solitary, the pedicel 1-1.5 cm. long and ca. 0.2 cm. wide, densely fimbrillate-lepidote, bracteolate, the bracteoles ca. 1.25-2 mm. long, densely fimbrillate-lepidote, long persistent; calyx campanulate-conical, (3-)4(-5)-lobulate, ca. 1.1-1.4 cm. long and 0.6-1 cm. wide, densely fimbrillate-lepidote without, appressed-sericeous within, the lobes triangular, more or less obtuse and ca. 3-4 mm. long; petals narrowly obovate, acute at the base, asymmetrically emarginate at the apex, 2-2.6 cm. long and 0.5-0.6 cm. wide, whitish, shortly stellate-puberulous on both sides; staminal column cylindrical, slightly enlarged near the apex, ca. 1.8-2 cm. long and 0.15 cm. wide, whitish, shortly and densely stellate-puberulous except the base, divided into 5 antheriferous, fleshy lobes ca. 2-3 mm. long, each lobe bearing 8 sessile anthers, the thecae paired, free or confluent at the apex and ca. 1.5 mm. long; ovary pyriform, glabrous, 2-celled; style filiform, slightly enlarged between the antheriferous lobes of the staminal column, up to 2.3 cm. long, densely fimbrillate-lepidote at the base to stellate-tomentellous at the apex; stigma shallowly bilobulate. *Capsule* ovoid to subglobose, mammillate, up to 2 cm. in diam., densely and minutely fimbrillate-lepidote, 1-celled, the fructiferous calyx cupuliform; seeds up to 1.3 cm. long.

Costa Rica and Panama, where it is called *guayabillo*.

CANAL ZONE: Barro Colorado Island, Donato trail, *Shattuck 1082*. DARIEN: headwaters Río Chico, 500-700 ft., *Allen 4632*; Río Chucunaque between El Real and Río Canalones, *Duke 4985*; vicinity of El Real, Río Tuira, trail between El Real and Pinogana, *Stern, Chambers, Dwyer, Ebinger 282*; vicinity of El Real, Río Tuira, 1 mile down from Pinogana near Quebrada Chuito, *Stern, Chambers, Dwyer, Ebinger 118*; vicinity of Campamento Buena Vista, Río Chucunaque above confluence with Río Tuquesa, near Quebrada Felix, *Stern, Chambers, Dwyer, Ebinger 944*; Boca de Pauarandó, on Sambú River, alt. 20 m., *Pittier 5575* (type). PANAMA: near Chepo, *Kluge 58*; vicinity of El Llano, *Duke 5815*.

2. *QUARARIBEA PARVIFOLIA* Standley, Field Mus. Nat. Hist., Bot. Ser. **4**: 232. 1929.

Tree, small and bushy, the young branchlets shortly stellate-puberulous. *Leaves* shortly petiolate, the petiole 3-8 mm. long, shortly stellate-puberulous or fimbrillate-lepidote, the stipules linear, 3-4 mm. long, shortly stellate-puberulous; blade oblong-lanceolate to obovate-oblong, rounded or obtuse to more or less acute at the base, bluntly acuminate at the apex, 5-19 cm. long and 2-6 cm. wide, membranous, the margins entire to slightly undulate, the upper surface slightly shining and glabrous or nearly so, the lower surface scatteringly fimbrillate-lepidote along the nerves, the nervation penninerved and prominent beneath. *Flowers* axillary, solitary, the pedicel slender, 0.6-4 cm. long, fimbrillate-lepidote, bracteolate, the bracteoles lanceolate-subulate, ca. 4-6 mm. long, fimbrillate-lepidote outside, long persistent; calyx tubiform-conical, 5-lobulate, ca. 14-15 mm. long and 4-5 mm. broad, fimbrillate-lepidote without, appressed-villous within, the lobes rounded and ca. 2 mm. long; petals more or less twice as long as the calyx, white, stellate-arachnoid without, glabrous within; staminal column cylindrical, ca. 5 cm. long, undivided, the upper part of ca. 7 mm. antheriferous, glabrous; anthers numerous, sessile; ovary more or less pyriform, ca. 1.5 mm. long

and 1.5 mm. in diam. at the base, sericeous, 2-celled(?); style sericeous near the base, elsewhere glabrous. *Capsule* unknown.

A still imperfectly understood species, known only from the Province Limon in Costa Rica and from the Province Bocas del Toro in Panama.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater 99*.

3. *QUARARIBEA CORDATA* (Humb. & Bonpl.) Vischer, Bull. Soc. Bot. Genève, ser. 2, **11**: 206, fig. 1(7), 2(3), 3(4). 1919

Matisia cordata Humb. & Bonpl., Pl. Aequin. **1**: 10, pl. 2a-2b. 1805.

Tree up to 30 m. high, the trunk straight and cylindric, the branches horizontal, the bark cinereous and rugose. *Leaves* long-petiolate, the petiole terete, slightly enlarged at both ends, 7.5-20 cm. long and ca. 2.5-4 mm. thick, glabrous or nearly so; blade cordate-suborbicular or ovate-cordate, 18-21 cm. long and 13-24 cm. wide, chartaceous to subcoriaceous, glabrous or nearly so above, glabrous to shortly stellate-puberulous beneath, 7- to 9-palminerved, the nervation prominent beneath. *Flowers* 3- to 9-fasciculate on the branches, the pedicel terete, 2- or 3-bracteolate; calyx irregularly 2- to 5-lobate, shortly stellate-tomentellous without, appressed-sericeous within, the lobes ovate and acute; petals obovate-oblong, cuneate at the base, rounded at the apex, about half again as long as the calyx, 2 petals a little smaller than the other 3, pale pink; staminal column longer than the petals, 5-lobate, the antheriferous lobes about $\frac{1}{3}$ of the length of the staminal column, each lobe bearing about 12 anthers; ovary 5-celled; style filiform, 5-angular at the base, shorter than the stamens, puberulous; stigma peltate-capitate. *Capsule* leathery, globose, mammillate, ca. 7.5 cm. long and 6-6.5 cm. in diam., shortly appressed-tomentellous, 2- to 5-celled, 2- to 5-seeded, the fructiferous calyx cupuliform, ca. 2.5 cm. long and 4.5 cm. in diam.; seeds up to 5 cm. long, 2 cm. wide and 1.8 cm. thick.

Panama and northwestern South America (Colombia to Peru); the *sapote* is sometimes cultivated for its edible fruits.

COCLÉ: region north of El Valle de Antón, 1,000 m., *Allen 3729*. DARIEN: Río Pirre, ca. 10 mi. south of El Real, *Duke 5471*.

4. *QUARARIBEA OBLIQUIFOLIA* (Standley) Standley, Field Mus. Nat. Hist., Bot. Ser. **18**: 683. 1937.

Matisia obliquifolia Standley, loc. cit. **4**: 232. 1929.

Matisia asymmetrica Cuatr., Rev. Acad. Colomb. Cienc. **7**: 49. 1946.

Quararibea asymmetrica (Cuatr.) Cuatr., Lloydia **11**: 191. 1948.

Tree 12-15 m. high, the trunk 20-25 cm. in diam., the pubescence of stellate hairs, the young branchlets puberulous to tomentellous. *Leaves* long-petiolate, the petiole slender, subterete, 3.5-7 cm. long, puberulous; blade oblique-obovate to oblique-elliptic, much inaequilateral and cordate at the base, obtuse or rounded at the apex, 17-30 cm. long and 8-23 cm. wide, subcoriaceous, the margins slightly

and irregularly undulate, the upper surface glabrous or scatteringly puberulous along the nerves, the lower surface sparsely puberulous, 6- to 8-palmate-radiate-nerved, the nervation reticulate and prominent beneath. *Flowers* cauliflorous, fasciculate, the pedicel slender, 0.8-2 cm. long, sparsely and shortly puberulous, ebracteolate; calyx campanulate, 5-lobulate, 12-15 mm. long and ca. 9 mm. broad, sparsely and shortly puberulous without, appressed-sericeous within, the lobes more or less triangular, obtuse and ca. 3 mm. long; petals obovate or elliptic, abruptly unguiculate, obtuse or rounded or seldom emarginate at the apex, 15-20 mm. long and 9-10 mm. wide, white, glabrous at the base to tomentellous on the upper part outside, glabrous inside; staminal column ca. 4 cm. long, white, glabrous, divided into 5 antheriferous lobes 10-15 mm. long, each lobe bearing 6 sessile anthers; ovary shortly tomentellous, 5-celled; style somewhat longer than the staminal column, puberulous; stigma capitate and briefly lobulate. *Capsule* ovoid or subglobose, subcoriaceous, up to 4 cm. in diam., shortly puberulous, 5-celled, each cell 1-seeded.

Costa Rica, Panama and Colombia. This species is very closely related to the 3 following species: *Q. inaequalis* (Dugand) Garcia-Barriga & Hernandez (*Matisia inaequalis* Dugand, *Caldasia* **3**: 359. 1945), *Q. inaequilatera* Cuatr. (*Lloydia* **11**: 187. 1948), and *Q. Uribei* Garcia-Barriga & Hernandez (*Mutisia* **2**: 1. 1952), and, when more material is available for study, all these species may perhaps be reduced to synonymy!

BOCAS DEL TORO: region of Almirante, Daytonia Farm, *Cooper* 435 (type).

5. *QUARARIBEA PTEROCALYX* Hemsl., *Diagn. Pl. Nov. Mex. Centr.-Am.* **4**. 1878, *Biol. Centr.Am.* **1**: 127, *t.10.* 1879; Standley, *Jour. Arnold Arb.* **11**: 124. 1930.

Tree 6.5-13 m. tall, the trunk up to 22 cm. in diam., the pubescence of stellate hairs (sometimes of tufted hairs?), the young branchlets whitish-gray-tomentellous to puberulous. *Leaves* with a terete petiole 1.5-2.5 cm. long, often slightly geniculate near the middle, tomentellous especially when young; blade elliptic to ovate-elliptic, rounded and sometimes unequal at the base, rounded or caudate-obtuse or long-acuminate at the apex, 14-30 cm. long and 6-13.5 cm. wide, subcoriaceous, the margins sometimes slightly recurved, bright and glabrous or nearly so above, whitish-gray-tomentellous beneath, penninerved, the nerves prominent beneath. *Flowers* axillary or oppositifolious, solitary, the pedicel short, narrowly 10-winged, ca. 1-1.3 cm. long, shortly tomentellous, bracteolate, the bracteoles ca. 2.5 mm. long, shortly tomentellous, long persistent; calyx tubiform, longitudinally 10-winged, 3-lobate, 3.5-4 cm. long and ca. 1.2 cm. wide, shortly tomentellous without, appressed-sericeous within, the lobes irregular, obtuse to rounded and ca. 1 cm. long; petals linear-spatulate, emarginate, 9.5-14 cm. long and 1.2-1.4 cm. wide, white, sparsely puberulous on both sides; staminal column cylindric, somewhat 5-angular, slightly enlarged and shortly 5-dentate at the apex, 8-13 cm. long and ca. 0.3 cm. wide, shortly tomentellous except the base, the upper part of ca. 2 cm. antheriferous; anthers numerous, subsessile, the thecae paired, free and parallel or more or less confluent at the apex, ca. 1.5 mm. long;

ovary narrowly pyriform, ca. 5 mm. long and 3 mm. in diam. at the base, shortly tomentellous, 4-celled; style filiform, slightly enlarged near the apex, as long as the staminal column, shortly tomentellous; stigma disk-shaped, ca. 4 mm. in diam. *Capsule* subglobose, mammillate, ca. 3.2-3.8 cm. long and 3.6-4.5 cm. in diam., tomentellous, (1-)2-celled, each cell 1-seeded, the fructiferous calyx cupuliform and ca. 4-5 cm. in diam.; seeds 2-2.6 cm. long.

Panama, in forests in swampy ground.

CANAL ZONE: Barro Colorado Island, *Aviles X7, Bangham 581, Shattuck 1018*; Frijoles Station, *Hayes 137* (type); along the Trinidad River, near sea level, *Pittier 4010*. DARIEN: 1-3 mi. southeast of Santa Fe on Pan-Am. Highway, *Duke 4100*; 0-4 mi. up Río Sabana from Santa Fe, *Duke 4174, 4175*; headwaters Río Chico, 500-750 ft., *Allen 4631*; vicinity of Paya, Río Paya and Palo de las Letras, *Stern, Chambers, Dwyer, Ebinger 212*; El Real, *Duke 4843*. PANAMA: Tocumen, *Dwyer 4192*; Chepo, *Kluge 53*; vicinity of Arenoso, lower Río Trinidad, 26-50 m., *Seibert 595*.

6. *QUARARIBEA BRACTEOLOSA* (Ducke) Cuatr., *Lloydia* **11**: 191. 1948.

Matisia bracteolosa Ducke, Bol. Tecn. Inst. Agron. Norte, Belem **4**: 17. 1945.

Quararibea Schultesii Cuatr., Bot. Mus. Leafl., Harv. Univ. **14**: 31. 1949.

Matisia Schultesii (Cuatr.) Cuatr., *Phytologia* **4**: 479. 1954.

Shrub to medium-sized tree up to 15 m. high, the pubescence chiefly of stellate hairs, the young branchlets densely ferruginous-puberulous. *Leaves* with a petiole 1-3 cm. long, densely ferruginous-puberulous, the stipules lanceolate, ca. 9 mm. long and 2.5 mm. wide, densely puberulous; blade oblong-obovate, seldom obovate, rounded to cuneate or sometimes obtuse at the base, acute to acuminate at the apex, 10-32 cm. long and 4.5-15 cm. wide, membranous, the upper surface sparsely puberulous and with simple and stellate hairs, the lower surface more or less densely puberulous and with chiefly stellate hairs, 3- to 5-palminerved at the base, the nervation reticulate and prominent beneath. *Flowers* oppositifolious, solitary, the pedicel flexuose, 1.2-2 cm. long (the fructiferous pedicel up to 5 cm. long), tomentellous, the bracteoles inserted just below the calyx, lanceolate to broadly lanceolate, ca. 1-1.5 cm. long and 0.2-0.8 cm. wide, tomentellous, rather long persistent; calyx tubiform-conical, 5-lobulate, provided with 5 longitudinal, well-developed, membranous wings, 1.2-2 cm. long, tomentellous without, appressed-whitish-sericeous within; petals narrowly spatulate, long-unguiculate, rounded and reflexed or spreading at the apex, 2-3 cm. long and 0.5-0.8 cm. wide, white, glabrous on the lower half to tomentellous on the upper half outside, glabrous inside; staminal column cylindric, ca. 3.5 cm. long, glabrous, divided into 5 antheriferous lobes ca. 0.4-0.8 cm. long, each lobe bearing 6 sessile anthers, the thecae free and ca. 1.5 mm. long; ovary transverse-elliptic, ca. 2-2.5 mm. long and 3 mm. in diam., shortly tomentellous, 5-celled; style more or less as long as the staminal column or somewhat longer, puberulous; stigma capitate. *Capsule* surrounded by the much accrescent calyx, ovoid, 2.5-4 cm. long and 1.7-2 cm. in diam., shortly puberulous, 5-celled, the cells 1-seeded, the fructiferous calyx cupuliform, 1.6-2.3 cm. long and 2-2.5 cm. broad; seeds oblong, 1.1-1.8 cm. long and ca. 0.4-0.5 cm. broad.

From Panama to Peru and Amazonian Brazil, along rivers.

BOCAS DEL TORO: region of Almirante, Daytonia Farm, Cooper 452. DARIEN: Caná-Cuasi trail (Camp 2), Chepigana District, 2,000 ft., M. E. & R. A. Terry 1447; Río Tucuti, on ridge upstream ca. 2 hrs. piragua above Tucuti, Duke 5258. PROVINCE UNKNOWN: M. E. Terry s. n.

8. HAMPEA Schlecht.

HAMPEA Schlecht., *Linnaea* **11**: 371. 1837.

Shrubs or trees, unarmed. *Leaves* simple, petiolate, the stipules narrowly linear, the blade entire or lobate, sometimes auriculate-appendaged at the base, palmi-nerved. *Inflorescences* axillary, fasciculate or flowers solitary. *Flowers* hermaphrodite or imperfect, pubescent and generally with tufted hairs, pedicellate, 3-bracteolate, the bractlets adnate to the calyx and caducous; receptacle eglandular; calyx cupuliform or campanulate, truncate or lobate, coriaceous, accrescent; petals 5, connate at the base into a tube coalescent with the staminal column, fleshy; stamens numerous, the staminal column divided into many unequal filaments; anthers 1-thecate, hippocrepiform, medifixus, extrorse, longitudinally dehiscent; pollen porate, the sexine uniform, tegillate and spinulate; ovary superior, sessile, 3-celled, none or rudimentar in the staminate flowers, the cells few-ovulate; style simple; stigma 1- to 3-divided and revolute. *Capsules* coriaceous or subligneous, loculicidally 3-valvate, the valves glabrous or not within; seeds few, the funicle expanded into a fleshy aril; cotyledons fleshy and contortuplicate.

A genus of about 15 species of Central America and Colombia; one species occurs in Panama.

1. HAMPEA APPENDICULATA (J. D. Sm.) Standley, *Jour. Wash. Acad. Sci.* **17**: 395. 1927.—Fig. 8

Hampea integerrima Schlecht. var. *appendiculata* J. D. Sm., *Bot. Gaz.* **27**: 331. 1899.

Hampea panamensis Standley, *Jour. Wash. Acad. Sci.* **17**: 396. 1927, *Jour. Arnold Arb.* **11**: 124. 1930.

Shrub or medium-sized tree up to 15 m. tall, the young branches covered with a short tomentum of ferruginous or ochraceous, tufted hairs. *Leaves* with tufted hairs, the petiole slender, 1.2-11 cm. long, shortly tomentellous; blade ovate to broadly ovate, sometimes more or less elliptic, truncate to subcordate or sometimes obtuse and auriculate-appendaged at the base, the appendages rounded and ca. 1-4 mm. long, acuminate to caudate-acuminate at the apex, 9-21 cm. long and 6-16 cm. wide, the margins entire or somewhat undulate, sparsely and shortly puberulous above especially when young, generally shortly tomentellous beneath, 5- to 7-palminerved, the nerves prominent beneath. *Flowers* solitary or fasciculate, either hermaphrodite or staminate, the pedicel of the staminate flowers 0.5-1.5 cm. long, that of the hermaphrodite ones usually longer and to 2-5 cm. long, slender, covered with a short tomentum of tufted hairs; bracteoles liguliform, 0.3-2 cm. long and ca. 1 mm. wide, tomentellous; calyx cupuliform-campanulate, irregularly 3- to 4-lobate, 7-9 mm. long and 9-12 mm. wide, covered with a short tomentum of tufted hairs without, glabrous within; petals 16-18 mm. long, white, creamy white or yellow, the corolla-tube ca. 3-4 mm. long and glabrous, the lobes obliquely and in-



Figure 8. *HAMPEA APPENDICULATA* (J. D. Sm.) Standley: A flowering branch ($\times \frac{2}{3}$); B, staminate flower ($\times 2$); C, id., longitudinal section ($\times 2$); D & E, capsules ($\times \frac{2}{3}$).

aequilaterally elliptic, unguiculate, emarginate and unilaterally apiculate at the apex, 13-14 mm. long and ca. 8 mm. wide, tomentellous outside, glabrous or nearly so and glandular-dotted within; stamens more numerous in the staminate flowers than in the hermaphrodite ones, about 22-40, the staminal column ca. 3-4 mm. long, barbate at the apex, not hollow in the staminate flowers, the filaments slender, unequal, 8-10 mm. long and glabrous; ovary more or less oblong, ca. 2 mm. long and 1.25 mm. in diam., densely papillate; style filiform; stigma slightly 3-divided. *Capsule* subligneous, very shortly stipitate, ellipsoid, 3-angular, subapiculate to rounded at the apex, 1.7-2.5 cm. long and 1.1-1.2 cm. in diam., covered with a short tomentum of tufted hairs outside, glabrous within except along the hispid sutures; seeds 1 or 2 in each cell, ellipsoid, 7-10 mm. long and 4.5-6 mm. wide, the testa blackish-brown with paler nerves, the aril caplike, covering less than half of the seed.

Costa Rica and Panama.

BOCAS DEL TORO: Changuinola Valley, *Dunlap 227*; Almirante region, *Cooper & Slater 8, 15* (type); region of Almirante, Buena Vista Camp on Chiriquí trail at 3,000 ft., *Cooper 599*; Water Valley, *von Wedel 779*; vicinity of Chiriquí Lagoon, *von Wedel 1315*; Río Cricamola, between Finca St. Louis and Konkintoö, ca. 10-50 m., *Woodson, Allen & Seibert 1898, 1922*. CANAL ZONE: Barro Colorado Island, *Aviles 11, Bangham 520, Salvoza 935, 985, Shattuck 238*. CHIRIQUÍ: Quebrada Velo, vicinity Finca Lerida, alt. 5,000 ft., *Allen 4670*; Bajo Mono-Robalo trail, Western slopes of Cerro Horqueta, alt. 5,000-7,000 ft., *Allen 4779*; Boquete region, Cerro Horqueta-cloud forest, alt. 6,500 ft., *Ch. & W. von Hagen 2138*. COCLÉ: north rim of El Valle, *Allen 1908*; El Valle, *Dwyer 1924*.

9. OCHROMA Sw.

OCHROMA Sw., *Nov. Gen. Sp. Pl. Prodr.* 97. 1788.

Trees, unarmed, the trunk sometimes buttressed, the wood very light. *Leaves* simple, petiolate, the stipules broadly ovate, the blade generally cordate, palmi-nerved, with tufted hairs. *Flowers* grouped toward the tip of the branchlets, axillary, solitary, hermaphrodite, actinomorphic, pedicellate, 3-bracteolate, the bracteoles fugacious; receptacle eglandular; calyx tubiform, slightly funnel-shaped, 5-lobate and with unequal lobes, coriaceous, with tufted hairs outside, deciduous; petals 5, adnate to the base of the staminal column, fleshy, with tufted hairs outside; stamens numerous, the staminal column elongate, shortly 5-lobate, antheriferous from about the middle to the apex; anthers 1-thecate, sessile, confluent, anfractuose, extrorse, longitudinally dehiscent; ovary superior, sessile, 5-celled, the cells many-ovulate; style filiform; stigma exceeding slightly the staminal column, spirally 5-sulcate. *Capsules* subligneous, elongate, loculicidally 5-valvate, densely lanate within; seeds numerous, small, pyriform, imbedded in the hairs of the capsule; cotyledons broad, the margins involute.

A neotropical, monotypic genus distributed from southern Mexico to Bolivia.

1. OCHROMA PYRAMIDALE (Cav. ex Lam.) Urban, *Repert. Sp. Nov. Beih.* 5: 123. 1920.—Fig.9.

Bombax pyramidale Cav. ex Lam., *Encycl. Méth. Bot.* 2: 552. Apr. 1788.
Ochroma lagopus Sw., *Nov. Gen. Sp. Pl. Prodr.* 98. Jun.-Jul. 1788.

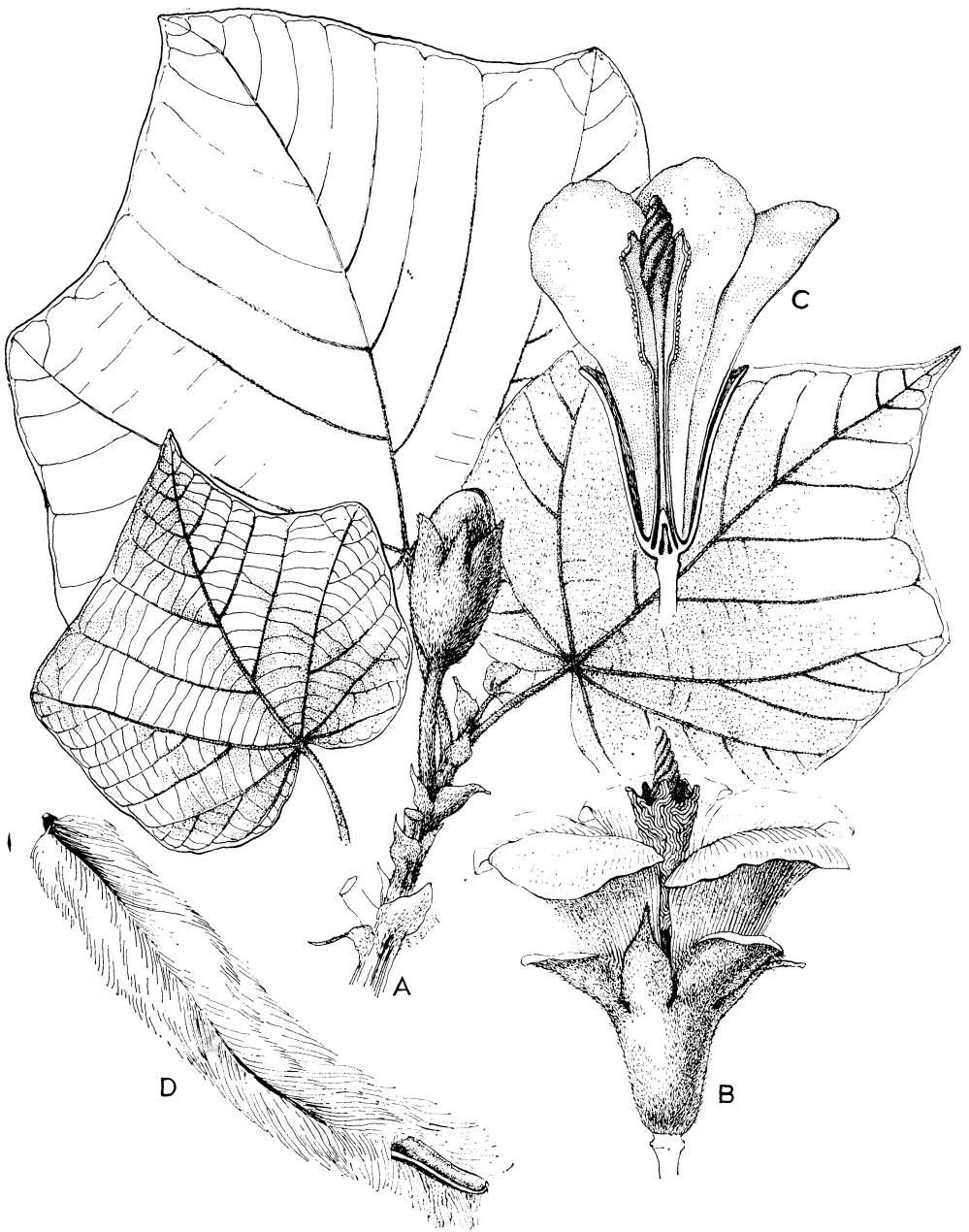


Figure 9. *OCHROMA PYRAMIDALE* (Cav. ex. Lam.) Urban: A, flowering branch ($\times \frac{1}{2}$); B, flower ($\times \frac{1}{2}$); C, id., longitudinal section ($\times \frac{1}{2}$); D, dehiscent capsule and kapok ($\times \frac{1}{2}$).

- Ochroma tomentosa* Humb. & Bonpl. ex Willd., Enum. Pl. Hort. Reg. Bot. Berol. 695. 1809.
Bombax angulata Sesse & Moc., Fl. Mex. 169. 1895.
Ochroma concolor Rowlee, Jour. Wash. Acad. Sci. **9**: 161. 1919.
Ochroma limonensis Rowlee, loc. cit. 163. 1919.
Ochroma grandiflora Rowlee, loc. cit. 163. 1919.
Ochroma velutina Rowlee, loc. cit. 164. 1919.
Ochroma bicolor Rowlee, loc. cit. 165. 1919.
Ochroma boliviana Rowlee, loc. cit. 166. 1919.
Ochroma obtusa Rowlee, loc. cit. 166. 1919.
Ochroma peruviana Johnston, Contr. Gray Herb. Harv. Univ. **31**: 95. 1928.
Ochroma pyramidale var. *concolor* (Rowlee) Schultes, Bot. Mus. Leaflet, Harv. Univ. **9**: 177. 1941.
Ochroma tomentosa var. *ibarrensis* Benoist, Bull. Soc. Bot. Fr. **88**: 439. 1941.
Ochroma lagopus var. *bicolor* (Rowlee) Standley & Steyerl., Field Mus. Nat. Hist., Bot. Ser. **23**: 62. 1944.
Ochroma lagopus var. *occigranatisensis* Cuatr., Phytologia **4**: 480. 1954.
Ochroma pyramidale var. *bicolor* (Rowlee) Brizicky, Trop. Woods **109**: 63. 1958.

Tree 10-30 m. tall, the trunk up to 0.90-1.80 m. in diam., sometimes buttressed, the crown large and spreading, the bark smooth and grayish, the branchlets tufted-puberulous. *Leaves* with a thick petiole 3-40 cm. long, tomentellous to glabrescent, the stipules ca. 1.5 cm. long and 1 cm. wide; blade broadly ovate, ovate-angulate to ovate and 3- to 5-sublobate, the base generally deeply cordate, sometimes more or less truncate, the apex or the central lobe obtuse, acute or acuminate, 10-40 cm. long and 11-35 cm. wide, chartaceous, the margins generally undulate, the upper surface tomentellous especially when young to glabrous, the lower surface shortly tomentellous, 7(-9)-palmi-nerved, the nervation prominent beneath. *Flowers* with a pedicel 4-11 cm. long and ca. 0.6-1 cm. in diam., tomentellous; calyx 8-11.5 cm. long, tomentellous outside, sericeous-villous inside, the lobes 2.5-4 cm. long, 2 lobes triangular and acute, the other 3 flabelliform; petals obovate-spatulate, 11-15 cm. long and ca. 5 cm. wide, whitish, puberulous on the upper part outside, glabrous or nearly so inside; staminal column cylindrical, enlarged at the base, 10-12.5 cm. long, glabrous, the antheriferous part ca. 5-5.5 cm. long; ovary conical, 5-angulate, ca. 13 mm. long and 7 mm. in diam. at the base, tomentellous at the apex; style ca. 9-10 cm. long, puberulous near the base; stigma ca. 3.5 cm. long. *Capsule* oblong-fusiform, 5-angulate, 16-25 cm. long and ca. 2.5 cm. in diam., the valves black and glabrous; seeds ca. 5 mm. long; kapok pale brown.

Frequent in clearings and second-growth forests; often cultivated, sometimes planted for shade.

Balsa is a rapidly growing tree known for its very lightweight wood which is used for life rafts, insulating, toys, etc.; the kapok is suitable for filling pillows and mattresses.

BOCAS DEL TORO: Changuinola Valley, *Cooper & Slater* 77; locality unknown, *von Wedel* 459. CANAL ZONE: vicinity of Fort Sherman, *Standley* 31015; near Fort Randolph, *Standley* 28733; Gatun Station, *Hayes* 123; Barro Colorado Island, *Aviles* 44, *L. H. & E. Z. Bailey* 151, *Bangham* 531, *Kenoyer* 441, *Shattuck* 526, *Wetmore & Abbe* 47; Gamboa, *Standley* 28497; Obispo, *Standley* 31711; between Summit and Gamboa, *J. M. & M. T. Greenman* 5219; vicinity of Miraflores, *P. & G. White* 41; between Miraflores and Corozal, alt. 20-30 m., *Pittier* 2511; Ancon Hill, *Bro. Celestine* 119, *Rowlee & Stork* 802; Balboa, *Standley* 26976;

road K9, alt. 270 ft., *Stern & Chambers* 42; Chiva-Chiva road, *Harvey* 5254; locality unknown, *Verner s. n.* CHIRIQUÍ: Progresso, *Cooper & Slater* 253. COLÓN: Juan Mina, Río Chagres, 25 m., *Allen* 4201. DARIEN: vicinity of Pinogana, 20 m., *Allen* 4312. PANAMA: Bella Vista, *Macbride* 2761; Capiri River, west of Panama City, *Baker* 804; along road between Panama and Chepo, *Dodge, Hunter, Steyermark & Allen* 16633; Taboga Island, *Standley* 28006; San José Island, *Johnston* 470, 511. VERAGUAS: vicinity of Santa Fe, Río Santa María, 1,000 ft., *Allen* 4421. PROVINCE UNKNOWN: *W. W. & H. E. Rowlee* 4, *R. S. Williams* 607.

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