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A REVISION OF *TABEBUIA* (BIGNONIACEAE) IN CENTRAL AMERICA

ALWYN H. GENTRY

Gentry, A. H. (Department of Botany, University of Wisconsin, Madison. Present address: Department of Biology, Washington University, St. Louis). A revision of *Tabebuia* (Bignoniaceae) in Central America. *Brittonia* **22**: 246–264. 1970.—Six species are recognized, one of which, *Tabebuia neochrysantha*, is described as new. The species are delimited primarily on the basis of herbarium material, supplemented by field observation. A key is included, as well as distribution maps, and morphological, anatomical, and ecological data for each species.

The genus *Tabebuia* Gomes ex DC. is composed of neotropical trees and shrubs. The history of its generic delimitations has recently been reviewed by Gentry (1969). Although well known for its showy flowers and valuable wood, the genus has had only one comprehensive taxonomic treatment, that of de Candolle (1845). The only Central American summary (Hemsley, 1882) is now badly out of date, although the regional floras of Standley (1926 to 1938), Allen (1956, 1964), and others have included perfunctory accounts of the taxa in some areas. The six species of *Tabebuia* treated here also extend into northern South America.

This study is based primarily on morphological characteristics exhibited by herbarium specimens, although supplementary field work in Central America has been of great value. Approximately 1000 specimens were examined from the following herbaria: DS, F, LA, MEXU, MICH, MO, MSC, NA, NY, TEX, US, WIS.

TAXONOMIC CHARACTERS

Habit. Growth form serves as an important distinguishing character between shrubby *T. palustris* and the rest of the species which are trees with straight trunks.

Bark. With experience, one can distinguish all six Central American species by characteristics of the mature bark. This is thin, smooth, and light gray in *T. palustris*; light gray and smooth, but slightly ridged in *T. palmeri*; similar but tending to flake, and with at least a trace of long, widely spaced vertical furrows in *T. chrysantha*; the vertical furrows are more pronounced in *T. guayacan*. The bark of *T. neochrysantha* is very distinctive having flat-surfaced light gray ridges alternating with darker furrows, and in *T. rosea* it is darker and rougher with a distinct pattern of ridges.

Wood. Wood provides some excellent taxonomic characters. That of *T. rosea* and *T. palustris* is of medium weight and light tan in color. The other four species have dark olive-brown and very heavy wood. *Tabebuia palmeri*, *T. guayacan*, *T. chrysantha*, and *T. neochrysantha* have characteristic lapachol deposits in their vessels, hence their designation as part of the "lapacho group" (Record & Hess, 1940).

Leaves. The number of leaflets per leaf distinguishes *T. palustris* (one or three leaflets) and *T. guayacan* (often with seven leaflets) from the remainder of the rather uniformly 5-foliolate Central American species. Leaflet shape varies from lanceolate to obovate, and often helps to characterize a species. Length to width ratios separate the usually narrow leaflets of *T. palustris* and *T. guayacan* from the wider ones of the other species. The elongated lateral petiolule is distinctive in *T. guayacan*. Serrated leaf margins, a highly variable character, must be used with

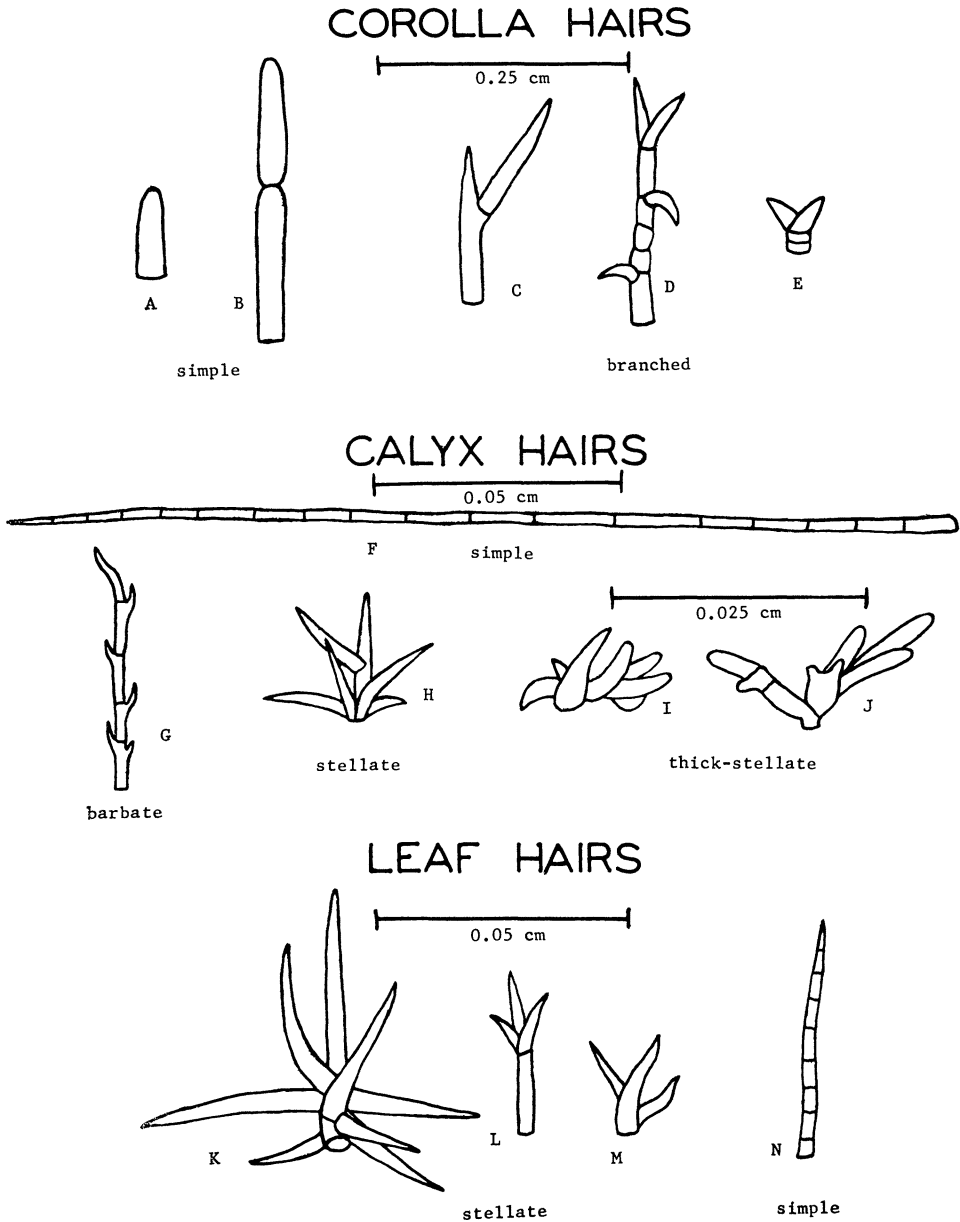


FIG. 1. Hair types of *Tabebuia*. A-E, corolla hairs. A, *T. palmeri* (interior); B, *T. chrysantha*; C, *T. chrysantha*; D, *T. guayacan*; E, *T. palmeri* (exterior). F-J, calyx hairs. F, *T. neochrysantha*; G, *T. chrysantha*; H, *T. chrysantha*; I, *T. guayacan*; J, *T. palmeri*. K-N, leaf hairs. K, *T. chrysantha*; L, *T. guayacan*; M, *T. guayacan*; N, *T. palmeri*.

extreme caution. Nevertheless, serrations, most common in *T. chrysantha* and always absent in *T. palustris* and *T. rosea*, are useful in combination with other characters. The varnished, subcoriaceous leaflets of *T. rosea* and *T. palustris* differ from those of other more membranous-leaved types.

Leaf Indumentum. Leaf pubescence is of great taxonomic importance (Fig. 1). Leaves of *T. neochrysantha* are densely covered beneath with 6- to 10-branched stellate hairs (Fig. 1, K), while *T. chrysantha* bears 6- to 9-branched stellate hairs over the whole leaf surface but these are much less dense. *T. guayacan* has mostly 3-branched stellate hairs (Fig. 1, L & M) restricted to the axils of the lateral nerves beneath. The leaves of *T. palmeri* bear simple or forked hairs (Fig. 1, N) usually localized in the lateral nerve axils beneath, while those of *T. rosea* and *T. palustris* lack pubescence other than glandular-lepidote scales.

Inflorescence. The degree of congestion of the inflorescence, and sequence of flowering are characters useful for separating *T. guayacan* with an open, synchronously flowering inflorescence from *T. chrysantha* and *T. neochrysantha* with flowers in relatively congested inflorescences and not all opening at the same time.

Calyx. The large, glandular-lepidote, bilabiate calyces of *T. palustris* and *T. rosea* are readily distinguishable from the short, mealy-pubescent (with thick-stellate hairs, Fig. 1, J), more or less truncate ones of *T. palmeri*. The other three species share a 5-lobed calyx of intermediate size with reddish or yellowish stellate pubescence varying from a few scattered thick-stellate hairs (Fig. 1, I) in *T. guayacan*, through a covering of reddish stellate hairs (Fig. 1, G & H) in *T. chrysantha*, to a golden woolly pubescence of both short stellate and long simple hairs (Fig. 1, F) in *T. neochrysantha*.

Corolla. Color of the corolla is a character of very great taxonomic value, varying from white in *T. palustris*, to various shades of purple in *T. rosea* and *T. palmeri*, to yellow in the other three species. The venation of the lobes is very useful in distinguishing between the closely related *T. neochrysantha* and *T. chrysantha*. The lobes of the latter, when dried, show a distinct and interconnecting pattern of darker venation all the way to their margins, while those of the former show much less conspicuous venation. As a consequence, the color of the corolla lobes of dried specimens of *T. neochrysantha* tends to be yellow, contrasting with the brown of the tubular part of the corolla. This differs from the uniform brown of the dry corolla of *T. chrysantha* (Fig. 2). *Tabebuia guayacan* shares the conspicuous corolla lobe venation of *T. chrysantha*, but is often characterized when dry by a reddish color within the corolla tube. Corolla pubescence (Fig. 1, A-E) and pubescence patterns differ among several species; *Tabebuia palmeri*, for example, is unique in having its corolla pubescent without.

Fruit. Size and shape of the fruit is especially valuable in separating *Tabebuia palustris* with its short thick capsule from the other species. *T. palmeri* has a thicker fruit than *T. rosea* and loses the calyx when mature; *T. rosea* retains the calyx on the mature fruit. Fruits of *T. rosea* and *T. palustris* are glandular-lepidote, *T. palmeri* glabrous, *T. guayacan* somewhat glandular-lepidote but irregularly ridged. In *T. chrysantha* the fruit is rugose and somewhat stellate-pubescent, but in *T. neochrysantha* it is strongly woolly-pubescent with both short stellate and long simple hairs.

Seeds. Seeds of *T. palustris* are rounded, corky, and lack the two membranous wings characteristic of the other five Central American species of *Tabebuia*. Seeds of *T. palmeri* appear uniseriate, those of the other species biseriate.

ECOLOGICAL CONSIDERATIONS

Tabebuia ranges through most of Latin America northward to 28 degrees north latitude in Sonora and Chihuahua, Mexico, and the Bahama Islands, and southward through the Antilles and Central America to northern Argentina and Uruguay.

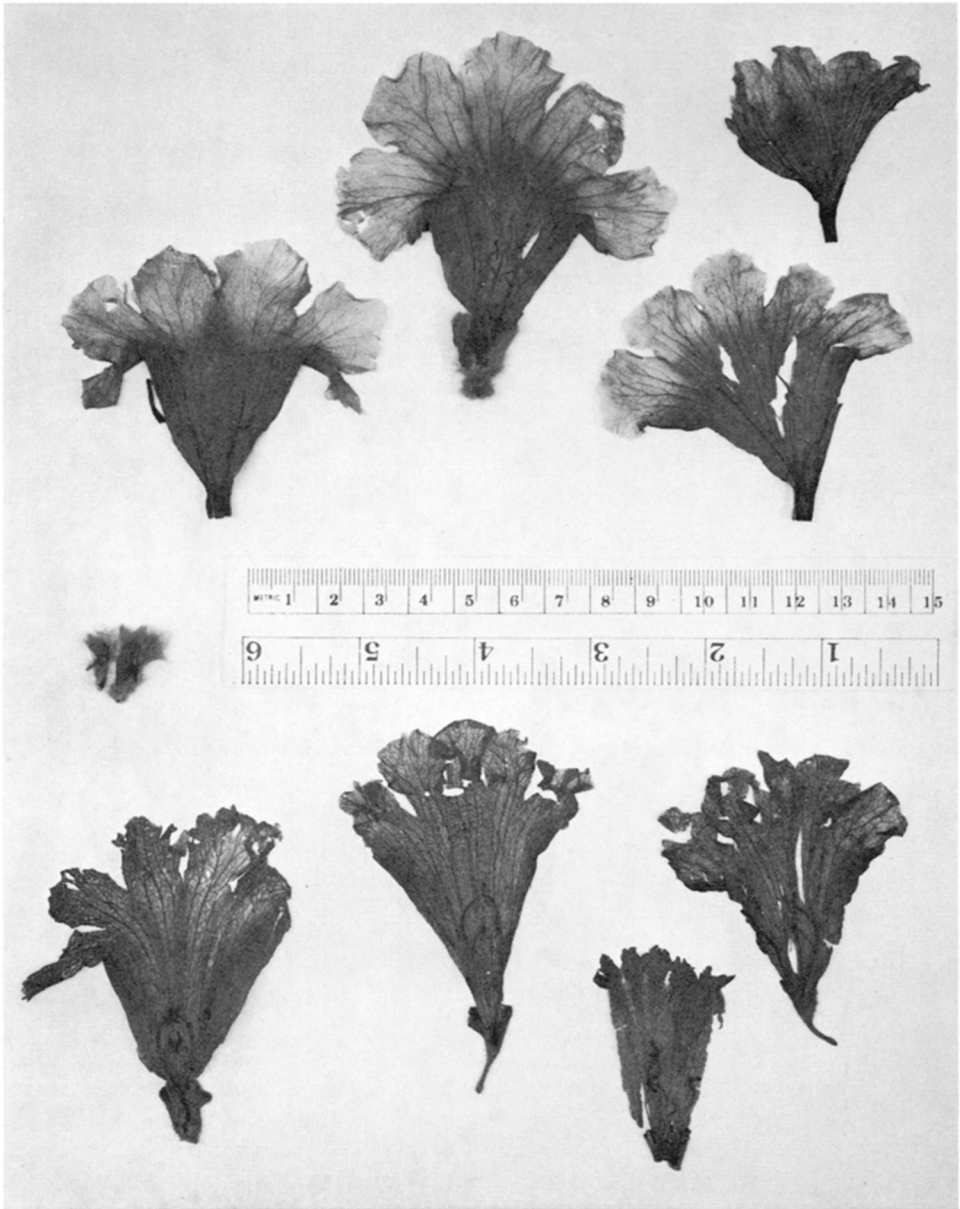


FIG. 2. Corollas of *Tabebuia neochrysantha* (above) and *T. chrysantha* (below). Note differences in corolla lobes.

The species are restricted to tropical climates and are especially prevalent in dry forest areas. Some, however, occur in rain forest or swamps. Of the Central American species, *T. palmeri* and *T. neochrysantha* are restricted to dry forest, *T. guayacan* to the rain forest, and *T. palustris* to brackish-water swamps. *Tabebuia chrysantha* is found in habitats more or less intermediate between dry forest and rain forest, and *T. rosea* is found in both dry and wet forests.

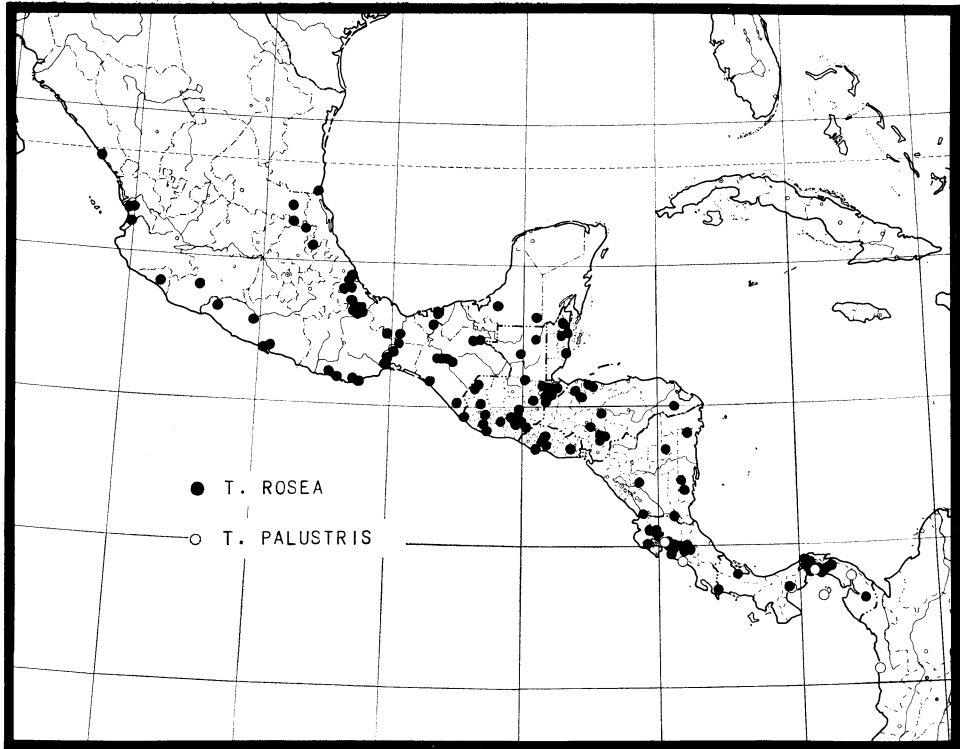


FIG. 3. Distribution of *Tabebuia palustris* Hemsley and *T. rosea* (Bertol.) DC. in Central America.

The species of *Tabebuia* characteristically flower during the dry season, usually losing their leaves at the same time. Toward the middle of the dry season, the leafless trees are completely covered with a profusion of brilliantly colored flowers. Since several species, all flowering during the dry season, may inhabit the same area, a problem arises as to their means of genetic segregation. Both temporal separations of flowering time and pollinator specificities seem to be operative. For example, in the dry forest area near Cañas, Guanacaste, Costa Rica, *T. palmeri* blooms mostly in late January, *T. rosea* in early February, and *T. neochrysantha* in late February and March. However, there is a great deal of local and individual variation so that the flowering periods of all three species, and especially *T. rosea* and *T. neochrysantha* may overlap. N. G. Smith (personal communication) has also noted a temporal separation of flowering periods around Balboa in the Canal Zone.

Pollination of all Central American *Tabebuia* species is accomplished primarily by bees, but the three Guanacaste species, at least, are usually visited by different species. *Tabebuia palmeri*, which has the best temporal isolation, is visited by many more individuals and species than *T. rosea* or *T. neochrysantha*. Species of Anthophoridae, Trigonidae, Halictidae, and Vespidae have all been collected visiting *T. palmeri*. *Tabebuia rosea* and *T. neochrysantha* attract relatively few potential pollinators. *Xylocarpa*, *Eulaema*, and some smaller anthophorids have been observed visiting *T. rosea*, while larger anthophorids prefer *T. neochrysantha*. Evidently pollinator specificity plays some part in keeping the species of *Tabebuia* genetically isolated.

There are other interesting relationships between animals and *Tabebuia*. The name *Tabebuia* was originally concocted from two words meaning "ant" and "wood," apparently in reference to the frequent inhabitation of hollowed-out *Tabebuia* twigs by ants. *Pseudomyrmex*, *Crematogaster*, *Paracryptoceras*, and *Camponotus* have all been recorded as nesting in hollowed-out *Tabebuia* twigs in Central America (Janzen, personal communication). Hummingbirds are frequent visitors to flowering *Tabebuia* trees but were never seen to act as pollinators, merely feeding on nectar by puncturing the corolla tube base with their beaks.

SYSTEMATIC TREATMENT

TABEBUIA Gomes ex DC., Prodr. **9**: 214. 1845.

Trees or shrubs; leaves opposite or sometimes alternate, simple, 1-foliolate, or digitately 3-(4-) 5-7-foliolate, the leaflets entire or serrate; indumentum of leaves, petioles and calyx usually similar within a species, often conspicuous, these parts glandular-lepidote, variously pubescent, or glabrous. Inflorescence terminal, short paniculate, very congested to open and much branched; calyx more or less campanulate, bilabiate, 3- or 5-lobed, or subtruncate, glabrous or pubescent, often glandular-lepidote; corolla tubular to campanulate, 5-lobed, slightly bilabiate, yellow, white, purple, red, or pink, glabrous to pubescent without, always somewhat pubescent within; stamens didynamous, included, inserted near base of corolla tube, the anthers glabrous with divergent thecae, longitudinally dehiscent, the staminode small, posterior; ovary superior, linear to linear-oblong, glabrous, glandular-lepidote, or pubescent, bilocular, the placentation axile with 2 placentae per locule, the ovules numerous, anatropous; stigma bilamellate; hypogynous disk annular-pulvinate or cupuliform. Capsules ecostate (though sometimes irregularly ridged), pendant, loculicidally dehiscent, linear to linear-oblong, compressed parallel to septum but dehiscing perpendicular to it; seeds biseriate or uniseriate, winged, the wings hyaline and membranaceous, or reduced, corky, and opaque; embryo flattened, the cotyledons foliaceous.

Distribution: Tropical America, from southern Sonora, Mexico, to northern Argentina and Uruguay at elevations from sea level to 2400 m, from rain forests to near-deserts. A genus of about 100 species, of which six are found in Central America, ca. 75 in the West Indies, and ca. 25 in South America.

Key to the Central American Species

1. Leaflets never stellate-pubescent; flowers rose, purple, or white; calyx glandular-lepidote or mealy-pubescent (if pubescent, corolla puberulous without); fruit glandular-lepidote or glabrous.
2. Leaflets glandular-lepidote, never pubescent, linear-oblong to elliptic-oblong; corolla glabrous without; calyx and fruit strongly glandular-lepidote.
3. Shrubby; leaves 1- or 3-foliolate, the leaflets linear oblong; inflorescence few-flowered; corolla white; fruit oblong, 8-9 cm long; restricted to tidal swamps in Costa Rica and Panama 1. *T. palustris*.
3. Large tree; leaves 5-foliolate, the leaflets linear-oblong; inflorescence many-flowered; corolla pale pink, rose, or lavender (rarely white); fruit elongate-cylindrical, 15-38 cm long 2. *T. rosea*.
2. Leaflets pubescent at least below in axils of lateral nerves, oval to oval-lanceolate; corolla puberulous without; calyx mealy-pubescent; fruit glabrous; dry deciduous forests 3. *T. palmeri*.
1. Leaflets stellate-pubescent at least in axils of lateral nerves below; flowers yellow; corolla always glabrous without; calyx with at least vestigial yellowish to reddish-stellate tomentum; fruit lepidote to woolly-pubescent.

4. Leaflets pubescent only in axils of lateral nerves below, mostly lanceolate, the leaves often 7-foliolate; inflorescence open, flowering synchronously; calyx sparingly thick-stellate-pubescent; fruit lepidote and conspicuously but irregularly ridged, somewhat tuberculate; rain forests 4. *T. guayacan*.
4. Leaflets with stellate pubescence scattered over undersurface, usually more or less obovate, the leaves almost never 7-foliolate; inflorescence usually congested, all flowers not opening at same time; calyx stellate-pubescent, often also with longer barbate or simple hairs; fruit sparingly to strongly stellate-pubescent, without pronounced ridges.
5. Leaf tomentum beneath not obscuring leaf surface; the leaflets obovate to oval (rarely almost lanceolate); corolla lobe venation of dried specimens forming conspicuous network all the way to margins, the color of lobes same as that of tube; calyx without long simple hairs, often with barbate hairs in addition to short-stellate ones; fruit rugose, sparingly stellate-pubescent 5. *T. chrysantha*.
5. Leaf tomentum beneath dense and obscuring leaf surface; the leaflets obovate; corolla of dried specimens with venation becoming obscure in lobes, the lobes appearing yellow and distinctly different from darker drying corolla tube; calyx conspicuously golden woolly-pubescent with many long (to 7 mm) simple hairs in addition to the short-stellate tomentum; fruit woolly-pubescent; dry forests 6. *T. neochrysantha*.

1. *TABEBUIA PALUSTRIS* Hemsley, Biol. Centr. Amer. Bot. **2**: 495. 1882.

TYPE: Panama: Canal Zone: swamps of the Río Grande, *S. Hayes 80* (K).

Erect shrubs or small trees 1–4 m tall, sometimes with twisted trunks, the branches slender and sprawling, thickened at each dichotomy; bark light gray, smooth, very thin. Wood whitish, of light to medium density. Leaves 1- to 3-foliolate, opposite; petioles semiterete to terete, lepidote, 2.3–10 cm long, somewhat pulvinate, the petiolules lepidote, merging into the leaflet base and sometimes not differentiated, conspicuously articulated to the petiole, the terminal 1–3.5 cm long, laterals when present 2–15 cm long; leaflets narrowly oblong, acute, attenuate (laterals often subsessile), the terminal largest, 10–19 cm long, 2.1–5.6 cm wide, the laterals when present 5–16 cm long, 1.1–3.6 cm wide, entire, subcoriaceous, heavily glandular-lepidote below, less so above. Inflorescences terminal on reduced branches subtended by two larger lateral branches; cyme 2- to 5-flowered; peduncle and pedicel lepidote. Calyx 2- or 3-labiate, 10–20 mm long, 4–10 mm wide, glandular-lepidote. Corolla white with two yellow lines in throat; infundibuliform; 5–6.8 cm long; slightly bilabiate; glabrous without, with two lines of thick hairs in throat within which converge from two lower sinuses to meet at the level of stamen insertion, a few scattered hairs on lobes and in sinuses. Stamens didynamous, the longer filaments 18–23 mm long, the shorter 14–16 mm long, staminode 5–7 mm long; anthers 5–6 mm long. Pistil 25–30 mm long; ovary linear, 5 mm long, 1 mm wide, very densely glandular-lepidote, the scales extending up base of style; disk thick, pulvinate. Fruit oblong, attenuate at both ends, 8–9 cm long, 1.6–2.6 cm wide.

Distribution: Restricted to the Pacific Coast of Costa Rica, Panama, and Colombia, at the drier edge of periodically inundated, usually brackish, mangrove swamps, regarded as rare (though often common in its restricted habitat); from sea level to 45 m.

Representative specimens:

COSTA RICA: PUNTARENAS: Boca de Barranca, *Echevarria 5347* (F), *León 4445* (NA); Boca Paquita, *Pittier 12035* (US). PANAMA: DARIEN: 0–4 mi up Río Sabana from Santa Fé, *Duke 4148, 4172* (MO); 3 mi E of Santa Fé, *Tyson et al., 4679* (MO). PANAMA: vicinity of Penonomé, *Williams 292* (NY, US). CANAL ZONE: Río Grande, *Woodson, Allen, & Seibert 760*

(MICH, MO, NA, NY); Miraflores Lock, *Gentry 422* (WIS). SAN JOSÉ ISLAND: Main Beach, *Erlanson 224* (US), *330* (NA, US), *Johnston 2* (US).

This distinctive species seems most closely related to *T. insignis* of northern South America. Its most unusual feature is its thick, woody, suborbicular seed without membranous wings, evidently an adaptation for water, rather than wind, dispersal. Among the Central American species, it is unique in its white flowers, short, thick, oblong fruits, 1- to 3-foliolate leaves, and shrubby stature.

2. *TABEBUIA ROSEA* (Bertol.) DC., Prodr. **9**: 215. 1845.

Tecoma rosea Bertol., Florula Guatimalensis 25. 1840. TYPE: Guatemala: Esquintla, *Velasquez s.n.* (FI).

Tecoma mexicana Mart. ex DC., Prodr. **9**: 218. 1845. TYPE: México: *Karwinski s.n.* (M, photo at WIS!)

Sparattosperma rosea (Bertol.) Miers, Proc. Roy. Hort. Soc. (London) **3**: 199. 1863.

Tabebuia mexicana (Mart. ex DC.) Hemsley, Biol. Centr. Amer. Bot. **2**: 495. 1882.

Tecoma evenia Donnell-Smith, Bot. Gaz. **20**: 8. 1895. (pro parte) TYPE: Guatemala: Dept. Santa Rosa: Santa Rosa, *Heyde & Lux 3110*. (HOLOTYPE: US! ISOTYPES: MO, NY)

Couralía rosea (Bertol.) Donnell-Smith, Bot. Gaz. **20**: 9. 1895.

Tecoma punctatissima Kranzl., Repert. Sp. Nov. **17**: 221. 1921. TYPE: Columbia: Villata: Bogatá, *Karsten s.n.* (W, photo 32879 at WIS!)

Tabebuia punctatissima (Kranzl.) Standley, Tropical Woods **36**: 18. 1933.

Tabebuia pentaphylla sensu auct., non L., Sp. Pl. ed. 2. **2**: 870. 1763.

Trees 10–27 m tall, to 1 m dbh.; trunk usually straight and cylindrical, sometimes twisted or fluted, the branches opposite, ascending; crown usually spreading; buttresses if present 3 or 4 and narrow, to 2.5 m tall; bark moderately rough, finely ridged, dark gray to brown, ca. 1 cm thick, the inner bark white; twigs glandular-lepidote. Wood of medium density, light grayish brown, with distinct pattern, the heartwood brownish, not well differentiated from the white sapwood; odor when fresh suggesting watermelon. Leaves palmately compound, opposite, often anisophyllous, 5-foliolate; petioles semiterete, lepidote, 5–30 cm long, pulvinate, the petiolules lepidote, articulated to the leaflet bases, the terminal 2–10 cm long, the intermediates 1.5–9.5 cm long, the laterals 0.2–2.4 cm long; leaflets elliptic-oblong to elliptic-ovate, acute to acuminate (very rarely retuse), rounded to cuneate, the terminal largest, 8–33 cm long, 3–18 cm wide, intermediates 6–30 cm long, 3–16 cm wide, laterals 3.5–23 cm long, 1.4–12 cm wide, entire, subcoriaceous (membranous in seedlings), glandular-lepidote, otherwise glabrous. Inflorescence terminal, open, dichotomously branched; many-flowered; flowers usually in twos, borne with or without leaves; peduncle and pedicel densely lepidote. Calyx campanulate, bilabiate, 15–19 (11–21) mm long, 6–12 mm wide, densely glandular-lepidote. Corolla white to pink or lavender, throat opens yellow turning white; infundibuliform; 5–10 cm long; slightly bilabiate; glabrous without, sparsely pubescent within, the lobe margins ciliate, two lines of small mostly unicellular hairs from two lower sinuses to just above level of stamen insertion. Stamens didynamous, the longer filaments 14–19 mm long, the shorter filaments 10–14 mm long; staminode 2–6 mm long; anthers 5–7 mm long. Pistil 19–32 mm long; ovary linear, 5–8 mm long, 1 mm wide, terete in cross-section, densely glandular-lepidote; disk cupuliform, 2 mm long, 2 mm wide. Fruit elongate-cylindrical, attenuate at both ends, to 38 cm long, 1.5 cm wide, glandular-lepidote; calyx usually persistent; seeds biseriate, bialate, membranous-winged, 0.7–1.0 cm long, 2.8–4.4 cm wide.

Distribution: Wide-ranging from southern Sinaloa and Tamaulipas, Mexico, to Colombia and northern Venezuela; cultivated as an ornamental throughout the tropics. Primarily a second growth species, in heavily forested areas found most

frequently along streams. The mature trees most common in tropical deciduous forests, although seedlings and young trees may grow almost anywhere; from sea level to 1440 m, altitudinally the widest range of any Central American species of *Tabebuia*.

Representative specimens:

MÉXICO: CAMPECHE: Tuxpeña, *Lundell 1317* (F, MO, NY, US). CHIAPAS: 2 mi E of Berriozábal, *Breedlove 9553* (DS, WIS); Escuintla, *Matuda 1084* (F, MEXU, NY, US). COLIMA: Coquimatlán, *Reko 4690* (US). GUERRERO: Calavera, *Hinton 10022* (F, MEXU, MO, NY, US). HIDALGO: Huejutla, *Seler 663* (US). MICHOACÁN: Apatzingán, *Leavenworth & Hoogstraal 1445* (F, MO, NY). NAYARIT: Rancho de Navarrete, *Ortega 24* (MEXU, US). OAXACA: Pinotepa, *Galeotti 7060H* (NY, US). PUEBLA: Bosque del Ajenjilre, *Bravo 102* (MEXU). SAN LUIS POTOSÍ: Tamazunchale, *Edwards 555* (F, MO, TEX). SINALOA: 4 mi N of Mazatlán, *College of Idaho Expedition M-1032* (MEXU). TABASCO: San Juan Bautista, *Rovirosa 131* (US). TAMAULIPAS: vicinity of Tampico, *Palmer 305* in 1910 (F, MO, NY, US). VERACRUZ: Zacualpan, *Purpus 6411* (F, MO, NY, US). BRITISH HONDURAS: BELIZE: Maskall, *Gentle 1189* (F, MICH, MO, NY). STANN CREEK: Stann Creek, *Schipp 730* (F, MICH, MO, NY). TOLEDO: sine loc., *Peck 917* (NY). GUATEMALA: ALTA VERAPAZ: Finca Yalpemech, *Steyermark 45293* (F). BAJA VERAPAZ: Hacienda San Jerónimo, *Salas 496* (F). ESCUINTLA: below Las Lajas, *Standley 64795* (F). GUATEMALA: 30 mi from Guatemala City, *Popenoe 762* (NA). HUEHUETENANGO: between Democracia and Canyon of Chamushu, *Steyermark 51228* (F, US). IZABAL: Quiriguá, *Standley 24609* (MO, NY, US). JUTIAPA: vicinity of Jutiapa, *Standley 75714* (F). PETÉN: *Barlett 12340* (F, MICH, NY). QUEZALTENANGO: Agua Caliente, *Greenman & Greenman 5926* (MO). SAN MARCOS: Ocos, *Steyermark 37824* (F, MO). SANTA ROSA: Aguacaliente, *Kellerman 7717* (F, US). SOLOLÁ: near Patulul, *Kellerman 5784* (US). SUCHITEPEQUEZ: vicinity of Tiquisate, *Steyermark 47649* (F). ZACAPA: 2 mi E of Gualán, *Record & Kuylen G127* (US). HONDURAS: COPÁN: Rodezno, *Whitford & Stadtmüller 3* (US). MOSQUITIA: Suji, *Haufe et al. 28* (WIS). ATLANTIDA: Lancetilla Valley, *Standley 54117* (F, US). COMAYAGUA: Las Limas, *Edwards P-90* (F, MICH). MORAZÁN: Zamorano, *Williams & Molina 11881* (F, MO). SANTA BARBARA: San Pedro Sula, *Thieme 5388* (US). EL SALVADOR: LA LIBERTAD: W of Cd. La Libertad, *Allen 7211* (F, US). LA PAZ: Hacienda Santo Tomás, *Carlson 1101* (F). SAN MIGUEL: Laguna de Olomega, *Standley 20982* (MO, NY, US). SAN SALVADOR: S of Cd. San Salvador, *Carlson 350* (F). NICARAGUA: CHONTALES: between Boaco cut-off and Acoyapa, *Bunting & Licht 728* (F). ZELAYA: Ocongwas River, *Englesing 182* (F, NY). COSTA RICA: ALAJUELA: El Coyolar, *Standley 40064* (US). CARTAGO: E of Tres Rios, *Stork 1382* (F, WIS). GUANACASTE: Montenegro, *Gentry 327* (WIS). PUNTARENAS: Tárcoles, *Brenes & Quiros 663* (F). SAN JOSÉ: Cd. San José, *Smith 4912* (US). PANAMA: BOCAS DEL TORO: Punta Rovalo to Rovalo River, *Seibert 1564* (MO, US). CHIRIQUI: Progreso, *Cooper & Slater 268* (F, US). COCLÉ: vicinity of Penonome, *Williams 429* (NY, US). COLÓN: CANAL ZONE: Mount Hope Cemetery, *Standley 28825* (US). DARIEN: vicinity of Pinogana, *Allen 4287* (MO, NY, US). PANAMA: Unnamed island N of Fairchild Point, Barro Colorado Island, *Gentry 444* (WIS).

Though placed by Smith (1895) in the now discarded genus *Couralía* with supposedly coriaceous, ligneous seed wings, all seeds have, in fact, thin, membranous wings. Perhaps confusion of the fruit with that of species of Bignoniaceae (e.g. *Paragonia pyramidata*) with woody-winged seeds led to this mistake.

The great nomenclatural confusion began with Hemsley (1882), who incorrectly identified *T. rosea* of the Latin American mainland with the Linnaean *T. pentaphylla* of the West Indies, this name being accepted for the Central American (but not the West Indian!) species until recently by most authors. The types and synonymy involved were thoroughly investigated by Sandwith (1954), who showed the propriety of using the name *T. rosea*. *Tabebuia punctatissima* and *T. mexicana* are later synonyms for *T. rosea*, the latter treated by Standley (1926) as a synonym of *T. chrysantha*. As shown by Seibert (1940), leaves of *T. rosea* were mixed with flowers of *T. chrysantha* in the type specimen of the illegitimate *T. evenia* Donnell-Smith.

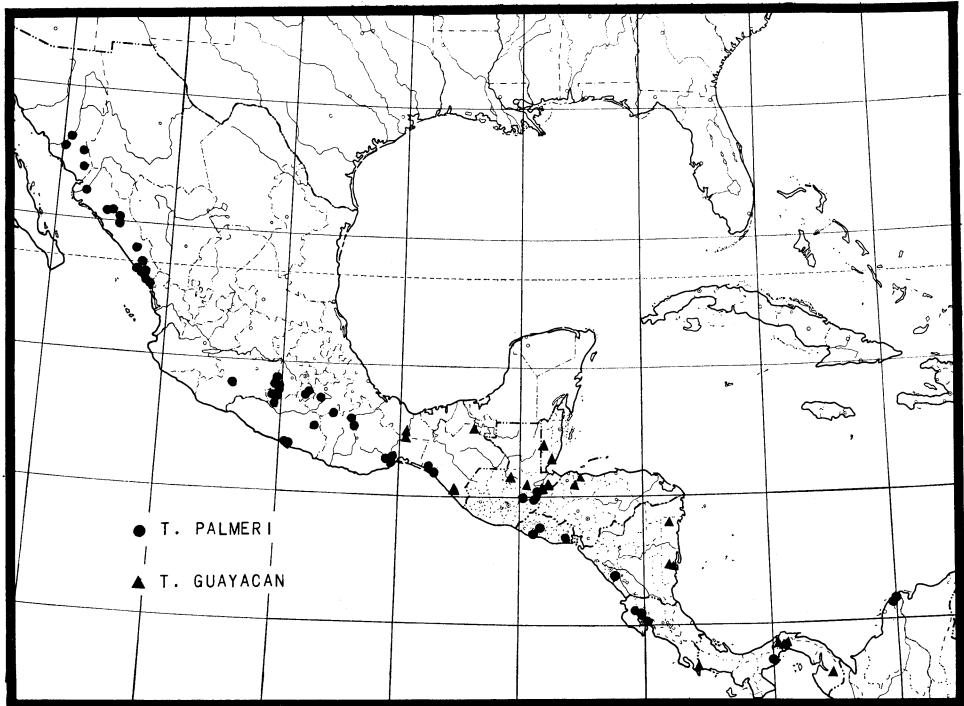


FIG. 4. Distribution of *Tabebuia palmeri* Rose and *T. guayacan* (Seemann) Hemsley in Central America.

3. *TABEBUIA PALMERI* Rose, Contr. U.S. Nat. Herb. **1**: 109. 1891.

TYPE: México: Sonora: Alamos, *Palmer 320* in 1890 (US!).

Tabebuia nicaraguensis Blake, Contr. Gray Herb. **52**: 95. 1917. TYPE: Nicaragua: Hacienda Campuscus, *Baker 2258* (HOLOTYPE: US! ISOTYPES: DS, F, MICH, MO, NY)

Tabebuia dugandii Standley, Tropical Woods **36**: 17. 1933. TYPE: Colombia: Atlántico Santa Rosa, *Dugand 345* (F!)

Trees 5–14 m tall, to 60 cm dbh., usually slender with spreading branches; old bark gray, relatively smooth; twigs terete, glabrate, the tips of the young shoot mealy-pubescent. Wood dark greenish brown, very dense, the vessels containing lapachol. Leaves palmately compound, opposite, often anisophyllous, 5-foliolate; petioles nearly terete, lepidote and puberulous, 4–13 cm long, pulvinate, the petiolules lepidote and slightly pubescent, articulated to the leaflet blades, the terminal 1–4 cm, the intermediates 0.9–4 cm, the laterals 0.2–2 cm long; leaflets ovate to elliptic, acuminate, cuneate to rounded, rarely subcordate, the terminal largest, 5–18 cm long, 1.5–8 cm wide, the intermediates 4–14 cm long, 2.8–9 cm wide, the basals smallest, 2.2–11 cm long, 1.5–8.3 cm wide, entire, rarely serrulate when young, membranous, somewhat glandular-lepidote above and below, pilose below at least in axils of lateral veins, often slightly so above on midrib, the hairs multicellular, simple, or sometimes forked. Inflorescence terminal, usually congested; flowers in threes, not opening synchronously, seldom borne while leaves are on tree; peduncle and pedicel distinctively whitish to tannish mealy-pubescent. Calyx cupuliform to campanulate, truncate or sometimes obscurely 5-lobed, 4–6 (3–9) mm long, 3–6 mm wide, prominently

mealy-pubescent with small, thick-stellate hairs. Corolla pink to purple, the yellow throat turning to purple in older flowers; elongate-campanulate; 4–7.5 cm long; very slightly bilabiate; puberulous without, a few scattered simple hairs within. Stamens didynamous, the longer filaments 16–23 mm long, the shorter 10–16 mm; staminode 3–7 mm long; anthers 5–7 mm long. Pistil 27–34 mm long; ovary linear, 3–4 mm long, 1 mm wide, tetragonal in cross-section, glabrous to slightly lepidote; disk cupuliform, slightly lobate, 1–1.5 mm long, 2 mm wide. Fruit elongate-cylindrical, attenuate at both ends, 12–56 cm long, 1.3–2.5 cm wide, glabrous; calyx deciduous; seeds appearing uniseriate, large and thick, bialate, membranous-winged, 1–1.6 cm long, 3–4.8 cm wide.

Distribution: Arid, usually hilly woodlands in the tropical deciduous forest of the Pacific slope from southern Sonora, Mexico, to Guanacaste, Costa Rica, inland even into the Atlantic drainage system in dry areas of southern Mexico and along the Motagua River in Guatemala. Also collected in the dry area of Panama southwest of the Canal Zone and (as *T. dugandii*) in seasonally dry Atlántico, Colombia. Most abundant at the northern end of its range, often one of the dominants in the tropical deciduous forests of Sonora. Altitudes from 5–1200 m.

Representative collections:

MÉXICO: CHIAPAS: San Pedro, *Mell 649* (US). GUERRERO: Acapulco, *Palmer 361* in 1895 (F, MEXU, MO, NY, US). MÉXICO: Distr. Temascaltepec, Villaneda, *Hinton 7407* (MO, NY). MICHOACÁN: Distr. Zitácuaro, Tuzantla-Salitre, *Hinton 13432* (US). MORELOS: Km. 18 carretera Zacatepec-Cuautla, *Palacios s.n.* (MEXU). OAXACA: slopes of Gingola near Tehuantepec, *Smith et al. 3226* (F, MEXU, MO, NY, US). PUEBLA: Chilac, *Miranda 2518* (MEXU). SINALOA: Mazatlán, *Ortega 5594* (US). SONORA: Alamos, *Gentry 4774* (F, MEXU, MO, US). GUATEMALA: CHIQUIMULA: Quebrada Shusho, above Cd. Chiquimula, *Standley 74351* (F). EL PROGRESO: around Barranquilla, *Steyermark 46429* (F, US). ZACAPA: Gualán, *Record & Kuylen G117* (US). EL SALVADOR: LA LIBERTAD: Km. 71, *Allen s.n.* (F, NY). SAN SALVADOR: S of Cd. San Salvador, *Allen & Garcia 6918* (F, NY, US). SAN MIGUEL: S side of Lake Olomega, *Tucker 904* (F, MICH, NY, US). COSTA RICA: GUANACASTE: Montenegro, *Gentry 343* (WIS). PANAMA: PANAMA: vicinity of Bejuco, *Allen 1630* (F, MO, NY, US). COLOMBIA: ATLÁNTICO: near Juan Mina, *Dugand 934* (F).

Tabebuia palmeri is unique among the Central American species in the combination of purple flowers with “lapacho-group” wood, and in leaves with simple hairs. The whitish or tannish mealy-pubescence of its calyx and young growth tips is one of the best distinguishing characteristics.

More restricted to dry areas than any other Central American species of *Tabebuia*, its spotty distribution has led to its redescription as *T. nicaraguensis* in Nicaragua and *T. dugandii* in Colombia. The closest relative of *T. palmeri* appears to be *T. avellanedeae* Lorentz ex Griseb. (*T. ipe* Mart.) of the dry part of central South America. The latter species has smaller, usually serrate leaves, although sharing a similar wood type, flower color, and calyx pubescence (see Dugand, 1956).

4. TABEBUIA GUAYACAN (Seemann) Hemsley, Biol. Centr. Amer. Bot. **2**: 495. 1882.

Tecoma guayacan Seemann, Bot. Voy. Herald. 180. 1854. TYPE: Panama: Cruces, *Seemann 398* (K).

Very large trees, to 50 m tall and 2 m dbh.; trunk straight, cylindrical, the crown spreading, more or less dichotomously branched; often with 4 or 5 buttresses 60 cm high; bark 1–2 cm thick, almost smooth when young, split into long shallow furrows when older, the plates between furrows breaking into scales, the color whitish gray to buff. Sapwood white to light brown; heartwood very dark olive-brown, heavy,

with lapachol abundant in vessels. Leaves palmately compound, opposite, 5- to 7-foliolate; petioles terete, glabrous, 9–13 (7–17) cm long, pulvinate, the petiolules glabrous, articulated to the leaflet base, the terminal 2.9–6.5 cm, the intermediates 2.4–5.6 cm, the laterals 1.1–3.4 cm long; leaflets lanceolate to narrowly ovate, acuminate, rounded to obtuse, the terminal 9–22 cm long, 3.7–9.5 cm wide, the intermediates 8–19 cm long, 2.8–8.3 cm wide, the laterals 6–14 cm long, 2.1–6.5 cm wide, these often partially divided (if with seven complete leaflets, the most lateral pair much smaller), entire (somewhat serrulate in seedlings), membranous, minutely lepidote especially below, stellately pubescent in axils of lateral nerves below, the hairs multicellular, usually 3-branched. Inflorescence terminal, not congested; flowers in twos or threes, opening synchronously, borne with or without leaves; peduncle and pedicels slightly stellate-rufescent. Calyx campanulate, irregularly 5-lobed to bilabiate, 7–15 mm long, 5–12 mm wide, sparsely stellate pubescent, the hairs small, rather thick. Corolla yellow, with brownish venation when dried, the dried tube reddish; infundibuliform; 6–11 cm long, bilabiate, the three longer lobes 22–33 mm, the two shorter ones 13–24 mm long; glabrous without, within with long, flattened, usually branched, 3- or 4-celled hairs in sinuses and forming four lines of villous pubescence in throat from the four lower sinuses to the level of stamen insertion, the two central lines uniting. Stamens didynamous, the longer filaments 15–21 mm long, the shorter filaments 11–16 mm long, staminode 3–9 mm long; anthers 3.5–6 mm long. Pistil 24–33 mm long; ovary linear, 3–5 mm long, 1.5 mm wide, terete, glabrous to somewhat lepidote; disk cupuliform, thin-walled, appearing sunken into base of ovary, 1 mm long, 1.5 mm wide. Fruit elongate-cylindrical, 29–45 cm long, 1.5–3 cm wide, glabrous; calyx deciduous; seeds biseriata, bialate, membranous-winged, 0.9–1.1 cm long, 3.5–4 cm wide.

Distribution: Mostly in moist rain forests of the Atlantic coasts of Central and northern South America, ranging uninterruptedly from Veracruz and Oaxaca, Mexico, to the Magdalena Valley of Colombia. A single collection from Escuintla, Chiapas, occurs on the Pacific slope; this in a narrow band of evergreen forest similar to that on the Atlantic slope. Trees are usually scattered through the rain forest; when in flower their brilliant canopies are readily spotted from a plane, and this sporadic distribution is quite apparent. At times, however, *T. guayacan* becomes locally dominant in a forest, as in the humid lowlands near Palenque, Chiapas, Mexico (Miranda, 1952). Below 350 meters.

Representative collections:

MÉXICO: CHIAPAS: Palenque, *Enríques 7306* (MEXU). OAXACA: Ubero, *Williams 9232* (F, MO, US). TABASCO: San Juan Bautisti, *Roviroso 481* (NY, US). VERACRUZ: Fortuño, *Williams 8760* (F, US). BRITISH HONDURAS: EL CAYO: Vaca, *Gentle 2532* (F, MEXU, MICH, TEX), pro parte. TOLEDO: Jacinto Creek, *Schipp 1173* (F, MICH, MO, NY). GUATEMALA: ALTA VERAPAZ: Cubilquitz, *Tuerckheim 7932* (NY, US). IZABAL: Las Quebradas, *Whitford & Stadtmiller 44* (US). HONDURAS: ATLANTIDA: Lancetilla, *Yale 82* (F). YORO: near Progreso, *Hottle 84* (F). NICARAGUA: BLUEFIELDS: vicinity of El Recreo, Escondido River, *Long 31* (F). PANAMA: CHIRIQUI: Progreso, *Cooper & Slater 311* (F, US). COLÓN: Río Boquerón, above Peluca Hydrographic Station, *Hunter & Allen 656* (MO, NY, US). DARIEN: vicinity of Pinogana, *Allen 4294* (MO). PANAMA: Barbour Trail, Barro Colorado Island, *Gentry 450* (WIS).

Towering as high as 50 meters, *T. guayacan* is the tallest Central American species of *Tabebuia* and among the tallest members of the Bignoniaceae. Though unique among Central American species in its restriction to wet forests, it is closely related to *T. chrysantha* and *T. neochrysantha* as indicated by its "lapacho group" wood, yellow flowers, and the stellate pubescence on its leaves and calyces. However, it

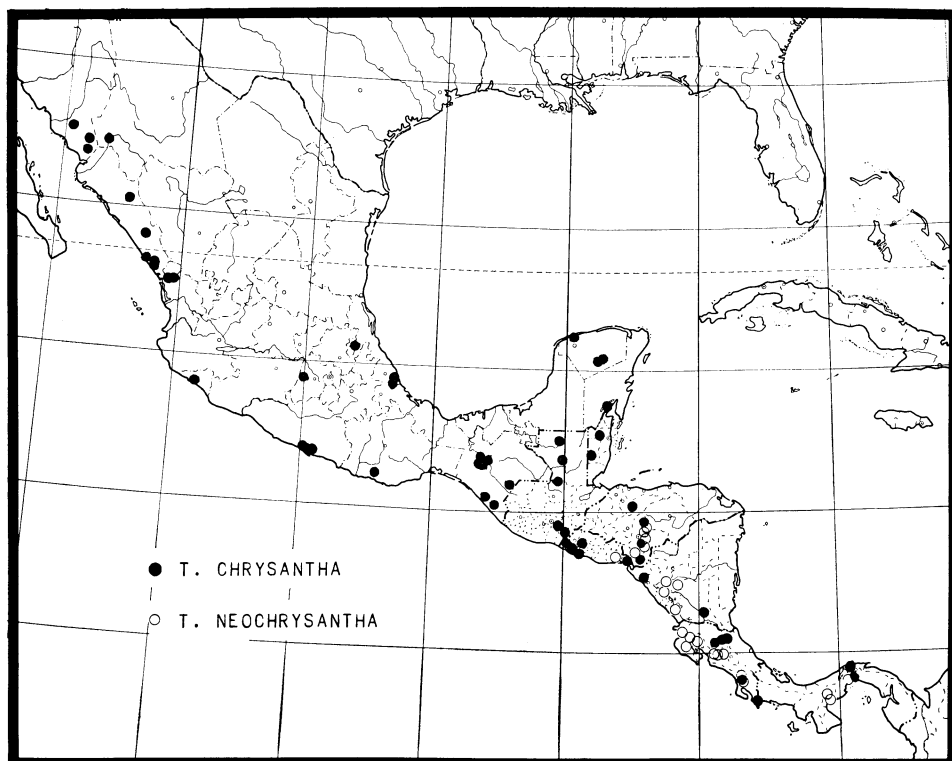


FIG. 5. Distribution of *Tabebuia chrysantha* (Jacquin) Nicholson and *T. neochrysantha* A. Gentry in Central America.

differs in its narrower leaflets with pubescence restricted to the lateral nerve axils below, much less pubescent calyx, and less congested inflorescence with all flowers opening together. It is the only Central American species of the genus commonly having seven leaflets per leaf; the lateral leaflets of 5-foliolate leaves are also sometimes partially divided.

5. *TABEBUIA CHRYSANTHA* (Jacquin) Nicholson, Dict. Gard. **4**: 1. 1887.

Bignonia chrysantha Jacquin, Hort. Schoenbr. **2**: 45. 1797. Type illustration: *Table 211*, Hort. Schoenbr. Plant from Caracas, Venezuela.

Tecoma chrysantha (Jacquin) DC., Prodr. **9**: 221. 1845.

Tecoma evenia Donnell-Smith, Bot. Gaz. **20**: 8. 1895. (pro parte) TYPE: Guatemala: Dept. Santa Rosa: Santa Rosa, Heyde & Lux 3110. (HOLOTYPE: US! ISOTYPES: MO, NY)

Tecoma palmeri Krantz, Repert. Sp. Nov. **17**: 220. 1921. TYPE: México: Guerrero: vicinity of Acapulco, Palmer 419 in 1895. (HOLOTYPE: US! ISOTYPES: F, MO, NY)

Small to large trees, to 30 m tall and 50 cm dbh., smaller farther north; trunk usually unbranched for some distance, the crown rounded and spreading; bark pale to dark gray, when older somewhat split and scaly; twigs variously stellate-pubescent, becoming glabrate. Wood of the "lapacho group," hard, heavy, the heartwood dark olive-brown, distinct from lighter colored sapwood. Leaves palmately compound, opposite (rarely alternate), 5-foliolate; petioles somewhat tetragonal, stellate-pubescent to glabrate, 5–16 cm long, pulvinate, the petiolules stellate-pubescent to

lepidote, articulated to the leaflet, the terminal 1.2–7.5 cm long, the intermediates 0.7–5.5 cm long, the laterals 0.3–1.5 cm long; leaflets broadly elliptic to obovate (rarely almost lanceolate), abruptly acuminate, obtuse to truncate or asymmetrically subcordate, the terminal 6–18 cm long, 4–11 cm wide, the intermediates 5–17 cm long, 3.4–10 cm wide, the laterals 2.5–13 cm long, 1.4–8 cm wide, entire to dentate, generally membranous, somewhat glandular-lepidote above and below, stellate-pubescent sometimes above, always to some extent below, the much-branched multicellular hairs on the main nerves and scattered on leaf undersurface. Inflorescence terminal, sometimes appearing axillary, somewhat congested, the compacted peduncle and pedicels stellately pubescent, flowers few to many, not opening synchronously, borne with or without leaves. Calyx campanulate, 5-lobed, 8–11 (5–12) mm long, 3–10 mm wide, stellately pubescent, the stellate hairs usually intergrading with abundant short-barbate hairs, the indumentum usually reddish brown. Corolla yellow with reddish lines in throat, the veins in dried specimens distinctly interconnected and readily apparent to the margins of lobes, the dried tube and lobes indistinguishable in color; infundibuliform; 3–8 cm long; slightly bilabiate, the lobes 9–26 mm long; glabrous without, within with four lines of simple or usually once-branched 2- or 3-celled hairs from four lower sinuses to level of stamen insertion, the lines converging, usually near level of stigma. Stamens didynamous, the longer filaments 16–22 mm, the shorter 10–15 mm long; staminode 4–9 mm long; anthers (3–)5–6 mm long. Pistil 18–31 mm long; ovary linear, 3.5–5 mm long, 1.5–2 mm wide, terete, glabrous to lepidote or very sparsely stellate-pubescent, appearing rather rugose when dry; disk patelliform, 0.5–1 mm long, 2–3 mm wide. Fruit elongate-cylindrical, attenuate and usually recurved at the ends, the length variable, 11–50 cm long, 0.6–2.0 cm wide, very sparingly short-stellate pubescent; calyx deciduous; seeds biseriata, bialate, membranous-winged, 0.4–0.9 cm long, 1.4–3.3 cm wide.

Distribution: In both dry and moist tropical forests from Venezuela and Colombia to southern Sonora and southwest Chihuahua, Mexico. From sea level to 1050 m and reputedly from a mountainside at 6000 ft (Chihuahua, *LeSueur 1299*).

Representative specimens:

MÉXICO: CHIAPAS: 22 mi SE of Comitán, *Carlson 1949* (F, NY). CHIHUAHUA: Río Urique Canyon, *Pennington 102* (TEX). COLIMA: SSE of Manzanillo, *Miranda 8801* (MEXU). MÉXICO: Distr. Valle de Bravo: La Junta, *Matuda 31664* (MEXU). MICHOACÁN: Hacienda Coahuayula, *Emrick 45* (F). NAYARIT: Acaponeta, *Lamb 542* (DS, MO, MSC, NY, US). OAXACA: Pinotepa, *Galeotti 7060N* (US). QUINTANA ROO: Chetumal, *Miranda 8117* (MEXU). SINALOA: Mazatlán, *Ortega 6316* (DS, US). SONORA: San Bernardo, *Gentry 1267* (F, MEXU, MO, NY). VERACRUZ: Camarón, Paso Coyal, *Conzatti 5446* (MEXU, NY). YUCATAN: SE of Kancabdzonot, *Gaumer & Sons 23890* (F, US). BRITISH HONDURAS: EL CAYO: Vaca, *Gentle 2352* pro parte (F, MICH, TEX). ORANGE WALK: Hill Bank, *Brown 15* (F). GUATEMALA: ALTA VERAPAZ: between Finca Yalpemech and Chinaja, *Steyermark 45654* (F, US). JUTIAPA: N of Cd. Jutiapa, *Standley 75606* (F). PETÉN: La Libertad, *Lundell 3407* (F, MICH, NY, US). EL SALVADOR: AHUACHAPÁN: Cd. Ahuachapán, *Standley 20330* (MO, NY, US). LA LIBERTAD: Cd. La Libertad, *Allen 7297* (F, NY). SAN SALVADOR: vicinity of Apopa, *Allen & Armour 6852* (F, US). SONSONATE: San Julian, *Calderón 2219* (US). HONDURAS: CHOLUTECA: vicinity of Cd. Choluteca, *Standley 24333* (F). EL PARÁISO: E of Danlí, *Standley 16777* (F). ISLA TIGRE: vicinity of Amapala, *Standley 20710* (US). MORAZÁN: Cerro Majicarán, Río de la Orilla, *Molina 2708* (F, MO, US). YORO: entre Yoro y Morazán, *Molina 6920* (F). NICARAGUA: CHINANDEGA: vicinity of Cd. Chinandega, *Standley 11465* (F). CHONTALES: San Miguelito, *Shank & Molina 4594* (F). COSTA RICA: ALAJUELA: 2 mi N of Villa Quesada, *Seibert 1602* (MO, NA, US). HEREDIA: La Virgen, *Gentry 526* (WIS). PUNTA Arenas: near Palmar Norte, *Allen 6711* (F, US). PANAMA: COLÓN: Santa Rita Ridge near Agua Claro Weather Station, *Gentry 456* (WIS). COMARCA DEL BARU: W of Puerto Armuelles, *Stern & Chambers 130* (NY, US). PANAMA: near Matías Hernández, *Standley 28956* (US).

The confusion existing between *T. chrysantha* and its close relatives *T. guayacan* and *T. neochrysantha* makes its taxonomy rather chaotic. There are mixed collections with *T. guayacan*, *T. palmeri*, and *T. rosea*. The distinctions between *T. chrysantha* and *T. guayacan* (pubescence, leaf shape, etc.) have already been elaborated; those between it and *T. neochrysantha* are examined in depth under *T. neochrysantha*. Even greater confusion exists in Venezuela, the type locality of *T. chrysantha*. Since *T. chrysantha* and *T. neochrysantha* both grow here, a question arises as to the proper application of the name *T. chrysantha* (*Bignonia chrysantha* Jacquin, 1797) which clearly takes precedence over any other possible name.

The location of the type specimen of *T. chrysantha* is unknown; yet the excellent illustration in the Hortus Schoenbrunnensis (Jacquin, 1797—original copy, Rare Book Room, University of Wisconsin Library) shows a twig with two leaves bearing symmetrically ovate leaflets and an inflorescence of several buds and three open flowers, these with a corolla venation visible all the way to the lobe tips. Furthermore, the schematically drawn calyx hairs are in red and do not hide the details of each unopened bud. Since all of these characters apply to *T. chrysantha* (as here used) perfectly, but none fits *T. neochrysantha*, the correct application of *T. chrysantha* is apparent.

The most interesting aspect of *T. chrysantha* is its tremendous morphological diversity. Obviously extremely heterogenous, it may well constitute several distinct species or subspecies. Pending more collections from critical areas, it seems advisable to continue to unite its many forms. The following are the most distinct:

I. A variation with more symmetrically ovate leaves occurs in wet forests in Costa Rica and Panama. The calyx pubescence is reduced, and the fruit is extremely long, longitudinally finely ridged, and only sparsely pubescent.

II. This most commonly collected form occurs from Mexico to Honduras. It is marked by an especially pronounced calyx pubescence, great leaf shape variability, and more rugose, usually smaller fruits.

III. A tree from El Salvador (*Allen 7297, 7300*) has the characteristic rusty red leaf pubescence replaced by scattered white stellate hairs and the stellate calyx hairs thickened and less conspicuously branched. A British Honduras collection (*Gentle 2532 pro parte*) shares this type of calyx pubescence.

IV. The Yucatan Peninsula form is especially distinct in its narrower usually serrate leaflets and fewer and shorter calyx hairs. Although perhaps sufficiently different from typical *T. chrysantha* to merit some kind of taxonomic recognition, it is probably not a distinct species, specimens from northern Guatemala and British Honduras showing many character gradations.

6. *TABEBUIA NEOCHRYSANTHA* A. Gentry, sp. nov.

Arbores. Folia digitata, opposita (raro alterna), foliolis 5, oblongi-obovatis, abrupte acuminatis vel apiculatis, obtusis vel truncatis, integris, lepidotis, stellatopilosis, glabrescentibus supra, densissime infra. Inflorescentia terminalis, congesta; flores multi, non omnes in anthesi simultanei. Calyx campanulatus, 5-lobatus, lanati-pubescentis, pilis brevibus stellatis necnon pilis longis et simplicibus, indumento aureo. Corolla lutea, venulis in siccitate obscuris in lobis, siccitate tubo bruneolo et lobis flavidis, infundibuliformis, leviter bilabiata, extra glabra, intus villosa in antica pagina. Stamina didynamia. Ovarium lineare, lepidotum vel aliquantum pilosum. Discus patelliformis. Fructus elongatus cylindricus, aurei lanati-pubescentis. Semina biseriata, bialata, membranacei-alata.

Trees to 20 m tall and 30 cm dbh.; bark distinctive, split at intervals leaving flat-topped ridges, these light gray, the splits darker; twigs strongly stellate-pubescent when young, partially glabrate. Wood of the "lapacho group," hard, heavy, the heartwood dark olive-brown, distinctly demarcated from the lighter sapwood. Leaves palmately compound, opposite (rarely alternate), 5-foliolate; petioles terete to semi-terete, stellate-pubescent, 6–14 cm long, pulvinate, the petiolules stellate-pubescent, articulated to the leaflets, the terminal 0.8–3.8 cm, the intermediate 0.7–3 cm, the laterals 0.2–1 cm long; leaflets oblong-obovate, abruptly acuminate to apiculate, obtuse to truncate, the terminal 5–13 cm long, 1.8–7.5 cm wide, the intermediates 4.2–11.3 cm long, 1.4–7.4 cm wide, the laterals 2.8–9.3 cm long, 1.6–5.3 cm wide, entire, membranous, somewhat glandular-lepidote above and below, stellate-pubescent, glabrescently so above, very densely so below, the many-branched multicellular hairs completely covering the undersurface of the leaf. Inflorescence terminal, very congested; flowers many, not opening synchronously, borne with or without leaves; peduncle and pedicels compacted, stellate-pubescent. Calyx campanulate, more or less 5-lobed, 8–15 mm long, 5–10 mm wide, woolly-pubescent with shorter stellate tomentum and thick covering of long (to 7 mm), simple hairs (a few intermediate long short-barbate hairs rarely present), the indumentum usually appearing golden yellow. Corolla yellow with reddish lines in throat, the veins in dried specimens becoming obscure in the lobes, dried tube and corolla lobes distinctly different in color, the tube usually brownish, the lobes yellowish; infundibuliform; 4.5–8 cm long; very slightly bilabiate, the five lobes 10–24 mm long; glabrous without, villous on anterior surface within, the pubescence converging from lower four sinuses to level of stamen insertion, a few scattered hairs also on upper side of tube, the hairs relatively short, flat, uni- to multicellular, simple or once branched. Stamens didynamous, the longer filaments 15–20 mm long, the shorter 9–15 mm long; staminode 2–11 mm long; anthers 2–5 mm long. Pistil 20–27 mm long; ovary linear 4–5 mm long, 1.5 mm wide, terete, lepidote to somewhat pubescent, the hairs both simple and stellate; disk patelliform, 1 mm long, 2–2.5 mm wide. Fruit elongate-cylindrical, attenuate, 18–30 cm long, 1–1.4 cm wide, abundantly golden woolly-pubescent with both a short stellate tomentum and a longer indumentum of simple hairs; calyx deciduous; seeds biseriata, bialate, membranous-winged, 0.4–0.8 cm long, 1.8–2.9 cm wide.

TYPE: Costa Rica: Guanacaste: 8 km N of Bagaces, 30 Jan 1969, *A. Gentry* 355. (HOLOTYPE: WIS; ISOTYPES: BM, F, MO, UC, US).

Distribution: Seasonally dry habitats, from Venezuela and Colombia to Honduras and extreme eastern El Salvador; very abundant locally. Near sea level to 850 meters.

Representative specimens:

EL SALVADOR: LA UNIÓN: Laguna de Maquigüe, *Standley* 20942 (NY, US). HONDURAS: CHOLUTECA: Papelón, *Shannon* 5051 (US). MORAZÁN: El Zamorano, *Williams & Molina* 12117 (F, MICH, MO). NICARAGUA: CHONTALES: vicinity of Juigalpa, *Standley* 9190 (F). MANAGUA: 60 km N of Cd. Managua, *Williams, Molina, & Williams* 25069 (F). RIVAS: Río de Las Lajas, *Shannon* 5050 (US). COSTA RICA: ALAJUELA: 5 km E of Grecia, *Gentry* 474 (WIS). GUANACASTE: 1 km S of Corobicí, *Gentry* 404 (WIS). PUNTARENAS: near Buenos Aires, *Molina et al.* 18117 (F). SAN JOSÉ: Santa Ana, *Solís* 129 (F, MO). PANAMA: COCLÉ: S of El Valle de Antón, *Allen* 4477 (MO). PANAMA: Balboa, *Gentry* 424 (WIS).

Though often treated as conspecific with *T. chrysantha*, this species, nevertheless, can be readily separated both in the field and in herbarium material. The most obvious differences are as follows:

1. Corolla lobe vascularization when dry: *T. chrysantha*, much-branched, conspicuous, and visible to the margin of the lobe which has a brownish coloration very

like that of the corolla tube; *T. neochrysantha* relatively inconspicuous and not prominent much beyond the base of the lobes which are clear yellow contrasting with the brown drying corolla tube.

2. Calyx color: *T. chrysantha* usually much more reddish; *T. neochrysantha* usually more golden yellow.

3. Calyx pubescence: *T. chrysantha* variable, the hairs stellate to barbate; *T. neochrysantha* with two distinct types, the hairs stellate and long and simple.

4. Leaflets: *T. chrysantha* highly variable in size and shape, the stellate pubescence beneath scattered, not obscuring the leaf surface; *T. neochrysantha* obovate, relatively uniform in size and shape, the pale yellowish stellate pubescence beneath extremely dense and obscuring the leaf surface (although sometimes partly glabrescent).

Although a well known tree, this species has heretofore had no botanical name. This is due partly to its taxonomic confusion with the sympatric *T. chrysantha* and partly to Hemsley's (1882) misapplication of the name *T. heterotricha* (*Tecoma heterotricha* DC.) to it. As a consequence, many authors have either failed to distinguish *T. neochrysantha* or, those who have done so in Central America, have used the incorrect name *T. heterotricha* applied by Hemsley.

In South America, *T. neochrysantha* is generally and incorrectly called *T. chrysantha*, while the true *T. chrysantha* is identified as *T. rufescens*. The confusion of names is not helped by the fact that in Venezuela and Colombia *T. neochrysantha* and *T. chrysantha* occur together along with closely allied forms bearing the names *T. rufescens* and *T. spectabilis*.

Based on characters of calyx pubescence and flower venation, at least two distinct entities appear in this species complex in northern South America. The first consists of *T. chrysantha*, *T. rufescens*, and *T. spectabilis*; the other only of *T. neochrysantha*. It is beyond the scope of this study to delve into the morass of South American *Tabebuia* taxa in search of clearer interpretations of specific boundaries in the former group, but it is clear that *T. neochrysantha*, at least, is distinct from *T. chrysantha*.

EXCLUDED SPECIES

Tabebuia aesculifolia (H.B.K.) Hemsley, Biol. Centr. Amer. Bot. **2**: 494. 1882. = *Godmania aesculifolia* (H.B.K.) Standley, Lista Prelim. Plantas El Salvador 200. 1925.

Tabebuia calderoni Standley, Jour. Washington Acad. Sci. **14**(11): 244. 1924. = *Adenocalymma calderoni* (Standley) Seibert, Carnegie Inst. Washington Publ. 532: 428. 1940.

Tabebuia cordata Benthham, Bot. Voy. Sulphur 129. 1844. = ?. Generic affinities are unknown; the scandent habit and bifoliolate leaves indicate it is not a *Tabebuia*.

Tabebuia donnell-smithii Rose, Bot. Gaz. **17**: 418. 1892. = *Roseodendron donnell-smithii* (Rose) Miranda, Bol. Soc. Bot. Méx. **29**: 43. 1965.

Tabebuia floccosa (Klotzsch ex Bur. & K. Schum.) Sprague & Sandwith, Kew Bull. 1932(1): 27. 1932. = *Xylophragma seemanniana* (Klotzsch ex Bur. & K. Schum.) Sprague & Sandwith, Kew Bull. **1953**: 452. 1954.

Tabebuia fuscata (DC.) Hemsley, Biol. Cent. Amer. Bot. **2**: 494. 1882. = *Godmania aesculifolia* (H.B.K.) Standley, Lista Prelim. Plantas El Salvador 200. 1925.

- Tabebuia heterotricha* (DC.) Hemsley, Biol. Centr. Amer. Bot. **2**: 495. 1882. (*Tecoma heterotricha* DC., Prodr. **9**: 219. 1845.) A series of photographs and a careful description of the type provided by the de Candolle herbarium indicate it is probably conspecific with *Tabebuia chrysantha* (Jacquin) Nicholson. If distinct, it does not occur in Central America.
- Tabebuia obtusifolia* (Chamisso) Bureau, Vidensk. Medd. Naturh. Foren. 113. 1893. = *Tabebuia leucoxylo* (Vell.) DC., Prodr. **9**: 212. 1845. A native of Brazil, recorded mistakenly from Mexico by Hemsley (1882).
- Tabebuia pyramidata* (L. C. Rich.) DC., Prodr. **9**: 214. 1845. = *Paragonia pyramidata* (L. C. Rich.) Bureau, Vidensk. Medd. Naturh. Foren. 104. 1894.
- Tabebuia sessilifolia* Donnell-Smith, Bot. Gaz. **25**: 156. 1898. = *Enallagma sessilifolia* (Donnell-Smith) Standley, Field Mus. Nat. Hist., Bot. Ser. **18**: 1120. 1938.
- Tabebuia speciosa* Standley, Field Mus. Nat. Hist., Bot. Ser. **8**(1): 49. 1930. = *Callichlamys latifolia* (L. C. Rich.) K. Schum., Nat. Pflanzenfam. **4**^{3b}: 223. 1894.

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(cf. pp. 139, 140)
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