

ADDITIONAL NEW TAXA AND
NEW COMBINATIONS IN HYMENAEA
(LEGUMINOSAE, CAESALPINIOIDEAE)

Y. T. LEE AND J. H. LANGENHEIM

THE LEGUMINOUS GENUS *Hymenaea* in the tribe Detarieae (Cynometrae sensu Léonard) has long been considered a neotropical genus. With the recent reinstatement of *Hymenaea* in the recorded African flora (Langenheim & Lee, 1974), the genus again has an amphi-Atlantic distribution. Although all species of *Hymenaea* but one are neotropical, evidence clearly supports an African origin for the genus with the Amazon Basin being a secondary center of distribution (Langenheim, 1973; Langenheim, Lee, & Martin, 1973; Langenheim & Lee, 1974). The African species *H. verrucosa* (formerly *Trachylobium verrucosum*) is restricted to the east tropical coast and adjacent offshore islands, occurring in seasonally dry lowland forests. In the New World, 17 species have been recognized to date (Lee & Langenheim, 1973) which span the tropics, occurring from 23°N to approximately 25° S and occupying all major ecosystem types from equatorial rain forest to thorn forest.

During the course of a systematic study of *Hymenaea* (Lee, 1973, unpublished thesis), one new species, two new varieties, and several new combinations were suggested which are discussed in the present paper.

Hymenaea maranhensis Y. T. Lee & Langenheim, sp. nov.

FIGURES 1 & 2.

Arbor parva usque ad 2–6 m. alta plerumque fruticosa cum ramulis prope terram. Foliola obovata vel oblonga, 8–10 × 4.0–5.5 cm., supra hebetata et sparse adpresso tomento praedita, infra tomento rubro-fusco implecto praedita, pilis maxime prominentibus secus venas et margines. Inflorescentia corymbosa racemis paucis paucifloribus composita, ramulis brevibus robustis indumento dense tomentoso praeditis, bracteolis ovatis vel obovatis 16–18 × 14–16 mm., plerumque per anthesin persistentibus. Hypanthium floris campanulatum, sessile; lobi calycis oblongi, 25–30 × 10–15 mm., indumento extus griseo-brunneo tomentoso intus aureo-tomentoso-sericeo praediti; petala spathulata, 28 × 12 mm., manifeste unguiculata (unguibus 6–7 mm. longis); ovarium longistipitatum (stipite circa 8 mm. longo), circa 10 × 4 mm., basi et secus margines indumento dense flavido-piloso praeditum, parte centrali plerumque nuda; ovula 8–12. Fructus maturus seminaque non cognita.

Type: **Brazil.** MARANHÃO: Municipio de Loreto, "Ilha de Balsas" region, between Balsas and Parnaiba River, ca. 20 km. south of Loreto, north of main house of Fazenda Trabalhosa, Apr. 8, 1962, G. & L.T. Eiten



FIGURE 1. Distribution of some species and varieties of *Hymenaea*. Insert showing general distribution of the genus.

4183 (NY, holotype!; UB!, isotype; additional type material was sent to K, SP, and US from UB).

Small tree, usually shrubby and branched near base. Leaves bifoliolate and petiolate, the petiole 12–16 mm. long, densely puberulent, the leaflets with twisted petiolule ca. 3 mm. long, the lamina obovate to oblong, the inner half much narrower than the outer half, the apex obtuse, the base oblique, with one side acute and the other side rounded, the midrib and secondary veins prominent on both sides, elevated beneath. Inflorescence corymbose, composed of few racemes, each with relatively few flowers, the pedicels 8–14 mm. long, the bracts not seen, bracteoles ovate to obovate, usually persistent during anthesis. Flowers relatively large, the bud before opening ca. 28×14 mm.; hypanthium campanulate, subsessile; calyx lobes oblong, grayish-brown tomentose outside, yellowish-brown tomentose-sericeous within; petals creamy white, spatulate, early deciduous; stamens 10, the filaments 30–35 mm. long, the anthers ca. 8 mm. long; ovary long-stipitate, obliquely oblong, densely yellowish pilose at base and along the margins but usually glabrate in the central parts, the style ca. 25 mm. long, glabrous, the ovules 8–12.

HABITAT AND DISTRIBUTION. This species is restricted to southeastern Maranhão and has only been collected a few times. It grows in sandy xeromorphic woodland, a type of *cerrado* (regionally referred to as 'chapada'). The flowering season is from February to April.

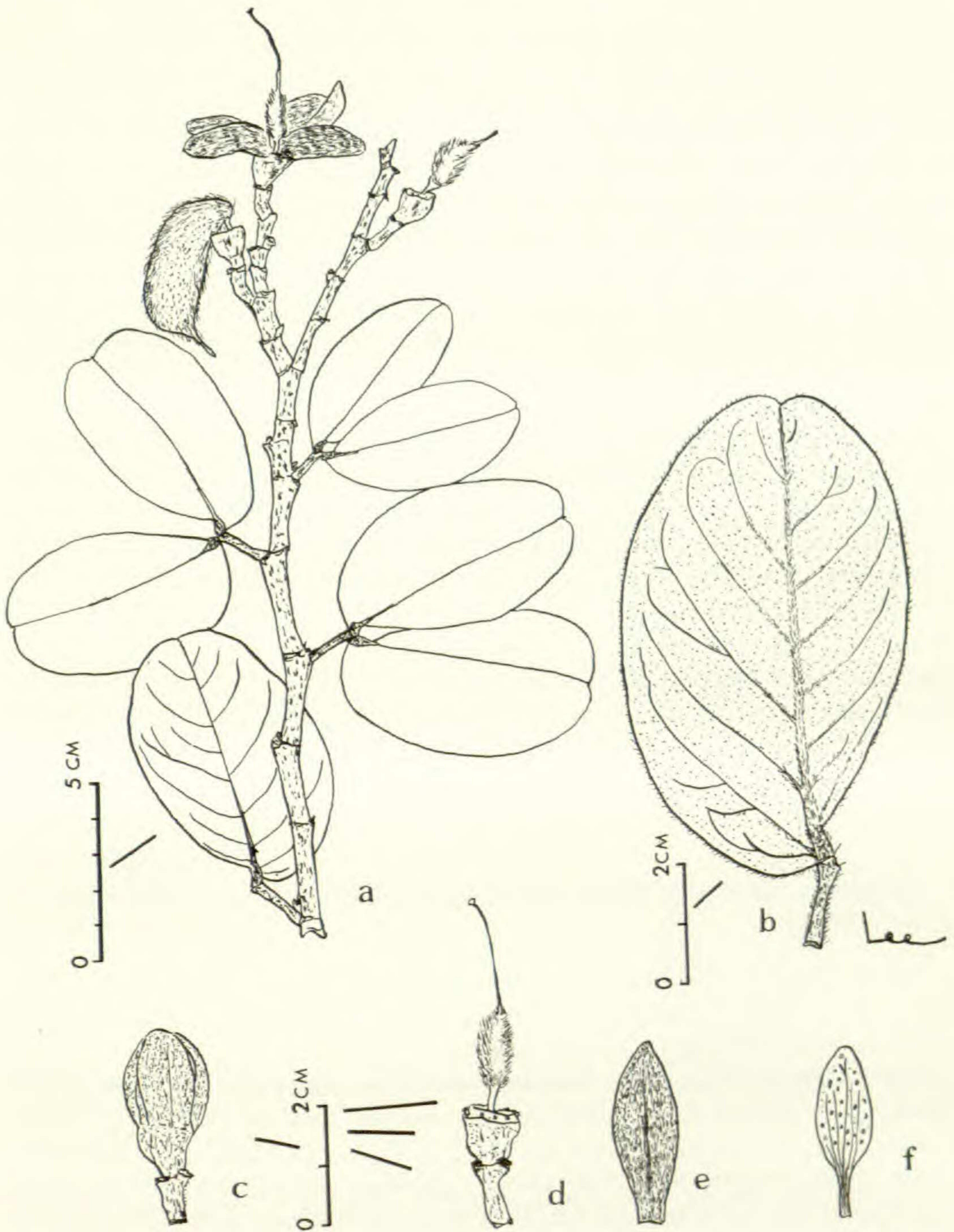


FIGURE 2. *Hymenaea maranhensis*. a, floral branch; b, leaflet (ventral side); c, flower bud; d, pedicel, hypanthium, and pistil; e, sepal (ventral side); f, petal.

Brazil. MARANHÃO. MUNICIPIO DE LORETO: "Ilha de Balsas" region between Balsas and Parnaíba River, Feb. 3, 1970, G. & L.T. Eiten 10460 (NY, UB); ca. 1 km. north of Parnaíba River at Santa Barbara, Feb. 18, 1971, 10669 (UB); ca. 6 km. SE of Loreto, Feb. 28, 1970, 10809 (A, UB).

VERNACULAR NAMES. "Jatobá do vaqueiro" and "jatobá da quaresma," Maranhão.

Professors G. and L. T. Eiten of Dept. VEG-IB, Universidade de Brasília, DF, Brazil, have kindly sent us their *Hymenaea* collections from Maranhão for study; from these the description of this new species was drawn. *Hymenaea maranhensis* is closely related to *H. eriogyne* and *H. aurea*, but can be separated from these species by (1) the vestiture pattern of the ovary which is densely pilose at the base and along the margins but usually glabrate in the central parts, (2) the relatively large and usually persistent bracteoles, (3) the long pedicels, and (4) the sessile hypanthium. It can be distinguished from the other species of sect. HYMENAEA, to which it belongs, by its pubescent ovary. It differs from the species in sect. TRACHYLOBIUM in its corymbose inflorescence and large flowers.

The specific epithet is derived from the name of the state of Maranhão, Brazil.

Hymenaea maranhensis has a partially pubescent ovary and spatulate petals, both characters of species which we considered to be more primitive and which occur in the rain forest; these characters, as well as the proximity of its range to the Amazon Basin, suggest the relictual nature of this species. Several presumably adaptative characters, such as the large and usually persistent bracteoles, the thickly coriaceous leaves, and the shrubby habit, indicate an evolutionary trend toward a drier habitat. Its resemblance to the more common *cerrado* species *H. stigonocarpa* also suggests an intermediate position between that species and those of the Amazonian rain forests (Lee, 1973, unpublished thesis).

Hymenaea rubriflora var. *glabra* Y. T. Lee & Andrade-Lima, var. nov.
FIGURES 1 & 3.

Varietatis *rubriflorae* similis sed in foliolis latioribus chartaceis utrinque glabris differt.

TYPE: Brazil. PERNAMBUCO: "Bonito, Mata secund., marg. estr. 1 km. além divisa Camocim de São Felix," Feb. 10, 1969, *D. de Andrade-Lima* 67-4929 (IPA, holotype!; UC, isotype!).

Small tree 5-6 m. tall. Leaves bifoliolate and petiolate, the petiole slender, 12-20 mm. long, glabrous, the leaflets with twisted petiolule ca. 4 mm. long, the lamina oblong, 10-14 × 4-7 cm., the inner half much narrower than the outer half, chartaceous, glabrous and shining on both sides, the apex obtuse to apiculate, the base oblique, with one side acute and the other side rounded, the midrib and secondary veins prominent, elevated beneath, the veinlets finely reticulate and conspicuous on both sides. Inflorescence corymbose, composed of few racemes, its branches short and densely reddish-brown tomentose, the pedicels 4-6 mm. long, bracteoles ca. 10 × 8 mm. The hypanthium campanulate, sessile to subsessile; calyx lobes oblong, obtuse, 16-18 × 6-9 mm.; petals red, lanceolate, 14-22 × 5-8 mm., short unguiculate (claws 2-3 mm. long); stamens ca. 25 mm. long, the anthers 4-5 mm. long, the filaments red to pink; ovary long-stipitate (the stipe ca. 5 mm. long), obliquely oblong, 7-8 × 3.5 mm., the style ca. 20 mm. long, the ovules 6-10. Fruit and seeds not seen.

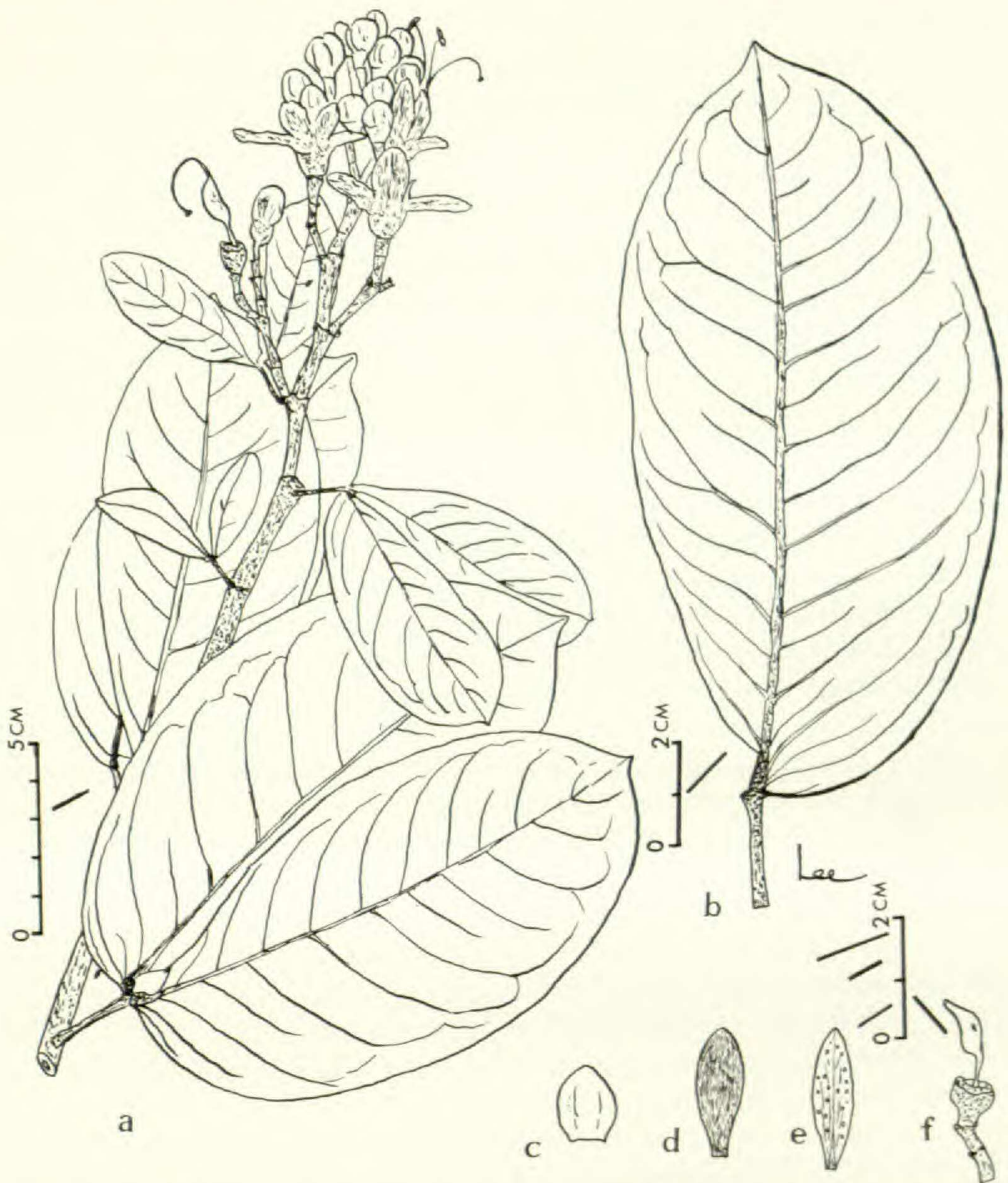


FIGURE 3. *Hymenaea rubriflora* var. *glabra*. a, floral branch; b, leaflet (dorsal side); c, bracteole (ventral side); d, sepal (ventral side); e, petal; f, pedicel, hypanthium, and pistil.

HABITAT AND DISTRIBUTION. This new variety is known solely from the type collection which was made in a secondary forest on a hilly range along the Atlantic coast. Flowering was in February.

VERNACULAR NAME. "Jatobá." This name is also used for other *Hymenaea* species.

Hymenaea rubriflora var. *glabra* may be easily separated from var. *rubriflora* by its broader, chartaceous, and glabrous leaflets.

The oblong, rather large (ca. 14×7 cm.), and glabrous leaflets are similar to those of *H. oblongifolia* var. *latifolia* which has been collected along Rio Gurjau, Pernambuco, and in southern coastal Bahia (Lee &

Langenheim, 1973). The two species, however, belong to different sections of the genus and can be separated by the type of inflorescence, vesture of the ovary, and the size of the flower.

Hymenaea courbaril L. Sp. Pl. 1192. 1753. var. *courbaril*. FIGURE 1.

Hymenaea courbaril var. *obtusifolia* Ducke, syn. nov., Arch. Jard. Bot. Rio de Janeiro 4: 47. 1925. Based upon a cultivated tree in Museu Goeldi, Belém, Pará, Brazil (from Ilha de Marajó?), *Ducke 16906* (MG, holotype!).

Hymenaea courbaril var. *villosa* Y.T. Lee & Andrade-Lima.

FIGURES 1 & 4.

Varietatis *subsessilis* similis sed in foliolis supra sparse pubescentibus infra dense villosis (praesertim secus costam et venas secundarias), floribus minoribus et ovario cum stipite distincto differt.

TYPE: Brazil. PARAÍBA: Along roadside near Paquevira de Natuba, Oct. 27, 1971, *Lee & Andrade-Lima 83* (UC, holotype!; UC, isotype!).

Medium-sized tree 8–10 m. tall, the trunk ca. 35 cm. in diameter, the branchlets lightly puberulent to glabrous. Leaves bifoliolate and petiolate, the petiole slender, 12–18 mm. long, slightly to densely puberulent, the leaflets with twisted petiolule 2–3 mm. long, the lamina broadly to narrowly falcate, 6–9 × 3.5 cm., the inner half much narrower than the outer half, coriaceous, shining and glabrate above, lightly to densely pubescent beneath, occasionally conspicuously short-hairy on margins, the apex acute to short-acuminate, the base oblique, with one side acute and the other side rounded, the midrib and secondary veins elevated beneath and densely villous, the veinlets finely reticulate beneath and obscure above. Inflorescence branches, pedicels, and flowering buds lightly ochraceous to yellowish-brown, puberulent, the pedicels ca. 6 mm. long. Flowering buds before opening ca. 18 × 7 mm.; the hypanthium with a stalk-like base 6–7 mm. long; calyx lobes obovate, ca. 14 × 7 mm., ochraceous to subgolden-brown pubescent outside, densely golden-brown tomentose within; petals creamy white, obovate, obtuse, 12 × 7 mm., sessile; stamens 22–25 mm. long, the anthers 5–6 mm. long; ovary short-stipitate (the stipe ca. 3 mm. long), obliquely oblong, ca. 5 × 3 mm., slightly pilose at one side of the base to glabrous, the ovules 8–12. Fruit oblong to cylindrical, 9–12 cm. long, 4.5–5.5 cm. wide, and 3.5–4.0 cm. thick, light to dark brown, sub-compressed, the suture not prominent. Seeds 4–8, obovoid to ellipsoid, about 2.5 cm. long, 2 cm. wide, and 1.2 cm. thick, the testa dark brown, its intrusion in the cotyledon producing 2 shallow furrows.

HABITAT AND DISTRIBUTION. The type specimen was collected from a moist forest in hills (elevation ca. 500 m.) in inland Paraíba about 70 km. west of the Atlantic coast. Two other specimens were collected in the same location and one in the neighboring state of Pernambuco. The flowering time is December and January.

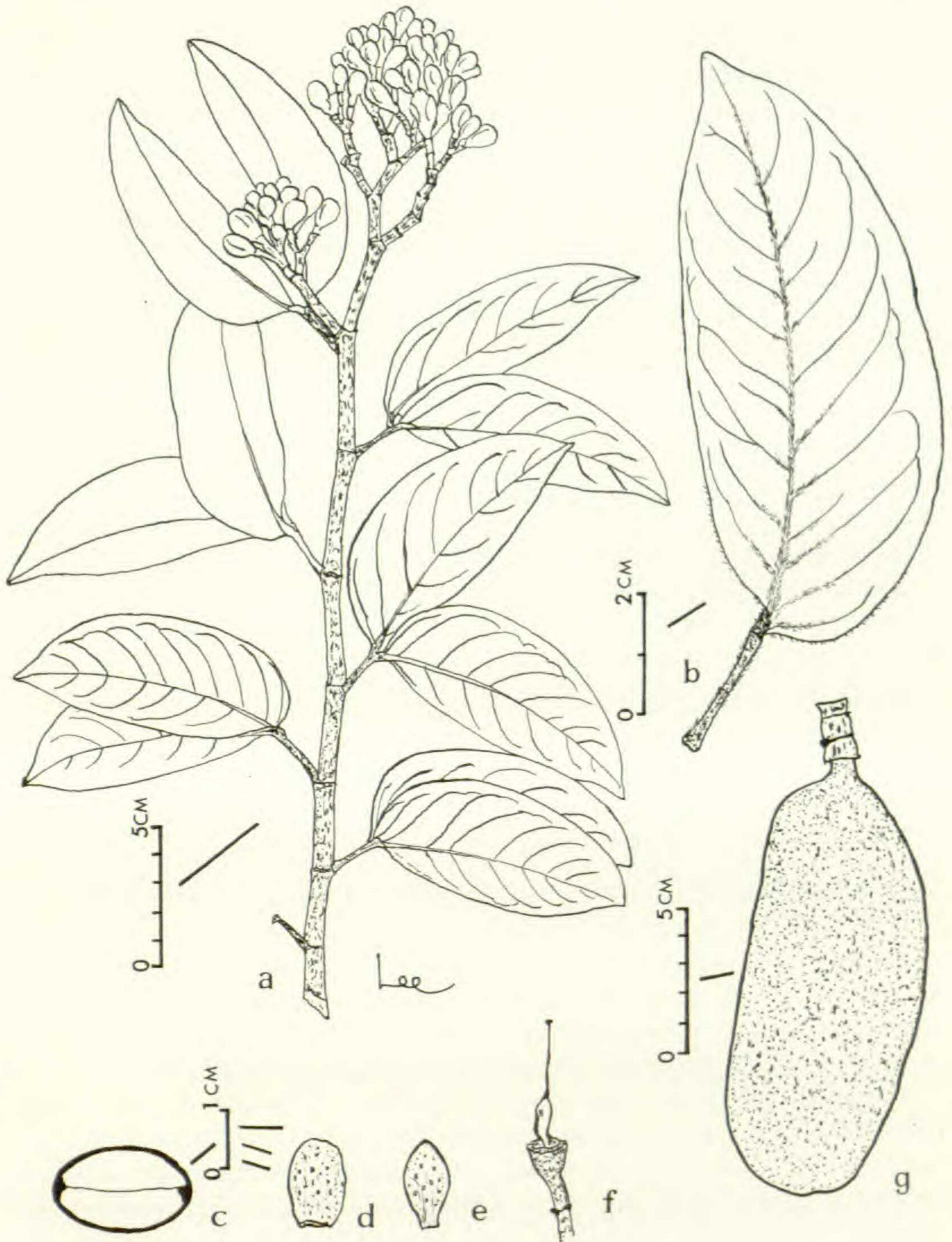


FIGURE 4. *Hymenaea courbaril* var. *villosa*. a, floral branch; b, leaflet (ventral side); c, seed (cross section) showing intrusions of testa; d, sepal (dorsal side); e, petal; f, pedicel, hypanthium, and pistil; g, mature fruit.

Brazil. PARAÍBA: in the vicinity of Natuba, Nov. 27, 1971, *Lee & Andrade-Lima 81 & 82* (UC); Alagoinha, Jan. 4, 1943, *L. Xavier 1183* (Herb., Univ. Federal de Paraíba). PERNAMBUCO: Tapera, Dec. 6, 1931, *D. B. Pickel 2853* (A, IPA).

VERNACULAR NAME. "Jatobá."

Hymenaea courbaril var. *villosa* is very similar to var. *subsessilis* but may be distinguished from it by (1) the lightly to densely villous lower surface of the leaflets, particularly the midrib and secondary veins, (2) the smaller flowers, and (3) the occasional pilosity at the inner side of the base of the ovary.

Because of its occasionally very densely hairy leaflets this variety has been confused with *Hymenaea martiana*, which is generally found in the drier habitats such as the thorn forests in northeastern Brazil and the savannah in central Brazil. However, *H. courbaril* var. *villosa* may be distinguished from *H. martiana* by its falcate leaflets, smaller flowers, and the vesture of the calyx.

Hymenaea courbaril var. *altissima* (Ducke) Y. T. Lee & Langenheim
comb. & stat. nov. FIGURE 1.

Hymenaea altissima Ducke, Annaes Acad. Brasil. Sci. 7: 207. 1935.

TYPE: Brazil. STATE OF RIO DE JANEIRO: Aveller, Fazenda Posse, 1930, A. Ducke RB 30306 (RB, lectotype!; MG!, R!, isotypes). Since Ducke merely listed six collections and did not indicate a type, one of these collections was designated by Egler (1963) as the "type."

HABITAT AND DISTRIBUTION. This variety has a very narrow distribution along the Atlantic coast. It has been collected in humid forests in the city of Rio de Janeiro, Guanabara, in Serra do Mar of the state of Rio de Janeiro, and in the city of São Paulo, São Paulo. Trees flower in November and December and have mature fruit in the following May.

VERNACULAR NAME. "Jatahy," commonly used for the entire genus in southern Brazil.

Hymenaea altissima was characterized by (1) small, short- or long-acuminate, and distinctly falcate leaflets on floral branches, (2) the highly reticulate venation of the leaflets conspicuous on both surfaces, (3) the relatively small flowers, and (4) the one- or many-seeded fruits.

The foliar characters and the relative size of flowers do not appear sufficiently significant to warrant specific status for this taxon. Of the two types of fruits described by Ducke, the one-seeded fruits are ovoid to obovoid and subcompressed, whereas the many-seeded fruits are oblong and strongly compressed, essentially similar to those of *H. courbaril* var. *courbaril*. Thus we conclude that the relationship of *H. altissima* is best expressed by varietal status under *H. courbaril*; the occurrence of two different types of fruits may be the result of factors controlling the availability of pollen during anthesis.

Hymenaea courbaril var. *longifolia* (Benth.) Y. T. Lee & Andrade-
Lima, comb. nov. FIGURE 1.

Hymenaea splendida var. *longifolia* Benth., in Martius, Flora Brasiliensis
15(2): 237. 1870.

TYPE: Brazil. BAHIA: Villada Barra, *Blanchet 3135* (R, holotype!; P, isotype!).

HABITAT AND DISTRIBUTION. Other than the type collection, this variety has been collected in Chapada do Araripe, in the border area of the states of Ceará, Piauí, and Pernambuco, which is surrounded by the thorn forest (*caatinga*), a vegetation type in northeastern Brazil. The vegetation of the *chapada* or highland is relatively dense, with scattered medium-sized trees and a thick ground cover (*cerrado* or *cerradão*). The difference of the highland vegetation from the surrounding areas probably results from its elevation (ca. 1000 m.) and more abundant annual rainfall. This variety flowers in November and December; the fruit usually falls in the following September.

VERNACULAR NAME. "Jatobá."

This taxon was originally described by Bentham (1870) as a variety of *H. splendida* and is known only from the type collection. It was brought to our attention by Professor D. de Andrade-Lima of the Instituto de Pesquisas Agronômicas, Recife, Pernambuco, Brazil. Additional material was collected during a trip to northeastern Brazil (*Lee & Andrade-Lima 95, 110, 111, & 112*) which enabled us to determine its present taxonomic status. *Hymenaea splendida* var. *splendida*, on the other hand, is considered to be synonymous with *H. courbaril* var. *stilbocarpa* (see below).

Hymenaea courbaril var. *longifolia* may be distinguished from other varieties of *H. courbaril* by the (1) large, rather long (ca. 12×7 cm.), glabrous, and usually obtuse leaflets, (2) medium-sized flowers (buds before opening ca. 30×12 mm.), (3) occasionally clawed petals, (4) externally ochraceous-puberulent and internally yellowish-tomentose calyx, and (5) unusual shape of the fruit, which is broadest at the distal end.

This variety may be separated from *H. stigonocarpa* var. *stigonocarpa*, which is characterized by glabrous leaflets and is commonly found in the *cerrado* of central Brazil, by its smaller flowers, long-stalked hypanthium (the stalk-like base is 6–7 mm. long), and the shape of the fruit.

***Hymenaea courbaril* var. *stilbocarpa* (Hayne) Y. T. Lee & Langen-**
heim, comb. & stat. nov. FIGURE 1.

Hymenaea stilbocarpa Hayne, *Arzneikunde gebräuchlichen Gewächses* 11: pl. 11. 1830 (*Flora* 10: 740. 1827, nomen).

Hymenaea confertifolia Hayne, *ibid.* pl. 9. 1830 (*Flora* 10: 740. 1827, nomen).
Based upon Sellow, "Brasilia" (B, probably destroyed; photographs, A!, K!, NY!, US!).

Hymenaea splendida Vog., syn. nov. *Linnaea* 11: 409. 1837. Based upon Sellow 1025, Bahia, Victoria, Brazil (B, probably destroyed; photographs, A!, K!, NY!, US!).

TYPE: Brazil. Ad Caldas in Minas Gerais, Sept. 1867, *Regnell 11–91* (K!). Hayne (1830) did not cite any specimens in his original description of this taxon. One of the four collections listed by Bentham (1870), the

first set of specimens ever cited as this taxon, is chosen here as the representative specimen.

HABITAT AND DISTRIBUTION. This variety is native along rivers in relatively dry forests on the plateau of the state of São Paulo and in adjacent parts of Rio de Janeiro and Minas Gerais. It has also been collected in southern Bahia, in the Federal District and southern Goiás. It is frequently cultivated in Belo Horizonte, Minas Gerais. It flowers from November to January; the fruit is usually mature in September.

VERNACULAR NAMES. "Jatobá"; "jatobá amarelo" (Minas Gerais); "jatobá mirim" (São Paulo); "jatobá miudo" (Ceará) and "jatobá de caatinga" (Bahia).

In describing this taxon, Hayne (1830) emphasized its dark-brown, sausage-shaped fruit. Although this variety has been confused with var. *altissima*, it is usually more like var. *courbaril*, and Bentham (1870) stated that fruit of the two could scarcely be distinguished. Ducke (1935) predicted that *H. stilbocarpa* would eventually be considered a subtropical variety of *H. courbaril*. The leaflets of var. *stilbocarpa* resemble those of certain populations of var. *courbaril* in western Mexico and the West Indies in shape, texture, and shiny surface, a similarity possibly explained by progressive radiation into adjacent subtropical regions. After evaluating all the characters, we agree with Ducke's view that the taxon is best considered as a variety of *H. courbaril*.

Hymenaea courbaril var. *stilbocarpa* is characterized by (1) calyx lobes rusty or dark brown and sericeous-velutinous externally, golden-brown sericeous internally, (2) fruit often dark brown and occasionally subterete, (3) flowers smaller than in var. *courbaril* and var. *subsessilis* but much larger than in var. *altissima*, and (4) medium-sized, subfalcate leaflets.

Hymenaea courbaril, therefore, is now considered to be a polymorphic species with six varieties — the five described here and the Amazonian variety *subsessilis*. The range of the species is essentially that of the genus. In the northern part of its distribution, *H. courbaril* var. *courbaril* has radiated into various ecosystems, whereas in the Amazon and south of it there is evidence of more morphological differentiation of *H. courbaril* in different geographical ranges characterized by distinctive habitats, leading to the recognition of these varieties.

***Hymenaea intermedia* var. *adenotricha* (Ducke) Y. T. Lee & Langenheim, comb. & stat. nov. FIGURE 1.**

Hymenaea adenotricha Ducke, Bull. Mus. Hist. Nat. (Paris), ser. 2. 5: 727. 1932.

TYPE: Brazil. AMAZONAS: Habitat silva non inundabili prope São Paulo de Olivença, Aug. 19, 1929, *Ducke RB 23282* (RB, holotype!; K!, P!, US!, isotypes).

HABITAT AND DISTRIBUTION. This variety has hitherto been known solely from the type collection made in São Paulo de Olivença, close to the Peruvian border, where only a single tree occurs in *terra firma* forest. A recent collection from Rio Curuquetê, near Cachoeira Santo Antonio (*Prance et al.* 14342), appears to belong to this variety. This suggests that the taxon may have a wider range than previously indicated. Flowering of the type collection was in August. Fruit and seeds have not been collected.

VERNACULAR NAME. "Jutaí," a name commonly used for the genus in the Amazon Basin.

Ducke in the original description recognized the affinity of this taxon to *Hymenaea intermedia* but distinguished *H. adenotricha* from it by (1) thickly coriaceous leaflets with the base broadly expanded on one side, (2) leaflets and petioles pubescent beneath, and (3) the ovary with short stiff hairs on one side. After examining the type, we consider *H. adenotricha* to be a western Amazonian variant of the typical form of *H. intermedia*.

Ducke (1935) also noted that the young fruits of this variety resembled those of *Peltogyne*, a neotropical genus which has been considered by some the genus most closely related to *Hymenaea*. This similarity, however, is only superficial. Mature fruit of *Peltogyne* is dehiscent, subtriangular to obliquely orbicular, flat, without pulpy endocarp, and usually one-seeded. This kind of fruit is significantly different from the fruit of *Hymenaea*, which is indehiscent, ovoid to oblong, with pulpy endocarp surrounding the seed or seeds. The leaves of *Peltogyne* are bifoliolate; however, in most species, the petiolule is distinct and cylindrical. The petiolule of *Hymenaea*, on the other hand, is twisted, with the outer side covered by the lamina of the leaflet. Additional evidence against an immediate affinity of the two genera comes from seedling characters. The difference in shape and number of primary leaves, again may indicate a relatively remote relationship between the two genera.

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