

NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA.

By HENRY PITTIER.

MORACEAE.

THE AMERICAN GENERA OF ARTOCARPOIDEAE-OLMEDIÆ.

Bibliographical researches connected with the identification of several species of this family led me to attempt the revision of the generic status of the Artocarpoideae-Olmediæ, the result of which is the reinstatement of the discarded *Naucleopsis* and *Noyera* and the dropping of *Maquira*. A tentative generic key is also given, our present knowledge of *Pseudolmedia*, *Olmedia*, *Perebea*, *Naucleopsis*, and *Noyera* reviewed, and a few new species described.

KEY TO THE AMERICAN GENERA.

- Male flowers without perianth; stamens more or less scattered on the surface of the receptacle.
- Female receptacle uniflorous; interfloral bractlets of male flowers spatulate..... PSEUDOLMEDIA (p. 432).
 - Female receptacles multiflorous; interfloral bracts more or less lamelliform and broad at base..... CASTILLA.^a
- Male flowers with perianth and 4 stamens.
- Female receptacles uniflorous.
 - Ovary superior; anthers introrse..... OLMEDIA (p. 433).
 - Ovary inferior; anthers extrorse..... OLMEDIOPHAENA.
 - Female receptacles multiflorous.
 - Style thick, short, and briefly bilobate..... PEREBEA (p. 436).
 - Style slender, elongate, and divided into 2 long, slender stigmas.
 - Perianth of female flowers none; ovary inferior, deeply immersed in the receptacle..... NAUCLEOPSIS (p. 439).
 - Perianth of female flowers 4-phyllous; ovary inferior but not at all immersed in the receptacle..... HELICOSTYLIS.
 - Perianth of female flowers monophyllous, thick, smooth at tip; ovary inferior, half immersed in the receptacle..... NOYERA (p. 441).

^a See Contr. Nat. Herb. 13: 247. 1910.

PSEUDOLMEDIA.^a

Three representatives of this genus are found in the eastern valleys of Peru, one on the Pacific slope of Guatemala, and a fifth in the mountains of Cuba, Jamaica, and Porto Rico. The type species is *Pseudolmedia havanensis* Trécul. Of this the author describes and illustrates the flowers, male and female, and a few details of the fruit will be found below. Three more species, all from Peru, are described in the same paper. Of one of these only the female flower is known, drawings of which are given, while of the two others, and also of the newly made *P. oxyphyllaria*, the male flowers only have been more or less thoroughly reported upon. A sixth species, *P. bucidaefolia* Bello,^b is doubtful on account of the assumed two-flowered female receptacles and other characters that do not belong to the genus.

KEY TO THE SPECIES.

Leaves glabrous or nearly so.

Primary veins 10 to 12 (?); bracts of male flowers glabrescent.. 1. *P. havanensis*.

Primary veins 15 or more.

Leaf blades 5 to 9 cm. long, 2 to 3 cm. broad; bracts of male flowers pubescent..... 2. *P. laevigata*.

Leaf blades 15 to 20 cm. long, 4 to 6 cm. broad; bracts of male flowers distinctly silky..... 3. *P. oxyphyllaria*.

Leaves more or less hairy beneath.

Leaves oblong-lanceolate, 7 to 16 cm. long, 2 to 4.5 cm. broad, downy beneath on the midrib and primaries, ciliate on the margin; stipules silky-ferruginose..... 4. *P. ferruginea*.

Leaves oblong-elliptic, 13 to 23 cm. long, 5 to 10 cm. broad; midrib and primaries sparsely hairy; stipules densely yellowish silky..... 5. *P. macrophylla*.

1. *Pseudolmedia havanensis* Trécul, Ann. Sci. Nat. III. 8: 130. pl. 5. f. 149-154. 1847. FIGURE 57.

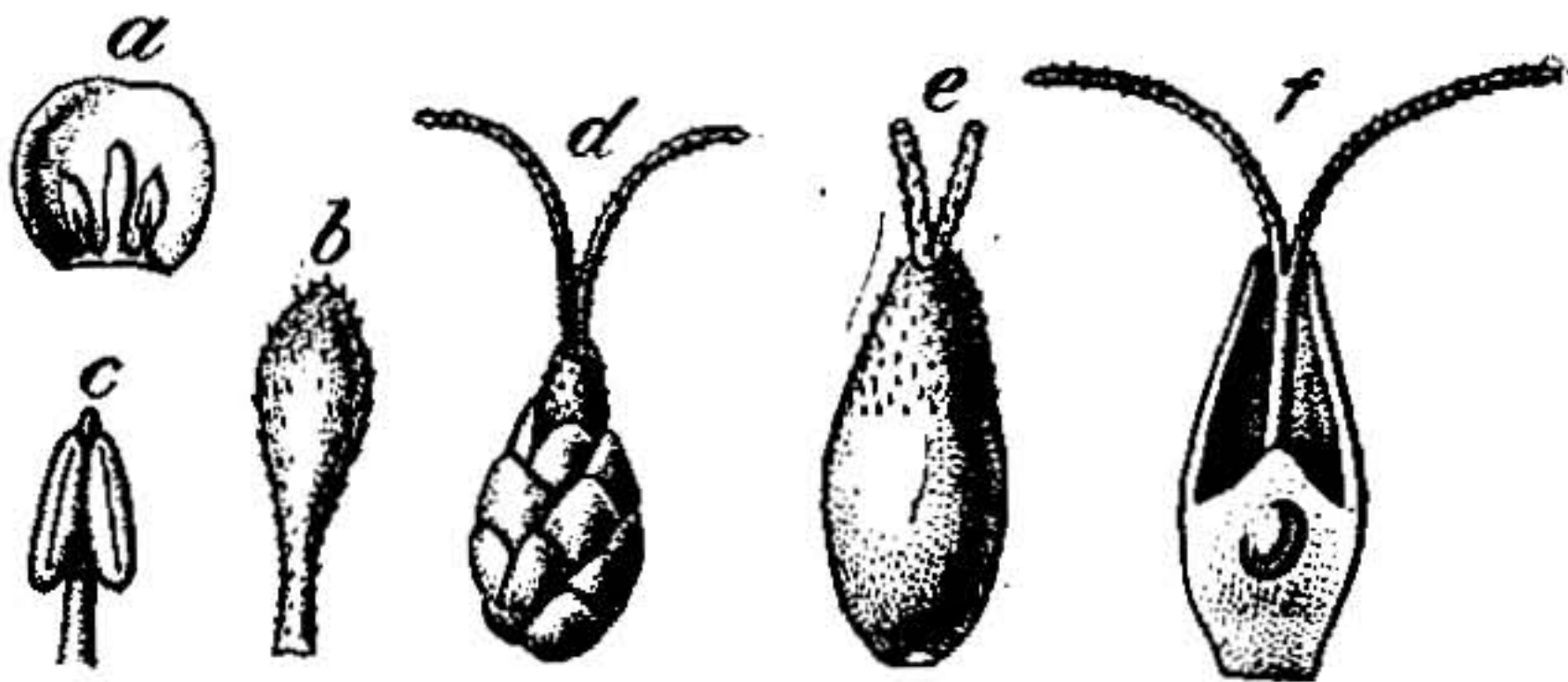


FIG. 57.—*Pseudolmedia havanensis*, floral details. a, Upper bract of involucre with three stamens inserted at the base, the middle one abortive; b, one of the spatulate bractlets intermingled with the anthers; c, stamen; d, female flower; e, the same without its squamose involucre; f, the same opened longitudinally to show insertion of the pendent ovule. Various sizes enlarged. From Trécul, Ann. Sci. Nat. III. 8: pl. 5.

Pseudolmedia spuria Griseb. Fl. Brit. W. Ind. 152. 1864.

^a *Pseudolmedia* Trécul, Ann. Sci. Nat. III. 8: 130. pl. 5. f. 149-154. 1847.

^b Anal. Soc. Esp. Hist. Nat. 12: 109. 1883.

Olmedia cubensis Klotzsch, *Linnaea* 20: 523. 1847.

CUBA: In forests, *Poeppig*; San Jose, *Wright* 2223.

JAMAICA: *Swartz, Alex. Prior*; Saint Anns, *Grisebach*.

PORTO RICO: Along Rio Blanco in Sierra de Naguabo, February 5, 1886, *Sintenis* 5382.

PANAMA: Lion Hill, *Hayes* 639.

The fruit of *P. havanensis* has never been described; it is like an egg-shaped berry, about 14 mm. long, carnose, yellowish or red (?), stipitate. The seed is ovoid-elongate, 7 mm. long, 4.5 mm. in diameter, and covered with a brownish integument, *Wright* 2223.

2. *Pseudolmedia laevigata* Trécul, *Ann. Sci. Nat.* III. 8: 131. 1847.

PERU: Without locality, *Herb. Webb*.

3. *Pseudolmedia oxyphyllaria* Donnell Smith, *Bot. Gaz.* 20: 294. 1895. FIGURE 58.

GUATEMALA: Volcan de Tecuamburro, Santa Rosa, alt. 2,000 meters, *Heyde & Lux*, male flowers, February, 1893, *Donnell Smith* 4429 (U. S. National Herbarium no. 481107).

4. *Pseudolmedia ferruginea* Trécul, *Ann. Sci. Nat.* III. 8: 131. *pl. 5. f. 155-157.* 1847. FIGURE 59.

Olmedia ferruginea *Poepp. & Endl.* *Nov. Pl. Poepp.* 2: 31. 1838.

PERU: Primeval forests around Lake Ega, Amazon Basin, *Poeppig*.

5. *Pseudolmedia macrophylla* Trécul, *Ann. Sci. Nat.* III. 8: 132. 1847.

PERU: Without locality, *Herb. Webb*.

OLMEDIA.^a

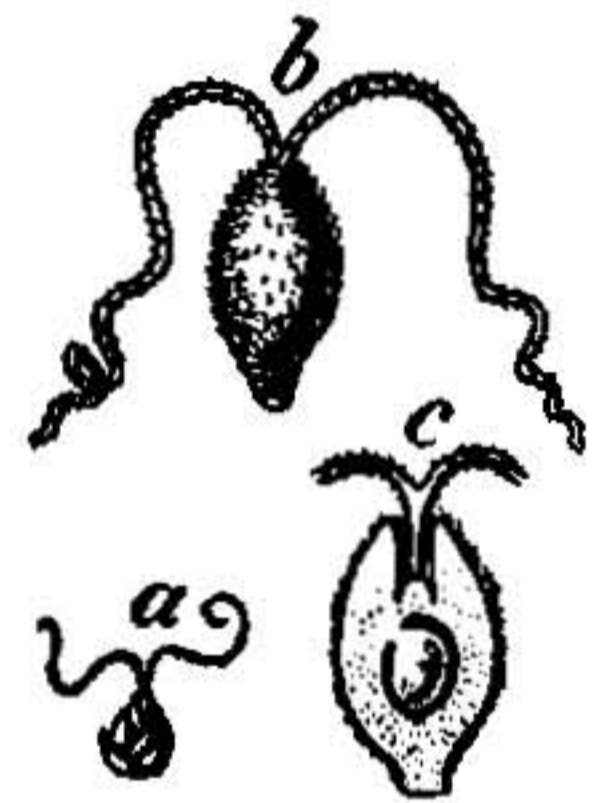


FIG. 59.—*Pseudolmedia ferruginea*, female flower. a, Female flower with involucre; b, the same without involucre; c, longitudinal section of the same. a, Natural size; b, c, considerably enlarged. From Trécul, *Ann. Sci. Nat.* III. 8: *pl. 5.*



FIG. 58.—*Pseudolmedia oxyphyllaria*, details of male flower. a, Outer bract; b, one of the middle bracts; c, group of stamens with one spatulate bractlet; d, d', single stamens. Scale 8.

The type of the genus is *Olmedia aspera* Ruiz & Pav., and the fundamental characters are, the female inflorescences bearing a single flower, surrounded by a bracteal involucre, and the tubulose or urceolate perianth surrounding the four stamens. Of the eight species known up to the present, one, *O. laurina*, is doubtful, its apparent affinities being with *Perebea calophylla* Benth. &

Hook. (*Olmedia calophylla* Poepp.); two, *O. aspera* and *O. towarensis*, have been poorly described on almost complete specimens; of *O. rigida* and *O. laevis*, only the female flowers have been superficially mentioned; while of the remaining species, *O. caucana*, *O. grandifolia*, and *O. falcifolia*, we know little besides the leaves and the male flowers. Under such conditions, any attempt at a natural grouping of the species according to their specific affinities is almost useless, and we must have recourse mainly to the leaf to establish an artificial key.

^a*Olmedia* Ruiz & Pav. *Syst. Veg. Peruv. Chil.* 257. 1798.

KEY TO THE SPECIES.

- Leaves entirely glabrous.
 Female flowers pedicellate..... 1. *O. laurina*.
 Female flowers sessile.
 Bracts of female flowers silky, with ciliate margin 2. *O. rigida*.
 Bracts of female flowers hairy, with smooth margin..... 3. *O. laevis*.
- Leaves more or less hairy.
 Male receptacles sessile..... 4. *O. aspera*.
 Male receptacles pedunculate.
 Leaves with entire margin..... 5. *O. towarensis*.
 Leaves with more or less distinctly dentate or sinuate margin.
 Leaves distinctly sinuate-serrate; male perianth 2-lobulate..... 6. *O. caucana*.
 Leaves obscurely sinuate.
 Leaves obovate-oblong, large; stipules 20 to 30 mm. long; pedicels 5 to 10 mm. long..... 7. *O. grandifolia*.
 Leaves elliptic, middle-sized; stipules 6 to 7 mm. long; pedicels 3 mm. long 8. *O. fulcifolia*.

The area of the genus extends on both sides of the Andes from Peru to Costa Rica and eastward to the Guianas.

1. *Olmedia laurina* Baill. *Adansonia* 11: 305. 1875. (An *Perebea*?.)
 COLOMBIA: *Triana*.
2. *Olmedia rigida* Klotzsch & Karst. *Linnaea* 20: 524. 1847.
 VENEZUELA: In forests around Tovar, *Karsten*.
3. *Olmedia laevis* Ruiz & Pav. *Peruv. Chil. Prodr.* 129. *pl.* 28. 1794; Klotzsch & Karst. *loc. cit.* 524.
 PERU: *Ruiz*.
 ECUADOR: *Eggers* 15746.
4. *Olmedia aspera* Ruiz & Pav. *Syst. Peruv. Chil.* 257; H. B. K. *Nov. Gen. & Sp.* 7: 162. *pl.* 633. 1825. FIGURE 60.
 PERU: *Ruiz*.
 ECUADOR: *Ruiz*.
5. *Olmedia towarensis* Klotzsch & Karst. *loc. cit.* 526.
 VENEZUELA: In the forests around the colony of Tovar, *Karsten*.
 COSTA RICA: Suerre, plains of Santa Clara, alt. 300 meters; male flowers only, April, 1896, *Donnell Smith* 6781. Identification doubtful.
6. *Olmedia caucana* Pittier, *sp. nov.* PLATES 78, 79. FIGURE 61.
 A small tree, 4 to 6 meters high, with erect-ascending limbs; bark of the branchlets brown, covered with a short, fugacious pubescence.
 Leaves distichous, rather large, provided each with a pair of caducous stipules; stipular scars joining at acute angle opposite the insertion of the petiole. Petioles hairy, rounded, thick, 8 to 10 mm. long. Leaf blades elliptic, cuneate at the base, abruptly narrowed into a long tip, inequilateral, the thinner half narrower and less rounded, 15 to 22 cm. long, 5 to 7 cm. broad, scabrous on both faces; main nerve and primary veins hairy and very prominent underneath; margin irregularly sinuate-serrate. Stipules lanceolate, broad at base, acuminate, purplish brown, 10 to 12 mm. long, scarious and minutely ciliate on the margin, slightly pubescent outside along the midrib.



OLMEDIA CAUCANA PITTIER.



OLMEDI A CAUCANA PITTIER.

Male inflorescences pedicellate, geminate in the axils of the leaves, but often solitary by abortion. Pedicels 8 to 10 mm. long, sparsely pubescent, provided at the base with two small scaly bracts. Receptacles flat, 8 to 10 mm. in diameter, covered outside with 2 or 3 concentric rows of bractlets, these ovate-lanceolate, more or less contracted at the base, usually acute at the tip, from 2 to 5 mm. long, 1.5 mm. broad or less, irregularly ciliate and covered outside with a few thick hairs. Flowers sessile, 20 to 25 on each receptacle. Perianth urceolate before anthesis, broadly short-tubular or campanulate after, monophyllous, thin, translucent, minutely pubescent outside, bilobulate; lobules broad, subulate, each with two dark, slender veins running from base to tip. Stamens 4, introrse before anthesis, glabrous; filaments nearly 4 mm. long, flattened and broad at the base, geniculate just below the anthers, these exerted, ovoid, about 1.8 mm. long. Pollen minute.

Female flowers, fruits, and seeds unknown.

Type in the U. S. National Herbarium, no. 530988, collected at La Manuelita near Palmira, Cauca Valley, Colombia, altitude about 1,200 meters, December 28, 1905, by H. Pittier (no. 803). Flowers.

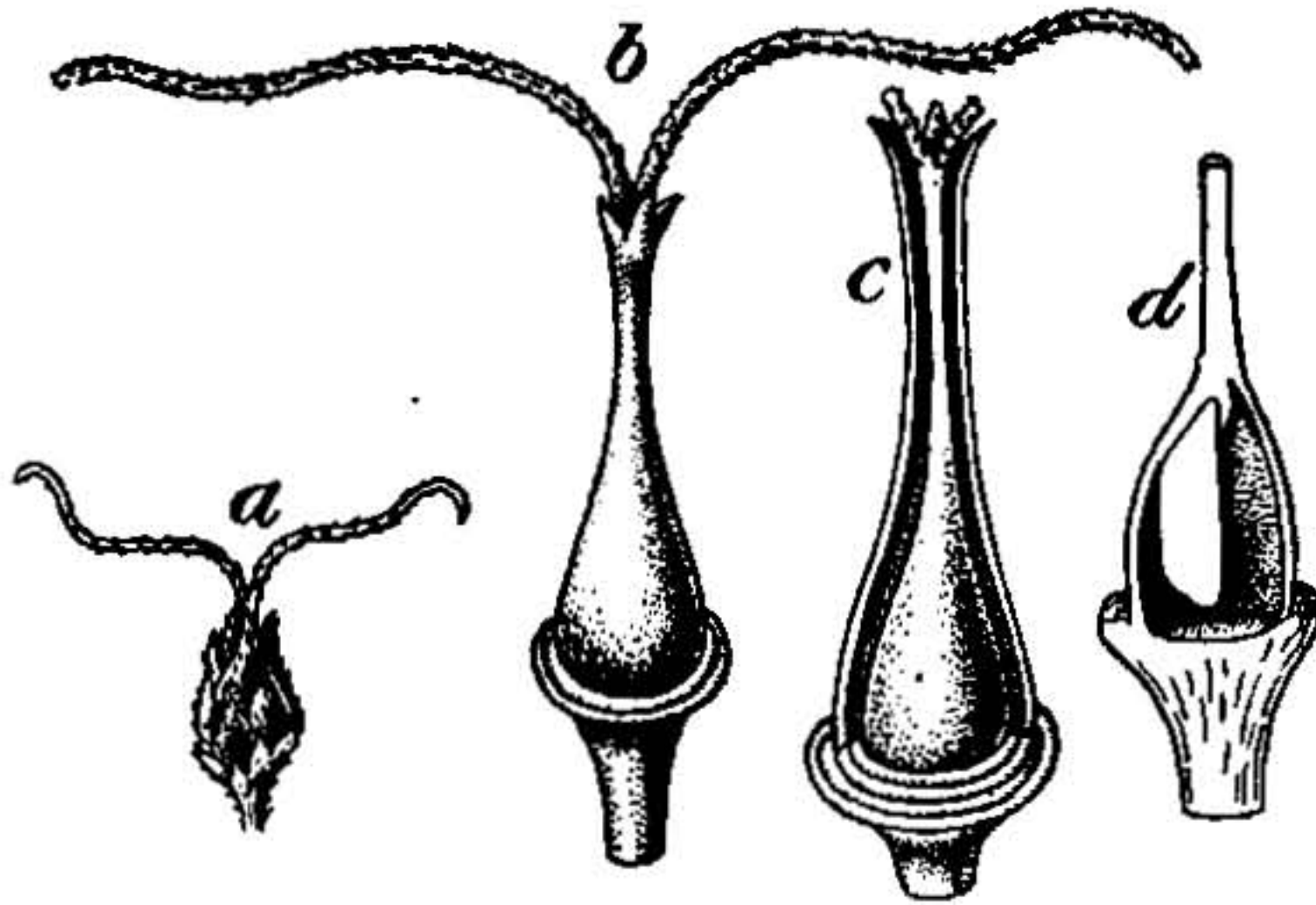


FIG. 60.—*Olmedia aspera*, female flower and fruit. *a*, Female flower; *b*, the same divested of its involucre; *c*, the same with the perianth open longitudinally; *d*, fruit, opened to show attachment of seed. *a*, Natural size; *b-d*, considerably enlarged. From Trécul, Ann. Sci. Nat. 8: pl. 2.

EXPLANATION OF PLATES 78, 79.—Twig with leaves and male inflorescence, plate 78 showing the upper and plate 79 the under surface of the leaves. From field photographs by H. Pittier.

7. *Olmedia grandifolia* Trécul, Ann. Sci. Nat. III. 8: 128. 1847. FIGURE 62.
FRENCH GUIANA: Cayenne, *Martin* (in Herb. Mus. Paris).

8. *Olmedia falcifolia* Pittier, sp. nov. FIGURE 63.

A small tree; branchlets hirsute, rough, slender.

Leaves alternate, distichous; petioles thick, 4 to 6 mm. long, hairy; leaf blades elliptic, inequilateral, 10 to 24 cm. long, 2.5 to 7 cm. broad, acute at the base, narrowing at the end into a slender tip 3 to 4 cm. long, both faces glabrous or nearly so; main nerves and primary veins scarcely noticeable above, prominent and subscabrous underneath; margin entire or obscurely sinuate-dentate. Stipules 6 to 7 mm. long, lanceolate, broad at base, acute at tip, brownish, minutely hairy outside.

Male inflorescences 1 or 2-geminate in the axils of the leaves; pedicels about 3 mm. long, with two small scarios bracts at the base; receptacle flat about 6 mm. in diameter, covered outside with 2 to 4 concentric rows of bracteoles, these more or less scarios, broader, thicker, and shorter in the inner row, lanceolate-acuminate and delicate in the marginal row, all hairy pubescent outside and with irregular margins. Flowers sessile, 15 to 20 in each receptacle; perianth 1.5 to 2 mm. long, minutely

pubescent outside, urceolate or globose before anthesis, opening into 4 stipitate lobes. Stamens 4, introrse in the closed perianth, exerted later; filaments about 1.5 mm. long, broad and flattened at base, more or less twisted; anthers ovoid, about 1.2 mm. long. Pollen minute (about 0.012 mm. in diameter) with 3 (or 4) pores.

Type in the U. S. National Herbarium, no. 577150, collected along the river Hacum, near Terraba, Diquís Valley, altitude about 150 meters, February, 1892, by A. Tonduz. Male flowers only.

COSTA RICA: Type collection; woods of Currés near Boruca, Diquís Valley, at about 50 meters altitude, Pittier, male flower only, March 4, 1898 (Instituto ffs. geog. Costa Rica, no. 12101; U. S. National Herbarium, no. 615381).

Species characterized by the long, curved acumen of its leaves, which are also mostly bent sidewise (i. e., in dried specimens, toward the twig to which they are attached.)



FIG. 61.—*Olmedia caucana*, details of male flower. a, Tip of floral bud before anthesis; b, open flower, early stage; c, open flower after dehiscence of the anthers; d, d', d'', various stages in the development of the anthers. Scale 3.

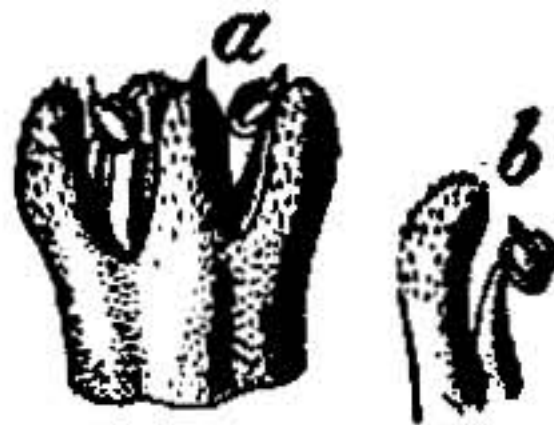


FIG. 62.—*Olmedia grandifolia*, male flower and stamen. a, Male flower; b, stamen inserted at base of one of the perianth segments. Both enlarged. From Trécul, Ann. Sci. Nat. III. 8: pl. 2.

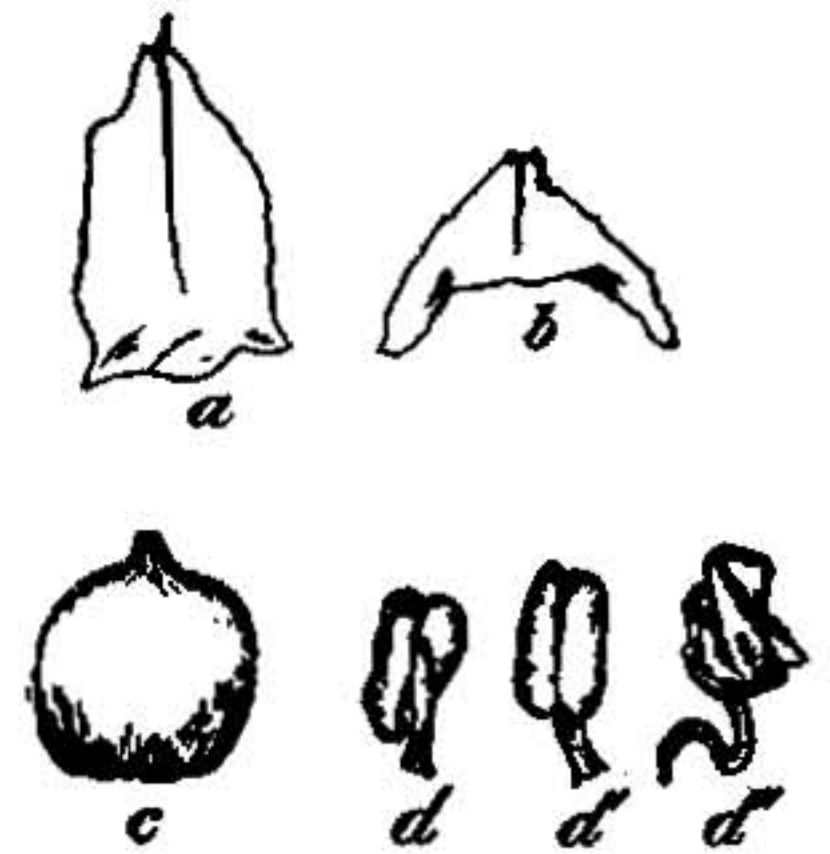


FIG. 63.—*Olmedia falcifolia*, details of male flower. a, Outer bract; b, inner bract; c, floral bud; d, d', d'', stamens at different stages. Scale 6.

PEREBEA.^a

Our knowledge of this genus, the type of which is *Perebea guianensis* Aubl., is very defective. Its species are dioecious, according to Bentham and Hooker,^b and this seems to be generally the case, although Karsten^c expressly refers to his *P. xanthochyma* as a monoecious species.

In the male flowers the perianth is 4-parted, with thick, biseriate, imbricate divisions, this again agreeing with Bentham and Hooker's definition. But Engler says, "Blüthenhülle der männlichen Blüten 4-teilig mit dicken Abschnitten in 2 Kreisen." It is not easy to understand how the segments of a monophyllous perianth can be placed alternately in two concentric circles. In *P. integrifolia* Karst., represented with *P. xanthochyma* in the above-cited plate 102, we see, however, that the perianth is divided almost to the base and that two of the divisions, apparently smaller, are exterior.

^a *Perebea* Aubl. Pl. Guian. 2: 953. 1775.

^b Gen. Pl. 3: 373. 1880.

^c Fl. Columb. 2: 23. pl. 102. 1869.

In my *P. castilloides*, which also differs much from all the other species in the shape and size of its leaves, the segments of the male perianth are quite free and narrowly unguiculate. We are in the dark as to the characters of the male flowers in *P. guianensis*, *P. laurifolia*, and *P. markhamiana*, and it is doubtful whether *P. calophylla* has a monophyllous or polyphyllous perianth, although it is reported as "4-partitus."

In *Olmedia caucana*, described for the first time in the present paper, the leaves are strikingly like those of *Perebea markhamiana*, and the only reason, in the absence of female inflorescences or fruits, for placing the species in the first rather than in the second genus, is that the perianths are clearly gamophyllous, the base forming a narrow tube and the tips being divided into two (or perhaps later into four) lobules. A surprise may be in store for the botanist who shall first be enabled to investigate the female flowers of this species or the male flowers of *Perebea markhamiana*. Mr. O. F. Cook drew my attention to the fact that, while in the other known female flowers of *Perebea* the style simply branches into two short, pubescent lobules, there are broad, leaf-like stigmas, with an undulate margin, in the latter species. Should other characters in the male flowers or in the fruits show such wide departure from those attributed to *Perebea*, there could be no hesitation in concurring in Mr. Cook's suggestion to separate *P. markhamiana* as a distinct generic type.

As the situation now is, every species of the genus, but for one or two exceptions, is so imperfectly described that the leaf is nearly the only part on which an analytical synopsis can be sketched, unless, as is to be hoped, there are better materials in the European herbaria.

The genus seems to belong exclusively to the Hylaea formation, and its known representatives are in the Amazonian basin, in the Guianas, and on the eastern side of the Isthmus of Panama.

KEY TO THE SPECIES.

- Leaves and stipules very large, the first ones cordate; perianth 4-phyllous..... 1. *P. castilloides*.
- Leaves more or less rounded or cuneate at base.
 - Leaves subsessile, smooth, remotely dented; stipules rather large..... 2. *P. guianensis*.
 - Leaves petiolate.
 - Leaves entirely smooth.
 - Style glabrous, branching into 2 thick, glabrous stigmas..... 3. *P. laurifolia*.
 - Style hairy; stigmas rather long..... 4. *P. xanthochyma*.
 - Leaves smooth above, more or less hairy beneath.
 - Leaves minutely pubescent beneath..... 5. *P. integrifolia*.
 - Leaves stiff-hairy beneath, serrate..... 6. *P. markhamiana*.
 - Leaves scabrous beneath, entire..... 7. *P. calophylla*.

1. *Perebea castilloides* Pittier, sp. nov.

PLATES 80, 81. FIGURE 64.

A tree 10 to 15 meters high with the habit of *Castilla*. Latex yellowish. Young shoots with thick medulla, densely hairy outside.

Leaves alternate, each provided with two deciduous stipules. Petioles very thick, about 1 cm. long, densely hairy. Leaf blades very large, 39 to 45 cm. long, 14 to 16 cm. broad, oblong-lanceolate, deeply cordate, long-acuminate, subglabrous, except on the hairy midrib, and dark green above; paler and hairy on the midrib, veins, and venules beneath; midrib and primary veins very prominent underneath, the latter connected by regularly disposed transverse oblique and anastomosed venules; margin entire. Stipules large, 5 to 7 cm. long, 1 to 2 cm. broad at base, lanceolate, long-acuminate, hairy outside along the midrib, glabrous along the margin and inside, more or less deeply purple colored.

Male inflorescences in clusters of 4 in the axils of the leaves, each receptacle provided at the base with two dark-colored bracts, one of which is included in the other. Outer bract long triangular acuminate, hairy outside, smooth inside, 1.5 to 2 cm. long, about 0.8 cm. broad at the base, this enveloping the peduncle; inner bract covered outside with long, sparse hairs, 1 to 1.5 cm. long, 0.5 to 0.6 cm. broad at the base, abruptly contracted at about the middle into a rounded tip, included in that of the outer bract. Peduncles rather slender, hairy, 3 to 4 cm. long. Receptacles flat, 1.5 to 2 cm. in diameter, covered outside by several rows of hirsute, imbricate bracteoles, the basal ones ovate, obtuse, or acuminate, the marginal ones narrower and longer. Flowers numerous, sessile. Perianth polyphyllous, quite hairy, surrounded at the base with a crown of stiff hairs; segments 4, spatulate-calyptate, 1 to 1.3 mm. long, very narrow at the base, opposite the divisions of the perianth and attached to them by the lower end, the two of the inner circle shorter than the exterior ones; filaments flattened and winged, sometimes subciliate at the edges; anthers semiexserted, small, heart-shaped.



FIG. 64.—*Perebea castilloides*, details of male flower. a, Flower from which one segment of the perianth and two anthers have been removed; b, two stamens inserted at base of perianth segments; c, a single stamen. Scale 9.

Female flowers, fruits, and seeds unknown.

Type in the U. S. National Herbarium, no. 615379, collected at Punta Peña near Chiriqui (Bocas del Toro), Panama, May, 1903, by H. Pittier. Male flowers only.

A remarkable species, worth investigating if the milk contains rubber as reported. It is doubtful whether it really belongs to *Perebea*; the leaves, very large and cordate, have a facies quite distinct from the one usual in this genus and remind of those of *Castilla*; the stipules are likewise large and striking; the male perianth is polyphyllous, its four divisions standing far apart and each bearing a stamen at the base; the shape of the anthers is also quite unusual. But for the lack of knowledge of the female flowers and fruits I should not hesitate to establish for this species a new genus.

EXPLANATION OF PLATES 80, 81.—Twigs with young and mature leaves and male inflorescences. From photographs taken by H. Pittier of fresh material from the tree furnishing the type specimen.

2. *Perebea guianensis* Aubl. Pl. Guian. 2: 953. pl. 361. 1775.

FRENCH GUIANA: Along the Courou River, *Aublet*.

3. *Perebea laurifolia* Trécul, Ann. Sci. Nat. III.8: 133. pl. 5. f. 1847. FIGURE 65.

FRENCH GUIANA: Without locality, *Martin*.

4. *Perebea xanthochyma* Karst. Fl. Columb. 2: 23. pl. 112. 1865.

COLOMBIA: Wet forests along the Meta River, near Villavicencio (*Karsten*).

5. *Perebea integrifolia* Karst. Fl. Columb. 2: 23. 1865.

COLOMBIA: With the foregoing.



PEREBEA CASTILLOIDES PITTIER.



PEREBEA CASTILLOIDES PITTIER.

6. *Perebea markhamiana* Benth.; Hook. f. Trans. Linn. Soc. Bot. II. 2: 211. 1886.
Castilloa markhamiana J. Collins, Rep. Caoutch. Comm. 12. pl. 3. 1872.
 PANAMA: In low woods at Lion Hill, Hayes 7.
7. *Perebea calophylla* Benth. & Hook. Gen. Pl. 3: 371. 1883.
Olmedia calophylla Poepp. & Endl. Nov. Pl. Poepp. 2: 32. pl. 146. 1838.
 PERU: Virgin forests around Ega Lake, near Amazonas River, flowers October,
 Poeppig.

NAUCLEOPSIS.^a

But for the unusual hair-like stigmas that emerge gracefully from the tips of the so-called perianths of Miquel's *Naucleopsis*, the likeness of the drawings with my own specimens from Costa Rica would be almost perfect. These delicate organs do not, however, correspond satisfactorily with the enlarged illustrations of the same, nor with the description

of *Naucleopsis glabra* Spruce, on which Bureau later founded his genus *Ogcodeia*. We are thus led to suspect that those styles of *Naucleopsis*, as shown in the plate referred to, under I (number omitted) and 31 (all three figures), are fictitious, as are also possibly the strongly marked teeth at the tip of the supposed perianths. Eliminating these details the original description of Miquel would be modified in the following manner:



FIG. 65.—*Perebea laurifolia*, details of female flower. a, Single flower; b, flower with perianth partly removed to show free upper part of ovary; c, longitudinal section showing the semi-inferior ovary and the insertion of the ovules. All enlarged. From Trécul, Ann. Sci. Nat. III. 8: pl. 5.

Flores dioici. Masculi incogniti. *Feminei nudi, bracteolis sublignosis interpositis, in receptaculo convexo deinde ovoideo basi pluriserialiter imbricato numerosis, extimi depauperati. Ovarium inferum, in receptaculo utrinque immersum, uniloculare, uniovulatum, ovulo prope apicem lateraliter pendulo anatropo. Stylus elongatus inter bracteolis inclusus, stigmatibus 2 elongatis. Fructus receptaculo adnato; semen ovoideum.*

Thus conceived, in accordance with the details obtained from the examination of *N. glabra* and *N. naga*, *Naucleopsis* becomes a well-defined genus, intermediary perhaps between *Perebea*, *Noyera*, and *Castilla*, but with such distinctive characters as to preclude its amalgamation with any of them.

Engler seems to have treated the subject in a very desultory manner, his main purpose being apparently to reduce the number of genera. This is made evident by his careless handling of Miquel's illustrations of *Naucleopsis*, reproduced in the *Pflanzenfamilien*^b as those of *Perebea*

^a *Naucleopsis* Miquel in Mart. Fl. Bras. 4¹: 120. pl. 35. 1853. *Ogcodeia* Bur. in DC. Prodr. 17: 282. 1873.

^b 3¹: 84. 1889.

laurina, thus affording a ready excuse for including Miquel's genus with the latter, a proceeding that is in no wise justified by the little we know of the Olmediae.

The discovery in Costa Rica of a representative of *Naucleopsis* is in itself highly interesting, as it shifts far toward the west and north

the areal limits of the genus. *Naucleopsis macrophylla* and *N. glabra* both belong to the Amazonian basin. The discontinuous distribution indicated by the presence of a third species in Central America may be only apparent as, on account of the facility with which trees are overlooked by collectors, the same species, or perhaps others, may yet be found in the intervening region. Nor would it appear very extraordinary if it came to light even that *Naucleopsis* is in reality a monotypic genus, a suggestion that is not supported nor yet precluded by our present fragmentary information.

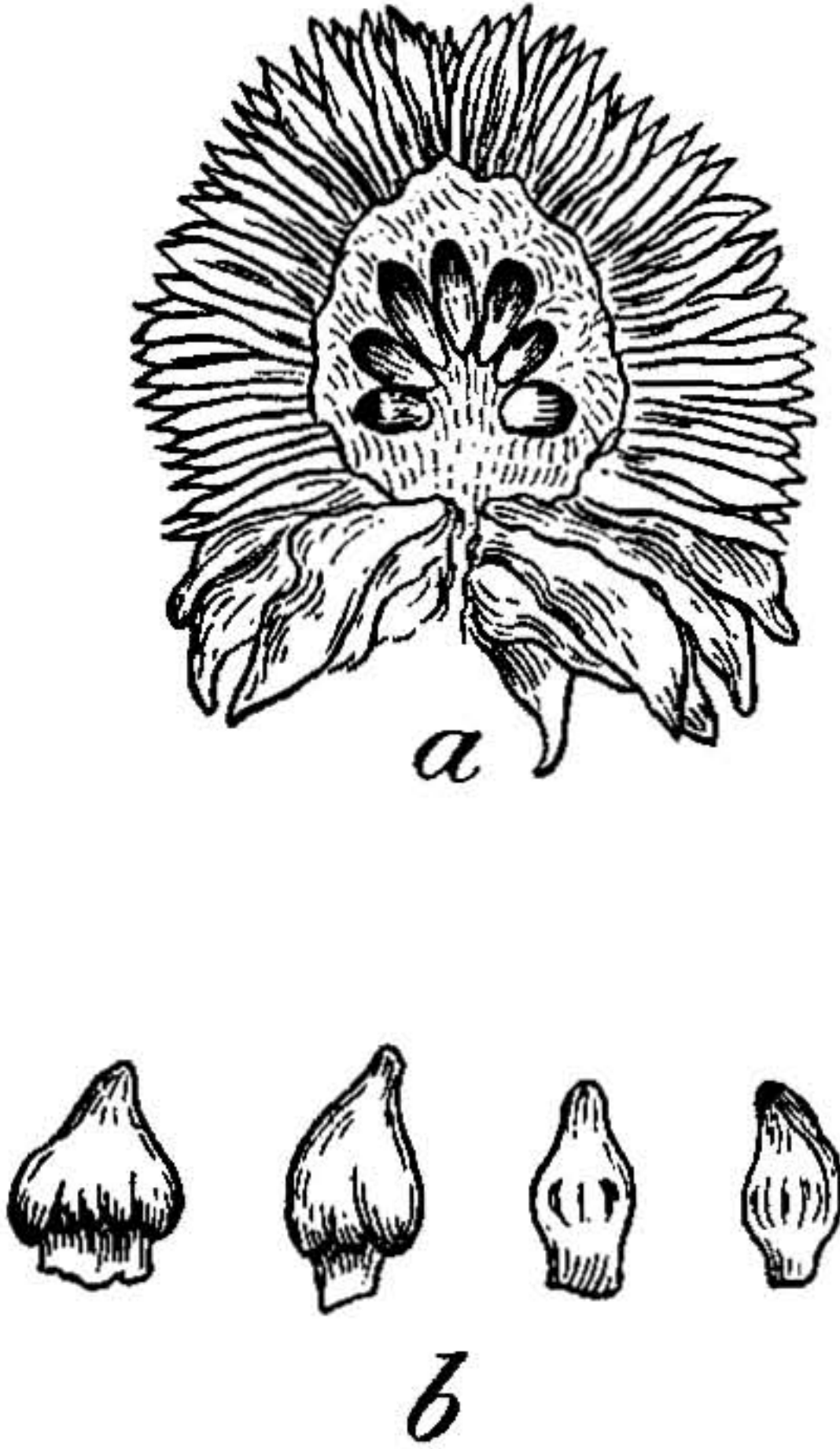


FIG. 66.—*Naucleopsis naga*, inflorescence. *a*, Vertical section; *b*, bracts at base. Natural size.

1. *Naucleopsis macrophylla* Miquel in Mart. Fl. Bras. 4¹: 120. pl. 35. 1853.

PLATE 82.

BRASIL: Here and there in the Amazonian forests (*von Martius*).

Leaves more or less pubescent beneath.

EXPLANATION OF PLATE 82.—*a*, Twig with parts of leaves and a female inflorescence; *b*, view from side, and *c*, view from beneath of female inflorescence; *d*, longitudinal section of the same; *e*, two single flowers. Reproduction in part of Miquel's plate.

2. *Naucleopsis glabra* Spruce, ined. (Type of genus *Ogcodeia* Bureau.)

BRASIL: Near Panuré on the Uaupes River, *Spruce* 2793.

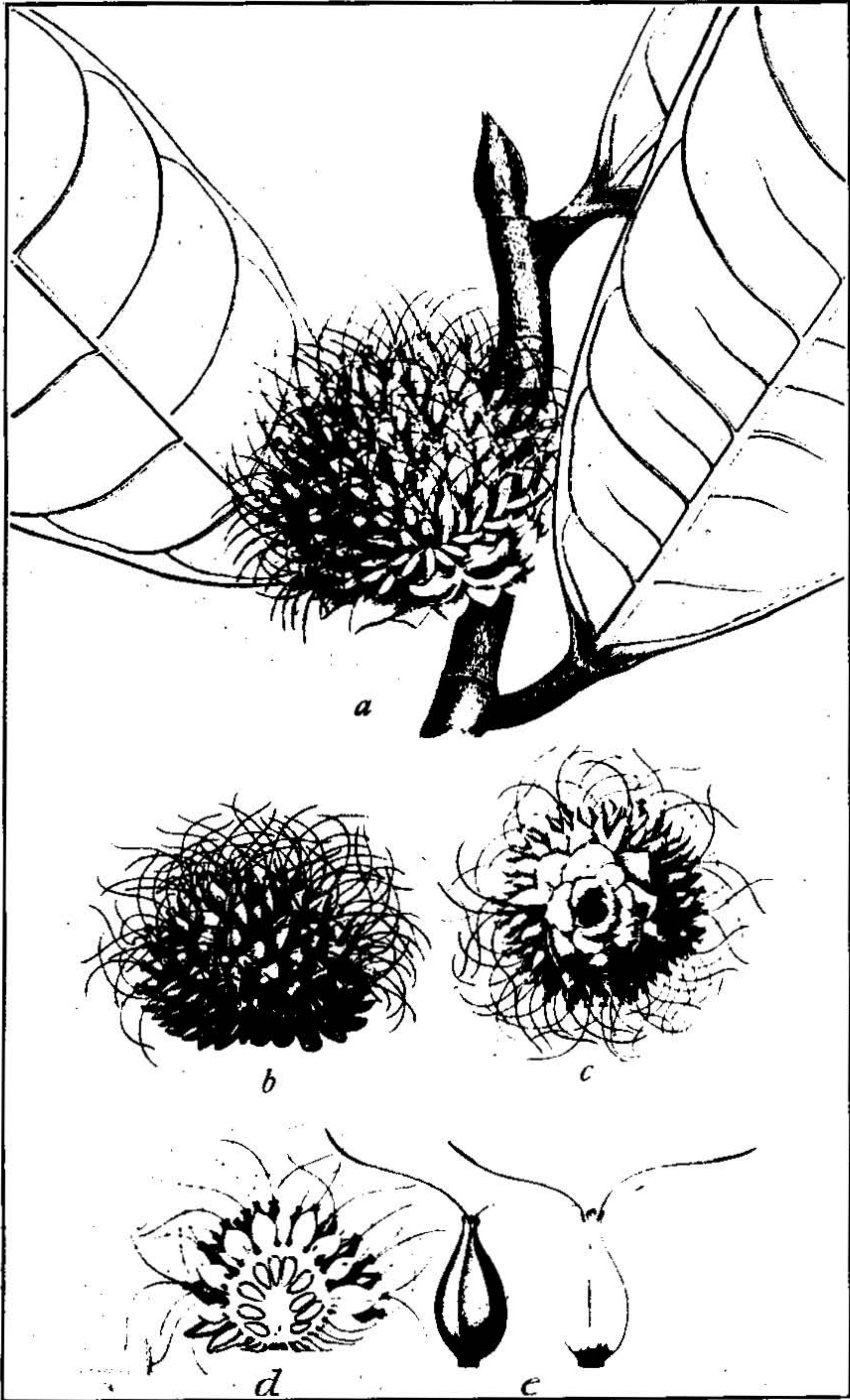
Leaves glabrous.

3. *Naucleopsis naga* Pittier, sp. nov.

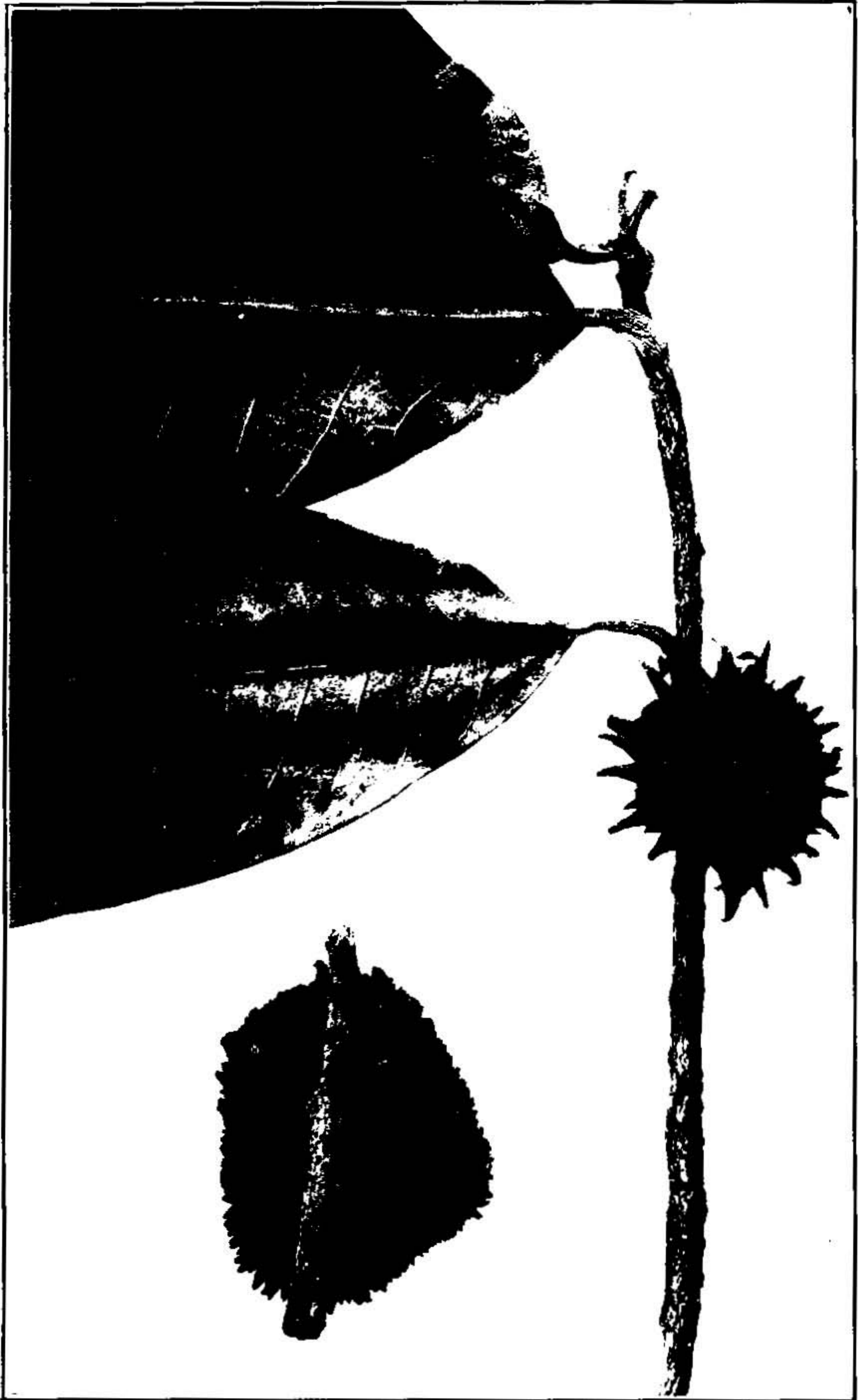
PLATES 83-85. FIGURES 66, 67.

A tree 8 to 10 meters high. Branchlets subangulose, covered with a grayish, verruculose and striate bark. Leaf scars ovate, those of the stipules hardly apparent, with a high angle opposite the leaf. Internodes short and irregular.

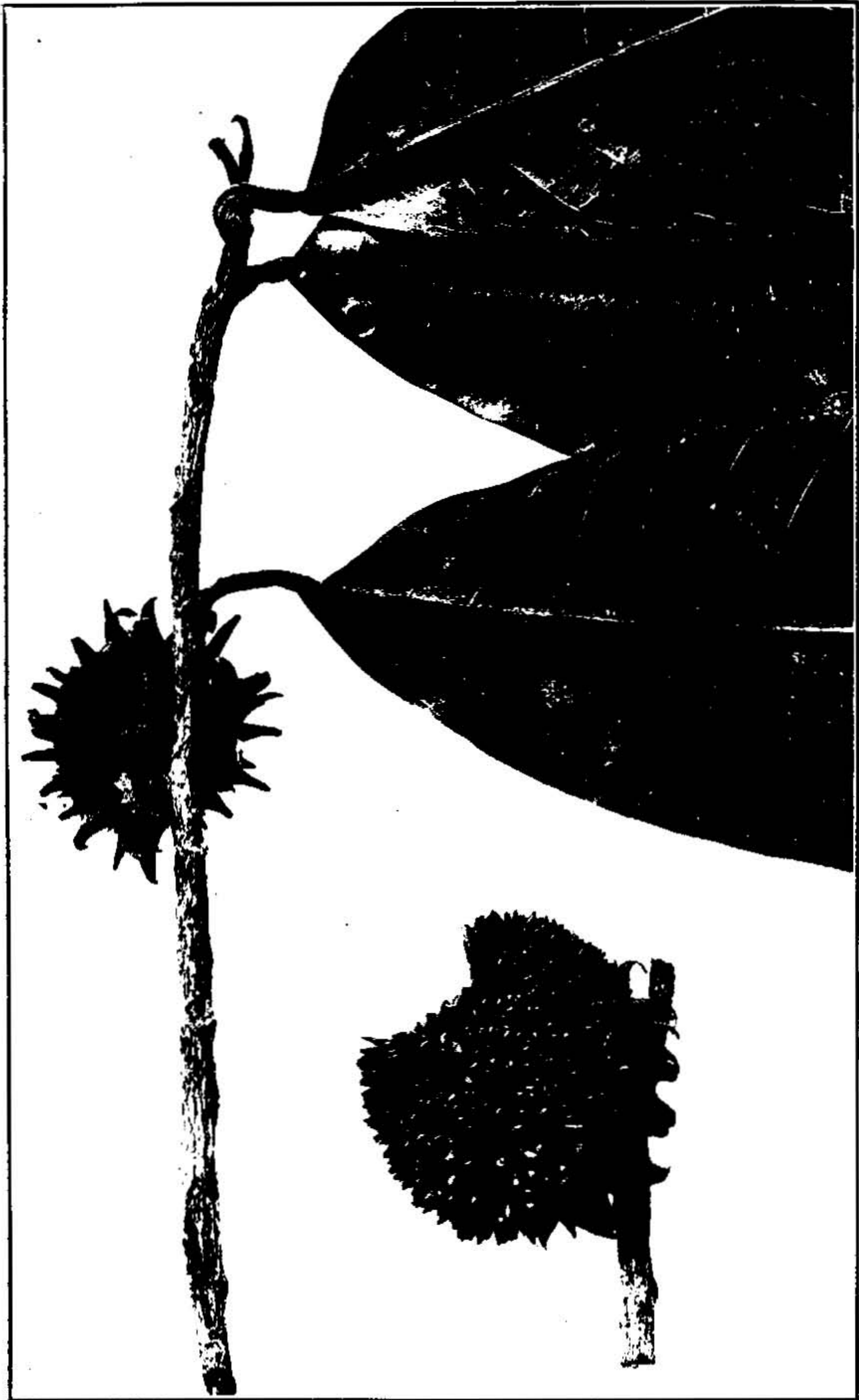
Leaves large, distichous, more or less pendulous, massed at the ends of the twigs, entirely glabrous. Petiole of the mature leaf 2.3 cm. or less thick, obscurely canaliculate, longitudinally striate in dry specimens. Leaf blades 30 to 45 cm. long, 8 to 12 cm. broad, elliptic-lanceolate, cuneate-rounded at base, acuminate at tip; midvein and lateral veins obvious on both sides, but more conspicuous on the lower face, where the midvein is prominent, quite smooth and longitudinally striate; primary veins 22 to 24; margin entire. Stipules geminate, small (not over 15 mm. long), early deciduous, minutely pubescent on the back.



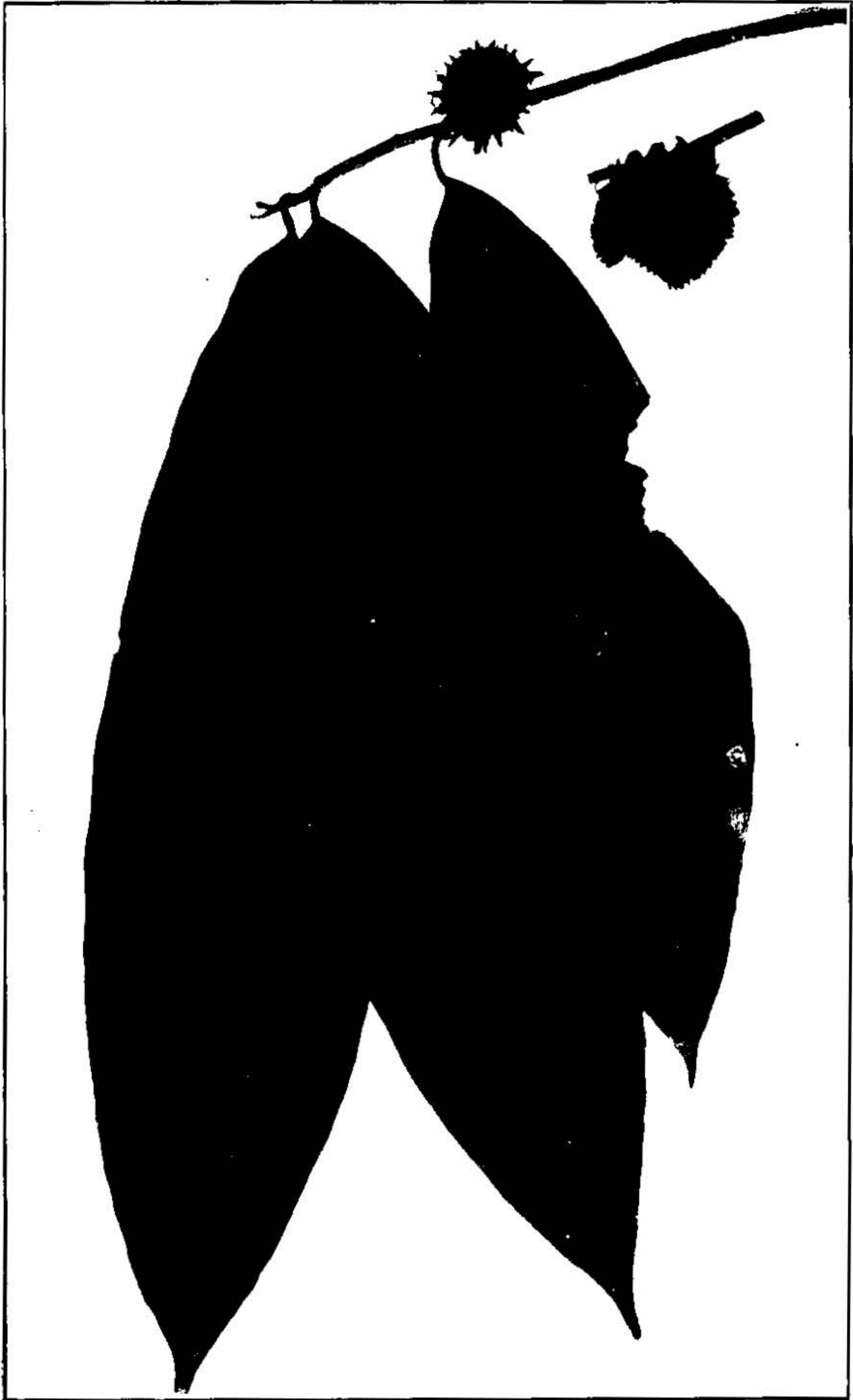
NAUCLEOPSIS MACROPHYLLA MIQ.



NAUCLEOPSIS NAGA PITTIER.



NAUCLEOPSIS NAGA PITTIER.



NAUCLEOPSIS NAGA PITTIER.

Female inflorescence sessile and solitary in the axils, altogether about 4 cm. in diameter. Receptacle at first convex, then ovoid, covered outside with 2 or 3 concentric rows of thick, ovate-lanceolate bracts, 8 to 15 mm. long, the basal ones broader (about 8 mm.), the marginal ones rather narrow (1 to 2 mm.), all brownish and squamulose; upper face of receptacle densely covered with erect, stiff bractlets, about 7 mm. long, claviform and attenuate at both ends, longitudinally plicate at the base, minutely hairy or squamulose (lepidote), enlarging later to 10 mm. or more long with an increased thickness. Flowers interspersed among the bractlets, 5 or 6 of the latter forming a kind of pseudoperianth around each style. Ovary deeply immersed in the receptacle, ovoid, the ovule hanging from the top of the cell; style 6 to 8 mm. long, the lower part (2 to 4 mm. long) filiform, glabrous, inclosed in the receptacle, the upper part, also glabrous, gradually thickening and then dividing into two diverging stigmas, 4 to 4.5 mm. long, thick, arcuate and with a verruculose, revolute stigmatic surface.

Fructiferous receptacle woody, shaped into an ovoid head; bracts and bractlets enlarged; styles persistent. Nutlets ovoid, about 4 mm. long, with a brown testa.

Type in the U. S. National Herbarium, no. 577712, collected in pastures at La Colombiana, plains of Santa Clara, Costa Rica, altitude about 100 meters, June, 1899, by H. Pittier. Female flowers and fruits only. Also in Instituto fis. geog. Costa Rica, no. 13444.

Jimenez, plains of Santa Clara, alt. 200 meters, *J. J. Cooper*, leaves only; common name *naga* (Instituto fis.-geogr. no. 10221; U. S. National Herbarium no. 615391).

EXPLANATION OF PLATES 83-85.—Twigs with female inflorescences and young fruits. From field photographs by H. Pittier. Natural size.



FIG. 67. *Naucleopsis naga*, bractlets and style. *a, a'*, Interfloral bractlets (*a*, on floriferous, *a'*, on fructiferous inflorescence); *b*, style. Scale 3.

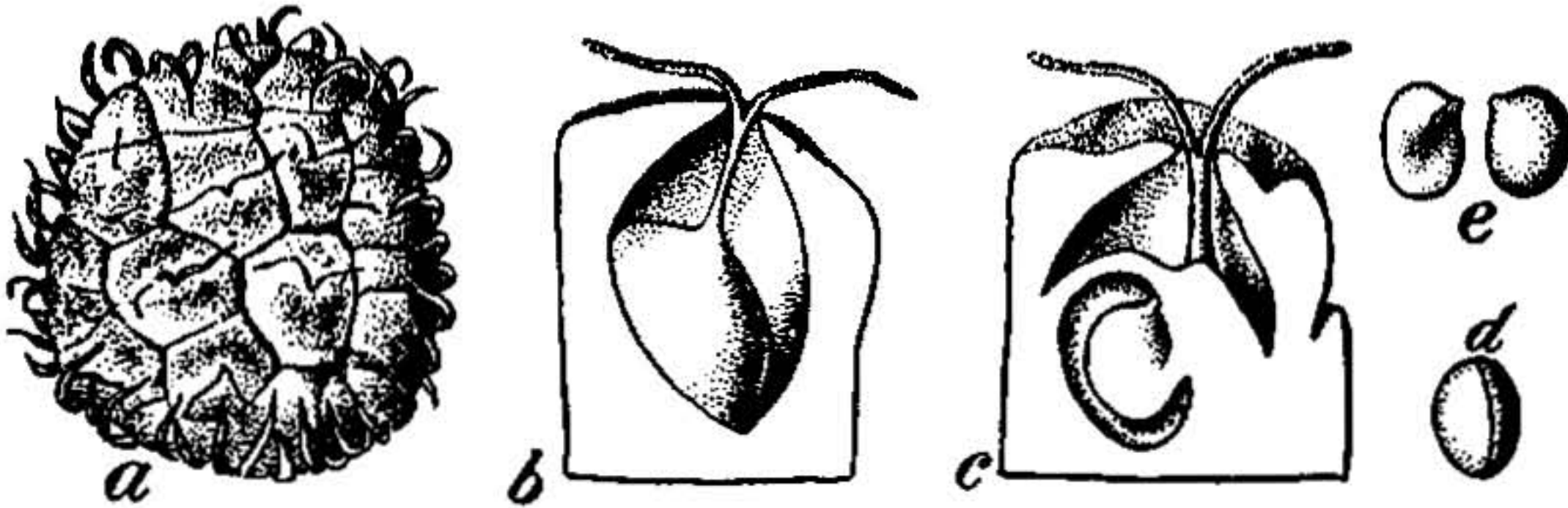


FIG. 68.—*Noyera rubra*, inflorescence and seed. *a*, Female inflorescence; *b*, female flower with the perianth partly cut off, showing the semi-inferior position of the ovary; *c*, vertical section of the same showing the anatropous, pendent ovule; *d*, seed; *e*, cotyledons separated, showing the short radicle. All enlarged. From Trécul, Ann. Sci. Nat. III. 8: pl. 5.

NOYERA.^a

This monotypic genus is founded on *N. rubra* Trécul, a tree from French Guiana, specimens of which, collected by Martin, are in the Paris Herbarium. To judge from the given illustrations (reproduced

^a Ann. Sci. Nat. III. 8: 1. 1847.

here, fig. 68), the receptacle is flat, or at the most convex, and bordered by long, linear, subulate bracts. The ovules are half immersed in the former and the tubulose perianth is short, thick, smooth at tip, and opening by a small pore. The male inflorescence is unknown.

Bentham & Hooker^a admit the genus *Noyera*, but amalgamate with it *Naucleopsis* and *Ogcodeia*, which differ not only by characters of the perianth, but also by the globose-ovoid receptacle in which the ovaries are deeply immersed. Engler^b goes further, including *Noyera*, as conceived by Bentham and Hooker, in *Perebea* as a simple section. This does not appear to be justified, because in the latter genus the perianth is formed by four segments that are free or connate, disposed in two series, and always distinct at the tip. Besides, while the receptacle is more or less flattened, as in the typical *Noyera*, the ovaries are not immersed, the styles are short and thick, and the stigmatic branches are either short or, in one species (*P. markhamiana*), expanded, but never long-filiform. And, as we have just seen, *Naucleopsis* stands still further from *Perebea*, on account of its ovaries inclosed in the body of the head-like receptacle.

MAQUIRA, A GENUS WITHOUT A STATUS.^c

This apparently monotypic genus was established by Aublet on immature specimens collected in French Guiana and described in his supplement to the *Plantes de la Guiane* entitled: "Plantes de la Guiane françoise dont on n'a pu se procurer des caracteres complets." No new material seems to have been collected, and it is quite surprising to find how, notwithstanding, the description of the genus has been steadily growing until it has reached its perfection in Baillon's *Histoire des Plantes*.^d

While certain characters attributed by Aublet to the above-named *Maquira* agree with descriptions by subsequent authors of other species, belonging to distinct genera, it would occur to no one to deduce any near affinity between *Maquira* and *Perebea* from the comparison of plates 361 and 389 of the *Plantes de la Guiane*, already referred to. Besides, had such relationship existed, it is not likely that it would have escaped the notice of the careful French botanist and have failed to be mentioned by him. Trécul,^e who made a thorough investigation of the group, does away with the genus *Maquira* and places its representative among his "species ignotae" attributing it with doubt to the genus *Olmedia*. The same view is taken by Miquel in his *Urticineae* of the *Flora Brasiliensis*.^f But

^a Gen. Pl. 3: 373.

^b Pflanzenfam. 3¹: 84.

^c *Maquira* Aubl. Pl. Guian. Suppl. 36. pl. 389. 1775.

^d 6: 206. 1877.

^e Ann. Sci. Nat. III. 8: 129. 1847.

^f 4¹: 115. 1852.

26 years after the publication of Trécul's memoir, Bureau in De Candolle's *Prodromus*^a reinstates *Maquira* in its former generic rank, giving it the following characteristics: "Stylus crassus. Stigma bilobum, lobis brevibus crassis. Ovarium inferum." The description of the style and stigma belongs to *Perebea*, in which, according to Trécul and his followers, the ovary is semi-inferior, while Aublet, the founder of the genus, leaves us in doubt as to this point.

Now, as Trécul does not seem to have seen any mature specimens of the typical *Perebea guianensis*, it is likely that he drew his conclusions as to the relative position of the ovary from an examination of his *Perebea laurifolia*, believed by Bureau to be precisely the same thing as *Maquira guianensis* and credited by him with an inferior ovary, while he gives this organ as superior in *Perebea*. And it is thus that by a little shifting of the ovary, up or down, from the middle position as given by Trécul, the reinstatement of the old and obscure *Maquira* becomes possible for the monographer of the *Prodromus*.

Baillon^b not only follows Bureau, but completes the fragmentary descriptions hitherto given, so that, except for the unknown seeds, there is not any doubt left for the casual reader as to our almost perfect knowledge of the genus. In the footnotes giving the bibliography of *Maquira*,^c however, we do not find any but the old sources mentioned above and there is no indication of Baillon having had opportunity to investigate new, mature, and complete specimens. We feel reluctant to call attention to such an informal proceeding on the part of Baillon, yet we can not but admit that his description is in the main a product of the imagination.

In the *Pflanzenfamilien*^d Engler takes a new standpoint, assimilating with doubt *Maquira* to *Helicostylis*. We have thus three different views as to the real standing of that genus, badly founded originally upon imperfect specimens, and as none of the expressed opinions seems to be better justified than the others, it would seem more logical to drop altogether the cumbersome *Maquira*, or relegate it forever to the genera *excludenda*.

ROSACEAE.

THREE ECONOMIC TREES OF CENTRAL AMERICA.

Licania platypus (Hemsl.) Pittier.

Moquilea platypus Hemsl. *Diagn. Pl.* 1:9. 1878; *Biol. Centr. Amer. Bot.* 1:366. 1880; *Hook. Icon. Pl. IV.* 7: *pl.* 2618, 2619. 1899. PLATE 86.

A large tree, reaching a height of 30 to 50 meters (Hemsley) when fully developed. Older branchlets rather thick, the glabrous, naked, dark purplish or brownish bark

^a 17:282. 1873.

^b *Hist. Pl.* 3:154, 155, 206. 1877.

^c *Loc. cit.* 206.

^d 3¹:84.

covered with white, rounded lenticels; younger shoots leaf-bearing, the bark deep brown or purple, densely dotted with minute, reddish white, prominent lenticels.

Leaves alternate and distichous, unusually long and narrow, perfectly glabrous. Petioles thick, 10 to 15 cm. long, shallow-canaliculate and of a dark color. Leaf blades coriaceous, elliptic-lanceolate to narrow-lanceolate, 10 to 25 cm. long, 3 to 6 cm. broad, acute at base and tip, more or less shiny above, glaucous beneath; main nerve thick, forming a broad, shallow groove above and rather prominent below; secondary nerves numerous (20 to 25), arcuate. Stipules geminate, short, broad at base and acuminate, irregularly ciliate.

Inflorescence broadly paniculate, terminal, regularly alternate-branched, very much condensed and provided with large, deciduous, purplish dark bracts and bractlets before blooming, broadly expanded, with rather slender branchlets during the anthesis. Panicles 10 to 35 cm. long, with pubescent branchlets and pedicels. Bracts (at base of main branchlets) narrowly lanceolate, 3.5 to 4 cm. long, 0.5 to 0.8 cm. broad, velvety-pubescent outside, smooth inside; bractlets (at base of flower clusters) also narrowly lanceolate, 0.5 to 1 cm. long, 0.2 to 0.5 cm. broad. Floral pedicels 1 to 2 mm. long. Receptacle canose-tomentose outside, provided inside on the staminal rim with a thick crown of brown woolly hairs. Sepals canose-tomentose, broadly ovate and acute, 1.8 to 2 mm. long, 1.6 to 1.8 mm. broad. Petals obovate, 2.5 to 3 mm. long, 1.5 to 1.8 mm. broad, narrow at base, acute at tip, ciliate, deciduous. Stamens 15 to 18; filaments subequal, glabrous. Ovary and lower half of style densely hairy.

Fruits very large, 1 to 3 to each panicle, 15 to 20 cm. long, 10 to 14 cm. in diameter, with a dark brown, verrucose skin, covered with white lenticels. Inside flesh yellow, juicy and sweet, somewhat fibrous. Seed usually single, ovate-oblong, flattened, 6 to 8 cm. long, 4 to 4.5 cm. in largest diameter; cotyledons large and fibrous, radicle small.

PANAMA: *Cuming* 1272 (Herb. Kew.).

COSTA RICA: Llanos de Currés, near Boruca, alt. 50 meters, *Pittier*, flowers, March 4, 1898 (Instituto fis.-geog. Costa Rica, no. 12102); Nicoya, *Cook, Collins & Doyle*, fruits, May 22, 1903, U. S. National Herbarium; *Pittier*, specimen of young fruit (Instituto fis.-geog. Costa Rica, no. 17131).

NICARAGUA: Neighborhood of Granada, cultivated, *Levy* 222, in Herb. Kew.

GUATEMALA: Mazatenango (Suchitepequez), alt. 400 meters; *Heyde & Lux*, flowers, January, 1894, *Donnell Smith* 6421; Gualán (Zacapa); fruit December 30, 1905, *Kellerman* 5670.

BRITISH HONDURAS: Belize Botanical Station, *Campbell*.

But for a few small discrepancies and a difference in the vegetative condition, our Costa Rican specimens agree with both Hemsley's description and the Guatemalan specimens of Heyde and Lux. The early deciduous bracts and bracteoles had not yet been noticed. The cup-like receptacle was described as hairy inside, whereas it is smooth or pubescent, and made into a tight-closed cell by the heavy hair crown on its rim. The distichous arrangement of the leaves and branchlets of the inflorescence is another remarkable feature of this tree.

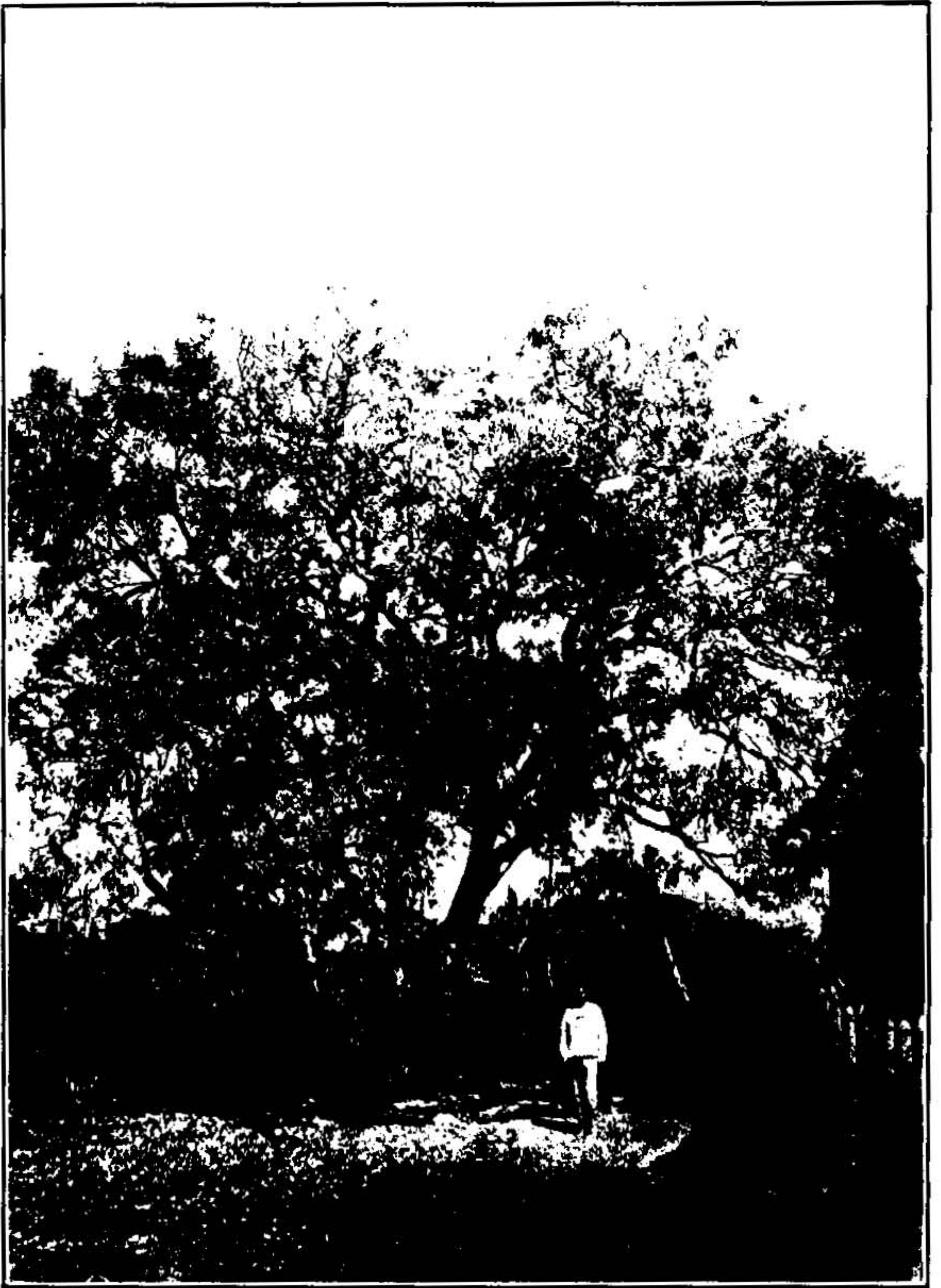
It is probable that *Licania platypus* is a deciduous tree, the flowers of which are borne on the foliated shoots produced in the same season. It attains very large dimensions and, when isolated in the open, has a stately appearance. Although I have seen it at many places in Guatemala (Zacapa, Jocotan), Salvador (Sonsonate, Nahuizalco, Sta. Tecla, Auachapan), and Costa Rica (Guanacaste, Santo Domingo, Barú, Boruca, Talamanca), it was never met with in a truly wild state. A curious fact is that the Brunka and Terraba Indians of Costa Rica do not seem to have any original expression to designate it and call the fruit simply *zapote*. Among the Bribri Indians of Talamanca, the tree is known under the name of *bekom*. In Guanacaste and Nicaragua it is called *sonzapote*, in Salvador *árbol de pan*, in Guatemala



LICANIA PLATYPUS (HEMSL.) PITTIER.



COUEPIA FLOCCOSA FRITSCH.



COUEPIA FLOCCOSA FRITSCH.

sunza and *chaúte*, and in British Honduras *monkey apple*. The fruit, which looks and tastes like anything but an apple, is certainly worth more than the predilection of a monkey, being rich and sweet with a slight acidulous flavor, and, according to Mr. G. N. Collins's judgment, superior to the common zapote.

EXPLANATION OF PLATE 86.—Stems with leaves and fruit. From a photograph by Cook, Collins & Doyle, taken at Nicoya, Costa Rica, in 1903. Natural size.

Licania arborea Seem. Bot. Voy. Herald 118. pl. 25. 1852-53.

This tree does not seem to have been noticed again since Seemann's memorable botanical explorations in Panama in the years 1846 to 1849. Its occurrence in Guatemala is therefore worthy of mention. But for a few minor details, our specimens agree closely with the original description, founded, as it seems, on Cuming's samples in the Kew Herbarium collected in Veraguas about 1829.

Licania arborea is a stately tree in its bearing, somewhat like *Anacardium rhinocarpus*. Under the name of *roble blanco* it has a limited use as heavy timber. The following are additional data completing Seemann's description and showing at the same time the discrepancies noticed in our specimens.

A tree 20 to 25 meters high. Floriferous branchlets mostly glabrate, verruculose. Mature leaves 10 to 15 cm. long, 4.5 to 10 cm. broad, glabrous, coriaceous, almost shiny above, glaucous and beautifully reticulate, with the main and secondary nerves very salient beneath; tips mostly rounded, often apiculate or also subemarginate. Rachis of inflorescence and calyx of flowers thickly brown-tomentose. Sepals 1 to 1.2 mm. long, 1.5 mm. broad at base. Petals very small (about 1.2 mm. long, 0.6 mm. broad, hairy-ciliate and early deciduous. Stamens unequal, 1.5 to 2 mm. long, adnate for about 0.7 mm. of their length at the base, villous. Style nearly 3 mm. long.

GUATEMALA: Dry hills of the valley of Ingiatie (Chiquimula), alt. about 900 meters, flowers, January 24, 1907, Pittier, 1899.

Couepia floccosa Fritsch, Ann. Naturhist. Hofmus. Wien 5: 12. 1890.

PLATES 87, 88. FIGURE 69.

A medium-sized tree, with gray, scaly bark, and spreading branches.

Leaves persistent, petiolate. Petioles 5 to 10 cm. long, rather thick, subcanaliculate, pale brownish tomentose. Leaf blades ovate, 5 to 8 cm. long, 2.5 to 5 cm. broad, subattenuate at base, rounded or obtusely acuminate at tip, rather thick, dark green and smooth above, whitish and tomentose with prominent main and secondary nerves beneath. Stipules small (5 mm. long), acute, deciduous.

Inflorescence racemose, simple or compound, the individual racemes 3 to 7 cm. long, in the axils of the leaves on the newly formed branchlets, 15 to 50 flowers to the raceme. Rachis, peduncles, and pedicels tomentose and sulcate (in the dry condition). Bracts at the base of the racemes short, triangular, acute, deciduous. Flowers pedicellate, in alternate, dichotomous clusters, 3 to 9 in each cluster. Floral bracts narrowly lanceolate, 5 to 6 mm. long. Pedicels 5 to 7 mm. long, articulate in the middle. Receptacle tomentose, sulcate, funnel-shaped or subcylindrical about 4 mm. long, with a lateral, tubular cavity, smooth inside and provided at the throat with long, stiff, retrorse hairs. Sepals ovate, obtuse, 4 mm. long, 2.5 to 3 mm. broad. Petals pinkish yellow, 4.5 to 5 mm. long, 3.5 mm. broad, more or less sparsely ciliate. Stamens 15 to 20, almost all fertile, inserted on a ring 1 mm. broad, covered inside with retrorse hairs; filaments 5 to 6 mm. long (above the ring), slender, glabrous; anthers small, rounded. Ovary densely hairy; style about 7.5 mm. long, hairy on its lower half.



FIG. 69.—*Couepia floccosa*, section and details of flower. a, Schematic longitudinal section of the flower; b, petal; c, stamens, showing also adnate part at the base; d, ovary and style. Scale 8.

Fruits fleshy, 1 to 3 to each floral raceme. Pedicel thick, 10 to 15 mm. long. Drupe 6 to 8 cm. long, 3 to 4 cm. in diameter, yellowish green, verrucose outside, with a yellow succulent mesocarp. Stone 5 to 6.5 cm. long, 2 to 2.5 cm. in diameter.

COSTA RICA: Guanacaste, Friedrichsthal; ^a Nicoya, alt. 135 meters; *Tonduz*, flowers, March, 1900 (Instituto ffs. geog. Costa Rica, no. 13858); *Pittier*, flowers, May, 1903 (Instituto ffs. geog. Costa Rica, no. 16689); *Cook & Doyle* 681, flowers and fruit, May 22, 1903 (U. S. National Herbarium).

EXPLANATION OF PLATES 87, 88.—Pl. 87, inflorescence and fruits. From a photograph by Cook & Doyle. Pl. 88, landscape in Nicoya, showing olosapo trees. From a photograph by H. Pittier, January 1, 1904.

Very nearly related to, if not identical with, *Couepia polyandra* (H. B. K.) Rose (*C. kunthiana* Benth.), of the western coast of Mexico, from which our specimens differ by the leaves being more rounded at the base and tip, the inflorescence much denser, and the flowers nearly half smaller. The name *floccosa* applies as well to one species as to the other, since in both the younger leaves are covered with the same floccose indument. The pubescence on the inner side of the staminal ring is apparently longer and thicker, and the hairs at the base of the style are more markedly retrorse

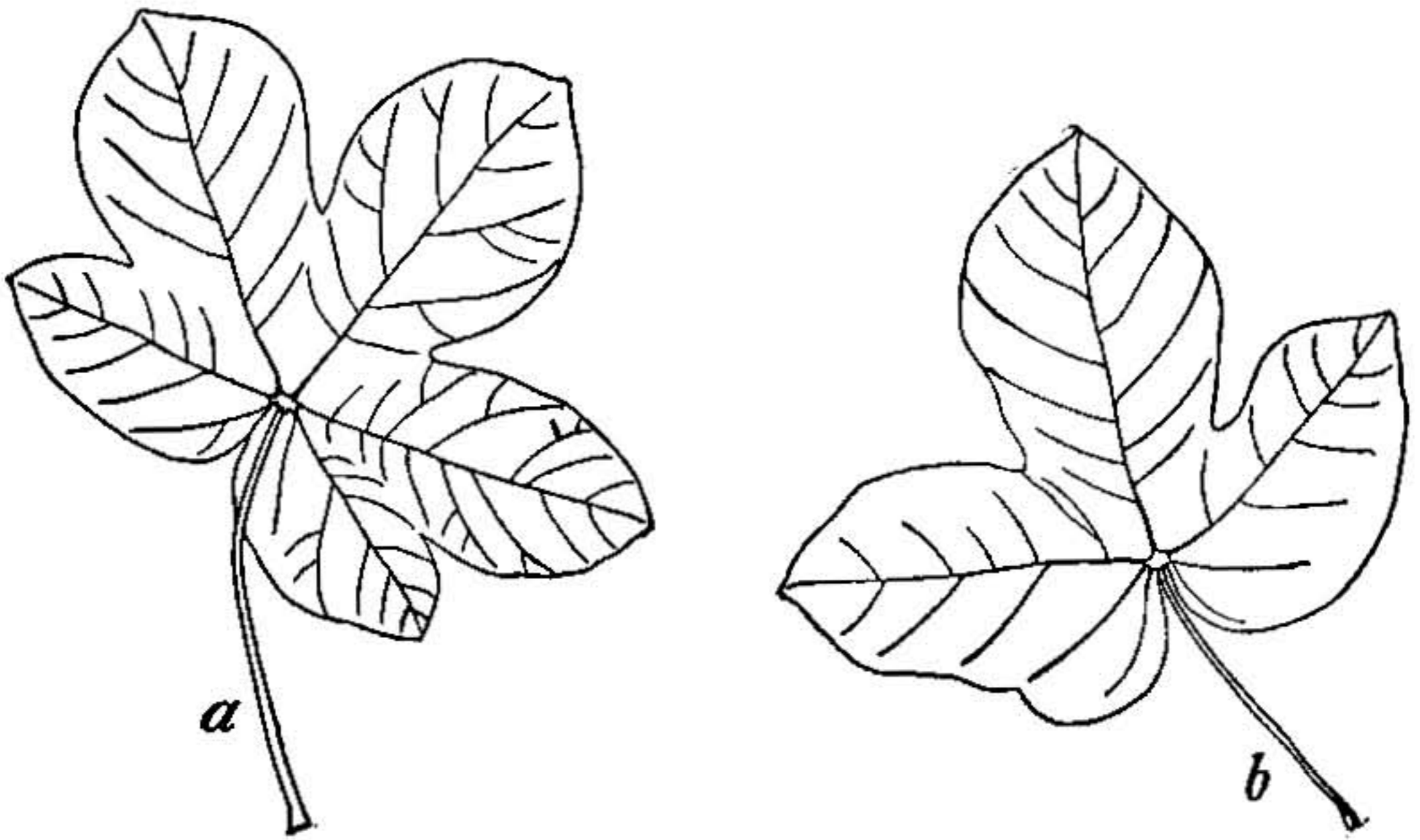


FIG. 70.—*Sterculia carthagenensis*, leaves. *a*, Type of leaf from Santa Marta, Colombia; *b*, type of leaf from Central America. Scale $\frac{1}{2}$.

in the Mexican species than in the Costa Rican one. There seems to be also a considerable difference in the form and size of the fruit and in the outer texture of the stone.

As already noted by Fritsch (*loc. cit.*) this species may be considered as a transitional stage between *Couepia* and *Hirtella*, shown by the reduced number of the stamens. It may be added that these appear to be in a single series and evenly distributed around the staminal ring. The cavity of the receptacle is obstructed at its opening by a traplike arrangement, the object of which may be to detain certain insects. In many cases, however, the tube is found to be eaten through at the base, showing how the intended victims avoid the obstacle.

Couepia floccosa blooms in Nicoya from the beginning of March, at the time of the earlier showers, to May, when the first fruits are also reaching maturity. When I visited the same trees for the second time, in January, 1904, they were in full leaf, notwithstanding the dryness of the season, the leaves being mainly new and growing on shoots that were evidently a product of the latter part of the preceding rainy season. The specimens at hand show that the floral racemes of the next crop, at the opening of the following wet period, develop in the axils of that latter growth.

^a Fide Fritsch, *loc. cit.*

It is not known whether this tree really grows wild, it being always seen around houses or in cultivated places, where it is tolerated on account of its fruits, characterized by Mr. G. N. Collins, of the Department of Agriculture, as "highly aromatic and delicious." This fruit has been known and prized by the natives for a long period under the name of *olosapo*, used both in Nicoya and Nicaragua, and probably derived from the Nahuatl *olozapotl*, a round zapote. In Nicoya it is also known under the name of *zapotillo*^a or small zapote.

STERCULIACEAE.

AN OLD AND A NEW SPECIES OF STERCULIA.

Sterculia carthagenensis Cav. *Monad. Diss.* 6: 353. 1790.

PLATE 89. FIGURES 70-76.

A portly tree with a straight trunk 25 to 30 meters high and a flat, densely leafy crown. Limbs horizontal and divaricate.

Leaves large, long-petiolate, deeply cordate, palmatilobate. Petioles 10 to 13 cm. long, subsulcate and more or less shaggy-hairy. Leaf blade 3 to 5-lobate, 10 to 15 cm. long, 18 to 24 cm. broad, more or less smooth and shiny above except at the base of the five main nerves, sparsely to densely felted beneath with short penicillate hairs; middle lobe ovate, slightly contracted at base, subacute; lateral lobes usually overlapping each other at the inner side.

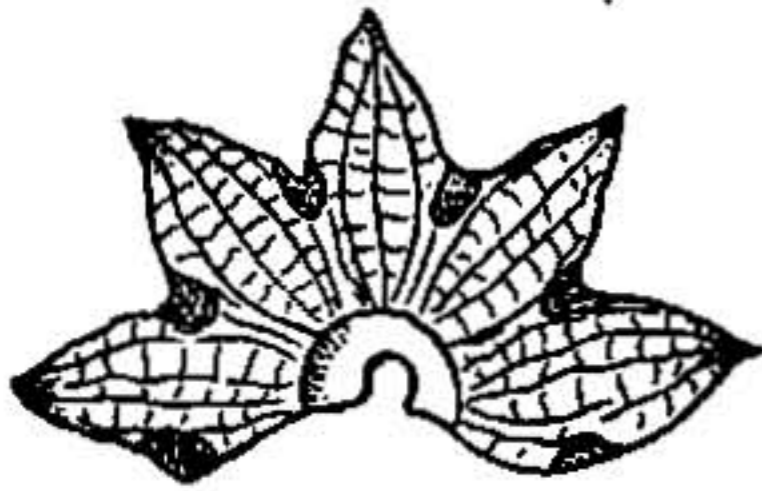


FIG. 71.—*Sterculia carthagenensis*, corolla of male flower, spread out. Specimen from Santa Marta, Colombia. Natural size.



FIG. 72.—*Sterculia carthagenensis*, androphorum of male flower. Specimen from Santa Marta, Colombia. Scale 3.

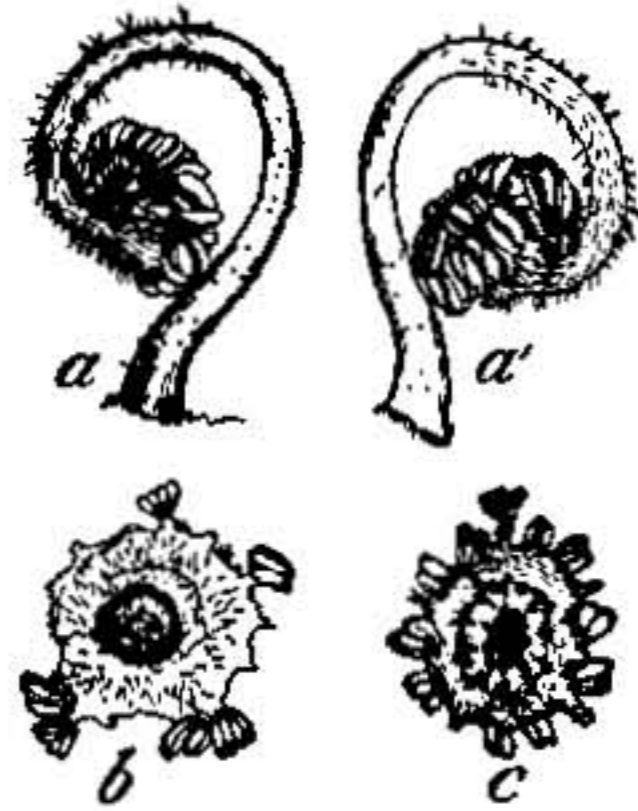


FIG. 73.—*Sterculia carthagenensis*, androphorum and parts. *a, a'*, Whole androphorum (Guatemala, Donnell Smith, 2545; *b*, staminal tube of same with a few stamens; *c*, staminal tube (Santa Marta, Colombia, H. H. Smith 1889) with glandulose filaments. Scale 3.

Panicles axillary at the end of the branchlets, large, racemose, unisexual, or bearing both male and hermaphrodite flowers; main rachis and ramifications densely covered with penicillate hairs, the former 25 cm. long and above. Bracts and bractlets early deciduous, small and densely hairy. Pedicels of mature flowers hairy, 1 to 2 cm. long. Calyx of male flowers rather large (1.5 to 1.8 mm. in diameter), about 18 mm. long, broadly campanulate, dirty yellow and diversely tinged with purple spots and lines, thickly covered outside with a filmy layer of very thin, multicellular filaments, mixed with purple or colorless penicillate hairs (fig. 76, *a*); the bottom inside showing a flat, golden yellow, glandular-appearing zone, about 7 mm. in diameter, sending 5 dark parallel nerves into each lobe; interlobular sinuses usually marked at the angle by a large black spot; lobes broadly triangular, 7 to 8 mm. long and broad at the base, obtuse or more or less acuminate. Androphorum 10 to 12 mm. long, inflexed, sparsely covered with thick, obtuse, multicellular hairs for its whole length or these mixed at the upper part with longer glandular hairs (fig. 76, *b*); staminal tube ovate, hardly thicker than the androphorum and about 1.3 mm. long, minutely covered with fine,

^a See H. Pittier, *Ensayo sobre las plantas usuales de Costa Rica* (1908), p. 142, where this tree is given as the Mexican *Couepia kunthiana* Benth.

straight, multicellular hairs, or else broadly shallow salver-form, about 1 mm. deep and then covered with the same long glandular hairs found on the androphorum; stamens crowded, 7 or 8 in the first form, 12 to 15 in the second, biseriate, short-stipitate or sessile; rudiment of ovary small, 5-winged, glabrous; stigma 5-lobulate,

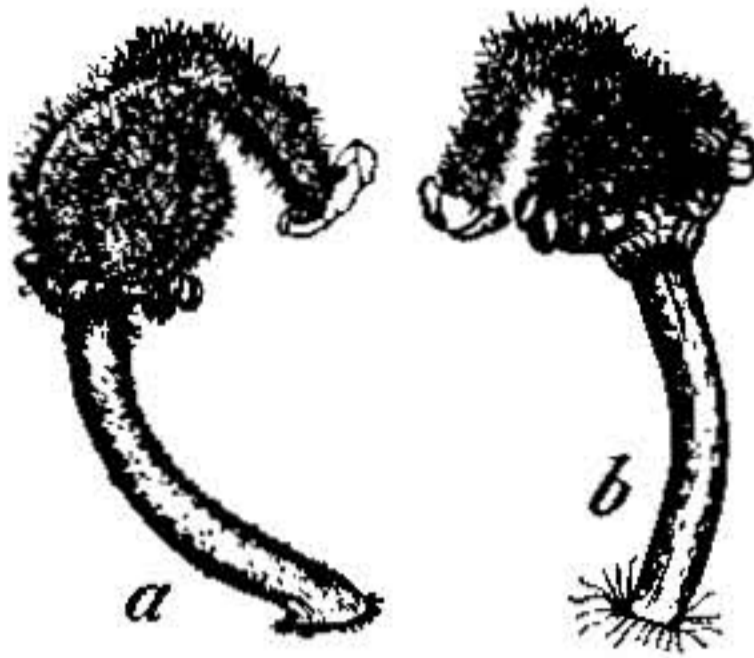


FIG. 74.—*Sterculia carthagenensis*, gynophorum. *a*, Specimen from Costa Rica (Pittier 2025); *b*, from Santa Marta, Colombia (H. H. Smith 1889). Scale 3.

yellow. Calyx of the female flower same as in the male one, but often larger; gynophorum 6 to 7 mm. long, otherwise like the androphorum; staminal tube shallow-cupuliform and broad, about 3 mm. in diameter and bearing 12 to 16 more or less distinctly biseriate stamens, alternately 2 short and 1 long, stipitate (that is to say, in the case represented in figure 73*a*, *a'*, 10 in the outer or lower series and 5 in the inner series). Ovary globose or ovoid, about 2 mm. in diameter, covered as is the style with a dense growth of penicillate hairs, and composed of 5 free, erect, 2 to 5-ovulate carpels; style reflexed, about 4 mm. long; stigma capitellate, more or less flat-conical and rounded at tip, obscurely 5-lobulate. Carpids 5, reflexed on a thick peduncle, 20 cm. long, obovoid, about 6 cm. long and 4 cm. thick, glabrescent, opening on the upper (ventral) suture, coated inside with a dense layer of erect, stiff, yellowish prickly hairs over 2 mm. long, and containing two to four black seeds. Seeds ovoid, about 2 cm. long and 1.3 cm. in diameter; episperm thin, shiny black, covered also with stiff, little adhesive, prickly hairs and followed inside by a layer of greasy, soap-like substance.

COLOMBIA: Forests around Cartagena (type locality), *Jacquin*, local name *camajonduro*; same locality, *Triana*; Calamar, *Triana*; Santa Marta (Magdalena), alt. 165 meters, flowers, February, *H. H. Smith* (U. S. National Herbarium); around Rio Frio, *Pittier*, local name *camajurü*; around Barranquilla, *Pittier*.

PANAMA: Around Panama City, *Seemann*, *Hayes* (local name *panamá*).

COSTA RICA: Puntarenas, on the Pacific coast, *Biolley*, flowers, February, 1907; *Pittier* 2025 (U. S. National Herbarium no. 578423); also on the Atlantic coast, seen at Chirripó farm, Zent Plains, in the forest, and elsewhere, *Pittier*; local name *panamá* (*Pittier*).

NICARAGUA: Without precise locality, but on the western coast *C. Wright* (U. S. National Herbarium no. 12983); Granada, *Baker* 2441, flowers, February 17, 1903 (U. S. National Herbarium no. 398767).

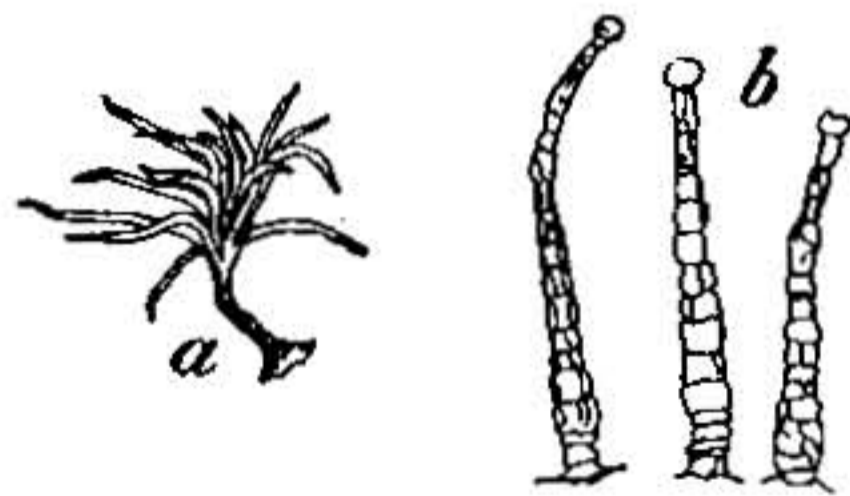


FIG. 76.—*Sterculia carthagenensis*, hairs of calyx and androphorum. *a*, One of the penicillate hairs covering the calyx and other parts; *b*, glandular hairs found on the androphorum. Scale 16.

SALVADOR: Around Sonsonate, alt. 100 meters, *Renson*, young flowers (U. S. National Herbarium no. 399532); local name *castaño* (*Pittier*).

GUATEMALA: Naranjo (Escuintla), alt. 100 meters, flowers March 29, 1892, *Donnell Smith* 2545 (U. S. National Herbarium no. 12982).

rudiment of ovary small, 5-winged, glabrous; stigma 5-lobulate, yellow. Calyx of the female flower same as in the male one, but often larger; gynophorum 6 to 7 mm. long, otherwise like the androphorum; staminal tube shallow-cupuliform and broad, about 3 mm. in diameter and bearing 12 to 16 more or less distinctly biseriate stamens, alternately 2 short and 1 long, stipitate (that is to say, in the case represented in figure 73*a*, *a'*, 10 in the outer or lower series and 5 in the inner series).

Ovary globose or ovoid, about 2 mm. in diameter, covered as is the style with a dense growth of penicillate hairs, and composed of 5 free, erect, 2 to 5-ovulate carpels; style reflexed, about 4 mm. long; stigma capitellate, more or less flat-conical and rounded at tip, obscurely 5-lobulate. Carpids 5, reflexed on a thick peduncle, 20 cm. long, obovoid, about 6 cm. long and 4 cm. thick, glabrescent, opening on the upper (ventral) suture, coated inside with a dense layer of erect, stiff, yellowish prickly hairs over 2 mm. long, and containing two to four black seeds. Seeds ovoid, about 2 cm. long and 1.3 cm. in diameter; episperm thin, shiny black, covered also with stiff, little adhesive, prickly hairs and followed inside by a layer of greasy, soap-like substance.

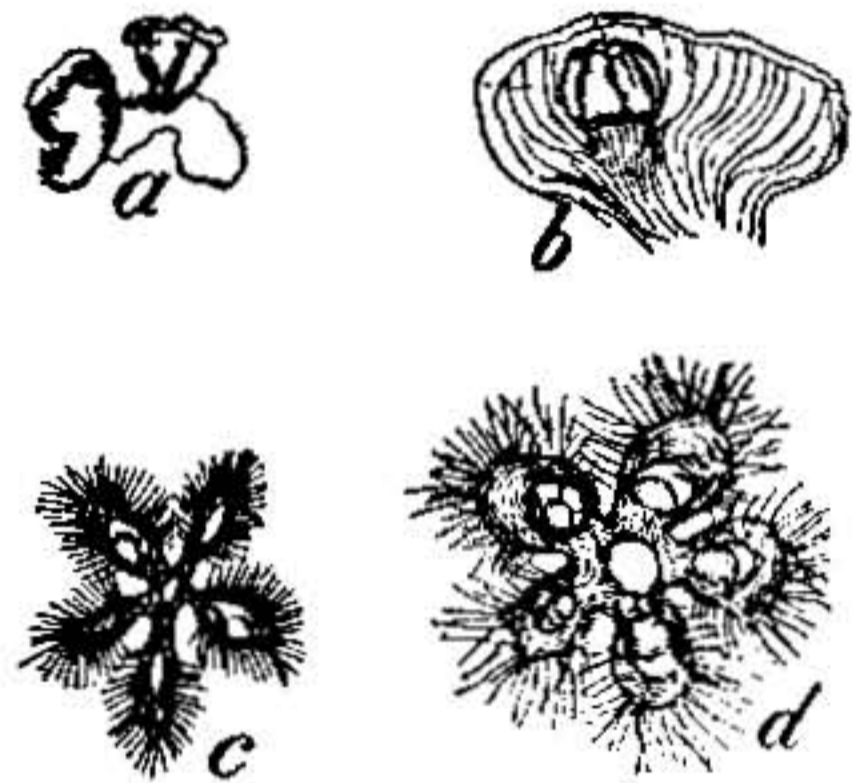


FIG. 75.—*Sterculia carthagenensis*, floral details. *a*, Stamens; *b*, rudiment of ovary on androphorum; *c*, *d*, cross sections of ovary. *a-c*, Material from Santa Marta, Colombia; *d*, from Costa Rica. Scale 6.



FRUIT OF STERCULIA CARTHAGENENSIS CAV.

YUCATAN AND TABASCO: *Johnson*.^a

JAMAICA: Kingston; Donnell Smith, flowers, February 17, 1894 (U. S. National Herbarium no. 409325); Devon Pen, *E. Campbell*, leaves only (U. S. National Herbarium no. 521778); said to be introduced from Colombia or Panama.

PORTO RICO: Magueyes (Ponce), *Goll* 782, flowers, November 25, 1899 (U. S. National Herbarium no. 409325); Ponce, *Nina Prey* 66, flowers and fruit, March 5, 1903 (U. S. National Herbarium nos. 845684-86; local name *anacagüite* (*Nina Prey*)).

EXPLANATION OF PLATE 89.—Fruit with three of the carpids open showing seeds. From a photograph taken in Washington of a specimen received from Panama in 1910. Natural size.

This species is quite variable and may be subdivided into several local forms, which one would be tempted to call species but for the fact that all possible intermediary stages seem to occur. The leaves (fig. 70, *a*, *b*), very variable in size, are at times only trilobate, at others divided into five lobes, the four lateral ones being of the same size and independent from each other. These divisions are either obtuse or acute, and the median lobe is more or less narrowed at the base. In the Santa Marta specimens, which should be nearer to Cavanilles type, the tomentum of the lower face of the leaf is thick and very soft to the touch, even in older leaves, and this applies also to the Porto Rican and Salvadorean specimens; in all Central American specimens but the latter the villosity is much less dense, the stellate bushy hairs being easily singled out under the lens. The floral racemes of the Santa Marta tree bear at the same time male and hermaphrodite flowers, and the same can also be said of the Puntarenas material, while in all the other specimens of the National Herbarium the racemes seem to be either entirely male, the most frequent case, or entirely hermaphrodite. Great variation is also observed in the pubescence of the androphorum and gynophorum and staminal tube, the latter being also variously shaped according to locality. Thus in H. H. Smith's samples, coming, as explained, from the locality nearest to Cartagena, both the androphorum and gynophorum are sparsely covered for their whole length with short, obtuse hairs, while on the staminal tube the pilosity is extremely minute and can hardly be distinguished with an ordinary lens; the staminal tube of the male flowers is scarcely broader than the androphorum, rather elongate, and bearing less than ten stamens (fig. 72*a*). In all the Central American samples but the one from San Salvador, the flowers of which are immature, the androphorum and gynophorum have at the base the same short sparse hairs, but their upper part, as well as the staminal tubes, is covered with glandular stiff hairs such as are represented in figure 76 *b*; in both the male and hermaphrodite flowers the staminal tube is broad and rather flat, with 12 to 14 stamens. There are also sensible differences in the form and size of the ovary complex and of the stigmas, so that one would easily be induced to segregate the two forms but for the fact that those ostensible differential characters are found together in the Jamaican and Porto Rican specimens. I am inclined, therefore, to follow Robert Brown ^b so far as to include in one polymorphic species, *S. carthagenensis* Cav., the specimens from the Caribbean coast of Venezuela and Colombia, Central America, and the West Indies, but excluding *S. chicha* St. Hil. from Brazil, which, judging by the specimen from Sellow (no. 1445), differs not only by the shape and texture of the leaves, but also by its simple floral racemes, its smaller flowers, its densely hairy androphorum and gynophorum, and doubtless by other characters.

***Sterculia costaricana* Pittier, sp. nov.**

FIGURES 77, 78.

A small tree, about 5 meters high.

Leaves simple, entire, long-petiolate, quite glabrous, crowded at the ends of the branchlets; petioles 2.5 to 5 cm. long, slender, rounded, slightly thicker toward the

^a Biol. Centr. Amer. Bot. 1: 126.^b Bennet, Pl. Jav. 228. 1838.

upper end; leaf blades 5 to 12 cm. long, 4 to 7 cm. broad, ovate, obtuse at base, ending abruptly in a very sharp and narrow acumen; upper face light green, showing the impressed venation; lower face pale, glaucous, with a more or less pinkish hue, the main nerves, veins, and anastomosing venules quite prominent. Stipules early caducous, 8 mm. long, 5 mm. broad at base, ovate-acute, almost subulate and hairy at the tip, purplish or brownish with numerous dark striae.

Panicles axillary at the ends of the branchlets, simple, up to 6 cm. long, the rachis and pedicels hairy-tomentose. Bracts early deciduous, about 8 mm. long, conch-like and acute at the tip, minutely hairy outside, dark-colored and striate. Pedicels 5 mm. long. Calyx of the male flower dark brown in dry specimens, densely gray-tomentose outside, hairy inside, 9 mm. long, deeply 5-cleft; segments linear-lanceolate, subacute, 6.5 mm. long, 2 mm. broad, with 3 to 5 dark longitudinal lines and a short, barbate appendage transversely inserted at the middle. Androphorum

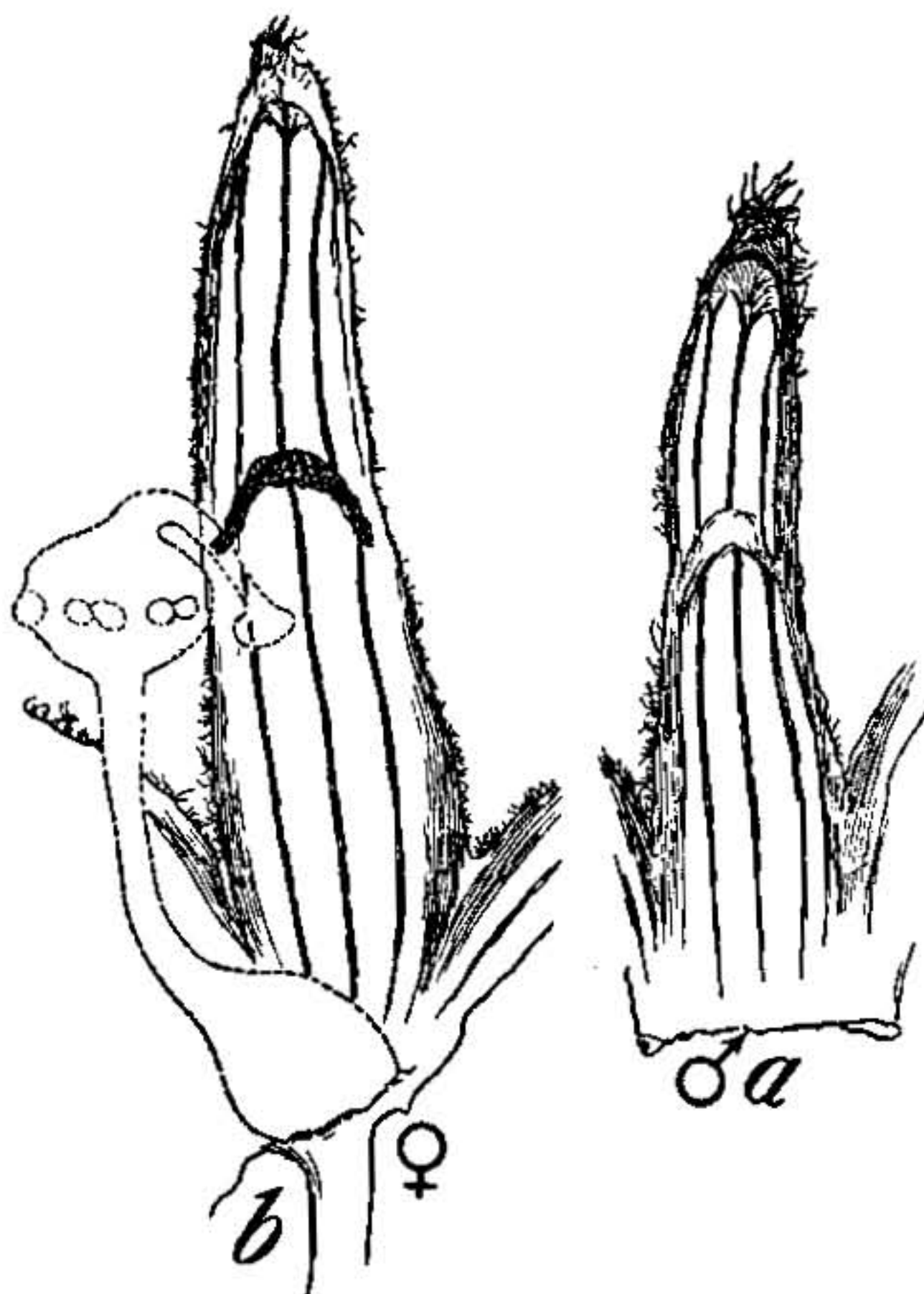


FIG. 77.—*Sterculia costaricana*, corollas of (a) male and (b) female flowers, showing comparative size. Scale 6.

filiform, 5.5 mm. long, thickened and covered with short, many-celled, apparently glandular hairs at the base, smooth above; staminal tube pendulous, small, salver-shaped or suburceolate, glabrous; anthers 10, biseriate, stipitate, crowded, the 5 exterior ones larger; rudiments of the pistil quite obsolete. Calyx of the female (or monoclinal) flowers as in the male flower but larger (about 11 mm. long), the lobes half spreading, nearly 9 mm. long, 2.5 mm. broad at the base. Gynophorum suberect, thick, glabrous except at the enlarged base (as in the androphorum), about 5 mm. long; staminal tube cupuliform, glabrous, about 2 mm. in diameter and 0.8 mm. high; stamens 10, those of the outer series conspicuously larger. Ovary depressed-globose, with 5 separate carpels and densely covered, as is the style, with coarse, unicellular, bifurcate or trifurcate hairs, the style thick, 1.8 mm. long; ovules in each carpel 4 to 6; stigma capitellate, indistinctly 5-lobulate, glabrous.

Mature carpids 5, large (10 to 15 cm. long and up to 12 cm. in diameter), obovate, borne on a thick peduncle 10 cm. long.

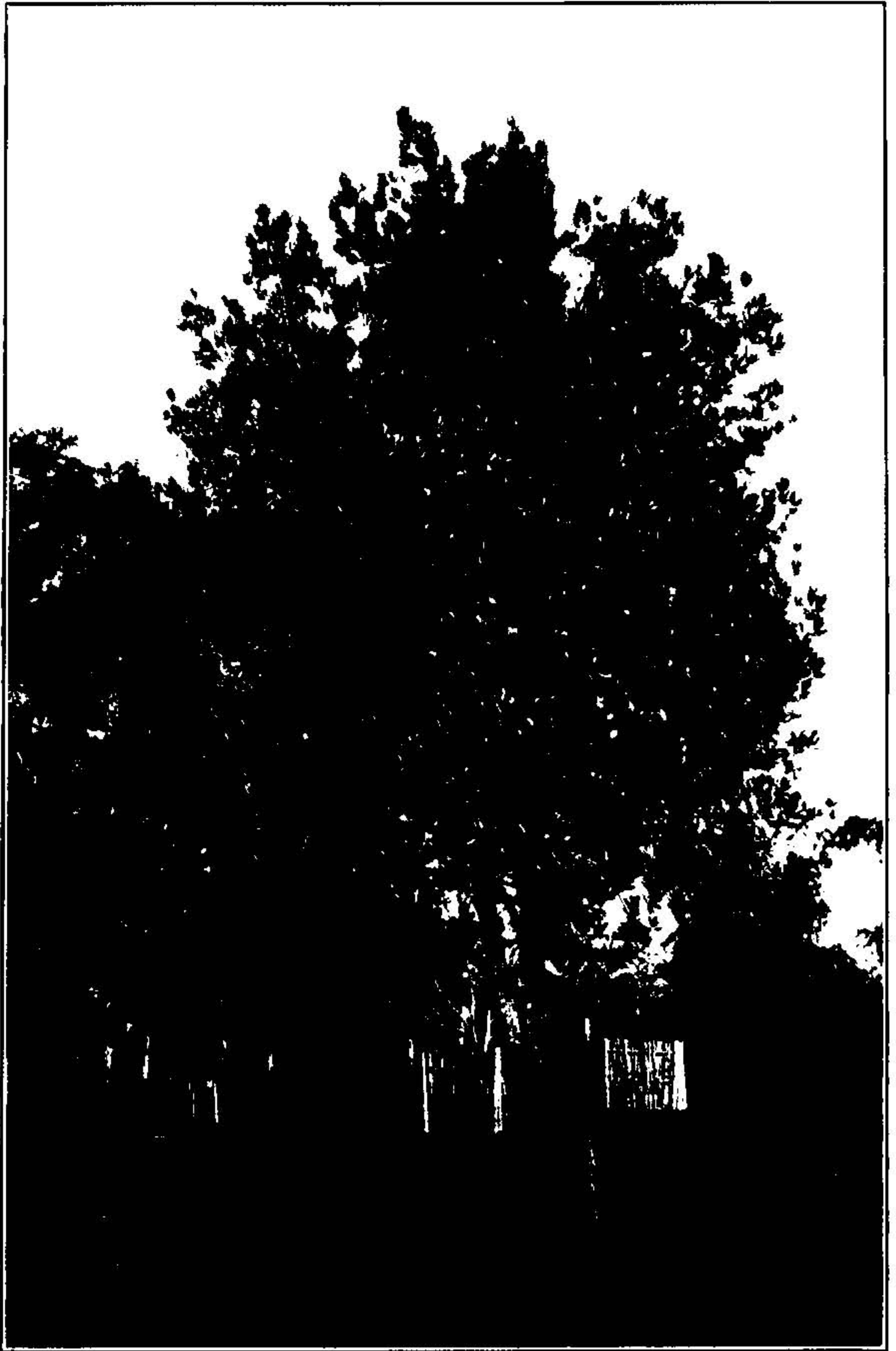
Type in the U. S. National Herbarium, no. 578036, collected at Las Delicias del Reventazon, plains of Santa Clara, altitude about 40 meters, September, 1901, by H. Pittier. Flowers and fruits. Same in Instituto ffs. geog. Costa Rica (no. 16172).

GUTTIFERAE.

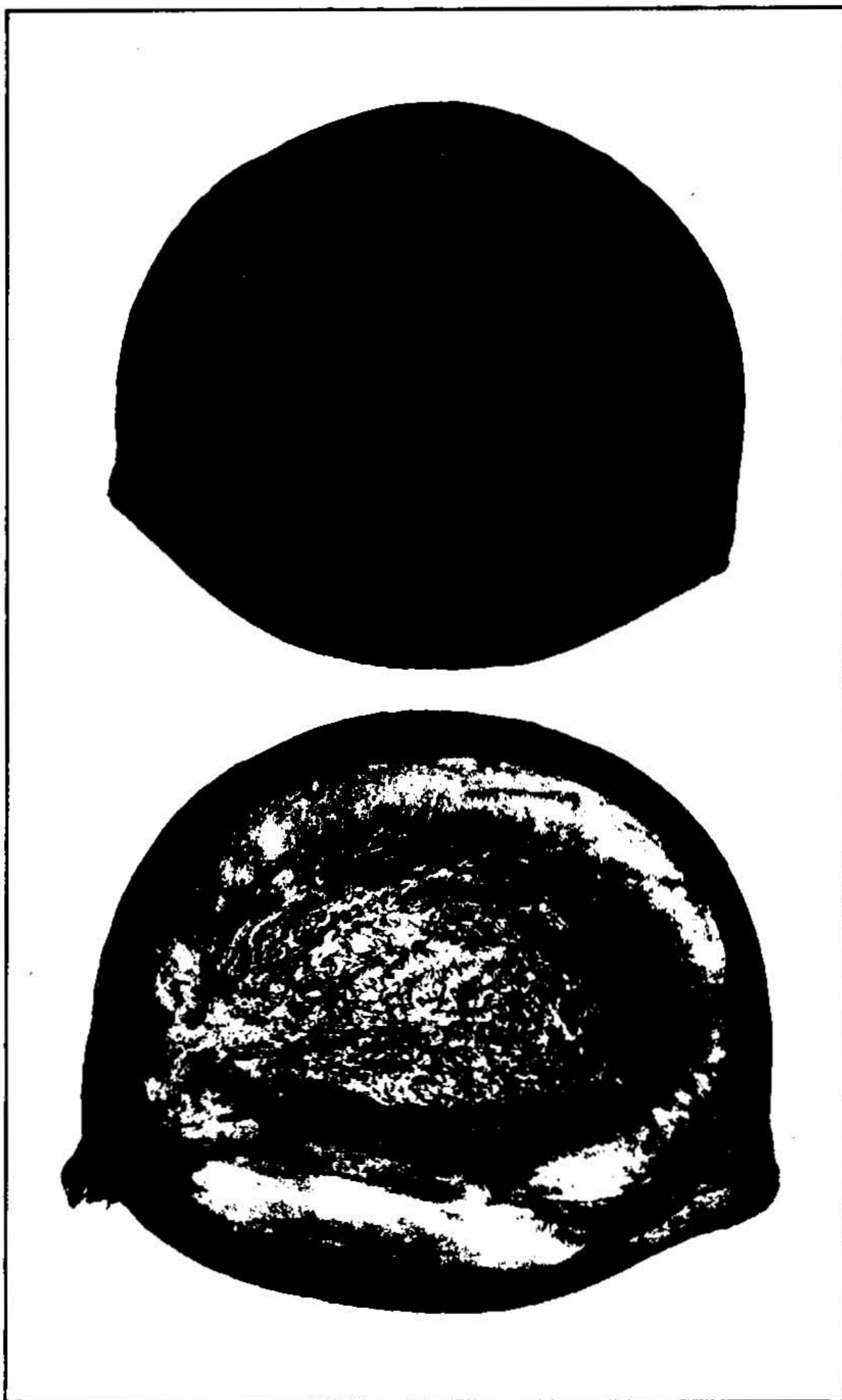
OLD AND NEW SPECIES OF SEVERAL GENERA.

***Hypericum epigeium* Keller, Bull. Herb. Boiss. II. 8: 183. 1908. FIGURE 79.**

A dwarf, suffrutescent plant, with underground stems emitting numerous, mostly simple branchlets, 10 to 20 cm. long, more or less densely foliose, 4-angled. Leaves elliptic, amplexicaul, obtuse or rounded at tip; intraparenchymatous glands mostly



MAMMEA AMERICANA L.



MAMMEA AMERICANA L.

large and appearing to the naked eye, on dry specimens, as so many black dots; main nerve prominent on the lower face, groovelike on the upper face. Flowers solitary at the ends of the branchlets. Sepals ovate-lanceolate, unequal, acute at the tip, often slightly constricted at the base, in our specimens measuring from 3 to 4.5 mm. in length with a breadth of 1 to 2.5 mm. Petals obovate, rounded at tip, short-unguiculate, persistent, 8 to 9 mm. long, 3 to 3.5 mm. broad, the 5 basal veins branching dichotomously into the lamina. Stamens 16 to 20, 5 to 7 mm. long, shortly adnate at the base. Ovary ovate, 3-grooved outside, 3-celled, about 3 mm. long; styles 3, 3 to 3.5 mm. long, slightly protruding above the stamens.

Except for the stamens being shortly adnate, our specimens agree closely with Keller's description of Mr. Donnell Smith's plant, distributed by the latter under the name of *H. mexicanum*.

GUATEMALA: Volcan de Agua, 3,899 meters (?), flowers, April, 1890, Donnell Smith distribution, no. 2147; same locality, but at about 3,000 meters, Shannon, flowers, June, 1892, Donnell Smith distribution, no. 3626; upper slopes of the same volcano, alt. about 3,750 meters, Pittier 45, flowers, March 22, 1905.

Mammea americana L. Sp. Pl. 512. 1753. PLATES 90, 91.

This is a beautiful middle-sized evergreen tree (10 to 12 meters high), with an oval crown of dense, dark green foliage. The trunk usually divides at a short distance from the ground into several vertical or little diverging limbs. These in turn give birth to smaller branches, which are opposite and spread at a more open angle. On these grow the ultimate leaf and flower bearing twigs. The leaves are thick, not very large (10 to 14 cm. long), obovate or obovate-oblong, cuneate at base and narrowing into a short, broad petiole; the secondary veins are numerous, parallel, and anastomosed by means of many transverse venules. The flowers are borne solitary on the nude twigs or in the axils of leaves; they are polygamous and rather large (about 4.5 cm. in diameter), and both the male and bisexual are found on the same tree. The free stamens are very numerous, with pale yellow anthers. The ovary is ovoid, 2-celled, with two ovules in each cell; the style is short and bears a broad, 2 or 4-lobulate stigma. The fruit is a large berry, 10 to 15 cm. in diameter when ripe; it has a thick skin and a fibrose-pulpy mesocarp, and contains 2 to 4 large stones with a rough, towy-fibrose tegument.

COMMON NAMES: *Mamey* (Spanish America in general, a name that is said to have originated in the Taíno language of Haiti); *mamey de Cartagena* (Panama, according to Seemann); English, *mammeé*, *mammeé-apple* (English West Indies); French, *abricot de Saint Domingue*, *abricotier d'Amérique*; Brunka, *tšep*; Tirub, *šrú* (both Costa Rican dialects); Misquito, *rurí* (eastern coast of Nicaragua); Cuna, *mámi*, perhaps the real origin of the Spanish name. ^a

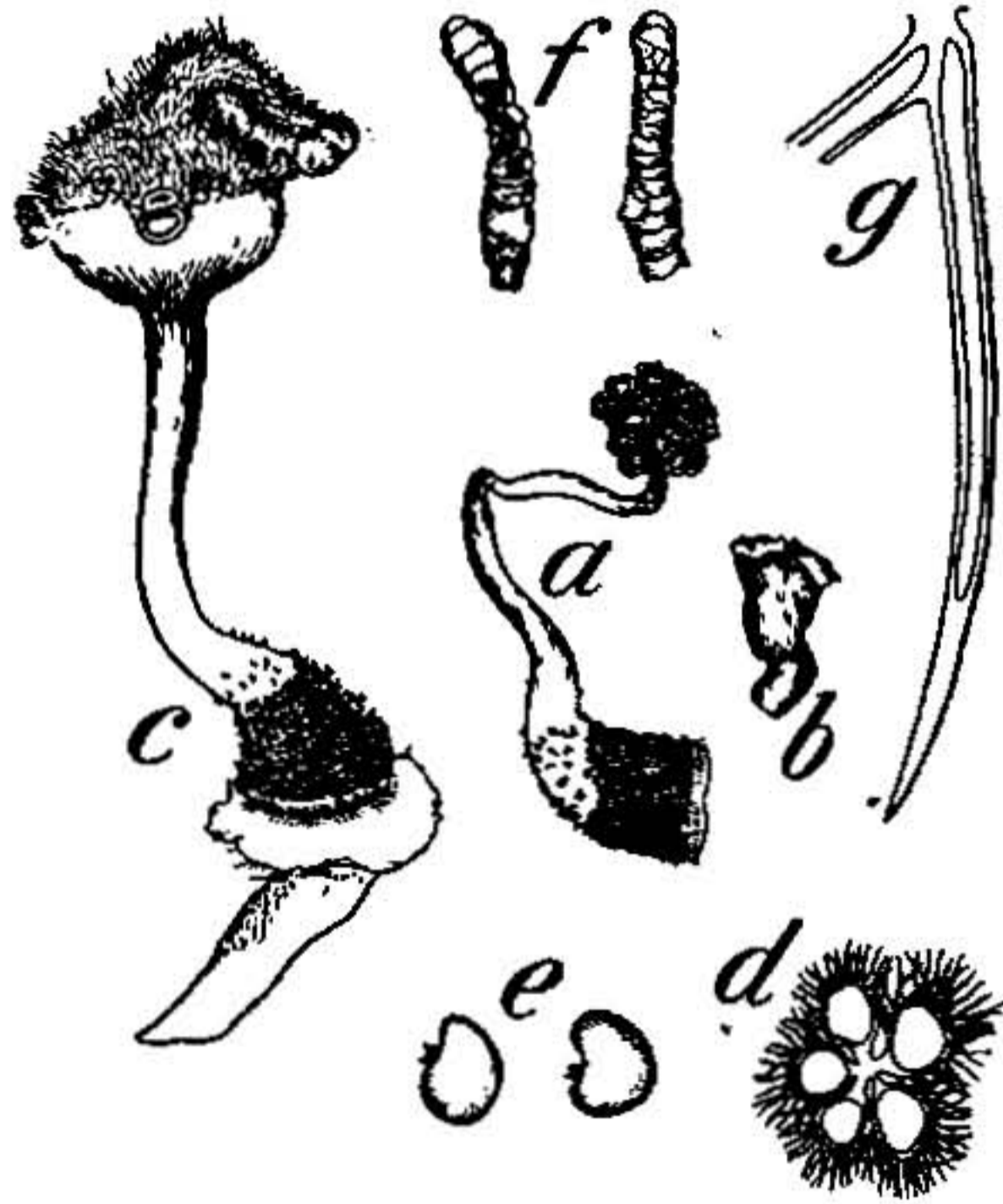


FIG. 78.—*Sterculia costaricana*, floral details. a, Androphorum; b, lateral view of stamen; c, gynophorum; d, section across ovary; e, ovules; f, hairs from those covering base of androphorum and gynophorum; g, hair from those covering ovary. a, c, and d, Scale 6; b, scale 16; e, scale 24; f and g, scale 100

^a See also Lanessan, *Les plantes utiles des colonies française*; Cook and Collins, *Economic Plants of Porto Rico* (Contr. Nat. Herb., vol. 8); Jumelle, *Cultures coloniales*, vol. 2; Pittier, *Plantas usuales de Costa Rica*.

The flowers of the *mamey* or *mamme* are sweet-scented and used in the French West Indies in the preparation of an aromatic water called *eau des créoles*, said to be refreshing and digestive. But the tree is known mainly through its fruits, which, according to Perrot, attain sometimes 4 kilograms in weight. The thick, juicy mesocarp has a sweet, aromatic taste, remotely suggesting the apricot, and, if this fruit were produced in marketable quantities and were able to stand long-distance transportation, it would constitute a valuable addition to our list of table fruits. It is also made into delicious preserves. The skin is very thick and rather tough and its bitter interior lining has to be removed carefully. The large seeds vary in number, to my knowledge, from 4 to none. Their rough, fibrous surface affords a good means of distinguishing this fruit from that of the zapotillo and the common zapote, which, like the former, sporadically make their appearance in our markets, and often under the same name.

The wood of *Mammea americana* is white, pretty hard, and moderately heavy and splits easily; it is sometimes made into boards or otherwise used for building purposes. According to Lanessan, its density is equal to 0.990, its elasticity to 1,000, and its resistance to 790. The bark exudes a resinous gum, used by the natives of the French

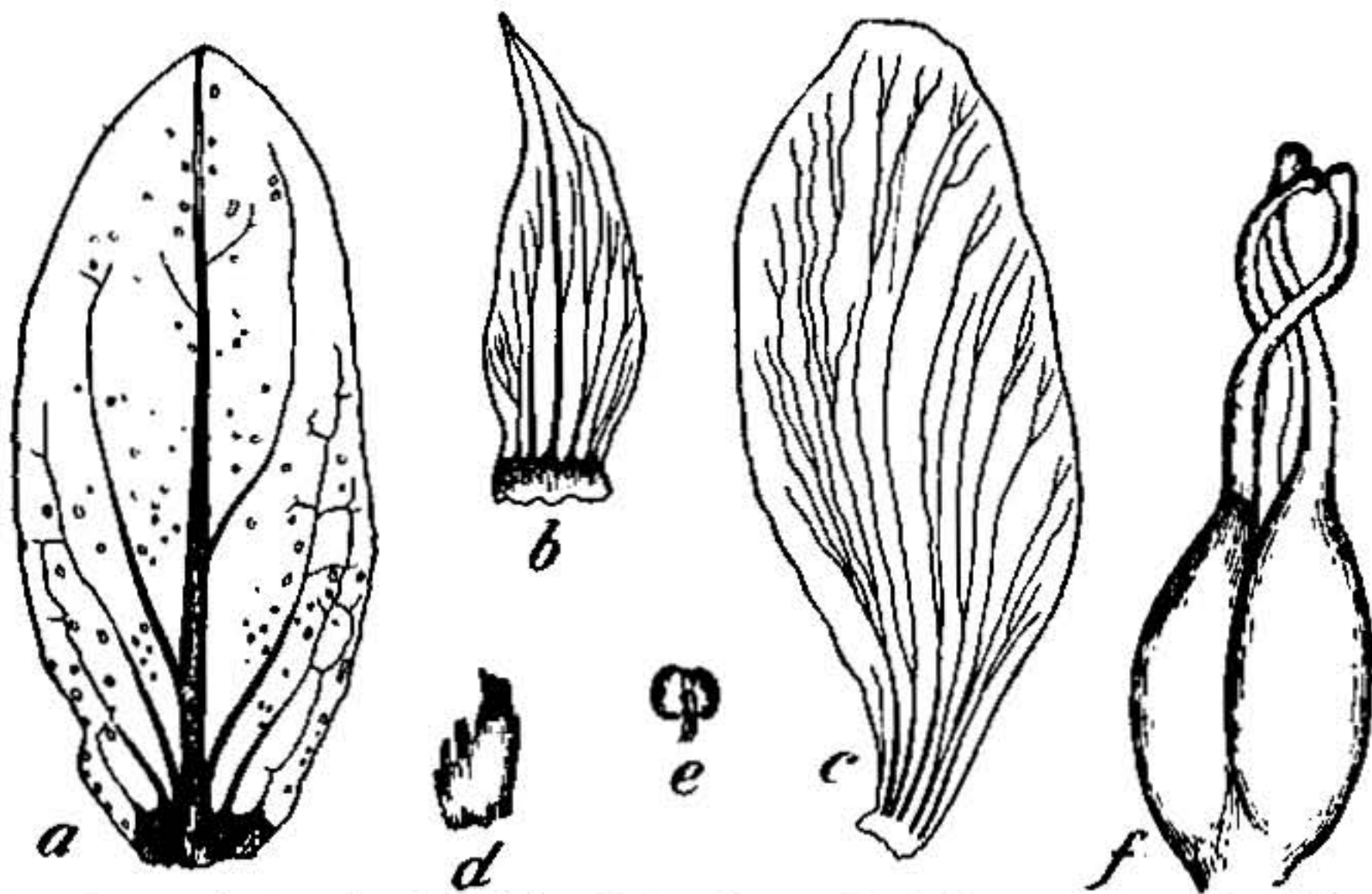


FIG. 79.—*Hypericum epigeum*, leaf and floral details. *a*, Leaf; *b*, sepal; *c*, petal; *d*, base of stamens; *e*, anther, showing insertion of filaments; *f*, pistil. Scale 6.

West Indies to extract the chigoes or sand-flies. In other parts of the Antilles the fermented sap is made into an intoxicating drink called "toddy."

The mamey-tree is a native of the warmer zone (from the sea level to an altitude of about 1,000 meters) of the West Indies, Central America, and the southern Caribbean littoral from the Guianas westward. It is frequent in cultivation all over tropical America, including Brazil and southern Mexico. In Costa Rica I have met it wild only once, between Cañas Gordas and Rio Chiriqui Viejo (i. e., in what is to-day Panamanian territory), but the fact that it has names in two of the aboriginal languages is sufficient proof of its native standing. Seemann collected it near Panama, and according to my personal information it is found wild in the forests of Veraguas. It is apparently of more frequent occurrence, both as a forest tree and a cultivated fruit tree, in the Lesser Antilles and in the Guianas.

EXPLANATION OF PLATES 90, 91.—Pl. 90, tree; pl. 91, fruits, one with part of flesh removed, showing stone. Pl. 90 from a photograph by Pittier & Doyle, taken at La Manuelita, Colombia, 1905-6; pl. 91, from a photograph by G. N. Collins, taken at Ponce, Porto Rico. The latter natural size.

***Clusia uvitana* Pittier, sp. nov.**

Section *Retinostemon*. Low bush, with diffuse, spreading branches.

Petioles 1 to 1.5 cm. long, broad and flattened. Leaf blades obovate, cuneate at base, rounded or subacute at tip, 10 to 14 cm. long, 5 to 6.5 cm. broad; margin revo-

lute; primary veins numerous, catenate (on dry specimens), parallel, distant about 2 mm., diverging from the main nerve at an angle of about 20° and all merging in a marginal vein.

Inflorescences axillary or terminal, much shorter than the leaves, the male ternate with 9 to 13 flowers. Bracts ovate, 5 to 6 mm. long; prophylla semiovate and subacute, about 2 mm. long. Male flowers: Pedicels 6 to 8 mm. long; sepals 4, concoid, orbicular, the interior about 7 mm. long and 10 mm. broad; petals 5, suborbicular-spathulate, nearly 15 mm. long and 12 mm. broad, dark-striate, the claw 5 mm. long and 2 mm. broad; andrœcium forming a solid, resin-like disk 8 mm. in diameter and 3 mm. high; anthers numerous around the base of the disk (28 to 30 in the lower row, 15 or more in the second row), irregularly scattered and imperfect toward the apex; rudiments of gynœcium wanting. Female flowers not known; presumably solitary, with 8 or 9 stigmas.

Capsule ovoid-globose, 2.5 to 3 cm. long, 2 cm. in diameter, 8 or 9-celled, each cell with many seeds; stigmas 8 or 9, spoon-like, forming a crown about 13 mm. in diameter.

Type in the U. S. National Herbarium, no. 366031, collected on Uvita Island, near Port Limon, Costa Rica, July, 1898, by H. Pittier. The material consists of male fruits and ripe capsules. Same in Instituto fıs. geog. Costa Rica (no. 12704).

This species was distributed under the name *C. minor* L., but differs from that species as described by Planchon and Triana^a by its short petioles, the form of the stigmas, and the details of the capsule. The male flower of *C. minor* does not seem to have been yet described and there is doubt as to the section to which that species should be referred. While our material may in the end be found to belong to this or to some other species previously described, there is a reasonable doubt as to its identity and in the absence of reliable information it seems preferable to record it for the present under a separate name.

***Rheedia edulis* Triana & Planch. Ann. Sci. Nat. IV. 14: 310. 1860.**

FIGURE 80.

A forest tree reaching a height of 30 meters. Branchlets tetragonous or 4-sulcate, with dichotomous ramification.

Leaves petiolate, glabrous, coriaceous, the younger ones reddish. Petioles 1 to 1.2 cm. long, canaliculate and subtetragonous, with a short, rather inconspicuous foveola. Leaf blades elliptic-lanceolate, cuneate at base, obtuse-rounded, acute, or acuminate at tip, 5 to 15 cm. long, 2 to 5 cm. broad, dark green above, paler or brownish beneath; main nerve and primary veins prominent on both faces, the latter simple, parallel, and very numerous on the long, narrow leaves, sparser, farther apart, and bifurcate on the more rounded leaves.

"Pedicels of the fertile flowers axillar and geminate. Sepals 2, obtuse. Stamens 10 to 12, persistent." ^b Male flowers 2 or 3-geminate. Pedicels 8 to 15 mm. long and broad. Petals 4, ovate-rounded, often with a ligular, acute appendage at tip, 5.5 to 7 mm. long, 4 to 5 mm. broad, white. Stamens 25 to 30, biseriate, 3 to 4 mm. long. Disk conical, rather flat but acute at tip, about 3.5 mm. in diameter, 1.5 mm. high.

"Fruits about the size of a hazelnut, yellow, one-seeded." ^b "The fruit of *R. edulis* is as large as the largest hazelnuts, but much longer than an olive; it is mono-spermous" (Wercklé in litt.).

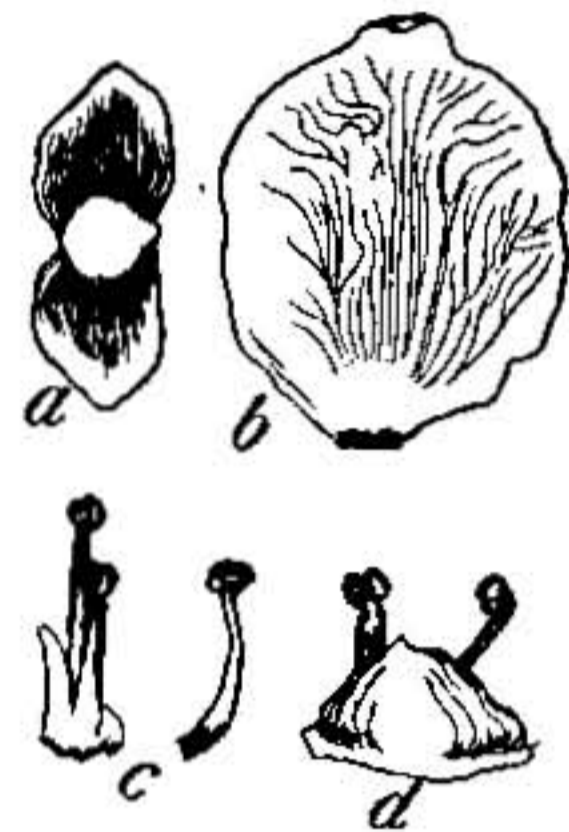


FIG. 80.—*Rheedia edulis*, floral details. a, Calyx; b, petal; c, stamens; d, disk with two adhering stamens. a-c, From Costa Rican specimens; d, from Guatemalan. Scale 3.

^a Ann. Sci. Nat. IV. 13: 334. 1860.

^b Seemann, Bot. Voy. Herald 89.

PANAMA: In dark forests near the village of San Lorenzo, Veraguas, *Seemann*; Panama (Herb. Fac. Sci. Monspel.).

COSTA RICA: Upper forests at El Rodeo de Pacaca, alt. about 1,000 meters, *Pittier*, male flowers only, December, 1892 (Instituto ffs. geog. Costa Rica, no. 1634).

GUATEMALA: Teocinte (Sta. Rosa) alt. about 830 meters, *Heyde & Lux*, male flowers only, December, 1892 (Donnell Smith distribution, no. 4315).

It is by no means certain that the tree met with in Costa Rica and Guatemala represents the species described first by Seemann from San Lorenzo de Chiriqui. If this proves to be really the case, then Seemann's description will be shown to be very inaccurate.

***Rheedia magnifolia* Pittier, sp. nov.**

A forest tree 15 to 20 meters high. Trunk 35 to 40 cm. in diameter. Crown elongate. Floriferous branchlets thick, laterally compressed, longitudinally striate-grooved when dry.

Leaves very large, thick and coriaceous. Petiole thick, 1.5 to 2 cm. long, with a broad, bulging foveola on the axillary side of the base. Leaf blade ovate-elliptic, rounded at base, shortly acuminate at tip, 35 to 40 cm. long, 15 to 20 cm. broad, dark green above, brownish-glaucous and finely punctulate beneath. Main nerve very

prominent and with an acute edge on the lower side, the lateral ones parallel, anastomosed transversely, 6 to 12 mm. distant, all merging into a marginal vein.

Male flowers in fascicles of 2 or 3 (?) in the axils of fallen leaves. Pedicels 3 cm. long. Sepals 2, ovate-rounded, 5 mm. broad and long, connate. Petals 4, ovate, narrowing at base into a short claw, rounded at tip, 11 to 12 mm. long, 7 to 10 mm. broad, pale yellow. Stamens numerous (about 30), inserted at the base of a central disk; filaments rather thick, nearly 4 mm. long, anthers small (about 0.5 mm. long and broad), basifix. Disk about 4.5 mm. in diam-

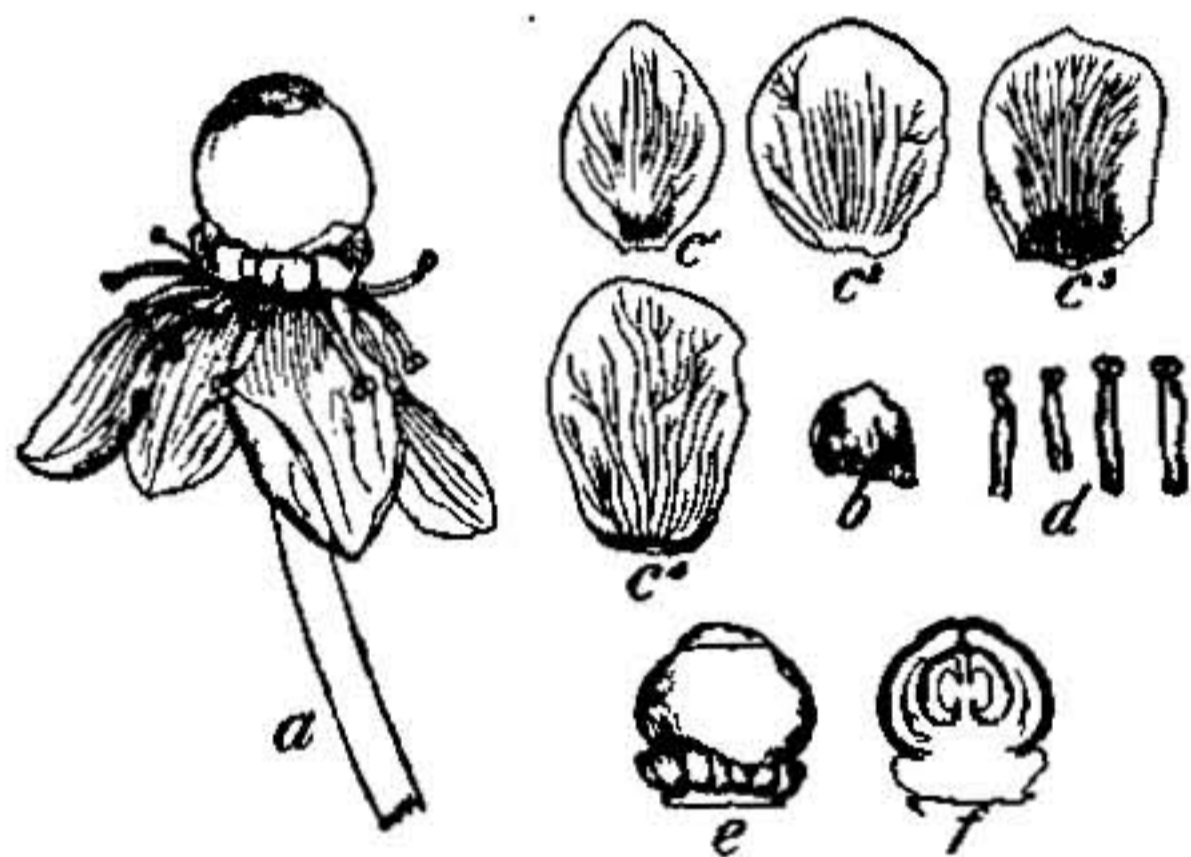


FIG. 81.—*Rheedia intermedia*, flower and details. *a*, Hermaphrodite or female flower; *b*, sepal; *c*¹ and *c*² the exterior, *c*³ and *c*⁴ the interior petals; *d*, stamens; *e*, ovary and disk; *f*, vertical section of same. Scale 3.

eter, hemispherical with a muriculate surface. Female flowers not known.

"Fruits ovoid, about 6 cm. long and 4.5 cm. in diameter, with a smooth, yellow skin. Seeds large, surrounded by an acidulous sweet pulp, edible and quite palatable" (MS. notes).

Type in the U. S. National Herbarium, no. 578033, collected in forests above Rio Hondo near Matina at an altitude of 400 meters, August, 1901, by H. Pittier. Male flowers and fruits only. Same in Instituto ffs. geog. Costa Rica, no. 16165.

This species differs from any of the group *Eurheedia* by its enormous leaves, much larger and broader than in *R. macrophylla*, and broader than in *R. longifolia*, and also by the size of its male flowers, the few-flowered inflorescences, and the dimensions of the fruits. On account of its fruit, the taste of which is agreeable and refreshing, this species is indicated for cultivation and improvement in warm, humid climates.

***Rheedia intermedia* Pittier, sp. nov.**

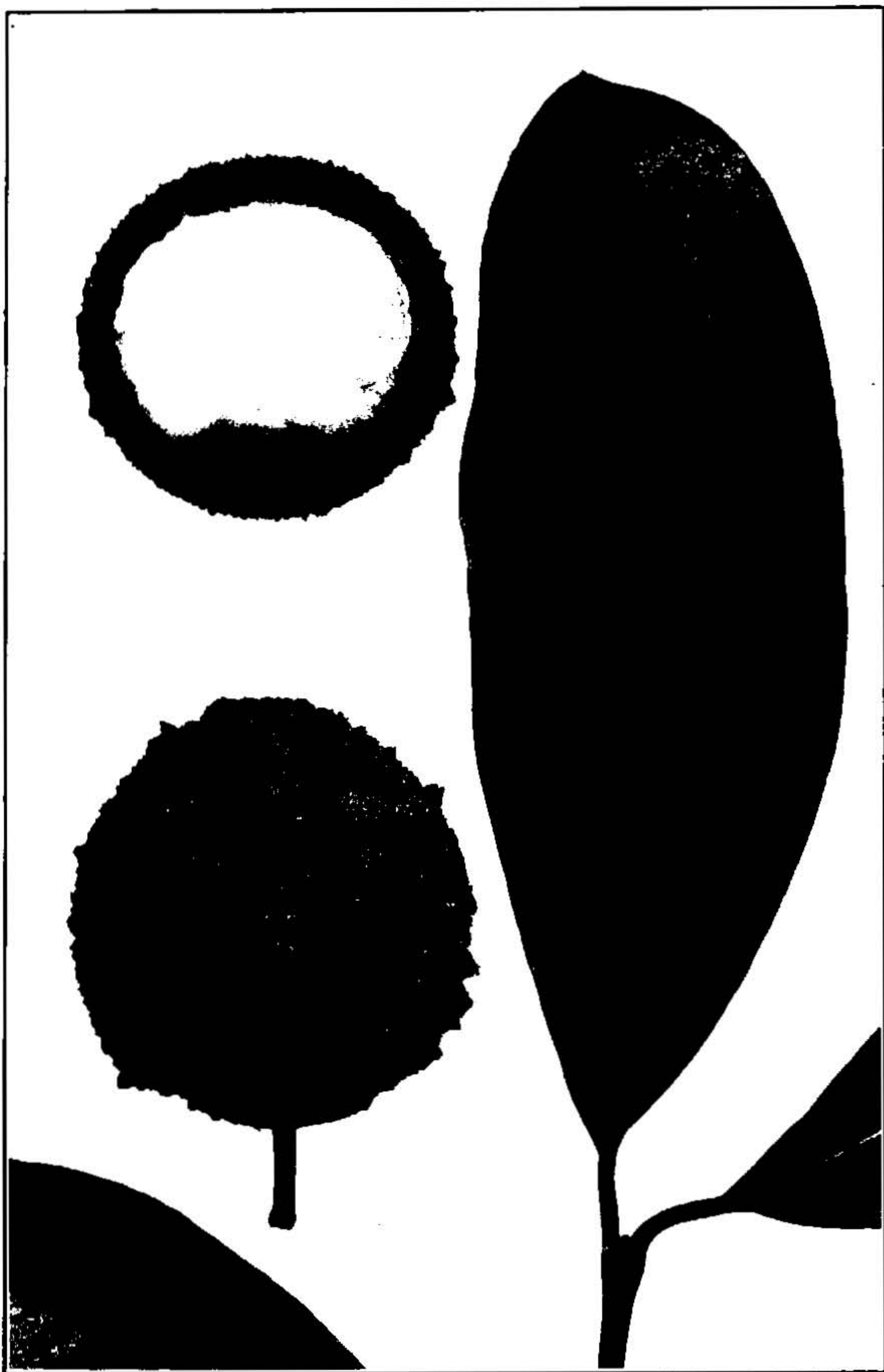
FIGURE 81.

A tree. Branchlets subterete or depressed. Internodes 3 to 11 cm. long.

Leaves rather large, when newly spread of a deep reddish color. Petioles about 2 cm. long, rather thick, broadly canaliculate above and with an acute edge below. Leaf blades elliptic-acuminate, cuneate-rounded at base, 15 to 23 cm. long, 5 to 7 cm. broad; main nerve prominent on both faces and with a sharp edge beneath; primary veins



RHEEDIA MADRUNO PLANCH. & TRIANA.



RHEEDIA MADRUNO PLANCH. & TRIANA.

numerous, more or less parallel, simple or ramified and profusely anastomosed, the principal ones merging into a marginal nerve.

Flowers in fascicles of 1 to 5 in the axils of deciduous leaves. Female flowers: Pedicels slender, 1 to 2 cm. long; sepals 2, conchoid, rounded with a more or less distinct apex, 1.2 mm. long, 1.5 mm. broad; petals more or less ovate-rounded, often with an acute tip, 3.5 to 4 mm. long, 2.5 to 3 mm. broad; staminodes about 10 (?), deciduous, 1.5 to 2 mm. long, with minute rudimentary anthers; disk lobulate, about 2.5 mm. in diameter and 0.6 mm. high; ovary globose-depressed, about 2.5 mm. in diameter and 2 mm. high, bilocular by abortion and each cell with one ovule; stigma sessile, peltate, with smooth edge, about 1.5 mm. in diameter and 0.2 mm. high. Male flowers and fruit not known.

Type in the U. S. National Herbarium, no. 398468, collected upon Rio Lanquín (Alta Verapaz), Guatemala, at an altitude of about 400 meters by von Türckheim, female flowers only, March, 1902 (Donnell Smith distribution no. 8180).

Also collected around Sepacuité (Alta Verapaz), at about 1,000 meters altitude, Cook & Griggs 477, leaves only, April 5, 1902 (U. S. National Herbarium, no. 408188).

This species differs from *R. macrophylla* Planch. & Triana var. *benthamiana* Vesque, under which name it has been distributed, in several particulars. Its flowers are about half smaller and the staminodes apparently less numerous; the stigma is narrower, not quite covering the globose-depressed ovary; the disk is not so pronounced. In the petioles the canal is almost closed by the reflexed wings and the foveola is more elongate. This tree is now made known under its new name with the concurrence of Capt. John Donnell Smith, who kindly furnished the best materials of his rich herbarium to make possible a satisfactory description.

Rheedia madruno Planch. & Triana, Ann. Sci. Nat. IV. 14: 315. 1860.

PLATES 92, 93. FIGURE 82.

A tree 6 to 8 meters high, with a low, pyramidal or subspherical, densely leafy crown. Branchlets subtetragonous and sulcate (when dry).

Leaves rather variable in size and form.

Petioles 1 to 1.4 cm. long, canaliculate, sub-

tetragonous, mostly of a light yellow color in young specimens; foveola about 4 mm. long, not very prominent. Leaf blades elliptic or oblong, cuneate at base, rounded, acute, or acuminate at tip, 6 to 15 cm. long, 2 to 5 cm. broad, dark green above, paler beneath; main nerve and primary veins prominent on both faces, the former rounded above and below, the latter numerous (about 60 on each side), single or bifurcate, more or less parallel, closely anastomosed and merging into a thick marginal vein.

Flowers more or less numerous (up to 14) in the axils of the leaves (these mostly absent at flowering time) on the former year's growth. Male flowers: Pedicels 12 to 20 mm. long, slender; sepals 2, ovate-rounded or crescent-shaped, 1 to 2 mm. long, 2 to 3 mm. broad, reflexed; petals 4, reflexed, pale yellow, the exterior ones ovate-elongate, about 7 mm. long, 3 to 3.5 mm. broad, more or less regularly rounded at tip, the interior ones ovate to ovate-rounded, 5.5 to 6 mm. long, 3.5 to 4.5 mm. broad, rounded at tip, all obscurely veined and irregularly dark-striate or dotted; stamens 25 to 30, biseriate, very shortly adnate at base and of a light yellow color; filaments

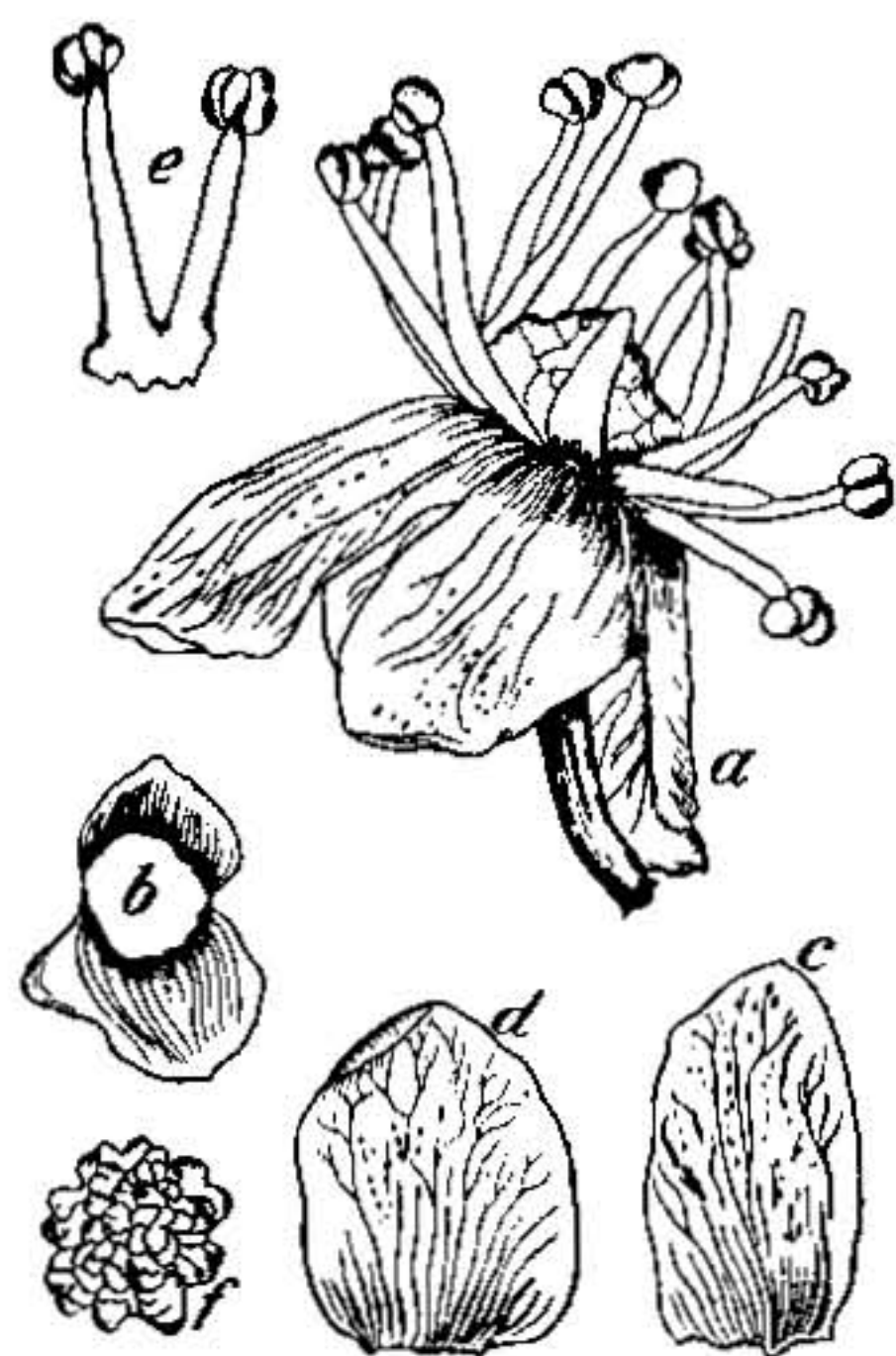


FIG. 82.—*Rheedia madruno*, male flower and details. a, Male flower; b, calyx; c, exterior petal; d, interior petal; e, stamens; f, disk seen from above. Scale 3.

rather slender, their free part 3 to 4 mm. long; anthers rounded, their cells distinctly bilobate; disk conical, muricate, about 3 mm. in diameter and 2.3 mm. high. Female flowers not known.

Fruit globose, about 5 cm. in diameter; skin verrucose, thick, lime-yellow outside, exuding when sectioned a sulphur-yellow, resinous latex. Seeds 1 to 3, ovate, about 2 cm. long, wrapped in a white, mellow, sweetish-acidulate, edible pulp.

COLOMBIA; La Manuelita near Palmira, eastern side of Cauca Valley, alt. about 1,200 meters; male flowers and fruits, December 30, 1905, *Pittier* 843.

EXPLANATION OF PLATES 92, 93.—Pl. 92, tree; pl. 93, fruits, one opened, and twig with terminal bud and leaves. From photographs taken in the field by Pittier & Doyle. Pl. 93, natural size.

Rheedia madruno ovata Pittier, subsp. nov.

PLATE 94.

Leaves mostly obovate-elliptic, long-cuneate at base, shortly acuminate or rounded at tip; petioles longer than in type. Flowers unknown. Fruit ovoid or conical at both ends, 6 cm. long, 4.5 cm. in diameter, with a long (2.5 cm.) pedicel. Seeds 3 cm. long.

Type in the U. S. National Herbarium, no. 531108, collected at La Manuelita near Palmira, eastern side of Cauca Valley, Colombia, altitude 1,100 to 1,302 meters in 1905-1906, by H. Pittier (no. 916). The type sheet shows only leafy stems. A second sheet bears 3 photographs, one of them here reproduced.

EXPLANATION OF PLATE 94.—Twig with leaves, a fruit, another fruit dissected, and a seed. Photograph by Pittier & Doyle.

Rheedia madruno bituberculata Pittier, subsp. nov.

PLATE 95.

Fruits found on the market at Cali (Cauca, Colombia). They have a basal and an apical nipple and are 7 cm. long and 5.5 cm. in diameter. The seeds are much longer (4 cm.) than in the foregoing varieties.

Type represented by a photograph in the U. S. National Herbarium, showing 4 fruits, 2 of them dissected.

EXPLANATION OF PLATE 95.—From the type photograph by Pittier & Doyle.

In view of the several deficiencies in the descriptions of the Andean species of *Rheedia*, I deem it preferable, notwithstanding the opinion of Vesque, to retain for the present the specific division established by Planchon and Triana in the memoir cited above. The identity of *Rheedia acuminata* and *R. madruno* of these authors is by no means elucidated by Vesque's explanations, and the diversity in the shape and dimensions of the fruits, as observed by me in the Cauca Valley, points to the coexistence there of several species of the group *Verticillaria*.

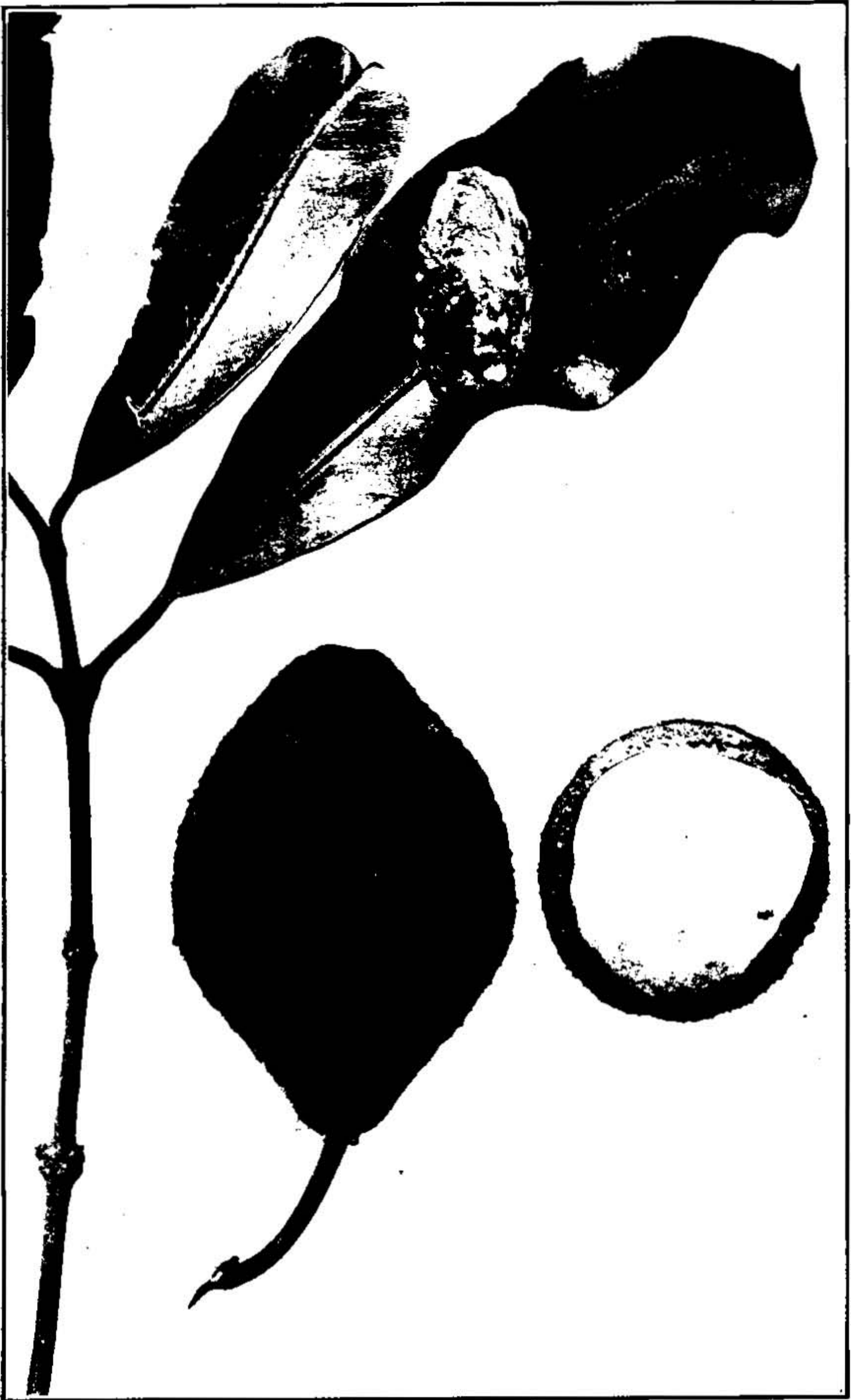
The *madroños* of the Cauca Valley are during their season a staple article of consumption among all classes, and are brought to the markets in large quantities. Their taste is rather agreeable, but, on account of the pulp firmly adhering to the large seeds, they feel rather awkward to the mouth.

Symphonia globulifera L. f. *Suppl.* Pl. 302. 1781.

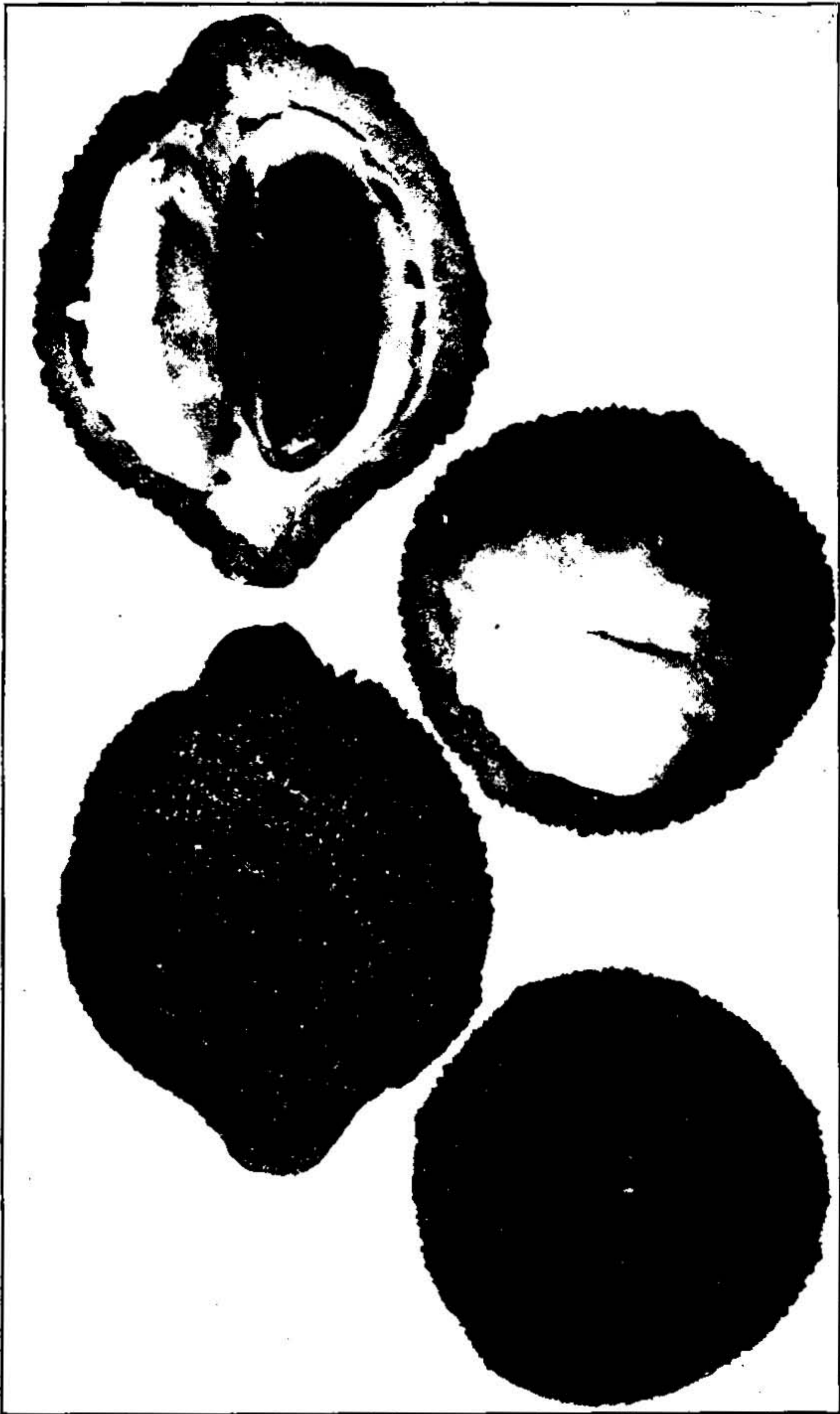
Vesque^a notes that he has not been able to observe a single fruit of this tree, apparently widely spread in the *tierra caliente* of tropical America and well represented in most herbaria. He adds that Planchon and Triana have attributed to that species a hairy seed, an assertion that is contradicted both by the testimony of the original description of Linnæus the son and by that of Bentham and Hooker.^b I have had several opportunities of studying this *Symphonia* in the forests of Costa Rica, where the Indians call it *cerillo* and tap it for the waxlike resin, which they use for lighting purposes. The fruits, as recorded in my notebooks, are ovate or ovoid-acuminate, 1.5 to 2 cm. long, 1 to 1.2 cm. in diameter, with a brown skin and a thin mesocarp filled with laticiferous ducts; they bear at the tip the persistent stigmas and the remnants of the stamens, and are almost without exception monospermous

^a In DC. *Monogr. Phan.* 8: 228.

^b *Gen. Pl.* 1: 173.



RHEEDIA MADRUNO OVATA PITTIER.



RHEEDIA MADRUNO BITUBERCULATA PITTIER.

by abortion. The seeds are ovoid-oblong, subtrigonus, 12 to 15 mm. long, about 8 mm. in diameter, covered by an arilluslike tegument, and always perfectly glabrous.

SAPOTACEAE.

AN OLD AND A NEW SPECIES OF LUCUMA.

Lucuma obovata H. B. K. Nov. Gen. & Sp. 3: 241. 1818.

FIGURE 83.

Achras lucuma Ruiz & Pav. Fl. Peruv. Chil. 3: 17. pl. 239. 1802; Molina, Sagg. Stor. Nat. Chil. ed. 2. 282. 1802.

A tree 8 to 10 meters high, laticiferous, evergreen and with a very dense, rounded or subglobose crown. Limbs spreading, with rugose, grayish bark. Branchlets terete, minutely pubescent.

Leaves in bunches at the ends of the branchlets. Petioles 12 to 22 mm. long, broadly flattened and sulcate above, rounded beneath, subglabrous. Leaf blades 11 to 12 cm. long, 4 to 5 cm. broad, elliptic-ovate, acute at the base, rounded or subacute at the tip, membranous or subcoriaceous, entire with a revolute margin, glabrous, dark green above, paler or ferruginous beneath; primary veins bifurcate, reticulate-anastomosed.

Flowers 1 to 3 in the axils of the leaves. Pedicels 10 to 12 mm. long, subglabrous. Sepals 5, 9 to 10 mm. long, 7 to 9 mm. broad, free, ovate, obtuse, concave, coriaceous, hairy-tomentose on the back, imbricate, the two exterior ones opposite and covering the others. Corolla 5-lobed (sometimes 6 or 7), about 13 mm. long; lobes about 6 mm. long, 4 mm. broad, ovate-orbicular, rounded at tip, subauriculate at the base on the right margin, minutely hairy or papillose on the outside. Staminodes 3.5 to 4 mm. long, sublinear, nude at the apex, subtrigonus and papillose for the lower part. Stamens very short (about 4 mm. long), glabrous, the filament rather short and stout, subulate; anthers almost basifix, ovoid-acuminate, apiculate. Pistil of variable length, according to the stage of anthesis, glabrous with a crown of stiff hairs around the base; ovary ovoid, 5-celled; style erect, obscurely sulcate and slightly capitellate.

Fruit globose-depressed or sometimes ovate, as large as a good-sized apple, green and smooth outside, bearing at the base the persistent calyx and at the apex a squamose or rugose spot or ring; sarcocarp thick, yellow, mealy. Seeds 1 to 5, but most commonly 2, subglobose, flattened on the umbilical surface, of the size of a chestnut.

COMMON NAMES: *Kitšua*, *lucmo*, or *lucumo* (Chile, Peru); Spanish, *mambón* (Costa Rica).

This tree appears to be a native of the maritime provinces of Peru and Chile, but Ruiz and Pavon seem to have known it only in the cultivated condition, while Bonpland simply states that it grows in the temperate region in the neighborhood of the town of Loja.^a In Costa Rica it exists only in a few specimens in gardens around San Jose and is said to have been introduced there by returning political exiles during the first half of the past century.

It flowers and fructifies all the year round. According to Ruiz and Pavon the fruits are not quite edible when they drop from the tree, and the natives of Peru

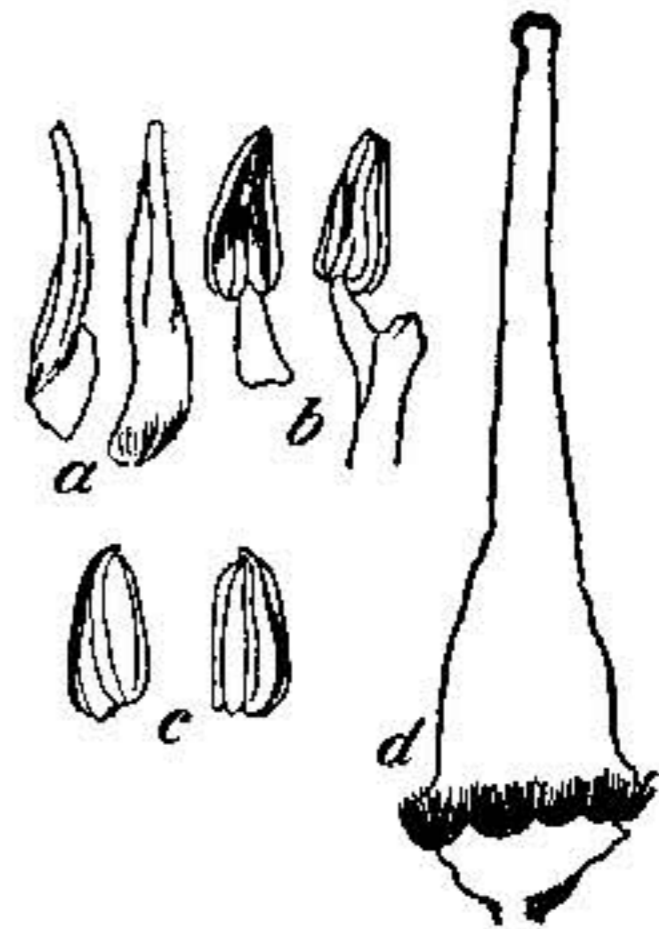


FIG. 83.—*Lucuma obovata*, floral details. *a*, Staminodes; *b*, stamens; *c*, anthers; *d*, pistil. Scale 3.

^a Velasco evidently refers to this species when he says: "El arbol es bastante grande, y tambien el fruto redondo, con diámetro de cinco dedos mas ó menos. Es carnososo, arenoso, poco dulce y seco, de corteza pajiza, carne amarilla y pepita grande, redonda muy lustrosa." *Historia del Reino de Quito*, p. 62, pl. 1. 1844.

keep them for a time in stored grain, chaff, furs, or dry hay until sufficiently soft. The mesocarp looks then quite like the yolk of a hard-boiled egg; it is sweet and agreeable at first, but soon becomes somewhat repugnant on account of a peculiar fatty taste, due to the latex that impregnates it.

The wood is whitish, compact, and durable; it is used by the Peruvians, according to the same authors, as a building material, which seems to indicate that the occurrence of the tree is not limited to gardens and orchards.

Lucuma jenmanii Pittier, sp. nov.

A tree. Branchlets thick, glabrous. Internodes very short. Terminal buds and new growth more or less hairy-tomentose.

Leaves rather large and long-petiolate. Petioles 3 to 5 cm. long, terete, canaliculate, hairy or glabrescent. Leaf blades 20 to 30 cm. long, 7 to 9 cm. broad, obovate, cuneate-rounded at base, rounded, obtuse or shortly acuminate at tip, glabrous and almost shiny above, with the costa impressed and the primary veins slightly prominent, glabrous, opaque, with both costa and veins quite prominent and the inter-venal spaces finely reticulate beneath; margin entire, slightly revolute; primary veins about 20 on each side.

Flowers sessile, in clusters of 2 to 5 (?) in the defoliate axils of the former season's growth, or in the axils of the upper leaves, and completely covering the branchlets. Basal bractlets very small, ovate, ferruginose-tomentose. Sepals 4, imbricate, free or more or less adnate at the base, 8 to 11 mm. long and broad, broad or slightly attenuate at the base, rounded or obtusely acuminate at the tip, coriaceous and more or less scarious on the margin, silky hairy outside. Corolla broadly tubular, about 14 mm. long, 4-lobate, glabrous or subglabrous, ciliate on the margin of the lobes; tube about 10 mm. long; lobes short (3 mm. long, 4 mm. broad), broadly ovate-rounded, slightly contracted at the base. Stamines alternating with the lobes of the corolla, about 2 mm. long, ovate-lanceolate and abruptly contracted into a rounded, papillose point; margin of the lower part of the staminode sometimes sparsely provided with stiff, erect hairs. Stamens glabrous; filaments about 9 mm. long, but adnate to the corolla for two-thirds of their length; anthers elongate-elliptic, 22 mm. long. Pistil 13 to 14 mm. long; ovary depressed-globose, 4-celled, densely covered with stiff gray hairs; style about 11 mm. long, glabrous, divided at the tip into 2 lobes, each of these again obscurely bilobulate.

Fruit not known.

Type in the U. S. National Herbarium, no. 619294, collected at Demerara, British Guiana, by Jenman (no. 4107).

NOTES ON SPECIES OF SIDEROXYLON.

The genus *Sideroxylon* was established by Dillenius, the type, *S. inerme* L., being a tree of the Cape Colony in South Africa.^a The first generic definition given by Linnæus in his *Genera*^b was correct as to the corolla and the staminodes, but erroneously gave the fruit as 4-seeded, a mistake that was apparently soon discovered, since it is not repeated in the 1748 edition of the *Systema*. Time after time unfortunate additions increased the genus and caused the original definition to be repeatedly altered. These additions not only included several *Bumelias* and a few other species belonging to closely related genera of the Sapotaceae, but also a *Scleroxylon*

^a Dill. Hort. Elth. 2: 357. 1732.

^b Gen. Pl. no. 264. 1737.

(Celastraceae), a Myrsine, and an Olinia (Oliniaceae). They furnish a ready explanation of the repeated changes just referred to.

The inconsistency of the successive editions of Linnæus's *Systema* and *Genera* and of the *Mantissae*, with reference to the genus *Sideroxylon*, was first brought to light by Jacquin,^a who, in 1788, made an attempt to remedy the existing confusion of species, confessing, however, that any effort to get a clear understanding of the characters of the genus would be vain as long as the structural details of the fruit were not fully known. Jacquin himself had published in 1760^b three species of American *Sideroxylon*, viz, *S. sapota*, *S. foetidissimum*, and *S. pauciflorum*. In the *Stirpium Americanarum Historia*^c the first species is referred to "Achras (Zapota major)" (*Lucuma mammosa* Gaertn.), without mention of the former name, and it was left thus disposed of. The two other species are described at length, but without emphasizing to any extent the differential characters given in the *Enumeratio*. According to this, *S. foetidissimum* has subopposite, *S. pauciflorum* alternate leaves. Besides, in *S. pauciflorum* the leaves are said to be always obtuse, the floral glomerules fewer flowered, the flowers less ill-smelling, and the tube of the corolla shorter. As a matter of fact, the examination of many specimens shows that the mature leaves are always alternate and the remaining characters very variable, so that we can but participate in the doubts of Jacquin and finally accept the more modern view of Urban,^d who reunites the two species under the first name.

Urban, however, seems to have carried his amalgamating process too far, and in the specimens of the U. S. National Herbarium representing numbers enumerated by him^e under the name of *S. foetidissimum*, we find no less than three forms or types, which can be readily distinguished even though our specimens are not quite satisfactory. Their distinctive characters are recapitulated in the following table:

Floral pedicels 10 mm. long. Anthers elongate-elliptic. Upper end of the connective spoon-shaped and slightly surpassing the apex of the cells. Seeds (pl. 96, *a*) broadly obovoid and flattened or sulcate at the apex; umbilical area circular; glabella prominent but not biscutellate. Leaves long-petiolate, ovate-elliptic, attenuate at the base, not coriaceous.—Cuba (*Wright* 1324).

Floral pedicels 5 to 6 mm. long. Anthers ovate.

Floral pedicels pubescent. Corolla 6 to 6.5 mm. long. Anthers not apiculate. Staminodes equal to fully half the length of the lobes of the corolla. Seeds ovoid-oblong (pl. 96, *b*); umbilical area ovate; glabella replaced by a small depression. Leaves rather short-petiolate, ovate, coriaceous, rounded at the base and forming a small pouch or fistula.—La Guadeloupe (*Duss* 2915).

^a Coll. Bot. 2: 247. 1788.

^b Enum. Pl. Carib. 15. 1760.

^c Page 56. 1763.

^d Symb. Antill. 5: 131. 1904.

^e Loc. cit. 133.

Pedicels glabrous. Corolla 3.5 to 4 mm. long. Anthers slightly apiculate. Staminalodes hardly above 1 mm. long. Seeds ovoid (pl. 96, c); umbilical area circular; glabella distinctly biscutellate. Leaves long-petiolate, pouchless.—Porto Rico (*Sintenis* 5001, 3950; *Heller* 507); Florida (*Garber*; *Chapman* 11, *Curtiss* 1759).

On account of the incomplete descriptions of the older authors, it is difficult to identify these forms with their intended specific names. It is, however, safe to admit that the Porto Rico and Florida specimens represent the original *S. mastichodendron* of Jacquin and Gaertner (fig. 84), even though

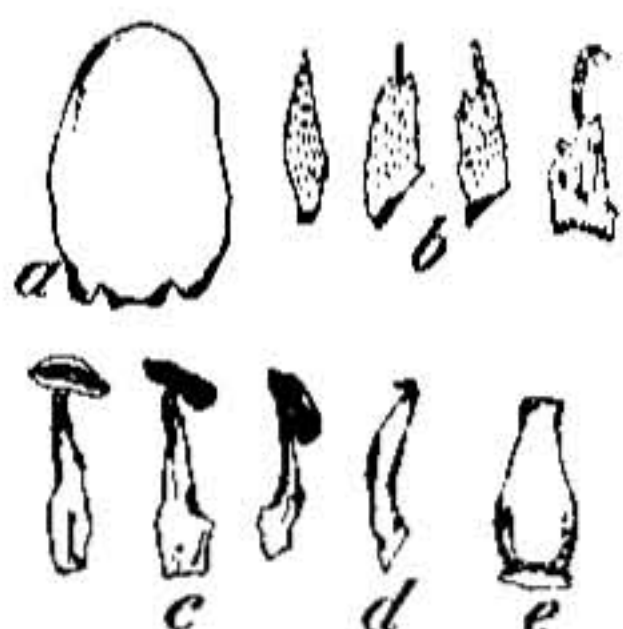


FIG. 84.—*Sideroxylon mastichodendron*, floral details. a, Petal (auriculate); b, staminodes; c, stamens; d, filament; e, pistil. Scale 3.

Jacquin does not mention the characteristic "glabella ovata bipartita" which seems to be a constant feature of the seeds in the Porto Rican and Floridan specimens and which is clearly shown in plate 202 of the *Supplementum Carpologiae*^a of the last author. An obscure detail of this question is that the origin of the specimen made use of in Gaertner's description is not given, while the names *acouma jaune* ou *abricot des bois* would seem to indicate a product of the French West Indies.

The other forms may represent entirely new species, or correspond to some of the older ones (*S. obovatum* Gaertn., *S. acouma* A. DC., *S. foetidissimum* Jacq.) (fig. 85). In regard to their status, we may repeat here what Jacquin said with respect to the whole genus: "Donec omnium fructificatio plene cognita sit, frustra tentabimus." Only the careful comparison of large series of complete materials will enable us to decide, and meanwhile Urban's step in condensing forms a few of which are to all appearances specifically characterized must be considered as premature.

The presence of a *Sideroxylon* of the *mastichodendron* group on the continental part of Central America is indicated by a specimen collected by Gaumer (no. 763) near Izamal (Yucatan). It was identified by Dr. Millspaugh^b as the true *S. mastichodendron*, but is certainly quite distinct from the specimens quoted above from Florida and Porto Rico, as well as from the Cuban tree, specimens of which were collected by Wright. I now propose to name it *Sideroxylon gaumeri*, its description being given below.

Under the much-used name of *Sideroxylon mastichodendron* Jacq., several collectors have distributed another Central American representative of the genus, widely known among the natives as *tempisque* or *tempisque*. It will be conclusively shown that this is in reality a very distinct type, more closely related to a Mexican species with many names, *Sideroxylon capiri*, which is also described and discussed in this paper.

EXPLANATION OF PLATE 96.—Seeds of *Sideroxylon*. a, Cuba, Wright 1324; b, Guadeloupe, Duss 2915; c, Florida, Curtiss 1759—these representing three forms included by Urban under *S. foetidissimum*; d, *Sideroxylon capiri*; e, *Sideroxylon tempisque*. From photographs taken in Washington by Pittier & Doyle. All natural size.

Sideroxylon gaumeri Pittier, sp. nov.

FIGURE 86.

A tree 25 to 30 meters high. Branchlets rather thick, with a glabrous iron-gray bark. Younger growth glabrous.

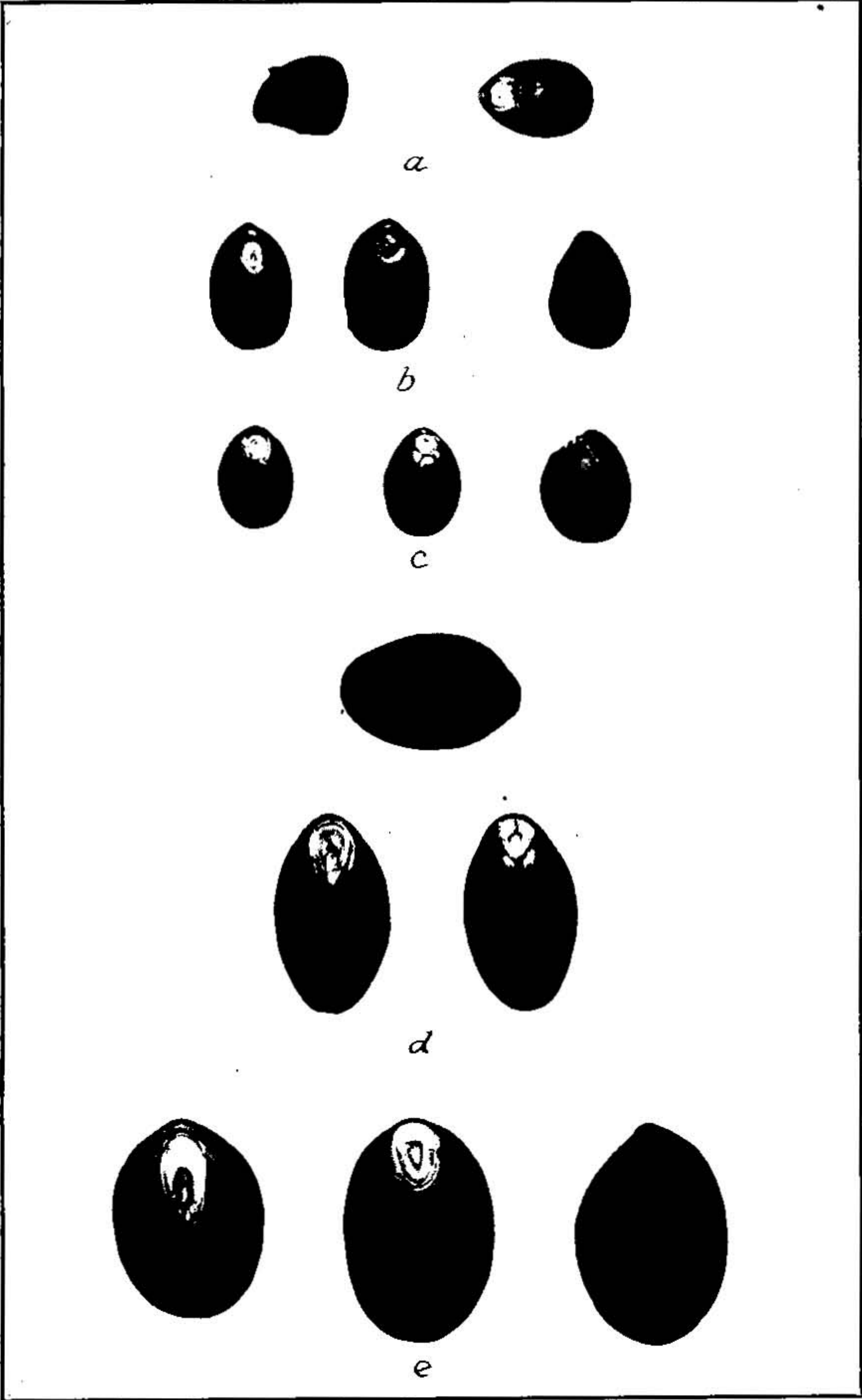
Leaves crowded at the end of the branchlets, glabrous, petiolate. Petioles 3.5 to 4 cm. long, slender, obscurely sulcate above. Leaf blades coriaceous, 8 to 10 cm. long, 3 to 5.5 cm. broad, ovate, rounded and shortly decurrent at base, rounded



FIG. 85.—*Sideroxylon foetidissimum* (?), floral details. a, Petal; b, staminodes; c, stamens; d, pistil. From Wright's No. 1324 (Cuba). Scale 3.

^a Gaert. f. *Fruct. & Sem.* 3: 123. pl. 202. 1805-1807.

^b *Field Mus. Bot.* 1: 313. 1896.



SEEDS OF SIDEROXYLON SPP.

and sometimes emarginate at tip, finely reticulate; main nerve impressed above, prominent beneath; veins salient on both faces; margin undulate.

Flowers pedicellate, in glomerules of 18 or less, entirely glabrous. Pedicels 4 to 5 mm. long. Calyx about 1.5 mm. long; sepals suborbicular, shorter than broad. Corolla pale yellow, 3.5 to 4 mm. long, 5-lobate; tube about 0.6 mm. long; lobes ovate, obtuse, not auriculate. Staminodes ovate-acuminate, 1.4 to 1.7 mm. long, with one or two subulate points, irregularly denticulate on the margin, longitudinally dotted-striate. Stamens short (1.8 to 2 mm. long); filaments thick and straight, bent and subulate at tip; anthers ovate (1.6 to 1.8 mm. long) with the connective cleft at the base and emarginate or shorter than the cells at the tip. Pistil glabrous, about 2.3 mm. long at the time of anthesis, deeply 5-sulcate; ovary ovate, 5-celled; style short, obtuse.

Fruit and seed unknown.

Type in the U. S. National Herbarium, no. 268389, collected at Izamal, Yucatan, July, 1895, by G. F. Gaumer (no. 763). Tree 80 feet high, very rare, only one seen; flowers.

This species is a near relative of the forms with ovate anthers of the West Indies and Florida, but differs from them by its many-flowered clusters, the inauriculate lobes of its corollas, its emarginate connectives, its distinctly 5-sulcate pistils, and probably by the characters of the fruit and seed.

Sideroxylon tempisque Pittier, sp. nov.

PLATE 96, c. FIGURES 87, 88.

A large tree. Branchlets more or less thick, with a dark gray bark, covered with the verrucose scars of the fallen leaves.

Leaves irregularly alternate, long-petiolate, glabrous, crowded at the ends of the branchlets. Petioles 4 to 8 cm. long, canaliculate above, rounded on the lower face, thicker and broader at the base. Leaf blades 7 to 12 cm. long, 3 to 5 cm. broad, elliptic-ovate, subacute at tip, finely reticulate, wavy on the margin, extended at the base over the petiole and forming a pouchlike, conical appendage, this bearing almost always a single minute spine on the upper margin; main nerve canaliculate above, prominent below; primary veins slightly prominent on both faces.

Flowers pedicellate, yellowish white, in clusters of 10 or less in the defoliate axils nearest to the ends of the branchlets. Pedicels about 5 mm. long, glabrous. Calyx about 3 mm. long, with 5 rounded ovate sepals, pubescent outside, slightly adnate at the base, persistent. Corolla 7 to 8 mm. long, 5-lobate, puberulous, glabrescent outside; tube very short (not over 1.5 mm. long); lobes imbricate, elliptic-ovate, 6 to 7 mm. long, slightly concave, auriculate or subauriculate at the base, rounded at the apex. Staminodes rudimentary (about 0.8 mm. long, ovate-squamiform, more or less acute at tip. Stamens nearly as long as the lobes of the corolla, extrorse, glabrous; filaments slender, rounded, 4 mm. long, subulate and incurved at tip; anthers 3.5 to 4 mm. long, extrorse, mediofix, ovate-acuminate, deeply cleft at the base, obtuse at tip. Pistil about 5 mm. long at time of anthesis, claviform, minutely hairy; ovary elongate-ovoid, 5-celled; style thick, obtuse.

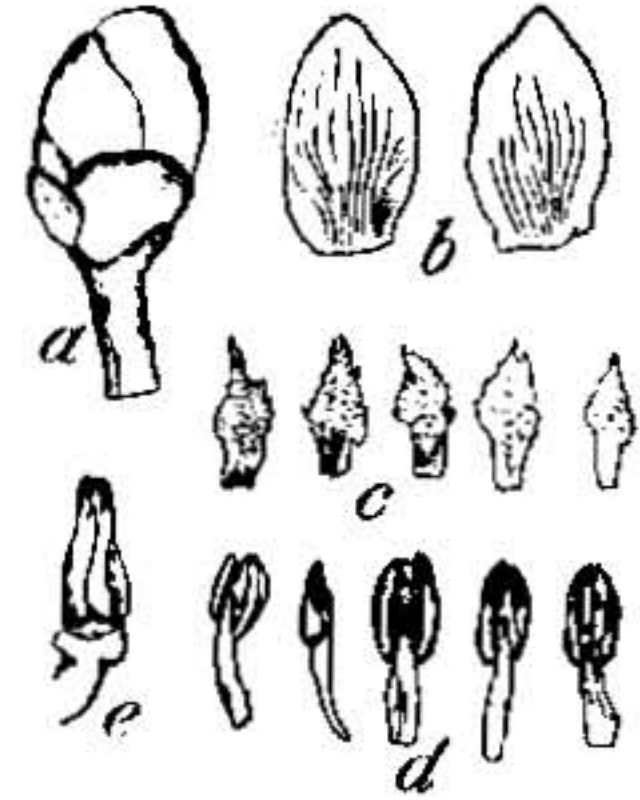


FIG. 86.—*Sideroxylon gaumeri*, flower bud and floral details. a, Bud; b, petals (not auriculate); c, staminodes; d, stamens; e, pistil. Scale 3.

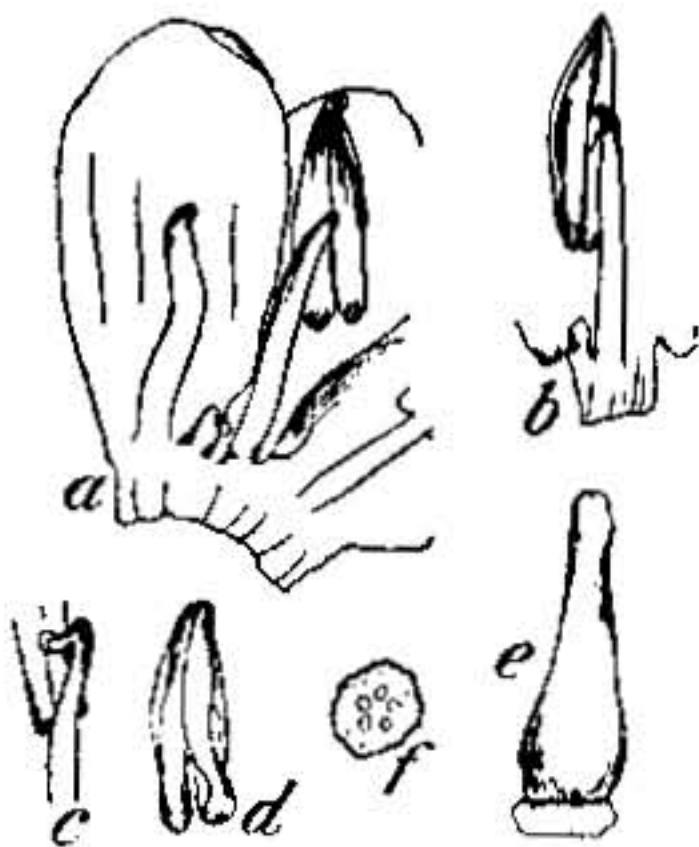


FIG. 87.—*Sideroxylon tempisque*, floral details. a, Part of corolla, showing lobe, staminode, and stamen; b, stamen, with base of corolla lobe and staminode; c, upper part of filament; d, frontal view of anther; e, pistil; f, section across ovary. Scale 3.

Staminodes rudimentary (about 0.8 mm. long, ovate-squamiform, more or less acute at tip. Stamens nearly as long as the lobes of the corolla, extrorse, glabrous; filaments slender, rounded, 4 mm. long, subulate and incurved at tip; anthers 3.5 to 4 mm. long, extrorse, mediofix, ovate-acuminate, deeply cleft at the base, obtuse at tip. Pistil about 5 mm. long at time of anthesis, claviform, minutely hairy; ovary elongate-ovoid, 5-celled; style thick, obtuse.

Fruit pedunculate, ovoid, acuminate, 3 to 4 cm. long, 2 to 2.5 cm. in diameter, apiculate, smooth; peduncles 1 to 1.5 cm. long, thick, stiff. Seed 1, ovoid, 2.3 to 2.8 cm. long, 1.5 to 1.8 cm. in diameter, brown, smooth but not glossy; umbilical area ovate-elliptic, whitish, bordered with a deeper groove, the hylum brownish, ovate, isolated toward the lower end of the area.

Type in the U. S. National Herbarium, no. 578318, collected at La Laguna de Santa Tecla, Salvador, altitude about 800 meters, in flower, February 6, 1907, by H. Pittier (no. 1917). A medium-sized tree.

SALVADOR: Type specimen.

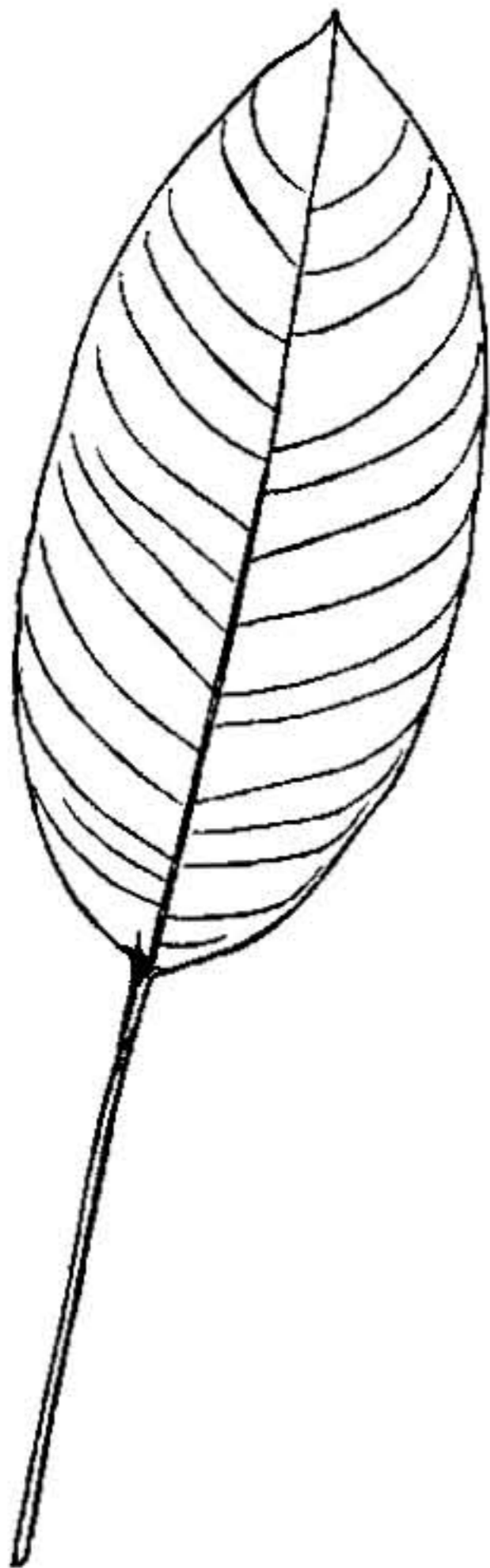


FIG. 88.—*Sideroxylon tempisque*, leaf. Scale $\frac{1}{4}$.

GUATEMALA: Amatitlan, alt. 1,300 meters, *Donnell Smith* 2508, flowers, May, 1892; Gualán (Zacapa), 122 meters above sea level, *Kellerman* 5023, fruit (U. S. Nat. Herb. no. 578624); between Nenton and Candelaria (Huehuetenango), *Cook* 62, flowers, June 1, 1906 (Nat. Herb. no. 574416); around La Antigua (Zacatepequez), alt. 1,480 meters, *Cook*, 1905, fruits in market (Nat. Herb. Seed Coll. no. 2713).

Spanish: *Tempisque* (Guatemala, Salvador. The name originally belonged to one of the dialects of Oaxaca or southern Mexico). Nahuatl: *Saquaiá* (Nahuizalco, Salvador). Kakchiquel: *kobak* (Guatemala).

This species is quite distinct from *S. mastichodendron* Jacq., a native from the Bahama Islands, Porto Rico, and Florida, with which it has been repeatedly confused. The petioles of the leaves are on the average much longer, the flowers much larger, the staminodes far from reaching half the length of the lobes of the corolla and not subulate nor acute, but rounded-squamose. The fruits and seeds are also about three times as large, the former acuminate and not rounded at tip. A special character that is wanting in *S. mastichodendron*, although it is mentioned by Urban,^a is the conical fistule or pouch at the base of the lamina. In *Donnell Smith's* specimens a small spine is always present at the mouth of the pouch on either side of the main nerve; in the other specimens it is mostly lacking, but the pouch is always well developed.^b

Sideroxylon capiri (Moc. & Sess.) Pittier.

PLATE 96, d. FIGURE 89.

Lucuma? capiri A. DC. in DC. Prodr. 8: 173. 1844.

Sideroxylon mexicanum Hemsl. Biol. Centr. Amer. Bot. 2: 296. 1886.

^a Symb. Antill. 5: 132. The author probably refers to the Guadeloupe form (*Duss* 2915), which is certainly a distinct species.

^b I am indebted to Mr. Juan J. Rodriguez, of Guatemala City, a zealous zoological investigator and a keen observer, for further information in regard to the *tempisque* and other Guatemalan fruit trees. He describes the former as a * * * "fine looking tree, with dense hard wood. This, however, is not used to any extent, the natives refraining from cutting down the trees for the sake of the fruit, even though this is not very highly esteemed and is more or less sticky. In former times the seeds were commonly used by boys and girls to play the *juego do los cinco*, but later they were replaced by imported marbles; and then the old game was altogether forsaken for the modern *patitos* and others. The larvæ of *Callichroma formosa*, a Cerambycid very conspicuous by its beautiful colors and roselike smell, feed on the *tempisque*. Beside the latter we have also a *tempixquillo* that appears to belong to the same genus, the fruits of which are smaller, sweeter, and not so sticky * * *."

Sideroxylon petiolare A. Gray, Proc. Amer. Acad. 22: 434. 1887.

Achras capiri Moc. & Sess. Pl. Nov. Hist. ed. 2. 48. 1893; Fl. Mex. ed. 2. 84. 1894.

A tree over 15 meters high, with numerous, alternating and spreading limbs. Older parts of the branchlets defoliate, glabrous, with a reddish brown bark; new growth leaf-bearing, ferruginose-tomentose.

Leaves thick, long-petiolate, crowded at the end of the branchlets, more or less covered at first with a ferruginose, furfuraceous down, then glabrous or nearly so. Petioles 3 to 7.5 cm. long, canaliculate. Leaf blades 7 to 15 cm. long, 4 to 7.5 cm. broad, varying in shape from ovate to elliptic-lanceolate, abruptly acuminate at the base, rounded or acuminate but nearly always apiculate at tip, deep green above, paler beneath; margin wavy, provided all around with a whitish, torulose border; costa canaliculate above, prominent beneath; primary veins 14 or 15, slightly prominent on both faces.

Floral clusters with 14 flowers or less, the pedicels sometimes intermingled with small, obtuse bracts (or undeveloped floral buds?). Pedicels of opened flowers about 11 mm. long, slender, tomentose or pubescent. Calyx 5-phyllous, 4 mm. long, sepals suborbicular, obtuse at tip, the exterior ones thick and quite pubescent outside, the interior ones a little smaller and scarious on the margin. Corolla spreading (13 mm. in diameter, pale yellow, 5 (seldom 6)-lobate; tube very short (less than 1 mm.); lobes ovate-oblong, concave, auriculate at the base, rounded at tip, about 5 mm. long, hairy-furfuraceous on the back in the bud, glabrous or pubescent later. Staminodes 1.5 to 2 mm. long, irregularly denticulate, mostly subulate. Stamens shorter than the corolla; free part of the filaments 3 to 3.5 mm. long, geniculate and subulate; anthers ovate-acuminate, cordate at base, 2.5 to 3 mm. long, the connective bicuspidate at the tip. Pistil glabrous, 4.5 mm. long; ovary ovoid-elliptic, 5 (seldom 6)-celled; style obtuse.

Fruit variable in shape but mostly ovoid-acuminate, 3 to 3.5 cm. long and at least 2 cm. in diameter when fresh; peduncles nearly 1 cm. long; calyx persistent, as is the thickened style, at the pointed end of the drupe; skin and sarcocarp yellow, the former quite smooth. Seeds elongate-ovoid, about 2.5 cm. long; umbilical area ovate-acuminate, surrounded by a torulose swelling of the base of the seed.

MEXICO: Jürgensen no. 212 in the Kew Herbarium, without precise locality (type of *S. mexicanum* Hemsl.); warm zone of Michoacan (*Achras capiri* Moc. & Sess., *Lucuma capiri* A. DC.), where it has been collected more recently in the mountains of the center of the State, at Ario, by N. Leon (Museo nacional, Mexico, no. 6; United States National Herbarium no. 347010, labeled *S. mexicanum*); barranca near Guadalajara (Jalisco), Palmer, flowers and fruits, June, 1886 (*Palmer* 131, 135, 136, Gray's types).

There is no doubt left in my mind as to the taxonomic identity of the four species as given above. Mociño & Sessé's descriptions agree closely with our specimens, except in the shape of the fruit. This is given as "subglobose" and in the *Calques et Dessins de la Flore mexicaine*, plate 749, it appears as a globose-depressed apple. But the seed is given a figure more in accordance with our present knowledge, and, as there is a necessary correlation in the shape of the two parts, it is hardly conceivable that an ovoid stone would find a place in the axis of a depressed-globose fruit; so we may assume that the sketch of the latter was drawn from memory or based upon inaccurate information. All other details in the description and drawings point to a *Sideroxylon*, not far removed from *S. tempisque* from Gautemala, and it is not likely that the analogy would fail in the form of the fruit only.



FIG. 89.—*Sideroxylon capiri*, floral details. a, Corolla lobe with stamen; b, stamens; c, staminodes; d, pistil. Scale 3.

Alphonse de Candolle's description of his *Lucuma? capiri* is founded on the "Calques et Dessins" and partakes of their inaccuracies. As the author himself acknowledges in his "Phytographie,"^a "although these drawings are generally exact," they are not quite satisfactory as types of new species. Nevertheless, taken as a whole, the description agrees wonderfully, except for the fruit, with the specimens described here.

With due allowance for the "personal equation," the tree described by Hemsley corresponds satisfactorily with the materials in the U. S. National Herbarium, except for the lesser dimensions of the leaves, the 10 to 12 instead of 14 or 15 primary veins, and the hirsute ovary. It may be inferred from the fact that the fuzzy pubescence on the back of the corolla lobes in their earlier stage is given as a character that the Kew specimens are undeveloped ones; this would also explain the discrepancy in the size of the leaves and the number of primary veins; the former are "molliter ferrugineo-hirsuta" only when young, the thick pubescence then hiding the terminal

venation. The "ovarium hirsutum," however, is not so easily explained in the absence of the type specimens.

The only serious discrepancy between Gray's description and the specimens at hand, which belong to the same numbers of the same set as those on which he established his species, is in the length of the leaves, this being underestimated.

The specimens of the Mexico National Museum come from the mountains of the State of Michoacan, on the western slope of Mexico, where the tree was first noticed. Those collected by Palmer grew farther north in the neighboring State of Jalisco, in the same altitudinal zone. The exact origin of the Kew specimens is unknown, but it is known that Jürgensen,

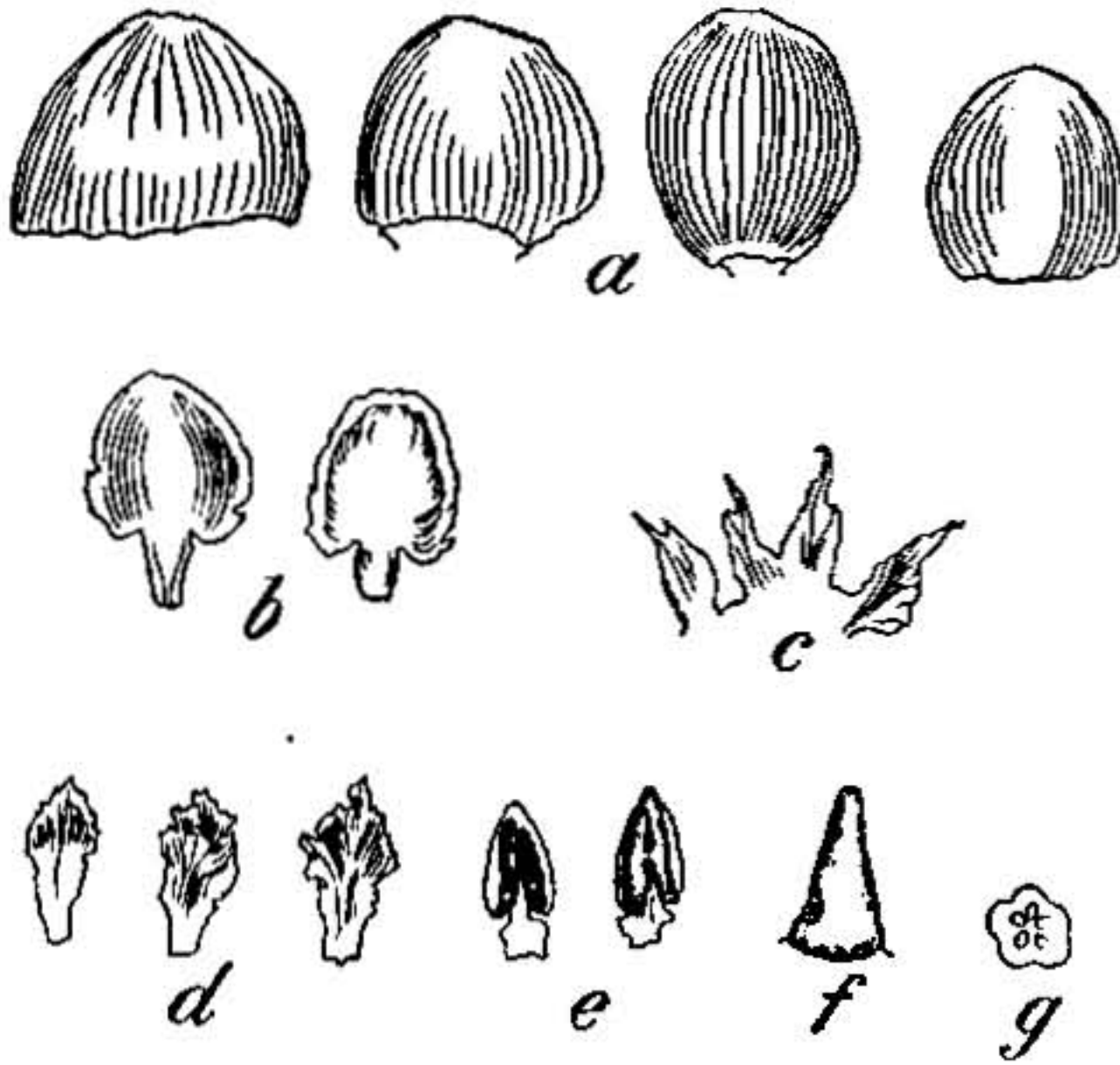


FIG. 90.—*Dipholis minutiflora*, floral details. a, Four sepals, that at the left exterior, that at the right interior (fourth sepal wanting); b, two exterior corolla lobes; c, interior corolla lobes; d, staminodes; e, stamens; f, pistil; g, cross section of ovary. Scale 6.

in the employ of Galeotti, collected principally in the mountains of Oaxaca.

The name *capiri*, already given to the tree in time of Mociño, again appears on the labels of the specimens collected by Leon, and this is also a good incidental confirmation of the view expressed at the beginning as to the definitive reduction of *Lucuma capiri*, *Sideroxylon mexicanum*, and *S. petiolare* to the primitive *Achras capiri* Moc. & Sess., which now becomes *Sideroxylon capiri*.

A NEW SPECIES OF DIPHOLIS AND ONE OF MIMUSOPS.

***Dipholis minutiflora* Pittier, sp. nov.**

FIGURE 90.

A small tree with dry bark and reddish, very hard wood. Twigs terete or subangulose, the newest ones whitish-tomentose, the oldest substriate and lenticellose. Buds ferruginose-pubescent.

Petioles 1.5 to 2 cm. long, canaliculate, minutely pubescent. Leaf blades coriaceous, obovate or oblong, 4 to 8 cm. long, 2 to 4 cm. broad, acute-rounded at base, obtuse, or broadly rounded and sometimes emarginate at the tip, light green above, paler or brownish beneath; main rib impressed above, prominent and obscurely silky-

pubescent beneath; primary veins 9 to 11 on each side, prominent beneath, distant 4 to 8 mm., inflexed toward the end, delicately anastomosed and forming with the main rib an angle of about 64° ; margin revolute.

Flowers very small (floral buds 2.5 mm. long, 2 mm. in diameter), in glomerules of 2 to 12 above the scars of the fallen leaves of the preceding season. Pedicels 5 to 7 mm. long, sparsely and minutely pubescent, each provided at the base with a very small, ovate stipule. Sepals 5, conchoid and rather thick, ovate-orbiculate or semi-orbicular, 1.8 to 2.2 mm. long, 1.7 to 2.5 mm. broad. Corolla white, about 1.8 mm. long, with a very short (0.5 mm.) tube; exterior lobes 5, rounded-ovate, emarginate at base, 1.3 mm. long, 1.5 mm. broad; interior lobes 10 in 5 pairs alternating with the exterior ones, lanceolate, irregularly lobulate-denticulate, long-acuminate, 1 to 1.2 mm. long. Stamens 5, extrorse, opposite the outside lobes; filaments very short (0.5 mm.); anthers ovate-acuminate, cordate at base, 1 mm. long. Staminodes 5, petaloid, ovate-apiculate, minutely denticulate, about 1 mm. long and 0.6 mm. broad. Pistil conical, 1.5 mm. high and 0.8 mm. in diameter at the base; ovary depressed, 5-celled, each cell 1-ovulate.

Berry single, borne on a pedicel 1 cm. long, ovate, about 3 cm. long and 2 cm. in diameter, yellow at maturity. Seed almost globose but slightly depressed and carinate back of the umbilicus, about 16 mm. long and of a rich dark brown color; umbilical area near the apex, ovate, pale brown, surrounded by a deep furrow.

Nearly related to *Dipholis nigra* Griseb., a native of Jamaica, but the flowers are smaller, the corolla about equal in length with the calyx and not half longer, the interior appendages lanceolate and not cordate-deltoid, the berry and seed about twice as large. Besides the leaves of *D. minutiflora* are smaller, coriaceous, obovate-obtuse and with the nervation very prominent beneath.

Type in the U. S. National Herbarium, no. 333967, collected in forests of El Copey, Dota Mountains, Costa Rica, altitude about 1,800 meters, February, 1898, by A. Tonduz. Flowers and fruits. Same, Instituto fis. geog. Costa Rica (no. 11935).

***Mimusops spectabilis* Pittier, sp. nov. FIGURE 91.**

A beautiful and very large tree, the straight trunk often reaching a height of 40 meters; bark brown; crown broad and depressed. Branchlets thick (7 to 10 mm. in diameter), with rugose, striate, grayish bark. Foliar scars small, impressed, more or less regularly semilunar. Floral scars 1 to 3 together on a more or less prominent knob, inserted above the foliar scar.

Leaves coriaceous, glabrous, deciduous, clustered at the ends of the twigs. Petioles rather slender, 2.5 to 3.5 cm. long, rounded, scarcely canaliculate. Leaf blades elliptic-oblong, cuneate-rounded at the base, obtuse or subacute at the tip, 12 to 15 cm. long, 5 to 6 cm. broad, light green above, brownish or yellowish green beneath; main rib rounded and very prominent beneath, sulcate above; primary veins 20 to 25, very thin, anastomosed at the marginal ends and delicately prominent beneath, scarcely noticeable above; margin revolute (in dry specimens).

Flowers in fascicles of 1 to 3 in the axils of fallen leaves. Pedicels 8 to 12 mm. long, fuzzy-tomentose. Sepals 6, biseriate, ovate or ovate-oblong, 6 to 7 mm. long, 4 to 5 mm. broad, coriaceous, grayish and velvety-tomentose outside, smooth inside. Corolla tubulose, about 7 mm. long; tube 2.5 to 3 mm. long; exterior lobes 12, ovate-oblong, obtuse at tip, with a sinuate margin, about 3 mm. long and 1.7 mm. broad, slightly pubescent on the back; interior lobes 6, ovate, attenuate at base, rounded at tip, 4 mm. long and 2.5 mm. broad. Stamens 6; filaments free, broadened at the



FIG. 91.—*Mimusops spectabilis*, floral details. a, Segment of corolla, back (outer) view, showing two exterior and one interior lobe; b, interior corolla lobe; c, two staminodes, spread; d, stamens; e, pistil longitudinally split; f, section across ovary. Scale 3.

base, angular, 3 to 3.5 mm. long; anthers dorsifix, deeply cordate, bifid at the tip, 2 to 2.7 mm. long; staminodes 6, longitudinally plicate, each spreading into an ovate-angulose, irregularly dentate-laciniate leaflet, 3.5 to 4 mm. long, but alternately broad and narrow. Pistil about 7.5 mm. long, obscurely 10-sulcate; ovary semiglobose, grayish-pubescent, 10-celled; style glabrous, slightly exserted.

Type in the U. S. National Herbarium, no. 592583, collected in forest close to the seashore at Piuta near Port Limon, September, 1899, by Henry Pittier. Flowers. Same in Instituto fis. geog. Costa Rica (no. 16012).

This noble tree is conspicuous by its towering proportions among the constituents of the littoral forest of the Atlantic coast. Its closest affinities seem to be with *M. longifolia* from Brazil, but it has very pronounced features of its own. It is the first species of the genus reported from Central America.

Mimusops spectabilis is one of the *nísperos* of the Costa Ricans and the Jamaica immigrants call it *bully tree*, on account of the likeness of its wood to that of *M. sideroxylon* Pierre. The wood is hard, heavy, and dark, and, as it is very resistant to water and wet soil, it is in great demand for railroad ties.