NEW OR NOTEWORTHY PLANTS FROM COLOMBIA AND CENTRAL AMERICA—7.[1]

By HENRY PITTIER.

INTRODUCTION.

In this seventh number of the series the author as usual presents descriptions of new and old species in several families. The only group treatment is that of the Artocarpoideae-Brosimeae of the family Moraceae, in which the genera Piratinera and Brosimum are redescribed as distinct and their species listed with description where needed.

MORACEAE.

THREE NEW SPECIES OF HELICOSTYLIS.

Helicostylis latifolia Pittier, sp. nov.

A middle-sized, laticiferous forest tree, 20 to 25 meters high, the trunk 30 to 40 cm. in diameter at the base. Bark rugose, lenticellate, 8 to 12 mm. thick, grayish. Main limbs ascending, the branchlets divaricate and subhorizontal. Crown globose or elongate.

Leaves of medium size, coriaceous, glabrous; petioles 4 to 7 mm. long, canaliculate, dark brown; blades broadly ovate or obovate, 4 to 9 cm. long, 3 to 5 cm. broad, subacute at the base, shortly acute-acuminate at the apex, light green above, subglaucous beneath; nervation brownish, impressed above, prominent beneath, the costa thick, the 13 to 15 primary veins almost perpendicular to it; margin obscurely revolute. Stipules lanceolate, acute, about 4 mm. long, caducous.

Male receptacles globose, solitary or geminate in the axils of the leaves, short-pedunculate, surrounded in estivation by a basal involucre of 4 or 5 ovate bracts about 0.5 cm. long; peduncles 4 to 5 mm. long, glabrous. Bractlets on the surface of the receptacle orbicular, peltate, hairy and ciliate, the largest 1.5 mm. in diameter. Perianth divisions 4, broadly ovate or obovate, hairy, ciliate. Stamens 0.8 to 2 mm. long; anther cells 2, transverse to the filaments and splitting almost as in *Brosimum alicastrum*. Female flowers not seen.

Fruit unknown.

Type in the U. S. National Herbarium, no. 678535, collected in the dry forest hills around Alhajuela, Chagres Valley, Canal Zone, Panama, male flowers only, May 12, 1911, by H. Pittier (no. 3488).

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[1] No. 6 of this series will be found in volume 18 of the Contributions, pp. 225–259.

There are the following other collections:

PANAMA: Hilly forests around Yaviza, southern Darién, male flowers, April 23, 1914, *Pittier* 6584. Forests around Pinogana, southern Darién, young shoots and leaves, April, 1914, *Pittier* 6696.

Helicostylis montana Pittier, sp. nov.

A large, deciduous tree, 25 to 30 meters high, the trunk 80 to 100 cm. in diameter at the base. Bark grayish, smooth. Primary limbs ascending. Crown elongate.

Leaves alternate, coriaceous, glabrous, petiolate; petioles terete, 5 to 10 mm. long, minutely pubescent; blades elliptic-lanceolate, suboblique, obtuse at the base, long and acutely acuminate at the apex, 8 to 14 cm. long, 2 to 4 cm. broad, glabrous and lustrous above, more or less pubescent beneath; nervation prominulous, the costa impressed above, very prominent beneath; primary veins about 15, arcuate, anastomosed along the margin, this entire and more or less revolute. Stipules not seen.

Male receptacles globose, axillary, about 12 mm. in diameter, the peduncles slender, 8 to 10 mm. long, pubescent; interstaminal bractlets orbicular-spatulate, hairy, ciliate, 10 to 15 mm. long. Perianth divisions 4, free from the base, obovate, conchoid, more or less attenuate, about 2 mm. long, sparsely hairy and ciliate on the upper margin. Stamens 4, exserted, about 3.5 mm. long; filaments slender, united at the base; anthers oblong, sagittate at the base, more or less apiculate at the tip. Female flowers not seen.

Fruit unknown.

Type in the U. S. National Herbarium, no. 715650, collected at Paso de Quebrada Gata, in the mountains of the San Felix Valley, Panama, at an altitude of 485 meters, male flowers only, December 28, 1911, by H. Pittier (no. 5426).

Helicostylis bolivarensis Pittier, sp. nov.

A tree. Branchlets short, slender, grayish, glabrous.

Leaves coriaceous, stiff, petiolate; petioles canaliculate, 3 mm. long, pubescent; blades ovate-elliptic, attenuate and rounded at the base, acutely short-acuminate at the apex, 3 to 8 cm. long, 2 to 4 cm. broad, above glabrous or puberulous, the venation prominulous, beneath paler and puberulous, the venation prominent; primary veins 12 to 14, conspicuously arcuate-anastomosed along the margins. Stipules acute-lanceolate, about 6 mm. long, pubescent, caducous.

Male inflorescence not known. Female flowers solitary in the axils of the leaves, subsessile, pubescent, the receptacle globose, scaly. Style about 5 mm. long, persistent, dividing at the apex into 2 short, thick stigmatic branches. Other details not known.

Fruit globose, 12 to 14 mm. in diameter, 1-seeded.

Type in the U. S. National Herbarium, no. 537446, collected in the vicinity of Estrella, Department of Bolivar, Colombia, female flowers and fruits, May, 1916, by H. M. Curran (no. 304).

THE GENERA PIRATINERA AND BROSIMUM.

Following Poeppig and Endlicher,[1] most modern botanists have considered *Piratinera guianensis* Aubl.,[2] not as the type of a well-founded genus, but as a member of the genus Brosimum, established by Swartz in 1788,[3] on his *Brosimum alicastrum*, the breadnut of

[1] Nov. Gen. & Sp. **2**: 34. *pl. 148. f. a–d.* 1838.
[2] Pl. Guian. **2**: 888. *pl. 340.* 1775.
[3] Prodr. Veg. Ind. Occ. 12. 1788.

Jamaica. If we admit that these two species are really congeneric, we must concede also the priority to Piratinera and transfer all species of Brosimum under that name. This was the view adopted by Coville and Wight in their revision of botanical nomenclature for the Century Dictionary, edition of 1909–11. On the other hand, Huber,[1] also trying to be consistent with the rules of nomenclature, reestablished the specific name of the Guiana tree as *Brosimum guianense* (Aubl.), supposing at the same time that the Amazon species he had in view was identical with the one from French Guiana, an assumption which, as we shall see, can not be sustained.

In the following paragraphs evidence is given tending to prove that Piratinera and Brosimum are in reality distinct and well-founded genera, and an attempt is made to straighten out the almost hopeless confusion brought about by the unjustified endeavor to keep them under a single head.

COMPARISON OF CHARACTERS.

The fundamental characters of the genus Brosimum as established by Swartz are: "Flowers without a perianth, the male numerous, 1-staminate, the female solitary in each inflorescence, this consisting of a globose receptacle covered with peltate scales." It is evident from Aublet's description that his plant has no place under Brosimum, even though there are contradictions between the Latin diagnosis and the description in French that follows.

In the former Aublet describes the inflorescences as "axillares, pedunculati, *globosi*, solitarii vel bini, virescentes." The word "globosi" seems to point to a globose receptacle, like that of Brosimum; but reading further we see that "le bouton de fleurs est singulier, *il est en cône par sa base, arrondi et convexe á son sommet*, qui est couvert d'un nombre considérable de petits corps en forme de champignons." The italicized expressions in the French text clearly indicate that in Piratinera the receptacle is not globose but turbinate. We find further that after the quaintly described male flowers have disappeared, "le bouton alors est jaune; et en le coupant transversalement on *apperçoit une grande quantité de loges, dans chacune desquelles est une graine fort petite.*" This would indicate that the same receptacle bears several female flowers and not one as in Brosimum.

PIRATINERA A DISTINCT GENUS.

That Aublet's description was exact both as to the shape of the receptacle and the plurality of the female flowers is shown by the fact that no less than four other species with the same characters

[1] Bol. Mus. Goeldi 6: 168. 1909.

have been since reported, beginning with *Brosimum aubletii* Poepp. & Endl. and ending with *Piratinera panamensis*, which is described below.

Reservations have to be made, however, with reference to the first of these two species. In fact, it is probable that it belongs neither to Brosimum nor to Piratinera, but perhaps to Helicostylis, since the female flowers are described as being "solitary in the axils of the leaves," while the male flowers, which in the case of a Brosimum or a Piratinera would appear on the same receptacle, are said not to be known. The further description of the female flowers, as bearing two distinct uniovulate ovaries, and the assertion that the fruits are succulent, 2-seeded, and fleshy, far from solving the puzzle in one direction or the other, only make it more intricate. In such cases it would seem that the wisest thing to do is to lay aside the description and discount the species until more complete information has been secured.

In 1891 Taubert described his *Brosimum rubescens*, from Brazil. The female flowers are said to be 2, laterally immersed, on each receptacle, the receptacle subglobose, the filaments very short; but we are left in doubt as to the presence or absence of a perianth in the male flowers.[1] *Brosimum acutifolium* Huber,[2] a shrub from the Amazon basin, is also incompletely described, but we are told that there are 2 or 3 female flowers on each receptacle, which is sufficient to show that the plant is not really a Brosimum.

In 1911 I discovered in the rain forest near Puerto Obaldía (San Blas Coast, Panama) a large tree which was taken at first for a Brosimum. A large number of dried specimens were made and one inflorescence placed in alcohol. On examining this material later two female flowers, manifested exteriorly by the bifid stigmas, were found on the specially preserved receptacle, while the softened dried material showed sometimes one, very often two, and in a few cases three ovaries, each containing one ovule. Each stamen is surrounded by a distinct yellow, cuff-shaped perianth, split on one side; the receptacle is relatively large, turbinate at the base, with a flat or convex flower-bearing surface.

From the above it follows that, in opposition to Brosimum as defined by Swartz, we have another group of trees, in which the male flowers, also 1-staminate but less numerous, have (in one case at least) a distinct perianth, and the female flowers are 2 or more on each receptacle, this being turbinate at the base or subglobose. This I consider to be Aublet's genus Piratinera, which can in no way be identified with Brosimum.

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[1] Bot. Jahrb. Engler 12: Beibl. 27: 4. 1891.

[2] Bol. Mus. Goeldi 6: 66. 1910.

THE ARTOCARPOIDEAE-BROSIMEAE OF TROPICAL AMERICA.

The tribe Artocarpoideae-Brosimeae is consequently represented in tropical America by 3 well-established genera, viz, Brosimum Swartz (type *B. alicastrum* Swartz); Piratinera Aubl. (type *P. guianensis* Aubl.); and Lanessania Baill. (type *L. turbinata* (Spruce) Baill.). In the last genus the receptacle has more or less the shape of an inverted bell, flat at the apex and bearing in the center a single female flower, this surrounded with numerous male flowers, which are 2 or 3-staminate; on the outside the receptacle is distinctly covered with small involucral bracts. Trymatococcus Poepp. & Endl. (type *T. amazonicus* Poepp. & Endl.) with a globose, ebracteate receptacle, bearing at the apex one female flower and many 3-staminate male flowers, should also be placed in this division of the Moraceae, rather than with the herbaceous Moraceae-Dorstenieae. In the latter the stamens are supposed to be inflexed in prefloration, while they are always erect in the Artocarpoideae-Brosimeae, a detail which has not, as far as I know, been determined with reference to the above genus.

CHARACTERS OF THE GROUP AND KEY TO THE GENERA.

Receptacle globose, subglobose, or turbinate, with numerous male flowers and 1, 2, or several female flowers.

Female flowers 2 or more. Receptacle turbinate; male flowers 1-staminate, with a monophyllous perianth ..... 1. PIRATINERA.
Female flower single.
  Stamen 1 in each male flower. Receptacle globose, entirely covered with flowers and orbicular scales; male flowers without a perianth ..... 2. BROSIMUM.
  Stamens 2 or 3 in each male flower, this provided with a perianth.
    Receptacle globose, ebracteate, with flowers on the flat apex only; stamens always 3 ..... 3. TRYMATOCOCCUS.
    Receptacle turbinate, bracteate on the outside; stamens 2 or 3 ..... 4. LANESSANIA.

CHARACTERS OF PIRATINERA AND LIST OF SPECIES.

Piratinera Aubl. Pl. Guian. **2**: 888. *pl. 340*. 1775.

Perianth of the male flowers short, tubular, split laterally; stamen 1, the anther 2-celled. Female flowers 2 or more, without a perianth, the ovary sunk into the receptacle, with short style and divaricate stigmas. Fruit globose, 2 or several-seeded.

Laticiferous trees or shrubs; leaves coriaceous, small, short-petiolate, entire; stipules small, lanceolate, caducous; receptacles pedunculate, usually solitary in the axils of the leaves, turbinate with a convex or plane surface or semiglobose; flowers intermixed with numerous orbicular, peltate bractlets.

Type species, *Piratinera guianensis* Aubl.

Known species 5, as follows:

Piratinera guianensis Aubl. Pl. Guian. **2:** 888. *pl. 340.* 1775. French Guiana.
Piratinera discolor (Schott) Pittier.
Brosimum discolor Schott in Mart. Fl. Bras. **4**[1]**:** 110. *pl. 33.* 1853, excl. syn. Eastern Brazil.
Piratinera rubescens (Taub.) Pittier.
Brosimum rubescens Taub. Bot. Jahrb. Engler **12:** Beibl. **27:** 9. 1891. Brazil.
Piratinera acutifolia (Huber) Pittier.
Brosimum acutifolium Huber, Bol. Mus. Goeldi **6:** 66. 1910. Amazonia.
Piratinera panamensis Pittier (below). Panama.

A NEW SPECIES OF PIRATINERA.

Piratinera panamensis Pittier, sp. nov. PLATE 7.

A middle-sized or large tree, up to 25 meters high and 60 cm. in trunk diameter. Bark grayish, smooth, laticiferous. Crown irregular, depressed.

Leaves distichous, chartaceous, rather small, petiolate; petioles 5 to 7 mm. long, slender, canaliculate, minutely puberulous; blades ovate-oblong, inequilateral, rounded or subacute at the base, abruptly and shortly obtuse-acuminate at the apex, 4 to 10 cm. long, 2.5 to 3.5 cm. broad, glabrous above, the venation prominulous, beneath minutely puberulous and paler, the venation more prominent; primary veins 9 to 14; margin entire, slightly revolute. Stipules 3 mm. long, lanceolate, pubescent, caducous.

Receptacles solitary in the axils of the leaves, pedunculate, irregularly obconical with a broad, flat or slightly convex apex 1 to 1.5 cm. in diameter, the whole surface more or less covered with orbicular peltate bracts, brownish and minutely grayish-puberulous; peduncles slender, 10 to 15 mm. long, minutely puberulous, as also the free spaces on the receptacles. Male flowers yellow. bractless, scattered over the empty spaces on the surface of the receptacle; perianth tubular, 0.2 to 0.4 mm. high, funnelform, monophyllous but open on one side, minutely puberulous; stamen 0.6 to 0.7 mm. long, exserted; filament thick, erect; anther 2-celled. Female flowers 2 or more to each receptacle, without a perianth; style slender, with only the 2 divaricate stigmas showing above the surface of the receptacle.

Fruit (immature) globose-subpyriform, 1 or 2-seeded.

Type in the U. S. National Herbarium, no. 679477, collected on hills back of Puerto Obaldía, San Blas Coast, Panama, in flower, September 2, 1911, by H. Pittier (no. 4336).

EXPLANATION OF PLATE 7.—Type specimen of *Piratinera panamensis* Pittier. Natural size.

CHARACTERS OF BROSIMUM AND LIST OF SPECIES.

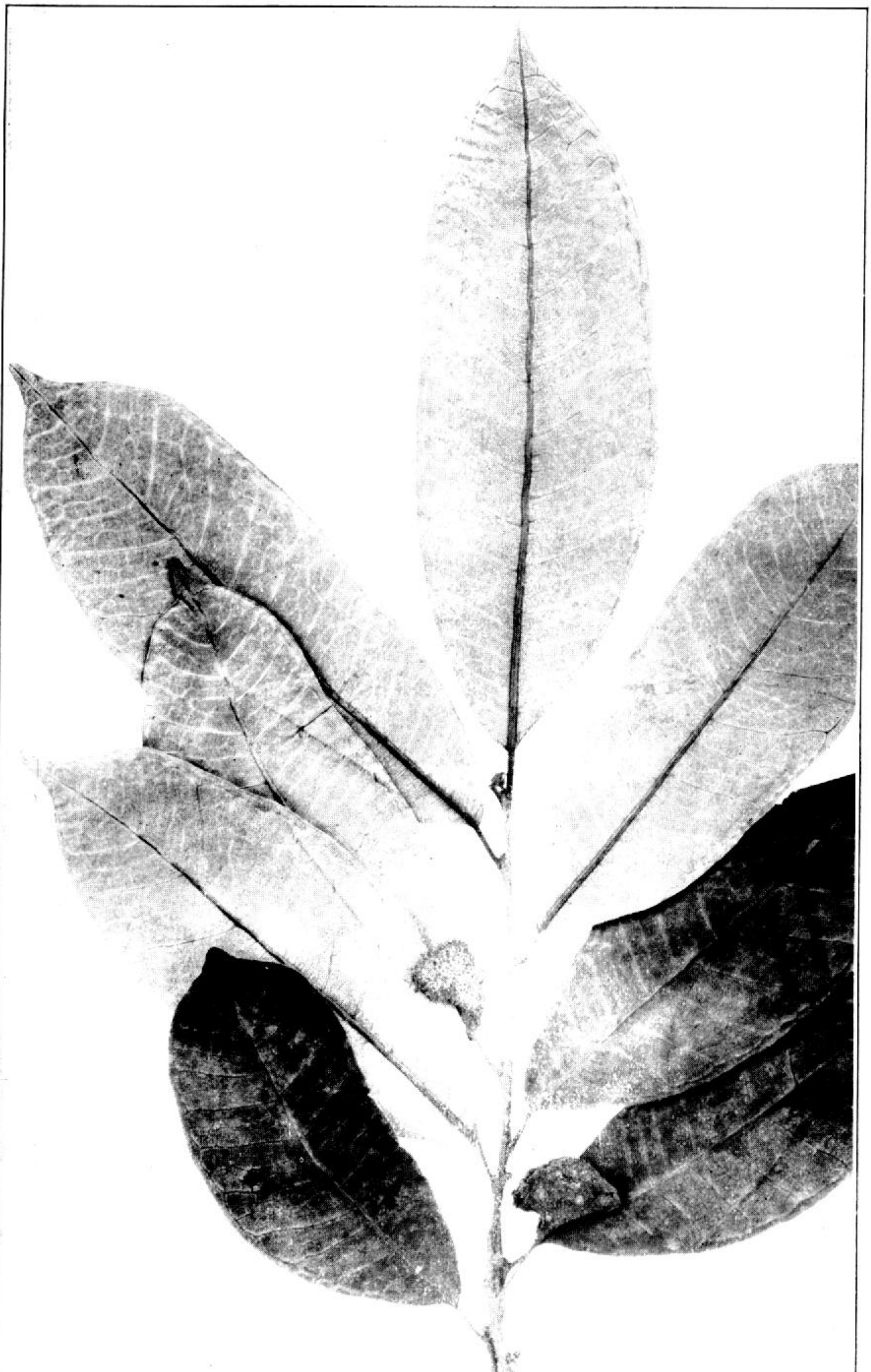
Brosimum Swartz, Prodr. Veg. Ind. Occ. 12. 1788.

Flowers without a perianth. Stamen 1, the anther 1 or 2-celled. Female flowers 1 on each receptacle, without a perianth, the ovary sunk into the receptacle, with a long style and long, divaricate or erect stigmas.

Fruit globose, 1-seeded.

Laticiferous trees; leaves membranous or coriaceous, of variable size, entire; stipules lanceolate, caducous; receptacles pedunculate, solitary or geminate in the axils of the upper leaves, globose; flowers intermixed with numerous peltate bractlets.

Type species, *Brosimum alicastrum* Swartz.



PIRATINERA PANAMENSIS PITTIER.

The following 9 species may be considered as definitely included in the genus:

Brosimum alicastrum Swartz, Prodr. Veg. Ind. Occ. 12. 1788. West Indies and Mexico.

Brosimum costaricanum Liebm. Dansk. Vid. Selsk. Afh. V. **2**: 334. 1851. Costa Rica.

Brosimum utile (H. B. K.) Pittier (below). Northern South America and Central America, from Venezuela to Nicaragua.

Brosimum gaudichaudii Trécul, Ann. Sci. Nat. III. Bot. **8**: 140. *pl 6. f. 172–176.* 1846. Western Brazil.

Brosimum glaucum Taub. Bot. Jahrb. Engler **12**: Beibl. **27**: 4. 1891. Brazil.

Brosimum glaziovii Taub. op. cit. **12**: Beibl. **27**: 3. 1891. Brazil.

Brosimum guianense Huber, Bol. Mus. Goeldi **6**: 168. 1908, excl. syn. Amazonia.

Brosimum pusillum Hassler, Bull. Herb. Boiss. II. **7**: 362. 1907. Paraguay.

Brosimum terrabanum Pittier, Contr. U. S. Nat. Herb. **18**: 70. 1914. Costa Rica.

All these species, according to their respective descriptions, possess the fundamental characters of the genus as originally established. With reference to the type, *B. alicastrum*, Swartz says[1] that the female flowers grow on distinct trees, in other words, that the species is diœcious. This affirmation evidently rests on a faulty examination, the style and stigmas emerging from the scaly floral involucre sometimes before the anthers. This is illustrated in the plate by Trécul,[2] where receptacles at various stages of development are shown on the same branchlet.

While the structure of the female flower is uniform all through the series, there is a fundamental difference in the structure of the stamen. In the type species, *B. alicastrum* Swartz, and in *B. terrabanum* Pittier, the anther consists of a single cell, in the shape of an orbicular cushion, placed horizontally at the apex of the filament; the dehiscence takes place around the outer edge, half the cell wall turning up as an inverted umbrella, the other half reflexed in the opposite direction. In the other known species the anthers are 2-celled, the cells being placed on both sides of the connective and splitting longitudinally. Thus the genus is naturally divided into two sections, Monotheca and Ditheca, which differ also as to their geographical distribution, since the species of the first type are found only in the West Indies and Middle America, while those of section Ditheca extend from Costa Rica southward.

The cow tree or milk tree, long known as *Brosimum galactodendron* Don, will be fully treated below.

The late Dr. Huber named his tree *Brosimum guianense* on the supposition that it was identical with *Piratinera guianensis* Aubl. and that *Brosimum aubletii* Poepp. & Endl., supposedly another name for the latter species, was not in accord with the nomenclatorial rules.[3] We have already seen that the identity of *B. aubletii* is very much in doubt. Concerning *B. guianense*, Dr. Huber wrote me a short time before his premature end that "Le réceptacle est un peu plus grand qu'un grain de plomb no. 8. *Fleur femelle unique.* Baie mure écailleuse, un peu plus grande qu'un petit pois." Further, Dr. Huber sent at my request two specimens of this species, which are now deposited in the U. S. National Herbarium. They were collected by A. Ducke near Obidos, Amazonia (no. 9189) and in the alluvial forests of Rio Mapuera, Amazonia (no. 9072). While both answer the general description of Brosimum, the styles are not seen

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[1] Fl. Ind. Occ. 1: 18. 1797.

[2] Ann. Sci. Nat. III. Bot. **8**: *pl.* 8. 1847.

[3] Bol. Mus. Goeldi **6**: 168. 1909.

on the small, freely staminate receptacle, and the material is too scanty to permit the dissection necessary to find the ovary. The above statement of Dr. Huber, however, is sufficient, and I do not hesitate to maintain this species as a true Brosimum, generically distinct from both *Brosimum aubletii* and *Piratinera guianensis*. Its relationship to the other recently described species of Brosimum remains to be established.

REDESCRIPTION OF BROSIMUM UTILE.

The description following, which is to my knowledge the first to include all parts, shows conclusively that the milk tree is really a Brosimum, differing from the general type only in the hard, woody mesocarp of its fruits.

Brosimum utile (H. B. K.) Pittier.

Galactodendrum utile H. B. K. Nov. Gen. & Sp. 7: 163. 1825.

Brosimum galactodendron D. Don in Sweet, Hort. Brit. ed. 2. 462. 1830.

A laticiferous tree, 20 to 25 meters high, the trunk 40 to 50 cm. in diameter at the base. Bark thick, grayish, smooth or verrucose. Trunk erect, simple, the crown elongate; young branchlets subangular, more or less pubescent.

Leaves large, coriaceous, petiolate; petioles 0.5 to 1.5 cm. long, thick, narrowly canaliculate, sparsely pubescent; blades ovate, elliptic, rounded at the base, abruptly acuminate at the apex in a drip tip, 10 to 25 cm. long, 3.5 to 9.5 cm. broad, glabrous on both sides, green above, golden brown beneath; margin entire; venation impressed on the upper face, prominent and slightly pubescent on the lower face; primary veins 27 to 30, parallel, straight, almost transverse, forming with the costa an angle of about 70 degrees. Stipules acute-lanceolate, about 2 cm. long, silky-pubescent, caducous, leaving at each node a circular scar.

Receptacles globose, each with one female flower, solitary in the axils of the leaves, long-pedunculate, about 7 mm. in diameter in the floriferous stage. Bractlets orbicular, thick, pilose-pubescent, sessile. Staminal bractlets broad and short (0.5 mm. long), ciliate. Stamen 0.7 to 1.4 mm. long; filament smooth; anther ovate, 2-celled. Ovary inserted 2.5 to 3 mm. deep in the receptacle; emerged part of the style about 2 mm. long, woolly-pubescent, forking at about the middle into 2 slender stigmatic branches.

Fruit depressed-globose, 2 to 2.5 cm. in diameter, the epicarp fleshy, 4 to 6 mm. thick, yellow at maturity, the mesocarp (putamen) woody, rugose on the surface, entirely filled with a single almond-like, white seed.

Collected anew on hills about Puerto Obaldía, San Blas Coast, Panama, in flower and fruit, September 1 to 4, 1911, *Pittier* 4345, 4418.

Notwithstanding the incompleteness of the specimens collected by Humboldt and Bonpland, Kunth described the new genus Galactodendrum, the species being *G. utile*, as cited above. Later Don sagaciously perceived the close kinship with Brosimum and transferred the species to it under the name *B. galactodendron*, which has been maintained ever since.

In 1840 W. J. Hooker gave an emended description of the tree, founded on material about as poor as that collected by Humboldt and Bonpland, accompanied by two plates, one giving the general habit, and the other the leaf, limb, and fruit of the tree.[1] In this article the original name, *Galactodendrum utile*, was retained, the association with Brosimum being considered as doubtful.

[1] Curtis's Bot. Mag. 66: *pl. 3723–24*. 1840.

This remarkable tree was first brought to the attention of botanists by Humboldt, who describes it in the following manner:

For many weeks, we have heard a great deal of a tree whose juice is a nourishing milk. The tree itself is called the *Cow Tree*, and we were assured that the negroes on the farm, who are in the habit of drinking large quantities of this vegetable milk, consider it as highly nutritive; an assertion which startled us the more, as almost all lactescent vegetable fluids are acrid, bitter, and more or less poisonous. Experience, however, proved to us during our residence at Bárbula, that the virtues of the *Cow Tree*, or *Palo de Vaca*, have not been exaggerated. This fine tree bears the general aspect of the *Star-Apple Tree* (*Chrysophyllum cainito*); its oblong, pointed, coriaceous, and alternate leaves are about ten inches long, and marked with lateral nerves, which are parallel, and project beneath. The flower we had no opportunity of seeing; the fruit is somewhat fleshy, and contains one or two kernels. Incisions, made in the trunk of the tree, are followed by a profuse flow of gluey and thickish milk, destitute of acridity, and exhaling a very agreeable balsamic odour. It was offered to us in calabashes, and though we drank large quantities of it, both at night before going to bed and again early in the morning, we experienced no uncomfortable effects. The viscidity of this milk alone renders it rather unpleasant to those who are unaccustomed to it. The negroes and free people who work in the plantations use it, by soaking in it bread made from *Maize, Manioc, Aropa,* and *Cassava;* and the superintendent of the farm assured us that the slaves become visibly fatter during the season when the *Palo de Vaca* yields most milk. When exposed to the air, this fluid displays on its surface, probably by the absorption of the atmospheric oxygen, membranes of a highly animal nature, yellowish and thready, like those of cheese; which, when separated from the more watery liquid, are nearly as elastic as those of caoutchouc, but in process of time exhibit the same tendency to putrefaction as gelatine. The people give the name of cheese to the curd which thus separates when brought into contact with the air, and say that a space of five or six days suffices to turn it sour, as I found to be the case in some small quantities that I brought to Valencia. The milk itself, kept in a corked bottle, had deposited a small portion of coagulum, and far from becoming fetid, continued to exhale balsamic scent. When mingled with cold water, the fresh fluid coagulated with difficulty; but contact with nitric acid produced the separation of the viscous membranes.[1]

Humboldt and Bonpland were inclined to think that this tree was peculiar to the coast cordillera of Venezuela, whereas subsequent information shows that its area is a very extensive one. With reference to Central America, I observed it in 1891 on the hills bordering the San Juan River on the Costa Rican side. On January 22, 1898, I camped on the ridge dividing the Savegre and Guavo rivers in Costa Rica, at the foot of a gigantic tree called "mastate" by my Brunka guides. When incised the bark yielded an abundant milk, of which I drank a whole cup without suffering any inconvenience. The bark was formerly used as a clothing material by the Indians. At the time when this tree so came under my notice botany was only of secondary interest to me, and I did not try to collect specimens or to identify the species, but there are strong reasons for believing that it was the "palo de vaca" of Humboldt, the area of which is thus extended west and northward to the border of Nicaragua. Around Puerto Obaldía it is a common element of the forest, called "palo de leche" by the natives, but it was not found in the course of my exploration in any other part of the Republic of Panama.

DOUBTFUL AND DISCARDED SPECIES OF BROSIMUM.

Brosimum echinocarpum Poepp. & Endl. Nov. Gen. & Sp. **2**: 34. *pl. 148*. 1838, with the "female involucre muricate, the stigma 4-fid and feathery, and the

[1] Voy. Equin. Nouv. Cont. **2**: 106 ff. 1819.

fruit echinate," certainly does not belong to the same genus, and even its place among the Moraceae is doubtful.

Brosimum spurium Swartz, Fl. Ind. Occ. **1**: 20. 1797, is *Pseudolmedia spuria* Griseb.[1]

Brosimum paraense Huber, Bol. Mus. Goeldi **6**: 66. 1910, is probably a good species, but the description of the inflorescence is incomplete.

Brosimum speciosum Dekker, Bull. Kol. Mus. Haarlem **35**: 100. 1906, is a name only.

Brosimum heteroclitum Donn. Smith, Bot. Gaz. **31**: 121. 1901, is a most interesting addition to the flora of Costa Rica, but it is certainly neither a Brosimum nor a Piratinera, the ovaries being described as pluriovulate and several on each receptacle.

USES AND VERNACULAR NAMES OF SPECIES OF THE GROUP.

Brosimum alicastrum Swartz is the breadnut of Jamaica, where the seeds, roasted singly or boiled together and reduced to a paste, are used as food, having a taste not unlike that of a hazelnut. The same species is reported from Yucatán under the Maya name of "ox" (Seler) or "oox" (Schott) and the Spanish names of "ramón" and "hoja ramón." The leaves and young shoots are there considered an excellent cattle feed, but no mention is made of the fruits. In Jamaica the name "ramon," or "ramoon," is applied to *Trophis americana* L., another tree of the mulberry family from which green fodder is obtained.

According to Liebmann[2] and others, this species extends into Central Mexico as far as Colipa and Papantla, where cattle also feed on the leaves, the vernacular name being "ojite."

The fruits of *Brosimum costaricanum* Liebm. are used to a small extent in the same way as the breadnut in Jamaica, and the flowers, which cover the ground under the trees at the time of blooming, are said to enter into the preparation of a savory pie. Both this species and *B. terrabanum* Pittier afford fodder and are known under the common name of "ojoche." As in the Mexican "ojite," the primitive Maya root "ox" is here readily recognized, as it is also in "ojuste," the Honduran vernacular for another unidentified species. But the ending "joche" or "juche" (found besides in "cacalojoche," "esquijoche," "quisjoche," etc.)[3] is derived from the Nahuatl "xochitl," flower, and hence it is also supposed that the original meaning of "ojoche" may have been *o-jochitl*, flower of the trail, on account of the deciduous receptacles covering the forest paths at a certain period of the year.

To the names "cow tree" and "palo de vaca," for *Brosimum utile*, those of "árbol de leche," "palo de leche," and "avichurí," used in Colombia, may be added, the last evidently indigenous. Cortez[4] reproduces the following analysis by Heintz, showing that the milk is not such a substantial food as had been affirmed by Humboldt:

Water	57.3
Albumin	0.4
Wax of the form C_{34} H_{66} O_3	31.4
Wax of the form C_{35} H_{58} O_7	5.8
Gum and sugar	4.7
Salts	0.4

[1] Fl. Brit. W. Ind. 152. 1859.

[2] Dansk. Vid. Selsk. Afh. V. **2**: 334. 1851.

[3] See Pittier, Pl. Usual. Costa Rica 57. 1908.

[4] Fl. Colomb. 126. 1896.

Information is lacking as to the economic value of the wood of the several species of Brosimum. That of *Piratinera guianensis* is known as "letterwood," "bois de lettre de Chine," "bois de lettre moucheté," and "bois d'amourette moucheté," names which, however, may apply also to several other species of Piratinera and Brosimum. Of the wood of the tree described by him, Aublet says that it is hard and compact, the sapwood white, and the heart red with black speckles. It is a valuable commercial asset, but a critical study of the several varieties, in connection with that of the corresponding botanical specimens, has yet to be made.

Piratinera panamensis goes among the inhabitants of Puerto Obaldía under the name of "guaímaro." Its wood is also white, fine-grained, and hard.

MAGNOLIACEAE.

A NEW SPECIES OF TALAUMA FROM PANAMA.

Talauma sambuensis Pittier, sp. nov.

A large tree, 30 to 40 meters high, the trunk straight, the crown elongate. Branchlets terete, rather thick, glabrous, marked with the annular scars of the stipules and the large, orbicular, white scars of the fallen leaves.

Leaves coriaceous, glabrous, crowded at the ends of the branchlets; petioles 1.5 to 4 cm. long, slightly thicker at the base, flattened above; blades ovate-elliptic, acute-cuneate at the base, subacute or sometimes shortly obtuse-acuminate at the apex, 11 to 25 cm. long, 4.5 to 11 cm. broad, minutely reticulate, concolorous, more or less lustrous on both faces; costa impressed above, very prominent beneath; primary veins alternate, prominulous on both faces, about 12 on each side of the costa, arcuate-anastomosed but first running straight to within a short distance (5 to 7 mm.) of the margin, each of them joining there with the anterior one, then turning almost abruptly to form a flat bow parallel to the margin; margin broadly sinuate. Stipules lanceolate, finely granular-reticulate, glabrous, caducous, about 2 cm. long.

Flowers not known.

Syncarp pedunculate, subglobose, about 8 cm. long and 7.5 cm. in diameter, woody, squamose-areolate, the carpel tips free, lanceolate, obtuse at the apex. Seeds not known.

Type in the U. S. National Herbarium, no. 715960, collected at Boca de Pauarandó on the Sambú River, southern Darién, Panama, fruit, February, 1912, by H. Pittier (no. 5681).

The fewness and incompleteness of the specimens in American herbaria of the several recognized species of Talauma, as well as the brevity of their descriptions, make it very difficult to estimate the relative value of the dominant characters and to discriminate between forms which may represent simply variations of one specific type. The above tree is evidently a near relative of *Talauma ovata* St. Hil., from Brazil, but seems to differ in the size and shape of the leaves, and in the smooth petioles and the number of primary veins. In *T. plumieri* DC., the "bois-pin" of Martinique, in *T. minor* Urban, from Jamaica, and in *T. gloriensis* Pittier, from Costa Rica, the netting of the veinlets is coarser, the leaf scars are distinct in size and shape, etc. Other differences appear when we compare our specimens with the other American species of the genus, for which reason it is considered preferable for the present to describe the Panama species as a distinct type.

GROSSULARIACEAE.

A NEW SPECIES OF RIBES FROM THE VENEZUELAN ANDES.

Ribes canescens Pittier, sp. nov.

A shrub with erect stems, the young shoots more or less cano-pubescent.

Leaves with petioles 1.5 to 2 cm. long, these white-tomentose; blades emarginate at the base, distinctly 3-lobate, about 3.5 cm. long and 4 cm. broad, membranous, glabrous above, whitish felted tomentose beneath, irregularly toothed on the margins, the median lobe larger, the teeth glandular-mucronate.

Male racemes pendulous, 6 to 9 cm. long, the rachis slender, more or less tomentose, and covered with pedicellate glands. Bracts lanceolate, cano-pubescent, glandular on the margins, 6 to 7 mm. long; bractlets lanceolate, clasping at the base, pubescent, 3 to 3.5 mm. long. Flowers about 8 mm. long, reddish, the pedicels about 2 mm. long. Receptacle tomentellous, eglandular. Sepals lance-acuminate, about 3 mm. long, 1.5 mm. broad, dark-veined, minutely tomentose without, flat, erect. Petals obovate-spatulate, flat, glabrous, about 2.5 mm. long, 1.2 mm. broad. Stamens slightly shorter than the petals, apparently erect, glabrous, the anthers yellow, ovoid. Ovary rudimentary, glabrous, conical; style bilobate. Female inflorescence not seen.

Fruit not known.

Type in the U. S. National Herbarium, no. 703585, collected on the Páramo de Piedras Blancas, Andes of Mérida, Venezuela, male flowers only, March 27, 1915, by Dr. A. Jahn (no. 414).

Janczewski [1] cites from the same region a variety of *Ribes andicola*, with the leaves whitish-tomentose beneath. This can not be the above species, which belongs to the section with flat petals and differs besides in the absence of feathery bristles at the base of the leaves and in these being eglandular or nearly so and the sepals not ligulate.

ROSACEAE.

OLD AND NEW SPECIES OF OSTEOMELES.

Osteomeles cuneata (Lindl.) Decaisne, Nouv. Arch. Mus. Hist. Nat. Paris **10**: 184. 1874

FIGURE 44.

Hesperomeles cuneata Lindl. Bot. Reg. **23**: *under pl. 1956.* 1837.

FIG. 44.—Leaf of *Osteomeles cuneata*. Natural size. From *U. S. Exploring Expedition*, no number, in U. S. National Herbarium.

A low, procumbent, spinescent shrub, the younger branchlets minutely pilosulous.

Leaves with petioles hardly over 1 mm. long; blades oblong-spatulate, long-cuneate at the base, rounded at the apex, often subtrilobate, 5 to 20 mm. long, 4 to 7 mm. broad, pilosulous or glabrescent on both faces, lustrous, the veins brownish, immersed, and inconspicuous above, pale brownish green and brownish-reticulate beneath, the costa prominent at the base, the angle of the main veins very acute (about 15 degrees); margin serrulate on the upper half of the blade, the teeth each bearing a caducous gland.

Corymbs equal to or shorter than the branchlets. Bracts acicular or spatulate-lanceolate, very narrow, villosulous, up to 4 mm. long. Pedicels cano-pubescent, 1 to 2 mm. long. Flowers 5 mm. long. Receptacle subglobose, more or less grayish-hairy without, densely white-tomentose on

[1] Mém. Soc. Phys. Hist. Nat. Genève **35**: 411. 1907.

the disk within. Calyx lobes triangular-apiculate, the broader base hairy, the tips glabrous. Petals glabrous, flat, suborbicular, 3 to 3.6 mm. long and broad, attenuate at the base into a broad claw, the margin more or less sinuate. Stamens numerous, about 2.5 mm. long, the anthers broader than long. Styles thick, clavate, cano-tomentose at the base, about 3 mm. long; stigma undivided.

Fruit not seen.

Type from Peru. The above description is from specimens in the U. S. National Herbarium, collected by the U. S. Exploring Expedition under the command of Capt. Wilkes, and others collected in Peru.

Osteomeles incerta Pittier, sp. nov. FIGURE 45.

An unarmed, erect shrub, the old bark grayish, the young branchlets ferruginous, furfuraceous.

Leaves alternate (not fasciculate); petioles 1 to 5 mm. long; blades coriaceous, rather thick, broadly ovate, subattenuate at the base, obtuse, emarginate, subacute, or apiculate at the apex, 10 to 25 mm. long, 5 to 15 mm. broad, more or less villosulous (principally on the costa), lustrous and minutely bullate-reticulate above, paler, glabrous or glabrescent, and reticulate beneath; venation impressed above, prominulous beneath; angle of the main primary veins about 60 degrees; margin sinuate-serrate, the teeth glandular. Stipules ovate-oblong, small, ferruginous-pubescent, caducous.

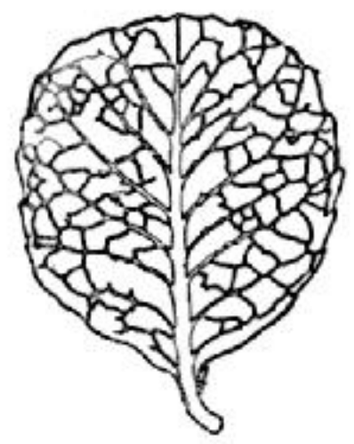

FIG. 45.—Leaf of *Osteomeles incerta*. Natural size. From type specimen.

Corymbs shorter than the leaves, 3 to 5-flowered, the rachis densely ferruginous-pubescent. Bracts lanceolate, attenuate toward the base and broadening again at the insertion, acute at the apex, villosulous, 3 to 7 mm. long or over, 0.5 to 1 mm. broad. Pedicels 3 to 5 mm. long, ferruginous-hairy. Flowers about 3 mm. long. Receptacle subglobose, more or less pilosulous; calyx lobes triangular-apiculate, more or less ferruginous-hairy almost to the apex, 4 to 4.5 mm. long. Petals broadly ovate, contracted at the base into a very short claw, obtuse at the apex, 5 mm. long, 3.5 to 4 mm. broad. Stamens glabrous, about 4.5 mm. long, the anthers ovate, about as broad as long. Disk brown-woolly. Styles slender, woolly at the base, 4 to 4.5 mm. long; stigmas discoid, undivided.

Fruit not known.

Type in the U. S. National Herbarium, no. 325749, collected in Bolivia, precise locality not stated, by Miguel Bang (no. 1839).

In the absence of the types or of more precise descriptions, it is extremely difficult to name with any degree of certainty any species of Osteomeles. The above species agrees in several particulars with the original description of *O. pernettyoides* (Wedd.) Decaisne, but differs also in about as many details. The leaves are seldom oblong-lanceolate, generally much larger than in the typical form (*O. pernettyoides microphylla*), and not glabrous or glaucous beneath as in the large-leaved form. Although reluctant to do so, I feel obliged to place this form under a separate name until a general revision of the types can be undertaken.

Osteomeles intermedia Pittier, sp. nov. FIGURE 46.

An erect, unarmed shrub, the old bark gray, glabrous, sparsely verruculose, the young branchlets grayish-pubescent and verruculose-tuberculate.

Leaves alternate; petioles canaliculate, 4 to 5 mm. long, sparsely grayish-pubescent; blades membranous, ovate, oblong, or obovate, rounded or cuneate at the base, acute at the apex, 1.5 to 3.5 cm. long, 1 to 1.7 cm. broad, lustrous,

minutely impressed-reticulate and glabrescent or sparsely grayish-pubescent above (the pubescence much denser on the costa), pale, prominulous-reticulate, and sparsely pilosulous beneath, glandular-serrulate except at the base. Stipules acute, grayish-pubescent, 1 to 5 mm. long, subpersistent, numerous at the base of the branchlets.

FIG. 46.—Leaf of *Osteomeles intermedia*. Natural size. From type specimen.

Corymbs much shorter than the leaves, 3 to 7-flowered, the rachis and pedicels sparsely grayish-pubescent. Bracts linear-acuminate, canaliculate, biappendiculate at the base, very sparsely pilosulous, 4 to 6 mm. long. Pedicels hardly over 1 mm. long. Flowers about 7.5 mm. long. Receptacle broadly obconical, sparsely grayish-pubescent. Calyx segments triangular-apiculate, broad and sparsely tomentose at the base, glabrous and glandular at the apex, about 3 mm. long. Petals white, ovate-oblong, concave, sessile, more or less distinctly apiculate, sinuate on the margin, 4 to 4.5 mm. long, 2.5 to 3 mm. broad. Stamens glabrous, the anthers about as broad as long. Disk densely white-tomentose. Styles rather thick, glabrous (except at the base); stigma discoid.

Fruit not known.

Type in the U. S. National Herbarium, no. 533720, collected in the Cordillera de Santa Marta, Colombia, at an altitude of about 2,750 meters, January, 1898–1901, in flower, by H. H. Smith (no. 1751).

Distributed under the name of *Osteomeles oblongifolia* Lindl., which, however, did not exist previously. Intermediate between the large-leaved and small-leaved species.

Osteomeles obovata Pittier, sp. nov. FIGURE 47.

A low, spinescent, erect shrub, the young branchlets glandular and ferruginous-hairy.

Leaves with petioles 2.5 to 5 mm. long; blades obovate or oblong-spatulate, cuneate at the base, truncate, rounded, obtuse, or subacute at the apex, 13 to 28 mm. long, 5 to 10 mm. broad, glabrous, or sparsely hairy on the costa, and lustrous above, dull, glabrous, and reticulate beneath; venation brown; angle of the primary veins about 33 degrees; margin sinuate-serrate, the teeth glandular. Stipules hardly more than 2 mm. long, narrow, acute, setaceous, deciduous.

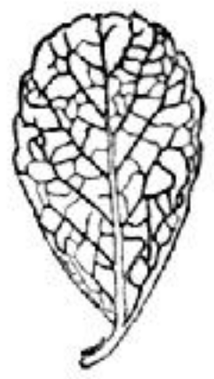

FIG. 47.—Leaf of *Osteomeles obovata*. Natural size. From type specimen.

Corymbs few-flowered (sometimes reduced to one flower), much shorter than the leaves, the rachis glandular and densely ferruginous-hairy. Bracts narrowly lanceolate, glabrous, 5 mm. long or less. Pedicels 1 to 2 mm. long, ferruginous-hairy. Flowers about 5 mm. long. Receptacle ovoid or subglobose, sparsely villous. Calyx lobes acicular, distant, hardly broadened at the base, more or less hairy on the lower half, 2 to 2.2 mm. long. Petals flat, broadly ovate or suborbicular, 2.8 to 3.5 mm. long, 2 to 2.4 mm. broad, contracted at the base into a short claw. Stamens glabrous, about 2.4 mm. long, the anthers ovoid, slightly longer than broad. Disk cano-tomentose. Styles terete, glabrous, 2.5 to 3.2 mm. long; stigma bilobulate.

Fruit not known.

Type in the U. S. National Herbarium, no. 700625, collected on Irazú Volcano, Costa Rica, at an altitude of about 3,000 meters, in flower, June 25, 1874, by Otto Kuntze.

There are the following additional specimens:

COSTA RICA: Irazú Volcano, flowers, March, 1894, *J. D. Smith* 4772. Potrero del Alto, Poás Volcano, January, 1888, *Pittier* (Inst. Fís. Geogr. Costa Rica, no. 326).

Otto Kuntze identified his specimens as *Osteomeles heterophylla* Ruiz & Pav., a species figured in the yet unpublished volume 4 of the Flora Peruviana.[1] This I have not seen, but considering the fact that the known small-leaved species of Osteomeles all have rather reduced areas of dispersion, I feel doubtful about this determination. On the other hand, Captain John Donnell Smith considered the specimens collected by himself and the writer to be *Osteomeles pernettyoides* (Wedd.) Decaisne, which is perhaps nearer the truth, since this species is known to reach the northernmost end of the Central Cordillera of Colombia, in the Páramo de Tolima, separated from the high Costa Rican mountains only by the Isthmian gap. But in our specimens the leaves are mostly obovate or oblong and seldom if ever lanceolate, the corymbs are few-flowered, with the rachis densely glandular-hairy and not simply villosulous, and the calyx segments, standing far apart, could hardly be called triangular-subulate.

Osteomeles pachyphylla Pittier, sp. nov. FIGURE 48.

A low, procumbent, spinescent shrub, the young branchlets ferruginous scaly pubescent and glandular.

Leaves alternate or subopposite; petioles 1 to 3.5 mm. long; blades coriaceous, thick, suborbicular to ovate, rounded-attenuate or subemarginate at the base, acute at the apex, 10 to 24 mm. long, 5 to 18 mm. broad, glabrous (or minutely pubescent above on the costa), reticulate and lustrous above, paler and beautifully reticulate beneath; venation impressed above, prominulous and of a darker color beneath; angle of the main veins about 56 degrees; margin sinuate-toothed, thickened all around the blade, the teeth glandular. Stipules lanceolate, concave, scarious, brownish, puberulous, caducous or subpersistent, 2 to 5 mm. long.

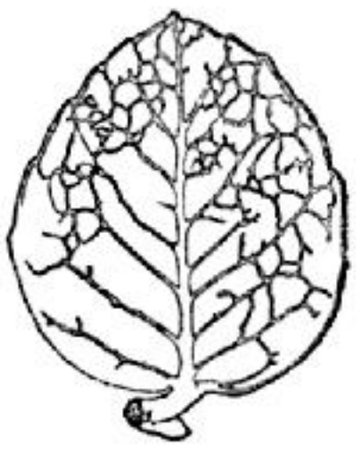

FIG. 48.—Leaf of *Osteomeles pachyphylla*. Natural size. From type specimen.

Corymbs shorter than the leaves, subsessile. Bracts apiculate, broadened at the base, glandular at the tip, more or less setulose-hairy on the lower half, 3 to 5.5 mm. long. Pedicels more or less ferruginous-hairy, 2 to 3 mm. long. Flowers about 8.5 mm. long. Receptacle ovoid, glabrous or sparsely pilosulous. Calyx lobes triangular-acuminate, 1.2 to 2.8 mm. long, glabrous or sparsely villosulous. Petals orbicular, concave, pinkish white, 3.5 to 3.8 mm. long, 3.2 to 3.6 mm. broad. Stamens connate at the base, 4 to 5 mm. long, the filaments slender, the anthers purplish, ovoid, longer than broad. Disk ferruginous-villosulous. Ovules 5, anatropous; styles terete, slender, about 5 mm. long, woolly at the base; stigmas bilobulate.

Fruit not seen.

Type in the U. S. National Herbarium, no. 531379, collected on rocky ledges of the Páramo de Buena Vista, Huila Group, Central Cordillera of Colombia, at an altitude of about 3,600 meters, in flower, January 25, 1906, by H. Pittier (no. 1183).

Closely related to *Osteomeles pernettyoides glauca* Decaisne, but differing in the glandular, scaly, ferruginous pubescence, the thick, coriaceous leaves, etc.

In prefloration, the filaments are inflexed-geniculate and the anthers crowded, apex downward, around the styles.

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[1] *Pl. 425. f. 2.*

Osteomeles pernettyoides (Wedd.) Decaisne, Nouv. Arch. Mus. Hist. Nat. (Paris) **10**: 184. 1874. FIGURE 49.

Hesperomeles pernettyoides Wedd. Chlor. And. **2**: 230. 1861.

A spinescent, erect shrub, 2 to 3 meters high, the old bark a rather dark gray, the young branchlets more or less brownish-puberulous and verruculose.

FIG. 49.—Leaf of *Osteomeles pernettyoides*. Natural size. From *Cook and Gilbert* 1873.

Leaves subopposite or alternate; blades coriaceous, ovate, obovate, or lanceolate, cuneate at the base, more or less decurrent on the petiole, rounded-obtuse or acute at the apex, 1 to 3 cm. long, 0.5 to 1.2 cm. broad, entirely glabrous, lustrous above, pale, dull, and prominulous-reticulate beneath, glandular-serrulate; angle of the primary veins about 61 degrees. Stipules small, acute.

Corymbs few-flowered, shorter than the leaves.

Fruits oblong, about 5 mm. long, crowned with the persistent calyx segments.

Type from the vicinity of the Volcano of Sorata, Province of Larecaja, Peruvian Andes, flowers and fruit, March, 1859, *Mandon* 653.

The above description is drawn from specimens collected at Piñasniocj, Panticalla Pass, Peru, at an altitude of about 3,600 meters, in fruit, July 16, 1915, *Cook & Gilbert* 1873.

This species has been reported further from the following localities:

COLOMBIA: Laguna Verde, Andes de Tuquerres, alt. 3,200 meters, *Triana*. Quindiú, Central Cordillera, alt. 3,000 meters, *Triana*. Páramo de Colima, Central Cordillera, *Linden* 945.

PERU: Between Cajamarca and Chachapoyas, alt. 3,500 meters, *Raimondi*. Cordilleras de Cuzco, *Gay*.

BOLIVIA: Cordillera de Sorata, Department of La Paz, *Mandon*. Unduavi, alt. 3,300 meters, in fruit, October, 1885, *Rusby* 2039.

Osteomeles resinoso-punctata Pittier, sp. nov. FIGURE 50.

A low, spinescent shrub, the branchlets twisted and knotty, the old bark gray, the young branchlets sparsely grayish-pubescent.

Leaves alternate or fasciculate at the nodes; petioles about 4 mm. long; blades subcoriaceous, ovate or ovate-lanceolate, cuneate at the base, mostly acute at the apex, 15 to 25 mm. long, 4 to 11 mm. broad, lustrous, pilosulous (principally on the costa), and prominulous-reticulate above, paler, reticulate, and sparsely pilosulous or glabrescent beneath; angle of the primary veins about 43 degrees; margin serrate-glandular on the upper two-thirds of the blade, with a transparent, resinous-looking spot corresponding to each tooth. Stipules acute-triangular, mucronate, sparsely hairy, 1 to 2 mm. long, caducous.

FIG. 50.—Leaf of *Osteomeles resinoso-punctata*. Natural size. From type specimen.

Corymbs axillary or terminal, longer than the leaves, 3 to 6-flowered, the rachis thick, sparsely hairy. Bracts linear-subulate, canaliculate, broadened and clasping at the base, glabrous, 4 to 6 mm. long. Pedicels 2 to 4 mm. long, more or less hairy. Flowers 9 to 10 mm. long. Receptacle broadly obconical, more or less grayish-pubescent, the disk sparsely pilosulous. Calyx segments triangular-acute, glabrous, about 3.5 mm. long. Petals white, concave, ovate or obovate, broadly cuneate at the base, rounded-obtuse at the apex, about 6 mm. long, 3.5 to 4 mm. broad. Stamens glabrous, about 4.5 mm. long, the anthers about as broad as long. Styles slender, nearly 5 mm. long, slightly woolly at the base; stigmas discoid, undivided.

Fruit not known.

Type in the U. S. National Herbarium, no. 703583, collected on the Páramo de Piedras Blancas, State of Mérida, in the Venezuelan Andes, at an altitude of about 3,800 meters, in flower, March 27, 1915, by Dr. A. Jahn (no. 412).

This species has the largest flowers among the high Andine species of Osteomeles. It is otherwise readily distinguished from the other small-leaved species by the transparent spot accompanying the teeth and the linear, canaliculate bracts.

CAESALPINIACEAE.

A NEW COLOMBIAN SPECIES OF BROWNEA.

Brownea bolivarensis Pittier, sp. nov.

A shrub or a small tree, up to about 5 meters high, the trunk 10 cm. in diameter at the base, the branchlets glabrous, with slightly scaly, verruculose bark.

Leaves mostly 3-jugate; rachis 7 to 16 cm. long, terete, narrowly canaliculate, lenticellate or verruculous, the petiolar part 1 cm. long or less. Leaflets opposite, glabrous, glandular at the base; petiolules blackish, stout, rugose-plicate, glabrous, 3 to 4 mm. long; blades elliptic or elliptic-oblong, attenuate and rounded or subcordate at the base, acutely long-acuminate at the apex, subinequilateral with the broader half on the lower (outer) side, the basal 3 to 15 cm. long, 1.5 to 4 cm. broad, the terminal 18 to 25 cm. long, 5 to 7 cm. broad; upper face of leaflets smooth, pale green, with prominulous costa and veins; lower face finely reticulate, the costa and veins prominent, the latter doubly anastomosed along the margin; glands basal on either side of the costa. Stipules caducous, not seen.

Spikes pendulous, 7 to 15-flowered, up to 15 cm. long, growing from older branchlets. Rachis ferruginous-pubescent. Bracts caducous, not seen. Pedicels ferruginous-pubescent, 1 cm. long. Sheath tubular-campanulate, 2.2 cm. long, minutely ferruginous-pubescent, the lobes rounded and subacute at the apex. Receptacle tube about 1 cm. long, widening from base to apex. Sepals 4, oblong or obovate, attenuate at the base, subobtuse at the apex, minutely pubescent without, the anterior one 3 cm. long, 1.1 to 1.2 cm. broad, the others 3.3 cm. long, 0.8 cm. broad. Petals obovate-spatulate, attenuate at the base into a slender claw about 1 cm. long, rounded at the apex, 4.7 cm. long, 1.5 cm. broad, pinkish red, glabrous. Stamens 11, 4 to 4.5 cm. long, glabrous, the filaments connate into a tube 3.5 cm. long; anthers oblong, 5 mm. long, 1.5 mm. broad, hairy inside at the apex. Pistil about 6.2 cm. long (stipe 0.8 cm., ovary 1.7 cm., style 3.7 cm.); stipe and ovary ferruginous-pubescent; style glabrous.

Legume 15 to 25 cm. long, 4.5 cm. broad, 4 to 6-seeded, expelling the seeds by the curling of the valves. Seeds oblong or obovate, more or less angular, laterally compressed, 2.2 to 2.7 cm. long, 1 to 1.5 cm. broad, about 0.8 cm. thick.

Type in the U. S. National Herbarium, no. 920170, collected on the trail between Norosí and Tiquisio, Department of Bolivar, Colombia, at an altitude of 150 to 600 meters, in flower and fruit, April–May, 1916, by H. M. Curran (no. 142).

This species is intermediate between *Brownea macrophylla* Linden and *B. latifolia* Jacq. With the first it has in common the inflorescence growing from the old wood, but it differs from it in most of the other characters. It has the 3-jugate leaves of the second, but with proportionally much narrower, differently shaped leaflets and much larger flowers.

A NEW SPECIES OF BAUHINIA FROM PANAMA.

Bauhinia ligulata Pittier, sp. nov.

Section Pauletia. A large, unarmed tree, up to 40 meters high and 80 cm. in trunk diameter. Bark brownish, rimose. Trunk straight, the limbs short, forming an elongate crown. Wood very hard.

Leaves petiolate, the petioles 2 cm. long, slender, deeply sulcate; blades coriaceous, 4 to 10 cm. long, 4 to 7.5 cm. broad, ovate, slightly emarginate at the base, bicuspidate at the apex with two short, subacute tips (sinus seldom over 12 mm. deep), smooth and almost shining above, grayish and minutely pubescent beneath; veins 13, the basal pair marginal, very salient beneath. Stipules ovate-elliptic, very small, scarious, caducous.

Inflorescences terminal, or of axillary, multiflorous, spiciform racemes at the ends of the branchlets. Buds claviform, ferruginous-pubescent, 2 to 2.5 cm. long just before anthesis. Flowers pedicellate, medium-sized, the bracts very small, caducous, the pedicels 2 to 6 mm. long, ferruginous-pubescent. Receptacle obconical, short-stipitate, about 7 mm. long. Calyx lobes 5, narrow, about 14 mm. long, more or less adnate, curled and reflexed in the later stages of anthesis. Petals 5, ovate-elliptic, attenuate at the base and short-unguiculate, acute at the tip, 3 cm. long, 6 mm. broad, slightly curled and sinuate on the margin, of a beautiful lilac color with the rib and pinnate veins dark purple. Stamens 10, all fertile, 5 long and 5 short, free to the base, entirely glabrous; filaments of long stamens about 25 mm. long, incurved, thicker at base; anthers ovate-elliptic, more or less open at the base, about 5 mm. long. Pistil glabrous, adnate at the base to the tube of the receptacle, then surrounded by two spathaceous ligules, these inserted on the receptacle inside the stamens, acute at the apex, hairy on the margin, 6 to 7 mm. long; ovary stipitate, 5 or 6-ovulate; style thick, the stigma papillose, depressed in the center, somewhat 3 or 5-lobed.

Fruit not known.

Type in the U. S. National Herbarium, no. 679475, collected in the forests around Puerto Obaldía, San Blas Coast, Panama, near sea level, in flower, September 2, 1911, by H. Pittier (no. 4334).

This remarkable species is probably the largest representative of the genus. The individual felled to obtain specimens measured 31 meters from foot to top and 63 cm. in trunk diameter, and a few of the other trees around this were much larger. It belongs to the group Pauletia with ovate or broadly elliptic petals, but differs from all the other species of the section by its short bicuspidate leaves and the form and size of the petals, and by the spathaceous envelopes at the base of the pistil, a character apparently not noticed heretofore in any other species of the genus.

FABACEAE.

A NEW SPECIES OF ATELEIA FROM COLOMBIA.

Ateleia herbert-smithii Pittier, sp. nov. FIGURE 51.

A tree, the young branchlets rather thick, knotty, lenticellate, at first minutely fulvous-pubescent, later glabrate.

Leaves 7 or 9-foliate, the rachis slender, terete, attenuate from the base, glabrous, 10 to 18 cm. long; stipules wanting or early caducous. Leaflets alternate, membranous; petiolules minutely pubescent, 4 to 8 mm. long; blades ovate, inequilateral, broad, subcordate, truncate, or abruptly acutate at the base, attenuate-acuminate and rounded-obtuse at the apex, 4 to 9.5 cm. long,

2.5 to 4.5 cm. broad, glabrous, the costa slightly prominent beneath, the veins and reticulation inconspicuous; stipels early caducous or wanting.

Inflorescence racemose-paniculate, terminal, densely flowered, about 20 cm. long, the rachis densely flowered, the individual racemes 5 to 9 cm. long. Flowers pedicellate, the pedicels 2 to 3 mm. long, pubescent, subtended at the base by a minute, pubescent bractlet. Calyx broadly companulate, 3 mm. long, entire or slightly sinuate on the margin, minutely puberulous or pubescent, persistent. Petal 1, yellow, glabrous, the claw about 3 mm. long, narrow, the blade ovate or suborbicular, reflexed, conchoid, about 5 mm. long and broad, irregularly sinuate on the margin. Stamens 10, 5 long and 5 short alternating, the former exserted, about 4 mm. long, the shorter ones subincluded; filaments slender, free or very slightly connate at the base; anthers dorsifixed, broadly ovate, the connective much shorter than the cells. Ovary stipitate, compressed, ovate, about 3 mm. long and 1.5 mm. broad, 2-ovulate, densely brownish-pubescent; stigma sessile, ovate-elliptic and concave, placed laterally to the apex on the ventral margin; ovules 2, amphitropous, borne on a short hilum.

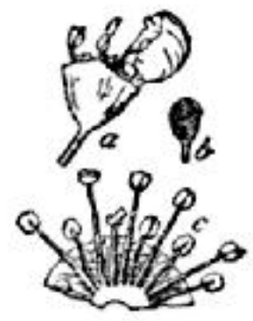

FIG. 51.—Floral details of *Ateleia herbert-smithii*. *a*, Flower; *b*, ovary; *c*, androecium. Natural size. From type specimen.

Fruit not known.

Type in the U. S. National Herbarium, no. 703851, collected in Santa Marta, Colombia, 1898–9, by H. H. Smith (no. 817).

The type of the genus Ateleia, *A. pterocarpa* Moc. & Sessé, is Mexican. Two or three more species have been reported from Yucatán and the Greater Antilles, and more recently two new additions have been described, one from Brazil (*A. glazioviana* Baill., 1892) and another from Bolivia (*A. guaraya* Herzog, 1909). The species here described inhabits the intermediate belt of South America, and shows the area of the genus to extend uninterruptedly from Mexico to Bolivia and eastern Brazil.

Ateleia herbert-smithii differs from all the other species of the genus in the shape of the leaflets. These, further, are distinctly and regularly alternate, as in *A. pterocarpa*, in which they are smaller, ovate, and more numerous. The young pods on the type specimens are ovate and 2-seeded, with the placental suture winged.

The species is named in honor of Mr. Herbert H. Smith, whose rich and well prepared collections of the flora of Santa Marta constitute one of the best recent contributions to the study of the flora of tropical America.

A VENEZUELAN SPECIES OF APOPLANESIA.

Apoplanesia cryptopetala Pittier sp. nov. FIGURE 52.

A shrub or small tree, the young branchlets glandular and tomentellous.

Leaves 13 to 21-foliolate, the rachis terete, 12 to 17 cm. long, tomentellous and sparsely glandular. Leaflets subcoriaceous. opposite, subopposite, or alternate, the petiolules 3 to 4 mm. long, grayish-hairy, sparsely glandular, the blades ovate-oblong, rounded at the base, rounded-emarginate at the apex, 2.5 to 6 cm. long, 1.5 to 2.5 cm. broad, minutely pilosulous above, paler, reticulate, sparsely pubescent, and black-glandular beneath, the costa densely hairy and the veins more or less so. Stipules wanting.

Inflorescence terminal, the numerous erect spikes paniculate, the rachis hairy, up to 20 cm. long. Bracts wanting; bractlets very small, hairy, acute, early caducous. Perfect flowers not seen. Pedicels hairy, short. Calyx hairy, 5-toothed. Petals 5, early deciduous. Stamens 10, the vexillar one free or

almost so. Ovary sessile, suborbicular, depressed, hairy, 2-ovulate; style filiform, geniculate close to the apex, hairy on the lower two-thirds of its length; stigma discoid, inconspicuous.

Calyx very much enlarged after flowering, the tube about 2.5 mm. long, hairy and covered with large black glands without, the lobes membranous, ovate-elliptic or obovate, hairy without, 3-nerved, beautifully reticulate, sparsely glandular, 8 to 9.5 mm. long (the carinal one shortest), 2.5 to 3.5 mm. broad.

Type in the U. S. National Herbarium, no. 602365, collected in Quebrada del Tigre, State of Lara, Venezuela, in bud and immature fruit, September 6, 1910, by Dr. A. Jahn (no. 173).

Until recently Apoplanesia was known to botanists only by a single obscure species from Mexico. The discovery by Dr. Jahn of a new member of the genus in Venezuela is therefore highly interesting. It will be noticed, however, that the new species differs from the generic type in having a 2-ovulate ovary, which will necessitate a slight change in the characterization of the group. In all the other characters the agreement is perfect. In our specimens, the numerous spikes of the inflorescences bear at the base a considerable number of flowers past the fertilization stage and with the calyx lobes fully developed, while the upper two-thirds of the rachis is covered with very young buds. In the more advanced among these, the 5 petals are present, though imperfectly developed, but it was not possible to find them in any of the open flowers, in which the stamens with full anthers and the ovary scarcely turning into fruit were always present.

FIG. 52.—Calyx of *Apoplanesia cryptopetala*. Natural size. From type specimen.

It is also a remarkable coincidence that the Mexican and Venezuelan species should be known under the same name of "palo de arco," or bow-wood.

OLD AND NEW SPECIES OF MACHAERIUM.

Machaerium acuminatum H. B. K. Nov. Gen. & Sp. 6: 391. 1825.

A tree, the branchlets terete, striate, glabrous.

Leaves 3 or 5-foliolate, glabrous, the rachis 6 to 8 cm. long. Leaflets coriaceous, the petiolules thick, sulcate, reddish, 3 to 4 mm. long, the blades ovate to oblong, rounded at the base, long-acuminate at the apex, 4.5 to 7.5 cm. long, 2 to 3.5 cm. broad, reticulate on both sides. Stipules wanting.

Inflorescences racemose, axillary or terminal, simple or branched, the peduncles 2 to 4 cm. long, glabrous. Flowers sessile, 6.5 to 7.5 mm. long; standard fuscous-pubescent; stamens diadelphous. Other floral details not known.

Legume 7 to 9 cm. long, stipitate, the stipe ferruginous-pubescent, 7 to 8 mm. long, the seminal part at first ferruginous-pubescent, 2.5 cm. long, 1.3 cm. broad, slightly curved, the wing falcate, rounded-obtuse at the apex, 2 to 2.3 cm. broad.

Type collected by Humboldt and Bonpland between San Pedro and La Victoria, near Hacienda del Tuy, State of Aragua, Venezuela.

Collected also at Colonia Tovar, State of Aragua, in fruit, *Fendler* 1913.

Machaerium bondaense Pittier, sp. nov.

A tree about 5 meters high, the branchlets terete, glabrous, lenticellate.

Leaves 7 or 9-foliolate. the rachis glabrescent or minutely pilosulous, 5 to 9 cm. long. Leaflets coriaceous, the petiolules 3 to 4 mm. long, minutely puberulous, the blades oblong, rounded at the base, attenuate-obtuse at the apex, 2.5 to 8 cm. long, 1.8 to 3.2 cm. broad, glabrous and minutely prominulous-reticulate above, beneath paler, puberulous, the costa and veins prominent, dark-colored. Stipules caducous, not seen.

Inflorescences axillary and terminal, paniculate, the rachis minutely grayish-pubescent. Flowers sessile, the other details not known.

Legume about 4.5 cm. long, long-stipitate, the stipe pubescent, 6 to 7 mm. long, the seminal part about 1 cm. long, 0.8 cm. broad, glabrous, arcuate, the wing membranous, cultrate, obtuse, mucronulate, loosely prominulous-reticulate, 1.1 cm. broad.

Type in the herbarium of the New York Botanical Garden, collected in dry forest near Bonda, Santa Marta, Colombia, almost at sea level, in fruit, November 1, 1898, by H. H. Smith (no. 702).

Labeled as *Machaerium acuminatum* H. B. K., but hardly to be confused with that species and apparently not closely related to any known species of the section Reticulata, to which it seems to belong.

Machaerium floribundum Benth. Journ. Linn. Soc. Bot. **4**: Suppl. 68. 1860.

A scandent shrub, climbing on high trees, the branchlets subangular, at first ferruginous-pubescent, later glabrous, the bark more or less rimose.

Leaves 3 to 9-foliolate, glabrous or almost so, the rachis 3 to 20 cm. long. Leaflets coriaceous, the petiolules thick, at first ferruginous-pubescent, 4 to 6 mm. long, the blades ovate or oblong, rounded at the base, abruptly short-acuminate, 3.5 to 13 cm. long, dark green and dull above, paler beneath, the costa and veins impressed on the upper face, very prominent beneath. Stipules lanceolate, acute, subindurate, 6 to 8 mm. long, often caducous.

Inflorescences terminal, paniculate, up to 40 cm. long, the rachis more or less ferruginous-pubescent, the branchlets often geminate, simple or ramified, the peduncles 1 to 6 cm. long, few to many-flowered. Bracts triangular-acute, about 5 mm. long, ferruginous-pubescent, usually caducous; bractlets orbicular, hairy, subpersistent. Flowers 6.5 to 7 mm. long, sessile or very shortly pedicellate. Calycinal bracts orbicular, fuliginous-pubescent, very small. Calyx campanulate, 3 to 4 mm. long, fuliginous-pubescent without, the teeth indistinct and irregular. Petals dull white; standard minutely pubescent without, the claw 1.5 to 2 mm. long, the blade oblong, attenuate at the base, bilobulate at the apex, 5 to 5.5 mm. long, about 4 mm. broad; wings glabrous, strongly inequilateral, unequal in size, the claw slender, 2 to 2.5 mm. long, the blade ovate, shortened on the vexillar side at the base, 5 mm. long, 2.5 to 3.5 mm. broad; carinal petals glabrous, falcate, auriculate, the claw as in the wings, the blade about 4 mm. long, 2 to 2.5 mm. broad. Stamens monadelphous, glabrous, the anthers ovoid or oblong. Ovary 1-ovulate, long-stipitate, densely fuliginous-pubescent, provided at the base with a very short tubular disk; style glabrous, oblique, about 1.1 mm. long.

Type from northern Brazil, in the Kew Herbarium. The above description from specimens collected in Santa Marta, Colombia, in flower, March, 1900, by H. H. Smith (no. 2039).

The Santa Marta specimens agree with Bentham's description, except in the size of the flowers (6 to 7 mm. long instead of 9.5 mm.) and in having the standard minutely fuliginous-pubescent, not glabrous, without. In the absence of the legume a nearer determination is hardly possible. In the Brazil and Guiana specimens the legume is 7.5 to 10 cm. long, glabrous, the seminal part incurved, 1.9 to 2.5 cm. long, the wing 2.6 to 3.6 cm. broad, the stipe 1.5 to 2 cm. long.

A specimen of the type collection of *Machaerium floribundum* var. *parviflorum* Benth. from Tarapoto, Peru, in the Gray Herbarium, is remarkable for its large, lanceolate, indurate-spinescent, recurved bracts, which seem to be persistent.

Machaerium glabratum Pittier, sp. nov. FIGURE 53.

An armed shrub (or tree?), the branchlets at first sparsely ferruginous-pubescent, later glabrous, grayish, verruculose.

Leaves 13 or 15-foliolate, the rachis 3.5 to 14 cm. long, slender, angular, hairy along the dorsal side. Leaflets subcoriaceous, glabrous, the petiolules about 0.5 mm. long. the blades oblong, rounded at the base, more or less retuse at the apex, 7 to 15 mm. long, 3 to 5 mm. broad, dark green above, paler beneath; veins crowded, parallel, slightly arcuate, not anastomosed, running into the marginal nerve. Stipules indurate-spinescent, narrow and acute, glabrous, about 5 mm. long.

Inflorescence paniculate, terminal, broad, 20 to 35 cm. long, the branchlets longer than the leaves, the rachis more or less puberulous; peduncles (branchlets of the second order) solitary or ternate, 3 to 10-flowered, 0.5 to 1.5 cm. long. Bracts more or less indurate, triangular-acute, more or less pubescent, subcaducous; bractlets scarious, caducous. Pedicels more or less ferruginous-pubescent, 2 to 2.5 mm. long. Flowers about 8 mm. long. Calycinal bractlets orbicular, puberulous or glabrous, minutely ciliate, 2 to 2.5 mm. long and broad. Calyx campanulate, gibbous-dilated on the vexillar side, 5 mm. long, purple, glabrous or minutely pilosulous, the teeth very short, rounded. Petals purple, glabrous; standard reflexed, ovate or obovate, the claw very short (hardly over 0.5 mm. long), the blade obovate or suborbicular, rounded at the base, rounded-emarginate at the apex, about 5.5 mm. long, 8 mm. broad; wings strongly oblique, arcuate, the claw 1.5 to 2 mm. long, the blade obovate, 1-auriculate at the base, obtuse, about 8 mm. long, 3 to 3.5 mm. broad; carinal petals strongly falcate-arcuate, the claw 1 to 1.5 mm. long, the blade 1-auriculate, subacute, about 9 mm. long, 3.5 mm. broad. Stamens monadelphous, the tube and filaments strongly arcuate, the anthers ovoid. Ovary 1-ovulate, stipitate at the base, flat-compressed, tomentellous or pubescent, provided at the base with a short tubular disk; style about 2.5 mm. long, glabrous.

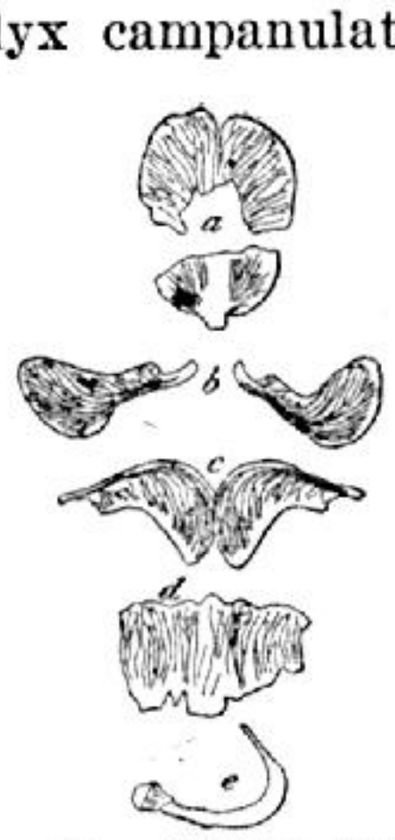

FIG. 53.—Floral details of *Machaerium glabratum*. *a*, Standard; *b*, wings; *c*, carinal petals; *d*, calyx; *e*, ovary. Natural size. From type specimen.

Fruit not known.

Type in the U. S. National Herbarium, no. 532839, collected in Santa Marta, Colombia, in flower, in October, 1898, by H. H. Smith (no. 264). Other specimens by the same collector and from the same locality under no. 2032.

Distributed as *Machaerium acaciaefolium* Mart. This, according to Bentham, is the same as *M. angustifolium* Vog., the first name possibly having the priority. The Santa Marta shrub disagrees with the Brazilian species in the shape of the stipules and leaflets, the latter being smaller and paler on the lower face, in the size of the flowers, and in the short claws of the glabrous petals, the monadelphous stamens, the relatively light pubescence of the ovary, etc. Even conceding a very broad margin of variation to *M. angustifolium*, it is hard to see how these specimens could be identified with this species.

Machaerium humboldtianum Vog. Linnaea **11**: 194. 1837. FIGURE 54.

A tree 4 to 7 meters high (Humboldt) or a vine (Pittier), the branchlets terete, striate, glabrous, puberulous, or minutely pubescent.

Leaves 5 or 7-foliolate, glabrous or more or less pubescent, the rachis 5 to 9 cm. long, thickening at the base. Leaflets coriaceous, the petiolules subcanaliculate, 2 to 5 mm. long, the blades obovate, ovate, or elliptic, usually

rounded, sometimes cuneate at the base, obtuse or obtusely acuminate at the apex, 4 to 8 cm. long, 1.5 to 4 cm. broad, dark green above, paler beneath; costa impressed on the upper face of the leaflets, strongly prominent on the lower face; veins very numerous, parallel, more or less prominulous on both faces, simple to the marginal nerve or sparsely branching; intermediate veinlets more or less parallel to the veins and somewhat anastomosed. Stipules indurate-spinescent, arcuate, concave on the lower side, pilosulous or glabrous.

Inflorescence paniculate, terminal, 15 to 30 cm. long, loose, ramified, the rachis terete, more or less pilosulous or pubescent, 3 times ramified. Bracts spinescent, yellowish, pilosulous, arcuate (like the stipules). Peduncles (branchlets of third order) 3 to 10-flowered, provided at the base with scaly or spinescent bracts. Pedicels 2 to 3 mm. long, densely grayish-pubescent, bracteolate at the base. Flowers 9 to 10 mm. long. Calyx campanulate, 5-toothed, persistent, 5 to 5.5 mm. long, substriate, glabrous or sparsely pubescent without, the carinal tooth longer, narrow and acute, the lateral teeth broader, obtuse or acute. Calycinal bractlets suborbicular, glabrous or puberulous, up to 1.5 mm. long and broad, entire. Petals purple, glabrous or sparsely pubescent without; standard strongly reflexed, the claw 1 to 1.5 mm. long, the blade orbicular or ovate, obtuse, subtruncate, or attenuate at the base, emarginate with broadly rounded lobes at the apex, 7 to 9 mm. long, 8.5 to 9 mm. broad; claw of the wings 2 to 2.5 mm. long, the blade obliquely obovate, narrow and more or less distinctly auriculate on the vexillar side at the base, broad and obtuse at the apex, about as long as that of the standard, 2.5 to 3.5 mm. broad; carinal petals strongly falcate, the claw 2 to 2.5 mm. long, the blade broadly rounded-auriculate on the vexillar side, more or less obtuse at the apex, 7.5 to 8 mm. long, 3 mm. broad, the carinal margin more or less reflexed. Stamens monadelphous, the filaments arcuate, the anthers oblong. Ovary 1-ovulate, long-stipitate with a tubular disk at the base, compressed, appressed-villous or villous-tomentose, the style straight, glabrous, the stigma inconspicuous.

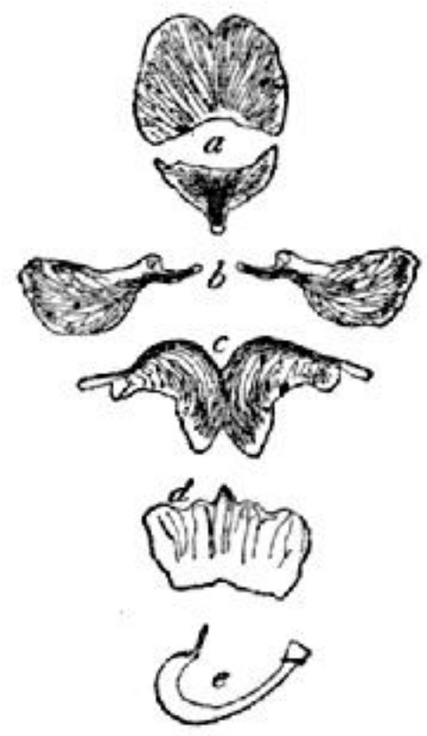

FIG. 54.—Floral details of *Machaerium humboldtianum*. *a*, Standard; *b*, wings; *c*, carinal petals; *d*, calyx; *e*, ovary. Natural size. From *Fendler* 2226 in Gray Herbarium.

Fruit entirely glabrous, long-stipitate, the stipe slender, 7 to 10 mm. long, the whole 5 to 6.5 cm. long, the seminal part narrow (5 to 7 mm. broad), elongate, strongly veined, attenuate at the base, the wing oblong, cultriform, obtuse, apiculate (on the vexillar side of the apex), up to 16 mm. broad. Seed oblong, arcuate, compressed, brownish, about 15 mm. long, 4 mm. broad.

Type from the Aragua Valley, Venezuela, collected by Humboldt and Bonpland. Above description based upon specimens from near Colonia Tovar, *Fendler* 2226, for the leaves and flowers, and Valle del Limón, near Maracay, State of Aragua, Venezuela, *Pittier* 6077, for the fruit and seed.

The following specimens also belong here:

VENEZUELA: La Trinidad de Maracay, State of Aragua, flowers, February, 1913, *Pittier* 5791.

COLOMBIA: Santa Marta, alt. 170 meters, flowers and young fruits, April, 1901, *H. H. Smith* 2026 (distributed as *M. lineatum* Benth.).

All these specimens agree in a general way with Vogel's description, except in one important detail. Following Humboldt's notes, this author gives the plant the status of a tree, while, according to notes taken at the time of the collection of my own specimens, it is a scandent shrub. Further information on the habit of this species is desirable.

According to Humboldt and Bonpland, *Machaerium humboldtianum* is known among the natives of the Aragua Valley under the names of "uña de gato," cat's claw, and "sangre de toro," bull's blood, the latter on account of the red gum which exudes from incisions made in the trunk.

Bentham attributes to this species subisadelphous stamens. As a matter of fact, they are always monadelphous structurally, the tube being opened above by a longitudinal slit which is ended at the base by a thick callous. The lower slit, which often divides the tube all through, is mechanical and the result more or less of the thickening of the ovary, so that the consequent division of the stamens into two apparent fraternities can not be considered as a real character of any species in the genus.

Machaerium intermedium Pittier, sp. nov. FIGURE 55.

An unarmed shrub or small tree, the branchlets verruculose, more or less ferruginous-pubescent.

Leaves 7 or 8-foliolate, the rachis slender, terete, sparsely ferruginous-hairy, 4.5 to 7 cm. long. Leaflets subcoriaceous, the petiolules ferruginous-hairy, 3 to 4 mm. long, the blades ovate, ovate-oblong, or ovate-elliptic, rounded at the base, acuminate at the apex, 2 to 4.5 cm. long, 1 to 1.7 cm. broad, dark green on both faces, sublustrous and reticulate above and sparsely villosulous along the costa, glabrous or very sparsely villosulous beneath, sparsely ciliate. Stipules wanting.

Inflorescences axillary and terminal, the rachis fuscous-pubescent, 1.5 to 2 cm. long, ramified, the branchlets or peduncles about 1 cm. long, 5 to 7-flowered. Bracts caducous or wanting; bractlets very small, ovate, conchoid, pubescent, subpersistent. Flowers sessile, about 8.5 mm. long. Calycinal bractlets clasping, much broader than long, fuscous-pubescent, about 1.5 mm. long, 2 to 2.5 mm. broad. Calyx campanulate, 2.5 to 3.5 mm. long, fuscous-pubescent, the teeth small and uneven. Petals purple; standard thick, coriaceous, conchoid, minutely fuscous-pubescent without, the claw about 0.7 mm. long, the blade suborbicular, rounded or subemarginate at the base, rounded and incised-emarginate at the apex, about 6 mm. long, 7 mm. broad, the margin incurved; wings long and narrow, fuscous-pubescent without along the middle, the claw about 2.5 mm. long, the blade scarcely auriculate, obtuse, 6 mm. long, 2.5 mm. broad; carinal petals falcate, fuscous-pubescent without along the carinal side, the claw as in the wings, the blade auriculate, obtuse, 6.5 mm. long, about 3 mm. broad, the vexillar margin almost straight. Stamens monadelphous, the carinal one longer, the filaments sparsely villous, the anthers oblong. Ovary 1-ovulate, stipitate, provided at the base with a glabrous tubular disk nearly 1.5 mm. long, the fuscous pubescence increasing in length from the base to the apex; style glabrous, straight, slender, about 2.5 mm. long.

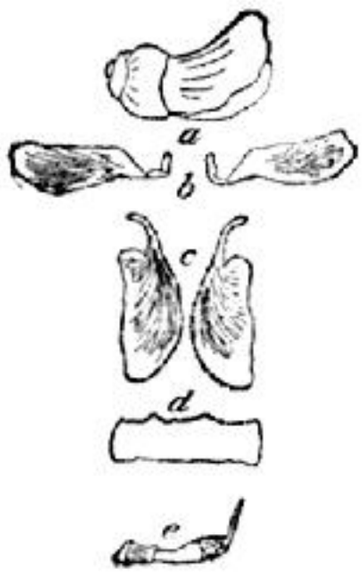

FIG. 55.—Floral details of *Machaerium intermedium*. *a*, Unopened flower; *b*, wings; *c*, carinal petals; *d*, calyx; *e*, ovary. Natural size. From type specimen.

Legume not known.

Type in the Gray Herbarium, collected in Santa Marta, Colombia, at an altitude of about 750 meters, 1898–1901, by H. H. Smith (no. 2038).

Very closely allied to *Machaerium seemannii* Benth. and *M. tovarense* Pittier (below), but differing from both in the pubescence, the average number of leaflets, and the size and indument of the flowers. Future investigations, based on more copious and complete material, may show that these three forms are not specifically distinct.

Machaerium madeirense Pittier, sp. nov.

A tree, the branchlets terete, at first densely ferruginous-pubescent.

Leaves 5 or 7-foliolate, the rachis puberulous, angular or terete, 4.5 to 8 cm. long. Leaflets coriaceous, the petiolules brownish-pubescent, thick, 4 to 6 mm. long, the blades ovate, broadly rounded or rounded-cuneate at the base, obtusely acuminate, 2 to 10 cm. long, 1.5 to 4.5 cm. broad, glabrous above, paler and minutely puberulous beneath. Stipules caducous, not seen.

Inflorescences terminal, paniculate, 15 to 20 cm. long, the rachis ferruginous-pubescent, the branchlets of the first order of peduncles 1.5 to 3 cm. long, 5 to 10-flowered. Bracts and bractlets caducous. Flowers short-pedicellate, the other details not known.

Legume 5.5 to 8 cm. long, short-stipitate (the stipe about 3 mm. long), sparsely ferruginous-pubescent all over, the seminal part small, 1 to 1.5 cm. long, 0.5 cm. broad, ovate, straight, the wing membranous, cultrate, obtuse, prominulous-reticulate, 11 to 12 mm. broad.

Type in the John Donnell Smith Herbarium, collected at the falls of the Madeira River, Brazil, in fruit, October, 1886, by H. H. Rusby (no. 1323).

Related perhaps to *Machaerium acuminatum*, but obviously distinguished from it by the pedicellate flowers and small pods.

Machaerium milleflorum Pittier, sp. nov. FIGURE 56.

A shrub or small tree, scarcely armed, the young branchlets terete, ferruginous-tomentose.

Leaves 21 to 27-foliolate, the rachis slender, 9 to 12 cm. long, ferruginous-tomentose. Leaflets membranous, the petiolules ferruginous-hairy, 1 mm. long or less, the blades ovate-oblong, the terminal one obovate, oblique, rounded at the base, rounded, often emarginate, sometimes acute and mucronulate at the apex, 1 to 3 cm. long, 0.6 to 1.2 cm. broad, dark green and sparsely pilosulous above, sparsely villous or pilosulous beneath, the costa and margin more densely ferruginous-hairy; veins somewhat distant, irregular, profusely anastomosed, the principal ones running into the marginal nerve. Stipules rather small, indurate-spinescent, acute-lanceolate, glabrous and dark-colored, subpersistent.

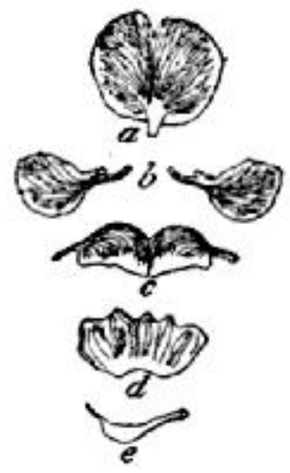

FIG. 56.—Floral details of *Machaerium milleflorum*. *a*, Standard; *b*, wings; *c*, carinal petals; *d*, calyx; *e*, ovary. Natural size. From type specimen.

Inflorescence paniculate, terminal, large (20 cm. long and broad or more), twice-branched, the rachis brownish-hairy or tomentellous; branchlets of first order 2 to 5-fasciculate, branched (or one simple, peduncle-like), 10 to 12 cm. long; peduncles cymoid, fasciculate at the nodes, slender, many-flowered, 1 to 3 cm. long. Bracts indurate-spinescent, glabrous, broad and acute, 2 to 3 mm. long; bractlets scarious, conchoid, purple, glabrescent, very small, persistent. Pedicels 1.5 to 2 mm. long, cano-pubescent. Flowers about 6 mm. long. Calycinal bracts suborbicular, conchoid, glabrous, about 1 mm. long, 1 to 1.5 mm. broad. Calyx campanulate, 3 to 3.5 mm. long, striate, purple, glabrous or minutely pilosulous, the teeth obtuse, about equal in length, but the vexillar ones broad. Petals pink (?); standard densely fulvous-hairy without, not reflexed, the claw obliquely inserted, about 1 mm. long, the blade orbicular, rounded or subtruncate at the base, deeply emarginate at the apex, the lobes rounded, about 5.5 mm. long, 6.5 mm. broad; wings broadly obovate, glabrous, 1-auriculate, subacute or obtuse, the claw 1.5 mm. long, the blade 4.5 mm. long, 3 mm. broad; carinal petals falcate, broad, with a straight vexillar margin, the claw as in the wings, the blade about 4.5 mm. long, 2.2 mm. broad. Stamens monadelphous, glabrous, the anthers ovoid. Ovary 1-ovulate,

stipitate, slightly arcuate, densely cano-pubescent or fulvous-pubescent, provided at the base with a very short cuplike disk; style glabrous, about 1.3 mm. long.

Fruit not known.

Type in the U. S. National Herbarium, no. 704057, collected in Santa Marta, Colombia, 1898–9, by H. H. Smith (no. 2033).

This species is remarkable for the size and branching of its inflorescence and for its small, numerous flowers.

Machaerium moritzianum Benth. Journ. Linn. Soc. Bot. 4: Suppl. 58. 1860.

FIGURE 57.

A shrub or small tree, almost unarmed, the branchlets terete, at first ferruginous-pubescent.

Leaves 17 to 25-foliolate, the rachis slender, subcanaliculate, 7 to 10 cm. long, ferruginous-pubescent. Leaflets membranous or subcoriaceous, the petiolules hairy, not over 1 mm. long, the blades oblique-oblong, cuneate or somewhat rounded at the base, rounded-emarginate at the apex, 1.2 to 2.5 cm. long, 6 to 10 mm. broad, more or less puberulous on both faces, paler beneath; veins rather distant, running into the marginal nerve, but branched and distinctly anastomosed. Stipules broadly triangular, acute, indurate and subspinescent, very caducous.

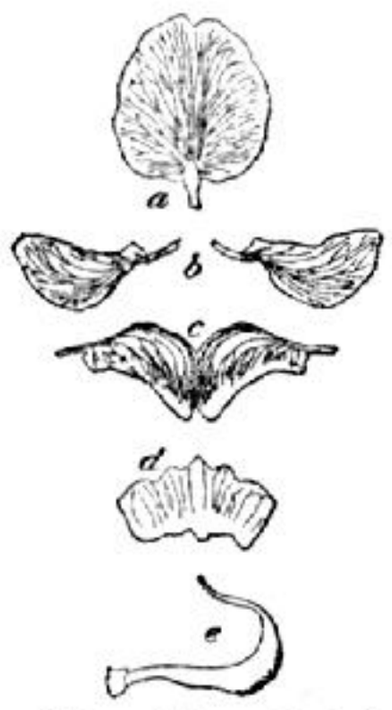

FIG. 57.—Floral details of *Machaerium moritzianum*. *a*, Standard; *b*, wings; *c*, carinal petals; *d*, calyx; *e*, ovary. Natural size. From *Fendler* 1750[1] in Gray Herbarium.

Inflorescence paniculate, axillary or terminal, 6 to 8 cm. long (shorter than the leaves), simple-branched, the rachis rufous-tomentose; peduncles solitary or in 2's or 3's, simple, 1 to 5-flowered, 1 to 2 cm. long. Bracts and bractlets not seen. Pedicels about 2 mm. long, rufous-hairy. Flowers 10 to 11 mm. long. Calycinal bractlets suborbicular or broader than long, ferruginous-pubescent, about 1.5 mm. long, 2 mm. broad. Calyx campanulate, 3 to 4 mm. long, pubescent, the vexillar teeth very broad and rounded, the carinal tooth slightly longer, acute. Petals purple, glabrous; standard reflexed, the claw about 2 mm. long, the blade ovate, broadly rounded at the base, rounded-emarginate at the apex, about 8 mm. long and 7.5 mm. broad; wings oblique, falcate, 1-auriculate, the claw 1.5 to 2 mm. long, the blade 7 mm. long, 3 mm. broad; carinal petals falcate, 1-auriculate, subacute at the apex, the claw 1.5 mm. long, the blade 7 to 7.5 mm. long, 3 mm. broad. Stamens monadelphous, glabrous, the filaments thick, the anthers small, ovoid. Ovary stipitate, strongly arcuate, densely villous-tomentose; style glabrous, about 5 mm. long.

Legume (fide Bentham) about 5 cm. long, the seminal part strongly bent, 10.5 to 11.5 mm. broad, the wing straight, about 17 mm. broad.

Type from Colonia Tovar, Venezuela, collected in flower by Fendler (no. 1750[1]). The above description is after the specimen of this collection in the Gray Herbarium. The fruits, which I have not seen, were described from Fendler's specimens (no. 1866[2]) from the same locality or from Moritz's no. 883, also from Venezuela, without further indication of locality.

Other specimens of the same species have been collected at the foot of the Cordillera de Santa Marta, Colombia, by H. H. Smith (no. 14). In these the leaflets are coriaceous and much larger than in the type, but the floral characters agree perfectly. The pubescence of the leaves, also, is decidedly less marked.

The venation of the leaflets undoubtedly places this species among the Oblonga. According to Bentham the base of the pod is like that of a Drepanocarpus on a small scale, while the wing is that of Machaerium.

Machaerium tovarense Pittier, sp. nov.

An unarmed tree, the branchlets terete, striate, verruculose, at first densely fulvous-pubescent.

Leaves 11 or 13-foliolate, the rachis densely fulvous-hairy, 6 to 9 cm. long. Leaflets subcoriaceous, the petiolules densely hairy, about 1 mm. long, the blades ovate-oblong or elliptic, rounded at the base, attenuate and obtusely subacuminate at the apex, 1 to 5 cm. long, 1 to 2 cm. broad, above lustrous, pilosulous. the venation prominulous, beneath paler, reticulate, densely hairy on the costa and sparsely pilosulous on the veins, the margin also more thickly pilose-ciliate. Stipules caducous, not seen.

Inflorescences axillary or terminal, racemose, 1 to 2 cm. long, the rachis fulvous-tomentose. Calycinal bractlets fulvous-pubescent, broader than long. Calyx persistent, campanulate, truncate, 2 to 3 mm. long. Filaments long-ciliate. Other details of the flower wanting.

Legume 7 to 8.5 cm. long, short-stipitate (the stipe about 4 mm. long), ferruginous-pubescent, more so on the seminal part and along the carinal margin, the seminal part 2 to 3 cm. long, 1.3 to 1.5 cm. broad, almost straight, the wing cultrate, obtuse, mucronate, 2 to 2.7 cm. broad.

Type in the Gray Herbarium, collected near Colonia Tovar, State of Aragua, Venezuela, in fruit, by A. Fendler (no. 1865).

This collection was considered by Bentham to belong to his *Machaerium scemannii*, the description of the fruit being added to the original description of that species. But the general pubescence is much more abundant on the Venezuelan tree, the leaflets on the whole more numerous, with shorter petiolules, and the fruits considerably larger and more hairy. On the other hand, the two species have many common characters, among them the villous filaments, so that there can be no doubt as to their being closely related.

AN OLD AND A NEW SPECIES OF DREPANOCARPUS.

Drepanocarpus inundatus Mart.; Benth. Ann. Wien. Mus. 2: 96. 1838. FIGURE 58.

A low, unarmed tree or shrub, the branchlets terete, glabrous.

Leaves 5 to 8-foliolate, entirely glabrous, the rachis 5 to 10 cm. long. Leaflets subcoriaceous, the petiolules subcanaliculate, 3 to 4 mm. long, the blades ovate-elliptic, rounded or sometimes cuneate at the base, obtusely long-acuminate at the apex, 2.5 to 7 cm. long, 1 to 3 cm. broad, dark green above, paler beneath, the veins prominulous on both faces, elegantly anastomosed-reticulate beneath. Stipules aculeiform, 2 to 4 mm. long, very caducous.

Inflorescences axillary, subracemose, much shorter than the leaves, sparsely branched, the rachis more or less ferruginous-pubescent, not over 4 cm. long, the branchlets (peduncles) simple, 5 to 8-flowered, not over 2 cm. long, cymoid. Bracts stipule-like, very caducous; bractlets ovate, conchoid, pubescent without, about 0.5 mm. long, caducous. Flowers sessile, about 1 mm. long. Calycinal bracts suborbicular (broader than long), fuliginous-pubescent without, 1.5 to 2 mm. long, 2.7 mm. broad. Calyx campanulate, striate, about 3.5 mm. long, purple, fuliginous-pubescent without, the teeth equal in length, rounded-obtuse, the vexillar ones a little broader. Petals purple; standard orbicular, attenuate at the base into a short (not over 1 mm. long) claw,

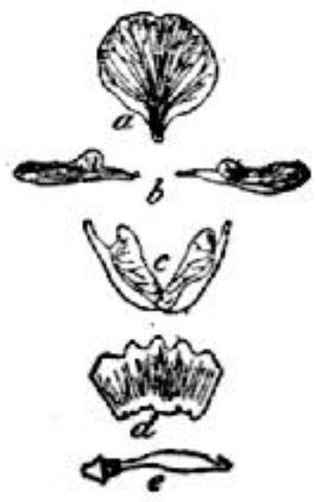

FIG. 58.—Floral details of *Drepanocarpus inundatus*. *a*, Standard; *b*, wings; *c*, carinal petals; *d*, calyx; *e*, ovary. Natural size. From *Bourgeau*, no number, in U. S. National Herbarium.

slightly emarginate at the apex, 6.5 mm. long, 6 mm. broad, silky-pubescent without; wings oblong, oblique, broadly 1-auriculate, obtuse, slightly pubescent at the base, the claw 1.5 to 2 mm. long, the blade 4 to 4.5 mm. long; carinal petals slightly falcate, semihastate-auriculate, pubescent at the base and along the carinal margin, the claw as in the wings, the blade 4.5 mm. long, 2 mm. broad. Stamens monadelphous, glabrous, the anthers ovoid. Ovary 1-ovulate, almost straight, long-stipitate, provided at the base with a tubular disk, this about 1 mm. long, glabrous, the stipe glabrous, the ovary proper fuliginous-hairy; style glabrous, recurved, about 1.3 mm. long.

The following specimens have been examined:

MEXICO: Córdoba Valley, State of Veracruz, 1865–6, *Bourgeau*.

EL SALVADOR: Southern slopes of Santa Ana Volcano, alt. 1,000 meters, flowers, February 18, 1907, *Pittier* 2057.

Drepanocarpus venezuelensis Pittier, sp. nov. FIGURE 59.

A low, bushy, half-trailing shrub, unarmed, the branchlets terete or more or less longitudinally sulcate, with reddish brown, rimose bark, the younger parts minutely appressed-pubescent.

Leaves 7 to 11-foliolate, the rachis 6 to 12 cm. long, at first ferruginous-pubescent, later glabrescent. Leaflets coriaceous, the petiolules ferruginous-pubescent or glabrescent, 4 to 5 mm. long, the blades oblong, rounded or subcuneate at the base, obtusely acutate or subacuminate at the apex, 5 to 11 cm. long, 1.5 to 3.5 cm. broad, dull, glabrous, and prominulous-reticulate above, paler, minutely appressed-pilosulous, and reticulate beneath, the costa and veins impressed above, very prominent beneath. Stipules ovate-acuminate, 2 to 4 mm. long, coriaceous, puberulous without, caducous.

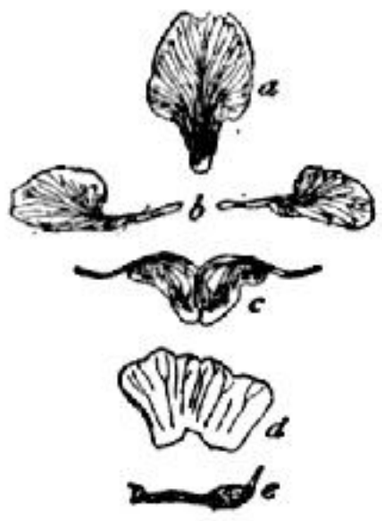

FIG. 59.—Floral details of *Drepanocarpus venezuelensis*. *a*, Standard; *b*, wings; *c*, carinal petals; *d*, calyx; *e*, ovary. Natural size. From type specimen.

Inflorescences paniculate, axillary or terminal, the rachis ferruginous-pubescent, the secondary branchlets (5 to 11 cm. long) and the peduncles often fasciculate at the nodes; peduncles simple or ramified, 5 to 8-flowered, 1 to 3 cm. long. Bracts ovate-acuminate, ferruginous-pubescent, about 2 mm. long, caducous; bractlets obovate, very small, hairy, subpersistent. Flowers sessile, 8 to 9 mm. long. Calycinal bractlets ovate to obovate, 1 to 2 cm. long, 1 to 5 mm. broad, ferruginous-pubescent. Calyx campanulate, 4 to 5 mm. long, minutely ferruginous-pubescent, the teeth very short, rounded and broad. Petals white with purple veins; standard straight (not reflexed), minutely ferruginous-pubescent without, the claw broad, about 2.5 mm. long, the blade ovate, attenuate at the base, rounded and broadly emarginate at the apex, about 6 mm. long and 5 mm. broad; wings glabrous, strongly oblique, the claw slender, 2.5 to 3 mm. long, the blade ovate, shortened at the base on the vexillar side, obtuse at the apex, 5.5 to 6 mm. long, 2.5 to 3 mm. broad; carinal petals strongly falcate, glabrous, the claw as in the wings, the blade about 5 mm. long, 2 to 2.5 mm. broad. Stamens monadelphous, glabrous, the filaments thick, the anthers small, subglobose. Ovary 1-ovulate, long-stipitate (stipe 3.5 to 4 mm. long), brownish-pubescent, provided at the base with a very short tubular disk; style glabrous, straight, about 1.1 mm. long.

Legume not known.

Type in the U. S. National Herbarium, no. 601838, collected at El Cedral de las Ajuntas, near Los Tegues, State of Miranda, Venezuela, in flower, April 27, 1913, by H. Pittier (no. 6108).

Collected also near Colonia Tovar, State of Aragua, 1856–7, by A. Fendler (no. 2318).

Fendler's specimen was first determined by Bentham as Drepanocarpus and later as *Machaerium leiophyllum* Benth. It has certainly very little in common with the latter, while its habit, the shape of the long, unguiculate petals, and the absence of any appearance of a wing in the developed ovaries all point to the former genus.

This shrub is known among the natives under the name of "chaperno."

TWO NEW SPECIES OF PTEROCARPUS FROM COLOMBIA.

Pterocarpus floribundus Pittier, sp. nov. FIGURE 60.

A tree, the branchlets glabrous, lenticellate.

Leaves 3 or 5-foliolate, the rachis slender, flattened above, 5 to 8 cm. long, glabrous. Leaflets membranous, the petiolules terete, 4 to 6 mm. long, more or less puberulous or pubescent, the blades ovate, rounded or abruptly acutate at the base, obtusely long-acuminate at the apex, 9 to 12 cm. long, 4.5 to 7 cm. broad, glabrous, minutely reticulate, paler beneath and the veins prominent.

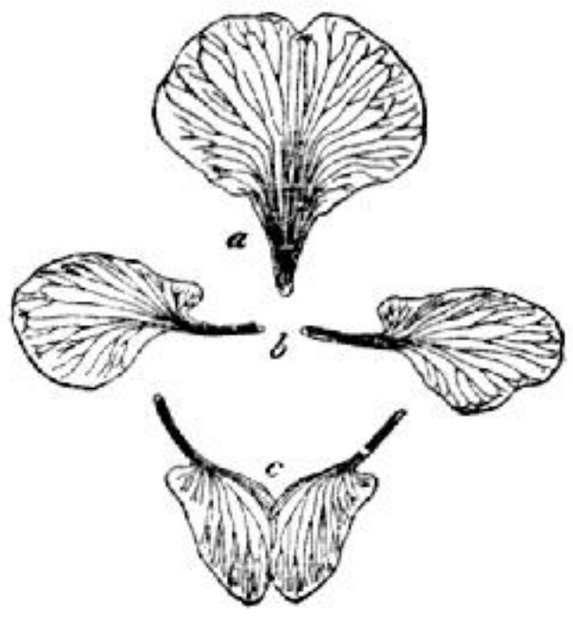

FIG. 60.—Petals of *Pterocarpus floribundus*. *a*, Standard; *b*, wings; *c*, carinal petals. Natural size. From type specimen.

Panicle terminal, many-branched, oblong, 20 to 25 cm. long, abundantly flowered, the main rachis grayish, glabrous, the rachis of the lateral racemes 4 to 6 cm. long, densely ferruginous-hairy. Bracts very small, obtuse, hairy. Flowers pedicellate, the pedicels 3 to 4 mm. long, ferruginous-hairy, provided at the apex with 2 opposite, linear-acute bractlets about 1 mm. long and contiguous to the calyx. Calyx turbinate-campanulate, narrow, oblique, 5 to 7 mm. long, ferruginous-pubescent without, persistent, the teeth acute. Petals glabrous, yellow; standard suborbicular, attenuate and purple at the base, the claw cuneate, about 4.5 mm. long, the blade broader than long, about 9 mm. by 14 mm.; wings oblique, broadly ovate, the claw slender, about 4.5 mm. long, the blade 1-auriculate at the base, broadly rounded at the apex, about 10 mm. long and 7 mm. broad; carinal petals coherent along the lower margin, subfalcate, the claw 3.5 to 4 mm. long, the blade oblique-oblong, 1-auriculate, obtuse at the apex, about 8 mm. long, 4 to 4.5 mm. broad. Stamens glabrous, monadelphous, the filaments free for about half their length; anthers oblong. Ovary sessile, 4-ovulate, ferruginous-tomentose, the style glabrous, about 10 mm. long.

Immature fruits orbicular, apiculate laterally.

Type in the U. S. National Herbarium, no. 704056, collected in Santa Marta, Colombia, 1898–9, by H. H. Smith (no. 2030).

This beautiful species seems to be very closely related to *P. rohrii* Vahl from the same region, differing mainly in the disposition of the inflorescence, the shape and reduced number of the leaflets, the small dimensions of the flowers, and the 4-ovulate ovary.

Pterocarpus heterophyllus Pittier, sp. nov. FIGURE 61.

A tree, the branchlets pilosulous, sparsely lenticellate.

Leaves 5 to 9-foliolate, the rachis slender, glabrous or pilosulous, 6 to 12 cm. long. Leaflets coriaceous, very variable in size; petiolules more or less villous, 3 to 4 mm. long; blades ovate, rounded, truncate, or sometimes subemarginate at the base, emarginate at the apex, 1.5 to 8 cm. long, 1.5 to 4 cm. broad,

glabrous, reticulate, dark green above, paler or almost glaucous beneath, the venation prominent on both faces.

Racemes simple, 10 to 15 cm. long, growing from the axils of the upper leaves, the rachis more or less rufous-pubescent. Flowers very large for the genus, solitary, geminate, or 3 or 4-fasciculate along the rachis; pedicels slender, 1 to 1.5 cm. long, rufous-pubescent, provided above the middle with 2 very small, alternate, hairy bractlets. Calyx turbinate-campanulate, oblique, 8 to 10 mm. long, minutely rufous-pubescent, persistent, the lobes rounded-obtuse. Petals glabrous, yellow with dark purple veins; standard reflexed, the claw rather narrow, 4 mm. long, the blade suborbicular, more or less distinctly emarginate at the broadly rounded apex, about 12 mm. long, 17 mm. broad; wings free, the claw slender, 5 to 6 mm. long, the blade ovate, 12 mm. long, 8.5 mm. broad; carinal petals cohering along the lower margin, the claw about 5.5 mm. long, the blade oblique-obovate, about 10 mm. long, 5.5 mm. broad. Stamens monadelphous, the free part of the filaments very short, the anthers ovate, dark brown. Ovary long-stipitate, 5 or 6-ovulate, rufous-villous, the style glabrous, slender, about 8 mm. long.

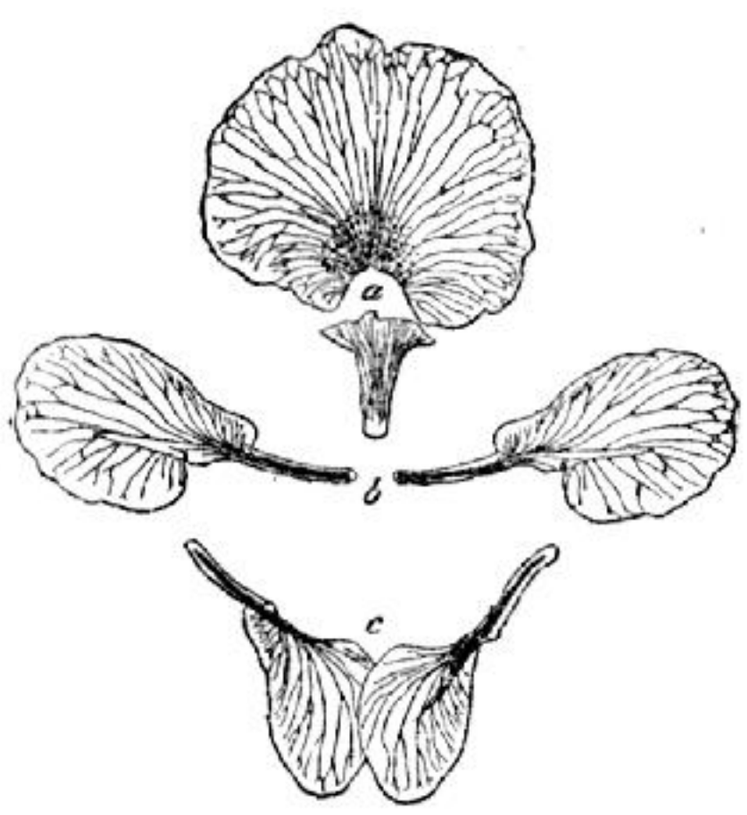

FIG. 61.—Petals of *Pterocarpus heterophyllus*. *a*, Standard; *b*, wings; *c*, carinal petals. Natural size. From type specimen.

Legume orbicular, stipitate, 1-seeded, more or less pubescent or glabrescent, reticulate, 5 to 5.5 cm. in diameter. Seed (immature?) obovate-elliptic, compressed, 7 mm. long, 3.5 mm. broad.

Type in the U. S. National Herbarium, no. 703743, collected in Santa Marta, Colombia, 1898–9, by H. H. Smith (no. 16).

This differs obviously from the other Pterocarpus species known from the same region in the shape of the leaflets and the size of the flowers. The staminal tube is often split into two parts as the ovary grows, the stamens thus becoming apparently isadelphous. The type specimen shows a wide variation in the size of the leaflets, but it is likely that taken all together and full grown on a whole tree, they would show more or less decidedly the larger dimensions indicated above.

AN OLD AND A NEW SPECIES OF PLATYMISCIUM.

Platymiscium polystachyum Benth. in Seem. Bot. Voy. Herald 111. *pl. 21.* 1853.

A middle-sized or large tree, forking low, with a rounded crown. Bark of the trunk grayish and rough, that of the branchlets brownish gray, densely dotted with minute lenticels.

Leaves opposite or ternate, imparipinnate, 3 or 5-foliolate, glabrous; leaflets opposite, short-petiolulate, coriaceous. Leaflet blades ovate, rounded at the base, 5 to 22 cm. long, 2 to 10 cm. broad, more or less abruptly narrowed at the apex into an obtuse acumen, finely reticulate, light green and shining above, paler beneath; costa and primary veins prominent beneath. Stipules orbicular-obtuse, caducous.

Racemes simple, 7.5 to 10 cm. long, glabrous, geminate or rarely solitary in the defoliate axils of last year's growth, appearing before the new leaves; rachis (peduncle included) 15 to 20 cm. long. Flowers numerous, 13 to 14

mm. long. Pedicels filiform, 5 to 10 mm. long, provided at the base with small, rounded, caducous bractlets. Calyx campanulate, 6 to 7 mm. long, bearing at the base 2 ovate bractlets about 1 mm. long; teeth subequal, irregular, minutely ciliate. Petals yellow; standard ovate-orbicular, attenuate into a slender claw, about 13 mm. long and 11 mm. broad; wings narrowly unguiculate, auriculate, ovate-elliptic, rounded at tip, 12 to 13 mm. long, 4 to 6 mm. broad; carinal petals cohering at the apex and nearly of the same size and shape as the wings. Stamens about 10 mm. long, the vexillar one free almost to the base; anthers ovate, apiculate. Ovary long-stipitate, 1-ovulate, glabrous; style slender, incurved.

Legumes few or single on each rachis of the inflorescence, elliptic, rounded at both ends, 9 cm. long, exclusive of a stipe 1 cm. long, 3.5 broad; pedicel 6 mm. long. Mature seed not seen.

Type in the Kew Herbarium.

The following specimens are of this species:

PANAMA: David, Chiriquí, a fine tree, producing a beautiful wood (Seemann). Hospital grounds at Ancón, Canal Zone, flowers, February, 1912, *Pittier* 5724. Río Congo, southern Darién, fruit, June, 1914, *Pittier* 6988.

COSTA RICA: Currés, on the banks of the Diquís River, near Boruca, Province of Puntarenas, alt. about 100 meters, a small tree, the trunk 15 to 20 cm. in diameter, in flower, March 4, 1898, *Pittier* (Inst. Fís. Geogr. Costa Rica, no. 11954).

Reported also from Colombia and Venezuela.

Bentham gave only a short diagnosis of this species, this accompanied with a plate, which is excellent in every detail but for the lack of fully developed leaflets. The present description is founded mostly on my specimens from Panama, in small part on the Costa Rican ones, which were first identified by Captain John Donnell Smith. There are small discrepancies between Bentham's drawing and my specimens; in the latter, for instance, the pedicels are mostly slender and much longer than the calyx, and the standard is slightly emarginate. The Costa Rican specimens were from a small tree and have no mature leaves.

Platymiscium dubium Pittier, sp. nov.

A middle-sized tree, forking low, with rounded, depressed, or elongate crown. Bark grayish, finely lenticellate on young twigs.

Leaves opposite, 5 or 7-foliolate, imparipinnate, entirely glabrous; rachis terete, 8 to 10 cm. long. Leaflets coriaceous, glabrous, opposite or nearly so, light green above, paler beneath; petiolules thick, slightly canaliculate, 4 to 6 mm. long; blades ovate to elliptic-lanceolate, broader and rounded at the base, acuminate at the apex, the lateral ones 5 to 9 cm. long, 2 to 4 cm. broad, the terminal one usually a little larger (9 to 11 cm. long, 4 to 5 cm. broad). Stipules semiorbicular, thick, caducous.

Racemes simple, short (3 to 7 cm. long), axillary. Flowers not known.

Pod thin, coriaceous, elliptic, rounded at both ends, 6 to 8 cm. long, 2 to 2.5 cm. broad, glabrous, the stipe about 7 mm. long, the pedicel not over 5 mm. long. Seed elongate, subreniform, flat, 7 mm. long, 3 mm. broad.

Type in the U. S. National Herbarium, no. 679925, collected near Chepo, Panama, at about 60 meters above sea level, in fruit, October, 1911, by H. Pittier (no. 4762).

Although it goes under the same common name of "quira," of Indian origin, this species can not be confused with *Platymiscium polystachyum* Benth., from which it differs obviously in habit as well as in the number, size, and texture of

the leaflets and the size and shape of the legume. On the other hand, the specimens, though incomplete, seem not to agree with any other species in the genus, so that even in the absence of the flowers it seems safe to regard them as representing a hitherto undescribed species.

A NEW VENEZUELAN SPECIES OF CLITORIA.

Clitoria dendrina Pittier, sp. nov. FIGURE 62.

A small tree, 4 to 5 meters high, the limbs ascending, the branchlets slightly pubescent or glabrate.

Leaves 3-foliolate, the rachis subangular, more or less tomentose-pubescent, 9.5 to 18 cm. long, the petiolar part about 6 times as long as the interfoliolar part. Leaflets thick, the petiolules terete, tomentose-pubescent, 7 to 9 mm. long, the blades broadly ovate or rhomboid-ovate, rounded or subcuneate at the base, obtuse or subacute at the apex, 8 to 12 cm. long, 8 to 10 cm. broad, puberulous above, the costa and veins more or less impressed, beneath paler, tomentose-pubescent, the costa, veins, and transverse veinlets brownish and strongly prominent. Stipules and stipels caducous, not seen.

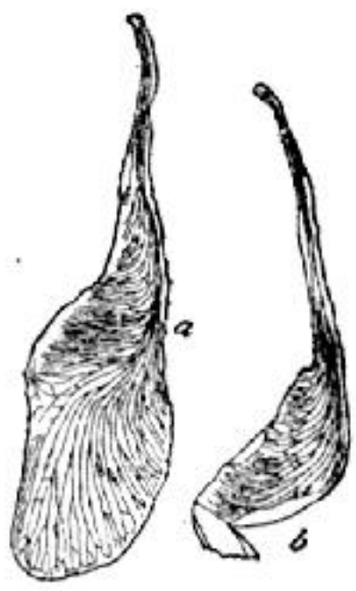

FIG. 62. — Petals of *Clitoria dendrina*. *a*, Wing; *b*, carinal petal. Natural size. From type specimen.

Inflorescence terminal, short-branched, many-flowered, the rachis about 4 cm. long, grayish-hairy; floral pedicels 5 to 7 mm. long, pubescent, the basal bractlets oblong-lanceolate, hairy, 1 to 2 mm. long. Flowers about 4.5 cm. long. Calycinal bractlets ovate, acute, about 3 mm. long and 2 mm. broad, pubescent. Calyx tubular, 12 to 14 mm. long, pubescent without, the teeth short (about 4 mm. long), ovate-acute. Petals dark purple, pubescent without, persistent; standard obovate, attenuate to the base, emarginate at the apex, about 3.5 cm. long, 3 cm. broad; wings long-unguiculate, the claw about 9 mm. long, the blade oblique-obovate, obtuse at the apex, 19 to 20 mm. long; carinal petals coherent at the apex, the claw slender, about 15.5 mm. long, the blade falcate, 9.5 mm. long, 4.5 mm. broad. Staminal tube 18 mm. long, straight, the free part of the filaments 1 to 3 mm. long, abruptly bent; anthers ovoid; vexillar stamens free at the base. Ovary substipitate or sessile, about 14 mm. long, tomentose, about 12-ovulate; style long, recurved, hispidulous almost to the capitellate stigma.

Legume pedicellate, stipitate, glabrous; pedicels thick, about 1 cm. long, glabrescent; stipe 2.5 to 3 cm. long, 3 mm. thick, pubescent, geniculate at the apex; legume proper linear-elongate, flat, attenuate at the base, apiculate at the apex, 18 to 25 cm. long, about 1.5 cm. broad, dark brown without, whitish within, the sutures slightly thickened. Seeds lenticular, brown, about 7 mm. in diameter, inserted on a broad, triangular placental expansion.

Type in the U. S. National Herbarium, no. 601479, collected along Río Limón, near Maracay, State of Aragua, Venezuela, at an altitude of 440 meters, in flower and fruit, January 27, 1913, by H. Pittier (no. 5773).

This species, which is a real tree, growing quite independently of the surrounding vegetation, belongs in the section Clitorianthes Benth., in the subdivision characterized by having the floral bractlets much shorter than the calyx. The only other species of this group reported so far from Venezuela is *C. javitensis* (H. B. K.) Benth., in which the stems are also thick and woody but climbing or trailing, the bractlets lanceolate, not ovate, and the leaflets glabrous or glabrescent, ovate or elliptic, and acuminate.

EUPHORBIACEAE.

OLD AND NEW SPECIES OF SAPIUM.

Sapium caudatum Pittier, sp. nov.

A medium-sized deciduous tree, about 15 meters high, the trunk 35 cm. in diameter at base. Ramification radio-fasciculate. Bark gray, with longitudinal fissures. New growth, leaves, and inflorescences entirely glabrous. Young foliiferous and floriferous shoots green, subangulate.

Leaves 3 to a cycle, erect; petioles 2 to 4.5 cm. long, rounded below, obscurely sulcate above; glands close to the lamina, short, conical, almost contiguous; blades 9 to 16 cm. long, 2.3 to 4 cm. broad, lanceolate, more or less rounded at the base, narrowing at the upper end into a long, slender, incurved tip; margin distinctly serrate, subrevolute, bearing many hydathodal teeth; venation forming a pale yellow net on the upper face of the leaf; costa prominent beneath; primary veins 8 to 10 mm. apart, arcuate. Stipules very small, obtuse, scaly.

Spikes often over 30 cm. long, solitary, tapering to an extended, slender, sterile cauda. Floral glands paired, not contiguous, ovate, purple. Female flowers 8 to 14; involucral bracts 3, broadly triangular or narrow, scarious, with smooth margin; perianth not apparent; ovary sessile, globose, obscurely sulcate; stigma sessile, its 3 reflexed branches early caducous. Male flowers in clusters of 5 to 14; bract triangular, much broader than long, more or less obtuse at tip, and with a scarious margin; bracteoles thin, irregular, or often undeveloped; perianth globose-campanulate, pink, about 1.7 mm. long, bilobulate, one of the lobules denticulate, covering the end of the other one between the stamens; stamens connate at the base and then diverging; filaments 2 to 2.5 mm. long, green, rather thick; anthers 2-celled, globose, purple.

Capsules 3 to 6 on each spike, small, depressed-globose, sessile, smooth, the divisions of the carpels well marked and their dorsal sutures obsolete. Seeds small (about 5 mm. long and broad), flattened, orbicular and almost heart-shaped, slightly tuberculate, the median line marked by a very thin raphe.

Type in the U. S. National Herbarium, nos. 678781 (flowers), 679149 (fruit), and 676760 (autumnal leaves), collected on a hill near Gamboa, Canal Zone, Panama, from a single tree, in flower, June 25, 1911, in fruit, July 23, 1911, by H. Pittier (nos. 3713, 4058, and 2603).

This species, which belongs to the group Cucullata of the section Americana Pax & Hoffm., was described from living specimens, the details being checked up later on material preserved in alcohol and on herbarium specimens. At my first acquaintance with the tree it was fast losing its leaves, previous to spring budding. In the specimen then collected (no. 2603, February 1, 1911), the leaves are coriaceous, olive-green above, whitish and scaly beneath; the petioles are very long and the blades large. Every tooth of the leaves which accompany the flowers ends in an easily caducous, conical, nectariferous gland, which does not seem to be the object of any special attention on the part of ants or other insects.

The examination of many sections of the cucullate appendage at the tip of the leaf showed a thickening of the epidermis on the upper side, but failed to indicate the presence of any glandular tissue; so that the term "apical gland," often used in the description of species of this genus, may after all be a misnomer. These appendages may serve other purposes than the feeding or sheltering of insects, and are met with in other plants distant generically, as for instance, in the banana (*Musa sapientum*), in which they appear in the young leaves but disappear as soon as the blade begins to unroll.

My frequent visits to the Gamboa Sapium tree allowed me to observe again the presence, already noticed in Costa Rica on *S. thelocarpum*, of large drops of water hanging in the early morning, even when there was no trace of dew, along the margins of the leaves. These leaves have evidently an unusual secretional power, which I have been led to locate in the larger, rounded teeth which appear at irregular intervals on their margin in several, if not all, species of the genus, and which seem to be real hydathodes, with an apical pore, the opening of the aquiferous duct, often so large as to be distinguished by the naked eye.

The extreme length of the floral spikes is one of the striking characters of *S. caudatum*. The basal flowers are often abortive, totally or in part, and the end of the rachis is long and slender, showing only imperfect clusters of male flowers. In the living specimens as well as in the dried ones, I have been unable to find any trace of a perianth on the female flowers. In the male flowers it was noticed that the stamens develop one at a time and that anthesis starts either at the base or in the middle of the cluster.

This species has its affinities with the group of *S. oligoneurum*, characterized by sessile capsules, coriaceous leaves, and long, slender spikes. It differs from the other species of the group by its lanceolate leaves, its very long spikes, the absence of perianth in the female flowers, and the larger number of male flowers in each cluster.

Sapium giganteum Pittier, sp. nov.

A large tree, about 30 meters high, the trunk 1 meter in diameter at base. Trunk straight, 8 meters high, the limbs divaricate, twisted, forming a rather flat, spreading crown. Bark grayish and rimose.

Leaves coriaceous, glabrous; petioles 1.4 to 2 cm. long, terete, shallow-sulcate, the glands rounded-conical, contiguous to the base of the blade and hardly diverging; blades 5 to 12 cm. long, 2.5 to 3.5 cm. broad, elliptic, rounded-cuneate at the base, narrowing at the apex to a slender, incurved appendage; costa prominent beneath, the primary veins 4 to 7 mm. apart, salient on both faces, straight at the base and then abruptly arcuate; margin sinuate-dentate or, close to the apex, serrate. Stipules not known.

Inflorescence not known.

Fructiferous spikes bearing 4 to 8 capsules, these sessile, depressed-globose, about 10 mm. long by 15 mm. in diameter, the divisions of the carpels and their dorsal sutures equally well marked by longitudinal furrows. Seeds surrounded by a red pseudo-aril, whitish, suborbicular and depressed, paucituberculate, apiculate, about 5 mm. long by 5.8 mm. broad.

Type in the U. S. National Herbarium, no. 679239, collected near Fató, Province of Colón, Panama, at sea level, in fruit, August 10, 1911, by H. Pittier (no. 4141).

Closely allied to *S. caudatum*, with which it could be identified but for the large size of the tree, its smaller, thicker leaves, with different margins, the primary veins more inflexed, the apical appendages longer and more slender, and the different size and shape of the capsules and seeds.

Sapium giganteum is one of the largest and most conspicuous trees in the forests around Fató, or Nombre de Dios, on the San Blas Coast of Panama.

Sapium aucuparium moritzianum (Klotzsch) Pittier.

Sapium moritzianum Klotzsch in Seem. Bot. Voy. Herald 100. 1853.

A tree, 5 to 10 meters high, with a more or less rounded-depressed crown and spreading branches. Floriferous branchlets erect. Bark rugose, gray.

Leaves coriaceous and stiff, olive-green above, darker beneath; petioles 5 to 15 mm. long, rounded on the back, flattened and broadly shallow-sulcate above; petiolar glands conical, erect (i.e., not divergent) and wide apart;

blades lanceolate or obovate-lanceolate, 6 to 13 cm. long, 1.3 to 2.5 cm. broad, rounded or broadly cuneate at the base, more or less obtuse or acute at the apex, with an incurved tip; margin finely and distinctly serrulate, each tooth bearing a dark, caducous nectarial gland; marginal hydathodes more or less numerous, in the shape of broad, rounded teeth; costa impressed above, salient beneath, as also the numerous slender, arcuate primary veins. Stipules ovate-reniform, fimbriate on the margin.

Spikes about 10 cm. long, solitary, terminal, androgynous or rarely only male; floral glands oblong; bracts broadly ovate-obtuse, fringed on the margin; bracteoles reduced to hairlike appendages. Female flowers 6 to 8, distant; perianth bilobulate; ovary globose; stigmas 3, sessile. Clusters of male flowers close together, 7 to 12-flowered; perianth yellowish, 2-cleft; stamens 2.

Capsules 3 to 6 on each spike, sessile, ovoid to depressed-globose, 10 mm. long, 13 mm. in diameter, the sutural furrows distinct, the septal ones obsolete. Seeds lenticular, apiculate, smooth, about 6 mm. long and broad.

The following specimens are of this subspecies:

PANAMA: Southern parts of the Province of Panama, *Seemann* 1243. Peña Prieta near Panama City, close to the sea beach, fruit, July 29, 1911, *Pittier* 4070. Sabana de Dormisolo near Chepo, Province of Panama, leaves only, October, 1911, *Pittier* 4659. Around Aguadulce, Province of Coclé, near sea level, leaves only, December, 1911, *Pittier* 4951.

This form has already been considered by both Dr. Huber and Dr. Pax as being possibly a mere variety of *S. aucuparium* Jacq., with which its affinities are indeed so very close that our specimens seem to be nearer Jacquin's original type than is *H. H. Smith* 1916, cited by Pax under *S. aucuparium*. From this they differ in having the leaves distinctly alternate and longer, narrower, and more acute at the tip, the petioles shorter, the blades thicker, and the margin conspicuously serrate. In the Aguadulce specimens, however, the leaves are obtuse at the base, while in those from Panama and Chepo they are acute. This latter character is the only one given by Dr. Pax to distinguish *S. moritzianum* from *S. aucuparium*, and the fact of its not being constant should decide the fate of the species. The capsules of the Peña Prieta tree seem to be larger and more depressed than in *S. aucuparium;* they are described, however, from specimens preserved in alcohol, and this may account for discrepancies. The detailed study of the flowers may yet bring to light really good distinctive characters, but, as the matter now stands, it must be confessed that there would be little reason to maintain *S. moritzianum* as a distinct species.

SAPINDACEAE.

A NEW SPECIES OF TALISIA FROM PANAMA.

Talisia panamensis Pittier, sp. nov.

A shrub, 1 to 3 meters high, the stem erect, unbranched.

Leaves glabrous, bunched at the ends of the stems, at first drooping and intensely pinkish, later spreading or ascending and green, the rachis subterete, 29 to 33 cm. long. Leaflets 5 or 7, coriaceous, subopposite or alternate, the petiolules more or less thickened, canaliculate, 0.5 to 1.5 cm. long, the blades oblong, cuneate at the base, abruptly acuminate at the apex, 12 to 21 cm. long, 4.5 to 6 cm. broad, dark green and lustrous above, the costa and veins impressed, beneath paler, conspicuously reticulate, the costa and veins very prominent.

Inflorescence cauline, racemose, loose, subpendulous, usually 3-fasciculate, the rachis angular, pubescent, 4 to 10 cm. long, sometimes branched at the base. Flowers 2 to 6 together on a short common peduncle, white, the pedicels about 1 mm. long. Calyx tubular, 4 to 5 mm. long, densely minute-pubescent without, 5-toothed. Petals 5, linear-cuneiform, obtuse, about 6 mm. long, glabrous, reflexed, bearing inside a hairy, bifid, erect, slightly longer appendage inserted above the claw. Disk cupulate, 1.5 mm. high, hairy. Stamens 8, glabrous, the filaments 4 mm. long, erect, the anthers introrse. Ovary 3-celled; stigma 3-lobulate, hairy, sessile.

Fruit not known.

Type in the U. S. National Herbarium, no. 716600, collected in the forests around Pinogana, southern Darién, Panama, in blossom, April 16, 1914, by H. Pittier (no. 6534).

This species belongs to the section Eutalisia, subsection Acladodia Radlk., characterized by having the petals markedly longer than the sepals, and the disk high and formed of 5 thick, connate scales, and by the large leaves. It seems to be closely related to *T. stricta* Triana & Planch., from which it differs by the glabrous leaves, petals, and stamens. *Talisia panamensis* grows scattered on small, lightly wooded hills in the forests of Darién, where it is easily detected on account of the peculiar appearance of its young leaves. It is the second representative of the genus reported from Panama, the first one, *T. nervosa* Radlk., having also been discovered by me, in 1911, on the Atlantic seaboard.

LECYTHIDACEAE.

A NEW SPECIES OF MONKEY-POT FROM COLOMBIA.

Lecythis curranii Pittier, sp. nov.

A tree, 30 meters high, the trunk 90 cm. in diameter at the base.

Leaves not known.

Inflorescence not known. Flowers pedicellate, about 4 cm. in diameter; pedicels 9 to 10 mm. long, thick, tomentellous. Calyx tomentellous, the sepals narrow-triangular, acute, 6 to 7 mm. long, entire. Petals 6, ovate or obovate, conchoid, rounded at the apex, 2 to 2.5 cm. long, 0.8 to 1.5 cm. broad, glabrous. Androphore ring about 1.5 cm. in diameter, the ligule 1.5 cm. long and broad, the galea ovate, broader than long. Filaments clavate; anthers ovate-globose. Ovary 4-celled, slightly convex above, the stigma almost sessile in the center.

Pyxidium ovoid, dark brown and smooth without, 17 cm. high (including operculum), the walls about 2.5 cm. thick, woody, the basal part 11.5 cm. high; calycary zone not very prominent, 6-lobed, 12.5 cm. in diameter; interzonal band 3.5 cm. high, 8 cm. in diameter at the apex on the margin of the operculum; operculum convex, slightly depressed at the center, 2 cm. thick. Seeds not known.

Type in the U. S. National Herbarium, no. 537552, collected on the trail from Norosí to Tiquisio, Department of Bolivar, Colombia, in flower and fruit, April–May, 1916, by H. M. Curran.

Miers reported and described from Colombia the following species:

Lecythis ampullaria Miers.
Lecythis bogotensis Miers.
Lecythis ampla Miers.
Lecythis elliptica H. B. K.
Lecythis dubia H. B. K.
Lecythis minor Jacq.

The first three we know only by their fruits, the descriptions of which do not agree with the above specimens; one of these species, *L. ampla*, has been found again by me in the forests of the San Blas Coast of Panama. Of the three latter species, which have small fruits, one, *L. elliptica*, is relatively well known and has been collected in recent years by H. H. Smith, H. M. Curran,

and myself, and the two remaining are evidently distinct from the large-fruited species here described.

A comparison with the species of the neighboring countries gave likewise negative results, so that the species may safely be considered new to science, and be named after Mr. Curran, its discoverer.

THEOPHRASTACEAE.

NEW SPECIES OF JACQUINIA AND CLAVIJA.

Jacquinia nemophila Pittier, sp. nov.

A shrub or small tree, about 3 meters high, sparsely branched, the branchlets more or less geniculate, the bark brownish or yellowish, glabrous and smooth.

Leaves opposite, sparse, glabrous; petioles canaliculate, 3 to 4 mm. long, dark-colored; blades oblong-elliptic, cuneately long-attenuate at the base, obtuse or subacute at the apex, 9 to 16 cm. long, 3 to 4.5 cm. broad, dark green above, the costa impressed, the venation prominulous (in the dry plant) and loosely reticulate, beneath paler, the costa prominent and the venation inconspicuous.

Inflorescence racemose, axillary or terminal, 2 to 5-flowered, 2 to 3 cm. long, the peduncle 3 to 5 mm. long, the pedicels minutely pubescent, 6 to 8 mm. long. Flowers subnutant. Sepals imbricate, suborbicular, about 4.5 mm. long and 5 mm. broad, sparsely ciliate. Corolla yellow, glabrous, the tube about 6 mm. long, the lobes suborbicular, about 6 mm. long and 8 mm. broad, reflexed. Staminodes squamiform, 3 to 3.5 mm. long, 4 to 4.5 mm. broad, rounded, obtuse, irregularly sinuate on the margin. Stamens 4.5 to 5 mm. long, the anthers obovate, obtuse, apiculate, the cells acute and divaricate at the base. Ovary ovoid, glabrous, about 3 mm. long; style glabrous, about 1.3 mm. long, ending in a subcapitellate stigma.

Fruit globose, golden yellow, about 3 cm. in diameter; seeds ovoid or oblong, flattened, brownish, 11 to 13 mm. long, 9 to 10 mm. broad, 3 to 4 mm. thick.

Type in the U. S. National Herbarium, no. 679486, collected in the humid forests of the littoral plain of Sperdí, near Puerto Obaldía, San Blas Coast, Panama, in flower and fruit, September 3, 1911, by H. Pittier (no. 4342).

This species is quite distinct from *Jacquinia macrocarpa*, described by Cavanilles from the semiarid district of the Pacific coast of Panama. Its leaves are sparse, opposite, and not mucronate-spinescent; the flowers are large and rather pale yellow, etc. The two species have in common the relatively large fruits, in which the seeds are surrounded by a sweet pulp, formed by the dissepiments of the placentas. The habit of *J. nemophila* is striking for the genus on account of the long, sparse, and bare ramification, with geniculate, semipendent branchlets. Another peculiarity of this species is the fact that it is found in the rain forests of eastern Panama, while most of the species hitherto known are characteristic of arid or semiarid districts of tropical America.

In the key given by Mez in his elaboration of the Theophrastaceae[1] *J. nemophila* would come in group A, near *J. keyensis* and *J. revoluta*, but it differs from both in habit and in the shape of the anthers, corolla lobes, and staminodes; from *J. keyensis* it is distinguished also by its large fruit, and from *J. revoluta* by its large, yellow flowers.

Clavija costaricana Pittier, sp. nov.

A shrub, 1 to 2 meters high, entirely glabrous.

Leaves large, coriaceous; petioles 2 to 4 cm. long, rather slender, subangular, blackish on the lower half (in the dry plant); blades obovate-elliptic, cuneately long-attenuate and subdecurrent at the base, more or less attenuate-acutate at the apex, 30 to 50 cm. long, 10 to 15 cm. broad, light green above, paler be-

[1] In Engl. Pflanzenreich IV. 236a: 29. 1903.

neath, the margin slightly revolute, entire; costa and venation prominulous above; costa and primary veins prominent beneath, the reticulation prominulous. Stipules linear, about 1 cm. long, turning black in drying.

Inflorescences (male) axillary, short (1 to 2 cm. long), the rachis glabrous. Bractlets inserted at the base of the pedicels, very small, triangular-acute, pilose-ciliate. Pedicels glabrous, 2 to 3 mm. long. Flowers tetramerous, orange-yellow. Calyx lobes membranous, ovate, obtuse, about 3 mm. long, minutely puberulous without. Corolla about 7 mm. long, the tube 2 mm. long, the lobes broadly ovate, rounded at the apex. Staminodes distinct, ovate, fleshy, hardly longer than the corolla tube, the margin entire. Stamens 4, erect, free, the filaments very short, with a trigonous section. Style (in male flowers) rudimentary, plumose-hairy (?). Other details not known.

Type in the U. S. National Herbarium, no. 474411, collected in forests around Río Hondo, plains of Santa Clara, Costa Rica, at an altitude of about 100 meters, male flowers only, May 5, 1903, by O. F. Cook and C. B. Doyle (no. 551).

The only specimen at hand is not in very good condition, but is sufficient to show a marked difference from the three other species reported so far from Central America. From *C. biborrana* Örst. and *C. mezii* Pittier it departs in its much larger leaves, and from *C. lehmannii* Mez in the slender petioles and the larger, orange-yellow flowers. Some of the petioles are covered with large, cruciform glands, which would constitute an excellent distinctive character but that their presence on this specimen may be a mere accident.

Clavija costaricana grows in the rain forests of the Atlantic seaboard; the other Costa Rican species is from the less humid forests of Jaris and Monte Aguacate, on the Pacific slope.

Clavija mezii Pittier, sp. nov.

A small, unramified shrub, 1 to 2 meters high. Younger parts of the stem thick, glabrous.

Leaves coriaceous, pale green, glabrous; petioles stout, 2.5 to 4 cm. long, angular, flattened on the upper side, thicker at the base; blades obovate-oblong, long-attenuate at the base, rounded and abruptly short-acuminate at the apex, 30 to 55 cm. long, 5 to 15 cm. broad, densely prominulous-reticulate; costa more or less flattened above, prominent on the lower face; primary veins prominulous, distinctly anastomosed along the thin, entire margin.

Male inflorescences loose, subnutant, 20 to 25-flowered, the rachis minutely pubescent, 10 to 12 cm. long; pedicels clavate, 2.5 to 3 mm. long, minutely puberulous, provided a little above the base with a very small, ovate-acuminate bractlet. Flowers small (not over 10 mm. in diameter), tetramerous, orange-red. Sepals suborbicular, about 2 mm. long and broad, glabrous, sinuate-fimbriate. Petals suborbicular or broadly ovate, conchoid, about 4 mm. long and broad, entire, connate at the base in a very short tube. Staminodes 4, glandlike, distinct, ovoid, alternating with the petals. Staminal tube slender, thickening toward the base, about 2 mm. long; anthers 8, connate in an obconical disk, this flat and 8-dentate on the upper face. Pistil rudimentary, lageniform. Female flowers not seen.

Fruit not known.

Type in the U. S. National Herbarium, no. 679440, collected in the hilly rain forest back of Puerto Obaldía, San Blas Coast, Panama, male flowers, August 30, 1911, by H. Pittier (no. 4313). Sterile specimens are mounted on sheet no. 679441.

The nearest affinities of this new species seem to be with *Clavija engelsii* Mez and *C. rodekiana* Mez. From the first it differs in having the flowers apparently all tetramerous and in the long petioles; from the latter in the smaller flowers and leaves, and the pubescent inflorescences.