

exactly reversed. It may be said here, anticipating another publication, that the pyroxene in the great majority of Mexican and Central American jades shows a great preponderance of jadeite over diopside. The pyroxene always contains considerable diopside, but only two cases are known in which the diopside and jadeite are present in about equal amount (one being the Tuxtla statuette), while the pyroxene in the Copan pebble is the only one known so far in which diopside dominates greatly over jadeite. This difference is so marked that it gives rise to the thought that, possibly, the Copan jade belongs to a petrographical series of jades which is distinct from the others, and thus possibly comes from a different locality.

BOTANY.—*Two new species of letterwood* (Piratinera). S. F. BLAKE, Bureau of Plant Industry.¹

The letterwood, snakewood, bois des lettres, or letterhout² of commerce is the heartwood of the species of the Moraceous genus *Piratinera* Aubl., all of which are native in the Guianas, the Amazon region of Brazil, and Panama. Aublet, describing the original species, *Piratinera guianensis*, says³ that it is called "bois des lettres" by the Creoles of French Guiana, and "boutous" by the Galibis, who used the inner wood in making bows and clubs. Canes and pestles were also made from it. A variety with white heartwood, called "bois des lettres blanc," and supposed by Aublet to be only a young state of the same species, was used by the negroes in the manufacture of walking sticks. For this purpose the straightest branches were selected and the bark removed. They were then stained a permanent black with a dye made by mixing soot with the sap of a species of *Inga* known as "bourgoni" (*Mimosa bourgoni* Aubl., now known as *Inga bourgoni* (Aubl.) DC.), and when polished had the appearance of ebony.

Letterwood has been an article of commerce from the earliest settlement of British Guiana. The timber was originally procured from fallen trunks from which the sapwood had long since rotted away. Although such material is still occasionally dug up from the forest floor, the prevailing practice is to fell the timber and split and hew

¹ Received September 26, 1922.

² It should be noted that the name "letterhout" is not restricted to species of *Piratinera*, but is used also, as proved by other material received from Professor Record, for *Helicostylis tomentosa* (Poepp. & Endl.) Rusby and a species of *Sahagunia* (?), and the same is true of many others of the vernacular names recorded in this paper.

³ Pl. Guian. 2: 890. 1775.

off the sapwood in the forest, sending to market the heart portions which are 3 to 8 inches in diameter and 7 or 8 feet long. Its principal use in this country is for the manufacture of walking sticks and umbrella handles. Minor uses include drum sticks, butts of fishing rods, violin and archery bows, and miscellaneous fancy articles. It is also employed to a limited extent in cabinet work, but only in the form of sawn veneers. The native Indians have long used it for making their bows and various other articles requiring great strength and elasticity.⁴

The letterwood trees inhabit the lowlands and not infrequently attain a diameter of two and rarely of three feet. The trunks are long and slender, covered with a smooth bark rich in milky latex, and have a very thick layer of light-colored sapwood surrounding a small, often irregular core of red or reddish-brown heartwood that is as heavy as *lignum-vitae*. Commercial wood is spotted all over with peculiar black markings which bear some semblance to hieroglyphics and often give to the surface the appearance of snake skin. Not all of the heartwood is figured in this way, and the native cutters cannot tell until they have cut through the sapwood whether the heart will be speckled or only striped with black. It has been supposed that the speckled wood was indicative of a certain species, but studies of sections of tree trunks which accompanied the herbarium material described in this paper prove that this feature is not a specific character.

Prof. Samuel J. Record, of the School of Forestry of Yale University, who is making a thorough investigation of many tropical American woods, has recently sent me for study a considerable number of specimens of *Moraceae* which he secured from British and Dutch Guiana, including no less than 12 sheets of *Piratinera*, as well as some detached leaves representing other collections. Full credit for the collection of these important specimens should be given to Mr. J. W. Gonggrijp, Conservator of Forests of Surinam, Mr. L. S. Hohenkerk, Forest Officer of British Guiana, and Mr. C. W. Anderson, formerly Forest Officer, whose efforts have provided material for the settlement of one of the many problems connected with the identification of tropical American trees of commercial importance. As preliminary examination of this material showed that it represented three species with distinctive foliar characters, leaves of all three

⁴ This paragraph and the following one have been contributed by Professor S. J. Record.

were sent to Dr. A. B. Rendle of the British Museum, who has kindly compared them with Aublet's type of *P. guianensis* and thus established the identity of that species.

It has been customary to refer the name *Piratinera* Aubl. (1775) to *Brosimum* Sw. (1788), and the latter name was made a *nomen conservandum* by the International Botanical Congress at Vienna in 1905. A few years ago, however, Mr. Henry Pittier⁵ brought forward evidence to show that the genera were distinct, being separable by the number of pistillate flowers (1 in *Brosimum*, 2 or more in *Piratinera*), and the presence of a perianth in the staminate flowers of *Piratinera*, as well as by differences in the shape of the receptacle. The last feature seems to be of minor significance, but the floral characters brought forward by Pittier are sufficient to justify the separation of the two genera. Another point of interest in the separation of the two genera is brought out in Professor Record's study of the wood of various species. He finds that the heartwood of *Piratinera* is never white, while that of *Brosimum* is always white, except in *B. paraense*, a species of somewhat doubtful generic position.

Five species of *Piratinera* were listed by Pittier,—*P. guianensis* Aubl., *P. discolor* (Schott) Pittier, *P. rubescens* (Taub.) Pittier, *P. acutifolia* (Huber) Pittier, and *P. panamensis* Pittier,—of which only the last two have hitherto been represented in the National Herbarium. In the light of the material now at hand, the separation of the first two species seems to be unjustified. *Brosimum discolor* Schott, briefly described⁶ in 1827, was fully described in 1853 by Miquel,⁷ who had examined an authentic specimen. Miquel described the under surface of the leaves as glaucescent and subsericeous-pubescent with short, appressed hairs. This is the diagnostic feature of the species, well represented in Prof. Record's material, which has been identified by Dr. Rendle with the type of *P. guianensis* Aubl., and as no distinguishing characters are apparent in Miquel's long description, it is evident that *P. discolor* (Schott) Pittier should be referred to the synonymy of *P. guianensis* Aubl.

With this reduction, and the addition of the two new species represented in the material sent by Prof. Record, the known species of *Piratinera* are increased to 6. All except *P. rubescens* are now rep-

⁵ Contr. U. S. Nat. Herb. 20: 96-100. 1918.

⁶ In Spreng. Syst. Veg. 4: 403. 1827.

⁷ In Mart. Fl. Bras. 4: 110. 1853.

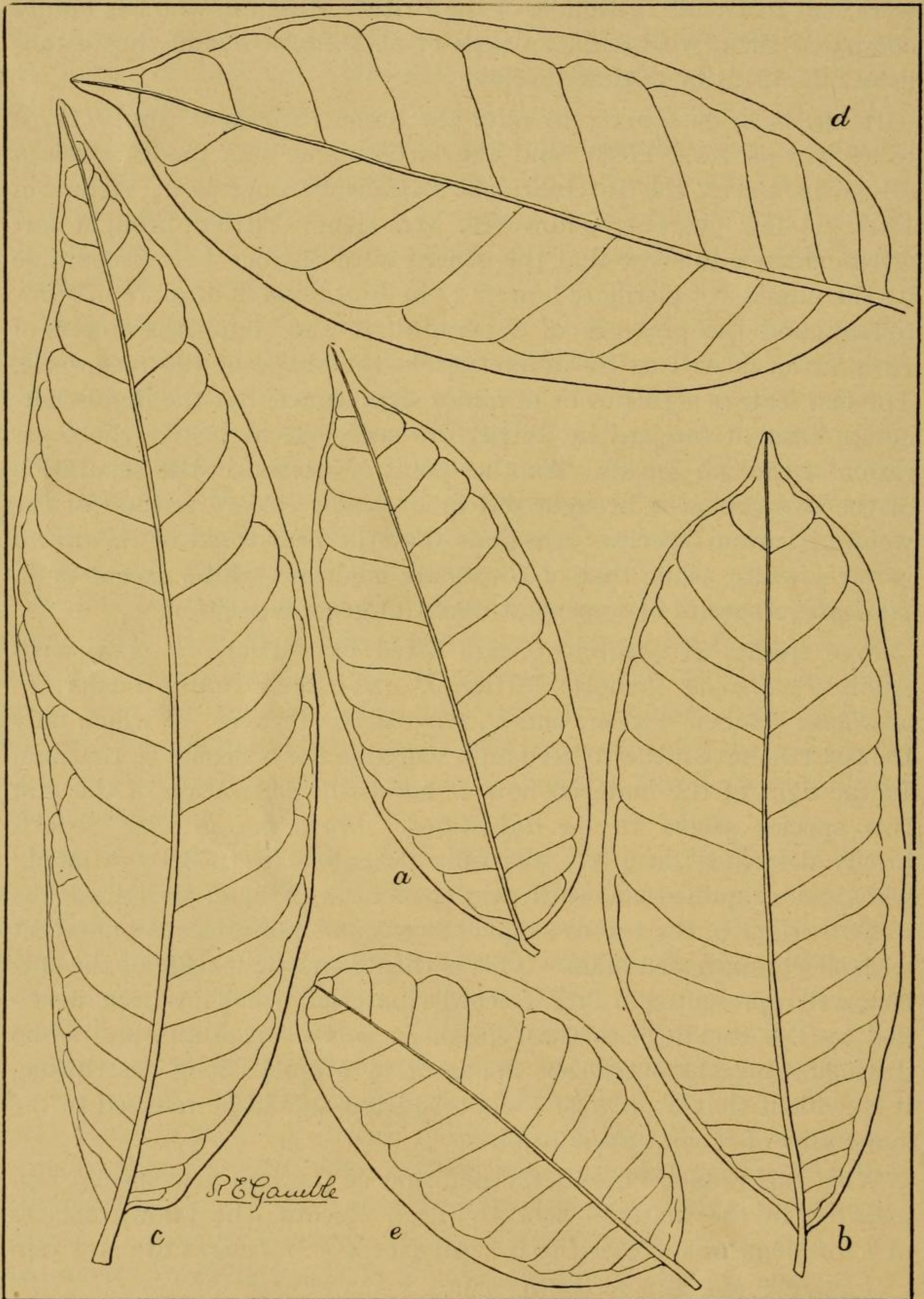


Fig. 1. Leaves of *Piratinera*, natural size.—*a*, *P. guianensis* Aubl. (Anderson 598A); *b*, *P. panamensis* Pittier (type collection); *c*, *P. acutifolia* (Huber) Pittier (Ducke 12155); *d*, *P. velutina* Blake (type); *e*, *P. scabridula* Blake (type).

resented in the National Herbarium. The following key based chiefly on the leaves will serve to separate the species.

Leaves finely appressed-puberulous beneath.

Leaves rather densely appressed-puberulous beneath; peduncles solitary, erect.

Petioles 2 to 5 mm. long; peduncles (in flower and fruit) 3 to 8 mm. long; receptacle in flower 3.5 to 7 mm. wide.

1. *P. guianensis*.

Petioles 5 to 7 mm. long; peduncles (in flower and fruit) 10 to 15 mm. long; receptacle in flower 1 cm. wide or more.

2. *P. panamensis*.

Leaves very sparsely appressed-puberulous beneath chiefly along the costa; peduncles usually paired, refracted.

3. *P. rubescens*.

Leaves densely puberulous to pilosulous beneath with spreading or incurved but not appressed hairs.

Leaves gradually long-acuminate, puberulous beneath with incurved hairs; chief lateral veins 14 to 22 pairs.

4. *P. acutifolia*.

Leaves emarginate or rounded to abruptly short-acuminate, hispidulous or pilosulous beneath with straight spreading hairs; chief lateral veins 8 to 12 pairs.

Leaf blades mostly 4.5 to 7.5 cm. long, 2 to 4 cm. wide, hispidulous along costa above, very densely scabridulous-hispidulous on surface beneath with minute hairs much shorter than the thickness of the leaf tissue.

5. *P. scabridula*.

Leaf blades mostly 7 to 12 cm. long, 3 to 5.5 cm. wide, glabrous above, rather densely velvety-pilosulous on surface beneath, the hairs about as long as the thickness of the leaf tissue.

6. *P. velutina*.

1. **Piratinera guianensis** Aubl. Pl. Guian. 2: 888. pl. 340. 1775. PALE-LEAF LETTERWOOD. Fig. 1, a.

Brosimum discolor Schott in Spreng. Syst. Veg. 4²: 403. 1827.

Brosimum guyanense Huber, Bol. Mus. Goeldi 5: 337. 1909.

Piratinera discolor Pittier, Contr. U. S. Nat. Herb. 20: 100. 1918.

TYPE LOCALITY: Caux, French Guiana.

ILLUSTRATIONS: Aubl. Pl. Guian. pl. 340. Miq. in Mart. Fl. Bras. 4¹: pl. 33 (as *B. discolor*).

SPECIMENS EXAMINED:

BRITISH GUIANA: Komentyne (Komantin) Creek, Wiruni River, and Berbice River (near savanna of Karaka), February 18, 1910, *C. W. Anderson* 467/C. T. 45 (N, Yale).⁸ Essequibo-Rupumuni region, *Anderson* 598A (N, Yale). On hills up to 15 or 20 meters above sea level, Kamuni Creek, Demerara River, *Anderson* 137 (Yale). Issororo Creek, Pomeroon River, June 8, 1909, *Anderson* 308 (Yale).

SURINAM: Zandery I., a station at Km. 45 of railway, November 25, 1915, *Forestry Service (Surinam)* 1371 (Yale). Moderzorg, Surinam River, August 8, 1921, *Forestry Service* 5429 (Yale). Sarwa Creek, Mapane, Commewyne River, November 22, 1921, *Forestry Service* 5497 (Yale, fragm. N). Berlyn, Km. 50 of railway, December 13, 1921, *Forestry Service* 5501 (Yale, fragm. N).

BRAZIL: Obidos, Amazonia, December 22, 1907, *Ducke* 9189 (N).

⁸ In the citation of specimens, N = U. S. National Herbarium; Yale = herbarium of Yale University.

The vernacular names accompanying the British Guiana material are "letterwood" (no. 598A) and "tibikushi" (*i.e.*, bastard letterwood; nos. 137, 308, 467). No. 308, which consists only of comparatively large leaves (about 11 cm. long, 5.5 to 6 cm. wide) and of a wood specimen (the latter not examined by the writer), is labeled "not true tibikushi." Although considerably larger than those of the other specimens examined, these leaves agree in pubescence, and seem to be clearly referable to *P. guianensis*. No. 137 is said to grow to be a large tree on sandy soil, the bark emitting a sticky substance when cut, and the heartwood being red mottled with black.

The material from Surinam is labeled with the following names: "letterhout," "letterhout (gespikkeld)," "man letterhout" (Dutch); "manlettri," "kappewerie lettri" (Negro English); "moejé-paulettoe" (Saramacca Bush Negro); "koeréroë," "koléro," "koelero" (Arowak Indian); "paida," "toekoesipaida," "wékérépaida" (Carab Indian)."

In his list of the described species of *Brosimum*, Pittier⁹ recognizes *B. guianense* Huber as a valid species distinct from *Piratinera guianensis* Aubl. This course is not in accordance with the rules of nomenclature, since Huber published the name, in the form *Brosimum guyanense*, without description, and cited *Piratinera guyanensis* Aubl. and *B. aubletii* Poepp. as synonyms. Three collections were listed, nos. 4871, 9189, and 9072. The two latter are in the National Herbarium, as mentioned by Mr. Pittier. Investigation of these, in the light of the information recently obtained as to the identity of Aublet's type, shows that no. 9189 is referable to *P. guianensis* Aubl. No. 9072, however, is referable to the new species described beyond as *Piratinera velutina*. In a later note by Huber,¹⁰ cited by Pittier as the place of publication of *B. guianense*, where the wood is described (with the vernacular name given as "muirapinima"), reference is again made to *P. guianensis* Aubl.

2. ***Piratinera panamensis*** Pittier, Contr. U. S. Nat. Herb. 20: 100. *pl.* 7. 1918. PANAMA LETTERWOOD. Fig. 1, b.

TYPE LOCALITY: Near Puerto Obaldía, Panama.

SPECIMENS EXAMINED:

PANAMA: Hills back of Puerto Obaldía, San Blas Coast, September 2, 1911, Pittier 4336 (type collection, N).

The vernacular name of this species is given as "guaímaro." Prof. Record, who has studied wood material collected by Mr. Pittier, informs me that the sapwood is white, and the heartwood dark red with black markings.

3. ***Piratinera rubescens*** (Taub.) Pittier, Contr. U. S. Nat. Herb. 20: 100. 1918. REDLEAF LETTERWOOD.

Brosimum rubescens Taub. Bot. Jahrb. Engler 12: Beibl. 27: 4. 1890.

TYPE LOCALITY: Brazil. Type collected by Glaziou (no. 12169).

The vernacular name of this plant is given as "páo vermelho."

⁹ Contr. U. S. Nat. Herb. 20: 101. 1918.

¹⁰ Bol. Mus. Goeldi 6: 168. 1910.

4. *Piratinera acutifolia* (Huber) Pittier, Contr. U. S. Nat. Herb. 20: 100. 1918. SHARPLEAF LETTERWOOD. Fig. 1, c.
Brosimum acutifolium Huber, Bol. Mus. Goeldi 6: 66. 1910.

TYPE LOCALITY: Primeval woods along the railroad between Belem and Bragança, Pará, Brazil. Type collected by A. Goeldi (no. 8231).

SPECIMEN EXAMINED:

BRAZIL: Rio Branco de Obidos, Pará, 4.8.1912, *Ducke* 12155 (N).

This species is readily recognized by its long-acuminate leaves. The vernacular name is "mururé."

5. *Piratinera scabridula* Blake, sp. nov. ROUGHLEAF LETTERWOOD. Fig. 1, e.

Tree with sticky latex; young branches slender, brown or purplish brown, minutely and rather sparsely spreading-hispidulous, glabrescent, the older flaky-barked, becoming gray; buds ovoid, acute, about 2.5 mm. long, finely erect-hispidulous; internodes 2 to 20 mm. long; stipules not seen; petioles 2 to 5 mm. long, sulcate above, finely hispidulous with spreading or erectish hairs; leaf blades elliptic to oval or sometimes obovate-oval, (2.7) 4.5 to 7.5 cm. long, (1.3) 2 to 4 cm. wide, obtuse or obtusely short-pointed to rounded, often emarginate, at base cuneate or rounded-cuneate and unequal, entire, subcoriaceous, above usually light green, shining in age, glabrous except along the hispidulous costa, beneath pale, along costa and chief veins spreading-hispidulous, on surface scabridulous to the touch with very dense and very minute, conical, spreading, whitish hairs, featherveined, the chief veins 8 to 12 pairs, diverging at an angle of 60° to nearly 90°, united inside the margin, flattish or barely prominulous above, prominulous beneath, the costa prominulous above, prominent beneath, the secondaries prominulous-reticulate beneath; peduncles axillary, solitary, erectish, about 7 mm. long, minutely antrorse-hispidulous; young receptacle depressed-hemispheric, about 4 mm. thick, covered with orbicular, peltate, minutely puberulous and ciliolate bracts; ♀ flowers about 5; ♂ flowers numerous, 1-androus, the perianth monophyllous, apparently split on one side; fruit not seen.

Type in the U. S. National Herbarium, no. 1,120,360, collected below Manakobi, on the Corentyn River, British Guiana, December 13, 1909, by C. W. Anderson (no. 406/CS). Duplicate in the herbarium of Yale University.

ADDITIONAL SPECIMENS EXAMINED:

SURINAM: Casipora Creek, Surinam River, November 24, 1921, *Forestry Service* 5495 (Yale, fragm. N). Irakoeka Creek, Surinam River, January 11, 1922, *Forestry Service* 5499 (Yale), 5500 (Yale, fragm. N).

The vernacular name associated with the type is "letterwood." The Dutch names of the other specimens are given as follows: "manletterhout" (5495), "kapiteinhout" (5499), "roode letterhout" (5500). The Arowak Indian name of 5495 is "koelero boelekollé." The label of the type collection states that the flowers were greenish yellow with brown anthers. Unfortunately only a single receptacle has been available for examination, and that is too young and in too poor condition to afford much information, beyond establishing the fact that the plant is certainly a *Piratinera*.

The hairs of the under leaf surface in this species are so small that under a 12x lens they appear merely as densely crowded papillae. Viewed on a cross section of the leaf under a 49x binocular, they are seen to be conical hairs, standing off stiffly at a right angle from the leaf surface, and about one-half to one-fifth as long as the thickness of the leaf.

6. *Piratinera velutina* Blake, sp. nov. VELVETLEAF LETTERWOOD.

Fig. 1, d.

Young branchlets brown, finely, densely, and rather softly spreading-puberulous, the older glabrate, gray-barked; internodes mostly 1 to 2.5 cm. long; stipules lance-subulate, 4.5 mm. long, appressed-puberulous on both sides, deciduous; petioles 3 to 5 mm. long, scarcely sulcate above, puberulous like the branchlets; leaf blades oblong to oblong-oval, rarely slightly obovate-oval, (5) 7 to 12 cm. long, 3 to 5.5 cm. wide, abruptly short-pointed with obtuse apex, at base very unequal, broadly rounded on one side, obliquely rounded on the other, entire, subcoriaceous, above deep green, shining, glabrous, beneath paler (brownish or griseous-green when dry), on the chief veins hispidulous-pilosulous with rather soft spreading or antrorse hairs, on surface very densely papillose and rather densely and softly velvety-pilosulous with spreading hairs, featherveined, the chief lateral veins 8 to 11 pairs, diverging at an angle of 60° to 80°, united inside the margin, with the secondaries flattish or delicately prominulous-reticulate above, prominulous-reticulate beneath, the costa prominent beneath; peduncles (very young) solitary, axillary, erect, puberulous, 5 mm. long or less; young receptacles depressed-subglobose, about 4.5 mm. thick, densely covered with orbicular, peltate, puberulous and ciliolate bracts; ♀ flowers 2 or 3; ♂ flowers numerous, 1-androus, the perianth monophyllous, split on one side; fruit not seen.

Type in the U. S. National Herbarium, no. 1,120,361, collected at Sectie O, a forest station at Km. 65 of railway, Surinam, February 15, 1916, by the Forestry Service of Surinam (no. 1647). Duplicate in herbarium of Yale University.

ADDITIONAL SPECIMENS EXAMINED:

SURINAM: Sectie O, November 3, 1915, *Forestry Service* 1158 (Yale), November 22, 1915, *Forestry Service* 1378 (Yale). Irakoeka Creek, Surinam River, January 11, 1922, *Forestry Service* 5498 (Yale).

BRAZIL: Alluvial forest, Rio Mapuera, Amazonia, December 8, 1907, *Ducke* 9072 (N).

The hairs on the under leaf surface of this species are much longer than those of *P. scabridula*, being readily distinguishable with a 12x lens, and about equaling the thickness of the leaf tissue when seen under the binocular.

The species bears the following names: "letterhout," "roode letterhout" (Dutch); "letri," "basra letri" (Negro English); "poevinga," "paulétoe" (Saramacca Bush Negro); "sokoné-biberoe," "belekoro," "koereroe" (Arawak Indian); "paida," "wékéré paida," "tianalin wéivé," "tokoro apolli merie" (Carab Indian).

DOUBTFUL SPECIES

Brosimum aubletii Poepp. & Endl. *Nov. Gen. & Sp.* 2: 34. *pl.* 148, *f.* a-d. 1838.

This species, from the banks of the Rio Huallaga near Yurimaguas, Peru, was stated by its authors to be without doubt identical with *Piratinera guianensis* Aubl. Pittier,¹¹ however, considers it "probable that it belongs neither to *Brosimum* nor to *Piratinera*, but perhaps to *Helicostylis*." The description and figures of the receptacle and floral parts, however, particularly of the peltate bracteoles, seem to me to indicate that the plant is a *Piratinera*, and that the staminate flowers were overlooked. The difference in range makes it improbable that the plant is identical with Aublet's species. Until more information is secured, it is impossible to dispose of the name definitely.

BOTANY.—*Diospyros konzattii*, a new species of persimmon from Mexico. PAUL C. STANDLEY, U. S. National Museum.¹

The National Museum has received recently from Prof. C. Conzatti of Oaxaca, Mexico, specimens of a native persimmon which can not be referred satisfactorily to any of the ten species previously listed from the country. The Mexican species of the genus are endemic, with two exceptions—*Diospyros ebenaster* Retz., an East Indian species with large fruit (4 to 7 cm. in diameter or larger), which is widely cultivated, being known commonly as "zapote prieto;" and *D. texana* Scheele, the "chapote" or "chapote prieto," which extends into western Texas. All the Mexican persimmons have edible fruit, whose pulp is usually black at maturity. The species here described is an interesting addition to the known trees of Mexico, especially since the collector has furnished such complete information concerning it.

***Diospyros konzattii* Standl., sp. nov.**

Tree, 10 meters high, the branchlets minutely and sparsely fulvous-puberulent; petioles 4 to 6 mm. long, minutely puberulent or glabrous; leaf blades ovate-oblong or lance-oblong, 5 to 9.5 cm. long, 2.5 to 3.5 cm. wide, acuminate, acute or subobtuse at base, subcoriaceous, glabrous, somewhat lustrous above, the costa depressed, the lateral nerves nearly obsolete, the costa prominent beneath, the lateral nerves also prominent, slender, irregular, 5 or 6 on each side; fruits borne on short stout pedicels; calyx 5-parted, the lobes narrowly lance-oblong or linear-lanceolate, 15 to 18 mm. long, long-attenuate, glabrous or sparsely strigillose outside near the base; fruit depressed-globose, about 4 cm. broad and 2 cm. high, glabrous, green, the pulp black; seeds 5 to 10, strongly compressed, about 13 mm. long and 10 mm. broad, brown, finely rugulose.

Type in the U. S. National Herbarium, no. 1,014,759, collected in the Cafetal San Rafael, Cerro Espino, Distrito de Pochutla, Oaxaca, Mexico, April 24, 1917, by C. Conzatti (no. 3167).

¹¹ Contr. U. S. Nat. Herb. 20: 98. 1918.

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