CORRESPONDENCE

RELATIVE TO

THIS MANUSCRIPT

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY
WASHINGTON

BOTANY

November 25, 1931.

MEMORANDUM FOR MR. E. P. KILLIP

Referring to your memorandum of November 19 regarding Mr. Pittier's paper, A Century of Panama Trees, I should like to go over the manuscript with you, to look up the special cases you mention.

Standley's Flora of the Panama Canal Zone is not a good book for the comparison of Mr. Pittier's names, because in the Canal Zone paper Standley did not follow the American Code. I shall be glad to go over the manuscript with you sometime when we can get an hour or two for the job.

Frederick V. Coville

Frederick V. Coville,
Botanist.

FVC:CBP.

SMITHSONIAN
LIBRARY

November 19, 1931.

Memorandum for Mr. Coville:

When we went over Mr. Pittier's paper, "A Century of Panama Trees," you asked me to prepare a memorandum for you of scientific names that might have to be altered. I have compared Mr. Pittier's paper with Standley's "Flora of the Panama Canal Zone." Of course Mr. Pittier included a number of species from parts of Panama other than the Zone which are not found in Standley's work, but in these instances I think the names used by Mr. Pittier are all correct. I append a list, in duplicate, of differences between the two papers, in which are inserted a few of my own comments.

There are a few matters in which I would like advice from you before marking the paper:

1. I assume that we will use small letters for species names throughout.

2. Pittier has synonyms placed in footnotes. Would it be better to put them immediately following the valid name?

3. Do you prefer to have local names in italics or in quotes; capitalized or not?

4. I believe we decided to eliminate Pittier's common name where it is merely a translation of the Latin. I presume therefore that where his translated name occurs in the text it would be best to substitute the full Latin name.

Respectfully,

SMITHSONIAN LIBRARY

(Numbers indicate page; S.=Standley; P.=Pittier; n.v.=local name.)

1. Ulmus mexicana.

S. says Ulmus not in C. Amer. and refers to this as Chaetoptelea mexicana Liebm.

4. Helicostylis latifolia

S. gives additional n. v. as "choybá" and "querendo."

11. Triplaris caracasana

Bad genus & Pittier probably right.

P. says from Venezuela into Central America, but S. says "The only Central American species, T. americana L. . . ."

19. Ocotea veraguensis

P. says "from Tehuantepec to the Panama Canal." Not given by S. under this name. ~~Perhaps~~ It is one of the three other species in S., ~~O. dendrodaphne,~~ O. cernua (Nees) Mez, ~~or O. acutangula.~~ which ranges from Tehuantepec to Darien.

21. Crataeva tapia.

S. gives as n. v. "palo de guaco" in Panama, yet P. says no. n. v. has been recorded.

39. Caesalpinia coriaria

Not in S. though from P. range it ought to be.

41. Tounatea darienensis

Swartzia is conserved for this. S. says that Swartzia darienensis is probably a synonym of T. simplex (S. simplex Spreng.) ~~If Swartzia is used, has the transfer been made?~~ This genus put in Fabaceae by S., in Caesalpinaceae by P. and by Della Torre & Harms.

44. Sweetia panamensis

This genus also put in Fabaceae by S and by Della Torre & Harms. In Caesalpinaceae by P.

46. Gliricidia maculata

S. has only G. sepium. Above is often considered a synonym. Note: Fabaceae better for family name?

48. Diphysa carthaginensis Jacq.

S. gives *D. robinioides* as a common tree in Panama, and clearly is considering the plant given as *D. carthaginensis* by Pittier, who says it is the only species reported from the Isthmus. I think Pittier is right.

62. Byrsonima cumingiana

S. gives only *B. crassifolia*, but both species are reported from Panama by Niedenzu. Note: Malpighiaceae should come *after* Meliaceae.

64. Zanthoxylum elephantiasis

Not in S., but we have Darien sheets of this.

~~Perhaps this is *Z. microcarpum* in S. Which is right?~~

67. Icica panamensis

Protium is conserved name for the genus and used by S.; also by P. in Pl. Usual. Venez.

77. Anacardium rhinocarpus

This = *A. excelsum* (Bert. & Balb.) Skeels.

80. Tapirira chagrensis

Not in S. but it should have been.

85. Heliocarpus appendiculatus

S. apparently uses *H. popayanensis* for this plant. The species of northern S. Amer. are not well understood, and the P. name is probably as good as the other.

96. Lindackeria laurina

S. uses *Oncoba* for the genus, and this is ~~conserved~~ better.

98. Hasseltia floribunda.

P. says no n. v. in Panama; S. gives "raspalengua" in Darien.

122. Terminalia obovata

Note: Combretaceae *precedes* Myrtaceae.

146. Tabernaemontana arborea.

Note: Apocynaceae *precedes* Boraginaceae.

148. Tecoma guayacan

150. Tecoma pentaphylla

Tabebuia is ~~conserved~~ generally used for this genus.

155. Genipa caruto

S. treats this as a form of *G. americana* L.

158. Amajoua

Usually spelled *Amaioua*.

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Mr. Killip,
Will you please look into this?
WRM
9/9/31

Dr. Maxon:

Dr. Coville asks what you think about this manuscript and its publication.

April 25, 1931.

Mr. H. Pittier,
Museo Comercial,
Caracas, Venezuela.

Dear Mr. Pittier:

Your letter of April 9 to Dr. Coville and the accompanying manuscript on One hundred trees of Panama have been received. Dr. Coville is now in Death Valley, California, but your letter will be called to his attention immediately upon his return in the latter part of May.

Very truly yours,

M

Acting Botanist.

VENEZUELA

a número

Número del bulto 858

Señor Frederick V. Coville, Bureau of Plant Industry, U.S. Department of Agriculture,

Lugar de destino,

Washington, D.C.

TIPOGRAFIA CENTRAL.

DECLARACION DE ADUANA

Descripción de bulto	CONTENIDO	VALOR	PESO NETO KILOG.	PESO NETO GR.	PESO BRUTO KILOG.	PESO BRUTO GR.	Portes pagados
1 pq.	Libro manuscrito				1	730	

Fecha de depósito 11 de Abril de 1931

Firma del remitente,

H. Pittier

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Firma del remitente,

H. Pittier

Caracas, April 9, 1931

Mr. Frederick V. Coville,
Bureau of Plant Industry,
U. S. Department of Agriculture,
Washington, D.C.

Dear Mr. Coville:

A few years ago, I sent you a manuscript on "One hundred trees of Panama", in the belief that it was ready for the printer. The paper was refused, mainly on account of its incomplete condition and also because Prof. Record made some more or less well founded objections to the part of the work corresponding to Mr. Mell. With regard to the last opinion, it should be noted that the manuscript was sent just at the time when Prof. Record's book was under press, and Prof. Record would not had been human if he had seen with indifference the publication of a paper on the trees of Panama, to be gratuitously distributed, made simultaneously with the marketing of his excellent book. I do not know how far his objections were well founded, but anyway it does not seem that he was the man to be called to express an opinion on the work of a man with whom he had just severed an old friendship and collaboration and to whom he did not, perhaps, do full justice when he partly suppressed his name as co-author of the book in reference.

In what concerns the defective part of the work, I thought it was worth correcting, becsuse it cannot be denied that, with regard to the forest products of Panama and their popularization, it is of some value. Unfortunately, in the several movings and transfers made by me since the paper was returned, one or two of the cross-section pictures have been lost and perhaps it will not be easy to obtain them again from the Forest Service. Fresh copies of the other pictures will certainly be put at your disposal by Mr. C. B. Doyle's Office in the Department.

Personally, I am not in anyway overanxious to see the paper printed and your refusal to again consider the matter will not be for me a matter of resentment. But I think that the publication of this contribution, which is the only essay on the timbers of Central America, would accomplish a useful object, and this is the sole reason why I now ask you to see whether the first decision not to print the paper cannot be reconsidered.

Notwithstanding Record's book, which is far from complete, we are sorely lacking generally in the way of literature on neotropical woods, and our work is not inferior to that existing on the timbers of the Guayanas and of Brasil.

With this mail I send you a new copy, partly rewritten. of the manuscript. I shall be thankful if you will kindly go through it and, in case you should find it convenient, submit it again to the board of publication of the Contributions.

Yours very sincerely

H. Pittier.

Dr. Little:

Your courtesy in letting me see this [illegible] greatly [illegible]

[illegible]

[illegible] I wonder if Mr. Killip [illegible] should [illegible] considered)

There is [illegible] of info [illegible] with [illegible] available.

[illegible] Dr. Pittier is still alive. Perhaps next time Mr. Killip writes him he might care to mention this [illegible]??

4/30/47

SMITHSONIAN

1. [illegible]

2. [illegible]

[illegible]

3. [illegible]

[illegible]

[illegible] sp., numerous [illegible]

[illegible]

Cornus disciflora, *Sterculia sanamensis*, many *Quercus* spp.
[illegible]

4. [illegible]

[illegible]

5. [illegible]

6. [illegible]

added [illegible]

7. An inter[illegible]

readers.

more up-to [illegible],

[illegible] uses of trees, etc., needs to

[illegible]

U.S.N.M.
JUL 19 1960
DIV WOODS

9. Anatomical terminology needs to be modernized.

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Helioceras [illegible]

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Linzrackia [illegible]

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Zulania [illegible]

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Vitex [illegible]

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[illegible]

[illegible]

Calycophyllum candidissimum (Vahl) DC

[illegible]

Amaioua corymbosa H.B.K.

[illegible]

[illegible]

QK
480
P2158

A century of trees
of
Panama

Described by H. enri Pittier and C. D. Mell

with 130 illustrations

Ulmaceae
(Elm Family)

The Mexican Elm

Ulmus mexicana (Liebmann) Planchon, D.C. Prodr. 17: 156-1873

Description of the tree

A lofty, deciduous forest tree. Trunk 25 to 30 m. high, limbs ascending, crown ovate. Bark gray, somewhat scaly. Folial and floral buds protected by distichous, ovate, yellowish brown deciduous scales; leaves peticlate, pubescent or hairy-pubescent when young, more or less glabrous and thick in their mature state, the petiole thin, rounded, 5 to 14 mm. long, the blade slightly oblique, ovate to elliptic, or more or less oblong, rounded and subemarginate at base, acuminate at tip, paler beneath, 7 to 11 cm. long, 2.5 to 4.5 cm. broad, the nervation prominent beneath, the margin serrate or biserrate. Inflorescence racemose, the elongate racemes appearing before the leaves of the season and in the axils of those of the past season. Flowers in alternate glomerules of 3 or less; bracteoles caducous, short and broad, ciliate; pedicels 3 to 6 mm. long, slender, pubescent; perianth persistent, broadly campanulate, yellow, pubescent outside, 2.5 to 3 mm. long 4- to 6-lobulate, the lobules irregularly denticulate, rounded or subacute and apiculate, ciliate on the margin; stamens 3 to 5, exserted, the filaments erect, slender, the anthers ovate-rounded, 2-celled; ovary stipitate, ovate-depressed, hairy-ciliate on the margin; styles 2, elongate, with a velvety stigmatic surface.

Samara glabrous on both faces, ciliate on the margin, the pedicel long and hairy.

Ulmus mexicana sheds its leaves in December and loses its blossoms in March, the new foliage following immediately. There is considerable variation in the leaves, depending upon the degree of exposure to light or shade.

Description of the wood

Sapwood thick, very light brown; heartwood much darker and occasionally marked by numerous nearly black lines.

Ulmus mexicana

margin of the forest at El Boquete,

Chiriqui

Wood hard, moderately heavy, strong, very tough, much finer grained than the American white elm (Ulmus americana L.) and subject to fair polish. Annual rings of growth very narrow and often visible only under a hand lens; inner boundary of annual ring marked by a single interrupted row of pores.

Pores (transverse section) in early wood small (.085 mm. in diameter), round or sometimes slightly elongated radially, and closed with tyloses in heartwood. Small vessels in late wood arranged chiefly in radial, oblique, semi-circular, or frequently in wavy tangential rows, giving the effect of minute festoons or wavy bands on a smooth surface. Vessel walls (longitudinal section) with numerous, small, bordered pits, hexagonal in outline; small vessels often with spiral markings. Perforations simple. Wood fibers 1.319 mm. long, with thick walls, small lumina, and few, very small, oblique, slit-like, simple pits. Wood-parenchyma fibers grouped around vessels and in continuous tangential lines connecting isolated or small groups of vessels in outer portion of late wood, visible only under hand magnifier on smooth transverse section. Pith rays numerous, narrow, barely visible under a hand lens, and from 1 to 6 cells wide and from a few to 25 cells high.

Distribution, Common Names and Uses

The Central American elm was recorded first in 1842, from the forests surrounding the Orizaba Volcano in Mexico. In 1898 it was collected in the Dota Mountains of Costa Rica, and quite recently, in the course of the botanical surveys undertaken in Panama by the Smithsonian Institution, it was found to constitute an important element of the forests in the upper Caldera Valley in Chiriquí. Although data are lacking, it is to be supposed that it occurs in the lower mountainous belt, between 1000 and 1800 m. altitude, in the whole stretch between the two extreme stations in the State of Vera Cruz to the North and in Chiriqui to the South. In Chiriqui, its preferred station seems to be on the slopes nearest to the interoceanic divide, where neither humidity nor dryness are excessive.

Ulmus mexicana is called ira in Costa Rica, and ceniza or cenizo in Chiriqui. Ira is probably taken from one of the early Indian languages and is applied also to several representatives of the laurel family. Ceniza is a Spanish

word meaning ash. The ash of this wood may have had formerly some application that gave origin to the name, but this is not shown by any information on record.

In Chiriqui and Costa Rica, the wood of the Mexican elm is used for building purposes, though only to a very small extent.

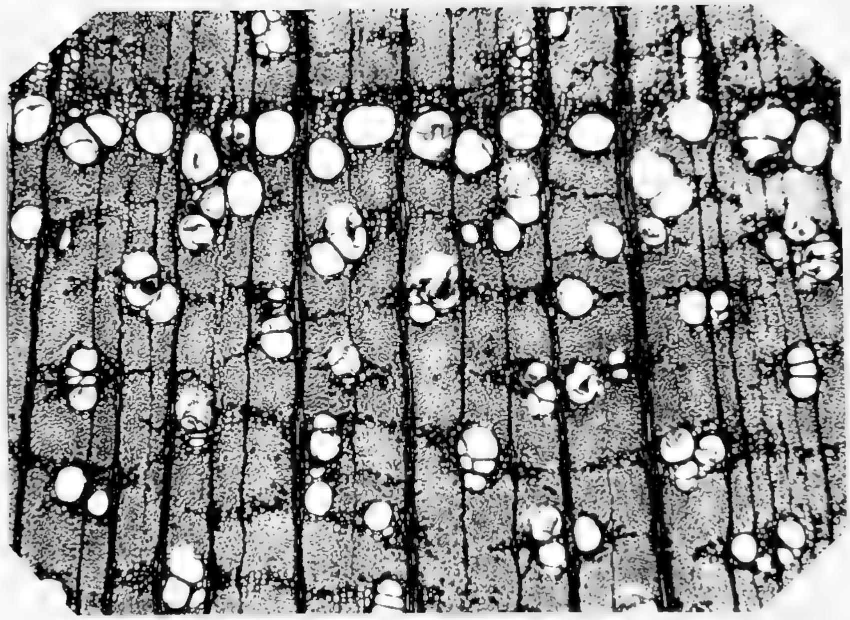
Moraceae

The Panaman Letterwood

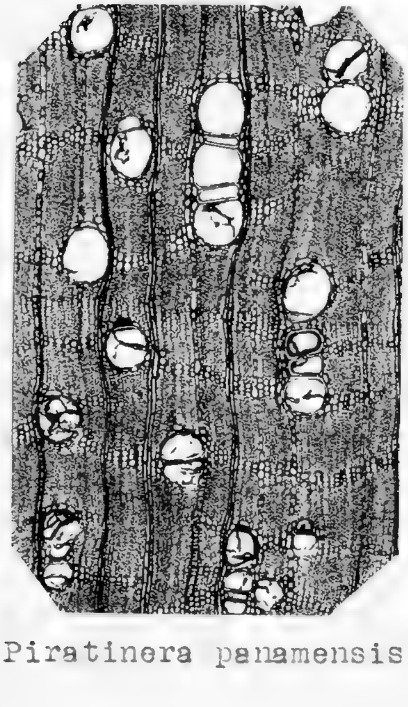
Piratinera panamensis Pittier

Description of the tree

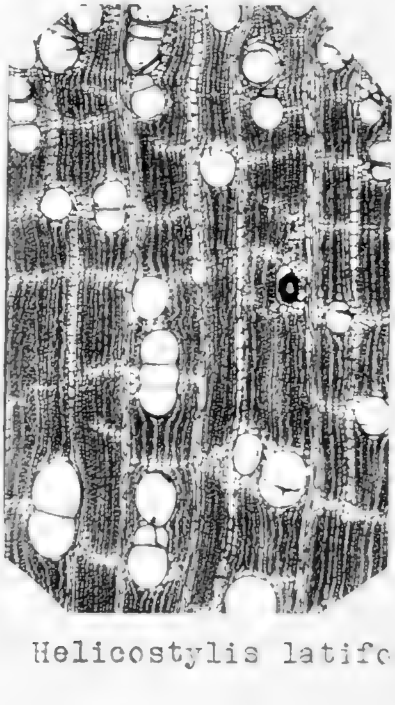
A laticiferous tree up to 25 m. high and 60 cm. diameter at the base, the bark grayish, smooth, the crown irregular, depressed. Leaves small, chartaceous, the petioles 3 to 7 mm. long, canaliculate, minutely, puberulous, the blades ovate-oblong, rounded or subacute at the base, abruptly and shortly obtuse acuminate, 4 to 10 cm. long, 2.5 to 3.5 cm. broad, glabrous, the venation prominulous above, paler and minutely puberulous, the venation more prominent beneath; primary veins 9 to 14. Stipules 3 mm. long, lanceolate, pubescent, caducous. Receptacles single in the axils of the leaves, turbinate at the base, flat, 1 to 1.5 cm. in diameter, orbicular or polygonal subconial at the flower-bearing apex; peduncles slender, minutely puberulous, 10 to 15 mm. long; interfloral bracts orbicular, peltate, grayish puberulous. Perianth of the male flowers yellow, tubular, 0.2 to 0.4 mm. long, monophyllous but split on one side; stamen 1, exerted, the anther 2-celled. Female flowers 2 or more to each receptacle, without a perianth; style short with only the 2 divaricate stigmas showing on the surface of the receptacle. Fruit globose or subpyriform, 1 to 3-seeded.



Ulmus mexicana



Piratinera panamensis



Helicostylis latifolia

Description of the Wood

Sapwood very thick, light yellowish or nearly white; heartwood in mature trees about 10 or 15 cm. in diameter, deep red, or rich brown mottled with darker colored spots remotely resembling Chinese characters,(on which account it is generally referred to as letterwood, leopardwood or snakewood). Wood very hard (about 75 pounds per cubic foot), heavy, tough, strong, straight and fine grained, taking a good polish and durable in contact with the soil. Annual rings of growth not visible.

Pores (transverse section) numerous, small (.12 mm. in diameter), round or radially compressed, open in sapwood, closed with a dark ruby-colored resin in heartwood, and arranged singly, in pairs or in radial rows of from 3 to 6. Vessel walls (longitudinal section) with numerous, small, bordered pits. Perforations simple. Wood fibers 1.12 mm. long, with thick walls, small lumina and very minute, slit-like simple pits. Wood parenchyma rather strongly developed, forming numerous, short, irregular, inconspicuous, tangential lines alternating with much wider bands of wood fibers. Rays numerous, very narrow, barely visible under hand lens, and from 1 to 3 cells wide and from a few to 15 or 20 cells high.

Distribution, common names and uses

So far Piratinera panamensis has been reported only from the vicinity of Port Obaldía on the San Blas Coast, where it is known under the name of "guaímaro". The wood shows a certain resemblance to the letterwood of Dutch and French Guianas, but it is not so finelý and distinctly figured. It is hard, heavy, strong and difficult to work and consequently is not used to any extent by the people of Panamá.

The broad-leaved Berba

Helicostylis latifolia Pittier

Description of the tree

A laticiferous tree 20 to 25 m. high, 30 to 40 cm. in

diameter at the base, the bark rugose, thin, grayish, the crown globose or elongate. Leaves coriaceous, glabrous, the petioles 4 to 7 mm. long, canaliculate, dark brown, the blades broadly ovate or obovate, subacute at the base, shortly acute-acuminate, light green with the venation impressed above, subglaucous, the costa and veins prominent beneath; primary veins 13 to 15, crowded and spreading. Stipules lanceolate, about 4 mm. long, caducous. Male receptacles globose, single or geminate in the axils of the leaves, provided at the base with 4 or 5 ovate, involucrate bracts; peduncles 4 to 5 mm. long, glabrous; interfloral bractlets orbicular, peltate, hairy, ciliate on the margin; perianth divisions 4, ovate or obovate, hairy, ciliate on the margin; stamens 4, the anther cells transverse, dehiscing as in the monothecous Brosima. Female flowers and fruits not known.

Description of the Wood

Sapwood thick, yellowish or nearly white; heartwood dark brown, tinged with red. Wood hard, heavy, very strong, tough, cross and very fine-grained, difficult to work, taking a good polish. Annual rings of growth not visible.

Ppres (transverse section) numerous, small (.1 mm. in diameter), round or radially flattened when it rows, open in the sapwood, closed with white or dark brown tyloses in the heartwood, and arranged singly or in short radial rows of from 2 to 6 or 8. Vessels walls (longitudinal section) with numerous, small, slightly bordered pits on all sides, except where in contact with pith rays, the pits are large, transversaly elongated and simple. Perforations simple. Wood fibers 1.018 mm. long, with very thick walls, small cell cavities and small simple pits. Wood parenchyma fairly strongly developed and arranged in very narrow, irregular, interrupted, tangential lines; also grouped around all vessels. Rays very numerous, narrow, from 1 to 4 cells wide and from 10 to 20 cells high.

Distribution, local names and uses

This tree has been found so far only in the Chagres Valley and in Darien. It seems, however, to be rather common in the monsoon-forests of the Pacific and is known among the

country-people under the name of berbá, borrowed from one of the native languages. The wood is heavy, difficult to work and not extensively used.

The spurious Isthmian Rubber-Tree

Castilla fallax O.F. Cook, Science n. ser. 18: 438. 1903

Description of the tree

A large or middle-sized, laticiferous tree, the branchlets thick, densely adpressed hairy. Leaves deciduous, coriaceous, the petioles thick, 1.5 to 2 cm. long, hairy, sulcate, the blades 30 to 40 cm. long, 10 to 15 cm. broad, oblong or oblong-lanceolate, rounded or subacute at the base, acuminate, rough and sparsely adpressed hairy above, adpressed pubescent beneath, the costa and veins very prominent, the margin entire. Stipules intrapetiolar, adnate, wide-ribbed, hairy without. Male receptacles single or geminate, sessile or subsessile, flabellate, 1.5 to 2 cm. broad, opening by a long, arcuate slit. Scales of the involucre almost free, pubescent without. Interstaminal bracts scarce, triangular, small. Stamens 1.5 to 2 mm. long. Female receptacles solitary, sessile, small. Scales of the involucre free, silky. Perianth free to the base, about 4 mm. long, silky pubescent without, 4 to 5-lobulate at the apex. Ovary partly free from the perianth; style 3 to 3.5 mm. long, slender, the 2 stigmas short and twisted. Fruits free, not fleshy, pubescent without; seeds about 8 mm. long and 6 mm. thick.

This species is distinguished from the other Central-American rubber-trees mainly by the free, dry nutlets and by the almost total absence of rubber in the resinous latex. It is usually a small or middle-sized tree, but in the forests of Darien it grows to larger proportions, the trunk measuring sometimes more than 1 meter in diameter, with a total height of 15 to 20 meters.

Description of the Wood

Sapwood thin, very light yellow or nearly white; heartwood darker. Wood soft, moderately light, not strong, straight and fairly fine-grained, easily worked, taking a good polish, and not very durable in contact with the soil. Annual rings of growth not clearly marked; the tangential lines of wood parenchyma on a smooth transverse surface do not indicate limits of growth layers.

Pores (transverse section) fairly numerous, large (.155 mm. in diameter), round when solitary, usually closed with orange yellow tyloses, often solitary, but also arranged in short radial rows of from 2 to 6. Vessel walls (longitudinal section) where in contact with ray cells and wood parenchyma bear bordered pits with transitions to large simple pits, always bordered where two vessels are in contact. Perforations simple, circular or elliptical. Wood fibers 1.21 mm. long, with thin walls, large cavities and small, oblique simple pits. Wood parenchyma highly developed especially around vessels and in the tangential bands clearly visible under the hand lens. Rays numerous, narrow, from 1 to 4 cells wide and from 4 to 5 times as high.

Distribution, common names and uses

The name of Central American rubber trees has been given to several of the species forming the genus Castilla, on account of their having been for a long time the only source of the rubber exported from the countries between and inclusive Mexico and Panama. Among the ten or less known species of this genus there are at least two which do not produce a commercial rubber. One of them is the tunu of the Honduras (British and Spanish), the specific distinction of which is not fully known, and the other is the spurious rubber tree of the Isthmus (Castilla fallax O.F. Cook), which is described here. It was known so far only from the easternmost part of Costa Rica, but the botanical investigations recently made under the supervision of the Smithsonian Institution have shown that it is of more frequent occurrence on the Pacific watershed of Panamá, increasing in abundance from Chiriqui to Darien, where it can be called a common forests tree on both sides of the Continental divide. It is because of its restricted distribution on the Isthmus and because it does not produce rubber, that it is here designated as Spurious Isthmian rubber tree, the real rubber yielding species being

represented in the same country by *Castilla panamensis* Cook. In Costa Rica *Castilla fallax* is known as *hule macho*, *hule* or *ule* being the Central American name, derived from the nahuatl, *ulli*, gum, for rubber or rubber tree. In Panama the native name is *caucho macho*, or sometimes *cauchillo*.

The bark of this tree yields a soft vegetable cloth, which the Cuna-Cuna and Choco Indians make into clouts, skirts or sleeping mats. The wood is used very seldom on account of the abundant flow of cortical latex, which makes it difficult to handle.

The Fustic-Tree

Chlorophora tinctoria (L) Gaudich. in Freye Vog. Bot. 508

(note) 1826.

Description of the tree

A dioecious tree, armed or unarmed, laticiferous, up to 20 meters high and 75 cm. in diameter, the bark brownish gray, the young branchlets more or less covered with rounded lenticels. Leaves alternate, membranous, glabrous, the petioles slender, 0.7 to 1 cm. long, the blades oblong, rounded at the base, acuminate, 4 to 13 cm. long, 1.5 to 4.5 cm. long, entire or more or less serrate. Inflorescences single in the axils of the leaves, the male flowers in hanging, pedunculate catkins, the female flowers in globose, sessile heads; male flowers; perianth 4-partite, stamens 4, exserted; female flowers: perianth broadly tubular, 4-toothed; ovary free, 1-ovulate; style long and filiform. Achenia numerous, surrounded by the floral perianth and covering the globose, fleshy receptacle.

The Fustic-tree is very variable in form and shape; sometimes it is armed with sharp axillary spines, other times without them; the leaves are either entire or serrate, both forms occuring side by side on the same branchlets. The Panamanian specimens, however, are found mostly with serrate leaves and belong to the variety designated as *Chlorophora tinctoria xanthoxylon*.

Description of the Wood[1]

Sapwood very thin, nearly white; heartwood light yellow, but becomes darker after exposure to air and light. Wood hard, heavy, strong, tough, usually straight and close grained, taking and excellent polish and durable in contact with the soil. Annual rings of growth not visible.

Pores (transverse section) rather numerous, moderately large (.02 to .25 mm. in diameter), round when isolated, radially compressed when two or more vessels are adjacent, open or closed with dark-brown tyloses, and arranged singly, in pairs, or in short radial rows, seldom more than 3. Vessel walls (longitudinal section) with numerous bordered pits and occasionally large simple pits occur where they are in contact with pith rays or wood parenchyma. Wood fibers .939 mm. long, with thick walls, small lumina and small slit-like simple pits. Wood parenchyma is abundant, surrounds all vessels, and occurs in tangential bands, forming structures which contrast strongly with the bands of harder tissue bordering on the outside and inside (transverse section). Crystals of calcium oxalate present. Rays numerous, barely visible under hand lens, from 1 to 3 cells wide, and from a few to 30 or more cells high.

Distribution, common names and uses

In Panama the fustic tree is common in the lower, semi-arid belt of the Pacific, where it prefers the proximity of the sea-shore and the well-drained banks of the small rivers. It has been more or less exploited, in view of its commercial value, in the more accessible places. In Costa Rica, it grows up to about 600 m. above sea level. It is known all over Central America as mora or palo de mora. In the trade the wood is called old fustic, fustic mulberry, Cuba wood and yellow wood.

Mora yields valuable yellow, brown, and green dyestuffs and is usually imported into the United States in the form of sticks from 2 to 4 feet long and from 3 to 8 inches in diameter. Locally, it is used extensively in wheelwright and cabinet work and for all purposes requiring great strength and durability.

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1) Fustic Wood; Its substitutes and Adulterants. Forest Service Circular 184.

Chlorophora tinctoria

Polygonaceae

The Sea-Grape Tree

Coccoloba uvifera L. Syst. 10, 1007 - 1758 -59.

Description of the tree

A tree, up to 18 m. high and 40 cm. in diameter, the trunk straight or twisted, erect or decumbent, covered with a reddish, more or less scaly bark, the crown irregular. Leaves alternate, thick, coriaceous, glabrous, the petioles broad, about 8 mm. long, the blade orbicular or broader than long, emarginate at the base, 10 to 12 cm. long, 15 to 18 cm. borad, the costa prominent on both sides; stipules short, clasping (2 adnate), glabrous. Racemes simple, slender, subpendulous, up to 30 cm. long, the rachis pubescent, surrounded at the base with glabrous bracts. Flowers fasciculate, the pedicels articulate at the middle, 2 to 4 mm. long; perianth 5-lobulate, about 3.5 mm. in diameter, the tube turbinate, the lobes greenish; stamens 8 to 9; ovary subglobose, sessile; styles 3. Berries purplish, succulent, ovoid or globose, 1-seeded, 1.5 to 2 cm. in diameter.

Description of the Wood

Sapwood fairly thick, very light red; heartwood darker colored, occasionally with nearly black linear markings, giving it a pleasing effect in cabinet work. Wood very hard, heavy, strong, very close grained, taking an excellent polish. Annual rings of growth not visible in most samples of this wood.

Pores (transverse section) very few, small (.125 mm. in tangential diameter); open or occasionally closed, radially elongated and arranged singly or in radial rows of from 2 to 4. Vessel walls (longitudinal section) thin with numerous small bordered pits where in contact with pith-ray cells and wood-parenchyma fibers. Ends of vessel segments wholely absorbed. Wood fibers about..7588 mm. long, and with thin walls and relatively large cell cavities. The pits are few, small and simple. Wood-parenchyma fibers scarce and present

only in the neighborhood of vessels and pith rays. Crystals of calcium oxalate seldom present in wood-parenchyma. Pith rays small, not visible under a hand lens, from 1 to 3 cells wide and from a few to 12 or more cells high; individual ray cells very rarely contains crystals of calcium oxalate.

Distribution, common names and uses

The Sea-grape is a tree strictly restricted to the sandy or rocky sea-beaches, on the coast of both the Atlantic and Pacific Oceans, from the Isthmus of Tehuantepec Southward to Brazil and Peru, being also common in the West Indies. In Panama and Costa Rica, it is generally known as uvero de playa, in the latter country sometimes also as papaturro, in Campeche as uva de mar, and in Cuba and Porto Rico as uvero, while the fruits are uvas caletas. It is called Raisinier de plage in the French West Indies, guajabara by the Brazilians, and sea-grape, mangrove grape-tree and pigeon-wood in the British possessions of tropical America (the first name, sea-grape, applies also to one of the marine algae). The tree is sometimes cultivated on account of its fruit and the wood of the larger trunks is highly valued as material for cabinet-work.

The Caracas Triplaris

Triplaris caracasana Cham., Linnaea 8:137-1833.

Description of the tree

A slender dioecious tree, up to 10 m. high and 35 cm. in diameter, the trunk straight, covered with a grayish rugged bark, the crown ovoid elongate and sparsely branched, the young branchlets fistulose with a greenish, sparsely villous or glabrous epiderm. Leaves alternate, coriaceous, the petioles broad, canaliculate, 0.5 to 1 cm., the blades elliptic-oblong, more or less acute and decurrent on the petiole at the base, acuminate, 15 to 30 cm. long, 4 to 12 cm. long, glabrous and dark green above, light green beneath and glabrous excepting the villous, laterally barbate costa; venation very prominent on the lower face of the blade; stipules clasping, caducous. Inflorescences racemose, forming large,

many-flowered terminal panicles, the rachis hairy tomentose. Male flowers sessile, each provided with 2 clasping, ovate-acute, hairy bracteoles, about 5.5 mm. long; perianth funnel-shaped, 6-lobulate, pubescent, about 4.5 mm. long; stamens 8, exserted, the filaments hairy, adnate at the base with the perianth. Female flowers sessile, provided with a single, caducous bract, the perianth about 1 cm. long, broad, 3-lobate, hairy; staminodes 3, laciniate, hairy inside, shorter than the perianth; ovary globose-triangulate;styles 3. Achenium 3-winged, glabrous, glossy, about 11 mm. long, crowned with the persistent styles and surrounded by the accrescent perianth, this red, about 5 cm. long, the tube hairy, the lobes sparsely so and reticulate.

Description of the Wood

Sapwood thick and yellowish white; heartwood yellow tinged with red turning darker with age. Wood very hard, heavy, strong, tough, straight and fine-grained, taking a good polish. Annual rings of growth clearly visible under high power of microscope.

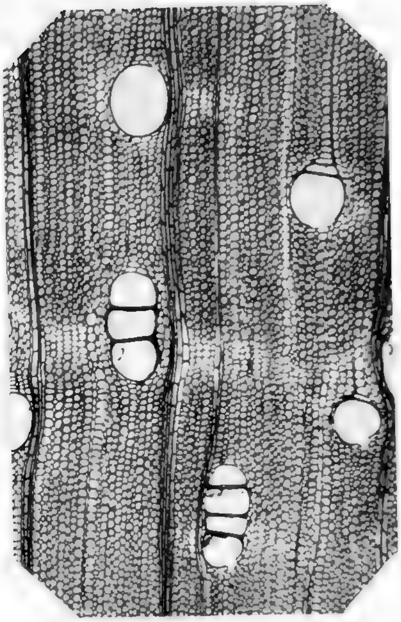
Pores (transverse section) not very numerous, (about .22 mm. in diameter) round, open, and arranged singly, in pairs, or in very short radial rows. Vessel walls (longitudinal section) with numerous very small round bordered pits; pit opening slightly elongated transversely. Perforations simple. Wood fibers about .71 mm. long with rather thick walls and small cavities. The pits are exceedingly minute and obliquely slit-like. Wood parenchyma very sparingly developed. Pith rays very small and invisible with the hand lens on a smooth transverse surface. They are only 1 or 2 cells wide and from 6 to 12 cells high.

Distribution, common names and uses

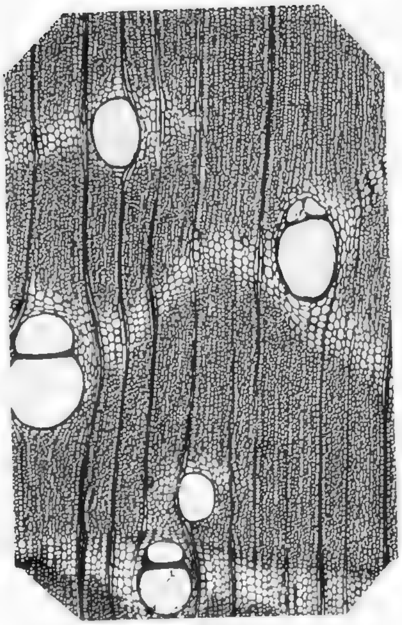
Triplaris caracasana Cham. extends along the coast of northern South America, from Venezuela into Central America, usually appearing in old clearings. In Panama, it is common along the railroad in the Canal Zone, being especially conspicuous at the fruiting time, on account of the showy red bunches loading the female individuals. This tree is characterized also by the presence of hosts of warlike, stinging ants, which inhabit the hollow branches and fall thick as

Triplaris caracasana

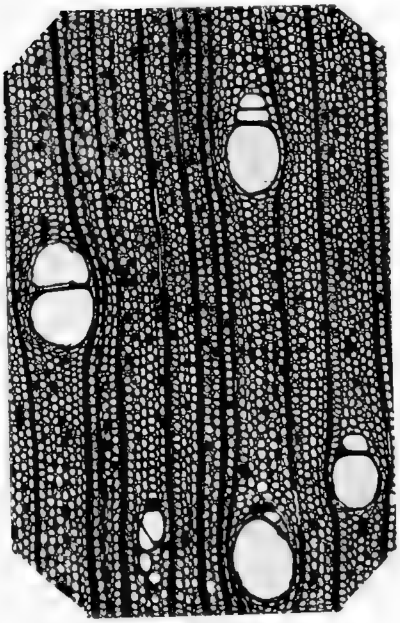
(In back ground *Tecoma pentaphylla*)



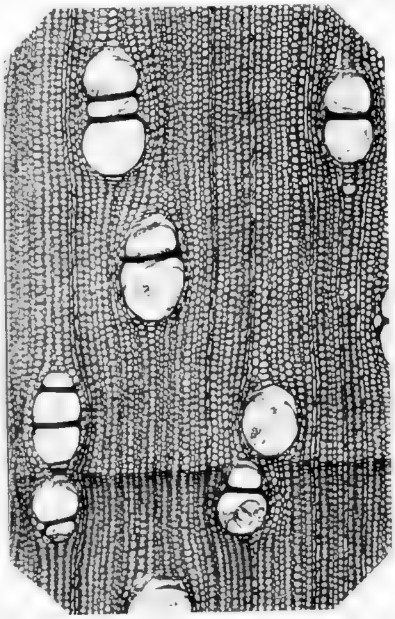
Castilla fallax



Chlorophora tinctoria



Coccoloba uvifera



Triplaris caracasana

rain on the intruder at his first contact with the trunk. On account of the almost absolute inviolability it owes to this protection it is called in Panama *vara santa* (holy pole). But it is also known in the same country as *palo hormiguero*, *guayabo hormiguero*, and in Costa Rica as *tabaco* and *hormigo*. It is also the *palo María* and *Barrabás* of the Venezuelians.

Magnoliaceae

The Panaman Talauma

Talauma sambuensis Pittier

Description of the tree

A large tree, 30 to 40 m. 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 end of the branchlets, the petioles 1.5 to 4 cm. long, slightly thicker at the base, flattened above, the 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; margin broadly sinuate. Stipules lanceolate, finely granular-reticulate, glabrous, caducous, about 2 cm. long. Flowers not known. Syncarpium 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.

Description of the Wood

Sapwood thin, light brown or nearly white; heartwood very dark, nearly black and tinged with purple; wood moderately soft, light, staight and fine-grained, easily worked, taking

a fairly good polish and not durable in contact with soil. Annual ring of growth clearly visible under hand lens on a smooth transverse surface.

Pores (transverse section) very numerous, rather small, (.13 mm. in diameter) round except when arranged in radial rows, open, and arranged singly or in small round groups of from 2 to 4 or in radial rows. Vessel walls (longitudinal section) where in contact with other vessels bear scalariform bordered pits and where in contact with pith rays or wood parenchyma have simple pits; spiral thickening present. Perforation scalariform with numerous simple or branched bars across the long slanting ends. Wood fibers about 1.71 mm. long with thin walls and relatively large cell cavities and few simple pits. Wood-parenchyma very scantily developed, occasionally present in early wood or around vessels. Rays narrow hardly visible under hand lens, from 1 to 5 cells wide and from 4 to 6 times as high.

Distribution, common names and uses

Our knowledge of the specific value and of the distribution of the several recorded forms of the genus Talauma in Central America is so imperfect, that it is not possible to determine for the present their respective areas, neither to fix their true relationship. Apparently they are distinct, very much localized types and scarcely represented within their natural habitat. Of the tree described above, a single specimen was found and designated by our Choco Indian guides under the name of Kakuá biuí. The wood, white and rather soft, is not known to be of any use whatever.

Annonaceae

The Panaman Desmopsis

Desmopsis panamensis (Robinson) Safford[1]

Description of the tree

A small tree, 4 to 8 m. high, symmetrical in habit, the trunk erect, continuous, covered with smooth, brownish gray bark, the branching radiate, the crown pyramidal. Leaves alternate, distichous, submembranous, the petioles short, the blades elliptic or oblong, acute at the base, short-acuminate, 10 to 20 cm. long, 3 to 7 cm. broad, glabrous above, rufous-pubescent beneath, the more so on the prominent veins. Flowers usually paired, the common peduncle, issuing opposite of one leaf, short, thick, provided at the end with a suborbicular, cordate, foliaceous bract, the pedicels long and slender; calyx small, 3-partite, the segments ovate-triangular; petals 6, greenish yellow, nearly erect, the margins revolute, the tips inflexed; receptacle himispherical or convex; stamens numerous, short, cuneate, the pollen-sacks parallel, capped by their crowded, hexagonal, expanded connectives; carpels 5 to 12, densely covered with minute dark brown stiff hairs. Fruit borne on a short stipe, oblong, long, 10 mm. in diameter, slightly torulose or marked by rings corresponding to the seeds within; seeds 6 to 8, discoid, grooved on the edge.

Description of the Wood

Sapwood usually wide, dark brown; heartwood somewhat darker. Wood hard, heavy, very strong, straight-grained, easily worked, taking a fine polish, and durable in contact with soil. The wood has a fishy odor. Annual rings of growth very narrow and visible only under the high power microscope.

Pores very numerous, minute (about .08 mm. in diameter), round when solitary, open in sapwood, but generally closed in heartwood and arranged singly, in radial rows or in small irregular groups of from a few to 6 or more. Vessel walls (longitudinal section) with numerous small bordered pits. Perforations simple, circular or elliptical. Wood fibers

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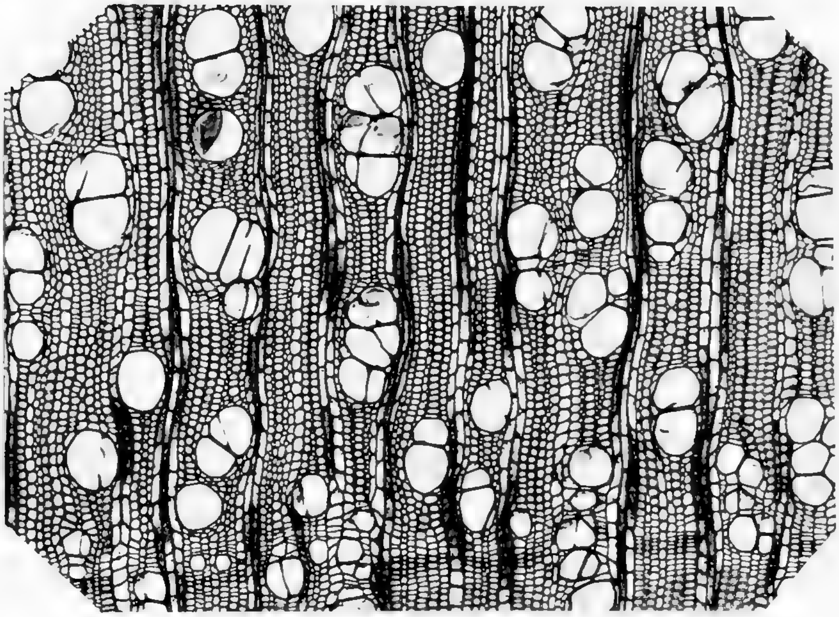
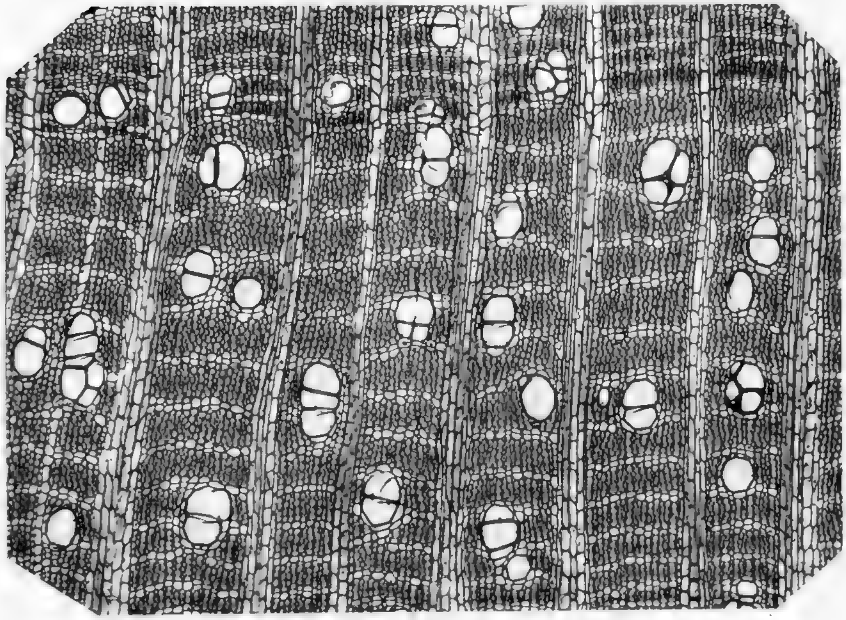
1) Unona panamensis Robinson, Am. Journ. Sc. III: 175. 1895.



Talauma sambuensis



Desmopsis panamensis

about 1.37 mm. long, with thick walls, fairly large cell cavities and a few small, oblique, simple, slit-like pits or sometimes with s small border. Arrangement of wood fibers in radial rows. Wood-parenchyma strongly developed and arranged in numerous faint tangential lines of about 1 or 2 cells wide, which alternate with lines of wood fibers. Rays usually rather wide and readily seen with hand lens on smooth transverse section, varying in width from 2 to 7 or more cells and frequently 6 to 10 times as high.

Distribution, common names and uses

This species is very little known and seems to have neither name nor use. It is introduced here rather as a representative of an order which includes several useful timber trees, woods of which have not yet been obtained.

Myristicac~~c~~eae
(Nutmeg-Family)

Warburg's Nutmeg-Tree

Virola Warburgii Pittier, Contr. U.S. Nat. Herb. 18:142,1916

Description of the tree

A dioecious tree, 15 to 30 meters high, the trunk straight, erect, 25 to 60 cm. in diameter at the base, the crown pyramidal. Leaves coriaceous, the petioles 1 to 2 cm. long, thick, densely ferruginous-tomentose, the blades 9 to 35 cm. long, 3 to 12.5 cm. broad, elliptic, acuminate, glabrous above, more or less ferruginous-tomentulous beneath; costa brown tomentose on the upper face of the leaf; costa and veins very prominent and densely tomentose on the lower face, the latter 10 to 15. Floral panicles ample, axillary, the rachis dense-

ly ferruginous-tomentose. Male inflorescence: panicles about 10 cm. long, the peduncles 1.5 to 3 cm. thick; floral clusters bracteolate at the base, the bractlets ovate-rounded, caducous; pedicels about 1.3 mm. long; perianth funnel-shaped, 3-fid, about 1.7 mm. long, ferruginous-tomentose without; anthers usually 6, about 0.5 mm. long, shorter than the thick staminal column. Female inflorescence imperfectly known. Fruit obovate, 1.6 cm. long and about 1.3 cm. in diameter, covered without with a fugacious, ferruginous tomentum; aril deep pink, many branched in its upper part; seeds 12 mm. long, 9 mm. in diameter, pointed at the base.

The real Nutmeg-Tree (Myristica fragrans Houtl.), a native of the Molukkan Islands in tropical Asia, is represented in America by the genus Virola, of which two species are found in Panama and a few others in the neighboring countries of Central and South America. The relationship is very close and the fruits of Virola are miniatures of the nutmeg, without having however its strong aromatic properties.

Virola Warburgii is a gregarious tree, which in some parts of Panama forms a conspicuous element of the forest.

Description of the wood

Sapwood light brown; heartwood darker. Wood soft, light, not strong, splits readily, moderately fine-grained, taking a fairly good polish, resembling crabwood (Carapa guianensis Aubl.) Annual rings of growth easily seen with a hand lens on a smooth transverse section.

Pores (transverse section) numerous, moderately small (.125 mm. in diameter), round, open, sometimes closed with dark tyloses and arranged singly or more often in radial rows of from 2 to 4 or more. Vessel walls (longitudinal section) with numerous, small, with a number of large elliptical simple pits on the radial surface. End walls of vessel segments with simple perforations or sometimes with scalariform perforations, with from 1 to 8 bars. Wood fibers about 1.34 mm. long, occasionally septate, with few simple pits. Wood parenchyma fibers scantily developed. Pith rays narrow, from 1 to 2 cells wide and from a few to cells high.

Distribution, common names and uses

Virola Warburgii has been collected in the Chagres Valley, in Chiriquí and in Darien, and is by no means a rare species. It grows always in thickly forested districts and prefers low, fertile ground, river flats especially. In Chiriqui, it is known as bogamani. The wood is of little use; the seeds burn readily with a clear light and the native Indians stick them on a thin piece of hard wood and use them as torches when they have to go out in the dark.

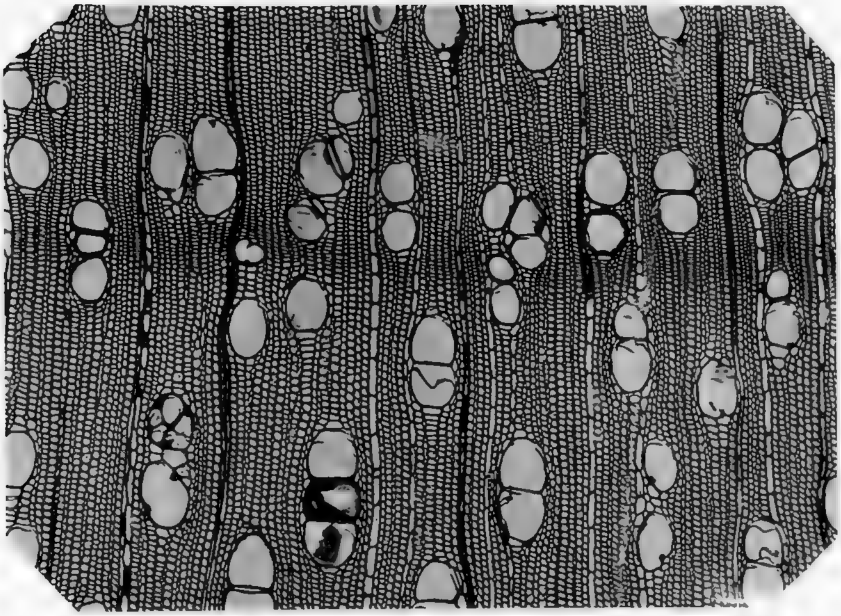
Lauraceae

The spreading Sigua

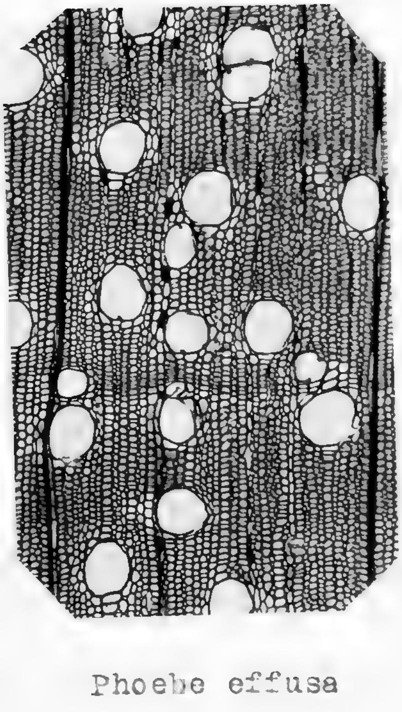
Phoebe effusa Meissn., DC. Prodr. 15, 1: 33 - 1864.

Description of the tree

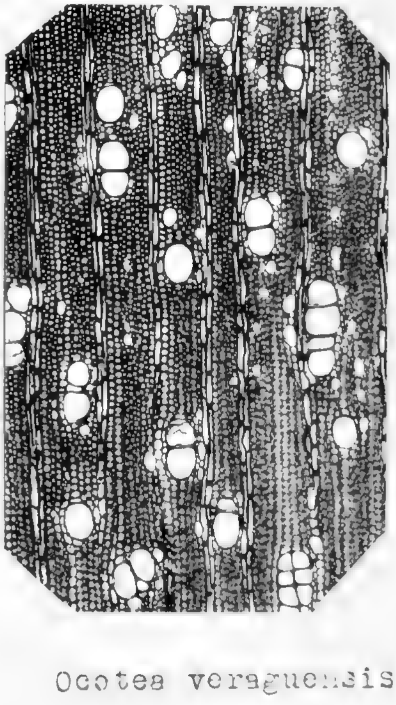
A tree often 30 m. high, the trunk erect, 75 to 100 cm. in diameter, covered with a grayish bark, the limbs ascendent, the crown irregular; flowering branchlets elongate and slender, the bark yellowish, more or less tomentellous toward the ends. Leaves subcoriaceous, the petioles up to 1 cm. long, canaliculate, the blades lanceolate or elliptic-lanceolate, cuneate at the base, acuminate, 6 to 17 cm. long, 2 to 6 cm. broad, more or less distinctly triplinerved, glabrous above, more or less pilous and barbulate in the axils of the prominent veins beneath. Inflorescence panniculate, glabrous, many-flowered; flowers greenish, very small, glabrous, ill-smelling; pedicels 4 to 7 mm. long; perianth 6-partite, the tube very short, the segments ovate, acute, the 3 exterior ones smaller; stamens of the two outer series contracted at the base in a short filament, the connective ovate; stamens of the third series narrower, not contracted and provided at the base with two large glands; staminodes (4th series) broadly ovate at the base, acuminate. Ovary subglobose, about 0.5 mm. in diameter, the style short and subcapitellate. Berry ovate-elongate, about 1 cm. long and 6 mm. in diameter,



Virola warburgii



Phoebe effusa



Ocotea veraguensis

surrounded at the base with the persistent segments of the perianth, attenuate in a thickened pedicel.[1]

Description of the Wood

Sapwood thick and light brown; heartwood slightly darker. Wood moderately soft, light, not strong, rather fine grained, taking a moderately fair polish, and is not durable in contact with the soil. Annual rings of growth very narrow and scarcely visible under the high power microscope.

Pores (transverse section) very numerous, small (about .13 mm. in diameter), usually round, open, and arranged singly or sometimes in pairs. Vessel walls (longitudinal section) with numerous small simple or bordered pits, or sometimes on radial surface with large transverse elongated simple pits resembling scalariform markings. Perforations simple. Wood fibers about 1.068 mm. long, with very thin walls, large lumina and small simple pits. Wood parenchyma not very abundantly developed. Rays very small, hardly visible under the hand lens, from 1 to 3 cells wide and from 3 to 5 times as high.

Distribution, common names and uses

The spreading sigua has been reported so far only from several localities in Central Mexico; its discovery in the forests of Chiriqui makes it probable that its area extends all over Central America. In Chiriqui it is known as *sigua blanco* and is extensively used for building purposes.

The Veraguan Ocotea

Ocotea veraguensis Mez, Laurac. Amer.: 240, 1889.

Description of the tree

A middle sized tree, with grayish, smooth or slightly

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[1] The identification of this species is subject to revision. The perianth and stamens of n° 48 Liebm. were transparent dotted and the stamens and staminodes are more or less pubescent. The

rugose bark, the branchlets ferruginous hairy at the ends. Leaves alternate, glabrous, coriaceous, the petioles canaliculate, 5 to 8 mm. long, the blades elliptic to oblong-lanceolate, acute at the base, obtuse or subacuminate at the apex, 7 to 12 cm. long, 2 to 4.7 cm. broad, olive green, minutely reticulate beneath. Inflorescence paniculate, terminal, ramose, the rachis minutely pubescent; flowers sweet-scented, white, the pedicels up to 10 mm. long; perianth tube very short, the divisions 6, ovate obtuse, dark lined longitudinally, 4 mm. long. Stamens 3-seriate, introrse and fertile in the two outer series, sterile and provided at the base with 2 large glands in the inner series, the anthers sessile and 4-celled. Pistil glabrous, about 2 mm. long, the ovary ovoid, the style short, the stigma capitellate and papillose. Berry ovoid, about 2 cm. long and 1 cm. in diameter, surrounded at the base by a flat, salver-shaped cupula.

Although growing preferently in the forest, this tree is often found in isolated individuals in the savannas and pastures. In this case, the trunk is low and seldom erect, and the crown depressed or elongate and more or less spreading. But when it grows in the forest, the appearance of the Ocotea is very distinct, the trunk becoming a long and clean shaft, surmounted by a scant crown. The bark is aromatic with a cinnamon-odor.

Description of the Wood

Sapwood thick, pale yellowish; heartwood very dark brown resembling walnut wood in general appearance. Wood hard, moderately heavy, tough, cross- and very close-grained, durable and taking a very good polish. Annual rings of growth usually narrow and visible only under high power microscope.

Vessels (transverse section) very numerous and small (.07 mm. in diameter), round or radially flattened when it rows, open in sapwood, generally closed in heartwood, and arranged singly or more often in radial rows of from 2 to 6 or more. Vessel walls (longitudinal section) with both simple and bordered pits and sometimes large elliptically elongated (transversely) pits resembling scalariform markings on radial side. End walls of vessel segments nearly horizontal and simple. Wood fibers about 1.256 mm. long, with septate, moderately thick walls, small cavities, and few oblique simple pits. Wood-parenchyma fibers scantily developed and occuring

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filaments of the anthers are more or less barbate. In the leaves, which are thinner and smaller, the costa is pubescent and even hairy. Nevertheless, the specimens agree tolerably with my 2937, the flowers of which are almost all immature. H.P.

only around vessels. Pith rays barely visible under hand lens very minute, from 1 to 3 cells wide and from a few to 15 cells high.

Distribution, common names and uses

The Veraguan Ocotea is distributed along the Pacific Coast of Central America from Tehuantepec to the Panama Canal. On the Atlantic watershed, it is known only in Alta Verapaz, a part of Guatemala which enjoys, like the southern coast, a climate with a well characterized dry season. The wood is used to some extent for light carpenter work; it is strong, lasting and easy to handle, but as the tree seldom reaches a satisfactory size and is not gregarious, the supply is necessarily limited. It is known in Panama as sigua canelo, in Costa Rica as canelo and canelillo, in Omotepe, an island of Lake Nicaragua, as palo colorado, and among the Kekchi Indians of Guatemala as pu-bu-buk.

Capparidaceae

The Garlic-scented Crataeva

Crataeva Tapia Linn. Sp. Pl. ed. 1: 637 (ex parte) - 1753.

Description of the tree

A small or middle-sized tree, up to ~~12~~ 16 m. high, and 35 40 cm. in diameter, the trunk erect, continuous, covered with a dark gray, verrucose bark, the branching radiate, the crown pyramidal or rounded; wood emitting a faint garlic odor. Leaves alternate, digitate, glabrous, exstipulate, the petioles 5 to 15 cm. long; leaflets 3, membranous, the petioles 4 to 10 mm. long, the blades ovate or oblong-lanceolate, 5 to 12 cm. long, 2.5 to 4.5 cm. broad, rounded at the base, acuminate, articulate on the petiole and very caducous. Inflorescences racemose, terminal, many-flowered; bracts lan-

ceolate, 4 to 7 mm. long; peduncles 2.5 to 6 cm. long; receptacle torulose, supporting the calyx and corolla; sepals 4, lanceolate, 5 to 8 mm. long; petals 4, long unguiculate, purplish white; stamens and pistil supported on a central, round column; stamens indefinite (8 to 50) with long slender filaments; pistil also very long, the ovary 1-celled. Berry subglobose, 3 to 4 cm. in diameter, orange yellow, pendulous; seeds numerous, ovoid, blackish, 5 to 6 mm. in diameter.

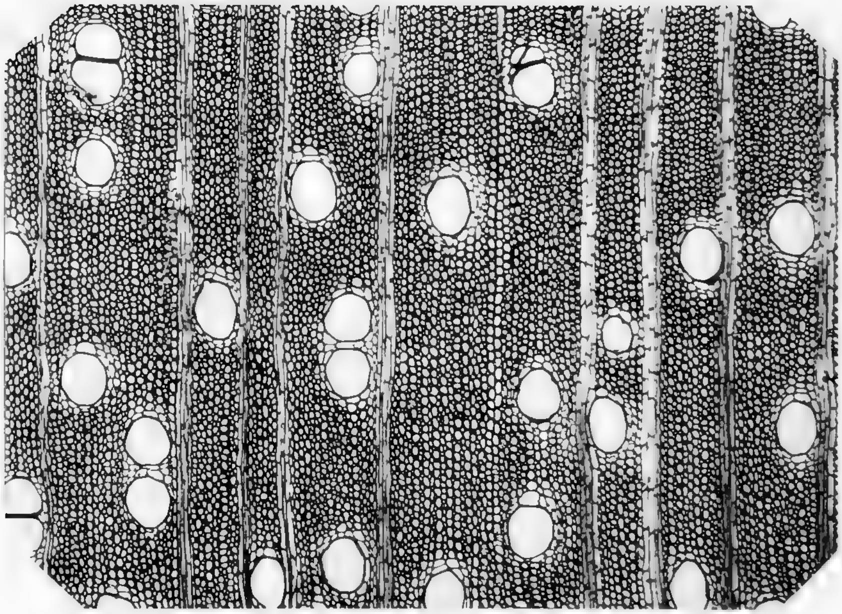
Description of the wood

Sapwood thick, nearly white, but sometimes yellowish upon exposure; heartwood yellow, often remoteyl resembling the darker shades of yellow poplar. Wood not very hard, moderately light, not strong, very fine grained, easily worked and not durable. Annual rings of growth clearly visible under hand lens on a smooth transverse surface.

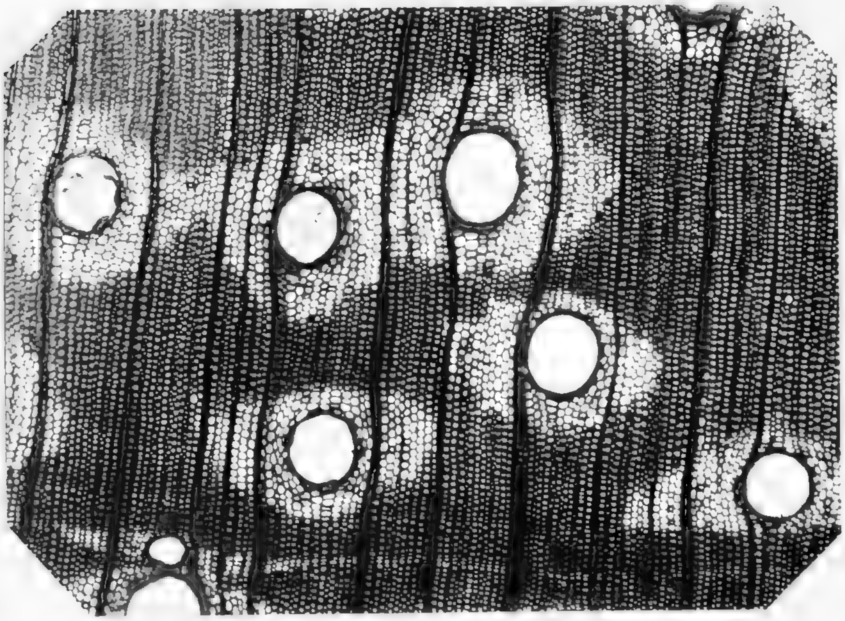
Pores (transverse section) not very numerous except in the beginning of the early wood, small (about .12 mm. in diameter), round or polygonal when isolate, open or often closed, and arranged singly or in small groups of two and three. Vessel walls (longitudinal section) with numerous bordered pits of varied size. Perforations simple. Wood fiber about .95 mm. long with few, simple, slit-like pits. Wood parenchyma sometimes strongly developed in the early wood and in the neighborhood of vessels. Rays numerous and plainly visible under hand lens on a smooth transverse surface, from 2 to 4 cells wide and from 4 to 8 times as high.

Distribution, common names and uses

This species is known ~~is~~ in Jamaica and in the low-lands of eastern South America, from Brazil to Panama. In the last country it has no known uses and no vernacular name has been recorded.



Crataeva tapia



Enterolobium Schomburgkii

Mimosaceae

Schomburgk's Enterolobium

Enterolobium Schomburgkii Benth. in Hook. Lond. Journ.

Bot. 3: 219- 1844.

Description of the tree

A tree about 30 m. high, and often 1.5 m. in diameter, the trunk erect, covered with a rugose bark, the crown flat and spreading, the young growth ferruginous pubescent. Leaves bipinnate, the rachis ferruginous-pubescent, with a large gland near the base of the main petiole, and other smaller ones between the pinnae and between the leaflets; pinnae 10 to 20-jugate; leaflets 50 to 60-jugate, narrow, falcate, 4 to 5 mm. long. Inflorescences axillary, mostly geminate or ternate, the peduncles about 2 cm. long, ferruginous pubescent. Calyx tubular turbinate, about 2 mm. long; corolla infundibuliform, 4 mm. long; stamens 20, white 1.5 cm. long. Legume broad, cochleate, 5 to 6 cm. in diameter, glabrous, sublignose, indehiscent.

Description of the Wood

Sapwood thick, very light brown; heartwood much darker. Wood very hard, heavy, strong, durable, moderately fine-grained, taking a good polish. Annual rings of growth not visible under high power microscope.

Pores (transverse section) moderately numerous, large (.25 mm. in diameter), round, open or more ofted closed, with dark brown tyloses in the heartwood, and arranged singly or in pairs; often forming short, irregular, tangential lines, but vessel walls seldom contiguous. Vessels always imbedded within numerous rows of wood-parenchyma fibers. Vessel walls (longitudinal section) uniformly pitted with numerous small bordered pits. End walls of vessel segments nearly horizontal, chiefly with circular opening (simple perforation). Wood fibers about 1.27 mm. long, with very thick walls and small cell cavities, with a few small simple pits. Wood pa-

renchyma strongly developed and arranged chiefly around vessels, where it is clearly visible as white zones. Rays relatively few, small, from 1 to 3 cells wide and from 4 to 7 times as high.

Distribution, common names and uses

This species of Enterolobium has a very wide area of distribution, having been reported from many stations between the Amazonas Valley and the western-most part of Panama, where it is called harina or jarina. It grows there on the high plains and on the ridges along the coast, at an altitude of about 100 meters, always in the dense forest, of which it is in places the dominating and largest species. Cattle are very fond of the pods and seek them on the ground at the time of their maturity. The wood is heavy and fine-grained, but of little use among the natives on account of its hardness and the large size of the trunk.

Caesalpiniaceae

The Panaman Mora

Dimorphandra megistosperma Pittier

Description of the tree

A large tree, up to 45 m. high, the trunk 10 to 15 m. long, and up to 1 m. in diameter, covered with a darkish, smooth bark, the crown elongate, the branchlets terete. Leaves quite glabrous; common petiole 5 to 10 cm. long; leaflets 2-jugate, leathery, the petiolules 3 to 4 mm. long, the blades suboblique, oblong-acuminate and obtuse, shiny above, 10 to 18 cm. long, 4 to 7 cm. broad. Floral spikes 8 to 10 cm. long; flowers sessile, glabrous; calyx 3.5 to 4 mm. long, the lobes rounded, ciliate; petals 5, white, obovate or

oblong, subemarginate, 6 mm. long, the margin ciliate; staminodes and stamens 5 each, longer than the petals, the former claviform, the latter barbate below the anthers; pistil stipitate, the ovary wooly villous, 3-ovulate, the style glabrous. Legume 1-seeded, coriaceous, up to 25 cm. long and 13 cm. broad; dehiscent; seed bean-shaped, of a shining mahogany color, 18 cm. long, 12 cm. broad when largest.

A gregarious tree, often provided with large buttresses, and the horizontal, almost superficial roots of which run to a great distance.

Description of the wood

Sapwood thick and nearly white; heartwood brown or reddish brown. Wood very hard, heavy, strong, tough, unusually coarse and straight-grained, taking a fairly good polish. It splits and works easily. The annual rings of growth not clearly marked even under the compound microscope.

Pores (transverse section) not numerous, conspicuous (about .16 mm. in diameter), round or elliptical, usually open both in sapwood and heartwood, and arranged singly or in radial rows of two or three. Vessel walls (longitudinal section) with numerous very small round bordered pits, these with slightly transversely elongated openings. The ends of vessel segments nearly horizontal and completely absorbed. Wood fibers about 1.5 mm. long with rather thick walls and small cell cavities. The pits very minute and oblique slit-like. Wood-parenchyma abundantly developed around the pores and in irregular tangential rows. The rays from two to four cells wide and from 5 to 20 times as high.

Distribution, common names and uses

The Panaman Mora is characteristic of the inner tidal belt of the Pacific, where it forms extensive forests, bordering at times for miles on the rivers. The natives Panamanians calls it alcornoque or cork-tree, a name the reason of which is not clear, since the bark is thin and the wood very hard. From the seeds they used to extract by infusion a dark red dye. The wood, dark reddish in

the heart and white in the sap, is very hard and claimed to be an advantageous substitute for oak and other hard timbers, especially for structures kept permanently under sea water. Large quantities of alcornoque wood could be obtained in Panama.

The Cativo or Prioria-tree

Prioria copaifera Grisebach, Fl. Brit. West Ind. 215,1864.

Description of the tree

A tree up to 50 meters high and 1.2 m. thick near the base, the crown broad and elongate, the bark grayish and smooth. Leaves paripinnate, glabrous, the rachis smooth or verruculose; leaflets 2-jugate, oblique, coriaceous, opposite, the petiolules thickish, about 7 mm. long, the blades elliptic-lanceolate, rounded at the base, subobtuse at the apex, 6 to 13 cm. long, 3 to 7 cm. broad, transparent dotted, the venation slightly prominent on both faces. Inflorescences terminal, paniculate, glabrous, the spikes alternate, 4 to 10 cm. long; flowers small, white, sessile, solitary or clustered, each provided with a minute involucral bract; calyx turbinate, 5-lobed, the tube about 1 mm. long and the segments rounded, 2.5 mm. long; no corolla; stamens 10, the filaments hairy; ovary sessile, 1-ovulate, hairy; style filiform, ending in aminute stigma. Pod obovate-orbiculate, flat, brownish, 8 to 12 cm. long, 6 to 7 cm. broad, 1-seeded; seed flat, exalbuminous.

Description of the wood

Sapwood thick, very light yellow tinged with red; heartwood darker often stained dark brown by a copious diffusion of resin, which oozes from resin-bearing canals. Wood moderately hard, heavy, not strong, fine-grained, and not subject to good polish. Annual rings of growth not visible even under high power microscope.

Vessels (transverse section) few, moderately large, (about .13 mm. in diameter), round or elliptical, open or sometimes closed with dark brown tyloses, and arranged chiefly singly, sometimes in small groups or radially in pairs. Vessel walls (longitudinal section) with numerous, large and small bordered pits; pit openings transversely elongated, sometimes united and forming ladder-like appearance. In addition to vessels and closely resembling them even under low magnification are resin canals, which are surrounded by numerous wood-parenchyma fibers or resin-secreting cells. Ends of vessel segments completely absorbed. Wood fibers about 1.69 mm. long with varying thicknesses; cell walls of larger fibers moderately thin and large cell cavities; small fibers with thick walls and obliterated cell cavities. Wood fibers irregularly arranged and very small fibers scattered in among large ones. Wood-parenchyma fibers abundant and arranged in tangential lines connecting vessels; also grouped among wood fibers and surrounding all vessels. Pith rays numerous, narrow, barely visible under hand lens, from 1 to 3 cells wide and from a few to 15 or 20 cells high.

Distribution, common names and uses

While in its typical station at Bachelor's Hall, Jamaica, this tree is said to grow at an altitude of about 200 meters above sea level, it belongs exclusively to the low, permanently or temporarily inundated forests of both the Atlantic and Pacific watersheds of Panama. In the Chagres basin it has been reported from the mouth of the river to Matachin, a locality presently under water, and in 1914 it was still conspicuous among the live trees of the inundated area, forming extensive groups if the Gatun, Trinidad and Caño Valleys. In Darien, it is the dominant species of the valley flats immediately closing upon the tidal belt. The forests of this section, the soil of which is more or less covered with fresh water during the heavy rainy season, are known as *cativales*, on account of the predominance of the *cativo*, this being the native name of the species. These flat districts are considered as the best for rice cultivation, probably on account of their abundant humidity.

The hard, heavy wood of the cativo is resinous and difficult to work; it is considered as of little or no use.

[illegible]

The Chirican Copaiba-Tree

Copaifera chiriquensis Pittier

Description of the tree

A large tree, up to about 30 m. high and 1.20 m. in diameter, with a rounded-depressed crown, and a reddish, densely verrucose bark. Leaves glabrous, 5 to 11-foliate, pari- or imparipinnate, the rachis terete, slender, 5 to 15 cm. long; leaflets briefly petiolulate, alternate excepting sometimes the terminal pair, the blades strongly oblique, elliptic-lanceolate, rounded at the base, more or less abruptly acuminate with an obtuse tip, sparsely transparent dotted, 2.5 to 5.5 cm. long, 2 to 2.5 cm. broad. Flowers not known. Legume almost sessile, briefly stipitate, orbiculate, depressed, 1-seeded, 2.3 cm. in diameter; seed ovoid, about 12 mm. long and 8 mm. in diameter, black and lustrous.

In his Flora of Panama, Seemann mentions a Copaifera officinalis collected by Warszewicz in the same region and which is identical either with the above species or with C. persimilis Pittier, described also from eastern Chiriqui. Both species differ from the true C. officinalis (L.) Willd. in the number of leaflets; in Copaifera chiriquensis the pods are small and orbicular; in C. persimilis the pods are very similar to those of C. officinalis but the leaflets are imparipinnate and 5 to 7-jugate instead of paripinnate and 2 to 4-jugate.

[illegible]

Description of the wood

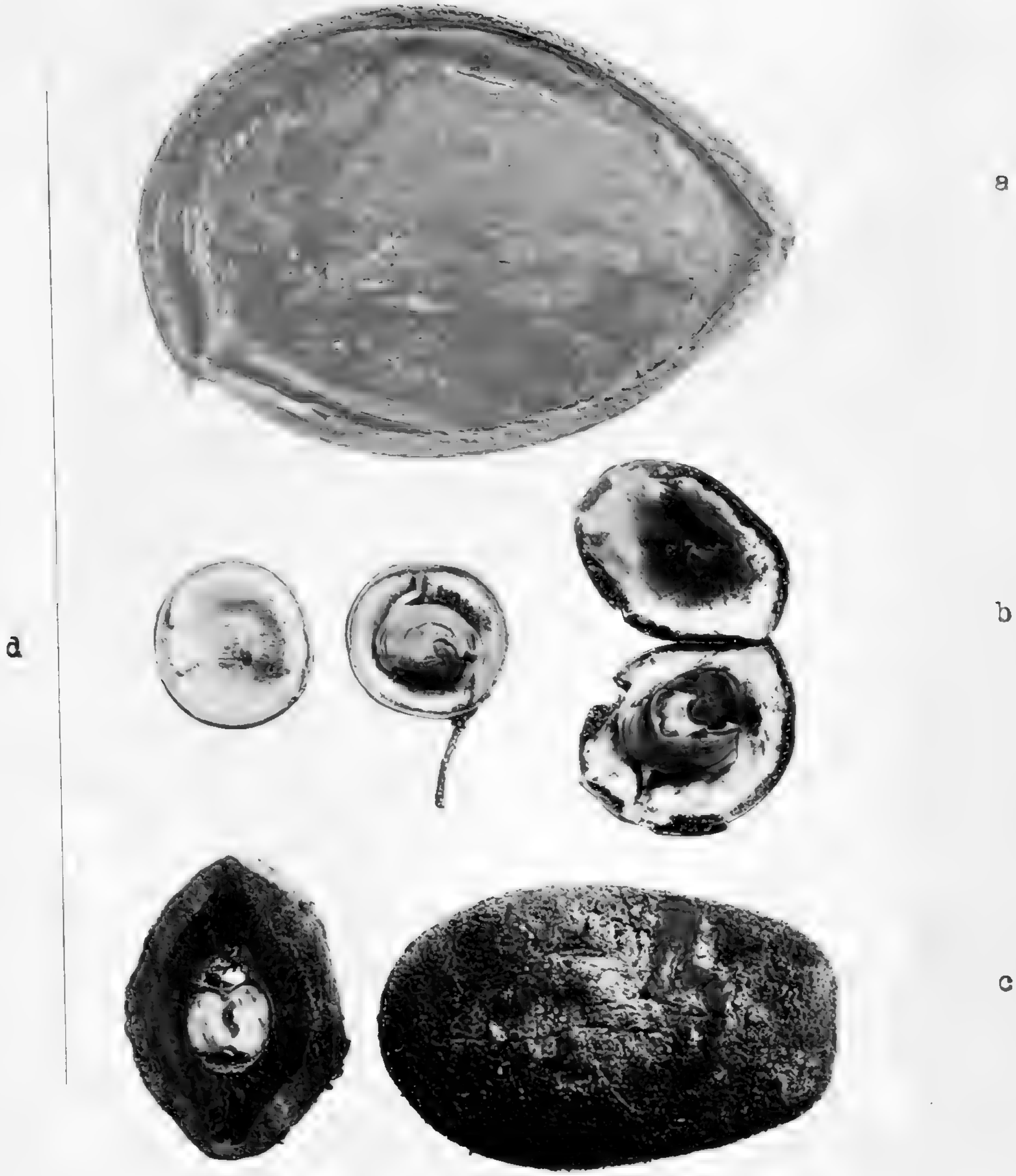
Sapwood thick, light brown; heartwood darker. Wood moderately soft and light in weight, not strong, straight and coarse-grained, not taking a very good polish. Annual rings of growth not evident; the conspicuous tangential bands of wood-parenchyma fibers are not indicative of annual layers of growth, because these lines frequently meet or disappear abruptly.

Pores (transverse section) rather numerous, large (.18

mm. in diameter(, round, open or occasionally closed with dark reddish tyloses in the heartwood, and arranged singly or in short radial rows of from a few to 4 to 6. Vessel wall (longitudinal section) with both simple and bordered pits; usually large bordered pits in places where two vessels abut upon each other. End walls of vessel segments often oblique or horizontal and invariably wholly absorbed. Wood fibers with relatively thin walls, moderately large cell cavities and few small simple or slightly bordered pits; they are not so distinctly radially arranged, but numerous, with smaller fibers wedged in between the larger ones. Wood-parenchyma fibers very highly developed, occuring in numerous tangential lines and grouped around vessels. Pith rays numerous, barely visible under the hand lens, usually from 1 to 4 cells wide and 4 to 6 times as high.

Distribution, common names and uses

This tree is known only from the western part of the republic of Panama, in Veraguas and Chiriquí, on the Pacific watersed. It grows on the extensive forests of the coast hills and does not seem to ascend the slopes above 150 meters. It is a remarkable tree on account of the thick veins or cavities filled with an oily liquid, which run from the one to the other extremity of the trunk in old trees. This liquid is one of the various copaivas of commerce, well-known as a medicinal drug. There is no record that it has ever been exported from Panama, but the natives used it formerly in its crude state as a paint, beside applying it to the curation of certain diseases. They call the tree as well as the drug, camibar, camiba and caniva, which names are all variations of some indigenous word. It is claimed that the veins thus filled with the liquid balsam sometimes burst with s sharp report. The pods always contain drops of a transparent yellowish gum or resin. The wood, which is said to be excellent and hard, is not used to any extent.

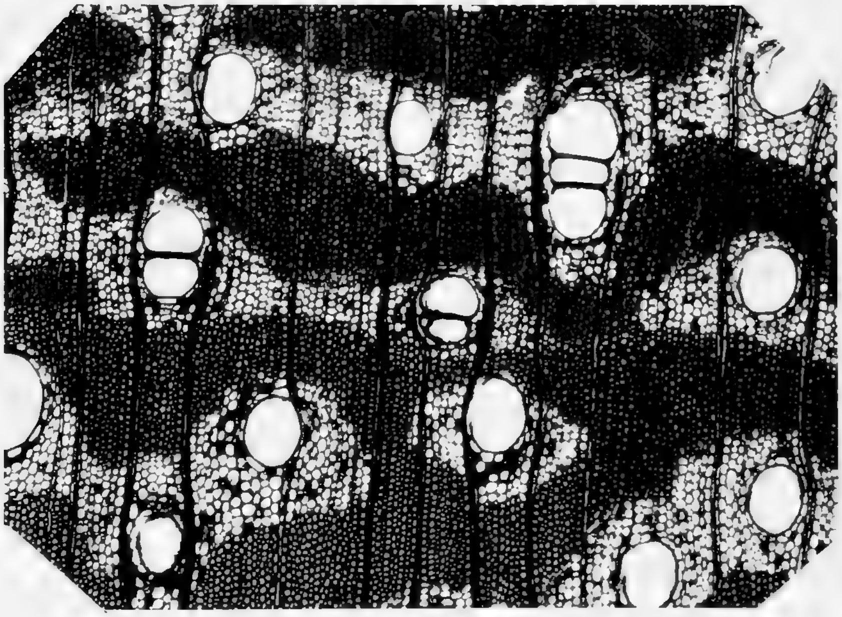


a. Prioria copaifera

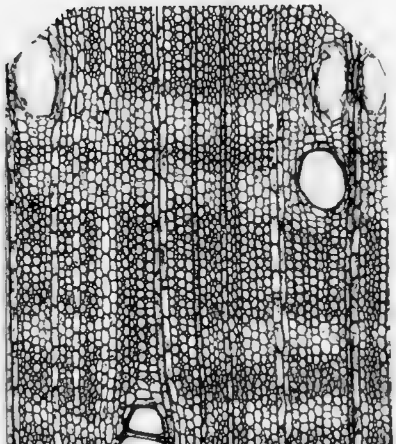
b. Copaifera chiriquensis

c. Coumarouna panamensis

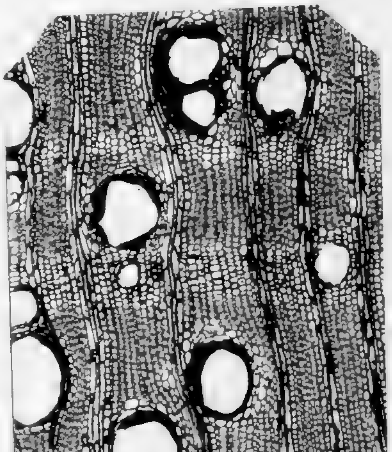
d. Copaifera persimilis



Dimorphandra megistosperma



Prioria copaifera



Copaifera chiriquensis

Nazarene Tree

Peltogyne purpurea Pittier

Description of the tree

Large, low branched, quite glabrous, with a smooth, grayish bark and an elongated crown; branchlets slender, purplish. Leaves deciduous; stipules membranous, crescent-like, acuminate, caducous; leaflets 1-jugate, briefly petiolulate; stipels thread-like, very caducous; petiolules 3 to 4 mm. long; leaflets unequilateral, falcate, narrow, obliquely rounded at the base, acuminate, 5.5. to 6.5 cm. long, 2.5 to 3 cm. broad. Flowers not known. Legume pedicellate, semiorbiculate, thin and smooth on the margin, mucronate at the tip, 1-seeded, 3 cm. long, 1.6 cm. broad; seed obliquely ovate, depressed, the funicle broadened into a salver-shaped aril.

So far no flowering specimens of this tree have been collected. The blossoms are said to be white. The fruits remain on the trees long after their maturation and the seeds, when freed by the opening of the valves, continue to adhere to the valves through the funicle, reaching the ground only, as it seems, when the condition are favorable to insure germination.

Description of the wood

Sapwood thick and nearly white; heartwood purple streaked with darker or lighter shades of same. Wood very hard, heavy, strong, tough, fine-grained and often cross-grained, taking a very beautiful polish. It is difficult to split and work. Annual rings of growth not clearly visible even under the hand lens.

Pores (transverse section) not very numerous, small (about .12 mm. in diameter), round or slightly radially elliptical, usually closed or plugged up at regular intervals in the vessels, and arranged singly or in pairs. Vessel walls (longitudinal section) with numerous small round somewhat

irregular bordered pits with oblique slit-like openings. The vessel segments are short and have their ends absorbed. Wood fibers about 1.6 mm. long with rather thick walls and small cell cavities. The pits are very minute. Wood parenchyma developed abundantly around the pores and in short tangential lines often connecting neighboring pores by lines of this soft tissue. Starch is present. Pith rays numerous and rather small, from 1 to 5 cells wide and from 6 to many cells high.

Distribution, common names and uses

The Nazarene Wood is conspicuous for the intense purple color of its heart-wood; this color has been compared by the common people with that of the spilled blood of Christ of Nazareth on the cross, whence the name of nazareno, morado which means purple, is another synonym. There is an imperfectly known species of the same genus (Peltogyne porphyrocardium Griseb.) growing on the island of Trinidad, the wood of which is of the same color, but this does not seem to be the case with the Amazonian species, which are said to have a reddish or brownish heart. The wood of the Nazarene tree is very hard and heavy and though often spoken of is not of much use.

The showy Macrolobium

Macrolobium floridum Karsten, Fl. Columb. 1:151, t. 75 - 1858-61.

Description of the tree

Middle sized and up to 25 meters high, the trunk about 35 cm. in diameter with a smooth grayish bark, the crown elongated. Leaves glabrous, 2-foliolate; stipules subulate, glabrous, 8 to 12 mm. long, caducous; petiole 6 mm. long, very thick; leaflets subsessile, oblique, obovate-lanceolate, 25- to 30 cm. long, 9 to 11 cm. broad, the nervation prominent beneath, the exterior half broadly rounded at the base.

Floral racemes 12 to 16 flowered, either terminal or issuing from the old wood of the trunk and limbs. Peduncles bracteate, thick, 3 to 4 cm. long; flowers pedicellate about 6 cm. long; pedicels 8 to 10 mm. long, provided with a small bract at the base and bearing at the tip 2 obovate bractlets, about 12 mm. long, glabrous, connate at the base; calyx tube 1 cm. long, short stipitate; sepals 4, ovate-elliptic, imbricate, about 2 cm. long and 6 mm. broad, glabrous. Petal single, unguiculate, elliptic-lanceolate, nearly 4 cm. long and 12 mm. broad, frilled and irregular on the margin, pinkish white, very caducous. Stamens 3, included or hardly exserted; pistil 47 to 50 mm. long, the ovary stipitate, 5-ovulate; style pubescent at the base, capitellate. Legume woody, stipitate, 12 to 16 cm. long, 4 to 5 cm. broad, dehiscent by the rolling up of the valves; seeds 4 to 5, ovate, flat, 3.5 cm. long and 2.5 cm. broad.

Description of the wood

Sapwood thick, very light brown; heartwood dark reddish brown. Wood rather soft, moderately heavy, rather strong, coarse grained, easily worked, splits readily, taking a moderately good polish, and is durable in contact with the soil. Annual rings of growth clearly visible under high power microscope.

Pores (transverse section) not very numerous, large (.24 mm. in diameter), round, open in sapwood, but generally closed in heartwood with dark reddish tyloses, and arranged singly or occasionally in short radial rows of from 2 to 4. Vessel walls (longitudinal section) in contact with ray cells and wood-parenchyma fibers have numerous, very small bordered pits, or sometimes on radial side large elliptical simple pits, Perforations simple, large and circular. Wood fibers about 1.199 mm. long, with relatively thick walls, fairly large cell cavities, and few rather large bordered pits. Wood parenchyma copiously developed and arranged chiefly around vessels, and frequently forming tangential lines between two or more pores. Rays numerous, very small, barely visible under the hand lens, usually 1 cell wide, rarely 2, and from a few to 12 or 16 cells high.

Distribution, common names and uses

Karsten discovered this showy tree in the coast mountain

range of Venezuela near Puerto Cabello, near the middle of the last century, and described it in his magnificent work of the flora of Colombia. It does not appear to have been reported again since that time but its occurrence in the virgin forests around Port Obaldia, near the mouth of the Atrato River, seems to indicate a wide distribution along the southern shores of the Caribbean Sea. The natives of Port Obaldia have no name for it and the wood does not seem to be generally used.

The Darien Browneopsis

Browneopsis excelsa Pittier, Contrib. U.S. Nat. Herb.

18:157. 1916.

Description of the tree

A tree, 25 to 30 m. high, the trunk up to 50 cm. in diameter, covered with a grayish bark, the crown elongate, with spreading branches.

Leaves paripinnate, 2 to 3-jugate, glabrous, the rachis 4 to 10 cm. long, slender, terete, the leaflets subopposite, petilulate; petiolules 6 mm. long; leaflet blades ovate, long cuspidate, 3 to 10 cm. long, 1 to 4 cm. broad, subcoriaceous, glandular at the base, the costa prominent beneath; stipules small and deciduous. Inflorescences mostly terminal, the flowers grouped in 4 or 5 clusters surrounded by numerous, imbricate, deciduous bracts. Peduncles thick, about 1 cm. long; bracts clasping, obovate, pubescent, 2 to 3.5 mm. long, the upper ones longest. Receptacular tube thick, about 8 mm. long; sepals 4, petaloid, glabrous, the 3 exterior ones 2.5 cm. long, 5 mm. broad, the interior one shorter, broader, lobulate and clasping. Petals 5, obovate-elongate, about 3 cm. long and 5 mm. broad, pale pink. Stamens 14 or 15, up to 3.5 cm. long. Ovary stipitate, multiovulate, densely pubescent; style 4 cm. long; stigma capitellate. Legume about 18 cm. long and 3.5 cm. broad, flat, stipitate, falcate; seeds ovoid-depressed, 2.5 to 3 cm. long and 1.7 to 2.2 cm. broad.

The genus *Browneopsis* Huber is very closely related to *Brownea* Jacq., of which there are at least two indigenous representatives in Panama, besides *B. ariza* Benth., cultivated as an ornamental. Both genera are similar in habit and thrive in about identical conditions, but in Browneopsis the number of stamens is larger and we note also the absence of the floral sheath which is characteristic of Brownea. The type of Browneopsis is Brazilian, and *B. excelsa* is presently the only species found outside the Amazonian basin.

Description of the wood

Sapwood thin, nearly white; heartwood slightly darker or very light brown. Wood very hard, heavy, tough, strong, exceedingly fine-grained, taking an excellent polish. Annual rings of growth not visible under the hand lens on a smooth transverse section.

Pores (transverse section) numerous and small (.13 mm. in diameter), chiefly round or elliptical, open in the sapwood, completely closed in the heartwood, arranged singly or sometimes in radial rows of 2 or 3. Perforations simple. Wood fibers about .9778 mm. long, with thick walls and very small cell cavities, with very inconspicuous simple pits. Pith rays exceedingly numerous, very narrow, hardly visible with the hand lens on a smooth transverse section, usually one cell wide and from a few to 12 cells high.

Distribution, common names and uses

~~Brownea~~ excelsa is known only from the forests of Southern Darien, Panama, where it grows gregariously on high ground along creeks and running rivers. The inhabitants call it *cuchillito*, i. e., small knife or machete, on account of the shape of the pods. Although the wood is hard and durable, and can take a fine polish, it does not seem to be of any special use.

The large-leaved Brownea

Brownea macrophylla Linden

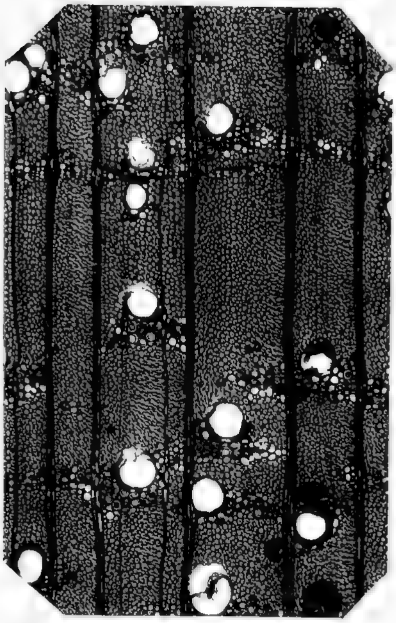
Description of the tree

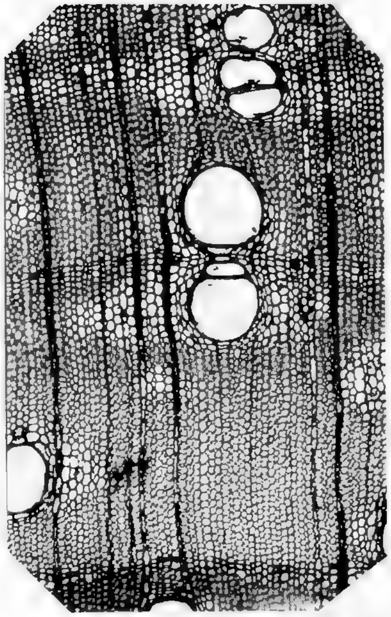
A tree 6 to 12 meters high, with sparse ramification, the young twigs villous. Leaves paripinnate, 3 to 6-jugate, the rachis more or less villous-pubescent, 20 to 40 cm. long. Leaflets opposite or alternate, the petiolules thick, 5 to 6 mm. long, pilose, the blades elliptic lanceolate, rounded or subacute and glandular at the base, longly acute-acuminate at the apex, 10 to 32 cm. long, 2 to 7.5 cm. broad (the terminal pair largest); costa villous and prominent beneath, the rest of the blade glabrous. Inflorescence in capitate spikes of 30 to 50 flowers each, growing from the trunk and lower limbs. Bracts pinkish white, varying from broadly ovate and 2 to 5 cm. long at base of spike to obovate-elliptic or lineal, up to 6 cm. long and as little as 2 mm. broad at the apex of same. Flowers fire-red, in the axils of the bracts, pedicellate, the sheath subcampanulate, grayish tomentose without, 3.5 to 4 cm. long, subilabiate with obtuse lobes; receptacle-tube 1.7 cm. long, slightly obconical; calyx segments 4, unequal, about 3 cm. long. Petals spatulate, 5 cm. long. Stamens 11, 10 to 11 cm. long, connate at the base. Pistil about 12 cm. long, the ovary densely tomentose, long stipitate, about 12-ovulate, the style filiform, the stigma globose-capitate. Legume not known.

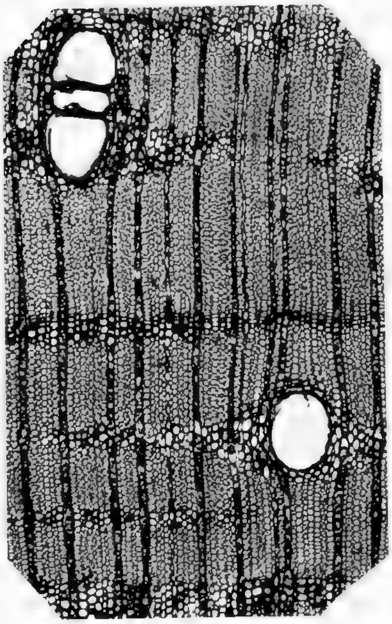
Description of the wood

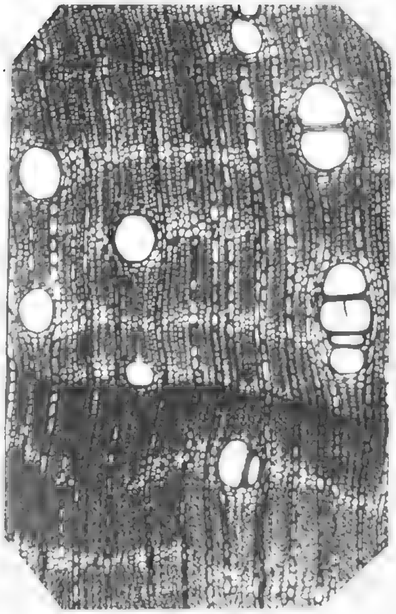
Sapwood thick and very light yellow; heartwood high brown. Wood hard, moderately heavy, strong, very tough, straight and coarse-grained, taking a fairly good polish. It is difficult to split and work on account of its long fibers which impede the action of tools. Annual rings of growth only faintly visible to the unaided eye.

Pores (transverse section) not numerous, varying from .60 to .14 mm. in diameter, round, usually filled with parenchyma tissue, and arranged singly or in groups of two to three in radial rows. Vessel walls (longitudinal section) very thin with numerous minute bordered pits. The ends of the vessel segments are horizontal and completely









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absorbed. Wood fibers about 2 mm. long with relatively thin walls and large cell cavities. Pits bordered and very indistinct. Wood parenchyma fibers abundantly developed around all vessels, which form very prominent tangential lines (transverse sections) connecting the pores. These elements contain starch. Pith rays are very numerous, uniformly scattered over the tangential section. They are one, rarely two, cells wide and many times as high.

Distribution, common names and uses.

This beautiful tree appears to be restricted to the Atrato valley in Colombia, from where it was first reported, and the Panaman Darien. It is remarkable for its showy flowers, on account of which it was brought into cultivation in England as early as 1860. Among the natives it is known under the name of "arizá" which applies also to other congeneric species. The trunk, which is seldom above 35 cm. in diameter, is usually hollow and inhabited by ants, so that although the wood is hard and strong, it is not generally used.

The ligulate Bauhinia

Bauhinia ligulata Pittier, Contr. U.S. Nat. Herb. 20: 112. 1918.

Description of the tree

A tree up to 40 m. high and 80 cm. in diameter, the trunk straight, covered with a brownish, rimose bark, the limbs short, forming an elongated crown. Leaves coriaceous, the petioles slender, sulcate, 2 cm. long, the blades heart-shaped, bu-cuspidate, 13-nerved, 4 to 10 cm. long, 4 to 7.5 cm. broad, glabrous above, paler and minutely pubescent beneath; stipules very small, scariose and caducous. Flowers numerous in terminal racemes; bracts very small and deciduous; pedicels 2 to 6 mm. long, ferruginous-pu-

bescent; receptacle short stipitate, about 7 mm. long; sepals 5, more or less adnate, laciniate, about 1.4 cm. long, retroflected; petals 5, short unguiculate, ovate-elliptic, acute at tip, 3 cm. long, 0.6 cm. broad, lilac with dark purple veins; stamens 10, all fertile, free, 5 long and 5 short; pistil glabrous, adnate at the base to the receptacle and surrounded farther up by 2 spathaceous ligules; ovary stipitate, 5 to 6-ovulate; style thick; stigma papillose, obscurely 3 or 5-lobed.

Description of the wood

Sapwood thin, light brown, slightly tinged with red; heartwood darker colored. Wood very hard and heavy, fairly strong, splits and works easily, fine-grained, beautiful figure, and takes a good polish. Annual rings of growth sometimes visible under hand lens.

Pores (transverse section) numerous, small (.12-.18 mm. in diameter), round when isolate, but when grouped they are usually compressed radially, open or sometimes closed with dark brown tyloses. Pores are often arranged in radial rows of from 2 to 5. Vessel walls (longitudinal section) with numerous small bordered pits. Perforations simple. Wood fibers about .98 mm. long, with rather thick walls and relatively large and numerous simple pits. The cell cavities are septate. Wood parenchyma strongly developed and in several rows of cells around the vessels; it also forms tangential lines connecting the vessels. Rays numerous, very narrow and usually only 1 to 3 cells wide and from 3 to 5 time as high.

Distribution, common names and uses

This tree grows in clusters on the alluvial bottom of the little valley back of Port Obaldia, on the Coast of San Blas, Panama. Very little is known of its distribution. The natives call it casco de vaca, cow's hoof, on account of the shape of the leaf, but this name also applies to other species of the genus. The wood is too hard to be used extensively locally, but it is abundant, has a fine grain, beautiful figure, takes a brilliant polish, and should attract the attention of the wood user.

Wild Tamarind

Dialium divaricatum Vahl.

Description of the tree

A tree 15 to 20 meters high, with smooth bark and elongated crown; young branchlets and inflorescences minutely ferruginous-puberulous. Leaves 5 to 7-foliolate, the rachis slender, canaliculate, or minutely ferruginous-puberulous, 3 to 8 cm. long; leaflets coriaceous, opposite or subalternate, the petiolules puberulous, about 2 mm. long, the blades ovate-lanceolate, rounded or broadly cuneate at the base, long and narrowly obtuse-acuminate, 2.5 to 7.5 cm. long, 1.5 to 2.5 cm. broad, entirely glabrous, the venation prominulous beneath. Inflorescence large, densely cymulose-paniculate. Flowers small, briefly pedicellate, the bractlets diminute and early caducous; calyx minutely ferruginous pubescent without, the tube short, the 5 segments obtuse, spreading or reflexed, 1.5 to 2 mm. long; corolla wanting; stamens 2; ovary almost sessile, ovoid, ferruginous-hairy, 2-ovulate, the style filiform at the base, broadening in a thick stigma at the apex. Legume indehiscent, obovoid, shortly stipitate, glabrous, about 2.5 cm. long and 1.4 cm. in diameter.

Description of the wood

Sapwood thick and nearly white; heartwood yellowish brown with irregular streaks of darker color. Wood very hard, heavy, strong, tough and very fine and cross-grained, taking a very smooth polish. It is exceedingly difficult to split and work. Annual rings of growth not visible even under hand lens or compound microscope.

Pores (transverse section) moderately numerous, small (about .12-.16 mm. in diameter), round or nearly so, open or more often fiffted with parenchyma tissue and arranged singly or less often in pairs. Vessels (longitudinal section) with numerous small bordered pits and small oblique slit-like pit openings. The ends of vessel segments completely absorbed. Wood fibers about 1.12 mm. long with very thick walls and small cell cavities.

The pits are slit-like and exceedingly small. Wood parenchyma abundantly developed around the pores and in broken and continuous tangential lines of a few to five cells in width. Pith rays very numerous and arranged in regular tiers as may be seen on a smooth tangential surface. Rays usually two cells wide and up to 5 times as high.

Distribution, common names and uses

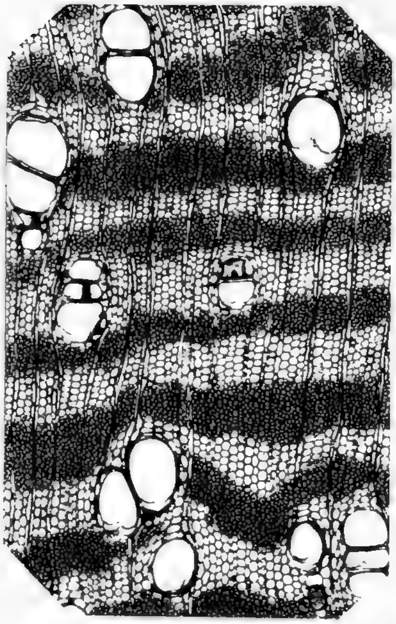
This large tree, not uncommon in the forests of Darien is remarkable for its broad area of dispersion. Known at first only from Brazil, it has successively been discovered in Guatemala and in Panama and probably exists everywhere in the unexplored forests of the intervening region of northern South America. In Panama the natives call it tamarindo de monte or wild tamarind, while in some parts of Brazil it is known as itú. The wood is tough, very hard and used whenever a strong and incorruptible material is needed. The bark as well as the pulp surrounding the seeds are considered as medicinal, the latter being used the same ways as the common tamarind.

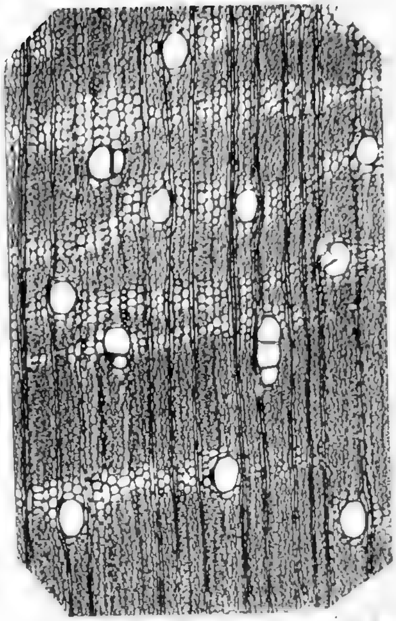
Dividivi-Tree

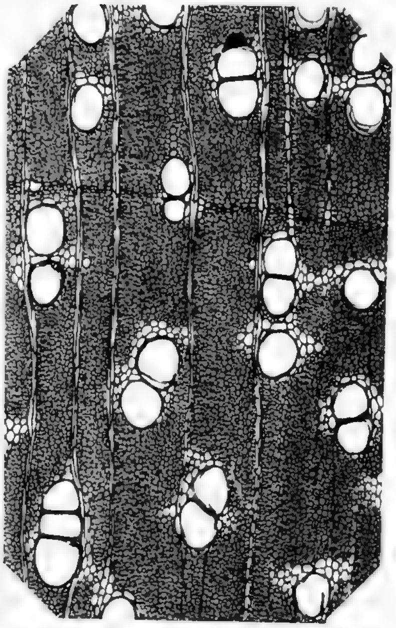
Caesalpinia coriaria Willd., Sp. Pl. Ed. 2,532. 1806.

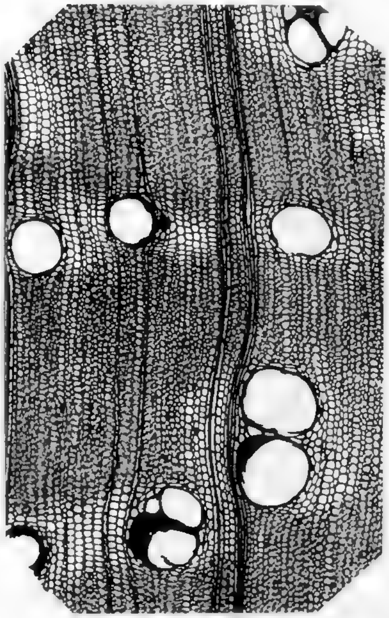
Description of the tree

A small, unarmed tree; trunk short, seldom straight, up to 35 cm. in diameter; crown rounded and spreading; young branchlets more or less pubescent. Leaves alternate, bipinnate, eglandulose, the rachis pubescent; pinnae 9 to 11, subopposite; leaflets 16 to 22-jugate, subsessile, lineal, opposite, about 5 mm. long, obtuse, black-dotted beneath. Flowers yellow, in terminal racemes, with the rachus sparsely hairy; pedicels about 2 mm. long, articulate at the base; calyx turbinate, glabrous, deeply 5-lobed, the lobes obtuse; petals unguiculate or spatulate, equal to the calyx, the superior one larger; stamens 10, free, the filaments hairy at









the base, the anthers hardly exserted; ovary briefly stipitate, glabrous, the style filiform, red, longer than the stamens. Legume obliquely oblong, many-seeded, glabrous, incurved laterally and more or less concavo-convex.

Description of the tree

Sapwood thin, light orange yellow; heartwood dark or sometimes nearly black resembling rosewood (*Dalbergia nigra* Allem.). Wood very hard, heavy, tough, very close-grained, taking an excellent polish. Annual rings of growth usually not visible under high power microscope.

Pores (transverse section) numerous, small (.12 mm. in diameter), round, open in sapwood and closed in heartwood, and arranged chiefly singly, in small groups or in short radial rows of from 2 to 3. When 3 together usually 1 large and 2 small ones. Vessel walls (longitudinal section) with numerous, small, bordered pits. Perforations simple. Wood fibers about 1.01 mm. long, with very thick walls, obscured cell cavities and pits minute, barely visible under a magnification of 125. Wood-parenchyma fibers very highly developed and arranged in numerous tangential lines which alternate with slightly broader lines of wood fibers. These alternating lines of tissue of different density can be readily seen under hand lens on a smooth transverse section. Pith rays very inconspicuous and barely visible under hand lens from 1 to 3 cells wide and from a few to 12 or 15 cells high.

Distribution, common names and uses

The dividivi-tree grows in open, semi-arid country, preferably on the dry outskirts of the tide belt, along the coasts of Venezuela, northern Colombia and Central America. Although it hardly can be called a gregarious tree, it is usually found in clusters, mixed with other arboreous species of low growth. It is mostly known commercially as *dividivi*, which seems to be derived from the name *libidibi* used somewhere along the northern coast of South America. In Venezuela it goes, however, under the name of *guatapán*, or *guatapanare*, while in southern Mexico it is called *cacalote*, in Guatemala *nacascalote*, and in Nicaragua and Costa Rica *nacascol*. These last three names are derived from the na-

huatl language, the first one, namely, from cacallotl which means a shell, and both the latter ones from nacaztli, the ear, and cacallotl, meaning the shell of the ear. In Panama, the dividivi-tree is known as agallo, or gall. The wood, which is very hard, is but little used, but from the dry pods, pulverized in a mortar, a black dye is prepared. These fruits, used both for tanning and dyeing, are exported on a small scale from Venezuela and some of the West Indies.

Darien's Tounatea

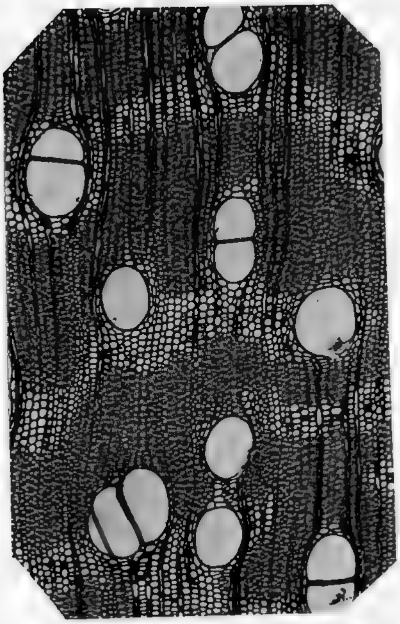
Tounatea darienensis Pittier, Journ. Wash. Acad. Sc. 11: 159. 1921

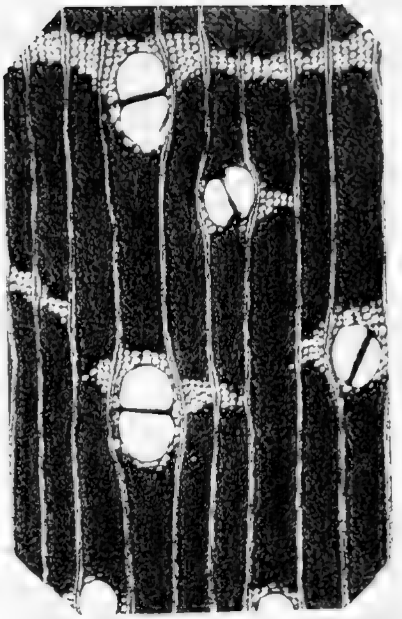
Description of the tree

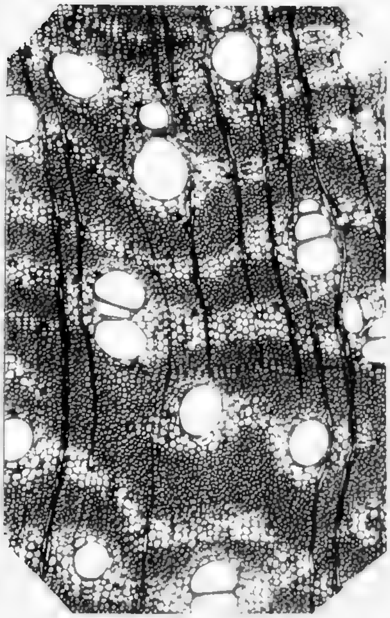
Small and spreading, glabrous throughout, with short trunk and hanging branches; bark smooth, grayish. Leaves membranous, single or ternate; stipules lineal, 4 to 6 mm. long, caducous; petioles of the single leaves 5 to 7 mm. long, articulate and bearing at the tip 2 symmetrical ear-like and more or less pointed appendages; rachis of the ternate leaves 3 to 6 cm. long, sub-winged or marginate, and with the same appendages as above at the insertion of the leaflets and at the tip; petiolules 4 mm. long; blades ovate-elliptic or broad lanceolate, obtuse at the apex, 7 to 16 cm. long, 3 to 6 cm. broad, the terminal one largest. Inflorescence racemose, axillary or terminal, single or geminate, 3 to 5-flowered; bracts and bractlets lineal, minutely pubescent, deciduous; pedicels clavate, 5 to 10 mm. long, pubescent; calyx irregularly 4-cleft, the divisions about 1 cm. long; petal 1, pale yellow, irregularly ovate-cordiform, 2.5 cm. long, 3 cm. broad; larger stamens 4 to 9, the smaller ones very numerous; ovary long stipitate, 8-ovulate, style capitellate.

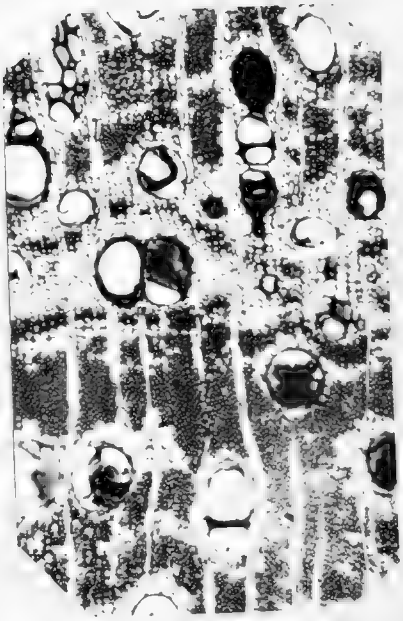
Description of the wood

Sapwood thick, yellow or nearly white; heartwood consi-









derably thicker, sometimes turning pinkish. Wood hard, heavy, strong, tough, cross, wavy and fine grained, difficult to work, taking a very good polish. Annual rings of growth not clearly defined.

Pores (transverse section) numerous, very small (about .06 mm. in diameter), round or irregular when in groups, open in sapwood, closed in heartwood, and arranged singly or in small groups or radial rows. Vessel walls (longitudinal section) numerous, small, round or transversely elongated; pits with a border, or with occasional transitions to simple pits. Perforations simple. Wood fibers about .8786 mm. long, with very thick walls and very small lumina, and small, slit-like simple pits. Wood parenchyma strongly developed, usually arranged in several rows around vessels and in tangential lines, usually short, but sometimes straight or wavy continuous. These lines are very faint and are barely visible with the hand lens on a smooth transverse section. Rays numerous, very narrow, from 1 to 3 cells wide and from 8 to 10 cells high.

Distribution, common names and uses

This small tree is known so far only from the Canal Zone, but it is likely that its range extends over a much larger area. No common names has been recorded and the very hard and fine grained wood does not seem to be extensively used.

The Panaman Swartzia

Swartzia panamensis Benth., Mart, Fl. Brasil. 15,2:38.1870.

Description of the tree

Probably deciduous, 6 to 20 m. high, with ascending limbs and elongated crown; trunk usually distorted, seldom over 40 cm. in diamter, covered with a smooth, grayish bark. Leaves 5-foliolate, first pubescent then glabrous; stipules lanceolate, acute, silky pubescent, caducous; rachis 9 to 13

cm. long; petiolules articulate, 4 to 6 mm. long; blades elliptic or ovate lanceolate, long acuminate, 8 to 18 cm. long, 3 to 6 cm. broad. Floral racemes single in the defoliated axils of the preceding season, very long, hanging and many flowered; bracts subulate, caducous, up to 1 cm. long; rachis of the raceme and pedicels pubescent, the former thick and subangulous, the latter retroflected, clavate, about 2 cm. long; calyx opening irregularly in 4 or 5 reflected lobes about 1 cm. long; petal 1, creamy yellow, almost square, (31 mm. long, 29 mm. broad),unguiculate, emarginate-hastate at the base, sub 4-lobulate, with the margin irregular; stamens very numerous, 6 to 10 larger, erect, with a thick filament, the remaining ones shorter, the filaments slender and the others small; ovary short, flattened, long stipitate, 6 to 8-seeded, dehiscent; seeds large, of irregular shape, sublenticular, 7 to 8.5 cm. long, 6 cm. in diameter and 1.5 cm. thick, exarillate, dark brown.

The appearence of this species seems to be unusually influenced by the local conditions. In the rain forests of San Blas, its growth is regular and the trunk straight, while in the hills of the Chagres and Trinidad valleys, covered with park-life forests or sparse growth, it looked somewhat stunted and deformed. The flowers, with their unique, very large petal, is striking as are also the pods, resembling a shoe-sole, which seem seldom to mature their seeds.

Description of the wood

Sapwood almost always very thick, nearly white; heartwood usually with black streaks or sometimes uniformly nearly jet black. Wood exceedingly hard, heavy, very compact, strong, close and straight grained and subject to good polish. Annual rings of growth not visible even under compound microscope.

Vessels (transverse section) few, small (.12 mm. in diameter), round or radially compressed, open in sapwood, often closed in heartwood and arranged singly or in radial rows of from 2 to 3. Vessels usually within the conspicuous tangential lines of wood-parenchyma fibers. Vessel walls (longitudinal section) with uniform structure; pits exceedingly small and simple or slightly bordered with a transversely elongated pit opening; in this case a striated effect is sometimes produced. Perforations simple. Wood fibers about

1.11 mm. long, with very thick walls and almost obliterated cell cavities; pit small and hardly visible under high power magnification. The wood-parenchyma fibers have few, round, simple pits, and occupy about one-third of the wood mass; this tissue is arranged in numerous tangential bands or lines, which alternate with similar lines of wood fibers. Pith rays numerous, minute, barely visible under hand lens, usually only one row of cells wide, sometimes 2 or rarely 3.

Distribution, common names and uses

The Panaman Swartzia is known only from the western part of Panama, where it is more frequent in the lower belt of the Caribbean watershed. On account of the shape and appearance of its pods it is called by the natives cútaro, from cútara, a sandal; the name cornudo, i.e., horny, is also used for the same species and refers to the hardness of the wood, which is such that the axes and other tools used to work it are quickly dulled. For this reason the wood, which is in other respects very useful, is not in favor among the local joiners and cabinet-makers.

The Panaman Sweetia

Sweetia panamensis Benth. Journ. Linn. Soc. 8:263. 1865.

Description of the tree

A tree about 15 meters high, and up to 40 cm. in diameter, low branched, the bark rugose and grayish, the limbs divaricate. Leaves imparipinnate, the rachis stiff, glabrous, obscurely canaliculate or flattened above, 6 to 12 cm. long, the leaflets 5 to 13, coriaceous; petiolules 3 to 5 mm. long, pubescent or glabrescent; leaflet blades ovate or oblong, broadly rounded at the base, emarginate at the tip, 4 to 7.5 cm. long, 2 to 4.5 cm. broad, glabrous, dark green and lustrous above, paler beneath. Inflorescences racemose and terminal, the rachis pubescent, 8 to 14 cm. long. Flowers white, very numerous; pedicels pubescent, slender, 2 to 3 mm. long; calyx campanulate, pubescent, the lobes 5, ovate-lanceolate, acute; petals 5, almost equal, spatulate with

long clawlets, emarginate; stamens 10, free, exserted; ovary substipulate, pubescent, 2 to 3-ovulate. Legume glabrous, thin, coriaceous, ovate lanceolate, stipitate, 1-seeded.

Description of the wood

Sapwood thick and yellowish white; heartwood reddish brown with stripes of deeper shades. Wood very hard, heavy strong, tough, cross and fine-grained, taking a very fine polish and difficult to split and to work. Annual rings of growth visible only under the hand lens.

Pores (transverse section) numerous, small (about .08 mm. in diameter), round or nearly so, open and arranged singly or more often in pairs or small groups of 3 to 4. Vessel wall (longitudinal section) with numerous minute bordered pits with transversely elongated pit openings. The ends of vessel segments are oblique and completely absorbed. Wood fibers about 1 mm. long with thick walls and small cell cavities. Pits simple and very small. Wood parenchyma abundantly developed, surrounding the pores, often forming short tangential lines connecting neighboring pores. Pith rays very numerous, small, storied and scarcely visible with the aid of the hand lens. Rays are from one to two cells wide and from 4 to 6 lines as high.

Distribution, common names and uses

The Panaman Sweetia is known from Darien and Central Panama, and also from the states of Michoacan and Guerrero in Mexico, appearing probably here and there in the intermediate region along the Pacific coast. In Panama it is called Malvecino (bad neighbor) and in Mexico huesito (little bone) both names probably referring to the excessive hardness of the wood, which seems to be of little use among the natives.

Fabaceae

Papilionatae

The spotted Gliricidia

Gliricidia maculata H.B.K., Nov. Gen. & Sp. 6:393. 1823.

Description of the tree

A deciduous tree 5 to 7 m. high and up to 30 cm. in diameter at the base, the trunk usually low and crooked, covered with a grayish, rimose or smooth bark, the crown low, elongate or spreading; branchlets grayish, verruculose, glabrous or pubescent. Leaves imparipinnate, glabrous, the rachis slender, 10 to 25 cm. long; leaflets 9 to 17, opposite or alternate, subcoriaceous, the petiolules slender, 3 to 5 mm. long, the blades ovate to ovate-elliptic, broadly rounded at the base, subacuminate, obtuse or acute at the apex, 3 to 7 cm. long, 2 to 3 cm. broad, purplish spotted on the lower face. Inflorescences racemose, glabrous, 5 to 10 cm. long, growing from the wood of the preceeding year, the rachis flowered almost from the base; flowers opposide or alternate, numerous; bracts very small, pubescent, deciduous; pedicels 4 to 6 mm. long, very slender; calyx oblique, turbinate-campanulate, entire, puberulous, persistent. Corolla lavender and white, the standard suborbiculate, emarginate at the apex, short unguiculate, about 1.8 cm. long and broad, yellow spotted at the base, the wings oblong, unguiculate, 1- auriculate, obtuse at the apex, about 18 mm. long and 6 mm. broad, the careen shorter, its petals long unguiculate, adhering at the apex; stamens 10, the vexillar one free, the others adnate in an open tube; ovary stipitate, linear, compressed, glabrous, 10 or 11-ovulate; style short, ascendent; stigma capitellate. Legume stipitate, obtuse, 10 to 12 cm. long, 1.5 cm. broad, flat, glabrous, dehiscent, the margins slightly prominent; seeds suborbiculate, impressed, brown, about 11 mm. long by 10 mm. broad.

Description of the wood

Sapwood moderately thin, yellowish, turning reddish-brown on exposure; heartwood darker, tinged with red and occasionally quite dark. Wood when young moderately light, becoming hard and heavy in old matured trees. It is very tough, close-grained, difficult to split, taking very good

polish, and very durable in contact with the soil. Annual rings of growth distinct, narrow, though very variable. The early wood is very porous and contrasts strongly with the denser and darker late wood.

Pores (transverse section) in early wood very numerous, .1 mm. in diameter), round, open in the sapwood, but completely closed with dark reddish tyloses in the heartwood, thus rendering it impervious to water. All pores are surrounded by several rows of wood-parenchyma fibers, especially in the early wood where they form continuous tangential bands. Vessels in late wood scattered singly or less often in small irregular groups or short radial rows of from 2 to 3. Vessel walls (longitudinal section) with numerous small bordered pits. Perforations simple. Wood fibers .840 mm. long, with thick walls, small cell cavities and few, small, slit-like simple pits. Wood-parenchyma fibers very abundant in early wood, where they form the bulk of the tissue, especially in wide annual rings of growth; in late wood usually surrounding small pores and occasionally form short tangential lines between pores (transverse section). Crystals present. Pith rays narrow, visible only under a hand lens on a smooth transverse section, and from 1 to 5 cells wide and from 2 to 4 cell high.

Distribution, common names and uses

The spotted *Gliricidia* is found almost everywhere in the open and cultivated country between Venezuela and Tehuantepec, and up to an altitude of about 1400 meters. But it appears very seldom in an absolutely wild state, being one of those trees which are transported from settlement to settlement on account of their many uses, and which seem to have been under semicultivation from inmemorial times.

The natives have several names for this tree. A few of these are indigenous, and two, *mata-raton* (kill-mouse) and *madre-de-cacao* (mother of the cacao tree) are used indifferently by Spanish-speaking people all over the specific area. In the Kekchi language of Alta Verapaz, in Guatemala, it is called *kan-té*, the suffix *té* meaning tree. In Costa Rica it is called *Madera negra* or *Bala*, the latter name being also used in Panama.

Gliricidia maculata is propagated either from seeds or from cuttings. The latter method is used exclusively when the tree is planted to grow into live-posts for hedges, as is very often the case. Young seedlings, raised in a nursery, are often planted to give shade and protection in new cacao or coffee plantations. The roots are said to have a sweetish taste and to be deadly to the field mice and rats which invariably eat them in preference to those of cacao or coffee trees. The green leaves are poisonous to horses, and in some parts of Panama they are fried with rice and used for poisoning rodents of house and field. The tree is highly beneficial to the soil as a fertilizer, both on account of its bacilli-abiding roots and its leaves, which are rich in nitrogen. The wood is hard and brown colored, and is used sometimes for building purposes as a substitute for bladder-pod (Diphysa).

The Panama Bladder-Pod tree

Diphysa carthagenensis Jacq., Sel. Stirp. Amer. Hist.
208. 1763

Description of the tree

Small and seldom over 6 m. high, with the trunk often tortuous, the ramification short and the crown irregular; bark rimose, thick, gray. Leaves alternate, imparipinnate, glabrous, the common petiole 5 to 10 cm. long; leaflets 9 to 11, alternate, the petiolules 2 to 3 mm. long, the blades ovate, obovate or oblong, rounded at the tip, 1.5 to 3 cm. long, 0.8 to 1.5 cm. broad, glacous beneath. Floral racemes 2 to 3 flowered, single or geminate in the axils of the leaves; flowers yellow, about 2 cm. long; pedicels slender, articulate, 1.2 cm. long; calyx campanulate, glabrous, 9 mm. long, 5-toothed, the 2 anterior teeth short and rounded, the posterior long and acute, the lateral smaller and irregular; standard ovate-orbiculate, about 2.2 cm. long; wings obovate, auriculate at the base, 7 mm. broad, the clawlet 4 mm. long; keel falcate, bifid at the tip, the petals adnate and auriculate at the base; stamens 10, adnate, included

in the keel; ovule long stipitate, multi-ovulate; style slender. Legume stipitate, bladder-like, borne on a pedicel 1 to 1.5 cm. long. Seeds 6 or less, oblong.

Description of the wood

Sapwood thin, nearly white; heartwood light greenish-yellow. Wood hard, heavy, very strong, close grained, taking a high polish. Annual rings of growth not visible under the high power microscope.

Vessels (transverse section) numerous, small (.08 mm. in diameter), round when solitary, or radially flattened when in radial rows and closed with dark yellowish tyloses in the heartwood. Vessel walls (longitudinal section) with numerous small bordered pits or small round or occasionally transversely elongated simple pits where in contact with pithray cells and wood-parenchyma fibers. Bordered pits larger where two vessels are adjacent to one another. End walls of vessel segments usually horizontal and perforation simple. Wood fibers about .82 mm. long, with very thick walls and nearly obscured cell cavities, and very small, slit-like and oblique simple pits. Wood-parenchyma fibers arranged in tangential lines of from 1 to 2 rows of cells wide and surrounding all vessels. These elements are easily recognized in transverse section by their thin walls and large cell cavities. Pith rays very narrow, from 1 to 4 cells wide and from a few to 20 cells high.

Distribution, common names and uses.

The genus Diphysa contains several species, scattered over Central America and the northern borders of South America. They all are small trees, not easily distinguished from each other. Up to the present time, however, D. carthagenensis, first described from near Cartagena in Colombia, is the only species reported from the Isthmus of Panama, where it grows sparingly on the borders of savannas and is known locally under the name of Cacique or Macano. In Cartagena it is called vivaseca or "dry and alive" and in Costa Rica the near related D. robinioides and D. sennoides Benth. (or possibly only one of the two) go by the nahuatl name of guachipilin, which probably means a tree-rattler, an allusion to the noise made by the dry pods when they are shaken by the wind. The name of bladder-pod tree explains

itself and corresponds to the Latin generic name, Diphysa, which means double bladder.

The cacique tree, although small, is very useful. The wood is hard and very durable, and is used almost to the exclusion of all other woods for the bases of the main stays that support the walls in the native "adobe" or "bahareque" buildings. The part of the log that is placed in contact with the soil is left with the bark on, the portion above the ground is squared. These bases are used again and again, after having been in the ground for many years. Cacique wood is also used by the Indians for making "macanas" or native plowing sticks, hence the name "macano". The tool handles of the carpenters and many small articles requiring very hard wood are made of cacique wood and formerly a yellow dye was extracted from it by coction.

Green sticks of this wood set in the ground take root readily and the tree is often planted in this way to grow into live posts for garden fences. It has also been reported as being used locally as a shade tree in cacao and coffee plantations.

The Panaman Cocobola

Dalbergia retusa Hemsley, Diagn. Pl. nov. 1:8. 1873.

Description of the tree

A deciduous tree up to 25 cm. high, the trunk low, straight or more or less crooked, about 40 cm. in diameter. Leaves alternate, 9 to 14-foliolate, the green color turning to black in dessication, the rachis, sparsely pubescent, 14 to 20 cm. long. Leaflets at first tender and drooping on fresh leaves, later coriaceous, the petiolules ferruginous-pubescent, 4 to 6 mm. long, the blades ovate or ovate-oblong, rounded at the base, bluntly acuminate and often retuse at the apex, 3.5 to 10.5 cm. long, 2.3 to 4 cm. broad, glabrous, dark green above, paler beneath, revolute on the margin. Floral racemes axillary, few flowered, sparsely

branched, 6 to 10 cm. long, the rachis minutely ferruginous pubescent. Pedicels 4 to 5 mm. long. Flowers white, about 15 mm. long. Calyx campanulate, 6 to 7 mm. long, ferruginous pubescent, the anterior lobes broad and connate, the lateral ones narrower, the posterior lobe more or less mucronate and longer. Petals glabrous, with long claws, the standard suborbiculate, about 14.5 mm. long, the wings free, ovate, about 14 mm. long, the carina falcate, obtuse, shorter than the wings. Stamens 10, the vexillar one usually free. Ovary long stipitate, 3 to 6-ovulate, the style long and slightly arcuate, with a minute, capitellate stigma. Legume ovate-elliptic, flat, glabrous, usually 1-seeded and 7 cm. long, 2.5 cm. broad, or 2 to 4-seeded and then up to 12 cm. long. Seeds oblong, subreniform, flat, 11 mm. long, 6.5 mm. broad.

This tree is very variable in its habit, being sometimes low and spreading, sometimes high, with a straight trunk and a more elongated crown.

Description of the wood

Sapwood thick, nearly white; heartwood very dark red with faint streaks of black to rosewood (Dalbergia nigra). Wood hard, heavy, strong and tough, fine and cross grained, rather difficult to work, but taking a good polish and durable in contact with the soil. Annual rings of growth not visible even under the high power microscope.

Pores (transverse section) very few, (.210 mm. in diameter), round or radially elliptical, open in sapwood, closed with dark red tyloses in the heartwood, and arranged singly or sometimes in pairs. Vessel walls (longitudinal section) with numerous, small bordered pits and a few transversely elongated simple pits. Perforations simple. Wood fibers about 1.02 mm. long, with thick walls and small lumina, and very small, slit-like, oblique simple pits. Wood parenchyma rather abundantly developed, but visible only under compound microscope as very minute irregular tangential lines of a single cell in width. Rays very inconspicuous, only one cell wide or sometimes two and from a few to 8 or 10 cells high.

Distribution, common names and uses –

Dalbergia retusa is probably the main source of the coco-

bola-wood extensively used in the United States for the manufacture of tool handles and small objects needing very hard material. The wood of Dalbergia hypoleuca Pittier, the Costa Rican cocobola, and perhaps some other wood of the same genus or its closer allies, is probably exported to a lesser extent for the same purposes. The Panaman cocobola has not been reported up to the present from other countries is found in the mixed forest or growing gregariously in small clumps along the foot hills and in gorges of the provinces of Panama (including Darien), Coclé and Veraguas. It seems to be of rare occurrence both on the northern watershed and in Chiriquí and, being a very valuable product, has been practically eradicated from the more accessible districts., The saw dust of the Panaman cocobola is said to act as a poison on the men working it in the factories. The sapwood is thick, yellowish, white, the heartwood dark brown and very tough; it takes a beautiful polish, but as the tree is never very large, the useful parts are only obtained in small pieces, so that they can hardly be used for large objects, like pieces of furniture.

During the construction of the first transisthmian railroad, cocobola was used to some extent for ties.

The Panaman Flat-Pod tree

Platypodium maxonianum Pittier, Contr. U.S. Nat. Herb. 18: 234. 1917.

Description of the tree

A tree 20 to 25 m. high, the trunk 12 to 15 m. and up to 1.20 m. in diameter; bark grayish, more or less rimose and shaggy. Leaves alternate 10 to 20-foliolate, the rachis 10 to 20 cm. long, broadly canaliculate, the petiolar part 1.5 to 2 cm. long, leaflets leathery, strongly oblique, the terminal one sometimes substituted by a setulose appendage 7 to 9 mm. long; petiolules 1 to 2 mm. long, blackish; blades elliptic-oblong, subcuneate at the base, rounded emarginate and mucronulate at the apex, lustrous, the costa

more or less pubescent above, paler, dull, and pubescent near the base and along the costa beneath, 3 to 6 cm. long, 1.5 to 2 cm. broad. Flowers not known. Legume glabrous, samarra-like, stipitate, oblanceolate, 11 to 11.5 cm. long, about 2.5 cm. broad, the basal part flat and membranous, the seed-bearing apex, thicker, woody, rounded and apiculate; peduncle 2 cm. long; stipe 1.2 cm.; seed obovate, elongate, about 18 mm. long and 8 mm. broad, the hilum near the narrowest end.

Description of the wood

Sapwood thin, light greenish yellow; heartwood somewhat darker. Wood hard, heavy, very tough, exceedingly close grained, taking a good polish. The wood has a green, pea-like odor. Annual rings of growth narrow and visible to the unaided eye on a smooth transverse section.

Pores numerous, small (.10 mm. in diameter), round, chiefly open, and arranged either singly or in short radial rows of from 2 to 5 or more. Vessel walls with numerous small bordered pits where in contact with pith rays and wood-parenchyma fibers. Bordered pits large where two vessels abutt on each other. End walls of vessel segments horizontal and completely absorbed. Wood fibers about 1.08 mm. long, with relatively thick walls and small cell cavities. Pits very small, slit-like and oblique, or nealy parallel to the axis of the fiber. Wood-parenchyma fibers arranged in tangential lines of from 1 to 2 rows of cells wide. This tissue does not surround vessels, and is common in most of the leguminous woods. They are easily recognized by thin walls and large cell cavities in a transverse section. Pith rays very narrow, from 1 to 3 cells wide, and the space between them is narrower than the diameter of the vessels.

Distribution, common names and uses

This tree is known only from Panama, where it was first collected by Hayes, between Gorgona and Matachin. In Chiriquí, it is frequent and apparently gregarious in the lower forest belt a short distance from the sea. It goes under the name of carcuera and the wood is not used to any extent, because the mature trunks are almost always found to be

hollow and filled ~~tih~~ with an oily liquid. It is said that such trees often burst with a loud report under the pressure of the latter. The same species occurs on the northern littoral plains of Colombia, where it is known in some parts under the name of lomo de caimán.

Darien Red Wood

Centrolobium patinense Pittier, Journ. Wash. Acad. Sc.

5:470. 1915.

Description of the tree

A deciduous tree, 30 meters high and over, with a grayish, rimose bark; crown elongate; branchlets and rachis of the leaves covered with a soft, purple or fawn-colored pubescence, the latter terete, 30 to 35 cm. long; stipules broadly ovate, obtuse, wooly hairy; leaflets 11 to 15, membranous, briefly petiolulate; petiolules 4 mm. long; blades ovate, rounded or emarginate at the base, abruptly acuminate, 3 to 12 cm. long, 2.5 to 7 cm. broad, the middle ones largest, pubescent above, glabrescent beneath, the costa and veins more or less reddish brown villous on both faces. Flowers not known. Legume pedicellate, stipitate, winged, 17 to 20 cm. long including the wing, (this 6 to 8 cm. broad), the body densely aculeate, the wing fan-like, obliquely truncate at the tip, longitudinally veined, the arc of the veins to the side of the spur-like remnant of the style.

Description of the wood

Sapwood thick and yellowish white; heartwood reddish or dark orange yellow with straight stripes of dark brown or nearly black color-wood, hard, moderately heavy, strong, tough, rather fine-grained and susceptible to high polish. It splits and works easily. Annual rings of growth visible only under hand lens or compound microscope.

Pores (transverse section) numerous, small (about .08 mm. in diameter), nearly round, closed in the heartwood with an abundance of reddish yellow tyloses and arranged singly, in small groups in short indistinct radial rows. Vessel walls (longitudinal section) with numerous small, round bordered pits having transversely slit-like pit openings. The ends of vessel segments nearly horizontal and almost completely absorbed. Wood fibers about .7 mm. long with rather thin walls and relatively large cell cavities. The pits very small and indistinct. Wood parenchyma abundantly developed around pores and pith rays. Cristals abundant bordering pith rays. Rays very numerous and arranged in tiers clearly visible as horizontal lines on smooth tangential surfaces. The rays are very small, rarely more than one cell wide and 10 cells high, often only 5 or 6 cells high.

Distribution, common names and uses

This tree, remarkable for its peculiar shaped fruits and the beauty of its red wood, enhanced by broad to narrow dark veins, is known only from southern Darien, where it grows in groups on the coastal hills and on the drier slopes of the interior. It is called by the natives Amarillo de Guayaquil or Guayaquil's Yellow, a name for which no explanation could be found, as the wood is not yellow and not known to have ever been imported from Guayaquil. It is very hard, and very adequate for interior wood-work and furniture.

The Chepan Quira

Platymiscium dubium Pittier, Contr. U.S. Nat. Herb. 20:
125. 1918.

Description of the tree

A middle-sized tree, forking low and with rounded depressed or elongated crown; bark grayish, finely lenticellose

on young twigs. Leaves opposite, 5 to 7-foliolate, imparipinnate, entirely glabrous; rhachis terete, 8 to 10 cm. long; leaflets coriaceous, opposite or almost so, light green above, paler beneath; petiolules thick, slightly canaliculate, 4 to 6 mm. long; leaflet blades ovate to elliptic-lanceolate, broader and rounded at the base, acuminate, the lateral ones 5 to 9 cm. long by 2 to 4 cm. broad, the terminal one usually a little larger (9 to 11 cm. long by 4 to 5 cm. broad). Stipules semi-orbiculate, thick and 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.

Description of the wood

Sapwood thick, nearly white; heartwood light brownish-red, occasionally with deep red and black linear markings, giving it an ornamental figure. Wood hard, heavy, tough, very close-grained, easily worked, taking a good polish, and durable in contact with the soil. Annual rings of growth usually very narrow and visible only under the high power microscope.

Pores (transverse section) moderately numerous (.25 mm. in diameter), round, open in sapwood but generally closed with dark reddish tyloses in heartwood, and arranged singly or occasionally in radial rows of from 2 to 4. Vessel walls (longitudinal section) in contact with ray cells or wood-parenchyma fibers have both bordered and simple pits. Perforations simple. Wood fibers about .73 mm. long, with thick walls, small lumina, and small, slit-like simple pits, chiefly on their radial walls. Wood-parenchyma fibers grouped usually around vessels and often branching out on opposite sides, forming short tangential rows. These elements are easily distinguished from wood fibers by their thin walls, relatively large lumina and round simple pits. Rays very numerous, storied, not visible to the unaided eye, one cell wide, and from 1 to 10 cells high.

Distribution, common names and uses

Up to the present this species is known only from Chepo

in the Bayano basin, but it is probably common on the Pacific watershed of Panama. It divides the name of quira with Platymiscium polystachyum, and other species of the same genus. The wood is used to a limited scale only, in the manufacture of furniture when a heavy and resisting material is needed. It is hard and fine grained, with a dark brown heart.

The Quira

Platymiscium polystachyum Benth., Seem. Bot. Voy. Herald

III, pl. 21. 1853.

Description of the tree

Deciduous, middle sized, forking low and forming a rounded crown; bark grayish, rough on the trunk, smooth and densely set with lenticels on the branchlets. Leaves opposite or 3-verticilate, imparipinnate, 3 to 5-foliolate, glabrous; stipules orbiculate, deciduous; leaflets membranous or leathery, the petiolules short, the blades ovate, rounded at the base, bluntly acuminate, 5 to 22 cm. long, 2 to 10 cm. broad, the terminal ones largest. Inflorescences racemose 15 to 20 cm. long, glabrous, geminate, appearing before or with the new leaves. Flowers numerous, yellow, 13 to 14 mm. long; pedicels thread-like, 5 to 10 mm. long; calyx campanulate, 6 to 7 mm. long, with irregular, minutely ciliate teeth, and bearing at the base 2 small, ovate bractlets; standard suborbiculate, attenuate in a slender clawlet, 13 mm. long, 11 mm. broad; wings auriculate, ovate-elliptic, 12 to 13 mm. long, 4 to 6 mm. broad; carinal petals adhering at the tip, about the same size and shape as the wings; stamens 10, the vexillar one almost free to the base; ovary long stipitate, 1-ovulate, glabrous. Legume thin, elliptic, obtuse at the ends, long stipitate, about 9 cm. long, 3.5 cm. broad.

Description of the wood

Sapwood usually thin and yellowish brown; heartwood reddish

to dark brown. Wood hard, heavy, strong, tough, difficult to split, more or less close-grained, taking a good polish. Annual rings of growth usually not clearly visible; the concentric rings of lighter and darker shades do not coincide with annual growth rings.

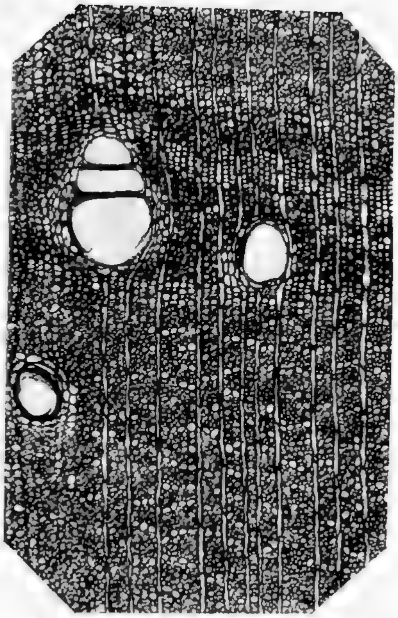
Pores (transverse section) numerous, moderately large though variable (about .13 mm. in diameter), nearly round, open or more often closed with a reddish cellular tissue and arranged singly occasionally in pairs. Vessel walls (longitudinal section) marked by many rather large bordered pits; all vessels in mature wood from the trunk completely surrounded by wood parenchyma fibers. Perforations at the ends of vessel segments simple. Wood fibers about 1.1 mm. long with thick walls and small cell cavities; the simple slit-like pits very small. Wood parenchyma fibers highly developed around the vessels, sometimes forming short tangential bands between the pores as seen in a smooth transverse section. Rays one or rarely two cells-wide and up to ten cells high, very numerous, storied and barely visible to the unaided eye on a smooth tangential surface.

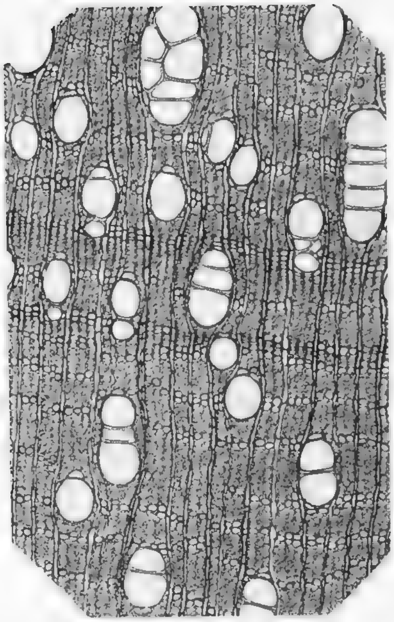
Distribution, common names and uses

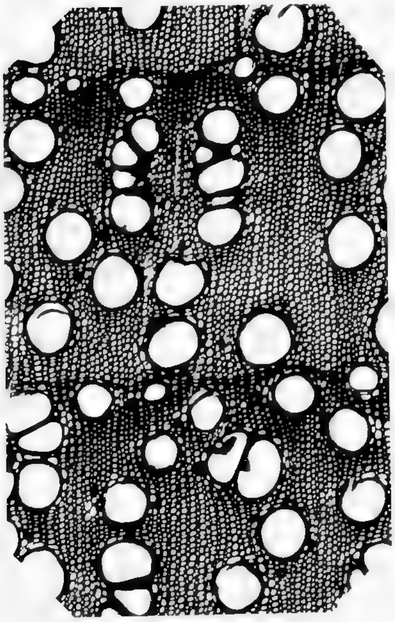
The quira is limited in its dispersion to the semi-arid districts of northern Venezuela and Colombia, and to the foot hills of the Pacific coast from Panama to Nicaragua.

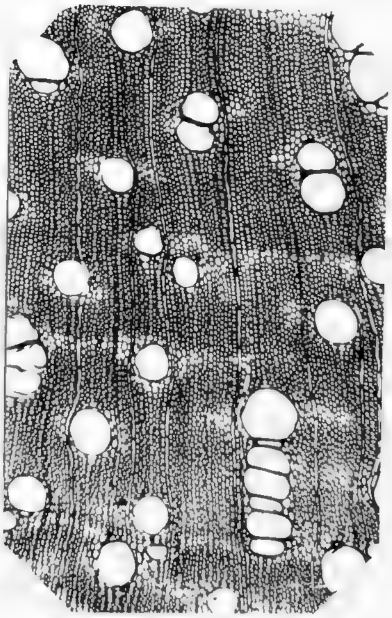
Besides the name of quira, used in Panama and evidently borrowed from some native dialect, the Brunka or Boruca Indians call it sinkrá, while their neighbors the Térraba know it as zrok. In Venezuela it is inaccurately designed as roble blanco or "white oak". The wood is highly esteemed among the natives, being used to a limited extent in the making of furniture.

It is often mentioned among the local joiners and cabinet makers of Panama and Costa Rica as one of the hardest, finest grained and most beautifully variegated woods of these countries. Notwithstanding this and the fact that the tree seems to be comparatively common along the Pacific coast, quira-wood very seldom reaches our northern markets. It deserves, however, to be better known, on account of its possible applications.









Savanna Angelin

(Swartz)

Andira inermis(1) H.B.K., var. savannarum Pittier

Description of the tree

(Low, not over 7 meters high, with a spreading crown and a grayish, more or less rimose bark.) Leaves 9 to 13-foliolate, glabrous or almost so, briefly petiolulate, the common petiole 10 to 23 cm. long; leaflets elliptic, lanceolate or ovate, short acuminate, 5 to 10 cm. long, 2 to 4 cm. broad; stipules subulate, 2 to 4 mm. long. Floral panicles terminal, erect, densely flowered, about 20 cm. long, its branches all ferruginous-pubescent; bracts lanceolate, acute, 5 to 6 mm. long. Flowers dark purple, 8 to 9 mm. long; calyx campanulate, distinctly 5-toothed, ferruginous-tomentose; petals nearly equally long, the standard suborbiculate, emarginate, truncate or auriculate at the base, with a very short clawlet, the wings oblique, the petals of the keel much broader than the wings, obovate, auriculate; vexillar stamen free and shorter; ovary 2-ovulate, stipitate, hairy about the base of the style. Fruit drupaceous and one-seeded.

In contrast with the common Angelin (Andira inermis H.B.K.), which is said to be high and imposing, the Savanna Angelin is characterized at once by its low and squatting appearance. While the former is in some parts one of the elements of the high forest, the latter appears only in the open savannas. The dark pink flowers spread in succession so that the erect panicles, lost in the middle of a thick foliage, are not very showy.

Description of the wood

Sapwood thin, light brown; heartwood dark brown tinged with red. Wood moderately hard, heavy, tough, exceedingly difficult to split, rather closed grained, taking a good polish. Annual rings of growth not visible even under the high power microscope.

Pores (transverse section) not very numerous, rather

large (.25 mm. in diameter), round, open or sometimes closed with dark brown tyloses, and arranged singly or occasionally in short radial rows, never more than 3 or 4 together. Vessel walls (longitudinal section) uniformly marked by numerous, rather large, oval, bordered pits; all vessels completely surrounded by wood-parenchyma fibers. Perforations simple. Wood fibers about 1.64 mm. long, with very thick walls and partly obliterated lumina. Pits difficult to see even under compound microscope magnifying 800 diameters. Tissue formed by wood fibers very dense and arranged in irregular tangential lines alternating with somewhat wider lines of wood-parenchyma fibers, which have thin walls, large lumina, and round simple pits. Pith rays visible only under hand lens, being only from 1 to 5 cells wide and from a few to 15 cells high. Rays often twice as wide within the tangential band of wood-parenchyma fibers as in those of wood fibers.

Distribution, common names and uses

Thus far the tree has been observed only in isolated individuals interspersed through the savannas around Chepo, in the province of Panama. It was never noticed in the high forests, where it is probably replaced by the real Angelin. The tree is called Cocú by the inhabitants; the wood is said to be rather soft as compared to the real Angelin and of little use.

The Panaman Eboe

Coumarouna panamensis Pittier, Contr. U.S. Nat. Herb. 18: 236. 1917.

Description of the tree

Often 50 m. high, and 1 m. diameter at the base; crown rounded or elongated; bark brownish and slightly scaly. Leaves glabrous, alternate, 5 to 8-foliolate, the petioles

40 to 70 cm. long, flattened, broad and winged; leaflets petiolulate, inaequilateral, transparent dotted, the first pair opposite, the following ones alternate, the petiolules 1 to 1.5 cm. long, the blades 15 to 30 cm. long, 5 to 7 cm. broad, oblique-elliptic, cuneate at the base, almost obtuse at the tip. Floral panicles terminal, loosely ramose, 30 to 40 cm. long. Flowers pedicellate, large; pedicels 4 to 5 mm. long; calyx tubulose, pubescent, about 6 mm. long bearing two anterior lobules 16 to 17 mm. long, 7 mm. broad, transparent dotted, and three posterior ones, small and acute; petals pink, the vexillum almost orbiculate, about the size of the anterior calycinal lobules and deeply emarginate, the wings oblique, obovate, bilobulate, the petals of the keel free, about 19 mm. long and auriculate; stamens connate nearly to the tip; ovary glabrous, uniovulate. Fruit drupaceous, pedicellate, ovate-oblong, depressed, 6 cm. long, 3.5 cm. broad and 3 cm. thick or less, the pedicel about 1.5 cm. long. Seed straight, oblong-elongate, about 5 cm. long and 1 to 1.3 cm. broad, covered with a light brown episperm.

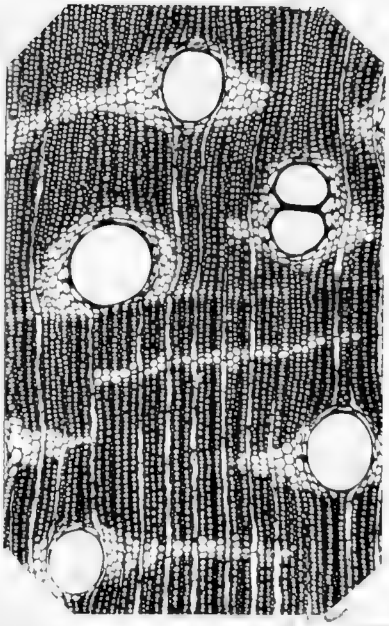
Description of the wood

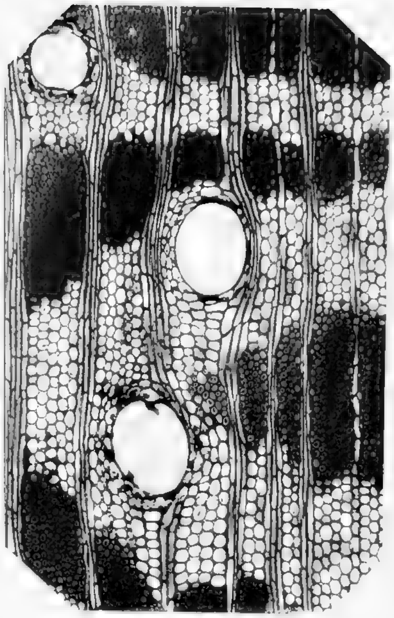
Sapwood thick, nearly white; heartwood much darker. Wood very hard, heavy, strong, tough, cross and fine-grained, difficult to work, taking a good polish, durable in contact with the soil. Annual rings of growth not visible under high power microscope.

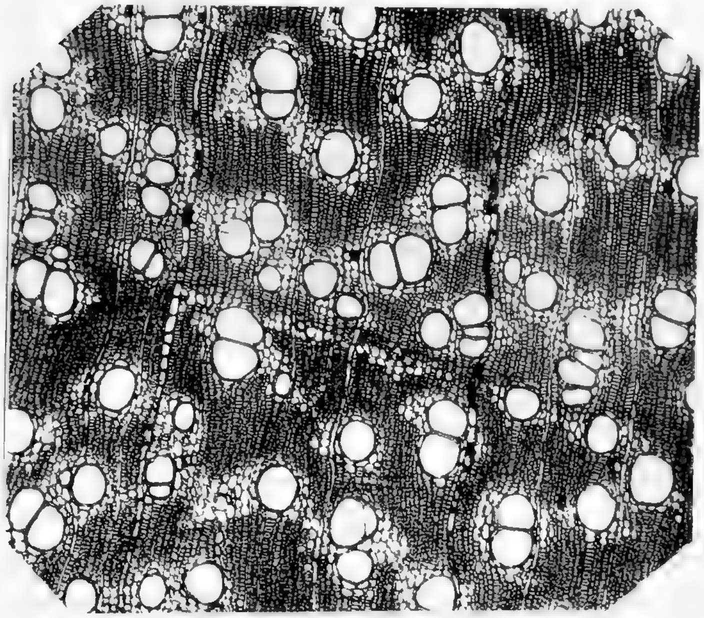
Pores (transverse section) numerous, small (.12 mm. in diameter), round, open in sapwood, closed with light brown tyloses in heartwood, and arranged singly or in pairs regularly throughout the wood. Vessel walls (longitudinal section) with numerous rather large bordered pits. Perforations simple. Wood fibers about 1.4 mm. long, with thick walls and small lumina; pits very small and simple. Wood parenchyma abundant, arranged chiefly around vessels and in short tangential lines (transverse section). Rays storied, numerous, very narrow and barely visible under hand lens on smooth transverse section, from 1 to 2 cells wide and from a few to 10 or 12 cells high.

Distribution, common names and uses -

This tree seems to be an important element of the forests







of both watersheds in the eastern part of the Republic of Panama. The specimens were collected mainly in the Canal Zone, but it was observed also and notes taken in the Pató Valley and around Port Obaldia on the Coast of San Blas, in the vicinity of Chepo and in the Sambú Valley on the Pacific side. Although it was not seen during the recent botanical survey in the western part of Panama, it may occur here and there. It grows always on well drained hill sides up to an altitude of about 400 m. above sea level. At the blooming time, from the latter part of june to the first days in August, it is conspicuous dots on the sides of the wooded hills. Later on, the fruits, scattered over the ground, indicate its presence everywhere.

Coumarouna panamensis is known all over the country under the name of almendro, i.e., almond-tree, The fresh seed is eaten by the natives, being extracted from the hard shell and prepared by roasting on a live fire. The wood is not used extensively on account of its hardness and resistence to the ax, but it is fine grained and takes a beautiful polish.

It may be mentioned here that the Panaman almond tree is a near relative to the Eboe Tree of the Mosquito Coast (Coumarouna oleifera Taubert.), to the Tonka-Bean Tree (C. odorata Taubert) of Venezuela, ~~and to the species from which the main supply of Gaiac wood is obtained (C. oppositifolia Taubert)~~. no Of late, the seeds of both the Eboe and the Almendro have acquired some importance as the source of a very fine oil, which is said to be used mainly in the preparation of perfumery supplies. [illegible]

Malpighiaceae

Cuming's Golden Spoon

Byrsonima Cumingiana A. Juss., Ann. Ser. 2,13:332. 1840.

Description of the tree

A small or middle sized tree, usually low, the crown

elongate; bark dark gray; young branchlets, petioles and rachis densely ferruginous-tomentose. Leaves opposed, coriaceous, the petioles broad, about 1 cm. long, the blades ovate or obovate to elliptic, subacute at the base, abruptly short acuminate, 6 to 11 cm. long, 4 to 5.5 cm. broad, adpressed hairy above, densely grayish-tomentose beneath. Inflorescence spicate, terminal, 10 to 12 cm. long; calyx glandulous, the sepals 5, ovate-oblong, 3 to 4 mm. long; petals deep yellow, suborbicular, 6 to 12 mm. long; ovary 3-lobed; styles 3. Drupe globose, nearly 1 cm. in diameter, greenish yellow at maturity.

Description of the wood

Sapwood thin, very light pink; heartwood brownish pink. Wood hard, heavy, strong, close- and cross-grained, taking a very good polish. Annual rings of growth visible only under high power microscope.

Pores (transverse section) very numerous, small (.116 mm. in diameter), round or slightly elliptical, open, and arranged singly or in radial rows of from 2 to 6 or more vessels usually smaller than the width of the space between two pith rays. Vessel walls (longitudinal section) with numerous simple and bordered pits when in contact with pith ray cells and wood-parenchyma fibers, always bordered where two vessels abut on each other. Ends of vessel segments wholly absorbed, leaving large circular or elliptical openings. Wood fibers about 1.19 mm. long, with moderately thick walls and relatively large cell cavities and few slit-like, simple pits. Wood-parenchyma fibers sparingly developed and occuring only in the neighborhood of vessels. Pith rays from 1 to 4 cells wide and from a few to 30 or more cells high.

Distribution, common names and uses

This tree appears generally with the savanna-formation in the semi-arid districts of eastern Central America, northern South America and some of the West Indian Islands. In the latter a few species of the genus are called *Golden Spoon*, a name referring to the shape of the petals and which can be retained for the Panamanian species. In some parts of Colombia, it is called *peralejo*, in others *chaparro*,

while the Central American name, used also in Panama, is nance. As referred above, the natives distinguished two varieties, the nance colorado and the nance blanco, and they use the first for beams in house-building, as it is very durable if not in contact with the earth. The decoction of the bark is said to be effective against certain **skin** diseases and from the fermented fruits a kind if chicha, or refreshing drink, is obtained, which is very much relished by most Panamanians.

Rutaceae

The common Satin-Wood Tree

Zanthoxylum elephantiasis Macfad., Fl. Jamaica. 1:193.1837.

Description of the tree

A middle sized, dioecious tree, about 15 m. high, 40 to 75 cm. in diameter; trunk usually erect, the bark grayish covered with large, depressed suberose cushions, these aculeate at the apex and inserted with their longer diameter transverse to the axis of the tree; branches ascendent; crown elongate; sterile branchlets prickly. Leaves exstipulate, imparipinnate, glabrous; rachis 10 to 25 cm. long; leaflets 5 to 17, the petiolules about 1 cm. long, the blades ovate or obovate to narrow elliptic, rounded at the base, obtuse, 4 to 11 cm. long, 1.5 to 3.5 cm. broad, dark green above, paler beneath, densely transparent dotted, the margin broadly crenate with acute teeth. Racemes terminal, densely flowered; the flowers pedicellate, in clusters of 3 or more; sepals 5, suborbiculate, entire, about 1 mm. long, the margin scarious; petals 5, greenish yellow, oblong, 5 to 6 mm. long. Male flowers; stamens 5. Female flowers: carpels 5, stipitate, each bearing a short style. Follicles divergent, 1 to 1.5 cm. long, verruculose glandular on the surface, at length shorter than the distinct carpophores.

Description of the wood

Sapwood thick, very light brown or nearly white; heartwood slightly darker tinged with light yellow wood, modera-

tely hard and light in weight, wavy and fine grained, mottled, easily worked, taking a very good polish, and durable in contact with soil. Annual rings of growth narrow and visible under hand lens on a smooth transverse section.

Pores very numerous, rather small (.09 mm. in diameter), round or when in rows usually compressed radially, open or more often closed both in sapwood and in heartwood, arranged singly or often in radial rows of from 2 to 5. Vessel walls with numerous small simple or bordered pits. Perforations simple. Wood fibers about 1.5 mm. long, with thin walls and relatively large lumina and small vertical simple pits. Wood-parenchyma not very strongly developed, and present usually around vessels, especially at the beginning of the growth layer. Rays numerous, small, hardly visible under hand lens on a smooth transverse section; from 1 to 2 rows of cells wide and from 10 to 25 cells high.

Distribution, common names and uses

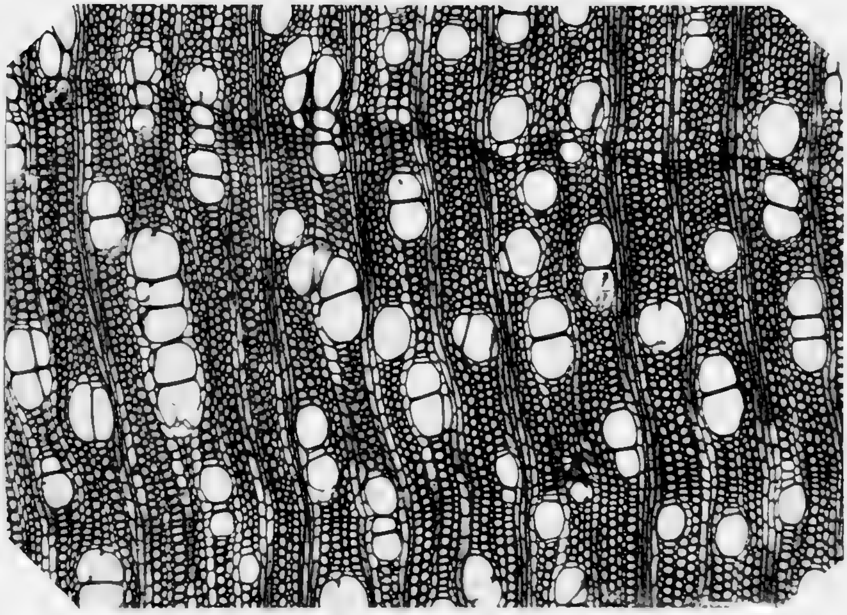
The common satin wood is sparingly distributed throughout all Central America, from southern Mexico to Darien and also in the three larger Antilles, Cuba, Santo Domingo and Jamaica. Although its wood is very valuable, it does not seem to be well known to the natives in Panama. In South-Darien (Panama) it is called ruda, and used **wherever a hard** wood is required.

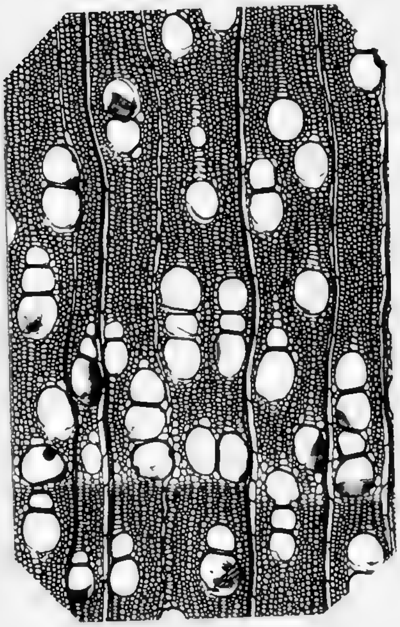
The Darien Satin-Wood Tree

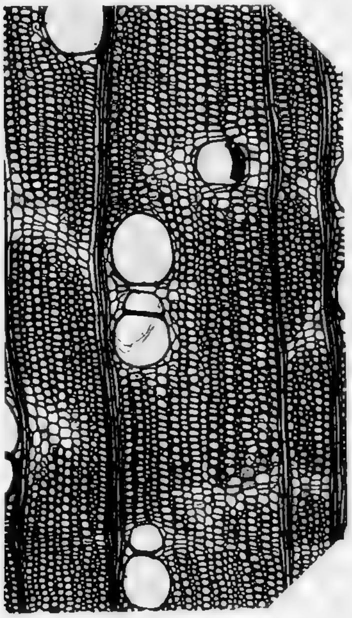
Zanthoxylum Pittieri P. Wilson, Contr. U.S. Nat. Herb. 20: 479. 1922.

Description of the tree

A tree 20 m. high or more and 30 to 40 cm. in diameter, the trunk erect, the grayish brown bark more or less covered with suberous cushions, ending in a sharp prickle; crown elongate, densely ramified; branchlets glabrous, prickly







Leaves paripinnate, the rachis 20 to 30 cm. long, terete, puberulous; leaflets 3 to 4-jugate, inequilateral, subopposite or alternate, the petiolules 5 to 10 mm. long, the blades ovate or ovate-oblong, rounded at the base, rounded-mucronate at the apex, 8 to 14 cm. long, 5 to 6 cm. broad, entire, glabrous and lustrous above, paler and more or less puberulent beneath, the costa and veins prominent. Rachis of the panicle minutely hispidulous. Male flowers: sepals 5, suborbicular, about 0.5 mm. long; petals 5, ovate to elliptic, 2 mm. long; stamens 5; rudimentary carpels 3. Female flowers and fruits not known.

Description of the wood

Sapwood thick, nearly white; heartwood slightly darker. Wood moderately soft, light in weight, not strong nor durable, moderately coarse grained and easily worked, not susceptible to good polish. Annual rings of growth not always definitely definable.

Pores numerous, rather large (.16 mm. in diameter), round, open, and arranged singly or in short radial rows of from 2 to 4,usually in pairs. Vessel walls in contact with ray cells and wood-parenchyma fibers, with numerous small, transversely slit-like, simple pits; where two vessels are abutting one another they have small bordered pits. Perforations simple. Wood fibers about 1.2 mm. long, with thin walls and relatively large cell cavities, and few simple, vertical, slit-like pits. Wood-parenchyma fibers abundantly developed and grouped around the vessels and in more or less irregular, interrupted tangential rows. These elements are readily distinguished from the wood fibers by their thin walls and larger cell cavities. Rays barely visible under the hand lens, from 1 to 4 or sometimes 5 cells wide and from 3 to 6 times as high.

Distribution, common names and uses

This tree is known only from its type station in southern Darien, where the Chocó Indians call it alcabú. There is no information as to the uses of the wood.

Burseraceae

The Panaman Icica

Icica panamensis Rose, North-Amer.Fl., 25^3:260. 1911.

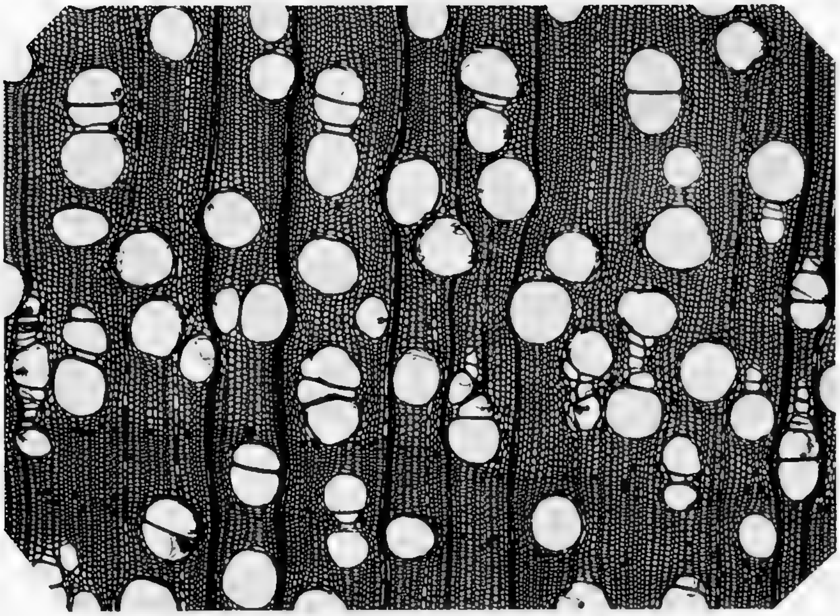
Description of the tree

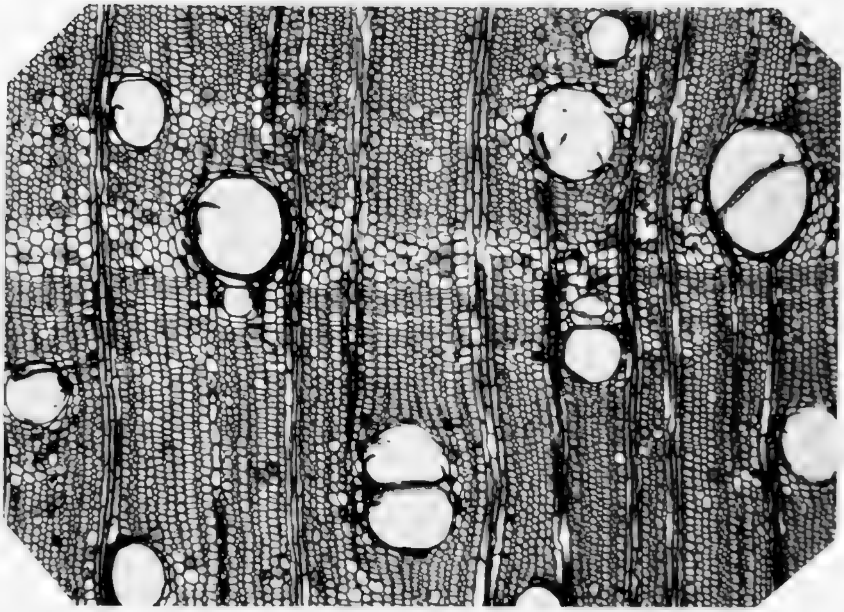
Small or middle-sized tree, seldom over 10 m. high, the trunk erect or slanting, often crooked, covered with a smooth grayish bark, the limbs irregular and few, the crown sparse; young branchlets glabrous. Leaves large, imparipinnate, about as broad as long, glabrous, the rachis 9 to 18 cm. long; leaflets 3 to 7; petiolules thick, the lateral ones 1.5 cm., the terminal one about 3 cm. long; blades oblong to elliptic, broadly rounded at the base, obtuse or subacuminate at the apex, and 12 to 18 cm. long. Flowers white, polygamous, on short axillary panicles; pedicels lor 2 mm. long; calyx cup-shaped, 4-partite, the lobes rounded; petals 4; stamens 8 to 10; pistil slightly longer than the stamens, glabrous, the ovary contracted at the base and apex, the stigma subsessile, 4-lobed. Drupe smooth, oblong-fusiform, 2 to 2.5 cm. long, the epicarp red at maturity.

Description of the wood

Sapwood rather thick and light brown; heartwood slightly darker. Wood relatively soft and heavy, not strong, straight and close grained, easily worked and taking a very good polish. Annual rings of growth not visible.

Pores (transverse section) very numerous, rather small (.14 mm. in diameter), round when isolated or irregular in outline when in groups or radial rows. Open in both sapwood and heartwood, and arranged singly, in pairs, small groups, or radial rows. The vessel walls (longitudinal section) when in contact with one another have numerous pits, large and bordered, but when in contact with the wood parenchyma and the ray cells they bear large, simple pits with transitions to bordered pits. The large simple pits sometimes resemble scalariform perforations. Perforations





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simple. Wood fibers about 1-2 mm. long, septate with thin walls, large lumina and simple pits. Wood parenchyma sparingly developed. Rays very narrow, usually from 1 to 3 cells wide and from 5 to 8 times as high.

Distribution, Common names and uses

This Icica is known only from the Atlantic Coast of Panama, where it grows on the hillsides covered with light forest growth. At Nombre de Dios, it is called copá, perhaps an alteration of copal, and the clear resin which runs from the incised trunk is used to cure sores and also as incense in the church. The wood is white, soft and of little if any service.

Meliaceae

The Sweet Cedrela

Cedrela fissilis Vell. Fl. Flum. 1: 75,2: t. 68. 1825.

Description of the tree

A tree of variable habit, trunk low and rounded crown, or trunk shaft-like and high, the crown then more or less elongated, the bark darkish, rimose on the trunk, smoother on the limbs, brownish, velvety pubescent, and covered with white lenticels on the branchlets. Leaves pinnate, deciduous, the rachis thick at the base, obscurely sulcate, velvety pubescent, 25 to 35 cm. long; leaflets 7 to 12-jugate, suopposite, subsessile, ovate to elliptic, subcordate or acute at the base, mostly oblique, 5 to 12 cm. long, 3 to 5 cm. broad. Pannicles many-flowered, the rachis velvety hairy; pedicels about 1 mm. long; calyx gamosepalous, 5-toothed, pubescent; petals 5, white, hairy, acute, narrow, 9 mm. long; stamens 5, shorter than the petals; ovary ovoid, glabrous, sessile on a sulcate, columnar disc, 5-celled, each cell 12-ovulate. Capsules in hanging bunches, dehiscent, 5-valvate, about 3 cm. long and 2 cm. in diameter; seeds flattened, long winged on one side only.

Description of the wood

Sapwood thin, nearly white; heartwood brownish-red or mahogany colored. Wood moderately hard, medium heavy, moderately strong and tough, fine-grained, easily worked, taking a very good polish, and durable in contact with the soil. Annual rings clearly visible with the unaided eye and marked by a single interrupted row of small pores in the early wood.

Pores few, rather large (about .21 mm. in diameter), round, open in sapwood, sometimes closed with dark brown tyloses in the heartwood, and arranged chiefly singly, sometimes in pairs or short radial rows of from 3 to 4. Vessel walls in contact with ray cells and wood-parenchyma fibers, usually with transversely elliptical bordered pits, or sometimes simple; elsewhere numerous bordered pits. Perforations simple throughout. Wood fibers about 1.619 mm. long, with thin walls, large lumina and small vertical, slit-like simple pits. Wood-parenchyma fibers fairly numerous, scattered irregularly throughout the wood. Rays numerous, clearly visible under the hand lens, and from 1 to 3, occasionally 4 cells, wide, and from 8 to 12 cells high.

Distribution, common names and uses

Cedrela fissilis has been reported from many points between Oaxaca in Mexico and the province of Minas Geraes in Brazil; it seems to thrive best in the lower belt and in a semi-arid climate. As to its uses and names, it does not seem to bepractically distinguished from Cedrela montana Turcz., and is variously called cedro, cedro dulce, or cedro colorado. In many parts of tropical America, these two species take the place of the spruce and pine of the temperate regions and are used extensively for carpenter, joiner and cabinet work. They are imported in large quantities into the United States coming from Central America and the northern coast of Colombia and Venezuela; the bitter Cedrela, cedro amargo (C. mexicana R. & S.), is much more valuable as a commercial timber.

Euphorbiaceae

Spurge Family

~~The~~ Hieronyma-Tree

Hieronym~~i~~a alchorneoides Fr. Allemão, Dissert. in Trab.Soc.
Velloz. Sebastianop. 1848, with plate.

Description of the tree

A large dioecious tree, the trunk covered with scaly, grayish bark, the crown flat or rounded, more or less spreading, the branchlets covered with minute, peltate scales. Leaves alternate, simple, oblique, coriaceous, the petioles slender, 2 to 5 cm. long, canaliculate, minutely scaly; blades ovate or ovate-elliptic, more or less rounded at the base, briefly acuminate, 8 to 16 cm. long, 4.5 to 10 cm. broad, olive green and sparsely scaly above, paler and densely scaly, with the costa and veins very prominent, beneath; stipules foliaceous, petiolulate, scaly. Inflorescences paniculate at the end of the branchlets, the rachis densely scaly, the brachlets spiciform, bracteolate, 5 to 7 cm. long. Flowers numerous either male or female, the calyx cupuliform, 4-lobulate, pubescent, the lobules rounded obtuse; petals none; disc thick, torulose. Male flowers: stamens usually 4, exserted; the anthers 2-loculate, with diverging cells; pistil rudimentary. Female flowers: no stamens; ovary ovoid, sessile, 2-celled, each cell 2-ovulate; stigmas usually 4, sessile, terete, recurved. Drupe small, 1 or 2-celled, surrounded by a reddish pericarp; seeds 1 or 2, pendulous.

Description of the wood

Sapwood thick, light pink; heartwood slightly darker resembling light colored mahogany. Wood hard, moderately heavy, tough, fine grained, taking a good polish. Annual rings of growth not visible; the alternating porous and less porous layers visible under hand lens on a smooth transverse section are not indicative of annual rings of growth, but represent periods of accelerated growth brought about by favorable conditions.

Pores (transverse section) very numerous, (.17 mm. in diameter), round, open, and distributed singly throughout the wood, rarely in small groups or short radial rows of contiguous vessels. Vessel walls (longitudinal section) with numerous large bordered pits; those between contiguous vessels often scalariform bordered, those in contact with wood-parenchyma and pith-ray cells with either bordered pits or bordered and simple, the latter sometimes very large. Ens of vessel segments usually wholly absorbed, sometimes both simple and scalariform perforations present in one and the same specimen. Wood fibers about 1.154 mm. long, moderately thick walls, with relatively large cell cavities and few slit-like pits. Wood-parenchyma fibers scantly developed; they surround vessels and are arranged in irregular inconspicuous, tangential lines, and may be recognized by their thin walls and large cell cavities. Pith rays very numerous, narrow, barely visible under a hand lens on a smooth transverse section, usually only one or two rows of cells wide and from a few to many cells high.

Distribution, common names and uses

Hieronym~~i~~a alchorneoides has a very wide area of distribution, extending from South Brazil to western Panama. While, however, it has been reported from various points in the Amazonas basin, it is not known to grow in the intervening of Venezuela and Colombia. In Panama, where it was first indicated by Seemann, it has been collected at several points along the Pacific coast and is by no means a rare tree. The Tupi-guarani names are *uricana* and *urucurana*, (meaning spurious anatto) the Panaman ones *pantano* and *Zapatero*. The wood is hard and fine grained, and wherever at hand, is extensively used in civil and naval construction as well as for fine joiner-work.

The arboreous Pera

Pera arborea Mutis, Vet. Akad. Handl. Stock. 5: 299. 1874.

Description of the tree

A middle sized, monoecious tree, the trunk slender, seldom straight, covered with a smooth, whitish bark, the crown sparse and flat. Leaves glabrous, subcoriaceous, the petioles 1 to 1.5 cm. long, sulcate, the blades ovate, cuneate and subdecurrent at the base, briefly acuminate, 10 to 18 cm. long, 5 to 8 cm. broad, reticulate, the costa and veins prominent on the lower face. Flowers unisexual, the inflorescences clustered in the axils of the leaves, and pedicellate. Involucre calyx-like, the 2 outer bracts coriaceous, broad, concave, hairy outside, red inside, the 2 inner bracteoles small, white, petaloid; neither calyx nor corolla; male flower central, surrounded by rudimentary ovaries, the stamens numerous; female flowers 4 in each involucre, the ovaries 3-celled, the stigmas almost sessile, stellate. Capsule loculicid, pear-shaped; seeds depressed, black and lustrous.

Description of the wood

Sapwood thick, very light brown, nearly white; heartwood darker. Wood moderately hard and heavy, rather strong, wavy and fine grained, taking an excellent polish. Annual rings of growth not clearly visible under hand lens.

Pores (transverse section) fairly numerous, rather small (.17 mm. in diameter), round or radially compressed, open both in sapwood and in heartwood and arranged either single or in short radail rows. Vessel walls (longitudinal section) with numerous, small, transversely oval bordered pits, with transitions to larger simple pits. Perforations simple. Wood fibers about 1.244 mm. long, with very thin walls and relatively large cell cavities and small vertical slit-like simple pits. Wood parenchyma abundant and arranged in very narrow, always indistinct, tangential lines from 1 to 2 cells wide. Rays numerous, very narrow, usually only one

cell wide and from a few to 15 or more cells high.

Distribution, common names and uses

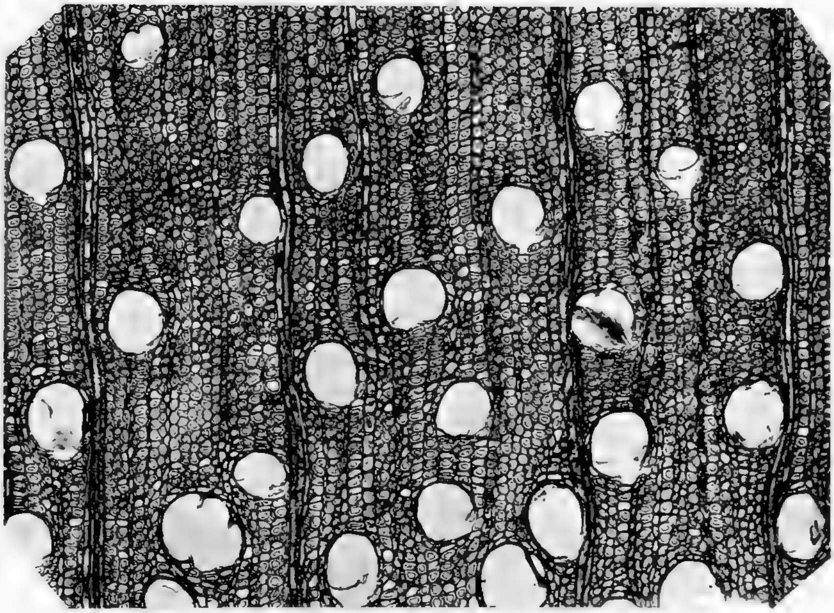
The tree is known only from Colombia and Panama, where it grows in the inferior warmer belt on the slopes and ridges of the hills. In Colombia the fruit and also the tree, are known under the name pera, on account of the shape of the former, which looks like a diminute pear. In Panama, the tree is called felí, a name probably taken from one of the native languages. The wood is said to be strong and is extensively used in house building in the villages along the Atlantic coast and in Darien.

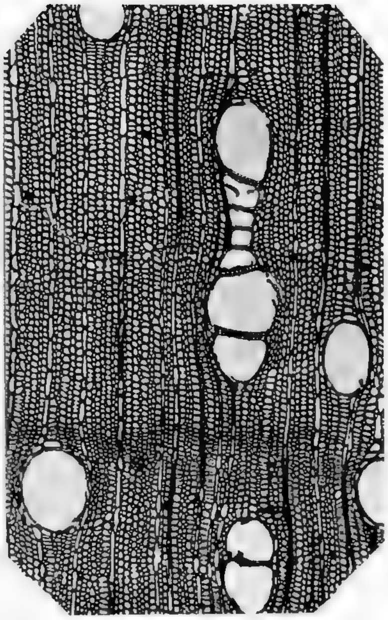
The birdcatcher's Milk-wood

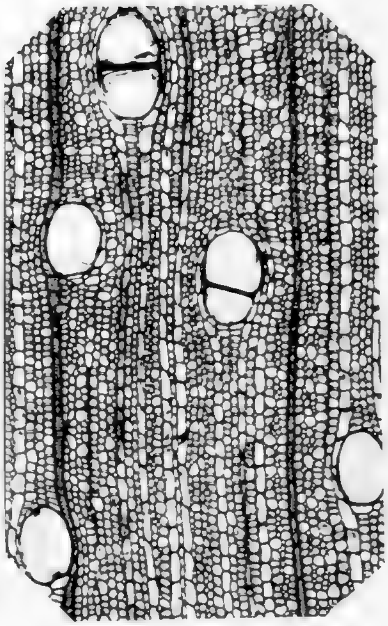
Sapium aucuparium Jacq., Enum. Pl. carib. 31. 1760

Description of the tree

A tree 5 to 10 m. high, the trunk low, the crown depressed and spreading; bark rugose, grayish; floriferous branchlets erect. Leaves coriaceous, glabrous, olive green, the petioles 5 to 15 mm. long, provided with two conical glands, the blades lanceolate or obovate-lanceolate, 6 to 13 cm. long, 1.3 to 2.5 cm. broad, obtuse or acute and incurved at the apex; margin serrulate, each tooth provided at first with a small deciduous gland; stipules ovate-reniform, fimbriate on the margin. Floral spikes about 10 cm. long, single, terminal, androgynous or only male; glands oblong; bracts broadly ovate obtuse, fimbriate; bracteoles reduced to hair-like appendages. Female flowers 5 to 8, distant, the perianth bilobulate, the ovary globoso, the 3 stigmas sessile. Clusters of male flowers close together, 7 to 12-flowered, the perianth 2-cleft, the stamens 2. Capsules 3 to 6 on each spike, sessile, more or less globose-depressed, about 10 cm. long and 13 cm. in diameter; seeds lenticular, apiculate, smooth, about 6 mm. long and broad.







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This tree, which had been distinguished by Klotzsch under the name of Sapium moritzianum, has a peculiar appearance not unlike that of certain willows. On the margins of the leaves are numerous hydathodes, or water-secreting organs, which appear at irregular intervals in the shape of larger, rounded teeth.

Description of the wood

Sapwood thick, nearly white; heartwood slightly darker. Wood very soft, light, not strong, very brittle, straight and rather coarse grained, easily worked, not taking a very good polish. Annual rings of growth barely visible under a high power microscope.

Pores few, rather large (.154 mm. in diameter), round, open both in sapwood and in heartwood, and arranged singly or in short radial rows of from 3 to 4. The vessel walls in contact with pith-ray cells and wood-parenchyma fibers contain few, large, transversely elongated simple pits; elsewhere numerous, small pits, with very narrow borders. Perforations simple. Wood fibers about 1.41 mm. long, with very thin walls, relatively large lumina, and small, slit-like simple pits, or sometimes with very narrow borders. Wood parenchyma sparingly developed. Rays exceedingly numerous, 1 cell wide and from 8 to 15 cells high. Pith rays constitute about 50 % of the bulk of the wood.

Distribution, common names and uses

The birdcatcher's Milk-wood, or lechero of Trinidad and Venezuela, is known from the northern part of South-America, including some of the Windward Islands. In Panama, its favorite stations are on rocky hills close to the seashore, or in the forests clumps of the savannas along the lower slopes of the Pacific watershed. On account of the peculiar appearance of its grayish green foliage, it is called olivo by the natives, who sometimes use the latex to smear small sticks by means of which they catch birds.

The Giant Milkwood

Sapium giganteum Pittier, Contr. U.S. Nat. Herb. 20:128. 1918.

Description of the tree

A tree, up to 30 meters high and 1 meter in diameter, the trunk straight, the limbs divaricate, forming a flat, spreading crown; bark grayish and rimose. Leaves coriaceous, glabrous, the petioles 1.4 to 2 cm. long with rounded-conical glands contiguous to the base of the blade, this elliptic, 5 to 12 cm. long, 2.5 to 3.5 cm. broad, tapering at the apex to a slender, incurved appendage; margins sinuate-toothed on the lower half of the blade, serrate toward the apex. Flowers not known. Capsules 4 to 8 on each spike, sessile, globose-depressed, about 10 mm. long by 15 mm. in diameter, the divisions of the carpels and the dorsal, loculicid lines of dehiscence marked by distinct meridian furrows; seeds whitish, suborbiculate and flattened, sparsely tuberculate, apiculate, about 5 mm. long and 6 mm. broad, surrounded with a red, aril-like tissue.

Description of the wood

Sapwood thick, light cream colored; heartwood slightly darker. Wood soft, light, not very strong, brittle, fairly fine grained, easily worked, does not take a good polish, and is not durable in contact with the soil. Annual rings of growth not clearly visible under high power microscope.

Pores numerous, (about .2 mm. in diameter), round when solitary or irregular when in groups, open, and arranged singly or more often in small irregular groups or radial rows of from 3 to 6. The vessel walls (longitudinal section) in contact with wood parenchyma and pith-ray cells have large transversely elongated simple pits; where two vessels are in contact, the pits are numerous, larger with a narrow border. Perforations simple. Wood fibers about 1.724 mm. long, with thin walls, large lumina and small simple pits. Wood-parenchyma fibers sparingly developed, chiefly grouped around vessels. Rays numerous, very narrow, only one cell wide and from a few to 12 or sometimes 15 cells high.

Distribution, common names and uses

The giant milk-wood is known only from the vicinity of Fató, on the San Blas Coast, where it is conspicuous for its size, and not uncommon along the foot of the hills. It is generally called olivo, and the wood, which is used only as fuel, is white, easy to work and moderately strong. The latex or milk is very resinous and does not appear to contain rubber.

The Jamaican Milk-Wood

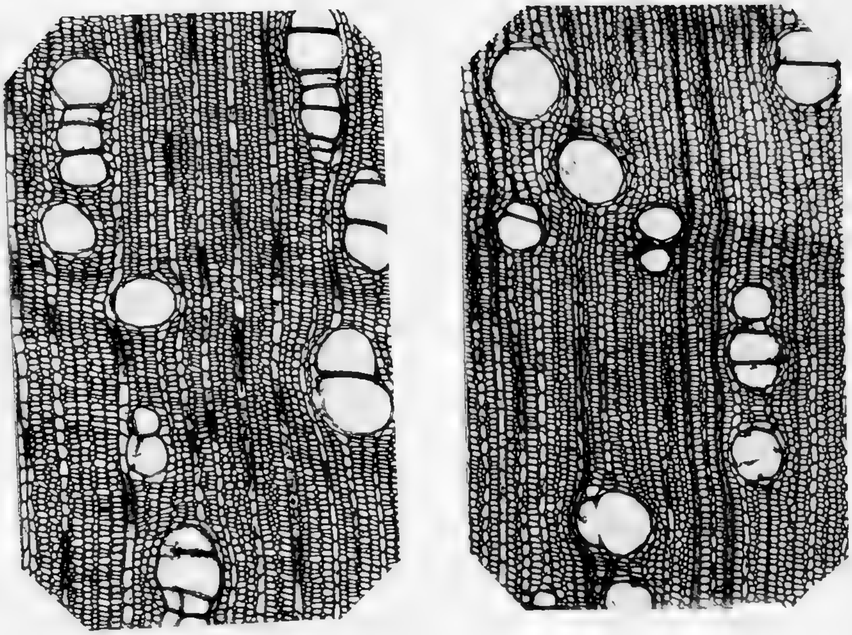
Sapium jamaicense Swart~~s~~z, Adnot. bot. : 62. 1829.

Description of the tree

A tree up to 25 m. high and often 1 m. in diameter at the base, the trunk erect, covered with a rough, furrowed and grayish bark, the crown irregular, elongate. Leaves membranaceous, glabrous, the petioles slender, 2.5 to 5 cm. long, provided at the apex with 2 sessile glands, the blades ovate, rounded cuneate at the base, briefly and obtusely acuminate, 6 to 12 cm. long, 3 to 5.5 cm. broad; margin entire; veins numerous; stipules ovate, acute. Floral spikes terminal, single or several clustered, at times bearing only male flowers, other times androgynous, the female flowers few and basal, the male flowers numerous and covering the upper part of the spike; floral glands elliptic; perianth of the female flowers 3-lobulate; ovary 3 or seldom 2-celled; male flowers 3 to 4-clustered, the perianth 2-lobulate, the stamens 2. Capsule globose, about 6 mm. in diameter; seeds lenticulate, slightly verruculose.

Description of the wood

Sapwood thick, nearly white; heartwood slightly darker.



Wood soft, coarse grained and not susceptible to a good polish, perishable in contact with the soil. Annual rings of growth visible only under the high power microscope.

Pores not very numerous, rather large (.17 mm. in diameter), round when isolated or irregular in outline when in groups, open, and arranged wither singly in small groups or short radial rows. Vessel walls with numerous, small, bordered or sometimes simple pits. Perforations simple. Wood fibers about 1.292 mm. long, with relatively thin walls, large cell cavities and small, oblique, slit-like bordered pits. Wood-parenchyma fibers not highly developed, scattered irregularly among wood fibers. Rays very narrow, usually only one cell wide, and 15 or more cells high.

Distribution, common names and uses

Sapium jamaicense Sw. is known to occur in Jamaica, Cuba and Santo Domingo, in the West Indies, in Guatemala and Panama in Central America, and in Colombia. It is called *Milk-wood* in Jamaica, *Lechero* in Cuba, *Lechoso* in Colombia, and *Ñipe* in North Darien, where our specimens were collected. The wood has no known uses.

Anacardiaceae

The Giant Cashew Tree

Anacardium Rhinocarpus D.C. Prodr. 2: 62. 1825.

Description of the tree

A tree up to 30 meters high and 1 m. in diameter at the base, the crown broadly rounded or elongate, the bark brownish, shaggy or scaly. Leaves alternate, entire, coriaceous, glabrous, bunched at the end of the young shoots, the petiole thick, flattened above, 1 to 2 cm. long, the blades obovate oblong, attenuate to the base, broadly rounded and often emarginate at the apex, 10 to 25 cm. long, 4 to 11 cm. broad, reticulate, the nervation prominent on the lower

face. Inflorescence broadly paniculate, few-flowered, subglabrous. Flowers small, white, the pedicels about 2 mm. long; calyx laciniate, with obtuse divisions, 1.5 to 2 mm. long and imbricate; petals 5, obtuse, twice as long as the calyx divisions; stamens 10.4 mm. long and 6 mm. short, connate at the base with the petals; ovary sessile, 1-celled, 1-ovulate. Fruit pedicel thick, fleshy; fruit reniform, about 3.5 cm. long and 2 cm. broad.

Description of the wood

Sapwood narrow, light brown; heartwood darker and tinged with yellow. Wood moderately soft, light though strong and durable, coarse and invariably cross-grained and difficult to work. Annual rings of growth usually very wide and visible only under the high power microscope.

Pores few, large (about .26 mm. in diameter), round, open in sapwood, but usually closed in heartwood, and regularly distributed throughout the wood, often solitary or in short radial rows of from 2 to 4. Vessel walls with relatively large bordered pits, where vessels border on one another; where their walls are in contact with pith-ray cells or wood-parenchyma fibers, the pits are usually large and simple. Pits usually transversely elongated parallel to one another, resembling scalariform markings. Wood fibers .942 mm. long, with moderately thin walls and relatively large cell cavities, sometimes forked. Pits rather large with very narrow borders. Pits openings usually elongated either in an oblique or transverse position. Cell cavities sometimes septate. Wood-parenchyma fibers abundant and arranged chiefly around vessels and bordering pith rays. Pith rays very numerous, varying from 1 to 4 or occasionally 5 cells wide, and from a few to 10 or 15 cells high. The individual ray cells large, usually shorter near the margin and often with crystals of calcium oxalate. Pits large and simple.

Distribution, common names and uses

The giant cashew-tree is found on continental America from the Guianas to Costa Rica, growing generally along rivers and only in the lower belt, from the sea-level to about 800 meters. It is one of the largest and most familiar trees of Panama, with a tough and hard wood, used in the native industry for making kitchen utensils and also

for canoes or dugouts, which are heavy and not very buoyant. Of late it has been successfully put on the market as a mahogany subtitute, often used for inside work in house building. The pounded bark, mixed with water, is said to stupefy fish and the fleshy peduncles of the fruit are edible. In Costa Rica and western Panama, the tree is called *espavé*, in eastern Panama, Colombia and part of Venezuela, it is known as **caracoli**.

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The Mosquito-Wood Tree

Mosquitoxylum jamaicense Urb. Notizblatt 1: 79. 1895.

Description of the tree

A tree up to 25 meters high and about 40 cm. in diameter, the trunk straight, covered with a reddish, scaly bark, the crown rounded depressed. Leaves alternate, the rachis glabrous, subangular, 5 to 20 cm. long, the leaflets, opposite or subopposite, oblique, 5 to 8-jugate, membranous; petioles 1.5 to 2 mm. long; blades ovate or ovate-elliptic, cuneate at the base, obtuse or slightly emarginate at the apex, 3 to 6 cm. long, 1.4 to 2 cm. broad, dark green and sublustrous above, paler and pubescent beneath. Inflorescence racemose, terminal, 20 to 25 cm. long, the rachis minutely adpressed pilose, the bracts and bractlets triangular, acute, pubescent, 1.5 to 2 mm. long, the flowers sessile, white, inconspicuous; involucre 3-foliolate; sepals 5, pubescent, about 1.5 mm. long; petals 5, ovate, 1.8 mm. long, more or les pubescent; stamens 5, staminodial in the female flowers; disc epigynous, crenate, purplish; ovary globose, sessile; style very short, 3-fid. Capsule ovoid, at first light red, turning to purple later.

The genus *Mosquitoxylum* is closely related to Rhus, differing only in the structure of the ovary and the mode of dehiscence of the capsule. The bark is full of an odorous, resin-like latex. The tree bears an immense number of seeds and when these are ripe, its crowns form red spots easily discovered from afar.

Description of the Wood

Sapwood thin, very pale pink; heartwood slightly darker, with a shade of yellow, resembling yellow poplar when freshly cut, soon turning darker. Wood hard, heavy, strong, brittle, cross- and close grained, taking a good polish, but not durable in contact with the soil. Annual rings of growth not visible under the high power microscope.

Pores numerous, small (.16 mm. in diameter), round, open in the sapwood, or sometimes closed in the heartwood, and arranged singly, in pairs, or very short radial rows. Vessel walls with numerous, small, slightly bordered pits, with transitions to large simple pits. Perforations simple. Wood fibers about .88 mm. long with thick walls, small lumina, and few small simple pits. Wood parenchyma sparingly developed. Rays numerous, narrow, from 1 to 2 rows of cells wide, and from 3 to 5 times as high.

Distribution, common names and uses

Besides Jamaica, where it was first discovered, the tree is known only from the Loma de la Gloria, a hill dominating the site of the old Spanish town of Nombre de Dios, on the coast of San Blas. The inhabitants of the neighboring town of Pató call it jobillo and use it as heavy timber in the construction of their houses. It is said, however, that it does not resist the humidity when in touch with the ground. The larger specimens in the forest are seldom sound. In Jamaica, the tree is known as Mosquito-Wood.

The Chagres-Tapirira

Tapirira chagrensis Pittier, Contrib. U.S. Nat. Herb.18: 158. 1916.

Description of the tree

About 20 meters high, the trunk 45 to 40 cm. in diameter at the base, straight, 8 to 10 meters to the first limbs; ra-

mification ascendent, forming an elongate crown, more or less depressed at the top; bark grayish and rimose on the trunk and larger limbs, light brown and dotted with lenticels on the young branchlets. Leaves glabrous, 9-foliolate, the rachis 12 to 25 cm. long, the petiole 6 to 10 cm. broadly flattened and expanded at the base; leaflets opposite, the petiolules sulcate, 1 to 3 cm. long, the terminal one longest, the blades coriaceous, oblique, ovate or obovate to elliptic, obtusely acuminate, 8 to 17 cm. long, 3 to 6.5 cm. broad, the margin entire. Pannicles axillary, subterminal, few-flowered, 12 to 15 cm. long, the rachis little ramified, more or less pubescent. Male flowers sessile; calyx about 1.5 mm. long, sparsely pubescent, the 5 lobes more or less acute; corolla white, the 5 petals naviculiform, erect, about 3 mm. long, acute; stamens 10, about equal to the corolla; rudimentary pistil stiffly hairy.

Description of the wood

Sapwood thin, light brown; heartwood dark or mahogany colored. Wood moderately hard and heavy, strong, tough, slightly cross and fine-grained, taking a splendid polish. Annual rings of growth scarcely visible.

Pores numerous, small (.1 mm. in diameter), round or radially flattened when in groups, open or sometimes closed with dark brown tyloses in the heartwood, and arranged singly or in short radial rows of from 3 to 6. Vessel walls with numerous, small bordered pits. Perforations simple. Wood fibers arranged in radial rows and about .85 mm. long, with rather thin walls, large lumina and small, transversely, slit-like simple pits; fibers frequently septate. Wood-parenchyma fibers found only occasionally in contact with vessels. Rays not very numerous, fairly conspicuous under the hand lens, usually from 1 to 3 or 4 cells wide and from 3 to 5 times as high.

Distribution, common names and uses

This tree was discovered in 1911, growing on the dry limestone hills around Alhajuela in the Middle Chagres valley. It seems to occur frequently in the forests of that district, but no common name could be obtained and the wood, hard and strong, is indifferently used as opportunity offers itself.

The Many-flowered Tapirira

Tapirira myriantha Triana & Planchon, Ann. Sc. Nat. Bot. V. 14:295. 1872.

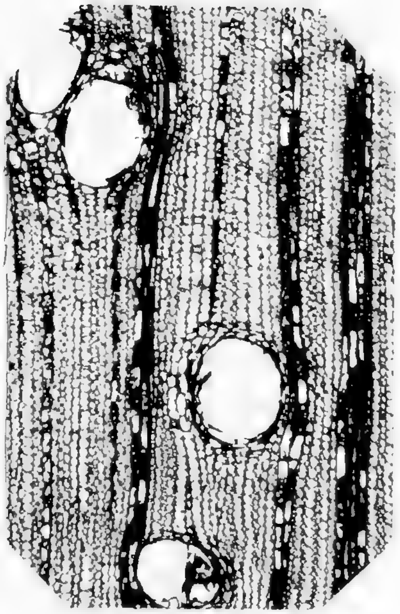
Description of the tree

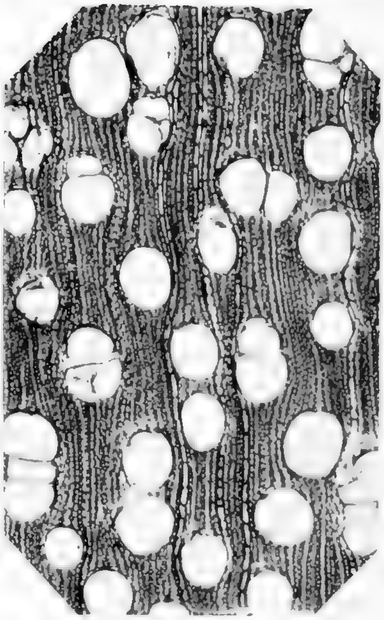
A tree, 25 meters high or more, the trunk 80 cm. in diameter at the base, the ramification ascending, irregular, forming a rounded, depressed crown; bark grayish and rimose on the trunk, brownish and dotted with numerous lenticels on the younger branchlets. Leaves imparipinnate, with 5 to 9 leaflets, the rachis 8 to 18 cm. long, minutely pubescent, the petiole about 6 cm. long, deeply canaliculate and tapering from the base; petiolules pubescent, the lateral ones 7 to 10 mm. long, the terminal ones 15 to 18 mm.; leaflet blades oblique, oblong to oblong-lanceolate, acuminulate, 9 to 22 cm. long, 4 to 6 cm, broad, the margin entire, the venation prominent beneath and sparsely pubescent. Floral panicles axillary and subterminal, equal to the leaves or shorter, densely flowered, the rachis more or less ferruginous-pubescent. Male flowers small, pedicellate, single or many-clustered; pedicels very short, hairy; calyx about 7 mm. long, hairy, the 5 lobules rounded, obtuse; petals 5, oblong-elliptic, acute or denticulate at the apex, 1.5 to 1.7 mm. long, pale yellow; stamens 10, hardly exceeding the corolla; rudimentary pistil obscurely 5-parted at the tip.

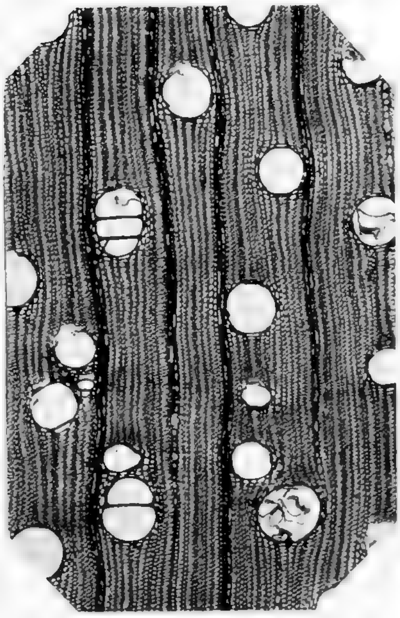
Description of the wood

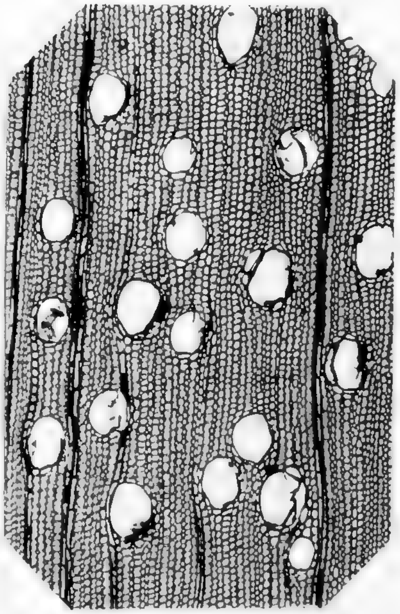
Sapwood thin, light brown; heartwood slightly darker or light mahogany colored. Wood moderately hard, heavy, strong, tough, straight and fine-grained, taking a very good polish. Annual rings of growth usually not visible.

Pores numerous, regularly distributed throughout the wood, very small (about .10 mm. in diameter), round or radially flattened when in groups, open or sometimes closed with dark brown tyloses in the heartwood, and arranged singly or very rarely in short radial rows of from 2 to 6. Vessel walls









with numerous, small, transversely, slit-like bordered pits. Perforations simple. Wood fibers about 1 mm. long, arranged in distinct radial rows, and with rather thin walls, large lumina, and very small simple pits, fibers frequently septate. Wood-parenchyma fibers sparingly developed and found only occasionally in contact with vessels. Rays not very numerous, fairly conspicuous under the hand lens, usually from 2 to 4 cells wide and from 12 to 20 cells high.

Distribution, common names and uses

This *Tapirira* is known only from the Choco province on the Pacific coast of Colombia, and from the coast of San Blas in Panama. At Fató, province of Colon, it is known under the names of *Bagamani*, *vagamani* and *vanamani*. It is not used for any special purpose except that an oily resinous fluid, used locally as a medicament, is extracted by means of incisions in the bark.

Elaeocarpaceae
(Breakax-Tree Family)

The large leaved Breakax-Tree

Sloanea megaphylla Pittier, Fedde's Repert. 13:312. 1914.

Description of the tree

A tree about 25 meters high and 40 cm. in diameter, with flat buttresses at the base, the trunk more or less fluted on the lower part, the bark reddish brown or grayish. Leaves caducous, coriaceous, the petioles terete, 9 to 10 cm. long, with a rounded elbow at the upper end, the blade obovate, emarginate at the base, obtuse, 45 to 60 cm. long, 26 to 36 cm. broad, glabrous above, minutely brownish pubescent beneath; venation impressed above, prominent underneath

the blade, the margin broadly sinuate. Floral racemes axillary, many flowered, 8 to 12 cm. long, provided with persistent bracts, the rachis canescent-tomentose; bracts and bractlets pinkish, lineal, remotely toothed; pedicels 3 to 9 cm. long, tomentose; sepals 5 to 6, lanceolate, 10 mm. long, 5 mm. broad, brown red, pubescent without; no petals; stamens numerous, appendiculate, pubescent all over, ovary subglobose, densely hairy; style 1.5 cm. long, hairy at the base, dividing at the apex in 5 slender, glabrous branches. Fruit subglobose, 3-celled, densely covered with reddish brown, 4.5 cm. long burrs. Seeds oblong depressed, 1 cm. long.

This tree is remarkable for its enormous leaves and its fluted trunk, both in striking contrast with the same parts in Sloanea quadrivalvis Seem., the other representative of the genus in Panama. Another large leaved species, S. medusula Schumann & Pittier, has been described from the Atlantic coast of Costa Rica, and may also be found in Panama.

Description of the wood

Sapwood thin, light brown, tinged with red; heartwood slightly darker. Wood hard, heavy, strong, tough, straight and fine-grained, and taking a good polish. Annual rings of growth can be readily distinguished under high power microscope.

Pores (transverse section) not numerous, small (.08 mm. in diameter), round or flattened radially when in groups, open or sometimes closed in the heartwood, and arranged singly and in short radial rows. Vessel walls (longitudinal section) with small, bordered pits with variations to simple pits sometimes very large. Perforations simple. Wood fibers about 1.289 mm. long, with rather thin walls and fairly large lumina and small simple or slightly bordered pits. Wood parenchyma sparingly developed. Rays numerous and quite conspicuous, from 1 to 10 cells wide and from 10 to 20 times as high.

Distribution, common names and uses

Sloanea megaphylla is known only from the Atlantic Coast of Panama, where it grows in the high primeval forest. It is known among the natives under the name of Mameicillo colo-

rado, and said to have been largely used in Colon for the under structure of the old docks. The Jamaican species, as well as ours, are known for their hard wood, to which they owe their names of breakax and ironwood trees.

Tiliaceae

The appendiculate Heliocarpus

Heliocarpus appendiculatus Turcz., Bull. Soc. Nat. Mosc. 1: 226. 1858.

Description of the tree

A shrub or a middle-sized tree, the trunk erect, covered with a grayish smooth bark, the branching radiate, the crown elongate or pyramidate. Leaves membranous, the petioles 5 to 6 cm. long, the blades ovate, emarginate or cordate at the base, acuminate, shallow 3-lobed in the lower leaves, about 20 cm. long, stellate-dotted above, more or less densely pubescent or tomentose beneath, crenate-toothed, the teeth glandulous, the basal sinus provided at the insertion with the petiole with a reniform, foliaceous appendage. Inflorescences panniculate, ramified, the rachis pubescent. Flowers clustered, polygamous, pedicelled, the calyx and corolla tetramerous; sepals linear-oblong, tomentose without; petals wanting; stamens 10 to 18, sterile in the female flowers; ovary 2-celled, abortive in the male flowers; style 1, bearing 2 long, toothed, divergent stigmas. Fruit ovate, stipitate, compressed laterally, with long bristles on the margin, the stipe pubescent.

Description of the wood

Sapwood thick and almost white; heartwood slightly darker. Wood exceedingly soft and light in weight, very brittle, weak, coarse and straight-grained, easily worked and does

not take a polish. Annual rings of growth not visible under the compound microscope.

Pores (transverse section) not very numerous, rather small (about .125 mm. in diameter), round or sometimes irregular in outline, open both in the sapwood and heartwood and arranged singly or in groups of 2 to 3. Vessel wall (longitudinal section) with numerous, very small simple and bordered pits. Perforations simple. Wood fibers about 1.07 mm. long, with very thin walls very large cell cavities, and inconspicuous simple pits. Wood parenchyma fibers strongly developed around the vessels and adjoining pith rays. There are inconspicuous in transverse sections even under the compound microscope. Rays very numerous and narrow, scarcely visible under hand lens. They are from 1 to 4 cells wide and from 3 to 4 times as high.

Distribution, common names and uses

This species seems to be restricted to Central-America. In Panama, it is known in some parts under the name of majagüillo, while it is the burío or burillo of Costa Rica and the calagüe, calagua or calagual of Salvador. The wood is of little or no use, but the fibrous and strong bark is one of the principal majaguas or rope-making materials, of the natives.

Bombacaceae

Fendler's False Bombax

Bombacopsis Fendleri (Seem.) Pittier, Contr. U.S. Nat.
Herb. 18:163. 1916.

Description of the tree

A deciduous tree, very variable in size (height from 6

to 30 meters; diameter of trunk 15 to 40 cm.). Trunk and limbs aculeate; terminal branchlets unarmed. (Leaves entirely glabrous, 6 or 7-foliolate. Petioles slender, 4 to 5 cm. long. Petiolules 2 to 3 mm. long, canaliculate. Leaflet blades oblong-cuneate, rounded-emarginate at the apex, light green above and glaucous beneath, the terminal ones 9 cm. long, 4.5 cm. broad, the lateral ones about 4 cm. long and 2 cm. broad. Venation prominent on both sides of the blade; veins straight, connected at their ends. Margin entire. Flowers loosely paniculate at the end of new branchlets. Pedicels glabrous, articulate, 5 mm. long, provided with 3 rounded, scaly, caducous bractlets about 1.5 mm. long. Calyx tubular, truncate, with irregular, often 5-mucronulate margin, eglandulose, obscurely tomentose, about 8 mm. long and 5 mm. in diameter. Petals inserted around a cuplike disk about 2.5 mm. long, slightly connate at the base, laciniate, reflexed, 8.5 to 10 cm. long, 6 to 9 mm. broad, rounded and often mucronulate at the apex, densely dark-dotted without except on the covered margin, minutely pubescent and white within. Staminal tube 2.2 cm. long and 3 to 4 mm. in diameter, softly hairy; filaments slender, white, 4 to 7 cm. long, free from the base, glabrous; anthers oblong-reniform, dorsifixed. Pistil glabrous, about 9 cm. long; ovary subglobose, about 2 mm. long; style slender, ending in a purple, minute, obscurely 5-tipped stigma. Capsule ovoid, pentagonal and truncate, 6 to 7 cm. long and 4 cm. in diameter, greenish and smooth without, dehiscent, the valves 1.5 to 2 cm. wide. Seeds small, ovate, smooth, brownish with black dots, wrapped in a silky, pale brown wool.)

Description of the wood

Sapwood thick and nearly white; heartwood yellowish white only slightly darker than the sapwood, wood moderately soft, light, rather weak and brittle and coarse-grained, not susceptible of a good polish. It splits and works easily. Annual rings of growth visible only under hand lens or compound microscope.

Pores (transverse section) not numerous, conspicuous (about .28 mm. in diameter) nearly round or slightly radially elongated, usually open both in sapwood and heartwood and arranged singly or in pairs, rarely three in a row. Vessel

walls (longitudinal section) with numerous very small transverse slit-like pits; the ends of vessel segments oblique and completely absorbed. Wood fibers about 1.3 mm. long with very thin walls and large septate cell cavities. The pits very small and indistinct. Wood-parenchyma sparingly developed. Intermediate wood-parenchyma fibers present. These represent a transition stage between wood fibers and wood parenchyma fibers, such elements have the cell cavities septate. Rays numerous and from 1 to 3 cells wide and from 8 to 10 times as high.

Distribution, common names and uses

Bombacopsis Fendleri is a well known tree within the limits of Panama, where it goes under the name of *cedro espinoso*, but has not heretofore been reported from the countries to the south and east, neither from Costa Rica, where it is supposed to extend northwestwards to some distance along the Pacific coast. It prefers the semi-dry climate of the southern watershed and crosses the Isthmus only through the gap formed by the Chagres Valley.

Superficially, the wood looks very much like that of the several species of Cedrela, except for its paler color. It is extensively used in Panama for the inside wood-work of houses. The supply, however, is limited, as the tree is never very large and grows in isolated specimens.

Sterculiaceae
(Cacao-Family)

Bernouilli's-Cacao Tree

Theobroma Bernouillii Pittier, Fedde's Repert. 13:319. 1914.

Description of the tree

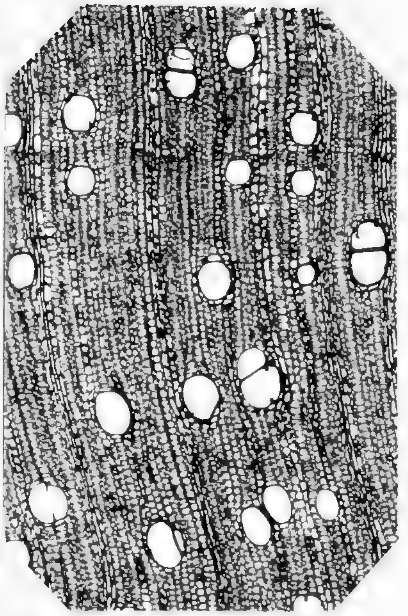
A cauliflorous tree, up to 12 meters high and 35 cm. in

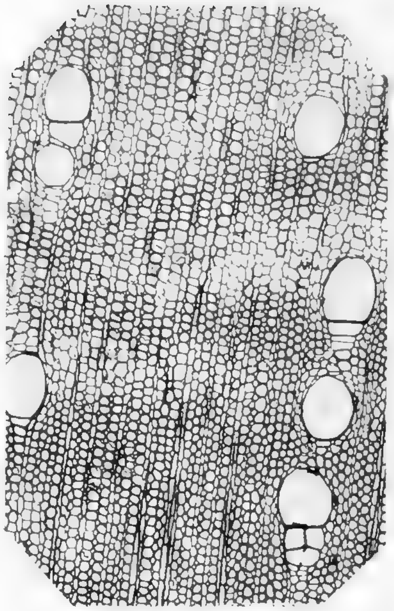
diameter, the trunk straight, the primary branches few and radiating; branchlets slender, densely stellate hairy. (Leaves distichous, oblique, trinerve, coriaceous; the petioles terete, 4 to 10 mm. long, brown and velvety; the blades narrow elliptic, 15 to 32 cm. long, 5 to 9 cm. broad, abruptly long acuminate, glabrous and sublustrous above, covered beneath with a dense film of white, stellate hairs; margin entire; venation prominent on the lower face, subglabrous or sparsely pubescent glandulous. Cymes fasciculate, many flowered, issuing from the trunk only, below the first limbs. Pophyllum and bracts fugacious; peduncles and pedicels brownish velvety, the latter slender, 5 to 8 mm. long; lobes of the calyx 5, parted almost to the base, elliptic, obtuse, 8 to 9.5 mm. long and 3 to 3.5 mm. long, glabrous and red within, covered without with a dense film of pale purple stellate hairs, intermixed with dark purple, glandular ones; petals 5, about 9 mm. long, the hood yellowish red with 5 red veins, pubescent without, the ligule sessile, suborbicular, red, about 4 mm. long and broad; staminal tube 2.5 mm. long, the 5 staminodes lanceolate, dark purple, 6 mm. long, the stamens 5, diantheriferous, pendulous. Ovary ovoid, 2.3 mm. long, pubescent; styles glabrous, white, 1.6 mm. long. Fruit with a coriaceous pericarp.)

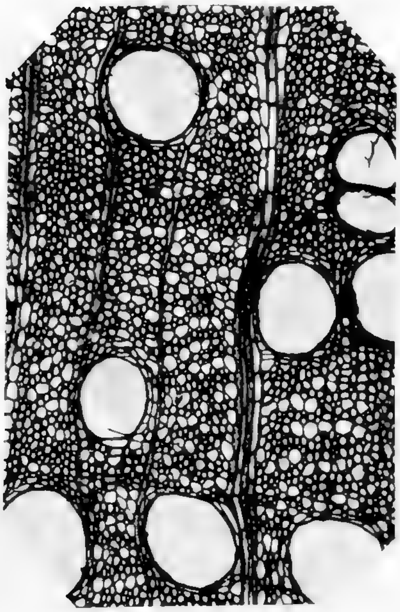
Description of the wood

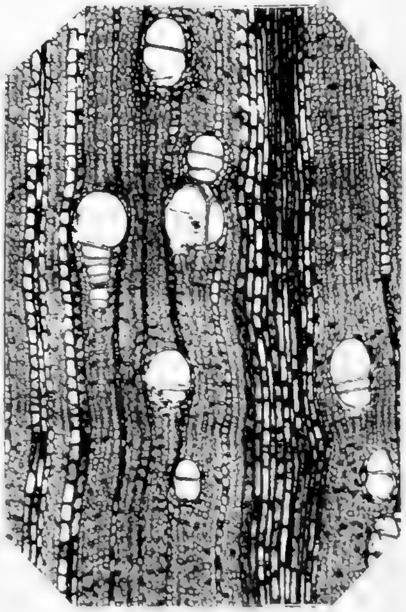
Sapwood very thin and light brown; heartwood dark brown, straight and close grained, taking a fairly good polish. Annual rings of growth visible under a hand lens.

(Pores (transverse section) few, rather small (about .14 mm. in diameter), round, open both in sapwood and heartwood, and arranged singly or in short radial rows. Vessel walls (longitudinal section) with numerous, small, bordered pits, with transitions to simple pits. Perforations usually scalariform with from 1 to 2 bars. The wood fibers about 1.411 mm. long, with relatively thick walls, small lumina, and small, slit-like, simple pits. Wood parenchyma abundantly developed and occurring in very many, narrow, usually from 1 to 2 cells wide, regular tangential rows. Rays conspicuous, from 8 to 12 cells wide and from 8 to 10 times as high.)









Distribution, common names and uses

(This interesting member of the cacao-family was discovered on the slopes of the Loma de la Gloria, near the ancient Spanish settlement of Nombre de Dios on the Carribbean, in company with a cohort of other new or remarkable species like Pera arborea, Tapirira myriantha, Gustavia parvifolia, G. nana, Apeiba guianensis, Inga panamensis, Stachyarrhena heterochroum, Styrax sp., and many others.) Its vernacular name is cacao de monte and the straight stems are used in the building of the native houses.

Dilleniaceae

The Sandpaper-Leaf Tree

Curatella americana Linn. Sp. Pl. 1: 248. 1758-59.

Description of the tree

A small, dwarfed tree, up to 8 m. high, the trunk usually crooked, covered with a scaly brownish bark, the limbs robust, the crown irregular. (Leaves coriaceous, rough, the petioles broad, 5 to 7 mm. long, the blades oblong to elliptic, rounded or acute at the base, mostly obtuse at the apex, 10 to 15 cm. long, 3.5 to 12 cm. broad, softly stellate-tomentose at first, later glabrescent and scabrous, the margins broadly crenate or repand. Inflorescence racemose, many flowered, issuing from the defoliate nodes; rachis hairy, with paired bracts at each branching; flowers 4 to 6 mm. in diameter, illsmelling; sepals 4 or 5, two exterior; petals 4 or 5, ovate, white, caducous; stamens numerous, the filaments thickening toward the apex; carpels 2, free, hairy, subglobose, 1-celled, each cell 2-ovulate; style long, supporting a discoid stigma. Capsules coriaceous, hairy, about 8 mm. long, 2-seeded; seeds ovoid 4 mm. long, black, lustrous.)

Description of the wood

Sapwood narrow, light brown; heartwood somewhat darker,

Wood moderately soft, light, coarse-grained, splits only with great difficulty, and not taking a good polish. Annual rings of growth not clearly distinguished under the high power microscope.

Pores(~~transverse~~ section) few, (.19 mm. in diameter), round, scattered, single, and usually closed with masses of tyloses in the hardwood. Vessel walls (longitudinal section) with numerous small simple pits. End walls of vessel segments wholly absorbed or with a sclariform ladder-like opening with only a few bars. Pits are frequently transversely elongated resembling scalariform markings. Wood fibers about 1.995 mm. long with very thick walls, small cell cavities, and minute oblique pits. Wood parenchyma fibers not strongly developed but occur in irregular tangential rows(1 cell wide) interrupted by pith rays. The pith rays constitute more than 50 per cent of the wood mass; they are from 15 to 30 cells wide and approximately five times as high. The individual cells are elongated, axillary, or less often nearly square on a radial surface.

Distribution, common names and uses

This species is characteristic of the savannas and light forests of the lower Tropical-American belt, from Brazil to Central Mexico. In Panama, it goes by the name of *curatela* (Seemann), *chumico*, and *chumico palo*; *chaparro* is the common designation of the same tree in Colombia and Venezuela, while the Brazilians of the Amazon Valley call it *cajueiro bravo* or *sambaibinha*. The leaves are used for scrubbing and even for polishing wood and iron; the wooden skeletons of the native saddles are often made of pieces taken from the twisted trunks.

Ochnaceae

The Large-leaved Cespedesia

Cespedesia macrophylla Seemann, Bot. Voy. Herald:97. 1853.

Description of the tree

A tree about 20 m. high and up to 60 cm. in diameter; the trunk and limbs covered with a dark, more or less scaly bark, the limbs large, dividing only near the end, the crown flattened, umbrella-like. Leaves clustered at the ends of the branchlets, glabrous, very large, coriaceous, the petioles 2 to 3.5 cm. long, the blades obovate-spatulate, 25 to 70 cm. long, 10 to 24 cm. broad, the costa and veins prominent on both sides, the margin mucronate-dentate. Pannicles erect, divaricate, 50 to 140 cm. long; flowers usually geminate, the pedicels 1 to 1.5 cm. long; sepals 5, coriaceous, 3 to 4 mm. long, persistent; petals obovate, 18 mm. long, 10 to 11 mm. broad, bright yellow; stamens numerous, the anthers linear, basifixed; ovary stipitate, 5-celled, many-ovulate, surmounted by a short style.

Description of the wood

Sapwood thick, dark reddish-brown; heartwood slightly darker. Wood hard, heavy, strong, cross-grained and difficult to split, fine grained, taking a good polish. Annual rings of growth not visible even under the high power microscope.

Pores (transverse section) very numerous, rather small (.14 mm. in diameter), round, open, or closed with whitish tyloses, arranged singly or in short radial rows. Vessel walls (longitudinal section) with numerous small simple and bordered pits with slit-like openings which join horizontally and form fine horizontal lines especially in tangential sections; in radial sections large, round, simple, sometimes elliptical pits present. Wood fibers about 1.43 mm. long, with very thick walls, small lumina, and minute simple pits. Wood parenchyma very sparingly developed. Rays very numerous and plainly visible under hand lens on a smooth

transverse section, from 1 to 7 cells wide and from 4 to 8 times as high.)

Distribution, common names and uses

This beautiful tree, discovered first by Seemann in the Colombian Darien, is gregarious and grows on the hillsides of the eastern part of Panama, always at some distance from the sea. Notwithstanding its striking appearance it does not seem to have been much noticed by the natives and the wood, tough and very heavy, is not used for any purpose.

Theaceae

The Caribbean Ternstroemia

Ternstroemia Seemannii Triana & Planch.

Description of the tree

A tree 6 to 8 m. high, the trunk erect, continuous, covered with a verruculose bark, the crown pyramidal, all parts glabrous. (Leaves oblanceolate, long cuneate at the base, obtuse at the apex, 4 to 8 cm. long, 2.5 to 5 cm. broad, the petioles 6 to 8 cm. long. Flowers axillary, single; peduncles 1 to 1.5 cm. long; sepals 5, 2 exterior, 3 interior, all rounded, coriaceous, 4 to 6.5 mm. long; petals 5, more or less coherent at the base, white; stamens 5, inserted on the petals; ovary 2 to 3-celled, each cell with several ovules. Capsule indehiscent, obconical, apiculate, about 2 cm. long and thick, bearing at the base the persistent calyx; 1 seed in each cell, obovate, flattened, about 10 mm. long and 6 mm. broad.)

Description of the wood

Sapwood thin, very light red or slightly yellowish; heart-

wood darker tinged with red. Wood moderately hard, heavy, fairly strong and brittle, straight and fine grained, taking a good polish. Annual rings of growth visible only under high power microscope.

Pores (transverse section) very numerous, small (about .10 mm. in diameter), radially elongated, open, and arranged chiefly in radial rows. Vessel walls (longitudinal section) with numerous, small, bordered pits. Perforations scalariform, sometimes 15 bars. Wood fibers about 2.395 mm. long, with very thick walls and very small lumina, and numerous small, bordered pits. Wood parenchyma considerably developed and arranged chiefly in short, irregular, tangential rows of one cell wide, also bordering vessels and pith rays. Rays numerous, wide, very conspicuous under the hand lens, from 1 to 6 cells wide and from 8 to 15 times as high.

Distribution, common names and uses

This tree is found in several of the Caribbean Islands, and on the Isthmus of Panama, where it grows both in the cool forest of the Atlantic coast and on the outskirts on the low savannas of the Pacific slope. At Nombre de Dios, it is known under the name of Mangle mata-pescado and the mashed bark is used to stupefy fish and so make its capture easy. Around Panama City, the same species is called Manglillo and its flowers are much sought for on account of their delightful fragrance. The wood is a good timber, hard and lasting, but its dimensions are reduced and the supply of it is short.

The Hog-Gum Tree

Symphonia globulifera, Linn. fil. Suppl. 302. 1781.

Description of the tree

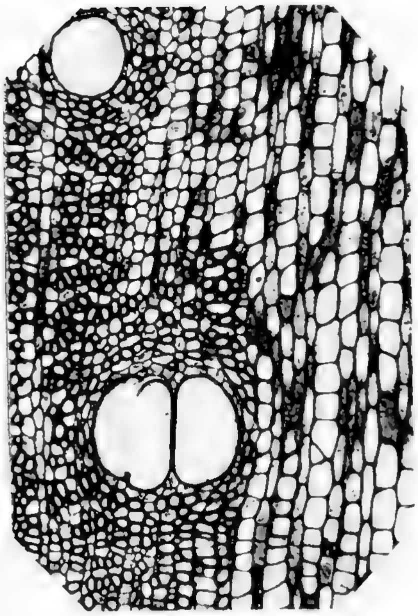
A tree up to 45 meters high and 1.20 m. in diameter,

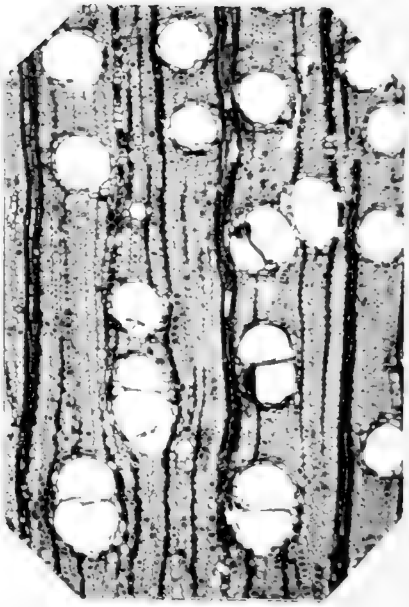
the trunk straight, provided at the base with low, flat buttresses and covered with a reddish, scaly bark, the ramification radiate and short, the crown elongate, the young shoots, leaves and flowers glabrous. (Leaves opposite, entire, coriaceous; the petioles canaliculate, about 1 cm. long; the blades entire, 6 to 10 cm. long, 2.5 to 4 cm. broad; costa and veins prominent on the lower face, the latter slender, parallel, crowded together and running straight to the margin. Flowers single or clustered at the end of the branchlets; the peduncles about 1.2 cm. long; sepals 5, suborbiculate, about 5 mm. long and broad; petals 5, thick, broadly ovate, red, 1.5 cm. long; disc cupuliform, extrastaminal, about 1.5 mm. high; staminal tube obpyriform, red, about 1 cm. long, dividing into 5 broad rays, each of which bears 3 extrorse anthers; ovary ovoid-oblong, sessile, 5-celled, each cell pluriovulate; style thick, about 7 mm. long, 5-fid. Berry ovoid, indehiscent about 2 cm. long, usually containing several seeds.

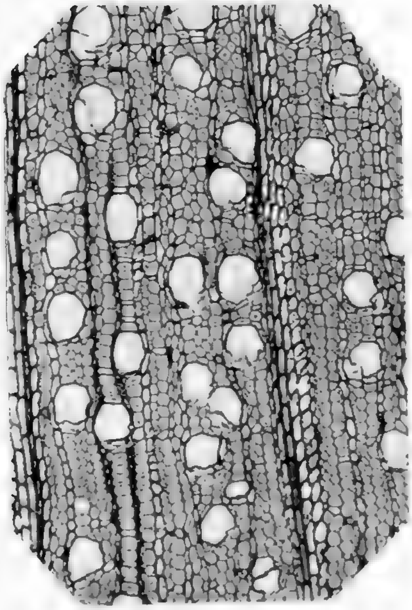
Description of the wood

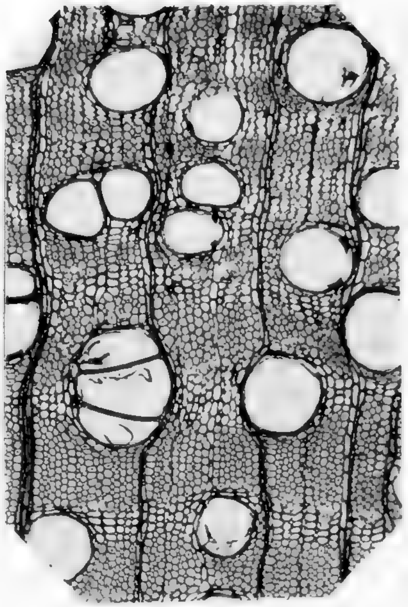
Sapwood thick, very light brown or nearly white when green; heartwood darker and tinged with yellow. Wood hard, heavy, strong, straight and very fine-grained, taking a high polish, and durable in contact with soil. Annual rings of growth not visible even under high power microscope.

Pores ~~(transverse section~~) numerous, moderately large (.19 mm. in diameter), round open in sapwood, closed with dark yellowish tyloses in heartwood, and arranged usually singly though occasionally in short rows of 3 to 4 radially much flattened pores. Vessel walls ~~(longitudinal section~~) where in contact with pith rays and wood-parenchyma bear numerous small simple or sometimes slightly bordered pits. Large simple pits are sometimes present on the radial walls. Perforations simple. Wood fibers about 1.86 mm. long, with very thick walls and almost obliterated cell cavities; fibers arranged irregularly; pits very small and simple. Wood-parenchyma highly developed forming tangential lines which alternate with much denser and slightly broader layers of wood fibers. The isolated vessels are invariably within the layers of this softer tissue. These two kinds of layers may be readily distinguished under the hand lens on a smooth transverse section by the fact that the wood-parenchyma has much thinner cell walls and larger lumina.









Rays very narrow, barely visible under hand lens and only from 1 to 4 cells wide and from 6 to 8 times as high.)

Distribution, common names and uses

Symphonia globulifera L. has a very wide range, extending over western tropical Africa and tropical America. It is a true forest tree, preferring humid districts and keeping to the lower belt, not over 200 meters above sea level. In Jamaica, it is known as *Hog-Gum* tree, which may be adopted as the common English name. For other countries we have *Bois á cochon*, in French Guyana and in the French speaking West Indian Islands, *Macouna*, *Mawna* or *Maouna-tree*, in British Guayana, *Oanani* or *Anany* in the Brazilian Province of Pará, *Maní* and *Peraman* in the Alto Orinoco (Venezuela) and Martinique and *Cerillo* in Panama and Costa Rica.

The wood is of a poor quality and seldom used, the large trees being generally hollow; the bark, leaves, flowers and fruits are filled with a bright yellow resin, which turns to black when exposed to the air, and is much used for calking the boats. A cotton cord, well soaked into the freshly extracted resin and dried, is used by the Indians as a torch, this giving a bright yellow light. The fruits, also filled with the yellow resin and of the size of a pigeon's egg, have a fleshy, acidulous, pleasantly tasting pericarp.

Flacourtiaceae
(Flacourtia-Family)

The laurel-like Lindackeria

Lindackeria laurina Presl. Relig. Haenk. 2:89, t. 65.1835-36.

Description of the tree

A tree 12 to 15 meters high, the trunk 30 to 35 cm. in diameter, usually straight, the crown pyramidal or elongate;

bark gray, more or less shaggy. Leaves alternate, glabrous, subcoriaceous, the petioles 6 to 9 cm. long, narrowly sulcate, the blades oblong lanceolate, 12 to 28 cm. long, 6 to 9.5 cm. broad, acuminate. Floral racemes terminal, simple or branched, few-flowered, glabrous, shorter than the leaves; pedicels 1 cm. long more or less; sepals 5, ovate to elliptic, 7 mm. long, obtuse or subacuminate; petals 5, narrow, elliptic, about 10 mm. long white; stamens 28, free or almost so, glabrate, nearly 6 mm. long, the filaments short, the anthers basifix, emarginate at the apex; pistil about 7 mm. long, the ovary softly echinate, pubescent, 1-celled, the many ovules inserted on 3 parietal placentas; style slender, pubescent at the base, obscurely 3-lobulate at the apex. Capsule subglobose, echinate, 1-celled, dehiscent, about 1 cm. in diameter, the pedicels about 1.5 cm. long, the seeds 1 to 4, ovoid.

Description of the wood

Sapwood thick, nearly white; heartwood light yellowish. Wood hard, moderately heavy, more or less brittle, very close-grained, taking a fairly good polish. Annual rings of growth not visible even under high power microscope.

Pores numerous, small (.06 mm. in diameter), round or radially compressed, open, and arranged in radial rows of from a few to 4 or more. Vessel walls with numerous simple or bordered pits, or sometimes one-sided bordered pits where they are in contact with pith-ray cells and wood-parenchyma fibers. Frequently large transversely elongated simple pits present. End walls of vessel segments chiefly wholly absorbed, or in the neighborhood of the pith these openings have scalariform bars from 5 to 8. Wood fibers about 1.47 mm. long with relatively thick walls, small cell cavities and prominent partition walls; the pits are slightly bordered with small transverse slit-like openings. The wood-parenchyma fibers resemble the wood fibers in transverse section except that they have slightly thinner walls. There are from 1 to 4 rows of wood fibers between the rows of wood-parenchyma fibers and the latter consist of a great many cells, frequently from 20 to 40. Pith rays narrow, barely visible under hand lens on smooth transverse section, from 1 to 4 cells wide and from 20 to 30 times as high.

Distribution, common names and uses

Lindackeria laurina extends from southern Mexico through Central America into the mountains of Colombia and Venezuela. It seems to occur most frequently along the southern slopes of Costa Rica and Panama; in the former country it is called *úgro*, a name taken from the térraba *u-gró* or *hu-gró*, meaning house-post; in Chiriquí, the western province of Panama, it is known as *carbonero*, and said to give a very fine charcoal. In both countries *Lindackeria laurina* is considered an excellent timber, but little used on account of it seldom attaining the required dimensions.

The Many-Flowered Hasseltia

Hasseltia floribunda H.B.K. Nov. Gen. & Sp. 7:232, t.651. 1825.

Description of the tree

Sometimes a mere shrub, or a tree 8 to 10 meters high, the bark smooth and grayish on the trunk, brownish purple on the branchlets, the crown irregular. Leaves(alternate, submembranous, glabrous, 3-nerved, the peticles 1.5 to 3.5 cm. long, slender, the blades ovate, acuminate, 7.5 to 16. cm. long, 3.5 to 7.5 cm. broad, remotely serrate. Inflorescence terminal, cymose, pseudo-umbellate, the rachis white and pubescent, flowers white, pedicels 2 to 4 mm. long; sepals 4, ovate or ovate-lanceolate, obtuse, about 3 mm. long, pubescent, persistent; petals 4, obovate, pubescent, a little longer than the sepals, the margin irregular (sinuate) at the apex; stamens numerous, the filaments reflected, sparsely villous; ovary globose, hairy, 2-celled, the ovules numerous; style short, persistent. Fruit small, black, hairy, 2 seeded.)

Description of the wood

Sapwood thin and almost white; heartwood slightly darker. Wood very hard, heavy, strong, tough, very close and straight-grained, easily worked, taking a very good polish. The annual growth of rings visible only under high power of the microscope.

Pores (~~transverse section~~) very numerous, small (.02 mm. in diameter), round, polygonal, or slightly elongated radially, open both in sapwood and heartwood, and arranged singly or more often in pairs or even in distinct radial rows of from 3 to 6 or more. Vessel walls ~~(longitudinal section~~) uniformly and densely pitted with numerous exceedingly small round bordered pits. End walls of the vessel segments wholly absorbed. Wood fibers about 1.55 mm. long with relatively thick walls and small cell cavities, the pits very small and slit-like. Wood parenchyma not very abundantly developed, occurring chiefly in the neighborhood of vessels and pith rays. Pith rays numerous and inconspicuous, chiefly only one cell wide, occasionally two cells, and from 10 to 20 or more cells high.)

Distribution, common names and uses.

This species is known from Ecuador, Colombia, Venezuela and the eastern part of Central America and is there of usual occurrence in the warmer lower belt. It is called pie de paloma (dove's foot) in the northern part of Colombia, but no common name has been recorded for Panama, where the wood does not seem to be used to any extent, except occasionally for fuel.

The Panaman Incense-Tree

Zuelania roussoviae Pittier, Contrib. U.S. Nat. Herb. 18: 163. 1916.

Description of the tree

A deciduous tree, 10 to 25 m. high, up to 50 cm. in dia-

meter at the base, the bark grayish and more or less rugged, the crown rounded or elongate. Leaves subcoriaceous, the petioles hairy, 1 cm. long, the blades oblong, subacute, serrulate on the margin, pellucid-dotted, pubescent above, hairy-tomentose beneath, 8 to 10 cm. long, 3 to 3.5 cm. broad; stipules narrow-lanceolate, small, hairy, caducous. Inflorescence of 10 to 15-flowered clusters, axillary, but appearing before the leaves. Pedicels 1 to 1.5 cm. long, hairy, provided with small, scarious bracts; sepals 5, ovate, obtuse, 7 mm. long, hairy without, greenish white; corolla none; stamens 32 to 34, the filaments 3.5 mm. long, subglabrous, the anthers ovate-elliptic, versatile, intermixed with 34 to 42 thick, clavate, sparsely hairy staminodes; pistil densely hairy, the ovary ovoid, 1 celled, with numerous ovules inserted on 3 parietal placentas; stigma sessile. Fruit berry-like, the 1.5 to 2 cm. long, hairy pedicel surmounted by the persistent calyx, the berry globose, sub-3-sulcate, about 3.5 cm. in diameter. Seeds numerous.)

Zuelania roussoviae Pittier, is the only known continental representative of the genus, the other members of which are at home in Cuba and possibly Jamaica.

The tree was first reported from the Isthmus by A. Fendler, who collected it in the lower Chagres district during the first months of 1850.

Description of the wood

Sapwood thick, nearly white; heartwood slightly darker. Wood hard, heavy, very tough and strong, close-grained, taking a good polish and durable in contact with the soil. Annual rings of growth not visible under the high power microscope.

Pores very numerous, small (.02 mm. in diameter), round, open or closed in the heartwood, and arranged singly, in pairs or in short radial rows of from 2 to 4. Vessel walls with numerous small simple pits where they are in contact with pith-ray cells and wood-parenchyma fibers; where two vessels are adjacent the pits are bordered. Perforations simple. Wood fibers about 1.~~400~~5 mm. long, with thick walls and moderately small lumina, with numerous, small, slit-like, simple pits on the radial walls. Wood-parenchyma fibers very sparingly developed. Pith rays very numerous and in-

conspicuous in transverse section, from 1 to 3 rows, usually/ 2 cells wide, and from 20 to 40 times as high.

Distribution, common names and uses

The Incense-Tree, or *caraño*, as it is called by the natives, grows as isolated individuals all over the territory of Panama. It loses its leaves during the dry season and is then very conspicuous in the maze of the forest vegetation on account of its clean grayish skeleton. In February, before the renewing of the foliage, it covers itself with innumerable white flowers, and its crown appear here and there as light colored spots lost in a sea of green.

The wood, white or light brown, splits easily and is said to burn readily, even when freshly cut. It is, however, of little use, and the tree is better known among the inhabitants of the country on account of the abundant, clear resin or gum (caraña) which exudes from incisions made in the trunk and to which great medicinal virtues are attributed.

Lythraceae

The many-flowered Adenaria

Adenaria floribunda H.B.K., Nov. Gen. & Sp. 6:185. 1823.

Description of the shrub

A shrub, or sometimes a small tree, not over 6 m. high, the branching diffuse and spreading, the bark reddish, the young branchlets hairy, 4-angled, the leaves and inflorescences densely covered with innumerable black glands. Leaves coriaceous, the petioles 2 to 4 mm. long, the blades elliptic-lanceolate, long acuminate, 6 to 10 cm. long, 2 to 3 cm. broad, light green above paler with the venation prominent and pubescent beneath. Flowers 5 to 13-clustered in the

axils of the leaves; usually tetramerous, sometimes 3, 5 or 6-merous; pedicels 4 to 6 mm. long, pubescent; calyx turbinate, pubescent, about 4 mm. long, lobulate; petals lanceolate, about 3 mm. long, yellowish or purplish white, alternating with the calyx lobes; stamens 7 to 12, included or exserted; ovary globose, stipitate, 2-celled, each cell pluri-ovulate. Fruit a pinkish white berry, about 4 mm. in diameter, surrounded at the base by the persistent calyx.)

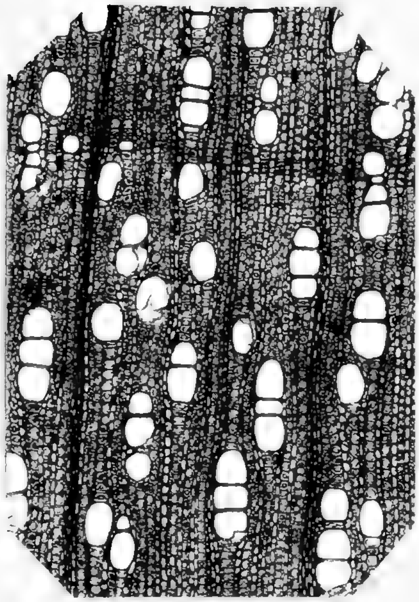
Description of the wood

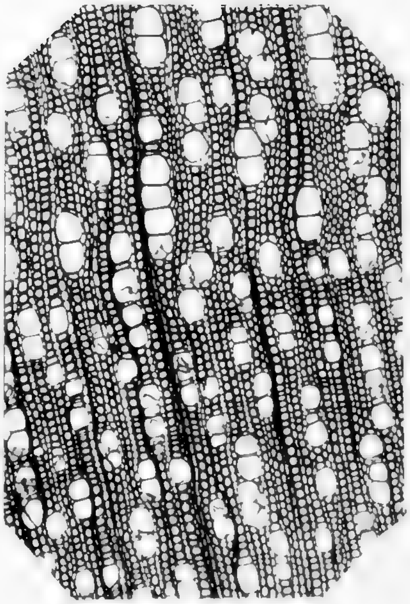
Sapwood light cream colored or nearly white; heartwood light yellow turning slightly darker or reddish upon exposure to light and air. Wood moderately soft, light in weight, not strong though tough, very fine and straight-grained, susceptible of a good polish. Annual rings of growth visible only under the high power microscope.

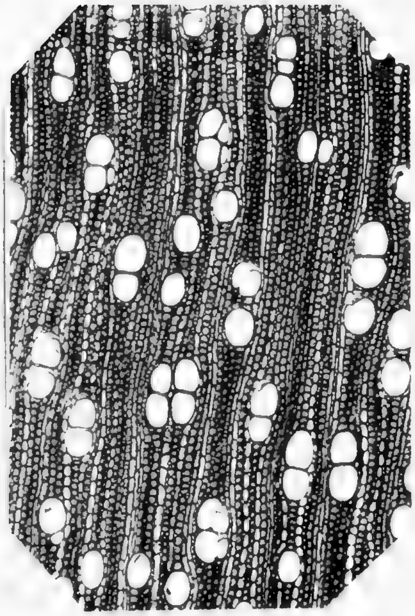
Pores ~~(transverse section)~~ numerous, small (.08 mm. in diameter), round when isolated and radially flattened when in groups, open both in sapwood and heartwood, and generally arranged in groups of from two to four. Vessel walls ~~(longitudinal section)~~ with numerous small, round bordered pits. Perforations simple. Wood fibers about 1.22 mm. long with moderately thin walls and comparatively large lumina, and small simple slit-like pits. Wood-parenchyma fibers not abundant, usually surrounding vessels and almost always only two cells long. Pith rays very numerous and inconspicuous under the hand lens. They are usually one cell wide, rarely two, and from 15 to 25 cells high.

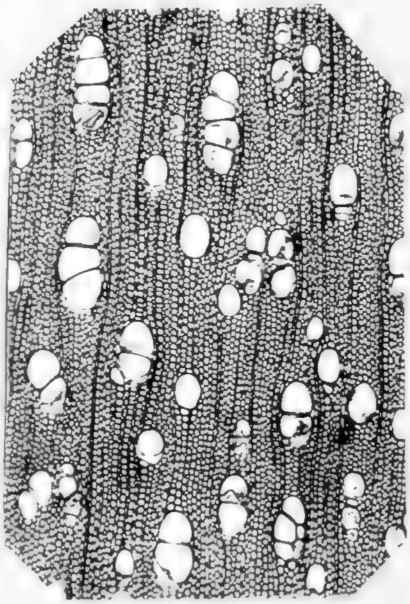
Distribution, common names and uses

The Adenaria is principally a South American tropical plant, reaching from the Canal Zone even as far as Argentina. In Central America, it is reported from Oaxaca (Mexico) but not from the countries southward. It is known in Colombia as chaparral, in Venezuela as guayabito, and the wood is of little, if any use.









The Granate-Leaved Lafoensia

Lafoensia punicifolia D.C., Mém. Soc. phys. Geneve 3, 2:86, t. 1. 1826.

Description of the tree

A tree, up to 15 m. high, the trunk straight, covered with a dark brown colored bark, the crown few branched, the branchlets more or less erect. Leaves coriaceous, glabrous, the petioles 3 to 6 mm. long, the blades lanceolate or sometimes ovate, obtusely acuminate, 3 to 8 cm. long, 1 to 2.5 cm. broad, lustrous above, paler beneath, the costa and veins dark colored and prominent. Inflorescence subpaniculate, terminal, few-flowered; pedicels thick, 2 to 3.5 cm. long; flowers 12 to 16-merous, first greenish, then purplish yellow; calyx broadly campanulate, 2.5 to 3 cm. long and 2 cm. in diameter; petals obovate or spatulate, 3 to 3.5 cm. long; stamens numerous, the filaments curled up, the anthers dorsifix and versatile; style 12 to 14 cm.long. Capsule ovoid, apiculate, about 3 cm. long and 2 cm. in diameter, dehiscent, 1-celled; seeds numerous.

The leaves of this tree present an interesting peculiarity in the presence of the lower face of the acumen of a pore corresponding to a cavity in the thickened end of the main nerve. No explanation seems to have been given as yet as to the function of this organ, but it seems reasonable to consider it as a form of hydathode.

Description of the wood

Sapwood usually thick, light or pale yellow; heartwood slightly darker. Wood rather hard, heavy, strong, tough, usually straight and very fine-grained, susceptible of a very fine polish, and moderately durable in contact with the soil. The annual rings of growth visible under hand lens.

Pores (transverse section) very numerous, small (.1 mm. in diameter), radially elongated, open both in the sapwood and heartwood, and arranged singly or more often in radial

rows of two or three. Vessel walls (longitudinal section) with very numerous, small round, bordered pits. Perforations simple. Wood fibers with moderately thick walls and small lumina, and a few small, lit-like pits. Wood parenchyma not strongly developed. Rays very numerous, not visible under the hand lens on a smooth transverse section, one or rarely two cells wide and from a few to 12 or more cells high.

Distribution, common names and uses

Lafoensia punicifolia ranges from Mexico southward across Central America and along the western slopes of the Andes to Bolivia. In Mexico, it is known as *palo moreno*, in Guatemala as *palo culebra* or *palo de culebra* (snake-wood), while in Panama it was formerly the origin of one of the principal dyes of the native Indians, in the form of a beautiful yellow color. This is probably the origin of the name *amarillo*, used at Chepo. There are, however, several kinds of *amarillos*. *Lafoensia punicifolia* is the *amarillo de fruto*, and the identity of the *amarillo real* y *amarillo calabazuelo* is still uncertain. The wood is fine grained and hard, and applied to various uses.

Lecythidaceae

The large Monkey-Pot Tree

Lecythis ampla Miers, in Trans. Linn. Soc. 30, 1:204. 1874.

Description of the tree

A very **tall** tree, 30 to 40 meters high, 1 to 1.50 meters in diameter at the base, the trunk erect, branching at the top only and covered with a blackish, rimose and fibrous bark, the crown broadly spreading, the branchlets slender, purplish and verruculose without. (Leaves small, subcoriaceous, glabrous, exstipulate, the petioles slender, 6 mm. long, the

blades broadly ovate, rounded or subacute at the base, acuminate, 3.5 to 9 cm. long, 2.5 to 4 cm. broad, reticulate, the margin sinuate-toothed and often sublobate; costa dark colored and prominate on the lower face; veins 12 to 13, several times anastomosed along the margin. Inflorescence not known. Pyxidium large and ample (20 cm. long, 15 cm. in diameter), urnshaped, the persistent calyx lobes forming 6 broad, sharp protuberances; operculum convex and more or less umbonate.)

Description of the wood

Sapwood thick, nearly white; heartwood light brown tinged with red, wood hard, heavy, tough, very close and even grained; and susceptible to good polish. Annual rings of growth very narrow and only faintly visible under hand lens.

(Pores ~~(transverse section)~~few, (.210 mm. in diameter) round, usually open in sapwood, closed in heartwood, and arranged singly or in pairs. Vessel walls ~~(longitudinal section)~~ with numerous small bordered pits, occasionally large simple pits present; end walls of vessel segment usually nearly horizontal and completely absorbed. Wood fibers about 1.74 mm. long, with very thick walls and totally obscured cell cavities; pits very small, simple and obliquely slit-like. Wood-parenchyma fibers abundantly developed and arranged in regular tangential lines of from 1 to 3 cells wide which alternate with tangential lines of wood fibers which are only slightly wider. Wood-parenchyma lines easily visible under hand lens. Pith rays very numerous, barely visible under the hand lens.on a smooth transverse section, from 1 to 3 cells wide and from a few to 10 or 12 high.)

Distribution, common names and uses

The real identity of this species is not established, but the fruits are very similar to those of *L. ampla*, described from specimens collected in the neighboring Colombian state of Antioquia. It is known as *olleto*, i.e., pot-tree, and the fruits as *ollas de mono* (monkey-pots); but it should be remembered that these names apply to everyone of the numerous species of neotropical genus. The wood is very

hard and lasting and said to resist indefinitely as well in the ground as in fresh or salt water. Its color is a rich reddish brown and as it is susceptible of a fine polish it certainly ought to have some future as an export timber.

Lecythis ampla grows on the ridges of the low hills around Port Obaldia, on the San Blas Coast. It is gregarious and one of the most conspicuous trees in the forests of the district. The seeds, which have not been seen, are certainly edible and could probably be collected in quantities sufficient for exportation.

Mell's Monkey-Pot

Lecythis melliana Pittier, Contr. U.S. Nat. Herb.

26:8, pl. 6. 1927.

Description of the tree

A large tree, up to 30 m. high and 80 cm. in diameter, the trunk straight, covered with a grayish, rimose bark, the branching radiate, beginning about 8 meters above the ground. Leaves coriaceous, glabrous, the petioles thick, canaliculate, 1.5 to 2.5 cm. long, the blades ovate-oblong, rounded and decurrent on the petiole at the base, rounded at the apex, 12 to 35 cm. long, 10 to 14 cm. broad, the costa thick, impressed above, very prominent beneath, the veins prominulous on both faces; margin entire, sometimes slightly repand. Inflorescence paniculate, few branched, the rachis thick, angular, glabrous. Flowers sessile, sulphur or orange yellow, 5 to 6 cm. in diameter; calyx tube 5 to 6 cm. long, salver-shaped, the 6 lobes ovate, obtuse, coriaceous, 9 to 11 mm. long and broad, the margin entire and revolute; petals ovate or obovate, obtuse at the apex; more or less attenuate and adnate together and with the androphor at the base, about 4 cm. long and 2 cm. broad; androphor yellow, the basal ring 7 to 8 mm. broad, the ligule about 2 cm. long and 1.5 cm. broad, the hood ovate, shortly

fimbricate on the margin; ovary 4-celled. Pyxis subglobose, woody, grayish brown and rough without, 15 to 16 cm. high, the walls 2 to 2.5 cm. thick; basal part obconical, 5.5 cm. high; calycary zone more or less continuous and even; interzonal band 7 to 7.5 cm. high, 15 cm. in diameter; operculum 3 cm. thick and 11.5 cm. in diameter; seeds 6.5 to 7 cm. long, 2.5 cm. broad, about 10 in each pyxis.)

Description of the wood

Sapwood thick and yellowish white, heartwood varying from light yellowish to reddish brown. Wood moderately hard, heavy, strong, tough, cross and more or less coarse-grained taking a fairly good polish. It splits and cuts with difficulty. Annual rings of growth are not clearly defined even under the compound microscope.

(Pores (transverse selection) not very numerous, rather large (about .15 mm. in diameter), round or more often elliptical in outline, open and arranged singly or in pairs. Vessel walls (longitudinal section) with numerous very small round bordered pits. The ends of the vessel segments are partly absorbed. Wood fibers about 2 mm. long with rather thick cell walls and small cell cavities. Pits oblique and slit like. Wood-parenchyma very highly developed, occuring in regular tangential lines or bands with alternate bands of wood fibers of equal width. All pores imbedded within the bands of soft tissue. Pith rays numerous and rather large, easily visible on radially cut boards. The rays are from 4 to 5 cells wide and from 6 to 10 times as high.)

Distribution, common names and uses

Known from Southern Darien (Panama) only, this stately tree will probably be found in the neighooring Colombian Chocó. It is common in the alluvial plains along the Tuyra River, especially in the vecinity of Pinogana and Yavisa. The wood, which is hard, and of a fine reddish brown color is not used extensively. The pot-like fruit, from which the names olla de mono, and olleto (the latter designating the tree) have been derived, contains about 10 large nuts, equalling, if not superior to, the best varieties of Brazil nuts. When fresh, they act as a strong laxative, for which reason they

are shunned by the natives, while highly prized by the monkeys and squirrels.

The Panaman Eschweilera

Eschweilera panamensis Pittier, Contr. U.S. Nat. Herb. 26: 12. 1927.

Description of the tree

A tree up to 25 m. high and 40 cm. in diameter, the trunk straight, covered with a gray, slightly rimose bark, the crown elongate, the branchlets slender. (Leaves alternate, glabrous, entire, coriaceous, the petioles thick, 5 to 8 mm. long, broadly canaliculate, the blades ovate, rounded and subdecurrent at the base, acuminate, 9 to 14 cm. long, 3.5 to 8 cm. broad, the costa prominent on both faces. Inflorescences racemose, terminal or in the axils of the upper leaves; rachis minutely pubescent; flowers numerous, alternate, pedicellate, ebracteate, glabrous; pedicels 7 to 8 mm. long; calyx lobes 6, rounded, obtuse, about 1 cm. long and broad; petals 6, unequal, obovate, rounded at tip, 11 to 15 mm. long, 7 to 11 mm. broad, the 3 exterior ones larger and thicker; ring of the androphor not over 6 mm. in diameter and supporting numerous anthers; hood transversely ovate, covered with numerous staminodes; ovary almost entirely superior, 2-celled, each cell pluriovulate; stigma sessile, obscurely lobulate. Pyxidium globose depressed, about 4 cm. long and 5 cm. in diameter, 2-celled, each cell with 1 seed, ovoid oblong, about 3 cm. long, 1.5 cm. in diameter.)

Description of the wood

Sapwood thick, nearly white, tinged with yellow; heartwood darker. Wood very hard, heavy, very tough and strong, straight and very close grained, taking a good polish. Annual rings of growth clearly visible under the hand lens.

(Pores ~~(transverse section)~~ few, (.15 mm. in diameter), round when isolated or irregular when in groups, open both in the sapwood and heartwood, and arranged singly or in small groups or radial rows. Vessel walls ~~(longitudinal section)~~ with numerous, small, bordered pits. Perforations simple. Wood fibers about 1.459 mm. long, with very thick walls and almost no lumina, the pits large and simple. Wood parenchyma very abundantly developed and in straight, distinct rows, clearly visible under the hand lens; these rows are from 1 to 2 or occasionally 3 cells wide. Rays very numerous and barely visible under the hand lens, from 1 to 3 cells wide and from 5 to 8 times as high.)

Distribution, common names and uses

Known only from the virgin forests around Puerto Obaldia, on the San Blas coast, where it is frequent, having a decidedly marked preference for the ridges of the hills up to about 300 m. above sea level. The wood is hard and fine grained, but has no special use. The native name, Majagua de Indio, seems to indicate that the bark is used as cordage by the Indians of the district.

The Reversed Eschweilera

Eschweilera reversa Pittier, Contr. U.S. Nat. Herb. 26:11.

1927

Description of the tree

A large tree, the trunk erect, nearly 80 cm. in diameter, the bark grayish and almost smooth, the crown elongate; young growth sparsely villous. (Leaves stipulate, membranous, at first deep pink all over, then on the lower face only, and lastly entirely green; petioles thick, 3 mm. long, sparsely hairy; blades ovate-elliptic, rounded and emarginate at the base, acuminate at the apex, 9 to 13 cm. long, 2.5 to 4.5 cm. broad, glabrous and minutely reticulate above, paler beneath and also glabrous except for a few whitish appressed hairs

at the base of the costa, the veins 8 to 9, the margin entire. Pyxidium 3 to 4 cm. long, 6 cm. in diameter ,broadly turbinate, the 6 sepals grown into 6 thick prominences; margin of the internal cavity rounded and reversed or projected outwards; operculum depressed, arched or conical, the remnants of the stigmas obscurely apparent at the center. Seeds 2.)

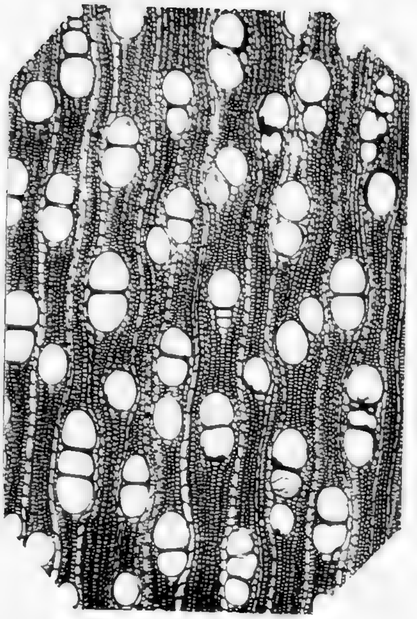
Description of the wood

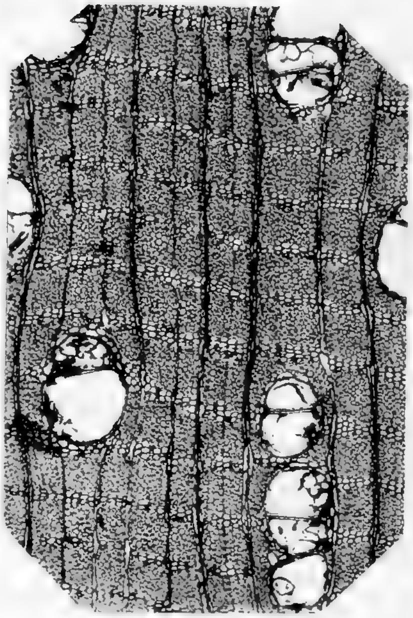
Sapwood very thick, light brown; heartwood much darker. Wood hard, strong, straight and very fine grained, taking a high polish. Annual rings of growth barely visible under hand lens.

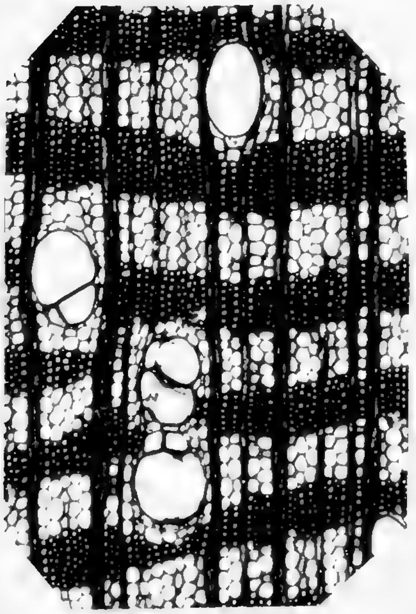
Pores (transverse section) moderately numerous, small (.114 mm. in diameter), round, open in sapwood and usually closed with white tyloses in the heartwood, and arranged singly or in small groups of from 2 to 3. Vessel walls (longitudinal section) with numerous, large simple pits where in contact with pith rays; where two vessels are adjacent the pits are small and bordered. Perforations simple. Wood fibers about 1.263 mm. long, with very thick walls and almost obliterated cell cavities, and small, vertical slit-like simple pits. Wood parenchyma strongly developed, forming short interrupted tangential lines. Vessels are invariably surrounded by this soft tissue. Rays very numerous, narrow, barely visible under the hand lens, from 1 to 4 cells wide and from 6 to 8 times as high.

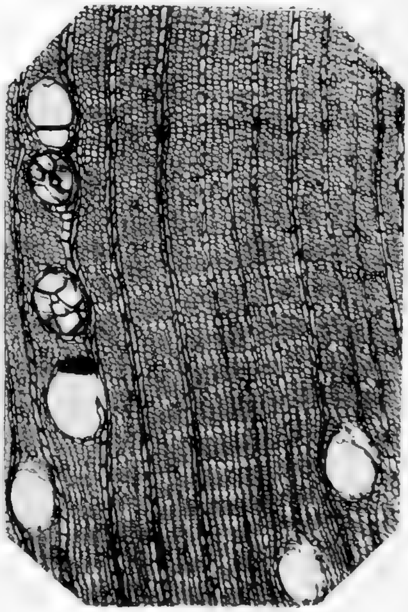
Distribution, common names and uses

This tree is known only from San Blas Coast in Panama. It did not seem to have been particularly noticed by the natives and, though the wood is hard and has a fine texture, it has no special application.









Fendler's Grias

Grias Fendleri Seemann, Bot. Voy. Herald 126. 1854.

Description of the tree

Entirely glabrous, 8 to 12 m. high and up to 35 cm. in diameter, the trunk divided almost from the base, the limbs erect, the bark gray and smooth. Leaves mostly on new wood, densely fasciculate, sessile, obovate-elliptic, long attenuate at the base, acute at the apex, 25 to 65 cm. long, 4 to 11 cm. broad, entire or obscurely serrate toward the apex, the costa and primary veins prominent on both faces. Inflorescence cauline, racemose, with a very short rachis. Flowers small for the family, the pedicels 5 to 7 mm. long, with one minute basal bractlet; calyx ovoid, about 6 mm. long and 5 mm. in diameter, the lobules 4, obtuse, with a black margin; petals 4, concave, ovate-elliptic, white, 12 to 14 mm. long, 9 or 10 mm. broad; androphor cup-shaped, white, with numerous staminodes; anthers sessile or subsessile; ovary ovoid-turbinate, 4-celled, the cells pluri-ovulate; stigma subsessile, 4-lobulate. Pyxidium 1-celled, 1-seeded, ovoid, green without, about 3 cm. long and 2.5 cm. in diameter, the peduncle about 1 cm. long; seed ovoid, hanging from the apex of the cell.

Description of the wood

Sapwood thick and yellowish white; heartwood brownish yellow often discolored. Wood moderately hard, heavy, not strong, brittle, straight-grained and resembling somewhat that of oak in radial section on account of the numerous and quite conspicuous pith rays. Annual rings of growth not visible under hand lens or compound microscope.

Pores (transverse section) rather numerous, small, about .16 mm. in diameter), round or irregular, open at least in sapwood, and arranged singly or more often forming small irregular groups and short radial rows of from two to four. Vessel wall (longitudinal section) very thin and with numerous rather large irregular bordered pits with small round

pit openings. Ends of vessel segments either horizontal or oblique and wholly absorbed. Wood fibers about 3.25 mm. long with relatively thick walls and small cell cavities. Pits exceedingly small and scarcely visible under high power of compound microscope. Wood parenchyma rather abundant, scattered throughout the wood; it occurs in short tangential lines of one cell in width. Rays very numerous and conspicuous, usually from 5 to 8 cells wide and many times as high.

Distribution, common names and uses

This species was originally discovered by A. Fendler in the forests near Chagres, at the mouth of the river of the same name, February 12, 1850. Since then, it was never collected again, until one of us had the good fortune of meeting several individual trees apparently belonging to the same species in the forests surrounding Pinogana in southern Darien. The tree is known to the natives as membrillo macho. The yellowish wood is easy to work and is used to a small extent as a house and handy-work timber.

The Darien Cannonball-Tree

Couroupita darienensis Pittier, Contr. U.S. Nat. Herb. 26: 7. 1927.

Description of the tree

A very large, deciduous tree with a straight trunk reaching up to 30 m. in height and 1.25 m. in diameter, from the apex of which the main limbs radiate horizontally, forming a flat, sparsely branched crown. Bark of the trunk and limbs thick, scaly, that of the branchlets with a strong fiber. Wood brownish to yellowish, with a fetid, exceedingly repulsive smell. Leaves obovate, short petiolate, with toothed margins. Floral racemes short, growing from the

limbs and larger branchlets. Corolla 7 to 8 cm. in diameter, pinkish white, the 6 petals fleshy, unequal, ovate, rounded at the base, broadly rounded at the apex, 2.5 to 4 cm. long, 2 to 3 cm. broad, glabrous. Androphorum pinkish white, broadening from the ring (1.8 cm. in diameter) to the galea (2.8 to 3 cm. broad); stamens very numerous and entirely covering the inner surface of the androphorum, the ones on the ring and ligule small, the filaments clavate, 1.2 to 1.5 mm. long, the anthers subglobose, those on the galea much larger, the filaments broad, attenuate, 2 to 2.5 mm. long and the anthers also subglobose. Ovary 6-celled. Pyxidium globose, slightly depressed, 15.5 t6 18 cm. in diameter, 6-celled, the calycary zone apical and obsolete, the seeds few, orbiculate, depressed, hairy, surrounded by the pulpy, acidulous dissepiments of the endocarp and columella.

Description of the wood

Sapwood thick and nearly white; heartwood grayish brown. Wood relatively hard and heavy, strong, tough, moderately coarse-grained, usually cross-grained, works fairly well and takes a good polish. Annual rings of growth not clearly visible even under high power of microscope.

Pores (transverse section) relatively few, large (about .28 mm. in diameter), round, somewhat oval or radially flattened, open both in the sapwood and heartwood and arranged singly, in pairs, or in short radial rows. Vessel walls (longitudinal section) relatively thin with a number of rather large irregular bordered pits; pits small and slit-like where they are in touch with wood fibers. The ends of vessel segments with simple perforations. Wood fibers about 1.4 mm. long with rather thin walls and large cell cavities. The pits are numerous, slit-like and very minute. Wood parenchyma abundantly developed, irregularly distributed throughout the wood or often arranged in inconspicuous tangential lines one cell in width. Pith rays very numerous and quite conspicuous on the radial surface and under the hand lens on a smooth transverse section. They are from a feww to 5 cells wide and from 4 to 8 times as high.

Distribution, common names and uses

This species, related to Couroupita peruviana and C. ni-

caraguensis P.C., is known only from Darien, but will probably be found in the neighboring districts of Choco and the Atrato valley. It grows singly and widely scattered in the virgin forest and is remarkable for its gigantic proportions. Its size and the repugnant fetidity of its fresh wood act as a protection against its being felled for any purpose by the natives, among whom it is known by the names of coco de mono and coco zapote.

The large-flowered Gustavia

Gustavia superba (H.B.K.) Berg., Linnaea 27:444. 1854.

Description of the tree

A tree up to about 20 meters high, and 35 cm. diameter at the base of the trunk, the limbs few and unbranched, glabrous and scarry. Leaves congeated at the end of the branches, glabrous, the petioles thick, 2 to 9.5 cm. long, the blades oblong-lanceolate, long cuneate at the base, long acuminate, 25 to 100 cm. long, 8 to 18 cm. broad, grossly and remotely serrate on the margin, and the venation prominent on both sides. Inflorescences racemose, 2 to 12-flowered, issuing from the old wood just below the branches, the peduncles thick, 2 to 6 cm. long, the pedicels 5 to 9 cm. long, bracteate at the base and bearing at the middle a pair of short, broad, clasping bractlets. Flowers 8 to 12 cm. in diameter, the receptacle about 2 cm. in diameter, the calyx short and truncate, the petals 8, obovate, obtuse, 5 to 7 cm. long, 2 to 3 cm. broad, yellow at the base, turning to pink toward the apex, the androphorum pinkish white, about 4.5 cm. in diameter, with the filaments and staminodes yellow at the base and pink at the apex, the ovary turbinate, velvety on the upper face, with a short and obtuse style. Pyxidium large (5 to 10 cm. long) subglobose.

Description of the wood

Sapwood thick and nearly white; heartwood reddish brown

with darker or nearly black streaks, wood hard, heavy, strong, tough, straight and fine-grained, taking an excellent polish. It splits and works rather easily. Annual rings of growth not clearly marked even under the compound microscope.

Pores (transverse section) numerous, small (about .08 mm. in diameter) nearly round or more often irregular when grouped in two to four generally arranged radially. Vessel walls (longitudinal section) with very numerous minute round bordered pits with slightly transversely elongated pit openings. The ends of the vessel segments are completely absorbed. Wood fibers are about 2 mm. long with rather thick walls and relatively small cell cavities. The pits are exceedingly minute and obliquely slit-like. Wood parenchyma very abundantly developed and rather uniformly distributed, occuring in tangential lines one cell wide. Pith rays numerous rather conspicuous under the hand lens. The rays are from 2 to 5 cells wide and from 10 to 15 times as high.

Distribution, common names and uses

This species, remarkable for its beautiful flowers, has a very limited area of dispersion. It has not been reported from the country to the east of Turbaco, near Cartagena (Colombia), the type-locality, and it does not seem to extend westwards much farther than the Canal Zone in Panama. Its existence in Ecuador, as reported by Sinclair(1), must be considered as doubtful. It grows either isolated or in small copses on gently sloping, sunny hills, and is known among the natives by the name of *membrillo*, on account, it is said, of its edible fruit, vaguely reminding in shape and taste those of the quince. In Colombia the same tree is called *Baco* and it belongs to the group of the *Pirigaras* , represented in Brazil by several species. The wood is used, to a limited extent, for building purposes.

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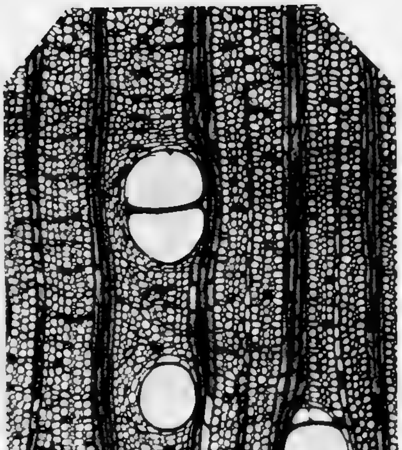
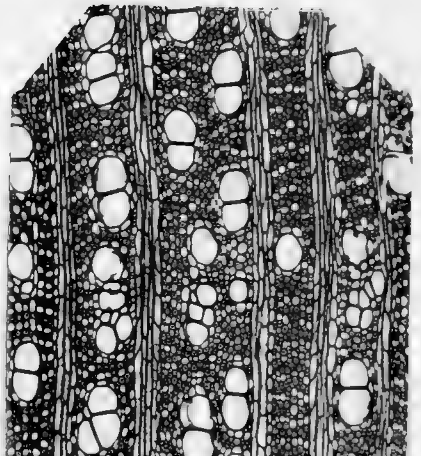
(1) Miers in Trans. Linn. Soc. 30, p. 177.





The small-leaved Gustavia

Gustavia pleurocarpa Pittier, Contr. U.S. Herb. 26:4. 1927.

Description of the tree

A middle sized tree, the trunk erect, covered with a smooth, grayish bark, the crown elongate, the branchlets slender and flexible. Leaves membranous, glabrous, the petioles 1.5 to 2 cm. long, the blades ovate-elliptic, attenuate and subdecurrent at the base, subacuminate and more or less acute at the apex, 8 to 19 cm. long, 3.5 to 7 cm. broad; margin entire; costa prominent on both faces of the blade; veins about 8, prominent beneath. Flowers terminal, single or geminate, about 6 cm. in diameter when spreading, the peduncles, bracts, receptacle and calyx lobes brownish purpuraceous. Peduncles 2 cm. long, rather thick, bearing at the middle a pair of bracts, these ovate, acute, 4 to 6 mm. long; calyx lobes 6, ovate, acute, persistent, about 7 mm. long; petals 6, ovate, rounded at apex, 3 to 3.5 cm. long, about 2 cm. broad, pale-yellow, more or less purpuraceous without, the exterior ones larger; stamens numerous, adnate at the base, inflected; ovary 6-celled, each cell pluriovulate; style very short; stigmas 6, erect and adhering. Young fruits crowned with persistent calyx lobes and more or less distinctly 6-costate.

Description of the wood

Sapwood very thin, nearly white; heartwood light yellow, turning darker upon exposure to light and air. Wood moderately hard and heavy, very tough, strong, slightly cross and fine-grained, taking a good polish. Annual rings of growth visible only under the high power microscope.

Pores (transverse section) very numerous, small (.125 mm. in diameter), round when isolated, but when in groups or radial rows irregular in outline, usually open, sometimes closed in the heartwood, and arranged chiefly in small groups or radial rows. Vessel walls (longitudinal section) with numerous, small, simple or bordered pits. Perforations

simple. Wood fibers about 1.256 mm. long, with thick walls, small lumina, and small simple pits. Wood parenchyma very abundant and arranged chiefly in very numerous tangential lines barely visible under the hand lens on a smooth transverse section. Rays numerous and conspicuous under the hand magnifier, from 1 to 5 cells wide and from 5 to 8 times as high.)

Distribution, common names and uses

The small leaved Gustavia is known only from the Loma de la Gloria, near Pató on the eastern Atlantic Coast of Panama, growing there in small clusters on the higher ridges. The natives call it *Bejuco de Lucá*, though it is not a vine, as the word *Bejuco* would imply. The wood, which is fine-grained and pretty hard, is not used to any extent.

Rhizophoraceae

The Elliptic-Leaved Cassipourea

Cassipourea elliptica Poir. Suppl. 2: 34. 1811.

Description of the tree

A small tree, up to about 10 m. high and 30 cm. diameter, the trunk mostly erect and straight, covered with a smooth grayish bark, the branching radiate or irregular and sparse, the crown usually elongate, the new growth glabrous. (Leaves small, pale green, subcoriaceous, glabrous, the petioles 5 to 6 mm, long, the blades broad elliptic, more or less acute at both ends, 5 to 10 cm. long, 3 to 5 cm. broad, often obscurely serrate on the margin. Flowers 3 to 4-clustered in the axils of the leaves, the pedicels 5 mm. long, surrounded at the base by many small, ovate-acuminate, hairy bracts; calyx 5-fid, 4 mm. long, glabrous without, silky hairy within; petals 4 or 5, purplish, long unguiculate, fimbriate on the

margin; disc cup-like, supporting the numerous stamens; pistil 6 mm. long, the ovary globose or subglobose, glabrous, the style slender, hairy, the stigma capitellate. Capsule 3-celled, 3-valved, each cell 1-seeded.)

Description of the wood

Sapwood thick, light brown or nearly white; heartwood very hard, heavy, brittle, straight and fine grained, fairly easy to work, taking a good polish, not durable in contact with the soil. Annual rings of growth usually very indistinctly visible even under the high power microscope.

Pores ~~(transverse section)~~ very numerous in tangential zones, these alternating with zones of a lesser number of pores, not indicative of annual growth layers. Pores small (.075 mm. in diameter), open in sapwood, often closed in heartwood and arranged singly or in short radial rows. Vessels ~~(longitudinal section)~~ with numerous minute pits very narrowly bordered. Perforations simple. Wood fibers about 1.66 mm. long, with rather thick walls, small lumina, and small, slit-like simple pits. Wood parenchyma strongly developed and arranged in numerous, irregular, inconspicuous, tangential lines. These elements surround vessels and border rays. Under high power microscope the parenchyma cells are easily distinguished from wood fibers by the thin walls of the former. Rays are very narrow, barely visible under hand lens, from 1 to 3 rows of cells wide and from 10 to 15 cells high.)

Distribution, common names and uses

Like the other representatives of the family, the Cassipourea is generally found in close proximity to the tidal belt. It occurs all over the West Indies and on the neighboring parts of continental America, not being reported, however, from any country north of Costa Rica. In some parts of Panama, it is called huesito, or small bone, an allusion to the hardness of its fine grained wood, the use of which is quite limited.

Myrtaceae

The common Guayabo-tree

Psidium Guajava L. Raddi, Mem. 1821, 2.

Description of the tree

A small tree, mostly with a low, more or less crooked trunk, covered with a scaly, reddish bark, and a depressed, broadly expanded crown; ultimate branchlets tetragonal, subalate, more or less silky-pubescent. (Leaves opposite, distichous, subcoriaceous, the petioles about 5 mm. long, the blades oblong to oblong-elliptic, rounded at the base, acute and mostly apiculate, 5 to 12 cm. long, 3 to 5 cm. broad, obscurely transparent dotted, more or less plicate, glabrous or glabrescent above, puberulous beneath. Peduncles axillary, 1 to 3-flowered, about 1.5 cm. long; flowers white, about 2.5 cm. in diameter; calyx closed in the bud and opening irregularly in 4 or 5 lobes; petals 4 or 5, ovate; stamens numerous, with ovate anthers; ovary inferior, many-ovulate; style simple, capitate. Berry pomiform or pyriform, 3 to 6 cm. long; the seeds numerous, immersed in a succulent pulp.)

Description of the wood

Sapwood thin, light brown or sometimes nearly white; heartwood brown, turning darker on exposure. Wood moderately hard, heavy, strong, tough, straight and exceedingly fine-grained, taking a good polish and durable in contact with the soil. Annual rings of growth not visible even under high power microscope.

(Pores ~~(transverse section)~~ very numerous and small (.05 mm. in diameter), round or slightly oval, open both in sapwood and in heartwood, arranged chiefly singly or sometimes in short radial rows of from a few to 6. Vessel walls ~~(longitudinal section)~~ with very numerous, small, transversely elongated bordered pits. Perforations simple. Wood fibers about 1.119 mm. long, with thick walls and relatively small lumina, and with a few small, slit-like, simple pits. Wood parenchyma not strongly developed. (Pith) Rays very numerous, not

visible under hand magnifier on a smooth transverse section, one to two cells wide, and from a few to 8 cells high.)

Distribution, common names and uses

X (Psidium Guajava L. grows naturally all over tropical America and is also frequently cultivated on account of its fruits. It is not a forest tree, its natural habitat being on the alluvial gravelly and open flats along the rivers, from sea-level up to an altitude of about 1400 meters. Cattle are very fond of the fruit and act as propagating agents. Through them the pastures soon become infested with the plant, the eradication of which then becomes a real problem, the abandonment of the land being often the only practical solution. The guayabal, or natural guayabo bush, is one of the typical plant associations of the American tropics.)

This Psidium is known all over its geographical area in Spanish America under the name of Guayabo, the fruit being a guayaba. In the English West Indies, this word has become Guava, which again is the Spanish name for several species of Inga. The Portuguese name is Araça. The wood of the Guayabo is very hard and fine-grained, but is of little use on account of the small dimensions of the tree. It is an excellent fuel. The fruits give delicious preserves and jellies, which in some parts are commercially valuable.

The Gasparillo-Tree

Aulacocarpus completens Pittier, Smithson. Misc. Coll. 63:

n. 4-1914

Description of the tree

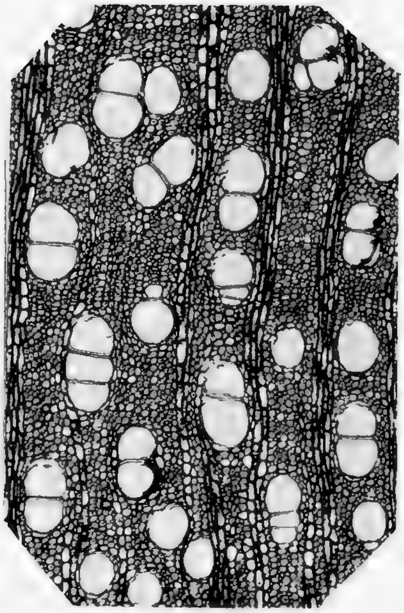
A tree entirely glabrous, up to 18 m. high and 35 cm. diam. at the base, the trunk more or less straight, covered

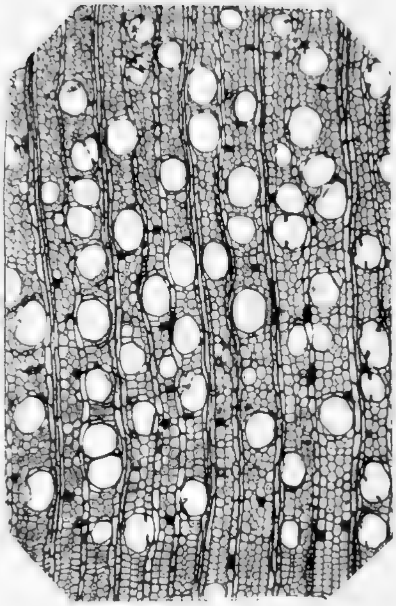
with a smooth, reddish or grayish bark, the crown sparse and irregular. (Leaves opposite, coriaceous, exstipulate; petioles thick, 4 to 5 mm. long; leafblades ovate-elliptic, more or less emarginate at the base, abruptly short acuminate, 14 to 25 cm. long, 5 to 11 cm. broad, light green above, paler beneath. Flowers axillary, single or clustered; pedicels slender, 12 to 15 mm. long, bearing at the middle one pair of small bractlets, these clasping, ovate-acute, persistent, about 2 mm. long; receptacle funnel-shaped, longer than the ovary, sepals 5, ovate-triangular, acute, about 6 mm. long, coriaceous, caducous; petals 5, reflexed, irregularly ovate, about 11 mm. long, 9 mm. broad, unguiculate, apiculate, the margin irregularly denticulate or lacerate; stamens 10, inserted on the margin of the receptacle, alternately opposed to petals and sepals, the filaments slender, about 10 mm. long, the anthers basifixed, introrse, with a pore on the ventral side and 4 small glands near the apex; ovary inferior, 5-celled, each cell 4 or 5-ovulate; style truncate, about 7.5 mm. long. Fruit dry, 4 to 1-celled, globose, more or less depressed, crowned with the persistent calyx; cells 1-seeded; seeds ovoid, about 11 mm. long.)

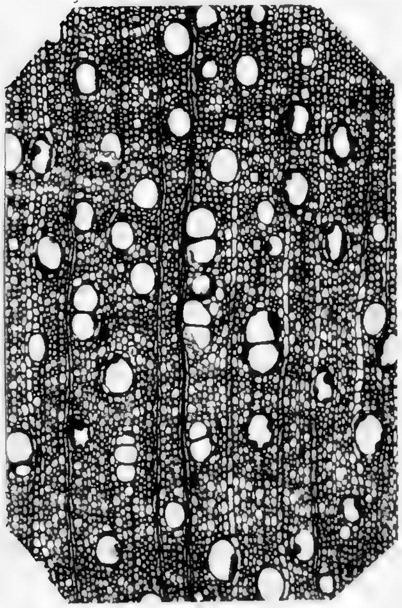
Description of the wood

Sapwood thin, light yellow or nearly white; heartwood slightly darker. Wood exceedingly hard, heavy, strong, tough, straight and fine-grained, difficult to work and taking a good polish. Annual rings of growth not visible under high power microscope.

Pores ~~(transverse section)~~ rather numerous, very small (.063 mm. in diameter), round, open in sapwood and closed in heartwood, and usually arranged singly, less often in pairs. Vessel walls (longitudinal ~~section)~~ with numerous, small bordered pits, with transitions to simple pits. Perforations simple. Wood fibers about .9~~010~~ mm. long, with very thick walls and almost no lumina; pits small and simple. Wood parenchyma is present only surrounding vessels, where it forms short rows extending tangentially from both sides of the vessel for a short distance. Rays very numerous and narrow, from 1 to 3 cells wide, and from 3 to 5 times as high.







Distribution, common names and uses

This tree is not unfrequent in the eastern forests of Panama where its hard and fine-grained wood is much prized. Besides being used in various ways in the native building and joiner crafts, it is said to make the best pole for pulling up the rivers the dugouts or canoes.

The Myrtaceous *Aulacocarpus*, which has several other representatives, is exclusively American, but it belongs, along with the Chilian *Tepualia*, to the sub-family of the Leptospermoideae, all other members of which are Australian.

Combretaceae

The obovate-leaved Terminalia

Terminalia obovata (Poir.), Eichler. Flor. bras. 142:91-1867.

Description of the tree

A middle sized, deciduous tree, the trunk erect, covered with a reddish, smooth bark, the crown elongate, the ultimate branchlets slender, wisp-like, at first rubiginous pubescent, glabrescent later. (Leaves alternate, clustered at the end of the branchlets, at first rubiginous pubescent, glabrous later; petioles terete, 3 to 7 mm. long; blades obovate, acuminate or obtuse, long attenuate at the base, 4.0 to 6.4 cm. long, 2.5 to 4 cm. broad; bractlets lanceolate, densely rubiginous pubescent, 2 to 3 mm. long caducous. Floral spikes simple, clustered at the end of defoliate branchlets, pendulous, 6 to 11 cm. long, the rachis slender, pubescent; flowers sessile, distant, bracteolate; calyx broadly 5-lobed, about 4 mm. in diameter, sparsely pubescent without, the subacute lobes densely ciliate; corolla none; stamens 10, long exserted, glabrous, the anther cells ovate; disc annular, pulvinate, very hairy; ovary inferior, obpyriform, 4-angled, pubescent, 2-celled, each cell 1-ovulate; style glabrous, slightly longer than the stamens.)

Description of the wood

Sapwood light yellow; heartwood darker, often turning reddish with darker streaks. Wood very hard, heavy, very strong, tough, very cross and fine-grained, works with difficulty, susceptible of a high polish and said to be very durable in contact with the soil. Annual rings of growth not visible on a smooth surface under the hand lens.

Pores (transverse section) not very numerous, (about .22 mm. in diameter), round or elliptical, open in the sapwood and often closed in the heartwood, and arranged chiefly singly or in pairs; in some places the pores are grouped in tangential lines similar to those in the early wood of ring porous wood. Vessel walls (longitudinal section) with numerous small, round, bordered pits. Perforations at the ends of vessel segments completely absorbed. Wood fibers about 1.4 mm. long with very thick walls and small cell cavities; the pits are very small slit-like and difficult to see under the compound microscope. Wood parenchyma abundantly developed around all pores. These can be easily seen on a smooth transverse surface under the hand lens. This softer tissue frequently forms tangential lines connecting the pores. Pith rays very numerous and invariably only one cell wide and from a few to 10 or more cells high.)

Distribution, common names and uses

The wood of this species is said to be often used, in some parts of South America, for building purposes. In Panama, it is of rare occurence and does not seem to have attracted the attention of the natives.

The Button-tree

Conocarpus erecta L., Hort. Cliff.: 485. 1737

Description of the tree

A small tree or a mere shrub, seldom over 8 m. high and

30 cm. in diameter, the bark gray, smooth, the crown irregular. (Leaves alternate, glabrous, the petioles 3 to 5 mm. long, the blades lanceolate, attenuate and biglandular at the base, acute at the tip, 4 to 8 cm. long, 1.5 to 3 cm. long, olive or grayish green. Flower heads globose, racemose, the rachis glabrous, flattened and subwinged; flowers small, pentamerous, hermaphrodite or only male; calyx 5-lobate, the lobes obtuse or acute; corolla none; stamens normally 10, but often less, inserted in two series on the calyx, exserted; discus intrastaminal (or epigynous) and formed or 5 fleshy, villous glands; ovary inferior, 1-celled, 2-ovulate, the style filiform, as long as the stamens. Achenia imbricate in a cone-like head, each with 2 well developed wings.)

Description of the wood

Sapwood thin, light brown or nearly white; heartwood dark brown. Wood hard, heavy, very strong and tough, very fine grained, taking a fairly good polish and very durable in contact with the soil. Annual rings of growth not vible even under the high power microscope.

(Pores ~~(transverse~~ section(very numerous, small (.063 mm. in diameter), round or nearly closed in the heartwood, and arranged singly, irregularly, more often in wavy tangential lines. Vessel walls (longitudinal section) with numerous, small oval slightly bordered pits, resembling a sieve-like structure with large simple pits present. Perforations simple. Wood fibers about 1.066 mm. long, with exceedingly thick walls, almost obliterated lumina, and with minute slit-like simple pits. Wood parenchyma abundantly developed and invariably arranged around vessels, forming tangential lines connecting these. Rays storied, numerous, and very narrow, barely visible under the hand lens on a smooth transverse section, 1 cell wide, and from a few to 8 or 10 cells high.)

Distribution, common names and uses

Conocarpus erecta L. is widely spread on the sea-shores of Tropical America, from southern Brazil to Florida and the West Indies on the Atlantic side and from Ecuador, including the Galapagos Islands, to Acapulco in Mexico, on

the Pacific. It is known also from the Western coast of Africa. It is called *Zaragosa* in Panama, *Alder tree*, *Button tree* and *Zaragoza mangrove* in the British West Indies, *Manglier flibustier*, *m. droit* and *m. noir*, in Martinique and Guadeloupe, *Botoncillo* and *Mangle Botoncillo* in Venezuela, and *mangue* in Brazil. The wood keeps almost indefinitely and is highly prized as timber, being used for carpenter work, poles, rafters, boat curves and cabinet work. The leaves and bark are used for tanning or dyeing purposes.

Melastomaceae

The silvery Miconia

Miconia argentea (Sw.) D.C. Prodr. 3: 182. 1828.

Description of the tree

A shrub or a middle sized or large tree, up to 15 m. high and 30 cm. in diameter at the base, the trunk sometimes stunted and crooked, or a straight, undivided bole 6 to 8 meters long, the bark grayish white, slightly rimose, the crown irregular or elongate, broader at the top; young branchlets angulous, more or less flattened, covered as are the leaves and rachis of the inflorescences with a silvery indumentum. (Leaves subcoriaceous, 5-nerved, the petioles canaliculate, slender, 2 to 8 cm. long, the blades ovate, more or less rounded at the base, briefly acuminate, 10 to 25 cm. long, 6 to 15 cm. broad, glabrous and dark green above, silvery white beneath, the margins remotely sinuate-toothed. Panicles terminal, ramulose, 6 to 20 cm. long. Flowers numerous, pedicellate, pentamerous; calyx 10-costate, 1.5 to 2 mm. long; petals white, 2 mm. long; stamens 10; ovary globose; style 4 to 5 mm. long, ending in a subgultate stigma. Berry about 3 mm. in diameter.)

Description of the wood

Sapwood thick, light brown; heartwood slightly darker. Wood moderately hard, light, not strong, straight, durable, fine-grained, easy to work, taking a medium polish.

Pores (~~transverse~~ section) small (about .13 mm. in diameter), round, open, and arranged singly, in pairs, or in short radial rows. Vessel walls (longitudinal section) in contact with parenchyma bears simple or bordered pits, usually large, transverse,usually simple in contact with pith rays. Perforations simple. Wood fibers about .806 mm. long, with moderately thick walls and relatively small cell cavities, septate, and simple pits, sometimes with a narrow border. Wood parenchyma sparingly developed, occurring only in connection with vessels. Pith rays very narrow, only one cell wide and from 10 to 25 cells high.

Distribution, common names and uses

Miconia argentea (Sw.) D.C. was described originally by Swartz from the Mosquito Shore in Nicaragua. It is met with from Trinidad to Guatemala along the Spanish Main, and, on the Pacific side of Central America, has also been reported at several points between the San Miguel Bay and the Mexican boundary in Guatemala. Its favorite resorts are on the borders of savannas and on semi-deforested clayey hills, where it appears as a second growth. It forms a conspicuous feature in the landscape on account of its leaves which are constantly turned up by the winds, thus showing their white under-faces. The tree is known by the following local names:

Cainillo, around Panama City, according to Seemann.

Canillo, in Chiriquí (Panama)

Capilote,(derived from the nahuatl capolotl?), in Guanacaste (Costa Rica).

Dos-Caras (= two faces), in the province of Los Santos (Panama), an allusion to the color contrast between the two sides of the leaf.

Mancha-Mancha, in southern Darien (Panama).

María, in Nicoya (Costa Rica).

María colorado, in the Diquis Valley (Costa Rica).

This variety of names, the list of which could probably

be extended, indicates that this small tree is a well known one among the natives and we find indeed that it is used everywhere, when near at hand, in the construction of their houses. The wood, which is moderately hard and easy to work, is said to be durable when not exposed to an excess of humidity.

Darien Miconia-Tree

Miconia darienensis Pittier, Contr. U.S. Nat. Herb. 18:248. 1917.

Description of the tree

Up to 20 meters high(and 40 cm. in diameter, the trunk straight, covered with a smooth grayish bark, the limbs ascending and forming an elongate crown; young branchlets very short, obscurely tetragonous, sparsely puberulous. Leaves opposite, entire, membranous, the petioles 0.5 to 1 cm. long, puberulous, the blades elliptic-lanceolate, 3-nerved, obtuse-acuminate, 8 to 24 cm. long, 2 to 5 cm. broad, dark green above, paler beneath. Pannicles terminal, about 10 cm. long, ovoid or pyramidal, the rachis glabrescent. Flowers pentamerous, clustered; pedicels 1 to 1.5 mm. long; calyx campanulate, 5-toothed, 1.5 mm. long, glabrous; petals oblique, obovate, 2.5 mm. long, white; stamens 10, about 5 mm. long, pubescent, the filament slender, the anthers gibbose and biauriculate at the base and opening by a terminal pore; ovary globose; style 4.5 mm. long, pubescent, stigma capitellate. Berries small, bluish black.)

Description of the wood

Sapwood scarcely to be distinguished from heartwood. Wood ranges from light brown to dark brown, hard, heavy, rather cross and fine grained, difficult to work, taking a fine polish, and durable in contact with the soil. Annual

rings of growth not visible under high power microscope.

(Pores (transverse section) fairly numerous, small (.13 mm. in diameter), round or radially elliptical, open or sometimes closed in the heartwood and arranged singly or often in short radial rows of 2 to 4. Vessel walls (longitudinal section) with numerous, small, oval, simple bordered pits; always bordered where in contact with other vessels. Perforations simple. Wood fibers .6752 mm. long with rather thick walls and small lumina alternating with tangential lines of wood fibers of very much thinner walls and larger cell cavities, the thin-walled wood fibers with large intercellular spaces (nearly 50 per cent of the wood mass in composed of these thin-walled wood fibers). Wood parenchyma scantily developed. Rays invisible even under the hand lens on a smooth transverse section, from 1 to 2 rows of cells wide and from 10 to 20 cells high.)

Distribution, common names and uses

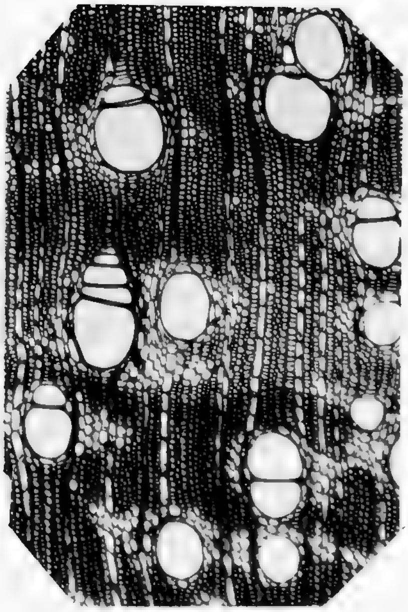
Thus far this tree is known only from the hills along the Tuyra River in Darien, where it is called *gorgojo* or *gorgojillo*. The wood is hard and keeps for years in the ground. It is one of the local building materials and during the construction of the first Panama railway, it was extensively used for cross-ties.

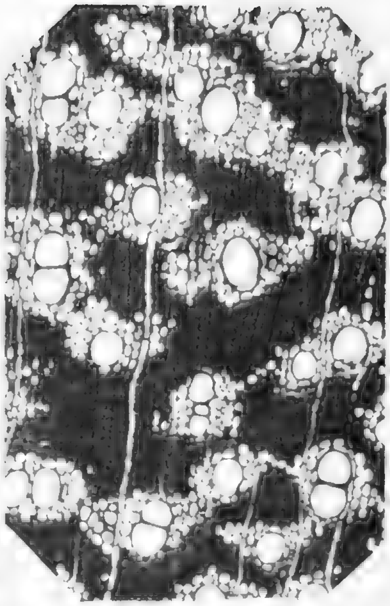
The Golden-Brown Miconia

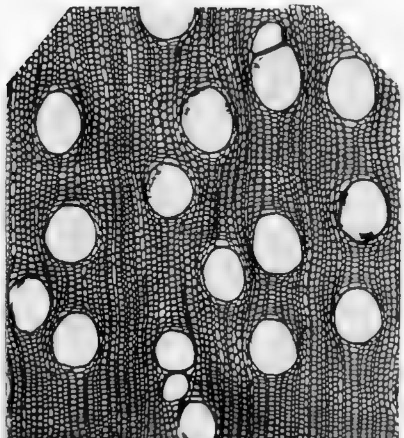
Miconia fulva D.C. Prodr. 3:180. 1828.

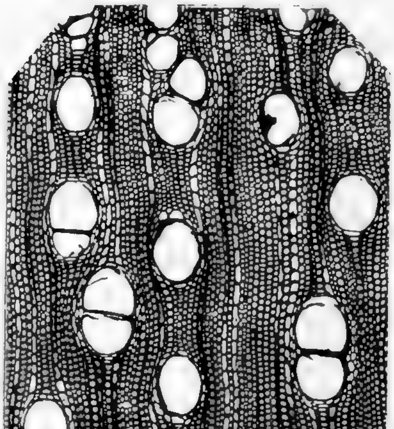
Description of the tree

A tree seldom above 10 meters high and 30 cm. in diameter, the trunk straight, covered with a reddish bark, the crown elongate or pyramidate, the 4-angled young twigs, petioles, lower face of the leaves, rachis of the inflorescence









and calyx laid over with a dense coating of golden brown, stellate scales. (Leaves membranous, opposite or 3 to 4-verticillate, the petioles angulous or sulcate, 5 to 12 mm. long, the blades 3-nerved from the base, lanceolate, long acuminate, 7 to 23 cm. long, 1.5 to 5 cm. broad; margin obscurely sinuate. Pannicles terminal, 10 to 15 cm. long, pyramidal. Flowers pentamerous, sessile; calyx campanulate, 2 mm. long, irregularly denticulate; petals ovate, 2.2 mm. long, white, denticulate and truncate at the apex; stamens 10, 3 to 3.5 mm. long, glabrous, the filaments flat, the anthers cuneate, truncate at the apex, opening by 2 longitudinal slits; ovary semi-inferior; style about 4 mm. long, glabrous, subclavate.)

Description of the wood

Sapwood thin, light brown; heartwood darker. Wood moderately hard, heavy, tough, very fine-grained, susceptible to good polish, and very durable in contact with air and water. Annual rings of growth very narrow and visible only under a hand lens or compound microscope.

Pores (transverse section) very numerous, small (.04 mm. in diameter), round, open or occasionally closed, with whitish tyloses in the heartwood, and arranged singly in small groups or distinct radial rows of from 2 to 6 or more, gradually becoming smaller toward the outer end of the row. Vessels sometimes partly surrounded by a single row of wood-parenchyma fibers. Vessel walls (longitudinal section) thin, and where in contact with pith-ray cells the pitting varies from simple to bordered; large bordered pits where two vessels abutt on one another. End walls always wholly absorbed. Wood fibers .927 mm. long, with thin walls and relatively large cell cavities; pits usually simple, though occasionally bordered. Wood parenchyma fibers not conspicuously developed and only occuring among vessels. Individual cells of these fibers usually long. Pith rays inconspicuous, only one row of cells wide and from a few to 10 or more cells high.

Distribution, common names and uses

This species seems to be very polymorphous and in its many forms spreads from the Amazon Basin to Central America, appearing also in some parts of the West Indies. In Chiriquí,

it is known as palo negro or black wood, and is reputed as incorruptible, being extensively used as building timber for posts, beams and the like.

The Rusty Miconia

Miconia rubiginosa D.C., Prodr. 3: 183. 1828.

Description of the tree

A shrub or small tree up to 8 m. high, the trunk 20 to 25 cm. in diameter, straight or crooked, covered with a grayish or reddish bark, the crown irregular, the young growth, petioles, rachis of the pan~~n~~icles and lower face of the leaves dendely rubiginous tomentose. Leaves coriaceous, the petioles 3 to 10 mm. long, the blades ovate, rounded at the base, briefly acuminate, entire, 6 to 10 cm. long, 3 to 6 cm. broad, dark green (turning to black by dessication) and lustrous above, rusty colored beneath, 5-costate, the 2 exterior nerves inconspicuous and close to the margins. Inflorescence panniculate, terminal, many-flowered, 5 to 20 cm. long. Flowers pentamerous; pedicels 1 to 4 mm. long; calyx sublobate, 2 to 3 mm. long, slightly hairy; petals 2 mm. long, rounded at the apex, white; stamens 10; ovary subglobose; style 4 mm. long. Berry blackish, 3 to 4 mm. in diameter.

Description of the wood

Sapwood thin, nearly white; heartwood light brown. Wood hard, moderately heavy, very tough, close-grained, susceptible to good polish, and very durable in contact with the soil. Annual rings of growth not visible even under the high power microscope.

Pores ~~(transverse section)~~ numerous, small (.08 mm.),

round, or more or often irregular in outline; open and arranged singly or often in radial rows of from 1 to 6 or 8. These rows usually interrupted, but invariably straight. The space between two pith rays equal to the diameter of vessels. Vessel walls ~~(longitudinal section)~~ thin, and either with simple or bordered pits. These pits are always bordered where they abutt on one another. End walls of vessels always wholly absorbed. Wood fibers 2.034 mm. long, with thin walls and relatively large cell cavities. Pits in the wood fibers usually simple, slit-like, oblique. Wood-parenchyma fibers not conspicuously developed and only occuring around vessels. Pith rays very numerous, hardly visible even under the hand lens, usually only one cell wide, rarely two, and from a few to 20 or more cells high. The individual cells are relatively very high.)

Distribution, common names and uses

The rusty Miconia has a very wide distribution. It has been repeatedly reported and collected all along the Atlantic coast from the Province of Sao Paulo in Brazil to Colombia, and appears again in the semi-arid districts of the latter country and of Peru and Ecuador as well as in a few of the smaller West Indian Islands. In some parts of Panama the women use the leaves to rub the cooking pans and pots and therefrom call the treelet friega-platos, a name which applies to many other species. In Chiriquí, where the tree is known under the name of canillo de cerro, the stems, which are hard and lasting, are used extensively as fence posts and to a smaller extent in house building.

Araliaceae

The Turkey-tail tree

Didymopanax Morototoni Dcne & Planch., Rev. hort. 1854:109.

Description of the tree

A tree 10 to 30 meters high, the trunk erect, often 65 cm.

in diameter at the base, covered with a yellowish gray, smooth bark, branched only near the top, the limbs forming a depressed, rounded crown. (Leaves large, digitate, clustered at the end of the branchlets, the petioles clasping and dilatate at the base, straight, 30 to 75 cm. long; leaflets 8 to 10, the petiolules 3 to 10 cm. long, the blades coriaceous, oblong-lanceolate or ovate-elliptic, rounded or subemarginate at the base, acuminate, 15 to 40 cm. long, 6 to 18 cm. broad, at first softly tomentose all over, later glabrous above, golden brown tomentose beneath. Inflorescences terminal, very large, panniculate, the rachis subglabrous, erect, the flowers umbellate or lateral branchlets; pedicels 3 to 7 mm. long, minutely pubescent; calyx short, 5-toothed; petals 5, elliptic or lanceolate, stamens 5, the anthers large, ovate; ovary 2-celled. Drupe ovate-compressed, about 5 mm. long, 7 to 9 mm. broad, more or less costate; pubescent or glabrous.)

Description of the wood

Sapwood very narrow and nearly white; heartwood slightly darker. Wood moderately hard and heavy, fine-grained and susceptible to very good polish. The tree has a very large pith. Annual rings of growth usually very narrow, but readily distinguished by means of a hand lens.

(Pores (~~transverse section~~) numerous, (.14 mm. in diameter), round, open, and scattered singly or in small groups or radial rows of from 2 to 6. Vessels always smaller in diameter than the distance between two pith rays. The vessel walls (~~longitudinal section~~) where in contact with pith-ray cells have large transversely elliptical, simple pits, together with slightly bordered pits. All other parts of the vessel walls bear bordered pits. End walls of vessel segments strongly inclined and with simple elliptical openings between the segments (simple perforation). Wood fibers about 1.354 mm. long, with thick walls, small cell cavities, septate, and with very small oblique, slit-like, simple pits. Wood-parenchyma fibers only sparingly developed, usually in the neighborhood of vessels. Pith rays very numerous, straight, invisible to the naked eye, and from 1 to 5 cells wide and from a few to 25 or more cells high.)

Distribution, common names and uses

The Turkey-tail Tree has a wide distribution, being found all along the northern coast of South America from the Guiana to Colombia, and then along the Pacific slope of Panama and Costa Rica, where it is one of the characteristic species of the park-like forests and of the outskirts of the savanas, up to an altitude of about 300 meters. Its specific name, *morototoni*, is taken from the Galibi language; in the French Guiana it is called *Bois canon batard*, *Bois de Mai* or *Bois de Saint Jean* (May, or St. John's Wood) and in Venezuela *Yagrumo de sabana*. It is the *Mangabé* of Chepo and other places in the eastern part of Panama, while in Chiriquí and Costa Rica it goes by the name of *pava*, turkey-tail tree, on account of the arrangement of the leaflets. The wood is often used in boards or beams in house building, and has been suggested as a good material for making matches.

Sapotaceae

The Balata-tree of Darien

Mimusops darienensis Pittier, Contr. U.S. Nat. Herb. 18: 249. 1917.

Description of the tree

A tree 40 to 50 meters high and 1.5 meters and over in diameter, the trunk straight, covered with a scaly, grayish brown bark, the limbs strong, more or less spreading into a depressed crown; young branchlets more or less brownish pubescent. Leaves alternate, thick, coriaceous, gathered on the newer growth, the petioles 2 to 3 cm. long, roundish, flattened, above or obscurely canaliculate, the blades obovate or elliptic-oblong, obtuse, glabrous and sublustrous above, at first more or less ferruginous and then brownish green beneath; stipules narrow lanceolate, about 5 mm. long,

caducous. Flowers 3 to 12-clustered in the axils of the leaves; pedicels about the length of the petioles, more or less brownish pubescent, tapering from apex to base; sepals 6, about 6 mm. long, ovate, obtuse, coriaceous, the 3 exterior ones fuzzy-pubescent without, the interior ones grayish pubescent; corolla about 6.5 mm. long, white, spreading, the tube very short, the lobes 18, the 12 exterior ones lanceolate, acute, mostly 2-fid, the 6 interior ones smaller; stamens and staminodes connate at the base, the former lanceolate, subulate, the 6 latter about 3 mm. long, the anthers extrorse; pistil glabrous, the ovary 9-celled. Berry ovoid, usually 1-seeded, seed 1 to 1.3 cm. long, 0.6 mm. broad, pointed at both ends.

This tree has 3 to 4 powerful, horizontal roots, without buttresses; it is one of the largest trees in the forests of Panama.

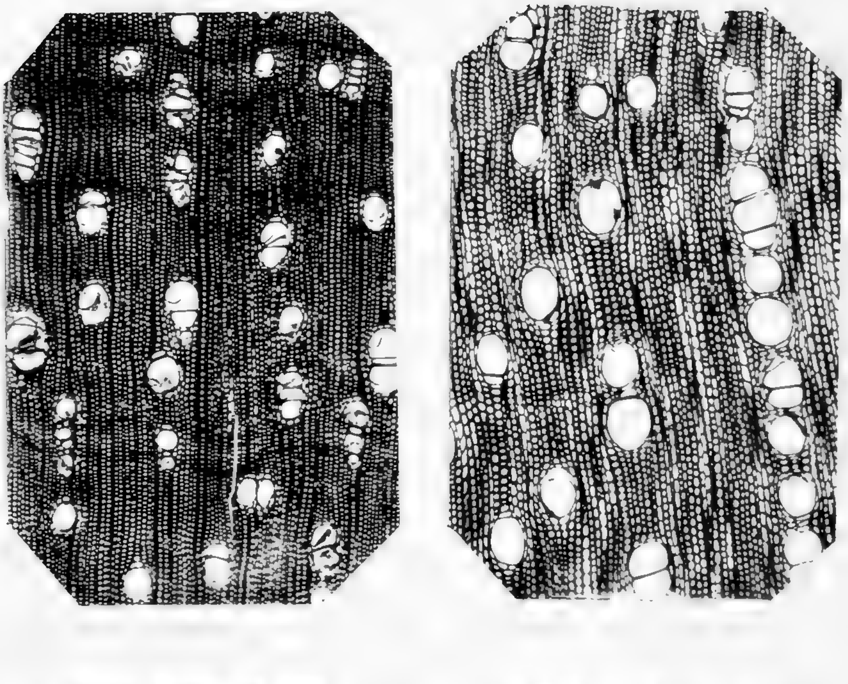
Description of the wood

Sapwood thin, very light brown, tinged with red; heartwood much darker resembling mahogany in color, turning darker on exposure to light and air. Wood very hard, heavy, strong, tough, straight- or cross- and fine-grained; it works with difficulty and takes a very good polish. Annual rings of growth barely visible under high power microscope.

Pores (~~transverse section)~~ very numerous, small (.09 mm. in diameter), round, open in sapwood, closed in heartwood and arranged in short radial rows of from 2 to 8. Vessel walls (longitudinal section) with numerous, small, round bordered pits. Perforations simple. Wood fibers about 1.55 mm. long, with very thick walls and almost obliterated cell cavities and very small dot-like simple pits. Wood parenchyma highly developed and arranged in numerous, tangential, continuous or broken lines of one or sometimes 2 cells wide, and easily visible under hand lens on a smooth transverse section. Rays numerous, narrow, from 1 to 2 cells wide, and from 8 to 12 cells high.

Distribution, common names and uses

Mimusops darienensis is a tree of great economic importance, especially on account of its gum, the caucho blanco



or *balata* of the commerce, but also for its wood, which under the names of *níspero* or *bully-tree*, is used in conjunction with *Achras Sapota* and at least one species of *Sideroxylon* for railroad ties and other strong constructions.

It seems to be one of the commonest trees in the forests of the Atlantic watershed of Panama up to an altitude of about 300 meters, and, according to the native balata-hunters, it extends far into the Atrato basin and the Sinú valley in Colombia. The extraction of the gum goes on without consideration to the preservation of the tree. Indeed, one rarely meets with an uninjured individual and the extermination of the species is furthered at a rapid rate.

The obovate Breakbill

Bumelia obovata A. D.C. Prodr. 8:191. 1844.

Description of the tree

A small tree, 6 m. high or less, the trunk seldom over 20 cm. in diameter, branched from close to the base, the bark brownish, more or less scaly, the branchlets usually aculeate at the end. (Leaves small, deciduous, glabrous, s single or in clusters, the petioles about 8 mm. long, the blades obovate-cuneate, rounded or emarginate at the apex, lustrous above, about 4 cm. long and 2 cm. broad. Flowers glabrous, 2 to 8-clustered on the foliar nodes; pedicels 3 to 7 mm. long; sepals 5, ovate, 2 to 2.5 mm. long, persistent; corolla white, a little over 4 mm. long, deeply lobate; exterior lobes 5, oblong, with smooth margin; interior lobes 10, sublanceolate, acute or 2-cuspid, inserted in pairs between the exterior ones and partly covered by the staminodes; stamens 5, opposed to the larger lobes, the anthers exserted; pistil 3.5 mm. long, the ovary globose, 5-celled, surrounded with a crown of stiff hairs; the style slender, persistent, ending in a minute stigma. Berry ovoid, 1-seeded, with thin mesocarp; seed ovoid, lustrous, brown, the small umbilical area near the apex.)

Description of the wood

Sapwood thin, light yellowish; heartwood darker. Wood hard, heavy, very brittle, very close grained, taking an excellent polish. Annual rings of growth not visible even under high power microscope.

Pores very numerous, small (.15 mm. or less in diameter), round or slightly elongated radially, open and arranged in small irregular groups or in branching radial rows, so characteristic of this group of plants. Vessels usually surrounded by several rows of wood-parenchyma fibers. Where these elements are in contact with wood-parenchyma and pith-ray cells they are provided with large elliptical simple pits in addition to bordered pits. End walls or vessel segments completely absorbed. Wood fibers 2.48 mm. long. Thick walls and small cell cavities; the cell walls are marked with small slit-like simple pits. Wood-parenchyma fibers highly developed, forming numerous irregular tangential lines, from one to four or more rows of cells wide. Pith rays very numerous and inconspicuous, hardly visible under the hand magnifier, usually from 1 to 2 cells wide, or occasionally from 3 to 4 and from a few to sometimes as many as 30 cells high.)

Distribution, common names and uses

This small tree is, so far as is known, the only Isthmian representative of the thorny Sapotaceae of America, which all belong to the genus Bumelia. It is found all over the West Indian Islands, on the high plateaus and western watershed of Mexico and along the Pacific coast of Central America. On some of the Windward Islands, it goes by the name of boxwood and break-bill while it is called bois-de-bouis, petit-bouis and bois-de-fer in the French Antilles, and caimitillo in Panama. The wood is very hard and used in the manufacture of small house-hold imprements, handles and the like. The fruit is edible and tastes not unlike that of the star-apple or caimito (Chrysophyllum cainito L.).

The Sclerous Lucuma

Lucuma sclerocarpa Pittier, Contr. U.S. Nat. Herb. 18: 166. 1916.

Description of the tree

A laticiferous tree, up to 25 m. high, the trunk mostly straight, 30 to 40 cm. in diameter at the base, the bark smooth, grayish. Young branches sparsely ferruginous-pubescent. Leaves alternate, entire, membranous, the petioles about 1.5 cm. long, canaliculate, the blades ovate-elliptic or elliptic, 10 to 25 cm. long, 4 to 9 cm. broad, subdecurrent, glabrous above, sparsely villous, paler or very light brown beneath; costa and veins prominent and sparsely hairy beneath. Flowers pedicellate, 3 to 6-clustered on defoliate axils; bracts small, ferruginous-pubescent; pedicels 1 to 3 mm. long, scarious-pubescent, with 2 minute, ovate, clasping bractlets at the base; sepals 6, free, ovate, the 2 exterior ones smaller, scaly outside, the interior ones 5 to 6 mm. long, pubescent without on the exposed parts, silky within; corolla about 8 mm. long, glabrous, the tube broad, the 5 lobes irregularly rounded; staminodes free; stamens 1.5 to 2 mm. long, glabrous; pistil about 7 mm. long, the ovary ovoid, 5-celled, densely hairy, the style glabrous, divided at the tip into 5 papillose lobules. Berry sclerous, sessile, ovate or pear-shaped, 7 cm. long and 4.5 cm. in diameter; seed large, ovoid, the umbilical area extending from one end to the other.

Description of the wood

Sapwood moderately thick, dark reddish brown; heartwood somewhat darker colored. Wood hard, heavy, very strong and tough, fine-grained, splits and works moderately easily, takes a good polish, and is very durable in contact with the soil. Annual rings of growth not visible under high power microscope.

Pores (transverse section) comparatively few, small, (114 mm. in diameter) round or often radially elliptical,

[illegible]

arranged singly but more often in radial rows of from a few to 6 or 8. The vessel walls ~~(longitudinal section)~~ where in contact with ray cells and wood parenchyma, have large transversely elliptical pits, simple, with transitions to bordered. Large elliptical simple pits are present on the radial surface of vessels.. Perforations simple with occasional scalariform perforations of from 1 to 7 bars. Wood fibers arranged in regular radial rows, about 1.321 mm. long, with relatively thick walls and small lumina and small simple pits. Wood parenchyma rather strongly developed and arranged in numerous narrow tangential lines visible under hand lens on a smooth transverse section. These lines are from 1 to 3, usually 2 rows of cells wide which alternate with from a few to 4 to 10 rows of wood fibers. Rays numerous and exceedingly small, barely visible under hand lens on smooth transverse section, from 1 to 3 cells wide and from a few to 10 or more cells high; the rays often terminate above and below in wood parenchyma and it is difficult sometimes to say where the ray ends and the fiber begins.)

Distribution, common names and uses

Most Lucumas, mainly known from Peru and Brazil, bear fleshy, edible fruits, so that the woody pericarp of this newly discovered Panaman species is a distinct, unusual feature. The tree is gregarious and found scattered along the creeks and on the lower hills of the San Blas Coast. The wood is hard and fine grained, but as yet unnoticed by the natives, who do not seem to have any name for it.

Symplocaceae
(Sweetleaf-Family)

The Chirican-Symplocos

Symplocos chiriquensis Pittier, Contr. U.S. Nat. Herb. 18: 168. 1916.

Description of the tree

A tree up to about 30 m. high, and 50 cm. or less in

diameter at the base. Bark of the trunk grayish and smooth, that of the minor branchlets purplish green and glabrous. Leaves membranous, glabrous, the petioles 7 to 10 mm. long, canaliculate, subdecurrent on the branchlets, the blades elliptic or obovate, cuneate at the base, more or less obtuse acuminate, the margin crenate and subrevolute. Floral racemes axillary, 1 to 5-flowered, 2 to 4 times as long as the petioles, the rachis minutely hairy. Flowers sweet-scented, sessile or very briefly pedicelled; calyx campanulate, 4 to 5-lobate, surrounded at the base with 3 to 5 very deciduous, deltoid, ciliate bractlets; calyx lobes broadly rounded, ciliate on the margin; corolla pink, tubulous, the 5 petals about 10 mm. long, 4 to 5 mm. broad; stamens about 35, 3-seriate, adnate at the base, included, the free part of the filaments flattened and apiculate at the apex; anthers cordate; ovary 4 to 5-celled; silky hairy; style slender, about 7 mm. long; stigma capitellate.

Description of the wood

Sapwood thick, very light yellow or nearly white; heartwood somewhat darker. Wood soft, moderately heavy, tough, strong, straight and fine grained, taking a fairly good polish, not durable in contact with the soil. Annual rings of growth not visible under the high power microscope.

Pores (transverse section) very numerous, small, about (.09 mm. in diameter), round, open, and arranged uniformly throughout the wood, either singly or in radial rows. Vessel walls (longitudinal section) with numerous small bordered pits. Perforations scalariform, sometimes as many as 12 bars. Wood fibers about 1.858 mm. long, with rather thick walls and relatively small lumina, and few bordered pits. Wood parenchyma only sparingly developed. Rays small, from 1 to 4 cells wide and from 3 to 4 times as high.

Distribution, common names and uses

Symplocos chiriquensis, the *camaleón* of the natives, is known only from the country around the Chiriqui Volcano, where it seems to constitute one of the conspicuous elements of the forests of the middle belt, being easily found out when loaded with the profuse crop of its sweet scented flowers. The wood is white and soft, and used only as fuel.

Boraginaceae

Prince-Wood Tree

Cordia alliodora (R. & P.) Cham., Linnaea 19:121. 1823.

Description of the tree

A tree 10 to 20 m. high and seldom over 50 cm. in diameter at the base. Trunk straight, branching from 5 to 10 m. above ground, the crown sparse and irregular; bark grayish and rimose. Leaves alternate, entire, petiolate; petioles 1.5 to 2 cm. long; blades ovate to lanceolate, attenuate toward the base, more or less acute or acuminate at the apex, sparsely stellate hairy above, densely so beneath, 10 to 18 cm. long, 3 to 7 cm. broad. Inflorescences large, and broad, terminal, panniculate; peduncles and pedicels densely stellate hairy; calyx tubulose, stellate-hairy, 4 to 5 mm. long, with 10 salient longitudinal ribs and 5 minute teeth; corolla salver-shaped, 5-lobed, persistent, white at first and then turning to brown; stamens exserted, the anthers ovate-elliptic; stigma bifid, each branch divided into broad lobes. Fruit drupaceous, surrounded by the accrescent calyx.

The largest specimens of this tree are usually found in localities with abundant rainfall. They always show the peculiarity of the forks of the younger twigs being thickened in a rounded, hollow swelling which shelters some kind of predacious ant.

Description of the wood

Sapwood thick, light brown; heartwood slightly darker, remotely resembling slippery elm. Wood moderately hard and heavy (specific gravity varies from .574 to .700), strong, close-grained, taking a medium good polish. Annual rings of growth barely visible under high power microscope.

Pores (transverse section) moderately numerous, small (.04-.18 mm. in diameter), round, open or sometimes closed with dark colored tyloses in the heartwood, and arranged

singly in small circular groups, or in short tangential lines. Vessel walls (longitudinal section) of uniform structure with numerous small bordered pits. End walls of vessel segments nearly horizontal and completely absorbed. Wood fibers about 1.52 mm. long with thick cell walls and small cell cavities. Wood-parenchyma fibers very highly developed and surrounding all vessels and scattered in groups throughout the wood. Pith rays very numerous and conspicuous under the hand lens, usually from 2 to 6 cells wide and from 10 to 30 times as high. The regular ray cells in the center of the pith rays are small and around in tangential section; those above and below as well as on the sides are from 2 to 4 times as wide; radially usually much shorter.)

Distribution; common names and uses

The prince-wood tree is found growing all over tropical America, including the West Indies, and it grows either isolated or in small clumps up to an altitude of about 1.200 meters, always on hills slopes or on well-drained flats. In Central America, including Panama and part of Mexico, it is known under the misleading name of laurel, in Cuba it is the *baria* (*varilla?*), in the French West Indies the *Bois de Cypre* or *Cipe*, and in Venezuela the *pardillo*. The wood is said to be incorruptible and is used extensively for beams, flooring, ceiling, as well as for finer work.

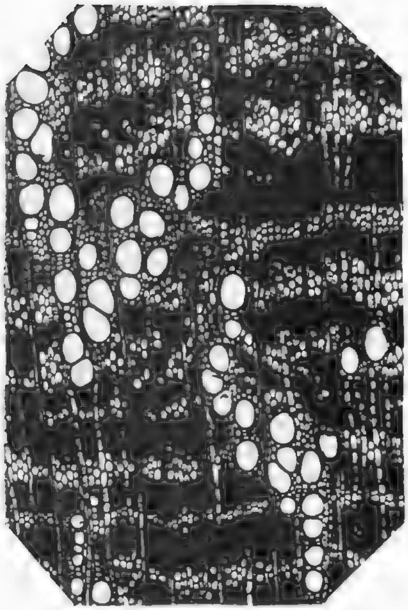
It is also variously known in other parts of tropical America as *Prince-wood*, *Spanish elm*, *Dominica rose-wood*, *bois de Rhodes*.

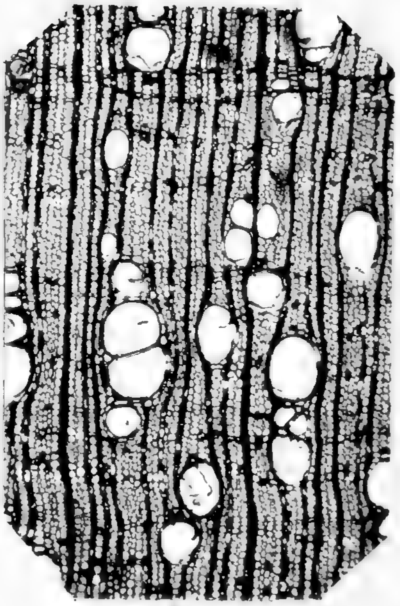
The Panaman Prince-wood

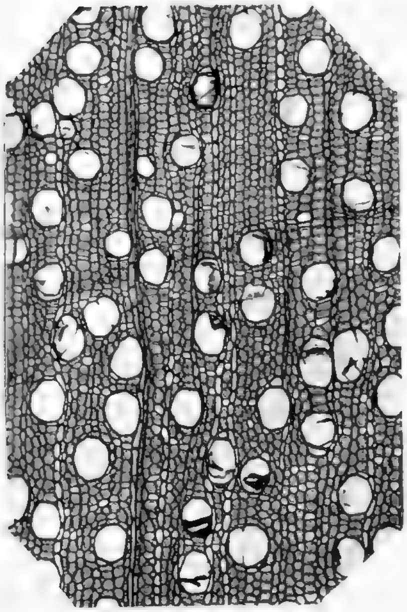
Cordia lasiocalyx Pittier, Contr. U.S. Nat. Herb. 18:251. 1917.

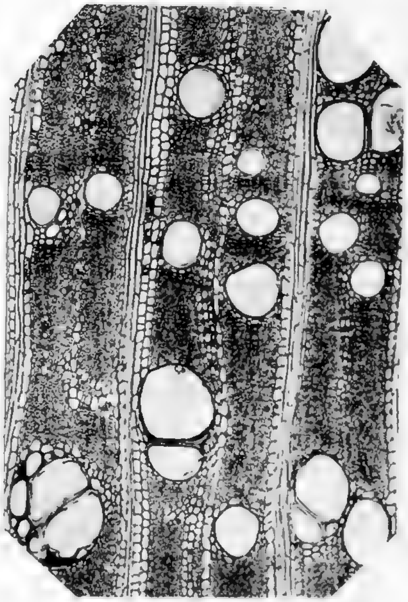
Description of the tree

A small or middle sized tree, with a low trunk and a









rounded-depressed spreading crown, the bark grayish, smooth, the branchlets, leaves and inflorescences all glabrous. Leaves subcoriaceous, the petioles sulcate, slender, 8 to 14 mm. long, the blades elliptic or elliptic-oblong, cuneate at the base, long acuminate, 10 to 12 cm. long, 3.5 to 4.5 cm. broad, often lustrous on both faces and paler on the inferior one; costa prominent on both sides, veins few, distant, interreticulate and anastomosed.

Inflorescence cymose-panniculate, axillary or terminal; cymes more or less regularly dichotomous, many flowered, about equal to the leaves or shorter. Calyx 5.5 mm. long, tubulous-campanulate, obscurely 10-sulcate, 3-toothed, the teeth ovate, 1- or 2-apiculate; corolla white, the tube funnel-shaped, about 5.5 mm. long, the lobes ovate, obtuse, reflexed and not contiguous; stamens inserted at the corolla-throat, exserted, the filaments villous at the base, the anthers deeply emarginate at the base, with the connective apiculate; pistil 5.5 mm. long, the ovary globose, the style bifid, each part dividing again in 2 branchlets each of which ends in a clavate stigma. Fruit not known.)

Description of the wood

Sapwood thick, light yellowish or nearly white; heartwood slightly darker. Wood rather soft, light, tough, moderately coarse and cross-grained, not easily worked and not durable in contact with the soil. Annual rings of growth not visible under the high power microscope.

(Pores few, large (.1 mm. in diameter), round, open in spawood, closed in heartwood, arranged singly or occasionally in pairs or small groups. Vessels (~~longitudinal section~~) with numerous small simple, bordered and transversely elongated pits. Perforations simple. Wood fibers about .9485 mm. long, with moderately thick walls and small lumina. Wood-parenchyma fibers strongly developed and arranged in numerous inconspicuous tangential lines, alternating with much wider bands of wood fibers. Wood-parenchyma fibers invariably surround vessels. Rays numerous and quite conspicuous under the hand lens, from 3 to 6 cells wide and from 4 to 8 times as high.)

Distribution, common names and uses

Thus far this tree has been reported only from the vecinity of Garachiné, Southern Darien, where it goes by the name of nigüito, meaning a small sandflea, an allusion probably to the appearance of the fruit or seed. The wood is not used for any special purpose.

Verbenaceae
(Verbena-Family)

The Large-Flowered Fiddlewood or Iguana-tree

Cytharexylum macrochlamys Pittier, Contr. U.S. Nat. Herb. 18:254. 191~~6~~7

Description of the tree

A tree, 25 to 30 m. high, the trunk up to 50 cm. in diameter, straight, covered with a reddish, rugose bark, the crown elongate; terminal branchlets thick, glabrous, 4 or 6-angled, more or less fistulose. Leaves membranous, glabrous, alternate or ternate, the petioles 1.5 to 3 cm. long, the blades ovate to elliptic, 10 to 24 cml long, 6 to 9 cm. broad, subacute or obtuse, entire, with 2 large glands at the base. Racemes axillary, usually ternate, subterminal, the rachis subglabrous, 12 to 25 cm. long. Flowers zygomorphous, about 1.7 cm. long; pedicels very short, puberulous; calyx 5 mm. long, salver-shaped, irregularly 5-toothed, suglabrous; corolla glabrous, white, the tube 11 mm. long, broad, slightly arcuate, the lobes 5, the median one rounded, narrow at the base, acuminate, the lateral ones broader and subobtuse; stamens included, inserted below the middle of the tube, glabrous; pistil 4 mm. long, glabrous, the ovary ovoid with 4 uniovulate cells; stigma capitellate, obscurely 2-lobate.

Description of the wood

Sapwood thick, yellowish white; heartwood slightly darker. Wood moderately soft, light, not strong, brittle, straight and only moderately fine grained, easily worked and taking a fairly good polish, not durable in contact with the soil. Annual rings of growth quite prominent under hand lens, often rather wide near the center.

Pores (transverse section) very numerous in the early wood, fewer in late wood, small (.15 mm. in diameter), round, open and arranged singly, in pairs, short radial rows or frequently in long tangential rows and almost unbroken row of pores at the beginning of the early wood. Vessel walls (longitudinal section) with numerous small simple and bordered pits; pit openings transversely slit-like. Perforations simple. Wood fibers, about .8577 mm. long, septate with very thin walls and large lumina, and numerous small, simple, sometimes bordered pits. Wood parenchyma highly developed, vessels arranged sparingly around and most abundant in the early wood. Rays numerous, small, barely visible under hand lens, from 1 to 4 cells wide and from 3 to 5 times as high.

Distribution, common names and uses

This species, conspicuous among the fiddlewoods, grows on the fertile alluvial flats of the Fató River, which empties into the Caribbean Sea one or two miles to the eastward of the now almost obliterated historical settlement of Nombre de Dios. These flats are covered with a dense forest growth, which proved to have an especially rich tree flora.

The natives call our new species iguanero, or iguana-tree, because, they say, the lizard-like reptile of that name, which they diligently hunt on account of its delicate chicken-like meat, is often caught while busy feeding on the leaves and flowers. The hard, tough wood, dull yellow in the heart of the trunk, is of little use.

The Panaman Vitex

Vitex floridula Duchass. & Walp. in Walp. Ann. Bot. Syst. 3: 240. 1852.

Description of the tree

A middle sized deciduous tree, the trunk straight, covered with grayish rimose bark, the branchlets at first puberulous, later subglabrate. (Leaves coriaceous, undeveloped at the time of flowering, glabrous, 3-foliolate, the lateral leaflets very caducous; petiole slender, 3 to 4.5 cm. long; petiolules 4 to 18 mm. long; blades ovate to elliptic, acute or subobtuse, 4 to 13 cm. long, 2 to 6 cm. broad, the terminal one largest. Cymes axillary, shorter than the petioles of the mature leaves, 3 or 4 times divided, the rachis minutely pubescent; bractlets linear, 1.5 mm. long, hairy, deciduous; calyx pubescent, cupuliform, irregularly 5-toothed, about 3 mm. long; corolla purplish blue, hairy without, the tube 5 mm. long, ventricose, the inferior lobe larger, orbicular, the lateral and upper lobes almost even, obovate; stamens long exserted, the filaments 5.5 and 6.5 mm. long, barbate at the base, the anthers ovoid, contiguous; ovary globose, glabrous; style glabrous, up to 9 mm. long. Berry ovoid, glabrous, bluish black, about 14 mm. long.

Like the other Panaman member of the genus, *Vitex masoniana* Pittier, this tree is usually gregarious. When, between March and May, one happens to look at the distant forests, either from the open parts of the Canal, the savannas of the western slope, or [illegible] the steamer running close to the coast, he may sometimes notice pale purple spots jutting from the green background. These show the presence of one of our Vitex, in full blossoms but still leafless.)

At close range, the Panaman Vitex is a tree of scant ramification, seldom over 20 meters high, but reaching sometimes about 1 meter in diameter. The trunk is straight and usually slanting.

Description of the wood

Sapwood thick, nearly white; heartwood slightly darker.

Wood hard, heavy, strong, brittle, cross and fine grained, easily worked, taking a fairly good polish, and said to be durable in contact with the soil. Annual rings of growth not clearly defined and visible only under the microscope.

(Pores (transverse section) numerous, (.166 mm. in diameter), round, open or sometimes closed in the heartwood, and arranged either singly or in small groups. Vessel walls ~~(longitudinal section)~~ with numerous, small, slightly bordered pits, with transitious simple pits. Where two vessels are in contact, the pits are bordered, but where wood parenchyma and pith ray cells are adjacent the pits are larger, simple, and usually transversely elongated. Perforations simple. Wood fibers about 1.046 mm. long, the walls moderately thick and the lumina relatively large, with few simple pits. Wood fibers often septate and occasionally with spiral markings. Wood parenchyma sparingly developed. Rays numerous and quite conspicuous under hand lens, from 3 to 6 cells wide and from 5 to 10 times as high.)

Distribution, common names and uses

In common with Mason's Vitex, this species is known to the natives by the name of *cuajado* or *cuajá* and the wood, which is of a light brown color and rather hard and lasting, is generally used as building material. It is said to keep long in earth. None of the two species have been found, so far, outside of the Isthmus, where they are not unfrequent in the forests of the lower belt.

Apocynaceae

Dogbane Family

The arboreous Mountain Jessamine

Tabernaemontana arborea Rose, Bot. Gaz. 18: 206. 1903

Description of the tree

A tree 10 to 15 m. high, 25 to 35 cm. in diameter at the

base, the trunk straight with a darkish gray, more or less shaggy bark, the crown flat and high, the branchlets stout, subquadrangular at the ends, somewhat fistulous, marked with numerous annular rings formed by the scars of fallen leaves, glabrous. (Leaves ovate, obovate or elliptic-lanceolate, long cuneate at the base, abruptly contracted in a short acumen, glabrous, deciduous. Inflorescences axillary or terminal, dichotomous, glabrous, many-flowered; floral pedicels about 8 mm. long; calyx 5-lobate, glabrous, the lobes divided almost to the base, ovate, obtuse, about 2 mm. long, each bearing on the inside 3 to 6 basal, elongated glands; corolla white, the tube dilated at the base, 8 to 9 mm. long, the lobes ovate-oblong, 15 mm. long, 8 mm. broad, rounded at the apex. Follicles smooth, about 8 cm. long and 0.5 cm. in diameter, geminate, ovoid-elongate.)

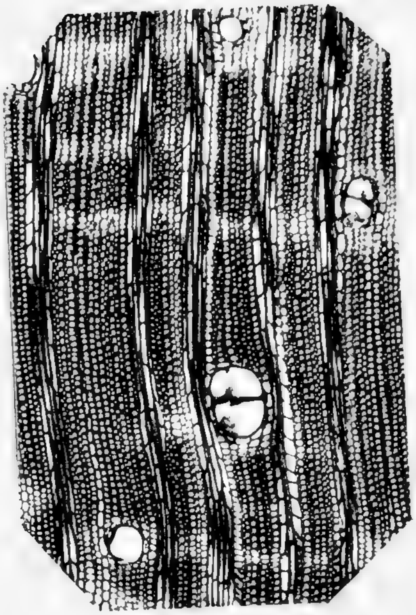
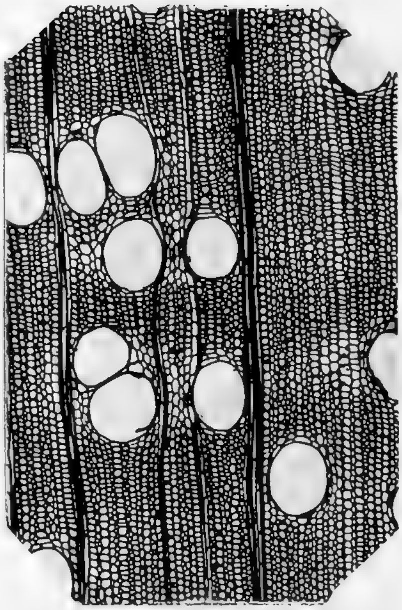
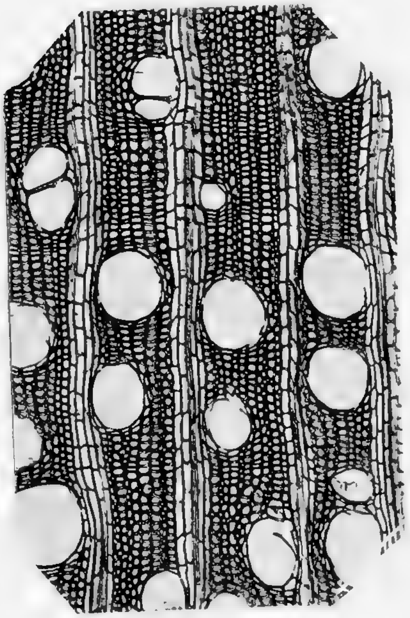
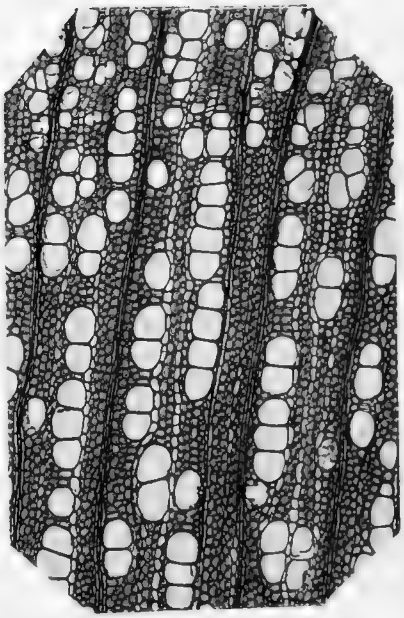
Description of the wood

Sapwood usually narrow, nearly white; heartwood somewhat darker or sometimes reddish brown. Wood very hard and tough, heavy, strong, very close and straight-grained, taking a very good polish.

Pores (transverse section) very numerous, small (about .078 mm. diam.), round or often polygonal in outline, open in sapwood, often closed in heartwood and arranged usually in radial rows of a few to 6 or 8. Vessel-walls (longitudinal section) with numerous, small, round, bordered pits. Perforations simple. Wood fibers about 1.5 mm. long with relatively thick walls and small cell cavities. Pits exceedingly small, oblique and slit-like. Wood parenchyma sparingly developed, occuring only in the neighborhood of vessels and pith rays. Rays very numerous, from 1 to 5 cells wide and from 10 to 20 times as high.)

Distribution, common names and uses

No common names are given for this species, which was found only in the Canal Zone and in Darien. The wood, which is heavy and hard, is of little use.

Bignoniaceae

The Panama Guayacan or Spurions Lignum Vitae

Tecoma Guayacan Seemann, Bot. Voy. Herald; 181 - 1854.

Description of the tree

A deciduous tree 12 to 30 m. high and up to 1.20 m. in diameter, the main roots running near the surface of the ground, the trunk erect, with buttresses at the base, covered with a reddish or grayish, almost smooth bark, the limbs ascendent and forming a rounded crown. Branchlets subtetragonous, clothed as are the young leaves and the peduncles, with a dense, rufous, stellate indument. Leaves digitate; peduncles thick, 12 to 15 cm. long, canaliculate; leaflets usually 5, seldom 6 or 7, the petiolules 1 to 2.5 cm. long, the blades ovate-lanceolate, rounded at the base, acuminate, 8 to 12 cm. long, 2 to 4 cm. broad, dark green and more or less hairy above, grayish tomentose and reticulate, with the costa and veins very prominent beneath; margin entire. Inflorescences terminal, corymbose-trichotom, developing before the appearance of the leaves. Flowers numerous; pedicels 0.8 to 1.6 cm. long, slender; calyx tubulous-campanulate, irregularly 5-toothed (the teeth rounded or obtuse), 11 mm. long, sparsely stellate hairy; corolla bright yellow, barbate within, campanulate-infundibuliform, the tube about 5 cm. long, glabrous without, barbate within, the lobes broad, rounded, glabrous, sinuate on the margin; stamens 4, inserted on the corolla about 7 mm. from its base, the fifth one reduced to a filiform appendix, filaments glabrous, 1.5 to 2 cm. long; pistil glabrous, 3.5 cm. long, the 2 stigmas ovate-obtuse. Capsule not known.

Description of the wood

Sapwood thick, very light yellow; heartwood dark brown tinged with red. Wood very hard, heavy, strong and tough, cross and fine-grained, taking a beautiful polish, and exceedingly durable in contact with the soil. Annual rings of

growth visible under the high power microscope.

(Pores ~~(transverse section)~~ very numerous and small (about .05 mm. in diameter), round when isolated, open in sapwood, closed with conspicuous yellowish green tyloses in the heartwood and arranged singly, in pairs or in small groups of 3 to 4. Vessel walls (longitudinal section) with numerous relatively large bordered pits. Perforations simple. Wood fibers about 1.48 mm. long, with very thick walls and nearly obliterated lumina, and with minute, slit-like simple pits. Wood parenchyma strongly developed and grouped around vessels and in short irregular tangential wavy lines. All pores are surrounded by these elements. Rays very numerous and inconspicuous, barely visible with a hand lens on transverse section, from 1 to 2 cells wide and from 6 to 8 cells high.)

Distribution, common names and uses

The Panama Guayacan is known thus far from the easternmost boundary of Panama and Guatemala, growing principally on the dry foothills at some distance from the Pacific Coast, and never much above 300 meters of altitude. The only part of the Isthmus where it is known to grow on the Atlantic side of the continental divide is in the Chagres Basin, where the depression in the mountains is so deep as to allow full sweep to the monsoon winds, and the penetration to the north of the semi-arid climate of the southern coast. In Guatemala, however, it appears again on the Atlantic watershed in the semi-arid Alta-Verapaz, while in Mexico, it reaches as far as the States of Guerrero and Michoacan, again on the Pacific coast.

(The native name *Guayacán*, is applied to species of two very distinct genera, a fact that has originated a very unfortunate confusion. It is, in the first place, the origin of the generic name *Guajacum*, applied to Zygophyllaceous trees, the wood of which has been long known as *Lignum vitae*, the typical *Guayacán* being *Guajacum officinale* from Venezuela, while again the *Guayacán polvillo* of Colombia is also a species of *Tecoma*.)

The *Guayacán* of Panama and Costa Rica, as well as the *Guayacán polvillo* of Colombia on the other hand, are Bigno-

niaceous trees of very distinct appearance and which have no right to the denomination of Lignum vitae, under which the first one is often known among Americans in the Canal Zone. Guayacán, Guajacum and Lignum vitae are really synonyms, when they apply to the Zygophyllaceous trees, with blue flowers, known by the botanists as Guajacum arboreum and G. officinale, but only the first one should be used for the yellow flowered Tecoma of the Isthmus. In Guatemala, the same tree goes under the name of cortés, or corteza, and in some parts of Mexico as verdecillo.)

(The wood of the Isthmian Guayacan is one of the most highly prized timbers of the Panamanian forests, and efforts should be made to grow the trees and insure a regular supply for the market. About 1848, Seemann noticed in the ruins of the Cathedral of Old Panama "beams of its wood, which have been exposed to the influence of climate since the destruction of the city in 1617". These beams were perfectly sound at the time and are still so today. Many of the guayacan ties used in the building of the first Panama railroad have been used again after many years of service. This hard wood has many other applications; the natives even turn the roots into curves for their schooners and small crafts, and the Indians make mortars, pestles, hoes and other small implements requiring hard wood, out of the broad buttresses at the base of the trunk.)

The Pink-flowered Tecoma

Tecoma pentaphylla Juss., D.C. Prodr. 9: 217. 1845.
Tabebuia (J.) Hemsl. Biol. Centr. Amer. [illegible]

Description of the tree

A deciduous tree 8 to 15 m. high, and up to 40 cm. in diameter, the trunk usually erect, covered with smooth grayish bark, the crown either depressed and spreading or elongate; young branchlets tetragonous, glabrous. (Leaves coriaceous, opposite, glabrous; petioles 7 to 10 cm. long, broad and flat

above, rounded beneath; leaflets 3 to 5, the petiolules 0.5 to 4.5 cm. long (the lateral ones shorter), the blades ovate, cuneate and often with a black spot at the base, shortly acuminate, 6 to 15 cm. long, 2.5 to 7.5 cm. broad (the lateral ones smaller), minutely scaly on both sides, light green above, paler beneath; costa and nerves prominent on the lower face, often dark colored on young leaves. Inflorescences terminal, corymbose, many flowered; peduncles dichotomous, minutely scaly; pedicels 4 to 8 mm. long; calyx tubular-campanulate, subbilabiate, irregularly lobulate, 10 to 11 mm. long, persistent; corolla pale pink, tubular-campanulate, glabrous without, piloculous within, the tube rather narrow, about 3.5 cm. long; stamens 4, glabrous; pistil 2 to 2.5 cm. long, the ovary minutely scaly, the stigmas ovate acute. Capsule subcylindrical, stipitate, cuspidate, 18 to 28 cm. long.

Description of the wood

Sapwood thick, light yellowish brown; heartwood slightly darker. Wood rather hard, heavy, strong, tough, moderately fine and cross-grained, taking a fairly good polish, and very durable in contact with the soil. Annual rings of growth visible only under high power microscope.

Pores (transverse section) rather numerous, (about .14 mm. in diameter), round or polygonal when isolated, open, and arranged wingly, in pairs, or small groups, generally in threes. Vessel walls (longitudinal section) with numerous, rather large, bordered pits. Perforations simple. Wood fibers about .9204 mm. long, with rather thin walls, relatively large lumina, and small, slit-like, oblique, simple pits. They are easily distinguished from the wood-parenchyma fibers, which have thinner walls, larger cell cavities, and are arranged in conspicuous tangential lines which alternate with lines of wood fibers. The wood parenchyma usually surrounds vessels, but the latter are not always found within the tangential lines of wood parenchyma. Rays numerous, small, not conspicuous on the transverse section - storied as seen in tangential surface, from 1 to 2 cells wide and from 8 to 12 cells high.)

Distribution, common names and uses

Tecoma pentaphylla is distributed along the northern coast of South America, and on some of the smaller Antilles, reaching west as far as Nicaragua following the open plains of the Pacific coast. In Panama, it does not seem to occur on the Atlantic slope, except in the middle Chagres basin. In the French island of Martinique, this tree is known as poirier, or poirier du pays, i.e., pear-tree or native pear-tree, on account of a remote likeness of the leaflets with the leaves of the real pear-tree. In Venezuela it is called apamate. For the Panamanians it is the roble, roble de sabana, or black oak, names which in Costa Rica apply also to Couralia rosea, and recall the firmness of the wood. It is used locally in the building of piers, boats, railroads, as well as in joiner and cart work.

Rubiaceae

Black's Alseis

Alseis blackiana Hemsley, Diag. Pl. Nov. pars. alt. 30. 1879.

Description of the tree

A tree up to 15 m. high and 25 cm. in diameter, the trunk more or less straight, covered with a gray, smooth bark, the crown elongate, the branchlets terete and glabrous. (Leaves opposite, submembranous, the petioles 1.5 to 2 cm. long, the blades obovate-oblong, 8 to 12 cm. long, 2.5 to 3 cm. broad, long cuneate at the base, acute at the apex, the costa and veins prominent on both sides and sparsely puberulous beneath; stipules acutely lanceolate, 8.5 to 11 mm. long, caducous. Inflorescence racemose, terminal; flowers numerous; bracts narrow lanceolate, acute, caducous; calyx cup-like, 5-toothed; corolla white, tubular, shortly 5-lobulate, the lobes obtuse; stamens 5, long exserted, the filaments barbate at the base, the anthers dorsifixed; ovary inferior, elongate, puberulous, many ovulate; style a little longer than the corolla tube, bifid. Capsule small, dehiscent, 4-valvate; seeds ovate-depressed, very small.)

Description of the wood

Sapwood thin, nearly white; heartwood darker, yellowish. Wood hard, heavy, rather tough, slightly cross- and very fine grained, working easily, taking a good polish. Annual rings of growth visible only under high power microscope.

Pores (transverse section) very numerous, small (about .08 mm. in diameter), round open both in sapwood and in heartwood, and arranged chiefly singly or occasionally in pairs. Vessel walls (longitudinal section) with numerous, small, bordered pits. Perforations simple. Wood fibers about 1.002 mm. long, with relatively thin walls, large lumina, and small simple pits. Wood parenchyma sparingly developed, occurring only in the neighborhood of vessels. Rays very numerous, from 1 to 6 cells wide and from 3 to 4 times as high.

Distribution, common names and uses

Black's Alseis is known only from Panama where it is not uncommon east of the Canal in the virgin~~s~~ forests of the lower belt; no native name has been recorded and the wood does not seem to have any special application.

The snowy Sunleaf

Calycophyllum candidissimum (Vahl) DC. Prodr. 4:367. 1830

Description of the tree

A tree 18 to 20 m. high and 50 to 60 cm. in diameter, the trunk long or short, straight or crooked, more or less furrowed, covered with a reddish gray, scaly or shaggy bark, the limbs ascendent, the crown rounded; young branchlets more or less reddish and verruculose, the extreme shoots subangulate, flattened below the axils. Leaves opposite,

subcoriaceous, the petioles terete, 0.5 to 2 cm. long, the blades ovate-elliptic, attenuate at the base, obtuse at the apex, 4 to 10 cm. long, 1.5 to 4 cm. broad, sublustrous above, glaucous with salient, pubescent or villous venation beneath; stipules small, pubescent. Inflorescence corymbiform, trichotomous, terminal, the ultimate branchlets ending in a 3-geminate cluster of flowers, of which the middle one is sessile and the lateral ones are short pedicelled; calyx 4-toothed, one of the teeth often sepal-like, the clawlet then 1 cm. long and slender, the blade ovate or rounded, attenuate or emarginate at the base, about 2 cm. long and broad, white; corolla tube about 3 mm. long, wooly inside, the 4 lobes about 5 mm. long; stamens 4, inserted at the throat of the corolla and alternate with the lobes; ovary inferior, ovoid, minutely pubescent; style short, smooth or hairy at the base, bilobate. Capsule oblong, 7 to 9 mm. long, glabrous or pubescent, costate, opening in 2 valves; seeds very small, ovate, winged.

In the axils of the veins on the lower face of the leaves, there is almost always a small opening corresponding with a cavity in the parenchyma and protected by long crossed hairs. The cavities (Acarododomatien of the German botanists) usually shelter tiny mites; they are found on the leaves of many species of Rubiaceae as also in other groups of the vegetable kingdom.

Description of the wood

Practically no distinction between sapwood and heartwood. Wood hard, heavy, strong, very fine-grained and durable, taking a good polish. Faint annual rings of growth recognizable only under the high power microscope.

Pores (transverse section) very numerous, small (.06 mm. in diameter), round, open, arranged singly or less often in short radial rows, vessels in such rows only seldom contiguous. Vessel walls (longitudinal section) with numerous small simple or bordered pits. End walls completely absorbed, usually nearly horizontal and circular or elliptical. Wood fibers about 1.34 mm. long, with thick walls and small, simple, slit-like, oblique pits. Wood-parenchyma fibers sparingly developed, usually present only around vessels. Pith rays very abundant, narrow, barely visible under hand

[illegible]

magnifier from 1 to 3 rows of cells wide and from a few to several cells high.)

Distribution, common names and uses

The snowy sunleaf extends from the Orinoco basin to the east, along the northern coast hills of South America, into Central America, where its western and northern known limits are at Hacienda Chacalapa[*] in southern Mexico. It is also a native of Cuba, where it goes under the name of *dágame*. All over Central America it is called *sálamo*, besides being one of the *madroños* of the Costa Ricans and the *alazano*, or *guayabo alazano*, of Panama. In Venezuela, it is knwon as *betún*. The wood is applied to many minor uses, and is exported from Cuba as *dágame spars* to be used as a substitute for the true lancewood. *Dágame lancewood* is a name often applied to it in the trade.

The Hairy-leaved Genipa

Genipa Caruto H.B.K., Nov. Gen. & Sp. 3: 318. 1818.

Description of the tree

A tree seldom over 15 m. high, with a diameter of 30 to 35 cm at the base, the trunk straight or crooked, covered with a grayish, smooth bark, the crown usually depressed and spreading. (Leaves coriaceous, bunched at the end of the branchlets, the petioles broad, up to 0.5 cm. long, the blades obovate, long cuneate at the base, obtusely acuminate, 8 to 25 cm. long, 3 to 12 cm. broad, glabrous and almost glossy above, grayish and tomentose-pubescent beneath; stipules ovate-triangular, scarious, brown, pubescent without, caducous, 0.8 to 1.5 cm. long. Inflorescence cymose-corymbose, more or less congested, terminal; bracts stipuliform, ovate-triangular, 3 to 4 mm. long. Flowers yellowish white, opening all at a time; calyx tubulous, truncate or sub-toothed,

[*]

6 to 8 mm. long, turning black by dessication; corolla 5 to 6-lobate, softly pubescent without and within, the tube equal to the calyx, the lobes narrow, obtuse, the limb about 3 cm. in diameter; anthers 5 or 6, sessile, inserted at the throat of the corolla tube; ovary inferior, 2-celled; style included, broadening toward the apex in a yellow stigma. Berry ovoid, glabrous, many seeded, about 5 cm. long, the outer shell coriaceous, the mesocarp pulpy.)

Description of the wood

Sapwood thick, nearly white; heartwood darker. Wood very hard, heavy (1), very brittle and close grained, taking an excellent polish. Annual rings of growth visible only under the high power microscope.

(Pores very numerous, small (.069 mm. in diameter), round, open, and arranged singly or in short radial rows. Vessel walls ~~(longitudinal section)~~ with numerous small bordered pits. End walls completely absorbed, usually nearly horizontal and circular or elliptical in outline. Wood fibers about 1.28 mm. long, with thick walls, very small cell cavities, and few simple, slit-like, oblique pits. Wood-parenchyma fibers sparingly developed, usually present only around vessels. Contrary to wood fibers they have thin walls and large cell cavities. Pith rays very abundant, narrow, not visible to the naked eye, from 1 to 3 cells wide, usually only 2, or from a few to 20 cells high. The marginal cells very large, often from 4 to 6 times as wide as the inner ones.)

Distribution, common names and uses

Genipa Caruto is very closely allied with Genipa americana L., the smooth-leaved Genipa; all posible transitions between the two can be observed and their distributive areas are the same. A number of authors are inclined to think that they should be considered simply as extreme forms of one single species, the name of which, according to the law of priority, would be G. americana L. Both forms grow more or less intermixed throughout the West Indies, and in the low belt of tropical America, up to about 500 meters of elevation.

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(1) Density 0.730 elasticity 3.263; resistence 0.762, according to Heckel (Plantes utiles des colonies francaises).

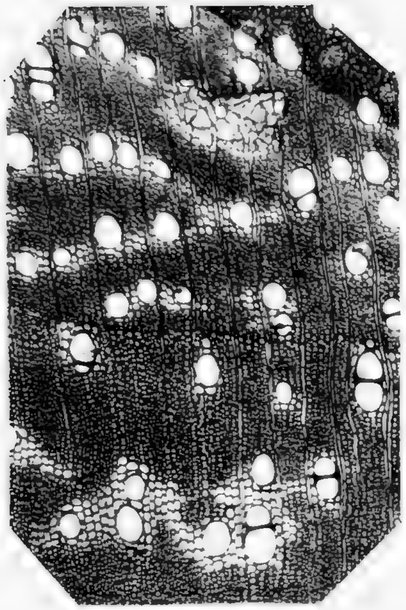
The tree is not gregarious and is found mostly in savanas or in clumps of deciduous forests interspersed through these. The generic name is derived from the Tupi, *genipapo*, and other names are found in many other primitive languages, as for instance:

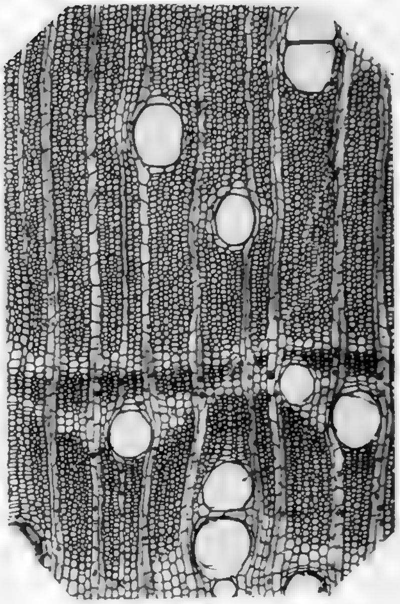
Taino: *xagua*, whence the Spanish *Jagua*.
Aruak: *tsaoua*.
Gallinago: *labouloubou*, when spoken of by men.
tsaoua, when spoken of by women.
Guarauno: *Caruto*, used also by the Venezuelians.
Guaycurú: *nottikai*.
Panos: *nané*.
Guarani: *nhandipa-guazú*.
Cocamas: *ouito*.
Runa Simi: *huito*, *vitú*.

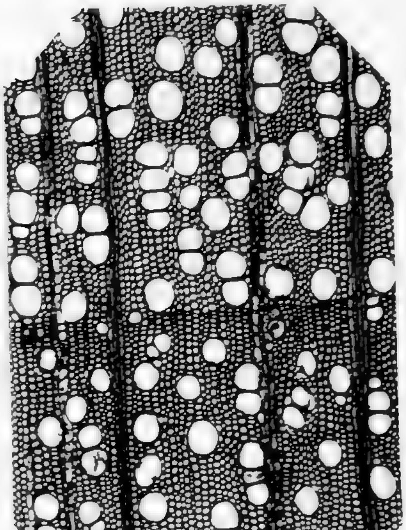
These name are all from eastern South America and extracted from the *Beitraege zur Ethnographie* of the celebrated von Martius. In Central America we find the following names in use:

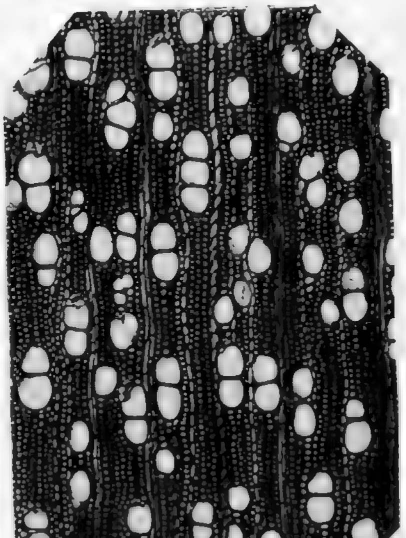
Cuna: *sáptur*, *sapturu-uála*.
Chocó: *pipará*.
Guaymí: *Kremé*.
Térraba: *brir*.
Salvador & Guatemala: *Irayol*.

The wood is fine-grained and does not split when exposed to the sun. It is often used in some parts for joiner and lathe-work, for gun-stocks, etc.; in Chepo (Panama) it is the choice material of house-builders for the hinge-bearing side of doors, designated by the singular name of *pié de verguenza* (shame's foot). (The bark is rich in tannin. The pulp of the fruit, acid and very astringent, is edible and used sometimes together with pine-apples and cashew fruits, in the preparation of a fermented beverage. But the principal importance of the tree, in primitive economics, consists in the dark blue dye which is obtained from the fruit by maceration, and which is used extensively for tattooing and body-painting; among the Cuna-Cuna and the Guaymies of Panama.) it enters into ingredients of facial adornment, and the former celebrate the coming into puberty of a girl by dipping her into









a bath of Genipa dye. (Among the Chocoes, the use of the same decoction is more general and indiscriminate, men, women and children appearing at times uniformly smeared with the bluish black liquid, other times with only their hands, feet or some other part of the body in the same color, while for feast days they adorn themselves with elaborate patterns, mostly monochrom, but also often varied by means of other vegetable pigments.)

The corymbose Amajoua

Amajoua corymbosa H.B.K. Nov. Gen. & Sp. 3:419, t. 294. 1818.

Description of the tree

A small dioecious tree up to 8 meters high and about 30 cm. in diam. at the base, the bark more or less shaggy, grayish brown, the crown scant and irregular. (Leaves coriaceous, the petioles half terete, 1 to 1.5 cm. long, narrowly canaliculate, the blades ovate, or ovate-elliptic, subcuneate at the base, briefly and obtusely acuminate, 10 to 25 mm. long, 4 to 9 cm. broad, glabrous above, pilose pubescent on the costa and veins beneath; stipules oblong, acute, 1.5 cm. long, membraneous, glandulous at the base within. Male inflorescence corymbose, loose, the rachis silky ferruginous, the peduncles compressed. Flowers hexamerous; calyx cupular-tubulous, silky pubescent, 6-toothed, 3 to 4 mm. long; corolla 18-19 mm. long, the lobules lanceolate, falcate, slightly tomentellous without, the tube swollen, puberulous at the base; stamens 6 mm. long, inserted on the corolla tube. Female inflorescence capitate, few flowered, the peduncles 0.5 to 1.5 cm. long. Flowers sessile; calyx 3 to 4 mm. long; corolla 10 mm. long; stamens sterile; ovary oblong, 3 mm. long; style clavate, 6 mm. long. Berry small, 2-celled, many-seeded, crowned with a thick disc.)

Description of the wood

Sapwood nearly white; heartwood slightly darker. Wood hard, heavy, tough, exceedingly close-grained, easily splitting, of fone texture and taking an excellent polish. Annual rings of growth not visible except under high power microscope.

Pores ~~(transverse~~ section) numerous, exceedingly small (.06 mm. in diameter) round or elliptical, open, arranged singly, in small irregular groups or in radial rows of from 2 to 4. Vessel walls (longitudinal section) with numerous minute simple and bordered pits. Perforations simple, with slanting ends. Wood fibers about 1.26 mm. long with very thick walls and nearly obscure, oblique, simple pits, arranged in irregular radial rows, wood-parenchyma moderately abundant, arranged irregularly in short tangential rows and in more or less radial rows; a number of these elements about vessels and pith rays. Rays numerous, narrow, barely visible under hand lens; from 1 to 5 cells wide and from 4 to 8 times as high. The rays usually terminate above and below in wood-parenchyma cells.

Distribution, common names and uses

Besides from Panama, Amajoua corymbosa is known from Trinidad and the northern part of South America. It grows only at low altitudes, preferably in deciduous, semi-dry forests and on the outskirts of savannas. In Panama it is called madroño, together with several other Rubiaceous trees and shrubs. The wood is strong and of current use, where available, in native house-building.

The spurious Calabazuelo

Stachyarrhena heterochroum Standley, Contr. U.S. Nat. Herb. 18: 142. 1916.

Description of the tree

A tree 8 to 10 m. high, the trunk straight, covered with

a grayish, smooth bark, the branching radiate and forming a pyramidal crown, the young branchlets terete and glabrous. Leaves glabrous, coriaceous, the petioles thick, 2 to 3 cm. long, the blades ovate to oblong-elliptic, acute at the base, abruptly acuminate or sometimes caudate, 15 to 28 cm. long, 5 to 9 cm. broad, lustrous and dark green above, paler beneath with the costa and veins prominent; stipules connate, 2 to 3 mm. high. Floral spikes pendulous, mostly terminal, 18 to 28 cm. long, glabrous; flowers sessile, solitary and usually remote; calyx campanulate, 2 mm. long, the margin obscurely denticulate; corolla 8 mm. long, turbinate, purplish pink within, pale pink without, the 5 lobes oblong, rounded, spreading, densely villous within; stamens 5, inserted on the middle of the tube, the filaments very short; stigmas broad, acute. Fruit subglobose, cherry red.

Description of the wood

Sapwood thick, light brown; heartwood much darker. Wood hard, heavy, more or less brittle, very fine-grained, works rather easily, and takes a good polish. Annual rings of growth not visible.

Pores (transverse section) very numerous, small (.04 mm. in diameter), can not be seen under hand lens magnifying 6 to 8 diameters, round and often closed both in sapwood and heartwood, and arranged singly or in very small groups. Vessel walls (longitudinal section) with numerous, very small simple and bordered pits. Perforations simple. Wood fibers about 1.52 mm. long, with thick walls, almost obliterated lumina, and minute vertical simple pits. Wood parenchyma sparsely developed and scattered among the wood fibers, frequently forming short tangential rows of one cell in width. Rays very numerous and narrow, scarcely visible under the hand lens, from 1 to 2 cells wide and from a few to 8 or 12 cells high.

Distribution, common names and uses

Thus far, the genus *Stachyarrhena* had never been reported outside of Brazil, and the discovery on the Isthmus of one of its representatives is highly interesting. *Stachyarrhena heterochroum* is known only from the Loma de la Gloria, back

of Fato on the Caribbean coast east of Colon, being known there by the very unappropriate name of *calabazuelo*. The wood is considered as a good timber and is used for rafters and other small pieces in house-building.

The western Bone-wood

Faramea occidentalis (L.) A. Rich., Mem. Soc. Hist. Nat.
Paris 5: 176. 1834.

Description of the tree

A small tree up to 6 m. high, the trunk straight, covered with a gray, smooth bark, the branches opposite, horizontal, forming a pyramidate or elongate crown; branchlets trichotomous, with a glabrous, green bark. (Leaves opposite, coriaceous, entirely glabrous, the petioles broadly canaliculate, 7 to 12 mm. long, the blades ovate-elliptic to elliptic-lanceolate, cuneate at the base, obtusely acuminate, 8 to 20 cm. long, 2 to 6 cm. broad, minutely reticulate, the costa and veins prominulous on both faces; stipules short, broad and rounded, but ending in a pointed awn up to 5 mm. long. Flowers glabrous, in axillary or terminal, few flowered, trichotomous cymes; calyx very short, funnel-shaped, truncate; corolla white, salver-shaped, the tube narrow, about 12 mm. long, the 4 lobes lanceolate and long acuminate, about as long as the tube, valvate in the bud; stamens 4, inserted into the corolla-tube, the anthers linear, sessile, subexserted; ovary 1-celled, 2-ovulate; style elongate with bifid stigma. Berry globose, about 8 mm. in diameter, dry, 1-seeded.)

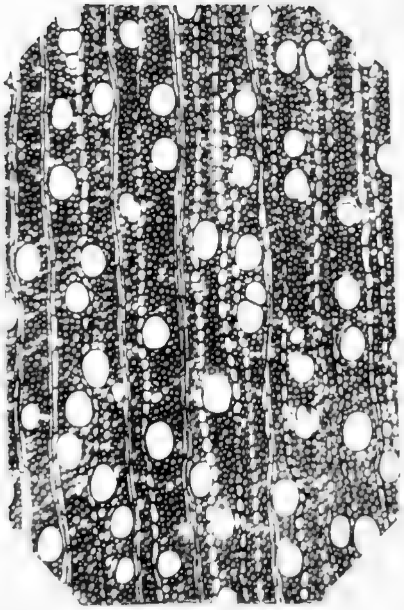
Description of the wood

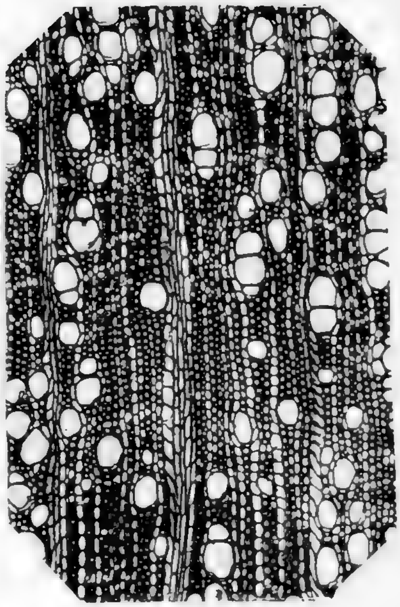
Sapwood very thin, nearly white; heartwood darker, tinged with yellow. Wood hard, moderately heavy, very tough, close-grained, taking a good polish. Annual rings of growth not clearly defined even under the high power microscope.

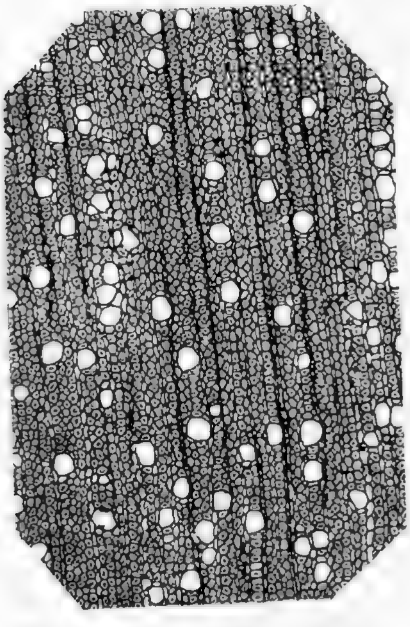
Pores ~~(transverse section)~~ not numerous, very small (.04 mm. in diameter) and often irregular in outline, open, and arranged singly or in small groups or radial rows of 2 or 3 in number. Vessel walls ~~(longitudinal section)~~ with numerous small simple and bordered pits. End walls of vessel segments completely absorbed. Wood fibers about 1.428 mm. long, with thick walls, small cavities and few simple, slit-like pits. In transverse section the wood fibers are chiefly polygonal. Wood-parenchyma fibers not abundantly developed and usually bordering pith rays and vessels. Pith rays rather prominent under hand lens on a smooth transverse section, from 1 to 5 cells wide and from 5 to 15 times as high.)

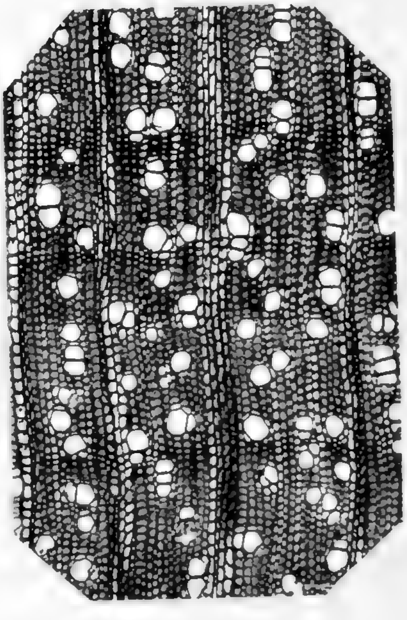
Distribution, common names and uses

This small tree is a common constituent of the underwood in the virgin forests of the lower belt, on both watersheds of Panama. Its area extends from Southern Mexico over Central America and northern South America to the three Guayanas, embracing also most of the West Indian Islands. In Panama it is known as *huesito*, i.e. small bone-wood, on account of the hardness of its white, fine grained wood; in some parts of the British West Indies, it is called *Wild Coffee* and *Wild Jasmine*. The straight stems are extensively used in native house building, while the wood is applied to the making of handles and other small objects.









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