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Yale University School of Forestry

TROPICAL WOODS

NUMBER 81 MARCH 1, 1945

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Watkins Collection.

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TROPICAL WOODS

NUMBER 81 March 1, 1945

A technical magazine devoted to the furtherance of knowledge of tropical woods and forests and to the promotion of forestry in the Tropics.

The editor of this publication and the writer of any articles therein, the authorship of which is not otherwise indicated, is SAMUEL J. RECORD, *Dean of the Yale University School of Forestry.*

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EDITOR, SAMUEL J. RECORD, DIES

Just as this magazine goes to press, word is received of the sudden death on February third of Samuel J. Record; Dean of the Yale School of Forestry, and editor of *Tropical Woods* since its founding in 1925. Dr. Record was ill for a week with a heart ailment, prior to his death.

Although the next issue (No. 82) may be somewhat delayed in appearance, *Tropical Woods* will continue under management of a new editor, to be announced in the future.

NOTES ON TROPICAL TIMBERS

By SAMUEL J. RECORD

Greenheart in the Martello Tower on Barbuda

Last November Mr. John Beard of the Forest Department, Trinidad, sent me some pieces of wood from an old beam in the stone fort on the Island of Barbuda. He wrote as follows:

"Barbuda is one of the Leeward Islands and lies north of Antigua. It is flat, coralline, barren, and almost uninhabited. On the south shore stands this fort, called the 'Martello Tower,' consisting of a stone tower, round, 12 feet in diameter and about 40 feet high, with three stories of loopholes, and a redoubt 20 feet square and 10 feet high on the south side. This fort is of unknown origin and is popularly supposed to be Spanish, which would make it date before 1700. Personally I believe it to be of English construction and late 18th century in date. The building still contains some old, decaying woodwork—two large beams and some lintels built in over doorways—all of the same species. I do not know the wood. Barbuda has never produced any trees large enough to have yielded this timber, so it must have come from outside and if we can identify the species it may give a very good idea as to who built the fort."

The samples, though weathered, are well preserved on the inside and have the silky luster so characteristic of many of the Lauraceae. The olive color and the high density serve to limit the range of possibilities in that large and difficult family and the absence of oil cells from the rays and wood parenchyma excludes all but Demerara Greenheart, *Ocotea Rodiaei* (Schomb.) Mez. The fact that the timber came from a British colony substantiates Mr. Beard's belief that the fort is of English construction.

Woods of *Dicymbe*

Elsewhere in this issue Dr. Adolpho Ducke describes a new species of *Dicymbe*, though there is some doubt in his mind as to the correctness of the genus. In general appearance the woods of *D. heteroxylon* Ducke and *D. amazonica* Ducke are very unlike. That of the latter is of normal structure. The other, however, has coarse, very irregular, dark brown, interrupted concentric bands spaced mostly 1–3 cm. apart. Patches of stone cells are common. In some places near the periphery of the stem there are direct connections with the bark. The inner surfaces of all of the bands have numerous conical or tangentially flattened projections (suggesting bird's-eye Maple), some of which extend from one band to another. They distort the grain and give the appearance of broad rays on cross section. There are also numerous, narrow, closely to widely spaced, concentric, apotracheal bands of parenchyma.

The woods have the following anatomical characters in common: The pores are small to medium-sized, fairly numerous but not crowded, and occur singly or in small multiples without definite pattern. The vascular pitting is fine. The rays are typically 1–4 cells wide and variable in height up to 35 cells; many of the cells are square and the marginal ones are usually large; crystals are common; the ray-vessel pitting is fine. Parenchyma is rather narrowly vasicentric and sparingly diffuse (apotracheal bands are apparently absent from *Dicymbe amazonica*); crystals are abundant. The wood fibers are small, rather thick-walled, and have numerous small pits. Ripple marks are absent.

The differences in these woods are no greater than between *Rhabdodendron macrophyllum* (Spruce) Huber, which has normal structure, and *R. amazonicum* (Benth.) Huber, which has concentric bands of included phloem. In *Tropical Woods* 79: 31 I described a specimen of wood of *Pera bicolor* (Kl.) Muell. Arg. that differs from all known material of that species in having concentric bands of phloem. Assuming that these samples are correctly classified, it would appear that included phloem is of uncertain diagnostic value.

Aggregate Rays in *Matayba*

In a collection of Surinam woods from Dr. Gerold Stahel, Director of the Agricultural Experiment Station at Paramaribo, is one (No. 156) of *Matayba*, probably *M. opaca* Radlk. A prominent feature of this specimen is the presence

of rather numerous ray aggregates that are fairly conspicuous on cross section. They are also visible on the tangential surface and some of them are several inches high.

Similar aggregates of very narrow rays are of regular or sporadic occurrence in certain Betulaceae (*Alnus*, *Betula*), Corylaceae (*Carpinus*, *Corylus*), and Fagaceae (*Castanopsis*, *Lithocarpus*, *Pasania*, *Quercus*), all of which belong to the order Fagales. They have also been found in *Cryptocarya corrugata* White & Francis and *C. glaucescens* R. Br., of the family Lauraceae (see *Tropical Woods* 48: 18). Apparently they have not been observed before in any of the Sapindaceae.

I examined all of the sections of sapindaceous woods in the Yale collections but did not find aggregate rays except in *Matayba*. Since they might have been missed in sectioning I inspected all of the woods of that genus (other than Stahel No. 156) and discovered them in four out of twelve species, namely, *M. inelegans* (Spruce) Radlk. (Y. 36885), *M. ingaefolia* Standl. (Y. 12230), *M. purgans* (P. & E.) Radlk. (Y. 18850 and 18979), and *M. Steinbachii* Melch. (Y. 39732, 39743, 39770, 39982, and 39990). Only in the last-named species did they occur in all the samples. They were absent from Y. 9503 (*M. opaca*) and are not mentioned by Pfeiffer (*De houtsoorten van Suriname*, pp. 380–384) in his descriptions. In most instances the aggregates were inconspicuous and might easily be overlooked in casual inspection.

The stimulus that causes the cambium to produce local increases in the number of rays naturally reduces the number of other cells formed in such places, and virtually eliminates vessels. Since vessels are much larger than the cambial initials from which they were derived it follows that their absence from a particular region would tend to reduce the volume of wood formed there. That such is the case is shown by the fact that the aggregating of rays results in local depressions in the outer surface of the woody cylinder and corresponding ribs in the inner bark. On cross sections, if the boundaries of the growth rings are visible, this "dipping in" is very distinct. In *Carpinus*, ray aggregates are themselves aggregated, thus producing large irregular depressions in the stem.

Miscellaneous

The report for 1938 by F. J. Müller & Sohn, Hamburg, noted considerable imports of lumber from Brazil and Chile (see *Tropical Woods* 58: 41–42). Among the Chilean kinds was Alerce (*Fitzroya*). Battery separator plates of this wood have been found in German submarines.

Owing to war-time difficulty in obtaining regular brake and clutch lining for tractors and trucks, the Nicaraguan government has been using Lignum-vitae (*Guaiacum*) as a substitute, with fairly satisfactory results.

Woods of the Rutaceae in which vertical gum ducts of traumatic origin have been reported are of the genera *Balfourodendron*, *Citrus*, *Esenbeckia*, *Euxylophora*, *Flindersia*, *Helietta*, *Metrodorea*, *Pilocarpus*, *Ravenia*, and *Zanthoxylum*. To this list can now be added *Micromelum*, as a specimen of *M. pubescens* Bl., collected in New Britain by J. H. L. Waterhouse shows such structures in a short arc.

In the key to woods with uniseriate rays (*Tropical Woods* No. 79), there is a mistake near the bottom of p. 31. Thus, 85 a should read "Rays distinctly heterogeneous, at least in part. Parenchyma in coarse bands," and 85 b, "Rays homogeneous or nearly so."

In *Timbers of the New World*, p. 513, I stated that the wood of *Simaba* is "probably resistant to insects." This opinion was based on the fact that the heartwood I had studied was as bitter as some of the other simarubaceous woods that are reputedly unpalatable to insects. Dr. Gerold Stahel, Director of the Agricultural Experiment Station at Paramaribo, Surinam, reports that some planks of *Simaba cuspidata* Spruce that were in process of drying were attacked by wood-destroying insects as quickly and as badly as in case of the highly susceptible wood of *Ceiba pentandra* (L.) Gaertn.

DICYMBE HETEROXYLON, A GIANT TREE WITH ANOMALOUS WOOD

By Adolpho Ducke

The species I am describing is represented by giant trees of the upland rain forest of the western part of the Brazilian State of Amazonas, near the town of São Paulo de Olivença. It is noteworthy because of its wood whose anomalous structure is unique among all forest trees of large size I have seen. The flowers are not fundamentally different from those of the genus *Dicymbe*, and pods and seeds agree in the principal genus characters with *Dicymbe amazonica* Ducke, the only species whose fruits are known. Our plant, accordingly, has been referred to the genus *Dicymbe*, near *D. Altsoni* Sand., whose leaves and flowers, according to the description, are not unlike those of the present new species. No mention, however, is made of an anomalous structure of the wood of *D. Altsoni* in the note on the collector's label reproduced by Sandwith: "Sapwood white, heartwood reddish. Trunk tends to be fluted in old trees." Evidently the collector examined the wood and did not discover anything abnormal. We therefore can presume that the structure of that wood is that of a normal Leguminosa.

Dicymbe heteroxylon Ducke, sp. nov. Arbor maxima trunco cylindrico, ligni structura pro leguminosa arborea abnormi. Ramuli teretes, juniores canopuberuli. Stipulae parvae lanceolatae cito caducae. Folia alterna, solum novella in petiolo rhachide et petiolulis canopuberula demum cito glabrata, vulgo 150–250 mm. longa, rhachide gracili; foliola paripinnata 4–8-juga petiolulis 1–3 mm. longis, lamina vulgo 50–80 mm. longa 15–20 mm. lata, lanceolata, basi anguste rotundata vel obtusa, apice longe acuminata acuminis apice obtuso, margine revoluta, coriacea, glabra, supra nitida, subtus pallidiore nitidula, costis mediana et lateralibus supra profunde impressis subtus prominentibus, lateralibus utrinque e costa mediana 12 ad 14 longe ante marginem anastomosantibus, venulis crebre reticulatis solum sub lente bene conspicuis. Inflorescentiae solum fructiferae visae, terminales, ut videtur laxe paniculatae. Flores vetusti sub arbore fructifera lecti, adulti maxima ex parte ab insectis rosi vel putredine corrupti, novelli (alabastra bracteolis crasse coriaceis inclusa) non raro perfecte conservati. Pedicellus florifer 12–17 mm. longus, strictus, validus, canotomentellus. Bracteolae duae 11–13 mm. longae 8–10 mm. latae, concavae, late ovatae, subobtusae, crasse et rigide coriaceae, extus canotomentellae intus glabrae, praefloratione alabastrum includentes marginibus solide cohaesis sutura valide carinata, anthesi usque ad basin solutae patentes. Calicis tubus discifer circiter 1 mm. longus 3 mm. latus, canotomentosus; sepala 4 praefloratione imbricata, tenuiter coriacea praeter extremum basin extus pilosam glabra, externa magnitudine et forma bracteolis subaequalia, interna angustiora magis oblonga apice subacuta. Petala 5 (in uno flore 6), praefloratione imbricata, externa maiora quam interna, obovato-oblonga ungue brevi crasso, lamina membranacea apice obtusa vel acutiuscula, extus longe et densissime albido-sericeo-hirsuta, intus glabra (petala perfecta solum in alabastris novellis adsunt, adulta in fragmentis visa calicis longitudinem parum excedent). Stamina libera, fertilia 10 rarius ad 12 (sterilia parva saepe 2 vel 3 adsunt), filamentis valde inaequalibus basi longissime et densissime hirsutis, praefloratione inflexis, maioribus calice longioribus, antheris dorsifixis longitudinaliter dehiscentibus. Ovarium in receptaculi fundo liberum at excentricum, sessile, pluriovulatum, longe et densissime fulvidohirsutum, stylo elongato glabro praefloratione involuto, stigmate peltato. Legumen maturum e stipite crasso vix usque ad 5 mm. longo, 100–150 mm. longum 35–60 mm. latum, plano-compressum, basi saepius modice inaequilaterum obtusum vel anguste rotundatum, vulge e basi usque parum infra apicem sensim dilatatum, apice vulgo valde obliquum acutiusculum et apiculatum, suturis non incrassatis, lignosum, densissime et persistenter rufescenti-velutinum, valvis elastice dehiscentibus demum saepius contortis; semina 2 ad 5, plus vel minus oblongo-suborbicularia 20–28 mm. diametro, 6–8 mm. crassa, exalbuminosa, sat mollia, testa tenui membranacea brunnea, funiculo brevi.

São Paulo de Olivença, silva terris altis in solo arenae albae humi stratu obtectae, 27–V–1940 et 1–IV–1944 fructibus

maturis, floribus sub arbore lectis, Ducke 1497 et cum ligno 339 in Yale.

Five of these giant trees have hitherto been observed, in a restricted area at a distance of a few kms. south of São Paulo de Olivença. They grow on soil of white sand covered by a thick layer of humus, in high forest near the limit of the lower "catinga" woods. The wood of three stems was examined and all had the same anomalous structure.

Dicymbe heteroxylon differs from the other species of the genus by the more numerous and smaller leaflets, by the sharp keel of the united bractlets, by the smaller flowers, and by the very short receptacle. It may also differ by the variable number of stamens and the frequent presence of staminodes, and perhaps also by the somewhat eccentric insertion of the ovary in the receptacle; other species, however, except *D. amazonica*, have not been studied enough for a complete comparison with the present species.

Dicymbe heteroxylon, whose trees are the largest known in the genus, has the most numerous and smallest leaflets and the smallest flowers of all congenerics. It exceeds, in this point, *D. Altsoni* of which the author of the species says: "It is noteworthy that whereas *D. Altsoni*, which has more numerous and smaller leaflets than its congeners, is a large tree reaching the height of 90 feet, the other two are comparatively small trees." The place of *D. Altsoni*, from that viewpoint, will now be occupied by *D. heteroxylon*.

Dicymbe amazonica Ducke, a better known species of the same genus, occurs in the same country. It grows, often gregariously, in the so-called "catinga," analogous with the "catinga" of the upper Rio Negro basin (described by Richard Spruce) where grows the type species of the genus, *D. corymbosa*. The wood of *D. amazonica* is of normal structure, but the growth of the trees is peculiar; two or three stems often come from a single root, or one large bole is accompanied by some smaller stems. *D. amazonica* also differs from *D. heteroxylon* in having less numerous but broader leaflets, thinner bractlets entirely connate without keeled suture in the prefloration, a longer calyx tube, larger petals, smaller pods with thinner valves glabrescent at maturity, and smaller seeds.

The enigmatical *Thylacanthus ferrugineus* Tul., only known in the very old and fragmentary type specimen, has been placed near *Dicymbe*, because of its bractlets and the central insertion of the ovary. It has poor-foliolated leaves. Those bractlets are spreading at anthesis as in our present new species, but remain united in the basal half. The species name *ferrugineus* would certainly not be applicable to our species. A photo of the badly preserved type was obtained through the kindness of Professor Auguste Chevalier. In Baillon's opinion (Hist. des Plantes II: 96. 1870), *Dicymbe* should be included in *Thylacanthus*, but that was not accepted by subsequent authors, because of the too incomplete condition of the type specimen of *Thylacanthus*.

A COLLECTION OF WOODY PLANTS FROM MELANESIA

By Mary Record

Assistant in Wood Technology, Yale University

Among the collections of the Yale School of Forestry is a highly interesting group of some 400 woods obtained with herbarium material during 1932–36 in Bougainville, New Britain, and various adjacent smaller islands by Mr. J. H. L. Waterhouse of Chatswood, N. S. W., Australia.

Mr. Waterhouse taught in native schools in the south and northwest Pacific tropics for many years (starting in Fiji in 1907), and is considered an authority on the languages and dialects of those areas. He is the author of several vocabulary and phrase books in various Melanesian languages, including a Roviana-English dictionary of the language of the Central Solomons. Thus, we can feel sure of the correctness of the native names given for the plants of this collection. Previous to his work for Yale, Mr. Waterhouse collected extensively in the Solomon Islands (1929–1932) on behalf of Kew, with the aid of a grant from the Empire Marketing Board.

The determinations of the Yale material represents the work of several eminent taxonomists, principally Dr. B. L. Burtt, Mr. V. S. Summerhayes, and others, of the Royal Botanic Gardens, Kew, England; Dr. M. Burret of Berlin-Dahlem (in the case of a group of palms); and Dr. E. D. Merrill and Dr. A. C. Smith of the New York Botanical Garden and Arnold Arboretum. Only seven specimens remain unidentified, at least as to the genus, and several undescribed species were discovered.

The places of collection for the plants enumerated are as follows: BOUGAINVILLE ISLAND: Siwai (of which Mr. Waterhouse writes, "This is a most interesting corner of a most wonderful island—the south or southwest end of Bougainville. Siwai is a vast jungle of gently rising land extending from the sea to the mountains inland. At this station, which is some 12 miles from the sea, the land is so level in appearance that it seems more like a vast plain, though we must be at an elevation of nearly a thousand feet. The soil is a deep rich alluvial and everywhere the country is well watered by clear streams of water often nearly icy cold. The largest part of the district is still covered by primeval jungle."): Nos. 1–15, 17, 18, 20–33, 55–79, 88, 91–97, 99–180, 186, 187, 189, 190, 193–202, 204–206, 423; Iru District: 16; Konua District: 19; Maisua: 80–87, 181–185, 188, 191, 192, 203; Buin: 89, 90; Harinai: 98; Northeast Bougainville: 332–345; Teop (an island northeast of Bougainville): 34–54; Kieta: 207. NEW BRITAIN: Gazelle Peninsula: Nodup Area: 208–265, 270–275, 280, 282, 294, 297, 298, 303, 307, 309, 310, 316, 317, 320, 322–331, 394–398, 405–411, 413–415, 424–430; Boava Area: 277–279, 283, 285–291, 293, 295, 296, 299–301, 304–306, 311–314, 319; Kabakada Area (north coast of Gazelle Peninsula): 346–373; Baining Area (southern extremity of Peninsula): 377–393, 399; Poronakaur, Rabauna: 400; Vunaolomarita: 401; Kurakalapua, Rau: 412; (exact location not given): 266–269, 276, 281, 292, 302, 308, 318, 321, 402–404, 421, 422. URAKUKUR ISLAND (Duke of York Group): 416–420.

In the list below, with annotations by Mr. Waterhouse, the following abbreviations are used after native names to indicate the proper dialect concerned:

B	Babatana (Choiseul, British Solomon Islands)
F	Fiji
M	Mono (Treasury Island, in the Shortland Group)
MA	Marovo (around Marovo Lagoon, B. S. I.)
N	Nakanai (Central New Britain)
NB	New Britain (especially Gazelle Peninsula)
P	Petats (west coast of Island of Buka to north of Bougainville)
R	Roviana (New Georgia, etc., central B. S. I.)
S	Siwai or Motuna (Siwai, southern Bougainville)
T	Teop (Northeast Bougainville, and Teop Island)
V	Varese (Choiseul, B. S. I.)

ACANTHACEAE

Acanthus ebracteolatus Vahl. KUMUKUMULU (NB). Spreading littoral shrub. Natives from the inland lick the leaves because of the salty taste. (No. 311; Y. 28606.)

Calycacanthus sp. MARKIAWA NB). Tree with striking red blossoms on a stalk. (No. 419; Y. 32146.)

Graptophyllum hortense Nees. SINGARATA (S), QOMAQOMOR (NB), MALAVIG (T). A shrub. (No. 141; Y. 22852.)

Pseuderanthemum sp. KATIKOTI (NB). Hard-stemmed shrub. (No. 360; Y. 29485.)

ANACARDIACEAE

Mangifera minor Blume. KONSI, PA (S), KOAI, KOKOR (NB), BAI, TAMOTE (T), RERÉKE (R), HAISI (M), BAK (P). Indigenous Mango up to 60 ft. high and 30 in. in diam. (Nos. 153, 221, and 293; Y. 22864, 27049, and 28589.)

Pentaspadon minutiflora B. L. Burtt. SIINARI (S), VITAWA (T). Handsome tree, 60–70 feet tall, with spreading crown and bearing masses of small creamy white blossoms. Prefers open country and river banks. (No. 13; Yale 21144.)

Rhus Engleriana Warb. MAIMAIG (NB). Medium-sized to large tree, used for making dugout canoes. (No. 329; Y. 29570.)

Rhus taitensis Guill. PANASIHU (S), ARABATA (MB). Tree about 40 ft. high, with whitish blossoms. (No. 184; Y. 22974.)

Semecarpus Anacardium L. f. MANGUTA (S), GAGAUS (P). Jungle tree, about 40 ft. high and 24 in. in diam. (No. 70; Y. 22675.)

Semecarpus laxiflora K. Schum., var. **glabrescens** Lauterb. IKURAKURAI (S), SAKITA (R). Small tree producing rash on some natives. (No. 61; Y. 22665.)

Spondias pinnata (L.) Kurz. KALATA. Tree 60–70 ft. high. (No. 389; Y. 29588.)

ANONACEAE

Canangium odoratum (Lam.) Baill. RAURU (S), A-ILUQA, VELUQA (NB), BINA (P, T). Medium-sized tree with strongly scented flowers which the natives dry and use to perfume oil. An extract from the bark is employed medicinally. (Nos. 150, 325; Y. 22861, 28622.)

Uvaria aff. **Rosenbergiana** Scheff and **U. macrophylla** Roxb. MAHKATAK-INGHORU (S). Name means "dog's broken nose." Trailing shrub, stem sometimes large and used in making keel for a certain kind of canoe. (No. 128; Y. 22839.)

APOCYNACEAE

Alstonia scholaris R. Br. KINGIRI (S), A-ITIG, TANGOVO (R), ITIG (NB), UAJIL (P), SINIVI (T). Probably the tallest of the Siwai jungle trees, attaining a height of 120 ft. with a straight trunk. The Teop name means canoe. At Roviana the tree is used ceremonially by the skull cult. (Nos. 111, 317; Y. 22715; 28616.)

Alstonia spectabilis R. Br. MIRU (S), JILO (P), LOA (T), TOTUANA (R). Useful timber tree about 70 ft. tall. (No. 78; Y. 22682.)

Alstonia subsessilis Miq. ITUWA (NB), ROA (T). Tree 30–40 ft. high, with tough wood. Bears masses of small blossoms and long seed pods. (Nos. 341, 371; Y. 29466, 29496.)

Anodendron oblongifolia Hemsl. KAPI (S), A-IBA (NB), PARASI (B), PUSI (R), HAVE (P), KARAKAVE (T). Vine yielding a very useful fiber for making rope. (No. 175; Y. 22965.)

Cerbera manghas L. LAQIR (NB), OPAU, VAKOKOPA (T). Small littoral tree with scented white flowers. Bark exudes a white latex when cut. The buds are macerated and used in native medicine. The fruit is said to be given to weaned children. (Nos. 44, 226; Y. 21284, 27054.)

Tabernaemontana (Rejoua) anguinea Hemsl. OIMA (S). Tree about 20 ft. high, bearing white flowers. The very striking fruit, which is of a peculiar shape and bright orange color, is regarded with awe by the natives who dread to touch it. (No. 75; Y. 22679.)

Wrightia tinctoria R. Br. OQOAQA (NB). Tree with brick-red flowers and trunks large enough for making canoes. (No. 270; Y. 27581.)

ARALIACEAE

Boerlagiodendron sp. PULAKA (NB). Straight-stemmed tree. Sap injurious to the skin, but bark is scraped and given with coconut to pigs, apparently as a tonic. (No. 319; Y. 28617.)

Polyscias sp. PUPUNG (S), TATAQALA (R), PAMU (T), PAPAMU (P). Tree about 20 ft. high, with glossy leaves and large heads of small flowers. (No. 74; Y. 22678.)

Polyscias aff. **pinnata** Forst. WALAQUR (NB). Shrub much employed for hedges. Young shoots used as spinach. (No. 227; Y. 27055.)

Schefflera (Cephaloschefflera) sp. TOUMO (S), VOVOKU (R). Parasite which frequently attains large size, growing out from a jungle tree. Its great spikes of reddish blossoms are highly attractive to certain kinds of butterflies. Plant is used in native medicine. Apparently unknown in New Britain and Teop. (No. 138; Y. 22849.)

AVICENNIACEAE

Avicennia marina (Forsk.) Vierh. (*A. alba* Blume). AVIAVI (T), TOGOR-IKABAG (NB). Tree up to 20 feet high, growing in salt or brackish water. Great flocks of small birds, called "buin" (probably *Calornis* sp.), roost in the trees at night and are taken with special nets. (Nos. 313, 342; Y. 28608, 29467.)

BIGNONIACEAE

Dolichandrone spathacea (L.f.) Seem. RAIRAI (S), TAVITUVITU (NB), SIBORUHU (T), VARASA (V), CHIVOL (P). Littoral tree about 30 ft. high with light wood used for "kudu" (tom-toms). (Nos. 165, 346, 399; Y. 22955, 29471, 29598.)

BORAGINACEAE

Cordia subcordata Lam. KANAU (NB), MARIMARE (T), TOTOL (P), NAWANAWA (F). A handsome littoral tree, 50–60 ft. high and 25 inches in diameter, with thick foliage and brick-red flowers. The timber is known as "Island Walnut." It has an important ceremonial use in New Ireland, as the V-shaped entrance to the men's taboo house is always made of this wood. (Nos. 40, 219; Y. 21280, 27047.)

Tournefortia argentea L.f. BEBE (T), DADOGO I KABAG (NB), Kabag means whitish or lime-like. Small, spreading littoral tree with soft leaves. The pith of the stem is used in garfish fishing. (Nos. 41, 296; Y. 21281, 28592.)

BURSERACEAE

Canarium sp. ROMURAI (S). Tree about 35 ft. high and 6 inches in diam. (No. 89; Y. 22693.)

Canarium sp. PUOGO (NB). This name, pronounced Pu-ongo, means to burst or explode. Tree 50–60 ft. tall, exuding a resin or oil used by the natives to anoint their bodies. (No. 348; Y. 28473.)

Canarium commune L. QALIP, KALUKALULU (NB). A large tree. (No. 316; Y. 28614.)

Canarium Mehenbethene Gaertn. MOI, TARIAPO, TUGTUGPURUA (S), BAGA, GALAPUAR, GARIKOKO, KUBIKA, VO (NB), UAGEL, UAGELE (P), OHITO (T), OKETE (R). Tree 70–80 ft. tall, bearing almond-like fruits that are harvested annually. (Nos. 69, 70, 106, 405, 406, 407, 411, 412; Y. 22673, 22674, 22710, 29764, 29765, 32056, 32060, 32061. Two or more varieties are probably represented.)

Canarium salomonense B. L. Burtt. PII, KUHURIMA (S). Tree about 50 ft. tall and 15 in. in diam. Siwai natives recognize two large divisions of *Canarium*, the "Moi" and "Pii"; equivalent names in Roviana, British Solomons, are "Okete" and "Tovinia," resp. There are numerous varieties, the nuts having marked differences in shape, toughness or shell, flavor, etc. (No. 73, type; Y. 22677.)

Santiria sp. A-IQAQALIP (NB). A tree. (No. 409; Y. 23058.)

CAPPARIDACEAE

Crataeva religiosa Forst. f. KURAKAI (S), VAQAQA (T). Tree about 30

ft. high. Extract from the root is used in native medicine for treatment of convulsions. (No. 17; Y. 21148.)

CELASTRACEAE

Perrottetia grandiflora Ridley. INUKU (S). Medium-sized tree, with tough wood used in making fire by friction; hence the native name. (No. 182; Y. 22972.)

CHLORANTHACEAE

Ascarina sp. ARIMU (S). Shrub or tree 10–12 ft. high. The bark is highly esteemed as a febrifuge. (No. 82; Y. 22686.)

COMBRETACEAE

Terminalia sp. TOWORO (S), TALIAQAU, TALISAQAU (NB), MARAKAOTO, OEBI (T), SAPEQAVA (B). Tree 90–100 ft. tall, supplying timber for house construction. (Nos. 195, 334, 378; Y. 22985, 29459, 29577. More than one species may be represented.)

Terminalia catappa L. TALIA (NB), KAOT, KOOTO (T), TAVOLA (F). Handsome deciduous tree, sometimes 6 ft. in diam. at base, common along sea coasts. The autumn foliage is especially attractive. The almond-like fruit is edible. Very young shoots are mixed with an earth called "tawal" and used by the natives for blackening their teeth. (Nos. 39, 259; Y. 21279, 27449.)

CONNARACEAE

Connarus sp. KUIKURURU (S), VAMEME (T). A tough, trailing shrub; probably an undescribed species. (No. 11; Y. 21142.)

CUNONIACEAE

Schizomeria Pulleana O. Schmidt. MOGORU (S). Tree about 40 ft. tall, with very tough wood. (No. 81; Y. 22685.)

Spiraeopsis celebica Miq. DONAI. Tree about 40 ft. high and 18 inches in diam. (No. 86; Y. 22690.)

DATISCACEAE

Octomeles sumatrana Miq. NONG (S), IRIMA (NB), INIMO, IRIMO (T), TUP (P), GOLITI? (R). Massive, spreading tree, 80–100 ft. tall and 6 ft. in diam. above the butresses, which are up to 7 ft. high. The flowers are rich in nectar and attract many flying foxes. (Nos. 101, 326; Y. 22705, 28623.)

DILLENIACEAE

Wormia ingens (B. L. Burtt) A. C. Smith (*Dillenia ingens* B. L. Burtt). KAUHANA (S), HEBERE (R). Tree 40–50 ft. high with handsome dark green foliage and brightly colored buds suggesting small rosy and yellow apples. Wood splits easily; is said to harden with age. (No. 25; Y. 21156.)

EBENACEAE

Diospyros sp. PIPIGA (NB). Small tree with an apple-like fruit that is eaten when other food is scarce. (No. 281; Y. 27592.)

ELAEOCARPACEAE

Elaeocarpus sp. RUHONAI (S). Jungle tree, 50–60 ft. high and 18 in. in diameter, with whitish splashes on bark. The flowers are very small and the glossy blue seeds are about the size of a small marble. The timber is useful. (Nos. 96, 177; Y. 22700, 22967.)

Elaeocarpus edulis Teijsm. & Binn. MARAMPI (S). An attractive tree about 30 ft. high, with cherry-red fruit. Not known in New Britain. (No. 146; Y. 22857.)

Elaeocarpus aff. **Müllerianus** Schltr. KIRIWIRO (S), PAIRA (T), PIDI (P), KELEVEG (M). Tree 90–100 ft. tall, with straight, buttressed trunk useful for making canoes. (No. 6; Y. 21137.)

Sloanea aff. **sigun** (Blume) K. Schum. KUINOTI, TUGTUQINI (S). Tree about 70 ft. tall. (No. 97; Y. 22701.)

ESCALLONIACEAE

Polyosma integrifolia Blume. KUNAIMAKUMAKU (S). Tree, 15–20 ft. high, growing at an elevation of about 1000 ft. above sea level. (No. 84; Y. 22688.)

EUPHORBIACEAE

Acalypha sp. NIGTANIG (S), A-EGUN (NB). Shrub, usually in second growth. (No. 192; Y. 22982.)

Acalypha sp. KIRO, TAKARA (S), HIVU (R), QILUH (P). Tree about 25 ft. high, with hard wood. (No. 56; Y. 22660.)

Acalypha sp. NIGTANIG (S). Tree about 30 ft. tall, with soft wood used for knife handles. (No. 9; Y. 21140.)

Acalypha longispica Warb. KAIKOAI (NB). TAVIS (T). A small tree. (No. 236; Y. 27164.)

Aleurites moluccana (L.) Willd. TOBOAI (NB). Tree 40–50 ft. high. (No. 218; Y. 27032.)

Antidesma bunius Spreng. HIPALA MALIVI (R). Small tree with dense wood and handsome fruit suggesting Dracontomelum. (No. 135; Y. 22846.)

Antidesma montanum Blume. HINUHA (S), DOMU (R). Tree about 30 ft. high and 12 in. in diam., with tough wood. (Nos. 118, 147; Y. 22829, 22858.)

Aporosa papuana Pax & K. Hoffm. NAPANIRUG (S), TALINGA NA KORI (P). Both vernacular names mean "possum's ear" and refer to the peculiar shape of the small leaves. A straight-stemmed tree about 30 ft. high. (No. 105; Y. 22709.)

Bischofia javanica Bl. LIKUTAN (NB). Large tree yielding useful timber. (No. 367; Y. 29492.)

Breynia aff. **acuminata** Muell. PIPIL (NB). Shrub with small fruit used by native children in bamboo popguns. (No. 244; Y. 27197.)

Bridelia minutiflora Hooker. MATUKURUPURIRI (S), BURUBURUA (NB). Tree about 50 ft. high and 20 in. in diam. (Nos. 196, 199; Y. 22986, 22989.)

Claoxylon sp. MARITU (S). Medium-sized tree with large pith. Leaf used as spinach or cabbage. (No. 88; Y. 22692.)

Claoxylon cuneatum J. J. Smith. IKIKOPO (MA), NAKUKUUNA (S). Tree

about 20 ft. high. The leaves are cooked and eaten as a vegetable. (No. 160; Y. 22950.)

Cleidion spiciflorum (Burm.) Merr. (*C. javanicum* Bl.). SIWONO (S), KULAIMUR (NB), IBIBU (R). Small bushy tree excellent for shade. (Nos. 79, 331; Y. 22683, 29572.)

Codiaeum variegatum (L.). Bl. TATOVO (S), ZAZALA (R). Shrub with variegated, twisted leaves. The SIWAI name means taboo and refers to the use of the live plants to define prohibited area. (Nos. 112, 113; Y. 22716, 22717.)

Endospermum moluccanum (T. & B.) Becc. POTOL (NB), NU'IU (T). Large tree with clusters of small fruit. The whitish wood is used in house building and in Teop as a rain-making charm. (No. 245; Y. 27198.)

Excoecaria agallocha L. TIRAI (NB). Littoral tree with Mangrove-like leaves and whitish wood. (No. 309; Y. 28604.)

Glochidion sp. AIKADAI (NB), MUAERU (T). Medium-sized to large tree. (No. 235; Y. 27163.)

Glochidion philippicum Rob. KIRIKIRIS (T). Small tree. Young leaves are used as spinach. (No. 51; Y. 21291.)

Glochidion ramiflorum Forst. MARAPERE, KUPIGAG, SIHAKU (S), PIPIL (NB), HILIVUVUTU (R), VETO (T), VOLU (M). Shrub or a small second-growth tree up to 25 ft., with little yellowish flowers. The bark is employed in native medicine. (Nos. 15, 57; Y. 21146, 22661.)

Homalanthus populneus Pax. PABA (NB). Small tree (No. 234; Y. 27162.)

Jatropha Curcas L. PULAWA (NB). Shrub or a small tree. (No. 261; Y. 27451.)

Macaranga sp. DUI (NB). Small tree. (No. 224; Y. 27052.)

Macaranga sp. PIRUHO (S), BARABARA, BARABARARAPITOK (NB), BANABANA, BANAPANA (T), RUMESE (B). Tree about 30 ft. high. The bark sometimes shows curious hieroglyphic markings and exudes a red resin when cut. The Siwai name means "without ashes" and refers to the comparative absence of ash when the soft wood is burned. (Nos. 169, 237; Y. 22959, 27190.)

Macaranga involucrata Baill. SULUI (NB). Tree about 35 ft. high, supplying some timber for house construction. (No. 354; Y. 29479.)

Macaranga riparia Engl. MANAKEI (S), BANABANA (T), VANAVAN (P), TUKITUKIHOBU (R). Tree about 60 ft. tall. (No. 27; Y. 21158.)

Macaranga tanarius (L). Muell. Arg. HIKUMUTU (S), QOQO, TABI (NB), NUAVUSI (T), TUKIHOBU (R). Tree 20–30 ft. high, mostly in second-growth. The natives rub the scented leaves on their bodies when dancing. The meaning of the Siwai name is "hiku," clay or white powder (referring to the bloom on the under surface of the leaf), and "mutu," adhere. (Nos. 154, 231, 232, 292; Y. 22865, 27159, 27160, 27603.)

Mallotus sp. MAMADA (NB). Small tree supplying useful timber. (No. 273; Y. 27584.)

Mallotus floribundus (Bl.) Muell. Arg. POTOMINO (S), A-IKAIKALAG (NB), LOUK (P), KOTAVAN (T). Tree 15–20 ft. high with heavy wood. The Siwai name is for Poto, who, in native legend, was the first to note the scent of the leaves. (No. 170; Y. 22960.)

Mallotus ricinoides Muell. Arg. KIKI NA VUAVUAT (NB). Small tree of drooping habit. Vernacular name means "sitting place of the vuavuat" (a kind of dove). (No. 230; Y. 27158.)

Mallotus tiliaefolia Muell. Arg. UKOITIITI (S), IKAPUL, TIWOTIWO (NB). Small tree with soft leaves which are used for covering baskets of whitebait. (Nos. 104, 302; Y. 22708, 28598.)

Melanolepis multiglandulosa Rchb. f. & Zoll. (*Mallotus moluccanus* Muell. Arg.). BARIBAR (NB). Small tree. (No. 263; Y. 27453.)

Phyllanthus sp. EVEL (NB). A shrub. (No. 225; Y. 27053.)

Phyllanthus paniculatus Oliv. VAETO (T). Tree about 30 ft. high said to be found only in dense jungle away from the beach. (No. 344; Y. 29469.)

Sapium sp. ETEL (NB). A shrub cultivated for its latex which is used for gluing feathers to dance ornaments or headdress. (No. 369; Y. 29494.)

Securinega sp. IVEL KUBAR (NB). A small tree. (No. 278; Y. 27589.)

FLACOURTIACEAE

Casearia aff. cluytiifolia Bl. HIRUNOPOMEWANA (S). Shrub or small tree with dense wood. Apparently unknown in New Britain. (No. 159; Y. 22949.)

† **Casearia aff. Ledermannii** Gilg. MEWANA (S), MAVUANA (R). Tree 60–70 ft. tall producing a useful, heavy wood. Apparently unknown in New Britain. (No. 161; Y. 22951.)

Erythrospermum Wichmanni Val. PARTALAI (NB). Tree about 50 ft. high with a straight stem. (No. 370; Y. 29495.)

Pangium edule Reinw. KALIKOLI (NB). A tree with a large, flat fruit. (No. 380; Y. 29579.)

FLAGELLARIACEAE

Flagellaria indica L. PIDIKAI (NB), PAQAU (T). A very useful vine, especially for making "vup," the basket-like fish trap of New Britain. (No. 328; Y. 28625.)

GESNERIACEAE

Cyrtandra filibracteata B. L. Burtt. TIPAKA (S). A small tree. (No. 134; Y. 22845.)

GNETACEAE

Gnetum gnemon L. MAREWA, MAREUWA, KISUPO (S), NULA (NB) LEQE (R), LAHAU (P), WAMAU (T). A very useful tree, 50–60 ft. tall, with fine-textured wood. The drupe-like fruit and the young leaves and "cabbage" shoots are edible. The bark yields a fine fiber for making very strong thread and twine. (Nos. 136, 265; Y. 22847, 27455.)

GOODENIACEAE

Scaevola frutescens (Mill.) Krause. PUSOKO (S), DADOGO, TAGALOP (NB), ANAHUNA (T), VIRITAPEPELE (B). A littoral shrub or small tree. (Nos. 205, 299, 301; Y. 22995, 28595, 28597.)

GRAMINEAE

Schizostachyum sp. KUTOPAKU (S), PADAKA (R), KOVEREU (T), KOHELAU

† This is dubious. C.T. White suggests Securinega sp. (Euphorbiaceae); this could well be on wood anatomy incl.

(P), Asaso (M). A small bamboo, rarely seen in flower. Stems used in making native combs. (Nos. 21, 100; Y. 21152, 22704.)

GUTTIFERAE

Calophyllum sp. Huwau (S), Manuba (NB), Qalukoko (B) Bunibuni (R). Large tree with resinous bark. The fruit is orange-like in appearance. (No. 201; Y. 22991.)

Calophyllum inophyllum L. Iroto (NB), Buni (R), Dilo (F). A littoral tree supplying useful timber. The burned fruit is a source of black dye for hair. The macerated leaves are used to stupefy the octupus in holes in the reef. (Nos. 258, 287; Y. 27448, 27598.)

Garcinia platyphylla A. C. Smith. Matumatu (S). Tree 25–30 ft. high, with very heavy, sappy timber. (No. 108, type; Y. 22712.)

Garcinia scaphopetala B. L. Burtt. Sigu (S), Pedeposa (B), Tabutabun (NB). Tree about 30 ft. high. (No. 183, type; Y. 22973.)

Garcinia solomonensis A. C. Smith. Pinuhunuhunu (S). Tree about 15 ft. high and 5 in. in diam. (No. 186; Y. 22976.)

Tripetalum cymosum K. Schum. Tabuna (NB). Tree with very dense foliage which is frequently used as a hiding place during fights. (No. 277; Y. 27588.)

HERNANDIACEAE

Hernandia ovigera L. Puleqi (NB), Vagovogove (T). A spreading soft-wooded littoral tree 50 ft. tall and 6 ft. in diam. From a distance the flowers suggest rosy crabapples. (Nos. 37, 211; Y. 21277, 27025.)

HIPPOCRATEACEAE

Salacia sp. Selesele (NB). A vine used as a whip in ceremonial flagellations. (No. 392; Y. 29591.)

Salacia aff. **prinoides** (Willd.) DC. Elelai (NB). A vine (No. 422; Y. 32065.)

ICACINACEAE

Tylecarpus sp. Mara veresuna (T). A small tree used in native plantations as a fertility charm. (No. 333; Y. 29458.)

LAURACEAE

Cinnamomum solomonense Allen. Enu (S). Small tree with glossy leaves and spicily scented bark. (No. 126; Y. 22837.)

Cryptocarya sp. Kohoso (S), Maribu (NB). Small tree supplying a strong timber useful in house building. (No. 143; Y. 22854.)

Cryptocarya cordata Allen. Tukura (NB), Nubiri (T). Large tree, the fruit, which is about the size of a currant, is used as a relish with certain foods. (No. 324, type; Y. 28621.)

Endiandra aff. **acuminata** Teschner. Momiro (S). Tree 25–30 ft. high. The bark and fruit are used in native medicine. (No. 80; Y. 22684.)

Litsea sp. Kaju (S), Ibaibalu (NB). Jungle tree 60–80 ft. tall with buttressed base. Siwai name from verb "kajukoitog," to twirl, in reference to the typical movements of the twigs. (No. 174; Y. 22964.)

Litsea domarensis O. C. Schmidt. Pulutabu, Kaviti (NB). Tree with tough leaves which are used as a wrapping ("pulu") for native shell money ("tabu"), hence one of the names. (No. 283; Y. 27594.)

Litsea aff. **tomentosa** Bl. Kakataikihe (S) Pulukabag (NB), Kakadeposa (B). Tree 50–60 ft. tall and 15 in. in diam. The wood is attractive and has a pleasant scent. (No. 185; Y. 22975.)

Litsea aff. **ochracea** Boerl. Kivito (S). Small to medium-sized jungle tree, sometimes used for making canoes. The natives also make spinning tops from the fruits. (No. 68; Y. 22672.)

LECYTHIDACEAE

Barringtonia spp. Pao, Papao, Papau, Poawutug (NB). Small trees. (Nos. 264, 366, 384, 404; Y. 27454, 29491, 29583, 29763.)

Barringtonia asiatica (L.) Kurz (*B. speciosa* Forst.). Vutug (NB). A tree. (No. 280; Y. 27591.)

Barringtonia racemosa B. Tatelam (NB). Tree 15–20 ft. high. (No. 353; Y. 29478.)

LEGUMINOSAE

Adenanthera pavonina L. Kuukig (S), Dividivula (NB). A tree. (No. 256; Y. 27446.)

Albizzia moluccana Miq. Tonimu (S), Maluvian (P), Taraue (T). Jungle tree 70–80 ft. tall. The bark can be removed from the trunk in sheets. No. 94; Y. 22698.)

Albizzia procera (Roxb.) Benth. Taqa (NB). Tree up to 50 ft. tall, straight-stemmed. The timber when dry is very hard and has the special name of "leo," meaning tough or strong. (No. 253; Y. 27443.)

Cynometra ramiflora L. Hapo (S), Mara asta (T). Spreading tree about 20 ft. high, with hard fruit. It is important in relation to native mythology. (No. 188; Y. 22978.)

Derris sp.? Vun (NB). (No. 413; Y. 32062.)

Desmodium ormocarpoides DC. (*D. dependens* Bl.). Limlimburkanakoko, Rokarokop (NB). The first name means "plaything of the crow," as this bird plucks the ripe red fruit, flies up and drops it, but catching it before it reaches the ground. The leaf is used as a fish charm. (Nos. 238, 276; Y. 27191, 27587.)

Desmodium tortuosum DC. Daudaula (NB). Small tree. (No. 291; Y. 27602.)

Desmodium umbellatum DC. Kukuvu (NB). Small tree with white blossoms. (No. 425; Y. 32828.)

Entada phaseoloides (L.) Merr. Aija (S), Vinau na kete (NB), Buri (B). The Siwai name means "crooked," in reference to the growth of this vine. The minute flowers are borne along the stem; seeds are giant beans. The plant is used in native medicine. (No. 179; Y. 22969.)

Erythrina variegata L., var. **orientalis** (L.) Merr. (*E. indica* Lam.) Balbal (NB). Small tree with red flowers. (No. 266; Y. 27456.)

Flemingia strobilifera R. Br. Rarara (NB). Shrub or small tree. The natives sometimes stick the branches in the ground to mark ownership. (No. 249; Y. 27202.)

Intsia bijuga O. Ktze. MAINAVA (NB), IVIN (T). Littoral tree 40 ft. or more in height useful for timber which is sometimes exported to Europe. (Nos. 53, 391; Y. 21293, 29590.)

NG.180 **Kingiodendron micranthum** B. L. Burtt. PANORUG (S). Tree 60–70 ft. tall and 2 ft. in diam. above the buttressed base, usually found near water. The timber is of good quality. (No. 172, type; Y. 22962.)

Leucaena Forsteri Benth. KOROPOI (S), AQIVANA (T), QEHALA (M), QEHOLO (R). Tree 30–40 ft. high, mostly in open country and along river banks. The bark is used in native medicine and the light wood is favored as fuel at cremations. (No. 8; Y. 21139.)

Mucuna gigantea DC. PIRIHIAMU (S), TUH (P). Siwai name means "beak of the pirihi," a small red parrakeet. Large vine with masses of yellow blossoms suggesting sprays of golden wistaria. (Nos. 67, 115; Y. 22671, 22826.)

Ormocarpum cochinchinense (Lour.) Merr. (*O. sennoides* DC., *O. glabrum* T. & B.). KALAWA (NB). Medium-sized to large, spreading tree. The leaves are cooked like spinach. (Nos. 382, 414; Y. 29581, 32063.)

Pongamia pinnata (L.) Merr. (*P. glabra* Vent.). PES (T). A little tree with pea-like flowers. (No. 36; Y. 21276.)

Pterocarpus indicus Willd. HODO, MAKAPA (S), BURIGAI (NB), PAPAIL (P), TABU (T), RIQI (R). Medium-sized to large, deciduous tree, with fine foliage and masses of golden yellow, scented flowers. Grows readily from cuttings. The red timber is of excellent quality and highly durable. The door of the sacred skull house or "oru" at Roviana Lagoon is of this timber, indicating that it is more or less sacred. (Nos. 19, 99, 408; Y. 21150, 22703, 32057.)

Sophora tomentosa L. VAMATE SUMAHUHU, VAMATESIHU (T). Small, white-leaved, soft-wooded littoral tree. The seeds are heated or cooked and used for killing head lice, hence the vernacular names. (Nos. 42, 340; Y. 21282, 29465.)

LILIACEAE

Cordyline fruticosa (L.) Chev. TAQETE (NB), TAVEA (T), LUQA (N). Large shrub, often planted on graves. Leaves used for covering food. (No. 212; Y. 27026.)

Dracaena (Pleomele); angustifola Roxb. KUMARARAHOWO, HURINIKO (S), WAKARAMUS (T), HAQOHEQO (P). Large shrub or small tree, with drooping foliage. Wood tough. (No. 28; Y. 21159.)

Smilax sp. LABOTO (NB), RORI (T). Thorny vine much used in white magic. No. 320; Y. 28618.)

LOGANIACEAE

Fagraea Berteriana A. Gray. KAUNOMORI (S). Parasitic plant with long pendant roots and whitish flowers. Named from "kau," a crow that feeds on the fruit. (No. 173; Y. 22963.)

Fagraea racemosa Jack. BAO (T). Tree about 30 ft. high. Fiber from the bark is used, along with others, in making fish lines and the line is rubbed with the leaves to attract fish. (No. 339; Y. 29464.)

Geniostoma sp. NUNANIMINI (S). Name means "frogs tongue." Tree about 25 ft. high, with great masses of minute very sweet flowers. (No. 119; Y. 22830.)

MALVACEAE

Abutilon indicum (L.) Sweet. VAVAVAR (NB). A shrub. (No. 239; Y. 27192.)

Cephalohibiscus Peekelii Ulbr. TARARU (S), PALAMOROA (NB). Tree 40–50 ft. tall, with soft wood. The bark is used for settling troughs in making sago ("saksak"). (Nos. 162, 423; Y. 22952, 32149.)

Hibiscus tiliaceus L. VAVAR (NB), RENATAO (T), VAU (F). Small tree with lemon-colored flowers. The bark yields a strong, useful fiber. (No. 220; Y. 27048.)

Thespesia populnea (L.) Soland. MADARA (NB), VARAMATA (T). Low, spreading tree. The bark is used in native medicine, the wood for making "kudu," a wooden drum or tom-tom with lizard skin for vellum. (Nos. 47, 257; Y. 21287, 27447.)

MELASTOMACEAE

Astronia spp. ORO ROMO, TONONI (S). Shrubs or small trees. The leaf of the Ororomo is used to impart a yellow color to the "nah," bark of an orchid stalk much employed in plaited work. (Nos. 85, 193; Y. 22689, 22983.)

Melastoma denticulatum Lab. TUPAINARAKU (S). Shrub 5 or 6 ft. high, with small but tough stem. Plant used in native medicine, particularly for anointing infants' fontanelles. (No. 63; Y. 22667.)

MELIACEAE

Aglaia sp. TAKANABEO (NB). Name means bird excrement. A small tree. (No. 209; Y. 27023.)

Aphanamixis rohituka (Roxb.) Pierre. RUHUGOWO (S). Tree about 30 ft. high, with long flower sprays. (No. 190; Y. 22980.)

Chisocheton spp. RUHOGOWO, TUGPAMOI (S), PISU (NB). Large trees. (Nos. 180, 355; Y. 22970, 29480.)

Dysoxylum spp. KIRAKIRA (S), PARU (NB). Large trees. (Nos. 77, 306; Y. 22681, 28602.)

Dysoxylum amooroides Miq. SINUTO (S), TUKATUKA (NB), KOKOAVA (T), MATAPUKU (B). Medium-sized to large tree, with buttressed trunk. (No. 191; Y. 22981.)

Dysoxylum aff. caulostachyum Miq. KIRAKIRA (S). Jungle tree with masses of white flowers along stem. (No. 72; Y. 22676.)

Dysoxylum rubrum Miq. KILAG (NB). Tree of about 30 ft. (No. 390; Y. 29589.)

Melia azedarach L. IQARAMUT (NB). Tree 40–50 ft. high. (No. 350; Y. 29475.)

Melia dubia Cav. TAQATAQAL (NB). Large tree with masses of small whitish flowers. (No. 415; Y. 32064.)

* **Vavaea bougainvillensis** B. L. Burtt. MONO (S). Tree 25–30 ft. high, of spreading habit, growing along river bank. (No. 157; Y. 22868.)

Xylocarpus moluccensis (Lam.) M. Roem. WADAWADA (NB), KOE (R). A littoral tree whose fruit is employed in a game by native children. (No. 310; Y. 28605.)

* V. amicorum Bentle.

MENTHACEAE

Ocimum gratissimum L. TIQILI (NB). Small tree. The leaves and blossoms are used to scent coconut oil. (No. 368; Y. 29493.)

MORACEAE

Artocarpus altilis (Parkinson) Fosberg (*A. incisa* L. f.). KURAKO (S), U-AKAU (P), BANIO (T), KAPIAKA (NB). Large tree, a kind of Breadfruit. (No. 158; Y. 22948.)

Ficus spp. HITURU, KAIKAI, KAUTORO, KOROPURU, KUNG, MUKAKUMA, PUIJO, SISI, SURASAI, TUPARE, TUTURI, UTOSIH (S.), KAQUA, KAROWO, KATUT, PAKA, PIDIKULA, POKOVITULA, QENIT, SER, TAKUMPAPAR, TUKAPARAR, WAWAIA (NB), HIKAVARAI, IVOI, KIRUKA, KUVI, LUHU, POI (T), BAVAU, LUSKO, U-AVOS (P), QULA (B), LAVUSU (R), TALITUE (V). A miscellaneous group of mostly small trees which cannot be determined specifically. (Nos. 10, 32, 46, 92, 95, 109, 124, 148, 156, 176, 189, 202, 203, 213, 222, 223, 247, 268, 269, 297, 379, 426; Y. 21141, 21163, 21286, 22696, 22699, 22713, 22835, 22859, 22867, 22966, 22979, 22992, 22993, 27027, 27050, 27051, 27200, 27579, 27580, 28593, 29578, 32829.)

Ficus aff. **Bernaysii** King. IRI (S), HAVONA (T). Siwai name means "blood." Tree of about 25 ft. (No. 7; Y. 21138.)

Ficus bougainvillei Rech. BAO, VABIHUBIHU (T). Tree about 25 ft. high. The latex is used in local medicine. (No. 52; Y. 21292.)

Ficus aff. **eulampra** K. Schum. HIKAVARAE, POHI (T). Medium-sized tree, with comestible leaves. (No. 38; Y. 21278.)

Ficus aff. **granatum** Forst. KEKERA, MONO (S), NOVINOVI (T), KAKAKO (P), RAPA (R). Small tree. (No. 30; Y. 21161.)

Ficus indica L. QUIAU (NB). Large tree, regarded as an abode of spirits. (No. 275; Y. 27586.)

Ficus indigofera Rech. HINGJOMU, KUUMO (S), AI (T), MAN (P), RAPAPATU (R), OHELE (M). Low, spreading tree. (Nos. 26, 127; Y. 21157, 22838.)

Ficus leucantatoma Poir. MAKEMAKE, TUTURI (S), EREVAT, PIDIKULA (NB), VIVIRU, WAHIRIHIRI (T), HUHU (R). Siwai name signifies a spinning top ("make"), from use made of seeds. Tree is of about 30 ft., usually in second growth. (Nos. 152, 228; Y. 22863, 27156.)

Ficus myriocarpa Miq. LOVO (NB). Small tree. (No. 248; Y. 27201.)

Ficus salomonensis Rech. KUJKUJ, SUSO (S), HEBERE GABIHI (R), KUKUSU (T), KAKUAKUA (P). Small tree. (No. 116; Y. 22827.)

Ficus subulata Bl. NAQALA (NB). A tree. (No. 347; Y. 29472.)

Ficus tinctoria Forst. TAGATATA (NB). A tree with edible fruit and comestible leaves. (Nos. 243, 427; Y. 27196, 32830.)

MYRISTICACEAE

Horsfieldia novae-lauenbergiae Warb. OLAI (NB), KOBUS, VADOVUDOVURU (T). Large tree yielding a useful timber. The strongly scented flowers are employed in native medicine. (Nos. 242, 337; Y. 27195, 29462.)

Horsfieldia sylvestris (Houtt.) Warb. MU (NB). Medium-sized to large tree, with long drip leaves. Sap employed as bird lime. Timber used in house building. (No. 318; Y. 28616.)

Horsfieldia tuberculata (K. Schum.) Warb. KAGKAG (S), A-IQIL (NB), TUTUPUN (P), VADOVODOVURU (T). Jungle tree, with buttressed trunk. Tender shoots sometimes eaten raw by natives. (Nos. 35, 178; Y. 21275, 22968.)

Myristica cerifera A. C. Smith. VORAGA (S), MU (NB). Large tree with buttressed stem. The bark is used in native charms. (No. 166; Y. 22956.)

MYRSINACEAE

Discocalyx Listeri (Stapf) Stapf & Mez. PIKUNAPA (S). The name means "possum trap." Tree to about 20 ft. (No. 83; Y. 22687.)

Maesa sp. NUUWA (S), TULTULURA (NB), ZIZITO (R), LAHAU (P). Tree 15–20 ft. high in secondary growth. (No. 58; Y. 22662.)

Maesa sp. TURTURULAVAT (NB). A littoral tree. (No. 250; Y. 27203.)

MYRTACEAE

Decaspermum fruticosum Forst. (*D. paniculatum* Kurz). IMINIL (NB). A small tree. (No. 330; Y. 29571.)

Eugenia spp. PURIMAKURI (S), TULIAN (NB). Small trees. (Nos. 120, 372, 417; Y. 22831, 29497, 32144.)

Eugenia sp. KORA (S), PAIRA (T), MATIAHO (P). Tree 80–90 ft. tall with straight trunk and whitish, faintly scented flowers. (No. 12; Y. 21143.)

Eugenia aff. **aquea** Burm. KORIKORISA (S). Tree about 20 ft., bearing prolific crops of waxy, pinkish fruit. (No. 133; Y. 22844.)

Eugenia clusiifolia A. Gray. TUTOVOS (New Ireland name). A beach tree, the source of a tough reddish timber in Bougainville. (No. 207; Y. 22997.)

Eugenia aff. **javanica** L. TAVAKARARA (NB). Large tree supplying timber for house construction. (No. 305; Y. 28601.)

Eugenia nutans K. Schum. TAGURIVA (T). Small tree with glossy leaves and cherry-red fruits. Wood tough. (No. 34; Y. 21274.)

Psidium guajava L. GUAVA (NB). Large shrub or small tree, probably introduced. (No. 229; Y. 27157.)

Syzygium malaccense (L.) Merr. & Perry (*Eugenia malaccensis* L.). PADOROJA (S), QAMATA, TAQIA (NB), KARIAPA, NANAM (T), HIPALA (R), DAWA (F), U-AMUA (P). A handsome fruit tree. (Nos. 200, 254; Y. 22990, 27444.)

Syzygium aff. **malaccense** (L.) Merr. & Perry. SINGIRIMU (S), HIPAHIPALA (R). Three collections of closely related but apparently not identical trees. (Nos. 102, 103, 110; Y. 22706, 22707, 22714.)

NYCTAGINACEAE

Pisonia sp. SIHO (S), BULBULIT (NB). Large, spreading tree. In New Britain the natives make bird lime from the seeds or fruit; in Siwai they get a kind of salt ("mio") from the wood ashes. (No. 151; Y. 22862.)

Pisonia umbellifera (Forst.) Seem. BAQONAKANA. (NB). Tree about 30 ft. high. (No. 358; Y. 29483.)

OLACACEAE

Ximenia americana L. KURIVAL (NB). Small, spreading thorny tree. (No. 274; Y. 27585.)

PALMACEAE

Areca catechu L. MOSI (S), MALI (P). The nuts are much used (with pepper berry and lime) as a stimulant. (No. 130; Y. 22841.)

Areca macrocalyx Zipp., var. **intermedia** Becc. MIRAKUPI (S), BOK (P). A tree about 25 ft. high and 4 in. in diam. Nuts sometimes used like that of *A. catechu*. Wood employed in making spears, etc. (No. 129; Y. 22840.)

Calamus Hollrungii Becc. POTONAI (S), OBAI (T), PATA (P), TIKULU (R), KARAKARA (M). A kind of rattan. (No. 20; Y. 21151.)

Caryota Rumphiana Mart. PAKO (T). Tree about 40 ft. tall and a foot in diam. Wood used for clubs, axe-handles, etc. (No. 50; Y. 21290.)

Heterospathe ramulosa Burret. MORARAI (S), UAPU (P). Tree about 4 in. in diam., supplying wood for spears and bows. (No. 131; Y. 22842.)

Licuala Lauterbachii Dam. & K. Schum., var. **bougainvillensis** Burret. OHOKUNA (S), A-UBAN (NB), LAKIRI (B). Leaves used in making a kind of ceremonial hat worn by men. (No. 198; Y. 22988.)

Ptychosperma multiramosum Burret. KIIMANG (S), KIJ (P). The nuts are sometimes chewed, and wood is used for bows, etc. (No. 132; Y. 22843.)

PANDANACEAE

Freycinetia aff. samoensis Warb. SISIRAI (S). Trailing shrub with striking white flowers. (No. 168; Y. 22958.)

Pandanus sp. KARIA (S), HALAGIRI (R). Plant about 25 ft. high, with fruit 21 in. long and 2 in. in diam. (No. 117; Y. 22828.)

Pandanus sp. SIRIDA (NB). The handsome red fruit is of about the size of a grapefruit. (No 393; Y. 29592.)

Pandanus sp. VAUM (NB). The wide leaves are used by the natives for umbrellas ("kukuvai"). (No. 397; Y. 29596.)

Pandanus tectorius Soland. MARITA (NB). The narrow leaves are used for stoppers ("kilimu") of the native water bottles ("pal a tava"). (No. 398; Y. 29597.)

PIPERACEAE

Piper sp. KUARAKA (NB). A large shrub. (No. 383; Y. 29582.)

Piper erectum C. DC. PUMPUPURI (S), MADOR (NB), HIAKURU (T), SIRORA (P). Grows to a height of 15 ft. Is used in native medicine, but apparently not as a beverage as in Polynesia. (No. 62; Y. 22666.)

PITTOSPORACEAE

Pittosporum ferrugineum Ait. BALAKURIGA (NB). Tree yielding a fine-textured timber suitable for boat knees, etc. (No. 285; Y. 27596.)

POACEAE

Bambusa vulgaris Schrad. KAUR NA KETE, KAUR NA PINAP, KAUR TUNA, KAUR VAT, KEDE NA KAUR, QOTO (NB). Two or more varieties of Bamboo, as distinguished by the natives, are represented in these collections. The stems are used in building houses, screens, basket-type fish traps, and for spear shaft. (Nos. 394, 395, 396, 400, 401, 402; Y. 29593, 29594, 29595, 29759, 29760, 29761.)

PROTEACEAE

Finschia sp. ISAKA (NB). A tree sometimes planted near villages for the sake of the black dye obtained from the pericarp of the fruit. (No. 349. Y. 29474.)

Finschia Waterhousiana B. L. Burret. TOGTUA (S), KANOKELE (B). Tall tree with handsome, golden flowers, edible fruit, and attractively figured timber. Apparently unknown in New Britain. (No. 187, type; Y. 22977.)

RHAMNACEAE

Alphitonia zizyphoides A. Gray. KIAKIALA (NB). Tree 20–25 ft. high, with masses of small black fruit and leaves that are white beneath. (No. 251; Y. 27441.)

Colubrina asiatica (L.) Brongn. BUBUBU (NB). Trailing littoral shrub, employed in making hoops for basket-type fish traps ("vup"). The leaves are used with lime to make a light-colored hair dye. (No. 272; Y. 27583.)

RHIZOPHORACEAE

Bruguiera conjugata (L.) Merr. TOGOR (NB). A kind of Mangrove, with very tough wood formerly used for making native crowbars, digging sticks, and other implements. (Nos. 279, 308; Y. 27590, 27590 A.)

Rhizophora mucronata Lam. TOGORLULU (NB). The name signifies a kind of Mangrove growing along the ground. (No. 312; Y. 28607.)

ROSACEAE-CHRYSOBALANOIDEAE

Parinarium corymbosum (Bl.) Miq. (*P. Griffithianum* Benth.) MORIGAG (S), GIZA (Duke Island). Large tree, with fairly heavy, close-textured timber. (No. 142; Y. 22853.)

Parinarium glaberrimum Hassk. (*P. laurinum* A. Gray). OSO (S), TITA (NB), ASTA, TAVAI (T), TAVAI, TITA (T), TIJ (P), TITA (R). Small or medium-sized tree. The flesh of the ripe fruit has a cheesy consistency and, after removal of the thick rind, makes an effective paste or hard-setting cement used for caulking canoes, making shell inlay work, etc. Siwai natives rub the seeds along their bow-strings to toughen them. (Nos. 3, 240, 410; Y. 21134, 27193, 32059.)

RUBIACEAE

Anthocephalus sp. MULUTKA (NB). A large tree. (No. 385; Y. 29584.)

Canthium cymigerum (Valet.) B. L. Burtt. HANA (S), QURAPI (MA). Tree 50–60 ft. tall, with buttressed base. Timber dense and fine-textured. The grated bark is used in "kupi," a marriage custom. (No. 163; Y. 22953.)

Dolicholobium acuminatum Burkill. AIRA (S). The name signifies crooked growth. Small tree along river banks. The blossoms are conspicuous. (No. 121; Y. 22832.)

Gardenia Hansemannii K. Schum. RUQA (NB), TOPIRO (T). Tree about

25 ft. high, with rather dense wood. The strongly scented flowers are used to scent coconut oil; the fruit, when treated with lime, yields a yellow dye; the seeds, when ripe, are the source of yellow powder. (Nos. 210, 282; Y. 27024, 27593.)

Guettarda speciosa L. KAVITI QAMATA, PULPULUTAUKA (NB); BARI (T). Tree 35–40 ft. high and 8 in. in diam.; sometimes larger. The wood is used in making tom-toms. (Nos. 49, 300, 420; Y. 21289, 28596, 32147.)

Ixora sp. VAGAVAGADOI (NB). A small tree. The leaf is chewed as a stimulant and is said to deaden the pain of wounds. (No. 286; Y. 27597.)

Ixora sp. PISIRI (NB). Tree of 20 ft., yielding tough wood. (No. 388; Y. 29587.)

Morinda citrifolia L. WALA (NB), GURATA (R), NINGTO, NINTO (S), RIRO (T). Shrub or small tree with yellowish wood. A good red dye is obtained by boiling the roots. (Nos. 48, 137, 214; Y. 21288, 22848, 27028.)

Mussaenda sp. PAPAPABEKE (NB). Littoral shrub with juicy fruit. The white leaves are used as towels or handkerchiefs and also medicinally. (Nos. 271, 365; Y. 27582, 29490.)

Neonauclea sp. KAPIAKA NA PUI (NB). The name means "breadfruit of the jungle." Small forest tree. (No. 252; Y. 27442.)

Neonauclea Hagenii (Sch. & Laut.) Merr. BARABARE (NB). A small bush tree. (No. 403; Y. 29762.)

Psychotria sp. KUUKAI (S). A vine. (No. 64; Y. 22668.)

Psychotria spp. DARAKI, KIKINAWAT, KIKI ORONUN, OQORI (NB). Large shrubs or small trees, probably of more than one species. (Nos. 363, 386, 421; Y. 29488, 29585, 32148.)

Sarcocephalus cordatus Miq. KOGA (S), TAIBANA (T), HAREREANA (P). Tree with large leaves and conspicuous whitish flowers. Wood cross-grained and tough. (No. 24; Y. 21155.)

Sarcocephalus undulatus (Roxb.) Miq. KOROKU (S), A-OPA (NB), QUQUA (B), Duduruma (V). Large tree with buttressed base. Yields a yellowish, tough timber. (No. 197; Y. 22987.)

Timonius spp. SISIKATE (S), MIA (NB). Trees 40–50 ft. tall, yielding durable timber for posts and house building. (Nos. 98, 216; Y. 22702, 27030.)

Uncaria aff. **ferrea** Bl. RUNGKI (S), TALILMULE (NB), KAKARU (T). A trailing shrub. (No. 140; Y. 22851.)

RUTACEAE

Chalcas crenulata (Turcz.) Tanaka. REMAKO (S), QARAVO (B), SIBO (T), KUABALON (NB). Low-spreading littoral tree. (No. 204; Y. 22994.)

Evodia sp. BAQAQA (NB). Tree about 40 ft. tall, with masses of golden blossoms. (No. 352; Y. 29477.)

Evodia spp. KURIH (S), VUVUAROM (T), LOMO, PATIPAT (NB). Small trees, sometimes planted for ornaments. (Nos. 18, 260, 289; Y. 21149, 27450, 27600.)

Evodia Elleryana F. Muell., var. **tetragona** W. D. Francis. MUNIG, KUNSI (S), WATA (T), HUAT (P), BOSI (R), MALIHASI (M). Handsome, white-barked tree, 60–70 ft. tall, with masses of rose-pink flowers. (No. 31; Y. 21162.)

Fagara megistophylla B. L. Burtt. KIHA (S), JUVI (T). Tree about 30 ft. high, bearing clusters of black seeds. (Nos. 5, 167; Y. 21136, 22957.)

Melicope grandifolia B. L. Burtt. HONGOPONIPO (S). The name signifies "white-haired old man." A small tree. (No. 122, type; Y. 22833.)

Micromelum pubescens Bl. PISUAI (NB). A small tree. (No. 359; Y. 29484.)

SAPINDACEAE

Allophylus ternatus (Forst.) Radlk. RU (on Island of Urakukur, Duke of York group). Short, spreading, littoral tree. (No. 416; Y. 32143.)

Allophylus timorensis Bl. VANAGUKAKU, VOATA (T). Tree 15–20 ft. high and 6 in. in diam., with masses of small flowers. The plant is used in native medicine. (Nos. 43, 343; Y. 21283, 29468.)

Dodonaea viscosa (L.) Jacq. NUK (NB). Small tree yielding very tough wood formerly used for digging sticks. (No. 327; Y. 28624).

Harpullia arborea (Blco.) Radlk. IKUKA (NB), ONUKAI (T). Tree about 25 ft. high. The leaves are used medicinally. (Nos. 335, 356; Y. 29460, 29481.)

Lepidopetalum hebecladum Radlk. PIRAGA (S), TOKAKAT (NB), SIKAKORE (V). Small tree, with fine-textured wood. (No. 171; Y. 22961.)

Pometia pinnata Forst. f. IGI (S), KUBULA (NB), TAWANA (T), TAN (P), QEMA (R), NISI (M). Tree 70–80 ft. tall, with very handsome foliage owing to the reddish tints. The timber is used locally for axe handles and some is exported to Europe. (Nos. 22, 377; Y. 21153, 29576.)

SAPOTACEAE

Burckella Erskineana Pierre. DOSIRI (T). Handsome tree about 60 ft. tall and 40 in. in diam. at the base. The white flowers have a strong, rather sickening scent, but the fine, large fruit has an aroma of rose petals. The wood is used for making canoe paddles. (No. 45; Y. 21285.)

Payena sp. BUKUBUK, BUKUBUKU (NB), DOSIRI (T), HOVAKA (R). A fine tree with highly esteemed fruit and useful timber. (Nos. 255, 294; Y. 27445, 28590.)

Sideroxylon aff. **novoguineense** K. Schum. RAIRAI (S), SIBORUHU (T), VARASA (V), CHIVOL (P). Littoral tree. (No. 206; Y. 22996.)

SAURAUIACEAE

Saurauia purgans B. L. Burtt. KARAKARA (S), TOKITOKI (T). Small tree, usually in lowlands and along river banks. The natives say that the flowers make a peculiar crying sound when opening. The bark is used as a purgative and in Siwai is administered to hunting dogs to invigorate them. (No. 33, type; Y. 21164.)

Saurauia Rudolfi Diels. DIDIGA (NB). Tree of about 15 ft. (No. 387; Y. 29586.)

SIMARUBACEAE

Soulamea amara Lam. VATAHAN (T). Littoral shrub or small tree. (No. 338; Y. 29463.)

SOLANACEAE

Brachistus vitiensis Seem. KOSIOU (S), KIALI (P). A small tree. (No. 66; Y. 22670.)

Solanum sp. PODOPODO NA TABARAN (NB). Plant with large pith. (No. 298; Y. 28594.)

Solanum verbascifolium L. AUMINAT, LALAVA, UMINAT (NB), MORIROGTOHI, PURUEKO (S), KULUMUDU (R). Small tree, common in second-growth. The leaves are used medicinally. (Nos. 76, 304, 428; Y. 22680, 28600, 32831.)

SONNERATIACEAE

Sonneratia caseolaris (L.) Engl. BABAO (T). Littoral tree, frequent in Mangrove formation. (No. 332; Y. 29457.)

STERCULIACEAE

Abroma augusta L. f. PALAUKAUKA, PALAUSUASU (NB). Shrub or small tree with soft wood. Fiber obtained from the bark is used in making the taboo "dukduk" headdress. The leaves are used to flavor certain dishes. (Nos. 267, 362; Y. 27578, 29487.

Commersonia Bartramiana (L.) Merr. QALQALIR KANA PALAI, TARALIA (NB), RUKU (S), MARABIRO (T). Large tree with light-weight wood. The bark has a powdery surface and, according to the natives the iguana ("palai") like to slide along it. (Nos. 125, 303; Y. 22836, 28599.)

Heritiera littoralis Dry. KAKONO (NB). (No. 314; Y. 28609.)

Kleinhofia hospita L. PARAKE (S), VANAI (T), VAU (NB), LAHAI (M), PAGO (R). Medium-sized, spreading tree. The timber is said to become very strong when it turns brown. (Nos. 4, 246; Y. 21135, 27199.)

Melochia odorata Forst. KUMANGA (S), TARALIA (NB). Small tree of second-growth. (No. 65; Y. 22669.)

Melochia umbellata (Houtt) Stapf. KOPIO (T). Small second-growth tree. (No. 336; Y. 29461.)

Sterculia sp. MAPUA (NB). Tree 40–50 ft. high. The wood is used for making elaborately carved dancing sticks. (No. 215; Y. 27029.)

Sterculia Conventzii K. Schum. MAPUA (NB). Large, spreading tree, excellent for shade. The flowers are white and the seeds are bright red. (No. 424; Y. 32827.)

Sterculia aff. **multinervia** Rech. TARA (S), PILOMA (B), TIPOI (NB). A useful tree, often planted for live fences. The bark yields a good fiber. (No. 194; Y. 22984.)

THYMELAEACEAE

Phaleria papuana Warb. VALOVALOKORILAMA (NB). Name is derived from the use of the fiber in expressing oil from flaked coconut. The tree is about 30 ft. high. (No. 361; Y. 29486.)

TILIACEAE

Microcos sp. OKARIA (NB). Tree sometimes 60 ft. tall. (No. 381; Y. 29580.)

Trichospermum sp. Ho (S), KOKOROMANA (R), PANASU (T), PUNAT (P). Tree 70–80 ft. tall, used on Petats for making canoes. The light wood burns fiercely when dry and is much used in cremation pyres. (No. 91; Y. 22695.)

Trichospermum calyculatum (Seem.) Burret. DOMOHURI (S), KOKOROMA (R). A medium-sized tree. The leaves bear a light powdery substance that is easily brushed off. (No. 123; Y. 22834.)

ULMACEAE

Celtis aff. **philippensis** Blanco. BALANARAM (NB). Tree about 40 ft. high, with a tough wood formerly used for club handles. (No. 351; Y. 29476.)

Gironniera celtidifolia Gaud. KIAU'A (S), HAKAKA (T). Jungle tree 50–60 ft. high. (No. 149; Y. 22860.)

Trema sp. IP (NB). Tree with a rather uncommon spreading growth of branches. The small seeds are very attractive to birds. (No. 288; Y. 27599.)

Trema orientalis (L.) Bl. A-IVU (NB). Small tree, with minute whitish flowers. The wood is used in native house building. (No. 429; Y. 32832.)

Trema orientalis Bl., var. **amboinensis** Laut. TIPIRA (S), DODORU (R), No (T), A-ip (NB). Small tree of the second-growth. (No. 55; Y. 22659.)

URTICACEAE

Boehmeria platyphylla Don, var. **moluccana** Wedd. OMORONIHIRUHIRU (S), A-IQIQIRI (NB), KALOIJ (P), VASAKUTO (V), PUTUMAKA (B), TOKURA (T). Siwai name meaning "tail of the omoro" refers to supposed resemblance of the whitish underside of the leaf to the tail of a fish, "omoro." Small tree; timber not strong enough to be of value. (No. 181; Y. 22971.)

Laportea sp. KALEG (NB). A nettle-tree. (No. 322; Y. 28620.)

Laportea Rechingeri H. Winkler. NANU (S), KALAKALAG (NB), HANATON (T), ZILATONGA (R), TINIPORO (M), BAIA (P). Small nettle-tree. (No. 155; Y. 22866.)

Leucosyke candidissima (Bl.) Wedd. ISOISO (S), PAVA (R). Small tree, with fig-like fruit. (No. 107; Y. 22711.)

Leucosyke capitellata Wedd. LEQA (NB). A tree with leaves silvery on the under side. (No. 262; Y. 27452.)

Pipturus argenteus (Forst.) Wedd. QAQAI, QAQAIKUBAR (NB). Medium-sized to large tree with small whitish flowers. The saplings are often selected for use in a native "slippery pole" sort of sport. (Nos. 233, 364, 430; Y. 27161, 29489, 32833.)

Pipturus incanus Wedd. TAMA (S), NEKETE (R), JIJIRIG (P), LAMEANA (T). A small tree. Extract from the leaves and bark used in veterinary medicine. (No. 59; Y. 22663.)

VERBENACEAE

Callicarpa aff. **caudata** Max. DIAPU (NB). Shrub or small tree. The leaves are used in native medicine. (No. 373; Y. 29498.)

Callicarpa erioclona Schauer. IKABAG (NB). A shrub. The young shoots are cooked with coconut. (No. 290; Y. 27601.)

Callicarpa pentandra Roxb. MOIKURO, NASIKAKU (S). Tree of about 25 ft. (No. 114; Y. 22825.)

Clerodendron Buchanani (Roxb.) Walp. BIRONAUMA (NB). A shrub. (No. 241; Y. 27194.)

Premna foetida Reinw. KUAI (NB). Tree about 25 ft. high, with masses of small blossoms. The wood is used for "tautau" (making fire by friction.) (No. 217; Y. 27031.)

Premna integrifolia L. KARUANA, REMAKO (S), VARO (R), REMAKO (M), QAROVO (B), TALITUE (V), SIBO (T), KAIKOA, KUA, KUABALON (NB). Medium-sized tree, yielding strong timber. (Nos. 144, 164, 295; Y. 22855, 22954, 28591.)

Premna obtusifolia R. Br. SIBO (T). Small tree about 15 ft. high, whose heartwood supplies useful, tough timber. (No. 54; Y. 21294.)

Vitex sp. KONA (S). Name means "bone." Tree of mountain area, producing a very tough wood. (No. 16; Y. 21147.)

Vitex cofassus Reinw. VASARI (NB). A large forest tree. (No. 357; Y. 29482.)

Vitex monophylla K. Schum. MOIKUI (S), TORA (T), TOLAS (P), VASARA (R), HASALA (M). Tree 80–90 ft. tall, with buttressed base. It supplies a useful timber. (No. 29; Y. 21160.)

Vitex trifolia L. TARIRAPITO (S), LOKULOKU (R), KOAKOALA (NB), PIPIKUL (P), PEADARI (T). Shrub or small tree with sprays of lilac-colored flowers. (No. 60; Y. 22664.)

VITACEAE

Leea sp. QOTIQOT (NB). A little tree with very small flowers. The leaves are used in making a kind of fish trap ("ugut"). (No. 321; Y. 28619.)

Leea Brunoniana C. B. Clarke. PIROKO (NB), KURARAMA (N). A small tree. The leaves are used in native medicine to relieve irritation of the skin. (No. 208; Y. 27022.)

Leea aff. **negrosensis** Elm. KOSIKASI (S), PIKORO (NB), HODUKALEQI (R). Small tree with small, round, berry-like fruit. (No. 145; Y. 22856.)

Leea tetramera B. L. Burtt. KUUKU (S), TAVURUVU (NB), BAU (T). Tree yielding a reddish timber. (No. 139; Y. 22850.)

Tetrastigma Lauterbachianum Gilg. PIHPIRO, SIMIKO (S). A tough jungle vine. (No. 93; Y. 22697.)

WINTERACEAE

Bubbia haplopus B. L. Burtt. PARU, ORORO JENARI (S). Medium-sized tree. The fresh wood has a pleasant odor. (No. 90, type; Y. 22694.)

CHECK LIST OF NATIVE NAMES

A-egun	*Acalypha*	Euphorbiaceae
Ai	*Ficus indigofera*	Moraceae
A-iba	*Anodendron oblongifolia*	Apocynaceae
Aija	*Entada phaseoloides*	Leguminosae
Aikadai	*Glochidion*	Euphorbiaceae
A-ikaikalag	*Mallotus floribundus*	Euphorbiaceae
A-iluqa	*Canangium odoratum*	Anonaceae
A-ip	*Trema orientalis amboinensis*	Ulmaceae
A-iqil	*Horsfieldia tuberculata*	Myristicaceae
A-iqaqalip	*Santiria*	Burseraceae
A-iqiqiri	*Boehmeria platyphylla moluccana*	Urticaceae

Aira	*Dolicholobium acuminatum*	Rubiaceae
A-itig	*Alstonia scholaris*	Apocynacae
A-ivu	*Trema orientalis*	Ulmaceae
Anahuna	*Scaevola frutescens*	Goodeniaceae
A-opa	*Sarcocephalus undulatus*	Rubiaceae
Aqivana	*Leucaena Forsteri*	Leguminosae
Arabata	*Rhus taitensis*	Anacardiaceae
Arimu	*Ascarina*	Chloranthaceae
Asaso	*Schizostachyum*	Gramineae
Asta	*Parinarium glaberrimum*	Rosaceae
A-uban	*Licuala Lauterbachii bougainvillensis*	Palmaceae
Auminat	*Solanum verbascifolium*	Solanaceae
Aviavi	*Avicennia marina*	Avicenniaceae
Babao	*Sonneratia caseolaris*	Sonneratiaceae
Baga	*Canarium Mehenbethene*	Burseraceae
Bai	*Mangifera minor*	Anacardiaceae
Baia	*Laportea Rechingeri*	Urticaceae
Bak	*Mangifera minor*	Anacardiaceae
Balakuriga	*Pittosporum ferrugineum*	Pittosporaceae
Balanaram	*Celtis* aff. *philippensis*	Ulmaceae
Balbal	*Erythrina variegata orientalis*	Leguminosae
Banabana	*Macaranga riparia*	Euphorbiaceae
Banabana, Banapana	*Macaranga*	Euphorbiaceae
Banio	*Artocarpus altilis*	Moraceae
Bao	*Fagraea racemosa*	Loganiaceae
Bao	*Ficus bougainvillei*	Moraceae
Baqaqa	*Evodia*	Rutaceae
Baqonakanai	*Pisonia umbellifera*	Nyctaginaceae
Barabara	*Macaranga*	Euphorbiaceae
Barabararapitok	*Macaranga*	Euphorbiaceae
Barabare	*Neonauclea Hagenii*	Rubiaceae
Bari	*Guettarda speciosa*	Rubiaceae
Baribar	*Melanolepis multiglandulosa*	Euphorbiaceae
Bau	*Leea tetramera*	Vitaceae
Bavau	*Ficus*	Moraceae
Bebe	*Tournefortia argentea*	Boraginaceae
Bina	*Canangium odoratum*	Anonaceae
Bironauma	*Clerodendron Buchanani*	Verbenaceae
Bok	*Areca macrocalyx intermedia*	Palmaceae
Bosi	*Evodia Elleryana tetragona*	Rutaceae
Bububu	*Colubrina asiatica*	Rhamnaceae
Bukubuk, Bukubuku	*Payena*	Sapotaceae
Bulbulit	*Pisonia*	Nyctaginaceae
Buni	*Calophyllum inophyllum*	Guttiferae
Bunibuni	*Calophyllum*	Guttiferae
Buri	*Entada phaseoloides*	Leguminosae
Burigai	*Pterocarpus indicus*	Leguminosae

Buruburua	*Bridelia minutiflora*	Euphorbiaceae
Chivol	*Dolichandrone spathacea*	Bignoniaceae
Chivol	*Sideroxylon* aff. *novoguineense*	Sapotaceae
Dadogo	*Scaevola frutescens*	Goodeniaceae
Dadogo i kabag	*Tournefortia argentea*	Boraginaceae
Daraki	*Psychotria*	Rubiaceae
Daudaula	*Desmodium tortuosum*	Leguminosae
Dawa	*Syzygium malaccense*	Myrtaceae
Diapu	*Callicarpa* aff. *caudata*	Verbenaceae
Didiga	*Saurauia Rudolfi*	Saurauiaceae
Dilo	*Calophyllum inophyllum*	Guttiferae
Dividivula	*Adenanthera pavonina*	Leguminosae
Dodoru	*Trema orientalis amboinensis*	Ulmaceae
Domohuri	*Trichospermum calyculatum*	Tiliaceae
Domu	*Antidesma montanum*	Euphorbiaceae
Donai	*Spiraeopsis celebica*	Cunoniaceae
Dosiri	*Burckella Erskineana*	Sapotaceae
Dosiri	*Payena*	Sapotaceae
Duduruma	*Sarcocephalus undulatus*	Rubiaceae
Dui	*Macaranga*	Euphorbiaceae
Elelai	*Salacia* aff. *prinoides*	Hippocrateaceae
Enu	*Cinnamomum solomonense*	Lauraceae
Erevat	*Ficus leucantatoma*	Moraceae
Evel	*Phyllanthus*	Euphorbiaceae
Gagaus	*Semecarpus Anacardium*	Anacardiaceae
Galapuar	*Canarium Mehenbethene*	Burseraceae
Garikoko	*Canarium Mehenbethene*	Burseraceae
Giza	*Parinarium corymbosum*	Rosaceae
Goliti	*Octomeles sumatrana*	Datiscaceae
Guava	*Psidium guajava*	Myrtaceae
Gurata	*Morinda citrifolia*	Rubiaceae
Haisi	*Mangifera minor*	Anacardiaceae
Hakaka	*Gironniera celtidifolia*	Ulmaceae
Halagiri	*Pandanus*	Pandanaceae
Hana	*Canthium cymigerum*	Rubiaceae
Hanaton	*Laportea Rechingeri*	Urticaceae
Hapo	*Cynometra ramiflora*	Leguminosae
Haqoheqo	*Dracaena angustifolia*	Liliaceae
Harereana	*Sarcocephalus cordatus*	Rubiaceae
Hasala	*Vitex monophylla*	Verbenaceae
Have	*Anodendron oblongifolium*	Apocynaceae
Havona	*Ficus* aff. *Bernaysii*	Moraceae
Hebere	*Wormia ingens*	Dilleniaceae
Hebere gabihi	*Ficus salomonensis*	Moraceae
Hiakuru	*Piper erectum*	Piperaceae
Hikavarae	*Ficus* aff. *eulampra*	Moraceae
Hikavarai	*Ficus*	Moraceae

Hikumutu	*Macaranga tanarius*	Euphorbiaceae
Hilivuvutu	*Glochidion ramiflorum*	Euphorbiaceae
Hingjomu	*Ficus indigofera*	Moraceae
Hinuha	*Antidesma montanum*	Euphorbiaceae
Hipahipala	*Syzygium* aff. *malaccense*	Myrtaceae
Hipala	*Syzygium malaccense*	Myrtaceae
Hipala malivi	*Antidesma bunius*	Euphorbiaceae
Hirunopomewana	*Casearia* aff. *cluytiifolia*	Flacourtiaceae
Hituru	*Ficus*	Moraceae
Hivu	*Acalypha*	Euphorbiaceae
Ho	*Trichospermum*	Tiliaceae
Hodo	*Pterocarpus indicus*	Leguminosae
Hodukaleqi	*Leea* aff. *negrosensis*	Vitaceae
Hongoponipo	*Melicope grandifolia*	Rutaceae
Hovaka	*Payena*	Sapotaceae
Huat	*Evodia Elleryana tetragona*	Rutaceae
Huhu	*Ficus leucantatoma*	Moraceae
Huriniko	*Dracaena angustifolia*	Liliaceae
Huvau	*Calophyllum*	Guttiferae
Ibaibalu	*Litsea*	Lauraceae
Ibibu	*Cleidion spiciflorum*	Euphorbiaceae
Igi	*Pometia pinnata*	Sapindaceae
Ikabag	*Callicarpa erioclona*	Verbenaceae
Ikapul	*Mallotus tiliaefolia*	Euphorbiaceae
Ikikopo	*Claoxylon cuneatum*	Euphorbiaceae
Ikuka	*Harpullia arborea*	Sapindaceae
Ikurakurai	*Semecarpus laxiflora glabrescens*	Anacardiaceae
Iminil	*Decaspermum fruticosum*	Myrtaceae
Inimo	*Octomeles sumatrana*	Datiscaceae
Inuku	*Perrottetia grandiflora*	Celastraceae
Ip	*Trema*	Ulmaceae
Iqaramut	*Melia azedarach*	Meliaceae
Iri	*Ficus* aff. *Bernaysii*	Moraceae
Irima, Irimo	*Octomeles sumatrana*	Datiscaceae
Iroto	*Calophyllum inophyllum*	Guttiferae
Isaka	*Finschia*	Proteaceae
Isoiso	*Leucosyke candidissima*	Urticaceae
Itig	*Alstonia scholaris*	Apocynaceae
Ituwa	*Alstonia subsessilis*	Apocynaceae
Ivel kubar	*Securinega*	Euphorbiaceae
Ivin	*Intsia bijuga*	Leguminosae
Ivoi	*Ficus*	Moraceae
Jijirig	*Pipturus incanus*	Urticaceae
Jilo	*Alstonia spectabilis*	Apocynaceae
Juvi	*Fagara megistophylla*	Rutaceae
Kagkag	*Horsfieldia tuberculata*	Myristicaceae
Kaikai	*Ficus*	Moraceae

Kaikoa	*Premna integrifolia*	Verbenaceae
Kaikoai	*Acalypha longispica*	Euphorbiaceae
Kaju	*Litsea*	Lauraceae
Kakadeposa	*Litsea* aff. *tomentosa*	Lauraceae
Kakako	*Ficus* aff. *granatum*	Moraceae
Kakaru	*Uncaria* aff. *ferrea*	Rubiaceae
Kakataikihe	*Litsea* aff. *tomentosa*	Lauraceae
Kakono	*Heritiera littoralis*	Sterculiaceae
Kakuakua	*Ficus salomonensis*	Moraceae
Kalaimur	*Cleidion spiciflorum*	Euphorbiaceae
Kalakalag	*Laportea Rechingeri*	Urticaceae
Kalata	*Spondias pinnata*	Anacardiaceae
Kalawa	*Ormocarpum cochinchinense*	Leguminosae
Kaleg	*Laportea*	Urticaceae
Kalikoli	*Pangium edule*	Flacourtiaceae
Kaloij	*Boehmeria platyphylla moluccana*	Urticaceae
Kalukalulu	*Canarium commune*	Burseraceae
Kanau	*Cordia subcordata*	Boraginaceae
Kanokele	*Finschia Waterhousiana*	Proteaceae
Kaot	*Terminalia catappa*	Combretaceae
Kapi	*Anodendron oblongifolia*	Apocynaceae
Kapiaka	*Artocarpus altilis*	Moraceae
Kapiaka na pui	*Neonauclea*	Rubiaceae
Kaqua	*Ficus*	Moraceae
Karakara	*Calamus Hollrungii*	Palmaceae
Karakara	*Saurauia purgans*	Saurauiaceae
Karakave	*Anodendron oblongifolium*	Apocynaceae
Karia	*Pandanus*	Pandanaceae
Kariapa	*Syzygium malaccense*	Myrtaceae
Karowo	*Ficus*	Moraceae
Karuana	*Premna integrifolia*	Verbenaceae
Katikoti	*Pseuderanthemum*	Acanthaceae
Katut	*Ficus*	Moraceae
Kauhana	*Wormia ingens*	Dilleniaceae
Kaunomori	*Fagraea Berteriana*	Loganiaceae
Kaur na kete	*Bambusa vulgaris*	Poaceae
Kaur na pinap	*Bambusa vulgaris*	Poaceae
Kaur tuna	*Bambusa vulgaris*	Poaceae
Kaur vat	*Bambusa vulgaris*	Poaceae
Kautoro	*Ficus*	Moraceae
Kaviti	*Litsea domarensis*	Lauraceae
Kaviti qamata	*Guettarda speciosa*	Rubiaceae
Kede na kaur	*Bambusa vulgaris*	Poaceae
Kekera	*Ficus* aff. *granatum*	Moraceae
Keleveg	*Elaeocarpus Müllerianus*	Elaeocarpaceae
Kiakiala	*Alphitonia zizyphoides*	Rhamnaceae
Kiali	*Brachistus vitiensis*	Solanaceae

Kiau'a	*Gironniera celtidifolia*	Ulmaceae
Kiha	*Fagara megistophylla*	Rutaceae
Kiimang	*Ptychospermum multiramosum*	Palmaceae
Kij	*Ptychospermum multiramosum*	Palmaceae
Kiki na vuavuat	*Mallotus ricinoides*	Euphorbiaceae
Kikinawat	*Psychotria*	Rubiaceae
Kiki oronun	*Psychotria*	Rubiaceae
Kilag	*Dysoxylum rubrum*	Meliaceae
Kingiri	*Alstonia scholaris*	Apocynaceae
Kirakira	*Dysoxylum*	Meliaceae
Kirakira	*Dysoxylum* aff. *caulostachyum*	Meliaceae
Kirikiris	*Glochidion philippicum*	Euphorbiaceae
Kiriwiro	*Elaeocarpus* aff. *Müllerianus*	Elaeocarpaceae
Kiro	*Acalypha*	Euphorbiaceae
Kiruka	*Ficus*	Moraceae
Kisupo	*Gnetum gnemon*	Gnetaceae
Kivito	*Litsea* aff. *ochracea*	Lauraceae
Koai	*Mangifera minor*	Anacardiaceae
Koakoala	*Vitex trifolia*	Verbenaceae
Koga	*Sarcocephalus cordatus*	Rubiaceae
Kohelau	*Schizostachyum*	Gramineae
Kohoso	*Cryptocarya*	Lauraceae
Kokoava	*Dysoxylum amooroides*	Meliaceae
Kokor	*Mangifera minor*	Anacardiaceae
Kokoromana	*Trichospermum*	Tiliaceae
Kokoromana	*Trichospermum calyculatum*	Tiliaceae
Kona	*Vitex*	Verbenaceae
Konsi	*Mangifera minor*	Anacardiaceae
Kooto	*Terminalia catappa*	Combretaceae
Kopio	*Melochia umbellata*	Sterculiaceae
Kora	*Eugenia*	Myrtaceae
Korikorisa	*Eugenia* aff. *aquea*	Myrtaceae
Koroku	*Sarcocephalus undulatus*	Rubiaceae
Koropoi	*Leucaena Forsteri*	Leguminosae
Koropuru	*Ficus*	Moraceae
Kosikasi	*Leea* aff. *negrosensis*	Vitaceae
Kosiou	*Brachistus vitiensis*	Solanaceae
Kotavan	*Mallotus floribundus*	Euphorbiaceae
Kovereu	*Schizostachyum*	Gramineae
Kua	*Premna integrifolia*	Verbenaceae
Kuabalon	*Chalcas crenulata*	Rutaceae
Kuabalon	*Premna integrifolia*	Verbenaceae
Kuai	*Premna foetida*	Verbenaceae
Kuaraka	*Piper*	Piperaceae
Kubika	*Canarium Mehenbethene*	Burseraceae
Kubula	*Pometia pinnata*	Sapindaceae
Kuhurima	*Canarium salomonese*	Burseraceae

Kuikururu	*Connarus*	Connaraceae
Kuinoti	*Sloanea* aff. *sigun*	Elaeocarpaceae
Kujkuj	*Ficus salomonensis*	Moraceae
Kukusu	*Ficus salmonensis*	Moraceae
Kukuvu	*Desmodium umbellatum*	Leguminosae
Kulumudu	*Solanum verbascifolium*	Solanaceae
Kumanga	*Melochia odorata*	Sterculiaceae
Kumararahowo	*Dracaena angustifolia*	Liliaceae
Kumukumulu	*Acanthus ebracteolatus*	Acanthaceae
Kunaimakumaku	*Polyosma integrifolia*	Escalloniaceae
Kung	*Ficus*	Moraceae
Kunsi	*Evodia Elleryana tetragona*	Rutaceae
Kupigag	*Glochidion ramiflorum*	Euphorbiaceae
Kurakai	*Crataeva religiosa*	Capparidaceae
Kurako	*Artocarpus altilis*	Moraceae
Kurarama	*Leea Brunoniana*	Vitaceae
Kurih	*Evodia*	Rutaceae
Kurival	*Ximenia americana*	Olacaceae
Kutopaku	*Schizostachyum*	Gramineae
Kuukai	*Psychotria*	Rubiaceae
Kuukig	*Adenanthera pavonina*	Leguminosae
Kuuku	*Leea tetramera*	Vitaceae
Kuumo	*Ficus indigofera*	Moraceae
Kuvi	*Ficus*	Moraceae
Laboto	*Smilax*	Liliaceae
Lahai	*Kleinhofia hospita*	Sterculiaceae
Lahau	*Gnetum gnemon*	Gnetaceae
Lahau	*Maesa*	Myrsinaceae
Lakiri	*Licuala Lauterbachii bougainvillensis*	Palmaceae
Lalava	*Solanum verbascifolium*	Solanaceae
Lameana	*Pipturus incanus*	Urticaceae
Laqir	*Cerbera manghas*	Apocynaceae
Lavusu	*Ficus*	Moraceae
Leqa	*Leucosyke capitellata*	Urticaceae
Leqe	*Gnetum gnemon*	Gnetaceae
Likutan	*Bischofia javanica*	Euphorbiaceae
Limlimburkanakoko	*Desmodium ormocarpoides*	Leguminosae
Loa	*Alstonia spectabilis*	Apocynaceae
Lokuloku	*Vitex trifolia*	Verbenaceae
Lomo	*Evodia*	Rutaceae
Louk	*Mallotus floribundus*	Euphorbiaceae
Lovo	*Ficus myriocarpa*	Moraceae
Luhu	*Ficus*	Moraceae
Luqa	*Cordyline fruticosa*	Liliaceae
Lusko	*Ficus*	Moraceae
Madara	*Thespesia populnea*	Malvaceae
Mador	*Piper erectum*	Piperaceae

Mahkatakinghoru	*Uvaria*	Anonaceae
Maimaig	*Rhus Engleriana*	Anacardiaceae
Mainava	*Intsia bijuga*	Leguminosae
Makapa	*Pterocarpus indicus*	Leguminosae
Makemake	*Ficus leucantatoma*	Moraceae
Malavig	*Graptophyllum hortense*	Acanthaceae
Mali	*Areca catechu*	Palmaceae
Malihasi	*Evodia Elleryana tetragona*	Rutaceae
Maluvian	*Albizzia moluccana*	Leguminosae
Mamada	*Mallotus*	Euphorbiaceae
Man	*Ficus indigofera*	Moraceae
Manakei	*Macaranga riparia*	Euphorbiaceae
Manguta	*Semecarpus Anacardium*	Anacardiaceae
Manuba	*Calophyllum*	Guttiferae
Mapua	*Sterculia*	Sterculiaceae
Mapua	*Sterculia Conventzii*	Sterculiaceae
Mara asta	*Cynometra ramiflora*	Leguminosae
Marabiro	*Commersonia Bartramiana*	Sterculiaceae
Marakaoto	*Terminalia*	Combretaceae
Marampi	*Elaeocarpus edulis*	Elaeocarpaceae
Marapere	*Glochidion ramiflorum*	Euphorbiaceae
Mara veresuna	*Tylecarpus*	Icacinaceae
Mareuwa	*Gnetum gnemon*	Gnetaceae
Marewa	*Gnetum gnemon*	Gnetaceae
Maribu	*Cryptocarya*	Lauraceae
Marimare	*Cordia subcordata*	Boraginaceae
Marita	*Pandanus tectorius*	Pandanaceae
Maritu	*Claoxylon*	Euphorbiaceae
Markiawa	*Calycacanthus*	Acanthaceae
Matapuku	*Dysoxylum amooroides*	Meliaceae
Matiaho	*Eugenia*	Myrtaceae
Matukurupuriri	*Bridelia minutiflora*	Euphorbiaceae
Matumatu	*Garcinia platyphylla*	Guttiferae
Mavuana	*Casearia* aff. *Ledermannii*	Flacourtiaceae
Mewana	*Casearia* aff. *Ledermannii*	Flacourtiaceae
Mia	*Timonius*	Rubiaceae
Mirakupi	*Areca macrocalyx intermedia*	Palmaceae
Miru	*Alstonia spectabilis*	Apocynaceae
Mogoru	*Schizomeria Pulleana*	Cunoniaceae
Moi	*Canarium Mehenbethene*	Burseraceae
Moikui	*Vitex monophylla*	Verbenaceae
Moikuro	*Callicarpa pentandra*	Verbenaceae
Momiro	*Endiandra* aff. *acuminata*	Lauraceae
Mono	*Ficus* aff. *granatum*	Moraceae
Mono	*Vavaea bougainvillensis*	Meliaceae
Morarai	*Heterospathe ramulosa*	Palmaceae
Morigag	*Parinarium corymbosum*	Rosaceae

Morirogtohi	*Solanum verbascifolium*	Solanaceae
Mosi	*Areca catechu*	Palmaceae
Mu	*Horsfieldia sylvestris*	Myristicaceae
Mu	*Myristica cerifera*	Myristicaceae
Muaeru	*Glochidion*	Euphorbiaceae
Mukakuma	*Ficus*	Moraceae
Mulutka	*Anthocephalus*	Rubiaceae
Munig	*Evodia Elleryana tetragona*	Rutaceae
Nakaukuuna	*Claoxylon cuneatum*	Euphorbiaceae
Nanam	*Syzygium malaccense*	Myrtaceae
Nanu	*Laportea Rechingeri*	Urticaceae
Napanirug	*Aporosa papuana*	Euphorbiaceae
Naqala	*Ficus subulata*	Moraceae
Nasikaku	*Callicarpa pentandra*	Verbenaceae
Nawanawa	*Cordia subcordata*	Boraginaceae
Nekete	*Pipturus incanus*	Urticaceae
Nigtanig	*Acalypha*	Euphorbiaceae
Ningto, Ninto	*Morinda citrifolia*	Rubiaceae
Nisi	*Pometia pinnata*	Sapidaceae
No	*Trema orientalis amboinensis*	Ulmaceae
Nong	*Octomeles sumatrana*	Datiscaceae
Novinovi	*Ficus* aff. *granatum*	Moraceae
Nuavusi	*Macaranga tanarius*	Euphorbiaceae
Nubiri	*Cryptocarya cordata*	Lauraceae
Nu'iu	*Endospermum moluccanum*	Euphorbiaceae
Nuk	*Dodonaea viscosa*	Sapindaceae
Nula	*Gnetum gnemon*	Gnetaceae
Nunanimini	*Geniostoma*	Loganiaceae
Nuuwa	*Maesa*	Myrisinaceae
Obai	*Calamus Hollrungii*	Palmaceae
Oebi	*Terminalia*	Combretaceae
Ohele	*Ficus indigofera*	Moraceae
Ohito	*Canarium Mehenbethene*	Burseraceae
Ohokuna	*Licuala Lauterbachii bougainvillensis*	Palmaceae
Oima	*Tabernaemontana anguinea*	Apocynaceae
Okaria	*Microcos*	Tiliaceae
Okete	*Canarium Mehenbethene*	Burseraceae
Olai	*Horsfieldia novae-lauenburgiae*	Myristicaceae
Omoronihiruhiru	*Boehmeria platyphylla moluccana*	Urticaceae
Onukai	*Harpullia arborea*	Sapindaceae
Opau	*Cerbera manghas*	Apocynaceae
Oqoaqa	*Wrightia tinctoria*	Apocynaceae
Oqori	*Psychotria*	Rubiaceae
Ororo jenari	*Bubbia haplopus*	Winteraceae
Ororomo	*Astronia*	Melastomaceae
Oso	*Parinarium glaberrimum*	Rosaceae
Pa	*Mangifera minor*	Anacardiaceae

Paba	*Homalanthus populneus*	Euphorbiaceae
Padaka	*Schizostachyum*	Graminae
Padoroja	*Syzygium malaccense*	Myrtaceae
Pago	*Kleinhofia hospita*	Sterculiaceae
Paira	*Elaeocarpus Müllerianus*	Elaeocarpaceae
Paira	*Eugenia*	Myrtaceae
Paka	*Ficus*	Moraceae
Pako	*Caryota Rumphiana*	Palmaceae
Palamoroa	*Cephalohibiscus Peekelii*	Malvaceae
Palaukauka	*Abroma augusta*	Sterculiaceae
Palausuasu	*Abroma augusta*	Sterculiaceae
Pamu	*Polyscias*	Araliaceae
Panasihu	*Rhus taitensis*	Anacardiaceae
Panasu	*Trichospermum*	Tiliaceae
Panorug	*Kingiodendron micranthum*	Leguminosae
Pao	*Barringtonia*	Lecythidaceae
Papail	*Pterocarpus indicus*	Leguminosae
Papamu	*Polyscias*	Araliaceae
Papao, Papau	*Barringtonia*	Lecythidaceae
Papapabeke	*Mussaenda*	Rubiaceae
Paqau	*Flagellaria indica*	Flagellariaceae
Parake	*Kleinhofia hospita*	Sterculiaceae
Parasi	*Anodendron oblongifolia*	Apocynaceae
Partalai	*Erythrospermum Wichmanni*	Flacourtiaceae
Paru	*Bubbia haplopus*	Winteraceae
Paru	*Dysoxylum*	Meliaceae
Pata	*Calamus Hollrungii*	Palmaceae
Patipat	*Evodia*	Rutaceae
Pava	*Leucosyke candidissima*	Urticaceae
Peadari	*Vitex trifolia*	Verbenaceae
Pedeposa	*Garcinia scaphopetala*	Guttiferae
Pes	*Pongamia pinnata*	Leguminosae
Pidi	*Elaeocarpus Müllerianus*	Elaeocarpaceae
Pidikai	*Flagellaria indica*	Flagellariaceae
Pidikula	*Ficus*	Moraceae
Pidikula	*Ficus leucantatoma*	Moraceae
Pihpiro	*Tetrastigma Lauterbachianum*	Vitaceae
Pii	*Canarium salomonense*	Burseraceae
Pikoro	*Leea* aff. *negrosensis*	Vitaceae
Pikunapa	*Discocalyx Listeri*	Myrsinaceae
Piloma	*Sterculia* aff. *multinervia*	Sterculiaceae
Pinuhunuhunu	*Garcinia solomonensis*	Guttiferae
Pipiga	*Disopyros*	Ebenaceae
Pipikul	*Vitex trifolia*	Verbenaceae
Pipil	*Breynia* aff. *acuminata*	Euphorbiaceae
Pipil	*Glochidion ramiflorum*	Euphorbiaceae
Piraga	*Lepidopetalum hebecladum*	Sapindaceae

Pirihiamu	*Mucuna gigantea*	Leguminosae
Piroko	*Leea Brunoniana*	Vitaceae
Piruho	*Macaranga*	Euphorbiaceae
Pisiri	*Ixora*	Rubiaceae
Pisu	*Chisocheton*	Meliaceae
Pisuai	*Micromelum pubescens*	Rutaceae
Poawutug	*Barringtonia*	Lecythidaceae
Podopodo na tabaran	*Solanum*	Solanaceae
Pohi	*Ficus* aff. *eulampra*	Moraceae
Poi	*Ficus*	Moraceae
Pokovitula	*Ficus*	Moraceae
Potol	*Endospermum moluccanum*	Euphorbiaceae
Potomino	*Mallotus floribundus*	Euphorbiaceae
Potonai	*Calamus Hbllrungii*	Palmaceae
Puijo	*Ficus*	Moraceae
Pulaka	*Boerlagiodendron*	Araliaceae
Pulawa	*Jatropha Curcas*	Euphorbiaceae
Puleqi	*Hernandia ovigera*	Hernandiaceae
Pulpulutauka	*Guettarda speciosa*	Rubiaceae
Pulukabag	*Litsea* aff. *tomentosa*	Lauraceae
Pulutabu	*Litsea domarensis*	Lauraceae
Pumpupuri	*Piper erectum*	Piperaceae
Punat	*Trichospermum*	Tiliaceae
Puogo	*Canarium*	Burseraceae
Pupung	*Polyscias*	Araliaceae
Purimakuri	*Eugenia*	Myrtaceae
Purueko	*Solanum verbascifolium*	Solanaceae
Pusi	*Anodendron oblongifolium*	Apocynaceae
Pusoko	*Scaevola frutescens*	Goodeniaceae
Putumaka	*Boehmeria platyphylla moluccana*	Urticaceae
Qalip	*Canarium commune*	Burseraceae
Qalqalir kana palai	*Commersonia Bartramiana*	Sterculiaceae
Qalukoko	*Calophyllum*	Guttiferae
Qamata	*Syzygium malaccense*	Myrtaceae
Qaqai, Qaqaikubar	*Pipturus argenteus*	Urticaceae
Qaravo	*Chalcas crenulata*	Rutaceae
Qarovo	*Premna integrifolia*	Verbenaceae
Qchala, Qeholo	*Leucaena Forsteri*	Leguminosae
Qema	*Pometia pinnata*	Sapindaceae
Qenit	*Ficus*	Moraceae
Qiau	*Fiscus indica*	Moraceae
Qiluh	*Acalypha*	Euphorbiaceae
Qomaqomor	*Graptophyllum hortense*	Acanthaceae
Qoqo	*Macaranga tanarius*	Euphorbiaceae
Qotiqot	*Leea*	Vitaceae
Qoto	*Bambusa vulgaris*	Poaceae
Qula	*Ficus*	Moraceae

Qurapi	*Canthium cymigerum*	Rubiaceae
Ququa	*Sarcocephalus undulatus*	Rubiaceae
Rairai	*Dolichandrone spathacea*	Bignoniaceae
Rairai	*Sideroxylon* aff. *novoguineense*	Sapotaceae
Rapa	*Ficus* aff. *granatum*	Moraceae
Rapapatu	*Ficus indigofera*	Moraceae
Rarara	*Flemingia strobilifera*	Leguminosae
Rauru	*Canangium odoratum*	Anonaceae
Remako	*Chalcas crenulata*	Rutaceae
Remako	*Premna integrifolia*	Verbenaceae
Renatao	*Hibiscus tiliaceus*	Malvaceae
Rereke	*Mangifera minor*	Anacardiaceae
Riqi	*Pterocarpus indicus*	Leguminosae
Riro	*Morinda citrifolia*	Rubiaceae
Roa	*Alstonia subsessilis*	Apocynaceae
Rokarokop	*Desmodium ormocarpoides*	Leguminosae
Romurai	*Canarium*	Burseraceae
Rori	*Smilax*	Liliaceae
Ru	*Allophylus ternatus*	Sapindaceae
Ruhogowo	*Chisocheton*	Meliaceae
Ruhonai	*Elaeocarpus*	Elaeocarpaceae
Ruhugowo	*Aphanamixis rohituka*	Meliaceae
Ruku	*Commersonia Bartramiana*	Sterculiaceae
Rumese	*Macaranga*	Euphorbiaceae
Rungki	*Uncaria* aff. *ferrea*	Rubiaceae
Ruqa	*Gardenia Hansemannii*	Rubiaceae
Sakita	*Semecarpus laxiflora glabrescens*	Anacardiaceae
Sapeqava	*Terminalia*	Combretaceae
Selesele	*Salicia*	Hippocrateaceae
Ser	*Ficus*	Moraceae
Sibo	*Chalcas crenulata*	Rutaceae
Sibo	*Premna integrifolia*	Verbenaceae
Sibo	*Premna obtusifolia*	Verbenaceae
Siboruhu	*Dolichandrone spathacea*	Bignoniaceae
Siboruhu	*Sideroxylon* aff. *novoguineense*	Sapotaceae
Sigu	*Garcinia scaphopetala*	Guttiferae
Sihaku	*Glochidion ramiflorum*	Euphorbiaceae
Siho	*Pisonia*	Nyctaginaceae
Siinari	*Pentaspadon minutiflora*	Anacardiaceae
Sikakore	*Lepidopetalum hebecladum*	Sapindaceae
Simiko	*Tetrastigma Lauterbachianum*	Vitaceae
Singarata	*Graptophyllum hortense*	Acanthaceae
Singirimu	*Syzygium* aff. *malaccense*	Myrtaceae
Sinivi	*Alstonia scholaris*	Apocynaceae
Sinuto	*Dysoxylum amooroides*	Meliaceae
Sirida	*Pandanus*	Pandanaceae
Sirora	*Piper erectum*	Piperaceae

Sisi	*Ficus*	Moraceae
Sisikate	*Timonius*	Rubiaceae
Sisirai	*Freycinetia* aff. *samoensis*	Pandanaceae
Siwono	*Cleidion spiciflorum*	Euphorbiaceae
Sului	*Macaranga involucrata*	Euphorbiaceae
Surasai	*Ficus*	Moraceae
Suso	*Ficus salomonensis*	Moraceae
Tabi	*Macaranga tanarius*	Euphorbiaceae
Tabu	*Pterocarpus indicus*	Leguminosae
Tabuna	*Tripetalum cymosum*	Guttiferae
Tabutabun	*Garcinia scaphopetalum*	Guttiferae
Tagalop	*Scaevola frutescens*	Goodeniaceae
Tagatata	*Ficus tinctoria*	Moraceae
Taguriva	*Eugenia nutans*	Myrtaceae
Taibana	*Sarcocephalus cordatus*	Rubiaceae
Takanabeo	*Aglaia*	Meliaceae
Takara	*Acalypha*	Euphorbiaceae
Takumpapar	*Ficus*	Moraceae
Talia	*Terminalia catappa*	Combretaceae
Taliaqau	*Terminalia*	Combretaceae
Talilmule	*Uncaria* aff. *ferrea*	Rubiaceae
Talinga na kori	*Aporosa papuana*	Euphorbiaceae
Talisaqau	*Terminalia*	Combretaceae
Talitue	*Ficus*	Moraceae
Talitue	*Premna integrifolia*	Verbenaceae
Tama	*Pipturus incanus*	Urticaceae
Tamote	*Mangifera minor*	Anacardiaceae
Tan	*Pometia pinnata*	Sapindaceae
Tangovo	*Alstonia scholaris*	Apocynaceae
Taqa	*Albizzia procera*	Leguminosae
Taqataqal	*Melia dubia*	Meliaceae
Taqete	*Cordyline fruticosa*	Liliaceae
Taqia	*Syzygium malaccense*	Myrtaceae
Tara	*Sterculia* aff. *multinervia*	Sterculiaceae
Taralia	*Commersonia Bartramiana*	Sterculiaceae
Taralia	*Melochia odorata*	Sterculiaceae
Tararu	*Cephalohibiscus Peekelii*	Malvaceae
Taraue	*Albizzia moluccana*	Leguminosae
Tariapo	*Canarium Mehenbethene*	Burseraceae
Tarirapito	*Vitex trifolia*	Verbenaceae
Tataelam	*Barringtonia racemosa*	Lecythidaceae
Tataqala	*Polyscias*	Araliaceae
Tatovo	*Codiaeum variegatum*	Euphorbiaceae
Tavai	*Parinarium glaberrimum*	Rosaceae
Tavakarara	*Eugenia* aff. *javanica*	Myrtaceae
Tavea	*Cordyline fruticosa*	Liliaceae
Tavituvitu	*Dolichandrone spathacea*	Bignoniaceae

Tavola	*Terminalia catappa*	Combretaceae
Tavuruvu	*Leea tetramera*	Vitaceae
Tawana	*Pometia pinnata*	Sapindaceae
Tij	*Parinarium glaberrimum*	Rosaceae
Tikulu	*Calamus Hollrungii*	Palmaceae
Tiniporo	*Laportea Rechingeri*	Urticaceae
Tipaka	*Cyrtandra filibracteata*	Gesneriaceae
Tipira	*Trema orientalis amboinensis*	Ulmaceae
Tipoi	*Sterculia* aff. *multinervia*	Sterculiaceae
Tiqili	*Ocimum gratissimum*	Menthaceae
Tirai	*Excoecaria agallocha*	Euphorbiaceae
Tita	*Parinarium glaberrimum*	Rosaceae
Tiwotiwo	*Mallotus tiliaefolia*	Euphorbiaceae
Toboai	*Aleurites moluccana*	Euphorbiaceae
Togor	*Bruguiera conjugata*	Rhizophoraceae
Togorikabag	*Avicennia marina*	Avicenniaceae
Togorlulu	*Rhizophora mucronata*	Rhizophoraceae
Togtua	*Finschia Waterhousiana*	Proteaceae
Tokakat	*Lepidopetalum hebecladum*	Sapindaceae
Tokotoki	*Saurauia purgans*	Saurauiaceae
Tokura	*Boehmeria platyphylla moluccana*	Urticaceae
Tolas	*Vitex monophylla*	Verbenaceae
Tonimu	*Albizzia moluccana*	Leguminosae
Tononi	*Astronia*	Melastomaceae
Topiro	*Gardenia Hansemannii*	Rubiaceae
Tora	*Vitex monophylla*	Verbenaceae
Totol	*Cordia subcordata*	Boraginaceae
Totuana	*Alstonia spectabilis*	Apocynaceae
Toumo	*Schefflera*	Araliaceae
Toworo	*Terminalia*	Combretaceae
Tugpamoi	*Chisocheton*	Meliaceae
Tugtugpurua	*Canarium Mehenbethene*	Burseraceae
Tugtuqini	*Sloanea* aff. *sigun*	Elaeocarpaceae
Tuh	*Mucuna gigantea*	Leguminosae
Tukaparar	*Ficus*	Moraceae
Tukatuka	*Dysoxylum amooroides*	Meliaceae
Tukihobu	*Macaranga tanarius*	Euphorbiaceae
Tukitukihobu	*Macaranga riparia*	Euphorbiaceae
Tukura	*Cryptocarya cordata*	Lauraceae
Tulian	*Eugenia*	Myrtaceae
Tultulura	*Maesa*	Myrsinaceae
Tup	*Octomeles sumatrana*	Datiscaceae
Tupainaraku	*Melastoma denticulatum*	Melastomaceae
Tupare	*Ficus*	Moraceae
Turturulavat	*Maesa*	Myrsinaceae
Tutovos	*Eugenia clusiifolia*	Myrtaceae
Tutupan	*Horsfieldia tuberculata*	Myristicaceae

Tuturi	*Ficus*	Moraceae
Tuturi	*Ficus leucantatoma*	Moraceae
Uagel, Uagele	*Canarium Mehenbethene*	Burseraceae
Uajil	*Alstonia scholaris*	Apocynaceae
U-akau	*Artocarpus altilis*	Moraceae
U-amua	*Syzygium malaccense*	Myrtaceae
Uapu	*Heterospathe ramulosa*	Palmaceae
U-avos	*Ficus*	Moraceae
Ukoiitiiti	*Mallotus tiliaefolia*	Euphorbiaceae
Uminat	*Solanum verbascifolium*	Solanaceae
Utosih	*Ficus*	Moraceae
Vabihubihu	*Ficus bougainvillei*	Moraceae
Vadovodovuru	*Horsfieldia tuberculata*	Myristicaceae
Vaeto	*Phyllanthus paniculatus*	Euphorbiaceae
Vagavagadoi	*Ixora*	Rubiaceae
Vagovogove	*Hernandia ovigera*	Hernandiaceae
Vakokopa	*Cerbera manghas*	Apocynaceae
Valovalokorilama	*Phaleria papuana*	Thymelaeaceae
Vamatesihu	*Sophora tomentosa*	Leguminosae
Vamate sumahuhu	*Sophora tomentosa*	Leguminosae
Vameme	*Connarus*	Connaraceae
Vanagukaku	*Allophylus timorensis*	Sapindaceae
Vanai	*Kleinhofia hospita*	Sterculiaceae
Vanavan	*Macaranga riparia*	Euphorbiaceae
Vaqaqa	*Crataeva religiosa*	Capparidaceae
Varamata	*Thespesia populnea*	Malvaceae
Varasa	*Dolichandrone spathacea*	Bignoniaceae
Varasa	*Sideroxylon* aff. *novoguineense*	Sapotaceae
Varo	*Premna integrifolia*	Verbenaceae
Vasakuto	*Boehmeria platyphylla moluccana*	Urticaceae
Vasara	*Vitex monophylla*	Verbenaceae
Vasari	*Vitex cofassus*	Verbenaceae
Vatahan	*Soulamea amara*	Simarubaceae
Vau	*Hibiscus tiliaceus*	Malvaceae
Vau	*Kleinhofia hospita*	Sterculiaceae
Vaum	*Pandanus*	Pandanaceae
Vavar	*Hibiscus tiliaceus*	Malvaceae
Vavavar	*Abutilon indicum*	Malvaceae
Veluqa	*Canangium odoratum*	Anonaceae
Veto	*Glochidion ramiflorum*	Euphorbiaceae
Vinau na kete	*Entada phaseoloides*	Leguminosae
Viritapepele	*Scaevola frutescens*	Goodeniaceae
Vitawa	*Pentaspadon minutiflora*	Anacardiaceae
Viviru	*Ficus leucantatoma*	Moraceae
Vo	*Canarium Mehenbethene*	Burseraceae
Voata	*Allophylus timorensis*	Sapindaceae
Volu	*Glochidion ramiflorum*	Euphorbiaceae

Vorago	*Myristica cerifera*	Myristicaceae
Vovoku	*Schefflera*	Araliaceae
Vun	*Derris*	Leguminosae
Vutug	*Barringtonia asiatica*	Lecythidaceae
Vuvuarom	*Evodia*	Rutaceae
Wadawada	*Xylocarpus moluccensis*	Meliaceae
Wahirihiri	*Ficus leucantatoma*	Moraceae
Wakaramus	*Dracaena angustifolia*	Liliaceae
Wala	*Morinda citrifolia*	Rubiaceae
Walaqur	*Polyscias* aff. *pinnata*	Araliaceae
Wamau	*Gnetum gnemon*	Gnetaceae
Wata	*Evodia Elleryana tetragona*	Rutaceae
Wawaia	*Ficus*	Moraceae
Zazala	*Codiaeum variegatum*	Euphorbiaceae
Zilatonga	*Laportea Rechingeri*	Urticaceae
Zizito	*Maesa*	Myrsinaceae

THE YALE WOOD COLLECTIONS

Accessions

At the end of the calendar year 1944 the total number of catalogued wood samples in the Yale wood collections amounted to 41,281, representing 11,983 named species of 2804 genera of 232 families. There were 564 accessions during the year, the largest single contribution (of 200 woods) being from Dr. Gerold Stahel, Director of the Agricultural Experiment Station, Paramaribo, Surinam. The sources of all the wood samples received are as follows:

Brazil: Mr. D. H. Allen, Washington, D. C.; Mr. J. T. Baldwin, Jr., Miami, Fla.; Dr. B. E. Dahlgren, Chicago Natural History Museum; Dr. D. G. de Almeida, Serviço Florestal, Rio de Janeiro; Mr. B. A. Krukoff, New York Botanical Garden.

Chile: Mr. Robert D. Short, Wichita, Kansas.

Colombia: Mr. W. L. Gregory, Board of Economic Warfare, Washington, D. C.; Dr. R. J. Seibert, U. S. Dept. Agric., Washington, D. C.; Mr. Wm. N. Watkins, U. S. National Museum, Washington, D. C.

Costa Rica: Mr. Arthur Bevan, U. S. Forest Service, Wash-

ington, D. C.; The United Fruit Company, New York, N. Y.; U. S. Forest Products Laboratory, Madison, Wisc.

Cuba: Mr. B. A. Krukoff, New York Botanical Garden.

Ecuador: Mr. W. T. Cox, Board of Econ. Warfare, Washington, D. C.; U. S. Forest Products Lab., Madison, Wisc.

Fiji Is.: Mr. A. R. Entrican, State Forest Service, Wellington, N. Z.

Guatemala: Mr. Donald D. Stevenson, Ayutla.

Haiti: Dr. William Seifriz, University of Pennsylvania, Philadelphia.

Hawaii: Dr. C. H. Edmondson, Bernice P. Bishop Museum, Honolulu.

Brit. Honduras: The Conservator of Forests, Belize.

Jamaica: Mr. A. Fletcher Marsh, Chicago, Ill.; Dr. A. H. Graves, Brooklyn Botanic Garden.

Mexico: Mr. G. P. Cooper, La Mesa, Calif.; The East Asiatic Co., Inc., San Francisco; Mr. N. H. Foster, Board of Econ. Warfare, Washington, D. C.; The Marine Products Co., San Diego, Calif.; Mr. H. von Breton, Los Angeles, Calif.

New Zealand (Cult.): Mr. A. R. Entrican, State Forest Service, Wellington.

Pacific Region, S. W.: Arnold Arboretum, Jamaica Plain, Mass.

Panama: Dr. R. J. Seibert, Washington, D. C.; U. S. For. Prod. Lab., Madison, Wisc.

Peru: Mr. J. T. Baldwin, Jr., Miami, Fla.

Philippines: Mr. B. A. Krukoff, N. Y. Bot. Garden.

Salvador: U. S. Forest Service, Washington, D. C.

Samoa: Mr. A. R. Entrican, State Forest Service, Wellington, N. Z.

Solomon Is.: Mr. A. R. Entrican, State Forest Service, Wellington, N. Z.

Surinam: Dr. Gerold Stahel, Agricultural Experiment Station, Paramaribo.

U. S. A.: Mr. W. G. Baxter, Los Angeles; Mr. George Cromie, New Haven, Conn.; Mr. H. A. Dittmann, Salt Lake City, Utah; Mr. Roland Harper, Tuscaloosa, Ala; Mr. Harold Nogle, Port Arthur, Texas; Mr. W. F. Opdyke, Cleveland Heights, Ohio; Mr. Manasseh Smith, Cumberland Center, Maine; Dr. H. von Schrenk, St. Louis, Mo.

U. S. A. (Cult.): Dr. A. H. Graves, Brooklyn Botanic Garden; Dr. Leon Croizat, Arnold Arboretum; Mr. George Kinne, Coolidge, Ariz.; Mr. W. F. Opdyke, Cleveland Heights, Ohio.

Sections for Microscopic Study

During 1944 there were added to the slide collections, cross, radial, and tangential sections of 181 specimens representing 124 named species, 30 genera, making a total of 20,250 slides of 11,486 specimens of 6837 named species, 2684 genera, and 220 families.

CURRENT LITERATURE

A pocket guide to sixty distinctive tropical trees cultivated in the open in the United States. By NELLIE IRENE STEVENSON. Fayette, Iowa. Pp. 70; 5 x 7½; 4 plates; 1944.

The descriptions are intended primarily for the use of winter visitors to the southern parts of the United States, chiefly Florida and southern California. Almost all of the trees "have unusual floral, foliage, or fruiting characters and are therefore the first specimens to be singled out for inquiry by visitors from the colder parts of the country."

Riqueza forestal domincana. By JOSÉ SCHIFFINO. *Revista Agricultura* (Dom. Rep.); Nos. 150–154, September 1943 to June 1944.

The trees described and illustrated are Caoba (*Swietenia mahagoni*), Nogal (*Juglans jamaicensis*), Balata (*Mimusops domingensis*), Sabina (*Juniperus gracilior*), Capá (*Cordia alliodora*), Cabirma Santa (*Guarea trichilioides*), Cabirma de Guinea (*G. grandiflora*), Cedro (*Cedrela odorata*), Caya Amarilla (*Sideroxylon* spp.), Caya Colorada (*Dipholis salicifolia*), Algarrobo (*Hymenaea courbaril*), Guaraguao (*Bucida Buceras*), and Gri-gri (*Buchenavia capitata*).

Forestry in the Leeward Islands. By Conservator of Forests, Trinidad and Tobago. Bull. No. 7, Development & Welfare

in the West Indies. Pp. 106; 6 x 9½. For sale by the Advocate Company, Ltd., Bridgetown, Barbados. Price 60¢.

The islands are Antigua, St. Kitts, Nevis, and Montserrat. The reports follow a uniform outline: General description; basis on which forest policy should rest; general forest policy; detailed recommendations; botanical names of trees; suggested forestry ordinance. The field investigations for the reports were made by Assistant Conservator of Forests J. C. Cater.

Forestry in the Windward Islands. By Conservator of Forests, Trinidad and Tobago. Bull. No. 11, Dev. & Welf. West Indies. Pp. 183; 6 x 9½. For sale by the Advocate Company, Ltd., Bridgetown, Barbados. Price 60¢.

The islands are Grenada, St. Vincent, St. Lucia, and Dominica. The reports are similar to those on the Leeward Islands and both undertakings were made possible under a Colonial Development and Welfare Scheme. "This scheme provides, with the concurrence of the Government of Trinidad and Tobago, for technical forestry assistance to be available to the Governments of the Leeward and Windward Islands for a period of five years. The Conservator of Forests of Trinidad and Tobago acts as adviser on forestry matters in the Leeward and Windward groups of islands and provision has also been made for a technically trained Assistant Conservator to be available for investigational, inspection, and advisory duties in the several islands."

The Jatrophas of Cervantes and of the Sessé & Mociño herbarium. By Rogers McVaugh. *Bull. Torrey Bot. Club* 72: 1: 31–41; 1 fig. January 1945.

"Among the several hundred species names published in the genus *Jatropha*, of the Euphorbiaceae, are eight published in 1794, with brief descriptions, by Vicente de Cervantes, who at that time held the chair of Botany in the Royal Botanical Garden in Mexico City. All these names relate to Mexican species, but are so briefly characterized as to make their identification all but impossible from the descriptions alone, and none of them is currently applied to any known species of *Jatropha*. It is now possible, however, to associate most of Cervantes' names with definite species, on the basis of contemporaneously named specimens from the herbarium of Sessé & Mociño, now on deposit at the Field Museum."

Una nueva especie del genero *Pinus*, *Pinus michoacana*. By Maximino Martínez. *Anales del Instituto de Biología* (México, D. F.) 15: 1: 1–6; 4 figs. 1944.

Pinus michoacana Martínez and its two varieties and three forms comprise a homogeneous group segregated from *P. Montezumae*.

Nuevas especies de *Juniperus* mexicanos. By Maximino Martínez. *Anales del Instituto de Biología* 15: 1: 7–15; 8 figs. 1944.

Juniperus Gamboana Martínez and *J. Comitana* Martínez are trees 8–10 (12) meters high and 40–80 (90) cm. in diameter growing at elevations above 1500 m. in the State of Chiapas.

The most hospitable tree. By Alexander F. Skutch. *The Scientific Monthly* 60: 5–17; 6 text figs.; January 1945.

A highly interesting account of the Cecropia tree and a discussion of its relation to the Azteca ants it houses and feeds. "To deny that the ants are of positive benefit to the tree is to refute the only plausible explanation that has been advanced for the evolution of its three great structural peculiarities: the exceptionally wide central hollow of the stem, the furry protecting leaf bases with their protein bodies, and pits that facilitate the perforation of the wall surrounding the hollow internode. Without some single use to which all three contribute, how can we account for the presence in a single species of features that would be surprising enough as random developments in three different families? The mystery still challenges us. The Cecropia is the most enigmatic tree of tropical America."

Nuevas contribuciones al conocimiento de la Provincia de Esmeraldas. Tomo I. By M. Acosta Solís. Quito, Ecuador, 1944. Pp. 606; 6½ x 9; illustrated.

This book deals with the Province of Esmeraldas which occupies the northwestern corner of Ecuador. It includes accounts of the geography, geology, climate, vegetation, timbers, fauna, agriculture, archeology, the Cayapa Indians, and various matters of concern to the well-being of the people of the region. The work is copiously illustrated with maps, photographs, and drawings. The author is the Director of the Ecuadorean Institute of Natural Sciences and is widely known for his scientific works.

Nota sôbre a classificação do parênquima do lenho. By. F. R. Milanez. *Rodriguésia* (Rio de Janeiro) 8: 17: 1–3; 5 plates; 1944.

Three classifications of wood parenchyma are recognized, namely, apotracheal, paratracheal, and mixed. The apotracheal is of seven types: (1) diffuse, (2) reticulate, (3) tangential, (4) regular concentric bands (1–3 cells wide), (5) irregular concentric bands (1–3 cells wide), (6) coarse concentric bands (4 or more cells wide), and (7) terminal or initial. The paratracheal is of nine types: (8) vasicentric, (9) aliform, (10) confluent, (11) incomplete (not completely surrounding pore), (12) unilateral, (13) winged incomplete or unilateral, (14) winged-confluent incomplete or unilateral, (15) secretory (enlarged cells with special contents), (16) peculiar, *i.e.*, different from the preceding. Four mixed types are recognized: (17) tangential, (18) concentric, and (19) initial which, while principally apotracheal, contain some pores; (20) mixed-unilateral, a combination of Nos. 12 and 14. Nine of the types are illustrated with photomicrographs of Brazilian woods.

Estudos novos sôbre uma planta velha: o cajueiro (*Anacardium occidentale* L.). By Othon Machado. *Rodriguésia* 8: 17: 19–48; 6 text figs., 21 plates; 1944.

A comprehensive report on *Anacardium occidentale* L., the source of the cashew nuts of commerce, with reference to its history, taxonomy, nomenclature, anatomy, medicinal properties, diseases, and other subjects. The bibliography contains 184 entries. Most of the plates are reproductions of photomicrographs.

As madeiras nacionais na paz ou na guerra. "Açoita cavalo," *Luehea divaricata* Mart. e espécies afins (Tiliaceae). By M. Kuhlmann and Arlindo Vianna. Pub. by Sec. Agr., Ind. & Com., São Paulo, Brazil, 1944. Pp. 67; 4½ x 6½; 9 plates. (Reprinted from *Rel. An. Inst. Bot.* March 1944, pp. 105–126.)

A comprehensive account of an important timber tree of southern Brazil. The wood, which has many of the properties of Birch (*Betula*), has proved particularly useful for certain military purposes, such as gunstocks, airplane propellers, and plywood.

La selva marginal de Punta Lara en la ribera argentina del Río de la Plata. By Ángel L. Cabrera and Genevieve Dawson. *Revista del Museo de la Plata* (n. s., sec. Botánica) 5: 22: 267–382; figs. 15, plates 10; 1944.

An ecological study, with an annotated list of plants, of a small natural forest constituting a biological reserve near Buenos Aires.

Las especies del género *Chorisia* cultivadas para adorno en la República Argentina, By Genevieve Dawson. *Revista Argentina de Agronomía* (Buenos Aires) 11: 1: 1–10; 3 text figs., 4 plates; March 1944.

Contains illustrated descriptions of four species of *Chorisia* grown for ornamental purposes in Argentina. One of these, *Chorisia pubiflora* (St. Hil.) Dawson, is a new combination; syns. *Eriodendron pubiflora* St. Hil., *Ceiba pubiflora* (St. Hil.) Schum., and *Ceiba Fiebrigii* Hochr. The best known common name for trees of the genus is Palo Borracho.

Native woods for construction purposes in the Western Pacific region. By J. H. Kraemer. Pub. by Bureau of Yards

and Docks, U. S. Navy Dept., Washington, D. C., September 1944. Pp. 382; 4¼ x 6 ¾; 101 text figs.; 5 folded maps. Distribution restricted.

The first edition (see *Tropical Woods* 80: 22) was issued in May 1944 and applied to the Solomon Islands, Papua, Northeast New Guinea, and the Bismarck Archipelago. The current edition covers the Solomon Islands, New Guinea Island, the Bismarck Archipelago, the Molucca Islands, Celebes, and the Philippine Islands. This book contains about twice as much material as the other and has five folded maps instead of one. It is not available to the public and is not for sale by the Government Printing Office, but "personnel engaged in the production of wood construction material in the Western Pacific region" can secure copies through the Bureau of Yards and Docks, U. S. Navy, Washington, D. C.

H. D. Tuple

Price 40 cents

Yale University School of Forestry

TROPICAL WOODS

NUMBER 82 JUNE 1, 1945

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TROPICAL WOODS

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A technical magazine devoted to the furtherance of knowledge of tropical woods and forests and to the promotion of forestry in the Tropics.

The editor of this publication and the writer of any articles therein, the authorship of which is not otherwise indicated, is ROBERT W. HESS, *Associate Professor of Forest Products, Yale University School of Forestry.*

Subscription price One Dollar for four consecutive numbers. Remittances should be made payable to TROPICAL WOODS.

Address all communications to the editor, 205 Prospect Street, New Haven 11, Connecticut, U. S. A.

A LOOK AHEAD

This issue marks the first number of *Tropical Woods* prepared under the direction of others than Samuel J. Record, the founder and until his death its editor. *Tropical Woods* was started in 1925 to furnish a suitable technical publication for writings on wood anatomy and tropical woods. It is appropriate that this issue of the magazine should be devoted to its creator who was also the principal contributor over the past twenty years since the founding of the publication. We believe that the readers of *Tropical Woods* will be interested to have summarized in one place the important features of Dean Record's scientific career.

Inquiries have been coming in as to the future of the magazine now that its founder has passed on. It is our purpose to continue publication of *Tropical Woods* because of value which it has in stimulating research in wood anatomy, particularly of tropical trees, and in disseminating information

to the numerous workers in this field scattered as they are throughout the world.

Dean Record's work in the study of tropical woods will be continued under the direction of Robert W. Hess, Associate Professor of Forest Products. Professor Hess as a graduate student received his training under Dean Record and subsequently, on appointment to the Yale School of Forestry faculty, collaborated for several years with him in the study of tropical woods and was joint author with Dean Record of "Timbers of the New World" published in 1943. Professor Hess becomes Editor of *Tropical Woods*. His concept of the purpose and function of the Yale wood collection is set forth in a special article on page 14.

Our intentions as a School in respect to the studies started by Dean Record are to continue investigations in the field of wood anatomy, particularly of tropical trees, and to enlarge the present wood collection until it contains samples of all existing woody species. To reach this goal we shall need continuation of the fine coöperation by collectors and wood anatomists throughout the world, which in the past has assisted so materially in the upbuilding and study of the present collection.

We bespeak this coöperation from our readers in the days which lie ahead.

GEORGE A. GARRATT,
Dean Yale School of Forestry

Photograph by Burdett Green

SAMUEL J. RECORD

SAMUEL JAMES RECORD

1881–1945

Samuel James Record, Dean of the Yale School of Forestry, died on February 3, 1945. He was a member of the class of 1905 at the School, and his achievements have given him a high place in the roster of American foresters. Like many other early graduates he entered the Forest Service upon graduation and engaged in diversified investigative and administrative work which provided invaluable experience as a basis for his later activities. In a relatively short time he was selected by Yale University as a member of the faculty of the School of Forestry where he had special opportunity in the scientific field, and attained through a brilliant career great national and international distinction as an educator and scholar.

He was born in Crawfordsville, Indiana, on March 10, 1881. His father, James Knox Polk Records, and his mother, Mary Minerva (Hutton) Records, were from English stock long resident in this country. Sam's home was on a farm. The fact that his father had at one time taught school indicates an intellectual environment in Sam's early life.

Sam Record attended high school at Crawfordsville and graduated from Wabash College in 1903 with the B.A. degree. He entered the Yale Forest School with the class of 1905, remaining for one year with an excellent record for which his previous work in college had especially equipped him. He then dropped out to accept a position as assistant in the Division of Forestry of the U. S. Department of Agriculture. In May 1907, he was promoted to the position of chief of reconnaissance and was appointed supervisor of the Arkansas National Forest. First steps were being taken for the organization of this forest unit and Record became its first supervisor. It was an extremely important post, involving problems of administration of peculiar complexities. I was chief forester during that last portion of his service in Arkansas and had keen appreciation of the problems which confronted him. Several years ago I visited the region and repeatedly heard his name mentioned most favorably by men who had known him. I recall Record's reference to his cordial reception when he visited the region after he became Dean of the Forest School.

He interrupted his work with the Government for six months in 1906, to serve as instructor in botany in Wabash College. It was at the termination of this period that the College granted him the degree of Master of Arts. The College kept in touch with his career at Yale and in 1930 awarded to him the honorary degree of Doctor of Science.

Record was appointed instructor at the Forest School on July 1, 1910. During that year he conducted courses in classification and structure of wood, mechanical properties of wood, and wood preservation. His varied experience, contributions to literature and special lectures given at the school in the previous year enabled the University to grant him the degree of Master of Forestry and he was promoted the following year to assistant professor of forest products.

The U. S. Forest Service had previously established several local branches of research in forest products, in coöperation with forest schools. One of these stations was at Yale, under the direction of H. D. Tiemann, a graduate of the school in 1903. The school had acquired various testing machines and other equipment used in this research. When the Federal Government established its central Forest Products Laboratory in 1910, there was excellent equipment available at Yale for Professor Record's special activities. There had also been assembled a considerable quantity of wood specimens including material from the Philippines and from tropical America. This furnished a basis for the great collection developed during succeeding years by Professor Record. A great deal of the material had not been identified and there was meager knowledge of the qualities and potential service of a large proportion of the tropical species.

Record perceived the necessity for study of the woods of the world, from the standpoint of their anatomical structure and other basic characteristics. The mechanical tests of large beams previously carried on by the Government at Yale were discontinued, and there was substituted the effort to discover the distinctive qualities of various species, including structure, weight, grain, intrinsic strength, durability, color, and other qualities. There was sought not only characteristics of wood of different species and variations under different conditions,

but the underlying explanation. Only by such research could effective utility of forest products be achieved. A collection of wood specimens took on new significance both to the student and to those engaged in extracting, processing and utilizing the products of the forest.

With this principle in mind Record proceeded to build a collection of wood specimens on a systematic and selective basis, using what was already at hand and adding representative material from American forests and those of other regions of the world.

In the early days when Record began his work at Yale teachers in all fields of forestry lacked suitable text books for instruction. In a short time they incorporated the material used in their instruction in published text books. The members of the faculty at Yale were among the leaders in publishing such books in addition to their contributions by articles in forestry and other journals. Sam Record issued his Identification of Economic Woods in the United States (John Wiley & Sons) in 1912, and followed this with Mechanical Properties of Wood (John Wiley & Sons) in 1914. These rendered a valuable service in forest education. They did not, however, represent the full contribution which he made to science throughout his career.

Record had exceptional ability as a writer. Here his broad education played a part. He had a fine background not only in English but in other languages. His broad intellectual interests and keen human perceptions are indicated in the diversity of his writings. Especially during his earlier years he wrote articles for forestry periodicals, scientific journals and newspapers on various subjects pertaining to trees, forests and forestry, as well as on highly technical topics. Some of these were descriptions of forests and forest problems in specific regions such as Forest conditions in Indiana; Treeless farms getting too common in Indiana; Missouri's opportunity in forestry; Forest conditions in the Ozarks of Missouri; The Middle West attitude toward timber supplies; and Forest resources in Arkansas. And he wrote numerous articles on general forestry topics, such as Nations have decayed with their forests; Woodlot forestry; Proper care of the woodlot;

Forestry—a profession for young men; Forest fire insurance in Germany; The National Forests; Hoosiers who teach forest lore; Some new ideas in controlling forest fires; Life of the forest ranger; The hardy catalpa; Pruning street trees.

His later publications and articles naturally tended to scientific and technical aspects within the scope of his special research. But in his studies he never failed to perceive the human implications of his work. He was constantly called upon to identify the wood used in antique furniture or of some artifacts of primitive peoples in remote tropical regions. I recall his amused interest in the question posed by someone as to the wood that Noah used in building the Ark.

His contributions to the knowledge of wood and technical forestry appeared in such periodicals as Botanical Gazette, Bulletin of the Torrey Botanical Club, Journal of the New York Botanical Garden, Field Museum Botanical Series, Science, Scientific Monthly, Scientific American, Proceedings of Indiana Academy of Science, American Architect, Journal of Forestry, American Forests and Forest Life, Empire Forestry Journal (London), Yale Forest School News, Country Gentleman, House and Garden, Home Geographic Monthly (Worcester, Mass.), Mid-Pacific Magazine (Honolulu) and a number of journals in Central and South America. In addition he contributed widely to trade journals concerned with lumber and other forest products. These included Hardwood Record, Barrel and Box, American Lumberman, Lumber World Review, St. Louis Lumberman, Southern Lumberman, Paper Trade Journal, Wood Worker (Indianapolis), Woodcraft (Cleveland), Lumber (Cleveland), Raw Material (N. Y.), New York Lumber Trade Journal and Nylta Handbook.

In 1925 Record inaugurated a quarterly journal, entitled *Tropical Woods*, published under the auspices of the School of Forestry, and under his direction as editor. He was the principal contributor, though many articles by other authors were included. This journal furnished a convenient channel for issuing currently the results of his studies of little known species of trees growing in tropical regions of the World.

It was a gratification to him that he was able to assemble

the major results of his studies of tropical trees and forests in a single volume with joint authorship of associate professor Robert W. Hess who for a number of years collaborated with him. This monumental work, Timbers of the New World (Yale University Press, New Haven, 1943) will be of great service in development and use of tropical forests in post-war years.

In the course of his studies Record formed close contacts with botanists, explorers, foresters and other leaders throughout the World. He himself visited the Latin American forests on two occasions, and directed explorations in Liberia and elsewhere through his former assistant G. Proctor Cooper and by others through correspondence.

It was at his suggestion that an international conference of botanists interested in wood research, was held in London in 1930. The result of that conference was the establishment of the International Association of Wood Anatomists. Record was one of the leaders in the movement and was elected the first secretary-treasurer. He received numerous invitations to visit South American and other countries which he declined, pending the completion of his book.

The significance of his great collection of woods cannot be measured. Professor Record recognized at the beginning that any collection of wood is valueless unless the material is properly classified for study. The collection as of January 1, 1945, comprises 41,281 wood samples, representing 11,983 identified species of trees, 2,804 genera, and 232 families. The second step has been the preparation of microscopic slides for anatomical study. Already Record had prepared 20,250 microscopic slides, representing 6,837 species, 2,684 genera and 220 families. Each year has shown progress in adding new material, and even more important rapid advance in anatomical study. Thus the collection was left by him so well organized that his successor can carry forward this work that is of inestimable value to the basic knowledge of the woods of the world.

One of the special features of the Wood Museum at the School of Forestry is the Rudolph Block collection of walking sticks. Mr. Block was a prominent newspaper correspondent

in New York. He was not only a brilliant member of the newspaper fraternity but had many broad interests beyond his special field. Mr. Block had been interested in woods of distinctive quality and color, and about 25 years or so ago he started a collection of wood specimens. When he encountered a wood of special interest he had it fashioned in the form of a walking stick from a design prepared under his personal supervision. He had traveled extensively and had a wide acquaintance. Various of Block's many friends about the world, knowing of his hobby, sent specimens to him. On these canes he devoted as much attention to the handle as to the stick itself, using gold, silver, ivory or other ornamental material for the diversified forms of the handles of the different specimens.

Early in the period of assembling the collection Mr. Block turned to Professor Record for identification of the woods and for information about the trees from which they were derived. I know something of the great esteem in which he held Record, having dined with him in New York and later in London. The collection was placed on exhibit in the U. S. National Museum in Washington and in the New York Botanical Garden. Later it was placed on loan in the Yale School of Forestry. Following Mr. Block's death in 1940 the collection was given to the Yale School of Forestry by Mrs. Block and her sons. The collection comprises 1400 canes and is unique from a scientific standpoint as well as of great interest as an exhibit of many rare specimens of wood.

In the process of Professor Record's research a number of new species of tropical trees were discovered by him and carry his name; and a number of species first discovered by other botanists also were named after Professor Record. A list of these species is given on pages 38–40 of this magazine.

Record was frequently called on to lecture to general audiences and to those having a special interest in forestry and forest products. He was especially in demand by the Nylta Club of New York. This is a club within the organization of the New York Lumber Trade Association. Monthly meetings of the club are held to bring members to discuss business topics of current interest and for general social contacts.

Record was one of the most favored lecturers, and was called upon frequently for a lecture or informal talk on some subject of his own choice. A monthly periodical is published and there are cordial references during more than twenty years to frequent occasions in which Record spoke to the Club. These contacts were a great pleasure and satisfaction to him.

Sam Record was a popular leader in his class at Yale and always a prominent figure in class and alumni meetings. He had a keen sense of humor with always a ready story in conversation. He was quick in repartee and enjoyed the give and take of conversation. He was very modest regarding his scholarly and other attainments. Probably few of his colleagues in the University fully appreciated the breadth and significance of his research. Naturally sensitive, his ready and genuine sympathy with students and others in their personal problems was a great asset in meeting his responsibilities as a teacher and Dean. No one today can measure the enduring influence of his personal life.

Sam Record was married in 1906 in Crawfordsville, Indiana, to Miss Mary Elizabeth Strauss of Topeka, Kansas. They had four children: Harold Clayton Record, born on January 5, 1907 and died later in the month; twins, Mason Thomas Record and Mary Elizabeth Record, born in March, 1909; and Alice Louise Record, born in May, 1911. Mason Record is an educator, now assistant professor of Sociology in Connecticut College for Women, New London, Conn. The daughter Mary was appointed to the staff of the Forest School in 1930, to assist her father in the laboratory and in the care of development of the museum of wood specimens. Alice Record in June, 1934, married A. Gifford Hooper then a Commonwealth Fellow at the School. She is now living in Stellenbosch, South Africa, where her husband is Professor of English in the University of Stellenbosch.

HENRY S. GRAVES,
Dean Emeritus, Yale School of Forestry

SAMUEL J. RECORD

An appreciation by PAUL C. STANDLEY

Fifty years ago when Samuel Record was sawing and splitting wood for the family stove he would have objected emphatically had he suspected that he would spend half his life working with that very substance which to a boy was so loathsome. It must be admitted that the tropical woods to whose study he later gave attention were more glamorous if not more practical than the oak and hickory of Indiana.

The abundant and detailed knowledge incorporated in his last and most important publication, *Timbers of the New World*, was not acquired easily or quickly but as the result of long and tedious inquiry into the nature and composition of American forests, their various kinds of woods, and the practical purposes to which they can be put.

Professor Record's keen practical interest in woods caused him to visit Guatemala, Honduras, British Honduras, and many parts of the United States, to make collections himself and to interest and instruct others in the collection and proper preparation of specimens. He soon learned that many of the older collections of tropical woods in museums were useless since they obviously were not from the trees which they were said to represent. He elevated wood collecting from its former status of guesswork and curio gathering to a truly scientific occupation, insisting that the samples of wood should be accompanied by determinable herbarium specimens and thus be associable with described species of plants. Through an unbelievably large number of correspondents scattered over almost all parts of the globe he was able to bring together a collection of wood samples, all identified with known species, numbering more than 41,000 specimens. Many of the individual lots of woods, some of them small but important, were secured with the help of amateurs to whom he communicated something of his enthusiasm. The Yale collection includes material of most genera of woody plants of the Americas and of many from the Old World.

With this wood collection Professor Record was on intimate terms, and his knowledge of woods seemed uncanny to

one unversed in the subject. Although regularly he called upon taxonomists to determine herbarium collections, he often could help them materially in naming strange plants by his own study of even slender twigs of plants that were sterile or otherwise difficult of recognition by ordinary methods. He enjoyed solving some of the minor problems of wood-lore. How did it happen that wood specimens sent from New Mexico were packed in a box made of Chilean Araucaria? Of what woods were made the articles found in Egyptian tombs, or the ancient ship timbers retrieved from the sea?

Woods are obviously a subject of immense economic importance, and the utility of data regarding them requires no emphasis. The woods of the United States have long been pretty well known but those of tropical America have not. Some of the most important cabinet and other woods imported into the United States were known only by their vernacular names and the report that they came from some sort of a tree somewhere in the tropics. Professor Record went to great trouble to obtain authentic specimens of all such woods and of the trees that produced them. He was finally able to place properly almost all these long uncertain trees, as may be seen in his *Timbers of the New World*, the most comprehensive and encyclopedic account of the woods of any great area of the earth.

Interested in establishing a common medium for dissemination of information among wood anatomists, whose vocabularies often had been personal rather than national or international, Professor Record was one of the founders of the International Association of Wood Anatomists. An important advance in the study of wood anatomy was made by the compilation of a list of equivalent terms for description of woods in the principal European languages.

Another successful enterprise was his publication of the quarterly journal *Tropical Woods*, begun in 1925 and now running to 80 numbers. This reviews current literature relating to tropical woods but consists in greater part of original papers relating to trees and their properties. This journal has had a more catholic distribution perhaps than almost any other American scientific publication. It reaches all the

principal botanical libraries of the world and also finds its way to forestry stations in the remotest parts of Africa and the islands of the Pacific, and other places with meager library facilities. *Tropical Woods*, aside from its importance as a place of publication for research, was of aid in the enlargement of the Yale wood collections, since many people sent collections to Professor Record to be named, studied, and reported upon if their contents justified comment.

The evident practical value of this wood research was recognized by the lumber trade of the United States, which often consulted him for aid in its difficulties. His long experience gave him a realistic appreciation of commerical phases of the subject, and his opinions were invoked to settle disputes, often acrimonious, that arose in the industry.

Professor Record's success in investigation of the woods of all parts of the earth well illustrates the eminently desirable, but too seldom attained, combination of highly technical knowledge and its practical application to daily life. Boards for construction purposes and microscope slides of wood are both lumber, the latter merely cut thin. While he had to a notable degree the gift of common sense in consideration of practical problems, he appreciated equally that portion of wood research that ordinarily would be termed "pure" science, and he organized, principally on the basis of his own studies, the whole system of wood anatomy so far as it is illustrated by the forests of tropical America.

My personal knowledge of Professor Record's work, extending over a good many years, is based upon a close association in the study of tropical American trees. For a long time he has been rather closely associated with Field Museum of Natural History and a member of the staff since 1928. He assisted in assembling and arranging the exhibits of the Museum's Hall of North American Woods. For several years he visited the Museum regularly for this purpose, and he wrote a popular guide to the wood hall which is practically a handbook of North American trees.

It always is difficult to express exactly one's impressions of the personality of a deeply valued friend. In the case of one who lived so full a life, with contacts extending into so many

fields of activity, it is doubly difficult. With a very definite dignity, Professor Record possessed an interest in human life that enabled him to meet on common ground a bootblack or a newspaper magnate, and he possessed an extraordinary talent for making friends. To an unusual degree Professor Record enjoyed life in all its phases, simple or sophisticated, and he had the faculty of making others in his company enjoy themselves almost as much as he evidently did. So greatly was his companionship valued that even casual acquaintances often went to considerable pains to enjoy his company again. A great many of his friends, many of them quite outside the farthest bounds of science, will indeed miss the contacts that have been broken so abruptly. They are only beginning to realize how much they depended upon his generous support and counsel.

PAUL C. STANDLEY,
Chicago Natural History Museum

NYLTA CLUB MEMORIAL

Professor Record was an honored and beloved lecturer at meetings of the Nylta Club (New York Lumber Trade Association) in New York City for years prior to his death, and no one felt his loss more deeply than this group.

Mr. Frank Niles, Mr. John Paterson, and Mr. Joseph Walsh representing the Nylta Club made a special trip to New Haven on April 10th to present personally to Professor Record's family a memorial volume composed by the Nylta Club. It is a handsome book, bound in rich brown leather tooled in gold, containing a photograph of Professor Record and several beautifully illuminated pages paying tribute to his memory. It also contains the signatures of the officers of the Nylta Club—Walter E. Umla, President, John G. Sussek, 1st Vice President, Henry A. Kuehn, 2nd Vice President, Theodore G. Bayer, Treasurer, and F. W. Ritter, Secretary; the names of the Board of Governors and those of the Past Presidents, and the signatures of one hundred and fifty Nylta Club members.

The text of the tribute to Professor Record is as follows:

"On February third, nineteen hundred and forty-five, Samuel J. Record passed to his rest.

"He was an outstanding personality among his fellow men, and though his wealth of knowledge was hidden in a retiring nature, his honesty of purpose was apparent to all who knew him.

"His great experience and wise counsel were eagerly sought, and his generous contribution of time and personal attention to the affairs of the Nylta Club endeared him to the hearts of those fortunate enough to have been associated with him.

"However, his memory, rich with thoughts of loyalty and friendship, lives among his former fellow-members.

"To his sorrowing family the Officers and Members of the Nylta Club extend their heartfelt sympathy."

THE YALE COLLECTION OF WOODS

From its beginning the great collection of woods at Yale has been made possible through the continued enterprise and coöperation of many individuals interested in providing the means for comprehensive study of the woods of the world. The carefully kept records and the periodic reports published in *Tropical Woods* list contributors from all parts of the world, representing many nationalities, occupations and interests.

Through his personal zeal and his host of friends, over a period of more than twenty years, Dean Record assembled 41,281 wood specimens, representing 11,983 named species of 2,804 genera of 232 families. Among these are numbered the originals or duplicates of many important collections from widely scattered parts of the globe. Many of the wood samples are supported by herbarium specimens located at Yale, at some other herbarium, or in more than one place. Some 20,250 slides, each slide having cross, radial and tangential sections for microscopic study, are a part of the collection.

The wood collection at Yale should not be considered a static museum; rather it is a scientific tool actively furthering the study of wood anatomy as applied to identification as well

as to many phases of wood technology, ontogeny, phylogeny, morphology, taxonomy, paleontology, and other branches of the plant sciences. It is unique in that its great size, completeness of composition, and thorough indexing permits comprehensive studies of large groups as well as detailed studies of smaller units. Many of the patterns of wood structure as obtained from study of scores of families and hundreds of genera are enticingly close to revelation. Better understanding of the significance of these relationships will simplify the task of wood identification and aid in establishing a more stable basis for the study of wood anatomy.

The accumulation and correlation of anatomical data and wood descriptions involves the use of both wood samples and microscope slides. The 20,000-odd slides now available represent a sound basis for study, particularly since generic and family representation is good. One of the great tasks ahead, however, is the preparation of sections of the 5,000 species and 30,000 specimens as yet uncut. Temporary mounts in lieu of permanent sections are time consuming both in preparation and subsequent study. It is hoped that the bulk of this large number of sections can be prepared in the near future.

Thus far the major work in tropical woods in connection with the collection has been in the following categories:

1. Studies of wood structure, identification methods, and wood descriptions.
2. Wood identifications for taxonomic botanists, wood using industries, and others.
3. Studies on properties and uses of tropical woods and diffusion of general information.

One of the goals of the active study of woods at Yale is the gradual development of means for offering greater service to those engaged in the study of woods in other places. Most of this service now appears in the form of articles in *Tropical Woods* and other publications. The two most important single works, "Timbers of Tropical America" and "Timbers of the New World" are the culmination of Dean Record's years of study of Latin American woods. There remains, however, material assembled for a companion volume, probably to be

entitled "Identification of American Timbers." It is hoped that this work, which was interrupted by the war, can soon be resumed. Other studies to result in published articles or books are under tentative consideration. Plans have been considered which may lead to the preparation and publication of detailed descriptions of the wood anatomy of large numbers of woody plants. It is believed that information of this character would be useful where large collections are not available.

In addition to the published information a considerable number of small wood samples are supplied to qualified investigators for the preparation of microscope slides. Students and other workers frequently visit Yale for either brief or protracted study of particular groups represented in the collection.

Considerable time is devoted to answering requests for identification of wood specimens. This particular service, although time-consuming, frequently results in the acquisition of significant information either from the inquirer or during the process of identification. We are particularly anxious to coöperate in the identification of woods for wood-using industries, wood anatomists, taxonomic botanists, museums, and others having worthwhile problems. Dean Record was highly interested in coöperative identification work with botanists of various institutions. Aside from the remarkably intuitive application of his familiarity with all woods, one of the contributing factors to Dean Record's success was his ability as a taxonomic botanist. If the facilities and men actively engaged in the study had been available he would have built a much larger herbarium of tropical trees at Yale. It is perhaps unfortunate that more active work in this field has not been carried on in close conjunction with the wood collection. Fortunately (as is apparent in the issues of *Tropical Woods*), the leading taxonomists of the world coöperated wholeheartedly with Dean Record, making up in part for this deficiency. For purposes of identification and description greatest credence will continue to be given wood samples supported by herbarium material from the same tree. Commercial wood samples or boards showing typical heartwood, or sapwood and heartwood in combination, are also

valued as they may disclose information on the character of the wood not shown in other samples. Even the bark is frequently used.

One of the important functions of the work with tropical woods is to supply information to those industrial concerns and individuals interested in these timbers. The available personnel necessarily limits the amount of coöperation that can be extended. It is hoped that this service can be extended from its present identification and general information category to include coöperative studies of tropical wood utilization problems. The time appears propitious for profitable utilization of tropical American timbers not only locally, but in the United States and other countries located in northern latitudes. It is likely that technical studies of the many woods involved can assist in eliminating pitfalls that have engulfed some of the earlier endeavors in this field.

In considering the functions of the collection the facilities for students must be noted. The Yale School of Forestry is a graduate department in Yale University offering the degree of Master of Forestry. Properly qualified individuals may enroll in the Graduate School of Yale University, taking work leading to the degrees of Master of Science or Doctor of Philosophy. Students of wood technology or those primarily interested in wood anatomy as a major field have the collection and its associated facilities as tools for advanced study.

It is our sincere hope that the many friends and collaborators who helped Dean Record build the great collection and who contributed so much to its many functions, will continue to offer their coöperation and support. This will constitute the best possible memorial in his honor. We shall earnestly strive to continue the work he initiated and endeavor to expand both the research and the services of the collection toward the goals he envisaged.

ROBERT W. HESS,
Associate Professor of Forest Products

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American timbers of the family Bignoniaceae. (With R. W. Hess.) *Tropical Woods* 63: 9–38, September 1940.

American woods of the family Rutaceae. (With R. W. Hess.) *Tropical Woods* 64: 1–28, December 1940.

American woods of the family Verbenaceae. (With R .W. Hess.) *Tropical Woods* 65: 4–21, March 1941.

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Keys to American woods. I. Ring-porous woods. II. Pores in ulmiform or wavy tangential arrangement. III. Pores in flame-like or dendritic arrangement. *Tropical Woods* 72: 19–35, December 1942.

Keys to American woods (continued). IV. Vessels virtually all solitary. V. Vessels with spiral thickenings. *Tropical Woods* 73: 23–42, March 1943.

Timbers of the New World. (With R. W. Hess.) New Haven: Yale University Press, March 1943. Pp. 640.

Keys to American woods (continued). VI. Vessels with scalariform perforation plates. VII. Vessels with very fine pitting. *Tropical Woods* 74: 17–43, June 1943.

Keys to American woods (continued). VIII. Vessels with opposite or scalariform pitting. IX. Woods with conspicuous rays. *Tropical Woods* 75: 8–26, September 1943.

Keys to American woods (continued). X. Woods with storied structure. *Tropical Woods* 76: 32–47, December 1943.

Yale, oldest forestry college, starts 44th year of training. *Timber Topics* (Milwaukee) 6: 6: 1–11, January–February 1944.

Random observations on Tropical-American timbers. *Tropical Woods* 77: 1–9, March 1944.

Note on the wood of *Sterigmapetalum colombianum*. *Tropical Woods* 77: 12, March 1944.

Keys to American woods (continued). XI. Woods with resin or gum ducts. XII. Parenchyma reticulate. *Tropical Woods* 77: 18–38, March 1944.

Keys to American woods (continued). XIII. Woods with septate fibers. *Tropical Woods* 78: 35–45, June 1944.

Miscellaneous notes on Tropical American woods. *Tropical Woods* 79: 1–5, September 1944.

Keys to American woods (continued). XIV. Dicotyledonous woods with xylem rays virtually all uniseriate. *Tropical Woods* 79: 25–34, September 1944.

Notes on tropical timbers. *Tropical Woods* 80: 1–6, December 1944.

Keys to American woods (continued). XV. Fibers with conspicuous bordered pits. XVI. Woods with oil (or similar) cells. *Tropical Woods* 80: 10–15, December 1944.

Notes on tropical timbers. *Tropical Woods* 81: 2–5, March 1945.

TREES AND SHRUBS NAMED IN HONOR OF SAMUEL J. RECORD

Species discovered by him in Central America

Inga Recordii Britton & Rose, *Tropical Woods* 7: 5. June 1, 1926.—A medium-sized leguminous tree collected in Stann Creek District, British Honduras, Jan. 19, 1926, and near Entre Ríos, lower Río Motagua valley, Guatemala, March 1, 1926. Local names, Bri-bri (B. H.), Guamo macho (Guat.).

Caesalpinia Recordii Britton & Rose, *Tropical Woods* 7: 6. June 1, 1926. Name changed to *Poincianella Recordii* Britton & Rose, *North American Flora* 23: 329. 1930.—Shrub or small tree (Leguminosae) collected in British Honduras, February 1926.

Zygia Recordii Britton & Rose, *Tropical Woods* 7: 6. June 1, 1926. Name changed to *Pithecolobium Recordii* (Britton & Rose) Standley, *Field Museum Bot. Ser.* 4: 212. 1929.—A small to medium-sized leguminous tree found along New River, near Guinea Grass, British Honduras, Jan. 29, 1926, and in the Entre Ríos region, lower Río Motagua valley, Guatemala, Feb. 25, 1926.

Chomelia Recordii Standley, *Tropical Woods* 7: 9. June 1, 1926. Name subsequently changed to *Anisomeris Recordii* Standley, *North American Flora*, 32: 227. 1934.—A small rubiaceous tree discovered in high forest between Los Andes and Entre Ríos, Guatemala, March 1, 1926. Local name, Clavo.

Mimosa Recordii Britton & Rose, *North American Flora* 23: 170. 1928. A coarse woody leguminous vine collected in Stann Creek District, British Honduras, Jan. 19, 1926.

Species discovered by others

Sterculia Recordiana Standley, *Tropical Woods* 44: 25. Dec. 1, 1935.—A large sterculiaceous tree collected in Panama by G. Proctor Cooper and George M. Slater, May 1927. Local name, Panamá. Standley first determined the material (which was sterile) as *Sloanea megaphylla* Pittier. "Recently, however, Professor Record has informed me that the wood of the Cooper & Slater tree has the structure of *Sterculia* rather than of *Sloanea*. He has also sent me flowers and fruits, which were inadvertently omitted from the first lot, and while it is now clear that the material represents a *Sterculia*, I know of no species to which it can be referred. I am accordingly describing it as new and naming it in Professor Record's honor."—Paul C. Standley, *loc. cit.*

Psychotria Recordiana Standley, *Field Museum Bot. Ser.* 17: 282. Sept. 28, 1937.—A small rubiaceous tree collected by Dr. A. Rimbach for the Yale School of Forestry in the western Cordillera of Quito, Valley of the Río Saloya, Ecuador, October 1935. "This species is named for Samuel J. Record, from whom the collection containing this plant was received."

Genera of South American trees

Recordoxylon Ducke, *Tropical Woods* 39: 16. September 1, 1935.—The original species, *R. amazonicum* Ducke, a large leguminous tree discovered along the Rio Negro, northern Amazon region, Brazil, by Dr. Adolpho Ducke in December 1929, was first named *Melanoxylon amazonicum* Ducke, *Tropical Woods* 31: 15. Sept. 1, 1932. "On reading Professor Record's 'notes on new species of Brazilian woods,' which follows the description of my new species, I noticed he said the structure of *M. amazonicum* is different from *Melanoxylon brauna* Schott. . . . A comparison of the fruits and seeds of these two species reveals fundamental differences, on account of which it is impossible to place both in the same genus. I decided, therefore, to create a new genus, and I have named it *Recordoxylon* in honor of Professor Record, since it was his observation concerning the wood structure that led to the revision of my orginial classification."—Dr. Adolpho Ducke in "*Recordoxylon:* a new genus of Leguminosae-Caesalpinioideae," *loc. cit.*—A second species *Recordoxylon stenopetalum* Ducke, *Arch. Inst. Biol. Veget.* (Rio de Janeiro) 4: 1: 16. 1938, was discovered by Dr. Ducke near São Paulo de Olivença in western Amazonas.

Recordia Moldenke, *Phytologia* (N. Y. Bot. Gard.) 1: 2: 99–101; fig. 13. July, 1934.—The type of only known species, *R. boliviana* Moldenke, was collected by José Steinbach at Bañado, Río Surutu, Santa Cruz, Bolivia, Oct. 1, 1925, and

is deposited in the herbarium of the Naturhistoriska Riksmuseet at Stockholm, Sweden. The species is a verbenaceous shrub or small tree endemic to the mountains of Santa Cruz. "The genus is named in honor of Prof. Samuel James Record, Professor of Forest Products at Yale University, whose admirable and painstaking researches in the vast field of comparative wood anatomy have contributed so much of inestimable value to the science of botany and whose generous coöperation, freely given, has proved invaluable so many times to his taxonomic colleagues."—H. N. Moldenke in "A monograph of the genus *Recordia*," *Phytologia* 1: 4: 172. September 1935.

H. H. Chatteaway

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TIMBERS OF THE NEW GUINEA REGION

By H. E. DADSWELL

Division of Forest Products, Council for Scientific and Industrial Research, Australia

This region most certainly falls within the tropics and therefore the timbers from it should be of interest to everyone concerned with tropical woods. These timbers have been of more than passing interest to many thousands of Allied Servicemen, who have been stationed in the South West Pacific Area, mainly because it was necessary to use them for a variety of purposes. They will continue to be of interest in the post-war period because Australia at least will look to the forests of New Guinea as a potential source of timber to satisfy her requirements. Therefore, some brief discussion of the various timbers, their properties and identification is not out of place.

Not very much was known of the timbers and timber resources of this region prior to the outbreak of hostilities with Japan. Some commercial exploitation had been attempted and some timbers had reached the Australian market from Papua and the Mandated Territory of New Guinea (chiefly from New Britain). In these shipments a variety of timber species was usually represented, but in most cases the following predominated:

Laup or Lup	*(Dracontomelum* sp., very similar to *Dracontomelum dao* of the Philippines.)
Erima	*(Octomeles sumatrana)*
Amberoi	*(Pterocymbium* sp.)
Taun	*(Pometia pinnata)*
Kamerere	*(Eucalyptus deglupta)*

Unfortunately the rather poor selection of species and the lack of care in the selecting and handling of the logs for shipment did not produce a very favorable impression on the Australian market. Taun and Kamerere did work up into very good material, but were not of such outstanding merit as to supplant the Australian hardwoods. The Laup, or New Guinea Walnut as it came to be called, received favorable attention mainly because of its general resemblance to Queensland Walnut *(Endiandra palmerstoni)*. It was also shipped to the United States in flitch form and sold under the general name "Oriental Wood." Other timbers of considerable promise were also known to occur in large stands, e. g. Hoop Pine *(Araucaria cunninghamii)*, and Klinki Pine *(Araucaria klinkii)*, but these were in the high country and the problem of extraction was difficult.

With the advent of the war with Japan, New Guinea and the neighboring islands became of great importance from the military point of view and, as would be expected from the building of large bases, wharves, and the development of air fields, there was a tremendous demand for timber. The demand was originally met by importation from Australia, but this was wasteful of shipping space and attention was directed to the utilization of the timber available on the spot. Thus there was an immediate request for all the information available on the timbers of these areas; for methods of

identification, and for details of the properties and general utilization of the commoner species. Unfortunately, such information was either lacking or in a form not readily available. One important publication was available in limited quantity, namely C. E. Lane-Poole's report on the "Forest Resources of Papua and New Guinea"; this was a report that had been presented to the Parliament of the Commonwealth of Australia in 1925 and the small number of copies was soon exhausted.

The Division of Forest Products was approached very early by the various Allied Services for information on the timbers of the New Guinea region and was able to supply data on the properties, identification and uses of some of the more important of these. From Lane-Poole's report a knowledge of the timber species likely to be encountered in New Guinea was obtained. It was found that many of these species had a wide distribution in the South West Pacific Area and where timber specimens were available for examination (specimens had been obtained pre-war from the Dutch East Indies, the Philippines and Malaya) it was easy to provide some of the necessary detailed information. In addition, by the courtesy of Mr. C. E. Lane-Poole, small specimens (1 x ½ x ¾") from the timbers collected by him during his visit to Papua and the Mandated Territory of New Guinea were available for examination as were a number of specimens collected by Waterhouse and supplied to the Division of Forest Products in 1936 through Dean S. J. Record of the Yale School of Forestry. From all these specimens it was possible to build up a considerable knowledge of certain New Guinea timbers and to make this information available to the Services in compact form.

It was apparent from this preliminary survey that there were many timbers which would prove suitable for the general requirements of the military, and from all reports they were of common occurrence in the rain forests although in the typical mixed stands of this type of forest. Thus, suitable timber supplies were available, but for the best utilization some means of identification and some knowledge of properties were necessary. As mentioned above it was

possible to supply data on some of the commoner species, but the man in the field had no certain way of knowing whether the timbers being handled were the ones for which the data were provided. Therefore, a simple card-sorting identification key for New Guinea timber was developed for use by untrained personnel. The principle of the card-sorting key is fairly well-known (S. H. Clarke, *New Phytologist* 37, pp. 369-374, 1938, H. E. Dadswell and A. M. Eckersley, *Jl. C.S.I.R.* 14, pp. 266-280, Nov. 1941). In the keys developed, possible variations in the macroscopic features of each timber were coded on a card which had a number of perforations around the margin. For any particular timber the characteristic features as observed in general examination and in the examination of a cleanly cut cross section, a split radial surface, and a cut tangential surface were recorded and the card for that timber notched at the perforations corresponding to the features present. Each card, therefore, represented one timber and covered the description of the macroscopic features of the timber as well as information on certain physical properties such as density and hardness.

In the first card key so developed only 50 of the commoner New Guinea species were included and the features used were those discernible visually, i.e. without the aid of a lens. This key was intended for personnel to whom a hand lens was unavailable. The second and more elaborate card key was designed to make use of features visible with a hand lens in addition to macroscopic features and so far some 115 New Guinea timbers have been included in this key. On the back of each card is printed information on the general properties of the timber and on any special features; in addition in all cases a photograph showing the cross-sectional appearance of the wood at 3 magnifications has been included. Numerous sets of these cards have been prepared and these, together with instructions, color chart, and needle for sorting have been distributed to Army Units. From information received they have proved of definite assistance in enabling personnel of engineer and forestry units to determine the identity and properties of the timber

encountered. Obviously, it was impossible to include all the timber species found in the tropical rain forests, but an attempt was made to cover the more important.

For general information the list of features employed, the appearance of the card, and the arrangement of features on the card are shown in Figure 1.

It will be noted that major divisions have been made on (i) physical features—color, weight, hardness, (ii) structural features visible to the naked eye or by means of a hand lens—size of rays; arrangement of soft tissue; number, size and arrangement of pores, and (iii) locality. In addition certain "other features" have been included. The various features are self explanatory except perhaps feature 21 which refers to the frothing obtained when shavings or sawdust from certain timbers are shaken with water.

The writer visited the New Guinea area under Army auspices in company with C. T. White, Government Botanist, Queensland. One purpose of the trip was to conduct classes of instruction in timber identification using the card-sorting identification key referred to above. It was remarkable how men with little or no training in wood technology readily picked up the basic information necessary to make the key work and applied the knowledge to such good purpose that with a very few hours practice they could, with the aid of the key, identify the common New Guinea timbers. Lectures on general utilization and on the properties of various New Guinea timbers helped to provide the class with sufficient background to select those most suitable for various purposes.

What then are the most common New Guinea timbers and what are their possibilities from the utilization point of view? Reference has been made earlier to a few species; in addition to these, Kwila *(Afzelia bijuga)*, Kaeda *(Planchonia timorensis)*, New Guinea Teak *(Vitex cofassus)*, New Guinea Rosewood *(Pterocarpus indicus)*, the various Mangroves *(Rhizophora* spp. and *Bruguiera* spp.), Cedar *(Cedrela toona* var *australis)*, were well-known prior to the war and consequently sought. But it should be realized that in the rain forest there are a very great number of different

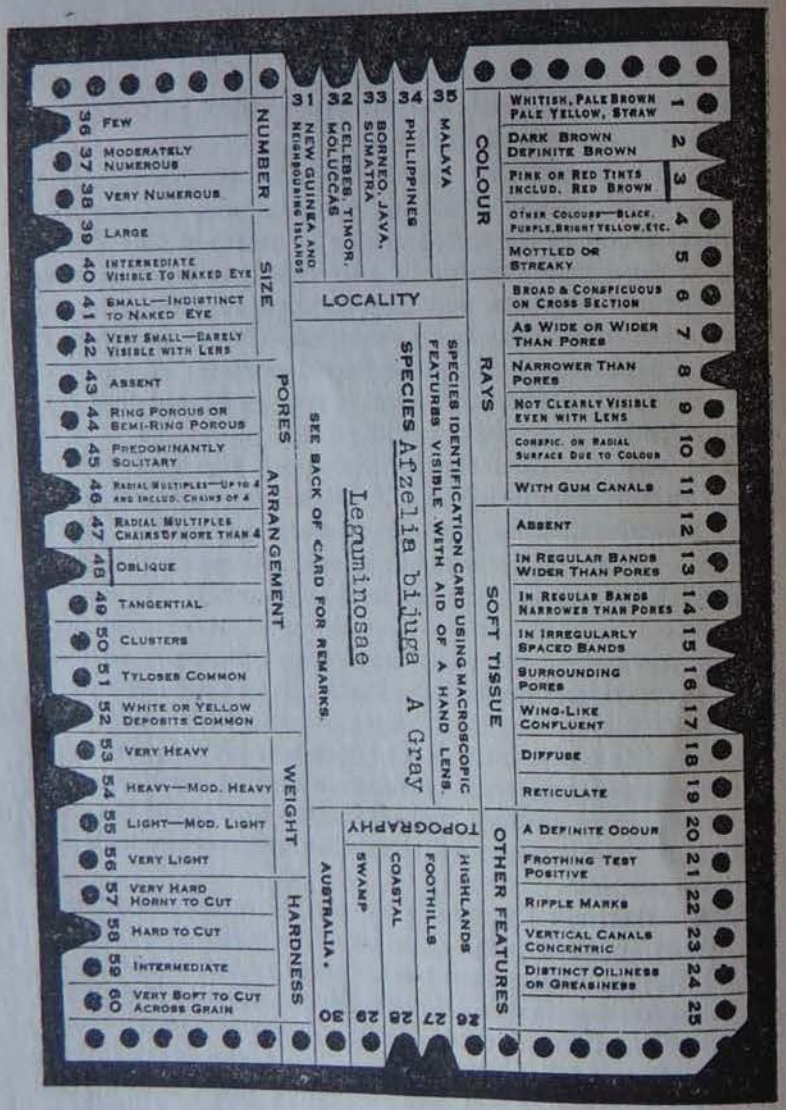

FIGURE 1

timber species and, because of the height of the trees, the density of the forest and the mixture of foliage in the canopy it is practically impossible to distinguish or identify all of these from the ground. What does impress the newcomer to this type of forest is the number of clear stems 70-90 feet in height. A great number of the trees of the first story with long, clear, boles 2′ to 3′6″ in diameter above the buttresses provide timbers of value, but during war-time every tree of suitable dimensions and with a clear bole is cut into timber and the very great mixture causes no immediate concern. However, this indiscriminate cutting is likely to bring unfavorable results when the structures being built are required to be semi-permanent and not of the type that may be left after one or two months. Thus, it is highly desirable that there be some knowledge of the properties and likely uses of the various species and this knowledge will be even more essential in the post-war period. The selection of timbers for piling only on the basis of long straight stems may enable a wharf structure to be built quickly, but it is not likely to give the best results where many of the best looking sticks in the forest are of species giving soft light timber of insufficient strength to stand either driving or the hard knocks that a wharf is likely to sustain.

For general information, therefore, the following list has been drawn up with the object of (i) giving some indication of the wide variety of species represented in these areas and (ii) indicating the possible use classification of the common species encountered. In practically all cases generic names only have been listed; it will be realized that each genus may cover a number of different yet equally important species. Further, reference has been made only to those species which would give timber suitable for milling; in other words, numerous species of the second and third stories and some of the first story have not been mentioned. Specimens from species of all the genera listed have been examined by the Division of Forest Products and practically all the genera were encountered by the author during his visit to the New Guinea area. The list is necessarily incomplete as it includes few of the high country species and many speci-

mens collected have not yet been finally identified. It is certain that the number of genera of interest from the timber point of view will be increased.

A. Wood dense, hard, with some reputation for durability and useful for posts, heavy construction and possibly piling.

Casuarinaceae	*Casuarina equisetifolia, C. nodiflora*
Lecythidaceae	*Planchonia timorensis*
Leguminosae	*Afzelia bijuga*
Myrtaceae	*Syzygium, Xanthostemon*
Rhizophoraceae	*Bruguiera, Ceriops, Rhizophora*
Rosaceae	*Parinarium*

B. Wood not as dense or hard as Group A but of definite value for constructional work.

Combretaceae	*Terminalia* (denser species)
Dipterocarpaceae	*Anisoptera, Hopea, Vatica*
Ebenaceae	*Diospyros*
Fagaceae	*Castanopsis, Lithocarpus*
Guttiferae	*Calophyllum, Garcinia*
Meliaceae	*Dysoxylum* (denser species)
Myrtaceae	*Rhodamnia*
Polygalaceae	*Xanthophyllum*
Rubiaceae	*Nauclea*
Sapotaceae	*Niemeyera, Planchonella*
Sonneratiaceae	*Sonneratia*
Sterculiaceae	*Heritiera*
Ulmaceae	*Celtis* (denser species)
Verbenaceae	*Vitex*

C. Wood of moderate weight and hardness (approximately equivalent to oak) and useful for general constructional purposes.

Cunoniaceae	*Weinmannia*
Combretaceae	*Terminalia*
Dilleniaceae	*Wormia quercifolia*
Euphorbiaceae	*Glochidion*
Meliaceae	*Chisocheton, Dysoxylum, Xylocarpus*
Myrtaceae	*Eucalyptus deglupta*

Proteaceae	*Grevillea, Helicia*
Rosaceae	*Pygeum*
Sapindaceae	*Pometia pinnata, Tristiropsis, Ganophyllum falcatum*
Sapotaceae	*Palaquium*
Ulmaceae	*Celtis* (other than dense species)

D. Wood with some reputation for durability but not with sufficiently high strength properties to fall within Groups A, B or C.

Lauraceae	*Cinnamomum*
Leguminosae	*Pterocarpus indicus*
Magnoliaceae	*Michelia*
Meliaceae	*Cedrela*

E. Wood moderately light to light in weight and useful for light construction, shelving, furniture, etc.

Anacardiaceae	*Buchanania, Campnosperma, Dracontomelum, Semicarpus, Spondias*
Apocynaceae	*Alstonia, Cerbera*
Araucariaceae	*Araucaria*
Elaeocarpaceae	*Elaeocarpus, Anoniodes, Aceratium*
Euphorbiaceae	*Endospermum* (straight stems)
Lauraceae	*Litsea, Cinnamomum, Cryptocarya*
Leguminosae	*Pterocarpus, Pongamia, Maniltoa*
Magnoliaceae	*Michelia*
Meliaceae	*Cedrela*
Moraceae	*Artocarpus, Antiaris, Ficus* (denser species)
Myristicaceae	*Myristica, Horsfieldia*
Podocarpaceae	*Dacrydium, Phyllocladus, Podocarpus*
Rubiaceae	*Sarcocephalus*
Rutaceae	*Evodia, Flindersia*
Sapindaceae	*Pometia, Ganophyllum, Tristiropsis*
Sterculiaceae	*Kleinhovia, Pterocymbium*
Tiliaceae	*Brownlowia*
Verbenaceae	*Gmelina*

The numerous other species which are encountered have no very great possibilities.

In general, it has been found that the most useful timbers are likely to be derived from the families Meliaceae, Sapotaceae, Myrtaceae, Rosaceae, Sapindaceae, Ulmaceae, Leguminosae, Lecythidaceae, Casuarinaceae, Guttiferae, Fagaceae, Combretaceae, Sonneratiaceae, Rhizophoraceae, Ebenaceae, Araucariaceae.

The above classification is by no means perfect but it has been put forward as a workable scheme until such time as more details on the physical properties of the various species are available. It will be recognized that any successful commercial exploitation of the timbers of the tropical rain forests depends on a number of factors, but one of these must be the utilization of as many of the timber species as possible. Selective logging is practically impossible, although in some areas certain species or groups of species seem to form a fair percentage of the stand.

It was of considerable interest to note the rather common occurrence of tension wood in species of the rain forest where most of the trees appeared to have long straight clear stems in which tension wood would not be suspected. It was observed, however, that typical tension wood bands of dense wood with fewer and smaller pores occurred commonly in certain species. Laboratory examination of specimens cut from the neighborhood of these bands confirmed the field diagnosis. Logs from these species gave considerable trouble in sawing, the saw cut becoming clogged with long masses of fiber very similar to wood wool. This fibrous material was caught up by the saw teeth, the saw became badly heated and finally jammed in the log. Damage to saws was considerable and time was lost in removing the log. Bad tension wood was found in the following:

Burseraceae	*Canarium*
Euphorbiaceae	*Endospermum*
Lauraceae	*Cinnamomum, Cryptocarya, Litsea*
Leguminosae	*Albizzia*
Moraceae	*Artocarpus*

Tension wood was also observed in the buttresses of many other species and in the wood of the stem just above the main buttresses. Its development in the main stem is possibly

related to the efforts of the tree to obtain sufficient light in the dense rain forest jungle.

Many trees of the rain forests exude a milky fluid on damaging the bark; these include species of the Moraceae, Sapotaceae, Euphorbiaceae, Anacardiaceae, Apocynaceae and some unidentified species of Meliaceae. In certain cases, particularly species of Anacardiaceae, this exudation causes dermatitis.

In the following tabulations the occurrence of certain definite anatomical features in New Guinea timber species have been set out. It will be seen that, in general, this occurrence is as would be expected from a knowledge of family characteristics.

I. Woods ring-porus.

Leguminosae	*(Pterocarpus)*
Lythraceae	*(Lagerstroemia)*
Meliaceae	*(Cedrela)*

II. Vessels in typical tangential arrangement.

Proteaceae	*(Grevillea)*
Rhizophoraceae	*(Carallia)*

III. Vessels virtually all solitary.

Casuarinaceae	
Cunoniaceae	*(Weinmannia)*
Dilleniaceae	*(Wormia)*
Dipterocarpaceae	*(Anisoptera, Hopea, Vatica)*
Fagaceae	*(Castanopsis, Lithocarpus)*
Gnetaceae	
Guttiferae	*(Calophyllum)*
Myrtaceae	*(Eucalyptus, Rhodamnia, Xanthostemon)*
Polygalaceae	*(Xanthophyllum)*
Rosaceae	*(Parinarium)*
Rubiaceae	*(Gardenia, Pavetta, Randia)*
Theaceae	*(Gordonia)*
Vitaceae	*(Leea)*

IV. Vessel elements with scalariform perforation plates.

Anacardiaceae	*(Campnosperma)*
Cunoniaceae	*(Weinmannia)*

Dilleniaceae	*(Wormia)*
Euphorbiaceae	*(Baccaurea)*
Magnoliaceae	*(Michelia)*
Rhizophoraceae	*(Bruguiera, Rhizophora)*
Theaceae	*(Gordonia)*

V. Vessels with very fine pitting.

Flacourtiaceae	*(Homalium)*
Malvaceae	*(Hibiscus)*
Meliaceae	*(Dysoxylum, Xylocarpus)*
Tiliaceae	*(Brownlowia)*

VI. Woods with conspicuous rays.

Casuarinaceae	(excepting *Casuarina equesetifolia)*
Fagaceae	*(Castanopsis, Lithocarpus)*
Icacinaceae	*(Tylecarpus)*
Proteaceae	*(Grevillea)*
Rhizophoraceae	*(Carallia)*
Sterculiaceae	*(Pterocymbium, Sterculia)*
Vitaceae	*(Leea)*

VII. Woods with storied structure (ripple marks).

Bombacaceae	*(Bombax)*
Leguminosae	*(Albizzia, Maniltoa, Pterocarpus, Pongamia)*
Malvaceae	*(Hibiscus, Thespesia)*
Meliaceae	*(Xylocarpus)*
Steculiaceae	*(Heritiera, Kleinhovia, Pterocymbium, Sterculia)*
Tiliaceae	*(Brownlowia)*

VIII. Woods which give positive frothing test.

Leguminosae	*(Albizzia moluccana)*
Sapindaceae	*(Ganophyllum, Pometia, Tristiropsis)*
Sapotaceae	*(Palaquium, Planchonella)*
Rhamnaceae	*(Alphitonia moluccana)*

IX. Horizontal gum canals in rays.

Anacardiaceae	*(Buchanania, Campnosperma, Spondias)*
Euphorbiaceae	*(Pimeleodendron)*
Moraceae	*(Antiaris, Artocarpus)*
Myristicaceae	Tanniniferous tubes present.

X. Reticulate parenchyma.

Anonaceae	*(Canangium)*
Apocynaceae	*(Alstonia)*
Bombacaceae	*(Bombax)*
Ebenaceae	*(Diospyros)*
Euphorbiaceae	*(Aleurites, Baccaurea, Endospermum, Macaranga, Mallotus, Pimeleodendron)*
Icacinaceae	*(Tylecarpus)*
Lecythidaceae	*(Planchonia)*
Malvaceae	*(Thespesia)*
Polygalaceae	*(Xanthophyllum)*
Rubiaceae	*(Sarcocephalus)*
Sapotaceae	*(Niemeyera, Palaquium, Planchonella)*
Sterculiaceae	*(Heritiera, Kleinhovia, Sterculia)*
Theaceae	*(Gordonia)*
Tiliaceae	*(Brownlowia)*

XI. Septate fibers.

Anacardiaceae	*(Campnosperma, Dracontomelum, Spondias)*
Burseraceae	*(Canarium, Garuga)*
Euphorbiaceae	*(Antidesma, Glochidion)*
Flacourtiaceae	*(Homalium)*
Lythraceae	*(Lagerstroemia)*
Meliaceae	*(Aglaia, Dysoxylum, Xylocarpus)*
Moraceae	*(Antiaris)*
Sapindaceae	*(Ganophyllum, Pometia, Tristiropsis)*
Sonneratiaceae	*(Sonneratia)*
Verbenaceae	*(Avicennia, Gmelina, Vitex)*
Vitaceae	*(Leea)*

XII. Oil cells present (or similar enlarged cells).

Anonaceae	*(Polyalthia)*
Combretaceae	*(Terminalia)*
Hernandiaceae	*(Hernandia)*
Lauraceae	*(Cinnamomum, Litsea, Cryptocarya)*
Magnoliaceae	*(Michelia)*

XIII. Fibers with conspicuously bordered pits.

Casuarinaceae	
Cunoniaceae	*(Weinmannia)*

Dilleniaceae	*(Wormia)*
Fagaceae	*(Castanopsis, Lithocarpus)*
Guttiferae	*(Calophyllum)*
Lecythidaceae	*(Planchonia)*
Magnoliaceae	*(Michelia)*
Myrtaceae	*(Eucalyptus, Rhodamnia, Xanthostemon)*
Rosaceae	*(Parinarium)*
Rubiaceae	*(Gardenia, Morinda, Pavetta, Randia, Sarcocephalus)*
Theaceae	*(Gordonia)*

XIV. Woods very hard and heavy.

Casuarinaceae	*(Casuarina)*
Myrtaceae	*(Xanthomyrtus, Syzygium, Xanthostemon)*
Rhizophoraceae	*(Bruguiera, Rhizophora)*
Rosaceae	*(Parinarium)*

In Australia, there is naturally a considerable amount of interest in the possibility of obtaining timber supplies from the New Guinea region after the War. From the somewhat limited observations that it was possible to make it is the opinion of the writer that there is sufficient timber there to support a fair sized timber industry provided that efforts are made to cut and market a number of species instead of trying to take out only 2 or 3 species. The very great mixture of species, indicated to some extent in this paper, and the difficulties of access to the rain forest areas, make it essential that all the useful species in an area being milled should be taken. The question of access to the forest areas is most important and, in the early stages at least, it would appear that only coastal areas would be touched. All the timber species in such areas and in the foothills are of the "hardwood" type. "Softwoods," and the two most important are Hoop Pine *(Araucaria cunninghamii)* and Klinki Pine *(Araucaria klinkii)*, are confined to the higher country above 3,000 feet. From all reports these are of a size and quality to make them most desirable but they must remain inaccessible until some means of access can be provided.

A NEW SPECIES OF COPAIFERA FROM PANAMA

By John D. Dwyer

Union University, Albany College of Pharmacy

Copaifera aromatica Dwyer, sp. nov.—Arbor ad 30 m.; cortex aromaticus; ramuli nodosi saepe colore varii cinereo-argenteo-brunnei flavo-brunnei vel nigro-brunnei subglabri ad apicem subangulares (saepe distincte contorti) vel ad apicem subplani lenticellis plerumque rugosis distinctisque; petiola foliorum gracilia praecipue glabra, 11—20 cm. longa; folia 16—30 cm. longa; foliola 8—12 (4—6 duo) alternata vel opposita distincte inaequilateralia glabra supra infraque minuto-farinosa punctata (saepe indistincte) angusto-ovato-oblonga lato-ovato-oblonga vel lato-oblonga, 2.5—9 cm. longa, 1.3—3.5 cm. lata, in longum falcato-acuminatum apicem attenuata minuto-retusa basi obtusa (rare cuneata vel plano-obtusa) costa supra plana infra prominente supra glabra vel pubescente infra hirsuto-pubescente venis principalibus secundariis ab costa 20—30+55°—60° angulo abeuntibus proxime margines bifurcatis margine gracile-calloso glandulosonitente glabro; floribus non visis; legumen (hic indehiscens) in siccitate crassum brunneum vel rubro-brunneum oblongo-rotundum obovato-rotundum, ad 3.1 cm. longum, 2.9 cm. latum, apice obtusum basi obtusum ad lato-cuneatum endocarpo in siccitate rubro-brunneo seminibus nigris laevibus haud oblique notatis obovato-oblongis, 1.5 cm. longis, 1.1 cm. latis arillo obscuro-rubro (in immaturis seminibus galeatis) vix cristato, 1.7 cm. longo, in parte basin seminis involvente.

Tree up to 30 m. high; bark aromatic; petioles of leaves glabrous, 11—20 cm. long; leaves 16—30 cm. long; leaflets 8—12 (4—6 pairs), glabrous, punctate (often indistinctly so), inequilateral, narrowly ovate-oblong, widely ovate-oblong or wide-oblong, 2.5—9 cm. long, 1.3—3.5 cm. wide, long-falcate-acuminate at apex, cuneate at base, the secondary veins 20—30+, ascending from costa at 55°—60° angle; flowers not seen; legume (immature) obovate-rotund, 3.1+ cm. long, 2.9+ cm. wide, the seeds obovate-oblong, 1.5+ cm. long, 1.1+ cm. wide, the arillus 1.7+ cm. long.

Distribution: Known only from Panama.

PANAMA: Province unknown: Belle Vista, *Macbride 2755* (US Nat. Herb., type of *C. aromatica);* Chiriquí: Hercon-citos, *Pittier 5118* (NY Bot. Garden); San Felix, *Pittier 5263* (Field Mus. and US Nat. Herb.); Veraguas: *Karszenisz* s.no. (Field Mus., photo and frag.).

C. aromatica, deriving its name from its coumarin-scented redolent bark, has already received two manuscript names, one from Pittier: *C. chiriquiensis* and one from Klotsch (?): *C. punctata.*[1]

While the leaflets of the new species resemble those of *C. multijuga* Hayne, particularly in the possession of a long-attenuate apex, nevertheless no floral material of *C. aromatica* was available to substantiate this alliance, as the outstanding characteristics of Hayne's species appear to be found in the flowers. While the number and size of the leaflets of *C. aromatica*, as well as their narrow-elliptic or ovate-elliptic shapes and falcate-acuminate apices suggest its relationship with *C. panamensis* (Britton) Standley, *C. reticulata* Ducke, and *C. paupera* Herzog, the new species has consistently larger leaves with the acumination of the blades of the leaflets obviously longer than in any species of this complex. In general the leaflets of *C. panamensis* are only vaguely acuminate at the apex, with the exception of one collection which I have seen, *Allen 816* (NY) whose leaflets are decidedly falcate-acuminate at the apex; despite the fact that this collection has more leaflets than the others examined, nevertheless these measure only 4 to 5 cm. in length. A study of comparative leaflet size reveals a range of 3 to 5 cm. in length for *C. panamensis* and about 7 cm. in length for *C. aromatica.* While the fruit of the material of the former species is immature, it appears to have been collected just prior to dehiscence. Its immature valves measure 2 cm. in length while the dehiscent legumes of *C. aromatica*, even though unopened, attain a length of 3.1 cm. Field notes reveal that *C. panamensis* is about one-half the height of *C.*

[1]This name is not to be confused with the validly published *C. epunctata* Amsh. (Mended Bot. Herb. Ryksuniv. Utrecht 52:9. 1939).

aromatica. C. reticulata and *C. paupera*, the two species of Amazonian Brazil and adjacent Bolivia and Peru have considerably smaller leaves with the leaflets proportionately smaller and short-acuminate, with the principal and parallel secondary veins 15 to 20 in number as opposed to the 20 to 30+ of the new species.

There is no record of *C. aromatica* yielding the oleoresin, Balsam of Copaiba. Pittier has attached wood samples to his collections deposited in the U. S. National Herbarium.

CURRENT LITERATURE

Algumas novidades do gênero *Aristolochia,* da flora sulamericana, descobertas nos herbarios do Jardim Botânico do Rio de Janeiro e do United States National Museum, de Washington, U. S. A. By F. C. HOEHNE. *Arquivos Bot. do Estado de S. Paulo* 1: 4: 89-92; 3 plates; 1942.

Aristolochia Loefgroenii Hoehne, *A. Schmidtiana* Hoehne, *A. decursive-bracteata* Hoehne, and *A. Limai* Hoehne are described as new.

Uma nova elaeocarpaceae de São Paulo. By F. C. HOEHNE. *Arq. Bot. do Estado de S. Paulo* 1: 4: 93-94; 1 plate; 1942.

Sloanea Fernando-Costae Hoehne is a new species here described.

***Vernonia* et *Verbesinae* novae brasiliensis.** By F. J. TOLEDO. *Arq. Bot. do Estado de S. Paulo* 1: 4: 95-98; 4 plates; 1942.

Herein are described one new species of *Vernonia* and three of *Verbesina.*

Duas novas *Aristolochia* a serem acrescentadas. By F. C. HOEHNE. *Arq. Bot. do Estado de S. Paulo* 1: 6: 135; 2 plates; April 1944.

The two new species are *A. Eggersii* Hoehne and *A. peltato deltoidea* Hoehne.

Uma nova espécie de Opiliaceae do Jardim Botânico de São Paulo. By F. C. HOEHNE. *Arq. Bot. do Estado de S. Paulo* 1: 6: 136-137; 1 plate, April 1944.

Agonandra Englerii is separated from *A. brasiliensis* Miers and described as new.

Contributions to the flora of extra-tropical South America, V. By HAROLD N. MOLDENKE. *Lilloa* (Tucumán, Argentina) 10: 1: 285-362; 1944.

There are listed 153 genera of 29 families, the majority from Argentina, others from Bolivia, Chile, Patagonia, Paraguay, and Uruguay.

Two new species are included: *Peperomia san-pedritoi* Trelease and *P. Venturii* Trelease, both from Argentina, and one new combination: *Piper argentinum* (C. DC.) Trelease [*P. Gaudichaudianum* var. *argentinum* D. DC.].

Contributions to the flora of extra-tropical South America, VI. By HAROLD N. MOLDENKE. *Lilloa* 10: 2: 363-385; December 1944.

"A report on 281 more specimens of extra-tropical South American plants received by the writer for study since the publication of the previous installment of this series."

Two genera of the family Lamiaceae are included, four genera of Euphorbiaceae, and eleven genera of Verbenaceae.

Lythraceae argentinae (addenda). By ALICIA LOURTEIG. *Lilloa* 10: 2: 387-394; 2 figs., 1 map; December 1944.

Since the appearance of the author's work, "Lythraceae argentinae," in *Lilloa* 9: 317-421 (1943), she has had the opportunity of taking some trips which allowed her to observe various species in their natural state, and also to study material pertaining to a species hitherto not cited for the flora of Argentina *(Heimia myrtifolia)*. These circumstances have led her to make some changes which are the reason for this present publication.

Una nueva especia de *Opuntia*. By A. CASTELLANOS and H. V. LELONG. *Lilloa* 10: 2: 395-402; 3 plates; December 1944.

Opuntia Schulzii Castell. & Lelong (synonym: *O. argentina* Spegazz. non Griseb.) is described as new, and is found by the authors to be very close to *O. bahiensis* Britt. & Rose. The new plant has been named for Señor Augusto Schulz, who first sent specimens of the plant to the authors.

Los tuberculos radiculares del Aliso (*Alnus jorullensis* H. B. K. var. *Spachii* Regel.). By A. CASTELLANOS. *Lilloa* 10: 2: 413-416; 2 figs.; December 1944.

"The author, in order to place the species, transcribes the original description of the subgenus *Gymnothyrsus*, illustrating it with drawings of the inflorescence and the flowers. He also describes and illustrates the radical tubers of this species."

Contribucion a la flora de San Luis, II. El guyacan del bajo de los Velez. By A. CASTELLANOS. *Lilloa* 10: 2: 433-444; 1 plate, 1 map; December 1944.

In this work the author treats the presence of "chaqueña" species in the interior of Argentina, taking as example *Caesalpinia melanocarpa*, a theme already treated by him in 1926 in work upon the geographic scope of *Trithrinax campestris* in the province of San Luis.

Contribucion al conocimiento de tres arboles argentinos de la familia de las Mirtaceas. By DIEGO LEGRAND. *Lilloa* 10: 2: 471-482; 1 plate; December 1944.

"Following with his botanical research on Argentine Myrtaceae, the author describes a new species: *Eugenia pseudo-mato*, making its study comparatively with *E. mato* Griseb. and *E. Güili* Speg., species affines, which live in the same region of Tucumán and Catamarca."

La especie de *Ficus* del noroeste argentino. By A. CASTELLANOS. *Lilloa* 10: 2: 483-491; 4 figs., 1 plate; December 1944.

The author describes as a new species, with the name of *Ficus Maroma*, the tree commonly called "maroma" which

has already been indicated by Hauman in 1925 for the region of the northwest of Argentina.

Plywood. By J. L. HARRISON-SMITH. *The New Zealand Journ. of Forestry* 5: 1: 35-41; 1942-1944.

The author gives a thorough and useful discussion of the business of manufacturing plywood in New Zealand, from species used and preparation of logs to drying and trimming the finished product.

***Pinus ponderosa:* comparison of various types grown experimentally at Kaingaroa State Forest.** By A. M. MOORE. *The N. Z. Journ. of Forestry* 5: 1: 42-47; 2 tables; 1942-1944.

"The only exotic tree species successfully established on 'frost flats' in the Kaingaroa State Forest are *P. ponderosa* and *P. contorta* var. *Murrayana*. Some of these stands are of poor type and attention should be paid to seed origin when preparing for future plantings.

"Data has been collected from an experimental block representing tree types of *P. ponderosa* from 13 localities in North America. Of these types those which center on Eldorado County in Northern California are the optimum."—*Author's summary.*

The flooring timbers of New South Wales. Bull. No. 1, Div. Wood Tech. N. S. W. For Com., Sydney, February 1942. Pp. 48; 6 x 9½.

"Flooring is one of the major uses to which our timbers are put, so that any economy in use, any contribution to the more economic logging of our forests is of notable assistance to the nation's war work.

"This book indicates to you those flooring timbers which are available in New South Wales, and it tells you where and how to use these timbers to their best advantage. If you take note of the instructions contained herein you will have helped to achieve the wartime objects indicated above.

"The usefulness of this publication is not confined to war conditions. It fills a much needed peace-time want for

information regarding the special qualities of our timbers. It demonstrates the limitless possibilities latent in the timbers of New South Wales and points out many fresh timbers with which to enrich our buildings."—*Preface by Minister for Agric. and Forests.*

Commercial Eucalyptus oils. By A. R. PENFOLD and F. R. MORRISON. Bull. No. 2, Technological Museum, Sydney, Australia (fourth and revised edition), 1944. Pp. 36; 5½ x 8¼. Price 1 shilling.

"The demand for information on Eucalyptus oils in a handy form is responsible for the issue of the fourth edition of this Bulletin. There is very little change in the format: Part I treats briefly of each species, with location of areas, yields of oil, principal constituents, the physical and chemical constants of the respective oils. Part II deals with routine laboratory methods for the examination of commercial Eucalyptus oils and their principal constituents."—*from Authors' preface.*

Guide to the extraction of Eucalyptus oil in the field. By A. R. PENFOLD and F. R. MORRISON. Bull. No. 4, Technological Museum, Sydney, Australia (fourth and revised edition), 1945. Pp. 24; 9 plates; 2 text figs.; 5½ x 8¼. Price 1 shilling.

"The issue of this revised edition was found necessary, for wartime conditions have stimulated increased production of Eucalyptus oils, whilst price fixation in 1943 helped to stabilize the industry. The increasing demand for Eucalyptus *dives* oil (type) for its piperitone content—the principal raw material for the manufacture of synthetic thymol and menthol—has been responsible for a steady rise in production of Eucalyptus oils for industrial purposes during the last 15 years. The popularity of disinfectants and deodorants based upon Eucalyptus oils has greatly stimulated production of those industrial grades rich in phellandrine and containing 25 per cent. to 30 per cent. of cineol."—*from Authors' preface.*

Notas a la flora de Colombia, VI. By José Cuatrecasas. *Rev. Acad. Col. Cienc. Ex., Fís., & Nat.* (Bogotá) 6: 21: 32-67; 33 figs.; December 1944.

The author describes one new genus (*Neocaldasia*, family Compositae), 43 new species, two new varieties, and one new form. Of the species 32 belong to the Compositae: *Senecio*, 23; *Gynoxys*, 5; *Liabum*, 2; *Neocaldasia*, 1; *Culcitium*, 1. One new species each is listed for *Theobroma* (Sterculiaceae), *Hypericum* (Guttiferae), and *Puya* (Bromeliaceae); two for *Quercus* (Fagaceae); four for *Cecropia* (Moraceae); two for *Mayna* (Flacourtiaceae).

Nuevas contribuciones al conocimiento de la provincia de Esmeraldas. I. By M. Acosta Solis. Quito, Ecuador. Pp. 606; 9½ x 6½; 11 special plates; 89 photos; 7 maps; 32 geol. outlines; 7 graphs; 17 figs.; 1944.

Following is a translation of the author's opening paragraphs:

"Up to the present time I have succeeded in knowing and studying the rich province of Esmeraldas, principally its coasts and part of its forests. And the result of the trips accomplished in this province I am presenting in the form of *Contribuciones* (Tomo I), declaring that, when I succeed in realizing new excursions and obtaining new observations, I shall publish the complete work, as I desire.

"Intentionally I am leaving the botanical part for a second publication (Tomo II) of these *Nuevas Contribuciones*, since I believe that by then I shall have completed the work. What is now published referring to the vegetation of Esmeraldas is only a chapter enumerating the principal forest species of the province."

The subjects taken up in detail include: geography, climatology, fauna, insects, agriculture, archeology, the Capaya Indians, educational problems, and the commerce of Esmeraldas.—Mary Record.

Estudio xilológico del *Drimys Winteri*. By Lucas A. Tortorelli. *Rev. de la Fac. de Agron. y Vet.* (Buenos Aires) 11: 1: 42-49; 1 fig., 1 plate; 1944.

"The structure of dicotyledones characterized by the presence of timbers formed by tracheas, fibers, ligneous radius and ligneous parenchyma, separates itself markedly from that which presents the timber of *Drimys Winteri*. Notwithstanding, this species of the dendrologic flora of the subantartic woods, lies within this great class. On the other hand it exhibits great similarity with the timber of the conifers, since as they, it has only ligneous (woody) tracheas, and radius; but these last ones are uni- or multiserials.

"The material has been collected in the Beagle channel (Tierra del Fuego) and its classification seems to correspond to *D. Winteri*, var. *chilensis*, although this variety has not been marked in the bibliography consulted for the region where I found it."—*Author's summary*.

Nota preliminar sobre una modificacion de la sistematica del genero *Verbena*. By Benno Schnack. *Anal. Inst. Fitotéc. Sta. Catalina* (Buenos Aires) 4: 17-22; 1944.

"This work shows that the classification given by Schauer of the genus *Verbena* in the two sections *Glandularia* and *Verbenaca* does not agree with the classification in two cytological groups; one of these groups has small chromosomes, being 7 the basic number, and the other group has chromosomes of a larger size, with 5 as the basic number. It is concluded that the taxonomy of the genus *Verbena* should be modified on the basis of the cytological groups."—*Author's summary*.

Paper-making materials of the British Empire. By J. R. Furlong. *Bull. Imp. Inst.* (London) 42: 4: 232-250; October-December 1944.

"This lecture (delivered before the Royal Society of Arts, March 21, 1944) is a review of the principal materials to be found in Empire countries which are being employed for the production of paper, or which may be considered as new

materials for that purpose, and of the prospects of expanding the Empire pulp industries. With processes of manufacture of pulp and of paper we are not concerned."

The following phases are discussed: The world position of pulp production; Outlook for new materials; The present position of pulp production in Empire countries; New materials and development of Empire pulp production.

On the taxonomic value of the anatomical structure of the vegetative organs of the dicotyledons. 3. The rôle of anatomy in the practical identification of commercial timbers. By B. J. RENDLE. Proceedings of the Linnean Society of London, Session 155, 1942-43, Pt. 3, 9 June 1944.

"The vegetative parts of a plant are subject to more variation than the sexual organs, and in the case of wood the difficulty of selecting a single typical specimen of reasonable proportions is increased by the large size of the average tree trunk. Thus the principle of referring to a type specimen cannot be applied to timber in quite the same way as it is to herbarium material."

"As regards the possibility of using family characteristics in the identification of timbers, some well-defined families or groups of related families show combinations of anatomical features which are remarkably distinctive, so that their timbers can be recognized almost at a glance. On the other hand, families often appear extremely heterogeneous so far as the structure of their timbers is concerned. . . ."

"In practice, therefore, the classification of timbers for the purpose of identification does tend to cut across the accepted botanical system, though probably no more than any other artificial method of classification."

Studies of Central American plants. VI. By PAUL C. STANDLEY and JULIAN A. STEYERMARK. *Bot. Ser. Field Mus.* 23: 4: 153-191; November 27, 1944.

"In this brief paper there are described new species of plants from Guatemala, preparatory to publication of a flora of that country. A large proportion of the new species belong to the genus *Eupatorium*, which is represented more lavishly in Guatemala than in any other region of Central America."

Fragmenta papuana (Observations of a naturalist in Netherlands New Guinea). By H. J. LAM. Translated from the Dutch by LILY M. PERRY. *Sargentia* (Arnold Arboretum, Jamaica Plain, Mass.) 5: 1-196; 2 maps; 32 text figs.; February 1945.

This valuable and well translated work, which is complete with index, is divided into the following chapters: I. Chronological survey of the Mamberamo Expendition to Central New Guinea, 1920-1922 in particular. II. Some meteorological data during the Central New Guinea expedition 1920-1921. III. Impressions of the Lower Mamberamo Territory. IV. The Meervlakte and the foothills. V. The north slope of the Central Mountain Range. VI. Above the forest limits: Doormantop and its vegetation. VII. Land and people of the Dika and Toli Valleys.

Plants and Plant Science in Latin America. Pub. by the *Chronica Botanica* Company (Waltham, Mass.) 1945. 38 plates; 49 text illusts.

"For a number of reasons . . . the editors of *Chronica Botanica* felt that an account concerning the vegetation and natural resources, as well as the present status and future of a number of branches of the plant sciences in Latin America, would be the most appropriate contribution they could make at present to the improvement of international relations and coöperation in the plant sciences, a field which presents in Latin America many problems of a great, often truly international, importance.

"The aim of this collection of articles which we started in 1941 in *Chronica Botanica* was to give the agronomist, botanist, forester and phytopathologist (whether he be located in the Americas or in Europe) information which he may need when starting work on the wild or cultivated plants of Latin America. It was hoped that it might be still

more useful for those who plan to go to Latin America to collect or to conduct research. The collection endeavoured to give some information concerning the present status of and the future possibilities and needs for research in the chief branches of the pure and applied plant sciences. In addition to data in his own field, the specialist will find much useful and stimulating information on vegetational and agronomic problems in general, on the organization of research, lists of books that he may consult, addresses of institutions and societies in the territory in which he is interested and which he may profitably contact, etc.

"We succeeded in obtaining so much material for our collection of articles that we soon had much more than could find a place in *Chronica Botanica*. At the suggestion of several correspondents we then decided to bring together all articles on this subject, those published in *Chronica Botanica*, those not yet published, and many additional ones, in one volume, which we are presenting herewith. Part 1 (pp. 1-260) consists primarily of articles not previously published. Only a few of the articles in this part have already appeared in the *Chronica* (but these have been revised by the authors in the meantime). Part 2 (pp. 261-349) consists, with a few exceptions, of reprints (mostly somewhat revised) of articles already published in the columns of *Chronica Botanica*.

"The attention of all readers is drawn to the detailed table of contents on p. 350 seq. As it was not feasible to prepare a subject index for our polyglot volume, it is important that every reader examine this table of contents with some care! It contains in Part I cross-references to Part 2 and vice versa."—From *Editor's foreword*

Las plantaciones de cedro en Cuba: Causas de su fracaso. By Juan T. Roig. Almanaque 1945, pp. 135-137. Pub. by Min. de Agric., Havana, Cuba.

For more than thirty years there has been intensified propaganda in Cuba for the purpose of increasing the sowing of cedro on a commercial scale. The Estación Experimental Agronómica de Santiago de las Vegas has distributed annually thousands of plants of cedro for the purpose. Since the cedro can be cut in thirty years, one would expect that there would by now be a large quantity of wood and that its price would be relatively cheap. But in reality the majority of the plantations have failed, totally or partially, and what cedar wood is available is daily more scanty, first grade wood selling at present for more than $200 a thousand feet, such as was sold at $60 a thousand feet ten or fifteen years ago.

The author found that in the interior of the Island, in general all the plantings of cedro made in pure stands, in open fields, had resulted in failure, and that the same had happened with plantings in impermeable terrains and in those very dry and arid.

The following conditions are considered by the author most favorable for the cultivation of cedro: 1) A fertile terrain, mostly calcareous, and with an alkaline or neutral reaction. 2) An inclined terrain or one with drainage. 3) Lateral shade during the first years, which could be given by *Platanus* or similar plants. 4) Planting in association with other trees that give shade, not dominant, and protection against the wind.—Mary Record.

Riqueza forestal dominicana. By José Schiffino. *Rev. de Agricultura* (Dominican Republic) 35: 153: 40-44: 4 photos; March-April 1944.

Three trees of the Dominican Republic are discussed in terms of their value to commerce. Cedro *(Cedrela odorata* L.), abundant throughout all the Republic, has been found excellent for doors and windows because it is soft and porous. It has also been found superior for diaphragms of phonographs, as it does not deform or change the musical vibrations in any way. Caya amarilla *(Sideroxylon foetidissimum* Jacq.), also abundant in all the Republic, has fruits edible to cattle; the general opinion is held in the country that the milk or latex which issues abundantly when the trunk is cut will help to cure hernias. The wood of Caya

amarilla is utilized in bridges, riverside structures, telegraph poles, etc., although the sapwood rots in contact with the ground, and must be protected by concrete if it is desired to last any length of time. Caya colorada *(Dipholis salicifolia* (L.) A. DC.) grows only in humid or semi-humid terrains. It is much used for all shore work, where it is unsurpassable, as it resists inclemency of salt water very well. It is not recommended for cabinet work as it cracks badly, but can be used for ordinary construction work, flooring, and such.—MARY RECORD.

El descubrimiento y distribucion de la *Cinchona pitayensis* en el Ecuador. By WILLIAM CAMPBELL STEERE. *Flora* (Official organ of the Inst. Ecuat. de Cienc. Nat., Quito, Ecuador) 4: 11: 13-21; 2 plates; May 1944.

This species of *Chinchona* had not been collected in Ecuador, as far as known, until the author found it in the province of Carchi, near Tulcán, August 1943. Since the initial discovery, various explorations have been made with the object of determining its geographic distribution in the country. Large quantities of the plant were found along all the western slopes of the Cordillera Occidental, between the Colombian frontier and the Río Mira, in the province of Carchi. In December 1943 appreciable stands of *Cinchona pitayensis* were found in the province of Imbabura, on the suboccidental declivities of the volcano of Cotacachi, west of Otavalo. More recently, in May 1944, it was discovered near Quito on the western slopes of the volcano of Pichincha.—MARY RECORD.

H. H. Chattaway

Price 25 cents

Yale University School of Forestry

TROPICAL WOODS

NUMBER 84 DECEMBER 1, 1945

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Yale University School of Forestry

TROPICAL WOODS

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A technical magazine devoted to the furtherance of knowledge of tropical woods and forests and to the promotion of forestry in the Tropics.

The editor of this publication and the writer of any articles therein, the authorship of which is not otherwise indicated, is ROBERT W. HESS, *Associate Professor of Forest Products, Yale University School of Forestry.*

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NOTES ON SOME GUATEMALAN TREES

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During preparation of manuscript for *Flora of Guatemala*, now in course of publication, there have been assembled certain data regarding trees of that country which are of general interest. Some of the data are quite new, and it is possible to report from Guatemala an important genus unrecorded previously from Central America. It is necessary also to make changes in current nomenclature of two or three trees of Mexico and Central America.

Four years ago a brief paper entitled The Forests of Guatemala was published in this Journal (*Tropical Woods* 67: 1-18), but the present notes supply information not included there.

Taxus

In North America (and the Western Hemisphere) there are four recognized species of Yew, which are separated by little if anything more than their geographic distribution. South of the United States only one is found, *T. globosa* Schlecht., based on material collected at Real del Monte, Hidalgo, Mexico, and occurring in that country in the states of Nuevo León, Hidalgo, Veracruz, Oaxaca, and probably elsewhere. The tree was found for the first time in Central America in 1942 by Dr. Julian A. Steyermark. It grows in wet or moist, mountain forest at elevations of 2,200 to 3,300 meters, in the Sierra de los Cuchumatanes of Huehuetenango on Cerro Cananá, and in the Sierra de las Minas of the departments of El Progresso and Zacapa. It is a small or medium-sized tree but large for the genus, sometimes attaining a height of 15 meters. It is known locally by the name Pinabete, the term applied in other parts of Guatemala to *Abies*.

Podocarpus

Only one species of *Podocarpus* has been found in northern Central America, *P. guatemalensis* Standl. The type, collected by the writer in 1922 in a swamp along the railroad near Puerto Barrios (sea level), was taken from a shrub probably of casual introduction, grown from seeds carried by birds or quite possibly by ocean currents, which in this vicinity cast up many strange objects on the beaches or at high tide bear them into the tidal swamps. Although search for *Podocarpus* has since been made in this locality, it has been in vain, but the swampy forests are difficult to explore and it may well be that trees do exist there. Two synonyms of *P. guatemalensis* are *P. Matudai* Lundell, described from Chiapas, and *P. pinetorum* Bartlett. The latter ill-conceived name is essentially a renaming of *P. guatemalensis*, Bartlett considering this name of uncertain application to the common British Honduras tree. There is no question as to the applicability of the name *Podocarpus guatemalensis*. The tree has long been known as common

and widely distributed in British Honduras, and lately it has been found in several regions of Guatemala, chiefly in rather remote places, in some of which it grows abundantly. It is known by the names Ciprecillo, Curus-té (in an Indian dialect of Huehuetenango), and Pashaque (also an Indian name; reported by José Ignacio Aguilar). This *Podocarpus* grows in Guatemala chiefly in moist or rather wet, mountain forest, mostly at 2,000 to 3,000 meters, often in association with *Abies*, *Pinus Ayacahuite*, and oaks. It has been found in the Sierra de las Minas in the departments of El Progreso and Zacapa, on Cerro Brujo in Chiquimula in eastern Guatemala, and at various places in the Sierra de los Cuchumatanes, Huehuetenango. In the vicinity of Ixcán in the last-named region it was found at much lower elevations, only 500 to 800 meters, doubtless as a result of local climatic conditions. In Guatemala this tree is ordinarily 20 meters high or less, with a trunk sometimes 60 cm. in diameter.

Pinus

There are in Guatemala five species and one variety of pine, which need not be discussed here in detail. Two of them are easily recognized for one reason or another; the other three are much alike, have similar distribution, and essentially the same properties.

Pinus Ayacahuite, a white pine, is confined to the highest mountains, where it often is associated with *Abies* and *Cupressus*, or with broad-leaf trees. It is notable for its great size, the trunks often being very tall, straight, and clean, with a great diameter, and also for its beautiful, large, long and narrow cones that carpet the ground beneath the trees. At its best it forms dense forests on whose floor only a few herbaceous plants and some low shrubs grow. On the slopes of Volcán de Zunil near Fuentes Georginas, the White Pine grows in a dense association of mixed broad-leaf trees, where it seems strangely out of place. The trees are conspicuous there because the graceful, long and slender leaves glisten prominently in sunshine. On government lands in the mountains above Totonicapán there are fine stands of

this tree, growing with *Abies*. Many of the trees have trunks a meter or more in diameter. Almost the only plants found beneath them are mosses, a few ferns, and the low half-shrubby plants of *Acaena*. The last is found throughout the sheep-raising areas of the Guatemalan highlands, its burlike fruits so infesting the wool of sheep that the animal becomes one great bur. Reproduction of the trees was noted as abundant here. Similar conditions exist in the high dreary mountains on the road between San Francisco El Alto and Momostenango. In the meadows between these latter forests the writer once was amazed to glance up and see a small herd of llamas grazing peacefully. He could scarcely believe his eyes until he recalled that some time previously llamas had been presented by the Peruvian government to Guatemala, and part of them had been sent to a remote part of the country for naturalization.

Equally easy to recognize is the Caribbean Pine, *Pinus caribaea* Morelet, because it is found only at low elevations, sometimes extending to cliffs at the edge of the sea, and never ascending far above sea level. This is the common pine of southern Florida, and the parts of Guatemala inhabited or dominated by it often have much the scenic appearance of the Florida Everglades, and a very similar flora.

The three other Guatemalan pines, *P. Montezumae* Lamb., *P. oocarpa* Schiede, and *P. pseudostrobus* Lindl., are much alike in general appearance and difficult to distinguish in the field and for that matter in the herbarium. All have similar properties and uses and much the same distribution.

These pines are the most important local source of lumber. At present most of it is sawed in small mills, but very often boards are sawed by hand from the logs. The log is placed across a pit and two men, one on top of the log, the other below in the pit, manipulate a rip saw until the desired boards are obtained. Watching this slow and painfully laborious process one is impressed by the scant value of labor in these tropical countries and also by the skill of the workers, who are able thus to make boards of uniform thickness.

Besides lumber, the pines furnish other local products, including turpentine and rosin, and a great deal of firewood, this of course not of desirable quality but sometimes the only fuel available. Strangely enough, fuel is often a serious problem in Guatemala. In the great wheat-growing valley about Sija, above Quezaltenango, there are no trees and shrubs and the only available fuel is grass roots. This scarcity has resulted in a conspicuous modification of ordinary food habits. The daily bread consists not of the usual *tortillas*, toasted over the fire, but of *tamalitos*, little tamales wrapped in corn husks and boiled. These *tamalitos* are always soggy and of repulsive appearance when, as often happens, they are made from black maize. They are a sorry food indeed, but their preparation is much more economical of fuel than is that of *tortillas*.

A common article of trade in all markets and neighborhood shops consists of *ocotes*, small billets of fat or resinous pine for kindling charcoal fires. It is amusing to watch a woman or child fingering the piles of *ocotes* until the choicest one is found, and as much attention is given to its selection as would be to a garment at a bargain sale. Pine torches are much used for illumination, both out of doors and in houses. In modern times tallow candles and electric torches are plentiful enough even in remote regions, but even the former are sometimes too expensive for the Indians.

Pine branches have long been a ceremonial offering by the Quecchí and other Indians to roadside crosses and shrines, and Dr. Karl Sapper believes they were offered to the gods of preconquest times. Several other Guatemalan trees are known to have had similar religious significance. Sapper states that in some parts of Alta Verapaz where pines are not native the Quecchí people plant them to have the branches conveniently at hand. The use of pine branches and leaves on all festive occasions is general in Guatemala, and probably of very ancient origin. It is customary to cover the floors and sometimes the streets with fresh green pine needles on holidays or for parties and any special occasion. The quantity of branches and leaves thus used in the cities

is considerable and has had a marked effect on the forests. Throughout Guatemala one marvels at the curious form of the pine trees and would be completely mystified unless the cause were discovered. Men climb the trees and cut all the main branches, leaving only a sort of tassel at the top. There are vast numbers of such fantastic trees everywhere in the central departments. Pine needles also are used in place of the more usual straw to strengthen adobe bricks.

While in most parts of Guatemala oaks are associated with pines, in some regions of Alta Verapaz, as about Cobán, there are few oaks and their place is taken there by *Liquidambar*, resulting in a much handsomer association of trees. The Pine here is *Pinus oocarpa*. Its very pale, yellowish, often handsome wood is much used in Cobán for all kinds of house construction and for furniture. It is the chief lumber used at Cobán. The seedlings in that wet region often make a prodigious growth, attaining a height of two meters before a node is formed. On Finca Samac not far outside Cobán, Gustav Heinrich, one of the oldest and most enterprising foreign residents of the region, made large plantings of pines on denuded limestone hills about 35 years ago. The trees have grown rapidly and thriftily, and from a short distance would be taken to constitute a natural forest. Many of the trees are now ready for cutting. Oaks planted at the same time are about half as tall.

Abies

In Guatemala there is a single fir, *Abies guatemalensis* Rehder, which has as a synonym the name *A. tacanensis* Lundell, based on material from Volcán de Tacaná on the border between Mexico and Guatemala. This is the only Central American species of *Abies* and the southernmost American one. For a fir it has a very limited distribution, and it is believed that its distribution is now completely known.

In Guatemala it is found only at high elevations of 2,700 to 3,700 meters and such elevations are necessarily of limited extent. It grows only in the Occidente or western Guatemala, in the departments of Huehuetenango (Sierra de los

Cuchumantanes), Totonicapán, Quezaltenango, and San Marcos. Nowhere are there trees enough to be of any real commercial importance but sometimes they form pure although small stands. More often they are associated with *Cupressus lusitanica* and *Pinus Ayacahuite*. It is fortunate that all or most Fir trees are found on national lands where they are strictly protected. Even at that, it seems probable that the trees are doomed to extinction at no very distant date since reproduction appears to be poor. At Cumbre del Aire, the type locality, there are numerous fine, tall, mostly isolated trees, but only a few produce cones and seedlings are rare. Some wood is obtainable at times, probably cut clandestinely, and it is said to be a favorite material for hand looms on which the fine Indian textiles are woven. The principal menace to the trees is the fact that the small ones and branches of the large ones are in demand as ornaments for altars in churches, house decorations, and the *arcos* or arches erected over streets and roads during fiestas. The foreign residents in Guatemala find in this fir an ideal Christmas tree, exactly like those of Europe and the United States, and many small trees (probably stolen) are taken to the cities during the holiday season. At Huehuetenango they were on sale at twelve cents each, while in the capital, to which they are carried on men's backs for long distances, they cost five dollars or more. The "classical" locality for the Pinabete, as it is called in Guatemala, is the high mountains above Totonicapán on the old highway across the country where on government lands there are many large trees and substantial quantities of seedlings.

Cupressus

The single Central American cypress is *Cupressus lusitanica* Mill., the southernmost American species. It occurs, or did formerly in all probability, almost throughout the country where there are suitable elevations, generally at 2,700-3,500 meters. After the pines it is now the commonest tree of the Coniferae in Guatemala, and after them the tree of greatest importance locally for lumber.

A newcomer to Guatemala would assume that Cypress was the commonest tree of the settled regions, for it is usually seen on every side, sometimes in large groves of natural appearance on the mountain sides. Once one enters these groves, it is found that the trees stand in rows. The use of native Cypress for reforestation in tropical America has been highly recommended by Wilson Popenoe (See *Tropical Woods* 65: 1-4) but no such recommendation was needed in Central America. It has been used for this purpose in Guatemala and other parts of Central America probably for centuries, and it is possible that today planted trees are more numerous in Guatemala than natural ones. Planted trees thrive under almost any condition of soil and climate, and large trees grow in parks and fincas almost down to the coast. Certain isolated trees in Guatemala are noted for their size, beauty, or historic associations. In the village of Concepción Chiquirichapa, Quezaltenango, there is a famous tree, now dead and consisting of only a trunk and a few broken branches, under whose shade Pedro de Alvarado and his men are said to have rested on their way to the conquest of the nearby Indian city that is now Quezaltenango. It has a low but massive trunk 10 to 14 meters in circumference.

In its native habitats the Guatemalan Cypress exhibits several curious and striking variations that are esteemed for decorative purposes. One of these is the Weeping Cypress (Ciprés Llorón) which has many very slender, long, and pendent branches, giving it a graceful effect suggestive of Weeping Willow, although less accentuated. The best known of the forms is the Ciprés Romano or "Roman" Cypress, much esteemed in Guatemala for ornamental planting. When growing in the open, the normal form of the tree has a crown more or less pyramidal, or somewhat irregular but always relatively broad. The crown of Ciprés Romano is columnar, exactly as in the Cypress trees pictured in Italian landscapes. These trees attain as great a height as the others but in appearance are of course altogether unlike them. The most celebrated locality for them is the vicinity of Quezaltenango, and probably the trees planted in other parts of

Guatemala have come from the the Volcano of Santa María, not far from Quezaltenango. On this volcano trees of both forms are abundant, in spite of the dry terrain that consists chiefly of loose sand. Sometimes the two forms grow together and sometimes apart. Standing on an eminence near the base of the volcano, as in the vicinity of Palojunoj, it is possible to look upward to the higher slopes of Santa María and see the exact distribution of the two forms. Both the weeping and columnar Cypress are believed to come true from seeds.

Juniperus

There are in Guatemala two species of *Juniperus* (Red Cedar) whose nomenclature is not fully settled. The less common one is probably *J. comitana* Martínez, described from Chiapas and found in Guatemala in Huehuetenango, Baja Verapaz (region of Santa Rosa), and Zacapa (Sierra de las Minas). It is of sparing occurrence in these regions and grows at elevations of 1,500 to 2,200 meters, forming open stands or occurring as isolated small trees.

The more abundant species will probably be called *Juniperus Standleyi* Steyermark, with which will be associated the widespread species of Mexico that was named *J. tetragona* Schlecht. That name is a homonym and must be reduced to synonymy. This *Juniperus* in Guatemala occurs only in the highest mountains at about 3,300 to 3,700 meters, in San Marcos only on and near the summit of Volcán de Tacaná, but in the Sierra de los Cuchumatanes of Huehuetenango abundantly on the high mountains and alpine or subalpine plains. It grows most profusely on limestone over which there is only scant soil, at times forms dense and almost impenetrable forests in which little else grows except a few shrubs such as *Mahonia*, *Holodiscus*, and *Rubus trilobus*. About the borders of such forests, composed of small or medium-sized individuals, the cedar trees often are associated with pines. These forests constitute a unique formation in the Guatemalan flora, and look like nothing found elsewhere in Central America. Because of the high elevation here, cold prevails throughout the year and below-

freezing temperatures must be common. Clouds and fog characterize the landscape, and the whole scene is about as forbidding as anything imaginable, an impression enhanced by the many dead tree trunks, the profuse gray lichens, and the croaking ravens that are the most conspicuous birds.

This species varies extraordinarily in habit. In the forests or groves the trees are rather well grown, but in open spaces between the groves there are shrubs probably many years old yet no more than a meter in height. These form flat-topped bushes or clumps similar to those of *Juniperus communis* in the Rocky Mountain region. On Volcán de Tacaná the species is represented by small trees at the lower part of its occurrence, but as the elevation increases the plants become progressively smaller, those on rocks near the summit being prostrate or nearly so and forming dense mats.

Hedyosmum

One of the commonest trees of the mountain cloud forests of Guatemala, at elevations of 1,200 to 2,900 meters, is *Hedyosmum mexicanum* Cordemoy *(H. Artocarpus* Solms). In the Cobán region, and especially on the slopes along the barranco of the Río Samalá which descends from Quezaltenango to Retalhuleu, it is one of the most characteristic species, at times almost dominating the forest. It is not one of the largest trees, attaining on the average a height of probably not more than 10 meters and often fruiting when only a shrub of two meters. The trunk is generally short and thick, and the crown dense. The stout branches are so brittle that they disarticulate when roughly handled. The leaves, which have a distinctive aromatic odor, turn black as they wither. The mature fruits are somewhat suggestive of a diminutive pineapple, very succulent and juicy, whitish, and edible, but their sweetish flavor is distinctly mediocre. Apparently no use is made locally of the wood, but in the Occidente the Indians prepare a substitute for coffee by placing two or three leaves in a cup of hot water. In Jalapa the tree is called Sandío; in Huehuetenango, Palo de Agua and Oczé, the latter an Indian term. The Quecchí name of

Cobán is Onj or Onc. The most generally used Spanish names are Mazorco, Té Azteco, Té Maya, and Té de Monte.

Alfaroa

The walnut family is represented in Guatemala by three genera: *Juglans*, of which there are probably two or even three species; *Engelhardtia* with a single species, *E. guatemalensis* Standl., rather widely distributed in mountain cloud and rain forests of Alta Verapaz, El Progreso, Huehuetenango, Quezaltenango, and San Marcos; and *Alfaroa*. The genus *Alfaroa*, with a single species, *A. costaricensis*, published by the writer in 1927, has been known only from the mountains of Costa Rica, where it abounds in a limited area south of Cartago, growing as a large shrub or small tree. It is scarcely a tree that would have been expected to occur in Guatemala. When studying the extensive material of "*Engelhardtia*," all sterile, collected in Guatemala by Dr. Steyermark and myself, I was surprised to find two distinct trees represented, one of them apparently *Alfaroa*. When flowers and fruits of the Guatemalan tree have been collected it may prove to be a distinct species, but the foliage certainly is similar to that of Costa Rican specimens. Dr. Steyermark found it in both Huehuetenango and Suchitepéquez but I have seen it only in Quezaltenango, along steep, densely forested mountain sides of the eastern slopes of the great barranco of the Samalá, between Finca Pirineos and Patzulín. My own specimens were taken from shrubs assumed to be *Engelhardtia* seedlings, and *E. guatemalensis* does grow in the same forest. No fertile trees were noted although they might have been found if their importance had been realized, but there were some tall trees scattered in the mixed forest, which is not quite so wet as that in which the Costa Rican trees grow. Since the specimens are sterile, there is always the possibility that they represent a second species of *Engelhardtia*, but they agree so well with Costa Rican collections that there is little reason for doubting their proper reference to *Alfaroa*.

Juliania

The genus *Juliania*, consisting of three or four species, all natives of Mexico, has interested all botanists who have come into contact with it because of the curious form of its inflorescence and fruit, and the uncertainty of its position in relation to other groups. Different authors, misled in part by the deceptive form of the inflorescence, suggestive of the catkins of the Amentales, have associated it with Juglandaceae and other families of that group, but in the writer's mind there is no doubt that the true relationship of *Juliania* is with *Rhus* and *Bursera*, which it much resembles in habit and foliage, very strikingly so indeed.

Only one species of the genus, *J. adstringens* Schlecht., has been found outside Mexico. It is one of the common small trees in the lower Motagua Valley in eastern Guatemala, growing on the very dry, rocky, cactus-infested hills in the departments of El Progreso, Zacapa, and Chiquimula. Although the Motagua Valley, at least in some parts, is a rich agricultural region because of local irrigation, the bordering hills are extremely dry during the rainless months and during that period there is very little green vegetation. The *Juliania* trees, known here by the name Caraño, are leafless for probably the greater part of the year. The range, in spite of the fact that the Guatemalan localities are isolated by several hundred miles from their nearest occurrence in Mexico, is a quite natural one, matched by many other species found in the Motagua Valley. As it grows here, Caraño is a small tree or large shrub only 3-6 meters high with a broad and often depressed or sometimes rather narrow crown. The trunk is low and thick, usually 20 cm. or less in diameter, and it is highly distinctive, being dark grayish brown and covered with large quadrangular low-conic prickle-like projections similar to those in some species of *Zanthoxylon*. Such bark is found only on mature trees and its character has not been described previously, so far as I know, in spite of the fact that it is the one feature that makes the trees recognizable when they are leafless.

Billia

The *Billia* of Guatemala has been reported in various publications of recent years as *B. colombiana* Planch. & Lind., a name for which the writer is probably responsible. Recently Dr. Steyermark, in a letter from Venezuela, protested that the South American tree so called was different from the Guatemalan one, and re-examination of the collections has shown that this is true. In Central America it is revealed that there are two species of *Billia*, *B. Hippocastanum* Peyr., described from southern Mexico and extending into the mountains of Guatemala, then reappearing in the mountains of Costa Rica; and *B. colombiana*, which grows in Costa Rica, Colombia, Venezuela, and Ecuador. *B. colombiana* has white or pale pink flowers. The much more showy *B. Hippocastanum* has flame-red petals and is one of the most gorgeous of all Central American trees. It is abundant in some regions of Guatemala, especially about Tactic in Alta Verapaz, and in the mixed mountain forests of Quezaltenango and San Marcos. In the latter region it often is one of the most abundant elements of the forest, prominent in flower and often growing to a great height.

Acer

In America *Acer* reaches its southern limit in Guatemala, where there are two species, widely different in all respects. Of most taxonomic interest is the recently described *A. Skutchii* Rehder, a relative of the Sugar Maple of the United States. It was based upon material collected by Dr. Alexander F. Skutch near Nebaj in the Department of Quiché, and more recently it has been found to be plentiful in the Sierra de las Minas of Zacapa, where it grows in moist or wet, mixed forest in ravines at 1,600 to 2,600 meters. The tree is 15 to 30 meters high with a trunk diameter of as much as 75 cm., the bark light gray, breaking up into thin plates. It is a deciduous tree, the leaves turning bright red or rose after the end of the rainy season, and reappearing in March or April, or even earlier.

The common *Acer* of Guatemala is a Box-elder, our specimens of which are referable to two varieties of the common North American *Acer Negundo* L.–*A. Negundo* var. *mexicanum* (DC.) Standl. & Steyerm. and *A. Negundo* var. *orizabense* (Rydb.) Standl. & Steyerm.–both of which are rather widely distributed in Guatemala and central and southern Mexico. The tree (the varieties differ from each other only in the presence or absence of pubescence, and from the United States tree in little more than range) is one of the abundant and characteristic species of Guatemala, especially in Alta Verapaz, Quezaltenango, and San Marcos. Around Cobán, Alta Verapaz, it borders most of the swift streams and is in leaf almost or quite throughout the year. Here as elewhere in Guatemala it is notable for its drooping leaflets, concave or almost pouchlike and hanging limply from the branches. In April the trees are very green and covered with long pendant racemes of fruits. About Cobán the Box-elder is often planted for hedges, which usually are cut back closely, perhaps for firewood. Large trees are scattered through the pastures.

In western Guatemala the tree behaves somewhat differently. There it is conspicuous in the high mountains (mostly at 2,000 to 3,000 meters), being a real "spring" tree, losing its leaves at the beginning of the cold season during which freezing temperatures often occur, and putting forth new ones as the flowers appear. The trees are conspicuous from a distance because of their great abundance of dark red or purplish flowers, the same tints being exhibited by the new foliage and giving an effect of autumn haze. In the white-sand areas of San Marcos, a most remarkable area where the mountain sides are covered with loose white volcanic sand that gives the landscape exactly the appearance of having received a recent snowfall, the tree is much planted, usually in widely separated rows, to keep the sand from drifting. The bark and young shoots are reported to contain much sugar and they are used commonly in the Occidente for making vinegar, hence the local name Palo de Vinagre. Most of the trees seen in the Occidente have their limbs cut off close to the trunk because of this use of the tree, and perhaps in part for fuel. In various parts of Guatemala the Box-elder is called Palo de Azúcar and Palo de Caballo, and about Cobán it is well known to everyone by its Quecchí name Raxoch.

Robinsonella

The genus *Robinsonella* consists of six species of large shrubs or small trees restricted to the mountains of Mexico and Central America. They are among the most beautiful of the Malvaceae, their white or bright purple flowers notable for the delicacy of their coloring rather than the gaudiness that characterizes many members of the family. There are three species in Guatemala, one with white, one with purple, and one with purple-veined white petals. The plants sometimes occur in abundance locally, usually on brushy sides of deep canyons, and when in flower the trees, sometimes as much as 10 meters high, are visible from a long distance. All species of *Robinsonella* are well worthy of cultivation in regions of suitable climate, which should be rather cool and fairly moist. The most attractive of local species is *R. divergens* Rose & Baker of Verapaz, Santa Rosa, and Huehuetenango. There are handsome individuals of this species in gardens in Cobán. They are a beautiful sight when in full bloom in March and April, being covered with small clusters of pendant bell-shaped flowers whose ground color is white but so strongly veined with bright purple as to appear more purple than white.

Bernoullia

Bernoullia flammea Oliver, whose type was collected by Bernoulli at Ixtacapa, Suchitepéquez, Guatemala, is the only member of the genus. Two other trees of the Amazon Valley of Brazil formerly associated with it have been referred by Ducke to a distinct and new genus, *Huberodendron*. In recent years *Bernoullia* has been discovered to be of rather wide distribution, from Oaxaca to Petén, British Honduras, and Honduras. On the Pacific coast of Guatemala it has been found only in the departments of Retalhuleu and Suchitepéquez where it has been collected several times.

It grows there on the higher plains and lower foothills, but most of the trees, so far as I have observed, are found in the vicinity of settlements, often in dooryards, and the trees are not numerous. They are leafless during the dry months and of ungainly appearance, but they blossom at the beginning of the rains and then attract attention because of the bunches of small but brilliant, flame-colored flowers. The names applied to the tree in Guatemala are Uacut in Petén, a Maya term, Ala de Cucaracha in reference to the large winged seeds whose kernels sometimes are eaten, and more commonly Canté, i. e. "snake-tree," an Indian name given for no obvious reason.

Hasseltia

Three species of *Hasseltia* (Flacourtiaceae) are known in Central America: *H. floribunda* H.B.K. in Nicaragua, Costa Rica, and Panama; *H. guatemalensis* Warb., a well-marked species growing along the Pacific bocacosta of Guatemala and extending into Chiapas; and *H. mexicana* (Gray) Standl., widely distributed in mountains and hills of Guatemala, and extending into southern Mexico, British Honduras, and Honduras. The last species has been reported from Petén as *Hasseltia dioica* (Benth.) Sleumer, an error for which Sleumer is primarily responsible, he having reduced *Banara mexicana* Gray to the synonymy of *H. dioica*, and using the name *Hasseltia pyramidalis* Hemsl. for the tree here called *Hasseltia mexicana*, but altogether in error. *Hasseltiopsis dioica* (Benth.) Sleumer, of which *Hasseltia dioica* is a synonym, is confined, so far as known at present, to Veracruz, and it is quite distinct in both foliage and inflorescence from the more common *Hasseltia mexicana*.

Wigandia

As is well known, there is no definite criterion by which a plant may be classified as a tree, shrub, or herb, and of this *Wigandia Kunthii* Choisy (Hydrophyllaceae) is a perfect example. Like almost all members of this essentially American family, it is ordinarily an herb, without question, although often a very large one, much larger, in fact, than

any other member of the family. The plants often continue to grow for several years and the stems then become decidedly woody. Occasionally, especially where planted and supplied with more than the usual amount of water, the plants become what people would describe as small trees, attaining a height of five meters at least, with a short thick trunk and a very dense but rather sparsely branched, rounded crown. Such trees are not common but when found they often are very handsome, with their large velvety leaves and great masses of bright purple blossoms. The plants produce myriads of minute winged seeds that are spread by the wind, and the smaller herbaceous plants are found everywhere along roadsides springing up abundantly on steep banks or *paredones* along newly cut roads. They flower through the dry season when other flowers are scarce, and always attract attention from tourists, who refer to them as "that blue flower." The plant is known in Central and western Guatemala by the name Chocón, which is a corruption of an Indian name, Chocán, the "a" very short and rather strongly accented.

Astianthus

This genus of the Bignoniaceae consists of a single species, *A. viminalis* (H.B.K.) Baillon, which is native in southern Mexico, has been collected in Salvador, and grows in some abundance in certain parts of the Oriente or eastern Guatemala. It is known here only in the departments of El Progreso, Zacapa, Chiquimula, and Santa Rosa, but it is one of the commonest and most conspicuous trees along the middle courses of the Motagua River. It is very particular as to habitat and grows only in the sandy and gravelly river beds, often at the very edge of the water, or at flood time half under water. In this respect it reminds one of *Chilopsis*, a shrub of the same family, confined to the same sort of habitats in southwestern United States and northern Mexico. Locally this tree is called Chilca, a word said to be of Quechua origin that is overworked in Central America, where it is applied particularly to shrubs with willow-like foliage and especially to those growing along streams. In the Motagua Valley this tree sometimes reaches a height of

nearly or quite 15 meters but usually is lower. It has a short thick ridged trunk, grayish white bark, and linear leaves. The trees often form dense thickets and are conspicuous because of their bright green foliage which contrasts during the dry season with the sparse withered vegetation of the nearby plains and hillsides. It is even more conspicuous when in blossom, producing many panicles of very large, bright yellow flowers similar in form and size to those of *Catalpa*. So far as known, no use is made of the wood, and it is probable that even men in search of fuel can find more satisfactory firewood on the adjacent hillsides.

VARIATION IN THE SPECIFIC GRAVITY OF BALSA AND ITS RELATION TO LONGITUDINAL SHRINKAGE

By JOHN P. LIMBACH, Technologist *and*
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Editor's Note: During the war Balsa (*Ochroma lagopus* Sw.) was used for many purposes, including aircraft, floats, life rafts, etc. For many of the applications the wide range of weight variation in the material as received from the supplier was considered a detracting factor in its use. In a few instances excessive longitudinal shrinkage, sometimes with attendant warping, caused trouble. The two problems are closely related as excessive shrinkage is characteristic of Balsa having exceptionally low density. The following paper covers a study of these problems.

The great variation in weight of Balsa makes its classification into weight grades essential if a buyer is to obtain a shipment best suited for a given purpose. Accordingly, along with other rules for inspection of Balsa the U. S. Foreign Economic Administration has set up the following weight limits for standard grades according to its rules revised March 1, 1944:

[1]Maintained at Madison, Wisconsin, in coöperation with the University of Wisconsin.

Grade "AA". This grade admits only lumber weighing less than 9 pounds per cubic foot "dry"[2] weight.
Grade "A". Admits only lumber weighing 9 to 18 pounds per cubic foot "dry" weight.
Grades "B", "C", and "Shorts". Have no weight limits except a general clause excluding Balsa of more than 18 pounds per cubic foot from any grade.

The variation in weight of Balsa as obtained in three separate shipments to the Forest Products Laboratory is shown in this report. In the first shipment received January 5, 1943, an attempt was made to obtain a representation of Balsa covering its commercial range of density.[3,4] This shipment cannot be said to conform exactly to any of the described grades.

Shipment No. 2 was received at the Laboratory October 18, 1944, on an order which originally specified a weight range of 6 to 9 pounds per cubic foot after the material was kiln-dried, but which was evidently filled by supplying Balsa of the "AA" grade.

The third shipment evidently was filled from the same grade as the second shipment. It was received at the Laboratory June 27, 1945.

The Balsa of shipment No. 1 ranged from 4.5 to 19.7 pounds per cubic foot (at 12 per cent moisture content) with the greatest representation in the 8 to 8.9 pounds per cubic foot class (see Table 1). The material in this shipment averaged 10.0 pounds per cubic foot. These data provide an indication of the range in weight of Balsa that might be expected in any purchase where grade weight specifications are not included, such as for example, grades "B", "C", and "Shorts".

[2]"Dry" lumber is defined as "lumber in a state of dryness which will permit close piling and bundling during the time necessary for delivery to destination without deterioration from decay."
[3]"Strength and Related Properties of Balsa and Quipo Woods" by C. A. Wiepking and D. V. Doyle, June 1944. Forest Products Laboratory Report No. 1511.
[4]"Longitudinal Shrinkage of Balsa," by B. H. Paul and J. P. Limbach, December 1944. Forest Products Laboratory Report No. 1364.

TABLE 1. RANGE IN DENSITY OF THREE SHIPMENTS OF BALSA
(12 per cent moisture content)

Shipment No.	Density classes (pounds per cubic foot)																		
	3.0 to 3.9	4.0 to 4.9	5.0 to 5.9	6.0 to 6.9	7.0 to 7.9	8.0 to 8.9	9.0 to 9.9	10.0 to 10.9	11.0 to 11.9	12.0 to 12.9	13.0 to 13.9	14.0 to 14.9	15.0 to 15.9	16.0 to 16.9	17.0 to 17.9	18.0 to 18.9	19.0 to 19.9
	Per cent of Total Number of Specimens																
1	.....	1.1	6.5	10.3	10.3	15.6	13.7	8.0	9.1	7.2	5.7	4.2	2.7	1.1	1.5	1.1	1.9
2	0.3	8.5	35.7	35.7	13.8	4.6	1.1	.....	0.3	.....	.....	.....	.....	.....	.....	.....	.....
3	0.4	12.9	40.9	34.2	9.7	1.4	0.4	0.1	.....	.....	.....	.....	.....	.....	.....	.....	.....

The second and third shipments conformed very well to the limitations of the "AA" grade since very little material in either shipment exceeded 9 pounds per cubic foot. Shipment No. 2 ranged from 3.7 to 11.5 pounds per cubic foot (at 12 per cent moisture content) with the greatest representation in the 5 to 5.9 pound class. The average weight of this shipment was 6.0 pounds per cubic foot.

On the basis of the weights of these shipments it is evident that if material with a range of 6 to 9 pounds per cubic foot is to be adhered to by a manufacturer that a rather high percentage of the "AA" grade would not meet his requirements.

Along with the classification of Balsa on a weight basis there are other factors which need to be taken into consideration. Important among them is longitudinal shrinkage which becomes increasingly manifest with reduction in weight.

LONGITUDINAL SHRINKAGE OF BALSA

Various investigations at the U. S. Forest Products Laboratory over a number of years have revealed unusually high dimensional changes along the grain with changes in moisture content of certain pieces of wood having very low specific gravity for the species involved.

The results of these investigations and reported distortions accompanying changes in relative humidity conditions surrounding fabricated aircraft parts containing Balsa wood suggested the need for information concerning longitudinal shrinkage of Balsa in order to ascertain how great the values may be and to what extent the variation is related to the specific gravity range of the species.

Sections 9½ inches long from shipment No. 1 having a range in specific gravity from 0.08 to 0.20 were cut from nine Balsa planks and ripped lengthwise into 238 specimens ¼ inch thick and ⅜ inch wide. They were weighed in an air-dry condition (the planks were originally kiln-dried some months previously), and the length was carefully measured to $\frac{1}{1000}$ of an inch. The specimens were then sub-

merged in cold water for two weeks and again weighed, and the length of each was measured. Next the specimens were allowed to dry slowly until again air-dry when they were placed in an oven at 100° to 105° C. (212° to 221° F.) until they were entirely free of moisture. The weight of each specimen and its length when oven-dry were then recorded.

The moisture content of the Balsa specimens in their initial air-dry condition ranged from 6.5 through 13.8 per cent and averaged 8.3 per cent based on their weight when oven-dry. On the same basis, the moisture content in the soaked condition ranged from a minimum of 141 per cent to a maximum of 792 per cent and averaged 400 per cent. The moisture content of green, freshly cut Balsa may be estimated at 200 to 400 per cent based upon statements that green logs float with ⅓ to ½ of their volume above the level of the water surface.

The average longitudinal shrinkage of the air-dry specimens was 0.197 per cent; that of the moisture-free specimens was 0.285 per cent. Both values are given in percentage of the length of the specimens when soaked. (The soaked dimensions of wood specimens have been established to be practically the equivalent of their dimensions in the green condition, which is the standard basis used for computing shrinkage values.)

The longitudinal shrinkage of each specimen when plotted in relation to its specific gravity based on weight and volume when oven-dry showed with one exception a shrinkage of more than 0.30 per cent for specimens below 0.10 in specific gravity. The maximum shrinkage of a single specimen is 0.633 per cent for a specimen having a specific gravity of 0.050, and the minimum shrinkage is 0.105 for a specimen with a specific gravity of 0.212.

Since purchase orders frequently call for Balsa within definite weight limits at a given moisture content, the longitudinal shrinkage is given for four weight classes that vary by 3-pound intervals up to 15 pounds per cubic foot. The maximum, minimum, and average shrinkage for each class is included in Table 2. Longitudinal shrinkage much beyond

0.25 per cent is considered undesirable for fabricated parts that are to be subjected to considerable moisture fluctuations in use.

TABLE 2. RELATION OF WEIGHT PER CUBIC FOOT (at 12 per cent moisture content) TO MAXIMUM, MINIMUM, AND AVERAGE LONGITUDINAL SHRINKAGE OF BALSA IN FOUR WEIGHT CLASSES RETWEEN 3 AND 15 POUNDS PER CUBIC FOOT

WEIGHT AT 12 PER CENT MOISTURE CONTENT	LONGITUDINAL SHRINKAGE FROM GREEN TO OVEN-DRY CONDITION		
	MINIMUM	AVERAGE	MAXIMUM
LB. PER CU. FT.	PER CENT OF SOAKED DIMENSION		
3.0— 5.9	0.147	0.370	0.634
6.0— 8.9	.147	.238	.335
9.0—11.9	.135	.209	.304
12.0—14.9	0.105	0.180	0.230

A short Balsa plank about 8 inches wide sent to the Forest Products Laboratory by a correspondent showed cross breaks toward one edge. Determinations of specific gravity across this plank revealed a range from 0.06 to 0.13. Longitudinal shrinkage measurements ranged from 0.32 to 0.73 per cent of the soaked length. The highest shrinkage was obtained on a specimen of the lowest specific gravity and varied inversely with specific gravity across the plank. Since the cross breaks occurred in the portion of lowest specific gravity, it is assumed that they were caused by abnormally high longitudinal shrinkage of that portion of the plank.

This is an example of unsatisfactory results from the use of Balsa wood having widely varying specific gravity. Careful segregation of Balsa on a weight basis and the elimination of the material considered likley to shrink excessively or fail in service is strongly recommended.

QUERIES FOR TAXONOMISTS

There are a number of woods whose structure suggests that they may be improperly placed in family or genus. Some of these are mentioned here in the hope that re-examination of the herbarium material will result in placements more compatible with the wood anatomy.

Symplocos tinctoria (L.) L'Her. differs from the other species of the same genus in that it has much smaller pores, finer rays, small circular pits, and nearly homogeneous rays. Other American species studied have scalariform ray-vessel pitting, heterogeneous rays, larger pores, and wider rays. From the wood structure alone a separate genus would appear feasible.

Daubentonia texana Pierce (= *D. Drummondii* Rydb.) shows distinct differences as compared with *D. punicea* (Cav.) DC. The structural differences are mainly those of size and abundance of elements but are significant in the Leguminosae. It has been suggested that these might be separate genera.

There seems to be ample reason for removing *Illicium* from the Winteraceae. Its wood structure is suggestive of Theaceae or Hamamelidaceae. Perhaps a separate family is indicated.

The wood of *Ravenia rosea* Standl. (Yale 1232, Field Museum Herb. No. 572,607) does not resemble that of *R. spectabilis* (Lindl.) Planch. (Yale 16156 and 20018). In *R. spectabilis* the wood is pinkish brown; the pores very small and thick walled; rays 1 to 3 cells wide and up to 25 cells high; parenchyma sparingly developed. *R. rosea* has yellowish white wood; thin-walled angular pores that are more frequently in multiples; rays 1 to 6 cells wide and up to 120 cells high; parenchyma abundant. Unfortunately wood samples of Tortugo Prieto, *R. urbani* Engl., are not available.

Despite the characteristically wide range of specific variation among the woods of *Senegalia*, the species *S. angustifolia* (Lam.) Britt. & Rose (= *Mimosa angustifolia* Lam. = *Acacia scleroxyla* Tussac) is notably dissimilar from all others in a number of respects. Its wood structure would lend support to the making of a monotypic genus from this species.

INTERNATIONAL ASSOCIATION OF WOOD ANATOMISTS

The Acting Secretary-Treasurer, Professor Harrar, has returned to his former position and may be addressed as follows:

Dr. Ellwood S. Harrar,
Professor of Wood Technology,
School of Forestry, Duke University,
Durham, North Carolina.

Interest in the resumption of active work by the Association has been expressed by several members. It is hoped that an early start can be made and that more active coöperative projects can be undertaken by the members in the future.

CURRENT LITERATURE

A contribution to our knowledge of the wild and cultivated flora of Florida—I. By HAROLD N. MOLDENKE. *The American Midland Naturalist* (Notre Dame, Indiana) 32: 3: 529-590. November 1944.

"The present contribution lists 2371 collections made in the state of Florida, mostly during the years 1927, 1929, and 1930. The collections represent 182 botanical families, 737 genera, and 1349 species and varieties."

"The sequence of families followed in this paper is that of my 'A Preliminary Classification of the Plant Kingdom to Families' which in turn, is based, with many modifications, on the system of Engler & Gilg, Engler & Diels, and J. Hutchinson."—*From author's preface.*

Studies in the Sapotaceae—I. The North American species of *Chrysophyllum*. By ARTHUR CRONQUIST. *Bull Torrey Bot. Club* 72: 2: 192-205; March 1945.

The 12 North American species of the genus are described.

Las Pináceas Mexicanas—I. By MAXIMINO MARTÍNEZ. *An Inst. Biol. Mexico*, Tomo XVI: 1-352; 300 figs.; 1945.

This very well illustrated and printed volume represents a comprehensive study of the genus *Pinus* as it occurs in Mexico. Some 39 species with 16 additional varieties and 10 additional forms are described. Keys are provided. Excellent photographs and line drawings show the distribution in Mexico; tree, leaves and fruit; and cell structure of the needle cross-section.

Annual report. Forest Department, Jamaica. Pp. 8, mimeographed. For the year ended March 31, 1945.

The total forest area is estimated at 481,840 acres, representing 17% of the total land area. The following were the principle timber species utilized in the order of volume cut: Broadleaf *(Terminalia latifolia);* Shadbark *(Pithecolobium alexandri);* Cedar *(Cedrela odorata);* Bullet (Black, White, Red), Naseberry, Sapodilla (Sapotaceae spp.); Mastic *(Sideroxylon foetidissimum);* Yacca *(Podocarpus purdieanus);* Goldspoon *(Antirrhoea jamaicensis);* Santa Maria *(Calophyllum antillanum.)*

Riqueza forestal dominicana. Tomo I. By JOSÉ SCHIFFINO. Pub. by Sec. Estado de Agri., Indust. y Trabajo (Ciudad Trujillo, Dom. Rep.). Pp. 294; 6 x 9½; May 1945.

The first of three volumes which will describe the trees and woods of the Dominican Republic. Each species is listed under the preferred common name with the scientific and other common names given. It is copiously illustrated with photographs of trees, herbarium sheets and drawings of herbarium material in the text.

Glossary of Cuban woods. By JUAN DE DIOS TEJADA Y SAÍNZ. Pub. by El Foro del Traductor, Santa María del Rosario, Cuba. Pp. 29; 2¾ x 4¼; 1945.

A short vocabulary covering the Cuban woods most commonly available for export, correlating local names with scientific nomenclature and the usually accepted English-language equivalents. The data as to characteristics, weights, uses, are intended as an aid to identification by dealers and

craftsmen, rather than for botanical students.—*From author's foreword.*

Wood utilization in Puerto Rico. By LAURENCE V. TEESDALE and JAMES W. GIRARD. Report No. TP-21, U. S. Forest Service, Washington, D. C., March 1945. Pp. 46; 8½ x 11; 11 photo off-set plates. Mimeographed.

"The possibility of expanding local production of furniture appears to be very promising if supplies of raw material can be obtained from dependable sources and at reasonable prices. The local forests contain only a small amount of merchantable timber suited for furniture and the trees are found scattered through rough country where extraction costs are high. Though some local timber will be marketed it will be only a small part of that needed by the industry and the bulk of the requirements will have to be imported.

"The Dominican Republic now supplies a small part of the mahogany used in Puerto Rico but the supply from that country could be very materially increased. Cuba, which supplies the bulk of the mahogany used in Puerto Rico, was not investigated. A source of less expensive lumber must be obtained, however, to supply the market for inexpensive furniture. Presumably this supply can be obtained in the United States but other sources should also be investigated."

—*From author's summary.*

The Caribbean Forester. Pub. quarterly by the Trop. For. Exp. Sta., U. S. Forest Service, Río Piedras, Puerto Rico. Vol. VI: 1-4: 1-272; October 1944-July 1945.

CONTENTS OF NO. 1

CONTENTS OF NO. 2

CONTENTS OF No. 3

The genus *Hevea* in Columbia. By RICHARD EVANS SCHULTES. *Bot. Mus. Leaflets* (Harvard, Cambridge), 12: 1: 1-20; 6 plates; June 1945.

The distribution of the various species in Colombia is given together with notes on their respective value for rubber latex. A key to the species is included.

Some Melastomaceae of Columbia. By H. A. GLEASON. *Bull. Torrey Bot. Club* 72: 5: 472-479; September 1945.

One new genus *Ptilanthus* and 12 other new species are described from collections made by Dr. José Cuatrecasas.

Caldasia. Boletín del Instituto de Ciencas Naturales de la Universidad Nacional de Colombia, Bogotá. Vol. III: 12: 121-234; 13: 235-344; October 20, 1944 and April 30, 1945, resp.

CONTENTS OF No. 12 (botanical)

CONTENTS OF No. 13 (botanical)

Histology of barks of *Cinchona* and some related genera occurring in Colombia. By RUBY D. LITTLE. Photo offset. Foreign Economic Administration, General Commodities Div., Cinchona Section, Washington, D. C., 1945. Pp. 73; 8½ x 11; 26 figs.

"In connection with the *Cinchona* bark procurement program in Colombia, South America, histological studies were made of the barks of *Cinchona* and some related genera. Five species of the Rubiaceae, *Cinchona officinalis*, *C. pitayensis*, *C. pubescens*, *Remijia pedunculata*, and *Ladenbergia hookeriana*, have been found to contain one or more of the alkaloids quinine, cinchonidine, cinchonine, and quinidine. All barks which have been found to contain not more than traces of any of these alkaloids are collectively designated 'false barks.' A total of 1,002 samples—753 samples containing cinchona alkaloids and 249 false bark samples—were examined microscopically. About 160 were named from microscopic characters alone.

"The normal forms of the five Colombian species of *Cinchona* and the three named *Remijia* species of the *R. pedunculata* group can now be determined from microscopic characters alone; and all false barks encountered can be differentiated from the foregoing by the same method. Descriptions, study outline, and keys for use in these determinations are provided."—*From Author's summary.*

El arbol de lacre, su importancia industrial (*Elaeagia utilis* Wedd.). By LUIS A. LEON. *Flora* (Quito, Ecuador) 4: 11: 13-21; 1 plate; May 1944.

The following is a translation of the author's introduction:

"In this short study I am not going to refer to the 'lacre' which commerce deals in and the industry manufactures as a base for gum resins and coloring substances. Neither shall I treat the 'arbol de lacre' *(Vismia guyanensis)* which flour-

ishes in the Amazon regions and the Guianas. . . . This other 'arbol de lacre' which is going to constitute the object of the present study is of especial interest by reason of being exclusive to the Occidental Cordillera of the Andes, as much Ecuadorean as Colombian. From the botanical and industrial point of view this tree offers extremely interesting aspects, so that it will bring us much profit if we divulge its properties and increase its cultivation. It is a tree which on one hand produces gum resins which are of top quality for the manufacture of lacquers and varnishes, and on the other hand furnishes very fine wood which can be used in carpentry and cabinet making."—MARY RECORD.

The discovery and distribution of *Cinchona pitayensis* in Ecuador. By WILLIAM CAMPBELL STEERE. *Bull. Torrey Bot. Club* 72: 5: 464-471; Sept. 1945.

"The form of *Cinchona pitayensis* which we now know to occur in the four northern Andean provinces of Ecuador is a beautiful tree with straight, unbranched trunk, which is clear white above and brown below. . . . Because of its high alkaloid content, of which about half is quinine, the bark is very bitter with the peculiar taste of quinine, either fresh or dry. There are other members of the Rubiaceae which grow with *Cinchona pitayensis* and might be confused with it, but the very bitter bark of the *Cinchona* easily distinguishes it from other members of the family which occur at the same altitude."

The problem of the Amazon. By F. FERREIRA NETTO. Translated by W. Andrew Archer. *The Scientific Monthly*, (Part I) 61: 1: 33-44; July 1945. (Part II) 61: 2: 90-100; Aug. 1945.

Issued in pamphlet form, the original Portuguese edition was very limited and soon out of print. "The present translation, therefore, seems justified in order to bring to a wider reading public what seems to me a commendably clear and concise presentation of some of the facts concerning the great Amazon region."

The various factors involved are discussed in Part I under the headings Land, Flora, Fauna, Climate, People, and Culture. Part II discusses "The Questions" under the headings Economy, Finance, Health, Transportation, Communications, and Social Relief; "The Solution" under the headings Unity, Technique, and Determination.

Melastomaceae novae III. By A. C. BRADE. *Rodriguésia* (Rio de Janeiro) 9: 18: 3-7; 5 plates; 1945.

The following are described as new: *Behuria Souza-Limae*, *B. Souza-Limae* var. *pallescens*, *Leandra Santos-Limae*, *L. magdalenensis*, *Pleiochiton magdalenensis*, and *P. longipetiolatum*.

Contribuição ao estudo das plantas medicinais do brasil: *Maytenus obtusifolia* Mart. By OTHON MACHADO. *Rodriquésia* 9: 18: 9-15; 6 plates; 1945.

Here are described the appearance and properties of the tree known in Brazil as Carne de anta, Congonha brava de fôlha miúda, Lenha branca, or Limãozinho.

Begonias novas do Brasil, III-IV. By A. C. BRADE. *Rodriguésia* 9: 18: 17-34; 12 plates; 1945.

A total of 14 new species are described, including herbs, shrubs, half-shrubs.

Um genero novo de Convolvulaceae. By LIBERATO JOAQUIM BARROSO. Rodriguésia 9: 18: 35-36; 1 plate; 1945.

The author proposes a new genus and species, *Kuhlmanniella Falconiana*, for a shrub of the family Convolvulaceae collected in Manáos, Amazonas.

Observações gerais e contribuições ao estudo da flora e fitofisionomia do Brasil, V: Estudos floristicos e fitofisionomicos realizados na região de Monte Alegre, Municipion de Amparo, S. Paulo, em Maio de 1942. By M. KUHLMANN. Pub. by Instituto de Botanica (São Paulo) September 1942. Pp. 32 + XVI; 9⅜ x 12⅜; 26 photographs.

An index of the scientific and of the common names of plants cited, and a table of contents for Nos. I-V of this series are included.

Seven new species of Gesneriaceae from Peru and Colombia. By C. V. Morton. *Jour. Wash. Acad. Sci.* 35: 4: 126-131; April 15, 1945.

Seven new species are referred to the genera *Besleria*, *Centrosolenia*, *Columnea*, and *Episcia*.

Las maderas argentinas en la industria æronautica. By Lucas A. Tortorelli. Pub. Tec. No. 1, Min. de Agri. de la Nacion, Dirreccion Forestal, (Buenos Aires), 1945. Pp. 21; 6¼ x 9¼; 5 plates (photomicrographs).

The author believes that Argentina should stress the use of some of its native woods, e. g. Araucaria de Neuquén *(Araucaria araucana)*, Guindo Fueguino *(Nothofagus betuloides,)* and Lenga *(Nothofagus pumilio)*, in the manufacture of aircraft, and discusses their comparative merits. Photomicrographs show cross, radial and tangential sections of the woods.

Las maderas argentinas en la decoracion moderna. By Lucas A. Tortorelli. Pub. Tec. No. 4, Min. de Agri. de la Nacion, Direccion Forestal (Buenos Aires), 1945. Pp. 26: 6¼ x 9¼.

Eight widely known woods that are much used by the trade, and a number of suggested Argentine substitutes are described macroscopically.

Maderas argentinas. By Pedro Dominguez. *Bol. de la Admin. Nac. Agua* (Buenos Aires) 9: 94: 284-298; 1 map; April 1945.

Includes tables showing the principal physical properties and characteristic of 75 Argentine woods, with scientific and common names of each; bibliography of Argentine authors on the subject.

Genera et species plantarum Argentinarum. Edited by H. R. Descole, Fundación Miguel Lillo, Tucumán, Argentina, 1945. 20 x 12. Price 160 (pesos argentinos) per volume.

Contents (Vol. I.)

Zygophyllaceae by H. R. Descole, C. A. O'Donell and A. Lourteig.
Cactaceae by A. Castellanos and H. Lelong.
Euphorbiaceae by A. Lourteig and C. A. O'Donell.

Contents (Vol. II.)

Asclepiadaceae by T. Meyer.
Valerianceae by E. O. Borsini.

Contents (Vol. III.)

Eriocaulaceae, Mayacaceae, Xyridaceae, Bromeliaceae by A. Castellanos.

Native woods for construction purposes in the South China sea region. By J. H. Kraemer. Navdocks P-163, Bu. of Yards and Docks, U. S. Navy Dept., Washington, D. C. January 1945. Pp. iv + 277; 4¼ x 6¾; 99 text figs.; 1 folded map.

This volume describes the trees and woods of Burma, Malay Peninsula, Thailand, Sumatra, Java, Borneo, French Indo-China, and Southeast China including Hainan and Formosa. As in the preceding volumes "Native Woods for Construction Purposes in the Western Pacific Region" (see *Tropical Woods* 80: 22 and 81: 52) the attempt was made to include only "trees of greatest importance to Construction Battalions, that is, those which occur at the lower elevations near beaches and along water courses, those which produce wood with desirable characteristics for construction purposes, and those which are widely distributed within the region." This volume is unrestricted and that for the Western Pacific Region has also been placed in the unrestricted category.

Les Acajous du Congo Belge. By P. Staner. *Bul. Agri. du Congo Belge* (Brussels) 34: 1-2: 163-245; 17 plates (4 in color); 7 figs.; 8 text figs.; 1 table; 1943.

The author describes the Meliaceae of the Congo whose woods are true mahoganies or good substitutes for them, examining the characteristics of these species in native habitat, their wood structure, and their commercial value.

Included are the following keys: an analytic key to the genera based on external morphological characteristics, two keys to the genera based on the microscopic characteristics of the wood (after Harms in Engl. *Pflanzenfam.*, 1940); analytic and morphological keys to the various species. Scientific names, native and foreign vernacular names are listed.

Les oléagineux du Congo Belge. By L. ADRIAENS. *Bul. Agr. du Congo Belge* (Brussels) 34: 1-2: 3-109; 3-4: 397-536; 30 illustrations; March-June, Sept.-Dec. 1943.

A systematic study of the oil-yielding species of trees of the Belgian Congo. Numerous tables show in detail the chemical composition of seeds, oily acids, characteristics of the oil, etcetera. Lists of the species or genera native to the Congo capable of furnishing edible oils, industrial oils and oily acids; of those furnishing siccative and non-siccative oils are included; and an alphabetical index to the scientific names.

A preliminary classification of the plant kingdom to families. By HAROLD N. MOLDENKE. Pub. by the New York Botanical Garden, Sept. 1944, and (Suppl. I) Nov. 1944. Pp. 37 + 4; mimeographed.

"This classification is based, with modifications, on some of the latest available studies on the various groups. The systems of Engler & Gilg, Engler & Diels, and J. Hutchinson (for the angiosperms) are followed in major part."

Contains (including the supplement, which lists a number of corrections and additions) a total of 1,560 botanical family names.

Systematic anatomy of the woods of the Tiliaceae. By FRANCIS KUKACHKA and L. W. REES. Tech. Bul. 158, Univ. Minnesota Agri. Exp. Sta., June 1943. Pp. 70; 6 x 9.

A study of 578 specimens, representing 206 species and 37 genera, revealed a marked similarity in the structure of the secondary xylem of the great majority of the investigated genera and a decided diversity in the anatomy of the others. The woods of the various genera are described. The fiber-vessel length ratio was found to have considerable phylogenetic significance. Unilaterally compound pitting appears to be an advanced feature which appears sporadically in the aposepalous tribes and reaches its culmination in the synsepalous tribes where it forms a constant feature.

Evidence from wood structure substantiates the system of Engler and Prantl in the segregation of the Elaeocarpaceae from the Tiliaceae as well as the disposition of the genera and

tribes of the former family. The Elaeocarpaceae are more primitive than the Tiliaceae. *Sloanea* is considered the most primitive member of the Elaeocarpaceae. *Echinocarpus* should be regarded as a distinct genus and not as a section under the genus *Sloanea*.

The family Tiliaceae comprises at least nine distinct groups on the basis of wood structure and these groups most nearly approximate the tribes as proposed by Burret. The shrubby members of the family appear to be more primitive than the arborescent forms. The Trichospermae, as designated by Burret, is considered to be the most primitive group. The Brownlowieae, in contrast to any of the previous systems, appears to be the most highly advanced group of the family.

Chartocalyx and *Grewiopsis* should be regarded as distinct genera and not reduced to synonymy under *Schoutenia* and *Desplatsia*, respectively. *Grewia* and *Microcos* are distinct genera which have deviated greatly in the organization of their woods. The status of *Vinticena* is still tentative.

In general, the evolution of floral structures seems to be correlated with the evolutionary development of anatomical structures. There is every indication that the study of anatomy will be of great value in the establishment of a natural classification of the angiosperms.—*Author's summary.*

Umbellales. By HAROLD WILLIAM RICKETT. *N. Amer. Flora* 28B; 1: 1; Dec. 30, 1944.

A brief description and a key separating the families (Araliaceae and Umbelliferae).

Araliaceae. By ALBERT C. SMITH. *N. Amer. Flora* 28B: 1:3-41; Dec. 30, 1944.

Botanical descriptions and keys are given for 75 species of nine genera.

Umbelliferae. (Pars). By MILDRED E. MATHIAS and LINCOLN CONSTANCE. *N. Amer. Flora* 28B: 1: 43-160; Dec. 30, 1944.

Botanical descriptions and keys are given for 227 species representing 61 genera.

The comparative morphology of the Winteraceae, III. Wood. By I. W. Bailey. *Journ. Arnold Arboretum* 25: 1: 97-103; 4 plates; January 1944.

"During the last 25 years, the study of the comparative anatomy of the cambium and xylem has progressed rapidly to a stage where it is possible to visualize the salient trends of evolutionary specialization of these tissues in the gymnosperms and angiosperms. Particularly in the case of the cambium, vessels, imperforate tracheary cells, and rays of dicotyledons, the irreversible trends of structural specializations are so obvious and clearly defined that they may be utilized, even statistically, in evaluating the levels of morphological specialization that have attained within specific groups of plants."

The cambium of Winteraceae, *Trochodendron* and *Tetracentron* is of the cytological type that characterizes vesselless secondary xylem of lower vascular plants. Comparisons between the vesselless wood of Winteraceae and Coniferae are misleading because of the structural differences, particularly in the rays and tracheary pitting. Comparison is more appropriate with the secondary xylem of certain of the Bennettitales and Pteridospermae.

"When the summation of evidence from all organs and parts of the plants is taken into consideration, there are no convincing arguments for deriving the Trochodendraceae from the Winteraceae or vice versa or even inferring that these families are closely related genetically."

On *Blakea* and *Topobea*. By H. A. Gleason. *Bul. Torrey Bot. Club* 72: 4: 385-393; July 1945

This distinctive tribe (Blakeae) of the Melastomaceae is comprised of some 100 species of trees, lianas, or epiphytic trees. Twelve new species and several new varieties are described.

De la présence de corpuscules siliceux dans les bois tropicaux en général et en particulier dans le bois du *Parinari glabra* Oliv. et du *Dialium Klainei* Pierre. Utilisation de ces bois en construction maritime. By Ed. Frison. *Bul. Agr. du Congo Belge* 33: 1: 91-105; 14 photomicrographs; March 1942.

Includes a list of 40 genera of 17 families which contain silicious concretions in the medullary rays or in the transverse parenchyma.

La estructura estratificada del leño de *Capparis salicifolia* Gris. By Domingo Cozzo. Pub. Tec. No. 3, Ministerio de Agricultura de la Nacion, Direccion Forestal (Buenos Aires), 1945. Pp. 3-5; 6¼ x 9¼; 1 plate.

The occurrence of storied structure is reported for the species *Capparis salicifolia* Gris. All elements are disposed in tiers. This species adds another genus to those reported in *Tropical Woods* 47: 16-18 (1936).

Notes sur la valeur économique des bois du *Corynanthe paniculata* Welw. et du *Pausinystalia Bequaerti* De Wild. By Ed. Frison. *Rev. Agri. du Congo Belge* (Brussels) 34: 3-4: 537-539; Sept.-Dec. 1943. Illustrated with six photomicrographs.

The location and state of rotenone in the root of *Derris elliptica*. By Francis A. Gunther and Franlin M. Turrell. *Jour. Agri. Res.* (Washington, D. C.) 71: 2: 61-79; 2 figs., 6 photomicrographs; July 15, 1945.

"Rotenone exists in situ in the form of whole derris resin (extractives) which occurs as discrete particles (globules) in certain cells in the xylem rays, xylem parenchyma, phloem parenchyma, and pericycle, and it does not occur in the vessels or in the fibers. Cells containing rotenone, in the resin form, are most numerous in the parenchyma of the phloem and of the xylem rays, being most dense in two concentric rings in the xylem.

"Starch is also present in great quantities in rings in the xylem and phloem parenchyma, apparently alternating with rings of rotenone-containing parenchyma. No starch occurs in fibers or in vessels, and starch and whole derris resin are not contained in the same cells.

"These particles (globules) of whole derris resin are in partial solution in an ethereal oil in situ. When the cell wall is broken the globules of resin and oil are suspended, prob-

ably by means of slowly hemolyzing saponins which were shown to be present, in the sap of the plant."—*From author's summary.*

The genus *Garcia* Vahl, a potential source of superior hard quick-drying oil. By CYRUS LONGWORTH LUNDELL. *Wrightia* (Southern Methodist Univ., Dallas, Texas) 1: 1-12; 1 fig.; August 1945.

"From preliminary investigations, *G. nutans* appears to be endemic in eastern Mexico, for the only known wild stands of the species occur in the region between Valles and Tamazunchale, San Luis Potosí. The genus *Garcia*, closely related botanically to the Asiatic genus *Aleurites*, the source of tung oil, contains two species native to Mexico, *G. nutans* and *G. parviflora*. Only *G. nutans* is at present known to bear seeds of potential commercial value as a source of quick-drying oil. Initial laboratory tests indicate that *Garcia* oil has characteristics and physical properties simliar to those of tung oil. In some ways, it appears to be equal, if not superior, to the best tung oil of commerce. The cultivation of the tree on a plantation basis will be necessary to obtain substantial commercial quantities of the oil. In test plantings in Florida and Texas, seedlings have made vigorous growth, some flowering within 14 months. The tree is widely adapted to the lowlands of tropical America. The area in eastern Mexico between Mante and Tamazunchale is suggested as the most favorable locality for growers to make test plantings on a commercial scale."—*From author's summary.*

Journal of the Arnold Arboretum (Jamaica Plain, Mass. 25: 1-521; January, April, July, October 1944.

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Additional common and vernacular names recorded for members of the Verbenaceae and Avicenniaceae (pp. 65-89) by HAROLD N. MOLDENKE.

The recorded common and vernacular names of Verbenaceae and Avicenniaceae arranged according to genera and species (pp. 89-123), by H. N. MOLDENKE.

Supplementary notes on the Eriocaulaceae, Avicenniaceae, and Verbenaceae of Texas. I (pp. 123-128), by H. N. MOLDENKE.

A contribution to the anatomy of *Salvadora persica* L. with special reference to the origin of the included phloem. By BALWANT SINGH. *Jour. Indian Bot. Soc.* 23: 2: 71-78; 2 plates, 6 photomicrographs; May 1944.

The anatomy of the stem, root and leaf are studied. The origin and structure of the strands of included phloem are described in detail.

"In conclusion, it may be said that the included phloem found in the wood of *Salvadora* (root as well as stem) is differentiated from the thin-walled parenchymatous cells cut off by the cambium on its inner side. Subsequently the cambium resumes its normal activity and the phloem becomes more deeply embedded into the wood.

". . . it is not satisfactory to rely on the presence or absence of any embedded cambial segment on the inside of an island, for such a cambium although it seems to be characteristic of the *Strychnos*-type, may differentiate secondarily in other cases. It may be pointed out that the suggestion (Eames and MacDaniels, 1925, p. 258) that of the two methods of origin of included phloem, only the *Strychnos*-type occurs in all cases and the other is probably non-existent, is incorrect."—*From the author's conclusions.*