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THE FORESTS OF THE UNITED STATES

FOREST TYPES AND METHODS



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THE FORESTS OF THE PHILIPPINES

PART II

THE PRINCIPAL FOREST TREES

BY

H. N. WHITFORD, PH. D.

FORESTER, CHIEF OF DIVISION OF INVESTIGATION



DEPARTMENT OF THE INTERIOR
BUREAU OF FORESTRY

BULLETIN No. 10

MAJOR GEORGE P. AHERN
DIRECTOR OF FORESTRY

MANILA
BUREAU OF PRINTING
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THE FORESTS OF THE PHILIPPINES

PART II

THE FOREST TREES



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BUREAU OF FORESTRY

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MAJOR GEORGE F. AHERN
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MAILED
BUREAU OF FORESTRY
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THE FORESTS OF THE PHILIPPINES: PART II
THE PRINCIPAL FOREST TREES

FAMILIES, SPECIES, VARIETIES, PLANTS, AND FRUIT
TREES & SHRUBS OF THE PHILIPPINE ISLANDS

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF FORESTRY,
Manila, November 29, 1910.

SIR: I have the honor to submit herewith a report entitled, "The Forests of the Philippines: Part II. The Principal Forest Trees," by H. N. Whitford, Ph. D., forester, chief division of investigation, and to recommend its publication as Part II of Bulletin No. 10.

Part I of this bulletin, dealing with The Forest Types and Products, was submitted for publication on November 11.

Very respectfully,

GEORGE P. AHERN,
Director of Forestry.

The honorable,
The ACTING SECRETARY OF THE INTERIOR, *Manila.*

THE FORESTS OF THE PHILIPPINES: PART II.

THE PRINCIPAL FOREST TREES.

FAMILIES, SPECIES, OFFICIAL COMMON NAMES, AND USUAL TRADE NAMES OF THE PRINCIPAL TREES.

Family.	Species.	Official name.	Usual trade name.
Pinaceæ	<i>Agathis alba</i> (Lam.) F. W. Foxw. (<i>Agathis philippinensis</i> Warb.)	Almáciga	Almáciga.
	<i>Pinus insularis</i> Endl.	Benguét pine	Benguet pine, saleng.
	<i>Pinus merkusii</i> J. & de V.	Tapúlao	
Casuarinaceæ	<i>Casuarina equisetifolia</i> Forst.	Agohó	Agoho.
Fagaceæ	<i>Quercus</i> spp.	Oaks	
Ulmaceæ	<i>Celtis philippensis</i> Blanco	Malakmo	
	<i>Trema amboinensis</i> Bl.	Anabión	
Moraceæ	<i>Allæanthus glaber</i> Warb.	Malambíngan	
	<i>Artocarpus communis</i> Forst.	Antipólo	Antipolo.
	<i>Artocarpus cumingiana</i> Trec.	Anubíng	Anubing, cubi.
	<i>Artocarpus integrifolia</i> L. f.	Nángka	Nangka.
	<i>Castilloa elastica</i> Cerv.	Castílloa	Castilloa.
	<i>Ficus elastica</i> L.		India rubber.
	<i>Ficus minabassae</i> Miq.	Hagímit	
	<i>Ficus variegata</i> Bl.	Tangisang-bayá-wak.	
	<i>Streblus asper</i> Lour.	Kaliós	
	<i>Taxotrophis ilicifolia</i> Vid.	Kúyus-kúyus	Kuyus-kuyus.
Olacaceæ	<i>Strombosia philippinensis</i> (Baill.) Rolfe	Tamayúan	Tamayuan.
Magnoliaceæ	<i>Michelia champaca</i> L.	Champáca	
	<i>Talauma villariana</i> Rolfe	Patángis	
Anonaceæ	<i>Anona muricata</i> L.	Guanábano	
	<i>Anona reticulata</i> L.	Anónas	
	<i>Anona squamosa</i> L.	Átis	
	<i>Canarium odoratum</i> Baill. <i>Cyathocalyx globosus</i> Merr.	Ilang-ilang Dalinas	Ilang-ilang.
Myristicaceæ	<i>Knema heterophylla</i> Warb.	Tambaláo	Duguan.
	<i>Myristica philippensis</i> Lam.	Dugúan	Duguan.
Lauraceæ	<i>Beilschmiedia cairocan</i> Vid.	Malacadiós	Macaladios, cubi.
	<i>Cinnamomun mercadoi</i> Vid.	Kalíngag	
	<i>Cinnamomum mindanaense</i> Elm.	Cinnamon	
	<i>Cryptocarya bicolor</i> Merr.	Dugkátan	Malacadios?
	<i>Dehaasia triandra</i> Merr.	Basláyan	Baticulin.
	<i>Eusideroxylon zwageri</i> T. & B.	Tambúlian	Billian or Borneo iron- wood.
	<i>Litsea perrottetii</i> (Bl.) F.-Vill.	Maráng	Baticulin.
	<i>Litsea</i> spp.		Do.
	<i>Neolitsea vidalii</i> Merr.	Puso-puso	Do.
	<i>Phoebe sterculioides</i> (Elm.) Merr.	Maláya	Do.
Pittosporaceæ	<i>Pittosporum pentandrum</i> (Blanco) Merr.	Mamalis	
Rosaceæ	<i>Parinarium griffithianum</i> Benth.	Liúsín	Liusin.
	<i>Pygeum preslii</i> Merr.	Lágo	

Families, species, official common names, etc.—Continued.

Family.	Species.	Official name.	Usual trade name.
Leguminosæ	<i>Acacia farnesiana</i> (L.) Willd.	Aróma	
	<i>Adenanthera intermedia</i> Merr.	Tanglin	Ipil.
	<i>Albizzia acle</i> (Blanco) Merr. (<i>Pithecolobium acle</i> Vid.)	Acle	Acle.
	<i>Albizzia procera</i> (Roxb.) Benth.	Acleng-párang	Acleng-párang.
	<i>Albizzia retusa</i> Benth.	Kásai	
	<i>Albizzia saponaria</i> (Lour.) Blume.	Salinkúgi	Salinkugi.
	<i>Bauhinia malabarica</i> Roxb.	Alibangbáng	
	<i>Caesalpinia sappan</i> L.	Sibucáo	Sibucáo.
	<i>Cassia javanica</i> L.	Caña-fistula	
	<i>Cassia siamea</i> Lam.		
	<i>Delonix regia</i> Raf. (<i>Poinciana regia</i> Boj.)	Fire tree	
	<i>Enterolobium saman</i> (Jacq.) Prain (<i>Pithecolobium saman</i> Benth.)	Rain tree	Acacia.
	<i>Erythrina indica</i> Lam.	Dapdáp	
	<i>Erythrophloeum densiflorum</i> (Elm.) Merr.	Kamátog	
	<i>Gliricidia sepium</i> (Jacq.) Steud.	Madre cacao	
	<i>Intsia acuminata</i> Merr.	Merrill's ipil	Ipil.
	<i>Intsia bijuga</i> (Colebr.) O. Ktze. (<i>Azela bijuga</i> A. Gray).	Ipil	Do.
	<i>Kingiodendron alternifolium</i> (Elm.) M. & R.	Batéte	Batete.
	<i>Leucaena glauca</i> (L.) Benth.	Ipil-ipil	Santa elena.
	<i>Ormosia calavensis</i> Azaola	Báhai	
	<i>Pahudia rhomboidea</i> (Blanco) Prain	Tindalo	Tindalo.
	<i>Parkia timoriana</i> (DC.) Merr. (<i>Parkia roxburghii</i> G. Don)	Cúpang	Cupang.
	<i>Peltophorum inerme</i> (Roxb.) Naves		
	<i>Pithecolobium dulce</i> (Roxb.) Benth.	Camanchile	Camanchile.
	<i>Pithecolobium scutiferum</i> (Blanco) Benth.	Anagáp	
	<i>Pongamia mitis</i> (L.) Merr.	Bani	
	<i>Prosopis dialiana</i> Naves	Philippine mes- quite.	Aroma.
	<i>Pterocarpus blancoi</i> Merr.	Blanco's narra	Narra.
	<i>Pterocarpus echinatus</i> Pers.	Prickly narra	Do.
	<i>Pterocarpus indicus</i> Willd.	Narra	Do.
	<i>Sesbania grandiflora</i> (L.) Pers.	Katúrai	
	<i>Sindora supa</i> Merr. (<i>Sindora wallichii</i> F. Vill. non Benth.)	Supá	Supa.
<i>Tamarindus indica</i> L.	Sampálok		
<i>Wallaceodendron celebicum</i> Koord.	Banuyo	Banuyo.	
Rutaceæ	<i>Citrus hystrix</i> DC.	Kabúyao	
	<i>Fagara integrifoliola</i> Merr.	Kayutána	
	<i>Murraya exotica</i> L.	Camúning	Camuning.
Burseraceæ	<i>Canarium luzonicum</i> A. Gray	Pili	
	<i>Canarium villosum</i> F. Vill.	Pagsahingín	
	<i>Garuga abilo</i> (Blanco) Merr.	Bogó	
	<i>Santiria nitida</i> Merr.	Kamingí	
Meliaceæ	<i>Aglaiá clarkii</i> Merr.	Tucang-cálo	Tucang-calao.
	<i>Aglaiá harmsiana</i> Perk.	Malasáing	
	<i>Dysoxylum</i> sp.?	Agard	
	<i>Lansium domesticum</i> Jack	Lansones	
	<i>Sandoricum indicum</i> Cav.	Santól	Santol.
	<i>Sandoricum vidalii</i> Merr.	Malasantól	Malasantol.
	<i>Toona calantas</i> M. & R.	Calántas	Calantas.
	<i>Xylocarpus granatum</i> Koen.	Piagáo	
	<i>Xylocarpus obovatus</i> A. Juss.	Tabigi	
Euphorbiaceæ	<i>Aleurites moluccana</i> Willd.	Lumbáng	Lumbang.
	<i>Aleurites trisperma</i> Blanco	Balukánad	Do.
	<i>Antidesma buntis</i> Spr.	Bignái	
	<i>Antidesma edule</i> Merr.	Tanigi	
	<i>Antidesma ghaesembilla</i> Gaertn.	Binayúyu	
	<i>Aporosa sphaeridophora</i> Merr.	Bignái laláki	
	<i>Aporosa symplocosifolia</i> Merr.	Malabignái	
	<i>Baccaurea tetrandra</i> Muell.-Arg.	Dilak	
	<i>Bischofia javanica</i> Bl.	Túai	
	<i>Cyclostemon bordenii</i> Merr.	Tinaán-pantái	Tinaan-pantai.
	<i>Cyclostemon grandifolius</i> C. B. Rob.	Banáwi	
	<i>Cyclostemon microphyllus</i> Merr.	Butong-manúk	
	<i>Endospermum peltatum</i> Merr.	Gúbas	Gubas.
	<i>Hevea brasiliensis</i> Muell.-Arg.	Para rubber	Para rubber.
<i>Homalanthus populneus</i> Pax	Balanti		
<i>Jatropha curcas</i> L.	Túba		

Families, species, official common names, etc.—Continued.

Family.	Species.	Official name.	Usual trade name.
Euphorbiaceæ	<i>Macaranga bicolor</i> Muell.-Arg.	Hamindáng	
	<i>Macaranga tanarius</i> Muell.-Arg.	Bínúnga	
	<i>Mallotus moluccanus</i> Muell.-Arg.	Alim	
	<i>Mallotus philippinensis</i> Muell.-Arg.	Banáto	
	<i>Mallotus ricinoides</i> Muell.-Arg.	Hinlaúmo	
	<i>Manihot glaziovii</i> Muell.-Arg.	Ceara rubber	Ceara rubber.
Anacardiaceæ	<i>Anacardium occidentale</i> L.	Kasól	
	<i>Buchanania arborescens</i> Blume	Balinghásay	Balinghasay.
	<i>Dracontomelum cumingianum</i> Baill.	Lamió	Dao.
	<i>Dracontomelum dao</i> M. & R.	Daó	Do.
	<i>Koordersiodendron pinnatum</i> (Blanco) Merr.	Amúguis	Amuguis.
	<i>Mangifera altissima</i> Blanco	Pahútan	
	<i>Mangifera indica</i> L.	Mango	Mango.
Rhamnaceæ	<i>Semecarpus perrottetii</i> March.	Ligás	
	<i>Spondias lutea</i> L.	Ciruclás	
	<i>Spondias pinnata</i> Kurz.	Libás	
	<i>Zizyphus trinervia</i> Poir.	Ligáa	
	<i>Zizyphus zonulatus</i> Blanco	Balacát	Balacát or ligáa.
Sapindaceæ	<i>Arytera littoralis</i> Bl.	Alásin	
	<i>Euphoria cinerea</i> Radlk.	Alúpag	Alupag.
	<i>Harpullia arborea</i> (Blanco) Radlk.	Uás	Do.
	<i>Litchi philippinensis</i> Radlk.		
Staphyleaceæ	<i>Pometia pinnata</i> Forst.	Malúgay	Malugay.
	<i>Turpinia pomifera</i> DC.	Anongo	
Tiliaceæ	<i>Columbia serratifolia</i> (Cav.) DC.	Aniláo	
	<i>Diplodiscus paniculatus</i> Turcz.	Balobó	
	<i>Grewia stylocarpa</i> Warb.	Susumbík	
Malvaceæ	<i>Bombycidendron vidualianum</i> (Naves) M. & R.	Lanútan	Lanutan.
	<i>Hibiscus tiliaceus</i> L.	Malubágo	
	<i>Thespesia populnea</i> Corr.	Banáto	Lanutan or banáto.
Bombacaceæ	<i>Bombax malabaricum</i> DC.	Malabútlak	
	<i>Ceiba pentandra</i> (L.) Gaertn.	Kápok	
Sterculiaceæ	<i>Heritiera littoralis</i> Dry.	Dúngon-láte	Dungon-late or dungon.
	<i>Kleinohfia hospita</i> L.	Tanág	
	<i>Pterocymbium tinctorium</i> (Blanco) Merr.	Talóto	Taluto.
	<i>Pterospermum</i> spp.	Bayók	
	<i>Sterculia blancoi</i> Rolfe	Magalipak	
	<i>Tarrietia javanica</i> Bl.	Lumbayáo	Lumbayao.
	<i>Tarrietia sylvatica</i> (Vid.) Merr.	Dúngon	Dungon.
Dilleniaceæ	<i>Dillenia luzoniensis</i> (Vid.) Merr.	Malacatmón	Catmon.
	<i>Dillenia philippinensis</i> Rolfe	Catmón	Do.
	<i>Dillenia speciosa</i> Gilg	Catmón-carabáo	Do.
Theaceæ	<i>Adinandra luzonica</i> Merr.		
	<i>Eurya</i> spp.		
	<i>Gordonia luzonica</i> Vid.		
	<i>Ternstroemia toquian</i> (Blanco) F.-Vill.	Bikag	
	<i>Thea montana</i> (Blanco) Merr.		
Guttifere	<i>Calophyllum blancoi</i> Pl. & Tr.	Bitánhol	Palomaria.
	<i>Calophyllum inophyllum</i> L.	Palo maria	Do.
	<i>Cratoxylon celebicum</i> Blume	Gúyong-gúyong	
	<i>Garcinia benthami</i> Pierre	Bunóg	
	<i>Garcinia binucao</i> Choisy	Binúkao	
	<i>Garcinia mangostana</i> L.	Mangosteen	Mangosteen.
	<i>Kayea paniculata</i> (Blanco) Merr.	Kaliwas	
	<i>Hopea acuminata</i> Merr.		
Dipterocarpaceæ	<i>Anisoptera curtisii</i> Dyer	Malapáho	Palosapis, mayapis.
	<i>Anisoptera thurifera</i> Blanco	Palosápis	Do.
	<i>Anisoptera</i> sp.	Afu	Do.
	<i>Dipterocarpus affinis</i> Brandis	Hagachác	Apitong.
	<i>Dipterocarpus grandiflorus</i> Blanco	Apitong	Do.
	<i>Dipterocarpus vernicifluus</i> Blanco	Pánao	Do.
	<i>Hopea acuminata</i> Merr.	Mangachapdy	Mangachapdy, dalingdingan.

Families, species, official common names, etc.—Continued.

Family.	Species.	Official name.	Usual trade name.
Dipterocarpaceae	<i>Hopea philippinensis</i> Dyer	Guísoc-guísoc	Dalingdingan, mangchapy.
	<i>Hopea pierrei</i> Hance	Dalingdingan-isák.	Yacal.
	<i>Hopea plagata</i> Vid.	Yacál.	Do.
	<i>Hopea</i> sp.	Black yacál	Do.
	do	Malayacál	Do.
	<i>Parashorea plicata</i> Brandis	Bagtican-lauan	Almon, white lauan.
	<i>Pentacme contorta</i> (Vid.) M. & R. (<i>Shorea contorta</i> Vid.)	White lauán	Lauan, white lauan.
	<i>Shorea balangeran</i> Burck	Guísoc	Yacal.
	<i>Shorea furfuracea</i> Miq.	Almón-lauán	Almon, white lauan.
	<i>Shorea guiso</i> (Blanco) Blume	Guijo	Guijo.
	<i>Shorea malaanonan</i> (Blanco) Blume	Malaa nónang-lauan.	Lauan, malaanonang.
	<i>Shorea polysperma</i> (Blanco) Merr.	Tanguile	Tanguile, mayapis, balakbakan.
	<i>Shorea</i> sp.	Mangasinórolauan.	Lauan, mangasinoro.
	do	Red lauán	Red lauan, red almon, tanguile, balakbakan.
	do	Tiáong-lauan	Tiaong-lauan, red lauan.
<i>Shorea squamata</i> (Tcz.) Dyer	Mayápis-lauán	Mayapis, red lauan.	
<i>Vatica</i> sp.	Kalúnti-lauán	Yacal.	
do	Nárig	Yacal blanco.	
do	Yacal blanco		
Flacourtiaceae	<i>Flacourtia inermis</i> Roxb.	Aránga	Aranga.
	<i>Homalium luzoniense</i> F. Vill.		
Datiaceae	<i>Octomeles sumatrana</i> Miq.	Biluáng	Biluang.
Lythraceae	<i>Lagerstroemia piriformis</i> Koehne (<i>Lagerstroemia batitinan</i> Vid.)	Batitínan	Batitinan, Philippine teak.
	<i>Lagerstroemia speciosa</i> (L.) Pers.	Banabá	Banaba.
Sonneratiaceae	<i>Sonneratia pagatpat</i> Blanco	Pagatpát	Pagatpat, montol.
	<i>Sonneratia</i> sp.	Pedadá	Pagatpat.
Lecythidaceae	<i>Barringtonia racemosa</i> Roxb.	Pítat	
	<i>Barringtonia speciosa</i> Forst.	Bótong	
	<i>Planchonia spectabilis</i> Merr.	Lamóg	
Rhizophoraceae	<i>Bruguiera caryophylloides</i> Bl.	Potótan-laláki	Bacauan.
	<i>Bruguiera eriopetala</i> W. & A.	Potótan	Do.
	<i>Bruguiera gymnorrhiza</i> Lam.	Busáin	Do.
	<i>Bruguiera parviflora</i> W. & A.	Langárai	Do.
	<i>Carallia integerrima</i> DC.	Bacáuan-gubat	
	<i>Ceriops tagal</i> (Perr.) C. B. Rob.	Tangál	Tangal, bacauan.
	<i>Rhizophora conjugata</i> L.	Bacáuan	Bacauan.
<i>Rhizophora mucronata</i> Lam.	Bacáuan-laláki	Do.	
Combretaceae	<i>Lumnitzera littorea</i> (Jack) Voigt	Tabáo	Tabao.
	<i>Lumnitzera racemosa</i> Willd.		
	<i>Terminalia calamansanai</i> (Blanco) Rolfe	Malacalumpit	
	<i>Terminalia catappa</i> L.	Talisay	Talisay.
	<i>Terminalia comintana</i> (Blanco) Merr.	Binggás	Bunglas, binggas, molave, batitinan.
	<i>Terminalia edulis</i> Blanco	Calumpit	Calumpit.
	<i>Terminalia nitens</i> Presl	Sácat	Sacat.
	<i>Terminalia ocarpa</i> Merr.	Talisay-gubat	Talisay.
<i>Terminalia pellucida</i> Presl	Dalinsi	Dalinsi.	



PLATE I.—ALMACIGA (*Agathis alba*).



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PLATE II.—BENGUET PINE (*Pinus insularis*).
a, Cluster of leaves; b, unopened cone; c, opened cone.



PLATE III.—BENGUET PINE (*Pinus insularis*).

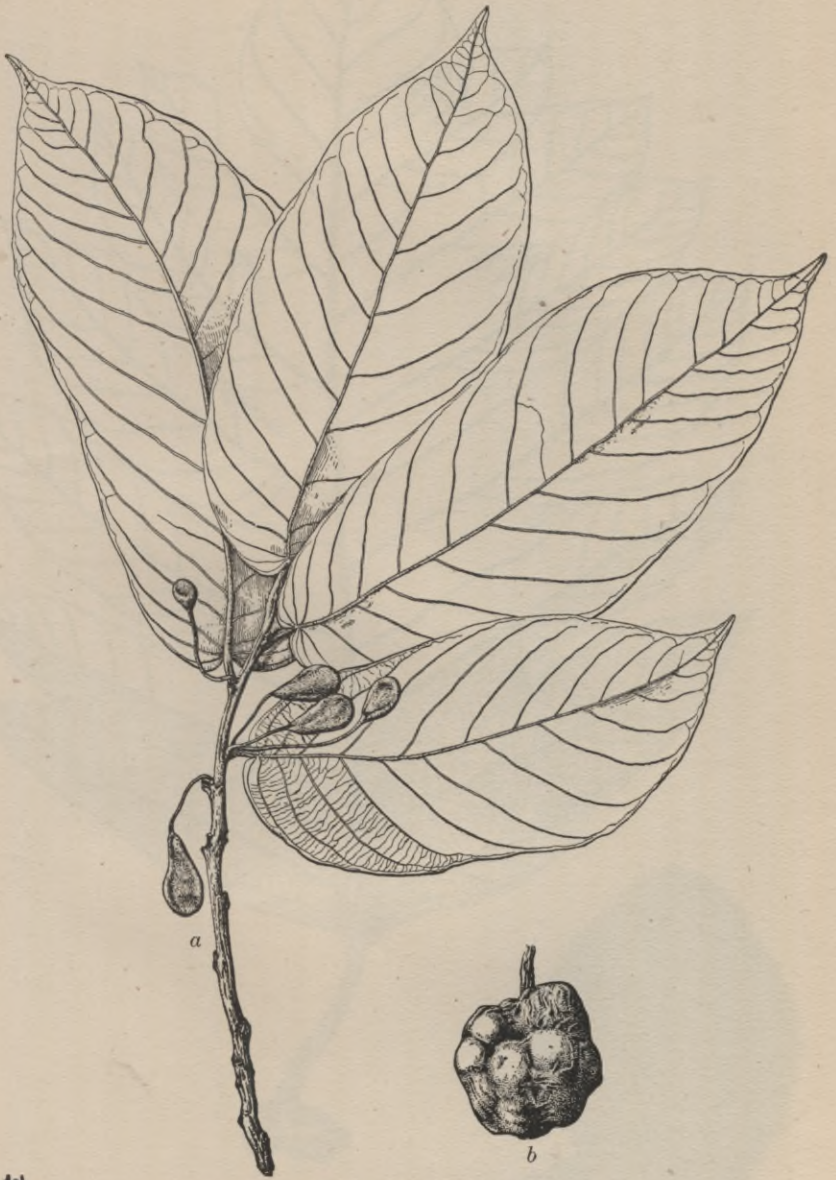
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PLATE IV.—AGOHO (*Casuarina equisetifolia*).
a, Branchlet showing reduced leaves.



PLATE V.—GROVE OF AGOHO TREES.



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PLATE VI.—ANUBING (*Artocarpus cumingiana*).

a, Young fruit; b, mature fruit.



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PLATE VII.—CULTIVATED FORM OF ANTIPOLO (*Artocarpus communis*).

a, Fruit.

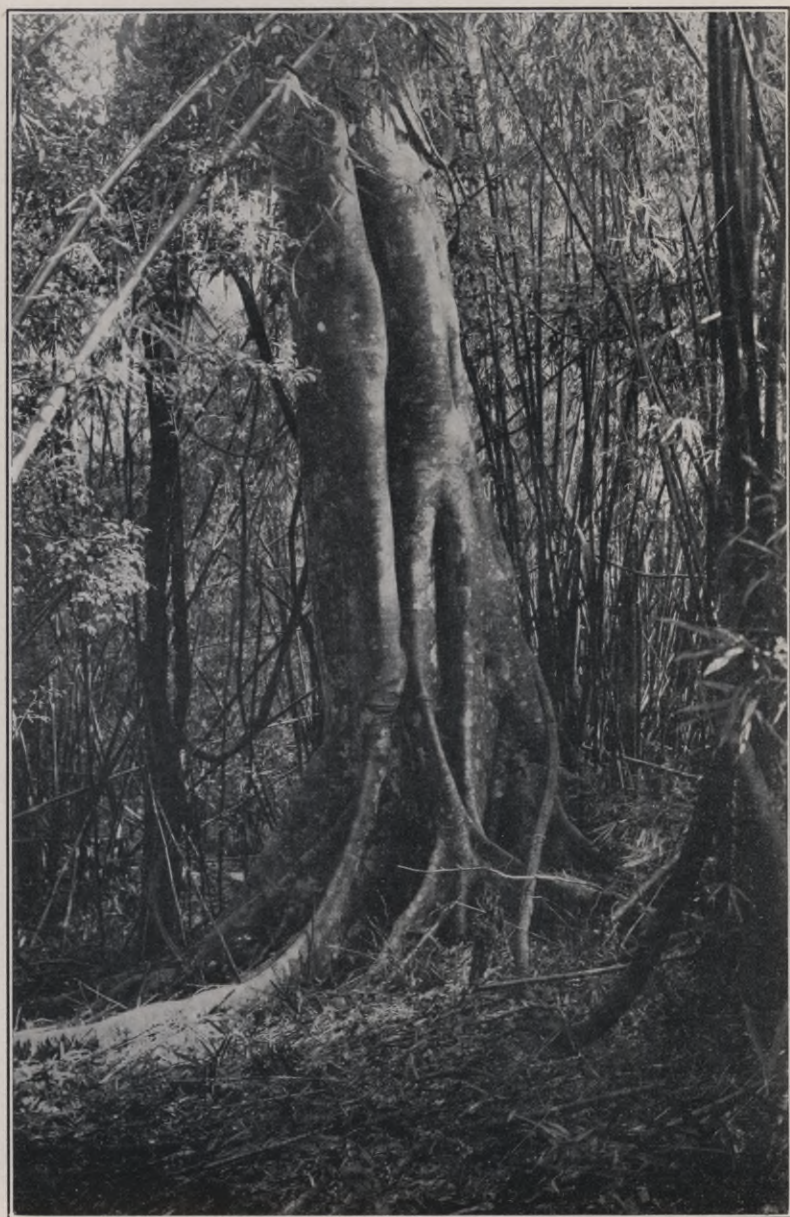


PLATE VIII.—BALETE (*Ficus* sp.).



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PLATE IX.—TAMAYUAN (*Strombosia philippinensis*).

a, Fruit.



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PLATE X.—DUGUAN (*Myristica philippensis*).

a, Flowers; b, fruit.



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PLATE XI.—TAMBALAO (*Knema heterophylla*).

a, Fruit; b, different forms of leaves.



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PLATE XII.—MARANG (*Litsea perrottetii*).

a, Cluster of flowers and young fruits; b, mature fruits.



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PLATE XIII.—MALACADIOS (*Beilschmiedia cairocan*).

a, Fruit; b, flower cluster.



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PLATE XIV.—LIUSIN (*Parinarium griffithianum*).

a, Flower cluster; b, fruits.



PLATE XV.—LEAVES AND LOWER PORTION OF THE TRUNK OF LIUSIN
(*Parinarium griffithianum*).



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PLATE XVI.—THE NARRAS.

a, Spiny narra (*Pterocarpus echinatus*); b, fruit of Blanco's narra (*Pterocarpus blancoi*); c, fruit of narra (*Pterocarpus indicus*).

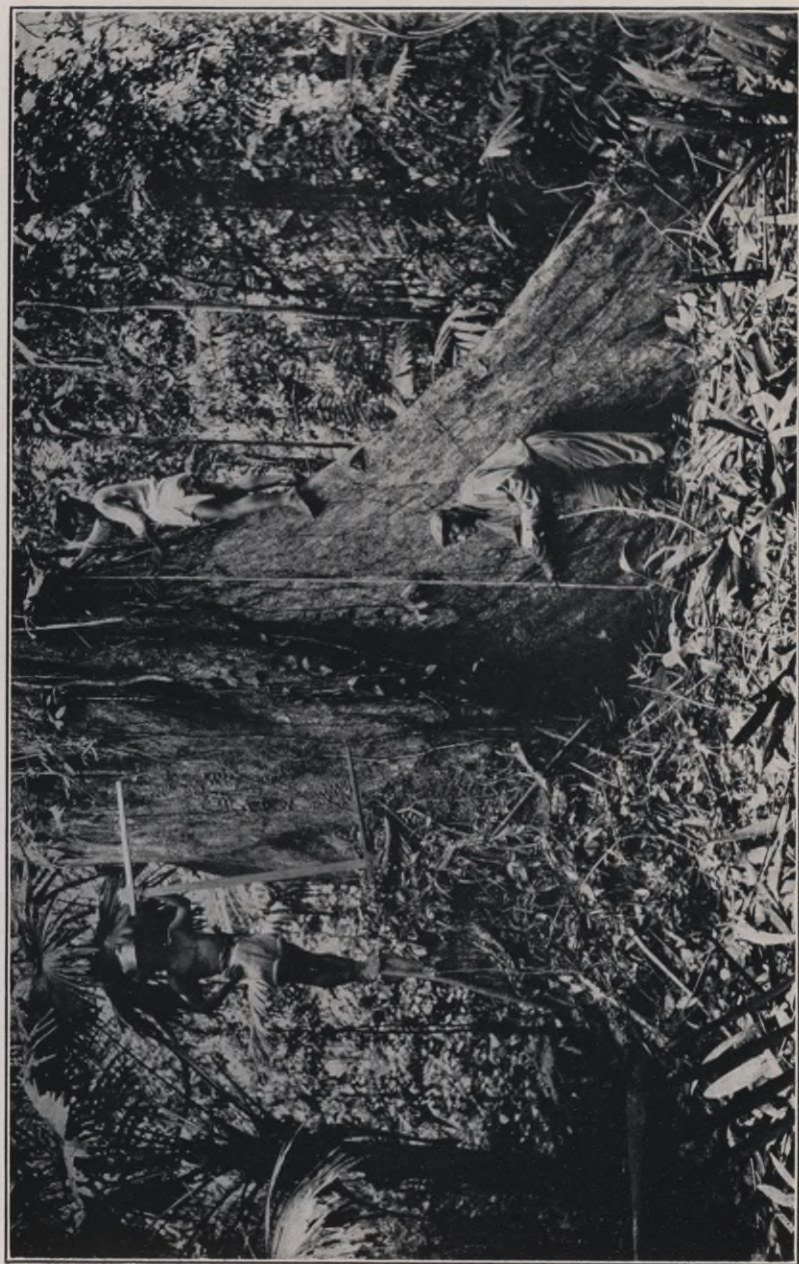


PLATE XVII.—LOWER PORTION OF THE TRUNK OF A LARGE NARRA (*Pterocarpus indicus*).
Showing root buttress.



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PLATE XVIII.—BATETE (*Kingiodendron alternifolium*).

a, Flower cluster; b, fruit.

Families, species, official common names, etc.—Continued.

Family.	Species.	Official name.	Usual trade name.	
Myrtaceæ	<i>Decaspermum blancoi</i> Vid.			
	<i>Decaspermum paniculatum</i> Kurz		Macaasim, malaruhát, binolo.	
	<i>Eucalyptus naudiniana</i> F. Muell.			
	<i>Eugenia bordenii</i> Merr.	Malarúhat na pulá.	Malaruhát, macaasim.	
	<i>Eugenia calubocob</i> C. B. Rob.	Kalubkób		
	<i>Eugenia jambolana</i> Lam.	Dúhat		
	<i>Eugenia jambos</i> L.	Tampói		
	<i>Eugenia javanica</i> Lam.	Makópa		
	<i>Eugenia luzoniensis</i> Merr.	Malarúhat na pulá.	Malaruhát, macaasim.	
	<i>Eugenia</i> spp.	Macaásim, malarúhat.	Do.	
	<i>Leptospermum flavescens</i> Smith	Malasulási		
	<i>Osbornia octodonta</i> F. Muell.	Tawális		
<i>Psidium guajava</i> L.	Bayábas	Bayabas.		
<i>Tristania decorticata</i> Merr.	Malabayábas			
<i>Xanthostemon verdugonianus</i> Naves	Manconó	Mancono, palo de hierro.		
Melastomataceæ	<i>Memeclon edule</i> Roxb.	Kúlis		
Araliaceæ	<i>Polyscias nodosa</i> Seem.	Malapapáya	Malapapaya, malasapsap.	
Cornaceæ	<i>Alangium longiflorum</i> Merr.	Malatápai	Malatapai, guntapai.	
Sapotaceæ	<i>Achras sapota</i> L.	Chico		
	<i>Illipe betis</i> (Blanco) Merr.	Bétis	Betis.	
	<i>Illipe ramiflora</i> Merr.	Banítí	Manicnie, mayapis.	
	<i>Mimusops</i> sp.	Bansaláguin	Bansalaguin.	
	<i>Palaquium luzoniense</i> (F.-Vill.) Vid.	Náto	Malac-malac.	
	<i>Palaquium philippense</i> (Perr.) C. B. Rob.	Malacmalac	Manicnie, nato.	
	<i>Palaquium tenuipetiolatum</i> Merr.	Manicnie	Manicnie, mayapis, amuguis.	
	<i>Sideroxylon</i> spp.	White nátos		
	Ebenaceæ	<i>Diospyros discolor</i> Willd.	Camagón	Camagon, ebony.
		<i>Diospyros mindanaensis</i> Merr.	Ata-áta	Bolongeta, camagon.
<i>Diospyros pilosantha</i> Blanco		Bolongéta	Bolongeta, camagon.	
<i>Maba buxifolia</i> Pers.		Ebony	Ebony, ébano.	
Lagoniaceæ	<i>Fagraea fragrans</i> Roxb.	Urung	Dolo, teca.	
Apocynaceæ	<i>Alstonia macrophylla</i> Wall.	Batino	Batino.	
	<i>Alstonia scholaris</i> (L.) R. Br.	Ditá	Dita.	
	<i>Wrightia calycina</i> R. Br.		Lanete.	
	<i>Wrightia laniti</i> (Blanco) Merr.	Lanéte	Do.	
Borraginaceæ	<i>Cordia blancoi</i> Vid.	Anonang		
Verbenaceæ	<i>Premna nauseosa</i> Blanco	Alagao	Mulawin-aso.	
	<i>Tectona grandis</i> L. f.	Teak	Teak.	
	<i>Vitex aherniana</i> Merr.	Sasalit	Sasalit, mola-ve.	
	<i>Vitex parviflora</i> Juss. (<i>Vitex littoralis</i> Decne.)	Molave	Molave.	
	<i>Vitex pentaphylla</i> Merr.	Kalipápa aso	Mulawin-aso.	
	<i>Vitex pubescens</i> Vahl.	Hairy-leaf mola-ve.	Molave.	
	<i>Vitex turczaninowii</i> Merr.	Lingo-lingo	Mulawin-aso.	
	Bignoniaceæ	<i>Dolichandrone spathacea</i> (L. f.) K. Sch.	Tói	
		<i>Oroxylum indicum</i> Benth.	Pinkapinkáhan	
		<i>Radermachera pinnata</i> (Blanco) Seem.	Bánaibánaí	
Rubiaceæ	<i>Nauclea</i> spp.		Calamansanay.	
	<i>Sarcocephalus cordatus</i> Miq.	Bancál	Bancal.	
	<i>Sarcocephalus junghuhnii</i> Miq.	Mambóg	Do.	

KEY TO THE PRINCIPAL TIMBER TREES OF THE PHILIPPINES.

1. Wook or bark, or both, resinous.
2. Leaves needle-like Benguet pine (p. 26)
2. Leaves not needle-like.
 3. Leaves simple, opposite or nearly so..... Almaciga (p. 25)
 3. Leaves simple, alternate (Dipterocarpaceæ).
 4. Bark ridged.
 5. Bark black, less than 5 millimeters in thickness; axils of basal veins of leaves with glands..... Black yacal (p. 73)
 5. Bark brown to black, more than 10 millimeters in thickness; axils of veins with or without glands.
 6. Glands only in axils of basal veins or wanting; leaves 4.5 to 8 centimeters long, 2 to 2.5 centimeters wide.. Mangachapuy (p. 75)
 6. Glands in axils of all secondary veins; leaves 3 to 8.5 centimeters long 1 to 3.5 centimeters wide..... Dalingdingan-isak (p. 76)
 5. Bark brown, cinnamon brown to nearly black; more than 10 millimeters thick; leaves without glands.
 6. Leaves hairy beneath.
 7. Hairs coarse, star shaped; stipules large; leaves 10 to 30 centimeters long; wood light red..... Mayapis-lauan (p. 65)
 7. Hairs not so coarse, star shaped; stipules smaller than preceding; leaves 9 to 17 centimeters long, wood with a very light red color Almon-lauan (p. 62)
 7. Hairs fine; bark with reddish tinge; wood dark red.
 - Red lauan (p. 66)
 7. Hairs fine and scattered, giving leaves a slightly rusty brown appearance; wood light brown with a reddish to yellowish tinge Malaanonang-lauan (p. 64)
 6. Leaves without hairs.
 7. Leaves with a white glaucous bloom beneath.
 - Bagtican-lauan (p. 63)
 7. Leaves without glaucous bloom.
 8. Leaves 7.5 to 23 centimeters long; 3.5 to 10 centimeters wide; widely distributed White lauan (p. 61)
 8. Leaves 7 to 12 centimeters long, 3 to 6 centimeters wide, reported only from Mindanao..... Kalunti-lauan (p. 64)
4. Bark not ridged.
 5. Bark brown, cinnamon red, to nearly black; inner bark stringy.
 6. Bark brown to cinnamon red, inner bark tan red; less than 10 millimeters thick; leaves without glands.
 7. Leaves 5 to 14 centimeters long, 3 to 6 centimeters wide, bluntly wedge shaped at the base..... Tanguile (p. 67)
 7. Leaves 8 to 19 centimeters long, 3 to 8 centimeters wide, rounded at base Guijo (p. 70)
 6. Bark brown to black, less than 6 millimeters thick; inner bark brown with pinkish tinge; leaves with prominent glands in axils; sharp-pointed stipules Guisoc-guisoc (p. 74)
 6. Bark gray-brown, cinnamon brown to nearly black; inner bark yellow; 10 millimeters or more in thickness.
 7. Bark gray-brown to cinnamon brown; some leaves with glands in axils of veins Yacal (p. 72)
 7. Bark darker than preceding; no glands; leaves slightly rusty brown beneath Guisoc (p. 73)

7. Bark like yacal; tree shorter and stockier; no glands; leaves like guijo and larger than guisoc and yacal.... **Malayacal** (p. 74)
5. Bark light gray, 8 millimeters or less in thickness; inner bark very brittle and red.
6. Leaf blade smooth; petiole 5.5 to 7 centimeters long.
Apitong (p. 68)
6. Leaf blade finely hairy beneath; petiole 2.5 to 3 centimeters long.
Panao (p. 69)
6. Petiole and midrib of underside of leaf coarsely hairy; leaves larger than apitong and panao (18 to 53 centimeters long, 7 to 22 centimeters wide) **Hagachac** (p. 70)
6. Tree smaller than preceding; resin scanty; leaves smooth, smaller than apitong, panao, hagachac (4.5 to 10 centimeters long, 3 to 5.5 centimeters wide)..... **Narig and Karig** (p. 76)
5. Bark yellowish gray, 15 to 25 millimeters thick; inner bark granular yellow **Palosapis** (p. 77)
3. Leaves compound, alternate; bark resinous.
The pilis, kamingi, and bogo (p. 44)
1. Wood and bark not resinous or at least not prominently so.
2. Bark with white sap.
3. Leaves opposite or whorled. (Apocynaceæ.)
4. Leaves in whorls of 4 to 7; each 5 to 20 centimeters long, 1 to 6.5 centimeters wide; wood soft..... **Dita** (p. 95)
4. Leaves in whorls of 3 to 4; 10 to 20 centimeters long, 3 to 7.5 centimeters wide; wood moderately hard **Batino** (p. 95)
4. Leaves opposite **The lanetes** (p. 96)
3. Leaves simple, alternate; sap flows sparingly when bark is cut from layer next the sapwood; woods lather readily when rubbed with saliva or water. (Sapotaceæ.)
4. Wood light brown or creamy white **The white natos** (p. 92)
4. Woods reddish.
5. Leaves with dense mat of golden-brown hairs beneath.
6. Bark 10 millimeters or less in thickness; brown to reddish brown in color; wood very hard and heavy **Betis** (p. 89)
6. Bark more than 10 millimeters in thickness, grayish brown in color; wood moderately hard and moderately heavy.
Malacmalac (p. 91)
5. Leaves smooth or nearly so.
6. Bark nearly black, ridged; leaves 4 to 12 centimeters long, 2 to 4 centimeters wide; wood very hard and heavy.
Bansalaguin (p. 90)
6. Bark gray to brown; leaves 9 to 17 centimeters long, 4 to 7 centimeters wide; wood moderately hard and moderately heavy.
Nato (p. 91)
6. Bark dark gray to dark brown; leaves 6 to 12 centimeters long, 2.5 to 4.5 centimeters wide; wood moderately hard and moderately heavy **Manicnic** (p. 92)
3. Leaves simple, alternate; sap flows freely when bark is cut. (Moraceæ.)
4. Fruit a fig.
5. Trees entrapping other trees **The baletes** (p. 30)
5. The trees not entrapping other trees; trees usually small; fruit often growing on the trunk or limbs Many species of **Ficus** (p. 30)

5. Tree not entrapping other trees; tree large, with smooth yellow bark.
Tangisang-bayawak (p. 30)
4. Fruit very large, not a fig.
5. Leaves very large (up to 90 centimeters in length), usually deeply lobed, hairy beneath and on veins above Antipolo (p. 29)
5. Leaves 18 to 35 centimeters long, hairy beneath and on veins above.
Anubing (p. 28)
5. Leaves small, entire, less than 18 centimeters long, smooth.
Nangka (p. 29)
2. Bark with yellow sap; leaves opposite. (Guttiferæ.)
3. Leaves yellowish green in color; bark yellow, ridged.
4. Leaves 9 to 16 centimeters long, 5.5 to 10 centimeters wide; wood with twisted grain; tree of seacoast Palo maria (p. 59)
4. Leaves longer and narrower than the preceding; wood straighter in grain; tree of the forests Bitanhol (p. 60)
2. Bark with red sap.
3. Sap very thin; bark dark colored; leaves simple.
4. Leaves 13 to 36 centimeters long, 6 to 13 centimeters wide, rusty hairy beneath; tree larger than the following Duguan (p. 31)
4. Leaves 14 to 24 centimeters long, 5 to 8 centimeters wide, white beneath.
Tambalao (p. 32)
3. Sap rather sticky, flows freely from tubes and hardens quickly; bark gray; leaves compound, 6 to 11 leaflets..... The narras (p. 35)
3. Sap flows sparingly; leaves compound.
4. Leaves trifoliate Tuai (p. 49)
4. Leaves pinnately compound Malugay (p. 54)
2. Bark with black sap which flows sparingly; leaves simple, alternate.
Ligas (p. 52)
2. Bark without resin or black, white or colored sap.
3. Leaves reduced to bracts Agoho (p. 27)
3. Leaves simple.
4. Leaves opposite; bark without purplish layer next to sapwood.
5. Trees of the mangrove swamps.
6. Trees with prominent stilt roots The bacauans (p. 82)
6. Trees without stilt roots.
7. Bark black The pototans (p. 82)
7. Bark dark red Tangal (p. 82)
6. Trees with aerial roots.
7. Leaves white beneath Api-api (p. 98)
7. Leaves orbicular, not white beneath Pagatpat (p. 81)
5. Trees not of the mangrove swamps.
6. Leaves with interpetiolar stipules Rubiaceae (p. 99)
7. Wood yellow with greasy feeling The bancals (p. 99)
7. Wood deep red when fresh cut, changing to rose color.
Calamansanay (p. 100)
6. Leaves very large (19 to 33 centimeters long, 13.5 to 22 centimeters wide), hairy beneath, without interpetiolar stipules.. Teak (p. 98)
6. Leaves smaller than the preceding, smooth, without interpetiolar stipules The macaasims (p. 87)
4. Leaves opposite, sometimes alternate; inner bark with purplish layer next to the sapwood. (Lythraceæ.)
5. Leaves 6 to 12 centimeters long, 2 to 5 centimeters wide.
Batitanan (p. 79)

5. Leaves 7.5 to 24 centimeters long, 3.5 to 11 centimeters wide.
Banaba (p. 80)
4. Leaves alternate; bark without purplish layer next to the sapwood.
5. Leaves with serrate margin..... Catmon (p. 58)
5. Leaves with wavy margin..... The arangas (p. 78)
5. Leaves with entire margin.
6. Leaves silvery white beneath.
7. Tree of the beach and mangrove swamp..... Dungon-late (p. 56)
7. Tree not of the beach..... Dungon (p. 55)
6. Leaves white beneath.
7. Leaves heart shaped..... Hamindang and binunga (p. 48)
7. Leaves not heart shaped..... Malacadios (p. 33)
6. Leaves not white nor silvery white beneath.
7. Leaves large, usually more than 18 centimeters long.
8. Trees with branches in horizontal planes..... Talisay (p. 85)
8. Trees with branches not in horizontal planes.
9. Bark inclined to be ridged..... Talisay-gubat (p. 84)
9. Bark not ridged Toog (p. 86)
7. Leaves less than 18 centimeters long.
8. Bark 5 millimeters or less in thickness..... Binggas (p. 86)
8. Bark more than 5 millimeters thick.
9. Leaves with two prominent glands at base of blade.
Liusin (p. 34)
9. Leaves without glands.
10. Leaves obovate.
11. Heartwood reddish brown Dalinsi (p. 84)
11. Heartwood gray to brownish yellow..... Sacat (p. 85)
10. Leaves not obovate. Inner bark yellow with white concentric rings Tamayuan (p. 30)
10. Inner bark yellow without white concentric rings.
Calumpit (p. 83)
3. Leaves compound.
4. Leaves opposite, palmately compound.
5. Leaflets smooth.
6. Leaflets usually 3; wood very hard Molave (p. 97)
6. Leaflets 3 to 7 (usually 5); wood very hard..... Sasalit (p. 98)
6. Leaflets 5, wood soft or moderately hard..... Mulawin-aso (p. 98)
5. Leaflets hairy, usually 3 Hairy molave (p. 98)
4. Leaves alternate.
5. Leaves palmately compound.
6. Leaves trifoliate.
7. Fine velvety hairs beneath Santol (p. 46)
7. Smooth or nearly so Malasantol (p. 46)
6. Leaflets 3 to 5 Lumbayao (p. 57)
5. Leaves simply compound, pinnate.
6. Leaves more than 1 meter in length Malapapaya (p. 89)
6. Leaves less than 1 meter in length.
7. Leaflets with white hairs beneath; more than 10 pairs.
Tucang-calao (p. 46)
7. Leaflets with white bloom beneath; less than 10 pairs.
8. Bark more than 8 millimeters thick..... Tindalo (p. 39)
8. Bark less than 8 millimeters thick Alupag (p. 53)
7. Leaflets neither hairy nor white beneath.

8. Leaflets 5 pairs or more.
9. Bark without cedary odor.
10. Bark black, ridged Amuguis (p. 50)
10. Bark steel gray, not ridged Dao (p. 50)
9. Bark with a distinct cedary odor..... Calantas (p. 45)
8. Leaflets less than 5 pairs.
9. Bark gray with a yellowish tinge; sapwood contains a greenish black oily sap Batete (p. 36)
9. Bark brown to nearly black; fruit with oily spines.
Supa (p. 37)
9. Bark light or steel gray with an orange tinge Ipil (p. 38)
5. Leaves doubly compound.
6. Leaflets white beneath.
7. Leaflets less than 1 centimeter long; leaves large and fern-like.
Cupang (p. 39)
7. Leaflets 2 centimeters or more long; leaves not fern-like.
Acleng-parang (p. 40)
6. Leaflets hairy beneath Salinkugi (p. 41)
6. Leaflets neither white nor hairy beneath.
7. Usually 3 pairs pinnae Banuyo (p. 41)
7. Usually 1 pair pinnae Acle (p. 42)

ABBREVIATIONS USED FOR PROVINCES, SUBPROVINCES, ISLANDS,
AND DIALECTS.

Ab.	Abra (subprovince).	Mas.	Masbate Island.
Ag.	Agusan (subprovince).	M.	Mindoro Province.
Al.	Albay Province.	Mind.	Mindanao Island.
B.	Bicol dialect.	Mis.	Misamis Province.
Bal.	Baler (subprovince).	N.	Negrilo dialect.
Bas.	Basilan Island.	N. E.	Nueva Ecija Province.
Batn.	Bataan Province.	N. Luz.	Northern Luzon.
Bat.	Batangas Province.	N. V.	Nueva Vizcaya Province.
Ben.	Benguet Province.	Neg.	Negros Island.
Bul.	Bulacan Province.	Pal.	Palawan Island.
Bur.	Burias Island.	Pam.	Pampanga Province.
But.	Butuan (subprovince).	Pan.	Panay Island.
Cag.	Cagayan Province.	Pang.	Pangasinan Province.
Cam.	Ambos Camarines Province.	Riz.	Rizal Province.
Cav.	Cavite Province.	Rom.	Romblon Island.
Cot.	Cotabato district.	S. Luz.	Southern Luzon.
Dav.	Davao district.	Sam.	Samar Island.
Guim.	Guimaras Island.	Sor.	Sorsogon Province.
Il.	Ilocano dialect.	Sp.	Spanish.
I. N.	Ilocos Norte.	Sur.	Surigao Province.
I. S.	Ilocos Sur.	T.	Tagalog dialect.
Ib.	Ibanag dialect.	Tar.	Tarlac Province.
Ig.	Igorot dialect.	Tay.	Tayabas Province.
In.	Infanta (subprovince).	Tic.	Ticao Island.
L.-B.	Lepanto-Bontoc Province.	U.	Union Province.
Lag.	Laguna Province.	V.	Visayan dialect.
Lan.	Lanao district.	Z.	Zambales Province.
Ley.	Leyte Island.	Zam.	Zamboanga district.
Mar.	Marinduque Island.		

NOTES ON THE COMMON NAMES OF TREES.

The matter of establishing a uniform common name for a given species is a difficult one even in the United States where there is one universal language. It may be easily imagined how much more complicated this becomes where there are, as in the Philippines, languages and dialects numbering, according to various authorities, from thirty to eighty. The confusion arising from this source leaves the average man helpless, in so far as recognizing a given tree by its local name is concerned.

The variations in local names fall principally into three classes: First, the case where various forms of a single name are applied to one species, or often to two or more species within one genus. The most familiar instance occurs in the case of *molave*, such widely varying forms as *muláwin*, *amugáuan*, *hamuráwon*, etc., being found in different regions for the two or three species of *Vitex* that produce a hard, durable wood. Second, where radically different names are applied to one and the same species. A familiar instance of this is furnished by *tindalo* (*Pahudia rhomboidea*); the official name is Tagalog, but in northern Luzon it is known as *magaláyao*, in southern Luzon and the Visayas as *baráyong* or *baláyung*. Third, where one name, instead of being confined to one species or even genus, is transferred to a different genus or even to plants of different families. Besides these, there are a number of cases where several names are applied to all or several of the species within one or two genera of a given family, but are rarely found outside that family. Two of the most striking instances of this are in the Gutta-percha and Talisay families. The names *sácat*, *calumpít*, *dalínsi*, and *talisay* are applied almost indifferently to half a dozen species of the genus *Terminalia*, of the latter family, but very rarely to other trees, unless with some distinguishing prefix or suffix. Similarly, the names *palacpálac*, *malacmálac*, *alacáac*, *dulítan*, *tagátói*, and *manicníc* are found associated with a number of species of *Palaquium*, and certain species of *Illipe* and *Sideroxylon*, of the Gutta-percha family.

When we consider, in addition to this, that most of the names (obscure even to the Filipino as soon as he leaves his own province) are meaningless to the foreigner, and that there is as yet no uniform system of orthography for the Philippine languages, it is easy to see that any attempt to bring uniformity out of this chaos will be as difficult as it is desirable.

Nevertheless, the attempt has been made in the following pages. The following principles have been used as guides: To select, from the various names used for a given species, one either already well established in literature or in commerce, or if none such exists, the most widely known name as recorded in botanical collections, etc.; to select in cases where the meaning is known, such a name as would apply well to the species in question; and, finally, to adopt as nearly as possible, a uniform,

phonetic system of spelling. In regard to the last rule, it has been necessary to make one considerable exception; it has not been considered advisable to change radically the spelling of those names that are included in the classification of the four groups as given in the Forest Manual.

A matter that would be of interest and even an appreciable aid to the botanist or forester is that of the meanings of common names, but, valuable as it might be, the average collector has little time to devote to this point. Aside from the fact that our knowledge on this side of the subject is still far from extensive, there is no place in a work of this kind for detailed linguistic studies. However, a few notes on some of the words commonly occurring in plant names would not be out of place.

The words recurring most frequently are color adjectives, among which the following are common: *putí*, *púlaw* or *púraw*, *mitlá* (white); *pulá* (red); *diláw* or *duláw* (yellow); an obscure and very variable, but frequently occurring word *ngísit*, *ngítit*, *ngítngít*, *innítit* (black); *ítim* or *ítóm* (black); *ápta*, *áta*, *éta* or *íta* (all related to *Aéta*, "Negrito," and meaning "black"). *Laláki* (male) and *babáe* (female) are frequently used to indicate great or less size, or, in other cases, greater or less hardness and durability. *Maláki* and *maliít* mean "large" and "small," respectively. *Dápat* and *láut* (sea), *pantái* (beach), *baibái* and *buhángin* (sand) are often used in names of plants growing on the beach or even on low coastal hills. *Búnduk*, *búkid*, and *gúbat* (forest or mountain) are used either to indicate that a plant grows only in the mountains or, sometimes, to distinguish a wild species from a cultivated one. *Túbig sálog*, *ílog*, etc., mean "water" or "river." *Sáhing*, *sáleng*, etc., mean "resin," "pitch," "gum." *Dugú* is "blood." *Párang*, found in various compounds, means land covered with the open second growth on abandoned clearings. The very common element *bolóng*, *balíng*, etc., found in many compounds, equals "leaf" and has, in Bicol at least, the derived meaning "medicine." The name *taluto* is derived from *lutu*, "red," "clotted blood." Various names come from the root *tína*, "to dye." *Macaásim* is from Tag. *ásim*, "acid," "sourness." Many names of animals are used, such as *áso* and *áyam* (dog); *usá* (deer); *bayáwak* and *butikí* (lizard); *núang*, *kalabáu*, and *damúlag* (carabao); *kambíng* (goat); *púsa*, *ikús*, *kutíng* (cat); *kabáyo* (from Sp. caballo, "horse"); *alibangbáng* (butterfly); *manúk* (chicken). *Bató* ("stone, rock") is generally used for trees producing very hard woods; *tigás*, *tugás*, *tigá*, *tras* mean "hard." Many prefixes are used, of which the commonest and the one of most constant signification is *mala*, which means "resembling" and is used as are the English words "false" or "bastard;" names compounded with this prefix generally signify that the plant so named resembles another either in general habit or in some particular feature, as leaves,

flowers, fruit or bark, color, taste or odor, etc. In the case of timber trees, it sometimes refers to similarity of the wood.

In the matter of spelling, the most important changes made are the substitution of *k* for *c* or *qu*, *c* being retained as a rule only in the combination *ch* and at the beginning of certain names, like *camuning*, that are already well known; and the substitution of *i* for *y*, unless the latter is consonantal as in *yacal*. Also the Spanish orthographic *u* has been omitted between *g* and *i*, except, as above stated, in names found in the classified list of the Forest Manual.

PINE OR SALENG FAMILY.

(Pinaceæ.)

This family, while the most important in temperate regions, where it furnishes the greatest bulk of lumber, is comparatively unimportant in the Philippines. Generally speaking, few representatives are found below 400 meters elevation. The members of the family can be readily distinguished by the resinous woods, combined with the character of the fruits, which are of the familiar type of the pine cone.

ALMACIGA. (Pl. I.)

Almaciga reaches a height of 40 to 45 meters and a diameter of 180 to 200 centimeters. It has a straight, regularly cylindrical bole without buttresses, which reaches a length of one-half to two-thirds the height of the tree. It is found scattered throughout the mountain regions from Cagayan to Davao. While usually above an altitude of 400 meters, scattered specimens sometimes occur as low as 200 meters. It requires fairly deep soil and somewhat protected situations. It seldom, if ever, occurs on exposed peaks or ridges, and is found associated with tanguile and the oaks. It is fairly tolerant of shade.

The bark is 10 to 15 millimeters in thickness, brittle in texture, light greenish to brownish gray in color, sheds in scroll-shaped patterns, and is thickly set with corky pustules; the inner bark is brown streaked with red, grading into a creamy color near the sapwood. The leaves are simple, opposite or nearly so, of a leathery texture, from 3 to 9.5 centimeters long and from 1 to 2.5 centimeters wide.

The sapwood has a light brownish creamy color; the heartwood is light brown, straight grained, soft in texture and light in weight. The wood, probably because of the comparative inaccessibility of the trees, is not found in the markets. The tree is valuable because it yields a resin known locally as *almaciga* and commercially as *dammar*. A closely related species yields the *kauri* resin and lumber of New Zealand. *Almaciga* resin is either gathered from the trunk, where it hardens after the bark of the tree has been cut, or from the ground at the base of the tree

where it has accumulated, or more commonly is mined where trees have stood previously and have long since died and decayed, leaving only large masses of resin in the ground.

The following regions are credited with having almaciga: Luzon (Cagayan, Abra, Benguet, Zambales, Bataan, Tayabas, Camarines, Albay, Sorsogon); Mindoro; Negros; Palawan; Mindanao (Davao and Zamboanga).

Almaciga has the scientific name of *Agathis alba*. Besides almaciga, this tree has the following common names: Adiangao (T., B.); baltik (Pal.); bidiangao (Neg.); bunsog (Ben.); dadiangao (T., B.); galagala (Pal.); litao (Ab.); makao (Mis.); saleng (Il., Tay.); titao (Ab.).

BENGUET PINE. (Pls. II and III.)

Benguet pine reaches a height of 30 meters and diameter of 140 centimeters. The bole is straight and clear; the crown is narrow with the lateral branches weakly developed. It is found in the high mountain region of central and northern Luzon. It reaches an altitude of 3,000 meters. It does best in deep rich soils, is intolerant of shade, and is found in patches sometimes of considerable size scattered throughout extensive grass areas.

The bark is 10 to 25 millimeters in thickness, yellowish or reddish brown in color, and broken into sections by vertical and horizontal fissures. The needle-like leaves, grouped in bunches of three or sometimes two, are 8 to 30 centimeters in length. The sapwood is yellowish white; the heartwood is light reddish brown with alternate light and dark rings, and very resinous. The wood is moderately hard and moderately heavy, resembling the yellow pines of the United States. It is used locally for house construction, mine props, and coffins.

Benguet pine has been reported from the following regions of Luzon: Ilocos Sur; Abra; Lepanto-Bontoc; Benguet; Pangasinan; Zambales.

The scientific name is *Pinus insularis*. It has the general Ilocano common name of saleng. Other names prevailing are bel-bel (Ig.); boo-boo (Ig.); ol-ol (Ig.); palanpino (Cag.); parna (Il.); talanpino (L.-B.); tapulao (Z.).

Under the name of tapulao or salit another species of pine (*Pinus merkusii*) is found in the mountain regions of Zambales and western Mindoro. This differs mainly from Benguet pine in having two needles instead of three.

YEW FAMILY.

(Taxaceæ.)

Species of *Podocarpus*, *Dacrydium*, and *Taxus* are found on the mountain tops throughout the Philippines. On some mountains the former two genera form almost pure stands on exposed ridges and peaks. The trees are usually low with short stocky trunks. The woods, though hard, are little if at all used in the Philippines.

PALM FAMILY.

(Palmae.)

The members of this family reach their best development in the dipterocarp forests where the dry season is not pronounced. The trees are more valuable for their by-products than for their wood. The leaves of nipa (*Nipa fruticans*), a mangrove swamp product, is a universal thatching material, and the fermented sap of the inflorescence is the chief source of vinegar and alcohol. In regions where bamboo is scarce, split trunks of the anahao palm and palma brava (*Livistona* spp.), anibong (*Oncosperma* spp.), and others replace that product for general house construction, and other domestic uses. Climbing palms (*Calamus* spp.) also furnishes the rattans of commerce which are known locally as "bejuco." (See Part I, p. 59.)

AGOHO OR CASUARINA FAMILY.

(Casuarinaceae.)

While this family produces several species, agoho is the only one of commercial importance.

AGOHO. (Pls. IV and V.)

Agoho is a tree reaching a height of 20 to 25 meters, and 50 to 60 centimeters in diameter, though it is usually much smaller. The bole is variable, being sometimes cylindrical and sometimes irregular. The crown is conical in shape and open. It is found scattered throughout the Philippines, where it usually occurs in groups on newly formed sand beaches or sand bars of the large rivers. It is distinctly an intolerant species.

The bark is 5 to 10 millimeters in thickness, brown to dark brown in color, smooth when young, roughening in old trees into fine ridges of greater or less length; the inner bark is bright rose in color and has a bitter taste. The leaves are reduced to small scales; in their place are thickly set jointed branchlets, which give the tree the general appearance of a pine.

The wood of agoho is very hard, very heavy, difficult to work and is considered durable. The sapwood is slightly lighter in color than the reddish brown to dark brown heartwood. It has large pith rays resembling those of oak. It has the following uses: Posts; railway ties; firewood.

Agoho has been collected from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Abra, Benguet, Pangasinan, Nueva Ecija, Tarlac, Pampanga, Zambales, Laguna, Baler, Infanta, Tayabas, Camarines, Sorsogon, Albay); Palani Island; Camiguin Island; Polillo Island; Ticao Island; Masbate; Mindoro; Palawan.

The scientific name of agoho is *Casuarina equisetifolia*. It has the general Tagalog name of agoho. Various forms of this name are agoso, agoo, and aroo. Karamutan (Moro) and malabohok (V.) are other local names.

Other species of *Casuarina* are present in the Philippines, principally in the mountains. These can be readily distinguished from agoho by their finer pith rays.

OAK OR KATABANG FAMILY.

(Fagaceæ.)

About twenty-five species of oak have been described as belonging to the Philippines. Trees of this genus occur at low altitudes, but are more abundant at 500 meters or more above sea level, where they often form a quite prominent feature of the forest. The wood is little used and can be readily distinguished by the prominent pith rays. The following common names are recorded for the various species of oak: Bangai (Ley.); basakan (Cam.); bultiok (Cag.); diraan (Pan.); kataban (Batn.); kotilik (Ben.); makabingao (N. V.); manaring (N. V.); olayan (Al.); pangnan (Batn.); palaien (Ab.); palonapoy (Z.); tiklik (Cag.); ulian (Cag.).

ELM OR MALAIKMO FAMILY.

(Ulmaceæ.)

The wood of malaikmo or malagibuyo (*Celtis philippinensis*) comes from a medium-sized tree scattered throughout the dipterocarp forests. This tree can be readily distinguished by its prominently three-veined leaves and by the black flecks of the inner bark. The wood is soft and light in weight and is used locally for various classes of light constructions. To this family belongs anabion or hanagdon (*Trema amboinensis*), a very small rapidly growing tree that sometimes forms almost pure stands in places where cañigins have been abandoned. The wood is used only locally.

FIG OR ANTIPOLLO FAMILY.

(Moraceæ.)

While the number of species and individuals of this family is large, only a few produce wood of any great value. The members can be readily recognized by the fact that the bark when cut exudes freely a thin milky sap. This character combined with alternate leaves distinguishes the family from all others. (See Betis family, p. 89.)

ANUBING. (Pl. VI.)

Anubing is a tree of medium height with a straight regular unbuttressed bole. It is found scattered on the edges of the dipterocarp type and on the moister slopes of the molave type.

The bark is 5 to 8 millimeters in thickness, light orange to dark orange red in color, in young trees papery in texture, in older ones harder and shedding in small patches. The inner bark is pink in color. On being cut, it exudes freely a milky sap which thickens rapidly on coming in contact with the air. The leaves are from 18 to 35 centimeters long and from 9 to 16 centimeters wide, hairy beneath and on the veins above.

The sapwood is a creamy white; the heartwood bright yellow when fresh cut, turning on ageing to a chocolate brown or greenish black. It is straight grained, moderately hard, moderately heavy, very durable, and

the pores generally contain white deposits. It has a disagreeable odor and taste, especially when fresh. It has the following uses: House construction (especially posts and rafters); railroad ties; canoes; naval construction.

Anubing has been found in the following regions: Luzon (Ilocos Sur, Abra, Bontoc, Rizal, Zambales, Bataan, Laguna, Tayabas, Camarines, Albay, and Sorsogon); Ticao Island; Masbate Island; Mindoro; Marinduque Island; Negros Occidental; and Surigao.

The scientific name of anubing is *Artocarpus cumingiana*, though some other species of *Artocarpus* produce the wood which passes for anubing. This tree has the general Tagalog name of anubing and the Visayan name of cubi. This latter name must not be confused with the cubi of Zamboanga, which is malacadios. (See p. 33.) Other names for anubing are bayuko (V.); kalulot (M.); nerec (N. Luz.); panganamaen (Il.); ubien (Il.).

ANTIPOLO. (Pl. VII.)

Antipolo is a tree reaching a height of 20 to 30 meters and a diameter of 60 to 100 centimeters. The bole is regular and gives lengths up to 15 meters. It has a dense crown, $\frac{1}{3}$ to $\frac{2}{3}$ the height of the tree. The tree is found scattered throughout the dipterocarp forests, growing best in deep soils. It is slightly tolerant of shade.

The bark is 10 to 15 millimeters in thickness, very dark in color tinged with red, and with obscure irregularly broken ridges; the inner bark is salmon red, yielding when cut a milky sap. The leaves are alternate, usually deeply lobed and very large, sometimes reaching 90 centimeters in length.

The sapwood is light creamy and the heartwood is bright yellow in color. The wood is softer than anubing and less durable. It has the following uses: Bancas; flooring; keels and planks of ships; ordinary furniture.

The tree is widely distributed throughout the Philippines from Cagayan to Mindanao. The scientific name of antipolo is *Artocarpus communis*. A cultivated form of it produces the bread fruit. Besides antipolo it has the following names: Pakak (Il.); tipolo (B.). Cultivated forms are known under the names of bread fruit, kamangsi (T.); rima (T.); ugob (B.).

NANGKA.

Nangka (*Artocarpus integrifolia*) is a small to medium-sized tree cultivated for the jack fruit. It has roundish leaves from 6.5 to 10 centimeters long and from 4 to 9 centimeters wide. The wood is softer and more even in texture than anubing; golden yellow in color, turning dark brown with age. It is used principally for the back and sides of stringed instruments and for furniture.

Besides the above named the forests contain many species of the genus *Ficus*. A number of these under the common name of "balete" start upon other trees and finally entrap them entirely. Some of the baletes produce an inferior quality of rubber. Some of the species like tangiang-bayawak (*Ficus variegata*) are large and can probably be utilized for match woods. Hagimit (*Ficus minahassæ*), with its long pendulous fruit stalks, is a conspicuous tree of the river bottoms, especially in second-growth forests. The woods of species of *Ficus* are soft, light, and of inferior quality, and the trees usually have ill-formed, short boles. The India rubber tree (*Ficus elastica*) and castilloa (*Castilloa elastica*) are cultivated to some extent for rubber.

Kuyus-kuyus (*Taxotrophis ilicifolia*) is a small tree with prickly leaves, whose wood is used extensively in making walking sticks. It is hard and heavy; the heartwood is streaked or mottled with green or dark brown and is sometimes almost black. Malambingan (*Allæanthus glaber*) is a medium-sized tree with a nearly white sapwood subject to the attacks of beetles; the outside heartwood is brilliant red, which grades into a light grayish brown; light in weight to moderately heavy and soft to moderately hard. Closely related species have the common names of himbabau (T.) and aplit (Pam.). Kalios (*Streblus asper*) is a small tree common in second-growth forests.

TAMAYUAN FAMILY.

(Olacaceæ.)

This family is represented in the Philippines by one commercial species.

TAMAYUAN. (Pl. IX.)

Tamayuan is a small to medium-size tree reaching a height of 20 to 25 meters and a diameter of 50 centimeters. The bole is short and usually somewhat irregular in shape. The crown is dense and rather elongated. It has a prominent place as a second-story tree in some dipterocarp forests. It does best on slopes with a fairly deep soil and is distinctly tolerant of shade.

The bark is 5 to 12 millimeters in thickness, smooth, dark brown to nearly black in color, and is thickly set with corky pustules. It is shed in large irregular patterns, the freshly exposed portions being cinnamon brown in color. The inner bark is yellowish with whitish rings. The leaves are simple, alternate, smooth, from 5 to 16 centimeters long and from 2 to 8 centimeters wide.

The sapwood has a light gray color and is sharply distinguished from the reddish brown heartwood. The wood is moderately heavy to heavy, hard, very fine and straight grained, and durable. It has the following uses: House building (especially posts, joists and rafters); ax handles; mining props; railway ties.

The tree has been found in the following regions: Luzon (Cagayan, Ilocos Norte, Isabela, Bulacan, Bataan, Laguna, Tayabas, Camarines, Sorsogon); Catanduanes Islands; Masbate; Mindoro; Leyte; Mindanao (Lanao and Zamboanga). The scientific name of tamayuan is *Strombosia philippinensis*. It has the general common names of tamayuan and kamayuan or some forms of these.

MAGNOLIA OR CHAMPACA FAMILY.

(Magnoliaceæ.)

Among others this family is represented by the champaca (*Michelia champaca*), cultivated for ornament, and patangis (*Talauma villariana*), a small tree occurring occasionally in the dipterocarp forests.

PAWPAW OR ILANG-ILANG FAMILY.

(Anonaceæ.)

With some practise the species of this family can be distinguished by the prominent pith rays in the bark and woods. They have alternate, simple leaves. The trees are usually small to very small and occur as undergrowth in the dipterocarp forests. A number of the species have the common name of lanutan. Among the more prominent is ilang-ilang (*Canangium odoratum*) whose blossoms are the source of the famous ilang-ilang perfume. It occurs in the dipterocarp forests and is cultivated to some extent. Dalinas or latuan (*Cyathocalyx globosus*) is a medium-sized tree whose small heartwood is purplish brown in color, hard, and heavy. So far as is known it is used only locally.

This family also contains the following introduced species cultivated for their fruits: Anonas or custard apple (*Anona reticulata*); atis or sweetsop (*Anona squamosa*); guanabano or soursop (*Anona muricata*).

NUTMEG OR DUGUAN FAMILY.

(Myristicaceæ.)

The trees of this family can be readily distinguished from all others by the abundant flow of a thin red sap when the bark is slashed. The leaves are simple and alternate. Two species seem to furnish timber that reaches the markets in small quantities at least and is used rather more extensively locally. A number of species of this family have the common name of duguan, but this name is most commonly applied to *Myristica philippensis*.

DUGUAN. (Pl. X.)

Duguan is a small to medium-sized tree reaching a height of 15 to 25 meters and a diameter of 60 or more centimeters. The bole is usually somewhat irregular, slightly buttressed and yields lengths up to 12 meters. The crown is irregular and somewhat dense, about one-third the height of the tree. This species is found scattered throughout the dipterocarp forests. It requires good soil and is fairly tolerant of shade.

The bark is 4 to 6 millimeters in thickness, nearly black in color with light brown patches where freshly shed; the inner bark is brown to reddish brown in color, and when cut exudes a thin red sap. The leaves are alternate, simple, rusty hairy beneath, from 13 to 36 centimeters long and from 6 to 13 centimeters wide. The sapwood is very light creamy pink in color; the heartwood is slightly darker in color, soft, moderately heavy, not durable, and somewhat spongy in texture. It is used locally for light and temporary construction, boxes, and dry measures.

Duguan has been reported from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Abra, Benguet, Pangasinan, Baler, Rizal, Bataan, Laguna, Batangas, Tayabas, Camarines); Camiguin Island; Mindoro; Leyte; Palawan; Culion; Mindanao (Zamboanga, Lanao); Basilan Island.

The scientific name of duguan is *Myristica philippensis*. Tambalao (*Knema heterophylla*) also furnishes some of the wood known as duguan. This tree is somewhat smaller than *Myristica philippensis*, with small leaves (from 14 to 24 centimeters long and from 5 to 8 centimeters wide) white underneath. Besides duguan (T.) and tambalao (Z. and Batn.) species of this family have the following common names: Anapias (Pang.); anis-kahoi (T.); anis-moscada (T.); balintua (Z.); dumadara (Cag.); durugo (Lag.); hindang-atian (Ley.); lanot (Cag.); malamabolo (Pang.); palong (Il.); pao (Il.); saging-kahoi (T.); talang-talang (T.); taliagan (Cag.). (Pl. XI.)

CINNAMON OR BATICULIN FAMILY.

(Lauraceæ.)

This family, while it contains a large number of tree species, yet yields only a few of little value, principally because the species are small or are so scattered that quantities can not be obtained in any one place. The members of the family (at least the species mentioned here) have simple alternate leaves. The principal woods are known as baticulin and malacadios. Except in a few cases it is impossible with our present knowledge to refer a number of similar woods to definite species. There seem to be three grades with transition forms between them.

Marang or white baticulin: This is a medium sized-tree with a straight cylindrical bole. Though scattered, it is widely distributed. The wood is very pale yellow fading to a dirty white. It is soft, light in weight, coarse grained, and not as resistant to the attacks of insects as the yellow baticulins. The species that produces this wood is *Litsea perrottetii*. While formerly thought to be the tree that produces baticulin of commerce it is now known that little if any of the baticulin of the sculptors comes from this species. (Pl. XII.)

Yellow baticulin: The woods known as baticulin to the cabinetmakers, carvers, sculptors, etc., are soft to moderately hard, light in weight to moderately heavy; pale straw color to deep yellow with reddish or greenish tints; generally with a distinct odor similar to camphor, and rarely attacked by insects. Certain species referred to the genera *Litsea*, *Phoebe*, *Dehaasia*, and perhaps *Neolitsea* and others produce yellow baticulin. Baslayan (*Dehaasia triandra*) is a medium-sized tree producing a wood



PLATE XIX.—LOWER PORTION OF THE TRUNK OF BATETE (*Kingiodendron alternifolium*).



PLATE XX.—SUPA (*Sindora supa*).

a, Flower; b, fruit.

J. Castro Del.

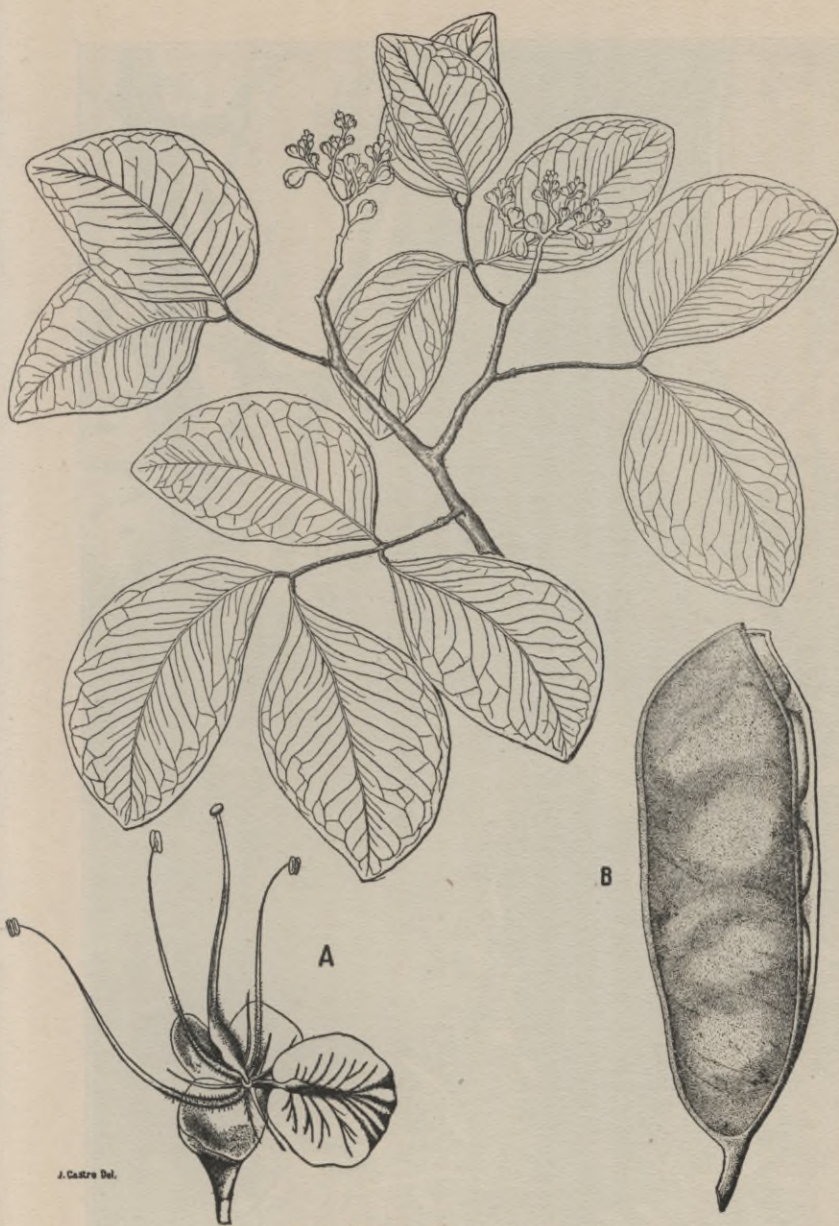


PLATE XXI.—IPIL (*Intsia bijuga*).
a, Flower; b, partially open fruit pod.



PLATE XXII.—LOWER PORTION OF THE TRUNK OF MERRILL'S IPIL (*Intsia acuminata*).

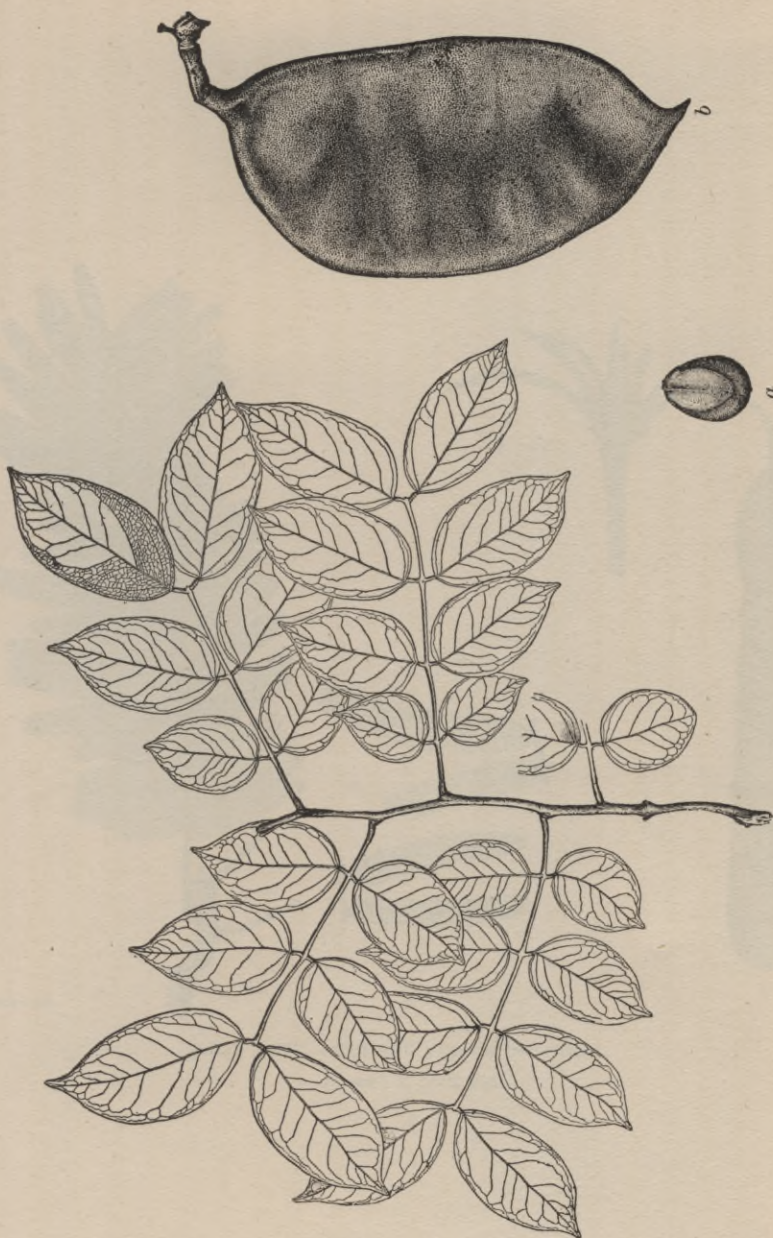


PLATE XXIII.—TINDALO (*Pahudia rhomboidea*).

a, Seed ; b, fruit.

J. V. Harms del.



PLATE XXIV.—CUPANG (*Parkia timoriana*).

a, Pinnæ; *b*, fruit pod.



PLATE XXV.—LOWER PORTION OF THE TRUNK OF CUPANG (*Parkia timoriana*).
Showing character of bark; leaves attached to the trunk.



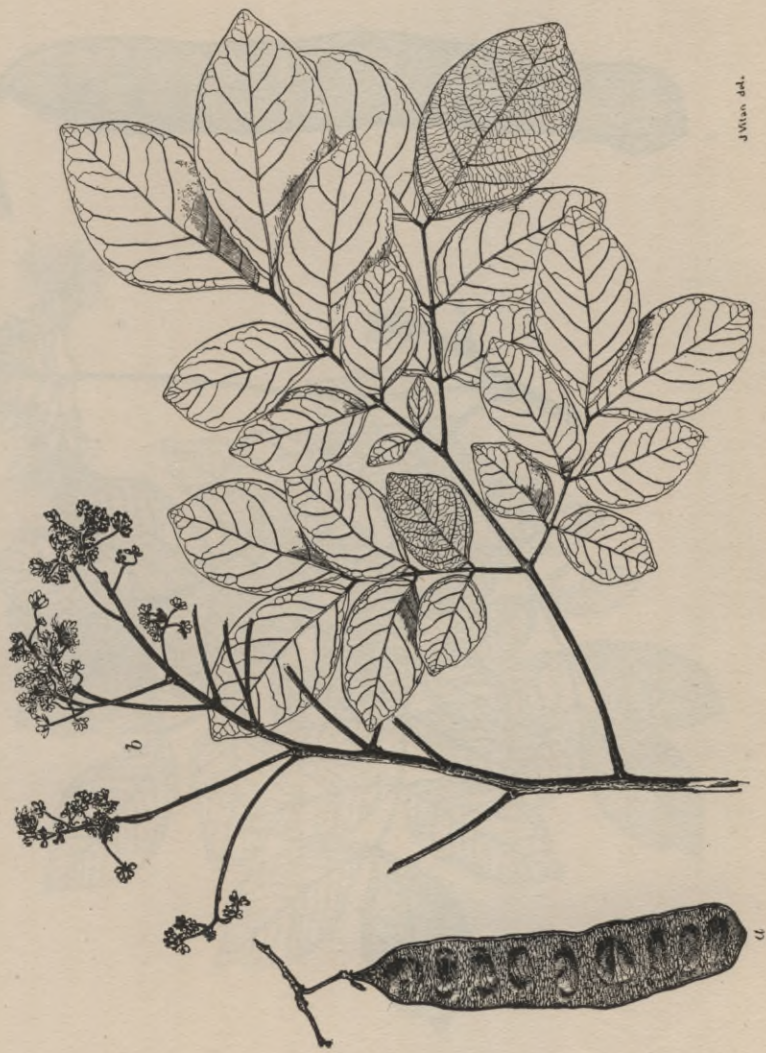
PLATE XXVI.—ACLENG-PARANG (*Albizzia procera*).

a, Fruit pod; b, cluster of young flowers.



PLATE XXVII.—PORTION OF THE BARK OF ACLENG-PARANG (*Albizzia procera*).

Leaves attached.



J.W. & S. Ed.

PLATE XXVIII.—SALINKUGI (*Albizzia saponaria*).

a, Fruit pod; b, cluster of flowers.



J. V. Van der.

PLATE XXIX.—BANUYO (*Waitaceodendron celebicum*).

a, Fruit pod; b, flower cluster.



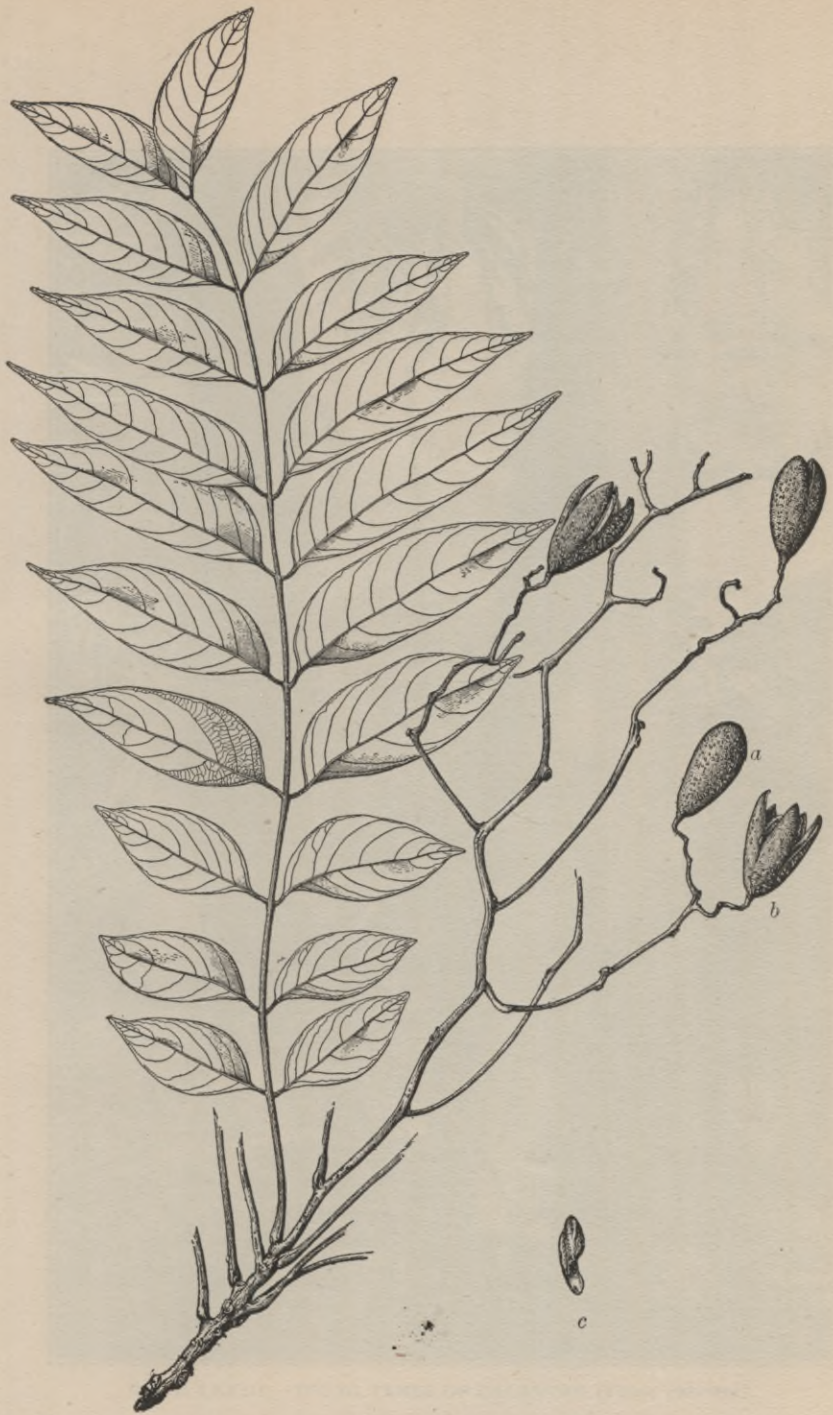
a

PLATE XXX.—ACLE (*Albizzia acle*).

a, Fruit pod.



PLATE XXXI.—PORTION OF TRUNK OF ACLE (*Albizzia acle*).
Cluster of leaves and fruit attached.



J.V. Van der.

PLATE XXXII.—CALANTAS (*Toona calantas*).

a, Closed fruit; b, opened fruit; c, seed.



PLATE XXXIII.—YOUNG TREES OF CALANTAS (*Toona calantas*).



3Vitan del.

PLATE XXXIV.—SANTOL (*Sandoricum indicum*).

a, Fruit; b, cross section of fruit.

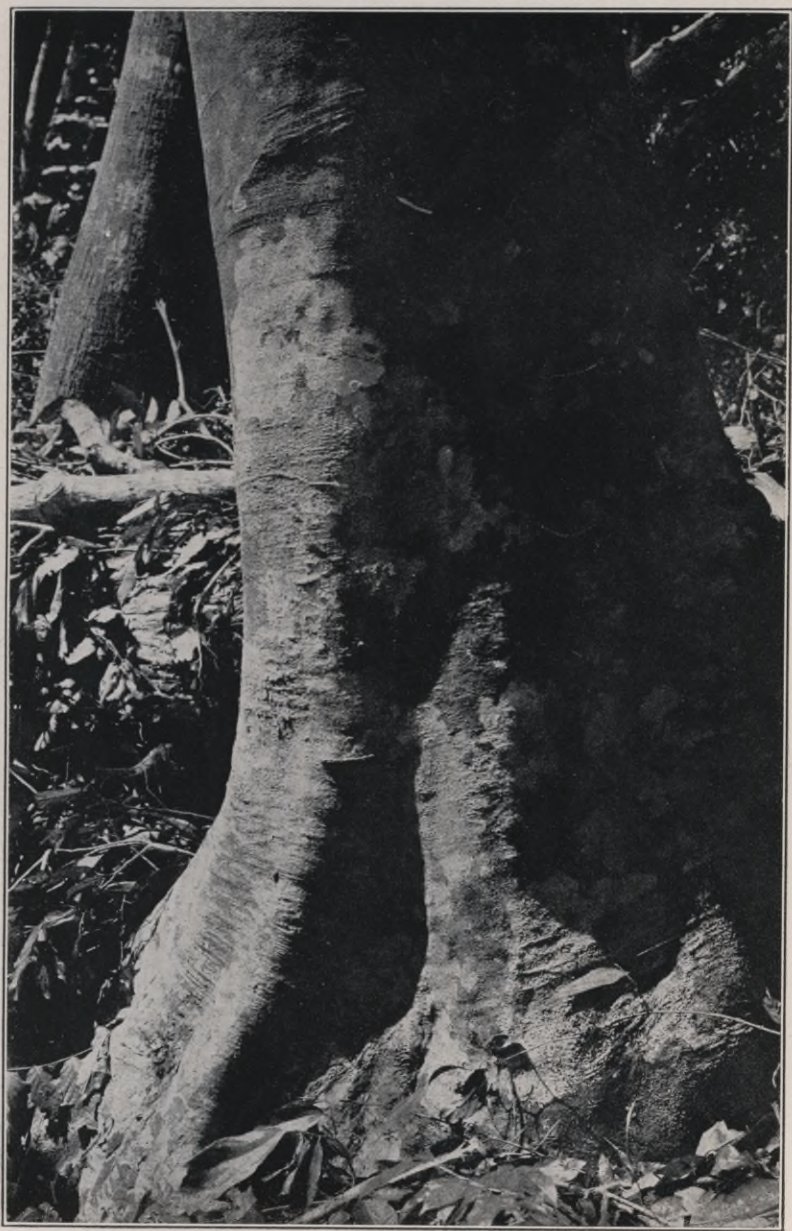


PLATE XXXV.—MALASANTOL (*Sandoricum vidalii*.)

deep yellow in color, soft, light to moderately heavy that is undoubtedly accepted by sculptors as baticulin. Malaya (*Phoebe sterculioides*) has a somewhat heavier and slightly darker wood than the average baticulin. Pusopuso (*Neolitsea vidalii*) produces a wood that is greenish yellow, streaked and mottled with brown, moderately heavy and moderately hard. It would perhaps be accepted as baticulin. Some species of *Litsea* produce wood so similar to the description given above that they will undoubtedly pass for baticulin.

Dugkatan (*Cryptocarya bicolor*) has a dark brown heartwood sharply marked off from the dull yellowish sapwood; it is hard, moderately heavy, rather fine and straight grained and has a good reputation for durability. It is known only from Mindanao. It is used for house posts. In mechanical properties and durability this wood might be classed with malacadios.

Malacadios (*Beilschmiedia cairocan*) is a tree that reaches a height of 30 meters and a diameter of 70 or more centimeters, with a bole 16 to 20 meters long. The bark is 15 to 20 millimeters in thickness, is gray to a dirty brown in color and distinctly ridged. Beneath the cork is a white spongy layer, very thin and pitted; this grades into a brown or dark brown color near the sapwood. The leaves are simple, alternate, whitish beneath, from 9 to 20 centimeters long and 3 to 8 centimeters wide. The wood is yellow, moderately heavy to heavy, moderately hard to hard, rather fine grained, when fresh has an odor much like aromatic vinegar and is said to be difficult to burn. The wood has the following uses: House construction (flooring, posts); furniture; shipbuilding. This tree has the following known distribution: Luzon (Ilocos Norte, Ilocos Sur, Tayabas, Camarines); Ticao Island; Masbate; Panay; Zamboanga. Besides malacadios, a name that is used in the northern islands, it has the local name of cubi in the Zamboanga region. (Pl. XIII.)

Tambulian (*Eusideroxylon zwageri*) is the Tawi Tawi name for the ironwood or billian of Borneo. The wood is yellow, on exposure turning to a glossy brown; very hard and very heavy and generally straight grained. It is difficult to saw, but is not hard to finish. It is said to be the best wood in the world for piling and is used for heavy construction, bridges, telegraph and telephone poles, and railway ties. In the Philippines it is known only from the Island of Tawi Tawi.

Kalingag (*Cinnamomum mercadoi*) is a medium-sized tree usually found in the tanguile-oak type. The wood is dull reddish brown, with dark mottlings and streaks; soft to moderately hard; moderately heavy; both bark and wood have a strong taste and odor of sassafras. The camphor wood (*Cinnamomum camphora*) is not native to the Philippines and has only recently been introduced. Cinnamon is gathered and used locally in Mindanao from *Cinnamomum mindanense*.

MAMALIS FAMILY.

(Pittosporaceæ.)

Mamalis (*Pittosporum pentandrum*) is a small tree growing in open places with the common names of basuit (Il.); darayao (Pal.); dili (N. V.); mamalis (T.). It yields a light colored wood, moderately hard, that is used only locally.

ROSE OR LIUSIN FAMILY.

(Rosaceæ.)

This family yields only one timber tree of commercial importance.

LIUSIN. (Pls. XIV and XV.)

Liusin is a medium-sized tree reaching a height of 25 to 30 meters and a diameter of 70 to 100 centimeters or larger. The bole is usually regular and straight, slightly buttressed. The crown is irregularly conical and dense. It is very scattered throughout the dipterocarp forests, found both on moist and dry soils and is intolerant of shade.

The bark is 5 to 8 millimeters in thickness, light brown or slightly gray in color; smooth and, where freshly shed, often very light gray with a tinge of green. In Mindanao, at least, the bark is shed in large elongated plates turned out below. This gives the tree a striking appearance. The inner bark is tan red in color, very brittle, and when cut exudes a sweetish watery sap. The leaves are simple, alternate, free from hairs, with two more or less prominent glands at the base of the leaf blade. They are somewhat leathery in texture, from 9 to 15 centimeters long and from 3 to 7 centimeters wide.

The sapwood is creamy brown in color; the heartwood is light reddish brown, heavy, very hard, extremely difficult to saw, fine and usually straight grained. It is very durable in contact with salt water. Liusin is especially valuable for piling, and also used for shipbuilding and house posts.

The following regions contain liusin: Luzon (Cagayan, Ilocos Sur, Abra, Nueva Ecija, Pangasinan, Rizal, Zambales, Bataan, Tayabas, Camarines); Mindoro; Samar; Leyte; Guimaras Island; Mindanao (Zamboanga, Lanao and Davao).

The scientific name of liusin is *Parinarium griffithianum*. Other species of the genus produce wood indistinguishable from liusin. Until recently the tree seemed to be little used and was first known under the name of liusin from Bataan and Zambales. The following local names are known: Aningat (Cag.); bakayo (Pang.); bingao (Il.); binggas (Pang.); dungon-dungonan (Tay.); kankangan (Dav.); kapgangan (M.); kulatingan (Tar.); malafuga (Tay.); maluktuk (Moro); mantalingan (Zam.); matamata (Ley.); olayan (Sam.); pasak; sabongkaag (Il.); sampinit (Guim.); sarangan (Sam.); tabun-tabun (Al.); tadian-manuk (Riz., Ab.); tiga (Sam.).

Lago or liusin-gubat (*Pygeum preslii*) and other species of *Pygeum* are sometimes used as lumber. An extract from the bark of lago is employed locally to dye cloth.

LOCUST OR NARRA FAMILY.

(Leguminosæ.)

The Narra family is, next to the dipterocarp family, the most important one from a lumber standpoint in the Philippine Islands. With the exception of cupang, it is preëminently the family of fine and durable furniture woods. A group of six of these, viz: narra, tindalo, banuyo, supa, acle, and ipil, have a beautiful grain and color, and for furniture and cabinetmaking will compare with any six other woods in the markets of the world. Nowhere appearing in any considerable quantity, the members of this family are encountered isolated here and there in situations with dry or sandy soils (tindalo, supa, ipil, and banuyo) or occupy places on moist flats or along streams (acle, ipil, and narra). Cupang, salinkugi, and acleng-parang are usually confined to the open parang country. All of the species mentioned are intolerant of shade, and associated with this they are found destitute or nearly destitute of leaves during a portion of the dry season. All of them also show seasonal rings of growth. The members of the Narra family mentioned here have simply or doubly compound leaves. The fruit is a one-seeded pod (batete), a winged pod with or without spines (various kinds of narra); a pod with oily spines (supa), or the usually long pod so characteristic of the family. The trees are usually medium size with short thick trunks, often large buttresses (narra and cupang) and broad spreading, open, vase-shaped crowns. They often give character to the vegetation, because they overtop the surrounding low growth and during the dry season their bare, or nearly bare, branches stand out in sharp contrast.

NARRA. (Pls. XVI and XVII.)

Narra is a medium-sized tree, 20 to 30 meters in height with an average diameter of 70 to 80 centimeters, though exceptional trees will reach a diameter of 150 to 200 centimeters. The bole has a merchantable length up to 15 meters, is usually angular and irregular and has flat buttresses, from which one-piece table tops 1.5 to 2 meters in diameter are made. It has a low-branching, wide-spreading, vase-shaped crown which is about one-half the total height of the tree.

Narra is found throughout the Philippines, principally in the forest regions where the dry season is not pronounced, nearly always occupying places on flat coastal plains behind mangrove swamps, or very scattered along streams in the low hills near the coast. In the former situation, for small areas, as high as four or five trees to the hectare may be found. While it prefers low, damp soils, occasional trees may be found on drier

slopes. It is decidedly a light-loving tree and is nearly deciduous for a short time during the dry season.

The bark is 3 to 5 millimeters in thickness, soft to the touch, grayish yellow to brownish yellow in color, with fine longitudinal lines about a centimeter apart. It is often shed in small thin flakes. The inner bark is light red, streaked with darker red short tubes united in vertical rows. These, when cut, exude a crimson liquid which on solidification becomes a very dark reddish brown. This liquid is said to have medicinal and dyeing properties. The leaves are simply compound, alternate, with 6 to 11 leaflets, which are smooth, from 5 to 13 centimeters long and from 2 to 8 centimeters wide.

The sapwood is nearly creamy white. The heartwood is yellow, red, or nearly white. It has a faint, sweet cedary odor, and chips soaked in water turn it fluorescent blue. The wood is moderately heavy, moderately hard to hard, with coarse and sometimes twisted grain, and durable, the heart being rarely attacked by insects. It has fine parallel cross lines ("ripple marks") in longitudinal sections.

Narra has the following uses: Bancas; bridge construction; cabinet-making; carabao yokes; carriage making; carving; doors; door panels; finishing of houses; floors; furniture; posts; railway ties; store fronts; table tops; walls; window sills.

The scientific name of narra is *Pterocarpus indicus*. Closely related species are prickly narra (*Pterocarpus echinatus*) and Blanco's narra (*Pterocarpus blancoi*) which are much like narra in all particulars except character of the fruits.

The distribution of the narras is as follows: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Abra, Union, Benguet, Pangasinan, Nueva Ecija, Tarlac, Zambales, Bulacan, Bataan, Rizal, Laguna, Baler, Tayabas, Camarines, Sorsogon, Albay); Palani Island; Marinduque; Mindoro; Masbate; Samar; Leyte; Negros Occidental; Palawan; Balabac Island; Camiguin Island; Mindanao (Surigao, Misamis, Lanao, Zamboanga, Davao).

Narra is the most common commercial name for the wood in the Philippines. It is also known as Philippine mahogany, and is practically the same as the *padouk* of India and Andaman rosewood. The following local names are also known: Agana (T.); antagan (Ib.); apalit (Tar.); asana (T., Il.); daitanag (Pam.); dungon (Kalinga Ig.); magalayao (Il., Ib.); naga (B., V.); nala (Moro); naya (Z.); odiao (Pam.); sagat (Cag.); sangki (Il., V.); tagga (Ib.); urian (Pam.).

BATETE. (Pls. XVIII and XIX.)

Batete is a tree which reaches a height of 30 to 35 meters and a diameter of 80 to 100 centimeters. It has a regularly cylindrical unbuttressed bole which has a clear length of 18 to 20 meters. The crown is globular and quite dense and is about one-third the height of the tree.

Batete is confined to the drier soils of the regions where the dry season is not pronounced. It is usually associated with molave or supa on limestone ridges, or with yacal on volcanic hills near the sea. It is slightly tolerant of shade, more so than any other member of this family, and occupies shallow soils usually on the top of ridges.

The bark is 7 to 10 millimeters in thickness; gray to gray-brown in color, with a yellowish tinge; sheds in large scroll-shaped patches. The inner bark is red. The leaves are alternate, simply-compound with from 3 to 7 usually alternate leaflets, which are smooth from 8 to 19 centimeters long and 4 to 9 centimeters wide.

The sapwood is light red, exuding a dirty, dark green, oily sap. The heartwood is reddish brown in color, streaked with black which is due to a dark colored oil. The wood soaked in water produces a brown color, tinged with purple. It is moderately hard and moderately heavy, easy to work and fairly durable. Batete is used for furniture, flooring, interior finish, and siding.

It is known from the following regions: Luzon (Cagayan, Tayabas, Camarines, Albay); Ticao Island; Masbate; Samar; Leyte; Mindanao (Zamboanga, Davao):

Batete has the scientific name of *Kingiodendron alternifolium*. The following local names are known: Danggai (B., V.); duka (Ley.); magbalago (Sam.); palo maria (Zam.); palina (Dav.); salalangan (Al.); talabangon (Sor.).

SUPA. (Pl. XX.)

Supa is a tree reaching a height of 20 to 30 meters, and in exceptional cases a diameter of 150 to 180 centimeters. The bole is regular, straight, and unbuttressed. The crown is very large, usually flattened vase-shaped, open, and with heavy limbs having a diameter of 25 to 40 centimeters. Supa seems to be confined to a limited part of regions without a distinct dry season. Here it occurs on the low limestone ridges near the seashore. It is intolerant of shade.

The bark is 7 to 10 millimeters in thickness, brown to nearly black in color, and sheds in large scales. Where freshly shed, pink colored patches are exposed. The leaves are alternate and simply compound, with usually three pair of leaflets, each smooth, leathery in texture, from 3.5 to 9 centimeters long and from 2.5 to 5 centimeters wide. The fruit is a pod, covered with straight, stiff spines, on the ends of which sticky drops of oil accumulate.

The sapwood is cream colored or pinkish; the heartwood is yellow when fresh, changing on exposure to a yellowish brown, often having a reddish tinge. It colors water a dark-reddish brown, and has a faint peppery odor. The wood is heavy, hard, fairly durable, slightly cross-grained, and rather difficult to work. It has the following uses: House construction (flooring, interior trim, door frames, posts); baseball bats;

bridge construction; naval construction; railroad ties; furniture; cabinet-making. (For a discussion of supa oil see Part I, p. 54.)

Supa has been found in the following regions: Luzon (Baler, Tayabas, Camarines, Sorsogon, Albay); and Mindoro.

The scientific name of supa is *Sindora supa*. Besides supa, the following names for this tree are known: Malapaho (T., V.); manapo (Bal.); parina (B.); yacal dilao (Tay.).

IPIL. (Pls. XXI and XXII.)

Ipil is a tree reaching a height of 30 to 45 meters and a diameter of 150 to 180 centimeters, though usually it is between 60 and 120 centimeters. The usually unbuttressed bole is sometimes straight and regular, though more often crooked and deformed. The tree often forks a short distance above the ground. Exceptionally large trees will have a clear length of 15 to 18 meters. The crown is large, and irregularly vase shaped. Ipil is found scattered throughout the Philippines along the coast, on flood plains near the mouths of large rivers, and occasionally on low hills. It seems to prefer a sandy soil with the ground water level not far below the surface. It is intolerant of shade.

The bark is 5 to 8 millimeters in thickness, gray with an orange tinge in color. The shallow saucer-like depressions made where bark is shed show a tan gray color until exposed for some time. The inner bark is light brown, mottled with pinkish brown specks. The leaves are alternate, simply-compound, composed usually of two pairs of leaflets; these are smooth, from 8 to 12 centimeters long and from 5.5 to 8.5 centimeters wide.

The sapwood is creamy in color, the heartwood is yellow when freshly cut, but turns reddish brown on exposure, and in old well-seasoned pieces it is chocolate colored. The pores frequently contain sulphur-colored deposits. The wood is heavy, hard, stiff, and not difficult to work.

It is one of the most desirable of the common hardwoods because of its great durability. It is used principally for house construction (doors, posts, flooring); railroad ties; paving blocks; telegraph poles; bridge construction; shipbuilding; high class furniture and cabinet work.

The following is the distribution of ipil: Luzon (Cagayan, Baler, Zambales, Bataan, Tayabas, Camarines, Albay, Sorsogon); Camiguin Island; Ticao Island; Masbate; Mindoro; Leyte; Guimaras Island; Dinagat Island; Panay; Negros; Palawan, Mindanao (Zamboanga, Davao, Cotabato, Surigao); Basilan Island; Tawi Tawi.

The scientific name of ipil is *Intsia bijuga*. Another closely related species, with usually three pairs of leaflets instead of two, is Merrill's ipil (*Intsia acuminata*). Ipil is the widespread common name for this wood in the Philippines; others recorded are: Labing (Tay.); sangai (Il.); tanglangao (Cam.). Equivalents of this wood are known in

Samoa as ifi-lele, in Guam as ifil, in Borneo as mirabow, and in the Federated Malay States, as merbou.

TINDALO. (Pl. XXIII.)

Tindalo is a tree reaching a height of 25 to 30 meters and a diameter of 60 to 80 centimeters, occasionally up to 120 centimeters. It is usually without buttresses and has a somewhat regular bole 12 to 15 meters in length. The crown, one-half the height of the tree, is broad spreading, vase shaped, semiopen, and partly deciduous during the dry season. Tindalo has a wide distribution throughout the Islands, but is not abundant. It is found scattered usually on dry, shallow, or rocky soils on the low ridges and hills along the coast. Less frequently it is scattered in the edges of the dipterocarp forests.

The bark is about 10 millimeters in thickness, creamy yellow in color, and has an uneven surface due to the saucerlike depressions made by the shedding of the outer layers. It is covered with numerous corky pustules, and sheds in scroll-shaped patterns. The inner bark is brownish yellow in color. The leaves are alternate, simply compound, with 3 (sometimes 4) pairs of leaflets. These are smooth with a white bloom beneath, from 3.5 to 10 centimeters long and from 3 to 5 centimeters wide.

The sapwood is white to creamy brown; the heartwood is yellowish red, becoming very dark with age. It is heavy, hard, durable, not difficult to work, has a fine, usually straight grain, takes a beautiful finish, and is almost free of the defect of warping.

Tindalo has the following uses: Fine furniture; cabinetmaking; fine interior finish (doors, floors, stairways, panels, etc.); railway ties; ship-building; general construction purposes.

The following regions are known to contain tindalo: Luzon (Cagayan, Isabela, Ilocos Norte, Pangasinan, Zambales, Rizal, Bataan, Tayabas, Camarines, Sorsogon); Palani Island; Polillo Island; Ticao; Masbate; Marinduque; Mindoro; Culion; Leyte; Cebu; Mindanao (Zamboanga, Cotabato, Surigao).

The scientific name of tindalo is *Pahudia rhomboidea*. Besides tindalo the most common names are as follows: Apalit (Pang.); Balayong or some form of it (V.); barayong (B.); magalayao (N. Luz.); pintok (Z.); uris (II.).

CUPANG. (Pls. XXIV and XXV.)

Cupang reaches a height of 35 to 40 meters, and a diameter of 150 to 180 centimeters. The bole is 15 to 20 meters in length, strongly buttressed, but otherwise fairly regular. The crown, about one-half the height of the tree, is large, vase shaped, widespreading, and open. Cupang is preeminently a tree of the rather open and second-growth forests where the dry season is pronounced, and is very scarce or entirely absent

in those parts where a pronounced dry season is wanting. It prefers good soils, requires a great deal of light, and therefore is found in the parang or on edges of untouched forests, or in open places of dipterocarp forests.

The bark is 6 to 12 millimeters in thickness, brown to russet-brown in color, often gray where exposed to sunlight. It has a roughened appearance due to shallow vertical broken lines, and is covered with small brown corky pustules. The inner bark is dark brownish red in color. The leaves are alternate, doubly compound, large and fern-like in appearance; the leaflets about 0.5 centimeter in length, and whitish beneath. The tree is bare of leaves from one to six weeks during the dry season.

The large sapwood is creamy white when fresh and then has a very disagreeable odor. On exposure it discolors rapidly. The heartwood is light brown, but is found only in trees 60 centimeters or more in diameter. The wood is light and soft, and decays rapidly.

Cupang has the following uses: Light and temporary construction; packing boxes; wooden soles of shoes; matches. It is known to be good for paper pulp.

The scientific name of cupang is *Parkia timoriana*. Besides cupang and some forms of it, the only known other name in use is butarik (N. Luz.).

Cupang is known to occur in the following regions, though no collections have been made in some of them: Luzon (Cagayan, Isabela, Ilocos Sur, Abra, Benguet, Pangasinan, Tarlac, Nueva Ecija, Pampanga, Bulacan, Zambales, Bataan, Rizal, Laguna, Tayabas, Camarines); Mindoro, Marinduque; Palawan.

ACLENG-PARANG. (Pls. XXVI and XXVII.)

Acleng-parang is a medium-sized tree reaching a height of 20 to 22 meters and a diameter of 60 to 90 centimeters. It has a straight, unbuttressed, regular bole about one-half the height of the tree. The crown is vase shaped, rather broad spreading and open. The tree is usually confined to the regions where the dry season is pronounced. Here it is found on the edge of the forest or in the more or less open parang type of forest. It resists fire well, and is intolerant of shade. It will grow in shallow or deep soil, but is seldom found in the latter. It is usually destitute of leaves from two to six weeks during the dry season.

The bark is 5 to 10 millimeters in thickness, smooth, and light gray when young, but on ageing it becomes slightly roughened and brownish gray to yellowish in color. The inner bark is pink, streaked with radiating lighter colored lines. The leaves are alternate and doubly compound with about 3 to 5 pairs of pinnæ, each with 6 to 10 pairs of leaflets; these are whitish beneath, from 2 to 6 centimeters long and from 1 to 2.5 centimeter wide.

The sapwood is large, creamy white; the heartwood is chocolate colored, shining, with alternate belts of darker and lighter color. The wood is

hard, moderately heavy, fairly durable, and sometimes substituted for acle. It is used for sugar-cane crushers, rice pounders, wheels, agricultural implements, carving, railroad ties, and house construction.

The tree is known from the following regions: Luzon (Ilocos Norte, Ilocos Sur, Abra, Benguet, Union, Pangasinan, Tarlac, Pampanga, Rizal, Zambales, Bataan, Camarines); Mindoro.

The scientific name of acleng-parang is *Albizzia procera*. The following local names are known: Adaan (Il.); alalangad (T.); aninapla (T.); kalai (Ig.); karial (Z.); palatangan (Il.).

SALINKUGI. (Pl. XXVIII.)

This is a small to medium sized tree attaining a diameter of 80 centimeters and a height of 25 meters, especially in the southern islands. The bole is one-half the height of the tree, usually somewhat irregular, but without buttresses. The crown is broadly vase shaped to globular and is open. It is found throughout the Philippine Islands generally in the parang or open forest.

The bark is about 5 millimeters in thickness, light gray to dark gray in color and densely covered with corky pustules; the inner bark is slightly pink in color and somewhat spongy in texture. The leaves are alternate, doubly compound, consisting usually of 2 pairs of pinnæ, each with 2 to 4 pairs of leaflets; these are from 5 to 14 centimeters long, and from 2.5 to 8 centimeters wide, and are covered beneath with fine velvety hairs.

The sapwood is creamy white; the heartwood is dark brown to nearly black streaked with lighter and darker belts and resembles that of acleng-parang. It is moderately hard and moderately heavy. The wood is used locally for general house construction, and, especially in the southern islands, for furniture and fine interior finish.

Salinkugi has the following distribution: Luzon (Ilocos Norte, Ilocos Sur, Benguet, Pangasinan, Pampanga, Bataan, Rizal, Laguna, Tayabas, Camarines, Albay); Mindoro; Ticao Island; Masbate; Guimaras Island; Samar; Negros; Mindanao (Zamboanga, Surigao); Basilan.

The scientific name of salinkugi is *Albizzia saponaria*. Besides the Visayan name of salinkugi, or some form of it, and the Tagalog one of gogong-toko, the following local names are known: Gogo (T.); gogokasai (Tay.); malatoko (Riz.); maratika (Il.); pipi (Neg.); tigion (V.).

BANUYO. (Pl. XXIX.)

Banuyo is a medium to large sized tree with a short, often irregular bole and an open crown. It is scattered throughout the molave type of forest on the dry coastal hills. It is intolerant of shade and seems to thrive best in dry places.

The bark is 5 to 8 millimeters in thickness, gray to brownish-gray in color, not ridged but roughened somewhat by irregularly shaped shallow pits, due to the depressions left where it is shed; the inner bark is dark reddish brown. The leaves are doubly compound with 3 pairs of pinnae each having about 5 pair of leaflets; these are smooth, from 3.5 to 8 centimeters long and from 1.5 to 4 centimeters wide.

The wood is golden brown in color and resembles acle, but is coarser grained, lighter in color and somewhat softer. It is moderately heavy, moderately hard, durable and is easily worked. Banuyo is used for furniture, cabinetmaking, carving, carriage bodies, picture frames, and fine interior finish. It is also employed for various classes of house construction work, especially flooring and siding.

The tree has been reported from the following regions: Luzon (Cagayan, Isabela, Benguet, Tayabas, Camarines); Camiguin Island; Masbate; Burias Island; Ticao Island; Samar; Negros.

The scientific name of banuyo is *Wallaceodendron celebicum*. Besides the Tagalog name of banuyo the following names are used: Balayong (V.); dauer (Cag.); lupigi (N. Luz.) molina (Cag.).

ACLE. (Pls. XXX and XXXI.)

Acle is a tree of medium height with usually a somewhat irregular bole, 70 to 100 centimeters in diameter and one-half or less than one-half the height of the tree. The trunk has root swells, but no buttresses. The crown is broad spreading, open, and is decidedly thinner during the dry than the wet season. It is a very scattered tree, and is usually found along streams where its roots can easily reach the ground-water level. It is intolerant of shade.

The bark is 8 to 12 millimeters in thickness; is dark brown to almost-black, and is covered with thick small scales giving it a very characteristic appearance. When rubbed with saliva or water the bark produces a lather. The inner bark is reddish brown in color, and brittle in texture. The leaves are doubly compound, usually with one pair of pinnae, each with 3 to 6 pair of leaflets, the terminal pair being much larger than the others. The leaflets are from 4.5 to 18 centimeters long and from 2 to 7 centimeters wide.

The sapwood is creamy white and perishable; the heartwood is a rich dark brown color, fine and curly grained, moderately heavy and hard, and gives water a dark brown color. It has a decided peppery odor. Acle is highly valued for fine furniture and cabinet making, and also has the following uses: House construction (posts, flooring, siding, interior finish); naval construction; ties; sides of guitars; carving.

Acle has been collected from the following regions: Luzon (Ilocos Sur,

Union, Pangasinan, Nueva Ecija, Rizal, Zambales, Bataan, Tayabas, Camarines, Sorsogon); Masbate; Mindoro; Negros; Palawan.

The scientific name of acle is *Albizzia acle*. The wood resembles somewhat the pyingadu of India (*Xylia dolabriformis* Benth.). Besides the Tagalog name of acle, the wood is known under the following names: Kita-kita or quita-quita (Il., Pam., Pang.); langip (V.); tabalangi (V.).

Besides the above the following members of this family need mention:

The raintree (*Enterolobium saman*) is extensively cultivated for ornament and shade throughout the Philippines. It is also known as acacia or monkey pod. Camanchile (*Pithecolobium dulce*) is a small to medium sized tree introduced from tropical America, whose bark is used for tanning leather, and the fleshy aril around the seeds is eaten. Anagap or bansilak (*Pithecolobium scutiferum*) is a small to medium sized tree, with large red, deeply lobed and curved pods, whose wood is used to some extent. Kasai (*Albizzia retusa*) is a small tree usually found in the beach type. Aroma (*Acacia farnesiana*) is a small bushy introduced tree found in the second-growth forests or scattered in the grass lands. Ipil-ipil or santa elena (*Leucaena glauca*), introduced from tropical America, is widely distributed in the second-growth forests and is sometimes planted to kill out the cogon grass. It is a small shrubby tree used extensively for firewood. Philippine mesquite or aroma (*Prosopis vitaliana*) is a small prickly tree, introduced from Mexico, that often forms thickets in the beach type. Tanglin (*Adenanthera intermedia*) is a medium-sized tree found scattered in the forests. Its wood is much like ipil and is often sold for it. Kamatog (*Erythrophloeum densiflorum*) is a medium-sized to large tree very scattered in the dipterocarp forests. The wood is not well known. Alibangbang (*Bauhinia malabarica*) is a small-sized tree very common in the parang. The common name signifies butterfly, from the shape of the leaves. Caña-fistula (*Cassia javanica*) is a small to medium sized tree usually found in the molave type. Its wood resembles banuyo in color, but has a structure similar to tindalo. The foreign name, caña-fistula is applied to the introduced *Cassia fistula* L. but most of the wood that reaches the market probably comes from *Cassia javanica*. The following native names also occur: Anahuhan (Tay.); bagiroro (Bur., Sor.); balayong (V.); dulaueng (Is.); tualing (Z). *Cassia siamea* and *Peltophorum inerme* are introduced trees extensively cultivated for ornament and shade. Both have brilliant yellow flowers. Fire tree (*Delonix regia*) is a small to medium sized cultivated tree introduced from Madagascar. Sibucan or sappan (*Casalpinia sappan*) is a small shrubby tree semicultivated as a dyewood. (See Part I, p. 54.) Bahai (*Ormosia calavensis*) is a medium-sized tree found very scattered in the dipterocarp forests. The wood is red, but is little known on the markets. Madre-cacao or kakawati (*Gliricidia sepium*) is a small bushy tree introduced from tropical America. It occurs in the parang and is one of the principal woods used for fuel. Katurai or katudai (*Sesbania grandiflora*) is a small tree with large white flowers used as salad or vegetable. It has probably been introduced into the Philippines. Sampalok or tamarind (*Tamarindus indica*) is a medium-sized tree growing in or near towns, probably introduced from Africa. The fruit is eaten raw or cooked with meat to flavor it. Bani (*Pongamia mitis*) is a small tree usually growing on the sandy beaches. The wood is used locally. Dapdap (*Erythrina indica*) is a medium-sized tree with a white, very soft wood, growing along the seashore. The tree is cultivated for its large red flowers and as a shade tree in hemp plantations. It is sometimes erroneously called the fire tree.

LEMON OR CAMUNING FAMILY.

(Rutaceæ.)

This is a family of small trees, representatives of which are found throughout the Philippines. The species usually have compound leaves which are full of oily droplets (pellucid dots). Camuning (*Murraya exotica* L.), the principal one worthy of mention, is a small tree, furnishing a very hard, very heavy, yellowish wood, used for canes, kris handles, and carvings. It is said to be a good substitute for boxwood. It is also known as banasi or banati. Species of the genus *Citrus* furnish the native cultivated orange (dalandan or cajel), the native cultivated grape fruit (sua or lukban) and two varieties of lime (dayap and kalamansi.) *Citrus hystria* (kabuyao) is a wild species whose fruit is used for washing hair and bleaching clothes. Kayutana (*Fagara* sp.) is a small to medium sized tree whose wood is pale yellow, hard, and heavy.

CANARY OR PILI FAMILY.

(Burseraceæ.)

The trees of this family have alternate compound leaves and resinous barks. Pili (*Canarium luzonicum*) is the tree that produces the resin that is known as the Manila elemi of commerce (known locally as pili resin, brea, or brea blanca). A form of this tree (perhaps a different species) produces the pili nut, an edible nut with a rich oily flavor resembling the almond. (See Part I, p. 56.) Pagsahingin (*Canarium villosum*) produces a resin similar to that of pili. The wood of both these *Canariums* and that of twenty or more other species is usually moderately hard, light to moderately heavy, and light grayish brown, sometimes pinkish, in color, fairly fine and straight grained; not very durable, but said to make good house posts if the portion in the ground is charred. The wood of kamingī (*Santiria nitida*) is pale brown, heavy, hard, rather tough, does not check much, but warps considerably, and is somewhat difficult to work. Bogo or bagulibas (*Garuga abilo*), another tree of this family, is usually found growing with molave. It has a short bole, large in diameter, and wide spreading branches. The sapwood has a pale dull brown color; the heartwood dark reddish brown with almost black streaks and mottlings, moderately heavy, moderately hard, rather coarse irregular grain, and not difficult to work.

MAHOGANY OR CALANTAS FAMILY.

(Meliaceæ.)

While this family has many representatives in the Philippines, the wood of only four species are commonly found in the lumber market. The woods of a large number of species are used, but the identifications are so obscure that it is impossible to discuss them at this time. Outside the Philippines this family furnishes to the lumber market the West Indian cedar (*Cedrela odorata* L.), the toon tree of India (*Toona* spp.), the true mahogany (*Swietenia mahagoni* L.), the satinwood of India (*Chloroxylon swietenia* DC.¹) and the African mahogany (*Khaya senegalensis*).

With some practise the members of the Calantas family can be distinguished by the large compound alternate leaves, grouped at the ends

¹ Placed in Rutaceæ by Engler.

of short, stout branchlets. The trees are small, medium sized, and sometimes large in diameter, though usually short boled. The wood of many species have a faint to distinct odor.

CALANTAS. (Pls. XXXII and XXXIII.)

Calantas is a tree that will reach a height of 40 to 50 meters and a diameter of over 150 centimeters, though the trees are usually much smaller. The bole is straight and cylindrical and about one-half the height of the tree in length. The crown is wide spreading and rather open. This tree is found scattered throughout the Philippines and can not be said to be abundant in any place. It occurs along small streams in the molave type, on flood plains in the lauan-hagachac type and sometimes in drier situations. It is not tolerant of shade.

The bark is 5 to 10 millimeters in thickness, brown to reddish brown in color and breaks into rough rectangular scales, the ends of which turn slightly outward. In small trees the bark often has longitudinal lines. The inner bark is reddish brown, slightly streaked with lighter bands, and has a distinct cedary odor. The leaves are compound, alternate, bunched at the ends of the twigs. There are 7 to 11 pairs of leaflets, each smooth or nearly so except when young, from 5 to 13 centimeters long and from 3.5 to 6 centimeters wide.

The sapwood of calantas is very light red; the heartwood is pale to dark red in color. The wood usually has a strong cedary odor. It is soft in texture and light in weight, and is coarse and straight grained. It is durable and resists the attacks of white ants and fungi very well. A form of calantas (probably a distinct botanical species) is found in Mindanao and Palawan. The wood of this, while in other respects like calantas, has no distinct odor except when fresh, and some of it has the bird's-eye grain, when it is known as bird's-eye or curly calantas.

Calantas is closely related to the West Indian cedar and like it is especially valuable for fine furniture, cabinetmaking, and cigar boxes. It is sometimes sold as Philippine mahogany. It is also used for pattern making, carvings, ceilings, doors, partitions, sides of guitars, and for bancas.

The present knowledge of the distribution of calantas is as follows: Luzon (Cagayan, Isabela, Bontoc, Pangasinan, Zambales, Bataan, Tayabas, Camarines, Sorsogon); Mindoro; Samar; Leyte; Negros; Palawan; Mindanao (Zamboanga and Basilan).

The scientific name of calantas is *Toona calantas*. Other species of *Toona* probably occur. Besides the general Tagalog name of calantas the following local names are known: Balongkavit (B.); bantinon (N. V.); danga (Is.); danigga (N. Luz.) danupra (Il.); kalantad (Pang.); Kantingen (Z., Il.); lanigda (V., B.); lanipga or some form of it (V., B.); porak (Il.); sagged (Pal.); sandana (V.); taratara (T.).

SANTOL. (Pl. XXXIV.)

Santol is a medium-sized tree reaching a height of 20 meters and a diameter of 70 centimeters. The tree has a straight, regular, but short bole. The crown is fairly dense and compact.

The bark is 4 to 7 millimeters in thickness, gray to grayish brown in color, rather smooth with fine longitudinal lines, and covered with corky pustules. Just beneath the surface the color is mottled green; the inner bark is pinkish red nearest the surface, but shades into a very light pink next to the sapwood. The leaves are compound and alternate. There are three leaflets, each from 13 to 16 centimeters long and from 6 to 9.5 centimeters wide, and covered below with fine velvety hairs.

The sapwood and heartwood are brownish pink in color. The wood is moderately heavy and moderately hard and has a very faint aromatic odor. When soaked in water it gives a reddish tinge. It is straight grained and easily worked. Santol is used for light construction purposes, especially house building, also for carving, sacred images, blocks for shaping hats, and furniture.

The scientific name of santol is *Sandoricum indicum*. It has the general common name of santol and besides growing wild is cultivated throughout the Philippines for its edible fruit.

MALASANTOL. (Pl. XXXV.)

Malasantol is a medium-sized tree reaching a height of at least 20 to 25 meters and a diameter of 80 centimeters. The bark is 4 to 7 millimeters in thickness and gray to grayish-brown in color; the inner bark is tan red in color. The leaves are alternate and trifoliate. The leaflets are from 6 to 18.5 centimeters long and from 4 to 9 centimeters wide and smooth or nearly smooth.

The sapwood is creamy white to salmon pink in color; the heartwood is reddish brown with a violet tinge. The wood is somewhat harder and heavier than santol and is straight and coarse grained. It has an odor similar to santol.

It has been recorded from the following provinces: Luzon (Nueva Vizcaya, Tarlac, Zambales, Bataan, Rizal, Laguna, Tayabas); Mindoro; Samar; Negros; Zamboanga.

The scientific name of malasantol is *Sandoricum vidalii*. It has the following local names: Biot (N. V.); bok-bok (Tay.); magsantol (Z.); malabobonao (Sam.); santol (Neg., Riz.).

TUCANG-CALAO. (Pl. XXXVI.)

Tucang-calao is a tree usually reaching a height of 20 to 25 meters and a diameter of 60 to 80 centimeters. The bole is regular and about one-half the height of the tree. The tree grows on the dry coastal hills, usually scattered through the forests in which bansalaguin and dungon occur.

The bark is 5 to 10 millimeters in thickness, light gray to gray in color, distinctly ridged. The inner bark is tan red in color. The leaves are alternately compound, composed of about 12 pairs of leaflets, each from 10 to 24 centimeters long and 2.5 to 8 centimeters wide, densely covered with whitish to rusty-brown hairs beneath.

The sapwood is grayish in color; the heartwood is brownish red with a fine and curly grain and a pungent cedary odor. The wood is heavy and hard. For beautiful color and grain this wood is of a mahogany grade. It is used for furniture, flooring, general house construction (especially interior finish), and shipbuilding.

This tree has been reported from the following regions: Luzon (Pangasinan, Batangas, Tayabas, Camarines, Albay); Masbate; Burias; and Cebu.

The scientific name of tucang-calao is *Aglaia clarkii*. The general commercial name is tucang-calao. Other local names are as follows: Alamog (Al.); balui (Pang.); kansuyod (Al., Bur.); makopa (Bat.); saldana (Cebu).

TABIGI.

This is a medium-sized tree with a short, thick, irregular bole and a spreading semiopen crown. It is found scattered throughout the mangrove swamps of the Philippines. The bark is 2 to 4 millimeters in thickness, smooth, cinnamon brown in color, sometimes with parallel curved lines of corky pustules. The inner bark is pink. The leaves are alternately compound; the leaflets are obovate, smooth, from 8 to 12 centimeters long and from 3.5 to 6 centimeters wide.

The sapwood is light brownish red. The heartwood is dark red in color, moderately hard, moderately heavy, and with fine ripple marks. It is very fine grained, durable, and shrinks but little in drying. It is used for furniture, sandals, and locally for construction of small houses and as firewood. The bark is used extensively for dyeing. (See Part I, p. 53.)

The scientific name of tabigi is *Xylocarpus obovatus*. It has the following local names: Lubanayong (Cag.); nigi (T.); tawigi (Mind.).

PIAGAO.

This is a medium-sized to tall tree with a fairly regular bole that will yield poles up to 18 meters in length and 60 to 80 centimeters in diameter. It is found throughout the mangrove swamps of the Philippines and seems to do best in the Davao region of Mindanao, where for very small areas it forms almost pure stands.

The bark is 3 to 7 millimeters in thickness, gray to dark brown with a reddish tinge, often with vertical bands of gray alternating with reddish brown, and inclined to be irregularly ridged or at least much roughened; the inner bark is red. The leaves are alternately compound;

the leaflets are smooth, leathery, from 9.5 to 12 centimeters long and from 3 to 7 centimeters wide.

The sapwood is brown, lightly tinged with red; the heartwood is dark red, with ripple marks. It is moderately hard, moderately heavy, durable, and said to last well as salt-water piling. It makes fine furniture and is of a mahogany grade.

The scientific name of piagao is *Xylocarpus granatum*. A third species of *Xylocarpus* is found in the Philippines.

A number of species of the genera of *Aglaia*, *Amoora*, *Chisocheton*, and *Dysoxylum* are scattered throughout the Islands, especially in the dipterocarp forests. It is impossible at the present time to describe these trees so that they be referred to definite species. Agar (a species of *Dysoxylum*?) yields a light-colored, golden-yellow, fine-grained, hard, and moderately heavy wood, found in small quantities on the Manila market. It takes a beautiful finish like that of satinwood. Woods similar to this in hardness and other characteristics are known under the Tagalog name of kuling-manuk and the Visayan name of miao. Malatumbaga is the Bataan name usually applied to *Aglaia harmsiana*. A wood similar to this, known as malasaging, and possibly the same species, comes from Tayabas and Camarines. It is dark red in color (resembling somewhat tukang-calao) and very durable. While the harder species of the genera mentioned above are valuable woods, they will never find much of a place in the markets because they are scattered and usually have ill-formed short boles. Lansones (*Lansium domesticum*) is a tree cultivated for its fruit.

RUBBER OR BINUNGA FAMILY.

(Euphorbiaceæ.)

While not of much importance from the standpoint of producing lumber, yet this family contains a large number of tree species, nearly all of which are small. These usually occupy a conspicuous place in the undergrowth of the dipterocarp forests, or are the "weed" trees of the second-growth forests.

The leaves are usually alternate and simple, but *Hevea brasiliensis* and *Bischofia javanica* are trifoliolate and *Manihot glaziovii* has deeply three to seven palmately parted leaves.

Undergrowth species: A number of species occupy a conspicuous place in the undergrowth of some of the dipterocarp forests. Among the most important of these are bignai lalaki (*Aporosa sphaeridophora*), malabignai or kaping-gubat (*Aporosa symplocosifolia*), butong-manuk or talimorung (*Cyclostemon microphyllum*), dilak (*Baccaurea tetrandra*). These are all strictly undergrowth trees, seldom reaching a diameter of over 15 centimeters and a height of 10 meters. They are all tolerant of shade.

Caiñgin species: Hamindang (*Macaranga bicolor*) and binunga (*Macaranga tanarius*) are among the first trees to enter newly made clearings, forming with *Homalanthus* species (especially balanti, *H. populneus*) almost pure stands. The Macarangas reach as scattered trees in some dipterocarp forests the dimensions of dominant or subdominant trees. They have peltate leaves. Balanti, with heart-shaped leaves, is a small spindly tree. All of these, with hinlaumo, (*Mallotus ricinoides*) and alim (*M. moluccanus*) are rapid growing trees, producing seeds at a very early age. Binayuyu or inyam (*Antidesma ghaesembilla*), tanigi (*Antidesma edule*), and bignai (*Antidesma bunius*) and other species of *Antidesma* are small trees found in the open grass lands. A special characteristic



J. Vitan del.

PLATE XXXVI.—TUCANG-CALAO (*Aglaiia clarkii*).

a, Fruit.



J.Vitan del

PLATE XXXVII.—AMUGUIS (*Koordersiodendron pinnatum*).

a, Fruit.



PLATE XXXVIII.—LOWER TRUNK OF AMUGUIS (*Koordersiodendron pinnatum*).
With leaves attached.



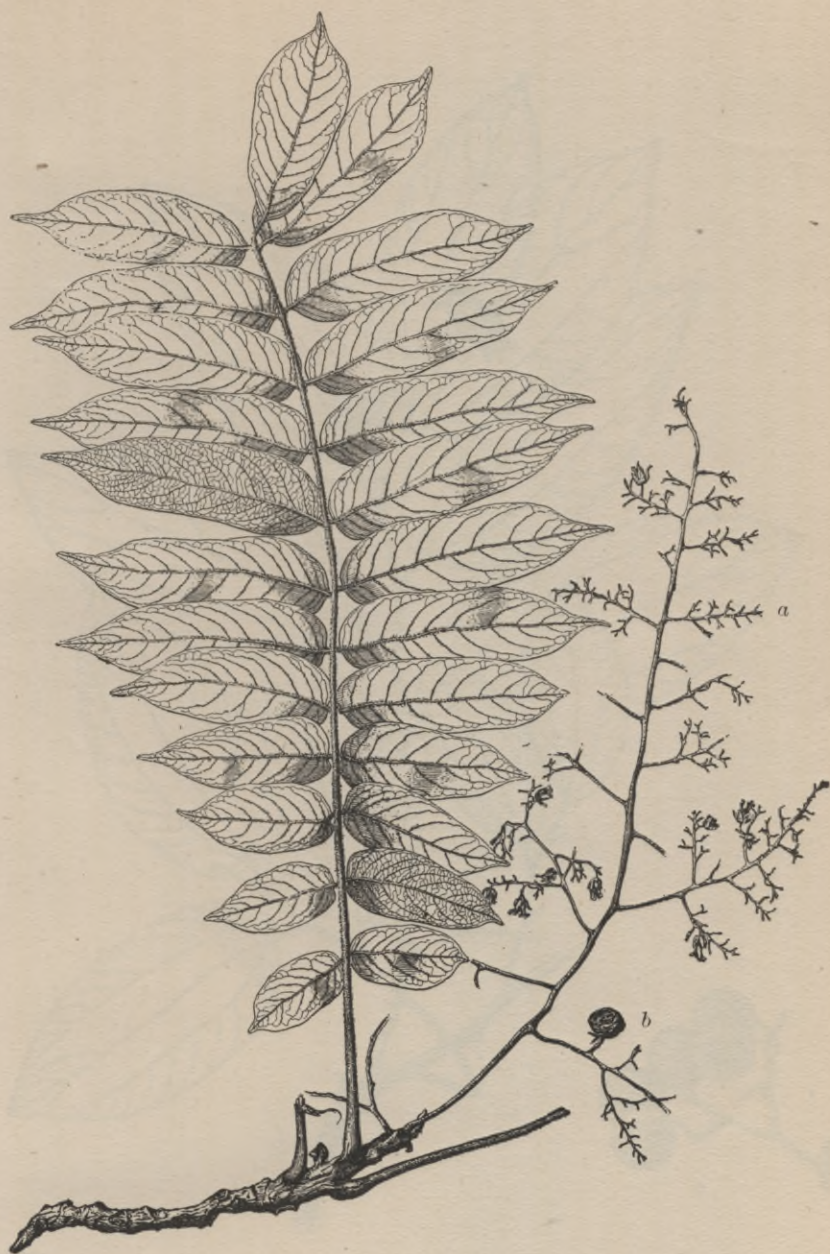
J. Wilson del.

PLATE XXXIX.—DAO (*Dracontomelum dao*).

a, Flower cluster; b, fruit cluster.



PLATE XL.—LOWER PORTION OF THE TRUNK OF DAO (*Dracontomelum dao*).



J. Vitan del.

PLATE XLI.—LAMIO (*Dracontomelum cumingianum*).

a, Flower cluster; b, fruit.



J. Vitan del.

PLATE XLII.—BALACAT (*Zizyphus zonulatus*).
a, Fruit cluster.



PLATE XLIII.—BALACAT (*Zizyphus zonulatus*).



J.Vitan del.

PLATE XLIV.—ALUPAG (*Euphoria cinerea*).

a, Flower cluster; *b*, fruit.



J. Vitan del.

PLATE XLV.—MALUGAY (*Pometia pinnata*).

a, Flower cluster; b, flower; c, fruit.



J. Van der

PLATE XLVI.—DUNGON (*Tarrietia sylvatica*).

a, Fruit.



PLATE XLVII.—BARK CHARACTERS OF DUNGEN (*Tarrietia sylvatica*).



J. Vitan del.

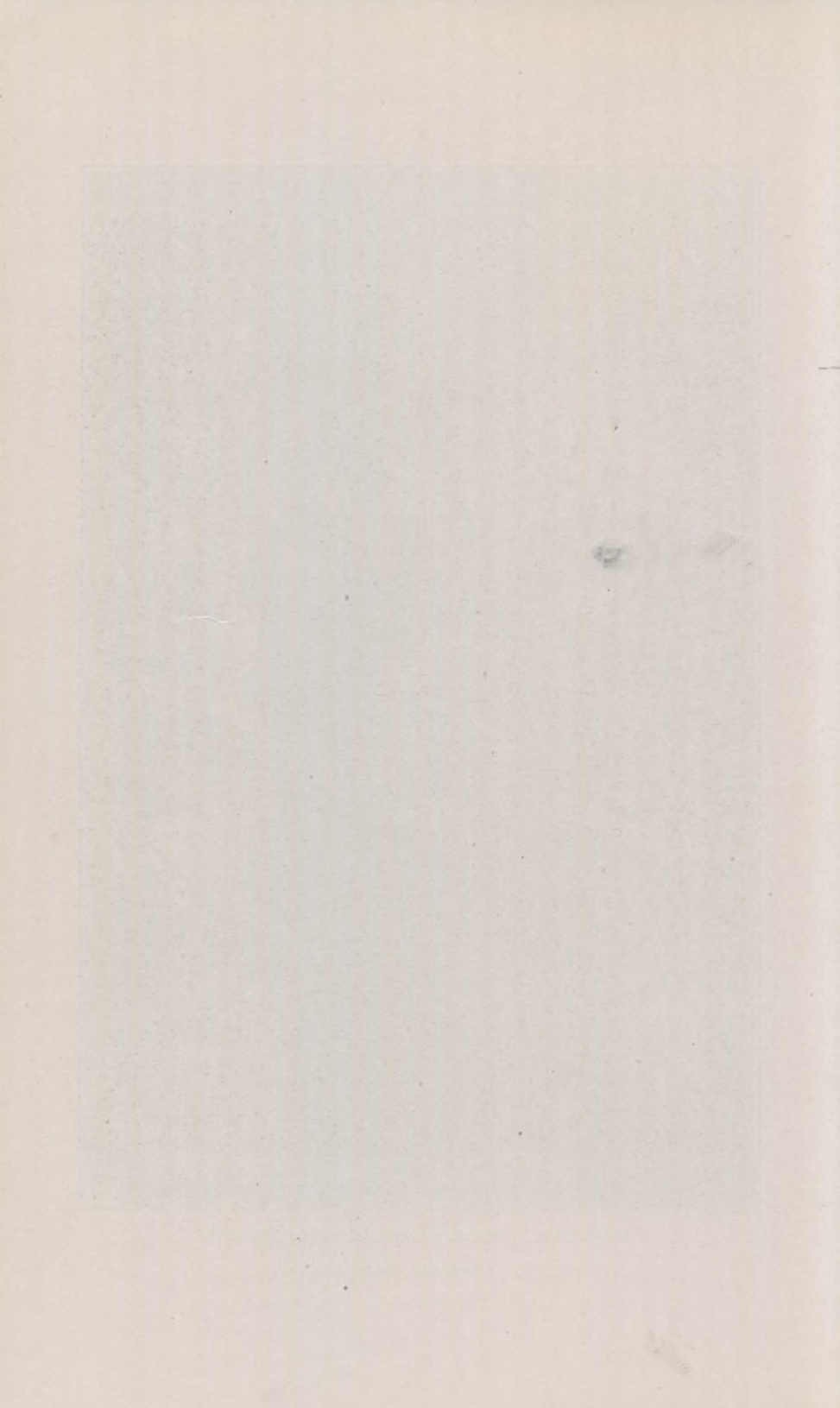
PLATE XLVIII.—DUNGON-LATE (*Heritiera littoralis*).

a, Fruit.



PLATE XLIX.—DUNGON-LATE (*Heritiera littoralis*).

Bark and leaves.



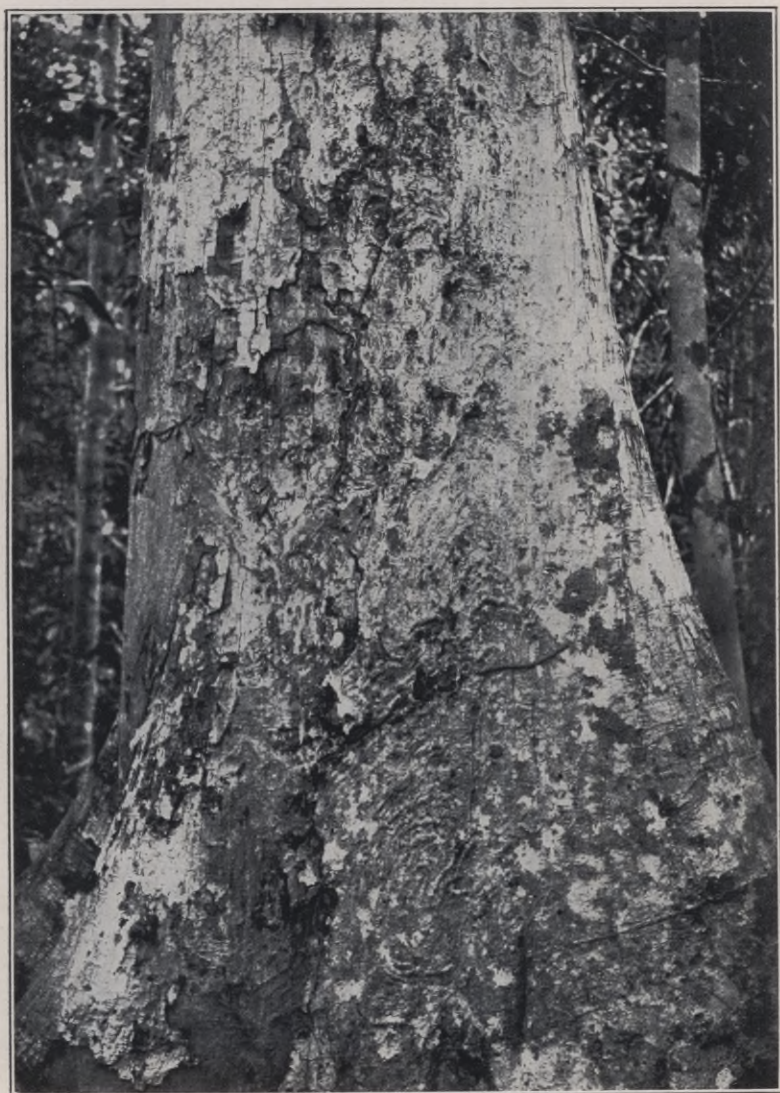


PLATE L.—LUMBAYAO (*Tarrietia javanica*).

Bark characters.



PLATE LI.—LUMBAYAO (*Tarrietia javanica*).



J.Vilan, del.

PLATE LII.—LUMBAYAO (*Tarrietia javanica*).

a, Fruit; *b*, flower cluster.

of binayuyu is its power to resist fires. Fire-swept cogonales often show scattered specimens of this tree nearly to the exclusion of all others.

Rubber-producing species: Para rubber (*Hevea brasiliensis*) and ceara rubber (*Manihot glaziovii*) of this family have recently been introduced into the Philippines. (See Part I, pp. 57, 58.)

Lumber species: Tuai or toog (*Bischofia javanica*) is a tall tree found scattered throughout the Philippines, usually isolated along streams. The tree has a fairly regular, unbuttressed, short bole with a wide-spreading crown. It is intolerant of shade. The bark is dark brown, soft to the touch, shedding in large thin scales. The inner bark is red with a thin, dark-red latex. The leaves are alternate, trifoliolate and smooth, with the edges of the leaflets toothed. The sapwood is light creamy color; the heartwood is red, moderately hard, and moderately heavy.

Gubas or binuang (*Endospermum peltatum*) is found very scattered in some of the dipterocarp forests of Luzon and Mindoro especially. It is a tall tree, codominant with the dipterocarps and has a straight regular bole without prominent buttresses. The bark is 4 to 10 millimeters in thickness, light gray, with a tinge of orange. The inner bark has a golden yellow color with a disagreeable odor. The leaves are alternate, peltate, and hairy. The sap and heart woods are light yellow in color. The wood is soft and light in weight and used principally for making matches or for light boxing material.

Hamindang and binunga, usually small trees in second-growth forests, sometimes attain the size of subdominant trees in virgin forests. They both have smooth, alternate, peltate leaves, white beneath. The bark is brown to light brown in color. The wood is light colored, light in weight, and sometimes used in making matches.

Some species of *Cyclostemon*, especially tinaan-pantai or dila-dila (*C. bordenii*) of the northern provinces and banawi (*C. grandifolius*) of Mindanao, attain the size of subdominant species in the dipterocarp forests. Banawi has a straight regular bole, strongly buttressed. The bark is about 10 millimeters in thickness, brown or slightly yellowish brown in color; thickly set with corky pustules, otherwise smooth. The inner bark is mottled yellow, with concentric lines of white, and is very brittle. The sapwood is slightly lighter in color than the heartwood, which is a rich creamy yellow when fresh cut and changes on drying to a brown streaked with black. The wood is moderately heavy and moderately hard. It is used locally for general construction purposes. Tinaan-pantai is a somewhat smaller tree than banawi, but in other respects similar to it.

Other species: The seeds of lumbang or biao (*Aleurites moluccana*) and balukanad or lumbang (*Aleurites trisperma*) produce the candle-nut oil of commerce. (See Part I, pp. 54, 56.) Under the name of bignai several species of *Antidesma* (principally *A. bunius*) produce edible fruits. Tuba or physic nut tree (*Jatropha curcas*) is an introduced species, extensively planted for hedges, whose nut is used in medicine and for bleaching clothes. Banato (*Mallotus philippensis*), whose fruit yields a powder used for dyeing and medicine, is a small tree growing in the virgin and second-growth forests.

SUMAC OR MANGO FAMILY.

(Anacardiaceæ.)

This family contains a few prominent timber trees, and some cultivated for their edible fruits. The members of the family have simple or compound alternate leaves.

AMUGUIS. (Pls. XXXVII and XXXVIII.)

Amuguis is a medium to large sized tree reaching a height of 30 to 40 meters and a diameter of 120 centimeters. It has a merchantable length of 18 to 20 meters. The bole is usually quite straight and cylindrical, though sometimes slightly crooked and irregularly cylindrical. It is strongly buttressed, especially in old trees. The crown is about one-half the height of the tree and is quite dense. Amuguis reaches its best development in the lauan-hagachac type, though it is scattered through the lauan-apatong type, especially near the streams. It requires considerable ground moisture and can be classified as an intolerant species.

The bark is 8 to 15 millimeters in thickness, dark brown to nearly black in color, and rather strongly ridged. The inside bark is pink to red, with vertical bands of very light color beneath the furrows.

The leaves of amuguis are compound, closely alternate, and bunched at the ends of twigs. There are 13 to 16 pairs of leaflets, each from 7 to 16 centimeters long and from 2 to 5 centimeters wide. These are smooth and glossy green above, yellowish green below, with the veins usually light red in color. The main leaf stalk is hairy. The tree is evergreen, though during the dry season the canopy is considerably thinner.

The sapwood is pale red; the heartwood red, moderately heavy, hard, and durable where not in contact with ground or much exposed. This wood ranks among the first for general house construction. It is especially desired for flooring. Other uses are furniture, partitions, naval construction, carriage making.

Amuguis is found scattered everywhere throughout the Philippines. The scientific name is *Koordersiodendron pinnatum*. Besides the general Tagalog name of amuguis the following names occur: Ambogis (V.); ampopot (Cag.); bankahasi (Il.); bankalari (Il.); dangilo (T.); gagil (Moro); karogkog (B.); lako-lako (Vis.); magalibas (Moro); mar-santog (Cag.); palosanto (T.); sambulauan (V., B.); urisan (Cag.).

DAO. (Pls. XXXIX and XL.)

Dao is a tree reaching a height of 35 to 40 meters and a diameter of 100 centimeters or more. It has a bole 18 to 20 meters in length and is strongly buttressed. The bole above the buttresses is usually regular, but often fluted near their attachment and that of the larger branches. The crown is about one-half the height of the tree. It is wide spreading, open, and with heavy branches. Dao is a widely distributed tree and is usually associated with amuguis, occupying a position in flats and along streams, though found on moist slopes. It thrives best in damp soils and is intolerant of shade.

The bark is 8 to 10 millimeters in thickness, nearly smooth, light steel gray in color on the older bark and light brown where freshly shed. It scales in scroll-shaped pieces either large or small. Just beneath the

cork is a thin red layer, under this is a very light pink spongy layer, which becomes red in color next to the sapwood. The inner bark is stringy in texture.

The leaves are alternate and compound, closely bunched at ends of stout twigs. There are usually 5 to 7 pairs of leaflets, each from 5 to 15 centimeters long and from 3 to 4.5 centimeters wide, glossy, light green in color, and smooth.

The sapwood is very light in color and large. The heartwood is brownish gray, streaked with black. The wood is moderately heavy and moderately hard. It is used locally for light construction work, bancas, rafters, and flooring. The small heartwood takes a beautiful polish and is used to some extent for furniture.

Dao is found throughout the Philippines, probably occurring in every province. It has the scientific name of *Dracontomelum dao*. It is well known everywhere under the Tagalog name of dao. Other local names are as follows: Batuan (V.); kamarak (N. Luz.); lamio (T.); malaiyao (T.); mamakao (Davao).

BALINGHASAY.

Balinghasay is a tree of medium height, reaching in exceptional cases 25 to 30 meters. It has a straight, fairly regular bole 15 to 18 meters in length. It has a fairly open crown, which is partly deciduous in the dry season. It occurs usually with amuguis and dao and is intolerant of shade.

The bark is 8 to 10 millimeters in thickness, quite smooth, but sometimes roughened with many small knobs; it is brownish in color with grayish yellow tinge. The inner bark is red. The leaves are simple and alternately bunched at the ends of rather stout twigs. They are from 10 to 30 centimeters long and from 3 to 9 centimeters wide.

The sapwood is light in color and large. The heartwood is reddish brown in color, moderately heavy, soft to moderately hard, rather fine, straight grained, often with numerous very small knots, and very easy to work. It is used for boxes, light construction purposes, cheap furniture, cigar boxes, dry measures, and is sometimes substituted for amuguis, but is lighter in weight and color, softer, and coarser grained.

Balinghasay is widely distributed throughout the Philippines in the lowlands. It has the scientific name of *Buchanania arborescens*. Besides the common name of balinghasay or some form of it the following names are known: Anam (V.); aranges (Cag.); bagulibas (M.); balanga (Guim.); balayohot (T.); baligohot (Cam.); bankalauan (T.); beobayano (Sur.); boroan (Pang.); dilaan (Z.); ganga (Cag.); hupong-hupong (Tay.); kaming (Z., Pang.); kanteng (Ab.); ligas (Cam.); lingabunu (Bas.); malabalunu (M.); malaligas (Tay.); paleng (Cag.); pusopuso (M.); tangantang (Tic., Mas., Tay.).

Besides the above, the family contains the following species worthy of mention: Lamio (*Dracontomelum cumingianum*) is a large tree very much resembling dao, but with much larger leaflets that are very hairy below on the midrib. Pahutan (*Mangifera altissima*) is a large tree, usually found in the river bottoms, with alternate, simple leaves and a wood much like that of balinghasay except for its small dark brown heartwood. Libas (*Spondias pinnata*) yields a soft wood used for making matches. Ligas (*Semecarpus perrottetii*) is a medium-sized tree with alternate, simple leaves and yields a wood much like amuguis. The leaves of this tree are poisonous to the touch and act much like those of the poison ivy. Kasoi, balubad, or cashew nut (*Anacardium occidentale*) is cultivated for its fruit. *Mangifera indica* yields the well-known mango or manga. Ciruelas (*Spondias lutea*) is cultivated for its fruits.

BUCKTHORN OR BALACAT FAMILY.

(Rhamnaceæ.)

This family contains trees with alternate (sometimes opposite) leaves, with (those mentioned here) three prominent veins.

BALACAT. (Pls. XLII and XLIII.)

Balacat reaches a height of 30 to 35 meters and a diameter up to 100 centimeters or over. It has a straight regular bole up to 20 meters in length, which is strongly buttressed. The crown is open, and for a short time during the dry season is sometimes destitute of leaves or nearly so. It is intolerant of shade. It is found scattered in the lauan-apitong, yacal-lauan, and sometimes the molave types; it occurs also in the moister soils of river valleys.

The bark is grayish brown in color, where freshly shed of a lighter color, and is ridged. In young trees it has sharp spines. In older trees, especially at the base between the buttresses, there are occasionally present large, thick and short spines. The inner bark is brownish red with white vertical lines beneath the furrows. The leaves are simple and alternate, usually smooth, sometimes hairy, especially when young, from 7 to 15 centimeters long and from 4 to 9 centimeters wide, prominently three veined.

The wood is creamy white to light brown in color, soft, light to moderately heavy in weight, and not durable. The heartwood is usually slightly darker than the sap, but in very large trees is red. It is coarse and straight grained. It is used for light and temporary construction, cheap furniture, and boxes.

The following are the regions from which this tree is reported. No doubt further explorations will extend its range. Luzon (Ilocos Norte, Ilocos Sur, Cagayan, Nueva Ecija, Pangasinan, Zambales, Bataan, Rizal, Tayabas, Camarines); Masbate; Mindoro; Leyte; Mindanao (Surigao, Zamboanga, Davao); Palawan.

It has the scientific name of *Zizyphus zonulatus*, though a hairy leaved form may be considered a distinct species. The commercial name is

balacat. Other names collected are as follows: Agguk (Cag.); aligamen (Il.); bigaa (T., V.); dagaa (Pal.); danlik (Tay.); diraan (Il.); duplak (Pang.); ligaa (T., V.); lumangud (Ley.); maglanka (Pal.).

Ligaa (*Zizyphus trinervia*) is the name of a small tree common in certain subtypes of the parang. It has spines or spiny warts arranged in circular rows around the tree.

SOAPBERRY OR ALUPAG FAMILY.

(Sapindaceæ.)

This is a family of trees with alternate compound leaves; the boles are usually irregular in shape; the barks are smooth. While there are a number of small trees, only two are commonly known in the lumber markets.

ALUPAG. (Pl. XLIV.)

Alupag is a medium-sized tree reaching exceptionally a height of 25 meters, though usually much smaller, and a diameter of 80 centimeters. The bole is 10 to 12 meters in length and is usually irregular in cross section and crooked. The crown, about one-half the height of the tree, is broad spreading and semiopen. It is found scattered throughout the Philippines, especially in the molave type and in the drier portions of the dipterocarp types. It is intolerant of shade.

The bark is 3 to 5 millimeters in thickness, ashy gray in color, and sheds in scroll-shaped scales; the inner bark is brownish red with alternate rings of light and dark colors. The leaves are compound and alternate; the leaflets (3 to 4 pairs) are whitish beneath, from 7 to 16 centimeters long and from 2 to 6 centimeters wide.

The sapwood is very light red in color; the heartwood is darker red to dark brown, heavy, very hard, durable, fine and straight grained, and very difficult to work. It has the following uses: House construction (flooring, rafters, posts); tool handles; carriage making; parts of ship; piling; cogwheels; carabao yokes.

Alupag has the following distribution: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Benguet, Pangasinan, Baler, Pampanga, Zambales, Bataan, Rizal, Batangas, Tayabas and Camarines); Marinduque; Masbate; Mindoro; Samar; Leyte; Mindanao (Zamboanga, Cotabato, Davao).

The scientific name is *Euphoria cinerea*. Besides the Tagalog name of alupag, or some form of it, the following names have been recorded: Alupay (T., Z.); apalong (Cag.); bagiles (Pang.); bait (Tay.); bakalao (Il.); bolik (Zam.); buanubai (Cot.); bulala (B.); dagindigan (Sam.); halupag (T.); himlaloang (Pam.); kandongisal (Mas.); lasilasan (Il.); malaresa (Pam.); marutong (Cag.); moling (Pang.); pamito (Mas.); ulayan (Ley.); usao (Ley.).

MALUGAY. (Pl. XLV.)

Malugay is a tree reaching a height of 25 to 35 meters and a diameter of 90 to 100 centimeters. The bole is 18 to 22 meters in length, usually somewhat fluted and sometimes slightly crooked. The crown is about one-third the height of the tree and semiopen. The tree is slightly intolerant of shade. It is found scattered throughout the drier portions of the dipterocarp types and reaches its best development on the Island of Mindoro; also found in the lauan-hagachac type.

The bark is 6 to 8 millimeters in thickness, and sheds in circular patches; the old bark is reddish brown in color with a purplish tinge; the new is brown to khaki color. The inner bark is reddish brown with rings of lighter color alternating with the darker. At certain seasons of the year the bark and sapwood exude sparingly a red sap. The leaves are compound, closely alternate, bunched at the ends of twigs, with 5 to 10 pairs of leaflets, each slightly serrate, from 8 to 24 centimeters long and from 3.5 to 8.5 centimeters wide, the basal ones reduced to bracts.

The sapwood is creamy red; the heartwood is pale red, moderately heavy, moderately hard, fine and straight grained, and tough. It has the following uses: General construction; cabinetwork; interior finish; ribs and planking of small boats; tool handles.

The tree is lumbered principally from Mindoro. It is recorded from the following regions: Luzon (Cagayan, Ilocos Norte, Bataan, Laguna, Camarines, Albay); Camiguin Island; Masbate; Mindoro; Ticao Island; Samar; Leyte; Negros; Mindanao (Zamboanga, Agusan, and Lanao); Palawan, and probably occurs in many other provinces. The scientific name is *Pometia pinnata*. Besides the common Mindoro name of malugay, the following have been recorded: Agupanga (M.); alauhau (Sam.); balambanan (Il.); bantangali (Ag.); ibu (Neg.); kabakabat (Il.); karunyan (M.); kogik (Al.); madalo (Cag.); mansanab (Neg.); quia-quia or kia-kia (Ley., Sam.); sidao (Cam., Is.); takugan (Mas.); tigawi (Tic., Cam., Mas.); tugoran (Mas.).

Besides the above-mentioned species the family furnishes a number of smaller trees, among the most important of which are alasin (*Arytera littoralis*), alahan (*Guioa perrottetii*), uas (*Harpullia arborea*), and *Litchi philippinensis*. The wood of the latter resembles very closely that of alupag.

BLADDERNUT OR ANONGO FAMILY.

(Staphyleaceæ.)

This family furnishes but one tree, anongo (*Turpinia pomifera*). It is a medium-sized tree in the undergrowth of dipterocarp forests. It has opposite, compound leaves, a light and soft wood, and is said to be used for household utensils.

LINDEN OR ANILAO FAMILY.

(Tiliaceæ.)

This is a family of small or medium sized trees with simple, alternate leaves, whose woods are used locally for fuel and light construction work. Anilao (*Columbia serratifolia*) is a small quick-growing tree common in second-growth forests. Its bark is used for tying purposes. Susumbik or kamuling (*Grewia stylocarpa*) and other species of *Grewia* are small to medium sized trees found as undergrowth in the dipterocarp types. Balobo (*Diplodiscus paniculatus*) is a small to medium sized tree fairly abundant in some dipterocarp forests. The wood is grayish or pale reddish brown, moderately hard, moderately heavy, and is used locally.

MALLOW OR MALUBAGO FAMILY.

(Malvaceæ.)

This is a family containing few trees of commercial importance. The leaves are simple, alternate, usually palmately nerved, at least those mentioned here.

Lanutan (*Bombycidendron vidalianum*) furnishes a heavy wood that is purplish in color and is used for carriage shafts and backs and sides of guitars and mandolins. Malubago (*Hibiscus tiliaceus*) is a tree of the sandy beaches and has a brown wood with a purplish tinge, very light in weight, used for floats for fish nets. The bark is used for making rope and cloth. Banalo or Portia tree (*Thespesia populnea*) is a medium-sized tree of the sandy beaches and yields a hard, moderately heavy, dark red heartwood that is used for backs, sides, and necks of musical instruments. This is the rosewood of the Seychelles Islands.

COTTON-TREE OR MALABULAK FAMILY.

(Bombacaceæ.)

The species mentioned in this family have alternate, palmately compound leaves. Malabulak (*Bombax malabaricum*) is a very large tree with light-colored, very soft wood. It is found scattered principally in the dry regions, where it is entirely deciduous for a short time. Kapok, doldol, or the cotton tree (*Ceiba pentandra*) is cultivated throughout the Philippines for the cotton it produces. It is used extensively for telephone or telegraph poles. Fresh cut poles of it placed in the ground take root and become trees. The wood is very soft, light colored, and is little used.

CACAO OR DUNGON FAMILY.

(Sterculiaceæ.)

The species mentioned in this family have alternate and simple leaves (except lumbayao), and yield a variety of woods. While a large number of species are present, only a few produce lumber found in the general market.

DUNGON. (Pls. XLVI and XLVII.)

This tree reaches a height of 30 to 35 meters and a diameter of 100 or more centimeters. It has a regular to irregular, strongly buttressed bole, in exceptional cases reaching 18 meters in length, but usually much shorter. The crown is one-third to one-half the height of the tree and

open. The tree is scattered throughout the molave type, sometimes in drier situations of the dipterocarp types. It is intolerant of shade.

The bark is 6 to 10 millimeters in thickness, ashy gray to cinnamon brown in color, sheds in irregular small flakes, and has small tan-colored pustules. The inner bark is pink in color with fine lighter concentric rings. The leaves are simple, alternate, from 7 to 20 centimeters long and from 3 to 9 centimeters wide, silvery white beneath.

The sapwood is pinkish; the heartwood is dark chocolate brown, very hard, heavy, tough, fine and cross grained, and very difficult to saw. It often contains white stony deposits in old knots and heart cracks. It is used for all sorts of construction purposes where great durability is desired. It is especially valuable for salt-water piling. Other uses are as follows: Naval construction (anchors, boat ribs, keels of ships, hoists); railroad ties; telegraph poles; wheels; cogwheels; bridge building; house construction (posts, beams, pillars); hemp presses.

The following regions are reported to contain dungon: Luzon (Ilocos Norte, Ilocos Sur, Pangasinan, Tarlac, Nueva Ecija, Bulacan, Zambales, Bataan, Rizal, Laguna, Batangas, Tayabas, Camarines, Albay); Masbate; Marinduque; Mindoro. The scientific name of dungon is *Tarrietia sylvatica*. The local names are as follows: Malarungon (T.); palmegapoy (Il.); palogapig (Il.); palonapin (Il.); palonapoy (Z.).

DUNGON-LATE. (Pls. XLVIII and XLIX.)

Dungon-late is a tree reaching a height of 20 meters and a diameter of 80 to 90 centimeters. It has an irregular bole, strongly buttressed. It has an open crown and is confined to the beach and the upper limits of the mangrove types. It is intolerant of shade.

The bark of dungon-late is 5 to 8 millimeters in thickness and is gray in color; in old trees it splits into rectangular patches, otherwise it is smooth; the inner bark is tan red in color and stringy in texture. The leaves are simple and alternate, from 9 to 25 centimeters in length and from 4 to 12 centimeters wide, silvery white beneath.

The wood in nearly all respects is like that of dungon, and it is difficult to tell them apart. Dungon has winged fruits, is found usually on the coastal hills some distance from tide water and is a larger tree. Dungon-late usually has a larger amount of sapwood, a large woody fruit strongly keeled and adapted for floating, and is found in or close to tide water. Dungon-late has much the same uses as dungon, and is no doubt substituted for it in many instances. The relative merits of the durability of the two woods is in doubt. Good specimens of both woods, free from sap, will probably withstand the attacks of teredo, white ants, and fungi equally well. Besides those given for dungon it has the following uses: Canoes (outrigger supports); firewood; charcoal.

Dungon-late is found in every province in the Philippines bordering on

tide water. It has the scientific name of *Heritiera littoralis*. Besides dungon-late it has the common names of dungon, especially in regions where dungon is unknown, paronapin or some form of it, and magayao (Cag.).

LUMBAYAO. (Pls. L, LI, and LII.)

This is a tree that reaches a height of 40 to 50 meters and a diameter of 80 to 120 centimeters. The bole, 20 to 25 meters in length, is regular and straight, though strongly buttressed. The crown is open, evergreen (slightly thinner during the dry season). It is slightly tolerant of shade. The tree is reported only from the southern islands, where it forms an important element of the yacal-lauan type, occupying with yacal the ridges and drier slopes.

The bark is 5 to 7 millimeters in thickness; in young trees gray in color, mottled with different shades; in older trees light gray, with brown patches where freshly shed; sheds in more or less regular, square, oblong, and rhomboidal pieces. The inner bark is reddish brown in color. The leaves are alternate, palmately compound, with 3 to 5 leaflets, each smooth, from 6 to 16 centimeters long and from 3 to 7 centimeters wide. The fruit is winged.

The sapwood is very pale red merging gradually into the red to reddish brown heartwood. The wood is moderately heavy, soft to moderately hard, coarse and straight grained, fairly durable, and is easy to work. It has the following uses: House construction (partitions, siding, doors, interior finish); furniture; canoes; boxes. It is one of the woods now being sold for Philippine mahogany in the United States.

The tree is reported from Mindanao (Zamboanga, Cotabato) and Basilan. The scientific name is *Tarrietia javanica*. So far only the common Moro name of lumbayao has been reported. Another species (*Tarrietia riedeliana*) resembling this one in general respects is reported from the Lanao district of Mindanao.

TALUTO. (Pl. LIII.)

Taluto is a very tall tree reaching a height of 45 to 50 meters and a very large diameter. It has a straight, regular, unbuttressed bole up to 25 or 30 meters in length. It usually has surface roots extending as much as 8 or more meters from the base of the trunk. The crown is open and deciduous for a short period during the dry season. It usually occupies the drier soils, and is found in the apitong-lauan, yacal-lauan, and molave types.

The bark is 25 to 30 millimeters in thickness, brittle in texture, brown in color, fissured with short vertical lines, otherwise smooth; the inner bark is bright red, streaked with white vertical plates arranged radially. The leaves are simple, alternate, heart shaped, prominently 5-nerved,

usually hairy beneath, from 10 to 14 centimeters long and from 9 to 13 centimeters wide.

Both the sapwood and heartwood are creamy white in color, light, soft, and with prominent pith rays. It is used principally as a match wood, also for boxes and as buoys for rafts.

While it probably occurs well scattered throughout the Philippines, it is recorded at present only in the following regions: Luzon (Cagayan, Pampanga, Nueva Ecija, Zambales, Rizal, Bataan, Laguna, Tayabas, and Camarines); Mindoro; Leyte; Mindanao (Surigao, Zamboanga); Palawan. It has the scientific name of *Pterocymbium tinctorium*. Besides the common Tagalog name of taluto or some form of it (taoto, teluto), the following names occur: Bangat (Z.); fanginhan (Riz.); huligano (N., E.); libtuk (Cag.); malasapsap (Pamp.); takung (Surigao).

Besides the above the following trees deserve mention. Tanag or taloktok (*Kleinhofia hospita*) occurs in open places, yields a light yellow wood little used and a bark used as rope. Kalumpang (*Sterculia foetida*) has palmately compound leaves (7 to 9 leaflets), and a gray, soft wood little used. The tree is cultivated for its seeds, which yield a valuable oil. A number of species of *Pterospermum* under the general name of bayok are small to medium sized trees occurring throughout the dipterocarp and molave types. They yield woods light in weight and moderately hard that are used locally. Magalipak (*Sterculia blancoi*) is often quite prominent in the molave type and some portions of the dipterocarp type. It yields a soft wood that is easily attacked by insects and fungus.

CATMON FAMILY.

(Dilleniaceae.)

The forest trees of this family are confined to one genus (*Dillenia*). The leaves are simple and alternate. The wood has prominently twisted pith rays.

CATMON.

This is a small to medium sized tree with a short bole and dense crown. It is found along streams or on moist slopes and ridges. The bark is 6 to 10 millimeters in thickness, irregularly blotched with gray to brown patches, the latter color occurring in the shallow depressions where freshly shed; the inner bark is light reddish brown. The leaves are simple, alternate, smooth, with edges coarsely toothed, from 13 to 18 centimeters long and from 5 to 8 centimeters wide. The leaf stalks of young leaves are winged. The sapwood is pale reddish; the heartwood dark red to dark brown, hard, heavy, brittle, with a coarse and twisted grain. The wood stains water a pale reddish color. The pith rays are broad and crooked. The vessels contain white deposits. The wood is used for furniture and general construction work.

The tree occurs throughout the Philippines. The scientific name of catmon is *Dillenia philippinensis*. Catmon carabao (*Dillenia speciosa*) has a larger leaf. Both the above have white flowers. Malacatmon

(*Dillenia luzoniensis*) is a large tree with yellow flowers. The following local names are known for the species of *Dillenia*: Alato (N. Luz.); anagao (Sur.); calocatmon (Tay.); magalapalali (N. Luz.); magatli (Cag.); palali (V., B., N. Luz.); pamalalian (Pang.).

TEA OR BIKAG FAMILY.

(Theaceæ.)

This a family of small to medium sized trees common in the tanguile-oak and mossy-forest types. None are important from the lumberman's standpoint. Bikag (*Ternstroemia toquian*) furnishes a bark commonly used for poisoning fish. *Adinandra luzonica*, *Gordonia luzonica*, *Thea montana* and *Eurya* spp. are common in the higher mountain regions.

MANGOSTEEN OR PALO-MARIA FAMILY.

(Guttiferae.)

This family of trees contains a yellowish sap in the bark. It has opposite leaves, usually with fine, closely set veins. The family can be readily distinguished from others by these characters.

PALO-MARIA. (Pl. LIV.)

This is usually a medium-sized, scraggly tree with a very short bole and a wide-spreading rather dense crown. It is found on the sandy beaches throughout the Islands.

The bark is 12 to 20 millimeters thick, brown in color with a decided yellowish tinge, and has a tendency to divide into distinct ridges, which are often broken into irregularly rectangular plates by cross fissures; the inner bark is pink to yellowish with concentric lines of darker color. When cut the bark exudes a yellowish sticky sap. A valuable oil known as oil of palo-maria is extracted from the seed. (See Part I, p. 56.) The leaves are simple, opposite, yellowish green in color with a very yellow midrib, and vary from 9 to 16 centimeters long and from 6.5 to 10 centimeters wide.

The wood is reddish brown in color, hard, moderately heavy, easy to saw, but difficult to finish on account of the twisted grain. It has the following uses: Fine furniture; turnery; general construction; house construction (flooring, interior finish, posts); bridge building; naval construction (masts, spars, decks, futtock timbers, oars, ships' booms, bowsprits, spars, and keels); carriage making (hubs and wagon shafts).

While probably nearly all provinces, especially those bordering the coast, have palo-maria, the records show it from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Abra, Infanta, Pangasinan, Nueva Ecija, Zambales, Bataan, Rizal, Tayabas, Camarines, Albay); Palani Island; Batanes Island; Camiguin Island; Polillo Island; Masbate Island; Burias Island; Mindoro; Culion Island; Cebu; Bohol; Negros; Mindanao (Zamboanga, Davao); Basilan; Palawan; Balabac

Island. The scientific name is *Calophyllum inophyllum*. Besides the common Spanish name of palo-maria, the following are recorded: Bansangal (Il.); biroi (Il.); bitangol (V.); bitaog (Il., V., Pam., T.); bitaui (Z., Pam., Il., V.); dankalan (T.); pamitlaten (Il.); pamitaogan or some form of it (V., Il.); Zarumayen (Il.). It is sometimes known on the markets from Borneo as Borneo mahogany.

The dipterocarp types contain a number of other species of *Calophyllum* with about the same common names, whose wood passes for palo-maria. As a rule, however, these trees are small to medium sized, though one, bitanhol or palo-maria del monte (*Calophyllum blancoi*), attains in some cases the size of a dominant tree. The tree can be told from palo-maria by the straight grain of the wood, the narrower leaves (2 to 6 centimeters wide), and by the fact that it does not grow on the beach. All *Calophyllums* can be easily recognized by their distinctly yellow bark. A number of species of *Garcinia* are small to medium sized trees scattered through the dipterocarp types and produce woods used locally. The wood of bunog (*Garcinia benthami*) is reddish brown and hard and durable. It is lumbered and used locally on the Island of Palawan. The fruits of binukao (*Garcinia binucao*) and other wild *Garcinias* are edible. The mangosteen (*Garcinia mangostana*) is cultivated in the southern islands for its edible fruit. Guyung-guyung (*Cratoxylon celebicum*) and other species of *Cratoxylon*, usually under the same common name, are small to medium sized trees that yield reddish woods used locally. Kaliwas (*Kayea paniculata*) is a small tree scattered along water courses.

DIPTEROCARP OR LAUAN FAMILY.

(Dipterocarpaceæ.)

This is by far the most prominent family of trees in the Philippines. It not only produces the largest trees containing the greatest bulk, but, counting all trees in the virgin forests from seedlings up, there are probably more dipterocarps than all other individual trees. Our knowledge concerning the number of species is still far from complete. So far there are recognized about 40 distinct species. This number will probably reach more than 50. About 12 species produce the bulk of the lumber found on the market, and are considered the most successful ones because they compose the largest stands.

The leaves are simple, alternate, and hairy or smooth. The wood is conspicuously oily (except *Vatica* spp. where it is obscurely so.) These oils, known as wood oils, harden into resin on exposure to the air. Deposits of resin often visible to the naked eye are arranged irregularly in incomplete concentric lines having the appearance of growth-rings, but they do not represent periods of growth. When the bark and sapwood are cut, the oil exudes more or less freely and usually hardens into forms having the appearance of candle drippings. While other families in the Philippines have resinous or oily woods, yet in none is this character so prominent as in the dipterocarps. The only other trees that approach the dipterocarps in this respect are members of the pili family (*Burseraceæ*), whose resin is usually in the inner portion of the bark (the

bast). The members of the pili family can readily be distinguished from the dipterocarps by their compound leaves. The dipterocarp fruits are usually globose or ovoid in shape and have, attached above or below, two or more longitudinally veined wings.

As a rule the trees are tall, many of the species reaching a height of 50 meters or over, though generally mature trees are between 40 and 50 meters. The boles are straight and regular, and usually have a merchantable length of 20 to 30 meters. They are generally strongly buttressed, though this is not always the case, especially in species of the genus *Dipterocarpus*.

From the lumberman's standpoint the woods can be divided into four groups as follows: The lauans, the apitongs, the yacals and palosapis. (See Part I, p. 32, for the distinction of these groups.)

THE LAUAN GROUP.

The principal trees that furnish the woods belonging to the lauan group are as follows: Almon-lauan; bagtican-lauan; kalunti-lauan; ma-laanonang-lauan; mangasinoro-lauan; mayapis-lauan; red lauan; tanguile; tiaong-lauan; white lauan.

WHITE LAUAN. (Pls. LVI and LVII.)

White lauan is a tree usually reaching a height of 40 to 45 meters and a diameter of 150 centimeters. It has a regular bole which reaches a length of 25 to 30 meters. Old trees are strongly buttressed. The crown is fairly dense and irregularly dome shaped. It is tolerant of shade, but seedlings do best in semiopen situations. It is widely scattered throughout the Islands in flats and on hills up to 700 meters, but reaches its best and most abundant development in the lauan-apitong and lauan-hagachac types. In many places it forms the principal tree of the dipterocarp forests.

The bark is 10 to 20 millimeters in thickness, brown to nearly black, or when exposed to sunlight is gray. There are distinct longitudinal ridges, especially in the upper part of the bole, which connect diagonally with each other. The ridges are 3 to 5 centimeters in width; the grooves are about 1 centimeter wide, lighter brown in color, and sometimes filled with corky pustules, especially in the young trees. In very old trees the bark at the base of the tree loses its ridged appearance and becomes more or less scaly. The inner bark is brown to slightly pinkish in color and stringy in texture. Beneath the grooves there are vertical cream-colored bands. The leaves are simple, alternate, and entirely free from hairs. They vary in size from 7.5 to 23 centimeters long and from 3.5 to 10 centimeters wide.

Both sapwood and heartwood are grayish white in color. The wood is light in weight, soft, with a straight and coarse grain, not durable, and easy to work. It is used for all purposes where cheapness and easy work-

ing are more important than strength and durability. It has the following uses: Cheap furniture; shipbuilding (canoes, lighters, masts, planks for ships); house construction (panels for doors, partitions, siding); boxes; concrete forms.

It is reported from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Abra, Bontoc, Benguet, Isabela, Nueva Vizcaya, Pangasinan, Bulacan, Rizal, Zambales, Bataan, Laguna, Tayabas, Camarines, Sorsogon, and Albay); Polillo Island; Marinduque Island; Mindoro; Masbate; Samar; Negros; Mindanao (Agusan, Zamboanga, Lanao, Davao); Basilan Island. It is probably present in all provinces.

The scientific name is *Pentacme contorta*. The most common name is lauan (white lauan, lauan blanco, lauan puti). The following local names are the most common: Apnit (Ib., B.); balabak (Cag.); bayukan (Lag., Z.); bugis (Davao); danlog or some form of it (V.); diraan (Ig.); hapnit (B.); lauaan (T., V.); malaanonang (Riz., Cam.); malakayan (Moro); mangasinoro (S. Luz., Mas.); sandana.

ALMON-LAUAN. (Pls. LVIII and LIX.)

This is a very large tree, reaching a height of 45 to 50 meters and a diameter of 150 centimeters. The bole is usually regular in shape and of even taper, in old trees is rather strongly buttressed, and has a maximum length of about 30 meters.

The crown is about one-third to one-half the length of the bole. It is wide spreading, flattened cone shaped to irregular and rather dense. The tree is found on gentle to medium steep slopes, usually requiring a good well-drained soil, and is confined to the regions where there is no pronounced dry season. It is tolerant of shade, and to this is attributed its success in holding its own in dense forests. It occurs associated with other lauans and the apitongs, with which it forms almost pure stands in some places.

The bark is 15 to 20 millimeters in thickness. In young and medium-sized trees it is cinnamon brown in color, in older trees it is darker, and when weathered in strong light it becomes lighter in color. In medium-sized trees it has long furrows between which are flat ridges 3 to 4 centimeters wide. These are checkered into irregular rectangular patches by cross lines connecting the furrows. The ridges are not usually prominent in the lower part of the tree, where the furrows are merely shallow fissures of the bark; in older trees, especially near the top, the furrows are deeper and then contain lines of corky pustules. The middle bark is very thin and has a pitted dark purple layer. The inner bark is light brown to slightly yellowish beneath the ridges, alternating with vertical creamy bands beneath the furrows, and is stringy in texture.

The leaves are simple, alternate, from 9 to 17 centimeters long and 4.5 to 9 centimeters wide, smooth above, with a dense mat of hairs beneath.

The petioles and young twigs are covered with hairs like those on the leaves.

The fresh sapwood is creamy in color, when exposed becoming light brown; the heartwood is light creamy brown to a pale red. The wood is light in weight and soft. It is used in all sorts of light and temporary construction and is especially valuable for interior finish. It has the same uses as white lauan.

It is reported from the following regions: Luzon (Laguna, Tayabas, Camarines, Sorsogon, Albay); Negros, Mindanao (Surigao, Zamboanga); Basilan Island.

The scientific name is *Shorea furfuracea*. The wood is sold in the Manila market under the names of almon and white lauan. The following are the most common local names: Danlig (Tay.); lauan (T.); malakayan (Moro); mangasinoro (Sor., Al., Cam.); mayapis (Tay.).

BAGTICAN-LAUAN. (Pls. LX and LXI.)

This is a very large tree reaching a height of 40 to 45 meters and a diameter of 150 to 180 centimeters. The bole is regular, usually strongly buttressed, and 20 to 30 meters in length. The crown is irregularly vase shaped, one-fourth to one-third the length of the bole, and somewhat dense.

This tree is found throughout the regions of the Philippines where the dry season is not pronounced and is probably more abundant than any other species. It extends from the subprovince of Baler to Davao, Mindanao. While doing best in deep soils on gentle slopes it occurs on fairly shallow soils from near sea level to 500 meters in altitude. It is found principally in the lauan type. It is a tree tolerant of shade, but will reproduce best in partially open places. Seedlings having become well established in such places during the wet season will be able to flourish in fully opened places during the short period of dry weather.

The bark is 10 to 20 millimeters in thickness. In young trees it has longitudinal cracks; in older trees it is distinctly divided into ridges which are long or short, finally connecting diagonally with each other, making a network. The grooves between the ridges usually contain rows of brown corky pustules. The bark is brown to nearly black in color, and in trees exposed to strong light is much lighter. The thin middle bark beneath the ridges is purplish red. The inner bark is tan colored with whitish vertical bands beneath the grooves, and is fibrous in texture. The leaves are simple and alternate and usually covered with a white glaucous bloom beneath. They are from 9 to 21 centimeters in length and from 4.5 to 11 centimeters in width.

The sapwood is grayish; the heartwood is dirty brown in color when fresh, but on exposure may change to a pale reddish brown. It is soft, light in weight, and not durable, but like the other lauans when quarter

sawn shows a fine figure. It has the same uses as the other light-colored lauan.

Bagtican-lauan is reported from the following regions: Luzon (Baler, Bulacan, Rizal, Laguna, Tayabas, Camarines, Sorsogon, Albay); Catanduanes Islands; Polillo Island; Masbate; Leyte; Negros; Mindanao (Zamboanga, Davao).

The scientific name of this species is *Parashorea plicata*. Bagtican-lauan is marketed usually under the names of lauan or almon. The following local names are reported: Apnit (S. Luz.); bagtican-lauan (Neg.); bayukan (Lag.); danlig (Tay.); hapnit (S. Luz.); lauan (T., Ley., Mas., Sur.); lauan puti (Riz.); malaanonang (Riz.); mangasinoro (Mas.); mayapis (Bal.).

MALAAONANG-LAUAN.

This name is applied to a tree that strongly resembles white lauan in general appearance. Herbarium specimens show that the tree is confined to central and northern Luzon and extends as far south as Tayabas Province. The bark is 10 to 20 millimeters in thickness and is prominently ridged. The wood is light brown with a yellowish and sometimes reddish tinge. It is moderately hard and light to moderately heavy. It is used for all purposes to which lauan is put. The leaves are from 5 to 12 centimeters long and from 4 to 7.5 centimeters wide, and when dry are slightly rusty brown beneath, due to scattered fine hairs. Malaanonang-lauan is reported from the following provinces: Luzon (Pangasinan, Nueva Ecija, Rizal, and Tayabas).

This tree is referred to *Shorea malaanonan*. The usual market name is lauan. The following local names are most common: Danlig (Tay.); Lauan puti (N. E.); malaanonang (Riz.); lauan (Riz., Tay.); pamayawasan (Pang.).

KALUNTI-LAUAN. (Pl. LXII.)

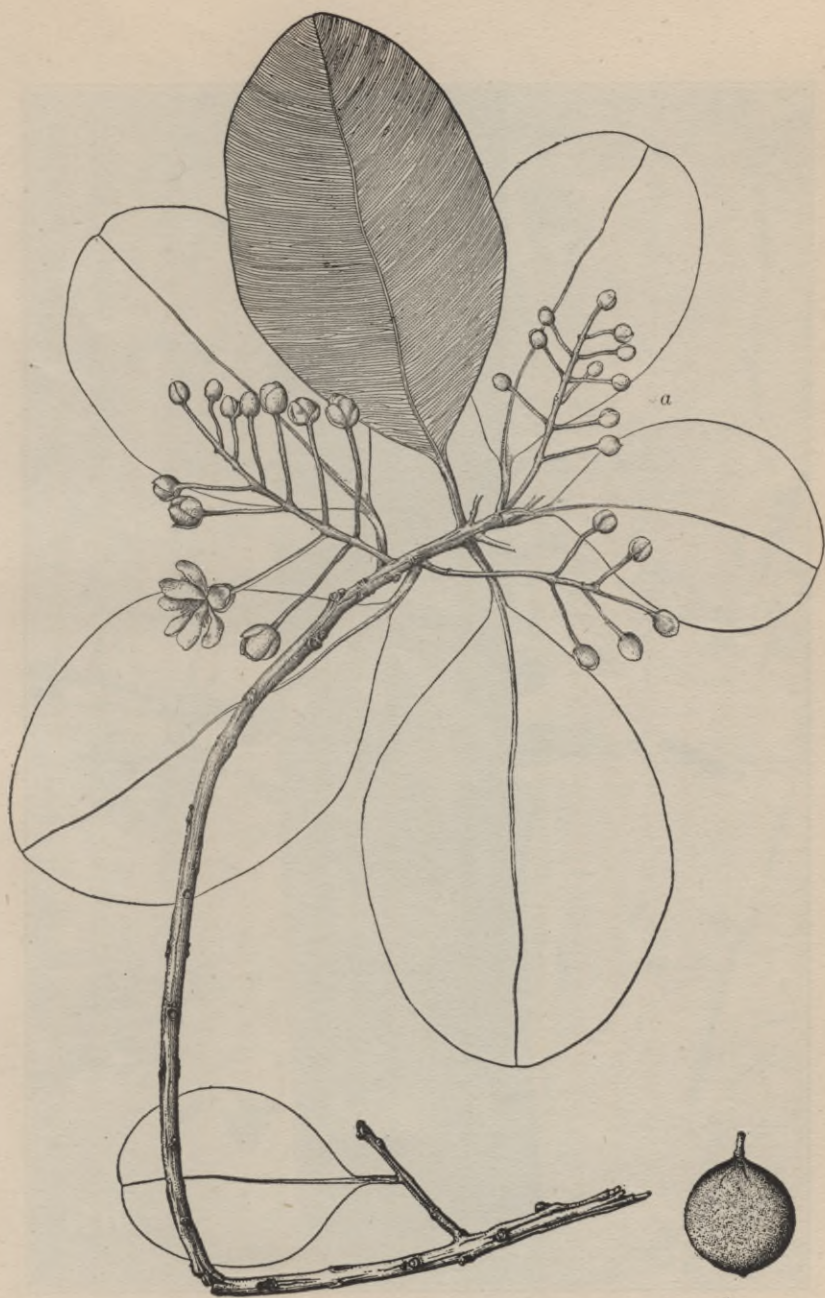
Kalunti-lauan is a tree reaching a height of 50 to 55 meters and a diameter of 180 centimeters. It has been reported only from the Zamboanga district of Mindanao, where it grows associated with yacal on the ridges and upper slopes. In silvicultural habits it closely resembles yacal. The bole is fairly regular, 30 to 40 meters in length, and strongly buttressed in old trees. The crown is narrow to fairly wide spreading and semiopen. The bark is 10 to 25 millimeters in thickness. In young trees it has a fairly uniformly smooth, brown color with short gray vertical lines; this characteristic sometimes holds in trees up to 75 centimeters in diameter in places. Trees from 20 centimeters up in diameter usually have a bark breaking into ridges 3 to 8 centimeters broad; horizontal cracks divide these into fairly regular pieces six to eight times as long as wide. In young trees the middle bark is green;



J. Vitar, del.

PLATE LIII.—TALUTO (*Pterocymbium tinctorium*).

a, Flower cluster; b, fruit cluster.



J. Vitan del.

PLATE LIV.—PALO-MARIA (*Calophyllum inophyllum*).

a, Flower cluster; b, fruit.



PLATE LV.—SMALL TREE OF BITANHOL (*Catophyllum blancoi*).

Leaves attached to the bark.



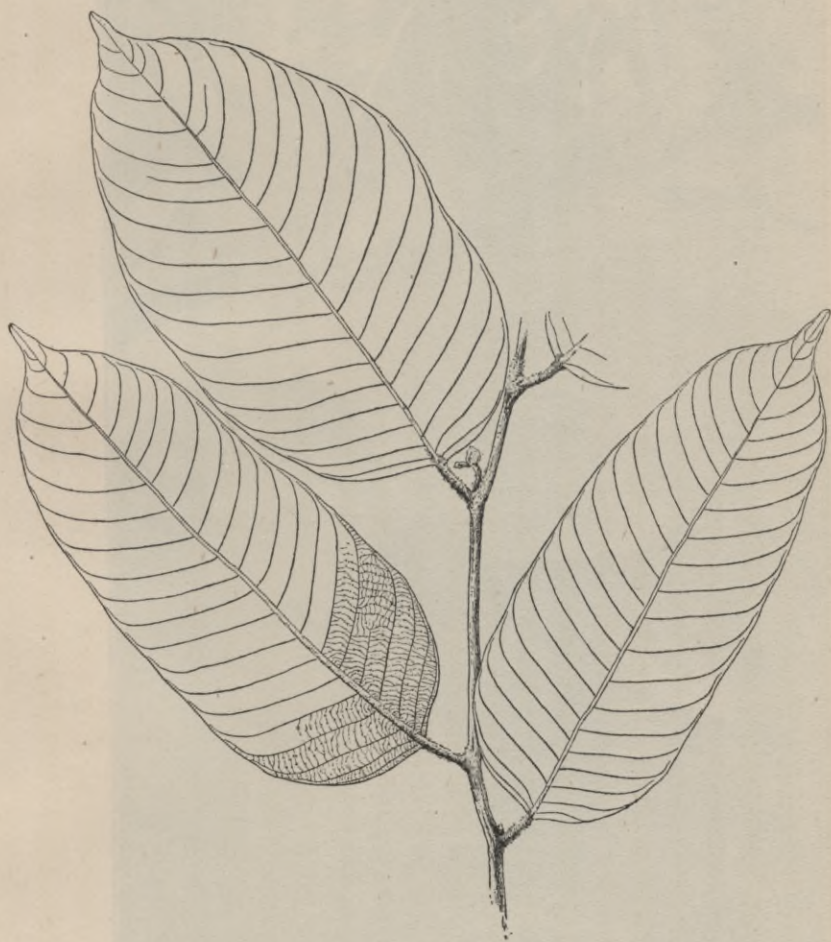
J. Vitan del.

PLATE LVI.—WHITE LAUAN (*Pentacme contorta*).

a, Fruit.



PLATE LVII.—BARK AND LEAVES OF WHITE LAUAN (*Pentacme contorta*).



J. Vitan del.
PLATE LVIII.—ALMON-LAUAN (*Shorea furfuracea*).



PLATE LIX.—BARK AND LEAVES OF ALMON-LAUAN (*Shorea farfaracea*).



J. Vitan del.

PLATE LX.—BAGTICAN-LAUAN (*Parashorea plicata*).

a, Fruit.



PLATE LXI.—BARK OF BAGTICAN-LAUAN (*Parashorea plicata*).



PLATE LXII.—KALUNTI-LAUAN (*Vatica* sp.).



PLATE LXIII.—MAYAPIS-LAUAN (*Shorea squamata*).

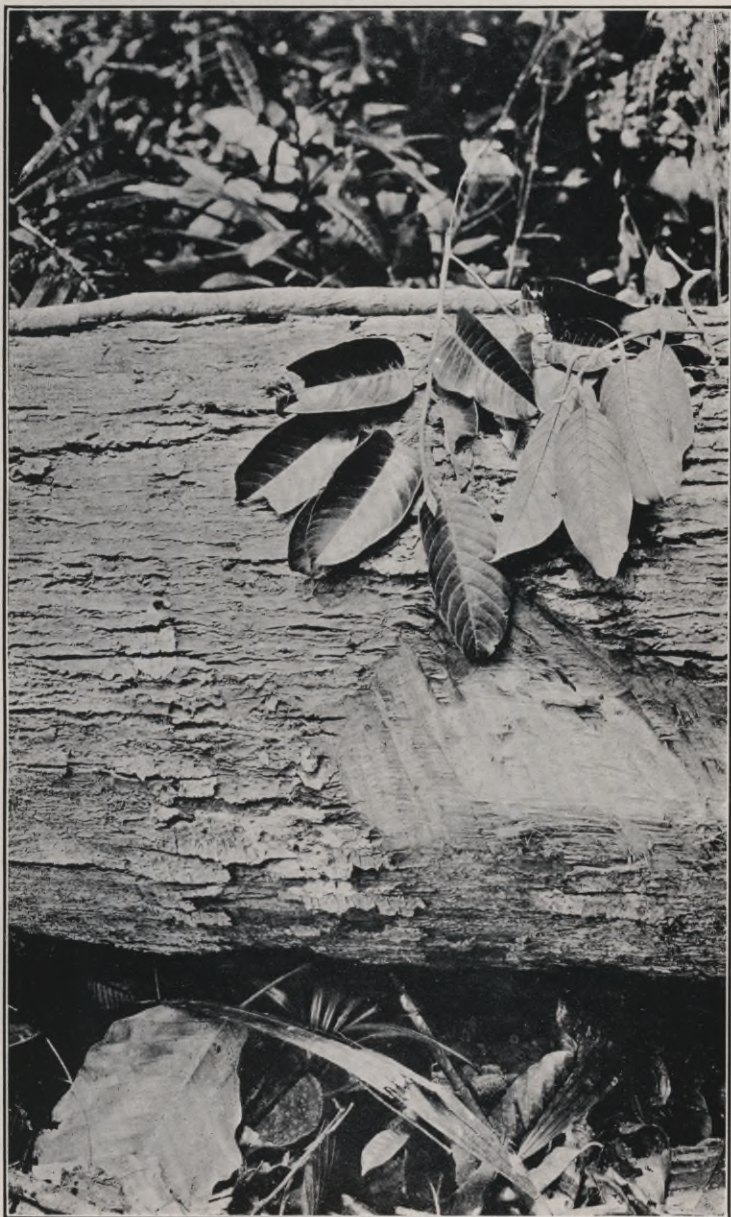


PLATE LXV.—BARK AND LEAVES OF RED LAUAN (*Shorea* sp.).



J.Vitan del

PLATE LXVI.—TANGUILE (*Shorea polysperma*).

a, Flower cluster; b, fruit.



PLATE LXVII.—BARK AND LEAVES OF TANGUILE (*Shorea polysperma*).



J. Vian del.

PLATE LXVIII.—APITONG (*Dipterocarpus grandiflorus*).

a, Fruit.



PLATE LXIX.—BARK AND LEAVES OF APITONG (*Dipterocarpus grandiflorus*).

in older ones it is a thickened brown layer. The inner bark is yellow to brownish yellow, diagonally fibrous, and very stringy.

The leaves are simple, alternate, and leathery in texture, from 7 to 12 centimeters long and from 3 to 6 centimeters wide, dark green above, lighter green below, smooth.

The sapwood is dirty creamy color when freshly cut, soon turning to a light brown; the heartwood is light yellow in color. The tree exudes a brown oil, which quickly hardens into jet black brittle resin.

The wood is light in weight, soft, coarse, and straight grained. At present it is little used, but will undoubtedly find its way into the market in some quantities and be sold for lauan.

It is reported only from the district of Zamboanga, Mindanao, but probably occurs in other parts of Mindanao and neighboring islands.

From the character of the leaves the tree is provisionally referred to *Vatica* sp. The only local name reported for this wood is kalunti (calunti).

MANGASINORO-LAUAN.

While the name mangasinoro is applied to several kinds of lauan, there is a species of *Shorea* found in southern Luzon that produces a yellowish white, soft, and light wood that has a structure different from the other lauans. From a lumberman's standpoint the timber would be classed as a white lauan. There are not sufficient data to describe the tree. It is probably not abundant nor widely distributed.

MAYAPIS-LAUAN. (Pl. LXIII.)

This is a tree which reaches a height of 40 to 45 meters or more and a diameter of 150 centimeters. The tree is strongly buttressed and has a regular bole with a length up to 25 or 30 meters. The crown is spreading, flatly conical in shape, and dense.

The tree is one of the constituents of the lauan and lauan-hagachac types. It is found more or less abundantly from the northern part of Luzon to the southern part of Mindanao. It does best on rich, deep, but fairly well-drained soils in the lowlands, and seldom reaches an altitude of over 300 meters. It is distinctly a tolerant tree. It grows with the other lauans, apitong, and sometimes hagachac. It is confined to regions where the dry season is not pronounced.

The bark is from 8 to 16 millimeters in thickness; it is brown to dark brown or cinnamon brown in color, gray when exposed to strong light and black when wet. It is rather prominently ridged, especially above. The inner bark is stringy in texture and brown to slightly pink in color, especially a distinct vertical band beneath the furrows.

The leaves are simple and alternate, from 12 to 30 centimeters in length and from 6 to 11 centimeters wide. They are coarsely hairy

beneath, especially along the midrib and veins. These hairs are set in bunches and to the naked eye appear star shaped. The leaf is coarse in texture and has large prominent stipules which are for a time persistent.

This tree resembles closely almon-lauan, but can be distinguished from it by its darker colored bark and much coarser, larger leaves and more prominent hairs. The wood, also, is redder in color.

The sapwood is creamy brown to pinkish in color; the heartwood is light red to red. It is slightly resinous, has a straight regular grain, and is light to moderately hard and soft. It is used in all classes of light and temporary construction purposes, especially where contact with the ground is not necessary. It is valuable for interior finish and light furniture and shows a good figure. Locally it is used for bancas and all classes of house building.

It is reported from the following regions: Luzon (Cagayan, Isabela, Laguna, Tayabas, Camarines, and Sorsogon); Polillo Island; Marinduque Island; Mindoro; Samar; Mindanao (Misamis, Lanao, Agusan, Zamboanga); Basilan Island.

Mayapis-lauan has the scientific name of *Shorea squamata*. The wood is sold in the Manila market under the name of mayapis, lauan, red lauan, and tanguile.

The following local names are the most common: Alam (Mangyan name of M.); balabak (Ib.); danlig (Tay.); lauan (T.); malacacao (Tay.); malakayan (Moro); malasinoro (Sam.); mayapis (T.); oghayan (Sam.); tabak (Tay.); ubanan (Manobo name of Ag.).

RED LAUAN. (Pls. LXIV and LXV.)

Red lauan is a tree reaching a height of 40 to 50 meters and a maximum diameter of 200 centimeters. It has a straight cylindrical bole with a slight taper and is strongly buttressed. The bole reaches a maximum length of 33 meters. The crown is one-fourth to one-third the length of the bole, and is irregularly dome shaped.

The tree is much like almon-lauan in all its requirements and is associated with it, apitong, tanguile, and bagtican-lauan in forming the dipterocarp forest of Negros. It is found on very gentle to fairly steep slopes in good soil. It is tolerant of shade, but develops best in young stages in partially open places.

The bark is 10 to 20 millimeters in thickness, dark brown to nearly black with a reddish tinge, and has ridges with shallow furrows, more prominent in the upper portions of the trunk. The bark is shed in rectangular plates, 10 to 20 centimeters long; freshly exposed patches are purplish black, brownish tan, or even gray in color and covered with thickly set corky pustules. At the base of large trees between buttresses there are often large irregular, very thin flakes. The inner bark is dull

tan or reddish in color with white fibers and stringy in texture. The leaves are simple and alternate, from 5 to 19 centimeters long and from 4 to 8 centimeters wide, and somewhat leathery in texture. The midrib above, the entire surface of the underside of the leaves, the petioles, and young twigs are covered with whitish velvety hairs.

The fresh sapwood is creamy in color near the bark, and gradually grades though a tan to the dark red color of the heartwood. The wood is light to moderately heavy and soft to moderately hard. It is used in all classes of temporary construction. Fine grades of it (with tanguile and other lauans) are used for interior finish and furniture and are shipped to the United States under the name of Philippine mahogany, where it is sold in competition with quarter-sawn oak. There it is finding great favor as a fine interior finish wood. Locally the wood of this tree is used for bancas and for all grades of house construction.

It is reported only from Occidental Negros and Agusan, but is probably present in other neighboring provinces. It is an undescribed species of *Shorea*. It has the local names of balakbakan, mangachapuy, and red lauan in Negros, and the wood is sold in the Manila market under the names of balakbakan, tanguile, red almon, and red lauan.

TANGUILE. (Pls. LXVI and LXVII.)

Tanguile is a tree that reaches a height of 45 to 50 meters and a diameter of 160 centimeters. The bole is regular, little to strongly buttressed, and reaches lengths of 25 to 30 meters. The crown is wide spreading, irregularly dome shaped and dense, and from one-third to one-half the length of the bole. This is one of the principal trees of the tanguile-oak and lauan types, but reaches its best development in the former type.

The bark is 5 to 6 millimeters in thickness, light red in color, and sheds in small to medium sized flakes. In old trees fresh bark for a time is nearly smooth or free from scales, when it is soft to the touch. The inner bark is red and stringy in texture.

The leaves are simple and alternate, from 5 to 14 centimeters long and from 3 to 6 centimeters wide, usually thin in texture, dark green above, a lighter green below, and smooth.

The sapwood is creamy in color, on exposure turning to a dirty brown. The heartwood is light red to reddish brown in color. The wood of trees grown in dry shallow soils is moderately hard and moderately heavy; that grown in the deeper soils is softer in texture and lighter in weight. The former is known as tanguile in Bataan and Zambales; the latter as balakbakan in Negros, and mayapis in Tayabas. The trees in dry exposed situations are shorter boled than those grown in moister places.

Tanguile resembles guiyo in general character of the bark and leaves. Usually, however, they are not found growing together. The shape of the

leaves is slightly different. The wood of tanguile is red in color, soft to moderately hard, and light to moderately heavy. The softer grades of tanguile resemble red lauan, and for most purposes there is little or no difference, but the harder grades are superior to it. It has the following uses: House construction (flooring, doors, interior finish); furniture; shipbuilding; canoes; boxes. With red lauan, it is the chief export material known as Philippine mahogany.

Tanguile is reported from the following regions: Luzon (Cagayan, Ilocos Norte, Pangasinan, Zambales, Bataan, Tayabas, Camarines, Albay); Polillo Island; Marinduque Island; Mindoro; Cebu; Negros. It is the equivalent of the wood known as klapak in Dutch East Borneo and obar suluk of British North Borneo.

It has the scientific name of *Shorea polysperma*. The following local names for tanguile are the most common: Abuhungan (Al.); adamui (B.); araka (Il.); balakbakan (Neg.); balagayan (Mangyan name of M.); damilang (Ib.); manaog (Cebu); mayapis (Tay.); pata (Pang.).

TIAONG-LAUAN.

This name is applied to a species of *Shorea* yielding a soft red wood which will pass on the market as red lauan or mayapis lauan. The tree resembles red lauan in general character, but has leaves something like tanguile. It is reported from the lauan forests of portions of the Tayabas and Laguna region, where it is very abundant. There is not sufficient information concerning it to warrant a detailed description. It has the same uses as red lauan.

THE APITONG GROUP.

The woods that belong to this group are as follows: Apitong, panao, hagachac and other species of *Dipterocarpus*, and guijo. (See Part I, p. 33.)

APITONG. (Pls. LXVIII and LXIX.)

Apitong is a tree that reaches a height of from 40 to 45 meters and a diameter of 180 centimeters. It has a straight regular bole with a length of from 25 to 30 meters. The crown is roughly flat-conical or irregular and semiopen. The tree is found throughout the Visayas and the northern islands and is especially abundant in the region where the dry season is pronounced. Here it occurs on ridges from near sea level to an altitude of 300 to 350 meters. It occupies somewhat drier situations than panao, and although tolerant of shade it does better in slightly open places.

The bark is 6 to 8 centimeters in thickness and brittle in texture. It varies from a brown-gray color in dense shade to a light gray color where exposed to strong light. It sheds in large scroll-shaped plates and has many corky pustules. The inner bark is reddish in color. The leaves vary in size from 19 to 30 centimeters in length and from 9.5 to 17

centimeters in width, are leathery in texture, and smooth. The petioles are from 5.5 to 7 centimeters in length. The tree resembles panao greatly in appearance, but can be readily distinguished from it by the character of the leaves, a somewhat shorter bole, longer bark scales, and longer leaf stalk. (See Panao.)

The heartwood is dark with a reddish tinge, the sapwood grayish brown. On cutting, the wood exudes abundant quantities of oil, which changes rapidly to a thick fluid resin on exposure to the air. This resin is known locally as balao, and is used principally in calking small boats. (See Part I, p. 55.) The wood is moderately heavy, moderately hard, with a straight but coarse grain. It is the most abundant heavy construction timber in the Islands, but can not be classed as a durable timber. It has the following uses: House building (interior finish, rafters, doors and windows, joists, sills, flooring, and sometimes parts of house posts spliced on top of more durable timbers); ship building (bancas, planks, bottoms, sides); piling; ordinary furniture; wagon beds; bridge timbers; charcoal.

Apitong is known to exist in the following regions: Luzon (Cagayan, Isabela, Ilocos Sur, Abra, Benguet, Pangasinan, Pampanga, Nueva Ecija, Bulacan, Zambales, Bataan, Rizal, Laguna, Tayabas, Camarines, Albay); Mindoro; Masbate; Leyte; Negros; Palawan. It probably occurs in a number of other provinces.

The scientific name of apitong is *Dipterocarpus grandiflorus*. The following local names have been recorded: Anahauon (B.); balao (T.); damalalian (Cag.); duko (N. Luz.); hagachac (Cam.); kamuyao (V., Il.); malapaho (T.); pagsahingin (Lag.); pamalalian (Cag.); paman-tuling (Pang., Il.); panao (T.).

PANAQ. (Pls. LXX and LXXI.)

Panao is a tree that reaches a height of 40 to 45 meters and a diameter of 160 to 180 centimeters. It has a straight regular bole attaining a length of 28 to 32 meters, usually with very prominent buttresses. Panao is especially abundant in the regions where the dry season is pronounced. Here it occurs in slightly more moist situations than apitong, usually occupying the slopes of the ridges up to an altitude of 600 meters. It is a medium tolerant species; seedlings, however, thrive best in fairly open situations.

The bark is 5 to 8 millimeters in thickness. It is light brown to gray in color, scaling off in large patches, and is covered with very numerous corky pustules; the inner bark is brown to reddish brown, stringy in texture. The leaves are from 10 to 23 centimeters long and from 6 to 13 centimeters wide with velvety hairs beneath. The petioles are 2.5 to 3 centimeters long and hairy. (For the difference between this tree and apitong see apitong.)

The sapwood is pale brown in color; the heartwood reddish brown,

and the grain coarse. Both sapwood and heartwood are very resinous. (See Apitong for further description.)

Panao is reported from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Pangasinan, Pampanga, Bulacan, Zambales, Bataan, Rizal, Laguna, Tayabas, Camarines); Polillo Island; Marinduque; Mindoro; Leyte; Negros. It probably occurs in many other provinces.

It has the scientific name of *Dipterocarpus vernicifluus*. The following local names are recorded: Afu (Il.); apitong (T.); kamuyao (Cag.); malapaho (Polillo); pagsahingin (Lag.).

HAGACHAC. (Pls. LXXII and LXXIII.)

Hagachac is a tree of the apitong group that reaches a height of 45 to 50 meters and a diameter of 150 to 170 centimeters. It has a straight, regular bole upward of 30 meters in length, usually without buttresses. The crown is broadly conical, medium compact. This tree is uniformly distributed throughout the Philippines where the dry season is not pronounced, on flood plains of the large and small rivers, and occasionally occurs on the low hills bordering these.

The bark is 6 to 8 millimeters in thickness. It is light gray and smooth in young trees; in older trees it sheds in thin, irregular flakes about three times as long as wide. The inner bark is reddish brown, about the same color as the heartwood.

The leaves are variable in size and shape, running from 18 to 53 centimeters in length and from 7 to 22 centimeters in width. The petioles are covered with coarse hairs, which also occur on the midrib of the underside of the leaves.

The wood resembles closely that of apitong, for which it is sold on the market. It also has the same uses.

It is reported from the following regions: Luzon (Cagayan, Laguna, Tayabas, Camarines); Marinduque Island; Mindoro; Masbate; Samar; Leyte; Mindanao (Surigao, Zamboanga, Davao).

This tree is usually referred to *Dipterocarpus affinis*, though there may be more than one species. Besides the common name of hagachac, the following local names have been collected: Anahauon (B.); apitong (Mas., Ley., Sam.); bayu (Sur.); kamuyao (Cag.); liput (Sur.).

Other species of the apitong group, usually referred to *Dipterocarpus hasseltii* and *Dipterocarpus speciosus*, and unknown species occur in many regions throughout the lauan types. These have the general habits of apitong and panao and yield woods much like them. Our information concerning them is not sufficient to warrant detailed descriptions.

GUIJO. (Pls. LXXIV and LXXV.)

Guijo is a tree that will reach a height of 40 to 55 meters and a diameter up to 180 centimeters. It has a straight, regular bole, strongly buttressed, that is from three-fifths to two-thirds the height of the tree.

The crown is irregularly globular in shape, somewhat open, especially in the dry season. Guijo is found in all the dipterocarp types. While it is tolerant of shade it does better in slightly open places.

The bark of guijo is 5 to 6 millimeters in thickness. Long exposed bark is light brown in color with corky pustules and sheds in scroll-shaped or nearly rectangular patches. Freshly exposed bark is cinnamon brown in color. The inner bark is light reddish brown in color and stringy in texture.

The leaves are simple, alternate, from 8 to 19 centimeters long and from 3 to 8 centimeters wide, and usually smooth. They closely resemble those of tanguile, though they are more rounded at the base.

The sapwood is very light in color; the heartwood is ash red to brownish red. It is fairly straight grained and inclined to warp when not well seasoned. Better grades of apitong closely resemble guijo and are often sold for it. It is moderately heavy and hard, and is one of the most useful timbers in the Islands. It is more durable than apitong, but considerably less so than yacal. It has the following uses: House construction (flooring, joists, rafters, posts joined above durable timbers, partitions, doors, sills, window frames, and interior finish of all kinds); shipbuilding (beams, booms, decking, keels, masts, outrigger supports, oars and paddles, side planking); carriage making (hubs, wheels, especially rims and spokes, and all other parts); furniture; docks; telegraph poles; piling; agricultural implements; vats; barrels.

Guijo is recorded from the following regions: Luzon (Cagayan, Isabela, Abra, Nueva Vizcaya, Bontoc, Pangasinan, Pampanga, Zambales, Bataan, Rizal, Laguna, Batangas, Tayabas, Camarines, Sorsogon, Albay); Marinduque Island; Mindoro; Masbate Island; Ticao Island; Samar; Leyte; Occidental Negros; Mindanao (Zamboanga, Cotabato, Davao); Basilan.

The scientific name of guijo is *Shorea guiso*. Besides the common name of guijo (or guiso) the following local names are recorded: Betik (Lag.); guisoc (V., Moro); katapang (N. V.); litan (Cag.); niquet or niket (Il.); sarai (Il.); yamban (Il.); zitan or some form of it (Il.).

THE YACAL GROUP.

A great deal of confusion yet exists concerning the correct determination of the species of trees that produce the woods of this group. Some of these are described here, in others there are not sufficient data to warrant description. As a rule the woods can be divided into two groups—the yacals proper and the mangachapuy group. Two grades of the mangachapuy are known on the market—the one hard and only slightly less durable than yacal, the other much less hard and durable. These latter are sometimes sold as mangachapuy, and have resulted in giving the harder varieties of the woods of the same name a bad repu-

tation. As yet there is insufficient information to warrant a full description of the trees of the softer varieties. (See Part I, p. 33.)

YACAL. (Pls. LXXVI and LXXVII.)

Yacal is a large tree with a height of 45 to 55 meters, though often mature trees are less than 45 meters. They will measure from 80 to 180 centimeters in diameter. The bole of yacal is regular, free from knots, and mature trees are usually strongly buttressed. The crown is semi-open, broad, with a few heavy branches, and is one-fourth to one-third the height of the tree. It is evergreen, but during the dry season there is a period when there are fewer leaves than during the wet season. It is found growing on the low coastal hills, usually of volcanic rock, and is especially abundant on headlands projecting into the sea. In these situations it occurs almost exclusively on the ridges and upper slopes where the soil is well drained and fairly shallow. Occasional trees are found scattered in the deeper soils of the more gentle slopes, though they do not occur in moist soils. It is partially tolerant of shade. Young trees develop best in open places, provided they can survive exceptionally dry periods. The altitudinal range is from near sea level to about 200 meters.

The bark is 10 to 15 millimeters in thickness. It is gray brown, cinnamon brown, to brown in color and is shed in small or large plates; weathered bark is somewhat lighter in color. The fresh bark of old trees is sometimes seamed; in young trees the bark is darkbrown, smooth, and sometimes seamed. The inner bark is yellowish brown when freshly cut, but changes rapidly to brown on exposure.

The leaves of yacal are simple, alternate, from 6.5 to 12 centimeters long and from 3 to 6 centimeters wide. In some leaves the axils of the secondary veins contain glands, which are absent in mature leaves of old trees. The old leaves are leathery and smooth.

The sapwood is light yellowish brown, changing rapidly to a color slightly lighter than the yellowish brown to brown heartwood. Old wood becomes dark brown. The wood is rather coarse grained and crossed fibrous, and splits quite easily tangentially, but with difficulty radially. It is hard and heavy and is very durable. When cut the tree yields an oil which quickly hardens into a brittle dirty black resin. (See Part I, pp. 54 and 55.)

Yacal is the most abundant of the heavy, hard, and very durable timbers. It is especially valuable in all classes of construction work where contact with the ground is necessary, but it is readily destroyed by teredo. It is used for the following purposes: House construction (posts, joists, rafters, flooring, doors, walls, sills); shipbuilding (keels, decking, sides, masts, rudders); bridge construction; railway ties; cabinetmaking; furniture; carriage making (especially spokes and fellies).

This species (probably including others closely allied in leaf and wood character) is reported from the following regions: Luzon (Cagayan, Nueva Vizcaya, Pangasinan, Nueva Ecija, Zambales, Camarines, Tayabas, Sorsogon); Mindoro; Mindanao (Zamboanga, Cotabato).

The species described above is referred to *Hopea plagata*. Besides the name of yacal it has the following local names: Betik (Il.); guisoc (B., V., Moro); papolongan or some form of it (T.); sapolongan (T.); siggai (Il.); taggai (Il.).

GUISOC. (Pl. LXXVIII.)

Guisoc, with yacal, furnishes most of the lumber known on the market as yacal. The habits of the tree are very similar to yacal. It attains a height of 35 to 45 meters and reaches a diameter of 150 to 170 centimeters. The bole, compared with trees of the same diameter of yacal, is usually shorter, the tree being consequently more stocky in appearance. The bark is reddish brown to brown where freshly shed, changing on weathering to dark brown or nearly black. It sheds in usually much larger irregular patterns. The fresh bark and that of young trees becomes seamed. The leaves are simple and alternate, from 8.5 to 15 centimeters long and from 2 to 6 centimeters wide. They, with the twigs and petioles, are covered beneath with fine brown hairs, which become rusty brown as the leaves age, so that the crown of the tree looked at beneath has a rusty brown appearance. During the dry season the canopy is much thinner between the time of the beginning of the shedding of the leaves and before the new leaves begin to develop. The tree, however, is not wholly deciduous, probably not losing more than a third of its foliage at any one time.

The wood is much like yacal in general appearance, and furnishes a considerable part of the yacal of commerce. The specimens examined have a slightly finer texture than that of yacal, but are equally hard and heavy. It has the same uses as yacal.

The tree has been reported from Tayabas, Camarines, Albay, Masbate, Samar, and Leyte, though it doubtless occurs elsewhere. From incomplete botanical specimens this tree has been referred to *Shorea balangeran*. It has the common names of guisoc, guisoc-amarillo, guisoc-guisoc, and yacal. It may be that the species from Pangasinan and Zambales furnishing wood under the names of guisoc colorado and yamban that are classed as yacal belong to this species.

BLACK YACAL.

Black yacal is a tree reaching a height of 30 or more meters and a diameter of 60 to 90 centimeters. The bole is usually irregular and spirally twisted. The bark is thin (3 to 4 millimeters) and nearly black with a reddish tinge. It is distinctly ridged. The inner bark is light brown in color. The sapwood is one-fourth the radius in thickness,

turning to the color of the heartwood on exposure. The heartwood is chocolate brown in color. The wood is similar to yacal, but harder. This tree is found scattered singly or in groups on low, dry coastal ridges in the Zamboanga district of Mindanao. So far it has not been reported from any other region. It belongs to the yacal group and is sold as yacal. As yet, no fruiting and flowering specimens have been collected from it, and it has provisionally been referred to the genus *Hopea*.

MALAYACAL.

Malayacal is a tree reaching an average height of 30 to 40 meters, and a diameter of 60 to 80 centimeters or more. This tree resembles yacal so closely in characters of bark that it at first sight is easily mistaken for it. It differs from yacal in being shorter boled, and less inclined to be buttressed. The crown is denser and more compact, in contrast with the open crown of yacal. The bark is usually thinner (6 to 10 millimeters). The leaves are larger, thinner, and of a different shape. While yacal is found on the upper slopes and ridges (on the lower slopes in rocky dry soils), malayacal is confined to the lower slopes, coves, and on flood plains along streams or arroyos of the low-hill region bordering on salt water. It is distinctly a tolerant species.

The wood of malayacal resembles closely that of yacal and is used for it. It is reported so far only from the Zamboanga district of Mindanao. From leaf specimens it has been referred provisionally to a species of *Shorea*.

GUISOC-GUISOC. (Pl. LXXIX.)

Guisoc-guisoc is a medium-sized tree reaching a height of 20 to 25 meters and a diameter of not more than 50 centimeters. The bole is fairly regular, usually slightly buttressed, and is apt to have persistent dead twigs near the base. The crown is semiopen and fairly wide spreading. It is distributed throughout the Philippines in the region where the dry season is not pronounced, usually very scattered on lower slopes and streams. It is a tolerant species and grows in dense dipterocarp forests. The weathered bark is dark brown to black, when fresh it is light brown. It is 3 to 5 millimeters in thickness, and sheds in large scaly patches; the inner bark is brown with pinkish tinge. The leaves are simple, alternate, from 10 to 26 centimeters long and from 4 to 7 centimeters wide, with very hairy glands in the axils of the secondary veins and with sharp-pointed stipules.

The sapwood is creamy when fresh cut, soon changing to brown. The heartwood is brown to chocolate brown and in places has dark brown streaks. Because of its small size and consequently large proportion of sap to heart the tree is infrequently cut because the sapwood is not durable. The heartwood is hard and probably as durable as yacal, and could be substituted for it. The tree has the following distribution: Luzon

(Tayabas, Camarines, Albay); Leyte; Occidental Negros; Mindanao (Agusan). The scientific name of guisoc-guisoc is *Hopea philippinensis*. Other common names reported are barakbakan (Ag.); makitarim or some form of it (B., V.); paina (B.).

An undescribed species of *Hopea*, under the common Moro name of mangasusu, occurs on the Zamboanga Peninsula of Mindanao. In habit, color, and character of the bark, in shape of leaves and presence of glands, and in fruit it is similar to guisoc-guisoc. The tree is uniformly larger, however, reaching a height of at least 35 meters and a diameter of 60 centimeters. The leaves vary in size from those of guisoc-guisoc to some two to three times their size. The wood shows irregularly concentric bands of nearly black, otherwise it is like guisoc-guisoc.

MANGACHAPUY. (Pl. LXXX.)

Mangachapuy is a tree that reaches a height of 30 meters and a diameter of 80 to 100 centimeters. It has a regular bole reaching 20 meters in length and a dense crown of small leaves. It is found on slopes associated with tanguile, more abundant above altitudes of 300 meters. It is a tolerant tree.

The bark is 10 to 15 millimeters in thickness. It is distinctly divided into ridges, but these are short and join diagonally, forming a more or less regular network. The furrows are usually filled with lines of corky pustules. The ridges are brown to nearly black in color, the furrows light brown and yellowish. The middle bark is brown; the inner bark is a light yellowish cream color, very stringy in texture and resinous. The leaves are simple and alternate, smooth above and below, thin in texture, usually with glands in the axils of the secondary veins; these are more prominent near the base of the leaf. The leaf blade is from 4.5 to 8 centimeters long and from 2 to 3.5 centimeters wide.

The sapwood is light creamy in color when fresh, changing to dirty brown on exposure. The heartwood is light yellowish brown when fresh, darkening on weathering. The wood is hard and heavy, and is considered nearly as durable as yacal. It has a straight and moderately fine grain.

It has the following uses: House construction (partitions, ceilings, moldings, rafters, posts, joists, flooring, sills, doors); shipbuilding (masts, decks, sides); piles; railway ties; wharves.

This tree is reported from the following regions: Luzon (Cagayan, Ilocos Norte, Bataan, Laguna, Tayabas, Camarines, Sorsogon, Albay); Mindoro; Leyte; Negros; Basilan.

Mangachapuy has the scientific name of *Hopea acuminata*. Besides the common name given above it also goes under the name of daling-dingan, under which it is very often sold.

DALINGDINGAN-ISAK.

This is a tree resembling mangachapuy in most particulars. It can be distinguished from it by the fine and closely set veins and the prominent hairy glands in the axils of the veins. The leaves are from 3 to 8.5 centimeters long and from 1 to 3.5 centimeters wide. The wood of this tree is much like that of mangachapuy. It is usually found scattered through certain subtypes of the lauan type and is reported from the following regions: Luzon (Cagayan, Pangasinan, Laguna, Infanta, Tayabas, Camarines, Sorsogon, and Albay); Polillo Island; Mindoro; Negros.

It is referred to *Hopea pierrei*. Besides the common name of dalingdingan-isak this species has the following local names: Dalingdingan (T.); lito (Sor.); makitarem (Sor.); mangachapuy (T., V.); pisak (Cag.).

NARIG.

Narig is a medium-sized tree between 20 and 30 meters in height. It reaches a diameter of 70 centimeters. The bole is quite regular, usually moderately or little buttressed, about two-thirds the height of the tree. The crown is semiopen. It is found on dry coastal ridges and is a constant associate of yacal in the yacal-lauan type of certain parts of Mindanao.

The bark is 5 to 7 millimeters in thickness. The outer bark is light gray in color when weathered; the fresh bark is brown to brownish-gray. It sheds in scroll-shaped patterns; the inner bark is very light pink with dark brown flecks, and is hard and brittle. The leaves are simple, alternate, and leathery in texture. They vary in size from 4.5 to 10 centimeters long and from 3 to 5.5 centimeters wide.

The sapwood is creamy to light brown in color and not durable. The fresh heartwood is pale yellow in color and when weathered becomes dark brown with a reddish tinge and often dark greenish streaks or mottlings. It is finer grained than yacal. The chief objection to narig is its small size and comparatively large proportion of sapwood.

The tree is reported only from the Zamboanga and Davao districts of Mindanao and from Basilan Island. Doubtless it occurs elsewhere in Mindanao and adjacent islands. A wood, probably narig, comes from Palawan under the name of atpai.

This tree is referred to a species of *Vatica* and may be the same as karig (*Vatica mangachapoi*), which it resembles in many respects.

KARIG. (Pl. LXXXI.)

This is a tree resembling narig in many respects. It seems to be confined to western Luzon where it is usually found at altitudes of from 350 to 700 meters. The tree differs mainly from narig in having smaller

leaves and a pale-yellow wood without the greenish mottling. Like narig it turns to a dull reddish brown on exposure.

This species has been collected from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Benguet, Bataan, Rizal). It is referred to *Vatica mangachapoi* and seems to be the species that produces the wood that was formerly known as mangachapuy. It has not, however, been collected under that name. Besides karig the following common names are recorded for it: Aniga (Ben.); aningat (Pang.); dangi (Riz.); labang (Il.).

YACAL BLANCO.

Yacal blanco is the name applied to a tree that resembles closely narig and karig. It occupies a place usually in the yacal-lauan type of Luzon and Leyte, that is, on the low coastal hills in the regions where the dry season is wanting or not pronounced. It is reported from the following regions: Luzon (Cagayan, Baler, Tayabas, Camarines, Albay); Polillo Island; Leyte. Besides the common name of yacal blanco the following local names are recorded: Bani (Cag.); bibit (Bal.); durog (Ley.); sionsiongong (Ley.); tapurao (Al.); yacal (Polillo).

The heartwood of narig, karig, and yacal blanco are hard and heavy timbers probably equal to yacal and are often substituted for it. The general characters of the trees are so nearly alike that they can scarcely be distinguished from each other. They have a smoother and finer grain than yacal.

THE PALOSAPIS GROUP.

The genus *Anisoptera* produces woods quite distinct from any of the above.

PALOSAPIS. (Pls. LXXXII and LXXXIII.)

This tree reaches a height of 40 to 45 meters and a diameter of 120 to 180 centimeters. It has a straight, regular, unbuttressed bole that is three-fifths to two-thirds the height of the tree. The canopy is dense in the rainy season and open in the dry, when it changes leaves. Trees in very dry situations may become entirely destitute of leaves for a few days. It is slightly tolerant of shade. Palosapis reaches its best development in the lauan-apitong type of regions where the dry season is pronounced, though it is scattered in various types of the other dipterocarp forests.

The bark is 15 to 25 millimeters in thickness, in young trees smooth with a yellowish tinge; in older trees, especially at the base, it is broken into choppy pieces, dirty brown in color. The bark just beneath the surface is a reddish brown color; the inner bark is granular brownish yellow, the granular appearance being due to broken concentric rings of yellow. The leaves are from 7.5 to 16 centimeters long and from 3

to 7 centimeters wide, often yellowish in color and usually free from hairs.

The sapwood is light creamy in color, staining on exposure to dirty gray; the heartwood pale yellow, often with rose streaks, changing on exposure to uniform yellowish brown. It has a coarse and fairly straight grain and is moderately heavy and soft to moderately hard. When fresh cut it has an unpleasant odor and yields abundant resin. The following are the uses of the wood: General construction; house construction (joists, rafters, flooring, siding); bancas; boxes; rice mortars; furniture; dry measures.

Palosapis is recorded from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Abra, Nueva Vizcaya, Pangasinan, Tarlac, Nueva Ecija, Zambales, Bataan, Rizal, Laguna, Camarines, Sorsogon, Albay); Masbate Islands; Mindoro; Cebu.

The scientific name of this species is *Anisoptera thurifera*. Besides the common name of palosapis the local names recorded are as follows: Dagang or dagum (Lag., Riz., Al.); duyong (Il.); letis (Mas.); mayapis (T.); paihapi (Z.).

A number of other species of *Anisoptera* yield wood that will pass on the market as palosapis. Malapaho or dagang (*Anisoptera curtisii*), with leaves very yellow beneath, is reported from Tayabas, Camarines, and Laguna. An undescribed species of *Anisoptera* (afu) from Cagayan and Ilocos Norte is much like palosapis, but with larger fruits. Another species (probably undescribed) occurs in the Zamboanga district of Mindanao.

ARANGA FAMILY.

(Flacourtiaceæ.)

THE ARANGAS.

Several species of the genus *Homalium* produce the wood known as aranga. The following description applies to *Homalium luzoniense*.

This tree reaches a height of 30 to 40 meters and a diameter of 80 to 90 centimeters. It has a fairly straight and regular bole that is strongly buttressed. It is a very scattered tree which is found principally in the Provinces of Tayabas and Camarines. The bark is 8 to 12 millimeters in thickness, gray to brown in color, and has a slightly uneven surface, sometimes with vertical lines. The leaves are simple and alternate, smooth, with slightly wavy margins, varying from 7 to 20 centimeters long and from 3.5 to 12.5 centimeters wide.

The sapwood is yellow, merging gradually into a yellowish or reddish brown heartwood, which in large trees has often irregular streaks of chocolate color. It is very hard, heavy, and fine grained. It is one of the most durable timbers in salt water and in the ground and is consequently much valued for piling and naval construction. It is also used for house construction (flooring, interior finish, posts, rafters); cabinetwork; railway ties.

It is impossible at the present time to give the gross characteristics of the following species, which also produce the wood known as aranga: *Homalium bracteatum*, *barandæ*, *panayanum*, and *villarionum*. Besides the general name of aranga for the woods that come from these species the following local names are recorded: Ampupuyot (V.); arangan, kamagahai (Cam.); kamuyon (Ab.); laing (Riz.); matangbokal (Il.); puyot (V.). One or more of the species above mentioned are reported from the following provinces: Luzon (Ilocos Sur, Pampanga, Bulacan, Bataan, Tayabas, Camarines); Guimaras Islands.

Flacourtia inermis is known as calamansanay in Zambales Province, but it seems that the wood of this species is not found in the Manila market and that the market calamansanay comes from another species in a different family. (See p. 100.)

BINUANG FAMILY.

(Datisceæ.)

This family is credited with one very large timber tree, binuang or biluang (*Octomeles sumatrana*). This reaches its best development along streams, and where the main body of the virgin forest has been removed it often occurs in groups. The bark is 12 to 18 millimeters in thickness, and grayish brown to reddish brown in color. The wood is light in weight and soft. It is used as buoys for rafts and sometimes for making matches.

BANABA FAMILY.

(Lythraceæ.)

The species of this family have opposite or nearly opposite leaves. The inner bark when cut and thus exposed to the air turns rapidly to a purplish color. This enables one to distinguish the timber trees of the family from those of others.

BATITINAN. (Pl. LXXXIV.)

This is a large tree that reaches a height of 30 to 40 meters, with a diameter of 80 to 90 centimeters. The bole is crooked to fairly straight and usually angular in cross-section. It is very strongly buttressed. The crown is about two-fifths the height of the tree, irregular, wide spreading, often flattened in one plane, and open. It is intolerant of shade and occurs very scattered on dry hills, in the yacal-lauan and molave types, and on coastal plains in certain portions of the lauan-hagachac type.

The bark is 4 to 5 millimeters in thickness, ashy gray in color, splitting into long obscure ridges about 5 millimeters in width. The newly formed bark is brown, covered with curling papery flakes, either square, rhomboidal, or rectangular. The inner bark has concentric rings of yellow alternating with gray; next the sapwood it quickly turns to a very dark purple on exposure to the air. The leaves are opposite or

nearly so, smooth, from 6 to 12 centimeters long and from 2 to 5 centimeters wide.

The sapwood is grayish, the heartwood greenish gray to dark brown. It is hard, heavy, very durable, and has a fine straight grain; seasonal rings are distinct. It has the following uses: House construction (posts, flooring, joists, rafters, interior finish); shipbuilding (keelson, masts, sides, decks); ties; piles; telegraph poles; furniture; tool handles.

Batitanan is reported from the following regions: Luzon (Rizal, Batangas, Tayabas, Camarines, Sorsogon, Albay); Samar; Leyte; Occidental Negros; Mindanao (Zamboanga, Davao); Basilan.

The scientific name is *Lagerstroemia piriformis*. Besides the name batitanan, the following local names are recorded: Bagunaum (Dav.); bugaron (Sam.); dinglas (Tay.); linan (Sor.); mantalinga (Zam.); tinaan (Cam.). The names binggas and lasila from northern Luzon, often credited to batitanan, apply to the wood of *Terminalia comintana*, which sometimes passes for batitanan. (See p. 86.) Batitanan is also known as Philippine teak.

BANABA. (Pl. LXXXV.)

This a medium-sized tree reaching a height of 25 to 28 meters and a diameter up to 80 centimeters. It has a short, usually irregular bole, with a wide-spreading, semiopen crown which is deciduous, or nearly so, during the dry season. It is intolerant of shade and is scattered along streams in open places in the forest, and often occurs in the second-growth forests.

The bark is 2 to 4 millimeters thick, gray to brown in color, with a yellowish tint, has fine vertical lines and is sometimes scaly. The bark next to the sapwood quickly turns to a purple color on exposure to the air. The leaves vary in size from 7.5 to 24 centimeters long and from 3.5 to 11 centimeters wide. They are smooth and opposite or nearly so.

The sapwood is light pink in color; the heartwood reddish brown. The wood is hard, moderately heavy, straight grained, and durable. It has the following uses: House building (posts, rafters, joists, flooring, sills, partitions, interior finish); boat construction; wharves; piling; furniture; carabao yokes; barrels; railroad ties; tool handles.

It has been reported from the following regions: Batanes Islands; Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Abra, Benguet, Pangasinan, Nueva Ecija, Baler, Zambales, Pampanga, Bulacan, Bataan, Rizal, Laguna, Batangas, Tayabas, Camarines); Mindoro; Samar; Leyte; Guimaras; Occidental Negros; Mindanao (Misamis); Palawan.

The scientific name is *Lagerstroemia speciosa*. Besides banaba, the following local names are recorded: Danioura (N. Luz.); kanilan (Guim.); makabalo (Pang.); mitla (Pam.); pamarauagon (Sam.); parabuking (Mis.); tabangao (Il.); tanaganan (Cag.).



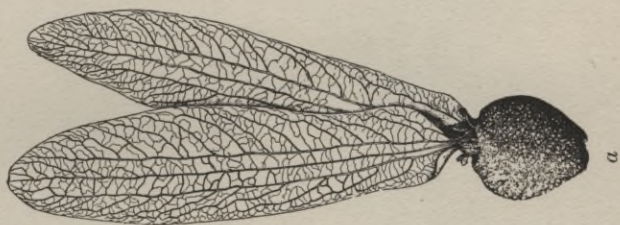
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PLATE LXX.—PANAQ (*Dipterocarpus vernicifluus*).

a, Fruit.



PLATE LXXI.—BARK AND LEAVES OF PANAQ (*Dipterocarpus vernicifluus*).



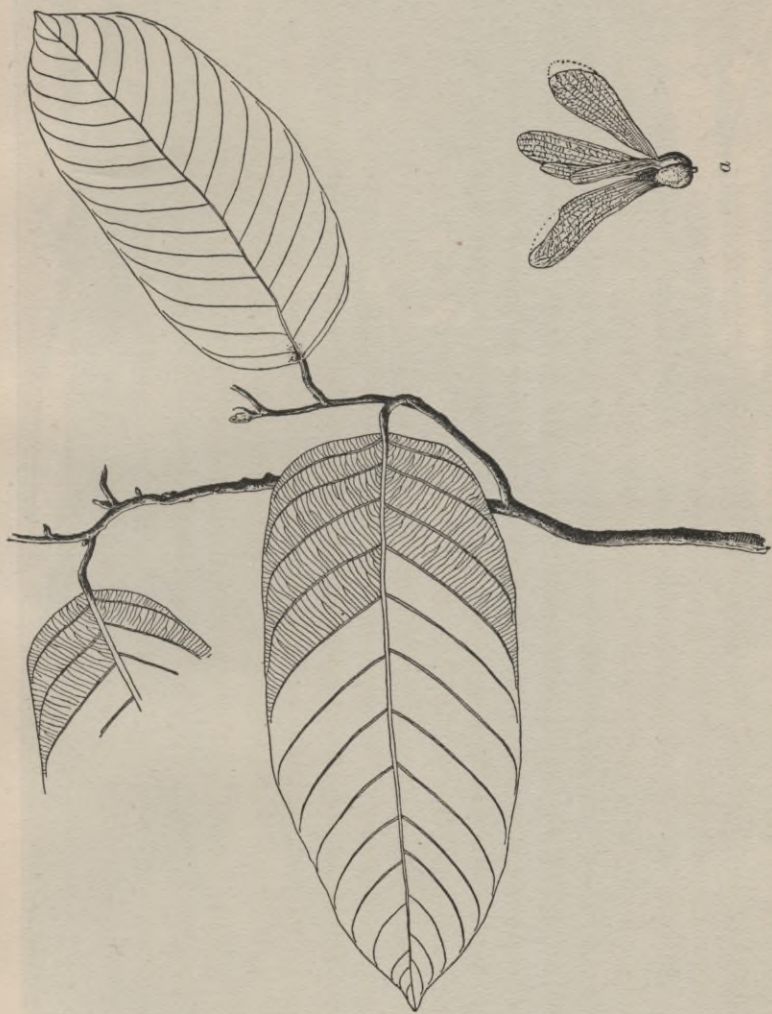
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PLATE LXXII.—HAGACHAC (*Dipterocarpus affinis*).

a, Fruit.



PLATE LXXIII.—BARK OF HAGACHAC (*Dipterocarpus affinis*).



J. Vitan del.

PLATE LXXIV.—GUIJO (*Shorea guiso*).

a, Fruit.



PLATE LXXV.—BARK AND LEAVES OF GUIJO (*Shorea guiso*).



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PLATE LXXVI.—YACAL (*Hopea plagata*).

a, Fruit.



PLATE LXXVII.—BARK OF YACAL (*Hopea plagata*).



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PLATE LXXVIII.—GUISOC (*Shorea balangeran*).

a, Flower cluster.



J. Vitan del.

PLATE LXXIX.—GUISOC-GUISOC (*Hopea philippinensis*).

a, Fruit.



J.Vitan del.

PLATE LXXX.—MANGACHAPUY (*Hopea acuminata*).

a, Fruit.



J.Vitan del.

PLATE LXXXI.—KARIG (*Vatica mangachapoi*).

a, Fruit.



J. V. Van der

PLATE LXXXII.—PALOSAPIS (*Anisoptera thurifera*).

a, Fruit.



PLATE LXXXIII.—BARK AND LEAVES OF PALOSAPIS (*Anisoptera thurifera*).



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PLATE LXXXIV.—BATITINAN (*Lagerstroemia piriiformis*).

a, Fruit cluster; b, flower cluster.



PLATE LXXXV.—BARK, LEAVES, AND FLOWERS OF BANABA (*Lagerstroemia speciosa*).



J. V. Van der...

PLATE LXXXVI.—BACAUAN (*Rhizophora conjugata*).

a, Flower cluster; b, seedling, with fruit attached.

PAGATPAT FAMILY.

(Sonneratiaceæ.)

PAGATPAT.

Pagatpat is a medium-sized to tall tree, usually with a straight regular bole. It is found throughout the Islands in the mangrove swamps. It is the largest of the species growing in the mangrove swamps. It coppices well, yielding good-sized logs in this way. The bark is 8 to 12 centimeters in thickness, brown to gray in color, inclined to be ridged and scaly; the inner bark is reddish brown with lighter colored fibers. The leaves are opposite, varying in size from 6 to 12 centimeters long and from 4 to 8 centimeters wide, sometimes nearly circular, thick, and leathery in texture.

The sapwood is light brown; the heartwood dark brown, heavy, durable and fine grained. It contains a large amount of salt and will rust nails, discoloring the wood in contact with them. It has the following uses: House building (flooring, siding, interior finish); bridge building; telegraph poles; planking for boats; furniture; ties, musical instruments. The air roots, known as daluru, are used for razor hones.

Pagatpat is found in all tidal swamps in the Philippines, where it usually occupies the outer zone; it reaches its best development in size and numbers in the southern islands. The scientific name of pagatpat is *Sonneratia pagatpat*. It is sometimes sold under the copyrighted name of montol.

Another species (*Sonneratia* sp.), has the common name in the Mindanao region of pedada. This tree has narrower leaves than pagatpat and occurs usually in the interior of the swamps.

PUTAT FAMILY.

(Lecythidaceæ.)

This family, with alternate simple leaves, has a number of species of trees, but none of very great importance from a commercial standpoint.

Botong (*Barringtonia speciosa*) is a medium-sized tree with large leaves, flowers, and fruits (the latter adapted for floating) that occupies a conspicuous place on the sandy beaches throughout the Philippines. *Barringtonia racemosa* and other closely allied species have the common name of putat. They are usually found back of the mangrove swamps or along streams where the ground-water level is very near the surface. The woods are light colored, very soft, and porous and are used only locally. Lamog or apalang (*Planchonia spectabilis*) is a medium-sized to tall tree found very scattered in some portions of the dipterocarp forests. Its wood is dark reddish brown, fine grained, hard, and moderately heavy to heavy.

THE MANGROVE OR BACAUAN FAMILY.

(Rhizophoraceæ.)

This in many respects is the most remarkable tree family in the world. With a few exceptions it is confined to the tidal-swamp regions, where its members form the principal elements of the mangrove swamps. The

trees all have simple, opposite, and leathery leaves; the seeds (those of the tidal-swamp species) germinate on the trees, developing seedlings without leaves, which drop, and are carried by the tides until they reach a lodging place, where they rapidly develop into trees. The woods of the trees are hard and heavy with prominent pith rays. The mangrove trees are the principal source of firewood and tan barks of the Philippines.

The principal trees of the swamps may be divided into three groups: The bacauans, the pototans, and tangal.

THE BACAUANS. (Pl. LXXXVI.)

These trees can be distinguished from the others by the prominent stilt roots. There are two species, bacauan (*Rhizophora conjugata*), and bacauan lalaki (*R. mucronata*).

Bacauan is a tree reaching a height of 20 to 22 meters and a diameter of 40 to 45 centimeters, though usually much smaller. The bark is 20 to 30 millimeters thick, nearly black, rough and usually scaly. The leaves vary in size from 11 to 14 centimeters long and from 3 to 7 centimeters wide. The flower stalk is 5 millimeters long or nearly sessile, and usually two-flowered.

Bacauan lalaki is a tree slightly larger than bacauan. It differs from it in having a flower stalk 2.5 centimeters long, usually three flowers, and larger leaves, varying in size from 11 to 18 centimeters long and from 5 to 12 centimeters wide.

THE POTOTANS. (Pl. LXXXVII.)

These reach a height of 20 to 25 meters and differ from the bacauans in having smaller leaves and no stilt roots. Their bark is dark colored, nearly black; the inner bark thick and yellowish brown in color.

The following are the species: Busain (*Bruguiera gymnorrhiza*); langarai (*Bruguiera parviflora*); pototan (*Bruguiera eriopetala*); pototan lalaki (*Bruguiera caryophylloides*).

TANGAL.

Tangal (*Ceriops tagal*) is a much smaller tree than the others and has a brown to nearly black smooth bark, except the large, scattering, nearly round pustules. The inner bark is reddish in color and thick. The leaves are from 4.5 to 9 centimeters long and from 2 to 4.5 centimeters wide.

Bacauan-gubat (*Carallia integerrima*) is found very scattered in the forests outside the swamps.

The following is a key to the principal trees of the mangrove swamps, including species of the other families.

KEY TO THE PRINCIPAL TREES OF THE MANGROVE SWAMPS.

I. Trees with prop roots.

- A. Leaves 11 to 14 centimeters long by 3 to 7 centimeters wide; flower stalk 5 millimeters or less in length, usually two-flowered..... 1. *Bacauan*.
 B. Leaves somewhat larger, 11 to 18 centimeters long, 5 to 12 centimeters wide; flower stalk 2.5 centimeters long, usually three-flowered.

2. *Bacauan lalaki*.

II. Trees without prop roots.

- A. Leaves simple, opposite, not white beneath.

1. Apex of leaf acute.

Flowers 2.5 centimeters long or more.

Leaves 7 to 14 centimeters long, 2.5 to 5.5 centimeters wide, flowers usually red 3. *Pototan*.Leaves 7 to 15 centimeters long, 3 to 6 centimeters wide, flowers usually yellow 4. *Busain*.

Flowers less than 1.25 centimeters long.

Leaves 5 to 9 centimeters long, 1.5 to 2.5 centimeters wide; flowers usually yellowish green to white 5. *Langarai*.Leaves 7 to 11 centimeters long, 3 to 5.5 centimeters wide; flowers usually yellow 6. *Pototan lalaki*.

2. Apex of leaf obtuse or rounded.

Leaves 7.5 to 10.5 centimeters long, 3 to 5.5 centimeters wide; small tree with red bark, with prominent corky pustules.

7. *Tangal*.

Leaves 6 to 12 centimeters long; 4 to 8 centimeters wide; medium sized to large tree with flaky bark and many short air roots springing from underground roots.

8. *Pagatpat*. (See p. 81.)

- B. Leaves simple, opposite, white beneath..... 9.
- Api-api*
- . (See p. 98.)

C. Leaves simple, alternate.

Leaves white beneath 10. *Dungon-late*. (See p. 36.)Leaves not white beneath 11. *Tabao*. (See p. 87.)

D. Leaves compound, alternate.

Leaflets ovate 12. *Tabigi*. (See p. 47.)Leaflets obovate 13. *Piagao*. (See p. 47.)

TALISAY FAMILY.

(Combretaceæ.)

This is a family of alternate simple leaves. The genus *Terminalia* has eight species that produce wood known in the markets. Five of these are so nearly alike that they are undoubtedly mixed and sold under the name that happens to be known by the dealers. The leaves of the *Terminalias* are usually obovate and more or less closely bunched at the ends of the twigs.

CALUMPIT. (Pl. LXXXVIII.)

This is a medium-sized to tall tree that reaches a height of 25 to 30 meters. The bole is usually regular, straight, and about one-half the height of the tree. It is very slightly if at all buttressed. The crown is

widespreading and semiopen. The tree is tolerant of shade and is very scattered.

The bark is 10 to 12 millimeters in thickness, dirty brownish black in color, irregularly but obscurely ridged, and in old trees scaly. The inner bark is yellowish with a thin watery sap. The leaves are simple, alternate, smooth, loosely bunched at ends of twigs, varying in size from 5 to 15 centimeters long and from 2.5 to 6 centimeters wide.

The sapwood is pale yellowish brown to yellow; the heartwood is pale reddish brown. The wood is moderately heavy to moderately hard, with a fairly straight to twisted grain, and takes a glossy finish. It colors water a pale dirty straw color. It has the following uses: House construction (pillars, rafters, siding, interior finish); cabinetwork; ship knees.

It is reported from the following regions: Luzon (Cagayan, Ilocos Sur, Lepanto-Bontoc, Nueva Vizcaya, Zambales, Bataan, Rizal, Tayabas, Camarines); Polillo Island; Masbate; Mindoro; Guimaras Island; Palawan; Zamboanga.

It has the scientific name of *Terminalia edulis*. Besides calumpit or some form of it, the following local names are recorded: Barasus (Pal.); gayumayen (Z.); gisit (N. Y.); kalautit (N. V.); kalumanog (Mas.); magtalisay (Mas.); tayataya (Guim.).

DALINSI.

This is a tree reaching a height of 25 to 30 meters and a diameter of 80 to 100 centimeters. The bark is gray to brown, with an inclination to be ridged. It resembles closely talisay-gubat, with which it is often confused. It, however, has smaller fruit and leaves; the latter vary in size from 5 to 9 centimeters long and from 3 to 6 centimeters wide.

The sapwood is yellowish gray to yellow; the heartwood reddish brown. The wood is moderately hard, moderately heavy, coarse and straight grained. It colors water a pale yellow. It has the same uses as calumpit.

It is recorded from the following regions: Luzon (Pangasinan, Tarlac, Zambales, Tayabas); Palawan.

The scientific name of dalinsi is *Terminalia pellucida*. The following local names are recorded: Aritongtong (Il.); hakit (Z.); kalautit (Tar.); Manaong (Pang.); subosubo (Z.); and many of the names applied to talisay-gubat.

TALISAY-GUBAT. (Pl. LXXXIX.)

This is a medium-sized tree reaching a height of 25 to 30 meters, and a diameter of 80 to 90 centimeters. The bole is unbuttressed, fairly straight and regular. The crown is irregular in shape, somewhat compact and semiopen. It occurs very scattered in the dipterocarp forests, usually in river bottoms or on lower slopes. The bark is 8 to

10 millimeters in thickness, brown, inclined to be obscurely ridged, and in old trees sheds in long flakes; the inner bark is brown with wedge-shaped pink patches near the outer surface. The leaves are simple, alternate, obovate, smooth, varying in size from 10 to 20 centimeters long and 6 to 10 centimeters wide.

The wood is a dull reddish brown, moderately hard, moderately heavy, and fairly straight grained. It has the same uses as calumpit.

It has the following distribution: Luzon (Cagayan, Ilocos Norte, Rizal, Laguna, Tayabas, Infanta, Camarines); Mindoro; and probably many other provinces.

The scientific name is *Terminalia oöcarpa*. Besides talisay-gubat, the following local names are known: Balinsil (In.); calumpit (Tay.); dalinsi (Cam., Tay., Cag.); kalautit (Il.); malagabi (M.); malaputat (Riz.); sacat (Cag.); talisay del monte (Batn.).

SACAT.

This is a tree that reaches a height of 25 to 30 meters and a diameter of 70 to 90 centimeters. It is intolerant of shade, and is scattered through the lighter portions of the dipterocarp forests.

The bark is 5 to 8 millimeters in thickness, gray to brown in color, sometimes with a yellowish tinge, and has fine longitudinal lines, sometimes with scattered corky pustules. The inner bark is brown with red tinge and yellow next to the sapwood. The leaves are simple, smooth, bunched alternately at the ends of the twigs, varying in size from 7 to 15 centimeters long and from 3 to 8 centimeters wide. The sapwood is light brown; the heartwood gray to brownish yellow, moderately heavy, moderately hard, coarse and straight grained, and colors water a pale yellow. It is used for all classes of light construction.

The following is the recorded distribution: Luzon (Ilocos Norte, Ilocos Sur, Pangasinan, Tarlac, Zambales, Bataan, Rizal, Batangas, Tayabas); Masbate; Mindoro; Zamboanga.

The scientific name is *Terminalia nitens*. The following local names are recorded: Calumpit (Batn.); dalinsi (Tay.); kalautit, (Il.); magtalisay (Mas.); subosubo (Z.).

It will be seen from the common names given above that calumpit, dalinsi, talisay-gubat, and sacat are confused and often mistaken for each other. It is sometimes difficult to separate them even with botanical specimens.

TALISAY.

This tree has two forms, the beach form and the river-bottom form. The beach form is a medium-sized tree seldom over 20 meters in height and often much less. It has a knotty bole, dirty gray in color. The river-bottom form is a tall tree with a grayish brown bark, 10 milli-

meters in thickness, which splits in longitudinal ridges, the furrows filled with corky pustules. The inner bark is pink, streaked with green-colored longitudinal lines. Both forms have the branches whorled in horizontal planes, with a flat, very broad crown. The leaves are large and coarse, varying in size from 14 to 33 centimeters long and from 10 to 20 centimeters wide.

The sapwood is light brown, sometimes with yellowish tints; the heartwood is reddish brown, moderately heavy, moderately hard, with a glossy, usually somewhat crossed grain (straight in river-bottom form). It colors water a pale yellow.

The tree is found distributed along sandy beaches everywhere; in deforested flood plains it often forms groups characterized by the whorled branches.

The scientific name is *Terminalia catappa*. The coast form has the common name of talisay; the river-bottom form, talisay, and lumanog or lanipao.

BINGGAS. (Pls. XC and XCI.)

This is a tall tree reaching a height of 35 to 40 meters and a diameter of 80 to 100 centimeters or more. It is found very scattered through the drier portions of the dipterocarp types.

The bark is 3 to 5 millimeters in thickness, light gray, and smooth; beneath the outer bark there is a papery layer, ashy gray in color; the inner bark is brown. The leaves are simple, alternate, smooth (young leaves downy), varying in size from 6 to 15.5 centimeters and in width from 3 to 6.5 centimeters.

The sapwood is yellow to very pale brown; the heartwood brown to dark gray with purplish streaks. The wood is hard, heavy, fine, and straight grained, and probably durable. It often passes for molave and batitinan and has the same uses as these.

It has been recorded from the following regions: Luzon (Cagayan, Ilocos Sur, Pangasinan, Nueva Ecija, Zambales, Bataan, Rizal, Camarines); Ticao Island; Mindoro; Leyte, Zamboanga.

The scientific name is *Terminalia comintana*. Besides the name of binggas, the following are recorded: Batitinan babaye (Ticao); dinglas or some form of it (T., V.); hinabusi (M.); lasila (II.); maglalopoi (Pang.); malatagum (Zam.); naghubo (Riz.); palang (Riz.); saplungan (Riz.); tiroron (Cam.).

TOOG. (Pl. XCII.)

This is a tall tree reaching a height of 35 to 40 meters and a diameter of 80 to 100 centimeters. It has a straight regular bole usually without buttresses. The crown is semiopen, the tree is semitolerant of shade. It occupies a conspicuous place in the dipterocarp forests of some regions.

The bark is 10 to 12 millimeters thick, dark red, nearly black when wet, with irregular lines of corky pustules. It is scalloped with irregular shallow depressions as large as saucers which mark the places of newly shed bark. The inner bark is tan red in color and very stringy. The leaves are simple, closely alternate at the ends of the twigs, smooth, varying in size from 15 to 25 centimeters long and from 4 to 10 centimeters wide.

The sapwood is grayish to very pale red in color; the heartwood bright reddish brown, moderately heavy, moderately hard, rough in texture, fairly straight grained, but warping badly when green.

The tree seems to be confined to a definite region, being reported only from Sorsogon, Masbate, Samar, and Leyte. The scientific name of it is *Terminalia quadrialata*. Only the local name of toog is recorded for it. It should not be confused with *Bischofia javanica* (tuai) which also has the name of toog and whose wood is very similar to it.

Malacalumpit or calamansanay (*Terminalia calamansanai*) was supposed to furnish some of the wood on the market known as calamansanay, but it is practically certain that the wood of this species is not the calamansanay of commerce. Tabao (*Lumnitzera littorea*) is a small to medium sized tree found in the mangrove swamps. The wood is yellowish or brownish gray, sometimes with a reddish tinge, hard, heavy, fine grained, strong and durable. It has the following uses: House construction; posts; piling; axles. In Borneo it is considered second only to billian for piling. This species has red flowers with inflorescence axillary. Another species, *L. racemosa* Willd., has white flowers with inflorescence terminal.

EUCALYPT OR MACAASIM FAMILY.

(Myrtaceæ.)

This is a family that produces a large number of small, medium-sized, and tall trees. The leaves are usually opposite and often contain more or less distinct oil glands (pellucid dots). Tree descriptions have not been collected and only a brief mention will be made of the species important to the lumber trade.

THE MACAASIMS.

From local names the following species are credited with producing the wood known as macaasim: *Eugenia benthamii*; *E. mimica*; *E. philippensis*; *E. bordenii*; *E. vidaliana*; and *Decaspermum paniculatum*. Of these, malaruhut (*E. bordenii*) seems to be the most abundant.

The wood of the macaasims is generally grayish brown, occasionally with yellowish, greenish or reddish tinge, and rather fine grained, hard, heavy and durable. The wood has the following uses: House construction (beams, posts, flooring, window sills); cabinetwork and furniture; boat building (rudders, decks, sides); telegraph poles; tool handles; wash-bowls; ties; piling.

The species of *Eugenia* are a constant element in all types of the dipterocarp forests, where they occur very scattered, occasionally as codominant trees, more usually as subdominant or undergrowth trees.

MANCONO. (Pl. XCIII.)

This is a medium-sized tree with an irregular bole reaching a diameter of 80 to 100 centimeters. The leaves vary in size from 5 to 8.5 centimeters long and from 3 to 6 centimeters wide, smooth and slightly whitish beneath. The sapwood is light reddish; the heartwood is yellowish brown turning to chocolate brown on exposure. The grain is fine and twisted. It is very hard and very heavy and exceedingly durable. It is undoubtedly the hardest and heaviest wood in the Philippines and is probably a good substitute for *lignum-vitæ*.¹ It has the following uses: Posts; piling; wooden tools; tool handles; pulleys; bearings.

Mancono reaches its most successful development in the northeastern part of Mindanao and the adjacent islands. It is recorded from the following regions: Ticao Island, Romblon; Leyte; Culion Islands; Palawan: Dinagat Island; Tinago Island. The scientific name is *Xanthostemon verdugonianus*. Besides the local name of mancono or magkono, it is called palo de hierro (Sp.), and tugas (V.).

Besides the above, the following deserve mention: Sudyang is a very hard, very heavy, and durable wood found in Surigao and islands adjacent which has provisionally been placed in this family. Malabayabas or tiga (*Tristania decorticata*) is a tree growing on dry coastal hills, and in the tanguile-oak type, where it sometimes occurs gregarious over small areas on very dry ridges or tops of low mountains. Its bark sheds frequently leaving a smooth gray surface like that of bayabas, whence the name malabayabas. It has a hard and heavy, dark reddish brown wood resembling mancono. Bayabas or guava (*Psidium guajava*) is introduced and escaped from cultivation. It produces an edible fruit and a good firewood. In many places it gives a decided tone to the second-growth forests. One species of eucalyptus (*E. naudiniana*) is reported from Zamboanga. It may have been introduced there. Malasulasi (*Leptospermum flavescens*) occurs gregarious on many mountain tops. Two species of *Decaspermum*, *D. blancoi* and *D. paniculatum*, are found, usually near the tops of the mountains, where the latter is nearly gregarious. Tawalis or sagasa (*Osbornia octodonta*) is a small tree with a hard durable wood, occurring on the edge of the mangrove swamps and on sandy beaches. The following species of *Eugenia* produce edible fruits: kalubkob (*E. calubcob*); duhat or lumboi (*E. jambolana*); makopa (*E. javanica*); tampoi (*E. jambos*) and others.

KULIS FAMILY.

(Melastomatacæ.)

This family contains a number of undergrowth trees and some small ones. Kulis (*Memecylon edule*) is a small or undergrowth tree occurring in certain regions of the dipterocarp types. It yields a hard durable wood that has been suggested as a substitute for boxwood.

¹ Hutchinson, W. I. A substitute for *Lignum-vitæ*. Bull. 9, Bureau of Forestry, 1908.

GINSENG OR MALAPAPAYA FAMILY.

(Araliaceæ.)

MALAPAPAYA.

This is a tree that reaches a height of 25 to 30 meters and a diameter of 50 to 60 centimeters. It has a straight bole 15 to 18 meters in height. Young trees are usually crowned with one group of large compound leaves, older ones have several branches, each similarly crowned. The bark is 12 to 15 millimeters in thickness, light gray to brown in color, with vertical lines; the inner bark is white with yellow rays and very brittle. The leaves are closely alternate, compound, 1 meter or more in length, with many leaflets, each with margins serrate and varying in size from 12 to 25 centimeters long and from 5 to 10 centimeters wide. The wood is yellowish white in color, light and very soft, straight grained, and easy to work. It is considered one of the best match woods, and is also used for very light construction purposes, match boxes, packing cases, and rafts.

It is recorded from the following provinces: Luzon (Pampanga, Bataan, Rizal, Laguna, Tayabas); Surigao; Basilan Island. It doubtless occurs in almost every province. It is usually a tree of the second-growth type, but occurs scattered in dipterocarp forests, especially the apitong-lauan type.

The scientific name is *Polyscias nodosa*. Besides malapapaya it has the following local names: Bias-bias (T., V.); bongling or some form of it (T., V.); malasapsap (Pam. and neighboring provinces); manomano (Bas.); tukud-langit (Batn.).

DOGWOOD OR MALATAPAI FAMILY.

(Cornaceæ.)

Only one tree, malatapai or guntapai (*Alangium longiflorum*) is of any importance to the lumberman. The sapwood is clear light yellow, very sharply distinguished from the dark coffee-colored heartwood. The wood is moderately hard, moderately heavy, very fine grained, and easy to work. It is used locally for construction purposes and is occasionally made into furniture and canes.

GUTTA-PERCHA OR BETIS FAMILY.

(Sapotaceæ.)

This is a family of large trees with alternate leaves and inner barks that contain a sticky milky sap which exudes sparingly when the bark is cut. The woods make a lather when rubbed with water or saliva.

BETIS. (Pls. XCIV and XCV.)

This is a large tree reaching a height of 35 to 40 meters and a diameter of 80 to 100 centimeters. It seems to be confined to the Island of Luzon, where it occurs as very scattered trees.

The bark is 5 to 8 millimeters in thickness, brown to reddish brown in color and is nearly smooth with light-colored vertical lines in young trees, but in older trees ridged; the inner bark is brownish red in color. The leaves are simple, alternate, closely bunched at ends of twigs, covered with dense brown hairs beneath and usually on the veins above, varying in size from 10 to 33 centimeters long and from 5 to 10 centimeters wide.

The wood is dark red in color, very hard, heavy, has a bitter taste, and is clear and straight grained. It is very durable and is especially valuable for piling. It also has the following uses: Shipbuilding (keels, stern posts); house building (posts, flooring, doors, rafters); railroad ties; wooden tools; tool handles; wharf building.

It is reported from the following regions: Luzon (Cagayan, Rizal, Tayabas, and Camarines); Samar. The scientific name of betis is *Illipe betis*. Besides betis or some forms of it, the following common names have been recorded: Bakayao (Il., Pang., T.); duyog-duyog (V.); lamigien (N. Luz.); pappagai; pasak (T., Z.); pianga (Cag.); talipopo (V.); urien (Cag.). A wood under the name of manilig from Cotabato seems to be betis, but may be a closely related species.

BANSALAGUIN.

This is a medium-sized tree reaching a height of 25 to 30 meters and a diameter of 80 to 90 centimeters, and usually has a straight, unbuttressed, regular bole less than half the height of the tree in length. The tree is intolerant of shade and is found in the dry soils of the coastal hills, where it is usually a constituent of the molave type.

The bark is 8 to 10 millimeters in thickness, black or nearly so, with prominent ridges broken by cross fissures into rectangular or rhomboidal patterns; the inner bark is red with white vertical lines beneath the furrows, brittle in texture, and next the sapwood exudes sparingly a thick milky sap. The leaves are simple, alternate, smooth, usually varying in size from 4 to 12 centimeters long, and from 2 to 4 centimeters wide, bunched at ends of twigs. The fruit is yellowish red in color.

The sapwood is light red in color; the heartwood dark red. The wood is very hard, heavy to very heavy, has a very fine grain and a bitter taste, and produces lather when rubbed with water or saliva. It is very much like betis, but takes a glossier finish and is finer, darker, heavier, and harder than betis. It is a first-class construction timber, and is especially valuable for salt-water piling. It also has the following uses: Tool handles; house construction (posts, beams, flooring); turnery; shipbuilding (keels, treenails, marlin spikes, belaying pins; spokes and handles of ships' wheels).

It has the following distribution: Luzon (Cagayan, Ilocos Sur, Nueva Ecija, Zambales, Bataan, Batangas, Tayabas, Sorsogon); Polillo, Ticao Island; Masbate; Mindoro; Culion Island; Samar; Mindanao (Zamboanga, Cotabato,) Tawi Tawi Island; Palawan.

Bansalaguin is a species of *Mimusops*. It has the following common names: Anak-batu (Tawi Tawi); duyog-duyog (V.); gatasan (N. E., Il.); cabiqui or kabiki (T.); ligayan (Moro); pappagan (Cag.); pat-saragon (Sam.); pisek (Il.); talipopo (V.).

NATO.

Nato is a large to very large tree reaching a height of 35 to 45 meters, with a diameter of 90 to 120 centimeters. It has a fairly straight, but usually rather strongly buttressed, bole that is one-fourth to one-half the height of the tree. The crown is irregular and semiopen. The tree is partially tolerant of shade. It is found scattered throughout certain portions of the dipterocarp types.

The bark is 15 to 25 millimeters thick, gray to brown in color, split by vertical fissures, usually filled with raised lines of corky pustules, giving it the appearance of being ridged. The inner bark is granular, salmon red in color, brittle in texture, and exudes a milky juice on being cut. The leaves are simple, alternate, smooth or nearly so, varying from 9 to 17 centimeters long and from 4 to 7 centimeters wide.

The wood is a pale dull red in color, moderately hard, moderately heavy and with fine, often wavy grain. It is used for about the same purposes as the red lauans and tanguile, which it resembles in color and general properties.

Nato is reported from the following regions: Luzon (Ilocos Sur, Abra, Pangasinan, Zambales, Rizal, Bataan, Laguna, Tayabas); Mindoro; Guimaras Island.

The scientific name of nato is *Palaquium luzoniense*. Besides nato the following local names are recorded: Bitanhol (Guim.); dulitan (Tay.); gatasan (Il.); palok-palok (Batn.); tagatoi (Batn.); takaran (Pang.); uakatan (M.).

MALACMALAC. (Pl. XCVI.)

This is a tree which in size and general characteristics is much like nato. The bark is 15 to 20 millimeters thick, grayish brown in color, with disconnected vertical lines, or furrows, and inclined to be ridged. The inner bark is red with lighter streaks beneath the furrows and next the sapwood exudes a thick milky sap. The leaves are simple, alternate, densely covered below with soft, golden brown hairs and vary in size from 14 to 28 centimeters long and 6 to 14 centimeters wide. The wood is much like that of nato and has the same uses.

Malacmalac is credited to the following regions: Luzon (Tarlac, Nueva Ecija, Zambales, Pampanga, Bulacan, Bataan, Rizal, Laguna, Batangas, Tayabas, Albay); Mindoro; Palawan.

It has the scientific name of *Palaquium philippense*. Besides malacmalac, it has the following local names: Alakaak (T.); baniti (Batn.); tayogong (Z.).

MANICNIC. (Pl. XCVII.)

Manicnic is a large-sized tree reaching a height of 33 to 35 meters and a diameter of 80 to 90 centimeters. It has a straight, regular, but medium buttressed, bole that reaches a length of 20 meters. The crown is flatly irregular. The bark is 18 to 25 millimeters thick, dark gray to dark brown, with longitudinal furrows about 3 centimeters or less apart; the inner bark is red, and when cut, exudes a milky sap. The leaves are simple, alternate, smooth, varying in size from 6 to 12 centimeters long and 2.5 to 4.5 centimeters wide. The wood is red in color, fine grained, moderately heavy, and moderately hard. It has the uses of the other *Palaquiums*.

The distribution of this tree is as follows: Luzon (Cagayan, Bataan, Laguna, Tayabas); Masbate; Mindoro. The scientific name is *Palaquium tenuipetiolatum*. Besides manicnic the following local names are known: Betis (Mas. and Tay.); mayusip (M.); pango (Cag.).

Besides the above, there are a large number of species of *Palaquium* about which there is not sufficient information to warrant description. Some species of this genus produce the gutta-percha of Mindanao. (See Part I, p. 57.)

Baniti (*Illipe ramiflora*), sometimes known as tanguile, is a medium-sized tree with wood much like the Palaquiums. Several species of *Sideroxylon* (*Natoputi*, or white nato) yield wood of much the same texture as the *Palaquiums* but not red in color. Information concerning these is too meager to permit their description.

PERSIMMON OR EBONY FAMILY.

(Ebenaceæ.)

This family is important because it produces the ebony of commerce. The leaves are simple and alternate, usually leathery in texture. The trees are small to medium-sized, with rough black bark. The sapwood is grayish white or red; the heartwood in many species sometimes of the same color, but more often the color of the sap streaked with black, or black streaked with red or grayish white, or jet black. Species with a jet-black heartwood are known as the true ebony in the Philippines, those with black streaked with another color are called camagon or bolongeta. Many species of *Diospyros* with or without black hearts are not described below because there are not sufficient data at present to do so. It is said that streaked black ebonyes can be changed to wholly black by burying them in the salt mud of the mangrove swamps.

The ebonyes are used in the Philippines principally for musical instruments, fine furniture, cabinetmaking, and canes. The supply is limited and so far as known little or none is exported. Locally the species with little or no black heart are used for all sorts of purposes.

EBONY.

This is a small tree occurring on dry coastal hills and sometimes on the edge of mangrove swamps. It seldom reaches a height of over 20

meters and a diameter of more than 40 centimeters. The bark is 4 to 10 millimeters thick, shiny black, with steel gray patches where recently shed. The inner bark is brownish red. The leaves are simple, alternate, smooth, leathery, varying in size from 2 to 6.5 centimeters long and 1 to 4 centimeters wide. The sapwood is grayish or creamy white, large, sharply distinguished from the small jet-black heartwood. It is used in the Philippines for canes, inlaying, frames, hilts, tool handles, fine furniture. It is not at all abundant.

The distribution is as follows: Luzon (Cagayan, Baler, Pangasinan, Zambales, Tayabas, Camarines); Batanes Islands; Mindoro; Masbate; Leyte; Panay; Mindanao (Surigao, Zamboanga, Davao); Tinago Island; Dinagat Island. The scientific name is *Maba buxifolia*. The Spanish name, "ebano," seems to be widespread. The principal Philippine name is bantulinao or some form of it; others are galarigal (T.); kaloyanan (Pam.); luyong (T.); malatalang (T.); tangintin (Sur.).

CAMAGON.

Camagon is usually a medium-sized to large tree reaching a height of 25 to 32 meters and a diameter of 60 to 80 centimeters. It is extensively cultivated for its fruit, which is usually known as mabolo. It occurs, however, scattered on coastal hills and sometimes in the deeper soils of the dipterocarp types.

The bark is 3 to 5 millimeters thick, brown to nearly black in color, with a rough surface; the middle bark is black, the inner light pink. The leaves are simple, alternate, leathery in texture, densely covered with fine white hairs beneath, and vary in size from 10 to 22 centimeters long and 4 to 9 centimeters wide.

The sapwood is large, grayish to pale red in color; the heartwood is black with brown, ashy gray, or red streaks. The wood is very hard, very heavy, and very fine grained. It is used for the same purposes as ebony and is much more abundant.

As previously stated, camagon is cultivated; probably almost every province in the Islands contains it. The scientific name is *Diospyros discolor*. Besides camagon and mabolo (the name of the fruit), the following local names occur: Amaga or some form of it (T., V.); bantulinao or some form of it (T.); ituman (Ley.); kalangtapai (T.); kaloyanan (Pam.); talang (Riz.).

BOLONGETA. (Pl. XCVIII.)

Bolongeta is a tree resembling camagon in many respects, except it is smaller in size and forms a conspicuous part of the undergrowth of some of the dipterocarp types. The bark is 3 to 5 millimeters thick, nearly black in color, with an uneven surface, having jagged, short spinous projections. The middle bark is black, the inner light red. The leaves

are alternate, simple, nearly smooth, or with a few scattered white hairs beneath, hardly visible to the naked eye; they vary in size from 9 to 17 centimeters long and 2.5 to 8 centimeters wide.

The sapwood is light red in color, the heartwood often has the same color, but may be black with reddish streaks. When large it is practically indistinguishable from camagon. It is used for the same purposes as camagon, but both sapwood and heartwood are locally used as structural timber. It is very heavy, very hard, and fine-grained.

The tree is reported from the following regions: Luzon (Cagayan, Ilocos Norte, Ilocos Sur, Nueva Ecija, Pangasinan, Baler, Zambales, Bataan, Rizal, Laguna, Batangas, Tayabas, Camarines); Camiguin Islands; Masbate; Mindoro; Samar; Tinago Island.

The scientific name is *Diospyros pilosanthera*. Besides the common name of bolongeta, or some form of it, the following local names are recorded: Alintatao or some form of it (T.); anam (B.); ata-ata (V.); bantulinao or some form of it (T.); camagon (T.); dambuhala (Riz.); ebano (Sp.); galangan (Pang.); malatalang (T.).

ATA-ATA.

This is a tree that in size, form, and bark characters closely resembles bolongeta. It seems to be more abundant in the Visayan Islands and Mindanao, and there replaces bolongeta as a medium-sized tree in the dipterocarp types. The leaves are nearly smooth with a whitish bloom beneath and vary in size from 10 to 17 centimeters long and 2.5 to 5 centimeters wide. The sapwood is grayish white, the heartwood sometimes of the same color but often black with or without whitish streaks.

This tree is referred to *Diospyros mindanaensis*. Besides ata-ata, it has the local names of bolongeta; anang (Tay.); and tapilak (Moro). The heartwood of the above and many other species may be sold as ebony, camagon, or bolongeta, depending on the color; if black, ebony; if black, slightly streaked, camagon; if much streaked, as bolongeta.

STRYCHNINE OR URUNG FAMILY.

(Loganiaceæ.)

The only representative of this family is urung (*Fagraea fragrans*). The wood is yellow when fresh and on exposure turns to a light brown. It is heavy, hard, fine grained, and very durable. It has the following uses: Posts; ship-building; piling; house construction. It is found principally in Palawan and has the common names of dolo and teca.

DOGBANE OR DITA FAMILY.

(Apocynaceæ.)

This family can usually be distinguished by the abundant milky sap in the bark and the opposite or whorled leaves.

DITA.

This is a medium to large tree reaching a height of 25 to 35 meters and a diameter of 80 to 100 centimeters. It has a fluted bole, weakly if at all buttressed. It is found very scattered in the dipterocarp forests, especially in the regions where the dry season is pronounced. It frequently occurs in the parang type as a small tree. It is intolerant of shade.

The bark is 8 to 10 millimeters thick, grayish to brownish yellow in color and sometimes covered with fine corky pustules; the inner bark is granular yellow in color, brittle, and exudes when cut an abundant thin milky white latex which has the taste of quinine. The leaves are smooth with glaucous bloom beneath, are usually arranged in whorls of 4 to 7, and vary in size from 5 to 20 centimeters long and 1.5 to 6.5 centimeters wide.

The wood is creamy white, light, soft, has a very bitter taste and discolors easily. It is used for light construction work, furniture, wooden soles for shoes, musical instruments, scabbards, and floats for fish nets.

The following is the distribution: Luzon (Cagayan, Ilocos Norte, Isabela, Abra, Bontoc, Union, Bataan, Rizal, Laguna, Tayabas, Camarines, Sorsogon, Albay); Mindoro; Samar; Leyte; Zamboanga; Palawan; Balabac Island. The scientific name is *Alstonia scholaris*. Besides dita or ditaa, it has the following local names: Alipauin (N. Luz.); andarayan (N. Luz.); dilupaon or some form of it (N. Luz.); lanitan (V.); oplai (Cag.); polai (Pang.); tanitan (V.).

BATINO.

Batino is a medium-sized tree resembling dita in many respects, but somewhat smaller. It usually occurs on dry hills and is tolerant of shade. The bark is 6 to 8 millimeters thick, gray in color, with slightly yellowish lines of corky pustules; the inner bark is yellowish brown in color with a milky sap. The leaves are simple in whorls of 4 (sometimes 3), sparingly hairy below, and varying in size from 10 to 20 centimeters long and 3 to 7.5 centimeters wide.

The wood is creamy white, moderately heavy and moderately hard, with a fine grain, has a bitter taste and disagreeable odor. It is used for house building (posts, rafters, siding, etc.); ties.

The following is the recorded distribution: Luzon (Cagayan, Ilocos Sur, Pangasinan, Baler, Rizal, Laguna, Batangas, Tayabas, Camarines); Mindoro; Guimaras Island; Lanao.

The scientific name is *Alstonia macrophylla*. Besides batino the following names are recorded: Itang-itang (Guim.); kalatuchi (Pang.); Pangolakloen (N. Luz.); tangitan (V.); ughayan (V.).

THE LANETES.

A number of species with similar characteristics as regards bark, size, and form of the tree, but with differences in character of the leaves, flowers, and fruits have the general name of lanete.

LANETE.

This is a tree that will reach the height of 20 to 25 meters and a diameter of 60 centimeters or more. It has usually a fluted and sometimes crooked bole and a rather open and irregular crown. It is found very scattered in semiopen portions of the dipterocarp types.

The bark is 4 to 8 millimeters in thickness, light gray to yellowish brown in color, and rather smooth; the inner bark is granular yellow in color, and when cut exudes rather freely a milky sap. The leaves are simple, opposite, with a more or less distinctly toothed margin, with velvety hairs beneath and sometimes above, and vary in size from 7 to 12 centimeters long and 2.5 to 5.5 centimeters wide. The wood is a pale cream color to that of old ivory, with no distinction between heartwood and sapwood. It varies in hardness from soft to moderately hard, and is moderately heavy.

It is one of the favorite carving woods of the Philippines. Other uses are as follows: Light construction purposes; furniture; soles of wooden shoes; kitchen utensils; chairs; parts of musical instruments; chests; turnery; window sills; scabbards.

The following is the recorded distribution of lanete: Luzon (Cagayan, Abra, Ilocos Sur, Lepanto, Union, Benguet, Nueva Ecija, Pangasinan, Zambales, Bataan, Rizal, Laguna); Mindoro; Culion Island. The scientific name is *Wrightia laniti*. Besides the Tagalog name of lanete or laniti, the following are recorded: Anotong (Z.) balubat (N. Luz.); lamisi or lamusi (Il.); laniteng (Riz.); lanoti (Il.); tanghas (V.); tigig (V.).

Wrightia calycina differs from the above species in having leaves with few, if any, hairs, varying in size from 5 to 16.5 centimeters long and 1.5 to 6.5 centimeters wide. This tree in Mindanao attains a much larger size than *Wrightia laniti*. No common name except lanete is recorded for it. It seems to be confined to the regions where the dry season is not pronounced, and is recorded from Tayabas, Masbate, Leyte, Guimaras, Occidental Negros, Palawan, Zamboanga, Lanao.

ANONANG FAMILY.

(Borraginaceæ.)

No trees of this family are of any importance from the lumberman's standpoint. Anonang (*Cordia blancoi*) deserves mention because it occupies a prominent place in the second-growth type and often occurs as isolated trees in grass patches, which position is due to the fact that it resists fairly well the effects of fires.



JVitan del.

PLATE LXXXVII.—BUSAIN (*Bruquiera gymnorrhiza*).

a, Flower; *b*, young seedling with remains of the fruit attached.



J.Vitan del.

PLATE LXXXVIII.—CALUMPIT (*Terminalia edulis*).

a, Fruit.



J. Van der

a

PLATE LXXXIX.—TALISAY-GUBAT (*Terminalia oöcarpa*).

a, Fruit.



J. Vilar del.

PLATE XC.—BINGGÁS (*Terminalia comintana*).

a, Flower cluster; b, fruit.

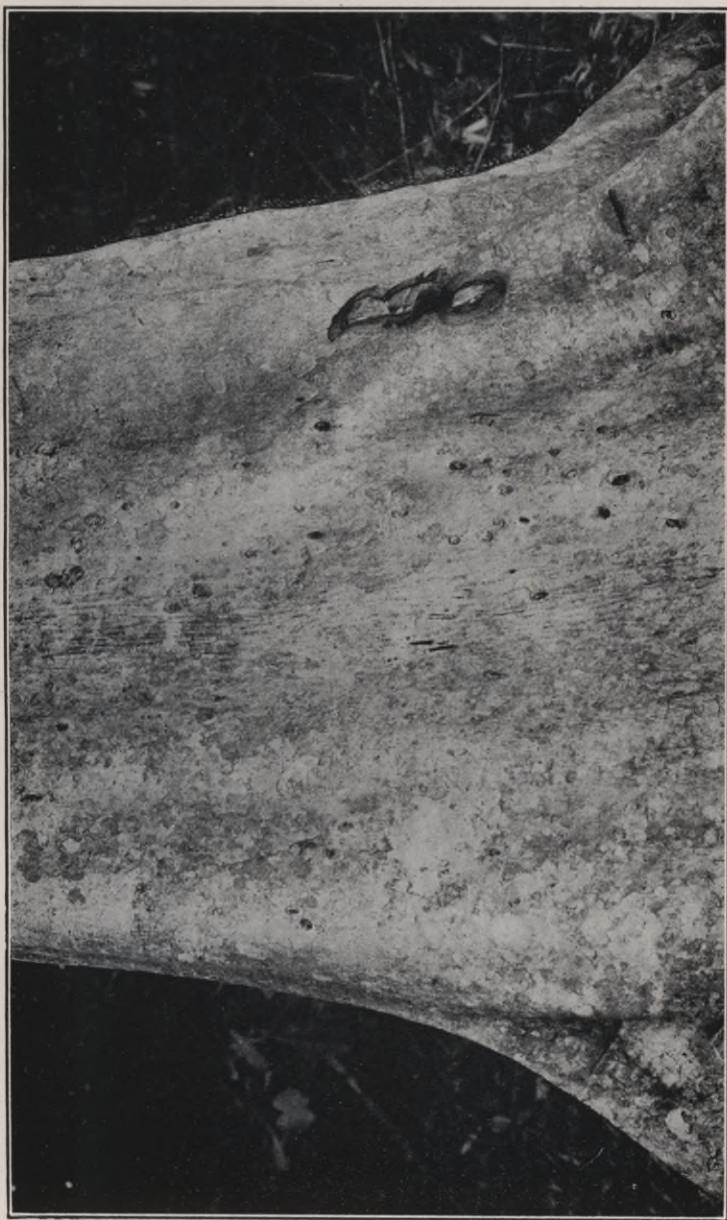


PLATE XCI.—BARK OF BINGGAS (*Terminalia comintana*).



PLATE XCII.—TOOG (*Terminalia quadrialata*).

Large tree on the left.



J. Vitar del.

PLATE XCIII.—MANCONO (*Xanthostemon verdugonianus*).

a, Flower cluster; b, fruit cluster.



J. Van der

PLATE XCIV.—BETIS (*Illipe betis*).

a, Fruit cluster; b, flower cluster with young leaves.

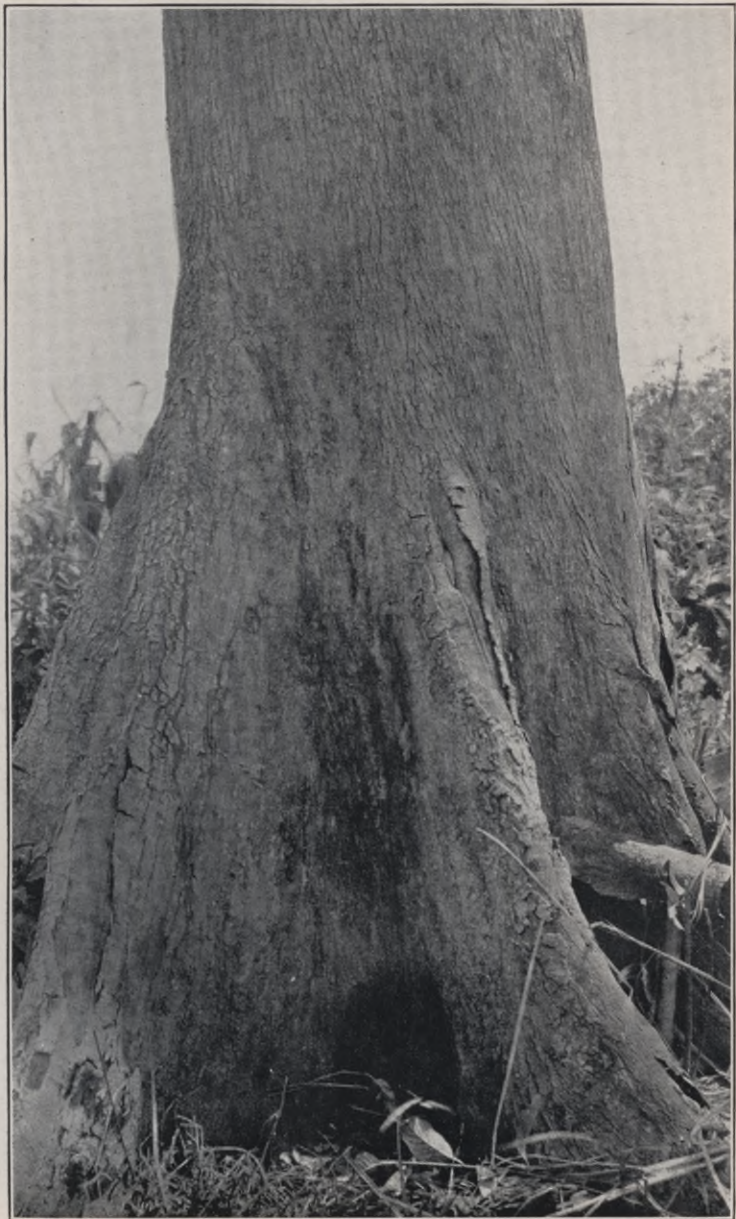


PLATE XCV.—BARK OF BETIS (*Illipe betis*).



PLATE XCVI.—BARK AND LEAVES OF MALACMALAC (*Palaquium philippense*).



PLATE XCVII.—BARK AND LEAVES OF MANICNIC (*Palaquium tenuipetiolatum*).



J. Vitan del

PLATE XCVIII.—BOLONGETA (*Diospyros pilosanthera*).

a, Flower cluster; *b*, fruit cluster.

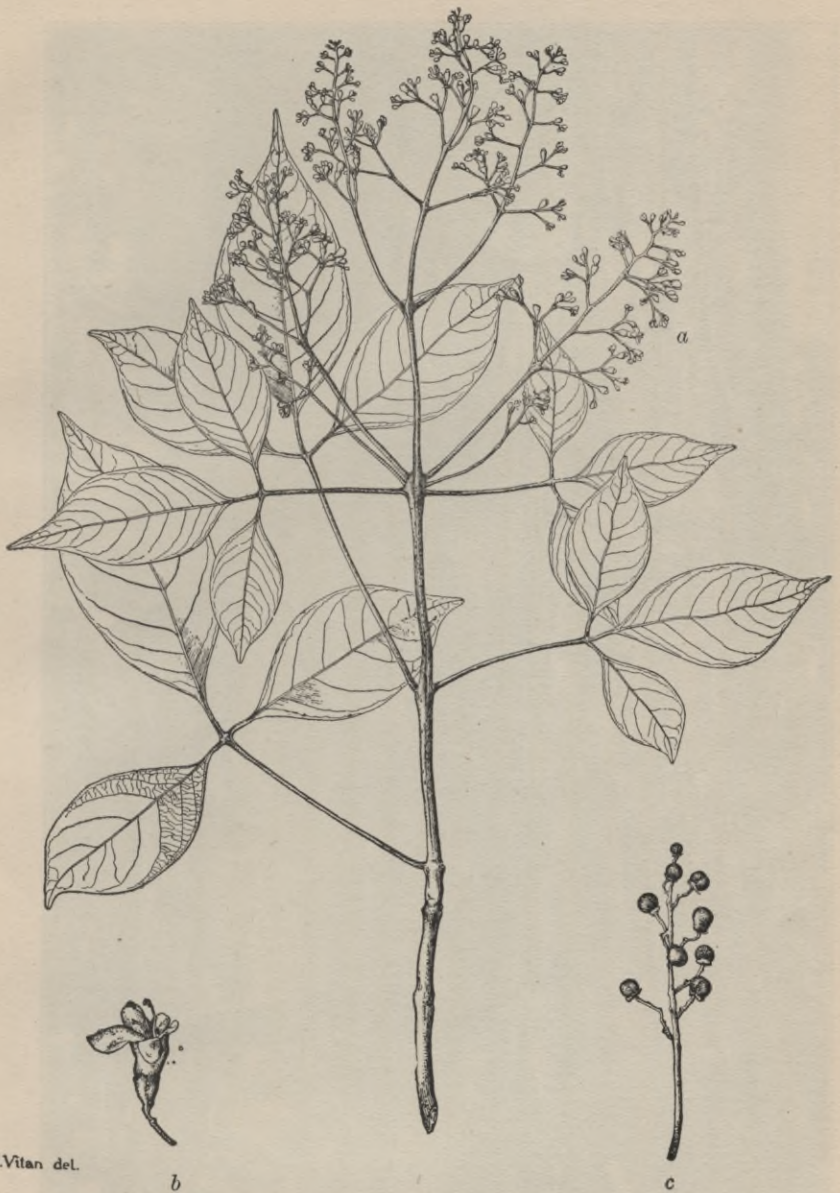


PLATE XCIX.—MOLAVE (*Vitex parviflora*).

a, Flower cluster; b, flower; c, fruit cluster.



PLATE C.—BARK OF MOLAVE (*Vitex parviflora*).



J. V. R. del

PLATE CI.—SASALIT (*Vitea aherniana*).



J. Van del

b

PLATE CII.—TEAK (*Tectona grandis*).

a, Flower cluster; b, fruit.



J. Vlan del.

PLATE CIII.—BANCAL (*Sarcocephalus cordatus*).

a, Flower cluster.



PLANT OF THE
MOUNTAINS OF THE
MOUNTAINS OF THE
MOUNTAINS OF THE

TEAK OR MOLAVE FAMILY.

(Verbenacæ.)

This is a family that has opposite, simple or palmately compound leaves.

MOLAVE. (Pls. XCIX and C.)

Molave is a tree that in exceptional cases will reach a height of 35 to 38 meters and a diameter up to 200 centimeters with a bole of 16 to 20 meters. Usually, however, it is below 30 meters high and may form in severe conditions a scraggly tree with a bole 2 meters or less in length. The bole is usually crooked, fluted, and buttressed. It has an open, wide-spreading crown. It is found throughout the Islands, especially on the low coastal hills, usually on limestone, but may occur on volcanic rocks. It is intolerant of shade, and partially or wholly deciduous during the dry season.

The bark is 8 to 10 millimeters in thickness, yellowish brown to gray in color, velvety to the touch, sometimes shedding in small thin flakes, otherwise smooth. The inner bark is light yellow, with darker yellow rings when freshly cut, but rapidly turns brown on exposure. The leaves are opposite, usually trifoliately compound; the leaflets are smooth, and vary in size from 4 to 15 centimeters long and 2.5 to 7 centimeters wide.

The sapwood is creamy white; the heartwood a pale yellow often turning to dull brown on exposure. It has a fine, usually crossed grain, with short and brittle fibers, making it easy to work. It is hard and heavy. It turns greenish yellow when treated with an alkali, and has a bitter taste and a slight odor. It stains water a greenish yellow color.

Molave is one of the best high-grade construction timbers in the Islands and is a good substitute for teak. It resists well the action of fungi, teredo, and white ants. The following is an enumeration of its uses: House construction (posts, doors, interior finish, flooring, joists, siding, sills); shipbuilding (knees, cutwater, sternposts); wagon making (axles, wheel rim, spokes); bridges; cabinetmaking; carabao yokes; cogwheels; docks; salt-water piles; pillars; plows; rice mortars; railroad ties; sugar mills; paving blocks; furniture; balusters and other turned work; hemp presses; sculpture; wooden tools; plane stocks; tool handles.

Practically all the provinces in the Philippines contain molave, though in many it is no longer in commercial quantities. The scientific name of molave is *Vitex parviflora*. The name molave is a corruption of the Tagalog name mulawin. The following local names are also recorded: Agubarao (V.); aguherao (V.); amurauon (B.); amugauan (Il., V., B.); bangongon (V.); bulaon (V., T., Pam.); bulauen (Pang.); bulaisan (Il.); bulaun (Z., Pam.); buyog tongon (Sur.); danigga (Il.); hamurauon (V.); hamulaon (T., B.); hamurauon (B.); hamursan (B.);

kalibayan (V.); kalipapa (Moro); kulipapa (Moro); lanahan (B.); maraun (V.); sagad (Il.); salingkapa (Guim.); tugas (V.).

The hairy leaf molave (*Vitex pubescens*) produces a wood so similar to molave that it is sold for it. It is recorded from the following regions: Mindoro; Guimaras; Culion Island; Palawan. A number of woods in the Philippines pass under the name of mulawin-aso and female molave as opposed to the hard molave (mulawin-bato) or male molave. The names of male and female are, of course, only a means of designating hard from soft molave. It is probable, as is maintained by some, that the wood of some trees of the same species (*V. parviflora*) is softer than the others. Young trees often have much softer wood than old trees and those growing in rich soils may be softer in texture. However, there are a number of distinct species of this family that do have the general name of mulawin-aso. One of the most important of these is kalipapa-aso or mulawin-aso (*Vitex pentaphylla*) which is a medium-sized tree usually found scattered in rich bottoms. This has a much softer wood than molave and has five leaflets instead of three. Another is lingo-lingo or mulawin-aso (*Vitex turczaninowii*) also with five leaflets. This tree is found scattered throughout Luzon and adjacent islands. A third species is alagao or mulawin-aso (*Premna nauseosa*) which has simple, opposite leaves, covered above and below with fine velvety hairs.

SASALIT. (Pl. CI.)

This is a medium-sized tree which reaches a height of 25 to 28 meters and a diameter of 75 centimeters, though usually it is considerably smaller. The bole is buttressed, usually crooked and fluted. It is found scattered in open places or as undergrowth in certain dipterocarp forests. The bark is 8 to 10 millimeters in thickness, gray to brown in color, slightly roughened by shallow saucer-like depressions; the inner bark is brittle. The leaves are opposite and palmately 3 to 7 compound; the leaflets are usually smooth, varying in size from 5.5 to 28 centimeters long and 2.5 to 12.5 centimeters wide. The wood of sasalit is light yellowish brown to dark yellowish brown. It is very heavy, very hard, durable, and less brittle than molave. It has practically the same uses as molave and is often sold for it.

Sasalit has been recorded from the following regions: Luzon (Cagayan, Pangasinan, Principe, Zambales, Tayabas, Albay, Sorsogon); Ticao Island; Samar; Negros; Zamboanga. It has the scientific name of *Vitex aherniana*. The following local names are known: Dalipapa (Cag.); dungula (Neg.); gualberto (Il.); igang (Principe); kalipapa (Sam., Al.).

Api-api (*Avicennia officinalis*) is a small tree common in the mangrove swamps. It has opposite leaves, white beneath. The wood is hard, heavy, very brittle and with a very peculiar structure.

TEAK. (Pl. CII.)

Teak is not native to the Philippines. Small plantations of it occur in the southern islands, especially in Zamboanga district, Basilan Island, and Sulu. Here it has been planted long enough to reach sizes up

to 80 centimeters or more in diameter. It is intolerant of shade. The bark is 8 to 20 millimeters thick, light brown to gray, with vertical lines, giving it an indistinct ridged appearance, the outside being a soft papery layer shedding in long thin flakes. The inner bark is light colored with prominent brown pith rays; on exposure it turns rapidly to a yellowish brown. The leaves are simple, opposite, with a dense mat of velvety hairs beneath, and vary in size from 19 to 33 centimeters long and 13.5 to 22 centimeters wide, though sprout leaves are much larger.

The sapwood is light colored; the heartwood is dark golden yellow, turning brown and finally black with age. It is moderately heavy, moderately hard, with a coarse and straight grain. It has a distinct aromatic odor. Teak is the best known wood of the Tropics. It is used for ship-building; high-class construction of all kinds; furniture; carving.

Teak (*teca*, Sp.) has been collected in the Philippines in the following regions: Rizal; Zamboanga; Basilan Island; Jolo Island. The scientific name is *Tectona grandis*.

CATALPA OR BANAI-BANAI FAMILY.

(Bignoniaceæ.)

This family is of little importance to the lumberman. Three trees are common, however, and need a brief mention in this place. Banai-banai (*Radermachera pinnata*) is a small to medium sized tree with doubly compound leaves and large showy flowers. It and other species of *Radermachera* are found scattered usually in open places. Pinkapinkahan (*Oroxylum indicum*) is a small to medium sized tree with large doubly compound leaves and long, flat, broad pods containing winged seeds. It seems to be confined to the region where the dry season is pronounced, and so far as observation goes is bare of leaves longer than any other tree in the Philippines. The wood is soft, light in weight and is used for matches. Tui (*Dolichandrone spathacea*) is a small tree usually confined to the sandy beaches and along tidal rivers. It has a soft light-colored wood used principally for making wooden shoe-soles.

COFFEE OR BANCAL FAMILY.

(Rubiaceæ.)

This family contains a large number of undergrowth, small and medium sized trees and a few that can be classified as large. The trees have opposite leaves with interpetiolar stipules (small leaf-like appendages between the leaf stalks of the opposite leaves) by which the trees can usually be readily distinguished from those of other families.

BANCAL. (Pl. CIII.)

Bancal is a small to medium sized tree with a straight regular bole, the length of which is about one-half the height of the tree. It is intolerant of shade, and is found usually along streams, in coastal plains, and occurs as scattered trees in grass lands in the deforested areas of the lauan-hagachac type. It owes its success here to the fact that it

resists well the effects of fires. The bark is 14 to 18 millimeters in thickness, grayish yellow to ashy red in color, very rough and scaly and has a bitter taste; the inner bark is yellow. The leaves vary in size from 12 to 24 centimeters long and 6.5 to 18.5 centimeters wide.

The sapwood is light yellow; the heartwood darker yellow in color. It is soft to moderately hard, moderately heavy, and has a decided waxy feeling. It has the following uses: House construction (partitions, posts, rafters, flooring, ceilings); small boats; furniture (chairs, desks); barrel staves; tubs; paddles for beating clothes (palopalo), and kitchen and other household implements; firewood; carving.

This or closely related species occur in nearly all provinces. The scientific name is *Sarcocephalus cordatus*. Besides bancal, it has the Ilocano name of bulala.

A number of other species much like bancal in many respects produce bancal lumber. Of these, mambog or bancal (*Sarcocephalus junghuhnii*) is confined to regions where the dry season is not pronounced. It differs from bancal in having smaller leaves.

CALAMANSANAY.

This name seems to apply to a number of species of this and, perhaps, other families that have a light rose-colored wood. (See pp. 79, 87.) The lumber on the market in Manila, however, comes from several species of *Nauclea* found in many parts of the Islands. The following description applies to a specially large species found in the Zamboanga district of Mindanao.

It is a tree that reaches a height of 40 meters and a diameter of 70 centimeters. The bole is straight and regular with slight buttresses. It is intolerant of shade and is very scattered. The bark is 8 to 10 millimeters in thickness, light gray to brown in color, with a surface broken into more or less continuous lines of corky pustules. The middle bark is brown; the inner bark is bright yellow when freshly cut, but on exposure quickly turns to brown. The leaves are simple and opposite.

The sapwood is yellowish with a tinge of pink; the heartwood when freshly cut is a brilliant red, but soon changes to the same color of the sapwood. The wood is heavy and hard, close and straight grained.

Calamansanay has the following uses: House construction (flooring, beams, posts, siding, window sills); masts for boats; furniture; telegraph poles; ties; tool handles.

While the above applies to a particular species of *Nauclea*, yet the character of the bark seems to be rather uniform for a number of species. The following is a list of common names of calamansanay: Bankalauag (V.); bayaho (II.); bisal (Pang); himbabalut (II.); kalamansauan (T.); kalumagon (B.); kamansak (Z.); malatumbaga (Zam.); subo-subo (Z.).



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[NOTE.—Official common names are in heavy-faced type; local names not official (i. e., synonyms), in Roman type.]

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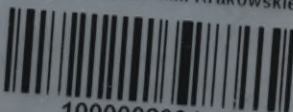
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