

UC-NRLF



B 3 419 570

HOUGH'S
AMERICAN
WOODS.
PART XI.

HOUGH'S
AMERICAN
WOODS.

PART XI.



THE
AMERICAN WOODS,

EXHIBITED BY ACTUAL SPECIMENS

AND WITH COPIOUS EXPLANATORY TEXT,

BY

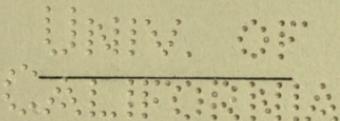
ROMEYN B. HOUGH, B. A.

PART XI.

REPRESENTING TWENTY-FIVE SPECIES

BY

TWENTY-FIVE SETS OF SECTIONS.



LOWVILLE, N. Y., U. S. A.

PUBLISHED AND SECTIONS PREPARED BY THE AUTHOR.

1910.

SD536

H55

v. 11

BIOLOGY
LIBRARY

BIOLOGY LIBRARY

Copyright nineteen hundred and ten,
By ROMEYN B. HOUGH

WEED-PARSONS PRINTING CO.,
ELECTROTYPERS AND PRINTERS
ALBANY, N. Y.



TO

Chauncey Delos Beadle,

WHOSE EXTENSIVE STUDY OF THE FLORA OF THE SOUTHERN STATES HAS ADDED
MATERIALLY TO THE STORE OF KNOWLEDGE,

PART XI, AMERICAN WOODS

IS DEDICATED AS AN EXPRESSION OF HIGHEST ESTEEM.

M175594

PREFACE TO THE SERIES.

The necessity of more generally diffused information concerning the variety and importance of our forest trees is justification enough for the appearance of this work, especially at this day, when the demands of Forestry in this country are constantly more and more keenly felt. The work was undertaken at the suggestion of my father, whose intense interest in Forestry, and a kindred taste, at once gave me inspiration to the work. It was entered upon with the expectation of his valuable companionship and counsel during its progress, but, alas ! that I was destined to have only at the outset, and, while I was then left ever to mourn the loss of a kind father, companion and teacher, the reader must fail to find in these pages that value and finish which his mind would have given them.

Among the happiest pictures of my memory are those in which I see my father's delight, as I would show to him, from time to time, my successful progress in devising a way of making the sections for this work, and if only for the happiness which its appearance would have caused him, could he have lived until this day, I have felt duty-bound to go on with it, even though left to do it alone.

The work is the outgrowth of one, of somewhat similar plan, proposed by my father some years since, but which he did not carry into effect. Its design is primarily and principally to show, in as compact and perfect a manner as possible, authentic specimens of our American woods, both native and introduced. For that end three sections, respectively transverse, radial and tangential to the grain (see Glossary), are made of each timber, sufficiently thin to allow in a measure the transmission of light, and securely mounted in well made frames.

The three planes above mentioned show the grain from all sides, so to speak, no plane being possible but that would be either one of them or a combination of them. The difficulty, however, of cutting a great number of sections exactly on those planes is obvious, so let it be understood that the terms, "transverse," "radial" and "tangential," are, in many cases, only approximately exact in their application.

My endeavor is to show, either in a part or all of the sections standing to represent a species, both the heart and sap-wood, but with some woods

as the Sumach, for instance, where usually only the outermost ring, or a part of it, could be said to represent the sap-wood, the display of that is quite impossible. In certain other woods, as the Spruce, etc., the transition from sap to heart-wood is almost indistinguishable by any difference in color, and, although both may be shown in the sections, one can scarcely distinguish between them.

The sequence of the numbers given to the various species is of importance only to show the botanical arrangement within a given Part, each Part being independent of the others.

The text of this work has been added rather as a secondary matter, to supply to those not having it in other form, such information as is of importance, in connection with the wood specimens, to give a fairly good acquaintance with the trees represented. It contains little, if any thing, new to the botanist, but to others it is hoped it may be of some value.

In its preparation some use has been made of my father's Elements of Forestry, and thanks are due the publishers of that work — Messrs. Robert Clarke & Co. of Cincinnati, Ohio — for the use of cuts in reproducing a number of its illustrations. Other valuable books of reference have been the works of Drs. Gray, Wood and Bessey, LeMaout and Decaisne's Descriptive and Analytical Botany, Prof. C. S. Sargent's Report on the Forest Trees of North America (constituting Vol. IX, Tenth Census of the United States, 1880), Micheaux and Nuttall's North American Sylva, George B. Emerson's Trees and Shrubs of Massachusetts, D. J. Browne's Trees of America, etc.

The authenticity of the timbers represented in this work has been a subject of personal attention and special care on the part of the author. The trees selected for specimens have been identified in the field, before felling, while the leaves, flowers or fruit (one or more) have been obtainable, and he can, hence, vouch for the authenticity of every specimen represented.

Succeeding Parts, uniform in style with Part I, and representing in each case twenty-five additional species, are planned to appear later, with the ultimate end in view of representing, as nearly as possible, all of the American woods, or at least the most important, in such a series of volumes as this one.

Upon the reception which this meets in public favor, and upon the co-operation of those interested in the cause, must naturally depend the carrying out of that plan. It is hoped that greater experience and skill will enable us to obviate in future parts the faults which occur, from lack of those qualities, in this.

Notice of errors in this work will be thankfully received in hopes of profiting therefrom in the future.

LOWVILLE, N. Y., *March* 30, 1888.

PREFACE TO PART XI.

In Part XI, AMERICAN WOODS, we resume the study of the species of the Atlantic and Central States.

We regret considerable delay in its appearance, owing mainly to demands upon the author's time for the preparation and issue of the companion work, HANDBOOK OF TREES.

That was the outgrowth of plans announced with Parts IX and X, AMERICAN WOODS, but carried out on somewhat different lines. It was found impracticable to issue TREE STUDIES in fascicles, as then intended, and, instead, it was decided to issue a Handbook, photo-descriptive of characteristic barks, leaves, fruits, winter branchlets, etc., of the various trees and indicate their distributions by the use of small individual maps, with photo-micrographs to show wood structures of at least one species of each genus.

To keep such a work within reasonable dimensions it was decided to limit it to the species found north of the latitude of the northern boundary of North Carolina and east of the Rocky Mountains, with the hope of supplementing it later if possible with similar handbooks of the trees of the Pacific slope and of the Southern States.

The one covering the trees of the Northern States and Canada was finally brought out, but to make it complete required much more time and field work than was anticipated, owing to off years, when a species would not bear flowers or fruit, the shortness of the period when suitable specimens for photographing could be procured, etc.

While the prosecution of this work delayed the issue of AMERICAN WOODS, Part XI, it furnished an opportunity for the further study of our eastern trees, which we feel has enhanced its value.

Deviating somewhat from the plan of previous Parts of the series the keys based upon flowers and fruits have been dispensed with in Part XI, and a considerably elaborated key based upon the leaves is included. This is designed to cover all of the generally accepted species of native and naturalized trees of northern United States and Canada, and is based upon what

as the Sumach, for instance, where usually only the outermost ring, or a part of it, could be said to represent the sap-wood, the display of that is quite impossible. In certain other woods, as the Spruce, etc., the transition from sap to heart-wood is almost indistinguishable by any difference in color, and, although both may be shown in the sections, one can scarcely distinguish between them.

The sequence of the numbers given to the various species is of importance only to show the botanical arrangement within a given Part, each Part being independent of the others.

The text of this work has been added rather as a secondary matter, to supply to those not having it in other form, such information as is of importance, in connection with the wood specimens, to give a fairly good acquaintance with the trees represented. It contains little, if any thing, new to the botanist, but to others it is hoped it may be of some value.

In its preparation some use has been made of my father's Elements of Forestry, and thanks are due the publishers of that work — Messrs. Robert Clarke & Co. of Cincinnati, Ohio — for the use of cuts in reproducing a number of its illustrations. Other valuable books of reference have been the works of Drs. Gray, Wood and Bessey, LeMaout and Decaisne's Descriptive and Analytical Botany, Prof. C. S. Sargent's Report on the Forest Trees of North America (constituting Vol. IX, Tenth Census of the United States, 1880), Micheaux and Nuttall's North American Sylva, George B. Emerson's Trees and Shrubs of Massachusetts, D. J. Browne's Trees of America, etc.

The authenticity of the timbers represented in this work has been a subject of personal attention and special care on the part of the author. The trees selected for specimens have been identified in the field, before felling, while the leaves, flowers or fruit (one or more) have been obtainable, and he can, hence, vouch for the authenticity of every specimen represented.

Succeeding Parts, uniform in style with Part I, and representing in each case twenty-five additional species, are planned to appear later, with the ultimate end in view of representing, as nearly as possible, all of the American woods, or at least the most important, in such a series of volumes as this one.

Upon the reception which this meets in public favor, and upon the co-operation of those interested in the cause, must naturally depend the carrying out of that plan. It is hoped that greater experience and skill will enable us to obviate in future parts the faults which occur, from lack of those qualities, in this.

Notice of errors in this work will be thankfully received in hopes of profiting therefrom in the future.

LOWVILLE, N. Y., *March* 30, 1888.

PREFACE TO PART XI.

In Part XI, AMERICAN WOODS, we resume the study of the species of the Atlantic and Central States.

We regret considerable delay in its appearance, owing mainly to demands upon the author's time for the preparation and issue of the companion work, HANDBOOK OF TREES.

That was the outgrowth of plans announced with Parts IX and X, AMERICAN WOODS, but carried out on somewhat different lines. It was found impracticable to issue TREE STUDIES in fascicles, as then intended, and, instead, it was decided to issue a Handbook, photo-descriptive of characteristic barks, leaves, fruits, winter branchlets, etc., of the various trees and indicate their distributions by the use of small individual maps, with photo-micrographs to show wood structures of at least one species of each genus.

To keep such a work within reasonable dimensions it was decided to limit it to the species found north of the latitude of the northern boundary of North Carolina and east of the Rocky Mountains, with the hope of supplementing it later if possible with similar handbooks of the trees of the Pacific slope and of the Southern States.

The one covering the trees of the Northern States and Canada was finally brought out, but to make it complete required much more time and field work than was anticipated, owing to off years, when a species would not bear flowers or fruit, the shortness of the period when suitable specimens for photographing could be procured, etc.

While the prosecution of this work delayed the issue of AMERICAN WOODS, Part XI, it furnished an opportunity for the further study of our eastern trees, which we feel has enhanced its value.

Deviating somewhat from the plan of previous Parts of the series the keys based upon flowers and fruits have been dispensed with in Part XI, and a considerably elaborated key based upon the leaves is included. This is designed to cover all of the generally accepted species of native and naturalized trees of northern United States and Canada, and is based upon what

we consider typical forms of leaves — such as we see on mature trees and not abnormally vigorous shoots. It would be an almost hopeless task to frame a key covering all unusual forms of leaves and keep within reasonable space, but one covering typical forms has seemed possible and has been here attempted. In its use the above limitation must be kept in mind, and what would be called average typical leaves selected for application of the key. With them, if possible, the fruits should be observed, as in framing the key fruits have been more or less included of necessity or for confirming other characters.

In the preparation of the key the use of technical terms has been avoided where others would do as well, but they could not be wholly dispensed with without sacrifice of definiteness, and that would be disastrous to the purposes of the undertaking.

For more convenient use in the field this key is being issued in small book form (4 x 6 in. in size of page) with glossary and an attractive photographic picture in colors of an isolated elm tree in both summer and winter conditions, as frontispiece.

For favors which were of material assistance in the preparation of AMERICAN WOODS, Part XI, the author wishes to express sincere thanks to Prof. William Trelease, Dr. N. M. Glatfelter, Mr. C. D. Beadle, Mr. T. B. Harrison, Mr. W. T. Davis, Mr. G. W. Letterman, Mr. Enos A. Mills, Mr. B. W. King and Mr. J. C. Teas.

As an item of news of unusual interest to the author of AMERICAN WOODS, he is tempted to mention here the fact that since the appearance of Part X he has been awarded, through the Franklin Institute of Philadelphia, Pa., the special Elliott Cresson gold medal on account of its production. Inasmuch as this action was entirely on the initiative of the Institute, whose rulings are looked upon as authoritative, it is a very gratifying testimonial, after the great amount of labor and money that have been expended in bringing out the work.

The wood-specimens for Part XII, AMERICAN WOODS, are already in hand and that volume is intended to be issued before the close of the present year.

LOWVILLE, N. Y., *May* 31, 1910.

A KEY BASED UPON LEAVES.

Abbreviations. — a. = apex or at apex; ab. = above; b. = base or at base; bn. = beneath; fr. = fruit; l. = long (usually omitted and implied after dimensions); lf. = leaf; lfts. = leaflets; lvs. = leaves.

a SIMPLE LEAVES.

b With well marked blade and petiole, or without petiole (sessile);

c MAIN RIB SINGLE — PINNATELY VEINED

d *Margin entire*;

e Leaves lance-oblong, thick,

f Acuminate at both ends, 3-9 in.

g Rugose-reticulate, deciduous; fr. an elongated dry drupe.

CORK-WOOD (*Leitneria floridana*).

g² Smooth and lustrous; fr. a dark blue drupe; veins beneath and petioles

h Rusty tomentose, evergreen.....SWAMP BAY (*Persea pubescens*).

h² Glabrous or nearly so, evergreen.....RED BAY (*P. Borbonia*).

f² Acute at both ends, 1½-4 in.; fr. an acorn.

WILLOW OAK (*Quercus Phellos*).

e² Leaves lance-obovate, cuneate, rounded a., mostly

f Clustered on lateral spurs; fr. a black drupe; beneath and petioles

g Densely tomentose.....WOOLLY BUCKTHORN (*Bumelia lanuginosa*).

g² Glabrous or nearly so.....SOUTHERN BUCKTHORN (*B. lycioides*).

f² Alternate on the branchlets.

g Thinnish, glabrous above, deciduous; fr. 2-celled capsules.

LEATHERWOOD (*Cyrilla racemiflora*).

g² Very thick, lustrous above, persistent; fr. acorn.

LIVE OAK (*Quercus Virginiana*).

e³ Leaves ovate.

f Inequilateral, long taper-pointed and narrow; fr. drupe.

MISSISSIPPI HACKBERRY (*Celtis mississippiensis*).

f² Equilateral, broad, lustrous ab. rounded b., long-acuminate; fr. compound, orange-like.....OSAGE ORANGE (*Toxylon pomiferum*).

e⁴ Leaves ovate-oblong, abruptly narrowed b.

f Alternate, acuminate, lustrous dark gr. ab., paler pubescent bn.; fr. large berry.....PERSIMMON (*Diospyros Virginiana*).

f² Opposite, rough-pubescent above, without stipules; fr. drupe.

ROUGH-LEAVED DOGWOOD (*Cornus asperifolia*).

f³ Verticillate (some opposite) glabrous ab., with stipules; fr. in globular head.....BUTTON-BUSH (*Cephalanthus occidentalis*).

e⁵ Leaves oblong, mostly cuneate b.,

f Deciduous.

we consider typical forms of leaves — such as we see on mature trees and not abnormally vigorous shoots. It would be an almost hopeless task to frame a key covering all unusual forms of leaves and keep within reasonable space, but one covering typical forms has seemed possible and has been here attempted. In its use the above limitation must be kept in mind, and what would be called average typical leaves selected for application of the key. With them, if possible, the fruits should be observed, as in framing the key fruits have been more or less included of necessity or for confirming other characters.

In the preparation of the key the use of technical terms has been avoided where others would do as well, but they could not be wholly dispensed with without sacrifice of definiteness, and that would be disastrous to the purposes of the undertaking.

For more convenient use in the field this key is being issued in small book form (4 x 6 in. in size of page) with glossary and an attractive photographic picture in colors of an isolated elm tree in both summer and winter conditions, as frontispiece.

For favors which were of material assistance in the preparation of AMERICAN WOODS, Part XI, the author wishes to express sincere thanks to Prof. William Trelease, Dr. N. M. Glatfelter, Mr. C. D. Beadle, Mr. T. B. Harrison, Mr. W. T. Davis, Mr. G. W. Letterman, Mr. Enos A. Mills, Mr. B. W. King and Mr. J. C. Teas.

As an item of news of unusual interest to the author of AMERICAN WOODS, he is tempted to mention here the fact that since the appearance of Part X he has been awarded, through the Franklin Institute of Philadelphia, Pa., the special Elliott Cresson gold medal on account of its production. Inasmuch as this action was entirely on the initiative of the Institute, whose rulings are looked upon as authoritative, it is a very gratifying testimonial, after the great amount of labor and money that have been expended in bringing out the work.

The wood-specimens for Part XII, AMERICAN WOODS, are already in hand and that volume is intended to be issued before the close of the present year.

LOWVILLE, N. Y., *May* 31, 1910.

A KEY BASED UPON LEAVES.

Abbreviations. — a. = apex or at apex; ab. = above; b. = base or at base; bn. = beneath; fr. = fruit; l. = long (usually omitted and implied after dimensions); lf. = leaf; lfts. = leaflets; lvs. = leaves.

a SIMPLE LEAVES.

b With well marked blade and petiole, or without petiole (sessile);

c MAIN RIB SINGLE — PINNATELY VEINED

d *Margin entire;*

e Leaves lance-oblong, thick,

f Acuminate at both ends, 3-9 in.,

g Rugose-reticulate, deciduous; fr. an elongated dry drupe.

CORK-WOOD (*Leitneria floridana*).

g² Smooth and lustrous; fr. a dark blue drupe; veins beneath and petioles

h Rusty tomentose, evergreen.....SWAMP BAY (*Persea pubescens*).

h² Glabrous or nearly so, evergreen.....RED BAY (*P. Borbonia*).

f² Acute at both ends, 1½-4 in.; fr. an acorn.

WILLOW OAK (*Quercus Phellos*).

e² Leaves lance-obovate, cuneate, rounded a., mostly

f Clustered on lateral spurs; fr. a black drupe; beneath and petioles

g Densely tomentose.....WOOLLY BUCKTHORN (*Bumelia lanuginosa*).

g² Glabrous or nearly so.....SOUTHERN BUCKTHORN (*B. lycioides*).

f² Alternate on the branchlets.

g Thinnish, glabrous above, deciduous; fr. 2-celled capsules.

LEATHERWOOD (*Cyrilla racemiflora*).

g² Very thick, lustrous above, persistent; fr. acorn.

LIVE OAK (*Quercus Virginiana*).

e³ Leaves ovate.

f Inequilateral, long taper-pointed and narrow; fr. drupe.

MISSISSIPPI HACKBERRY (*Celtis mississippiensis*).

f² Equilateral, broad, lustrous ab. rounded b., long-acuminate; fr. compound, orange-like.....OSAGE ORANGE (*Toxylon pomiferum*).

e⁴ Leaves ovate-oblong, abruptly narrowed b.

f Alternate, acuminate, lustrous dark gr. ab., paler pubescent bn.; fr. large berry.....PERSIMMON (*Diospyros Virginiana*).

f² Opposite, rough-pubescent above, without stipules; fr. drupe.

ROUGH-LEAVED DOGWOOD (*Cornus asperifolia*).

f³ Verticillate (some opposite) glabrous ab., with stipules; fr. in globular head.....BUTTON-BUSH (*Cephalanthus occidentalis*).

e⁵ Leaves oblong, mostly cuneate b.,

f Deciduous.

- g Alternate, acute or obtuse both ends, glabrous ab.; fr. acorn.
SHINGLE OAK (*Quercus imbricaria*).
- g² Opposite, acute or acuminate both ends; fr. drupe.
FRINGE-TREE (*Chionanthus Virginica*).
- f² Persistent, thick and coraceous, clustered near tips of branchlets,
g Obtuse or acute both ends,
h Broad, lustrous ab., white bn.; fr. aggregation of follicles.
SWEET BAY (*Magnolia glauca*).
- h² Narrow, glabrous ab., paler bn.; fr. capsule.
ROSE BAY (*Rhododendron maximum*).
- g² Acuminate both ends; fr. capsule. MOUNTAIN LAUREL (*Kalmia latifolia*).
- e⁶ Leaves obovate-oblong,
f Narrow and sometimes falcate; fr. acorn.
LAUREL OAK (*Quercus laurifolia*).
- f² Wider, coriaceous, lustrous ab., acute or acuminate; fr. drupe.
SOUR GUM (*Nyssa sylvatica*).
- e⁷ Leaves obovate,
f Large (3-20 in.) membranaceous.
g Cuneate b.,
h Short acuminate, 8-12 in. narrow; fr. fleshy baccate.
PAPAW (*Asimina triloba*).
- h² Acute to obtuse a., 12-20 in.; fr. aggregation follicles.
UMBRELLA-TREE (*Magnolia tripetala*).
- g² Ear-lobed b.; fr. aggregation follicles.
h 10-12 in. long.....FRASER MAGNOLIA (*M. Fraseri*).
- h² 15-30 in. long.....LARGE-LEAF MAGNOLIA (*M. macrophylla*).
- f² Small (4-6 in.) cuneate.
g Membranaceous, wide, rounded a., glabrous ab.; fr. drupelet.
AMERICAN SMOKE TREE (*Cotinus Americanus*).
- g² Coriaceous, narrow, mostly acute; fr. drupe.
WATER GUM (*Nyssa biflora*).
- e⁸ Leaves oval, membranaceous, deciduous.
f Rounded or subcordate b., 7-10 in.; fr. aggregation follicles.
CUCUMBER-TREE (*Magnolia acuminata*).
- f² Cuneate b., acuminate a., veins arcuate.
g Alternate or clustered; fr. blue drupe.
BLUE DOGWOOD (*Cornus alternifolia*).
- g² Opposite or clustered; fr. red drupe.
FLOWERING DOGWOOD (*Cornus florida*).
- d² Margin both entire and dentate or denticulate; leaves
e Linear-lanceolate, 2-5 in., entire or remotely denticulate; fr. capsule.
SANDBAR WILLOW (*Salix fluviatilis*).
- e² Oblanceolate, 3-5 in., entire or remotely serrate, fragrant; fr. small drupe.
WAX MYRTLE (*Myrica cerifera*).
- e³ Lance-obovate, cuneate b., rounded to acute a., entire or appressed-serrate,
evergreen; fr. drupaceous.....CASSENA HOLLY (*Ilex cassine* L.).
- e⁴ Ovate-oblong, 5-10 in., acuminate with long stems and both entire and with
from 1-5 large pointed teeth; fr. drupe.
COTTON GUM (*Nyssa aquatica*).

- e⁵ Oblong, acute to acuminate both ends, entire and irregularly serrulate, 3-7 in., glaucous bn.; fr. capsule.....SORREL-TREE (*Oxydendrum arboreum*).
- e⁶ Obovate-oblong, cuneate to rounded b., 1-3 in., whitish pubescent bn.; fr. capsule.....BEBB'S WILLOW (*Salix Bebbiana*).
- e⁷ Elliptical, very thick and firm, glabrous, with few remote spine-tipped teeth, evergreen; fr. drupe.....HOLLY (*Ilex opaca*).
- e⁸ Obovate, ½-2 in., subsessile, firm thick and lustrous, entire and obscurely denticulate; fr. berry.....SPARKLEBERRY (*Vaccinium arborem*).
- d³ Margin both entire and lobed, the latter mostly on vigorous shoots, very short-stemmed; the entire leaves are
 - e Lance-obovate to spatulate, cuneate b., wide and rounded or obscurely 3 lobed a. (other leaves sharply pinnately 3-7-lobed) tardily deciduous; fr. acorn.....WATER OAK (*Quercus nigra*).
 - e² Ovate-oblong, 2-7 in., abruptly narrowed b., acute or obtuse a. (other leaves with large lobe on one or both sides); fr. drupe.
 - SASSAFRAS (*Sassafras sassafras*).
 - e³ Broad-ovate, large, long-stemmed, the lowest pair of veins branching; arrangement
 - f Ternate (some opposite) subcordate, acute or acuminate, pith of twigs not segmented; fr. pod-like; leaves
 - g Acute or short acuminate; fringe of hairs on seeds pointed.
 - CATALPA (*Catalpa catalpa*).
 - g² Long-acuminate, fringe of hairs of seeds wide.
 - HARDY CATALPA (*Catalpa speciosa*).
 - f² Opposite, cordate., acute or bluntly pointed, pith of twigs segmented; fr. capsule.....PRINCESS TREE (*Paulownia tomentosa*).
 - d⁴ Margin serrate or serrulate,
 - e Leaves inequilateral, alternate;
 - f Petioles short, veins impressed above and
 - g Parallel; mostly doubly serrate, firm
 - h Smooth above; fr. samara; branchlets
 - i Not corky-winged; leaf-buds smooth and blunt.
 - WHITE ELM (*Ulmus Americana*).
 - i² Some corky-winged; leaf-buds acuminate, puberulous;
 - j Leaves 2-6 in.; a northern tree.....CORK ELM (*Ulmus Thomasi*).
 - j² ¾-3 in.; a southern tree.....WINGED ELM (*Ulmus alata*).
 - h² Very rough above.; fr. samara.....SLIPPERY ELM (*Ulmus pubscens*).
 - g² Not parallel, arcuate and ramose; simply serrate, thin; fr. drupe.
 - HACKBERRY (*Celtis occidentalis*).
 - f² Petioles long; veins little if at all impressed, arcuate, ovate-orbicular, prominently reticulated; fr. nut-like with parachute.
 - g Leaves smooth and greenish beneath.....BASSWOOD (*Tilia Americana*).
 - g² Leaves silvery-pubescent beneath, with small if any axillary tufts.
 - WHITE BASSWOOD (*T. heterophylla*).
 - g³ Leaves stellate-pubescent beneath, with conspicuous axillary tufts.
 - MICHAUX'S BASSWOOD (*T. Michauxii*).
 - g⁴ Leaves rusty-pubescent beneath; a southern tree.
 - DOWNY BASSWOOD (*T. pubescens*).
 - e² Leaves equilateral or nearly so; fr. a

- f² Drupe-like, but containing 2-6 one-seeded nutlets; lvs. lanceolate to oblong, membranaceous and markedly wrinkled.
MOUNTAIN HOLLY (*Ilex monticola*).
- f³ A pome (apple); leaves ovate to oblong or oval, firm, mostly rounded b. and leaf stalks
g Slender, long and smooth.
h Leaves glabrous ab. and usually bn., sharply and widely serrate; fr. ½ in. or less, in loose racemes.
SERVICE-BERRY (*Amelanchier Canadensis*).
- h² Leaves lustrous ab., smooth bn., appressed serrate or subentire; fr. usually tapering to the stem, containing grit cells.
PEAR (*Pyrus communis*).
- g² Short, stout, gray-tomentose as is the under surface of lvs.; fr. hollowing at stem and without grit-cells.....APPLE (*Pyrus Malus*).
- f⁴ Capsule, which is
g 1-celled, dehiscent by 2 valves, ¼ in. or less l; seeds with silky hairs;
h Leaf-buds covered with single scale; leaves
i Linear-lanceolate, very long taper-pointed and drooping.
WEeping WILLOW (*Salix babylonica*).
- i² Narrow-lanceolate, green bn.; petioles not glandular; finely serrate.
BLACK WILLOW (*Salix nigra*).
- i³ Lanceolate; petioles
j Glandular; glabrous bn., coarsely serrate; branchlets greenish and very brittle.....BRITTLE WILLOW (*S. fragilis*).
- j² Not glandular; pale bn.; stipules.
k Foliaceous; branchlets hoary-pubescent.
WARD'S WILLOW (*Salix longipes*).
- k² Deciduous; leaves
l Glabrous ab., whitish and glaucous bn.; branchlets yellow.
YELLOW WILLOW (*S. vitellina*).
- l² Silky-pubescent both sides; branchlets greenish.
WHITE WILLOW (*S. alba*).
- i⁴ Broad lanceolate, smooth above, pale and glaucous bn.; petioles long and not glandular...PEACH-LEAF WILLOW (*Salix amygdaloides*).
- i⁵ Lance-ovate, very lustrous dark green ab., firm; petioles glandular.
SHINING WILLOW (*S. lucida*).
- i⁶ Oblanceolate and lanceolate, pale bn., finely serrate; stipules foliaceous; branchlets first season and buds hairy.
MISSOURI WILLOW (*S. Missouriensis*).
- i⁷ Ovate-oblong, rounded or subcordate b., acute a.
BALSAM WILLOW (*Salix basamifera*).
- h² Buds covered by several scales;
i Leaves lanceovate, cuneate or rounded b., bluntly pointed a.
NARROW-LEAF COTTONWOOD (*Populus augustifolia*).
- i² Leaves ovate-orbicular, subcordate.
TWEEDY'S COTTONWOOD (*P. Tweedyi*).
- g² 5-celled, dehiscent by 5 valves; leaves lance-obovate to oblong, tapering both ways, remotely serrate above the middle and

- h Persistent, thick, coriaceous; seeds winged.
 LOBLOLLY BAY (*Gordonia Lasianthus*).
- h² Deciduous, membranaceous; seeds not winged.
 FRANKLINIA (*Franklinia Altamaha*).
- f⁵ Nutlet,
- g Not winged, each
- h Subtended by a 3-lobed leaf-like bract and arranged in aments; lvs. unequally and sharply serrate, glabrous bn. except for silky hairs in the axils of veins.....BLUE BEECH (*Carpinus Caroliniana*).
- h² Enclosed in a membranous sac and arranged in loose cone-like aments; leaves ovate-oblong, unequally and sharply serrate, pubescent bn.
 IRONWOOD (*Ostrya Virginiana*).
- g² Winged both sides and borne in the axils of scales which form a cone; scales
- h 3-lobed, thin and falling away at maturity of seed;
- i Bark chalky white and peeling in strips around the trunk; lvs.
- j Ovate, rounded or obtuse b., acuminate a.; bark peeling readily.
 CANOE BIRCH (*Betula papyrifera*).
- j² Deltoid, long-acuminate, petioles long and slender; bark peeling with some difficulty.....WHITE BIRCH (*Betula populifolia*).
- i² Bark smooth, lustrous reddish brown; lvs. broad ovate.
 WESTERN RED BIRCH (*B. fontinalis*).
- i³ Bark scaly, gray-brown; lvs. ovate-oblong, narrow and rounded or subcordate b., aromatic when bruised.
 SWEET BIRCH (*Betula lenta*).
- i⁴ Bark silvery yellow, separating in thin layers and hanging in curls; lvs. ovate-oblong, narrow and mostly heart shaped b., aromatic.
 YELLOW BIRCH (*Betula lutea*).
- i⁵ Bark reddish brown, separating in thin persistent scales; lvs. rhombic ovate.....RIVER BIRCH (*B. nigra*).
- h² Thickened, woody and persistent; lvs.
- i Ovate-oblong, mostly acute or acuminate a., lustrous dark green ab.; fls. in late summer.....SEA-SIDE ALDER (*Alnus maritima*).
- i² Orbicular-obovate, rounded to notched a., dull green ab.; fls. in early spring.....EUROPEAN ALDER (*Alnus glutinosa*).
- f⁶ Nut.
- g Enveloped by a 2-4-valved prickle-covered involucre, lateral veins of lvs. straight, parallel, and each terminating in a tooth; nut
- h Triangular, each involucre inclosing a pair; lvs. ovate-oblong, acuminate, hairy along veins bn.....BEECH (*Fagus Americana*).
- h² Globose—top-shaped, single in involucre; lvs. narrow-oblong with slender teeth and white-tomentose bn.
 CHINQUAPIN (*Castanea pumila*).
- h³ Compressed ovoid-globose, 2 or 3 in an involucre; lvs. lance-oblong with coarse teeth, green and glabrous both sides.
 CHESTNUT (*Castanea dentata*).
- g² Subtended by an involucre cup—an acorn; lvs. lance-oblong, obovate, coarsely and sharply serrate;
- h Large trees.....CHINQUAPIN OAK (*Quercus acuminata*).

h² Shrubs or very small trees... DWARF CHINQUAPIN OAK (*Q. prinoides*).

d⁵ Margin both serrate or serrate-dentate and lobed in the same lvs., though the lobed lvs. may be on vigorous shoots only, and the latter lvs. are not considered in these further descriptions.

e Fruit a small pome (apple)

f With 1-5 bony, 1-seeded nutlet-like carpels; small trees and shrubs with thorny branches; lvs.

g Obovate (large ones more elliptical) entire, cuneate b., rounded or acute a.; petioles short, winged above and glandless;

h Leaves lustrous dark-green ab., thick; fr. globose-oblong, $\frac{1}{2}$ in., dull red; nutlets 1-3..... COCK-SPUR THORN (*Crataegus crus-galli*).

h² Leaves dull gray-green ab., more membranaceous; fr. subglobose, $\frac{1}{2}$ -1 in., dull red or yellow with white dots.

DOTTED THORN (*C. punctata*).

g² Obovate-oblong, wider and short cuneate b., petioles longer and winged ab.

h Irregularly serrate-dentate, acute or blunt-pointed and slightly, if at all, lobed, dark green and smooth ab.; fr. scarlet or orange, $\frac{1}{4}$ in. or less; nutlets usually 5..... SOUTHERN THORN (*C. viridis*).

h² Crenate-serrate or with short crenate toothed lobes, rounded or obtuse a.; fr. oblong-globose, $\frac{1}{2}$ in., dark red or orange, black dotted, with 2-3 nutlets..... MARGARETTA THORN (*C. Margaretta*).

h³ With short acute-toothed lobes or doubly serrate-dentate, obtuse to acute a., pubescent bn. 2-5 in.; petioles glandular; fr. oblong-globose, $\frac{1}{2}$ in.; nutlets 2-3 with ventral cavities.

PEAR THORN (*C. tomentosa*).

g³ Obovate-orbicular, rounded or obtuse a., coriaceous, coarsely and irregularly serrate-dentate, or very slightly lobed; thorns $2\frac{1}{2}$ -4 in.; fr. lustrous crimson, $\frac{1}{4}$ - $\frac{1}{2}$ in., subglobose, on erect stems; nutlets with deep ventral cavities.... LONG-SPINE THORN (*Crataegus macracantha*).

g⁴ Leaves broad-ovate;

h Waxy-coated, slightly 5-angled and flattened subglobose, apple-green becoming purplish red; lvs. subcordate b., acute, with 3 or 4 pairs short pointed lobes, thickish..... WAXY THORN (*C. pruinosa*).

h² Fruit pubescent at least at the ends,

i Subglobose, $\frac{3}{4}$ -1 in., in small drooping villous clusters; calyx-lobes large and deciduous; nutlets 4 or 5; lvs. truncate or subcordate b., with appressed pubescence ab., pubescent bn.

RED-FRUITED THORN (*C. mollis*).

i² Obovoid-oblong, in erect compact clusters with prominent and persistent calyx-lobes and tube; lvs. rounded b., acute or obtuse a.

CHAMPLAIN THORN (*C. Champlainensis*).

h³ Smooth and lustrous, about $\frac{3}{4}$ in.; lvs. scabrous ab.; fr.

i Orange red with pale dots, obovoid, calyx-lobes enlarged and persistent; lvs. thickish..... RED-FRUITED THORN (*C. submollis*).

i² Bright scarlet with dark dots; lvs. membranaceous.

SCARLET THORN (*C. pedicellata*).

g⁵ Triangular-ovate, $1\frac{1}{2}$ -3 in., truncate b., acute or acuminate a., lustrous dark green ab., coarsely serrate-dentate and incisedly 3-5-lobed.

WASHINGTON THORN (*C. cordata*).

- g⁶ Oval to orbicular.
- h Membranaceous, hairy on veins bn.,
- i Rounded or obtuse a. and b., sharply serrate with 2-3 short lobes, glabrous yellow-green ab., paler and concave bn.
PRINGLE'S THORN (*C. Pringlei*).
- i² Acute or acuminate a., rounded b., sharply serrate-dentate, and with 3 or 4 pairs short lobes, scabrous ab., pubescent on veins bn.
HOLME'S THORN (*C. Holmesiana*).
- h² Coriaceous, finely doubly serrate-dentate.
SCARLET THORN (*C. coccinea*).
- f² With 5 papery usually 2-seeded carpels; small flat waxy fragrant apples; lvs.
- g Tomentose or pubescent bn., oblong-ovate to oval,
- h Crenate-serrate and usually with short crenate lobes; fr. stems slender and glabrate.....PRAIRIE CRAB (*Pyrus Ioensis*).
- h² Crenate and very much wrinkled; fr. stems short.
SOULARD CRAB (*Pyrus Soulardi*).
- g² Glabrous throughout, with long slender stems; fr. hard translucent long-stemmed and calyx-lobes.
- h Deciduous; fr. yellowish, red-cheeked, scarcely waxy and but little hollowed at b.; lvs. ovate-oblong serrate or sometimes entire, not lobed.....SIBERIAN CRAB (*Pyrus baccata*).
- h² Persistent in fruit; fr. yellow-green, waxy, deeply hollowed at b., very sour; lvs. triangular ovate to truncate or subcordate b., acute a., serrate-dentate and usually with few short lobes.
FRAGRANT CRAB (*Pyrus coronaria*).
- e² Fruit a juicy syncarp (blackberry-like), edible; lvs. with arcuate lateral veins, the lowermost pair branching; lvs.
- f Lustrous ab., glabrous bn., broad-ovate, coarsely serrate; fr. pinkish white.
WHITE MULBERRY (*Morus alba*).
- f² Dull dark green and roughish ab., pubescent and strongly reticulate bn., orbicular ovate; petioles glabrate; fr. purple-black.
RED MULBERRY (*Morus rubra*).
- e³ Fruit a globular head with seeds exerted on red fleshy stipes; lvs. rough ab., under surface and petioles velvety-pubescent.
PAPER MULBERRY (*Broussonetia papyrifera*).
- d⁶ Margin crenate-serrate;
- e Leaves opposite, mostly
- f Oblong, tapering b., acuminate; small trees and shrubs; lvs.
- g Glabrous bn., 2-3 in.; inhabits wet lowlands; fr. drupe.
SWAMP PRIVET (*Forestiera acuminata*).
- g² Pubescent bn., 2-5 in., membranaceous and very finely crenate-serrate; an upland tree; fr. fleshy capsule.
BURNING BUSH (*Euonymus atropurpureus*).
- f² Broad-ovate to oval, 1½-5½ in., rounded b., obtuse to acute a., the lateral veins very prominent and arcuate; fr. drupe-like.
BUCKTHORN (*Rhamnus cathartica*).
- e² Leaves alternate,

- f Laterally compressed and long, blades rounded b., acute or short acuminate a., glabrous and firm (white velvety when young); fr. capsule.
LARGE-TOOTH POPLAR (*Populus grandidentata*).
- f² Terete, slender and short, blades mostly rounded or obtuse both ends, membranaceous; fr. drupe-like.
WESTERN SERVICEBERRY (*Amelanchier alnifolia*).
- d⁹ *Margin sinuate or sinuate-dentate*,
e Lance-oblong to ovate, obtuse to subcordate b., bluntly acute a., with 10-16 pairs of straight lateral veins.....ROCK OAK (*Quercus Prinus*).
e² Obovate-oblong, cuneate b., rounded or obtuse a., 6-8 pairs of lateral veins, whitish bn.....SWAMP WHITE OAK (*Quercus platanoides*).
e³ Oval-obovate, rounded or subcordate b., rounded to acute or apiculate a., membranaceous; petioles short and thick; fr. woody capsule.
WITCH HAZEL (*Hamamelis Virginia*).
e⁴ Suborbicular (on vigerous shoots 3-5-lobed) 2-4 in., dark green ab., white velvety tomentose bn. on stems, etc.; fr. capsule....ABELE (*Populus alba*).
- d¹⁰ *Margin lobed*; fruit a
e Small apple, containing a single 2-seeded bony nutlet; branchlets thorny and lvs. with 1-3 pairs of wide-spreading lobes.
HAWTHORN (*Crataegus Oxyacantha*).
e² Narrow upright cone, made up of closed carpels; lvs. with one or two pairs of wide-spreading entire lobes and turcate or with wide sinus at apex.
TULIP TREE (*Liriodendron tulipifera*).
- e³ Acorn; lvs. pinnately lobed and
f Lobes bristle-tipped; acorns maturing in the autumn of the second year; sinuses
g Narrow at bottom; lobes wide at base and narrowing towards apex; lvs.
h Oval to ovate, lobes 4-5 pairs, each lobe with
i One to three sharp teeth; fruit
j Scarcely $\frac{1}{4}$ enveloped by its shallow saucer.
RED OAK (*Quercus rubra*).
j² Half enveloped by its deep saucer.
GRAY OAK (*Q. borealis*).
i² Entire, triangular and wide-spreading.
SWAMP SPANISH OAK (*Quercus pagodaefolia*).
- h² Obovate and lobes generally in
i Four pairs, symmetrically arranged, the larger lobes 1-4 toothed.
YELLOW OAK (*Q. velutina*).
i² One to three pairs,
j Not symmetrically arranged, lobes scarcely dentate and those of some lvs. finger like.....SPANISH OAK (*Q. digitata*).
j² Symmetrically arranged and generally in
k Two pairs; shrubs or very small trees.
BEAR OAK (*Quercus nana*).
- k² A single pair of wide-spreading lobes near a., or scarcely lobed and very wide at a.; a medium-size tree.
BLACK JACK OAK (*Q. Marilandica*).
- g² * Sinuses wide, rounded and deep; lobes narrow, widening toward the apex, the larger with 1-4 spreading teeth or sometimes toothed lobes; acorn

h Oblong and with

i Very shallow saucer-like cup.

SOUTHERN RED OAK (*Quercus Texana*).

i² Deep top-shaped cup about half enveloping the acorn.

HILL'S OAK (*Q. ellipsoidalis*).

h² Subglobose, half enveloped by its deep turbinate cup of closely appressed scales.....SCARLET OAK (*Q. coccinea*).

h³ Flattened-globose to almost hemispheric, with shallow saucer-shaped or slightly top-shaped cup.....PIN OAK (*Q. palustris*).

f² Lobes rounded or bluntly pointed and acorns maturing in the autumn of the first year; lvs.

g Obovate-oblong, under surface

h Glabrous, larger lobes long and narrow, acorn about one-third invested by the cup.....WHITE OAK (*Q. alba*).

h² White-tomentose, lobes shorter and more triangular; acorn nearly enveloped by its thin-edged cup.....OVER-CUP OAK (*Q. lyrata*).

g² Broad-obovate with

h 1 or 2 pairs of rounded lobes, the one next the apex much the largest and commonly truncate or with wide sinus at apex.

POST OAK (*Q. minor*).

h² 3 or 4 pairs — deeply lyrate pinnatifid; acorns generally large with fringed cup.....BUR OAK (*Q. macrocarpa*).

e² MAIN RIBS SEVERAL — PALMATELY VEINED;

d *Leaves alternate with*

e 5-7 deep lobes — star-shaped; fr. globose head of capsules.

SWEET GUM (*Liquidambar Styraciflua*).

e² 3-5 short lobes; b. of leaf-stem enveloping the new leaf-bud; fr. globose head of akenes.....SYCAMORE (*Platanus occidentalis*)

e³ Not lobed, entire, orbicular-cordate; fr. pod.

REDBUD (*Cercis Canadensis*).

d² *Leaves opposite*; fr. samaras in pairs united at base.

e Large or medium-size trees with rather firm lvs.;

f Sinuses rounded at bottom and lobes entire or nearly so; sinuses

g Moderately deep; lvs. pale and glabrous bn., without stipules.

SUGAR MAPLE (*Acer Saccharum*).

g² Shallow; lvs. green and pubescent bn., edges drooping; stipules often present.....BLACK MAPLE (*A. nigrum*).

f² Sinuses pointed at bottom and lobes more or less toothed; lvs.

g Deeply 5-lobed with narrow sinuses....SILVER MAPLE (*A. dasycarpum*).

g² Moderately 3-5-lobed with wide sinuses; under surface pale and

h Glabrate; rather thin, subcordate b.....RED MAPLE (*A. rubrum*).

h² Moderately hairy, especially along the veins, firm, mostly tapering and entire b. obovate-orbicular, small and sometimes without lobes.

CAROLINA MAPLE (*A. Carolinum*).

h³ Velvety pubescent, thick, wide-orbicular; a southern tree.

DRUMMOND MAPLE (*A. Drummondii*).

e² Small trees or tall shrubs with membranaceous leaves; lobes

h Doubly serrate; lvs.

i Acuminate, 3-lobed at a. only, eastern.

STRIPED MAPLE (*A. Pennsylvanicum*).

1² Acute or obtuse, 3-5-lobed, or even 3-parted or 3-foliolate, western.

DWARF MAPLE (*A. glabrum*).

h² Coarsely serrate-dentate, pubescent bn.

MOUNTAIN MAPLE (*A. spicatum*).

b² Without well-marked blade and petiole (latter present, but very small in leaves of Hemlocks);

c LEAVES LINEAR AND IN FLAT 2-RANKED SPRAYS,

d *Sessile*,

e Deciduous, soft, light green (those of fruiting-branchlets scale-like); fr. subglobose cones.....BALD CYPRESS (*Taxodium distichum*).

e² Evergreen, more rigid, dark green ab., whitish and keeled bn., leaving a flat or depressed scar when breaking away from branchlet; cones erect, 2 to 3½ in. long and falling apart at maturity.

f Bracts of cone shorter than scales.....BALSAM FIR (*Abies balsamea*).

f² Bracts longer than the scales, exerted and reflexed.

FRASER'S FIR (*Abies Fraseri*).

d² With very small appressed petioles,

e Leaves obtuse or rounded a.; cones less than 1 in. and with suborbicular scales which expand but little at maturity.....HEMLOCK (*Tsuga Canadensis*).

e² Leaves notched or rounded a.; cones more than 1 in. and oblong scales expanding widely at maturity...CAROLINA HEMLOCK (*Tsuga Caroliniana*).

c² LEAVES SCALE-LIKE IMBRICATED AND CLOSELY APPRESSED OR AWL-SHAPED, in four ranks and making a conspicuously

d Flat 2-edged branchlet; cones ½ in. or less, with few leathery scales, 4 only being fertile.....ARBOR VITAE (*Thuja occidentalis*).

d² 4-angled branchlet; fr.

e Subglobose cones, ¼ in., with peltate, valvate scales.

WHITE CEDAR (*Chamaecyparis thyoides*).

e² Fleshy, dark blue and glaucous berries (really modified cones);

f Leaves of two kinds, both scale like and awl-shaped; buds naked; fr.

g Maturing in autumn of first season.....RED CEDAR (*J. Virginiana*).

g² Maturing in autumn of second season.

ROCKY MOUNTAIN RED CEDAR (*J. scopulorum*).

f² Leaves all awl-shaped, buds scaly.....COMMON JUNIPER (*J. communis*).

c³ LEAVES NEEDLE-SHAPED; FRUIT A CONE;

d Leaves not in fascicles (scattered), short, stiff, pointing every way, ridged above and below (4-sided), with woody and persistent bases;

e Branchlets pubescent and foliage

f Yellowish-green; cones 1¼-2 in., oblong-cylindrical, on stalks which are slightly if at all incurved; cones with subentire scales.

RED SPRUCE (*Picea rubens*).

f² Blue-green; cones ¾-1¼ in., with incurved stalks; cones with erose margined scales.....BLACK SPRUCE (*Picea Mariniana*).

e² Branchlets glabrous; cones oblong-cylindrical; about

f 2 in. long, with nearly orbicular scales, truncate and entire at apex.

WHITE SPRUCE (*Picea Canadensis*).

f² 2½-4 in. long, with rhomboidal, flexuose scales, narrow erose-dentate and elongated at apex.....BLUE SPRUCE (*P. Parryana*).

d² *Leaves in fascicles,*

e Evergreen, quite stiff and in fascicles of

f 2 each, a membranaceous sheath inclosing the base of each fascicle, about

g 1 in. long, sheaths very short.....JACK PINE (*P. divaricata*).

g² 1½-2½ in. long; sheaths ⅛ in. or less; branchlets smooth and purple.
JERSEY PINE (*P. Virginiana*).

g³ 3-5 in. long; branchlets rough.

h Cones 1½-2 in., narrow ovoid, scales armed with weak prickles.

YELLOW PINE (*P. echinata*).

h² Cones 3-4 in., broad-ovoid, scales armed with very thick stout prickles.

TABLE-MOUNTAIN PINE (*P. pungens*).

g⁴ 5-6 in. long, thick and with smooth-bossed cones.

RED PINE (*P. resinosa*).

f² 3 each and 3-6 in. long; cones 1½-3 in.....PITCH PINE (*P. rigida*).

g⁵ 5-8 in. long; cones

h 2-3 in., globular-ovoid, persisting closed on the branches for some years.

POND PINE (*P. serotina*).

h² 3-5 in., narrow-ovoid, opening and discharging its seeds the year of maturity; resin-ducts in leaves near surface.

LOBLOLLY PINE (*P. Taeda*).

g⁶ 8-15 in., resin-ducts not near surface; cones cylindrical-ovoid, 6-10 in. long, breaking away from branch within its b.

LONG-LEAF PINE (*P. palustris*).

f³ Both 2 and 3 each; Rocky Mountain trees.

ROCK PINE (*P. ponderosa scopulorum*).

f⁴ 5 each, slender, 3-5 in.; cones 4-6 in., curved-cylindrical, with stems.

WHITE PINE (*P. Strobus*).

e² Deciduous, soft, short and in fascicles of many each (scattered on shoots of the season).....TAMARACK (*Larix Americana*).

a² COMPOUND LEAVES;

b Pinnately compound,

c ALTERNATE AND

d *Entire*;

e Leaflets 3, subsessile, obovate-oblong, remotely crenate-serrate; fr. samara.

HOP-TREE (*Ptelea trifoliata*).

e² Leaflets 7-9, short-stemmed, ovate to suborbicular and alternately arranged; fr. pod.....YELLOW WOOD (*Cladrastis lutea*).

c³ Leaflets 9-13, short-stemmed, ovate-oblong, abruptly acuminate; fr. shining white drupelet.....POISON SUMACH (*Rhus vernix*).

e⁴ Leaflets 11-21, short-stemmed, oblong, obtuse or rounded b., rounded and notched or bristle-tipped a.; fr. pod.

f Petioles and branchlets glabrous.....LOCUST (*Robinia Pseudacacia*).

f² Petioles and branchlets viscid.....CLAMY LOCUST (*R. viscosa*).

e⁵ 12-25, short-stemmed, lance-falcate; fr. drupe.

WESTERN SOAPBERRY (*Sapindus Drummondii*).

d² *Entire, but remotely serrate toward a.*; stem winged between the leaflets; fr. crimson drupelets.....DWARF SUMACH (*Rhus capallina*).

- d³ Entire, but with 1-4 glandular teeth at b.; fr. twisted samara.
TREE-OF-HEAVEN (*Ailanthus glandulosa*).
- d⁴ Serrate;
- e Leaflets 3-11, the lateral sessile, and successively larger towards the terminal one; fr. a nut enveloped in a 4-valved woody husk; leaflets
 - f 3-5, lanceolate; nut small, compressed,
 - g 4-angled; husk rather thick and parting to b.
SOUTHERN SHELL-BARK HICKORY (*H. Carolinae-Septentrionalis*).
 - g² Scarcely angled, husk rough, very thin and splitting with difficulty if at all.....NORTHERN HICKORY (*H. borealis*).
 - f² 5, lance-ovate to obovate; fr. with very thick husk splitting freely to b.
SHAG-BARK HICKORY (*H. ovata*).
 - f³ Both 5 and 7; fruit
 - g More or less compressed pyriform; husk thin and tardily dehiscent; nut quite smooth and thick-shelled.....PIG-NUT HICKORY (*H. glabra*).
 - g² Subglobose with husk splitting freely; nut small,
 - h Thin-shelled.....SMALL-FRUITED HICKORY (*H. microcarpa*).
 - h² Thick-shelled.....PALE-LEAF HICKORY (*H. villosa*).
 - f⁴ 7-9, mostly obovate and large; fr. with thick free-splitting husk and thick-shelled ribbed nuts; petioles and new growths
 - c Densely hirsute; bark with rough firm ridges (not shaggy); nut globular or little compressed.....MOCKER-NUT HICKORY (*H. alba*).
 - g² Glabrous or pubescent; bark shaggy with long strips; nut very large, compressed.....KING-NUT HICKORY (*H. laciniosa*).
 - f⁵ 7-11, lanceolate to narrow obovate, the lower ones somewhat falcate; fr. with elevated sutures; nut with thin shell and generally bitter cornel.
 - g Nut smooth, whitish and little compressed.
BITER-NUT HICKORY (*H. minima*).
 - g² Very rugose, ridged and compressed, brownish.
WATER HICKORY (*H. aquatica*).
 - f⁶ 9-11 lance-ovate, falcate; fr. cylindrical-oblong, husk thin.
PECAN (*H. Pecan*).
 - e² Leaflets 9-15, subsessile (except the terminal one) with reddish stems; fr. very small berry-like apples in loose cymose clusters; leaflets
 - f Acuminate, glabrous and teeth scarcely spreading; leaf-buds glutinous.
AMERICAN MOUNTAIN ASH (*Sorbus Americana*).
 - f² Acute or obtuse a.
 - g Leaf-buds with rusty appressed hairs; lfts. glabrate ab.; teeth spreading.
LARGE-FRUITED MOUNTAIN ASH (*S. scopulina*).
 - g² Leaf-buds whitish tomentose; lfts. pubescent.
ROWAN TREE (*Sorbus Aucuparia*).
 - e³ Leaflets 11-19 and
 - f Sessile, viscid-pubescent as is all new growth; fr. nut with indehiscent husk.....BUTTERUNT (*Juglans cinerea*).
 - f² Petiolulate, glabrous and leaf-stems spiny bn.; fr. capsule.
PRICKLY ASH (*Xanthoxylum Clava-Herculis*).
 - e⁴ Leaflets 13-25,
 - f Lance-ovate and green bn.; twigs glabrate; a large tree; fr. nut with indehiscent husk.....BLACK WALNUT (*Juglans nigra*).
 - f² Lanceolate, pale pubescent bn.; twigs velvety; a small tree; fr. drupelets with crimson hair.....STAG-HORN SUMACH (*Rhus hirta*).

c² LEAVES OPPOSITE; LEAFLETS

d 3-7, entire at base, serrate or serrate lobed above; fr. samaras obliquely winged and in pairs jointed together at b. BOX ELDER (*Acer Negundo*).

d² 5-11 and fr. a straight samara with terminal wing.

e Samara with seed-bearing portion flattened and wing extending the entire length

f Lateral leaflets sessile; calyx in the fertile flowers none.

BLACK ASH (*F. nigra*).

f² Lateral leaflets stalked; calyx present

g Samara obovate to spatulate; twigs terete.

WATER ASH (*F. Caroliniana*).

g² Samara elliptic to spatulate; twigs 4-sided.

BLUE ASH (*F. quadrangulata*).

e² Samara with seed-bearing portion subterete; wing not extending to base; leaflets stalked; calyx present in fertile flower

f Wing almost entirely terminal—slightly if at all decurrent on body

g Leaves and branchlets glabrous or nearly so.

WHITE ASH (*F. Americana*).

g² Leaves beneath and branchlets pubescent.

BILTMORE ASH (*F. Biltmoreana*).

f² Wing decurrent somewhat on sides of body but not to base

g Wing of samara spatulate

h Branchlets and leaves glabrous or nearly so; leaves green beneath.

GREEN ASH (*F. lanceolata*).

h² Branchlets and petioles velvety pubescent

i Samara less than 2 in. long; calyx small.

RED ASH (*F. Pennsylvania*).

i² Samara mostly 2 in. long or more; calyx enlarged.

PUMPKIN ASH (*F. profunda*).

g² Wing of samara long-linear. DARLINGTON ASH (*F. Darlingtonii*).

b² Palmately compound; fr. large coriaceous capsule; leaflets membranaceous and usually

c 7, lance-obovate, cuneate, apiculate a., wrinkled.

HORSE CHESTNUT (*Aesculus Hippocastanum*).

e² 5 (sometimes 6 or 7)

d Oval or oblong, subsessile or acute or short acuminate a.

OHIO BUCKEYE (*Aesculus glabra*).

d² Obovate-oblong, short-stemmed, acuminate.

SWEET BUCKEYE (*Aesculus octandra*).

a³ DECOMPOUND LEAVES;

b Evenly bipinnate, with 8-12 pairs of pinnae each with many oblong oblique leaflets about ½ in. long; fr. pod. MIMOSA TREE (*Albizia Julibrissin*).

b² Irregularly bipinnate or sometimes ternate, single leaflets taking the place of some pinnae; petioles

c Armed with prickles; fr. many small dark purple berries.

HERCULES CLUB (*Aralia spinosa*).

c² Unarmed; fr. large broad pods with large seeds and sweet pulp.

COFFEE-TREE (*Gymnocladus doicus*).

- a¹ **BOTH COMPOUND AND DECOMPOUND LEAVES**, the former often in fascicles,
tree armed with large branching thorns; fr. a shining
- c Long contorted and twisted linear many-seeded pod.
HONEY LOCUST (*Gleditsia triacanthos*).
- c² Short, oblique-ovate, 1-seeded pod.
WATER LOCUST (*Gleditsia aquatica*).

A SYSTEMATIC STUDY

OF THE

SPECIES WHOSE WOODS ARE REPRESENTED IN THE ACCOMPANYING SECTIONS.

The timbers comprised in the series which this text is designed to accompany belong to what are known, botanically speaking, as *Flowering* and mostly *Exogenous Plants*. At the outset, therefore, we will, once for all, define these groups; and, as the characters herein given are equally true of all the species enumerated in the following pages, they need not be repeated in the further definition of the various sub-groups and species.

FLOWERING OR PHÆNOGAMOUS PLANTS.

Plants producing flowers which consist essentially of stamens and pistils, the latter bearing ovules or seeds.

In distinction from the *Flowering Plants* are the *Flowerless* or *Cryptogamous Plants*, comprising the rest of the vegetable kingdom, from the very simply organized Slime Moulds and Bacteria up to the highly organized Ferns and Club-Mosses. But in the study of timbers this group is unimportant, as only in a few rare cases do any of its representatives attain the dimensions of trees. Those exceptions are the Tree-Ferns of tropical countries — gigantic ferns, which sometimes attain the height of fifty or sixty feet, with straight shafts quite like tree trunks and tops consisting of a bunch of enormous plume-like fronds. They, however, are of practically no value as timber.

EXOGENOUS OR DICOTYLEDONOUS PLANTS.

Flowering plants whose stems consist of a central column of pith surrounded by wood in concentric layers, and this in turn by bark; the stems increasing in thickness by the addition of a new layer each year to the wood externally and to the bark internally. Leaves mostly netted-vein. First leaves of the embryo (cotyledons) two and opposite, or (in the

Coniferæ) several in a whorl. Parts of the flower in fours or fives, very rarely in threes.

A second class of *Flowering Plants* and comprising the rest of the group is the *Endogenous* or *Monocotyledonous Plants*, characterized by having stems in which the wood occurs as threads or bundles running through a cellular, pith-like tissue so that a transverse section exhibits the wood as dots and not in concentric rings. Leaves mostly parallel-veined. Embryo with single cotyledon, or rarely two, and then alternate and unequal. Parts of the flower generally in threes. In southern United States and elsewhere in or near the tropics trees are found, such as the Palms, etc., which belong to this class, but none that we have to do with at present.

Exogenous plants are subdivided into two well-marked groups or subclasses — *Angiospermæ* and *Gymnospermæ*. The former includes by far the greater part of the Flowering Plants, and most of the species represented in "American Woods" are representatives of it.

ANGIOSPERMÆ.

Flowering, exogenous plants in which there is a complete pistil — with stigma and closed ovary — containing ovules which develop into seeds at maturity. This sub-class comprises many groups of plants known as Orders, and such as are represented by plants which attain the dimensions of trees, within the limits of the United States, we purpose to consider in the following pages:

ORDER MAGNOLIACEÆ: MAGNOLIA FAMILY.

Leaves alternate, simple, coriaceous, entire or lobed (never toothed), marked with minute transparent dots, feather-veined; leaf buds covered with membranous stipules, which soon fall away. *Flowers* single, large, polypetalous, polyandrous, polygamous, hypogenous, perfect; sepals and petals colored alike, in three or more circles of three each, imbricated in the bud, deciduous; anthers adnate: pistils numerous, packed together and covering the elongated receptacle, and forming in *Fruit* a sort of fleshy or dry cone containing one or two seeds in each carpel, with a minute embryo in fleshy albumen.

Trees or shrubs with aromatic and bitter bark.

GENUS MAGNOLIA, L.

Leaves folded lengthwise in the bud, embracing and embraced by the sheathing stipules. Leaf-buds conical. *Flowers* large, fragrant: sepals 3: petals 6-9: anthers longer than the filaments and opening inward: carpels 2-valved and 2-seeded, aggregated and coherent in a mass. *Fruit* a fleshy, somewhat woody cone, each carpel opening at maturity along its back, letting out its 1 or 2 berry-like seeds, suspended each by a long, extensile thread.

Trees and shrubs. (Genus named in compliment of Prof. Pierre Magnol, an early French botanist.)

251. MAGNOLIA FRASERI, WALT.

FRASER MAGNOLIA. EAR-LEAF OR LONG-LEAF CUCUMBER-TREE.

Ger., *Fraser-Magnolie*. Fr., *Magnolier de Fraser*. Sp., *Magnolia de Fraser*.

SPECIFIC CHARACTERS:—*Leaves* deciduous, clustered at the ends of the branchlets, obovate-spatulate, auriculate at base, acute or obtuse at apex, glabrous dark green above, paler beneath; buds glabrous, purplish green. *Flowers* white, fragrant, 8–10 in. across; sepals early deciduous; petals 6–9, spreading, obovate-spatulate, longer than the sepals and those of the outer rank larger and broader than those of the inner. *Fruit* oblong, glabrous, 3–4 in. long, the carpels with long curved beaks; seed compressed.

A tree of medium size, rarely more than 40 ft. (12 m.) in height, or with trunk more than 18 in. (0.46 m.) in diameter, and vested in a rather thin and quite smooth grayish brown, beech-like bark. It not infrequently sends up two or more trunks from a single base and is commonly crooked or leaning.

HABITAT. — The Alleghany Mountain region from southwestern Virginia southward to southern Alabama and the Chattahoochee River region of western Florida, most abundant on the southern slopes of the mountains between the altitudes of 2000 and 3000 ft. above tide, where it prefers the moist soil in the vicinity of streams. As we descend from these altitudes it becomes less and less common and more scattered among other trees.

PHYSICAL PROPERTIES. — Wood light, soft, not strong, satiny, not durable in contact with the soil, of close grain and easily worked. The sap-wood is usually abundant and of a pale-cream color, and the scanty heart-wood, which does not commonly show in trunks of less than 30 or 40 years of age, is of a purple-brown color. *Specific Gravity*, 0.5003; *Percentage of Ash*, 0.28; *Relative Approximate Fuel Value*, 0.4989; *Coefficient of Elasticity*, 94462; *Modulus of Rupture*, 707; *Resistance to Longitudinal Pressure*, 418; *Resistance to Indentation*, 123; *Weight of a Cubic Foot in Pounds*, 31.18.

USES. — Though not a wood of recognized commercial importance its properties would suggest its applicability to the uses for which the white-wood and the Cucumber-tree wood are used. An important point in the utility of the tree lies in its value for ornamental planting, its large rich green leaves, white fragrant flowers and curious fruit making it one of the most desirable of our deciduous trees, in localities where it will thrive, and these extend considerably beyond the limits of its natural range.

ORDER ILLICINEAE : HOLLY FAMILY.

Leaves simple, mostly alternate, coriaceous, ex-stipulate and mostly evergreen. *Flowers* small, white or greenish, axillary, 4-8 numerous and sometimes dicecious; calyx minute, free, imbricated in the bud; corolla regular, cleft or almost parted, hypogynous, imbricated in the bud; stamens as many as the divisions of the corolla, alternate with them and attached to their base; anthers adnate, opening lengthwise; ovary free from the calyx, 4-8-celled, with a single suspended ovule in each cell; stigmas 4-8 or united into one, nearly sessile. *Fruit* drupaceous, with 4-8 anatropous seeds containing large fleshy albumen and minute embryo.

Trees and shrubs of over one hundred species, some of considerable economic value.

GENUS ILEX, L.

Leaves alternate. *Flowers* lateral, single or clustered and usually perfect (but many are abortive), usually 4 (but sometimes 5-8) numerous; calyx persistent; petals distinct or scarcely united at the base, obtuse, oval or obovate, spreading; stigmas separate or united. *Fruit* a drupe-like berry, and usually red or purple.

(*Ilex* is an ancient Latin name, but originally applied to a species of Oak.)

252. ILEX MONTICOLA, GRAY.

MOUNTAIN HOLLY. LARGE-LEAF HOLLY.

Ger., *Berg-Steckpalme*. Fr., *Houx de Montagne*. Sp., *Acebo de la Montaña*.

SPECIFIC CHARACTERS: — *Leaves* deciduous, ovate to oblong-lanceolate, 3-5 in. long, obtuse or acute at base, acuminate or acute at apex, sharply serrate with slender pointed teeth, membranaceous, prominently arcuate-veined, glabrous dark green above, paler and glabrous except on the prominent veins beneath; petioles slender, about $\frac{1}{2}$ in. long. *Flowers* in June, in few-flowered cymes at the ends of short spurs on the growth of the previous season, or solitary on the new growth; calyx lobes acute, ciliate. *Fruit* subglobose, scarlet, sometimes nearly $\frac{1}{2}$ in. in diameter; nutlet prominently ribbed.

A small tree of a somewhat pyramidal habit of growth and under most favorable conditions attaining the height of 30 or 40 ft. (12 m.). The trunks of the largest trees may be 10 or 12 in. (0.30 m.) in thickness and are covered with a thin brownish gray bark slightly if at all roughened by fissures. In many localities it is a shrub rather than a tree.

PHYSICAL PROPERTIES. — Wood moderately heavy, hard, close-grained, with many small medullary rays and annual rings rather indistinctly indicated. The sap-wood is of a creamy white color and the small heart light brown. *Specific Gravity*, 0.6563; *Weight of a Cubic Foot in Pounds*, 40.90.

HABITAT. — The Appalachian Mountains, from the Catskills of New York State to northern Alabama and Georgia, but known as a tree only in the southern part of its range, as far north as North Carolina.

USES. — Wood very similar in appearance and properties to that of the commercial holly (*I. opaca*) and would doubtless be applied to the same uses were it procurable in sufficient size and quantity.

Although a highly desirable species for ornamental planting, on account of its attractive foliage and large fruit, the period of its retention of leaves and fruit is unfortunately short.

ORDER HIPPOCASTANACEÆ: HORSE-CHESTNUT FAMILY.

Leaves deciduous, opposite, petiolate, digitately compound, with 3–9 serrate leaflets, and without stipules. *Flowers* appearing after the leaves, conspicuous, polygamous, in showy terminal cymes or panicles, only the lowermost flowers generally fertile; pedicel jointed; calyx campanulate with 5 unequal lobes, imbricated in the bud; petals 4–5, unequal, clawed; disk hypogenous, annular; stamens 5–8, usually 7, unequal with elongated filiform filaments and introrse 2-celled anthers longitudinally dehiscent; ovary sessile, 3-celled, with 2 ovules in each cell; style slender, elongated, curved, and with terminal stigma. *Fruit* a coriaceous 3-valved 1–2-seeded capsule, loculicidally dehiscent; seeds large, round or irregularly himispherical with smooth shining brown coat, large pale hilum, large thick unequal cotyledons, 2-leaved plumule and remaining underground in germination.

Trees and a few shrubs with ill-scented bark, large branchlets and buds, and of about eighteen species natives of North America and Asia and grouped in two genera, *Aesculus* and *Billia*, the latter a genus of Mexico and Central America.

GENUS *AESCULUS*, L.

A genus of ten or twelve species of which four native and one naturalized are represented among the trees of America. The characters are those of the family.

The name is the classical name of a kind of oak and transferred to this genus.

253. *AESCULUS GLABRA*, WILLD.

OHIO BUCKEYE. FETID BUCKEYE.

Ger., *Ranzige-Kastanie*. Fr., *Marronnier Fetide*. Sp., *Castaño Fetido*.

SPECIFIC CHARACTERS: — *Leaves* with petioles 4–6 in. long and 5–7 oval or oblong leaflets 3–6 in. long cuneate and entire at base, acuminate, finely unequally serrate above, at maturity glabrous on upper surface, pubescent on the veins beneath and on the petioles. *Flowers* (April–May) yellowish green, about $\frac{3}{4}$ in. long, mostly unilateral in loose pubescent panicles 5–6 in. long; calyx campanulate; petals of nearly equal length, the claws about equally as long as the calyx but the lateral pair broader; stamens longer than the petals, usually 7, with long curved filaments; ovary pubescent and armed with prickles. *Fruit* irregularly obovate or subglobose, 1–2 in. long, more or less roughened with prickles; seed 1–1½ in. wide.

A small or medium-size tree, occasionally attaining the height of 75 ft. (23 m.) and with a trunk diameter of 2 ft. (0.61 m.), but it is not commonly of more than half these dimensions. When isolated it develops a

full, broad or rounded top. The bark of trunk is of a brownish gray color, rough with may friable and commonly rounded scales.

HABITAT. — The western slopes of the Alleghany Mountains, from western Pennsylvania to northern Georgia, and westward throughout the great Mississippi Valley to about central Nebraska and western Kansas. It is rather local in its distribution, inhabiting the banks of streams and rich bottom-lands, and, excepting in localities, is not an abundant tree. Its former abundance in Ohio is evinced by one of the names by which it is often known.

PHYSICAL PROPERTIES. — Wood light, soft, of very fine grain, satiny, rather tough and easily worked, and of a buff-white color, both in the sap and heart-wood, but the latter assuming a purple-brown color when about to decay. *Specific Gravity*, 0.4542; *Percentage of Ash*, 0.86; *Relative Approximate Fuel Value*, 0.4503; *Coefficient of Elasticity*, 64438; *Modulus of Rupture*, 494; *Resistance to Longitudinal Pressure*, 313; *Resistance to Indentation*, 71; *Weight of a Cubic Foot in Pounds*, 28.31.

USES. — A favorite wood for the manufacture of artificial limbs and splints and certain kinds of wooden ware where lightness and toughness are important qualities, and it is also used for paper pulp.

MEDICINAL PROPERTIES. — Said to be very useful in congestions of the portal circulation.*

ORDER SAPINDACEÆ: SOAPBERRY FAMILY.

Leaves alternate in the American representatives, petiolate, pinnately or palmately compound, without stipules. *Flowers* regular or slightly irregular, polygamous, diœcious; calyx 4-5-lobed or divided, imbricated in the bud; petals 4-5, imbricated; disk annular, fleshy; stamens usually 5-10 inserted on the disk; anthers introrse, 2-celled, longitudinally dehiscent; ovary solitary, with 2-4 lobes and cells or entire; ovules 1 or 2 in each cell; styles terminal. *Fruit*, a drupe or capsule with small solitary seed and containing no albumen.

Trees, shrubs and a few vines with watery juice and chiefly confined to the tropics of the Old World. Over a thousand species are known grouped in about twenty genera. Of the arborescent genera four are represented in the United States, all southward.

GENUS SAPINDUS, L.

Leaves mostly pinnate, deciduous. *Flowers* small, with short pedicels, in ample racemes or panicles; sepals 4-5, unequal; petals of same number and alternate with the sepals, each usually with a scale at its base inside and inserted under the edge of the disk; stamens 8-10 inserted on the disk, equal, usually with hairy filaments included in the perfect flowers but much longer and exerted in the staminate flowers; anthers versatile; ovary ascending and 3-celled with a single ovule in each cell; style columnar, short, and

* U. S. Dispensatory, 16th Ed., p. 1698.

2-4-lobed stigma. *Fruit* a 1-3 seeded drupe-like berry, subglobose or 2-3-lobed; seed one in each carpel, obovate, with smooth testa and hilum surrounded with silky hairs.

The name is from *sapo* and *Indus*, meaning *Indian soap*.

Trees and shrubs of wide distribution mainly in tropical regions and most abundant in Asia. About forty species are known of which three are found in southern United States, one ranging as far north as southern Missouri.

254. SAPINDUS DRUMMONDI, H. & A.

WESTERN SOAPBERRY. WILD CHINA-TREE.

Ger., *Drummond Steifenbeere*. Fr., *Savonier de Drummond*. Sp., *Arbol de Jaboncillo*.

SPECIFIC CHARACTERS: — *Leaves* glabrous or nearly so, with slender not winged rachises and 9-11 pairs of lanceolate usually falcate acuminate short-petiolate oblique entire leaflets 2-3 in. long, acute at base, glabrous above, pubescent, thickish. *Flowers* (May-June) about 3-16 in. across, white, in terminal compound panicles 6-9 in. long. *Fruit* ripening in early autumn and remaining, more or less shriveled, on the branches until spring, oval, about $\frac{1}{2}$ in. long, yellow, translucent, glabrous and slightly if at all keeled; seed dark brown.

An interesting tree of medium stature, attaining the height of from 50 to 75 ft. (20 m.), with few large branches and a trunk from $1\frac{1}{2}$ to 2 ft. (0.60 m.) in thickness above the strong buttresses which are found at its base. The bark of trunk is of an ashen gray color, rough with irregular and rather thin scales.

HABITAT. — Southern Kansas and southward throughout the region from western Louisiana to southern Arizona and southward into Mexico. It occupies the moist soil of bottom-lands and the vicinity of streams, generally scattered or in small groups among trees of other species.

PHYSICAL PROPERTIES. — Wood heavy, moderately hard, strong, with very fine medullary rays and layers of annual growth marked with many large open ducts. It is of a yellow-brown color with light greenish yellow sap-wood. *Specific Gravity*, 0.8126; *Percentage of Ash*, 1.50; *Relative Approximate Fuel Value*, 0.8004; *Coefficient of Elasticity*, 83681; *Modulus of Rupture*, 843; *Resistance to Longitudinal Pressure*, 470; *Resistance to Indentation*, 272; *Weight of a Cubic Foot in Pounds*, 50.64.

USES. — The facility with which the wood splits between the layers of growth makes this a useful timber for splints for the manufacture of baskets, for which it is employed in Texas, as the wood of the Black Ash of similar properties is employed in the Northern States.

ORDER ANACARDIACEÆ: CASHEW FAMILY.

Leaves alternate, simple or compound, without pellucid dots; stipules none. *Flowers* polypetalous, small, often polygamous, regular and furnished with bracts; sepals 3-5, united at the base, persistent; petals 5 (or sometimes wanting), imbricated in the bud; stamens 5 or 10, alternate with the petals and perigynous; ovary free, 1-celled and 1-ovuled; styles or stigmas 3. *Fruit* a berry or drupe, the seed containing no albumen.

Trees or shrubs with a milky resinous or gummy acrid juice, which, as well as the exhalations, are often poisonous.

GENUS RHUS, LINNÆUS.

Leaves alternate, mostly compound (rarely simple) without stipules. *Flowers* minute, white or greenish, polygamous or dioecious by abortion, in axillary or terminal compound panicles; calyx 5-lobed, generally persistent; petals 5, longer than the lobes of the calyx and inserted under the margin of the disk which surrounds the base of the free ovary imbricated in aestivation; stamens 5, alternate with the petals, with subulate filaments and oblong introrse 2-celled anthers, attached by the back and longitudinally dehiscent, rudimentary in the pistillate flowers; pistil with 1-celled ovary, three terminal styles with capitate stigmas, the ovary containing a single anatropous ovule suspended by a funiculus rising from the base of the cell. *Fruit* a smooth or hairy berry with thin dryish and resinous sarcocarp and crustaceous or horny endocarp; seed destitute of albumen and with thin membranous testa.

(The name, *Rhus*, is the old Latin and Greek name of the Sumach.)

255. RHUS VERNIX, L.

POISON SUMACH.

Ger., *Gift-Sumach*. Fr., *Sumach Empoisonne*. Sp., *Zumaque Venenoso*.

SPECIFIC CHARACTERS: — *Leaves* 7-14 in. long and with 7-13 short-petiolate ovate-oblong or obovate entire leaflets (the terminal one often 2 or 3-lobed) obtuse or acute and unequal at base and mostly acuminate at apex, lustrous dark green above, paler and prominently veined beneath. *Flowers* (June) yellow-green, $\frac{1}{8}$ in. across, in long loose axillary panicles. *Fruit* ripens in September and often hangs from leafless branches in the winter, in long loose panicles; drupe compressed globose, about $\frac{1}{4}$ in. in diameter, shining ivory white or grayish; stone striated.

A low tree with wide-spreading top of few branches, occasionally attaining the height of 20 or 30 ft. (8 m.), and with short trunk, rarely 10 or 12 in. (0.30 m.) in diameter. This is covered with a smooth dark-gray bark; prominently marked horizontally with large lenticels. Over a large part of its range it is considered rather a shrub than a tree.

HABITAT. — From about the latitude of the northern boundary of New York and Vermont, westward to Minnesota and southward to central Mississippi and Alabama, growing in swamps and along the low, miry banks of streams and ponds, where its existence is always made evident in autumn by the brilliancy of its red and yellow autumnal foliage and pearl-like fruit.

PHYSICAL PROPERTIES. — Wood light, soft, with fine medullary rays, and annual layers marked by several rows of rather small open ducts. — It is of a bright light-yellow color streaked with brown and greenish, and the thin sap-wood is nearly pure white. *Specific Gravity*, 0.4382; *Percentage of Ash*, 0.64; *Relative Approximate Fuel Value*, 0.4354; *Weight of a Cubic Foot in Pounds*, 27.30.

MEDICINAL PROPERTIES. — These are said to be identical with those of the allied Poison Ivy.

GENUS COTINUS, ADANS.

Leaves deciduous, simple, mostly petiolate, thinnish, obovate, oblong or oval, entire, glabrous or nearly so. *Flowers* small, greenish-yellow, diœcious or polygamous, in large loose terminal panicles with slender acerescens pedicels many of which are abortive and become villous; calyx lobes persistent; petals twice as long as the sepals; stamens 5, shorter than the petals; ovary obovoid, compressed; styles 3, lateral, spreading. *Fruit* 1-seeded dry obliquely oblong compressed glabrous drupelets, conspicuously reticulated and bearing the remnants of the styles on one side; stone bony. The drupelets occur in ample loose thyrsoid panicles with many plume-like abortive pedicels.

The name is the ancient Greek name of the *Wild Olive*, transferred to this tree.

Small trees of two species with aromatic milky juice, one a native of Europe and Asia and the other of southwestern United States.

256. COTINUS AMERICANUS, NUTT.

AMERICAN SMOKE-TREE. CHITTAM-WOOD.

Ger., *Amerikanischer Rauchbaum*. Fr., *Sumac Cotinus Americain*. Sp., *Arbol Fumoso Americano*.

SPECIFIC CHARACTERS: — *Leaves* oval to obovate, 4–6 in. long, thinish, mostly petiolate but the lowermost of the season's growth subsessile, decurrent on the petioles, rounded or emarginate at apex, entire, glabrous, dark green above, paler and pubescent on the mid-ribs beneath. *Flowers* (April-May) $\frac{1}{8}$ in. across greenish, in panicles 5–6 in. long. *Fruit* drupelets about $\frac{1}{8}$ in. long and produced sparingly among the plumose sterile pedicels.

A small tree, occasionally attaining the height of 30 or 35 ft. (10 m.), with spreading top of few large branches and trunk 12–14 in. (0.33 m.) in diameter, covered with an ash-gray bark roughened with many small imbricated scales.

HABITAT. — One of the rarest and most locally distributed trees of North America the Smoke-tree is found on limestone ridges in the vicinity of Huntsville, Alabama, and the Cheat Mountains of eastern Tennessee, in the valley of the Medina River in western Texas, and on the Ozark Mountains in southwestern Missouri and southwestward into Oklahoma. It is probably more common in the last-mentioned locality than in any other.

PHYSICAL PROPERTIES. — Wood soft, light, rather coarse-grained, with very small medullary rays and annual layers marked by several rows of small open ducts. It is of a beautiful golden brown color, with pure white sapwood of only one or two layer's growth. *Specific Gravity*, 0.6425; *Percentage of Ash*, 0.50; *Relative Approximate Fuel Value*, 0.6393; *Weight of a Cubic Foot in Pounds*, 40.04.

USES. — This wood yields an orange-colored dye, and its durability in contact with the soil makes it a useful wood for fence posts. It was formerly a much more abundant tree than at present, as the demand for it in earlier days for the above uses greatly reduced its abundance.

ORDER ROSACEÆ: ROSE FAMILY.

Leaves alternate and with stipules which sometimes fall early or are rarely wanting. *Flowers* regular; sepals 5 or rarely fewer, united at the base and often furnished outside with bractlets resembling the sepals; petals as many as the sepals, or, rarely, wanting. distinct and inserted on a disk which lines the calyx-tube; stamens distinct, numerous (with rare exceptions) and inserted with the petals on the disk of the calyx-tube; pistils 1-many, distinct or united and often combined with the calyx-tube. *Fruit* various, as drupe, pome, achenium, etc.; seeds solitary or few, mostly albumenless, with straight embryo and large thick cotyledons.

Trees, shrubs and herbs, many of great economic value in the production of most useful fruits, beautiful flowers, choice perfumes, etc.

GENUS PRUNUS, TOURNEFORT.

Leaves simple; stipules free and commonly deciduous. *Flowers* perfect, with calyx regular, free and falling away after flowering; petals widely spreading; stamens 15-30; pistil solitary with style terminal or nearly so, and ovary containing 2 pendulous ovules. *Fruit* a drupe, fleshy, with a smooth 1-seeded (rarely 2-seeded) pit.

Trees and shrubs. (*Prunus* is the ancient Latin name of the *plum-tree*.)

257. PRUNUS AMERICANA, MARSH.

WILD PLUM.

Ger., *Amerikanischer Schlehdorn*. Fr., *Prunier d'Amerique*. Sp., *Ciruelo Americano*.

SPECIFIC CHARACTERS: — *Leaves* ovate to obovate, $2\frac{1}{2}$ -4 in. long, narrowed and rounded or tapering at base, acuminate at apex, sharply and sometimes doubly-serrate, nearly glabrous when they unfold and at maturity rugose, dark green above, paler and with prominent reticulate veins beneath; petioles mostly glandless. *Flowers* when leaves are about half grown, in 2-4-flowered glabrous umbels; calyx lobes sometimes entire, pilose inside; petals white, rounded with claw. *Fruit* subglobose or slightly elongated with tough acerb skin orange or red often with pale spots; pit oval, rather smoothish and turgid and slightly ridged on the ventral side and obscurely grooved on the dorsal.

Var. *lanata* Sudw. is a form ranging from Missouri to Texas with pubescent under surfaces of leaves, calyx-lobes, pedicels and branchlets.

The American Wild Plum, which is the name applied to this particular species of the native American Plums of greatest distribution, is a small tree, generally with low broad top of stiff branches and slightly zigzag and somewhat spinous branchlets. When crowded by other trees it may attain the height of 30 or 40 ft. (10 m.). The trunk is rarely more than 12 in. (0.30 m.) in diameter, and is covered with a purplish brown bark rough with thinnish elongated scales.

HABITAT. — From central New York westward to the eastern slopes of the Rocky Mountains and southward to western Florida, southern Texas and the mountains of northeastern Mexico. It inhabits preferably moist, rich low-lands, and in the Southern States is even found in localities subject to annual inundation.

PHYSICAL PROPERTIES. — Wood heavy, hard, strong, close-grained, and of a rich brown color sometimes streaked with purple and with thin, lighter sap-wood. *Specific Gravity*, 0.7215; *Percentage of Ash*, 0.18; *Relative Approximate Fuel Value*, 0.7202; *Coefficient of Elasticity*, 82659; *Modulus of Rupture*, 864; *Resistance to Longitudinal Pressure*, 588; *Resistance to Indentation*, 213; *Weight of a Cubic Foot in Pounds*, 44.96.

USES. — The fruit of the American Plum is esteemed as one of our best native fruits, though differing considerably in quality in different trees. Some of the best forms have been introduced into cultivation under special names. Such are the De Soto, Louisa, Itasca, Minnetonka, etc.

ORDER ERICACEÆ: HEATH FAMILY.

Leaves commonly alternate, but sometimes opposite and rarely whorled, without stipules. *Flowers* regular, symmetrical, perfect and 4-5 numerous; corolla present and lobed or of distinct petals: stamens as many as the lobes of the corolla, or twice as many, free from it, but inserted with it on an annular disk; anthers usually introrse, commonly appendaged and opening by terminal chinks or pores, pollen compound, of 4 united grains (except in a few herbaceous species, the *Monotropæ*): pistil with single style, superior or inferior ovary, having as many cells as the lobes of the corolla, or rarely fewer. *Fruit* a berry, drupe or capsule with small anatropous seeds having small embryo in fleshy albumen.

A large family, mainly of shrubs, but a few trees and herbs, and quite various in characters.

GENUS VACCINIUM, L.

Leaves alternate and mostly small. *Flowers* small, white or pink, with bibracteolate pedicels, in axillary racemes or clusters or rarely solitary: calyx 3-5-lobed, valvate, persistent and the tube adnate to the ovary; corolla gamopetalous, epigynous, mostly urn-shaped or campanulate, 4-5-lobed, imbricated; stamens twice as many as the lobes of the corolla and inserted on its base under the edge of the thick disk; filaments short: anthers awned on the back and cells prolonged upwards into tubes opening by terminal pores: ovary 4-5 celled or imperfectly 8-10-celled: style filiform, erect, with terminal stigma: ovules numerous, anatropous, attached to inner angle of the cell. *Fruit* a berry 4-5 or

8-10-celled containing many compressed seeds with minute embryo surrounded with fleshy albumen.

The name is the classical Latin name of the European *Bilberry*.

This genus consists of shrubs (some epiphytal) and a few small trees with slender branchlets and many of its representatives with edible fruits.

258. VACCINIUM ARBOREUM, NUTT.

SPARKLEBERRY. FARKLEBERRY. TREE HUCKLEBERRY.

Ger., *Baumartige Heidelbeere*. Fr., *Vaciet d'arbre*. Sp., *Arbol de Arandano*.

SPECIFIC CHARACTERS: — *Leaves* deciduous northward but persistent southward, obovate to oval, $\frac{1}{2}$ - $2\frac{1}{2}$ in. long, subsessile, cuneate at base, rounded or acute at apex, with entire or obscurely denticulate and revolute margins, at maturity lustrous dark green above, paler and glabrous or puberulous beneath, coriaceous. *Flowers* (March-May) white, in leafy-bracted racemes, with slender pedicels $\frac{1}{2}$ in. long; corolla campanulate with 5 acute reflexed lobes; stamens 10, with hairy filaments. *Fruit* ripe in October, subglobose, $\frac{1}{4}$ in. in diameter, shining black.

A small tree, rarely more than 25 ft. (8 m.) in height, with top of spreading, contorted branches and many fine branchlets. The trunk rarely exceeds 8 or 10 in. (0.27 m.) in diameter, is often crooked or leaning and is vested in a thin brownish gray bark which exfoliates in elongated friable scales.

HABITAT. — From the coast region of North Carolina to southern Kansas and southward throughout the Southern States generally, as far west as eastern Texas, and ranging northward in the Mississippi valley to southern Illinois. It inhabits preferably sandy, moist soil of bottomlands and the banks of streams, and attains its greatest size and is most abundant in the region of the coast; in the interior and to the northward is more shrubby in habit of growth.

PHYSICAL PROPERTIES. — Wood heavy, hard, strong, of fine close grain with many rather conspicuous medullary rays, and of a pinkish white color, shading gradually into a light reddish brown heart. *Specific Gravity*, .07610; *Percentage of Ash*, 0.39; *Relative Approximate Fuel Value*, 0.7580; *Resistance to Longitudinal Pressure*, 399; *Resistance to Indentation*, 279; *Weight of a Cubic Foot in Pounds*, 47.43.

USES. — A useful wood in turnery, for tool handles and similar small articles of wooden ware. The fruit, though palatable, is little used, as it is not as accessible as that of some of the more shrubby species, and is rather inferior in quality.

MEDICINAL PROPERTIES. — The bark and leaves contain some tannin, on which account it is sometimes used in domestic practice, where an astringent action is desired.

GENUS KALMIA, L.

Leaves evergreen, coriaceous, entire, short-petiolate. *Flowers* mostly axillary in umbels, with slender pedicels from the axils of persistent bracts; calyx 5-parted, imbricated in the bud, persistent; corolla 5-lobed, saucer-shaped, pink, purple or white, and containing ten pouches with keels extending from the pouches to the lobes and sinuses; stamens 10, shorter than the corolla, with oblong anthers retained in the pouches of the corolla until the flower opens, then liberated by straightening of the elastic filiform filaments causing a discharge of the pollen; disk 10-lobed; ovary subglobose, 5-celled, with filiform exerted style and capitate stigma; ovules numerous in each cell, anatropous, attached to an axile placenta. *Fruit* a subglobose crustaceous, 5-celled capsule, obscurely 5-lobed tardily septically dehiscent from the persistent axis; seeds minute, subglobose, embryo in fleshy albumen.

The name is in honor of *Peter Kalm*, a Swedish botanist of the 18th century.

Small trees and shrubs of 6 or 7 species, all of which are found in the United States excepting one, which is a native of Cuba.

259. KALMIA LATIFOLIA, L.

MOUNTAIN LAUREL.

Ger., *Berg-Lorbeer*. Fr., *Kalmie de Montagne*. Sp., *Laurel de la Montaña*.

SPECIFIC CHARACTERS: — *Leaves* persistent, alternate, opposite and in threes, conduplicate, elliptic-lanceolate to oblong, acute at both ends, pubescent at first but at maturity lustrous dark green above, paler beneath, thick, rigid. *Flowers* (May-June), about $\frac{3}{4}$ in. in diameter, numerous in compound and crowded terminal corymbs, 3-6 in. across; pedicels slender, erect, glandular, pubescent; corolla white or pinkish and delicately penciled above. *Fruit* a depressed-globose glandular capsule, three-sixteenths in. in diameter with persistent calyx and style.

A small tree occasionally attaining the height of 30 or 40 ft. (10m.), with rounded top of stout diverging branches and with crooked or leaning and sometimes gnarled trunk which occasionally attains the diameter of 15 or 18 in. (0.40). The bark of trunk is of a yellowish gray color and exfoliates in narrow elongated fibrous scales.

HABITAT. — The Atlantic coast states from southern New Brunswick and Nova Scotia southward to northern Florida and westward to western Louisiana, but not extending far west of the Alleghanies excepting in the southern part of its range. It is only a shrub throughout most of its range, but attains the stature of a tree on the high Alleghany Mountains. It is uncommon and locally distributed to the northward, but very abundant and

forming vast thickets and distributed as an under-shrub throughout the forests on the slopes of the southern Alleghanies.

PHYSICAL PROPERTIES. — The wood is fine-grained, rather hard, heavy and strong, with fine medullary rays and of a reddish brown color, with thick lighter colored sap-wood. *Specific Gravity*, 0.7160; *Percentage of Ash*, 0.41; *Relative Approximate Fuel Value*, 0.7131; *Coefficient of Elasticity*, 58484; *Modulus of Rupture*, 639; *Resistance to Longitudinal Pressure*, 430; *Resistance to Indentation*, 262; *Weight of a Cubic Foot in Pounds*, 44.62.

USES. — The wood is useful in turnery for tool-handles and other small articles of wooden ware. The species ranks high in value for ornamental planting, it being one of the most beautiful shrubs of the North American forest when in flower, and its shining evergreen foliage is attractive at all seasons of the year.

MEDICINAL PROPERTIES. — The leaves are occasionally employed in medicine on account of astringent and reputed sedative and antiphlogistic properties, although their value is disputed by many physicians.

NOTE. — The leaves and other succulent parts are said to be poisonous to sheep, though, strangely, they are eaten with impunity by deer, goats, partridges and pheasants. Cases of poisoning in men have been reported from eating the flesh of birds which have subsisted largely on the buds and leaves.* Honey gathered from the flowers possesses properties poisonous to man, though not to the bees, and they raise brood on it with impunity.†

ORDER SAPOTACEÆ: SAPODILLA FAMILY.

Leaves alternate or sometimes clustered, simple, entire, pinnately-veined, mostly coriaceous, petiolate, without stipules. *Flowers* small, regular, perfect, in axillary clusters; calyx of 5-8 persistent sepals, imbricated; corolla hypogenous, 5-8-cleft, with an internal lobe-like appendage or two at each sinus and a short tube; disk none; stamens as many as the lobes of the corolla and opposite them inserted on the tube; anthers 2-celled, subextrorse, longitudinally dehiscent; pistil with ovary sessile, usually 5-celled, with simple style and terminal stigma, and containing a solitary anatropous ovule. *Fruit* a berry with persistent calyx at base and tipped with remnants of the style, usually 1-seeded, the seed containing a large straight embryo with or without albumen.

Trees, shrubs and vines with milky juice and of wide distribution throughout the warmer regions of the globe, some species producing valuable timbers or fruits and one producing the gutta percha of commerce. The family consists of about 400 species of 35 genera, of which 5 genera are represented in the trees of the United States, all subtropical excepting *Bumelia*.

* U. S. Dispensatory, 16th Ed., p. 1834

† A B C of Bee Culture, p. 263.

GENUS BUMELIA, SW.

Leaves alternate on vigorous shoots or clustered on spur-like lateral branchlets, conduplicate in the bud, oblanceolate to obovate, elliptical, more or less silky tomentose beneath, short petiolate. *Flowers* with slender pedicels, in crowded axillary fascicles; calyx subcampanulate, with 5 unequal lobes; corolla campanulate, white, 5-lobed, the rounded lobes and their appendages equal; stamens with short filiform filaments and sagitate anthers; ovary conical-ovoid, hirsute, with simple pointed style stigmatic at apex. *Fruit* an oblong, obovoid or subglobose black drupe, solitary or few together, with thin flesh and large seed having a thick smooth light brown crustaceous testa, basal hilum. large straight embryo with thick fleshy cotyledons and no albumen.

The name is the classical Greek for the *Ash-tree* transferred to this genus.

Small trees and shrubs with more or less spiniscent branchlets and of about 20 species, natives of the western hemisphere, 5 being found within the United State and four of these are small trees.

260. BUMELIA LANUGINOSA, PERS.

WOOLLY BUCKTHORN OR BUMELIA. GUM ELASTIC. CHITTIM-WOOD.

Ger., *Wolliger-Kreuzdorn*. Fr., *Nerprun laineux*. Sp., *Ladierna lanosa*.

SPECIFIC CHARACTERS: — *Leaves* mostly obovate or oblanceolate, 1-2½ in. long, narrow, cuneate at base, rounded or bluntly pointed at apex, woolly tomentose at first but at maturity dark green and glabrous above and densely tomentose beneath as are the short petioles and all new growth, tardily deciduous. *Flowers* (July-August) in usually several-flowered fascicles with pedicels about ¼ in. long; calyx with obtuse or rounded lobes; staminodia ovate, acute denticulate. *Fruit* drupe, black, ½ in. less in length; seed oblong, rounded at apex, about ¼ in. long.

Var. *rigida*, Gray, is a form found along the Mexican boundary with rigid spiniscent branchlets and smaller thicker leaves.

A small or medium-size tree, occasionally attaining the height of 50 or 60 ft. (16 m.), and when isolated develops an oval or rounded top of rigid branches, armed with short stout spines, and with leaves mainly clustered on short lateral spurs. The trunks are occasionally 2 or 3 ft. (0.7 m.) in thickness and are vested in a dark grayish brown bark deeply fissured into reticulated ridges, which finally exfoliate in thick scales.

HABITAT. — From southern Georgia and Florida westward to about central Texas and northward in the Mississippi valley to southern Missouri and Illinois, growing on dry rocky slopes and ridges.

PHYSICAL PROPERTIES. — Wood moderately heavy and strong, with very fine medullary rays and a markedly characteristic arrangement of the large and small open ducts. It is of a light yellowish brown color with abundant lighter sap-wood. *Specific Gravity*, 0.6544; *Percentage of Ash*, 1.23; *Relative Approximate Fuel Value*, 0.6464; *Coefficient of Elasticity*, 48334;

Modulus of Rupture, 387; *Resistance to Longitudinal Pressure*, 362; *Resistance to Indentation*, 160; *Weight of a Cubic Foot in Pounds*, 40.78.

USES. — The wood is used in Texas, where the species is comparatively abundant, in cabinet-making.

ORDER STYRACEÆ: STORAX FAMILY.

Leaves alternate, simple, pinnately veined and without stipules. *Flowers* regular, perfect; calyx more or less adnate to the ovary; corolla gamopetalous or polypetalous, with 4 or 8 lobes or petals; stamens twice as many as the lobes of the corolla or more, adnate to the tube and arranged in a single series; anthers introrse; ovary 2-5-celled, with slender simple style and terminal stigma; ovules anatropous. *Fruit* a drupe with thin dry flesh, sometimes winged; hard and mostly 1-seeded stone containing straight embryo and copious albumen.

Trees or shrubs with more or less stellate or scaly pubescence and confined to the warmer regions of the globe. About 75 species are known grouped in 7 genera. Two genera are represented in the United States and of these the following one is arborescent.

GENUS MOHRODENDRON, BRITT.

Leaves deciduous, oval to obovate-oblong, membranaceous, denticulate. *Flowers* bell-shaped, in fascicles or short racemes, with slender drooping pubescent bracteolate pedicels from the axils of the leaves of the previous year; calyx tube obconic, 4-ribbed, tomentose, adnate to the ovary and with short 4-toothed limb; corolla epigynous, 4-lobed or divided, thin and white, stamens 8-16, with flat filaments more or less united at base and slightly adnate to the base of the corolla; ovary 2-4-celled, with an elongated style, terminal stigma and 4 ovules in each cell, the upper ascending and the lower pendulous. *Fruit* a dry, oblong, 2-4-winged drupe, 1-4-celled, tipped with the style and calyx teeth and containing a thick-walled bony stone; embryo terete, axile.

Named in compliment to Dr. Chas. Mohr, botanist and author of the *Flora of Alabama*, etc.

Trees and shrubs of the southern Atlantic states of North America and comprised in three species of which two are aborescent and one shrubby. One of the former ranges as far north as southern Illinois.

261. MOHRODENDRON CAROLINUM, BRITT.

SILVER-BELL TREE. SNOW-DROP TREE.

Ger., *Carolina Maiglökenbaum*. Fr., *Colche d'Arbre de Carolina*. Sp., *Campanilla blanca de Carolina*.

SPECIFIC CHARACTERS: — *Leaves* oval to obovate-oblong, 4-6 in. long, acute or obtuse at base, mostly acuminate at apex, remotely serrulate, pale tomentose at first, at maturity glabrous dark green above, paler and more or less pubescent beneath. *Flowers* (March-April) on drooping pedicels; corolla slightly lobed, about $\frac{3}{4}$ in. long; stamens 10-16 with glabrous filaments; ovary 4-celled. *Fruit* ripening in late autumn, 4-winged, 1-2 in. long.

The Silver-bell Tree on the high Alleghany Mountains attains the height of 70 or 80 ft. (30 m.), with a trunk 3 to 4 ft. (1 m.) in diameter, but

elsewhere it hardly attains half the above dimensions, and in localities is rather a tall shrub than a tree. When isolated it develops a low broad or rounded top.

The bark of trunk is of a reddish brown color, fissured into longitudinal and more or less reticulated scaly ridges.

HABITAT. — From West Virginia and southern Illinois southward to central Florida, eastward throughout the Piedmont region of North and South Carolina and westward to eastern Texas, growing in rich moist soil and along the banks of streams. It attains its greatest growth and abundance on the western slopes of the Alleghanies in Tennessee.

PHYSICAL PROPERTIES. — Wood light, soft, strong, fine-grained, with open ducts quite uniformly distributed through the season's growth, and of a rich, mottled, reddish brown color, with thick, pinkish white sap-wood. *Specific Gravity*, 0.5628; *Percentage of Ash*, 0.40; *Relative Approximate Fuel Value*, 0.5605; *Weight of a Cubic Foot in Pounds*, 35.07.

USES. — In the limited region of its commercial importance (Blount, Sevier and Monroe Counties, Tenn.) the large Silver-bell trees yield valuable timber for cabinet-making, etc. There it is locally known as the *bellwood*, *peawood* and *chittam*, and the figured trunks yield a very beautiful veneering when cut with a rotary cutter.

The tree is deservedly popular for ornamental planting, on account of the abundance and beauty of its bell-shaped flowers, converting its branches into veritable garlands in early spring, and its handsome foliage and curious fruit during the summer and autumn.

ORDER OLEACEÆ : OLIVE FAMILY.

Leaves opposite and simple or pinnately compound. *Flowers* monopetalous (rarely apetalous or polypetalous); calyx 4-cleft, toothed or entire, or sometimes wanting, corolla regular, 4-cleft (or sometimes 4-petalous, or even wanting altogether); stamens only 2 (or rarely 4); ovary 2-celled with usually two suspended ovules in each cell. *Fruit* fleshy or capsular, containing 4 (or fewer) seeds.

Represented by trees and shrubs.

GENUS FRAXINUS, TOURNEFORT.

Leaves petioled, oddly-pinnate, with 3-15 toothed or entire leaflets. *Flowers* small, racemed or paniced, from the axils of the last year's leaves, the American representatives diœcious and apetalous; calyx and corolla, when present, as described for the order; anthers large, linear or oblong; style single, stigma 2-cleft. *Fruit* a 1-2-celled, flattened samara, winged at the apex, 1-2 pendulous seeds in each cell.

(*Fraxinus* is the ancient Latin name of the *ash*; supposed to be from the Greek φράξις, a *separation*, alluding to the facility with which the wood splits.)

262. FRAXINUS LANCEOLATA, BORCK.

GREEN ASH.

Ger., *Grüne Esche*. Fr., *Frêne Vert*. Sp., *Fresno Verde*.

SPECIFIC CHARACTERS: — *Leaves* 8–12 in. long with petiole and rachis glabrous or nearly so and 5–9 oblong-lanceolate to ovate petiolulate leaflets, cuneate at base, acuminate at apex, usually sharply serrate at maturity, glabrous or nearly so, bright green both sides or slightly lighter beneath; branchlets gray, terete, glabrous with pale lenticels. *Flowers* dioecious, without petals. *Fruit* samara, 1–2 in. long, with terete body tapering from the base, tipped with a spatulate or lanceolate wing decurrent about half way down the body.

The Green Ash rarely attains a greater height than 60 or 70 ft. (20 m.), or greater thickness of trunk than 2 or 3 ft. (0.70 m.). It develops a broad rounded top of slender spreading branches when isolated. The bark of trunk is of an ashen gray color, deeply furrowed into narrow, firm ridges.

HABITAT. — Chiefly a tree of the great Mississippi basin, inhabiting the banks of streams, lake shores and low-bottom lands, from the valley of the Saskatchewan to the shores of the Gulf of Mexico; westward to the Rocky Mountains and eastward to western Massachusetts, but is less abundant east of the Alleghany Mountains.

PHYSICAL PROPERTIES. — Wood rather heavy, hard, strong, with inconspicuous medullary rays and annual rings marked by several rows of large open ducts. It is of a rich, mottled light brown color, with thick creamy white sap-wood. *Specific Gravity*, 0.7117; *Percentage of Ash*, 0.65; *Relative Approximate Fuel Value*, 0.7071; *Coefficient of Elasticity*, 90313; *Modulus of Rupture*, 895; *Resistance to Longitudinal Pressure*, 482; *Resistance to Indentation*, 220; *Weight of a Cubic Foot in Pounds*, 44.35.

USES. — A valuable wood for the manufacture of agricultural implements, oars, tool-handles, etc., as is the wood of the White Ash from which it is not distinguished in commerce.

The Green Ash is a favorite shade tree in many of the cities and villages of the middle west, and is probably more extensively planted than any other ash tree.

263. FRAXINUS QUADRANGULATA, MICHX.

BLUE ASH.

Ger., *Blaue Esche*. Fr., *Frêne Bleu*. Sp., *Fresno Azul*.

SPECIFIC CHARACTERS: — *Leaves* 8–12 in. long with 7–9 ovate-oblong to lanceolate short-petiolulate leaflets 3–5 in. long, unequally rounded or obtuse at base, long-acuminate, closely serrate, tomentose at first but at maturity glabrous, dark yellow green above, paler

and glabrous or hairy-tufted in the axils of the veins beneath. *Flowers* perfect, in loose panicles; calyx almost obsolete; corolla none; stamens 2 with dark purple oblong anther-cells. *Fruit* linear-oblong, 1-2 in. long, winged all around, parallel-veined and the body extending more than half way to the emarginate apex.

The Blue Ash occasionally attains the height of 100 ft. (30 m.) or a little more, and has a diameter of trunk of 3 or 4 ft. (1 m.), in southern Indiana and Illinois, but elsewhere does not often surpass 75 ft. (25 m.) in height or 2½ ft. (0.75 m.) in thickness of trunk. The bark of trunk is of an ashen gray color and peculiarly rough with narrow elongated scales, which commonly loosen at their lower ends first and curve outwards, causing a more or less pronounced imbricated appearance. This peculiarity becomes more and more pronounced with age and gives to old trunks a remarkably rough and shaggy appearance.

HABITAT. — From southern Michigan to northern Alabama and central Arkansas, and from the western slopes of the Alleghanies in Kentucky and Tennessee to western Iowa and Nebraska, inhabiting mainly limestone ridges and slopes and nowhere in very great abundance.

PHYSICAL PROPERTIES. — Wood rather heavy, hard and brittle, with very obscure medullary rays and annual layers of growth marked by numerous large open ducts. It is of a light yellowish brown color with lighter sapwood. *Specific Gravity*, 0.7184; *Percentage of Ash*, 0.78; *Relative Approximate Fuel Value*, 0.7128; *Coefficient of Elasticity*, 77439; *Modulus of Rupture*, 811; *Resistance to Longitudinal Pressure*, 499; *Resistance to Indentation*, 222; *Weight of a Cubic Foot in Pounds*, 44.77.

USES. — The wood is used for flooring, agricultural implements, etc., and from the inner bark a blue dye is made, from which fact the tree takes its name. It is a tree of excellent habit of growth and other features which make it desirable for ornamental planting.

ORDER LAURACEÆ : LAUREL FAMILY.

Leaves alternate, simple, generally marked with pelucid dots and (as with the bark) aromatic. *Flowers* in clusters; sepals 4-6; colored, slightly united at the base, strongly imbricated in 2 rows in the bud; petals absent; stamens definite with 2-4-celled anthers which open by recurved lid-like valves; pistil solitary, free, 1-celled, 1-ovuled and with single style. *Fruit* a drupe or berry with single suspended anatropous albumenless seed. Trees and shrubs.

GENUS PERSEA, GAERTNER.

Leaves entire, evergreen. *Flowers* perfect, greenish or white, in small axillary pedunculate clusters or cymes, without involucre; calyx 6-parted, persistent; stamens 12 in 4 rows, those of the innermost sterile and rudimentary; anthers 4-celled, one pair above the other, opening by uplifted valves; anthers of three stamens extrorse, the others introrse. *Fruit* an ovoid drupe with persistent calyx at base and containing a single large seed.

Genus represented by trees and shrubs of which the delicious Avocado or Alligator Pear, the *P. gratissima* is one representative. (*Persea* is a classical name of some Oriental sacred tree.)

264. PERSEA BORBONIA, SPRENG.

RED BAY.

Ger., *Rother Lorbeerbaum*. Fr., *Laurier Rouge*. Sp., *Laurel Rojo*.

SPECIFIC CHARACTERS: — *Leaves* oblong-lanceolate, about equally pointed at both ends, with entire revolute margins, pilose at first but at maturity lustrous bright green above, paler and glaucous beneath, thick and firm, veins rather obscure and arcuate near the margin; petioles and new growths puberulous or nearly glabrous. *Flowers* with glabrous peduncles mostly from $\frac{1}{2}$ –1 in. long; calyx pale yellow. *Fruit* lustrous dark blue, about $\frac{1}{2}$ in. or less in diameter, with thin flesh and red stems.

The maximum size attained by the Red Bay is about 60 or 70 ft. (20 m.) in height and 3 to $3\frac{1}{2}$ ft. (0.80 m.) in diameter of trunk. This is vested in a grayish brown bark fissured into flat firm ridges.

HABITAT. — The Red Bay inhabits the coast region from Virginia to southern Florida and westward to the Brazos River in Texas, ranging northward west of the Mississippi River into Arkansas. It prefers the moist soil of bottom-lands, swamps and the vicinity of streams, but is occasionally found in dryer situations.

PHYSICAL PROPERTIES. — Wood of moderate hardness and strength, with thin obscure medullary rays and open ducts quite uniformly distributed. It is susceptible of a beautiful polish, and is of a reddish brown color with lighter sap-wood. *Specific Gravity*, 0.6429; *Percentage of Ash*, 0.76; *Relative Approximate Fuel Value*, 0.6380; *Coefficient of Elasticity*, 83900; *Modulus of Rupture*, 902; *Resistance to Longitudinal Pressure*, 573; *Resistance to Indentation*, 199; *Weight of a Cubic Foot in Pounds*, 40.07.

USES. — Wood used to some extent for interior finishing, cabinet work, etc., but too limited in supply to be of much commercial importance. The tree though ranking high in ornamental value, on account of its excellent habit of growth and shining evergreen foliage, has not attained the value for ornamental planting that it deserves.

ORDER ULMACEÆ : ELM FAMILY.

Leaves simple, alternate; stipules caducous. *Flowers* perfect or polygamous by abortion, apetalous, in loose clusters, not catkins; calyx somewhat bell-shaped, free from the ovary; stamens springing from the calyx, usually as many as its lobes and opposite them; filaments straight, ovary 1–2-celled with a single suspended ovule in each cell; styles or stigmas two. *Fruit*, a samara or drupe with suspended seed; no albumen.

Represented by trees, rarely shrubs.

GENUS CELTIS, TOURN.

Leaves pointed, somewhat oblique at the base. *Flowers* appearing with the leaves, greenish, axillary, monœciously polygamous; the *staminate flowers* in little fascicles or racemes; calyx 6-parted, stamens 6; the *fertile flowers* solitary or in pairs, pedunculate, calyx 5-parted, stamens 5, ovary 1-celled, styles 2, stigmas awl-shaped, elongated, recurved. *Fruit* a globular drupe, 1-seeded; seed containing a little gelatinous albumen, embryo curved, cotyledons crumpled.

(*Celtis* is the ancient Greek name of the *Lotus*.)

265. CELTIS MISSISSIPPIENSIS, Bosc.

MISSISSIPPI HACKBERRY OR SUGARBERRY.

Ger., *Mississippi Zürgelbaum*. Fr., *Micocoulier de Mississippi*. Sp.,
Almez de Mississippi.

SPECIFIC CHARACTERS:—*Leaves* ovate to oblong-lanceolate, inequilateral and often falcate, 3-nerved, from wedge-shaped to rounded and very oblique at base, long taper-pointed, entire or with remote low sharp teeth, smooth dark green above, paler beneath. *Flowers* as described for the genus. *Fruit* small orange brown drupes, $\frac{1}{8}$ to $\frac{1}{4}$ in. long, with thin flesh and reticulated pit.

Var. *reticulata* (Torr.) Sarg. is the *Palo Blanco* of the Southwest.

The Mississippi Hackberry is a tree sometimes 75 or 80 ft. (25 m.) in height with oblong or rounded head and more or less drooping lower branches, and a trunk seldom more than 2 or 3 ft. (0.80 m.) in thickness. The bark of trunk is very peculiar and characteristic. It is of a bluish gray color and smooth but for curious irregular corky excrescences which project at intervals prominently from its surface. These excrescences vary greatly in abundance, sometimes almost completely covering its surface and sometimes being almost entirely absent, but either extreme is exceptional.

HABITAT.—The banks of streams, lake shores and rich bottom-lands, and less commonly limestone ridges, from southern Indiana and Illinois southward throughout the Mississippi basin to the Gulf, and from the western base of the Alleghany Mountains to western Arkansas and eastern Texas and Mexico. It is also found throughout Florida.

PHYSICAL PROPERTIES.—Wood quite heavy, hard, strong and tough, with thin medullary rays, conspicuous large open ducts and regularly arranged rows of smaller ducts. It is of a light brownish yellow color, with thick greenish white sap-wood. *Weight of a Cubic Foot in Pounds*, 49.75.

Not found in large enough size or in sufficient abundance to be prominent in commerce, but of properties suitable for use in the manufacture of agricultural implements, etc.

It is valued as an attractive shade tree for street planting in southern villages and cities in the regions in which it grows.

ORDER MORACEÆ: * MULBERRY FAMILY.

Leaves simple, alternate, sometimes polymorphous, furnished with usually fugacious stipules. *Flowers* monœcious or diœcious, usually in spikes or heads; 3-5-lobed, becoming fleshy in the fruit, free, imbricated in the bud, or rarely wanting; corolla wanting; stamens as many as the calyx-lobes and opposite them, or fewer and inserted at their bases, with elastic filaments, inflexed in the bud; ovary free; 1- (or sometimes 2) celled, containing a single ovule; style filiform, single or 2-parted. *Fruit*, an achenium or drupe developed by the succulent calyx and with seed containing fleshy albumen and a curved embryo.

Trees and shrubs with milky and usually noxious or poisonous juice. They are mostly of the tropics and include many interesting trees, among which are the Banyan, Fig, Bread-fruit trees, etc.

GENUS BROUSSONETIA, VENT.

Leaves both alternate and opposite, entire or toothed, serrate, without lobes or variously 1-5-lobed, petioled, 3-nerved at base. *Flowers* diœcious, staminate in cylindrical nodding ament-like spikes; calyx 4-parted; stamens 4; pistillate flowers capitate with tubular perianth, stalked ovary and 2-cleft style. *Fruit* in a globular head and nutlet exerted with enlarged red fleshy stipe and perianth.

Named in honor of T. N. V. Broussonet, a French naturalist.

Trees and shrubs of three or four species with milky juice and natives of eastern Asia, one species being widely naturalized in eastern United States.

266. BROUSSONETIA PAPYRIFERA, VENT.

PAPER MULBERRY.

Ger., *Papier-Maulbeerbaum*. Fr., *Murier à papier*. Sp., *Moral de papel*.

SPECIFIC CHARACTERS: — *Leaves* usually ovate, 3-8 in. long, not lobed and also (especially on young plants) variously 3-5-lobed or with single lobe on one side all forms commonly on the same tree, cordate or rounded at base, acuminate, serrate-dentate, rough above, velvety tomentose beneath, long petiolate. *Flowers* in middle spring, staminate aments peduncled. *Fruit* heads $\frac{3}{4}$ in. across, with red exerted fleshy perianth.

The Paper Mulberry as seen in this country is a rather low tree with long lateral branches, and when isolated bearing a wide symmetrical top covering an area perhaps 40 or 50 ft. (14 m.) across and casting a dense shade. Such trees are generally not quite as tall as broad, and the short trunk may be 3 or 4 ft. (1 m.) thick, and is often much gnarled and convoluted. The bark of younger trunks is smooth and handsomely reticulated with pale yellow lines.

* *Moraceæ* is ranked by some authors as a sub-order of the order *Urticaceæ*.

HABITAT. — The native home of the Paper Mulberry is eastern Asia and adjacent islands. It was introduced into this country as an ornamental shade tree, and has become naturalized in the Southern States and as far north along the Atlantic coast at least as the vicinity of New York city.

PHYSICAL PROPERTIES. — Wood rather soft, light and coarse-grained, with obscure, short medullary rays and annual rings indicated by numerous large open ducts. It is of a rich pinkish brown color with yellowish white sap-wood.

USES. — The wood is not at present of commercial importance in this country. In the Orient the inner bark of the tree is extensively used in paper-making. Tappa cloth, extensively used by the natives of the South Pacific islands, is made from the inner bark by maceration and pounding to remove the non-fibrous portion.

ORDER JUGLANDACEÆ: WALNUT FAMILY.

Leaves alternate, pinnate and without stipules. *Flowers* monœcious and apetalous, except in some cases in the fertile flowers. *Sterile flowers* in catkins with an irregular calyx adnate to the scale of the catkin. *Fertile flowers* solitary or in small clusters, with calyx regularly 3-5-lobed, adherent to the incompletely 2-4-celled, but 1-ovuled ovary. *Fruit* a sort of dry drupe (a tryma), with a fibrous and more or less fleshy and coriaceous outer coat (shuck) very astringent to the taste, a hard, bony inner coat (shell), and a 2-4-lobed seed, which is orthotropous, with thick, oily and often corrugated cotyledons and no albumen.

All representatives of the order are trees.

GENUS HICORIA, RAF.

Leaves odd-pinnate with few leaflets; leaf-buds scaly and from them appear generally both kinds of flowers, the fertile at the extremity of the growth and the sterile at the base, the leaves between. (In one or two species, subgenus *Pecania*, the staminate catkins appear in lateral fascicles at the summit of the shoots of the preceding year.) *Sterile flowers* in slender, imbricated, mostly forked catkins; scales 3-parted; calyx mostly 3-parted; stamens 3-10, free, filaments short or wanting and anthers hairy. *Fertile flowers* clustered 2-5 together, their common peduncle terminating the shoot of the season; calyx 4-cleft, superior; petals none; stigmas sessile, 2-lobed, the lobes bifid, papillose, persistent. *Fruit* (October) with a coriaceous but at length dry and hard epicarp (shuck), finally falling away in 4 more or less distinct valves, and a smoothish horny endocarp (shell) with a 2-lobed nucleus.

Trees with hard bark, very tough wood and continuous pith.

Name is adapted from the North American Indian name.

267. HICORIA PECAN, BRITT.

PECAN.

Ger., *Pecan-nuszbaum*. Fr., *Pacane*. Sp., *Pacana*.

SPECIFIC CHARACTERS: — *Leaves* 12–20 in. long with 9–15 lanceolate to lanceolate-oblong falcate subsessile leaflets which are long-pointed, inequilateral and rounded or wedge-shaped at base; bud-scales few, valvate. *Flowers* in early June; staminate in subsessile aments, 3–5 in. long; calyx with middle lobe linear and much longer than the oblong lateral lobes. *Fruit* in clusters of 3–11, oblong-cylindric, pointed, 1–2½ in. long, with prominent sutures and thin brittle husk splitting to the base; nut 1–2 in. long, pointed, with smooth thin brown shell with black markings, thin astringent dissepiments and delicious seed.

The Pecan tree is the largest of the Hickories, and in the primeval forests it is said that it attained the great size of 150 ft. (45 m.) or more in height, with great buttressed trunks 5 or 6 ft. (1.50 m.) in diameter above the buttresses. As commonly seen growing in open fields one is impressed with the great size of its shapely oblong or obovoid top, as compared with the thickness of the supporting trunk. This is vested in a brownish gray bark, fissured into narrow, more or less reticulated ridges, and is readily distinguished from the barks of other Hickories.

HABITAT. — The Mississippi River valley, from eastern Iowa and southern Illinois and Indiana, southward to central Alabama and Mississippi, eastward to central Kentucky and Tennessee and westward into Texas, inhabiting rich bottom-lands, especially those subject to occasional inundation. It is also found in Mexico, but there, on mountain ranges.

PHYSICAL PROPERTIES. — Wood moderately heavy, hard, strong and tough, with inconspicuous medullary rays, and of a light chocolate brown color and with very thick creamy white sap-wood.

USES. — Wood used in the manufacture of wagons, agricultural implements, etc., and for fuel, but not generally considered as valuable as the wood of the other hickories. The chief popularity of the tree lies in its fruit, the pecan nut being a too well-known article of commerce to require comment here. The nut of the wild tree is small and inferior as compared with the commercial article, which shows the improvement of generations of skillful propagation and selection.

ORDER MYRICACEÆ: SWEET-GALE FAMILY.

Leaves alternate, resinous or waxy-dotted, generally fragrant and without stipules or with caducous stipules. *Flowers* monœcious or diœcious with both staminate and pistillate flowers in scaly catkins, calyx and corolla wanting; stamens usually 4–6 (2 to 16) sessile

or with filaments united into a sort of stipe; ovary inferior, 1-celled, with single erect orthotropous ovules, styles two filiform, stigmatose along the inner sides. *Fruit*, drupaceous, often waxy-coated and containing a single exalbuminous seed.

GENUS MYRICA, LINNEAUS.

Leaves alternate, evergreen or deciduous, resinous-dotted, irregularly dentate or lobed (rarely entire) pinnately veined, without stipules or stipules falling away early. *Flowers* monœcious or diœcious in aments which form in the summer in the axils of the leaves of the year (the staminate from axils below those producing the pistillate when both are borne on the same plant), and remaining over winter open the next spring, the small, naked flowers appearing in the axils of the scales of the ament. Staminate aments oblong-cylindrical, dense; stamens 2 to 16 at the base of the scale, subtended by two or more scale-like bractlets; filaments free or united at base into a sort of stipe, anthers erect, ovate, 2-celled, longitudinally dehiscent. Pistillate flowers in ovoid aments; ovary sessile, styles forked, stigmatic on inner faces. *Fruit* a small subglobose drupe with exocarp generally papillose and covered with a waxy exudation, endocarp thick and hard, seed erect, exalbuminous with straight embryo.

Genus composed of small trees and shrubs, mostly of temperate and warmer climates, several of them being of considerable economic importance, mainly from the yield of wax which is exuded from the surface of the fruit.

(*Myrica* is the ancient Greek name of some kind of shrub, thought to be the Tamarisk, transferred to this species.)

268. MYRICA CERIFERA, L.

WAX MYRTLE. BAYBERRY. CANDLEBERRY.

Ger., *Wachsbaum*. Fr., *Cirier*. Sp., *Arayan de Cera*.

SPECIFIC CHARACTERS:—*Leaves* oblong-lanceolate to oblanceolate, $1\frac{1}{2}$ -5 in. long, cuneate at base and decurrent on the short petiole, acute, remotely serrate chiefly above the middle or entire, dark green above and paler beneath, fragrant with yellow resin glands. *Flowers* (March-April) diœcious; staminate aments $\frac{1}{2}$ - $\frac{3}{4}$ in. long, cylindric; stamens few; pistillate aments oblong, shorter than the staminate. *Fruit* globose drupes, $\frac{1}{8}$ in. or less in diameter, coated with bluish white wax and tipped with base of style, ripening in early autumn and long persisting.

The Wax Myrtle is a shrub or small tree occasionally 40 ft. (12 m.) in height, and 10 or 12 in. (0.25 m.) in thickness of trunk. This is often crooked or leaning, and in the forests of the low regions in the vicinity of the coasts it is found in clusters or small groups. The bark of trunk is smooth and of a mottled, light gray color. Over a large part of its range it is only a shrub in stature and habit of growth.

HABITAT.—In arborescent form the wax myrtle is confined to swamps and low-lands of the coast region from southern Maryland to Florida; thence westward into Texas and northward in Lower Mississippi valley into

Arkansas. In its shrubby form it is found farther into the interior of the country and in dryer situations.

PHYSICAL PROPERTIES. — Wood light, soft, not strong, close-grained, with thin medullary rays and quite uniformly distributed fine open ducts. It is of a mottled brown color, with pinkish white sap-wood. *Specific Gravity*, 0.5637; *Percentage of Ash*, 0.51; *Relative Approximate Fuel Value*, 0.5608; *Coefficient of Elasticity*, 88778; *Modulus of Rupture*, 815; *Resistance to Longitudinal Pressure*, 445; *Resistance to Indentation*, 144; *Weight of a Cubic Foot in Pounds*, 35.13.

USES. — Wood little used, though suitable for use in turnery for small articles of wooden ware. The fruit is sometimes gathered, or was abundantly in former days, for making candles. Its coating of wax, known as "Myrtle Wax," is removed by heating in water, and with it a very good candle is made, which burns with some fragrance and a distinctly bluish light.

MEDICINAL PROPERTIES are asserted of the wax which is procured from the fruit. It has been popularly employed as a remedy for dysentery, the powdered wax in doses of a teaspoonful, with mucilage or syrup, being given, frequently repeated.*

ORDER CUPULIFERÆ: OAK FAMILY.

Leaves alternate, simple, straight veined; the stipules, forming the bud-scales, deciduous. *Flowers* monœcious, apetalous. *Sterile flowers* in clustered or racemed catkins (or in simple clusters in the Beech); calyx regular or scale-like; stamens 5–20. *Fertile flowers* solitary, clustered or spiked and furnished with an involucre which forms a cup or covering to the nut; calyx-tube adherent to the ovary, its teeth minute and crowning the summit; ovary 2–7-celled with 1–2 pendulous ovules in each cell, but all of the cells and ovules, except one, disappearing before maturity; stigmas sessile. *Fruit* a 1-celled, 1-seeded nut, solitary or several together and partly or wholly covered by the scaly (in some cases echinate) involucre cup or covering; seed albumenless, with an anatropous, often edible, embryo; cotyledons thick and fleshy.

Order is represented by trees and shrubs of wide geographic distribution.

GENUS QUERCUS, LINNÆUS.

Flowers greenish or yellowish. *Sterile flowers* in loose, slender, naked catkins, which spring singly or several together from axillary buds; calyx 2–8-parted or cleft; stamens 3–12; anthers 2-celled. *Fertile flowers* with ovary nearly 3-celled and 6-ovuled, two of the cells and 5 of the ovules being abortive; stigma 3-lobed; involucre developing into a hard, scaly cup around the base of the nut or acorn, which is 1-celled, 1-seeded.

(*Quercus* is the ancient Latin name for the Oak, supposed to be from the Celtic *quer*, *fine*, and *cuez*, *tree*.)

269. QUERCUS DIGITATA, SUDW.

SPANISH OAK. FINGER OAK.

Ger., *Finger-Eiche*. Fr., *Chêne de doiget*. Sp., *Roble de dedo*.

SPECIFIC CHARACTERS: — *Leaves* variable, oblong to obovate, rounded or wedge-shaped at base and often irregularly deeply pinnatifid with 3–7 oblique and often falcate or long and narrow entire or dentate and bristle-tipped acuminate lobes or sometimes with merely 3 short spreading lobes at apex, lustrous dark green above and gray or pubescent beneath. *Flowers* staminate with thin scarious pubescent 4–5-lobed calyx; stigmas slender, dark red. *Fruit* sessile or short-stalked acorn, about $\frac{1}{2}$ in. long and not more than one-third covered by the thin flat or turbinate shallow cup covered with thin obtuse closely appressed scales.

The Spanish Oak does not often attain a greater height than 70 or 80 ft. (25 m.) or diameter of trunk than 3 or 4 ft. (1 m.), but in particularly favorable localities has been known to attain 100 ft. (30 m.) in height and 4 or 5 ft. (1.50 m.) in diameter of trunk. The bark of trunk is of a dark or reddish brown color and is fissured into long scaly firm ridges. When growing in the open the tree develops a top of stiff far-reaching branches and stout branchlets.

HABITAT. — From southern New Jersey southward through the Atlantic coast states to central Florida, and throughout the Gulf coast states to the valley of the Brazos River in Texas, ranging northward in the Mississippi valley to southern Indiana and Illinois. It grows on dry gravelly uplands and slopes, as well as rich bottom-lands that are not too wet.

PHYSICAL PROPERTIES. — Wood heavy, hard, strong, coarse-grained, with rather remote large medullary rays, not durable in contact with the soil and of a reddish or yellowish brown color, with pale creamy white sap-wood. *Specific Gravity*, 0.6928; *Percentage of Ash*, 0.25; *Relative Approximate Fuel Value*, 0.6911; *Coefficient of Elasticity*, 140151; *Modulus of Rupture*, 1193; *Resistance to Longitudinal Pressure*, 596; *Resistance to Indentation*, 201; *Weight of a Cubic Foot in Pounds*, 43.18.

USES. — Wood useful in the manufacture of agricultural implements, furniture, interior finishing, etc., though inferior in value to the woods of the white oak group. It is largely used for fuel, and its bark, which is rich in tannin, is used in tanning leather.

The tree has its place as an ornamental shade tree of recognized value, the drooping nature and coloring of its curious foliage giving it a pleasing effect and peculiar feature.

270. QUERCUS IMBRICARIA, MICHX.

SHINGLE OAK.

Ger., *Schindel-Eiche*. Fr., *Chêne de Bardeau*. Sp., *Roble de Ripa*.

SPECIFIC CHARACTERS: — *Leaves* oblong or oblong-lanceolate, 4-6 in. long, sometimes bristle-tipped, particularly when young, acute or obtuse at apex and wedge-shaped or rounded at base, with entire or slightly undulate margins, coriaceous, reddish or yellowish green and tomentose at first, at maturity very lustrous dark green above, paler and pubescent beneath with yellowish midribs and prominent veins; petioles short, pubescent. *Flowers* staminate aments slender and numerous, hoary-tomentose, 2-3 in. long with yellowish pubescent 4-lobed calyx; pistil with short tomentose peduncles; stigmas recurved. *Fruit* solitary or 2 or 3 together with short peduncles and subglobose dark brown or striated nut about $\frac{1}{2}$ in. long and one-third inclosed in a flattish turbinate cup of small closely imbricated pubescent scales.

The Shingle Oak in particularly favored localities has been known to attain the height of 100 ft. (33 m.), when growing in the forest, with a columnar trunk 3 or 4 ft. (1 m.) in diameter, but usually it is a considerably smaller tree, and when growing in the open develops a full rounded or ovoid top. The bark of trunk is of a dark gray color, fissured into low, firm, uneven ridges.

HABITAT. — From Pennsylvania westward to southern Iowa and eastern Kansas, and southward into northern Georgia, Alabama and Arkansas, growing on rich uplands and slopes, as well as lowlands that are not too wet.

PHYSICAL PROPERTIES. — Wood heavy, hard, strong, rather coarse-grained, with moderately large medullary rays, and of a light reddish brown color with creamy white sap-wood. *Specific Gravity*, 0.7529; *Percentage of Ash*, 0.43; *Relative Approximate Fuel Value*, 0.7497; *Coefficient of Elasticity*, 119357; *Modulus of Rupture*, 1218; *Resistance to Longitudinal Pressure*, 552; *Resistance to Indentation*, 226; *Weight of a Cubic Foot in Pounds*, 4692.

USES. — A useful wood in the manufacture of furniture, interior furnishing, etc., and in regions where abundant, and more suitable wood is not easily available, for clapboards and shingles. It is from this last-mentioned use that the tree receives its name.

The Shingle Oak makes a very attractive and ornamental shade tree for door-yards and parks, and deserves to be more extensively planted than it now is.

271. QUERCUS PHELLOS, L.

WILLOW OAK.

Ger., *Weiden-Eiche*. Fr., *Chêne de Saule*. Sp., *Roble de Sauce*.

SPECIFIC CHARACTERS: — *Leaves* oblong-lanceolate $2\frac{1}{2}$ –5 in. long, acute at both ends with very short petiole and usually bristle-tipped, entire or with slightly undulate and revolute margins; revolute in the bud and light green and pubescent when they unfold, but finally lustrous light green, paler and usually glabrous with pubescent midribs beneath. *Flowers* staminate calyx yellow, pubescent, 4–5-lobed; pistillate with short glabrous peduncles and slender recurved stigmas. *Fruit* sessile or with short stalks, usually solitary, with subglobose or hemispherical pale-pubescent nut and thin flat saucer-shaped cup enveloping only its base and covered with small thin closely imbricated scales.

The Willow Oak occasionally attains the height of 70 or 80 ft. (22 m.), and its trunk may be 2 or 3 ft. (0.90 m.), vested in a brownish gray bark, furrowed into many low, firm, longitudinal ridges. When isolated from other trees it develops an ovoid or rounded top, with many slender branches.

HABITAT. — From Staten Island, N. Y., southward between the Alleghanies and the coast to northern Florida, thence westward in the Gulf coast region to Texas, and northward to southeastern Missouri and western Kentucky, inhabiting alike the lowlands and rich slopes and uplands.

PHYSICAL PROPERTIES. — Wood heavy, hard and strong, rather coarse-grained and of a light mottled reddish brown color, with creamy white sapwood. *Specific Gravity*, 0.7472; *Percentage of Ash*, 0.50; *Relative Approximate Fuel Value*, 0.7435; *Coefficient of Elasticity*, 78440; *Modulus of Rupture*, 989; *Resistance to Longitudinal Pressure*, 390; *Resistance to Indentation*, 216; *Weight of a Cubic Foot in Pounds*, 46.57.

USES. — Wood used to some extent in the manufacture of agricultural implements, house-building material, etc., and for fuel. An interesting tree for planting in parks and door-yards, and deserving of more extensive use for this purpose than has hitherto been made of it.

GENUS CASTANEA, TOURN.

Leaves alternate, strongly straight-veined, acuminate and expanding before the flowers. *Sterile flowers* clustered in long naked cylindric axillary catkins; calyx 5–6-parted; stamens 5–20 with slender filaments and 2-celled anthers. *Fertile flowers* usually three together inclosed in an ovoid, 4-lobed, scaly involucre cup; calyx 5–6-lobed, adherent to the 3–7-celled, 6–14-ovuled ovary; stigmas awn-shaped and as many as the cells; abortive stamens 5–12. *Fruit* a globose, hard, very prickly, 4-valved dehiscent involucre, inclosing each, 1–3 coriaceous 1-seeded nuts; cotyledons very thick.

Trees and shrubs. (“*Castanea*” is the ancient Greek name of the chestnut.)

272. *CASTANEA PUMILA*, MILL.

CHINQUAPIN. CHINKEPIN.

Ger., *Kleine Castanie*. Fr., *Chincapin*. Sp., *Castaña enano*.

SPECIFIC CHARACTERS:—*Leaves* narrow-oblong, 3–5 in. long, mostly acute at apex, narrowed and wedge-shaped or rounded at base, coarsely serrate with slender pointed teeth, tomentose at first, at maturity glabrous dark green above, whitish tomentose beneath; petioles short stout and branchlets the first season pubescent. *Flowers* (June-July) staminate aments 2–6 in. long, hoary-tomentose; pistillate flowers at the bases of the upper androgynous aments, sessile or nearly so. *Fruit* involucre 1–1½ in. in diameter, commonly in spike-like clusters, densely crowded with slender sharp spines outside, opening generally by 2 or 3 valves and containing a single round-ovoid lustrous dark brown nut pointed and white-pubescent at apex, ½–¾ in. long and containing a large sweet seed naked at apex with scars of abortive ovules.

The Chinquapin sometimes attains the height of 40 or 50 ft. (15 m.), and such a tree may have a trunk diameter of 2 or 3 ft. (0.80 m.), with dark grayish or reddish brown bark, fissured into long loose scales. When isolated it develops a wide-spreading or rounded top, but only throughout a comparatively small portion of its range does it attain the stature of a tree. Elsewhere it is rather a shrub than a tree.

HABITAT.—From southern Pennsylvania to northern Florida and Texas, occupying dry, gravelly slopes and ridges, as well as the rich bottom-lands.

PHYSICAL PROPERTIES.—Wood very similar in properties and uses to that of the allied Chestnut. It is light, moderately hard and strong, coarse-grained, with very small medullary rays and numerous large open ducts marking the annual layers of growth, durable in contact with the soil, and of a yellowish brown color, with thin, lighter sap-wood. *Specific Gravity*, 0.5887; *Percentage of Ash*, 0.12; *Relative Approximate Fuel Value*, 0.5880; *Coefficient of Elasticity*, 114108; *Modulus of Rupture*, 991; *Resistance to Longitudinal Pressure*, 495; *Resistance to Indentation*, 118; *Weight of a Cubic Foot in Pounds*, 36.69.

USES.—The durability of the wood in contact with the soil makes it excellent for fence-posts, rails, railway ties, etc., and the delicious nuts which are borne in abundance form a commodity in the markets of the southern cities and villages.

ORDER SALICACEÆ: WILLOW FAMILY.

Leaves alternate, simple, undivided and furnished with stipules, which are either scale-like and deciduous, or leaf-like and persistent. *Flowers* diœcious, both kinds in catkins, one under each bract or scale of the catkin and destitute of both calyx and corolla, or the

former represented by a gland-like cup; ovary 1 to 2-celled; styles wanting, or 2 and short; stigmas often 2-lobed. *Fruit* a 1 or 2-celled, 2-valved capsule, with numerous seeds springing from two parietal or basal placentæ and furnished with long, silky down; seeds ascending, anatropous, without albumen; cotyledons flat.

Trees or shrubs of rapid growth, light wood and bitter bark.

GENUS SALIX, TOURN.

Leaves generally narrow, long and pointed and usually with conspicuous stipules; bud scales single. *Flowers* appearing before or with the leaves in terminal and lateral cylindrical, imbricated catkins, the scales or bracts of which are entire and each subtending a flower, which is without calyx, and bears at its base 1 or 2 small nectiferous glands. *Sterile flowers* with 2 (but sometimes more) distinct or united stamens. *Fertile flowers* ovary ovoid lanceolate, taper-pointed; style short; stigmas 2, short and mostly bifid. *Fruit* a 1-celled capsule, dehiscent at maturity by two valves which roll back to the base to liberate the numerous minute comose seeds.

Trees and shrubs with lithe round branches and growing mostly along streams and in moist localities. (*Salix* is from the Celtic *sal*, *near* and *lis*, *water*, alluding to the favorite locality of the willows.)

273. SALIX FLUVIATILIS, NUTT.

SAND-BAR WILLOW. LONG-LEAF WILLOW.

Ger., *Langblättrige Weide*. Fr., *Saule de Longefeuille*. Sp., *Sauce de Hojas Largas*.

SPECIFIC CHARACTERS: — *Leaves* involute in the bud, linear-lanceolate, 2-6 in. long, gradually tapering to both ends, remotely dentate with small glandular spreading teeth, glabrous, pubescent, yellowish green; stipules small, deciduous; petioles short and not glandular. *Flowers* (April-May) aments on terminal short leafy branchlets, often branching, with pubescent peduncles or from axillary buds of same branchlets; scales light yellow, villous; stamens 2 with filaments slightly hairy at base; ovary short-stalked with large sessile lobed stigmas. *Fruit* capsules narrow-ovoid, glabrate.

A small tree, occasionally attaining the height of 60 ft. (18 m.), with slender upright branches, and trunk 2 ft. (0.60 m.) in diameter, but such dimensions are rare. It is usually a much smaller tree, or covers large areas as only a shrub. The bark of trunk is thin, of a dark reddish brown color and quite smooth, or slightly fissured into low, longitudinal ridges.

HABITAT. — A species of very wide distribution, being found from western New England and the vicinity of Quebec, across the continent to the Pacific coast, and from the valley of the Mackenzie River above the Arctic circle, southward to northern Mexico. It inhabits the banks of streams, and is abundant in the valleys of many western streams.

PHYSICAL PROPERTIES. — Wood soft, light, close-grained, with many thin medullary rays, and of a warm, reddish brown color with lighter sap-wood. *Specific Gravity*, 0.4930; *Percentage of Ash*, 0.48; *Relative Approximate Fuel Value*, 0.4906; *Weight of a Cubic Foot in Pounds*, 30.72.

USES. — The wood is sometimes used for light fuel and charcoal, but the great value of the tree lies in the part which it plays in the economy of nature, in fixing the banks of streams from erosion by its long roots and stems. It is usually the first tree in many localities to take possession of sand-bars, as soon as they appear sufficiently above water, and in course of time the Sycamores and other sturdy riparian trees are able to gain footing under the protection afforded by the little willows.

GYMNOSPERMÆ.

Flowering, exogenous plants with *leaves* chiefly parallel-veined and cotyledons frequently more than two. *Flowers* diclinous and very incomplete; pistil represented by an open scale or leaf, or altogether wanting, with ovules naked, fertilized by direct contact with the pollen, and seeds at maturity naked — without a true pericarp.

ORDER CONIFERÆ : PINE FAMILY.

Leaves mostly awl-shaped or needle-shaped, evergreen, entire and parallel-veined. *Flowers* monœcious, or rarely diœcious in catkins or cones, destitute of both calyx and corolla; stamens one or several (usually united); ovary, style and stigma wanting; ovules one or several at the base of a scale, which serves as a carpel, or on an open disk. *Fruit* a cone, woody and with distinct scales, or somewhat berry-like, and with fleshy coherent scales, seeds orthotropous, embryo in the axis of the albumen.

Trees or shrubs with a resinous juice.

GENUS PINUS, TOURNEFORT.

Leaves evergreen, needle-shaped, from slender buds, in clusters of 2-5 together, each cluster invested at its base with a sheath of thin, membranous scales. *Flowers* appearing in spring, monœcious. *Sterile flowers* in catkins, clustered at the base of the shoots of the season; stamens numerous with very short filaments and a scale-like connective; anther cells, 2, opening lengthwise; pollen grains triple. *Fertile flowers* in conical or cylindrical spikes — cones — consisting of imbricated, carpellary scales, each in the axil of a persistent bract and bearing at its base within a pair of inverted ovules. *Fruit* maturing in the autumn of the second year, a cone formed of the imbricated carpellary scales, which are woody, often thickened or awned at the apex, persistent, when ripe dry and spreading each to liberate two nut-like and usually winged seeds; cotyledons 3-12, linear.

(*Pinus* is a Latin word from Celtic *pin* or *pen*, a *crag*.)

274. PINUS TAEDA, L.

LOBLOLLY PINE. OLD-FIELD PINE. ROSEMARY PINE.

Ger., Rosmarin-Fichte. Fr., Pin de Romarin. Sp., Romero en Pino.

SPECIFIC CHARACTERS: — *Leaves* in clusters of 3, with close persistent sheaths, rather slender and stiff, dark green, 6–9 in. long, with large stomata on each face and two fibro-vascular bundles. *Flowers* staminate yellow, crowded; pistillate solitary or few together, lateral (below the apex of growing shoot) yellow, short-stalked. *Cones* 3–5 in. long, lateral spreading, sessile, reddish brown; scales thickened at apex with prominent transverse ridges and spreading prickle. The cones often remain on the branches for a year after liberating the seeds. These are mottled, about $\frac{1}{4}$ in. long and provided with a large wing broadest above the middle.

The Yellow Pine is a large tree, for the Atlantic States, when of its greatest dimensions, being 125 ft. (38 m.) or more in height, and 4 or 5 ft. (1.25 m.) in thickness of trunk, but its average stature is considerably less. When isolated, it develops an oblong or rounded pyramidal top, and the bark of trunk is of a reddish brown color, fissured into large irregular plates and flat ridges, which exfoliate in closely appressed, friable scales.

HABITAT. — From Delaware and extreme southern New Jersey, southward throughout the maritime region and back to the foothills of the Alleghanies to about the latitude of Tampa Bay, Florida, and westward to the valley of the Colorado River in Texas. In the Mississippi Valley it ranges northward to central Tennessee and central Arkansas.

PHYSICAL PROPERTIES. — The wood of the Loblolly Pine seems to vary considerably in quality in different localities. It is generally of rapid growth, not strong, brittle, coarse-grained, with broad resinous bands of summer growth, and of a light pinkish brown color, with thick, yellowish white sap-wood. The resin ducts are small, and the tree yields but little turpentine when boxed. *Specific Gravity*, 0.5441; *Percentage of Ash*, 0.26; *Relative Approximate Fuel Value*, 0.5427; *Coefficient of Elasticity*, 112847; *Modulus of Rupture*, 883; *Resistance to Longitudinal Pressure*, 427; *Resistance to Indentation*, 107; *Weight of a Cubic Foot in Pounds*, 33.91.

USES. — The wood is manufactured into lumber for general construction purposes, interior finishing, boxes, etc.

GENUS PICEA, LINK.

Leaves evergreen, scattered (not clustered at the base), sessile, jointed upon a persistent base, short ($\frac{1}{2}$ to $1\frac{1}{2}$ in.) needle-shaped, 4-angled, pointing every way and all of one kind. *Flowers* appear in spring, monœcious; the sterile in the axils of the leaves of the preceding

year; anthers tipped with a recurved appendage, cells opening lengthwise; fertile flowers in terminal catkins. *Fruit*, cones maturing the first year, pendulous with scales thin (neither thickened nor furnished with a spur at the apex) persistent on the axis. Otherwise quite as described for the genus *Pinus*.

(*Picea* is the ancient Latin name.)

275. PICEA PARRYANA, SARG.

BLUE SPRUCE. SILVER SPRUCE.

Ger., *Blaue Tanne*. Fr., *Sapin Bleu*. Sp., *Picea Azul*.

SPECIFIC CHARACTERS: — *Leaves* rigid, 4-sided, from $\frac{1}{2}$ in. on fertile branches to $1\frac{1}{2}$ in. long on sterile, curved, spiny, acuminate, bluish green to silvery or dull green; branchlets glabrous. *Flowers* reddish yellow; pistillate with broad denticulate scales and acute bract. *Fruit*, cones sessile, oblong-cylindrical, $2\frac{1}{2}$ –4 in. long, with glossy rhomboidal flexuose scales narrow and erose-dentate at the elongated apex; seed $\frac{1}{8}$ in. long with short wide wing.

The beautiful Blue Spruce occasionally surpasses 100 ft. (30 m.) in height, and has a trunk diameter of 3 ft. (0.90 m.) or somewhat more, but such dimensions are unusual. The bark of trunk is of grayish or reddish brown color, fissured into obscure ridges and numerous irregular, closely appressed scales. The habit of growth of the tree when young is to form a distinct and beautiful pyramid, with horizontal branches in regular whorls, but with advancing age the horizontal branches generally elongate and curve gracefully upward, making an oblong or less regularly pyramidal head. Its various tints of foliage, from green to a beautiful silvery blue, constitute a peculiar and striking feature. In the language of Mr. Enos A. Mills, "With its fluffy, silver-tipped robe, and its garlands of cones, it is the handsomest tree on the Rockies."

HABITAT. — The Rocky Mountains of Colorado, western Wyoming and eastern Utah between the altitudes of 6,500 and 9,000 or 10,000 ft. above tide, growing mainly along the courses of streams, and generally singly, or in small groups among other trees. It does not form pure stands of any considerable extent.

PHYSICAL PROPERTIES. — Wood light, soft, not strong, of close grain, and yielding a beautiful satiny finish. It is of a brownish white color, with little if any distinction in tint between its sap and heart-woods. *Specific Gravity*, 0.3740; *Percentage of Ash*, 0.38; *Relative Approximate Fuel Value*, 0.3726; *Coefficient of Elasticity*, 55360; *Modulus of Rupture*, 454;

Resistance to Longitudinal Pressure, 358; *Resistance to Indentation*, 79; *Weight of a Cubic Foot in Pounds*, 23.31.

USES. — Wood valuable for lumber for general construction purposes, interior finishing, flooring, sounding boards for musical instruments and paper pulp, as is the case with the wood of the spruces generally. The tree is very popular on account of its value for ornamental planting, and is extensively planted throughout this country and Europe for beautifying parks and grounds, where it gives a particularly pleasing effect because of its silvery-blue foliage.

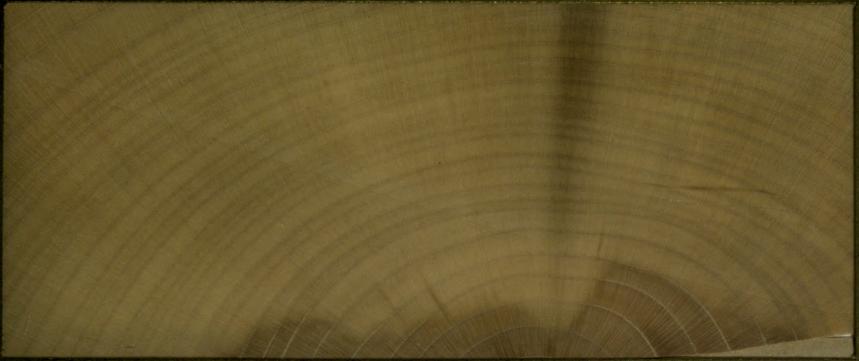
INDEX TO PART XI.

	No.	Page.		No.	Page.
Acebo de la Montaña.....	252	20	<i>Fraxinus lanceolata</i>	262	
<i>Aesculus glabra</i>	253	21	<i>quadrangulata</i>	263	
Almez de Mississippi.....	265	37	Fresno Azul	263	
ANACARDIACEÆ	24		Verde	262	
Arayan de Cera	268	41	Frêne Bleu	263	
Arbol de Arandano.....	258	28	Vert	262	
de Jaboncillo	254	23	Gift-Sumach	255	
Fumoso Americano	256	25	Gum Elastic	260	
Ash, Blue	263	34	Hackberry, Mississippi	265	
Green	262	34	Heath Family		
Bay, Red	264	36	Heidelbeere, Baumartige	258	
Bayberry	268	41	<i>Hicoria pecan</i>	267	
Berg-Lorbeer	259	29	HIPPOCASTANACEÆ		
Berg-Stechpalme	252	20	Holly Family		
<i>Broussonetia papyrifera</i>	266	38	Large-leaf	252	
Buckeye, Fetid	253	21	Mountain	252	
Ohio	253	21	Horse-Chestnut Family		
Buckthorn, Woolly	260	31	Houx de Montagne.....	252	
<i>Bumelia lanuginosa</i>	260	31	Huckleberry, Tree	258	
Campanilla blanca de Carolina...	261	32	<i>Ilex monticola</i>	252	
Candleberry	268	41	ILICINEÆ		
Cashew Family	24		JUGLANDACEÆ		
Castanie, Kline	272	46	<i>Kalmia latifolia</i>	259	
<i>Castanea pumila</i>	272	46	Kalmie de Montagne.....	259	
Castaña enano	272	46	Ladierna lanosa	260	
Fetido	253	21	LAURACEÆ		
<i>Celtis Mississippensis</i>	265	37	Laurel Family		
Chêne de Bardeau.....	270	44	Laurel de la Montaña....	259	
de doiget	269	43	Mountain	259	
de Saule	271	45	Rojo	264	
China-tree, Wild	254	23	Laurier Rouge	264	
Chincapin	272	46	Lorbeerbaum, Rother	264	
Chinkepin	272	46	MAGNOLIACEÆ		
Chinquapin	272	46	Magnolia de Fraser.....	251	
Chittam-wood	256	25	Family		
Chittim-wood	260	31	Fraser	251	
Citier	268	41	<i>Magnolia Fraseri</i>	251	
Ciruelo Americano	257	26	Magnolier de Fraser.....	251	
<i>Cotinus Americanus</i>	256	25	Maigloekenbaum, Carolina	261	
CONIFERÆ	48		Marronnier Fetide	253	
Colche d'Arbre de Carolina.....	261		Maurier à papier.....	266	
Cucumber-tree, Ear-leaf	251	19	Meocoulier de Mississippi.....	265	
Long-leaf	251	19	<i>Mohrodendron Carolinum</i>	261	
CUPULIFERÆ	42		MORACEÆ		
Elm Family	36		Moral de papel.....	266	
ERICACEÆ	27		Mulberry Family		
Esche, Blaue	263	34	Paper	266	
Grüne	262	34	MYRICACEÆ		
Farkleberry	258	28	<i>Myrica cerifera</i>	268	
Fincer-Eiche	269	43	Myrtle, Wax	268	
Fraser-Magnolie	251	19	Nerprun laineux	260	

	No.	Page.		No.	Page.
Oak Family		42	Sapin Bleu	275	50
Finger	269	43	Sapodilla Family		30
Shingle	270	44	<i>Sapondus Drummondii</i>	254	23
Spanish	269	43	SAPOTACEÆ		30
Willow	271	45	Sauce de Hojas Largas	273	47
OLEACEÆ		33	Sauce de Longfeuille	273	47
Olive Family		33	Savonier de Drummond	254	23
Pacane	267	40	Schlehdorn, Amerikanischer	257	26
Papier-Maulbeerbaum	266	38	Schindel-Eiche	270	44
Pecan	267	40	Silver-bell Tree	261	32
Pecana	267	40	Smoke-tree, American	256	25
Pecan-nuszbaum	267	40	Snow-drop Tree	261	32
<i>Persea borbonia</i>	264	36	Soapberry, Western	254	23
<i>Picea Azul</i>	275	50	Soapberry Family		22
<i>Picea Parryana</i>	275	50	Sparkleberry	258	28
Pin de Romarin	274	49	Spruce, Blue	275	50
Pine Family		48	Silver	275	50
Loblolly	247	49	Steifenbeere, Drummond	254	23
Old-field	247	49	Storax Family		32
Rosemary	247	49	STYRACEÆ		32
<i>Pinus taeda</i>	247	49	Sugarberry, Mississippi	265	37
Plum, American Wild	257	26	Sumac <i>Cotinus Americain</i>	256	25
<i>Prunus Americana</i>	257	26	Sumach Empoisonne	255	24
Prunier d'Amerique	257	26	Poison	255	24
<i>Quercus digitata</i>	269	43	Sweet Gale Family		40
<i>imbricaria</i>	270	44	Tanne, Blaue	275	50
<i>phellos</i>	271	45	ULMACEÆ		36
Ranzige-Kastanie	253	21	<i>Vaccinium arboreum</i>	258	28
Rauchbaum, Amerikanischer	256	25	Vaciet d'arbre	258	28
<i>Rhus vernix</i>	255	24	Wachsbaum	268	41
Roble de dedo	269	43	Walnut Family		39
de Ripa	270	44	Weide, Langblättrige	273	47
de Sauce	271	45	Weiden-Eiche	271	45
Romero en Pino	274	49	Willow Family		46
ROSACEÆ		26	Long-leaf	273	47
Rose Family		26	Sand-bar	273	47
Rosmarin-Fichte	274	49	Wolliger-Kreuzdorn	260	31
SALICACEÆ		46	Zürgelbaum, Mississippi	265	37
<i>Salix fluviatilis</i>	273	47	Zumaque Venenoso	255	24
SAPINDACEÆ		22			

251. MAGNOLIA FRASERI WALT.

Fraser Magnolia. Ear-leaf or Long-leaf Cucumber-tree.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Fraser-Magnolie. *Fr.* Magnolier de Fraser.

Sp. Magnolia de Fraser.

252. ILEX MONTICOLA GRAY

Mountain Holly, Large-leaf Holly.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Berg-Steckpalmc. *Fr.* Houx de Montagne.

Sp. Acebo de la Montaña.

FR. AESCULUS GLABRA WILLD.

Ohio Buckeye. Fetid Buckeye.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Ranzige-Kastanie. *Fr.* Marronnier fetide.

Sp. Castano fetido.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Ranzige-Kastanie. *Fr.* Marronnier tefido.

Sp. Castano tefido.

109. *SAPINDUS DRUMMONDI* H. & A.

Western Soapberry, Wild China-tree.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Drummond Seifenbeere. *Fr.* Savonnier de Drummond.

Sp. Arbol de Jaboncillo.

Western Soapberry. Wild China-tree.



TRANSVERSE SECTION.



RADIAL SECTION.



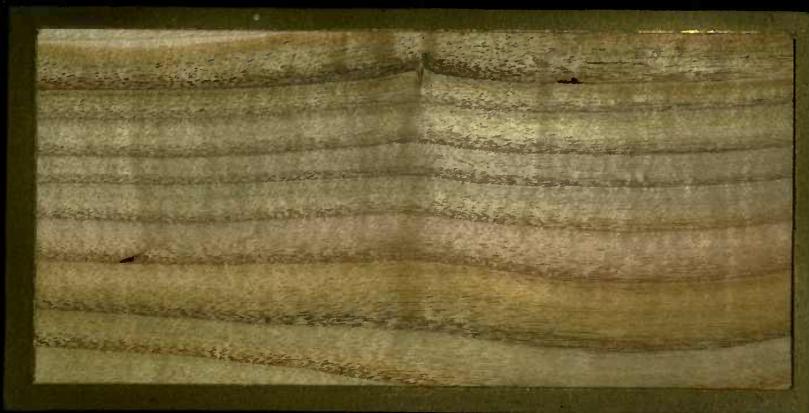
TANGENTIAL SECTION.

Ger. Drummond Seifenbeere. *Fr.* Savonier de Drummond.
Sp. Arbol de Jaboncillo.

Poison Sumach.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Gift-Sumach. *Fr.* Sumach empoisonné.

Sp. Zumaque Venenoso.

255 RHUS VERNIX, L.

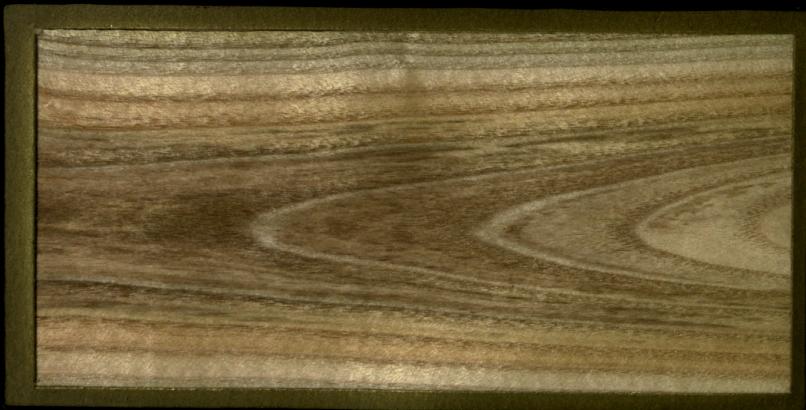
Poison Sumach.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Gift-Sumach. *Fr.* Sumach empoisonné.

Sp. Zumaque Venenoso.

256. COTINUS AMERICANUS NUTT.

American Smoke-tree, Chittam-wood.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Amerikanischer Rauchbaum. *Fr.* Sumac *Cotinus Americanus*.

Sp. Arbol fumoso Americano.

256. COTINUS AMERICANA, Nutt.

American Smoke-tree. Cream-wood.



TRANSVERSE SECTION



RADIAL SECTION.



TANGENTIAL SECTION

Ger. Amerikanischer Rauchbaum. Fr. Sumac *Cotinus Americana*

Sp. Arbol fumoso Americano.

257 PRUNUS AMERICANA Marsh.

Wild Plum.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Amerikanischer Schlehdorn. Fr. Prunier d'Amerique.

Sp. Ciruelo Americano.

257 PRUNUS AMERICANA Marsh.

Wild Plum.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Amerikanischer Schlehdorn. Fr. Prunier d'Amerique.

Sp. Ciruelo Americano.

258 VACCINIUM ARBOREUM MARSH.

Sparkleberry. Farkleberry. Tree Huckleberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Baumartige Heidelbeere. *Fr.* Vaccin d'arbre.

Sp. Arbol de Arandano.

258. VACCINIUM ARBOREUM MARSH

Sparkleberry. Parkleberry. Tree Huckleberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Baumartige Heidelbeere. *Fr.* Vaccin d'arbre.

Sp. Arbol de Arandano.

259 KALMIA LATIFOLIA L.

Mountain Laurel.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Berg-Lorbeer. *Fr.* Kalmie de Montagne.

Sp. Laurel de la Montaña.

Mountain Laurel



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Berg-Lorbeer. *Fr.* Kalmie de Montagne.

Sp. Laurel de la Montaña.

166. *BUMELIA LANUGINOSA* PERS.

Clayton-wood. Woolly Buckthorn. Gum Elastic.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Wolliger-Kreuzdorn. *Fr.* Nerprun laineux.

Sp. Ladierna lanosa.



TRANSVERSE SECTION



RADIAL SECTION.



TANGENTIAL SECTION

Ger. Wolliger-Kreuzdorn. *Fr.* Nerprun laineux.
Sp. Ladierna lanosa.

GEN. MOHRODENDRON CAROLINUM BRITT.

Silver-bell Tree. Snow-drop Tree.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Carolina Maiglökenbaum. *Fr.* Cloche d'arbre de Carolina.

Sp. Campanilla blanca de Carolina.

261. MOHRODENDRON CAROLINUM BRITT.

Silver-bell Tree. Snow-drop Tree.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Carolina Maiglökenbaum. *Fr.* Cloche d'arbre de Carolina.
Sp. Campanilla blanca de Carolina.

102. FRAXINUS LANCEOLATA BORCK.

Green Ash.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Grüne Esche. *Fr.* Frêne Vert. *Sp.* Fresno verde.

262. FRAXINUS LANCEOLATA BORCK.

Green Ash.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Grüne Esche. Fr. Frêne Vert. Sp. Fresno verde.

FRAXINUS QUADRANGULATA MICHX.

Blue Ash.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Gen. Blauc Esche. Fr. Frêne Bleu. Sp. Fresno azul.

263. FRAXINUS QUADRANGULATA MICHX.

Blue Ash.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Blaue Esche; *Fr.* Frêne Bleu; *Sp.* Fresno azul.

254. PERSEA BORBONIA SPRENG.

Red Bay.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Rother Lorbeerbaum. Fr. Laurier Rouge Sp. Laurel rojo.

Red Bay.



TRANSVERSE SECTION.



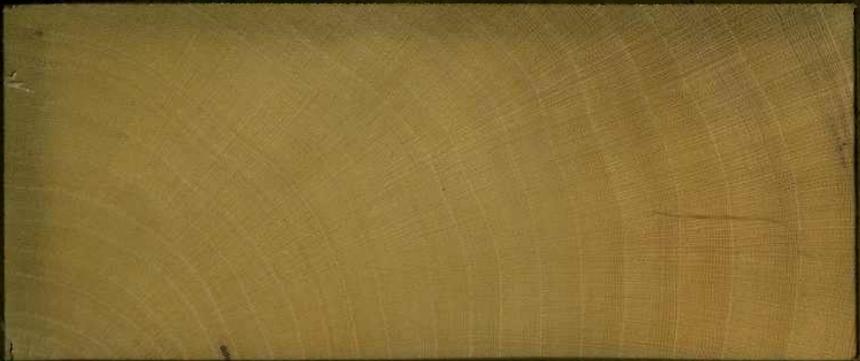
RADIAL SECTION.



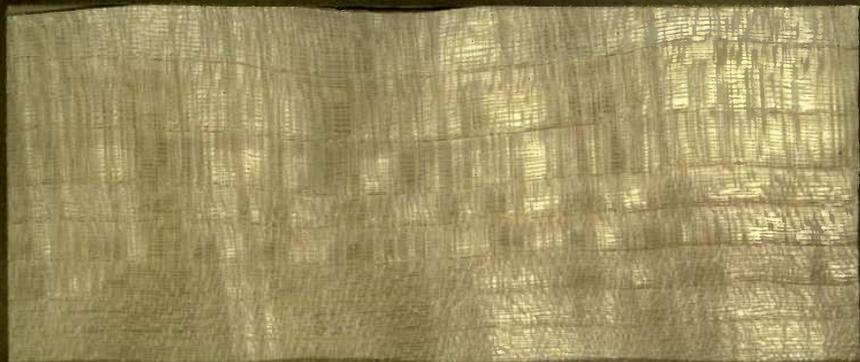
TANGENTIAL SECTION.

1. *CELTIS MISSISSIPPIENSIS* Bosc.

Mississippi Hackberry or Sugarberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

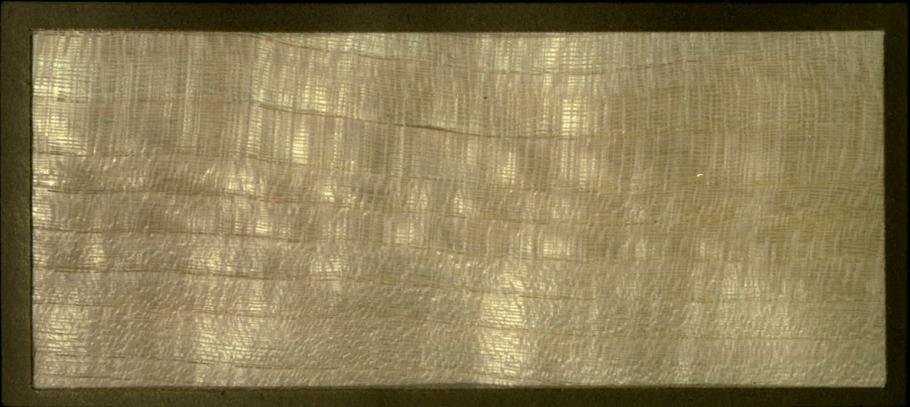
Ger. Mississippi Zürgelbaum, Fr. Micocoulier de Mississippi,
Sp. Almez del Mississippi.

265. CELTIS MISSISSIPPIENSIS Bosc.

Mississippi Hackberry or Sugarberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Mississippi Zügelbaum. Fr. Micocoulier de Mississippi.

Sp. Almez del Mississippi.

Pecan.



TRANSVERSE SECTION.



RADIAL SECTION.



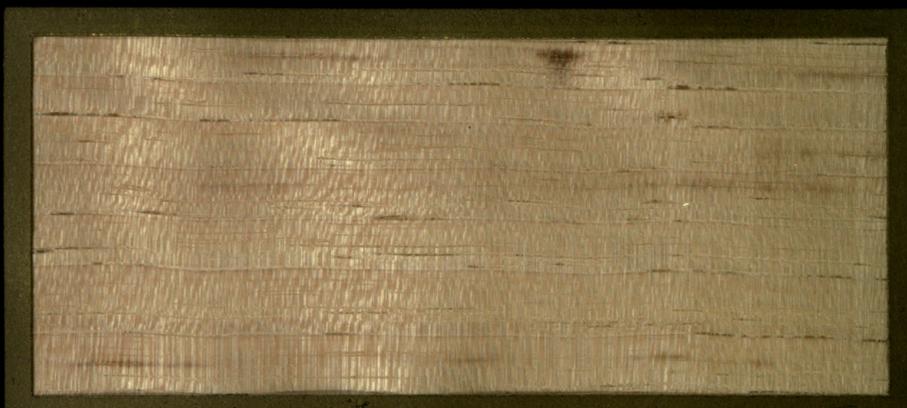
TANGENTIAL SECTION.

Ger. Pecan Nüsse. Fr. Pacane. Sp. Pacana.

Pecan.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Pecan Nüsse. *Fr.* Pacane. *Sp.* Pacana.

Broussonetia papyrifera Vent.

Paper Mulberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Papier-Maulbeerbaum. *Fr.* Murier à papier.

Sp. Moral de papel.

Paper Mulberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Papier-Maulbeerbaum, *Fr.* Murier à papier.

sp. Moral de papel.

200. MYRICA CERIFERA L.

Wax Myrtle. Bayberry. Candleberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Wachsbaum. Fr. Cirier. Sp. Arayan de cera.

208 MYRICA CERIFERA L.

Wax Myrtle. Bayberry. Candleberry.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Wachsbaum. *Fr.* Cirier. *Sp.* Arayan de cera.

101. *QUERCUS DIGITATA* SUDW.

Finger Oak. Spanish Oak.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Finger-Eiche. Fr. Chêne de doigt. Sp. Roble de dedo.



TRANSVERSE SECTION.



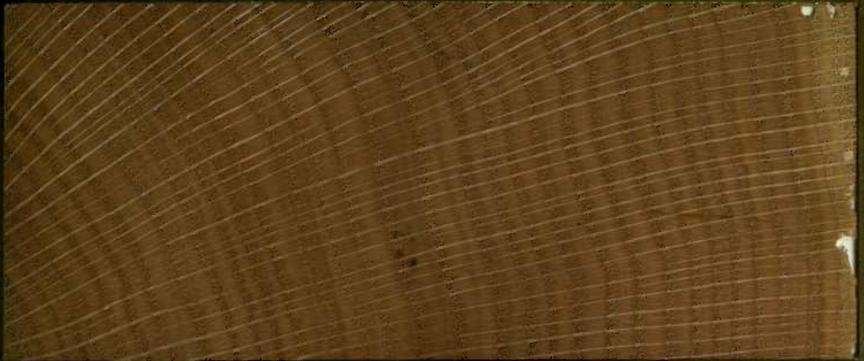
RADIAL SECTION.



TANGENTIAL SECTION.

QUERCUS IMBRICARIA MICHX.

Shingle Oak.



TRANSVERSE SECTION.



RADIAL SECTION.



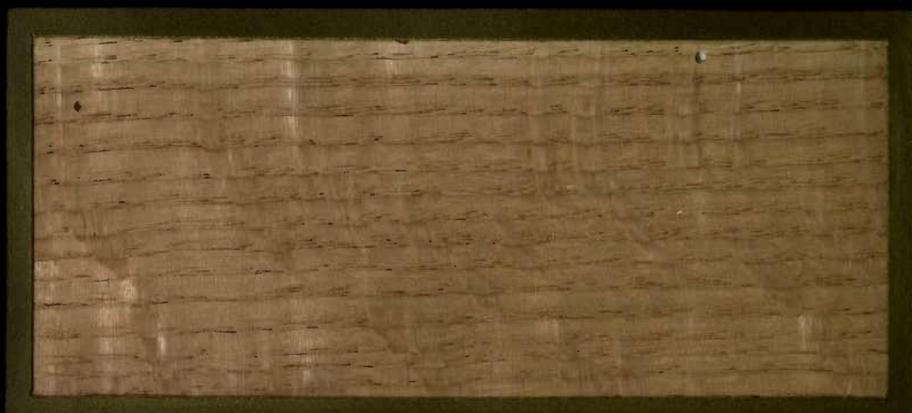
TANGENTIAL SECTION.

Ger. Schindel-Eiche. *Fr.* Chêne de bardeau. *Sp.* Roble de ripa.

1891



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Schindel-Eiche. Fr. Chêne de bardeau. Sp. Roble de ripa.

QUERCUS PHELLOS L.

Willow Oak.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Weiden Eiche. Fr. Chêne de Saule. Sp. Roble de Sauce.

Willow Oak.



TRANSVERSE SECTION.



RADIAL SECTION.

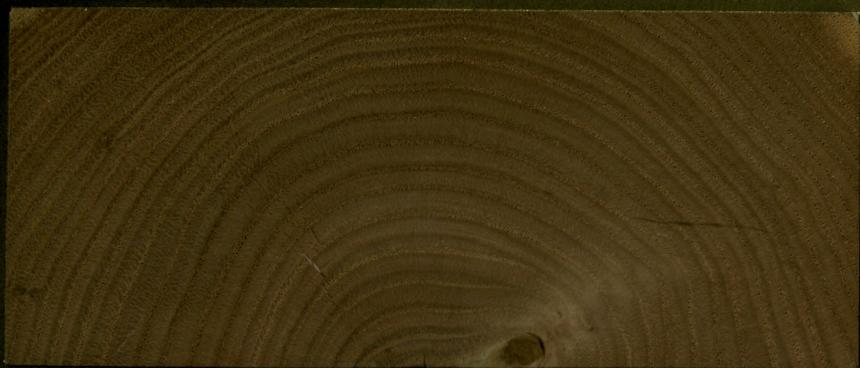


TANGENTIAL SECTION.

Ger. Weiden Eiche. Fr. Chêne de Saule. Sp. Roble de Saule.

CASTANEA PUMILA MILL.

Chinquapin, Chinkepin.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

var. Kleine Kastanie. *Fb.* Chincapin. *Sp.* Castaño enano.

Chinquapin. Chincapin.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Kleine Kastanie. *Fr.* Chincapin. *Sp.* Castano enano.

278. SALIX FLUVIATILIS NUTT.

Sand-bar Willow. Long-leaf Willow.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Langblattrige Weide. *Fr.* Saule de longefueille.

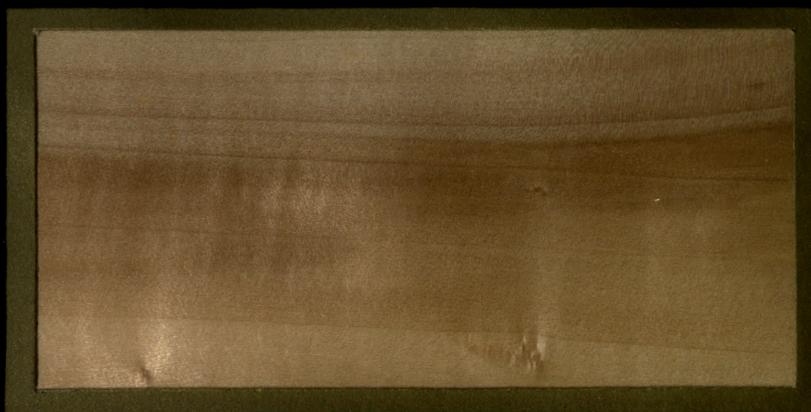
Sp. Sauce de hojas largas.

273. SALIX FLUVIATILIS. Nutt.

Sand-bar Willow. Long-leaf Willow.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Langblättrige Weide. *Fr.* Saule de longefueille.

Sp. Sauce de hojas largas.

274. PINUS TAEDA L.

Loblolly, Old-field or Rosemary Pine.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Rosmarin-Fichte. *Fr.* Pin de Romarin. *Sp.* Romero en pino.

274. PINUS TAEDA L.

Loblolly, Old-field or Rosemary Pine



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Rosmarin-Fichte. *Fr.* Pin de Romarin. *Sp.* Romero en pino.

275. PICEA PARRYANA SARG.

Blue Spruce, Silver Spruce,



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

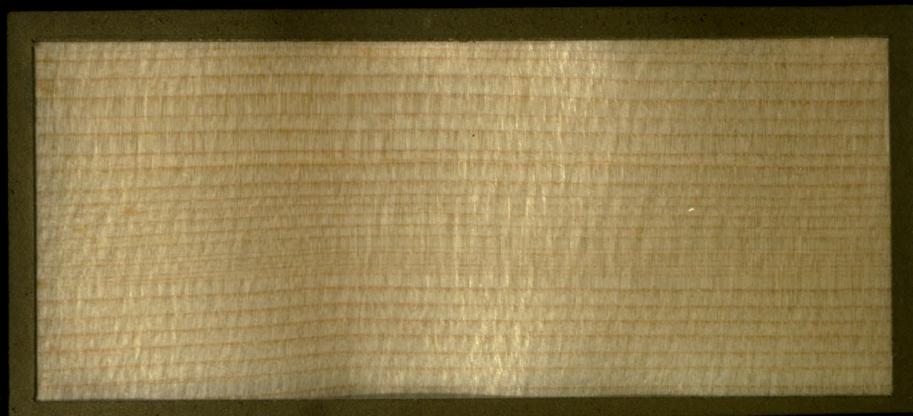
Ger. Blaue Tanne. *Fr.* Sapin bleu. *Sp.* Picea azul.

276. PICEA PATRYANA, SARG.

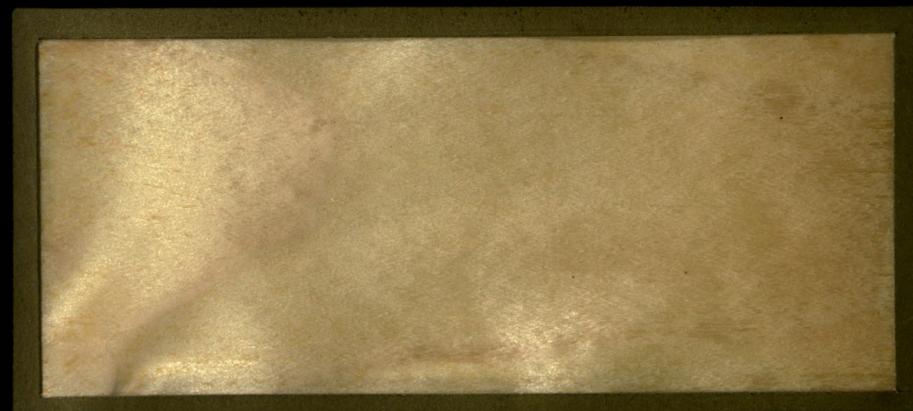
Blue Spruce. Silver Spruce.



TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION.

Ger. Blaue Tanne. Fr. Sapin bleu. Sp. Picea azul.

Hough, R.B.
American woods

H55
v.11
BIOLOGY
LIBRARY

M175594 LOCKED
CASE

SD536
H55
v.11

BIOLOGY
LIBRARY

THE UNIVERSITY OF CALIFORNIA LIBRARY

PLATES 251-275

Collate before charging and
before discharging.

