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FIELD MUSEUM OF NATURAL HISTORY
FOUNDED BY MARSHALL FIELD, 1893

DEPARTMENT OF BOTANY

FIELD MUSEUM OF NATURAL HISTORY

North American Trees

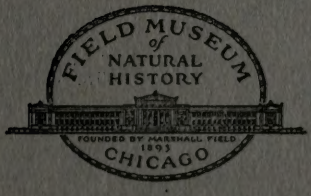
GUIDE
TO
CHARLES F. MILLSPAUGH HALL

BY

SAMUEL J. RECORD

RESEARCH ASSOCIATE IN WOOD TECHNOLOGY, FIELD MUSEUM
PROFESSOR OF FOREST PRODUCTS, SCHOOL OF FORESTRY, YALE UNIVERSITY

B. E. DAHLGREN
ACTING CURATOR, DEPARTMENT OF BOTANY
EDITOR



CHICAGO, U. S. A.
1934

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PREFACE

This book is designed to serve as a reference guide to the collection of North American trees exhibited by the Department of Botany of Field Museum. Its text is identical with that of the explanatory labels accompanying the specimens displayed in Charles F. Millspaugh Hall. The fact that it has been prepared by so reliable an authority on American woods as Samuel J. Record, Professor of Forest Products in the School of Forestry of Yale University and the Museum's Research Associate in Wood Technology, is a guarantee of its value, and publication will make it available as a work of reference quite apart from its special relation to the Museum's exhibits.

The Guide may be recommended to all who wish to know the essential facts concerning the principal trees of the United States, as well as to those who desire exact and specific information about our most important woods. It should appeal equally to student and teacher, to the worker or dealer in woods, and to those actively engaged in forestry, as well as to the many who enjoy familiarity with the woodland and wish to extend their knowledge and interest. Throughout the text the aim has been brevity and accuracy, with the avoidance, so far as possible, of purely technical descriptions.

The members of the Museum and others familiar with its collection of American woods may recall that the first plans for a display of North American trees were made soon after the establishment of the Museum in 1893. As early as 1894 measures were taken by Dr. C. F. Millspaugh, then Curator of the Department of Botany, to begin the collection of the requisite material. Between 1902 and 1912 intensive field work for the purpose was conducted at frequent intervals by a member of the staff, Mr. Huron H. Smith, late Curator of Botany in Milwaukee Public Museum. Various parts of the country were visited by him for the purpose of securing authentic material and photographs to be used in making a comprehensive exhibition of the forest resources of the United States.

Soon after the Museum had taken possession of the present building it was realized that the space and means that could be allotted to North American woods were not sufficient to permit the realization of the original plans, which called for the exhibition of a complete series of the seven-hundred-odd species of trees occurring north of the Rio Grande. After careful consideration of the situation it was decided to retire to the study collection all the less important species on display and to restrict the exhibits to the most important forest trees, those most valuable for their lumber and of the greatest practical interest to the visitor of the Museum. Also, in order to furnish within the limits of the hall a conception of the wide variety of trees that constitute the forests of North America there have been included a few species of secondary or even scant importance from a utilitarian point of view.

Eighty-four species are thus represented in the series; of these approximately 35 per cent are conifers such as the various pines, spruces, firs, and cedars. The remainder belong to families of flowering plants, and of these almost one-half are of the relatively few catkin-bearing families, which, with the conifers, are especially characteristic of the cool temperate zone in the northern hemisphere. It is interesting to note that a large proportion of our most useful hardwoods, such as walnut, hickories, birches, beeches, alders, and oaks, are obtained from this group, and that comparatively few are derived from plant families such as the legumes, laurels, myrtles, and others, that are conspicuous in the tropics and furnish most of the trees and woods of the southern hemisphere.

In issuing this Guide grateful acknowledgment is made to the many lumber concerns, forestry organizations, and individuals, who at various periods in the history of the collections have generously assisted the Museum in its efforts to obtain representative specimens for display. A list of these will be found on pages 116-117. To the United States Forest Service the Museum is especially indebted for the use of the illustrations reproduced in this publication.

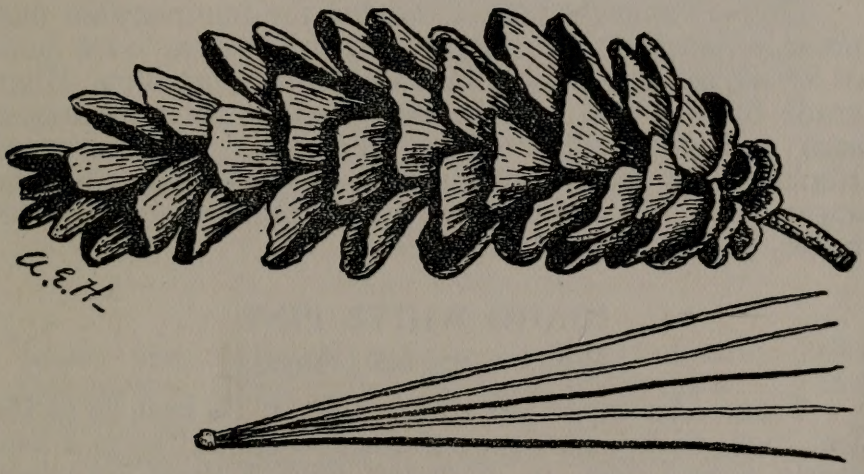
B. E. DAHLGREN

NORTH AMERICAN TREES

EASTERN WHITE PINE

Pinus Strobus Linnaeus

Tree.—A timber tree of the first importance, attaining a height of 100 to 150 feet, or in exceptional instances 200 to 250 feet, with a smooth, well-formed trunk 3 to 4 feet, or sometimes up to 6 feet, in diameter. Soft, flexible, bluish green leaves 3 to 5 inches long, arranged in clusters of 5. Cones thin-scaled, 4 to 10 inches long, resin-coated at maturity. Bark of young stems and branches smooth



EASTERN WHITE PINE
One-half natural size

and lustrous, becoming rough and 1 to 2 inches thick on old trunks. Often attains an age of 200 to 300 years.

Distributed from Newfoundland to southeastern Manitoba; thence southward through Minnesota and central Wisconsin, with detached groves as far south as central and eastern Iowa, southern Wisconsin, and northern Illinois; eastward through southern Michigan and along the shores of Lake Erie to New York; also throughout the Appalachian Mountains as far south as Alabama and Georgia; abundant throughout New England, New York,

and Pennsylvania and on the Atlantic coast as far south as central New Jersey. Forms pure stands or associates with other pines and northern hardwoods. Comparatively little virgin timber remains, but much lumber is cut from second-growth trees. Extensively planted for ornamental and forestry purposes. (Family Pinaceae.)

Wood.—Very light, soft, not very resinous, straight-grained, of fine and uniform texture, very easy to work, finishes smoothly, and holds its place well when manufactured; odor and taste absent or very mild; heartwood pale brown or reddish, deepening with age, highly resistant to weathering, and fairly durable in contact with the ground; sapwood nearly white. Wood of very old trees of exceptionally mild and uniform texture known as pumpkin pine.

Use.—Formerly very extensive for innumerable purposes of general construction—entire houses were built of it—carpentry, planing-mill and factory products. High-grade lumber now largely restricted to pattern-making, sash and door manufacture, and other exacting uses. Replaced for many purposes by Idaho white pine and sugar pine. Second-growth timber extensively used for boxes, pail stock, and matches.

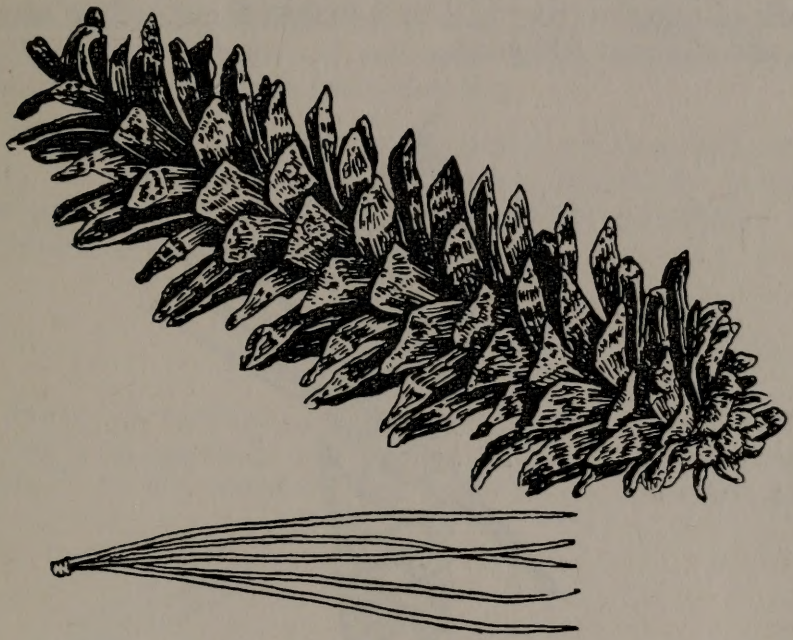
IDAHO WHITE PINE

Pinus monticola Douglas

Tree.—An important timber tree, at its best 90 to 150 feet high, with a slender, well-formed trunk 2½ to 5 feet, rarely 6 to 8 feet, in diameter, with a short-branched, narrow, symmetrical crown; in open forests 50 to 60 feet in height, with one or more very long and heavy branches extending horizontally well beyond the others. Leaves are 2 to 4 inches long, bluish green with a whitish tinge, and in clusters of 5. Cones are 6 to 10 inches long. Bark usually not over an inch thick, broken into small square blocks that are highly characteristic. Maximum age about 500 years.

Scattered through mountain forests, at elevations between 2,000 and 7,000 feet, from the basin of the Columbia River in British Columbia to Vancouver Island; on the mountains of northern Washington to the western

slopes of the Rocky Mountains of northern Montana; on the Coast ranges of Washington and Oregon; on the Cascade and Sierra Nevada ranges south to southern California. At its best on northern slopes and flats in northern



IDAHO WHITE PINE
One-half natural size

Idaho and adjacent regions of Montana and British Columbia. Often called western white pine. (Family Pinaceae.)

Wood.—Light, soft, straight-grained, of fine and uniform texture, very easy to work, only slightly resinous; heartwood light brown or reddish, fairly durable, sapwood nearly white. Wood similar in all its properties to eastern white pine.

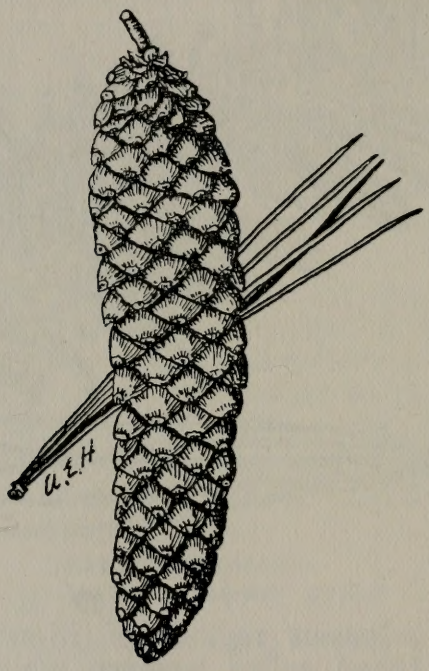
Use.—Same as that of eastern white pine, mostly for planing-mill and factory products.

SUGAR PINE

Pinus Lambertiana Douglas

Tree.—A very valuable timber tree, attaining under favorable conditions an average height of 175 feet, maximum 240 feet, with a long, smooth bole 4 or 5 feet, some-

times up to 11 feet, in diameter. Leaves 2½ to 4 inches long, dark green, rigid, and in clusters of 5. Cones highly characteristic, 13 to 18 inches long, sometimes nearly 2 feet, and 2½ to 3½ inches in diameter when closed. Bark of mature trees is 2 to 3 inches thick. Tree attains an age of about 500 years.



SUGAR PINE
Cone, one-sixth natural size; needles, one-half natural size

Distributed from west-central Oregon southward through the Sierra and Coast ranges of California into the peninsula of Lower California; commercial range from Douglas County, Oregon, to Kern County in the California Sierras and Glenn County in the California Coast Range. Largest trees and heaviest stands of timber from Tulare to Eldorado counties, California, along the west slope of the Sierras in comparatively moist, loose, deep, sandy loam. Altitudinal range from 3,000 feet in the north to 11,000 feet in Lower California. Occurs in small pure stands, but more commonly with western yellow pine, incense cedar, white fir, and Douglas fir. (Family Pinaceae.)

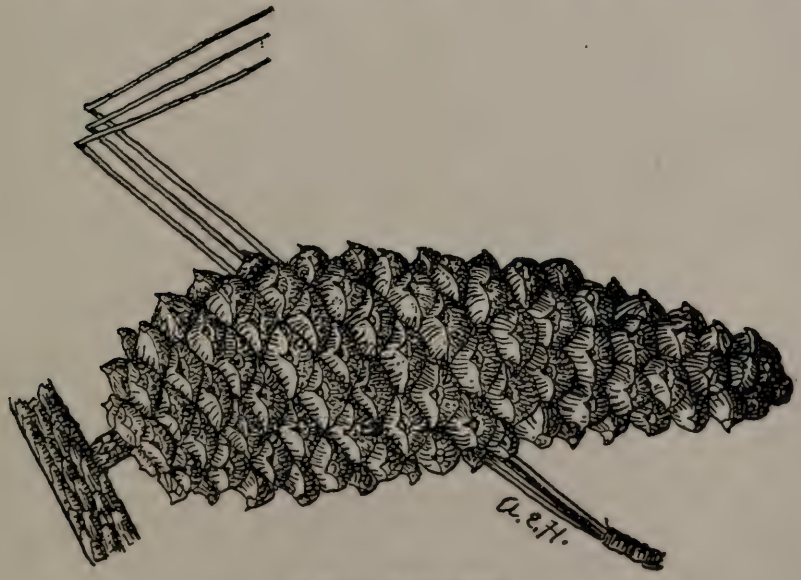
Wood.—Light, soft, straight-grained, and uniform-textured, easily worked; resembles the white pines, but is somewhat coarser-textured, with more prominent resin ducts and a more pronounced fragrance; heartwood pale brown, sometimes tinged with red in old trees that are highly resinous; sapwood yellowish white. Lumber available in large sizes free from defects.

Use.—Same as eastern white pine—planing-mill products, sash, doors, blinds, general millwork, factory products, patterns, and matches. Large quantities are consumed in California for fruit boxes.

LONGLEAF PINE

Pinus palustris Miller

Tree.—A very important timber tree, usually 75 to 100 feet high, occasionally 130 feet, with a straight, cylindrical trunk 20 to 30, occasionally 36, inches in diameter, and



LONGLEAF PINE
One-third natural size

free of limbs for one-half or two-thirds of its length. Leaves 8 to 18 inches long, in clusters of 3, forming tufts at ends of coarse twigs. Cones 6 to 10 inches long. Bark

of mature trees not over ½ inch thick, in large, flat, scaly plates. Attains an age of about 300 years.

Formerly in almost unbroken forest from southern Virginia through the south Atlantic and Gulf states to eastern Texas, but now largely cut over. Original stand estimated to have been about four hundred billion board feet. Grows in pure stands with little undergrowth, usually on poor sandy and gravelly soils. (Family Pinaceae.)

Wood.—Hard, heavy, stiff, and strong; grain mostly fine and straight; growth rings with dense, sharply defined layers of summer wood; often highly resinous; heartwood durable; color of heartwood pale red or brown, that of the thin sapwood yellowish white. Second-growth timber is coarser-grained, more defective, and less durable.

Use.—Unexcelled for heavy construction—beams, girders, sills, sleepers, joists, trusses, rafters, columns, heavy floors, bridge planking, tanks and silos, car and ship timbers, and wood distillates. Heartwood with high resin content especially well adapted for heavy, durable timbers, as in bridges, trestles, and cotton mills, and for railway crossties and piling. Less resinous wood for general carpentry, flooring, interior finish, crating, excelsior, and wood pulp; and, when creosoted, for harbor works and wood-block paving. Longleaf pine trees are the principal source of naval stores—turpentine, rosin, etc.

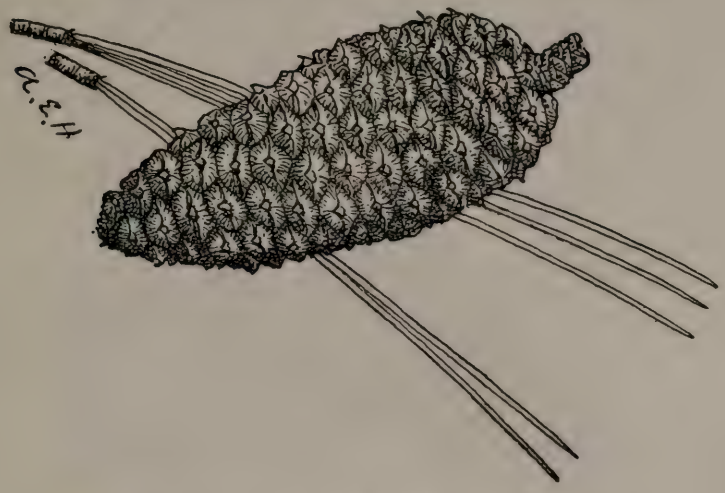
SLASH PINE

Pinus caribaea Morelet

Tree.—A large timber tree, often 80 to 100 feet high, maximum 150 feet, with a straight trunk 2 to 3 feet in diameter, usually swollen at the base, and clear of branches for 40 to 70 feet. Leaves 8 to 12 inches long, in clusters of 2 or 3. Terminal bud elongates in the spring into a straight, stout, light gray "candle." Bark of mature trees light orange-colored, scaly, usually not over ½ inch thick. Maximum age attained about 200 years.

Distributed from Charleston, South Carolina, westward through southern Georgia, Alabama, Mississippi, and southeastern Louisiana to the Mississippi River, and southward nearly to the southern extremity of Florida.

It is the chief pine of commercial importance in southern Florida. In original forest confined mostly to poorly drained flat lands and borders of swamps, but quickly takes possession of abandoned fields and cut-over lands. Important for reforestation. (Family Pinaceae.)



SLASH PINE
Cone, one-half natural size; needles, one-third natural size

Wood.—Hard, heavy, strong, and resinous, equaling or exceeding longleaf pine in these properties; grain often coarse and uneven; resinous heartwood highly durable; heartwood dark orange, thick sapwood yellowish or nearly white.

Use.—Last of the southern pines to come into general use. First-growth timber chiefly for heavy and durable construction; second-growth largely for railway crossties (treated) and general construction. Yield of crude turpentine greatest of all American trees.

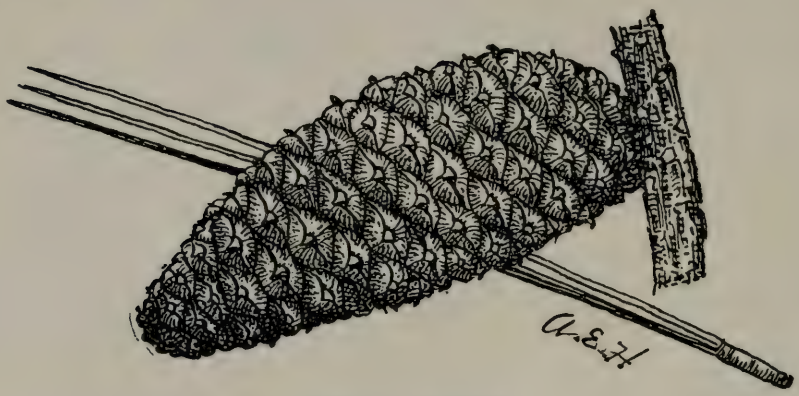
LOBLOLLY PINE

Pinus taeda Linnaeus

Tree.—An important timber tree attaining a height of 80 to 100 feet, maximum 130 feet, with a long straight trunk 2 or 3, occasionally 4 or 5, feet in diameter. Leaves 6 to 9 inches long, in clusters of 3. Bark, before maturity, generally thicker, more deeply furrowed, and somewhat

darker than that of shortleaf, but in old age these differences largely disappear. Seldom attains an age of 300 years.

General range includes the southern states bordering on the Atlantic and the Gulf, from Maryland to Texas, and extends up the Mississippi River into southeastern Arkansas. Adapted to wide range of soil conditions, and will endure more water in the soil than will shortleaf. Quickly takes possession of cut-over lands and abandoned



LOBLOLLY PINE
One-half natural size

fields, and makes remarkably rapid growth. Much second-growth timber now on the market. Lumber from the coastal plain of North Carolina and Virginia commonly sold, in mixture with shortleaf, as North Carolina pine. (Family Pinaceae.)

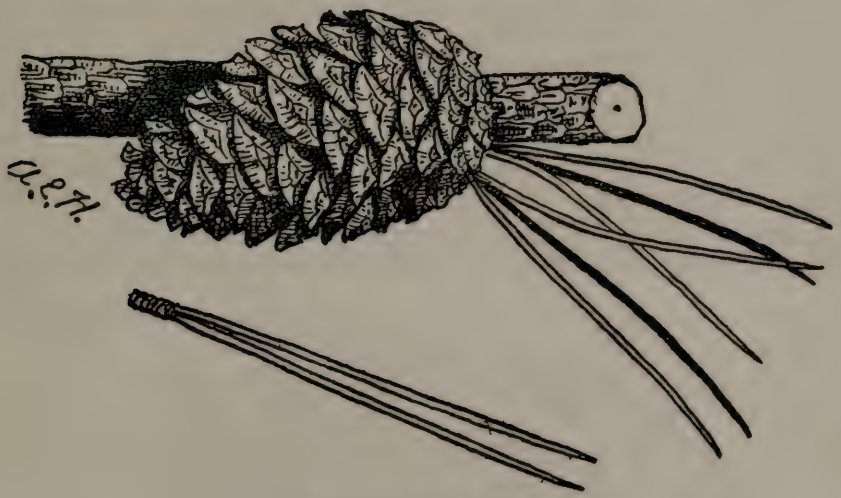
Wood.—Widely variable in quality, that from dense first-growth stands being fine-grained, with sharp contrast between spring and summer wood portions of annual rings, suggesting longleaf; second-growth very coarse-grained and coarse-textured, with more and larger knots and much larger proportion of sapwood. Heartwood yellowish to orange brown, sapwood nearly white.

Use.—First-growth timber for general construction of all kinds, planing-mill products, interior trim, ceiling, flooring, siding, furniture, boxes and crates, kraft paper, and fuel. Second-growth timber chiefly for rough construction lumber and boxes. Both kinds used, after preservative treatment, for railway crossties, piling, and poles.

SHORTLEAF PINE

Pinus echinata Miller

Tree.—An important timber tree, 80 to 100 feet high, exceptionally 110 to 130 feet, with a well-formed trunk 24 to 30 inches, sometimes 4 feet, in diameter. In many ways apparently intermediate between loblolly and longleaf pine. Leaves mostly 3 to 5 inches long, usually in pairs, but often 3 in a cluster on the more vigorous twigs. Bark of old trees nearly an inch thick, broken into large, irregularly shaped plates. Commonly reaches an age of about 200 years, occasionally 300 to 400 years.



SHORTLEAF PINE
One-half natural size

Botanical range covers more than 440,000 square miles, extending from Long Island, New York, to southeastern Kansas, southward to Texas and northern Florida, embracing some portion at least of twenty-four states. Commercial range includes the broad Piedmont region lying between the Appalachians and the Atlantic coastal plain from Virginia to South Carolina; the northern half of Georgia, Alabama, Mississippi, and Louisiana; the eastern portions of Texas and Oklahoma; most of Arkansas; and a part of southeastern Missouri. Young trees when burned or cut back will often regenerate from stump sprouts. (Family Pinaceae.)

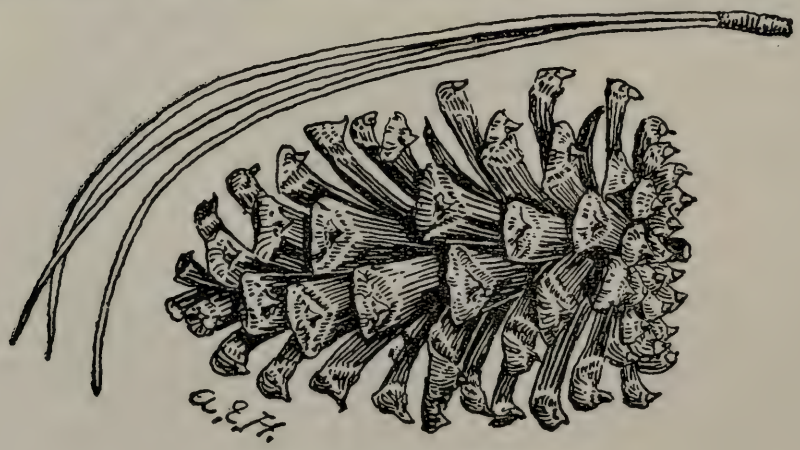
Wood.—Variable from rather light and soft to decidedly hard and heavy; bands of summer wood dense and sharply defined; straight-grained, easy to work, finishes smoothly, and takes paint and preservatives well; occasionally the heartwood and normally the bases of all large limbs become heavily impregnated with resin; heartwood light reddish or orange in color, clearly defined from the nearly white sapwood, which in young trees is very broad.

Use.—General construction work of all kinds, though usually not the equal of longleaf pine for heavy timbers; planing-mill products, interior trim, flooring, rafters, boxes and crates, furniture, slack cooperage, railway crossties (treated), kraft paper, excelsior, and fuel.

PONDEROSA PINE

Pinus ponderosa Lawson

Tree.—At its best a massive, straight-boled tree with a long, open crown of heavy, bent branches; 125 to 140 feet high, rarely 150 to 230 feet, with a trunk 3 to 5 feet, sometimes 6 to 8 feet, in diameter and clear of branches



PONDEROSA PINE
One-half natural size

for 40 to 60 feet; in central and southern Rocky Mountains 60 to 125 feet high and 20 to 30 inches in diameter. Leaves 5 to 11 inches long, in clusters of 3. Bark of old trunks is 3 to 4 inches thick, broken into very broad, scaly plates; that of young trees blackish and furrowed, thus giving

rise to the lumberman's name of black Jack for immature timber. Trees of northern Rocky Mountain region and Pacific slope attain an age of 350 to 500 years; elsewhere rarely 300 years.

Distributed over the greater part of the western United States, also in southern British Columbia and northern Mexico; reaches its best development in California. Occurs at elevations between 1,800 feet (Pacific region) and 10,000 feet (southern Rockies), the main forest growth in the Rocky Mountain region being between 5,000 and 8,000 feet. Forms large, pure stands and also occurs in mixture with other coniferous trees. The forests are often open and park-like. (Family Pinaceae.)

Wood.—Variable from hard, heavy, resinous, and reddish-colored to light, soft, fine-textured, and light-colored; at one extreme a typical yellow pine, at the other much like white pine. Lumber has been known on the market as western white pine, California white pine, and Arizona white pine, but in 1924 the Western Pine Manufacturers' Association officially adopted for it the name of pondosa pine and in 1932 the more correct term, ponderosa pine.

Use.—Almost every purpose for which any pine lumber is suitable—general construction, planing-mill products, flooring, ceiling, siding, interior trim, railway crossties (treated), fuel, etc. Large quantities of lumber used in California for fruit boxes.

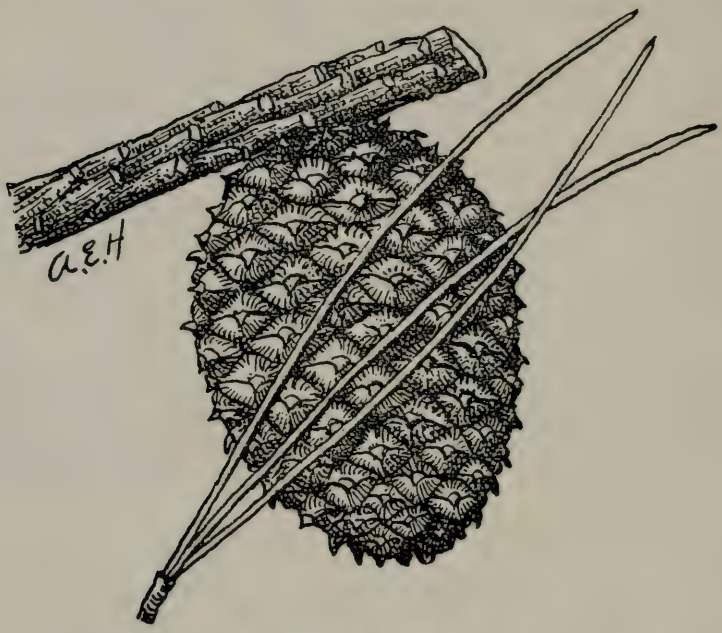
PITCH PINE

Pinus rigida Miller

Tree.—A tree of secondary commercial importance, usually not over 60 feet high, with a short and irregular trunk 18 to 30 inches in diameter; occasionally 80 to 100 feet high and 3 feet in diameter. Coarse, contorted, rough-barked branches form a round-topped thick crown that is often irregular and picturesque. Leaves stiff, 3 to 5 inches long, in clusters of 3. Bark on old trees moderately thick and divided into irregular, flat, scaly ridges. Maximum age attained is about 250 years.

Distributed from southern New Brunswick southward into Georgia and westward into Tennessee, Kentucky,

Ohio, and southeastern Ontario, a botanical range of half a million square miles; widely dispersed, with occasional small tracts of fairly dense stand. Avoids too severe competition of other species through its ability to grow on very poor soils. Highly resistant to fire. Young



PITCH PINE
Two-thirds natural size

trees, when burned or cut back, will often regenerate from sprouts that develop from the base of the stump. (Family Pinaceae.)

Wood.—Moderately heavy, not very hard, brittle, resinous, often knotty; grain variable from fine to coarse, usually irregular; bands of summer wood distinct; heartwood fairly durable, the color pale brown or red, sharply demarcated from the thick, pitchy, yellowish sapwood. Resin ducts numerous and distinct.

Use.—Mostly local, for rough lumber, general construction, boxes and crates, mine props, and fuel. Not an important factor in general trade; timber exported under name of pitch pine is not of this species.

RED OR NORWAY PINE

Pinus resinosa Aiton

Tree.—An important timber tree, usually 70 to 80 feet high at maturity, with a well-formed trunk 20 to 30 inches in diameter; rarely up to 150 feet high and 3 to 5 feet in diameter. Leaves in pairs, 5 to 7 inches long. Bark of mature trees about an inch thick, grayish yellow

RED OR NORWAY PINE
Natural size

or reddish brown, in diamond-shaped plates. Greatest age known about 300 years.

Distributed from Nova Scotia westward through Quebec and central Ontario into Manitoba; southward through northeastern and lake states. Range corresponds closely to that of eastern white pine. Of greatest economic importance in lake states and Ontario. Occurs in groves or scattered through forests of other pines

and hardwoods, usually on dry, sandy, or gravelly soils. Is of great importance in reforestation on account of its rapid growth on poor soils and its freedom from disease and insect enemies. (Family Pinaceae.)

Wood.—Light and soft, moderately strong and tough, easy to work, not durable in contact with the ground. Wood from young trees of rapid growth is softer, lighter-colored, and more uniform in texture than the finer-grained, harder, and redder wood from slow-growing trees on dry, sandy soil; at one extreme much like white pine, at the other like some yellow pines. Minute anatomy very similar to that of the Scotch pine of Europe.

Use.—General construction, planing-mill products, boxes and crates, shipbuilding, water tanks, and paving blocks. Lumber often sold in mixture with white pine and used for same purposes.

TAMARACK

Larix laricina (DuRoi) Koch
L. americana Michaux

Tree.—A straight, slender, deciduous tree, attaining under favorable conditions a height of 70 feet, very rarely 100 feet, with a trunk 20 inches, sometimes up to 30 inches, in diameter; often small because of the poor conditions for growth. Even in the closest stands the crown cover is never very dense and the branches are entirely bare of foliage during the winter, resembling those of southern cypress in this respect. Bark thin and scaly. Maximum age known is less than 200 years.

Very widely distributed over a portion of Alaska, nearly all of Canada east of the Rocky Mountains, the lake states, and New England. Frequently forms pure stands, often of considerable extent. It is most abundant in sphagnum swamps and muskegs, but the largest trees are in moist, drained soil. Commonly associated with black spruce, which has about the same distribution. (Family Pinaceae.)

Wood.—Rather hard and heavy, strong and elastic, durable, fine-textured; grain variable from fine to coarse and from straight to spirally twisted; odorless and taste-

less, fairly durable in contact with the ground; heartwood pale yellowish brown, the thin sapwood nearly white. Small scattered resin ducts present.

TAMARACK
Two-thirds natural size

Use.—Chiefly for telegraph and telephone poles, fence posts, and railway crossties, owing to the small size of the trees. Largest trees sometimes cut into lumber for rough construction.

WESTERN LARCH

Larix occidentalis Nuttall

Tree.—A very much larger tree than its eastern relative, the tamarack, growing ordinarily to a height of 100 to 180 feet, rarely over 200 feet, with a trunk 3 or 4 feet, sometimes 5 to 8 feet, in diameter, and a tapering trunk clear of branches 60 to 100 feet. Spire-like crown very open, appearing sparsely clad, with pale yellowish green, deciduous leaves, turning bright lemon yellow in late autumn. Bark on old trees deeply furrowed near the base and 3 to 6 inches thick. Ages of 300 years are common, the largest trees being 600 to 700 years old.

The distribution of western larch is very limited, the center being in northern Idaho. Occurs on mountain slopes, preferably north and west exposures, stream bottoms, valleys, and flats, at elevations between 2,000 and 7,000 feet. Very exacting in its requirements of soil moisture and makes its best growth in deep, fresh, porous soils. Sometimes forms pure, open stands, but is usually

WESTERN LARCH
One-third natural size

found in mixture with western white pine, western red cedar, Douglas fir, and sometimes western yellow pine. (Family Pinaceae.)

Wood.—Hard and heavy to moderately so, stiff and strong, straight-grained, rather fine-textured, highly resistant to decay; wood from the bases of old trees usually very resinous and likely to be shaky; color of heartwood clear reddish brown, that of the thin and sharply demarcated sapwood nearly white. Small, scattered, resin ducts present.

Use.—Lumber for general construction, millwork, interior trim, ceiling and siding, telegraph and telephone poles, railway crossties, and fence posts.

RED SPRUCE

Picea rubra Link

Tree.—A very important timber tree, under favorable conditions attaining an average height of 70 to 80 feet, occasionally 100 feet, with a tapering trunk 18 to 36 inches in diameter. Branches slender and long persistent; branchlets covered by persistent leaf bases. Bark thin, resinous, and scaly. Average age of mature stands between 200 and 300 years; maximum age about 400 years.

Distributed from Prince Edward Island to the valley of the St. Lawrence River, southward to the coast of

RED SPRUCE
Two-thirds natural size

Massachusetts, along the interior hilly parts of New England and New York to the Allegheny Mountains, as far as western North Carolina. Occurs on a variety of soils, but prefers well-drained lands and mountain slopes; altitudinal range varies from near sea level in the north to 5,000 feet or more in the south. It grows in dense pure stands, or in mixture with black spruce, balsam fir, tamarack, hemlock, maple, beech, and others. (Family Pinaceae.)

Wood.—Light and soft, but very stiff, strong, and elastic for its weight, fairly straight-grained, easy to work, not highly resinous; inner core of first-growth trees usually fine-grained, the outer portion coarser; odorless and tasteless, not very durable when exposed; heartwood with a pinkish tinge and not sharply defined from the

yellowish white sapwood. Small, scattered, resin ducts present.

Use.—Mostly for ground and sulphite pulp, for which it is highly suitable; also for sounding boards of musical instruments, especially violins and pianos, and for rough construction, food containers, and miscellaneous purposes. The trees are the source of commercial quantities of spruce gum.

BLACK SPRUCE

Picea mariana (Miller) B.S.P.

Tree.—Usually a small tree 25 to 40 feet high, with a trunk 4 to 10 inches in diameter; in favorable situations larger, very rarely 100 feet high and 2 to 3 feet in diameter.

BLACK SPRUCE
Two-thirds natural size

Crown characteristically open and irregular, the slender branches extending to the ground except in middle-aged or old trees grown in dense stand, where the lower half is free of branches. Bark of old trees thin, with small, ashy brown scales. Moderately long-lived, average sizes being from 125 to 200 years old; in wet marshes small and stunted, and stems with 75 to 100 annual rings may be only 1 or 2 inches in diameter.

Distributed throughout most of Canada, Alaska, the lake states, New England, New York, Pennsylvania, and southern Appalachian Mountains. Essentially a swamp tree, characteristic of sphagnum bogs, muskegs, and margins of lakes, but grows on a variety of sites at elevations between 100 and 3,500 feet and attains largest size on constantly moist, but well-drained, alluvial soils. Occurs in pure stands of variable extent, or in mixture with tamarack, white cedar, and balsam fir. (Family Pinaceae.)

Wood.—Rather light and soft, but stiff and strong for its weight, very fine-grained, of fine and uniform texture, odorless and tasteless, not very durable; color clear pale yellow throughout. Resin ducts absent.

Use.—Chiefly for the manufacture of pulp. Commercially least important of the eastern spruces because of its small size.

SITKA SPRUCE

Picea sitchensis (Bongard) Carrière

Tree.—A massive timber tree, attaining a maximum height of 300 feet and a diameter of 12 feet above the basal swelling; usually in good stands 150 to 200 feet high and 3 to 6 feet in diameter. Forest-grown trees have a short, open crown of small branches and long, clean trunks of moderate taper. Bark thin and covered with stiff, cupped, dark purple gray scales which render the tree readily distinguishable from its associates. Maximum age about 600 years.

Distributed from sea level to 3,000 feet elevation along the coast from Kodiak Island, Alaska, to Mendocino County, California; width of strip nowhere more than 200 miles and usually much less. Heaviest stands in the northwestern part of the Olympic Peninsula, Washington, at elevations between 400 and 600 feet. Usually occurs in mixture with western hemlock, Douglas fir, and western red cedar, occasionally forming pure stands over small areas. (Family Pinaceae.)

Wood.—Light, soft, usually straight-grained, of fine and uniform texture, tough, easily worked, very strong for its weight, odorless and tasteless, not very durable; the pale pinkish brown heartwood merges imperceptibly

into the creamy white sapwood. Numerous small, scattered, resin ducts are present in the wood.

SITKA SPRUCE
Cone-bearing branch, one-third natural size; seed, one-half natural size

Use.—First came into prominence in 1917 for aircraft construction, for which purpose it is best suited of all American woods. Other uses are for paper pulp, building lumber of all kinds except for heavy construction, planing-mill products, boxes and crates, food containers, and sounding boards of musical instruments.

EASTERN HEMLOCK

Tsuga canadensis Carrière

Tree.—A tree usually 60 to 70 feet high, occasionally 100 feet, with a tapering trunk 10 to 24 inches, rarely 3 or 4 feet, in diameter. Branches are remarkably persistent and in mature trees commonly cover two-thirds of the trunk, forming a very dense crown, numerous sound stubs extending almost to the ground. Bark on

old trees up to 1½ inches thick, the reddish brown scales more or less tinged with purple.

Distributed from Nova Scotia westward throughout the St. Lawrence River Valley and Ontario to the west

EASTERN HEMLOCK
Two-thirds natural size

end of Lake Superior, southward through the lake states, New England, and along the Appalachian Mountains to northern Georgia and Alabama. Most abundant in New England, northern New York, and western Pennsylvania; attains its largest size along mountain streams in North Carolina and Tennessee. Grows in mixed hardwood forests on uplands and often covers northern slopes of rocky ridges and steep banks of rivers. Much planted for ornamental purposes. (Family Pinaceae.)

Wood.—Moderately hard and heavy, stiff and strong, but brittle and inclined to be harsh, splintery, and shaky; perishable in contact with the ground; odor of fresh wood unpleasant; color throughout pale brown, the summer wood with a faint purplish tinge.

Use.—Paper pulp, rough construction lumber such as joists, rafters, and sheathing, and for boxes, crates, and

concrete forms. Unsuited for use in exposed places without preservative treatment. Bark has long been an important source of tannin.

WESTERN HEMLOCK

Tsuga heterophylla (Rafinesque) Sargent

Tree.—A large forest tree of the Pacific northwest, its tall, clean, smooth-looking trunk, fine foliage, and drooping branchlets distinguishing it from all of its

WESTERN HEMLOCK
One-half natural size

associates. Mature trees often 125 to 175 feet high, occasionally 200 to 225 feet, with gradually tapered trunks 2 to 5 feet, sometimes up to 8 feet, in diameter. Bark of old trees 1 to 2 inches thick and deeply furrowed. Age limit about 500 years.

Distributed from the southern coast region of Alaska southward into Mendocino County, California. A tree of the middle, moist, forest zone, growing from sea level to 7,000 feet elevation; absent from the dry inland basins of Oregon, Washington, and British Columbia, but

reappearing on the west slope of the Rocky Mountains. Largest trees occur on lower slopes, flats, and stream bottoms on the west slope of the Cascade Mountains and on the Coast ranges of Washington and British Columbia. Generally scattered in patches, groups, or singly through the forest, though occasionally forming pure stands in northern portions of its range. Often associated with Douglas fir, western red cedar, and Sitka spruce. (Family Pinaceae.)

Wood.—Of light weight, moderately strong, fine-grained, uniform-textured, works easily with tools, is odorless when dry, not durable; color throughout pale brown with faint purplish tinge to the summer wood. Resin ducts may be present as a result of injury. Freshly sawed lumber, especially from butt logs of mature timber, contains a high percentage of moisture, but seasoning is not difficult. Wood in every way superior to eastern hemlock.

Use.—Rough lumber for common boards; also for house construction and heavy timbers; for finished products such as flooring, siding, ceiling, and trim; also for boxes, crates, woodenware, slack cooperage, and paper pulp. Bark yields a higher percentage of tannin than that of eastern hemlock.

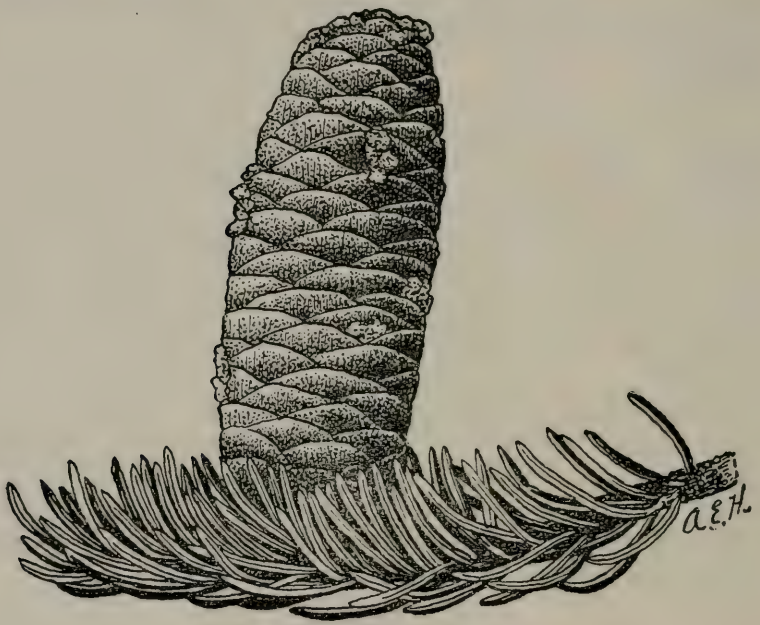
BALSAM FIR

Abies balsamea (Linnaeus) Miller

Tree.—A small or medium-sized, very symmetrical tree, usually 50 to 60 feet high, rarely 90 to 100, with a trunk 12 to 18 inches, occasionally 25 to 30 inches, in diameter. Bark on old trees often one-half inch thick, broken on the surface into many scaly plates; bark on young trees smooth, with numerous resin blisters, the source of "Canada balsam" of the trade.

Distributed from Newfoundland westward into the Canadian Rocky Mountains, southward through the lake states, New England, and along the mountains to southwestern Virginia. Heaviest commercial stands occur in Quebec and Ontario; estimated to compose more than 50 per cent of the forest, 150,000 square miles in extent, on the southern slopes of the Laurentian shield, south of the Height of Land. Found in commercial quantities in

most of Maine, northern New Hampshire, Vermont, and New York, and in some of the swamps of northern Wisconsin, northern Michigan, and Minnesota. Grows in swamps, flat lands, and up the slopes of mountains to timber line. A comparatively short-lived tree, the large ones usually defective. (Family Pinaceae.)



BALSAM FIR
Two-thirds natural size

Wood.—Light, soft, even-textured, straight-grained, not very strong, rather brittle, odorless and tasteless, not durable; color white to brownish, with little distinction between heartwood and sapwood. Most nearly resembles white spruce, but is without resin ducts.

Use.—Chiefly for ground and sulphite pulp. Considered inferior to spruce, perhaps chiefly because of the lower yield per cord. Used to a limited extent for construction lumber, boxes and crates, cooperage, excelsior, etc.

NOBLE FIR

Abies nobilis Lindley

Tree.—Tall tree, usually from 150 to 200 and occasionally up to 250 feet high. Trunk from 6 to 8 feet in

diameter. Until the tree is from 80 to 100 feet in height the tapering trunk is covered with thin, smooth, pale bark and armed with branches which form a regular open pyramid gradually narrowing to the summit. In older trees the lower limbs gradually fall, leaving the trunk free from branches for from 100 to 150 feet when fully grown, and the crown becomes comparatively broad and

NOBLE FIR
Twig, seed, and cone, one-half natural size

somewhat rounded. Bark on old trunks from 1 to 2 inches thick, bright reddish brown and deeply divided into broad flat ridges irregularly broken by cross fissures and covered with thick, closely appressed scales. Sometimes known as red fir. (Family Pinaceae.)

Wood.—Light, hard, strong and rather close-grained; pale brown with reddish streaks and sapwood somewhat darker; contains broad, conspicuous, dark-colored resinous bands of summer cells and thin, obscure medullary rays.

Use.—Sometimes sawed into lumber and occasionally used under the name larch for interior finish of buildings and for packing cases.

DOUGLAS FIR

Pseudotsuga taxifolia (Poiret) Britton

Tree.—A very important timber tree, attaining, under best conditions, a height of 180 or 190 feet, rarely over 200 feet, with a trunk 4 to 6 feet, sometimes 10 feet,

DOUGLAS FIR
Two-thirds natural size

in diameter. Outside the humid Pacific coast region usual heights are 75 to 100 feet; diameters, 18 to 30 inches. Trees in high, exposed places are small and stunted. Maximum age about 500 years. Bark of old trees 5 to 12 inches, near the base sometimes 18 to 24 inches, thick.

Distributed from British Columbia southward to central California, and through the Rocky Mountain region to northwestern Texas, southern New Mexico, Arizona, and northern Mexico—over 2,000 miles north and south and almost 1,000 miles east and west. Most abundant and of its largest size not far above sea level in southern British Columbia and western Washington and Oregon, forming, either alone or mixed with western hemlock, very dense forests yielding 55,000 to 60,000, sometimes 100,000, board feet per acre. (Family Pinaceae.)

Wood.—Stiff and strong, moderately hard and heavy, not difficult to work, fairly durable; resembles southern pine but is commonly lighter and less resinous. Grain very coarse, medium, or fine; coarse-grained wood, the red fir of lumbermen, usually distinctly reddish brown; fine-grained wood, often called yellow fir, a clear yellowish brown. The two classes are sometimes obtained from the same tree and, while practically equal in strength values, the finer-grained, yellow wood is preferred for finishing lumber. Coast type timber obtainable in very large sizes and is generally heavier, stronger, and freer from defects than the mountain type.

Use.—All kinds of construction, millwork, and carpentry. Flat grain is often prominently figured, thus giving it value for panels. Lumber and timber shipped to all parts of the United States and to foreign countries, in the latter case under the name of Oregon pine.

REDWOOD

Sequoia sempervirens (Lambert) Endlicher

Tree.—Massive timber tree, 190 to 280 feet high, sometimes 350 feet, with a trunk 8 to 12 feet, occasionally 15 to 20 feet, in diameter above the greatly enlarged base. Bark on the large trunks sometimes a foot thick. Very long-lived, though less so than its near relative, the big-tree, and probably never exceeding 2,000 years; few trees cut for lumber are over 500 years old.

Distributed from the southwestern corner of Oregon southward, 10 to 30 miles inland, through the California coast region to Salmon Creek Canyon in Monterey

County, a distance of about 300 miles; generally from near sea level to about 2,500 feet elevation, and mainly within the fog belt on the seaward side of the coast mountains. Best and most nearly pure stands occur in Humboldt County and adjacent regions in northern California. Area covered, about 1,850 square miles, mostly a mixture of redwood (50 to 75 per cent), Douglas fir, tanbark oak, western hemlock, and western red cedar. Tree regenerates from stump and root sprouts after logging. (Family Taxodiaceae.)

REDWOOD
Two-thirds natural size

Wood.—Varies from soft, fine-grained, and uniform-textured to coarse, hard, and heavy; is easy to split, seasons readily, takes a very smooth finish, holds its place well when manufactured, is odorless, tasteless, and non-resinous, highly resistant to decay and insects; heartwood light to dark cherry red, the color more or less leachable; sapwood nearly white.

Use.—Chiefly for siding, interior trim, sash and doors, foundation work, greenhouses, silos, flumes, poles, fence posts, and paving blocks. Burls and curly-grained material used for fancy veneers.

SOUTHERN CYPRESS

Taxodium distichum (Linnaeus) Richard

Tree.—An important timber tree, attaining a height of 100 to 120 feet, occasionally 150 feet, with a straight trunk 3 to 5 feet, rarely up to 12 feet, in diameter above the basal swelling. Symmetrical crown of younger trees eventually becoming flat-topped and coarse, often bearded with Spanish moss, bare and open during the winter and giving rise to the name bald cypress. Horizontal roots often produce erect, conical, leafless, woody projections, called "knees," whose height corresponds closely to average high-water level for the locality. Ages of 400 to

SOUTHERN CYPRESS
Two-thirds natural size

600 years very common, maximum age probably about 2,000 years.

Distributed from southern New Jersey over the Atlantic coastal plain to southern Florida, and westward through the Gulf coast region nearly to the Mexican border in Texas, and up the Mississippi Valley to southern Illinois and Indiana. Areas of most important lumber production are the alluvial flood plains of the Mississippi River; Florida and southern Georgia; coastal regions of South

Carolina and southeastern North Carolina. Occurs both in pure stands and in mixture with hardwoods. Logging operations in the deep swamps have progressed from the simple float method in the eighties to the pull-boat in the nineties, and from that to the present overhead-cableway skidding. Trees usually girdled six to twelve months in advance of logging to permit drying out enough to float. Sprouts develop from the stumps of saplings, but not from old or girdled trees. (Family Taxodiaceae.)

Wood.—Variable from very light and soft to rather heavy and hard; grain straight to interlocked, texture rather fine, growth rings usually distinct; easy to work, requires care in seasoning, is noted for its durability; color of heartwood variable from yellow to orange and deep brown, often variegated, the sapwood white; some specimens have a waxy or greasy appearance and feel and a somewhat rancid odor. Old trees often riddled with the galleries of a fungus (*Fomes geotropus* Cooke), producing the so-called "pecky" or "peggy" cypress.

Use.—Especially suited for building purposes where resistance to decay is essential, such as siding, cornices, gutters, shingles, railings, stepping, doors, porches, greenhouses, and storage vats; also for interior finish, laundry appliances, paneling, coffins, fencing material, poles, and railway crossties.

INCENSE CEDAR

Libocedrus decurrens Torrey

Tree.—A large tree with rapidly tapering trunk, widely buttressed at the base and covered with a deeply furrowed, shreddy bark, sometimes 2 or 3 inches thick. Ordinarily 80 to 100 feet high and 30 to 50 inches in diameter, rarely 125 to 160 feet high and 6 to 8 feet in diameter. Trunks of most of the larger trees and some of the smaller ones riddled by a fungus (*Polyporus amarus*), giving the wood the appearance of having been attacked by boring insects, a condition similar to "peckiness" in southern cypress. Largest trees probably 600 to 800 years old.

Distributed scatteringly from central Oregon to Lower California. Commercial range confined to the west slope

of the Sierra Nevadas and the mountains of northern California and southern Oregon; nowhere in pure forests, but usually comprising from 5 to 10 per cent of the stand of other species, such as sugar pine, ponderosa pine, and Douglas fir. (Family Cupressaceae.)

INCENSE CEDAR
One-half natural size

Wood.—Light and soft, straight-grained, of fine and uniform texture, easy to work, splits readily, cuts very smoothly, seasons readily, has a pronounced spicy-resinous scent and taste, and is highly resistant to decay and insects; heartwood light brown tinged with red, deepening upon exposure, sharply defined from the white or cream-colored sapwood.

Use.—Locally for fence posts, foundation timber, telegraph and telephone poles, and some lumber. Of chief importance commercially as a substitute for eastern red cedar in the manufacture of lead pencils.

NORTHERN WHITE CEDAR

Thuya occidentalis Linnaeus

Tree.—A medium-sized tree, 50 to 60 feet high, occasionally 80 feet, with a tapering trunk, often fluted and buttressed, usually not more than 2 or 3 feet in

diameter, rarely 4 to 8 feet, at the base, and often dividing into two or three stout, secondary stems. Limbs slender and upright, forming a narrow, long, compact crown. Foliage sprays flat, yellow green in color, the leaves scale-like. Cones small, elongated, and leathery, standing

NORTHERN WHITE CEDAR
Two-thirds natural size

erect on the fruiting sprays. Bark very thin, light red brown, often tinged with orange.

Distributed from Nova Scotia and New Brunswick northwestward into Manitoba, thence southward through the lake states and New England; occasionally also in the southern Appalachians. Often cultivated for ornamental purposes. Of principal commercial importance in the lake states. Occurs for the most part on swampy ground or stream banks, often forming very dense forests. Trees growing in swamps and along rivers nearly always have curved trunks. (Family Cupressaceae.)

Wood.—Very light, soft, and spongy, even-textured, not strong, seasons readily, is very easy to work, holds its place well when manufactured, is mildly and fragrantly

scented and highly durable; heartwood pale brown, often variable in shade, sapwood thin and white.

Use.—Mostly in the round for fence posts, telegraph and telephone poles, piling, and street railway ties; also for shingles, pail stock, and small boats. Not commonly sawed into lumber.

WESTERN RED CEDAR

Thuya plicata Don

Tree.—Very important timber tree, 150 to 175 feet high, rarely 200 or 225 feet, with a conical, fluted trunk usually 3 to 8 feet, maximum of 15 feet, in diameter, the

WESTERN RED CEDAR
One-third natural size

limbs long persistent. Stringy, fibrous, reddish bark thin (½ to ¾ inch) and resinous. Maximum age about 1,000 years.

Distributed from the southeastern coast of Alaska southward to northern California, eastward through northern Washington to northern Idaho and Montana, and to the Cascades of Washington and Oregon. Occurs chiefly in wet or constantly moist situations and is at its

best in the river bottoms near Puget Sound and Vancouver Island. Sometimes in pure stands, more commonly associated with Douglas fir, Sitka spruce, western hemlock, and western white pine. (Family Cupressaceae.)

Wood.—Very light, soft, and spongy, not strong, of straight, even, and often coarse grain, medium-textured, easy to work, seasons readily, is comparatively inert to changes in humidity of the air, fragrantly scented, noted for its durability; heartwood variable in color from dark brown or reddish to light yellow, sapwood thin and white; light-colored portions of heartwood often mistaken for sapwood.

Use.—Most important source of shingles in the United States. Lumber used for bevel siding, interior finish, porch columns, boat building, patterns, tank staves, and coffins. In the round for fence posts, telegraph and telephone poles, and piling. Especially suited for articles requiring durability and ease of working, but not great strength or resistance to wear.

SOUTHERN WHITE CEDAR

Chamaecyparis thyoides (Linnaeus) B.S.P.

Tree.—Medium-sized tree, attaining under favorable conditions a height of 70 to 80 feet, occasionally more, with a well-formed trunk 2 feet, occasionally 3 to 5 feet, in

SOUTHERN WHITE CEDAR
Two-thirds natural size

diameter; much smaller in northern portion of its range. Branches slender, forming a narrow, spire-like crown. Leaves scale-like, on open fan-like spray. Bark on mature trunks sometimes an inch thick, light reddish brown, divided irregularly into flat, anastomosing ridges, often twisted spirally around the stem.

Botanical range fringes the Atlantic coast from Maine to northern Florida, and westward near the Gulf to southwestern Mississippi. Commercial range chiefly from New Jersey to Florida. Occurs in deep, miry swamps, often forming dense, pure forests. Sound trunks are frequently extracted from the bottoms of swamps where they have lain submerged for centuries. (Family Cupressaceae.)

Wood.—Very light and soft, of uniform texture, straight-grained, readily seasoned, easily worked, holds its place well when manufactured, is fragrantly scented and highly durable; heartwood of a roseate brown color, sapwood lighter.

Use.—Much less than formerly for boat building, woodenware, pails, tubs, tanks, chests, cabinets, shingles, telegraph and telephone poles, and fence posts. Not commonly sawed into lumber.

PORT ORFORD CEDAR

Chamaecyparis Lawsoniana (Murray) Parlatore

Tree.—A large forest tree, 125 to 180 feet high, sometimes over 200 feet, with a well-formed trunk 4 to 6 feet, rarely 12 feet, in diameter. Forest-grown trees short-crowned, the trunks clear of branches for 80 to 100 feet. Bark at fluted base of old trees 6 to 10 inches thick, deeply seamed, the outer portions separable into long strips. Attains an age of about 600 years.

Range restricted to a narrow belt, 10 to 40 miles wide, bordering the coast of southern Oregon and northern California. Center of production in the Coos Bay region of Oregon. Trees commonly scattered through the forest, either singly or in small groups, in association with western red cedar, Sitka spruce, western hemlock, and Douglas fir. In comparison with many other western timbers, the supply is very limited. (Family Cupressaceae.)

PORT ORFORD CEDAR
One-half natural size

Wood.—Variable from rather light and soft to fairly hard and heavy, strong and elastic, straight-grained, usually of fine and uniform texture, sometimes highly resinous but generally not; has a pungent, aromatic odor, very pronounced in freshly cut timber; is easy to work and highly durable; heartwood yellowish white, sometimes with a decided reddish tinge; sapwood lighter, not very clearly defined.

Use.—Sash, doors, blinds, siding, match sticks, and battery separators. Considerable quantities of lumber are shipped to the Orient for house construction.

ALASKA CEDAR

Chamaecyparis nootkatensis (Lambert) Spach

Tree.—A forest tree, under favorable conditions 75 to 80 feet high, sometimes 120 feet, with a somewhat crooked and fluted trunk 2 to 3 feet, or occasionally 4 to 6 feet, in

diameter, and clear of branches for 30 to 50 feet; on high exposed slopes and crests stunted and sprawling. Cones require two years for maturity, thus resembling *Cupressus* and differing from other species of *Chamaecyparis*. The bark is only about ½ inch thick and the thin, flat ridges flake off in long, narrow strips. Maximum age about 600 years.

ALASKA CEDAR
One-half natural size

Most abundant and largest on coast and adjacent islands of British Columbia and southeastern Alaska, at elevations between sea level and 3,000 feet, often predominating in the forest; also occurs southward on the coast and in the Cascades through Washington and northern Oregon, at elevations between 2,500 and 7,000 feet, mainly scattered through the forest either singly or in small groups. Sometimes in pure stands of limited extent. Common associates are Sitka spruce, western red cedar, western hemlock, and maple. (Family Cupressaceae.)

Wood.—Of medium weight, rather hard, straight-grained, of fine and uniform texture, easy to work, finishes smoothly, and is highly durable; fresh wood has pronounced resinous odor suggesting turnips; heartwood is pale to sulphur yellow, thin sapwood nearly white.

Use.—Not extensive, on account of the limited supply. Suitable for many of the purposes for which Port Orford cedar is employed.

EASTERN RED CEDAR

Juniperus virginiana Linnaeus

Tree.—Usually a small or medium-sized tree, but under favorable conditions in the South attaining a height of 80 to 100 feet, and a diameter up to 4 feet. Form varies from the low, irregular, bushy type of the West to the conical and spire-like crowns of southern New England, Virginia, and Maryland. Boles of forest-grown

EASTERN RED CEDAR
Two-thirds natural size

trees with considerable clear length, but usually much tapered and fluted. So-called "cedar apples" are galls produced by a fungus which, in another phase of its life cycle, causes apple rust. Bark thin, light brown, tinged with red, and separating into long, thin strips, frayed at the margins. Attains an age of 300 to 400 years.

Occurs, for the most part scatteringly, in southeastern Canada and over all that portion of the United States east of line drawn from central South Dakota to eastern Texas, mostly on dry gravelly slopes and rocky ridges. Most abundant and best developed south of the Ohio

River, especially in the foothills of the Cumberland Mountains and the basin of the Tennessee River in Tennessee and Alabama, where it composes pure forests. (Family Cupressaceae.)

Wood.—Light and soft, but firm and compact, very brittle, straight-grained, of very fine and uniform texture, easy to split, cuts with remarkable smoothness, has a pleasant taste and scent, is highly durable; heartwood reddish or purplish brown, sometimes with pale brown or nearly white streaks; sapwood thin, dingy white. Logs usually very knotty and fluted, the largest often decayed at the center.

Use.—Now chiefly confined to the manufacture of lead pencils and clothes chests. Trees too small or defective for lumber are used for poles and fence posts. Formerly much used for small cooperage (pails, churns, and tubs), interior finish, boat building, planing-mill products, faucets, cigar boxes, cabinets, coffins, and articles of turnery and carving.

MONTEREY CYPRESS

Cupressus macrocarpa Gordon

Tree.—A medium-sized tree, 60 to 80 feet tall, with a trunk from 1 to 3, rarely up to 6 feet, in diameter. Trees standing on cliffs exposed directly to the ocean winds exhibit irregular, flat crowns and flattened trunks and main branches. In protected situations the crown becomes conical with long, spreading tips to the main branches.

Limited to two localities on the ocean shore at the mouth of the Carmel River near Monterey, California. It is the most restricted in its distribution of the California trees and of any coniferous species in the world. It is widely cultivated in California for ornamental purposes, windbreaks, and hedges. It is also cultivated in various parts of Europe and has been planted with success in Australia and New Zealand. (Family Cupressaceae.)

Wood.—Heavy, hard, strong, rather brittle, close-grained, compact, easy to work, satiny, durable in contact with soil, with a fragrant odor and capable of a high polish;

color of heartwood clear bright brown streaked with red and yellow, thin sapwood light yellow.

MONTEREY CYPRESS
Branch, one-quarter natural size; fruit, one-half natural size

Use.—Owing to its comparative rarity the wood is not used to any appreciable extent for lumber.

BLACK WALNUT

Juglans nigra Linnaeus

Tree.—A magnificent timber and nut tree, at its best 125 to 150 feet high in the forest, with a long, clear, well-formed trunk 4 to 6 feet in diameter. Now more commonly open-grown, with a short, clear bole and a broad, round to spreading crown. Leaves 1 to 2 feet long, with 15 to 23 leaflets. Nuts with a rich, edible meat, and inclosed in a thick, fleshy, green husk containing a brown-staining juice. Bark dark-colored, corky, and heavily ridged. Attains an age of at least 300 years.

Distributed from southern New England and Ontario to Minnesota, South Dakota, and Nebraska, southward into Texas, and eastward to Georgia, reaching the Atlantic coast line in South Carolina, a total of about 600,000 square miles. One of the most important trees in the

central hardwood region, occurring scattered through the forest, in small open groves, or singly in fields and along fences. At least fifty million board feet of timber per year seem assured. (Family Juglandaceae.)

BLACK WALNUT

Leaf, one-fifth natural size; fruit, one-third natural size; twig, three-quarters natural size

Wood.—Cabinet wood of the first order, rather heavy, hard, and strong, usually straight-grained and even-textured; easy to work, takes a high polish, seasons readily, holds its place with fidelity when manufactured, has a faint, agreeable scent, is very durable. Pores are variable in size, comparatively few, irregularly distributed; rays fine and inconspicuous; root burls highly figured; wood of crotches and root flares is curly-grained and ornate; color of heartwood rich brown deepening to chocolate, often with purplish tinge; thick sapwood dingy white, but takes on the rich color of the heart when steamed.

Use.—Principally for cabinet work, fine furniture, gunstocks, and interior finish, for which it is eminently suited. Figured wood commonly made into veneers.

BUTTERNUT

Juglans cinerea Linnaeus

Tree.—A timber tree of secondary importance, usually short-statured and divided near the ground into many

coarse, spreading branches; occasionally attaining a height of 100 feet, with a tall, straight trunk 2 to 3 feet in diameter and free of limbs for more than half its length. Yellowish green, pinnate leaves 15 to 30 inches long, with 11 to 17 leaflets. Elongated, four-ribbed, deeply sculptured, edible nuts enclosed in a thin pulp coated with rusty, clammy hairs. Bark of old trees about an inch thick, separating

BUTTERNUT
Leaf and fruit, one-sixth natural size; twig, one-half natural size

into long, flat, light-colored ridges. Usually rather short-lived, but may attain an age of 200 years or more. (Family Juglandaceae.)

Distributed from New Brunswick and Quebec, westward to Minnesota, and southward to Arkansas and Delaware and along the Appalachian Mountains to Georgia. Occurs scattered through the hardwood forests, preferring rich, moist soil near the banks of streams. Common along fences and creeks and sometimes on rocky uplands. Occasionally cultivated for its nuts.

Wood.—Light, soft, brittle, straight-grained, uniform-textured, readily seasoned, very easy to work, holds its place well when manufactured, is odorless and tasteless or nearly so, and resistant to decay. Pores are variable in size, not very numerous, and scattered irregularly; rays

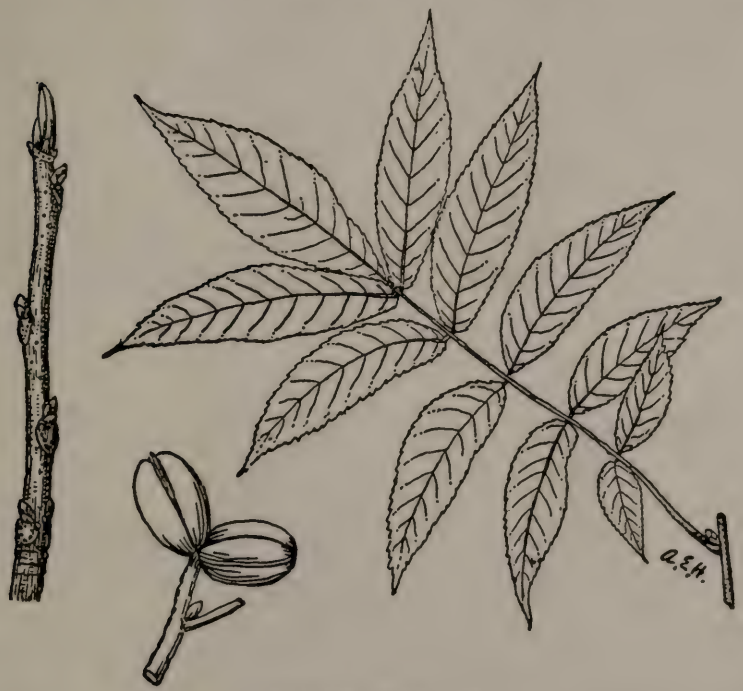
fine and inconspicuous; heartwood is light chestnut-brown often with darker zones, sapwood thin and white.

Use.—Furniture and interior finish; limited because of the small supply available.

PECAN HICKORY

Carya pecan Ascherson and Graebner

Tree.—Largest of the hickories and chiefly valuable for its nuts. A forest tree, attaining under favorable conditions a height of more than 100 feet, in exceptional instances as great as 180 feet, with long, massive trunk



PECAN HICKORY

Twig, one-half natural size; fruit, two-fifths natural size; leaf, one-fifth natural size

3 to 5 feet, sometimes 6 or 7 feet, in diameter, supporting a narrow, symmetrical crown. Pinnate leaves 12 to 20 inches long, with 9 to 17 sickle-shaped leaflets. Bright reddish brown nuts elongated, smooth, thin-shelled, with a thin, brittle husk. Bark of old trees dark brown, about 1 inch thick, close and finely ridged. Attains an age of about 400 years.

Principal distribution in the Mississippi Valley south of Iowa, extending into Oklahoma and Texas. Most abundant and of largest size in southern Arkansas and eastern Texas. Prefers low, rich river bottoms. Cultivated in the South for its valuable nuts, and many improved forms have been developed. (Family Juglandaceae.)

Wood.—Ring-porous; hard, heavy, brittle, rather coarse-textured, straight-grained, fairly easy to work; color of heartwood light brown tinged with red, often somewhat streaked, sapwood thin and dingy white. Wood inferior in strength and elasticity to that of other hickories.

Use.—Chiefly for fuel; also for manufacture of vehicles and farming implements. The nuts, which are derived both from forest trees and plantations, are a much more important article of commerce than the wood.

BITTERNUT HICKORY

Carya cordiformis Koch

Tree.—A slender forest tree, often called pignut; attains under favorable conditions a height of 100 feet,

BITTERNUT HICKORY
One-third natural size

with a straight trunk 18 to 24 inches, occasionally 3 or 4 feet, in diameter, with a broad crown composed of stout,

spreading or ascending branches and fine, flexible branchlets. Terminal buds narrow, scurfy pubescent, and of a sulphur yellow color. Pinnate leaves 6 to 10 inches long, with 7 to 9 long-pointed leaflets. Nuts small and rounded, with a very bitter kernel, and inclosed in a very thin husk that is 4-winged from the tip to the middle. Hard, tight-clinging bark less than ¾ inch thick, grayish brown, roughened by shallow fissures and narrow ridges. Attains an age of about 200 years.

Very widely distributed throughout the eastern half of the United States and extends into southern Ontario and Quebec. The common hickory of Iowa, Nebraska, and Kansas. Attains its best development in the rich bottom lands of the Ohio River basin. Usually solitary and scattered. (Family Juglandaceae.)

Wood.—Ring-porous; hard, heavy, strong, tough, and elastic; usually not the equal of shagbark hickory in these respects, but superior to pecan; color of heartwood dark brown, that of thin sapwood nearly white. Young trees of rapid growth (second-growth) have tougher wood and a much larger proportion of sapwood.

Use.—Fuel, spokes, tool handles, farming implements, and athletic equipment.

SHAGBARK OR SHELLBARK HICKORY

Carya ovata Koch

Tree.—A very important timber and nut tree, 80 to 100 feet high, rarely 130 feet, with a long, straight trunk 2 to 3 feet, rarely 4 feet, in diameter. Leaves hairy, 8 to 14 inches long, with 5 or rarely 7 rather large leaflets. Nut commonly flattened and 4-angled, and inclosed within a thick husk which splits freely to base at maturity. Bark on old trees in long, curved strips or plates attached at the middle. Occasional tight-barked trees reputed to produce the strongest and toughest wood. Attains an age of about 350 years.

Widely distributed throughout the eastern half of the United States, from southern Maine westward through Ontario to Minnesota, and southward to Florida and Texas. Common throughout the central hardwood region, on low hills and rich bottom lands. Occurs as isolated

trees, or composing a considerable portion of the stand, or sometimes in nearly pure groves. Often protected as a shade and nut tree in pastures. (Family Juglandaceae.)

SHAGBARK OR SHELLBARK HICKORY
Leaf and fruit, one-third natural size; twig, one-half natural size

Wood.—Ring-porous; with a dense band of summer wood marked with spider-web lines of parenchyma; the rays fine and inconspicuous; very hard, heavy, tough, strong, and resilient, usually straight-grained; heartwood reddish brown, sometimes with rusty streaks; sapwood nearly white, thin in old trees but very thick in young, thrifty trees (second-growth), and preferred for most purposes. Seasoned sapwood subject to damage from powder-post beetles.

Use.—Mostly in the form of billets for the manufacture of axes and other tools subjected to shock, spokes and rims of automobile and carriage wheels, poles, shafts, and singletrees of light vehicles, picker sticks in looms, golf sticks, skis, scythe snaths, mower pitmans, sucker rods for pumps, and many other purposes requiring great strength and toughness. Considered the best of all woods for fuel and smoking meat. The nuts are a valuable article of commerce.

MOCKERNUT HICKORY

Carya alba Koch

Tree.—A medium-sized to large forest tree, 50 to 75 feet high, occasionally 100 feet, with a straight trunk usually less than 2 feet, sometimes 3 feet, in diameter, free of branches for half its height and bearing a rather large crown of upright, rigid, or gracefully pendulous branches. Open-grown trees commonly enlarged at the base. Twigs coarse; winter buds large and plump, with the outer scales

MOCKERNUT HICKORY

Fruit, one-third natural size; leaf, one-fifth natural size; twig, two-thirds natural size

easily detached. Nut rounded, with a very thick shell and deceitfully small kernel (hence the name mockernut), the husk thick and splitting nearly to the base at maturity. Compound, resinous, and hairy leaves 8 to 12 inches long, with 5 or 7 large leaflets. Bark light gray or slate-colored, with irregular, rounded ridges that are not shaggy. Attains an age of about 300 years.

Range extensive, from Massachusetts westward through southern Ontario to Nebraska, and southward to Florida

and Texas. Attains its largest size in the basin of the Ohio River and in Missouri and Arkansas. (Family Juglandaceae.)

Wood.—Ring-porous; very hard, heavy, tough, and strong, usually straight-grained; heartwood rich dark brown or reddish, sapwood rather thick and nearly white. In structure and properties the wood is very similar to that of the shagbark hickory.

Use.—In articles requiring strength and toughness, and for fuel. Use identical with that of shagbark hickory.

PIGNUT HICKORY

Carya glabra Sweet

Tree.—A medium-sized to large forest tree, usually 60 to 70 feet high, occasionally 90 feet, with a slender

PIGNUT HICKORY
One-half natural size

trunk 20 to 30 inches, rarely over 3 feet, in diameter, bearing a rather narrow crown formed by short, spreading branches, the lower ones often pendulous. Handsome,

round-topped, and short-boled when grown in the open. Twigs slender and smooth, the terminal bud small and plump, losing the outer scales in winter. Nuts flattened, not ridged, thick-walled, containing a small, bitter-sweet kernel, and inclosed in a rather thin, pear-shaped husk which splits only part way or remains closed at maturity. Bark close, dark gray, narrowly ridged, suggesting white ash. Attains an age of about 350 years.

Widely distributed from central New England westward through southern Ontario to southeastern Minnesota and Nebraska, southward to Florida and eastern Texas. Occurs on dry ridges and hillsides. (Family Juglandaceae.)

Wood.—Hardest, heaviest, and toughest of the hickories. In structure and appearance very similar to shagbark hickory.

Use.—Principally for handles of axes and hammers, spokes and other parts of vehicles requiring shock-resisting ability, and fuel.

COTTONWOOD

Populus heterophylla Linnaeus

Tree.—An important timber tree, attaining under favorable conditions a height of 80 to 130 feet, with a long, well-formed trunk 2 to 3 feet in diameter, and a rather narrow crown composed of slender branches and stout twigs. It is usually much smaller and in the northern part of its range is rarely more than 40 feet tall. Leaves woolly on both surfaces at first, becoming smooth above. Flowers in catkins, appearing before the leaves, the two sexes on different trees. Bark of old trees suggests shagbark hickory. Rarely 100 years of age.

Distributed throughout the Atlantic coastal plain from Connecticut to western Florida, along the Gulf coast to Louisiana, and up the Mississippi River Valley to southern Indiana and Illinois, the shape of the region covered being roughly that of a horseshoe. Commercial distribution south of North Carolina in the East, and south of Kentucky in the West. Is especially abundant on moist, abandoned fields, marshes, and the borders of swamps. Often called swamp cottonwood. Usual associates are red maple, tupelo, and red gum. Even-aged pure stands occur on old fields. Grows rapidly. (Family Salicaceae.)

COTTONWOOD
Twig, three-quarters natural size; leaf and fruit, one-half natural size

Wood.—Diffuse-porous; rather fine-textured, light, soft, not very strong, fairly tough, inclined to warp in seasoning, easy to work, holds nails firmly, is perishable in contact with the soil; color of heartwood dull brown, that of sapwood lighter.

Use.—Boxes and crates, slack cooperage, veneers for baskets and plywood, veneer cores, excelsior, paper pulp, and many of the purposes for which soft pine, basswood, and yellow poplar are employed.

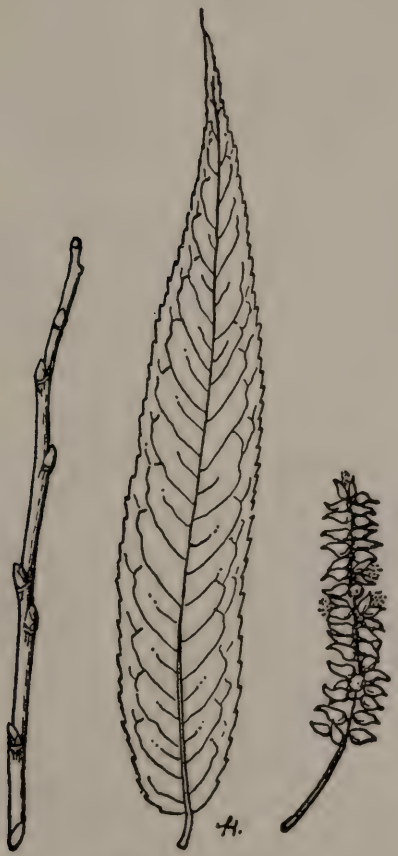
BLACK WILLOW

Salix nigra Marshall

Tree.—Largest of native willows, attaining a maximum height of 140 feet, with a long, clear bole 4 feet in diameter; usually 25 to 40 feet high and 10 to 20 inches in diameter, or with a large base supporting several sprout-like stems. Often a crooked or inclined tree, with a wide, open, round-topped crown composed of slender branchlets and smooth, pliable twigs that are brittle at the base. Winter buds about ⅛ inch long and covered with a single scale. Leaves simple, alternate, narrow, frequently

sickle-shaped. Flowers in catkins, the male and female on different trees. Bark very bitter, on mature trees about 1 to 2 inches thick, rough, and deeply furrowed. Tree attains a maximum age of about 150 years, but some of the largest specimens are only 75 years old.

Black willow and its varietal forms are distributed from New Brunswick to southern Florida and west to eastern



BLACK WILLOW
Two-thirds natural size

Dakota, Nebraska, Kansas, Oklahoma, southern Arizona, southern and central California, and south into Mexico. Commonly on low, moist, alluvial banks of streams and lakes; of its largest size in the lower Mississippi Valley. Grows very rapidly. (Family Salicaceae.)

Wood.—Diffuse-porous; rather fine-textured, of light weight but firm and tough, not easy to split, holds nails firmly, is not durable; color of heartwood brown or reddish brown, often irregular, sometimes with a bluish tinge especially when freshly cut; sapwood thin, whitish. Resembles cottonwood and the lumber is sometimes sold in mixture with it.

Use.—Lumber for core-stock in veneered panels of desks, filing cabinets, and bookcases, and for shelving, boxes and crates, wagon beds, and heading for barrels. Other uses: slack cooperage, charcoal for black gunpowder, woodenware, excelsior, artificial limbs, and fence posts. Small trees often used for weaving mats for river bank revetments.

HOP HORNBEAM

Ostrya virginiana (Miller) Koch

Tree.—A small tree of minor importance, usually 20 to 30 feet high, with a trunk 18 to 20 inches in diameter,

HOP HORNBEAM
Twig, one-half natural size; leaf and fruit, one-half natural size

and a wide-spreading, open or round crown of long, slender branches drooping at the ends; occasionally 60 feet high and 2 feet in diameter. Leaves alternate, simple, 3 to 5 inches long, with doubly serrate margins and pointed

tips. The pendant fruit clusters resemble hops. The bark, which is smooth and light brown on small trees, is rough and shreddy on old ones.

Widely distributed from Nova Scotia west to Manitoba, and south to Gulf states as far west as Texas. Occurs on dry, gravelly slopes and ridges, usually under the shade of oaks and other large trees, and rarely conspicuous in the composition of the forest. It is often called ironwood, a name applied also to the blue or water beech (*Carpinus caroliniana* Walter). (Family Betulaceae.)

Wood.—Diffuse-porous; rays very fine; is very hard, heavy, tough, and strong, fine-textured, inclined to warp in seasoning, not very durable; color light brown or roseate.

Use.—Usually limited to farm purposes, such as handles and other parts of implements, wedges, levers, and fuel.

SWEET BIRCH

Betula lenta Linnaeus

Tree.—A valuable timber tree, attaining a height of 70 to 80 feet, with a well-formed trunk 2 to 3, rarely 5 feet, in diameter. Twigs and bark with pronounced sweet taste of wintergreen. Simple, sharply serrate leaves 2½ to 6 inches long and half as wide, alternate on young shoots and paired on short spurs. Bark suggests cherry and does not exfoliate in papery layers as in other birches.

Distributed from Newfoundland to northwestern Ontario and southward to southern Indiana and Illinois, and along the mountainous regions to central Kentucky, Tennessee, and western Florida. Common forest tree in the North, largest on the western slopes of the southern Allegheny Mountains, occurring chiefly on rich upland soils. (Family Betulaceae.)

Wood.—Diffuse-porous; fine-textured, hard, heavy, and very strong, usually straight-grained but sometimes curly, splits easily, requires care in seasoning, is not difficult to work, finishes very smoothly and takes a beautiful, satiny polish, is odorless and tasteless, only moderately durable in contact with the ground; heartwood brown,

tinged with red, sometimes deeply reddish, sapwood yellowish and rather sharply defined. Similar to maple, but with less distinct rays. Often stained to imitate mahogany.

SWEET BIRCH
One-half natural size

Use.—Chiefly for furniture, cabinet work, interior finish, paneling, flooring, farming machinery, and articles of turnery, including gunstocks. Cordwood used for fuel and distillation. Twigs and bark distilled for birch oil which is similar in its properties to oil of wintergreen.

YELLOW BIRCH

Betula lutea Michaux

Tree.—A very important forest tree, usually 60 to 80 feet high, sometimes 100 feet, with a trunk 2 to 3 feet, occasionally up to 5 feet, in diameter. Twigs and bark with a mild flavor of wintergreen. Simple, doubly serrate leaves 3 to 4 inches long and half as wide, alternate on young shoots and paired on short spurs. Bark of branches and young stems lustrous silvery or coppery, soon forming a ragged fringe, and later peeling in filmy, yellow layers, finally becoming on old trunks ½ inch thick, in large reddish or yellowish brown plates.

Found on moist uplands from Newfoundland and the northern shores of the Gulf of St. Lawrence to Lake Abitibi in Ontario, southward through the lake states and New England and along the Allegheny Mountains to Tennessee and North Carolina. Abundant and of its largest size in eastern Canada, and in northern New

YELLOW BIRCH
One-half natural size

York and New England; small and rare in southern New England and southward. Principal sources of lumber Wisconsin and upper Michigan. (Family Betulaceae.)

Wood.—Diffuse-porous; fine-textured, hard, heavy, and strong, usually straight-grained but sometimes figured, easy to work, finishes very smoothly and takes a satiny polish, is odorless and tasteless, only moderately durable in contact with the ground; heartwood light to dark reddish brown, often with golden hue, sapwood yellowish and rather sharply defined. Very similar in appearance and properties to sweet birch. Often stained to imitate mahogany.

Use.—Furniture and cabinet work of all kinds, interior finish, flooring, doors, farming machinery, woodenware, and articles of turnery. Cordwood for fuel and distillation.

PAPER BIRCH

Betula papyrifera Marshall

Tree.—An important forest tree, in favorable situations 60 to 70 feet high, rarely 90 feet, with a slender, cylindrical trunk 10 to 12 inches, rarely 3 feet, in diameter, and usually free of large branches for 40 or 50 feet. In unfavorable sites and near limits of its range becomes gnarled,

PAPER BIRCH
Three-quarters natural size

twisted, and very branchy; often reduced to a shrub. Resinous leaves 2 to 3 inches long, alternate on young twigs and paired on short spurs. Bark on young trunks and large limbs thin, lustrous white, marked with long, horizontal lines, and separating into papery, flesh-colored or pale orange layers; near the ground dark-colored and broken into thick scales. Seedling trees attain an age of 125 to 150 years; sprouts rarely more than 80 years.

Distributed from Labrador to the southern shores of Hudson Bay, and from New England through the lake states to North Dakota and Nebraska. Common in the Maritime Provinces of Canada and north of the Great Lakes, and in northern New York and New England, often forming extensive stands; elsewhere usually as scattered individuals. Frequently seeds up burned-over areas in the North, forming pure, even-aged stands or mixed with aspens. (Family Betulaceae.)

Wood.—Diffuse-porous; very fine-textured, uniform, straight-grained, compact, moderately hard, heavy, and strong, works easily, finishes very smoothly, is perishable in contact with the soil; heart brownish, with a reddish tinge, thick sapwood nearly white. For most purposes only the sapwood is suitable.

Use.—Spools, bobbins, dowels, toothpicks, shoe pegs, shoe shanks, novelties, and toys. Bark for novelties and canoes, hence the tree is often called canoe birch. Some of the bark canoes used for carrying merchandise in Canada a century and more ago were 48 feet long with a beam of 9 feet and a capacity of 4 tons.

RIVER BIRCH

Betula nigra Linnaeus

Tree.—A tree of secondary importance, usually 80 to 90 feet high, occasionally 100 feet, with a trunk 1 to 2 feet, rarely 5 feet, in diameter and commonly divided near the base into 2 or 3 slightly divergent branches. Crown narrow, irregular, and picturesque, the limbs covered with ragged, orange-colored, papery bark. The leaves are covered with a dense white wool when young, becoming smooth, thin, and tough, 1½ to 3 inches long and 1 to 2 inches wide, broadly ovate, sharply toothed, arranged alternately on young twigs and in pairs on the spurs. The cylindrical cones, which are unusual in that they ripen in May and June, are 1 to 1½ inches long and ½ inch thick. The bark of old trunks is nearly an inch thick, dark red brown, deeply furrowed and broken.

The botanical range extends from Massachusetts to Florida, and westward to eastern Texas, Kansas, Iowa, and Minnesota, an area of over a million square miles. The tree

is confined to banks of streams, ponds, swamps, and deep rich soil subject to inundation, attaining its largest size in the damp semi-tropical lowlands of Florida, Louisiana,

RIVER BIRCH
Three-quarters natural size

and Texas. No other species of birch grows in such warm regions or in such wet places. (Family Betulaceae.)

Wood.—Diffuse-porous; rather coarse-textured, sometimes cross-grained, moderately hard and strong, tough, lacking figure and beauty, and not durable; heartwood pale brown, sapwood lighter.

Use.—Slack cooperage staves, heading, and hoops, fruit baskets, woodenware, ox yokes, wooden shoes, and miscellaneous minor purposes.

RED ALDER

Alnus rubra Bongard

Tree.—A tree of the Pacific coast, usually 40 to 60 feet high, with a smooth, straight trunk 12 to 18 inches in diameter, but in very favorable situations attaining a height of 100 feet and a maximum diameter of 3½ feet. Leaves 3 to 6 inches long and 2 to 4 inches wide, falling in the autumn while still green. Cones ½ to 1 inch long,

with very small, winged seeds. Bark ashy gray, shallowly seamed into narrow, flat ridges. Reaches maturity in about 50 years, but lives to be about 100.

Distributed from Sitka, Alaska, through the islands and coast mountains of British Columbia, western Washington and Oregon to Santa Barbara, California. Occurs along streams and in well-drained bottom land and gentle slopes, attaining its largest size in the Puget Sound country. On the lower slopes of the coast mountains of Washington

RED ALDER
Two-thirds natural size

and Oregon sometimes in pure stands; more commonly in mixture with willow, black cottonwood, maples, western dogwood, and western red cedar. (Family Betulaceae.)

Wood.—Diffuse-porous; fine-textured, uniform, of rather light weight when dry, fairly soft but tenacious, straight-grained, seasons readily, works easily, finishes smoothly, is fairly durable; heartwood pale reddish brown, sapwood whitish when first cut but soon becoming stained on the surface. Finishes to resemble cherry.

Use.—Locally for furniture, broom handles, pack saddles, interior finish and moldings, columns, and salt-water piling.

BEECH

Fagus grandifolia Ehrhart

Tree.—An important timber tree, 70 to 80 feet high, occasionally 125 feet, with a smooth, slender trunk 2 to 4 feet in diameter, often with a thicket of shoots about the base. Twigs tipped with reddish brown, cigar-shaped buds upward of an inch long. Shiny, alternate leaves 2 to 5 inches long, coarsely toothed, the prominent lateral veins

BEECH
One-half natural size

parallel. Small, brown, triangular nuts with a sweet kernel are paired in a curly-prickled bur. The smooth bluish gray bark invites carving.

Distributed widely from Nova Scotia to northern Wisconsin, south to Florida and Texas. Attains its best development on the slopes of the Allegheny Mountains and in the lower Ohio River Valley, where it is in mixture with other hardwoods. Sometimes forms pure stands upon the slopes of mountains in the North, grows along the margins of swamps and in bottom lands in the South. It is very tolerant of shade. (Family Fagaceae.)

Wood.—Diffuse-porous; usually straight-grained, fine-textured, has rather prominent rays, is hard, heavy, and strong, requires care in seasoning, is easily worked,

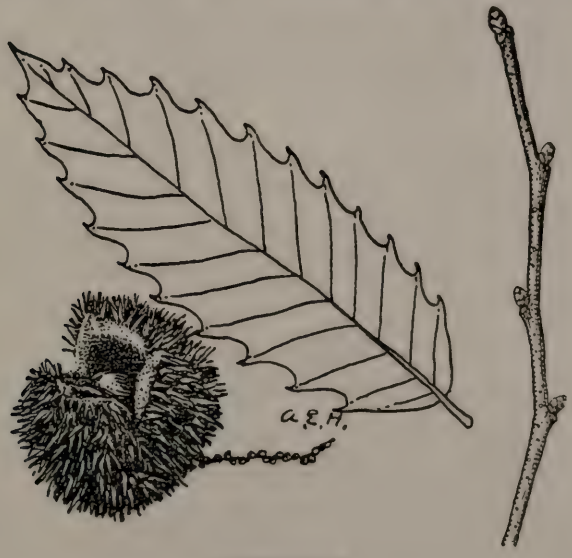
finishes smoothly, is odorless and tasteless, not durable in contact with the ground; heartwood light brown to distinctly reddish, sapwood whitish. In appearance and properties the wood is intermediate between maple and sycamore.

Use.—Inexpensive furniture, slack cooperage, woodenware, turned articles, agricultural implements, laundry appliances, flooring and fixtures, railway crossties (treated), distillation, and fuel.

CHESTNUT

Castanea dentata (Marshall) Borkhausen

Tree.—An important timber and nut tree, threatened with extinction. In the forest often attaining a height of 90 feet, occasionally 110 feet, with a long, cylindrical bole 3 to 5 feet in diameter, with a rather open, heavy-limbed crown. In the open develops a low, round-topped



CHESTNUT

Fruit and twig, one-half natural size; leaf, one-third natural size

crown, often 100 feet across, and a very short bole occasionally 10 to 12 feet in diameter. Leaves 6 to 8 inches long and about 2 inches wide, with sharp, recurved teeth. Red brown nuts with a sweet edible kernel, and inclosed in a heavy, very spiny bur. Bark dark brown, 1 to 2

inches thick, divided into long, flat, scaly ridges. Attains an age of about 600 years.

Formerly distributed from southern Maine to northwestern Vermont, southern Ontario, and southern shores of Lake Ontario to southeastern Michigan, southward to Delaware and southeastern Indiana, and on the Allegheny Mountains to central Kentucky and Tennessee, central Alabama, and Mississippi. Attains its largest size in western North Carolina and eastern Tennessee. The chestnut blight, caused by a fungus (*Endothea parasitica*) of Asiatic origin, has largely exterminated the tree in the northern portions of its range and is progressing southward unchecked. (Family Fagaceae.)

Wood.—Ring-porous; fine-rayed, usually straight-grained, rather light in weight, stiff and brittle, easy to work, finishes smoothly, seasons readily and holds its place well when manufactured, is odorless when dry, but with a mildly astringent taste, has a high tannin content, producing blue black stains in contact with iron when moist, is very durable in the ground; heartwood brown, thin sapwood white. Old timber often with small wormholes.

Use.—Railway crossties, telegraph and telephone poles, fence posts, interior finish, inexpensive furniture, cores for veneered panels, cooperage, and shingles. Only American wood important as a source of tannin extract; spent chips used for paper pulp.

NORTHERN RED OAK

Quercus borealis var. *maxima* Ashe

Tree.—An important timber tree, usually 70 to 90 feet high, occasionally 150 feet, with a long, clear bole 2 to 4 feet, rarely 5 feet, in diameter. Smooth, dark green leaves 5 to 9 inches long and 4 to 6 inches wide, with 7 to 9 bristle-tipped lobes. Acorns mature the second season, have plump nuts, ¾ to 1¼ inches long, and thick, shallow cups. Bark on old trunks broken by shallow fissures into continuous, flat ridges.

Distributed throughout the eastern half of the United States, from Nova Scotia west to Minnesota, and southward to Florida, Mississippi and Oklahoma; makes its

best development in rich, moist, but fairly well-drained soils in the region north of the Potomac and Ohio rivers; rare and local in the South. A tree of rapid growth, usually associated with other oaks, basswood, elm, chest-

NORTHERN RED OAK
Leaf and fruit, one-third natural size; twig, one-half natural size

nut, and hickories. Often planted for timber production and for shade. (Family Fagaceae.)

Wood.—Ring-porous; pores open; rays large and conspicuous; is hard, heavy, strong, requires care in seasoning, is fairly easy to work, finishes smoothly, is not durable in contact with the ground; heartwood reddish brown, often decidedly reddish, especially in vicinity of knots; sapwood nearly white. Woods of the group of which red oak is the type differ from the white oak group in being less durable, having open pores, and a more reddish color. Pores in summer wood are few and rounded, individually distinct under a hand magnifier, and with gradual transition from the large pores of the spring wood.

Use.—Furniture, interior finish, paneling, flooring, farming machinery, heavy construction, cooperage, railway crossties (treated), and fuel.

PIN OAK

Quercus palustris Muenchhausen

Tree.—A medium-sized to large lowland tree, occasionally 100 to 120 feet high, with a well-formed trunk 4 to 5 feet in diameter; more commonly 60 to 80 feet high with a tapering trunk 2 to 3 feet in diameter, clothed throughout much of its length with small, tough branches, the lower drooping to the ground or breaking off at some distance from the base. The name pin oak is in reference to these stubs, which penetrate to the center of the tree.

PIN OAK
Twig, one-half natural size; leaf and fruit, one-third natural size

Leaves 4 to 6 inches long and divided deeply into 5 to 7 bristle-pointed lobes, dark green and shiny, turning scarlet in the autumn. Acorns maturing at the end of the second summer, small, the nut nearly globose, ½ inch in diameter, often striped, with a yellow, bitter kernel; the saucer-like cup thin and shallow. Bark of branches and young trunks smooth and shiny, that of old trunks 1 to 1½ inches thick, very tight, the furrows shallow and usually wide.

Distributed from Massachusetts to Michigan and Missouri, and south to Virginia, Tennessee, and Oklahoma. Common on the coastal plain south of the Hudson River and very abundant in the lower Ohio River Valley. Occurs along the borders of swamps in river bottoms, also in hard,

compact, clay soils with little drainage. Well suited for planting along streets. (Family Fagaceae.)

Wood.—Ring-porous; pores open; rays large and conspicuous; is very hard, heavy, and strong, difficult to season without checking and warping, often knotty and not very durable in contact with the ground; heartwood reddish brown, sapwood nearly white. Timber not highly valued.

Use.—Railway crossties (treated), underground piling, heavy construction, cooperage, chairs, and fuel.

SOUTHERN RED OAK

Quercus rubra Linnaeus

Tree.—A forest tree, with several varietal forms, usually 70 to 80 feet high, occasionally 120 feet, with a well-formed trunk 2 to 3 feet, sometimes 4 to 5 feet, in

SOUTHERN RED OAK
Leaf and fruit, one-third natural size; twig, one-half natural size

diameter, and an open crown of large, spreading branches. The leaves are 6 to 7 inches long, glossy green above and velvety below, variable from pear-shaped with 3 lobes, to very irregularly lobed, the lobes all bristle-tipped. The acorns ripen the second year, and the small, rounded nut (½ inch long) is set in a thin, saucer-shaped cup which

tapers to a short stem. The bark on old trees is about an inch thick, divided by shallow fissures into broad ridges, the color varying from light gray on the limbs and young trunks to dark gray or almost black on the old ones.

Distributed throughout the southeastern portion of the United States from southern New Jersey to northern Florida, through the Gulf states to Texas, and through eastern Oklahoma and southeastern Missouri to southern Illinois and Indiana. Some forms of this tree prefer the uplands, others the rich bottom lands. Often known as Spanish oak. Frequently planted for shade and ornamental purposes. (Family Fagaceae.)

Wood.—Similar in appearance and properties to the red oak of the north. Ring-porous; pores open; rays large and conspicuous; is hard, heavy, strong, not durable, requires care in seasoning; heartwood reddish brown, sapwood nearly white.

Use.—Furniture, heavy construction, farming implements, interior finish, flooring, railway crossties (treated), cooperage, and fuel. The bark is a source of tannin.

BLACK OAK

Quercus velutina Lambert

Tree.—A large forest tree, often 75 to 90 feet high, occasionally 150 feet, with a trunk 2 to 3 feet, rarely 4 to 5 feet, in diameter. New twigs scurfy coated; winter buds large and woolly. Leaves mostly 5 or 6 inches long and 3 or 4 inches wide, dark green above, pale and more or less scurfy below, usually with 7 bristle-tipped lobes. Acorns mature the second season, the nut being ½ to 1 inch long, with yellow and extremely bitter kernel and loosely scaly cup. Bark very rough on old trunks, nearly black on the surface and deep orange inside.

Distributed throughout the eastern half of the United States and southern Ontario, from southern Maine to northern Florida, westward to southeastern Wisconsin, eastern Nebraska and Texas. Abundant in all parts of the Mississippi basin, attaining its best development in the lower Ohio River Valley; mostly on dry, gravelly uplands and ridges. (Family Fagaceae.)

BLACK OAK
Twig, one-half natural size; leaf and fruit, one-third natural size

Wood.—Ring-porous; pores open; rays prominent; is hard, heavy, strong, straight-grained, coarse-textured, likely to split in seasoning, not very durable in contact with the ground; heartwood reddish brown, sapwood nearly white. Similar in appearance and properties to red oak and commonly sold in mixture with it.

Use.—Same as red oak: for furniture, interior finish, flooring, farming machinery, heavy construction, cooperage, railway crossties (treated), and fuel. The bark is the source of a commercial yellow dye.

WILLOW OAK

Quercus phellos Linnaeus

Tree.—A timber tree of secondary importance, usually 60 to 80 feet high, occasionally 100 feet, with a trunk 2 to 3 feet, rarely 4 feet, in diameter, and a rather narrow crown composed of small branches and slender twigs. Leaves 2 to 5 inches long and ½ to 1 inch broad, bristle-pointed, and without lobes or teeth, resembling those of willow. The small acorns, which ripen during the second season, are closely set along the stem, the light brown, rounded nut about ½ inch in diameter, and

the saucer-like cup thin and shallow. Bark reddish brown and smooth on younger trees and parts, eventually becoming ½ to ¾ inch thick and broken by shallow fissures into irregular plates.

WILLOW OAK
Twig, one-half natural size; leaf and fruit, one-third natural size

Distributed from New Jersey southward along the maritime plain to northern Florida, westward to Texas and southern Illinois; avoids the mountainous regions. Occurs along the wet borders of swamps and streams and rich, sandy uplands. (Family Fagaceae.)

Wood.—Ring-porous; pores open; rays coarse and conspicuous; is very heavy, hard, and strong, very difficult to season without checking and warping, not durable in contact with the ground; heartwood reddish brown, sapwood nearly white. Not separated commercially from others of the red oak group.

Use.—To a rather limited extent for heavy construction, agricultural implements, vehicle parts, slack cooperage, and in some instances for furniture, interior trim, and flooring.

WATER OAK

Quercus nigra Linnaeus

Tree.—A southern tree of minor commercial importance, occasionally attaining a height of 80 or 90 feet, with a trunk 2 to 3 feet in diameter, and a symmetrical crown composed of small branches and slender twigs. The dull,

bluish green leaves are usually 2 to 3 inches long and 1 to 2 inches wide, mostly wedge-shaped, but subject to considerable variation. The acorns, which ripen the second season, are small, the plump, rounded nuts being about ½ inch in diameter, the cup thin and saucer-like. The tight, smooth bark is light reddish brown, and ½ to ¾ inch thick.

WATER OAK

Twig and fruit, one-half natural size; leaf, one-third natural size

Distributed from southern Delaware southward into the peninsula of Florida, westward into eastern Texas and Oklahoma, southern Missouri and Illinois; avoids the mountainous regions. Occurs mostly along swamps and in river bottoms, often in association with willow oak. Sometimes planted for shade and decorative purposes in the South. (Family Fagaceae.)

Wood.—Ring-porous; pores open; medullary rays thin, but conspicuous on quarter-sawed material; is hard, heavy, and strong, refractory in drying, not durable in contact with the ground; heartwood light brown, sapwood nearly white. Lumber usually sold as red oak.

Use.—To a limited extent for wagons, carts, bridge flooring, furniture, especially chairs, interior finish, cooperage, railway crossties (treated), and fuel.

WHITE OAK

Quercus alba Linnaeus

Tree.—A majestic tree, in the forest 80 to 120 feet high, sometimes 150 feet, with a well-formed, smooth

trunk 3 to 4 feet, occasionally up to 6 feet, in diameter, and free of branches for 50 to 75 feet. In the open the short, thick trunk supports a great, wide-spreading crown. Leaves 5 to 9 inches long and 2 to 4 inches wide, with 5 to 9 ascending, blunt lobes. Acorns mature in one season, the oblong nut smooth and shiny, with a sweet

WHITE OAK
Fruit and leaf, one-quarter natural size; twig, one-half natural size

and edible kernel and a flat-bottomed cup. Bark of old trees light gray, 1½ to 2 inches thick, in irregular scales, long strips, or heavy ridges. Attains an age of 500 to 600 years.

Distributed over the entire eastern half of the United States and southern Canada as far west as Minnesota and Texas. Attains its best development on rich uplands of the western slopes of the Allegheny Mountains and in the central Mississippi and lower Ohio basins. Now of greatest commercial importance in the southern Appalachian region and westward to the Mississippi and Ohio rivers. (Family Fagaceae.)

Wood.—Ring-porous; pores closed with tyloses; rays high, producing beautiful silver grain on quarter-sawed lumber; is hard, heavy, tough, and strong, though variable in these properties according to conditions of growth; usually straight-grained, not difficult to work, ordinarily

seasons with less difficulty than other oaks, is highly durable in contact with the soil; heartwood light to dark brown, rarely with pinkish tinge, sapwood nearly white. Woods of the group of which white oak is the type differ from the red and black oaks in being more durable, having closed pores and an absence of pronounced reddish color; pores in summer wood are thin-walled, angular, too numerous to count with a hand magnifier, and with gradual transition from the large pores in the spring wood.

Use.—Furniture and cabinet work, interior finish, flooring, tight cooperage, heavy construction, farming implements and machinery, framing timbers, heavy wheels, railway crossties, fence posts, and fuel. Best of all American woods for tight cooperage and hardwood floors, and ranks with walnut and mahogany for fine furniture.

CHESTNUT OAK

Quercus montana Willdenow

Tree.—A medium-sized tree, often 60 to 70 feet high, occasionally 120 feet, with a trunk 18 to 24 inches, sometimes 3 to 4½ feet, in diameter. In the open low-branched, with a trunk sometimes 6 to 7 feet through; on rocky

CHESTNUT OAK

Leaf and fruit, one-third natural size; twig, two-thirds natural size

ridges small and gnarly. Leaves somewhat wedge-shaped, 5 to 9 inches long and about half as broad, with scalloped or wavy margins. Acorns mature in one season, the nut 1 to 1½ inches long, with sweet kernel, and partly inclosed in a thin cup. Bark of old trees almost an inch thick, with long, heavy, rounded ridges and wide furrows; very rich in tannin. Long-lived, but specimens over 200 years of age are nearly always hollow.

Distributed throughout the Appalachian region and extending into southern Ontario. Most common and of its largest size on the lower slopes of the mountains of the Carolinas and Tennessee, where it comprises a large part of the forest. Principal associates are black oak and chestnut. (Family Fagaceae.)

Wood.—Ring-porous; pores mostly open; rays comparatively low; is hard, heavy, strong, and durable; quality of timber depends largely upon conditions of growth, that from large, forest-grown trees being straighter-grained, more mellow and easier to work, and less difficult to season, than the denser, tougher, and irregularly grained timber from open-grown stands; heartwood is brown to dark brown, sapwood nearly white. Small, discolored wormholes common. On account of poor silver grain rarely quarter-sawed, even in the large sizes.

Use.—Smaller sizes for railway crossties, fence posts, fuel, and rough construction; large timber cut into lumber used for the same purposes as plain-sawed white oak. Principal source of oak tanbark in eastern United States.

POST OAK

Quercus stellata Wangenheim

Tree.—Usually a medium-sized tree, 50 to 60 feet high, sometimes 100 feet, with a trunk 1 to 2 feet, rarely 4 feet, in diameter, with a dense crown of heavy, spreading branches and coarse, woolly twigs. In the northeastern portions of its range it is small and shrubby. The thick, leathery leaves are 4 to 7 inches long and 3 to 5 inches wide, usually 5-lobed, the middle pair of lobes prominently developed, the upper surface dark glossy green, the lower covered with rusty hairs. Acorns mature in one season,

the oval nut ½ to 1 inch long, hairy at the apex, and inclosed for about half its length in the thin and woolly cup. Bark of old trunks similar to that of white oak, but

POST OAK
One-third natural size

usually darker and broken into shorter lengths; that of the branches often loosely scaly.

Distributed from Massachusetts and northern Illinois southward to the Gulf, and from the Atlantic west into Nebraska and central Texas. Largest and most abundant in the Mississippi basin. Occurs on dry, gravelly or sandy uplands and poor soils generally. (Family Fagaceae.)

Wood.—Ring-porous; pores closed with tyloses; rays prominent; is hard, heavy, tough and strong, difficult to season without checking, grain often interlocked, not very easy to work, but finishes smoothly, is highly durable in contact with the soil; heartwood light to dark brown, sapwood nearly white.

Use.—Chiefly for railway crossties, fence posts, wagon hubs, heavy construction, cooperage, and fuel. Lumber from large trees sold in mixture with white oak and used for the same general purposes.

WHITE ELM

Ulmus americana Linnaeus

Tree.—A large and important timber tree, usually 80 to 100 feet high, occasionally 130 feet, with a trunk 3 to 5 feet in diameter above the buttressed base, which is 6 to 12 feet through. Crown usually composed of long, upright

branches, gradually spreading and producing various beautiful and graceful forms, sometimes suggesting the spray of a fountain. The simple, alternate leaves are 4 to 6 inches long, thick and rough, unequal at base, doubly toothed, and with prominent, parallel, lateral veins. The fruits, which are borne in clusters and ripen as the leaves unfold, consist of a small, flat seed surrounded by a papery wing ½ inch in diameter. Bark on old trunks 1 to 1½ inches thick, ashy gray, roughened by irregular

WHITE ELM

Twig, one-half natural size; leaf and fruiting branch, one-third natural size

furrows into firm or corky ridges, showing alternate brown and white layers when cut across.

The botanical range includes nearly all of the United States and southern Canada east of the Rocky Mountains. The region of principal commercial importance embraces the lake states, New England, and the lower Mississippi Valley. The tree prefers the rich, moist soils of river bottoms. It is planted for shade and ornament. (Family Ulmaceae.)

Wood.—Ring-porous, but often inconspicuously so; pores of summer wood in wavy bands alternating with layers of wood fibers of about the same width, producing a very tough and pliable material; is moderately hard and heavy, coarse-textured, inclined to warp in seasoning, usually difficult to split, saws rather woolly, finishes smoothly, but does not take a high polish, is odorless and

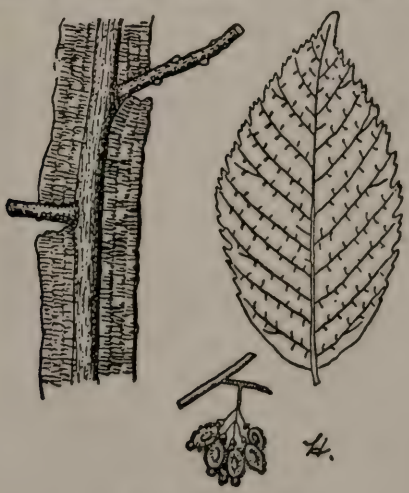
tasteless when dry, and not highly durable; heartwood light brown to gray, sapwood nearly white.

Use.—Staves, hoops, and linings of slack cooperage, bent work of all kinds, baskets, framework of furniture, vehicles, and agricultural machinery. Especially adapted for purposes where pliability, toughness, and resistance to shock and rough usage are required.

WINGED ELM

Ulmus alata Michaux

Tree.—A medium-sized timber tree, 40 to 50 feet tall, trunk rarely 2 feet in diameter, with short, stout, spreading or erect branches forming a narrow, oblong, and rather open, round-topped crown. The wing-like growths of cork on opposite sides of the branchlets are characteristic of the species, whence the common and technical names. Also known as wahoo or cork elm.



WINGED ELM
Two-thirds natural size

Its range extends from southern Virginia to western Florida and Texas and north to southern Indiana and Illinois, but it is more common and reaches its best development in southern Missouri, Arkansas, and eastern Oklahoma. It usually grows in dry, gravelly uplands, sometimes in rich alluvial soil along the borders of swamps and near the banks of streams. (Family Ulmaceae.)

Wood.—Indistinctly ring-porous; pores in spring wood small and scattered in single row, pores of summer wood in wavy bands alternating with layers of wood fibers; is heavy, hard, and strong, close-grained and difficult to split; heartwood light brown, sapwood thick, lighter-colored.

Use.—Hubs of small wheels and handles of tools. In the southern states it is used to some extent for furniture. The inner bark is sometimes employed for fastening covers on cotton bales.

ROCK ELM

Ulmus racemosa Thomas

Tree.—An important timber tree, 80 to 100 feet high, with a long, well-formed trunk 2 to 3 feet in diameter, and a narrow crown composed of short, stout, spreading

ROCK ELM
Twig and leaf, natural size; fruit, one-half natural size

branches and slender, stiff, corky-winged branchlets. Leaves thick and firm, smooth above and downy below, about 2 inches long and half as broad, and with doubly toothed margins. The clustered fruits, which ripen when

the leaves are about half grown, consist of a small nutlet inclosed in a finely hairy, papery wing about ½ inch in diameter. Bark deeply fissured and grayish, resembling that of the white elm.

Distributed from southern Quebec and Ontario to northern New Jersey, West Virginia, and Tennessee, and westward into Nebraska and northeastern Kansas. The principal commercial sources of supply are the southern portions of Michigan and Wisconsin. Occurs on heavy clay lowlands and dry, gravelly uplands, but prefers well-drained soils in mixture with beech and sugar maple. This species is not usually distinguished from the white elm. (Family Ulmaceae.)

Wood.—Indistinctly ring-porous; pores in spring wood small and scattered in a single row; summer wood laminated, with alternate layers of pores and fibers; rays fine and indistinct; is hard, heavy, stiff, and strong, exceeding the other elms in these properties; otherwise very similar to white elm.

Use.—Frames and various other parts of vehicles and agricultural machinery, bent work, furniture, baskets and crates, heavy construction, hubs, and slack cooperage.

HACKBERRY

Celtis occidentalis Linnaeus

Tree.—A tree of minor commercial importance, usually not over 50 feet high and often much smaller, but occasionally 130 feet, with a trunk 18 to 24 inches, rarely 3 feet, in diameter, and a round-topped crown composed of spreading, often irregular, branches, the lower often drooping, and fine twigs, frequently matted by disease into "witches' brooms." The small branchlets have a chambered white pith resembling that of walnut except in color. The simple, alternate, rough, unsymmetrical leaves are 2 to 4 inches long, sharp-pointed, and with toothed margins and prominently netted veins; often with galls. The small, cherry-like fruits are borne singly on stems and have a prominent, furrowed stone and a thin, orange-colored, sweet flesh. Bark on young stems and limbs suggests beech, often becoming warty; base of old trees very rough.

This species, including its varietal forms, is very widely, but sparingly, distributed over the major part of the United States east of the Rocky Mountains, and extends into southern Canada. Occurs on a variety of soils and sites,

HACKBERRY
Twig, one-half natural size; leaf and fruit, two-thirds natural size

including rocky ridges and hilltops, but attains its best development in bottom lands. (Family Ulmaceae.)

Wood.—Ring-porous; pores in spring wood usually in a rather narrow band, pores in summer wood very small, arranged in irregularly wavy bands alternating with fiber bands; rays rather fine; is hard, fairly heavy, not very strong, coarse-textured, fairly straight-grained, not easy to split, works readily, finishes smoothly and takes a good polish, is not durable; color of heartwood pale yellow, that of sapwood gray.

Use.—Has no distinctive uses. Timber usually sold in mixture with elm and ash and used for inexpensive furniture, refrigerators, hoe handles, agricultural implements, crates, barrel staves and hoops, and fuel.

SUGARBERRY

Celtis laevigata Willdenow

Tree.—A southern tree of minor economic importance, attaining under favorable conditions a height of 60 to 80 feet, with a trunk 2 to 3 feet in diameter, and a broad crown composed of spreading or drooping branches and slender twigs. The elongated, light green, simple, smooth-margined leaves are 2½ to 5 inches long and ¾ to 3 inches wide, long-pointed and unsymmetrical. Small fruits cherry-like, orange-red or yellow, with prominent stone and thin, sweet flesh. Pale gray bark of upper

SUGARBERRY
One-half natural size

branches suggests beech, that of trunk irregularly covered with prominent wart-like growths.

Distributed from Virginia, southern Indiana, Missouri, and eastern Kansas south into the Gulf states, making its best growth on bottom lands. Small varietal forms of the species extend from Texas and Oklahoma into New Mexico, Arizona, and northern Mexico. (Family Ulmaceae.)

Wood.—Almost identical with that of the hackberry.

Use.—Same as that of the hackberry.

OSAGE ORANGE

Maclura aurantiaca Nuttall

Tree.—Small tree widely planted for hedges. In natural forest occasionally attaining a height of 50 to 60 feet, with a short, irregular trunk having a maximum diameter of 3 feet and an irregular, round-topped crown composed of stout branches and thorny twigs. Leaves 3 to 5 inches long and 2 to 3 inches wide, with a white, sticky juice. Fruit has the general appearance of a large,

OSAGE ORANGE
Leaf and fruit, one-quarter natural size; twig, two-thirds natural size

green orange and, when punctured, exudes a sticky, milky juice that turns black upon exposure. Bark of old trees brown and shreddy, that of the roots flaking off in orange-colored, papery scales.

Natural range limited to southern Arkansas, Oklahoma, and Texas, a total area of about 10,000 square miles. Occurs on rich bottom lands and makes best development in Red River Valley in Oklahoma. (Family Moraceae.)

Wood.—Ring-porous; the pores closed with tyloses; pores in spring wood in distinct band, those in summer wood very small and clustered; rays very fine; is exceedingly hard, heavy, strong, and elastic, difficult to cut across the grain, splits very readily, takes a lustrous polish, is inert to atmospheric changes, remarkably durable in contact with the soil; heartwood bright yellow, becoming

brown upon exposure, often with reddish streaks; sapwood very thin and white. Noted for its strength, elasticity, and durability. Usually available only in small pieces.

Use.—Felloes of wagons for use in dry, sandy regions; also insulator pins, fence posts, house blocks, bridge piling, and archery bows. The Osage Indians made bows of it, and on that account the French explorers called it *bois d'arc* (bow wood), now corrupted to bodark. Trees from old hedges provide large quantities of posts in the Middle West. Roots, bark, and wood are limited sources of a yellow dyestuff.

RED MULBERRY

Morus rubra Linnaeus

Tree.—A small tree of minor commercial importance, usually 35 to 50 feet high, rarely 60 or 70 feet, with a short trunk 12 to 24 inches, rarely up to 4 feet, in diameter, and a broad crown composed of rather heavy, spreading

RED MULBERRY
Twig, two-thirds natural size; leaf, one-half natural size

branches and slender, crooked branchlets. The alternate, simple, hairy leaves are 3 to 5 inches long, rounded or sometimes mitten-shaped, and coarsely toothed. The edible fruit is dark purple or black, and resembles a black-

berry. The bark on old trunks is dark reddish brown, peeling off in long, narrow flakes.

Distributed widely, but sparingly, from southern Ontario west to eastern Dakotas, south to the Gulf states, as far west as Texas. Occurs on rich soils near the bases of slopes and attains its best development in the basin of the lower Ohio River and on the foothills of the southern Appalachians. (Family Moraceae.)

Wood.—Ring-porous; pores in spring wood in distinct band, those in summer wood very small and grouped; rays fine, but distinct; is of medium density and weight, usually straight-grained, coarse-textured, seasons readily, is easy to work, finishes smoothly and takes a high polish, is highly durable in contact with the ground; color of heartwood yellow brown or orange, becoming brown upon exposure; thin sapwood white.

Use.—Restricted by very limited and scattered supply. Mostly for fence posts, railway crossties, and fuel; occasionally for small cabinets, cooperage, and construction.

YELLOW POPLAR

Liriodendron Tulipifera Linnaeus

Tree.—A magnificent timber tree, attaining an average height of 80 to 100 feet, sometimes nearly 200 feet, with a long, smooth trunk 3 to 6 feet, rarely up to 10 feet, in diameter. Leaves 4 to 6 inches long and about as broad and very distinctive. Flowers greenish yellow and tulip-like, giving rise to the name tulip tree. Fruit an upright cone, 2 to 3 inches long. Bark of old trees 1 to 2 inches thick, deeply furrowed. Attains an age of 300 to 400 years.

Distributed from Vermont, southern Ontario, and southern Michigan south to northern Florida and west to Arkansas and Missouri. Attains its largest size in mixed hardwood forests on agricultural soils and protected coves in the Ohio River Valley and on mountain slopes in the Carolinas, Tennessee, and Kentucky. It grows rapidly and is often planted for decoration. (Family Magnoliaceae.)

Wood.—Diffuse-porous; pores and rays very small; growth rings terminated by fine, light-colored line; is light and soft to moderately so, straight-grained, uniform-textured, very easy to work, finishes very smoothly,

seasons readily and holds its place well when manufactured, is odorless and tasteless, fairly durable in contact with the soil; heartwood usually yellow, sometimes greenish to purplish, becoming brown upon exposure; sapwood nearly white. Lumber sometimes beautifully figured with wavy grain and mottle. Lumber of second-growth trees commonly known in the eastern markets as whitewood; is considerably harder, tougher, and more refractory than old timber.

YELLOW POPLAR

Leaf, flower, and fruit, one-third natural size; twig, two-thirds natural size

Use.—Very extensively cut into lumber for wide range of articles not requiring great strength, such as wide panels, high-grade boxes and food containers, bodies of vehicles, drawers and shelving of furniture, interior finish (to be painted), woodenware, bevel siding, porch columns, and, the lower grades, for rough construction and paper pulp.

CUCUMBER TREE

Magnolia acuminata Linnaeus

Tree.—A well-formed tree, usually 60 to 80 feet high, occasionally 100 feet, with a long, well-formed trunk 2 to 3 feet, sometimes 6 feet, in diameter, and a pyramidal

crown composed of slender branches, the lower horizontal, the upper erect. Terminal buds about ½ inch long and densely covered with white, silky hairs. The simple, alternate, entire leaves are 6 to 10 inches long and 4 to 6 inches wide. Fruit a cylindrical, knobby mass 2 to 3 inches long, suggesting a cucumber when green, becoming dark red when ripe, with scarlet seeds which are liberated from small pockets and hang suspended on slender threads.

CUCUMBER TREE
Leaf and fruit, one-third natural size; twig, two-thirds natural size

Bark, unlike that of other magnolias, in long, scaly, brown or grayish brown ridges.

Distributed along the north shore of Lake Erie, western New York, eastern Ohio, southern Indiana and Illinois, along the Appalachian Mountains to southern Alabama, and west to Arkansas. Attains its best development at the base of the mountains of Tennessee and the Carolinas. Often planted for ornament. (Family Magnoliaceae.)

Wood.—Diffuse-porous; all the pores very small; rays inconspicuous; is light and soft or moderately so, straight-grained, fine-textured, easy to work, finishes smoothly, seasons readily, is fairly durable; color of heartwood

yellowish or yellow brown, that of the rather thick sapwood nearly white. Wood similar in appearance and properties to yellow poplar, and often sold in mixture with it, though considered inferior.

Use.—Practically the same as yellow poplar; in manufacture of vehicles, furniture, woodenware, and shelving, and in interior finish.

MOUNTAIN MAGNOLIA

Magnolia Fraseri Walter

Tree.—A small tree of slight economic importance, occasionally 30 to 40 feet high, with a straight, leaning, or divided trunk 9 to 18 inches in diameter, and a crown composed of irregular, stout branches and thick,

MOUNTAIN MAGNOLIA
Leaf and fruit, one-fourth natural size; twig, two-thirds natural size

brittle twigs terminated by a long, pointed, smooth, purplish winter bud. The smooth, bright green leaves are broad toward the apex and conspicuously eared at the base, usually 10 to 12 inches long and 6 or 7 inches wide, but much larger on young shoots. The pale yellow, sweet-scented flowers are 8 to 10 inches across. The fruit resembles that of the cucumber tree, though somewhat larger. Bark grayish brown and usually smooth.

Occurs sparingly in rich coves and on the slopes of the southern Appalachian Mountains at elevations between 2,000 and 4,000 feet above the sea. (Family Magnoliaceae.)

Wood.—Diffuse-porous; the pores small; rays inconspicuous; is light, soft, weak, easy to work, not very durable; heartwood light brown, sapwood nearly white.

Use.—Very limited and only in mixture with other species for rough lumber and wood pulp.

RED OR SWEET GUM

Liquidambar Styraciflua Linnaeus

Tree.—Very important timber tree, often 80 to 100 feet high, sometimes 150 feet, with a long, smooth bole 2 to 5 feet in diameter, and a rather narrow crown. Overmature trees usually broken and dry-topped, with widespreading crown. Branchlets with corky wings. Fruits are spiny-looking balls about an inch in diameter, suspended on slender stalks, suggesting sycamore. Leaves alternate, simple, star-shaped, 3 to 7 inches across, richly colored in autumn. Bark on old trunks grayish brown, 1 to 1½ inches thick, and deeply furrowed.

Botanical range includes the southern portion of the United States below a line from Connecticut westward through the Ohio River Valley to Kansas and southward through Oklahoma into Texas; reappearing on the mountains of central and southern Mexico and the highlands of eastern Guatemala and Honduras. Most abundant and largest in river bottom lands subject to inundation in the maritime region of the south Atlantic and Gulf states and lower Mississippi Valley. (Family Hamamelidaceae.)

Wood.—Diffuse-porous; the pores very small; rays very fine; is of medium density and weight, very fine-textured, irregular-grained, requires care in seasoning to

prevent warping, is easy to work, takes a high, glossy finish, is odorless and tasteless, not durable in contact with the ground; heartwood brown or reddish brown, with satiny luster, often beautifully figured with dark markings suggesting Circassian walnut; sapwood often very thick, brownish or nearly white. Timber slow in coming into general use because of early difficulties in drying the wood properly. Quarter-sawed lumber least inclined to warp.

RED OR SWEET GUM
Leaf and fruit, one-third natural size; twig, two-thirds natural size

Heartwood lumber known in English markets as satin walnut; that of the sapwood as hazel pine.

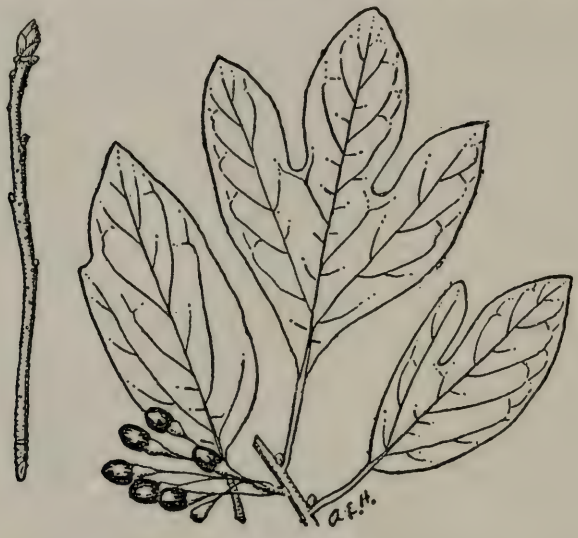
Use.—Very extensive and for wide range of purposes; furniture of all grades, interior finish (sometimes under the name of hazel), doors, backgrounds of show windows, planing-mill products, panels, veneers for plywood, baskets, wooden dishes, wire-bound boxes, and slack cooperage.

SASSAFRAS

Sassafras officinale Nees and Ebermaier

Tree.—An interesting aromatic tree, varying in size from low and shrubby to 40 or 50 feet high, with an irregu-

lar trunk 12 to 18 inches in diameter, occasionally 80 to 100 feet high and up to 6 feet in diameter; the flat-topped crown composed of stout, usually crooked, branches and slender, yellow green, spicy-flavored twigs. The simple, alternate, dark green leaves are 4 to 6 inches long and 2 to 4 inches wide, wedge-shaped at the base, and entire, mitten-shaped, or 3-lobed. Flowers small and greenish, the two sexes borne on different trees. Fruit a small, oblong, blue



SASSAFRAS
Twig, one-half natural size; leaf and fruit, one-third natural size

black berry, with its base in a small, long-stalked cup. Bark aromatic, that of old trunks dark reddish brown, sometimes 1½ inches thick, and deeply furrowed.

Widely distributed from Maine and southern Ontario south to Florida and west to Iowa and Texas. Attains its best development in mixed hardwood forests growing on rich, sandy, well-drained soils. Often takes possession of old fields, especially in the South, sometimes forming open groves of small or medium-sized, irregular trees, perhaps in mixture with persimmon. (Family Lauraceae.)

Wood.—Ring-porous; pores large and in distinct band in spring wood, very small and clustered in summer wood; rays inconspicuous; is light, soft, not strong, brittle, straight-grained, coarse-textured, seasons readily, is easy to work, finishes smoothly, holds its place well when manu-

factured, is aromatic, and fairly durable in contact with the ground; heartwood pale brown, that of thin sapwood nearly white. Wood resembles black ash and catalpa.

Use.—Mostly for fence posts, rails, and poles; lumber used for same general purposes as that of black ash. Small roots used for tea, and the volatile oil of bark and roots for medicinal and flavoring purposes.

SYCAMORE

Platanus occidentalis Linnaeus

Tree.—The largest broad-leaf tree in North America, usually 75 to 110 feet high, with a smooth trunk 2 to 5 feet in diameter, occasionally 170 feet high and 14 feet in diameter. Very large trees usually hollow. Leaves large,

SYCAMORE
Leaf and fruit, one-third natural size; twig, one-half natural size

woolly on under surface, the base of the stalk completely concealing the elongated buds. Fruit spherical, about an inch in diameter, consisting of a marble-like center and a compact mass of slender, fuzzy, seed-like bodies, which are dispersed by the wind. Bark thin, smooth, coarsely mottled, mostly whitish in winter and green or brown in summer, flaking off in large, thin plates; at base of old trunks rather thick and rough.

Widely distributed, from Maine and Ontario south to Florida and west to Minnesota, Nebraska, and Texas. Principal supply of the timber is along river bottoms in the valleys of the Ohio and Mississippi rivers and tributary streams. The sycamore is closely related to the European plane tree, which frequently is planted along streets in eastern cities. (Family Platanaceae.)

Wood.—Diffuse-porous; the pores all small and well distributed; rays distinct, producing silver grain on quarter-sawed lumber; is moderately hard, heavy, rather fine-textured, grain more or less interlocked, requires care in seasoning to prevent warping, is difficult to split, finishes smoothly and takes a lustrous polish, is odorless and tasteless, not durable in contact with the ground; heartwood brown, tinged with red, sapwood rather thick and yellowish. Quarter-sawed lumber highly figured, due to the prominent, dark-colored rays and often also to feather grain; sometimes called lacewood. Sycamore of the European lumber trade is a species of maple; the sycamore of the Bible was a fig tree.

Use.—Boxes, crates, tobacco caddies, slack cooperage, furniture, fixtures, planing-mill products, butchers' blocks, woodenware, novelties, and fuel.

BLACK CHERRY

Prunus serotina Ehrhart

Tree.—Formerly a very valuable timber tree, attaining under the most favorable conditions a height of 100 feet, with a straight or crooked trunk 4 to 5 feet in diameter; usually much smaller and sometimes only a shrub. The bitter, aromatic leaves 2 to 5 inches long and 1 to 1½ inches wide, with one or more conspicuous glands at the base of the blade. Small, white flowers in long, drooping clusters, unlike the cultivated cherries. The nearly black fruits have a dark purple, juicy, sweet flesh. Bark on young trunks thin, marked with horizontal lines and peeling off in filmy layers; that of old trunks ½ to ¾ inch thick and irregularly fissured.

Distributed from Nova Scotia south to Florida and west to South Dakota, Kansas, and Texas. At its best in the southern Appalachian region and portions of the Ohio Valley, where it was formerly common in the mixed

hardwood forests. Requires a rich, moist, deep soil for its best development; low and scrubby forms very common on a wide variety of soils and sites. The only native wild cherry tree of economic importance. (Family Rosaceae.)

BLACK CHERRY
Leaf and fruit, one-third natural size; twig, two-thirds natural size

Wood.—Diffuse-porous; pores small, gradually reducing in size and number during the season's growth; rays narrow, but producing beautiful silver grain on quarter-sawed lumber; is moderately heavy, hard, and strong, straight-grained, fine-textured, not difficult to season, works easily, takes a beautiful polish, holds its place well when manufactured, is nearly odorless and tasteless, durable in contact with the ground; heartwood rich, lustrous reddish brown, deepening upon exposure, sapwood yellowish white. A cabinet wood ranking with walnut and mahogany.

Use.—Formerly for cabinet work, fine furniture, and interior finish; now chiefly for printer's blocking, spirit levels, handsaw handles, patterns, and office fixtures.

HONEY LOCUST

Gleditsia triacanthos Linnaeus

Tree.—A large, thorny tree, 60 to 80 feet high, occasionally 140 feet, with a trunk 2 to 3 feet, sometimes 5 or 6

feet, in diameter. Trees in the open have short trunks and broad, round-topped crowns. Spines slender and very sharp, at first simple, later three-pronged, becoming large, many-pronged, and clustered. A variety of this tree is unarmed. Leaves alternate, pinnate or bipinnate, 7 or 8 inches long, sometimes clustered. Fruit a flat, reddish

HONEY LOCUST
Leaf and fruit, one-quarter natural size; twig, three-quarters natural size

brown, twisted pod, 10 to 18 inches long, containing many flat, oval, brownish seeds. Bark on branches and young stems smooth except for conspicuous, raised lenticels; that of old trunks sometimes smooth, but usually fissured into long, firm ridges.

Distributed from western New York and Pennsylvania south to Georgia and west to eastern South Dakota, Nebraska, and Texas. Prefers moist, fertile soil and attains its largest size in bottom lands of small streams in southern Indiana and Illinois. Common in prairie groves of oak, walnut, and hickory in central Illinois. Usually grows singly, but sometimes forms nearly pure stands. Often cultivated for ornament and shade, and for windbreaks. (Family Leguminosae.)

Wood.—Ring-porous; the large pores open and in a conspicuous band in spring wood, those of summer wood very small and clustered; rays highly colored and distinct; is very hard, heavy, tough, and strong, coarse-textured, requires care in seasoning, finishes very smoothly, takes a glossy polish, is odorless and tasteless, and fairly durable in contact with the ground; color of heartwood bright reddish brown, that of the usually thick sapwood pale yellow. Wood similar to Kentucky coffee tree, but is finer-textured and usually has a much thicker sapwood. Is of minor commercial importance.

Use.—Fence posts, railway crossties, sills, hubs of heavy wheels, and fuel.

KENTUCKY COFFEE TREE

Gymnocladus dioicus (Linnaeus) Koch

Tree.—A rare tree, 60 to 80 feet high, occasionally 110 feet, with a trunk 2 to 3 feet in diameter, usually dividing into 2 to 4 secondary stems. Leaves alternate, twice compound, 1 to 3 feet long and nearly as wide, with

KENTUCKY COFFEE TREE
Leaf and fruit, one-eighth natural size; twig, one-half natural size

ovate leaflets about 2 inches long, the whole appearing more like a branch than a leaf; leaves in falling leave coarse-

limbed crown open and conspicuously bare. Fruit a coarse, leathery, dark reddish brown pod, 4 to 10 inches long and 1 to 2 inches broad, containing 6 to 9 plump, round seeds having a horn-like seed coat and surrounded by a thick layer of sweet, jelly-like pulp. Bark very hard, fissured, the ridges usually with sharp, upcurled edges that are very characteristic.

Distributed sparingly from New York and southwestern Ontario to southern Minnesota and south to Tennessee and Arkansas. Occurs as single individuals in rich bottom lands; nowhere common. Occasionally cultivated in lawns and parks, but more for its oddity than beauty. (Family Leguminosae.)

Wood.—Ring-porous; the large pores open and in a conspicuous band in spring wood, those in summer wood very small and clustered; rays rather coarse; is very hard, heavy, and strong, straight-grained, very coarse-textured, requires care in seasoning, takes a high polish, is odorless and tasteless, and very durable in contact with the ground; color of heartwood light cherry red to reddish brown, that of thin sapwood greenish yellow. Wood resembles that of the honey locust, and is of very little commercial importance because of its scarcity.

Use.—In a small way for fence posts, railway ties, heavy construction, farming implements, interior finish, and furniture. The roasted nuts are edible and have been used as a substitute for coffee.

BLACK LOCUST

Robinia Pseudacacia Linnaeus

Tree.—A valuable tree of medium size, attaining a height of 50 to 70 feet, occasionally 90 feet, with a slender trunk 18 to 24 inches, sometimes 3 to 4 feet, in diameter. Pinnate leaves 8 to 14 inches long, with 7 to 19 oval leaflets; base of leaf stem covers the buds and at either side is a small prickle. Sweet-scented, white, pea-like flowers borne in loose clusters. Thin, brown pods, 2 to 4 inches long and ½ inch wide, contain 4 to 8 small seeds. Bark deeply furrowed.

Originally of rather limited distribution on the slopes of the Appalachian Mountains from Pennsylvania south

to northern Georgia; also in Arkansas and southern Illinois. Now widely naturalized and often forming thickets of small, distorted trees. Much planted for ornament and shade; damage caused by locust borer seriously interferes with usefulness of tree for forestry purposes. Usually propagates by root shoots. (Family Leguminosae.)

BLACK LOCUST
Leaf and fruit, one-third natural size; twig, two-thirds natural size

Wood.—Ring-porous; the large pores tightly closed with tyloses and in a conspicuous, light-colored band in spring wood, those of summer wood very small and clustered; rays inconspicuous; is exceedingly hard, heavy, tough, strong, and elastic, usually straight-grained, requires care in seasoning to prevent checking, is not easy to work, takes a lustrous polish, holds its place remarkably well when manufactured, is odorless and nearly tasteless, very durable in contact with the ground; heartwood greenish to clear yellow, becoming brown upon exposure,

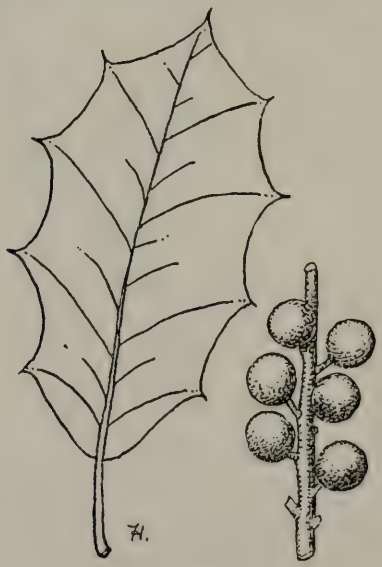
sapwood usually thin and white. Two forms of the tree, black locust and yellow locust, are sometimes distinguished, chiefly on the basis of the color and quality of the wood.

Use.—Insulator pins on telephone and telegraph lines, treenails, hubs of carriages, various articles of turnery, fence posts, railway crossties, and fuel. Rarely manufactured into lumber.

HOLLY

Ilex opaca Aiton

Tree.—An evergreen tree, best known on account of its decorative leaves and berries; of small size in the North, becoming larger in the South where it is often 40 to 50 feet high, infrequently 80 feet or more, with a trunk 2 to 3 feet, rarely 4 feet, in diameter. The crown is narrow and



HOLLY
Two-thirds natural size

composed of slender branches and stiff twigs. The alternate, simple, and leathery leaves are dull yellow green, 2 to 4 inches long, and with characteristic wavy margin and spiny teeth; they remain on the tree for three years. The fruit is bright red, about the size of a pea, with a small nut and a thin, fleshy covering. Bark light gray,

about ½ inch thick, and roughened with small warty growths.

Occurs in the coast region from Massachusetts to Florida, from southern Indiana and Illinois through the valley of the Mississippi River to the Gulf, and through Missouri, Arkansas, Louisiana, and eastern Texas, attaining its best development in bottom lands along streams in the last three states. (Family Aquifoliaceae.)

Wood.—Diffuse-porous; the pores all very small; rays rather coarse but inconspicuous; annual rings indistinct; is of medium density and weight, hard, rather brittle, straight-grained, fine-textured, not very difficult to season, works easily, finishes very smoothly, is odorless and tasteless, and perishable in contact with the soil; color of heartwood milk-white, becoming brownish upon exposure; sapwood thick, scarcely distinguishable. Timber has no established market.

Use.—Inlaying, scroll-sawing, turnery, brush-backs, borders of parquet floors, and fancy cabinet work. Is sometimes dyed to imitate ebony for handles of cutlery. Leafy twigs and berries of commercial importance for Christmas decorations.

SUGAR MAPLE

Acer saccharum Marshall

Tree.—Most valuable of all maples. A large tree, attaining a maximum height of 120 feet, with a long, straight trunk 3 to 5 feet in diameter. Trees grown in the open have a short, stout trunk and a large, symmetrical, spreading or round-topped crown. Leaves opposite, simple, 4 to 5 inches in diameter, usually 5-lobed, sparingly toothed, bright green above and paler below, with rich autumnal coloring. Seeds winged and in slender stalked pairs, ripening in autumn. Bark on older trunks deeply furrowed, the long irregular plates often loosening vertically.

Widely distributed throughout all that portion of the United States east from South Dakota and Texas. Most common and of its largest size at moderately high elevations in New England, New York, and Pennsylvania, in coves and on northern slopes in the southern

Appalachians, the Ohio River Valley, and the northern parts of the lake states. A common shade and ornamental tree in the northern states. (Family Aceraceae.)

SUGAR MAPLE
Leaf and fruit, one-third natural size; twig, one-half natural size

Wood.—Diffuse-porous; all the pores small; rays small, but rather conspicuous on quarter-sawed lumber; growth rings limited by reddish line; is hard, heavy, tough, and strong, of fine and uniform texture, grain usually straight, but sometimes curly or bird's eye, is not very difficult to season, finishes smoothly and takes a lustrous polish, is odorless and tasteless, and not durable in contact with the ground; heartwood light brown with reddish tinge, sapwood nearly white.

Use.—Extensively used for furniture, flooring, interior finish, vehicle construction, handles, agricultural implements, woodenware, shoe lasts, athletic goods, various articles of turnery, musical instruments, also distillation and fuel. In the northern states the sap is the source of syrup and sugar.

RED MAPLE

Acer rubrum Linnaeus

Tree.—A medium-sized to large tree, often 60 to 80 feet high, occasionally 120 feet, with a long trunk 2 to 3 feet, sometimes over 4 feet, in diameter, and a rather

narrow crown of upright branches and bright red branchlets. Leaves opposite, simple, light green above and pale or whitish below, 3- to 5-lobed, and with numerous coarse teeth. Small red or scarlet flowers in conspicuous clusters on the branchlets before the opening of the leaves. Winged, paired seeds ripen in spring or early summer. Bark of branches and young stems smooth and gray, suggesting beech, that of old trunks dark-colored and shaggy.

RED MAPLE
One-half natural size

One of the commonest and most generally distributed trees of eastern United States and Canada, having its western limits in northwestern Minnesota and eastern Texas. Usually a tree of lowlands and swamps, attaining its largest size in river swamps of the lower Ohio Valley, but also growing in upland forests, reaching an altitude of 4,500 feet in the mountains of North Carolina. Various forms and varieties are recognized. (Family Aceraceae.)

Wood.—Diffuse-porous; all the pores small; rays small, but distinct on quarter-sawed lumber; pith flecks common; growth rings not very clearly defined; is fairly hard, heavy, and strong, fine-textured, straight-grained, not difficult to season, easy to work, finishes very smoothly, is perishable

in contact with the soil; heartwood light brown, with reddish or sometimes greenish tinge, sapwood nearly white. Often sold in mixture with sugar maple; when sold separately is commonly called soft maple.

Use.—Cheaper grades of furniture, interior finish (to be painted), veneers for plywood, baskets, and woodenware, turned handles, railway crossties (treated), fuel, and various less exacting purposes for which sugar maple is employed.

BASSWOOD

Tilia glabra Ventenat

Tree.—Very important timber tree, usually 60 to 80 feet high, occasionally 120 feet, with a long, smooth trunk 2 to 3 feet, rarely over 4 feet, in diameter. Leaves irregularly heart-shaped, 4 to 7 inches long, sharply toothed and pointed. Sweet-scented, yellowish white flowers in

BASSWOOD

Leaf and fruit, one-third natural size; twig, one-half natural size

drooping clusters, the stalk attached to the middle of an elongated, leaf-like bract which serves as a wing in distributing the pea-like, woolly-coated fruits. Bark deeply furrowed, easy to cut; inner portion, or bast, very tough and fibrous, thus giving rise to the name basswood (bast-wood).

Distributed from New Brunswick to Manitoba, south to Georgia and west to Texas. Occurs in rich, moist soil

in mixed hardwood forests, occasionally in small, nearly pure stands. Principal sources of lumber are Michigan and Wisconsin. Basswood is closely related to the European linden; in parts of the Middle West is often called linn. (Family Tiliaceae.)

Wood.—Diffuse-porous; all the pores very small; rays thin, but some of them rather high and sometimes show very distinctly on radial surfaces; growth rings indistinct; is light, soft, rather tough and strong for its weight, uniformly fine-textured, straight-grained, seasons readily, but is subject to blue stain, very easy to work, finishes smoothly, holds nails firmly, shrinks and warps very little, is nearly odorless and tasteless, perishable in contact with the ground; heartwood creamy brown with occasionally darker streaks, not clearly defined from the thick, nearly white sapwood. A very clean-looking wood, highly esteemed in a great many industries.

Use.—High-grade boxes and food containers, unexposed parts of furniture, panels and bent work of vehicle bodies, best grade of excelsior, flour barrels, apiarists' supplies, interior finish (to be painted), miscellaneous planing-mill products, and veneers for plywood and baskets. Flowers a valuable source of honey.

BLACK GUM

Nyssa sylvatica Marshall

Tree.—A large tree of secondary commercial importance, usually 60 to 80 feet high, but occasionally 100 feet or more, with a long trunk 18 to 24 inches, rarely 5 feet, in diameter, and a narrow or flat-topped crown of slender, tough branches. Leaves alternate, simple, 2 to 5 inches long, dark green and shiny, the upper surface turning bright scarlet in early autumn. Flowers small, greenish white, and clustered, the two sexes on separate trees. Fruits small and blue black, the flesh sour. Bark rough and scaly, becoming deeply fissured and broken into small blocks on old trunks.

Widely distributed throughout the eastern half of the United States and southern Canada, attaining its largest size in the southern Appalachians. Occurs on a variety of soils and sites, but is most common in lowlands and swamps. Sometimes planted for ornamental purposes. In

parts of its range it is known as pepperidge and sour gum and often as tupelo. (Family Cornaceae.)

BLACK GUM
One-half natural size

Wood.—Diffuse-porous; the pores all very small; growth rings indistinct; is of medium density and weight, very tough, grain interlocked, texture very fine and uniform, difficult to season, tends to warp badly, is not easy to work but takes a good polish, is odorless and tasteless, perishable in contact with the soil; heartwood yellowish brown, sapwood very thick, nearly white. Lumber sometimes sold as tupelo.

Use.—Veneers for crates and baskets, box shooks, machinery rollers, rough floors, hubs, woodenware, and excelsior. Not highly esteemed for any purpose.

TUPELO GUM

Nyssa aquatica Marshall

Tree.—A large timber tree of the southern swamps, attaining a maximum height of 100 feet, with a somewhat crooked trunk 3 to 4 feet in diameter above the greatly enlarged, tapering base. The narrow crowns are composed of rather small, spreading branches and coarse, brittle twigs. Leaves alternate, simple, 5 to 7 inches long and 2 to 4 inches wide, dark green and shiny above and

pale and somewhat downy beneath. The flowers are small, the male in dense clusters, the female solitary and long-stemmed, the two sexes on separate trees. Fruit plum-like, about an inch long, dark purple, with thin, sour flesh. Bark thin, very dark brown, with long, vertical ridges.

TUPELO GUM
Twig, two-thirds natural size; leaf and fruit, one-third natural size

Distributed along the coast from southern Virginia to northern Florida, and through the Gulf states into Texas; northward through Arkansas, western Tennessee, Kentucky, and southern and southeastern Missouri, to southern Illinois. Of its greatest size and commercial importance in the cypress swamps of southern Louisiana. (Family Cornaceae.)

Wood.—Diffuse-porous; the pores all very small; rays very fine; growth rings usually indistinct; is light, firm, stiff, rather brittle, of fine and uniform texture, grain interlocked, requires great care in seasoning to prevent warping, works easily, finishes smoothly, resists wear, is odorless and tasteless, not durable in contact with the

ground; heartwood brownish, sometimes variegated, cream-colored or grayish, often not sharply defined from the thick, light-colored sapwood. Wood of enlarged bases very light, soft, and spongy. Lumber first introduced into general trade in 1899; known in America as tupelo, in European markets as bay poplar.

Use.—Boxes, veneers for plywood and baskets, warehouse and factory floors, siding, moldings, interior trim (to be painted), kitchen furniture, lath, slack cooperage, and railway crossties (treated).

FLOWERING DOGWOOD

Cornus florida Linnaeus

Tree.—A small, bushy tree, usually 15 to 25 feet high, occasionally 40 feet, with a well-formed trunk, 6 to 10 inches, rarely 18 inches, in diameter, and a flat crown of

FLOWERING DOGWOOD
Twig, two-thirds natural size; leaf and fruit, one-half natural size

small, spreading or upright branches and smooth, upturned twigs. Leaves opposite, simple, 3 to 5 inches long, rounded or oblong, with smooth margins and prominent

veins. Tree very conspicuous and ornamental when in bloom, due to the four large, white or rose-colored, petal-like parts which surround the heads of very small, greenish flowers. Fruits are fleshy, about ¾ inch long, borne in heads, and turn scarlet when ripe. Bark of the trunk dark red, deeply fissured and broken into small blocks.

Occurs scatteringly in the forest in the shade of many other kinds of trees throughout most of the eastern half of the United States, and extends into the mountains of northern Mexico. It attains its best development in the southern Appalachian region. The largest remaining supply of the timber is in Mississippi, Alabama, and Georgia. The tree is of little commercial importance in the northern states, but is often cultivated or protected in woodlands for decorative purposes. (Family Cornaceae.)

Wood.—Diffuse-porous; the pores all very small; rays small, but very distinct on radial surface because of the dark color; growth rings limited by narrow, rather dark line; is very hard, heavy, tough, and strong, uniformly fine-textured, straight-grained, requires much care in seasoning to prevent splitting, finishes very smoothly and takes a glassy polish, wears uniformly, is odorless and tasteless, not durable in contact with the ground; heartwood reddish or sometimes greenish brown; the thick sapwood lighter and rather sharply defined, becoming decidedly reddish or roseate upon exposure. Wood resembles sugar maple, but is more deeply colored.

Use.—One of the very few woods suitable for shuttles in power looms; several million dogwood shuttles are consumed annually. Other uses are spindles, bobbins, handles, mallets, golf-club heads, wood-engraving, and fuel.

PERSIMMON

Diospyros virginiana Linnaeus

Tree.—A tree best known for its fruit; usually not over 50 feet high, with a trunk 10 to 18 inches in diameter, but known to attain in dense forests a height of 100 to 130 feet, with a long, slender trunk 2 to 3 feet in diameter; trees in thickets often scrubby. Leaves 3 to 6 inches long and 1 to 3 inches wide, dark, glossy green above and grayish green beneath. Small, four-lipped, wax-like

flowers vary from greenish yellow to milky white, the two sexes on different trees. The round, several-sided, juicy fruits are 1 to 3 inches in diameter, very astringent and puckery when green; when ripe the custard-like, orange-colored pulp is rich and sweet. Bark on old trunks broken into squarish blocks.

PERSIMMON

Leaf and fruit, one-half natural size; twig, three-quarters natural size

Distributed from Connecticut to Iowa and south to the Gulf of Mexico. Most favorable development from Maryland, Virginia, and the Carolinas, westward through Missouri and Arkansas. Often spreads by root sprouts and forms thickets. Several natural varieties and forms recognized and various horticultural forms cultivated for the fruit. (Family Ebenaceae.)

Wood.—Indistinctly ring-porous; pores not abundant; rays fine and inconspicuous; growth rings fairly distinct; is very hard and heavy, straight-grained, rather fine-textured, requires careful seasoning to avoid splitting, is not difficult to work, takes a glassy polish, is odorless and tasteless; heartwood variegated, brown and black, brittle, usually very defective; sapwood thick, grayish, very tough and strong. Persimmon wood is a kind of ebony, but

only the sapwood is of commercial importance. Has many properties of hickory.

Use.—Principally for large shuttles in power looms; also for golf-club heads, carpenters' planes, mallets, shoe lasts, articles of turnery. Heartwood used to limited extent for brush-backs and various fancy articles.

RED ASH

Fraxinus pennsylvanica Marshall

Tree.—A medium-sized tree of secondary commercial importance, usually only 40 to 60 feet high, occasionally

RED ASH

Twig, three-quarters natural size; leaf, one-third natural size; fruit, one-half natural size

70 feet, with a trunk 18 to 30 inches, seldom up to 4 feet, in diameter, and a rather irregular, compact crown

of numerous upright branches and slender twigs, velvety at first, terminated by a blunt, brown bud. Leaves opposite, pinnate, 10 to 12 inches long, with 7 to 9 stalked leaflets that are velvety on lower surface. Flowers and fruit similar to those of white ash. Bark of trunk grayish brown, ½ to ⅔ inch thick, with shallow furrows and scaly ridges; inner bark reddish.

Distributed rather sparingly from Nova Scotia and Manitoba southward to central Georgia, northern Alabama, northeastern Mississippi, southern Indiana and Illinois, northern Missouri, eastern Kansas, and southwestern Oklahoma. Occurs in rich bottom land and swampy lowlands, occasionally in drier situations. (Family Oleaceae.)

Wood.—Ring-porous; pores open, large pores in conspicuous band, those in summer wood few, small, usually not connected by lines; rays very fine and indistinct; is hard, heavy, brittle, straight-grained, seasons readily, finishes smoothly, is odorless and tasteless, not durable in contact with the ground; heartwood brown or reddish brown, sapwood yellowish. Wood similar to white ash and sold in mixture with it, though considered somewhat inferior to that species. Supply limited.

Use.—Same as white ash: bentwork, handles, cooperage, interior finish, and planing-mill products.

WHITE ASH

Fraxinus americana Linnaeus

Tree.—A timber tree of the first importance, usually 70 to 90 feet high, occasionally 120 feet, with a long, clear trunk 2 to 3 feet, sometimes 5 or 6 feet, in diameter, and a narrow crown of heavy branches and thick, smooth branchlets terminated by a blunt, dark brown bud. Leaves opposite, pinnate, 8 to 12 inches long, with 5 to 9, usually 7, stalked leaflets. Flowers not conspicuous, appearing before the leaves, the male and female on separate trees. Winged, dart-like fruits in large, drooping clusters. Bark on old trees 1 to 3 inches thick, deeply furrowed, and dark grayish brown.

Widely distributed from Nova Scotia to Minnesota and southward to Florida and Texas. Prefers fertile,

rather moist soils on low hills and along streams, attaining its largest size in the bottom lands of the lower Ohio Valley. Occurs in mixed hardwood forests. (Family Oleaceae.)

WHITE ASH
Leaf and fruit, one-third natural size; twig, one-half natural size

Wood.—Ring-porous; pores open, the larger ones in a conspicuous band, those in summer wood few, small, and in outermost portion of ring connected by tangential lines; rays very fine and indistinct; is hard, heavy, strong, highly elastic, straight-grained, easy to work, seasons readily, takes a glossy polish, bends well, holds its place well when manufactured, is odorless and tasteless, not durable in contact with the soil; heartwood brown, often with reddish tinge; sapwood nearly white, very thick in trees of rapid growth. Timber the most valuable of the American ashes.

Use.—Handles of shovels, forks, and rakes; staves and heading of butter tubs; poles, shafts, bodies, panels, and bent work of vehicles; planing-mill products; refrigerators, kitchen cabinets, furniture, and interior trim; oars, sporting and athletic goods, woodenware, novelties, and many other purposes.

BLUE ASH

Fraxinus quadrangulata Michaux

Tree.—A slender tree, generally not more than 60 or 70 feet tall but sometimes reaching a height of 120 feet, with a trunk 2 to 3 feet in diameter. Leaves opposite, greenish yellow, compound, with 7 to 11 leaflets borne on short stalks. Fruit 1 to 2 inches long, winged to the base. Bark thin, scaly, and of a light grayish color.

BLUE ASH

Twig, two-thirds natural size; leaf and fruit, one-third natural size

Nowhere very abundant, it usually inhabits rich limestone hills, occasionally descending into the fertile bottom lands. It attains its best development on the lower Wabash River in Indiana and Illinois and on the western slopes of the Big Smoky Mountains in Tennessee. Its northern limit extends to southern Michigan and its western to Missouri. A blue dye may be obtained by macerating the inner bark in water. (Family Oleaceae.)

Wood.—Ring-porous; the larger pores in a conspicuous band, those in the summer wood few, small, and in outer-

most portion of ring connected by tangential bands; is heavy, hard, compact, satiny, close-grained and rather brittle; heartwood light yellow, streaked with brown, the thick sapwood lighter-colored. In general appearance the wood resembles white ash but is more stringy and usually considered stronger.

Use.—Flooring and carriage building. The sapwood is used for handles of agricultural implements. It is a tree of excellent habit of growth and other features which make it desirable for ornamental planting.

CONTRIBUTORS TO HALL OF NORTH AMERICAN WOODS

AMERICAN WALNUT MANUFACTURERS' ASSOCIATION, Chicago, Illinois: black walnut.

BARNABY, CHARLES H., Greencastle, Indiana: dogwood.

BAYER, JACOB, LUMBER COMPANY, New York: black cherry.

BERST-FORSTER-DIXFIELD COMPANY, Cloquet, Minnesota: paper birch.

BIGELOW, A. P., AND COMPANY, Long Island City, New York: eastern white pine.

BOISE-PAYETTE LUMBER COMPANY, Boise, Idaho: Idaho white pine.

BRUCE, E. L., COMPANY, Memphis, Tennessee: red gum.

CRAFTSMAN WOOD SERVICE COMPANY, INC., Chicago, Illinois: holly.

CREWS, H. R., LUMBER COMPANY, Tulsa, Oklahoma: osage orange.

DOLBUR AND CARSON COMPANY, Eureka, California: redwood.

EASTMAN-GARDINER HARDWOOD COMPANY, Laurel, Mississippi: sycamore.

FRITZ, PROFESSOR EMANUEL, UNIVERSITY OF CALIFORNIA, Berkeley, California: Monterey cypress and sugar pine.

GREAT SOUTHERN LUMBER COMPANY, Bogalusa, Louisiana: longleaf pine.

HAMMOND LUMBER COMPANY, Eureka, California: redwood.

HINES, EDWARD, LUMBER COMPANY, Chicago, Illinois: ponderosa pine.

KEITH, THE, LUMBER COMPANY, Chicago, Illinois: sycamore.

KING, W. O., LUMBER COMPANY, Chicago, Illinois: sugar maple.

MADERA SUGAR PINE COMPANY, Madera, California: branch of sugar pine.

MCCLOUD, THE, RIVER LUMBER COMPANY, McCloud, California: ponderosa pine.

MOYER, F. G., Georgetown, Ohio: dogwood.

NEILS, J., LUMBER COMPANY, Libby, Montana: western larch.

PANHANDLE LUMBER COMPANY, Spirit Lake, Idaho: Idaho white pine.

PICKREL WALNUT COMPANY, St. Louis, Missouri: black walnut.

RED RIVER LUMBER COMPANY, Westwood, California: incense cedar.

RICHMOND CEDAR WORKS, Richmond, Virginia: southern white cedar.

SEATTLE CEDAR LUMBER MANUFACTURING COMPANY and WEST COAST LUMBERMEN'S ASSOCIATION, Seattle, Washington: western red cedar.

SHEVLIN PINE SALES COMPANY and SUGAR PINE LUMBER COMPANY, LTD., Pinedale, California: sugar pine.

VON PLATEN-FOX COMPANY, Iron Mountain, Michigan: tamarack.

WILLIAMS, F. B., CYPRESS COMPANY, Patterson, Louisiana: southern cypress.

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