



DEPARTMENT OF THE INTERIOR, CENSUS OFFICE.

FRANCIS A. WALKER, Superintendent, Appointed April 1, 1879; resigned November 3, 1881. CHAS. W. SEATON, Superintendent, Appointed November 4, 1881.

REPORT

ON THE

FORESTS OF NORTH AMERICA

(EXCLUSIVE OF MEXICO),

BY

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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE,
Washington, D. C., September 1, 1884.

Hob. H. M. Teller, Secretary of the Interior.

SIR: I have the honor to transmit herewith the Report on the Forests of North America (exclusive of Mexico), by Charles S. Sargent, Arnold Professor of Arboriculture in Harvard College.

This report constitutes the ninth volume of the series forming the final report on the Tenth Census.

I have the honor to be, most respectfully, your obedient servant,

CHAS. W. SEATON,
Superintendent of Census.

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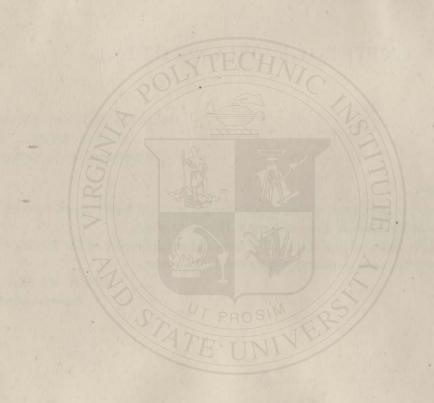


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LETTER OF TRANSMITTAL.

Brookline, Massachusetts, July 1, 1883.

TO THE SUPERINTENDENT OF CENSUS.

SIR: I have the honor to submit the following report upon the nature and condition of the forests of the United States, to which are added statistics of the lumber and other industries directly dependent upon the forest for their support.

Mr. Andrew Robeson, of Brookline, Massachusetts, has prepared the maps which accompany this report; he has supervised the entire statistical work of this division and has conducted its correspondence.

Mr. Stephen P. Sharples, of Cambridge, Massachusetts, has conducted the various experiments undertaken with the view of determining the value of the different woods produced in the forests of the United States.

Mr. C. G. Pringle, of East Charlotte, Vermont, has examined the forests of northern New England and New York, Pennsylvania, and West Virginia; and subsequently, as an agent for the American Museum of Natural History, has greatly increased our knowledge of the trees of Arizona and southern California.

Mr. A. H. Curtiss, of Jacksonville, Florida, has studied the forests of Georgia and Florida, and subsequently, as an agent of the American Museum of Natural History, has added to our knowledge of the semi-tropical forests of southern Florida.

Dr. Charles Mohr, of Mobile, Alabama, has explored the forests of the Gulf states.

Mr. H. C. Putnam, of Eau Claire, Wisconsin, has gathered the forest statistics of Pennsylvania, Michigan, Wisconsin, and Minnesota.

Mr. George W. Letterman, of Allenton, Missouri, has examined the forests extending west of the Lower. Mississippi River, and Professor F. L. Harvey, of Fayetteville, Arkansas, has gathered the forest statistics of that state.

Mr. Sereno Watson, of Cambridge, Massachusetts, has studied, during a long and arduous journey, the forests of the northern Rocky Mountain region, and Mr. Robert Douglas, of Waukegan, Illinois, those of the Black hills of Dakota.

I take this opportunity to call your attention to the faithful and admirable manner in which my associates have performed the difficult duties to which they were assigned; their zeal and intelligence have made possible the preparation of this report.

It is my pleasant duty also to call your attention to the fact that this investigation has been greatly aided from the first by the experience and knowledge of Messrs. G. M. Dawson, John Macoun, and Robert Bell, members of the Geological Survey of Canada; the information in regard to the distribution northward of the trees of the eastern United States is entirely derived from the latter's paper upon the Canadian forests, published in the Report of the Geological Survey of Canada for the years 1879–'80.

I am under special obligation to Dr. George Engelmann, of Saint Louis, Missouri, my companion in a long journey through the forests of the Pacific region, for valuable assistance and advice; his unrivaled knowledge of our oaks, pines, firs, and other trees has been lavishly placed at my disposal.

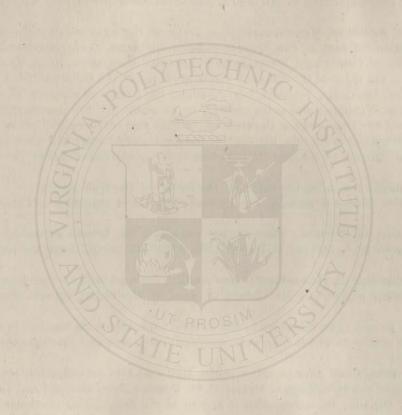
Mr. M. S. Bebb, of Rockford, Illinois, the highest American authority upon the willow, has given me the benefit of his critical advice in the study of this difficult genus. I desire to express to him and to Dr. Laurence Johnson, of New York, who has furnished me with a full series of notes upon the medical properties of the trees of the United States, the deep sense of my obligation. My thanks are also due to Mr. Henry Gannett, Geographer of the Tenth Census, for cordial co-operation in the work of this division; to Colonel T. T. S. Laidley, of the United States army, in command of the arsenal at Watertown, Massachusetts, and to Mr. James E. Howard, in charge of the testing machine there, for advice and assistance afforded Mr. Sharples while conducting the experiments upon the strength of woods, as well as to a large number of correspondents in all parts of the United States who have favored me with their cordial co-operation.

I am, sir, your obedient servant,

CHARLES S. SARGENT,

Special Agent.

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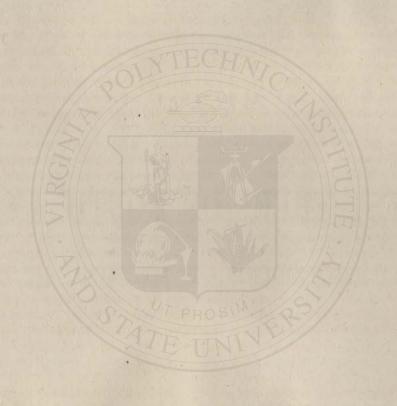


PART I.

THE FOREST TREES OF NORTH AMERICA,

EXCLUSIVE OF MEXICO.

1



THE FORESTS OF NORTH AMERICA.

GENERAL REMARKS.

The North American continent, or that part of it situated north of Mexico, which will alone be considered here, may be conveniently divided, with reference to its forest geography, into the Atlantic and the Pacific regions, by a line following the eastern base of the Rocky mountains and its outlying eastern ranges from the Arctic circle to the Rio Grande. The forests which cover these two divisions of the continent differ as widely, in natural features, composition, and distribution, as the climate and topography of eastern America differ from the climate and topography of the Pacific slope. The causes which have produced the dissimilar composition of these two forests must be sought in the climatic conditions of a geological era earlier than our own and in the actual topographical formation of the continent; they need not be discussed here.

The forests of the Atlantic and the Pacific regions, dissimilar in composition in the central part of the continent, are united at the north by a broad belt of subarctic forests extending across the continent north of the fiftieth degree of latitude. One-half of the species of which this northern forest is composed extends from the Atlantic to the Pacific; and its general features, although differing east and west of the continental divide, in conformity with the climatic conditions peculiar to the Atlantic and the Pacific sides of the continent, still possess considerable uniformity. The forests of the Atlantic and the Pacific regions are also united at the south by a narrow strip of the flora peculiar to the plateau of northern Mexico, here extending northward into the United States. Certain characteristic species of this flora extend from the gulf of Mexico to the shores of the Pacific, and while the peculiar features of the eastern and the western slopes of the interior mountain system of the continent are still maintained here, the Atlantic and the Pacific regions of the Mexican forest belt possess many general features in common. Typical North American species, moreover, peculiar to the forests of the Atlantic or of the Pacific, mingle upon the Black hills of Dakota, and upon the Guadalupe and other mountains of western Texas, the extreme eastern ridges of the Rocky Mountain range, and the outposts between the Atlantic and the Pacific regions.

THE ATLANTIC REGION.

The forests of the Atlantic region may be considered under six natural divisions: the Northern Forest, the Northern Pine Belt, the Southern Maritime Pine Belt, the Deciduous Forest of the Mississippi Basin and the Atlantic Plain, the Semi-tropical Forest of Florida, and the Mexican Forest of Southern Texas (Map No. 2, portfolio).

These natural divisions, although composed in part of species found in other divisions and possessing many general features in common, are still for the most part well characterized by predominant species or groups of species, making such a separation natural and convenient.

The Northern Forest stretches along the northern shores of Labrador nearly to the sixtieth degree of north latitude, sweeps to the south of Hudson bay, and then northwestward to within the Arctic circle. This Northern Forest extends southward to the fiftieth degree of north latitude on the Atlantic coast, and nearly to the fifty-fourth degree at the 100th meridian. It occupies 10 degrees of latitude upon the Atlantic sea-board and nearly 20 degrees in its greatest extension north and south along the eastern base of the Rocky mountains. The region occupied by this Northern Forest, except toward its southwestern limits, enjoys a copious rainfall; it is divided by innumerable streams and lakes, and abounds in swampy areas often of great extent. The nature of the surface and the low annual mean temperature check the spread of forest growth and reduce the number of arborescent species, of which this forest is composed, to eight; of these, four cross to the Pacific coast, while the remainder, with a single exception, are replaced west of the continental divide by closely allied forms of the Pacific forest. The white and the black spruces are characteristic trees of this region; they form an open, stunted forest upon the low divides of the

water-sheds, and reach a higher latitude than any other arborescent species of the continent; the valleys and wide bottoms are clothed with broad sheets of poplars, dwarf birches, and willows. The forest of this entire region is scattered, open, stunted, and of no great economic value. It embraces, south of the sixtieth degree of north latitude, the northern extension of the great midcontinental plateau, which will be considered hereafter.

South of the Northern Forest the Northern Pine Belt extends from the Atlantic coast to the ninety-sixth meridian of longitude; east of the Apalachian Mountain system it extends south over nearly 6 degrees of latitude, with a long, narrow spur following the higher Alleghany ridges for nearly 3 degrees farther south; west of the Alleghany mountains, in the region of the great lakes, the pine forest is replaced south of the forty-third degree of latitude by the deciduous growth of the Mississippi basin. This second division of the Atlantic forest may be characterized by the white pine (Pinus Strobus), its most important, if not its most generally-distributed, species. East of the Apalachian system this tree often forms extensive forests upon the gravelly drift plain of the Saint Lawrence basin, or farther south and west appears in isolated groves, often of considerable extent, scattered through the decidnous forest. Forests of black spruce are still an important feature of this region, especially at the north, and within its boundaries the hemlock, the yellow cedar, the basswood, the black and the white ash, the sugar maple, and several species of birch and elm find their northern limits and the center of their most important distribution. The hickories and the oaks, characteristic features of the decidnous forests of all the central portion of the Atlantic region, reach here the northern limits of their distribution, as do the chestnut, the sassafras, the tulip tree, the magnolia, here represented by a single species, the red cedar, the tupelo, the sycamore, the beech, and other important genera.

The Southern Maritime Pine Belt extends from the thirty-sixth degree of north latitude along the coast in a narrow belt, varying from one hundred to two hundred miles in width, as far south as cape Malabar and Tampa bay; it stretches across the Florida peninsula and along the coast of the gulf of Mexico until the alluvial deposits of the Mississippi are encountered; it reappears west of that river in Louisiana, north and south of the Red river, and here gradually mingles with the deciduous forests of the Mississippi basin in Arkansas and eastern Texas. This belt is well characterized by the almost continuous growth, outside of the broad river bottoms and the immediate neighborhood of the coast, by the open forest of the long-leaved pine (P. palustris). The live oak, the palmetto, and various species of pine characterize the coast forest of this region; through the river bottoms and along the borders of the shallow ponds, scattered through the pine forest, different gums, water oaks, hickories, and ashes attain noble dimensions. The southern cypress (Taxodium), although extending far beyond the limits of this natural division, here attains its greatest development and value, and, next to the long-leaved pine, may be considered the characteristic species of the maritime pine belt.

The Deciduous Forest of the Mississippi Basin and the Atlantic Plain occupies, with two unimportant exceptions to be considered hereafter, the remainder of the Atlantic region. Through this deciduous forest, where peculiar geological features have favored the growth of Coniferae, belts of pine, growing gregariously or mixed with oaks and other broad-leaved trees, occur, especially upon some portions of the Atlantic plain and toward the limits of the Southern Maritime Pine Belt, west of the Mississippi river. The characteristic features of the forest of this whole region are found, however, in the broad-leaved species of which it is largely composed. Oaks, hickories, walnuts, magnolias, and ashes give variety and value to this forest, and here, with the exception of a few species peculiar to a more northern latitude, the deciduous trees of the Atlantic region attain their greatest development and value. Upon the slopes of the southern Alleghany mountains and in the valley of the lower Red river, regions of copious rainfall and rich soil, the deciduous forest of the continent attains unsurpassed variety and richness. Upon the Alleghany mountains northern and southern species are mingled, or are only separated by the altitude of these mountains; rhododendrons, laurels, and magnolias, here attaining their maximum development, enliven the forests of northern pines and hemlocks which clothe the flanks of these mountains or are scattered through forests of other broad-leaved species. The cherry, the tulip tree, and the chestnut here reach a size unknown in other parts of the country. The forest of the Red River valley is hardly less varied. The northern species which the elevation of the Alleghany mountains has carried south are wanting, but other species peculiar to the southern Atlantic and Gulf coasts are here mingled with plants of the southern deciduous forest. The seven species of Carya (the hickories) are nowhere else closely associated. A great variety of the most important oaks grow here side by side; here is the center of distribution of the North American hawthorns, which do not elsewhere attain such size and beauty. The osage orange is peculiar to this region; the red cedar, the most widely distributed of American Conifera, the southern and the yellow pine (Pinus palustris and mitis) here reach their best development. Just outside of this region, upon the "bluff" formation of the lower Mississippi valley and of western Louisiana, the stately southern magnolia, perhaps the most beautiful of the North American trees, and the beech assume their greatest beauty, and give a peculiar charm to this southern forest.

The western third of the Atlantic region is subjected to very different climatic conditions from those prevailing in the eastern portion of the continent; it consists of an elevated plateau which falls away from the eastern base of the Rocky mountains, forming what is known as the Great Plains. This great interior region, on account of its remoteness from natural reservoirs of moisture, receives a meager and uncertain rainfall, sufficient to insure a growth of herbage, but not sufficient to support, outside the narrow bottoms of the infrequent streams, the scantiest

forests. This treeless plateau extends north to the fifty-second degree of north latitude; it follows southward the trend of the Rocky mountains far into Mexico, extending eastward at the point of its greatest width, in about latitude 400 N., nearly to the ninety-seventh meridian. This whole region is generally destitute of forest. The narrow bottoms of the large streams are lined, however, with willows, poplars, elms, and hackberries, trees adapted to flourish under such unfavorable conditions. These diminish in size and number with the rainfall, and often disappear entirely from the banks of even the largest streams toward the western limits of the plateau, south of the forty-fifth degree of latitude. North and east of these central treeless plains a belt of prairie extends from the sixtieth degree of north latitude to southern Texas. The average width east and west of this prairie region, through much of its extent, is not far from 150 miles. Its eastern extension, between the fortieth and forty-fifth degrees of latitude, is much greater, however, here reaching the western shores of lake Michigan, and forming a great recess in the western line of the heavy forest of the Atlantic region with a depth of nearly 600 miles. The transition from the heavy forest of the eastern and central portions of the Atlantic region to the treeless plateau is gradual. The change occurs within the prairie region. Here is the strip of debatable ground where a continuous struggle between the forest and the plain takes place. There is here sufficient precipitation of moisture to cause, under normal conditions. a growth of open forest, but so nicely balanced is the struggle that any interference quickly turns the scale. Trees planted within this prairie belt thrive if protected from fire and the encroachment of the tough prairie sod, and so extend the forest line westward; if the forest which fringes the eastern edge of the prairie is destroyed it does not soon regain possession of the soil, and the prairie is gradually pushed eastward.

The eastern line of the plain where arborescent vegetation is confined to the river bottoms, and which divides it from the prairie where trees grow naturally, to some extent, outside of the bottoms, and where they may be made to grow under favorable conditions everywhere, is determined by the rainfall enjoyed by this part of the continent. The extreme eastern point reached by this line is found, upon the fortieth degree of north latitude, near the northern boundary of the state of Kansas. North of the fortieth degree it gradually trends to the west, reaching the eastern base of the Rocky mountains in about latitude 52°. This northwestern trend of the eastern plain line may be ascribed to the comparatively small evaporation which takes place during the shorter summer of the north and to a slight local increase of spring and summer rainfall. South of the fortieth degree the plain line gradually trends to the southwest under the influence of the gulf of Mexico, reaching its extreme western point in Texas upon the one hundredth meridian.

Other causes, however, than insufficient rainfall and a nicely balanced struggle between the forest and the plain have prevented the general growth of trees in the prairie region east of the ninety-fifth meridian. The rainfall of this region is sufficient to insure the growth of a heavy forest. The rain falling upon the prairies of Minnesota, Wisconsin, Iowa, Illinois, and Missouri equals in amount that enjoyed by the Michigan peninsula and the whole region south of lakes Ontario and Erie, while prairies exist within the region of the heaviest forest growth. It is not want of sufficient heat, or of sufficient or equally distributed moisture, which has checked the general spread of forest over these prairies. The soil of which the prairies are composed, as is shown by the fact that trees planted upon them grow with vigor and rapidity, is not unsuited to tree growth. It is not perhaps improbable that the forests of the Atlantic region once extended continuously as far west at least as the ninety-fifth meridian, although circumstantial evidence of such a theory does not exist; and the causes which first led to the destruction of the forests in this region, supposing that they ever existed, cannot with the present knowledge of the subject be even guessed at. It is, however, fair to assume that forests once existed in a region adapted, by climate, rainfall, and soil, to produce forests, and that their absence under such conditions must be traced to accidental causes. It is not difficult to understand that the forest once destroyed over such a vast area could not easily regain possession of the soil protected by an impenetrable covering of sod and subjected to the annual burnings which have occurred down to the present time; while the force of the wind, unchecked by any forest barrier, over such an area would, even without the aid of fires, have made the spread of forest growth slow and difficult. The assumption that these eastern prairies may have once been covered with forests is strengthened by the fact that since they have been devoted to agriculture, and the annual burning has been stopped, trees which were formerly confined to the river bottoms have gradually spread to the uplands. Small prairies situated just within the western edge of the forest have entirely disappeared within the memory of persons still living; the oak openings-open forests of large oaks through which the annual fires played without greatly injuring the full-grown trees—once the characteristic feature of these prairies, have disappeared. They are replaced by dense forests of oak, which only require protection from fire to spring into existence. In western Texas, the mesquit, forced by annual burning to grow almost entirely below the surface of the ground, is, now that prairie fires are less common and destructive, spreading over what a few years ago was treeless prairie. The prairies, then, or the eastern portions of them situated in the region of abundant rainfall, are fast losing their treeless character, and the forest protected from fire is gradually gaining in every direction; regions which fifty years ago were treeless outside the river bottoms now contain forests covering 10 or even 20 per cent. of their area. These eastern, well-watered prairies must not, however, be confounded with their dry western rim adjoining the plains—the debatable ground between forest and plain—or with the plains themselves. There is now no gradual, constant spread of forest growth upon the plains. They are treeless, on account of insufficient moisture to develop forest growth; and while trees may, perhaps, if planted, survive during a few years

beyond the western limits of the prairie as here laid down, the permanent establishment of forests there does not seem practicable, and, sooner or later, a period of unusual drought must put an end to all attempts at forest cultivation in a region of such insufficient and uncertain rainfall (Map No. 1, portfolio).

It remains to consider the Semi-tropical Forest of Florida and the Mexican Forest of Southern Texas.

A group of arborescent species of West Indian origin occupies the narrow strip of coast and islands of southern Florida. This belt of semi-tropical vegetation is confined to the immediate neighborhood of the coast and to occasional hummocks or islands of high ground situated in the savannas which cover a great portion of southern Florida, checking, by the nature of the soil and want of drainage, the spread of forest growth across the peninsula. This semi-tropical forest belt reaches cape Malabar on the east and the shores of Tampa bay on the west coast, while some of its representatives extend fully 2 degrees farther north. It is rich in composition; nearly a quarter of all the arborescent species of the Atlantic forest are found within this insignificant region. The semi-tropical forest, in spite of its variety, is of little economic importance. The species of which it is composed here reach the extreme northern limit of their distribution; they are generally small, stunted, and of comparatively little value. Certain species, however, attain respectable proportions; the mahogany, the mastic, the royal palm, the mangrove, the sea-grape, the Jamaica dogwood, the manchineel, and other species here become considerable and important trees.

In western and southern Texas the trees of the Mississippi basin, checked by insufficient moisture from farther extension southward outside the river bottoms, are replaced by species of the plateau of northern Mexico. streams flowing into the gulf of Mexico are still lined, however, east of the one-hundredth meridian, with the species of the Atlantic basin, which thus reach southward to beyond the Rio Grande. The Mexican forest belt of Texas extends from the valley of the Colorado river, near the ninety eighth meridian, to the Rio Grande. It touches the coast not far from the Nucces river and extends to the eastern base of the mountain ranges west of the Pecos; here the species of which it is composed mingle with those peculiar to the Pacific-Mexican forest. The forest of this region, like that of all countries of insufficient moisture, is open, stunted, and comparatively of little value. It is characterized by enormous areas covered with chaparral (dense and often impenetrable thickets of thorny shrubs and small trees), by a stunted and occasional arborescent growth upon the hills and plains, and by fringes of heavier timber along the river bottoms. The most valuable and perhaps the most characteristic species of this whole region, the mesquit, extends to the Pacific coast. With this exception, none of the arborescent species peculiar to this region attain any considerable size or importance, although the forest of small junipers which covers the low limestone hills of the Colorado valley are locally valuable in a country so generally destitute of trees. The region immediately adjoining the Rio Grande abounds in different species of Acacia, Leucana, and other Mexican Leguminosa; and farther west, upon the dry plains of the Presidio, the Spanish bayonet (Yucca baccata) covers wide areas with a low, open, and characteristic forest growth.

THE PACIFIC REGION.

The Pacific forest region is coextensive with the great Cordilleran Mountain system of the continent. The causes which have influenced the present position and density of these forests must be sought in the peculiar distribution of the rainfall of the region. The precipitation of moisture upon the northwest coast is unequaled by that of any other part of the continent. It gradually decreases with the latitude until, in southern California, the temperature of the land so far exceeds that of the ocean that precipitation is impossible through a large part of the year. The interior of all this great region, shut off by the high mountain ranges which face the ocean along its entire extent, is very imperfectly supplied with moisture. It is a region of light, uncertain, and unequally distributed rainfall, heavier at the north, as upon the coast, and decreasing gradually with the latitude in nearly the same proportion. This entire region is composed of a mass of mountain ranges with a general north and south trend, separating long and generally narrow valleys. The precipitation of moisture within the interior region is largely regulated by the position of the mountain chains. Warm currents ascending their sides become cold and are forced to deposit the moisture they contain. It follows that, while the interior valleys are rainless or nearly so, the mountain ranges, and especially the high ones, receive during the year a considerable precipitation of both rain and snow. If the distribution of the forests of any region is dependent upon the distribution and amount of moisture it receives, forests exceeding in density those of any other part of the continent would be found upon the northwest coast; they would gradually diminish toward the south, and entirely disappear near the southern boundary of the United States, while the forests of all the interior region, from the summit of the principal Coast Ranges to the eastern base of the Rocky mountains, woul? be confined to the flanks and summits of the mountains. These forests would be heavy upon the high ranges, especially toward the north; they would disappear entirely from the valleys and low mountain ranges. An examination of the forests of the Pacific region will show that in general distribution and density they actually follow the distribution of the rainfall of the region. These forests well illustrate the influence of moisture upon forest growth. Within the Pacific region the heaviest and the lightest forests of the continent coexist with its heaviest and lightest rainfall.

The forests of the Pacific region may be considered under four divisions: the Northern Forest, the Coast Forest, the Interior Forest, and the Mexican Forest (Map No. 2, portfolio).

The Northern Forest of the Pacific region extends from nearly the seventieth to about the fifty-eighth degree of north latitude, or, immediately upon the coast, is replaced by the Coast Forest nearly 2 degrees farther north; it extends from the continental divide, here mingled with the Northern Forest of the Atlantic region, to the shores of the Pacific. The southern limit of this open, scanty Northern Forest, composed of species which extend across the continent, or of species closely allied to those of the Northern Forest of the Atlantic region, is still imperfectly known, especially in the interior. The determination of the southern range in Alaska and British Columbia of several species, as well as the northern range here of a few others, must still be left to further exploration. The white spruce, the most important and the most northern species of the forest of the North Atlantic region, is here also the most important species. It attains a considerable size as far north as the sixty-fifth degree, forming, in the valley of the Yukon, forests of no little local importance. The canoe-birch, the balsam poplar, and the aspen, familiar trees of the North Atlantic region, also occur here. The gray pine and the balsam fir of the Atlantic region are replaced by allied forms of the same genera. The larch alone, of the denizens of the extreme Northern Forest of the Atlantic coast, finds no congener here in the northern Pacific forest.

The Pacific Coast Forest, the heaviest, although far from the most varied, forest of the continent, extends south along the coast in a narrow strip from the sixtieth to the fiftieth parallel; here it widens, embracing the shores of Puget sound and extending eastward over the high mountain ranges north and south of the boundary of the United States. This interior development of the Coast Forest, following the abundant rainfall of the region, is carried northward over the Gold, Selkirk, and other interior ranges of British Columbia in a narrow spur extending north nearly to the fifty-fourth parallel. It reaches southward along the Cœur d'Alêne, Bitter-Root, and the western ranges of the Rocky Mountain system to about latitude 47° 30′, covering northern Washington territory, Idaho, and portions of western Montana.

The Coast Forest south of the fiftieth degree of latitude occupies the region between the ocean and the eastern slopes of the Cascade Range; in California the summits of the principal southern prolongation of these mountains, the Sierra Nevada, marks the eastern limits of the Coast Forest, which gradually disappears south of the thirty-fifth parallel, although still carried by the high ridges of the southern Coast Range nearly to the southern boundary of the United States. The Coast Forest, like the forests of the whole Pacific region, is largely composed of a few coniferous species, generally of wide distribution. The absence of broad-leaved trees in the Pacific region is striking; they nowhere form great forests as in the Atlantic region; when they occur they are confined to the valleys of the coast and to the banks of mountain streams, and, economically, are of comparatively little value or importance. The characteristic and most valuable species of the northern Coast Forest are the Alaska cedar (Chamæcyparis), the tide-land spruce, and the hemlock. These form the principal forest growth which covers the ranges and islands of the coast between the sixty-first and the fiftieth parallels. Other species of the Coast Forest reach here the northern limits of their distribution, although the center of their greatest development is found farther south.

The red fir (Pseudotsuga), the most important and widely-distributed timber tree of the Pacific region, reaches the coast archipelago in latitude 51°; farther inland it extends fully 4 degrees farther north, and in the region of Puget sound and through the Coast Forest of Washington territory and Oregon it is the prevailing forest tree. The characteristic forest of the northwest coast, although represented by several species extending south as far as cape Mendicino, near the fortieth parallel, is replaced south of the Rogue River valley by a forest in which forms peculiar to the south rather than to the north gradually predominate. The forest of the northwest coast reaches its greatest density and variety in the narrow region between the summits of the Cascade Range and the ocean. North of the fifty-first parallel it gradually decreases in density, and south of the forty-third parallel it changes in composition and character. This belt of Coast Forest is only surpassed in density by that of some portions of the redwood forest of the California coast. The red fir, the great tide-land spruce, the hemlock, and the red cedar (Thuya) reach here enormous dimensions. The wide river bottoms are lined with a heavy growth of maple. cottonwood, ash, and alder, the narrow interior valley with an open growth of oak. In this great coniferous forest the trunks of trees two or three hundred feet in height are often only separated by the space of a few feet. The ground, shaded throughout the year by the impenetrable canopy of the forest, never becomes dry; it is densely covered by a thick carpet of mosses and ferns, often of enormous size. The more open portions of this forest are choked by an impenetrable growth of various Vaccineae of almost arborescent proportions, of hazel, the vine-maple, and other shrubs. The soil which has produced the maximum growth of forest in this region is, outside the river bottoms, a thin, porous gravel of glacial origin, rarely more than a few inches in depth; the luxuriance of vegetable growth, therefore, illustrates the influence of a heavy rainfall and temperate climate upon the forest.

The general character of this forest in the interior, although composed largely of the species peculiar to the coast, differs somewhat from the Coast Forest proper in composition and largely in natural features. The dense, impenetrable forest of the coast is replaced, east of the summit of the Cascade Range, by a more open growth, generally largely destitute of undergrowth. The red fir, the hemlock, and the red cedar (Thuya) are still important elements of the forest. Less valuable species of the Coast Forest—the white fir (Abies grandis), the yew, the alders, the mountain hemlock (Tsuga Pattoniana), the hawthorn, the buckthorn, and the white pine (Pinus monticola)—are still represented. The latter, a local species upon the coast, only reaches its greatest development toward the eastern limit of this region, here forming considerable and important forests. Other species peculiar to the Coast Forest, the maples, the ash, the oak, the arbutus, and the Alaska cedar, do not extend east of the Cascades. The tide-

land spruce is replaced by an allied species of the interior region. The widely-distributed yellow pine (Pinus ponderosa), barely represented in the northern portions of the immediate Coast Forest, becomes east of the mountains one of the most important and characteristic elements of the forest. The Coast Forest south of the forty-third degree of latitude changes in composition. The tide-land spruce, the hemlock, and the Thuya are gradually replaced by more southern species. The sugar pine (P. Lambertiana) here first appears. The California laurel (Umbellularia) covers with magnificent growth the broad river bottoms. The Libocedrus, several oaks, and the chinquapin here reach the northern limits of their distribution. The change from the northern to the southern forest is marked by the appearance of the Port Orford cedar (Chamæcyparis Lawsoniana), adding variety and value to the forests of the southern Oregon coast. Farther south, near the northern boundary of California, the redwood forests (Sequoia) appear-

The Coast Forest of California will be most conveniently discussed under three subdivisions: the forest of the Coast Range, the forest of the western slope of the Sierra Nevada, which, toward the northern boundary of the state, extends to the coast, covering the mass of mountains which here unite the Sierra Nevada and the Coast Range; and, third, the open forest of the long, narrow valleys lying between the Coast Range and the Sierra Nevada, south of this northern connection. The important feature of the Coast Range, as far south as the thirtyseventh degree of latitude, is the belt of redwood occupying an irregular, interrupted strip of territory facing the ocean, and hardly exceeding thirty miles in width at the points of its greatest development. The heaviest growth of the redwood forest occurs north of the bay of San Francisco, and here, along the slopes and bottom of the narrow cañons of the western slope of the Coast Range, the maximum productive capacity of the forest is reached. No other forest of similar extent equals in the amount of material which they contain the groups of redwood scattered along the coast of northern California. The red fir reaches, in the California Coast Range, a size and value only surpassed in the more northern forests of the coast; the yellow pine is an important tree in the northern portions of this region, and here flourish other species of the genus endemic to this region. The forest of the Coast Range is marked by the presence within its limits of several species of singularly restricted distribution. Cupressus macrocarpa and Pinus insignis are confined to a few isolated groves upon the shores of the bay of Monterey; Abies bracteata occupies three or four cañons high up in the Santa Lucia mountains; it is found nowhere else; and Pinus Torreyana, the most local arborescent species of North America, has been detected only in one or two small groups upon the sand-dunes just north of the bay of San Diego. The characteristic forest of the Coast Range is checked from farther southern development, a little below the thirty-fifth parallel, by insufficient moisture; the scanty forests which clothe the high declivities of the Coast Range farther south belong in composition to the Sierra forests.

The heavy forest which covers the western slopes of the Sierra Nevada, a forest only surpassed in density by the redwood belt of the coast and the fir forest of Puget sound, occupies, in its greatest development, a belt situated between 4,000 and 8,000 feet elevation. This forest belt extends from about the base of mount Shasta at the north to the thirty-fifth parallel; farther south it diminishes in density and disappears upon the southern ridges of the Coast Range just north of the southern boundary of California. Its greatest width occurs in northern California, where to the south of mount Shasta the Sierra system is broken down into a broad mass of low ridges and peaks. The characteristic species of this forest is the great sugar pine (P. Lambertiana), which here reaches its greatest development and value, and gives unsurpassed beauty to this mountain forest. With the sugar pine are associated the red fir, the yellow pine, two noble Abies, the Libocedrus; and, toward the central part of the state, the great Sequoia, appearing first in small isolated groups, and then, farther south, near the headwaters of Kern river, in a narrow belt extending more or less continuously for several miles. This heavy forest of the Sierras, unlike the forest which farther north covers the western flanks of the Cascade Range, is almost destitute of undergrowth and young trees. It shows the influence of a warm climate and unevenly distributed rainfall npon forest growth. The trees, often remote from one another, have attained an enormous size, but they have grown slowly. Above this belt the Sierra forest stretches upward to the limits of tree growth. It is here subalpine and alpine in character and of little economic value. Different pines and firs, the mountain hemlock, and the western juniper are scattered in open stretches of forest upon the high ridges of the Sierras. The forest below the belt of heavy growth gradually becomes more open. Individual trees are smaller, while the number of species increases. The small pines of the upper foot-hills are mingled with oaks in considerable variety. These gradually increase in number. Pines are less frequent and finally disappear.

The forest of the valleys is composed of oaks, the individuals often widely scattered and of great size, but nowhere forming a continuous, compact growth. The Coast Forest of the Pacific region, unsurpassed in density, is composed of a comparatively small number of species, often attaining enormous size. It presents the same general features throughout its entire extent, except as modified by the climatic conditions of the regions which it covers. The species which compose this forest range through nearly 26 degrees of latitude, or northern species, are replaced in the south by closely allied forms; and, as in the Atlantic region, the southern species far exceed in number those peculiar to the north.

The Interior Forest extends from the southern limits of the northern subarctic forest to the plateau of northern Mexico; it occupies the entire region between the eastern limits of the Pacific Coast Forest and the extreme western limits of the Atlantic region. The forests of this entire region, as compared with the forests east and west of it, are stunted and remarkable in their poverty of composition. They are confined to the high slopes

and canons of the numerous mountain ranges composing the interior region, while the valleys are treeless, or, outside of the narrow river bottoms, nearly treeless. The interior forest attains its greatest development and considerable importance upon the western slope of the California Sierras and upon the flanks of the high peaks of the southern Rocky Mountain system, from Colorado, where the timber line reaches an extreme elevation of 13,500 feet, to southern New Mexico and western Arizona. The minimum in North American forest development. outside the absolutely treeless regions, both in the number of species and in the proportion of forest to entire area, is found south of the Blue mountains of Oregon, in the arid region between the Wahsatch mountains and the Sierra Nevada, known as the Great Basin. Here the open, stunted forest is confined to the highest ridges and slopes of the infrequent canons of the low mountain ranges which occupy, with a general north and south trend, this entire region. The individuals which compose this forest are small, although often of immense age, and everywhere show the marks of a severe struggle for existence. Seven arborescent species only have been detected in the forests of the northern and central portions of this region. The mountain mahogany (Cercocarpus), the only broad-leaved species of the region, with the exception of the aspen, which throughout the entire interior region borders, above an elevation of 8,000 feet, all mountain streams, reaches here its greatest development. This tree, with the nut pine (Pinus monophylla), characterizes this region. Stunted junipers are scattered over the lowest slopes of the mountains, or farther south often cross the high valleys, and cover with open growth the mesas, as the lower foot-hills are locally known. An open forest of arborescent yuccas (Yucca brevifolia) upon the high Mojaye plateau is a characteristic and peculiar feature of the flora of this interior region. The red fir and the yellow pine, widely distributed throughout the Pacific region, do not occur upon the mountain ranges of the Great Basin.

The heavy forests of the interior region, found along the western slopes of the California Sierras and upon the Rocky Mountain system, are, for the most part, situated south of the forty-second degree of latitude. The forests of the whole northern interior portion of the continent, outside the region occupied in the northern Rocky mountains by the eastern development of the Coast Forest, feel the influence of insufficient moisture; the number of species of which they are composed is not large; the individuals are often small and stunted, while the forests are open, scattered, without undergrowth, and confined to the cañons and high slopes of the mountains. The most generally distributed species of this northern region, a scrub pine (*Pinus Murrayana*), occupies vast areas, almost to the exclusion of other species, and is gradually taking possession of ground cleared by fire of more valuable trees. South of the fifty-second parallel the red fir (*Pseudotsuga*) and the yellow pine (*Pinus ponderosa*) appear; with them is associated, in the Blue mountains and in some of the ranges of the northern Rocky mountains, the western larch (*Larix oc cidentalis*), the largest and most valuable tree of the Columbian basin.

The forest covering the eastern slope of the Sierra Nevada consists almost exclusively of various species of pine, often of great size and value. The characteristic species of this region are the yellow pine and the closely-allied *Pinus Jeffreyi*, here reaching its greatest development. The red fir is absent from this forest, while the oaks, multiplied in many forms on the western slopes of these mountains, have here no representative.

The forests of the southern Rocky Mountain region, less heavy and less generally distributed than those of the western slope of the Sierras, are, as compared with those of the Great Basin, heavy, dense, and valuable. They owe their existence to the comparatively large precipitation of moisture distributed over this elevated region. The characteristic species of the Colorado mountains is a spruce (Picea Engelmanni); it forms, at between 8,000 and 10,000 feet elevation, extensive and valuable forests of considerable density and great beauty; with it are associated a balsam fir of wide northern distribution, and various alpine and subalpine species of pine; at lower elevations forests of yellow pine and red fir cover the mountain slopes, while the bottoms of the streams are lined with cottonwood, alder, and maple, or with an open growth of the white fir (Abies concolor), a species of the Coast Forest, here reaching the eastern limits of its distribution; the foot-hills above the treeless plain are covered with scant groves of the nut-pine (Pinus edulis), stunted junipers, and a small oak, which in many forms extends through a large area of the southern interior region. A forest similar in general features to that of Colorado, and largely composed of the same species, extends over the high mountains of New Mexico to those of western Texas and western and northwestern Arizona, where a heavier forest of pine covers the elevated region lying along the thirty-firth parallel, culminating in the high forest-clad San Francisco mountains of northern Arizona.

The species of the interior Pacific region mingle along its southern borders with the species peculiar to the plateau of northern Mexico. The Pacific-Mexican Forest, although differing widely in natural features from the Atlantic-Mexican Forest, possesses several species peculiar to the two. The forests of this region are confined to the high mountains and their foot-hills, and to the banks of the rare water-courses. They disappear entirely from the Colorado desert and from the valleys and low mountain ranges of southwestern Arizona. The most important and generally distributed species peculiar to the valleys of this region is the mesquit, the characteristic species of the Atlantic-Mexican region. The suwarrow, however, the great tree cactus, is perhaps the most remarkable species of the region, giving an unusual and striking appearance to the dry mesas of central and southern Arizona. The high mountain ranges, extending across the boundary of the United States, between the one hundred and fifth and the one hundred and eleventh meridians, enjoy a larger and more regularly distributed rainfall than the regions east, and especially west, of these meridians. The forests which cover these southern mountain ranges are often dense and varied. Upon their summits and almost inaccessible upper slopes the firs and pines of

the Pacific region are mingled with pines, a juniper, an arbutus, and various other species peculiar to the Mexican plateau. Extensive forests of a cypress of Mexican origin also characterize this mountain vegetation. The bottoms of the cañons are lined with a dense growth of cottonwood, hackberry, a noble sycamore, an ash, a cherry, and other decidnous trees. The high foot-hills and mesas are covered with open groves of various oaks peculiar to the Mexican-Pacific region, here reaching, within the United States at least, their greatest development.

Such are some of the prominent forest features of North America; a dense forest, largely composed, except at the north, of a great variety of broad-leaved species, and extending from the Atlantic sea-board in one nearly unbroken sheet until checked by insufficient moisture from further western development—the forest of the Atlantic region; a forest of conifers, occupying the ranges of the great Cordilleran mountain system, unsurpassed in density in the humid climate of the coast, open and stunted in the arid interior—the forest of the Pacific region.

A more detailed examination of the distribution of North American arborescent genera and species will serve to illustrate the wealth of the forests of the Atlantic and the comparative poverty of those of the Pacific region. It will show, too, more clearly how widely the forests of these two great regions differ in composition.

DISTRIBUTION OF GENERA.

The forests of North America contain arborescent representatives of 158 genera; 142 genera occur in the Atlantic and 59 genera in the Pacific region. Of the Atlantic genera, 48 are not represented in the United States outside the semi-tropical region of Florida.

The following table illustrates the distribution of these genera; the genera of semi-tropical Florida are designated by a *.

	represented by arbo- rescent species in the Atlantic region.	by arbo- rescent species in		Genera represented by arbo- rescent species in the Atlantic region.	by arbo- rescent species in
Magnolia	. v	I.C.	Eysenhardtia	V	V
Liriodendron	. 1		Dalea		V
Asimina	· V		Robinia	V	V
Anona	. 1		Olneya		V
Capparis	. 1		*Piscidia	V	MATERIAL RECURSION
Canella	. 1		Cladrastis	V	
Clusia	V		Sophora	V	
Gordonia	V		Gymnocladus	V	NEW COLUMN
Fremontia		V	Gleditschia	V	
Tilia	V		Parkinsonia	V	V
Byrsonima	· V	.62.	Cercis	V	
Guaiacum	OV		Prosopis	V	V
Porliera	V		Leucæna	V	
Xanthoxylum	V	7	Acacia	V	V
Ptelia	· V	V	*Lysiloma	V	
Canotia		V	*Pithecolobium	V	
Simaruba	· V	11.00	*Chrysobalanus	V	
Bursera	· V		Prunus	V	V
Amyris	V		Vauquelinia		V
Swietenia	. V		Cercocarpus		V
Ximenia	V		Pyrus	V	V
llex	V		Cratægus	V	V
Cyrilla	· V		Heteromeles		V.
Cliftonia	V		Amelanchier	V	
Euonymus	· V		Hamamelis	V	
Myginda	V		Liquidambar	V	of an artist
Schæfferia	V	***********	Rhizophora	V	505555555
Reynosia	V	40,100,000,000	*Conocarpus.	V	
Condalia	V	V	*Laguncularia	V	
Rhamnus	V	V	*Calyptranthes	V	
Ceanothus	1	V	*Eugenia	V	
Colubrina	V		Cereus .	V	V
Æsculus			Cornus		200
Ungnadia	V	V	Nyssa	V	1
Sapindus	V	V	Sambucus	V	
Hypelate	1	V	Viburnum	V	V
Acer	V		*Exostemma	V	Consideration
	1	V	The state of the s	V	
Negundo	· V	V	Pinckneya* *Genipa	1	
Pistacia.	V	********	*Guettarda	V	********

	Genera represented by arbo- rescent species in the Atlantic region.	Genera represented by arbo- rescent species in the Pacific region.		Genera represented by arbo- rescent species in the Atlantic region.	Genera represented by arbo- rescent species in the Pacific region.
Vaccinium	V		Planera	V	
Andromeda	V		Celtis	V	V
Arbutus	·V	V	*Ficus	V	
Oxydendrum	V		Morus	V	V
Kalmia	V		Maclura	V	********
Rhododendron	V		Platanus	V	V
*Myrsine	V		Juglans	V	V
*Ardisia	V		Carya	V	******
*Jacquinia	V		Myrica	V	V
*Chrysophyllum	V		Quercus	V	V
*Sideroxylon	V		Castanopsis	******	V
*Dipholis	V		Castanea	V	
Bumelia	V	V	Fagus	V	********
*Mimusops	V		Ostrya	V	*********
Diospyros	N	********	Carpinus	V	
Symplocos	V		Betula	V	V
Halesia	V	*********	Alnus	V	V
Fraxinus	V	V	Salix	V	V
Forestiera	V		Populus	V	V
Chionanthus	V		Libocedrus		V
Osmanthus	V		Thuya	V	V
Cordia	1	******	Chamæcyparis	V	V
*Bourreria	//1		Cupressus		V
*Ehretia	V	*******	Juniperus	V	1
Catalpa	V		Taxodium	V	
Chilopsis	V	V	Sequoia		V
*Crescentia	V		Taxus	V	1
*Citharexylum	V		Torreya	1	V
*Avicennia	V		Pinus	1	· V
*Pisonia	V		Picea	V	V
*Coccoloba	V		Tsuga	V	V
Persea	V		Pseudotsuga		V
"Nectandra	V		Abies	V	V
Sassafras	V		Larix	1	V
Umbellularia		V	Sabal	V	
*Drypetes) V	********	Washingtonia	*********	V
*Sebastiania	V		*Thrinax	V	
*Hippomane	V		*Oreodoxa	V	
Ulmus	1		Yueca	V	V

Arborescent species of 43 genera occur within the limits of the two regions. They are:

Ptelia.	Robinia.	Arbutus.	Quercus.	Taxus.
·Condalia.	Parkinsonia.	Bumelia.	Betula.	Torreya.
Rhamnus.	Prosopis.	Fraxinus.	Alnus.	Pinus.
Æsculus.	Acacia.	Chilopsis.	Salix.	Picea.
Ungnadia.	Prunus.	Celtis.	Populus.	Tsuga.
Sapindus.	Pyrus.	Morus.	Thuya.	Abies.
Acer.	Cratægus.	Platanus.	Chamæcyparis.	Larix.
Negundo.	Cornus.	Juglans.	Juniperus.	Yucca.
Evsenhardtia	Sambuens	Myrica	Control & Control of C	

The following genera, 44 in number, of the Atlantic region, exclusive of those of semi-tropical Florida, are not represented in the Pacific forest:

Magnolia.	Cliftonia.	Rhizophora.	Forestiera.	Maclura.
Liriodendron.	Pistacia.	Nyssa.	Chionanthus.	Carya.
Asimina.	Cladrastis.	Viburnum.	Osmanthus.	Castanea.
Gordonia.	Sophora.	Pinckneya.	Cordia.	Fagus.
Tilia.	Gymnocladus.	Andromeda.	Catalpa.	Ostrya.
Porliera.	Gleditschia.	Oxydendrum.	Persea.	Carpinus.
Xanthoxylum.	Leucæna.	Diospyros.	Sassafras.	Taxodium.
Ilex.	Hamamelis.	Symplocos.	Ulmus.	Sabal.
Cyrilla.	Liquidambar.	Halesia.	Planera.	

The following genera of the Atlantic region, 9 in number, are represented in the Pacific flora by one or more frutescent, but by no arborescent, species:

Euonymus. Rhus. Cercis. Amelanchier. Viburnum. Vaccinum. Kalmia. Rhododendron. Forestiera.

Ptelia, Condalia, Sapindus, Robinia, Bumelia, Celtis, Morus, and Juglans, genera reaching their greatest development in North America in the Atlantic region, extend with a single arborescent representative into the Pacific region. Rhamnus, Æsculus, Acer, Negundo, Prunus, Pyrus, Cratægus, Cornus, Sambuous, Fraxinus, Platanus, Myrica, Quercus, Betula, Alnus, Salix, Populus, Thuya, Chamæcyparis, Juniperus, Taxus, Torreya, Pinus, Picea, Tsuga, Abies, and Larix, characteristic North American genera, are widely represented in the two regions.

Ungnadia, Eysenhardtia, Parkinsonia, Prosopis, Acacia, Chilopsis, and Yucca, genera of the Mexican flora, are common to the two regions.

Arbutus, a genus of the Pacific region, just reaches, with a doubtful species, the Atlantic region through western Texas.

The following genera of the Pacific region, 13 in number, have no representatives in the Atlantic region:

Fremontia. Canotia. Olneya. Vauquelinia. Cercocarpus. Heteromeles. Umbellularia.

Castanopsis. Libocedrus. Cupressus. Sequoia. Pseudotsuga. Washingtonia.

The following genera of the Pacific, 3 in number, are represented in the Atlantic region by frutescent species:

Ceanothus.

Dalea.

Cereus.

The Atlantic forest, exclusive of semi-tropical Florida, contains 45 genera entirely unrepresented in the Pacific region and 7 genera without Pacific arborescent representatives. The Pacific forest contains 13 genera unrepresented in the Atlantic region and 3 genera without Atlantic arborescent representatives.

The following genera of the Mexican region, 14 in number, are not elsewhere represented in North America. Genera with arborescent representatives in both the Atlantic and Pacific-Mexican regions are designated by a star (*):

Porliera. Canotia. *Ungnadia. Pistacia.
*Eysenhardtia.
Dalea.

Olneya.
*Parkinsonia.
Leucæna.

Acacia. Vauquelinia. Cereus. *Chilopsis.
Washingtonia.

Porliera and Leucana belong to the Atlantic; Canotia, Dalea, Olneya, Vauquelinia, Cercus, and Washingtonia to the Pacific region.

DISTRIBUTION OF SPECIES.

In the forests of North America 412 arborescent species have been detected; of these, 292 species belong to the Atlantic region, and 153 occur within the limits of the Pacific region. Species common to the two regions are rare; they are principally confined to the subarctic Northern Forest and to the narrow belt along the southern boundary of the United States.

The following species, 10 in number, cross the continent:

Prosopis juliflora. Pyrus sambucifolia. Sambucus Mexicana. Betula papyrifera. Salix longifolia. Populus tremuloides. Populus balsamifera. Juniperus Virginiana. Picea alba. Yucca baccata.

Prosopis juliflora, Sambucus Mexicana, and Yucca baccata belong to the Mexican flora of the south; Salix longifolia also belongs here, although extending northward into the Atlantic and through the Pacific Coast region of the United States. Populus balsamifera, Betula papyrifera, and Picea alba belong to the Northern Forest. Pyrus sambucifolia, Populus tremuloides and Juniperus Virginiana are widely distributed through the central portions of the Atlantic and Pacific regions; they are the only really continental arborescent species.

The following species of the Atlantic region, 15 in number, extend from the Atlantic into the Pacific region:

Ptelia trifoliata.
Condalia obovata.
Sapindus marginatus.

Negundo aceroides. Parkinsonia aculeata. Prunus Americana. Prunus Pennsylvanica. Cratægus tomentosa. Fraxinus viridis. Celtis occidentalis. Morus microphylla. Quercus Emoryi. Alnus incana. Salix nigra.

Ptelia trifoliata, a widely distributed species of the Atlantic region, extends through western Texas into the extreme southeastern portion of the Pacific region. Condalia obovata, Ungnadia speciosa, Parkinsonia aculeata, Morus microphylla, and Quercus Emoryi, of the Atlantic-Mexican forest, extend into the Pacific-Mexican region. Sapindus marginatus, of the southern Atlantic region, extends through western Texas to the Pacific-Mexican region. Prunus Americana, Prunus Pennsylvanica, and Alnus incana, widely distributed through the northern portions of the Atlantic region, just reach the eastern limits of the central Pacific region.

Negundo aceroides, Cratagus tomentosa, Fraxinus viridis, and Celtis occidentalis are widely distributed through the interior Pacific region, although nowhere reaching the coast.

The following species of the Pacific region, 8 in number, extend through the Mexican into the Atlantic region:

Eysenhardtia orthocarpa. Prosopis pubescens. Acacia Greggii. Fraxinus pistaciæfolia. Chilopsis saligna.
Juglans rupestris.

Juniperus occidentalis. Juniperus pachyphlæa.

Juglans rupestris and Juniperus occidentalis reach their greatest development in the Pacific Coast region, and extend through the Pacific-Mexican region into western Texas; no other species are common to the Pacific Coast forest and the Atlantic-Mexican region. The 6 remaining Pacific-Atlantic species belong to the Pacific-Mexican region, just reaching western Texas.

The following species of the Southern Pacific region extends into the Atlantic region:

Salix amygdaloides.

The following species of the Pacific forest, 12 in number, endemic to the interior arid region, do not extend beyond its limits:

Acer grandidentatum.
Robinia Neo-Mexicana.
Cercocarpus ledifolius.

Cratægus rivularis. Fraxinus anomala. Quercus undulata.

Populus angustifolia. Pinus flexilis. Pinus edulis. Pinus monophylla. Picea pungens. Yucca brevifolia.

A detailed examination of the distribution of the arborescent species composing the North American forests shows that—

Magnolia is represented by seven Atlantic species, with fhe center of its distribution in the southern Alleghany region.

Liriodendron is represented by a single species, widely-distributed through the eastern and central portions of the Atlantic region.

Asimina is represented by a single widely-distributed arborescent species and by three frutescent species of the Atlantic region.

Anona, Capparis, Canella, and Clusia are represented each by a single semi-tropical species.

Gordonia is represented by two species of the southern Atlantic region, one of wide distribution, the other rare and local.

Fremontia, a genus endemic to the Pacific region, is represented by a single species of the southern Pacific Coast region.

Tilia is represented by two Atlantic species, with its center of distribution in the southern Alleghany region.

Byrsonima is represented by a single semi-tropical species.

Guaiacum is represented by a single semi-tropical species.

Porliera is represented by a single species of the Atlantic-Mexican region.

Xanthoxylum is represented by two species of the Atlantic region, by a semi-tropical species, and by a second semi-tropical species which reaches the Atlantic-Mexican region.

Ptelia is represented by a single arborescent species of wide distribution in the Atlantic, reaching also the Pacific region, where a frutescent species occurs, and by a second frutescent species of the south Atlantic region.

Canotia, a genus endemic to the Pacific-Mexican region, is represented by a single species.

Simaruba, Amyris, Swietenia, Ximenia, are each represented by a single semi-tropical species.

Bursera is represented by a single semi-tropical species and by a second frutescent species of the Pacific-Mexican region.

Ilex, an Atlantic genus, is represented by four arborescent and several frutescent species, with its center of distribution in the southern Atlantic region.

Cyrilla and Cliftonia are each represented by a single species of the southern Atlantic region.

Euonymus is represented by a widely-distributed arborescent species in the Atlantic, and by a frutescent species in both the Atlantic and the Pacific regions.

Myginda, Schæfferia, and Reynosia are each represented by a single semi-tropical species.

Condalia is represented by one semi-tropical and by one species of the Atlantic-Mexican reaching the Pacific-Mexican region.

Rhamnus is represented by one arborescent and by one frutescent species in the Atlantic, by two arborescent and one frutescent species in the Pacific region, and by one frutescent species common to the two regions.

Ceanothus is represented by a single arborescent species in the Pacific Coast region and by several frutescent species widely distributed through the Atlantic and the Pacific regions.

Colubrina is represented by a single semi-tropical species.

Æsculus is represented by two arborescent and by three frutescent species in the Atlantic, and by an arborescent species in the Pacific region.

Ungnadia, an endemic genus of the Atlantic-Mexican region, and just reaching the Pacific-Mexican region, is represented by a single species.

Sapindus is represented by one species widely distributed through the southern Atlantic, and reaching the Pacific region, and by one semi-tropical species.

Acer is represented by five Atlantic and four Pacific species.

Negundo is represented by one species widely distributed through the Atlantic and the Pacific regions and by a second species in the Pacific region.

Rhus is represented by five arborescent species in the Atlantic and by several frutescent species in both the Atlantic and the Pacific regions.

Pistacia is represented by a single species in the Atlantic-Mexican region.

Eysenhardtia is represented by a single arborescent species in the Pacific-Mexican, extending into the Atlantic-Mexican region, where a second frutescent species occurs.

Dalea is represented by a single arborescent species in the Pacific-Mexican and by numerous frutescent and herbaceous species in the Atlantic and the Pacific regions.

Robinia, with its center of distribution in the southern Alleghany region, is represented by two arborescent and one frutescent species in the Atlantic and by one arborescent species in the Pacific region.

Olneya, an endemic genus of the Pacific-Mexican region, is there represented by a single species.

Piscidia is represented by a single semi-tropical species.

Ciadrastis is represented by a single local species in the southern Atlantic region.

Sophora is represented by a species in the southern Atlantic and by a second species in the Atlantic-Mexican region, and by four frutescent or suffrutescent species.

Gymnocladus is represented by a single species in the central Atlantic region.

Gleditschia is represented by two widely-distributed species in the Atlantic region.

Parkinsonia is represented by an arborescent species common to the Atlantic- and the Pacific-Mexican regions, by two arborescent and one frutescent species in the Pacific-Mexican, and by a frutescent species in the Atlantic-Mexican region.

Cercis is represented by a widely-distributed species in the Atlantic, by a second species in the Atlantic-Mexican, and a frutescent species of the California Coast region.

Prosopis is represented by two arborescent species common to the Atlantic- and the Pacific-Mexican regions, and by two frutescent species.

Leucana is represented by two species in the Atlantic-Mexican region.

Acacia is represented by two arborescent species in the Atlantic-Mexican, by one arborescent species of the Pacific-Mexican extending into the Atlantic-Mexican region, and by several frutescent species widely distributed through the two regions.

Lysiloma is represented by a single semi-tropical species.

Pithecolobium is represented by a single polymorphous arborescent species of semi-tropical Florida, and by a shrubby species of the Mexican Boundary region.

Chrysobalanus is represented by one arborescent and one frutescent semi-tropical species.

Prunus is represented by seven arborescent species in the Atlantic region; of these, one is semi-tropical and two extend into the Pacific region. This genus is represented in the Pacific region by four species, of which one belongs to the Mexican region, and by several frutescent species.

Vauquelinia, an endemic genus of the Pacific-Mexican region, is there represented by a single species.

Cercocarpus is represented by two widely-distributed species in the Pacific region.

Pyrus is represented by one species common to both Atlantic and Pacific, by three arborescent and one frutescent species in the Atlantic, and by one arborescent species in the Pacific region.

Cratægus is represented by twelve arborescent and frutescent species in the Atlantic, of which one extends into the Pacific region, and by two species in the Pacific region.

Heteromeles is represented by a single species in the Pacific Coast region.

Amelanchier is represented by one arborescent species in the Atlantic and by one frutescent species in the Pacific region.

Hamamelis and Liquidambar are each represented by one widely-distributed species in the Atlantic region.

Rhizophora is represented by a single species in the southern Atlantic region.

Conocarpus, Laguncularia, and Calyptranthes are each represented by a single semi-tropical species.

Eugenia is represented by five semi-tropical species.

Cereus is represented by a single arborescent species in the Pacific and by several frutescent species in the Atlantic and Pacific regions.

Cornus is represented by two arborescent species in the Atlantic, by a single arborescent species in the Pacific region, and by several frutescent and herbaceous species in the two regions.

Nyssa is represented by three species in the Atlantic region.

Sambucus is represented by one arborescent species of wide distribution in the Pacific, by one species in the Pacific-Mexican extending into the Atlantic-Mexican, by a frutescent species in the Atlantic, by a second frutescent species in the Pacific, and by a frutescent species common to the Atlantic and Pacific regions.

Viburnum is represented by two arborescent species in the Atlantic and by several frutescent species in the Atlantic and the Pacific regions.

Exostemma is represented by a single semi-tropical species.

Pinckneya, an endemic genus of the southern Atlantic region, is there represented by a single species.

Genipa is represented by a single semi-tropical species.

Guettarda is represented by one arborescent and by one frutescent semi-tropical species.

Vaccinium is represented by one arborescent species in the Atlantic and by several frutescent species in the Atlantic and the Pacific regions.

Andromeda is represented by an arborescent and several frutescent species in the Atlantic region.

Arbutus is represented by one species in the Pacific Coast, by a second species in the Pacific Mexican, and by one species in the Atlantic-Mexican region.

Oxydendrum, an endemic genus of the Atlantic region, is there represented by a single species.

Kalmia is represented by one arborescent species and by three frutescent species in the Atlantic region, of which one extends to the Pacific region.

Rhododendron is represented by one arborescent and by several frutescent species in the Atlantic and by several frutescent species in the Pacific region.

Myrsine, Ardisia, Jacquinia, Chrysophyllum, Sideroxylon, and Dipholis are each represented by a single semi-tropical species.

Bumelia is represented by four species in the Atlantic and by one species in the Pacific-Mexican region.

Mimusops is represented by one semi-tropical species.

Diospyros is represented by one species in the Atlantic and by one in the Atlantic-Mexican region.

Symplocos is represented by one species in the southern Atlantic region.

Halesia is represented by two arborescent and by one frutescent species in the southern Atlantic region.

Fraxinus, with its center of distribution in the southern Atlantic region, is represented by seven species in the Atlantic, of which one extends into the Pacific region, and one belongs to the Mexican region, and by three arborescent and one frutescent species in the Pacific, of which one belongs to the Mexican region.

Forestiera is represented by one arborescent and seven frutescent species in the Atlantic region, of which one reaches the Mexican-Pacific region.

Chionanthus and Osmanthus are each represented by a single species in the southern Atlantic region.

Cordia is represented by one arborescent and by one frutescent semi-tropical species and by one arborescent and one frutescent species in the Atlantic-Mexican region.

Bourreria and Ehretia are each represented by a single semi-tropical species.

Catalpa is represented by two species in the southern Atlantic region.

Chilopsis is represented by a single species in the Pacific-Mexican region, extending into the Atlantic-Mexican region.

Crescentia, Citharexylum, and Avicennia are each represented by a single semi-tropical species.

Pisonia is represented by one arborescent and by two frutescent semi-tropical species.

Coccoloba is represented by two semi-tropical species.

Persea is represented by one species in the southern Atlantic region.

Nectandra is represented by one semi-tropical species.

Sassafras is represented by one widely-distributed species in the Atlantic region.

Umbellularia is represented by a single species in the Pacific Coast region.

Drypetes, Sebastiania, and Hippomane are each represented by a single semi-tropical species.

Ulmus, with its center of distribution in the Mississippi basin, is represented in the Atlantic region by five species.

Planera is represented by a single species in the southern Atlantic region.

Celtis is represented by a single polymorphous species of wide distribution in the Atlantic region, extending into the Pacific region, and by a frutescent species common to the Atlantic-Mexican and the Pacific-Mexican regions. Ficus is represented by three semi-tropical species.

Morus is represented by one widely-distributed species in the Atlantic region, and by one species in the Atlantic-Mexican, extending into the Pacific-Mexican region.

Maclura is represented by a single local species in the southern Atlantic region.

Platanus is represented by one widely-distributed species in the Atlantic region, by a species in the Pacific coast, and by a species in the Pacific-Mexican region.

Juglans is represented by two widely-distributed species in the Atlantic region and by a species in the Pacific coast, extending through the Pacific-Mexican into the Atlantic-Mexican region.

Carya, an endemic genus of the Atlantic region, with its center of distribution west of the Mississippi river, is represented by seven species.

Myrica is represented by one arborescent and two frutescent species in the Atlantic region and by one arborescent species in the Pacific Coast region.

Quercus, with its center of most important distribution in the basin of the lower Ohio river, is represented in the Atlantic region by twenty-four arborescent species, of which one, belonging to the Mexican region, extends into the Pacific-Mexican region; and in the Pacific region by twelve arborescent species, of which one belongs to the interior and four to the Mexican region, and by two frutescent species.

Castanopsis is represented by a single species in the Pacific Coast region.

Castanea is represented by two species in the Atlantic region.

Fagus, Ostrya, and Carpinus are each represented by a single widely-distributed species in the Atlantic region.

Betula, with its center of distribution in the northern Atlantic region, is represented by one arborescent and by one frutescent species common to the Atlantic and the Pacific regions, by four arborescent and one frutescent species in the Atlantic region, and by one arborescent species in the Pacific region.

Alnus is represented by three arborescent species in the Atlantic, of which one extends to the Pacific region, by three arborescent species in the Pacific region, and by two frutescent species common to the Atlantic and the

Pacific regions.

Salix is represented in the Atlantic region by five arborescent species, of which three are found in the Pacific region, and by many frutescent species. This genus is represented in the Pacific region by ten arborescent and by many frutescent species.

Populus is represented by two species common to the Atlantic and the Pacific regions, by three species in the

Atlantic region, and by three species in the Pacific region.

Libocedrus is represented by a single species in the Pacific Coast region.

Thuya is represented by one species in the Atlantic and by one species in the Pacific region.

Chamæcyparis is represented by one species in the Atlantic and by two species in the Pacific Coast region.

Cupressus is represented by four species in the Pacific region, of which three occur in the coast and one in the Mexican region.

Juniperus is represented by one arborescent species in the Atlantic region, by three arborescent species in the Pacific, of which one belongs to the Pacific-Mexican and one extends to the Atlantic-Mexican region, and by two frutescent species common to both regions.

Taxodium is represented by a single species in the southern Atlantic region.

Sequoia, an endemic genus of the Pacific Coast region, is there represented by two species.

Taxus is represented by an exceedingly local arborescent species in the southern Atlantic region, by a frutescent species in the northern Atlantic region, and by an arborescent species in the Pacific Coast region.

Torreya is represented by a single exceedingly local arborescent species in the southern Atlantic region and by

a single species in the Pacific Coast region.

Pinus, with its center of distribution in the southern Pacific Coast region, is represented by thirteen species in the Atlantic and by twenty-two species in the Pacific region, of which three belong to the interior and four to the Mexican region.

Picea is represented by one species common to the Atlantic and the Pacific regions, by one species in the

Atlantic, and by three species in the Pacific region, of which one belongs to the interior region.

Tsuga is represented by two species in the Atlantic and by two species in the Pacific region.

Pseudotsuga, an endemic genus of the Pacific region, is there represented by a single widely-distributed species.

Abies is represented by one widely-distributed and by one exceedingly local species in the Atlantic region and by seven species in the Pacific region, of which one is exceedingly local.

Larix is represented by one species in the Atlantic and by two species in the Pacific region.

Sabal is represented by a single species in the southern Atlantic region.

Washingtonia is represented by a single species in the Pacific Mexican region.

Thrinax is represented by two semi-tropical species, and Oreodoxa by one.

Yucca is represented by one arborescent and one frutescent species common to the Atlantic and the Pacific regions, by one arborescent and by two frutescent species in the Atlantic, and by two arborescent and by one frutescent species in the Pacific region.

A CATALOGUE

OF THE

FOREST TREES OF NORTH AMERICA, EXCLUSIVE OF MEXICO,

WITH

REMARKS UPON THEIR SYNONYMY, BIBLIOGRAPHICAL HISTORY, DISTRIBUTION, ECONOMIC VALUE, AND USES.

2 FOR

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FOREST TREES OF NORTH AMERICA.

Species which grow from the ground with a single stem, either wholly or over a large portion of the area of their distribution, are admitted as trees into the following catalogue, without reference to the height or size they may attain.

The line which divides trees from shrubs is entirely arbitrary, and is often unsatisfactory in application. A separation of this nature, however, based upon habit rather than upon size, is perhaps less objectionable, all things considered, than any other, and serves at least to keep this catalogue within reasonable limits.

The word "compact", used in the description of various woods mentioned in the catalogue, indicates that they show no tendency to check or open in drying, and does not refer to their structure.

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CATALOGUE OF FOREST TREES.

MAGNOLIACEÆ.

1.-Magnolia grandiflora, Linnæus,

Spec. 2 ed. 755.—Marshall, Arbustum, 84.—Am. Gewach. t. 185, 186.—Walter, Fl. Caroliniana, 158.—Gærtner, Fruct. i, 343, t. 70.—B. S. Barton, Coll. i, 13; ii, 20.—Aiton, Hort. Kew. ii, 251; 2 ed. iii, 329.—Bartram, Travels, 2 ed. 82.—Lamarck, Dict. iii, 672; Ill. iii, 35, t. 490.—Mænch, Meth. 274.—Willdenow, Spec. ii, 1255; Enum. i, 579.—Michaux, Fl. Bor.-Am. i, 327.—Nouveau Duhamel, ii, 219, t. 65.—Desfontaines, Hist. Arb. ii, 5.—Robin, Voyages, iii, 265.—Andrews, Bot. Rep. viii, t. 518.—Titford, Hort. Bot. Am. 76.—Michaux f. Hist. Arb. Am. iii, 71, t. 1; N. American Sylva, 3 ed. ii, 8, t. 51.—Rursh, Fl. Am. Sept. ii, 380.—Nuttall, Genera, ii, 18; Sylva, i, 81; 2 ed. i, 96.—De Candolle, Syst. i, 450; Prodr. i, 80.—Hayne, Dend. Fl. 116.—Elliott, Sk. ii, 36.—Loddiges, Bot. Cab. t. 814.—Sprengel, Syst. ii, 642.—Audubon, Birds, t. 5, 32.—Rafinesque, Med. Bot. ii, 32.—Don, Miller's Dict. i, 82.—Eaton, Manual, 6 ed. 218.—Croom in Am. Jour. Sci. 1 ser. xxvi, 314.—Loudon, Arboretum, i, 261 & t.—Hooker, Jour. Bot. i, 188.—Eaton & Wright, Bot. 312.—Torrey & Gray, Fl. N. America, i, 42.—Spach, Hist. Veg. vii, 470.—Dietrich, Syn. iii, 308.—Sering e, Fl. Jard. iii, 225.—Darby, Bot. S. States, 210.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 13.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 66.—Wood, Cl. Book, 214; Bot. & Fl. 24.—Porcher, Resources S. Forests, 38.—Baillon, Hist. Pl. i, 133, f. 165–169.—Koch, Dendrologie, i, 367.—Young, Bot. Texas, 148.—Vasey, Cat. Forest Trees, 6.

M. Virginiana, var. β. fætida, Linnæus, Spec. 1 ed. 536, in part.

Mt grandiflora, var. elliptica and obovata, Pursh, Fl. Am. Sept. ii, 380.

M. grandiflora, var. lanceolata, Pursh, Fl. Am. Sept. ii, 380.—Bot. Mag. t. 1952.—Eaton, Manual, 6 ed. 218.

BIG LAUREL. BULL BAY.

Cape Fear river, North Carolina, south near the coast to Mosquito inlet, and Tampa bay, Florida; basin of the Mississippi river south of latitude 32° 30′, extending westward to southwestern Arkansas, and along the Texas coast to the valley of the Brazos river.

One of the most magnificent trees of the Atlantic forest, evergreen, 18 to 27 meters in height, with a trunk 0.60 to 1.20 meter in diameter; reaching its greatest development on the "bluff" formations along the eastern bank of the Missessippi river from Vicksburg to Natchez, and of western Louisiana.

Wood heavy, hard, not strong, close-grained, compact, easily worked, satiny; medullary rays very numerous, thin; color, creamy white or often light brown, the heavier sap-wood nearly white; specific gravity, 0.6360; ash, 0.53; little used except as fuel; suitable for interior finish, fine cabinet work, etc.

2.- Magnolia glauca, Linnæus,

Spec. 2 ed. 755.—Kalm, Travels, English ed. i, 204.—Schoepf, Mat. Med. Am. 91.—Marshall, Arbustum, 83.—Wangenheim, Amer. 60, t. 19, f. 46.—Walter, Fl. Caroliniana, 158.—B. S. Barton, Coll. i, 13; ii, 20.—Lamarck, Dict. iii, 674.—Aiton, Hort, Kew. ii, 251; 2 ed. iii, 329.—Mench, Meth. 274.—Willdenow, Spec. ii, 1256; Enum. i, 579.—Schkuhr, Handb. ii, 1441, t. 148.—Michaux, Fl. Bor.-Am. i, 327.—Nouveau Duhamel, ii, 223, t. 66.—Desfontaines, Hist. Arb. ii, 5.—Titford, Hort. Bot. Am. 76.—Bonpland, Pl. Malm. 103, t. 42.—Michaux f. Hist. Arb. Am. iii, 77, t. 2; N. American Sylva, 3 ed. ii, 12, t. 52.—Pursh, Fl. Am. Sept. ii, 381.—Eaton, Manual, 6 ed. 218.—Bigelow, Med. Bot. ii, 67, t. 27; Fl. Boston. 3 ed. 244.—Nuttall, Genera, ii, 18.—Barton, Prodr. Fl. Philadelph. 59; Med. Bot. i, 77, t. 7; Compend. Fl. Philadelph. ii, 17.—Loddiges, Bot. Cab. t. 215.—De Candolle, Syst. i, 452; Prodr. i, 80.—Hayne, Dend. Fl. 116.—Elliott, Sk. ii, 37.—Bot. Mag. t. 2164.—Sprengel, Syst. 642.—Torrey, Compend. Fl. N. States, 221; Fl. N. York, i, 17, t. 5.— Audubon, Birds, t. 118.—Rafinesque, Med. Bot. ii, 34.—Don, Miller's Dict. i, 82.—Eaton, Manual, 6 ed. 218.—Hooker, Jour. Bot. i, 188.—Beck, Bot. 15.—Sertum Botanicum, v & t.—Reichenbach, Fl. Exot. v, 37, t. 342.—Lindley, Fl. Med. 23.—Eaton & Wright, Bot. 312.—Torrey & Gray, Fl. N. America, i, 42.—Spach, Hist. Veg. vii, 473.—Dietrich, Syn. iii, 308.—Griffith, Med. Bot. 96, f. 56.— Loudon, Arboretum, i, 267 & t.—Emerson, Trees Massachusetts, 527; 2 ed. ii, 603 & t.—Seringe, Fl. Jard. iii, 226.—Gray, Genera, i, 61, t. 23; Manual N. States, 5 ed. 49.—Schnizlein, Icon. t. 176.—Darlington, Fl. Cestrica, 3 ed. 8.—Darby, Bot. S. States, 211.— Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 13.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 66.— Lesquereux in Owen's 2d Rep. Arkansas, 374.—Wood, Cl. Book, 214; Bot. & Fl. 24.—Porcher, Resources S. Forests, 36.—Koch, Dendrologie, i, 369.—Young, Bot. Texas, 148.—Vasey, Cat. Forest Trees, 6.

- M. Virginiana, var. a. glauca, Linnæus, Spec. 1 ed. 535.
- M. fragrans, Salisbury, Prodr. 379.—Rafinesque, Fl. Ludoviciana, 91; Med. Bot. ii, 32.
- M. longifolia, Sweet, Hort. Brit. 11.—Don, Miller's Dict. i, 83.—Dietrich, Syn. iii, 308.
- M. glauca, var. latifolia, Aiton, Hort. Kew. 2 ed. iii, 350.—Pursh, Fl. Am. Sept. ii, 381.—Eaton, Manual, 6 ed. 218.
- M. glauca, var. longifolia, Aiton, Hort. Kew. 2 ed. iii, 330.—Pursh, Fl. Am. Sept. ii, 381.—Rafinesque, Fl. Ludoviciana, 91.—Hayne, Dend. Fl. 116.—Eaton, Manual, 6 ed. 218.

SWEET BAY. WHITE BAY. BEAVER TREE. WHITE LAUREL. SWAMP LAUREL.

Cape Ann, Massachusetts; New Jersey southward, generally near the coast, to bay Biscayne and Tampa bay, Florida; basin of the Mississippi river south of latitude 35°, extending west to southwestern Arkansas and the valley of the Trinity river, Texas.

A tree 15 to 22 meters in height, with a trunk sometimes 1.20 meter in diameter, or toward its northern limits reduced to a low shrub; swamps or low wet woods, reaching its greatest development on the rich hummocks of the interior of the Florida peninsula and along the low sandy banks of pine-barren streams of the Gulf states.

Wood light, soft, not strong, close-grained, compact; medullary rays very numerous, thin; color, light brown tinged with red, the sap-wood nearly white; specific gravity, 0.5035; ash, 0.47; in the Gulf states sometimes used in the manufacture of broom handles and small woodenware.

The dried bark, especially of the root, of this species and of *M. acuminata* and *M. Umbrella* is included in the American *Materia Medica*, furnishing an aromatic tonic and stimulant used in intermittent and remittent fevers; a tincture made by macerating the fresh fruit or bark in brandy is a popular remedy for rheumatism (*U. S. Dispensatory*, 14 ed. 567.—*Nat. Dispensatory*, 2 ed. 891).

3.-Magnolia acuminata, Linnæus.

Spec. 2. ed. 756.—Marshall, Arbustum, 83.—Walter, Fl. Caroliniana, 159.—B. S. Barton, Coll. i, 13.—Aiton, Hort. Kew. ii, 251; 2 ed. iii, 331.—Lamarck, Dict. iii, 674.—Willdenow, Spec. ii, 1257; Ennm. i, 579.—Michaux, Fl. Bor.-Am.·i, 329.—Nouveau Duhamel, ii, 222.—Desfontaines, Hist. Arb. ii, 5.—Michaux f. Hist. Arb. Am. iii, 82, t. 3; N. American Sylva, 3 ed. ii, 15, t. 53.—Pursh, Fl. Am. Sept. ii, 381.—De Candolle, Syst. i, 453; Prodr. i, 89.—Loddiges, Bot. Cab. t. 418.—Nuttall, Genera, ii, 18.—Bot. Mag. t. 2427.—Hayne, Dend. Fl. 117.—Elliott, Sk. ii, 37.—Rafinesque, Med. Bot. ii, 32.—Guimpel, Otto & Hayne, Abb. Holz. 18, t. 17.—Sprengel, Syst. ii, 642.—Torrey, Compend. Fl. N. States, 221; Fl. N. York, i, 28.—Rafinesque, Med. Bot. ii, 34.—Beck, Bot. 15.—Sertum Botanicum, v. & t.—Don, Miller's Dict. i, 83.—Reichenbach, Fl. Exot. t. 251.—Eaton, Manual, 6 ed. 218.—Loudon, Arboretum, i, 273 & t.—Eaton & Wright, Bot. 312.—Torrey & Gray, Fl. N. America, i, 43.—Dietrich, Syn. iii, 308.—Griffith, Med. Bot. 98.—Darlington, Fl. Cestrica, 3. ed. 9.—Darby, Bot. S. States, 211.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 14.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 67.—Wood, Cl. Book, 214; Bot. & Fl. 24.—Porcher, Resources S. Forests, 38.—Baillon, Hist. Pl. i, 140.—Gray, Manual N. States, 5. ed. 49.—Koch, Dendrologie, i, 371.—Young, Bot. Texas, 149.—Vasey, Cat. Forest Trees, 6.—Nat. Dispensatory, 2 ed. 891.—Ridgway in Proc. U. S. Nat. Mus. 1882, 58.

- M. Virginiana, var. e. Linnæus, Spec. 1 ed. 536.
- M. DeCandollii, Savi, Bibl. Ital. i, 224 & t.

Tulipastrum Americanum, Spach, Hist. Veg. vii, 483.

CUCUMBER TREE. MOUNTAIN MAGNOLIA.

Western New York to southern Illinois, southward along the Alleghany mountains, and scattered through eastern and middle Kentucky and Tennessee, usually on Carboniferous deposits, to southern Alabama (Stockton, *Mohr*) and northeastern Mississippi; Arkansas, Crowley's ridge, and in the southern and southwestern part of the state (Texarkana, *Harvey*, and in Polk, Howard, Cross, and Pike counties).

A large tree, 20 to 30 meters in height, with a trunk 0.60 to 1.20 meter in diameter; rich woods, reaching its greatest development on the slopes of the southern Alleghany mountains.

Wood durable, light, soft, not strong, close-grained, compact, satiny; medullary rays numerous, thin; color, yellow-brown, the sap-wood lighter, often nearly white; specific gravity, 0.4690; ash, 0.29; used for pump-logs, water-troughs, flooring, cabinet-making, etc.

4.- Magnolia cordata, Michaux,

Fl. Bor.-Am. i, 328.—Aiton, Hort. Kew. 2 ed. iii, 331.—Poiret, Suppl. iii, 547.—Michaux f. Hist. Arb. Am. iii, 87, t. 4; N. American Sylva, 3 ed. ii, 18, t. 54.—Pursh, Fl. Am. Sept. ii, 382.—Lindley, Bot. Reg. iv, t. 325.—Nuttall, Genera, ii, 18.—De Candolle, Syst. i, 455; Prodr. i, 80.—Hayne, Dend. Fl. 118.—Elliott, Sk. ii, 38.—Loddiges, Bot. Cab. t. 474.—Sprengel, Syst. ii, 642.—Rafinesque, Med. Bot. ii, 32.—Eaton, Manual, 6 ed. 218.—Sertum Botanicum, v & t.—Don, Miller's Dict. i, 83.—Reichenbach, Fl. Exot. t. 250.—Loudon, Arboretum, i, 275 & t.—Eaton & Wright, Bot. 312.—Torrey & Gray, Fl. N. America, i, 43.—Dietrich, Syn. iii, 308.—Darby, Bot. S. States, 211.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 14.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 68.—Wood, Cl. Book, 214; Bot. & Fl. 25.—Koch, Dendrologie, i, 371.—Vasey, Cat. Forest Trees, 6.

Tulipastrum Americanum, var. subcordatum, Spach, Hist. Veg. vii, 483.

CUCUMBER TREE.

Southern Alleghany Mountain region, near Augusta, Georgia (Michaux, Elliott), head of Sipsey creek, "valley of Davidson creek", Winston county, Alabama (Mohr).

A tree 22 to 24 meters in height, with a trunk sometimes 0.60 meter in diameter; low, rich woods; very rare

and local.

Wood light, soft, not strong, close-grained, compact; medullary rays very numerous, thin; color, light brown streaked with yellow, the sap-wood light yellow; specific gravity, 0.4139; ash, 0.32.

5.- Magnolia macrophylla, Michaux,

Fl. Bor.-Am. i, 327.—Nouveau Duhamel, ii, 221.—Desfontaines, Hist. Arb. ii, 5.—Aiton, Hort. Kew. 2 ed. iii, 331.—Poiret, Suppl. iii, 573.—Michaux f. Hist. Arb. Am. iii, 99, t. 7; N. American Sylva, ii, 26, t. 57.—Bonpland, Pl. Malm. 84, t. 33.—Pursh, Fl. Am. Sept. ii, 381.—Nuttall, Genera, ii, 18; Sylva, i, 83; 2 ed. i, 99.—De Candolle, Syst. i, 454; Prodr. i, 80.—Bot. Mag. t. 2189.—Hayne, Dend. Fl. 117.—Elliott, Sk. ii, 40.—Sprengel, Syst. ii, 642.—Rafinesque, Med. Bot. ii, 31, t. 62.—Eaton, Manual, 6 ed. 218.—Sertum Botanicum, v & t.—Don, Miller's Dict. i, 83.—Croom in Am. Jour. Sci. 1 ser. xxv, 76.—Reichenbach, Fl. Exot. ii, 44, t. 139.—Loudon, Arboretum, i, 271 & t.—Eaton & Wright, Bot. 312.—Torrey & Gray, Fl. N. America, i, 43.—Spach, Hist. Veg. vii, 479.—Dietrich, Syn. iii, 308.—Griffith, Med. Bot. 98, f. 57.—Darby, Bot. S. States, 211.—Cooper in Smithsonian Rep. 1858, 250.—Seringe, Fl. Jard. iii, 230.—Chapman, Fl. S. States, 14.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 67.—Wood, Cl. Book, 214; Bot. & Fl. 25.—Gray, Manual N. States, 5 ed. 49.—Koch, Dendrologie, i, 374.—Vasey, Cat. Forest Trees, 6.

LARGE-LEAVED CUCUMBER TREE.

North Carolina, eastern base of the Alleghany mountains (Iredell and Lincoln counties); southeastern Kentucky southward to middle and western Florida and southern Alabama, extending west to the valley of Pearl river, Louisiana; central Arkansas (Garland, Montgomery, Hot Springs, and Sebastian counties).

A tree 6 to 18 meters in height, with a trunk rarely 0.60 meter in diameter; rich woods, reaching its greatest development in the limestone valleys of northern Alabama; rare and local.

Wood light, hard, not strong, close-grained, compact, satiny; medullary rays numerous, thin; color, brown, the sap-wood light yellow; specific gravity, 0.5309; ash, 0.35.

6.-Magnolia Umbrella, Lamarck,

Dict. iii, 673.—Nouveau Duhamel, ii, 221.—De Candolle, Prodr. i, 80.—Loiseleur, Herb. Amat. iii, t. 198.—Sprengel, Syst. ii, 642.—Don, Miller's Dict. i, 83.—Torrey & Gray, Fl. N. America, i, 43.—Spach, Hist. Veg. vii, 475.—Dietrich, Syn. iii, 308.—Seringe, Fl. Jard. iii, 227.—Gray, Genera, i, 62, t. 24; Proc. Linnæan Soc. ii, 106, f. 1–18; Manual N. States, 5 ed. 49.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 13.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 67.—Wood, Cl. Book, 214; Bot. & Fl. 25.—Porcher, Resources S. Forests, 38.—Vasey, Cat. Forest Trees, 6.

M. Virginiana, var. tripetala, Linnœus, Spec. 1 ed. 536.

M. tripetala, Linnæus, Spec. 2 ed. 756.—Marshall, Arbustum, 84.—Walter, Fl. Caroliniana, 159.—B. S. Barton, Coll. i, 14.— Aiton, Hort. Kew. ii, 252; 2 ed. iii, 331.—Willdenow, Spec. ii, 1258; Enum. i, 579.—Michaux, Fl. Bor.-Am. i, 327.— Desfontaines, Hist. Arb. ii, 5.—De Candolle, Syst. i, 452.—Michaux f. Hist. Arb. Am. iii, 90, t. 5; N. American Sylva, 3 ed. ii, 20, t. 5.—Pursh, Fl. Am. Sept. ii, 381.—Nuttall, Genera, ii, 18; Sylva, i, 84; 2 ed. i, 100.—Guimpel, Otto & Hayne, Abb. Holz. 20, t. 18.—Hayne, Dend. Fl. 116.—Elliott, Sk. ii, 38.—Torrey, Compend Fl. N. States, 221.— Rafinesque, Med. Bot. ii, 32.—Eaton, Manual, 6 ed. 218.—Eaton & Wright, Bot. 312.—Griffith, Med. Bot. 98.— Loudon, Arboretum, i, 269, t. 5.—Darby, Bot. S. States, 211.—Koch, Dendrologie, i, 379.—Nat. Dispensatory, 2 ed. 891.

UMBRELLA TREE. ELK WOOD.

Southeastern Pennsylvania, southward along the Alleghany mountains to central Alabama (Prattville, Mohr) and northeastern Mississippi, westward through Kentucky and Tennessee; in central (Hot Springs) and southwestern Arkansas (Fulton, valley of the Red river, Harvey).

A small tree, rarely exceeding 12 meters in height, with a trunk 0.10 to 0.40 meter in diameter; rich, shady hillsides; most common and reaching its greatest development along the western slope of the southern Alleghany mountains.

Wood light, soft, not strong, close-grained, compact; medullary rays very numerous, thin; color, brown, the heavier sap-wood nearly white; specific gravity, 0.4487; ash, 0.20.

7.- Magnolia Fraseri, Walter,

- Fl. Caroliniana, i, 59 & t.—Torrey & Gray, Fl. N. America, i, 43.—Walpers, Rep. i, 70.—Dietrich, Syn. iii, 308.—Chapman, Fl. S. States, 14.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 68.—Wood, Cl. Book, 214; Bot. & Fl. 25.—Gray, Manual N. States, 5 ed. 49.—Koch, Dendrologie, i, 372.—Vasey, Cat. Forest Trees, 6.
 - M. auriculata, Lamarck, Dict. iii, 673.—Bartram, Travels, 2 ed. 337.—Willdenow, Spec. ii, 1258; Enum. i, 579.—Michaux, Fl. Bor.-Am. i, 328.—Nouveau Duhamel, ii, 222.—Desfontaines, Hist. Arb. ii, 5.—Michaux f. Hist. Arb. Am. iii, 94, t. 6; N. American Sylva, 3 ed. ii, 23, t. 56.—Andrews, Bot. Rep. ix, t. 573.—Bot. Mag. t. 1206.—Cubières, Mem. Mag. & t.—Aiton, Hort. Kew. 2 ed. iii, 332.—Pursh, Fl. Am. Sept. ii, 382.—Nuttall, Genera, ii, 18; Sylva, i, 84; 2 ed. i, 98.—De Candolle, Syst. i, 454; Prodr. i, 80.—Hayne, Dend. Fl. 117.—Elliott, Sk. ii, 39.—Sprengel, Syst. ii, 642.—Andubon, Birds, t. 38.—Don, Miller's Dict. i, 83.—Eaton, Manual, 6 ed. 218.—Hooker, Jour. Bot. i, 188.—Spach, Hist. Veg. vii, 477.—Loudon, Arboretum, i, 276 & t.—Seringe, Fl. Jard. iii, 229.
 - M. pyramidata, Bartram, Travels, 2 ed. 338.—Pursh, Fl. Am. Sept. ii, 382.—De Candolle, Syst. i, 454; Prodr. i, 80.—Hayne, Dend. Fl. 117.—Lindley, Bot. Reg. v, t. 407.—Loddiges, Bot. Cab. t. 1092.—Rafinesque, Med. Bot. ii, 32.—Don, Miller's Dict. i, 83.—Eaton, Manual, 6 ed. 221.—Loudon, Arboretum, i, 277 & t.—Seringe, Fl. Jard. iii, 230.—Darby, Bot. S. States. 211.
 - M. auricularis, Salisbury, Parad. Lond. i, t. 43.—Kerner, Hort. t. 360.

LONG-LEAVED CUCUMBER TREE.

Alleghany mountains, from Virginia southward to the Chattahoochee region of western Florida, and southern Alabama (Clark county, Mohr), extending west to the valley of Pearl river, Mississippi.

A small tree, 8 to 12 meters in height, with a trunk 0.15 to 0.20 meter in diameter; rich woods.

Wood light, soft, not strong, close-grained, compact; medullary rays very numerous, thin; color, brown, the sap-wood nearly white; specific gravity, 0.5003; ash, 0.28.

8.-Liriodendron Tulipifera, Linnaus,

Spec. 1 ed. i, 535.—Kalm, Travels, English ed. i, 202.—Marshall, Arbustum, 78.—Wangenheim, Amer. 32, t. 13, f. 32.—Walter, Fl. Caroliniana, 158.—Schmidt, Arb. i, 48.—B. S. Barton, Coll. i, 14, 45.—Aiton, Hort. Kew. ii, 250; 2 ed. iii, 329.—Gærtner, Fruct. ii, t. 178.—Bot. Mag. t .275.—Moench, Meth. 222.—Abbot. Insects Georgia, ii, t. 102.—Schkuhr, Handb. ii, 93, t. 147.—Trew, Icon. t. 10.-Willdenow, Spec. ii, 1254; Enum. i, 579.-Michaux, Fl. Bor.-Am. i, 326.-Nouveau Duhamel, iii, 62, t. 18.-Desfontaines, Hist. Arb. ii, 15.—Poiret in Lamarck, Diet. viii, 137; Ill. iii, 36, t. 491.—St. Hilaire, Pl. France, iii, t. 377.—Titford, Hort. Bot. Am. 76.—Michaux f. Hist. Arb. Am. iii, 202, t. 5; N. American Sylva, 3 ed. ii, 35, t. 61.—Eaton, Manual, 63; 6 ed. 208.—Nuttall, Genera, ii, 18; Sylva, i, 84; 2 ed. i, 100.—Barton, Prodr. Fl. Philadelph. 59; Med. Bot. i, 91, t. 8; Compend. Fl. Philadelph. ii, 18.—De Candolle, Syst. i, 462; Prodr. i, 82.—Bigelow, Med. Bot. ii, 107, t. 31.—Hayne, Dend. Fl. 115.—Elliott, Sk. ii, 40.—Torrey, Compend. Fl. N. States, 221; Fl. N. York, i, 28.—Rafinesque, Med. Bot. ii, 239.—Guimpel, Otto & Hayne, Abb. Holz. 34, t. 29.— Cobbett, Woodlands, No. 516.—Sprengel, Syst. ii, 642.—Audubon, Birds, t. 12.—Don, Miller's Dict. i, 86.—Beck, Bot. 15.—Lindley, Fl. Med. 23.—Spach, Hist. Veg. vi, 488.—Loudon, Arboretum, i, 284 & t.—Eaton & Wright, Bot. 302.—Penn. Cycl. xxv, 341.—Torrey & Gray, Fl. N. America, i, 44.—Dietrich, Syn. iii, 309.—Griffith, Med. Bot. 98, f. 58.—Emerson, Trees Massachusetts, 529; 2 ed. ii, 605 & t .- Seringe, Fl. Jard. iii, 240.-Gray, Genera, i, 64, t. 25; Manual N. States, 5 ed. 50.-Darlington, Fl. Cestrica, 3 ed. 9.-Darby, Bot. S. States, 212.—Agardh, Theor. & Syst. Pl. t. 11, f. 2.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 14.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 77.—Lemaire, Ill. Hort. 15, t. 571.—Wood, Cl. Book, 215; Bot. & Fl. 25.—Porcher, Resources S. Forests, 39.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 183.—Baillon, Hist. Pl. i, 143, f. 175-178.—Koch, Dendrologie, i, 380.—Guibourt, Hist. Drognes, 7 ed. iii, 746.—Ridgway in Am. Nat. vi, 663; Proc. U. S. Nat. Mus. 1882, 59.—Vasey, Cat. Forest Trees, 6.—Eichler, Sit. Bot. Brand. xxii, 83, f. 1-3.—Bell in Geological Rep. Canada, 1879-'80, 53°.

Tulipifera Liriodendron, Miller, Dict. No. 1.

L. procera, Salisbury, Prodr. 379.

TULIP TREE. YELLOW POPLAR. WHITE WOOD.

Southwestern Vermont, through western New England, southward to northern Florida (latitude 30°); west through New York, Ontario, and Michigan to lake Michigan, south of latitude 43° 30′, thence south to latitude 31° in the Gulf states east of the Mississippi river; through southern Illinois and southeastern Missouri to Crowley's ridge, northeastern Arkansas.

One of the largest and most valuable trees of the Atlantic forests, 30 to 60 meters in height, with a trunk 2 to 4 meters in diameter (*Ridgway*); rich woods and intervale lands, reaching its greatest development in the valley of the lower Wabash river and along the western slopes of the Alleghany mountains in Tennessee and North Carolina.

Wood light, soft, not strong, brittle, very close straight-grained, compact, easily worked; medullary rays numerous, not prominent; color, light yellow or brown, the thin sap-wood nearly white; specific gravity, 0.4230; ash, 0.23; largely manufactured into lumber and used for construction, interior finish, shingles, in boat-building, and especially in the manufacture of wooden pumps, woodenware, etc.; varieties varying slightly in color and density are recognized by lumbermen.

Liriodendrin, a stimulant tonic, with diaphoretic properties, is obtained by macerating the inner bark, especially of the root (Jour. Philadelphia Col. Phar.iii. 5.—U. S. Dispensatory, 14 ed. 556.—Nat. Dispensatory, 2 ed. 871).

ANONACEÆ.

9.-Asimina triloba, Dunal,

Mon. Anon. 83.—De Candolle, Syst. i, 479; Prodr. i, 87.—Elliott, Sk. ii, 42.—Guimpel, Otto & Hayne, Abb. Holz. 66, t. 53.—Hayne, Dend. Fl. 118.—Sprengel, Syst. ii, 639.—Torrey, Compend. Fl. N. States, 222; Ann. Lyc. N. York, ii, 165.—Beck, Bot. 16.—Don, Miller's Dict. i, 91.—Nuttall in Jour. Philadelphia Acad. vii, 11.—Dietrich, Syn. iii, 304.—Loudon, Arboretum, i, 293, f. 39.—Gray, Genera, i, 69, t. 26, 27; Manual N. States, 5 ed. 50.—Parry in Owen's Rep. 609.—Darlington, Fl. Cestrica, 3 ed. 9.—Darby, Bot. S. States, 212.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 15.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 94.—Lesquereux in Owen's 2d Rep. Arkansas, 347.—Maout & Decaisne, Bot. English ed. 199 & figs.—Bot. Mag. t. 5854.—Wood, Cl. Book, 215; Bot. & Fl. 26.—Porcher, Resources S. Forests, 41.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 183.—Koch, Dendrologie, ii, 383.—Young, Bot. Texas, 149.—Vasey, Cat. Forest Trees, 6.—Ridgway in Proc. U. S. Nat. Mus. 1882, 60.—Burgess in Coulter's Bot. Gazette, vii, 95.

Anona triloba, Linnæus, Spec. 1 ed. 537.—Marshall, Arbustum, 10.—Lamarck, Dict. ii, 125.—Walter, Fl. Caroliniana, 158.—
B. S. Barton, Coll. i, 29.—Aiton, Hort. Kew. ii, 254; 2 ed. iii, 335.—Willdenow, Spec. ii, 1267; Enum. i, 580.—Nouveau Duhamel, ii, 83, t. 25.—Desfontaines, Hist. Arb. ii, 21.—Michaux f. Hist. Arb. Am. iii, 161, t. 9; N. American Sylva, 3 ed. ii, 33, t. 60.—Barton, Prodr. Fl. Philadelph. 59.—Schkuhr, Handb. ii, 95, t. 149.

Anona pendula, Salisbury, Prodr. 380.

Orchidocarpum arietinum, Michaux, Fl. Bor.-Am. i, 329.

Porcelia triloba, Persoon, Syn. ii, 95.—Pursh, Fl. Am. Sept. ii, 383.—Rafinesque, Fl. Ludoviciana, 92.—Barton, Compend. Fl. Philadelph. ii, 18.—Nuttall, Genera, ii, 19.—Poiret, Suppl. iv, 529.—Eaton, Manual, 6 ed. 278.—Audubon, Birds, t. 2, 162.—Eaton & Wright, Bot. 371.

Uvaria triloba, Torrey & Gray, Fl. N. America, i, 45.—Torrey, Fl. N. York, i, 30.—Caruel in Ann. Mus. Firenze, 1864, 9, t. 1, f. 1-7.—Baillon, Adansonia, viii, 333; Hist. Pl. i, 193, f. 220-228.

A. campaniflora, Spach, Hist. Veg. vii, 529.

PAPAW. CUSTARD APPLE.

Western New York (Lockport and in Monroe county); Ontario (Queenstown heights); eastern and central Pennsylvania, west to southern Michigan, southern Iowa, and eastern Kansas (Manhattan), south to middle Florida and the valley of the Sabine river, Texas.

A small tree, sometimes 12 meters in height, with a trunk rarely exceeding 0.30 meter in diameter, or often reduced to a slender shrub; rich, rather low woods, reaching its greatest development in the lower Wabash valley and in the valley of the White river, Arkansas.

Wood very light, very soft and weak, coarse-grained, spongy; layers of annual growth clearly marked by several rows of large open ducts; color, light yellow shaded with green, the sap-wood lighter; specific gravity, 0.3969; ash, 0.21.

Anona laurifolia, Dunal,

Mon. Anon. 65.—De Candolle, Syst. i, 468; Prodr. i, 84.—Sprengel, Syst. ii, 641.—Lindley, Bot. Reg. xvi, t. 1328.—Schnizlein, Icon. t. 174, f. 9.—Grisebach, Fl. British West Indies, 4.—Cooper in Smithsonian Rep. 1860, 439.—Chapman, Fl. S. States, Suppl. 603.

A. glabra, Chapman in Coulter's Bot. Gazette, iii, 2 [not Linnæus].

A. species, Vasey, Cat. Forest Trees, 6.

POND APPLE.

Semi-tropical Florida, cape Malabar to bay Biscayne, on the west coast, Pease creek to the Caloosa river, and through the West Indies.

A small tree, sometimes 9 meters in height, with a trunk 0.30 meter in diameter, or toward its northern limit and on the west coast often reduced to a stout, wide-spreading shrub; common and reaching its greatest development within the United States on the low islands and shores of the Everglades in the neighborhood of bay Biscayne.

Wood light, soft, not strong, rather close-grained, compact, containing many scattered open ducts; color, light brown streaked with yellow, sap-wood lighter; specific gravity, 0.5053; ash, 4.86.

The large fruit (0.14 to 0.28 meter long) scarcely edible.

CAPPARIDACEÆ.

11.—Capparis Jamaicensis, Jacquin,

Stirp. Am. 160, t. 101.—Aiton, Hort. Kew. 2 ed. iii, 285.—De Candolle, Prodr. i, 252.—Descourtilz, Fl. Med. Antilles, v. t. 273.—Macfadyen, Fl. Jamaica, 39.—Grisebach, Fl. British West Indies, 18.—Chapman, Fl. S. States, 32.—Porcher, Resources S. Forests, 75.—Eichler in Martius, Fl. Brasil. xiii, 270, t. 64, f. 11.—Vasey, Cat. Forest Trees, 6.

- C. Breynia, Linnæus, Spec. 2 ed. 721, in part.—Aiton, Hort. Kew. 2 ed. iii, 285.—De Candolle, Prodr. i, 252, in part.—Swartz, Obs. 210 [not Jacquin].—Macfadyen, Fl. Jamaica, 39.
- C. cynophyllophora, Linnæus, Spec. 1 ed. 504 [not subsequent ed. fide Eichler, l. c.].—Aiton, Hort. Kew. 2 ed. iii, 285.—Macfadyen, Fl. Jamaica, 39.
- C. siliquosa, Linnæus, Spec. 2 ed. 721.
- C. torulosa, Swartz, Prodr. 81.—De Candolle, Prodr. i, 252.—Grisebach, Fl. British West Indies, 18.
- C. uncinata, Loddiges, Cat. [not Wallich].
- C. emarginata, Richard, Fl. Cuba, 78, t. 9.—Walpers, Rep. i, 201.

Semi-tropical Florida, cape Canaveral to the southern keys; in the West Indies and southward to Brazil.

A small tree, sometimes 6 meters in height, with a trunk 0.15 meter in diameter, or reduced to a low shrub; common and reaching its greatest development within the United States on Upper Metacombe and Umbrella Keys.

Wood heavy, hard, close-grained, compact, satiny, containing many evenly-distributed large open ducts; medullary rays numerous, obscure; color, yellow tinged with red, the sap-wood lighter; specific gravity, 0.6971; ash, 4.76.

CANELLACE E.

12.—Canella alba, Murray;

Linnæus, Syst. 14 ed. iv, 443.—Swartz, Obs. 190; Trans. Linnæan Soc. i, 96, t. 8.—Willdenow, Spec. ii, 851; Enum. i, 496.—Aiton, Hort. Kew. 2 ed. iii, 144.—Titford, Hort. Bot. Am. Suppl. 3, t. 10, f. 4.—De Candolle, Prodr. i, 563.—Hayne, Arzn. 9, t. 5.—Stevenson & Churchill, Med. Bot. ii, t. 66.—Woodville, Med. Bot. 3 ed. iv, 694, t. 237.—Lindley, Med. Bot. 116.—Carson, Med. Bot. i, 24, t. 16.—Griffith, Med. Bot. 181, f. 98.—Miers in Ann. Nat. Hist. 3 ser. i, 348; Contrib. i, 116.—Grisebach, Fl. British West Indies, 109.—Chapman, Fl. S. States, 93.—Guibourt, Hist. Drogues, 7 cd. iii, 621, f. 767.—Vasey, Cat. Forest Trees, 7.—Bentley & Trimen, Med. Pl. i, 26, t. 26.

C. Winterana, Gærtner, Fruct. i, 377, t. 77.

Wintera Canella, Linnæus, Spec. 2 ed. 636.—Poiret in Lamarck, Dict. viii, 799, t. 399.

C. laurifolia, Loddiges, Cat.—Sweet, Hort. Brit. 65.—Don, Miller's Dict. i, 680.

WHITE WOOD. CINNAMON BARK. WILD CINNAMON.

Semi-tropical Florida, on the southern keys (Elliott's Key, Key Largo to Jew Fish Key); through the West Indies.

A small tree, often 10 meters in height, with a trunk 0.22 meter in diameter; not rare.

Wood very heavy, exceedingly hard, strong, close-grained, compact; medullary rays numerous, thin; color, dark reddish-brown, the sap-wood light brown or yellow; specific gravity, 0.9893; ash, 1.75.

The pale inner bark appears in the *Pharmacopæa* under the name of *Cortex canellæ albæ*, furnishing an aromatic stimulant and tonic, occasionally employed in cases of debility of the digestive organs, or as an adjunct to more active remedies (*Miers*, *l. c.—Flückiger & Hanbury*, *Pharmacographia*, 68.—*U. S. Dispensatory*, 14 ed. 210.—*Nat. Dispensatory*, 2 ed. 337).

GUTTIFERÆ.

13.-Clusia flava, Linnæus,

Spec. 2 ed. 1495.—Willdenow, Spec. iv, 977; Enum. ii, 1043.—Aiton, Hort. Kew. 2 ed. v, 444.—Titford, Hort. Bot. Am. 105.—De Candolle, Prodr. i, 559.—Macfadyen, Fl. Jamaica, 134.—Nuttall, Sylva, ii, 111, t. 77; 2 ed. ii, 58, t. 77.—Grisebach, Fl. British West Indies, 407.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 43.—Planchon & Triana in Ann. Sci. Nat. 4 ser. xiii, 352.—Walpers, Ann. vii, 340.—Vasey, Cat. Forest Trees, 7.

C. rosea, Torrey & Gray, Fl. N. America, i, 168.

Jamaica and other West Indian islands; Key West (Blodgett) prior to 1840. Not detected by later explorers (Palmer, Garber, Chapman, Curtiss) of the botany of semi-tropical Florida, and probably not now growing spontaneously within the limits of the United States.

Wood not examined.

TERNSTREMIACEÆ.

14.-Gordonia Lasianthus, Linnaus,

Mant. i, 570.—Ellis, Phil. Trans. 60, 518, t. 11; Letters, t. 2.—L'Heritier, Stirp. Nov. 156.—Cavanilles, Diss. ii, 307, t. 161.—Walter, Fl. Caroliniana, 177.—Aiton, Hort. Kew. ii, 231; 2 ed. iv, 234.—Lamarck, Diet. ii, 770; Ill. iii, 146, t. 594, f. 1.—Swartz, Obs. 271.—Willdenow, Spec. iii, 840.—Michaux, Fl. Bor.-Am. ii, 43.—Bot. Mag. t. 668.—Nouveau Duhamel, ii, 236, t. 68.—Desfontaines, Hist. Arb. i, 484.—Persoon, Syn. ii, 259.—Michaux f. Hist. Arb. Am. iii, 131, t. 1; N. American Sylva, 3 ed. ii, 29, t. 58.—Pursh, Fl. Am. Sept. i, 451.—Nuttall, Genera, ii, 84.—De Candolle, Prodr. i, 528.—Elliott, Sk. ii, 171.—Sprengel, Syst. iii, 125.—Don, Miller's Diet. i, 573, f. 99.—Audubon, Birds, t. 168.—Reichenbach, Fl. Exot. t. 151.—Spach, Hist. Veg. iv, 79.—Loudon, Arboretum, i, 379, f. 93.—Torrey & Gray, Fl. N. America, i, 223.—Eaton, Manual, 6 ed. 161.—Eaton & Wright, Bot. 258.—Browne, Trees of America, 52.—Dietrich, Syn. iv, 862.—Gray, Genera, ii, 103, t. 140, 141; Manual N. States, 5 ed. 104.—Choisy, Mem. Ternst. & Camel. 51.—Darby, Bot. S. States, 256.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 60.—Curtis in Rep. Geological Surv. N. Carolina 1860, iii, 80.—Maout & Decaisne, English ed. 274 & figs.—Wood, Cl. Book, 274; Bot. & Fl. 65.—Baillon, Hist. Pl. iv, 230, f. 254, 255.—Vasey, Cat. Forest Trees, 7.

Hypericum Lasianthus, Linnæus, Spec. 1 ed. 783.—Hill, Veg. Syst. xv, t. 1, f. 3.

G. pyramidalis, Salisbury, Prodr. Stirp. 386.

LOBLOLLY BAY. TAN BAY.

Southern Virginia, south near the coast to cape Malabar, and cape Romano, Florida, west along the Gulf coast to the valley of the Mississippi river.

A tree 15 to 24 meters in height, with a trunk often 0.45 to 0.50 meter in diameter; low, sandy swamps.

Wood light, soft, not strong, close-grained, compact, not durable; medullary rays numerous, thin; color, light red, the sap-wood lighter; specific gravity, 0.4728; ash, 0.76; somewhat employed in cabinet making.

The bark, rich in tannin, was once occasionally used, locally, in tanning leather (Bartram, Travels, 2 ed. 160).

15.-Gordonia pubescens, L'Heritier,

Stirp. Nov. 156.—Lamarek, Diet. ii, 770.—Cavanilles, Diss. ii, 308, t. 162.—Aiton, Hort. Kew. ii, 231; 2 ed. iv, 234.—Willdenow, Spec. iii, 841.—Michaux, Fl. Bor.-Am. ii, 43.—Ventenat, Jard. Malm. t. 1 (Schrader, Neues Jour. Bot. 1806, 121).—Nouveau Duhamel, ii, 237.—Kœnig & Sims, Ann. Bot. i, 171.—Desfontaines, Hist. Arb. i, 484.—Persoon, Syn. ii, 259.—Michaux f. Hist. Arb. Am. iii, 135, t. 2; N. American Sylva, 3 ed. ii, 31, t. 59.—Pursh, Fl. Am. Sept. ii, 451.—Nuttall, Genera, ii, 84.—Loiseleur, Herb. Amat. iv, t. 236.—Elliott, Sk. ii, 171.—De Candolle, Prodr. i, 528.—Sprengel, Syst. iii, 125.—Don, Miller's Diet. i, 573.—Eaton, Manual, 6 ed. 161.—Audubon, Birds, t. 185.—Spach, Hist. Veg. iv, 80.—Loudon, Arboretum, i, 380, f. 94.—Torrey & Gray, Fl. N. America, i, 223.—Eaton & Wright, Bot. 258.—Browne, Trees of America, 54.—Dietrich, Syn. iv, 862.—Gray, Genera, ii, 102, t. 141, f. 11-14, t. 142.—Choisy, Mem. Ternst. & Camel. 51.—Darby, Bot. S. States, 257.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 60.—Wood, Cl. Book, 274; Bot. & Fl. 65.—Vasey, Cat. Forest Trees, 7.—Goodale & Sprague, Wild Flowers, 193, t. 47.

Franklinia Altamaha, Marshall, Arbustum, 49.—Bartram, Travels, 2 ed. 16, 465:—Rafinesque, Atlant. Jour. 79 & f.

G. Franklini, L'Heritier, Stirp. Nov. 156.—Willdenow, Spec. iii, 841.—Nouveau Duhamel, ii, 237.—Desfontaines, Hist. Arb. i, 484.—Persoon, Syn. ii, 259.—Poiret, Suppl. ii, 816.

Michauxia sessilis, Salisbury, Prodr. Stirp. 386.

Lacathea florida, Salisbury, Parad. Lond. t. 56.—Colla, Hort. Ripul. Appx. i, 134.

FRANKLINIA.

Near Fort Barrington, on the Altamaha river, Georgia (J. & W. Bartram, Dr. Moses Marshall).

Careful explorations of Bartram's original locality by later botanists, especially by Mr. H. W. Ravenel, have failed to rediscover this species, which is, however, still preserved in cultivation through the original plants introduced by the Bartrams. "Florida" given as a locality by Torrey & Gray, l. c., on the authority of Herb. Schweinitz, and followed by Chapman, l. c., is probably an error (Ravenel in Am. Naturalist, xvi, 235).

STERCULIACE Æ.

16.-Fremontia Californica, Torrey,

Smithsonian Contrib. vi, 5, t. 2, f. 2; Proc. Am. Assoc. iv, 191; Pacific R. R. Rep. iv, 15, 71.—Newberry in Pacific R. R. Rep. vi, 68.—Walpers, Ann. iv, 319.—Gray in Jour. Boston Soc. Nat. Hist. vii, 146.—Bentham & Hooker, Genera, i, 212, 982.—Bot. Mag. t. 5591.—Lemaire, Ill. Hort. xiii, t. 496.—Belge Hort. xvii, 236, t. 13.—Carrière in Rev. Hort. 1867, 91 & t.—Koch, Dendrologie, i, 483.—Masters in London Gard. Chronicle, 1869, 610.—Seemann, Jour. Bot. vii, 297.—London Garden, 1873, 54 & t.—Planchon in Fl. des Serres, xxii, 175.—Brewer & Watson, Bot. California, i, 88; ii, 437.—Rothrock in Wheeler's Rep. vi, 41, 357.

Cheiranthodendron Californicum, Baillon, Hist. Pl. iv, 70.

SLIPPERY ELM.

California, valley of Pitt river, southward along the western foot-hills of the Sierra Nevada, and in the Santa Lucia mountains southward through the Coast ranges to the San Jacinto mountains; rare at the north, most common and reaching its greatest development on the southern sierras and the San Gabriel and San Bernardino ranges.

A small tree, 6 to 10 meters in height, the short trunk often 0.30 to 0.45 meter in diameter, or more often a tall, much branched shrub; dry, gravelly soil.

Wood heavy, hard, very close-grained, compact, satiny, containing many groups of small ducts parallel to the thin, conspicuous medullary rays, layers of annual growth obscure; color, dark brown tinged with red, the thick sap-wood lighter; specific gravity, 0.7142; ash, 1.69.

The mucilaginous inner bark used locally in poultices.

TILIACEÆ.

17.-Tilia Americana, Linnæus.

Spec. 1 ed. 514.—Marshall, Arbustum, 153.—Wangenheim, Amer. 55.—Aiton, Hort. Kew. ii, 229; 2 ed. iii, 299.—Willdenow, Spec. ii, 1162; Enum. i, 565.—Desfontaines, Hist. Arb. ii, 37.—Persoon, Syn. ii, 66.—Michaux f. Hist. Arb. Am. iii, 311, t. 1; N. American Sylva, 3 ed. iii, 81, t. 131.—Barton, Prodr. Fl. Philadelph. 58; Compend. Fl. Philadelph. ii, 6.—Eaton, Manual, 59.—James in Long's Exped. i, 69.—Watson, Dend. Brit. ii, 134, t. 134.—Torrey, Compend. Fl. N. States, 214; Fl. N. York, i, 116.—Loudon, Arboretum i, 373 & t.—Torrey & Gray, Fl. N. America, i, 239.—Bigelow, Fl. Boston. 3 ed. 227.—Emerson, Trees Massachusetts, 511; 2 ed. ii, 584 & t.—Browne, Trees of America, 47.—Gray, Genera, ii, 96, t. 136; Manual N. States, 5 ed. 103; Hall's Pl. Texas, 5.—Darlington, Fl. Cestrica, 3 ed. 38.—Darby, Bot. S. States, 262.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 59.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 79.—Lesquereux in Owen's 2d Rep. Arkansas, 352.—Wood, Cl. Book, 272; Bot. & Fl. 64.—Porcher, Resources S. Forests, 103.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 186.—Walpers, Ann. vii, 449.—Koch, Dendrologie, i, 480.—Young, Bot. Texas, 188.—Vasey, Cat. Forest Trees, 7.—Macoun in Geological Rep. Canada, 1875—76, 191.—Sears in Bull. Essex Inst. xiii, 174.—Bell in Geological Rep. Canada, 1879—'80, 51c.—Ridgway in Proc. U. S. Nat. Mus. 1882, 61.

- T. nigra, Borkhausen, Handb. d. Forstbot. ii, 1219.
- T. glabra, Ventenat in Mem. Acad. Sci. iv, 9, t. 2.—Nouveau Duhamel, i, 228.—Poiret in Lamarck, Dict. vii, 681.—Pursh, Fl. Am. Sept. ii, 362.—Nuttall, Genera, ii, 3.—De Candolle, Prodr. i, 513.—Hayne, Dend. Fl. 112.—Elliott, Sk. ii, 2.—Guimpel, Otto & Hayne, Abb. Holz. 55, t. 45.—Hooker, Fl. Bor.-Am. i, 108.—Don, Miller's Dict. i, 553.—Eaton, Manual, 6 ed. 365.—Beck, Bot. 59.—Darlington, Fl. Cestrica, 2 ed. 312.—Eaton & Wright, Bot. 452.—Dietrich, Syn. iii, 237.—Richardson, Arctic Exped. 422.
- T. latifolia, Salisbury, Prodr. 367.
- T. Canadensis, Michaux, Fl. Bor.-Am. 306.—Persoon, Syn. ii, 66.—Poiret in Lamarck, Dict. vii, 683.
- T. neglecta, Spach, Ann. Sci. Nat. 2 ser. ii, 340, v. 15; Hist. Veg. iv, 27, 29.—Walpers, Rep. i, 359.

LIME TREE. BASS WOOD. AMERICAN LINDEN. LIN. BEE TREE.

Northern New Brunswick, westward in British America to about the one hundred and second meridian, southward to Virginia and along the Alleghany mountains to Georgia and southern Alabama; extending west in the United States to eastern Dakota, eastern Nebraska, eastern Kansas, the Indian territory, and southwest to the valley of the San Antonio river, Texas.

A large tree, 20 to 24 meters in height, with a trunk 0.90 to 1.20 meter in diameter, or, exceptionally, 30 to 45 meters in height, with a trunk 0.92 to 1.84 meter in diameter (valley of the lower Wabash river, *Ridgway*); common in all northern forests, and always an indication of rich soil; toward its western and southwestern limits only along river bottoms.

Wood light, soft, not strong, very close-grained, compact, easily worked; medullary rays numerous, rather obscure; color, light brown, or often slightly tinged with red, the sap-wood hardly distinguishable; specific gravity, 0.4525; ash, 0.55; largely used in the manufacture of woodenware and cheap furniture, for the panels and bodies of carriages, the inner soles of shoes, in turnery, and the manufacture of paper-pulp (the quickly-discolored sap renders it unfit for making white paper).

The inner bark, macerated, is sometimes manufactured into coarse cordage and matting; the flowers, rich in honey, highly prized by apiarists.

Aqua tilia, an infusion of the flowers, buds, and leaves of the different species of Tilia, is used in Europe as a domestic remedy in cases of indigestion, nervousness, etc. (Nat. Dispensatory, 2 ed. 1429).

Var. pubescens, Loudon,

Arboretum, i, 374 & t.-Browne, Trees of America, 48.-Gray, Manual N. States, 5 ed. 103; Hall's Pl. Texas, 5.

- T. Caroliniana, Miller, Dict. No. 4.-Wangenheim, Amer. 56.-Marshall, Arbustum, 154.
- T. Americana, Walter, Fl. Caroliniana, 153 [not Linnæus].
- T. pubescens, Aiton, Hort. Kew. ii, 229; 2 ed. iii, 299.—Willdenow, Spec. ii, 1162; Enum. i, 566.—Ventenat in Mem. Acad. Sci. iv, 10, t. 3.—Nouveau Duhamel, i, 228, t. 51.—Persoon, Syn. ii, 66.—Desfontaines, Hist. Arb. ii, 37.—Michaux f. Hist. Arb. Am. iii, 317, t. 3; N. American Sylva, 3 ed. iii, 85, t. 133.—Pursh, Fl. Am. Sept. ii, 363.—De Candolle, Prodr. i, 513.—Hayne, Dend. Fl. 112.—Elliott, Sk. ii, 3.—Watson, Dend. Brit. ii, t. 135.—Torrey, Comp. Fl. N. States, 215.—Don, Miller's Dict. i, 553.—Eaton, Manual, 6 ed. 365.—Beck, Bot. 59.—Eaton & Wright, Bot. 452.—Penn. Cycl. xxiv, 447.—Dietrich, Syn. iii, 237.—Darby, Bot. S. States, 262.—Chapman, Fl. S. States, 59.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 79.—Walpers, Ann. vii, 449.—Koch, Dendrologie, i, 479.—Vasey, Cat. Forest Trees, 7.
- T. laxiflora, Michaux, Fl. Bor.-Am. i, 306.—Poiret in Lamarck, Dict. vii, 683.—Persoon, Syn. ii, 66.—Willdenow, Enum.
 Suppl. 38.—De Candolle, Prodr. i, 513.—Hayne, Dend. Fl. 113.—Torrey, Compend. Fl. N. States, 215.—Don, Miller's
 Dict. i, 553.—Eaton, Manual, 6 ed. 365.—Beck, Bot. 59.—Spach, Ann. Sci. Nat. 2 ser. ii, 343, t. 15; Hist. Veg. iv, 32.—
 Browne, Trees of America, 48.—Dietrich, Syn. iii, 237.
- T. grata, Salisbury, Prodr. 367.
- T. pubescens, var. leptophylla, Pursh, Fl. Am. Sept. ii, 63.
- ? T. stenopetala, Rafinesque, Fl. Ludoviciana, 92.—Robin, Voyages, iii, 484.
- T. truncata, Spach, Ann. Sci. Nat. 2 ser. ii, 342; Hist. Veg. iv, 30.—Dietrich, Syn. iii, 237.
- T. Americana, var. Walteri, Wood, Cl. Book, 272; Bot. & Fl. 64.

North Carolina to the Chattahoochee region of western Florida, usually near the coast; Houston, Texas (E. Hall).

A small tree, rarely exceeding 15 meters in height, with a trunk 0.30 meter in diameter; swamps or low ground; rare, or often confounded with the typical T. Americana.

Wood lighter, but not otherwise distinguishable from that of T. Americana; specific gravity 0.4074; ash, 0.65.

18.—Tilia heterophylla, Ventenat,

- Mem. Acad. Sci. iv, 16, t. 5.—Nouveau Duhamel, i, 229.—Poiret in Lamarck, Dict. vii, 683.—Pursh, Fl. Am. Sept. ii, 363.—Nuttall, Genera, ii, 3; Sylva, i, 90, t. 23; 2 ed. i, 107, t. 23.—De Candolle, Prodr. i, 513.—Don, Miller's Dict. i, 553.—Eaton, Manual, 6 ed. 365.—Spach in Ann. Sci. Nat. 2 ser. ii, 345; Hist. Veg. iv, 34.—Torrey & Gray, Fl. N. America, i, 239.—Eaton & Wright, Bot. 452.—Penn. Cycl. xxiv, 447.—Walpers, Rep. i, 359.—Dietrich, Syn. iii, 237.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 60.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 79.—Wood, Cl. Book, 272; Bot. & Fl. 64.—Gray, Manual N. States, 5 ed. 103.—Vasey, Cat. Forest Trees, 7.—Nat. Dispensatory, 2 ed. 1429.—Ridgway in Proc. U. S. Nat. Mus. 1882, 61.
 - T. alba, Michaux f. Hist. Arb. Am. iii, 315, t. 2; N. American Sylva, 3 ed. iii, 84, t. 132 [not Waldstein & Kitaibel].—Eaton & Wright, Bot. 452.—Darby, Bot. S. States, 262.
 - T. laxiflora, Pursh, Fl. Am. Sept. ii, 363 [not Michaux].—Elliott, Sk. ii, 2.
 - T. Americana, var. heterophylla, Loudon, Arboretum, i, 375 & t.
 - T. heterophylla, var. alba, Wood, Cl. Book, 272; Bot. & Fl. 64.

WHITE BASS WOOD. WAHOO.

Mountains of Pennsylvania, southward along the Alleghany mountains to northern Alabama and Florida (valley of the Apalachicola river, opposite Chattahoochee, *Mohr*), west to middle Tennessee and Kentucky, southern Indiana, and southern and central Illinois (valley of the Illinois river).

A tree 15 to 20 meters in height, with a trunk 0.60 to 1.20 meter in diameter; rich woods and river bottoms, often on limestone; most common and reaching its greatest development along the western slopes of the southern Alleghany mountains and in middle Tennessee.

Wood light, soft, not strong, close-grained, compact, easily worked; medullary rays numerous, obscure; color, light brown, the sap-wood hardly distinguishable; specific gravity, 0.4253; ash, 0.62; generally confounded with that of *Tilia Americana*, and used for similar purposes.

MALPIGHIACEÆ.

19.-Byrsonima lucida, HBK.

Nov. Gen. & Spec. v, 147.—De Candolle, Prodr. i, 580.—Jussieu, Mon. Malpig. ii, 40.—Walpers, Rep. v, 168.—Richard, Fl. Cuba, 115, t. 28*.—Grisebach, Fl. British West Indies, 115.—Chapman, Fl. S. States, 82.

Malpighia lucida, Swartz, Fl. Ind. Occ. ii, 852.

TALLOWBERRY. GLAMBERRY.

Semi-tropical Florida, on the southern keys (Boca Chica, No-Name Key, etc.); through the West Indies. A small tree, sometimes 6 to 8 meters in height, with a trunk 0.15 to 0.25 meter in diameter, or often branching from the ground, and frutescent in habit.

Wood light, soft, weak, close-grained, compact; medullary rays numerous, thin; color, light red, the sap-wood a little lighter; specific gravity, 0.5888; ash, 2.46.

Fruit edible.

ZYGOPHYLLACEÆ.

20.-Guaiacum sanctum, Linnæus,

Spec. 1 ed. 382.—De Candolle, Prodr. i, 707.—Nuttall, Sylva, iii, 16, t. 86; 2 ed. ii, 86, t. 86.—Gray, Genera, ii, 123, t. 148.—Schnizlein, Icon. t. 253, f. 21.—Cooper in Smithsonian Rep. 1858, 264.—Grisebach, Fl. British West Indies, 134.—Chapman, Fl. S. States, 64.—Wood, Bot. & Fl. 67.—Vasey, Cat. Forest Trees, 7.

G. verticale, Richard, Fl. Cuba, 321.

LIGNUM-VITÆ.

Semi-tropical Florida, Upper Metacombe and Lignum-Vitæ Keys, common; Lower Metacombe and Umbrella Keys, rare; in the Bahamas, St. Domingo, Cuba, Porto Rico, etc.

A low, gnarled tree, not exceeding, within the limits of the United States, 8 meters in height, with a trunk sometimes 0.30 meter in diameter.

Wood exceedingly heavy, very hard, strong, brittle, close-grained, compact, difficult to work, splitting irregularly, containing many evenly-distributed resinous ducts; medullary rays numerous, obscure; color, rich yellow-brown, varying in older specimens to almost black, the sap-wood light yellow; specific gravity, 1.1432; ash, 0.82; used in turnery and for the sheaves of ships' blocks, for which it is preferred to other woods.

Lignum Guaiaci, Guaiacum wood, the heart of this and the allied G. officinale, Linnœus, formerly largely used in the treatment of syphilis, is now only retained in the Materia Medica as an ingredient in the compound decoction of sarsaparilla.

Guaiac, the resinous gum obtained from these species, is a stimulating diaphoretic and alterative, or in large doses cathartic, and is still employed in cases of chronic rheumatism, gout, etc. (Flückiger & Hanbury, Pharmacographia, 92.—U. S. Dispensatory, 14 ed. 456.—Nat. Dispensatory, 2 ed. 696.—Guibourt, Hist. Drogues, 7 ed. iii, 551.—Berg, Pharm. Anat. Atl. 53, t. 27).

21.—Porliera angustifolia, Gray,

Smithsonian Contrib. iii, 28.—Torrey, Bot. Mex. Boundary Survey, 42.

Guaiacum angustifolium, Engelmann, Wislizenus' Rep. 29.—Gray in Jour. Boston Soc. Nat. Hist. vi, 158; Genera, ii, 123, t. 149.—Walpers, Ann. iii, 840.—Watson in Proc. Am. Acad. xvii, 334.

Western Texas, valley of the Colorado river to the Rio Grande (Austin, Matagorda bay, New Braunfels, San Antonio, Brownsville, Fort McIntosh), extending west to the Rio Pecos (Havard); in northern Mexico.

A small tree, 8 to 10 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or toward its eastern, northern, and western limits reduced to a low shrub; reaching its greatest development in the United States on the calcareous hillsides bordering the valley of the Guadalupe river.

Wood exceedingly heavy, very hard, close-grained, compact, the open ducts smaller and less regularly distributed than in *Guaiacum*; medullary rays very thin, numerous; color, rich dark brown, turning green with exposure, the sap-wood bright yellow; specific gravity, 1.1101; ash, 0.51; probably possessing medicinal properties similar to those of lignum-vitæ.

RUTACEÆ.

22.-Xanthoxylum Americanum, Miller,

Dict. No. 2.—Du Roi, Obs. Bot. 57.—Wangenheim, Amer. 116.—Torrey & Gray, Fl. N. America, i, 214.—Torrey in Nicollet's Rep. 147.— Emerson, Trees Massachusetts, 509; 2 ed. ii, 581.—Gray, Genera, ii, 148, t. 156; Pacific R. R. Rep. xii², 41; Manual N. States, 5 ed. 110.—Richardson, Arctic Exped. 423.—Parry in Owen's Rep. 610.—Darby, Bot. S. States, 253.—Cooper in Smithsonian Rep. 1858, 250.—Wood, Cl. Book, 282; Bot. & Fl. 70.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187.—Koch, Dendrologie, i, 563.—Vasey, Cat. Forest Trees, 8.

- X. Clava-Herculis, Lamarck, Dict. ii, 38; Ill. t. 811, f. 3 [not Linnæus]. -Aiton, Hort. Kew. iii, 399. -Mœnch, Meth. 340.
- X. fraxinifolium, Marshall, Arbustum, 167.-B. S. Barton, Coll. i, 52; ii, 38.
- X. fraxineum, Willdenow, Spec. iv, 757; Enum. 1013; Berl. Baumz. 413.—Persoon, Syn. ii, 615.—Desfontaines, Hist. Arb. ii, 343.—Aiton, Hort. Kew. 2 ed. v. 383.—Pursh, Fl. Am. Sept. i, 210.—Nuttall, Genera, ii, 236.—Nouvean Duhamel, vii, 3. t. 2.—Hayne, Dend. Fl. 197.—Bigelow, Med. Bot. iii, 156, t. 59; Fl. Boston. 3 ed. 405.—De Candolle, Prodr. i, 726.—Sprengel, Syst. i, 945.—Torrey, Compend. Fl. N. States, 373.—Rafinesque, Med. Bot. ii, 113, f. 96.—Don, Miller's Dict. i, 802.—Eaton, Manual, 6 ed. 399.—Beck, Bot. 70.—Spach, Hist. Veg. ii, 364.—Lindley, Fl. Med. 216.—Loudon, Arboretum, i, 488, f. 158 & t.—Dietrich, Syn. ii, 1000.—Hooker, Fl. Bor. Am. i, 118.—Eaton & Wright, Bot. 482.—Nees, Pl. Wied. 5.—Griffith, Med. Bot. 195, f. 103.—Browne, Trees of America, 150.—Agardh, Theor. & Syst. Pl. t. 19, f. 9.—Schnizlein, Icon. t. 250, f. 1-14.—Maout & Decaisne, Bot. English ed. 324 & figs.—Baillon, Hist. Pl. iv, 398, f. 433-438.
- X. mite, Willdenow, Enum. 1013.—Poiret, Suppl. v, 622.—De Candolle, Prodr. i, 727.—Don, Miller's Dict. i, 802.—Loudon, Arboretum, i, 489.
- X. ramiflorum, Michaux, Fl. Bor.-Am. ii, 235.
- X. tricarpum, Hooker, Fl. Bor.-Am. i, 118 [not Michaux].
- Thylax fraxineum, Rafinesque, Med. Bot. ii, 114.

PRICKLY ASH. TOOTHACHE TREE.

Eastern Massachusetts, west to northern Minnesota, eastern Nebraska, and eastern Kansas, south to the mountains of Virginia and northern Missouri.

A small tree, not often 7 meters in height, with a trunk 0.15 to 0.20 meter in diameter; or, reduced to a shrub, 1.50 to 1.80 meter in height; common and reaching its greatest development in the region of the great lakes; rocky hillsides, or more often along streams and rich river bottoms.

Wood light, soft, coarse-grained; medullary rays numerous, thin; color, light brown, the sap-wood lighter; specific gravity, 0.5654; ash, 0.57.

The bark of Xanthoxylum, an active stimulant, is used in decoction to produce diaphoresis in cases of rheumatism, syphilis, etc., and as a popular remedy for toothache (U. S. Dispensatory, 14 ed. 940.—Bentley in London Pharm. Jour. 2 ser. v, 399.—Guibourt, Hist. Drogues, 7 ed. iii, 562.—Nat. Dispensatory, 2 ed. 1535).

23.-Xanthoxylum Clava-Herculis, Linnæus,

Spec. 1 ed. 270, in part.—B. S. Barton, Coll. i, 25, 52; ii, 38.—Willdenow, Spec. iv, 754, in part.—Aiton, Hort. Kew. 2 ed. v, 382.—Elliott, Sk. ii, 690.—Planchon & Triana in Ann. Sci. Nat. 5 ser. xiv, 312.

X. fraxinifolium, Walter, Fl. Caroliniana, 243 [not Marshall].

Fagara fraxinifolia, Lamarck, Ill. i, 334.

X. Carolinianum, Lamarck, Dict. ii, 39; Ill. 403, t. 811, f. 1.—Torrey & Gray, Fl. N. America, i, 214.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v, 213.—Gray, Genera, ii, 148, t. 156, f. 13, 14; Manual N. States, 5 ed. 110; Hall's Pl. Texas, 5.—Scheele in Romer, Texas, 432.—Nuttall, Sylva, iii, 8, t. 83; 2 ed. ii, 78, t. 83.—Darby, Bot. S. States, 253.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 66.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 103.—Wood, Cl. Book, 282; Bot. & Fl. 70.—Young, Bot. Texas, 194.—Vasey, Cat. Forest Trees, 8.

X. aromaticum, Willdenow, Spec. iv, 755 (excl. syn.).—Jacquin f. Eclogæ, i, 103, t. 70.

X. tricarpum, Michaux, Fl. Bor.-Am. ii, 235.—Poiret, Sappl. ii, 294.—Aiton, Hort. Kew. 2 ed. v, 383.—Pursh, Fl. Am. Sept. i, 210.—De Candolle, Prodr. i, 726.—Elliott, Sk. ii, 690.—A. de Jussien in Mem. Mus. xii, t. 25, f. 38.—Sprengel, Syst. i, 945.—Don, Miller's Dict. i, 803.—Spach, Hist. Veg. ii, 365.—Loudon, Arboretum, i, 488.—Eaton, Manual, 6 ed. 399.—Eaton & Wright, Bot. 482.—Dietrich, Syn. ii, 1000.

Kampmania fraxinifolia, Rafinesque, Med. Rep. v, 354.

Pseudopetalon glandulosum, Rafinesque, Fl. Ludoviciana, 108; Med. Bot. ii, 114.

Pseudopetalon tricarpum, Rafinesque, Fl. Ludoviciana, 108; Med. Bot. ii, 114.

X. Catesbianum, Rafinesque, Med. Bot. ii, 114.

TOOTHACHE TREE. PRICKLY ASH, SEA ASH, PEPPER WOOD, WILD ORANGE.

Southern Virginia, southward near the coast to bay Biscayne and Tampa bay, Florida, westward through the Gulf states to northwestern Louisiana, southern Arkansas (south of the Arkansas river), and the valley of the Brazos river, Texas.

A small tree, rarely 12 to 14 meters in height, with a trunk 0.30 meter in diameter, of very rapid growth; usually along streams and low, rich river bottoms, reaching its greatest development in southern Arkansas, Louisiana, and eastern Texas.

A form with trifoliate leaves is-

X. macrophyllum, Nuttall, Sylva, iii, 10; 2 ed. ii, 80.—Lesquereux in Owen's 2d Rep. Arkansas, 353.

X. Clava-Herculis, var. Watson in Proc. Am. Acad. xvii, 335.

Wood light, hard, not strong, soft, coarse-grained, not durable, containing many scattered open ducts; medullary rays numerous, thin; color, light brown, the sap-wood lighter; specific gravity, 0.5056; ash, 0.82.

X. Clava-Herculis probably possesses similar medicinal properties to those of the last species (Nat. Dispensatory 2 ed. 1535).

Var. fruticosum, Gray,

Smithsonian Contrib. iii, 30.—Torrey & Gray in Pacific R. R. Rep. ii, 161.—Torrey, Bot. Mex. Boundary Survey, 43.—Chapman, Fl. S. States, 66?—Wood, Bot. & Fl. 71.

X. hirsutum, Buckley in Proc. Philadelphia Acad. 1861, 450; 1870, 136 (see Gray in same, 1862, 162).—Young, Bot. Texas, 195.

Western Texas, Corpus Christi (Buckley), mouth of the Colorado river (Mohr), near Austin, and west to Devil's river and Eagle pass; Florida (?) (Chapman l. c.).

A low shrub, or on the Texas coast a small tree, 6 to 8 meters in height, with a trunk 0.20 to 0.30 meter in diameter.

Wood light, soft, close-grained, compact; medullary rays numerous, thin; color, light brown, the sap-wood yellow; specific gravity, 0.5967; ash, 0.76.

24.—Xanthoxylum Caribæum, Lamarck,

Dict. ii, 40.—Gærtner, Fruct. i, 333, t. 68, f. 8.—Descourtilz, Fl. Med. Antilles, ii, 58.—Planchon & Triana in Ann. Sci. Nat. 5 ser. xiv, 315.—Guibourt, Hist. Drogues, 7 ed. iii, 562.

- X. Clava-Herculis, Linnaus, Spec. 1 ed. 270, in part.—De Candolle, Prodr. i, 727.—Macfadyen, Fl. Jamaica, 194.—Grisebach, Fl. British West Indies, 138.
- X. lanceolatum, Poiret, Suppl. ii, 293.—De Candolle, Prodr. i, 727.
- X. Floridanum, Nuttall, Sylva, iii, 14, t. 85; 2 ed. ii, 85, t. 85.—Chapman, Fl. S. States, 66.—Wood, Bot. & Fl. 70.—Young, Bot. Texas, 194.—Vasey, Cat. Forest Trees, 8.

SATIN WOOD.

Semi-tropical Florida, south Bahia Honda and Boca Chica Keys; in the West Indies.

A small tree, 6 to 10 meters in height, with a trunk 0.30 to 0.40 meter in diameter.

Wood very heavy, exceedingly hard, not strong, brittle, fine-grained, compact, satiny, susceptible of a beautiful polish; medullary rays numerous, thin, conspicuous; color, light orange, the sap-wood lighter; specific gravity, 0.9002; ash, 2.02.

25.-Xanthoxylum Pterota, HBK.

Nov. Gen. & Spec. vi, 3.—Kunth, Syn. iii, 325.—De Candolle, Prodr. i, 725.—Torrey & Gray, Fl. N. America, i, 680.—Macfadyen, Fl. Jamaica, 190.—Nuttall, Sylva, iii, 11, t. 84; 2 ed. ii, 81, t. 84.—Seemann, Bot. Herald, 275.—Torrey, Bot. Mex. Boundary Survey, 43.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 66.—Young, Bot. Texas, 195.—Planchon & Triana in Ann. Sci. Nat. 5 ser. xiv, 311.—Engler in Martius, Fl. Brasil. xii², 154.—Vasey, Cat. Forest Trees, 8.—Hemsley, Bot. Am.-Cent. i, 169.—Watson in Proc. Am. Acad. xvii, 335.

Fagara Pterota, Linnæus, Amœn, v, 393, in part.—Lamarck, Diet. ii, 444; Ill. i, 335, t. 84.—Willdenow, Spec. i, 666.—Aiton, Hort. Kew. 2 ed. i, 263.—Titford, Hort. Bot. Am. 40.—Turpin, Diet. Sci. Nat. xvi, 107, t. 127.

Fagara lentiscifolia, Willdenow, Enum. i, 166.—Grisebach, Fl. British West Indies, 137.

WILD LIME.

Semi-tropical Florida, Mosquito inlet to the southern keys, on the west coast from about latitude 29° to cape Sable; southwestern Texas, and southward through Mexico to Brazil.

A small tree, sometimes 8 meters in height, with a trunk rarely exceeding 0.15 meter in diameter, or often reduced to a slender shrub; in Florida common, and reaching its greatest development on the keys of the west coast; in Texas not common, but widely distributed as a small shrub, or on the shores of Matagorda bay, west of the Nueces river, and in the valley of the Rio Grande a low tree.

Wood heavy, hard, close-grained, compact; medullary rays thin, numerous; color, brown tinged with red, the sap-wood yellow; specific gravity, 0.7444; ash, 0.78.

26.-Ptelia trifoliata, Linnæus,

Spec. 1 ed. 118.—Medicus, Bot. Beobacht. 215.—Marshall, Arbustum, 115.—Walter, Fl. Caroliniana, S8.—Aiton. Hort. Kew. i, 162; 2 ed. i, 264.—Lamarck, Ill. i, 336, t. 84.—Mench, Meth. 55.—Willdenow, Spec. i, 670; Enum. i, 116.—Nouveau Duhamel, i, 252, t. 57.—Michaux, Fl. Bor. Am. i, 99.—Schkuhr, Handb. 83, t. 83.—Poiret in Lamarck, Dict. v, 706.—Persoon, Syn. i, 145.—Desfontaines, Hist. Arb. ii, 343.—Robin, Voyages, iii, 509.—Pursh, Fl. Am. Sept. i, 107.—Nuttall, Genera, i, 104.—Guimpel, Otto & Hayne, Abb. Holz. 94, t. 74.—Hayne, Dend. Fl. 8.—Elliott, Sk. i, 201.—Rœmer & Schultes, Syst. iii, 291.—Torrey, Fl. U. S. 189; Compend. Fl. N. States, 86.—Fl. N. York, i, 133; Pacific R. R. Rep. iv, 73; Bot. Mex. Boundary Survey, 43.—De Candolle, Prodr. ii, 82.—Sprengel, Syst. i, 441.—Turpin, Dict. Sci. Nat. xliv, 2, t. 128.—A. de Jussieu in Mem. Mus. xii, t. 26, f. 42.—Beck in Am. Jour. Sci. 1 ser. x, 264; Bot. 71.—Don, Miller's Dict. i, 806.—Spach, Hist. Veg. ii, 369.—Hooker, Jour. Bot. i, 202.—Lindley, Fl. Med. 215.—Loudon, Arboretum, i, 489 & t.—Eaton, Manual, 6 ed. 288.—Torrey & Gray, Fl. N. America, i, 215.—Eaton & Wright, Bot. 379.—Dietrich, Syn. i, 497.—Browne, Trees of America, 153.—Scheele in Rœmer, Texas, 432.—Gray, Genera, ii, 150, t. 157; Manual N. States, 5 ed. 110.—Richardson, Arctic Exped. 423.—Parry in Owen's Rep. 610.—Agardh, Theor. & Syst. Pl. t. 19, f. 7, 8.—Cooper in Smithsonian Rep. 1858, 250.—Darby, Bot. S. States, 254.—Chapman, Fl. S. States, 66.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 107.—Lesquereux in Owen's 2d Rep. Arkansas, 353.—Wood, Ol. Book, 283; Bot. & Fl. 71.—Schnizlein, Icon. t. 250, f. 15-26.—Young, Bot. Texas, 195.—Baillon, Hist. Pl. iv, 395, f. 445, 446.—Koch, Dendrologie, i, 566.—Vasey, Cat. Forest Trees, 8.—Hemsley, Bot. Am.-Cent. i, 171.—Burgess in Coulter's Bot. Gazette, vii, 95.

Amyris elemifera, Linnæus, Spec. 2 ed. 295.—St. Hilaire, Fam. Nat. i, 253.

P. viticifolia, Salisbury, Prodr. 68.

HOP TREE. SHRUBBY TREFOIL. WAFER ASH.

Ontario and New York (banks of the Niagara river), Pennsylvania southward to northern Florida, west to Minnesota and the headwaters of the Canadian river; through western Texas to the valley of the Mimbres river, New Mexico (Bigelow), and southward into northern Mexico.

A small tree, sometimes 4 to 6 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or more often reduced to a slender shrub; shady, rocky hillsides.

A variety with more or less pubescent leaves, not rare on the south Atlantic coast, and the common form of western Texas, is—

var. mollis, Torrey & Gray, Fl. N. America, i, 680.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v, 213.—Torrey in Marcey's Rep. 282.—Gray in Smithsonian Contrib. iii, 31; Hall's Pl. Texas, 5.—Wood, Bot. & Fl. 71.—Watson in Proc. Am. Acad. xvii, 335.

P. mollis, Curtis in Am. Jour. Sci. 2 ser. vii, 406; Rep. Geological Surv. N. Carolina, 1860, iii, 107.—Walpers, Ann. ii, 259.—Chapman, Fl. S. States, 67.—Young, Bot. Texas, 196.

Wood heavy, hard, close-grained, compact, satiny, the annual growths clearly marked by two or three rows of open ducts; medullary rays few, thin; color, yellow-brown, the sap-wood hardly distinguishable; specific gravity, 0.8319; ash, 0.30.

The bark of the root possesses tonic properties and is employed by herbalists in the form of tinctures and fluid extracts in cases of dyspepsia, debility, etc. (Am. Jour. Pharm. 1862, 198; 1867, 337.—U. S. Dispensatory, 14 ed. 1740.—Nat. Dispensatory, 2 ed. 1179); the bitter fruit is occasionally used domestically as a substitute for hops.

27.-Canotia holocantha, Torrey,

Pacific R. R. Rep. iv, 68.—Gray in Ives' Rep. 15; Proc. Am. Acad. xii, 159.—Baillon, Adansonia, x, 18; Hist. Veg. vi, 7, 42.—Brewer & Watson, Bot. California, i, 190.—Rothrock in Wheeler's Rep. 24, 81, t. 1.—Maximowicz in Act. Hort. St. Petersburg v, 256.—Rusby in Bull. Torrey Bot. Club, ix, 106.

Arizona, White Mountain region, valley of the Gila river (Rothrock), valley of Bill Williams Fork (Bigelow).

A small tree, 6 to 8 meters in height, with a trunk sometimes 0.30 meter in diameter, or often a large shrub; dry, rocky mesas. Wood heavy, hard, close-grained, compact; medullary rays numerous, not prominent; color light brown, the sap-wood lighter; specific gravity, 0.6885; ash, 5.33.

SIMARUBEÆ.

28.-Simaruba glauca, De Candolle,

Diss. in Ann. Mus. xvii, 323; Prodr. i, 733.—Humboldt, Bonpland & Kunth, Nov. Gen. et Spec. vi, 16.—Descourtilz, Fl. Med. Antilles, i, 66, t. 14.—Planchon in London Jour. Bot. v, 567.—Gray, Genera, ii, 152.—Nuttall, Sylva, iii, 20, t. 87; 2 ed. ii, 88, t. 87.—Cooper in Smithsonian Rep. 1858, 264.—Grisebach, Fl. British West Indies, 139.—Chapman, Fl. S. States, 67.—Wood, Bot. & Fl. 72.—Planchon & Triana in Ann. Sci. Nat. 5 ser. xv, 357.—Engler in Martius, Fl. Brasil. xii², 223.—Vasey, Cat. Forest Trees, 8.—Hemsley, Bot. Am.-Cent. i, 173.

Quassia Simaruba, Linnæus, Suppl. 234.—Wright, Trans. Edinburgh Soc. ii, 73, t. 1, 2; Bot. & Med. Account of Q. Simaruba.—Gærtner, Fruct. i, 340, t. 70.—Lamarck, Ill. ii, 478, t. 343, f. 2.—Willdenow, Spec. ii, 568.—Aiton, Hort. Kew. 2 ed. iii, 42.—Descourtilz, Fl. Med. Antilles, i, 23, t. 5.

Quassia dioica, Bergius, Mat. Med. 355.

S. amara, Aublet, Guian. t. 331.—Hayne, Arzn. iv, t. 15.—Schnizlein, Icon. t. 249, f. 1-6.

S. medicinalis, Endlicher, Medz. Pf. 525.—Berg, Handb. i, 373.—Berg & Schmidt, Off. Gew. ii, t. 13.

PARADISE TREE.

Semi-tropical Florida, cape Canaveral to the southern keys; through the West Indies to Brazil.

A tree sometimes 15 meters in height, with a trunk 0.60 meter in diameter; within the United States not common, and reaching its greatest development on the shores of bay Biscayne.

Wood light, soft, not strong, coarse-grained, containing many large scattered open ducts; medullary rays few, thin; color, light brown, the sap-wood a little darker; specific gravity, 0.4136; ash, 0.93.

The bark of this species has been occasionally used as a substitute for that of S. officinalis, DC. as an aromatic, bitter tonic (U. S. Dispensatory, 14 ed. 838,—Nat. Dispensatory, 2 ed. 1294).

BURSERACEÆ.

29.-Bursera gummifera, Jacquin,

Am. Pict. t. 65.—Linnæus, Spec. 2 ed. 741.—Lamarck, Ill. ii, 392, t. 256.—Willdenow, Spec. iv, 1119.—Aiton, Hort. Kew. 2 ed. v, 481.—

*Titford, Hort. Bot. Am. 107.—De Candolle, Prodr. ii, 78.—Descourtilz, Fl. Med. Antilles, ii, t. 97.—Spach, Hist. Veg. ii, 239.—

Macfadyen, Fl. Jamaica, 229.—Nuttall, Sylva, ii, 117, t. 79; 2 ed. ii, 64, t. 79.—Richard, Fl. Cuba, 390.—Browne, Trees of America, 189.—Grisebach, Fl. British West Indies, 173.—Cooper in Smithsonian Rep. 1858, 264; 1860, 440.—Chapman, Fl. S. States, 68.—Wood, Bot. & Fl. 72.—Planchon & Triana in Ann. Sci. Nat. 5 ser. xv, 302.—Vasey, Cat. Forest Trees, 8.—Hemsley, Bot. Am.-Cent. i, 177.— Engler in De Candolle, Suites, iv, 39.

B. acuminata, Willdenow, Spec. iv, 1120.—De Candolle, Prodr. ii, 78.

Elaphrium integerrimum, Tulasne in Ann. Sci. Nat. 3 ser. vi, 369. (Fide Engler, L.c.)

GUM ELEMI, GUMBO LIMBO, WEST-INDIAN BIRCH.

Semi-tropical Florida, cape Canaveral to the southern keys, west coast Caloosa river and Caximbas bay; through the West Indies.

A tree often 18 meters in height, with a trunk 0.50 to 0.70 meter in diameter; one of the largest and most common trees of southern Florida, of very rapid growth and decay.

Wood very light, exceedingly soft and weak, spongy, containing many scattered open ducts; medullary rays numerous, thin; color, light brown or gray, quickly discoloring with decay; specific gravity, 0.3003; ash, 2.04; used in making live-fences, pieces of the trunk when planted in the coral rock of the keys throwing out roots and growing rapidly.

The aromatic resin obtained from this species was formerly somewhat used in various forms, under the name of Caranna, as a remedy for gout (Watts, Chem. Dict. i, 749.—Guibourt, Hist. Drogues, 7 ed. iii, 525, f. 749); and in the West Indies is manufactured into a valuable varnish. An infusion of the leaves is occasionally used as a domestic substitute for tea.

30.—Amyris sylvatica, Jacquin,

Am. Pict. t. 108.—Willdenow, Spec. ii, 333.—Aiton, Hort. Kew. 2 ed. ii, 351.—De Candolle, Prodr. ii, 81.—Dietrich, Syn. ii, 1271.—Macfadyen, Fl. Jamaica, 231.—Richard, Fl. Cuba, 393.—Grisebach, Fl. British West Indies, 174.—Planchon & Triana in Ann. Sci. Nat. 5 ser. xv, 321.—Vasey, Cat. Forest Trees, 8.

Toxicodendron arborescens, Miller, Dict. No. 9.

A. dyatripa, Sprengel, Neue Entdeck. iii, 48.—De Candolle, Prodr. ii, 81.

Rhus arborescens, De Candolle, Prodr. ii, 73.

- A. Plumieri, De Candolle, Prodr. ii, 81.
- A. Floridana, Nuttall in Am. Jour. Sci. v, 294; Sylva ii, 114, t. 78; 2 ed. ii, 61, t. 78.—De Candolle, Prodr. ii, 81.—Torrey & Gray, Fl. N. America, i, 221.—Eaton, Manual, 6 ed. 16.—Eaton & Wright, Bot. 123.—Loudon, Arboretum, ii, 561.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 68.—Wood, Bot. & Fl. 72.—Vasey, Cat. Forest Trees, 8.
- A. cymosa, Reichenbach in Sieb. Pl. Trin. No. 29 %.
- A. maritima, Richard, Fl. Cuba, 392 [not Jacquin].

TORCH WOOD.

Semi-tropical Florida, Mosquito inlet to the southern keys; in the West Indies.

A small tree sometimes 7 meters in height, with a trunk 0.20 to 0.25 meter in diameter; common.

Wood very heavy, exceedingly hard and strong, close-grained, compact, resinous, exceedingly durable, susceptible of a beautiful polish; medullary rays obscure; color, light orange, the sap-wood lighter; specific gravity, 1.0459; ash, 0.59.

MELIACEÆ.

31.—Swietenia Mahogoni, Linnæus,

Spec. 2 ed. 548.—Jacquin, Stirp. Am. t. 127.—Cavanilles, Diss. ii, 365, t. 209.—Gærtner, Fruct. ii, 89, t. 96.—Lamarck, Dict. iii, 678.—Willdenow, Spec. ii, 557.—Aiton, Hort. Kew. 2 ed. ii, 338.—Titford, Hort. Bot. Am. 64.—Descourtilz, Fl. Med. Antilles, ii, 125, t., 99.—De Candolle, Prodr. i, 625.—Turpin in Dict. Sci. Nat. Atlas, t. 170.—Tussac, Fl. Antilles, iv, t. 23.—Hayne, Arzn. i, t. 19.—Hooker, Bot. Misc. i, 21, t. 16, 17.—A. de Jussieu in Mem. Mus. xix, 248, t. 11.—Don, Miller's Dict. i, 687, f. 116.—Woodville, Med. Bot. 3 ed. iii, 620, t. 220.—Spach, Hist. Veg. iii, 164, t. 21.—Lindley, Fl. Med. 155.—Macfadyen, Fl. Jamaica, 175.—Torrey & Gray, Fl. N. America, i, 242.—Eaton, Manual, 6 ed. 360.—Eaton & Wright, Bot. 447.—Walpers, Rep. i, 436.—Nuttall, Sylva, ii, 98, t. 75; 2 ed. ii, 46, t. 75.—Richard, Fl. Cuba, 304.—Schnizlein, Icon. t. 226, f. 1.—Cooper in Smithsonian Rep. 1858, 264.—Darby, Bot. S. States, 263.—Chapman, Fl. S. States, 62.—Grisebach, Fl. British West Indies, 131.—Wood, Bot. & Fl. 66.—Baillon, Hist. Pl. v, 478, f. 472-476.—Guibourt, Hist. Drogues, 7 ed. iii, 596.—Tippel & Bollevar, Ausland. Cult. Pfl., Atlas, i, t. 2, f. 1.—C. De Candolle, Suites, i, 723.—Hemsley, Bot. Am.-Cent. i, 183.

S. Senegalensis, Desrousseaux in Lamarck, Diet. iii, 678.

Cedrus Mahogoni, Miller, Diet. No. 2.

MAHOGANY. MADEIRA.

Semi-tropical Florida, on the southern keys (Key Largo, Elliott's Key); through the West Indies, and in Central America.

A large tree, on the Florida keys rarely exceeding 15 meters in height, with a trunk sometimes 0.90 meter in diameter.

Wood heavy, exceedingly hard, very strong, brittle, very close-grained, compact, very durable, susceptible of a high polish; medullary rays numerous, obscure; color, rich reddish-brown, turning darker with age, the thin sapwood yellow; specific gravity, 0.7282; ash, 1.09; varying greatly in quality in different regions; largely used and preferred to all other woods for cabinet-making of all sorts, interior finish, etc.; formerly somewhat employed in ship-building.

OLACINEÆ.

32.-Ximenia Americana, Linnæus,

Spec. 1 ed. Appx. 1193.—Bartram, Travels, 2 ed. 112.—Lamarck, Iil. ii, 435, t. 297.—Willdenow, Spec. ii, 338.—Aiton, Hort. Kew. 2 ed. ii, 352.—De Candolle, Prodr. i, 533.—Nuttall, Sylva, i, 124, t. 36; 2 ed. i, 138, t. 36.—Schnizlein, Icon. t. 223, f. 1-9, 30, 31.—Cambessedes in St. Hilaire, Fl. Brasil. i, 341.—Wight & Walker-Arnott, Prodr. Fl. Penins. Or. i, 89.—Walpers, Rep. i, 377; Ann. vi, 565.—Richard, Fl. Cuba, 304.—Cooper in Smithsonian Rep. 1858, 264.—Grisebach, Fl. British West Indies, 310.—Baillon, Adansonia, ii, t. 9, f. 5, 6.—Chapman, Fl. 8. States, 61.—Engler in Martius, Fl. Brasil. xii, 9, t. 2, f. 1.—Vasey, Cat. Forest Trees, 8.—Hemsley, Bot. Am.-Cent. i, 185.

Heymassoli spinosa, Aublet, Guian. i, 324, t. 125.—Lamarck, Ill. ii, 435.

X. multiflora, Jacquin, Stirp. Am. 106, t. 177, f. 31.—Lamarck, Ill. ii, 435, t. 297, f. 1, 2.—Spach, Hist. Veg. xiii, 264.

X. montana, Macfadyen, Fl. Jamaica, i, 121.

WILD LIME. TALLOW NUT. HOG PLUM. MOUNTAIN PLUM.

Florida, east coast from the Saint John's river to the southern keys, west coast Caloosa river to Caximbas bay; through the West Indies to Brazil, and on the coast of the Indian peninsula (introduced?, A. De Candolle, Geog. Bot. ii, 1027).

A small, low, wide-spreading tree, rarely exceeding 4 meters in height, with a trunk 0.15 meter in diameter, or in pine-barren soil and toward its northern limits reduced to a low shrub; common and reaching its greatest development in Florida on the west coast.

Wood very heavy, tough, hard, close-grained, compact, containing numerous regularly-distributed open ducts; medullary rays few, thin; color, brown, tinged with red, the sap-wood lighter; specific gravity, 0.9196; ash, 0.73.

Hydrocyanic acid has been obtained from the edible plum-shaped fruit (Flückiger & Hanbury, Pharmacographia, 222).

ILICINEÆ.

33.-Ilex opaca, Aiton,

Hort. Kew. i, 169; 2 ed. i, 277.—Willdenow, Spec. i, 708; Enum. 172; Berl. Baumz. 190.—Nouveau Duhamel, i, 8.—Michaux, Fl. Bor.-Am. ii, 228.—Persoon, Syn. i, 151.—Poiret, Suppl. iii, 65.—Michaux f. Hist. Arb. Am. ii, 191, t. 11; N. American Sylva, 3 ed. ii, 122, t. 84.—Barton, Prodr. Fl. Philadelph. 95; Compend. Fl. Philadelph. 94.—Pursh, Fl. Am. Sept. i, 117.—Rafinesque, Fl. Ludoviciana, 111; Med. Bot. ii, 7, t. 53.—Nuttall, Genera, i, 109.—Rœmer & Schultes, Syst. iii, 487.—Link, Enum. 147.—James, Cat. 176; Long's Exped. ii, 294.—Hayne, Dend. Fl. 10.—Torrey in Ann. Lyc. N. York, ii, 173; Fl. U. S. 194; Compend. Fl. N. States, 87; Fl. N. York, ii, 2.— Elliott, Sk. ii, 679.—De Candolle, Prodr. ii, 14.—Sprengel, Syst. i, 495.—Watson, Dend. Brit. i, t. 3.—Beck, Bot. 230.—Eaton, Manual, 6 ed. 186.—Loudon, Arboretum, ii, 516 & t.—Hooker, Fl. Bor.-Am. i, 121; Jour. Bot. i, 201.—Eaton & Wright, Bot. 282.—Bigelow, Fl. Boston. 3 ed. 64.—Don, Miller's Dict. ii, 17.—Spach, Hist. Veg. ii, 427.—Dietrich, Syn. i, 554.—Griffith, Med. Bot. 432.—Emerson, Trees Massachusetts, 341; 2 ed. ii, 385 & t.—Browne, Trees of America, 167.—Darby, Bot. S. States, 426.—Darlington, Fl. Cestrica, 3 ed. 17.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 269.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 58.—Lesquereux in Owen's 2d Rep. Arkansas, 373.—Wood, Cl. Book, 496; Bot. & Fl. 207.—Gray, Manual N. States, 5ed. 306.—Young, Bot. Texas, 372.—Vasey, Cat. Forest Trees, 8.—Maximowicz in Mem. Acad. St. Petersburg, xxix, No. 3, 29.—Mellichamp in Bull. Torrey Bot. Club, viii, 113.

- I. aquifolium, Marshall, Arbustum, 63 [not Linnæus].-Walter, Fl. Caroliniana, 241.
- I. Canadensis, Marshall, Arbustum, 64.
- I. laxiflora, Lamarck, Diet. iii, 147; Ill. i, 355.—Pursh, Fl. Am. Sept. i, 117.—Ræmer & Schultes, Syst. iii, 494; Mant. 334.—De Candolle, Prodr. ii, 14.—Sprengel, Syst. i, 495.—Don, Miller's Diet. ii, 17.—Spach, Hist. Veg. ii, 427.—Dietrich, Syn. i, 555.—Loudon, Arboretum, ii, 517.—Eaton, Manual, 6 ed. 186.—Eaton & Wright, Bot. 282.
- I. quercifolia, Meerburgh, Icon. ii, t. 5.

Ageria opaca, Rafinesque, Sylva Telluriana, 47.

AMERICAN HOLLY.

Quincy, Massachusetts, southward, near the coast, to Mosquito inlet and Charlotte harbor, Florida, valley of the Mississippi river, southern Indiana southward to the gulf of Mexico, and southwest through Missouri, Arkansas, and eastern Texas to the valley of the Colorado river.

An evergreen tree, sometimes 15 meters in height, with a trunk 0.30 to 1.20 meter in diameter, or toward its northern limits reduced to a shrub; generally in low, rather moist soil; most common and reaching its greatest development in the rich bottoms of southern Arkansas and eastern Texas.

Wood light, soft, not strong, tough, rather hard, close-grained, very compact, easily worked; medullary rays numerous, inconspicuous; color, nearly white, turning to light brown with exposure, the sap-wood still lighter; specific gravity, 0.5818; ash, 0.76; used and admirably adapted for cabinet work, interior finish, and turnery of the highest class.

A bitter principle (*Ilicin*), common to other species of the genus, has been obtained from the fruit of this tree (Am. Jour. Pharm. xxviii, 314.—U. S. Dispensatory, 14 ed. 1670.—Nat. Dispensatory, 2 ed. 754).

34.—Ilex Dahoon, Walter,

- Fl. Caroliniana, 241.—Michaux, Fl. Bor.-Am. ii, 228.—Pursh, Fl. Am. Sept. i, 117.—Nuttall, Genera, i, 109.—Rœmer & Schultes, Systiii, 489; Mant. 332.—De Candolle, Prodr. ii, 14.—Elliott, Sk. ii, 680.—Watson, Dend. Brit. ii, t. 114.—Sprengel, Syst. i, 495.—Audubon, Birds, t. 48.—Don, Miller's Dict. ii, 19.—Hooker, Jour. Bot. i, 202.—Eaton, Manual, 6 ed. 186.—Eaton & Wright, Bot. 282.—Spach, Hist. Veg. ii, 428.—Dietrich, Syn. i, 554.—Loudon, Arboretum, ii, 519.—Griffith, Med. Bot. 433.—Darby, Bot. S. States, 426.—Chapman, Fl. S. States, 269.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 58.—Wood, Bot. & Fl. 207.—Gray, Manual N. States, 5 ed. 306.—Vasey, Cat. Forest Trees, 8.—Maximowicz in Mem. Acad. St. Petersburg, xxix, No. 3, 29.—Nat. Dispensatory, 2 ed. 755.
 - I. Cassine, Linnæus, Spec. 125, in part.—Marshall, Arbustum, 64.—Aiton, Hort. Kew. i, 170, in part; 2 ed. i, 279.—Lamarck, Diet. iii, 147; Ill. i, 355.—Willdenow, Spec. i, 709; Enum. i, 172; Hort. Berol. i, t. 31.—Nouveau Duhamel, i, 9.—Persoon, Syn. 151.—Desfontaines, Hist. Arb. ii, 362.—Poiret, Suppl. iii, 65.—Pursh, Fl. Am. Sept. i, 117.—Ræmer & Schultes, Syst. iii, 490.—Hayne, Dend. Fl. 10.—De Candolle, Prodr. ii, 14.—Sprengel, Syst. i, 495.—Don, Miller's Diet. ii, 17.—Spach, Hist. Veg. ii, 426.—Dietrich, Syn. i, 544—Loudon, Arboretum, ii, 517, f. 184.—Eaton & Wright, Bot. 282.—Gæppert in Del. Sem. Vratisl. 1885 (Linnæa, xxvi, 746).
 - I. Cassine, var. latifolia, Aiton, Hort. Kew. 2 ed. i, 278.
 - I. cassinoides, Link, Enum. i, 148.—Ræmer & Schultes, Syst. iii; Mant. 332.
 - I. laurifolia, Nuttall in Am. Jour. Sci. I ser. v, 289.—Eaton, Manual, 6 ed. 186.—Eaton & Wright, Bot. 282.

Ageria palustris, Rafinesque, Sylva Telluriana, 47.

Ageria obovata, Rafinesque, Sylva Telluriana, 47.

Ageria heterophylla, Rafinesque, Sylva Telluriana, 48.

DAHOON. DAHOON HOLLY.

Southern Virginia, southward near the coast to Mosquito inlet and Tampa bay, Florida, west along the Gulf coast to the prairie region of western Louisiana.

A small tree, sometimes 8 meters in height, with a trunk from 0.20 to 0.30 meter in diameter; low, wet soil; not common, and running into numerous forms, of which the best marked are—

var. angustifolia, Torrey & Gray, Fl. N. America, ined.

- I. Cassine, var. angustifolia, Willdenow, Spec. i, 709.—Aiton, Hort. Kew, 2 ed. i, 278.—Nouveau Duhamel, i, 9, t. 3.
- I. angustifolia, Willdenow, Enum. i, 172.—Pursh, Fl. Am. Sept. i, 118.—Nuttall, Genera, i, 109.—Romer & Schultes, Syst. iii, 489.—De Candolle, Prodr. ii, 14.—Watson, Dend. Brit. i, t. 4.—Sprengel, Syst. i, 495.—Don, Miller's Dict. ii, 17.—Hooker, Jour. Bot. i, 201.—Spach, Hist. Veg. ii, 428.—Dietrich, Syn. i, 554.—Loudon, Arboretum, ii, 517, f. 185.

- I. ligustrina, Elliott, Sk. ii, 708 [not Jacquin].—Spach, Hist. Veg. ii, 429.—Eaton, Manual, 6 ed. 187.—Eaton & Wright, Bot. 282.—Darby, Bot. S. States, 123.
- 9 I. Watsoniana, Spach, Hist. Veg. ii, 429.

Var. myrtifolia (only in low cypress swamps and ponds), Chapman, Fl. S. States, 269.—Nat. Dispensatory, 2 ed. 755.

- I. myrtifolia, Walter, Fl. Caroliniana, 214.—Nouveau Duhamel, i, 10, t. 4.—Michaux, Fl. Bor.-Am. ii, 229.—Poiret, Suppliii, 65.—Willdenow, Enum. Suppl. 8.—Rœmer & Schultes, Syst. iii, 489.—Link, Enum. 148.—Spach, Hist. Veg. ii, 429.—Eaton, Manual, 6 ed. 187.—Eaton & Wright, Bot. 282.—Darby, Bot. S. States, 426.—Gray, Manual N. States, 5 ed. 306.—Maximowicz in Mem. Acad. St. Petersburg, xxix, No. 3, 26.
- I. rosmarifolia, Lamarek, Ill. i. 356.—Persoon, Syn. i, 151.—Poiret, Suppl. iii, 65,
- I. ligustrifolia, Don, Miller's Dict. ii, 19.—Eaton, Manual, 6 ed. 187.—Wood, Cl. Book, 497; Bot. & Fl. 207.

Wood light, soft, not strong, close-grained, compact; medullary rays numerous, thin; color, light brown, the sap-wood nearly white; specific gravity, 0.4806; ash, 0.91; that of var. myrtifolia heavier, nearly white; specific gravity, 0.5873; ash, 0.90.

35.—Ilex Cassine, Walter,

- Fl. Caroliniana, 241.—Aiton, Hort. Kew. i, 170, in part.—James, Cat. 176; Long's Exped. ii, 294.—Hooker, Jour. Bot. i, 202.—Eaton, Manual, 6 ed. 186.—Chapman, Fl. S. States, 269.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 59.—Lesquereux in Owen's 2d Rep. Arkansas, 373.—Wood, Bot. & Fl. 208.—Gray, Manual N. States, 5 ed. 306.—Young, Bot. Texas, 373.—Maximowicz in Mem. Acad. St. Petersburg, xxix, No. 3, 22.
 - Cassine, β. Linnæus, Spec. 1 ed. 125.

Cassine Peragua, Linnaus, Mant. ii, 220.—Marshall, Arbustum, 26.—Plenck, Icon. t. 239.

Cassine Caroliniana, Lamarck, Diet. i, 652

- I. vomitoria, Aiton, Hort. Kew. i, 170; 2 ed. i, 278.—Salisbury, Prodr. 70.—Willdenow, Spec. i, 709.—Enum. Suppl. 8.—
 B. S. Barton, Coll. i, 36, 56.—Nouveau Duhamel, i, 10.—Persoon, Syn. i, 151.—Desfontaines, Hist. Arb. ii, 362.—
 Titford, Hort. Bot. Am. 41.—Pursh, Fl. Am. Sept. i, 118.—Nuttall, Genera, i, 109.—Ræmer & Schultes, Syst. iii, 491;
 Mant. 333.—De Candolle, Prodr. ii, 14.—Sprengel, Syst. i, 495.—Torrey in Ann. Lyc. N. York, ii, 173.—Don, Miller's Dict. ii, 17.—Hooker, Jour. Bot. i, 202.—Spach, Hist. Veg. ii, 430.—Lindley, Fl. Med. 393.—Dietrich, Syn. i, 555.—
 Loudon, Arboretum, ii, 518, f. 186.—Eaton, Manual, 6 ed. 187.—Eaton & Wright, Bot. 282.—Griffith, Med. Bot. 433.—Browne, Trees of America, 169.—Guibourt, Hist. Drogues, 7 ed. iii, 544.
- I. ligustrina, Jacquin, Coll. iv, 105; Icon. Rar. ii, 9, t. 310 [not Elliott].—Lamarck, Ill. i, 356.
- I. Floridana, Lamarck, Ill. i, 356.
- I. Cassena, Michaux, Fl. Bor.-Am. ii, 229.—Poiret, Suppl. iii, 65.—Rœmer & Schultes, Syst. iii, 490.—Elliott, Sk. ii, 681.—Darby, Bot. S. States 426.—Wood, Cl. Book, 497.

I. religiosa, Barton, Fl. Virginica, 66.

Cassine ramulosa, Rafinesque, Fl. Ludoviciana, 363.

Hierophyllus Cassine, Rafinesque, Med. Bot. ii, 8.

Emetila ramulosa, Rafinesque, Sylva Telluriana, 45.

Ageria Cassena, Rafinesque, Sylva Telluriana, 47.

Ageria geminata, Rafinesque, Sylva Telluriana, 48.

CASSENA. YAUPON. YOPON.

Southern Virginia, southward, near the coast, to the Saint John's river and Cedar Keys, Florida, west along the Gulf coast to southern Arkansas, and the valley of the Colorado river, Texas.

A small tree, 6 to 8 meters in height, with a trunk 0.10 to 0.15 meter in diameter, or more often a shrub, sending up many slender stems and forming dense thickets; sandy, moist soil, along ponds and streams, reaching its greatest development in the river bottoms of eastern Texas.

Wood heavy, hard, close-grained, liable to check in drying; medullary rays numerous, conspicuous; color, nearly white, becoming yellow with exposure, the sap-wood lighter; specific gravity, 0.7270; ash, 0.87.

The leaves possess powerful emetic properties, and were employed by the southern Indians, together perhaps with those of *I. Dahoon*, in the preparation of their "black drink" (Am. Jour. Pharm. xliv, 217.—U. S. Dispensatory, 14 ed. 1670.—Nat. Dispensatory, 2 ed. 754).

36.-Ilex decidua, Walter,

- Fl. Caroliniana, 241.—Poiret, Suppl. iii, 65.—Chapman, Fl. S. States, 269.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 59.—Lesquereux in Owen's 2d Rep. Arkansas, 373.—Wood, Cl. Book, 497; Bot. & Fl. 208.—Gray, Manual N. States, 5 ed. 306.—Young, Bot. Texas, 373.—Vasey, Cat. Forest Trees, 8.—Maximowicz in Mem. Acad. St. Petersburg, xxix, No. 3, 30.—Watson in Proc. Am. Acad. xvii, 335.
 - I. prinoides, Aiton, Hert. Kew. i, 169; 2 ed. i, 278.—Lamarck, Ill. i, 355.—Willdenow, Spec. i, 709.—Nouveau Duhamel, i, 11.—Michaux, Fl. Bor.-Am., ii, 229.—Persoon, Syn. i, 151.—Desfontaines, Hist. Arb. ii, 362.—Pursh, Fl. Am. Sept. i, 118.—Nuttall, Genera, i, 109.—Remer & Schultes, Syst. iii, 488; Mant. 332.—Watson, Dend. Brit. i, t. 15.—Sprengel, Syst. i, 495.—Audubon, Birds, t. 89.—Eaton, Manual, 6 ed. 187.—Eaton & Wright, Bot. 282.—Darby, Bot. S. States, 426.
 - I. astivalis, Lamarck, Diet. iii, 147; Ill. i, 356.
 - Prinos deciduus, De Candolle, Prodr. ii, 16.—Don, Miller's Dict. ii, 20.—Hooker, Jour. Bot. i, 202.—Loudon, Arboretum, ii, 520.
 - I. ambiguus, Elliott, 8k. ii, 705.

Southern Virginia, southward, through the middle districts, to western Florida, valley of the Mississippi river, southern Illinois southward to the Gulf of Mexico, and through southeastern Missouri, Arkansas, and eastern Texas to the valley of the Colorado river.

A small tree, 8 to 9 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or in the Atlantic states a tall, straggling shrub; low, wet woods along streams, reaching its greatest development in the Iron Mountain region of Missouri and in southern Arkansas.

Wood heavy, hard, close-grained, compact; medullary rays numerous, thin; color, creamy-white, the sap-wood lighter; specific gravity, 0.7420; ash, 0.70.

CYRILLACE E.

37.-Cyrilla racemiflora, Linnæus,

Mant. i, 50; Syst. 14 ed. 241.—Jacquin, Icon. Rar. t. 47; Coll. i, 162.—Walter, Fl. Caroliniana, 103.—Lamarck, Dict. ii, 245; Ill. ii, 144, t. 147, f. 2.—Nouveau Duhamel, i, 215, t. 46.—Desfontaines, Hist. Arb. i, 255.—Elliott, Sk. i, 294.—Eaton, Manual, 6 ed. 119.—Eaton & Wright, Bot. 218.—Torrey & Gray, Fl. N. America, i, 256.—Nuttall, Sylva, ii, 96, t. 74; 2 ed. ii, 43, t. 74.—Planchon in Hooker's Jour. Bot. v, 254.—Schnizlein, Icon. t. 240, f. 1-4, 6, 17, 19, 21.—Darby, Bot. S. States, 417.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 272.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 105.—Porcher, Resources S. Forests, 130.—Maout & Decaisne, Bot. English ed. 540 & f.—Baillon, Adansonia, i, 203, t. 4.—Wood, Cl. Book, 493; Bot. & Fl. 205.—Vasey, Cat. Forest Trees, 18.

Andromeda plumata, Bartram, Cat.—Marshall, Arbustum, 9.

- C. Caroliniana, Michaux, Fl. Bor.-Am. i, 158.—Gærtner, f. Fruct. Suppl. 147, t. 209, f. 8.—Persoon, Syn. i, 175.—Pursh, Fl. Am. Sept. i, 170.—Nuttall, Genera, i, 145.—Poiret, Suppl. ii, 436.—Ræmer & Schultes, Syst. v, 408.—Bot. Mag. t. 2456.—Walpers, Rep. vi, 421.—Dietrich, Syn. i, 805.
- Itea Cyrilla, L'Heritier, Stirp. i, 137, t. 66.—Swartz, Prodr. 50; Fl. Ind. Occ. i, 506; Obs. 94, t. 4.—Willdenow, Spec. i, 1146.—Aiton, Hort. Kew. 2 ed. ii, 37.
- U. racemosa, Loudon, Arboretum, iv, 2577, f. 2503.
- C. polystachia, C. parvifolia, C. fuscata, Rafinesque, Aulikon Botanikon, 8.

IRON WOOD.

North Carolina southward, near the coast, to middle Florida (latitude 30°), westward, along the Gulf coast, to the valley of the Pearl river, Mississippi.

A small tree, sometimes 8 to 10 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or often a tall shrub, sending up many stems from the root; open swamps and low thickets; a variety (*Chapman*, *Curtiss*) with narrower, persistent leaves, and thicker spongy bark, in pond holes and wet depressions of the pine barrens of the Apalachicola region of western Florida, forms dense, impenetrable thickets.

Wood heavy, weak, hard, close-grained, compact; medullary rays thin, not conspicuous; color, brown tinged with red, the sap-wood a little lighter; specific gravity, 0.6784; ash, 0.42.

38.—Cliftonia ligustrina, Banks,

Ex. Gærtner f. Fruct. Suppl. 246, t. 225.—Bartram, Travels, 2 ed. 31.—Torrey & Gray, Fl. N. America, i, 256.—Nuttall, Sylva, ii, 92, t. 73; 2 ed. ii, 39, t. 73.—Planchon in Hooker's Jour. Bot. v. 255.—Walpers, Rep. vi, 422.—Dietrich, Syn. ii, 1412.—Schnizlein. Icon. t. 240**x, f. 5, 7-10, 20.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 273.—Porcher, Resources S. Forests, 130.—Baillon in Adansonia, i, 202, t. 4, f. 3-6.—Vasey, Cat. Forest Trees, 18.

Mylocaryum ligustrinum, Willdenow, Enum. i, 454.—Bot. Mag. t. 1625.—Lamarck, Ill. iii, 616, t. 952, f. 1.—Pursh, Fl. Am. Sept. i, 302, t. 14.—Poiret, Suppl. iv, 41.—Elliott, Sk. i, 508.—Eaton, Manual, 6 ed. 231.—Eaton & Wright, Bot. 323.—Darby, Fl. S. States, 417.—Wood, Cl. Book, 493; Bot. & Fl. 205.

TITI. IRON WOOD. BUCKWHEAT TREE.

Valley of the Savannah river, Georgia, southward to the Chattahoochee region of west Florida, westward along the Gulf coast to the valley of the Pearl river, Louisiana.

A small tree, sometimes 12 meters in height, with a trunk 0.30 to 0.40 meter in diameter, or toward its southern limits in Florida reduced to a shrub; margins of pine-barren ponds and streams.

Wood heavy, soft, not strong, close-grained, compact; medullary rays numerous, thin; color, brown tinged with red, the sap-wood lighter; specific gravity, 0.6249; ash, 0.42; largely used as fuel, burning with a clear flame.

. CELASTRACEÆ.

39.-Euonymus atropurpureus, Jacquin.

Hort. Vind. ii, 155, t. 120.—Lamarck, Dict. ii, 573; Ill. ii, 98.—Aiton, Hort. Kew. i, 274; 2 ed. ii, 29.—Willdenew, Spec. i, 1132; Enum. i, 256.—Michaux, Fl. Bor.-Am. i, 155.—Persoon, Syn. i, 243.—Nouveau Duhamel, iii, 26.—Desfontaines, Hist. Arb. ii, 356.—Pursh, Fl. Am. Sept. i, 168.—Turpin, Dict. Sci. Nat. xvii, 532, t. 272.—Eaton, Manual, 28; 6 ed. 140.—Nuttall, Genera, 155.—Ræmer & Schultes, Syst. v, 466.—Hayne, Dend. Fl. 24.—Elliott, Sk. i, 293.—De Candolle, Prodr. ii, 4.—Torrey in Ann. Lyc. N. York, ii, 173; Fl. U. S. 261; Compend. Fl. N. States, 120; Fl. N. York, i, 141; Nicollet's Rep. 147.—Sprengel, Syst. i, 788.—Don, Miller's Dict. ii, 5.—Beck, Bot. 72.—Hooker, Jour. Bot. i, 201.—Spach, Hist. Veg. ii, 405.—Rafinesque, New Fl. 60.—Loudon, Arboretum, ii, 499, f. 167.—Torrey & Gray, Fl. N. America, i, 257.—Dietrich, Syn. i, 819.—Eaton & Wright, Bot. 240.—Griffith, Med. Bot. 219, f. 112.—Gray, Genera, ii, 188; Manual N. States, 5 ed. 116.—Richardson, Arctic Exped. 423.—Parry in Owen's Rep. 610.—Darby, Bot. S. States, 268.—Darlington, Fl. Cestrica, 3 ed. 48.—Baillon in Bull. Soc. Bot. France, v, 314.—Chapman, Fl. S. States, 76.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 102.—Lesquereux in Owen's 2d Rep. Arkansas, 354.—Wood, Cl. Book, 289; Bot. & Fl. 76.—Porcher, Resources S. Forests, 129.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187.—Koch, Dendrologie, i, 629.—Young, Bot. Texas, 205.—Vasey, Cat. Forest Trees, 9.

E. Carolinensis, Marshall, Arbustum, 43.

E. latifolius, Marshall, Arbustum, 44 [not Aiton].-Agardh, Theor. & Syst. Pl. t. 22, f. 4.

BURNING BUSH. WAHOO. SPINDLE TREE, ARROW WOOD.

Western New York, west to the valley of the upper Missouri river (Fort Union), Montana, southward to northern Florida, southern Arkansas, and eastern Kansas.

A small tree, rarely 6 to 8 meters in height, with a trunk 0.15 meter in diameter, or more often a shrub 2 to 3 meters in height; low, rich woods, reaching its greatest development west of the Mississippi river.

Wood heavy, very close-grained, liable to check badly in seasoning; medullary rays hardly discernible; color, white tinged with orange; specific gravity, 0.6592; ash, 0.58.

Wahoo bark, a mild but rather uncertain purgative, is used by herbalists in the form of decoctions, tinctures, fluid extracts, etc. (Am. Jour. Pharmacy, xx, 80.—U. S. Dispensatory, 14 ed. 402.—Nat. Dispensatory, 2 ed. 559).

40.-Myginda pallens, Smith,

Rees' Cycl. xxv, No. 4.—De Candolle, Prodr. ii, 13.—Dietrich, Syn. i, 554.—Grisebach, Fl. British West Indies, 146.—Chapman in Coulter's Bot. Gazette, iii, 3; Fl. S. States, Suppl. 612.

Semi-tropical Florida, Upper Metacombe Key; in the West Indies.

A small tree, rarely exceeding 4 meters in height, with a trunk 0.15 meter in diameter.

Wood very heavy, hard, very close-grained, compact, satiny; layers of annual growth and numerous medullary rays hardly distinguishable; color, dark brown or nearly black, the thick sap-wood lighter brown tinged with red; specific gravity, 0.9048; ash, 3.42.

41.—Schæfferia frutescens, Jacquin,

Stirp. Am. 259.—Gærtner f. Fruct. Suppl. 249, t. 225, f. 7.—Lamarck, Ill. iii, 402, t. 809.—Poiret in Lamarck, Diet. vi, 727.—De Candolle, Prodr. ii, 41.—Karsten, Fl. Columbiæ, i, t. 91.—Chapman, Fl. S. States, 76.—Grisebach, Fl. British West Indies, 146.—Walpers, Ann. vii, 581.

S. completa, Swartz, Fl. Ind. Occ. i, 327, t. 7, f. A.—Willdenow, Spec. iv, 741.—Aiton, Hort. Kew. 2 ed. v, 371.—Macfadyen, Fl. Jamaica, 207.

S. buxifolia, Nuttall, Sylva, ii, 42, t. 56; 2 ed. i, 190, t. 56.—Cooper in Smithsonian Rep. 1858, 264.

YELLOW WOOD. BOX WOOD.

Semi-tropical Florida, southern keys from Metacombe Key eastward, Caloosa river and sparingly on the Reef Keys; in the West Indies.

A small tree, occasionally 10 meters in height, with a trunk 0.15 to 0.20 meter in diameter, generally hollow and defective.

Wood heavy, hard, close-grained, compact, susceptible of a high polish; medullary rays numerous, obscure; color, light bright yellow, the sap-wood a little lighter; specific gravity, 0.7745; ash, 2.54.

RHAMNACEÆ.

42.—Reynosia latifolia, Grisebach,

Cat. Pl. Cuba, 34.—Eggers, Videnskab, Medd. fra. Nat. For. 173 & t.; Bull. U. S. Nat. Mus. xiii, 40.—Gray in Coulter's Bot. Gazette, iv, 208.—Chapman, Fl. S. States, Suppl. 612.

? Rhamnus lævigatus, Vahl, Symbolæ, iii, 41.

Ceanothus lævigatus, De Candolle, Prodr. ii, 30.

Scutia ferrea, Chapman, Fl. S. States, 72 [not Brongniart].

? Rhamindium revolutum, Chapman, Fl. S. States, Suppl. 612.

RED IRON WOOD. DARLING PLUM.

Semi-tropical Florida, Miami (*Garber*), bay Biscayne, and on the southern keys (*Curtiss*); in the West Indies. A small tree, sometimes 8 meters in height, with a trunk 0.15 to 0.20 meter in diameter.

Wood heavy, exceedingly hard, strong, close-grained, compact; medullary rays numerous, thin; color, rich dark brown, the sap-wood light brown; specific gravity, 1.0715; ash, 3.20.

The edible fruit, ripening in April and May, of agreeable flavor.

43.-Condalia ferrea, Grisebach,

Fl. British West Indies, 100.—Walpers, Ann. vii, 588.—Gray in Coulter's Bot. Gazette, iv, 208.—Chapman, Fl. S. States, Suppl. 612.

Rhamnus ferrea, Vahl, Symbolæ, iii, 41, t. 58.

Zizyphus emarginatus, Swartz, Fl. Ind. Occ. iii, 1954.

Ceanothus ferreus, De Candelle, Prodr. ii, 30.

Scutia ferrea, Brongniart in Ann. Sci. Nat. 1 ser. x, 363 [not Chapman, Fl. S. States, 72].—Vasey, Cat. Forest Trees, 9.

BLACK IRON WOOD.

Semi-tropical Florida, cape Canaveral to bay Biscayne, on the southern keys; in the West Indies.

A small tree, sometimes 11 meters in height, with a trunk 0.25 to 0.38 meter in diameter, generally hollow and defective; common.

Wood exceedingly heavy and hard, strong, brittle, close-grained, compact, difficult to work; remarkable for the large percentage of ash; medullary rays very numerous, thin; color, rich orange-brown, the sap-wood lighter; specific gravity, 1.3020; ash, 8.31.

44.—Condalia obovata, Hooker,

Icon. t. 287.—Torrey & Gray, Fl. i, 685.—Gray in Jour. Boston Soc. Nat. Hist. vi, 169; Genera, ii, 172, t. 164; Smithsonian Contrib. iii, 32; v, 27; Hall's Pl. Texas, 5.—Torrey, Bot. Mex. Boundary Survey, 47.—Watson in Proc. Am. Acad. xvii, 336.

BLUE WOOD. LOGWOOD. PURPLE HAW.

Eastern and southwestern Texas, westward through southern New Mexico to southern Arizona; probably extending into northern Mexico.

A small tree, 6 to 10 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or often a shrub; reaching its greatest development along the streams of eastern Texas; one of the common "chaparral" plants of western Texas, here forming dense, impenetrable thickets.

Wood very heavy, hard, close-grained, liable to check in seasoning, containing many groups of large irregularly-arranged open ducts; medullary rays numerous, obscure; color, light red, the sap-wood light yellow; specific gravity, 1.1999; ash, 7.03.

45.—Rhamnus Caroliniana, Walter,

Fl. Caroliniana, 101.—Lamarck, Ill. ii, 88; Dict. iv, 476.—Michaux, Fl. Bor.-Am. i, 153.—Nouveau Duhamel, iii, 47.—Persoon. Syn. i, 239.—Pursh, Fl. Am. Sept. i, 166.—Nuttall, Genera, i, 153.—Rœmer & Schultes, Syst. v, 285.—Elliott, Sk. i, 289.—De Candolle, Prodr. ii, 26.—Sprengel, Syst. i, 768.—Torrey in Ann. Lyc. N. York, ii, 174.—Don, Miller's Dict. ii, 32.—Hooker, Jour. Bot. i, 202.—Torrey & Gray, Fl. N. America, i, 262.—Dietrich, Syn. i, 807.—London, Arboretum, ii, 537.—Eaton, Manual, 6 ed. 300.—Eaton & Wright, Bot. 390.—Scheele in Rœmer, Texas, 432.—Nuttall, Sylva, ii, 50, t. 59; 2 ed. i, 198, t. 59.—Darby, Bot. S. States, 269.—Lesquereux in Owen's 2d Rep. Arkansas, 354.—Wood, Cl. Book, 219; Bot. & Fl. 77.—Koch, Dendrologie, i, 610.—Gray, Hall's Pl. Texas, 5.

? Frangula fragillis, Rafinesque, Fl. Ludoviciana, 320; Sylva Telluriana, 27.

Sarcomphalus Carolinianus, Rafinesque, Sylva Telluriana, 29.

Frangula Caroliniana, Gray, Genera, ii, 178, t. 167; Manual N. States, 5 ed. 115.—Torrey, Bot. Mex. Boundary Survey, 46.—Cooper in Smithsonian Rep. 1858, 251.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 92.—Chapman, Fl. S. States, 73.—Vasey, Cat. Forest Trees, 9.

INDIAN CHERRY.

Long Island, New York, west along the valley of the Ohio river to southern Illinois, Missouri south of the Meramec river, eastern Kansas, and the Indian territory, south to northern Florida (latitude 30°), and through the Gulf states to western Texas.

A small tree, 6 to 10 meters in height, with a trunk 0.20 to 0.30 meter in diameter, or in the Atlantic states generally a tall shrub; rich woods along streams and river bottoms, reaching its greatest development in southern Arkansas and eastern Texas.

Wood light, hard, not strong, coarse-grained, compact; medullary rays numerous, thin; color, light brown, the sap-wood lighter; specific gravity, 0.5462; ash, 0.64.

The edible fruit sweet and agreeable.

46.—Rhamnus Californica, Eschscholtz,

Mem. Acad. St. Petersburg, x, 281 (Linnaa Litt.-Ber. 1828, 149.—Presl, Rep. Bot. i, 197).—Don, Miller's Dict. ii, 32.—Torrey & Gray, Fl. N. America, i, 263.—Dietrich, Syn. i, 806.—Eaton & Wright, Bot. 390.—Brewer & Watson, Bot. California, i, 101.—Hemsley, Bot. Am.-Cent. i, 197.

R. oleifolius, Hooker, Fl. Bor.-Am. i, 123, t. 44.—Hooker & Arnott, Bot. Beechey, 136, 328.—Torrey & Gray, Fl. N. America, i, 260.—Eaton & Wright, Bot. 390.—Bentham, Bot. Sulphur, 10; Pl. Hartweg. 302.—Durand in Jour. Philadelphia Acad. 1855, 85.—Carrière in Rev. Hort. xlvi, 354, f. 47-49.

Endotropis oleifolia, Rafinesque, Sylva Telluriana, 31.

R. laurifolius, Nuttall in Torrey & Gray, Fl. N. America, i, 260.—Eaton & Wright, Bot. 390.

Frangula Californica, Gray, Genera, ii, 178; Jour. Boston Soc. Nat. Hist. vi, 146.—Torrey in Sitgreaves' Rep. 157

Pacific R. R. Rep. iv, 74; Bot. Mex. Boundary Survey, 46; Bot. Wilkes Exped. 261.—Newberry in Pacific R. R. Rep. vi, 69.—Bolander in Proc. California Acad. iii, 78.

California, west of the Sierra Nevadas, from the valley of the upper Sacramento river southward to Santa Barbara and fort Tejon.

A small tree, rarely 7 to 9 meters in height, with a trunk 0.30 to 0.37 meter in diameter (*Pringle*), or commonly a shrub, along the sea-coast and at high elevations often prostrate; common and reaching its greatest development in the valleys of the Santa Cruz mountains. A low shrubby form, densely white tomentose, especially on the under side of the leaves, of southern California, Arizona, and New Mexico, is—

var. tomentella, Brewer & Watson, Bot. California, i, 101.

R. tomentellus, Bentham, Pl. Hartweg. 303.—Seemann, Bot. Herald, 275.—Walpers, Ann. ii, 267.

Frangula Californica, var. tomentella, Gray in Smithsonian Contrib. vi, 28.-Torrey in Pacific R. R. Rep. iv, 74; vii, 9.

Wood light, soft, rather coarse-grained, checking in drying; layers of annual growth marked by many rows of open ducts; medullary rays narrow, obscure; color, brown or light yellow, the sap-wood lighter; specific gravity, 0.6000; ash, 0.58.

47.-Rhamnus Purshiana, De Candolle,

Prodr. ii, 25.—Loudon, Arboretum, ii, 538, f. 211.—Hooker, Fl. Bor.-Am. i, 123, t. 43; London Jour. Bot. vi, 78.—Don, Miller's Diet. ii, 32.—Torrey & Gray, Fl. N. America, i, 262.—Dietrich, Syn. i, 807.—Nuttall, Sylva, ii, 52; 2 ed. i, 200.—Richardson, Arctic Exped. 423.—Newberry in Pacific R. R. Rep. vi, 69.—Koch, Dendrologie, i, 610.—Gray in Proc. Am. Acad. viii, 379.—Brewer & Watson, Bot. California, i, 101.—Hall in Coulter's Bot. Gazette, ii, 86.

R. alnifolius, Pursh, Fl. Am. Sept. i, 166 [not L'Heritier].

Cardiolepis obtusa, Rafinesque, Sylva Telluriana, 28.

Frangula Purshiana, Cooper in Smithsonian Rep. 1858, 259; Pacific R. R. Rep. xii², 29, 57.—Vasey, Cat. Forest Trees, 9.—Torrey, Bot. Wilkes Exped. 262.

BEARBERRY, BEAR WOOD, SHITTIM WOOD.

Puget sound, east along the mountain ranges of northern Washington territory to the Bitter Root mountain, Idaho (Mullan pass, Watson), and the shores of Flathead lake, Montana (Canby & Sargent), southward through western Washington territory, Oregon, and California, west of the Sierra Nevada, to about latitude 40°.

A small tree, often 12 meters in height, with a trunk 0.30 to 0.45 meter in diameter; depressions and along the sides and bottoms of cañons in the coniferous forests, reaching its greatest development along the western slope of the Coast Range of southern Oregon.

Wood light, very hard, not strong, close-grained, compact, satiny; medullary rays numerous, thin; color, light brown tinged with yellow, the sap-wood somewhat lighter; specific gravity, 0.5672; ash, 0.67.

The bark, like that of other species of the genus, possesses powerful cathartic properties, and, under the name of Cascara sagrada, has recently been introduced by herbalists in the form of fluid extracts, tinetures, etc., immense quantities being gathered for this purpose in the Oregon forests (Nat. Dispensatory, 2 ed. 659).

48.—Ceanothus thyrsiflorus, Eschscholtz,

Mem. Acad. St. Petersburg, x, 285.—Hooker, Fl. Bor.-Am. i, 125.—Don, Miller's Dict. ii, 37.—Hooker & Arnott, Bot. Beechey, 136, 328.—Torrey & Gray, Fl. N. America, i, 266.—Dietrich, Syn. i, 813.—Loudon, Arboretum, ii, 540.—Eaton & Wright, Bot. 185.—Lindley, Bot. Reg. xxx, t. 38.—Nuttall, Sylva, ii, 44, t. 57; 2 ed. i, 193, t. 57.—Bentham, Pot. Sulphur, 10; Pl. Hartweg. 302.—Ann. Gand. 1847, t. 107.—Torrey in Pacific R. R. Rep. iv, 14; Bot. Mex. Boundary Survey, 45; Bot. Wilkes Exped. 263.—Newberry in Pacific R. R. Rep. vi, 69.—Cooper in Pacific R. R. Rep. xii², 57.—Bolander in Proc. California Acad. iii, 78.—Koch, Dendrologie, i, 621.—Watson in Proc. Am. Acad. x, 334.—Brewer & Watson, Bot. California, i, 102.—Vasey, Cat. Forest Trees, 9.

BLUE MYRTLE.

California Coast ranges, from Mendicino county south to the valley of the San Louis Rey river (Pala, Parish Brothers).

A small tree, 8 to 10 meters in height, with a trunk 0.10 to 0.15 meter in diameter, or toward the southern limits reduced to a low shrub; common and reaching its greatest development in the *Sequoia* forests near Santa Cruz.

Wood light, soft, close-grained, compact; medullary rays very obscure; color, light brown, the sap-wood darker; specific gravity, 0.5750; ash, 0.69.

The bark of the root may be expected to possess similar astringent properties to that of the shrubby *C. Americana*, used with advantage in cases of diarrhea and dysentery, and as a domestic remedy in throat troubles (*U. S. Dispensatory*, 14 ed. 1609.—*Nat. Dispensatory*, 2 ed. 373).

49.—Colubrina reclinata, Brongniart,

Ann. Sci. Nat. 1 ser. x, 369.—Richard, Fl. Cuba, 359.—Grisebach, Fl. British West Indies, 101.—Eggers in Bull. U. S. Nat. Mus. No. 13, 40.

Rhamnus ellipticus, Aiton, Hort. Kew.i, 265; 2 ed. ii, 17.—Willdenow, Spec. i, 1098.—Swartz, Prodr. 50; Fl. Ind. Occ. i, 497. Zizyphus Dominigensis, Nouveau Duhamel, iii, 56.

Ceanothus reclinatus, L'Heritier, Sert. 6.—Rœmer & Schultes, Syst. v, 288.—De Candolle, Prodr. ii, 31.—Macfadyen, Fl. Jamaica, 211.

NAKED WOOD.

Semi-tropical Florida, Umbrella Key, on the north end of Key Largo, and sparingly on the small islands south of Elliott's Key; through the West Indies.

One of the largest trees of the region, deciduous, 12 to 18 meters in height, with a trunk 0.60 to 1.25 meter in diameter; reaching its greatest development within the United States on Umbrella Key, here forming a dense forest.

Wood heavy, hard, very strong, brittle, close-grained, compact, satiny, susceptible of a good polish, containing many small open ducts; medullary rays numerous, thin; color, dark brown tinged with yellow, the sap-wood light yellow; specific gravity, 0.8208; ash, 1.75.

"The trunk attains a size of over 1 meter and is most extraordinary. When 0.152 meter thick it becomes furrowed, and the furrows and ridges multiply and extend in all directions; trunks 0.75 to 1 meter in diameter appear like a mass of braided serpents. On small trunks the bark breaks up into flakes which curl up and drop off. Between the ridges where the bark persists the edges of dozens of papery layers may be seen" (Curtiss in let).

SAPINDACEÆ.

50.-Æsculus glabra, Willdenow,

- Enum. 405.—Pursh, Fl. Am. Sept. i, 255.—Nuttall, Genera, i, 241.—De Candolle, Prodr. i, 597.—Torrey, Fl. U. S. 384; Compend. Fl. N. States, 164.—Guimpel, Otto & Hayne, Abb. Holz. 28, t. 24.—Hayne, Dend. Fl. 44.—Sprengel, Syst. ii, 166.—Don, Miller's Dict. i, 652.—Beck, Bot. 65.—Loudon, Arboretum, i, 467, f. 133.—Torrey & Gray, Fl. N. America, i, 251.—Dietrich, Syn. ii, 1225.—Eaton & Wright, Bot. 115.—Walpers, Rep. i, 424.—Gray, Genera, ii, 207, t. 176, 177; Manuel N. States, 5 ed. 118.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 79.—Wood, Cl. Book, 288; Bot. & Fl. 85.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187.—Koch, Dendrologie, i, 508.—Vasey, Cat. Forest Trees, 9.—Ridgway in Proc. U. S. Nat. Mus. 1882, 61.
 - Æ. pallida, Willdenow, Enum. 406.—Nuttall, Genera, i, 242.—De Candolle, Prodr. i, 597.—Guimpel, Otto & Hayne, Abb. Holz. 29, t. 25.—Sprengel, Syst. ii, 166.—Don, Miller's Dict. i, 650.—Eaton, Manual, 6 ed. 6.—Lindley, Bot. Reg. xxiv, t. 51.—Loudon, Arboretum, i, 468, f. 134.
 - Æ. echinata, Muhlenberg, Cat. 38.
 - Æ. Ohioensis, Michaux f. Hist. Arb. Am. iii, 242; N. American Sylva, 3 ed. ii, 156, t. 92.—Poiret, Suppl. iii, 593.—De Candolle, Prodr. i, 597.—Don, Miller's Dict. i, 652.—Eaton, Manual, 6 ed. 6.—Riddell, Syn. Fl. W. States, 34.—Lindley, Bot. Reg. xxiv, 51, t. 51.—Nuttall, Sylva, ii, 71; 2 ed. ii, 17.
 - ? Æ. carnea, Guimpel, Otto & Hayne, Abb. Holz. 25, t. 22.—Hayne, Dend. Fl. 43.—Lindley, Bot. Reg. xiii, t. 1056.—Watson, Dend. Brit. ii, t. 121.—Don, Miller's Dict. i, 652.—Torrey & Gray, Fl. N. America, i, 253.—Walpers, Rep. i, 425.

Pavia glabra, Spach in Ann. Sci. Nat. 2 ser. ii, 54; Hist. Veg. iii, 23.

Pavia pallida, Spach in Ann. Sci. Nat. 2 ser. ii, 54; Hist. Veg. iii, 23.

- ? Pavia carnea, Spach in Ann. Sci. Nat. 2 ser. ii, 54; Hist. Veg. iii, 23.—Don in Sweet's Brit. Fl. Gard. 2 ser. t. 301.
- ? Pavia Watsoniana, Spach in Ann. Sci. Nat. 2 ser. ii, 54; Hist. Veg. iii, 23.—Torrey & Gray, Fl. N. America, i, 253.
- ? Æ. Watsoniana, Dietrich, Syn. ii, 1225.—Walpers, Rep. i, 425.
- A. Hippocastanum, var. Ohioensis, Loudon, Arboretum, i, 467.—Browne, Trees of America, 110.
- A. Hippocastanum, var. glabra, London, Arboretum, i, 467.—Browne, Trees of America, 111.
- A. Hippocastanum, var. pallida, Loudon, Arboretum, i, 468.—Browne, Trees of America, 111.

OHIO BUCKEYE. FETID BUCKEYE.

Western slopes of the Alleghany mountains, Pennsylvania to northern Alabama, westward through southern Michigan (rare) to southern Iowa, eastern Kansas to about longitude 97° west, and the Indian territory.

A small tree, 8 to 15 meters in height, with a trunk 0.30 to 0.60 meter in diameter; rich soil along streams and river bottoms, reaching its greatest development in the high valleys of the southern Alleghany mountains.

Wood light, soft, not strong, close-grained, compact, difficult to split, often blemished by dark lines of decay; medullary rays obscure; color, white, the sap wood darker; specific gravity, 0.4542; ash, 0.86; largely used in

common with that of the other species of the genus in the manufacture of woodenware, artificial limbs (for which the wood of Æsculus is preferred to that of all other American trees), paper-pulp, wooden hats, less commonly for the bearings of shafting and machinery, and occasionally manufactured into lumber.

The bark of the allied old world species Æ. Hippocastanum occasionally has been found efficacious as a substitute for cinchona bark in the treatment of intermittent fevers (U. S. Dispensatory, 14 ed. 1565.—Nat. Dispensatory, 2 ed. 712), and similar properties may be looked for in the bark of Æ. glabra.

51.- Æsculus flava, Aiton.

Hort. Kew. i, 494; 2 ed. ii, 335.—B. S. Barton, Coll. i, 13; Bot. Appx. 26, t. 15, f. 2.—Willdenow, Spec. ii, 286; Enum. i, 405; Berl. Baumz. 13.—Desfontaines, Hist. Arb. i, 385.—Pursh, Fl. Am. Sept. i, 255.—Nuttall, Genera, i, 242,—James in Long's Exped. i, 22.—Guimpel, Otto & Hayne, Abb. Holz. 27, t. 23.—Hayne, Dend. Fl. 44.—Elliott, Sk. i, 436.—Watson, Dend. Brit. ii, t. 163.—Loddiges, Bot. Cab. t. 1280.—Torrey & Gray, Fl. N. America, i, 252.—Dietrich, Syn. ii, 1225.—Eaton, Manual, 6 ed. 7.—Eaton & Wright, Bot. 116.—Walpers, Rep. i, 424.—Darby, Bot. S. States, 266.—Torrey in Pacific R. R. Rep. iv, 74.—Browne, Trees of America, 118.—Schnizlein, Icon. t. 230*x, f. 3.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 80.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 48.—Lesquereux in Owen's 2d Rep. Arkansas, 354.—Wood, Cl. Book, 288; Bot. & Fl. 75.—Gray, Manual N. States, 5 ed. 118.—Vasey, Cat. Forest Trees, 9.

Æ. octandra, Marshall, Arbustum, 4.-Miller's Dict. No. 1.

Pavia flava, Mench, Meth. 66.—De Candolle, Prodr. i, 598.—Don, Miller's Dict. i, 653.—Spach in Ann. Sci. Nat. 2 ser. ii, 55; Hist. Veg. iii, 25.—Loudon, Arboretum, i, 471 & t.

Æ. lutea, Wangenheim in Schrift. Gesell. Nat. Fr. Berlin, viii, 133, t. 6.—Michaux, Fl. Bor.-Am. i, 219.—Persoon, Syn. i, 403.—Koch, Dendrologie, i, 509.

Pavia lutea, Poiret in Lamarck, Dict. v, 94.—Nouveau Duhamel, iii, 155, t. 38.—Michaux f. Hist. Arb. Am. iii, 237, t. 11;
N. American Sylva, 3 ed. ii, 153, t. 91.

Æ. neglecta, Lindley, Bot. Reg. xii, t. 1009.

Pavia neglecta, Don, Miller's Dict. i, 653.—Spach in Ann. Sci. Nat. 2 ser. ii, 55; Hist. Veg. iii, 24.—Loudon, Arboretum, i. 472.

SWEET BUCKEYE.

Allegheny county, Pennsylvania (T. C. Porter), southward along the Alleghany mountains to northern Georgia (Augusta) and Alabama, west along the valley of the Ohio river to southern Iowa, the Indian territory, and the valley of the Brazos river, eastern Texas.

A tree 18 to 28 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or toward its southwestern limits reduced to a shrub; rich woods and along streams, reaching its greatest development on the slopes of the Alleghany mountains of North Carolina and Tennessee.

A variety with purple or flesh-colored flowers, the leaflets pubescent beneath, is-

var. purpurascens, Gray, Manual N. States, 5 ed. 118.

E. hybrida, De Candolle, Hort. Monsp. 1813, 75.—Poiret, Suppl. iv. 334.

Æ. discolor, Pursh, Fl. Am. Sept. i, 255.—Nuttall, Genera, i, 242.—Bot. Reg. iv, t. 310.—Elliott, Sk. i, 436.—Sprengel, Syst. ii, 167.—Sertum Botanicum, iv & t.—Eaton & Wright, Bot. 116.—Walpers, Ann. iv, 381.

Pavia discolor, Poiret, Suppl. v, 769.—Don, Miller's Dict. i, 653.—Ea ton, Manual, 6 ed. 7.—Spach in Ann. Sci. Nat. 2 ser. ii, 57; Hist. Veg. iii, 28.—Loudon, Arboretum, i, 472.

Pavia hybrida, De Candolle, Prodr. i, 598.—Den, Miller's Dict. i, 653.—Eaton, Manual, 6 ed. 6.—Spach in Ann. Sci. Nat. 2 ser. ii, 56; Hist. Veg. iii, 27.—Loudon, Arboretum, i, 472.—Eaton & Wright, Bot. 116.—Koch, Dendrologie, i, 512.

Æ. Pavia, var. discolor, Torrey & Gray, Fl. N. America, i, 252.—Walpers, Rep. i, 424.—Gray in Jour. Boston Soc. Nat. Hist. vi, 167.

Wood light, soft, close-grained, compact, difficult to split; medullary rays numerous, obscure; color, creamywhite, the sap-wood hardly distinguishable; specific gravity, 0.4274; ash, 1.00.

52.—Æsculus Californica, Nuttall:

Torrey & Gray, Fl. N. America, i, 251; Sylva, ii, 69, t. 64; 2 ed. ii, 16, t. 64.—Hooker & Arnott, Bot. Beechey, 327.—Dietrich, Syn. ii, 1225.—Eaton & Wright, Bot. 116.—Walpers, Rep. i, 424.—Bentham, Bot. Sulphur, 9; Pl. Hartweg. 301.—Durand in Jour Philadelphia Acad. 1855, 85.—Rev. Hort. iv, 150, f. 10, 11.—Torrey in Pacific R. R. Rep. iv, 74; Bot. Mex. Boundary Survey, 48; Bot. Wilkes Exped. 260.—Newberry in Pacific R. R. Rep. vi, 20, 69, f. 1.—Bot. Mag. t. 5077.—Fl. des Serres, xiii, 39, t. 1312.—London Gard. Chronicle, 1858, 844.—Belge, Hort. ix, 121 & t.—Gray in Proc. Boston Soc. Nat. Hist. vii, 146.—Belander in Proc. California Acad. iii, 78.—Walpers, Ann. 624.—Koch, Dendrologie, i, 513.—Brewer & Watson, Bot. California, i, 106.—Vasey, Cat. Forest Trees, 9.

Calothyrsus Californica, Spach in Ann. Sci. Nat. 2 ser. ii, 62; Hist. Veg. iii, 35.

Pavia Californica, Hartweg in Jour. Hort. Soc. London, ii, 123.—Carrière in Rev. Hort. 1862, 362 & f.

CALIFORNIA BUCKEYE.

California, valley of the upper Sacramento river and Mendocino county, southward along the Coast ranges to San Luis Obispo, and along the western foot-hills of the Sierra Nevada to the San Bernardino mountains.

A low, widely-branching tree, 8 to 12 meters in height, with a short trunk 0.60 to 0.90 meter in diameter, often greatly expanded at the base, or more often a much-branched shrub 3 to 5 meters in height; borders of streams, reaching its greatest development in the canons of the Coast Range, north of San Francisco bay.

Wood light, soft, not strong, very close-grained, compact; medullary rays numerous, obscure; color, white slightly tinged with yellow, the sap-wood hardly distinguishable; specific gravity, 0.4980; ash, 0.70.

53.-Ungnadia speciosa, Endlicher,

Atacta Bot. t. 36; Nov. Stirp. Desc. ix, 75.—Torrey & Gray, Fl. N. America, i, 684; Pacific R. R. Rep. ii, 162.—Walpers, Rep. i, 423; v, 371; Ann. vii, 625.—Gray in Jour. Boston Soc. Nat. Hist. vi, 167; Genera, ii, 211, t. 178, 179; Smithsonian Contrib. iii, 38; v, 30; Mem. Am. Acad. new ser. v, 299; Hall's Pl. Texas, 5.—Fl. des Serres, x, 217, t. 1059.—Torrey, Bot. Mex. Boundary Survey, 48.—Schnizlein, Icon. t. 230, f. 2, 8.—Cooper in Smithsonian Rep. 1858, 265.—Koch, Dendrologie, i, 515.—Baillon, Hist. Pl. v, 423.—Vasey, Cat. Forest Trees, 9.—Watson in Proc. Am. Acad. xvii, 337.

U. heterophylla, Scheele in Linnæa, xxi, 589; Romer, Texas, 589.

U. heptaphylla, Scheele in Linnæa, xxii, 352; Ræmer, Texas, 432.

SPANISH BUCKEYE.

Valley of the Trinity river (Dallas, Reverchon) through western Texas to the cañons of the Organ mountains, New Mexico (Bigelow); southward into Mexico.

A small tree, sometimes 6 to 8 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or toward its eastern and western limits reduced to a low shrub; common west of the Colorado river; bottoms and rich hillsides, reaching its greatest development in the valley of the Guadalupe river, between New Braunfels and the coast.

Wood heavy, soft, not strong, close-grained, compact, satiny, containing numerous evenly-distributed open ducts; medullary rays numerous, inconspicuous; color, red tinged with brown, the sap-wood lighter; specific gravity, 0.6332; ash, 1.17.

Fruit reputed poisonous.

54.—Sapindus marginatus, Willdenow,

Enum. i, 432.—Muhlenberg, Cat. 41.—De Candolle, Prodr. i, 607.—Sprengel, Syst. ii, 250.—Don, Miller's Dict. i, 665.—Spach, Hist. Veg. iii, 54.—Torrey & Gray, Fl. N. America, i, 255, 685; Pacific R. R. Rep. ii, 162.—Eaton, Manual, 6 ed. 323.—Eaton & Wright, Bot. 411.—Nuttall, Sylva, ii, 72, t. 65; 2 ed. ii, 19, t. 65.—Leavenworth in Am. Jour. Sci. i, 49, 130.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v, 241.—Gray in Jour. Boston Soc. Nat. Hist. vi, 169; Genera, ii, 214, t. 180; Smithsonian Contrib. iii, 38; Hall's Pl. Texas, 5.—Engelmann in Wislizenus' Rep. 12.—Torrey in Emory's Rep. 138; Marcy's Rep. 282; Pacific R. R. Rep. iv, 2, 74; Bot. Mex. Boundary Survey, 47.—Scheele in Rœmer, Texas, 433.—Schnizlein, Icon. t. 230, f. 22.—Chapman, Fl. S. States, 79.—Lesquereux in Owen's 2d Rep. Arkansas, 354.—Wood, Cl. Book, 288; Bot. & Fl. 75.—Porcher, Resources S. Forests, 85.—Young, Bot. Texas, 208.—Vasey, Cat. Forest Trees, 9.—Hemsley, Bot. Am.-Cent. i, 214.—Watson in Proc. Am. Acad. xvii, 337.

- S. saponaria, Lamarck, Ill. ii, 441, t. 307 [not Linnæus].—Michaux, Fl. Bor.-Am. i, 242.—Poiret in Lamarck, Dict. vi, 663, in part.—Persoon, Syn. i, 444.—Pursh, Fl. Am. Sept. i, 274.—Nuttall, Genera, i, 257.—Elliott, Sk. i, 460.—Torrey in Ann. Lyc. N. York, ii, 172.—Darby, Bot. S. States, 267.
- 9 S. inæqualis, De Candolle, Prodr. i, 608.
- S. falcatus, Rafinesque, Med. Bot. ii, 261.
- S. acuminata, Rafinesque, New Fl. 22.
- S. Drummondi, Hooker & Arnott, Bot. Beechey, 281 (excl. var.).—Walpers, Rep. i, 417-

WILD CHINA. SOAPBERRY.

Atlantic coast, Savannah river to the Saint John's river, Florida, and on Cedar Keys; southern Arkansas, valley of the Washita river (Prescott, Letterman) through western Louisiana and Texas to the mountain valleys of southern New Mexico and Arizona; southward into Mexico, and in the West Indies (? S. inæqualis).

A tree, sometimes 15 to 18 meters in height, with a trunk rarely 0.60 meter in diameter; west of the Colorado river much smaller, rarely 9 meters in height; along streams or toward the western limits of its distribution only in mountain valleys, reaching its greatest development along the river bottoms of eastern Texas.

Wood heavy, strong, hard, close-grained, compact, easily split into thin strips; layers of annual growth clearly marked by several rows of large open ducts; medullary rays thin, obscure; color, light brown tinged with yellow, the sap-wood lighter; specific gravity, 0.8126; ash, 1.50; largely used in Texas in the manufacture of cotton-baskets, and in New Mexico for the frames of pack-saddles.

Saponin, common in several species of the genus, and affording a substitute for soap, may be looked for in the fruit and roots of this tree.

55.—Sapindus Saponaria, Linnæus,

Spec. 1 ed. 367; Swartz, Obs. 152.—Lamarck, Ill. ii, 441, t. 307.—Willdenow, Spec. ii, 468.—Aiton, Hort. Kew. 2 ed. ii, 424.—Titford, Hort. Bot. Am. 61.—Poiret in Lamarck, Dict. vi, 663.—Descourtilz, Fl. Med. Antilles, iv, 121, t. 261.—De Candolle, Prodr. i, 607.—Spach. Hist. Veg. iii, 53.—Eaton, Manual, 6 ed. 323.—Macfadyen, Fl. Jamaica, 159.—Rafinesque, New Fl. 22.—Nuttall, Sylva, ii, 72; 2 ed. 20.—Richard, Fl. Cuba, 280.—Grisebach, Fl. British West Indies, 126.—Baillon, Hist. Pl. v, 349, f. 353.—Vasey, Cat. Forest Trees, 10.—Chapman in Coulter's Bot. Gazette, iii, 3; Fl. S. States, Suppl. 613.

SOAPBERRY.

Semi-tropical Florida, bay Biscayne, cape Sable, Caximbas bay, Thousand Islands, Key Largo, Elliott's Key; in the West Indies.

A small tree, 6 to 10 meters in height, with a trunk sometimes 0.38 meter in diameter; common on cape Sable, and reaching its greatest development within the United States on the Thousand Islands and along the shores of Caximbas bay.

Wood heavy, rather hard, close-grained, compact; medullary rays numerous, thin; color, light brown tinged with yellow, the sap-wood yellow; specific gravity, 0.8367; ash, 4.34.

The fruit and roots rich in saponin and used in the West Indies as a substitute for soap (Guibourt, Hist. Drogues, 7 ed. iii, 598.—U. S. Dispensatory, 14 ed. 1751); the round, black seeds for beads, buttons, and small ornaments.

56.—Hypelate paniculata, Cambessedes,

Mem. Mus. xviii, 32.—Don, Miller's Dict. i, 671.—Richard, Fl. Cuba, 295.—Grisebach, Fl. British West Indies, 127.—Chapman, Fl. S. States, 79.—Vasey, Cat. Forest Trees, 10.

Melicocca paniculata, Jussieu in Mem. Mus. iii, 187, t. 5.—De Candolle, Prodr. i, 615.—Nuttall, Sylva, ii, 74, t. 66; 2 ed. ii, 21, t. 66.

Exothea oblongifolia, Macfadyen, Fl. Jamaica, 232.

H. oblongifolia, Hooker in London Jour. Bot. iii, 226, t. 7.

INK WOOD. IRON WOOD.

Semi-tropical Florida, east coast, Mosquito inlet to the southern keys; in the West Indies.

A tree often 12 meters in height, with a trunk 0.45 meter in diameter.

Wood very heavy, exceedingly hard, very strong, close-grained, susceptible of a good polish, checking in drying; medullary rays obscure; color, bright reddish-brown, the sap-wood lighter; specific gravity, 0.9533; ash, 1.25; used in ship-building, for the handles of tools, and piles; resisting the attacks of the teredo.

57.—Hypelate trifoliata, Swartz,

Fl. Ind. Occ. ii, 655, t. 14.—Delessert, Icon. iii, t. 39.—De Candolle, Prodr. i, 614.—Chapman, Fl. S. States, 78.—Grisebach, Fl. British West Indies, 127; Cat. Pl. Cuba, 46.

WHITE IRON WOOD.

Semi-tropical Florida, Upper Metacombe and Umbrella Keys; in the West Indies.

A tree sometimes 12 meters in height, with a trunk 0.45 to 0.60 meter in diameter.

Wood very heavy, hard, close grained, compact, susceptible of a fine polish, durable in contact with the soil; medullary rays thin, obscure; color, rich light brown, the sap-wood darker; specific gravity, 0.9102; ash, 1.38; used in ship-building, for the handles of tools, posts, etc.

58.—Acer Pennsylvanicum, Linnaus,

Spec. 1 ed. 1055.—Aiton. Hort. Kew. iii, 435.—Michaux, Fl. Bor. Am. ii, 252.—Willdenow, Spec. iv, 989; Enum. i, 1045.—Desfontaines, Hist. Arb. i, 391.—Nouveau Duhamel, iv, 32.—Trattinick, Archiv. i, t. 11.—Hayne, Dend. Fl. 210.—Elliott, Sk. i, 451.—Torrey, Fl. U. S. 397; Compend. Fl. N. States, 170; Fl. N. York, i, 135.—Sprengel, Syst. ii, 224.—Eaton, Manual, 6 ed. 2.—Torrey & Gray, Fl. N. America, i, 246.—Hooker, Fl. Bor. Am. i, 111.—Emerson, Trees Massachusetts, 496; 2 ed. ii, 566 & t.—Gray, Genera, ii, 200, t. 174, f. 1-3; Manual N. States, 5 ed. 119.—Richardson, Arctic Exped. 422.—Darby, Bot. S. States, 265.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 80.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 52.—Buchenau in Bot. Zeit. xix, 285, t. 2, f. 24.—Wood, Cl. Book, 286; Bot. & Fl. 74.—Koch, Dendrologie, i, 521.—Baillon, Hist. Pl. v, 373, f. 418-420.—Vasey, Cat. Forest Trees, 10.—Sears in Bull. Essex Inst. xiii, 175.—Bell in Geological Rep. Canada, 1879-'80, 53°.

- A. Canadense, Marshall, Arbustum, 4.
- A. striatum, Du Roi, Diss. 58; Harbk. i, 8, t. 1.—Wangenheim, Amer. 29, t. 12, f. 2.—Lamarck, Dict. ii, 381.—Ehrhart, Beitr iy, 25.—Moeneh, Meth. 56.—Persoon, Syn. i 417.—Michaux f. Hist. Arb. Am. ii, 242, t. 17; N. American Sylva, 3 ed. ii, 175, t. 47.—Pursh, Fl. Am. Sept. i, 267.—Nuttall, Genera, i, 258.—De Candolle, Prodr. i, 593.—Watson, Dend. Brit. i, t. 70.—Don, Miller's Dict. i, 648.—Beck, Bot. 64.—Loudon, Arboretum, i, 407 & t.—Spach, Hist. Veg. iii, 85; Ann. Sci. Nat. 2 ser. ii, 162.—Dietrich, Syn. 1281.—Eaton & Wright, Bot. 112.—Bigelow, Fl. Boston, 3 ed. 407.—Browne, Trees of America, 76.

STRIPED MAPLE. MOOSE WOOD. STRIPED DOGWOOD, GOOSE-FOOT MAPLE. WHISTLE WOOD.

Valley of the Saint Lawrence river (Ha-Ha bay), northern shores of lake Ontario, islands of lake Huron, south through the northern Atlantic states, and along the Alleghany mountains to northern Georgia, west through the lake region to northeastern Minnesota.

A small tree, 6 to 10 meters in height, with a trunk 0.15 to 0.20 meter in diameter; cool ravines and mountain sides.

Wood light, soft, close-grained, compact, satiny; medullary rays numerous, thin; color, light brown, the sapwood lighter; specific gravity, 0.5299; ash, 0.36.

59.—Acer spicatum, Lamarek,

- Dict. ii, 381.—Aiton, Hort. Kew. iii, 485.—Persoon, Syn. i, 417.—De Candolle, Prodr. i, 593.—Don, Miller's Dict. i, 648.—Audubon, Birds, t. 134.—Penn. Cycl. i, 77.—Eaton, Manual, 6 ed. 2.—Beck, Bot. 64.—Spach, Hist. Veg. 87; Ann. Sci. Nat. 2 ser. ii, 163.—Loudon, Arboretum, i, 406, t. 26.—Torrey & Gray, Fl. N. America, i, 246.—Dietrich, Syn. ii, 1281.—Eaton & Wright, Bot. 112.—Torrey, Fl. N. York, i, 185.—Browne, Trees of America, 74.—Emerson, Trees Massachusetts, 497; 2 ed. ii, 567 & t.—Parry in Owen's Rep. 610.—Richardson, Arctic Exped. 422.—Chapman, Fl. S. States, 80.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 52.—Wood, Cl. Book, 287; Bot. & Fl. 74.—Gray, Manual N. States, 5 ed. 119.—Koch, Dendrologie, i, 522.—Macoun in Geological Rep. Canada, 1875—76, 192.—Sears in Bull. Essex Inst. xiii, 175.—Bell in Geological Rep. Canada, 1879—'80, 54c.—Nicholson in London Gard. Chronicle, 1881, 172.
 - A. Pennsylvanicum, Du Roi, Diss. 61; Harbk. i, 22, t. 1 [not Linnæus].—Wangenheim, Amer. 82, t. 12, f. 30.—Marshall, Arbustum, 2.
 - A. parviflorum, Ehrhart, Beitr. iv, 25; vi, 40.-Monch, Meth. 56.
 - A. montanum, Aiton, Hort. Kew. iii, 435; 2 ed. v, 447 (excl. syn. striatum).—Michaux, Fl. Bor.-Am. ii, 253.—Willdenow, Spec. iv, 988; Enum. i, 1045.—Desfontaines, Hist. Arb. i, 391.—Nouveau Duhamel, iv, 33.—Trattinick, Archiv. i, t. 13.—Pursh, Fl. Am. Sept. i, 267.—Nuttall, Genera, i, 253.—Guimpel, Otto & Hayne, Abb. Holz. 59, t. 48.—Hayne, Dend. Fl. 213.—Elliott, Sk. i, 452.—Torrey, Fl. U. S. 398; Compend. Fl. N. States, 170.—Sprengel, Syst. ii, 224.—Hooker, Fl. Bor.-Am. i, 111.—Bigelow, Fl. Boston. 3 ed. 408.—Darby, Bot. S. States, 265.

MOUNTAIN MAPLE.

Valley of the Saint Lawrence river, west along the northern shores of the great lakes to northern Minnesota and the Saskatchewan region, south through the northern states, and along the Alleghany mountains to northern Georgia.

A small tree, sometimes 8 to 10 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or often a tall shrub; cool woods and mountain ravines, reaching its greatest development on the western slopes of the Alleghany mountains of North Carolina and Tennessee.

Wood light, soft, close-grained, compact; medullary rays inconspicuous; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.5330; ash, 0.43.

60.-Acer macrophyllum, Pursh,

Fl. Am. Sept. i, 267.—Poiret, Suppl. v, 669.—Nuttall, Genera, i, 253; Sylva, ii, 77, t. 67; 2 ed. ii, 24, t. 67.—De Candolle, Prodr. i, 594.—Sprengel, Syst. ii, 225.—Penn. Cycl. i, 78.—Eaton, Manual, 6 ed. 2.—Hooker, Fl. Bor.-Am. i, 112, t. 38.—Don, Miller's Dict. i, 648.—Spach in Ann. Sci. Nat. 2 ser. ii, 165.—Torrey & Gray, Fl. N. America, i, 246.—Hooker & Arnott, Bot. Beechey, 327.—Dietrich, Syn. ii, 1281.—Loudon, Arboretum, i, 408, t. 28, f. 117, 118.—Eaton & Wright, Bot. 112.—Bentham, Pl. Hartweg, 301.—Browne, Trees of America, 78.—Richardson, Arctic Exped. 423.—Durand in Jour. Philadelphia Acad. 1855, 84.—Torrey in Pacific R. R. Rep. iv, 74; Bot. Mex. Boundary Survey, 47; Bot. Wilkes Exped. 258.—Newberry in Pacific R. R. Rep. vi, 21, 67.—Cooper in Pacific R. R. Rep. xii, 28, 57; Smithsonian Rep. 1858, 258.—Lyall in Jour. Linnæan Soc. vii, 134, 144.—Bolander in Proc. California Acad. iii, 78.—Wood, Cl. Book, 287; Bot. & Fl. 74.—Rothrock in Smithsonian Rep. 1867, 334.—Koch, Dendrologie, i, 528.—Gray in Proc. Am. Acad. viii, 379.—Brewer & Watson, Bot. California, i, 107.—Vasey, Cat. Forest Trees, 10.—Macoun in Geological Rep. Canada, 1875-76, 192.—G. M. Dawson in Canadian Nat. new ser. ix, 330.—Nicholson in London Gard. Chronicle, 1881, 10.

A. palmatum, Rafinesque, New Fl. & Bot. i, 48 [not Thunberg].

BROAD-LEAVED MAPLE.

Coast of Alaska, from latitude 55° south along the islands and coast of British Columbia, through western Washington territory and Oregon, and along the California Coast ranges and western slopes of the Sierra Nevada to the San Bernardino mountains and Hot Spring valley, San Diego county (*Parish Brothers*), not ascending above 4,000 feet altitude.

A tree 24 to 30 meters in height, with a trunk 1.20 to 1.50 meter in diameter; along streams and river bottoms, reaching its greatest development on the rich bottom lands of the Coquille and other rivers of southern Oregon, where, with the California laurel, it forms dense, heavy forests.

Wood light, soft, not strong, close-grained, compact, easily worked, susceptible of a good polish; medullary rays numerous, thin; color, rich light brown tinged with red, the sap-wood lighter, often nearly white; specific gravity, 0.4909; ash, 0.54; largely used in Oregon in the manufacture of furniture, for ax and broom handles, frames of snow-shoes, etc.; specimens with the grain beautifully curled and contorted are common and valued in cabinet-making.

61.—Acer circinatum, Pursh.

Fl. Am. Sept. i, 266.—Poiret, Suppl. v, 669.—Nuttall, Genera, i, 253; Jour. Philadelphia Acad. vii, 16 (excl. syn.); Sylva, ii, 80, t. 67; 2 ed. ii, 27, t. 67.—De Candolle, Prodr. i, 595.—Sprengel, Syst. ii, 225.—Penn. Cycl. i, 79.—Eaton, Manual, 6 ed. 2.—Don, Miller's Dict. i, 651.—Spach in Ann. Sci. Nat. 2 ser. ii, 166; Hist. Veg. iii, 97.—Loudon, Arboretum, i, 422, f. 112, 127.—Torrey & Gray, Fl. N. America, i, 247.—Hooker, Fl. Bor.-Am. i, 112, t. 39.—Eaton & Wright, Bot. 112.—Dietrich, Syn. ii, 1282.—Browne, Trees of America, 91.—Richardson, Arctic Exped. 422.—Lindley in Paxton's Fl. Gard. ii, 156, f. 210 (London Gard. Chronicle, 1851, 791, f. 211).—Newberry in Pacific R. R. Rep. vi, 21, 69.—Cooper in Pacific R. R. Rep. xii, 28, 57; Smithsonian Rep. 1858, 258.—Lyall in Jour. Linnæan Soc. vii, 134.—Gray in Proc. Am. Acad. viii, 379.—Wood, Cl. Book, 287, Bot. & Fl. 74.—Koch, Dendrologie, i, 523.—Torrey, Bot. Wilkes Exped. 258.—Brewer & Watson, Bot. California, i, 107.—Vasey, Cat. Forest Trees, 10.—Hall in Coulter's Bot. Gazette, ii, 85.—Macoun in Geological Rep. Canada, 1875-'76, 192.—G. M. Dawson, Canadian Nat. new ser. ix, 330.—Nicholson in London Gard. Chronicle, 1881, 10.

A. virgatum, Rafinesque, New Fl. & Bot. i, 48.

VINE MAPLE.

British Columbia, valley of the Fraser river (Yale) and probably farther north, southward through Washington territory and Oregon, west of the Cascade mountains to the Mount Shasta region of northern California, rarely ascending to 4,000 feet altitude.

A small tree, sometimes 8 to 12 meters in height, with a trunk 0.20 to 0.30 meter in diameter; along streams; the stems often prostrate and forming dense, impenetrable thickets.

Wood heavy, hard, not strong, close-grained, compact; medullary rays numerous, thin; color, light brown or often nearly white, the sap-wood lighter; specific gravity, 0.6660; ash, 0.39; used as fuel; by lumbermen for ax and shovel handles, and by the coast Indians for the bows of fishing nets.

62.-Acer glabrum, Torrey.

Ann. Lyc. N. York, ii, 172; Bot. Wilkes Exped. 259.—Don, Miller's Dict. i, 650.—Eaton, Manual, 6 ed. 2.—Torrey & Gray, Fl. N. America, i, 247, 684.—Eaton & Wright, Bot. 112.—Walpers, Rep. i, 409.—Nuttall, Sylva, ii, 86; 2 ed., ii, 33.—Newberry in Pacific R. R. Rep. vi. 69.—Cooper in Smithsonian Rep. 1858, 258; Pacific R. R. Rep. xii, 51, 57; Am. Nat. iii, 406.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187.—Gray in Am. Jour. Sci. 2 ser. xxxiv, 259; Proc. Philadelphia Acad. 1863, 59.—Porter in Hayden's Rep. 1870, 474; 1871, 480.—Watson in King's Rep. v, 52.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 19.—Coulter in Hayden's Rep. 1872, 763.—Macoun in Geological Rep. Canada, 1875–76, 192.—Brewer & Watson, Bot. California, i, 107.—Rethrock in Wheeler's Rep. vi, 83.—Nicholson in London Gard, Chronicle, 1881, 750.

- A. barbatum, Douglas in Hocker, Fl. Bor.-Am. i, 113.-Loudon, Arboretum, i, 420, f. 125 (excl. syn.).
- A. Douglasii, Hooker in London Jour. Bot. vi, 77, t. 6.
- A. tripartitum, Nuttall in Torrey & Gray, Fl. N. America, i, 247.—Dietrich, Syn. ii, 1281.—Eaton & Wright, Bot. 112.—Walpers, Rep. i, 409.—Nuttall, Sylva, ii, 85, t. 71; 2 ed. ii, 33, t. 71.—Gray in Mem. Am. Acad. new ser. iv¹, 28; Pacific R. R. Rep. iv, 73.—Newberry in Pacific R. R. Rep. vi, 69.

DWARF MAPLE.

British Columbia, valley of the Fraser river and probably farther north, south through Washington territory, Oregon, and along the Sierra Nevada of California to the Yosemite valley; east along the mountain ranges of Idaho and Montana to the eastern base of the Rocky mountains, south through Colorado and Utah, in the east Humboldt Range, Nevada, and in the mountain ranges of western New Mexico and eastern Arizona.

A small tree, 8 to 12 meters in height, with a trunk sometimes 0.30 meter in diameter, or more often reduced to a low shrub 1 to 2 meters in height; borders of streams, reaching its greatest development in the mountain canons of western New Mexico and eastern Arizona.

Wood heavy, hard, close-grained, compact; medullary rays numerous, thin; color, light brown, or often nearly white, the sap-wood lighter; specific gravity, 0.6028; ash, 0.30.

63.—Acer grandidentatum, Nuttall;

Torrey & Gray, Fl. N. America, i, 247.—Dietrich, Syn. ii, 1283.—Eaton & Wright, Bot. 112.—Walpers, Rep. i, 409.—Nuttall, Sylva, ii, 82, t. 69; 2 ed. ii, 29, t. 69.—Watson in King's Rep. v, 52; Pl. Wheeler, 7.—Porter in Hayden's Rep. 1871, 480.—Vasey, Cat. Forest Trees, 10.—Parry in Am. Nat. ix, 201, 268.—Rothrock in Wheeler's Rep. vi, 83.—Rusby in Bull. Torrey Bot. Club, ix, 106.—Watson in Proc. Am. Acad. xvii, 338.—Nicholson in London Gard. Chroniele, 1881, 172.

Western Montana, headwaters of the Columbia river (Nuttall), cañons of the Wahsatch mountains, Utah, and south through eastern Arizona to southwestern New Mexico (Mogollon mountains, E. L. Greene), and reported in the ranges east of the Rio Grande; southward into Coahuila (Palmer).

A small tree, rarely exceeding 10 meters in height, with a trunk 0.20 to 0.25 meter in diameter; along streams; not common.

Wood heavy, hard, close-grained, compact; medullary rays numerous, thin, distinct; color, light brown, or often nearly white; specific gravity, 0.6902; ash, 0.64.

64.-Acer saccharinum, Wangenheim,

Amer. 36, t. 11, f. 26.—Lamarek, Dict. ii, 379.—Walter, Fl. Caroliniana, 251.—Aiton, Hort. Kew. iii, 434; 2 ed. v, 447.—Ehrhart, Beitr. iv, 24.—Persoon, Syn. i, 417.—Nouveau Duhamel, iv, 29, t. 8.—Willdenow, Spec. iv, 985; Enum. ii, 1044.—Desfontaines, Hist. Arb. i, 392.—Trattinick, Archiv. i, t. 3.—Michaux f. Hist. Arb. Am. ii, 218, t. 15; N. American Sylva, 3 ed. i, 153, t. 42.—Titford, Hort. Bot. Am. 105.—Pursh, Fl. Am. Sept. i, 266.—Eaton, Manual, 44; 6 ed. 2.—Nuttall, Genera, i, 253.—Hayne, Dend. Fl. 214.—Elliott, Sk. i, 450.—Richardson, Franklin Jour. 26; Arctic Exped. 422.—De Candolle, Prodr. i, 595.—Torrey, Fl. U. S. 396; Compend. Fl. N. States, 170; Fl. N. York, i, 135.—Sprengel, Syst. ii, 225.—Penn. Cycl. i, 79.—Hooker, Fl. Bor. Am. i, 113.—Don, Miller's Dict. i, 650.—Beck, Bot. 63.—Bigelow, Fl. Boston. 3 ed. 406.—Spach, Hist. Veg. iii, 170; Ann. Sci. Nat. 2 ser. ii, 99.—Loudon, Arboretum, i, 411, t. 31, f. 122.—Torrey & Gray, Fl. N. America, i, 248.—Eaton & Wright, Bot. 112.—Dietrich, Syn. ii, 1282.—Walpers, Rep. i, 410.—Nees, Pl. Med. 5.—Nuttall, Sylva, ii, 88; 2 ed. ii, 35.—Browne, Trees of America, 83.—Emerson, Trees Massachusetts, 489; 2 ed. ii, 258 & t.—Gray, Genera, ii, 200, t. 174; Manual N. States, 5 ed. 119.—Darlington, Fl. Cestrica, 3 ed. 45.—Darby, Bot. S. States, 265.—Parry in Owen's Rep. 610.—Chapman, Fl. S. States, 80.—Lesquereux in Owen's 2d Rep. Arkansas, 354.—Wood, Cl. Book, 286; Bot. & Fl. 74.—Porcher, Resources S. Forests, 80.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187.—Young, Bot. Texas, 206.—Vasey, Cat. Forest Trees, 10.—Guibourt, Hist. Drogues, 7 ed. iii, 606.—Ward in Bull. U. S. Nat. Mus. No. 22, 73.—Sears in Bull. Essex Inst. xiii, 175.—Bell in Geological Rep. Canada, 1879-780, 51c.—Ridgway in Proc. U. S. Nat. Mus. 1882, 62.

A. saccharum, Marshall, Arbustum, 4.

A. barbatum, Michaux, Fl. Bor.-Am. ii, 253.—Willdenow, Spec. iv, 989.—Poiret, Suppl. ii, 575.—Pursh, Fl. Am. Sept. i, 266.—Nuttall, Genera, i, 255.—Elliott, Sk. i, 451.—De Candolle, Prodr. i, 595.—Torrey, Fl. U. S. 396; Compend. Fl. N. States, 169.—Eaton, Manual, 6 ed. 2.—Sprengel, Syst. ii, 224.—Don, Miller's Dict. i, 649.—Beck, Bot. 63.—Spach, Hist. Veg. iii, 178; Ann. Sci. Nat. 2 ser. ii, 118.—Torrey & Gray, Fl. N. America, i, 249, 684.—Eaton & Wright, Bot. 112.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii. 51.

SUGAR MAPLE, SUGAR TREE. HARD MAPLE, ROCK MAPLE.

Southern Newfoundland, valleys of the Saint Lawrence and Saguenay rivers, shores of lake Saint John, west along the northern shores of the great lakes to Lake of the Woods; south through the northern states and along the Alleghany mountains to northern Alabama and the Chattahoochee region of west Florida (var. Floridanum, Chapman, l. c.); west to Minnesota, eastern Nebraska, eastern Kansas (rare), and eastern Texas.

A tree of great economic value, 24 to 36 meters in height, with a trunk 0.60 to 1.20 meter in diameter, or toward its southwestern limits greatly reduced in size; rich woods, often forming extensive forests, and reaching its greatest development in region of the great lakes.

Wood heavy, hard, strong, tough, close-grained, compact, susceptible of a good polish; medullary rays numerous, thin; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.6912; ash, 0.54; largely used in the manufacture of furniture, shoe lasts and pegs, saddle-trees, in turnery, for interior finish, and flooring; in ship-building for keels, keelsons, shoes, etc., and furnishing valuable fuel; "curled" maple and "bird's-eye" maple, accidental forms in which the grain is beautifully curled and contorted, are common and highly prized in cabinet-making.

Maple sugar is principally made from this species; the ashes of the wood, rich in alkali, yield large quantities of potash.

Var. nigrum, Torrey & Gray,

- Fl. N. America, i, 248.—Torrey, Fl. N. York, i, 136.—Loudon, Arboretum, i, 411.—Browne, Trees of America, 84.—Gray, Manual N. States, 5 ed. 119.—Vasey, Cat. Forest Trees, 10.—Bell in Geological Rep. Canada, 1879—'80, 54°.
 - A. saccharinum, Michaux, Fl. Bor.-Am. ii, 252 [not Wangenheim].
 - A. nigrum, Michaux f. Hist. Arb. Am. ii, 238, t. 16; N. American Sylva, 3 ed. i, 163, t. 43.—Pursh, Fl. Am. Sept. i, 266.—Poiret, Suppl. v, 669.—Nuttall, Genera, i, 253.—Elliott, Sk. i, 450.—De Candolle, Prodr. i, 595.—Torrey, Fl. U. S. 397; Compend. Fl. N. States, 170.—Sprengel, Syst. ii, 225.—Don, Miller's Dict. i, 650.—Beck, Bot. 63.—Eaton, Manual, 6 ed. 2.—Spach, Hist. Veg. iii, 104; Ann. Sci. Nat. 2 ser. ii, 170.—Dietrich, Syn. ii, 1282.—Eaton & Wright, Bot. 112.—Koch, Dendrologie, i, 532.—Gray in Am. Nat. vi, 767; vii, 422.—Wood, Cl. Book, 286; Bot. & Fl. 74.

BLACK SUGAR MAPLE.

Western Vermont, shores of lake Champlain, westward to southern Missouri, south through Tennessee to northern Alabama, the valley of the Chickasaw river, Mississippi (Mohr), and southwestern Arkansas (Fulton, Letterman).

A large tree along streams and river bottoms, in lower ground than the species with which it is connected by numerous intermediate forms.

Wood heavier than that of the species; specific gravity, 0.6915; ash, 0.71.

65.—Acer dasycarpum, Ehrhart,

- Beitr. iv, 24.—Mœnch, Meth. 56.—Persoon, Syn. i, 417.—Willdenow, Spec. iv, 985; Enum. ii, 1044.—Aiton, Hort. Kew. 2 ed. v, 446.—Pursh, Fl. Am. Sept. i, 266.—Nuttall, Genera, i, 252; Sylva, ii, 87; 2 ed. ii, 35.—Hayne, Dend. Fl. 213.—Elliott, Sk. i, 449.—Torrey, Fl. U. S. 396; Compend. Fl. N. States, 169; Fl. N. York, i, 136, t. 18; Nicollet's Rep. 147.—Sprengel, Syst. ii, 225.—Tausch, Regensb. Fl. xii², 553.—Eaton, Manual, 6 ed. 2.—Loudon, Arboretum, i, 423, fig. 129 & t.—Hooker, Fl. Bor.-Am. i, 113; Jour. Bot. i, 200.—Bigelow, Fl. Boston. 3 ed. 407.—Torrey & Gray, Fl. N. America, i, 248.—Eaton & Wright, Bot. 112.—Emerson, Trees Massachusetts, 487; 2 ed. ii, 556 & t.—Parry in Owen's Rep. 610.—Darlington, Fl. Cestrica, 3 ed. 46.—Richardson, Arctic Exped. 423.—Darby, Bot. S. States, 265.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 81.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 51.—Lesquereux in Owen's 2d Rep. Arkansas, 354.—Wood, Cl. Book, 286; Bot. & Fl. 74.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187.—Buchenau in Bot. Zeit. xix, 285, t. 11.—Gray, Manual N. States, 5 ed. 119.—Vasey, Cat. Forest Trees, 10.—Coulter's Bot. Gazette, v, 88.—Koch, Dendrologie, i, 541.—Sears in Bull. Essex Inst. xiii, 3.—Bell in Geological Rep. Canada, 1879–'80, 53°.—Nicholson in London Gard. Chronicle, 1881, 136, f. 24.—Ridgway in Proc. U. S. Nat. Mus, 1882, 62.
 - A. saccharinum, Linnæus, Spec. 1 ed. 1055.
 - A. rubrum, var. pallidum, Aiton, Hort. Kew. iii, 434.
 - A. eriocarpum, Michaux, Fl. Bor.-Am. ii,253.—Desfontaines in Ann. Mus. vii, 412, t. 25, f. 1; Hist. Arb. i, 392.—Poiret, Suppl. ii, 573.—Trattinick, Archiv. i, t. 8.—Michaux f. Hist. Arb. Am. ii, 205, t. 13; N. American Sylva, 3 ed. i, 146, t. 40.—Nouveau Duhamel, iv, 30.—De Candolle, Prodr. i, 595.—Don, Miller's Dict. i, 650.—Penn. Cycl. i, 79.—Beck, Bot. 63.—Spach, Hist. Veg. iii, 116; Ann. Sci. Nat. 2 ser. ii, 177.—Darlington, Fl. Cestrica, 2 ed. 245.—Dietrich, Syn. ii, 1282.—Browne, Trees of America, 95.—Meehan in Proc. Philadelphia Acad. 1868, 140.

SOFT MAPLE. WHITE MAPLE. SILVER MAPLE.

Valley of the Saint John's river, New Brunswick, to Ontario, south of latitude 45°, south to western Florida; west to eastern Dakota, eastern Nebraska, the valley of the Blue river, Kansas, and the Indian territory.

A large tree, 18 to 30 or, exceptionally, 36 meters in height, with a trunk 1.20 to 1.80 meter in diameter; along streams and intervales, in rich soil; most common west of the Alleghany mountains, and reaching its greatest development in the basin of the lower Ohio river.

Wood light, hard, strong, brittle, close-grained, compact, easily worked; medullary rays numerous, thin; specific gravity, 0.5269; ash, 0.33; somewhat used in the manufacture of cheap furniture, for flooring, etc.; maple sugar is occasionally made from this species.

4 FOR

66.—Acer rubrum, Linnæus,

Spec. 1 ed. 1055.—Du Roi, Diss. 59.—Marshall, Arbustum, 3.—Lamarck, Diet. ii, 300; Ill. iii, 438, t. 844, f. 3.—Ehrhart, Beitr. iv, 23.— Abbot, Insects Georgia, ii, 93.—Aiton, Hort. Kew. iii, 434 (excl. var.); 2 ed. v, 446.—Moench, Meth. 56.—Michaux, Fl. Bor.-Am. ii, 253.—Persoon, Syn. i, 417.—Robin, Voyages, iii, 471.—Nouveau Duhamel, iv, 31.—Willdenow, Spec. iv, 984; Enum. ii, 1044.— Desfontaines in Ann. Mus.vii, 413, t. 25, f.2; Hist. Arb. i, 391.—Poiret, Suppl. ii, 574.—Trattinick, Archiv. i, t. 9.—Michaux f. Hist. Arb. Am. ii, 210, t. 14; N. American Sylva, 3 ed. i 149, t. 41.—Pursh, Fl. Am. Sept. i, 265.—Bigelow, Fl. Boston. 377.—Nuttall, Genera, i, 252.—Eaton, Manual, 44; 6 ed. 2.—Hayne, Dend. Fl. 213.—Elliott, Sk. i, 449.—Torrey, Fl.U. S. 395; Compend. Fl. N. States, 169; Fl. N. York, i, 137.—Watson, Dend. Brit. ii, t. 169.—Sprengel, Syst. ii, 225.—Audubon, Birds, t. 54, 67.—Tausch, Regensb. Fl. xii*, 552.—Penn. Cycl. i, 79.—Hooker, Fl. Bor.-Am. i, 114; Jour. Bot. i, 199.—Don, Miller's Dict. i, 650.—Beck, Bot. 63.—Spach, Hist. Veg. iii, 113; Ann. Sci. Nat. 2 ser. ii, 176.—Loudon, Arboretum, i, 424, f. 130 & t. --Torrey & Gray, Fl. N. America, i, 249, 684.—Dietrich, Syn. ii, 1282.—Eaton & Wright, Bot. 112.—Bigelow, Fl. Boston. 3 ed. 405.—Walpers, Rep. i, 409.—Reid in London Gard. Chroniele, 1844, 276.—Emerson, Trees Massachusetts, 483; 2 ed. ii, 551 & t.—Parry in Owen's Rep. 610.—Richardson, Arctic Exped. 422.—Nuttall, Sylva, ii, 87; 2 ed. ii, 34.—Darlington, Fl. Cestrica, 3 ed. 46.—Darby, Bot. S. States, 265.—Cooper in Smithsonian Rep. 1858, 251.— Chapman, Fl. S. States, 81.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 50.—Lesquereux in Owen's 2d Rep. Arkansas, 354, Wood, Cl. Book, 286; Bot. & Fl. 74. - Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187. - Porcher, Resources S. Forests, 79.—Buchenau in Bot. Zeit. xix, 285, t. 11.—Gray, Manual N. States, 5 ed. 119.—Koch, Dendrologie, i, 542.—Young, Bot. Texas, 206.—Vasey, Cat. Forest Trees, 10.—Macoun in Geological Rep. Canada, 1875-76, 192.—Sears in Bull, Essex Inst. xiii, 176.—Bell in Geological Rep. Canada, 1879-180, 54c.—Nicholson in London Gard. Chronicle, 1881, 172, f. 30, 31.—Ridgway in Proc. U. S. Nat. Mus. 1882, 62.

? A. glaucum, Marshall, Arbustum, 2.

? A. Caroliniana, Walter, Fl. Caroliniana, 251.

A. coccineum, Michaux f. Hist. Arb. Am. ii, 203; N. American Sylva, 3 ed. i, 142.

A. sanguineum, Spach, Hist. Veg. iii, 115; Ann. Sci. Nat. 2 ser. ii, 176.—Dietrich, Syn. ii, 1282.

RED MAPLE. SWAMP MAPLE. SOFT MAPLE. WATER MAPLE.

New Brunswick, Quebec and Ontario, south of latitude 49°, north and west to the Lake of the Woods, south to Indian and Caloosa rivers, Florida, west to eastern Dakota, eastern Nebraska, the Indian territory, and the valley of the Trinity river, Texas.

A large tree, 20 to 30 or, exceptionally, 32 meters in height, with a trunk 0.90 to 1.50 meter in diameter; borders of streams and low, wet swamps, reaching its greatest development in the valleys of the lower Wabash and Yazoo rivers.

Wood heavy, hard, not strong, close-grained, compact, easily worked; medullary rays numerous, obscure; color, brown, often tinged with red, the sap-wood lighter; specific gravity, 0.6178; ash, 0.37; largely used in cabinet-making, turnery, and for woodenware, gun stocks, etc.; an accidental variety with undulating grain is highly valued.

Ink is occasionally made, domestically, by boiling the bark of this species in soft water and combining the tannin with sulphate of iron; formerly somewhat used in dyeing.

Var. Drummondii.

A. Drummondii, Hooker & Arnott in Hooker, Jour. Bot. i, 199.—Nuttall, Sylva, ii, 83, t. 70; 2 ed. ii, 30, t. 70.

Southern Arkansas, eastern Texas, western Louisiana, and sparingly through the Gulf states to southern Georgia.

Well characterized by its obovate or truncate leaves, the base entire or slightly crenulate-toothed, densely covered, as well as the petioles and young shoots, with a thick white tomentum; fruit convergent, the wings bright red, even when fully ripe.

A large tree, in deep, wet swamps, connected with the species by numerous intermediate forms of Georgia, Florida, and Alabama.

Wood lighter than that of the species; specific gravity, 0.5459; ash, 0.34.

67.-Negundo aceroides, Monch,

Meth. 334.—Torrey & Gray, Fl. N. America, i, 250.—Eaton & Wright, Bot. 327.—Torrey in Nicollet's Rep. 147; Fremont's Rep. 88; Pacific R. R. Rep. iv, 73.—Nuttall, Sylva, ii, 92; 2 ed. ii, 38.—Gray in Jour. Boston Soc. Nat. Hist. vi, 166; Mem. Am. Acad. new ser. iv, 29; v, 309; Genera, ii, 202, t. 175; Pacific R. R. Rep. xii, 41; Manual N. States, 5 ed. 120.—Richardson, Arctic Exped. 423.—Parry in Owen's Rep. 610.—Darlington, Fl. Cestrica, 3 ed. 46.—Cooper in Smithsonian Rep. 1858, 251; Am. Nat. iii, 306.—Chapman, Fl. S. States, 81.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 53.—Wood, Cl. Book, 287; Bot. & Fl. 74.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 188.—Porter in Hayden's Rep. 1870, 474.—Watson in King's Rep. v, 52; Pl. Wheeler, 7.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 19.—Macoun & Gibson in Trans. Bot Soc. Edinburgh, xii, 319.—Young, Bot. Texas, 207.—Vasey, Cat. Forest Trees, 10.—Macoun in Geological Rep. Canada, 1875-'76, 192.—Brewer & Watson, Bot. California, i, 108.—Rothrock in Wheeler's Rep. vi, 84.—Hemsley, Bot. Am.-Cent. i, 214.—Sears in Bull. Essex Inst. xiii, 176.—Bell in Geological Rep. Canada, 1879-'80, 48c.—Nicholson in London Gard. Chronicle, 1881, 815.—Ridgway in Proc. U. S. Nat. Mus. 1882, 63.—Watson in Proc. Am. Acad. xvii, 338.

Acer Negundo, Linnæus, Spec. 1 ed. 1056.—Wangenheim, Amer. 30, t. 12, f. 29.—Marshall, Arbustum, 2.—Lumarck, Dict. ii, 380.—Walter, Fl. Caroliniana, 250.—Aiton, Hort. Kew. iii, 436; 2 ed. v, 448.—Michaux, Fl. Bor.-Am. ii, 253.—Persoon, Syn. i, 418.—Desfontaines, Hist. Arb. i, 391.—Willdenow, Spec. iv, 992; Enum. ii, 1046.—Nouveau Duhamel, iv, 27, t. 7.—Trattinick, Archiv. i, t. 40.—Michaux f. Hist. Arb. Am. ii, 247, t. 18; N. American Sylva, 3 ed. i, 172, t. 46.—Pursh, Fl. Am. Sept. i, 268.—Hayne, Dend. Fl. 216.—Elliott, Sk. i, 452.—James in Long's Exped. ii, 69.—Torrey, Fl. U. S. 298; Compend. Fl. N. States, 170; Ann. Lyc. N. York, ii, 172; Emory's Rep. 407.—Sprengel, Syst. ii, 225.—Guimpel, Otto & Hayne, Abb. Holz. 119, t. 95.—Eaton, Manual, 6 ed. 2.—Dietrich, Syn. ii, 1283.—Loudon, Arboretum, i, 460, t. 46, 47.—Darby, Bot. S. States, 265.—Buchenau in Bot. Zeit. xiv, 285, t. 11 & figs.—Koch, Dendrologie, i, 544.—Baillon, Hist. Pl. v, 374, f. 426.

Negundium fraxinifolium, Rafinesque, Med. Rep. v, 354.—Desvaux, Jour. Bot. v, 170.

Negundo fraxinifolium, Nuttall, Genera, i, 253.—De Candolle, Prodr. i, 596.—Hooker, Fl. Bor.-Am. i, 114; Jour. Bot. i, 200.—Don, Miller's Dict. i, 651.—Beck, Bot. 64.—Spach, Hist. Veg. iii, 119.—Rafinesque, New Fl. & Bot. i, 48.—Browne, Trees of America, 106.—Scheele in Ræmer, Texas, 433.—Schnizlein, Icon. t. 227, f. 2, 18.

? N. Mexicanum, De Candolle, Prodr. i, 596.—Hemsley, Bot. Am.-Cent. i, 214.

N. trifoliatum, Rafinesque, New Fl. & Bot. i, 48.

N. lobatum, Rafinesque, New Fl. & Bot. i, 48.

N. Californicum, Scheele in Romer, Texas, 433 [not Torrey & Gray].

BOX ELDER. ASH-LEAVED MAPLE.

Shores of the Winooski river and lake Champlain, Vermont, near Ithaca, New York, eastern Pennsylvania, and south to Hernando county, Florida (not detected in northeastern Florida); northwest through the lake region of the United States and Manitoba to the Dog's Head, lake Winnipeg, and along the southern branch of the Saskatchewan to the eastern base of the Rocky mountains; west in the United States to the eastern slopes of the Rocky mountains of Montana, through Colorado to the Wahsatch mountains, Utah; southwest through the basin of the Mississippi river, western Texas, and New Mexico to the Mogollon mountains, eastern Arizona; southward into Mexico.

A tree 15 to 22 meters in height, with a trunk 0.60 to 0.90 or, exceptionally, 1.20 meter in diameter; moist soil, borders of streams, etc.; in the Rocky Mountain region in high valleys, between 5,000 and 6,000 feet elevation; one of the most widely distributed trees of the American forest, reaching its greatest development in the valleys of the Wabash and Cumberland rivers.

Wood light, soft, not strong, close-grained, compact; medullary rays numerous, thin; color, creamy-white, the sap-wood hardly distinguishable; specific gravity, 0.4328; ash, 1.07; occasionally used in the interior finish of houses, for woodenware, cooperage, and paper-pulp.

Small quantities of maple sugar are sometimes obtained from this species.

68.-Negundo Californicum, Torrey & Gray,

Fl. N. America, i, 250, 684.—Hooker & Arnott, Bot. Beechey, 327, t. 77.—Eaton & Wright, Bot. 327.—Walpers, Rep. i, 410.—Bentham, Pl. Hartweg. 301.—Nuttall, Sylva, ii, 90, t. 72; 2 ed. ii, 37, t. 72.—Cooper in Smithsonian Rep. 1858, 258, in part.—Koch, Dendrologie, i, 545.—Brewer & Watson, Bot. California, i, 108.—Vasey, Cat. Forest Trees, 10.—Nicholson in London Gard. Chronicle, 1881, 815.

Acer Californicum, Dietrich, Syn. ii, 1283.

N. accroides, Torrey in Pacific R. R. Rep. iv, 74; Bot. Mex. Boundary Survey, 47; Bot. Wilkes Exped. 259 [not Mench].—Bolander in Proc. California Acad. iii, 78.

BOX ELDER.

California, valley of the lower Sacramento river (Sacramento, and in Marin and Contra Costa counties), southward in the interior valleys of the Coast ranges to about latitude 35°, cañons of the western slopes of the San Bernardino mountains (*Parish Brothers*).

A small tree, 6 to 12 meters in height, with a trunk 0.30 to 0.60 meter in diameter; borders of streams.

Wood light, soft, not strong, close-grained, compact; medullary rays numerous, thin; color, nearly white, or slightly tinged with yellow; specific gravity, 0.4821; ash, 0.54; occasionally used in the manufacture of cheap furniture.

ANACARDIACE Æ.

69.-Rhus cotinoides, Nuttall,

Mss. in Herb. Philadelphia Acad.; Travels, 177.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 70.—Wood, Cl. Book, 285; Bot. & Fl. 73.—Buckley in Proc. Philadelphia Acad. 1881, 125.—Mohr in Proc. Philadelphia Acad. 1881, 217.

R. cotinus? Torrey & Gray, Fl. N. America, i, 216.—Wood, Cl. Book, 285.

Cotinus Americanus, Nuttall, Sylva, iii, 1, t. 81; 2 ed. ii, 71, t. 81.

Cotinus coggygria, Engler in De Candolle, Suites, iv, 351, in part.

Indian territory, "on the light, broken, calcareous, rocky banks of the Grand river, a large tributary of the Arkansas, at a place then known as the Eagle's Nest," (Nuttall, l. c.); Alabama, north of the Tennessee river on southern slopes of the Cumberland mountains (on a hill near Bailie's farm, twelve miles from Huntsville, on the Madison road, Buckley, Mohr), and doubtfully reported north of the Alabama line, in Tennessee.

CHITTAM WOOD.

In Alabama, a small wide-branching tree, 9 to 10 meters in height, with a trunk sometimes 0.30 meter in diameter; on limestone benches from 700 to 900 feet elevation, in dense forests of oak, ash, maple, etc.; local and very rare; not rediscovered in Arkansas or the Indian territory; in Alabama nearly exterminated.

Wood light, soft, rather coarse-grained, checking badly in drying, very durable in contact with the soil; layers of annual growth marked by several rows of large open ducts; medullary rays, numerous, very obscure; color, bright, clear, rich orange, the thin sap-wood nearly white; specific gravity, 0.6425; ash, 0.50; largely used locally for fencing, and yielding a clear orange dye.

70.—Rhus typhina, Linnaus,

Amæn. iv, 311.—Medicus, Bot. Beobacht. 1782, 228.—Wangenheim, Amer. 95.—Marshall, Arbustum, 129.—Walter, Fl. Caroliniana, 255.—Aiton, Hort. Kew. i, 365; 2 ed. ii, 162.—Ehrhart, Beitr. vi, 89.—Mænch, Meth. 72.—Willdenow, Spec. i, 1478; Enum. i, 323.—B. S. Barton, Coll. i, 51.—Schkuhr, Handb. 237.—Michaux, Fl. Bor.-Am. i, 182.—Nouveau Duhamel, ii, 164, t. 47.—Persoon, Syn. i, 324.—Desfontaines, Hist. Arb. ii, 325.—Poiret in Lamarck, Dict. vii, 503.—Barton, Prodr. Fl. Philadelph. 39; Compend. Fl. Philadelph. i, 153.—Pursh, Fl. Am. Sept. i, 204.—Eaton, Manual, 35; 6 ed. 302.—Nuttall, Genera, i, 203.—Ræmer & Schultes, Syst. vi, 643.—Hayne, Dend. Fl. 33.—Elliott, Sk. i, 360.—Torrey, Fl. U. S. 322; Compend. Fl. N. States, 140; Fl. N. York, i, 128.—De Candolle, Prodr. ii, 67.—Sprengel, Syst. i, 936.—Watson, Dend. Brit. i, t. 17, 18.—Hooker, Fl. Bor.-Am. i, 126.—Don, Miller's Dict. ii, 70.—Beck, Bot. 76.—Spach, Hist. Veg. ii, 212.—Bennett, Pl. Jav. Rar. 80.—Loudon, Arboretum, ii, 550, f. 224.—Torrey & Gray, Fl. N. America, i, 217, 680.—Eaton & Wright, Bot. 392.—Bigelow, Fl. Boston. 3 ed. 126.—Dietrich, Syn. ii, 1002.—Emerson, Trees Massachusetts, 501; 2 ed. ii, 571 & t.—Browne, Trees of America, 184.—Griffith, Med. Bot. 186.—Parry in Owen's Rep. 610.—Darlington, Fl. Cestrica, 3 ed. 43.—Richardson, Arctic Exped. 424.—Darby, Bot. S. States, 254.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 69.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 93.—Lesquereux in Owen's 2d Rep. Arkansas, 353.—Wood, Cl. Book, 384; Bot. & Fl. 73.—Porcher, Resources S. Forests, 208.—Gray, Manual N. States, 5 ed. 111.—Koch, Dendrologic, i, 576.—Young, Bot. Texas, 197.—Vasey, Cat. Forest Trees, 10.—Guibourt, Hist. Drogues, 7 ed. iii, 488.—Nat. Dispensatory, 2 ed. 1230.—Ridgway in Proc. U. S. Nat. Mus. 1882, 63.—Engler in De Candolle, Suites, iv, 377.

Datisca hirta, Linnæus, Spec. 1 ed. 1037.—Don, Miller's Dict. i, 290.

- R. hypselodendron, Mench, Meth. 73.
- R. Canadense, Miller, Dict. No. 5.—Nouveau Duhamel, ii, 163.
- R. viridiflora, Nouveau Duhamel, ii, 163.—Poiret in Lamarck, Dict. vii, 504.—De Candolle, Prodr. ii, 67.—Nuttall, Genera, i, 203.—Don, Miller's Dict. ii, 70.—Dietrich, Syn. ii, 1002.—Loudon, Arboretum, ii, 551.—Browne, Trees of America, 184
- R. typhina, var. viridiflora, Engler in De Candolle, Suites, iv, 378.

STAGHORN SUMACH.

New Brunswick, west through the valley of the Saint Lawrence river to southern Ontario and Minnesota, south through the northern states and along the Alleghany mountains to northern Georgia, central Alabama and Mississippi.

A small tree, rarely 9 meters in height, with a trunk 0.15 to 0.30 meter in diameter, or often a shrub; dry hillsides or often along streams in sandy, moist soil. A variety with laciniate leaves occurs near Hanover, New

Hampshire, var. laciniata, Wood, Cl. Book, 284.—Bot. & Fl. 73).

Wood light, brittle, soft, coarse-grained, compact, satiny, susceptible of a good polish; layers of annual growth clearly marked by four to six rows of large open ducts; medullary rays numerous, obscure; color, yellow streaked with green, the sap-wood nearly white; specific gravity, 0.4357; ash, 0.50; occasionally used for inlaying cabinet work; the young shoots for "sap quills" in drawing the sap of the sugar maple.

Bark and leaves astringent, rich in tannin, and somewhat used locally as a dye and in dressing skins (Special Rep. No. 26, U. S. Ag. Dep. 22, t. 3); an infusion of the berries used domestically as a gargle in cases of catarrhal sore throat.

71.—Rhus copallina, Linnaus,

Spec. 1 ed 266.—Medicus, Bot. Beobacht. 1782, 224.—Marshall, Arbustum, 128.—Wangenheim, Amer. 96.—Walter, Fl. Caroliniana, 255.—Gærtner, Fruct. i, 205, t. 44.—Aiton, Hort. Kew. i, 366; 2 ed. ii, 163.—Plenck, Icon. t. 233.—Lamarck, Ill. ii, 346, t. 207, f. 3.—Jacquin, Hort. Schönb. iii, 50, t. 341.—Willdenow, Spec. i, 1480; Enum. i, 324.—Michaux, Fl. Bor.-Am. i, 182.—Schkuhr, Handb. 237.—Nouveau Duhamel, ii, 160.—Persoon, Syn. i, 324.—Desfontaines, Hist. Arb. ii, 325.—Poiret in Lamarck, Dict. vii, 506.—Barton, Prodr. Fl. Philadelph. 39.—Pursh, Fl. Am. Sept. i, 205.—Eaton, Manual, 34; 6 ed. 302.—Nuttall, Genera, i, 203.—Ræmer & Schultes, Syst. vi, 647.—Hayne, Dend. Fl. 34.—Elliott, Sk. i, 362.—Torrey, Fl. U. S. 323; Compend. Fl. N. States, 140; Fl. N. York, 129.—De Candolle, Prodr. ii, 68.—Sprengel, Syst. i, 936.—Don, Miller's Dict. ii, 72.—Beek, Bot. 75.—Hooker in Jour. Bot. i, 202.—Spach, Hist. Veg. ii, 214.—Torrey & Gray, Fl. N. America, i, 217.—Eaton & Wright, Bot. 392.—Bigelow, Fl. Boston. 3 ed. 126.—Dietrich, Syn. ii, 1003.—Loudon, Arboretum, ii, 554.—Emerson, Trees Massachusetts, 503; 2 ed. ii, 574.—Griffith, Med. Bot. 186.—Gray in Mem. Am. Acad. new ser. vi, 28; Manual N. States, 5 ed. 111; Hall's Pl. Texas, 5.—Scheele in Ræmer, Texas, 431.—Darlington, Fl. Cestrica, 3 ed. 43.—Darby, Bot. S. States, 255.—Chapman, Fl. S. States, 69.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 92.—Lesquereux in Owen's 2d Rep. Arkansas, 352.—Wood, Cl. Book, 284; Bot. & Fl. 73.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 187.—Porcher, Resources S. Forests, 207.—Koch, Dendrologie, 575.—Young, Bot. Texas, 197.—Vasey, Cat. Forest Trees, 11.—Nat. Dispensatory, 2 ed. 1236.—Ward in Bull. U. S. Nat. Mus. No. 22, 73.—Ridgway in Proc. U. S. Nat. Mus. 1882, 63.—Engler in De Candolle, Suites, iv, 384.

? R. copallina, vars. latifolia, latialata, angustifolia, and serrata, Engler in De Candolle, Suites, iv, 384.

DWARF SUMACH.

Northern New England, south to Manatee and Caximbas bay, Florida, west to Missouri, Arkansas, and the valley of the San Antonio river, Texas.

A small tree, 6 to 9 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or at the north a low shrub 1 to 2 meters in height; dry hills and ridges, reaching its greatest development in southern Arkansas and eastern Texas; running into various forms. The best marked is—

var. leucantha, De Candolle, Prodr. ii, 68.—Gray in Jonr. Boston Soc. Nat. Hist. vi, 158.

R. leucantha, Jacquin, Hort. Schönb. iii, 50, t. 342.—Spach, Hist. Veg. ii, 215.

R. copallina, var. angustialata, Engler in De Candolle, Suites, iv, 384.

Shrubby, leaflets lanceolate, flowers white.

Wood light, soft, not strong, coarse-grained, compact, satiny, susceptible of a good polish; layers of annual growth clearly marked by several rows of large open ducts; medullary rays thin, not prominent; color, light brown streaked with green, or often tinged with red; the sap-wood lighter; specific gravity, 0.5273; ash, 0.60.

Leaves and bark astringent, rich in tannin; the leaves largely collected, principally in Maryland, Virginia. West Virginia, and Tennessee, and ground for tanning and dyeing (Special Rep. No. 26, U. S. Ag. Dep. 26, t. 5); the fruit, acid and astringent, used, as well as that of the shrubby Rhus glabra, by herbalists in the form of decoctions, fluid extracts, etc., as a gargle in the treatment of sore throat.

Var. lanceolata, Gray,

Jour. Boston Soc. Nat. Hist. vi, 158.—Torrey, Bot. Mex. Boundary Survey, 44.—Watson in Proc. Am. Acad. xvii, 338.

R. copallina, var. integrifolia, Engler in De Candolle, Suites, iv, 384.

Western Texas, Dallas (Reverchon) to the Rio Grande.

A small tree, with lanceolate, elongated leaflets, 5 to 6 meters in height, with a trunk 0.12 to 0.15 meter in diameter; calcareous soil; common; specific gravity, 0.5184; ash, 0.85.

72.-Rhus venenata, De Candolle,

Prodr. ii, 68.—Hooker, Fl. Bor.-Am. i, 126.—Don, Miller's Dict. ii, 71.—Beck, Bot. 76.—Spach, Hist. Veg. ii, 215.—Lindley, Fl. Med. 284.—Loudon, Arboretum, ii, 552, f. 226.—Torrey & Gray, Fl. N. America, i, 218, 681.—Eaton & Wright, Bot. 392.—Dietrich, Syn. ii, 1003.—Torrey, Fl. N. York, i, 130.—Browne, Trees of America, 186.—Griffith, Med. Bot. 185.—Emerson, Trees Massachusetts, 504; 2 ed. ii, 575 & t.—Darlington, Fl. Cestrica, 3 ed. 44.—Richardson, Arctic Exped. 424.—Cooper in Smithsonian Rep. 1858, 250.—Chapman, Fl. S. States, 69.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 93.—Lesquereux in Owen's 2d Rep. Arkansas, 353.—Wood, Cl. Book, 284; Bot. & Fl. 73.—Gray, Manual N. States, 5 ed. 111.—Vascy, Cat. Forest Trees, 11.—Bailey in Am. Nat. vii, 5, f. 3.—Ward in Bull. U. S. Nat. Mus. No. 22, 73.—Engler in De Candolle, Suites, iv, 397.

R. vernix, Linnæus, Spec. 1 ed. 265, in part.—Kalm, Travels, English ed. 177.—Medicus, Bot. Beobacht. 1782, 223.—Marshall, Arbustum, 130.—Wangenheim, Amer. 92.—Aiton, Hort. Kew. i, 366; 2 ed. ii, 163.—Plenck, Icon. t. 234.—Lamarck, Ill. ii, 346, t. 207, f. 2.—Willdenow, Spec. i, 1479; Enum. i, 323.—B. S. Barton, Coll. i, 23, 50.—Schkuhr, Handb. 236.—Michaux, Fl. Bor.-Am. i, 183.—Nouveau Duhamel, ii, 165.—Persoon, Syn. i, 324.—Desfoutaines, Hist. Arb. ii, 325.—Poiret in Lamarck, Dict. vii, 505.—Nuttall, Genera, i, 203.—Barton, Prodr. Fl. Philadelph. 39; Compend. Fl. Philadelph. 154.—Pursh, Fl. Am. Sept. i, 205.—Eaton, Manual, 34; 6 ed. 302.—Bigelow, Med. Bot. i, 96, t. 10; Fl. Boston. 3 ed. 126.—Rœmer & Schultes, Syst. vi, 646.—Hayne, Dend. Fl. 34.—Elliott, Sk. i, 362.—Torrey, Fl. U. S. 323; Compend. Fl. N. States, 203.—Sprengel, Syst. i, 936.—Hooker, Jour. Bot. i, 202.—Darby, Bot. S. States, 255.—Porcher, Resources S. Forests, 206.

POISON SUMACH. POISON ELDER.

Northern New England, south to northern Georgia, Alabama, and western Louisiana, west to northern Minnesota, Missouri, and Arkansas.

A small tree, 6 to 8 meters in height, with a trunk sometimes 0.15 to 0.20 meter in diameter, or more often a tall shrub; low, wet swamps or, more rarely, on higher ground.

Wood light, soft, coarse-grained, moderately compact; layers of annual growth clearly marked by three or four rows of large open ducts; medullary rays thin, very obscure; color, light yellow streaked with brown, the sap-wood lighter; specific gravity, 0.4382; ash, 0.64.

The whole plant, as well as the allied R. Toxicodendron, to most persons exceedingly poisonous to the touch, owing to the presence of a volatile principle, Toxicodendric acid (U. S. Dispensatory, 14 ed. 908.—Nat. Dispensatory, 2 ed. 1464); the white milky sap turning black in drying and yielding a valuable lacquer (Bigelow, Med. Bot. l. c.)

73.-Rhus Metopium, Linnaus,

Amen. v, 395.—Titford, Hort. Bot. Am. 51.—Descourtilz, Fl. Med. Antilles, ii, 49, t. 79.—De Candolle, Prodr. ii, 67.—Macfadyen, Fl. Jamaica, 225.—Nuttall, Sylva, ii, 121, t. 80; 2 ed. ii, 68, t. 80.—Richard, Fl. Cuba, 381.—Cooper in Smithsonian Rep. 1858, 264.—Grisebach, Fl. British West Indies, 175.—Chapman, Fl. S. States, 69.—Wood, Bot. & Fl. 73.—Vasey, Cat. Forest Trees, 11.

Metopium Linnæi, Engler in De Candolle, Suites, iv. 367.

POISON WOOD. CORAL SUMACH. MOUNTAIN MANCHINEEL. BUM WOOD. HOG PLUM. DOCTOR GUM.

Semi-tropical Florida, bay Biscayne to the southern keys; in the West Indies.

A tree 12 to 15 meters in height, with a trunk sometimes 0.60 meter in diameter, reaching in the United States its greatest development on the shores of bay Biscayne, near Miami; one of the most common trees of the region, the large specimens generally decayed.

Wood heavy, hard, not strong, close-grained, checking badly in drying, containing many evenly-distributed open ducts; medullary rays numerous, thin; color, rich dark brown streaked with red, the sap-wood light brown or yellow; specific gravity, 0.7917; ash, 2.39; little esteemed.

A resinous gum, emetic, purgative, and diaretic, is obtained from incisions made in the bark of this species (*Pharm. Jour.* vii, 270.—*Guibourt, Hist. Drogues*, 7 ed. iii, 489).

74.—Pistacia Mexicana, HBK.

Nov. Gen. & Spec. vii, 22, t. 608.—De Candolle, Prodr. ii, 64.—Gray in Smithsonian Contrib. v, 27.—Torrey, Bot. Mex. Boundary Survey, 44.—Cooper in Smithsonian Rep. 1858, 265.—Brewer & Watson, Bot. California, i, 109.—Vasey, Cat. Forest Trees, 11.—Hemsley, Bot. Am.-Cent. i, 221.—Watson in Proc. Am. Acad. xvii, 338.

Texas, valley of the Rio Grande (near the mouth of the Pecos river, Bigelow); southward into Mexico (Saltillo, Palmer, etc.).

Wood not collected.

LEGUMINOSÆ.

75.—Eysenhardtia orthocarpa, Watson,

Proc. Am. Acad. xvii, 339.

E. amorphoides, var. orthocarpa, Gray in Smithsovian Contrib. iii, 46; v, 237.

E. amorphoides, Torrey, Bot. Mex. Boundary Survey, 51, in part.

Western Texas, valleys of the upper Guadalupe and Rio Grande, west to the Santa Rita and Santa Catalina mountains, Arizona (Pringle); southward into northern Mexico.

A small tree, 5 to 6 meters in height, with a trunk 0.09 to 0.15 meter in diameter, or more often a low shrub; dry, gravelly soil, reaching its greatest development near the summit of the Santa Catalina mountains, at 3,000 feet altitude.

Wood heavy, hard, close-grained, very compact; layers of annual growth clearly defined by numerous rows of open ducts; medullary rays numerous, thin; color, light reddish-brown, sap-wood clear yellow; specific gravity, 0.8740; ash, 1.28.

76.-Dalea spinosa, Gray,

Mem. Am. Acad. new ser. v, 315; Ives' Rep. 10.—Torrey, Pacific R. R. Rep. iv, 78; vii, 9, t. 3.—Bot. Mex. Boundary Survey, 53.—Walpers, Ann. iv, 485.—Cooper in Smithsonian Rep. 1858, 266.—Watson in Proc. Am. Acad. xi, 132.—Brewer & Watson, Bot. California, i, 143.—Hemsley, Bot. Am. -Cent. 249.

Asagræa spinosa, Baillon in Adausonia, ix, 232; Hist, Pl. ii, 288.

Colorado desert, southern California (Agua Caliente, Toras, etc.), and eastward to the valley of the lower Gila river, Arizona.

A small tree, sometimes 6 meters in height, with a short, stout trunk 0.45 to 0.50 meter in diameter (Parry, Parish Brothers), or often a low shrub; dry, gravelly, rocky soil.

Wood light, soft, rather coarse-grained, containing many evenly-distributed open ducts; medullary rays numerons, thin; color, walnut-brown, the sap-wood nearly white; specific gravity, 0.5536; ash, 4.04.

77.-Robinia Pseudacacia, Linnaus,

Spec. 1 ed. 722.—Marshall, Arbustum, 133.—Wangenheim, Amer. 16, t. 7.—L'Heritier, Stirp, Nov. 158.—Walter, Fl. Caroliniana, 186.—Aiton, Hort. Kew. iii, 53; 2 ed. iv, 323.—Gærtner, Fruct. ii, 307, t. 145.—Willdenow, Spec. iii, 1131; Enum. i, 769.—Michaux, Fl. Bor.—Am. ii, 65.—Nouveau Duhamel, ii, 60, t. 16.—Poiret in Lamarck Dict, vi, 222; Ill. iii, 163, t. 606.—Persoon, Syn. ii, 311.—Desfontaines, Hist. Arb. ii, 302.—Michaux f. Hist. Arb. Am. iii, 245, t. 1; N. American Sylva, 3 ed. ii, 92, t. 76.—Pursh, Fl. Am. Sept. ii, 487.—Eaton, Manual, 82; 6 ed. 306.—Thomas in Am. Month. Mag. & Crit. Rev. ii, 90.—Nuttall, Genera, ii, 118.—Hayne, Dend. Fl. 140.—Elliott, Sk. ii, 242.—De Candolle, Prodr. ii, 261.—Sprengel, Syst. iii, 247.—Torrey in Ann. Lyc. N. York, ii, 178; Compend. Fl. N. States, 271; Fl. N. York, i, 165; Emory's Rep. 408.—Hooker, Fl. Bor.-Am. i, 140.—Audubon, Birds, t. 104.—Don, Miller's Dict. ii, 237.—Beck, Bot. 82.—Spach, Hist. Veg. i, 258.—Torrey & Gray, Fl. N. America, i, 294.—Loudon, Arboretum, ii, 609, f. 305 & t.—Eaton & Wright, Bot. 397.—Bigelow, Fl. Boston. 3 ed. 295.—Browne, Trees of America, 197.—Emerson, Trees, Massachusetts, 460; 2 ed. ii, 522 & t.—Griffith, Med. Bot. 238, f. 123.—Dietrich, Syn. iv, 1053.—Darlington, Fl. Cestrica, 3 ed. 65.—Darby Bot. S. States, 280.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 94.—Curfis in Rep. Geological Surv. N. Carolina, 1860, iii, 48.—Lesquereux in Owen's 2d Rep. Arkansas, 356.—Wood, Cl. Book, 319; Bot. & Fl. 95.—Lemaire, Ill. Hort. xii, t. 427.—Porcher, Resources S. Forests, 188.—Gray, Manual N. States, 5 ed. 131.—Koch, Dendrologie, i, 55.—Verlot in Rev. Hort. 1873, 152 & f.—Young, Bot. Texas, 228.—Vasey, Cat. Forest Trees, 11.—Ridgway in Proc. U. S. Nat. Mas. 1889, 65

Pseudacacia odorata, Mench, Meth. 145.

R. fragilis, Salisbury, Prodr. 336.

LOCUST. BLACK LOCUST. YELLOW LOCUST.

Alleghany mountains, Pennsylvania (Locust ridge, Monroe county, *Porter*) to northern Georgia; widely and generally naturalized throughout the United States east of the Rocky mountains, and possibly indigenous in northeastern (Crowley's ridge) and western Arkansas and the prairies of eastern Indian territory.

A tree 22 to 25 meters in height, with a trunk 0.90 to 1.20 meter in diameter; west of the Mississippi river much smaller or often a low shrub 1.80 to 3 meters in height, reaching its greatest development on the western slopes of the mountains of West Virginia.

Wood heavy, exceedingly hard and strong, close-grained, compact, very durable in contact with the ground; layers of annual growth clearly marked by two or three rows of large open ducts; color, brown or, more rarely, light green, the sap-wood yellow; specific gravity, 0.7333; ash, 0.51 (*Trecul in Am. Jour. Sci.* 3 ser. xix, 182, t. 2, f. 1; t. 6, 7, f. 10.); largely used in ship-building, for posts of all sorts, construction, and in turnery; preferred to other American woods for treenails, and in this form largely exported.

The bark of the root tonic, or in large doses purgative and emetic (*U. S. Dispensatory*, 14 ed. 1746.—*Nat. Dispensatory*, 2 ed. 1233); formerly widely planted as a timber tree (*Cobbett*, *Woodlands*, par. 323); its cultivation in the United States now generally abandoned on account of the destructive attacks of the locust borer (*Cyllene picta*, *Packard in Bull. U. S. Entomological Com.* No. 7, 95).

78.-Robinia viscosa, Ventenat,

Hort. Cels. 4, t. 4.—Bot. Mag. t. 560.—Willdenow, Spec. iii, 1131; Enum. ii, 769.—Michaux, Fl. Bor.-Am. ii, 65.—Nouveau Duhamel, ii, 64, t. 17.—Poiret in Lamarck, Dict. vi, 222.—B. S. Barton, Bot. Appx. 29, t. 21.—Persoon, Syn. ii, 311.—Desfontaines, Hist. Arb. ii, 302.—Aiton, Hort. Kew. 2 ed. iv, 323.—Michaux f. Hist. Arb. Am. iii, 262, t. 2; N. American Sylva, ii, 104, t. 77.—Pursh, Fl. Am. Sept. ii, 488.—Nuttall, Genera, ii, 118.—Hayne, Dend. Fl. 140.—Elliott, Sk. ii, 242.—De Candolle, Prodr. ii, 262.—Guimpel, Otto & Hayne, Abb. Holz. 81, t. 65.—Sprengel, Syst. iii, 247.—Don, Miller's Dict. ii, 236.—Eaton, Manual, 6 ed. 306.—Spach, Hist. Veg. i, 260.—Torrey & Gray, Fl. N. America, i, 295.—Loudon, Arboretum, ii, 626, t. 87, f. 306.—Eaton & Wright, Bot. 397.—Browne, Trees of America, 209.—Dietrich, Syn. iv, 1053.—Darby, Bot. S. States, 280.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 94.—Curtis in Rep. Geological Surv. N. Čarolina, 1860, iii, 49.—Wood, Cl. Book, 319; Bot. & Fl. 95.—Porcher, Resources S. Forests, 193.—Gray, Manual N. States, 5 ed. 131.—Vasey, Cat. Forest Trees, 11.

R. glutinosa, Curtis, Bot. Mag. t. 560.-Koch, Dendrologie, i, 59.

CLAMMY LOCUST.

"High Alleghany mountains south of latitude 350" (Michaux). "Open woods, slopes of Buzzard ridge, altitude 4,500 feet, near Highland, Macon county, North Carolina" (J. Donnell Smith).

A small tree, 9 to 12 meters in height, with a trunk not exceeding 0.30 meter in diameter; very rare, and not rediscovered until 1882 by the numerous botanists who have visited, during the last thirty years, the localities where the Michauxs, father and son, discovered this species; widely cultivated and now occasionally naturalized in the Atlantic states.

Wood (of a cultivated specimen) heavy, hard, close-grained, compact; layers of annual growth clearly marked by many rows of open ducts; medullary rays numerous, thin; color, brown, the sap-wood light yellow; specific gravity, 0.8094; ash, 0.20.

79.-Robinia Neo-Mexicana, Gray,

Mem. Am. Acad. new ser. v, 314.—Torrey in Pacific R. R. Rep. iv, 79; Bot. Mex. Boundary Survey, 53.—Walpers, Ann. iv, 491.—Cooper in Smithsonian Rep. 1858, 265.—Watson in King's Rep. v, 419.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 23.—Vasey, Cat. Forest Trees, 11.

LOCUST.

Colorado, valley of the Purgatory river (near Trinidad), headwaters of the Canadian river, through western and southwestern New Mexico to the Santa Catalina and Santa Rita mountains (*Lemmon, Pringle*), Arizona (4,500 to 7,000 feet altitude), southern Utah, Mount Zion cañon, west fork of the Rio Virgin, and near Kanah.

A small tree, sometimes 6 to 8 meters in height, with a trunk 0.15 to 0.25 meter in diameter, or toward its upper limits of growth reduced to a low shrub; reaching its greatest development in the valley of the Purgatory river, Colorado.

Wood heavy, exceedingly hard, strong, close-grained, compact, satiny, containing many evenly-distributed open ducts; medullary rays, thin, conspicuous; color, yellow streaked with brown, the sap-wood light yellow; specific gravity, 0.8034; ash, 0.60.

80.-Olneya Tesota, Gray,

Mem. Am. Acad. new ser. v, 328; Ives' Rep. 11.—Torrey in Pacific R. R. Rep. iv, 11, 82; vii, 10, t. 5; Bot. Mex. Boundary Survey, 58.—Walpers, Ann. iv, 479, 587.—Cooper in Smithsonian Rep. 1858, 265.—Brewer & Watson, Bot. California, i, 157.—Vasey, Cat. Forest Trees, 11.—Hemsley, Bot. Am.-Cent. i, 260.

IRON WOOD. ARBOL DE HIERRO.

California, valley of the Colorado river south of the Mohave mountains, valley of the lower Gila river, southwestern Arizona; southward in Sonora.

A small tree in the United States, rarely 9 meters in height, with a trunk sometimes 0.45 meter in diameter; dry arroyos and cañons; in Sonora more common and of larger size.

Wood very heavy and hard, strong, brittle, close-grained, compact, the grain generally contorted, difficult to cut and work, susceptible of a high polish; medullary rays numerous, thin; color, rich dark brown streaked with red, the sap-wood clear bright yellow; specific gravity, 1.0602; ash, 2.29 (the heart-wood, 1.1486; ash, 2.59; sap-wood, 0.8958; ash, 1.85); occasionally manufactured into canes.

81.—Piscidia Erythrina, Linnæus,

Spec. 2 ed. 993.—Jacquin, Amer. 206.—Swartz, Obs. 277.—Lamarck, Dict. i, 443; Ill. iii, 163, t. 605.—Titford, Hort. Bot. Am. 84.—Lunan, Hort. Jam. i, 269.—Humboldt, Bonpland & Kunth, Nov. Gen. & Spec. vi, 382.—De Candolle, Prodr. ii, 267.—Descourtilz, Fl. Med. Antilles, iii, 203, t. 196.—Macfadyen, Fl. Jamaica, i, 258.—Nuttall, Sylva, ii, 31, t. 52; 2 ed. i, 180.—Bentham in Jour. Linnæan Soc. iv, Suppl. 116; Bot. Sulphur, 81.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 110.—Grisebach, Fl. British West Indies, 200.—Porcher, Resources S. Forests, 175.—Vasey, Cat. Forest Trees, 11.—Hemsley, Bot. Am.-Cent. i, 319.

Erythrina piscipula, Linnæus, Spec. 1 ed. 107.

P. Carthagenensis, De Candolle, Prodr. ii, 267.

JAMAICA DOGWOOD.

Semi-tropical Florida, bay Biscayne, west coast, Pease creek to cape Sable, and on the southern keys; in the West Indies and southern Mexico.

A tree 12 to 15 meters in height, with a trunk 0.45 to 0.75 meter in diameter.

Wood heavy, very hard, not strong, close-grained, compact, susceptible of a high polish, containing few large scattered open ducts; medullary rays thin, not conspicuous; color, yellowish-brown, the sap-wood lighter; specific gravity, 0.8734; ash, 3.38; one of the favorite woods of the region for boat-building, fire-wood, and charcoal.

The bark, especially of the root, narcotic, occasionally administered in the form of tinctures, or used, as well as the young branches and leaves, to poison or stupefy fish.

82.—Cladrastis tinctoria, Rafinesque,

Fl. Kent. 1824; Neog. 1825; Med. Bot. ii, 210; New Sylva, iii, 83.—Torrey & Gray, Fl. N. America, i, 390.—Walpers, Rep. i, 807.—Browne, Trees of America, 192.—Darby, Bot. S. States, 294.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 113.—Porcher Resources S. Forests, 175.—Wood, Cl. Book, 301; Bot. & Fl. 84.—Gray, Manual N. States, 5 ed. 143.—Vasey, Cat. Forest Trees, 11.

Virgilia lutea, Michaux f. Hist. Arb. Am. iii, 266, t. 3; Travels, 289; N. American Sylva, 3 ed. ii, 106, t. 78.—Parsh, Fl. Am. Sept. i, 309.—Nuttall, Genera, i, 284.—Hayne, Dend. Fl. 53.—Loiseleur, Herb. Amat. t. 297.—De Candolle, Prodr. ii, 98.—Sprengel, Syst. iv², 1, 171.—Don, Miller's Dict. ii, 112.—Eaton, Manual, 6 ed. 397.—Spach, Hist. Veg. i, 163.—Eaton & Wright, Bot. 480.—Dietrich, Syn. ii, 1501.—Loudon, Arboretum, ii, 565, t. 78.

C. lutea, Koch, Dendrologie, i, 6.

YELLOW WOOD. YELLOW ASH. GOPHER WOOD.

Central Kentucky, cliffs of the Kentucky and Dick's rivers; middle Tennessee, mountains of east Tennessee to Cherokee county, North Carolina.

A tree 9 to 15 meters in height, with a trunk sometimes 0.90 or, exceptionally, 1.20 meter in diameter; rich hillsides; in Kentucky on the Trenton limestones, and reaching its best development in middle Tennessee; rare and very local, the large trees generally hollow or defective.

Wood heavy, very hard, strong, close-grained, compact, susceptible of a good polish; layers of annual growth clearly marked by several rows of open ducts, and containing many evenly-distributed similar ducts; color, bright, clear yellow, changing with exposure to light brown, the sap-wood nearly white; specific gravity, 0,6278; ash, 0.28; used for fuel, occasionally for gunstocks, and yielding a clear yellow dye.

83.—Sophora secundiflora, Lagasca;

De Candolle, Cat. Hort. Monsp. 148; Prodr. ii, 96.—Don, Miller's Dict. ii, 110.—Gray in Smithsonian Contrib. iii, 54.—Rev. Hort. 4 ser. iii, 201, t. 11.—Bentham & Hooker, Genera, i, 555.—Hemsley, Bot. Am.-Cent. i, 321.—Watson in Proc. Am. Acad. xvii, 347.

Broussonetia secundiflora, Ortega, Dec. v, 61, t. 7.

Virgilia secundiflora, Cavanilles, Icon. t. 401.

Agastianis secundiflora, Rafinesque, New Sylva, iii, 86.

Dermatophyllum speciosum, Scheele in Linnæa, xxi, 458.

S. speciosa, Bentham in Jour. Boston Soc. Nat. Hist. vi, 178.—Gray in Mem. Am. Acad. new ser. ivx, 38; Smithsonian Contrib. iii, 54; Hall's Pl. Texas, 7.—Walpers, Ann. ii, 439.—Torrey, Bot. Mex. Boundary Survey, 58.—Young, Bot. Texas, 242.—Vasey, Cat. Forest Trees, 12.

FRIGOLITO.

Matagorda bay, Texas, west to the mountains of New Mexico (Havard).

A small tree, sometimes 9 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or often, especially west of the San Antonio river, a tall shrub, rarely exceeding 2 meters in height, forming dense thickets; borders of streams, generally in a low, rather moist soil.

Wood very heavy, hard, close-grained, compact, susceptible of a high polish; medullary rays numerous, thin; color, orange streaked with red, the heavier sap-wood brown or yellow; specific gravity, 0.9842; ash, 1.59; furnishing valuable fuel.

The seeds contain an exceedingly poisonous alkaloid, Sophoria (H. C. Wood in Philadelphia Med. Times, August 4, 1877.—Rothrock in Coulter's Bot. Gazette, ii, 133.—Nat. Dispensatory, 2 ed. 1333).

84.-Sophora affinis, Torrey & Gray,

Fl. N. America, i, 390.—Leavenworth in Am. Jour. Sci. 1 ser. ix, 130.—Gray in Jour. Boston Soc. Nat. Hist. vi, 178; Hall's Pl. Texas, 7.—Scheele in Rœmer, Texas, 428.—Vasey, Cat. Forest Trees, 12.

Styphnolobium affine, Walpers, Rep. i, 807.

Arkansas, valley of the Arkansas river (Letterman) to the valley of the San Antonio river, Texas.

A small tree, 5 to 7 meters in height, with a trunk sometimes 0.15 to 0.25 meter in diameter; borders of streams and prairies.

Wood heavy, very hard, strong, coarse-grained, compact; layers of annual growth clearly marked by several rows of large open ducts; medullary rays thin, conspicuous; color, light red, the sap-wood bright, clear yellow; specific gravity, 0.8509; ash, 0.73.

Ink is occasionally made domestically from the resinous exudations of the pod.

85.—Gymnocladus Canadensis, Lamarek,

Diet, i, 733; Ill. iii, 412, t. 823.—Michaux, Fl. Bor.-Am. ii, 241, t. 51.—Willdenow, Spec. iv, 460; Enum. ii, 1019; Berl. Baumz. 169.—Persoon, Syn. ii, 626.—Desfontaines, Hist. Arb. ii, 250.—Aiton, Hort. Kew. 2 ed. v, 400.—Michaux f. Hist. Arb. Am. ii, 272, t. 23; N. American Sylva, 3 ed. i, 182, t. 50.—Pursh, Fl. Am. Sept. i, 304.—Nuttall, Genera, ii, 243.—Hayne, Dend. Fl. 203.—James in Long's Exped. i, 138.—Reichenbach, Mag. Bot. t. 40.—De Candolle, Prodr. ii, 480.—Sprengel, Syst. ii, 327.—Torrey in Ann. Lyc. N. York, ii, 193; Compend. Fl. N. States, 376; Fl. N. York, i, 196; Emory's Rep. 407.—Hooker, Fl. Bor.-Am. i, 166.—Don, Miller's Diet. 429.—Eaton, Manual, 6 ed. 162.—Beck, Bot. 93.—Spach, Hist. Veg. i, 89.—Loudon, Arboretum, ii, 256 & t.—Torrey & Gray, Fl. N. America, i, 398.—Eaton & Wright, Bot. 258.—Richardson, Arctic Exped. 424.—Walpers, Rep. i, 809.—Browne, Trees of America, 218.—Cooper in Smithsonian Rep. 1858, 251.—Lesquereux in Owen's 2d Rep. Arkansas, 358.—Wood, Cl. Book, 300; Bot. & Fl. 83.—Engelmann in Trans. Am, Phil. Soc. new ser. xii, 190.—Gray, Manual N. States, 5 ed. 145.—Briot in Rev. Hort. 1870, 436.—Vasey, Cat. Forest Trees, 12.—Bell in Geological Rep. Canada, 1879–80, 54c.—Ridgway in Proc. U. S. Nat. Mus. 1882, 63.—Chapman, Fl. S. States, Suppl. 618.

Guilandina dioica, Linnæus, Spec. 1 ed. 381.—Marshall, Arbustum, 56.—Aiton, Hort. Kew. ii, 56.—James in Long's Exped. i. 138.

Hyperanthera dioica, Vahl, Symbolæ, i, 31.

G. dioica, Koch, Dendrologie, i, 5.—Baillon, Hist, Pl. ii, 87, f. 52, 53.

KENTUCKY COFFEE TREE. COFFEE NUT.

Conococheague creek, Franklin county, Pennsylvania (*Porter*); western New York, shores of Cayuga and Seneca lakes, west through southern Ontario and southern Michigan to the valley of the Minnesota river, Minnesota, eastern Nebraska, eastern Kansas, southwestern Arkansas, and the Indian territory, to about longitude 96° west, south to middle Tennessee.

A tree 25 to 33 meters in height, with a trunk 0.60 to 0.90 meter in diameter; rich woods and bottoms; not common.

Wood heavy, not hard, strong, coarse-grained, durable in contact with the ground, liable to check in drying, easily worked, susceptible of a high polish; layers of annual growth clearly marked by one or two rows of open ducts; medullary rays numerous, thin; color, rich light brown tinged with red, the thin sap-wood lighter; specific gravity, 0.6934; ash, 0.67; occasionally used in cabinet-making, for posts, rails, &c.

The fresh leaves, macerated and sweetened, are used in Tennessee as a poison for house-flies; the seeds formerly as a domestic substitute for coffee.

86.—Gleditschia triacanthos, Linnæus,

Spec. 1 ed. 1056 (excl. var.).—Medicus, Bot. Beobacht. 1782, 230.—Lamarck, Dict. ii, 465; Ill. iii, 446, t. 857, f. 1.—Aiton, Hort. Kew. iii, 444 (excl. vars.); 2 ed. v, 474.—Mœnch, Meth. 69.—Abbot, Insects Georgia, ii, t. 285.—Michaux, Fl. Bor.-Am. ii, 257.—Schkuhr, Handb. iii, 554, t. 356.—Robin, Voyages, iii, 497.—Persoon, Syn. ii, 123.—Desfontaines, Hist, Arb. ii, 246.—Willdenow, Spec. iv, 1097; Enum. 1058; Berl. Baumz. 163.—Nouveau Duhamel, iv, 100, t. 25.—Michaux f. Hist. Arb. Am. iii, 164, t. 10; N. American Sylva, 3 ed. 108, t. 79.—Pursh, Fl. Am. Sept. i, 221.—Nuttall, Genera, ii, 239.—James in Long's Exped. i, 138.—Hayne, Dend. Fl. 218.—Elliott, Sk. ii, 709.—Guimpel, Otto & Hayne, Abb. Holz. 157, t. 132.—De Candolle, Prodr. ii, 479.—Sprengel, Syst. iii, 918.—Torrey, Compend. Fl. N. States, 375; Fl. N. York, i, 192.—Audubon, Birds, t. 42, 146, 150.—Rœmer & Schultes, Syst. vii, 78.—Don, Miller's Dict. ii, 428.—Beck, Bot. 93.—Eaton, Manual, 6 ed. 158.—Spach, Hist. Veg. i, 92.—Torrey & Gray, Fl. N. America, i, 398.—Loudon, Arboretum, ii, 650, t. 90, 91.—Eaton & Wright, Bot. 254.—Browne, Trees of America, 212.—Dietrich, Syn. iv, 539.—Darby, Bot. S. States, 295.—Cooper in Smithsonian Rep. 1858, 251.—Gray in Pacific R. R. Rep. xii², 42; Manual N. States, 5 ed. 145.—Chapman, Fl. S. States, 115.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 49.—Lesquereux in Owen's 2d Rep. Arkansas, 358.—Wood, Cl. Book, 300; Bot. & Fl. 83.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 190.—Porcher, Resources S. Forests, 195.—Koch, Dendrologie, i, 8.—Hunt in Am. Nat. i, 433.—Young, Bot. Texas, 246.—Vasey, Cat. Forest Trees, 12.—Ridgway in Proc. U. S. Nat. Mus. 1882, 64.—Burgess in Coulter's Bot. Gazette, vii, 95.

G. spinosa, Marshall, Arbustum, 54.

G. Meliloba, Walter, Fl. Caroliniana, 254.

G. macrantha, Willdenow, Berl. Baumz. 164.

G. elegans, Salisbury, Prodr. 323.

Melilobus heterophylla, Rafinesque, Sylva Telluriana, 121.

HONEY LOCUST. BLACK LOCUST. THREE-THORNED ACACIA. SWEET LOCUST. HONEY SHUCKS.

Pennsylvania, western slopes of the Alleghany mountains, west through southern Michigan to eastern Nebraska, eastern Kansas, and the Indian territory to about longitude 96° west; south to Tampa bay, Florida (not detected in eastern Florida), northern Alabama, northern Mississippi, and the valley of the Brazos river, Texas.

A tree, 25 or 30 meters, or exceptionally 40 meters, in height, with a trunk 0.60 to 1.20 meter in diameter; low, rich bottom lands, or more rarely on dry, sterile hills; the characteristic tree of the "barrens" of middle Kentucky and Tennessee, reaching its greatest development in the bottoms of the lower Ohio River basin; widely cultivated for shade and as a hedge plant, and now somewhat naturalized in the Atlantic states east of the Alleghany mountains.

A not uncommon form, nearly destitute of thorns, is-

var. inermis, Pursh, Fl. Am. Sept. i, 221.—De Candolle, Mem. Leg. t. 22, f. 109; Prodr. ii, 479.—Eaton, Manual, 6 ed. 158.—
Torrey & Gray, Fl. N. America, i, 398.—Loudon Arboretum, ii, 650, t. 92, 93.—Browne, Trees of America, 213.

G. inermis, Linnens, Spec. 1509, in part.—Nouveau Duhamel, iv, 100,—Bentham in Trans. Linneau Soc. xxx3, 557.

A form with spines and fruit shorter than those of the type is-

var. brachycarpos, Michaux, Fl. Bor.-Am. ii, 257.—Torrey & Gray, Fl. N. America, i, 398.—Browne, Trees of America, 213.

G. brachycarpa, Pursh, Fl. Am. Sept. 221.—De Candolle, Prodr, ii, 479.—Sprengel, Syst. iii, 919.—Don, Miller's Dict. ii, 428.—Eaton, Manual, 6 ed. 158.—Eaton & Wright, Bot. 254.—Loudon, Arboretum, ii, 653.—Dietrich, Syn. iv, 539.

Wood heavy, hard, strong, coarse-grained, moderately compact, very durable in contact with the soil, susceptible of a high polish; layers of annual growth strongly marked by many rows of open ducts; medullary rays numerous, conspicuous; color, bright brown or red, the sap-wood lighter; specific gravity, 0.6740; ash, 0.80; used for fence posts and rails, wagon hubs, construction, etc.; its value hardly appreciated.

Beer is sometimes made domestically by fermenting the sweet, unripe fruit (Porcher l. c.).

87.-Gleditschia monosperma, Walter.

- Fl. Caroliniana, 254.—Michaux, Fl. Bor.-Am. ii, 257.—Schkuhr, Handb. iii, 555.—Persoon, Syn. ii, 623.—Desfontaines, Hist. Arb. ii, 24.—Willdenow, Spec. iv, 1097; Enum. 1058; Berl. Baumz. 165.—Nouveau Duhamel, iv, 101.—Aiton, Hort. Kew. 2 ed. v, 474.—Michaux f. Hist. Arb. Am. iii, 169, t. 11; N. American Sylva, 3 ed. ii, 111, t. 80.—Pursh, Fl. Am. Sept. 221.—Poiret, Suppl. ii, 641.—Nuttall, Genera, ii, 239.—Hayne, Dend. Fl. 218.—Elliott, Sk. ii, 709.—De Candolle, Prodr. ii, 479.—Sprengel, Syst. iii, 919.—Don, Miller's Dict. 428.—Eaton, Manual, 6 ed. 158.—Spach, Hist. Veg. i, 98.—Torrey & Gray, Fl. N. America, i, 398.—Eaton & Wright, Bot. 254.—Loudon, Arboretum, ii, 653, f. 364.—Browne, Trees of America, 215.—Dietrich, Syn. iv, 539.—Darby, Bot. S. States, 295.—Chapman, Fl. S. States, 115.—Wood, Cl. Book, 300; Bot. & Fl. 83.—Gray. Manual N. States, 5 ed. 145.—Vasey, Cat. Forest Trees, 12—Ridgway in Proc. U. S. Nat. Mus. 1882, 64.
 - G. triacanthos, var. monosperma, Linnæus, Spec. 1 ed. 1057.—Aiton, Hort. Kew. iii, 444.
 - G. aquatica, Marshall, Arbustum, 54.
 - G. Carolinensis, Lamarck, Dict. ii, 465; Ill. iii, 447, t. 857, f. 2.—Romer & Schultes, Syst. vii, 74.
 - G. triacantha, Gærtner, Fruct. ii, 311, t. 146, f. 3 [not Linnæus].
 - G. inermis, Koch, Dendrologie, i, 9 [not Linnæus].

WATER LOCUST.

South Carolina to Matanzas inlet and Tampa bay, Florida, through the Gulf states to the valley of the Brazos river, Texas, and through Arkansas to middle Kentucky and Tennessee, southern Indiana and Illinois.

A tree 12 to 18 meters in height, with a trunk sometimes 0.60 or, exceptionally, 0.90 meter in diameter; deep swamps; rare in the south Atlantic and Gulf states; common and reaching its greatest development in the bottom lands of southern Arkansas, Louisiana, and eastern Texas, here often covering extensive areas.

Wood heavy, very hard, strong, rather coarse-grained, compact, susceptible of a high polish; layers of annual growth clearly marked by one to three rows of open ducts; medullary rays thin, conspicuous; color, rich bright brown tinged with red, the thick heavier sap-wood clear light yellow; specific gravity, 0.7342; ash, 0.73.

88.—Parkinsonia Torreyana, Watson,

Proc. Am. Acad. xi, 135.—Brewer & Watson, Bot. California, i, 162.

Cercidium floridum, Torrey in Pacific R. R. Rep. iv, 11, 82; v, 360, t. 3; Bot. Mex. Boundary Survey, 59.—Gray in Ives' Rep. 11.—Vasey, Cat. Forest Trees, 12.—James in Am. Nat. xv, 982.—Hemsley, Bot. Am.-Cent. i, 327.

GREEN-BARK ACACIA. PALO VERDE.

Colorado desert, southern California (Inio, Toras, etc., Parish Brothers), east to the valley of the lower Gilariver, Arizona.

A low, much-branched tree, 8 to 10 meters in height, the short trunk sometimes 0.45 to 0.50 meter in diameter; low canons and depressions in the sandhills of the desert; common and reaching its greatest development in the valleys of the lower Colorado and Gila rivers.

Wood heavy, not strong, soft, close-grained, compact, satiny, susceptible of a beautiful polish, containing many small evenly-distributed open ducts; medullary rays very numerous, thin; color, light brown, the sap-wood clear light yellow; specific gravity, 0.6531; ash, 1.12.

89.—Parkinsonia microphylla, Torrey,

Pacific R. R. Rep. iv, 82; Bot. Mex. Boundary Survey, 59.—Walpers, Ann. vii, 812.—Gray in Ives' Rep. 11.—Bentham in Martius, Fl. Brasil. xv², 78.—Watson, Pl. Wheeler, 8; Proc. Am. Acad. xi, 136.—Brewer & Watson, Bot. California, i, 162.—Hemsley, Bot. Am.-Cent. i, 327.

Valley of the lower Colorado and Bill Williams rivers, eastward through southern Arizona.

A small, much-branched tree, 6 to 7 meters in height, with a trunk 0.25 to 0.30 meter in diameter (Wickenburg, *Pringle*), or often a low shrub 1 to 3 meters in height.

Wood heavy, hard, coarse-grained, compact, containing numerous large, scattered, open ducts; medullary rays numerous, thin, conspicuous; color, rich dark brown streaked with red, the sap-wood light brown or yellow; specific gravity, 0.7449; ash, 3.64.

90.-Parkinsonia aculeata, Linnæus,

Spec. 1 ed. 375.—Jacquin, Stirp. Am. 121, t. 80.—Lamarck, Ill. ii, 475, t. 336.—Willdenow, Spec. ii, 513.—Aiton, Hort. Kew. 2 ed. iii, 24.—De Candolle, Mem. Leg. ii, t. 21; Prodr. ii, 486.—Descourtilz, Fl. Med. Antilles, i, 54, t. 12.—Macfadyen, Fl. Jamaica, 334.—Bentham, Bot. Sulphur, 87; Martius, Fl. Brasil. xv², 78, t. 26.—Cooper in Smithsonian Rep. 1858, 265.—Torrey, Bot. Mex. Boundary Survey, 59.—Grisebach, Fl. British West Indies, 204; Pl. Lorentz. 81.—Gray, Hall's Pl. Texas, 8.—Brewer & Watson, Bot. California, i, 162.—Vasey, Cat. Forest Trees, 12.—Hemsley, Bot. Am.-Cent. i, 327.—Watson in Proc. Am. Acad. xvii, 348.

Corpus Christi, Texas, west along the Mexican boundary to the valley of the Colorado river, Arizona (Yuma); and southward into Mexico; probably of American origin, but now widely naturalized throughout the tropical and warmer regions of the globe (A. De Candolle, Geog. Bot. ii, 719, 770, 793).

A small tree, 6 to 12 meters in height, with a trunk sometimes 0.30 meter in diameter.

Wood heavy, hard, very close-grained, inclined to check in drying, containing many evenly-distributed small open ducts; medullary rays very numerous, thin, conspicuous; color, light brown, the very thick sap-wood lighter, often tinged with yellow; specific gravity. 0.6116; ash, 2.32.

91.—Cercis Canadensis, Linneus,

Spec. 1 ed. 374.—Du Roi, Obs. Bot. 10.—Marshall, Arbustum, 32.—Lamarck, Dict. ii, 586.—Wangenheim, Amer. 84.—Walter, Fl. Caroliniana, 135.—Aiton, Hort. Kew. ii, 47; 2 ed. iii, 22.—Willdenow, Spec. ii, 508; Enum. 439; Berl. Baumz. 84.—Nouveau Duhamel, i, 19.—Michaux, Fl. Bor. Am. i, 265.—Schkuhr, Handb. 354.—Persoon, Syn. i, 454.—Desfontaines, Hist. Arb. ii, 254.—Pursh, Fl. Am. Sept. i, 308.—Eaton, Manual, 46; 6 ed. 89.—Nuttall, Genera, i, 283.—Hayne, Dend. Fl. 53.—Elliott, Sk. i, 470.—Torrey in Ann. Lyc. N. York, ii, 194; Fl. U. S. 441; Compend. Fl. N. States, 188; Fl. N. York, i, 188; Nicollet's Rep. 149; Emory's Rep. 408.—De Candolle, Prodr. ii, 518.—Sprengel, Syst. ii, 346.—Guimpel, Otto & Hayne, Abb. Holz. 116, t. 92.—Hooker, Fl. Bor. Am. i, 167; Companion Bot. Mag. i, 24.—Don, Miller's Dict. ii, 468.—Beck, Bot. 94.—Spach, Hist. Veg. i, 129.—Torrey & Gray, Fl. N. America, i, 392.—Loudon, Arboretum, ii, 659 & t.—Eaton & Wright, Bot. 190.—Dietrich, Syn. ii, 155.—Browne, Trees of America, 221.—Gray in Mem. Am. Acad. new ser. iv¹, 38; Manual N. States, 5 ed. 144.—Richardson, Arctic Exped. 424.—Parry in Owen's Rep. 611.—Darlington, Fl. Cestrica, 3 ed. 67.—Darby, Bot. 8. States, 294.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 114.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 50.—Lesquereux in Owen's 2d Rep. Arkansas, 357.—Wood, Cl. Book, 301; Bot. & Fl. 84.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 190.—Porcher, Resources S. Forests, 197.—Koch, Dendrologie i, 14.—Baillon, Hist. Pl. ii, 121.—Vasey, Cat. Forest Trees, 12.—Ridgway in Proc. U. S. Nat. Mus. 1882, 65.

Siliquastrum cordatum, Mench, Meth. 54.

C. Canadensis, var. pubescens, Pursh. Fl. Am. Sept. i, 308.-Loudon, Arboretum, ii, 659.

REDBUD. JUDAS TREE.

Western Pennsylvania, southward to Tampa bay, Florida, northern Alabama and Mississippi, westward through southern Michigan and Minnesota to eastern Nebraska; southwest through Missouri and Arkansas to the eastern portions of the Indian territory, Louisiana, and the valley of the Brazos river, Texas.

A small tree, 12 to 16 meters in height, with a trunk sometimes 0.30 meter in diameter; rich woods, borders of streams and swamps; most common and reaching its greatest development in southern Arkansas, the Indian territory, and eastern Texas, here, when in bloom, a conspicuous feature of the forest.

Wood heavy, hard, not strong, rather coarse-grained, compact, susceptible of a good polish; layers of annual growth clearly marked by one to three rows of open ducts; medullary rays exceedingly numerous, thin; color, rich dark brown tinged with red, the sap-wood lighter; specific gravity, 0.6363; ash, 0.72.

92.—Cercis reniformis, Engelmann;

Scheele in Romer, Texas, 428. - Watson in Proc. Am. Acad. xvii, 348.

- C. occidentalis, var. Gray in Jour. Boston Soc. Nat. Hist. vi, 177.—Walpers, Ann. ii, 440.—Torrey, Bot. Mex. Boundary Survey, 58.—Brewer & Watson, Bot. California, i, 161.
- C. occidentalis, Gray, Hall's Pl. Texas, 7 [not Torrey].—Hemsley, Bot. Am.-Cent. i, 340, in part.
- C. occidentalis, var. Texensis, Watson, Index, i, 209.

REDBUD.

Middle and western Texas west of the Colorado river; in northern Mexico.

A small tree, 6 to 8 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or often a shrub forming dense thickets; limestone hills; formerly often confounded with the shrubby C. occidentalis of the California coast region.

Wood heavy, hard, close-grained, compact; layers of annual growth clearly marked by one to three rows of open ducts; medullary rays numerous, not conspicuous; color, brown streaked with yellow, the sap-wood lighter; specific gravity, 0.7513; ash, 0.77.

93.—Prosopis juliflora, De Candolle,

- Prodr. ii, 447.—Descourtilz, Fl. Med. Antilles, viii, 107, t. 550.—Lindley, Fl. Med. 270.—Walpers, Rep. i, 861.—Bentham, Rev. Mim. in Trans. Linnæau Soc. xxx, 377.—Schnizlein, Icon. t. 277, f. 13.—Brewer & Watson, Bot. California, i, 163.—Rothrock in Wheeler's Rep. vi, 42, 107.—Hemsley, Bot. Am.-Cent. i, 344.
 - P. glandulosa, Torrey in Ann. Lyc. N. York, ii, 192, t. 2; Emory's Rep. 139; Pacific R. R. Rep. iv, 82.—Don, Miller's Dict. ii, 400.—Dietrich, Syn. ii. 1424.—Eaton & Wright, Bot. 376.—Walpers, Rep. i, 861.—Bentham in Hooker's Jour. Bot. iv, 348; London Jour. Bot. v, 81.—Grisebach, Fl. British West Indies, 217.—Watson in King's Rep. v, 420; Pl. Wheeler, 8.—Gray, Hall's Pl. Texas, 7.—Vasey, Cat. Forest Trees, 12.
 - Algarobia glandulosa, Torrey & Gray, Fl. N. America, i, 399; Pacific R. R. Rep. ii, 164.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v, 242.—Engelmann in Wislizenus' Rep. 10.—Scheele in Remer, Texas, 427.—Gray in Jour. Boston Soc. Nat. Hist. vi, 181; Smithsonian Contrib. iii, 60; v, 51; Mem. Am. Acad. new ser. v, 304; Ives' Rep. 11.—Torrey in Sitgreaves' Rep. 158; Pacific R. R. Rep. iv, 20, 82; vii, 10; Bot. Mex. Boundary Survey, 60.—Cooper in Smithsonian Rep. 1858, 259; Scientific Press, San Francisco, Nov. 1871, & f.—Palmer in Am. Nat. xii, 594.
 - P. odorata, Torrey in Fremont's Rep. 313, t. 1 (excl. fruit).

MESQUIT. ALGAROBA. HONEY LOCUST. HONEY POD.

Texas, valley of the Trinity river (Dallas, etc.) to the northern and western limits of the state; west through New Mexico and Arizona to the *mesas* west of the San Bernardino mountains, California, reaching southern Colorado, southern Utah (Saint George), and southern Nevada; southward through southern Mexico; in Jamaica.

A tree of the first economic value, sometimes 9 to 15 meters in height, with a trunk 0.90 meter in diameter, or much smaller, often reduced to a low shrub; on dry prairies and high rocky plains, or west of the Rocky mountains, along desert streams, here often forming open forests, and reaching its greatest development within the United States in the valley of the Santa Cruz and other streams of southern Arizona; in western Texas (Fort Stockton, etc.), on account of the annual burning of the prairies, rarely 1 meter in height, the roots then enormously developed, often weighing several hundred pounds, forming, as they are here locally known, "underground forests" and furnishing the best and cheapest fuel of the region.

Wood heavy, very hard, not strong, close-grained, compact, difficult to work, almost indestructible in contact with the soil, containing many evenly-distributed, rather large, open ducts; medullary rays numerous, distinct; color, rich dark brown or often red, the sap-wood clear yellow; specific gravity, 0.7652; ash, 2.18; of the root, specific gravity, 0.8493; ash, 3.02; exclusively used for the beams and underpinnings of the adobe houses of New Mexico, Arizona, and northern Mexico; for posts and fencing, and occasionally in the manufacture of furniture, the fellies of heavy wheels, etc.; the best and often the only fuel of the region, burning slowly with a clear flame, and producing valuable charcoal, but unsuited for the generation of steam on account of its destructive action upon boilers.

A gum resembling gum arabic is yielded by this species; the unripe and pulpy pods rich in grape sugar, edible, and furnishing valuable and important fodder.

94.—Prosopis pubescens, Bentham,

London Jour. Bot. v, 82; Rev. Mim. in Trans. Linnaan Soc. xxx, 380.—Walpers, Ann. i, 259.—Watson in King's Rep. v, 420; Pl. Wheeler, 8.—Brewer & Watson, Bot. California, i, 163.—Rothrock in Wheeler's Rep. vi, 42, 107.—Hemsley, Bot. Am.-Cent. i, 344.

P. odorata, Torrey in Fremont's Rep. 313, t. 1 (for fruit).

P. Emoryi, Torrey in Emory's Rep. 139.

Strombocarpa pubescens, Gray in Smithsonian Contrib. iii, 60; v, 51; Ives' Rep. 9.—Torrey & Gray in Pacific R. R. Rep. ii, 163.—Torrey in Pacific R. R. Rep. iv, 11, 20, 82; v, 360, t. 4; vii, 10; Bot. Mex. Boundary Survey, 60.—Cooper in Smithsonian Rep. 1858, 259; Scientific Press, San Francisco, Nov. 1871 & f.—Vasey, Cat. Forest Trees, 12.

Strombocarpa odorata, Torrey in Sitgreaves' Rep. 158.

SCREW BEAN. SCREW-POD MESQUIT. TORNILLA.

Valley of the Rio Grande (Presidio), western Texas, westward through New Mexico and Arizona (valley of the Gila and Colorado rivers) to southern California (White Water, *Parish Brothers*, Vallecito, *Thurber*), and southward into Mexico; southern Utah (Saint George), and southern Nevada (Ash Meadows).

A small tree, rarely 9 meters in height, with a trunk sometimes 0.30 to 0.45 meter in diameter, or often a tall, much branched shrub; sandy or gravelly bottom lands, reaching its greatest development within the United States in the valleys of the lower Colorado and Gila rivers.

Wood heavy, exceedingly hard, not strong, brittle, close-grained, compact, containing many evenly-distributed open ducts; medullary rays numerous, thin; color, light brown, the sap-wood somewhat lighter; specific gravity, 0.7609; ash, 0.95; used for fuel and fencing.

The pods used as fodder, and sometimes made into flour by the Indians.

95.-Leucæna glauca, Bentham,

Hooker's London Jour. Bot. iv, 417; Rev. Mim. in Trans. Linnman Soc. xxx, 443.—Walpers, Rep. i, 884.—Grisebach, Fl. British West Indies, 220.—Hemsley, Bot. Am.-Cent. i, 351.—Watson in Proc. Am. Acad. xvii, 350.—Chapman, Fl. S. States, Suppl. 619.

Mimosa glauca, Linnæus, Spec. 2 ed. 1504.

Acacia glaucu, Willdenow, Spec. iv, 1075.—De Candolle, Prodr. ii, 467.

Acacia frondosa, Willdenow, Spec. iv, 1076.—De Candolle, Prodr. ii, 468.

Acacia biceps, Willdenow, Spec. iv, 1075 .- De Candolle, Prodr. ii, 467.

Mimosa leucocephala, Lamarck, Dict. i, 12.

Acacia leucocephala, Link, Enum. Hort. Berl. ii, 444.—De Candolle, Prodr. ii, 467.

Mimosa biceps, Poiret, Suppl. i, 75.

Mimosa frondosa, Klein in Poiret, Suppl. i, 76.

Western Texas, San Saba to Devil's river (Buckley); southward into Mexico; semi-tropical Florida (introduced, Curtiss), and through the West Indies.

A small tree, 7 to 9 meters in height, with a trunk 0.10 to 0.15 meter in diameter, or often a tall or, in Florida, low shrub, sending up many stems from the ground.

Wood heavy, hard, close-grained, compact, containing many small, regularly-distributed open ducts; layers of annual growth and medullary rays hardly distinguishable; color, rich brown streaked with red, the sap-wood clear yellow; specific gravity, 0.9235; ash, 3.29.

96.-Leucæna pulverulenta, Bentham,

Hooker's London Jour. Bot. iv, 417; Rev. Mim. in Trans. Linnaan Soc. xxx, 443.—Hemsley, Bot. Am.-Cent. i, 351.

Acacia pulverulenta, Schlechtendal in Linnæa, xii, 571.

Acacia esculenta, Martens & Galeotti in Bull. Acad. Brux. x2, 312.

Southern Texas, valley of the lower Rio Grande; southward into Mexico.

A small tree, 6 to 8 meters in height, with a trunk 0.10 to 0.15 meter in diameter, often forming dense thickets; rich, sandy loam.

Wood heavy, hard, very close-grained, compact, containing many small, regularly-distributed open ducts; medullary rays very numerous, thin, conspicuous; color, rich dark brown, the sap-wood clear yellow; specific gravity, 0.6732; ash, 1.01.

97.-Acacia Wrightii, Bentham.

8mithsonian Contrib. iii, 64; Rev. Mim. in Trans. Linnæan Soc. xxx, 521.—Gray, Smithsonian Contrib. v, 53.—Walpers, Ann. iv, 626.—Torrey, Bot. Mex. Boundary Survey, 161.—Brewer & Watson, Bot. California, i, 61.—Watson in Proc. Am. Acad. xvii, 351.

CAT'S CLAW.

Western Texas, valley of the Guadalupe river (New Braunfels), westward and southward to the valley of the Rio Grande; in northern Mexico.

A small tree, rarely 9 meters in height, with a trunk sometimes exceeding 0.30 meter in diameter, or often a low, much-branched shrub.

Wood very heavy, hard, very close-grained, compact; layers of annual growth marked by one or two rows of small open ducts, and containing many scattered smaller ducts; medullary rays hardly distinguishable; color, bright, clear brown streaked with red and yellow, the sap-wood clear yellow; specific gravity, 0.9392; ash, 0.63.

98.—Acacia Greggii, Gray,

Smithsonian Contrib. iii, 65; v,53; Ives' Rep. 11.—Torrey in Sitgreaves' Rep. 158; Pacific R. R. Rep. vii, 10; Bot. Mex. Boundary Survey, 61.—Walpers, Ann. iv, 625.—Bentham, Rev. Mim. in Trans. Linnæan Soc. xxx, 521.—Cooper in Smithsonian Rep. 1860, 442.—Brewer & Watson, Bot. California, i, 164.—Rothrock in Wheeler's Rep. vi, 108.—Hemsley, Bot. Am.-Cent. i, 353.—James in Am. Nat. xv, 981.

CAT'S CLAW.

Western Texas, valley of the Rio Grande, westward through southern New Mexico and Arizona to San Diego, California; southward into northern Mexico.

A low, much-branched tree, sometimes 9 meters in height, with a trunk rarely 0.45 meter in diameter, or often a shrub; dry mesas and in low cañons; common; the large specimens generally hollow and defective.

Wood heavy, exceedingly hard, strong, brittle, close-grained, compact; layers of annual growth marked by numerous rows of rather large open ducts; medullary rays numerous, thin; color, rich brown or red, the sap-wood light yellow; specific gravity, 0.8550; ash, 0.91; used for fuel.

A resinous gum resembling gum arabic is produced by this species (Am. Jour. Pharm. lii, 419).

99.-Acacia Berlandieri, Bentham,

London Jour. Bot. i, 522; Rev. Mim. in Trans. Linnæan Soc. xxx, 529.—Walpers, Rep. i, 919.—Dietrich, Syn. iv, 500.

A. tephroloba, Gray in Smithsonian Contrib. iii, 65; v, 54.—Walpers, Ann. iv, 625.—Torrey, Bot. Mex. Boundary Survey, 61.—Hemsley, Bot. Am.-Cent. i, 352.—Watson in Proc. Am. Acad. xvii, 351.

Southern Texas, valley of the Nucces (La Salle county) to Devil's river; southward into Mexico.

A small tree, sometimes 6 to 8 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or more often a tall shrub, sending up many stems from the ground; the large specimens usually hollow and defective.

Wood not examined.

100.-Lysiloma latisiliqua, Bentham,

Rev. Mim. in Trans. Linnæan Soc. xxx, 534.—Chapman, Fl. S. States, Suppl. 619.

Mimosa latisiliqua, Linnæus, Spec. 2 ed. 1504.

Acacia latisiliqua, Willdenow, Spec. iv, 1067.—Persoon, Syn. ii, 255.—De Candolle, Prodr. ii, 467.—Macfadyen, Fl. Jamaica, 318.—Nuttall, Sylva, ii, 34, t. 53; 2 ed. i, 183, t. 53.—Cooper in Smithsonian Rep. 1858, 264.

L. Bahamensis, Bentham in Hooker's London Jour. Bot. iii, 82.

Acacia Bahamensis, Grisebach, Fl. British West Indies, 221.

WILD TAMARIND.

Semi-tropical Florida, southern keys (Key Largo, Elliott's, Plantation, and Boca Chica Keys); through the West Indies.

A tree sometimes 15 meters in height, with a trunk 0.60 to 0.90 meter in diameter; bark of the young, vigorous trees smooth; the older trees generally decayed and defective, with rough, dark bark (Curtiss).

Wood heavy, hard, not strong, tough, close-grained, compact, susceptible of a fine polish, containing many scattered, open ducts; medullary rays numerous, not conspicuous; color, rich dark brown tinged with red, the sap-wood white; specific gravity, 0.6418; ash, 2.12; somewhat used locally in boat- and ship-building, and considered equal to mahogany for this purpose.

101.-Pithecolobium Unguis-cati, Bentham,

Hooker's London Jour. Bot. iii, 200; Rev. Mim. in Trans. Linnæan Soc. xxx, 572, 648.—Grisebach, Fl. British West Indies, 276.—Chapman, Fl. S. States, 116.—Vasey, Cat. Forest Trees, 13.

Mimosa Unguis-cati, Linnæus, Spec. 2 ed. 1497.—Jacquin, Hort. Schænb. iii, 74, t. 392.—Descourtilz, Fl. Med. Antilles, i, t. 11.

Inga Unguis-cati, Willdenow, Spec. iv, 1006.—De Candolle, Prodr. ii, 436.—Nuttall, Sylva, ii, 37, t. 54; 2 ed. i, 86, t. 54.

Mimosa rosea, Vahl, Eclogæ, iii, 33, t. 25.

Inga rosea, Stendel in De Candolle, Prodr. ii, 437.

Inga forfex, Kunth, Mim. 12, t. 16.

P. forfex, Bentham in Hooker's London Jour. Bot. iii, 199.

Inga Guadalupensis, Desvaux, Jour. i, 70.

Mimosa Guadalupensis, Persoon, Syn. ii, 262.

Inga microphylla, Humboldt & Bonpland in Willdenow, Spec. iv, 1004.

P. microphyllum, Bentham in Hooker's London Jour. Bot. iii, 200.

P. Guadalupensis, Chapman, Fl. S. States, 116.

CAT'S CLAW.

Semi-tropical Florida, Caximbas bay, and on the southern keys; through the West Indies.

A small tree, sometimes 6 meters in height, with a trunk rarely exceeding 0.15 meter in diameter, or often throwing out many spreading, vine-like stems from the ground.

Wood very heavy, hard, close-grained, checking badly in drying; medullary rays numerous, inconspicuous; color, rich red varying to purple, sap-wood clear yellow; specific gravity, 0.9049; ash, 2.46.

ROSACEÆ.

102.-Chrysobalanus Icaco, Linnæus,

Spec. 1 ed. 513.—Jacquin, Stirp. Am. 154, t. 94.—Lamarck, Diet. iii, 224; Ill. ii, 542, t. 428.—Poiret, Suppl. iii, 135.—Aiton, Hort. Kew 2 ed. iii, 200.—De Candolle, Prodr. ii, 525.—Lindley in Trans. Hort. Soc. London, v, 98.—Turpin, Diet. Sci. Nat. 236.—Tussac, Fl. Antilles, iv, 91, t. 31.—Spach, Hist. Veg. i, 369, t. 5, f. 4.—Torrey & Gray, Fl. N. America, i, 406.—Walpers, Rep. ii, 1; Ann. iv, 642.—Bentham, Bot. Sulphur, 91; Fl. Nigritiana, 336.—Sprengel, Icon. t. 274, f. 1-13.—Cooper in Smithsonian Rep. 1860, 439.—Chapman, Fl. S. States, 119.—Grisebach, Fl. British West Indies, 229.—Baillon in Adansonia, vii, 221; Hist. Pl. i, 427, f. 486, 487.—Hooker f. in Martius, Fl. Brasil. ii, 7.—Guibourt, Hist. Drogues, 7 ed. iii, 287.—Hemsley, Bot. Am.-Cent. i, 365.

COCOA PLUM.

Semi-tropical Florida, cape Canaveral to bay Biscayne, west coast Caximbas bay, and on the southern keys; through the West Indies and tropical America to Brazil.

A small tree, 7 to 10 meters in height, with a trunk 0.15 to 0.30 meter in diameter, or along sandy beaches a low, prostrate shrub 1.08 to 2.16 meters in height; reaching its greatest development within the United States on the borders and islands of the Everglades, near bay Biscayne.

Wood heavy, hard, strong, close-grained, compact, containing few irregularly-distributed, not large, open ducts; medullary rays numerous, thin; color, light brown often tinged with red, the sap wood lighter; specific gravity, 0.7709; ash, 0.87.

Varieties are distinguished by A. H. Curtiss with the skin of the edible fruit white or black, the latter more ovate with narrower, softer stones (? var. pellocarpa, Hooker f. l. c.—C. pellocarpa, Miquel, Prim. Esseq. 193.—Grisebach, l. c.).

103.-Prunus Americana, Marshall,

Arbustum, iii.—Darlington in Ann. Lyc. N. York, iii, 87, t. 1; Fl. Cestrica, 3 ed. 72.—Eaton, Manual, 6 ed. 285.—Beck, Bot. 95.—Torrey & Gray, Fl. N. America, i, 407; Pacific R. R. Rep. ii, 164.—Eaton & Wright, Bot. 377.—Nuttall, Sylva, ii, 19, t. 48; 2 ed. i, 169, t. 48.—
Torrey, Fl. N. York, i, 194; Emory's Rep. 408; Pacific R. R. Rep. iv, 82.—Emerson, Trees Massachusetts, 449; 2 ed. ii, 511.—Hooker in London Jour. Bot. vi, 217.—Ræmer, Syn. Mon. iii, 59.—Gray in Mem. Am. Acad. new ser. iv¹, 40; Manual N. States, 5 ed. 148.—
Scheele in Ræmer, Texas, 430.—Richardson, Arctic Exped. 424.—Parry in Owen's Rep. 611.—Chapman, Fl. S. States, 119.—Curtis in Rep. Geological Serv. N. Carolina, 1860, iii, 56.—Lesquereux in Owen's 2d Rep. Arkansas, 358.—Wood, Cl. Book, 327; Bot. & Fl. 102.—Engelmann in Trans. Am. Phil. Soc. new ser. xiii, 190.—Koch, Drendrologie, i, 101.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 33.—Vasey, Cat. Forest Trees, 13.—Macoun in Geological Rep. Canada, 1875-'76, 194.—Broadhead in Coulter's Bot. Gazette, iii, 52.—Bell in Geological Rep. Canada, 1879-'80, 54°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 65.

- P. Mississippi, Marshall, Arbustum, 112.
- P. spinosa, Walter, Fl. Caroliniana, 146 [not Linneus].
- P. nigra, Aiton, Hort. Kew. ii, 165; 2 ed. iii, 198.—Willdenow, Spec. ii, 993; Berl. Baumz, 311.—Poiret in Lamarck, Dict. v, 674.—Persoon, Syn. ii, 35.—Bot. Mag. t. 1117.—Pursh, Fl. Am. Sept. i, 331.—Torrey, Fl. U. S. 469; Compend. Fl. N. States, 199.—Sprengel, Syst. ii, 477.—Rœmer, Syn. Mon. iii, 59.
- Cerasus nigra, Loiseleur in Nouveau Duhamel, v, 32.—Seringe in De Candolle, Prodr. ii, 538.—Hooker, Fl. Bor.-Am. i, 167;
 Companion Bot. Mag. i, 24.—Don, Miller's Dict. ii, 513.—Beck, Bot. 96.—Spach, Hist. Veg. i, 399.—Loudon, Arboretum, ii, 704, f. 411, 412.
- P. hiemalis, Elliott, Sk. i, 542 [not Michaux].
- P. coccinea, Rafinesque, Fl. Ludoviciana, 135.

WILD PLUM. CANADA PLUM. HORSE PLUM.

Valley of the Saint Lawrence (Quebec) to the valley of Rainy and Assinaboine rivers and southern shores of lake Manitoba; northern Vermont, western New England, and southward through the Atlantic states to the Chattahoochee region of western Florida, west to the valley of the upper Missouri river, Dakota, and Cheyenne cañon, Pike's Peak region, Colorado, southwest through Arkansas, the Indian territory, to about longitude 102°, and the valley of the lower Concho river, Texas.

A small tree, 6 to 12 meters in height, with a trunk rarely exceeding 0.30 meter in diameter; rich woods, or along streams and borders of ponds and swamps, reaching its greatest development on the bottom lands of eastern Texas.

A form with the young leaves and pedicles pubescent is—

var. mollis, Torrey & Gray, Fl. N. America, i, 407.

- P. hiemalis, Michaux, Fl. Bor.-Am. i, 284.—Poiret in Lamarck, Dict. v, 679.—Persoon, Syn. ii, 35.—Desfontaines, Hist. Arb. ii, 206.—Nouveau Duhamel, v, 184.—Hayne, Dend. Fl. 73.—Sprengel, Syst. ii, 477.—Spach, Hist. Veg. i, 398.—Rœmer, Syn. Mon. iii, 59.
- P. mollis, Torrey, Fl. U. S. 470; Compend. Fl. N. States, 199.—Beck, Bot. 95.
- Cerasus hiemalis, Seringe in De Candolle, Prodr. ii, 538.—Hooker, Fl. Bor.-Am. i, 168.—Beck, Bot. 96.—Loudon, Arboretum, ii, 704.—Don, Millér's Dict. ii, 504.

Cerasus Americana, Hooker, Companion Bot. Mag. i, 24.

Wood heavy, very hard, strong, very close-grained, compact, satiny, susceptible of a beautiful polish; medullary rays numerous, thin; color, rich bright brown or often red, the sap-wood lighter; specific gravity, 0.7215; ash, 0.18; used for the handles of tools, etc.

Often cultivated for the yellow, red, or rarely nearly black, acid or rarely sweet fruit, and furnishing an excellent stock on which to graft the varieties of the domestic plum.

5 FOR

104.—Prunus angustifolia, Marshall,

Arbustum, iii.-Koch, Dendrologie, i, 103.

- P. Chicasa, Michaux, Fl. Bor.-Am. i, 284.—Poiret in Lamarck, Diet. v, 680.—Persoon, Syn. ii, 35.—Nuttall, Genera, i, 302.—Nouveau Duhamel, v, 183.—Elliott, Sk. i, 542.—Torrey in Ann. Lyc. N. York, ii, 194; Pacific R. R. Rep. iv, 82.—Sprengel, Syst. ii, 476.—Audubon, Birds, t. 53.—Eaton, Manual, 6 ed. 285.—Spach, Hist. Veg. i, 397.—Torrey & Gray, Fl. N. America, i, 407; Pacific R. R. Rep. ii, 164.—Eaton & Wright, Bot. 377.—Romer, Syn. Mon. iii, 58.—Darlington, Fl. Cestrica, 3 ed. 73.—Darby, Bot. S. States, 299.—Browne, Trees of America, 250.—Cooper in Smithsonian Rep. 1858, 251.—Chapman, Fl. S. States, 119.—Curtis in Rep. Geological Surv. N. Carolina 1860, iii, 56.—Lesquereux in Owen's 2d Rep. Arkansas, 858.—Wood, Cl. Book, 328; Bot. & Fl. 102.—Gray, Manual N. States, 5 ed. 148; Hall's Pl. Texas, 9.—Young, Bot. Texas, 1251.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 33.—Vasey, Cat. Forest Trees, 13.—Ridgway in Proc. U. S. Nat. Mus. 1882, 65.
- P. insititia, Walter, Fl. Caroliniana, 146.—Abbot, Insects Georgia, ii, t. 60.
- Cerasus Chicasa, Seringe in De Candolle, Prodr. ii, 538.—Hooker, Fl. Bor.-Am. i, 168; Companion Bot. Mag. i, 24.—Don, Miller's Dict. ii, 514.—Loudon, Arboretum, ii, 705.

CHICKASAW PLUM. HOG PLUM.

Probably native of the eastern slopes of the southern Rocky mountains, where it is found at an altitude of 7,000 feet, and of the high plateau east and southeast of them; now widely naturalized by early cultivation throughout the Atlantic forests south of Pennsylvania, and west of the Alleghany mountains extending as far north as southern Michigan.

A small tree, 6 to 8 meters in height, with a trunk, 0.15 to 0.20 meter in diameter, or often a low shrub; generally along streams or borders of prairies, in rich soil.

Wood heavy, soft, not strong, close-grained, compact; medullary rays numerous, thin; color, light brown or red, the sap wood lighter; specific gravity, 0.6884; ash, 0.28; often cultivated for its globose red or yellow fruit.

105.—Prunus Pennsylvanica, Linnæus f.

- Suppl. 252.—Willdenow, Spec. ii, 992; Enum. 518; Berl. Baumz. 310.—Abbot, Insects Georgia, i, t. 45.—Poiret in Lamarck, Dict. v, 673.—Persoon, Syn. ii, 35.—Nouveau Duhamel, v, 9.—Aiton, Hort. Kew. 2 ed. iii, 198.—Pursh, Fl. Am. Sept. i, 331.—Nuttall, Genera, i, 302.—Torrey, Fl. U. S. 468; Compend. Fl. N. States, 198.—Sprengel, Syst. ii, 477.—Hayne, Dend. Fl. 73.—Eaton, Manual, 6 ed., 285.—Beck in Am. Journal Sci. 1 ser. xiv, 112.—Dietrich, Syn. iii, 42.—Chapman, Fl. S. States, 130.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 57.—Wood, Bot. & Fl. 102.—Gray in Proc. Philadelphia Acad. 1863, 61; Manual N. States, 5 ed. 148.—Koch, Dendrologie, i, 117.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc, Pub. No. 4, 33.—Emerson, Trees Massachusetts, 2 ed. ii, 513.—Vasey, Cat. Forest Trees, 13.—Macoum in Geological Rep. Canada, 1875-76, 194.—Bell in Geological Rep. Canada, 1879-780, 54c.—Sears in Bull. Essex Inst. xiii, 176.
 - ? P. lanceolata, Willdenow, Berl. Baumz. 240, t. 3, f. 3.
 - Cerasus borealis, Michaux. Fl. Bor.-Am. i; 286.—Nouveau Duhamel, v, 32.—Michaux f. Hist. Arb. Am. iii, 159, t. 8; N. American Sylva, 3 ed. ii, 152, t. 90.—Seringe in De Candolle, Prodr. ii, 558.—Don, Miller's Dict. ii, 513.—Beck, Bot. 97.—Loudon, Arboretum, ii, 703, f. 410.—Ræmer, Syn. Mon. iii, 78.
 - P. borealis, Poiret in Lamarck, Diet. v, 674.—Pursh, Fl. Am. Sept. i, 538.—Eaton, Manual, 54.—Barton, Gompend. Fl. Philadelph. i, 223.—Nuttall, Genera, i, 302.—Loddiges, Bot. Cab. t. 1598.—Bigelow, Fl. Boston. 3 ed. 205.
 - P. persicifolia, Desfontaines, Hist. Arb. ii, 205.
 - ? Cerasus persicifolia, Loiseleur in Nouveau Duhamel, v, 9.—Seringe in De Candolle, Prodr. ii, 537.—Don, Miller's Dict. ii, 512.—Spach, Hist. Veg. i, 411.—Rœmer, Syn. Mon. iii, 81.
 - Cerasus Pennsylvanica, Seringe in De Candolle, Prodr. ii, 538.—Hooker, Fl. Bor.-Am. i, 168.—Don, Miller's Diet. ii, 514.—
 Beck, Bot. 97.—Torrey & Gray, Fl. N. America, i, 409.—Loudon, Arboretum, ii, 705.—Eaton & Wright, Bot. 189.—
 Torrey, Fl. N. York, i, 196.—Nuttall, Sylva, ii, 15; 2 ed. i, 165.—Browne, Trees of America, 265.—Emerson, Trees
 Massachusetts, 1 ed. 451.—Rœmer, Syn. Mon. iii, 57.—Gray, Manual N. States, 1 ed. 115.—Parry in Owen's Rep. 611.—
 Richardson, Arctic Exped. 425.—Cooper in Smithsonian Rep. 1858, 251.—Wood, Cl. Book, 327.

WILD RED CHERRY. PIN CHERRY. PIGEON CHERRY.

Labrador, shores of Hudson's bay, and west through the Saskatchewan region to the valley of the upper Fraser river (Soda creek, *Macoun*); south through the northern states to Pennsylvania, central Michigan, northern Illinois, central Iowa, and along the high Alleghany mountains of North Carolina and Tennessee, and the Rocky mountains of Colorado.

A small tree, rarely exceeding 12 meters in height, with a trunk sometimes 0.60 meter in diameter, or in the Rocky Mountain region reduced to a low shrub; common in all the northern forests, in northern New England taking possession of ground cleared by fire of the coniferous forests.

Wood light, soft, close-grained, compact; medullary rays numerous, thin; color, light brown, sap-wood clear yellow; specific gravity, 0.5023; ash, 0.40.

The small acid fruit used domestically and by herbalists in the preparation of cough mixtures, etc.

106 .- Prunus umbellata, Elliott,

Sk. i, 541.—Eaton, Manual, 6 ed. 286.—Dietrich, Syn. iii, 44.—Chapman, Fl. S. States, 119.—Wood, Cl. Book, 328; Bot. & Fl. 102.—Young, Bot. Texas, 251.—Vasey, Cat. Forest Trees, 13.

P. pumila, Walter, Fl. Caroliniana, 146 [not Linnæus].

Cerasus umbellata, Torrey & Gray, Fl. N. America, i, 409.—Eaton & Wright, Bot. 190.—Romer, Syn. Mon. iii, 78.

SLOE. BLACK SLOE.

South Carolina, south near the coast to Mosquito inlet and Tampa bay, Florida, and through central Alabama to eastern Mississippi (Holly Springs and Enterprise, Mohr).

A small tree, 5 to 6 meters in height, with a trunk 0.25 to 0.38 meter in diameter; dry, sandy soil.

Wood heavy, hard, close-grained, compact; medullary rays numerous, thin; color, dark reddish-brown, the sap-wood much lighter; specific gravity, 0.8202; ash, 0.12.

The black or red pleasantly acid fruit used as a preserve.

107.—Prunus emarginata, Walpers,

Rep. ii, 9.—Dietrich, Syn. iii, 42.—Loudon, Arboretum, ii, 714.—Watson in King's Rep. v, 79.—Torrey, Bot. Wilkes Exped. 284.—Brewer & Watson, Bot. California, i, 167.

Cerasus emarginata, Douglas in Hooker, Fl. Bor.-Am. i, 169.—Don, Miller's Dict. ii, 515.—Torrey & Gray, Fl. N. America, i, 410.—Eaton & Wright, Bot. 189.—Romer, Syn. Mon. iii, 79.—Torrey in Pacific R. R. Rep. iv, 83.—Bolander in Proc. California Acad. iii, 79.

Cerasus erecta, Presl, Epimel. Bot. 194.—Walpers, Ann, iii, 854.

Cerasus glandulosa, Kellogg in Proc. California Acad. i, 59.

Vancouver's island and the valley of the lower Fraser river, south through western Washington territory and Oregon, east to the western slopes of the Bitter Root mountain, Idaho (Lolo trail, Watson), and the valley of the Jocko river, Montana (Canby & Sargent). California along the western slopes of the Sierra Nevadas and on the Coast ranges, from San Francisco bay to the Santa Lucia mountains (G. R. Vasey), reaching an elevation of from 3,000 to 4,000 feet.

A tree often 12 to 15 meters in height, with a trunk sometimes exceeding 0.30 meter in diameter; at high elevations and throughout central California reduced to a shrub 2 to 3 meters in height, or in the Santa Lucia mountains 15 to 18 meters in height, with a trunk 0.60 to 0.90 meter in diameter (Vasey); generally along streams or in low, rich woods.

The wood of the type not collected.

Var. mollis, Brewer,

Bot. California, i, 167.—Hall in Coulter's Bot. Gazette, ii, 86.

Cerasus mollis, Douglas in Hooker, Fl. Bor.-Am. i, 169.—Hooker, London Jour. Bot. vi, 217.—Don, Miller's Dict. ii, 515.—
Torrey & Gray, Fl. N. America, i, 410.—Loudon, Arboretum, ii, 417.—Eaton & Wright, Bot. 189.—Nuttall, Sylva, ii, 14, t. 46; 2 ed. i, 164, t. 46.—Rœmer, Syn. Mon. iii, 79.—Richardson, Arctic Exped, 425.—Newberry in Pacific R. R. Rep. vi, 73.—Cooper in Pacific R. R. Rep. xii, 29, 59; Am. Nat. iii, 406.—Lyall in Jour. Linnæan Soc. vii, 131.—Gray in Proc. Am. Acad. viii, 381.

P. mollis, Walpers, Rep. ii, 9.—Dietrich, Syn. iii, 42.—Torrey, Bot. Wilkes Exped. 284.—Vasey, Cat. Forest Trees, 13.—Macoun in Geological Rep. Canada, 1875-76, 194.

The common northern and Idaho form, more or less wooly pubescent, especially on the under side of the leaves. Wood light, soft, not strong, brittle, close-grained, compact; medullary rays numerous, thin; color, brown streaked with green; specific gravity, 0.4502; ash, 0.21.

108 .- Prunus serotina, Ehrhart,

- Beitr. iii, 20.—Willdenow, Spec. ii, 986; Enum. 517; Berl. Baumz. 301.—Persoon, Syn. ii, 34.—Desfontaines, Hist. Arb. ii, 204.—Aiton, Hort. Kew. 2 ed. iii, 196.—Eaton, Mannal, 54; 6 ed. 284.—Nuttall, Genera, i, 302.—Barton, Compend. Fl. Philadelph. 54.—Guimpel, Otto & Hayne, Abb. Holz. 45, t. 37.—Hayne, Dend. Fl. 70.—Sprengel, Syst. ii, 478.—Nees, Pl. Neuwied, 9.—Hooker f. in Trans. Linnæan Soc. xxii², 327.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 56.—Lesquereux in Owen's 2d Rep. Arkansas, 358.—Wood, Bot. & Fl. 102.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 190.—Chapman, Fl. S. States, 120.—Gray, Manual N. States, 5 ed. 149; Hall's Pl. Texas, 9.—Koch, Dendrologie, i, 122.—Torrey, Bot. Wilkes Exped. 284.—Emerson, Trees Massachusetts, 2 ed. ii, 515 & t.—Brewer & Watson, Bot. California, i, 167.—Vasey, Cat. Forest Trees, 13.—Bentley & Trimen, Med. Pl. ii, 97, t. 97.—Sears in Bull. Essex Inst. xiii, 176.—Bell in Geological Rep. Canada, 1879–'80, 54°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.
 - P. Virginiana, Miller, Dict. No. 3 [not Linnseus].—Du Roi, Obs. Bot. 12; Harbk. ii, 191.—Wangenheim, Amer. 34, t. 14.—Medicus, Bot. Beobacht. 1782, 345.—Marshall, Arbustum, 112.—Walter, Fl. Caroliniana, 146.—Aiton, Hort. Kew. ii, 163.—Poiret in Lamarck, Dict. v, 664.—Pursh, Fl. Am. Sept. i, 329.—Elliott, Sk. i, 540.—Torrey, Fl. U. S. 467; Compend. Fl. N. States, 189.—Bigelow, Fl. Boston, 3 ed. 204.
 - Cerasus Virginiana, Michaux, Fl. Bor.-Am. i, 285.—Michaux f. Hist. Arb. Am. iii, 151, t. 6; N. American Sylva, 3 ed. ii, 147, t. 88.—Hooker, Fl. Bor.-Am. i, 169 (excl. syn.).—Don, Miller's Dict. ii, 515.—Beck, Bot. 97.—Darlington, Fl. Cestrica, 2 ed. 289.—Loudon, Arboretum, ii, 710, f. 418.—Browne, Trees of America, 268.
 - Cerasus serotina, Loiseleur in Nouveau Duhamel, v, 3.—Seringe in De Candolle, Prodr. ii, 540.—Spach, Hist. Veg. i, 416.—Torrey & Gray, Fl. N. America, i, 410.—Loudon, Arboretum, ii, 712, f. 419 & t.—Eaton & Wright, Bot. 189.—Torrey, Fl. N. York, i, 196; Pacific R. R. Rep. vii, 11.—Penn. Cycl. vi, 432.—Carson, Med. Bot. i, 41, t. 35.—Griffith, Med. Bot. 288.—Emerson, Trees Massachusetts, 1 ed. 453.—Gray, Manual N. States, 1 ed. 115; Jour. Boston Soc. Nat. Hist. vi, 186.—Darlington, Fl. Cestrica, 3 ed. 75.—Darby, Bot. S. States, 299.—Cooper in Smithsonian Rep. 1858, 252.—Porcher, Resources S. Forests, 169.—Richardson, Arctic Exped. 425.—Wood, Cl. Book, 326.—Bolander in Proc. California Acad. iii, 79.

P. cartilaginea, Lehmann, Ind. Sem. Hamburg, 1833.

Padus serotina, Agardh, Theor. & Syst. Pl. t. 14, f. 8.

Padus Virginiana, Romer, Syn. Mon. iii, 86.

Padus cartilaginea, Ræmer, Syn. Mon. iii, 86.

WILD BLACK CHERRY. RUM CHERRY.

Southern Ontario, southward through the Atlantic forests to Matanzas inlet and Tampa bay, Florida, west to the valley of the Missouri river, Dakota, eastern Kansas, the Indian territory, and the valley of the upper San Antonio River, Texas.

A tree 18 to 30 meters in height, with a trunk 0.90 to 1.20 or, exceptionally, 1.50 meter in diameter; rich, generally elevated woodlands; common and reaching its greatest development on the western slopes of the Alleghany mountains from West Virginia southward; not common and of small size in the Gulf region and Texas

Wood light, hard, strong, close, straight-grained, compact, easily worked; medullary rays numerous, thin; color, light brown or red, growing darker with exposure, the thin sap-wood yellow; specific gravity, 0.5822; ash, 0.15; largely used and esteemed in cabinet work, interior finish, etc., and now becoming scarce.

The bark contains a bitter tonic principle, and infused with cold water generates a small percentage of hydrocyanic acid; employed as a tonic and sedative in cases of pulmonary consumption in the form of cold infusions, sirups, and fluid extracts (*Proc. Am. Phur. Assoc.* xxiii, 209.—Globley in Jour. Pharm. et Chimie, xv, 40.—Guibourt, Hist. Drogues, 7 ed. iii, 317.—Pharm. Jour. 3 ser. iv, 44.—Fluckiger & Hanbury, Pharmocographia, 224.—U. S. Dispensatory, 14 ed. 749.—Nat. Dispensatory, 2 ed. 1177); the bitter fruit used domestically in the preparation of cherry brandy.

Note.—The closely-allied P. Virginiana of the north Atlantic region, a tall shrub, sometimes 6 to 8 meters in height, does not assume arborescent habit.

109.-Prunus Capuli, Cavanilles,

- Sprengel, Syst. ii, 477.—Schlechtendal in Linnæa, xiii, 89, 404.—Koch, Dendrologie, i, 123.—Hemsley, Bot. Am.-Cent. i, 367.—Watson in Proc. Am. Acad. xvii, 352.
 - Cerasus Capollin, De Candolle, Prodr. ii, 539.—Don, Miller's Dict. ii, 515.—Loudon, Arboretum, ii, 713, f. 420.—Bentham, Pl. Hartweg. 10.—Lindley, Fl. Med. 232.—Penn. Cycl. vi, 432.—Torrey & Gray, Fl. N. America, i, 412.—Gray in Smithsonian Contrib. v, 54.
 - Cerasus Capuli, Seringe in De Candolle, Prodr. ii, 541.—Don, Miller's Dict. ii, 516.—Spach, Hist. Veg. i, 422.
 - P. Capollin, Zuccarini in Abhandl. Acad. Munich, ii, 345, t. 8.—Ræmer, Syn. Mon. iii, 87.—Torrey, Bot. Mex. Boundary Survey, 62.—Rusby in Bull. Torrey Bot. Club, ix, 53.
 - P. Canadensis, Mociño & Sessé, Pl. Mex. Icon. incd.

WILD CHERRY.

Apache and Guadalupe mountains, Texas, west through southern New Mexico and Arizona to the southern slopes of the San Francisco mountains; southward through northern New Mexico, and in Peru.

A small tree, in the United States, rarely 12 meters in height, with a trunk often 0.30 meter in diameter; bottoms of canons and mountain valleys, generally between 5,000 and 7,000 feet elevation.

Wood heavy, moderately hard, close-grained, compact; medullary rays very numerous, thin; color, brown, or often bright, clear red, the sap-wood nearly white; specific gravity, 0.7879; ash, 0.20.

110.-Prunus demissa, Walpers,

Rep. ii, 10.—Dietrich, Syn. iii, 43.—Bentham, Pl. Hartweg. 307.—Torrey, Bot. Mex. Boundary Survey, 63.—Watson in King's Rep. v, 80; Pl. Wheeler, 8.—Porter in Hayden's Rep. 1871, 481.—Coulter in Hayden's Rep. 1872, 764.—Rothrock, Pl. Wheeler, 37.—Brandegee in Hayden's Rep. 1875, 236.—Brewer & Watson, Bot. California, i, 167.—Vasey, Cat. Forest Trees, 13.—Hall in Coulter's Bot. Gazette, ii, 86.—Macoun in Geological Rep. Canada, 1875–76, 194.—Hemsley, Bot. Am.-Cent. i, 368.

Cerasus serotina, Hooker, Fl. Bor.-Am. i, 169, in part.

Cerasus demissa, Nuttall in Torrey & Gray, Fl. N. America, i, 411.—Gray in Mem. Am. Acad. new ser. iv¹, 40.—Durand in Jour. Philadelphia Acad. 1855, 87.—Torrey in Pacific R. R. Rep. iv, 83.—Newberry in Pacific R. R. Rep. vi, 73.—Cooper in Smithsonian Rep. 1858, 259; Pacific R. R. Rep. xii³, 59.

Padus demissa, Romer, Syn. Mon. iii, 87.

P. Virginiana, var. demissa, Torrey, Bot. Wilkes Exped. 284.—Gray in Proc. Am. Acad. viii, 381.

WILD CHERRY.

Vancouver's island east to the western slopes of the Rocky mountains of Montana, south through the Pacific region; in Sonora.

A small tree, sometimes 7 to 10 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or more often a low shrub; reaching its greatest development in the rich valleys of southern Oregon and northern California, near the coast; in southern California, and east of the Cascade and Sierra Nevada ranges, a low shrub confined to high, mountain valleys.

Wood heavy, hard, not strong, close-grained, compact; medullary rays numerous, conspicuous; color, light brown, the sap-wood lighter; specific gravity, 0.6951; ash, 0.50.

111.-Prunus Caroliniana, Aiton,

Hort. Kew. ii, 163; 2 ed. iii, 196.—Willdenow, Spec. ii, 987.—Poiret in Lamarck, Dict. v, 667.—Persoon, Syn. ii, 34.—Desfontaines, Hist. Arb. ii, 203.—Nuttall, Genera, i, 302.—Sprengel, Nene Entdeck. i, 304; Syst. ii, 478.—Hayne, Dend. Fl. 71.—Elliott, Sk. i, 540.—Audubon, Birds, t. 159, 190.—Eaton, Manual, 6 ed. 286.—Schlechtendal in Linnæa, xiii, 89.—Dietrich, Syn. iii, 43.—Chapman, Fl. S. States, 120.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 57.—Wood, Bot. & Fl. 103.—Koch, Dendrologie, i, 124.—Young, Bot. Texas, 252.—Gray, Hall's Pl. Texas, 9.—Vasey, Cat. Forest Trees, 13.

- P. Carolina, Miller, Dict.—Du Roi, Harbk. ii, 198.
- P. serratifolia, Marshall, Arbustum, 114.
- P. Lusitanica, Walter, Fl. Caroliniana, 146.
- Cerasus Caroliniana, Michaux, Fl. Bor.-Am. i, 285.—Nouveau Duhamel, v, 5.—Michaux f. Hist. Arb. Am. iii, 156, t. 7;

 N. American Sylva, 3 ed. ii, 150, t. 89.—Seringe in De Candolle, Prodr. ii, 540.—Don, Miller's Dict. ii, 516.—Spach, Hist. Veg. i, 420.—Penn. Cycl. vi, 432.—London, Arboretum, ii, 720, f. 423.—Torrey & Gray, Fl. N. America, i, 411.— Eaton & Wright, Bot. 190.—Browne, Trees of America, 272.—Darby, Bot. S. States, 299.—Griffith, Med. Bot. 291.— Cooper in Smithsonian Rep. 1858, 252.—Porcher, Resources S. Forests, 171.—Wood, Cl. Book, 326.
- P. sempervirens, Willdenow, Enum. Suppl. 33.
- ? Bumelia serrata, Pursh, Fl. Am. Sept. 155.—Romer & Schultes, Syst. iv, 498.
- ? Achras serrata, Poiret, Suppl. v, 36.

Leptocarpa Caroliniana, Nuttall, Sylva, ii, 18; 2 ed. i, 167.

Chimanthus amygdalinus, Rafinesque, Fl. Ludoviciana, 159.

Laurocerasus Caroliniana, Romer, Syn. Mon. iii, 90.

WILD ORANGE. MOCK ORANGE. WILD PEACH.

North Carolina, south, near the coast, to bay Biscayne, Florida, and southern Alabama, west, along the Gulf coast, to the valley of the Guadalupe river, Texas.

A small tree, evergreen, 10 to 12 meters in height, with a trunk rarely exceeding 0.30 meter in diameter; common and reaching its greatest development in the rich, light, deep soil of the bottoms of eastern Texas, here often covering extensive tracts known as "peach brakes"; not common in the eastern Gulf states.

Wood heavy, hard, strong, close-grained, checking badly in seasoning, susceptible of a good polish; medullary rays numerous, thin; color, light reddish-brown, or, more rarely, rich dark brown, the sap-wood lighter; specific gravity, 0.8688; ash, 0.41.

Generally planted in the southern states as an ornamental and hedge plant; foliage, bark, and fruit contain prussic acid, the leaves, especially when partly withered, often proving fatal to animals browsing upon them.

112.-Prunus sphærocarpa, Swartz.

Prodr. 81; Fl. Ind. Occ. ii, 927 [not Michaux].—Willdenow, Spec. ii, 987.—Poiret in Lamarck, Dict. v, 666.—Persoon, Syn. ii, 34.—Don, Miller's Dict. ii, 516.—Schlechtendal in Linnæa, xiii, 87.—Walpers, Rep. ii, 10.—Grisebach, Fl. British West Indies, 231.—Chapman, Fl. S. States, Suppl. 620.

Cerasus sphærocarpa, Loiseleur in Nouveau Duhamel, v. 4.—Seringe in De Candolle, Prodr. ii, 540.—Loudon, Arboretum ii, 721.—Bot. Mag. t. 3141.—Spach, Hist. Veg. i, 421.

Semi-tropical Florida, western shores of bay Biscayne (Curtiss); in the West Indies.

A small tree, in Florida not exceeding 6 meters in height, with a trunk 0.10 to 0.15 meter in diameter; high rocky woods or, more rarely, along the borders of streams and ponds; rare.

Wood heavy, hard, close-grained, checking badly in drying, containing many very small open ducts; layers of annual growth and medullary rays obscure; color, light, clear red, the sap-wood pale yellow; specific gravity, 0.8998; ash, 0.87.

113.-Prunus ilicifolia, Walpers,

Rep. ii, 10.—Dietrich, Syn. iii, 43.—Torrey, Bot. Mex. Boundary Survey, 63; Bot. Wilkes Exped. 285.—Brewer & Watson, Bot. California, i, 168; ii, 443.—Vasey, Cat. Forest Trees, 13.

Cerasus ilicifolia, Nuttall in Hooker & Arnott, Bot. Beechey, 340, t. 83.—Torrey & Gray, Fl. N. America, i, 411.—Nuttall, Sylva, ii, 16, t. 47; 2 ed. i, 165, t. 47.—Torrey in Emory's Rep. 139; Pacific R. R. Rep. iv, 83.—Paxton, Brit Fl. Garden, iii, 44, f. 254.—Walpers, Ann. iv, 654.—Cooper in Smithsonian Rep. 1858, 259.—Kellogg in Proc. California Acad. ii, 22.—Bolander in Proc. California Acad. iii, 79; iv, 22.—London Garden, 1873, 131 & fig.

Laurocerasus ilicifolia, Romer, Syn. Mon. iii, 92.

ISLAY.

California, Coast ranges from San Francisco bay south to the southern boundary of the state, extending to the western slopes of the San Bernardino and San Jacinto mountains.

A small tree, evergreen, often 9 to 12 meters in height, with a trunk 0.30 to 0.60 meter in diameter, or when distant from the coast often reduced to a low shrub.

Wood very heavy, hard, strong, close-grained, checking in seasoning, satiny, susceptible of a beautiful polish, containing many regularly-distributed rather small open ducts; medullary rays numerous, thin; color, bright reddish-brown, the sap-wood much lighter; specific gravity, 0.9803; ash, 0.78; furnishing valuable fuel.

114.—Vauquelinia Torreyi, Watson,

Proc. Am. Acad. xi, 147.—Brewer & Watson, Bot. California, i, 169.—Maximowicz in Act. Hort. St. Petersburg, v², 237.—Hemsley, Bot. Am.-Cent. i, 370.

Spiræa Californica, Torrey in Emory's Rep. 140.

V. corymbosa, Torrey, Bot. Mex. Boundary Survey, 64 [not Correa].

Arizona, high mountains near the Gila (Emory), summits of the Santa Catalina mountains (Pringle, Lemmon); in Sonora.

A small tree in the Santa Catalina mountains, 4 to 6 meters in height, with a trunk 0.10 to 0.20 meter in diameter; dry slopes and rocky bluffs at 2,700 to 4,000 feet elevation, granitic soil; generally hollow and decayed.

Wood very heavy, hard, very close-grained, compact, susceptible of a beautiful polish; medullary rays numerous, thin; color, rich dark brown streaked with red, the sap-wood yellow; specific gravity, 1.1374; ash, 1.45.

115.—Cercocarpus ledifolius, Nuttall;

Torrey & Gray, Fl. N. America, i, 427.—Hooker, Icon. t. 324.—Nuttall, Sylva, ii, 28, t. 51; 2 ed. i, 178, t. 51.—Walpers, Rep. ii, 46.—Dietrich, Syn. iii, 119.—Watson in King's Rep. v, 83, 420; Pl. Wheeler, 8.—Porter in Hayden's Rep. 1871, 481.—Coulter in Hayden's Rep. 1872, 765.—Parry in Am. Nat. ix, 201, 270; Proc. Davenport Acad. i, 146.—Engelmann in Simpson's Rep. 435.—Brewer & Watson, Bot. California, i, 174.—Vasey, Cat. Forest Trees, 13.—Sargent in Am. Jour. Sci. 3 ser. xvii, 421.—Rothrock in Wheeler's Rep. vi, 43, 111, 360.

MOUNTAIN MAHOGANY.

Cœur d'Alêne mountains, Idaho, southward along the western slopes of the Rocky mountains of Montana and Wyoming; eastern extremities of the Blue mountains of Washington territory and Oregon, Wahsatch mountains, Utah, and west along the mountain ranges of the Great Basin to the western slope of the Sierra Nevada of California, extending southward into Arizona and New Mexico.

A small, low tree, rarely 12 meters in height, with a trunk sometimes 0.60 to 0.90 meter in diameter, or north of Utah and Nevada reduced to a low shrub; dry, rocky mountain slopes, between 6,000 and 8,000 feet elevation, reaching its greatest development on the high ranges of central Nevada.

A shrubby variety of the Wahsatch mountain and other ranges of Utah, characterized by its rigid, intricately branched growth, short, revolute leaves and smaller flowers and fruit, is—

var. intricatus, M. E. Jones in herb.

- C. intricatus, Watson in Proc. Am. Acad. x, 346.—Parry in Am. Nat. ix, 270; Proc. Davenport Acad. i, 147.
- C. brevifolius, Watson in King's Rep. v, 83 [not Gray].

Wood very heavy, hard, close-grained, compact, brittle, difficult to work, susceptible of a beautiful polish; medullary rays very numerous, thin; color, bright, clear red, or often rich dark brown, the sap-wood clear yellow; specific gravity; 1.0731; ash, 1.04; furnishing the most valuable fuel of the region, and largely manufactured into charcoal.

116.—Cercocarpus parvifolius, Nuttall:

Hooker & Arnott, Bot. Beechey, 337.—Torrey & Gray, Fl. N. America, i, 427; Pacific R. R. Rep. ii, 164.—Hooker, Icon. t. 323.—Walpers, Rep. ii, 45.—Torrey in Fremont's Rep. 89; Emory's Rep. 139; Sitgreaves' Rep. 158; Pacific R. R. Rep. iv, 83; Bot. Mex. Boundary Survey, 63; Bot. Wilkes Exped. 287.—Dietrich, Syn. iii, 119.—Gray in Mem. Am. Acad. new ser. iv, 41; Smithsonian Contrib. iii, 68; v, 54; Proc. Boston Soc. Nat. Hist. vii, 146; Am. Jour. Sci. 2 ser. xxxiii, 411; Proc. Philadelphia Acad. 1863, 61.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 190.—Bolander in Proc. California Acad. iii, 79.—Porter in Hayden's Rep. 1870, 475; 1871, 481.—Watson in King's Rep. v, 82.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 34.—Rothrock, Pl. Wheeler, 37; Wheeler's Rep. vi, 111, 359.—Brewer & Watson, Bot. California, i, 174; ii, 444.—Vasey, Cat. Forest Trees, 13.—M. E. Jones, Excur. Bot. 12, 15, 20, 21.—Hemsley, Bot. Am.-Cent. i, 374.—Watson in Proc. Am. Acad. xvii, 353.

MOUNTAIN MAHOGANY.

California, valley of the Klamath river, southward through the Coast ranges to the San Bernardino and San Jacinto mountains, and in Lower California; Rocky mountains of Wyoming, Colorado, and New Mexico, mountains of southern Arizona, and southward into Sonora.

A small tree, rarely 6 to 9 meters in height, with a trunk sometimes 0.30 meter in diameter, or more often a shrub; dry, gravelly soil, reaching its greatest development on the mountains of southern New Mexico and Arizona, at an elevation of 6,000 to 8,000 feet.

A glabrous variety of southern California, with dark green leaves, is-

var. glaber, Watson, Bot. California, i, 175.

- C. betulæfolius, Nuttall in Hooker, Icon. t. 322.-Walpers, Rep. ii, 46.
- C. betuloides, Nuttall in Torrey & Gray, Fl. N. America, i, 427.—Hooker in London Jour. Bot. vi, 218.

A form with small entire or sparingly toothed leaves, of northern Mexico, is-

var. paucidentatus, Watson in Proc. Am. Acad. xvii, 353.

Wood very heavy, hard, close-grained, compact, difficult to work, susceptible of a beautiful polish; medullary rays numerous, thin; color, bright reddish-brown, the sap-wood light brown; specific gravity, 0.9365; ash, 0.45; furnishing valuable fuel.

117.-Pyrus coronaria, Linnæus,

Spec. 1 ed. 480.—Kalm, Travels, English ed. ii, 166.—Du Roi, Harbk. i, 229.—Marshall, Arbustum, 118.—Aiton, Hort. Kew. ii, 176; 2 ed. iii, 209.—Willdenow, Spec. ii, 1019; Enum. 527; Berl. Baumz. 330.—Persoon, Syn. ii, 40.—Pursh, Fl. Am. Sept. i, 340.—Eaton, Manual, 56; 6 ed. 291.—Nuttall, Genera, i, 307.—Barton, Compend. Fl. Philadelph. i, 228.—Hayne, Dend. Fl. 86.—Torrey, Fl. U. S. i, 180; Compend. Fl. N. States, 203; Fl. N. York, i, 223.—Bot. Mag. t. 2009.—Elliott, Sk. i, 559.—Bot. Reg. viii, 651.—Sprengel, Syst. ii, 510.—De Candolle, Prodr. ii, 635.—Don, Miller's Dict. ii, 647.—Beck, Bot. 113.—Hooker, Companion Bot. Mag. i, 25.—Reichenbach, Fl. Exot. t. 240.—Torrey & Gray, Fl. N. America, i, 223.—Dietrich, Syn. iii, 154.—Loudon, Arboretum, ii, 908 & t.—Browne, Trees of America, 297.—Richardson, Arctic Exped. 428.—Parry in Owen's Rep. 612.—Darby, Bot. S. States, 307.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 128.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 69.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 332; Bot. & Fl. 112.—Porcher, Resources S. Forests, 149.—Gray, Manual N. States, 5 ed. 161.—Koch, Dendrologie, i, 214.—Wenzig in Linnæa, xxxviii, 40 (excl. var.).—Macoun & Gibson in Trans. Bot. Soc. Edinburgh, xii, 325.—Vasey, Cat. Forest Trees, 13.—London Garden, xix, 400, t. 280.—Ward in Bull. U. S. Nat. Mus. No. 22, 78.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.

Malus coronaria, Miller, Dict. No. 2.—Mœnch, Meth. 682.—Michaux, Fl. Bor.-Am. i, 292.—Poiret in Lamarck, Dict. v, 562.—
Desfontaines, Hist. Arb. ii, 140.—Nouveau Duhamel, vi, 139, t. 44, f. 1.—Michaux f. Hist. Arb. Am. iii, 65, t. 10; N. American Sylva, 3 ed. ii, 58, t. 65.—Barton, Prodr. Fl. Philadelph. 55.—Spach, Hist. Veg. ii, 136, t. 8.—Rœmer, Syn. Mon. iii, 191.—Decaisne in Nouv. Arch. Mus. x, 154.—Carrière in Rev. Hort. 1877, 410 & t.

Cratagus coronaria, Salisbury, Prodr. 357.

Malus microcarpa coronaria, Carrière in Rev. Hort. 1884, 104, f. 24.

AMERICAN CRAB. SWEET-SCENTED CRAB.

Ontario, valley of the Humber river, shores of lake Erie, southward through western New York and Pennsylvania to the District of Columbia, and along the Alleghany mountains to central Alabama and northern Mississippi; west to southern Minnesota, Iowa, eastern Kansas, the Indian territory, and northern Louisiana.

A small tree, rarely 6 to 9 meters in height, with a trunk often 0.30 meter in diameter; rich, rather low woods, reaching its greatest development in the valleys of the lower Ohio region.

Wood heavy, rather soft, not strong, very close-grained, checking badly in drying; medullary rays numerous, obscure; color, brown varying to light red, the sap-wood yellow; specific gravity, 0.7048; ash, 0.52; used for levers, handles of tools, and in turnery.

Often planted for ornament on account of its fragrant blossoms; the small, yellow-green austere fruit used for preserves, and occasionally made into cider.

118.—Pyrus angustifolia, Aiton,

Hort. Kew. ii, 176; 2 ed. iii, 209.—Willdenow, Spec. ii, 1020.—Poiret in Lamarck, Dict. v, 455.—Persoon, Syn. ii, 40.—Pursh, Fl, Am. Sept. i, 341.—Elliott, Sk. i, 559.—Torrey, Fl. U. S. 480; Compend. Fl. N. States, 203.—Sprengel, Syst. ii, 509.—De Candolle, Prodr. ii, 635.—Watson, Dend. Brit. ii, t. 132.—Bot. Reg. xiv, 1207.—Don, Miller's Dict. 647.—Beck, Bot. 113.—Hooker, Companion Bot. Mag. i, 25.—Torrey & Gray, Fl. N. America, i, 471.—Loudon, Arboretum, ii, 909 & t.—Eaton & Wright, Bot. 382.—Dietrich, Syn. iii, 154.—Nuttall, Sylva, ii, 24; 2 ed. i, 174.—Darby, Bot. S. States, 307.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 128.—Curtis in Rep. Geolog cal Surv. N. Carolina, 1860, iii, 69.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 333; Bot. & Fl. 112.—Gray, Manual N. States, 5 ed. 161.—Koch, Dendrologie, i, 213.—Vasey, Cat. Forest Trees, 14.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.

P. coronaria, Wangenheim, Amer. 61, t. 21, f. 47 [not Linnæus].—Walter, Fl. Caroliniana, 148.

Malus angustifolia, Michaux, Fl. Bor.-Am. i, 292.—Decaisne in Nouv. Arch. Mus. x, 155.

Malus sempervirens, Desfontaines, Hist. Arb. ii, 141.—Nouveau Duhamel, vi, 638, t. 43, f. 1.—Poiret, Suppl. iv, 524.—Spach, Hist. Veg. ii, 135, t. 8, figs.—Rœmer, Syn. Mon. iii, 191.

P. coronaria, var. angustifolia, Wenzig in Linnæa, xxxviii, 41.

Chloromeles sempervirens, Decaisne in Fl. des Serres, xxiii, 126.

AMERICAN CRAB APPLE. SOUTHERN CRAB APPLE.

Pennsylvania?, southern Delaware, and the valley of the lower Wabash river, Illinois, south to the Chattahoochee region of western Florida.

A small tree, 6 to 9 meters in height, with a trunk rarely 0.30 meter in diameter; low, rich woods; most common and reaching its greatest development along the river bottoms of the south Atlantic states; less common west of the Alleghany mountains.

Wood heavy, hard, close-grained, checking badly in drying; medullary rays numerous, obscure; color, light brown tinged with red, the sap-wood yellow; specific gravity, 0.6895; ash, 0.33; used for levers, handles of tools, etc.

The austere fruit used for preserves and made into eider.

119.-Pyrus rivularis, Douglas;

Hooker, Fl. Bor.-Am. i, 203, t. 68.—Don, Miller's Diet. ii, 647.—Torrey & Gray, Fl. N. America, i, 471.—Eaton & Wright, Bot. 383.—Walpers, Rep. ii, 53.—Dietrich, Syn. iii, 154.—Ledebour, Fl. Rossica, ii, 99.—Nuttall, Sylva, ii, 22, t.49; 2 ed. i, 172, t. 49.—Richardson, Arctic Exped. 428.—Torrey in Pacific R. R. Rep. iv, 85; Bot. Wilkes Exped. 292.—Newberry in Pacific R. R. Rep. vi, 73.—Cooper in Smithsonian Rep. 1858, 259; Pacific R. R. Rep. xii, 29, 60.—Rothrock in Smithsonian Rep. 1867, 435, 446.—Koch, Dendrologie, i, 212.—Gray in Proc. Am. Acad. viii, 382.—Wenzig in Linnæa, xxxviii, 38.—Brewer & Watson, Bot. California, i, 188.—Vasey, Cat. Forest Trees, 14.—Hall in Coulter's Bot. Gazette, ii, 87.—Macoun in Geological Rep. Canada, 1875—76, 135.—Dawson in Canadian Nat. new ser. ix, 330.

P. diversifolia, Bongard in Mem. Acad. Sci. St. Petersburg, 6 ser. ii, 133.

P. fusca, Rafinesque, Med. Bot. ii, 254.

P. subcordata, Ledebour, Fl. Rossica, ii, 95.

Malus rivularis, Rœmer, Syn. Mon. iii, 215.—Decaisne in Nouv. Arch. Mus. x, 155.

Malus diversifolia, Romer, Syn. Mon. iii, 215.—Decaisne in Nouv. Arch. Mus. x, 155.

Malus subcordata, Rœmer, Syn. Mon. iii, 192.

OREGON CRAB APPLE.

Coast of Alaska, southward along the coast and islands of British Columbia, through Washington territory and Oregon, west of the Cascade mountains, to Sonoma county, California.

A small tree, sometimes 9 meters in height, with a trunk 0.30 to 0.45 meter in diameter; rich, low woods, generally along streams, often forming dense thickets.

Wood heavy, hard, very close-grained, liable to check badly in drying, susceptible of a beautiful polish; medullary rays numerous, obscure; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.8316; ash, 0.41; used for mallets, mauls, bearings of machinery, etc.

The small, black, pleasantly acid fruit occasionally used as a preserve, and prized by the Indians as food.

120.-Pyrus Americana, De Candolle,

Prodr. ii, 637.—Watson, Dend. Brit. i. t. 54.—Sprengel, Syst. ii, 511.—Hooker, Fl. Bor,-Am. i, 204.—Don, Miller's Dict. ii, 648.—Beck, Bot. 113.—Audubon, Birds, t. 363.—Torrey & Gray, Fl. N. America, i, 472.—Loudon, Arboretum, iii, 920 & t.—Eaton & Wright, Bot. 383.—Torrey, Fl. N. York, i, 224.—Dietrich, Syn. iii, 155.—Nuttall, Sylva, ii, 25, t. 50; 2 ed. i, 175, t. 50.—Browne, Trees of America, 326.—Emerson, Trees Massachusetts, 439; 2 ed. ii, 499.—Parry in Owen's Rep. 612.—Richardson, Arctic Exped. 428.—Lange, Pl. Grænl. 134.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 129.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 70.—Wood, Cl. Book, 333; Bot. & Fl. 112.—Porcher, Resources S. Forests, 168.—Gray, Manual N. States, 5 ed. 161.—Koch, Dendrologie, i, 190.—Brewer & Watson, Bot. California, i, 189.—Vasey, Cat. Forest Trees, 14.—Macoun in Geological Rep. Canada, 1875-'76, 195.—Sears in Bull. Essex Inst. xiii, 176.—Bell in Geological Rep. Canada, 1879-'80, 54°.

Sorbus Americana, Marshall, Arbustum, 145.—Willdenow, Enum. 520.—Pursh, Fl. Am. Sept. i, 341.—Poiret, Suppl. v, 164.—Eaton, Manual, 55; 6 ed. 351.—Nuttall, Genera, i, 305.—Hayne, Dend. Fl. 75.—Torrey, Fl. U. S. 477; Compend. Fl. N. States, 202.—Spach, Hist. Veg. ii, 95.—Bigelow, Fl. Boston. 3 ed. 207.—Ræmer, Syn. Mon. iii, 138.—Maximowicz in Bull. Acad. St. Petersburg, xix, 174.—Wenzig in Linnæa, xxxviii, 71.—Decaisne in Nouv. Arch. Mus. x, 158.

Sorbus aucuparia, Poiret in Lamarck, Dict. vii, 234, in part.—Bigelow, Fl. Boston. 1. ed. 119.—Decaisne in Nouv. Arch. Mus. x, 158, in part.

Sorbus aucuparia, var. Americana, Persoon, Syn. ii, 38 & addend.

P. aucuparia, Meyer, Pl. Labrador, 81, in part.—Schlechtendal in Linnæa, x, 99.—Hooker f. in Trans. Linnæan Soc. xxii*, 290, 327, in part.

Sorbus humifusa, Rafinesque, Med. Bot. ii, 265.

MOUNTAIN ASH.

Greenland?, Labrador, Newfoundland, Anticosti island, and westward along the southern shore of James' bay to the valley of the Nelson river (White Mud falls), southward through all mountainous regions of the northeastern states, and along the high mountains of Virginia and North Carolina; in northern Michigan, Wisconsin, and Minnesota.

A small tree, 6 to 9 meters in height, with a trunk 0.30 to 0.45 meter in diameter; borders of swamps and in moist, rocky woods, reaching its greatest development on the northern shores of lakes Huron and Superior.

A form with smaller fruit, peculiar to the high southern Alleghany mountains, is-

var. microcarpa, Torrey & Gray, Fl. N. America, i, 472.

Sorbus aucuparia, var. a. Michaux, Fl. Bor.-Am. i, 290.

Sorbus microcarpa, Pursh, Fl. Am. Sept. i, 341.—Poiret, Suppl. v, 164.—Elliott, Sk. i, 555.—Torrey, Fl. U. S. 477.—Eaton, Manual, 6 ed. 351.—Spach, Hist. Veg. ii, 95.—Rœmer, Syn. Mon. iii, 138.

P. microcarpa, Sprengel, Syst. ii, 511.—De Candolle, Prodr. ii, 636.—Don, Miller's Dict. ii, 648.—Beck, Bet. 113.—Eaton & Wright, Bot. 383.—Loudon, Arboretum, ii, 921.

Sorbus Americana, var. microcarpa, Wenzig in Linnæa, xxxviii, 71.

Sorbus riparia, Rafinesque, New Sylva, 15.

Wood light, soft, close-grained, compact; medullary rays numerous, obscure; color, light brown, the sap-wood lighter; specific gravity, 0.5451; ash, 0.83.

Often planted for ornament.

121.-Pyrus sambucifolia,

Chamisso & Schlechtendal in Linnæa, ii, 36.—Bongard in Mem. Acad. Sci. St. Petersburg, 6 ser. ii, 133.—Don, Miller's Dict. ii, 648.—Torrey & Gray, Fl. N. America, i, 472.—Walpers, Rep. ii, 53.—Dietrich, Syn. iii, 155.—Ledebour, Fl. Rossica, ii, 99.—Trautvetter & Meyer, Fl. Ochot. 37.—Maximowicz, Prim. Fl. Amurensis, 103.—Rothrock in Smithsonian Rep. 1867, 446.—Gray, Manual N. States, 5 ed. 161; Proc. Am. Acad. viii, 382.—Porter in Hayden's Rep. 1870, 475.—Watson in King's Rep. v, 92.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 38.—Brewer & Watson, Bot. California, i, 189.—Macoun in Geological Rep. Canada, 1875—76, 195.—Hall in Coulter's Bot. Gazette, ii, 87.—G. M. Dawson in Canadian Nat. new ser. ix, 10.—Sears in Bull. Essex Inst. xiii, 176.

Sorbus aucuparia, var. 3. Michaux, Fl. Bor.-Am. i, 290.

Sorbus aucuparia, Schrank, Pl. Labrador, 25, in part [not Linnæus].

P. Americana, Newberry in Pacific R. R. Rep. vi, 73 [not De Candolle].—Cooper in Pacific R. R. Rep. xii², 60.—Torrey, Bot. Wilkes Exped. 292.

P. aucuparia, Meyer, Pl. Labrador, 81, in part.—Schlechtendal in Linnæa, x, 99, in part.—Hooker in Trans. Linnæan Soc. xxii², 290, 327, in part.

Sorbus sambucifolia, Rœmer, Syn. Mon. iii, 139.—Maximowicz in Bull. Acad. Sci. St. Petersburg, xix, 174.—Wenzig in Linnæa, xxxviii, 73.—Decaisne in Nouv. Arch. Mus. x, 159.

Sorbus Sitchensis, Romer, Syn. Mon. iii, 139.

MOUNTAIN ASH.

Labrador to northern New England and the shores of lake Superior; high mountain ranges of the Pacific region from Alaska to southern New Mexico; in Kamtchatka.

A small tree, 9 to 12 meters in height, with a trunk sometimes 0.30 meter in diameter, or in the Pacific forests generally reduced to a low shrub; cold, wet swamps or borders of streams, reaching its greatest development in northern New England and Minnesota.

Wood light, soft, weak, close-grained, compact; medullary rays numerous, obscure; color, light brown, the sap-wood nearly white; specific gravity, 0.5928; ash, 0.35.

The bark and unripe fruit of the American mountain ashes, like those of the nearly-allied *P. aucuparia* of Europe, are extremely astringent, and occasionally used, domestically, in infusions, decoctions, etc., in the treatment of diarrhea (*Nat. Dispensatory*, 2 ed. 1333).

122.—Cratægus rivularis, Nuttall;

Torrey & Gray, Fl. N. America, i, 464.—Dietrich, Syn. iii, 161.—Walpers, Rep. ii, 58.—Nuttall, Sylva, ii, 9; 2 ed. i, 160.—Cooper in Smithsonian Rep. 1858, 258; Am. Nat. iii, 407.—Regel in Act. Hort. St. Petersburg, i, 107.—Watson in King's Rep. v, 92.—Porter in Hayden's Rep. 1871, 482.—Coulter in Hayden's Rep. 1872, 765.—Brandegee in Hayden's Rep. 1875, 236.—Vasey, Cat. Forest Trees, 14.—Macoun in Geological Rep. Canada, 1875-76, 195.—Engelmann in Coulter's Bot. Gazette, vii, 128.

C. sanguinea, var. Douglasii, Coulter in Hayden's Rep. 1872, 765 [not Torrey & Gray].

British Columbia, south through eastern Oregon and Washington territory, east and southeast along the mountain ranges of Idaho, Montana, Utah, and Colorado, to the Pinos Altos mountains, New Mexico (Greene).

A small tree, 6 to 8 meters in height, with a trunk rarely exceeding 0.30 meter in diameter, or often a tall, much-branched shrub, forming dense, impenetrable thickets along borders of streams and swamps.

Wood heavy, hard, close-grained, compact; medullary rays numerous, thin; color, bright reddish-brown, the sap-wood nearly white; specific gravity, 0.7703; ash, 0.35.

123.—Cratægus Douglasii, Lindley,

Bot. Reg. xxi, t. 1810.—Loudon, Arboretum, ii, 823, f. 584 & t.—Koch, Dendrologie, i, 147.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 26.—Brewer & Watson, Bot. California, i, 189.—Macoun in Geological Rep. Canada, 1875–76, 195.—Engelmann in Coulter's Bot. Gazette, vii, 128.

? C. glandulosa, Pursh, Fl. Am. Sept. i, 337, in part.

C. punctata, var. brevispina, Douglas in Hooker, Fl. Bor.-Am. i, 201.

C. sanguinea, var. Douglasii, Torrey & Gray, Fl. N. America, i, 464.—Walpers, Rep. ii, 58.—Dietrich, Syn. iii, 160.—Torrey, Bot. Wilkes Exped. 292.—Regel in Act. Hort. St. Petersburg, i, 116.

C. sanguinea, Nuttall, Sylva, ii, 6, t. 44; 2 ed. i, 157, t. 44 [not Pallas].—Cooper in Smithsonian Rep. 1858, 259; Am. Nat. iii, 407.—Vasey, Cat. Forest Trees, 14.

Anthomeles Douglasii, Remer, Syn. Mon. iii, 140.

C. rivularis, Brewer & Watson, Bot. California, i, 189 [not Nuttall].

British Columbia, valley of the Parsnip river, in about latitude 55° N., south through Washington territory and Oregon to the valley of the Pitt river, California, extending east through Idaho and Montana to the western base of the Rocky mountains (valley of the Flathead river, Canby & Sargent).

A small tree, sometimes 12 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or often a tall shrub throwing up many stems from the ground and forming impenetrable thickets; rather wet, sandy soil along streams, and reaching its greatest development in the valleys west of the Cascade mountains; toward its eastern limits a low shrub.

Wood heavy, hard, tough, close-grained, compact, satiny, susceptible of a beautiful polish; medullary rays numerous, thin; color, nearly white tinged with rose, the sap-wood lighter; specific gravity, 0.6950; ash, 0.33; used for wedges, mauls, etc.

The small, sweet, black fruit; ripening in August, is largely collected by the Indians.

124.—Cratægus brachyacantha, Sargent & Englemann;

Engelmann in Coulter's Bot. Gazette, vii, 128.

HOGS' HAW.

New Orleans?, (Drummond in herb. Gray); Minden, Louisiana (Mohr); Concord, Texas (Sargent); Longview, Texas (in fruit, Letterman).

A tree 9 to 12 meters in height, with a trunk sometimes 0.60 meter in diameter; borders of streams in low, very rich soil; the largest North American representative of the genus.

Wood heavy, hard, very close-grained, compact, susceptible of a beautiful polish; medullary rays numerous, very obscure; color, light brown tinged with rose, the sap-wood lighter; specific gravity, 0.6793; ash, 0.42.

The large blue-black fruit greedily eaten by hogs and other animals.

125.—Cratægus arborescens, Elliott,

Sk. i, 550.—Eaton, Manual, 6 ed. 112.—Torrey & Gray, Fl. N. America, i, 466.—Eaton & Wright, Bot. 212.—Dietrich, Syn. iii, 160.—Walpers, Rep. ii, 58.—Nuttall, Sylva, ii, 10, t. 45; 2 ed. i, 160, t. 45.—Darby, Bot. S. States, 306.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 127.—Wood, Cl. Book, 331; Bot. & Fl. 111.—Young, Fl. Texas, 259.—Vasey, Cat. Forest Trees, 14.—Engelmann in Bull. Torrey Bot. Club, ix, 4.

Phænopyrum arborescens, Ræmer, Syn. Mon. iii, 153.

C. Crus-galli, var. pyracanthifolia, Regel in Act. Hort. St. Petersburg, i, 109, in part.

Valley of the Savannah river, South Carolina (Aiken, Ravenel), south to the Chattahoochee region of western Florida; valley of the Mississippi river, near Saint Louis (Engelmann), south and southwest to western Louisiana, and the valley of the lower Colorado river, Texas.

A small tree, 6 to 9 meters in height, with a trunk sometimes 0.45 to 0.60 meter in diameter; borders of streams and in rather low, wet swamps.

Wood heavy, hard, not strong, close-grained, compact, susceptible of a beautiful polish; medullary rays very numerous, obscure; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.6491; ash, 0.57. The small globular fruit bright red or, more rarely, orange.

126.-Cratægus Crus-galli, Linnæus,

Spec. 1 ed. 476.—Kalm, Travels, English ed. i, 115.—Medicus, Bot. Beobacht. ii, 344.—Walter, Fl. Caroliniana, 147.—Aiton, Hort. Kew. ii, 170; 2 ed. iii, 202.—Willdenow, Spec. ii, 1004.—Micaux, Fl. Bor.-Am.i, 298.—Persoon, Syn. ii, 37.—Pursh, Fl. Am. Sept. i, 338.—Eaton, Manual, 55; 6 ed. 111.—Nuttall, Genera, i, 305.—Barton, Compend. Fl. Philadelph. i, 225; Prodr. Fl. Philadelph. 54.—Elliott, Sk. i, 548.—Torrey, Fl. U. S. 476; Compend. Fl. N. States, 202; Fl. N. York, i, 221.—Watson, Dend. Brit. i, t. 56.—De Candolle, Prodr. ii, 626.—Hooker, Fl. Bor.-Am. i, 200; Companion Bot. Mag. i, 25.—Don, Miller's Dict. ii, 598.—Beck, Bot. 111.—Torrey & Gray, Fl. N. America, i, 463.—Loudon, Arboretum, ii, 820, f. 574, 575 & t.—Eaton & Wright, Bot. 212.—Bigelow, Fl. Boston. 3 ed. 206.—Dietrich, Syn. iii, 158.—Browne, Trees of America, 278.—Emerson, Trees Massachusetts, 433; 2 ed. ii, 492 & t.—Ræmer, Syn. Mon. iii, 117.—Parry in Owen's Rep. 612.—Darlington, Fl. Cestrica, 3 ed. 83.—Darby, Bot. S. States, 305.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 127.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 83.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 331; Bot. & Fl. 111.—Porcher, Resources S. Forests, 148.—Gray, Manual N. States, 5 ed. 160; Hall's Pl. Texas, 9.—Young, Bot. Texas, 258.—Regel in Act. Hort. St. Petersburg, i, 108.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 19.—Vasey, Cat. Forest Trees, 14.—Bell in Geological Rep. Canada, 1879-'80, 54c.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.

C. lucida, Du Roi, Obs. Bot. 13.—Wangenheim, Amer. 53, t. 17, f. 42.—Sprengel, Syst. ii, 506.—De Candolle, Prodr. ii, 629.—Eaton, Manual, 6 ed. 112.—Don, Miller's Dict. ii, 599.—Eaton & Wright, Bot. 212.

Mespilus Crus-galli, Marshall, Arbustum, 88.—Lamarck, Dict. iv, 441.—Desfontaines, Hist. Arb. ii, 157.—Nouveau Duhamel, iv, 149.—Willdenow, Enum. 522; Berl. Baumz. 244.—Hayne, Dend. Fl. 80.—Koch, Dendrologie, i, 142.

? Mespilus cuneiformis, Marshall, Arbustum, 88.

Mespilus lucida, Ehrhart, Beitr. iv, 17.-Mench, Meth. 685.-Spach, Hist. Veg. ii, 57.

Mespilus cuneifolia, Mench, Meth. 684.

C. Crus-galli, var. splendens, Aiton, Hort. Kew. 2 ed. iii, 202.

Mespilus Watsoniana, Spach, Hist. Veg. ii, 57.

C. Watsoniana, Ræmer, Syn. Mon. iii, 117.

COCKSPUR THORN. NEWCASTLE THORN.

Valley of the Saint Lawrence river, west through southern Ontario to Manitoba, south through the Atlantic forests to the valley of the Chipola river, western Florida, and the valley of the Colorado river, Texas.

A small tree, 4 to 10 meters in height, with a trunk sometimes 0.30 meter in diameter, running into various forms. The best marked are—

var. pyracanthifolia, Aiton, Hort. Kew. ii, 170; 2 ed. iii, 202.—De Candolle, Prodr. ii, 626.—Torrey & Gray, Fl. N. America, i, 464.—Loudon, Arboretum, ii, 820, t. 128, f. 580.—Browne, Trees of America, 278.—Regel in Act. Hort. St. Petersburg, i, 109, in part.

C. salicifolia, Medieus, Bot. Beobacht. ii, 345.—Romer, Syn. Mon. iii, 117.

C. Crus-galli, var. salicifolia, Aiton, l. c.; 2 ed. l. c.—Willdenow, Berl. Baumz. 244.—De Candolle, l. c.—Loudon, l. c. f. 551-553, 578 & t.—Browne, l. c.—Regel, l. c. 110.

Mespilus Crus-galli, var. salicifolia, Hayne, Dend. Fl. 80.

Mespilus Crus-galli, var. pyracanthifolia, Hayne, t. c.

Mespilus salicifolia, Koch, Dendrologie, i, 144.

C. Coursetiana, Romer, Syn. Mon. iii, 117.

var. ovalifolia, Lindley, Bot. Reg. xxii, t. 1860.—Torrey & Gray, Fl. N. America, i, 464.—Dietrich, Syn. iii, 159.—Loudon, Arboretum, ii, 821, f. 579 & t.—Regel in Act. Hort. St. Petersburg, i, 109.

Mespilus ovalifolia, Hornemann, Hort. Hafn. Suppl. 52.-Koch, Dendrologie, i, 143.

Mespilus prunellifolia, Poiret, Suppl. iv, 72.

C. ovalifolia, De Candolle, Prodr. ii, 627.—Don, Miller's Dict. ii, 598.—Rœmer, Syn. Mon. iii, 117.

C. prunellifolia, De Candolle, l. c.-Don, l. c.-Romer, l. c.

Mespilus elliptica, Guimpel, Otto & Hayne, Abb. Holz. 170, t. 144 [not Lamarck].—Spach. Hist. Veg. ii, 68.

var. linearis, De Candolle, Prodr. ii, 626.—Torrey & Gray, Fl. N. America, i, 464.—Dietrich, Syn. iii, 159.—London, Arboretum, ii, 821, f. 577.—Browne, Trees of America, 278.—Regel in Act. Hort. St. Petersburg, i, 110.

Mespilus lucida, var. angustifolia, Ehrhart, Beitr. iv, 18.

C. linearis, Persoon, Syn. ii, 37.—Romer, Syn. Mon. iii, 118.

Mespilus linearis, Desfontaines, Hist. Arb. ii, 156.—Poiret, Suppl. iv, 70.—Spach, Hist. Veg. ii, 57.

var. prunifolia, Torrey & Gray, Fl. N. America, i, 464.—Dietrich, Syn. iii, 159.—Loudon, Arboretum, ii, 821, f. 576 & t.—Regel in Act. Hort. St. Petersburg, i, 110.

Mespilus prunifolia, Marshall, Arbustum, 90.—Lamarck, Dict. iv, 443.—Nouveau Duhamel, iv, 150, t. 40.—Sprengel, Syst. ii, 506.

Mespilus rotundifolia, Ehrhart, Beitr. iii, 20.

C. prunifolia, Persoon, Syn. ii, 37.—Bosc in De Candolle, Prodr. ii, 627.—Don, Miller's Dict. ii, 598.—Lindley, Bot. Reg. xxii, t. 1868.—Eaton, Manual, 6 ed. 112.—Eaton & Wright, Bot. 212.

Mespilus Bosciana, Spach, Hist. Veg. ii, 58.

C. Bosciana, Romer, Syn. Mon. iii, 118.

Wood heavy, hard, not strong, close-grained, compact, satiny, susceptible of a fine polish; medullary rays numerous, very obscure; color, brown tinged with red, the sap-wood rather lighter; specific gravity, 0.7194; ash, 0.56.

The long, strong spines are occasionally collected and used to fasten sacks and for similar purposes.

127.—Cratægus coccinea, Linnæus,

Spec. 1 ed. 476.—Walter, Fl. Caroliniana, 147.—Aiton, Hort. Kew. ii, 167; 2 ed. iii, 200.—Willdenow, Spec. ii, 1000 (excl. syn.).—Michaux, Fl. Bor.-Am. i, 288.—Persoon, Syn. ii, 36.—Pursh, Fl. Am. Sept. i, 337.—Eaton, Manual, 55; 6 ed. 111.—Nuttall, Genera, i, 305.—Schrank, Pfl. Labrador, 26.—Barton, Compend, Fl. Philadelph. i, 225.—Hayne, Dend. Fl. 77.—Elliott, Sk. i, 553.—Torrey, Fl. U. S. 474; Compend. Bot. N. States, 201; Fl. N. York, i, 221; Emery's Rep. 408.—De Candolle, Prodr. ii, 627.—Hooker, Fl. Bor.-Am. i, 201; Bot. Mag. t. 3432.—Don, Miller's Dict. ii, 599.—Meyer, Pl. Labrador, 82.—Beck, Bot. 112.—Lindley, Bot. Reg. 23, t. 1957.—Torrey & Gray, Fl. N. America, i, 465.—Bigelow, Fl. Boston. 3 ed. 206.—Eaton & Wright, Bot. 211.—Dietrich, Syn. iii, 160.—Walpers, Rep. ii, 58.—London, Arboretum, ii, 816, f. 564-566, t. 121.—Schnizlein, Icon. t. 270, f. 18-20, 22.—Emerson, Trees Massachusetts, 434; 2 ed. ii, 493 & t.—Richardson, Arctic Exped. 427.—Darlington, Fl. Cestrica, 3ed. 83.—Darby, Bot. S. States, 305.—Cooper in Smithsonian Rep. 1858, 252.—Gray in Pacific R. R. Rep. xii, 43; Manual N. States, 5 ed. 160.—Chapman, Fl. S. States, 127.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 82.—Lesquereux in Owen's 2d Rep. Arkansas, 309.—Wood, Cl. Book, 331; Bot. & Fl. 111.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 9.—Vasey, Cat. Forest Trees, 14.—Sears in Bull. Essex Inst. xiii, 177.—Bell in Geological Rep. Canada, 1879-'80, 55°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.

Mespilus coccinea, Marshall, Arbustum, 87.—Mœnch, Meth. 684.—Lamarck, Diet. iv,442.—Desfontaines, Hist. Arb ii, 156.—Willdenow, Enum. 523; Berl. Baumz. 238.—Wendland in Regensb. Fl. 1823, 699.—Sprengel, Syst. ii, 507.—Spach, Hist. Veg. ii, 64.

Mespilus rotundifolia, Ehrhart, Beitr. iii, 20.—Wendland in Regensb. Fl. 1823, 700.—Watson, Dend. Brit. i, t. 58.—Koch, Dendrologie, i, 148.

Pyrus glandulosa, Monch, Meth. 680.

C. glandulosa, Willdenow, Spec. ii, 1002 (excl. syn.).—Pursh, Fl. Am. Sept. i, 337, in part.—Torrey, Fl. U. S. 475; Compend. Fl. N. States, 201.—De Candolle, Prodr. ii, 627.—Loddiges, Bot. Cab. t. 1012.—Hooker, Fl. Bor.-Am. i, 201.—Don, Miller's Dict. ii, 599.—Eaton, Manual, 6 ed, 111.—Beck, Bot. 112.—Eaton & Wright, Bot. 211.—Loudon, Arboretum, ii, 817, f. 550, 567, 568 & t.—Richardson, Arctic Exped. 427.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 84.—Regel in Act. Hort. St. Petersburg, i, 120.

Mespilus glandulosa, Willdenow, Enum. 523.—Sprengel, Syst. ii, 507.—Spach, Hist. Veg. ii, 62.—Koch, Dendrologie, i, 145.

Mespilus pubescens, Wendland in Regensb. Fl. 1823, 700.

C. Crus-galli, Bigelow, Fl. Boston. 2 ed. 194 [not Linnæus].

? Mespilus Wendlandii, Opiz in Regensb. Fl. 1834, 590.

C. macracantha, Loddiges in Loudon, Arboretum, ii, 819, f. 572, 573 & t.

C. glandulosa, var. macracantha, Lindley in Bot. Reg. xxii, t. 1912.

Mespilus flabellata, Spach, Hist. Veg. ii, 63.-Koch, Dendrologie, i, 148.

Halmia flabellata, Romer, Syn. Mon. iii, 136.

Anthomeles rotundifolia, Romer, Syn. Mon. iii, 140.

Phænopyrum coccineum, Ræmer, Syn. Mon. iii, 156.

Phænopyrum Wendlandii, Ræmer, Syn. Mon. iii, 156.

SCARLET HAW. RED HAW. WHITE THORN.

West coast of Newfoundland, west along the valley of the Saint Lawrence river and the northern shores of the great lakes to Manitoba, south through the Atlantic forests to northern Florida and eastern Texas.

A small tree, sometimes 9 meters in height, with a trunk 0.30 meter in diameter; open upland woods or along streams and borders of prairies; very common at the north, rare at the south; running into many forms, varying in the size and shape of the leaves, size of the fruit, etc. The best marked are—

var. viridis, Torrey & Gray, Fl. N. America, i, 465.—Torrey in Nicollet's Rep. 149.

O. viridis, Linnaus, Spec. 1 ed. 476.—Willdenow, Spec. ii, 1001.—Persoon, Syn. ii, 36.—Elliott, Sk. i, 551.—De Candolle, Prodr. ii, 630.—Don, Miller's Dict. ii, 601.—Eaton, Manual, 6 ed. 112.—Darlington, Fl. Cestrica, 2 ed. 293.—Eaton & Wright, Bot. 212.—Beck, Bot. 305.—Darby, Bot. S. States, 305.—Wood, Cl. Book, 332; Bot. & Fl. 111.

? Phænopyrum viride, Ræmer, Syn. Mon. iii, 156.

Mespilus viridis, Koch, Dendrologie, i, 149.

C. glandulosa, var. rotundifolia, Regel in Act. Hort. St. Petersburg, i, 120.

var. populifolia, Torrey & Gray, Fl. N. America, 1, 465.

C. populifolia, Elliott, Sk. i, 553 [not Walter].—Nuttall, Genera, i, 305.—Eaton, Manual, 6 ed. 112—Beck, Bot. 305.—Eaton & Wright, Bot. 212.—Darby, Bot. S. States, 305.

Mespilus populifolia, Lamarck, Diet. iv, 447.

Phænopyrum populifolium, Ræmer, Syn. Mon. iii, 156.

C. coccinea, var. typica, Regel in Act. Hort. St. Petersburg, i, 121.

var. oligandra, Torrey & Gray, Fl. N. America, i, 465.

Wood heavy, hard, close-grained, compact; medullary rays thin, very obscure; color, brown tinged with red, the sap-wood a little lighter; specific gravity, 0.8618; ash, 0.38.

128.—Cratægus subvillosa, Schrader,

Ind. Sem. Hort. Gœtt.—Torrey in Pacific R. R. Rep. iv, 35.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.

C. coccinea, var. mollis, Torrey & Gray, Fl. N. America, i, 465.—Gray in Jour. Boston Soc. Nat. Hist. vi, 186.—Parry in Owen's Rep. 612.—Regel in Act. Hort. St. Petersburg, i, 121.

Phænopyrum subvillosum, Ræmer, Syn. Mon. iii, 154.

- C. mollis, Scheele in Linnæa, xxi, 569; Rœmer, Texas, Appx. 473.—Walpers, Ann. ii, 523.
- C. sanguinea, var. villosa, Ruprecht & Maximowicz, Prim. Fl. Amurensis, 101.
- C. Texana, Buckley in Proc. Philadelphia Acad. 1861, 454 (see Gray in same, 1862, 163).—Young, Fl. Texas, 258.
- C. tomentosa, var. mollis, Gray, Manual N. States, 5 ed. 160.—Wood, Cl. Book, 330; Bot. & Fl. 121.—Vasey, Cat. Forest Trees, 14.

Mespilus tiliæfolia, Koch, Dendrologie, i, 151.

SCARLET HAW.

Eastern Massachusetts (possibly introduced); central Michigan to eastern Nebraska, south to middle Tennessee, and southwest through Missouri, Arkansas, the Indian territory, and Texas to the valley of the San Antonio river.

A small tree, 7 to 9 meters in height, with a trunk rarely 0.45 meter in diameter; rich woods and along borders of streams and prairies.

Wood heavy, hard, not strong, close-grained, compact; medullary rays numerous, very obscure; color, light brown or light red, the sap-wood lighter; specific gravity, 0.7953; ash, 0.69.

The large red fruit often downy, edible, and of agreeable flavor.

129.—Cratægus tomentosa, Linnæus,

Spec. 1 ed. 476 (excl. syn. Gronovius).—Kalm, Travels, English ed. ii, 151.—Du Roi, Harbk. i, 183.—Torrey & Gray, Fl. N. America, i, 466.—Dietrich, Syn. iii, 160.—Torrey, Fl. N. York, i, 222.—Emerson, Trees Massachusetts, 1 ed. 435; 2 ed. ii, 494 & t.—Parry in Owen's Rep. 612.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 127.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 330.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 191.—Gray, Manual N. States, 5 ed. 160.—Young, Bot. Texas, 258.—Vasey, Cat. Forest Trees, 14.—Macoun in Geological Rep. Canada, 1875—76, 195.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.

C. leucophlæos, Monch, Hort. Weiss. 31, t. 2.—Regel in Act. Hort. St. Petersburg, i, 106.

Mespilus Calpodendron, Ehrhart, Beitr. ii, 67.

C. pyrifolia, Aiton, Hort. Kew. ii, 168; 2 ed. iii, 200.—Willdenow, Spec. ii, 1001.—Persoon, Syn. ii, 36.—Nouveau Duhamel, iv, 131.—Poiret, Suppl. i, 292.—Pursh, Fl. Am. Sept. i, 337.—Nuttall, Genera, i, 305.—Elliott, Sk. i, 550.—Torrey, Fl. U. S. 475; Compend. Fl. N. States, 201.—De Candolle, Prodr. ii, 627.—Hooker, Fl. Bor.-Am. i, 201.—Don, Miller's Dict. ii, 599.—Eaton, Manual, 6 ed. 111.—Lindl¬γ, Bot. Reg. xxii, t. 1877.—Loudon, Arboretum, ii, 819, f. 571 & t.--Eaton & Wright, Bot. 211.

Mespilus latifolia, Lamarck, Dict. iv, 444.—Desfontaines, Hist. Arb. ii, 156.—Nouveau Duhamel, iv, 150.—Spach, Hist. Veg. ii, 60.

O. latifolia, Persoon, Syn. ii, 36.—Don, Miller's Dict. ii, 598.—Eaton, Manual, 6 ed. 112.—Eaton & Wright, Bot. 212.—Remer, Syn. Mon. 119.

Mespilus pyrifolia, Willdenow, Enum. 523; Berl. Baumz. 240.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 15.—Sprengel, Syst. ii, 507.—Hayne, Dend. Fl. 78.

Mespilus lobata, Poiret, Suppl. iv, 71.

Mespilus odorata, Wendland in Regensb. Fl. 1823, 700.

Mespilus pruinosa, Wendland in Regensb. Fl. 1823, 700.

C. lobata, Bose in De Candolle, Prodr. ii, 628.

C. flava, Hooker, Fl. Bor.-Am. i, 202 (excl. syn.).

Halmia tomentosa, Remer, Syn. Mon. 135.

Halmia lobata, Romer, Syn. Mon. 135.

Phænopyrum pruinosum, Ræmer, Syn. Mon. 155.

? C. coccinea, var. viridis, Torrey in Pacific R. R. Rep. iv, 86 [not Torrey & Gray].

C. tomentosa, var. pyrifolia, Gray, Manual N. States, 5 ed. 160 .- Wood, Bot. & Fl. 111.

C. coccinea, Brandegee in Hayden's Rep. 1875, 236 [not Linnæus].

C. leucocephalus, Lavallée, Arboretum Segrez. 78, t. 22 [not Mœnch].

C. coccinea, var. cordata, Lavallée, Arboretum Segrez. 81, t. 22.

BLACK THORN. PEAR HAW.

New Brunswick, westward along the valley of the Saint Lawrence river and the northern shores of the great lakes to the Saskatchewan region, southward through the Atlantic forests to the Chattahoochee region of western Florida, and eastern Texas west to the mountains of eastern Washington territory and Oregon, southwestern Colorado, and southwestern New Mexico.

A small tree, 6 to 9 meters in height, with a trunk rarely 0.45 meter in diameter, or often, especially west of the Rocky mountains, reduced to a low shrub, here forming dense thickets along mountain streams; the most widely-distributed of the North American *Cratagi*, varying greatly in the size, shape, and color of the fruit, form of the leaves, amount of pubescence, etc.

Wood heavy, hard, not strong, close-grained, compact; medullary rays numerous, thin; color, bright reddishbrown, the sap-wood lighter; specific gravity, 0.7633; ash, 0.50.

Var. punctata, Gray,

Manual N. States, 2 ed. 124.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 127.—Porter in Hayden's Rep. 1871, 481.—Vasey, Cat. Forest Trees, 14.

C. punctata, Jacquin, Hort. Vindob. i, 10, t. 28.—Aiton, Hort. Kew. ii, 169; 2 ed. iii, 202.—Willdenow, Spec. ii, 1004.—Michaux, Fl. Bor.-Am. i, 289.—Persoon, Syn. i, 37.—Pursh, Fl. Am. Sept. i, 338.—Elliott, Sk. i, 548.—Torrey, Fl. U. S. 476; Compend. Fl. N. States, 202; Fl. N. York, i, 222.—De Candolle, Prodr. ii, 627.—Hooker, Fl. Bor.-Am. i, 201 (excl. var.); Companion Bot. Mag. i, 25.—Don, Miller's Dict. ii, 589.—Eaton, Manual, 6 ed. 111.—Beck, Bot. 111.—Torrey & Gray, Fl. N. America, i, 466.—Loudon, Arboretum, ii, 818, f. 569, 570 & t.—Eaton & Wright, Bot. 211.—Dietrich, Syn. iii, 159.—Browne, Trees of America, 277.—Emerson, Trees Massachusetts, 435; 2 ed. ii, 495.—Gray, Manual N. States, 1 ed. 128.—Richardson, Arctic Exped. 427.—Darlington, Fl. Cestrica, 3 ed. 84.—Darby, Bot. S. States, 306.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 330; Bot. & Fl. 111.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 191.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 14.

Mespilus cornifolia, Muenchhausen, Hausv. v, 145.—Lamarck, Dict. iv, 444.—Koch, Dendrologie, i, 134.—Spach, Hist. Veg. ii, 60, t. 10, f. c.

C. Crus-galli, Wangenheim, Amer. 52.-Du Roi, Harbk. i, 195 rnot Linnæus].

Mespilus cuneifolia, Ehrhart, Beitr. iii, 21.--Sprengel, Syst. ii, 506.--Spach, Hist. Veg. ii, 61.

Mespilus punctata, Loiseleur in Nouveau Duhamel, iv, 152.—Willdenow, Enum. 524; Berl. Baumz. 243.—Poiret, Suppl. iv, 70.—Hayne, Dend. Fl. 79.—Watson, Dend. Brit. i, t. 57.—Spach, Hist. Veg. ii, 61.—Wenzig in Linnæa, xxxviii, 128.

Mespilus pyrifolia, Desfontaines, Hist. Arb. ii, 155.

C. punctata, var. rubra and aurea, Aiton, Hort. Kew. 2 ed. iii, 202.

C. latifolia, De Candolle, Prodr. ii, 627.

? C. flexuosa, Schweinitz in Long's 2d Exped. ii, Appx. 112.

C. flava, Darlington, Fl. Cestrica, 2 ed. 292 [not Aiton].

C. cuncifolia, Romer, Syn. Mon. iii, 118.

C. obovatifolia, Ræmer, Syn. Mon. iii, 120.

Halmia punctata, Romer, Syn. Mon. iii, 134.

Halmia cornifolia, Romer, Syn. Mon. iii, 134.

C. tomentosa, var. plicata, Wood, Cl. Book, 330; Bot. & Fl. 111.

C. punctata, var. xanthocarpa, Lavallée, Arboretum Segrez. i, 53, t. 16.

Fruit larger than that of the species, dull red or yellow.

130.-Cratægus cordata, Aiton,

Hort. Kew. ii, 168; 2 ed. iii, 200.—Willdenow, Spec. ii, 1000.—Persoon, Syn. ii, 36.—Eaton, Manual, 55; 6 ed. 111.—Elliott, Sk. i, 554.—Torrey, Fl. U. S. 474; Compend. Fl. N. States, 201.—De Caudolle, Prodr. ii, 628.—Watson, Dend. Brit. i, t. 63.—Lindley, Bot, Reg. xiv, t. 1151.—Hooker, Fl. Bor.-Am. i, 201.—Don, Miller's Dict. ii, 599.—Beck, Bot. 112.—Torrey & Gray, Fl. N. America, i, 467.—Loudon, Arboretum, ii, 825 & t.—Eaton & Wright, Bot. 211.—Dietrich, Syn. iii, 160.—Browne, Trees of America, 280.—Richardson, Arctic Exped. 427.—Darlington, Fl. Cestrica, 3 ed. 83.—Darby, Bot. S. States, 306.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 127.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 82.—Wood, Cl. Book, 331; Bot. & Fl. 111.—Gray, Manual N. States, 5 ed. 159.—Young, Bot. Texas, 257.—Regel in Act. Hort. St. Petersburg, i, 114.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 31.—Vasey, Cat. Forest Trees, 14.

Mespilus Phænopyrum, Ehrhart in Linnæus f. Suppl. 254; Beitr. i, 181; ii, 67.—Mænch, Meth. 685.—Lamarek, Dict. iv, 446.

C. populifolia, Walter, Fl. Caroliniana, 147 [not Elliott].-Pursh, Fl. Am. Sept. i, 337.

Mespilus acerifolia, Burgsdorf in Lamarck, Dict. iv, 442.—Nouveau Duhamel, iv, 151.—Spach, Hist. Veg. ii, 65.

Mespilus cordata, Miller, Icon. t. 179.—Willdenow, Enum. 523; Berl. Baumz. 239.—Hayne, Dend. Fl. 77.—Sprengel, Syst. ii, 507.—Koch, Dendrologie, i, 138.

Phænopyrum cordatum, Ræmer, Syn. Mon. iii, 157.

Phænopyrum accrifolium, Ræmer, Syn. Mon. iii, 157.

WASHINGTON THORN.

Valley of the upper Potomac river, Virginia, southward along the Alleghany mountains to northern Georgia and Alabama, extending west through eastern and middle Kentucky and Tennessee to the valley of the lower Wabash river, Illinois.

A small tree, 6 to 8 meters in height, with a trunk rarely 0.30 meter in diameter; generally along banks of streams.

Wood heavy, hard, close-grained, compact; medullary rays numerous, obscure; color, brown tinged with red, the sap-wood lighter; specific gravity, 0.7293; ash, 0.46.

Formerly widely planted as a hedge plant.

131.—Cratægus apiifolia, Michaux,

Fl. Bor.-Am. i, 287.—Persoon, Syn. ii, 38.—Pursh, Fl. Am. Sept. i, 336.—Nuttall, Genera, i, 305.—Elliott, Sk. i, 552.—De Candolle, Prodr. ii, 627.—Don, Miller's Diet. ii, 599.—Audubon, Birds, t. 192.—Eaton, Manual, 6 ed. 112.—Hooker, Companion Bot. Mag. i, 25.—Torrey & Gray, Fl. N. America, i, 467.—Loudon, Arboretum, ii, 824, f. 588, 589 & t.—Eaton & Wright, Bot. 212.—Dietrich, Syn. iii, 160.—Darby, Bot. S. States, 306.—Rœmer, Syn. Mon. iii, 121.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 127.—Wood, Cl. Book, 331; Bot. & Fl. 111.—Gray, Manual N. States, 5 ed. 159; Hall's Pl. Texas, 9.—Young, Bot. Texas, 257.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 29.—Vasey, Cat. Forest Trees, 14.

C. oxyacantha, Walter, Fl. Caroliniana, 147 [not Linnæus].

Mespilus apiifolia, Marshall, Arbustum, 89.—Poiret, Suppl. iv, 68.—Sprengel, Syst. ii, 508.—Spach, Hist. Veg. ii, 67.

Mespilus monogyna, var. apiifolia, Koch, Dendrologie, i, 160.

C. oxyacantha, var. apiifolia, Regel in Act. Hort. St. Petersburg, 119.

PARSLEY HAW.

Southern Virginia, southward near the coast to about latitude 28°, extending west through the Gulf states to southern Arkansas and the valley of the Trinity river, Texas.

A small tree, rarely 6 to 9 meters in height, with a slender stem rarely exceeding 0.08 to 0.10 meter in diameter, or more often a low shrub, throwing up many stems from the ground; low, rich soil, reaching its greatest development in the pine-barren hummocks of central Florida.

Wood heavy, hard, very close-grained, compact, susceptible of a beautiful polish; medullary rays thin, very obscure; color, bright brown tinged with red or rose, the sap-wood much lighter; specific gravity, 0.7453; ash, 0.97.

132.—Cratægus spathulata, Michaux,

Fl. Bor.-Am. i, 228.—Persoon, Syn. ii, 37.—Barton, Compend. Fl. Philadelph. i, 226.—Elliott, Sk. i, 552.—Loddiges, Bot. Cab. t. 1261.—
Don, Miller's Dict. ii, 599.—Hooker, Companion Bot. Mag. i, 25.—Gray in Lindley, Bot. Reg. xxiii under t. 1957; Manual N. States,
5 ed. 159.—Eaton, Manual, 6 ed. 112.—Torrey & Gray, Fl. N. America, i, 467.—Loudon, Arboretum, ii, 825, f. 591 & t.—Eaton &
Wright, Bot. 212.—Dietrich, Syn. iii, 160.—Darby, Bot. S. States, 306.—Chapman, Fl. S. States, 126.—Lesquereux in Owen's 2d Rep.
Arkansas, 359.—Wood, Cl. Book, 331; Bot. & Fl. 111.—Young, Bot. Texas, 257.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow,
xlviii, 31.—Ridgway in Am. Nat. vi, 728.

Mespilus Azarolus, Marshall, Arbustum, 89 [not Linnæus].

Mespilus spathulata, Poiret, Suppl. iv, 68.—Desfontaines, Hist. Arb. ii, 157.—Sprengel, Syst. ii, 507.—Spach, Hist. Veg. ii, 66.—Koch, Dendrologie, i, 137.

C. microcarpa, Lindley, Bot. Reg. xxii, t. 1846.

Phenopyrum spathulatum, Romer, Syn. Mon. iii, 355.

SMALL-FRUITED HAW.

Virginia, southward to the Chattahoochee region of western Florida, west through the Gulf states to the valley of the Washita river, Arkansas (Hot Springs, Letterman), and the Colorado river, Texas.

A small tree, 6 to 8 meters in height, with a trunk 0.20 to 0.25 meter in diameter, or often reduced to a low shrub; margins of streams and prairies; common and reaching its greatest development along the bottom lands of western Louisiana and eastern Texas.

Wood heavy, hard, not strong, close-grained, compact; medullary rays very numerous, obscure; color, light brown or red. the sap-wood lighter; specific gravity, 0.7159; ash, 0.66.

6 FOR

133.—Cratægus berberifolia, Torrey & Gray,

Fl. N. America, i, 469.—Dietrich, Syn. iii, 159.—Walpers, Rep. ii, 59.—Rœmer, Syn. Mon. iii, 115.—Wood, Cl. Book, 332.—Regel in Act. Hort. St. Petersburg, i, 123.—Engelmann in Coulter's Bot. Gazette, vii, 128.

Mespilus berberifolia, Wenzig in Linnæa, xxxviii, 125.

Phænopyrum ellipticum, Romer, Syn. Mon. iii, 155.

Phænopyrum Virginicum, Ræmer, Syn. Mon. iii, 155.

New Orleans? (Drummond, No. 1051); Opelousas, Louisiana (Carpenter, Sargent).

A small tree, 6 to 8 meters in height, with a trunk 0.20 to 0.25 meter in diameter; borders of prairies, in low ground; the fruit and wood not yet collected.

134,-Cratægus æstivalis, Torrey & Gray,

Fl. N. America, i, 468.—Walpers, Rep. ii, 58.—Dietrich, Syn. iii, 162.—Nuttall, Sylva, ii, 12; 2 ed. i, 162.—Darby, Bot. S. States, 306.—Chapman, Fl. S. States, 127.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 331; Bot. & Fl. 111.—Regel in Act. Hort. St. Petersburg, i, 124.—Vasey, Cat. Forest Trees, 14.

Mespilus æstivalis, Walter, Fl. Caroliniana, 148.—Lamarck, Diet. iv, 447.

- C. elliptica, Elliott, Sk. i, 548 [not Aiton].
- C. lucida, Elliott, Sk. i, 549 [not Ehrhart].
- C. opaca, Hooker & Arnott in Companion Bot. Mag. i, 25 .- Loudon, Arboretum, iv, 2563.

Anthomeles æstivalis, Ræmer, Syn. Mon. iii, 141.

MAY HAW. APPLE HAW.

South Carolina, south to northern Florida, west through the Gulf states to southern Arkansas and the valley of the Sabine river, Texas.

A small tree, 6 to 9 meters in height, with a trunk 0.15 to 0.20 meter in diameter; generally in sandy soil along the margins of streams and ponds; common and reaching its greatest development in the bottom lands of western Louisiana and eastern Texas.

Wood heavy, hard, not strong, close-grained, compact; medullary rays numerous, obscure; color, light brown or red, the sap-wood lighter; specific gravity, 0.6564; ash, 0.57.

The large, globular, fragrant, red fruit, of agreeable subacid flavor, used as a preserve, in jellies, etc.; ripening in May.

135.-Cratægus flava, Aiton,

Hort. Kew. ii, 169; 2 ed. iii, 201.—Willdenow, Spec. ii, 1002.—Persoon, Syn. ii, 37.—Pursh, Fl. Am. Sept. i, 338.—Nuttall, Genera, i, 305.—De Candolle, Prodr. ii, 628.—Watson, Dend. Brit. i, t. 59.—Don, Miller's Diet. ii, 600.—Lindley, Bot. Reg. xxiii, t. 1939.—Torrey & Gray, Fl. N. America, i, 468.—Eaton, Manual, 6 ed. 112.—Loudon, Arboretum, ii, 823, f. 585 & t.—Eaton & Wright, Bot. 211.—Dietrich, Syn. iii, 160.—Darby, Bot. S. States, 306.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 28.—Curtia in Rep. Geological Surv. N. Carolina, 1860, iii, 83.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 332; Bot. & Fl. 111.—Gray, Manual N. States, 5 ed. 160.—Regel in Act. Hort. St. Petersburg, i, 122.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 27.—Vasey, Cat. Forest Trees, 14.

Mespilus flexispina, Monch, Verz. Baum. 62, t. 4.-Koch, Dendrologie, i, 139.

C. glandulosa, Aiton, Hort. Kew. ii, 168; 2 ed. iii, 201 [not Michaux].—Persoon, Syn. ii, 37.—Poiret, Suppl. iv, 69, in part.

Mespilus Caroliniana, Poiret in Lamarck, Dict. iv, 442.—Desfontaines, Hist, Arb. ii, 156.—Sprengel, Syst. ii, 507.

C. Caroliniana, Persoon, Syn. ii, 36.—Elliott, Sk. i, 554.—Eaton, Manual, 6 ed. 112.—Eaton & Wright, Bot. 212.

Mespilus flava, Willdenow, Enum. 523.—Poiret, Suppl. iv, 70.—Watson, Dend. Brit. i, t. 59.—Spach, Hist. Veg. ii, 59.

C. turbinata, Pursh, Fl. Am. Sept. Addend. 735.—Poiret, Suppl. v, 543.—Elliott, Sk. i, 549.—De Candolle, Prodr. ii, 627.—Don, Miller's Dict. ii, 599.—Eaton & Wright, Bot. 212.

Mespilus turbinata, Sprengel, Syst. ii, 506.—Spach, Hist. Veg. ii, 66.

- C. flava, var. lobata, Lindley, Bot. Reg. xxiii, t. 1932.
- C. lobata, Bosc in De Candolle, Prodr. ii, 628.—Don, Miller's Dict. ii, 599.—Loudon, Arboretum, ii, 824, f. 554, 586.

Phænopyrum Carolinianum, Ræmer, Syn. Mon. iii, 152.

Anthomeles flava, glandulosa, and turbinata, Romer, Syn. Mon. iii, 141.

SUMMER HAW. YELLOW HAW.

Virginia, southward, generally near the coast, to Tampa bay, Florida, west through the Gulf states to eastern Texas and southern Arkansas.

A small tree, rarely 7 meters in height, with a trunk 0.30 meter in diameter, or reduced to a much-branched shrub 2 to 3 meters in height; borders of streams, in low, sandy soil subject to overflow.

Wood heavy, hard, close-grained, checking badly in drying, satiny, susceptible of a good polish; medullary rays very numerous, obscure; color, light brown tinged with red or rose, the sap-wood lighter; specific gravity, 0.7809; ash, 0.79.

Fruit small, red or yellow, acid.

Var. pubescens, Gray,

Manual N. States, 5 ed. 160.

Mespilus hiemalis, Walter, Fl. Caroliniana, 148.—Lamarck, Dict. iv, 447.

C. viridis, Walter, Fl. Caroliniana, 147 [not Linnæus].—Elliott, Sk. i, 551.

C. elliptica, Aiton, Hort. Kew. ii, 168; 2 ed. iii, 201.—Willdenow, Spec. ii, 1002.—Persoon, Syn. ii, 37.—Pursh, Fl. Am. Sept. i, 337.—Nuttall, Genera, i, 305.—Torrey, Fl. U. S. 475; Compend. Fl. N. States, 201.—De Candolle, Prodr. ii, 627.—Hooker, Fl. Bor.-Am. i, 201.—Don, Miller's Dict. ii, 598.—Beck, Bot. 33.—Eaton, Manual, 6 ed. 111.—Torrey & Gray, Fl. N. America, i, 469.—Eaton & Wright, Bot. 211.—Dietrich, Syn. iii, 109.—Darby, Bot. S. States, 306.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 84.—Regel in Act. Hort. St. Petersburg, i, 122.

Mespilus elliptica, Lamarck, Dict. iv, 447.—Wenzig in Linnæa, xxxviii, 125.—Koch, Dendrologie, i, 140.

- C. glandulosa, Michaux, Fl. Bor.-Am. i, 288 [not Aiton].—Nuttall, Genera, i, 305.—Chapman, Fl. S. States, 128.—Vasey, Cat. Forest Trees, 14.
- C. Michauxii, Persoon, Syn. ii, 38.
- C. spathulata, Pursh, Fl. Am. Sept. i, 336 [not Michaux].—De Candolle, Prodr. ii, 627.—Lindley, Bot. Reg. xxii, t. 1890; xxiii, under t. 1957.

Mespilus Michauxii, Hornemann, Hort. Hafn. 455.—Poiret, Suppl. iv, 69.

- C. flava, Elliott, Sk. i, 551 [not Aiton].
- C. Virginica, Loddiges in Loudon, Arboretum, ii, 842, f. 560, 615.—Kaleniczenko in Bull. Soc. Imp. Nat. Moscow, xlviii, 58.

SUMMER-HAW. RED HAW.

Virginia, southward to Tampa bay, Florida, and sparingly through the Gulf states to western Louisiana.

A low tree growing with the species, from which it is distinguished by the pubescence of the calyx and young branches, the smaller flowers, and larger, bright red or yellow, globular or pear-shaped fruit.

Wood heavy, hard, not strong, close-grained, compact; medullary rays numerous, very obscure; color, bright red or rose, the sap-wood lighter; specific gravity, 0.7683; ash, 0.91.

The large, edible fruit used in the south Atlantic states in preserves, jellies, etc.

NOTE. - Cratagus parvifolia, Aiton, ef the south Atlantic region, a low shrub, is not included in this catalogue.

136.—Heteromeles arbutifolia, Remer,

Syn. Mon. iii, 105.—Decaisne in Nouv. Arch. Mus. x, 144, t. 9.—Brewer & Watson, Bot. California, i, 188; ii, 444.

Oratægus arbutifolia, Poiret in Nouveau Duhamel, iv, 131; Dict. Suppl. i, 292.—Aiton, Hort. Kew. 2 ed. iii, 202.—Loddiges, Bot. Cab. t, 201.

Aronia arbutifolia, Nuttall, Genera, i, 306.

Photinia arbutifolia, Lindley in Trans. Linnæan Soc. xiii, 103; Bot. Reg. vi, 491 & under t. 1956.—Sprengel, Syst. ii, 508.—
De Candolle, Prodr. ii, 631.—Chamisso & Schlechtendal in Linnæa, ii, 542.—Don, Miller's Dict. ii. 602.—Spach, Hist.
Veg. ii, 80.—Hooker & Arnott, Bot. Beechey, 139, 340.—Torrey & Gray, Fl. N. America, i, 473.—Dietrich, Syn. iii, 162.—
Loudon, Arboretum, ii, 868, f. 619.—Bentham, Bot. Sulphur, 14; Pl. Hartweg. 307.—Torrey in Emory's Rep. 140;
Sitgreaves' Rep. 119; Pacific R. R. Rep. iv, 85; Bot. Mex. Boundary Survey, 64; Bot. Wilkes Exped. 291.—Wood, Cl.
Book, 329.—Bolander in Proc. California Acad. iii, 80.—Vasey, Cat. Forest Trees, 14.—Palmer in Am. Nat. xii, 599.—
Maximowicz in Bull. Acad. Sci. St. Petersburg, xix, 180.—Wenzig in Linnæa, xxxviii, 96.

Mespilus arbutifolia, Link, Enum. Hort. Berol. ii, 36.

Photinia salicifolia, Presl, Epimel. Bot. 204.—Walpers, Ann. iii, 858.

H. Fremontiana, Decaisne in Nouv. Arch. Mus. x, 144.

TOYON. TOLLON. CALIFORNIA HOLLY.

California Coast ranges, Mendocino to San Diego county, extending east to the foot-hills of the Sierra Nevada and San Bernardino mountains.

A small, low-branched evergreen tree, rarely exceeding 9 meters in height, the short trunk sometimes 0.30 to 0.45 meter in diameter, or more often a low, much-branched shrub.

Wood very heavy, hard, close grained, inclined to check in drying, satiny, susceptible of a beautiful polish; medullary rays numerous, very obscure; color, dark reddish-brown, the sap-wood lighter; specific gravity, 0.9326; ash, 0.54.

137.—Amelanchier Canadensis, Torrey & Gray,

Fl. N. America, i, 473.—Walpers, Rep. ii, 55.—Dietrich, Syn. iii, 158.—Torrey, Fl. N. York, i, 225.—Browne, Trees of America, 282.—Emerson, Trees Massachusetts, i, 443; 2 ed. ii, 503 & t.—Parry in Owen's Rep. 612.—Darlington, Fl. Cestrica, 3 ed. 86.—Richardson, Arctic Exped. 428.—Seemann, Bot. Herald, 52.—Hooker f. in Trans. Linnæan Soc. xxii², 290, 327.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 129.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 68.—Lesquereux in Owen's 2d Rep. Arkansas, 359.—Wood, Cl. Book, 329; Bot. & Fl. 110.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 191.—Porcher, Resources S. Forests, 168.—Gray, Manual N. States, 5 ed. 162.—Koch, Dendrologie, i, 180.—Vasey, Cat. Forest Trees, 14.—Maximowicz in Bull. Acad. St. Petersburg, xix, 175.—Ridgway in Proc. U. S. Nat. Mus. 1882, 66.

Mespilus Canadensis, Linnæus, Spec. 1 ed. 478 (excl. syn. Gronovius).—Walter, Fl. Caroliniana, 148.—Aiton, Hort. Kew. ii, 173.

Cratægus tomentosa, Linnæus, Spec. 1 ed. 476 (excl. syn. Gronovius).

Pyrus Botryapium, Linnæus f. Suppl. 255.—Wangenheim, Amer. 90, t. 28, f. 65.—Ehrhart, Beitr. i, 183 j; ii, 68.—Willdenow, Spec. ii, 1013; Enum. 525; Berl. Baumz. 322.—Aiton, Hort. Kew. 2 ed. iii, 207.—Pursh, Fl. Am. Sept. i, 339.—Hayne, Dend. Fl. 83.—Guimpel, Otto & Hayne, 100, t. 79.—Sprengel, Syst. ii, 509.—Andubon, Birds, t. 60.—Bigelow, Fl. Boston. 3 ed. 308.

Cratagus racemosa, Lamarck, Dict. i, 84.—Desfontaines, Hist. Arb. ii, 148.—Nouveau Duhamel, iv, 133.—Poiret, Suppl. i, 292.

Mespilus nivea, Marshall, Arbustum, 90.

Mespilus Canadensis, var. cordata, Michaux, Fl. Bor.-Am. i, 291.

Aronia Botryapium, Persoon, Syn. ii, 39.—Nuttall, Genera, i, 557.—Elliott, Sk. i, 557.—Torrey, Fl. U. S. 479; Compend. Fl. N. States, 203.—Eaton, Manual, 6 ed. 29.—Eaton & Wright, Bot. 135.

Mespilus arborea, Michaux f. Hist. Arb. Am. iii, 68, t. 11; N. American Sylva, 3 ed. ii, 60, t. 66.—Barton, Prodr. Fl. Philadelph, 55.

A. Botryapium, Lindley in Trans. Linnæan Soc. xiii, 100.—De Candolle, Prodr. ii, 632.—Hooker, Fl. Bor.-Am. i, 202.—Don, Miller's Dict. ii, 604.—Beck, Bot. 112.—Spach, Hist. Veg. ii, 84.—Loudon, Arboretum, ii, 874, f. 627-629 & t.—Remer, Syn. Mon. iii, 145.—Darby, Bot. S. States, 307.—Wenzig in Linnæa, xxxiii, 110.—Decaisne in Nouv. Arch. Mus. x. 135.

Aronia arborea, Barton, Compend. Philadelph. i, 228.

Aronia cordata, Rafinesque, Med. Bot. ii, 196.

A. ovalis, Hooker, Fl. Bor.-Am. i, 202, in part.

Pyrus Bartramiana, Tausch, Fl. xxi, 715.

Pyrus Wangenheimiana, Tausch, Fl. xxi, 715.

A. Bartramiana, Ræmer, Syn. Mon. iii, 145.

A. Wangenheimiana, Romer, Syn. Mon. 146.

JUNE BERRY. SHAD BUSH. SERVICE TREE. MAY CHERRY.

Newfoundland and Labrador, west along the southern shores of Hudson bay to the Saskatchewan region, south through the Atlantic forests to northern Florida, southwestern Arkansas, and the Indian territory.

A small tree, 9 to 15 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or in some forms reduced to a low shrub (var. rotundifolia, Torrey & Gray; var. oligocarpa, Torrey & Gray); common at the north, rare at the south, and reaching its greatest development on the high slopes of the southern Alleghany mountains; varying greatly in the shape of the leaves, size of the flowers, amount of pubescence on the leaves and young shoots, etc.

The best marked arborescent variety is-

var. oblongifolia, Torrey & Gray, Fl. N. America, i, 473.—Walpers, Rep. ii, 55.—Dietrich, Syn. iii, 158.—Torrey, Fl. N. York, i, 225; Nicollet's Rep. 149.—Emerson, Trees Massachusetts, i, 444; 2 ed. ii, 504 & t.—Wood, Cl. Book, 330; Bot. & Fl. 110.—Gray, Manuel N. States, 5 ed. 162.—Macoun in Geological Rep. Canada, 1875—76, 195.

Cratagus spicata, Lamarck, Dict. i, 84.—Desfontaines, Hist. Arb. ii, 148.—Nouveau Duhamel, iv, 132.—Poiret, Suppl. i, 292.

Mespilus Canadensis, var. obovalis, Michaux, Fl. Bor.-Am. i, 291.

Pyrus ovalis, Willdenow, Spec. ii, 1014; Berl. Baumz. 323.—Pursh, Fl. Am. Sept. i, 340.—Schrank, Pl. Labrador, 26.—Bigelow, Fl. Boston. 3 ed. 207.

Aronia ovalis, Torrey, Fl. U. S. 479; Compend. Fl. N. States, 203.—Eaton, Manual, 6 ed. 29.—Eaton & Wright, Bot. 135.

- A. ovalis, De Candolle, Prodr. ii, 632.—Meyer, Pl. Labrador, 81.—Hooker, Fl. Bor.-Am. i, 202, in part.—Don, Miller's Dict. ii, 604.—Beck, Bot. 112.—Spach, Hist. Veg. ii, 85.—Loudon, Arboretum, ii, 876, f. 632.
- A. intermedia, Spach, Hist. Veg. ii, 85.—Wenzig in Linnæa, xxxiii, 112.
- A. oblongifolia, Romer, Syn. Mon. iii, 147.
- A. spicata, Decaisne in Nouv. Arch. Mus. x, 135, t. 9, f. 5.

Wood heavy, exceedingly hard, strong, close-grained, checking somewhat in seasoning, satiny, susceptible of a good polish; medullary rays very numerous, obscure; color, dark brown often tinged with red, the sap-wood much lighter; specific gravity, 0.7838; ash, 0.55; the small fruit sweet and edible.

Note.—The closely allied Amelanchier alnifolia, Nuttail, a low shrub, is widely distributed over the mountain ranges of the interior Pacific region.

HAMAMELACEÆ.

138.—Hamamelis Virginica, Linnæus,

Spec. 2 ed. 124.—Marshall, Arbustum, 58.—Du Roi, Harbk. i, 423.—Wangenheim, Amer. 89, t. 29, f. 62.—Lamarck, Dict. iii, 68; Ill. i, 350, t. 88.—Aiton, Hort. Kew. i, 167; 2 ed. i, 275.—Schkuhr, Handb. i, 88, t. 27.—Willdenow, Spec. i, 701; Enum. 171; Berl. Baumz. 172.—Michaux, Fl. Bor. Am. i, 100.—Persoon, Syn. i, 150.—Desfontaines, Hist. Arb. ii, 29.—Pursh. Fl. Am. Sept. i, 116.—Nuttall, Genera, i, 107.—Nouveau Duhamel, vii, 207, t. 60.—Elliott, Sk. i, 219.—Remer & Schultes, Syst. iii, 483.—Loddiges, Bot. Cab. t. 598.—Barton, Fl. N. America, iii, 21, t. 78.—Torrey, Fl. U. S. 192; Compend. Fl. N. States, 86; Fl. N. York, i, 260.—Guimpel, Otto & Hayne, Abb. Holz. 95, t. 75.—Sprengel, Syst. i, 491.—Rafinesque, Med. Bot. i, 227, f. 45.—De Candolle, Prodr. iv, 268.—Hooker, Fl. Bor.-Am. i, 275; Companion Bot. Mag. i, 48.—Don, Miller's Dict. iii, 396, f. 69.—Beck, Bot. 152.—Eaton, Manual 6 ed. 164.—Spach, Hist, Veg. viii, 79.—Dietrich, Syn. i, 550.—Torrey & Gray, Fl. N. America, i, 597.—Loudon, Arboretum, ii, 1007, f. 756, 757.—Eaton & Wright, Bot. 260.—Bigelow, Fl. Boston. 3 ed. 63.—Emerson, Trees Massachusetts, 416; 2 ed. ii, 473 & t.—Darby, Bot. 8. States, 328.—Darlington, Fl. Cestrica, 3 ed. 98.—Agardh, Theor. & Syst. Pl. t. 13, f. 7.—Schnizlein, Icon. t. 167, f. 18-25, 27-29.—Gray in Am. Jour. Sci. 2 ser. xxiv, 438; 3 ser. v, 144; Manual N. States, 5 ed. 173.—Chapman, Fl. S. States, 157.—Curtis in Rep. Geological Surv. N. Carolina, iii, 105.—Lesquerenx in Owen's 2d Rep. Arkansas, 362.—Wood, Cl. Book, 375; Bot. & Fl. 120.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 193.—Porcher, Resources S. Forests, 58.—Koch, Dendrologie, ii, 458.—Baillon in Adansonia, x, 123; Hist. Pl. iii, 389, f. 462-464.—Young, Bot. Texas, 291.—Maout & Decaisne, Bot. English ed. 408 & f.

- H. dioica, Walter, Fl. Caroliniana, 255.—Gmelin, Syst. Veg. i, 281.
- H. androgyna, Walter, Fl. Caroliniana, 255.—Gmelin, Syst. Veg. i, 282.
- H. corylifolia, Mench, Meth. 273.
- . H. macrophylla, Pursh. Fl. Am. Sept. i, 116.—Poiret, Suppl. v, 698.—Elliott, Sk. i, 220.—Ræmer & Schultes, Syst. iii, 483.—Rafinesque, Med. Bot. i, 230.—Eaton, Manual, 6 ed. 164.—Don, Miller's Diet. iii, 396.—Eaton & Wright, Bot. 261.

Trilopus Virginiana, nigra, rotundifolia, and dentata, Rafinesque, New Sylva, 15-17.

- H. Virginiana, var. parvifolia, Nuttall, Genera, i, 107.—Torrey, Fl. U. S. 193; Compend. Fl. N. States, 87.—Don, Miller's Diet. iii, 396.—Beck, Bot. 152.—Torrey & Gray, Fl. N. America, i, 597.
- H. parvifolia, Rafinesque, Med. Bot. i, 230.
- Trilopus parvifolia, Rafinesque, New Sylva, 17.

WITCH HAZEL.

North rn New England and southern Ontario to Wisconsin, south through the Atlantic region to northern Florida and eastern Texas.

A small tree, exceptionally 7 to 9 meters in height, with a trunk 0.30 to 0.37 meter in diameter, or more often a tall shrub throwing up many stems from the ground; common; rich, rather damp woodlands, reaching its greatest development in the region of the southern Alleghany mountains.

Wood heavy, hard, very close-grained, compact; layers of annual growth hardly distinguishable; medullary rays numerous, thin, obscure; color, light brown tinged with red, the sap-wood nearly white; specific gravity, 0.6856; ash, 0.37.

The bark and leaves rich in tannin, and largely used by herbalists in the form of fluid extracts, decoctions, etc., in external applications, and as a reputed remedy in hemorrhoidal affections (New York Jour. Med. x, 208.—Trans. Am. Med. Assoc. i, 350.—U. S. Dispensatory, 14 ed. 1661.—Nat. Dispensatory, 2 ed. 704).

139.-Liquidambar Styraciflua, Linnæus,

Spec. 1ed. 999.—Marshall, Arbustum, 77.—Wangenheim, Amer. 49, t. 16, f. 40.—Walter, Fl. Caroliniana, 237.—Lamarck, Dict. iii, 533; Ill. iii, 367, t. 783.—Aiton, Hort. Kew. iii, 365; 2 ed. v, 306.—Gærtner, Fruct. ii, 57, t. 90.—Mænch, Meth. 340.—Abbot, Insects Georgia, i, 48.-B. S. Barton, Coll. i, 16.-Willdenow, Spec. iv, 475; Enum. 985; Berl. Baumz. 214.-Michaux, Fl. Bor.-Am. ii, 202.-Persoon, Syn. ii, 573.—Desfontaines, Hist. Arb. ii, 541.—Titford, Hort. Bot. Am. 97.—Schkuhr, Handb. iii, 275, t. 307.—Nouveau Duhamel, ii, 42, t. 10; vii, 207, t. 60.—Michaux f. Hist. Arb. Am. iii, 194, t. 4; N. American Sylva, 3 ed. ii, 42, t. 64.—Barton, Prodr. Fl. Philadelph. 92; Compend. Fl. Philadelph. ii, 177.—Pursh, Fl. Am. Sept. ii, 635.—Eaton, Manual, 110; 6 ed. 208.—Rafinesque, Fl. Ludoviciana, 116.—Nuttall, Genera, ii, 219; Trans. Am. Phil. Soc. 2 ser. v, 168.—Nees, Fl. Offic. t. 95.—Elliott, Sk. ii, 621.—Sprengel, Syst. iii, 864.—Humboldt, Bonpland & Kunth, Nouv. Gen. & Spec. vii, 273.—Andubon, Birds, t. 44.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, ii, 217.—Beck, Bot. 326.—Hooker, Companion Bot. Mag. ii, 64.—Eaton & Wright, Bot. 302.—Spach, Hist. Veg. x, 84.—Loudon, Arboretum, iv, 2049, f. 1961 & t.—Lindley, Fl. Med. 322.—Griffith, Med. Bot. 581, f. 254.—Broomfield in London Jour. Bot. vii. 144.— Schnizlein, Icon. t. 98, f. 5-21.—Seemann, Bot. Herald, 346.—Darby, Bot. S. States, 509.—Cooper in Smithsonian Rep. 1858, 252.— Chapman, Fl. S. States, 157.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 77.—Lesquereux in Owen's 2d Rep. Arkansas, 362.—Wood, Cl. Book, 375; Bot. & Fl. 120.—Porcher, Resources S. Forests, 344.—De Candolle, Prodr. xvi2, 157.—Oliver in Hooker f. Icon. xi, 13.—Gray, Manual N. States, 5 ed. 174.—Koch, Dendrologie, ii, 464.—Young, Bot. Texas, 291.—Vasey, Cat. Forest Trees, 15.—Maout & Decaisne, Bot. English ed. 412 & figs.—Baillou, Hist. Pl. iii, 397, f. 471-474.—Guibourt, Hist. Drogues, 7 ed. ii, 300, f. 445.—Ridgway in Am. Nat. vi, 664; Proc. U. S. Nat. Mus. 1882, 67.—Broadhead in Coulter's Bot. Gazette, iii, 53.—Hemsley, Bot. Am.-Cent. i, 400.

L. Styraciflua, var. Mexicana, Örsted, Am.-Cent. xvi, t. 11.

L. macrophylla, Örsted, Am.-Cent. xvi, t. 10.

SWEET GUM. STAR-LEAVED GUM. LIQUIDAMBER. RED GUM. BILSTED.

Fairfield county, Connecticut, to the valleys of the lower Ohio, White, and Wabash rivers south to cape Canaveral and Tampa bay, Florida, southwest through southern Missouri, Arkansas, and the Indian territory to the valley of the Trinity river, Texas; in central and southern Mexico.

A large tree, often 30 to 36 or, exceptionally, 48 meters in height, with a trunk 1.20 to 1.80 meter in diameter; in low, wet soil; very common and reaching its greatest development in the bottom lands of the Mississippi basin, here, with the cotton gum, forming a large proportion of the heavy forest growth.

Wood heavy, hard, not strong, rather tough, close-grained, compact, inclined to shrink and warp badly in seasoning, susceptible of a beautiful polish; medullary rays numerous, very obscure; color, bright brown tinged with red, the sap-wood nearly white; specific gravity, 0.5910; ash, 0.61; manufactured into lumber and used in the construction of buildings for plates, boarding, and clapboards, in cabinet work as a substitute for black walnut, and for veneering and street pavements; its great economic value hardly appreciated on account of the difficulty experienced in properly seasoning it.

The balsamic exudation obtained from this species at the south collected by herbalists and sometimes used in the form of a sirup as a substitute for storax in the treatment of catarrhal affections, or externally as an ointment in dressing frost-bite, abscess, etc., and in the manufacture of chewing gums (Flückiger & Hanbury, Pharmacographia, 246.—Nat. Dispensatory, 2 ed. 834).

RHIZOPHORACEÆ.

140.-Rhizophora Mangle, Linnæus,

Spec. 1 ed. 443.—Jacquin, Amer. 141, t. 89.—Gærtner, Fruct. i, 212, t. 45, f. 1.—Lamarck, Ill. ii, 517, t. 396; Dict. vi, 160.—Willdenow, Spec. ii, 844.—Persoon, Syn. ii, 2.—Decourtilz, Fl. Med. Antilles, i, 45, t. 10.—Vellozo, Fl. Flum. t. 1.—De Candolle, Prodr. iii, 32.—Eaton, Manual, 6 ed. 301.—Spach, Hist. Veg. iv, 332, t. 34.—Torrey & Gray, Fl. N. America, i, 484.—Nuttall in Am. Jour. Sci. 1 ser. v, 295.—Hooker & Arnott, Bot. Beechey, 290.—Arnott in Ann. Nat. Hist. i, 361.—Walpers, Rep. ii, 70.—Bentham, Bot. Sulphur, 14.—Darby, Bot. S. States, 312.—Porcher, Resources S. Forests, 55.—Grisebach, Fl. British West Indies, 274.—Schnizlein, Icon. t. 263, f. 1-7.—Maout & Decaisne, Bot. English ed. 419.—Eichler in Martins, Fl. Brasil. xii², 426, t. 90.—Vasey, Cat. Forest Trees, 15.—Baillon, Hist. Pl. vi, 284, f. 253–259.

R. racemosa, Meyer, Prim. Fl. Esseq. 185.—De Candolle, Prodr. iii, 32.

R. Americana, Nuttall, Sylva, i, 95, t. 24; 2 ed. i, 112, t. 24.—Cooper in Smithsonian Rep. 1858, 264.

MANGROVE.

Semi-tropical Florida, Mosquito inlet and Cedar Keys to the southern keys; delta of the Mississippi river and coast of Texas; southward through the West Indies and tropical America; now widely naturalized throughout the tropics of the old world (A. De Candolle, Geog. Bot. ii, 772).

A tree 12 to 18, or, exceptionally, 27 meters in height, with a trunk 0.30 to 0.60 meter in diameter, or more commonly not exceeding 4 to 7 meters in height; low saline shores, reaching in the United States its greatest development on bay Biscayne and cape Sable; south of latitude 29°, bordering with almost impenetrable thickets the coast of the Florida peninsula, ascending the rivers for many miles, especially those flowing from the Everglades, and entirely covering many of the southern keys.

Wood exceedingly heavy, hard and strong, close-grained, checking in drying, satiny, susceptible of a beautiful polish, containing many evenly-distributed rather small open ducts; medullary rays numerous, thin; color, dark reddish brown streaked with lighter brown, sap-wood lighter; specific gravity, 1.1617; ash, 1.82; furnishing valuable fuel; not greatly affected by the teredo, and used for piles.

COMBRETACEÆ.

141.—Conocarpus erecta, Linnaus,

Spec. 1 ed. 176.—Lamarck, Dict. ii, 96; Ill. i, 126, f. 1.—Jacquin, Amer. t. 78.—Gærtner, Fruct. ii, 470, t. 177, f. 3.—Swartz, Obs. 79.—Willdenow, Sp. i, 994.—Aiton, Hort. Kew. 2 ed. i, 381.—Titford, Hort. Bot. Am. 47.—De Candolle, Prodr. iii, 16.—Decourtilz, Fl. Med. Antilles, vi, 68, t. 399.—Spach, Hist. Veg. iv, 304.—Torrey & Gray, Fl. N. America, i, 485.—Nuttall, Sylva, i, 113, t. 33; 2 ed. i, 128, t. 33.—Richard, Fl. Cuba, 526.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 136.—Grisebach, Fl. British West Indies, 277.—Eichler in Martius, Fl. Brasil, xiv², 101, t. 35, f. 2.—Vasey, Cat. Forest Trees, 15.

BUTTON WOOD

Semi-tropical Florida, cape Canaveral to the southern keys, west coast, Tampa bay to cape Sable; through the West Indies to Brazil.

A low tree, often 8 or, exceptionally, 15 to 18 meters in height, with a trunk sometimes 0.60 meter in diameter; common and reaching its greatest development in the United States on Lost Man's river, north of cape Sable; or reduced to a low under shrub (var. procumbens, De Candolle, l. c.—Eichler, l. c.; C. procumbens, Linnæus, Spec. 1 ed. 177.—Jacquin l. c. 79, t. 52, f. 2.—Gærtner, l. c. iii, 205, f. 4—Grisebach, l. c.; C. acutifolia, Willdenow in Ræmer & Schultes, Syst. v, 574).

Wood very heavy and hard, strong, close-grained, very compact, susceptible of a beautiful polish; medullary rays numerous, obscure; color, dark yellow brown, the sap-wood lighter; specific gravity, 0.9900; ash, 0.32; burning slowly like charcoal, and highly valued for fuel.

142.-Laguncularia racemosa, Gærtner f.

Fruct. Suppl. 209, t. 217.—De Candolle, Prodr. iii, 17.—Spach, Hist. Veg. iv, 305.—Nuttall, Sylva, i, 117, t. 34; 2 ed. i, 132, t. 34.—Bentham, Bot. Sulphur, 14, 92.—Richard, Fl. Cuba, 527.—Eichler in Martius, Fl. Brasil. xiv², 102, t. 35, f. 3.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 136.—Grisebach, Fl. British West Indies, 276.—Vasey, Cat. Forest Trees, 15.—Baillon, Hist. Pl. vi. 278.

Conocarpus racemosa, Linnæus, Spec. 2 ed. 251; Syst. 181.—Jacquin, Amer. 80, t. 53.—Swartz, Obs. 79.—Willdenow, Spec. i, 995.

Schousbaa commutata, Sprengel, Syst. ii, 332.

Bucida Buceras, Vellozo, Fl. Flum. iv, t. 87 [not Linnæus].

L. glabrifolia, Presl, Reil. Hænk, ii, 22.—Walpers, Rep. ii, 63.—Chapman, Fl. S. States, 136.

WHITE BUTTON WOOD. WHITE MANGROVE.

Semi-tropical Florida, cape Canaveral to the southern keys, west coast, Cedar Keys to cape Sable; through the West Indies and tropical America; coast of tropical Africa.

A small tree, sometimes 6 or, exceptionally, 22 meters in height (Shark river, Florida, Curtiss), with a trunk 0.30 to 0.60 meter in diameter, or toward its northern limits reduced to a low shrub; very common; saline shores of lagoons and bays.

Wood very heavy and hard, strong, close-grained, very compact; susceptible of a beautiful polish; medullary rays numerous, obscure; color, dark yellow-brown, the sap-wood much lighter; specific gravity, 0.7137; ash, 1.62.

MYRTACEÆ.

143.—Calyptranthes Chytraculia, Swartz,

Prodr. 79; Fl. Ind. Occ. ii, 921.—Willdenow, Spec. ii, 975.—Aiton, Hort. Kew. 2 ed. iii, 192.—De Candolle, Prodr. iii, 237.—Nuttall, Sylva, i, 101, t. 26; 2 ed. i, 117, t. 26.—Berg in Linnæa, xxvii, 26.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 131.—Grisebach, Fl. British West Indies, 232.—Hemsley. Bot. Am.-Cent. i, 408.

Myrtus Chytraculia, Linnæus, Amen. v, 398.—Swartz, Obs. 202.

Eugenia pallens, Poiret, Suppl. iii, 122.

Semi-tropical Florida, shores of bay Biscayne, Key Largo; in the West Indies.

A small tree, sometimes 8 meters in height, with a trunk 0.10 to 0.15 meter in diameter.

Wood very heavy, hard, close-grained, compact, containing many evenly-distributed rather large open ducts; medullary rays numerous, thin; color, brown tinged with red, the sap-wood a little lighter; specific gravity, 0.8992; ash, 3.32.

144.-Eugenia buxifolia, Willdenow,

Spec. ii, 960.—Persoon, Syn. ii, 28.—De Candolle, Prodr. iii, 275.—Nuttall, Sylva, i, 108, t. 29; 2 ed. i, 123, t. 29.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 131.—Grisebach, Fl. British West Indies, 236.—Vasey, Cat. Forest Trees, 15.

Myrtus buxifolia, Swartz, Prodr. 78; Fl. Ind. Occ. ii, 899.

Myrtus axillaris, Poiret in Lamarck, Dict. iv, 412.

E. myrtoides, Poiret, Suppl. iii, 125.

Myrtus Poireti, Sprengel, Syst. ii, 483.

E. triplinervia, Berg in Linnæa, xxvii, 190, in part.

GURGEON STOPPER. SPANISH STOPPER.

Semi-tropical Florida, cape Canaveral to the southern keys, west coast, Calcosa river to cape Romano; in the West Indies.

A small tree, rarely 6 to 9 meters in height, with a trunk sometimes 0.30 meter in diameter, reaching its greatest development on the rich hummocks of the Everglades.

Wood very heavy, exceedingly hard, very strong, close-grained, very compact; medullary rays numerous, thin; color, dark brown shaded with red, the sap-wood a little lighter; specific gravity, 0.9360; ash, 1.50; somewhat used for fuel.

145.—Eugenia dichotoma, De Candolle,

Prodr. iii, 278.—Nuttall, Sylva, i, 103, t. 27.; 2 ed. i, 120, t. 27.—Berg in Linnæa, xxvii, 261.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 131.—Vasey, Cat. Forest Trees, 15.

E. divaricata, Lamarck, Diet. i, 202.

? Myrtus dichotoma, Vahl in Poiret, Suppl. iv, 53.

Anamomis punctata, Grisebach, Fl. British West Indies, 240.

NAKED WOOD.

Semi-tropical Florida, Mosquito inlet to cape Canaveral, common; west coast, Caloosa river to cape Romano; in the West Indies.

A small tree, sometimes 6 to 8 meters in height, with a trunk rarely 0.15 meter in diameter.

A form with the leaves, buds, and calyx more or less pubescent (E. dichotoma, var. fragrans, Nuttall, l, c.; E. pungens, Willdenow, Spec. ii, 964; Bot. Mag. t. 1242; E. montana, Aublet, Guian. i, 495, t. 195), not rare in West Indies, and, according to Nuttall, collected by Mr. Baldwin in the vicinity of New Smyrna, Florida, has not been rediscovered within the limits of the United States.

Wood very heavy, hard, close-grained, compact; medullary rays numerous, thin; color, light brown or red, sap-wood yellow; specific gravity, 0.8983; ash, 0.74.

The small, edible fruit of agreeable aromatic flavor, and greatly improved by cultivation in rich soil.

146.—Eugenia monticola, De Candolle,

Prodr. iii, 275.—Chapman, Fl. S. States, 131.—Grisebach, Fl. British West Indies, 236.—Vasey, Cat. Forest Trees, 15.

Myrtus monticola, Swartz, Fl. Ind. Occ. ii, 898.

E. triplinervia, Berg in Linnæa, xxvii, 190, in part.

E. axillaris, Berg in Linnæa, xxvii, 201, in part.

STOPPER. WHITE STOPPER.

Florida, Saint John's river to Umbrella Key; rare; in the West Indies.

A small tree, rarely 7 meters in height, with a trunk 0.30 meter in diameter, or in northern Florida reduced to a low shrub.

Wood very heavy, hard, strong, very close-grained, compact; medullary rays numerous, thin; color, brown, often tinged with red, the sap-wood darker; specific gravity, 0.9156; ash, 1.89.

147.—Eugenia longipes, Berg,

Linnæa, xxvii, 150.—Chapman, Fl. S. States, Suppl. 620.

STOPPER.

Semi-tropical Florida, No-Name Key; in the West Indies.

A small tree, 4 to 7 meters in height, with a trunk 0.15 to 0.20 meter in diameter; rare.

Wood very heavy, hard, close-grained, checking badly in drying, containing many evenly-distributed open ducts; medullary rays numerous, very obscure; color, dark brown or nearly black, the sap-wood brown tinged with red; specific gravity, 1.1235; ash, 3.48.

The small red fruit with the flavor of cranberries.

148.—Eugenia procera, Poiret,

Suppl. ii, 129.—De Candolle, Prodr. iii, 268.—Nuttall, Sylva, i, 106, t. 28; 2 ed. i, 122, t. 28.—Berg in Linnæa, xxvii, 207.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 131.—Grisebach, Fl. British West Indies, 238.—Vasey, Cat. Forest Trees, 15.

Myrtus procera, Swartz, Prodr. 77; Fl. Ind. Occ. ii, 887.—Willdenow, Spec. ii, 968.

E. Baruensis, Grisebach, Cat. Pl. Cub. [not Jacquin], 87.

RED STOPPER.

Semi-tropical Florida, shores of bay Biscayne, Key Largo, Elliott's Key; in the West Indies.

A tree, 12 to 18 meters in height, with a trunk 0.30 to 0.45 meter in diameter; often forming extensive groves, and reaching its greatest development in the United States in the neighborhood of Miami, bay Biscayne.

Wood very heavy, exceedingly hard, very strong and close-grained, compact; medullary rays numerous, hardly distinguishable; color, light yellow-brown, the sap-wood darker; specific gravity, 0.9453; ash, 2.62; probably valuable in cabinet-making and as a substitute for box-wood for coarse wood-engraving.

Note.—Psidium Guaiava, Raddi, the Guava, widely cultivated in the tropics for its fruit, is now sparingly naturalized in semi-tropical Florida.

CACTACE Æ.

149.—Cereus giganteus, Engelmann;

Emory's Rep. 158; Am. Jour. Sci. 2 ser. xiv, 335; xvii, 231; Proc. Am. Acad. iii, 287; Bot. Mex. Boundary Survey, Cactaceæ, 42, t. 61, 62 & front.; Brewer & Watson, Bot. California, i, 247.—Thurber in Mem. Am. Acad. new ser. v, 302, 305.—Fl. des Serres, x, 24, & t.; xv, 187, t. 1600.—Bigelow in Pacific R. R. Rep. iv, 12.—Engelmann & Bigelow in Pacific R. R. Rep. iv, 36.—Walpers, Ann. v, 46.—Cooper in Smithsonian Rep. 1858, 259.—Lemaire, Ill. Hort. ix, Misc. 95.—Marcou in Jour. Hort. Soc. France, 2 ser. iii, 676.—Lindley, Treasury Bot. 256, t. 17.—Vasey, Cat. Forest Trees, 15.—Rothrock in Wheeler's Rep. vi, front.—Hemsley, Bot. Am.-Cent. i, 343.—James in Am. Nat. xv, 982, f. 3.

Pilocereus Engelmanni, Lemaire, Ill. Hort. ix, Misc. 95.

SUWARROW. SAGUARO. GIANT CACTUS.

Valley of Bill Williams river, Arizona, south and east through central Arizona to the valley of the San Pedro river; southward in Sonora.

A tall, columnar tree, 8 to 18 meters in height, with a trunk sometimes 0.60 meter in diameter; dry, stony mesas or low hills rising from the desert.

Wood of the large, strong ribs, very light, soft, rather coarse-grained, solid, satiny, susceptible of a fine polish, almost indestructible in contact with the ground; medullary rays very numerous, broad; color, light brown tinged with yellow; specific gravity, 0.3188; ash, 3.45; used in the region almost exclusively for the rafters of adobe houses, for fencing, and by the Indians for lances, bows, etc.

The edible fruit largely collected and dried by the Indians.

CORNACEÆ.

150.-Cornus alternifolia, Linnæus f.

Suppl. 125.—Lamarck, Dict. ii, 116; Ill. i, 303.—L'Heritier, Cornus, 10, t. 6.—Ehrhart, Beitr. iii, 19.—Aiton, Hort. Kew. i, 159; 2 ed. i, 262.—Willdenow, Spec. i, 664; Enum. 165; Berl. Baumz. 104.—Michaux, Fl. Bor.-Am. i, 93.—Persoon, Syn. i, 144.—Desfontaines, Hist. Arb. i, 351.—Nouveau Duhamel, ii, 157, t. 45.—Pursh, Fl. Am. Sept. i, 109.—Nuttall, Genera, i, 99.—Rœmer & Schultes, Syst. iii, 323; Mant. 251.—Elliott, Sk. i, 210.—Guimpel, Otto & Hayne, Abb. Holz. 53, t. 43.—Hayne, Dend. Fl. 8.—Torrey, Fl. U. S. 180; Compend. Fl. N. States, 83; Fl. N. York, i, 288.—Sprengel, Syst. i, 451.—De Candolle, Prodr. iv, 271.—Hooker, Fl. Bor.-Am. i, 275.—Don, Miller's Dict. iii, 398.—Beck, Bot. 154.—Eaton, Manual, 6 ed. 109.—Tausch in Regensb. Fl. xxi, 732.—Spach, Hist. Veg. viii, 92.—Dietrich, Syn. i, 503.—Torrey & Gray, Fl. N. America, i, 649.—Loudon, Arboretum, ii, 1010, f. 760.—Eaton & Wright, Bot. 210.—Bigelow, Fl. Boston. 3 ed. 60.—C. A. Meyer in Mem. Acad. Sci. St. Petersburg, v, 6, 13.—Walpers, Rep. v, 932.—Emerson, Trees Massachusetts, 409; 2 ed. ii, 463 & t.—Parry in Owen's Rep. 613.—Darlington, Fl. Cestrica, 3 ed. 110.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 167.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 167.—Wood, Cl. Book, 391; Bot. & Fl. 143.—Gray, Manual N. States, 5 ed. 201.—Koch, Dendrologie, i, 690.—Young, Bot. Texas, 303.

C. alterna, Marshall, Arbustum, 35.

DOGWOOD.

New Brunswick, west along the valley of the Saint Lawrence river to the northern shores of lake Superior, south through the northern states and along the Alleghany mountains to northern Georgia and Alabama.

A small tree, 4 to 8 meters in height, with a trunk 0.15 to 0.20 meter in diameter; low, rich woods and borders of streams and swamps.

Wood heavy, hard, close-grained, checking badly in drying; medullary rays numerous, thin; color, brown tinged with red, the sap-wood light yellow; specific gravity, 0.6696; ash, 0.41.

151.—Cornus florida, Linnæus,

Spec. 1 ed. 117.—Marshall, Arbustum, 35.—Lamarck, Dict. ii, 114; Ill. i, 302.—Wangenheim, Amer. 51, t. 17, f. 41.—Walter, Fl. Caroliniana, 88.—L'Heritier, Cornus, 4.—Aiton, Hort. Kew. i, 157; 2 ed. i, 261.—Willdenow, Spec. i, 661; Enum. 164; Berl. Baumz. 100.—Abbot, Insects Georgia, ii, t. 73.—B. S. Barton, Coll. i, 12, 45; ii, 17, 19.—Bot. Mag. t. 526.—Michaux, Fl. Bor.-Am. i, 91.—Persoon, Syn. i, 143.—Desfontaines, Hist. Arb. i, 350.—Schkuhr, Handb. 82.—Titford, Hort. Bot. Am. 41, t. 16, f. 7.—Nouveau Duhamel, ii, 153.—Michaux f. Hist. Arb. Am. iii, 138, t. 3; N. American Sylva, 3 ed. i, 176, t. 48.—Pursh, Fl. Am. Sept. i, 108.— Bigelow, Med. Bot. ii, 69, t. 73; Fl. Boston. 3 ed. 59.—Eaton, Manual, 19; 6 ed. 108.—Nuttall, Genera, i, 98.—Barton, Med. Bot. i, 43, t. 3.—Rœmer & Schultes, Syst. iii, 319.—Hayne, Dend. Fl. 6.—Guimpel, Otto & Hayne, Abb. Holz. 21, t. 19.—Elliott, Sk. i, 207.— Torrey in Ann. Lyc. N. York, ii, 208; Fl. U. S. 178; Compend. Fl. N. States, 82; Fl. N. York, i, 290; Nicollet's Rep. 151; Emory's Rep. 408.—Sprengel, Syst. i, 451.—Beck in Am. Jour. Sci. 1 ser. x, 264; Bot. 153.—Audubon, Birds, t. 8, 73, 122.—Rafinesque, Med. Bot. i, 131, f. 28.—De Candolle, Prodr. iv, 273.—Hooker, Fl. Bor.-Am. i, 277, in part; Companion Bot. Mag. i, 48.—Don, Miller's Diet. iii, 400.—Lindley, Fl. Med. 81.—Dietrich, Syn. i, 504.—Torrey & Gray, Fl. N. America, i, 652.—Loudon, Arboretum, ii, 1017, f. 769.—Eaton & Wright, Bot. 209.—Reid in London Gard. Chronicle, 1844, 276.—Browne, Trees of America, 350.—Emerson, Trees Massachusetts, 413; 2 ed. ii, 467 & t.—Griffith, Med. Bot. 347, f. 164.—Carson, Med. Bot. i, 50, t. 42.—Richardson, Arctic Exped. 429.—Darlington, Fl. Cestrica, 3 ed. 111.—Darby, Bot. S. States, 339.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 168.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 60.—Lesquereux in Owen's 2d Rep. Arkansas, 364.—Wood, Cl. Book, 391; Bot. & Fl. 143.—Blakie in Canadian Nat. vi, 1.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 194.—Porcher, Resources S. Forests, 59.—Gray, Manual N. States, 5 ed. 200; Hall's Pl. Texas, 11.—Koch, Dendrologie, i, 694.—Young, Bot. Texas, 303.—Vasey, Cat. Forest Trees, 16.—Baillon, Hist. Pl. vii, 68, f. 46.—Broadhead in Coulter's Bot. Gazette, iii, 53.—Bentley & Trimen, Med. Pl. ii, 136, t. 136.—Bell in Geological Rep. Canada, 1879-'80, 55c.—Ridgway in Proc. U. S. Nat. Mus. 1882, 67.

Benthamidia florida, Spach, Hist. Veg. viii, 107.

FLOWERING DOGWOOD. BOX WOOD.

Southern New England, southern Ontario, southern Minnesota, and through the Atlantic forests to latitude 28° 50′ in Florida, and the valley of the Brazos river, Texas.

A small tree, 9 to 12 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or toward its northern limits reduced to a low shrub; rich woods; very common, especially at the south.

Wood heavy, hard, strong, close-grained, tough, checking badly in drying, satiny, susceptible of a beautiful polish; medullary rays numerous, conspicuous; color, brown, changing in different specimens to shades of green and red, the sap-wood lighter; specific gravity, 0.8153; ash, 0.67; used in turnery, for wood engravings and the bearings of machinery, hubs of wheels, barrel hoops, etc.

The bark, especially of the root, in common with that of the other species of the genus, possesses bitter tonic properties, and is used in decoctions, etc., in the treatment of intermittent and malarial fevers (Am. Jour. Pharm. vii, 109.—Maisch in Proc. Am. Pharm. Assoc. 315.—U. S. Dispensatory, 14 ed. 352.—Nat. Dispensatory, 2 ed. 467).

152.-Cornus Nuttallii, Audubon,

Birds, t. 467.—Torrey & Gray, Fl. N. America, i, 652.—Walpers, Rep. ii, 435.—Bentham, Pl. Hartweg. 312.—Nuttall, Sylva, iii, 51, t. 97; 2 ed. ii, 117, t. 97.—Durand in Jour. Philadelphia Acad. 1855, 89.—Torrey in Pacific R. R. Rep. iv, 94; Bot. Mex. Boundary Survey, 71; Bot. Wilkes Exped. 326.—Newberry in Pacific R. R. Rep. vi, 24, 75.—Cooper in Smithsonian Rep. 1858, 259; Pacific R. R. Rep. xii², 29, 63.—Lyall in Jour. Linnæan Soc. vii, 134.—Gray in Proc. Am. Acad. viii, 387.—Brewer & Watson, Bot. California, i, 274; ii, 452.—Vasey, Cat. Forest Trees, 16.—Hall in Coulter's Bot. Gazette, ii, 88.—Macoun in Geological Rep. Canada, 1875—76, 198.—G. M. Dawson in Canadian Nat. new ser. ix, 331.

C. florida, Hooker, Fl. Bor.-Am. i, 277, in part.

FLOWERING DOGWOOD.

Vancouver's island and along the coast of southern British Columbia, through western Washington territory and Oregon, and southward through the Coast ranges of California and along the western slope of the Sierra Nevada to the San Bernardino mountains.

A small, slender tree, sometimes 18 to 24 meters in height, with a trunk rarely 0.45 meter in diameter; ascending the Cascade mountains to 3,000 feet, and the San Bernardino mountains to from 4,000 to 5,000 feet elevation; common; rich, rather damp soil, generally in the dense shade of conferous forests.

Wood heavy, exceedingly hard, strong, close-grained, compact, satiny, susceptible of a good polish; medullary rays numerous, obscure; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.7481; ash, 0.50; somewhat used in cabinet-making, for mauls, handles, etc.

153 .- Nyssa capitata, Walter,

- Fl. Caroliniana, 253.—Lamarck, Dict. iv, 508.—Michaux f. Hist. Arb. Am. ii, 257, t. 20; N. American Sylva, 3 ed. iii, 37, t. 113.— Aiton, Hort. Kew. 2 ed. v, 480.—Poiret, Suppl. v, 740.—Elliott, Sk. ii, 685.—Hooker, Companion Bot. Mag. ii, 62.—Eaton, Manual, 6 ed. 236.—Eaton & Wright, Bot. 329.—Spach, Hist. Veg. x, 464.—Darby, Bot. S. States, 493.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 168.—Lesquereux in Owen's 2d Rep. Arkansas, 364.—Wood, Cl. Book, 392; Bot. & Fl. 143.—Koch, Dendrologie, ii, 456.—Vasey, Cat. Forest Trees, 16.
 - N. Ogeche, Marshall, Arbustum, 97.
 - N. coccinea, Bartram, Travels, 2 ed. 17.
 - N. tomentosa, Poiret in Lamarck, Diet. iv, 508.
 - N. candicans, Michaux, Fl. Bor.-Am. ii, 259.—Persoon, Syn. ii, 614.—Desfontaines, Hist. Arb. i, 37.—Willdenow, Spec. iv, 1113.—Pursh, Fl. Am. Sept. i, 117.—Poiret, Suppl. iv, 116.—Nuttall, Genera, ii, 236; Trans. Am. Phil. Soc. v, 167.—Remer & Schultes, Syst. v, 557.—Sprengel, Syst. i, 832.—Dietrich, Syn. i, 879.—Loudon, Arboretum, iii, 1318, f. 1199.—Browne, Trees of America, 426.
 - N. montana, Gærtner, Fruct. iii, 201, t. 216.

OGEECHEE LIME. SOUR TUPELO. GOPHER PLUM.

Georgia, from the valley of the Ogeechee to the Saint Mary's river, west Florida (near Vernon, Mohr), and in southern Arkansas.

A tree 9 to 18 meters in height, with a trunk 0.30 to 0.90 meter in diameter; deep swamps and river bottoms; rare and local.

Wood light, soft, not strong, tough, rather coarse-grained, compact, unwedgeable, containing many regularly-distributed open ducts; medullary rays numerous, thin; color, white, the sap-wood hardly distinguishable; specific gravity, 0.4613; ash, 0.34.

A conserve, under the name of "Ogeechee limes", is made from the large, acid fruit.

154.—Nyssa sylvatica, Marshall,

- Arbustum, 97.—Michaux f. Hist. Arb. Am. ii, 260, t. 21; N. American Sylva, 3 ed. iii, 29, t. 110.—Poiret, Suppl. iv, 116.—Barton, Prodr. Fl. Philadelph. 97; Compend. Fl. Philadelph. ii, 193.
 - N. aquatica, Linnæus, Spec. 1 ed. 1058, in part.—St. Hilaire, Fam. Nat. ii, 152.—Persoon, Syn. ii, 614.—Michaux f. Hist. Arb. Am. ii, 165, t. 22; N. American Sylva, 3 ed. iii, 31, t. 111.—Remer & Schultes, Syst. v, 576.—Barton, Prodr. Fl. Philadelph. 97; Compend. Fl. Philadelph. ii, 192.—Sprengel, Syst. i, 832.—Audubon, Birds, t. 133.—Elliott, Sk. ii, 684.—Dietrich, Syn. i, 878.—Eaton, Manual, 6 ed. 236.—Eaton & Wright, Bot. 329.—Spach, Hist. Veg. x, 464.—Darby, Bot. S. States, 492.—Chapman, Fl. S. States, 168.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 168.—Porcher, Resources S. Forests. 347.—Koch, Dendrologic, ii, 455.—Young, Bot. Texas, 304.—Vasey, Cat. Forest Trees, 16.
 - N. multiflora, Wangenheim, Amer. 46, t. 16, f. 39.—Elliott, Sk. ii, 684.—Walter, Fl. Caroliniana, 253.—Beck, Bot. 307.—Eaton, Manual, 6 ed. 236.—Eaton & Wright, Bot. 329.—Spach, Hist. Veg. x, 463.—Torrey, Fl. N. York, ii, 161, t. 95.—Emerson, Trees Massachusetts, 312, t. 17; 2 ed. ii, 353 & t.—Schnizlein, Icon. t. 108, f. 1, 2.—Darlington, Fl. Cestrica, 3 ed. 254.—Darby, Bot. S. States, 492.—Cooper in Smithsonian Rep. 1858, 252.—Chapman, Fl. S. States, 168.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 62.—Lesquereux in Owen's 2d Rep. Arkansas, 364.—Wood, Cl. Book, 392; Bot. & Fl. 143.—Gray, Manual N. States, 5 ed. 201.—Koch, Dendrologie, ii, 554.—Young, Bot. Texas, 304.—Vasey, Cat. Forest Trees, 16.—Broadhead in Coulter's Bot. Gazette, iii, 53.—Bessey in Am, Nat. xv, 134.—Bell in Geological Rep. Canada, 1879-'80, 55°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 68.—Burgess in Coulter's Bot. Gazette, vii, 95.
 - N. Caroliniana, Poiret in Lamarck, Dict. iv, 507; Lamarck, Ill. iii, 442, t. 851, f. 1.
 - N. biflora, Walter, Fl. Caroliniana, 253.—Lamarck, Diet. iv, 508.—Michaux, Fl. Bor.-Am. ii, 259.—Willdenow, Spec. iv, 1113; Enum. 1061; Berl. Baumz. 256.—Desfontaines, Hist. Arb. i, 37.—Gærtner f. Fruct. Suppl. 203, t. 216.—Aiton, Hort. Kew. 2 ed. v, 479.—Pursh, Fl. Am. Sept. i, 177.—Nuttall, Genera, ii, 236; Trans. Am. Phil. Soc. v, 167.—Poiret, Suppl. iv, 115.—Torrey in Ann. Lyc. N. York, ii, 200; Compend. Bot. N. States, 372.—Hayne, Dend. Fl. 229.—Eaton, Manual, 116.—Beck, Bot. 307.—Loudon, Arboretum, iii, 1317, f. 1195, 1196.—Browne, Trees of America, 423.—Baillon, Hist. Pl. v, 266, f. 241-244.
 - · N. integrifolia, Aiton, Hort. Kew. iii, 446.—Persoon, Syn. ii, 614.
 - N. Canadensis, Poiret in Lamarck, Dict. iv, 507.
 - N. villosa, Michaux, Fl. Bor.-Am. ii, 258.—Willdenow, Spec. iv, 1112.—Desfontaines Hist. Arb. i, 37.—Aiton, Hort. Kew. 2 edv, 479.—Bigelow, Fl. Boston. 3 ed. 380.—Pursh, Fl. Am. Sept. i, 117.—Nuttall, Genera, ii, 276.—Ræmer & Schultes, Syst. v, 575.—Sprengel, Syst. i, 832.—Torrey, Compend. Bot. N. States, 372.—Dietrich, Syn. i, 878.—Loudon, Arboretum, iii, 1317, f. 1197, 1198.
 - N. multiflora, var. sylvatica, Watson, Index, 442.

TUPELO. SOUR GUM. PEPPERIDGE. BLACK GUM.

Valley of the Kennebec river, Maine (Kent's Hill, Prof. Stone), West Milton, Vermont, west to central Michigan, south to Tampa bay, Florida, and the valley of the Brazos river, Texas.

A tree 15 to 36 meters in height, with a trunk 0.60 to 1.50 meter in diameter, or at the north much smaller; borders of swamps, or on rather high, rich hillsides and pine uplands; at the south often in pine-barren ponds and deep swamps, the base of the trunk then greatly enlarged and swollen (N. aquatica).

Wood heavy, rather soft, strong, very tough, unwedgeable, difficult to work, inclined to check unless carefully seasoned, not durable in contact with the soil, containing numerous regularly-distributed small open ducts; medullary rays numerous, thin; color, light yellow or often nearly white, the sap-wood hardly distinguishable; specific gravity, 0.6353; ash, 0.52; now largely used for the hubs of wheels, rollers in glass factories, ox yokes, and on the gulf coast for wharf piles.

Note.—Various forms of Nyssa, which at different times have been considered by botanists as entitled to specific rank, are connected by so many intermediate forms, and offer so few distinctive characters, that they are here united into one polymorphous species, which thus enlarged may properly bear Marshall's earlier name of Nyssa sylvatica, rather than the more familiar Nyssa multiflora of Wangenheim.

155.-Nyssa uniflora, Wangenheim,

- Amer. 83, t. 27, f. 57.—Walter, Fl. Caroliniana, 253.—Elliott, Sk. ii, 686.—Eaton & Wright, Bot. 329.—Darby, Bot. 8. States, 493.—Cooper in Smithsonian Rep. 1858, 253.—Chapmau, Fl. S. States, 168.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 62.—Wood, Cl. Book, 392; Bot. & Fl. 143.—Gray, Manual N. States, 5 ed. 201.—Koch, Dendrologie, ii, 455.—Young, Bot. Texas, 304.—Vasey, Cat. Forest Trees, 16.
 - N. aquatica, Linnæus, Spec. 1058, in part.—Marshall, Arbustum, 96.—Lamarck, Dict. iv, 507. —Desfontaines, Hist. Arb. i, 36.
 - N. denticulata, Aiton, Hort. Kew. iii, 446; 2 ed. v, 480.—Persoon, Syn. ii, 615.—Willdenow, Spec. iv, 1114.—Gærtner f. Fruct. Suppl. 203, t. 216.—Pursh. Fl. Am. Sept. i, 178.—Poiret, Suppl. iv, 115.—Nuttall, Genera, ii, 236.—Hayne, Dend. Fl. 229.—Ræmer & Schultes, Syst. v, 577.—Sprengel, Syst. i, 832.—Dietrich, Syn. i, 879.

- N. angulosa, Poiret in Lamarck, Dict. iv, 507; Ill. iii, 442, t. 851, f. 2.—Romer & Schultes, Syst. v, 578.
- N. palustris, Salisbury, Prodr. 175-
- N. tomentosa, Michaux, Fl. Bor.-Am. ii, 259.—Persoon, Syn. ii, 615.—Willdenow, Spec. iv, 1113.—Pursh, Fl. Am. Sept. i, 177.—Nuttall, Genera, ii, 236.—Romer & Schultes, Syst. v, 577.—Elliott, Sk. ii, 685.—Sprengel, Syst. i, 832.—Andubon, Birds, t. 13.—Dietrich, Syn. i, 879.—Eaton & Wright, Bot. 329.—Darby, Bot. S. States, 493.
- N. angulisans, Michaux, Fl. Bor.-Am. ii, 259.—Dietrich, Syn. i, 879.—Spach, Hist. Veg. x, 465.
- N. grandidentata, Michaux f. Hist. Arb. Am. ii, 252, t. 19; N. American Sylva, 3 ed. ii, 34, t. 112.—Loudon, Arboretum, iii, 1319, f. 1200, 1201.—Lesquereux in Owen's 2d Rep. Arkansas, 364.
- N. capitata var. grandidentata, Browne, Trees of America, 426.

LARGE TUPELO. COTTON GUM. TUPELO GUM.

Southern Virginia, south near the coast to the valley of the Saint Mary's river, Georgia, through the Gulf states to the valley of the Neches river, Texas, and through Arkansas and southern and southeastern Missouri to the valley of the lower Wabash river, Illinois.

A large tree, 21 to 30 meters in height, with a trunk 0.90 to 1.20 meter in diameter; deep swamps and river bottoms subject to frequent overflow; one of the largest and most common trees of the bottom lands of the lower Mississippi river basin, and reaching its greatest development in the cypress swamps of western Louisiana and eastern Texas, near the coast.

Wood light, soft, not strong, close-grained, compact, unwedgeable; medullary rays numerous, thin; color, light brown, or often nearly white; specific gravity, 0.5194; ash, 0.70; used in turnery, largely for woodenware, broom handles, and wooden shoes; that of the root for the floats of nets, etc., as a substitute for cork.

CAPRIFOLIACEÆ.

156.—Sambucus glauca, Nuttall;

Torrey & Gray, Fl. N. America, ii, 13.—Walpers, Rep. ii, 453.—Torrey in Pacific R. R. Rep. vi, 12; Ives' Rep. 15; Bot. Mex. Boundary Survey, 71.—Gray in Smithsonian Contrib.v, 66; Proc. Am. Acad. vii, 387; Syn. Fl. N. America, i², 9.—Watson in King's Rep. v, 134.—Vasey, Cat. Forest Trees, 16.—Brewer & Watson, Bot. California, i, 278.—Hall in Coulter's Bot. Gazette, 88.—Rothrock in Wheeler's Rep. vi, 135, 363.

- S. Californica, Hort.—Koch, Dendrologie, ii, 72.
- ? S. Mexicana, Newberry in Pacific R. R. Rep. vi, 75 [not Presl].

ELDER.

Valley of the Fraser river and Vancouver's island, British Columbia, southward through California to the Mexican boundary, extending west to the Blue mountains of Oregon and the Wahsatch range, Utah.

A small tree, sometimes 8 to 9 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or toward its northern limits reduced to a large shrub; confined to valleys, in dry, gravelly soil.

Wood light, soft, weak, coarse-grained, checking in drying; medullary rays numerous, rather conspicuous; color, yellow tinged with brown, the sap-wood lighter; specific gravity, 0.5087; ash, 1.57.

The large blue-black fruit edible and sometimes cooked.

157.—Sambucus Mexicana, Presl,

- Hort. Hænk.—De Candolle, Prodr. iv, 322.—Don, Miller's Dict. iii, 437.—Loudon, Arboretum, ii, 1030.—Gray in Smithsonian Contrib. v, 66; Syn. Fl. N. America, i², 9.—Torrey in Pacific R. R. Rep. iv, 95; Bot. Mex. Boundary Survey, 71.—Brewer & Watson, Bot. California, i, 278.—Rothrock in Wheeler's Rep. vi, 135.—Hemsley, Bot. Am.-Cent. ii, 1.
 - S. glauca, Bentham, Pl. Hartweg. 313 [not Nuttall].
 - S. velutina, Durand & Hilgard in Jour. Philadelphia Acad. new ser. iii, 39.

ELDER.

Valley of the Nueces river (San Patricio), south and west along the southern boundary of the United States to Posa creek, Kern county, California, and southward into Mexico.

A small tree, sometimes 6 meters in height, with a trunk 0.15 to 0.25 meter in diameter; bottom lands, in moist, gravelly loam.

Wood light, soft, rather coarse-grained, compact; medullary rays numerous, thin, conspicuous; color, light brown, the sap-wood lighter; specific gravity, 0.4614; ash, 2.00.

158.-Viburnum Lentago, Linnæus,

Spec. 1 ed. 268.—Marshall, Arbustum, 160.—Wangenheim, Amer. 100.—Walter, Fl. Caroliniana, 116.—Aiton, Hort. Kew. i, 372; 2 ed. ii, 168.—Willdenow, Spec. i, 1491; Enum. 327; Berl. Baumz. 531.—Nouveau Duhamel, ii, 129.—Schkuhr, Handb. 234.—Michaux, Fl. Bor.-Am. i, 178.—Persoon, Syn. i, 327.—Desfontaines, Hist. Arb. i, 344.—Poiret in Lamarck, Dict. viii, 658.—Pursh, Fl. Am. Sept. i, 201.—Barton, Prodr. Fl. Philadelph. 40.—Eaton, Manual, 34; 6 ed. 387.—Nuttall, Genera, i, 202.—Hayne, Dend. Fl. 37.—Remer & Schultes, Syst. vi, 637.—Elliott, Sk. i, 365.—Torrey, Fl. U. S. i, 318; Compend. Fl. N. States, 138; Fl. N. York, i, 305.—Watson, Dend. Brit. i, t. 21.—Sprengel, Syst. i, 934.—Guimpel, Otto & Hayne, Abb. Holz. 125, t. 102.—De Candolle, Prodr. iv, 325.—Hocker, Fl. Bor.-Am. i, 279.—Beck, Bot. 156.—Don, Miller's Dict. iii, 440.—Spach, Hist. Veg. viii, 311.—Loudon, Arboretum, ii, 1033, f. 780.—Dietrich, Syn. ii, 1011.—Eaton & Wright, Bot. 473.—Torrey & Gray, Fl. N. America, ii, 15.—Bigelow, Fl. Boston. 3 ed. 123.—Penn. Cycl. xxvii, 294.—Emerson, Trees Massachusetts, 364; 2 ed. ii, 412.—Darlington, Fl. Cestrica, 3 ed. 115.—Darby, Bot. S. States, 342.—Chapman, Fl. S. States, 171.—Wood, Cl. Book, 398; Bot. & Fl. 147.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 194; Trans. St. Louis Acad. ii, 269.—Gray, Manual N. States, 5 ed. 206; Syn. Fl. N. America, ie, 12.—Koch, Dendrologie, ii, 62.—Young, Bot. Texas, 309.—Vasey, Cat. Forest Trees, 16.—Macoun in Rep. Geological Surv. Canada, 1875-76, 198.—Ridgway in Proc. U. S. Nat. Mus. 1882, 68.

SHEEPBERRY. NANNYBERRY.

Southern shores of Hudson bay west in British America to about longitude 102°, south through the northern states to southern Indiana and Saint Louis county, Missouri, and along the Alleghany mountains to northern Georgia.

A small tree, 6 to 9 meters in height, with a trunk sometimes 0.15 to 0.25 meter in diameter; rocky ridges and along borders of streams and swamps, in rich, moist soil; most common and reaching its greatest development far north.

Wood heavy, hard, close-grained, compact, emitting a disagreeable odor; medullary rays thin, barely distinguishable; color, dark orange-brown, the sap-wood nearly white; specific gravity, 0.7303; ash, 0.29.

159.-Viburnum prunifolium, Linnæus,

Spec. 1 ed. 268.—Marshall, Arbustum, 160.—Wangenheim, Amer. 98.—Walter, Fl. Caroliniana, 116.—Aiton, Hort. Kew.i, 371; 2 ed. ii, 167.—Willdenow, Spec. i, 1487; Enum. 326; Berl. Baumz. 530.—Abbot, Insects Georgia, ii, 53.—Nouveau Duhamel, ii, 128, t. 38.—Schkuhr, Handb. 233.—Michaux, Fl. Bor.-Am. i, 178.—Persoon, Syn. i, 326.—Desfontaines, Hist. Arb. i, 344.—Poiret in Lamarck, Dict. viii, 653.—Pursh, Fl. Am. Sept. i, 201.—Barton, Prodr. Fl. Philadeph. 39; Compend. Fl. Philadelph. i, 151.—Nuttall, Genera, i, 202.—Rœmer & Schultes, Syst. vi, 631.— Hayne, Dend. Fl. 37.—Torrey, Fl. U. S. i, 318; Compend. Fl. N. States, 138.—Elliott, Sk. i, 365.—Sprengel, Syst. i, 933.—Guimpel, Otto & Hayne, Abb. Holz. 125, t. 101.—Watson, Dend. Brit. i, t. 23.—Audubon, Birds, t. 23.—De Candolle, Prodr. iv, 325.—Beck, Bot. 156.—Don, Miller's Dict. iii, 440.—Spach, Hist. Veg. viii, 312.—Loudon, Arboretum, ii, 1034, t. 193.—Hooker, Fl. Bor.-Am. ii, 279.—Torrey & Gray, Fl. N. America, ii, 14.—Walpers, Rep. ii, 451.—Darlington, Fl. Cestrica, 3 ed. 115.—Darby, Bot. S. States, 342.—Chapman, Fl. S. States, 171.—Wood, Cl. Book, 398; Bot. & Fl. 147.—Gray, Manual N. States, 5 ed. 206; Syn. Fl. N. America, i³, 12.—Engelmann in Trans. St. Louis Acad. ii, 269.—Koch, Dendrologic, ii, 62.—Young, Bot. Texas, 309.—Vasey, Cat. Forest Trees, 16.—Ridgway in Proc. U. S. Nat. Mus. 1882, 68.—Watson in Proc. Am. Acad. xviii, 96.

V. pyrifolium, Poiret in Lamarck, Dict. v, 658.—Pursh, Fl. Am. Sept. i, 201.—Nuttall, Genera, i, 202.—Barton, Compend. Fl. Philadelph. i, 152.—Romer & Schultes, Syst. vi, 631.—Hayne, Dend. Fl. 37.—Watson, Dend. Brit. i, t. 22.—Desfontaines, Hist. Arb. i, 345; Cat. Hort. Paris, 3 ed. 404.—De Candolle, Prodr. iv, 325.—Beek, Bot. 156.—Loudon, Arboretum, ii, 1034, f. 781, 782.—Bigelow, Fl. Boston, 3 ed. 123.

V. prunifolium, var. ferrugineum, Torrey & Gray, Fl. N. America, ii, 15.

BLACK HAW. STAG BUSH.

Fairfield county, Connecticut, valley of the lower Hudson river (Fishkill landing), south to Hernando county, Florida, and the valley of the Colorado river, Texas, west to Missouri, Arkansas, and the Indian territory.

A small tree, sometimes 6 to 9 meters in height, with a trunk rarely exceeding 0.15 meter in diameter, or at the north generally reduced to a low, much-branched shrub; usually on rocky hillsides, in rich soil.

Wood heavy, very hard, strong, brittle, close-grained, liable to check in drying; medullary rays numerous, very obscure; color, brown tinged with red, the sap-wood nearly white; specific gravity, 0.8332; ash, 0.52.

The edible fruit sweet and insipid; the tonic and astringent bark somewhat used in the treatment of uterine disorders in the form of decoctions or fluid extracts (Boston Med. and Surg. Jour. October 10, 1867.—U. S. Dispensatory, 14 ed. 1783.—Nat. Dispensatory, 2 ed. 1821).

RUBIACEÆ.

160.-Exostemma Caribæum, Ræmer & Schultes,

Syst. v, 18.—Sprengel, Syst. i, 705.—De Candolle, Prodr. iv, 359.—Don, Miller's Dict. iii, 481.—Dietrich, Syn. i, 722.—Spach, Hist. Veg. viii, 395.—Torrey & Gray, Fl. N. America, ii, 36.—Chapman, Fl. S. States, 180.—Grisebach, Fl. British West Indies, 324.—Guibourt, Hist. Drogues, 7 ed. iii, 187, f. 628.—Gray, Syn. Fl. N. America, i², 23.

Cinchona Caribæa, Jacquin, Stirp. Amer. t. 176, f. 65.—Gærtner, Fruct. i, 169, t. 33.—Aiton, Hort. Kew. i, 228; 2 ed. i, 372.—Lambert, Cinchona, 38, t. 12 (excl. syn.).—Andrews, Bot. Rep. vii, t. 481.

Cinchona Jamaicencis, Wright in Trans. Royal Soc. lxvii, 504, t. 10.

Semi-tropical Florida, on the southern keys; through the West Indies.

A small tree, sometimes 7 meters in height, with a trunk 0.20 to 0.30 meter in diameter.

Wood very heavy, exceedingly hard, strong, close-grained, checking in drying, satiny, susceptible of a beautiful polish; medullary rays numerous, very obscure; color, light brown, beautifully streaked with different shades of yellow and brown, the sap-wood clear, rich yellow; specific gravity, 0.9310; ash, 0.23.

161.-Pinckneya pubens, Michaux,

Fl. Bor.-Am. i, 103, t. 13.—Willdenow, Enum. Suppl. 30.—Aiton, Hort. Kew. 2 ed. i, 372.—Michaux f. Hist. Arb. Am. ii, 276, t. 24; N. American Sylva, i, 180, t. 49.—Pursh, Fl. Am. Sept. i, 158.—Nuttall, Genera, ii, 37.—Barton, Fl. N. America, i, 25, t. 7.—Sprengel, Syst. i, 705.—Elliott, Sk. i, 269.—Rafinesque, Med. Bot. ii, 57, t. 72.—De Candolle, Prodr. iv, 366.—Audubon, Birds, t. 165.—Eaton, Manual, 6 ed. 263.—Don, Miller's Dict. iii, 486.—Lindley, Fl. Med. 433.—Spach, Hist. Veg. viii, 400.—Eaton & Wright, Bot. 357.—Torrey & Gray, Fl. N. America, ii, 37.—Browne, Trees of America, 354.—Griffith, Med. Bot. 365, f. 174.—Darby, Bot. S. States, 347.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 179.—Wood, Cl. Book, 401; Bot. & Fl. 150.—Porcher, Resources S. Forests, 404.—Vasey, Cat. Forest Trees, 17.—Gray, Syn. Fl. N. America, i², 23.

Cinchona Caroliniana, Poiret in Lamarek, Dict. vi, 40.

P. pubescens, Persoon, Syn. i, 197.—Gærtner f. Fruct. Suppl. 81, t. 194, f. 3.

GEORGIA BARK.

South Carolina, near the coast; basin of the upper Apalachicola river in Georgia and Florida.

A small tree, 6 to 9 meters in height, with a trunk 0.15 to 0.30 meter in diameter; borders of streams, in low, sandy swamps; rare.

Wood light, soft, weak, close-grained, checking badly in drying; layers of annual growth clearly marked by four to six rows of large open ducts; medullary rays few, obscure; color, brown, the sap-wood lighter; specific gravity, 0.5350; ash, 0.41.

Infusions of the bark are successfully used in the treatment of intermittent fever, as a substitute for cinchona (U. S. Dispensatory, 14 ed. 1734).

162.—Genipa clusiæfolia, Grisebach,

Fl. British West Indies, 317.—Gray, Syn. Fl. N. America, i2, 29.

Gardenia clusiafolia, Jacquin, Coll. Appx. 37, t. 4, f. 3.—Persoon, Syn. i, 199.—De Candolle, Prodr. iv, 381; Dietrich, Syn. i, 796.

Randia clusia folia, Chapman, Fl. S. States, 179.—Vasey, Cat. Forest Trees, 17.

SEVEN-YEAR APPLE.

Semi-tropical Florida, on the southern keys; in the West Indies.

A small, much-branched, knotty tree, sometimes 6 meters in height, with a trunk rarely exceeding 0.10 meter in diameter, or in Florida more often a shrub; saline shores.

Wood very heavy, hard, close-grained, compact, susceptible of a beautiful polish; medullary rays numerous, thin; color, rich dark brown shaded with orange, the sap-wood light yellow; specific gravity, 1.0316; ash, 1.06.

The large insipid fruit popularly but incorrectly supposed to require seven years in which to ripen.

163.-Guettarda elliptica, Swartz,

Prodr. 59; Fl. Ind. Occ. i, 634.—Lamarck, Ill. ii, 218.—Persoon, Syn. i, 200.—Poiret, Suppl. ii, 859.—Ræmer & Schultes, Syst. iv, 442.—De Candolle, Prodr. iv, 457.—Dietrich, Syn. i, 787.—Don, Miller's Dict. iii, 551.—Torrey & Gray, Fl. N. America, ii, 35.—Grisebach, Fl. British West Indies, 332.—Gray, Syn. Fl. N. America, i², 30.

G. Blodgettii, Shuttleworth in herb.—Chapman, Fl. S. States, 178.—Vasey, Cat. Forest Trees, 17.

Semi-tropical Florida, on the southern keys; through the West Indies.

A small tree, 4 to 7 meters in height, with a trunk rarely exceeding 0.20 meter in diameter.

Wood heavy, hard, very close-grained, checking in drying, satiny, susceptible of a beautiful polish, containing numerous scattered small open ducts; medullary rays numerous, thin; color, light brown tinged with red; specific gravity, 0.8337; ash, 1.05.

ERICACEÆ.

164.-Vaccinium arboreum, Marshall,

Arbustum, 157.—Michaux, Fl. Bor.-Am. i, 230.—Persoon, Syn. i, 479.—Desfontaines, Hist. Arb. i, 270.—Pursh, Fl. Am. Sept. i, 285.—
Nuttall, Genera, i, 263.—Elliott, Sk. i, 495.—Don, Miller's Dict. iii, 853.—Loudon, Arboretum, ii, 1159.—De Candolle, Prodr. vii,
567.—Dietrich, Syn. ii, 1264.—Darby, Bot. S. States, 414.—Loddiges, Bot. Cab. t. 1885.—Walpers, Ann. ii, 1096.—Chapman, Fl. S.
States, 259.—Wood, Cl. Book, 482; Bot. & Fl. 198.—Lesquereux in Owen's 2d Rep. Arkansas, 373.—Young, Bot. Texas, 369.—
Gray, Hall's Pl. Texas, 15; Syn. Fl. N. America, iii, 20.—Vasey, Cat. Forest Trees, 71.

V. mucronatum, Walter, Fl. Caroliniana, 139 [not Linnæus].

V. diffusum, Aiton, Hort. Kew. ii, 356.-Bot. Mag. t. 1607.-Koch, Dendrologie, ii, 96.

Batodendron arboreum, Nuttall in Trans. Am. Phil. Soc. 2 ser. viii, 261; Sylva, iii, 43; 2 ed. ii, 111.

FARKLEBERRY.

North Carolina, south near the coast to Hernando county, Florida, through the Gulf states, and from southern Illinois and southern Missouri south through Arkansas and eastern Texas to the shores of Matagorda bay.

A small tree, 7 to 9 meters in height, with a trunk rarely 0.25 meter in diameter, or toward its northern limits often reduced to a low shrub; very common throughout the pine belt of the Gulf states along the larger ponds and streams, in moist, sandy soil, and reaching its greatest development in eastern Texas, near the coast.

Wood heavy, hard, very close-grained, compact, liable to twist in drying, satiny, susceptible of a beautiful polish; medullary rays numerous, broad, conspicuous; color, light brown tinged with red, the sap-wood hardly distinguishable; specific gravity, 0.7610; ash, 0.39; somewhat used in turnery in the manufacture of small handles, etc.

165.—Andromeda ferruginea, Walter,

- Fl. Caroliniana, 138.—Aiton, Hort. Kew. ii, 67; 2 ed. iii, 52.—Willdenow, Sp. ii, 609.—Michaux, Fl. Bor.-Am. i, 252.—Nouveau Duhamel, i, 190.—Ventenat, Hort. Malmaison, 80, t. 80.—Persoon, Syn. i, 480.—Desfontaines, Hist. Arb. i, 257.—Pursh, Fl. Am. Sept. i, 292.—Elliott, Sk. i, 489.—Darby, Bot. S. States, 420.—Chapman, Fl. S. States, 263.—Wood, Cl. Book, 488; Bot. & Fl. 202.—Gray, Syn. Fl. N. America ii¹, 33.
 - A. rhomboidalis, Nouveau Duhamel, i, 192.
 - A. ferruginea, var. arborescens, Michaux, Fl. Bor.-Am. i, 252.
 - A. ferruginea, var. fruticosa, Michaux, Fl. Bor. Am. i, 252.
 - A. rigida, Pursh, Fl. Am. Sept. i, 292.—Loddiges, Bot. Cab. t. 430.
 - Lyonia ferruginea, Nuttall, Genera, i, 266.—Don, Miller's Dict. iii, 830.—Loudon, Arboretum, ii, 1109.—Dietrich, Syn. ii, 1399.—De Candolle, Prodr. vii, 600.—Koch, Dendrologie, ii, 122.

Lyonia rigida, Nuttall, Genera, i, 266.—Don, Miller's Dict. iii, 830.—De Candolle, Prodr, vii, 600.

South Carolina to northern Florida, near the coast.

A small tree, in rich hummocks, 6 to 9 meters in height, with a trunk 0.15 to 0.25 meter in diameter, often crooked or semi-prostrate; or in sandy pine-barren soil reduced to a low shrub, 0.60 to 0.90 meter in height; the leaves varying greatly in shape, venation, etc.

Wood heavy, hard, not strong, very close-grained, checking in drying, satiny, susceptible of a beautiful polish; medullary rays numerous, thin; color, bright brown tinged with red, the sap-wood a little lighter; specific gravity, 0.7500; ash, 0.46.

166.—Arbutus Menziesii, Pursh,

- Fl. Am. Sept. i, 282.—Sprengel, Syst. ii, 286.—Don, Miller's Dict. iii, 834.—Loudon, Arboretum, ii, 1122.—De Candolle, Prodr. vii, 582.—Dietrich, Syn. ii, 1387.—Hooker, Fl. Bor.-Am. ii, 36.—Hooker & Arnott, Bot. Beechey, 143.—Nuttall, Sylva, iii, 42, t. 95; 2 ed. ii, 109, t. 95.—Torrey in Pacific R. R. Rep. iv, 116; Bot. Wilkes Exped. 378.—Newberry in Pacific R. R. Rep. vi, 23, 79, f. 22.—Cooper in Smithsonian Rep. 1858, 260; Pacific R. R. Rep. xii², 29, 66.—Lyall in Jour. Linnæan Soc. vii, 131.—Gray in Proc. Am. Acad. vii, 393; Bot. California, i, 452, in part; Syn. Fl. N. America, ii¹, 27, in part.—Vasey, Cat. Forest Trees, 17.—Hall in Coulter's Bot. Gazette, ii, 88.—Macoun in Geological Rep. Canada, 1875–76, 203.—G. M. Dawson in Canadian Nat. new ser. ix, 331.—Hemsley, Bot. Am.-Cent. ii, 276.
 - A. procera, Douglas in Lindley's Bot. Reg. xxi, t. 1753.—Loudon, Arboretum, ii, 1121.—De Candolle, Prodr. vii, 582.—Dietrich, Syn. ii, 1387.—Paxton, Mag. Bot. ii, 147 & t.—Walpers, Rep. vi, 416.
 - A. laurifolia, Lindley, Bot. Reg. xxx, t. 67.—Hooker, Fl. Bor.-Am. ii, 36.

MADROÑA.

Islands of British Columbia, from Seymour narrows southward through Washington territory and Oregon, near the coast, and through the Coast ranges of California to the Santa Lucia mountains.

A small tree, sometimes 15 to 25 meters in height, with a trunk 0.90 to 1.20 meter in diameter, or, exceptionally, much larger (the great specimen near San Rafael, Marin county, California, 6.85 meters in circumference 2 meters from the ground); south of San Francisco bay much smaller, often reduced to a low shrub; hillsides, in rich soil.

Wood heavy, hard, strong, close-grained, checking in drying; medullary rays numerous, conspicuous; color, light brown shaded with red, the sap-wood lighter; specific gravity, 0.7052; ash, 0.40; largely used in the manufacture of gunpowder, the bark in tanning.

167.—Arbutus Xalapensis, HBK.

Nov. Gen. & Spec. iii, 281.—Sprengel, Syst. ii, 286.—Don, Miller's Dict. iii, 834.—Hooker, Icon. i, t. 27.—Bentham, Pl. Hartweg. 66.—De Candolle, Prodr. vii, 583.—Dietrich, Syn. ii, 1388.—Walpers, Ann. ii, 1105.—Jour. Hort. Soc. London, v, 192 & t.

- A. variens, Bentham, Pl. Hartweg. 77.—Paxton, Brit. Fl. Gard. ii, 118.—Hemsley, Bot. Am.-Cent. ii, 277.
- ?A. macrophylla, Martens & Galeotti in Bull. Acad. Brux. ix, 9.—Walpers, Rep. ii, 725.
- A. Menziesii, Gray in Bot. California, i, 452, in part; Syn. Fl. N. America, ii¹, 27, in part.—Rothrock in Wheeler's Rep. vi, 25, 183 [not Pursh].

Southern Arizona, Santa Rita mountains, between 4,500 and 7,000 feet elevation; southward through northern Mexico.

A small tree, with white, scaly bark, 9 to 12 meters in height, with a trunk 0.45 to 0.60 meter in diameter; dry, gravelly slopes; large specimens generally hollow and defective.

Wood heavy, soft, not strong, brittle, close-grained, checking badly in drying, susceptible of a good polish; medullary rays numerous, obscure; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.7099; ash, 0.25.

168.—Arbutus Texana, Buckley,

Proc. Philadelphia Acad. 1861, 460.—Gray in Proc. Philadelphia Acad. 1862, 165.—Young, Bot. Texas, 370.

- A. Menziesii, Gray in Bot. California, i, 452, in part; Syn. Fl. N. America, ii¹, 27, in part.
- ?A. Xalapensis, Watson in Proc. Am. Acad. xviii, 111.

Western Texas, Hays and Travis counties (Buckley), west to the Guadalupe and Eagle mountains (Havard), and southward, probably into northern Mexico.

A small tree, 5 to 6 meters in height, with a trunk 0.15 to 0.25 meter in diameter; dry limestone hills and ridges; rare.

7 FOR

Wood heavy, hard, close-grained, compact; medullary rays numerous, obscure; color, brown, the sap-wood lighter, tinged with red; specific gravity, 0.7500; ash, 0.51; used in turnery, the manufacture of mathematical instruments, etc.

Note.—The synonomy and specific position of the Mexican species of Arbutus which reach the southern boundary of the United States are still obscure, and cannot be well elucidated with the existing knowledge of the Mexican flora.

169.—Oxydendrum arboreum, De Candolle,

Prodr. vii, 601.—Dietrich, Syn. ii, 1389.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 263.—Lesquereux in Owen's 2d Rep. Arkansas, 372.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 79.—Wood, Cl. Book, 489; Bot. & Fl. 203.—Gray, Manual N. States, 5 ed. 296; Syn. Fl. N. America, ii¹, 33.—Koch, Dendrologie, ii, 128.—Vasey, Cat. Forest Trees, 17.—Nat. Dispensatory, 2 ed. 798.

Andromeda arborea, Linnæus, Spec. 1 ed. 394.—Lamarck, Dict. i, 158.—Marshall, Arbustum, 7.—Wangenheim, Amer. 105.—
Walter, Fl. Caroliniana, 138.—Aiton, Hort. Kew. ii, 69; 2 ed. iii, 53.—Willdenow, Spec. ii, 612; Enum. 452; Berl. Baumz.
31.—Michaux, Fl. Bor.-Am. i, 255.—Nouveau Duhamel, i, 178.—Bot. Mag. t. 905.—Desfontaines, Hist. Arb. i, 257.—
Michaux f. Hist. Arb. Am. iii, 222, t. 7; N. American Sylva, 3 ed. ii, 126, t. 85.—Pursh, Fl. Am. Sept. i, 295.—Nuttall,
Genera, i, 265.—Elliott, Sk. i, 491.—Barton, Fl. N. America, i, 105, t. 30.—Hayne, Dend. Fl. 59.—Torrey, Fl. U. S. i,
420; Compend. Fl. N. States, 182.—Sprengel, Syst. ii, 291.—Gray, Manual N. States, 1 ed. 266.—Darby, Bot. S.
States, 419.—Porcher, Resources S. Forests, 379.

Andromeda arborescens, Persoon, Syn. i, 480.—Willdenow, Enum. 453.—Loddiges, Bot. Cab. t. 1210.

Lyonia arborea, Don in Edinburgh Phil. Jour. xvii, 159.—Don, Miller's Dict. iii, 831.—Loudon, Arboretum, ii, 1111.—Spach, Hist. Veg. ix, 486.—Browne, Trees of America, 356.

SORREL TREE. SOUR WOOD.

Western Pennsylvania, southward along the Alleghany mountains to western Florida and the eastern shores of Mobile bay, west to middle Tennessee and through the upper regions of the Gulf states to western Louisiana.

A small tree, 12 to 18 meters in height, with a trunk 0.25 to 0.35 meter in diameter; usually in rather dry, gravelly soil.

Wood heavy, hard, very close-grained, compact, susceptible of a beautiful polish; medullary rays numerous, thin; color, brown tinged with red, the sap-wood somewhat lighter; specific gravity, 0.7458; ash, 0.37; used for the handles of tools, bearings of machinery, etc.

170.—Kalmia latifolia, Linnæus,

Spec. 1 ed. 301.—Kalm, Travels, English ed. i, 335.—Marshall, Arbustum, 72.—Lamarck, Dict. ii, 345; Ill. ii, 487, t. 363, f. 1.—Gærtner, Fruct. i, 305, t. 63, f. 7.—Wangenheim, Amer. 64, t. 24, f. 50.—Walter, Fl. Caroliniana, 138.—Aiton, Hort, Kew. ii, 64; 2 ed. iii, 47.—Lamarck, Ill. 487, t. 363, f. 1.—Abbot, Insects Georgia, i, t. 87.—Willdenow, Spec. ii, 600; Enum. 450; Berl. Baumz. 202.—Schkuhr, Handb. 359, t. 116.—Michaux, Fl. Bor.-Am. i, 258.—Persoon, Syn. i, 477.—Desfontaines, Hist. Arb. i, 220.—Robin, Voyages, iii, 419.—Michaux f. Hist. Arb. Am. iii, 144, t. 4; N. American Sylva, 3 ed. ii, 62, t. 67.—Pursh, Fl. Am. Sept. i, 296.—Barton, Prodr. Fl. Philadelph. 49.—Eaton, Manual, 47; 6 ed. 195.—Bigelow, Med. Bot. i, 113, t. 13; Fl. Boston. 3 ed. 179.—Nuttall, Genera, i, 267.—Hayne, Dend. Fl. 54.—Elliott, Sk. i, 481.—Torrey, Fl. U. S. i, 422; Compend. Fl. N. States, 182.—Sprengel, Syst. ii, 293.—Audubon, Birds, t. 55.—Rafinesque, Med. Bot. ii, 16, t. 57.—Sertum Botanicum, iv & t.—Beck, Bot. 219.—Don, Miller's Dict. iii, 850.—Lindley, Fl. Med. 380.—Loudon, Arboretum, ii, 1151, f. 959.—De Candolle, Prodr. vii, 729.—Spach, Hist. Veg. ix, 498, t. 139.—Hooker, Fl. Bor.-Am. ii, 41.—Dietrich, Syn. ii, 1407.—Browne, Trees of America, 363.—Emerson, Trees Massachusetts, 392; 2 ed. ii. 443 & t.—Griffith, Med. Bot. 428, f. 192.—Darlington, Fl. Cestrica, 3 ed. 172.—Darby, Bot. S. States, 420.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 264.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 99.—Lesquereux in Owen's 2d Rep. Arkansas, 373.—Wood, Cl. Book, 484; Bot. & Fl. 200.—Porcher, Resources S. Forests, 381.—Gray, Manual N. States, 5 ed. 298; Syn. Fl. N. America, ii¹, 38.—Koch, Dendrologie, ii, 152.—Vasey, Cat. Forest Trees, 17.—London Garden, xxii, 6, t. 343.

LAUREL. CALICO BUSH. SPOON WOOD. IVY.

New Brunswick and the northern shores of lake Erie, south to western Florida, and through the Gulf states to western Louisiana and the valley of the Red river, Arkansas (Hot Springs, Letterman).

A small tree, sometimes 9 to 12 meters in height, with a trunk 0.30 to 0.60 meter in diameter, or more often a low shrub; rich woodlands; most common and reaching its greatest development in the southern Alleghany mountains, here often forming dense, impenetrable thickets.

Wood heavy, hard, strong, brittle, close-grained, compact; principal medullary rays broad, dark brown, conspicuous, intermediate rays numerous, thin, inconspicuous; color, brown tinged with red, the sap-wood somewhat lighter; specific gravity, 0.7160; ash, 0.41; used for tool handles, in turnery, and for fuel.

The leaves, buds, and fruit, reputed poisonous to cattle, are occasionally used medicinally (U. S. Dispensatory, 14 ed. 1682.—Nat. Dispensatory, 2 ed. 798).

171.-Rhododendron maximum, Linnæus,

Spec. 1 ed. 391.—Marshall, Arbustum, 127.—Gærtner, Fruct. i, 304, t. 63, f. 6.—Wangenheim, Amer. 63, t. 22, f. 49.—Aiton, Hort. Kew. ii, 67; 2 ed. iii, 50.—Mœnch, Meth. 45.—Lamarck, Dict. vi, 365; Ill. ii, 448, t. 364, f. 1.—B. S. Barton, Coll. i, 18.—Willdenow, Spec. ii, 606; Enum. 451; Berl. Baumz. 357.—Nouveau Duhamel, ii, 141.—Michaux, Fl. Bor.-Am. i, 259.—Schkuhr, Handb. 362.—Persoon, Syn. i, 478.—Desfontaines, Hist. Arb. i, 221.—Bot. Mag. t. 951.—Michaux f. Hist. Arb. Am. iii, 144, t. 4; N. American Sylva, 3 ed. ii, 64, t. 68.—Pursh, Fl. Am. Sept. i, 297.—Eaton, Manual, 47; 6 ed. 301.—Nuttall, Genera, i, 268.—Bigelow, Med. Bot. iii, 101, t. 51; Fl. Boston. 3 ed. 178.—Elliott, Sk. i, 483.—Hayne, Dend. Fl. 57.—Torrey, Fl. U. S. i, 426; Compend. Fl. N. States, 184.—Sprengel, Syst. ii, 292.—Audubon, Birds, t. 103.—Beck, Bot. 220.—Don, Miller's Dict. iii, 843.—Loudon, Arboretum, ii, 1134, f. 932.—De Candolle, Prodr. vii, 722.—Hooker, Fl. Bor.-Am. ii, 43.—Spach, Hist. Veg. ix, 503.—Dietrich, Syn. ii, 1404.—Eaton & Wright, Bot. 391.—Browne, Trees of America, 359.—Emerson, Trees Massachusetts, 384; 2 ed. ii, 435 & t.—Griffith, Med. Bot. 428.—Darlington, Fl. Cestrica, 3 ed. 171.—Darby, Bot. S. States, 421.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 265.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 97.—Lesquereux in Owen's 2d Rep. Arkansas, 373.—Wood, Cl. Book, 491; Bot. & Fl. 204.—Porcher, Resources S. Forests, 380.—Gray, Manual N. States, 5 ed. 300; Syn. Fl. N. America ii¹, 42.—Koch, Dendrologie, ii, 169.—Vasey, Cat. Forest Trees, 17.

R. procerum, Salisbury, Prodr. 287.

R. maximum, var. roseum, Pursh, Fl. Am. Sept. i, 297.—Elliott, Sk. i, 484.

R. maximum, var. album, Pursh, Fl. Am. Sept. i, 297.—Elliott, Sk. i, 484.

R. maximum, var. purpureum, Pursh, Fl. Am. Sept. i, 297.-Elliott, Sk. i, 484.

R. purpureum, Don, Miller's Dict. iii, 843.—Loudon, Arboretum, ii, 1134.—Dietrich, Syn, ii, 1404.

R. Purshii, Don, Miller's Dict. iii, 843.—Loudon, Arboretum, ii, 1135.—Dietrich, Syn. ii, 1404 (var. album, Pursh, l. c.).

GREAT LAUREL. ROSE BAY.

Nova Scotia and the northern shores of lake Erie, south through New England, New York, and along the Alleghany mountains to northern Georgia.

A small tree, sometimes 10 to 12 meters in height, with a trunk rarely exceeding 0.30 meter in diameter, or often a tall, straggling shrub; at the north in cold swamps; rare; very common and reaching its greatest development in the southern Alleghany mountains, steep, rocky banks of streams, etc.; never on limestone.

Wood heavy, hard, strong, brittle, close-grained, compact; medullary rays numerous, thin; color, light clear brown, the sap-wood lighter; specific gravity, 0.6303; ash, 0.36; occasionally used in turnery for the handles of tools, etc., and a possible substitute for box-wood in engraving. A decoction of the leaves is occasionally used domestically in the treatment of rheumatism, sciatica, etc.

MYRSINACEÆ.

172.-Myrsine Rapanea, Romer & Schultes,

Syst. iv, 509.—Don, Miller's Dict. iv, 10.—Dietrich, Syn. i, 618.—A. De Candelle, Prodr. viii, 97.—Miquel in Martius, Fl. Brasil. ix, 307, t. 50-52.—Gray, Syn. Fl. N. America ii¹, 65.

Rapanea Guyanensis, Aublet, Guian. i, 121, t. 46.—Swartz, Obs. 51; Fl. Ind. Occ. i, 262.—Lamarck, Ill. ii, 48, t. 122, f. 1.

Samara pentandra, Swartz, Obs. 51; Fl. Ind. Occ. i, 262 [not Aiton].

Samara floribunda, Willdenow, Spec. i, 665.—Lamarck, Ill. ii, 46, t. 122, f. 1.

Caballeria coriacea, Meyer, Prim. Fl. Esseq. 118.

M. Floridana, A. De Candolle in Trans. Linnæan Soc. xvii, 107; Prodr. viii, 98.—Dietrich, Syn. i, 98.—Chapman, Fl. S. States, 277.

M. floribunda, Grisebach, Fl. British West Indies, 393.

Semi-tropical Florida, Indian river southward to the southern keys; through the West Indies to Brazil.

A small tree, in Florida rarely exceeding 8 meters in height, with a trunk 0.10 to 0.15 meter in diameter, or often a shrub; borders of ponds and fresh-water creeks; in the West Indies much larger.

Wood heavy, hard, very close-grained, compact; medullary rays numerous, very conspicuous; color, brown tinged with red and beautifully striped with the darker medullary rays, the sap-wood hardly distinguishable; specific gravity, 0.8341; ash, 0.81.

173.-Ardisia Pickeringia, Nuttall,

Sylva, iii, 69, t. 102; 2 ed. ii, 133, t. 102.—A. De Candolle, Prodr. viii, 124.—Cooper in Smithsonian Rep. 1858, 264.—Chapman, Fl. S. States, 277.—Vasey, Cat. Forest Trees, 19.—Gray, Syn. Fl. N. America, ii¹, 65.—Hemsley, Bot. Am.-Cent. ii, 294.

Cyrilla paniculata, Nuttall in Am. Jour. Sci. v, 290.

Pickeringia paniculata, Nuttall in Jour. Philadelphia Acad. vii, 1.

MARLBERRY. CHERRY.

Semi-tropical Florida, Mosquito inlet to the southern keys, west coast, Caloosa river to cape Romano; in the West Indies and southern Mexico.

A small tree, sometimes 8 meters in height, with a trunk rarely 0.15 meter in diameter, or often a shrub; reaching its greatest development in Florida on the shores of bay Biscayne.

Wood heavy, hard, very close-grained, compact, susceptible of a beautiful polish; medullary rays very numerous, conspicuous; color, rich brown, beautifully marked with the darker medullary rays, the sap-wood a little lighter; specific gravity, 0.8602; ash, 1.85.

174.—Jacquinia armillaris, Jacquin,

Amer. 53, t. 39.—Linnæus, Spec. 2 ed. 272.—Aiton, Hort. Kew. i, 257; 2 ed. ii, 5.—Lamarck, Ill. ii, 46, t. 39.—Vahl, Eclog. i, 26.—Swartz, Obs. 85.—Willdenow, Spec. i, 1064; Enum. 246.—Persoon, Syn. i, 234.—Romer & Schultes, Syst. iv, 490.—Sprengel, Syst. i, 668.—Don, Miller's Dict. iv, 24.—Dietrich, Syn. i, 638.—Bentham, Bot. Sulphur, 123.—A. De Candolle, Prodr. viii, 149.—Miquel in Martius, Fl. Brasil. ix, 282, t. 27.—Cooper in Smithsonian Rep. 1858, 265.—Chapman, Fl. S. States, 276.—Grisebach, Fl. British West Indies, 397.—Seemann, Jour. Bot. iii, 279.—Vasey, Cat. Forest Trees, 19.—Gray, Syn. Fl. N. America, ii¹, 66.—Hemsley, Bot. Am.-Cent. ii, 294.

Chrysophyllum Barbasco, Losfling, Iter. 204, 277.

JOE WOOD.

Semi-tropical Florida, on the southern keys; rare; through the West Indies to Brazil.

A low, rigid tree, rarely exceeding in Florida 4 meters in height, with a trunk sometimes 0.15 meter in diameter; in the Bahamas and other West Indian islands probably much larger.

Wood heavy, hard, coarse-grained, checking and shrinking badly in drying, containing many scattered large open ducts; medullary rays numerous, broad, conspicuous; color, light clear brown tinged with yellow; specific gravity, 0.6948; ash, 3.45.

The saponaceous leaves sometimes used as a substitute for soap.

SAPOTACEÆ.

175.—Chrysophyllum oliviforme, Lamarck,

Dict. i, 552; Ill. ii, 42.—Descourtilz, Fl. Med. Antilles, ii, 71.—A. De Candolle, Prodr. viii, 158.—Grisebach, Fl. British West Indies, 398.—Gray, Syn. Fl. N. America, ii¹, 67.—Chapman, Fl. S. States, Suppl. 634.

- C. Caneto, B. Linnæus, Sp. 3 ed. 278 (excl. syn. Læfling).
- C. monopyrenum, Swartz, Prodr. 49; Fl. Ind. Occ. i, 480.—Persoon, Syn. i, 236.—Ræmer & Schultes, Syst. iv 703.—Sprengel, Syst. i, 666.—Bot. Mag. t. 3303.—Dietrich, Syn. i, 638.—Miquel in Martius, Fl. Brasil. vii, 94.
- C. ferrugineum, Gærtner f. Fruct. Suppl. 120, t. 202, f. 1.
- C. microphyllum, Chapman in Coulter's Bot. Gazette, iii, 9.—Vasey, Cat. Forest Trees, 18 [not A. De Candolle].

Semi-tropical Florida, cape Canaveral to the southern keys (Elliott's Key, No-Name Key, Key Largo), west coast, Caloosa river to cape Sable; rare; through the West Indies to Brazil.

A small tree, sometimes 9 meters in height, with a trunk 0.25 to 0.30 meter in diameter.

Wood very heavy, hard, strong, close-grained, checking in drying; medullary rays numerous, not conspicuous; color, light brown shaded with red, the thin sap-wood a little lighter; specific gravity, 0.9360; ash, 1.24.

176.—Sideroxylon Mastichodendron, Jacquin,

Coll. ii, t. 17, f. 5.—Lamarck, Ill. ii, 41, t. 120, f. 2.—Gærtner f. Fruct. Suppl. 125.—Sprengel, Syst. i, 666.—Dietrich, Syn. i, 622.—A. De Candolle, Prodr. viii, 181.—Grisebach, Fl. British West Indies, 399.—Gray, Syn. Fl. N. America ii¹, 67.

Bumelia pallida, Swartz, Prodr. 40; Fl. Ind. Occ. 489.

Achras pallida, Poiret in Lamarck, Dict. vi, 533.

Bumelia Mastichodendron, Ræmer & Schultes, Syst. iv, 493.

S. pallidum, Sprengel, Syst. i, 666.—A. De Candolle, Prodr. viii, 180.—Chapman, Fl. S. States, 274.—Vasey, Cat. Forest Trees, 18.

Bumelia fatidissima, Nuttall, Sylva, iii, 39, t. 94; 2 ed. ii, 108, t. 94.—Cooper in Smithsonian Rep. 265.

MASTIC.

Semi-tropical Florida, cape Canaveral to the southern keys, west coast, cape Romano to cape Sable; in the West Indies.

A tree often 18 meters in height, with a trunk 0.60 to 0.90 meter in diameter; the largest and most valuable tree of semi-tropical Florida; common.

Wood very heavy, exceedingly hard, strong, close grained, checking in drying, containing few scattered small open ducts; medullary rays numerous, not conspicuous; color, bright orange, the sap-wood yellow; specific gravity, 1.0109; ash, 5.14; not affected by the teredo; largely used in ship- and boat-building.

The dry fruit, of a pleasant subacid flavor, eagerly eaten by animals.

177.—Dipholis salicifolia, A. De Candolle,

Prodr. viii, 188 (Delessert, Icon. Mex. ined. t. 40).—Richard, Fl. Cuba, t. 542.—Miquel in Martius, Fl. Brasil. vii, 45, t. 18.—Chapman, Fl. S. States, 274.—Grisebach, Fl. British West Indies, 401.—Vasey, Cat. Forest Trees, 18.—Gray, Syn. Fl. N. America ii¹, 67.

Achras salicifolia, Linnæus, Spec. 2 ed. 470.

Bumelia salicifolia, Swartz, Prodr. 50; Fl. Ind. Occ. i, 491.—Lamarck, Ill. ii, 42.—Willdenow, Spec. i, 1086.—Aiton, Hort. Kew. 2 ed. ii, 12.—Rœmer & Schultes, Syst. iv, 494.—Dietrich, Syn. i, 621.

Sideroxylon salicifolium, Gærtner f. Fruct. Suppl. 124, t. 202.-Lamarck, Ill. ii, 42.

BUSTIC. CASSADA.

Semi-tropical Florida, bay Biscayne to the southern keys; through the West Indies to Brazil.

A tree sometimes 15 meters in height, with a trunk rarely 0.60 meter in diameter; the large trees hollow and defective; rare.

Wood very heavy, exceedingly hard, very strong, close-grained, compact, checking in drying, susceptible of a beautiful polish, containing many scattered large open ducts; color, dark brown or red, the sap-wood lighter; specific gravity, 0.9316; ash, 0.32.

178.-Bumelia tenax, Willdenow,

Spec. i, 1088; Enum. 248; Berl. Baumz. 67.—Aiton, Hort. Kew. 2 ed. ii, 12.—Rœmer & Schultes, Syst. iv, 496.—Elliott, Sk. i, 288.—Persoon, Syn. i, 237.—Hayne, Dend. Fl. 18.—Sprengel, Syst. i, 664.—Eaton, Manual, 6 ed. 60.—Don, Miller's Dict. iv, 30.—Loudon, Arboretum, ii, 1193, f. 1017.—Dietrich, Syn. i, 621.—Spach, Hist. Veg. ix, 388.—Eaton & Wright, Bot. 162.—Nuttall, Sylva, iii, 35, t. 92; 2 ed. ii, 104, t. 92.—A. De Candolle, Prodr. viii, 196.—Darby, Bot. S. States, 428.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 275.—Wood, Cl. Book, 501; Bot. & Fl. 210.—Vasey, Cat. Forest Trees, 19.—Gray, Syn. Fl. N. America, iii, 68.

Sideroxylon tenax, Linnæus, Mant. 48.—Jacquin, Coll. ii, 252.—Lamarck, Dict. i, 245; Ill. ii, 42.—Aiton, Hort. Kew, i, 262.—Swartz, Obs. 91.—Desfontaines, Hist. Arb. i, 204.—Robin, Voyages, iii, 461.

Sideroxylon Carolinense, Jacquin, Obs. iii, 3, t. 54.

Sideroxylon sericeum, Walter, Fl. Caroliniana, 100.

Sideroxylon chrysophylloides, Michaux, Fl. Bor.-Am. i, 123.—Rafinesque, Fl. Ludoviciana, 53.

B. chrysophylloides, Pursh, Fl. Am. Sept. i, 155.—Nuttall, Genera, i, 135.—Watson, Dend. Brit. i, t. 10.

?B. reclinata, Chapman, Fl. S. States, 275 [not Ventenat].

North Carolina, south near the coast to cape Canaveral and Cedar Keys, Florida.

A small tree, 6 to 9 meters in height, with a trunk sometimes 0.15 meter in diameter; sandy soil.

Wood heavy, hard, not strong, very close-grained, compact, susceptible of a beautiful polish; well characterized, as in all the North American species, by large open ducts, defining, with several rows, the rings of annual growth, and connected by conspicuous branching groups of similar ducts, giving to a cross-section a beautifully reticulated appearance; medullary rays numerous, thin; color, light brown streaked with white, the sap-wood lighter; specific gravity, 0.7293; ash, 0.78.

179.—Bumelia lanuginosa, Persoon.

Syn. i, 237.—Pursh, Fl. Am. Sept. i, 155.—Nuttall, Genera, i, 135.—Romer & Schultes, Syst. iv, 497.—Elliott, Sk. i, 288.—Eaton, Manual, 6 ed. 60.—Don, Miller's Dict. iv, 30.—Loudon, Arboretum, ii, 1194.—Eaton & Wright, Bot. 162.—A. De Candolle, Prodr. viii, 190.—Darby, Bot. S. States, 428.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 275.—Lesquereux in Owen's 2d Rep. Arkansas, 374.—Wood, Cl. Book, 501; Bot. & Fl. 210.—Gray, Manual N. States, 5 ed. 308; Hall's Pl. Texas, 15; Syn. Fl. N. America, ii¹, 68.—Young, Bot. Texas, 377.—Vasey, Cat. Forest Trees, 19.

? Sideroxylon tenax, Walter, Fl. Caroliniana, 100.

Sideroxylon lanuginosum, Michaux, Fl. Bor.-Am. i, 122.

- *P. oblongifolia, Nuttall, Genera, i, 135; Sylva, iii, 33; 2 ed. ii, 102.—Sprengel, Syst. i, 664.—Eaton, Manual, 6 ed. 60.—Eaton & Wright, Bot. 162.—Don, Miller's Dict. iy, 30.—Loudon, Arboretum, ii, 1194.—Dietrich, Syn. i, 621.—A. De Candolle, Prodr. viii, 190.—Lesquereux in Owen's 2d Rep. Arkansas, 374.
- B. ferruginea, Nuttall, Sylva, iii, 34; 2 ed. ii, 103.
- B. tomentosa, A. De Candolle, Prodr. viii, 190.
- B. arborea, Buckley in Proc. Philadelphia Acad. 1861, 461.

GUM ELASTIC. SHITTIM WOOD.

Georgia and northern Florida to Mobile bay, Alabama; southern Illinois and southern Missouri, through Arkansas to the valley of the Rio Grande, Texas (Eagle pass, Havard) (B. oblongifolia).

An evergreen tree, sometimes 18 meters in height, with a trunk 0.90 meter in diameter, or in the Atlantic states much smaller, rarely exceeding 6 meters in height; common and reaching its greatest development in the rich bottom lands of eastern Texas.

A low, depressed form of the sand-hills of the Altamaha river, Georgia, still to be rediscovered, with small leaves and "edible fruit as large as a small date", is var. macrocarpa, Gray, Syn. Fl. N. America, ii¹, 68 (B. macrocarpa, Nuttall, Sylva, iii, 37; 2 ed. ii, 106).

Wood heavy, soft, weak, close-grained, very compact, the open ducts conspicuous; medullary rays numerous, thin; color, light brown or yellow, the sap-wood lighter; specific gravity, 0.6544; ash, 1.23; somewhat used in cabinet-making, for which it is well suited.

A clear, very viscid gum exuded from the freshly-cut wood is sometimes used domestically.

180.—Bumelia spinosa, A. De Candolle,

Prodr. viii, 191 (Delessert, Icon. Mex. ined. t. 75).—Hemsley, Bot. Am.-Cent. ii, 299.—Watson in Proc. Am. Acad. xviii, 112.

Santa Catalina mountains, Arizona, at an elevation of 2,700 feet (*Pringle*); Parras and Saltillo, Mexico (*Palmer*, No. 787).

A small tree, 6 to 7 meters in height, with a trunk 0.20 to 0.25 meter in diameter; dry, gravelly soil, near water-courses.

Wood heavy, hard, very close-grained, compact, the open ducts conspicuous; medullary rays thin, obscure; color, light rich brown or yellow, the sap-wood lighter; specific gravity. 0.6603; ash, 1.24.

181.—Bumelia lycioides, Gærtner f.

Fruct. Suppl. 127, t. 120.—Persoon, Syn. i, 237.—Willdenow, Enum. 249; Berl. Baumz. 68.—Pursh, Fl. Am. Sept. i, 237.—Nuttall, Genera. i, 135; Sylva, iii, 31, t. 91; 2 ed. ii, 101, t. 91.—Rœmer & Schultes, Syst. iv, 495.—Hayne, Dend. Fl. 19.—Elliott, Sk. i, 287.—Sprengel, Syst. i, 664.—Eaton, Manual, 6 ed. 60.—Don, Miller's Dict. iv, 30.—Loudon, Arboretum, ii, 1193, f. 1016.—Dietrich, Syn. i, 621.—Spach, Hist. Veg. ix, 388.—Eaton & Wright, Bot. 162.—A. De Candolle, Prodr. viii, 189.—Griffith, Med. Bot. 441.—Darby, Bot. S. States, 427.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 275.—Lesquereux in Owen's 2d Rep. Arkansas, 374.—Wood, Cl. Book, 501; Bot. & Fl. 210.—Gray, Manual N. States, 5 ed. 308; Syn. Fl. N. America, ii¹, 68.—Young, Bot. Texas, 376.—Vasey, Cat. Forest Trees, 19.—Hemsley, Bot. Am.-Cent. ii, 298.

Sideroxylon lycioides, Linnæus, Hort. Cliff. 488 (excl. hab.).—Lamarck, Dict. i, 246; Ill. ii, 42.—Aiton, Hort. Kew. i, 262; 2 ed. ii, 13.—Willdenow, Spec. i, 1090.—Michaux, Fl. Bor.-Am. i, 122.—Pursh, Fl. Am. Sept. i, 155.—Jaume St. Hilaire, Fl. & Pom. Am. Franc. t. 81.

Sideroxylon decandrum, Linnæus, Mant. 48.—Willdenow, Spec. i, 1091.

Syderoxylon læve, Walter, Fl. Caroliniana, 100.

IRON WOOD. SOUTHERN BUCKTHORN.

Coast of Virginia and southern Illinois, south to Mosquito inlet and Caloosa river, Florida, and through southern Missouri, Arkansas, and Texas to the valley of the Rio Concho, Texas.

A small tree, sometimes 9 to 12 meters in height, with a trunk rarely exceeding 0.15 meter in diameter; low, rich soil, or often, in the Atlantic and Gulf states, a low, semi-prostrate shrub, described as—

var. reclinatum, Gray, Syn. Fl. N. America, ii1, 68.

Sideroxylon reclinatum, Michaux, Fl. Bor.-Am. i, 122.

B. reclinata, Ventenat, Choix, t. 22.—Persoon, Syn. i, 237.—Pursh, Fl. Am. Sept. i, 155.—Rœmer & Schultes, Syst. iv, 496.—
Elliott, Sk. i, 287.—Eaton, Manual, 6 ed. 60.—Dietrich, Syn. i, 621.—Don, Miller's Dict. iv, 30.—Loudon, Arboretum, ii, 1193.—A. De Candolle, Prodr. viii, 190.—Darby, Bot. S. States, 428.—Wood, Cl. Book, 501; Bot. & Fl. 210.

Wood heavy, hard, not strong, close-grained, compact; medullary rays numerous, thin; color, light brown or yellow, the sap-wood lighter; specific gravity, 0.7467; ash, 0.81.

182.-Bumelia cuneata, Swartz,

Fl. Ind. Occ. i, 496.—Persoon, Syn. i, 237.—Romer & Schultes, Syst. iv, 498.—Sprengel, Syst. i, 665.—Don, Miller's Dict. iv, 30.—Dietrich, Syn. i, 621.—Grisebach, Fl. British West Indies, 401.—Gray, Syn. Fl. N. America. ii¹, 68.—Hemsley, Bot. Am.-Cent. ii, 297.

Achras cuncifolia, Poiret in Lamarck, Dict. vi, 534.

B. angustifolia, Nuttall, Sylva, iii, 38, t. 93; 2 ed. ii, 106, t. 93.—Cooper in Smithsonian Rep. 1858, 265.

Sideroxylon cuneatum, A. De Candolle, Prodr. viii, 181.

B. parvifolia, A. De Candolle, Prodr. viii, 190.—Chapman, Fl. S. States, 275.—Vasey, Cat. Forest Trees, 19.

B. myrsinifolia, A. De Candolle, Prodr. viii, 192.

B. reclinata, Torrey, Bot. Mex. Boundary Survey, 109 [not Ventenat].

ANTS' WOOD. DOWNWARD PLUM. SAFFRON PLUM.

A small tree, rarely exceeding 4 meters in height, with a trunk sometimes 0.30 meter in diameter.

Semi-tropical Florida, Merritt's island, Indian river, and southward to the southern keys, not rare; west coast, Cedar Keys to cape Romano, rare; rocky shores and in the interior of low, barren keys; Texas, valley of the lower Rio Grande, Ross to Laredo, and southward into northern Mexico; in the West Indies.

Wood heavy, hard, not strong, very close-grained, compact, satiny, susceptible of a beautiful polish; medullary rays numerous, thin; color, light brown or orange, the sap-wood lighter; specific gravity, 0.7959; ash, 1.90.

183.-Mimusops Sieberi, A. De Candolle,

Prodr. viii, 204.—Chapman, Fl. S. States, 275.—Vasey, Cat. Forest Trees, 18.—Gray, Syn. Fl. N. America, iii, 69.

Achras Zapotilla, var. parviflora, Nuttall, Sylva, iii, 28, t. 90; 2 ed. ii, 97, t. 90.

M. dissecta, Grisebach, Fl. British West Indies, 400, in part.

Achras mammosa, Sieber, Pl. Trin. No. 33 [not Linnæus nor Bonpland].

WILD DILLY.

Semi-tropical Florida, on the southern keys, common; in the West Indies.

A small, low, gnarled tree, sometimes 9 meters in height, with a trunk 0.30 to 0.40 meter in diameter; generally hollow and defective.

Wood very heavy, hard, strong, close-grained, inclined to check in drying, susceptible of a beautiful polish; medullary rays numerous, very obscure; color, rich, very dark brown, the sap-wood lighter; specific gravity, 1.0838; ash, 2.61.

EBENACEÆ.

184.—Diospyros Virginiana, Linnæus,

Spec. 1 ed. 1057.—Kalm, Travels, English ed. i, 127, 345.—Marshall, Arbustum, 40.—Wangenheim, Amer. 84, t. 28, f. 58.—Walter, Fl. Caroliniana, 253.—Aiton, Hort. Kew. iii, 446; 2 ed. v, 478.—Abbot, Insects Georgia, ii, t. 61, 74.—B. S. Barton, Coll. i, 11, 45; ii, 52.—Michaux, Fl. Bor.-Am. ii, 258.—Gærtner f. Fruct. Suppl. 138, t. 207.—Willdenow, Spec. iv, 1107; Enum. 1061; Berl. Baumz. 127.—Poiret in Lamarck, Dict. v, 528.—Persoon, Syn. ii, 1806.—Desfontaines, Hist. Arb. i, 208.—Titford, Hort. Bot. Am. 106.—Michaux f. Hist. Arb. Am. ii, 195, t. 12; N. American Sylva, 3 ed. ii, 157, t. 93.—Pursh, Fl. Am. Sept. ii, 265.—Nouveau Duhamel, vi, 84.—Barton, Prodr. Fl. Philadelph. 97; Compend. Fl. Philadelph. ii, 198.—Eaton, Manual, 117; 6 ed. 126.—Nuttall, Genera, ii, 240.—Hayne, Dend. Fl. 228.—Elliott, Sk. ii, 712.—Collin, Förslag af några Nord-Americas Träd. 23.—Torrey, Compend. Fl. N. States, 375.—Audubon, Birds, t. 87.—Sprengel, Syst. ii, 202.—Watson, Dend. Brit. ii, 146.—Rafinesque, Med. Bot. i, 153, t. 32.—Beck, Bot. 229.—Don, Miller's Dict. iv, 39.—Loudon, Arboretum, ii, 1195, t. 200, 201.—Eaton & Wright, Bot. 225.—A. De Candolle, Prodr. iv, 228.—Browne, Trees of America, 368.—Griffith, Med. Bot. 435, f. 196.—Dietrich, Syn. v, 437.—Belg. Hort. iv, 118 & t.—Darby, Bot. S. States, 425.—Darlington, Fl. Cestrica, 3 ed. 176.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 273.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 70.—Lesquereux in Owen's 2d Rep. Arkansas, 374.—"Ettingsh. Blatt-Skel. Dikot. 89, t. 38, f. 12."—Wood, Cl. Book, 500; Bot. & Fl. 209.—Porcher, Resources S. Forests, 385.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 200.—Gray, Manual N. States, 5 ed. 308; Hall's Pl. Texas, 15; Syn. Fl. N. America, ii', 69.—Koch, Dendrologie, ii, 204.—Hiern in Trans. Cambridge Phil. Soc. xii', 224.—Vasey, Cat. Forest Trees, 18.—Broadhead in Coulter's Bot. Gazette, iii, 59.—Ridgway in Proc. U. S. Nat. Mus. 1882, 68.

- D. concolor, Mench, Meth. 471.
- D. Guaiacana, Robin, Voyages, iii, 417.
- D. pubescens, Pursh, Fl. Am. Sept. i, 265 [not Persoon].—Rafinesque, Fl. Ludoviciana, 139.—Don, Miller's Dict. iv; 38.—Loudon, Arboretum, ii, 1196.
- D. Virginiana, var. pubescens, Nuttall, Genera, ii, 240.—Elliott, Sk. ii, 713.
- D. Virginiana, var. microcarpa, Rafinesque, Med. Bot. i, 115.
- D. Virginiana, var. concolor, Rafinesque, Med. Bot. i, 155.
- D. Virginiana, var. macrocarpa, Rafinesque, Med. Bot. i, 155.
- D. Persimon, Wikström, Jahr. Schwed. 1830, 92.
- D. ciliata, Rafinesque, New Fl. & Bot. i, 25 [not A. De Candolle].
- D. calycina, Audibert, Cat. Hort. Tonn. (ex. Spach).—Loudon, Gard. Mag. 1841, 394.
- D. angustifolia. Audibert, Cat. Hort. Tonn. (ex. Spach).-Loudon, Gard. Mag. 1841, 394.
- D. lucida, Hort.-Loudon, Gard. Mag. 1841, 394.
- D. intermedia, Hort.—Loudon, Gard. Mag. 1841, 394.

PERSIMMON.

Light-house point, New Haven, Connecticut, Long Island, New York, and southward to bay Biscayne and the Caloosa river, Florida, southern Alabama and Mississippi; southern Ohio to southeastern Iowa, southern Missouri, Arkansas, eastern Kansas, the Indian territory, and the valley of the Colorado river, Texas.

A tree 10 to 20 or, exceptionally, 30 to 35 meters in height (*Ridgway*), with a trunk sometimes 0.60 meter in diameter; very common and often entirely occupying abandoned fields throughout the middle and lower regions of the southern Atlantic and Gulf states, reaching its greatest development in the rich bottom lands of the lower Ohio basin.

Wood heavy, hard, strong, very close-grained, compact, susceptible of a high polish, containing few scattered, open ducts, the rings of annual growth marked by one or more rows of similar ducts; medullary rays numerous, conspicuous; color, dark brown, or often nearly black, the thick sap-wood light brown, often containing numerous darker spots; specific gravity of the sap-wood, 0.7908; ash, 0.96; used in turnery for shoe-lasts, plane-stocks, etc., and preferred for shuttles; the dark heart-wood only developed in very old specimens and rarely seen.

The yellow edible fruit exceedingly austere until after frost, then becoming sweet and luscious, or in the Gulf states ripening in August without austerity; sometimes used domestically, fermented with hops, corn-meal, or wheat bran, as a beverage under the name of "simmon beer".

A decoction of the bitter and astringent unripe fruit and inner bark occasionally used in the treatment of diarrhea, sore throat, hemorrhage, etc. (B. R. Smith in Am. Jour. Pharm. October, 1846, 215.—J. E. Bryan in same, May, 1860, 215.—U. S. Dispensatory, 14 ed. 380.—Nat. Dispensatory, 2 ed. 514).

185.-Diospyros Texana, Scheele,

Linnea, xxii, 145; Remer, Texas, 441; Appx. 763.—Walpers, Ann. iii, 14.—Torrey, Bot. Mex. Boundary Survey, 109.—Cooper in Smithsonian Rep. 1858, 266.—Young, Bot. Texas, 376.—Hiern in Trans. Cambridge Phil. Soc. xii¹, 238.—Gray, Hall's Pl. Texas, 15; Syn. Fl. N. America, ii¹, 70.—Vasey, Cat. Forest Trees, 18.—Hemsley, Bot. Am.-Cent. ii, 300.

BLACK PERSIMMON. MEXICAN PERSIMMON. CHAPOTE.

Western Texas, Matagorda bay to the valley of the Concho river; southward into northern Mexico.

A small tree, 4 to 10 meters in height, with a trunk sometimes 0.30 meter in diameter, or more often a low shrub; not rare, and reaching its greatest development in Texas along the rich bottoms of the Guadalupe river; borders of prairies, in rich soil; in Mexico more common and of larger size.

Wood heavy, hard, very close-grained, compact, satiny, taking a beautiful polish, containing few minute, scattered, open ducts; medullary rays numerous, thin; color, nearly black, often streaked with yellow, the thick sap-wood clear bright yellow; specific gravity, 0.8460; ash, 3.33; used in turnery for the handles of tools, etc., suitable for wood-engraving, and probably the best substitute among American woods for box-wood.

The small black fruit sweet and insipid.

STYRACACEÆ.

186.—Symplocos tinctoria, L'Heritier,

Trans. Linnæan Soc. i, 176.—Willdenow, Spec. iii, 1436.—Aiton, Hort. Kew. iv, 419.—Sprengel, Syst. iii, 339.—Don, Miller's Dict. iv, 2.—A. De Candolle, Prodr. viii, 254.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 272.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 65.—Lesquereux in Owen's 2d Rep. Arkansas, 374.—Wood, Cl. Book, 499; Bot. & Fl. 209.—Gray, Manual N. States, 5 ed. 310; Syn. Fl. N. America, ii¹, 71.—Young, Bot. Texas, 374.—Vasey, Cat. Forest Trees, 18.

Hopea tinctoria, Linnæus, Mant. 105.—Walter, Fl. Caroliniana, 189.—Michaux, Fl. Bor.-Am. ii, 42.—Persoon, Syn. ii, 72.—
Desfontaines, Hist. Arb. i, 217.—Gærtner f. Fruct. Suppl. 146, t. 209, f. 2.—Robin, Voyages, iii, 419.—Michaux f. Hist.
Arb. Am. iii, 61, t. 9; N. American Sylva, 3 ed. iii, 45, t. 117.—Pursh, Fl. Am. Sept. ii, 451.—Nuttall, Genera, ii, 83.—
Elliott, Sk. ii, 173.—Eaton, Manual, 6 ed. 176.—Spach, Hist. Veg. ix, 420.—Eaton & Wright, Bot. 272.—Darby, Bot.
S. States, 425.—Porcher, Resources S. Forests, 388.

HORSE SUGAR. SWEET LEAF.

Southern Delaware, south to about latitude 30° in Florida, and west through the Gulf states to western Louisiana and southern Arkansas (Malvern, Texarkana, Letterman).

A small tree, 6 to 10 meters in height, with a trunk 0.20 to 0.25 meter in diameter, or often a low shrub; borders of cypress swamps or in deep, damp, shaded woods.

Wood light, soft, not strong, close-grained, checking in drying; medullary rays numerous, thin; color, light red, or often nearly white, the sap-wood lighter; specific gravity, 0.5325; ash, 0.68.

Leaves sweet, greedily eaten by cattle and horses, and yielding, as does also the bark, a yellow dye.

187.—Halesia diptera, Linnæus,

Spec. 2 ed. 636.—Marshall, Arbustum, 57.—Lamarck, Dict. ii, 66.—Willdenow, Spec. ii, 849; Enum. 496; Berl. Baumz. 171.—Cavanilles, Diss. vi, 338, t. 187.—Michaux, Fl. Bor.-Am. ii, 40.—Persoon, Syn. ii, 4.—Aiton, Hort. Kew. 2 ed. iii, 143.—Nouveau Duhamel, v, 144.—Pursh, Fl. Am. Sept. ii, 450.—Nuttall, Genera, ii, 83.—Elliott, Sk. i, 508.—Hayne, Dend. Fl. 66.—Loddiges, Bot. Cab. t. 1172.—Sprengel, Syst. iii, 84.—Eaton, Manual, 6 ed. 164.—Don, Miller's Dict. iv, 7.—Loudon, Arboretum, ii, 1191, f. 1014.—Spach, Hist. Veg. ix, 426.—Eaton & Wright, Bot. 260.—A. De Candolle, Prodr. viii, 270.—Miers, Contrib. i, 193.—Darby, Bot. S. States, 425.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 271.—Wood, Cl. Book, 499; Bot. & Fl. 209.—Koch, Dendrologie, ii, 201.—Vasey, Cat. Forest Trees, 18.—Gray, Syn. Fl. N. America, ii¹, 71.

H. reticulata, Buckley in Proc. Philadelphia Acad. 1860, 444.

SNOW-DROP TREE. SILVER-BELL TREE.

South Carolina to northern Florida, near the coast, and west through the lower region of the Gulf states to eastern Texas and Garland county, Arkansas (Harvey).

A small tree, sometimes 6 to 10 meters in height, with a trunk 0.10 to 0.20 meter in diameter, or often a shrub sending up many clustered stems from the root; borders of swamps, in low, wet woods.

Wood light, soft, strong, very close-grained, compact; medullary rays numerous, thin; color, light brown, the sap-wood lighter; specific gravity, 0.5705; ash, 0.42.

188.-Halesia tetraptera, Linnæus,

Spec. 2 ed. 636.—Marshall, Arbustum, 57.—Gærtner, Fruct. i, 160, t. 32, f. 2.—Lamarck, Dict. ii, 66; Ill. ii, 521, t. 404, f. 1.—Aiton, Hort. Kew. ii, 125; 2 ed. iii, 143.—Mænch, Meth. 507.—Abbot, Insects Georgia i, t. 46.—Willdenow, Spec. ii, 849; Enum. 496; Berl. Baumz. 170.—Cavanilles, Diss. vi, 338, t. 186.—Michaux, Fl. Bor.-Am. ii, 40.—Persoon, Syn. ii, 4.—Desfontaines, Hist. Arb. i, 216.—Nouveau Duhamel, v, 143, t. 45.—Pursh, Fl. Am. Sept. ii, 449.—Nuttall, Genera, ii, 82.—Bot. Mag. t. 910.—Elliott, Sk. i, 507.—Hayne, Dend. Fl. 66.—Loddiges, Bot. Cab. t. 1173.—Sprengel, Syst. iii, 84.—Guimpel, Otto & Hayne, Abb. Holz. 43, t. 35.—Eaton, Manual, 6 ed. 164.—Don, Miller's Dict. iv, 6.—Loudon, Arboretum, ii, 1190, f. 1012, t. 196, 197.—Spach, Hist. Veg. ix, 426.—Eaton & Wright, Bot. 260.—A. De Candolle, Prodr. viii, 270.—Browne, Trees of America, 366.—Miers, Contrib. i, 191, t. 93.—Darby, Bot. S. States, 425.—Cooper in Smithsonian Rep. 1858, 253.—Agardh, Theor. & Syst. Pl. t. 22, f. 16, 17.—Chapman, Fl. S. States, 271.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 80.—Wood, Cl. Book, 499; Bot. & Fl. 209.—Örsted in Saerskitt. Aftryk. af Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 89, f. 2.—Gray, Manual N. States, 5 ed. 310; Syn. Fl. N. America, ii¹, 71.—Koch, Dendrologie, ii, 199.—Young, Bot. Texas, 374.—Vasey, Cat. Forest Trees, 18.

RATTLEBOX. SNOW-DROP TREE. SILVER-BELL TREE. CALICO WOOD.

Mountains of West Virginia to southern Illinois, south to middle Florida, central Alabama and Mississippi, and through Arkansas to western Louisiana and eastern Texas.

A tree 10 to 15 meters in height, with a trunk rarely 0.60 meter in diameter, or often a tall shrub; generally along streams, in rich soil; most common and reaching its greatest development in the southern Alleghany mountains; common in cultivation.

Wood light, soft, close-grained, compact; medullary rays numerous, thin; color, light brown, the sap-wood lighter; specific gravity, 0.5628; ash, 0.40.

Note.—Halesia parviflora, Michaux, of southern Georgia, and Florida, does not attain the size or habit of a tree.

OLEACEÆ.

189.-Fraxinus Greggii, Gray,

Proc. Am. Acad. vii, 64; Syn. Fl. N. America, ii¹, 74.—Hemsley, Bot. Am.-Cent. ii, 305.

F. Schiedeana, var. parvifolia, Torrey, Bot. Mex. Boundary Survey, 166.

Western Texas, valley of the Rio Grande, from the San Pedro to the Pecos river; southward into Mexico. A small tree, sometimes 7 to 9 meters in height, with a trunk 0.10 to 0.15 meter in diameter (Lampasas mountains, Mexico, Buckley), or often a graceful shrub; limestone soil.

Wood heavy, hard, very close-grained, compact; layers of annual growth and medullary rays obscure; color, brown, the sap-wood lighter; specific gravity, 0.7904; ash, 0.93.

190.-Fraxinus anomala, Torrey;

Watson in King's Rep. v, 283.—Parry in Am. Nat. ix, 203.—Vasey, Cat. Forest Trees, 20.—Gray, Syn. Fl. N. America, ii¹, 74.

Southwestern Colorado, McElmo river (Brandegee), southern Utah, Kanawa, Leeds, Silver Leaf, Labyrinth cañon of the Colorado river, valley of the Rio Virgen, near Saint George.

A small tree, sometimes 6 meters in height, with a trunk 0.15 to 0.20 meter in diameter, with the habit of a dwarf pear tree; common on elevated sandstone mesas and plateaus.

Wood heavy, hard, coarse-grained, containing many large, open, scattered ducts, the layers of annual growth marked by several rows of similar ducts; medullary rays numerous, thin; color, light brown, the sap-wood lighter; specific gravity, 0.6597; ash, 0.85.

191.—Fraxinus pistaciæfolia, Torrey,

Pacific R. R. Rep. iv, 128; Bot. Mex. Boundary Survey, 166.—Cooper in Smithsonian Rep. 1858, 260.—Gray, Hall's Pl. Texas, 19; Syn. Fl. N. America, ii¹, 74.—Vasey, Cat. Forest Trees, 20.—Rusby in Bull. Torrey Bot. Club. ix, 54.—Hemsley, Bot. Am.-Cent. ii, 305.—Watson in Proc. Am. Acad. xviii, 113.

F. velutina, Torrey in Emory's Rep. 149.

F. coriacea, Watson in Am. Nat. vii, 302, in part.—Rothrock in Wheeler's Rep. vi, 186, t. 22.—Vasey, Cat. Forest Trees, 20.

F. pistaciæfolia, var. coriacea, Gray, Syn. Fl. N. America, ii¹, 74.

ASH.

Mountains of western Texas, through southern New Mexico, southern and eastern Arizona, to southern Nevada (Ash Meadows, Rothrock); in northern Mexico.

A small tree, 10 to 12 meters in height, with a trunk rarely 0.45 meter in diameter; generally along borders of streams, in elevated cañons, less commonly in dry soil, the foliage then thick and coriaceous or, more rarely, velvety tomentose (var. coriacea, Gray, l. c.); the large specimens generally hollow and defective.

Wood heavy, soft, not strong, coarse-grained, compact; medullary rays numerous, thin; color, light brown, the sap-wood lighter; specific gravity, 0.6810; ash, 0.62; occasionally used in wagon-building, for ax handles, etc.

192.-Fraxinus Americana, Linnæus,

- Spec. 2 ed. 1510.—Walter, Fl. Caroliniana, 254.—Aiton, Hort. Kew. iii, 445; 2 ed. v, 476.—Willdenow, Spec. iv, 1102; Enum. 1060; Berl. Baumz. 145.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 393.—Vahl Enum. i, 49.—Persoon, Syn. ii, 604.—Desfontaines, Hist. Arb. i, 102.—Nouveau Duhamel, iv, 63.—Michaux f. Hist. Arb. Am. iii, 106, t. 8; N. American Sylva, 3 ed. iii, 49, t. 118 (excl. fruit).—Barton, Prodr. Fl. Philadelph. 97; Compend. Fl. Philadelph. ii, 192.—Eaton, Manual, 114.—Hayne, Dend. Fl. 221.—Cobbett, Woodlands, 131.—Sprengel, Syst. i, 95.—Beck, Bot. 232.—Loudon, Arboretum, ii, 1232, f. 1055 & t.—Penn. Cycl. x, 455.—Bigelow, Fl. Boston. 3 ed. 408.—Hooker, Fl. Bor.-Am. ii, 51.—Torrey, Fl. N. York, ii, 125, t. 89.—A. De Candolle, Prodr. viii, 177.—Browne, Trees of America, 394.—Darlington, Fl. Cestrica, 3 ed. 238.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 369.—Curtis in Geological Rep. N. Carolina, 1860, iii, 54.—Wood, Cl. Book, 597; Bot. & Fl. 277.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 206.—Porcher, Resources S. Forests, 494.—Gray, Manual N. States, 5 ed. 401; Hall's Pl. Texas, 19; Syn. Fl. N. America, ii¹, 74.—Koch, Dendrologie, ii, 252.—Young, Bot. Texas, 452.—Vasey, Cat. Forest Trees, 20.—Macoun in Geological Rep. Canada, 1875–776, 207.—Sears in Bull. Essex Inst. xiii, 177.—Bell in Geological Rep. Canada, 1879–780, 52°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 68.
 - F. Caroliniensis, Wangenheim, Amer. 81.
 - F. alba, Marshall, Arbustum, 51.—Hayne, Dend. Fl. 223.
 - F. acuminata, Lamarck, Dict. ii, 542.—Bose in Mem. Inst. 1808, 205.—Pursh, Fl. Am. Sept. ii, 9.—Nuttall, Genera, ii, 231; Sylva, iii, 64; 2 ed. ii, 129.—Hayne, Dend. Fl. 220.—Elliott, Sk. ii, 672.—Sprengel, Syst. i, 95.—Torrey, Compend. Fl. N. States, 371; Nicollet's Rep. 154.—Romer & Schultes, Syst. iii, 277.—Darlington, Fl. Cestrica, 2 ed. 8.—Eaton, Manual, 6 ed. 148.—Beck, Bot. 232.—Don, Miller's Dict. iv, 56.—Eaton & Wright, Bot. 247.—Emerson, Trees Massachusetts, 333; 2 ed. ii, 376 & t.—Darby, Bot. S. States, 429.—Porcher, Resources S. Forests, 494.
 - F. juglandifolia, Lamarck, Dict. ii, 542.—Bosc in Mem. Inst. 1808, 208.—Desfontaines, Hist. Arb. i, 103.—Hayne, Dend. Fl. 221.—Beck, Bot. 232.—Don, Miller's Dict. iv, 55.
 - F. Canadensis, Gærtner, Fruct. i, 222, t. 49.
 - F. epiptera, Michaux, Fl. Bor.-Am. ii, 256.—Vahl, Enum. i, 50.—Willdenow, Spec. iv, 1102; Berl. Baumz. 147.—Persoon, Syn. ii, 603 —Desfontaines, Hist. Arb. i, 103.—Poiret, Suppl. ii, 671.—Nuttall, Genera, ii, 231.—Pursh, Fl. Am. Sept. i, 8.— Elliott, Sk. ii, 672.—Sprengel, Syst. i, 96.—Rœmer & Schultes, Syst. 278.—Eaton, Manual, 6 ed. 148.—Don, Miller's Dict. iv, 55.—Loudon, Arboretum, ii, 1237.—Penn. Cycl. x, 455.—Eaton & Wright, Bot. 247.—Hooker, Fl. Bor.-Am. ii, 50.— A. De Candolle, Prodr. viii, 277.—Darby, Bot. S. States, 429.—Cooper in Smithsonian Rep. 1858, 399.
 - F. lancea, Bosc in Mem. Inst. 1808, 209 (fide Loudon, Arboretum, ii, 1237).
 - F. discolor, Muhlenberg, Cat. 111.—Rafinesque, Fl. Ludoviciana, 37.—Spach, Hist. Veg. viii, 297.
 - F. Americana, var. latifolia, Loudon, Arboretum, ii, 1232.—Browne, Trees of America, 396.
 - ? F. juglandifolia, var. serrata, Hayne, Dend. Fl. 221.
 - ? F. juglandifolia, var. subserrata, Hayne, Dend. Fl. 221.

WHITE ASH.

Nova Scotia, New Brunswick, southern Ontario to northern Minnesota, south to northern Florida, central Alabama and Mississippi, and west to eastern Nebraska, eastern Kansas, the Indian territory, and the valley of the Trinity river, Texas.

A large tree of the first economic value, 15 to 30 or, exceptionally, 42 meters (*Ridgway*) in height, with a trunk 1.20 to 1.80 meter in diameter; low, rich, rather moist soil, reaching its greatest development in the bottom lands of the lower Ohio River basin; toward its western and southwestern limits smaller, of less economic value, and generally replaced by the green ash (*Fraxinus viridis*).

A form of the southern states with remarkably small fruit has been described as-

var. microcarpa, Gray, Syn. Fl. N. America, ii1, 75.

- F. albicans, Buckley in Proc. Philadelphia Acad. 1862, 4, in part.
- F. Curtissii, Vasey, Cat. Forest Trees, 20.

Wood heavy, hard, strong, ultimately brittle, coarse-grained, compact; layers of annual growth clearly marked by several rows of large open ducts, occupying in slowly-grown specimens nearly the entire width of the annual rings; medullary rays numerous, obscure; color, brown, the sap-wood much lighter, often nearly white; specific gravity, 0.6543; ash, 0.42; specific gravity of the heavier sap-wood, 0.7180; largely used in the manufacture of agricultural implements, carriages, handles, oars, and for interior and cabinet work.

Var. Texensis,

Gray, Syn. Fl. N. America, ii1, 75.

- F. albicans, Buckley in Proc. Philadelphia Acad. 1862, 4, in part.
- F. coriacea, Watson in Am. Nat. vii, 302, in part.
- F. pistaciæfolia, Gray, Hall's Pl. Texas, 19 [not Torrey].

Western Texas, Dallas (Reverchon), to the valley of the Devil's river.

A small tree, 10 to 12 meters in height, with a trunk sometimes 0.60 meter in diameter; dry, rocky hills and ridges.

Wood heavy, hard, strong, rather close-grained, compact; layers of annual growth marked by one or more rows of open ducts; medullary rays numerous, obscure; color, light brown, the sap-wood lighter; specific gravity, 0.7636; ash, 0.70; used for the same purposes as that of the species.

193.-Fraxinus pubescens, Lamarck,

- Dict. ii, 548.—Walter, Fl. Caroliniana, 254.—Willdenow, Spec. iv, 1103; Enum. 1060; Berl. Baumz. 148.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 393.—Vahl, Enum. i, 51.—Persoon, Syn. ii, 604.—Desfontaines, Hist. Arb. i, 102.—Nouveau Duhamel, iv, 62.—Aiton, Hort. Kew. 2 ed. v, 476.—Pursh, Fl. Am. Sept. i, 9.—Rœmer & Schultes, Syst. 279.—Nuttall, Genera, ii, 231.—Hayne, Dend. Fl. 223.—Elliott, Sk. ii, 673.—Sprengel, Syst. i, 95.—Torrey, Compend. Fl. N. States, 371; Fl. N. York, ii, 126.—Beck, Bot. 232.—Eaton, Manual, 6 ed. 148.—Don, Miller's Dict. iv, 55.—Loudon, Arboretum, ii, 1233, f. 1056.—Penn. Cycl. x, 455.—Eaton & Wright, Bot. 247.—Hooker, Fl. Bor.-Am. ii, 51.—A. De Candolle, Prodr. viii, 278.—Emerson, Trees Massachusetts, 337; 2 ed. ii, 380.—Darlington, Fl. Cestrica, 3 ed. 239.—Darby, Bot. S. States, 429.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 370.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 54.—Wood, Cl. Book, 597; Bot. & Fl. 277.—Gray, Manual N. States, 5 ed. 402; Syn. Fl. N. America, ii¹, 75.—Young, Bot. Texas, 452.—Vasey, Cat. Forest Trees, 20.—Sears in Bull. Essex Inst. xiii, 177.—Ridgway in Proc. U. S. Nat. Mus, 1882, 69.
 - F. Pennsylvanica, Marshall, Arbustum, 51.-Koch, Dendrologie, ii, 253.
 - F. nigra, Du Roi, Harbk. 2 ed. i, 398 [not Marshall].
 - F. pubescens, var. longifolia, Willdenow, Spec. iv, 1104.—Vahl, Enum. i, 52.—Pursh, Fl. Am. Sept. ii, 9.—Loddiges, Cat. ed. 1836.—Loudon, Arboretum, ii, 1233.—A. De Candolle, Prodr. viii, 278.
 - F. pubescens, var. latifolia, Willdenow, Spec. iv, 1104.—Vahl, Enum. i, 52.—Pursh, Fl. Am. Sept. i, 9.—Hayne, Dend. Fl. 223.—Eaton, Manual, 6 ed. 148.—Loudon, Arboretum, ii, 1233.—A. De Candolle, Prodr. viii, 278.
 - F. pubescens, var. subpubescens, Persoon, Syn. ii, 605.—Pursh, Fl. Am. Sept. i, 9.—Eaton, Manual, 6 ed. 148.—Loudon, Arboretum, ii, 1234.—A. De Candolle, Prodr. viii, 278.—Browne, Trees of America, 395.
 - F. longifolia, Bosc in Mem. Inst. 1808, 209.
 - F. subvillosa, Bosc in Mem. Inst. 1808, 209.
 - F. tomentosa, Michaux f. Hist. Arb. Am. iii, 112, t. 9; N. American Sylva, 3 ed. iii, 53, t. 119.—Barton, Compend. Fl. Philadelph. ii, 192.
 - F. Americana, var. pubescens, Browne, Trees of America, 395.
 - F. oblongocarpa, Buckley in Proc. Philadelphia Acad. 1864, 4.

RED ASH.

New Brunswick to southern Ontario and northern Minnesota, south to northern Florida and central Alabama. A tree 12 to 15 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; borders of streams and swamps, in low ground; common and reaching its greatest development in the north Atlantic states; rare west of the Alleghany mountains, probably not extending west of the Mississippi river.

Wood heavy, hard, strong, brittle, coarse-grained, compact; medullary rays numerous, thin; color, rich brown, the sap-wood light brown streaked with yellow; specific gravity, 0.6251; ash, 0.26; specific gravity of the lighter sap-wood, 0.5609; somewhat used as a substitute for the more valuable white ash, with which it is often confounded.

194.-Fraxinus viridis, Michaux f.

- Hist. Arb. Am. iii, 115, t. 10; N. American Sylva, 3 ed. iii, 54, t. 120 (excl. fruit).—Hayne, Dend. Fl. 222.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 370.—Gray in Pacific R. R. Rep. xii², 46; Manual N. States, 5 ed. 402; Hall's Pl. Texas, 19; Syn. Fl. N. America, ii¹, 75.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 54.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Wood, Cl. Book, 598; Bot. & Fl. 277.—Watson in King's Rep. v, 284.—Young, Bot. Texas, 453.—Vasey, Cat. Forest Trees, 20.—Macoun in Geological Rep. Canada, 1875—76, 207.—Bell in Geological Rep. Canada, 1879—'80, 49.—Hemsley, Bot. Am.-Cent. ii, 305.—Burgess in Coulter's Bot. Gazette, vii, 95.
 - F. juglandifolia, Willdenow, Spec. iv, 1104; Enum. 1060; Berl. Baumz. 140 [not Lamarck].—Vahl, Enum. i, 50.—Persoon, Syn. ii, 604.—Nouveau Duhamel, iv, 63, t. 16.—Aiton, Hort. Kew. 2 ed. v, 476.—Pursh, Fl. Am. Sept. i, 9.—Ræmer & Schultes, Syst. i, 278; iii, Suppl. 255.—Eaton, Manual, 114.—Sprengel, Syst. i, 95.—Torrey, Compend. Fl. N. States, 371.—Beck, Bot. 233.—Don, Miller's Dict. iv, 55.—Loudon, Arboretum, ii, 1236, f. 1061, 1062 & t.—Eaton & Wright, Bot. 247.—Gray, Manual N. States, 1 ed. 373.
 - 9F. Caroliniana, Willdenow, Spec. iv, 1103; Enum. 1060; Berl. Baumz. 148.—Vahl, Enum. i, 51.—Du Roi, Harbk. 2 ed. i, 400.—Persoon, Syn. ii, 605.—Desfontaines, Hist. Arb. i, 103.—Nouveau Duhamel, iv, 62.—Pursh, Fl. Am. Sept. i, 9.—Nuttall, Genera, ii, 231.—Elliott, Sk. ii, 673.—Hayne, Dend. Fl. 223.—Sprengel, Syst. i, 95.—Eaton, Manual, 6 ed. 148.—Don, Miller's Dict. iv, 55.—Eaton & Wright, Bot. 147.—Darby, Bot. S. States, 429.
 - F. juglandifolia, var. subintegerrima, Vahl, Enum. i, 50.
 - F. expansa, Willdenow, Berl. Baumz. 150.—Romer & Schultes, Syst. i, 279.—Don, Miller's Dict. iv, 55.—Loudon, Arboretum, ii, 1238.—A. De Candolle, Prodr. viii, 278.—Browne, Trees of America, 399.
 - F. Americana, var. juglandifolia, Browne, Trees of America, 398.
 - F. Novæ-Angliæ, Koch, Dendrologie, ii, 251 [not Miller nor Wangenheim]

GREEN ASH.

Shores of lake Champlain, Tiverton, Rhode Island, and southward to northern Florida, west to the valley of the Saskatchewan, the eastern ranges of the Rocky mountains of Montana, the Wahsatch mountains of Utah, and the ranges of eastern and northern Arizona.

A tree 15 to 18 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; borders of streams or in low, rather moist soil; at the west confined to the bottom lands of the large streams and to high mountain canons.

Wood heavy, hard, strong, brittle, rather coarse-grained, compact, satiny, containing numerous scattered, small, open ducts, the layers of annual growth marked by several rows of larger ducts; medullary rays numerous, obscure; color, brown, the sap-wood lighter; specific gravity, 0.7117; ash, 0.65; inferior in quality, although often used as a substitute for white ash.

Var. Berlandieriana, Torrey,

Bot. Mex. Boundary Survey, 166.—Gray, Syn. Fl. N. America, ii¹, 75.—Hemsley, Bot. Am.-Cent. ii, 305.—Watson in Proc. Am. Acad. xviii, 113.

- F. Berlandieriana, De Candolle, Prodr. viii, 278.
- F. trialata, Buckley in Proc. Philadelphia Acad. 1862, 5.

Texas, west of the Colorado river; southward into northern Mexico.

A small tree, 9 to 12 meters in height, with a trunk rarely exceeding 0.30 meter in diameter; borders of streams, in low, rich soil.

Wood light, soft, rather close-grained, compact, containing few small, scattered, open ducts, the layers of annual growth clearly marked by one or two rows of larger ducts; medullary rays numerous, obscure; color, light brown, the sap-wood lighter; specific gravity, 0.5780; ash, 0.54.

195 .- Fraxinus platycarpa, Michaux,

- Fl. Bor.-Am. ii, 256.—Vahl, Enum. i, 49.—Persoon, Syn. ii, 605.—Desfontaines, Hist. Arb. i, 103.—Nouveau Duhamel, iv, 64.—Michaux f. Hist. Arb. Am. iii, 128, t. 13; N. American Sylva, 3 ed. iii, 63, t. 124.—Poiret, Suppl. ii, 671.—Pursh, Fl. Am. Sept. i, 9.—Romer & Schultes, Syst. i, 278.—Nuttall, Genera, ii, 231.—Hayne, Dend. Fl. 225.—Elliott, Sk. ii, 673.—Sprengel, Syst. i, 96.—Eaton, Manual, 6 ed. 149.—Don, Miller's Dict. iv, 55.—Eaton & Wright, Bot, 247.—A. De Candolle, Prodr. viii, 277.—Darby, Bot. S. States, 429.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 370.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 53.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Wood, Cl. Book, 598; Bot. & Fl. 277.—Gray, Manual N. States, 5 ed. 402; Syn. Fl. N. America, ii¹, 75.—Young, Bot. Texas, 453.—Vasey, Cat. Forest Trees, 20.
 - F. Caroliniana, Miller, Dict. No. 6.—Lamarck, Dict. ii, 518.—Romer & Schultes, Syst. i, 278.—Don, Miller's Dict, iv, 55.—Loudon, Arboretum, ii, 1237.—Koch, Dendrologie, ii, 258.
 - F. excelsior, Walter, Fl. Caroliniana, 254 [not Linnæus].
 - F. Americana, Marshall, Arbustum, 50 [not Linnæus].
 - F. pallida, Bosc in Mem. Inst. 1808, 209.
 - F. pubescens, Bosc in Mem. Inst. 1808, 210 [not Lamarck].
 - F. triptera, Nuttall, Genera, ii, 232; Sylva, iii, 62, t. 100; 2 ed. 127, t. 100.—Elliott, Sk. ii, 674.—Don, Miller's Dict, iv, 56.—Loudon, Arboretum, ii, 1240.—A. De Candolle, Prodr. viii, 274.—Darby, Bot. S. States, 429.
 - F. curvidens, Hoffmannsegg, Verz. d. Pflanzenkult. 29.
 - F. pauciflora, Nuttall, Sylva, iii, 61, t. 100; 2 ed. ii, 126, t. 100.
 - F. Americana, var. Caroliniana, Browne, Trees of America, 398
 - F. Americana, var. triptera, Browne, Trees of America, 399.
 - F. Nuttallii, Buckley in Proc. Philadelphia Acad. 1860, 444.
 - F. nigrescens, Buckley in Proc. Philadelphia Acad. 1862, 5.

WATER ASH.

Southeastern Virginia, south near the coast to cape Canaveral and the Caloosa river, Florida, west through the Gulf states to the valley of the Sabine river, Texas, and the Washita river, southwestern Arkansas; in the West Indies.

A small tree, 9 to 12 meters in height, with a trunk rarely exceeding 0.30 meter in diameter; deep river swamps.

Wood very light, soft, not strong, brittle, close-grained, compact, the open ducts not conspicuous; medullary rays few, obscure; color, nearly white, or sometimes tinged with yellow, the sap-wood lighter; specific gravity, 0.3541; ash, 0.73.

196.—Fraxinus quadrangulata, Michaux,

- Fl. Bor.-Am. ii, 255.—Willdenow, Spec. iv, 1104.—Vahl, Enum. i, 50.—Persoon, Syn. ii, 605.—Bosc in Mem. Inst. 1808, 211.—Desfontaines, Hist. Arb. i, 103.—Nouveau Duhamel, iv, 64.—Michaux f. Hist. Arb. Am. iii, 118, t. 11; 2 ed. iii, 61, t. 123.—Poiret, Suppl. ii, 671.—Pursh, Fl. Am. Sept. i, 8.—Rœmer & Schultes, Syst. i, 278.—Nuttall, Genera, ii, 231.—Hayne, Dend. Fl. 223.—Sprengel, Syst. i, 96.—Eaton, Manual, 6 ed. 149.—Don, Miller's Dict. iv, 55.—Loudon, Arboretum, ii, 1235, f. 1059, 1060.—Spach, Hist. Veg. viii, 296.—Penn. Cycl. x, 455.—Eaton & Wright, Bot. 247.—A. De Candolle, Prodr. viii, 278.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 370.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Wood, Cl. Book, 598; Bot. & Fl. 277.—Gray, Manual N. States, 5 ed. 402; Syn. Fl. N. America, ii¹, 75.—Koch, Dendrologie, ii, 259.—Young, Bot. Texas, 453.—Vasey, Cat. Forest Trees, 20.—Engelmann in Coulter's Bot. Gazette, v, 63.—Ridgway in Proc. U. S. Nat. Mus. 1882, 69.—Burgess in Coulter's Bot. Gazette, vii, 95.
 - F. tetragona, Cels in Nouv. Cours, Agr. vii, 73.
 - F. quadrangularis, Loddiges, Cat. 1836.
 - F. nervosa, Loddiges, Cat. 1836.
 - F. quadrangulata, var. nervosa, Loudon, Arboretum, ii, 1235.
 - F. Americana, var. quadrangulata, Browne, Trees of America, 397.
 - F. Americana, var. quadrangulata nervosa, Browne, Trees of America, 397.

BLUE ASH.

Southern Michigan to central Minuesota, south to northern Alabama, and through Iowa and Missouri to northeastern Arkansas (Duvall's bluff, Letterman).

A tree 18 to 25 or, exceptionally, 37 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; generally on limestone hills, rarely extending into the bottom lands, and reaching its greatest development in the basin of the lower Wabash river.

Wood heavy, hard, not strong, brittle, close-grained, compact, satiny; layers of annual growth clearly marked by one to three rows of large open ducts; medullary rays numerous, obscure; color, light yellow streaked with brown, the sap-wood lighter; specific gravity, 0.7184; ash, 0.78; largely used for flooring, in carriage-building, etc. The inner bark, macerated, dyes blue.

197.—Fraxinus Oregana, Nuttall,

Sylva, iii, 59, t. 99; 2 ed. ii, 124, t. 99.—Torrey in Pacific R. R. Rep. iv, 128.—Newberry in Pacific R. R. Rep. vi, 25, 87.—Cooper in Smithsonian Rep. 1858, 260; Pacific R. R. Rep. xii², 28, 68; Am. Nat. iii, 407.—Koch, Dendrologie, ii, 260.—Gray in Bot. California, i, 472; Syn. Fl. N. America, ii¹, 76.—Vasey, Cat. Forest Trees, 20.

F. pubescens, var. Hooker, Fl. Bor.-Am. ii, 51.

F. grandifolia, Bentham, Bot. Sulphur, 33.

OREGON ASH.

Shores of Puget sound, south through Washington territory and Oregon west of the eastern valleys of the Cascade mountains, along the California Coast ranges to San Francisco bay and the western slopes of the Sierra Nevada to the San Bernardino and Hot Spring mountains, California.

A tree sometimes 24 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; moist soil, generally along streams, and reaching its greatest development in the bottom lands of southwestern Oregon.

Wood light, hard, not strong, brittle, coarse-grained, compact, containing many large, open, scattered ducts, the layers of annual growth strongly marked with several rows of similar ducts; medullary rays numerous, thin; color, brown, the sap-wood lighter; specific gravity, 0.5731; ash, 0.34; specific gravity of the lighter sap-wood, 0.5630; used in the manufacture of furniture, for the frames of carriages and wagons, in cooperage, for fuel, etc.

198.—Fraxinus sambucifolia, Lamarck,

Dict. ii, 549.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 393.—Willdenow, Spec. iv, 1099; Enum. 1059; Berl. Baumz. 150.—Vahl, Enum. i, 51.—Persoon, Syn. ii, 605.—Desfontaines, Hist. Arb. i, 103.—Bose in Mem. Inst. 1808, 211.—Nouveau Duhamel, iv, 60.—Aiton, Hort. Kew. v, 475.—Michaux f. Hist. Arb. Am. iii, 122, t. 12; N. American Sylva, 3 ed. iii, 159, t. 122.—Pursh, Fl. Am. Sept. i, 8.—Ræmer & Schultes, Syst. i, 279.—Nuttall, Genera, ii, 231.—Barton, Compend. Fl. Philadelph. ii, 192.—Hayne, Dend. Fl. 224.—Torrey, Compend. Fl. N. States, 371; Fl. N. York, ii, 126.—Beck, Bot. 232.—Eaton, Manual, 6 ed. 148.—Don, Miller's Dict. iv, 54.—Loudon, Arboretum, ii, 1234, f. 1057, 1058.—Spach, Hist. Veg. viii, 299.—Hooker, Fl. Bor.-Am. ii, 50.—Eaton & Wright, Bot. 147.—A. De Candolle, Prodr. viii, 278.—Emerson, Trees Massachusetts, 338; 2 ed. ii, 381 & t.—Darlington, Fl. Cestrica, 3 ed. 239.—Cooper in Smithsonian Rep. 1858, 253.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Wood, Cl. Book, 598; Bot. & Fl. 277.—Gray, Manual N. States, 5 ed. 402; Syn. Fl. N. America, ii¹, 76.—Vasey, Cat. Forest Trees, 20.—Ridgway in Proc. U. S. Nat. Mus. 1882, 69.—Bell in Geological Rep. Canada, 1879-'80, 48c.

F. nigra, Marshall, Arbustum, 51.

F. Novæ-Angliæ, Wangenheim, Amer. 51.

F. crispa, Hort.

F. sambucifolia, var. crispa, Loddiges, Cat. 1836.—Loudon, Arboretum, ii, 1234.

F. Americana, var. sambucifolia, Browne, Trees of America, 393-

BLACK ASH. HOOP ASH. GROUND ASH.

Southern Newfoundland, along the northern shores of the gulf of Saint Lawrence, southwesterly to the eastern shores of lake Winnipeg, south through the northern states to New Castle county, Delaware, the mountains of Virginia, southern Illinois, and northwestern Arkansas.

A tree 25 to 30 meters in height, with a trunk 0.30 to 0.60 meter in diameter; swamps and low river banks; the most northern representative of the genus in America.

Wood heavy, soft, not strong, tough, rather coarse-grained, compact, durable, separating easily into thin layers; layers of annual growth strongly marked by several rows of large open ducts; medullary rays numerous,

thin; color, dark brown, the sap-wood light brown, or often nearly white; specific gravity, 0.6318; ash, 0.72; specific gravity of the heavier sap-wood, 0.7465; largely used for interior finish, fencing, barrel hoops, in cabinet-making, and the manufacture of baskets.

NOTE.—Frazinus dipetala, Hooker & Arnott, of the California Coast ranges and the western slopes of the southern Sierra Nevadas, and F. cuspidata, Torrey, of the valley of the Rio Grande, do not attain arborescent habit or dimensions.

The following, characterized by Bosc in Mem. Inst. 1808, mainly from the foliage of garden specimens of supposed North American origin, cannot be safely referred to our species: F. alba, cinerea, elliptica, fusca, mixta, nigra, ovata, pannosa, pulverulenta, Richardi, rubicunda, and rufa.

199.-Forestiera acuminata, Poiret,

Suppl. ii, 664.—Hayne, Dend. Fl. 194.—Nuttall in Trans. Am. Phil. Soc. new ser. v, 176.—Torrey in Nicollet's Rep. 154.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v, 262.—Chapman, Fl. S. States, 370.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Wood, Cl. Book, 600; Bot. & Fl. 277.—Gray, Manual N. States, 5 ed. 402; Proc. Am. Acad. iv, 363 (excl. var.); Syn. Fl. N. America, ii¹, 76.—Koch, Dendrologie, ii, 224.—Vasey, Cat. Forest Trees, 20.

Adelia acuminata, Michaux, Fl. Bor.-Am. ii, 225, t. 48.

Borya acuminata, Willdenow, Spec. iv, 711.—Aiton, Hort. Kew. 2 ed. 366.—Elliott, Sk. ii, 675.—Eaton, Manual, 6 ed. 57.—Eaton & Wright, Bot. 159.

Borya ligustrina, Willdenow, Spec. iv, 711, in part.—Aiton, Hort. Kew. 2 ed. 366, in part.—Gray, Manual N. States, 2 ed. 358, in part.

Borya nitida, Willdenow, Enum. Suppl. 66.

Bigelovia acuminata, Smith in Rees' Cycl. xxxix, No. 4.

PRIVET.

Western Georgia, western Florida, through the Gulf states to the valley of the Colorado river, Texas, and northward through Arkansas to southern Missouri and Cahokia creek, Illinois (opposite Saint Louis).

A small tree, 6 to 8 meters in height, with a trunk rarely 0.20 meter in diameter; borders of swamps and streams, in low, wet soil; common in the Gulf region, near the coast, and reaching its greatest development in southern Arkansas.

Wood heavy, soft, not strong, brittle, close-grained, compact; medullary rays numerous, thin, rather conspicuous; color, light yellow streaked with brown; the sap-wood lighter; specific gravity, 0.6345; ash, 0.72.

200.-Chionanthus Virginica, Linnæus,

Spec. 1 ed. 8.—Marshall, Arbustum, 33.—Walter, Fl. Caroliniana, 60.—Wangenheim, Amer. 92.—Aiton, Hort. Kew. iii, 14; 2 ed. i, 23.—Lamarck, Ill. i, 30, t. 9, f. 1.—Willdenow, Spec. i, 46; Enum. 14; Berl. Baumz. 87.—Abbot, Insects Georgia, ii, t. 98.—Michaux, Fl. Bor.-Am. i, 3.—Vahl, Enum. i, 44.—Persoon, Syn. i, 9.—Desfontaines, Hist. Arb. i, 111.—Pursh, Fl. Am. Sept. i, 7.—Remer & Schultes, Syst. i, 72.—Nuttall, Genera, i, 5; Sylva, iii, 56, t. 88; 2 ed. ii, 122, t. 88.—Elliott, Sk. i, 6.—Hayne, Dend. Fl. 2.—Torrey, Fl. U. S. i, 7; Compend. Fl. N. States, 17.—Sprengel, Syst. i, 34.—Loddiges, Bot. Cab. t. 1264.—Guimpel, Otto & Hayne, Abb. Holz. 93, t. 73.—Beck, Bot. 232.—Eaton, Manual, 6 ed. 92.—Don, Miller's Dict. iv, 50.—Loudon, Arboretum, ii, 1206, f. 1029, 1030.—Spach, Hist. Veg. viii, 259.—Dietrich, Syn. i, 37.—Eaton & Wright, Bot. 193.—A. De Candolle, Prodr. viii, 295.—Browne, Trees of America, 371.—Darlington, Fl. Cestrica, 3 ed. 238.—Darby, Bot. S. States, 429.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 369.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 95.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Wood, Cl. Book, 599; Bot. & Fl. 276.—Porcher, Resources S. Forests, 494.—Gray, Manual N. States, 5 ed. 401; Hall's Pl. Texas, 19; Syn. Fl. N. America, ii¹, 77.—Koch, Dendrologie, ii, 262.—Young, Bot. Texas, 452.—Vasey, Cat. Forest Trees, 20.

- C. trifida, Monch, Meth. 437.
- C. Virginica, var. latifolia, Vahl, Enum. i, 44.—Aiton, Hort. Kew. 2 ed. i, 23.—Pursh, Fl. Am. Sept. i, 8.—Hayne, Dend. Fl. 2.—Don, Miller's Dict. iv, 50.
- C. Virginica, var. angustifolia, Vahl, Enum. i, 44.—Aiton, Hort. Kew. 2 ed. i, 23.—Hayne, Dend. Fl. 2.—Watson, Dend. Brit. i, t. 1.—Don, Miller's Dict. iv, 50.
- C. Virginica, var. montana, Pursh, Fl. Am. Sept. i, 8.—Torrey, Fl. U. S. i, 7; Compend. Fl. N. Scates, 17.—Beck, Bot. 232.—Eaton, Manual, 6 ed. 92.—Eaton & Wright, Bot. 194.—A. De Candolle, Prodr. viii, 295.
- O. Virginica, Var. maritima, Pursh, Fl. Am. Sept. i, 8.—Torrey, Fl. U. S. i, 7; Compend. Fl. N. States, 17.—Beck, Bot. 232.—Eaton, Manual, 6 ed. 92.—Don, Miller's Dict. iv, 50.—Eaton & Wright, Bot. 194.—A. De Candolle, Prodr. viii, 295.—Regel, Gartenflora, xvi, t. 564.
- C. maritima, Loddiges, Cat. 1836.
- C. heterophylla, Rafinesque, New Fl. & Bot. i, 86.
- C. longifolia, Rafinesque, New Fl. & Bot. i, 87.
- C. montana, Rafinesque, New Fl. & Bot. i, 88.
- C. angustifolia, Rafinesque, New Fl. & Bot. i, 88.

FRINGE TREE. OLD MAN'S BEARD.

Lancaster county and the banks of the Brandywine, Chester county, Pennsylvania, south to Tampa bay, Florida, and through the Gulf states to southern Arkansas and the valley of the Brazos river, Texas.

A small tree, 6 to 10 meters in height, with a trunk 0.15 to 0.20 meter in diameter; generally along streams in low, rich soil; very common in cultivation.

Wood heavy, hard, close-grained, compact; layers of annual growth marked by several rows of large open ducts, connected as in that of *Bumelia* by branching groups of similar ducts; medullary rays numerous, obscure; color, light brown, the sap-wood lighter; specific gravity, 0.6372; ash, 0.51.

A decoction of the tonic and anti-periodic bark of the root sometimes employed in the treatment of intermittent fevers (Am. Jour. Pharm. xliv, 398.—U. S. Dispensatory, 14 ed. 1612).

201.—Osmanthus Americanus, Bentham & Hooker,

Genera, ii, 667.-Gray, Syn. Fl. N. America, ii¹, i, 78.

Olea Americana, Linnæus, Mant. 24.—Marshall, Arbustum, 98.—Lamarck, Diet. iv, 543; Ill. i, 28.—Aiton, Hort. Kew. i, 14; 2 ed. i, 22.—Willdenow, Spec. i, 45; Enum. 13.—Michaux, Fl. Bor.-Am. ii, 222.—Vahl, Enum. i, 41.—Persoon, Syn. i, 9.—Desfontaines, Hist. Arb. i, 112.—Nouveau Duhamel, v, 67.—Michaux f. Hist. Arb. Am. iii, 50, t. 6; N. American Sylva, ii, 3 ed. 128, t. 86.—Pursh. Fl. Am. Sept. i, 7.—Rœmer & Schultes, Syst. i, 70.—Rafinesque, Fl. Ludoviciana, 38.—Nuttall, Genera, i, 5.—Elliott, Sk. i, 5.—Sprengel, Syst. i, 34.—Croom in Am. Jour. Sci. 1 ser. xxvi, 315.—Dietrich, Syn. i, 37.—Don, Miller's Diet. iv, 48.—Spach, Hist. Veg. viii, 267.—Eaton, Manual, 6 ed. 239.—Dietrich, Syn. i, 37.—Eaton & Wright, Bot. 333.—A. De Candolle, Prodr. viii, 286.—Browne, Trees of America, 381.—Darby, Bot. S. States, 429.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 369.—Cartis in Rep. Geological Surv. N. Carolina, 1860, iii, 57.—Lesquereux in Owen's 2d Rep. Arkansas, 382.—Wood, Cl. Book, 599; Bot. & Fl. 276.—Porcher, Resources S. Forests, 493.—Gray, Manual N. States, 5 ed. 401.—Young, Bot. Texas, 451.—Vasey, Cat. Forest Trees, 20.

DEVIL WOOD.

Southern Virginia, south to cape Canaveral and Tampa bay, Florida, and through the Gulf states to eastern Louisiana, near the coast.

A small tree, 10 to 15 meters in height, with a trunk sometimes 0.30 meter in diameter; borders of streams and pine-barren swamps, in moist, rich soil.

Wood heavy, very hard and strong, close-grained, unwedgeable, difficult to work, containing many radiating groups of open cells parallel to the thin, obscure, medullary rays; color, dark brown, the thick sap-wood light brown or yellow; specific gravity, 0.8111; ash, 0.46.

BORRAGINACEÆ.

202.-Cordia Sebestena, Linnæus,

Spec. 1 ed. 190.—Jacquin, Amer. t. 42.—Lamarck, Ill. i, 421, t. 96, f. 1.—Willdenow, Spec. i, 1073; Enum. 248.—Andrews, Bot. Rep. iii, 157, t. 157.—Poiret in Lamarck, Dict. vii, 45.—Persoon, Syn. i, 166.—Trattinick, Archiv. t. 354.—Rœmer & Schultes, Syst. iv, 452.—Sprengel, Syst. i, 649.—Bot. Mag. t. 794.—Aiton, Hort. Kew. 2 ed. ii, 8.—Descourtilz, Fl. Antilles, iv, 205, t. 277.—Chamisso in Linnæa, vi, 755.—Audubon, Birds, t. 177.—Don, Miller's Dict. iv, 375.—Dietrich, Syn. i, 611.—Nuttall, Sylva, iii, 81, t. 106; 2 ed. ii, 145, t. 106.—Cooper in Smithsonian Rep. 1858, 265.—Grisebach, Fl. British West Indies, 478.—Gray, Syn. Fl. N. America, ii¹, 180.

? C. juglandifolia, Jacquin, Amer. t. 43.

C. speciosa, Willdenow in Romer & Schultes, Syst. iv, 799.—A. De Candolle, Prodr. ix, 476.

Sebestena scabra, Rafinesque, Sylva Telluriana, 38.

GEIGER TREE.

Semi-tropical Florida, on the southern keys; rare; in the West Indies.

A small tree, sometimes 8 meters in height, with a trunk 0.06 to 0.08 meter in diameter; rich hummock soil; ornamental and becoming a large tree in cultivation.

Wood heavy, hard, close-grained, compact, satiny, containing few scattered, small, open ducts; medullary rays very numerous, thin, conspicuous; color, dark brown, the thick sap-wood light brown or yellow; specific gravity, 0.7108; ash, 4.22.

8 FOR

203 .- Cordia Boissieri, A. De Candolle,

Prodr. ix, 478.—Torrey, Bot. Mex. Boundary Survey, 135.—Cooper in Smithsonian Rep. 1860, 442.—Gray, Syn. Fl. N. America, ii¹, 180.

Texas, valley of the Rio Grande, westward to New Mexico and southward into Mexico.

A small tree, rarely 8 meters in height, with a trunk 0.12 to 0.15 meter in diameter, or more often reduced to a low shrub.

Wood light, rather soft, close-grained, compact, containing many small scattered open ducts; medullary rays very numerous, thin, conspicuous; color, dark brown, the sap-wood light brown; specific gravity, 0.6790; ash, 3.53.

204.—Bourreria Havanensis, Miers,

Bot. Contrib. ii, 238.—Gray, Syn. Fl. N. America, ii¹, 181.

Ehretia Havanensis, Willdenow in Rœmer & Schultes, Syst. iv, 805.—Humboldt, Bonpland & Kunth, Nov. Gen. & Spec. vii, 206.—A. De Candolle, Prodr. ix, 508.

Ehretia tomentosa, Lamarck, Ill. i, 425.—Poiret, Suppl. ii, 1.—Sprengel, Syst. i, 648.—Dietrich, Syn. i, 630.

B. tomentosa, Don, Miller's Dict. iv, 390.

B. recurva, Miers, Bot. Contrib. ii, 238.

B. ovata, Miers, Bot. Contrib. ii, 238.

Ehretia Bourreria, Chapman, Fl. S. States, 329 [not Linnœus].—Vasey, Cat. Forest Trees, 19.

B. tomentosa, var. Havanensis, Grisebach, Fl. British West Indies, 482.

STRONG BARK.

Semi-tropical Florida, southern keys (Key Largo, Elliott's Key, etc.); in the West Indies.

A small tree, 10 or, exceptionally, 15 meters (Key Largo, Curtiss) in height, with a trunk 0.20 to 0.25 meter in diameter; the large specimens generally hollow and defective.

A form (generally shrubby in Florida) with scabrous or hispidulous leaves is-

var. radula, Gray, Syn. Fl. N. America, ii1, 181.

Ehretia radula, Poiret, Suppl. ii, 2.—Dietrich, Syn. i, 630.—A. De Candolle, Prodr. ix, 506.—Chapman, Fl. S. States, 329.

B. radula, Don, Miller's Dict. iv, 390.—Chamisso in Linnæa, viii, 120.—Miers, Bot. Contrib. ii, 238.

Cordia Floridana, Nuttall, Sylva, iii, 83, t. 107; 2 ed. ii, 147, t. 107.—Cooper in Smithsonian Rep. 1858, 265.

Wood heavy, very hard, strong, very close-grained, compact, susceptible of a beautiful polish; medullary rays numerous, obscure; color, brown streaked with orange, the sap-wood not distinguishable; specific gravity, 0.8073; ash, 2.79.

205.—Ehretia elliptica, De Candolle,

Prodr. ix, 503.—Torrey, Bot. Mex. Boundary Survey, 136.—Cooper in Smithsonian Rep. 1858, 266.—Miers, Bot. Contrib. ii, 228, t. 85.—Gray, Syn. Fl. N. America, ii¹, 181.

KNACKAWAY. ANAQUA.

Texas, Corpus Christi to New Braunfels (Mohr), and southward to the valley of the lower Rio Grande.

A tree 10 to 15 meters in height, with a trunk sometimes 0.50 meter in diameter; generally along borders of streams, in rich loam, and reaching its greatest development between the Guadalupe and Nueces rivers, 50 to 75 miles from the Gulf coast.

Wood heavy, hard, not strong, very close-grained, compact, unwedgeable, containing many small open ducts arranged in numerous concentric rings within the layers of annual growth, these marked by several rows of larger ducts; medullary rays numerous, thin; color, light brown, the sap-wood a little lighter; specific gravity, 0.6440; ash, 1.31.

BIGNONIACEÆ.

206.-Catalpa bignonioides; Walter,

- Fl. Caroliniana, 64.—De Candolle, Prodr. ix, 226.—Darlington, Fl. Cestrica, 3 ed. 182.—Cooper in Smithsonian Rep. 1858, 253.—Chapman, Fl. S. States, 285.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 50.—Wood, Cl. Book, 513; Bot. & Fl. 218.—Bureau, Mon. Bignoniaceæ, t. 25.—Gray, Manual N. States, 5 ed. 321, in part; Syn. Fl. N. America, ii¹, 319, in part.—Koch, Dendrologie, ii, 302.—Young, Bot. Texas, 385.—Vasey, Cat. Forest Trees, 19, in part.—Guibourt, Hist. Drogues, 7 ed. ii, 548.
 - Bignonia Catalpa, Linnæus, Spec. 1 ed. 622 (excl. syn.).—Lamarck, Dict. i, 417.—Marshall, Arbustum, 21.—Wangenheim, Amer. 58, t. 20, f. 45.—Willdenow, Spec. iii, 289; Enum. 649.—Michaux, Fl. Bor.-Am. ii, 25.—Desfontaines, Hist. Arb. i, 189.—Michaux f. Hist. Arb. Am. iii, 217, t. 6; N. American Sylva, 3 ed. ii, 55, t. 64.—Barton, Prodr. Fl. Philadelph. 66.—Rafinesque, Fl. Ludoviciana, 159.—Porcher, Resources S. Forests, 460.—Maout & Decaisne, Bot. English ed. 602 & f.
 - O. cordifolia, Jaume St. Hilaire in Nouveau Duhamel, ii, 13, in part (excl. t. 5).—Barton, Compend. Fl. Philadelph. i, 9.—Nuttall, Genera, i, 10.—Elliott, Sk. i, 24.—Torrey, Fl. U. S. i, 16; Compend. Fl. N. States, 20.—Beck, Bot. 245.—Eaton, Manual, 6 ed. 85.—Darlington, Fl. Cestrica, 2 ed. 363.—Spach, Hist. Veg. ix, 132.—Eaton & Wright, Bot. 184.—Darby, Bot. S. States, 439.
 - C. syringæfolia, Sims, Bot. Mag. t. 1094.—Schkuhr, Handb. t. 175.—Aiton, Hort. Kew. 2 ed. i, 24.—Pursh. Fl. Am. Sept. i, 10.—Eaton, Manual, 8; 6 ed. 85.—Meyer, Prim. Fl. Esseq. 3.—Hayne, Dend. Fl. 2.—Loddiges, Bot. Cab. t. 1285.—Sprengel, Syst. i, 70.—Sertum Botanicum, i, t.—Lindley, Fl. Med. 499; Penn. Cycl. vi, 363.—Don, Miller's Dict. iv, 230.—London, Arboretum, iii, 1261 & t.—Dietrich, Syn. i, 82.—Nuttall, Sylva, iii, 77; 2 ed. ii, 140.—Torrey, Fl. N. York, ii, 25.—Browne, Trees of America, 406.
 - C. communis, Du Mont, Bot. Cult. 2 ed. iii, 242.

CATALPA. CATAWBA. BEAN TREE. CIGAR TREE. INDIAN BEAN.

Southwestern Georgia, valleys of the Little and Apalachicola rivers, western Florida, and through central Alabama and Mississippi.

A low, much-branched tree, 12 to 15 meters in height, with a trunk 0.50 to 0.75 meter in diameter; borders of streams and swamps, in rich loam; rare and local; long cultivated for ornament, and now extensively naturalized throughout the middle and southern Atlantic states.

Wood light, soft, not strong, coarse-grained, compact, very durable; layers of annual growth clearly marked by many rows of large open ducts; medullary rays numerous, obscure; color, light brown, the thin (one or two years') sap-wood lighter, often nearly white; specific gravity, 0.4474; ash, 0.38; used and highly valued for fence posts, rails, etc.; a reputed emetic.

A decoction of the seeds and dried bark occasionally used in cases of asthma and bronchitis (Am. Jour. Pharm. xlii, 204.—U. S. Dispensatory, 14 ed. 1608.—Nat. Dispensatory, 2 ed. 367).

207.—Catalpa speciosa, Warder;

Engelmann in Coulter's Bot. Gazette, v, 1.—Sargent in London Gard. Chronicle 1879, 784.—Ridgway in Proc. U. S. Nat. Mus. 1882, 70.—Barnes in Coulter's Bot. Gazette, ix, 74.

- C. cordifolia, Jaume St. Hilaire in Nouveau Duhamel, ii, 13, in part, t. 5.—Nuttall in Trans. Am. Phil. Sec. 2 ser. v, 183.
- C. bignonioides, Lesquereux in Owen's 2d Rep. Arkansas, 375 [not Walter.]—Gray, Manual N. States, 5 ed. 321, in part; Syn. Fl. N. America, ii¹, 319, in part.—Vasey, Cat. Forest Trees, 19, in part.—Broadhead in Coulter's Bot. Gazette, iii, 59.

WESTERN CATALPA.

Valley of the Vermilion river, Illinois, through southern Illinois and Indiana, western Kentucky and Tennessee, southeastern Missouri and western Arkansas.

A tree 20 to 35 or, exceptionally, 45 meters in height (Ridgway), with a trunk 1 to 2 meters in diameter; borders of streams and swamps, in rich bottom lands; common and reaching its greatest development in the valley of the lower Wabash river; cultivated and now widely naturalized through southern Arkansas, western Louisiana, and eastern Texas.

Wood light, soft, not strong, coarse-grained, compact, very durable in contact with the soil; layers of annual growth clearly marked by several rows of large open ducts; medullary rays numerous, obscure; color, brown, the thin sap-wood lighter; specific gravity, 0.4165; ash, 0.39; largely used for railway ties, fence posts, rails, etc., and adapted for cabinet work and interior finish.

208.—Chilopsis saligna, D. Don,

Edinburgh Phil. Jour. ix, 261.—Don, Miller's Dict. iv, 223.—Dietrich, Syn. iii, 566.—Gray in Bot. California, i, 587; Syn. Fl. N. America, ii¹, 320.—Vasey, Cat. Forest Trees, 19.—Rothrock in Wheeler's Rep. vi, 217.—Hemsley, Bot. Am.-Cent. ii, 494.—Rusby in Bull. Torrey Bot. Club, ix, 54.

Bignonia linearis, Cavanilles, Icon. iii, 35, t. 269.

C. linearis, De Candolle, Prodr. ix, 227.—Cooper in Smithsonian Rep. 1858, 266.

C. glutinosa, Engelmann in Wislizenus' Rep. 10.

DESERT WILLOW.

Valley of the Rio Grande, Texas (Laredo, Letterman), west through southern New Mexico and Arizona to the San Gorgonio pass and the San Felipe cañon, San Diego county, California; southward into northern Mexico.

A small tree, 6 to 8 meters in height, with a trunk sometimes 0.30 meter in diameter; mesas and banks of depressions and water-courses in the desert; the large specimens generally hollow and defective.

Wood light, soft, not strong, close-grained, checking in drying, containing many scattered, small, open ducts, the layers of annual growth marked by several rows of larger ducts; medullary rays numerous, obscure; color, brown streaked with yellow, the sap-wood much lighter; specific gravity, 0.5902; ash, 0.37.

209.—Crescentia cucurbitina, Linnæus,

Mant. 2 ed. 250.—Swartz, Obs. 234.—Willdenow, Spec. iii, 311.—Persoon, Syn. ii, 168.—Aiton, Hort. Kew. 2 ed. iv, 37.—Gærtner f. Fruct. Suppl. 250, t. 223.—Dietrich, Syn. iii, 567.—Don, Miller's Diet. iv, 232.—De Candolle, Prodr. ix, 246.—Seemann in Jour. Bot. & Kew Gard. Misc. vi, 274; ix, 142.—Walpers, Ann. v, 524.—Grisebach, Fl. British West Indies, 445.—Hemsley, Fl. Am. Cent. ii, 489.

C. orata, Burmann, Fl. Ind. 132.

- C. latifolia, Lamarck, Diet. i, 558; Ill. iii, 96, t. 547.—Descourtile, Fl. Antilles, iii, 143, t. 182.
- C. lethifera, Tussac, Fl. Antilles, iv, 50, t. 17.
- C. toxicaria, Tussac, Fl. Antilles, iv, 50, t. 17.
- C. obovata, Bentham, Bot. Sulphur, 130, t. 46.

BLACK CALABASH TREE.

Semi-tropical Florida, near Miami, and on Little river (Garber, Curtiss); in the West Indies.

A small tree, in Florida rarely exceeding 6 meters in height, with a trunk 0.10 to 0.12 meter in diameter.

Wood heavy, hard, very close-grained, compact, containing many small, regularly-distributed, open ducts; medullary rays thin, hardly distinguishable; color, light brown tinged with orange, the sap-wood lighter; specific gravity, 0.6319; ash, 1.35.

VERBENACEÆ.

210.-Citharexylum villosum, Jacquin,

Coll. i, 72; Icon. Rar. t. 118.—Persoon, Syn. ii, 142.—Aiton, Hort. Kew. 2 ed. iv, 36.—Dietrich, Syn. iii, 614.—Schauer in De Candollo, Prodr. xi, 610.—Walpers, Rep. iv, 76.—Chapman, Fl. S. States, 309.—Vasey, Cat. Forest Trees, 10.—Gray, Syn. Fl. N. America, iii, 340.—Hemsley, Bot. Am.-Cent. ii, 537.

FIDDLE WOOD.

Semi-tropical Florida, cape Canaveral to the southern keys (Pumpkin Key, Curtiss); and through the West Indies to Mexico.

A small tree, rarely exceeding in Florida 6 meters in height, with a trunk 0.10 to 0.15 meter in diameter, or north of bay Biscayne reduced to a low, much-branched shrub; common and reaching within the United States its greatest development on the shores of bay Biscayne, Lost Man's river, etc.

Wood heavy, exceedingly hard, strong, close-grained, compact, susceptible of a fine polish, containing numerous small, regularly-distributed, open ducts; color, clear bright red, the sap-wood lighter; specific gravity, 0.8710; ash, 0.52.

211.—Avicennia nitida, Jacquin,

Amer. 177, t. 112, f. 1.—Persoon, Syn. ii, 143.—Chamisso in Linnæa, vii, 370.—Sprengel, Syst. ii, 768.—Martius, Mat. Med. Brasil. 49; Bot. Brasil. ix, 303.—Dietrich, Syn. iii, 619.—Schauer in De Candolle, Prodr. xi, 699.—Grisebach, Fl. British West Indies, 502.—Gray, Syn. Fl. N. America, iii, 341.

- A. tomentosa, Meyer, Prim. Fl. Esseq. 221 [not Jacquin].—Nuttall, Sylva, iii, 79, t. 105; 2 ed. ii, 143, t. 105.—Cooper in Smithsonian Rep. 1858, 265.—Chapman, Fl. S. States, 310.—Vasey, Cat. Forest Trees, 19.
- A. oblongifolia, Nuttall ?; Chapman, Fl. S. States, 310.—Vasey, Cat. Forest Trees, 19.

BLACK MANGROVE. BLACK TREE. BLACK WOOD.

Florida coast, Saint Augustine to the southern keys, and from Cedar Keys to cape Sable; deltas of the Mississippi river; through the West Indies to Brazil.

A tree 6 to 9 meters in height, with a trunk 0.25 to 0.30 meter in diameter, or, exceptionally, 20 to 23 meters in height, with a trunk 0.60 meter in diameter; north of Mosquito inlet reduced to a low shrub; common along saline shores and swamps, throwing up many leafless, corky stems, and forming, with the red mangrove (*Rhizophora*), impenetrable thickets, or, more rarely, scattered and round-headed; reaching its greatest development in the United States on the west coast of Florida, north of cape Sable.

Wood very heavy, hard, rather coarse-grained, compact, the eccentric layers of annual growth marked by several rows of large open ducts; medullary rays numerous, thin; color, dark brown or nearly black, the sapwood brown; specific gravity, 0.9138; ash, 2.51.

NYCTAGINACEÆ.

212.-Pisonia obtusata, Swartz,

Fl. Ind. Occ. 1960.—Jacquin, Hort. Schenb. iii, 36, t. 314.—Lamarck, Ill. iii, 449, t. 861.—Dietrich, Syn. ii, 1226.—Choisy in De Candolle, Prodr. xiii², 443.—Chapman, Fl. S. States, 374.—Grisebach, Fl. British West Indies, 71.—Vasey, Cat. Forest Trees, 21.

PIGEON WOOD. BEEF WOOD. CORK WOOD. PORK WOOD.

Semi-tropical Florida, cape Canaveral to the southern keys; through the West Indies.

A tree 9 to 15 meters in height, with a trunk 0.25 to 0.45 meter in diameter; saline shores and beaches, reaching its greatest development in Florida on Elliott's and Old Rhodes Keys.

Wood heavy, rather soft, weak, coarse-grained, compact, containing numerous large open ducts; layers of annual growth and medullary rays hardly distinguishable; color, yellow tinged with brown, the sap-wood darker; specific gravity, 0.6529; ash, 7.62; probably of little value.

Note.—The semi-prostrate and vine-like trunks of P. aculeata, Linnæus, of the same region, although attaining a considerable size, cannot be properly considered arborescent.

POLYGONACEÆ.

213.-Coccoloba Floridana, Meisner;

De Candolle, Prodr. xiv, 165.—Chapman, Fl. S. States, 392.—Porcher, Resources S. Forests, 376.—Vasey, Cat. Forest Trees, 21.

C. parvifolia, Nuttall, Sylva, iii, 25, t. 89; 2 ed. ii, 95, t. 89 [not Poiret].—Cooper in Smithsonian Rep. 1858, 265.

PIGEON PLUM.

Semi-tropical Florida, cape Canaveral to the southern keys, and from cape Romano to cape Sable.

A tree 15 to 18 meters in height, with a trunk 0.30 to 0.60 meter in diameter; one of the largest and most common trees of the region.

Wood very heavy, exceedingly hard, strong, brittle, very close-grained, inclined to check in drying, containing few small, scattered, open ducts; layers of annual growth and numerous medullary rays obscure; color, rich dark brown tinged with red, the sap-wood lighter; specific gravity, 0.9835; ash, 5.03; valuable and somewhat used for cabinet-making.

The edible and abundant grape-like fruit, ripening in February and March, is eagerly devoured by raccoons and other animals.

214.—Coccoloba uvifera, Jacquin,

Amer. 112, t. 73.—Gærtner, Fruct. i, 214, t. 45, f. 3.—Aiton, Hort. Kew. ii, 34; 2 ed. ii, 421.—Lamarck, Ill, ii, 445, t. 316, f. 2.—Willdenow, Spec. ii, 457; Enum. 431.—Poiret in Lamarck, Dict. vi, 61.—Persoon, Syn. i, 442.—Titford, Hort. Bot. Am. 61.—Aiton, Hort. Kew. 2 ed. ii, 421.—Sprengel, Syst. ii, 252.—Descourtilz, Fl. Antilles, ii, 41, t. 77.—Bot. Mag. t. 3130.—Rafinesque, Fl. Telluriana, ii, 34.—Spach, Hist. Veg. x, 542.—Dietrich, Syn. Fl. ii, 1326.—Nuttall, Sylva, iii, 23, t. 88; 2 ed. ii, 93, t. 88.—Carson, Med. Bot. ii, 21, t. 67.—Meisner in De Candolle, Prodr. xiv, 152; Bot. Brasil. vi, 42.—Cooper in Smithsonian Rep. 1858, 265.—Chapman, Fl. S. States, 391.—Porcher, Resources S. Forests, 376.—Grisebach, Fl. British West Indies, 161.

Polygonum uvifera, Linnæus, Spec. 1 ed. 365.

SEA GRAPE.

Semi-tropical Florida, Mosquito inlet to the southern keys, west coast, Tampa bay to cape Sable; through the West Indies to Brazil.

A low tree, rarely exceeding in Florida 4 meters in height, with a gnarled and contorted trunk often 0.90 to 1.20 meter in diameter, or reduced to a low, generally prostrate shrub; saline shores and beaches; common.

West Indian forms, differing in the shape of the leaves, etc., are-

var. ovalifolia, Meisner, l. c.

var. Læganensis, Meisner, l. c.

C. Læganensis, Jacquin, Amer. 113, t. 178, f. 33.

Wood very heavy, hard, very close-grained, inclined to check in drying, susceptible of a beautiful polish, containing few scattered, rather small, open ducts; layers of annual growth and numerous medullary rays hardly distinguishable; color, rich dark brown or violet, the sap-wood lighter; specific gravity, 0.9635; ash, 1.37; valuable for cabinet-making.

The edible fruit of agreeable subacid flavor.

LAURACEÆ.

215.—Persea Carolinensis, Nees,

Syst. Laurinarum, 150.—Spach, Hist. Veg. x, 492.—Dietrich, Syn. ii, 1339.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 63.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 63.—Wood, Cl. Book, 620; Bot. & Fl. 290.—Meisner in De Candolle, Prodr. xv¹, 50.—Gray, Manual N. States, 5 ed. 422; Hall's Pl. Texas, 473.—Young, Bot. Texas, 473.—Vasey, Cat. Forest Trees, 21.

Laurus Borbonia, Linnæus, Spec. 1 ed. 370, in part.—Marshall, Arbustum, 73.—Walter, Fl. Caroliniana, 133.—Aiton, Hort. Kew. ii, 39; 2 ed. ii, 429.—Lamarck, Dict. iii, 450.—Willdenow, Spec. ii, 481.—Desfontaines, Hist. Arb. i, 65.—Nouyeau Duhamel, ii, 163.

Laurus Carolinensis, Catesby, Carol. i, 63, t. 63.—Michaux, Fl. Bor.-Am. i, 245.—Persoon, Syn. i, 449.—Desfontaines, Hist. Arb. i, 65.—Poiret, Suppl. iii, 321.—Willdenow, Enum. Suppl. 22.—Michaux f. Hist. Arb. Am. iii, 180, t. 2; N. American Sylva, 3 ed. ii, 116, t. 82.—Pursh, Fl. Am. Sept. i, 276.—Elliott, Sk. i, 461.—Sprengel, Syst. ii, 665.—Torrey, Compend. Fl. N. States, 174.—Beck. Bot. 305.—Eaton, Manual, 6 ed. 199.—Loudon, Aboretum, iii, 1299, f. 1168, 1169.—Eaton & Wright, Bot. 293.—Browne, Trees of America, 414.—Darby, Bot. S. States, 491.—Schnizlein, Icon. t. 106, f. 5–12.

Laurus Carolinensis, var. glabra, Pursh, Fl. Am. Sept. i, 276.

Laurus Carolinensis, var. obtusa, Pursh, Fl. Am. Sept. i, 276.

Laurus Caroliniana, Poiret, Suppl. iii, 323.—Nuttall, Genera, i, 258.

P. Borbonia, Sprengel, Syst. ii, 268.

P. Carolinensis, var. glabriuscula, Meisner in De Candolle, Prodr. xv1, 51.

RED BAY.

Southern Delaware?, south to bay Biscayne and cape Romano, Florida, and through the Gulf states to southern Arkansas and the valley of the Trinity river, Texas, near the coast.

A tree 15 to 20 meters in height, with a trunk 0.60 to 0.90 meter in diameter; borders of streams and swamps, in low, rich soil.

Wood heavy, hard, very strong, brittle, very close-grained, compact, susceptible of a beautiful polish, containing many evenly-distributed open ducts; medullary rays numerous, thin; color, bright red, the sap-wood much lighter; specific gravity, 0.6429; ash, 0.76; formerly somewhat used in ship-building, interior finish, and for cabinet work.

Var. palustris, Chapman,

Fl. S. States, 393.

Laurus Carolinensis, var. pubescens, Pursh, Fl. Am. Sept. i, 276.

P. Carolinensis, var. pubescens, Meisner in De Candolle, Prodr. xv1, 51.

North Carolina to Alabama, generally near the coast.

A small tree, 9 to 12 meters in height, with a trunk rarely exceeding 0.30 meter in diameter; low, sandy banks of pine-barren streams and swamps; well distinguished from the species by the longer peduncles densely clothed, as are the young shoots and under sides of the leaves, with short, brown tomentum, and by the somewhat coarsergrained orange-colored wood.

Wood heavy, soft, strong, close-grained, compact, containing numerous rather large open ducts; medullary rays numerous, thin; color, orange streaked with brown; the sap-wood light brown or gray; specific gravity, 0.6396; ash, 0.37.

216.-Nectandra Willdenoviana, Nees,

Syst. Laurinarum, 290, 321.-Meisner in De Candolle, Prodr. xvi2, 165.

Laurus sanguinea, Swartz, Fl. Ind. Occ. ii, 707.

Laurus Catesbyana, Michaux, Fl. Bor.-Am. i, 244.—Poiret, Suppl. iii, 321.—Pursh, Fl. Am. Sept. i, 275.—Elliott, Sk. i, 462.—Sprengel, Syst. ii, 265.—Eaton, Manual, 6 ed. 199.—Eaton & Wright, Bot. 294.—Darby, Bot. S. States, 491.

Laurus Catesbæi, Persoon, Syn. i, 499.—Nuttall, Genera, i, 258.

Gymnobalanus Catesbyana, Nees, Syst. Laurinarum, 483.

N. Bredemeieriana, Nees in Linnaa, xxi, 505.

Persea Catesbyana, Chapman, Fl. S. States, 393.—Vasey, Cat. Forest Trees, 21.

LANCE WOOD.

Semi-tropical Florida, cape Canaveral and cape Romano to the southern keys; through the West Indies to Central America.

A small tree, 6 to 9 meters in height, with a trunk rarely exceeding 0.15 meter in diameter; common and reaching its greatest development in Florida on the shores of bay Biscayne and in the neighborhood of cape Romano.

Wood heavy, hard, close-grained, checking in drying, containing many small, regularly-distributed, open ducts; medullary rays numerous, thin; color, rich dark brown, the sap-wood bright yellow; specific gravity, 0.7693; ash, 0.60.

217.—Sassafras officinale, Nees,

Handb. der Med. Pharm. Bot. ii, 418; Syst. Laurinarum, 488.—Hayne, Arzn. i, 12, t. 19.—Lindley, Fl. Med. 338.—Dietrich, Syn. ii, 1357.—Spach, Hist. Veg. x, 503.—Torrey, Fl. N. York, ii, 158.—Emerson, Trees Massachusetts, 359; 2 ed. ii, 359 & t.—Griffith, Med. Bot. 551.—Darlington, Fl. Cestrica, 3 ed. 251.—Spruce in Hooker's London Jour. Bot. vii, 278.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 394.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 63.—Lesquereux in Owen's 2d Rep. Arkansas, 384.—Wood, Cl. Book, 620; Bot. & Fl. 290.—Porcher, Resources S. Forests, 350.—Meisner in De Candolle, Prodr. xv¹, 171.—Gray, Manual N. States, 5 ed. 423; Hall's Pl. Texas, 19.—Koch, Dendrologie, ii, 364.—Young, Bot. Texas, 473.—Vasey, Cat. Forest Trees, 21.—Broadhead in Coulter's Bot. Gazette, iii, 59.—Bentley & Trimen, Med. Pl. iii, 220, t. 220.—Ridgway in Proc. U. S. Nat. Mus. 1882, 70.—Bell in Geological Rep. Canada, 1879-'80, 55°.

Laurus Sassafras, Linnaus, Spec. 1 ed. 371.—Du Roi, Harbk. i, 356.—Kalm, Travels, English ed. i, 146, 341.—Marshall, Arbustum, 74.—Wangenheim, Amer. 82, t. 27, f. 56.—Walter, Fl. Caroliniana, 134.—Aiton, Hort. Kew. ii, 40; 2 ed. ii, 429.—Lamarck, Dict. iii, 454.—Abbot, Insects Georgia, i, t. 11.—B. S. Barton, Coll. 11, 19; ii, 27.—Willdenow, Spec. ii, 485; Enum. 435; Berl. Baumz. 208.—Michaux, Fl. Bor.-Am. i, 243.—Schkuhr, Handb. 349.—Persoon, Syn. i, 450.—Robin, Voyages, iii, 361.—Desfontaines, Hist. Arb. i, 66.—Titford, Hort. Bot. Am. 130.—Michaux f. Hist. Arb. Am. iii, 173, t. 1; N. American Sylva, 3 ed. ii, 113, t. 81.—Pursh, Fl. Am. Sept. i, 277.—Rafinesque, Fl. Ludoviciana, 25.—Bigelow, Med. Bot. ii, 142, t. 35; Fl. Boston. 3 ed. 170.—Nuttall, Genera, i, 259; Sylva, i, 88; 2 ed. i, 104.—Elliott, Sk. i, 464.—Nees, Pl. Offic. t. 131.—Torrey, Fl. U. S. i, 408; Compend. Fl. N. States, 174.—Descourtilz, Fl. Antilles, vii, 51, t. 464.—Audubon, Birds, t. 144.—Stephenson & Churchill, Med. Bot. iii, t. 126.—Beck, Bot. 305.—Eaton, Manual, 6 ed. 199.—Darlington, Fl. Cestrica, 2 ed. 254.—Eaton & Wright, Bot. 293.—Browne, Trees of America, 416.—Darby, Bot. S. States, 492.

Persea Sassafras, Sprengel, Syst. ii, 270.—Schnizlein, Icon. t. 106, f. 15-23.

SASSAFRAS.

Eastern Massachusetts, southwestern Vermont, and west through southern Ontario and central Michigan to southeastern Iowa, eastern Kansas, and the Indian territory; south to Hernando county, Florida, and the valley of the Brazos river, Texas.

A tree 12 to 15 meters in height, with a trunk 0.60 to 0.90 meter in diameter, exceptionally 24 to 27 meters in height, with a trunk 1.80 to 2.25 meters in diameter, or toward its northern limits reduced to a small tree or shrub; rich, sandy loam, reaching its greatest development in southwestern Arkansas and the Indian territory; at the south often taking possession, with the persimmon, of abandoned fields in the middle districts.

Wood light, soft, not strong, brittle, coarse-grained, very durable in contact with the soil, slightly aromatic, checking in drying; layers of annual growth clearly marked with three or four rows of large open ducts; medullary rays numerous, thin; color, dull orange-brown, the thin sap-wood light yellow; specific gravity, 0.5042; ash, 0.10; used for light skiffs, ox yokes, etc., and largely for fence posts and rails, and in cooperage.

The root, and especially its bark, enters into commerce, affording a powerful aromatic stimulant; the oil of sassafras, distilled from the root, is largely used in imparting a pleasant flavor to many articles of domestic use; the pith of the young branches infused with water furnishes a mucilage used as a demulcent in febrile and inflammatory affections (Sharpe in Am. Jour. Pharm. 1863, 53.—Proctor in Proc. Am. Pharm. Assoc. 1866, 217.—U. S. Dispensatory, 14 ed. 814.—Nat. Dispensatory, 2 ed. 1274; Flückiger & Hanbury, Pharmacographia, 483).

"Gumbo filet," a powder prepared by the Choctaw Indians of Louisiana from the mucilaginous leaves, is used at the south in the preparation of "gumbo" soup.

218.—Umbellularia Californica, Nuttall,

Sylva, i, 87; 2 ed. i, 102.—Watson, Bot. California, ii, 61.

Laurus regia, Douglas in Companion Bot. Mag. ii, 137.

Oreodaphne Californica, Nees, Syst. Laurinarum, 463.—Bentham, Pl. Hartweg. 334; Bot. Sulphur, 49.—Dietrich, Syn. ii, 1356.—Hooker & Arnott, Bot. Beechey, 389.—Torrey in Pacific R. R. Rep. iv, 133; v, 364; Mex. Boundary Survey, 184.—Newberry in Pacific R. R. Rep. vi, 24, 88, f. 3.—Cooper in Smithsonian Rep. 1858, 260.—Bot. Mag. t. 5320.

Tetranthera Californica, Hooker & Arnott, Bot. Beechey, 159.—Meisner in De Candolle, Prodr. xv¹, 192.—Torrey in Bot. Wilkes Exped. 451.

Drimophyllum pauciflorum, Nuttall, Sylva, i, 85, t. 22; 2 ed. i, 102, t. 22.

MOUNTAIN LAUREL. CALIFORNIA LAUREL. SPICE TREE. CAGIPUT. CALIFORNIA OLIVE. CALIFORNIA BAY TREE.

Rogue River valley, Oregon, south through the California coast ranges to San Diego county, and along the western slopes of the Sierra Nevada to the San Bernardino mountains.

An evergreen tree, 24 to 30 meters in height, with a trunk 1.20 to 1.80 meter in diameter, or toward its southern limits and at high elevations a small tree or shrub; most common and reaching its greatest development in the rich valleys of southwestern Oregon.

Wood heavy, hard, strong, close-grained, compact, susceptible of a beautiful polish, containing numerous small, regularly-distributed, open ducts; medullary rays numerous, thin; color, rich light brown, the sap-wood lighter; specific gravity, 0.6517; ash, 0.39; used on the Oregon coast in ship-building, for jaws, bitts, cleats, cross-trees, etc.; the most valuable material produced by the Pacific forests for interior and cabinet work.

The leaves yield a volatile oil, Oreodaphne (Am. Jour. Pharm. xlvii, 105).

EUPHORBIACEÆ.

219.—Drypetes crocea, Poiteau,

Mem. Mus. i, 159, t. 8.—Nuttall, Sylva, ii, 66, t. 63; 2 ed. ii, 12, t. 63.—Cooper in Smithsonian Rep. 1858, 265.—Chapman, Fl. S. States, 410.—Grisebach, Fl. British West Indies, 32; Cat. Pl. Cuba, 15.—Müller in De Candolle, Prodr. xv², 455.

Schæfferia lateriflora, Swartz, Fl. Ind. Occ. i, 329.

D. sessiliflora, Baillon, Etud. Gen. Euphorbiaceæ, Atlas, 45, t. 24, f. 34-40.

D. glauca, Grisebach in Mem. Am. Acad. new ser. viii, 157 [not Vahl].

D. crocea, var. longipes, Müller in De Candolle, Prodr. xv2, 456.

GUIANA PLUM. WHITE WOOD.

Semi-tropical Florida, bay Biscayne to the southern keys; in the West Indies.

A small tree, sometimes 9 meters in height, with a trunk 0.12 to 0.17 meter in diameter.

Wood heavy, hard, not strong, brittle, close-grained, checking in drying; medullary rays numerous, thin; color, rich dark brown, the sap-wood yellow; specific gravity, 0.9209; ash, 6.14.

Var. latifolia, Müller,

De Candolle, Prodr. xv2, 456.

D. glauca, Nuttall, Sylva, ii, 68; 2 ed. ii, 14.—Chapman, Fl. S. States, 410.

D. alba, var. latifolia, Grisebach in Nachrich. d. Konigl. Gesell. Wiss. Univ. Götting. 1865, 165, in part.

Semi-tropical Florida, bay Biscayne to the southern keys; in the West Indies.

A tree sometimes 12 meters in height, with a trunk 0.30 to 0.35 meter in diameter.

Wood heavy, hard, not strong, brittle, very close-grained, checking in drying; medullary rays numerous, obscure; color, brown streaked with bright yellow, the sap-wood dull brown; specific gravity, 0.9346; ash, 8.29. Perhaps a distinct species, the fruit and flowers not recently collected.

220.—Sebastiania lucida, Müller;

De Candolle, Prodr. xv2, 1181.

Gymnanthes lucida, Swartz, Prodr. 96.

Excecaria lucida, Swartz, Fl. Ind. Occ. ii, 1122.—Willdenow, Spec. iv, 865.—Poiret, Suppl. i, 155.—Persoon, Syn. ii, 634.—
Nuttall, Sylva, ii, 60, t. 61; 2 ed. ii, 6, t. 61.—A. de Jussieu, Tent. Euphorb. t. 16, f. 55.—Richard, Fl. Cuba, 199.—
Dietrich, Syn. v, 256.—Cooper in Smithsonian Rep. 1858, 265.—Chapman, Fl. S. States, 405.—Grisebach, Fl. British
West Indies, 50.—Vasey, Cat. Forest Trees, 21.

CRAB WOOD. POISON WOOD.

Semi-tropical Florida, bay Biscayne to the southern keys; common; in the West Indies.

A small tree, sometimes 9 meters in height, with a trunk 0.15 to 0.20 meter in diameter; the large specimens generally hollow and decayed.

Wood very heavy, hard, very close-grained, compact, susceptible of a beautiful polish; medullary rays numerous, obscure; color, rich dark brown streaked with yellow, the sap-wood bright yellow; specific gravity, 1.0905; ash, 2.78; now largely manufactured into canes, and furnishing valuable fuel.

221.—Hippomane Mancinella, Linnæus,

Spec. 1 ed. 1191.—Jacquin, Amer. 250, t. 159.—Lamarck, Dict. ii, 694.—Aiton, Hort. Kew. iii, 378; 2 ed. v, 333.—Swartz, Obs. 369.—Willdenow, Spec. iv, 571.—Persoon, Syn. ii, 589.—Titford, Hort. Bot. Am. Suppl. 9, t. 12, f. 5.—Lamarck, Ill. iii, 374, t. 793, f. 1.—Sprengel, Syst. iii, 805.—Spach, Hist. Veg. ii, 524.—Nuttall, Sylva, ii, 54, t. 60; 2 ed. i, 202, t. 60.—Bentham, Bot. Sulphur, 163.—Richard, Fl. Cuba, 200.—Dietrich, Syn. v, 224.—Cooper in Smithsonian Rep. 1858, 265.—Baillon, Etud. Gen. Euphorbiaceæ, t. 6, f. 12-20.—Chapman, Fl. S. States, 404.—Porcher, Resources S. Forests, 120.—Grisebach, Fl. British West Indies, 50.—Regel, Gartenflora, xv, 163, t. 510.—Müller in De Candolle, Prodr. xv², 1201.—Schnizlein, Icon. t. 243, f. 3.—Maout & Decaisne, Bot. English ed. 693 & f.—Vasey, Cat. Forest Trees, 21.

Mancinella venenata, Tussac, Fl. Antilles, iii, 21, t. 5.

MANCHINEEL.

Semi-tropical Florida, on the southern keys; common; through the West Indies and Central America to the Pacific.

A small tree, in Florida rarely exceeding 4 meters in height, with a trunk 0.12 to 0.17 meter in diameter; abounding in white, milky, exceedingly caustic poisonous sap. "Rain washing the leaves becomes poisonous, and the smoke of the burning wood injures or destroys the eyes."—(A. H. Curtiss).

Wood light, soft, close-grained, compact, containing numerous evenly-distributed, small, open ducts; medullary rays numerous, obscure; color, dark brown, the thick sap-wood light brown or yellow; specific gravity (sap-wood), 0.5772; ash, 5.16.

URTICACEÆ.

222.-Ulmus crassifolia, Nuttall,

Trans. Am. Phil. Soc. 2 ser. v, 169.—Planchon in Ann. Sci. Nat. 3 ser. x, 279; De Candolle, Prodr. xvii, 162.—Walpers, Ann. iii, 426.—Cooper in Smithsonian Rep. 1858, 254.—Lesquereux in Owen's 2d Rep. Arkansas, 386.—Wood, Cl. Book, 633.—Gray, Hall's, Pl. Texas, 21.—Vasey, Cat. Forest Trees, 23.

U. opaca, Nuttall, Sylva, i, 35, t. 11; 2 ed. i, 51, t. 11.—Browne, Trees of America, 503.

CEDAR ELM.

Arkansas, south of the valley of the Arkansas river to the valley of the Rio Grande, Texas, extending west to Eagle Pass.

A tree 18 to 20 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or toward its southern or southwestern limits much smaller; borders of streams, in rich soil; one of the most common and valuable timber trees of Texas west of the Trinity river, and reaching its greatest development in the valleys of the Guadalupe and Trinity rivers.

Wood heavy, hard, not strong, brittle, very close-grained, compact; layers of annual growth and medullary rays obscure; marked, in common with that of all the North American species, by concentric circles of irregularly-arranged groups of small open ducts; color, light brown tinged with red, the heavier sap-wood lighter; specific gravity, 0.7245; ash, 1.20; used in the manufacture of wagon hubs, saddle-trees, chairs, etc., and very largely for fencing.

223.-Ulmus fulva, Michaux,

Fl. Bor.-Am. i, 172.—Persoon, Syn. i, 291.—Willdenow, Enum. Suppl. 14.—Pursh, Fl. Am. Sept. i, 200.—Smith in Rees' Cycl. xxxix, No. 10.—Eaton, Manual, 31; 6 ed. 376.—Nuttall, Genera, i, 201.—Ræmer & Schultes, Syst. vi, 301.—Elliott, Sk. i, 333.—Hayne, Dend. Fl. 32.—Torrey, Fl. U. S. i, 299; Compend. Fl. N. States, 132; Fl. N. York, ii, 166; Fremont's Rep. 97.—Sprengel, Syst. i, 931.—Rafinesque, Med. Bot. ii, 271.—Beck, Bot. 333.—Hooker, Fl. Bor.-Am. ii, 142.—Bigelow, Fl. Boston. 3 ed. 114.—Eaton & Wright, Bot. 464.—Loudon, Arboretum, iii, 1407, f. 1247.—Dietrich, Syn. ii, 992.—Spach in Ann. Sci. Nat. xv, 363; Hist. Veg. xi, 107.—Emerson, Trees Massachusetts, 297; 2 ed. ii, 334 & t.—Browne, Trees of America, 501.—Griffith, Med. Bot. 551.—Planchon in Ann. Sci. Nat. 3 ser. x, 276.—De Candolle, Prodr. xvii, 161.—Scheele in Ræmer, Texas, 446.—Walpers, Ann. iii, 426.—Richardson, Arctic Exped. 436.—Darlington, Fl. Cestrica, 3 ed. 255.—Darby, Bot. S. States, 502.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 416.—Curtis in Rep. Geological Surv. N. Carolina, iii, 1860, 55.—Lesquereux in Owen's 2d Rep. Arkansas, 386.—Wood, Cl. Book, 633; Bot. & Fl. 299.—Porcher, Resources S. Forests, 310.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 208.—Gray, Manual N. States, 5 ed. 442.—Koch, Dendrologie, ii, 422.—Young, Bot. Texas, 496.—Hayden in Warreu's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 22.—Bentley & Trimen, Med. Pl. iv, 233, t. 233.—Ridgway in Proc. U. S. Nat. Mus. 1882, 72.—Bell in Geological Rep. Canada, 1879-80, 55c.

U. pubescens, Walter, Fl. Caroliniana, 111.

U. Americana, var. rubra, Aiton, Hort. Kew. i, 319; 2 ed. ii, 107.—Willdenow, Spec. i, 1325.—Hayne, Dend. Fl. 31.

? U. crispa, Willdenow, Enum. 295; Berl. Baumz. 520.

U. rubra, Michaux f. Hist. Arb. Am. iii, 278, t. 6; N. American Sylva, 3 ed. iii, 73, t. 128.

RED ELM. SLIPPERY ELM. MOOSE ELM.

Valley of the lower Saint Lawrence river to Ontario and northern Dakota, south to the Chattahoochee region of northern Florida, central Alabama and Mississippi, and the valley of the San Antonio river, Texas.

A tree 15 to 20 meters in height, with a trunk 0.45 to 0.60 meter in diameter; borders of streams and hillsides, in rich soil.

Wood heavy, hard, strong, very close-grained, compact, durable in contact with the ground, splitting readily when green; layers of annual growth clearly marked by several rows of large open ducts; medullary rays numerous, thin; color, dark brown or red, the thin sap-wood lighter; specific gravity, 0.6956; ash, 0.83; largely used for wheel stock, fence posts, rails, railway ties, sills, etc.

The inner bark mucilaginous, nutritious, and extensively used in various medicinal preparations (Am. Jour. Pharm. xxiv, 180.—Philadelphia Med. Times, 1874, 303.—U. S. Dispensatory, 14 ed. 913.—Nat. Dispensatory, 2 ed. 1480.—Flückiger & Hanbury, Pharmacographia, 501).

224.—Ulmus Americana, Linnæus,

Spec. 1 ed. 226.—Kalm, Travels, English ed. ii, 298.—Marshall, Arbustum, 156. —Wangenheim, Amer. 46.—Gærtner, Fruct. i, 225, t. 49, f. 5.—Walter, Fl. Caroliniana, 111.—Aiton, Hort. Kew. i, 319; 2 ed. ii, 107.—Willdenow, Spec. i, 1325; Enum. 295; Suppl. 14; Berl. Baumz. 519.—Nouveau Duhamel, ii, 147.—Schkuhr, Handb. 179.—Michaux, Fl. Bor.-Am. i, 173.—Persoon, Syn. ii, 191.—Desfontaines, Hist. Arb. ii, 442.—Michaux f. Hist. Arb. Am. iii, 269, t. 4; N. American Sylva, 3 ed. iii, 67, t. 126.—Pursh, Fl. Am. Sept. i, 199.— Smith in Rees' Cycl. xxxix, No. 7.—Eaton, Manual, 31; 6 ed. 376.—Barton, Compend. Fl. Philadelph. i, 150.—Nuttall, Genera, i, 201.—Remer & Schultes, Syst. vi, 300.—Elliott, Sk. i, 333.—Hayne, Dend. Fl. 31.—Torrey, Fl. U. S. i, 298; Compend. Fl. N. States, 132; Fl. N. York, ii, 165; Nicollet's Rep. 160; Emory's Rep. 412.—Sprengel, Syst. i, 930.—Beck, Bot. 333.—Loudon, Arboretum, iii, 1406, f. 1246.—Hooker, Fl. Bor.-Am. ii, 142.—Bigelow, Fl. Boston, 3 ed. 114.—Dietrich, Syn. ii, 992.—Eaton & Wright, Bot. 464.—Spach in Ann. Sci. Nat. 2 ser. xv, 364; Hist. Veg. xi, 108.—Emerson, Trees Massachusetts, 286; 2 ed. ii, 322 & t.—Browne, Trees of America, 499.—Planchon in Ann. Sci. Nat. 3 ser. x, 268; De Candolle, Prodr. xvii, 155.—Scheele in Romer, Texas, 446.— Walpers, Ann. iii, 424.—Buckley in Am. Jour. Sci. 2 ser. xiii, 398.—Richardson, Arctic Exped. 436.—Darlington, Fl. Cestrica, 3 ed. 255.—Darby, Bot. S. States, 502.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 416.—Curtis in Rep. Geological Surv. N. Carolina, iii, 1860, 55.—Lesquereux in Owen's 2d Rep. Arkansas, 386.—Wood, Cl. Book, 633; Bot. & Fl. 298.— Porcher, Resources S. Forests, 311.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 208.—Gray, Manual N. States, 5 ed. 442.—Hall's Pl. Texas, 21.—Koch, Dendrologie, ii, 421.—Young, Bot. Texas, 496.—Winchell in Ludlow's Rep. Black Hills, 68.—Vasey, Cat. Forest Trees, 22.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Macoun in Geological Rep. Canada, 1875-'76, 209.— Sears in Bull. Essex Inst. xiii, 177.—Ridgway in Proc. U. S. Nat. Mus. 1882, 71.—Bell in Geological Rep. Canada, 1879-780, 48c.

U. mollifolia, Marshall, Arbustum, 156.

- U. Americana, var. pendula, Aiton, Hort. Kew. i, 320; 2 ed. ii, 107.—Willdenow, Spec. i, 1326.—Pursh, Fl. Am. Sept. i, 200.—Eaton, Manual, 31.—Spach in Ann. Sci. Nat. 2 ser. xv, 364; Hist. Veg. xi, 109.
- U. Americana, var. alba, Aiton, Hort. Kew. 1, 320; 2 ed. ii, 107.—Hayne, Dend. Fl. 32.
- U. pendula, Willdenow, Berl. Baumz. 519.—Hayne, Dend. Fl. 33.
- U. alba, Rafinesque, Fl. Ludoviciana, 115; New Fl. & Bot. i, 38.
- U. Americana, var. scabra, Spach in Ann. Sci. Nat. 2 ser. xv, 364; Hist. Veg. ix, 109.—Walpers, Ann. iii, 424.
- U. Americana, var. Bartramii, Walpers, Ann. iii, 424.
- U. Americana, var. ?aspera, Chapman, Fl. S. States, 416.
- U. Floridana, Chapman, Fl. S. States, 416.

WHITE ELM. AMERICAN ELM. WATER ELM.

Southern Newfoundland to the northern shores of lake Superior and the eastern slope of the Rocky mountains, in about latitude 52° N.; south to cape Canaveral and Pease creek, Florida, extending west in the United States to the Black hills of Dakota, central Nebraska, the Indian territory, in about longitude 100° W., and the valley of the Rio Concho, Texas.

A large tree, 30 to 35 meters in height, with a trunk 1.80 to 2.70 meters in diameter; rich, moist soil, borders of streams, etc.; toward its western and southwestern limits only in river bottoms.

Wood heavy, hard, strong, tough, rather coarse-grained, compact, difficult to split; layers of annual growth clearly marked by several rows of large open ducts; medullary rays numerous, thin; color, light brown, the sapwood somewhat lighter; specific gravity, 0.6506; ash, 0.80; largely used for wheel stock, saddle-trees, flooring, in cooperage, and now largely exported to Great Britain and used in boat- and ship-building.

225.—Ulmus racemosa, Thomas,

Am. Jour. Sci. 1 ser. xix, 170 & t.—Beck, Bot. 334.—Eaton, Manual, 6 ed. 376.—Eaton & Wright, Bot. 464.—Nuttall, Sylva, i, 37, t. 12; 2 ed. i, 53, t. 12.—Torrey, Fl. N. York, ii, 166, t. 96.—Browne, Trees of America, 500.—Cooper in Smithsonian Rep. 1858, 254.—Wood, Cl. Book, 633; Bot. & Fl. 299.—Gray, Manual N. States, 5 ed. 442.—Vasey, Cat. Forest Trees, 22.—Sargent in Rep. Massachusetts Board Ag. 1878, 271.—Bell in Geological Rep. Canada, 1879-'80, 55°.—Chapman, Fl. S. States, Suppl. 649.

U. Americana, Planchon in De Candolle, Prodr. xvii, 155, in part.

ROCK ELM. CORK ELM. HICKORY ELM. WHITE ELM. CLIFF ELM.

Southwestern Vermont (Robbins), west through western New York, Ontario, and southern Michigan to northeastern Iowa (Waverly, Bessey), and south through Ohio to central Kentucky.

A large tree of great economic value, 20 to 30 meters in height, with a trunk sometimes 0.90 meter in diameter; low, wet clay, rich uplands, rocky declivities, or river cliffs; common and reaching its greatest development in southern Ontario and the southern peninsula of Michigan.

Wood heavy, hard, very strong, tough, very close-grained, compact, susceptible of a beautiful polish; layers of annual growth marked with one to two rows of small open ducts; medullary rays numerous, obscure; color, light clear brown often tinged with red, the thick sap-wood much lighter; specific gravity, 0.7263; ash, 0.60; largely used in the manufacture of heavy agricultural implements, wheel stock, and for railway ties, bridge timbers, sills, etc.

226.-Ulmus alata, Michaux,

Fl. Bor.-Am. i, 173.—Persoon, Syn. i, 291.—Michaux f. Hist. Arb. Am. iii, 275, t. 5; N. American Sylva, 3 ed. iii, 71, t. 127.—Pursh, Fl. Am. Sept. i, 200.—Nuttall, Genera, i, 201.—Ræmer & Schultes, Syst. vi, 209.—Elliott, Sk. i, 333.—Sprengel, Syst. i, 931.—Audubon, Birds, t. 18.—Eaton, Manual, 6 ed. 376.—Loudon, Arboretum, iii, 1408, f. 1248.—Dietrich, Syn. ii, 992.—Eaton & Wright, Bot. 464.—Penn. Cycl. xxv, 493.—Browne, Trees of America, 502.—Planchon in Ann. Sci. Nat. 3 ser. x, 270; De Candolle, Prodr. xvii, 155.—Walpers, Ann. iii, 425.—Darby, Bot. S. States, 503.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 417.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 55.—Lesquereux in Owen's 2d Rep. Arkansas, 386.—Wood, Cl. Book, 633; Bot. & Fl. 299.—Porcher, Resources S. Forests, 311.—Gray, Manual N. States, 5 ed. 443; Hall's Pl. Texas, 21.—Young, Bot. Texas, 496.—Vasey, Cat. Forest Trees, 22.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Ridgway in Proc. U. S. Nat. Mus. 1882, 70.

U. pumila, Walter, Fl. Caroliniana, 111 [not Linnæus].

U. Americana, var. alata, Spach in Ann. Sci. Nat. 2 ser. xv, 364; Hist. Veg. xi, 109.

WAHOO. WINGED ELM.

Southern Virginia, south through the middle districts to the Chattahoochee region of western Florida; southern Indiana and Illinois, south to the Gulf coast, and southwest through southern Missouri, Arkansas, the eastern portions of the Indian territory to the valley of the Trinity river, Texas.

A small tree, 7 to 12 meters in height, with a trunk 0.30 to 0.60 meter in diameter; generally in dry, gravelly soil, or, rarely, along the borders of swamps and river bottoms; most common and reaching its greatest development in southern Missouri and Arkansas.

Wood heavy, hard, not strong, very close-grained, compact, unwedgeable; medullary rays distant, not conspicuous; color, brown, the sap-wood lighter; specific gravity, 0.7491; ash, 0.99; largely used for hubs, blocks, etc.

227.-Planera aquatica, Gmelin,

Syst. ii, 150.—Willdenow, Spec. iv, 967; Enum. Suppl. 14; Berl. Baumz. 281.—Persoon, Syn. i, 291.—Nuttall, Genera, i, 202.—Hayne, Dend. Fl. 202.—Eaton, Manual, 6 ed. 266.—Eaton & Wright, Bot. 360.—Spach in Ann. Sci. Nat. 2 ser. xv, 355; Hist. Veg. xi, 116.—Planchon in Ann. Sci. Nat. 3 ser. x, 261; De Candolle, Prodr. xvii, 167.—Walpers, Ann. iii, 428.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 417.—Wood, Cl. Book, 633; Bot. & Fl. 299.—Gray, Manual N. States, 5 ed. 443.—Koch, Dendrologie, ii, 424.—Young, Bot. Texas, 497.—Vasey, Cat. Forest Trees, 23.

Anonymos aquatica, Walter, Fl. Caroliniana, 230.

- P. Gmelini, Michaux, Fl. Bor.-Am. ii, 248.—Desfontaines, Hist. Arb. ii, 446.—Rœmer & Schultes, Syst. vi, 305.—Elliott, Sk. i, 334.—Sprengel, Syst. i, 493.—Dietrich, Syn. i, 551.—Penn. Cycl. xxv, 490.—Darby, Bot. S. States, 503.
- P. ulmifolia, Michaux f. Hist. Arb. Am. iii, 283, t. 7; N. American Sylva, 3 ed. iii, 80, t. 130.—Poiret, Suppl. iv, 429.—Nouveau Duhamel, vii, 65, t. 21.—Loudon, Arboretum, iii, 1413, f. 1251.—Browne, Trees of America, 515.—Curtis in Rep. Geological Surv. N. Carolina, iii, 1860, 81.
- ? Ulmus nemoralis, Aiton, Hort. Kew. i, 319; 2 ed. ii, 108.—Willdenow, Spec. i, 1326; Berl. Baumz. 520.—Desfontaines, Hist. Arb. ii, 442.—Pursh, Fl. Am. Sept. i, 200.—Smith in Rees' Cycl. xxxix, No. 8.—Nuttall, Genera, i, 201.—Beck, Bot. 334.—Eaton, Manual, 6 ed. 376.—Eaton & Wright, Bot. 464.

Ulmus aquatica, Rafinesque, Fl. Ludoviciana, 165.

P. Richardi, Sprengel, Syst. i, 493, in part.—Torrey & Gray in Pacific R. R. Rep. ii, 175 [not Michaux].

Valley of the Cape Fear river, North Carolina, south to the Chattahoochee region of western Florida, and through central Alabama and Mississippi to western Louisiana and the valley of the Trinity river, Texas, extending north through Arkansas and southern Missouri to the valley of the lower Wabash river and central Kentucky.

A small tree, 9 to 12 meters in height, with a trunk 0.30 to 0.60 meter in diameter; cold, deep, inundated river swamps; rare in the Atlantic and eastern Gulf states; very common and reaching its greatest development in the Red River valley and southern Arkansas.

Wood light, soft, not strong, close-grained, compact, containing few scattered open ducts; medullary rays numerous, thin; color, light brown, the sap-wood nearly white; specific gravity, 0.5294; ash, 0.45.

228.—Celtis occidentalis, Linnaus,

- Spec. 2 ed. 1478.—Du Roi, Harbk. i, 141.—Marshall, Arbustum, 29.—Wangenheim, Amer. 48.—Gærtner, Fruct. i, 374, t. 77, f. 3.—Walter. FI. Caroliniana, 250.—Aiton, Hort. Kew. iii, 437; 2 ed. v, 449.—Lamarck, Dict. iv, 137; Ill. iii, 437, t. 844, f. 1.—Abbot, Insects Georgia, i, t. 36.—Willdenow, Spec. iv, 944; Enum. 1046; Berl. Baumz. 82.—Nouveau Duhamel, ii, 36, t. 9.—Michaux, Fl. Bor.-Am. ii, 249.— Persoon, Syn. i, 292.—Desfontaines, Hist. Arb. ii, 448.—Michaux f. Hist. Arb. Am. iii, 225, t. 8; N. American Sylva, 3 ed. iii, 38, t. 114.— Pursh, Fl. Am. Sept. i, 200.—Eaton, Manual, 31; 6 ed. 36.—Nuttall, Genera, i, 202.—Romer & Schultes, Syst. vi, 306.—Hayne, Dend. Fl. 216.—Elliott, Sk. ii, 584.—Torrey, Fl. U. S. i, 300; Compend. Fl. N. States, 132; Fl. N. York, ii, 167; Bot. Wilkes Exped. 456.— Guimpel, Otto & Hayne, Abb. Holz. 119, t.96.—Sprengel, Syst. i, 932.—Watson, Dend. Brit. ii, 147.—Beck, Bot. 334.—Rafinesque, New Fl. & Bot. i, 32.—Loudon, Arboretum, iii, 1417 & t.—Hooker, Fl. Bor.-Am. ii, 142.—Eaton & Wright, Bot. 186.—Spach in Ann. Sci. Nat. 2 ser. xvi, 40; Hist. Veg. xi, 133.—Penn. Cycl. xxv, 490.—Browne, Trees of America, 517.—Emerson, Trees Massachusetts, 306, t. 16; 2 ed. ii, 344 & t.-Planchon in Ann. Sci. Nat. 3 ser. x, 288; De Candolle, Prodr. xvii, 174.-Walpers, Ann. iii, 396.-Richardson, Arctic Exped. 436.—Darlington, Fl. Cestrica, 3 ed. 256.—Darby, Bot. S. States, 503.—Cooper in Smithsonian Rep. 1858, 254.— Chapman, Fl. S. States, 417.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 61.—Lesquereux in Owen's 2d Rep. Arkansas, 386.— Wood, Cl. Book, 634; Bot. & Fl. 299.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 208.—Porcher, Resources S. Forests, 312.— Gray, Manual N. States, 5 ed. 443; Hall's Pl. Texas, 21.—Koch, Dendrologie, ii, 432.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 23.—Burbank in Proc. Boston Soc. Nat. Hist. xviii, 215.—Putzbys in Fl. des Serres, xxii, 206.— Macoun in Geological Rep. Canada, 1875-76, 209.—Ridgway in Proc. U. S. Nat. Mus. 1882, 72.
 - C. crassifolia, Lamarck, Dict. iv, 138.—Nouveau Duhamel, ii, 37.—Michaux f. Hist. Arb. Am. iii, 228, t. 9; N. American Sylva, 3 ed. iii, 40, t. 115.—Pursh, Fl. Am. Sept. i, 200.—Nuttall, Genera, i, 202.—Ræmer & Schultes, Syst. vi, 307.—Torrey, Fl. U. S. i, 300; Compend. Fl. N. States, 132; Fremont's Rep. 97; Emory's Rep. 412.—Sprengel, Syst. i, 932.—Beck, Bot. 334.—Eaton, Manual, 6 ed. 85.—Rafinesque, New Fl. & Bot. i, 34.—Loudon, Arboretum, iii, 1418, f. 1254.—Eaton & Wright, Bot 186.—Spach in Ann. Sci. Nat. 2 ser. xvi, 39; Hist. Veg. xi, 130.—Penn. Cycl. xxv, 490.—Browne, Trees of America, 519.—Emerson, Trees of Massachusetts, 309; 2 ed. ii, 347 & t.
 - C. obliqua, Mench, Meth. 344.
 - C. occidentalis, var. scabriuscula, Willdenow, Spec. iv, 995; Berl. Baumz. 2 ed. 82.—Hayne, Dend. Fl. 217.—London, Arboretum, iii, 1417.
 - C. occidentalis, var. tenuifolia, Persoon, Syn. i, 292.
 - C. cordata, Persoon, Syn. i, 292.—Desfontaines, Hist. Arb. ii, 448.—Du Mont, Cour. Bot. Cult. vi, 389.
 - C. lævigata, Willdenow, Berl. Baumz. 2 ed. 81; Enum. Suppl. 68.—Ræmer & Schultes, Syst. vi, 306.—Sprengel, Syst. i, 932.—Rafinesque, New. Fl. & Bot. i, 34.—Loudon, Arboretum, iii, 1420.—Koch, Dendrologie, ii, 432.
 - C. pumila, Pursh, Fl. Am. Sept. i, 200.—Romer & Schultes, Syst. vi, 306.—Torrey, Fl. U. S. i, 300; Compend. Fl. N. States, 132.—Beck, Bot. 334.—Eaton, Manual, 6 ed. 86.—Rafinesque, New Fl. & Bot. i, 35.—London, Arboretum, iii, 1420.—Eaton & Wright, Bot. 186.
 - C. alba, Rafinesque, Fl. Ludoviciana, 25; New Fl. & Bot. i, 32.—Planchon in De Candolle, Prodr. xvii, 177.
 - C. canina and C. maritima, Rafinesque in Am. Monthly Mag. & Crit. Rev. ii, 43, 44.
 - C. occidentalis, var. cordata, Willdenow, Berl. Baumz. 2 ed. 82.—Hayne, Dend. Fl. 217.—Ræmer & Schultes, Syst. vi, 306.— Loudon, Arboretum, iii, 1417.
 - C. tenuifolia, Nuttall, Genera, i, 202; Sylva, i, 135; 2 ed. i, 149.—Rafinesque, New Fl. & Bot. i, 36.
 - C. occidentalis, var. integrifolia, Nuttall, Genera, i, 202.—Chapman, Fl. S. States, 417.—Wood, Cl. Book, 634; Bot. & Fl. 209.
 - C. Mississippiensis, Bosc, Dict. Ag. new ed. x, 41.—Poiret, Suppl. iii, 688.—Spach in Ann. Sci. Nat. 2 ser. xvi, 42; Hist. Veg. xi, 136.—Planchon in Ann. Sci. Nat. 3 ser. x, 287; De Candolle, Prodr. xvii, 176.—Walpers, Ann. iii, 397.—Cooper in Smithsonian Rep. 1858, 254.—Lesquereux in Owen's 2d Rep. Arkansas, 386.—Gray, Manual N. States, 5 ed. 443; Hall's Pl. Texas, 21.—Vasey, Cat. Forest Trees, 23.—Ridgway in Proc. U. S. Nat. Mus. 1882, 72.
 - C. integrifolia, Nuttall in Trans. Am. Phil. Soc. new ser. v, 169.—Cooper in Smithsonian Rep. 1858, 254.
 - C. longifolia, Nuttall in Trans. Am. Phil. Soc. new ser. v, 169; Sylva, i, 134, t. 40; 2 ed. i, 148, t. 40.—Rafinesque, New Fl. & Bot. i, 33.—Planchon in De Candolle, Prodr. xvii, 177.
 - C. heterophylla, C. patula, C. Floridiana, C. fuscata, C. salicifolia, C. morifolia, C. maritima, Rafinesque, New Fl. & Bot. i. 31-37.
 - C. occidentalis, var. grandidentata, Spach in Ann. Sci. Nat. 2 ser. xvi, 40; Hist. Veg. xi, 133.—Walpers, Ann. iii, 396.
 - C. occidentalis, var. serrulata, Spach in Ann. Sci. Nat. 2 ser. xvi, 41; Hist. Veg. xi, 134.—Walpers, Ann. iii, 396.
 - C. crassifolia, var. tiliæfolia, Spach in Ann. Sci. Nat. 2 ser. xvi, 39; Hist. Veg. xi, 131.—Walpers, Ann. iii, 396.
 - C. crassifolia, var. morifolia, Spach in Ann. Sci. Nat. 2 ser. xvi, 39; Hist. Veg. xi, 131.—Walpers, Ann. iii, 396.
 - C. crassifolia, var. cucalyptifolia, Spach in Ann. Sci. Nat. 2 ser. xvi, 40; Hist. Veg. xi, 131.—Walpers, Ann. iii, 396.

- C. Audibertiana, Spach in Ann Sci. Nat. 2 ser. xvi, 41; Hist. Pl. xi, 135.—Planchou in De Candolle, Prodr. xvii, 174.
- C. Audibertiana, var. ovata, Spach in Ann. Sci. Nat. 2 ser. xvi, 41; Hist. Veg. xi, 135.
- C. Audibertiana, var. oblongata, Spach in Ann. Sci. Nat. 2 ser. xvi, 41; Hist. Veg. xi, 135.
- C. Lindheimeri, Engelmann in herb. A. Braun. (Koch, Drendrologie, ii, 434).
- C. Berlandieri, Klotsch in Linnæa, xviii, 541.—Planchon in De Candolle, Prodr. xvii, 178.
- C. Texana, Scheele in Linnaa, xx, 146; Romer, Texas, 446; Appx. 146.
- C. occidentalis, var. crassifolia, Gray, Manual N. States, 2 ed. 395; 5 ed. 443.—Wood, Cl. Book, 634; Bot. & Fl. 299.
- C. occidentalis, var. pumila, Gray, Manual N. States, 2 ed. 397; 5 ed. 443.—Chapman, Fl. S. States, 417.—Curtis in Rep. Geological Surv. N. Carolina, iii, 1860, 62.—Watson in King's Rep. v, 321.

SUGARBERRY. HACKBERRY.

Valley of the Saint Lawrence river west to eastern Dakota, south through the Atlantic region to bay Biscayne and cape Romano, Florida, and the valley of the Devil's river, Texas.

A large tree, 18 to 30 or, exceptionally, 36 to 39 meters (*Ridgway*) in height, with a trunk 0.60 to 1.50 meter in diameter; most common and reaching its greatest development in the Mississippi River basin; rich bottoms or dry hillsides; sometimes reduced to a low shrub (*C. pumila*), and varying greatly in the size, shape, and texture of the leaves (*C. Mississippiensis lavigata*, integrifolia, crassifolia, etc.); the extremes connected by innumerable intermediate forms, which, thus considered, make one polymorphous species of wide geographical range.

Wood heavy, rather soft, not strong, coarse-grained, compact, satiny, susceptible of a good polish; layers of annual growth clearly marked by several rows of large open ducts, containing many small groups of smaller ducts arranged in intermediate concentric rings; medullary rays numerous, thin; color, clear light yellow, the sap-wood lighter; specific gravity, 0.7287; ash, 1.09; largely used for fencing and occasionally in the manufacture of cheap furniture.

Var. reticulata.

- C. reticulata, Torrey in Ann. Lyc. N. York, ii, 247.—Eaton, Manual, 6 ed. 86.—Rafinesque, New Fl. & Bot. i, 35.—Eaton & Wright, Bot. 186.—Nuttall, Sylva, i, 133, t. 39; 2 ed. i, 146, t. 39.—Browne, Trees of America, 518.—Planchon in Ann. Sci. Nat. 3 ser. x, 293; De Candolle, Prodr. xvii, 178.—Walpers, Ann. iii, 396.—Torrey & Gray in Pacific R. R. Rep. ii, 175.—Cooper in Smithsonian Rep. 1858, 260; Am. Nat. iii, 407.—Gray in Proc. Am. Acad. vii, 401.—Watson in Pl. Wheeler, 16.—Vasey, Cat. Forest Trees, 23.—Hall in Coulter's Bot. Gazette, ii, 91.—Rothrock in Wheeler's Rep. vi, 238.—Rusby in Bull. Torrey Bot. Club, ix, 54.
- C. Douglasii, Planchon in Ann. Sci. Nat. 3 ser. x, 293; De Candolle, Prodr. xvii, 178.—Walpers, Ann. iii, 396.
- ? C. occidentalis, var. pumila, Watson in King's Rep. v, 321 [not Gray].
- C. brevipes, Watson in Proc. Am. Acad. 3 ser. xiv, 297.—Rothrock in Wheeler's Rep. vi, 238.

HACKBERRY. PALO BLANCO.

Western Texas (Dallas, Ravenel) to the mountains of southern Arizona, and through the Rocky mountains to eastern Oregon; in the Tehachipi pass, California (Pringle).

A small tree, 12 to 15 meters in height, with a trunk rarely 0.60 meter in diameter; borders of streams, generally in high mountain cañons, or in the more arid regions reduced to a low shrub; well characterized by its small, thick, coriaceous leaves, slightly pubescent on the underside along the prominent reticulated veins, and by the light-colored, deeply-furrowed bark, but connected with the typical *C. occidentalis* by intermediate forms not rare in western Texas.

Wood not distinguishable in structure or color from that of the species; specific gravity, 0.7275; ash, 1.22.

229.—Ficus aurea, Nuttall,

Sylva, ii, 4, t. 43; 2 ed. i, 154, t. 43.—Cooper in Smithsonian Rep. 1858, 265.—Chapman, Fl. S. States, 415.—Vasey, Cat. Forest Trees, 22.

F. aurea, var. latifolia, Nuttall, Sylva, ii, 4; 2 ed. i, 154.

Semi-tropical Florida, Indian river to the southern keys.

A large parasitic tree, germinating on the trunks and branches of other trees, and sending down to the ground long aerial roots, which gradually grow together, kill the inclosed tree, and form a trunk sometimes 0.90 to 1.20 meter in diameter.

Wood exceedingly light, soft, very weak, coarse-grained, compact, not durable; medullary rays thin, hardly distinguishable; color, light brown, the sap-wood lighter; specific gravity, 0.2616; ash, 5.03.

230.-Ficus brevifolia, Nuttall,

Sylva, ii, 3, t. 42; 2 ed. i, 153, t. 42.—Cooper in Smithsonian Rep. 1858, 265.—Chapman, Fl. S. States, 415.—Vasey, Cat. Forest Trees, 22.

Semi-tropical Florida, bay Biscayne to the southern keys (Key Largo, Pumpkin Key, Curtiss).

A tree sometimes 15 meters in height, with a trunk rarely exceeding 0.30 meter in diameter.

Wood light, soft, close-grained, compact, containing few large, open, scattered ducts and many groups of much smaller ducts arranged in concentric circles; medullary rays numerous, thin, conspicuous; color, light brown or yellow, the sap-wood lighter; specific gravity, 0.6398; ash, 4.36.

231.—Ficus pedunculata, Aiton,

Hort. Kew. iii, 450; 2 ed. v, 486.—Chapman, Fl. S. States, 415.—Grisebach, Fl. British West Indies, 151.

F. complicata, Humboldt, Bonpland & Kunth, Nov. Gen. & Spec. ii, 48.

Urostigma pedunculatum, Miquel in Hooker, London Jour. Bot. vi, 450.-Walpers, Ann. i, 677.

WILD FIG. INDIA-RUBBER TREE.

Semi-tropical Florida, bay Biscayne to the southern keys (Key Largo, Umbrella and Boca Chica Keys, etc. Curtiss); in the West Indies.

A tree sometimes 12 meters in height, with a trunk rarely exceeding 0.50 meter in diameter, or often shrubby

and much branched from the ground; rare.

Wood light, soft, weak, close-grained, compact, containing many large, open, scattered ducts, with many groups of small ducts arranged in concentric circles; medullary rays numerous, obscure; color, light orange-brown, the sap-wood undistinguishable; specific gravity, 0.4739; ash, 4.92.

232.-Morus rubra, Linnæus,

Spec. 1 ed. 986.—Marshall, Arbustum, 93.—Wangenheim, Amer. 37, t. 15, f. 35.—Walter, Fl. Caroliniana, 241.—Aiton, Hort. Kew. iii, 343; 2 ed. v, 266.—Mænch, Meth. 343.—Lamarck, Dict. iv, 377.—Abbot, Insects Georgia, ii, t. 70.—Michaux, Fl. Bor.-Am. ii, 179.—Willdenow, Spec. iv, 369; Enum. 967; Berl. Baumz. 252.—Nouveau Duhamel, iv, 91, t. 23.—Persoon, Syn. ii, 558.—Desfontaines, Hist. Arb. ii, 416.—Michaux f. Hist. Arb. Am. iii, 232, t. 10; N. American Sylva, 3 ed. iii, 42, t. 116.—Pursh, Fl. Am. Sept. ii, 639.—Eaton, Manual, 105; 6 ed. 230.—Barton, Prodr. Fl. Philadelph. 89.—Nuttall, Genera, ii, 209.—Hayne, Dend. Fl. 155.—Elliott, Sk. ii, 574.—Sprengel, Syst. i, 492.—Torrey, Compend. Fl. N. States, 352; Nicollet's Rep. 160; Fl. N. York, ii, 220; Emory's Rep. 412.—Rafinesque, Med. Bot. ii, 243; New Fl. & Bot. i, 43; Am. Manual Mulberry Trees, 13.—Beck, Bot. 316.—Dietrich, Syn. i, 551.—Loudon, Arboretum, iii, 1359 & t.—Seringe, Descr. & Cult. du Mür. 223, t. 20.—Eaton & Wright, Bot. 323.—Spach, Hist. Veg. xi, 48.—Browne, Trees of America, 457.—Emerson, Trees Massachusetts, 280; 2 ed. i, 314.—Darlington, Fl. Cestrica, 2 ed. 285.—Darby, Bot. S. States, 503.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 415.—Gray in Pacific R. R. Rep. xii², 47; Manual N. States, 5 ed. 444.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 71.—Lesquereux in Owen's 2d Rep. Arkansas, 386.—Wood, Cl. Book, 635; Bot. & Fl. 300.—Porcher, Resources S. Forests, 305.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 208.—Koch Dendrologie, ii, 447.—Young, Bot. Texas, 494.—Bureau in De Candolle, Prodr. xvii, 245.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 22.—Riley in Special Rep. U. S. Dept. Ag. No. 11, 34.—Ridgway in Proc. U. S. Nat. Mus. 1882, 73.—Burgess in Coulter's Bot. Gazette, vii, 95.

- M. Canadensis, Lamarck, Dict. iv, 380.—Seringe, Descr. & Cult. du Mûr. 224.
- M. scabra, Willdenow, Enum. 967; Berl. Baumz. 152.—Nuttall, Genera, ii, 209.—Rafinesque, Am. Manual Mulberry Trees, 29.—Hayne, Dend. Fl. 154.—Sprengel, Syst. i, 492.—Loddiges, Cat. 1836.
- M. tomentosa, Rafinesque, Fl. Ludoviciana, 113; Am. Manual Mulberry Trees, 30.
- M. reticulata, M. Canadensis, M. parvifolia, and M. riparia, Rafinesque, Am. Manual Mulberry Trees, 29-31.
- M. rubra, var. Canadensis, Loudon, Arboretum, iii, 1360.
- M. Missouriensis, Audibert, Cat. Jard. Tonnelle.
- M. rubra, var. tomentosa, Bureau in De Candolle, Prodr. xvii, 246.
- M. rubra, var. incisa, Bureau in De Candolle, Prodr. xvii, 247.

RED MULBERRY.

Western New England and Long Island, New York, west through southern Ontario and central Michigan to the Black hills of Dakota, eastern Nebraska and Kansas, south to bay Biscayne and cape Romano, Florida, and the valley of the Colorado river, Texas.

A large tree, 18 to 20 meters in height, with a trunk 0.90 to 1.20 meter or, exceptionally, 2.15 meters in diameter (P. J. Berckmans, Augusta, Georgia); generally in rich bottom lands; most common and reaching its greatest development in the basins of the lower Ohio and the Mississippi rivers.

Wood light, soft, not strong, rather tough, coarse-grained, compact, very durable in contact with the soil, satiny, susceptible of a good polish; layers of annual growth clearly marked by several rows of large open ducts; medullary rays numerous, thin; color, light orange-yellow, the sap-wood lighter; specific gravity, 0.5898; ash, 0.71; largely used in fencing, cooperage, for snaths, and at the south in ship- and boat-building.

The large dark purple fruit sweet and edible.

233.-Morus microphylla, Buckley,

Proc. Philadelphia Acad. 1862, 8.—Gray in Proc. Philadelphia Acad. 1862, 167. — Young, Bot. Texas, 494.

M. parvifolia, Engelmann in herb—Gray, Hall's Pl. Texas, 21.—Vasey, Cat. Forest Trees, 22.—Riley in Special Rep. U. S. Dept. Ag. No. 11, 34.

MEXICAN MULBERRY.

Valley of the Colorado river, through western Texas to the valley of the Gila river, New Mexico; and southward into Mexico.

A small tree, sometimes 7 meters in height, with a trunk rarely 0.30 meter in diameter, or often reduced to a low shrub; most common and reaching its greatest development in the mountain cañons of southern New Mexico; in Texas generally on limestone formations.

Wood heavy, hard, close-grained, compact; layers of annual growth marked with several rows of small open ducts; medullary rays numerous, thin; color, orange or, rarely, dark brown, the sap-wood light yellow; specific gravity, 0.7715; ash, 0.68.

The small acid fruit hardly edible.

234.-Maclura aurantiaca, Nuttall,

Genera, ii, 234; Trans. Am. Phil. Soc. 2 ser. v, 169; Sylva, i, 126, t. 37, 38; 2 ed. i, 140, t. 37, 38.—James in Long's Exped. ii, 158.—Delile in Bull. Soc. Ag. Her. 1835 & t.—Eaton, Manual, 6 ed. 217.—Seringe in Mem. Soc. Ag. Lyon, 1835, 125 & t; Descr. & Cult. du Mûr. 232, t. 273.—Lambert, Pinus, 2 ed. ii, Appx. 4, t. 3.—Loudon, Arboretum, iii, 1342, 1362, f. 1226–1228; Gard. Mag. xi, 312, f. 45–47.—Eaton & Wright, Bot. 311.—Spach, Hist. Veg. xi, 53.—Browne, Trees of America, 465.—Darby, Bot. S. States, 504.—Cooper in Smithsonian Rep. 1858, 254.—Miquel in Martius, Fl. Brasil. iv, 158.—Wood, Cl. Book, 635; Bot. & Fl. 299.—Porcher, Resources S. Forests, 101.—Koch, Dendrologie, ii, 437.—Bureau in De Candolle, Prodr. xvii, 227.—Dumen in Proc. California Acad. v, 398.—Vasey, Cat. Forest Trees, 22.—Guibourt, Hist. Drogues, 7 ed. ii, 325.—Riley in Special Rep. U. S. Dept. Ag. No. 11, 35.

Toxylon Maclura, Rafinesque, New Fl. & Bot. i, 43; Am. Manual Mulberry Trees, 13.

Ioxylon pomiferum, Rafinesque in Am. Monthly Mag. and Crit. Rev. ii, 118.

Broussonetia tinctoria, Torrey in Ann. Lyc. N. York, ii, 246 [not Kunth].

OSAGE ORANGE. BOIS D'ARC.

Southwestern Arkansas, south of the valley of the Arkansas river, southeastern portions of the Indian territory, and southward in northern Texas to about latitude 32° 50′ N. (Dallas, Reverchon, etc.).

A tree, sometimes 15 to 18 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; rich bottom lands; most common and probably reaching its greatest development along the valley of the Red river in the Indian territory.

Wood heavy, exceedingly hard, very strong, flexible, close-grained, compact, very durable in contact with the ground, satiny, susceptible of a beautiful polish, containing numerous small open ducts, layers of annual growth clearly marked by broad bands of larger ducts; medullary rays thin, numerous, conspicuous; color, bright orange, turning brown with exposure, the sap-wood light yellow; specific gravity, 0.7736; ash, 0.68; largely used for fence posts, paving blocks, railway ties, wheel stock; extensively planted for hedges, especially in the western states.

PLATANACEÆ.

235.—Platanus occidentalis, Linnæus,

Spec. 1 ed. 999.—Du Roi, Harbk. ii, 134.—Marshall, Arbustum, 105.—Wangenheim, Amer. 31, t. 13, f. 31.—Walter, Fl. Caroliniana, 236.— Aiton, Hort. Kew. iii, 365; 2 ed. v, 305.—Monch, Meth. 358.—Abbot, Insects Georgia, ii, t. 55.—Michaux, Fl. Bor.-Am. ii, 163.— Lamarck, Dict. v, 438.—Nouveau Duhamel, ii, 6, t. 2.—Willdenow, Spec. iv, 474; Enum. 984; Berl. Baumz. 284.—Persoon, Syn. ii, 575.—Desfontaines Hist. Arb. ii, 545.—Schkuhr, Handb. iii, 274, t. 306.—Robin, Voyages, iii, 524.—Michaux f. Hist. Arb. Am. iii, 184, t. 3; N. American Sylva, 3 ed. ii, 48, t. 63.—Pursh, Fl. Am. Sept. ii, 635.—Barton, Prodr. Fl. Philadelph. 91; Compend. Fl. Philadelph. 176.—Eaton, Manual, 110; 6 ed. 267.—Nuttall, Genera, ii, 219.—Hayne, Dend. Fl. 171.—James in Long's Exped. i, 23.—Elliott, Sk. ii, 620.—Sprengel, Syst. iii, 865.—Watson, Dend. Brit. i, t. 100.—Torrey, Compend. Fl. N. States, 356; Fl. N. York, ii, 218; Bot. Mex. Boundary Survey, 205 .- Audubon, Birds, t. 206 .- Loudon, Arboretum, iv, 2043, f. 1959 & t .- Eaton & Wright, Bot. 361 .- Hooker, Fl. Bor.-Am. ii, 158.—Bigelow, Fl. Boston. 3 ed. 384.—Emerson, Trees Massachusetts, 227; 2 ed. i, 261 & t.—Scheele in Romer, Texas, 446.—Buckley in Am. Jour. Sci. 2 ser. xiii, 399.—Darlington, Fl. Cestrica, 3 ed. 282.—Darby, Bot. S. States, 509.—Agardh, Theor. & Syst. Pl. t. xiii, f. 1, 2.—Cooper in Smithsonian Rep. 1858, 254.—Hartig, Forst. 446, t. 54.—Chapman, Fl. S. States, 418.—Curtis in Rep. Geological Surv. N. Carolina, 76.—Lesquereux in Owen's 2d Rep. Arkansas, 386.—Wood, Cl. Book, 640; Bot. & Fl. 303.— Engelmann in Trans. Am. Phil. Soc. new ser. xii, 209.—A. De Candolle, Prodr. xvi², 159.—Gray, Manual N. States, 5 ed. 447; Hall's Pl. Texas, 21.—Koch, Dendrologie, ii, 468.—Schnizlein, Icon. t. 97, f. 1-24.—Young, Bot. Texas, 498.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 22.—Ridgway in Proc. U. S. Nat. Mus. 1882, 73.—Bell in Geological Rep. Canada, 1879-'80, 55°.

P. lobata, Mench, Meth. 358.

P. hybridas, Brotero, Fl. Lus. ii, 487.

P. vulgaris, var. angulosa, Spach in Ann. Sci. Nat. 2 ser. xv, 293; Hist. Veg. xi, 79.

SYCAMORE. BUTTON WOOD. BUTTON-BALL TREE. WATER BEECH.

Southern Maine and southeastern New Hampshire to northern Vermont and the northern shores of lakes Ontario and Erie, west to eastern Nebraska and Kansas, south to northern Florida, central Alabama and Mississippi, and the valley of the Nucces river, Texas, extending southwest to the valley of the Devil's river.

The largest tree of the Atlantic forests, often 30 to 40 meters in height, with a trunk 2.40 to 4.20 meters in diameter; generally along streams and river bottoms, in rich, moist soil; very common and reaching its greatest development in the bottom lands of the Ohio and Mississippi rivers; the large specimens generally hollow.

Wood heavy, hard, not strong, very close-grained, compact, difficult to split and work; layers of annual growth clearly marked by broad bands of small ducts; the numerous medullary rays very conspicuous, as in that of all the North American species; color, brown tinged with red, the sap-wood lighter; specific gravity, 0.5678; ash, 0.46; largely used for tobacco boxes (its principal use), ox-yokes, butchers' blocks, and, rarely, in the manufacture of cheap furniture.

236.—Platanus racemosa, Nuttall:

Audubon, Birds, t. 362; Sylva, i, 47, t. 15; 2 ed. i, 63, t. 15.—Bentham, Pl. Hartweg. 336.—Newberry in Pacific R. R. Rep. vi, 33, 89, t. 11, f. 10.—Cooper in Smithsonian Rep. 1858, 260.—Torrey, Bot. Mex. Boundary Survey, 204; Ives' Rep. 27; Bot. Wilkes Exped. 457.—A. De Candolle, Prodr. xvi², 160.—Koch, Dendrologie, ii, 469.—Vasey, Cat. Forest Trees, 23.—Watson, Bot. California, ii, 66.

P. occidentalis, Hooker & Arnott, Bot. Beechey, 160, 380 [not Linnæus].

P. Californica, Bentham, Bot. Sulphur, 54.

P. Mexicana, Moricand, Pl. Rar, Amer. t. 13?—Torrey in Sitgreaves' Rep. 172; Pacific R. R. Rep. vii, 20.

SYCAMORE. BUTTON WOOD.

California, valley of the Sacramento river, south through the interior valleys and coast ranges to the southern boundary of the state.

A large tree, 24 to 30 meters in height, with a trunk 0.90 to 1.20 meter in diameter; borders of streams, in rich soil.

Wood light, soft, not strong, very close-grained, compact, difficult to split; layers of annual growth clearly marked by narrow bands of small ducts; medullary rays numerous, conspicuous; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.4880; ash, 1.11.

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237.—Platanus Wrightii, Watson,

Proc. Am. Acad. x, 349.-Vasey, Cat. Forest Trees, 23.-Rusby in Bull. Torrey Bot. Club, ix, 54.

P. Mexicana, Torrey in Emory's Rep. 151 [not Moricand].

P. racemosa, Watson, Pl. Wheeler, 16 [not Nuttall]. - Rothrock in Wheeler's Rep. vi, 239.

SYCAMORE.

Valleys of southwestern New Mexico to the valley of the San Pedro river, Arizona; southward into Mexico.

A tree sometimes 15 to 18 meters in height, with a trunk 0.45 to 0.60 meter in diameter; banks of streams and high mountain canons.

Wood light, soft, weak, very close-grained, compact; layers of annual growth clearly marked by several rows of open ducts; medullary rays numerous, thin, very conspicuous; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.4736; ash, 1.35.

JUGLANDACEÆ.

238.-Juglans cinerea, Linnæus,

Spec. 2 ed. 1415.—Jacquin, Icon. Rar. i, t. 193.—Wangenheim, Amer. 21, t. 9, f. 21.—Walter, Fl. Caroliniana, 235.—Aiton, Hort. Kew. iii, 361; 2 ed. v, 296.—Lamarck, Dict. iv, 503; Ill. iii, 365, t. 781, f. 7.—B. S. Barton, Coll. i, 22, 31; ii, 43.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 388.—Michaux, Fl. Bor.-Am. ii, 191.—Willdenow, Spec. iv, 456; Enum. 978; Berl. Baumz. 193.—Persoon, Syn. ii, 556.—Desfontaines, Hist. Arb. ii, 347.—Pursh, Fl. Am. Sept. ii, 636.—Barton, Prodr. Fl. Philadelph. 92.—Bigelow, Med. Bot. ii, 115, t. 32; Fl. Boston. 3 ed. 378.—Eaton, Manual, 108; 6 ed. 192.—Nuttall, Genera, ii, 220; Sylva, i, 41; 2 ed. i, 37.—Hayne, Dend. Fl. 163.—Elliott, Sk. ii, 622.—Sprengel, Syst. iii, 865.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, ii, 180.—Rafinesque, Med. Bot. ii, 234.—Audubon, Birds, t. 142.—Beck, Bot. 335.—Spach, Hist. Veg. ii, 170.—Lindley, Fl. Med. 307.—Loudon, Arboretum, iii, 1439, f. 1262.—Hooker, Fl. Bor.-Am. ii, 143.—Eaton & Wright, Bot. 287.—Emerson, Trees Massachusetts, 182; 2 ed. i, 207 & t.—Griffith, Med. Bot. 589.—Carson, Med. Bot. ii, 42, t. 86.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 262.—Darby, Bot. S. States, 513.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 419.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 45.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 640; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 16, t. 4, f. 45; Prodr. xvi², 137.—Porcher, Resources S. Forests, 317.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 209.—Gray, Manual N. States, 5 ed. 447.—Koch, Dendrologic, i, 589.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 23.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Bentley & Trimen, Med. Pl. iv, 247, t. 247.—Beal in Am. Nat. xv, 36, f. 6.—Sears in Bull. Essex Inst. xiii, 178.—Bell in Geological Rep. Canada, 1878–80, 53°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 76.

J. oblonga, Miller, Dict. No. 3.—Du Roi, Harbk. i, 332—Mœnch, Meth. 696.—Retzius, Obs. i, 10.

J. oblonga alba, Marshall, Arbustum, 67.

J. cathartica, Michaux f. Hist. Arb. Am. i, 165, t. 2; N. American Sylva, 3 ed. i, 109, t. 31.

Carya cathartica, Barton, Compend. Fl. Philadelph. ii, 178.

Wallia cinerea, Alefeld in Bonplandia, 1861, 334.

BUTTERNUT. WHITE WALNUT.

Southern New Brunswick, valley of the Saint Lawrence river, Ontario and southern Michigan to northern Minnesota (lake Pokegoma, *Garrison*) and central Iowa, south to Delaware and along the Alleghany mountains to northern Georgia, central Alabama and Mississippi, northern Arkansas, and southeastern Kansas.

A tree 18 to 24 or, exceptionally, 30 to 35 meters (Ridgway) in height, with a trunk 0.60 to 0.90 meter in diameter; rich woodlands; rare at the south; most common and reaching its greatest development in the Ohio River basin.

Wood light, soft, not strong, rather coarse-grained, compact, easily worked, satiny, susceptible of a beautiful polish, containing numerous regularly-distributed, large, open ducts; medullary rays distant, thin, obscure; color, bright light brown, turning dark with exposure, the sap-wood lighter; specific gravity, 0.4086; ash, 0.51; largely used for interior finish, cabinet work, etc.

The inner bark, especially that of the root, is employed medicinally as a mild cathartic (Am. Jour. Pharm. 1874, 169.—U. S. Dispensatory, 14 ed. 526.—Nat. Dispensatory, 2 ed. 794), and furnishes a yellow dye.

239.—Juglans nigra, Linnæus,

Spec. 1 ed. 997.—Jacquin, Icon. Rar. i, t. 191.—Wangenheim, Amer. 20, t. 8, f. 20.—Walter, Fl. Caroliniana, 235.—Aiton, Hort. Kew, iii, 360; 2 ed. v, 296.—Mench, Meth. 696.—Lamarck, Dict. iv, 502; Ill. iii, 365, t. 781, f. 6.—Abbot, Insects Georgia, i, t. 88.-Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 388.—Michaux, Fl. Bor.-Am. ii, 191.—Willdenow, Spec. iv, 456; Enum. 978; Berl. Baumz. 193.—Smith in Rees' Cycl. xx, No. 3.—Persoon, Syn. ii, 566.—Desfontaines, Hist. Arb. ii, 347.— Nouveau Duhamel, iv, 179, t. 48.—Michaux f. Hist. Arb. Am. i, 158, t. 1; N. American Sylva, 3 ed. i, 140, t. 30.—Pursh, Fl. Am. Sept. ii, 636.—Barton, Prodr. Fl. Philadelph. 92; Compend. Fl. Philadelph. ii, 177.—Eaton, Manual, 108; 6 ed. 192.—Nuttall, Genera, ii, 220; Sylva, i, 41; 2 ed. i, 57.—Hayne, Dend. Fl. 163.—Elliott, Sk. ii, 622.—Sprengel, Syst. iii, 865.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, ii, 179.—Watson, Dend. Brit. ii, t. 158.—Audubon, Birds, t. 84, 156.—Rafinesque, Med. Bot. ii, 233.—Beck, Bot. 335.— Spach, Hist. Veg. ii, 168.—Loudon, Arboretum, iii, 1435, f. 1260 & t.—Eaton & Wright, Bot. 287.—Emerson, Trees Massachusetts, 185; 2 ed. i, 211 & t.—Griffith, Med. Bot. 589.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 262.—Darby, Bot. S. States, 513.—Cooper in Smithsonian Rep. 1858, 254.—Chapman, Fl. S. States, 419.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 45.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 640; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 34, t. 1, f. 1, 8-10; Prodr. xvi2, 137.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 209.—Porcher, Resources S. Forests, 318.—Gray, Manual N. States, 5 ed. 447.—Koch, Dendrologie, i, 587.—Schnizlein, Icon. t. 244, f. 1, 8, 12, 13.—Young, Bot. Texas, 500.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 23.—Guibourt, Hist. Drogues, 7 ed. ii, 302.—Beal in Am. Nat. xv, 36, f. 5.—Sears in Bull. Essex Inst. xiii, 178.—Bell in Geological Rep. Canada, 1879-'80, 53c.— Ridgway in Proc. U. S. Nat. Mus. 1882, 76.—Nicholson in London Gard. Chronicle, 1882, 780.—Watson in Proc. Am. Acad. xviii, 155.

J. nigra oblonga, Marshall, Arbustum, 67.

Wallia nigra, Alefeld in Bonplandia, 1861, 334.

BLACK WALNUT.

Western Massachusetts, west along the southern shores of lake Erie through southern Michigan to southern Minnesota, eastern Nebraska, and eastern Kansas, south to the Chattahoochee region of northern Florida, central Alabama and Mississippi, and the valley of the San Antonio river, Texas.

A large tree, often 30 to 45 meters in height, with a trunk 1.80 to 3 meters in diameter; rich bottom lands and hillsides; most common and reaching its greatest development on the western slopes of the southern Alleghany mountains and in the rich bottoms of southwestern Arkansas and the Indian territory; less common east of the Alleghany mountains, and now everywhere scarce.

Wood heavy, hard, strong, rather coarse-grained, liable to check if not carefully seasoned, easily worked, susceptible of a beautiful polish, durable in contact with the soil, containing numerous large, regularly-distributed, open ducts; medullary rays numerous, thin, not conspicuous; color, rich dark brown, the thin sap-wood much lighter; specific gravity, 0.6115; ash, 0.79; more generally used in cabinet-making, interior finish, and for gun stocks than that of any other North American tree.

240.—Juglans rupestris, Engelmann;

Sitgreaves' Rep. 171, t. 15.—Torrey, Bot. Mex. Boundary Survey, 205; Ives' Rep. 27.—Cooper in Smithsonian Rep. 1858, 260.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 28, t. 2, f. 11; Prodr. xvii², 138.—Vasey, Cat. Forest Trees, 24.—Watson, Bot. California, ii, 93; Proc. Am. Acad. xviii, 155.—Rusby in Bull. Torrey Bot. Club. ix, 54.

- J. rupestris, var. major, Torrey in Sitgreaves' Rep. 171, t. 16; Bot. Mex. Boundary Survey, 205; Pacific R. R. Rep. vii, 20.—C. De Candolle, Prodr. xvi², 138.—Hemsley, Bot. Am.-Cent. iii, 164.
- J. Californica, Watson in Proc. Am. Acad. x, 349; Bot. California, ii, 93.—Vasey, Cat. Forest Trees, 24.—Rothrock in Wheeler's Rep. vi, 249.

WALNUT.

Valley of the Colorado river (near Austin), west through western Texas, southern New Mexico, and Arizona from 5,000 to 7,000 feet elevation, and in the California Coast ranges from the San Bernardino mountains to the neighborhood of San Francisco bay and the valley of the Sacramento river.

A tree rarely 15 to 22 meters in height, with a trunk 0.30 to 0.90 meter in diameter, reaching its greatest development in the neighborhood of San Francisco bay; in Texas generally reduced to a low, much-branched shrub; borders of streams and mountain cañons, in rich soil.

Wood heavy, hard, not strong, coarse-grained, checking in drying, susceptible of a good polish, containing numerous regularly-distributed, large, open ducts; medullary rays distant, thin, obscure; color, rich dark brown, the sap-wood lighter; specific gravity, 0.6554; ash, 1.01.

The small nuts sweet and edible.

241.—Carya olivæformis, Nuttall,

Genera, ii, 221.—Sprengel, Syst. ii, 849.—Eaton, Manual, 6 ed. 83.—Spach. Hist. Veg. ii, 173.—Penn. Cycl. vi, 331.—Loudon, Arboretum, iii, 1441, f. 1263.—Eaton & Wright, Bot. 183.—Scheele in Remer, Texas, 447.—Belg. Hort. vi, 223, t. 45, f. 2.—Torrey, Bot. Mex. Boundary Survey 205.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 418.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 641; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36, t. 1, f. 3, t. 5, f. 59; Prodr. xvii, 144.—Porcher, Resources S. Forests, 333.—Gray, Manual N. States, 5 ed. 448.—Young, Bot. Texas, 499.—Vasey, Cat. Forest Trees, 24.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Ridgway in Proc. U. S. Nat. Mus. 1882, 77.—Hemsley, Bot. Am.-Cent. iii, 163.—Watson in Proc. Am. Acad. xviii, 155.

Juglans Pecan, Marshall, Arbustum, 69.—Walter, Fl. Caroliniana, 236.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 392.

Juglans Illinoinensis, Wangenheim, Amer. 54, t. 18, f. 43.

Juglans angustifolia, Aiton, Hort. Kew. iii, 361; 2 ed. v, 296.

Juglans rubra, Gærtner, Fruct. ii, 51, t. 89, f. 1.—Lamarck, Ill. iii, 365, t. 781, f. 4.

Juglans cylindrica, Lamarck, Dict. iv, 505; Ill. iii, 365, t. 781, f. 5.—Nouveau Duhamel, iv, 179.

Juglans olivæformis, Michaux, Fl. Bor.-Am. ii, 192.—Willdenow, Spec. iv, 457; Enum. 979; Berl. Baumz. 194.—Persoon, Syn. ii, 566.—Desfontaines, Hist. Arb. ii, 348.—Michaux f. Hist. Arb. Am. i, 175, t. 3; N. American Sylva, 3 ed. i, 114, t. 32.—Muhlenberg, Cat. 88.—Aiton, Hort. Kew. 2 ed. v, 296.—Pursh, Fl. Am. Sept. ii, 636.—Hayne, Dend. Fl. 163.—Regel, Gartenflora, xviii, 89.

C. angustifolia, Nuttall, Sylva, i, 41; 2 ed. i, 57.

?C. tetraptera, Liebmann in Dansk. Vidensk. Selsk. Forhand. 1850, 80.

Hickorea species, LeConte in Proc. Philadelphia Acad. vi, 402.

C. Illinoensis, Koch, Dendrologie, i, 593.

PECAN. ILLINOIS NUT.

Near Davenport, Iowa (C. C. Parry), southern Illinois, and Indiana, northwestern Kentucky, south and southwest through Missouri and Arkansas to eastern Kansas, the Indian territory, and through western Louisiana and Texas to the valley of the Concho river.

A tree 30 to 52 meters in height, with a trunk 0.90 to 1.80 meter in diameter; borders of streams in low, rich soil; very common and reaching its greatest development in the bottom lands of Arkansas and the Indian territory; the largest species of the genus and the largest and most important tree of western Texas.

Wood heavy, hard, not strong, brittle, close-grained, compact; layers of annual growth marked by one or two rows of large open ducts; medullary rays numerous, thin; color, light brown tinged with red; the sap-wood lighter brown; specific gravity, 0.7180; ash, 1.13; less valuable than the wood of the other species and hardly used except for fuel.

The sweet, edible nuts are collected in great quantities, affording an important article of commerce.

242.—Carya alba, Nuttall,

Genera, ii, 221.—Elliott, Sk. ii, 624.—Watson, Dend. Brit. ii, t. 148.—Sprengel, Syst. ii, 849.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, 181.—Beck, Bot. 336.—Eaton, Manual, 6 ed. 83.—Spach, Hist. Veg. ii, 174.—Penn. Cycl. vi, 332.—Loudon, Arboretum, iii, 1446, f. 1269 & t.—Eaton & Wright, Bot. 183.—Hooker, Fl. Bor.-Am. ii, 143.—Emerson, Trees Massachusetts, 191; 2 ed. i, 217 & t.—Darlington, Fl. Cestrica, 3 ed. 263.—Darby, Bot. S. States, 513.—Belg. Hort. vi, 223, t. 48, f. 8.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 418.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 43.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 641; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36, t. 2, f. 13, 14, 18, t. 3, f. 24, t. 4, f. 44, 46; Prodr. xvi², 142.—Gray, Manual N. States, 5 ed. 448.—Young, Bot. Texas, 499.—Vasey, Cat. Forest Trees, 24.—Aldrich in Am. Nat. xv, 227.—Sears in Bull. Essex Inst. xiii, 179.—Ridgway in Proc. U. S. Nat. Mus. 1882, 72.—Bell in Geological Rep. Canada, 1879-'80, 55°.

Juglans ovata, Miller, Dict.

Juglans alba ovata, Marshall, Arbustum, 69.

Juglans oualis, Wangenheim, Amer. 24, t. 10, f. 23.

Juglans compressa, Gærtner, Fruct. ii, 50, t. 89, f. 1.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 300.—Willdenow, Spec. iv, 458; Enum. 979; Berl. Baumz. 195.—Persoon, Syn. ii, 566.—Desfontaines, Hist. Arb. ii, 347.—Aiton, Hort. Kew. 2 ed. v, 297.—Hayne, Dend. Fl. 164.—Lamarck, Ill. iii, 365, t. 781, f. 3.

? Juglans exaltata, Bartram, Travels, 2 ed. 38.

Juglans squamosa, Lamarck, Dict. iv, 504.—Desfontaines, Hist. Arb. ii, 348.—Michaux f. Hist. Arb. Am. i, 190, t. 7; N. American Sylva, 3 ed. i, 123, t. 36.—Barton, Prodr. Fl. Philadelph. 92; Compend. Fl. Philadelph. ii, 179.—Bigelow, Fl. Boston. 3 ed. 380.

Juglans alba, Michaux, Fl. Bor. Am. ii 193 [not Linnæus].—Pursh, Fl. Am. Sept. ii, 637.—Eaton, Manual, 108.

C. microcarpa, Nuttall, Genera, ii, 221; Sylva, i, 38, t. 13; 2 ed. i, 55, t. 13.—Sprengel, Syst. ii, 849.—Penn. Cycl. vi, 332.—London, Arboretum, iii, 1451.—Darlington, Fl. Cestrica, 3 ed. 264.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 419.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 44.—Wood, Cl. Book, 642; Bot. & Fl. 304.—C. De Candolle, Prodr. xvi², 143.—Gray, Manual N. States, 5 ed. 448.—Koch, Dendrologie, i, 596.—Young, Bot. Texas, 499.—Vasey, Cat. Forest Trees, 24.—Ridgway in Proc. U. S. Nat. Mus. 1882, 77.

SHELL-BARK HICKORY. SHAG-BARK HICKORY.

Valley of the Saint Lawrence river, along the northern shores of lakes Ontario and Erie to southern Michigan and southeastern Minnesota, south to the Chattahoochee region of western Florida, central Alabama and Mississippi, and west to eastern Kansas, the Indian territory, and eastern Texas.

A large tree of the first economic value, 24 to 30 or, exceptionally, 39 to 45 meters in height (*Ridgway*), with a trunk 0.90 to 1.20 meter in diameter; rich hillsides and sandy ridges; common and reaching its greatest development west of the Alleghany mountains; varying greatly in the size and shape of the fruit. A form with small, thin-shelled nuts (*C. microcarpa*, *Nuttall l. e.*) is not rare from Delaware southward, and in Michigan.

Wood heavy, very hard and strong, tough, close-grained, compact, flexible; layers of annual growth clearly marked with one to three rows of large open ducts; medullary rays numerous, thin; color, brown, the thin and more valuable sap-wood nearly white; specific gravity, 0.8372; ash, 0.73; largely used in the manufacture of agricultural implements, carriages, ax handles, baskets, etc.

The sweet and edible nuts afford an important article of commerce.

243.—Carya sulcata, Nuttall,

Genera, ii, 221.—Elliott, Sk. ii, 624.—Sprengel, Syst. ii, 849.—Torrey, Compend. Fl. N. States, 357.—Beck, Bot. 336.—Eaton, Manual, 6 ed. 83.—Spach, Hist. Veg. ii, 174.—Penn. Cycl. vi, 332.—Loudon, Arboretum, iii, 1448, f. 1271.—Eaton & Wright, Bot. 183.—Darby, Bot. S. States, 513.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 418.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 43.—Lesquerenx in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 641; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36, t. 5, f. 51, 52; Prodr. xvi³, 143.—Gray, Manual N. States, 5 ed. 449.—Young, Bot. Texas, 499.—Vasey, Cat. Forest Trees, 24.—Ridgway in Proc. U. S. Nat. Mus. 1882, 78.

Juglans sulcata, Willdenow, Berl. Baumz. 1 ed. 154, t. 7; Spec. iv, 457.—Muhlenberg & Willdenow in Neue Schriften Gesell.
Nat. Fr. Berlin, iii, 391.—Persoon, Syn. ii, 566.—Desfontaines, Hist. Arb. ii, 348.—Pursh, Fl. Am. Sept. ii, 637.

Juglans mucronata, Michaux, Fl. Bor.-Am. ii, 192.

Juglans laciniosa, Michaux f. Hist. Arb. Am. i, 199, t. 8; N. American Sylva, 3 ed. i, 128, t. 37.—Barton, Prodr. FL. Philadelph. 92.—Poiret, Suppl. iv, 112.—Audubon, Birds, t. 101.

C. cordiformis, Koch, Dendrologie, i, 597.

BIG SHELL-BARK. BOTTOM SHELL-BARK.

Chester county, Pennsylvania, west to southern Indiana and Illinois, eastern Kansas, and the Indian territory.

A tree 24 to 30 or, exceptionally, 37 (Ridgway) meters in height, with a trunk 0.60 to 1.20 meter in diameter; bottom lands, in low, rich soil; rare and local; most common and reaching its greatest development along the streams of southern Arkansas and the Indian territory.

Wood heavy, very hard, strong and tough, very close-grained, compact, flexible; layers of annual growth marked by one or two rows of large open ducts; medullary rays numerous, obscure; color, dark brown, the sapwood nearly white; specific gravity, 0.8108; ash, 0.90; used for the same purposes as that of the shell-bark hickory. The large nuts sweet and edible.

244.—Carya tomentosa, Nuttall,

Genera, ii, 221.—Barton, Compend. Fl. Philadelph. ii, 179.—Elliott, Sk. ii, 625.—Sprengel, Syst. ii, 849.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, ii, 182.—Beck, Bot. 336.—Eaton, Manual, 6 ed. 83.—Spach, Hist. Veg. ii, 176.—Penn. Cycl. vi, 332.—Loudon, Arboretum, iii, 1444, f. 1267.—Eaton & Wright, Bot. 183.—Emerson, Trees Massachusetts, 194, t. 13; 2 ed. i, 222 & t.—Darlington, Fl. Cestrica, 3 ed. 263.—Darby, Bot. S. States, 513.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 419.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 43.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Bock, 641; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36; Prodr. xvi², 143.—Gray, Manual N. States, 5 ed. 449.—Young, Bot. Texas, 499.—Vasey, Cat. Forest Trees, 24.—Ridgway in Proc. U. S. Nat. Mus. 1882, 78.

Juglans alba, Linnæus, Spec. 1 ed. 997.—Du Roi, Harbk i, 333.—Kalm in Act. Holm. 1769, 117.—Wangenheim, Amer. 23, t. 10, f. 2.—Walter, Fl. Caroliniana, 235.—Aiton, Hort. Kew. iii, 360; 2 ed. v, 296.—Gærtner, Fruct. ii, 50, t. 89, f. 1.— Mænch, Meth. 696.—Abbot, Insects Georgia, i, t. 29.—Lamarck, Dict. iv, 503; Ill. iii, 364, t. 781, f. 2.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 389.—Smith in Rees' Cycl. xx, No. 2.—Willdenow, Spec. iv, 457; Berl. Baumz. 154.—Desfontaines, Hist, Arb. ii, 347.—Bigelow, Fl. Boston. 3 ed. 379.

- Juglans tomentosa, Lamarck, Dict. iv, 504.—Michaux, Fl. Bor.-Am. ii, 192.—Michaux f. Hist. Arb. Am. i, 184, t. 6; N. American Sylva, 3 ed. i, 120, t. 35.—Pursh, Fl. Am. Sept. ii, 637.—Barton, Prodr. Fl. Philadelph. 92.
- C. tomentosa, var. maxima, Nuttall, Genera, ii, 221; Sylva, i, 40; 2 ed. i, 56.—Sweet, Hort. Brit. ed. 1830.—Beck, Bot. 336.—Loudon, Arboretum, iii, 1445.—C. De Candolle, Prodr. xvi², 143.
- C. alba, Koch, Dendrologie, i, 596 [not Nuttall].

MOCKER NUT. BLACK HICKORY. BULL NUT. BIG-BUD HICKORY. WHITE-HEART HICKORY. KING NUT.

Valley of the Saint Lawrence river, northern shores of lakes Ontario and Erie to eastern Nebraska, eastern Kansas, and the Indian territory, south to cape Canaveral and Tampa bay, Florida, and the valley of the Brazos river, Texas.

A tree 24 to 30 or, exceptionally, 33 (Ridgway) meters in height, with a trunk 0.90 to 1.20 meter in diameter; generally on rich upland hillsides—less commonly in low river bottom lands; very common in the Gulf states, and throughout the south the most widely-distributed species of the genus.

Wood heavy, very hard, strong, tough, very close-grained, checking in drying, flexible, containing few large, regularly-distributed, open ducts; medullary rays numerous, thin, obscure; color, rich dark brown, the thick sapwood nearly white; specific gravity, 0.8216; ash, 1.06; used for the same purposes as that of the shell-bark hickory.

245.-Carva porcina, Nuttall.

Genera, ii, 222.—Barton, Compend. Fl. Philadelph. ii, 180.—Elliott, Sk. ii, 627.—Watson, Dend. Brit. ii, t. 167.—Sprengel, Syst. ii, 849.—
Torrey, Compend. Fl. N. States, 358.—Beck, Bot. 336.—Eaton, Manual, 6 ed. 83.—Spach, Hist. Veg. ii, 178.—Penn. Cycl. vi, 332.—
Darlington, Fl. Cestrica, 2 ed. 546.—London, Arboretum, iii, 1449, f. 1272-1274.—Eaton & Wright, Bot. 183.—Spach, Hist. Veg. ii, 178.—Emerson, Trees Massachusetts, 197, t. 14; 2 ed. i, 224 & t.—Wood, Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36, t. 1, f. 5, t. 5, f. 54; Prodr. xvii, 143.—Porcher, Resources S. Forests, 332.—Gray, Manual N. States, 5 ed. 449; Hall's Pl. Texas, 21.—Vasey, Cat. Forest Trees, 24.—Ridgway in Proc. U. S. Nat. Mus. 1882, 78.

Juglans glabra, Miller, Dict. No. 5.—Wangenheim, Amer. 25, t. 10, f. 24.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 391.—Willdenow, Spec. iv, 458; Berl. Baumz. 196.—Persoon, Syn. ii, 566.—Aiton, Hort. Kew. 2 ed. v, 297.—Eaton, Manual, 108.—Hayne, Dend. Fl. 164.

Juglans alba acuminata, Marshall, Arbustum, 68.

Juglans obcordata, Lamarck Diet. iv, 504.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 391.—Willdenow, Spec. iv, 458.—Persoon, Syn. 566.

Juglans porcina, Michaux f. Hist. Arb. Am. i, 206, t. 9; N. American Sylva, 3 ed. i, 132, t. 38.—Pursh, Fl. Am. Sept. ii, 638.—Barton, Prodr. Fl. Philadelph. 92.—Audubon, Birds, t. 91.

Juglans pyriformis, Muhlenberg, Cat. 92.

Juglans porcina, var. obcordata, Pursh, Fl. Am. Sept. ii, 638.—Barton, Compend. Fl. Philadelph. ii, 180.—Watson, Dend. Brit. ii, 167.

Juglans porcina, var. pisiformis, Pursh, Fl. Am. Sept. ii, 638.—Barton, Compend. Fl. Philadelph. ii, 180.

C. glabra, Torrey, Fl. N. York, ii, 182, t. 101.—Gray, Manual N. States, 1 ed. 412.—Darlington, Fl. Cestrica, 3 ed. 264.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 419.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 44.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Koch, Dendrologie, i, 594.—Young, Bot. Texas, 499.

C. amara, var. porcina, Darby, Bot. S. States, 513.

PIG NUT. BROWN HICKORY. BLACK HICKORY. SWITCH BUD HICKORY.

Southern Maine to southern Ontario, southern Michigan and Minnesota, eastern Nebraska, eastern Kansas, and the Indian territory, south to cape Canaveral and Pease creek, Florida, and the valley of the Nueces river, Texas.

A tree 24 to 30 or, exceptionally, 40 (Ridgway) meters in height, with a trunk 0.90 to 1.50 meter in diameter; dry hills and uplands; common.

Wood heavy, hard, very strong and tough, flexible, close-grained, checking in drying, containing many large open ducts; color, dark or light brown, the thick sap-wood lighter, often nearly white; specific gravity, 0.8217; ash, 0.99; used for the same purposes as that of the shell-bark hickory.

246.—Carya amara, Nuttall,

Genera, ii, 222.—Barton, Compend. Fl. Philadelph. ii, 180.—Elliott, Sk. ii, 626.—Sprengel, Syst. ii, 849.—Torrey, Compend. Fl. N. States, 358; Fl. N. York, ii, 183.—Beck, Bot. 336.—Spach, Hist. Veg. ii, 177.—Penn. Cycl. vi, 332.—Loudon, Arboretum, iii, 1443, f. 1264.—Hooker, Fl. Bor.-Am. ii, 144.—Emerson, Trees Massachusetts, 199, t. 15; 2 ed. i, 226 & t.—Darlington, Fl. Cestrica, 3 ed. 264.—Darby, Bot. S. States, 513.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 419.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 44.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 641; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36, t. 1, f. 2, t. 5, f. 53–55; Prodr. xvi², 144.—Gray, Manual N. States, 5 ed. 449; Hall's Pl. Texas, 21.—Koch, Dendrologie, i, 592.—Young, Bot. Texas, 500.—Vasey, Cat. Forest Trees, 24.—Sears in Bull. Essex Inst. xiii, 178.—Bell in Geological Rep. Canada, 1879–'80, 52°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 77.

Juglans alba minima, Marshall, Arbustum, 68.

Juglans cordiformis, Wangenheim, Amer. 25, t. 10, f. 25.

Juglans angustifolia, Lamarck, Dict. iv, 504 [not Aiton].

Juglans amara, Michaux f. Hist. Arb. Am. i, 177, t. 4; 3 ed. i, 116, t. 33.—Pursh, Fl. Am. Sept. ii, 638.

Hickorius amara, Rafinesque, Fl. Ludoviciana, 109.

BITTER NUT. SWAMP HICKORY.

Southern Maine to the valley of the Saint Lawrence river, west through Ontario, central Michigan and Minnesota to eastern Nebraska, eastern Kansas, and the Indian territory, south to the Chattahoochee region of western Florida and the valley of the Trinity river, Texas.

A tree 18 to 24 meters in height, with a trunk 0.60 to 0.90 meter in diameter; borders of streams and swamps, in low ground, or often on dry, rich uplands.

Wood heavy, very hard, strong, tough, close-grained, checking in drying; layers of annual growth marked by several rows of large open ducts; medullary rays numerous, obscure; color, dark brown, the thick sap-wood light brown, or often nearly white; specific gravity, 0.7552; ash, 1.03; largely used for hoops, ox-yokes, etc.

247.—Carya myristicæformis, Nuttall,

Genera, ii, 222.—Elliott, Sk. ii, 626.—Sprengel, Syst. ii, 849.—Eaton, Manual, 6 ed. 83.—Spach, Hist. Veg. ii, 179.—Penn. Cycl. v, 332.—Loudon, Arboretum, iii, 1451, f. 1275.—Eaton & Wright, Bot. 1833.—Chapman, Fl. S. States, 419.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36, t. 6, f. 58; Prodr. xvi², 145.—Koch, Dendrologie, i, 595.—Young, Bot. Texas, 500.—Vasey, Cat. Forest Trees, 24.—Ravenel in Bull. Torrey Bot. Club. vi, 81.

Juglans myristicæformis, Michaux f. Hist. Arb. Am. i, 211, t. 10; N. American Sylva, 3 ed. i, 135, t. 39.—Pursh, Fl. Am. Sept. ii, 638.—Poiret, Suppl. iv, 112.—Rafinesque, Fl. Ludoviciana, 161.

C. amara, var. myristicæformis, Cooper in Smithsonian Rep. 1858, 255.

NUTMEG HICKORY.

South Carolina, "Goose creek" (Michaux), "Berkeley district" (Ravenel); Arkansas, valley of the Arkansas river (Pine Bluff, Letterman), south to the Red River valley.

A tree 24 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter; sandy ridges along the borders of streams and swamps; rare and very local in South Carolina; more common and reaching its greatest development in southern Arkansas.

Wood heavy, hard, very strong and tough, close-grained, compact, containing numerous small open ducts, layers of annual growth marked by one or two rows of larger ducts; medullary rays numerous, thin, not conspicuous; color, light brown, the sap-wood lighter; specific gravity, 0.8016; ash, 1.06.

248.—Carya aquatica, Nuttall,

Genera, ii, 222.—Elliott, Sk. ii, 627.—Sprengel, Syst. ii, 849.—Eaton, Manual, 6 ed. 83.—Spach, Hist. Veg. ii, 179.—Penn. Cycl. vi, 332.—Loudon, Arboretum, iii, 1444, f. 1265, 1266.—Eaton & Wright, Bot. 183.—Scheele in Rœmer, Texas, 447.—Darby, Bot. S. States, 514.—Chapman, Fl. S. States, 419.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 44.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 641; Bot. & Fl. 304.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 36, t. 1, f. 4, t. 5, f. 56, 57; Prodr. xvi², 144.—Koch, Dendrologie, i, 593.—Young, Bot. Texas, 500.—Vasey, Cat. Forest Trees, 24.

Juglans aquatica, Michaux f. Hist. Arb. Am. i, 182, t. 5; N. American Sylva, 3 ed. i, 119, t. 34.—Pursh, Fl. Am. Sept. ii, 638.—Poiret, Suppl. iv, 112.

Hicorius integrifolia, Rafinesque, Fl. Ludoviciana, 109.

C. integrifolia, Sprengel, Syst. ii, 849.—Loudon, Arboretum, iii, 1451.

WATER HICKORY, SWAMP HICKORY, BITTER PECAN.

North Carolina, in the lower districts, south to cape Malabar and the Caloosa river, Florida (in Florida not detected within 8 or 10 miles of the coast), through the Gulf states to western Louisiana, northeastern Arkansas, and the valley of the Brazos river, Texas.

A tree 18 to 21 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or generally much smaller; low river swamps; most common and reaching its greatest development in the bottom lands of the lower Mississippi and Yazoo rivers.

Wood heavy, soft, strong, rather brittle, very close-grained, compact, containing few scattered, open duets; layers of annual growth less clearly marked than in the other species of the genus; medullary rays numerous, thin; color, dark brown, the sap-wood light, often nearly white; specific gravity, 0.7407; ash, 1.27; used for fencing, fuel, etc.

MYRICACEÆ.

249.-Myrica cerifera, Linnæus,

Spec. 1 ed. 1024.—Kalm, Travels, English ed. i, 92.—Marshall, Arbustum, 94.—Lamarck, Dict. ii, 592; Ill. iii, 402, t. 809, f. 1.—Gærtner, Fruct. i, 190, t. 39, f. 7.—Walter, Fl. Caroliniana, 242.—Aiton, Hort. Kew. iii, 396; 2 ed. v, 379.—Mænch, Meth. 362.—B. S. Barton, Coll. ii, 4.—Nouveau Duhamel, ii, 190.—Schkuhr, Handb. iii, 465, t. 322.—Michaux, Fl. Bor.-Am. ii, 227.—Willdenow, Spec. iv, 745; Enum. 1011; Berl. Baumz. 254.—Persoon, Syn. ii, 614.—Desfontaines, Hist. Arb. ii, 472.—Titford, Hort. Bot. Am. 100.—Pursh, Fl. Am. Sept. ii, 620.—Nuttall, Genera, ii, 235; Trans. Am. Phil. Soc. 2 ser. v, 167.—Bigelow, Med. Bot. iii, 32, t. 43; Fl. Boston. 3 ed. 394.—Hayne, Dend. Fl. 197.—Elliott, Sk. ii, 678.—Sprengel, Syst. i, 493.—Torrey, Compend. Fl. N. States, 372; Fl. N. York, ii, 197.—Rafinesque, Med. Bot. ii, 244.—Eaton, Manual, 6 ed. 231.—Beck, Bot. 324.—Loudon, Arboretum, iv, 2057, f. 1968.—Lindley, Fl. Med. 305.—Dietrich, Syn. i, 551.—Eaton & Wright, Bot. 324.—Spach, Hist. Veg. xi, 263.—Emerson, Trees Massachusetts, 224; 2 ed. i, 256 & t.—Darby, Bot. S. States, 507.—Chapman, Fl. S. States, 426.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 106.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 650; Bot. & Fl. 309.—Porcher, Resources S. Forests, 312.—C. De Candolle in Ann. Sci. Nat. 4 ser. xviii, 21, t. 3, f. 32; Prodr. xvi³, 148.—Lawson in Trans. Bot. Soc. Edinburgh, viii, 108.—Gray, Manual N. States, 5 ed. 457.—Koch, Dendrologie, ii, 663.—Young, Bot. Texas, 511.—Vasey, Cat. Forest Trees, 28.

- M. Pennsylvanica, Lamarck, Dict. ii, 592.—Desfontaines, Hist. Arb. ii, 472.—Nouveau Duhamel, ii, 190, t. 55.—Pursh, Fl. Am. Sept. ii, 620.—Sprengel, Syst. i, 493.—Eaton, Manual, 6 ed. 232.—Eaton & Wright, Bot. 325.—Spach, Hist. Veg. xi, 262.
- M. Carolinensis, Miller, Dict. No. 3.—Wangenheim, Amer. 102.—Willdenow, Spec. iv, 746; Enum. 1011.—Aiton, Hort. Kew. 2 ed. v, 379.—Pursh, Fl. Am. Sept. ii, 620.—Nuttall, Genera, ii, 235.—Elliott, Sk. ii, 678.—Eaton, Manual, 6 ed. 232.—Eaton & Wright, Bot. 324.—Darby, Bot. S. States, 507.
- M. cerifera humilis, Marshall, Arbustum, 95.
- M. cerifera, var. latifolia, Aiton, Hort. Kew. iii, 396.
- M. cerifera, var. media, Michaux, Fl. Ber.-Am. ii, 227.—Chapman, Fl. S. States, 427.
- M. cerifera, var. arborescens, Michaux, Fl. Bor.-Am. ii, 227.
- M. cerifera, var. pumila, Michaux, Fl. Bor.-Am. ii, 227.—Pursh, Fl. Am. Sept. ii, 620.—Chapman, Fl. S. States, 427.
- M. cerifera, var. angustifolia, C. De Candolle, Prodr. xvi2, 148.
- M. cerifera sempervirens, Hort.

BAYBERRY. WAX MYRTLE.

Shores of lake Erie; Maine, and south near the coast to the Florida keys and southern Alabama.

A tree sometimes 12 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or, except in the southern states, a low, much-branched shrub; usually on sandy beaches and dry hillsides, reaching its greatest development in the bottoms and rich hummocks of the Georgia and Florida coasts.

Wood light, soft, strong, brittle, very close-grained, compact; medullary rays numerous, thin; color, dark brown, the sap-wood lighter; specific gravity, 0.5637; ash, 0.51.

The leaves and stimulant and astringent bark of the roots sometimes employed by herbalists (Am. Jour. Pharm. 1863, 193.—U. S. Dispensatory, 14 ed. 257, 1706.—Nat. Dispensatory, 2 ed. 944). The wax which covers the small globular fruit, formerly largely collected and made into candles, and now, under the name of myrtle-wax, a popular remedy in the treatment of dysentery.

250.-Myrica Californica, Chamisso,

Linnæa, vi, 535.—Bentham, Pl. Hartweg. 336; Bot. Sulphur, 55.—Hooker, Fl. Bor.-Am. ii, 160.—Hooker & Arnott, Bot. Beechey, 390.—Lindley in Jour. London Hort. Soc. vii, 282.—Torrey in Pacific R. R. Rep. iv, 137; Bot. Wilkes Exped. 465.—Newberry in Pacific R. R. Rep. vi, 89.—Cooper in Pacific R. R. Rep. xii², 68.—C. De Candolle, Prodr. xvi², 153.—Gray in Proc. Am. Acad. vii, 401.—Vasey, Cat. Forest Trees, 28.—Hall in Coulter's Bot. Gazette, ii, 91.—Watson, Bot. California, ii, 81.

? M. Xalapensis, Hooker & Arnott, Bot. Beechey, 160.

Cape Foulweather, Oregon, south near the coast to the bay of Monterey, California.

A small evergreen tree, rarely exceeding 9 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or toward its northern limits reduced to a low shrub; sandy beaches and gravelly hillsides.

Wood heavy, very hard, strong, brittle, very close-grained, compact; medullary rays numerous, thin, conspicuous; color, light rose, the sap-wood lighter; specific gravity, 0.6703; ash, 0.33.

CUPULIFERÆ.

251.-Quercus alba, Linnæus,

Spec. 1 ed. 996.—Du Roi, Harbk. ii, 270, t. 5, f. 5.—Lamarck, Dict. i, 720.—Marshall, Arbustum, 119.—Wangenheim, Amer. 12, t. 3, f. 6.-Walter, Fl. Caroliniana, 235.-Aiton, Hort. Kew. iii, 358; 2 ed. v, 293.-Abbot, Insects Georgia, ii, t. 80, 87.-Michaux, Fl. Bor.-Am. ii, 195.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 395.—Willdenow, Spec. iv, 448; Enum. 977; Berl, Baumz, 346.—Persoon, Syn. ii, 570.—Desfontaines, Hist, Arb. ii, 508.—Michaux f. Hist, Arb. Am. ii, 13, t. 1; N. American Sylva, 3 ed. i, 22, t. 1.—Pursh, Fl. Am. Sept. ii, 633.—Barton, Prodr. Fl. Philadelph. 91; Compend. Fl. Philadelph. ii, 17.—Eaton, Manual, 108; 6 ed. 293.—Nuttall, Genera, ii, 215; Sylva, i, 14; 2 ed. i, 24.—Nouveau Duhamel, vii, 175.—Hayne, Dend. Fl. 158.— Elliott, Sk. ii, 607.—Sprengel, Syst. iii, 864.—Torrey, Compend. Fl. N. States, 359; Fl. N. York, ii, 192.—Andubon, Birds, t. 107, 147.—Beck, Bot. 330.—Loudon, Arboretum, iii, 1864, f. 1723-1726 & t.—Hooker, Fl. Bor.-Am. ii, 158.—Eaton & Wright, Bot. 385.— Bigelow, Fl. Boston. 3 ed. 375.—Spach, Hist. Veg. xi, 155.—Emerson, Trees Massachusetts, 127, t. 1; 2 ed. i, 145 & t.—Griffith, Med. Bot. 585.—Penn. Cycl. xix, 216.—Richardson, Arctic Exped. 437.—Darlington, Fl. Cestrica, 3 ed. 266.—Darby, Bot. S. States, 511.—Cooper in Smithsonian Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 613, t. 1.—Chapman, Fl. S. States, 423.—Curtisin Rep. Geological Surv. N. Carolina, 1860, iii, 31.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 645; Bot. & Fl. 306.—Porcher, Resources S. Forests, 257.—A. De Candolle, Prodr. xvi², 22.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden-Meddelt. Nos. 1-6, 1866, 66.—Liebmann, Chènes Am. Trop. t. xxxiii, 29, 30, 58, 59.—Gray, Manual N. States, 5 ed. 450; Hall's Pl. Texas, 21.—Koch, Dendrologie, ii², 50.—Young, Bot. Texas, 505.—Vasey, Cat. Forest Trees, 25.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Sears in Bull. Essex Inst. xiii, 179.—Britton in Bull. Torrey Bot. Club, viii, 126.—Bell in Geological Rep. Canada, 1879-'80, 52c.-Ridgway in Proc. U.S. Nat. Mus. 78.

- ?Q. sinuata, Walter, Fl. Caroliniana, 235.
- Q. alba, var. pinnatifida, Michaux, Hist. Chênes Am. No. 4, t. 5, f. 1; Fl. Bor.-Am. ii, 195.—Loudon, Arboretum, iii, 1864.
- Q. alba, var. repanda, Michaux, Hist. Chênes Am. No. 4, t. 5, f. 2.—Pursh, Fl. Am. Sept. ii, 633.—Hayne, Dend. Fl. 159.—Loudon, Arboretum, iii, 1864.
- Q. alba, var. pinnatifido-sinuata, Hayne, Dend. Fl. 158.
- Q. alba, var. sinuata, Hayne, Dend. Fl. 159.
- Q. alba, var. microcarpa, A. De Candolle, Prodr. xvis, 22.

WHITE OAK.

Northern Maine, valley of the Saint Lawrence river, Ontario, lower peninsula of Michigan to southeastern Minnesota, south to the Saint John's river and Tampa bay, Florida, west to the valley of Nodaway river, Missouri, western Arkansas, and the valley of the Brazos river, Texas.

A large tree of the first economic value, 24 to 45 meters in height, with a trunk 1.20 to 2.40 meters in diameter; all soils; very common and reaching its greatest development along the western slopes of the Alleghany mountains and in the valley of the Ohio river and its tributaries, here often forming more than half the forest growth.

Wood strong, very heavy, hard, tough, close-grained, liable to check unless carefully seasoned, durable in contact with the soil; layers of annual growth strongly marked by several rows of large open ducts; medullary rays broad, prominent; color, brown, the sap-wood lighter brown; specific gravity, 0.7470; ash, 0.41; largely used in ship-building, construction of all sorts, cooperage, in the manufacture of carriages, agricultural implements, and baskets, and for railway ties, fencing, interior finish, cabinet-making, fuel, etc.

A decoction of the astringent inner bark is employed medicinally in cases of hemorrhage, dysentery, etc. (U. S. Dispensatory, 14 ed. 755.—Nat. Dispensatory, 2 ed. 1196).

252.-Quercus lobata, Née,

Ann. Cienc. Nat. iii, 278.—Smith in Rees' Cycl. xxx, No. 77.—Persoon, Syn. ii, 571.—Nouveau Duhamel, vii, 180.—Poiret, Suppl. ii, 224.—Bentham, Pl. Hartweg. 337.—Liebmann in Dansk. Vidensk. Selsk. Forhandl. 1854, 14; Chênes Am. Trop. 23, t. 42, f. 1-3.—Torrey, Bot. Mex. Boundary Survey, 205; Bot. Wilkes Exped. 461, t. 15.—A. De Candolle, Prodr. xvi², 24.—Koch, Dendrologie, ii², 53.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 388; Wheeler's Rep. vi, 374; Bot. California. ii, 95.

- Q. Hindsii, Bentham, Bot. Sulphur, 55.—Endlicher, Genera, Suppl. iv. 24.—Walpers, Ann. i, 635.—Torrey in Pacific R. R. Rep. iv, 138; v, 365.—Newberry in Pacific R. R. Rep. vi, 29, 89, t. 1, f. 7.—Cooper in Smithsonian Rep. 1858, 261.—Bolander in Proc. California Acad. iii, 230.—Örsted in Saerskitt, Aftryk. af, Nat. For. Viden. Meddelt. 1866, Nos. 1-6, 66.—Liebmann, Chênes Am. Trop. t. 42, f. 4.—R. Brown Campst. Horæ Sylvanæ, 52, f. 1-3.
- Q. longiglanda, Torrey in Fremont's Geographical Mem. California, 15, 17.
- Q. Ransomi, Kellogg in Proc. California Acad. i, 25.

WHITE OAK. WEEPING OAK.

California, west of the Sierra Nevadas from the valley of the upper Sacramento river south through the foothills and interior valleys to the San Bernardino mountains.

The largest of the Pacific oaks, often 30 meters in height, with a trunk 0.90 to 2.40 meters in diameter; very common through the central part of the state.

Wood moderately hard, fine-grained, compact; layers of annual growth marked by few large open ducts and containing few smaller ducts arranged in lines parallel to the broad, conspicuous medullary rays; color, light brown, the sap-wood lighter; specific gravity, 0.7409; ash, 0.30; of little economic value, and only used for fuel.

253.-Quercus Garryana, Douglas;

Hooker, Fl. Bor.-Am. ii, 159.—Hooker & Arnott, Bot. Beechey, 391.—Nuttall, Sylva, i, 1, t. 1; 2 ed. i, 14, t. 1.—Torrey in Pacific R. R. Rep. iv, 138; Bot. Wilkes Exped. 462.—Newberry in Pacific R. R. Rep. vi, 89.—Cooper in Smithsonian Rep. 1858, 260; Pacific R. R. Rep. xii², 28, 68; Am. Nat. iii, 407.—Lyall in Jour. Linnæan Soc. vii, 131, 144.—A. De Candolle, Prodr. xvi², 24.—Bolander in Proc. California Acad. iii, 229.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. 1866, Nos. 1–6, 66.—Rothrock in Smithsonian Rep. 1858, 435.—Liebmann, Chênes Am. Trop. t. 40, f. 3.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 389; Bot. California, ii, 95.—Maconn in Geological Rep. Canada, 1875—76, 210.—G. M. Dawson in Canadian Nat. new ser. ix, 330.

- Q. Newi, Liebmann in Dansk. Vidensk. Selsk. Forhandl. 1854, 173; Chênes Am. Trop. 23, t. xli, f. 1, 2.
- Q. Douglasii, var. ? Newi, A. De Candolle, Prodr. xvi2, 24.
- Q. Œrstediana, R. Brown Campst. in Ann. & Mag. Nat. Hist. April, 1871, 2.
- Q. Jacobi, R. Brown Campst. in Ann. & Mag. Nat. Hist. April, 1871, 7.

WHITE OAK.

Vancouver's island, shores of Puget sound, south through western Washington territory, Oregon, and California to San Francisco bay; in Washington territory and Oregon extending to the eastern slopes of the Cascade mountains.

A tree 21 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or at high elevations reduced to a low shrub; dry, gravelly soil; common.

Wood strong, hard, that of the young trees tough, close-grained, compact; layers of annual growth marked by one to three rows of open ducts; medullary rays, varying greatly in width, often conspicuous; color, light brown or yellow, the sap-wood lighter, often nearly white; specific gravity, 0.7453; ash, 0.39; somewhat used for earriage and cooperage stock, in cabinet-making, ship-building, and very largely for fuel; the best substitute for eastern white oak produced in the Pacific forests.

254.—Quercus obtusiloba, Michaux,

Hist. Chênes Am. No. 1, t. 1; Fl. Bor.-Am. ii, 194.—Smith in Rees' Cycl. xxx, No. 78.—Michaux f. Hist. Arb. Am. ii, 36, t. 4; N. American Sylva, 3 ed. i, 36, t. 5.—Pursh, Fl. Am. Sept. ii, 632.—Nuttall, Genera, ii, 215.—Barton, Compend. Fl. Philadelph. ii, 171.—Elliott, Sk. ii, 606.—Torrey, Compend. Fl. N. States, 359; Fl. N. York, ii, 190.—Beck, Bot. 329.—Eaton, Manual, 6 ed. 293.—Loudon, Arboretum, iii, 1870, f. 1732 & t.—Hooker, Fl. Bor.-Am. ii, 158.—Eaton & Wright, Bot. 384.—Scheele in Rœmer, Texas, 446.—Darlington, Fl. Cestrica, 3 ed. 265.—Darby, Bot. S. States, 511.—Cooper in Smithsonian Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 615, t. 11.—Chapman, Fl. S. States, 423.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 32.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 645; Bot. & Fl. 306.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 209.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. 1866, Nos. 1-6, 66.—Liebmann, Chênes Am. Trop. t. H, t. 33, f. 60.—Gray, Manual N. States, 5 ed. 451; Hall's, Pl. Texas, 21.—Young, Bot. Texas, 505.

- Q. alba minor, Marshall, Arbustum, 120.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 395.
- Q. stellata, Wangenheim, Amer. 78, t. 6, f. 15.—Abbot, Insects Georgia, ii, t. 77.—Willdenow, Spec. iv, 452; Enum, 977; Berl. Baumz. 349.—Persoon, Syn. ii, 570.—Aiton, Hort. Kew. 2 ed. v, 294.—Nouveau Duhamel, vii, 180.—Hayne, Dend. Fl. 161.—Nuttall, Sylva, i, 13; 2 ed. i, 23.—Spach, Hist. Veg. xi, 156.—Emerson, Trees Massachusetts, 133, t. 3; 2 ed. i, 151 & t.—A. De Candolle, Prodr. xvi³, 22.—Koch, Dendrologie, iii, 52.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 389.—Ridgway in Proc. U. S. Nat. Mus. 1882, 84.—Watson in Proc. Am. Acad, xviii, 156.
- ? Q. villosa, Walter, Fl. Caroliniana, 235.
- Q. lobulata, Abbot, Insects Georgia, i, 47.
- § Q. Drummondii, Liebmann in Dansk. Vidensk. Selsk. Forhandl. 1854, 170.—A. De Candolle, Prodr. xvi², 24.
- Q. obtusiloba, var. parvifolia, Chapman, Fl. S. States, 423.
- Q. stellata, var. Floridana, A. De Candolle, Prodr. xvi2, 22.

POST OAK. IRON OAK.

Martha's Vineyard, Massachusetts, south to northern Florida, west through southern Ontario and Michigan to eastern Nebraska, Kansas, the Indian territory, and extending to the one hundredth meridian in central Texas.

A tree rarely exceeding 24 meters in height, with a trunk 0.90 to 1.50 meter in diameter, or on the Florida coast reduced to a low shrub (var. parvifolia, etc.); dry, gravelly uplands, clay barrens, or in the southwest on Cretaceous formations; the most common and widely-distributed oak of the Gulf states west of the Mississippi river, forming the principal growth of the Texas "cross-timbers."

Wood heavy, hard, close-grained, compact, checking badly in drying, very durable in contact with the soil; layers of annual growth marked by one to three rows of not large open ducts; medullary rays numerous, conspicuous; color, dark or light brown, the sap-wood lighter; specific gravity, 0.8367; ash, 0.79; largely used, especially in the southwest, for fencing, railway ties, and fuel, and somewhat for carriage stock, cooperage, construction, etc.

255.—Quercus undulata, var. Gambelii, Engelmann,

Wheeler's Rep. vi, 249.

- Q. Gambelii, Nuttall in Jour. Philadelphia Acad. new ser. i, 179.—Torrey in Sitgreaves' Rep. 172, t. 18; Bot. Mex. Boundary Survey, 205.—Cooper in Smithsonian Rep. 1858, 260.—Liebmann, Chênes Am. Trop. 22, t. 40, f. 1.—Hemsley, Bot. Am.-Cent. iii, 171.
- Q. alba, var. ? Gunnisonii, Torrey in Pacific R. R. Rep. ii, 130.—Watson in King's Rep. v, 321.—Porter in Hayden's Rep. 1871, 493.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 127.—Macoun in Geological Rep. Canada, 1875—76, 209.
- Q. Douglasii, var. Gambelii, A. De Candolle, Prodr. xvi2, 23.
- Q. stellata, var. Utahensis, A. De Candolle, Prodr. xvi2, 22.
- ? Q. Emoryi, Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 127 [not Torrey].

SCRUB OAK.

Near the mouth of the Pecos river (*Havard*), through the mountains of western Texas, and New Mexico to the Santa Catalina (*Lemmon*, *Pringle*) and San Francisco mountains, Arizona, eastern slopes of the Rocky mountains of Colorado north to the valley of the Platte river, and through the Wahsatch mountains of Utah.

A small tree, rarely 15 meters in height, with a trunk sometimes 0.60 meter in diameter, or often a low shrub spreading from underground shoots and forming dense thickets, reaching its greatest development on the high mountains of southern New Mexico and Arizona; the large specimens generally hollow and defective.

Wood heavy, hard, strong, that of young trees quite tough, close-grained, checking badly in drying; layers of annual growth marked by few not large open ducts; medullary rays numerous, conspicuous; color, rich dark brown, the sap-wood lighter; specific gravity, 0.8407; ash, 0.99; largely used for fuel, and in Utah the bark in tanning.

256.—Quercus macrocarpa, Michaux,

- Hist, Chènes Am. No. 2, t. 2, 3; Fl. Bor.-Am. ii, 194.—Willdenow, Spec. iv, 453; Enum. 977; Berl. Baumz. 350.—Smith in Rees' Cycl. xxx, No. 80.—Persoon, Syn. ii, 570.—Poiret, Suppl. il, 224.—Michaux f. Hist, Arb, Am. ii, 34, t. 3; N. American Sylva, 3 ed.i, 35, t. 4.—Pursh, Fl. Am. Sept. ii, 632.—Nuttall, Genera, ii, 215.—Nouveau Duhamel, vii, 182.—Hayne, Dend. Fl. 161.—Sprengel, Syst. iii, 863.—Torrey, Compend. Fl. N. States, 359; Nicollet's Rep. 160; Fl. N. York, ii, 191, t. 108.—Beck, Bot. 330.—Eaton, Manual, 6 ed. 293.—Loudon, Arboretum, iii, 1869, f. 1731 & t.—Eaton & Wright, Bot. 385.—Spach, Hist. Veg. xi, 159.—Emerson, Trees Massachusetts, 132, t. 2; 2 ed. i, 149 & t.—Scheele in Rœmer, Texas, 446.—Richardson, Arctic Exped. 437.—Cooper in Smithsonian Rep. 1858, 255.—Brendel in Trans, Illinois Ag. Soc. 131, t. 5, f. 21.—Chapman, Fl. S. States, 423.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 645; Bot. & Fl. 306.—Engelmann in Trans, Am. Phil. Soc. new ser. xii, 209; Trans. St. Louis Acad. iii, 389.—A. De Candolle, Prodr. xvi², 20.—Örsted in Saerskitt, Aftryk, af, Nat. For. Viden, Meddelt, Nos. 1-6, 1866, 67.—Liebmann, Chènes Am. Trop. t. G, t. 33, f. 27, 28.—Gray, Manual N. States, 5 ed. 451.—Koch, Dendrologie, ii², 51.—Young, Bot. Texas, 506.—Winchell in Ludlow's Rep. Black Hills, 68.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 24.—Broadhead in Coulter's Bot. Gazette, iii, 60.—J. F. James in Jour. Cincinnati Soc. Nat. Hist. iv, 1 & t.—Ridgway in Proc. U. S. Nat. Mus. 1882, 81.—Bell in Geological Rep. Canada, 1879—'80, 49°.—Watson in Proc. Am. Acad. xviii, 156.
 - Q. olivæformis, Michaux f. Hist. Arb. Am, ii, 32, t. 2; N. American Sylva, 3 ed. i, 33, t. 3.—Smith in Rees' Cycl. xxx, No. 91.—Pursh, Fl. Am. Sept. ii, 632.—Nuttall, Genera, ii, 215; Sylva, i, 14; 2 ed. i, 24.—Nouveau Duhamel, vii, 181.—Sprengel, Syst. iii, 864.—Torrey, Compend. Fl. N. States, 359.—Fl. N. York, ii, 191.—Beck, Bot. 330.—Eaten, Manual, 6 ed. 293.—Loudon, Arboretum, iii, 1869, f. 1730.—Eaton & Wright, Bot. 385.—Spach, Hist. Veg. xi, 159.—Gray, Manual N. States, 1 ed. 414.—A. De Candolle, Prodr. xvi², 20.—Örsted in Saerskitt. Aftryk, af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 67.—Engelmann in Trans. St. Louis Acad. iii, 391.
 - Q. obtusiloba, var. depressa, Nuttall, Genera, ii, 215.
 - Q. macrocarpa, var. olivæformis, Gray, Manual N. States, 2 ed. 404; 5 ed. 451.
 - Q. macrocarpa, var. abbreviata, A. De Candolle, Prodr. xvia, 20.
 - Q. macrocarpa, var. minor, A. De Candolle, Prodr. xviº, 20.
 - Q. stellata, var. depressa, A. De Candolle, Prodr. xvi2, 23.

BURR OAK. MOSSY-CUP OAK. OVER-CUP OAK.

Nova Scotia, New Brunswick, northern shores of lake Huron to lake Winnipeg, south to the valley of the Penobscot river, Maine (O. E. Hamlin), and along the shores of lake Champlain and the valley of the Ware river, Massachusetts, to Lancaster county, Pennsylvania, west to the eastern foot-hills of the Rocky mountains of Montana, central Nebraska and Kansas, southwest to the Indian territory and the valley of the Nueces river, Texas.

A large tree of the first economic value, 24 to 30 or, exceptionally, 50 meters in height, with a trunk 1.20 to 2.10 meters in diameter; rich bottoms and prairies; in the prairie region the principal growth of the "oak openings", and extending farther west and northwest than any oak of the Atlantic forests.

Wood heavy, strong, hard, tough, close-grained, compact, more durable in contact with the soil than that of other American oaks; layers of annual growth marked by one to three rows of small open ducts; medullary rays often broad and conspicuous; color, dark or rich light brown, the sap-wood much lighter; specific gravity, 0.7453; ash, 0.71; generally confounded with the less valuable white oak (Q. alba), and employed for the same purposes.

257.—Quercus lyrata, Walter,

Fl. Caroliniana, 235.—Abbot, Insects Georgia, ii, t. 83.—Michaux, Hist. Chênes Am. No. 3, t. 4; Fl. Bor.-Am. ii, 195.—Willdenow, Spec. iv, 453.—Smith in Rees' Cycl. xxx, No. 79.—Persoon, Syn. ii, 570.—Poiret, Suppl. ii, 224.—Michaux f. Hist. Arb. Am. ii, 42, t. 5; N. American Sylva, 3 ed. i, 39, t. 6.—Aiton, Hort. Kew. 2 ed. v, 295.—Pursh, Fl. Am. Sept. ii, 632.—Nouveau Duhamel, vii, 181.—Nuttall, Genera, ii, 215.—Elliott, Sk. ii, 607.—Sprengel, Syst. xi, 156.—Eaton, Manual, 6 ed. 295.—Loudon, Arboretum, iii, 1871, f. 1733, 1734.—Eaton & Wright, Bot. 386.—Spach, Hist. Veg. xi, 156.—Darby, Bot. S. States, 511.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 423.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 33.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Bot. & Fl. 306.—A. De Candolle, Prodr. xvi², 19.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt, Nos. 1-6, 1886, 66.—Koch, Dendrologie, ii², 53.—Gray, Hall's Pl. Texas, 21.—Young, Bot. Texas, 506.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 389.—Ridgway in Proc. U. S. Nat. Mus, 1882, 80.

OVER-CUP OAK. SWAMP POST OAK. WATER WHITE OAK.

North Carolina, south near the coast to the Chattahoochee region of northern Florida, west through Alabama, Mississippi, and Louisiana to the valley of the Trinity river, Texas, and through Arkansas and southeastern Missouri (Allenton, *Letterman*) to middle Tennessee, southern Indiana and Illinois.

A tree 24 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter; deep, often submerged, river swamps; rare in the Atlantic states; more common and reaching its greatest development in the valley of the Red river and the adjacent portions of Arkansas and Texas.

Wood heavy, hard, strong, tough, very durable in contact with the ground, close-grained, inclined to check in drying; layers of annual growth marked by one to three rows of large open ducts; medullary rays broad, numerous, conspicuous; color, rich dark brown, the sap-wood much lighter; specific gravity, 0.8313; ash, 0.65; used for the same purposes as that of the white oak (Q. alba).

258.-Quercus bicolor, Willdenow,

Neue Schriften Gesell. Nat. Fr. Berlin, iii, 396; Spec. iv, 440.—Smith in Rees' Cycl. xxx, No. 50.—Persoon, Syn. ii, 569.—Poiret, Suppl. ii, 219.—Pursh, Fl. Am. Sept. ii, 633.—Eaton, Manual, 107; 6 ed. 294.—Barton, Compend. Fl. Philadelph. ii, 172.—Nuttall, Genera, ii, 215; Sylva, i, 13; 2 ed. i, 23.—Nouveau Duhamel, vii, 165.—Sprengel, Syst. iii, 860.—Torrey, Compend. Fl. N. States, 359; Fl. N. York, ii, 192.—Beck, Bot. 331.—Bigelow, Fl. Boston. 3 ed. 375.—Eaton & Wright, Bot. 385.—Emerson, Trees Massachusetts, 135, t. 4; 2 ed. i, 153 & t.—Buckley in Am. Jour. Sci. 2 ser. xiii, 397.—Darlington, Fl. Cestrica, 3 ed. 266.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 646; Bot. & Fl. 306.—A. De Candolle, Prodr. xvi², 20.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 67.—Gray, Manual N. States, 5 ed. 451.—Koch, Dendrologie, ii², 47.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 389.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Sears in Bull. Essex Inst. xiii, 179.—Bell in Geological Rep. Canada, 1879–'80, 55°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 79.

- ? Q. Prinus platanoides, Lamarck, Dict. i, 21.
- Q. alba palustris, Marshall, Arbustum, 120.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 395.
- Q. Prinus tomentosa, Michaux, Hist. Chènes Am. No. 5, t. 9, f. 2; Fl. Bor.-Am. ii, 196.—Loudon, Arboretum, iii, 1876, f. 1739.
- Q. Prinus, var. discolor, Michaux f. Hist. Arb. Am. ii, 46, t. 6; N. American Sylva, 3 ed. i, 41, t. 7.—Cooper in Smithsonian Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 617, t. 3.—Chapman, Fl. S. States, 424.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 34.
- Q. bicolor, var. mollis, Nuttall, Genera, ii, 215.—Torrey, Compend. Fl. N. States, 359.
- Q. Prinus, var. bicolor, Spach, Hist. Veg. xi, 158.
- ? Q. bicolor, var. platanoides, A. De Candolle, Prodr. xvi2, 21.

SWAMP WHITE OAK.

Southern Maine, valley of the upper Saint Lawrence river, Ontario, southern peninsula of Michigan to southeastern Iowa and western Missouri, south to Delaware, and along the Alleghany mountains to northern Georgia, northern Kentucky, and northern Arkansas.

A large tree, 24 to 36 meters in height, with a trunk 1.20 to 2.40 or, exceptionally, over 3 meters ("Wadsworth Oak", Geneseo, New York) in diameter; borders of streams and swamps, in deep alluvial soil; common and reaching its greatest development in the region south of the great lakes.

· Wood heavy, hard, strong, tough, close-grained, inclined to check in seasoning; layers of annual growth marked by one to three rows of large open ducts; medullary rays broad and conspicuous; color, light brown, the sap-wood hardly distinguishable; specific gravity, 0.7662; ash, 0.58; used for the same purposes as that of the white oak (Q. alba).

259.—Quercus Michauxii, Nuttall,

Genera, ii, 215 (excl. syn.).—Elli tt, Sk. ii, 609.—Spreugel, Syst. iii, 860.—Eaton, Manual, 6 ed. 295.—Eaton & Wright, Bot. 386.—Darby, Bot. S. States, 511.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 382.—Ward in Bull. U. S. Nat. Mus. No. 22, 113.—Ridgway in Proc. U. S. Nat. Mus. 1882, 81.

- Q. Prinus palustris, Michaux, Hist. Chênes Am. No. 5, t. 6; Fl. Bor-Am. ii, 196.—Michaux f. Hist. Arb. Am. ii, 51, t. 7; N. American Sylva, 3 ed. i, 44, t. 8.—Barton, Prodr. Fl. Philadelph. 91.—Loudon, Arboretum, iii, 1872, f. 1735 & t.
- Q. Prinus, var. Michauxii, Chapman, Fl. S. States, 424.
- Q. Prinus, Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 33, in part.
- Q. bicolor, var. Michauxii, Engelmann in Trans. St. Louis Acad. iii, 390.

BASKET OAK. COW OAK.

New Castle county, Delaware, south through the lower and middle districts to northern Florida, through the Gulf states to the valley of the Trinity river, Texas, and through Arkansas and southwestern Missouri to central Tennessee and Kentucky, and the valley of the lower Wabash river.

A tree 24 to 36 meters in height, with a trunk 1.20 to 2.10 meters in diameter; borders of streams and deep, often submerged, swamps; the common and most valuable white oak of the Gulf states, reaching its greatest development in the rich bottom lands of southeastern Arkansas and Louisiana.

Wood heavy, hard, very strong, tough, close-grained, compact, very durable in contact with the soil, easily split; layers of annual growth marked by few rather large open ducts; medullary rays broad, conspicuous; color, light brown, the sap-wood darker; specific gravity, 0.8039; ash, 0.45; largely used in the manufacture of agricultural implements, wheel stocks, baskets, for which it is unsurpassed, for cooperage, fencing, construction, and fuel.

The large, sweet, edible acorns eagerly devoured by cattle and other animals.

260.-Quercus Prinus, Linnæus,

- Spec. 1 ed. 995.—Du Roi, Harbk. ii, 276, t. 6, f. 3.—Lamarck, Dict. i, 720.—Marshall, Arbustum, 125.—Wangenheim, Amer. 15, t. 4, f. 8.—Aiton, Hort. Kew. iii, 356; 2 ed. v, 290.—Mœnch, Meth. 348.—Abbot, Insects Georgia, ii, t. 82.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 397.—Michaux, Fl. Bor.-Am. ii, 195.—Willdenow, Spec. iv, 439; Enum. 975; Berl. Baumz. 339.—Smith in Rees' Cycl. xxx, No. 47.—Persoon, Syn. ii, 568.—Desfontaines, Hist. Arb. ii, 509.—Pursh, Fl. Am. Sept. ii, 633.—Barton, Compend. Fl. Philadelph. ii, 171.—Nuttall, Genera, ii, 215.—Nouveau Duhamel, vii, 164.—Hayne, Dend. Fl. 155.—Elliott, Sk. ii, 608.—Sprengel, Syst. iii, 859.—Torrey, Compend. Fl. N. States, 359.—Audubon, Birds, t. 50, 131.—Beck, Bot. 331.—Eaton, Manual, 6 ed. 294.—Loudon, Arboretum, iii, 1872.—Eaton & Wright, Bot. 385.—Spach, Hist. Veg. xi, 157.—Penn. Cycl. xix, 216.—Darlington, Fl. Cestrica, 3 ed. 267.—Darby, Bot. S. States, 511.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 423.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 645; Bot. & Fl. 306.—Porcher, Resources S. Forests, 264.—A. De Candolle, Prodr. xvi², 21.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1–6, 67.—Gray, Manual N. States, 5 ed. 451.—Young, Bot. Texas, 506.—Koch, Dendrologie, ii², 48.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 390.
 - Q. Prinus, var. monticola, Michaux, Hist. Chènes Am. No. 5, t. 7; Fl. Bor.-Am. ii, 196.—Michaux f. Hist. Arb. Am. ii, 55, t. 8; N. American Sylva, 3 ed. i, 46, t. 9.—Barton, Prodr. Fl. Philadelph. 91.—Loudon, Arboretum, iii, 1873, f. 1736.—Spach, Hist. Veg. xi, 158.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 424.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 34.—Wood, Cl. Book, 646.—A. De Candolle, Prodr. xvi², 21.—Gray, Manual N. States, 5 ed. 451.—Vasey, Cat. Forest Trees, 25.—Bailey in Am. Nat. xiv, 892, f. 1-4.
 - Q. montana, Willdenow, Spec. iv, 440; Enum. 975; Berl. Baumz. 340.—Persoon, Syn. ii, 569.—Smith in Rees' Cycl. xxx, No. 49.—Pursh, Fl. Am. Sept. ii, 634.—Eaton, Manual, 107, 6 ed. 294.—Barton, Compend. Fl. Philadelph. ii, 172.— Nuttall, Genera, ii, 216.—Nouveau Duhamel, vii, 165, t. 47, f. 2.—Hayne, Dend. Fl. 156.—Elliott, Sk. ii, 609.—Sprengel, Syst. iii, 860.—Torrey, Compend. Fl. N. States, 354; Fl. N. York, ii, 192.—Beck, Bot. 331.—Bigelow, Fl. Boston. 3 ed. 377.—Eaton & Wright, Bot. 385.—Emerson, Trees Massachusetts, 138, t. 6; 2 ed. i, 156 & t.—Gray, Manual N. States, 1 ed. 414.—Darlington, Fl. Cestrica, 3 ed. 266.—Darby, Bot. S. States, 511.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Porcher, Resources S. Forests, 263.—Burgess in Coulter's Bot. Gazette, vii, 95.
 - Q. Prinus, var. lata, Aiton, Hort. Kew. 2 ed. v, 290.
 - Q. Castanea, Emerson, Trees Massachusetts, 137, t. 5; 2 ed. i, 155 & t. [not Muhlenberg & Willdenow].

CHESTNUT OAK. ROCK CHESTNUT OAK.

Blue hills, eastern Massachusetts, west to the shores of lake Champlain, shores of Quinté bay, Ontario (Macoun), and the valley of the Genesee river, New York, south to Delaware, and through the Alleghany Mountain region to northern Alabama, extending west to central Kentucky and Tennessee.

A tree 24 to 30 meters in height, with a trunk 0.90 to 1.20 meter in diameter; rocky banks and hillsides; very common and reaching its greatest development in the southern Alleghany region, here often forming a large portion of the forest growth.

Wood heavy, hard, strong, rather tough, close-grained, inclined to check in drying, durable in contact with the soil, containing few open ducts; medullary rays very broad, conspicuous; color, dark brown, the sap-wood lighter; specific gravity, 0.7499; ash, 0.77; largely used in fencing, for railway ties, etc.

The bark, rich in tannin, is largely used in preference to that of other North American white oaks in tanning leather.

261.—Quercus prinoides, Willdenow,

- Neue Schriften Gesell. Nat. Fr. Berlin, iii, 397; Spec. iv, 440.—Persoon, Syn. ii, 569.—Poiret, Suppl. ii, 219.—Nouveau Duhamel, vii, 166.—Torrey, Fl. N. York, ii, 193, t. 109.—Gray, Manual N. States, 1 ed. 415.—Darlington, Fl. Cestrica, 3 ed. 267.—Chapman, Fl. S. States, 424.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 35.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 646.—Koch, Dendrologie, ii², 49.—Young, Bot. Texas, 506.—Engelmann in Trans. St. Louis Acad. iii, 391.
 - Q. Prinus humilis, Marshall, Arbustum, 125.—Gray, Manual N. States, 5 ed. 452.
 - Q. Castanea, Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 396 [not Née].—Willdenow, Spec. iv, 441; Enum. 976; Berl. Baumz. 341.—Persoon, Syn. ii, 569.—Pursh, Fl. Am. Sept. ii, 634.—Smith in Rees' Cycl. xxx, No. 51.—Poiret, Suppl. ii, 219.—Eaton, Manual, 107; 6 ed. 294.—Barton, Compend. Fl. Philadelph. ii, 172.—Nuttall, Genera, ii, 216.—Hayne, Dend. Fl. 156.—Elliott, Sk. ii, 610.—Sprengel, Syst. iii, 860.—Torrey, Compend. Fl. N. States, 354; Fl. N. York, ii, 193.—Beck, Bot. 331.—Eaton & Wright, Bot. 385.—Gray, Manual N. States, 1 ed. 415.—Darlington, Fl. Cestrica, 3 ed. 267.—Darby, Bot. S. States, 511.—Brendel in Trans. Illinois Ag. Soc. iii, 619, t. 4.—Chapman, Fl. S. States, 424.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 34.—Lesquereux in Owen's 2d Rep. Arkansas, 387.—Wood, Cl. Book, 646.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 68.—Liebmann, Chênes Am. Trop. t. H, K. & 33, f. 31, 32.—Young, Bot. Texas, 506.
 - Q. Prinus, var. acuminata, Michaux, Hist. Chênes Am. No. 5, t. 8; Fl. Bor.-Am. ii, 196.—Michaux f. Hist. Arb. Am. ii, 61, t. 9; N. American Sylva, 3 ed. i, 49, t. 10.—Nouveau Duhamel, vii, 167.—Loudon, Arboretum, iii, 1875, f. 1637.—Cooper in Smithsonian Rep. 1858, 255.—Wood, Bot. & Fl. 306.—Gray, Manual N. States, 5 ed. 451.—Vasey, Cat. Forest Trees, 25.
 - Q. Prinus pumila, Michaux, Hist. Chênes Am. No. 5, t. 9, f. 1; Fl. Bor.-Am. ii, 196.—Loudon, Arboretum, iii, 1875, f. 1738.

- Q. Prinus Chinquapin, Michaux f. Hist. Arb. Am. ii, 65, t. 10; N. American Sylva, 3 ed. i, 50, t. 11.—A. De Candolle, Prodr. xvi*, 21.
- Q. Chinquapin, Pursh, Fl. Am. Sept. ii, 634.—Smith in Rees' Cycl. xxx, No. 48.—Nuttall, Genera, ii, 216.—Elliott, Sk. ii, 611.—Torrey, Compend. Fl. N. States, 354.—Beck, Bot. 331.—Eaton, Manual, 6 ed. 294.—Darlington, Fl. Cestrica, 2 ed. 536.—Eaton & Wright, Bot. 385.—Bigelow, Fl. Boston. 3 ed. 377.—Emersor, Trees Massachusetts, 140; 2 ed. i, 155 & t.—Darby, Bot. S. States, 511.
- Q. Prinus, var. oblongata, Aiton, Hort. Kew. v, 290.
- Q. Prinus, var. prinoides, Wood, Bot. & Fl. 306.
- Q. Muhlenbergii, Engelmann in Trans. St. Louis Acad. iii, 591.—G. D. Butler in Coulter's Bot. Gazette, iii, 77.—Ridgway in Proc. U. S. Nat. Mus. 1882, 82.

YELLOW OAK. CHESTNUT OAK. CHINQUAPIN OAK.

Eastern Massachusetts, shores of lake Champlain, west along the northern shores of lakes Ontario and Erie, through southern Michigan to eastern Nebraska, eastern Kansas, and the Indian territory; south to Delaware and through the Alleghany region to northern Alabama and Mississippi, southwest to the Guadalupe mountains, western Texas (Havard).

A tree 24 to 30 or, exceptionally, 39 meters (Ridgway) in height, with a trunk 0.60 to 0.90 meter in diameter (Q. Muhlenbergii), or often, especially toward the eastern and western limits of its range, reduced to a low, slender shrub (Q. prinoides); dry hillsides and low, rich bottoms; rare, except as a shrub, east of the Alleghany mountains; very common in the Mississippi River basin, and reaching its greatest development in southern Arkansas.

Wood heavy, hard, very strong, close-grained, checking badly in drying, very durable in contact with the soil; layers of annual growth marked by rows of small open ducts; medullary rays broad, conspicuous; color, dark brown, the sap-wood much lighter; specific gravity, 0.8605; ash, 1.14; used for cooperage, wheel stock, fencing, railway ties, etc.

The small acorns sweet and edible.

Note.—Differences in the size and habit of individuals of this species, thus enlarged, seem to be dependent upon soil and climate, numerous intermediate forms connecting the extremes of eastern Massachusetts and the Mississippi valley.

262.—Quercus Douglasii, Hooker & Arnott,

Bot. Beechey, 391.—Hooker, Icon. iv, t. 382, 383.—Bentham, Pl. Hartweg. 337; Bot. Sulphur, 55.—Nuttall, Sylva, i, 10, t. 4; 2 ed. i, 20, t. 4.—Torrey in Pacific R. R. Rep. v, 365; Bot. Wilkes Exped. 462.—Cooper in Smithsonian Rep. 1858, 260.—A. De Candolle, Prodr. xvi², 23.—Bolander in Proc. California Acad. iii, 230.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 66.—Liebmann, Chênes Am. Trop. t. 41, f. 3, 4.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 392; Bot. California, ii, 95.—Hall in Coulter's Bot. Gazette, ii, 91.

Q. oblongifolia, var. brevilobata, Torrey in Bot. Wilkes Exped. 460.

MOUNTAIN WHITE OAK. BLUE OAK.

California, from about latitude 39°, south along the western foot-hills of the Sierra Nevadas below 4,000 feet elevation, and through the Coast ranges to the San Gabriel mountains.

A tree 18 to 24 meters in height, with a trunk 0.60 to 1.20 meter in diameter; common on the low foot-hills of the sierras.

Wood very hard, heavy, strong, brittle, inclined to check in drying; layers of annual growth marked by several rows of small open duets and containing many scattered groups of smaller duets; medullary rays numerous, varying greatly in width; color, dark brown, becoming nearly black with exposure, the thick sap-wood light brown; specific gravity, 0.8928; ash, 0.84.

263.—Quercus oblongifolia, Torrey,

Sitgreaves' Rep. 173; Bot. Mex. Boundary Survey, 206; Ives' Rep. 28.—Cooper in Smithsonian Rep. 1858, 261.—A. De Candolle, Prodr. xvi°, 36.—Watson, Pl. Wheeler, 17.—Vasey, Cat. Forest Trees, 26.—Engelmann in Trans. St. Louis Acad. iii, 393; Bot. California, ii, 96.

Q. undulata, var. oblongata, Engelmann in Wheeler's Rep. vi, 250.

WHITE OAK.

California, foot-hills of the San Gabriel mountains, and in San Diego county (here occupying a narrow belt, 30 miles in width some 30 miles from the coast, *Parish Brothers*); foot-hills of the mountain ranges of southern Arizona and New Mexico; southward into Mexico.

A small evergreen tree, 12 to 15 meters in height, with a trunk 0.45 to 0.60 meter in diameter; the large

specimens generally hollow and defective.

Wood very heavy, hard, strong, brittle, very close-grained, checking badly in drying; layers of annual growth hardly distinguishable, containing few small open ducts arranged in many groups parallel to the broad and very conspicuous medullary rays; color, very dark brown or almost black, the thick sap-wood brown; specific gravity, 0.9441; ash, 2.61; of little economic value except as fuel.

264.-Quercus grisea, Liebmann,

Dansk. Vidensk. Selsk. Forhandl. 1854, 13; Chênes Am. Trop. t. 46, f. 1, 2.—A. De Candolle, Prodr. xvi², 35.—Örsted in Saerskift. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 69.—Rusby in Bull. Torrey Bot. Club, ix, 78.—Watson in Proc. Am. Acad. xviii, 156.

- Q. pungens, Liebmann in Dansk. Vidensk. Selsk. Forhandl. 1854, 13; Chênes Am. Trop. 22, t. 45, f. 1-3.—A. De Candolle, Prodr. xvi², 36.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 69.—Rusby in Bull. Torrey Bot. Club ix, 78.
- Q. undulata, var. grisea, Engelmann in Trans. St. Louis Acad. iii, 382; Wheeler's Rep. vi, 250.
- Q. undulata, var. pungens, Engelmann in Trans. St. Louis Acad. iii, 392; Wheeler's Rep. vi, 250; Bot. California, ii, 96.—Palmer in Am. Nat. xii, 596.
- Q. undulata, var. Wrightii, Engelmann in Trans. St. Louis Acad. iii, 382, 392.

WHITE OAK.

Mountains of southern Colorado and western Texas (Havard), southern New Mexico and Arizona from 5,000 to 10,000 feet elevation, west to the Colorado desert of California; southward into northern Mexico.

A tree 15 to 24 meters in height, with a trunk rarely exceeding 0.60 meter in diameter, or reduced to a low, much-branched shrub; a polymorphous species, varying greatly in habit and in the shape and texture of the leaves, but apparently well characterized by its connate cotyledons; the large specimens generally hollow and defective.

Wood very heavy, strong, hard, close-grained, checking badly in drying; layers of annual growth marked by one or two rows of small open ducts, these connected by rows of similar ducts parallel to the numerous conspicuous medullary rays; color, very dark brown, the thick sap-wood much lighter; specific gravity, 1.0092; ash, 1.82.

265.—Quercus reticulata, Humboldt & Bonpland,

- Pl. Æquin. ii, 40, t. 86.—Poiret, Suppl. v, 609.—Sprengel, Syst. iii, 860.—Loudon, Arboretum, iii, 1944, f. 1865.—Michaux f. N. American Sylva, 3 ed. i, 90.—A. De Candolle, Prodr. xvi², 33.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 67.—Liebmann, Chênes Am. Trop. t. H, t. 34, f. 10-16, t. 35, f. 15-22.—Vasey, Cat. Forest Trees, 26.—Engelmann in Trans. St. Louis Acad. iii, 383; Wheeler's Rep. vi, 250.—Hemsley, Bot. Am.-Cent. iii, 176.—Watson in Proc. Am. Acad. xviii, 156. 7
 - Q. spicata, Humbolt & Bonpland, Pl. Æquin. ii, 46, t. 89.—Bentham, Pl. Hartweg. No. 429.
 - Q. decipiens, Martens & Galeotti in Bull. Brux. v, 10.
 - ? Q. reticulata, var. Greggii, A. De Candolle, Prodr. xvi², 34.—Hemsley, Bot. Am.-Cent. iii, 176.

Southeastern Arizona, San Francisco and Santa Rita mountains from 7,000 to 10,000 feet elevation; southward into northern Mexico.

A small tree, 9 to 12 meters in height, with a trunk 0.30 to 0.45 meter in diameter; dry, gravelly slopes.

Wood very heavy, hard, close-grained, checking badly in drying, containing many small, scattered, open ducts; medullary rays numerous, very broad; color, dark brown, the sap-wood lighter; specific gravity, 0.9479; ash, 0.52.

266.—Quercus Durandii, Buckley,

Proc. Philadelphia Acad. 1860, 445; 1881, 121.—Gray, Hall's Pl. Texas, 21.—Young, Bot. Texas, 507:—Vasey, Cat. Forest Trees, 26.—Watson in Proc. Am. Acad. xviii, 156.

- Q. obtusifolia, var. ? brevileba, Torrey, Bot. Mex. Boundary Survey, 206.
- Q. annulata, Buckley in Proc. Philadelphia Acad. 1860, 445.
- Q. San-Sabeana, Buckley in Young, Bot. Texas, 507.
- Q. undulata, Engelmann in Trans. St. Louis Acad. iii, 392, in part [not Torrey].

Alabama, Wilcox county (Buckley), valley of the Little Cahaba river, Bibb county (Mohr); Shreveport, Louisiana?, (Buckley); Texas, Dallas (Reverchon), valley of the Colorado river (Buckley, Mohr, Sargent), west and south.

A tree 21 to 24 meters in height, with a trunk 0.60 to 1.20 meter in diameter; rich bottom lands or dry mesas and limestone hills, then reduced to a low shrub, forming dense, impenetrable thickets of great extent (Q. San-Sabeana); rare and local in Alabama; the common and most valuable white oak of western Texas.

Wood very heavy and hard, strong, brittle, close-grained, inclined to check in drying; layers of annual growth marked by few large open ducts; medullary rays numerous, conspicuous; color, brown, the sap-wood lighter; specific gravity, 0.9507; ash, 1.78; used for the same purposes as that of the white oak (Q. alba).

267.-Quercus virens, Aiton,

Hort. Kew. iii, 356; 2 ed. v, 287.—Bartram, Travels, 2 ed. 82.—Michaux, Hist. Chênes Am. No. 6, t. 10, 11; Fl. Bor.-Am. ii, 196.—Willdenow, Spec. iv, 425; Enum. 974.—Robin, Voyages, iii, 264.—Smith in Rees' Cycl. xxx, No. 5.—Persoon, Syn. ii, 567.—Desfontaines, Hist. Arb. ii, 507.—Poiret, Suppl. ii, 213.—Michaux f. Hist. Arb. Am. ii, 67, t. 11; N. American Sylva, 3 ed. i, 52, t. 12.—Pursh, Fl. Am. Sept. ii, 626.—Nuttall, Genera, ii, 214; Sylva, i, 16; 2 ed. i, 28.—Nouveau Duhamel, vii, 151.—Elliott, Sk. ii, 595.—Sprengel, Syst. iii, 858.—Cobbett, Woodlands, 446.—Eaton, Manual, 6 ed. 294.—Loudon, Arboretum, iii, 1918, f. 1802, 1803 & t.—Eaton & Wright, Bot. 385.—Spach, Hist. Veg. xi, 177.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v, 234.—Scheele in Ræmer, Texas, 446; Appx. 147.—Penn. Cycl. xix, 216.—Darby, Bot. S. States, 510.—Torrey, Bot. Mex. Boundary Survey, 206.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl, S. States, 421.—Curtis in Rep. Geological Surv. N. Carolina, 35.—Wood, Cl. Book, 643; Bot. & Fl. 305.—Porcher, Resources S. Forests, 263.—A. De Candolle, Prodr. xvi², 37.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 69.—Gray, Manual N. States, 5 ed. 452; Hall's Pl. Texas, 21.—Liebmann, Chênes Am. Trop. t. 33, f. 50-57.—Young, Bot. Texas, 503.—Vasey, Cat. Forest Trees, 26.—Engelmann in Trans. St. Louis Acad. iii, 383; iv, 191.—Hemsley, Bot. Am.-Cent. iii, 178.—Watson in Proc. Am. Acad. xviii, 155.

- Q. Virginiana, Miller, Dict. 7 ed. No. 17.-Koch, Dendrologie, ii², 57.
- Q. Phellos, var. sempervirens, Marshall, Arbustum, 124.
- Q. sempervirens, Walter, Fl. Caroliniana, 234.
- Q. oleoides, Chamisso & Schlechtendal in Linnæa, v, 79.—Martens & Galeotti in Bull. Brux. x, No. 3.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden, Meddelt. Nos. 1-6, 1866, 69.
- Q. retusa, 'Liebmann in Dansk. Vidensk. Selsk. Forhandl. 1854, 187.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 69.

LIVE OAK.

Mob Jack bay, Virginia, south along the coast to bay Biscayne and cape Romano, Florida, along the Gulf coast to Mexico, extending through western Texas to the valley of the Red river, the Apache and Gaudalupe mountains and the mountains of northern Mexico south of the Rio Grande at 6,000 to 8,000 feet elevation (Havard); in Costa Rica (Q. retusa).

An evergreen tree of great economic value, 15 to 18 meters in height, with a trunk 1.50 to 2.10 meters in diameter, or in the interior of Texas much smaller, often shrubby; on the coast, rich hummocks and ridges, a few feet above water-level; common and reaching its greatest development in the south Atlantic states.

Wood very heavy, hard, strong, tough, very close-grained, compact, difficult to work, susceptible of a beautiful polish; layers of annual growth obscure, often hardly distinguishable, containing many small open ducts arranged in short broken rows parallel to the broad, conspicuous medullary rays; color, light brown or yellow, the sap-wood nearly white; specific gravity, 0.9501; ash, 1.14; formerly very largely and now occasionally used in ship-building.

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268.—Quercus chrysolepis, Liebmann,

Dansk. Vidensk. Selsk. Forhandl. 1854, 173; Chênes Am. Trop. 23, t. 47.—Torrey, Bot. Mex. Boundary Survey, 206; Bot. Wilkes Exped. 458.—Cooper in Smithsonian Rep. 1858, 260.—Kellogg in Proc. California Acad. ii, 45.—A. De Candolle, Prodr. xvi², 37.—Bolander in Proc. California Acad. iii, 231.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 69.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 383, 393; Wheeler's Rep. vi, 374; Bot. California, ii, 97.—Watson in Proc. Am. Acad. xi, 119.—Palmer in Am. Nat. xii, 596.

- Q. fulvescens, Kellogg in Proc. California Acad. i, 67, 71.—Newberry in Pacific R. R. Rep. vi, 27, 89.
- Q. crassipocula, Torrey in Pacific R. R. Rep. iv, 137; v, 365, t. 9.
- ? Q. oblongifolia, R. Brown Campst. in Ann. & Mag. Nat. Hist. April, 1871, 4 [not Torrey].

LIVE OAK. MAUL OAK. VALPARAISO OAK.

Cow Creek valley, Oregon, south through the California Coast ranges and along the western slopes of the Sierra Nevada and San Bernardino mountains between 3,000 and 8,000 feet elevation, and south into Lower California; southeastern Arizona, San Francisco (Greene) and Santa Catalina mountains (Pringle).

An evergreen tree of great economic value, 18 to 27 meters in height, with a trunk sometimes 1.50 meter in diameter, or at high elevations reduced to a low, narrow-leaved shrub (var. vaccinifolia, Engelmann in Trans. St. Louis Acad. iii, 393; Bot. California, ii, 97.—Q. vaccinifolia, Kellogg in Trans. California Acad. ii, 96).

Wood heavy, very strong and hard, tough, close grained, compact, difficult to work, containing many rather small open ducts arranged in wide bands parallel to the broad, conspicuous medullary rays; color, light brown, the sap-wood darker; specific gravity, 0.8493; ash, 0.60; somewhat used in the manufacture of agricultural implements, wagons, etc.; the most valuable oak of the Pacific forests.

269.—Quercus Emoryi, Torrey,

Emory's Rep. 151, t. 9; Bot. Mex. Boundary Survey, 206; Pacific R. R. Rep. iv, 138; Ives' Rep. 28.—Watson in Pl. Wheeler, 17.—Vasey, Cat. Forest Trees, 26.—Engelmann in Trans. St. Louis Acad. iii, 382, 387, 394; Wheeler's Rep. vi, 250.—Palmer in Am. Nat. xii, 596.—Hemsley, Bot. Am.-Cent. iii, 170.

Q. hastata, Liebmann in Dansk. Vidensk. Selsk. Forhandl. 1854, 13; Chênes Am. Trop. 22.—A. De Candolle, Prodr. xvi*, 36.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 69.

BLACK OAK.

Bexar and Comal counties, Texas, through the mountain ranges of western Texas, of southern New Mexico, and of eastern and southern Arizona.

A tree 12 to 15 meters in height, with a trunk 0.30 to 0.90 meter in diameter, or toward its eastern limits in Texas reduced to a low shrub; common and reaching its greatest development in southwestern New Mexico and southern Arizona between 5,000 and 7,000 feet elevation near streams in open canons; dry, gravelly soil, the large specimens hollow and defective.

Wood very heavy, not hard, strong, brittle, close-grained, compact; layers of annual growth marked by several rows of small open ducts, these connected by narrow groups of similar ducts parallel to the broad, conspicuous medullary rays; color, dark brown or almost black, the thick sap-wood bright brown tinged with red; specific gravity, 0.9263; ash, 2.36.

270.-Quercus agrifolia, Née,

Ann. Cienc. Nat. iii, 271.—Fischer, Misc. Hisp. i, 108.—Willdenow, Spec. iv, 431.—Persoon, Syn. ii, 568.—Smith in Rees' Cycl. xxx, No. 29.—Pursh, Fl. Am. Sept. ii, 627.—Nuttall, Genera, ii, 214; Sylva, i, 5, t. 2; 2 ed. i, 16, t. 2.—Nouveau Duhamel, vii, 156.—Sprengel, Syst. iii, 859.—Eaton, Manual, 6 ed. 292.—Loudon, Arboretum, iii, 1894.—Bentham, Pl. Hartweg. 337; Bot. Sulphur, 55.—Eaton & Wright, Bot. 384.—Hooker, Icon. iv, t. 377.—Hooker & Arnott, Bot. Beechey, 391.—Jour. Hort. Soc. London, vi, 157 & t.—Carrière in Fl. des Serres, vii, 137 & f.—Torrey in Sitgreaves' Rep. 173; Pacific R. R. Rep. iv, 138; v, 365; vii, 20; Bot. Mex. Boundary Survey, 206; Ives' Rep. 28; Bot. Wilkes Exped. 460.—Paxton's Brit. Flower Gard. ii, 44.—Newberry in Pacific R. R. Rep. vi, 32, f. 9.—Bolander in Proc. California Acad. iii, 229.—A. De Candolle, Prodr. xvi², 37.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 69.—Liebmann, Chênes Am. Trop. t. 44.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Louis Acad. iii, 383; Wheeler's Rep. vi, 374; Bot. California, ii, 98.—Hemsley, Bot. Am.-Cent. iii, 167.

- Q. oxyadenia, Torrey in Sitgreaves' Rep. 172, t. 17.—Cooper in Smithsonian Rep. 1858, 261.
- Q. acutiglandis, Kellogg in Proc. California Acad. i, 25.

ENCENO. COAST LIVE OAK.

California, Mendocino county, south through the Coast Range valleys to Lower California.

A large evergreen tree, 24 to 30 meters in height, with a trunk 1.20 to 2.10 meters in diameter, or, rarely, reduced to a low shrub (var. frutescens, Engelmann in Bot. California, ii, 98); rare at the north; common south of San Francisco bay, and the largest and most generally distributed oak in the extreme southwestern part of the state; dry slopes and ridges.

Wood heavy, hard, strong, brittle, close-grained, compact; layers of annual growth hardly distinguishable, containing many large open ducts arranged in several rows parallel to the broad, conspicuous medullary rays; color, light brown or red, the sap-wood darker brown; specific gravity, 0.8253; ash, 1.28; of little value except as fuel.

271.—Quercus Wislizeni, A. De Candolle,

Prodr. xvi³, 67.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 73.—Vasey, Cat. Forest Trees, 27.—Engelmann in Trans. St. Louis Acad. iii, 385, 396; Bot. California, ii, 98.

Q. Morehus, Kellogg in Proc. California Acad. ii, 36.

LIVE OAK.

California, mount Shasta region, south along the western slopes of the Sierra Nevadas to Tulare county, and in the Coast ranges south to the Santa Lucia mountains.

An evergreen tree, 15 to 18 meters in height, with a trunk 0.90 to 1.80 meter in diameter, or toward its northeastern limits reduced to a shrub 0.90 to 3 meters in height (var. frutescens, Engelmann in Bot. California, ii, 99); not common.

Wood heavy, very hard, strong, close-grained, compact, containing numerous large open ducts arranged in irregular bands parallel to the broad, conspicuous medullary rays; color, light brown tinged with red, the sapwood lighter; specific gravity, 0.7855; ash, 1.02.

272.—Quercus rubra, Linnæus,

Spec. 1 ed. 996.—Du Roi, Harbk. ii, 265.—Lamarck, Dict. i, 720.—Walter, Fl. Caroliniana, 234.—Aiton, Hort. Kew. iii, 357; 2 ed. v, 292.—Mœnch, Meth. 348.—Abbot, Insects Georgia, ii, t. 103.—Michaux, Hist. Chênes No. 2, t. 35, 36; Fl. Bor.-Am. ii, 200.—Willdenow, Spec. iv, 445; Enum. 976; Berl. Baumz. 342.—Smith in Rees' Cycl. xxx, No. 60.—Persoon, Syn. ii, 569.—Desfontaines, Hist. Arb. ii, 511.—Michaux f. Hist. Arb. Am. ii, 126, t. 26; N. American Sylva, 3 ed. i, 84, t. 28.—Pursh, Fl. Am. Sept. ii, 630.— Eaton, Manual, 108; 6 ed. 293.—Nuttall, Genera, ii, 214.—Barton, Compend. Fl. Philadelph. ii, 169.—Nouveau Duhamel, vii, 170.—Hayne, Dend. Fl. 157.—Elliott, Sk. ii, 602.—Sprengel, Syst. iii, 863.—Torrey, Compend. Fl. N. States, 358; Nicollet's Rep. 160; Fl. N. York, 189, t. 106.—Beck, Bot. 329.—Loudon, Arboretum, iii, 1877, f. 1740-1744 & t.—Hooker, Fl. Bor.-Am. ii, 158.— Bigelow, Fl. Boston. 3 ed. 376.—Eaton & Wright, Bot. 384.—Spach, Hist. Veg. xi, 165.—Emerson, Trees Massachusetts, 48, t. 10; 2 ed. i, 163 & t.—Scheele in Rœmer, Texas, 446.—Penn. Cycl. xix, 216.—Darlington, Fl. Cestrica, 3 ed. 269.—Darby, Bot. S. States, 510.—Cooper in Smithsonian Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 369, t. 9.—Chapman, Fl. S. States, 422.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 41.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 644; Bot. & Fl. 306.—Porcher, Resources S. Forests, 262.—Engelmann in Trans. Am. Phil. Soc. new ser. v, 209; Trans. St. Louis Acad. iii, 394.—A. De Candolle, Prodr. xvi², 60.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 72.—Gray, Manual N. States, 5 ed. 454; Hall's Pl. Texas, 21.—Liebmann, Chênes Am. Trop. t. A, B.—Koch, Dendrologie, ii², 70.— Young, Bot. Texas, 504.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 26.—Macoun in Geological Rep. Canada, 1875-'76, 209.—Sears in Bull. Essex Inst. xiii, 179.—Ridgway in Proc. U. S. Nat. Mus. 1882, 83.—Bell in Geological Rep. Canada, 1879-'80, 51c.

- Q. rubra maxima, Marshall, Arbustum, 122.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 395.
- Q. rubra, var. latifolia, Lamarck, Dict. i, 720.—Aiton, Hort. Kew. 2 ed. v, 292.—Loudon, Arboretum, iii, 1877.
- Q. rubra, var. montana, Aiton, Hort. Kew. 2 ed. v, 292.—Loudon, Arboretum, iii, 1877.
- Q. ambigua, Michaux f. Hist. Arb. Am. ii, 120, t. 24; N. American Sylva, 3 ed. i, 81, t. 26 [not HBK.].—Pursh, Fl. Am. Sept. ii, 630.—Nuttall, Genera, ii, 214.—Eaton, Manual, 6 ed. 293.—Loudon, Arboretum, iii, 1881, f. 1749 & t.—Eaton & Wright, Bot. 384.
- Q. coccinea, var. rubra, Spach, Hist. Veg. xi, 165.
- Q. coccinea, var. ambigua, Gray, Manual N. States, 5 ed. 454.
- Q. rubra, var. runcinata, A. De Candolle, Prodr. xvi2, 60.—Engelmann in Trans. St. Louis Acad. iii, 542.

RED OAK. BLACK OAK.

Nova Scotia, southern New Brunswick to eastern Minnesota, western Iowa, eastern Kansas, and the Indian territory, south to northern Florida, southern Alabama and Mississippi, and the valley of the San Antonio river, Texas.

A large tree, 24 to 30 or, exceptionally, 45 meters (Ridgway) in height, with a trunk 1.20 to 2.10 meters in diameter; very common, especially at the north, in all soils and extending farther north than any Atlantic oak.

Wood heavy, hard, strong, coarse-grained, inclined to check in drying; layers of annual growth marked by several rows of very large open ducts; medullary rays few, conspicuous; color, light brown or red, the sap-wood somewhat darker; specific gravity, 0.6540; ash, 0.26; now largely used for clapboards, cooperage, and somewhat for interior finish, in the manufacture of chairs, etc.

Var. Texana, Buckley,

Proc. Philadelphia Acad. 1881, 123.—Engelmann in Coulter's Bot. Gazette, vii, 14.

- Q. palustris, Torrey & Gray in Pacific R. R. Rep. ii, 175 [not Du Roi].
- Q. coccinea, var. microcarpa, Torrey, Bot. Mex. Boundary Survey, 206.
- Q. Texana, Buckley in Proc. Philadelphia Acad. 1860, 445.—Young, Bot. Texas, 507.

RED OAK.

Western Texas, valley of the Colorado river with the species and replacing it south and west, extending to the valley of the Nueces river and the Limpia mountains (Havard).

A tree 21 to 24 meters in height, with a trunk rarely exceeding 0.60 meter in diameter.

Wood heavier, harder, much closer-grained than the species, not checking in drying; layers of annual growth marked with fewer and smaller open ducts; specific gravity, 0.9080; ash, 0.85.

273.—Quercus coccinea, Wangenheim,

Amer. 44, t. 4. f. 9.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 398.—Michaux, Hist. Chênes Am. No. 18, t. 31, 32; Fl. Bor.-Am. ii, 199.—Willdenow, Spec. iv, 445; Enum. 976; Berl. Baumz. 343.—Smith in Rees' Cycl. xxx, 61.—Persoon, Syn. ii, 569.—Desfontaines, Hist. Arb. ii, 511.—Poiret, Suppl. ii, 221.—Michaux f. Hist. Arb. Am. ii, 116, t. 23; N. American Sylva, 3 ed. i, 79, t. 25.—Aiton, Hort. Kew. 2 ed. v, 292.—Pursh. Fl. Am. Sept. ii, 630.—Eaton, Manual, 108; 6 ed. 292.—Nuttall, Genera, ii, 214.—Barton, Compend. Fl. Philadelph. ii, 169.—Nouveau Duhamel, vii, 171.—Hayne, Dend. Fl. 157.—Elliott, Sk. ii, 602.—Sprengel, Syst. iii, 863.—Torrey, Compend. Fl. N. States, 358; Fl. N. York, ii, 189.—Beck, Bot. 329.—Loudon, Arboretum, iii, 1879, f. 1746–1748 & t.—Eaton & Wright, Bot. 384.—Bigelow, Fl. Boston. 3 ed. 376.—Spach, Hist. Veg. xi, 165.—Emerson, Trees Massachusetts, 144, t. 9; 2 ed. i, 163 & t.—Scheele in Rœmer, Texas, 446.—Penn. Cycl. xix, 216.—Darlington, Fl. Cestrica, 3 ed. 268.—Darby, Bot. S. States, 510.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 422.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 40.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 645; Bot. & Fl. 306.—A. De Candolle, Prodr. xvi², 61.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 72.—Gray, Manual N. States, 5 ed. 453.—Liebmann, Chênes Am. Trop. t. B.—Koch, Dendrologie, ii², 69.—Young, Bot. Texas, 504.—Vasey, Cat. Forest Trees, 26.—Engelmann in Trans. St. Louis Acad. iii, 385, 394.—Ridgway in Proc. U. S. Nat. Mus. 1882, 80.—Watson in Proc. Am. Acad. xviii, 156.

Q. rubra, B. Linnæus, Spec. 1 ed. 996.—Aiton, Hort. Kew. iii, 357.

SCARLET OAK.

Southern Maine to northern New York, Ontario, northern Michigan and Minnesota, eastern Iowa and northeastern Missouri, south to Delaware and southern Tennessee, and through the Alleghany region to northern Florida.

A tree 24 to 30 or, exceptionally, 54 meters (*Ridgway*) in height, with a trunk rarely exceeding 0.60 to 1.20 meter in diameter; at the east in dry, sandy soil or, less commonly, in rich, deep soil; in the northwestern prairie region with *Q. macrocarpa* forming the oak-opening growth; not common and reaching its greatest development in the basin of the lower Ohio river.

Wood heavy, hard, strong, coarse-grained; layers of annual growth strongly marked by several rows of large open ducts; medullary rays thin, conspicuous; color, light brown or red, the sap-wood rather darker; specific gravity, 0.7405; ash, 0.19; if used at all, confounded with that of *Q. rubra*.

274.—Quercus tinctoria, Bartram,

Travels, 2 ed. 37.—Abbot, Insects Georgia, ii, t. 56.—Michaux, Hist. Chènes Am. No. 13, t. 24, 25; Fl. Bor.-Am. ii, 198.—Willdenow, Speciv, 444; Enum. 976; Berl. Baumz. 344.—Desfontaines, Hist. Arb. ii, 509.—Poiret, Suppl. ii, 221.—Michaux f. Hist. Arb. Am. ii, 110, t. 22; N. American Sylva, 3 ed. i, 76, t. 24.—Aiton, Hort. Kew. 2 ed. v, 291.—Pursh, Fl. Am. Sept. ii, 629.—Smith in Rees' Cycl. xxx, No. 58.—Barton, Prodr. Fl. Philadelph. 91; Compend. Fl. Philadelph. ii, 168.—Eaton, Manual, 108; 6 ed. 292.—Nuttall, Genera, ii, 214; Sylva, i, 21; 2 ed. i, 32.—Nouveau Duhamel, vii, 169.—Hayne, Dend. Fl. 156.—Elliott, Sk. ii, 601.—Sprengel, Syst. iii, 862.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, ii, 188.—Audubon, Birds, t. 82.—Beck, Bot. 328.—Loudon, Arboretum, iii, 1884, f. 1753, 1754.—Hooker, Fl. Bor.-Am. ii, 158.—Bigelow, Fl. Boston. 3 ed. 376.—Eaton & Wright, Bot. 384.—Spach, Hist. Veg. xi, 164.—Emerson, Trees Massachusetts, 141, t. 7; 2 ed. i, 160 & t.—Griffith, Med. Bot. 586.—Gray, Manual N. States, 1 ed. 416.—Darlington, Fl. Cestrica, 3 ed. 268.—Darby, Bot. S. States, 510.—Cooper in Smithsoniau Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 627, t. 8.—Chapman, Fl. S. States, 422.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 39.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 645.—Engelmann in Proc. Am. Phil. Soc. new ser. xii, 209; Trans. St. Lonis Acad. iii, 395.—Porcher, Resources S. Forests, 238.—Örsted in Saerskitt. Aftryk, af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 45, 72, f. 18.—Liebmann, Chênes Am. Trop. 9, f. 6.—Young, Bot. Texas, 504.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Guibourt, Hist. Drogues, 7 ed. ii, 288.—Vasey, Cat. Forest Trees, 27.—Bentley & Trimen, Med. Fl. iv, 251, t. 251.—Ridgway in Proc. U. S. Nat. Mus. 1882, 84.

- ? Q. velutina, Lamarck, Diet. i, 172.—Koch, Dendrologie, ii², 68.
- Q. nigra, Marshall, Arbustum, 120 [not Linnæus].-Wangenheim, Amer. 79, t. 6, f. 16.
- Q. rubra, Wangenheim, Amer. 14, t. 3, f. 7 [not Linnæus].—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 399.
- Q. discolor, Aiton, Hort. Kew. iii, 358.—Abbot, Insects Georgia, ii, 111.—Willdenow, Spec. iv, 444; Berl. Baumz. 345.—
 Poiret, Suppl. ii, 221.—Smith in Rees' Cycl. xxx, No. 59.—Nuttall, Genera, ii, 214.—Elliott, Sk. ii, 601.—Sprengel, Syst. iii, 863.—Beck, Bot. 329.—Eaton, Manual, 6 ed. 292.—Eaton & Wright, Bot. 384.
- Q. tinctoria, var. angulosa, Michaux, Fl. Bor.-Am. ii, 198.-Loudon, Arboretum, iii, 1858.
- Q. tinctoria, var. sinuosa, Michaux, Fl. Bor.-Am. ii, 198.—Loudon, Arboretum, iii, 1885, f. 1755-1757.—Liebmann, Chênes Am. Trop. t. C.
- ? Q. Shumardii, Buckley in Proc. Philadelphia Acad. 1860, 445.
- Q. coccinea, var. tinctoria, Gray, Manual N. States, 5 ed. 454.—Wood, Cl. Book, 306.—A. De Candolle, Prodr. xvi2, 61.

BLACK OAK. YELLOW-BARK OAK. QUERCITRON OAK. YELLOW OAK.

Southern Maine to northern Vermont, Ontario, southern Minnesota, eastern Nebraska, eastern Kansas, and the Indian territory, south to the Chattahoochee region of western Florida, southern Alabama and Mississippi, and eastern Texas.

A large tree, 24 to 36 or, exceptionally, 48 meters (Ridgway) in height, with a trunk 0.90 to 1.80 meter in diameter; generally on dry or gravelly uplands; very common.

Wood heavy, hard, strong, not tough, coarse-grained, liable to check in drying; layers of annual growth marked by several rows of very large open ducts; color, bright brown tinged with red, the sap-wood much lighter; specific gravity, 0.7045; ash, 0.28; somewhat used for cooperage, construction, etc.

The bark largely used in tanning; the intensely bitter inner bark yields a valuable yellow dye, and is occasionally used medicinally in the form of decoctions, etc., in the treatment of hemorrhage (*U. S. Dispensatory*, 14 ed. 756.—*Nat. Dispensatory*, 2 ed. 1196).

275.—Quercus Kelloggii, Newberry,

Pacific R. R. Rep. vi, 89, 286, f. 6.—Torrey, Bot. Wilkes Exped. 466.—R. Brown Campst. Horæ Sylvanæ, 58, f. 4-6.—Engelmann in Bot. California, ii, 99.

- Q. rubra, Bentham, Pl. Hartweg. 337 [not Linnæus].
- Q. tinctoria, var. Californica, Torrey in Pacific R. R. Rep. iv, 138; Bot. Mex. Boundary Survey, 205; Ives' Rep. 28.
- Q. Californica, Cooper in Smithsonian Rep. 1858, 261.
- Q. Sonomensis, Bentham in De Candolle Prodr. xvi², 62.—Bolander in Proc. California Acad. iii, 230.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 72.—Vasey, Cat. Forest Trees, 27.—Engelmann in Wheeler's Rep. vi, 374.—Palmer in Am. Nat. xii, 596.

BLACK OAK.

Valley of the Mackenzie river, Oregon, south through the Coast ranges and along the western slopes of the Sierra Nevada and San Bernardino mountains to the southern borders of California.

A large tree, 18 to 24 meters in height, with a trunk 0.90 to 1.20 meter in diameter, or at high elevations reduced to a shrub; the most common and important oak of the valleys of southwestern Oregon and the California Sierras.

Wood heavy, hard, strong, very brittle, close-grained, compact; layers of annual growth marked by several rows of large open ducts; medullary rays few, broad, conspicuous; color, light red, the thin sap-wood lighter; specific gravity, 0.6435; ash, 0.26; of little value, except as fuel; the bark somewhat used in tanning.

276.—Quercus nigra, Linnœus,

Spec. 1 ed. 995.—Lamarck, Diet, i, 721.—Wangenheim, Amer. 77, t. 5, f. 13.—Walter, Fl. Caroliniana, 234.—Aiton, Hort. Kew. iii, 357; 2 ed. v, 291.—Abbot, Insects Georgia, i, 50; ii, 58.—Michaux, Hist. Chênes Am. No. 17, t. 22, 23; Fl. Bor.-Am. ii, 198.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 399.—Willdenow, Spec. iv, 442.—Smith in Rees' Cycl. xxx, No. 53.—Persoon, Syn. ii, 569.—Desfontaines, Hist. Arb. ii, 509.—Pursh, Fl. Am. Sept. ii, 629.—Eaton, Manual, 108; 6 ed. 292.—Barton, Compend. Fl. Philadelph. ii, 168.—Nouveau Duhamel, vii, 168.—Elliott, Sk. ii, 600.—Sprengel, Syst. iii, 862.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, ii, 188; Bot. Mex. Boundary Survey, 206.—Audubon, Birds, t. 116.—Beck, Bot. 328.—Loudon, Arboretum, iii, 1890, f. 1764, 1765.—Eaton & Wright, Bot. 384.—Spach, Hist. Veg. xi, 162.—Darlington, Fl. Cestrica, 3 ed. 267.—Darby, Bot. S. States, 510.—Coper in Smithsonian Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 625, t. 7.—Chapman, Fl. S. States, 421.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 38.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 644; Bot. & Fl. 305.—A. De Candolle, Prodr. xvi², 63.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 72.—Gray, Manual N. States, 5 ed. 453; Hall's Pl. Texas, 21.—Liebmann, Chênes Am. Trop. t. A.—Koch, Dendrologie, ii², 61.—Young, Bot. Texas, 503.—Vasey, Cat. Forest Trees, 26.—Ridgway in Proc. Nat. Mus. 1882, 82.—Watson in Proc. Am. Acad. xviii, 156.

- Q. nigra, var. latifolia, Lamarck, Dict. i, 721.
- Q. nigra integrifolia, Marshall, Arbustum, 121.
- ? Q. aquatica, Walter, Fl. Caroliniana, 234.
- Q. Marylandica, Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 399.

BLACK JACK. JACK OAK.

Long island, New York, west through northern Ohio and Indiana to about latitude 55° N. in Wisconsin, southern Minnesota, eastern Nebraska, Kansas, and the Indian territory to about 99° west longitude, south to Matanzas inlet and Tampa bay, Florida, and the valley of the Nueces river, Texas.

A small tree, sometimes 12 or even 18 meters in height, with a trunk rarely exceeding 0.60 meter in diameter, or more often much smaller; dry, barren uplands, or often on heavy clay soils; very common through the southern states, and reaching its greatest development in southwestern Arkansas, Indian territory, and eastern Texas, forming, with the post-oak (*Q. obtusiloba*), the growth of the Texas cross-timbers.

Wood heavy, hard, strong, checking badly in drying; layers of annual growth marked by several rows of large open ducts; medullary rays broad, conspicuous; color, rather dark rich brown, the sap-wood much lighter; specific gravity, 0.7324; ash, 1.16; of little value except as fuel.

277.-Quercus falcata, Michaux,

Hist. Chênes Am. No. 16, t. 28; Fl. Bor.-Am. ii, 199.—Persoon, Syn. ii, 569.—Poiret, Suppl. ii, 221.—Michaux f. Hist. Arb. Am. ii, 104, t. 21; N. American Sylva, 3 ed. i, 73, t. 23.—Pursh, Fl. Am. Sept. ii, 630.—Nuttall, Genera, ii, 214.—Barton, Compend. Fl. Philadelph. ii, 170.—Nouveau Duhamel, vii, 169.—Elliott, Sk. ii, 604.—Torrey, Compend. Fl. N. States, 358.—Beck, Bot. 329.—Eaton, Manual, 6 ed. 293.—Loudon, Arboretum, iii, 1882, f. 1750, 1751.—Lindley, Fl. Med. 292.—Eaton & Wright, Bot. 384.—Darlington, Fl. Cestrica, 3 ed. 269.—Darby, Bot. S. States, 510.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 422.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 39.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 644; Bot. & Fl. 306.—Porcher, Resources S. Forests, 256.—A. De Candolle, Prodr. xvi², 59.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 72.—Gray, Manual N. States, 5 ed. 453; Hall's Pl. Texas, 21.—Liebmann, Chênes Am. Trop. t. A, t. 22, f. 3.—Young, Bot. Texas, 505.—Vasey, Cat. Forest Trees, 26.—Ridgway in Proc. U. S. Nat. Mus. 1882, 80.

- Q. rubra montana, Marshall, Arbustum, 123.
- Q. nigra digitata, Marshall, Arbustum, 121.
- Q. cuneata, Wangenheim, Amer. 78, t. 5, f. 14.—Koch, Dendrologie, ii², 64.
- Q. elongata, Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 400.—Willdenow, Spec. iv, 444.—Smith in Rees' Cycl. xxx, 57.—Aiton, Hort. Kew. 2 ed. v, 291.
- Q. triloba, Michaux, Hist. Chênes Am. No. 14, t. 26.—Willdenow, Spec. iv, 443; Berl. Baumz, 342.—Smith in Rees' Cycl. xxx, No. 54.—Persoon, Syn. ii, 569.—Poiret, Suppl. ii, 220.—Aiton, Hort. Kew. 2 ed. v, 291.—Pursh, Fl. Am. Sept. ii, 628.—Hayne, Deud. Fl. 156.—Sprengel, Syst. iii, 862.—Torrey, Compend. Fl. N. States, 357.—Beck. Bot. 328.—Eaton, Manual, 6 ed. 292.—Eaton & Wright, Bot. 384.—Wood, Cl. Book, 644; Bot. & Fl. 306.

- Q. falcata, var. triloba, Nuttall, Genera, ii, 214.—Elliott, Sk. ii, 604.—Darby, Bot. S. States, 511.—A. De Candolle, Prodr. xvi², 59.
- Q. falcata, var. pagodæfolia, Elliott, Sk. ii, 605.—Darby, Bot. S. States, 511.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 39.
- Q. discolor, var. triloba, Spach, Hist. Veg. xi, 163.
- Q. falcata, var. Ludoviciana, A. De Candolle, Prodr. xvis. 59.

SPANISH OAK. RED OAK.

Long island, New York, south to Hernando county, Florida, through the Gulf states to the valley of the Brazos river, Texas, and through Arkansas and southeastern Missouri to central Tennessee and Kentucky, southern Illinois and Indiana.

A large tree, 24 to 30 meters in height, with a trunk 0.90 to 1.80 meter in diameter; dry, gravelly uplands and barrens; in the north Atlantic states only near the coast; rare; most common and reaching its greatest development in the south Atlantic and Gulf states, where, in the middle districts, it is the most common forest tree.

Wood heavy, very hard and strong, not durable, coarse-grained, checking badly in drying; layers of annual growth strongly marked by several rows of large open ducts; medullary rays few, conspicuous; color, light red, the sap-wood lighter; specific gravity, 0.6928; ash, 0.25; somewhat used for cooperage, construction, etc., and very largely for fuel.

The bark rich in tannin.

278.—Quercus Catesbæi, Michaux,

Hist. Chênes Am. No. 17, t. 29, 30; Fl. Bor. Am. ii, 199,—Abbot, Insects Georgia, i, 27, t. 14.—Willdenow, Spec. iv, 446.—Smith in Rees Cycl. xxx, No. 62.—Persoon, Syn. 569.—Desfontaines, Hist. Arb. ii, 511.—Poiret, Suppl. ii, 221.—Michaux f. Hist. Arb. Am. ii, 101, t. 20; N. American Sylva, 3 ed. i. 71, t. 22.—Pursh, Fl. Am. Sept. ii, 630.—Nuttall, Genera, ii, 214.—Nouveau Duhamel, vii, 172.—Elliott, Sk. ii, 603.—Sprengel, Syst. iii, 866.—Torrey, Compend. Fl. N. States, 358.—Beck, Bot. 329.—Eaton, Manual, 6 ed. 293.—Loudon, Arboretum, iii, 1889, f. 1763, 1763.—Eaton & Wright, Bot. 384.—Spach, Hist. Veg. xi, 162.—Darby, Bot. S. States, 510.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 422.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 41.—Wood, Cl. Book, 644; Bot. & Fl. 306.—A. De Candolle, Prodr. xvi², 59.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 72.—Koch, Dendrologie, ii², 67.—Young, Bot. Texas, 503.—Vasey, Cat. Forest Trees, 26.

? Q. lævis, Walter, Fl. Caroliniana, 234.

TURKEY OAK. SCRUB OAK. FORKED-LEAF BLACK JACK. BLACK JACK.

North Carolina, south near the coast to cape Malabar and Pease creek, Florida, and along the coast of Alabama and Mississippi.

A small tree, 7 to 15 meters in height, with a trunk 0.45 to 0.60 meter in diameter; very common in the south Atlantic and east Gulf states upon barren sandy hills and ridges of the maritime pine belt; rare in Mississippi.

Wood heavy, hard, strong, close-grained, compact; layers of annual growth marked by several rows of large open ducts and containing many much smaller ducts arranged in short lines parallel to the broad, conspicuous medullary rays; color, light brown tinged with red, the sap-wood somewhat lighter; specific gravity, 0.7294; ash, 0.87; largely used for fuel.

279.—Quercus palustris, Du Roi,

Harbk. ii, 268, t. 5, f. 4.—Wangenheim, Amer. 76, t. 5, f. 10.—Michaux, Hist. Chènes Am. No. 19, t. 33, 34; Fl. Bor.-Am. ii, 200.— Willdenow, Spec. iv, 446; Enum. 976; Berl. Baumz. 343.—Persoon, Syn. ii, 569.—Desfontaines, Hist. Arb. ii, 511.—Poiret, Suppl. ii, 222.—Michaux f. Hist. Arb. Am. ii, 123, t. 25; N. American Sylva, i, 83, t. 27.—Aiton, Hort. Kew. 2 ed. v, 292.—Smith in Rees' Cycl. xxx, No. 6.—Pursh, Fl. Am. Sept. ii, 631.—Barton, Prodr. Fl. Philadelph. 91; Compend. Fl. Philadelph. ii, 170.—Eaton, Manual, 108; 6 ed. 293.—Nuttall, Genera, ii, 214.—Nouveau Duhamel, vii, 172.—Hayne, Dend. Fl. 158.—Sprengel, Syst. iii, 863.—Torrey, Compend. Fl. N. States, 358; Fl. N. York, ii, 190, t. 107.—Beck, Bot, 329.—Loudon, Arboretum, iii, 1687, f. 1758-1761 & t.—Eaton & Wright, Bot. 384.—Spach, Hist. Veg. xi, 166.—Darlington, Fl. Cestrica, 3 ed. 269.—Cooper in Smithsonian Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 631.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 644; Bot. & Fl. 306.—A. De Candolle, Prodr. xvi², 60.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 23, 72, f. 4.—Gray, Manual N. States, 5 ed. 454.—Liebmann, Chênes Am. Trop. t. A.—Koch, Dendrologie, ii², 71.—Emerson, Trees Massachusetts, 2 ed. i, 167 & t.—Vasey, Cat. Forest Trees, 27.—W. E. Stone in Bull. Torrey Bot. Club, ix, 57.—Ridgway in Proc. U. S. Nat. Mus. 1882, 83.—Burgess in Coulter's Bot. Gazette, vii, 95.—Chapman, Fl. S. States, Suppl. 649.

- Q. rubra, var. dissecta, Lamarck, Diet. i, 120.
- Q. rubra ramosissima, Marshall, Arbustum, 122.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, 398.

PIN OAK. SWAMP SPANISH OAK. WATER OAK.

Valley of the Connecticut river, Massachusetts (Amherst, Stone), to central New York, south to Delaware and the District of Columbia; southern Wisconsin to eastern Kansas, southern Arkansas, and southeastern Tennessee.

A tree 24 to 30 or, exceptionally, 36 meters (*Ridgway*) in height, with a trunk 0.90 to 1.50 meter in diameter; low, rich soil, generally along the borders of streams and swamps; most common and reaching its greatest development west of the Alleghany mountains.

Wood heavy, hard, very strong, coarse-grained, inclined to check badly in drying; layers of annual growth marked by several rows of large open ducts; medullary rays broad, numerous, conspicuous; color, light brown, the sap-wood rather darker; specific gravity, 0.6938; ash, 0.81; somewhat used for shingles, clapboards, construction, and in cooperage.

280 .- Quercus aquatica, Walter,

- Fl. Caroliniana, 234.—Aiton, Hort. Kew. iii, 357; 2 ed. v, 290.—Abbot, Insects Georgia, ii, t. 59, 79.—Michaux, Hist. Chènes Am. No. 11, t. 19, 20, 21; Fl. Bor.-Am. ii, 198.—Muhlenberg & Willdenow in Neue Schriften Gesell. Nat. Fr. Berlin, iii, 399.—Persoon, Syn. ii, 569.—Desfontaines, Hist. Arb. ii, 509.—Poiret, Suppl. ii, 220.—Michaux f. Hist. Arb. Am. ii, 89, t. 17; N. American Sylva, 3 ed. i, 65, t. 19.—Smith in Rees' Cycl. xxx, No. 52.—Pursh, Fl. Am. Sept. ii, 628.—Barton, Compend. Fl. Philadelph. ii, 168.—Nouveau Duhamel, vii, 167.—Elliott, Sk. ii, 599.—Sprengel, Syst. iii, 862.—Torrey, Compend. Fl. N. States, 357.—Audubon, Birds, t. 24.—Beck, Bot. 328.—Eaton, Manual, 6 ed. 292.—Loudon, Arboretum, iii, 1892. f. 1767.—Eaton & Wright, Bot. 384.—Spach, Hist. Veg. xi, 161.—Darby, Bot. S. States, 510.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 421.—Curtis in Rep. Geological Surv. N. Carolina, 37.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 643; Bot. & Fl. 305.—A. De Candolle, Prodr. xvi², 67.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt, Nos. 1-6, 1866, 72.—Gray, Manual N. States, 5 ed. 452; Hall's Pl. Texas, 21.—Liebmann, Chênes Am. Trop. t. D.—Young, Bot. Texas, 503.—Vasey, Cat. Forest Trees, 26.
 - Q. nigra aquatica, Lamarck, Diet. i, 721.
 - Q. nigra trifida, Marshall, Arbustum, 121.
 - ? Q. uliginosa, Wangenheim, Amer. 80, t. 6, f. 18.
 - Q. hemisphærica, Willdenow, Spec. iv, 443.—Poiret, Suppl. ii, 628.—Pursh, Fl. Am. Sept. ii, 628.—Smith in Rees' Cycl. xxx, No. 56, 628.—Nuttall, Genera, ii, 214.—Eaton, Manual, 6 ed. 295.—Eaton & Wright, Bot. 385.—Michaux f. N. American Sylva, 3 ed. 187.
 - Q. nana, Willdenow, Spec. 448.—Elliott, Sk. ii, 599.
 - Q. aquatica, vars. cuneata, elongata, indivisa, attenuata, Aiton, Hort. Kew. 2 ed. v, 290.
 - Q. hemisphærica, var. nana, Nuttall, Genera, ii, 214.
 - Q. aquatica, var. hybrida, Chapman, Fl. S. States, 421.
 - Q. nigra, Koch, Dendrologie, ii2, 61, in part.

WATER OAK. DUCK OAK. POSSUM OAK. PUNK OAK.

Sussex county, Delaware, south through the coast and middle districts to cape Malabar and Tampa bay, Florida, through the Gulf states to the valley of the Colorado river, Texas, and through Arkansas to the valley of the Black river, southeastern Missouri (Poplar Bluffs, Letterman), middle Kentucky and Tennessee.

A tree 15 to 24 meters in height, with a trunk 0.60 to 1.20 meter in diameter; generally along streams and bottoms in heavy, undrained soil, or, more rarely, upon uplands; very common and reaching its greatest development along the large streams in the maritime pine belt of the eastern Gulf states.

Wood heavy, hard, strong, coarse-grained, compact; layers of annual growth marked by several rows of large open ducts; medullary rays thin, conspicuous; color, rather light brown, the sap-wood lighter; specific gravity, 0.7244; ash, 0.51; probably not used except as fuel.

281.—Quercus laurifolia, Michaux,

- Hist. Chènes Am. No. 10, t. 17; Fl. Bor.-Am. ii, 197.—Willdenow, Spec. iv, 427.—Persoon, Syn. ii, 567.—Smith in Rees' Cycl. xxx, No. 14.—Aiton, Hort. Kew. 2 ed. v, 288.—Pursh, Fl. Am. Sept. ii, 627.—Nuttall, Genera, ii, 214.—Nouveau Duhamel, vii, 153.—Elliott, Sk. ii, 597.—Sprengel, Syst. iii, 857.—Eaton, Manual, 6 ed. 294.—Loudon, Arboretum, iii, 1897, f. 1775, 1776.—Eaton & Wrighf, Bot. 385.—Darby, Bot. S. States, 510.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 36.—Liebmann, Chènes Am. Trop. t. D.—Wood, Cl. Book, 643.—Vasey, Cat. Forest Trees, 26.—Engelmann in Trans. St. Louis Acad. iii, 385, 395.
 - Q. laurifolia hybrida, Michaux, Hist. Chênes Am. No. 10, t. 18.
 - Q. laurifolia, var. obtusa, Willdenow, Spec. iv, 428.—Aiton, Hort. Kew. 2 ed. v, 288.—Wood, Cl. Book, 343.
 - Q. laurifolia, var. acuta, Willdenow, Spec. iv, 428,-Aiton, Hort. Kew. 2 ed. v, 288.
 - Q. obtusa, Pursh, Fl. Am. Sept. ii, 627.
 - Q. Phellos, var. laurifolia, Chapman, Fl. S. States, 420.—Wood, Bot. & Fl. 305.—Young, Bot. Texas, 502.
 - Q. aquatica, var. laurifolia, A. De Candolle, Prodr. xvi2, 68.

LAUREL OAK.

North Carolina, south near the coast to Mosquito inlet and cape Romano, Florida, and along the Gulf coast to the shores of Mobile bay.

A large tree, 18 to 24 meters in height, with a trunk 0.90 to 1.20 meter in diameter; most common and reaching its greatest development on the rich hummocks of the Florida coast.

Wood heavy, very strong and hard, coarse-grained, inclined to check in drying; layers of annual growth marked by several rows of rather small open ducts; medullary rays broad, conspicuous; color, dark brown tinged with red, the sap-wood lighter; specific gravity, 0.7673; ash 0.82.

282.—Quercus heterophylla, Michaux f.

Hist. Arb. Am. ii, 87, t. 16; N. American Sylva, 3 ed. i, 64, t. 18.—Pursh, Fl. Am. Sept. ii, 627.—Barton, Compend. Fl. Philadelph. ii, 167.—Nuttall, Genera, ii, 214; Sylva, i, 15; 2 ed. i, 24.—Green in Universal Herbal, ii, 442.—Torrey, Compend. Fl. N. States, 357.—Sweet, Cat. 2 ed. 466.—Beck, Bot. 328.—Eaton, Manual, 6 ed. 292.—Loudon, Arboretum, iii, 1894.—Eaton & Wright, Bot. 383.—Gale in Proc. Nat. 1nst. 1855, 70, f. 1.—Wood, Cl. Book, 645.—Buckley in Proc. Philadelphia Acad. 1862, 361; 1862, 100.—Gray, Hall's Pl. Texas, 21.—Liebmann, Chênes Am. Trop. t. B.—Meehan in Proc. Philadelphia Acad. 1875, 437, 465; Coulter's Bot. Gazette, vii, 10.—Leidy in Proc. Philadelphia Acad. 1875, 415.—Engelmann in Trans. St. Louis Acad. iii, 385, 391.—Martindale, Notes on the Bartram Oak, 3; Coulter's Bot. Gazette, vi, 303.—Ward in Bull. U. S. Nat. Mus. No. 22, 114.

- Q. aquatica, var. heterophylla, Aiton, Hort. Kew. 2 ed. v, 290.—A. De Candolle, Prodr. xvi2, 68.
- Q. nigra, var. Cooper in Smithsonian Rep. 1858, 255.
- Q. Phellos x tinctoria, Gray, Manual N. States, 4 ed. 406.
- Q. Phellos, var. Gray, Manual N. States, 5 ed. 453.
- Q. Phellos × coccinea, Engelmann in Trans. St. Louis Acad. iii, 541.

BARTRAM'S OAK.

New Jersey, Salem and Cumberland counties, "restricted to a line or belt bordering extreme tidal points of streams entering the Delaware river where the alluvial terminates and the upland commences," (Commons); Delaware, near Townsend station and Wilmington; North Carolina (M. A. Curtis in herb. Canby); eastern Texas (E. Hall); this perhaps Q. Durandii.

A small tree, 12 to 15 meters in height, with a trunk 0.45 to 0.60 meter in diameter; rare and very local.

Wood heavy, hard, very strong, close-grained, compact; layers of annual growth marked by several rows of small open ducts; medullary rays numerous, conspicuous; color, light brown tinged with red, the sap-wood somewhat darker; specific gravity, 0.6834; ash, 0.17.

283.—Quercus cinerea, Michaux,

Hist. Chènes Am. No. 8, t. 14; Fl. Bor.-Am. ii, 197.—Willdenow, Spec. iv, 425.—Persoon, Syn. ii, 567.—Poiret, Suppl. ii, 212.—Michaux f. Hist. Arb. Am. ii, 82, t. 14; N. American Sylva, 3 ed. i, 61, t. 16.—Aiton, Hort. Kew, 2 ed. v, 288.—Pursh, Fl. Am. Sept. ii, 626.—Smith in Rees' Cycl. xxx, No. 6.—Nuttall. Genera, ii, 214.—Nouveau Duhamel, vii, 151.—Elliott, Sk. ii, 594.—Sprengel, Syst. iii, 857.—Eaton, Manual, 6 ed. 294.—Eaton & Wright, Bot. 6 ed. 294.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v, 262.—Scheele in Ræmer, Texas, 446.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 421.—Curtis in Rep. Geological Surv. N. Carolina, 37.—Wood, Cl. Book, 643; Bot. & Fl. 305.—A. De Candolle, Prodr. xvi², 73.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 73.—Gray, Manual N. States, 5 ed. 452; Hall's Pl. Texas, 21.—Young, Bot. Texas, 502.—Koch, Dendrologie, ii², 58.—Vasey, Cat. Forest Trees, 26.—Engelmann in Trans. St. Louis Acad. iii, 385, 395.

- Q. Prinus, β. Linnæus, Spec. 1 ed. 995.
- Q. humilis, Walter, Fl. Caroliniana, 234.
- Q. Phellos, var. cinerea, Aiton, Hort. Kew. iii, 354.—Loudon, Arboretum, iii, 1895, f. 1773.—Spach, Hist. Veg. xi, 161.

UPLAND WILLOW OAK. BLUE JACK, SAND JACK.

North Carolina, south near the coast to cape Malabar and Pease creek, Florida, west along the Gulf coast to the valley of the Brazos river, Texas, extending north through eastern Texas to about latitude 33°.

A tree 9 to 15 meters in height, with a trunk rarely exceeding 0.20 meter in diameter; sandy barrens and dry upland ridges.

Wood heavy, hard, strong, close grained, compact; layers of annual growth marked by several rows of not large open ducts; medullary rays distant, thin, conspicuous; color, light brown tinged with red, the sap-wood darker; specific gravity, 0.6420; ash, 1.21.

284.—Quercus hypoleuca, Engelmann,

Trans. St. Louis Acad. iii, 384; Wheeler's Rep. vi, 251.—Vasey, Cat. Forest Trees, 26.—Rusby in Bull. Torrey Bot. Club, ix, 78.

Q. confertifolia, Torrey, Bot. Mex. Boundary Survey, 207 [not HBK.].—Cooper in Smithsonian Rep. 1858, 261.

Limpia mountains, Texas (Havard), valleys of the high mountain ranges of southwestern New Mexico, Santa Rita mountains, Arizona, above 6,000 feet elevation; southward into Sonora.

A small evergreen tree of great beauty, 9 to 15 meters in height, with a trunk sometimes 0.75 meter in diameter; dry, gravelly slopes and summits, the large specimens hollow and defective.

Wood heavy, very strong and hard, close grained, compact; layers of annual growth marked by few small open ducts; meduliary rays broad, conspicuous; color, dark brown, the sap-wood much lighter; specific gravity, 0.8009; ash, 1.34.

285.—Quercus imbricaria, Michaux,

Hist. Chênes Am. No. 9, t. 15, 16; Fl. Bor.-Am. ii, 197.—Willdenow, Spec. iv, 428; Enum. Suppl. 64; Berl. Baumz. 338.—Persoon, Syn. ii, 567.—Poiret, Suppl. ii, 214.—Michaux f. Hist. Arb. Am. ii, 78, t. 13; N. American Sylva, 3 ed. i, 60, t. 15.—Aiton, Hort. Kew. 2 ed. v, 288.—Smith in Rees' Cycl. xxx, No. 15.—Pursh, Fl. Am. Sept. ii. 627.—Nuttall, Genera, ii, 214.—Barton, Compend. Fl. Philadelph. ii, 167.—Nouveau Duhamel, vii, 153.—Hayne, Dend. Fl. 155.—Elliott, Sk. ii, 598.—Sprengel, Syst. iii, 857.—Torrey, Compend. Fl. N. States, 357.—Beck, Bot. 328.—Eaton, Manual, 6 ed. 292.—Loudon, Arboretum, iii, 1898, f. 1777.—Eaton & Wright, Bot. 383.—Darby, Bot. S. States, 510.—Torrey & Gray in Pacific R. R. Rep. ii, 130.—Cooper in Smithsonian Rep. 1858, 255.—Brendel in Trans. Illinois Ag. Soc. iii, 623, t. 6.—Chapman, Fl. S. States, 420.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 36.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 643; Bot. & Fl. 305.—A. De Candolle, Prodr. xvi², 63.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1860, 73.—Gray, Manual N. States, 5 ed. 452.—Young, Bot. Texas, 502.—Liebmann, Chênes Am. Trop. t. D, t. xxii, f. 5.—Koch, Dendrologie, ii², 60.—Vasey, Cat. Forest Trees, 26.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Ridgway in Proc. U. S. Nat. Mus. 1882, 80.

Q. Phellos, var. imbricaria, Spach, Hist. Veg. xi, 160.

SHINGLE OAK, LAUREL OAK.

Allentown, Lehigh county, Pennsylvania (Porter), west through southern Michigan, southern Wisconsin, and southeastern Iowa to southeastern Nebraska and northeastern Kansas, south to northern Georgia and Alabama, middle Tennessee, and northern Arkansas.

A tree 24 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter; rich woodlands.

Wood heavy, hard, rather coarse-grained, checking badly in drying; layers of annual growth marked by many rows of large open ducts; medullary rays broad, conspicuous; color, light brown tinged with red, the sap-wood much lighter; specific gravity, 0.7529; ash, 0.43; occasionally used for clapboards, shingles, etc.

286.—Quercus Phellos, Linnæus,

Spec. 1 ed. 994.—Lamarck, Dict. i, 722.—Wangenheim, Amer. 76, t. 5, f. 11.—Walter, Fl. Caroliniana, 234.—Aiton, Hort. Kew, iii, 354; 2 ed. v, 287.—Abbot, Insects Georgia, ii, t. 52, 91.—Michaux, Fl. Bor.-Am. ii, 197.—Willdenow, Spec. iv, 423; Enum. 974; Berl. Baumz. 337.—Smith in Rees' Cycl. xxx, No. 7.—Persoon, Syn. ii, 567.—Desfontaines, Hist. Arb. ii, 507.—Michaux f. Hist. Arb. Am. ii, 75, t. 12; N. American Sylva, 3 ed. i, 58, t. 14.—Pursh, Fl. Am. Sept. ii, 625.—Barton, Prodr. Fl. Philadelph. 91; Compend. Fl. Philadelph. ii, 167.—Nuttall, Genera, ii, 214; Sylva, i, 15; 2 ed. i, 17.—Nouveau Duhamel, vii, 150.—Hayne, Dend. Fl. 155.—Elliott, Sk. ii, 593.—Sprengel, Syst. iii, 857.—Torrey, Compend. Fl. N. States, 357; Fl. N. York, ii, 187.—Beck, Bot. 328.—Eaton, Manual, 6 ed. 383.—Loudon, Arboretum, iii, 1894, f. 1774 & t.—Eaton & Wright, Bot. 383.—Spach, Hist. Veg. xi, 160.—Penn. Cycl. xix, 216.—Darby, Bot. S. States, 509.—Cooper in Smithsonian Rep. 1858, 255.—Chapman, Fl. S. States, 420.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 36.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 643; Bot. & Fl. 305.—A. De Candolle, Prodr. xvi², 63.—Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 73.—Gray, Manual N. States, 5 ed. 452; Hall's Pl. Texas, 21.—Young, Bot. Texas, 502.—Koch, Dendrologie, ii², 59.—Vasey, Cat. Forest Trees, 26.—Gartenflora, xxix, 221 & f.—Ridgway in Proc. U. S. Nat. Mus. 83.

- Q. Phellos angustifolia, Marshall, Arbustum, 124.
- Q. Phellos latifolia, Marshall, Arbustum, 124.—Loddiges, Cat. ed. 1836.—Loudon, Arboretum, iii, 1895 & t.
- Q. Phellos, var. viridis, Aiton, Hort. Kew. iii, 354.
- Q. Phellos, var. humilis, Pursh, Fl. Am. Sept. ii, 625.

WILLOW OAK. PEACH OAK.

Tottenville, Staten island, New York, south near the coast to northeastern Florida, through the Gulf states to the valley of the Sabine river, Texas, and through Arkansas to southeastern Missouri, Tennessee, and southern Kentucky.

A tree 18 to 24 meters in height, with a trunk sometimes 0.90 meter in diameter; bottom lands or rich sandy uplands.

Wood heavy, strong, not hard, rather close-grained, compact; layers of annual growth marked by several rows of small open ducts; medullary rays few, distant; color, light brown tinged with red, the sap-wood lighter red; specific gravity 0.7472; ash, 0.50; somewhat used for fellies of wheels, clapboards, in construction, etc.

287.-Quercus densiflora, Hooker & Arnott,

Bot. Beechey, 391.—Hooker, Icon. iv, t. 380.—Bentham, Pl. Hartweg. 337.—Nuttall, Sylva, i, 11, t. 5; 2 ed. i, 21, t. 5.—Torrey in Pacific R. R. Rep. iv, 138.—Bot. Wilkes Exped. 458.—Newberry in Pacific R. R. Rep. vi, 31, 89, f. 8.—A. De Candolle, Prodr. xvi², 82.—Bolander in Proc. California Acad. iii, 231.—Vasey, Cat. Forest Trees, 25.—Engelmann in Trans. St. Lonis Acad. iii, 380; Bot. California, ii, 99.

Q. echinacea, Torrey in Pacific R. R. Rep. iv, 137, t. 14.

Pasania densiflora, Örsted in Saerskitt. Aftryk. af. Nat. For. Viden. Meddelt. Nos. 1-6, 1866, 73.

Q. echinoides, R. Brown Campst. in Ann. & Mag. Nat. Hist. April, 1871, 2.

TANBARK OAK. CHESTNUT OAK. PEACH OAK.

Valley of the Umpqua river, Oregon, south through the Coast ranges to the Santa Lucia mountains, California. A tree 18 to 24 meters in height, with a trunk 0.60 to 0.90 meter in diameter; rich valleys and banks of streams; most common and reaching its greatest development in the redwood forests of the California coast.

Wood heavy, hard, strong, very close-grained, compact, containing broad bands of small open ducts parallel to the thin, dark, conspicuous medullary rays; color, bright reddish-brown, the thick sap-wood darker brown; specific gravity, 0.6827; ash, 1.49; largely used as fuel.

The bark, rich in tannin, very largely used and preferred to that of any other tree of the Pacific forests for tanning.

Note.—The following shrubby species of Quercus do not properly find a place in this catalogue:

Quercus undulata, Torrey in Ann. Lyc. N. York, ii, 248, t. 4. Interior Pacific region from Colorado southward.

Quercus Breweri, Engelmann in Bot. California, ii, 96.

Q. lobata, var. fruticosa, Engelmann in Trans. St. Louis Acad. iii, 888.
Western slopes of the high Sierra Nevadas, California.

Querous Georgiana, M. A. Curtis in Chapman's Fl. S. States. Stone Mountain, Georgia.

Quercus myrtifolia, Willdenow, Sp. iv, 424.

Q. Phellos, var. arenaria, Chapman, Fl. S. States, 420.

Q. aquatica, var. myrtifolia, A. De Candolle, Prodr. xvi, 68.

South Atlantic and Gulf coast.

Querous ilicifolia, Wangenheim, Amer. 79, t. 6, f. 17.

Q. Banisleri, Michaux, Hist. Chênes Am. t. 27.

North Atlantic region.

Quercus pumila, Walter, Fl. Caroliana, 234.

- Q. Phellos pumila, Michaux, Hist. Chênes Am. t. 15, f. 1.
- Q. cinerca, var. pumila, Chapman, Fl. S. States, 421.—A. De Candolle, Prodr. 16, 74.
- Q. cinerea, var. sericea, Engelmann in Trans. St. Louis Acad. iii, 384.
- Q. sericea, Willdenow, Spec. 424.
- Q. Phellos, var. sericea, Aiton, Hort. Kew. iii, 354.

Pine barrens, South Carolina.

Quercus dumosa, Nuttall, Sylva, i, 7.

- Q. berberidifolia, Liebmann in Dansk. Vidensk. Selsk. Forhandl. 1854, 172, in part.
- Q. dumosa, var. bullata, Engelmann in Bot. California, 296.
- Q. acutidens, Torrey, Bot. Mex. Boundary Survey, 207, t. 51.

Coast ranges of southern California.

Numerous hybrid or supposed hybrid oaks, variously described by American botanists, are not properly considered here.

288.—Castanopsis chrysophylla, A. De Candolle;

Seemann's Jour. Bot. i, 182; Prodr. xvi², 109.—Watson in King's Rep. v, 322; Bot. California, ii, 100.—Gray in Proc. Am. Acad. vii, 401.—Torrey, Bot. Wilkes Exped. 463.—Vasey, Cat. Forest Trees, 27.—Hall in Coulter's Bot. Gazette, ii, 91.

Castanea chrysophylla, Douglas in Hooker's London Jour. Bot. ii, 496, t. 16.—Bentham, Pl. Hartweg. 337.—Hooker, Fl. Bor.-Am. ii, 159.—Nuttall, Sylva, i, 21; 2 ed. i, 37.—Bot. Mag. t. 4953.—Torrey in Pacific R. R. Rep. iv, 137; Bot. Mex. Boundary Survey, 205.—Morren in Belg. Hort. vii, 248, t. 240.—Newberry in Pacific R. R. Rep. vi, 26, 89, f. 4.—Fl. des Serres, xii, 3, t. 1184.—Cooper in Smithsonian Rep. 1858, 261.—Kellogg in Proc. California Acad. ii, 280.—Bolander in Proc. California Acad. iii, 231.—Engelmann in Wheeler's Rep. vi, 375.—Shingles in London Gard. Chronicle, 1882, 716.

Castanea chrysophylla, var. minor, Bentham, Pl. Hartweg. 337-

Castanea sempervirens, Kellogg in Proc. California Acad. i, 71.

C. chrysophylla, var. minor, A. De Candolle, Prodr. xvi2, 110.

C. chrysophylla, var. pumila, Vasey, Cat. Forest Trees, 27.

CHINQUAPIN.

Cascade mountains, Oregon, below 4,000 feet elevation, south along the western slopes of the Sierra Nevadas, and through the California Coast ranges to the San Bernardino and San Jacinto mountains.

A tree 15 to 24 meters in height, with a trunk 0.30 to 0.90 meter in diameter, or at high elevations and toward its southern limits reduced to a low shrub; most common and reaching its greatest development in the Coast Range valleys of northern California; at its southern limits rarely below 10,000 feet elevation.

Wood light, soft, not strong, close-grained, compact; layers of annual growth marked by a single row of rather large open ducts; medullary rays numerous, obscure; color, light brown tinged with red, the sap-wood lighter; specific gravity, 0.5574; ash, 0.35; in southern Oregon occasionally used in the manufacture of plows and other agricultural implements.

289.—Castanea pumila, Miller,

Dict. No. 2.—Lamarck, Dict. i, 708.—Michaux, Fl. Bor.-Am. ii, 193.—Willdenow, Spec. iv, 461; Enum. 980; Berl. Baumz. 78.—Smith in Rees' Cycl. xiv, No. 2.—Nouveau Duhamel, iii, 79.—Persoon, Syn. ii, 572.—Desfontaines, Hist. Arb. ii, 500.—Michaux f. Hist. Arb. Am. ii, 166, t. 7; N. American Sylva, 3 ed. iii, 16, t. 105.—Aiton, Hort. Kew. 2 ed. v, 298.—Pursh, Fl. Am. Sept. ii, 624.—Rafinesque, Fl. Ludoviciana, 159; New Fl. & Bot. i, 83.—Nuttall, Genera, ii, 217; Am. Phil. Soc. 2 ser. v, 168.—Hayne, Dend. Fl. 165.—James in Long's Exped. ii, 287.—Elliott, Sk. ii, 615.—Torrey, Compend. Fl. N. States, 355; Fl. N. York, ii, 196.—Audubon, Birds, t. 85.—Beck, Bot. 332.—Eaton, Manual, 6 ed. 84.—Penn. Cycl. vi, 350.—Loudon, Arboretum, iii, 2002, f. 1927, 1928.—Eaton & Wright, Bot. 184.—Spach, Hist. Veg. xi, 192.—Darlington, Fl. Cestrica, 3 ed. 270.—Darby, Bot. S. States, 512.—Cooper in Smithsonian Rep. 1858, 256.—Chapman, Fl. S. States, 424.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 47.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 646; Bot. & Fl. 307.—Porcher, Resources S. Forests, 237.—A. De Candolle, Prodr. xvi², 115.—Gray, Manual N. States, 5 ed. 455.—Young, Bot. Texas, 508.—Koch, Dendrologie, ii², 24.—Vasey, Cat. Forest Trees, 27.—Butler in Coulter's Bot. Gazette, iii, 17.

Fagus pumila, Linnæus, Spec. 1 ed. 998.—Du Roi, Harbk. i, 175.—Wangenheim, Amer. 57, t. 19, f. 44.—Walter, Fl. Caroliniana, 233.—Aiton, Hort. Kew. iii, 361.—Abbot, Insects Georgia, ii, t. 57.

Fagus Castanea pumila, Marshall, Arbustum, 47.

Fagus pumila, var. præcox, Walter, Fl. Caroliniana, 233.

C. nana, Muhlenberg, Cat. 86.—Elliott, Sk. ii, 615.—Rafinesque, New Fl. & Bot. i, 83.—Darby, Bot. S. States, 512.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 47.—Lesquereux in Owen's 2d Rep. Arkansas, 388.

C. alnifolia, Nuttall, Genera, ii, 217; Sylva, i, 19, t. 6; 2 ed. i, 36, t. 6.

C. vesca, Lesquereux in Owen's 2d Rep. Arkansas, 388 [not Gærtner].

CHINQUAPIN.

Lancaster county, Pennsylvania, and the valley of the lower Wabash river, Indiana, south and southwest to northern Florida and the valley of the Neches river, Texas.

A tree sometimes 15 meters in height, with a trunk 0.30 to 1.05 meter in diameter, or often, especially in the Atlantic states, reduced to a low shrub; rich hillsides and borders of swamps; most common and reaching its greatest development in southern Arkansas.

Wood light, hard, strong, coarse-grained, durable in contact with the ground, liable to check in drying; layers of annual growth marked by many rows of large open ducts; medullary rays numerous, obscure; color, dark brown, the sap-wood hardly distinguishable; specific gravity, 0.5887; ash, 0.12; used for posts, rails, railway ties, etc.

The small nuts sweet and edible.

290.—Castanea vulgaris, var. Americana, A. De Candolle,

Prodr. xvi², 114.—Schneck in Coulter's Bot. Gazette, vi, 159.—Bell in Geological Rep. Canada, 1879–180, 53°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 84.

Fagus Castanea dentata, Marshall, Arbustum, 46.

- Fagus Castanea, Wangenheim, Amer. 47 [not Linnæus].—Walter, Fl. Caroliniana, 233.—Aiton, Hort. Kew. iii, 361, in part.—Lamarck, Ill. iii, 366, t. 782, in part.
- C. resca, Var. Americana, Michaux, Fl. Bor.-Anc. ii, 193.—Persoon, Syn. ii, 572.—Barton, Prodr. Fl. Philadelph. 90.—Pursh, Fl. Am. Sept. ii, 624.—Eaton, Manual, 109; 6 ed. 84.—Nuttall, Genera, ii, 217.—Elliott, Sk. ii, 614.—Torrey, Compend. Fl. N. States, 355; Fl. N. York, ii, 195, t. 111.—London, Arboretum, iii, 1984.—Eaton & Wright, Bot. 184.—Emerson, Trees Massachusetts, 164, 2 ed. i, 187 & t.—Porcher, Resources S. Forests, 238. Vasey, Cat. Forest Trees, 27.—Rudkin in Bull. Torrey Bot. Club, vii, 81.
- O. Americana, Rafinesque, New Fl. & Bot. i, 82.—Willdenow, Enum. Suppl. 64.—Nuttall, Sylva, i, 24; 2 ed. i, 38.—Spach, Hist. Veg. xi, 191.—Cooper in Smithsonian Rep. 1858, 256.—Koch, Dendrologie, ii², 23.—Martindale in Proc. Philadelphia Acad. 1880, 2.
- C. vesca, Willdenow, Spec. iv, 460, in part.—Desfontaines, Hist. Arb. ii, 500, in part.—Michaux f. Hist. Arb. Am. ii, 151, t. 6; N. American Sylva, 3 ed. iii, 11, t. 104 [not Gærtner].—Hayne, Dend. Fl. 165, in part.—Sprengel, Syst. iii, 856, in part.—Beck, Bot. 332.—Penn. Cycl. vi, 350.—Bigelow, Fl. Boston. 3 ed. 224.—Darlington, Fl. Cestrica, 3 ed. 270.—Darby, Bot. S. States, 511.—Chapman, Fl. S. States, 424.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 46.—Wood, Cl. Book, 646; Bot. & Fl. 306.—Gray, Manual N. States, 5 ed. 455.

CHESTNUT.

Southern Maine to the valley of the Winooski river, Vermont, southern Ontario and southern Michigan, south through the northern states to Delaware and southern Indiana, and along the Alleghany mountains to northern Alabama, extending west to middle Kentucky and Tennessee.

A large tree, 24 to 30 meters in height, with a trunk 1.80 to 4 meters in diameter; rich woods and hillsides; very common and reaching its greatest development on the western slopes of the southern Alleghany mountains.

Wood light, soft, not strong, coarse-grained, liable to check and warp in drying, easily split, very durable in contact with the soil; layers of annual growth marked by many rows of large open ducts; medullary rays numerous, obscure; color, brown, the sap-wood lighter; specific gravity, 0.4504; ash, 0.18; largely used in cabinet-making, for railway ties, posts, fencing, etc.

The fruit, although smaller, superior in sweetness and flavor to that of the European chestnut.

An infusion or fluid extract of the dried leaves is successfully employed in the treatment of whooping-cough and other pectoral affections (U. S. Dispensatory, 14 ed. 245.—Nat. Dispensatory, 2 ed. 364).

291.-Fagus ferruginea, Aiton,

Hort. Kew, iii, 362; 2 ed. v, 298.—Abbot, Insects Georgia, ii, t. 75.—Willdenow, Spec. iv, 460; Enum. 980; Berl. Baumz, 140.—Persoon, Syn, ii, 571.—Desfontaines, Hist. Arb. ii, 496.—Michaux f. Hist. Arb. Am. ii, 174, t. 9; N. American Sylva, 3 ed. iii, 21, t. 106.—Smith in Rees' Cycl. xiv, No. 4.—Pursh, Fl. Am. Sept. ii, 624.—Barton, Prodr. Fl. Philadelph. 90; Compend. Fl. Philadelph. ii, 174.—Eaton, Manual, 108; 6 ed. 145.—Sprengel, Syst. iii, 856.—Torrey, Compend. Fl. N. States, 354; Fl. N. York, ii, 194, t. 110.—Beck. Bot. 333.—Eaton, Manual, 6 ed. 145.—Loudon, Arboretum, iii, 1980, f. 1917.—Hooker, Fl. Bor.-Am. ii, 159.—Eaton & Wright, Bot. 244.—Bigelow, Fl. Boston. 3 ed. 374.—Darlington, Fl. Cestrica, 3 ed. 271.—Cooper in Smithsonian Rep. 1858, 256.—Chapman, Fl. S. States, 425.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 47.—Wood, Bot. & Fl. 307.—A. D. Candolle, Prodr. xvi², 118.—Gray, Manual N. States, 5 ed. 455.—Koch, Dendrologie, ii², 19.—V asey, Cat. Forest Trees, 27.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Sears in Bull. Essex Inst. xiii, 179.—Bell in Geological Rep. Canada, 1879-'80, 52°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 85.

- F. sylvatica atropunicea, Marshall, Arbustum, 46.
- F. Americana latifolia, Wangenheim, Amer. 80, t. 29, f. 55.—Loudon, Arboretum, iii, 1980, f. 1916.
- F. sylvatica, Walter, Fl. Caroliniana, 233 [not Linnæus].—Pursh, Fl. Am. Sept. ii, 624.—Beck, Bot. 333.—Darlington, Fl. Cestrica, 2 ed. 538.—Darby, Bot. S. States, 512.
- F. sylvestris, Michaux, Fl. Bor. Am. ii, 194.—Michaux f. Hist. Arb. Am. ii, 170, t. 8; N. American Sylva, 3 ed. iii, 18, t. 107.—Hooker, Fl. Bor.-Am. ii, 159.—Lesquereux in Owen's 2d Rep. Arkansas, 388.
- F. alba, Rafinesque, Fl. Ludoviciana, 131.
- F. sylvatica, var. Americana, Nuttall, Genera, ii, 216.—Barton, Compend. Fl. Philadelph. ii, 174.—Elliott, Sk. ii, 613.—Eaton, Manual, 6 ed. 145.—Loudon, Arboretum, iii, 1953.—Eaton & Wright, Bot. 244.—Emerson, Trees Massachusetts, 153; 2 ed. i, 180 & t.—Wood, Cl. Book, 647.—Porcher, Resources S. Forests, 235.
- F. Americana, Sweet, Hort. Brit. Spach, Hist. Veg. xi, 201.
- F. ferruginea, var. Caroliniana, Loudon, Arboretum, iii, 1980, f. 1915.

BEECH.

Nova Scotia and the valley of the Restegouche river to the northern shores of lake Huron and northern Wisconsin, south to the Chattahoochee region of western Florida and the valley of the Trinity river, Texas, west to eastern Illinois, southeastern Missouri, and Madison county, Arkansas (Letterman).

A large tree, 24 to 30 or, exceptionally, 34 meters (*Ridgway*) in height, with a trunk 0.90 to 1.20 meter in diameter; rich woods, or at the south sometimes in bottom lands or the dryer portions of swamps, reaching its greatest development upon the "bluff" formations of the lower Mississippi basin; very common.

Wood very hard, strong, tough, very close grained, not durable in contact with the soil, inclined to check in drying, difficult to season, susceptible of a beautiful polish; medullary rays broad, very conspicuous; color, varying greatly with soil and situation, dark red, or often lighter, the sap-wood nearly white; specific gravity, 0.6883; ash, 0.51; largely used in the manufacture of chairs, shoe-lasts, plane-stocks, handles, etc., and for fuel.

292.—Ostrya Virginica, Willdenow,

Spec. iv, 469; Enum. 982; Berl, Baumz. 260.—Persoon, Syn. ii, 573.—Aiton, Hort, Kew. 2 ed. v, 302.—Pursh, Fl. Am. Sept. ii, 623.—Eaton, Manual, 109; 6 ed. 244.—Nuttall, Genera, ii, 219.—Hayne, Dend. Fl. 169.—Elliott, Sk. ii, 618.—Sprengel, Syst. iii, 856.—Torrey, Compend. Fl. N. States, 356; Nicollet's Rep. 160; Fl. N. York, ii, 185, t. 102.—Audubon, Birds, t. 40.—Loudon, Arboretum, iii, 2015, f. 1940.—Hooker, Fl. Bor.-Am. ii, 160.—Eaton & Wright, Bot. 336.—Bigelow, Fl. Boston, 3 ed. 383.—Spach in Ann. Sci. Nat. 2 ser. xvi, 246; Hist. Veg. xi, 218.—Emerson, Trees Massachusetts, 177; 2 ed. i, 201 & t.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 274.—Darby, Bot. S. States, 509.—Cooper in Smithsonian Rep. 256.—Chapman, Fl. S. States, 426.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 75.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 647; Bot. & Fl. 307.—Porcher, Resources S. Forests, 233.—A. De Candolle, Prodr. xvi², 125.—Gray, Manual N. States, 5 ed. 456.—Young, Bot. Texas, 510.—Vasey, Cat. Forest Trees, 27.—Sargent in Am. Nat. xi, 683.—Sears in Bull. Essex Inst. xiii, 179.—Ridgway in Proc. U. S. Nat. Mus. 85.

Carpinus Ostrya, Linnæus, Spec. 1 ed. 998, in part.—Du Roi, Harbk. i, 130.—Wangenheim, Amer. 48.—Marshall, Arbustum, 25.—Mænch, Meth. 694.—Abbot, Insects Georgia, ii, t. 76.—Nouveau Duhamel, ii, 200.—Michaux f. Hist. Arb. Am. iii, 53, t. 7; N. American Sylva, 3 ed. iii, 27, t. 109.

Carpinus Virginiana, Miller, Dict. 7 ed. No. 4.—Lamarck, Dict. i, 708; Wangenheim, Amer. 49.—Nouveau Duhamel, ii, 201.—Desfontaines, Hist. Arb. ii, 493.—Smith in Rees' Cycl. vii, No. 5.

Carpinus triflora, Monch, Meth. 394.

Carpinus Ostrya, var. Americana, Michaux, Fl. Bor.-Am. ii, 202.

- O. Virginica, var. glandulosa, Spach in Ann, Sci. Nat. 2 ser. xvi, 246; Hist. Veg. xi, 218.
- O. Virginica, var. eglandulosa, Spach. in Ann. Sci. Nat. 2 ser. xvi, 246; Hist. Veg. xi, 218.
- O. Virginiana, Koch, Dendrologie, ii2, 6.

HOP HORNBEAM. IRON WOOD. LEVER WOOD.

Bay of Chalcur, through the valleys of the Saint Lawrence and the lower Ottawa rivers, along the northern shore of lake Huron to northern Minnesota, south through the northern states and along the Alleghany mountains to the Chattahoochee region of western Florida, and through eastern Iowa, southeastern Missouri, and Arkansas to eastern Kansas, the Indian territory, and eastern Texas.

A small tree, 9 to 15 meters in height, with a trunk 0.30 to 0.60 meter in diameter; generally on dry, gravelly hillsides and knolls, reaching its greatest development in southern Arkansas; common.

Wood heavy, very strong and hard, tough, very close-grained, compact, susceptible of a beautiful polish, very durable in contact with the soil; medullary rays numerous, obscure; color, light brown tinged with red, or, like the sap-wood, often nearly white; specific gravity, 0.8284; ash, 0.50; used for posts, levers, handles of tools, etc.

293.-Carpinus Caroliniana, Walter,

- Fl. Caroliniana, 238.—A. De Candolle, Prodr. xvi², 126.—Koch, Dendrologie, ii², 4.—Sears in Bull. Essex Inst. xviii, 180.—Ridgway in Proc. U. S. Nat. Mus. 1882, 85.
 - C. Americana, Lamarck, Dict. iv, 708; Suppl. ii, 202.—Michaux, Fl. Bor.-Am. ii, 201.—Willdenow, Spec. iv, 468; Enum. Suppl. 64; Berl. Baumz. 75.—Persoon, Syn. ii, 573.—Michaux f. Hist. Arb. Am. iii, 57, t. 8; N. American Sylva, 3 ed. iii, 26, t. 108.—Pursh, Fl. Am. Sept. ii, 623.—Aiton, Hort. Kew. 2 ed. v, 301.—Eaton, Manual, 109; 6 ed. 82.—Barton, Prodr. Fl. Philadelph. 91; Compend. Fl. Philadelph. ii, 176.—Nuttall, Genera, iii, 218.—Hayne, Dend. Fl. 168.—Elliott, Sk. ii, 618.—Watson, Dend. Brit. ii, t. 157.—Sprengel, Syst. iii, 854.—Guimpel, Otto & Hayne, Abb. Holz. 107, t. 84.—Torrey, Compend. Fl. N. States, 356; Fl. N. York, ii, 185, t. 103.—Penn. Cycl. iv, 315.—London, Arboretum, iii, 2013, f. 1936.—Hooker, Fl. Bor.-Am. ii, 160.—Eaton & Wright, Bot. 182.—Bigelow, Fl. Boston. 3 ed. 383.—Spach in Ann. Sci. Nat. 2 ser. xvi, 252; Hist. Veg. xi, 224.—Emerson, Trees Massachusetts, 174; 2 ed. i, 198 & t.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 273.—Darby, Bot. S. States, 508.—Cooper in Smithsonian Rep. 1858, 256.—Chapman, Fl. S. States, 425.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 75.—Lesquereux in Owen's 2d Rep. Arkansas, 388.—Wood, Cl. Book, 648; Bot. & Fl. 307.—Gray, Manual N. States, 5 ed. 457; Hall's Pl. Texas, 21.—Young, Bot. Texas, 509.—Vasey, Cat. Forest Trees, 27.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Bell in Geological Rep. Canada, 1879-'80, 52°.
 - C. Betulus Virginiana, Marshall, Arbustum, 25.

HORNBEAM. BLUE BEECH. WATER BEECH. IRON WOOD.

Nova Scotia, southern New Brunswick, northern shores of Georgian bay, southern peninsula of Michigan to northern Minnesota (lake Pokegama, *Garrison*), south to cape Malabar and Tampa bay, Florida, and the valley of the Trinity river, Texas, west to central Iowa, eastern Kansas, and the valley of the Poteau river, Indian territory.

A small tree, 9 to 15 meters in height, with a trunk sometimes 0.60 to 0.90 meter in diameter, or at the north much smaller and often reduced to a low shrub; borders of streams and swamps, in moist soil; most common and reaching its greatest development along the western slopes of the southern Alleghany mountains and in southern Arkansas and eastern Texas.

Wood heavy, very strong and hard, close-grained, inclined to check in drying; medullary rays numerous, broad; color, light brown, the thick sap-wood nearly white; specific gravity, 0.7286; ash, 0.83; sometimes used for levers, handles of tools, etc.

BETULACEÆ.

294.—Betula alba, var. populifolia, Spach.

Ann. Sci. Nat. 2 ser. xv, 187; Hist. Veg. xi, 233.—Endlicher, Genera, Suppl. iv², 19.—Regel in Mem. Soc. Nat. Moscow, xix, 76, t. 4, f. 19-28; Gray, Manual N. States, 5 ed. 459.—Vasey, Cat. Forest Trees, 28.—Macoun in Geological Rep. Canada, 1879-280, 55°.

- B. lenta, Du Roi, Harbk. i, 92 [not Linnæus].-Wangenheim, Amer. 45, t. 29, f. 38.
- B. populifolia, Marshall, Arbustum, 19.—Aiton, Hort. Kew. iii, 336; 2 ed. v, 299.—Willdenow, Berl. Baumz. 1 ed. 37, t. 2, f. 5; Spec. iv, 463.—Persoon, Syn. ii, 572.—Desfontaines, Hist. Arb. ii, 476.—Nouveau Duhamel, iii, 204.—Poiret, Suppl. i, 687.—Michaux f. Hist. Arb. Am. ii, 139, t. 2; N. American Sylva, 3 ed. ii, 78, t. 71.—Pursh, Fl. Am. Sept. ii, 620.—Smith in Rees' Cycl. iv, No. 8.—Barton, Prodr. Fl. Philadelph. 92; Compend. Fl. Philadelph. ii, 175.—Eaton, Manual, 109; 6 ed. 53.—Nuttall, Genera, ii, 218; Sylva, i, 25; 2 ed. i, 42.—Hayne, Dend. Fl. 166.—Sprengel, Syst. iii, 854.—Watson, Dend. Brit. ii, 151.—Torrey, Compend. Fl. N. States, 355; Fl. N. York, ii, 199, t. 112.—Loudon, Arboretum, iii, 1707, f. 1560.—Hooker, Fl. Bor.-Am. ii, 155.—Eaton & Wright, Bot. 156.—Bigelow, Fl. Boston. 3 ed. 381.—Emerson, Trees Massachusetts, 213; 2 ed. i, 243 & t.—Gray, Manual N. States, 1 ed. 421.—Cooper in Smithsonian Rep. 1858, 256.—Wood, Cl. Book, 649; Bot. & Fl. 308.—Koch, Dendrologie, ii, 646.
- B. acuminata, Ehrhart, Beitr. vi, 98.-Moench, Meth. 693.
- B. alba, subspecies populifolia, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 399; De Candolle, Prodr. xvi2, 164.

WHITE BIRCH. OLD-FIELD BIRCH. GRAY BIRCH.

New Brunswick and the valley of the lower Saint Lawrence river to the southern shores of lake Ontario, south, generally near the coast, to New Castle county, Delaware.

A small, short-lived tree of rapid growth, 6 to 9 meters in height, with a trunk 0.30 to 0.45 meter in diameter; dry, gravelly, barren soil or borders of swamps, now generally springing up upon abandoned or burned land in eastern New England.

Wood light, soft, not strong, close-grained, liable to check in drying, not durable; medullary rays numerous, obscure; color, light brown, the sap wood nearly white; specific gravity, 0.5760; ash, 0.29; largely used in the manufacture of spools, shoe-pegs, wood pulp, etc., for hoop-poles and fuel.

The bark and leaves, as well as those of B. papyrifera and B. lenta, are popularly esteemed as a remedy for various chronic diseases of the skin, bladder, etc., and for rheumatic and gouty complaints; the empyreumatic oil of birch obtained from the inner bark by distillation is used externally and internally for the same purposes (U. S. Dispensatory, 14 ed. 1592.—Nat. Dispensatory, 2 ed. 287); the bark occasionally used domestically in the manufacture of ink.

295.—Betula papyrifera, Marshall,

Arbustum, 19.-Michaux, Fl. Bor.-Am. ii, 180.

B. papyracea, Aiton, Hort. Kew. iii, 337; 2 ed. v, 300.—Willdenow, Spec. iv, 464; Enum. 981; Berl. Baumz. 58, t. 2, f. 1.—
Nouvean Duhamel, iii, 205.—Persoon, Syn. ii, 572.—Desfontaines, Hist. Arb. ii, 477.—Poiret, Suppl. i, 688.—Michaux
f. Hist. Arb. Am. ii, 133, t. 1; N. American Sylva, 3 ed. ii, 70, t. 69.—Smith in Rees' Cycl. iv, No. 9.—Pursh, Fl. Am. Sept.
ii, 621.—B. S. Barton, Bet. Appx. 34, t. 27, f. 1.—Eaton, Manual, 109; 6 ed. 53.—Barton, Compend. Fl. Philadelph. ii,
175.—Nuttall, Genera, ii, 218; Sylva, i, 25; 2 ed. i, 42.—Hayne, Dend. Fl. 167.—Watson, Dend. Brit. ii, t. 152.—Sprengel,
Syst. iii, 854.—Torrey, Compend. Fl. N. States, 355; Fl. N. York, ii, 199.—Andubon, Birds, t. 88.—Loudon, Arboretum,
iii, 1708, f. 1561 & t.—Hooker, Fl. Bor.-Am. ii, 155.—Eaton & Wright, Bot. 156.—Bigelow, Fl. Boston. 3 ed. 381.—
Penn. Cycl. ii, 349.—Emerson, Trees Massachusetts, 210; 2 ed. i, 239 & t.—Parry in Owen's Rep. 618.—Richardson,
Arctic Exped. 437.—Cooper in Smithsonian Rep. 1858, 256.—Hooker f. in Trans. Linnæan Soc. xxiii², 300, 339.—Wood,
Cl. Book, 649; Bot. & Fl. 308.—Gray, Manual N. States, 5 ed. 459.—Koch, Dendrologie, ii, 645.—Vasey, Cat. Forest
Trees, 28.—Macoun in Geological Rep. Canada, 1875–76, 210.—Sears in Bull. Essex Inst. xiii, 180.—Bell in Geological
Rep. Canada, 1879–80, 45°.

- B. nigra, Loiseleur in Nouveau Duhamel, ii, t. 51 [not Linnæus].
- B. grandis, Schrader in Ind. Hort. Goett. 1833, 2.
- B. rubra, Loddiges, Cat. ed. 1836.
- B. Canadensis, Loddiges, Cat. ed. 1836.
- B. alba, var. papyrifera, Spach. in Ann. Sci. Nat. 2 ser. xv, 188; Hist. Veg. xi, 234.—Endlicher, Genera, Suppl. iv³, 19.—Regel in Mem. Soc. Nat. Moscow, xix, 81, t. 5, f. 5–16.
- B. cordifolia, Regel in Mem. Soc. Nat. Moscow, xix, 86, t. 12, f. 29-36.
- B. alba, subspecies papyrifera, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 401; De Candolle, Prodr. xvi2, 166.
- B. alba, subspecies papyrifera, var. cordifolia, Regel in Bull. Soc. Nat. Moscow, xxxviii⁴, 401; De Candolle, Prodr. xvi², 166.
- B. alba, subspecies papyrifera, var. communis, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 401; De Candolle, Prodr. xvio, 166.
- B. alba, subspecies commutata, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 401; De Candolle, Prodr. xvi2, 166.
- B. occidentalis, Lyall in Jour. Linnæan Soc. vii, 134 [not Hooker].
- B. alba, var. populifolia, Winchell in Ludlow's Rep. Black Hills, 67 [not Spach].

CANOE BIRCH. WHITE BIRCH. PAPER BIRCH.

Northern Newfoundland and Labrador to the southern shores of Hudson bay and northwest to the Great Bear lake and the valley of the Yukon river, Alaska, south, in the Atlantic region to Wading river, Long island, the mountains of northern Pennsylvania, Clear lake, Montcalm county, Michigan, northeastern Illinois and Saint Cloud, Minnesota; in the Pacific region south to the Black hills of Dakota (R. Douglas), the Mullen trail of the Bitter Root mountains and Flathead lake, Montana, the neighborhood of Fort Colville, Washington territory (Watson), and the valley of the lower Fraser river, British Columbia (Engelmann & Sargent).

A tree 18 to 24 meters in height, with a trunk 0.60 to 0.90 meter in diameter; rich woodlands and banks of streams; very common in the northern Atlantic region and reaching a higher latitude than any deciduous tree of the American forest.

Wood light, strong, hard, tough, very close-grained, compact; medullary rays numerous, obscure; color, brown tinged with red, the sap-wood nearly white; specific gravity, 0.5955; ash, 0.25; largely used in the manufacture of spools, shoe-lasts and pegs, in turnery, for fuel, wood-pulp, etc.

The very tough, durable bark easily separated into thin layers, impervious to water, is largely used in the manufacture of canoes, tents, etc.

296.—Betula occidentalis, Hooker,

- Fl. Bor.-Am. ii, 155.—Spach in Ann. Sci. Nat. 2 ser. xv, 197.—Nuttall, Sylva, i, 22, t. 7; 2 ed. i, 40, t. 7.—Endlicher, Genera, Suppl. iv³, 20.—Torrey in Fremont's Rep. 97; Bot. Wilkes Exped. 466.—Newberry in Pacific R. R. Rep. vi, 89.—Cooper in Smithsonian Rep. 1858, 261; Am. Nat. iii, 408.—Regel in Mem. Soc. Nat. Moscow, xix, 131, t. 15, f. 35.—Porter in Hayden's Rep. 1871, 493.—Watson in King's Rep. v, 323, t. 35; Pl. Wheeler, 17; Bot. California, ii, 79.—Porter & Hayden, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 127.—Rothrock in Pl. Wheeler, 50; Wheeler's Rep. vi, 239.—Vasey, Cat. Forest Trees, 28.—Macoun in Geological Rep. Canada, 1875–776, 210.—G. M. Dawson in Canadian Nat. new ser. ix, 331.
 - B. alba, subspecies occidentalis typica, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 400; De Candolle, Prodr. xvi2, 165.

BLACK BIRCH.

British Columbia, south to the Mount Shasta region (Strawberry vale) and the eastern cañons of the Sierra Nevadas above Owen's valley (*Lemmon*), California, and through the interior ranges and the Rocky mountains to Utah and northern New Mexico.

A small tree, 8 to 12 meters in height, with a trunk sometimes 0.30 to 0.45 meter in diameter; mountain cañons and along streams, in moist soil, often throwing up several stems from the ground and forming dense thickets.

Wood soft, strong, brittle, close-grained, compact; medullary rays numerous, obscure; color, light brown, the sap-wood lighter; specific gravity, 0.6030; ash, 0.30; somewhat used for fencing, fuel, etc.

297.—Betula lutea, Michaux f.

Hist. Arb. Am. ii, 152, t. 5; N. American Sylva, 3 ed. ii, 82, t. 73.—Spach in Ann. Sci. Nat. 2 ser. xv, 191; Hist. Veg. xi, 243.—Endlicher, Genera, Suppl. iv³, 20.—Wood, Bot. & Fl. 308.—Gray, Manual N. States, 5 ed. 459.—Koch, Dendrologie, ii, 640.—Vasey, Cat. Forest Trees, 28.—Sears in Bull. Essex Inst. xiii, 180.

- B. excelsa, Pursh, Fl. Am. Sept. ii, 621 [not Aiton].—Nuttall, Genera, ii, 218.—Sprengel, Syst. iii, 854.—Torrey, Compend. Fl. N. States, 355; Fl. N. York, ii, 200.—Eaton, Manual, 6 ed. 53.—London, Arboretum, iii, 1711, f. 1564, 1565 & t.—Hooker, Fl. Bor.-Am. ii, 156.—Eaton & Wright, Bot. 156.—Bigelow, Fl. Boston. 3 ed. 382.—Lindley in Penn. Cycl. ii, 349.—Gray, Manual N. States, 1 ed. 422.—Emerson, Trees Massachusetts, 206; 2 ed. i, 235 & t.—Richardson, Arctic Exped. 438.—Cooper in Smithsonian Rep. 1858, 256.—Chapman, Fl. S. States, 428.—Curtis in Rep. Geological Surv. N. Carolina, 1830, iii, 74.—Wood, Cl. Book, 648.—Bell in Geological Rep. Canada, 1879-'80, 50°.
- B. lenta, Regel in Mem. Soc. Nat. Moscow, xix, 125, in part; Bull. Soc. Nat. Moscow, xxxviii4, 417, in part; De Candolle, Prodr. xvi2, 179, in part.

YELLOW BIRCH. GRAY BIRCH.

Newfoundland, northern shores of the gulf of Saint Lawrence to Abittibi lake and the western shores of lake Superior and Rainy lake, south through the northern states to Delaware and southern Minnesota, and along the Alleghany mountains to the high peaks of North Carolina and Tennessee.

One of the largest and most valuable deciduous trees of the northern New England and Canadian forests, often 21 to 29 meters in height, with a trunk 0.90 to 1.20 meter in diameter; rich woodlands; common.

Wood heavy, very strong and hard, very close-grained, compact, satiny, susceptible of a beautiful polish; medullary rays numerous, obscure; color, light brown tinged with red, the heavier sap-wood nearly white; specific gravity, 0.6553; ash, 0.31; largely used for fuel, in the manufacture of furniture, button and tassel molds, pill and match boxes, and for the hubs of wheels.

298.—Betula nigra, Linnæus,

Spec. 1 ed. 982.—Marshall, Arbustum, 18.—Walter, Fl. Caroliniana, 231.—Aiton, Hort. Kew. iii, 336; 2 ed. v, 299.—Gærtner, Fruct. ii, 54, t. 90, f. 1.—Willdenow, Spec. iv, 464; Enum. 981; Berl. Baumz. 56.—Nouveau Duhamel, iii, 203, t. 51.—Persoon, Syn. ii, 572.—Desfontaines, Hist. Arb. ii, 477.—Smith in Rees' Cycl. iv, No. 2.—Pursh, Fl. Am. Sept. ii, 621.—Nuttall, Genera, ii, 218.—Hayne, Dend. Fl. 166.—Lamarck, Ill. iii, 350, t. 760, f. 2.—Elliott, Sk. ii, 616.—Watson, Dend. Brit. ii, t. 153.—Sprengel, Syst. ii, 854.—Torrey, Compend. Fl. N. States, 355; Fl. N. York, ii, 201.—Beck, Bot. 325.—Loudon, Arboretum, iii, 1710, f. 1562, 1563 & t.—Penn. Cycl. ii, 149.—Emerson, Trees Massachusetts 208; 2 ed. i, 237.—Darlington, Fl. Cestrica, 3 ed. 275.—Darby, Bot. S. States, 508.—Cooper in Smithsonian Rep. 1858, 256.—Chapman, Fl. S. States, 428.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 73.—Regel in Mem. Soc. Nat. Moscow, xix, 118, t. 12, f. 1-12; Bull. Soc. Nat. Moscow, xxxviii⁴, 412; De Candolle, Prodr. xvi², 175.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 649; Bot. & Fl. 308.—Porcher, Resources S. Førests, 266.—Gray, Manual N. States, 5 ed. 459; Hall's Pl. Texas, 21.—Koch, Dendrologie, ii, 644.—Young, Bot. Texas, 512.—Vasey, Cat. Forest Trees, 28.—Burbank in Proc. Boston Soc. Nat. Hist. xviii, 214.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Ridgway in Proc. U. S. Nat. Mus. 1882, 85.

- B. lanulosa, Michaux, Fl. Bor.-Am. ii, 181.—Nouveau Duhamel, iii, 206.
- B. rubra, Michaux f. Hist. Arb. Am. ii, 142, t. 3; N. American Sylva, 3 ed. ii, 80, t. 72.—Loddiges, Bot. Cab. t. 1248.—Eaton, Manual, 6 ed. 53.—Eaton & Wright, Bot. 156.—Spach in Ann. Sci. Nat. 2 ser. xv, 185; Hist. Veg. xi, 230.—Endlicher, Genera, Suppl. iv², 19.
- B. angulata, Loddiges, Cat. ed. 1836.

RED BIRCH. RIVER BIRCH.

Banks of the Merrimac and Spicket rivers, Middlesex and Essex counties, Massachusetts, Wading river, Long island, south through the coast and middle districts to the Chattahoochee region of western Florida, west to western Iowa, northwestern Missouri, eastern Kansas, the Indian territory, and the valley of the Trinity river, Texas.

A tree 18 to 24 meters in height, with a trunk rarely exceeding 0.75 meter in diameter; banks of streams and ponds; very common and reaching its greatest development in the south Atlantic states and in the basin of the lower Mississippi river.

Wood light, rather hard, strong, close-grained, compact; medullary rays numerous, obscure; color, brown, the sap-wood much lighter; specific gravity, 0.5762; ash, 0.35; used in the manufacture of furniture, woodenware, wooden shoes, ox-yokes, etc.

11 FOR

299.-Betula lenta, Linnæus,

Spec. 1 ed. 983.—Lamarck, Diet. i, 453.—Marshall, Arbustum, 19.—Aiton, Hort. Kew. iii, 337; 2 ed. v, 300.—Willdenow, Spec. iv, 464; Enum. 981; Berl. Baumz. 59.—Persoon, Syn. ii, 572.—Desfontaines, Hist. Arb. ii, 477.—Nouveau Duhamel, iii, 205.—Michaux f. Hist. Arb. Am. ii, 147, t. 4; N. American Sylva, 3 ed. ii, 85, t. 74.—Smith in Rees' Cycl. iv, No. 3.—Pursh, Fl. Am. Sept. ii, 621.—Eaton, Manual, 109; 6 ed. 53.—Barton, Compend. Fl. Philadelph. ii, 175.—Nuttall, Genera, ii, 218.—Hayne, Dend. Fl. 167.—Elliott, Sk. ii, 617.—Watson, Dend. Brit. ii, 144.—Sprengel, Syst. ii, 854.—Torrey, Compend. Fl. N. States, 356; Fl. N. York, ii, 200.—Guimpel, Otto & Hayne, Abb. Holz. 105, t. 83.—Loudon, Arboretum, iii, 1713, f. 1566.—Hooker, Fl. Bor.-Am. ii, 156.—Eaton & Wright, Bot. 156.—Bigelow, Fl. Boston. 3 ed. 381.—Lindley in Penn. Cycl. ii, 349.—Spach in Ann. Sci. Nat. 2 ser. xv, 190; Hist. Veg. xi, 241.—Emerson, Trees Massachusetts, 203; 2 ed. i, 232 & t.—Richardson, Arctic Exped. 438.—Endlicher, Genera, Suppl. iv², 20.—Darlington, Fl. Cestrica, 3 ed. 275.—Darby, Bot. S. States, 508.—Cooper in Smithsonian Rep. 1858, 256.—Chapman, Fl. S. States, 428.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 74.—Regel in Mem. Soc. Nat. Moscow, xxxviiii, 125, in part; Bull. Soc. Nat. Moscow, xxxviii, 417, in part; De Candolle, Prodr. xvi², 179, in part.—Wood, Cl. Book, 648; Bot. & Fl. 308.—Porcher, Resources S. Forests, 265.—Gray, Manual N. States, 5 ed. 458.—Koch, Dendrologie, ii, 639.—Vasey, Cat. Forest Trees, 28.—Sears in Bull. Essex Inst. xiii, 180.—Bell in Geological Rep. Canada, 1879-'80, 55°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 85.

B. nigra, Du Roi, Harbk. i, 93.—Wangenheim, Amer. 35, t. 15, f. 34.

B. excelsa, Aiton, Hort. Kew. iii, 337; 2 ed. v, 299 [not Pursh].—Willdenow, Spec. iv, 464.—Berl. Baumz. 41, t. 2, f. 2.—Nouveau Duhamel, iii, 203, t. 52.—Persoon, Syn. ii, 572.—Desfontaines, Hist. Arb. ii, 477.—Poiret, Suppl. i, 687.—Smith in Rees' Cycl. iv, No. 10.—Hayne, Dend. Fl. i, 7.—Spach in Ann. Sci. Nat. 2 ser. xv, 188; Hist. Veg. xi, 243.—Endlicher, Genera, iv², 20.

B. carpinifolia, Ehrhart, Beitr. vi, 99.—Willdenow, Enum. 981; Berl. Baumz. 49.

CHERRY BIRCH. BLACK BIRCH. SWEET BIRCH. MAHOGANY BIRCH.

Newfoundland and the valley of the Saguenay river, west through Ontario to the Manitou islands of lake Huron, south to northern Delaware and southern Indiana, and along the Alleghany mountains to the Chattahoochee region of northern Florida, extending west to middle Kentucky and Tennessee.

A tree 18 to 24 meters in height, with a trunk 0.90 to 1.50 meter in diameter; rich woodlands; very common in all northern forests.

Wood heavy, very strong and hard, close-grained, compact, satiny, susceptible of a beautiful polish; medullary rays numerous, obscure; color, dark brown tinged with red, the sap-wood light brown or yellow; specific gravity, 0.7617; ash, 0.26; now largely used in the manufacture of furniture and for fuel; in Nova Scotia and New Brunswick largely in ship-building.

"Birch beer" is obtained by fermenting the saccharine sap of this and perhaps some other species of the genus

300.-Alnus maritima, Muhlenberg,

Mss.—Nuttall, Sylva, i, 34, t. 10²; 2 ed. i, 50, t. 10².—Gray, Manual N. States, 5 ed. 461; Hall's Pl. Texas, 21.—Canby in Coulter's Bot. Gazette, vi, 1881.

Betula-Alnus maritima, Marshall, Arbustum, 20.

A. oblongata, Regel in Mem. Soc. Nat. Moscow, xix, 172, t. vi, f. 3-9 [not Willdenow].

A. maritima typica, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 427; De Candolle, Prodr. xvi2, 186.

SEASIDE ALDER.

Southern Delaware and eastern Maryland, near the coast; valley of the Red river, Indian territory, in about longitude 96° 30′ W. (E. Hall); Manchuria and Japan (A. maritima, Japonica and arguta, Regel in De Candolle, Prodr. xvi², 186).

A small tree, 6 to 7 meters in height, with a trunk 0.10 to 0.15 meter in diameter; borders of streams and swamps.

Wood light, soft, close-grained, checking badly in drying; medullary rays broad, conspicuous; color, light bright brown, the sap-wood hardly distinguishable, somewhat lighter; specific gravity, 0.4996; ash, 0.39.

301.—Alnus rubra, Bongard,

Mem. Acad. St. Petersburg, 6 ser. ii, 162.—Hooker, Fl. Bor.-Am. ii, 158.—Spach in Ann. Sci. Nat. 2 ser. xv, 205.—Endlicher, Genera, Suppl. iv², 21.—Lyall in Jour. Linnæan Soc. vii, 134.—Regel in Bull. Soc. Nat. Moscow, xxxviii4, 429; De Candolle, Prodr. xvi², 186.—Torrey, Bot. Wilkes Exped. 467.—Watson, Bot. California, ii, 80.—G. M. Dawson in Canadian Nat. new ser. ix, 331.

?A. glutinosa, Pursh, Fl. Am. Sept. ii, 622 [not Willdenow].

- A. Oregana, Nuttall, Sylva, i, 28, t. 9; 2 ed. i, 44, t. 9.—Newberry in Pacific R. R. Rep. vi, 25, 89.—Cooper in Smithsonian Rep. 1858, 261; Pacific R. R. Rep. xii², 28, 68.—Vasey, Cat. Forest Trees, 28.—Hall in Coulter's Bot. Gazette, ii, 91.
- A. incana, var. rubra, Regel in Mem. Soc. Nat. Moscow, xix, 157, t. 17, f. 3-4.

ALDER.

Sitka, south through the Islands and Coast ranges of British Columbia, Washington territory, Oregon, and California to Santa Barbara, extending east through the Blue mountains to northern Montana.

A large tree, 24 to 30 meters in height, with a trunk 0.90 to 1.20 meter in diameter, or in British Columbia and the Blue mountains often reduced to a low shrub; river bottom lands and borders of streams; most common and reaching its greatest development along the large streams of western Washington territory and Oregon.

Wood light, soft, not strong, brittle, very close-grained, compact, easily worked, satiny, susceptible of a beautiful polish; medullary rays distant, broad; color, light brown tinged with red, the sap-wood nearly white; specific gravity, 0.4813; ash, 0.42; largely used in Oregon in the manufacture of furniture.

302.-Alnus rhombifolia, Nuttall,

Sylva, i, 33; 2 ed. i, 49.—Torrey, Bot. Wilkes Exped. 467.—Vasey, Cat. Forest Trees, 28.—Watson, Bot. California, ii, 80.

- A. glutinosa, var. serrulata, Regel in Mem. Soc. Nat. Moscow, xix, 164, in part.
- A. serrulata, var. rugosa, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 432, in part; De Candolle, Prodr. xvi2, 188, in part.

ALDER.

Valley of the lower Fraser river, British Columbia, south through the Coast ranges to southern California, extending east along the ranges of Washington territory to Clear creek, Idaho (Watson), and the valley of the Flathead river, Montana (Canby & Sargent).

A small tree, 9 to 15 meters in height, with a trunk sometimes 0.60 to 0.90 meter in diameter, or toward its northern and eastern limits reduced to a shrub; borders of streams; the common alder of the California valleys.

Wood light, soft, not strong, brittle, close-grained, compact; medullary rays numerous, obscure; color, light brown, the sap-wood lighter, often nearly white; specific gravity, 0.4127; ash, 0.31.

303.—Alnus oblongifolia, Torrey,

Bot. Mex. Boundary Survey, 204.—Cooper in Smithsonian Rep. 1858, 266.—Watson in Pl. Wheeler, 17; Bot. California, ii, 80.—Rothrock in Wheeler's Rep. vi, 239.—Rusby in Bull. Torrey Bot. Club, ix, 79.

A. serrulata, var. oblongifolia, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 443; De Candolle, Prodr. xvi2, 188.

ALDER.

San Bernardino and Cayumaca mountains, California, through the ranges of southern Arizona and southern New Mexico to the valley of the Rio Grande; southward into Mexico.

A tree 15 to 21 meters in height, with a trunk 0.90 to 1.20 meter in diameter; borders of streams in deep mountain canons.

Wood light, soft, not strong, brittle, close-grained, compact; medullary rays numerous, very obscure; color, light brown tinged with yellow, the sap-wood nearly white; specific gravity, 0.3981; ash, 0.42.

304.—Alnus serrulata, Willdenow,

Spec. iv, 336; Enum. 965; Berl. Baumz. 2 ed. 21.—Nouveau Duhamel, ii, 216.—Persoon, Syn. ii, 550.—Desfontaines, Hist. Arb. ii, 488.—Aiton, Hort, Kew. 2 ed. v, 259.—Michaux f. Hist. Arb. Am. iii, 320, t. 4, f. 1; N. American Sylva, 3 ed. ii, 87, t. 75, f. 1.—Pursh, Fl. Am. Sept. ii, 623.—Barton, Prodr. Fl. Philadelph. 89; Compend. Fl. Philadelph. ii, 158.—Eaton, Manual, 105; 6 ed. 12.—Nuttall, Genera, ii, 206.—Hayne, Dend. Fl. 122.—Elliott, Sk. ii, 567.—Torrey, Compend. Fl. N. States, 350; Fl. N. York, ii, 202, t. 115.—Beck, Bot. 326.—Darlington, Fl. Cestrica, 3 ed. 276.—Loudon, Arboretum, iii, 1688, f. 1544.—Eaton & Wright, Bot. 120.—Bigelow, Fl. Boston. 3 ed. 220.—Spach in Aun. Sci. Nat. 2 ser. xv, 206; Hist. Veg. xi, 251.—Emerson, Trees Massachusetts, 218; 2 ed. i, 248 & t.—Endlicher, Genera, Suppl. iv², 21.—Darby, Bot. S. States, 508.—Chapman, Fl. S. States, 429.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 102.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 650; Bot. & Fl. 308.—Porcher, Resources S. Forests, 266.—Gray, Manual N. States, 5 ed. 461.—Young, Bot. Texas, 513.—Broadhead in Coulter's Bot. Gazette, iii, 60.

Betula rugosa, Du Roi, Harbk. i, 176.—Wangenheim, Amer. 86, t. 29, f. 60,—Ehrhart, Beitr. iii, 21.

?Betula-Alnus glauca, Marshall, Arbustum, 20.

Betula serrulata, Aiton, Hort. Kew. iii, 338.—Willdenow, Berl. Baumz. 1 ed. 45.—Abbot, Insects Georgia, ii, 183, t. 92.—Michaux, Fl. Bor.-Am. ii, 181.

- A. serrulata, var. vulgaris, Spach in Ann. Sci. Nat. 2 ser. xv, 206.
- A. serrulata, var. macrophylla, Spach in Ann. Sci. Nat. 2 ser. xv, 206.
- A. serrulata, var. oblongata, Spach, Hist. Veg. xi, 251.
- A. serrulata, var. latifolia, Spach, Hist. Veg. xi, 251.
- A. rubra, Tuckerman in Am. Jour, Sci. 1 ser. xlv, 32.
- A. hybrida, Reichenbach, Icon. Fl. Germ. xii, t. 630, f. 1292.
- A. glutinosa, var. serrulata, Regel in Mem. Soc. Nat. Moscow, xix, 164, t. 11, f. 6, 8, in part.
- A. glutinosa, var. rugosa, Regel in Mem. Soc. Nat. Moscow, xix, 165, t. 11, f. 9, 10.
- A. serrulata genuina and obtusifolia, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 432; De Candolle, Prodr. xvi2, 188.
- A. serrulata, var. rugosa, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 432, in part; De Candolle, Prodr. xvi3, 188, in part.
- A. rugosa, Koch, Dendrologie, ii, 635.
- A. oblongata, undulata, rugosa, Canadensis, and Americana, Hort.

BLACK ALDER. SMOOTH ALDER.

Essex county, Massachusetts, west to southern Missouri, south to northern Florida and the valley of the Trinity river, Texas.

A small tree, 6 to 12 meters in height, with a trunk 0.10 to 0.15 meter in diameter, or more often a tall, branching shrub forming dense thickets; borders of streams and swamps, probably reaching its greatest development in southern Arkansas.

Wood light, soft, close-grained, compact; medullary rays numerous, conspicuous; color, light brown, the sapwood lighter; specific gravity, 0.4666; ash, 0.38.

A decoction of the bark and leaves, as well as those of A. incana, is a popular remedy against impurity of the blood and in the treatment of diarrhea and hæmaturia, etc. (Nat. Dispensatory, 2 ed. 135).

305.-Alnus incana, Willdenow,

Spec. iv, 335; Enum. 965; Berl. Baumz. 2 ed. 20.—Persoon, Syn. ii, 550.—Aiton, Hort. Kew. 2 ed. v, 259.—Hayne, Dend. Fl. 152.—Eaton, Manual, 6 ed. 12.—Loudon, Arboretum, iii, 1687, f. 1543.—Hooker, Fl. Bor.-Am. ii, 157.—Eaton & Wright, Bot. 120.—Spach in Ann. Sci. Nat. 2 ser. xv, 206; Hist. Veg. xi, 252.—Nuttall, Sylva, i, 30; 2 ed. i, 46.—Tuckerman in Am. Jour. Sci. 1 ser. xlv, 32.—Torrey, Fl. N. York, ii, 202.—Emerson, Trees Massachusetts, 220; 2 ed. i, 251 & t.—Endlicher, Genera, Suppl. iv², 21.—Parry in Owen's Rep. 618.—Cooper in Smithsonian Rep. 1858, 256.—Hooker f. in Trans. Linnæan Soz. xxiii², 301.—Wood, Cl. Book, 649; Bot. & Fl. 308.—Regel in Bull. Soc. Nat. Moscow, xxxviii³, 433; De Candolle, Prodr. xvi², 188.—Gray, Manual N. States, 5 ed. 461.—Koch, Dendrologie, ii, 636.—Vasey, Cat. Forest Trees, 28.—Macoun in Geological Rep. Canada, 1875–76, 210.—Bell in Geological Rep. Canada, 1879–780, 55°.

Betula-Alnus, var. β. incana, Linnæus, Spec. 1 ed. 983.—Du Roi, Harbk. i, 109.

Betula incana, Linnseus, Suppl. 417.—Aiton, Hort. Kew. iii, 339.—Willdenow, Berl. Baumz. 1 ed. 45.—Smith in Rees' Cycl. iv, No. 7.

? Betula-Alnus rubra, Marshall, Arbustum, 20.

- A. glauca, Michaux f. Hist, Arb. Am. iii, 322, t. 4, f. 2; N. American Sylva, 3 ed. 89, t. 75, f. 2.—Bigelow, Fl. Boston, 3 ed. 367.
- A. incana, var. glauca, Gray, Manual N. States, 1 ed. 423; 3 ed. 461.
- A. incana, Americana, and genuina, Regel in Mem. Soc. Nat. Moscow, xix, 155.

SPECKLED ALDER. HOARY ALDER. BLACK ALDER.

Newfoundland to the eastern base of the Rocky mountains, south to northern New England, Wisconsin, Minnesota, and eastern Nebraska; in Europe.

A small tree, 6 to 7 meters in height, with a trunk 0.10 to 0.15 meter in diameter, or more often a tall, branching shrub; borders of streams and swamps.

A form with leaves green and glabrous on both sides or slightly pubescent, extending through the mountain ranges of the Pacific region from the Saskatchewan and British Columbia to New Mexico and the southern Sierra Nevadas of California, is—

var. virescens, Watson, Bot. California, ii, 81.

- A. incana, var. glauca, Regel in Mem. Soc. Nat. Moscow, xix, 154, in part; Bull. Soc. Nat. Moscow, xxxviii⁴ 433, in part; De Candolle, Prodr. xvi², 189, in part.—Watson in King's Rep. v, 326 [not Aiton]; Pl. Wheeler, 17.—Rothrock, Pl. Wheeler, 50; Wheeler's Rep. vi, 239.—Macoun in Geological Rep. Canada, 1875-76, 210.
- A. serrulata, var. rugosa, Regel in Bull. Soc. Nat. Moscow, xxxviii4, 432, in part; De Candolle, Prodr. xvi2, 188, in part.

Wood light, soft, close-grained, checking in drying; medullary rays numerous, broad; color, light brown, the sap-wood nearly white; specific gravity, 0.4607; ash, 0.42; preferred and largely used in northern New England in the final baking of bricks, and occasionally, as well as that of A. serrulata, in the manufacture of gunpowder.

SALICACEÆ.

306.—Salix nigra, Marshall,

Arbustum, 139.—Muhlenberg in Neue Schriften Gesell. Nat. Fr. Berlin, iv, 237, t. 4, f. 5 (Ann. Bot. ii, 65, t. 5, f. 5).—Willdenow, Spec. iv, 657; Enum. 1003; Berl. Baumz. 2 ed. 426.—Perseon, Syn. ii, 599.—Michaux f. Hist. Arb. Am. iii, 324, t. 5, f. 1; N. American Sylva, 3 ed. iii, 64, t. 125, f. 1.—Pursh, Fl. Am. Sept. ii, 614.—Poiret, Suppl. iv, 61.—Eaton, Manual, 118; 6 ed. 320.—Nuttall, Genera, ii, 231; Sylva, i, 79; 2 ed. i, 94.—Hayne, Dend. Fl. 180.—Elliott, Sk, ii, 670.—Sprengel, Syst. i, 100.—Torrey, Compend. Fl. N. States, 370; Fl. N. York, ii, 209.—Forbes, Sal. Woburn. 280.—W. Koch, Comment. 17.—Beck, Bot. 320.—Trautvetter in Mem. Acad. St. Petersburg, iii, 614.—Loudon, Arboretum, iii, 1529, 1604, f. 8.—Hooker, Fl. Bor.-Am. ii, 148.—Barratt, Sal. Am. No. 19.—Eaton & Wright, Bot. 408.—Dietrich, Syn. v, 419.—Seringe, Fl. Jard. ii, 35.—Emerson Trees Massachusetts, 271; 2 ed. i, 307 & t.—Darlington, Fl. Cestrica, 3 ed. 279.—Andersson in Ofr. af. Vet. Akad. Forh. 1858, 114 (Proc. Am. Acad. iv, 53); Kongl. Sven. Akad. Handl. vi, 19, f. 15; De Candolle, Prodr. xvi², 200.—Darby, Bot. S. States, 506.—Cooper in Smithsonian Rep. 1858, 256.—Walpers, Ann. v, 744.—Chapman, Fl. S. States, 430.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 75.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 654; Bot. & Fl. 310.—Porcher, Resources S. Forests, 334.—Eugelmann in Trans. Am. Phil. Soc. new ser. xii, 209.—Gray, Manual N. States, 5 ed. 460; Hall's Pl. Texas, 21.—Koch, Dendrologie, ii, 513.—Young, Bot. Texas, 514.—Macoun in Geological Rep. Canada, 1875—76, 210.—Vasey, Cat. Forest Trees, 28.—Bebb in Bot. California, ii, 83.—Sears in Bull. Essex Inst. xiii, 181.—Ridgway in Proc. U. S. Nat. Mus. 1882, 86.—Hemsley, Bot. Am.-Cent. iii, 180

- S. pentandra, Walter, Fl. Caroliniana, 243.
- S. Caroliniana, Michaux, Fl. Bor.-Am. ii, 226.—Lamarck, Dict. vi, 662.—Poiret, Suppl. v, 62.
- S. Houstoniana, Pursh, Fl. Am. Sept. ii, 614.—Poiret, Suppl. v, 68.—Sprengel, Syst. i, 107.—Elliott, Sk. ii, 670.—Trautvetter in Mem. Acad. St. Petersburg, iii, 615.—Forbes, Sal. Woburn. 21, t. 21.—Eaton & Wright, Bet. 409.
- S. falcata, Pursh, Fl. Am. Sept. ii, 614 [not HBK.].—Poiret, Suppl. v, 70.—Sprengel, Syst. i, 107.—Forbes, Sal. Woburn. 279.—Eaton, Manual, 6 ed. 320.—Hooker, Fl. Bor.-Am. ii, 149.—Barratt, Sal. Am. No. 21.—Dietrich, Syn. v, 420.
- ? S. ambigua, Pursh, Fl. Am. Sept. ii, 617.—Forbes, Sal. Woburn. 282.—Eaton, Manual, 6 ed. 321.—Eaton & Wright, Bot. 409.
- S. ligustrina, Michaux f. Hist. Arb. Am. iii, 326, t. 5, f. 2; N. American Sylva, 3 ed. iii, 65, t. 125, f. 2.—Poiret, Suppl. v, 61.
- S. Purshiana, Sprengel, Syst. iii, 608.—Beck, Bot. 320.—Darlington, Fl. Cestrica, 2 ed. 560.
- S. flavo-virens, Hornemann in Cat. Hort. Hafn. Suppl. ii, 11.
- ? S. cordata, var. falcata, Torrey, Compend. Fl. N. States, 370.
- S. nigra, var. falcata, Torrey, Fl. N. York, ii, 209.—Carey in Gray, Manual N. States, 1 ed. 429.—Darlington, Fl. Cestrica, 3 ed. 280.

BLACK WILLOW.

Southern New Brunswick and the northern shores of lakes Huron and Superior southward through the Atlantic region to bay Biscayne and the Caloosa river, Florida, and the valley of the Guadalupe river, Texas; Pacific region, valleys of the Sacramento river, California, and the Colorado river, Arizona.

A small tree, sometimes 15 to 18 meters in height, with a trunk rarely 0.60 meter in diameter, or in southern Florida reduced to a low shrub; usually along the banks of streams; most common in the basin of the Mississippi river and reaching its greatest development in the rich bottom lands of the Colorado and other rivers of eastern Texas; varying greatly in the size and shape of the leaves (vars. angustifolia, longifolia, latifolia, etc., Andersson in Kongl. Sven. Akad. Handl. vi, 20), length and habit of the aments, etc.

The best marked forms are-

var. marginata, Andersson in Kongl. Sven. Akad. Handl. vi, 22; De Candolle, Prodr. xvi2, 201.

S. marginata, Wimmer in Schedul. Herb. Vindab.

var. longipes, Andersson in Kongl. Sven. Akad. Handl. vi, 22; De Candolle, Prodr. xvi2, 201.

S. longipes, Shuttleworth in herb. Hooker.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 114 (Proc. Am. Acad. iv, 53).—Walpers, Ann. v, 744.

Forms of var. longipes more or less pubescent have been characterized by Andersson in Kongl. Sven. Akad. Handl. vi, 22; De Candolle, Prodr. xvi², 201, as subvars. venulosa and gongylocarpa [Shuttleworth], (S. longipes, var. pubescens, Andersson in Proc. Am. Acad. iv, 53; S. subvillosa, Elliott in herb. Schweinitz ex. Nuttall, Sylva, i, 79; 2 ed. i, 94, vide Gray in Proc. Am. Acad. iv, 53, note).

var. Wrightii, Andersson in Kongl. Sven. Akad. Handl.vi, 22; De Candolle, Prodr. xvi2, 201.—Hemsley, Bot. Am.-Cent. iii, 180.

S. Wrightii, Andersson in Ofv. af. Vet. Akad. Forh. 1858, 115 (Proc. Am. Acad. iv, 55 —Walpers, Ann. v, 745.—Torrey in Bot. Mex. Boundary Survey, 204.

var. Wardii, Bebb in Bull. U. S. Nat. Mus. No. 22, 114.

Wood light, soft, weak, close-grained, checking badly in drying; medullary rays obscure; color, brown, the sap-wood nearly white; specific gravity, 0.4456; ash, 0.70.

The tonic and astringent bark used domestically as a popular febrifuge, and containing, in common with that of all the species of the genus, salicylic acid, a powerful anti-pyritic now successfully used in the treatment of acute cases of gout, rheumatism, typhoid fever, etc. (Am. Jour. Pharm. 1875, 303.—U. S. Dispensatory, 14 ed. 796, 1748.—Nat. Dispensatory, 2 ed. 1248).

Note.—The closely allied Salix occidentalis, Bosc, of the West Indies is not perhaps specifically distinct from S. nigra, with which some of the forms of var. longipes from southern Florida seem to connect it.

307.-Salix amygdaloides, Andersson,

Ofv. af. Vet. Akad. Forh. 1858, 114 (Proc. Am. Acad. iv, 53).—Walpers, Ann. v, 744.—Bebb in Wheeler's Rep. vi, 240.

? S. melanopsis, Nuttall, Sylva, i, 78, t. 21; 2 ed. i, 93, t. 21.

S. nigra, var. amygdaloides, Andersson in Kongl. Sven. Akad. Handl. vi, 21; De Candolle, Prodr. xvi², 201.—Rothrock, Pl. Wheeler, 50.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 128.

WILLOW.

Shores of the great lakes (Wayne county, New York, Hankenson; Painesville, Ohio, Beardslee), westward to the valley of the Saskatchewan, and southward through the Rocky Mountain region to southern New Mexico; banks of the lower Columbia river, Oregon (Howells).

A small tree, rarely 9 to 12 meters in height, with a trunk 0.15 to 0.30 meter in diameter; along streams.

Wood light, soft, not strong, close-grained, checking in drying; the heart-wood light brown, sap-wood nearly white; specific gravity, 0.4509; ash, 0.92.

308.-Salix lævigata, Bebb,

Am. Nat. viii, 202; Bot. California, ii, 83.

WILLOW.

California, Sierra county (Lemmon) and the valley of the Sacramento river to the southern boundary of the state.

A tree sometimes 15 meters in height, with a trunk 0.30 to 0.60 meter in diameter; borders of streams and bottom lands.

A form with narrower falcate leaves (Yreka, E. L. Greene) is-

var. angustifolia, Bebb in Bot. California, ii, 84.—Rothrock in Wheeler's Rep. vi, 374.

A form with short, densely-flowered aments is-

var. congesta, Bebb in Bot. California, ii, 84.

Wood light, soft, not strong, brittle, close-grained, compact; medullary rays numerous, very thin; color, light brown tinged with red; specific gravity, 0.4872; ash, 0.58.

309.-Salix lasiandra, Bentham,

- Pl. Hartweg. 336.—Torrey in Pacific R. R. Rep. iv, 138.—Newberry in Pacific R. R. Rep. vi, 89.—Bebb in Bot. California, ii, 84.
 - S. Hoffmanniana, Hooker & Arnott, Bot. Beechey, 159.
 - S. speciosa, Nuttall, Sylva, i, 58, t. 17; 2 ed. i, 74, t. 17 [not Hooker & Arnott].—Newberry in Pacific R. R. Rep. vi, 89.—Cooper in Pacific R. R. Rep. xii², 29.
 - lucida, var. angustifolia, forma lasiandra, Andersson in Ofv. af. Vet. Akad. Forh. 1858, 115 (Proc. Am. Acad. iv, 54).
 - S. arguta, var. lasiandra, Andersson in Kongl. Sven. Akad. Handl. vi, 33; De Candolle, Prodr. xvi2, 206.

WILLOW.

British Columbia, shores of lake Kamloop (Macoun), southward to the valley of the Sacramento river, California; Rocky mountains, Utah, and through Colorado to New Mexico (var. Fendleriana).

A tree 12 to 18 meters in height, with a trunk sometimes 0.60 meter in diameter; banks of streams; very common; varying in the shape of the leaves and character of the aments.

The best marked forms are-

var. lancifolia, Bebb in Bot. California, ii, 84.

- S. lancifolia, Andersson in Kongl. Sven. Akad. Handl. vi, 34, f. 23.—Gray in Proc. Am. Acad. vii, 402.—Hall in Coulter's Bot. Gazette, ii, 91.
- S. lucida, var. macrophylla, Andersson in De Candolle, Prodr. xvi², 205.

The common form of British Columbia and western Washington territory and Oregon.

var. Fendleriana, Bebb in Bot. California, ii, 84.

- S. pentandra, var. caudata, Nuttall, Sylva, i, 61, t. 18; 2 ed. i, 77, t. 18.
- S. Fendleriana, Andersson in Ofv. af. Vet. Akad. Forh. 1858, 115 (Proc. Am. Acad. iv, 54).—Walpers, Ann. v, 745.
- S. arguta, Andersson in Kongl. Sven. Akad. Handl. vi, 32; De Candolle, Prodr. xvi2, 205, in part.

Wood light, soft, not strong, brittle, close-grained, compact; medullary rays numerous, very obscure; color, light brown, the sap-wood lighter or often nearly white; specific gravity, 0.4756; ash, 0.60. Var. lancifolia, specific gravity, 0.4547; ash, 0.79. Var. Fendleriana, the heart-wood brown, sap-wood light brown; specific gravity, 0.4598; ash, 0.56.

310.-Salix longifolia, Muhlenberg,

Neue Schriften Gesell. Nat. Fr. Berlin, iv, 238, t. 6, f. 6 (Ann. Bot. ii, 66, t. 5, f. 6).—Willdenow, Spec. iv, 670.—Persson, Syn. ii, 600.—Pursh, Fl. Am. Sept. ii, 613.—Nuttall, Genera, ii, 231.—Torrey in Ann. Lyc. N. York, ii, 248; Fl. N. York, ii, 209; Nicollet's Rep. 160; Fremont's Rep. 97; Emory's Rep. 412; Sitgreaves' Rep. 172; Bot. Mex. Boundary Survey, 204.—Barratt, Sal. Am. No. 23.—Beck, Bot. 320.—Eaton, Manual, 6 ed. 319.—Eaton & Wright, Bot. 408.—Hooker, Fl. Bor.-Am. ii, 149.—Dietrich, Syn. v, 420.—Parry in Owen's Rep. 618.—Richardson, Arctic Exped. 439, 440.—Cooper in Smithsonian Rep. 1858, 261.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 116 (Proc. Am. Acad. iv, 56); Kongl. Sven. Akad. Handl. vi, 54, f. 35; De Candolle, Prodr. xvi², 214.—Walpers, Ann. v, 745.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 653; Bot. & Fl. 310.—Engelmann in Proc. Am. Phil. Soc. new ser. xii, 209.—Gray, Manual N. States, 5 ed. 465.—Watson in King's Rep. v, 324; Wheeler's Rep. 1872, 493.—Gray in Proc. Am. Acad. vii, 402.—Macoun in Geological Rep. Canada, 1875-76, 210.—Vasey, Cat. Forest Trees, 29.—Hall in Coulter's Bot. Gazette, ii, 91.—Bebb in Wheeler's Rep. vi, 240; Bot. California, ii, 84.—Ward in Bull. U. S. Nat. Mus. No. 22, 116.

S. fluviatalis, Nuttall, Sylva, i, 73; 2 ed. i, 89.

2 S. rubra, Richardson, Arctic Exped. Appx. 37.

S. longifolia, var. pedicellata, Andersson in Kongl. Sven. Akad. Handl. vi, 55, f. 35; De Candolle, Prodr. xvi², 214.—Macoun in Geological Rep. Canada, 1875-76, 210.

SAND-BAR WILLOW.

Valley of the Connecticut river (Sunderland, Massachusetts, N. G. Jesup) and of the Potomac river at Washington (Ward); west and northwest through the region of the great lakes to the valley of the Mackenzie river, in latitude 66° N. (Richardson), through the Mississippi basin, Texas, the Rocky Mountain region, and the Pacific Coast states.

A small tree, 6 to 9 meters in height, with a trunk rarely exceeding 0.30 meter in diameter; borders of streams and river sand-bars, in low, wet sandy soil, often forming low, dense clumps; rare east of the Alleghany mountains; very common throughout the Mississippi River basin, and reaching its greatest development in the valleys of Oregon and northern California.

Well-marked forms, varying from the type in the form of the leaves, aments, and nature of pubescens, etc., are-

var. exigua, Bebb in Bot. California, ii, 85.

S. exigua, Nuttall, Sylva, i, 75; 2 ed. i, 90.

S. longifolia, var. angustissima, Andersson in Ofv. af. Vet. Akad. Forh. 1858, 116 (Proc. Am. Acad. iv, 56).

Western Texas to California and Oregon.

var. argyrophylla, Andersson in Kongl. Sven. Akad. Handl. vi, 55; De Candolle, Prodr. xvi², 214.—Watson in King's Rep. v, 324.—Porter in Hayden's Rep. 1872, 493.—Rothrock, Pl. Wheeler, 50.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 128.—Macoun in Geological Rep. Canada, 1875-76, 210.—Bebb in Bot. California, ii, 85.

S. argophylla, Nuttall, Sylva, i, 71, t. 20; 2 ed. i, 87, t. 20.

? S. brachycarpa, Nuttall, Sylva, i, 69; 2 ed. i, 85.

S. longifolia, var. opaca, Andersson in Kongl. Sven. Akad. Handl. vi, 55.

S. longifolia, var. argyrophylla angustissima, Andersson in Kongl. Sven. Akad. Handl. vi, 55; De Candolle, Prodr. xvi², 214.

S. longifolia, var. argyrophylla opaca, Andersson in De Candolle, Prodr. xvi2, 214.

Western Texas to Oregon.

Wood light, soft, very close-grained, compact; medullary rays numerous, very obscure; color, brown tinged with red, the sap-wood brown; specific gravity, 0.4930; ash, 0.48. Var. exigua, heavier, the heart- and sap-wood darker colored; specific gravity, 0.5342; ash, 1.06.

311.—Salix sessilifolia, Nuttall,

Sylva, i, 68; 2 ed. i, 84.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 116 (Proc. Am. Acad. iv. 56); Kongl. Sven. Akad. Handl. vi, 55, f. 36; De Candolle, Prodr. xvi², 214.—Walpers, Ann. v, 746.—Bebb in Bot. California, ii, 85.

S. sessilifolia, var. villosa, Andersson in De Candolle, Prodr. xvi2, 215.

Puget sound southward to northern California, near the coast.

A small tree, 9 to 12 meters in height, with a trunk rarely exceeding 0.30 to 0.45 meter in diameter; borders of streams, in low, wet ground.

A form with narrower entire leaves, of the Sacramento valley and the California Coast ranges, is-

- var. Hindsiana, Andersson in Ofv. af. Vet. Akad. Forh. 1858, 117 (Proc. Am. Acad. iv, 56).—Bebb in Bot. California, ii, 85.
- S. Hindsiana, Bentham, Pl. Hartweg. 335.—Newberry in Pacific R. R. Rep. vi, 89.—Torrey in Pacific R. R. Rep. iv, 138.—Andersson in Kongl. Sven. Akad. Handl. vi, 56, f. 37; De Candolle, Prodr. xvi², 215.—Walpers, Ann. v. 746.
- S. Hindsiana, var. tenuifolia, Andersson in Kongl. Sven. Akad. Handl. vi, 56; De Candolle, Prodr. xvi², 215.

Wood light, soft, close-grained, compact; medullary rays thin; color, light red, the sap-wood nearly white; specific gravity, 0.4397; ash, 0.50.

312.—Salix discolor, Muhlenberg,

Neue Schriften Gesell. Nat. Fr. Berlin, iv, 234, t. 5, f. 1 (Ann. Bot. ii, 62, t. 5, f. 1).—Willdenow, Spec. iv, 665.—Persoon, Syn. ii, 599.—Pursh, Fl. Am. Sept. ii, 613.—Poiret, Suppl. v, 56.—Nuttall, Genera, ii, 231.—Elliott, Sk. ii, 669.—Torrey, Compend. Fl. N. States, 369; Fl. N. York, ii, 206.—Sprengel, Syst. i, 104.—Forbes, Sal. Woburn. 279.—Eaton, Manual, 6 ed. 319.—Smith in Rees' Cycl. No. 25.—Darlington, Fl. Cestrica, 3 ed. 257.—Eaton & Wright, Bot. 408.—Loudon, Arboretum, iii, 1530, f. 1317, 1630, f. 147.—Bigelow, Fl. Boston. 3 ed. 392.—Hooker, Fl. Bor.-Am. ii, 147.—Barratt, Sal. Am. No. 3.—Emerson, Trees Massachusetts, 258; 2 ed. i, 296 & t.—Dietrich, Syn. v, 419.—Richardson, Arctic Exped. 312.—Darby, Bot. S. States, 506.—Andersson in Ofv. af. Vet. Akad. Forb. 1858, 114 (Proc. Am. Acad. iv, 63); Kongl. Sven. Akad. Handl. vi, 83, f. 49; De Candolle, Prodr. xvi², 225.—Walpers, Ann. v, 750.—Chapman, Fl. S. States, 430.—Gray, Manual N. States, 5 ed. 462.—Koch, Dendrologie, ii, 570.—Macoun in Geological Rep. Canada, 1874-775, 210.—Ridgway in Proc. U. S. Nat. Mus. 1882, 86.

S. sensitiva, Barratt, Sal. Am. No. 8.

GLAUCOUS WILLOW.

Labrador, west to the valleys of the Peace and Athabasca rivers, southward through the Atlantic region to Delaware and southern Missouri.

A small tree, rarely exceeding 6 meters in height, with a trunk sometimes 0.30 meter in diameter, or more often a tall, straggling shrub 3 to 6 meters in height; along streams and borders of swamps in low, wet soil; varying greatly in the form of leaves, aments, and nature of pubescence.

The best marked forms are-

- var. eriocephala, Andersson in Koagl. Sven. Akad. Handl. vi, 85; De Candolle, Prodr, xvi², 225.—Gray, Manual N. States, 5 ed. 463.
- S. eriocephala, Michaux, Fl. Bor.-Am. ii, 225.—Lamarck, Dict. vi, 661.—Bigelow, Fl. Boston. 3 ed. 391.—Eaton, Manual, 6 ed. 321.—Eaton & Wright, Bot. 409.—Emerson, Trees Massachusetts, 1 ed. 259; 2 ed. i, 196 & t.—Carey in Gray's Manual N. States, 1 ed. 426.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 117 (Proc. Am. Acad. iv, 57).—Walpers, Ann. v, 746.
- S. crassa, Barratt, Sal. Am. No. 7.
- var. prinoides, Andersson in Kongl. Sven. Akad. Handl. vi, 86; De Candolle, Prodr. xvi², 225.—Emerson, Trees Massachusetts, 2 ed. i, 297.
- S. prinoides, Pursh, Fl. Am. Sept. ii, 613.—Nuttall, Genera, ii, 231.—Sprengel, Syst. i, 102.—Poiret, Suppl. iv, 67.—Torrey, Compend. Fl. N. States, 366.—Smith in Rees' Oycl. No. 26.—Forbes, Sal. Woburn. 79, t. 40.—Eaton, Manual, 6 ed. 319.—Beck, Bot. 319.—Eaton & Wright, Bot. 407.—W. Koch, Comment. 46.—Loudon, Arboretum, iii, 1530, f. 1317, 1612, f. 40.—Hooker, Fl. Bor.-Am. ii, 150.—Emerson, Trees Massachusetts, 1, ed. 259.—Dietrich, Syn. v, 419.

Wood light, soft, close-grained, compact, containing many evenly-distributed, small, open ducts; medullary rays and layers of annual growth not obscure; color, brown streaked with orange, the sap-wood light brown; specific gravity, 0.4261; ash, 0.43.

313.—Salix flavescens, Nuttall,

Sylva, i, 65; 2 ed. i, 81.—Bebb in Bot. California, ii, 86, in part.

Rocky mountains of Idaho and Montana southward to the Mogollon range, New Mexico (E. L. Greene); on the Cascade mountains, Oregon, and the Sierra Nevada, California.

A small tree, sometimes 6 to 9 meters in height, with a trunk rarely 0.30 meter in diameter; borders of streams, reaching its greatest development in the southern Rocky Mountain region.

Wood light, soft, not strong, close-grained, compact; medullary rays numerous, obscure; color, brown tinged with red, the sap-wood nearly white; specific gravity, 0.4969; ash, 0.61.

Var. Scouleriana, Bebb;

Coulter's Bot. Gazette, vii, 129.

- S. brachystachys, Bentham, Pl. Hartweg. 336.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 121 (Proc. Am. Acad. iv, 61); Kongl. Sven. Akad. Handl. vi, 82, f. 48; De Candolle, Prodr. xvi², 224.
- S. Scouleriana, Barratt in Hooker, Fl. Bor.-Am. ii, 145, in part.-Cooper in Pacific R. R. Rep. xii2, 29.
- S. brachystachys, var. Scouleriana, Andersson in De Candolle, Prodr. xvi2, 224.
- S. flavescens, Bebb in Bot. California, ii, 86, in part.

BLACK WILLOW.

Kadiak island, Alaska (Kellogg), southward through British Columbia, western Washington territory, and Oregon to Santa Barbara, California.

A small tree, 8 to 9 meters in height, with a trunk rarely 0.60 meter in diameter; uplands, near springs or streams, or often in quite dry soil; common and reaching its greatest development near the shores of Puget sound.

Wood light, hard, strong, tough, close-grained, compact; medullary rays numerous, very obscure; color, light red, the sap-wood brown; specific gravity, 0.5412; ash, 0.39.

314.—Salix Hookeriana, Barratt;

Hooker, Fl. Bor.-Am. ii, 145, t. 180.—Nuttall, Sylva, i, 64; 2 ed. i, 80.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 119 (Proc. Am. Acad. iv, 59); De Candolle, Prodr. xvi², 274.—Walpers, Ann. v, 747.—Macoun in Geological Rep. Canada, 1875–76, 210.

Grand rapids of the Saskatchewan (Douglas); coast of Washington territory and Oregon.

A small tree, 8 to 9 meters in height, with a trunk rarely 0.30 meter in diameter, or more often a low, straggling shrub with many prostrate stems; on the coast generally along the edge of sea-beaches, or in low, rather moist, sandy soil.

Wood light, soft, close-grained, compact, containing many minute open ducts; medullary rays thin, very obscure; color, light brown tinged with red, the sap-wood nearly white; specific gravity, 0.5350; ash, 0.32.

315.—Salix cordata, var. vestita, Andersson,

Kongl. Sven. Akad. Handl. vi, 159; De Candolle, Prodr. xvi2, 252.

DIAMOND WILLOW.

Valley of the Missouri river and its tributaries, Fort Osage, Missouri (*Prince Neuwied*), Iowa, Nebraska, and westward to about the one hundred and tenth degree of longitude.

A small tree, rarely 8 meters in height, with a trunk 0.15 to 0.20 meter in diameter, or more often a straggling shrub not exceeding 1.80 to 3 meters in height; low bottom lands, in wet, sandy soil.

Wood light, soft, close-grained, compact, the annual layers of growth clearly defined; medullary rays very obscure; color, brown or often tinged red, the sap-wood nearly white; specific gravity, 0.6069; ash, 0.59; heavier than that of other species examined, and largely used for fence posts, being said to equal, when thoroughly seasoned, red cedar in durability in contact with the soil.

Note.—The typical Salix cordata, Muhlenberg, of wide distribution through the Atlantic region, rarely, if ever, attains arborescent size or habit.

316.—Salix lasiolepis, Bentham,

- Pl. Hartweg. 335.—Cooper in Smithsonian Rep. 1858, 261.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 118 (Proc. Am. Acad. iv, 58); De Candolle, Prodr. xvi², 264.—Walpers, Ann. v, 747.—Vasey, Cat. Forest Trees, 29.—Bebb in Bot. California, ii, 86.
 - S. lasiolepis, var. Bigelovii, Bebb in Bot. California, ii, 86 (a vernal state, teste Bebb in lit.).
 - S. Bigelovii, Torrey in Pacific R. R. Rep. iv, 139.—Andersson in Ofv. af. Vet. Akad. Forb. 1858, 118 (Proc. Am. Acad. iv, 58); Kongl. Sven. Akad. Handl. vi, 163, f. 94; De Candolle, Prodr. xvi², 255.—Walpers, Ann. v, 747.
 - S. Bigelovii, var. fuscior, Andersson in Kongl. Sven. Akad. Handl. vi, 163; De Candolle, Pro Ir. xvi², 255.
 - S. —, ? Watson in King's Rep. v, 325.
 - S. losiolepis, var. fallax, Bebb in Bet. California, ii. 86.

WILLOW.

California, valley of the Klamath river, southward through the western portions of the state, reaching in the Sierra Nevadas an elevation of 3,500 to 4,000 feet above the sea.

A small tree, sometimes 12 to 18 meters in height, with a trunk 0.45 to 0.50 meter in diameter, or northward and at high elevations reduced to a low shrub; leaves varying greatly in shape and breadth (vars. angustifolia and latifolia, Andersson in De Candolle Prodr. xvi², 255), or toward its southern limit often persistent until spring (S. Hartwegi, Bentham in Pl. Hartweg, 52; S. humilis, var. Hartwegi, Andersson, l. c. 236).

Wood light, soft, not strong, close-grained, compact; medullary rays numerous, thin; color, light brown, the sap-wood nearly white; specific gravity, 0.5587; ash, 0.98; somewhat used as fuel, especially in the southern part of the state.

317.-Salix Sitchensis, Sanson:

Bongard in Mem. Acad. St. Petersburg, 6 ser. ii, 162.—Ledebour, Fl. Rossica, iii, 609.—Richardson, Arctic Exped. 439.—Andersson in Ofv. af. Vet. Akad. Forh. 1858, 126 (Proc. Am. Acad. iv, 66); Kongl. Sven. Akad. Handl. vi, 106, f. 59; De Candolle, Prodr. xvi², 233.—Walpers, Ann. v, 752.—Gray in Proc. Am. Acad. vii, 402.—Hall in Coulter's Bot. Gazette, ii, 93.—Bebb in Bot. California, ii, 87; Coulter's Bot. Gazette, vii, 25.

S. cuneata, Nuttall, Sylva, i, 66; 2 ed. i, 82.

SILKY WILLOW.

Alaska, southward near the coast to Santa Barbara, California.

A low, much-branched tree, rarely exceeding 8 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or more often a straggling shrub; low, wet soil, borders of streams and ponds.

A form with narrow oblanceolate leaves is-

var. angustifolia, Bebb in Bot. California, ii, 87.

S. chlorophylla, var. pellita, Andersson in Kongl. Sven. Akad. Handl. 139, f. 72; De Candolle, Prodr. xvi2, 244.

Wood light, soft, close-grained, compact; medullary rays numerous, thin; color, light red, the sap-wood nearly white; specific gravity, 0.5072; ash, 0.59.

318.-Populus tremuloides, Michaux,

- Fl. Bor.-Am. ii, 243.—Nouveau Duhamel, ii, 184, t. 53.—Persoon, Syn. ii, 623.—Desfontaines, Hist. Arb. ii, 465.—Michaux f. Hist. Arb.-Am. iii, 285, t. 8, f. 1; N. American Sylva, 3 ed. ii, 175, t. 99, f. 1.—Poiret, Suppl. iv, 377.—Willdenow, Enum. Suppl. 67.—Torrey, Ann. Lyc. N. York, ii, 249; Compend. Fl. N. States, 375; Fremont's Rep. 97; Fl. N. York, ii, 214; Sitgreaves' Rep. 172; Ives' Rep. 27; Bot. Wilkes Exped, 468.—Beck, Bot. 323.—Darlington, Fl. Cestrica, 3 ed. 281.—Eaton, Manual, 117; 6 ed. 277.—Lindley, Fl. Med. 320.—Hooker, Fl. Bor.-Am. ii, 154.—Eaton & Wright, Bot. 370.—Bigelow, Fl. Boston. 3 ed. 397.—Spach in Ann. Sci. Nat. 2 ser. xv, 30; Hist. Veg. x, 384.—Nuttall, Sylva, i, 55; 2 ed. i, 70.—Seringe, Fl. des Jard. ii, 56.—Parry in Owen's Rep. 618.—Newberry in Pacific R. R. Rep. vi, 25, 89.—Cooper in Smithsonian Rep. 1858, 257; Pacific R. R. Rep. xii², 29, 68; Am. Nat. iii, 409.—Hooker f. in Trans. Linnæan Soc. xxiii², 301.—Wood, Cl. Book, 655; Bet. & Fl. 311.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 209.—Gray, Manual N. States, 5 ed. 466.—Wesmæl in De Candolle, Prodr. xvi², 325.—London Gard. Chronicle, 1871, 683.—Watson in King's Rep. v, 327; Pl. Wheeler, 17; Am. Jour. Sci. 3 ser. xv, 135; Bot. California, ii, 91.—Porter in Hayden's Rep. 1871, 494.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 128.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 29.—Hall in Coulter's Bot. Gazette, ii, 91.—Macoun in Geological Rep. Canada, 1875-76, 210.—Rothrock in Wheeler's Rep. vi, 51.—Beal in Am. Nat. xv, 32, f. 1.—Trelease in Coulter's Bot. Gazette, vi, 284, f. 6.—Sears in Bull. Essex Inst. xiii, 183.—G. M. Dawson in Canadian Nat. new ser. ix, 231.—Ridgway in Proc. U. 8. Nat. Mus. 1882, 87.
 - P. trepida, Willdenow, Spec. iv, 803.—Aiton, Hort. Kew. 2 ed. 395.—Pursh. Fl. Am. Sept. ii, 618.—Eaton, Manual, 117.—Nuttall, Genera, ii, 239.—Sprengel, Syst. ii, 244.—Loudon, Arboretum, iii, 1649, f. 1510.
 - P. tremuliformis, Emerson, Trees Massachusetts, 243; 2 ed. i, 279 & t.
 - P. Atheniensis, Hort.-Koch, Dendrologie, ii, 486 (excl. syn.).

ASPEN. QUAKING ASP.

Northern Newfoundland and Labrador to the southern shores of Hudson bay, northwest to the Great Bear lake, the mouth of the Mackenzie river, and the valley of the Yukon river, Alaska; south in the Atlantic region to the mountains of Pennsylvania, the valley of the lower Wabash river, and northern Kentucky; in the Pacific region south to the valley of the Sacramento river, California, and along the Rocky mountains and interior ranges to southern New Mexico, Arizona, and central Nevada.

A small tree, 15 to 18 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; very common through British America and spreading over enormous areas bared by fire of the coniferous forest; in the Pacific region very common upon moist mountain slopes and bottoms at an elevation of 6,000 to 10,000 feet; the most widely-distributed North American tree.

Wood light, soft, not strong, close-grained, compact, not durable, containing, as does that of the whole genus, numerous minute, scattered, open ducts; medullary rays very thin, hardly distinguishable; color, light brown, the thick sap-wood nearly white; specific gravity, 0.4032; ash, 0.55; largely manufactured into wood-pulp, a substitute for rags in the manufacture of paper; in the Pacific region sometimes used for fuel, flooring, in turnery, etc.

A bitter principle in the bark causes its occasional use as a tonic in the treatment of intermittent fevers and cases of debility (U. S. Dispensatory, 14 ed. 1763).

319.-Populus grandidentata, Michaux,

Fl. Bor.-Am. ii, 243.—Persoon, Syn. ii, 624.—Desfontaines, Hist. Arb. ii, 466.—Michaux f. Hist. Arb. Am. iii, 287, t. 8, f. 2; N. American Sylva, 3 ed. ii, 176, t. 99, f. 2.—Pursh, Fl. Am. Sept. ii, 619.—Poiret, Suppl. iv, 377.—Barton, Compend. Fl. Philadelph. ii, 197.—Nuttall, Genera, ii, 239.—Hayne, Dend. Fl. 200.—Willdenow, Enum. Suppl. 67.—Elliott, Sk. ii, 710.—Sprengel, Syst. ii, 244.—Torrey, Compend. Fl. N. States, 375; Fl. N. York, ii, 214.—Beck, Bot. 323.—Eaton, Manual, 6 ed. 277.—Hooker, Fl. Bor.-Am. ii, 154.—Eaton & Wright, Bot. 370.—Loudon, Arboretum, iii, 1650, f. 1511.—Bigelow, Fl. Boston. 3 ed. 397.—Spach in Ann. Sci. Nat. xv, 2 ser. 33; Hist. Veg. x, 384.—Emerson, Trees Massachusetts, 242; 2 ed. i, 278 & t.—Seringe in Fl. des Jard. ii, 56.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 281.—Darby, Bot. S. States, 507.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 431.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 73.—Wood, Cl. Book, 656; Bot. & Fl. 311.—Gray, Manual N. States, 5 ed. 466.—Koch, Dendrologie, ii, 487.—Wesmæl in De Candolle, Prodr. xvi², 327.—Vasey, Cat. Forest Trees, 29.—Watson in Am. Jour. Sci. 3 ser. xv, 135.—Beal in Am. Nat. xv, 34, f. 2.—Sears in Bull. Essex Inst. xiii, 182.—Trelease in Coulter's Bot. Gazette, vi, 285.—Bell in Geological Rep. Canada, 1879—180, 56°.

P. grandidentata, var. pendula, Torrey, Compend. Fl. N. States, 375.—Nuttall, Genera, ii, 239.

POPLAR.

Nova Scotia, New Brunswick, and west through Ontario to northern Minnesota, south through the northern states and along the Alleghany mountains to North Carolina, extending west to middle Kentucky and Tennessee.

A tree 21 to 24 meters in height, with a trunk 0.50 to 0.75 meter in diameter; rich woods and borders of streams and swamps.

Wood light, soft, not strong, close-grained, compact; medullary rays thin, obscure; color, light brown, the sap-wood nearly white; specific gravity, 0.4632; ash, 0.45; largely manufactured into wood-pulp and occasionally used in turnery, for woodenware, etc.

320.-Populus heterophylla, Linnœus,

Spec. 1 ed. 1034.—Marshall, Arbustum, 107.—Wangenheim, Amer. 85.—Walter, Fl. Caroliniana, 248.—Aiton, Hort. Kew. iii, 407; 2 ed. v, 397.—Nouveau Duhamel, ii, 181, t. 51.—Michaux, Fl. Bor.-Am. ii, 244.—Willdenow, Spec. iv, 806; Enum, 1017; Berl. Baumz. 293.—Desfontaines, Hist. Arb. ii, 466—Pursh, Fl. Am. Sept. ii, 619.—Nuttall, Genera, ii, 239.—Hayne, Dend. Fl. 203.—Elliott, Sk. ii, 712.—Sprengel, Syst. ii, 244.—Torrey, Compend. Fl. N. States, 375; Fl. N. York, ii, 215.—Beck, Bot. 323.—Eaton, Manual, 6 ed. 278.—Darlington, Fl. Cestrica, 3 ed. 281.—Loudon, Arboretum, iii, 1672, f. 1534.—Eaton & Wright, Bot. 371.—Spach in Ann. Sci. Nat. 2 ser. xv, 30; Hist. Veg. x, 386.—Seringe in Fl. des Jard. ii, 61.—Darby, Bot. S. States, 507.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 431.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 73.—Wood, Cl. Book, 656; Bot. & Fl. 311.—Gray, Manual N. States, 5 ed. 467.—Koch, Dendrologie, ii, 488.—Wesmæl in De Candolle, Prodr. xvi², 326.—Vasey, Cat. Forest Trees, 29.—Watson in Am. Jour. Sci. 3 ser. xv, 135.—Trelease in Coulter's Bot. Gazette, vi, 285.—Ridgway in Proc. U. S. Nat. Mus. 1881, 86.

P. cordifolia, Burgsdorf, Anleit. Erz. Holzart. 3 ed. 152.

P. argentea, Michaux f. Hist. Arb. Am. iii, 390, t. 9; N. American Sylva, 3 ed. ii, 170, t. 97.

P. heterophylla, var. argentea, Wesmæl in De Candolle, Prodr. xvi², 376.

RIVER COTTONWOOD. SWAMP COTTONWOOD.

Guilford, Connecticut (W. R. Dudley), Northport, Long island, south, generally near the coast, to southern Georgia, through the Gulf states to western Louisiana, and through Arkansas to central Tennessee and Kentucky, southern Illinois and Indiana.

A tree 24 to 27 meters in height, with a trunk 0.60 to 0.75 meter in diameter; borders of river swamps; most common and reaching its greatest development in the basin of the lower Ohio river; rare and local.

Wood light, soft, not strong, close-grained, compact; medullary rays thin, very obscure; color, dull brown, the thick sap-wood lighter brown; specific gravity, 0.4089; ash, 0.81.

321.-Populus balsamifera, Linnæus,

Spec. 1 ed. 1034.—Du Roi, Harbk. 82 —Marshall, Arbustum, 107.—Wangenheim, Amer. 85, t. 28, f. 59.—Aiton, Hort. Kew. iii, 406; 2 ed. v., 397.—Mœnch, Meth. 338.—B. S. Barton, Coll. i, 16.—Nouveau Duhamel, ii, 179, t. 50.—Michaux, Fl. Bor.-Am. ii, 244.—Willdenow, Spec. iv, 805; Enum. 1017; Berl. Baumz. 290.—Persoon, Syn. ii, 624.—Desfontaines, Hist. Arb. ii, 466.—Michaux f. Hist. Arb. Am. iii, 306, t. 13, f. 1; N. American Sylva, 3 ed. ii, 172, t. 98, f. 1.—Pursh, Fl. Am. Sept. ii, 618.—Eaton, Manual, 117; 6 ed. 278.—Nuttall, Genera, ii, 239; Sylva, i, 55; 2 ed. i, 70.—Hayne, Dend. Fl. 202.—Sprengel, Syst. ii, 244.—Beck, Bot. 322.—Lindley, Fl. Med. 320.—Loudon, Arboretum, iii, 1637, f. 1535, 1536 & t.—Hooker, Fl. Bor.-Am. ii, 153.—Eaton & Wright, Bot. 370.—Hooker & Arnott, Bot. Beechey, 159.—Spach in Ann. Sci. Nat. 2 ser. xv, 33; Hist. Veg. x, 393.—Lindley, Bot. Reg. xxix, Misc. 20.—Seringe in Fl. des Jard. ii, 65.—Torrey, Fl. N. York, ii, 216; Bot. Wilkes Exped. 469.—Cooper in Smithsonian Rep. 1858, 257; Am. Nat. iii, 408.—Hooker f. in Trans. Linnæan Soc. xxiii³, 301.—Wood, Cl. Book, 656; Bot. & Fl. 311.—Gray, Manual N. States, 5 ed. 467.—Koch, Dendrologie, ii, 495.—Vasey, Cat. Forest Trees, 29.—Macoun in Geological Rep. Canada, 1875-76, 211.—Watson in Am. Jour. Sci. xv, 135.—Beal in Am. Nat. xv, 34, f. 4.—Trelease in Coulter's Bot. Gazette, vi, 285.—Sears in Bull. Essex Inst. xiii, 181.—Bell in Geological Rep. Canada, 1879-'80, 45c.

- P. Tacamahaca, Miller, Dict.
- P. viminea, Bon Jard. 1845, 565.
- P. balsamifera, var. genuina, Wesmæl in De Candolle, Prodr. xvi², 329.

BALSAM. TACAMAHAC. BALM OF GILEAD.

Straits of Belle Isle to Richmond gulf and cape Churchill, Hudson bay, northwest to the shores of the Great Bear lake and the valley of the Yukon river, Alaska, south to northern New England, central Michigan and Minnesota, the Rocky mountains and interior ranges of Montana and Idaho, Washington territory, and British Columbia.

A large tree,18 to 24 meters in height, with a trunk 1.50 to 2.10 meters in diameter; very common on all islands and shores of the northern rivers; in British Columbia generally confounded with the allied *P. trichocarpa*, the range of the two species here still uncertain.

Wood very light, soft, not strong, close-grained, compact; medullary rays numerous, very obscure; color, brown, the thick sap-wood nearly white; specific gravity, 0.3635; ash, 0.66.

The buds, as well as those of several other species, covered with a resinous exudation, and occasionally used medicinally as a substitute for turpentine and other balms.

Var. candicans, Gray,

Manual N. States, 2 ed. 419; 5 ed. 467.—Cooper in Smithsonian Rep. 1858, 257.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 129.—Watson in Am. Jour. Sci. 3 ser. xv, 135.—Bull. Torrey Bot. Club, vii, 57.—Trelease in Coulter's Bot. Gazette, vi. 285.

- P. balsamifera lanceolata, Marshall, Arbustum, 108.
- P. candicans, Aiton, Hort. Kew. iii, 406; 2 ed. v. 397.—Nouveau Duhamel, ii, 179.—Willdenow, Spec. iv, 806; Enum. 1017; Berl. Baumz. 291.—Persoon, Syn. ii, 624.—Michaux f. Hist. Arb. Am. iii, 308, t. 13, f. 2; N. American Sylva. 3 ed. ii, 173, t. 98, f. 2.—Pursh, Fl. Am. Sept. ii, 618.—Barton, Prodr. Fl. Philadelph. 96.—Poiret, Suppl. iv, 378.—Nuttall, Genera, ii, 239.—Hayne, Dend. Fl. 202.—Sprengel, Syst. ii, 244.—Torrey, Compend. Fl. N. States, 375; Fl. N. York, ii, 217.—Andubon, Birds, t. 59.—Beck, Bot, 332.—Eaton, Manual, 6 ed. 278.—Loudon, Arboretum, ii, 1676, f. 1537.—Hooker, Fl. Bor.-Am. ii, 154.—Eaton & Wright, Bot. 370.—Bigelow, Fl. Boston. 3 ed. 398.—Spach in Ann. Sci. Nat. 2 ser. xv, 33; Hist. Veg. x, 392.—Lindley, Bot. Reg. xxix, Misc. 22.—Emerson, Trees Massachusetts, 245; 2 ed. i, 281.—Seringe in Fl. des Jard. ii, 63.—Gray, Manual N. States, 1 ed. 431.—Wood, Cl. Book, 656; Bot. & Fl. 311.—Wesmæl in De Candolle, Prodr. xvi², 330.
- P. Canadensis, Monch, Weiss. 81 [not Michaux f.].
- P. latifolia, Mench, Meth. 338.
- P. Ontariensis, Hort.—Loddiges, Cat. 1836.
- P. macrophylla, Lindley in Loudon, Encyc. Pl. 840.
- P. acladesca and P. heterophylla, Hort. (ex. Koch, Wachen. 1865, 238).

A large tree, rare or unknown in a wild state; very common in cultivation. The wood heavier than that of the species; specific gravity, 0.4161; ash, 0.46.

322.-Populus angustifolia, James,

- Long's Exped. i, 497.—Torrey in Ann. Lyc. N. York, ii, 249; Fremont's Rep. 97; Sitgreaves' Rep. 172; Ives' Rep. 27; Bot. Wilkes Exped. 469.—Nuttall, Sylva, i, 52, t. 16; 2 ed. i, 68, t. 16.—Cooper in Smithsonian Rep. 1858, 261; Am. Nat. iii, 408.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 29.—Watson in Am. Jour. Sci. 3 ser. xv, 136; Bot. California, ii, 91.
 - P. Canadensis, var. angustifolia, Wesmæl in De Candolle, Prodr. xvi2, 329.
 - P. balsamifera, var. angustifolia, Watson in King's Rep. v, 327; Pl. Wheeler, 17.—Porter in Hayden's Rep. 1871, 494.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 128.—Macoun in Geological Rep. Canada, 1875-'76, 211.—Rusby in Bull. Torrey Bot. Club, ix, 106.

BLACK COTTONWOOD.

Black hills of Dakota (R. Douglas), Swimming Horse creek, and the Snowy Mountain region, Montana, Red Rock creek, southwestern Montana (Watson), east Humboldt and Shoshone mountains, Nevada, Rocky mountains of Colorado, and the ranges of southwestern New Mexico and eastern Arizona.

A small tree, 15 to 18 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; borders of streams, between 6,000 and 10,000 feet elevation.

Wood light, soft, weak, close-grained, compact; medullary rays numerous, obscure; color, brown, the sap-wood nearly white; specific gravity, 0.3912; ash, 0.79.

323.-Populus trichocarpa, Torrey & Gray;

- Hooker, Icon. v, 878.—Walpers, Ann. v, 767.—Cooper in Smithsonian Rep. 1858, 266.—Wesmæl in De Candolle, Prodr. xvi², 330.—Watson in King's Rep. v, 328; Am. Jour. Sci. 3 ser. xv, 136; Bot. California, ii, 91.—Torrey, Bot. Wilkes Exped. 469.—Macoun in Geological Rep. Canada, 1875–76, 211.—Trelease in Coulter's Bot. Gazette, vi, 285, f. 5.—G. M. Dawson in Canadian Nat. new ser. ix, 331.
 - P. balsamifera, var. Hooker, Fl. Bor.-Am. ii, 154.
 - P. angustifolia, Newberry in Pacific R. R. Rep. vi, 89 [not James].—Cooper in Pacific R. R. Rep. xii, 29, 68.
 - P. balsamifera, Lyall in Jour. Linnæan Soc. vii, 134 [not Linnæus].—Hall in Coulter's Bot. Gazette, ii, 91.
 - P. trichocarpa, var. cupulata, Watson in Am. Jour. Sci. 3 ser. xv, 136; Bot. California, ii, 91.
 - P. balsamifera, var. & Californica, Watson in Am. Jour. Sci. 3 ser. xv, 136.

BLACK COTTONWOOD. BALSAM COTTONWOOD.

Valley of the Fraser river, British Columbia, and probably much farther north, east to the eastern base of the Bitter Root mountains, Montana (Watson), south through Washington territory, western Oregon and California to the southern borders of the state.

A large tree, 24 to 60 meters in height, with a trunk 1.20 to 2.10 meters in diameter; banks of streams and bottom lands below 6,000 feet elevation; very common and reaching its greatest development in the valleys of the lower Columbia river and the streams flowing into Puget sound, here the largest deciduous tree of the forest.

Wood very light, soft, not strong, rather close-grained, compact; medullary rays thin, hardly distinguishable; color, light dull brown, the sap-wood lighter, nearly white; specific gravity, 0.3814; ash, 1.27; in Oregon and Washington territory largely manufactured into staves of sugar barrels, woodenware, etc.

324.-Populus monilifera, Aiton,

Hort. Kew. iii, 406; 2 ed. v, 396.—Abbot, Insects Georgia, ii, 71.—Nouveau Duhamel, ii, 186.—Willdenow, Spec. iv, 805; Enum. 1017; Berl. Baumz. 292.—Persoon, Syn. ii, 623.—Desfontaines, Hist. Arb. ii, 465.—Michaux f. Hist. Arb. Am. iii, 295, t. 10, f. 2; N. American Sylva, 3 ed. ii, 168, t. 96, f. 2.—Pursh, Fl. Am. Sept. ii, 618.—Nuttall, Genera, ii, 239; Trans. Am. Phil. Soc. 2 ser. v, 167.—Hayne, Dend. Fl. 202.—Sprengel, Syst. ii, 244.—Watson, Dend. Brit. ii, t. 102.—Beck, Bot. 323.—Eaton, Manual, 6 ed. 278.—London, Arboretum, iii, 1657, f. 1517 & t.—Eaton & Wright, Bot. 371.—Spach in Ann. Sci. Nat. 2 ser. xv, 32; Hist. Veg. x, 389.—Torrey in Fremont's Rep. 97; Fl. N. York, ii, 215; Pacific R. R. Rep. v, 365.—Emerson, Trees Massachusetts, 249; 2 ed. i, 287.—Seringe in Fl. des Jard. ii, 63.—Cooper in Smithsonian Rep. 1858, 257.—Gray in Pacific R. R. Rep. xii², 47; Manual N. States, 5 ed. 467.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 72.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 655.—Engelmann in Trans. Am. Phil, Soc. xii, 209.—Watson in King's Rep. v, 327; Am. Jour. Sci. 3 ser. xv, 136.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Macoum in Geological Rep. Canada, 1875–76, 211.—Trelease in Coulter's Bot. Gazette, vi, 285, f. 3, 4.—Ward in Bull. U. S. Nat. Mus. No. 22, 116.—Beal in Am. Nat. xv, 34, f. 3.—Bell in Geological Rep. Canada, 1879–'80, 56°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 87.—Chapman, Fl. S. States, Suppl. 649.

? P. deltoide, Marshall, Arbustum, 106.

- P. angulata, Aiton, Hort. Kew. iii, 406; 2 ed. v, 396.—Nouveau Duhamel, ii, 186.—Desfontaines, Hist. Arb. ii, 466.—Willdenow, Spec. iv, 805; Enum. 1017; Berl. Baumz. 294.—Michaux f. Hist. Arb. Am. iii, 302, t. 12; N. American Sylva, 3 ed. ii, 161, t. 94.—Pursh, Fl. Ann. Sept. ii, 619.—Eaton, Manual, 117; 6 ed. 277.—Nuttall, Genera, ii, 239.—James in Long's Exped. ii, 164.—Torrey in Ann. Lyc. N. York, ii, 249.—Elliott, Sk. ii, 711.—Sprengel, Syst. ii, 244.—Loudon, Arboretum, iii, 1670, 1533 & t.—Eaton & Wright, Bot. 370.—Spach in Ann. Sci. Nat. 2 ser. xv, 321; Hist. Veg. x, 391.—Seringe in Fl. des Jard. ii, 64.—Scheele in Romer, Texas, 446.—Darby, Bot. S. States, 507.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 431.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 655; Bot. & Fl. 311.—Gray, Manual N. States, 5 ed. 467.—Wesmæl in De Candolle, Prodr. xvi², 328.—Koch, Dendrologie, ii, 494.—Young, Bot. Texas, 514.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 129.—Vasey, Cat. Forest Trees, 29.—Sears in Bull. Essex Inst. xiii, 182.
- P. lævigata, Aiton, Hort. Kew. iii, 406; 2 ed. v, 395.—Willdenow, Spec. iv, 803.—Pursh, Fl. Am. Sept. ii, 619.—Poiret, Suppl. iv, 378.—Nuttall, Genera, ii, 239; Sylva, i, 54; 2 ed. i, 70.—Sprengel, Syst. ii, 244.—Beck, Bot. 323.—Eaton, Manual, 6 ed. 278.—Loddiges, Cat. ed. 1836.—Eaton & Wright, Bot. 370.—Emerson, Trees Massachusetts, 246; 2 ed. i, 283.
- P. glandulosa, Mench, Meth. 339.
- P. angulosa, Michaux, Fl. Bor.-Am. ii, 243.
- P. Canadensis, Michaux f. Hist. Arb. Am. iii, 302, t. 12; N. American Sylva, 3 ed. ii, 164, t. 95.—Spach in Ann. Sci. Nat. 2 ser. xv, 32; Hist. Veg. x, 390.—Seringe in Fl. des Jard. ii, 65.—Fescali, Forst. Pfl. 122, t. 8, f. 10-14.—Wood, Bot. & Fl. 311.—Wesmæl in De Candolle, Prodr. xvi², 329.—Koch, Dendrologie, ii, 491.
- P. Virginiana, Du Mont, Cours. Bot. Cult. vi, 400.
- P. Marylandica, Bose in Nouv. Dict. xi, 409.—Poiret, Suppl. iv, 378.—Sprengel, Syst. ii, 244.
- P. macrophylla, Loddiges, Cat. ed. 1836.
- P. Lindleyana, P. neglecta, and P. lævigata, Hort.

COTTONWOOD. NECKLACE POPLAR. CAROLINA POPLAR. BIG COTTONWOOD.

Shores of lake Champlain, Vermont, south through western New England to the Chattahoochee region of western Florida, west along the northern shores of lake Ontario to the eastern base of the ranges of the Rocky mountains of Montana, Colorado, and New Mexico.

A large tree, 24 to 51 meters in height, with a trunk 1.20 to 2.40 meters in diameter; low, moist soil; the common cottonwood of Texas and the western plains, bordering all streams flowing east from the Rocky mountains.

Wood very light, soft, not strong, close-grained, compact, liable to warp in drying, difficult to season; medullary rays numerous, obscure; color, dark brown, the thick sap-wood nearly white; specific gravity, 0.3889; ash, 0.96; largely used in the manufacture of paper-pulp, for light packing-cases, fence boards, and fuel.

325.—Populus Fremontii, Watson,

Proc. Am. Acad, x, 350; Am. Jour. Sci. 3 ser. xv, 136; Bot. California, ii, 92.

P. monilifera, Newberry in Pacific R. R. Rep. vi, 327 [not Aiton].—Watson in King's Rep. v, 327; Pl. Wheeler, 17.—Torrey, Bot. Wilkes Exped. 469.

COTTONWOOD.

California, valley of the upper Sacramento river, south to San Bernardino county (Colton, Parry), and eastward in Nevada and Utah.

A large tree, 24 to 30 meters in height, with a trunk 1.20 to 1.80 meter in diameter; borders of streams; the common cottonwood of the valleys of central California.

Wood light, soft, not strong, close-grained, compact, liable to warp in drying, difficult to season; medullary rays thin, very obscure; color, light brown, the sap-wood nearly white; specific gravity, 0.4914; ash, 0.77.

Var. Wislizeni, Watson,

Am. Jour. Sci. 3 ser. xv, 137; Bot. California, ii, 92; Proc. Am. Acad. xviii, 157.—Rusby in Bull. Torrey Bot. Club, ix, 79.

P. monilifera, Torrey in Sitgreaves' Rep. 172; Bot. Mex. Boundary Survey, 204; Ives' Rep. 27 [not Aiton].—Bigelow in Pacific R. R. Rep. iv, 21.

COTTONWOOD. WHITE COTTONWOOD.

San Diego county, California, through Arizona and New Mexico to western Texas and southern Colorado.

A large tree, 24 to 30 meters in height, with a trunk 1.20 to 1.80 meter in diameter; borders of streams; the prevalent cottonwood of the arid southwestern region, there largely planted as a shade tree and for fuel.

Wood light, soft, not strong, compact; specific gravity, 0.4621; ash, 1.13; furnishing the ordinary domestic fuel of the region.

CONIFERÆ.

326.-Libocedrus decurrens, Torrey,

Smithsonian Contrib., vi, 7, t. 3; Pacific R. R. Rep. iv, 140; Bot. Mex. Boundary Survey, 211; Bot. Wilkes Exped. t. 16.—Bentham, Pl. Hartweg, 338.—Lindley in London Gard. Chronicle, 1853, 695.—Newberry in Pacific R. R. Rep. vi, 63.—Cooper in Smithsonian Rep. 1858, 262.—Walpers, Ann. v, 795.—Bolander in Proc. California Acad. iii, 228.—Parlatore in De Candolle, Prodr. xvi², 456.—R. Brown Campst. in Trans. Edinburgh Bot. Soc. ix, 373.—Hoopes, Evergreens, 309, f. 40.—Watson in King's Rep. v, 335; Bot. California, ii, 116.—A. Murray in London Garden, ii, 542.—Gordon, Pinetum, 2 ed. 402.—Veitch, Manual Conif. 267.

Thuya Craigana, Murray in Rep. Oregon Exped. 2, t. 5.

Thuya gigantea, Carrière in Rev. Hort. 1854, 224, f. 12-14, in part; Fl. des Serres, ix, 199, f. 3-5, in part; Trait. Conif. 106, in part; 2 ed. 112, in part.—Gordon, Pinetum, 321, in part; Suppl. 102, in part.—Henkel & Hochstetter, Nadelhölz. 280, in part.

Heyderia decurrens, Koch, Dendrologie, ii3, 179.

WHITE CEDAR. BASTARD CEDAR. POST CEDAR. INCENSE CEDAR.

North fork of the Santian river, Oregon, south along the western slopes of the Cascade and Sierra Nevada mountains between 3,000 and 8,500 feet elevation, and through the California Coast ranges to the San Bernardino and Cayumaca mountains.

A large tree, 30 to 45 meters in height, with a trunk 1.20 to 2.10 meters in diameter; slopes and valleys; common. Wood light, soft, not strong, brittle, close-grained, compact, very durable in contact with the soil; bands of small summer cells thin, dark colored, conspicuous; medullary rays numerous, obscure; the thin sap-wood nearly white; specific gravity, 0.4017; ash, 0.08; largely used for fencing and in the construction of water-flumes, and for interior finish, furniture, laths, shingles, etc.; often injured by a species of dry rot (Dædalia vorax, Harkness in Pacific Rural Press, Jan. 25, 1879, f. 1, 2), rendering it unfit for lumber.

327.—Thuya occidentalis, Linnæus,

Spec. 1 ed. 1002, -Kalm, Travels, English ed. iii, 170.-Marshall, Arbustum, 152.-Wangenheim, Amer. 7, t. 2, f. 3.-Walter, Fl. Caroliniana, 238.—Aiton, Hort. Kew. iii, 371; 2 ed. v, 321.—Gærtner, Fruct. ii, 62, t. 91, f. 2.—Michaux, Fl. Bor.-Am. ii, 209.— Willdenow, Spec. iv, 508; Enum. 990; Berl. Baumz. 504.—Nouveau Duhamel, iii, 12, t. 4.—Poiret in Lamarck, Dict. vii, 369; Ill. iii, 369.—Schkuhr, Handb. iii, 287, t. 309.—Persoon, Syn. ii, 580.—Desfontaines, Hist. Arb. ii, 575.—Titford, Hort. Bot. Am. 98.— Michaux f. Hist. Arb. Am. iii, 29, t. 3; N. American Sylva, 3 ed. iii, 177, t. 156.—Pursh, Fl. Am. Sept. ii, 647.—Barton, Prodr. Fl. Philadelph. 93.—Eaton, Manual, 111; 6 ed. 364.—Nuttall, Genera, ii, 224.—Hayne, Dend. Fl. 177.—Elliott, Sk. ii, 641.—Watson, Dend. Brit. ii, 150.—Sprengel, Syst. iii, 888.—Richard, Conif. 43, t. 71, f. 1.—Torrey, Compend. Fl. N. States, 361; Fl. N. York, ii, 234.—Rafinesque, Med. Bot. ii, 268.—Beck, Bot. 338.—Loudon, Arboretum, iv, 2454, f. 2312-2314 & t.—Forbes, Pinetum Woburn. 193.—Hooker, Fl. Bor.-Am. ii, 165.—Eaton & Wright, Bot. 451.—Bigelow, Fl. Boston. 3 ed. 388.—Spach, Hist. Veg. xi, 339.—Penn. Cycl. xxiv, 409.—Reid in London Gard. Chronicle, 1844, 276.—Emerson, Trees Massachusetts, 96; 2 ed. i, 112.—Endlicher, Syn. Conif. 51.—Lindley & Gordon in Jour. Hort. Soc. London, v, 206.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 294.—Knight, Syn. Conif. 16.—Carrière in Rev. Hort. 1854, 224, f. 15; Trait. Conif. 103; 2 ed. 109.—Darby, Bot. S. States, 516.— Cooper in Smithsonian Rep. 1858, 257.—Gordon, Pinetum, 323; 2 ed. 403.—Chapman, Fl. S. States, 436.—Wood, Cl. Book, 662; Bot, & Fl. 315.—Porcher, Resources S. Forests, 507.—Henkel & Hochstetter, Nadelhölz. 278.—Nelson, Pinaceæ, 68.—R. Brown Campst. in Trans. Edinburgh Bot. Soc. ix, 363.—Gray, Manual N. States, 5 ed. 472.—Hoopes, Evergreens, 317.—Parlatore in De Candolle, Prodr. xvi², 458.—Schnizlein, Icon. t. 76, f. 2.—Koch, Dendrologie, ii², 173.—Vasey, Cat. Forest Trees, 36.—Macoun in Geological Rep. Canada, 1875-76, 211.—Sears in Bull. Essex Inst. xiii, 183.—Veitch, Manual Conif. 261.—Bell in Geological Rep. Canada, 1879-280, 47°.

T. odorata, Marshall, Arbustum, 152.

T. obtusa, Mench, Meth. 691.

Cupressus Arbor-vitæ, Targione-Tozzetti, Obs. Bot. ii, 51.

T. Wareana and T. Sibirica, Hort.

WHITE CEDAR. ARBOR-VITÆ.

New Brunswick to Anticosti island, through the valley of the Saint Lawrence river to the southern shores of James' bay and southeast to the eastern extremity of lake Winnipeg, south through the northern states to central New York, northern Pennsylvania, central Michigan, northern Illinois, central Minnesota, and along the Alleghany mountains to the high peaks of North Carolina.

A tree 12 to 18 meters in height, with a trunk sometimes 1.20 to 1.50 meter in diameter; cold, wet swamps and along the rocky banks of streams; very common at the north, spreading over great areas of swamp; extensively cultivated as a hedge and ornamental plant, and producing innumerable seminal varieties of more or less horticultural value.

Wood very light, soft, not strong, brittle, rather coarse-grained, compact, very durable in contact with the soil; the bands of small summer cells very thin, dark colored; medullary rays numerous, indistinct; color, light brown, turning darker with exposure, the thin sap-wood nearly white; specific gravity, 0.3164; ash, 0.37; largely used for posts, fencing, railway ties, and shingles.

The distilled oil and a tincture of the leaves of *Thuya* have been found useful in the treatment of pulmonary and uterine complaints (U. S. Dispensatory, 14 ed. 1775.—Nat. Dispensatory, 2 ed. 1428).

328.—Thuya gigantea, Nuttall,

- Jour. Philadelphia Acad. vii, 52; Sylva, iii, 102, t. iii; 2 ed. ii, 162, t. 111.—Loddiges, Cat. ed. 1836.—Loudon, Arboretum, Iv, 2458.—
 Hooker, Fl. Bor.-Am. ii, 165.—Spach, Hist. Veg. xi, 342.—Endlicher, Syn. Conif. 52.—Lindley & Gordon in Jour. Hort. Soc. London, v, 206.—Newberry in Pacific R. R. Rep. vi, 56, f. 22.—Carrière, Trait. Conif. 102; 2 ed. 112, in part.—Cooper in Smithsonian Rep. 1858, 262; Am. Nat. iii, 413.—Gordon, Pinetum, 321, in part; Suppl. 102; 2 ed. 181.—Torrey, Bot. Mex. Boundary Survey, 211.—Lyall in Jour. Linnæan Soc. vii, 133, 144.—Henkel & Hochstetter, Nadelhölz. 280, in part.—Nelson, Pinaceæ, 67.—Rothrock in Smithsonian Rep. 1867, 434.—Parlatore in De Candolle, Prodr. xvi², 457.—R. Brown Campst. in Trans. Edinburgh Bot. Soc. ix, 367.—Hoopes, Evergreens, 315.—London Gard. Chronicle, 1871, 683.—Gray in Proc. Am. Acad. vii, 402.—Fowler in London Gard. Chronicle, 1872, 1527.—Koch, Deudrologie, ii², 176.—Vasey, Cat. Forest Trees, 36.—E. Hall in Coulter's Bot. Gazette, vi, 267.—Veitch, Manual Conif. 256.
 - T. plicata, Don, Hort. Cantab. 6 ed. 249.—Lambert, Pinus, 1 ed. ii, 19; 2 ed. 114, in part.—Nuttall, Sylva, iii, 103; 2 ed. ii, 164.—Spach, Hist. Veg. xi, 342.—Endlicher, Syn. Conif. 51 (excl. syn. Wareana & odorata).—Lindley & Gordon in Jour. Hort. Soc. London, v, 205.—Knight, Syn. Conif. 16.—Carrière, Trait. Conif. 102 (excl. syn. Wareana & odorata); 2 ed. 106 (excl. syn. Wareana).—Cooper in Smithsonian Rep. 1858, 262; Pacific R. R. Rep. xii², 27.—Henkel & Hochstetter, Nadelhölz. 277 (excl. syn. odorata).—Nelson, Pinaceæ, 68.—Gordon, Pinetum, 2 ed. 406.—A. De Candolle, Prodr. xvi², 457, in part.—Vasey, Cat. Forest Trees, 36.—Veitch, Manual Conif. 263.
 - T. Menziesii, Douglas, Mss.—Carrière, Trait. Conif. 106; 2 ed. 107.—Gordon, Pinetum, 323.—Nelson, Pinacem, 67.—Henkel & Hochstetter, Nadelhölz. 281.
 - T. Lobbii, Hort.
 - T. occidentalis, var. plicata, Hort.-Hoopes, Evergreens, 321.

RED CEDAR. CANOE CEDAR.

Alaska, south along the Coast ranges and islands of British Columbia, through western Washington territory and Oregon and the Coast ranges of northern California to Mendocino county, extending east along the mountains of Washington territory to the Cœur d'Alêne, Bitter Root, and Salmon River mountains of Idaho and the western slopes of the Rocky mountains of northern Montana (Canby & Sargent).

A large tree, 30 to 45 meters in height, with a trunk 0.90 to 3.60 meters in diameter; low, rich woods and swamps, less commonly on dry ridges and slopes below 5,200 feet elevation; common and reaching its greatest development in western Washington territory and Oregon; the large specimens generally hollow.

Wood very light, soft, not strong, brittle, rather coarse-grained, compact, easily worked, very durable in contact with the soil; bands of small summer cells thin, dark colored, distinct; medullary rays numerous, obscure; color, dull brown tinged with red, the thin sap-wood nearly white; specific gravity, 0.3796; ash, 0.17; largely used for interior finish, fencing, shingles, in cabinet-making and cooperage, and exclusively by the Indians of the northwest coast in the manufacture of their canoes.

329.—Chamæcyparis sphæroidea, Spach,

Hist. Veg. xi, 331.—Endlicher, Syn. Conif. 61.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—Knight, Syn. Conif. 20.—Carrière, Trait. Conif. 133; 2 ed. 122.—Gordon, Pinetum, 49; 2 ed. 71.—Henkel & Hochstetter, Nadelhölz. 248.—Nelson, Pinaceæ, 69.—Parlatore in De Candolle, Prodr. xvi², 464.—Ridgway in Proc. U. S. Nat. Mus. 1882, 87.

Cupressus thyoides, Linnæus, Spec. 1 ed. 1003.—Kalm, Travels, English ed. ii, 174.—Du Roi, Harbk. ii, 198.—Marshall, Arbustum, 39.—Wangenheim, Amer. 8, t. 2, f. 4.—Aiton, Hort. Kew. iii, 372; 2 ed. v, 323.—Bartram, Travels, 2 ed. 409.—Michaux, Fl. Bor.-Am. ii, 208.—Willdenow, Spec. iv, 512; Enum. 991; Berl. Baumz. 111.—Nouveau Duhamel, iii, 6.—Persoon, Syn. ii, 580.—Desfontaines, Hist. Arb. ii, 567.—Schkuhr, Handb. iii, 286, t. 310.—Michaux f. Hist. Arb. Am. iii, 20, t. 2; N. American Sylva, 3 ed. iii, 162, t. 152.—Pursh, Fl. Am. Sept. ii, 646.—Eaton, Manual, 111; 6 ed. 115.—Nuttall, Genera, ii, 224.—Hayne, Dend. Fl. 178.—Elliott, Sk. ii, 644.—Watson, Dend. Brit. ii, 156.—Torrey, Compend. Fl. N. States, 361; Fl. N. York, ii, 233.—Beck, Bot. 338.—Loudon, Arboretum, iv, 2475, f. 2327.—Forbes, Pinetum Woburn. 183, t. 61.—Hooker, Fl. Bor.-Am. ii, 165.—Eaton & Wright, Bot. 215.—Bigelow, Fl. Boston. 3 ed. 387.—Emerson, Trees Massachusetts, 98; 2 ed. i, 114.—Richardson, Arctic Exped. 442.—Darby, Bot. S. States, 516.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 435.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 28.—Wood, Cl. Book, 663; Bot. & Fl. 315.—Porcher, Resources S. Forests, 509.—Gray, Manual N. States, 5 ed. 473.—Hoopes, Evergreens, 346.—Koch, Dendrologie, ii², 162.—Vasey, Cat. Forest Trees, 36.—Veitch, Manual Conif. 238.

Thuya sphæroidea, Sprengel, Syst. iii, 889.

Thuya sphæroidalis, Richard, Conif. 45, t. 8, f. 2. 12 FOR

WHITE CEDAR.

Southern Maine, south near the coast to northern Florida, and along the Gulf coast to the valley of the Pearl river, Mississippi.

A tree 24 to 27 meters in height, with a trunk 0.60 to 1.20 meter in diameter; in deep, cold swamps; rare in the Gulf states, west of the bay of Mobile.

Wood very light and soft, not strong, close-grained, compact, easily worked, very durable in contact with the soil; bands of small summer cells thin, dark colored, conspicuous; medullary rays numerous, obscure; color, light brown tinged with red, growing darker with exposure, the sap-wood lighter; specific gravity, 0.3322; ash, 0.33; largely used in boat-building, for woodenware, cooperage, shingles, interior finish, telegraph and fence posts, railway ties, etc.

Along the Atlantic coast from New Jersey southward lumber is manufactured from buried trunks of this species dug from peat swamps.

330.-Chamæcyparis Nutkaensis, Spach,

Hist. Veg. xi, 333.—Nuttall, Sylva, iii, 105; 2 ed. ii, 165.—Endlicher, Syn. Conif. 62.—Ledebour, Fl. Rossica, iii, 680.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—Carrière, Trait. Conif. 134; 2 ed. 127.—Walpers, Ann. v, 796.—Henkel & Hochstetter, Nadelhölz, 250.—Parlatore in De Candolle, Prodr. xvi², 465.—Hall in Coulter's Bot. Gazette, ii, 91.—G. M. Dawson in Canadian Nat. 2 ser. ix, 329.

Cupressus Nootkatensis, Lambert, Pinus, 1 ed. ii, 18; 2 ed. ii, No. 60.—Loudon, Arboretum, iv, 2480.

Cupressus Nutkaensis, Hooker, Fl. Bor.-Am. ii, 165.—Newberry in Pacific R. R. Rep. vi, 63, f. 28.—Gordon, Pinetum, 66; 2 ed. 94.—Cooper in Smithsonian Rep. 1858, 263.—Nelson, Pinaceæ, 74.—Hoopes, Evergreens, 345.—Lawson, Pinetum Brit. ii, 199, t. 34, f. 1-12.—Koch, Dendrologie, ii², 165.—Vasey, Cat. Forest Trees, 36.—Macoun in Geological Rep. Canada, 1876-77, 211.—Veitch, Manual Conif. 235.

Thuya excelsa, Bongard in Mem. Acad. St. Petersburg, 6 ser. ii, 164.

Cupressus Americana, Trautvetter, Imag. Pl. Fl. Rossica, 12, t. 7.

C. Nutkaensis, var. glauca, Walpers, Ann. v, 769.

Thuyopsis borealis, Hort.—Carrière, Trait. Conif. 1 ed. 113.

Thuyopsis cupressoides, Carrière, Man. des Pl. iv, 324.

C. excelsa, Fischerin herb. Sitka.

Thuyopsis Tchugatskoy and T. Tchugatskoyæ, Hort.

YELLOW CYPRESS. SITKA CYPRESS.

Sitka, south along the islands and Coast ranges of British Columbia and the Cascade mountains of Washington territory and Oregon to the valley of the Santian river, Oregon ("Lucky Camp mountain", Cusick).

A large tree of great economic value, 30 to 38 meters in height, with a trunk 1.20 to 1.80 meter in diameter, or toward its southern limits and at high elevations much smaller; common along the coast at the sea-level to about latitude 49° 30′ N., then less common and only at higher elevations; south of British Columbia hardly below 5,000 feet elevation and very rare and local; the most valuable timber tree of Alaska.

Wood light, hard, not strong, brittle, very close-grained, compact, very durable in contact with the soil, easily worked, satiny, susceptible of a beautiful polish, possessing an agreeable, resinous odor; bands of small summer cells thin, not conspicuous; medullary rays thin, numerous, hardly distinguishable; color, bright, light clear yellow, the thin sap-wood nearly white; specific gravity, 0.4782; ash, 0.34; somewhat used in boat- and ship-building, for furniture, interior finish, etc., probably unsurpassed in beauty as a cabinet wood by that of any North American tree.

331.—Chamæcyparis Lawsoniana, Parlatore,

Stud. Organ. Conif. 23, 29, t. 3, f. 22-25; De Candolie, Prodr. xvi², 464.—Gordon, Pinetum, 2 ed. 85.—Watson, Bot. California, ii, 155.—Sargent in London Gard. Chronicle, 1881, 8.

Cupressus Lawsoniana, Murray in Edinburgh New Phil. Jour. new ser. i, 292, t. 9.—Bot. Mag. t. 5581.—Nelson, Pinaceæ, 72.—Cooper in Smithsonian Rep. 1858, 263.—Lawson, Pinetum Brit. ii, 191, t. 31, f. 1-13.—Hoopes, Evergreens 342, f. 53.—Henkel & Hochstetter, Nadelhölz. 246.—Fowler in London Gard. Chronicle, 1872, 285.—London Garden, vii 508 & t.—Vasey, Cat. Forest Trees, 36.—Veitch, Manual Conif. 231.—Eichler in Monatsb. Acad. Berl. 1881, f. 29, 30.

Cupressus fragrans, Kellogg in Proc. California Acad. i, 103.

? Cupressus attenuata, Gordon, Pinetum, 1 ed. 57; 2 ed. 79.

C. Boursierii, Carrière, Trait. Conif. 2 ed. 125 [not Decaisne].

C. Nutkanus, Torrey, Bot. Wilkes Exped. t. 16.

PORT ORFORD CEDAR. OREGON CEDAR. WHITE CEDAR. LAWSON'S CYPRESS. GINGER PINE.

Oregon, Coos bay, south to the valley of the Rogue river, not extending more than thirty miles from the coast; California, valley of the upper Sacramento river (shores of Castle and Soda lakes, Shasta county).

A large tree of the first economic value, 45 to 61 meters in height, with a trunk 1.80 to 4 meters in diameter; rich woods, in low, moist soil, interspersed with the yellow fir and hemlock; most common and reaching its greatest development along the Oregon coast; local; in California very rare and local.

Wood light, hard, strong, very close-grained, compact, easily worked, very durable in contact with the ground, abounding in odoriferous resin, satiny, susceptible of a beautiful polish; layers of small summer cells thin, not conspicuous; medullary rays numerous, very obscure; color, light yellow or almost white, the thin sap-wood hardly distinguishable; specific gravity, 0.4621; ash, 0.10; largely manufactured into lumber and used for interior finish, flooring, railway ties, fence posts, matches, and in ship- and boat-building; the resin strongly diuretic and a powerful insecticide.

332.—Cupressus macrocarpa, Hartweg,

- Jour. Hort. Soc. London, ii, 187.—Bentham, Pl. Hartweg. 337.—Gordon in Jour. Hort. Soc. London, iv, 296 & t.; Pinetum, 65; 2 ed. 91.—Lindley & Gordon in Jour. Hort. Soc. London, v, 206.—Knight, Syn. Conif. 20.—Torrey, Bot. Mex. Boundary Survey, 211.—Cooper in Smithsonian Rep. 1858, 263; Proc. California Acad. iii, 290.—Carrière, Trait. Conif. 1 ed. 124, in part.—Bolander in Proc. California Acad. iii, 228.—Henkel & Hochstetter, Nadelhölz. 239.—Nelson, Pinaceæ, 73.—Hoopes, Evergreens, 353.—Parlatore in De Candolle, Prodr. xvi², 473.—Fowler in London Gard. Chronicle, 1872, 285.—Koch, Dendrologie, ii², 148.—Vasey, Cat. Forest Trees, 36.—Watson, Bot. California, ii, 113.—Veitch, Manual Conif. 234.—Lawson Pinetum Brit, ii, 195, t. 32.
 - C. Lambertiana, Carrière in Rev. Hort. 1855, 232; Trait. Conif. 124; 2 ed. 166.
 - C. Hartwegii, Carrière in Rev. Hort. 1855, 232; Trait. Conif. 2 ed. 168.
 - ?C. macrocarpa, var. fastigiata, Knight, Conif. 20.—Parlatore in De Caudolle, Prodr. xvi², 473.—Veitch, Manual Conif. 234.
 - ?C. Hartwegii, var. fastigiata, Carrière, Trait. Conif. 2 ed. 169.

MONTEREY CYPRESS.

California, Monterey (Cypress point, Pescadero ranch, and Carmelo point).

A tree 15 to 21 meters in height, with a trunk 1.20 to 1.80 meter in diameter; on granite rocks immediately upon the sea-coast; very local.

Wood heavy, hard, strong, rather brittle, very close-grained, compact, easily worked, very durable in contact with the soil, satiny, susceptible of a beautiful polish, odorous; bands of small summer cells thin, dark colored, conspicuous; medullary rays numerous, hardly distinguishable; color, clear bright brown streaked with red and yellow, the thin sap-wood light yellow; specific gravity, 0.6261; ash, 0.57; very beautiful and of undoubted value as a cabinet wood.

333.-Cupressus Goveniana, Gordon,

- Jour. Hort. Soc. London, iv, 296 & f.; Pinetum, 60; 2 ed. 83.—Bentham, Pl. Hartweg. 337.—Lindley & Gordon in Jour. Hort. Soc. London, v, 206.—Carrière, Trait. Conif. 125; 2 ed. 170.—Torrey, Mex. Boundary Survey, 211.—Cooper in Smithsonian Rep. 1858, 266.—Henkel & Hochstetter, Nadelhölz. 240.—Hoopes, Evergreens, 252.—Parlatore in De Candolle, Prodr. xvi², 472.—Fowler in London Gard. Chronicle, 1872, 285.—Watson, Bot. California, ii, 114.—Veitch, Manual Conif. 230.
 - ? C. Californica, Carrière, Trait. Conif. 127; 2 ed. 164.
 - C. Californica gracilis, Nelson, Pinaceæ, 70, in part
 - ? C. cornuta, Carrière in Rev. Hort. 1866, 251 & f.
 - ? Juniperus aromatica, Hort.

Humboldt county, California, south along the coast and through the Coast ranges into Lower California.

A small tree, sometimes 12 to 15 meters in height, with a trunk 0.60 to 0.90 meter in diameter; borders of streams and mountain slopes, in rather rich soil, or often a low shrub, fruiting when 0.30 to 1 meter in height, and occupying extensive tracts of sandy barrens 1 to 5 miles inland from the coast, or thin, rocky soil (*Pringle*); widely but not generally distributed.

Wood light, soft, not strong, brittle, close-grained, compact; bands of small summer cells broad, dark colored, conspicuous; medullary rays thin, obscure; color, light brown, the thick sap-wood nearly white; specific gravity, 0.4689; ash, 0.45.

334.—Cupressus Macnabiana, Murray,

Edinburgh, New Phil. Jour. new ser. i, 293, t. 10.—Gordon, Pinetum, 64; 2 ed. 90.—Carrière, Trait. Conif. 2 ed. 165.—Hoopes, Evergreens, 353.—Parlatore in De Candolle, Prodr. xvi², 473.—Koch, Dendrologie, ii², 150.—Vasey, Cat. Forest Trees, 36.—Watson, Bot. California, ii, 114.—Veitch, Manual Conif. 233.

- C. glandulosa, Hooker, (ex. Henkel & Hochstetter, Nadelhölz. 241).
- C. Californica gracilis, Nelson, Pinaceæ, 70, in part.

California, mountains south of Clear lake, Lake county (Torrey, Bolander, Pringle, Miller).

A small tree, sometimes 9 meters in height, with a trunk 0.30 to 0.45 meter in diameter, or more often a tall shrub branching from the ground; very rare and local; not rediscovered in the original station reported by Jeffrey, the Mount Shasta region.

Wood not collected.

335.-Cupressus Guadalupensis, Watson,

Proc. Am. Acad. xiv, 300; Bot. California, ii, 114.

- C. macrocarpa, ? Watson in Proc. Am. Acad. xi, 119 [not Hartweg].
- C. Arizonica, E. L. Greene in Bull. Torrey Bot. Club, ix, 64.—Rusby in Bull. Torrey Bot. Club, ix, 79.—Watson in Proc. Am. Acad. xviii, 157.

San Francisco mountains of New Mexico and eastern Arizona (Greene, Rusby), Santa Catalina and Santa Rita mountains, Arizona (Pringle, Lemmon); on the Sierra Madre, near Saltillo, and Gaudalupe island, Mexico (Palmer).

A tree 18 to 21 meters in height, with a trunk 0.60 to 0.90 meter in diameter; rocky canons and ridges; on the New Mexico and Arizona mountains, forming extensive forests between 5,000 and 8,000 feet elevation, generally on northern slopes; local.

Wood light, soft, very close-grained, compact, easily worked, susceptible of a good polish; bands of small summer cells, broad, conspicuous; medullary rays numerous, very obscure; color, gray, often faintly streaked with yellow, the thick sap-wood light yellow; specific gravity, 0.4843; ash, 0.44.

336.—Juniperus Californica, Carrière,

Rev. Hort, iii, 353 & f.; Trait. Conif. 58; 2 ed. 41.—Gordon, Pinetum, 121.—Vasey, Cat. Forest Trees, 37.—Engelmann in Trans. St. Louis Acad. iii, 588; Wheeler's Rep. vi, 375.—Palmer in Am. Nat. xii, 593.—Watson, Bot. California, ii, 113.

- J. tetragona, var. osteosperma, Torrey in Pacific R. R. Rep. iv, 141; Bot. Mex. Boundary Survey, 210; Ives' Rep. 28.
- J. tetragona, Cooper in Smithsonian Rep. 1858, 263 [not Schlechtendal].
- J. Cerrosianus, Kellogg in Proc. California Acad. n, 37.
- J. occidentalis, Gordon, Pinetum, Suppl. 38; Pinetum, 2 ed. 162, in part.—Henkel & Hochstetter, Nadelhölz. 245, in part.—Hoopes, Evergreens, 299, in part.—Parlatore in De Candolle, Prodr. xvi², 489, in part.
- J. Californica, var. osteosperma, Engelmann; Watson in Proc. Am. Acad. xi, 119.

JUNIPER.

California, San Francisco bay, south through the Coast ranges to Lower California.

A small tree, rarely 6 to 9 meters in height, with a trunk 0.30 to 0.60 meter in diameter, or more often a tall shrub, sending up many stems from the ground; sandy barrens and dry, rocky soil.

Wood light, soft, very close-grained, compact, very durable in contact with the soil; bands of small summer cells thin, dark colored, not conspicuous; medullary rays numerous, very obscure; color, light brown slightly tinged with red, the sap-wood nearly white; specific gravity, 0.6282; ash, 0.75; in southern California largely used for feneing and fuel.

Var. Utahensis, Engelmann,

Trans. St. Louis Acad. iii, 588; Wheeler's Rep. vi, 264.—Vasey, Cat. Forest Trees, 37.—Sargent in Am. Jour. Sci. 3 ser. xvii, 418.—Palmer in Am. Nat. xii, 594.—Watson, Bot. California, ii, 113.

- J. occidentalis, Watson in King's Rep. v, 336, in part; Pl. Wheeler, 18 [not Hooker].
- J. occidentalis, var. Utahensis, Veitch, Manual Conif. 289.

JUNIPER.

Western base of the Wahsatch mountains, Utah, to eastern California, south through the Great Basin to southeastern California (*Pringle*) and the San Francisco mountains, eastern Arizona (*Greene*).

A small, contorted tree, 6 to 9 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or more often a tall, much branched shrub; very common through the elevated valleys and along the lower slopes of all the ranges of central and southern Utah and Nevada, and the most generally distributed arborescent species of the region.

Wood light, soft, close-grained, compact, very durable in contact with the soil; color, light brown, the thick sap-wood nearly white; specific gravity, 0.5522; ash, 0.49; the common fuel and fencing material of the region.

337.—Juniperus pachyphlæa, Torrey,

- Pacific R. R. Rep. iv, 142; Bot. Mex. Boundary Survey, 210; Ives' Rep. 28.—Cooper in Smithsonian Rep. 1858, 263.—Henkel & Hochstetter, Nadelhölz. 247.—Carrière, Trait. Conif. 2 ed. 56.—Parlatore in De Candolle, Prodr. xvi², 490.—Gordon, Pinetum, 2 ed. 164.—Engelmann in Trans. St. Louis Acad. iii, 589; Wheeler's Rep. vi, 264.—Palmer in Am. Nat. xii, 593.—Veitch, Manual Conif. 289.—Rusby in Bull. Torrey Bot. Club, ix, 79.—Hemsley, Bot. Am.-Cent. iii, 184.
 - J. plochyderma, Torrey in Sitgreaves' Rep. 173, t. 16.
 - J. Sabina pachyphlæa, Antoine, Kupress. 39.

JUNIPER.

Eagle and Limpia mountains (Havard), west along the ranges of western Texas, southern New Mexico and Arizona south of latitude 34°; southward into Mexico.

A tree 9 to 15 meters in height, with a trunk 0.60 to 1.20 meter in diameter; dry, stony slopes and ridges, generally between 2,000 and 3,000 feet elevation; the prevailing and largest juniper of the mountains of western Texas.

Wood light, soft, not strong, brittle, very close grained, compact, susceptible of a fine polish; bands of small summer cells very thin, dark colored, not conspicuous; medullary rays numerous, obscure; color, clear light red, often streaked with yellow, the thin sap-wood nearly white; specific gravity, 0.5829; ash, 0.11.

338.-Juniperus occidentalis, Hooker,

- Fl. Bor.-Am.ii, 166.—Endlicher, Syn. Conif. 26.—Lindley & Gordon in Jonr. Hort. Soc. London, v, 202.—Carrière, Conif. 42, in part; 2 ed. 40, in part.—Torrey in Pacific R. R. Rep. iv, 142.—Cooper in Smithsonian Rep. 1858, 263.—Gordon, Pinetum, 117 (excl. syn.); Suppl. 38 (excl. syn.); 2 ed. 162 (excl. syn.).—Henkel & Hochstetter, Nadelhölz. 345, in part.—Nelson, Pinaceæ, 142.—Hoopes, Evergreens, 299 (excl. syn. *Ualifornica*).—Parlatore in De Candolle, Prodr. xvi*, 489, in part.—Vasey, Cat. Forest Trees, 37.—Macoun in Geological Rep. Canada, 1875—76, 211.—Palmer in Am. Nat. xii, 594.—Watson, Bot. California, ii, 113.—Veitch, Manual Conif. 289.
 - J. excelsa, Pursh, Fl. Am. Sept. ii, 647.—Nuttall, Genera, ii, 245.
 - J. Andina, Nuttall, Sylva, iii, 95, t. 110; 2 ed. ii, 157, t. 110.—Carrière, Trait. Conif. 2 ed. 55.

Chamæcyparis Boursierii, Decaisne in Bull. Soc. Bot. France, i, 70.

- J. Hermanni, Koch, Dendrologie, ii², 141 [not Sprengel].
- J. occidentalis, var. pleiosperma, Engelmann in Trans. St. Louis Acad. ii, 590.
- J. pyriformis, Hort.

JUNIPER.

Blue mountains and high prairies of eastern Washington territory and Oregon, Cascade mountains of Oregon, valley of the Klamath river, California, and south along the high ridges of the Sierra Nevada, between 7,000 and 10,000 feet elevation, to the San Bernardino mountains (*Parish Bros.*).

A tree 9 to 15 meters in height, with a trunk 1.20 to 2.10 meters in diameter, or often a low, much-branched shrub; dry, rocky ridges and prairies, reaching its greatest development in the California sierras.

Wood light, soft, very close-grained, compact, very durable in contact with the soil; bands of small summer cells thin, not conspicuous; medullary rays numerous, very obscure; color, light red or brown, the sap-wood nearly white; specific gravity, 0.5765; ash, 0.12; largely used for fencing and fuel.

Var. monosperma, Engelmann,

Trans. St. Louis Acad. iii, 590; Wheeler's Rep. vi, 263.—Veitch, Manual Conif. 289.—Rusby in Bull. Torrey Bot. Club, ix, 79.

JUNIPER.

Eastern base of Pike's peak, Colorado, to the mountains of western Texas, and through New Mexico and southern Arizona to southern California.

A small, stunted tree, 6 to 9 meters in height, with a trunk sometimes 0.60 meter in diameter, or often branching from the ground with many stout, contorted stems; dry, gravelly slopes between 3,500 and 7,000 feet elevation.

Wood heavier than that of the type, the layers of annual growth often eccentric; specific gravity, 0.7119; ash, 0.78; largely used for fuel and fencing.

Var. conjugens, Engelmann,

Trans, St. Louis Acad. iii, 590.—Veitch, Manual Conif. 289.—Watson in Proc. Am, Acad. xviii, 158.

JUNIPER.

Western Texas, valley of the Colorado river (Austin), west and north.

A tree 11 to 15 meters in height, with a trunk sometimes 0.30 meter in diameter, covering with extensive forests the limestone hills of western Texas; its range not yet satisfactorily determined.

Wood light, hard, not strong, very close-grained, compact, very durable in contact with the soil; bands of small summer cells thin, dark colored, conspicuous; medullary rays numerous, very obscure; color, brown, often streaked with red, the thin sap-wood nearly white; specific gravity, 0.6907; ash, 0.46; largely used for fencing, fuel, telegraph poles, railway ties, etc.

339.-Juniperus Virginiana, Linnæus,

Spec. 1 ed. 1039.—Kalm, Travels, English ed. ii, 180.—Marshall, Arbustum, 70.—Wangenheim, Amer. 9, t. 2, f. 5.—Walter, Fl. Caroliniana, 248.—Aiton, Hort. Kew. iii, 414; 2 ed. v. 414.—Lamarck, Dict. iv, 627.—Willdenow, Spec. iv, 853; Enum. 1025; Berl. Baumz. 198.—Persoon, Syn. ii, 632.—Desfontaines, Hist. Arb. ii, 539.—Michaux f. Hist. Arb. Am. iii, 42, t. 5; N. American Sylva, 3 ed. 173, t. 155. -Pursh, Fl. Am. Sept. 647. -Nouveau Duhamel, vi. 49, t. 16. -Barton, Prodr. Fl. Philadelph. 96; Compend. Fl. Philadelph. ii, 200.—Eaton, Manual, 118; 2 ed. 194.—Nuttall, Genera, ii, 245; Sylva, iii, 97; 2 ed. ii, 159.—Bigelow, Med. Bot. iii, 49, t. 45; Fl. Boston, 3 ed. 398.—Hayne, Dend. Fl. 205.—Elliott, Sk. ii, 717.—Torrey in Nicollet's Rep. 167; Compend. Fl. N. States, 377; Fl. N. York, il, 235; Marcy's Rep. 284; Pacific R. R. Rep. iv, 142; Bot. Mex. Boundary Survey, 211; Ives' Rep. 28.—Sprengel, Syst. iii, 908.—Richard, Conif. 37, t. 6, f. 2.—Audubon, Birds, t. 43.—Rafinesque, Med. Bot. ii, 13.—Beck, Bot. 337.—Lindley, Fl. Med. 556.—Loudon, Arboretum, iv, 2495, f. 2357.—Forbes, Pinetum Woburn. 199.—Penn. Cycl. xiii, 147.—Eaton & Wright, Bot. 288.— Emerson, Trees Massachusetts, 102; 2 ed. i, 118.—Endlicher, Syn. Conif. 27, in part.—Scheele in Romer, Texas, Appx. 447.— Lindley & Gordon in Jour. Hort. Soc. London, v, 202.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 295.—Knight, Syn. Conif. 12.—Darby, Bot. S. States, 515.—Durand in Jour. Philadelphia Acad. 1855, 101.—Torrey & Gray in Pacific R. R. Rep. ii, 130, 175.—Carrière, Trait. Conif. 43; 2 ed. 44.—Bigelow in Pacific R. R. Rep. 20.—Gordon, Pinetum, 112; 2 ed. 154.—Cooper in Smithsonian Rep. 1858, 257; Am. Nat. iii, 413.—Chapman, Fl. S. States, 435.—Gray in Pacific R. R. Rep. xii², 48; Manual N. States, 5 ed. 474; Hall's Pl. Texas, 21.—Hooker f. in Trans. Linnæan Soc. xxiii², 302.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 71.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 663; Bot. & Fl. 314.—Porcher, Resources S. Forests, 510.—Engelmann in Trans. Am. Phil. Soc. new ser. xii, 209; Trans. St. Louis Acad. iii, 591; Wheeler's Rep. vi, 263.—Lyall in Jour. Linnæan Soc. vii, 144.—Henkel & Hochstetter, Nadelhölz. 335.—Nelson, Pinaceæ, 153.—Hoopes, Evergreens, 291.—Parlatore in De Candolle, Prodr. xvi², 488.—Young, Bot. Texas, 517.—Koch, Dendrologie, ii², 138.—Watson in King's Rep. v, 335.—Rothrock in Pl. Wheeler, 28, 50; Wheeler's Rep. vi, 10.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 132.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 122.—Vasey, Cat. Forest Trees, 37.—Guibourt, Hist. Drogues, 7 ed. ii, 242.—Broadhead in Coulter's Bot. Gazette, iii, 60.-G. M. Dawson in Canadian Nat. new ser. ix, 329.-Sears in Bull. Essex Inst. xiii, 183.-Veitch, Manual Conif. 282.—Bell in Geological Rep. Canada, 1870-'80, 52°.—Ridgway in Proc. U. S. Nat. Mus. 1882, 87.—Hemsley, Bpt. Am.-Cent. iii, 184.

- J. Caroliniana, Marshall, Arbustum, 71.—Du Roi, Harbk. 2 ed. 497.
- J. arborescens, Monch, Meth. 699.
- J. Barbadensis, Michaux, Fl. Bor.-Am. ii, 246 [not Linnæus].—Pursh, Fl. Am. Sept. ii, 647.—Nuttall, Genera, ii, 245; Sylva, iii, 96; 2 ed. ii, 158.
- J. Virginiana, var. Caroliniana, Willdenow, Berl. Baumz. 198.—Hayne, Dend. Fl. 205. —Loudon, Arboretum, iv, 2495.
- J. Virginiana, var. Hermanni, Persoon, Syn. ii, 632.
- J. Hermanni, Sprengel, Syst. iii, 908.
 - J. feetida, var. Virginiana, Spach in Ann. Sci. Nat. 2 ser. xvi, 298; Hist. Veg. xi, 316.
 - J. Virginiana vulgaris, Endlicher, Syn. Conif. 28.
 - J. Sabina, var. Virginiana, Antome, Kupress, t. 83, 84.

RED CEDAR. SAVIN.

Southern New Brunswick to the northern shores of Georgian bay, northern Michigan, Wisconsin and Minnesota, south to cape Malabar and Tampa bay, Florida, and the valley of the Colorado river, Texas, west to eastern Nebraska, Kansas, and the Indian territory to about the one hundredth parallel of west longitude; in the Pacific region, Rocky mountains of Colorado to Vancouver's island, British Columbia; not extending to western Texas, California, or Oregon; in Utah, Nevada, and Arizona rare and local.

The most widely distributed of North American Coniferæ, a tree 24 to 30 meters in height, with a trunk 0.60 to 1.35 meter in diameter, or toward its northern and western limits much smaller, often reduced to a low shrub; dry, gravelly ridges, and limestone hills, or in the Gulf states, especially near the coast, in deep swamps; in northern Montana, borders of streams and lakes; common; and reaching its greatest development in the valley of the Red river, Texas.

Wood light, soft, not strong, brittle, very close- and straight-grained, compact, easily worked, very durable in contact with the soil; odorous; bands of small summer cells rather broad, conspicuous; medullary rays numerous, very obscure; color, dull red, the thin sap-wood nearly white; specific gravity, 0.4926; ash, 0.13; largely used for posts, sills, railway ties, interior finish, cabinet-making, and almost exclusively for lead-pencils.

A decoction of the leaves is occasionally used as a substitute for savine cerete, and an infusion of the berries as a diuretic (U. S. Dispensatory, 14 ed. 529.—Nat. Dispensatory, 2 ed. 795).

340.—Taxodium distichum, Richard,

Ann. Mus. xvi, 298; Conif. 52, t. 10.—Nouveau Duhamel, iii, 8.—Robin, Voyages, iii, 525.—Lambert, Pinus, 2 ed. 25 & t.—Torrey, Compend. Fl. N. States, 361; Bot. Mex. Boundary Survey, 210.—Brongniart in Ann. Sci. Nat. 1 ser. xxx, 182.—Loudon, Arboretum, iv, 2481, f. 2335-2339.—Forbes, Pinetum Woburn. 177, t. 60.—Endlicher, Syn. Conif. 68, in part.—Engelmann & Gray in Jour. Boston Soc. Nat. Hist. v. 234.—Scheele in Rœmer, Texas, Appx. 447.—Lindley & Gordon in Jour. Hort. Soc. London, v. 209.—Knight, Syn. Conif. 20.—Darlington, Fl. Cestrica, 3 ed. 295.—Carrière, Trait, Conif. 143; 2 ed. 180; Rev. Hort. viii, 62 & f.—Morren in Belg. Hort. vi, 74 & t.—Gordon, Pinetum, 305; 2 ed. 382.—London Gard. Chronicle, 1857, 549.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. 8. States, 435.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 29.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 663; Bot. & Fl. 315.—Henkel & Hochstetter, Nadelhölz. 258.—Gray, Manual N. States, 5 ed. 473.—Hoopes, Evergreens, 364, f. 58.—Parlatore in De Candolle, Prodr. xvi², 440.—Lawson, Pinetum Brit. ii, 305, f. 1-9.—Fowler in London Gard. Chronicle, 1872, 1526.—Young, Bot. Texas, 518.—Koch, Dendrologie, ii², 195.—Bertrand in Bull. Soc. Bot. France, xviii, 127.—Vasey, Cat. Forest Trees, 36.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Veitch, Manual Conif. 214.—Ridgway in Proc. U. S. Nat. Mus. 87.—Watson in Proc. Am. Acad. xviii, 158.

Cupressus disticha, Linnæus, Spec. 1 ed. 1003.—Du Roi, Harbk. i, 201.—Marshall, Arbustum, 39.—Lamarck, Diet. ii, 244.—Wangenheim, Amer. 43.—Walter, Fl. Caroliniana, 238.—Aiton, Hort. Kew. iii, 372; 2 ed. v, 323.—Bartram, Travels, 2 ed. 88.—Michaux, Fl. Bor.-Am. ii, 208.—Desfontaines, Hist. Arb. ii, 567.—Willdenow, Spec. iv, 512; Enum. 991; Berl. Baumz. 111.—Schkuhr, Handb. iii, 288.—Michaux f. Hist. Arb. Am. iii, 4, t. 1; N. American Sylva, 3 ed. iii, 154, t. 151.—Pursh, Fl. Am. Sept. ii, 645.—Barton, Prodr. Fl. Philadelph. 93.—Rafinesque, Fl. Ludoviciana, 151.—Nuttall, Genera, ii, 224.—Hayne, Dend. Fl. 178.—James in Long's Exped. ii, 317, 318.—Elliott, Sk. ii, 642.—Beck, Bot. 238.—Eaton, Manual, 6 ed. 116.—Eaton & Wright, Bot. 215.—De Chambray, Trait. Arb. Res. Conif. 349.—Dickson & Brown in Am. Jour. Sci. 2 ser. v, 15.—Porcher, Resources S. Forests, 508.

Cupressus disticha, var. patens and var. nutans, Aiton, Hort. Kew. 2 ed. v, 323.

Cupressus disticha, var. imbricaria, Nuttall, Genera, ii, 224; Trans. Am. Phil. Soc. 2 ser. v, 163.—Croom in Am. Jour. Sci. 1 ser. xxviii, 166.

Schubertia disticha, Mirbel in Mem. Mus. xiii, 75.—Sprengel, Syst. iii, 890.—Spach, Hist. Veg. xi, 349.

- T. microphyllum, Brongniart in Ann. Sci. Nat. 1 ser. xxx, 182.—Endlicher, Syn. Conif. 68.—Lindley & Gordon in Jour. Hort. Soc. London, v, 207.—Carrière, Trait. Conif. 148.
- T. adscendens, Brongniart in Ann. Sei. Nat. 1 ser. xxx, 182.—Endlicher, Syn. Conif. 69.—Lindley & Gordon in Jour. Hort. Soc. London, v, 207.—Carrière, Trait. Conif. 148.
- T. distichum, var. patens and var. nutans, Endlicher, Syn. Couif. 68.—Loudon, Arboretum, iv. 2481.
- T. distichum fustigiatum, Knight, Syn. Conif. 21.—Carrière, Trait. Conif. 145; 2 ed. 181.—Gordon, Pinetum, 307; 2 ed. 383.—Henkel & Hochstetter, Nadelhölz. 260.—Hoopes, Evergreens, 367.
- T. distichum, var. microphyllum, Henkel & Hochstetter, Nadelhölz. 261.—Parlatore in De Candolle, Prodr. xvis, 441 (T. Sinense pendulum, Forbes, Pinetum Woburn. 180.—Glyptostrobus pendulus, Endlicher, Conif. 71.—Bot. Mag. t. 5603.—Carrière, trait. Conif. 152.—T. Sinense, Gordon, Pinetum, 309.—Cupressus Sinense, Hort.).

Cuprespinnata disticha, Nelson, Pinaceæ, 61.

BALD CYPRESS. BLACK CYPRESS. RED CYPRESS. WHITE CYPRESS. DECIDUOUS CYPRESS.

Sussex county, Delaware, south near the coast to Mosquito inlet and cape Romano, Florida, west through the Gulf states near the coast to the valley of the Nueces river, Texas, and through Arkansas to western Tennessee, western and northern Kentucky, southeastern Missouri, and southern Illinois and Indiana.

A large tree of great economic value, 24 to 46 meters in height, with a trunk 1.80 to 4 meters in diameter; deep, submerged swamps, river-bottom lands, and pine-barren ponds; common and forming extensive forests in the south Atlantic and Gulf states.

Wood light, soft, close, straight-grained, not strong, compact, easily worked, very durable in contact with the soil; bands of small summer cells broad, resinous, conspicuous; medullary rays numerous, very obscure; color, light or dark brown, the sap-wood nearly white; specific gravity, 0.4543; ash, 0.42; largely manufactured into lumber and used for construction, cooperage, railway ties, posts, fencing, etc., often injured, especially west of the Mississippi river, by a species of *Dædalia*, not yet determined, rendering it unfit for lumber.

Two varieties of cypress, black and white, are recognized by lumbermen, the wood of the former heavier than water when green, rather harder and considered more durable than the other; the unseasoned wood of the latter lighter than water and rather lighter colored than black cypress.

341.—Sequoia gigantea, Decaisne,

Bull. Bot. Soc. France, i, 70; Rev. Hort. 1855, 9, t. 10, f. 1.—Gray in Proc. Am. Acad. iii, 94; Am. Jour. Sci. 2 ser. xvii. 440; xviii, 150, 286.—Torrey in Pacific R. R. Rep. iv, 140.—Kellogg in Proc. California Acad. i, 42.—Blake in Pacific R. R. Rep. v, 257, t. 13.—Carrière, Trait. Conif. 166.—Newberry in Pacific R. R. Rep. vi, 90.—Cooper in Smithsonian Rep. 1858, 263.—Wood, Bot. & Fl. 315.—Bloomer in Proc. California Acad. iii, 397.—Hoopes, Evergreens, 239, f. 29.—Parlatore in De Candolle Prodr. xvi², 437.—Koch, Dendrologie, ii², 194.—Bertrand in Ann. Sci. Nat. 5 ser. xx, 114.—Vasey, Cat. Forest Trees, 36.—Muir in Proc. Am. Assoc. xxv, 242.—Watson, Bot. California, ii, 117.

Wellingtonia gigantea, Lindley in London Gard. Chronicle, 1853, 819, 823; Bot. Mag. t. 4777, 4778.—C. Lemaire in Ill. Hort. 1854, 14 & t.—Naudin in Rev. Hort. 1854, 116.—Fl. des Serres, ix, 93 & t. 903 & t.—Flor. Cabinet, 1854, 121 & t.—Bigelow in Pacific R. R. Rep. iv, 22.—Gordon, Pinetum, 330; Suppl. 106; 2 ed. 415.—Murray in Edinburgh New Phil. Jour. new ser, xi, 205, t. 3-9 (Trans. Bot. Soc. Edinburgh, vi, 330, t. 6, f. 8, 9).—Henkel & Hochstetter, Nadelhölz. 222.—Carrière, Trait. Conif. 2 ed. 217.—Veitch, Manual Conif. 415.

Wellingtonia Californica, Winslow in California Farmer, September, 1854.—Hooker, Jour. Bot. & Kew Misc. vii, 26.

Taxodium Washingtonianum, Winslow in California Farmer, September, 1854.

Taxodium giganteum, Kellogg & Behr in Proc. California Acad. i, 51.

S. Wellingtonia, Seemann in Bonplandia, ii, 238; iii, 27; vi, 343; Ann. & Mag. Nat. Hist. 3 ser. March, 1859, 161.—Lawson, Pinetum Brit. iii, 299, t. 37, 51, 53, f. 1-37.

Gigantabies Wellingtonia, Nelson, Pinacea, 79.

BIG TREE.

California, western slopes of the Sierra Nevadas from Placer county (Calaveras Grove) south to Deer creek on the southern borders of Tulare county.

The largest tree of the American forest, 76 to 119 meters in height, with a trunk 6 to 11 meters in diameter; valleys and moist swales or hollows between 4,000 and 6,000 feet elevation, growing in small, isolated groves, except toward its southern limits, here mixed with the sugar pine and red and white firs, covering large tracts, often several hundred acres in extent.

Wood very light, soft, weak, brittle, rather coarse-grained, compact, remarkably durable in contact with the soil; bands of small summer cells thin, dark colored, conspicuous; medullary rays numerous, thin; color, bright clear red, turning much darker with exposure, the thin sap-wood white; specific gravity, 0.2882; ash, 0.50; in Fresno county formerly somewhat manufactured into lumber and locally used for fencing, shingles, construction, etc.

342.—Sequoia sempervirens, Endlicher,

Syn. Conif. 198.—Decaisne in Rev. Hort. 1855, 9, t. 11, f. 2.—Carrière, Trait. Conif. 164; 2 ed. 210.—Bigelow in Pacific R. R. Rep. iv, 23.—Newberry in Pacific R. R. Rep. vi, 57, 90, f. 23.—Torrey in Pacific R. R. Rep. iv, 140; Bot. Mex. Boundary Survey, 210; Ives' Rep. 28.—Gordon, Pinetum, 303; Suppl. 97; 2 ed. 379.—Cooper in Smithsonian Rep. 1858, 263.—Murray in Edinburgh New Phil. Jour. new ser. xi, 221 (Trans. Bot. Soc. Edinburgh, vi, 346).—Seemann in Ann. & Mag. Nat. Hist. 3 ser. March, 1859, 165.—Wood, Bot. & Fl. 315.—Bolander in Proc. California Acad. iii, 231.—Hoopes, Evergreens, 244.—Parlatore in De Candolle Prodr. xvi⁹, 436.—Koch, Dendrologie, ii⁹, 193.—Vasey, Cat. Forest Trees, 36.—Stearns in Am. Nat. x, 110.—Watson, Bot. California, ii, 116.—Veitch, Manual Conif. 212.—Lawson, Pinetum Brit. iii, t. 52 & figs.

Taxodium sempervirens, Lambert, Pinus, 114; 2 ed. ii, 107, t. 52.—Loudon, Arboretum, iv, 2487, f. 2340, 2341.—Hooker, Fl.
Bor.-Am. ii, 164; Icon. iv, t. 379.—Hooker & Arnott, Bot. Beechey, 1841.—Fremont, Geographical Mem. California, 36, 37.—Henkel & Hochstetter, Nadelhölz, 262.

Taxodii species, Douglas in Companion Bot. Mag. ii, 150.

Sequoia gigantea, Endlicher, Syn. Conif. 190, in part.—Bentham, Pl. Hartweg. 338.

Abies religiosa, Hooker & Arnott, Bot. Beechey, 160.

Schubertia sempervirens, Spach, Hist. Veg. xi, 353.

S. religiosa, Presl, Epimel. Bot. 357.—Walpers, Ann. iii, 448.

Gigantabies taxifolia, Nelson, Pinacem, 78.

REDWOOD.

California, from the northern boundary of the state, south through the Coast ranges to "Veers creek" near the southern border of Monterey county.

A large tree of great economic value, 61 to 92 meters in height, with a trunk 2.40 to 7 meters in diameter, sending up from the stump when cut many vigorous shoots; sides of cañons and gulches in low, wet situations, borders of streams, etc., not appearing on dry hillsides; generally confined to the western slopes of the Coast ranges, and nowhere extending far from the coast; most generally multiplied and reaching its greatest average density north of cape Mendocino.

Wood light, soft, not strong, very brittle, rather coarse-grained, compact, susceptible of a good polish, easily split and worked, very durable in contact with the soil; bands of small summer cells thin, dark colored, conspicuous; medullary rays numerous, very obscure; color, clear light red, the thin sap-wood nearly white; specific gravity, 0.4208; ash, 0.14; largely sawed into lumber; the prevailing and most valuable building material of the Pacific coast, and in California almost exclusively used for shingles, fence posts, telegraph poles, railway ties, wine-butts, tanning- and water-tanks, coffins, etc.; forms with curled or contorted grain are highly ornamental.

343.—Taxus brevifolia, Nuttall,

Sylva, iii, 86, t. 108; 2 ed. ii, 149, t. 108 (*T. occidentalis* on plate).—Torrey in Pacific R. R. Rep. iv, 140.—Newberry in Pacific R. R. Rep. vi, 60, 90, f. 26.—Cooper in Smithsonian Rep. 1858, 263; Pacific R. R. Rep. xii², 26, 69; Am. Nat. iii, 414.—Wood, Bot. & Fl. 316.—Bolander in Proc. California Acad. iii, 229.—Carrière, Trait. Conif. 2 ed. 742.—Hoopes, Evergreens, 383.—Parlatore in De Candolle, Prodr. xvi², 501.—Gray in Proc. Am. Acad. vii, 402.—Koch, Dendrologie, ii², 95.—Gordon, Pinetum, 2 ed. 392.—Vasey, Cat. Forest Trees, 35.—Macoun in Geological Rep. Canada, 1875—76, 211.—Hall in Coulter's Bot. Gazette, ii, 91.—Watson. Bot. California, ii, 110.—G. M. Dawson in Canadian Nat. new ser. ix, 329.—Veitch, Manual Conif. 305.

- T. baccata, var. Canadensis, Bentham, Pl. Hartweg. 338.
- T. baccata, Hooker, Fl. Bor.-Am. ii, 167, in part.
- T. Boursierii, Carrière in Rev. Hort. 1854, 228 & t.; Trait. Conif. 523; 2 ed. 739.
- T. Lindleyana, Murray in Edinburgh New Phil. Jour. new ser. i, 294; Trans. Bot. Soc. Edinburgh, vi, 1860.—Lawson, Cat. 1855, 15.—Gordon, Pinetum, 316; Suppl. 99.—Henkel & Hochstetter, Nadelhölz. 360.—Nelson, Pinaceæ, 174.
- T. Canadensis, Bigelow in Pacific R. R. Rep. iv, 25 [not Willdenow].

YEW

Queen Charlotte islands and the valley of the Skeena river, south through the Coast ranges of British Columbia, through western and the mountain ranges of eastern Washington territory and Oregon to the western slopes of the Rocky mountains of northern Montana (Canby & Sargent), through the California Coast ranges to the bay of Monterey and along the western slopes of the Sierra Nevadas to about latitude 37° N.

A tree 18 to 24 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or toward its eastern limits in Idaho and Montana much smaller, often reduced to a low shrub; rare; low, rich woods and borders of streams, reaching its greatest development in western Oregon, Washington territory, and British Columbia.

Wood heavy, hard, strong, brittle, very close-grained, compact, susceptible of a beautiful polish, very durable in contact with the soil; bands of small summer cells thin, dark colored, conspicuous; medullary rays thin, numerous, very obscure; color, light bright red, the thin sap wood light yellow; specific gravity, 0.6391; ash, 0.22; used for fence posts and by the Indians of the northwest coast for paddles, spear handles, bows, fish-hooks, etc.

344,-Taxus Floridana, Nuttall,

Sylva, iii, 92; 2 ed. ii, 155.—Croom in Am. Johr. Sci. 1 ser. xxvi, 334.—Chapman, Fl. S. States, 436.—Carrière, Trait. Conif. 2 ed. 741.—Hoopes, Evergreens, 384.—Vasey. Cat. Forest Trees, 36.

T. montana, Nuttall, Sylva, iii, 92; 2 ed. ii, 155.

YEW.

Western Florida, banks of the Apalachicola river from Bristol to Aspalaga, Gadsden county, and Watson's Landing? (Curtiss).

A small tree, 3 to 6 meters in height, with a trunk 0.15 to 0.25 meter in diameter; rare and very local.

Wood heavy, hard, very close-grained, compact; bands of small summer cells very thin, dark colored, not conspicuous; medullary rays numerous, obscure; color, dark brown tinged with red, the thin sap-wood nearly white; specific gravity, 0.6340; ash, 0.21.

345.—Torreya taxifolia, Arnott,

Ann. Nat. Hist. i, 134; Hooker, Icon. iii, t. 232, 233.—Eaton & Wright, Bot. 454.—Nuttall, Sylva, iii, 91, t. 109; 2 ed. ii, 153, t. 109.—Spach, Hist. Veg. xi, 298.—Endlicher, Syn. Conif. 241.—Lindley & Gordon in Jour. Hort. Soc. London, v, 226.—Darby, Bot. S. States, 516.—Carrière, Trait. Conif. 514; 2 ed. 726.—Gordon, Pinetum, 329; 2 ed. 412.—Cooper in Smithsonian Rep. 1858, 259.—Chapman, Fl. S. States, 436.—Wood, Cl. Book, 664; Bot. & Fl. 316.—Hoopes, Evergreens, 387, f. 62.—Parlatore in De Candolle, Prodr. xvi², 505.—Koch, Dendrologie, ii², 100.—Vasey, Cat. Forest Trees, 35.—Veitch, Manual Conif. 311.

Caryotaxus taxifolia, Henkel & Hochstetter, Nadelhölz. 367.

Fætataxus montana, Nelson, Pinaceæ, 167.

STINKING CEDAR. SAVIN.

Western Florida, eastern bank of the Apalachicola river from Chattahoochee to the neighborhood of Bristol, Gadsden county; doubtfully reported from the shores of a small lake west of Ocheesee and at Wakulla Springs, Wakulla county (Curtiss).

A tree 12 to 18 meters in height, with a trunk 0.60 to 0.90 meter in diameter, sending up when cut many vigorous shoots from the stem and roots; borders of swamps on calcareous soil; very rare and local.

Wood light, rather hard, strong, brittle, very close-grained, compact, susceptible of a beautiful polish, very durable in contact with the soil; bands of small summer cells very thin, not conspicuous; medullary rays numerous, obscure; color, clear bright yellow, the thin sap-wood much lighter; specific gravity, 0.5145; ash, 0.73; largely used locally for fence posts, etc.

346.—Torreya Californica, Torrey,

N. York Jour. Pharm. iii, 49; Pacific R. R. Rep. iv, 140.—Bigelow in Pacific R. R. Rep. iv. 24.—Kellogg in Proc. California Acad. i, 35.—Newberry in Pacific R. R. Rep. vi, 61, 90, f. 27.—Cooper in Smithsonian Rep. 1858, 263.—Bolander in Proc. California Acad. iii, 229.—Hoopes, Evergreens, 385.—Parlatore in De Candolle, Prodr. xvi², 506.—Koch, Dendrologie, ii², 101.—Gordon, Pinetum, 2 ed. 410.—Vasey, Cat. Forest Trees, 35.—Watson, Bot. California, ii, 110.

T. Myristica, Hooker f. in Bot. Mag. t. 4780.—Van Houtte in Fl. des Serres, ix, 175 & t.—Carrière, Conif. 315; 2 ed. 727.—Gordon, Pinetum, 1 ed. 327.—Murray in Edinburgh New Phil. Jour. new ser. x, 7, t. 3.—Veitch, Manual Conif. 311.

Caryotaxus Myristica, Heukel & Hochstetter, Nadelhölz. 368.

Fætataxus Myristica, Nelson, Pinaceæ, 168.

CALIFORNIA NUTMEG. STINKING CEDAR.

California, Mendocino county, and along the western slope of the Sierra Nevadas to Tulare county, between 3,000 and 5,000 feet elevation.

A tree 15 to 22 meters in height, with a trunk 0.30 to 0.90 meter in diameter, sending up from the stump when cut many vigorous shoots; borders of streams, in moist soil; rare.

Wood light, soft, not strong, very close-grained, compact, susceptible of a fine polish, very durable in contact with the soil; bands of small summer cells broad, not conspicuous; medullary rays numerous, obscure; color, clear light yellow, the thin sap-wood nearly white; specific gravity, 0.4760; ash, 1.34.

347.—Pinus Strobus, Linnæus,

Spec. 1 ed. 1001; Du Roi, Harbk. ii, 57.—Wangenheim, Amer. i, t. 1, f. 1.—Aiton, Hort. Kew. iii, 369; 2 ed. v, 318.—Swartz, Obs. 363.— Monch, Meth. 364. - Michaux, Fi. Bor.-Aw. ii, 205. - Poiret in Lamarck, Diet. v. 341; Ill. iii, 369, t. 786, f. 2. - Lambert, Pinus, 1 ed. t. 22; 2ed. i, 27, t. 35; 3ed. i, 51, t. 32.—Willdenow, Spec. iv, 501; Enum. 989; Berl Baumz. 213.—Persoon, Syn. ii, 579.—Desfontaines, Hist. Arb. ii, 612.—Michaux f. Hist. Arb. Am. i, 104, t. 10; N. American Sylva, 3 ed. iii, 126, t. 145.—Nouveau Duhamel, v, 249, t. 76.—Smith in Rees' Cycl. xxviii, No. 17.—Pursh, Fl. Am. Sept. ii, 644.—Eaton, Manual, 110; 6 ed. 265.—Nuttall, Genera, ii, 223; Sylva, iii, 118; 2 ed. ii, 176 (excl. syn. var. monticola). - Hayne, Dend. Fl. 175. - Elliott. Sk. ii, 638. - Sprengel, Syst. ii, 887. - Torrey, Compend. Fl. N. States, 360; Fl. N. York, ii, 229.—Richard, Conif. 60, t. 12, f. 2.—Audubon, Birds, t. 39.—Beck, Bot. 339.—Loudon, Arboretum, iv, 2280, f. 2193-2196.—Forbes, Pinetum Woburn. 83.—Hooker, Fl. Bor.-Am. ii, 161.—Eaton & Wright. Bot. 359.—Bigelow, Fl. Boston. 3 ed. 385.—Antoine, Conif. 43, t. 20, f. 3.—Lindley in Penn. Cycl. xvii, 173.—Link in Linnæa, xv, 514.—Spach, Hist. Veg. xi, 394.— De Chambray, Trait. Arb. Res. Conif. 262, t. 4, 5, f. 8.—Emerson, Trees Massachusetts, 60; 2 ed.i, 73 & t.—Endlicher, Syn. Couif. 147.—Gihoul, Arb. Resin. 35, t. 5.—Knight, Syn. Couif. 34.—Lindley & Gordon in Jour. Hort. Soc. London. v, 215.—Carrière, Trait, Conif. 302; 2 ed. 398.—Buckley in Am. Jour. Sci. 2 ser. xiii, 398.—Darlington, Fl. Cestrica, 3 ed. 290.—Darby, Bot. S. States, 515.—Gordon, Pinetum, 239; 2 ed. 322.—Cooper in Smithsonian Rep. 1858, 257.—Fescali, Forst. Pfl. 56, t. 11, f. 7-13.—Chapman, Fl. S. States, 434.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 25.—Wood, Cl. Book, 660; Bot. & Fl. 312.—Porcher, Resources S. Forests, 505.—Henkel & Hochstetter, Nadelhölz. 92.—Nelson, Pinaces, 130.—Hoopes, Evergreens, 136, f. 19.—Gray, Manual N. States, 5 ed. 470.—Parlatore in De Candolle, Prodr. xvi2, 405.—Schnizlein, Icon. t. 77, f. 10.—Koch, Dendrologie, ii2, 319.—Vasey, Cat. Forest Trees, 32.—Macoun in Geological Rep. Canada, 1875-76, 211.—Sears in Bull. Essex Inst. xiii, 187.—Veitch, Manual Conif. 183.—Bell in Geological Rep. Canada, 1879-'80, 49c.

- P. Strobus, var. alba, var. brevifolia, var. compressa, Loudon, Arboretum, iv, 2280.—Lindley & Gordon in Jour. Hort. Soc. London, v, 215.
- P. Strobus, var. nivea, Hort.

WHITE PINE. WEYMOUTH PINE.

Newfoundland, northern shores of the gulf of Saint Lawrence to lake Nipigon and the valley of the Winnipeg river, south through the northern states to Pennsylvania, the southern shores of lake Michigan, "Starving rock," near La Salle, Illinois, near Davenport, Iowa (Parry), and along the Alleghany mountains to northern Georgia.

A large tree of the first economic value, 24 to 52 meters in height, with a trunk 1.20 to 3.50 meters in diameter; sandy loam upon drift formations, forming extensive forests, or in the region of the great lakes often in small bodies scattered through the hard-wood forests, here reaching its greatest development; north of latitude 47° N. and south of Pennsylvania, central Michigan, and Minnesota much smaller, less common and valuable.

Wood light, soft, not strong, very close, straight-grained, compact, easily worked, susceptible of a beautiful polish; bands of small summer cells thin, not conspicuous, resin passages small, not numerous nor conspicuous; medullary rays numerous, thin; color, light brown, often slightly tinged with red, the sap-wood nearly white; specific gravity, 0.3854; ash, 0.19; more largely manufactured into lumber, shingles, laths, etc., than that of any other North American tree; the common and most valuable building material of the northern states; largely used in cabinet-making, for interior finish, and in the manufacture of matches, woodenware, and for many domestic purposes.

Coniferin, a glucoside principle, has been discovered in the cambium layer of this and several other species of Conifera (Jour. für Prakt. Chem. xcvii, 243.—Am. Jour. Pharm. 1867, 261.—U. S. Dispensatory, 14 ed. 901).

348.—Pinus monticola, Douglas;

Lambert, Pinus, 1 ed. iii, 27, t. 35.—Loudon, Arboretum, iv, 2291, f. 2208, 2209.—Forbes, Pinetum Woburn. 81, t. 31.—Antoine, Conif. 40, t. 18, f. 3.—Hooker & Arnott, Bot. Beechey, 394.—Endlicher, Syn. Conif. 148.—Lindley & Gordon in Jour. Hort. Soc. London, v, 215.—Carrière, Trait. Conif. 305; 2 ed. 401.—Gordon, Pinetum, 233; 2 ed. 314.—Cooper in Smithsonian Rep. 1858, 262; Pacific R. R. Rep. xii², 27; Am. Nat. iii, 410.—Lyall in Jour. Linnæan Soc. vii, 141.—Henkel & Hochstetter, Nadelhölz. 94.—Nelson, Pinaceæ, 120.—Hoopes, Evergreens, 135.—Bolander in Proc. California Acad. iii, 318.—Parlatore in De Candolle, Prodr. xvi², 405.—Gray in Proc. Am. Acad. vii, 402.—Fowler in London Gard. Chronicle, 1872, 1071.—Koch, Dendrologie, ii², 322.—Vasey, Cat. Forest Trees, 32.—Macoun in Geological Rep. Canada, 1875—76, 211.—Hall in Coulter's Bot. Gazette, ii, 91.—Engelmann in Bot. California, ii, 123.—G. M. Dawson in Canadian Nat. new ser. ix, 328.—Veitch, Manual Conif. 181, f. 41.—Lawson, Pinetum Brit. i, 69, f. 1-6.

- P. Strobus, var. monticola, Nuttall, Sylva, iii, 118; 2 ed. ii, 176.
- P. Grozelieri, Carrière in Rev. Hort. 1869, 126.
- P. porphyrocarpa, Lawson, Pinetum Brit. i, 83, f. 1-8.

WHITE PINE.

Vancuover's island, Coast and Gold ranges of southern British Columbia, through the Cœur d'Alêne and Bitter Root mountains of Idaho to the valley of the Flathead river, northern Montana (Canby & Sargent), south along the Cascade mountains of Washington territory and Oregon and the California sierras to Calaveras county.

A large tree, 30 to 46 meters in height, with a trunk 0.90 to 1.50 meter in diameter; most common and reaching its greatest development in the Pend d'Oreille and Clark's Fork regions of Idaho, here a valuable and important timber tree; in British Columbia generally below 3,000 feet, and in California between 7,000 and 10,000 feet elevation; not common.

Wood very light, soft, not strong, close, straight-grained, compact; bands of small summer cells thin, resinous, not conspicuous, resin passages numerous, not large, conspicuous; medullary rays numerous, obscure; color, light brown or red, the sap-wood nearly white; specific gravity, 0.3908; ash, 0.23; inferior in quality, although resembling that of the eastern white pine (*P. Strobus*); in Idaho and Montana somewhat manufactured into lumber.

349.—Pinus Lambertiana, Douglas,

Companion Bot. Mag. ii, 92, 106, 107, 130, 152; Trans. Linnæan Soc. xv, 500.—Lambert, Pinus, 1 ed. iii, 157, t. 68, 69.—Loudon, Arboretum, iv, 2288, f. 2203.—Forbes, Pinetum Woburn. 77, t. 30.—Hooker, Fl. Bor.-Am. ii, 161.—Antoine, Conif. 41, t. 19.—Lindley in Penn. Cycl. xvii, 173.—Hooker & Arnott, Bot. Beechey, 394.—Spach, Hist. Veg. xi, 397.—Nuttall, Sylva, iii, 122, t. 114; 2 ed. ii, 180, t. 114.—De Chambray, Trait. Arb. Res. Conif. 346.—Endlicher, Syn. Conif. 150.—Lindley & Gordon in Jour. Hort. Soc. London, v, 215.—Carrière, Trait. Conif. 307; 2 ed. 403.—Bigelow in Pacific R. R. Rep. iv, 21.—Torrey in Pacific R. R. Rep. iv, 141; Bot. Mex. Boundary Survey, 210; Ives' Rep. 28.—Newberry in Pacific R. R. Rep. vi, 42, 90, f. 14.—Gordon, Pinetum, 228; 2 ed. 307.—Cooper in Smithsonian Rep. 1858, 262.—Murray in Trans. Bot. Soc. Edinburgh, vi, 369.—Lawson, Pinetum Brit. i, 47, t. 7, f. 1-7.—Bolander in Proc. California Acad. iii, 226, 317.—Henkel & Hochstetter, Nadelhölz. 95.—Nelson, Pinaceæ, 115.—Hoopes, Evergreens, 134.—Parlatore in De Candolle, Prodr. xvi², 402.—Fowler in London Gard. Chronicle, 1872, 1071.—Koch, Dendrologie, ii², 323.—Vasey, Cat. Forest Trees, 32.—Veitch, Manual Conif. 179.

SUGAR PINE.

Oregon, Cascade and Coast ranges, from the head of the Mackenzie river and the valley of the Rogue river south along the western flank of the California sierras, through the Coast ranges to the Santa Lucia mountains, and in the San Bernardino and Cuyamaca mountains.

A large tree, 46 to 92 meters in height, with a trunk 3 to 7 meters in diameter; most common and reaching its greatest development upon the sierras of central and northern California between 4,000 and 8,000 feet elevation; in the Oregon Coast ranges descending to 1,000 feet above the sea-level.

Wood very light, soft, coarse, straight-grained, compact, satiny, easily worked; bands of small summer cells thin, resinous, conspicuous, resin passages numerous, very large and conspicuous; medullary rays numerous, obscure; color, light brown, the sap-wood nearly white; specific gravity, 0.3684; ash, 0.22; now largely manufactured into lumber and used for interior finish, door-blinds, sashes, etc., and for cooperage and woodenware; less valuable and less easily worked than that of the eastern white pine (*Pinus Strobus*); its quality injured by the larger and more numerous resin passages.

A saccharine exudation from the stumps of cut or partially-burned trees sometimes used as a substitute for sugar.

350.-Pinus flexilis, James,

Long's Exped. ii, 27, 34.—Torrey in Ann. Lyc. N. York, ii, 249; Pacific R. R. Rep. iv, 141.—Eaton, Manual, 6 ed. 265.—Eaton & Wright, Bot. 359.—Nuttall, Sylva, iii, 107, t. 112; 2 ed. ii, 167, t. 107.—Lindley & Gordon in Jour. Hort. Soc. London, v, 220.—Carrière in Fl. des Serres, ix, 200; Rev. Hort. 1854, 228; Trait. Conif. 310; 2 ed. 392.—Bigelow in Pacific R. R. Rep. iv, 6, 20.—Gordon, Pinetum, 224; 2 ed. 302.—Cooper in Smithsonian Rep. 1858, 262.—Parry in Trans. St. Louis Acad. ii, 121.—Engelmann in Am. Jour. Sci. 2 ser. xxxiv, 331; Trans. St. Louis Acad. ii, 208; Wheeler's Rep. vi, 257; Bot. California, ii, 124.—Henkel & Hochstetter, Nadelhölz. 126.—Nelson, Pinaceæ, 112.—Bolander in Proc. California Acad. iii, 318.—Hoopes, Evergreens, 131, f. 18.—Parlatore in De Candoile, Prodr. xvi², 403.—Porter in Hayden's Rep. 1871, 494.—Watson in King's Rep. v, xxviii, 332; Pl. Wheeler, 17.—Rothrock, Pl. Wheeler, 27, 50; Wheeler's Rep. vi, 9.—Porter & Coulter, Fl. Colorado; Hayden, Surv. Misc. Pub. No. 4, 130.—Murray in London Gard. Chronicle, 1875, 106.—Vasey, Cat. Forest Trees, 32.—Sargent in Am. Jour. Sci. 3 ser. xvii, 420—Lawson, Pinetum Brit. i, 35, f. 1.

- P. Lambertiana, var. Hocker, Fl. Bor.-Am. ii, 161.
- P. Lambertiana, var. brevifolia, Endlicher, Syn. Conif. 150.—Lindley & Gordon in Jour. Hort. Soc. London, v, 215.—Carrière, Trait. Conif. 2 ed. 404.
- P. flexilis, var. serrulata, Engelmann in Wheeler's Rep. vi, 258.
- P. flexilis, var. macrocarpa, Engelmann in Wheeler's Rep. vi, 258.

WHITE PINE.

Eastern slopes of the Rocky mountains, Montana, and probably much farther north, south to New Mexico, on the Guadalupe and Limpia mountains, western Texas (*Havard*), on the high mountain ranges of Utah, Nevada, and northern Arizona, Inyo mountains and mount Silliman, California.

A tree 15 to 18 meters in height, with a trunk 0.60 to 1.20 meter in diameter; dry, gravelly slopes and ridges between 4,000 and 10,000 feet elevation; common along the eastern slopes of the Rocky mountains of northern Montana, forming open, scattered forests, here low, round-topped, and the prevailing forest tree; in central Nevada the most valuable lumber tree of the region.

Wood light, soft, close-grained, compact; bands of small summer cells narrow, not conspicuous, resin passages numerous, large; medullary rays numerous, conspicuous; color, light clear yellow, turning red with exposure, the sap-wood nearly white; specific gravity, 0.4358; ash, 0.28; in northern Montana, Nevada, and Utah sometimes sawed into inferior lumber and used in construction and for various domestic purposes.

351.—Pinus albicaulis, Engelmann,

Trans. St. Louis Acad. ii, 209; Coulter's Bot. Gazette, vii, 4.—Gray in Proc. Am. Acad. vii, 402.—Vasey, Cat. Forest Trees, 32.—Hall in Coulter's Bot. Gazette, ii, 91.—Lawson, Pinetum Brit. i, 1, f. 1-4.

- P. flexilis, Murray, Rep. Oregon Exped. i, t. 2, f. 1 [not James].—Lyall in Jour. Linnman Soc. vii, 142.—Parlatore in De Candolle, Prodr. xvi², 403, in part.
- P. cembroides, Newberry in Pacific R. R. Rep. vi, 44, 90, f. 15 [not Zuccarini].
- P. Shasta, Carrière, Trait. Conif. 2 ed. 390.
- P. flexilis, var. albicaulis, Engelmanu in Bot. California, ii, 124.—G. M. Dawson in Canadian Nat. new. ser. ix, 328.

Coast ranges of British Columbia, from the valley of the Litasyouco river (G. M. Dawson) south along the Cascade and Blue mountains of Washington territory and Oregon, extending east along the high ranges of northern Washington territory to the eastern slope of the Rocky mountains of northern Montana (Old Marias pass, Canby & Sargent); California, Scott's mountains, mount Shasta, and on the high peaks of the Sierra-Nevadas to mount San Bernardino.

A small alpine tree, 6 to 12 meters in height, with a trunk rarely 0.60 meter in diameter, or at its highest elevation reduced to a low, prostrate shrub; dry, gravelly ridges at the extreme limit of tree growth, reaching in the San Bernardino mountains an elevation of 10,500 feet.

Wood light, soft, not strong, brittle, close-grained, compact; bands of small summer cells thin, not conspicuous, resin passages numerous, not large; medullary rays numerous, obscure; color, light brown, the sap-wood nearly white; specific gravity, 0.4165; ash, 0.27.

352.—Pinus reflexa, Engelmann,

Coulter's Bot. Gazette, vii, 4.-Rusby in Bull. Torrey Bot. Club, ix, 80.

P. flexilis, var. reflexa, Engelmann in Wheeler's Rep. vi, 258.

WHITE PINE.

High mountains of southwestern New Mexico (Greene, Rusby) to the Santa Rita mountains (Rothrock, Engelmann & Sargent) and Santa Catalina mountains (Lemmon, Pringle), Arizona.

A tree 24 to 30 meters in height, with a trunk sometimes exceeding 0.60 meter in diameter; rocky ridges and slopes of almost inaccessible canons between 6,000 to 8,000 feet elevation.

Wood light, hard, not strong, close-grained, compact; bands of small summer cells thin, resinous, not conspicuous, resin passages large, not numerous; medullary rays numerous, obscure; color, light red, the sapwood nearly white; specific gravity, 0.4877; ash, 0.26.

353.-Pinus Parryana, Engelmann,

Am. Jour. Sci. 2 ser. xxiv, 332, note; Bot. California, ii, 124.—Parlatore in De Candolle, Prodr. xvi², 402.—Vasey, Cat. Forest Trees, 30.

P. Llaveana, Torrey, Bot. Mex. Boundary Survey, 208, t. 55 [not Schiede & Deppe].—Cooper in Smithsonian Rep. 1858, 262.—Bolander in Proc. California Acad. iii, 318.

PIÑON. NUT PINE.

California, Larkin's station, 20 miles southeast of Campo, San Diego county (Vasey), and southward into Lower California.

A small tree, 6 to 9 meters in height, with a trunk 0.30 to 0.45 meter in diameter; very rare within the limits of the United States; south of the boundary forming extensive open forests upon the high mesas and slopes of Lower California (Pringle).

Wood light, soft, close grained, compact; bands of small summer cells thin, not conspicuous, resin passages very numerous, large, conspicuous; medullary rays numerous, obscure; color, light brown or yellow, the sap-wood much lighter, nearly white; specific gravity, 0.5675; ash, 0.54.

The large seeds edible.

354.—Pinus cembroides, Zuccarini,

- Flora, ii, 93.—Endlicher, Syn. Conif. 182.—Fl. des Serres, iv, 3446, t. 97.—Nelson, Pinaceæ, 107.—Parlatore in De Candolle, Prodr. xvi³, 397.—Engelmann in Trans. St. Louis Acad. iv, 176.—Watson in Proc. Am. Acad. xviii, 158.
 - P. Llaveana, Schiede & Deppe in Linnæa, xii, 488.—Forbes, Pinetum Woburn. 49, t. 17.—Antoine, Conif. 36, t. 16, f. 1.—Spach, Hist. Veg. xi, 401.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Carrière, Trait. Conif. 405; 2 ed. 461.—Gordon, Pinetum, 199; 2 ed. 274 (excl. syn. edulis).—Henkel & Hochstetter, Nadelhölz. 64 (excl. syn. edulis).—Hoopes, Evergreens, 143.
 - . P. osteosperma, Engelmann in Wislizenus' Rep. No. 3.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Carrière in Fl. des Serres, ix, 200; Rev. Hort. 1854, 227.

NUT PINE.

Santa Catalina mountains, Arizona (Pringle); through northern Mexico.

A small tree, in Arizona 6 to 7 meters in height, with a trunk hardly exceeding 0.30 meter in diameter; dry ridges and slopes at 3,500 feet elevation.

Wood light, soft, very close-grained, compact; bands of small summer cells thin, not conspicuous, resin passages few, small; medullary rays numerous, obscure; color, light clear yellow, the sap-wood nearly white; specific gravity, 0.6512; ash, 0.90.

The seeds edible.

355.—Pinus edulis, Engelmann,

- Wislizenus' Rep. No. 4; Wheeler's Rep. vi, 260.—Lindley & Gordon in Jonr. Hort. Soc. London, v. 216.—Carrière, Fl. des Serres, ix, 201; Rev. Hort. 1854, 227; Trait. Conif. 408.—Torrey in Sitgreaves' Rep. 173, t. 20; Pacific R. R. Rep. iv, 140; Ives' Rep. 28.—Bigelow in Pacific R. R. Rep. iv, 3, 19.—Cooper in Smithsonian Rep. 1858, 261.—Hoopés, Evergreens, 142.—Parlatore in De Candolle, Prodr. xvi³, 398.—Watson in Pl. Wheeler, 17.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 130.—Vasey, Cat. Forest Trees, 30.—Rothrock in Wheeler's Rep. vi, 9.—Rusby in Bull. Torrey Bot. Club, ix, 106.—Veitch, Manual Conif. 172.
 - P. cembroides, Gerdon in Jour. Hort. Soc. London, v, 236 & f.; Pinetum, 192; 2 ed. 265 [not Zuccarini].—Fl. des Serres, iv, 324b, 325b, t. 331, f. 97.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Carrière, Trait. Conif. 404; 2 ed. 460.
 - P. futilis, Roezl in herb. fide Gordon, Pinetum, Suppl. 76; 2 ed. 265.

PIÑON. NUT PINE.

Eastern base of Pike's peak, Colorado, south through New Mexico to the mountains of western Texas.

A small tree, 6 to 9 meters in height, with a trunk 0.30 to 0.90 meter in diameter; dry mesas and slopes, generally on lime or sandstone, reaching in Colorado an elevation of 9,000 feet.

Wood light, soft, not strong, brittle, close-grained, compact, durable in contact with the soil; bands of small summer cells thin, not conspicuous, resin passages few, small; medullary rays numerous, obscure; color, light brown, the sap-wood nearly white; specific gravity, 0.6388; ash, 0.62; largely used for fuel, charcoal, fencing, etc., and in western Texas occasionally manufactured into inferior lumber.

The large edible nuts supply the Indians with a valuable article of food.

356.—Pinus monophylla, Torrey & Fremont,

- Fremont's Rep. 319, t. 4.—Cooper in Smithsonian Rep. 1858, 261.—Bolander in Proc. California Acad. iii, 318.—Hoopes, Evergreens, 142.—Parlatore in De Candolle, Prodr. xvi², 378.—Lawson, Pinetum Brit. i, 65, t. 9, f. 1–12 (*P. Fremontiana* on plate).—Watson in King's Rep. v, 330; Pl. Wheeler, 17.—Koch, Dendrologie, ii², 271.—Bertrand in Bull. Soc. Bot. France, xviii, 81, t. 5, f. 81.—Rothrock in Pl. Wheeler, 28, 50.—Vasey, Cat. Forest Trees, 30.—Palmer in Am. Nat. xii, 594.—Engelmann in Wheeler's Rep, vi, 259, 374; Trans. St. Louis Acad. iv, 178; Bot. California, ii, 124.—Sargent in Am. Jour. Sci. 3 ser. xvii, 419.—Masters in London Gard. Chronicle, 1883, p. 48, f. 8.
 - P. Fremontiana, Endlicher, Syn. Conif. 1831, in part.—Gordon in Jour. Hort. Soc. London, iv, 293 & f.; Pinetum, 194; 2 ed. 235.—Knight, Syn. Conif. 28.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Carrière, Trait. Conif. 194; 2 ed. 462.—Henkel & Hochstetter, Nadelhölz. 62.

PIÑON. NUT PINE.

Near Utah lake, Utah, to the eastern foot-hills of the California sierras, south along the mountain ranges of the Great Basin to the San Francisco mountains of eastern Arizona.

A small, bushy tree, 4 to 6 meters in height, with a trunk sometimes 1 meter in diameter; dry, gravelly slopes and mesas between 3,000 and 6,000 feet elevation.

Wood light, soft, weak, brittle, close-grained, compact; bands of small summer cells thin, not conspicuous, resin passages few, not large; medullary rays numerous, obscure; color, yellow or light brown, the sap-wood nearly white; specific gravity, 0.5658; ash, 0.68; largely used for fuel and charcoal.

The large edible seeds furnish the principal food of the Indians of the Great Basin.

357.—Pinus Balfouriana, Murray,

Rep. Oregon Exped. i, t. 3, f. 1.—Gordon, Pinetum, 217; 2 ed. 293.—Henkel & Hochstetter, Nadelhölz. 109.—Bolander in Proc. California. Acad. iii, 318.—Carrière, Trait. Conif. 2 ed. 425.—Nelson, Pinaceæ, 104.—Hoopes, Evergreens, 149.—Fowler in London Gard. Chronicle, 1872, 973.—Vasey, Cat. Forest Trees, 32.—Engelmann in Trans. St. Louis Acad. iv, 179; Bot. California, ii, 125.—Veitch, Manual Conif. 175.—Lawson, Pinetum Brit. i, 11, f. 1-5.

California, Scott's mountain, Siskiyou county (Jeffrey, Lemmon), mount Whitney, and about the headwaters of King and Kern rivers.

A small tree, 15 to 19 meters in height, with a trunk 0.60 to 0.90 meter in diameter; dry, gravelly slopes and ridges, forming upon Scott's mountain a broad belt of open forest growth between 5,000 and 8,000 feet elevation.

Wood light, soft, weak, brittle, very close-grained, compact, satiny, susceptible of a good polish; bands of small summer cells very narrow, dark colored, resin passages few, not conspicuous; medullary rays numerous obscure; specific gravity, 0.5434; ash, 0.41.

Var. aristata, Engelmann,

Wheeler's Rep. vi, 375.—Bot. California, ii, 125.—Veitch, Manual Conif. 175.

- P. aristata, Engelmann in Am. Jour. Sci. 2 ser. xxxiv, 331; Trans. St. Louis Acad. ii, 205, t. 5, 6; iv, 179; Bot. California, ii, 125.—Parry in Trans. St. Louis Acad. ii, 123.—Wood, Bot. & Fl. 313.—Regel, Gartenflora, 1863, iii, 91.—Henkel & Hochstetter, Nadelhölz. 417.—Nelson, Pinaceæ, 103.—Carrière, Trait. Conif. 2 ed. 424.—Parlatore in De Candolle, Prodr. xvi², 400.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 130.—Murray in London Gard. Chronicle, 1875, 106.—Gordon, Pinetum, 2 ed. 291.—Vasey, Cat. Forest Trees, 32.—Brandegee in Coulter's Bot. Gazette, 32.—Lawson, Pinetum Brit. i, 5, f. 1.
- P. Balfouriana, Watson in King's Rep. v, 331; Pl. Wheeler, 17 [not Murray].—Rothrock in Pl. Wheeler, 28, 50.—Sargent in Am. Jour. Sci. 3 ser. xvii, 419.

FOXTAIL PINE. HICKORY PINE.

Mountains of southeastern California, Nevada, northern Arizona, and southern Utah to Colorado, above 7,500 feet, or in Colorado reaching 12,000 feet elevation.

A tree 15 to 30 meters in height, with a trunk 0.60 to 2.40 meters in diameter; dry, gravelly ridges; not common.

Wood light, soft, not strong, very close-grained, compact; bands of small summer cells thin, dark colored, not conspicuous, resin passages few, not prominent; medullary rays numerous, obscure; color, red, the thin sap-wood nearly white; specific gravity, 0.5572; ash, 0.30; in central Nevada largely used for the timbering of mines, and now nearly exterminated.

358.—Pinus resinosa, Aiton,

- Hort. Kew. iii, 337; 2 ed. v, 316.—Lambert, Pinus, 1 ed. t. 14; 2 ed. i, 20, t. 14; 3 ed. i, 17, t. 13.—Willdenow, Spec. iv, 496; Enum. 988; Berl. Baumz. 267.—Poiret in Lamarck, Dict. v, 339.—Persoon, Syn. ii, 578.—Desfontaines, Hist. Arb. ii, 612.—Smith in Rees' Cycl. xxviii, No. 3.—Pursh, Fl. Am. Sept. ii, 642.—Eaton, Manual, 110; 6 ed. 264.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 173.—Sprengel, Syst. ii, 886.—Torrey, Compend. Fl. N. States, 360; Fl. N. York, ii, 227.—Beck, Bot. 339.—Loudon, Arboretum, iv, 2210, f. 2094-2097.—Forbes, Pinetum Woburn. 19, t. 6.—Hooker, Fl. Bor.-Am. ii, 161, in part.—Eaton & Wright, Bot. 358.—Bigelow, Fl. Boston. 3 ed. 384.—Lindley in Penn. Cycl. xvii, 170.—Antoine, Conif. 7, t. 4, f. 1.—Link in Linnæa, xv, 501.—Endlicher, Syn. Conif. 178.—Knight, Syn. Conif, 27.—Lindley & Gordon in Jour. Hort. Soc. London, v, 219.—Parry in Owen's Rep. 618.—Carrière, Trait. Conif. 401.—Gordon, Pinetum, 183 (excl. syn. Loiseleuriana); 2 ed. 256.—Richardson Arctic Exped. 441.—Cooper in Smithsonian, Rep. 1858, 257.—Wood, Cl. Book, 661; Bot. & Fl. 313.—Henkel & Hochstetter, Nadelhölz. 45 (excl. syn. Loiseleuriana).—Hoopes, Evergreens, 102.—Gray, Manual N. States, 5 ed. 470.—Parlatore in De Candolle, Prodr. xvi², 388.—Koch, Dendrologie, ii², 286.—Vasey, Cat. Forest Trees, 30.—Macoun in Geological Rep. Canada, 1879-'80, 50°.—Veitch, Manual Conif. 159.
 - P. rubra, Michaux f. Hist. Arb. Am. i, 46, t. 1; N. American Sylva, 3 ed. iii, 91, t. 134 [not Lambert].—De Chambray, Trait. Arb. Res. 344.—Gihoul, Arb. Resin. 27.—Carrière, Trait. Conif. 2 ed. 496.
 - P. Laricio, var. resinosa, Spach, Hist. Veg. 385.

RED PINE. NORWAY PINE.

Newfoundland, northern shores of the gulf of Saint Lawrence and lake Nipigon to the valley of the Winnipeg river, south through the northern states to Chestnut Hill, Middlesex county, Massachusetts, the mountains of northern Pennsylvania, Isabella county, Michigan, and central Minnesota.

A large tree, 24 to 46 meters in height, with a trunk 0.60 to 1.37 meter in diameter; light sandy loam or dry, rocky ridges, forming scattered groves rarely exceeding a few hundred acres in extent; common and reaching its greatest development through northern Wisconsin and Minnesota; rare in the eastern States, except in the extreme northern portions of New England.

Wood light, not strong, hard, rather coarse-grained, compact; bands of small summer cells broad, dark colored, very resinous, resin passages few, small, not conspicuous; medullary rays numerous, thin; color, light red, the sap-wood yellow or often almost white; specific gravity, 0.4854; ash, 0.27; largely manufactured into lumber and used for all purposes of construction, flooring, piles, etc.

359.-Pinus Torreyana, Parry.

Bot. Mex. Boundary Survey, 210, t. 58, 59; Proc. San Diego Nat. Hist. Soc. Nov. 1883.—Carrière, Trait. Conif. 326; 2 ed. 423.—Gordon, Pinetum, 241.—Cooper in Smithsonian Rep. 1860, 442.—Henkel & Hochstetter, Nadelhölz. 117.—Bolander in Proc. California Acad. iii, 318.—Hoopes, Evergreens, 150.—Vasey, Cat. Forest Trees, 31.—Palmer in Am. Nat. xii, 594.—Engelmann in Trans. St. Louis Acad. iv, 181; Bot. California, ii, 125.—Veitch, Manual Conif. 173.

P. lophosperma, Lindley in London Gard. Chronicle, 1860, 46.—Gordon, Pinetum, Suppl. 69; 2 ed. 310.—Henkel & Hochstetter, Nadelhölz. 112.—Nelson, Pinaceæ, 117.—Parlatore in De Candolle, Prodr. xvi², 391.

California, mouth of the Soledad river, San Diego county; doubtfully reported from one of the islands off Santa Barbara and from Lower California.

A low, short-lived, gnarled, crooked tree, 6 to 8 meters in height, with a trunk 0.23 to 0.33 meter in diameter; crests of sandy bluffs immediately upon the sea-coast; very local and fast disappearing.

Wood light, soft, not strong, brittle, rather close-grained, compact; bands of small summer cells broad, resinous, conspicuous, resin passages small, few; medullary rays numerous, obscure; color, light red, the sap-wood yellow or nearly white; specific gravity, 0.4879; ash, 0.35; locally used for fuel.

360.—Pinus Arizonica, Engelmann,

Wheeler's Rep. vi, 260; Trans. St. Louis Acad. iv, 181; Coulter's Bot. Gazette, vii, 4.

YELLOW PINE.

Santa Rita mountains (Rothrock, Engelmann & Sargent), Santa Catalina mountains (Lemmon, Pringle), and probably upon other ranges of southern Arizona.

A tree 24 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter; high rocky ridges between 6,000 and 8,000 feet elevation; the prevailing forest tree over large areas near the summits of the Santa Catalina mountains (*Lemmon*).

Wood light, soft, not strong, rather brittle, close grained, compact; bands of small summer cells broad, very resinous, conspicuous, resin passages numerous, large; medullary rays thin, obscure; color, light red or often yellow, the sap-wood lighter yellow or white; specific gravity, 0.5038; ash, 0.20; sometimes sawed into inferior lumber.

361.—Pinus ponderosa, Douglas.

Companion Bot. Mag. ii, 111.—Loudon, Arboretum, iv, 2243, f. 2132-2136.—Forbes, Pinetum Woburn. 44, t. 15.—Antoine, Conif. 28, t. 8, f. 1.—Lindley in Penn. Cycl. xvii, 172.—Link in Linnæa, xv, 306.—Nuttall, Sylva, iii, 114; 2 ed. ii, 173.—Spach, Hist. Veg. xi, 389.— Endlicher, Syn. Conif. 163.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 340; 2 ed. 445.—Gordon, Pinetum, 205; Suppl. 67; 2 ed. 281.—Newberry in Pacific R. R. Rep. vi, 36, 90, t. 4, f. 12.—Cooper in Smithsonian Rep. 1858, 261; Pacific R. R. Rep. xii³, 27, 68; Am. Nat. iii, 409.—Torrey, Bot. Mex. Boundary Survey, 209; Ives' Rep. 28.—Engelmann in Am. Jour. Sci. 2 ser. xxxiv, 332; Proc. Am. Phil. Soc. 2 ser. xii, 209; Wheeler's Rep. vi, 261; Trans. St. Louis Acad. iv, 181; Bot. California, ii, 125.—Lyall in Jour. Linnæan Soc. vii, 142.—Bolander in Proc. California Acad. iii, 226, 317.—Henkel & Hochstetter, Nadelhölz. 71.—Nelson, Pinaceæ, 125.—Hoopes, Evergreens, 117.—Parlatore in De Candolle, Prodr. xvi², 395 (excl. syn. Sinclairii).—Watson in King's Rep. v, 331; Pl. Wheeler, 17.—Gray in Proc. Am. Acad. vii, 402.—Fowler in London Gard. Chronicle, 1872, 1326.—Koch, Dendrologie, ii², 310.—Rothrock in Pl. Wheeler, 28, 50; Wheeler's Rep. vi, 9.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 129.—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 121.—Vasey, Cat. Forest Trees, 30.—Hall in Coulter's Bot. Gazette, ii, 91.—Macoun in Geological Rep. Canada, 1875-776, 211.—Brandegee in Coulter's Bot. Gazette, iii, 32.—G. M. Dawson in Canadian Nat. new ser. ix, 326.—Rusby in Bull. Torrey Bot. Club, ix, 106.

- P. Benthamiana, Hartweg in Jour. Hort. Soc. London, ii, 189; iii, 223.—Gordon in Jour. Hort. Soc. London, iv, 212 & t.; (Fl. des Serres, vi, 85 & f.); Pinetum, 188; 2 ed. 261 (excl. syn. Sinclairii).—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Carrière, Trait. Conif, 350; 2 ed. 452.—Murray in Edinburgh New Phil. Jour. new ser. i, 287, t. 8.—Henkel & Hochstetter, Nadelhölz. 84.—Nelson, Pinaceæ, 104.—Fowler in London Gard. Chronicle, 1872, 973.
- P. resinosa, Torrey in Ann. Lyc. N. York, ii, 249 [not Aiton].—Douglas, Companion Bot. Mag. ii, 126.—Hooker, Fl. Bor.-Am. ii, 161, in part.—Winchell in Ludlow's Rep. Black Hills, 68.
- P. brachyptera, Engelmann in Wislizenus' Rep. No. 4.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Carrière in Fl. des Serres, ix, 201; Rev. Hort. 1854, 227; Trait. Conif. 356; 2 ed. 454.—Bigelow in Pacific R. R. Rep. iv 18.—Gordon, Pinetum, 190; 2 ed. 263.—Henkel & Hochstetter, Nadelhölz. 85.—Nelson, Pinaceæ, 454.
- P. Beardsleyi, Murray in Edinburgh New Phil. Jour. new ser. i, 286, t. 6.—Carrière, Trait. Conif. 359.
- P. Craigana, Murray in Edinburgh New Phil. Jour. new ser. i, 288, t. 7.
- P. macrophylla, ? Torrey in Sitgreaves' Rep. 173 [not Engelmann].
- P. Engelmanni, Torrey in Pacific R. R. Rep. iv, 141 [not Carrière].
- P. Parryana, Gerdon, Pinetum, 202; 2 ed. 277 [not Engelmann].—Henkel & Hochstetter, Nadelhölz. 88.—Carrière, Trait. Conif. 2 ed. 446.
- P. ponderosa, var. Benthamiana, Vasey, Cat. Forest Trees, 30.
- P. ponderosa, var. scopulorum, Engelmanu in Bot. California, ii, 126.

YELLOW PINE. BULL PINE.

Interior of British Columbia, south of latitude 51°, south and east along the mountain ranges of the Pacific region to Mexico, the Black hills of Dakota, Colorado, and western Texas; not detected in central or southern Nevada.

A large tree, 61 to 91 meters in height, with a trunk 3.60 to 4.57 meters in diameter, or throughout the Rocky Mountain region much smaller, rarely exceeding 30 meters in height (var. scopulorum); dry, rocky ridges and prairies, or in northern California rarely in cold, wet swamps, reaching its greatest development along the western slope of the sierras of northern and central California; in western Washington territory and Oregon rare and local; after Pseudotsuga Douglasii the most generally distributed and valuable timber tree of the Pacific forests, furnishing the principal lumber of eastern Washington territory and Oregon, western Montana, Idaho, the Black hills of Dakota, western Texas, New Mexico, and Arizona.

Wood, varying greatly in quality and value, heavy, hard, strong, brittle, not coarse-grained nor durable, compact; bands of small summer cells broad or narrow, very resinous, conspicuous, resin passages few, small; medullary rays numerous, obscure; color, light red, the very thick sap-wood almost white; specific gravity, 0.4715; ash, 0.35; largely manufactured into lumber, and used for railway ties, fuel, etc.

Note.—A form with purple cones and long glaucous foliage, approaching P. Jeffreyi in habit, is the prevailing tree of the valley of Flathead lake, Montana (Canby & Sargent).

362.—Pinus Jeffreyi, Murray,

- Rep. Oregon Exped. 2, t. 1; Edinburgh New Phil. Jour. new ser. xi, 224, t. 8, 9 (Trans. Bot. Soc. Edinburgh, vi, 350 & t.); Carrière, Trait. Conif. 388; 2 ed. 439.—Gordon, Pinetum, 198; 2 ed. 272.—Henkel & Hochstetter, Nadelhölz. 87.—Nelson, Pinaceæ, 115.—Hoopes, Evergreens, 115.—Parlatore in De Candolle, Prodr. xvi², 393.—Lawson, Pinetum Brit. i, 45, t. 6, f. 1-4.—Koch, Dendrologie, ii², 314.—Engelmann in Coulter's Bot. Gazette, vii, 4.—Veitch, Manual Conif. 165.
 - P. deflexa, Torrey in Bot. Mex. Boundary Survey, 209, t. 56, in part.—Cooper in Smithsonian Rep. 1860, 442.—Henkel & Hochstetter, Nadelhölz, 416.—Carrière, Trait. Conif. 2 ed. 455.—Bolander in Proc. California Acad. iii, 318.—Parlatore in De Candolle, Prodr. xvi², 431.—Fowler in London Gard. Chronicle, 1872, 1070.—Murray in London Gard. Chronicle, 1875, 106.—Gordon, Pinetum, 2 ed. 289.
 - P. ponderosa, var. Jeffreyi, Vasey, Cat. Forest Trees, 31.—Engelmann in Trans. St. Louis Acad. iv, 181; Bot. California, ii, 126.

BULL PINE. BLACK PINE.

California, Scott's mountain, Siskiyou county, south along the Sierra Nevada to the San Bernardino and San Jacinto mountains.

A large tree, 30 to 31 meters in height, with a trunk 1.20 to 4 meters in diameter; dry, gravelly slopes between 6,000 and 8,000 feet elevation; most common and reaching its greatest development on the eastern slope of the Sierra Nevadas, here generally replacing the allied *P. ponderosa*, from which it may be distinguished by its more deeply-cleft bark, glaucous branchlets and leaves, much larger cones, and by the strong, pungent odor of oil of orange of the freshly-cut branchlets.

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Wood light, strong, hard, rather coarse-grained, compact; bands of small summer cells not broad, very resinous, conspicuous, resin passages few, not large; medullary rays numerous, obscure; color, light red, the sap-wood pale yellow or nearly white; specific gravity, 0.5206; ash, 0.26; largely manufactured into coarse lumber.

Abietine, a volatile carbo-hydrogen possessing powerful anæsthetic properties, is probably obtained by distilling the resinous exudation of this species, and not of P. Sabiniana (Watt's Dict. Chemistry, 2d Suppl. 1.—Am. Jour. Pharm. 1872, 97.—U. S. Dispensatory, 14 ed. 900).

363.—Pinus Chihuahuana, Engelmann,

Wislizenus' Rep. No. 26; Wheeler's Rep. vi, 262; Trans. St. Louis Acad. iv, 181; Coulter's Bot. Gazette, vii, 4.—Lindley & Gordon in Jour. Hort. Soc. London, v, 220.—Carrière in Fl. des Serres, ix, 200; Rev. Hort. 1854, 227; Trait. Conif. 357; 2 ed. 455.—Gordon, Pinetum, 193; 2 ed. 266.—Torrey, Bot. Mex. Boundary Survey, 209.—Cooper in Smithsonian Rep. 1860, 442.—Henkel & Hochstetter, Nadelhölz. 86.—Hoopes, Evergreens, 143.—Parlatore in De Candolle, Prodr. xvi², 397.—Vasey, Cat. Forest Trees, 32.

Santa Rita mountains, Arizona (Rothrock, Engelmann & Sargent), San Francisco mountains of southwestern New Mexico and Arizona (Greene); in Chihuahua.

A small tree, 18 to 24 meters in height, with a trunk 0.45 to 0.60 meter in diameter; dry, rocky ridges and slopes between 5,000 and 7,000 feet elevation; not common.

Wood light, soft, strong, brittle, close-grained, compact; bands of small summer cells not broad, resinous, conspicuous, resin passages few, rather large, conspicuous; medullary rays numerous, thin; color, clear light orange, the thick sap-wood lighter; specific gravity, 0.5457; ash, 0.39.

364.—Pinus contorta, Douglas;

Loudon, Arboretum, iv, 2292, f. 2210, 2211.—Nuttall, Sylva, iii, 117; 2 ed. ii, 176.—Endlicher, Syn. Conif. 168.—Carrière, Trait. Conif. 164; 2 ed. 474.—Torrey in Pacific R. R. Rep. iv, 141.—Gordon, Pinetum, 165; 2 ed. 232.—Cooper in Smithsonian Rep. 1858, 261.—Lyall in Jour. Linnæan Soc. vii, 133, 141, in part.—Henkel & Hochstetter, Nadelhölz. 24.—Rothrock in Smithsonian Rep. 1867, 433.—Hoopes, Evergreens, 81, in part.—Parlatore in De Candolle, Prodr. xvi², 381, in part.—Watson in King's Rep. v, 330.—Fowler in London Gard. Chronicle, 1872, 1070.—Gray in Proc. Am. Acad. vii, 402.—Koch, Dendrologie, ii², 301.—Vasey, Cat. Forest Trees, 29.—Hall in Coulter's Bot. Gazette, ii, 91.—Macoun in Geological Rep. Canada, 1875-'76, 211.—Engelmann in Trans. St. Louis Acad, iv, 182; Bot. California, ii, 126; London Gard. Chronicle, 1883, 351.—G. M. Dawson in Canadian Nat. 2 ser. ix, 327, in part.—Veitch, Manual Conif. 145.—Masters in London Gard. Chronicle, 1883, 45, f. 5.

- P. inops, Bongard in Mem. Acad. St. Petersburg, 6 ser. ii, 163 [not Aiton].—Hooker, Fl. Bor.-Am. ii, 161, in part.—Ledebour, Fl. Rossica, iii, 676 [not Aiton].
- P. Boursieri, Carrière in Rev. Hort. 1854, 233 & f.; Fl. des Serres, ix, 200 & f.; Trait. Conif. 398; 2 ed. 475.
- P. Banksiana, Lindley & Gordon in Jour. Hort. Soc. London, v, 218, in part.
- P. muricata, Bolander in Proc. California Acad. iii, 227, 317 [not Don].
- P. B.landeri, Parlatore in De Candolle, Prodr. xvi2, 379.

SCRUB PINE.

Alaska, south along the coast to Mendocino county, California, extending inland to the western slopes of the Coast ranges.

A small, stunted tree, 6 to 9 meters in height, with a trunk 0.30 to 0 50 meter in diameter; sandy dunes and exposed rocky points.

Wood light, hard, strong, brittle, coarse-grained; bands of small summer cells very broad, resinous, conspicuous, resin passages numerous, not large; medullary rays numerous, obscure; color, light brown tinged with red, the thick sap-wood nearly white; specific gravity, 0.5815; ash, 0.19.

365.—Pinus Murrayana, Balfour,

Rep. Oregon Exped. 2, t. 3, f. 2.—Murray in Edinburgh New Phil. Jour. new ser. xi, 226 (Trans. Bot. Soc. Edinburgh, vi, 351).

- P. inops, Bentham, Pl. Hartweg. 337 [not Aiton].
- P. contorta, Newberry in Pacific R. R. Rep. vi, 34, 90, t. 5, f. 11 [not Douglas].—Engelmann in Am. Jour. Sci. 2. ser. xxiv, 332.—Lyall in Jour. Linnæan Soc. vii, 141, in part.—Cooper in Am. Nat. iii, 409.—Parlatore in De Candolle, Prodr. xvi², 381, in part.—Porter in Hayden's Rep. 1871, 494.—Gray in Proc. Am. Acad. vii, 402.—Rothrock in Pl. Wheeler, 27, 50.—Parry in Am. Nat. vii, 179.
- P. contorta, var. latifolia, Engelmann in King's Rep. v, 331; Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 129; Wheeler's Rep. vi, 262.—Brandegee in Coulter's Bot. Gazette, iii, 32.—G. M. Dawson in Canadian Nat. new ser. ix, 328.
- P. contorta, var. Bolanderi, Vasey, Cat. Forest Trees, 29.

TAMARACK. BLACK PINE. LODGE-POLE PINE. SPRUCE PINE.

Valley of the Yukon river, Alaska (Fort Selkirk, Dall), south through the interior of British Columbia, along the mountain ranges of Washington territory and Oregon and the Sierra Nevadas of California to mount San Jacinto; on the high plateau east of the Rocky mountains in about latitude 56°, and south through the mountains of Idaho, Montana, Wyoming, Colorado, and Utah to New Mexico and northern Arizona.

A tree 18 to 24 meters in height, with a trunk 0.60 to 1.20 meter in diameter; reaching its greatest development in the California Sierras; in the interior regions in dry, gravelly soil, here the prevailing tree, covering immense areas, and generally replacing other species destroyed by fire; western Washington territory and southward only along the borders of moist alpine meadows between 6,000 and 9,000 feet elevation; generally confounded with the closely-allied *P. contorta* of the coast, from which it may be distinguished by its longer, broader leaves, very thin, scaly bark, thin sap-wood, and less resinous and finer-grained wood, resembling that of the white pines; the distribution of the two species in northern British Columbia and Alaska still undetermined.

Wood light, soft, not strong, close, straight-grained, easily worked, compact, not durable; bands of small summer cel s narrow, not conspicuous, resin passages few, not large; medullary rays numerous, obscure; color, light yellow or nearly white, the thin sap-wood lighter; specific gravity, 0.4096; ash, 0.32; occasionally manufactured into lu 1ber, and used for fuel, railway ties, etc.

366.-Pinus Sabiniana, Douglas,

Companion Bot. Mag. ii, 150.—Lambert, Pinus, 1 ed. iii, 137, t. 58.—Loudon, Arboretum, iv, 2246, f. 2138-2143.—Forbes, Pinetum Woburn. 63, t. 23, 24.—Hooker, Fl. Bor.-Am. ii, 162.—Lindley in Penn. Cycl. xvii, 172.—Antoine, Conif. 30, t. 11.—Hooker & Arnott, Bot. Beechey, 393.—Link in Linnæa, xv, 509.—Nuttall, Sylva, iii, 110, t. 113; 2 ed. ii, 169, t. 113.—Spach, Hist. Veg. xi, 390.—De Chambray, Trait. Arb. Res. 347.—Endlicher, Syn. Conif. 159.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Fl. des Serres, ix, 275, t. 964.—Carrière, Trait. Conif. 334; 2 ed. 435.—Torrey & Gray in Pacific R. R. Rep. ii, 130.—Bigelow in Pacific R. R. Rep., iv, 25.—Torrey in Pacific R. R. Rep. iv, 141; Bot. Mex. Boundary Survey, 210; t. 57; Ives' Rep. 28.—Newberry in Pacific R. R. Rep. vi, 39, 90, f. 13.—Gordon, Pinetum, 208; 2 ed. 284.—Cooper in Smithsonian Rep. 1858, 261.—Walpers, Ann. v, 799.—Bolander in Proc. California Acad. iii, 226, 318.—Henkel & Hochstetter, Nadelhölz. 75.—Lawson, Pinetum Brit. i, 85, t. 11, t. 1-3.—Nelson, Pinaceæ, 129.—Hoopes, Evergreens, 121.—Parlatore in De Candolle, Prodr. xvi², 391.—Fowler in London Gard. Chronicle, 1872, 1326.—Koch, Dendrologie, ii², 312.—Vasey, Cat. Forest Trees, 31.—Engelmann in Wheeler's Rep. vi, 375; Traus. St. Louis Acad. iv, 182; Bot. California, ii, 127.—Veitch, Manual Conif. 169.

DIGGER PINE. BULL PINE.

California, Portuguese Flat, Shasta county, south along the foot-hills of the Coast ranges and the western slope of the Sierra Nevadas below 4,000 feet elevation.

A large tree, 24 to 30 meters in height, with a trunk 0.60 to 1.20 meter in diameter; very common through all the foot-hills region.

Wood light, soft, not strong, brittle, very coarse-grained, compact, not durable; bands of small summer cells broad, very resinous, conspicuous, resin passages few, large, prominent; medullary rays numerous, obscure; color, light brown or red, the thick sap-wood yellow or nearly white; specific gravity, 0.4840; ash, 0.40; largely used for fuel.

The large edible nuts furnish the Indians an important article of food.

367.-Pinus Coulteri, D. Don,

Trans. Linnæan Soc. xvii, 440.—Loudon, Arboretum, iv, 2250, f. 2144-2146.—Forbes, Pinetum Woburn. 67, t. 25, 26.—Antoine, Conif. 31, t. 12, 13.—Penn. Cycl. xvii, 172.—Link in Linnæa, xv, 510.—Hooker & Arnott, Bot. Beechey, 393.—Nuttall, Sylva, iii, 112; 2 ed. ii, 171.—Endlicher, Syn. Conif. 160.—Carrière in Fl. des Serres, ix, 275 & t.; Trait. Conif. 334; 2 ed. 435.—Cooper in Smithsonian Rep. 1858, 261.—Torrey in Ives' Rep. 28.—Henkel & Hochstetter, Nadelhölz. 76.—Bolander in Proc. California Acad. iii, 318.—Parlatore in De Candolle, Prodr. xvi, 392.—Vasey, Cat. Forest Trees, 31.—Gordon, Pinetum, 2 ed. 266.—Engelmann in Trans. St. Louis Acad. iv, 182; Bot. California, ii, 127.—Lawson, Pinetum Brit. i, 23, f. 1-5.

- P. macrocarpa, Lindley in Bot. Reg. xxvi, Misc. 61.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Gordon, Pinetum, 201.—Nelson, Pinaceæ, 117.—Hoopes, Evergreens, 115.—Veitch, Manual Conif. 166.
- P. Sabiniana Coulteri, Loudon, Encycl. Pl. 985, f. 1839-1841.
- P. Sabiniana macrocarpa, Hort.

California, Monte Diablo, south through the Coast ranges to the Cuyamaca mountains, and probably in Lower California.

A tree 24 to 46 meters in height, with a trunk 0.90 to 1.80 meter in diameter; dry ridges and slopes between 3,000 and 6,000 feet elevation; most common and reaching its greatest development in the San Jacinto mountains.

Wood light, soft, not strong, brittle, coarse-grained; bands of small summer cells broad, very resinous, conspicuous, resin passages few, large; medullary rays numerous, prominent; color, light red, the thick sap-wood nearly white; specific gravity, 0.4133; ash, 0.37.

368.—Pinus insignis, Douglas;

- Loudon, Arboretum, iv, 2243, f. 2132-2137.—Forbes, Pinetum Woburn. 51, t. 18.—Lindley in Penn. Cycl. xvii, 171.—Antoine, Conif. 27, t. 8, f. 1.—Hooker & Arnott, Bot. Beechey, 393.—Spach, Hist. Veg. xi, 389.—Nuttall, Sylva, iii, 115; 2 ed. ii, 174.—Bentham, Bot. Sulphur, 55.—Endlicher, Syn. Conif. 163.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 339; 2 ed. 440.—Bigelow in Pacific R. R. Rep. iv, 25.—Torrey in Pacific R. R. Rep. iv, 141; Bot. Mex. Boundary Survey, 209, t. 55; Ives' Rep. 28.—Newberry in Pacific R. R. Rep. iv, 90.—Gordon, Pinetum, 197; 2 ed. 270.—Cooper in Smithsonian Rep. 1858, 261.—Murray in Edinburgh New Phil. Jour. new ser. xi, 222 (Trans. Bot. Soc. Edinburgh, vi, 347).—Henkel & Hochstetter, Nadelhölz. 69.—Bolander in Proc. California Acad. iii, 262, t. 317.—Nelson, Pinaceæ, 114.—Hoopes, Evergreens, 143.—Parlatore in De Candolle, Prodr. xvi², 395.—Lawson, Pinetum Brit. i, 37 t. 1, 5, f. 1-14.—Fowler in London Gard. Chronicle, 1872, 1070.—Vasey, Cat. Forest Trees, 31.—Engelmann in Trans, St. Louis Acad. iv, 182; Bot. California, ii, 128.—Veitch, Manual Conif. 163, f. 39.
 - **P. Californica, Loiseleur in Nouveau Duhamel, v. 243.—Loudon, Arboretum, iv. 2268.—Endlicher, Syn. Conif. 162.—
 Hooker & Arnott, Bot. Beechey, 393.—Nuttall, Sylva, iii, 117; 2 ed. ii, 175.—Carrière, Trait. Conif. 1 ed. 253.
 - P. adunca, Bosc in Poiret, Suppl. iv, 418.
 - P. Sinclairii, Hooker & Arnott, Bot. Beechey, 392, 393, t. 93, in part.—Nuttall, Sylva, iii, 141; 2 ed. ii, 198.—Carrière, Trait. Conif. 2 ed. ii, 198.
 - P. radiata, D. Don in Trans. Linnæan Soc. xvii, 442; Lambert, Pinus, 1 ed. iii, 133, t. 86.—Loudon, Arboretum, iv, 2270, f. 2182.—Antoine, Conif. 33, t. 14, f. 3.—Hooker & Arnott, Bot. Beechey, 392, 393, in part.—Nuttall, Sylva, iii, 116; 2 ed. ii, 175.—Endlicher, Syn. Conif. 161.—Hartweg in Jour. Hort. Soc. London, iii, 226.—Gordon in Jour. Hort. Soc. London, iv, 214 & f. (Fl. des Serres, vi, 434 & t.); Pinetum, 206; 2 ed. 282.—Knight, Syn. Conif. 37.—Lindley & Gordon in Jour. Hort. Soc. London, v, 216.—Carrière, Trait. Conif. 1 ed. 337.—Nelson, Pinaceæ, 127.—Hoopes, Evergreens, 118.—Koch, Dendrologie, ii², 307.—Vasey, Cat. Forest Trees, 31.
 - P. tuberculata, D. Don in Trans. Linnæan Soc. xvii, 441 [not Gordon].—Lambert, Pinus, 1 ed. iii, 131, t. 85.—Loudon, Arboretum, iv, 2270, f. 2181.—Antoine, Conif. 33, t. 14, f. 2.—Hooker & Arnott, Bot. Beechey, 394.—Endlicher, syn. Conif. 162.—Carrière, Trait. Conif. 338; 2 ed. 441, in part.—Nelson, Pinaceæ, 137.—Hoopes, Evergreens, 123 (excl. syn. Californica).—Parlatore in De Candolle, Prodr. xvi², 394, in part.
 - P. rigida,? Hooker & Arnott, Bot. Beechey, 160 [not Miller].
 - P. insignis macrocarpa, Hartweg in Jour. Hort. Soc. London, iii, 226.—Carrière, Trait. Conif. 440.

MONTEREY PINE.

California, Pescadero to Monterey and San Simeon bay.

A tree 24 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter; sandy soil, in immediate proximity to the sea-coast; rare and local; now widely cultivated on the Pacific coast for shelter and ornament. A form of Guadalupe island, off the coast of Lower California, with leaves in pairs, is var. binata (Engelmann in Proc. Am. Acad. xi, 119; Bot. California, ii, 128).

Wood light, soft, not strong, brittle, close-grained, compact; bands of small summer cells not broad, resinous, conspicuous; color, light brown, the very thick sap-wood nearly white; specific gravity, 0.4574; ash, 0.30; locally somewhat used for fuel.

369.-Pinus tuberculata, Gordon,

Jour. Hort. Soc. London, iv, 218 & f. (Fl. des Serres, v, 517° & f.); Pinetum, 211; 2 ed. 288 [not Don].—Rep. Oregon Exped. 2, t. 2, f. 2.— Henkel & Hochstetter, Nadelhölz. 78, in part.—Bolander in Proc. California Acad. iii, 262,317.— Lawson, Pinetum Brit. i, 93, t. 13, f. 1-9.—Carrière, Trait. Conif. 2 ed. 441, in part.—Parlatore in De Candolle, Prodr. xvi³, 394 (excl. bib.).—Koch, Dendrologie, ii², 309.—Vasey, Cat. Forest Trees, 31.—Engelmann in Trans. St. Louis Acad. iv, 183; Bot. California, ii, 128.—Veitch, Manual Conif. 170.

P. Californica, Hartweg in Jour. Hort. Soc. London, ii, 189 [not Loiseleur].

KNOB-CONE PINE.

Valley of the Mackenzie river, Oregon, south along the western slope of the Cascade and Sierra Nevada mountains, and in the California Coast ranges from the Santa Cruz to the San Jacinto mountains.

A tree 18 to 22 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or, rarely, reduced to a low shrub, fruiting when not more than 1 meter in height; dry, gravelly ridges and slopes from 2,500 (San Bernardino mountains) to 5,500 (mount Shasta) feet elevation; not common.

Wood light, soft, not strong, brittle, coarse-grained, compact; bands of small summer cells very broad, not conspicuous, resin passages numerous, large, prominent; medullary rays numerous, thin; color, light brown, the thick sap-wood nearly white or slightly tinged with red; specific gravity, 0.3499; ash, 0.33.

370.-Pinus Tæda, Linnæns,

Spec. 1 ed. 1000, in part.—Du Roi, Harbk. ii, 63.—Wangenheim, Amer. 41.—Aiton, Hort. Kew. iii, 368; 2 ed. v, 317.—Mænch, Meth. 365.—Michaux, Fl. Bor.-Am. ii, 205.—Lambert, Pinus, 1 ed. i, 23, t. 16, 17; 2 ed. i, 26, t. 17, 18; 3 ed. i, 30, t. 15.—Willdenow, Spec. iv, 498; Berl. Baumz. 269.—Persoon, Syn. ii, 578.—Desfontaines, Hist. Arb. Ii, 612.—Michaux f. Hist. Arb. Am. i, 98, t. 9; N. American Sylva, 3 ed. iii, 123, t. 143.—Nouveau Duhamel, v, 245, t. 75, f. 2.—Smith in Rees' Cycl. xxviii, No. 13.—Pursh, Fl. Am. Sept. ii, 644.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 175.—Elliott, Sk. ii, 636.—Sprengel, Syst. ii, 887.—Eaton, Manual, 6 ed. 265.—Lawson, Ag. Manual, 351; Pinetum Brit. i, 89, t. 12.—Loudon, Arboretum, iv, 2237, f. 2118-2122.—Forbes, Pinetum Woburn. 43, t. 14.—Antoine, Conif. 25, t. 7, f.1.—Eaton & Wright, Bot. 359.—Link in Linnæa, xv, 503.—Spach, Hist. Veg. xi, 391.—Griffith, Med. Bot. 609.—Gihoul, Arb. Resin, 32.—Endlicher, Syn. Conif. 164.—Scheele in Ræmer, Texas, Appx. 447.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 344; 2 ed. 448.—Darby, Bot. 8. States, 515.—Gordon, Pinetum, 210; 2 ed. 286.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. 8. States, 433.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 22.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 660; Bot. & Fl. 313.—Porcher, Resources 8. Forests, 506.—Henkel & Hochstetter, Nadelhölz, 65.—Nelson, Pinaceæ, 136.—Gray, Manual N. States, 5 ed. 469; Hall's Pl. Texas, 21.—Hoopes, Evergreens, 122.—Parlatore in De Candolle, Prodr. xvi², 393.—Young, Bot. Texas, 516.—Koch, Dendrologie, ii², 304.—Vasey, Cat. Forest Trees, 31.—Bentley & Trimen, Med. Pl. iv, 259, t. 259.—Engelmann in Trans. St. Louis Acad. iv, 183.—Veitch, Manual Conif. 172.

P. Tæda, var. tenuifolia, Aiton, Hort. Kew. iii, 368.

LOBLOLLY PINE. OLD-FIELD PINE. ROSEMARY PINE.

Southern Delaware, south to cape Malabar and Tampa bay, Florida, generally near the coast, through the Gulf states to the valley of the Colorado river, Texas, and north through southern Arkansas to the valley of the Arkansas river.

A tree 24 to 46 meters in height, with a trunk 0.90 to 1.50 meter in diameter; low, wet clay or dry sandy soil; springing up on all abandoned lands from Virginia southward, and now often replacing in the southern pine belt the original forests of *Pinus palustris*; in eastern North Carolina rarely on low, rich swamp ridges, here known as rosemary pine and attaining its greatest development and value.

Wood light, not strong, brittle, very coarse-grained, not durable; bands of small summer cells broad, very resinous, conspicuous, resin passages few, not prominent; medullary rays numerous, obscure; color, light brown, the very thick sap-wood orange, or often nearly white; wood of the rosemary pine close-grained, less resinous, lighter, with much thinner sap; specific gravity, 0.5441; ash, 0.26; largely used for fuel and manufactured into lumber of inferior quality.

Turpentine is occasionally manufactured from this species (U. S. Dispensatory, 14 ed. 901.—Flückiger & Hanbury, Pharmacographia, 545).

371.—Pinus rigida, Miller,

Dict. 7 ed. No. 10.—Du Roi, Harbk. ii, 60.—Marshall, Arbustum, 101.—Wangenheim, Amer. 41.—Lambert, Pinus, 1 ed. i, 25, t. 18, 19; 2 ed. i, 28; t. 18, 19; 3 ed. i, 32, t. 16, 17.—Willdenow, Spec. iv, 498; Enum. 988; Berl. Baumz. 268.—Persoon, Syn. ii, 578.—Desfontaines, Hist. Arb. ii, 612.—Michaux f. Hist. Arb. Am. i, 89, t. 8; N. American Sylva, 3 ed. iii, 118, t. 144.—Nouvean Duhamel, v, 244, t. 74.—Aiton, Hort. Kew. 2 ed. v, 317.—Smith in Rees' Cycl. xxviii, No. 14.—Pursh, Fl. Am. Sept. ii, 643.—Poiret, Suppl. iv, 417.—Eaton, Manual, 110; 6 ed. 265.—Barton, Compend. Fl. Philadelph. ii, 183.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 175.—Elliott, Sk. ii, 635.—Sprengel, Syst. ii, 887.—Torrey, Compend. Fl. N. States, 360; Fl. N. York, ii, 227.—Beck, Bot. 339.—Loudon, Arboretum, iv, 2239, f. 2123—2126.—Forbes, Pinetum Woburn. 41, t. 13.—Eaton & Wright, Bot. 358.—Antoine, Conif. 26, t. 7, f. 2.—Bigelow, Fl. Boston. 3 ed. 385.—Lindley in Penn. Cycl. xvii, 172.—Link in Linnæa, xv, 503.—Spach, Hist. Veg. xi, 388.—Griffith, Med. Bot. 604.—Giboul, Arb. Resin, 31.—Endlieher, Syn. Conif. 164.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 342; 2 ed. 447.—Darlington, Fl. Cestrica, 3 ed. 290.—Darby, Bot. S. States, 514.—Gordon, Pinetum, 207; 2 ed. 283.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 433.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 21.—Wood, Cl. Book, 660; Bot. & Fl. 313.—Henkel & Hochstetter, Nadelhölz, 67.—Nelson, Pinaceæ, 128.—Gray, Manual N. States, 5 ed. 469.—Hoopes, Evergreens, 119.—Parlatore in De Candolle, Prodr. xvi², 394.—Koch, Dendrologie, ii², 307.—Vasey, Cat. Forest Trees, 31.—Engelmann in Trans. St. Louis Acad. iv, 183.—Sears in Bull. Essex Inst. xiii, 186.—Veitch, Manual Conif. 169.

- P. Tæda, var. rigida, Aiton, Hort. Kew. iii, 368.
- P. Twda, var. a. Poiret in Lamarck, Dict. v, 340.
- P. Fraseri, Loddiges, Cat. ed. 1836, 50 [not Pursh].
- P. Loddigesii, Loudon, Arboretum, iv, 2269

PITCH PINE.

Valley of the Saint John's river, New Brunswick, to the northern shores of lake Ontario, south through the Atlantic states to northern Georgia, extending to the western slope of the Alleghany mountains in West Virginia and Kentucky (Pineville, Bell county, De Friese).

A tree 12 to 24 meters in height, with a trunk 0.60 to 0.90 meter in diameter; dry, sandy, barren soil, or less commonly in deep, cold swamps; very common.

Wood light, soft, not strong, brittle, coarse-grained, compact; bands of small summer cells broad, very resinous, conspicuous, resin passages numerous, not large; medullary rays numerous, obscure; color, light brown or red, the thick sap-wood yellow or often nearly white; specific gravity, 0.5151; ash, 0.23; largely used for fuel, charcoal, and occasionally manufactured into coarse lumber.

NOTE.—Upon the island of Nantucket, Massachusetts, this species is now greatly injured by the attacks of the destructive caterpillar of the pine moth (Retina frustrana, Scudder in Pub. Massachusetts Ag. Soc. 1883 & t).

372.—Pinus serotina, Michaux,

- Fl. Bor.-Am. ii, 205.—Willdenow, Spec. iv, 499.—Persoon, Syn. ii, 578.—Michaux f. Hist. Arb. Am. i, 86, t. 7; N. American Sylva, 3 ed. iii, 117, t. 142.—Nouveau Duhamel, v, 246, t. 75, f. 1.—Pursh, Fl. Am. Sept. ii, 643.—Poiret, Suppl. iv, 417.—Nuttall, Genera, ii, 223.—Lambert, Pinus, 1 ed. iii, 35, t. 18.—Elliott, Sk. ii, 634.—Sprengel, Syst. ii, 887.—Torrey, Compend. Fl. N. States, 360.—Beck, Bot. 339.—Eaton, Manual, 6 ed. 265.—Loudon, Arboretum, iv, 2242, f. 2127-2131.—Forbes, Pinetum Woburn. 47, t. 16.—Eaton & Wright, Bot. 359.—Antoine, Conif. 27, t. 8, f. 2.—Lindley in Penn. Cycl. xvii, 172.—Link in Linnæa, xv, 504.—Spach, Hist. Veg. xi, 389.—Gihoul, Arb. Resin. 32.—Endlicher, Syn. Conif. 163.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 341; 2 ed. 449.—Darby, Bot. S. States, 514.—Gordon, Pinetum, 209; 2 ed. 285.—Chapman, Fl. S. States, 433.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 21.—Henkel & Hochstetter, Nadelhölz. 70.—Nelson, Pinaceæ, 129.—Parlatore in De Candolle, Prodr. xvi³, 394.—Koch, Dendrologie, ii², 305.—Vasey, Cat. Forest Trees, 31.
 - P. Tæda, var. alopecuroidea, Aiton, Hort. Kew. 2 ed. v, 317.-Loudon, Arboretum, iv, 2237.
 - P. rigida, var. serotina, Loudon, Encycl. Pl. 979, f. 1824-1827.—Cooper in Smithsonian Rep. 1858, 257.—Hoopes, Evergreens, 120.—Engelmann in Trans. St. Louis Acad. iv, 183.

POND PINE.

North Carolina, south near the coast to the head of the Saint John's river, Florida.

A tree 12 to 24 meters in height, with a trunk 0.60 to 0.90 meter in diameter; inundated borders of streams and ponds in low, peaty soil; not common.

Wood heavy, soft, not strong, brittle, coarse-grained, compact; bands of small summer cells broad, forming fully one-half the annual growth, very resinous, dark colored, conspicuous, resin passages few, large; medullary rays numerous, obscure; color, dark orange, the thick sap-wood pale yellow; specific gravity 0.7942; ash, 0.17.

373.-Pinus inops, Aiton,

- Hort. Kew. iii, 367; 2 ed. v, 316.—Michaux, Fl. Bor.-Am. ii, 204.—Lambert, Pinus, 1 ed. i, 18, t. 13; 2 ed. i, 21, t. 14; 3 ed. i, 25, t. 12.—Willdenow, Spec. iv, 496; Enum. 988; Berl. Baumz. 266.—Persoon, Syn. ii, 578.—Michaux f. Hist. Arb. Am. i, 58, t. 4; N. American Sylva, 3 ed. iii, 103, t. 139.—Nouveau Duhamel, v, 236, t. 69, f. 1.—Pursh, Fl. Am. Sept. ii, 641.—Smith in Rees' Cycl. xxviii, No. 10.—Barton, Prodr. Fl. Philadelph. 93.—Compend. Fl. Philadelph. ii, 183.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 173.—Elliott, Sk. ii, 633.—Sprengel, Syst. ii, 886.—Torrey, Compend. Fl. N. States, 359.—Audubon, Birds, t. 97.—Beck, Bot. 338.—Eaton, Manual, 6 ed. 265.—Bon Jard. 1837, 976.—Loudon, Arboretum, iv, 2192, f. 2068—2071.—Forbes, Pinetum Woburn. 15, t. 4.—Hooker, Fl. Bor.-Am. ii, 161, in part.—Eaton & Wright, Bot. 358.—Antoine, Conif. 17, t. 5, f. 3.—Lindley in Penn. Cycl. xvii, 171.—Link in Linnæa, xv, 500.—Spach, Hist. Veg. xi, 386.—Endlicher, Syn. Conif. 167.—Knight, Syn. Conif. 26.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 361; 2 ed. 471.—Darlington, Fl. Cestrica, 3 ed. 290.—Darby, Bot. S. States, 514.—Gordon, Pinetum, 167; 2 ed. 238.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 433.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 20.—Wood, Cl. Book, 661; Bot. & Fl. 313.—Henkel & Hochstetter, Nadelhölz. 22.—Nelson, Pinaces, 113.—Gray, Manual N. States, 5 ed. 470.—Hoopes, Evergreens, 84.—Parlatore in De Candolle, Prodr. xvi², 380 (excl. syn. variabilis).—Vasey, Cat. Forest Trees, 30.—Veitch, Manual Conif. 158.
 - P. Virginiana, Miller, Gard. Dict. 7 ed. No. 9.—Du Roi, Obs. Bot. 43; Harbk. 2 ed. ii, 35.—Marshall, Arbustum, 102.—Wangenheim, Amer. 74.—Koch, Dendrologie, ii², 299.
 - P. Tæda, var. Virginiana, Poiret in Lamarck, Dict. v, 340.

JERSEY PINE. SCRUB PINE.

Middle Island, Long island, Tottenville, and Clifton, Staten island, New York, south, generally near the coast, to the valley of the Savannah river (Aiken, South Carolina), and through eastern and middle Kentucky to "the knobs" of southeastern Indiana.

A tree 24 to 36 meters in height, with a trunk 0.60 to 0.90 meter in diameter, or in the Atlantic states generally much smaller; sandy, generally barren soil, reaching its greatest development west of the Alleghany mountains.

Wood light, soft, not strong, brittle, very close-grained, compact, durable; bands of small summer cells broad, very resinous, conspicuous, resin passages few, not prominent; medullary rays numerous, thin; color, light orange, the thick sap-wood nearly white; specific gravity, 0.5309; ash, 0.30; largely used for fuel, and in Kentucky and Indiana preferred for and largely manufactured into water-pipes and pump-logs.

374.—Pinus clausa, Vasey,

Cat. Forest Trees, 30.

P. inops, var. clausa, Engelmann in Trans. St. Louis Acad. iv, 183.—Chapman, Fl. S. States, Suppl. 650.

SAND PINE. SCRUB PINE. SPRUCE PINE.

Florida, shores of Pensacola bay, south, generally within 30 miles of the coast, to Pease creek, and occupying a narrow ridge along the east coast south of Saint Augustine.

A tree 21 to 24 meters in height, with a trunk 0.60 to 0.75 meter in diameter, or on the west coast rarely 6 to 9 meters in height; barren, sandy dunes and ridges; most common and reaching its greatest development about the head of Halifax bay.

Wood light, soft, not strong, brittle; bands of small summer cells broad, very resinous, conspicuous, resin passages numerous, prominent; medullary rays numerous, thin; color, light orange or yellow, the thick sap-wood nearly white; specific gravity, 0.5576; ash, 0.31; occasionally used for the masts of small vessels.

375.—Pinus pungens, Michaux f.

Hist. Arb. Am. i, 61, t. 5; N. American Sylva, 3 ed. iii, 105, t. 140.—Nouveau Duhamel, v. 236, t. 67, f. 4.—Aiton, Hort. Kew. 2 ed. v, 314.—Pursh, Fl. Am. Sept. ii, 643.—Poiret, Suppl. iv, 417.—Elliott, Sk. ii, 635.—Sprengel, Syst. ii, 886.—Eaton, Manual, 6 ed. 265.—Lambert, Pinus, 1 ed. iii, 34, t. 17.—Loudon, Arboretum, iv, 2197, f. 2077-2080.—Forbes, Pinetum Woburn. 17, t. 5.—Eaton & Wright, Bot. 359.—Antoine, Conif. 18, t. 5, f. 4.—Lindley in Penn. Cycl. xvii, 171.—Nuttall, Sylva, iii, 125; 2 ed. ii, 184.—Spach, Hist. Veg. xi, 287.—Endlicher, Syn. Conif. 166.—Knight, Syn. Conif. 27.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 359; 2 ed. 470.—Darby, Bot. S. States, 515.—Gordon, Pinetum, 181; 2 ed. 254.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 432.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 20.—Wood, Cl. Book, 660; Bot. & Fl. 313.—Henkel & Hochstetter, Nadelhölz, 21.—Nelson, Pinaceæ, 127.—Gray, Manual N. States, 5 ed. 469.—Hoopes, Evergreens, 98.—Parlatore in De Candolle, Prodr. xvi², 379.—Koch, Dendrologie ii², 304.—Vasey, Cat. Forest Trees, 30.—Meehan in Rep. Penn. Fruit Growers' Soc. 1877 & t.—Engelmann in Trans. St. Louis. Acad. iv, 183.—Veitch, Manual Conif, 158.

TABLE-MOUNTAIN PINE. HICKORY PINE.

Alleghany mountains, Pennsylvania to Tennessee.

A tree 9 to 18 meters in height, with a trunk 0.60 to 1.05 meter in diameter; most common and reaching its greatest develop ment upon the high mountains of East Tennessee, here often the prevailing species and forming extensive forests.

Wood light, soft, not strong, brittle, coarse-grained, compact; bands of small summer cells broad, resinous, conspicuous, resin passages numerous, large; medullary rays numerous, prominent; color, light brown, the thick sap-wood nearly white; specific gravity, 0.4935; ash, 0.27; in Pennsylvania largely manufactured into charcoal.

376.-Pinus muricata, D. Don,

Trans. Linnæan Soc. xvii, 441.—Lambert, Pinus, 1 ed. iii, t. 84.—Loudon, Arboretum, iv, 2269, f. 2180.—Hooker & Arnott, Bot. Beechey, 393.—Antoine, Conif. 32, t. 14, f. 1.—Nuttall, Sylva, iii, 113; 2 ed. ii, 172.—Endlicher, Syn. Conif. 161.—Knight, Syn. Conif. 26.—Gordon in Jour. Hort. Soc. London, iv, 216 & f. (Fl. des Serres, v. 517b & f.); Pinetum, 173; 2 ed. 246 (excl. syn. Murrayana).—Lindley & Gordon in Jour. Hort. Soc. London, v. 217.—Carrière, Trait. Conif. 359; 2 ed. 470.—Torrey, Bot. Mex. Boundary Survey, 209, t. 54 (P. Edgariana on plate).—Cooper in Smithsonian Rep. 1858, 261.—Henkel & Hochstetter, Nadelhölz. 60.—Nelson, Pinaceæ, 121.—Hoopes, Evergreens, 92.—Parlatore in De Candolle, Prodr. xvi², 379.—Fowler in London Gard. Chronicle, 1872, 1164.—Koch, Dendrologie, ii³, 302.—Vasey, Cat. Forest Trees, 30.—Engelmann in Trans. St. Louis Acad. iv, 183; Bot. California, ii, 128.—Veitch, Manual Conif. 151.—London Gard. Chronicle, 1884, 49, f. 7-9.

- P. inops, var. Bentham, Pl. Hartweg. 337.
- P. Edgariana, Hartweg in Jour. Hort. Soc. London, iii, 217, 226.
- P. contorta, Bolander in Proc. California Acad. iii, 227, 317 [not Douglas].

OBISPO PINE. BISHOP'S PINE.

California, Mendocino county south through the Coast ranges to San Luis Obispo county.

A tree 24 to 36 meters in height, with a trunk 0.30 to 0.90 meter in diameter, or more often not exceeding 15 meters in height; cold peat bogs or barren, sandy gravel; always exposed to the winds and fogs of the ocean, and not found above 2,000 feet elevation, reaching its greatest development in Mendocino county; rare and local.

Wood light, very strong and hard, rather coarse-grained, compact; bands of small summer cells broad, resinous, resin passages few, not prominent; medullary rays numerous, thin; color, light brown, the thick sap-wood nearly white; specific gravity, 0.4942; ash, 0.26.

377.—Pinus mitis, Michaux,

- Fl. Bor.-Am. ii, 204.—Michaux f. Hist. Arb. Am. i, 52, t. 3; N. American Sylva, 3 ed. iii, 96, t. 137.—Barton, Prodr. Fl. Philadelph 93.—Poiret, Suppl. iv, 417.—Loudon, Arboretum, iv, 2195, f. 2072-2076.—Antoine, Conif. 16, t. 5, f. 1.—Lindley in Penn. Cycl. xvii, 171.—Spach, Hist. Veg. xi, 386.—Torrey, Fl. N. York, ii, 229.—Endlicher, Syn. Conif. 167.—Knight, Syn. Conif. 26.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 361; 2 ed. 472.—Gordon, Pinetum, 170; 2 ed. 243 (excl. syn. Roylei).—Cooper in Smithsonian Rep. 1858, 275.—Chapman, Fl. S. States, 433.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 19.—Lesquereux in Owen's 2d Rep. Arkansas, 389.—Wood, Cl. Book, 660; Bot. & Fl. 313.—Henkel & Hochstetter, Nadelhölz. 23.—Gray, Manual N. States, 5 ed. 470.—Hoopes, Evergreens, 88.—Parlatore in De Candolle, Prodr. xvi², 380.—Young, Bot. Texas, 516.—Koch, Dendrologie, ii², 300.—Vasey, Cat. Forest Trees, 30.—Broadhead in Coulter's Bot. Gazette, iii, 60.—Engelmann in Trans. St. Louis Acad. iv, 184.—Ridgway in Proc. U. S. Nat. Mus. 88.
 - P. echinata, Miller, Dict. 7 ed. No. 12.—Marshall, Arbustum, 180?—Wangenheim, Amer. 74.
 - P. Virginiana, var. echinata, Du Roi, Harbk. ii, 38.
 - P. Tæda, var. variabilis, Aiton, Hort. Kew. iii, 368.
 - P. variabilis, Lambert, Pinus, 1 ed. i, 22, t. 15; 2 ed. i, 25, t. 16; 3 ed. i, 29, t. 14.—Willdenow, Spec. iv, 498.—Persoon, Syn. ii, 578.—Nouveau Duhamel, v, 235, t. 69, f. 2.—Aiton, Hort. Kew. 2 ed. v, 316.—Pursh, Fl. Am. Sept. ii, 643.—Smith in Rees' Cycl. xxviii, No. 12.—Barton, Compend. Fl. Philadelph. ii, 183.—Nuttall, Genera, ii, 223.—Elliott, Sk. ii, 633.—Sprengel, Syst. ii, 886.—Torrey, Compend. Fl. N. States, 360.—Beck, Bot. 339.—Eaton, Manual, 6 ed. 265.—Forbes, Pinetum Woburn. 35, t. 11.—Eaton & Wright, Bot. 358.—Antoine, Conif. 15, t. 5, f. 2.—Link in Linnæa, xv, 502.—Endlicher, Syn. Conif. 168 (excl. syn.).—Darby, Bot. S. States, 514.
 - P. rigida, Porcher, Resources S. States, 504 [not Miller].

YELLOW PINE. SHORT-LEAVED PINE. SPRUCE PINE. BULL PINE.

Staten island, New York, south to the Chattahoochee region of western Florida, through the Gulf states to Tennessee and eastern Texas, and through Arkansas to the Indian territory, southeastern Kansas, southern Missouri, and in Union county, Illinois.

A tree 24 to 30 meters in height, with a trunk 0.60 to 1.35 meter in diameter; light sandy soil or, less commonly, along the low borders of swamps; forming west of the Mississippi river, mixed with oaks and other decidnous trees, extensive forests; the only species of northern Arkansas, Kansas, and Missouri, reaching its greatest development in western Louisiana, southern Arkansas, and eastern Texas.

Wood, varying greatly in quality and amount of sap, heavy, hard, strong, generally coarse-grained, compact; bands of small summer cells broad, often occupying half the width of the annual growth; very resinous, resin passages numerous, large; medullary rays numerous, conspicuous; color, orange, the sap-wood nearly white; specific gravity, 0.6104; ash, 0.29; largely manufactured into lumber, especially in the states west of the Mississippi river, and among yellow pines only inferior in value to that of *P. palustris*.

378.—Pinus glabra, Walter,

Fl. Caroliniana, 237.—Poiret in Lamarck, Dict. v, 342.—Ravenel in Proc. Elliott Soc. i, 52.—Chapman, Fl. S. States, 433.—Porcher, Resources S. Forests, 506.—Hoopes, Evergreens, 82.—Vasey, Cat. Forest Trees, 30.—Engelmann in Trans. St. Louis Acad. iv, 184.

?P. mitis, var. paupera, Wood, Cl. Book, 660.

CEDAR PINE. SPRUCE PINE. WHITE PINE.

South Carolina, south to the Chattahoochee region of western Florida, generally near the coast, and through the Gulf states south of latitude 32° 30′ to the valley of the Pearl river, Louisiana.

A tree 24 to 30 meters in height, with a trunk 0.60 to 1.20 meter in diameter; rich bottom lands and hummocks in dense forests of hard-wood trees, reaching its greatest development in Alabama and Mississippi; not common and local.

Wood light, soft, not strong, brittle, very coarse-grained, not durable; bands of small summer cells broad, not resinous, resin passages few, not large; medullary rays numerous, obscure; color, light brown, the sap-wood nearly white; specific gravity, 0.3931; ash, 0.45.

379.-Pinus Banksiana, Lambert,

Pinus, 1 ed. i, 7, t. 3; 2 ed. i, 7, t, 3; 3 ed. i, 9, t. 3.—Persoon, Syn. ii, 578.—Desfontaines, Hist. Arb. ii, 611.—Nouveau Duhamel, v, 234, t. 67, f. 3.—Aiton, Hort. Kew. 2 ed. v, 315.—Pursh, Fl. Am. Sept. ii, 642.—Smith in Rees' Cycl. xxviii, No. 4.—Nuttall, Genera, ii, 223; Sylva, iii, 124; 2 ed. ii, 182.—Sprengel, Syst. ii, 886.—Torrey, Compend. Fl. N. States, 360.—Beck, Bot. 339.—Eaton, Manual, 6 ed. 265.—Loudon, Arboretum, iv, 2190, f. 2064-2067.—Forbes, Pinetum Woburn. 13, t. 3.—Hooker, Fl. Bor.-Am. ii, 161.—Eaton & Wright, Bot. 358.—Antoine, Conif. 8, t. 4, f. 2.—Lindley in Penn. Cycl. xvii, 171.—Link in Linnæa, xv, 491.—Spach, Hist. Veg. xi, 379.—Endlicher, Syn. Conif. 177.—Knight, Syn. Conif. 26.—Lindley & Gordon in Jour. Hort. Soc. London, v, 218 (excl. syn. contorta).—Parry in Owen's Rep. 618.—Carrière, Trait. Conif. 381; 2 ed. 485.—Gordon, Pinetum, 163; 2 ed. 230.—Richardson, Arctic Exped. 441.—Cooper in Smithsonian Rep. 1858, 257.—Hooker f. in Trans. Linnæan Soc. xxiii², 301.—Wood, Cl. Book, 661.—Henkel & Hochstetter, Nadelhölz. 44.—Nelson, Pinaceæ, 104.—Gray, Manual N. States, 5 ed. 470.—Hoopes, Evergreens, 78.—Vasey, Cat. Forest Trees, 29.—Macoun in Geological Rep. Canada, 1875—76, 211.—Engelmann in Trans. St. Louis Acad. iv, 184.—Sears in Bull. Essex Inst. xiii, 186.—Bell in Geological Rep. Canada, 1879—'80, 46c.—Veitch, Manual Conif. 158.

- P. sylvestris, var. divaricata, Aiton, Hort. Kew. iii, 366.
- P. Hudsonica, Poiret in Lamarck, Diet. v, 339.—Parlatore in De Candolle, Prodr. xvi², 380.—Wood, Bot. & Fl. 313.—Koch, Dendrologie, ii², 298.
- P. rupestris, Michaux f. Hist. Arb. Am. i, 49, t. 2; N. American Sylva, 3 ed. iii, 95, t. 136.

GRAY PINE. SCRUB PINE. PRINCE'S PINE.

Bay of Chalcur, New Brunswick, to the southern shores of Hudson bay, northwest to the Great Bear lake, the valley of the Mackenzie river, and the eastern slope of the Rocky mountains between the fifty-second and sixty-fifth degrees of north latitude; south to northern Maine, Ferrisburg, Vermont (R. E. Robinson), the southern shore of lake Michigan, and central Minnesota.

A small tree, 9 to 22 meters in height, with a trunk rarely exceeding 0.75 meter in diameter; barren, sandy soil or, less commonly, in rich loam; most common north of the boundary of the United States, and reaching its greatest development in the region north of lake Superior, here often forming considerable forests; toward its extreme western limits associated and often confounded with the closely allied *P. contorta* and *P. Murrayana* of the Pacific region.

Wood light, soft, not strong, rather close-grained, compact; bands of small summer cells not broad, very resinous, conspicuous, resin passages few, not large; medullary rays numerous, obscure; color, clear light brown or, rarely, orange, the thick sap-wood almost white; specific gravity, 0.4761; ash, 0.23; largely used for fuel, railway ties, etc.

380.—Pinus palustris, Miller,

- Diet. 7 ed. No. 14.—Marshall, Arbustum, 100.—Wangenheim, Amer. 73.—Walter, Fl. Caroliniana, 237.—Aiton, Hort. Kew. iii, 368;
 2 ed. v, 317.—Abbot, Insects Georgia, i, t. 42.—Du Roi, Harbk. 2 ed. ii, 66.—Michaux, Fl. Bor.-Am. ii, 204.—Lambert, Pinus, 1 ed. i, 27, t. 20;
 2 ed. i, 30, t. 21;
 3 ed. i, 41, t. 24, 25.—Willdenow, Spec. iv, 499.—Poiret in Lamarck, Diet. v, 341.—Persoon, Syn. ii, 578.—Desfontaines, Hist. Arb. ii, 612.—Pursh, Fl. Am. Sept. ii, 644.—Smith in Rees' Cycl. xxviii, No. 15.—Nuttall, Genera, ii, 223;
 5 sylva, iii, 126;
 2 ed. ii, 185.—Hayne, Dend. Fl. 174.—Elliott, Sk. ii, 637.—Sprengel, Syst. ii, 887.—Eaton, Manual, 6 ed. 266.—Forbes, Pinetum Woburn. 59, t. 22.—Eaton & Wright, Bot. 359.—Antoine, Conif. 23, t. 6, f. 2.—Link in Linnæa, xv, 206.—Griffith, Med. Bot. 604.—Darby, Bot. S. States, 515.—Cooper in Smithsonian Rep. 1858, 257.—Wood, Gl. Book, 660.—Porcher, Resources S. Forests, 495.—Michaux f. N. American Sylva, 3 ed. iii, 106, t. 141 (the plate as P. australis).
 - P. australis, Michaux f. Hist. Arb. Am. i, 64, t. 6.—Nouveau Duhamel, v, 246, t. 75, f. 3.—Loudon, Arboretum, iv, 2255, f. 2156—2160.—Lindley in Penn. Cycl. xvii, 171.—Spach, Hist. Veg. xi, 392.—Endlicher, Syn. Conif. 165.—Carson, Mcd. Bot. ii, 43, t. 87.—Gihoul, Arb. Resin. 33.—Knight, Syn. Conif. 30.—Lindley & Gordon in Jour. Hort. Soc. London, v, 217.—Carrière, Trait. Conif. 345; 2 ed. 450.—Gordon, Pinetum, 187; Suppl. 63; 2 ed. 260.—Chapman, Fl. 8. States, 434.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 24.—Wood, Bot. & Fl. 313.—Henkel & Hochstetter, Nadelhölz. 65.—Nelson, Pinaccae, 103.—Hoopes, Evergreens, 109.—Parlatore in De Candolle, Prodr. xvi², 392.—Young, Bot. Texas, 517.—Vasey, Cat. Forest Trees, 31.—Bentley & Trimen, Med. Pl. iv, 258, t. 258.—Engelmann in Trans. St. Louis Acad. iv, 185.—Veitch, Manual Conif. 172.

LONG-LEAVED PINE. SOUTHERN PINE. GEORGIA PINE. YELLOW PINE. HARD PINE.

Southeastern Virginia, south to cape Canaveral and Tampa bay, Florida, and through the Gulf states to the valley of the Red river, Louisiana, and the Trinity river, Texas, rarely extending beyond 150 miles from the coast.

A tree of the first economic value, 18 to 29 meters in height, with a trunk 0.60 to 1.20 meter in diameter; dry, sandy loam of the maritime plain, generally of Tertiary formation, and forming, outside of the river bottoms, extensive forests almost to the exclusion of other species, or toward its extreme interior range, especially in the Gulf states, occupying rolling hills, here mixed with oaks and various deciduous trees; rarely along the borders of swamps in low, wet soil.

Wood heavy, exceedingly hard, very strong, tough, coarse-grained, compact, durable; bands of small summer cells broad, occupying fully half the width of the annual growth, very resinous, dark colored, resin passages few, not conspicuous; medullary rays numerous, conspicuous; color, light red or orange, the thin sap-wood nearly white; specific gravity, 0.6999; ash, 0.25; largely manufactured into lumber and used in construction of all sorts, for ship-building, fencing, railway ties, etc.

The turpentine, tar, pitch, rosin, and spirits of turpentine manufactured in the United States are almost exclusively produced by this species (U. S. Dispensatory, 14 ed. 709, 899.—Nat. Dispensatory, 2 ed. 1417.—Flückiger & Hanbury, Pharmacographia, 545).

381.—Pinus Cubensis, Grisebach,

Mem. Am. Acad. viii, 530; Cat. Pl. Cuba, 217.—Parlatore in De Candolle, Prodr. xvi2, 396.

- P. Tæda, var. heterophylla, Elliott, Sk. ii, 636.
- P. Elliottii, Engelmann; Vasey, Cat. Forest Trees, 30; Trans. St. Louis Acad. iv, 186, t. 1, 2, 3.—Chapman, Fl. S. States, Suppl. 650.
- P. Cubensis, var. terthrocarpa, Wright.-Grisebach, Cat. Pl. Cuba, 217.

SLASH PINE. SWAMP PINE. BASTARD PINE. MEADOW PINE.

South Carolina (Bluffton, Mellichamp), south near the coast to the southern keys of Florida, west along the Gulf coast to the valley of the Pearl river, Louisiana, not extending beyond 50 or 60 miles inland; in the West Indies.

A tree 24 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter; light sandy soil along the dunes and marshes of the coast, or wet clay borders of ponds, abandoned fields, etc., and now rapidly taking possession of ground from which the forests of *P. palustris* have been removed; the only species of Florida south of cape Canaveral and bay Biscayne.

Wood heavy, exceedingly hard, very strong, tough, coarse-grained, compact, durable; bands of small summer cells very broad, occupying fully half the width of the annual growth, very resinous, conspicuous, resin passages few, not large; medullary rays numerous, rather prominent; color, rich dark orange, the sap-wood lighter, often nearly white; specific gravity, 0.7504; ash, 0.26; hardly inferior in value to that of *P. palustris*, although rarely manufactured into lumber.

Turpentine is occasionally manufactured in southern Florida from this species.

Note.—Specimens collected upon the southern keys of Florida by A. H. Curtiss connect the forms of South Carolina, Georgia, and northern Florida with the West Indian tree.

382.—Picea nigra, Link,

Linnæa, xv, 520.—Carrière, Trait. Conif. 241; 2 ed. 323.—Hooker f. in Trans. Linnæan Soc. xxiii², 301.—Brunet, Hist. Picea, 10 & t. f. B.—Peck in Trans. Albany Inst. viii, 283.—Engelmann in London Gard. Chronicle, 1879, 334.—Sears in Bull. Essex Inst. xiii, 185.

Abies Mariana, Miller, Dict.-Wangenheim, Amer. 75.

Pinus Mariana, Du Roi, Obs. Bot. 38; Harbk. ii, 107.—Ehrhart, Beitr. iii, 24.

Pinus Abies Canadensis, Marshall, Arbustum, 103.

Pinus Americana rubra, Wangenheim, Amer. 75.

Pinus nigra, Aiton, Hort. Kew. iii, 370; 2 ed. v, 319.—Lambert, Pinus, 1 ed. i, 41, t. 27; 2 ed. i, 45, t. 27; 3 ed. i, 64, t. 37.—Willdenow, Spec. iv, 506; Enum. 990; Berl. Baumz. 278.—Persoon, Syn. ii, 579.—Pursh. Fl. Am. Sept. ii, 640.—Smith in Rees' Cycl. xxviii, No. 20.—Barton, Compend. Fl. Philadelph. ii, 182.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 177.—Elliott, Sk. ii, 640.—Sprengel, Syst. ii, 885.—Torrey, Compend. Fl. N. States, 359; Fl. N. York, ii, 230.—Beck, Bot. 340.—Eaton, Manual, 6 ed. 264.—Hooker, Fl. Bor.-Am. ii, 163.—Eaton & Wright, Bot. 358.—Bigelow, Fl. Boston. 3 ed. 386.—Antoine, Conif. 88, t. 34, f. 3.—Endlicher, Syn. Conif. 115.—Darby, Bot. S. States, 515.—Porcher, Resources S. Forests, 505.—Parlatore in De Candolle, Prodr. xvi², 413.

Pinus Americana, Gærtner, Fruct. ii, 60, t. 91, f. 1.

Pinus rubra, Lambert, Pinus, 1 ed. i, 48, t. 28; 2 ed. i, 47, t. 30; 3 ed. i, 66, t. 38 [not Michaux f.].—Persoon, Syn. ii, 579.—Aiton, Hort. Kew. 2 ed. v, 319.—Pursh, Fl. Am. Sept. ii, 640.—Smith in Rees' Cycl. xxviii, No. 23.—Nuttall, Genera, ii, 223.—Sprengel, Syst. ii, 885.—Turrey, Compend. Fl. N. States, 359.—Beck, Bot. 340.—Eaton, Manual, 6 ed. 264.—Hooker, Fl. Bor.-Am. ii, 164.—Eaton & Wright, Bot. 358.—Antoine, Conif. 87, t. 34, f. 2.—Endlicher, Syn. Conif. 113.—Gihoul, Arb. Resin. 44.—Parlatore in De Candolle, Prodr. xvi², 413.

Abies denticulata, Michaux, Fl. Bor.-Am. ii, 206.-Poiret in Lamarck, Dict. vi, 520.

Abies nigra, Poiret in Lamarck, Dict. vi, 520.—Desfontaines, Hist. Arb. ii, 580.—Michaux f. Hist. Arb. Am. i, 124, t. 11; N. American Sylva, 3 ed. iii, 139, t. 147.—Nouveau Duhamel, v, 292, t. 81, f. 1.—Lindley in Penn. Cycl. i, 32.—Loudon, Arboretum, iv, 2312, f. 2225-2227.—Spach, Hist. Veg. xi, 410, in part.—Emerson, Trees Massachusetts, 81; 2 ed. ii, 96.—Griffith, Med. Bot. 606.—Knight, Syn. Conif. 36.—Lindley & Gordon in Jour. Hort. Soc. London, v, 211.—Parry in Owen's Rep. 618.—Gordon, Pinetum, 11; 2 ed. 17.—Richardson, Arctic Exped. 442.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 434.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 27.—Wood, Cl. Book, 662; Bot. & Fl. 313.—Porcher, Resources S. Forests, 507.—Henkel & Hochstetter, Nadelhölz. 191.—Nelson, Pinaceæ, 50.—Gray, Manual N. States, 5 ed. 471.—Hoopes, Evergreens, 169.—Vasey, Cat. Forest Trees, 33.—Guibourt, Hist. Drogues, 7 ed. ii, 247.—Macoun in Geological Rep. Canada, 1879-'80, 44c.—Veitch, Manual Conif. 74.

Abies rubra, Poiret in Lamarck, Dict. vi, 520.—Desfontaines, Hist. Arb. ii, 580.—Loudon, Arboretum, iv, 2316, f. 2228.—
Forbes, Pinetum Woburn. 101, t. 35.—Knight, Syn. Conif. 37.—Lindley & Gordon in Jour. Hort. Soc. London, v, 211.—
Gordon, Pinetum, 11; 2 ed. 17.—Henkel & Hochstetter, Nadelhölz. 189.—Nelson, Pinaceæ, 51.

P. rubra, Link in Linnæa, xv, 521.—Carrière, Trait. Conif. 240; 2 ed. 322.

Abies nigra, var. rubra, Michaux f. Hist. Arb. Am. i, 123; N. American Sylva, 3 ed. iii, 141.—Spach, Hist. Veg. xi, 411.—Hoopes, Evergreens, 170.

? Abies rubra, var. arctica, Lindley & Gordon in Jour. Hort. Soc. London, v, 211.

Abies alba, Chapman, Fl. S. States, 435 [not Poiret].

Abies Americana, Koch, Dendrologie, ii2, 241.

P. nigra, var. rubra, Engelmann in London Gard. Chronicle, 1879, 334.

Abies arctica, Hort.

Abies Marylandica, Hort.

BLACK SPRUCE.

Newfoundland, northern Labrador to Ungava bay, Nastapokee sound, cape Churchill, Hudson bay, and northwest to the mouth of the Mackenzie river and the eastern slope of the Rocky mountains; south through the northern states to Pennsylvania, central Michigan, Wisconsin, and Minnesota, and along the Alleghany mountains to the high peaks of North Carolina.

A tree 15 to 21 meters in height, with a trunk 0.60 to 0.90 meter in diameter; light, dry, rocky soil, forming, especially north of the fiftieth degree of latitude, extensive forests on the water-sheds of the principal streams or in cold, wet swamps; then small, stunted, and of little value (*P. rubra*).

Wood light, soft, not strong, close, straight-grained, compact, satiny; bands of small summer cells thin, resinous, resin passages few, minute; medullary rays few, conspicuous; color, light red or often nearly white, the sap-wood lighter; specific gravity, 0.4584; ash, 0.27; largely manufactured into lumber, used in construction, for ship-building, piles, posts, railway ties, etc.

Essence of spruce, prepared by boiling the young branches of this species, is used in the manufacture of spruce beer, a popular beverage (U. S. Dispensatory, 14 ed. 901).

383.-Picea alba, Link,

Linnæa, xv, 519.—Carrière, Trait. Conif. 238; 2 ed. 319.—Fl. des Serres, xxi, 157, t. 2251.—Brunet, Hist. Picea, 4 & t. f. A.—Engelmann in London Gard. Chronicle, 1879, 334.—Sears in Bull. Essex Inst. xiii, 184.

Abies Canadensis, Miller, Dict. No. 1.

Pinus Canadensis, Du Roi, Obs. Bot. 38; Harbk. ii, 124 [not Linnæus].—Wangenheim, Amer. 5, t. 1, f. 2.

P. laxa, Ehrhart, Beitr. iii, 24.

P. glauca, Mench, Weiss. 73.

Pinus alba, Aiton, Hort. Kew. iii, 371; 2 ed. v, 318.—Lambert, Pinus, 1 ed. i, 39 t. 26; 2 ed. i, 43, t. 28; 3 ed. i, 61, t. 35.—
Willdenow, Spec. iv, 507; Enum. 990; Berl. Baumz. 280.—Persoon, Syn. ii, 579.—Pursh, Fl. Am. Sept. ii, 641.—Smith
in Rees' Cycl. xxviii, No. 21.—Eaton, Manual, 6 ed. 264.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 177.—Elliott,
Sk. ii, 640.—Sprengel, Syst. ii, 885.—Torrey, Compend. Fl. N. States, 359; Fl. N. York, ii, 231.—Meyer, Pl. Labrador,
30.—Beck, Bot. 340.—Hooker, Fl. Bor.-Am. ii, 163.—Eaton & Wright, Bot. 358.—Bigelow, Fl. Boston. 3 ed. 386.—
Antoine, Conif. 86, t. 34, f. 1.—Endlicher, Syn. Conif. 112.—Darby, Bot. S. States, 515.—Tuinbouw Flora, 1855, 1,
t. 14, 15.—Walpers, Ann. v, 799.—Parlatore in De Candolle, Prodr. xvi², 414.

Pinus tetragona, Mench, Meth. 364.

Abies alba, Poiret in Lamarck, Dict. vi, 521.—Michaux, Fl. Bor.-Am. ii, 207.—Desfontaines, Hist. Arb. ii, 580.—Michaux f. Hist. Arb. Am. i, 133, t. 12; N. American Sylva, 3 ed. iii, 144, t. 148.—Nouveau Duhamel, v, 291, t. 81, f. 2.—Loudon, Arboretum, iv, 2310, f. 2224.—Forbes, Pinetum Woburn. 95, t. 33.—Nuttall, Sylva, iii, 129; 2 ed. ii, 189.—Spach, Hist. Veg. xi, 412.—Emerson, Trees Massachusetts, 84; 2 ed. i, 99.—Gihoul, Arb. Resin. 43.—Knight, Syn. Conif. 36.—Lindley & Gordon in Jour. Hort. Soc. London, v, 211.—Parry in Owen's Rep. 618.—Gordon, Pinetum, 2; 2 ed. 3.—Richardson, Arctic Exped. 442.—Cooper in Smithsonian Rep. 1858, 257.—Hooker f. in Trans. Linnæan Soc. xxiii², 301.—Engelmann in Am. Jour. Sci. 2 ser. xxxiv, 330.—Wood, Cl. Book, 661; Bot. & Fl. 313.—Porcher, Resources S. Forests, 507.—Henkel & Hochstetter, Nadelhölz. 188.—Nelson, Pinaceæ, 47.—Gray, Manual N. States, 5 ed. 471.—Murray in Seemann, Jour. Bot. v, 253, t. 69, f. 2-7.—Hoopes, Evergreens, 157, f. 20.—Vasey, Cat. Forest Trees, 32.—Guibourt, Hist. Drogues, 7 ed. ii, 247.—Macoun in Geological Rep. Canada, 1875-76, 211.—Bell in Geological Rep. Canada, 1879-'80, 44c.

Abies rubra, var. carulea, Loudon, Arboretum, iv, 2316.—Lindley & Gordon in Jour. Hort. Soc. London, v, 211.

Abies cœrulea, Forbes, Pinetum Woburn. 99.

P. cœrulea, Link in Linnæa, xv, 522.

Pinus rubra, var. violacea, Endlicher, Syn. Conif. 114.

P. nigra, var. glauca, Carrière, Trait. Conif. 1 ed. 242.

Abies arctica, Murray in Seemann, Jour. Bot. v, 253, t. 69, f. 1, 8-13.

Abies laxa, Koch, Dendrologie, ii2, 243.

Abies alba, var. cœrulea, Carrière, Trait. Conif. 2 ed. 320.

Abies alba, var. arctica, Parlatore in De Candolle, Prodr. xvi2, 414.

WHITE SPRUCE.

Newfoundland, northern shore of Labrador to Ungava bay, cape Churchill, and northwestward to the mouth of the Mackenzie river and the valley of the Yukon river, Alaska; south to the coast of Maine, northeastern Vermont (West Burke and Elmwood, *Pringle*), northern Michigan, Minnesota to Moose lake and the White Earth Indian reservation, the Black hills of Dakota (*R. Douglas*), along the Rocky mountains of northern Montana to the valley of the Blackfoot river (*Canby & Sargent*), Sitka, and British Columbia.

A tree 15 to 50 meters in height, with a trunk 0.60 to 0.90 meter in diameter; low, rather wet soil, borders of ponds and swamps; most common north of the boundary of the United States, and reaching its greatest development along the streams and lakes of the Flathead region of northern Montana at an elevation of 2,500 to 3,500 feet; the most important timber tree of the American subarctic forests north of the sixtieth degree of latitude, here more generally multiplied and of larger size than the allied *P. nigra*, with which it is associated; its distribution southward in British Columbia not yet satisfactorily determined.

Wood light, soft, not strong, close, straight-grained, compact, satiny; bands of small summer cells thin, not conspicuous, resin passages few, minute; medullary rays numerous, prominent; color, light yellow, the sap-wood hardly distinguishable; specific gravity, 0.4051; ash, 0.32; largely manufactured into lumber, although not distinguished in commerce from that of the black spruce (P. nigra).

384.—Picea Engelmanni, Engelmann,

Trans. St. Louis Acad. ii, 212; Wheeler's Rep. vi, 256; London Gard. Chroniele, 1879, 334; 1882, 145.—Carrière, Trait. Conif. 2 ed. 348.—G. M. Dawson in Canadian Nat. new ser. ix, 325.—Rusby in Bull. Torrey Bot. Club, ix, 80.

Abies alba, ? To rrey in Fremont's Rep. 97,

Abies nigra, Engelmann in Am. Jour. Sci. 2 ser. xxxiii, 330 [not Poiret].

Abies Engelmanni, Parry in Trans. St. Louis Acad. ii, 122; London Gard. Chronicle, 1863, 1035; Am. Nat. viii, 179; Proc. Davenport Acad. i, 149.—Regel, Gartenflora, 1864, 244.—Henkel & Hochstetter, Nadelhölz. 418.—Hoopes, Evergreens, 177, f. 22.—Watson in King's Rep. v, 332; Pl. Wheeler, 17.—Porter in Hayden's Rep. 1871, 494.—Porter & Coulter, Fl. Colorado; Hayden's Sury. Misc. Pub. No. 4, 130.—Vasey, Cat. Forest Trees, 33.—Koch, Dendrologie, ii³, 242.—Hall in Coulter's Bot. Gazette, ii, 91.—Sargent in London Gard. Chronicle, 1877, 631.—Macoun in Geological Rep. Canada, 1875-'76, 211.—Brandegee in Coulter's Bot. Gazette, iii, 32.—Bell in Geological Rep. Canada, 1879-'80, 56°.—Veitch, Manual Conif. 68.

Pinus Engelmanni, Engelmann in Proc. Am. Phil. Soc. new ser. xii, 209.

Pinus commutata, Parlatore in De Candolle, Prodr. xviº, 417.—Gordon, Pinetum, 2 ed. 5.

WHITE SPRUCE.

Peace River plateau, in latitude 55° 46′ N. (G. M. Dawson), through the interior of British Columbia and along the Cascade mountains of Washington territory and Oregon to the valley of the Mackenzie river; along the principal ranges of the Rocky and Wahsatch mountains to the San Francisco mountains, Sierra Blanco, and mount Graham, Arizona.

A large tree, 24 to 46 meters in height, with a trunk 0.90 to 1.20 meter in diameter, or at its extreme elevation reduced to a low, prostrate shrub; dry, gravelly slopes and ridges between 5,000 and 11,500 feet elevation; the most valuable timber tree of the central Rocky Mountain region, here forming extensive forests, generally above 8,500 feet elevation; rare and of small size in the mountains of Washington territory, Oregon, and Montana.

Wood very light, soft, not strong, very close, straight-grained, compact, satiny; bands of small summer cells narrow, not conspicuous, resin passages few, minute; medullary rays numerous, conspicuous; color, pale yellow tinged with red, the sap-wood hardly distinguishable; specific gravity, 0.3449; ash, 0.32; in Colorado manufactured into lumber and largely used for fuel, charcoal, etc.

The bark rich in tannin, and in Utah sometimes used in tanning leather.

NOTE.—Forms of northern Montana too closely connect this species with the allied P. alba. The two species occur here, however, only at different elevations, in different soils, and never mingle.

385.—Picea pungens, Engelmann,

London Gard. Chronicle, 1879, 334; 1832, 145.—Masters in London Gard. Chronicle, 1883, 725, f. 130.

P. Menziesii, Engelmann in Trans. St. Louis Acad. ii, 214 [not Carrière].

Abies Menziesii, Engelmann in Am. Jour. Sci. 2 ser. xxxiii, 330 [not Lindley].—Gray in Proc. Philadelphia Acad. 1863, 76.—Watson in King's Rep. v, 333, in part.—Parry in Am. Nat. viii, 179 [not Lindley].—Porter in Hayden's Rep. 1871, 494.—Hoopes, Evergreens, 166, in part.—Rothrock in Pl. Wheeler, 28; Wheeler's Rep. vi, 10 [not Lindley].—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 131 [not Lindley].—Vasey, Cat. Forest Trees, 33, in part.—Brandegee in Coulter's Bot. Gazette, iii, 32.

Abies Menziesii Parryana, André in III. Hort. xxiii, 198; xxiv, 53, 119.—Roezl in III. Hort. xxiv, 86.

Abies Engelmanni glauca, Veitch, Manual Conif. 69.

WHITE SPRUCE. BLUE SPRUCE.

Valley of the Wind river, south through the mountain ranges of Wyoming, Colorado, and Utah.

A tree 30 to 46 meters in height, with a trunk 0.60 to 0.90 meter in diameter; borders of streams, in damp or wet soil, generally between 6,000 and 9,000 feet elevation, never forming forests or reaching as high elevations as the allied *P. Engelmanni*; rare and local.

Wood very light, soft, weak, close-grained, compact, satiny; bands of small summer cells narrow, not conspicuous. resin passages few, small; medullary rays numerous, prominent; color, very light brown or often nearly white, the sap-wood hardly distinguishable; specific gravity, 0.3740; ash, 0.38.

386.—Picea Sitchensis, Carrière,

Trait. Conif. 1 ed. 260; Engelmann in London Gard. Chronicle, 1879, 344; Bot. California, ii, 122.

Pinus Sitchensis, Bongard in Mem. Acad. St. Petersburg, 6 ser. ii, 104.—Hooker, Fl. Bor.-Am. ii, 164.—Endlicher, Syn. Conif. 123.

Abies Menziesii, Lindley in Penn. Cycl. 1, 32.—Loudon, Arboretum, iv, 2321, f. 2232.—Forbes, Pinetum Woburn. 93, t. 32.—
Nuttall, Sylva, iii, 131, t. 116; 2 ed. ii, 189, t. 116.—Knight, Syn. Conif. 37.—Lindley & Gordon in Jour. Hort. Soc.
London, v, 211.—Newberry in Pacific R. R. Rep. vi, 56, 90, t. 9, f. 21.—Gordon, Pinetum, 6; 2 ed. 12.—Cooper in
Smithsoniau Rep. 1858, 262; Pacific R. R. Rep. xii³, 25, 69, in part.—Wood, Bot. & Fl. 314.—Lyall in Jour. Linnæan Soc.
vii, 131, 133, 144.—Henkel & Hochstetter, Nadelhöiz. 187.—Nelson, Pinaceæ, 148.—Rothrock in Smithsoniau Rep.
1867, 433.—Hoopes, Evergreens, 166, in part.—Watson in King's Rep. v, 333, in part.—Veitch, Manual Conif. 73.

Pinus Menziesii, Douglas in Lambert, Pinus, 1 ed. iii, 161, t. 71.—Hooker, Fl. Bor.-Am. ii, 162.—Antoine, Conif. 85, t. 33, f. 1, 2.—Hooker & Arnott, Bot. Beechey, 394.—Endlicher, Syn. Conif. 112.—Parlatore in De Candolle, Prodr. xvi², 418.

? Abies trigona, Rafinesque, Atlant. Jour. 119.—Endlicher, Syn. Conif. 124.—Carrière, Trait. Conif. 1 ed. 264.

? Abies falcata, Rafinesque, Atlant. Jour. 119.—Endlicher, Syn. Conif. 124.—Lindley & Gordon in Jour. Hort. Soc. London, v, 213.—Carrière, Trait. Conif. 268; 2 ed. 314.

Pinus Menziesii, var. crispa, Antoine, Conif. 85, t. 35, f. 2.

Abies Sitchensis, Lindley & Gordon in Jour. Hort. Soc. London, v, 212.—Koch, Dendrologie, ii2, 247.

P. Menziesii, Carrière, Man. des Pl. iv, 339; Trait. Conif. 237; 2 ed. 318.

? Sequoia Rafinesquei, Carrière, Trait. Conif. 2 ed. 213.

TIDE-LAND SPRUCE.

Alaska, south to Mendocino county, California, not extending more than 50 miles inland from the coast.

A large tree of great economic value, 46 to 61 meters in height, with a trunk 2.40 to 5.19 meters in diameter; gravelly ridges and swamps, reaching its greatest development in Washington territory and Oregon near the mouth of the Columbia river, here forming a belt of nearly continuous forest growth 50 or, farther north and south, rarely more than 10 or 15 miles in width.

Wood light, soft, not strong, close, straight-grained, compact, satiny; bands of small summer cells narrow, not conspicuous, resin passages few, obscure; medullary rays numerous, rather prominent; color, light brown tinged with red, the sap-wood nearly white; specific gravity, 0.4287; ash, 0.17; largely manufactured into lumber and used for construction, interior finish, fencing, boat-building, the dunnage of vessels, cooperage, woodenware, etc.

387.—Tsuga Canadensis, Carrière,

Trait. Conif. 189; 2 ed. 248.—Sears in Bull. Essex Inst. xiii, 184.—Engelmann in Coulter's Bot. Gazette, vi, 224.

Pinus Canadensis, Linnæus, Spec. 2 ed. 1421.—Wangenheim, Amer. 39, t. 15, f. 36.—Ehrhart, Beitr. iii, 23.—Aiton, Hort. Kew. iii, 370; 2 ed. v, 320.—Michaux, Fl. Bor.-Am. ii, 206.—Lambert, Pinus, 1 ed. 50, t. 32; 2 ed. i, 56, t. 35; 3 ed. ii, 79, t. 45.—Willdenow, Spec. iv, 505; Enum. 989; Berl. Baumz. 277.—Poiret in Lamarck, Dict. vi, 521.—Persoon, Syn. ii, 579.—Pursh, Fl. Am. Sept. ii, 640.—Smith in Rees' Cycl. xxviii, No. 29.—Barton, Compend. Fl. Philadelph. ii, 182.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 176.—Elliott, Sk. ii, 639.—Sprengel, Syst. ii, 885.—Torrey, Compend. Fl. N. States, 359; Fl. New York, ii, 230.—Beck, Bot. 340.—Eaton, Manual, 6 ed. 264.—Darlington, Fl. Cestrica, 2 ed. 548.—Hooker, Fl. Bor.-Am. ii, 164, in part.—Eaton & Wright, Bot. 358.—Bigelow, Fl. Boston. 3 ed. 386.—Antoine; Conif. 80, t. 32, f. 3.—Endlicher, Syn. Conif. 86.—Gihoul, Arb. Resin. 46.—Darby, Bot. S. States, 515.—Parlatore in De Candolle, Prodr. xvi², 428.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 211, 212, t. 23, f. 3.—Bentley & Trimen, Med. Pl. iv, 264, t. 264.

Pinus Americana, Miller, Dict. 7 ed. No. 6.—Du Roi, Obs. Bot. 41; Harbk. 2 ed. ii, 151.

Pinus Abies Americana, Marshall, Arbustum, 103.

Abies Canadensis, Desfontaines, Hist. Arb. ii, 530.—Michaux f. Hist. Arb. Am. i, 138, t. 13; N. American Sylva, 3 ed. iii, 146, t. 140.—Nouveau Duhamel, v, 293, t. 83, f. 1.—Eaton, Manual, 111.—Richard, Conif. 77, t. 17, f. 2.—Audubon, Birds, t. 197.—Loudon, Arboretum, iv, 2322 & t.—Forbes, Pinetum Woburn. 129.—Nuttall, Sylva, iii, 133; 2 ed. ii, 190.—Spach, Hist. Veg. xi, 424.—Emerson, Trees Massachusetts, 77; 2 ed. i, 92 & t.—Griffith, Med. Bot. 606.—Knight, Syn. Conif. 37.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—Parry in Owen's Rep. 618.—Darlington, Fl. Cestrica, 3 ed. 291.—Gordon, Pixetum, 14; 2 ed. 22.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 434.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 27.—Wood, Cl. Book, 661; Bot. & Fl. 313.—Porcher, Ressurces S. Forests, 503.—Henkel & Hochstetter, Nadelhölz. 153 (excl. syn. aromatica).—Nelson, Pinaceæ, 30.—Gray, Manual N. States, 5 ed. 471.—Hoopes, Evergreens, 184, f. 23.—Koch, Dendrologie, ii², 249.—Vasey, Cat. Forest Trees, 23.—Fl. des Serres, xxii, 203.—Guibourt, Hist. Drogues, ii, 247.—Bell in Geological Rep. Canada, 1879–'80, 51°.—Veitch, Manual Conif. 114, f. 29.

Picea Canadensis, Link in Linnæa, xv, 524.

HEMLOCK.

Nova Scotia, southern New Brunswick, valley of the Saint Lawrence river to the shores of lake Temiscaming, and southwest to the western borders of northern Wisconsin; south through the northern states to New Castle county, Delaware, southeastern Michigan, central Wisconsin, and along the Alleghany mountains to Clear Creek falls, Winston county, Alabama (Mohr).

A tree 21 to 33 meters in height, with a trunk 0.90 to 1.15 meter in diameter; dry, rocky ridges, generally facing the north and often forming extensive forests almost to the exclusion of other species, or, less commonly, borders of swamps in deep, rich soil; most common at the north, although reaching its greatest individual development in the high mountains of North Carolina and Tennessee.

Wood light, soft, not strong, brittle, coarse, crooked-grained, difficult to work, liable to wind-shake and splinter, not durable; bands of small summer cells rather broad, conspicuous; medullary rays numerous, thin; color, light brown tinged with red or often nearly white, the sap-wood somewhat darker; specific gravity, 0.4239; ash, 0.46; largely manufactured into coarse lumber and used in construction for outside finish, railway ties, etc.; two varieties, red and white, produced apparently under precisely similar conditions of growth, are recognized by lumbermen.

The bark, rich in tannin, is the principal material used in the northern states in tanning leather, and yields a fluid extract sometimes used medicinally as a powerful astringent.

Canada or hemlock pitch, prepared from the resinous secretion of this species, is used in the preparation of stimulating plasters, etc. (U. S. Dispensatory, 14 ed. 709, 903.—Nat. Dispensatory, 2 ed. 1109.—Flückiger & Hanbury, Pharmacographia, 552).

388.—Tsuga Caroliniana, Engelmann,

Coulter's Bot. Gazette, vi, 223.

Abies species, Gibbs in Proc. Elliott Soc. i, 286.

Abies Caroliniana, Chapman, Fl. S. States, Suppl. 650.

HEMLOCK.

Southern Alleghany region, Bluff mountain, North Carolina (A. Gray), "Saluda mountain," South Carolina (L. S. Gibbs), Pinnacle mountain, North Carolina (Curtiss), New river, North Carolina, and Cæsar's head, South Carolina (Canby), Whitesides mountain and Devil's Court-House peak, Jackson county, North Carolina (J. Donnell Smith).

A small tree, 12 to 15 meters in height, with a trunk 0.60 to 0.75 meter in diameter; dry, rocky ridges between 4,000 and 5,000 feet elevation; rare and local; long confounded with the closely allied *T. Canadensis*, from which it may be distinguished by its larger, glossier, blunter leaves, and larger cones with wide-spreading scales.

Wood light, soft, not strong, brittle, coarse-grained; bands of small summer cells narrow, not conspicuous; medullary rays numerous, thin; color, light brown tinged with red, the sap-wood nearly white; specific gravity, 0.4275; ash, 0.40.

389.—Tsuga Mertensiana, Carrière,

Trait. Conif. 2 ed. 250.—Engelmann in Bot. California, ii, 121; Coulter's Bot. Gazette, vi, 224.—G. M. Dawson in Canadian Nat. new ser. ix, 324.

Abies heterophylla, Rafinesque, Atlant. Jour. 119.—Endlicher, Syn. Conif. 124.—Carrière, Trait. Conif. 1 ed. 265.

Pinus Mertensiana, Bongard in Mem. Acad. St. Petersburg, 6 ser. iii, 163.—Hooker, Fl. Bor.-Am. ii, 164.—Endlicher, Syn. Conif. 111.—Ledebour, Fl. Rossica, iii, 668.—Parlatore in De Candolle, Prodr. xvi², 428.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 211, 212, t. 23, f. 4.

Pinus Canadensis, Bongard in Mem. Acad. St. Petersburg, 6 ser. iii, 163 [not Linnæus].—Douglas in Companion Bot. Mag. ii, 127.—Hooker, Fl. Bor.-Am. ii, 164, in part.—Ledebour, Fl. Rossica, iii, 668.

Abies Mertensiana, Lindley & Gordon in Jour. Hert. Soc. London, v. 211.—Carrière, Trait. Conif. 1 ed. 232.—Gordon, Pinetum, 18; Suppl. 12; 2 ed. 29.—Lyall in Jour. Linnæan Soc. vii, 133, 144.—Henkel & Hochstetter, Nadelhölz. 152.—Rothrock in Smithsonian Rep. 1867, 433.—Cooper in Am. Nat. iii, 412.—Gray in Proc. Am. Acad. vii, 402.—Heopes, Evergreens, 192.—Koch, Dendrologie, ii², 250.—Vasey, Cat. Forest Trees, 33.—Macoun in Geological Rep. Canada 1875—76, 211.—Hall in Coulter's Bot. Gazette, ii, 91.

Abies Canadensis, ? Cooper in Smithsonian Rep. 1858, 262; Pacific R. R. Rep. xii2, 69 [not Desfontaines].

Abies Bridgesii, Kellogg in Proc. California Acad. ii, 37.

Abies Albertiana, Murray in Proc. Hort. Soc. London, iii, 149 & f.—Lawson, Pinetum Brit. ii, 111, t. 16, f. 1-18.—Nelson, Pinaceæ, 31.—Fowler in London Gard. Chronicle, 1872, 75.

Abies taxifolia, Hartweg, ined. (fide Murray in Proc. Hort. Soc. London, iii, 148).

Pinus Pattoniana, McNab in Proc. Royal Irish Acad. 2 ser. ii, 211, 212, t. 23, f. 2 [not Parlatore] (fide Engelmann in London Gard. Chronicle, 1882, 145).

Abies Pattonii, McNab in Jour. Linnæan Soc. xix, 208.

HEMLOCK.

Alaska, south along the islands and coast of British Columbia, and through the Selkirk, Gold, and other interior ranges to the Bitter Root mountains of Idaho, and the western slopes of the Rocky mountains of Montana (valley of the Flathead river, Canby & Sargent), extending south along the Cascade mountains to southern Oregon and in the Coast ranges to Marin county, California, between 1,000 and 4,000 feet elevation.

A large tree, 30 to 61 meters in height, with a trunk 1.20 to 3 meters in diameter; low, moist bottoms or rocky ridges; very common and reaching its greatest development in western Oregon and Washington territory, often forming extensive forests, especially along the western base of the Cascade mountains.

Wood light, hard, not strong, rather close-grained; bands of small summer cells thin, not conspicuous; medullary rays numerous, prominent; color, light brown tinged with yellow, the sap-wood nearly white; specific gravity, 0.5182; ash, 0.42; occasionally manufactured into coarse lumber.

The bark, rich in tannin, is the principal material used on the northwest coast in tanning leather.

390.-Tsuga Pattoniana, Engelmann,

Bot. California, ii, 121; London Gard. Chronicle, 145.

Abies Pattoniana, Jeffrey in Rep. Oregon Exped. i, t. 4, f. 2.—Murray in Edinburgh New Phil. Jour. new ser. i, 291, t. 9, f. 1-7.—Lawson, Pinetum Brit. ii, 157, t. 22.—Gray in Proc. Am. Acad. vii, 402.—Koch, Dendrologie, ii², 252.—Hoopes, Evergreens, 172.—Carrière, Trait. Conif. 2 ed. 30.—Hall in Coulter's Bot. Gazette, ii, 91.—Veitch, Manual Conif. 116, f. 31, 32.

? Picea Californica, Carrière, Trait. Conif. 261; 2 ed. 346.

Abies Hookeriana, Murray in Edinburgh New Phil. Jour. new ser. i, 289, t. 9, f. 11-17.—Lawson, Pinetum Brit. ii, 153, t. 21, 22, f. 1-22.—Nelson, Pinaceæ, 31.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 211, 212, t. 23, f. 1.—Veitch, Manual Conif. 115, t. 32.

Abies Williamsonii, Newberry in Pacific R. R. Rep. vi, 53, 90, t. 7, f. 19.—Wood, Bot. & Fl. 313.—Cooper in Am. Nat. iii, 412.—Vasey, Cat. Forest Trees, 33.

Pinus Pattoniana, Parlatore in De Candolle, Prodr. xvi², 429.

Abies Pattonii, Gordon, Pinetum, 1 ed. 10 (excl. syn. trigona).

Abies Pattoni, Gordon, Pinetum, Suppl. 12.—Henkel & Hochstetter, Nadelhölz. 151 (excl. syn. trigona).

Valley of the Fraser river, British Columbia, and probably much farther north, south along the Cascade mountains and the California Sierras to the headwaters of the San Joaquin river, extending east along the high mountains of northern Washington territory to the western slopes and summits of the Cœur d'Alêne and Bitter Root mountains of Idaho (Lolo trail, Watson), and the divide between Thompson and Little Bitter Root creeks, northern Montana (H. B. Ayres).

An alpine tree, rarely 30 meters in height, with a trunk 1.50 to 2.10 meters in diameter; dry slopes and ridges near the limits of tree growth, ranging from an elevation of 2,700 feet in British Columbia to 10,000 feet in the Sierras of central California.

Wood light, soft, not strong, close-grained, satiny, susceptible of a good polish; bands of small summer cells thin, not conspicuous; medullary rays numerous, obscure; color, light brown or red, the sap-wood nearly white; specific gravity, 0.4454; ash, 0.44.

391.—Pseudotsuga Douglasii, Carrière,

Trait. Conif. 2 ed. 256.—Engelmann in Wheeler's Rep. vi, 257; Bot. California, ii, 120.—G. M. Dawson in Canadian Nat. new ser. ix, 323.—Eichler in Monatsb. Acad. Berl. 1881, f. 18–22.—Rusby in Bull. Torrey Bot. Club, ix, 79.

Pinus taxifolia, Lambert, Pinus, 1 ed. i, 51, t. 33; 2 ed. i, 58, t. 36; 3 ed. ii, 82, t. 47.—Pursh, Fl. Am. Sept. ii, 640.—Smith in Rees' Cycl. xxviii, No. 28.—Sprengel, Syst. ii, 885.—Eaton, Manual, 6 ed. 264.—Eaton & Wright, Bot. 358.

Abies taxifolia, Poiret in Lamarck, Dict. vi, 523.—Nouveau Duhamel, v, 293.—Torrey & Gray in Pacific R. R. Rep. ii, 130.—Cooper in Smithsonian Rep. 1858, 262; Pacific R. R. Rep. xii⁹, 69.

Abies Douglasii, Lindley in Penn. Cycl. 1, 32.—Loudon, Arboretum, iv, 2319, f. 2230.—Forbes, Pinetum Woburn. 127, t. 45.—Bentham, Pl. Hartweg. 57.—Nuttall, Sylva, iii, 129, t. 115; 2 ed. ii, 187, t. 115.—Spach, Hist. Veg. xi, 423.—Knight, Syn. Conif. 37.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—London Gard. Chronicle, 1854, 163.—Bigelow in Pacific R. R. Rep. iv, 17.—Torrey in Pacific R. R. Rep. iv, 141; Bot. Mex. Boundary Survey, 210; Ives' Rep. 28.—Newberry in Pacific R. R. Rep. xii, 54, 90, t. 8, f. 20.—Gordon, Pinetum, 15; Suppl. 10; 2 ed. 24.—Cooper in Smithsonian Rep. 1858, 262; Pacific R. R. Rep. xii², 24, 69; Am. Nat. iii, 411.—Wood, Bot. & Fl. 313.—Engelmann in Am. Jour. Sci. 2 ser. xxxiv, 330; Proc. Am. Phil. Soc. new ser. xii, 209.—Lyall in Jour. Linnæan Soc. vii, 131, 133, 143.—Henkel & Hochstetter, Nadelhölz. 155.—Nelson, Pinaceæ, 32.—Rothrock in Smithsonian Rep. 1867, 433; Pl. Wheeler, 28, 50; Wheeler's Rep. vi, 9.—Hoopes, Evergreens, 189.—Lawson, Pinetum Brit. ii, 115, t. 17, 18, f. 1-23.—Porter in Hayden's Rep. 1871, 494.—Watson in King's Rep. v, 334; Pl. Wheeler, 17.—Fowler in London Gard. Chronicle, 1872, 75.—Gray in Proc. Am. Acad. vii, 402.—Koch, Dendrologie, ii², 255.—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc, Pub. No. 4, 131.—Murray in London Gard. Chronicle, 1872, 106.—Vasey, Cat. Forest Trees, 33—Hayden in Warren's Rep. Nebraska & Dakota, 2 ed. 122.—Macoun in Geological Rep. Canada, 1875-776, 211.—Hall in Coulter's Bot. Gazette, ii, 91.—Brandegee in Coulter's Bot. Gazette, iii, 32.—Veitch, Manual Conif. 119, f. 35.

Abies mucronata, Rafinesque, Jour. Atlant. 119.—Endlicher, Syn. Conif. 126.—Lindley & Gordon in Jour. Hort. Soc. London, v, 213.—Carrière, Trait. Conif. 268; 2 ed. 312.

Abies mucronata palustris, Rafinesque, Jour. Atlant. 129.—Carrière, Trait. Conif. 268; 2 ed. 313.

Pinus Douglasii, Lambert, Pinus, 1 ed. iii, 163, t. 21.—Hooker, Fl. Bor.-Am. ii, 162, t. 183.—Antoine, Conif. 84, t. 33, f. 3.—Hooker & Arnott, Bot Beechey, 394.—Endlicher, Syn. Conif. 87.—Torrey in Sitgreaves' Rep. 173.—Parlatore in De Candolle, Prodr. xvi², 430.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 703, t. 49, f. 32, 32a, 32b.

Abies Douglasii, var. taxifolia, Loudon, Arboretum, iv, 2319, f. 2231.—Gordon, Pinetum, 16; 2 ed. 25.—Henkel & Hochstetter, Nadelhölz, 156.

Pinus Douglasii, var. brevibracteata, Antoine, Conif. 84, t. 33, f. 4.

Picea Douglasii, Link in Linnæa, xv, 524.

Tsuga Douglasii, Carrière, Trait. Conif. 192.—Bolander in Proc. California Acad. iii, 232.

Tsuga Lindleyana, Roezl, Cat. Grain Mex. 8.

RED FIR. YELLOW FIR. OREGON PINE. DOUGLAS FIR.

Coast ranges and interior plateau of British Columbia south of latitude 55° N. (not reaching the coast archipelago north of Vancouver's island), east to the eastern slope of the Rocky mountains in latitude 51° N. (Bow River pass, *Macoun*); south along the mountain ranges of Washington territory, Oregon, the California Coast ranges, and the western slope of the Sierra Nevadas, through the mountain ranges east to Montana, Wyoming, Colorado, and the Guadalupe mountains of Texas; in the Wahsatch and Uintah mountains, the ranges of northern and eastern Arizona, and southward into Mexico; not detected in the interior region between the Sierra Nevada and the Wahsatch mountains, south of the Blue mountains of Oregon, and north of Arizona.

A large tree, 61 to 92 meters in height, with a trunk 0.83 to 3.66 meters in diameter, or in the Rocky mountains much smaller, here rarely 30 meters in height; the most generally-distributed and valuable timber tree of the Pacific region, growing from the sea-level to an elevation in Colorado of nearly 10,000 feet; often forming extensive forests, almost to the exclusion of other species, and reaching in western Oregon and Washington territory its greatest development and value.

Wood hard, strong, varying greatly with age and conditions of growth in density, quality, and amount of sap; difficult to work, durable; bands of small summer cells broad, occupying fully half the width of the annual growth, dark colored, conspicuous, soon becoming flinty and difficult to cut; medullary rays numerous, obscure; color, varying from light red to yellow, the sap-wood nearly white; specific gravity, 0.5157; ash, 0.08; largely manufactured into lumber and used for all kinds of construction, railway ties, piles, fuel, etc.; two varieties, red and yellow fir, are distinguished by lumbermen, dependent probably upon the age of the tree; the former coarse-grained, darker colored, and considered less valuable than yellow fir.

The bark is found valuable in tanning leather.

14 FOR

Var. macrocarpa, Engelmann,

Bot California, ii, 120.

Abies Douglasii, var. macrocarpa, Torrey in Ives' Rep. 28.-Vasey, Cat. Forest Trees, 33.

Abies macrocarpa, Vasey in Gard. Monthly, Jan. 1876.

HEMLOCK.

California Coast ranges; San Bernardino mountains to the Cuyamaca mountains.

A tree 30 to 54 meters in height, with a trunk 1.20 to 1.80 meter in diameter; dry ridges and cañons between 2,500 and 4,000 feet elevation.

Wood heavy, hard, strong, cross-grained, very durable, difficult to work; color, rather darker red than that of the species; specific gravity, 0.4563; ash, 0.08; somewhat manufactured into coarse lumber and largely used for fuel.

392.—Abies Fraseri, Lindley,

Penn. Cycl. i, 30.—Forbes, Pinetum Woburn. iii, t. 38.—Link in Linnæa, xv, 531.—Nuttall, Sylva, iii, 139, t. 119; 2 ed. ii, 196, t. 119.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—Carrière, Trait. Conif. 200; 2 ed. 270.—Cooper in Smithsonian Rep. 1858, 257.—Chapman, Fl. S. States, 434.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 26.—Wood, Cl. Book, 661; Bot. & Fl. 314.—Henkel & Hochstetter, Nadelhölz. 169.—Gray, Manual N. States, 5 ed. 472, in part.—Hoopes, Evergreens, 202.—Bertrand in Bull. Soc. Bot. France, xviii, 379.—Koch, Dendrologie, ii², 216.—Vascy, Cat. Forest Trees, 35.—Engelmann in Trans. St. Louis Acad. iii, 596; London Gard. Chronicle, 1877, 147.—Veitch, Manual Conif. 96.

Pinus Fraseri, Pursh, Fl. Am. Sept. ii, 639.—Smith in Rees' Cycl. xxviii, No. 27.—Poiret, Suppl. v, 35.—Sprengel, Syst. ii, 884.—Beck, Bot. 340.—Eaton, Manual, 6 ed. 264.—Lambert, Pinus, 1 ed. iii, 74, t. 42.—Eaton & Wright, Bot. 358.—Antoine, Conif. 76, t. 29, f. 1.—Endlicher, Syn. Conif. 91.—Parlatore in De Candolle, Prodr. xvi², 419.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 684, t. 47, f. 10.

A. balsamea, var. Fraseri, Nuttall, Genera, ii, 223.—Spach, Hist. Veg. xi, 422.

Pinus balsamea, var. Fraseri, Torrey, Compend. Fl. N. States, 359.

Picea Fraseri, Loudon, Arboretum, iv, 2340, f. 2243, 2244.—Knight, Syn. Conif. 39.—Gordon, Pinetum, 148; 2 ed. 205.

BALSAM. SHE BALSAM.

High mountains of North Carolina and Tennessee.

A tree 18 to 24 meters in height, with a trunk sometimes 0.60 meter in diameter; moist slopes between 5,000 and 6,500 feet elevation, often forming considerable forests.

Wood very light, soft, not strong, coarse-grained, compact; bands of small summer cells rather broad, light colored, not conspicuous; medullary rays numerous, thin; color, light brown, the sap-wood lighter, nearly white; specific gravity, 0.3565; ash, 0.54.

393.-Abies balsamea, Miller,

Dict. No. 5.—Desfontaines, Hist. Arb. ii, 579.—Nouveau Duhamel, v, 295, t. 83, f. 2.—Richard, Couif. 74, t. 16.—Lindley, Penn. Cycl. i, 30; Fl. Med. 554—Forbes, Pinetum Woburn. 109, t. 37.—Link in Linnæa, xv, 530.—Spach, Hist. Veg. xi, 421.—Griffith, Med. Bot. 605, f. 268.—Lindley & Gordon in Jour. Hort. Soc. London, v, 210.—Carrière, Trait. Conif. 217; 2 ed. 292.—Richardson, Arctic Exped. 441.—Darlington, Fl. Cestrica, 3 ed. 291.—Cooper in Smithsonian Rep. 1858, 257.—Wood, Cl. Book, 661; Bot. & Fl. 314.—Porcher, Resources S. Forests, 506.—Henkel & Hochstetter, Nadelhölz. 176.—Gray, Manual N. States, 5 ed. 471.—Hoopes, Evergreens, 197.—Bertrand in Bull. Soc. Bot. France, xviii, 379.—Koch, Dendrologie, ii², 214.—Vasey, Cat. Forest Trees, 34.—Guibourt, Hist. Drogues, 7 ed. ii, 246.—Engelmann in Trans. St. Louis Acad. iii, 597.—Macoun in Geological Rep. Canada, 1875—'76, 211.—Sears in Bull. Essex Inst. xiii, 184.—Bell in Geological Rep. Canada, 1879—'80, 46c.—Veitch, Manual Conif. 88.

Pinus balsamea, Linnæus, Spec. 1 ed. 1002.—Wangenheim, Amer. 40.—Aiton, Hort. Kew. iii, 370; 2 ed. v, 319.—Mænch, Meth. 364.—Du Roi, Harbk. 2 ed. 144.—Lambert, Pinus, 1 ed. i, 48, t. 31; 2 ed. i, 52, t. 33; 3 ed. i, 72, t. 41.—Willdenow, Spec. iv, 504; Enum. 989; Berl. Baumz. 276.—Persoou, Syn. ii, 579.—Pursh, Fl. Am. Sept. ii, 639.—Eaton, Manual, 111; 6 ed. 264.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 176.—Elliott, Sk. ii, 639.—Sprengel, Syst. ii, 884.—Torrey, Compend. Fl. N. States, 359; Fl. N. York, ii, 229.—Descourtilz, Fl. Med. Antilles, iv, 59, t. 246.—Woodville, Med. Bot. 3 ed. v, 1, t. 1.—Beck, Bot. 340.—Hooker, Fl. Bor.-Am. ii, 163.—Eaton & Wright, Bot. 358.—Bigelow, Fl. Boston. 3 ed. 385.—Antoine, Conif. 66, t. 26, f. 3.—Endlicher, Syn. Conif. 103.—Gihoul, Arb. Resin. 45.—Darby, Bot. S. States, 515.—Parlatore in De Candolle, Prodr. xvi², 423.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 684, t. 47, f. 11.—Bentley & Trimen, Med. Pl. iv, 263, t. 263.

Pinus Abies Balsamea, Marshall, Arbustum, 102.

A. balsamifera, Michaux, Fl. Bor.-Am. ii, 207, in part.—Michaux f. Hist. Arb. Am. i, 145, t. 14; N. American Sylva, 3 ed. iii, 150, t. 150, in part.

Picea balsamea, Loudon, Arboretum, iv, 2339, f. 2240, 2241.—Knight, Syn. Conif. 39.—Gordon, Pinetum, 143; 2 ed. 200.—Henkel & Hochstetter, Nadelhölz. 176.—Emerson, Trees Massachusetts, 85; 2 ed. i, 101.—Nelson, Pinaceæ, 37.

Picea balsamea, var. longifolia, Hort.-Loudon, Arboretum, iv, 2339.

Picea Fraseri, Emerson, Trees Massachusetts, 88; 2 ed. i, 104 [not Loudon].

BALSAM FIR. BALM OF GILEAD FIR.

Northern Newfoundland and Labrador to the southern shores of Hudson bay, northwest to the Great Bear lake and the eastern base of the Rocky mountains; south through the northern states to Pennsylvania, central Michigan and Minnesota, and along the Alleghany mountains to the high peaks of Virginia.

A tree 21 to 27 meters in height, with a trunk rarely exceeding 0.60 meter in diameter, or at high elevations reduced to a low, prostrate shrub (A. Hudsonica, Hort.); damp woods and mountain swamps.

Wood very light, soft, not strong, coarse-grained, compact, not durable; bands of small summer cells not broad, resinous, conspicuous; medullary rays numerous, obscure; color, light brown, often streaked with yellow, the sap-wood lighter; specific gravity, 0.3819; ash, 0.45.

Canadian balsam or balm of fir, an aromatic liquid oleo-resin obtained from this and other species of Abies by puncturing the vesicles formed under the bark of the stem and branches, is used medicinally, chiefly in the treatment of chronic catarrhal affections, and in the arts (U. S. Dispensatory, 14 ed. 898, 900.—Nat. Dispensatory, 2 ed. 1417.— Flückiger & Hanbury, Pharmacographia, 552).

394.-Abies subalpina, Engelmann,

Am. Nat. x,554; Trans. St. Louis Acad. iii, 597; Wheeler's Rep. vi, 255.—Vasey, Cat. Forest Trees, 34.—Hall in Coulter's Bot. Gazette, ii, 91.—Brandegee in Coulter's Bot. Gazette, iii, 32.—G. M. Dawson in Canadian Nat. newser. ix, 326.—Masters in London Gard. Chronicle, 1881, 236, f. 43, 44, 45.

?Pinus lasiocarpa, Hooker, Fl. Bor.-Am. ii, 163 [not Hort.].—Endlicher, Syn. Conif. 105.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 682, t. 46, f. 7, 7a; t. 47, 48, 49 (excl. syn.).

?A. lasiocarpa, Nuttall, Sylva, iii, 138; 2 ed. ii, 195.—Lindley & Gordon in Jour. Hort. Soc. London, v, 210.—Carrière, Trait. Conif. 1 ed. 221.—Cooper in Smithsonian Rep. 1858, 262.—Murray in Proc. Hort. Soc. London, iii, 313, f. 27-31.—Henkel & Hochstetter, Nadelhölz. 161 (excl. syn.).

? Pinus species, Torrey in Fremont's Rep. 97.

Picea amabilis, Gordon, Pinetum, 154, in part; 2 ed. 213, in part.

A. bifolia, Murray in Proc. Hort. Soc. London, iii, 320, f. 51-56; London Gard. Chronicle, 1875, 465, f. 96, 97.—Regel, Gartenflora, xiii, 119.—Henkel & Hochstetter, Nadelhölz. 420.

A. grandis, Engelmann in Am. Jour. Sci. 2 ser. xxxiv, 310 [not Lindley].—Carrière, Trait. Conif. 2 ed. 296, in part.—Watson, in King's Rep. v, 334, in part.—Gray in Proc. Am. Acad. vii, 402 [not Lindley].—Porter & Coulter, Fl. Colorado; Hayden's Surv. Misc. Pub. No. 4, 131 [not Lindley].

Pinus amabilis, Parlatore in De Candolle, Prodr. xvis, 426, in part.

Picea bifolia, Murray in London Gard. Chronicle, 1875, 105.

A. subalpina, var. fallax, Engelmann in Trans. St. Louis Acad. iii, 597.

BALSAM.

Valley of the Stakhin river, Alaska, in latitude 60° N. (Muir), south through British Columbia and along the Cascade mountains to northern Oregon (Collier), through the Blue mountains of Oregon and the ranges of Idaho, Montana, Wyoming, Utah, and Colorado.

A tree 24 to 40 meters in height, with a trunk rarely exceeding 0.60 meter in diameter; mountain slopes and canons between 4,000 (British Columbia) and 12,000 (Colorado) feet elevation; generally scattered and rarely forming the prevailing forest growth.

Wood very light, soft, not strong, rather close-grained, compact; bands of small summer cells very narrow, not conspicuous; medullary rays numerous, obscure; color, light brown or nearly white, the sap-wood lighter; specific gravity, 0.3476; ash, 0.44.

395.-Abies grandis, Lindley,

Penn. Cycl. i, 30.—Forbes, Pinetum Woburn. 123, t. 43.—Spach, Hist. Veg. xi, 422.—Nuttall, Sylva, iii, 134; 2 ed. ii, 192.—Lindley & Gordon in Jour. Hort. Soc. London, v, 210.—Carrière, Trait. Conif, 220; 2 ed. 296 (excl. syn.).—Cooper in Smithsonian Rep. 1858, 262; Pacific R. R. Rep. xii², 25, 69; Am. Nat. iii, 410.—Wood, Bot. & Fl. 314.—Lyall in Jour. Linnæan Soc. vii, 143.—Bolander in Proc. California Acad. iii, 232.—Henkel & Hochstetter, Nadelhölz. 160.—Nelson, Pinaceæ, 38.—Hoopes, Evergreens, 211.—Bertrand in Bull. Soc. Bot. France, xviii, 378.—Vasey, Cat. Forest Trees, 34.—Hall in Coulter's Bot. Gazette, ii, 91.—Macoun in Geological Rep. Canada, 1875–76, 211.—Engelmann in Trans. St. Louis Acad. iii, 593; London Gard. Chronicle, 1879, 684; 1880, 660, f. 119; Bot. California, ii, 118.—G. M. Dawson in Canadian Nat. new ser. ix, 326.—Masters in London Gard. Chronicle, 1881, 179; f. 33–36.—Veitch, Manual Conif. 97, f. 23, 24.

Pinus grandis, Douglas in Companion Bot. Mag. ii, 147.—Hooker, Fl. Bor.-Am. ii, 163.—Antoine, Conif. 63, t. 25, f. 1.—Hooker & Arnott, Bot. Beechey, 394.—Endlicher, Syn. Conif. 105.—Parlatore in De Candolle, Prodr. xvi², 427 (excl. syn.).—McNab in Proc. Royal Irish Acad. 2 ser. ii, 678, t. 46, f. 4, 4°.

PA. aromatica, Rafinesque, Atlant. Jour. 119.—Endlicher, Syn. Conif. 125.—Lindley & Gordon in Jour. Hort. Soc. London, v, 213.—Carrière, Trait. Conif. 266; 2 ed. 310.

Picca grandis, Loudon, Arboretum, iv, 2341, f. 2245, 2246, in part.—Knight, Syn. Conif. 39.—Gordon, Pinetum, 155; Suppl. 5 (excl. syn. Parsonsii); 2 ed. 216.—Newberry in Pacific R. R. Rep. vi, 46, 90, f. 16, t. 6, in part.—Murray in London Gard. Chronicle, 1875, 135, f. 28.

A. Gordoniana, Carrière, Trait. Conif. 2 ed. 298 (excl. syn. Parsonsii).—Bertrand in Bull. Soc. Bot. France, xviii, 379.

A. amabilis, Murray in Proc. Hort. Soc. London, iii, 310, f. 22-24 [not Forbes].

WHITE FIR.

Vancouver's island, south to Mendocino county, California, near the coast; interior valleys of western Washington territory and Oregon south to the Umpqua river, Cascade mountains below 4,000 feet elevation, through the Blue mountains of Oregon (Cusick) to the eastern slope of the Cœur d'Alêne mountains (Cooper), the Bitter Root mountains, Idaho (Watson), and the western slopes of the Rocky mountains of northern Montana (Flathead region, Canby & Sargent).

A large tree, 61 to 92 meters in height, with a trunk 0.90 to 1.50 meter in diameter; most common and reaching its greatest development in the bottom lands of western Washington territory and Oregon in rich, moist soil; or moist mountain slopes, then much smaller, rarely exceeding 30 meters in height.

Wood very light, soft, not strong, coarse-grained, compact; bands of small summer cells broader than in other American species, dark colored, resinous, conspicuous; medullary rays numerous, obscure; color, light brown, the sap-wood rather lighter; specific gravity, 0.3545; ash, 0.49; in western Oregon manufactured into lumber and used for interior finish, packing-cases, cooperage, etc.

396.—Abies concolor, Lindley & Gordon,

Jour. Hort. Soc. London, v, 210.—Parry in Am. Nat. ix, 204.—Vasey, Cat. Forest Trees, 34.—Engelmann in Trans. St. Louis Acad. iii, 600; Wheeler's Rep. vi, 255; London Gard. Chronicle, 1879, 684, f, 114, 115; Bot. California, ii, 118.—Brandegee in Coulter's Bot. Gazette, iii, 32.—Masters in London Gard. Chronicle, 1879, 684, f. 114, 115.—Veitch, Manual Conif. 93.

Pinus concolor, Engelmann in herb.; Parlatore in De Candolle, Prodr. xvi², 426.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 681, t. 46, f. 6.

Pieca concolor, Gordon, Pinetum, 155; 2 ed. 216.—Murray in London Gard. Chronicle, 1875, 135, f. 26.

Pinus lasiocarpa, Balfour in Rep. Oregon Exped. i, t. 4, f. 1 [not Hooker].—Murray in Proc. Hort. Soc. London, iii, 314, f. 25.—Henkel & Hochstetter, Nadelhölz. 429.

?A. balsamea, Bigelow in Pacific R. R. Rep. iv, 18 [not Miller].—Torrey in Pacific R. R. Rep. iv, 141.

Picea grandis, Newberry in Pacific R. R. Rep. vi, 46, in part.

Abies grandis, Carrière, Trait. Conif.; 2 ed. 296, in part.—Watson in Pl. Wheeler, 17 [not Lindley].

Picea Lowiana, Gordon, Pinetum, Suppl. 53; 2 ed. 218.—Henkel & Hochstetter, Nadelhölz. 419.

A. Lowiana, Murray in Proc. Hort. Soc. London, iii, 317, f. 38-41.

A. amabilis, Watson in King's Rep. v, 333 [not Forbes].

A. grandis, var. Lowiana, Hoopes, Evergreens, 212.

Pinus grandis, Parlatore in De Candolle, Prodr. xvi2, 427, in part.

Picea concolor, var. violacea, Murray in London Gard. Chronicle, 1875, 464, f. 94, 95.

Pinus Lowiana, McNab in Proc. Royal Irish Acad. 2 ser. ii, 680, t. 46, f. 5.

A. lasiocarpa, Hort. [not Nuttall].

A. Parsonsii, Hort.

WHITE FIR. BALSAM FIR.

Northern slopes of the Siskiyou mountains, Oregon, and perhaps farther north in the Cascade mountains, south along the western slope of the Sierra Nevadas to the San Bernardino and San Jacinto mountains, California; along the high mountains of northern Arizona to the Mogollon mountains, New Mexico, northward to the Pike's Peak region of Colorado, and in the Wahsatch mountains of Utah.

A large tree, 30 to 40 meters in height, with a trunk 1.20 to 1.50 meter in diameter; moist slopes and cañons between 3,000 and 9,000 feet elevation, reaching its greatest development in the California sierras, varying greatly in the color and length of leaves, habit, etc., and perhaps merely a southern form of the too nearly allied A. grandis, from which it cannot be always readily distinguished.

Wood very light, soft, not strong, coarse-grained, compact; bands of small summer cells narrow, resinous, not conspicuous; medullary rays, numerous, obscure; color, very light brown or nearly white, the sap-wood somewhat darker; specific gravity, 0.3638; ash, 0.85; occasionally manufactured into lumber and used for packing-cases, butter-tubs, and other domestic purposes.

397.—Abies bracteata, Nuttall,

Sylva, iii, 137, t. 118; 2 ed. ii, t. 118.—Hartweg in Jour. Hort. Soc. London, iii, 225.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—Carrière, Trait. Conif. 196; 2 ed. 265.—London Gard. Chronicle, 1853, 435; 1854, 459; 1859, 928.—Bot. Mag. t. 4740.—Lemaire in Ill. Hort. i, 14, t. 5.—Fl. des Serres, ix, 109 & t.—Naudin in Rev. Hort. 1854, 31.—Cooper in Smithsonian Rep. 1858, 262.—Murray in Edinburgh New Phil. Jour. new ser. x, 1, t. 1, 2 (Trans. Bot. Soc. Edinburgh, vi, 211, t. 1, 2).—Henkel & Hochstetter, Nadelhölz. 167.—Hoopes, Evergreens, 199.—Bertrand in Bull. Soc. Bot. France, xviii, 379.—Vasey, Cat. Forest Trees, 35.—Engelmann in Trans. St. Louis Acad. iii, 601; London Gard. Chronicle, 1879, 684; Bot. California, ii, 118—Veitch, Manual Conif. 89, f. 14, 15.

Pinus venusta, Douglas in Companion Bot. Mag. ii, 152.

Pinus bracteata, D. Don in Trans. Linnæan Soc. xvii, 443.—Lambert, Pinus, 1 ed. iii, 169, t. 91.—Antoine, Conif. 77, v. 30.—Hooker & Arnott, Bot. Beechey, 394.—Hooker, Icon. t. 379.—Endlicher, Syn. Conif. 89.—Walpers, Ann. v, 798.—Parlatore in De Candolle, Prodr. xvi², 419.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 674, t. 46, f. 1.

Picea bracteata, Loudon, Arboretum, iv, 2348, f. 2256.—Gordon, Pinetum, 145; 2 ed. 202.—Lawson, Pinetum Brit. ii, 171, t. 25, 26, f. 1-7.—Nelson, Pinaceæ, 37.—Fowler in London Gard. Chronicle, 1872, 286.

A. venusta, Koch, Dendrologie, iiº, 210.

Santa Lucia mountains, California, from the northern boundary of San Luis Obispo county about 40 miles northward.

A tree 46 to 61 meters in height, with a trunk 0.90 to 1.20 meter in diameter; moist, cold soil, occupying 4 or 5 canons between 3,000 and 6,000 feet elevation, generally west of the summit of the range (G. R. Vasey).

Wood heavy, not hard, coarse grained, compact; bands of small summer cells broad, resinous, conspicuous; medullary rays numerous, obscure; color, light brown tinged with yellow, the sap-wood not seen; specific gravity, 0.6783; ash, 2.04; probably more valuable than the wood of the other North American Abies.

398-Abies amabilis, Forbes.

Pinetum Woburn. 125, t. 44.—Lindley & Gordon in Jour. Hort. Soc. London, v. 210.—Carrière, Trait. Conif. 219; 2 ed. 296.—Cooper in Smithsoniau Rep. 1858, 262.—Lyall in Jour. Hort. Soc. London, vii, 143.—Henkel & Hochstetter, Nadelhölz. 159.—Nelson, Pinaceæ, 36.—Hoopes, Evergreens, 209 (excl. syn. lasiocarpa).—Fowler in London Gard. Chronicle, 1872, 285.—Koch, Dendrologie, ii³, 211 (excl. syn. lasiocarpa).—Macoun in Geological Rep. Canada, 1875-76, 211.—Engelmann in London Gard. Chronicle, 1880, 720, f. 136-141; Coulter's Bot. Gazette, vii, 4.—Veitch, Manual Conif. 86.

Pinus amabilis, Douglas in Companion Bot. Mag. ii, 93.—Antoine, Conif. 63, t. 25, f. 2.—Hooker & Arnott, Bot. Beechey, 394.—Endlicher, Syn. Conif. 104.—Parlatore in De Candolle, Prodr. xvi², 426, in part.

Pinus grandis, Lambert, Pinus, 1 ed. iii, t. 26 [not Douglas].

Picea amabilis, Loudon, Arboretum, iv, 2342, f. 2247, 2248.—Knight, Syn. Conif. 39.—Gordon, Pinetum, 154; 2 ed. 213 (excl. syn.).—Newberry in Pacific R. R. Rep. vi, 51, 90, f. 18.

A. grandis, Murray in Proc. Hort. Soc. London, iii, 308, f. 18-21 [not Lindley].

A. grandis, var. densiflora, Engelmann in Trans. St. Louis Acad. iv, 599.

Valley of the Fraser river, British Columbia (Engelmann & Sargent), and probably farther north, south along the Cascade mountains of Washington territory and Oregon.

A tree 30 to 45 meters in height, with a trunk sometimes 1.20 meter in diameter, forming extensive forests on the mountains of British Columbia, between 3,500 and 5,000 feet, and upon the mountains south of the Columbia river between 3,000 and 4,000 feet elevation, here reaching its greatest development; its northern range not yet determined.

Wood light, hard, not strong, close-grained, compact; bands of small summer cells broad, resinous, dark colored, conspicuous; medullary rays numerous, thin; color, light brown, the sap-wood nearly white; specific gravity, 0.4228; ash, 0.23.

399.-Abies nobilis, Lindley.

Penn. Cycl. i, 30.—Forbes, Pinetum Woburn. 115, t. 40.—Link in Linnæa, xv, 532.—Spach, Hist. Veg. xi, 419.—Nuttall, Sylva, iii, 136, t. 117; 2 ed. ii, 193, t. 117.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—Carrière, Trait. Conif. 198; 2 ed. 268.—Jour. Bot. & Kew Gard. Misc. ix, 85.—Cooper in Smithsonian Rep. 1858, 262.—Henkel & Hochstetter, Nadelhölz. 168.—Hoopes, Evergreens, 203.—Koch, Dendrologie, ii⁹, 209.—Vasey, Cat. Forest Trees, 34.—Engelmann in Trans. St. Louis Acad. iii, 601, in part; London Gard. Chronicle, 1879, 885; Bot. California, ii, 119, in part; Coulter's Bot. Gazette, vii, 4.—Veitch, Manual Conif. 101.

Pinus nobilis, Douglas in Companion Bot. Mag. ii, 147.—Lambert, Pinus, 1 ed. iii, 167, t. 74.—Hooker, Fl. Bor.-Am. ii, 162.—Antoine, Conif. 77, t. 29, f. 2.—Hooker & Arnott, Bot. Beechey, 394.—Endlicher, Syn. Conif. 90.

Picea nobilis, Loudon, Arboretum, iv, 2342, f. 2249, 2250.—Knight, Syn. Conif. 39.—Lindley & Gordon in Jour. Hort. Soc. London, v, 209.—Gordon, Pinetum, 149; Suppl. 48; 2 ed. 207.—Newberry in Pacific R. R. Rep. vi, 49, 90, f. 17.—Lawson, Pinetum, Brit. ii, 181, t. 28, 29, f.1-18.—Nelson, Pinaceæ, 39.

Pseudotsuga nobilis, Bertrand in Bull. Soc. Bot. France, xviii, 86.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 699, t. 49, f. 29, 29*.

A. magnifica, Engelmann in Bot. California, ii, 119, in part.

RED FIR.

Oregon, Cascade mountains from the Columbia river south to the valley of the upper Rogue river, and along the summits of the Coast Range from the Columbia to the Nestucca river (Collier).

A large tree, 61 to 92 meters in height, with a trunk 2.40 to 3 meters in diameter, forming, with A. amabilis, extensive forests along the slopes of the Cascade Range, between 3,000 and 4,000 feet elevation; less multiplied in the coast ranges, here reaching its greatest individual development.

Wood light, hard, strong, rather close-grained, compact; bands of small summer cells broad, resinous, dark colored, conspicuous; medullary rays thin, hardly distinguishable; color, light brown streaked with red, the sapwood a little darker; specific gravity, 0.4561; ash, 0.34.

400.—Abies magnifica, Murray,

Proc. Hort. Soc. London, iii, 318, f. 42-50; London Gard. Chronicle, 1875, 134.—Regel, Gartenflora, xiii, 119.—Henkel & Hochstetter, Nadelhölz, 419.—Koch, Dendrologie, ii², 213.—Engelmann in Trans. St. Louis Acad. iii, 601; London Gard. Chronicle, 1879, 885, f. 116; Bot. California, ii, 119; Coulter's Bot. Gazette, vii, 4.—Veitch, Manual Conif. 99.

A. campylocarpa, Murray in Trans. Bot. Soc. Edinburgh, vi, 370.

A. nobilis robusta, Hort.-Carrière, Trait. Conif. 2 ed. 269.

Picca magnifica, Gordon, Pinetum, 2 ed. 219.—Murray in London Gard. Chronicle, 1875, 105.

Pinus amabilis, Parlatore in De Candolle, Prodr. xvi², 426, in part.—McNab in Proc. Royal Irish Acad. 2 ser. ii, 677, t. 46, f. 3, 3^a ?

A. amabilis, Vasey, Cat. Forest Trees, 34 [not Forbes].

Pseudotsuga magnifica, McNab in Proc. Royal Irish Acad. 2 ser. ii, 700, t. 49, f. 30, 30°.

A. nobilis, Engelmann, Bot. California, ii, 119, in part.

RED FIR.

California, mount Shasta, south along the western slope of the Sierra Nevadas to Kern county.

A large tree, 61 to 76 meters in height, with a trunk 2.40 to 3 meters in diameter, forming about the base of mount Shasta extensive forests between 4,900 and 8,000 feet elevation; farther south less common and reaching an extreme elevation of 10,000 feet.

Wood light, soft, not strong, rather close-grained, compact, satiny, durable in contact with the soil, liable to twist and warp in seasoning; bands of small summer cells broad, resinous, dark colored, conspicuous; medullary rays numerous, thin; color, light red, the sap-wood somewhat darker; specific gravity, 0.4701; ash, 0.30; largely used for fuel and occasionally manufactured into coarse lumber.

401.-Larix Americana, Michaux,

Fl. Bor.-Am. ii, 203.—Michaux f. Hist. Arb. Am. iii, 37, t. 4; N. American Sylva, 3 ed. iii, 167, t. 153.—Andubon, Birds, t. 4.—Loudon, Arboretum, iv, 2399.—Emerson, Trees Massachusetts, 89; 2 ed. i, 105 & t.—Gihoul, Arb. Resin. 51.—Parry in Owen's Rep. 618.—Richardson, Arctic. Exped. 442.—Cooper in Smithsonian Rep. 1858, 257.—Hooker f. in Trans. Linnæan Soc. xxiii, 302.—Wood, Cl. Book, 662; Bot. & Fl. 314.—Nelson, Pinaceæ, 86.—Gray, Manual N. States, 5 ed. 442.—Hoopes, Evergreens, 247.—Regel, Gartenflora, xx, 105, t. 684, f. 7, 8 (Belg. Hort. xxii, 105, t. 10, f. 2, 3).—Bertrand in Ann. Sci. Nat. 5 ser. xx, 90.—Vasey, Cat. Forest Trees, 35.—Macoun in Geological Rep. Canada, 1875—76, 211.—Sears in Bull. Essex Inst. xiii, 185.

Pinus laricina, Du Roi, Obs. Bot. 49; Harbk. ii, 83.—Wangenheim, Amer. 42, t. 16, f. 37.—Monch, Meth. 364.

Pinus Larix rubra, alba and nigra, Marshall, Arbustum, 103, 104.

Pinus intermedia, Wangenheim, Amer. 42, t. 16, f. 37.—Du Roi, Harbk. 2 ed. ii, 114.

- Pinus pendula, Aiton, Hort. Kew, iii, 369; 2 ed.v, 320.—Lambert, Pinus, 1 ed. i, 55, t. 36; 2 ed. ii, 63, t. 39; 3 ed. ii, 86, t. 49.—
 Willdenow, Spec. iv, 502.—Persoon, Syn. ii, 579.—Pursh, Fl. Am. Sept. ii, 645.—Smith in Rees' Cycl. xxviii, No. 32.—
 Eaton, Manual, 110; 6 ed. 365.—Nuttall, Genera, ii, 223.—Sprengel, Syst. ii, 887.—Audubon, Birds, t. 90, 180.—Beck,
 Bot. 339.—Hooker, Fl. Bor.-Am. ii, 164.—Eaton & Wright, Bot. 359.—Torrey, Fl. N. York, ii, 232.—Parlatore in De
 Candolle, Prodr. xvi², 409.
- Pinus microcarpa, Lambert, Pinus, 1 ed. i, 56, t. 37; 2 ed. ii, 65, t. 40; 3 ed. ii, 88, t. 50.—Willdenow, Spec. iv, 502; Enum. 989; Berl. Baumz. 273.—Persoon, Syn. ii, 579.—Aiton, Hort. Kew. 2 ed. v, 321.—Pursh. Fl. Am. Sept. ii, 645.—Smith in Rees' Cycl. xxviii, No. 33.—Eaton, Manual, 110; 6 ed. 365.—Nuttall, Genera, ii, 223.—Hayne, Dend. Fl. 175.—Sprengel, Syst. ii, 887.—Torrey, Compend. Fl. N. States, 360.—Meyer, Pl. Labrador, 30.—Beck, Bot. 340.—Hooker, Fl. Bor.-Am. ii, 164.—Eaton & Wright, Bot. 359.—Bigelow, Fl. Boston. 3 ed. 387.—Antoine, Conif. 54, t. 21, f. 1.—Endlicher, Syn. Conif. 132.
- Abies pendula, Poiret in Lamarck, Dict. vi, 514.—Nouveau Duhamel, v, 288.—Lindley & Gordon in Jour. Hort. Soc. London, v, 213.
- Abies microcarpa, Poiret in Lamarck, Dict. vi, 514.—Nouveau Duhamel, v, 289, t. 79, f. 2.—Lindley in Penn. Cycl. i, 33.—Lindley & Gordon in Jour. Hort. Soc. London, 213.
- L. tenuifolia, Salisbury in Trans. Linnæan Soc. viii, 313.
- L. pendula, Salisbury in Trans. Linnæan Soc. viii, 313.—Forbes, Pinetum Woburn. 137, t. 46.—Carrière, Trait. Conif. 1 ed. 272.—Gordon, Pinetum, 129; 2 ed. 177.—Hooker f. in Trans. Linnæan Soc. xxiii, 302.
- L. microcarpa, Desfontaines, Hist. Arb. ii, 597.—Forbes, Pinetum Woburn. 139, t. 47.—Spach. Hist. Veg. xi, 436.—Link in Linnæa, xv, 536.—Carrière, Trait. Conif. 275; 2 ed. 355.—Gordon, Pinetum, 129; 2 ed. 175.—Henkel & Hochstetter, Nadelhölz. 137.—Hooker f. in Trans. Linnæan Soc. xxiii, 302, 341.—Veitch, Manual Conif. 180.
- L. intermedia, Loddiges, Cat. ed. 1836, 50.—Forbes, Pinetum Woburn. 141.—Link in Linnæa, xv. 535.
- L. Americana rubra, Loudon, Arboretum, iv, 2400.-Knight, Syn. Conif. 40.
- L. Americana, var. pendula, Loudon, Arboretum, iv, 2400.—Carrière, Trait. Conif. 2 ed. 356.
- L. Americana, var. prolifera, Loudon, Arboretum, iv, 2401.—Carrière, Trait. Conif. 2 ed. 356.
- L. decidua, var. Americana, Henkel & Hochstetter, Nadelhölz. 133.

LARCH. BLACK LARCH. TAMARACK. HACKMATACK.

Northern Newfoundland and Labrador to the eastern shores of Hudson bay, cape Churchill and northwest to the northern shores of the Great Bear lake and the valley of the Mackenzie river within the Arctic circle; south through the northern states to northern Pennsylvania, northern Indiana and Illinois, and central Minnesota.

A tree 24 to 30 meters in height, with a trunk 0.60 to 0.90 meter in diameter; moist uplands and intervale lands, or south of the boundary of the United States in cold, wet swamps, often covering extensive areas, here much smaller and less valuable.

Wood heavy, hard, very strong, rather coarse-grained, compact, durable in contact with the soil; bands of small summer cells broad, very resinous, dark colored, conspicuous, resin passages few, obscure; medullary rays numerous, hardly distinguishable, color, light brown, the sap-wood nearly white; specific gravity, 0.6236; ash, 0.33; preferred and largely used for the upper knees of vessels, for ship timbers, fence posts, telegraph poles, railway ties, etc.

The inner bark of the closely-allied European larch is recommended in the treatment of chronic catarrhal affections of the pulmonary and urinary passages; probably that of the American species would be equally efficacious.

402.-Larix occidentalis, Nuttall,

Sylva, iii. 143, t. 120; 2 ed. ii, 199, t. 120.—Newberry in Pacific R. R. Rep. vi, 59, f. 24, 25.—Cooper in Smithsonian Rep. 1858, 262; Am. Nat. iii, 412.—Lyall in Jour. Linnæan Soc. vii, 143.—Nelson, Pinaccæ, 91.—Hoopes, Evergreens, 253.—Regel, Gartenflora, xx, 103, t. 685, f. 8-10 (Belg. Hort. xxii, 101, t. 8, f. 3-5).—Vasey, Cat. Forest Trees, 35.—Gordon, Pinetum, 2 ed. 176.—Macoun in Geological Rep. Canada, 1875—76, 211.—G. M. Dawson in Canadian Nat. new ser. ix, 329.—Veitch, Manual Conif. 130.

Pinus Larix, Douglas in Companion Bot. Mag. ii, 109 [not Linnæus].

L. Americana, var. brevifolia, Carrière, Trait. Conif. 2 ed. 357.

Pinus Nuttallii, Parlatore in De Candolle, Prodr. xvi2, 412.

TAMARACK.

British Columbia, Selkirk and Gold ranges, south of latitude 53° N., extending west to the head of Okanagan lake (G. M. Dawson), south along the eastern slopes of the Cascade mountains to the Columbia river, through the mountain ranges of northern Washington territory to the western slopes of the Rocky mountains of Montana, and in the Blue mountains of Washington territory and Oregon.

A noble tree of great economic value, 30 to 45 meters in height, with a trunk 0.90 to 1.50 meter in diameter; moist mountain slopes and benches between 2,500 and 5,000 feet elevation; scattered among other trees and never exclusively forming forests; the thick bark long resisting the action of forest fires; very common, and perhaps reaching its greatest development in the region north of the Big Blackfoot river and in the valley of the Flathead river, Montana, here the largest and most valuable timber tree.

Wood heavy, exceedingly hard and strong, rather coarse-grained, compact, satiny, susceptible of a fine polish, very durable in contact with the soil; bands of small summer cells broad, occupying fully half the width of annual growth, very resinous, dark colored, conspicuous, resin passages few, obscure; medullary rays numerous, thin; color, light bright red, the thin sap-wood nearly white; specific gravity, 0.7407; ash, 0.09; occasionally manufactured into lumber, but principally used for fuel, posts, railway ties, etc.

403.—Larix Lyallii, Parlatore,

Enum, Sem. Hort. Reg. Mus. Flor. 1863; London Gard. Chronicle, 1863, 916 (Regel, Gartenflora, xiii, 244).—Lyall in Jour, Linnman Soc. vii, 143.—Henkel & Hochstetter, Nadelhölz. 417.—Carrière, Trait. Conif. 2 ed. 361.—Hoopes, Evergreens, 256.—Regel, Gartenflora, xx, 103, t. 685, f. 11–13 (Belg, Hort. xxii, 102, t. 9, f. 1–3).—Bertrand in Ann. Sci. Nat. 5 ser. xx, 90.—Vasey, Cat. Forest Trees, 35.—Macoun in Geological Rep. Canada, 1875–76, 211.—Veitch, Manual Conif, 130.

Pinus Lyallii, Parlatore in De Candolle, Prodr. xvi², 412.

"Cascade mountains, 6,500 to 7,000 feet, forming an open belt of trees mingled with *P. flexilis* (*P. albicaulus*); on the Galton range at 6,000 feet and in the Rocky mountains at 7,000 feet, growing with *P. flexilis*" (*Lyall*); mount Stewart, Washington territory (*Brandegee & Tweedy*, August, 1883); Grave Creek pass, northern Montana (*H. B. Ayres*, September, 1883).

A low, much-branched, straggling, alpine tree, rarely exceeding 15 meters in height, with a trunk sometimes 1.50 meter in diameter; dry, rocky soil, generally upon northern exposures, and associated with *Pinus albicaulis* and *Tsuga Pattoniana* along the upper limits of tree-growth between 5,500 and 7,000 feet elevation (*Brandegee*).

The wood not collected.

NOTE.—A well-marked species, distinguished from L. occidentalis by its alpine habit, the larger green or purple deciduous cones with ciliated scales, and by the dense tomentum covering the young shoots and leaf buds.

PALMACEÆ.

404.—Sabal Palmetto, Loddiges;

Romer & Schultes, Syst. vii, 1487.—Croom in Am. Jour. Sci. 1 ser. xxvi, 315.—Martius, Hist. Palm. iii, 247.—Kunth, Enum. iii, 247.—Spach, Hist. Veg. xii, 107.—Chapman, Fl. S. States, 438.—Curtis in Rep. Geological Surv. N. Carolina, 1860, iii, 64.—Wood, Cl. Book, 666; Bot. & Fl. 317.—Vasey, Cat. Forest Trees, 38.

Corypha Palmetto, Walter, Fl. Caroliniana, 119.

Chamærops Palmetto, Michaux, Fl. Bor.-Am. i, 206.—Michaux f. Hist. Arb.-Am. ii, 186, t. 10; N. American Sylva, 3 ed. iii, 5, t. 101.—Aiton, Hort. Kew. 2 ed. v, 490.—Nuttall, Genera, i, 231.—Elliott, Sk. i, 431.—Sprengel, Syst. ii, 137.—Eaton, Manual, 6 ed. 89.—Eaton & Wright, Bot. 191.—Darby, Bot. S. States, 546.—Cooper in Smithsonian Rep. 258.—Porcher, Resources, S. Forests, 526.

CABBAGE TREE. CABBAGE PALMETTO.

Smith island, off the mouth of Cape Fear river, North Carolina, south along the coast to Key Largo, Florida, and along the Gulf coast to the Apalachicola river.

A tree 7 to 12 meters in height, with a trunk 0.60 to 0.90 meter in diameter; sandy maritime shores; very common and reaching its greatest development upon the west coast of the Florida peninsula south of Cedar Keys.

Wood light, soft; fibro-vascular bundles hard, difficult to work, dark colored; color, light brown; specific gravity, 0.4404; ash, 7.66; impervious to the attacks of the teredo, and very durable under water; largely used for piles, wharves, etc.

405.-Washingtonia filifera, Wendland,

Bot. Zeit. xxxvii, 68.—Watson, Bot. California, ii, 211, 485.

Brahea dulcis,? Cooper in Smithsonian Rep. 1860, 442 [not Martius].

Pritchardia filamentosa, Wendlaud in Bot. Zeit. xxxiv, 807.—Vasey, Cat. Forest Trees, 38.—Fenzi in Bull Soc. Tosc. Ort. i, 116 & f.—Palmer in Am. Nat. xii, 598.

Brahea filamentosa, Hort.-Williams in London Gard. Chronicle, 1876, 80.

FAN-LEAF PALM.

San Bernardino county, California, from the eastern base of the San Bernardino mountains to the valley of the Colorado river.

A tree 12 to 18 meters in height, with a trunk 0.60 to 1.05 meter in diameter, forming groves of 250 to 500 plants in the depressions of the desert, in moist alkaline soil, or solitary and scattered near the heads of small ravines formed by water-courses; often stunted and greatly injured by fire.

Wood light, soft; fibro-vascular bundles hard, difficult to cut, dark colored, conspicuous; specific gravity 0.5173; ash, 1.89.

406.—Thrinax parviflora, Swartz,

Prodr. 57; Fl. Ind. Occ. i, 614,—Aiton, Hort. Kew. iii, 614; 2 ed. ii, 307.—Willdenow, Spec. ii, 202.—Persoon, Syn. i, 383.—Poiret in Lamarck, Dict. vii, 633.—Titford, Hort. Bot. Am. 112.—Sprengel, Syst. ii, 20.—Romer & Schultes, Syst. vii, 1300.—Martius, Hist. Palm. iii, 255, t. 103.—Kunth, Enum. iii, 253.—Dietrich, Syn. ii, 1091.—Walpers, Ann. v, 818.—Grisebach, Fl. British West Indies, 515.—Vasey, Cat. Forest Trees, 38.—Chapman in Coulter's Bot. Gazette, iii, 12; Fl. S. States, Suppl. 651.

T. Garberi, Chapman in Coulter's Bot. Gazette, iii, 12; Fl. S. States, Suppl. 651.

SILK-TOP PALMETTO.

Semi-tropical Florida, southern keys from Bahia Honda to Long's Key; in the West Indies.

A small tree, 9 meters in height with a trunk rarely exceeding 0.10 meter in diameter, or in pine-barren soil often low and stemless (T. Garberi).

Wood light, soft; fibro-vascular bundles small, hard, not conspicuous; color, light brown; specific gravity, 0.5991; ash, 3.99; the trunk used in making sponge- and turtle-crawls.

407.—Thrinax argentea, Loddiges;

Desfontaines, Cat. 3 ed. 31.—Rœmer & Schultes, Syst. vii, 1300.—Martius, Hist. Palm. iii, 256, t. 103, f. 3, t. 163.—Kunth, Enum. iii, 253.—Dietrich, Syn. ii, 1091.—Walpers, Ann. v, 818.—Grisebach, Fl. British West Indies, 515.—Chapman, Fl. S. States, Suppl. 651.

Palma argentea, Jacquin, Fragm. 38, No. 125, t. 43, f.1. - Märter in Bom. Physik. Arbeiten. ii, 76.

SILVER-TOP PALMETTO. BRICKLEY THATCH. BRITTLE THATCH.

Semi-tropical Florida, on a nameless key 10 miles west of Key West, Elliott's Key, Key Largo, Piney Key, Boca Chica Key, Key West, Gordon Key, and on the small keys south and west of Bahia Honda Key (Ourtiss); in the West Indies.

A small tree, 7 to 9 meters in height, with a trunk 0.15 to 0.20 meter in diameter.

Wood light, soft; fibro-vascular bundles small, very numerous; interior of the trunk spongy, much lighter than the exterior; specific gravity, 0.7172; ash, 3.01; used for piles, the foliage in the manufacture of ropes, for thatch, etc.

408.—Oreodoxa regia, HBK.

Nov. Genera & Spec. i, 305.—Martius, Hist. Palm. iii, 168, t. 156, f. 3-5.—Richard, Fl. Cuba, 348.—Kunth, Enum. iii, 182.—Spach, Hist. Veg. xii, 68.—Ill. Hort. ii, 28 & t.—Walpers, Ann. v, 807.—Grisebach, Fl. British West Indies, 327.—London Gard. Chronicle, 1875, 302, f. 66.—Chapman, Fl. S. States, Suppl. 651.

Enocarpus regia, Sprengel, Syst. ii, 140.

O. oleracea, ? Cooper in Smithsonian Rep. 1860, 440.

ROYAL PALM.

Semi-tropical Florida, "Little and Big Palm hummocks," 15 and 25 miles east of cape Romano (Curtiss), near the mouth of Little river, and on Elliott's Key; in the West Indies.

A tree 18 to 30 meters in height, with a trunk 0.60 meter in diameter; rich hummocks, often forming extensive groves; in Florida rare and local.

Wood heavy, hard; fibro-vascular bundles large, very dark, conspicuous; interior of the trunk spongy, much lighter than the exterior; color, brown; specific gravity, exterior of the trunk, 0.7982, interior, 0.2128; ash, 2.54.

LILIACE E.

409.-Yucca canaliculata, Hooker,

Bot. Mag. t. 5201.—Baker in London Gard. Chronicle, 1870, 1217.—Engelmann in Trans. St. Louis Acad. iii, 43.

Y. Treculiana, Carrière in Rev. Hort. vii, 280.—Baker in London Gard. Chronicle, 1870, 828.—Engelmann in Trans. St. Louis Acad. iii, 41.—Vasey, Cat. Forest Trees, 38.—London Garden, xii, 328, t. 94.

SPANISH BAYONET.

Southern Texas, Matagorda bay, and from the Brazos and Guadalupe rivers south into Mexico.

A small tree, 5 to 8 meters in height, with a trunk 0.30 to 0.75 meter in diameter; dry, gravelly, arid soil.

Wood, like that of the whole genus, showing distinct marks of concentric arrangement, fibrous, spongy, heavy, difficult to cut and work; color, light brown; specific gravity, 0.6677; ash, 6.27.

The bitter, sweetish fruit cooked and eaten by the Mexicans; the root stock, as in the whole genus, saponaceous and largely used by the Mexicans as a substitute for soap.

410.—Yucca brevifolia, Engelmann,

King's Rep.v, 496; Trans.St. Louis Acad. iii, 47.—Parry in Am. Nat. ix, 141, 351.—Vasey, Cat. Forest Trees, 38.—Watson, Bot. California, ii, 164.

Y. Draconis, ? var. arborescens, Torrey in Pacific R. R. Rep. iv, 147.

THE JOSHUA. JOSHUA TREE.

Southwestern Utah, northwestern Arizona to southern Nevada, and the valley of the Mohave river, California. A tree 6 to 12 meters in height, with a trunk 0.60 to 0.90 meter in diameter; dry, gravelly soil, forming upon the Mohave desert at 2,500 feet elevation an open, straggling forest.

Wood light, soft, spongy, difficult to work; color, very light brown or nearly white; specific gravity, 0.3737; ash, 4.00; occasionally manufactured into paper-pulp.

411.—Yucca elata, Engelmann,

Coulter's Bot. Gazette, vii, 17.

Y. angustifolia, var. radiosa, Engelmann in King's Rep. v, 496.

Y. angustifolia, var. elata, Engelmann in Trans. St. Louis Acad. iii, 50; Wheeler's Rep. vi, 270.

SPANISH BAYONET.

Western Texas to southern Arizona and Utah; southward into Mexico.

A small tree, 3 to 5 meters in height, with a trunk 0.20 to 0.25 meter in diameter; dry, gravelly mesas.

Wood light, soft, spongy; color, light brown or yellow; specific gravity, 0.4470; ash, 9.28.

412.-Yucca baccata, Torrey,

Bot. Mex. Boundary Survey, 221; Ives' Rep. 29.—Cooper in Smithsonian Rep. 1858, 266.—Baker in London Gard. Chronicle, 1870, 923.—André in Ill. Hort. 3 ser. xx, 23, t. 115.—Gray, Hall's Pl. Texas, 23,—Engelmann in Trans. St. Louis Acad. iii, 44; King's Rep. v, 496; Wkeeler's Rep. vi, 270.—Loew in Wheeler's Rep. iii, 609.—Rothrock in Wheeler's Rep. vi, 52.—Watson, Bot. California, ii, 164.

Y. filamentosa, ? Wood in Proc. Philadelphia Acad. 1868, 167 [not Torrey].

SPANISH BAYONET. MEXICAN BANANA.

Western Texas, south of latitude 32° N., west through New Mexico to southern Colorado and San Diego county, California; southward into northern Mexico.

A tree 7 to 12 meters in height, with a trunk 0.60 meter in diameter, or often much smaller, and toward the northern limits of its range stemless; forming upon the plains of Presidio county, Texas, extensive open forests (Havard).

Wood light, soft, spongy, difficult to work; color, light brown; specific gravity, 0.4470; ash, 9.28.

The large juicy fruit edible and an important article of food to Mexicans and Indians; a strong coarse fiber, prepared by macerating the leaves in water, is manufactured into rope by the Mexicans.

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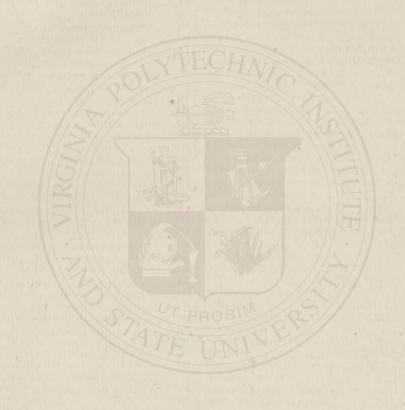
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PART II.

THE WOODS OF THE UNITED STATES.

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THE WOODS OF THE UNITED STATES.

A critical examination of the wood produced by the indigenous trees of North America, exclusive of Mexico, has been made in connection with the investigation of the forest wealth of the United States.

Mr. S. P. Sharples, special agent in charge of this department of the investigation, has had general direction of such experiments, and suggested the methods adopted for their execution.

The object of this examination has been to determine, first, the fuel value of the woods of the United States; second, the value as material for construction of the wood of the principal timber trees of the country. The results thus obtained are highly suggestive; they must not, however, be considered conclusive, but rather valuable as indicating what lines of research should be followed in a more thorough study of this subject.

The fuel value has been obtained by a determination of the specific gravity and the ash of the absolutely dry wood, supplemented by a determination of the actual chemical composition of the wood of some of the most important trees; the value of our woods for construction has been obtained by experiments made with the United States testing-machine at the Watertown arsenal. Each specimen as received was at once numbered, and this number, designated in the following tables as "Office number", was carefully repeated on every fragment cut from the original tree, and always refers to the same specimen. In a few cases in the early part of the work a sub-number was used to designate a specimen from another tree of the same species received from the same collector. In most cases the specimens were taken from the butt-cut of the tree, and unless it is otherwise mentioned in the remarks, were free from sap and knots; they may be regarded as representing the best wood that could be obtained from the tree.

The specimens used in the different series of experiments are deposited in the National Museum at Washington and in the museum of the Arboretum of Harvard College. It was found necessary, in order to secure proper material upon which to carry out the various experiments, to obtain a much larger amount of wood of the different species than was actually consumed in the experiments. This surplus material has been worked into 12,961 museum specimens, of convenient size, showing as far as possible the bark, sap-, and heart-wood of each species. These have been made into sixty sets, more or less complete, and distributed to the following educational institutions in the United States and Europe:

Institute of Technology, Boston, Massachusetts. United States Military Academy, West Point, New York. Academy of Natural Science, Philadelphia, Pennsylvania. United States Naval Academy, Annapolis, Maryland. Sheffield Scientific School, New Haven, Connecticut. School of Mines, Columbia College, New York, New York. National School of Forestry, Nancy, France. Museum of Science and Art, Edinburgh, Scotland. Agricultural Museum, Rome, Italy. Brown University, Providence, Rhode Island. Rensselaer Polytechnic Institute, Troy, New York. Lawrence Scientific School, Cambridge, Massachusetts. Iowa Agricultural College, Ames, Iowa. Administration of National Forests, Lisbon, Portugal. National Forest Administration, Paris, France. McGill University, Montreal, Canada. Royal Botanic Gardens, Sydney, New South Wales. State Agricultural College, Lansing, Michigan.

Peabody Academy of Science, Salem, Massachusetts. Arkansas Industrial University, Fayetteville, Arkansas. Imperial Botanic Gardens, St. Petersburg, Russia. American Society of Civil Engineers, New York, New York. Portland Society of Natural History, Portland, Maine. New Jersey Agricultural College, New Brunswick, New Jersey. State Agricultural College, Burlington, Vermont. State Agricultural College, College Station, Maryland. Union College Engineering School, Schenectady, New York. Cornell University, Ithaca, New York. Hampton Agricultural and Normal Institute, Hampton, Virginia. Pennsylvania State College, State College, Pennsylvania. Ohio State University, Columbus, Ohio. Agricultural College of Missouri, Columbia, Missouri. University of Wisconsin, Madison, Wisconsin. State Agricultural and Mechanical College, Auburn, Alabama. University of Minnesota, Minneapolis, Minnesota. North Carolina Agricultural College, Chapel Hill, North Carolina. West Virginia University, Morgantown, West Virginia. State Agricultural College, Orono, Maine. Georgia Agricultural College, Athens, Georgia. Massachusetts Agricultural College, Amherst, Massachusetts. Tennessee Agricultural College, Knoxville, Tennessee. New Hampshire College of Agriculture, Hanover, New Hampshire. Illinois Industrial University, Champaign, Illinois. State Agricultural College, Corvallis, Oregon. State Agricultural College, Manhattan, Kansas. Agricultural College of Mississippi, Starkville, Mississippi. Kentucky Agricultural College, Lexington, Kentucky. Claffin University, Orangeville, South Carolina. Purdue University, Lafayette, Indiana. Botanic Garden, Königsberg, Germany. Engineer's office, Water-works, Boston, Massachusetts. Franklin Society, Providence, Rhode Island. Madison University, Hamilton, New York. Rochester University, Rochester, New York. Colby Academy, New London, New Hampshire.

SPECIFIC GRAVITY AND ASH.

The specific gravity and the ash of every tree of the United States have been determined (Table I) by Mi. Sharples, with the exception of the following: Clusia flava, once detected upon the keys of southern Florida, but not rediscovered; Gordonia pubescens, a rare and local species discovered in the last century upon the banks of the Altamaha river of Georgia and never rediscovered; Pistacia Mexicana and Acacia Berlandieri, economically unimportant species of the valley of the lower Rio Grande; Cratagus berberifolia, a little known species of the Red River valley; Cupressus Macnabiana, a rare and local species of California of little economic importance, and Larix Lyallii, a rare and local species of the northern Rocky mountains.

At least two determinations of specific gravity have been made for each species studied, and, in the case of woods of commercial importance, specimens were taken from many trees growing in widely different parts of the country, and under different conditions of soil and climate.

The specimens used for specific gravity determinations were made 100 millimeters long and about 35 millimeters square, and were dried at 100° centigrade until they ceased to lose weight. The specific gravity was then obtained by measurement with micrometer calipers and calculation from the weights of the blocks.

Two determinations of ash were made from each specimen studied by burning small, dried blocks in a muffle furnace at a low temperature.

An average of the specific gravity and of the ash of all the specimens taken from the same tree was made, and the average of these averages is given as the final result for the species; equal weight is thus given to each tree in the calculations without regard to the number of specimens representing it. In the following table the trees of the United States are arranged in the order of the weight of the dry wood:

			11,5					
Catalogue number.	Species.	Relative specific gravity.	Catalogue number.	Species.	Relative specific gravity.	Catalogue number.	Species.	Relative specific gravity.
43	Condalia ferrea	1, 3020	163	Guettarda elliptica	0. 8337	402	Larix occidentalis	0.7407
44	Condalia obovata	1. 1999	159	Viburnum prunifolium	0.8832	273	Quercus coccines	0.7405
140	Rhizophora Mangle	1. 1617	26	Ptelia trifoliata	0.8319	87	Gleditschia monosperma	0.7342
20	Guaiacam sanctum	1. 1432 1. 1374	119 257	Pyrus rivularis	0.8316	77 276	Robinia Pseudacacía	0. 7333
114	Eugenia longipea	1. 1235	292	Ostrya Virginica	0. 8284	158	Viburnum Lentago	0.7303
21	Porliera angustifolia	1, 1101	270	Quercus agrifolia	0.8253	278	Quercus Catesbæi	0.7294
220	Sebastiania lucida	1.0905	244	Carya tomentosa	0. 8218	178	Bumelia tenax	0. 7293
183	Mimusops Sieberi	1. 0838	245	Carya porcina	0.8217	130 228	Cratægus cordata	0 7293
42	Reynosia latifolia	1. 0715	106	Prunus umbellata	0. 8202	293	Carpinus Caroliniana	0.7286
80	Olneya Tesota	1.0602	151	Cornus florida	0. 8153	31	Swietenia Mahogoni	0.7282
30	Amyris sylvatica	1.0459	201	Sapindus marginatus Osmanthus Americanus	0.8126	228	Celtis occidentalis, var. reticulata	0.7275
162	Genipa clusiæfolia	1.0316	243	Carya sulcata	0. 8111	225	Ulmus racemosa	0. 7263
264	Quercus grisea	1.0092	78	Robinia viscosa	0. 8094	222	Ulmus crassifolia	0.7245
141	Conocarpus erecta	0. 9900	204	Bourreria Havanensis	0.8073	280	Quercus aquatica	0.7244
12	Canella alba	0. 9893	259 79	Quercus Michauxii	0. 8039	103 126	Prunus Americana	0. 7215 0. 7194
213	Coccoloba Floridana	0. 9835	247	Carya myristicæformis	0.8016	196	Fraxinus quadrangulata	0.7184
113	Prunus ilicifolia	0. 0803	284	Quereus hypoleuca	0.8009	241	Carya olivæformis	0.7180
214	Coccoloba uvifera	0. 9635	182	Bumelia cuneata	0.7959	407	Thrinax argentea	0.7172
266	Hypelate paniculata	0, 9533	128	Cratægus subvillosa	0. 7953	170	Kalmia latifolia	0.7160 0.7159
267	Quereus virens	0. 9501	73	Rhus Metopium	0.7917	16	Fremontia Californica	0.7142
265	Quereus reticulata	0. 9479	184	Diospyros Virginiana	0.7908	142	Laguncularia racemosa	0.7137
148	Eugenia procera	0. 9453	189	Fraxinus Greggii	0.7904	338	Juniperus occidentalis, var. monosperma	
263	Quercus oblongifolia	0. 9441	109 271	Prunus Capuli	0. 7879 0. 7855	194	Fraxinus viridis	0.7117
116	Cercocarpus parvifolius	0. 9365	137	Amelanchier Canadensis	0.7838	167	Arbutus Xalapensis	0.7099
144	Eugenia buxifolia	0. 9360	135	Cratægus flava	0.7809	166	Arbutus Menziesii	0.7052
175	Chrysophyllum oliviforme	0.9360	41	Schæfferia frutescens	0.7745	117	Pyrus coronaria	0.7048
219 136	Drypetes croces, var. latifolia Heteromeles arbutifolia	0, 9346	234	Maclura aurantiaca	0.7736	274 380	Quercus tinctoria	0.7045
177	Dipholis salicifolia	0. 9316	102	Chrysobalanus Icaco	0.7709	11	Capparis Jamaicensis	The state of French Co.
160	Exostemma Caribæum	0.9310	122	Cratægus rivularis	0,7703	223	Ulmus fulva	0.6956
269	Quercus Emoryi	0. 9263	216	Nectandra Willdenoviana Cratægus flava, var. pubescens	0.7693	110	Prunus demissa	0. 6951 0. 6950
95 219	Drypetes crocea	0. 9209	135 281	Quercus Iaurifolia	0. 7673	174	Jacquinia armillaris	
32	Ximenia Americana	0. 9196	258	Quercus bicolor	0.7662	279	Quercus palustris	
146	Eugenia monticola	0. 9156	93	Prosopis juliflora	0.7652	85	Gymnocladus Canadensis	THE RESERVE TO STATE OF THE PERSON NAMED IN
211	A vicennia nitida	0. 9138	192	Fraxinus Americana, var. Texensis Cratægus tomentosa	0.7636	277 64	Quercus falcata	0. 6928 0. 6915
272	Quercus rubra, var. Texana	0. 9080	299	Betula lenta	0.7617	64	Acer saccharinum	0.6912
101	Pithecelobium Unguis-cati	0. 9049	164	Vaccinium arboreum	0.7610	338	Juniperus occidentalis, var. conjugens.	0. 6907
40	Myginda pallens	0.9048	94	Prosopis pubescens	0.7609 0.7552	63	Acer grandidentatum	0.6902
24 112	Xanthoxylum Caribæum	0. 9002	246	Carya amaraQuercus imbricaria	0, 7529	118 27	Pyrus angustifolia	0. 6895
143	Calyptranthes Chytraculia	0.8992	92	Cercis reniformis	0.7513	104	Prunus angustifolia	0. 6884
145	Eugenia dichotoma	0.8983	381	Pinus Cubensis	0. 7504	291	Fagus ferruginea	0, 6883
262	Quercus Douglasii	0. 8928	168	Arbutus Texana	0.7500 0.7500	138	Hamamelia VirginicaQuercus heterophylla	0. 6856 0. 6834
. 75 81	Eysenhardtia orthocarpa	0.8740	165	Quercus Prinus	0.7499	287	Quercus densiflora	0. 0827
210	Citharexylum villosum	0.8710	226	Ulmus alata	0,7491	191	Fraxinus pistaciæfolia	0.6810
111	Prunus Caroliniana	0.8688	152	Cornus Nuttallii	0.7481	124	Cratægus brachyacantha	0. 6793
127	Cratægus coccinea	0.8618	286	Quercus Phellos		263	Cordia Boissieri	0. 6790
261 173	Quercus prinoides	0.8605 0.8602	251 181	Quercus alba	A CONTRACTOR OF	397	Cyrilla racemifiora	0. 6783
98	Acacia Greggii	0. 8550	169	Oxydendrum arboreum	0, 7458	86	Gleditschia triacanthos	0. 6740
84	Sophora affinis	0, 8509	131	Cratægus apiifolia	0.7453	96	Leucaena pulverulenta	0, 6732
268 185	Quercus chrysolepis	0.8493	253	Quercus Garryana	0, 7449	250 150	Myrica Californica	0. 6703
255	Querous undulata, var. Gambelii	0.8407	256 89	Parkinsonia microphylla	0.7453	409	Yucca canaliculata	0. 6677
242	Carya alba	0.8372	25	Xanthoxylum Pterota	0.7444	61	Acer circinatum	0.6660
55	Sapindus Saponaria	0.8367	36	Ilex decidua	0.7420	180	Bumelia spinosa	0.6603
254 172	Quercus obtusiloba		252 248	Quercus lobata	0.7409	190	Fraxinus anomala Euonymus atropurpureus	0, 6597
112	, my come ampanentiation and a second	0.0031	1 210	. Om Ja adameter	0.1201	. 00	- Land James Maroper Persons	

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Catalogue number.	Species.	Relative specific gravity.	Catalogue number	Species.	Relative specific gravity.	Catalogue number	Species.	Relative specific gravity.
134	Cratægus æstivalis	0.6564	187	Halesia diptera	0.5705	379	Pinus Banksiara	0. 4761
240	Juglans rupestris	0.6554	235	Platanus occidentalis	0. 5678	346	Torreya Californica	0.4760
297 179	Betula lutea Bumelia lanuginosa	0. 6553 0. 6544	353 47	Pinus Parryana	0. 5675 0. 5672	309 231	Salix lasiandra	0. 4756
192	Fraxinus Americana	0. 6543	356	Pinus monophylla	0. 5658	237	Platanus Wrightii	0.4736
272	Quercus rubra	0.6540	22	Xanthoxylum Americanum	0.5654	14	Gordonia Lasianthus	0.4728
88	Parkinsonia Torreyana	0, 6531	249	Myrica cerifera	0. 5637	361	Pinus ponderosa	0.4715
212	Pisonia obtusata	0. 6529	188 316	Halesia tetraptera	0, 5628 0, 5587	400	Abies magnifica	0.4701
354	Pinus cembroides	0. 6512	374	Pinus clausa	0. 5576	333	Cupressus Goveniana	0.4689
224	Ulmus Americana	0, 6506	288	Castanopsis chrysophylla	0.5574	304	Alnus serrulata	0.4666
125	Cratægus arborescens	0, 6491	357	Pinus Balfouriana, var. aristata	0.5572	319	Populus grandidentata	0.4632
205	Cuercus Kelloggii	0. 6440	76 336	Dalea spinosa	0.5522	325	Populus Fremontii, var. Wislizenii Chamæcyparis Lawsoniana	0.4621
275 215	Persea Carolinensis	0. 6429	45	Rhamnus Caroliniana	0. 5462	157	Sambucus Mexicana	0.4621
60	Rhus cotinoides	0, 6425	66	Acer rubrum, var. Drummondii	0.5459	153	Nyssa eapitata	0.4613
283	Quercus cinerea	0.6420	363	Pinns Chihuahuana	0. 5457	305	Alnus incana	0.4607
100	Lysiloma latisiliqua	0.6418	120 370	Pyrus Americana	0.5451	309	Salix lasiandra, var. Fendleriana Picea nigra	0.4598
230 215	Persea Carolinensis, var. palustris	0. 6396	857	Pinus Balfouriana	0, 5441	368	Pinus insignis	0. 4584
343	Taxus brevifolia	0.6391	313	Salix flavescens, var. Scouleriana	0.5412	391	Pseudotsuga Douglasii, var. macro-	0.4563
355	Pinus edulis	0.6388	161	Pinckneya pubens	0.5350		carpa.	
200	Chionanthus Virginica	0. 6372 0. 6363	314	Salix Hookeriana	0. 5350	399	Abies nobilis	0.4561
91	Cercis Canadensis	0. 6360	310	Salix longifolia, var. exigua	0, 5342	309	Salix lasiandra, var. lancifolia Taxodium distichum	0. 4517
154	Nyssa sylvatica	0. 6356	186	Symplocos tinctoria	0. 5325	50	Æsculus glabra	0.4542
199	Forestiera acuminata	0. 6345	ā	Magnolia macrophylla	0.5309	17	Tilia Americana	0.4525
344	Taxus Floridana	0.6340	373	Pinus inops	0.5309	290	Castanea vulgaris, var. Americana	0.4504
53 209	Ungnadia speciosa	0. 6332	58 227	Acer Pennsylvanicum	0, 5299 0, 5294	107 307	Prunns emarginata	0. 4502 0. 4502
198	Fraxinus sambucifelia	0. 6318	71	Rhus copallina	0. 5273	6	Magnolia Umbrella	0. 4487
171	Rhododendron maximum	0. 6303	65	Acer dasycarpum	0. 5269	206	Catalpa bignonioides	0.4474
336	Juniperus Californica	0.6282	362	Pinus Jeffreyi	0.5206	411	Yucca elata	0.4470
82 332	Cladrastis tinctoria	0. 6278	155 71	Nyssa uniflora	0.5194	306	Salix nigra	0.4456
193	Fraxinus pubescens	0. 6251	389	Tsuga Mertensiana.	0. 5182	404	Sabal Palmetto	0.4404
38	Cliftonia ligustrina	0.6249	405	Washingtonia filifera	0. 5173	311	Salix sessilifolia	0. 4397
401	Larix Americana	0. 6236	391	Pseudotsuga Douglasii	0.5157	72	Rhus venenata	0.4382
66 90	Acer rubrum Parkinsonia aculeata	0.6178	345	Pinus rigida	0.5151	350 70	Pinus flexilis	0. 4358
239	Juglans nigra		156	Sambueus glauca	0.5087	67	Negundo aceroides	0. 4328
377	Pinus mitis	0.6104	317	Salix Sitchensis	0.5072	386	Picea Sitchensis	0, 4287
315	Salix cordata, var. vestita	0. 6069	23	Xanthoxylum Clava-Herculis	0.5056	388	Tsuga Caroliniana	0.4275
408 296	Oreodoxa regia	0.6034	10 217	Anona laurifolia	0.5053	51 312	Æsculus flava	0.4274
62	Acer glabrum	0.6028	360	Pinus Arizonica	0.5038	18	Tilia heterophylla	0. 4253
46	Rhamnus Californica	0.6000	2	Magnolia glauca	0.5035	387	Tsuga Canadensis	0.4239
406	Thrinax parviflora	0. 5991 0. 5967	105	Prunus Pennsylvanica	0.5023	8	Liriodendron Tulipifera	0. 4230
23	ticosum.	0. 5367	300	Magnolia Fraseri	0,5003	398	Abies amabilis	0. 4228 0. 4208
295	Betula papyrifera	0.5955	52	Æsculus Californica	0.4980	207	Catalpa speciosa	0.4165
121	Pyrus sambucifolia	0.5928	313	Salix flavescens	0.4969	351	Pinus albicaulis	0.4165
139	Liquidambar Styraciflua	0.5909	376	Pinus muricata	0.4942	321	Populus balsamifera, var. candicans	0.4161
208 232	Chilopsis saligna	0.5902	375	Pinus pungens	0.4935	28	Magnelia cordata	0. 4139 0. 4136
19	Byrsonima lucida	0.5888	339	Juniperus Virginiana	0. 4926	367	Pinus Coulteri	0.4133
289	Castanea pumila	0.5887	325	Populus Fremontii	0.4914	302	Alnus rhombifolia	0.4127
34	Ilex Dahoon, var. myrtifolia	0.5873	60	Acer macrophyllum	0.4909	365	Pinus Murrayana	0.4096
337 108	Juniperus pachyphlæa	0. 5829 0. 5822	236 359	Platanus racemosa	0.4880	320 238	Populus heterophylla	0.4089
33	Ilex opaca	0, 5818	352	Pinus reflexa	0.4877	17	Tilia Americana, var. pubescens	0.4074
364	Pinus contorta	0.5815	308	Salix lævigata	0.4872	383	Picea alba	0.4051
194	Fraxinus viridis, var. Berlandieriana	0,5780	358	Pinus resinosa	0. 4854	318	Populus tremuloides	0.4032
221 338	Hippomane Mancinella	0. 5772	335	Cupressus Guadalupensis Pinus Sabiniana	0.4843	303	Alnus oblongifolia	0.4017
298	Betula nigra	0.5762	68	Negundo Californicum	0.4821	9	Asimina triloba	0. 3969
294	Betula alba, var. populifolia	0.5760	301	Alnus rubra	0.4813	378	Pinus glabra	0.3931
48	Ceanothus thyrsiflorus	0.5750	34	Ilex Dahoon	0.4806	322	Populus angustifolia	0. 3912
197	Fraxinus Oregana	0. 5731	330	Chamacyparis Nutkaensis	0. 4782	348	Pinus monticola	0.3008

Catalogue number.	Relative specific		Catalogue number.	Species.	Relative specific gravity.	Catalogue number.	Species.		
324	Populus monilifera	0.3889	396	Abies concolor	0.3638	329	Chamæcyparis sphæroidea	0. 3322	
347	Pinus Strobus	0.3854	321	Populus balsamifera	0.3635	149	Cereus giganteus	0.3188	
393	Abies balsamea	0.3819	392	Abies Fraseri	0.3565	327	Thuya occidentalis	0.3164	
323	Populus trichocarpa	0.3814	395	Abies grandis	0.3545	29	Bursera gummifera	0.3003	
328	Thuya gigantea	0.3796	195	Fraxinus platycarpa	0.3541	341	Sequoia gigantea	0. 2882	
385	Picea pungens	0, 3740	369	Pinus tuberculata	0.3499	412	Yucca baccata	0. 2724	
410	Yucca brevifolia	0.3737	394	Abies subalpina	0.3476	229	Ficus aurea	0. 2616	
349	Pinus Lambertiana	0.3684	384	Picea Engelmanni	0.3449				

It will be noticed that all species in which the wood is heavier than water belong to the semi-tropical region of Florida or to the arid Mexican and interior Pacific regions. There seems to be a certain, but by no means constant relation, as shown in this table, between aridity of climate and the weight of the wood produced by closely allied species or by individuals of the same species. The wood of the form of Quercus rubra peculiar to western Texas is nearly 39 per cent, heavier than the average of all the specimens of the typical species grown in the northern states. Among the white oaks the wood of species belonging to regions of little rainfall, Quercus grisea, oblongifolia, Durandii, and Douglasii, is heavier than that of allied species peculiar to regions more favorable for the growth of trees. The average of two specimens of Quercus princides grown in western Texas is 19 per cent. heavier than the average of all the other specimens of this species grown in other parts of the country. In Frazinus, the wood of F. Greggii of the Rio Grande valley is heavier than that of any other species; it only just surpasses in weight, however, the wood of the western Texas form of F. Americana, which is 20 per cent. heavier than the average of all specimens of the typical species grown north of Texas. On the other hand, the wood of Texas forms of Fraxinus viridis is constantly lighter than that of northern specimens, and the wood of Celtis grown in Arizona is lighter than that of the average of all the other specimens of this species. In Juglans, the heaviest wood is that of J. rupestris, a species belonging to a region of little rainfall, and a specimen of J. nigra from western Texas is 33 per cent. heavier than the average of all specimens grown in the Mississippi basin. In the case of Platanus, the heaviest wood is that of the Atlantic species, but wood of the species peculiar to the comparatively moist climate of southwestern Arizona is, however, considerably lighter than that of the drier climate of southern California.

FUEL VALUE.

The relative fuel values are obtained by deducting the percentage of ash from the specific gravity, and are based on the hypothesis that the real value of the combustible material in all woods is the same.

A number of analyses was also made of the wood of several of the principal trees of the United States (Table II) and their absolute fuel value calculated. Mr. Sharples describes the methods adopted by him to obtain these results, as follows:

The carbon and hydrogen determinations were made by the ordinary processes of organic analysis, by burning the wood in a current of oxygen. The moisture was determined by drying the wood at 100° centigrade until its weight became sensibly constant. The calculations were then made on the dry wood. The results contain a slight constant error, arising from the fact that the nitrogen in the wood was not determined. This error is, however, very slight, the nitrogen, which is included in the percentage of oxygen, rarely amounting, in any wood, to one per cent. The column headed "Hydrogen combined with oxygen", is found by dividing the amount in the column headed "Oxygen" by eight, and represents the hydrogen that may be considered as already combined with oxygen in the form of water, and is therefore useless for fuel. The fuel value per kilogram is found by multiplying the percentage of carbon by 8,080, and that of excess of hydrogen by 34,462 (these being the values obtained by Favre and Silberman), adding these together and deducting from the sum the product of the total hydrogen multiplied by 4,833, which represents the heat required to evaporate the water produced by burning the hydrogen. The constants used above represent the number of kilograms of water raised one degree centigrade, by burning one kilogram of carbon or hydrogen. The fuel value per cubic decimeter is found by multiplying the value per kilogram by the specific gravity. It need hardly be said that this fuel value is rarely attained in practice, and that it is never utilized. There are too many sources of loss; the calculation supposes that the combustion is perfect, that no smoke is given off, and that the heat of the products of combustion, with the exception of that necessary to convert the water into vapor, is all utilized.

It appears from Mr. Sharples' experiments that resinous woods give upward of 12 per cent. more heat from equal weights burned than non-resinous woods; the heat produced by burning a kilogram of dry non-resinous wood being about 4,000 units, while the heat produced by burning a kilogram of dry resinous wood is about 4,500 units, a unit being the quantity of heat required to raise 1 kilogram of water 1 degree centigrade.

Count Rumford first propounded the theory that the value of equal weights of wood for fuel was the same without reference to specific distinctions; that is, that a pound of wood, whatever the variety, would always produce the same amount of heat (Count Rumford's Works, Boston, 1873, vol. ii). Marcus Bull, experimenting in 1826 upon the fuel value of different woods (Trans. Am. Phil. Soc., new ser., iii, 1), found a variation of only 11 per cent. between the different species tested. Rumford's theory must be regarded as nearly correct, if woods are

separated into resinous and non-resinous classes. The specific gravity gives a direct means of comparing heat values of equal volumes of wood of different resinous and non-resinous species. In burning wood, however, various circumstances affect its value; few fire-places are constructed to fully utilize the fuel value of resinous wood, and carbon escapes unconsumed in the form of smoke. Pine, therefore, which, although capable of yielding more heat than oak or hickory, may in practice yield considerably less, the pine losing both carbon and hydrogen in the form of smoke, while hickory or oak, burning with a smokeless flame, is practically entirely consumed. The ash in a wood, being non-combustible, influences its fuel value in proportion to its amount. The state of dryness of wood also has much influence upon its fuel value, though to a less degree than is generally supposed. The water in green wood prevents its rapid combustion, evaporation reducing the temperature below the point of ignition. Green wood may often contain as much as 50 per cent. of water, and this water must evaporate during combustion; but as half a kilogram of ordinary wood will give 2,000 units of heat, while half a kilogram of water requires only 268.5 units to evaporate it, 1731.5 units remain available for generating heat in wood containing even a maximum amount of water. In cases where the pressure was perpendicular to the grain of the wood it was applied on the side of the specimen nearest to the heart of the tree.

A factor in the general value of wood as fuel is the ease with which it can be seasoned; beech, for example, a very dense wood of high fuel value when dried, is generally considered of little value as fuel, on account of the rapidity with which it decays when cut and the consequent loss of carbon by decomposition.

THE STRENGTH OF WOOD.

The specimens tested for the purpose of determining the strength of the wood produced by the different trees of the United States were cut, with few exceptions, before March, 1881, and were slowly and carefully seasoned.

Those used in determining the resistance to transverse strain were made 4 centimeters square and long enough to give the necessary bearing upon the supports. These were shod with flat iron plates, slightly rounded on the edges and were set exactly 1 meter apart; they remained perfectly rigid under the pressure applied. Each specimen was weighed, measured, and its specific gravity calculated before it was tested. The result thus obtained represents the specific gravity of the air-dried wood.

To eliminate the action of their weight the specimens were placed upright, and hydraulic pressure was applied by means of an iron rod 12 millimeters in radius, acting midway between the supports, the deflections being read at this point.

The direction of the grain of the wood is shown by diagrams in the table (Table III), the pressure acting upon it horizontally from the left.

The pressure was applied slowly and uniformly, a reading of the deflections being taken for every 50 kilograms. When a load of 200 kilograms had been applied it was removed and the set read. Pressure was again applied in the same way, and the readings of deflections were resumed when 200 kilograms was again reached.

The formula used in calculating the coefficient of elasticity was $E = \frac{P l^3}{4 \triangle b d^3}$; l, b, d, being taken in millimeters; that of the modulus of rupture, $E = \frac{3 P l}{2 b d^2}$, l, b, d being in centimeters, P, in both formulas, in kilograms.

A few experiments were also made in the same manner, for purposes of comparison, to determine the transverse strength of specimens 1 meter long between the bearings and 8 centimeters square (Table IV).

The specimens tested by longitudinal compression were 4 centimeters square and 32 centimeters (8 diameters) long. They were placed between the platforms of the machine, and pressure was gradually applied until they failed. The figures given represent the number of kilograms required to cause failure.

The specimens tested under pressure applied perpendicularly to the fibers were 4 centimeters square and 16 centimeters long. They were placed upon the platform of the machine and indented with an iron punch 4 centimeters square on its face, covering the entire width of the specimen and one-quarter of its length at the center. In this series of experiments the direction of the annual rings was noted, horizontal pressure being also applied from the left. Readings were taken of the pressure necessary to produce each successive indentation of 0.254 up to 2.54 millimeters, and in the case of specimens which did not fail with this pressure a further test was made of the weight required to produce indentations of 3.81 and 5.08. The remarks (Table V) upon the behavior of the wood of the different species under compression were furnished by Mr. James E. Howard, in charge of the testing machine.

COMPARATIVE VALUES.

In the following table the number standing opposite each species represents its relative value in the column in which it appears.

This table is purely an arbitrary one, since the introduction of one or more species would of course change the value of all species standing lower in value, or results based on an examination of a larger number of specimens of any species may change the relative numbers in regard to it very considerably. In other words, any twenty or thirty species bearing consecutive numbers may change places with each other. This arises partly from the want of uniformity of the wood of any species, and partly from the fact that where so many determinations fall between comparatively narrow limits the mere order of sequence must be largely accidental.

TABLE OF RELATIVE VALUES.

Catalogue number.	Species.	Approximate fuel value.	Elasticity.	Ultimate transverse strength.	Ultimate resistance to longitudinal crushing.	Resistance to indenta- tion to 1.27 millimeters.	Catalogue number.	Species.	Approximate fuel value.	Elasticity.	Ultimate transverse strength.	Ultimate resistance to longitudinal crushing.	Resistance to indenta- tion to 1.27 millimeters.
	MAGNOLIACEÆ.							ANACARDIACEÆ.	****			0.00	010
1 2	Magnolia grandiflora	145 205	133 127	135	115	124 234	71 73	Rhus copallina	193	210	205	227 73	216
3	Magnolia scuminata	230	122	201	189	226	***	DECEMBER 1000 / / / / /			Acceptance	197.	200
4	Magnolia cordata	265	119	236	191	248		LEGUMINOSÆ.					
5	Magnolia macrophylla	189	41	184	104	247	77	Robinia Pseudacacia	87	19	3	12	71
6	Magnolia Umbrella	249	207	245	234	257	79	Robinia Neo-Mexicana	51 7	143	81 153	16 235	52
7 8	Magnolia Fraseri	207	114	179	182	262	80 81	Olneya Tesota	35	154	151	34	24
8	Liriodendron Tulipifera	259	124	208	228	202	82	Cladrastris tinetoria	150	95	88	71	141
	ANONACEÆ.						84	Sophora affinia	34	102	121	48	27
9	Asimina triloba	277,	281	293	298	285	85	Gymnocladus Canadensis	114	77	144	200	163
10	Anona laurifolia	220	278	234	277	198	86	Gleditschia triacanthos	124	64	77 49	93 41	156 53
	CANELLACEÆ.			51		7 7	87	Gleditschia monosperma	134	264	259	184	90
12	Canella alba	11	56	50	6	5	91	Cercis Canadensis	146	228	165	123	142
	TERNSTREMIACEÆ.						93	Prosopis juliflora	69	259	273	40	26
14	Gordonia Lasianthus	228	187	201	214	240	94	Prosopis pubescens	67	172	91	18	28
	TILIACEÆ.	Y		1.74		A		ROSACEÆ.					
17	Tilia Americana	246	161	241	240	290	103	Prunus Americana	97	161	103	39	104
17	Tilia Americana, var. pubescens	272	183	256	195	298	104	Prunus angustifolia	119	253	276	197	190
18	Tilia heterophylla	257	158	248	202	263	107	Prunus emarginata	248	149	194	124	266
	MALPIGHIACEÆ.					104	108	Prunus serotina	164	153	115 186	61 84	114 76
19	Byrsonima lucida	169	272	288	206	100	110	Prunus Caroliniana	29	120	76	50	32
	ZYGOPHYLLACEÆ.			100000		100000	113	Prunus ilicifolia	10	212	138	63	39
20	Guaiacum sanctum	3	1477	107	10	1	117	Pyrus coronaria	109	245	273	181	- 74
20		0	147	137	10		121	Pyrus sambucifolia	165	248	284	220	225
	RUTACEÆ.				00/		125	Crategus arborescens	135	189	228	95	140
23	Xanthoxylum Clava-Herculis	1000	217	219	148	165	126 128	Cratægus Crus-galli	100 52	240 135	210 162	169	107 63
24	Xanthoxylum Caribæum	27	143	150	15	18	129	Cratægus tomentosa	65	213	177	153	80
	SIMARUBEÆ.	N.		1	three	12000	132	Cratægus spathulata	102	237	268	139	99
28	Simaruba glauca	268	121	252	171	251	134	Cratægus æstivalis	128	256	176	152	94
	BURSERACEÆ.			1			135	Cratægus flava	61	225	167	76	31
29	Bursera gummifera	298	292	300	300	300	137	Amelanchier Canadensis	.57	34	24	19	48
30	Amyris sylvatica	5	65	2	9	6	77	HAMAMELACEÆ,					
	MELIACEÆ.	1111					139	Liquidambar Styraciflua	162	167	214	128	192
31	Swietenia Mahogoni	96	71	56	20	36		RHIZOPHORACEÆ.					
	ILICINEÆ.						140	Rhizophora Mangle	2	2	10	2	8
33	Hex epiaca	THE STATE OF	244	188	180	149	-	COMBRETACEÆ.					The second
34	Hex Daboon	224	246	250	252	214	141	Conocarpus erecta	9	89	72	32	19
	CYRILLACEÆ.						142	Laguncularia racemosa	108	219	264	147	174
38	Cliftonia ligustrina	152	191	262	231	177		MYRTACEÆ.					
	RHAMNACEÆ.	the .		1911			144	Eugenia buxifolia	18	6	38	1	20
42	Reynosia latifolia		74	116	3	4	146	Eugenia monticola	24	65	15	55	12
43	Condalia ferrea	1 184	45	85	5	187	148	Eugenia procera	19	38	14	17	9
47	Rhamnus Purshiana		208 129	251 152	154 28	131		CORNACEÆ.					
	SAPINDACEÆ.		100	102	-	101	151	Cornus florida	44	176	85	69	40
50	Æsculus glabra	245	243	021	273	282	152	Cornus Nuttallii	74	85	- 60	22	77
52	Æsculus Californica	208	243	271	246	282	153	Nyssa capitata	235	234	194	167	169
54	Sapindus marginatus	47	165	112	122	58	154	Nyssa sylvatica	141	178	112	125	127
60	Acer macrophyllum	213	194	190	223	159	155	Nyssa uniflora	195	275	210	237	161
61	Acer circinatum	126	221	147	136	119		CAPRIFOLIACEÆ.					
64	Acer saccharinum	117	9	18	30	73	156	Sambucus glauca	206	299	295	287	184
64	Acer dasycarpum	118 192	88 59	68 53	57 113	66	159	Viburnum prunifolium	38	131	69	37	35
66	Acer rubrum	154	117	121	133	151		RUBIACEÆ.	FIG.				17 13
67	Negundo aceroides	256	260	263	270	215	160	Exostemma Caribæum	15	36	55	8	7
68	Negundo Californicum	221	113	132	155	221	161	Pinckneya pubens	187	231	291	289	230

TABLE OF RELATIVE VALUES-Continued.

Catalogue number.	Species.	Approximate fuel value.	Elusticity.	Ultimate transverse strength.	Ultimate resistance to longitudinal crushing.	Resistance to indenta- tion to 1.27 millimeters.	Catalogue number.	Species.	Approximate fuel value.	Elasticity.	Ultimate transverse strength.	Ultimate resistance to longitudinal crushing.	Resistance to indenta- tion to 1.27 millimeters.
	ERICACEÆ.												
165	Andromeda ferruginea	72	179	194	107	92	224	Ulmus Americana	136	205	110	146	138
166	Arbutus Menziesii	107	164 251	81 230	198	110 75	225	Ulmus racemosa	93 80	62 273	167	38 158	112
169	Oxydendrum arboreum	78	137	164	790	95	227	Planera aquatica	191	266-	228	203	179
170	Kalmia latifolia	101	258	219	168	65	228	Celtis occidentalis	94	229	135	178	101
171	Rhododendron maximum	148	242	205	156	133	228	Celtis occidentalis, var. reticulata	98	143	127	160	56
	SAPOTACEÆ.						220	Ficus aurea	300	300	298	299	296
175	Chrysophyllum oliviforme	17	54	107	33	15	231	Ficus pedunculata	244 163	292 173	299 141	284 179	207 148
176	Sideroxylon Mastichodendron	12	61	67	23	25	284	Maclura aurautisca	63	114	25	4	22
177	Dipholis salicifolia	16	16	18	11	49		PLATANACEÆ.	250			200	2577
178	Bumelia lanuginosa	90	204	200	239	146	Twitter.			200	and the second	2200	160
181	Bumelia lycioides	81	193	254	106	162 97	235 236	Platanus occidentalis	178 218	146 249	222	144 269	158 245
182	Bumelia cuneata	56	252	265	117	47	237	Platanus Wrightii	231	286	285	267	245
183	Mimusops Sieberi	4	95	79	135	16		and the second of the second o	2000	200	3735	7000	
	EBENACEÆ.					1		JUGLANDACEÆ.	14.000		ALCO AT	200.00	200
184	Diospyros Virginiana	55	192	98	88	29	238	Juglans cinerea	270	181	238 109	205	244 126
	STYRACACÆ.	7/			100		240	Juglans rupestris.	155	63 218	236	159	143
186	Symplocos tinetoria	190	250	230	218	139	241	Carya olivæformis	103	239	246	164	84
187	Halesia diptera	172	229	107	166	123	242	Carya alba	36	12	11	27	60
	OLEACEÆ.	17					243	Carya sulcata	46	78	33	52	45
191	Fraxinus pistaciæfolia	122	254	226	217	100	244 245	Carya tomentosa	43	42	26	36	51
192	Fraxinus Americana	130	91	106	121	108	246	Carya porcina	42 71	92 86	31	43	41 78
192	Fraxinus Americana, var. Texensis	66	69	27	65	121	247	Carya myristicæformis	49	8	1	25	34
193	Fraxinus pubescens	151	182	101	162	113	248	Carya aquatica	86	93	96	110	55
194	Fraxinus viridis	105	133	91	114	98		MYRICACEÆ.					
195	Fraxinus quadrangulata	291 73	283 196	261 121	296	185	249	Myrica cerifera	177	137	119	151	182
197	Fraxinus Oregana	171	156	203	80	157	250	Myrica Californica.	125	99	46	74	135
198	Fraxinus sambucifolia	149	142	125	175	130	200	CUPULIFERÆ.				200300	
199	Forestiera acuminata	147	227	175	199	154	071		ma	404	n#	00	100
201	Osmanthus Americanus	45	28	1 40	51	64	251	Quercus lobata	76 85	104 222	85 103	82 172	105 136
	BORRAGINACEÆ.		1	1	777		253	Querous Garryana	79	183	99	97	79
204	Bourreria Havanensis	53	97	71	45	43	254	Quercus obtusiloba	37	169	100	108	54
205	Ehretia elliptica	142	296	169	215	87	255	Quereus undulata, var. Gambelii	32	262	194	186	69
	BIGNONIACEÆ.						256	Quereus macrocarpa	82	122	65	103	82
206	Catalpa bignonioldes	250	233	241	238	273	257 258	Quercus lyrata	39 60	17 131	50 81	100	72 96
207	Catalpa speciosa	263	175	224	194	254	259	Quercus Michauxii	48	106	28	112	83
208	Chilopsis sal'gna	161	267	247	278	181	260	Quercus Prinus	75	27	48	67	86
	VERBENACEÆ.						261	Quercus princides	31	53	6	44	61
210	Citharexylum villosum	28	26	73	13	37	262	Quercus oblongifolia	26 20	197 150	57	53 165	17
	NYCTAGINACEÆ.						263 264	Quercus grisea	8	209	175 73	116	10 21
212	Pisonia obtusata	157	284	296	274	218	266	Quercus Durandii	21	165	57	70	38
DIA.		101	20%	200	214	210	267	Querous virens	13	49	54	59	30
	POLYGONACEÆ.				4		268	Quercus chrysolepis	33	33	4	62	33
213	Coccoloba Floridana	14	49	78	7	13	269	Quercus Emoryi	22	247	180	176	11
	LAURACEÆ.						270 271	Quercus Wislizeni	41 58	110 148	75 118	131 72	81 57
215	Persea Carolinensis	138	162	88	47	128	272	Querous rubra	129	48	63	83	150
215	Persea Carolinensis, var. palustris	140	162	116	232	132	272	Quercus rubra, var. Texana	23	83	52	42	44
217	Sassafras officinale	202	273 70	235 127	221 49	188 120	273	Quercus coccinea	84	65	38	87	116
	EUPHORBIACEÆ.	104	100	200	7570	marrie I	274	Quercus tinctoria	106	81	145	92	115
010				-	-		275	Quercus Kelloggii	137	206 102	145 43	149	152 46
219 219	Drypetes croses are latifolis	30	79	132	24	23	277	Quercus falcata	113	11	12	35	117
218	Drypetes crocea, var. latifolia	25	168	178	79	13	278	Quercus Catesbæi	91	80	42	137	88
	URTICACEÆ.						279	Quercus palustris	115	55	32	101	134
222	Ulmus crassifolia	99	226	142	142	68	280	Quercus aquatica	95	29	40	91	122

TABLE OF RELATIVE VALUES -Continued.

Catalogue number.	Species.	Approximate fuel value.	Elasticity.	Ultimate transverse strength.	Ultimate resistance to longitudinal crushing.	Resistance to indenta- tion to 1.27 millimeters.	Catalogue number.	Species.	Approximate fuel value.	Elasticity.	Ultimate transverse strength.	Ultimate resistance to longitudinal crushing.	Resistance to indenta- tion to 1.27 millimeters.
282	Quercus heterophylla	121	30	35	190	144	347	Pinus Strobus	282	154	225	212	278
283	Quercus cinerea	144	203	57	150	118	348	Pinus monticola	279	112	232	263	288
284	Quercus hypoleuca	54 68	114	29	279 56	59	350	Pinus Lambertiana	287	187 235	238 227	262	270
286	Quercus Phellos	77	190	63	211	102	351	Pinus flexilis	253 262	276	244	251 265	219
287	Quercus densifiora	123	106	70	119	93	352	Pinus reflexa	215	127	143	105	200
288	Castanopsis chrysophylla	180	94	158	163	200	353	Pinns Parryana	174	297	287	258	129
289	Castanea pumila	160	46	60	99	209	355	Pinns edulis	143	291	283	253	106
290	Castanea vulgaris, var. Americana	247	152	184	222	227	356	Pinus monophylla	176	289	297	288	155
291	Fagus ferruginea	120	32 15	18	120	125	357	Pinus Balfouriana	185	255	288	260	178
293	Carpinus Caroliniana	92	43	23 18	64 96	85 103	357 358	Pinus Balfouriana, var. aristata	179 217	223 51	210	268 140	189 256
		1000	(750)	10	00	2176	359	Pinus Torreyana	200	270	149	272	180
	BETULACEÆ.				7.7	TO	360	Pinus Arizonica	203	174	210	204	217
294	Betula alba, var. populifolia	168	214	140	254	196	361	Pinns ponderosa	226	140	171	226	222
295	Betula papyrifera	159	18	37	109	195	362	Pinus Jeffreyi	201	125	156	185	212
296	Betula occidentalis Betula lutea	158 127	126	127	207	171	363	Pinus Chihuahuana	182	216	- 114	259	170
298	Betula nigra	170	58	66	157	103	364 365	Pinus Murrayana	166 269	198	60 253	264	175 253
199	Betula lenta	64	10	9	31	91	366	Pinus Sabiniana	219	257	139	261	186
301	Alnus rubra	222	72	121	188	210	367	Pinus Coulteri	266	46	148	283	246
302	Alnus rhombifolia	267	158	190	244	268	368	Pinus insignis	239	101	158	183	229
303	Alnus oblongifolia	276	199	189	285	279	369	Pinus tuberculata	293	290	290	293	255
	SALICACEÆ.						370	Pinus Tæda	183	52	95	170	223
307	Salix amygdaloides	251	277	257	291	264	371 372	Pinus rigida		261	158	245	191
308	Salix lævigata	216	280	217	272	208	373	Pinus inops		39 269	17 207	86 241	42 168
309	Salix lasiandra, var. lancifolia	243	141	199	257	249	374	Pinus clausa	178	268	269	238	194
309	Salix lasiandra, var. Fendleriana	236	298	276	281	261	375	Pinus pungens	211	186	166	247	213
313	Salix flavescens, var. Scouleriana	209	65	125 81	192	241	376	Pinus maricata	210	35	47	85	204
316	Salix lasiolepis.	181	137	120	216	199	377	Pinus mitis	156	13	45	118	197
318	Populus tremuloides	275	180	198	266	265	379	Pinus glabra	278 225	288	270 214	280	228 237
319	Populus grandidentata	234	108	169	243	295	380	Pinus palustris	110	7	18	26	167
320	Populus heterophylla	271	220	218	283	250	381	Pinus Cubensis	70	5	15	21	137
321	Populus balsamifera	288 264	150 215	257	271	276	382	Picea nigra	237	60	156	193	272
322	Populus angustifolia	280	284	232	286 296	291	383	Picea alba	273	90	155	256	283
323	Populus trichocarpa	285	57	204	209	293	384	Picea Engelmanni	295	185 265	249	292	275
324	Populus monilifera	281	98	145	249	258	386	Picea Sitchensis	286 254	100	281 216	295 248	267 281
325	Populus Fremontii	214	73	183	225	252	387	Tsuga Canadensis	258	135	171	219	260
325	Populus Fremontii, var. Wislizeni	238	160	186	230	239	388	Tsuga Caroliniana		224	279	196	211
	CONIFERÆ.			Mag		100	389	Tsuga Mertensiana		13	80	60	235
326	Libocedrus decurrens	274	157	190	130	242	390	Tsuga Pattoniana		195	171	224	232
327	Thuya occidentalis	297	271	267	275		391	Pseudotsuga Douglasii		20	96	81	238
328	Thuya gigantea	284	81	154	145	284	391	Abies Fraseri	240 290	74 104	111 219	132 255	233 289
329	Chamæcyparis sphæroidea	296	294	281	294	287	393	Abies balsamea		177	265	236	277
331	Chamæcyparis Nutkaensis	223	87	130	138		394	Abies subalpina	294	201	275	276	294
333	Capressus Goveniana.	233	31 279	93 260	129 242		395	Abies grandis		109	271	208	299
338	Juniperus occidentalis, var. conjugens	116	211	276	75		396	Abies concolor	289	130	180	210	269
339	Juniperus Virginiana	212	238	158	177		398	Abies amabilis	260	24	134	127	292
340	Taxodium distichum	242	84	190	174	4 15 25 21	399 400	Abies magnifica	241 229	21 241	105	141	205 243
341	Sequoia gigantea	299	287	280	213		401	Larix Americana		23	90	58	231
342 343	Sequoia sempervirens	261	236	238	187		402	Larix occidentalis		1	7	14	173
345	Taxus brevifolia	139	202 170	34 94	111	62 166		PALMACEÆ.					
846	Torreya Californica	227	294	243	250	100000	405	Washingtonia filifera	199	263	285	297	164
•		1	201	240	200	200	200	The state of the s	100	203	200	201	

The following table gives the figures from which the table of relative values was computed, and includes all species upon which complete tests have been made.

The coefficient of elasticity is derived from the second deflection, the measurements being taken in millimeters and the weight in kilograms.

The ultimate transverse strength is the force, applied at the middle of the stick, required to break a stick 4 centimeters square and 1 meter between the supports.

In the compression tests the surface exposed to pressure was 4 centimeters square. To give the pressure on a square centimeter these results must be divided by 16.

The indentation to 1.27 millimeters, or the fifth in the series, is the one selected for comparison.

TABLE OF AVERAGES.

Catalogue number.	Species.	Approximate relative fuel value.	Coefficient of clastic- ity, kilograms on millmeters.	Ultimate transverse strength, in kilo- grams.	Ultimate resistance to longitudinal crush- ing, in kilograms.	Resistance to indentation to 1.27 millimeters, in kilograms.	Catalogue number.	Species.	Approximate relative fuel value.	Coefficient of elastic- ity, kilograms on millimeters.	Ultimate transverse strength, in kilo- grams.	Ultimate resistance to longitudinal crush- ing, in kilograms.	Resistance to indentation to 1.27 milli- meters, in kilograms.
	MAGNOLIACEÆ.							SAPINDACEÆ.					
1	Magnolia grandifiora	63, 26	903	338	7,705	3, 156	50	Æsculus glabra	45. 03	644	211	5, 017	1, 132
2	Magnolia glauca	50.11	914	313	6,790	1, 627	52	Æsculus Californica	49.45	683	271	5, 686	1, 722
3	Magnolia acuminata	46.76	929	286	6, 633	1,709	54	Sapindus marginatus	80. 05	837	360	7,523	4, 350
4	Magnolia cordata	41. 26	941	256	6, 552	1, 427	60	Acer macrophyllum	48. 83	780	292	6, 100	2, 597
5	Magnolia macrophylla	52. 90 44. 78	1,169	297	7,829	1, 427	01	Acer circinatum	66. 34	718	327	7, 349	3, 205
7	Magnolia Fraseri	49. 89	944	249 302	5, 861 6, 691	1, 343	64	Acer saccharinum	68. 75 68. 66	1,465	490 410	9, 907 8, 803	4, 019
8	Liriodendron Tulipifera	42, 20	926	280	5, 955	1, 296	65	Acer dasycarpum	52. 52	1, 110	435	7,711	4, 149 2, 899
	ANONACEÆ.		777				66	Acer rubrum	61. 65	943	346	7, 402	2, 795
	Committee of the Commit	1000	7/4/20	100	72 3057		67	Negundo aceroides	42.82	582	226	5, 151	1, 781
9	Asimina triloba	39. 61	482	167	3, 395	1, 098	68	Negundo Californicum	47.95	945	340	7,072	1,719
10	Anona laurifolia	48, 11	501	259	4, 829	2, 037		ANACARDIACEÆ.					
	CANELLACEÆ.						1200				92000	Torontonion .	
12	Canella alba	97. 20	1, 117	438	12, 519	9, 163	71	Rhus copallina	52. 42	736	283	6, 033	1,744
	TERNSTREMIACEÆ.				1		73	Rhus Metopium	77. 28	1,050	280	8, 523	3, 348
14	Gordonia Lasianthus	46, 92	794	286	6, 195	1,591		LEGUMINOSÆ.					
7000	TILIACEÆ.	100000		1000	11.11	4,557	77	Robinia Pseudacacia	72.96	1,301	543	11, 272	4, 038
	(District Control			1			79	Robinia Neo-Mexicana	79.86	1,149	388	10, 931	4, 427
17	Tilia Americana	45, 00	840	252	5,768	1,044	80	Olneya Tesota	103.59	868	320	5, 851	10, 478
17	Tilia Americana, var. pubescens Tilia heterophylla	40, 47	811 846	239	6, 487	950	81	Piscidia Erythrina	84. 39	851	321	9, 548	5, 698
10	- and the second of the second	92.21	040	290	6,307	1, 296	82	Cladrastis tinctoria	62. 61	1,002	385	8, 550	2, 937
	MALPIGHIACEÆ.				100		84	Sophora affinis	84. 46	977	346	9, 129	5, 348
19	Byrsonima lucida	57, 43	525	181	6, 260	3, 475	85	Gymnocladus Canadensis	68, 88	1,048	329	6, 406	2, 560
	ZYGOPHYLLACEÆ.						86	Gleditschia triacanthos	66. 86 72. 89	1,086	394 439	8,001	2, 697
20	Guaiacum sanctum	113.38	863	336	11,789	12, 689	88	Parkinsonia Torreyana	64. 58	558	233	9,344	4, 420 3, 620
	RUTACEÆ.		200			Harris Artista	91	Cercis Canadensis	63. 18	688	310	7, 510	2, 917
							93	Prosopis juliflora	74.86	583	207	9, 412	5, 484
23	Xanthoxylum Clava-Herculis Xanthoxylum Caribæum	PO (10) 1200	726 868	273	7, 189	2, 548	94	Prosopis pubescens	75. 37	824	382	10, 732	5, 267
24		88. 20	808	322	10, 955	5, 964		POSTORE					
	SIMARUBEÆ.						103	ROSACEÆ. Prunus Americana	72. 02	007	369	0.410	2 405
28	Simaruba glauca	40.98	932	241	6, 816	1, 383	103	Prunus angustifolia	68, 65	827 603	200	9, 419 6, 441	3, 405 2, 132
	BURSERACEÆ.			100			107	Prunus emarginata, var. mollis	44. 93	861	290	7, 507	1, 280
29	Bursera gummifera	29, 41	417	63	2,473	749	108	Prunus serotina	58. 14	852	354	8, 746	3, 269
30	Amyris sylvatica	103.97	1,085	557	11, 975	8, 795	110	Prunus demissa	69.16	769	295	8, 165	3, 937
	MELIACEÆ.			116			111	Prunus Caroliniana	86, 52	937	396	8, 989	5, 090
***	and the same of th	70.00	*****	100		72 342	113	Prunus ilicifolia	97, 27	732	334	8, 709	4, 888
31	Swietenia Mahogoni	72.03	1062	428	10,660	4, 951	117	Pyrus coronaria	70, 11	642	207	6,706	3, 999
	ILICINEÆ.						121	Pyrus sambucifolia	58. 08	626	190	6, 123	1,715
33	Ilex opaca	57.74	643	293	6, 709	2, 826	125 126	Cratægus arborescens	64. 55 71. 54	788 664	265 279	7,969	2, 951
34	Ilex Dahoon	47.62	642	244	5, 582	1,808	128	Cratægus subvillosa	78. 98	901	315	6, 884 8, 612	3, 368 4, 207
	CYRILLACEÆ.				1		129	Cratægus tomentosa	75. 96	732	303	7, 117	3, 844
38	Cliftonia ligustrina	62, 23	783	225	5, 938	2,356	132	Cratægus spathulata	71. 12	673	216	7, 280	3, 484
72.53	RHAMNACEÆ.	, notore.	1	-			134	Cratægus æstivalis	65. 27	592	304	7, 122	3, 583
		Carrier Control					135	Cratægus flava, var. pubescens	76, 13	708	309	8, 437	5, 103
42	Reynosia latifolia	103, 72	1,050	350	13, 426	9, 753	137	Amelanchier Canadensis	77. 95	1, 197	483	10,712	4, 483
43	Condalia ferrea	119.38 54.27	1, 143 741	386 242	12, 848 7, 112	10, 388 2, 195		HAMAMELACEÆ.			1 1 1 1	1	
45													

TABLE OF AVERAGES-Continued.

Catalogue number.	Species.	Approximate relative fuel value.	Coefficient of elastic- ity, kilograms on millimeters.	Ultimate transverse strength, in kilo- grams.	Ultimate resistance to longitudinal orushing, in kilograms.	Resistance to indentation to 1.27 millimeters, in kilograms.	Catalogue number.	Species.	Approximate relative fuel value.	Coefficient of elasticity, kilograms on millimeters.	Ultimate transverse strength, in kilo- grams.	Ultimate resistance to longitudinal orushing, in kilograms.	Resistance to indentation to 1.27 millimeters, in kilograms.
	RHIZOPHORACEÆ.							BIGNONIACEÆ.					
140	Rhizophora Mangle	114.06	1, 656	515	13, 767	7, 394	206 207 208	Catalpa bignonioides	44. 57 41. 48 58. 79	682 822 544	252 270 247	5, 821 6,521 4, 753	1, 230 1, 377 2, 304
141 142	Conocarpus erecta		1, 025 724	402 221	9, 593 7, 190	5, 926 2, 386	210	VERBENACEÆ. Citharexylum villosum	86, 75	1, 257	400	11, 034	4, 927
144 146	Eugenia buxifolia	89. 83	1, 575 1, 085	450 500	14, 198 8, 845	5, 851 6, 532	212	NYCTAGINACEÆ. Pisonia obtusata	60. 31	465	127	4, 962	1, 737
148	CORNACEÆ.	92. 05	1, 191	502	10,750	7, 099	213	POLYGONACEÆ. Coccoloba Floridana	93. 40	1, 136	392	12, 337	6, 310
151	Cornus florida		821	386	8, 553	4, 875		LAURACEÆ.					
153	Cornus Nuttallii		1,031	423	10, 603	3,883	215	Persea Carolinensis	63. 81	839	385	9, 173	3, 128
153	Nyssa capitata Nyssa sylvatica		681 818	290 360	6, 895	2, 484	215	Persea Carolinensis, var. palustris Sassafras officinale	63. 73 50. 38	849 519	350 257	5, 874 6, 110	3, 073 2, 144
155	Nyssa uniflora		518	279	5, 848	2, 575	218	Umbellularia Californica EUPHORBIACEÆ.	64. 92	1, 068	844	9, 095	3, 196
156	Sambucus glauca		305	158	4, 400	2, 218	219	Drypetes crocea	86. 44	1, 039	340	10, 410	5, 797
159	Viburnum pruvifolium	82, 89	907	406	9, 474	5, 009	219	Drypetes crocea, var. latifolia URTICACEÆ.	88.65	836	302	8, 324	£, 510
160	Exostemma Caribæum	92, 89	1, 194	429	12, 020	7,707	222	Ulmus crassifolia	71. 59 69. 77	704 953	330	7, 248	4,080
161	Pinckneya pubens	53, 28	683	173	4, 355	1, 678	223	Ulmus Americana	64. 54	747	371 364	8, 628 7, 191	2, 399
	ERICACEÆ.						225	Ulmus racemosa	72. 20	1,006	455	9, 474	3, 281
165	Andromeda ferruginea		814	290	7, 802	3, 611	226	Ulmus alata	74. 17	523	309	7,001	4, 095
166	Arbutus Menziesii		838 616	387 264	8, 034 6, 419	3, 322 3, 947	227	Planera aquatica	52. 71 72. 08	552 685	265	6, 305	2, 334 3, 472
169	Oxydendrum arboreum		889	311	8, 025	3, 550	228	Celtis occidentalis, var. reticulata	71.86	868	344	6, 985	4, 373
170	Kalmia latifolia	71.31	585	273	6, 890	4, 196	229	Ficus aurea	24. 84	257	102	2, 597	980
171	Rhododendron maximum	62. 80	646	283	7, 020	3, 066	231	Ficus pedunculata	45. 07 58. 56	407 824	98	4, 491 6, 721	1, 905 2, 805
	SAPOTACEÆ.				1	7	234	Maclura aurantiaca	76.01	944	483	12, 939	5, 806
175	Chrysophyllum oliviforme	100000000000000000000000000000000000000	1, 124	366	9, 571	6, 108	0	PLATANACEÆ.			25.150	WARE PROPERTY.	
176 177	Sideroxylon Mastichodendron Dipholis salicifolia		1,099	414	10, 410	5, 682 4, 480	235	Platanus occidentalis	56. 52	864	271	7, 207	2, 645
178	Bumelia tenax		751	287	7, 235	2, 894	236	Platanus racemosa	48. 26	624	240	5, 190	1,486
179	Bumelia lanuginosa	64, 64	483	165	5, 799	2, 564	237	Platanus Wrightii	46.72	457	183	5, 228	1, 867
181	Bumelia lycioides		781 603	240 220	7, 825	3, 529 4, 581		JUGLANDACEÆ.			110		
183	Mimusops Sieberi		1,002	390	7, 643	6, 001	238	Juglans cinerea	40.66	812	255	6, 270	1,488
	EBENACEÆ.			11			239 240	Juglans nigra Juglans rupestris	60. 91	1,092	365 256	9, 178 6, 997	3, 140 2, 909
184	Diospyros Virginiana	78. 32	782	375	8, 045	5, 192	241	Carya olivæformis	70.99	666	247	6, 951	3,714
	STYRACEÆ.	10.02	102	310	7,010	7,200	242	Carya alba	83, 11	1,390	512	10,007	4, 344
186	Symplocos tinetoria	52. 88	622	264	6, 146	2, 967	243	Carya sulcata	80. 35 81. 29	1,039	464	8, 939 9, 485	4, 609
187	Halesia diptera		683	366	6, 940	3, 153	245	Carya porcina	81.36	1, 014	466	9, 232	4, 822
	OLEACEÆ.	1000000000	1/1/1				246	Carya amara	74.74	1, 030	470	8, 357	3, 878
491	Fraxinus pistaciæfolia	67. 68	601	266	6, 158	3, 368	247	Carya myristicæformis	79. 31	1,465	595	7 776	5, 042
192	Fraxinus Americana	65. 16	1, 015	367	7, 535	2, 745	248	Carya aquatica	73. 13	1, 013	376	7, 776	4, 397
192	Fraxinus Americana, var. Texensis		1, 082	480	8, 664	3, 177	011	MYRICACEÆ.	E0.00	000	0.10	7 100	0.704
193	Fraxinus pubescens		812 903	371 382	6, 960	3, 272	249 250	Myrica cerifera	56. 08 66. 81	888 992	348 442	7, 122 8, 516	2,304
195	Fraxinus platycarpa	I STATE OF THE STA	476	229	4, 014	2, 209	200	CUPULIFERÆ.	37.000	337	-	20.000	74,755
196	Fraxinus quadrangulata	74.50	774	346	7, 980	3, 322	951	Quercus alba	74. 39	971	386	8, 183	3, 388
197	Fraxinus Oregana		848	284	8, 320	2, 653 3, 106	251 252	Quercus lobata	73. 87	717	369	6, 793	3, 014
199	Forestiera acuminata		872 703	345 306	6, 766 6, 418	2,717	253	Quercus Garryana	74. 24	811	375	7, 957	3, 846
201	Osmanthus Americanus		1, 231	449	8, 966	4, 206	254	Quercus obtusiloba	83, 01	833	372	7,790	4, 415
	BORRAGINACEÆ.						255 256	Quercus undulata, var. Gambelii Quercus macrocarpa	85. 38 74. 06	571 929	290 419	6, 668 7, 843	4, 072 3, 730
204	Bourreria Havanensis	78. 48	996	403	9, 197	4,702	257	Quercus lyrata	82, 59	1, 334	438	7, 864	4, 033
	Ehretia elliptica		397	308	6, 192	3, 663	258	Quercus bicolor	76.18	906	388	7,850	3, 534

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TABLE OF AVERAGES-Continued.

Catalogue number.	Species.	Approximate relative fuel value.	Coefficient of clastic- ity, kilograms on millimeters.	Ultimate transverse strength, in kilo- grams.	Ultimate resistance to longitudinal crush- ing, in kilograms.	Resistance to indentation to 1.27 millimeters, in kilograms.	Catalogue number.	Species.	Approximate relative fuel value.	Coefficient of elasticity, kilograms on millimeters.	Ultimate transverse strength, in kilo-	Ultimate resistance to longitudinal crush-ing, in kilograms:	Resistance to indentation to 1.27 milli- meters, in kilograms.
259	Quercus Michauxii	80. 03	964	477	7, 715	3, 725	324	Populus monilifera	38. 53	994	328	5, 651	1, 327
260 261	Quercus Prinus	74. 42 86. 09	1, 255	440 528	8, 615 9, 204	3, 686 4, 224	325 325	Populus Fremontii	48.77	1, 051 843	298 295	6, 055 5, 950	1, 382 1, 607
262	Quercus Douglasii	88.53	771	424	8, 913	5, 988					200	01300	3,007
263	Quercus oblongifolia	97, 60	857	307	6, 941	7,031		CONIFERÆ.			1		
264	Quercus griseaQuercus Durandii	99.10	740 837	400 424	7, 666 8, 550	5, 829 4, 922	326	Libocedrus decurrens	40, 14	847	291	7, 446	1, 561
267	Querous virens	93. 93	1, 136	434	8,748	5, 185	327	Thuya occidentalis Thuya gigantea	31. 53 37. 90	533 1,034	219 319	4, 903	957
268	Quercus chrysolepis	84. 43	1, 198	541	8, 721	5, 079	329	Chamæcyparis sphæroidea	33. 12	404	194	4, 149	1, 074
269 270	Quercus Emoryi	90.44	638 953	300 399	6, 759 7, 416	6,646	330	Chamæcyparis Nutkaensis	47.66	1,029	342	7, 281	1,618
271	Quercus Wislizeni	77.75	861	349	8, 527	3, 770 4, 362	331	Chamæcyparis Lawsoniana	46.16	1, 217	379	7, 454	1, 317
272	Quercus rubra	65. 28	1, 137	422	8, 172	2, 825	338	Cupressus Goveniana Juniperus occidentalis, var. conju-	46. 68 68. 75	499 734	230	5, 742 8, 505	2, 852 4, 464
272	Quercus rubra, var. Texana	90.03	1, 033	437	9, 310	4, 665		gens.	2000.00		200	21,000	-1.402
273	Quercus coccinea	73. 91	1,085	450 444	8, 074 8, 012	3, 224	339	Juniperus Virginiana	49.11	670	316	6,750	2, 376
275	Quercus Kelloggii	64.18	745	328	7, 184	2, 783	340	Taxodium distichum	45. 24	1,032	291	6, 771	1, 166
276	Quercus nigra	72.39	977	445	7, 954	4, 582	341	Sequoia gigantea	28. 67 42. 02	451 676	196 255	6, 210	1,091
277	Quercus falcata	69. 11	1,402	509	9, 532	3, 223	343	Taxus brevifolia	63. 78	761	460	7, 784	4, 223
278	Quercus CatesbæiQuercus palustris	72. 31 68. 82	1, 035	447 465	7, 316	3, 646	345	Torreya taxifolia	51, 08	821	378	7, 364	2, 523
280	Quereus aquatica		1, 227	449	8, 023	3, 040	346	Torreya Californica	46.96	401	249	5, 625	1,962
281	Quercus laurifolia		1, 259	504	8, 424	4, 056	347	Pinus Strobus	38. 47 38. 99	851 950	267 260	6, 219 5, 349	1, 194
282	Quercus heterophylla	68, 22	1, 225	458	6, 600	2, 908	349	Pinus Lambertiana	36, 76	794	255	5, 382	1, 244
283	Quercus cinerea	63. 47 78. 41	751 944	424 475	7, 167 4, 695	3, 221	350	Pinus flexilis	43. 42	676	266	5, 591	1,727
285	Quercus imbricaria	74. 97	1, 193	520	8, 839	4, 348	351	Pinus albicaulis	41.54	512	249	5, 296	1,716
286	Quercus Phellos	74. 35	784	422	6, 236	3, 452	352 353	Pinus reflexa	48, 65 56, 44	913 378	329 182	7, 825 5, 420	2, 002 3, 126
287	Quercus densiflora	67. 25	964	404	7, 609	3, 593	355	Pinus edulis	63, 49	421	191	5, 579	3, 388
288	Castanopsis chrysophylla Castanea pumila	55. 55 58. 80	1,012	316 423	6, 959 7, 923	1,912	356	Pinus monophylla	56, 20	435	123	4, 389	2,713
290	Castanea vulgaris, var. Americana.	44. 95	856	297	6, 106	1,698	357 357	Pinus Balfouriana	54.17	594	181	5, 398	2, 350
291	Fagus ferruginea	68. 48	1, 210	490	7,550	3, 145	357	Pinus Balfouriana, var. aristata Pinus resinosa	55. 56 48. 41	715 1, 132	279 341	5, 209 7, 274	2, 140 1, 353
292	Ostrya Virginica	82, 42	1, 373	484	8, 669	3, 696	359	Pinus Torreyana	50. 62	542	323	4, 548	2, 309
293	Carpinus Carolinana	72. 26	1, 149	490	7, 969	3, 405	360	Pinus Arizonica	50. 28	824	279	6, 292	1,740
	BETULACEÆ.				17		361	Pinus ponderosa	46, 99	887	307	6, 037	1,719
20.4	Data was	244 14	-	800	- Const		362	Pinus Jeffreyi	50. 53	925 726	318 355	6, 679 5, 398	1, 850 2, 470
294	Betula alba, var. populifolia Betula papyrifera		730 1,306	332 454	5, 564 7, 781	2, 073	364	Pinus contorta	58.04	1,585	423	8, 868	2, 382
296	Betula occidentalis	60. 12	924	344	6, 260	2, 459	365	Pinus Murrayana	40.83	771	241	5, 328	1, 379
297	Betula lutea	65, 34	1,618	533	9, 907	2, 581	366	Pinus Sabiniana	48.18	585	333	5, 387	2, 202
298	Betula nigra	57.42	1, 113	415	7,007	2, 117	367 368	Pinus insignis	41. 18 45. 60	1,141	325 316	5, 874 6, 680	1, 475
299 301	Alnus rubra	75. 97 47. 98	1,432	519 346	9, 907 6, 644	3, 615 1, 870	369	Pinus tuberculata	34. 88	429	175	4, 207	1, 372
302	Alnus rhombifolia	41. 14	846	291	5, 696	1, 257	370	Pinus Tæda	54. 27	1, 128	377	6, 834	1,719
303	Alnus oblongifolia	39. 65	769	293	4, 452	1, 189	371	Pinus rigida	51. 39	581	316	5, 687	2, 123
	SATIGACEN						372	Pinus inops	79. 29 52. 98	1, 170 543	497 281	8, 079 5, 765	4, 740 2, 496
	SALICACEÆ.						374	Pinus clausa	55, 09	543	214	6, 028	2, 100
307	Salix amygdaloides	44. 68	501	235	4, 224	1, 294	375	Pinus pungens	49. 22	803	310	5, 670	1,842
308	Salix lævigata	48, 44	488	275	5, 114	1,894	376	Pinus muricata	49, 29	1, 194	441	8, 142	1, 950
309	Salix lasiandra, var. lancifolia Salix lasiandra, var. Fendleriana	45. 73 45. 12	305 879	200 288	4, 581 5, 457	1, 311	377	Pinus mitis	60. 86 39. 13	1, 375	443 212	7, 628 4, 604	2, 064 1, 694
313	Salix flavescens	53. 91	1, 262	388	7, 484	2,019	379	Pinus Banksiana	47. 50	942	278	6, 329	1, 609
313	Salix flavescens, var. Scouleriana.	49. 39	1,085	345	6, 532	1,581	380	Pinus palustris	69. 82	1,488	490	10,074	2, 508
316	Salix lasiolepis	55. 32	888	347	6, 169	2, 241	381	Pinus Cubensis	74, 83	1,577	500	10, 626	2, 985
318	Populus tremuloides Populus grandidentata	40.10	963	289 308	5, 285 5, 727	1, 281	382	Picea nigra	45.71	1,100	318	6, 520 5, 489	1, 240
320	Populus heterophylla	40. 57	723	274	4, 527	1, 384	384	Picea Engelmanni	33, 38	808	245	4, 271	1, 217
321	Populus balsamifera	36. 11	857	235	5, 126	1, 202	385	Picea pungens	37, 26	553	194	4, 128	1, 267
321	Populus balsamifera, var. candi-	41.42	730	260	4, 418	1,030	386	Picea Sitchensis	42.80	990	277	5, 653	1, 160
322	cans. Populus angustifolia	38. 81	458	171	4 000	1 005	387	Tsuga Canadensis	42. 20	900	307	6, 142	1, 314
323	Populus trichocarpa		1, 117	284	4, 332 6, 243	1 225	388	Tsuga Mertensiana	42. 58 51. 61	713 1, 375	197 388	6, 450 8, 747	1, 622

TABLE OF AVERAGES-Continued.

number.	Species.	Approximate relative fuel value.	oefficient of elastic- ity, kilograms on millimeters.	transverse h in kilo-	resistance to idinal crush- kilograms.	se to inden- to 1.27 milli- in kilograms.	number.	Species.	Approximate relative fuel value.	it of elastic- lograms on sters.	transverse h in kilo-	e resistance to udinal crush- kilograms.	be to inden- to 1.27 milli- in kilograms.
Catalogue		Approxin	Coefficier ity, ki millime	Ultimate strength grams.	Ultimate longitu ing, in	Resistanc tation meters	Catalogue		Approxi	Coefficient of ity, kilogram millimeters.	Ultimate strength grams.	Ultimate longituding in k	Resistance tation to meters in
390	Tsuga Pattoniana	44. 35	775	307	6, 074	1, 664	398	Abies amabilis	42.18	1260	338	7, 480	1,029
391	Pseudotsuga Douglasii	51.53	1283	376	8, 289	1,608	399	Abies nobilis	45.46	1277	368	7, 256	1, 917
391	Pseudotsuga Douglasii, var. ma-	45. 59	1050	361	7, 405	1,642	400	Abies magnifica	46. 87	662	299	6, 963	1,545
	crocarpa.						401	Larix Americana	62.16	1261	384	8, 763	1, 675
392	Abies Fraseri	35. 46	972	273	5, 557	1,048	402	Larix occidentalis	74.00	1658	524	11, 023	2, 395
393	Abies balsamea	38, 02	819	220	5, 851	1, 202							
394	Ables subalpina	34. 61	762	202	4,829	1,015		PALMACEÆ.					
395	Abies grandis	35. 08	958	211	6, 255	810					-11		100 000000
396	Abies concolor	36. 07	909	300	6, 237	1, 248	405	Washingtonia filifera	50.75	563	183	3, 633	2, 550

The following table illustrates the relation between the specific gravity and the transverse strength of the wood of species upon which a sufficient number of tests has been made to render such a comparison valuable. The determinations of the specific gravity and transverse strength were, in every case, made upon the same specimen, at the same time. The table is arranged according to the specific gravity of the specimens.

It will be noticed that the strength of the different specimens closely but not invariably follows their specific gravity. An examination of Table III will show, however, that in nearly every case where any wide difference occurs it is due to imperfections in the stick disproportionately affecting its strength. Moreover, in the case of species where the specific gravity and strength of different specimens are nearly identical, their order of arrangement becomes largely accidental. A slight difference in the time occupied in the strength tests, or slight variations in the direction of the grain of the wood, may considerably affect the sequence in such a table:

TABLE ILLUSTRATING THE RELATION BETWEEN TRANSVERSE STRENGTH AND SPECIFIC GRAVITY IN THE WOOD OF CERTAIN SPECIES.

1200		_							-
Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse strength.	Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse strength.
3	Magnolia acuminata	534	01	PI	66	Acer rubrum	20	1	8
		534	2	2			878	2	3
		246	3	3			878	3	1
		261	4	5			1048	4	2
		246	5	4	1		1048	5	4
		261	6	6		and the state of t	530	6	5
8	Liziodendron Tulipfera	818	1	1			530	7	6
		818	2	5			743	8	9
- 34		1231	3	2			743	9	7
		1236	4	6	77	Robinia Pseudacacia	1248	1	1
		1236	5	4			405	2	2
5		1232	6	3			1248	3	5
		1232	7	8	1	THE PROPERTY OF THE PARTY OF TH	1247	4	3
		395	8	7			1247	5	4
60	Acer macrophyllum	982	1	1			815	6	6
		982	2	2	-		815	7	7
		1023	3	4	108	Prunus serotina	15	1	1
		1023	4	3	100		15	2	2
64	Acer saccharinum	299	1	2			127	8	4
		1233	2	1			1053	4	5
		1235	3	7			1053	5	6
		1234	4	6			127	6	3
		1235	5	5			763	7	8
		1234	6	4			763	8	7
		1233	7	3			368	9	9
		376	8	8	100		317	10	10
1 550		409	9	9			817	11	1000
64	Acer saccharinum, var. nigrum	274	1	1			1151	12	13 12
		213	2	2		The state of the s	406	2.00	
		757	3	3	117	Pyrus coronaria	1088 7108	1 2	1 3
		757	4	4	11		7108	1 2	0

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	Species.	Office number.	Relative specific gravity.	Relative transverse strength.	Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative francourse
	Pyrus coronaria—continued	1088	3	2	194	Fraxinus viridis—continued	948	2	
	Liquidambar Styraciflua	1087 1173	4	2			957 438	3 4	
-		1182	2 3	9			57	5	1
		1182 1183	4	5 8			957 308	6 7	
۱		1173	5	1.	100		308	8	-
ŀ		1095 1181	6 7	3 11	196	Fraxinus quadrangulata	66 66	1 2	1
		1181	8	10			286 ¹	3	
	Action to the second	546 1095	9	6	1		518 286 ²	5	
		546	11	12			291	6	
	0	1183	12	7			125 125	7 8	
	Cornus florida	1077	4	1 3	217	Sassafras officinale	814	1	
	THE PARTY OF THE P	1092	5	8			814	2	
		812 812	6 7	5		The state of the s	71 854	3 4	ı
		761	8	7	1		854	5	-
		67 67	9	6	No.		446 387	6 7	
	Nyssa sylvatica	750	1	2	1		71	8	۱
	118/1	835	2	9	223	Ulmus fulva	387	9	1
	The second second second second	750 833	3 4	1 6	220	Olitida Idiya	134 134	1 2	۱
		833	5	4	224	Ulmus Americana	533	1	
		834 834	6 7	7 3			533 1049	2 3	
		813	8	5			19	4	ı
	- - - -	813	9	8		11/1/2	19	5	
1	Nyssa uniflora	128 128	1 2	1			1036 1036	6 7	ŀ
		604	3	6			958	8	
		604 550	4 /5	5		101/6//	281 281	9	
		550	6	3	10 S	2//	958	11	ı
ŀ	Diospyros Virginiana	425 1084	1 2	1 6	225	Ulmus racemosa	116	1 2	
		1162	3	4	11		314	3	
		811	4	3			1165	4	
		1084 811	5	5			428 116 ³	5	
		61	7	8	000	0.10	116	7	
	Fraxinus Americana	61 1045	8	7	228	Celtis occidentalis	873 873	1 2	ľ
	***************************************	1045	2	4		Heritar No Carlo markette	1111	3	
		114 ³ 937	3 4	3 19			306 306	4 5	1
		2272	5	2			1111	6	1
		130	6	7			75	7	ŀ
		431 1144	7 8	6 5	232	Morus rubra	75 132	8	1
		2271	9	10		NEW YORK THE STATE OF THE STATE	1255	2	1
		392 212	10	8		Charles and the Account to the	132 1255	3 4	1
		212	12	9			1244	5	1
		747	13	21		with the beautiful to the little to	1245	6	
		551 227	14 15	14 13	238	Juglans cinerea	1246 1057	7	
		267	16	12			762	2	1
-		747	17	17		THE RESERVE OF THE PARTY OF THE	16	3 4	1
1		551 114 ⁵	18 19	15 16	11		16 76	5	-
1		114	20	18			76	6	
1		114	21	20			123 393	7 8	

Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse strength.	Catalogue number.	Species.	Отсе number.	Relative specific gravity.	Relative transverse strength.
239	Juglans nigra	951 951 766 766 318 325 407 117 117 292 539 531	1 2 3 4 5 6 7 8 9 1 2 3 4	4 3 1 6 9 8 5 2 7 4 7 2 3	251	Quercus alba—continued	491 2593 493 492 8 403 895 251 1132 403 251 323 1132	19 20 21 22 23 24 25 26 27 28 29 30 31	15 21 17 24 25 28 29 4 31 33 26 20 34
		1056 1056 3 1097 249 118 249 118	5 6 7 8 9 10 11 12 13	12 13 6 1 11 14 10 16	253	Querous Garryans	49 443 32 ⁸ 113 985 1027 985 988 1027	32 33 34 35 1 2 3 4 5	22 35 22 31 1 6 3 2
243	Carya sulcata	816 539 816 383 1082 391	13 14 15 16 1 2 3	5 9 8 15 3 5	254	Quercus obtusiloba	1029 988 1029 771 771 256 151	6 7 8 1 2 3 4	5 8 5 7 3
		1166 391 1082 1164 1170 1165	4 5 6 7 8 9	6 4 7 2 8 9	256	Querous macrocarpa.	151 351 351 137 310 1071	5 6 7 1 2 8	2 4 4 1 8 5
245	Carya porcina	88 88 1168 1168 442 538 6	1 2 3 4 5 6	1 2 7 4 9 3 5	JI	IN BAS	310 143 933 1073 1072 933 79	4 5 6 7 8 9	10 13 12 6 7 11
248	Carya aquatica	6 121 740 740 362 362	8 9 1 2 3 4	6 8 1 5 3	257	Quercus lyrata	432 831 79 545 762 762	11 12 13 1 1 2	9 4 2 1 2 3
251	Quercus alba	129 917 1257 749 547 547	5 6 1 2 3 4	2 6 18 27 1	258	Quercus bicolor	545 54 846 846 54 ² 54	4 1 2 3 4 5	4 1 5 4 2 3
		1257 8 1050 749 259 238	5 6 7 8 9	14 19 10 8 9 5	259		755 755 240 240 524 524	1 2 3 4 5 6	3 1 5 6 4 2
		748 32 1050 49 250 895	11 12 13 14 15 16	3 12 2 13 7 29	260	Quercus Prinus	35 925 31 925 31 434	1 2 3 4 5 6	1 3 5 4 2 6
		238 250	17 18	6 16	261	Quercus prinoides	273 287	1 2	2 4

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Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse strength.	Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse
261	Querous princides—continued	514 34 ²	3 4	3		Fagus ferruginea—continued	765 765	7 8	
		514 34	5 6	5			443 442	9	
267	Quercus virens	404 954	1 2	7		Betula papyrifera	836 1065	1 2	11
		954 799	3 4	5			1065 1067	3 4	
		919	5	4			722	5	
		799 919	6 7	1	5		990 1066	6 7	
72	Quercus rubra	1043 146	1 2	10			1066 990	8 9	
		1043 217	3 4	-			1667 722	10 11	1
		215	5		297	Betula lutea	843	1	
		218	6	3			843 1068	2 4	
		7 140	8 9				1069 1070	5 3	
		215	10	11			1068	6	
	1/5//	92	11 12	13	- 24		1069 1070	7 8	
	1/5//	141 920	13 14	11	298	Betula nigra	842 841	1 2	
		920	15	~	7		841	3	
		451	16 17	1:	- 11		842 136	5	
4	Quercus tinotoria	74 363	1 2		S Stranger	Alnus rubra	136 991	6	
		362	3		2	Ainus ruora	991	2	
		86 36	5		8		1025 967	3 4	
		247	6	- 4	1		967	5	
		17 247	U 8		3 324	Populus monilifera	1025 309	6	
		437 17	9	1	7		754 754	2 3	
		244	11	1	1		309	1	
77	Querous falcata	444 548	12	1	3		304 304	6	
		265 548	3		1 325	Populus Fremontii, var. Wielizeni	912 646	1 2	
		131	4	9	5		646	3	No.
		131 265	6		4		909	5	
		245 245	7 8	100	6 8 327	Thuya occidentalis.	909 1099	6	2.0
0	Quercus aquatica	742	1	1 5	1	They would be a second to the	874	2	
		511 742	3	1 13	8		874 782	3 4	2.15
	a de la companya del companya de la companya del companya de la co	511 349	4 5		2		1099 783	5 6	
		349	6	1 3	3	THE STATE OF THE S	783	7	
		2641 2642	7 8	1	5		790 790	8	-
203	Castanea valgavia nea tanaslaane	264 ³	9		7 2		379 379	10 11	
10	Castanea valgaris, var. Americana	258	2	1	1		792	12	
		516 18	3 4	1 22	3 4 32	Chamæcyparis sphæroidea	793 350	13	
91	Fagus ferruginea	119	1 2	#	2		850	2	
		9 853	3		4		850 851	3 4	
		9 853	4 5		6		851 852	5	
		119	6		5		350	7	

THE WOODS OF THE UNITED STATES.

	Species.	Office number.	Relative specific gravity.	Relative transverse strength.	Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse
)	Chamæcyparis Nutkaensis	969	1	5	378	Pinus glabra—continued	764	2	ľ
1		983 1000	2 3	1 8			142 142	3 4	
1		983 1000	4 5	3 6			544 544	5	
1	AND SHARE THE PARTY OF THE PART	994	6	4	379	Pinus Banksiana	780	1	
1		994 969	7 8	2 7			879 394	3	
	Juniperus Virginiana	1249	1	5			394	4	
1		1250 734	2 3	7			879 780	5	
1		800	4	4	380	Pinus palustris	81	1	
1		800 327	5	3 2	196		358 559	2 3	
		327	7	6			358	4	
ı	Sequoia sempervirens	711	1 2	5	TI	The state of the s	357 81	5	
1		711	3	3		4/0	359	7	
		713 713	4 5	6 2			360 361	8	
		712	6	4	10		361	10	
1	Pinus Strobus .	712 222	7	7 2	0		360 243	11 12	
١		1044	2	7			243	13	
	$1/\epsilon 5//\epsilon$	797	3 4	1 4			385 390	14 15	
١		788	5	3			357	16	
		788 797	6 7	5 6			85 384	17	
١		1044	8	11			390	19	
		789 789	9	8 9		1	85 384	20 21	
i		777	11	10	381	Pinus Cubensis	493	1	1
١	Pinus resinosa	315 315	1 2	1 2		1/2/	493 356	2 3	١
		1076	3	3			356	4	
١		1076 785	5	P 5	5		84 84	5	
l		1074	6	6	382	Picea nigra	231	1	
I		1075 785	7 8	7 8	N		231 776	2 3	
١	Pinus ponderosa	632	1	3			880	4	
١		910 907	2 3	10 11			776 373	5	
l	of Fundamental Control of the Contro	689	4	1			880	7	
۱	we are an arrival to the state of the state	619 630	5	9			794 794	8 9	
١		731	7	6	383	Picea alba	513	1	1
١		626 718	8 9	2 5		The state of the s	773 773	. 3	
l		630	10	12			784	4	i
l		718 636	11	8 7			513 784	5	
l	Pinus Tæda	82	1	1			791	7	ı
		355 355	2 3	6	386	Picea Sitchensis	970 970	2	
		388	4	2			1015	3	
	The same of the sa	389 388	5 6	3 7			977 1026	5	
	District Control of the Control of t	389	7	5			977	6	
	Pinus inops	1172 1172	1 2	4 2	10		1026	7 8	
1	THE PROPERTY OF STREET	1169	3	o 6			1019	9	
1		1169 622	5	1 5	387	Tsuga Canadensis	793 793	1 2	
1		621	6	3	1		772	3	

RELATION BETWEEN TRANSVERSE STRENGTH AND SPECIFIC GRAVITY, ETC.-Continued.

Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse strength.	Catalogue number.	Species.	Office number.	Relative specific gravity.	Relative transverse strength.
87	Tsuga Canadensis—continued	1040	5	4	391	Pseudotsuga Douglasii—continued:	1022	245	2
		1040	6	5			1008	20	2
		775	7	13			2712	27	2
		787	8	9			1020	28	1
		787	9	8			1022	29	
		5	10	10			986	30	1
- 6		219	11	7			1020	31	
		775	12	15			702	32	1
		1042	13	11		The state of the s	709	Sit	
		1042	14	12			709	84	1
- 0		5	15	17	394	Abies subalpina	449	1	
		817	16	14			4492	2	
		219	17	16			4491	3	100
- 11		817	18	18			4491	4	
		778	19	20			820	5	
	D 1 - D 1 - D	778	20	19	000		820	6	
91	Paeudotsuga Douglasii	708	1	1	396	Abies concolor	733	1	
		708	2	2			639	2	
		1018	3	8	2	X	733 639	3	
	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1018	5	10			529	. 4	1
1		1016	6	33			529	6	
		989	7	7	401	Larix Americana	2262	1	1000
		1016	8	18	401	Larix Americana	226	2	
	1/5//	705	9	14			774	3	
		627	10	5			840	4	
7		881	11	9		MARK THE RESIDENCE OF THE PARTY	786	5	
		881	12	13			795	6	
		1008	13	19	0-1		774	7	i i
-		706	14	11	-		795	8	
8		720	15	15			840	9	110
		1011	16	17			781	10	100
		627	17	12	1		786	11	
		720	18	30			781	12	
		1011	19	32	402	Larix occidentalis	1006	1	
-		974	20	16			1006	2	
		732	21	21		IN (651)	984	3	
		732	22	29	10		984	4	
	THE RESERVE OF THE PARTY OF THE	973	23	25			719	5	
		973	24	20	ITA		719	6	

GENERAL REMARKS.

An examination of the results obtained from the various tests made upon the woods of North America indicate at least the important fact that within the limits of any species the weight and strength of any specimen of wood depends upon the actual proportion of the space occupied in the layers of annual growth with open ducts to the space occupied with compact, woody tissue, and to the size of these ducts; or in the case of the wood of Coniferæ, the proportion of space occupied with cells formed early in the season to that occupied with the smaller cells of the summer growth. The proportion between these two kinds of growth varies not only in every individual tree, but in different parts of the same tree. The causes which thus affect the growth of wood are not very apparent. It is not soil, nor age, nor general climatic conditions, it appears, which produce the different proportion between the solid and the light portions of the annual growth in any species, because in the same individual this proportion is found to vary from year to year. It varies very irregularly; nor does the rapidity of growth, as has been supposed, greatly affect the strength of wood, because the proportion of open to compact growth is little affected by rapid or slow increase of the tree's diameter. How far annual climatic variations affect the nature of the annual layers of growth has not been demonstrated, although it is not impossible that in years in which conditions favorable to rapid growth are extended late into the season, the proportion of the annual layer occupied by open, weak growth to the growth of the whole year would be greater than that formed in a year during which the season favorable for rapid growth was less extended.

It follows that while such experiments as those conducted by Mr. Sharples are necessary to establish maximum and relative values for any species, these being established, actual values of any given specimen of

wood may be determined by microscopic examination of its structure; that is, two specimens of the wood of any species to which the census tests have been applied being given, their relative values can be determined by an examination of their structure as well as or better than by any elaborate experiments.

TANNIN VALUES.

The amount of tannin contained in the bark of various trees of the United States has been determined.

These determinations give the proportion of tannin. They do not indicate the real value of the bark of the species for tanning, which can only be obtained by actual experiments made on a large scale, other properties in the bark, beside the percentage of tannin, affecting the value of the leather prepared with it.

These determinations must therefore be regarded as approximations, which will serve, in some cases, to indicate species not now in general use for this purpose, which may be looked to as possible sources of tannin supply.

The methods adopted by Mr. Sharples in making these determinations are described by him as follows:

The tannin in each case was determined in the rossed bark; that is, bark deprived of the main part of the outside coating. The method employed was that devised by Lowenthal, which may be thus briefly described: A standard decoction of the bark is titrated with permanganate of potash, a quantity of indigo being first added to it. In a second portion the tannin is precipitated by means of gelatine, and the gallic acid in the liquid again determined by permanganate and indigo. The difference between these two readings gives the amount of tannin in the bark, the value of the permanganate having previously been determined by pure tannic acid, or by oxalic acid and calculation.

The bark of the following species has been examined:

Catalogue number.	Botanical name.	Common name.	Per cent. of tannin.	Per cent. of ash.	Catalogue number.	Botanical name.	Common name.	Per cent. of tannin.	Per cent. of ash.
14	Gordonia Lasianthus	Loblelly Bay. Tan Bay	13. 14	2, 35	275	Quercus Kelloggii	Black Oak	6.76	8. 64
93	Prosopis juliflora	Mesquit. Algaroba. Honey	4.04	8.71	276	Quercus nigra	Black Jack. Jack Oak	4. 36	6. 28
1		Locust. Honey Pod.			277	Quercus falcata	Spanish Oak. Red Oak	8. 59	4. 32
140	Rhizophora Mangle	Mangrove	31.04	6.70	287	Quercus densifiora	Tanbark Oak. Chestnut Oak.	16.46	3.84
160	Exostemma Caribæum	,	5. 81	7.16	-		Peach Oak.	1000	1334
251	Quercus alba	White Oak	5, 99	6.11	290	Castanea vulgaris, var. Ameri-	Chestnut	6, 25	2,00
256	Quercus macrocarpa	Burr Oak. Mossy-cup Oak.	4. 59	8.05		cana.	/		
		Over-cup Oak.			382	Picea nigra	Black Spruce	7. 20	2.84
260	Quercus Prinus	Chestnut Oak. Rock Chest-	6. 25	3, 83	384		White Spruce		2.75
		nut Oak.			384	Picea Engelmanni	do	17.01	2.32
261	Quercus princides (old tree)	Yellow Oak. Chestnut Oak.	4. 33	8.38	384		do		0.75
		Chinquapin Oak.		PA	387	Tsuga Canadensis	Hemlock	13.11	1.31
261		do		6. 23	389		do	7780000	1.44
267		Live Oak		8, 89	389	Tsuga Mertensiana	do	15. 87	1.49
269	Quereus Emoryi	Black Oak	9.76	15.09	390			300-300,000,000	2.48
272	Quercus rubra	Red Oak. Black Oak	4.56	4. 43	391	Pseudotsuga Douglasii	Red Fir. Yellow Fir. Ore-	13.79	1.56
274	Quercus tinctoria	Black Oak. Yellow-bark Oak. Quercitron Oak. Yellow Oak.	5. 90	5. 73			gon Pine. Donglas Fir.		

TABLE I.—SPECIFIC GRAVITY, ASH, AND WEIGHT PER CUBIC FOOT

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF WTH.
	Office					meters.	Sap- wood.	Heart-wood.
MAGNOLIACEÆ.				The state of the s		RE AU	Semi1	
1. Magnolia grandiflora	346	Alabama	Cottage Hill	C. Mohr	Rich loam	0. 372	116	
2. Magnolia glauca. Sweet Bay. White Bay. Beaver Tree. White Laurel. Swamp Laurel.	354	do	do	do	Swampy	0. 268	91	20
3. Magnolia acuminata	246	Virginia	Wytheville	H. Shriver	Clay limestone			
Cacamoer 1766. Mountain Magricens.	2611	do	Fancy Gap	do	Rich, light			
No.	2612	do	do	do	do			
	2613	do	do	do	do			
	534	Mississippi	Selvers' mill	C. Mohr	do	0. 198	26	14
4. Magnolia cordata	1178	Alabama	Winston county	C. Mohr				
	22	North Carolina	Statesville	M. E. Hyams	Rich	0.050	18	
5. Magnolia macrophylla	532	Mississippi	Quitman	The state of the s		0.000	10	11.000000
6. Magnolia Umbrella	2661	Virginia	Wytheville	H. Shriver		0.072	15	8
Umbrella Tree. Elk Wood.	2663	do	do	do				
	2663	do	do	do		*********		
		The state of the s		C				
7. Magnolia Fraseri	2601	do	Fancy Gap	đo	Damp	0. 085	20	
Long-leaved Cucumber Tree.	2602	do	do	do	do			
	2603	do	do	do	do			
8. Liriodendron Tulipifera	138	Michigan	Dansville		Sandy			
ALTERNATION MADE NOTES	165	Ohio	D. E. McSherry & Co.	E. E. Barney		and the second		
	174	Tennessee	Woodsum Machine Company.	do				
	177	Ohio	Company. Barney & Smith . Manufacturing Co.	do				
	178	do	D.E.McSherry & Co.	and the second second				
	187	do	J. W. Stoddard & Co.					
	188	do	Barney & Smith Manufacturing Co.	do				******
	395	Michigan	Lansing	W. J. Beal	444			******
	818	West Virginia	Grafton	C. G. Pringle				******
	1231	Pennsylvania	Chester county	P. P. Sharples		tra contra contra	• • • • • • • • • • • • • • • • • • • •	*****
Street, And Street, St.	1232	do	do	do				
ANONACEÆ.								
9. Asimina triloba	911	Missorri	Verent	C.W. T.	A 31	0.000		FIF U.S.
Paparo. Custard Apple.	211	Missouri	Meramec river, Jef- ferson county. Cumberland river	G. W. Letterman	COLUMN TO SERVICE STATE OF THE	0. 169	••••••	******
	332	Tennessee	Cumberland river	A. Gattinger	do	0. 086		******
0. Anona laurifolia	470	Florida	Day Disas	A W C	0			4
Pond Apple.	479	Florida	bay Biscayne	A. H. Curtiss	Swampy	0.240	47	

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OF DRY SPECIMENS OF THE WOODS OF THE UNITED STATES.

SPECIFIC GRAVITY DETERMINATIONS.		Abtt	ORTERMINA	TIONS.	Weight, per cubic foot,	Remarks.			
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	AUMELES	
9, 6040	0.6680		0. 6360	0.40	0. 65	0. 53	39. 63	Second sp. gr. determination made on sap-wood	
0. 5034	0. 5037		0. 5035	0.42	0. 53	0.47	31. 38		3
2222			0. 5213	0. 29	0. 26	0, 27			189
0. 5012	0. 5413	************	0. 4399	0. 25	0, 20	0, 27		***************************************	
0. 4399			0. 4562	0.30		0. 30			
0. 4215			0.4215	0.30		0.30			
0. 5065	0, 5058		0. 5061	0.34	0. 33	0.34			
			0. 4690		L. Santill	0. 29	29. 23		
0. 4095	0.4184	0.4101	0. 4139	0. 25	0. 39	0.32	25. 79	Third sp. gr. determination made on sap-wood; fourth sp. gr. determination, 0.4175.	100
0 5055	0 4000		0.5117	0.00	(A)	0.20	7417	All sap-wood	
0. 5375	0. 4859	************	0. 5117 0. 5501	0. 32	0.34	0.32		an bay nood	
0. 5468	0. 0034	*************	0. 5501	0.40	0.34	0.35			
			0. 5309			0. 35	33. 09		
0. 3787			0. 3787	0.19		0.19		Growth rapid	
0. 5067			0.5067	0.18		0.18		Growth rapid; 0.5 sap-wood	
0. 4606			0. 4606	0. 24		0.24		Growth rapid; all sap-wood	
			0. 4487			0. 20	27.96		1
0. 5430			0, 5430	0. 25		0. 25		All sap-wood	
0.4976			0.4976	0.27		0. 27			
0.4602			0. 4602	0.33		0. 33		All sap-wood	
			0. 5003	0		0. 28	31. 18		
0.3843			0. 3843	0. 25		0. 25	051		
0. 3831	0. 3783		0.3807	0. 27	0. 27	0.27		Yellow poplar	1
0.3798	0. 3787		0. 3792	0. 20	0. 22	0.21		Yellow poplar (soft)	
0. 4475	0. 4361		0.4418	0.17	0.15	0.16		Hard poplar	
0.4512	0. 4442		0.4477	0, 19	0.19	0. 19		Hard poplar	1
0.4362	0.4150		2000000	0.18	0.21	0.19		Yellow poplar	1
0. 4436	0, 4551		0,4493	0. 25	0.30	0, 27			
0.3774			0.3774	0.33	0.31	0.32			1
0. 4763	0.4822		100 00000	0. 26	0. 29	0. 28	***************************************	White poplar	1
0. 4144	0. 4409			0. 20	0. 22	0. 21		Vellow poplar	
0. 4188	0.4/12		0. 4230	0.19	0.16	0.18	26. 36	Tenow popular	
			0.4200			0.20	=		1
0. 3549	0. 3810		0. 3679	0, 16	0.14	0.15			-
0, 4259			0.4259	0. 24	0.30	0.27			1
	Spin		0. 3969		-	0. 21	24.74		-
		0. 5048		4.94	4. 79	4. 86	31. 49		1

TABLE I.—SPECIFIC GRAVITY, ASH, AND WEIGHT PER CUBIC FOOT

Species.	Ощее пишрег.	State.	Locality.	Collector.	Soil.	Diameter of tree,	GROWTH.		
	ОЩеел				Elega Cont	in meters.	Sap- wood.	Heart wood.	
CAPPARIDACEÆ.							Bell		
11. Capparis Jamaicensis	477 1186	Florida	Upper Metacombe Key. do	A. H. Curtiss	ACCOUNT TO A SECOND		34		
	1186	do	do	do	do)		
CANELLACEÆ.	100								
12. Canella alba	499	do	THE PERSON NAMED IN COLUMN	do	CONTRACTOR OF THE PARTY OF THE		17		
Cinnamon.	1131	do	Elliott's Key	do	do	0. 120	5	14	
TERNSTRŒMIACEÆ.				The second second					
14. Gordonia Lasianthus	236	South Carolina	Bonneau's Depot	- Alleria	AND DESCRIPTION OF THE PARTY OF				
	414	do	Aiken	do	Swampy	0. 330	22	25	
			TECHA						
STERCULIACEÆ.	70000				MARKET STATE				
16. Fremontia Californica	1230	California	San Bernardino mountains.	C. G. Pringle	******************				
TILIACEÆ.	2	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	0.470	9	26	
Lime Tree. Bass Wood. American Lin- den. Lin. Bee Tree.	124	Michigan	Big Rapids	W. J. Beal	Gravelly		-	20	
	252	Missouri	Allenton	G. W. Letterman	Alluvial		3	73	
	316	Michigan	Hersey	W. J. Beal	Rich loam				
	1039	Massachusetts	Danvers	J. Robinson	Moist gravel	0. 330	2	35	
			6						
			I a day		7			100	
17. Tilia Americana, var. pubescens	745	Georgia	Painhridge	A. H. Curtiss	Low	0.300	23	100	
an amountains our passessess.	130	deorgin	Damoringe		7		-		
18. Tilia heterophylla	2851	Kentucky	Cliffs Kentucky river	W. M. Linney	Limestone				
White Bass Wood. Wahoo.	2852	do	and the second second	do	Committee of the second	and the second	1	- Common	
	2858	do	PRINST	do			100000000000000000000000000000000000000	-	
	320	Tennessee	Cumberland river	A. Gattinger	Alluvial				
			CONT						
MALPIGHIACEÆ.									
19. Byrsonima lucida	510	Florida	Boca Chica Key	A. H. Curtiss	Coral	0. 080	21		
Intowoerry, Guinoerry.	1113	do	No-Name Key	do	do				
	1117	do		do		0.074	19	12	
	1190	do	No-Name Key	do	do		******		
THE SECOND STREET	-								
ZYGOPHYLLACEÆ.	744							000	
20. Guaiacum sanctum	476	do	Upper Metacombe Key.	do		0.178	18	55	
	898	do		Department of Agriculture.	22 20				
	1133	do	Elliott's Key	A. H. Curtiss	Coral				
		200		1 1 4-1	CHES .		TA P	1	
of Dankers an ometicalis	047	Towns	Can Antonia	C. Mohr	Limestone	0, 056	31		
21. Porliera angustifolia	947	Texas	San Antonio	O MIONI	/ Aminosouto	0, 000	OI.		
22. Xanthoxylum Americanum	80	Missouri	Allenten	G. W. Letterman	. Alluvial	0.087	5	9	
Prickly Ash. Toothache Tree.	392	Michigan	Lansing		A CONTRACTOR OF THE PARTY OF TH	0.066	4	28	
	THE PARTY OF								

THE WOODS OF THE UNITED STATES.

OF DRY SPECIMENS OF THE WOODS OF THE UNITED STATES-Continued.

0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.0000 0.00	SPECIFIC GRAVITY DETERMINATIONS.		rions.	АБН	DETERMINA	TIONS.	Weight, per cubic foot,	Remarks.	Office number.	
0. 7272 0. 7113	First.	Second.	Third.	Average,	First.	Second.	Average.	in pounds		Ощее п
0. 7272 0. 7113	0 6600	0.6600		0.6849	5.60	5 77	5.60			47
6.9270 0.9509		100000000	**********		0000000		1135555			118
6.6570	0.1212	0. 1515			0.00		100000	46.44		200
1.0500				0. 6971			4. 76	43, 44		
0. 3852 0. 4659 0. 4255 0. 49 0. 44 0. 47 2 0. 455 0. 49 0. 44 0. 47 2 0. 479 0. 44. 53 11 11 11 11 11 11 11 11 11 11 11 11 11		0.000								49
0. 3852 0. 4459 0. 4255 0. 49 0. 44 0. 47 2. 6. 65 0. 6501 1. 62 1. 66	1. 0390	1. 0017		1. 0203	2. 66	2. 65	2. 66		0.5 sap-wood	113
0. 5146				0, 9893			1. 75	61. 65		
0.4926 0.7288 0.7482 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.61 1.86 1.09 44.51 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1	0. 3852	0. 4659		0. 4255	0.49	0.44	0.47			. 23
0. 6995 0. 7288	0. 5146	0. 5255		0. 5201	1, 02	1. 08	1. 05			41
0. 4629				0.4728			0, 76	29. 47		A
0. 4629	0. 6995	0.7288		0.7142	1.51	1.86	1, 69	44.51	KO//	128
0. 4829										
0. 8815	0.4626			0.4674	0.80	0. 23	0.31			
0. 5035		V1 11 200			>///		25000			12
0. 5186		0. 4378			7/7	1	Real			25
0. 4272	0. 5166			0. 5166	0, 55	0.64	0.60		All sap-wood	31
0.4103	0.4272	0. 4163	0. 4362	0. 4266	0.42	0.48	0. 45	A		103
0. 4087				0. 4525			0, 55	28, 20		
0. 4087	re librar								The state of the s	
0. 4927 0. 3791 0. 379		5		0.4074	3	1	0. 65	25. 39	Growth very rapid	74
0. 3791	0.4087	0.4220)			0.62	0.64)			7/5/6	
0. 8674	0.4927			0. 4927	0.45		0, 45		Second growth	28
0. 4695	0.3791			0. 3791	0. 67		0.67	10.00		28
0. 5257					- colored		0.86			28
0. 5257 0. 5360 0. 5308 2. 84 2. 85 2. 85 1. 1000 1. 1100 <	0.4695	0. 4545	***********	0, 4620	0.48	0. 53	0. 50			35
0.5909 0.6783 0.6783 0.6783 0.6478 2.40 1.94 2.17 11 0.5681 0.5791 0.5875 0.5782 2.75 2.56 2.65 11 0.6009 0.5964 0.5987 1.94 2.40 2.17 11 0.5888 2.46 36.69 1.1845 1.2180 0.9563 1.1196 0.87 0.92 0.90 0.5 sap-wood 1.2736 1.1700 1.2218 0.51 0.81 0.66 Second sp. gr. determination made on 0.5 sap-wood 1.0997 1.0998 1.0652 1.0882 0.86 0.94 0.90 0.06 sap-wood 11 1.1230 1.0843 1.1230 1.1101 0.53 0.49 0.51 69.18 Sap-wood 12 0.6122 0.5909 0.5963 0.6045 0.60 0.58 0.59 0.54 0.55 0.54 0.55 0.54 0.54 0.55 0.54 0.54 0.55 0.54 0.55 0.54 0.54 0.55 0.54 0.54 0.55 0.54 0				0. 4253			0. 62	26. 51		
0.581 0.5791 0.5875 0.5782 2.75 2.56 2.65	0. 5257	0, 5360		0. 5308	2. 84	2. 85	2. 85			. 5
0.6009 0.5964 0.5987 1.94 2.40 2.17 1.1 0.5888 2.46 36.69 2.46 36.69 1.1845 1.2180 0.9663 1.1196 0.87 0.92 0.90 0.5 sap-wood 1.2736 1.1700 1.2218 0.51 0.81 0.66 Second sp. gr. determination made on 0.5 sap-wood 1.0097 1.0998 1.0652 1.0882 0.86 0.94 0.90 0.66 sap-wood 1.1 1.1230 1.0843 1.1230 1.1101 0.53 0.49 0.51 69.18 Sap-wood 1.0098 0.6122 0.5969 0.6045 0.60 0.58 0.59 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 0.54 0.55 <td>0, 5909</td> <td>0, 6783</td> <td>0. 6743</td> <td>0. 6478</td> <td>2, 40</td> <td>1.94</td> <td>2.17</td> <td></td> <td></td> <td>111</td>	0, 5909	0, 6783	0. 6743	0. 6478	2, 40	1.94	2.17			111
1. 1845	0.5681	0, 5791	0. 5875	0.5782	2.75	2. 56	2. 65			111
1.1845 1.2180 0.9563 1.1196 0.87 0.92 0.90 0.5 sap-wood 1.2736 1.1700 0.5 sap-wood 1.2218 0.51 0.81 0.66 0.66 0.50 sap-wood 1.0097 1.0098 1.0652 1.0882 0.86 0.94 0.90 0.66 sap-wood 1.0098 1.1432 0.82 71.24 0.66 sap-wood 1.1230 1.1101 0.53 0.49 0.51 69.18 Sap-wood 1.0098 </td <td>0. 6009</td> <td>0. 5964</td> <td></td> <td>0. 5987</td> <td>1. 94</td> <td>2. 40</td> <td>2. 17</td> <td></td> <td></td> <td>119</td>	0. 6009	0. 5964		0. 5987	1. 94	2. 40	2. 17			119
1. 2736 1. 1700 1. 2218 0. 51 0. 81 -0. 66 Second sp. gr. determination made on 0.5 sap-wood 1. 1000 1. 0097 1. 0998 1. 0652 1. 0882 0. 86 0. 94 0. 90 0. 66 sap-wood 11 1. 1230 1. 1230 1. 1101 0. 53 0. 49 0. 51 69. 18 Sap-wood 1 0. 6122 0. 5969 0. 6045 0. 60 0. 58 0. 59 0. 5235 0. 5290 0. 5262 0. 54 0. 55 0. 54 0. 55 0. 54				0. 5888			2.46	36. 69		
1. 2736 1. 1700 1. 2218 0. 51 0. 81 0. 66 Second sp. gr. determination made on 0.5 sap-wood 1. 1230 1. 1230 1. 0843 1. 1230 1. 1101 0. 53 0. 49 0. 51 69. 18 Sap-wood 1. 1230 0. 6122 0. 5969 0. 6045 0. 60 0. 58 0. 59 0. 5235 0. 5290 0. 5262 0. 54 0. 55 0. 54	1. 1845	1. 2180	0. 9563	1. 1196	0. 87	0. 92	0.90		0.5 sap-wood	4
1. 1230 1. 0843 1. 1230 1. 1101 0. 53 0. 49 0. 51 69. 18 Sap-wood. 0. 6122 0. 5969 0. 6045 0. 60 0. 58 0. 59 0. 5235 0. 5290 0. 5262 0. 54 0. 55 0. 54	1. 2736	1.1700				0. 81	- 0. 66		Second sp. gr. determination made on 0.5 sap-wood	. 8
1. 1230 1. 0843 1. 1230 1. 1101 0. 53 0. 49 0. 51 69. 18 Sap-wood 0. 6122 0. 5969 0. 6045 0. 60 0. 58 0. 59 0. 5235 0. 5290 0. 5262 0. 54 0. 55 0. 54	1.0097	1. 0998	1.0652	1.0882	0.86	0.94	0.90		0.66 sap-wood	11
0.6122 0.5969 0.6045 0.60 0.58 0.59 0.5235 0.5290 0.5262 0.54 0.55 0.54				1. 1432	N TO		0.82	71. 24		6
0. 5235 0. 5290 0. 5362 0. 54 0. 55 0. 54	1, 1230	1. 0843	1. 1230	1. 1101	0, 53	0.49	0. 51	69. 18	Sap-wood	. 94
0. 5235 0. 5290 0. 5362 0. 54 0. 55 0. 54	0, 6122	0. 5969		0, 6045	0, 60	0, 58	0, 59		it is a second of the second o	
0.5654 0.57 35.23			Action and the second			100,000,000	1,000			. 31
				0, 5654			0. 57	35, 23		

FOREST TREES OF NORTH AMERICA.

TABLE I.—SPECIFIC GRAVITY, ASH, AND WEIGHT PER CUBIC FOOT

Species.	Обісе пишвег.	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF WTH.
	Оте	0.1				in meters.	Sap- wood.	Heart-wood.
23. Xanthoxylum Clava-Herculis	735	Florida	W/4 19 10 491 111 -111	A. H. Curtiss	100			
Pepper Wood. Wild Orange.	1086	Georgia	Cumberland island .	C. Mohr			500	
	1000	Lexus	raiestine	C. Monr	Damp, sandy	0. 352	20	10
23. Xanthoxylum Clava-Herculis, var. fru- ticosum	938	do	Austin	do	Dry, calcareous	0. 098	33	
4. Xanthoxylum Caribæum	1109	Florida	Babia Handa Var	A H Cunting	Com			
Satin Wood.	1140			A. H. Curtiss			4	54
	1140					0. 100		04
5. Xanthoxylum Pterota	481	do	Bay Biscayne	A. H. Curtiss	Coral			
Wild Lime.	950	Texas	Matagorda bay	Company of the Compan	Calcareous	petra consta		
	1128	Florida	Bay Biscayne	and the same of the same	Coral		13	31
		7//				7.00		10000
26. Ptelia trifoliata	768	do	Aspalaga	do	Calcareous	0. 94	23	
Ash. 7. Canotia holocantha	1228	Arizona	Wickenburg	C. G. Pringle				
SIMARUBEÆ.								
28. Simaruba glauca	487	Florida	Bay Biscayne	A. H. Curtiss	Coral			
Paradise Tree.		(the start		1 //				
BURSERACEÆ.				1//2/	/ .			
9. Bursera gummifera	462	do	Upper Metacombe Key.	do				
dian Birch.	903	do	WAKARA!	Department of Agriculture.				
		137	EUNL					
0. Amyris sylvatica	475	do	Upper Metacombe Key.	A. H. Curtiss	Coral	0. 128	61	
MELIACEÆ.								
1. Swietenia Mahogoni	452	do	do	do	do	0. 228	16	81
OLACINEÆ.								
2. Ximenia Americana	472	do	do	do	do	0.112	3	43
Wild Lime, Tallow Nut. Hog Plum. Mountain Plum.	1134	do	Umbrella Key	do	do			
ILICINEÆ.		The season	VA SEPTE					
3. Ilex opaca	280	South Carolina	Waverly Mills	W. St. J. Mazyck	Sandy loam	0. 144	35	
American Holly.	902	do		Department of Agriculture.				
4. Hex Dahoon	484	Florida	Bay Biscayne	A. H. Curtiss	Low, damp	0.128	29	
4. Ilex Dahoon, var. myrtifolia	802	do	Jacksonville	A CONTRACTOR OF THE PARTY OF TH	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.148	28	

OF DRY SPECIMENS OF THE WOODS OF THE UNITED STATES-Continued.

Weight, per cubic foot, in pounds Remarks.	Wei	TIONS.	DETERMIKA	ASH 1	TONS.	SPECIFIC GRAVITY DETERMINATIONS.		
		Average.	Second.	First.	Average.	Third.	Second.	First.
0.91 0.91		0. 91	0. 91	0. 92	0. 5070		0, 5002	0, 5139
		1-11/00/10	0, 65	0.68	0. 4826		0. 4772	0. 4880
			0.84	0.90	0, 5272		0. 5153	0. 5392
0.82 31.51			.57.5.7		0, 5056		1	
						STRATES		C1 200/03
0.76 0.76 37.19	-	0.76	0.76	0.76	0. 5967	0, 6030	0. 5733	0. 6139
2.01 1.80		1.80	2, 01	1.59	0.8782		0.8965	0. 8598
2. 15 2. 25		2, 25	2. 15	2. 34	0. 9222	0. 9302	0. 9275	0. 9090
2, 02 56, 10		2, 02			0.9002			
1.00 0.95		0. 95	1.00	0, 90	0. 7573		0. 7666	0.7480
0.59 0.61		0.61	0.59	0, 63	0. 5791		0. 5775	0.5807
0.89 0.79		0.79	0.89	0.69	0.8968	0. 8955	0. 8949	0.9000
0.78 46.39		0.78	Tall 1	7//	0.7444			
0. 27 0. 30 51. 84		0, 30	0. 27	0.34	0, 8319		0, 8400	0. 8238
4.54 5.33 42.91		5. 33	4, 54	6.13	0. 6885		0. 7305	0. 6464
			the same					
0.92 0.93 25.78	15	0. 93	0, 92	0. 93	0, 4136		0. 4172	0.4100
			7 000	3				
1.91 1.98		1.98	1.91	2. 05	0. 2584	0. 2587	0. 2488	0. 2677
2.07 2.09		2.09	2.07	2. 10	0.3423		0.4022	0. 2823
2.04 18.71	Tit.	2.04	LA		0, 3003			
0.51 0.59 65.18	U	0. 59	0.51	0. 66	1. 0459		1, 0450	1. 0469
1.11 1.00 45.38		1.09	1.11	1.06	0.7282	0. 7047	0.7464	0. 7335
0. 69 0. 62		0, 62	0.69	0.55	0. 8862		0, 8925	0. 8799
		0.83	0. 82	0.84	0. 9531	0. 9249	0. 9505	0. 9838
0.73 57.31		0.73	186		0. 9196	THE ST		
0. 55 0. 63		0. 63	0. 55	0. 71	0. 6335		0. 6624	0. 6046
0.71 0.88		0. 88	0.71	1.04	0. 5301		0. 5078	0. 5524
0.76 36.26		0.76	1		0. 5818	1 × 1		
0.88 0.91 29.95		0.91	0.88	0. 94	0. 4806		0.4820	0. 4791
		-						THE LA

TABLE I.—SPECIFIC GRAVITY, ASH, AND WEIGHT PER CUBIC FOOT

Species.		State.	Locality.	Collector.	Soil.	Diameter of tree,	LAYERS O		
a provides	Ощое пишрег	Double.				in meters.	Sap- wood.	Heart	
5. Nex Cassine	345	Alabama	Cottage Hill	C. Mohr	Sandy	0. 076	17		
Cassena, Yaupon. Yopon.	804	Florida	Saint John's river	A. H. Curtiss	Rich, sandy				
	952	Texas	The state of the state of	C. Mohr		CONTRACTOR OF THE PARTY OF THE			
3 Dex decidua	56	Missouri	Allenton	G. W. Letterman	Low, damp				
	335	Texas	Dallas	J. Reverchon	Upland				
The American State of the Australia	753	Florida	Chattahoochee river	A. H. Curtiss	Clay	0.086	33		
	945	Texas	New Braunfels	C. Mohr	Alluvial		*******		
CYRILLACEÆ.			TECHA						
I. Cyrilla racemifiora	341	Alabama	Chunchula	do	POLICE AND A PROPERTY OF THE P	1000000			
	615	Georgia	Ogeechee river	A. H. Curtiss	Low		******		
		7 / 2				212041			
8. Cliftonia ligustrina	338	Alabama	Cottage Hill	C. Mohr	Wet	0. 194	47		
CELASTRACEÆ.									
Burning Bush. Wahoo. Spindle Tree. Arrow Wood.	1078	Missouri		G. W. Letterman	Designation of the second second		*******		
		En L							
. Myginda pallens	1188	Florida	Umbrella Key	A. H. Curtiss	Calcareous			*****	
Schæfferia frutescens	478 1201	do	Upper Metacombe Key. do	do		0.110	71		
RHAMNACEÆ.			EUNI		A-11-11				
2. Reynosia latifolia	454	do	do	do	do	0.112	.7	55	
3. Condalia ferrea	460	do	do	do	do	0.166	22	56	
Condalia obovata	941	Texas	New Braunfels	C. Mohr	Dry, calcareous	0. 100	5	30	
5. Rhamnus Caroliniana	43	Missouri	Allenton	G. W. Letterman		*******			
	521	Tennessee	Nashville	A. Gattinger	do	*********			
	803	Florida	Saint John's river Jonesboro'	A. H. Curtiss T. B. Kitchens	Rich hummock	0. 108	19	10	
	1001	THAILSOS	CONCOUNT	4 2 1 1 1 1 1		3, 300		, A1	
8. Rhamnus Californica	1256	California	Santa Cruz mountains.	C. G. Pringle		******			
Rhamnus Purshiana Bearberry. Bear Wood. Shittim	993	Oregon	Portland	G. Engelmann and C. S. Sargent.	Rich, alluvial				
Wood. 8. Ceanothus thyrsifiorus	1101	California	Santa Cruz	C. L. Anderson		0. 090	11		

SPI	CIPIC GHAVIT	Y DETERMINA	TIONS.	ASH 1	DETERMINA	TIONS.	Weight, per cubic foot,	Remarks.	Office and Law
First.	Second.	Third.	A verage.	First.	Second.	Average.	in pounds (average).	270,3313, 200	Otto
J. 7257	0.7185		0.7221	0.74	0.70	0.72			
0. 6890			0.7041	1.04	1.11	1.08			
0. 7475	District Conference of the Con	***************************************	0. 7547	6. 89	0.72	0.81	SOSTON I TONO SON		
0. 7475	0.7019		0. 7270			0.87	45, 31		
			0.7270			0.01	30,01		
0.7970			0,7976	0.44	0.50	0.47			
0. 7888	- Company		0.7888	0. 83	0.84	0.84			
0.5910			0. 5885	0.87	0.79	0, 83			
0. 7960	0.7894	0.7039	0. 7931	0. 67	0. 67	0. 67			
	1-1		0, 7420		/	0.70	46. 25		
0, 7147	0, 6563		0. 6855	0.41	0.43	0.42			
0, 6818	- Carrier		0. 6713	0.42	0.40	0.41			
			0.6784	V		0.42	42.28		
0. 6350	0. 6147		0. 6249	0.35	0.48	0.42	38, 95		
			100		1 9			Fig. Chemistry	
0. 6240			0. 6240	0.70	0.58	0.64			
0. 6868	- Continuos		0. 6943	0. 51	0.53	0.52			
	133350		0, 6592			0.58	41.08		
0.9057	0. 9039		0. 9048	3.88	2, 95	3.42	56. 39		
							12.01		
0.7487	0.7728		0.7608	2.70	2.91	2.85	-0.5h		
0. 791:	0, 7850		0.7881	2.15	2.28	2, 22			-
			0. 7745		1	2.54	48. 27	and the second second	
1. 060	1. 0825		1.0715	3, 24	3, 15	3, 20	66.78		
1. 302	1.3020		1, 3020	8, 00	8, 61	8, 31	81. 14		
1, 204	9 1, 1949		1.1999	7. 03	7. 02	7. 03	74.78	0. 125 sap-wood	
			74 7444		201202				-
0. 595			0, 5954	0.19	0, 18	0.19	***********		
0. 594	2 2 2 2 2 2	***************************************	0.5951	0.76	0.98	0.87			
0.497	1 2 100		0. 5136	0.47	0, 52	0.50	***************************************	All sap-wood	
0. 489	STATE OF THE PARTY.	>	. 0.4807	1.15	0, 81	0.98		0.5 sap-wood	-
	Hall		0.5462			0, 64	34. 04		
0. 000	0		0.6000	0.63	0, 53	0. 58	37. 39		
0, 566	5 0.5678		0.5672	0.74	0.59	0. 67	35, 35	0. 25 sap-wood	
				=	1	-	=		
0.580	11 11 11 11 11 11	\$	0. 5750	0.70	0. 68	0.69	35, 83	Growth rapid	-
0.590	5 0.5025)		=	-		_		1

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,	LAYE	
Брешев.	Ошеет	Dodge.	Liousiny.		DVIII	in meters.	Sap- wood.	Heart-wood.
49. Colubrina reclinata	502 1139	Floridado		A. H. Curties		0. 126 0. 100	6 13	45
SAPINDACEÆ. 50. Æsculus glabra.	297	Missouri	Allenton	G. W. Letterman	Rich, moist			
50. Æsculus glabra	386	Commence of the party of the pa	do	THE BUILDING TO SECTION	Alluvial	Charles and Allert Annual Control		
	427	Tennessee	Nashville	A. Gattinger	Rich, moist			
51. Æsculus flava	445	do	do	do	Rich upland			7
Sweet Buckeye. 52. Æsculus Californica	684	California	TECHA					
53. Ungnadia speciosa	944	Texas	New Braunfels	C. Mohr	Limestone	0. 124	26	
54. Sapindus marginatus	307	do	Dallas	1 31				
	589 824	New Mexico		78/2 25 25	do			
	928	Texas		C. Mohr	The second second	all and the	24	36
55. Sapindus Saponaria.	568	Florida	Cane Sable	A. H. Curtiss	Rich, sandy, damp.	0. 134	41	
Soapberry.	1122	do	A FINITE III	do				
				1/15/1				7917
56. Hypelate pariculata	463	do	Upper Metacombe Key.	do	do	0. 262	- 15	80
57. Hypelate trifoliata	464	do	do	,do	do	0. 224	13	72
58. Acer Pennsylvanioum Striped Maple. Moose Wood. Striped Dogwood. Goose-foot Maple. Whistle	99 372	Vermont	Huntingdondo	C. G. Pringledo	Gravellydo			
Wood.								
50. Acer spicatum	98	do	do	do	do			******
and the state of t	371	do	do	do	do	******		******
60. Acer macrophyllum	982 1023	Oregondo	Portland Portland Furniture Company.	G. Englemann and C. S. Sargent. do	Rich, alluvial	0, 229	30	40
61. Acer circinatum	962	do	Portland	do	Contraction of the			
	1013	Washington ter-	Wilkeson	do	do			
TO THE REAL PROPERTY.		ritory.						
62. Acer glabrum Dwarf Maple.	526	Colorado	Englemann's cañon.	R. Douglas	Dry, gravelly	0.048	28	

Office number		Weight, per cubic foot	rions.	ETERMINA	ASH D	TIONS,	DETERMINAT	FIC GRAVITY	specii
110	Remarks.	Weight, per cubic foot, in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
			1. 21	1.14	1. 29	0. 8308		0.0710	
			2. 29	2. 26	2. 31	0.8108	0. 8112	0. 8516 0. 8166	0. 8100
		51, 15	1.75			0. 8208			
			1.01	1.00	1.01	0. 4314		0, 4358	0, 4270
			0.84	0. 85	0.83	0.4706		0.4625	0.4787
			0.73	0. 68	0.77	0.4606			0. 4606
		28. 31	0.86			0.4542	917		
-		27, 24	1.00	1.00	0. 99	0. 4274		0. 4307	0. 4241
		31.04	0.70	0.73	0, 66	0.4980		0. 5038	0.4921
		39. 46	1.17	1.19	1.15	0. 6332		0. 6272	0. 6392
			1.35	1.27	1.42	0.7750		0. 7980	0.7520
			1, 69	1. 52	1.86	0, 8470		0. 8616	0.8324
			1.44		1.44	0.8162		0. 8345	0. 7978
			1, 53	1. 52	1. 54	0. 8123	0. 8296	0. 8522	0.7550
		50. 64	1.50	ARR		0. 8126			
I			3, 56	3.30	3, 82	0. 8679		0. 8763	0. 8595
			5. 13	5. 25	5. 00	0.8056	0. 8204	0. 8024	0.7940
-		52.14	4.34			0. 8367			
		50.41	1. 25	1.27	1, 23	0. 9533		0. 9465	0. 9600
		56. 72	1.38	1.41	1.85	0. 9102		0. 8548	0. 9656
-			0.24	A SE	8.90	0.5115		0 5110	0 5111
1			0.34	0.35	0, 32	0. 5115 0. 5484	0. 5789	0. 5119	0. 5111
1		33. 02	0.36			0, 5299	0.000	0.0110	010001
			-	0.07	0.40				0.7100
-	All sap-wood	***********	0.40	0. 37	0.42	0. 5202 0. 5457	0. 5353	0. 5205 0. 5528	0. 5198 0. 5490
1		33, 22	0. 43			0, 5330			
			0.58	0. 57	0, 59	0. 5113	0, 5254	0, 5029	0. 5057
	· · · · · · · · · · · · · · · · · · ·		0.49	0.49	0.49	0. 4705		0. 5087	0.4323
		30, 59	0. 54			0. 4909			
			0. 39	0. 39	0. 39	0. 6772		0. 6720	0. 6824
-			0. 36	0.37	0.35	0.6624		0.6660	0. 6587
-			0.43	0.44	0.41	0, 6585		0. 6800	0. 6370
-		41.51	0.39			0. 6660			
		37. 57	0.30	0, 29	0.31	0.6028		0, 6023	0, 6032

Speciee.	Office number.	State.	Locality,	Collector.	Soil.	Diameter of tree,		RS OF WTH.
	Отбе					in meters.	Sap- wood.	Heart-wood.
68. Acer grandidentatum	886	Uteh	City Creek cañon	M. E. Jones	Moist, gravelly	0.050	13	
64. Acer saccharinum	105	Vermont		C. G. Pringle	Gravelly			
Rock Maple.	203	Ohio	Woodsum Machine Company.	E. E. Barney				
	298	Missouri	Allenton	G. W. Letterman	Rich uplands			
	299	do	do	do	Distributed to the constitution			F25358V59B
	376	Vermont	Charlotte	C. G. Pringle	CONTRACTOR STORES	PRODUCTION OF THE		100000000000000000000000000000000000000
	409	New England	Charlestown Navy- yard. Charlotte	S. H. Pook		100000000000000000000000000000000000000		Carpo Grav
	1233	Vermont	CONTRACTOR STATE OF THE STATE O	F. H. Horsford	The special property of the second	SALEST SELECT		******
	1234	do	do	do	I ASSESSED TO THE THE PARTY OF THE PARTY	CONTRACTOR		******
The state of the s	1235	do	do	do		.1	******	*****
"B' SI SISSIVE STATE		1017	TECHY					
64. Acer saccharinum, var. nigrum	213	do	do	C. G. Pringle	Clay			
Black Sugar Mapl	2741	Missouri	Allenton	G. W. Letterman	Low, alluvial			
THE RESERVE OF THE PARTY OF THE	2742	do	do	do	Rich, alluvial			
	399	do	do	do	Low, alluvial			
A	440	Tennessee	Nashville	A. Gattinger	Rich			
	757	Florida	Chattahoochee	A. H. Curtiss	Clay	0. 268	51	
	1167	Missouri	Allenton	G. W. Letterman	Rich, alluvial	.,		122112
65. Acer dasycarpum	103	Vermont	Charlotte	C. G. Pringle	Swampy			
од нары, ниве мары, висет мары.	367	do	do	do	do			
	448	Missouri	Allenton	G. W. Letterman				
	1052	Massachusetts	Topsfield	J. Robinson	Low meadow			
		10	PROSIM	27/				
BE THE STATE OF TH		MAT	H TTT		Malla Carlo	100		
66. Acer rubrum	20	do	Arnold Arboretum	C. S. Sargent	Drift	0, 285	18	36
Red Maple. Swamp Maple. Soft Maple. Water Maple.	530	Mississippi		C. Mohr		0, 222	41	
	743	Georgia	Bainbridge		- Constant	0. 252	22	54
	878	Massachusetts	Danvers	J. Robinson	do	0.168	30	3
	1048	do	North Reading	do ,		0. 204	60	6
		A THE OWNER						
A PARTY TO A STATE OF			Mary John		Market 1 and	-		
66. Ager rubrum, var. Drummondii	1239	Missouri	Darden Dlud'	C W Tettermen				
w. Mor Institut var. Diminionalities	1240	I Victoria de la companya della companya della companya de la companya della comp	Poplar Bluff	A SECURITION OF THE PARTY OF TH			*******	******
	1240				**************	*********	*******	
67. Negundo aceroides	290	Missouri	Allenton	G. W. Letterman	Rich bottom			
	311	Texas	Dallas	J. Reverchon	do			
68. Negundo Californicum	645	California	Contra Costa county	G. R. Vasey	Rich, moist	0. 240	14	
			100					
ANACARDIACEÆ.		AND THE RESERVE OF THE PERSON		CALL POINT				1
	1176		Huntsville	C. Mohr	Rich loam			A Property of

mmpe	Remarks.	Weight, per cubic foot,	TIONS.	PETERMINA	ASII 1	TIONS.	DETERMINA	FIC GRAVITY	SPEC
Office number.	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
		43. 01	0. 64	0.61	0.60	0. 6902	*********	0. 6791	0.7012
1			0.42	0.40	0.44	0.6071		0, 6003	0. 6139
	***************************************		0.48	0.45	0. 51	0, 6332		0. 6300	0. 6363
			0.57	0.59	0, 54	0.7898		0. 8098	0.7697
			0.59	0.57	0.60	0.7759		0. 7689	0. 7828
			1.02	1.10	0.93	0.6661		0. 6783	0. 6538
		+*********	0.40	0.44	0.36	0.6242			0. 6242
			0. 62	0.33	0.91	0.7106			0.7106
			0.31	0. 29	0.33	0. 6896		0. 6899	0. 6893
			0.42	0.35	0.48	0. 7230			0.7239
	Control of the state of the sta	43. 08	0.54			0, 6012			
	VO		1. 25	1.01	1.48	0. 6964	0. 6639	0. 6935	0. 7319
			0.56		0. 56	0.7115	0.000	0, 6980	0. 7249
		73	0.52		0. 52	0.7108		0, 7002	0. 7214
			0, 63	0.56	0.70	0. 6958		0, 6799	0. 7117
			1.17	1.02	1.31	0. 6419		0.6429	0. 6410
		A.	0.44	0. 33	0.55	0.7014	0.7165	0,7008	0. 6868
			0.39	0. 36	0.42	0. 6827		0. 6840	0. 6814
		43. 09	0.71			0, 6915			
		Total	0.32	0, 32	0.31	0.5072		0, 5254	0. 4889
			0.31	0.31	0.30	0. 4844		0.4828	0.4860
			0.41	0.42	0.40	0. 4911		0, 5062	0.4760
			0. 28	0.27	0. 29	0. 6251	0. 6344	0. 6163	0. 6247
	25//	32, 84	0.33		1	0, 5269			
		TATI	Mad	XA!	20			-	2/4220
-	All sap-wood		0. 25	0. 25	0, 24	0.6803		0. 0845	0. 6761
0	***************************************	************	0. 43	0.42	0. 43	0. 5917	0.5001	0. 6064	0. 5770
•	Sandard third are an astronomications and an are made	***************************************	0.49	0.49	0, 49	0.5466	0.5601	0. 5510	0. 5288
	Second and third sp. gr. determinations made on sap-wood	***********	0.33	0. 33	0. 32	0, 6433	0, 6406 0, 6260	0. 6496 0. 6185	0. 6397
		38. 50	0. 37			0. 6178			
1						7,110	HIVE		
			0.31	0.31	0.31	0, 5563			0, 5563
			0. 36	0, 36	0.36	0. 5355		**********	0, 5355
		34. 02	0.34			0. 5459			
			0, 99	1. 22	0.76	0. 4310		0, 4288	0, 4332
			1.16	1. 30	1. 01	0. 4346		0.4474	0. 4217
		26, 97	1. 07			0. 4328			
		30. 04	0. 54	0. 57	0.51	0.4821		0.4856	0.4786
		40.04	0.50	0.51	0.48	0.6425	0.6686	0. 6393	0. G196

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF
	Office					meters.	Sap- wood.	Heart-wood.
70. Rhus typhina	158	Vermont	Hinesburgh	C. G. Pringle	Gravelly			
Staghorn Sumach.	1060	Massachusetts	Danvers	J. Robinson	do	0.120	2	34
71. Rhus copallina	70	Section 2011	The state of the s	G. W. Letterman		A STATE OF THE PARTY		
	610 736	Florida	river.	A. H. Curtiss	The state of the s		5	19
								1
71. Rhus copallina, var. lanceolata	330	Texas	Dallas	J. Reverchon	Dry, gravelly			
72. Rhus venenata	876	Massachusetts	Danvers	J. Robinson	Wet, swampy	0.070	1	20
	1037	do	do	do	do	0. 085	4	16
	1041	do	do	do	do	0.067	4	27
	5							
73. Rhus Metopium Poison Wood. Coral Sumach. Mount- ain Manchineel. Bum Wood. Hog Plum. Doctor Gum.	467	Florida	Upper Metacombe Key.	A. H. Curtiss	Coral	0. 222	89	39
LEGUMINOSÆ.	0			3 1/2				3 8
5. Eysenhardtia orthocarpa	1147	Arizona	Santa Rita mount- ains.	C. G. Pringle	Dry, rocky]	*********		
6. Dalea spinosa	1079	California	Agua Caliente	Parish Brothers	Dry, sandy			umin
7. Robinia Pseudacacia	405		vard.	S. H. Pook A. Gattinger		The second second		
	815	West Virginia	Grafton	C. G. Pringle	Limestone			
The second second	845	Massachusetts	Danvers	J. Robinson	Gravelly	0.184	4	35
8. Robinia viscosa	1061	do	do	do	Loam	0.060	4	8
79. Robinia Neo-Mexicana	1031	Colorado	Trinidad	W. B. Strong	Low, moist			
0. Olneya Tesota	650	California	Lower Colorado valley.	G. Engelmann and C. S. Sargent.	Dry, gravelly			
81. Piscidia Erythrina	564	Florida	Upper Metacombe Key.	A. H. Curtiss	Coral			
32. Cladrastis tinctoria	33	Kentucky	Mercer county			1-1001000		
	439	Tennessee	Nashville	A. Gattinger	Alluvial	*******	*********	
83. Sophora secundiflora	940	Texas	New Brapafela	C. Mohr	Limestone			
Frigolito.	940	TOXAS	New Distillaters	O. MEURIT	ышеволе			

SPECI	FIC GRAVITY	DETERMINA	nons.	ASH	DETERMINA	TIONS.	Weight, per cubic foot, in pounds		nmber.
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number.
0.4476	0, 4593		0. 4535	0.43	0. 54	0.49			158
0.4079	0.4855)		0.4179	0. 52	0. 52	0. 52			1060
0.3912	0. 3869 \$		0. 4357	0.02	0.32	0.50	27. 15		1.000
0, 4997	0. 5080		0, 5039	0, 62	0. 62	0. 62			76
0. 5478	0. 5579		0. 5529	0. 63	0.56	0. 60	***************************************	***************************************	616
0.5472	0. 4910	0. 5367	0. 5250	0.55	0.60	0. 57		4	736
			0. 5273			0.60	32, 86		
0. 5131	0. 5236	***********	0. 5184	0. 89	0, 80	0. 85	32, 31		336
0.4383	0.4362}		0.4326	0.90	0.88	0. 89	CITY		87
(0.4193	0, 4368)				0.5	3117			
0.4535	0.4449	**********	0.4418	0.49	0, 49	0.49	my grann		103
0.4259	0. 4511	0.4440	0. 4403	0.50	0. 60	0.55	<u></u>		104
WAY!			0. 4382	7//	1	0. 64	27, 31		
0.8106	0. 7728		0.7917	2.31	2.47	2.39	49. 34		46
							SA		
0, 8691	0. 8884	0.8646	0. 8740	1 29	1. 28	1.28	54. 47	0.125 sap-wood	1147
0.5714	0. 5904 }		0. 5536	3, 41	4. 68	4.04	34. 50	First, second, and third sp. gr. determinations made on sap- wood; fourth sp. gr. determination made on 0.1 sap-wood.	1078
(0.5285	0. 5241)			10		VTP	OSIM	wood; fourth sp. gr. determination made on 0.1 sap-wood.	
0.7550	0.7904		0. 7727	0.22	0.20	0. 24			40
0.7908	•••••		- 0. 7908	1, 26	1.12	1.19	.,,		44
0. 6490	0. 6387 0. 7279	0.7097	0. 6439	0. 35	0.95	0. 35	*********	Third on an Administration and a second Collinstal	81.
0.7410	0.7219	0.7087	0. 7259	0.22	0. 25		45.50	Third sp. gr. determination made on sap-wood. Cultivated	84
		- Contract	0. 1000			0. 51	45, 70		
0.8130 0.7942	0. 8017		0. 8094	0, 22	0. 19	0. 20	50. 44	0. 125 sap-wood. Cultivated	106
0.7988	0. 7855	0. 8258	0, 8034	0.62	0.58	0.60	50.07		103
C 0 8059	0.9600)				0.155	-			
0.8953 1.1542	1, 1542	1, 1374	1,0602	1.85 2.75	2, 15 }	2, 29	66, 07		65
							20.00		
0, 8779	0. 8689		0.8734	3.42	3. 34	3, 38	51, 43		56
0.6072	0. 6485		0, 6278	0, 21	0.17	0.19			3
0. 6277			0, 6277	0.39	0.36	0.38			43
V FOU		19:10	0. 6278			0. 28	39, 12		
1.0310	0. 9890	0. 9325	0. 9842	1.44	1.74	1.59	61.31	First and second sp. gr. determinations made on sap-wood	94

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF
	Ощсел					in meters.	Sap- wood.	Heart-wood:
84. Sophera affinis	329	Texas	Dallas	J. Reverchon	Dry, calcareous			
	932	do	Austin	C. Mohr	do	0.084	10	16
85. Gymnocladus Canadensis	296	Missouri	Allenton	G. W. Letterman	Low, rich			
Kentucky Coffee Tree. Coffee Nut.	402	do	do	do	Alluvial			
	519	Tennessee	Nashville	A. Gattinger	Limestone			
86. Gleditschia triacanthos. Honey Locust. Black Locust. Three-	531	Missouri		G. W. Letterman				
thorned Acacia. Sweet Locust. Honey Shucks.	532	do		do				
	444	Tennessee	Nashville	A. Gattinger	Dry, sandy barren			
The second second		180				las ir		
87. Gleditschia monosperma	760	Florida	Chattahoochee river.	A. H. Curtiss	Alluvial	0. 294	21	26
88. Parkinsonia Torreyana	678	Arizona	Lower river.	G. Engelmann and C. S. Sargent.	Sandy			
89. Parkinsonia mierophylla	1258	do	Valley of the Gila	C. G. Pringle		********	******	
90. Parkinsonia aculeata	829			Department of Agriculture.				
	1208	Texas	Austin	S. B. Buckley				*******
91. Cercis Canadensis	59 436		Allenton	G. W. Letterman		10000000	5	35
	1089	Missouri	PROS			111500112154		
	1090			do	Commission of the Commission o		I DE LA COMPANSION DE L	
	1091	do	do	do	do ,	********	******	
92. Cercis reniformis	1142	Texas	Austin	S. B. Buckley	Limestone			
93. Prosopis juliflora	561	do	Fort Stockton	B. L. Baldridge	Light, sandy			
Mesquit. Algaroba. Honey Lecust. Honey Pod.	590	Arizona		A STATE OF THE PARTY OF THE PAR	-			
	680	do	do	do				
	927	Texas	Austin	C. Mohr	Rich, calcareous			
94. Presopis pubescens	600	California	Fort Yuma	G. Engelmann and	***************			77
Screw Bean. Screw-pod Mesquit. Tor- nilla.	658	do	do	C. S. Sargent.	Sandy		******	
	998	do	do	do	•••••	0.064	8	
95. Leucæna glauca	1224	Mexico	Lampasas mountains	S. B. Buckley				
96. Leucæna pulverulenta	1222	Texas	Brownsville	do	Sandy			

CIFIC GRAVITY	TY DETERMINA	rions	ASH 1	DETERMINA	TIONS.	Weight, per cubic foot, in pounds (average).	Remarks.	100
Second.	Third.	Average.	First.	Second.	A verage.	in pounds (average).	ANGINE SIG	-
0. 8161		0.8090	0.42	0.34	0.38		0.25 sap-wood	
0. 9316		0. 8928	1.04	1.13	1.09		0.5 sap-wood	
		0, 8509			0.73	53, 03		
0. 6786		0, 6743	0.70	0. 57	0.64			
		0. 6663	0.45	0.50	0.48			
		0. 7395	0.98	0.82	0.90			h
		0. 6934			0. 67	43, 21		
0. 7359		0. 7345	0. 55	0. 61	0. 58			
0. 6275		0. 6346	0. 69		0.69	,		
		0. 6528	1. 29	0.98	1.14			
		0, 6740	//<	OF	0, 80	42.00		
0,7245	0, 7272	0.7342	0. 60	0,79	0. 73	45, 76	First sp. gr. determination made on sap-wood	
0. 6732	2	0. 6531	1.25	1.00	1, 12	40, 70	Second sp. gr. determination made on sap wood	-
0.7722	3	0.7449	4. 20	3. 08	3. 64	49, 75		-
		0, 6325	2, 32	2, 26	2, 29			-
0. 5968	3	0. 5008	2. 17	2. 51	2.34			
		0. 6116			2.32	38. 11		
0. 6070	0, 6157	0, 6110	0. 59	0. 56	0.58		1/5/	1
		0.7098	0.67	0. 67	0.67			
0, 5959		. 0. 6107	0. 80	0.77	0.79	051		
0.6084		0. 6289	0.82	0.74	0.78		A	
0.6417	7	0. 6213	0.67	0.84	0.76			İ
		0. 6363		2011	0, 72	39. 65	STATE OF THE PARTY OF THE PARTY.	١
0.7645	5 0.7502	0.7513	0.76	0.77	0. 77	46. 82	First and second sp. gr. determinations made on half sap wood	-
0. 8664		0. 8493	3, 35	2, 69	3. 02		Root	-
0. 6997	7	0.7067	1. 67	1.71	1. 69			
0.7726	8	0.7487	1. 45	2.49	1.97			1
0.7620	0.7587	0.7562	2. 09	2.00	2. 05		0.05 sap-wood	1
		0, 7652			2.18	47. 13		-
0. 7910	0	0,7841	1. 02	0.98	1,00		Dead tree; 0.75 sap-wood	
0. 7930		0. 7729	0. 91	0.90	0, 91		All sap-wood	1
0.7278	8	0. 7258	0.95		0.95		All sap-wood	-
-		0, 7609		MALIE	0. 95	47, 42		-
0. 9205	5	0. 9235	3. 27	3. 31	3, 29	57. 55		
0, 6800)	0. 6732	0. 90	1.13	1.01	41. 95		1

Species.		State.	Locality.	Collector.	Soil.	of tree,	-	WTH.
	Office number.					in meters.	Sap- wood.	Heart
Acacia Wrightii	1209	Texas	Austin	S. B. Buckley				
Oat's Olaw.	598	Arizona	Santa Rita mount-	G. Engelmann and	Der manally			
Acacia Greggii	697	do	ains.	C. S. Sargent.	The state of the s	************		in accordance
	893	do	Clifton	E. L. Greene	•••••			*** **
0. Lysiloma latisiliqua	509	Florida		A. H. Curtiss	PROPERTY . A SERVICE OF STREET	The second	14	29
	1112	do	Key Largo	do	do			
t. Pithecolobium Unguis-cati	465	do	Timor Mategorpha	do	do			
Cat's Claw.	1108	do	Key.	do				
	1/	3						
ROSACEÆ.	1/5	7//		1/2/	1-38-42			
2. Chrysobalanus Icaco	480	do	Bay Biscayne	A. H. Curtiss	Swampy	0. 100	47	57125
3. Prunus Americana	68	Missouri	Allenton	G. W. Letterman	Rich uplands			
Wild Plum. Canada Plum. Horse Plum.	220	Vermont	Charlotte	C. G. Pringle	Gravelly			
	334	Texas	Dallas	J. Reverchon	Rich	*******		
		(Par						17
4. Prunus angustifolia Ohickasaw Plum. Hog Plum.	435	Tennessee	Nashville	A. Gattinger	River bluff			tettet:
5. Prunus Pennsylvanica	233	Vermont	Charlotte	C. G. Pringle	Cold, gravelly			
5. Prunus umbellata	606	Georgia	Altamaha river	A. II. Curtisa	Clay	0. 216	21	2
7. Prunus emarginata, var. mollis	968	Washington territory.	Wilkeson	G. Engelmann and C. S. Sargent.	Low, rich,	********		10000
8. Prunus serotina	15	Massachusetts	Roxbury	C. S. Sargent	Gravelly	0. 205	9	3
	106	Vermont	Charlotte	C. G. Pringle		SWOOD FEETING		****
	115	Michigan	Dansville	W. J. Beal		100000000000000000000000000000000000000	100000000000000000000000000000000000000	Contract Con
	127	Missouri	Allenton	G. W. Letterman R. Douglas			-	- Constant
	198	Ohio	Barney & Smith	E. E. Barney	The second secon			- Contract
	817	Michigan	Manufacturing Co. Hersey	W. J. Beal				11177211
	368	Vermont	Charlotte	C. G. Pringle	Gravelly			
	406	Virginia or Mid- dle states.	Charlestown Navy-	S. H. Pook				****
	725	Pennsylvania	yard. Williamsport	C. G. Pringle	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	*******		
	763	Florida	Chattahoocheeriver.	A. H. Curtiss	W. W	0. 218	15	4
	1053	Massachusetts	Topsfield	J. Robinson	Gravelly	0. 320	11	3
		THE PARTY OF				and:		
9. Prunus Capuli	294 418	New Mexico	Pinos Altos mountains.	E. L. Greene		0. 238	7	15

irst. Second. Third. Average		GRAVITY DETERMINATIONS. ASH DETERMINATIONS.				TIONS.	Weight, per cubic foot, in pounds	Remarks.	numb
t. Seco	nd.	Third.	Average.	First.	Second.	Average.	in pounds (average).		Office number.
180 0.9	404		0. 9392	0.68	0.57	0. 63	58. 53		12
		- 10	A 0702	0.68	0.89	0.79		0.05 sap-wood	1
	616	***********	0. 8703	0. 95	0.00	0.95		0.05 sap-wood	
558	0010	***********	0.8558	1,00		1.00			1
100			0. 8550			0, 91	53, 28		
3 - 3			200000000000000000000000000000000000000		8 80				4
Mineral III himse	6663	0, 6901	0. 5848	2.00	2.44	2, 22		Rough bark	1
901 0.7	159	0.0001		1.00	2.01		40.00	assign state and a	
			0.6418			2.12	40, 00		
829 0.8	8349		0.8589	2, 48	2. 25	2.37	Jane John		9
885 1.0	135		0. 9510	3.00	2, 09	2, 55		MON	1
			0. 9049			2, 46	56, 39		
		9-11-11		X//					
290 0. 8	8129		0. 7709	0.87	0.87	0, 87	48.04		
750 0.6	6745		0. 6748	0.11	0.09	0.10			
	6800		0. 6918	0.17	0. 21	0.19	PAN		
	8079		0.7978	0.33	0. 21	0. 27			
			0. 7215		1	0.18	44. 96		
			0.7210					13 1/2 //	
675 0.1	7092		0, 6884	0.28	0, 28	0. 28	42, 90		
014 0.3	5031		0, 5023	0.36	0. 43	0. 10	31. 30		
162 0.	8242		0.8202	0.14	0.10	0.12	51.11		8
310 0.	4694		0.4502	0.18	0. 23	0. 21	28, 06		
047 0 1	7078		0.5004	0.19	0.14	0.14		0.5 sap-wood	
10000	7079 5539	**********	0.5500	0.13	0.14	0.14		U.U SAP WOUL	
11000	4832		10000000	0. 12	0.15	0.14	in a second		
20220	6235	Taken No. (California	100 100 100 100	0. 19	0. 17	0.18			
40000	6508	***********	100000000	0. 19	110000	0.12			
1000 1000		***********	0. 5491		0.13	200			
Commercial	5659	*********	0. 5667	0. 13	0, 11	0.12			
10.1000	5186	********	0. 5280	0.19	0.17	0.18	in the second		
10000	5351	AF#23511031	0.5241	0.14	0.17	0.16	222272222		
	discourse	**********	0.4680	0.06	0.09	0.08	24244244		
	5777	**********	0. 5756	0.09	0. 10	0.10	*********	•••••	
	5221	0.0000		0.17	0.34	0.25			
1833 0,	6857	0. 6880	0, 6857	0, 15	0. 17	0.16			
S. Marie		13.01	0. 5822			0. 15	36, 28		
7282 0.	6940		0.7111	0, 16	0.12	0.14			
3459 0.	8837		0. 8648	0.28	0. 20	Ones		. 0.33 sap-wood	
			0, 7879	1	1	0. 20	49, 10		

		umbe	State.	Locality.	Collector.	Soil.	Diameter of tree,		WTH.
	Species.	Office number.	State.	Locality.	Constant	Dan.	in meters.	Sap- wood.	Heart wood.
110.	Prunus demissa	637	California	Strawberry valley	G. Engelmann and C. S. Sargent.	Low, rich			
111.	Prunus Caroliniana	549	Alabama	Mobile	C. Mohr	Sandy			
	Wild Orange. Mock Orange. Wild Peach.	806	Florida	Jacksonville	A. H. Curtiss	do	0.171	8	61
		916	do	Chattahoochee	C. Mohr	Alluvial	(4//2000)	12	50
		1032	do	Jacksonville Victoria	A. H. Curtiss	Sandy	0.180	26	34
		1002							
12.	Prunus sphærocarpa	1217	Florida	Edge of Everglades.	A. H. Curtiss	Rocky			
13.	Prunus ilicifolia	1158	California	Santa Cruz	C. L. Anderson		0. 206	80	
14.	Vauquelinia Torreyi	1152	Arizona	Santa Rita mount-	C. G. Pringle				
15	. Cereocarpus ledifolius	883	74//						
1.147.	Mountain Mahogany.	904	Utah	City Creek cañon	M. E. Jones Department of Ag-	Rocky			
		5			riculture.				
116	Cercocarpus parvifolius	825	California	Siskiyou county	G. Engelmann and C. S. Sargent.		0.062	3	2
17.	Pyrus coronaria	808	Delaware	Kiamensi	W. M. Canby	Clay			
		1087	Pennsylvania	Nazareth	J. Henry	Moist	*********		*****
		1088	do	do	do	do	********	******	
				MISSER			348		
118	. Pyrus angustifolia American Crab Apple. Southern Crab Apple.	313	South Carolina	Aiken	H. W. Ravenel	Rieb, damp	0, 130	25	
110.	Pyrus rivularis	1002	Oregon	Portland	G. Engelmann and C. S. Sargent.	Rich hills	0.186		
20.	Pyrus Americana	214	Vermont	Charlotte	C. G. Pringle	Gravelly			
	Mountain Ash.	365	do	Huntingdon	do	do			
						34 11	100		
121	Pyrus sambucifolia	410	do	Mount Mansfield	do	do	0, 106	17	
122	. Cratægus rivularis	885	Utah	City Creek cañon	M.E. Jones	do	0, 064	14	1
23	. Cratægus Donglasii	999	Oregon	Cascades of the Co- lumbia river.	G. Engelmann and C. S. Sargent.	Rich	0, 200	29	****
24	Cratagus brachyacantha	926	Louisiana	Webster parish	C. Mohr	Clay			
125	. Cratægus arborescens	3631	South Carolina	the state of the s	H. W. Ravenel			1	
		3632	do	do	do	do			
		An annual land	Georgia	Carrier Control of the Control of th	A. H. Curtiss	And the same of th	0, 168	46	

ımber.		Weight, per cubic foot, in pounds	noxs.	ETERMINA'	ASH I	noxs.	DETERMINAT	FIC GRAVITY	SPECI
Office number.	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
63		43. 32	0.50	0. 48	0. 51	0, 6951	0, 6800	0. 6937	0. 7025
54			0.33	0.33	0. 32	0. 9685	**********	0.9855	0. 9515
80			0.38	0.37	0, 39	0.8472	0, 8314	0.8227	0. 8874
91			0.44	0, 44	0.44	0.7782	*********	0.7797	0.7706
100			0, 48	0, 49	0.46	0, 8691		0. 8721	0.8670
106			0, 43	0.43	0, 43	0.8810	0. 8790	0. 8610	0, 9030
		54, 14	0, 41			0.8688			
121		56. 07	0. 87	0.76	0, 97	0.8998		0. 8934	0. 9062
115		61, 09	0.78	0.76	0.80	0. 9803		0, 9720	0. 9885
115		70, 88	1.45	1.46	1.44	1. 1374		1. 1408	1. 1340
							100000	5 0000	0/0000
90	0.125 sap-wood		0.89	0. 69	1. 27	1. 1015	1.0400	1. 0332 1. 1080	1.0608
		66. 87	1.04			1. 0731			
700		58. 36	0.45		0.45	0. 9365	N.		0. 9365
82		00,00	0.45		0.45				
808			0. 56	0.48	0.52	0.7174	0. 7320	0.7228	0. 6973
108			0. 44	0.38	0.50	0. 6730 0. 7240	0. 6788 0. 7057	0. 6762 0. 7260	0. 6640
108			0.02	0. 10	0.45		0.7037	0.7200	0. 1404
	(5)/	43, 92	0.52		No	0. 7048			
31		42. 97	0. 33	0.33	0. 33	0. 6895		0. 6845	0. 6945
100		51, 82	0.41	0.41	0.41	0.8316		0, 8366	0.8266
21			1.11	1. 23	0.98	0, 5438	0. 5539	0. 5429	0. 5345
36	0.25 sap-wood		0.56	0. 56	0.56	0. 5464	**********	0.5416	0.5512
		33, 97	0. 83			0. 5451			
41	Sap-wood	36. 94	0. 35	0.31	0. 39	0, 5928		0.5963	0, 5893
88		48, 00	0.35	0.37	0. 33	0. 7703		0, 7734	0.7672
00		43, 31	0. 33	0, 36	0. 29	0. 6950	0. 6898	0, 6928	0.7025
92		42. 83	0, 42	0.46	0. 37	0, 6793		0. 6835	0. 6750
36			0. 67	0.70	0. 63	0, 6228		0.6230 }	0. 6366
1000				70.76				0. 6225 \$	0.6093
36			0.38	0.00	0.38	0. 6427	******	0. 6590	0, 6263
60		**********	0. 65	0. 68	0. 62	0.6817	++++++++++	0. 6699	0. 6934
		40.45	0.57		1	0. 6491	100	THE RESERVE	-

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in	GROY	
	Office					meters.	Sap- wood.	Heart-wood.
126. Cratægus Crus-galli	328	Massachusetts	Brookline	J. Robinson	Loam	0.180		
Cockspur Thorn. Newcastle Thorn.	1093	Missouri	Allenton	The second secon	THE RESERVE TO SERVE THE PARTY OF THE PARTY	SASSINGUE III		
127. Cratægus coccinea	100	Vermont	Monkton	C. G. Pringle	Gravelly			
128. Cratægus subvillosa	949	Texas	Victoria	C. Mohr	Alluvial	0. 180	61	
Buret Haw.	1081	Missouri	Saint Louis	H. Eggert		0.106	28	
129. Cratægus tomentosa	154	Vermont	Charlotte	C. G. Pringle	Clay			
Black Thorn. Pear Haw.	426	Tennessee	Nashville	A. Gattinger	Limestone			
		30	n sea	(2)				
130. Cratægus cordata	447	do	do	do	Low			
Washington Thorn. 131. Crategus apiifolia	759	Florida	Chattahoochee	A. H. Curtiss	Alluvial	0.080	27	
132. Cratægus spathulata	300	South Carolina	Aiken	H. W. Ravenel	Rich, damp			
Small-fruited Haw.	614	Georgia	Ogeechee river	A. H. Curtiss	Low	0. 880	38	
134. Cratægus æstivalis	239	South Carolina	Bonneau's Depot	H. W. Ravenel	Damp, rich			
135. Cratægus flava	301	do	Aiken	do			58	
	569	Florida	Tampa	A. H. Curtiss	Sandy		*******	
		107		(X)				1
135. Cratægus flava, var. pubescens Summer Haw. Red Haw.	767	do	Aspalaga	do	Dry clay	0. 142	44	
136. Heteromeles arbutifolia	1160	California	Santa Cruz	C. L. Anderson		0. 184	21	34
137. Amelanchier Canadensis	156	Vermont	Charlotte	C. G. Pringle	Gravelly			
Juneberry. Shad Bush. Service Tree. May Oherry.	241	Kentucky	Brumfield Station	W. M. Linney	Waverly shale	0.140	84	69
	849	Massachusetts	Danvers	J. Robinson	Loam	0.190	43	21
HAMAMELACEÆ.								
138. Hamamelis Virginica	867	do	Beverly	do	Rocky	********		******
	875	do	Danvers	do	do			
	1259	Tennessee	Montvale	A. H. Curtiss	*****************			
			1					
129. Liquidambar Styraciflua	546	Alabama	Kemper's mill	C. Mohr	Rich, alluvial			
amber. Red Gum. Bilsted.	1095	Arkansas	Little Rock	G. W. Letterman	15.00	25.7400		
	1173		Mount Holly	S. P. Sharples	and the same		30	17

- Low		Weight, per cubic foot,	rions.	ETERMINA	ASH I	TONS.	DETERMINAT	IC GRAVITY	SPECII
Office number	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
. 3	Cultivated		0. 56	0. 55	0, 57	0, 6642	0. 6632	0, 6705	0. 6590
. 10			0. 55	0.60	0.49	0.7746	0.7791	0. 7667	0.7781
		44. 83	0. 56			0.7194			
. 1		53.71	0.38	0.40	0.36	0.8618		0.8582	0. 8654
. 8	The state of the s		0.78	0.78	0.77	0.7597		0.7144	0.7000
. 10			0. 61	0. 68	0. 71	0. 7527 0. 8379		0. 7144	0. 7909
		49, 56	0.69			0, 7953			
1								Mary Inc.	
	Market Market Commencer Co		0.47	0.44	0.50	0.7681		0.7712	0.7649
			0.52	0. 51	0.53	0. 7585		0.7110	0.8059
1		47. 57	0.50			0.7633			
		45. 45	0.46	0.44	0.48	0. 7293		0.7481	0, 7105
-		46, 45	0.97	1. 22	0.72	0. 7453		0.7400	0. 7506
			0. 69	0. 67	0.71	0. 7611		0.7698	0. 7524
			0, 62	0. 63	0.60	0.6708		0. 6700	0. 6716
-		44. 61	0.66			0. 7159			
	10 / / / / / / / / / / / / / / / / / / /	40, 91	0.57	0.56	0. 57	0. 6564		0. 6503	0. 6625
			0.88	0.04	0.00	0.7070		0.7000	0.7704
			0.69	0.94	0, 82	0. 7672 0. 7945		0. 7620 0. 7718	0. 7724
1		ROSIN	O P	0					
-		48. 67	0.79	A		0.7809			
-	,	47. 88	0.91	0.91	0.91	0. 7683		0.7596	0.7770
		58, 18	0, 54	0.46	0. 62	0. 9326		0.9042	0.9610
K.	First sp. gr. determination made on 0.75 sap-wood; second sp.		0. 63	0.64	0.61	0. 6858		0.7642	0. 6074
1	gr. determination made on 0.5 sap-wood. 0.25 sap-wood		0.48	0. 53	0.42	0.7924		0.7944	0.7904
	First and third sp. gr. determinations made on 0.9 sap-wood; second sp. gr. determination made on sap-wood.	***********	0. 55	0.45	0. 65	0. 8783	0. 8570	0. 9028	0, 8600
-		48. 85	0. 55			0.7838			Sec.
1			0.41	0.41	6.30	0.7040		0.7393 7	0.7067
			0,44	0.44	0.43	0. 7342		0,7826	0.7081
			0.30	0.33	0. 27	0.7126		0.7828	0.6662
			0.36	0.39	0. 32	0. 6099		0. 6985)	0. 7028 0. 6099
		42.72	0.37			0. 6836			
									74.04.04
			0.48	0.49	0.47	0.6:95		0.6176	0.6415
	All sap-wood		0.61	0.73	0.48	0.5710		0, 5665	0. 5773
			0, 67	0. 66	0. 67	0. 5615	0. 5692	0. 5549	0. 5605

	umber.	g	Tanatta	Collector	Soil	Diameter of tree,	- GROW	
Species.	Office number	State.	Locality.	Collector.	Soil	in meters.	Sap- wood,	Heart-wood.
139. Liquidambar Styraciflua—continued	1182	Mississippi	The state of the s	R. Abbey	- Anne Anne Anne Anne Anne Anne Anne Ann			
	1183	do	do	do	do			12011120
RHIZOPHORACEÆ.								
140. Rhizophora Mangle	485	Florida	Bay Biscayne	A. H. Curtiss	Salt-marsh	0. 250	31	50
COMBRETACEÆ. 141. Conocarpus erecta Button Wood.	489	do	do	do	do	0.164	15	34
142. Lagunoularia racemosa	507	do	Sugar-loaf Sound	do	,do	*********		******
MYRTACEÆ. 143. Calyptranthes Chytraculia	1205	do	Key Largo	do	Coral			
144. Eugenia buxifolia	456	do	Upper Mctacombe	do	do	0. 084	43	
Gurgeon Stopper. Spanish Stopper.	1118	do	Lost Man's river	do	Humus and coral			
	1120	do	Elliott's Key	do	Coral			
	1198	do	Upper Metacombe Key.	do	do			
				4.	Sandar.	0.004	5	5.0
145. Eugenia dichotoma	1200	do	Palm Hummock	do	Sandy	0.084	5	53
146. Eugenia monticola	1115	do	Umbrella Key	do	do	0. 150	15	
Stopper. White Stopper.	1135	do	do	do	do			
	1189	do	do	do	do			
		5	PROSIM	(23//				
147. Eugenia longipes	1197	do	No-Name Key	do	do			
Stopper.	1101		2,0 2,111,19					
148. Eugenia procera	1127	do	Miami	do	do	0. 141	87	
CACTACEÆ.		Land Land		Section 2		-		
149. Cereus giganteus	693	Arizona	. Tueson	G. Engelmann and C. S. Sargent.	Dry, gravelly	********	SMESSES	
CORNACEÆ.		1000000			1000			
150. Cornus alternifolia Dogwood. *	860	Massachusetts	Danvers	J. Robinson	Leam			
Dogwood.	861	do	do	do	do			
	100			Harris March	Autorities of the same			
151. Corpus florido	67	Missouri	Allenton	G. W. Letterman	Uplands	0.143	47	
151. Cornus florida	761	Florida	- Contraction of the Contraction	201100312000000000000000000000000000000	The state of the s		72	
The state of the s	812	West Virginia		A TO A CONTROL OF THE PARTY OF	Total Control of the			
	1077		Allenton				44	7
	1092	do	do	do	. Flinty			
			A LA					
			Dag Co.				1 20	
152. Corms Nuttallii	900	Oregon	. Portland	G. Engelmann and C. S. Sargent.				

	FIC GRAVITY	DETERMINAT	rions.	ASH 1	DETERMINA	TIONS.	Weight, per cubic foot, in pounds	Remarks.	173
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Available	
17 527001	S. CORNE								
0. 6125	0. 5891 0. 5765	0. 6256 0. 5878	0. 6091	0. 72	0.77	0.75			
0.0020	0.0100	0.0010		0.00			20 02		
			0. 5910			0.61	36, 83		
1. 1391	1. 1842		1/1617	1.80	1.83	1.82	72, 40		
0, 9939	0, 9860		0.9900	0, 32	0.32	0. 32	61. 70		
0.7100	0.7174		0. 7137	1. 69	1.54	1. 62	44, 48		
0. 8930	0. 9282	0. 8765	0. 8992	3.04	3, 59	3, 32	56.04		
					01			VI	
0. 8753		***********	0. 8753	1.11	1, 26	1,19			
1.0625	1.0400		1. 0513	1.19	1.05	1, 12			
0.8645	0. 8540	1. 0200	0. 9128	2. 23	2, 15	2. 19			
0, 8857	0. 9232		0. 9045	1.66	1.38	1.52			
			0, 9360	7//		1.50	58.33		
0. 8526	0. 8392	Name and State of the last of	0. 8459	0.85	0. 91	0.88	VA!		E
0. 9542	0. 9472		0. 9507	0.58	0.60	0.59	18		
			0. 8983		6	0.74	55, 98		
			-					3 // /	
0.8910	0. 9110		0. 9010	2. 05	1. 95	2. 00			
0.9180	0. 9340	0. 9202	0. 9241	1.60	1.95	1. 77		/	
0. 9140	0. 9295		0. 9217	1. 83	1.99	1.91			
			0. 9156	110	17	1.89	57.06		
1, 1450	1. 1020		1. 1235	3, 36	3, 60	3.48	70.02		
0. 9425	0. 9482		0. 9453	2, 44	2, 79	2. 62	58. 91		
0, 3259	0. 3116		0. 3188	3.89	3. 01	3, 45	19. 87		
0.6572	0. 6748	0. 6048	0. 6456	0.43	0.41	0.42	20022122222	All sap-wood	
0. 6987	0, 6932	0. 6893	0. 6937	0.39	0, 43	0.41		All sap-wood	
	000		0. 6696			0.41	41. 73		
0.8264	0. 8264		0.8264	0.51	0.60	0. 56			-
0.7599	0.7710		0. 7655	0.75	0.84	0, 80			
0.7892	0. 7863		0.7878	0.73	0, 83	0.78			
0.8690	0.8916		111111111111111111111111111111111111111	0.66	0. 58	0. 62			
0.8114	0. 8215	************	0. 8165	0, 62	0.60	0. 61			
			0.8153			0. 67	50. 81	The second secon	1
			0.0103			0,00	- Control		ì

	Species.	mnu	State.	Locality.	Collector.	Soil.	Diameter of tree, in	GRO	RS OF WTH.
		Office number					meters.	Sap- wood.	Heart wood.
53.	Nyssa capitata Ogecchée Lime. Sour Tupelo. Gopher Plum.	605	Georgia	Ogeechee river	A. H. Curtiss	Swampy	0. 220	27	******
54.	Nyssa sylvatica	235	South Carolina	Bonneau's Depot	H. W. Ravenel	Muck			
	Gum.	517	Tennessee	Cumberland river	A. Gattinger				
		608	Georgia	Ogeechee river	A. H. Curtiss	Muck	0. 220	49	
		750	Florida	Chattahoochee	do	Clay	0. 214	49	
		813	West Virginia	Grafton	C. G. Pringle				
		833	Massachusetts	West Newbury	J. Robinson	Rich	0.256	66	32
		834	do	do	do	do	********		
		835	do	Chebacco pond	do	Low, rich			
			/33	TECHA					
55.	Nyssa uniflora	128	South Cerolina	Bonneau's Depot	H. W. Ravenel	Swampy			
	Large Tupelo. Cotton Gum. Tupelo Gum.	235	do	do	do		0.188	30	
		550	Alabama	Stockton	C. Mohr	Alluvial	0. 320	67	19
	· ·	604	Georgia	Ogeechee river	A. H. Curtiss	Swampy			
								111111111111111111111111111111111111111	
	CAPRIFOLIACEÆ.	0							
56.	Sambucus glauca	681	California	Contra Costa county.	G. R. Vasey	Gravelly	0. 320	6	28
	Elder.								
57.	Sambucus Mexicana	1220	Arizona	Santa Catalina mountains.	C. G. Pringle				
58.	Viburnum Lentago	108	Vermont	Charlotte	Ado	Muck			
	Sheepberry. Nannyberry.	370	do	Hinesburg	do	Swampy			
		11/2		DE LA CONTRACTOR DE LA	1/2				
			U	T DROSIM	1/25//				
159.	Viburnum prunifolium	42	Kentucky	Mercer county	W. M. Linney	Shale			
	Black Haw. Stag Bush.	1104	do	do	do	Trenton limestone.			
		739		Bainbridge	1 100 100 100 100 100 100 100 100 100 1	Clay	0.076	36	
	RUBIACEÆ.								
160.	Exostemma Caribæum	466	Florida	Upper Metacombe	do	Coral	0.076	28	25
		100	2.00.00	Key.					
61.	Pinckneya pubens	257	South Carolina	Bluffton	J. H. Mellichamp	Sandy, swamp	0.108	5	34
	Georgia Dark.	381	do	do	do	do			
162.	Genipa clusiæfolia	457	Florida	Upper Metacombe Key.	A. H. Curtiss				15.5551
		1132	do	Elliott's Key	do		**********	******	
		1195	do	Upper Metacombe Key.	do	do		********	44444
163	Guettarda elliptica	471	do	do	do	do	0. 095	34	
46.00	***************************************	1129	do	The state of the s	do	do			
		1194	do	Control of the Contro	The state of the s	do			
		-						ACTUAL ST	0

BPECH	OC GRAVITY	DETERMINAT	ions.	ASH I	ETERMINA	TIONS.	Weight, per	
First.	Second.	Third.	Average.	First.	Second.	Average.	Weight, per cubic foot, in pounds (average).	Remarks.
0.1000	0. 4546		0. 4613	0. 35	0. 33	0.34	28.75	
0.4680	0.4040		0.4013	0, 55	0.00	0, 54	20.10	
0. 5656	0. 5649		0. 5652	0.66	0. 81	0.74		
0.5650			0. 5650	0.89	0.79	0.84		
0. 6079	0.6104		0.6092	0.49	0.43	0.46		N. Caroliniana
0.6436	0.6682		0. 6559	0.49	0.49	0.49		
0. 6198	0.5865		0.6031	0.52	0.53	0.53	+**********	
0.6849	0.6787	0.6881	0. 6839	0.41	0.40	0.41	***********	
0.7467	0. 6748	0.6708	0.6974	0.38	0.39	0.38		
0.7429	0. 6626	0.7022	0, 7026	0.32	0.34	0. 33		
			0. 6353			0, 52	39. 59	
			0.7047	4.70	101	0.74		
0. 5589	0. 5700		0.5645	0.72	0.76	0.74		
0. 5656	0. 5649	**********	0, 5653	0.66	0.81	0.74		***************************************
0. 5002	0, 5525		0, 5264	0.58	0.59	0.59		
0.4424	0.4002		0, 4213	0.76	0, 66	0.71		
			0.5194			0.70	32. 37	
0.5076	0. 5098		0. 5087	1. 60	1.55	1. 57	31. 70	
0. 4588	0. 4668	0. 4586	0. 4614	1. 83	2. 17	2, 00	28, 75	
0.7285	0.7075		0.7180	0. 27	0. 28	0.28		0.1 sap-wood
0.7519	0.7332		0. 7426	0. 29	0.30	0.30		
			0.7303	3		0. 29	45. 51	7/5/
0.0100	HILL.			w not		7700	DOSIN	//65//
0. 8106	**********	************	0.8106	0.46	0.49	0.48		0.75 sap-wood
0. 9140			0. 9140	0.47		0.47	TXYY	All sap-wood
0.7749	***************************************		0.7749	0.60		0.60		All sap-wood
			0. 8332		FE	0.52	51. 92	A STATE OF THE PARTY OF THE PAR
0. 9200	0. 9419		0. 9310	0. 24	0. 22	0. 23	58. 02	
0. 5528	0. 5613		0. 5571	0.28	0. 27	0.28		
0. 5126	0. 5131		0, 5129	0.49	0.58	0. 54		
			0. 5350			0.41	33. 41	
1, 0219			1 0010		0.00	0.00		An
1. 0425	1. 0270	0.0177	1. 0219	0.71	0.60	0.66	**********	All sap-wood
1. 0705	1. 0270	0. 9175	0. 9957	1.00	1.02	1.01	***********	Second and third sp. gr. determinations made on 0.2 sap-wood.
1.0703	1. 0840		1,0772	1.48	1.55	1. 52	***************************************	
		FIE	1. 0316			1.06	64, 29	
0. 9375	0. 8933		0.9154	0.88	0.79	9.84		***************************************
0.8409	0. 8598		0,8504	0.94	1.03	0.99		
0.7490	0. 7217		0, 7858	1. 33	1. 32	1. 32		
			0. 8337			1.05	51, 96	
		1						

	Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,		ERS OF WIH.
	opores.	Оте	Diaco.	Intally.	Constitut	Son.	in meters.	Sap- wood.	Heart-wood.
	ERICACEÆ.		STELL FOR						
164.	Vaccinium arboreum	343	Alabama			Sandy		65	******
		612	Georgia	Altamaha river	A. H. Curtiss	Swampy			
165.	Andromeda ferruginea	1033	Florida	Jacksonville	do	Hummock			
		1034	do	do	do		0. 216	5	29
dis									
166.	Arbutus Menziesii	643	California		G. R. Vasey				
		019	do	TECHA					
	The second water by the second		100		(C)		33412		
167.	Arbutus Xalapensis	596	Arizona	Santa Rita mountains.	G. Engelmann and C. S. Sargent.	Rocky			
168.	Arbutus Texana	1085	Texas	Hays county	S. B. Buckley	Limestone	0. 086	22	26
169.	Oxydendrum arboreum	353	Alabama	Cottage Hill	C. Mohr	Light, rich	0. 130	28	
-0.000	Sorrel Tree. Sour Wood.	515	Tennessee	Nashville	A. Gattinger	Act To the second of the con-			
			45			SHE			
						3 Marian		lh-	
170.	Kalmia latifolia	2621	Virginia	Fancy Gan	H. Shriver	Moist	0.082	74	
	Laurel, Calico Bush. Spoon Wood. Ivy.	2622	1 100		do				
	The state of the s	2623	do	AND THE RESERVE TO TH	do				
					//5/				1.016
			0	MISSERT	1/51/				
171	Rhododendron maximum	2631	do	do	do	do	0.078	52	
	Great Laurel. Rose Bay.	2632	do	do	do	E-Seattle Control of the Control of	0.010		
				F. O.I.Y.E					10.2500523
	MYRSINACEÆ.								
172.	Myrsine Rapanea	1123	Florida	Bay Biscayne	A. H. Curtiss	Coral			
170	Andiata Diabantusia	494	do	do	do	do	0.080	15	18
110.	Ardisia Pickeringia	1136	do	do	do	do	0.000	40	10
		1192	do	Palm creek	do	do			
174.	Jacquinia armillaris	498	do	Key Largo	do	do			
	Joe Wood.	1130	do	Elliott's Key	do	do			
		1199	,do ,	Umbrella Key	do	do			
	SAPOTAČEÆ.								
175.	Chrysophyllum oliviforme	492	do	Bay Biscayne	do	do	0. 105	18	
176.	Sideroxylon Mastichodendron	461	do	Upper Metacombe Key.	do	do	0. 266	29	49

Office number.	Remarks.	Weight, per cubic foot, in pounds	rions.	ETERMINA	ASH D	TIONS.	DETERMINAT	TIC GRAVITY	SPECII
100	Acmaras.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
- 5			0 44	0.45	0.42	0.7647		0.7479	0.7814
			0.34	0. 32	0. 35	0, 7573	************	0.7405	0.7740
		47. 42	0.39			0.7610			
- 1			0.41	0.37	0.45	0. 7894		0. 8021	0.7766
			0. 51	0.45	0. 56	0.7106		0.7174	0.7037
1	The state of the s	46. 74	0.46	pilitra)	Jew.	0.7500			
-			0.38	0. 33	0.42	0. 6696		0. 6939	0.6452
1			0.41	0, 39	0.42	0. 7407	******	0. 7332	0.7482
1	VIC.	43.95	0.40	OF		0.7052			
		501	0, 25	0.24}	§ 0.21	0. 7099		0. 6955 }	0. 7202
			- VI	0.30 \$	3			0. 7397 \$	0. 6842
	0.5 sap-wood	46. 74	0. 51	0.48	0.54	0. 7500	0. 7292	0.7674	0. 7585
			0.46	0.49	0.42	0. 7803	0.7916	0.7574	0. 7920
-			0.29	0.31	0. 27	0.7114			0.7114
		46, 48	0. 37			0. 7458			
	/// //		0.61		0.61	0, 7536			0. 7536
			0.31		0.31	0. 7214			0.7214
1	7//2//		0.82		0.32	0. 6730	*********	**********	0. 6730
	23/	44.62	0.41	1	10	0.7160			
-			0, 43		0.43	0, 6266			0. 6266
-			0. 29		0.29	0. 6341			0. 6341
		39. 28	0.36			0. 6303			
		51, 98	0.81	0.88	0.74	0.8341	0. 7990	0. 8541	0.8491
			1.83	1, 84	1.81	0, 8283		0.8412	0.8154
			1.85	1. 95	1.74	0. 8666		0. 8532	0.8800
		*********	1.85	1. 95	1.75	0. 8856	**********	0. 8942	0. 8770
		53, 61	1.85			0. 8602			
			3. 96	3. 82	4, 09	0. 6258	0. 6582	0. 6500	0.5693
			3. 61	3, 74	3, 47	0. 6456		0.6475	0. 6437
•			2, 79	2, 73	2, 85	0, 8132		0. 7965	0. 8300
		43. 30	8, 45			0. 6948			
		58. 33	1, 24	1.11	1.36	0. 9360	0. 9660	0.9433	0, 8986
		63.00	5.14	5. 37	4.90	1. 0109	1.0052	1. 0149	1 0125

Species.	Office number	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF
. N. P. G. C.	ОЖеел		and the same of th			in meters.	Sap- wood.	Hear
7. Dipholis salicifolia	488	Florida	Bay Biscayne	A. H. Curtiss	Coral	0.170	36	14
Bustic. Cassada.	500	do	Umbrella Key	do	do	0.150	7	25
	1191	do		do	DESCRIPTION OF THE PROPERTY.			
3. Bumelia tenax	746	Georgia	Bainbridge	do	Low	0. 128	29	
Dymalia lanucinan	20	Missaunt	AWantan	C.W.TW	Thursday	0.000		
. Bumelia lanuginosa	60	Missouri	Allenton	PERSONAL PROPERTY OF THE PERSON		0. 286	57	5555
	930	Texas	Austin	The state of the s	Contract of the second	0. 237	65	****
	1083	Missouri	Allenton	G. W. Letterman	do	*********	*******	****
		1/33	TECH					
. Bumelia spinosa	1146	Arizona	Santa Catalina mountains.	C. G. Pringle	Rocky			
	1151	do	do	do	do			
	1/5	7//		10	1			
	12	1/ - 03			1200			
Bumelia lycioides	333	Tennessee	Nashvilla	A. Gattinger	Alluvial			
Iron Wood. Southern Buckthorn.		Telliosaco	Tradaville	A. Gattinger	Alluvini	**********		
Bumelia cuncata Ants' Wood. Downward Plum. Saf-	503	Florida	Long Key		4 4	CONTRACTOR OF THE	••••••	
fron Plum.	1124	do	Boca Chica Key	do	do		••••••	
	100	A Far		8 //				
* Mimusops Sieberi	458	do	Upper Metacombe	do	do	0.170	12	1110
Wild Dilly.			Key.			0.210		
EBENACEÆ.		Consul	T. PROSIM	25//				
Diospyros Virginiana	61	Missouri	Allenton	G. W. Letterman	Rich upland	0.158	56	
Persimmon.	425	Tennessee	Nashville	A. Gattinger	Rich loam			
	811	West Virginia	Grafton	C. G. Pringle				
	1084	Missouri	Allenton	G. W. Letterman	Rich upland			
	1162	do	do	do	do			
Diospyros Texana	936	Texas	Austin	C. Mohr	Calcareous	0.098	37	
mon. Chapote.								
STYRACACEÆ.				*				
Symplocos tinctoria	347	Alabama	Cottage Hill	do	Sandy	0.134	26	
Horse Sugar. Sweet Leaf.	560	Arkansas	Texarkana	G. W. Letterman	do	0. 123	47	
		THE REAL PROPERTY.						
Halesia diptera	738	Georgia	Bainbridge	A. H. Curtiss	Low			
Halesia diptera	922	Florida	Apalachicola	CONTRACTOR OF THE PROPERTY OF				
		HEELE			A TITLING	G I I		
		F F F G (15) (1)	Training to the second	STATE OF THE STATE OF	Della Company			

De asc.	IFIC GRAVITY	DETERMINA	TIONS.	ASH 1	DETERMINA	TIONS.	Weight, per cubic foot, in pounds	Powerles	unbe
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number.
					0.00	0. 33			
0. 9813	0. 8887		0. 9350	0.34	0.32	0. 33			4.8
0.9737	0. 9233	*******	0. 9485	0. 26	0.31	0. 25	***********		50
0. 9312	0.8912		0. 9112	0.37	0. 33		**********		119
			0, 9316			0.32	58. 06		
0.7106	0.7479		0. 7293	0.71	0.84	0.78	45. 45		74
0.7541	0. 7299		0.7420	1.10	1.02	1.06			. 6
0. 5947	0. 5997	0, 5777	0. 5907	1.44	1. 28	1.36		***************************************	93
0. 6221	0, 6386		0, 6304	1. 27	1. 27	1.27	**********		108
			0. 6544			1. 23	40.78		
0. 6580	0, 6991		0. 6786	1.19	1.04	1.11			114
0. 6392	0. 6063 }	3253466	0. 6419	1, 32	1.43	1.37	2		11
0.6565	0. 6658 \$			1.02	1.40				11
	100		0, 6603			1. 24	41. 15		-
0.7467			0. 7467	0.81	0.81	0. 81	46. 53		. 38
0. 7567	0. 7465		0. 7516	2. 29	2, 31	2.30			. 5
0.8420	0. 8384		0.8402	1.60	1.43	1.51			11:
			0. 7959			1.90	49. 60		700
	100		0.1000		The state of the s		40.00		
1. 0525	1.0989	1.1000	1. 0838	2. 89	2. 32	2. 61	67. 54		41
				ON			12.00		
0. 7639	0.7465		0.7550	100	7 40	PF	OSIN		
0. 8552	0. 1405		0, 7552 0, 8552	1.03	1.03	1.03			
0. 7962	0, 7864		0. 7913	0.95	1.12	1.04	UINT	Female	4
0. 7790	0. 7920	**********	0. 7855	0. 83	0.70	0.77	***************************************		. 8
0. 7710	0.7722	0. 7570	0. 7667	0. 97	1.02	1.01		Wood with black streaks	. 10
			0, 7908			0. 96	49. 28		
0, 8325	0. 8391	0.8664	0. 8460	3. 34	3, 32	3. 33	52, 72		90
			100						
0, 5265	0. 5593		0. 5429	0.72	0. 81	0.77		1	3
0. 5079	0. 5360		0. 5220	0. 62	0. 57	0. 60			5
			0. 5325	MATE		0.68	33. 18		
0. 5481	0. 5381		0. 5431	0. 57	0.42	0. 50			. 7
0. 5999	0. 5957		0. 5978	0. 35	0.35	0. 35			9
			0. 5705		R	0.42	35. 55		

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,	LAYE	RS OF
species.	Ощее п	State.	Locality.	Confector.	3011	in meters.	Sap- wood.	Heart wood.
188. Halesia tetrantera	275	Virginia	Carter's ferry	H. Shriver	Rocky			
88. Halesia tetraptera Ratilebox. Snow-drop Tree. Silver- bell Tree. Calico Wood.	613	Georgia	Altamaba river	A. H. Curtiss			- 17	
OLEACEÆ. 89. Fraxinus Greggii	1221	Mexico	Lampasas mount-	S. B. Buckley				
90. Fraxinus anomala	1105	Utah	Kane county	A. L. Siler	Sandy			
91. Fraxinus pistaciæfolia	591	Arizona	Santa Rita mount-	G. Engelmann and C. S. Sargent.	Low			
	892	Eastern Arizona	San Francisco mountains.					
		100	10011	(0)				
92. Fraxinus Americana	25	Massachusetts	Acushnet	E. A. Dana				
White Ash.	391	Missouri	Allenton	G. W. Letterman	Siliceous hills			
	392	do	do	do	Alluvial			
	393	do	do	do	do			
	1141	Michigan	Dansville	W. J. Beal	Clay			
	1143	do	Hudson	do				-
	1144	do	Lansing	do	a			
	1145	do	Dansville	do	Clay			
	130	South Carolina	Bonneau's Depot	H. W. Ravenel	Wet			
	144	Illinois	Waukegan	Robert Donglas	Clay			
	170	Ohio	Pineo, Daniels & Co.	E. E. Barney				
	173	do #	Farmers' Friend Manufacturing Co.	do				
	175	do	J.W. Stoddard & Co.	do				
	190	do	Woodsum Machine Co.	do				
	191	do	B. E. McSherry &	do			227277	
	212	Virginia	Wytheville	H. Shriver			1010101	
	2271	Vermont	Charlotte	C. G. Pringle	Gravelly	*******		10000
	2273	do	do	do	Swampy	*******		
	2671	Virginia	Wytheville	H. Shriver			*****	
	2672	do	do	do		*********		
	2673	do	do	do		********	******	
	431	Tennessee	Nashville	A. Gattinger	Limestone		******	
	551	Alabama	Kemper's mill	C. Mohr	Alluvial	0. 268	79	
	728	Pennsylvania	Williamsport,	C. G. Pringle				
	747	Georgia	Bainbridge	A. H. Curtiss	River-bottom	0.260	95	
	1045	Massachusetts	Reading	J. Robinson		0. 215	64	*****
2. Fraxinus Americana, var. Texensis	364	Texas	Dallas	J. Reverchon	Dry, calcareous	0.384	69	
	937	do	Austin	C. Mohr	Rich, calcareous			
		A TOWN			The state of the s			
93. Fraxinus pubescens	100	Michigan	Tansing	W I Post	Poor			
Red Ash.	139 229t	Michigan Vermont	Lansing	Charles and the second	100	1		
	229		Charlotte	C. G. Pringledo	San			

SPEC	TFIC GRAVITY	Second. Third. Average		ASH	DETERMINA	TIONS.	Weight, per cubic foot, in pounds		Total Marie
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	
0. 5617	0. 5460		0. 5539	0.38	0.36	0. 37			
0. 5569	0. 5864		0. 5717	0.48	0.38	0.43			1
THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE				10,392		36,737	and the same of th		
			0, 5628			0.40	35. 07		1
0.7778	0. 8030		0. 7904	0.97	0, 89	0. 93	49, 26		1:
9. 6708	0. 6485		0. 6597	0.81	0. 88	0, 85	41.11	Growth slow	1
0. 6336	0. 6243)			(0.84	0.88)				
0. 0330	0. 6656		0. 6625	0.44	0.69	0.71	***************************************		1
0. 6868	0. 7120		0, 6994	0.51	0. 54	0.53	CLI		
01 0000			0. 6810			0. 62	42.43		
0.5911	0. 6682		0. 6297	0. 29	0.32	0. 31			
0. 6253	0. 6481		0. 6367	0. 33	0. 34	0.34		Wood from hills not considered valuable.	
0, 6223			0. 6223	0.51		0.51		All sap-wood.	
0. 6771			0. 6771	717					
0. 5265	0.4711		0. 4988	0. 53		0. 53			
0.7225			0, 7225	0, 60	109	0.60		<u> </u>	
0. 6506			0. 6506	0.38		0.38			
0.6086			0. 6086	0, 32		0.32			1
0. 6744	0.7005	*******	0, 6875	0.36	0.89	0.38		All sap-wood*	
0.7631	0.7600		0.7616	0.45	0.45	0.45		All sap-wood; second growth. Growth rapid	
0.7449	**********		0.7449	0.35	0.37	0.36			
0.7179	0.7116		0.7148	0.39	0.39	0.39	***********	American capation and a second	
0.6470	0. 6473		0.6472	0 31	0.29	0.30	Margary	many long to specific and the contraction of the co	1
0. 6383	0. 6387		0, 6335						- 3
0. 6116	***************************************		0.6116	0. 24	0.24	0. 24		A	1
0. 6157	0. 6213		0. 6185	0.45	0.42	0.44		0.5 sap-wood	1
0. 6253	0. 6326		0. 6290	0.30		0.30	*************		1
0. 6489	0. 6987		0. 6738	0. 26		0. 26	***********		1
0. 6097			0. 6097	0, 43		0.43		0.5 sap-wood	3
0. 6329		*********	0, 6329	0.35		0.35		0.5 sap-wood	
0. 6763	***************************************	***************************************	0. 6763	0.44		0.44		All sap-wood	3
0, 6449	727072773527	**********	0. 6449	0.74	0. 69	0.72			1
0.6176	0. 6481	**********	0.6329	0. 55	0.48	0.52	*********		
0. 6423	0.5944	***********	0,6184	0, 37	0.28	0.33	***********		1
0. 5599	0.5972	0.0010	0.5786	0.68	0.71	0.70			
0. 9131	0. 8141	0.8016	0.8429	0.47	0.39	0.43	40.77	0.000	1
24/19/2009			0. 6543			0.42	40.77		-
0. 8252	0, 8530	***************************************	0.8391	0, 56	0.49	0.53	***********		
0.7095	0.6667		0. 6881	0.86	0. 87	0.87			
	WE ST		0.7636		Parish !	0.70	47. 59		
0.5066	0. 6529	0. 6779	0. 6125	0.26		0. 26		Poor quality	1 2
0.6619	***********		0.6619	0. 21		0. 21			1

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		TRS OF WIH.
	Ошее	750.70				meters.	Sap- wood.	Hear
93. Fraxinus pubescens—continued	2293	Vermont	Charlotte	C. G. Pringle	Clay			
so. Fluxinus pubescens—continuou		7 01110110 11111111	Charlotte	O. C. Zingio.	Only		*******	1
	1059	Massachusetts	Topsfield	J. Robinson	River-bottom			
94. Fraxinus viridis	57	Missouri	Allenton	G. W. Letterman	Rich, wet			
Green Ash.	308	Texas	Dallas	J. Reverchon	do	1011 0011	45	42
	438	Tennessee	Nashville	A. Gattinger			III	
	948	Texas	Victoria	C. Mohr		0. 144	31	
	957	do	Matagorda bay	do	do	0.184	34	
The state of the s	501		Managorus bay			0.104	0%	
			TECH					
94. Fraxinus viridis, var. Berlandieriana Ash.	1211	do	Austin	S. B. Buckley	do			*****
95. Fraxinus platycarpa	536	Alabama	Stockton	C. Mohr	Rich, alluvial	0.090	27	*****
96. Fraxinus quadrangulata	66	Missouri	Allenton	G. W. Letterman	Dry upland	0. 138	35	
Blue Ash.	125	Michigan	Lansing		Rich loam	BOOK TO SERVICE		
	2861	Kentucky	Mercer county	The state of the s	Limestone			
	2862	do	do	do	.do	COLUMN TO SERVICE SERV		10000
	2863	do			do		September 1	100000
	291	Missouri	Allenton		Sandy loam		Comment With the	10000000
	423	do	do	Chraning and social conjugate at	The Auto San Land Control of the Control	**********		10755
	518	Tennessee	Nashville	A SEPTEMBER OF STREET	Rich upland	*********	********	20000
	310	Tennesses	Nashvine	A. Gattinger	Rich limestone		********	*****
				1/2/				
97. Fraxinus Oregana	964	Oregon	Portland	G. Engelmann and	Low, wet	0. 355	46	4
Oregon Ash.	1001	do	Weidler's saw-mill .	C. S. Sargent.		0.000		Marine .
the minimum to the second	1024	do	Portland Furniture	do				
	1030	do	Company.	do			*******	*****
	2000		do			**********		
98. Fraxinus sambucifolia	102	Vermont	Charlotte	C C Pringle	West meater			
Black Ash. Hoop Ash. Ground Ash.	122	Michigan	Dansville	W. J. Beal	Wet, peaty			
	147				1			
		Illinois	Waukegan	Robert Douglas	Low, wet			****
	378	Vermont	Charlotte	C. G. Pringle	Wet, peaty			
	839	Massachusetts	Danvers	J. Robinson	Rich, loamy	0. 236	55	
99. Forestiera acuminata	616	Georgia	Ogeechee river	A. H. Curtiss	Rich, moist	0.075	91	
Privet.	737	do	The state of the s	The second contract of the second	NAME OF TAXABLE PARTY OF TAXABLE PARTY.	0.075	31	*****
	955	Texas	Matagorda bay	C. Mohr		0. 150	55	
	200	TOARS	matagorda bay	C. Monr	Andvist	**********		
00. Chionanthus Virginica	276	Virginia	Carter's ferry	H. Shriver	Rich, moist			
Fringe Tree. Old Man's Beard.	751	Florida	Chattahoochee	A. H. Curtiss		0, 141	47	

		Weight, per cubic foot	rions.	ETERMINA	ASH I	TIONS.	DETERMINAT	FIC GRAVITY	SPECI
	Remarks.	Weight, per cubic foot, in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
			0. 20		0. 20	0. 6459			0. 6459
1	All sap-wood		0.42	0. 41	0.42	0, 5598		0. 5260 }	0. 5957
						3,000		0. 5489 \$	0. 5685
		38, 96	0. 26			0, 6251			
	First sp. gr. determination made on 0.5 sap-wood		0. 55	0. 62	0. 47	0. 6671		0. 6701	0. 6640
			0.56	0. 57	0. 54	0. 6112	******	0. 6277	0. 5947
	All sap-wood	*********	0.81	0.80	0. 82	0. 7350			0. 7350
ı	Second and third sp. gr. determinations made on sap-wood		0.60	0.56	0. 63	0. 7949	0. 7902	0. 8217	0.7728
ı	Second sp. gr. determination made on sap-wood	**********	0. 79	0.76	0.82	0.7503		0.7807	0.7198
		44. 35	0.65			0. 7117			
	<u> </u>	36. 02	0. 54	0. 56	0. 51	0. 5780		0. 5786	0.5774
		22. 07	0.73	0.76	0.69	0.3541		0. 3515	0. 3567
			0. 65	0. 67	0, 63	0. 8343		0, 8440	0. 8246
			0.00	0.01	0.96	0. 4929		0.0910	0. 4929
			0.74		0.74	0. 7789			0. 7789
	Second growth	MA	0.81		0.81	0. 8131			0. 8131
	Second growth		0. 82		0.82	0. 7469			0.7469
			0. 89	0. 90	0.88	0. 6027		0.6086	0. 5967
			0.76	0.74	0.78	0, 6822		0. 6746	0. 6897
	2 1 1/A //		0. 61	0. 61	0, 60	0.7960			0.7960
		46.78	0.78		3	0.7184			
	Second sp. gr. determination made on sap-wood.	OSIN	0. 27	0.43	0.11	0. 6189		0. 5947	0, 6432
	Second spr gar decommended and say would		0.73		0.73	0. 5719		0. 6123	0. 5314
	Brash		0.14	0. 15	0. 12	0. 4645		0. 4736	0. 4553
	Tough		0. 23	0. 24	0. 21	0, 6371		0. 6425	0. 6317
		35, 72	0.34			0, 5731			
			0, 60	0. 57	0, 62	0. 6274		0. 6338	0, 6209
			0. 89		0. 89	0. 5034			0. 5034
	Second sp. gr. determination made on 0.125 sap-wood.		0. 86	0.88	0.84	0. 6836	Control of the Contro	0.6812	0, 6859
ĺ	and a bright account management and a series only account		0.80	0.83	0.77	0. 6207		0. 5928	0. 6485
	All sap-wood		0.47	0.48	0.46	0.7243		0. 7465	0.7020
		39. 37	0.72			0. 6318			
			0.74	0, 72	0.75	0. 7284		0. 7500	0. 7067
			0.69	0.72	0. 65	0. 5755		0. 5681	0. 5829
			0.74	0. 60	0.88	0. 5995		0. 6002	0. 5988
		39, 54	0.72			0. 6345	The same		
		222000	0. 53		0. 53	0. 5552		0, 4628	0.6476
			0. 53	0. 56	0.39	0. 7191	0. 7259	0.7165	0. 7150
				- 1					

Species.	Ошсе пишрег.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF WTH.
	ОЩсел			39-5-19-12		meters.	Sap- wood.	Heart-wood.
201. Osmanthus Americanus	283	Louisiana	Amite	C. Mohr	Rich, alluvial			
Devil Wood.	344	Alabama	Cottage Hill	do	Low, rich			
	584	Florida	Saint John's river	A. H. Curtiss	Sandy loam	0, 190	45	19
BORRAGINACEÆ.								
02. Cordia Sebestena	1202	do	The state of the s	do		7		
	1218	do	do	do	do	*********	******	
03. Cordia Boissieri	1223	Texas	Brownsville	S. B. Buckley	Limestone			*****
04. Bourreria Havanensis	455	Florida	Upper Metacombe Key.	The same of the sa	The second secon	THE REAL PROPERTY.	45	******
	1137	do	Key Largo	do	do		******	******
	1/5			13				1
05. Ehretia elliptica	827	Texas		Department of Ag-				
Knackaway. Anaqua.	942	do	New Braunfels	riculture. C. Mohr.	Rich, alluvial	0. 170	25	
BIGNONIACEÆ.		40						
06. Catalpa bignonioides	167	Ohio	Alexandersville	S. H. Binkley and E.	Clayey loam			
Catalpa. Catawba. Bean Tree. Cigar Tree. Indian Bean.	540	Alabama	Stockton	E. Barney.	Low, wet	100000000000000000000000000000000000000		
	744	Georgia	Bainbridge		Clay	0. 238	3	17
			MISSORT	1/5//				1
07. Catalpa speciosa	38	Missouri	Charleston	C. S. Sargent	Wet clay	0. 288	8	51
Western Catalpa.	160	Ohio	Dayton	E. E. Barney	DAMES -			
The party of the second	166	Illinois	Cairo		La Company of the Com			
	171	Indiana	Wabash river	E. E. Barney				
	180	Tennessee	Obion river	E. P. Hynds and E.	tom.			
	181	Missouri	New Madrid	E. E. Barney	do			
	182	Illinois	Ullin	do	do			
	183	Missouri	New Madrid	do	do			
District our residence of the second	184	do	do	do	do			
	210	Indiana	Vincennes	do	do			
08. Chilopsis saligna	556	New Mexico		E. L. Greene	Alluvial	********	******	
Desert Willow.	595	Arizona	Gila river. Tucson	G. Engelmann and	Moist, gravelly			
	682	do	do	C. S. Sargent.	do			
09. Crescentia cucurbitina	1216	Florida	Bay Biscayne	A. H. Curtiss	Coral			
Black Calabash Tree.						11		
VERBENACEÆ.								
10. Citharexylum villosum	483	do	do	do	do			

SPECI	FIC GRAVITY	DETERMINAT	HONS.	weight, pe			Weight, per	Personal	ampe
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number.
0. 8156	0, 8652		0, 8404	0. 68	0, 65	0. 67		0.5 sap-wood	2
0.8606	ST CORP.		0. 8606	0. 26	0, 29	0.28		All sap-wood	3
0.7100	0.7544		0.7322	0.43	0.43	0.43		First sp. gr. determination made on sap-wood; second sp. gr. determination made on 6.75 sap-wood.	5
.72.003241	777 17700	0	0.8111		3000	0.46	50. 55	termination made on 0.75 sap-wood.	
			V V		X				
0.7740			0.7740		4. 09	4. 09			12
0.6008	0. 6942		0, 6475	4. 43	4. 28	4. 35			12
			0,7108			4. 22	44. 30		
0. 6710	0. 6870		0, 6790	3, 67	3, 39	3, 53	42.31		12
0.0710	0.0010	*************	0.0780	3,07	0,00	0.00	94.01		12
0. 8280	0. 8248		0. 8264	3, 38	3, 20	3, 29		V.A.	4
0.7708	0,7960	0. 7980	0, 7883	2. 28	2, 27	2.28			fi
			0, 8073	V/		2.79	50, 31		
			-	>//		A 12 1241			
0. 6636	0. 6548 0. 6302	***********	0. 6592 0. 6288	1, 23	1. 27	1. 25			8
0.0274	0.0002	***************************************	0.0200	1. 33	1.41	1. 37			
			0. 6440		A	1.31	40, 13		
0. 4293	0. 4270		0.4282	0.40	0.41	0,41		Cultivated	1
0.4694	0.4979		0, 4837	0, 26	0.34	0, 30		(4.3.4	
0. 4426	0.4177	***************************************	0. 4302	0.47	0.37	0.42			1
			0.4474	(3)		0.38	27. 88		
0.4601	0.4446		0.4524	0.30	0.41	0.36	ROSIN	//23//	
0. 4586	0.4467		0. 4527	0.34	0.39	0.37		Cultivated	
0. 3897	0. 3829		0. 3863	0. 36	0.34	0. 35			
0, 3850	0.3878	*******	0.3864	0.32	0.30	0.31			. 3
0.4156	0. 3783	0.4260	0.4066	0.45	0.50	0.48			
0. 3900			0. 3900	0.38	0.42	0.40		From an old fence-rail	
0. 3968			0.3968	0.47	0.43	0.45		From a post 47 years in the ground	
0.4493			0.4493	0.48	0.37	0.43		From a standing tree killed by earthquake a 1812	
0.4535			0. 4535	0.40	0. 34	0. 37			
0. 3911	0. 3907		0. 3909	0.38	0.39	0.39			
			0.4165			0.39	25, 96		
0. 6059			0. 6059	0.37	0. 37	0. 37			
0. 5631			0. 5631	0. 43	0.41	0.42			
0. 6003	0.6026	***************************************	0. 6015	0. 32	0. 32	0.32			
		1 10	0. 5902		1	0.37	36, 78		
0. 6270	0. 6368		0. 6319	1.47	1. 23	1, 35	39. 38		1
0, 8775	0. 8644		0. 8710	0, 49	0, 54	0. 52			

		Ошсе пишьег.	State.	Locality.	Collector.	Soil.	Diameter of tree,	GHO	
	Species.	Ощее п	State.	Locality.	Concession	504	in meters.	Sap- wood.	Hear
1	Avicennia nitida. Black Tree. Black	490	Florida	Bay Biscayne	A. H. Curtiss	Coral	0. 158	39	18
	Wood.	826	do		Department of Ag- riculture.	****************	enneton.co	*******	*****
		828	do		do	****************	*******		*****
	NYCTAGINACEÆ.								
12.	Pisenia obtusata. Pigeon Wood. Beef Wood. Cork Wood. Pork Wood.	474	do	Upper Metacombe Key.	A. H. Curtiss	Coral	*****		*****
13.	POLYGONACEÆ.	473	do	do	do	do ,	0.156	48	2
170551	Pigeon Plum.			TECH					17
4.	Coccoloba uvifera	453	do	do	do	Sandy	0. 214	17	2
15	LAURACEÆ. Persea Carolinensis	585	do	Saint John's river	do	Sandy Ioam	0. 188	12	4
LW	Red Bay.						Secretary.		
15.	Persea Carolinensis, var. palustris	340	Alabama	Mobile county	C. Mohr	Damp, sandy	0. 372	119	*****
6.	Nectandra Willdenoviana	470	Florida	Upper Metacombe Key.	A. H. Curtiss	Coral	•••••	******	
	res.	1138	do	Bay Biscayne	do	do	0.086	27	
		1196	do	Upper Metacombe Key.	do	do			
			1 the			1			
17	Sassafras officinale	71	Missouri	Allenton	G. W. Letterman	Low, rich			
	Sassafras.	387	do	do	do	Alluvial			
		446	Tennessee	Nashville	A. Gattinger	Rich			
		814	West Virginia	Grafton	C. G. Pringle				
		854	Massachusetts	Danvers	J. Robinson	Rich loam	0.232	11	
		1163	Missouri	Allenton	G. W. Letterman	Low, alluvial			
110	Umbellularia Californica	703	Oregon	Coos bay	G. Engelmann and				1
10.	Mountain Laurel. California Laurel. Spice Tree. Cagiput. California Olive. California Bay Tree.	897	California	Coos bay	C. S. Sargent. Department of Agriculture.				
	Olive, California Bay Tree.		toking the part		riculture.		1000		
	EUPHORBIACEÆ.		No.	B T B E					
19.	Drypetes crocea	468	Florida	Upper Metacombe Key.	A. H. Curtiss				10000
		1185	do	No-Name Key	do				
		1193	do	Upper Metacombe Key.	do	do			1000
		1							
19.	Drypetes crocea, var. latifolia	459	do	do	do	do	0. 292	112	1
		1187	do	do	do	do			

SPECI	FIC GHAVITY	DETERMINAT	rions.	ASH I	DETERMINA	TIONS.	Weight, per cubic foot,	
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.
1. 0919	1. 0485		1, 0702	1. 99	1. 12	1, 56		0.5 sap-wood
0.9066	1, 9522		0. 9794	1.71	1. 72	1.71		
0.7074	0. 6762		0.6918	4. 54	4. 01	4. 27		First sp. gr. determination made on sap-wood; second sp. gr. determination made on 0.5 sap-wood. All sap-wood.
			0. 9138			2, 51	56, 95	
0. 6475	0. 6582		0. 6529	7.44	7. 79	7, 62	40. 69	
				1975				
0.9629	1.0040	•••••	0. 9835	5, 25	4. 81	5, 03	61. 20	0.66 sap-wood.
0. 9149	0. 9998	0. 9759	0. 9635	1.11	1. 63	1, 37	60.04	First sp. gr. determination made on 0.5 sap-wood; third sp. gr. determination made on 0.25 sap-wood.
0. 6373	0. 6485		0. 6429	0.66	0. 85	0.76	40. 07	
0.5977	0. 6815		0. 6396	0.46	0. 27	0. 37	39, 86	
0, 8206	0. 7650		0. 7928	0.82	0. 68	0.75		0.9 sap-wood
0.7980	0.8482 }		0, 8147	0. 52	0, 59	0. 56		All sap-wood
0.8148	0.7980 \$		0.0141	0.02	0, 00	0.00	**********	All sap-wood
0.7222	0. 6787		0.7005	0.48	0.47	0.48		
			0.7693			0.60	47. 94	
0. 5030	0. 5210		0. 5120	0.11	0, 09	0.10		1/511
0.4900	0.4828		0.4864	0.08	0.09	0.09		
0. 4542			0, 4542	0.04	0.05	0, 05	8051	
0.5266	0. 5363		0.5315	0.06	0.07	0.07		
0. 5765	**********	0. 5773	0. 5769	0,06	0. 23	0.15		***************************************
0. 4558	0. 4319	0. 5055	0.4644	0.12	0.15	0.13	******	
			0, 5042	No. 16		0, 10	81. 42	
0, 6326	0, 6202		0. 6264	0.36	0. 27	0. 32		
0. 6697	0. 6840		0. 6769	0. 55	0. 36	0.46		
			0. 6517			0.39	40. 61	
0. 9195	0. 8448		0. 8821	8, 58	8, 16	8, 37		All sap-wood
0. 8918	0. 9119		0. 9019	3. 19	3. 26	3, 23		
0. 9690	0. 9882		0. 9786	7. 07	6. 58	6. 83		
			0. 9209			6. 14	57, 39	
1.0069	0. 9390		0. 9730	8. 69	9. 09	8, 89		•••••
0. 9048	0. 8878		0.8963	7. 70	7. 70	7.70		
			0. 9346			8, 29	58. 24	

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in	GRO	WTH.
	Office					meters.	Sap- wood.	Hear
20. Sebastiania lucida	469	Florida	Key.	A. H. Curtiss			30	40
	1126 1206	do	Key Largo	do				
d. Hippomane Mancinella	1110	do	Key West	do	do	0, 129	35	
URTICACEÆ.								
2. Ulmus crassifolia	324	Texas	Dallas	J. Reverchon	Rich loam	0. 484	52	7
	929	do	Austin	C. Mohr	do	***********	********	
Nant mining		1613	TECHA					
3. Ulmus fulva	301	Kentucky	Mercer county	W. M. Linney	Limestone			
Red Elm. Slippery Elm. Moose Elm.	303	do	do	do	do			
	304	do	do	do	do			
	101	Vermont	Hinesburg	C. G. Pringle	Gravelly loam			
	120	Michigan	Dansville	W. J. Beal	Gravelly			
	134	Missouri	Allenton	G. W. Letterman	Rich, alluvial			
	366	Vermont	Charlotte	C. G. Pringle	Gravelly			
	369	đo	do	do	do			
	429	Tennessee	Nashville	A. Gattinger	Clay			
	869	Massachusetts	Boxford	J. Robinson	Rich loam	******		
		MAN MAN						
4. Ulmus Americana	19	do	Arnold Arboretum .			0. 561	19	3
	202	Ohio		E. E. Barney				
	2811	Missouri		G. W. Letterman				
	2812	do		do	do			
	958	Texas	Colorado river	C. Mohr	do	0. 230	17	P.S.
	1036	Massachusetts	Danvers	J. Robinson	Gravelly	0.160	7	1
	1049	do	North Reading	do	do	0. 215	21	1
Rock Elm. Cork Elm. Hickory Elm.	1161	Michigan	Dansvillle					
White Elm. Oliff Elm.	1162	do		do		The Contract of the Contract o		
	1163	do		do	THE PROPERTY OF THE PARTY OF TH	CONTRACTOR OF		*****
	314	do	S-EN HOSEN SHOW COME	do	Alluvial	Charles and Con-		
	428	Tennessee	Nashville			2 7 7 7 7 7 7 7 7 7 7 7 7 7		1000
								10000
3. Ulmus alata	133	South Carolina	Bonneau's Depot	H. W. Ravenel	do			
Wahoo. Winged Elm.	380	Tennessee	Davidson county	A. Gattinger				
				100				3

r	TY DETERMI	NATI	ions.	ASH	DETERMIN.	ATIONS.	Weight, per cubic foot,	Remarks.	
1.	Third.		Average.	First.	Second.	Average.	in pounds (average).		
55			1, 1025	4, 96	4.48	4.72		0.25 sap-wood	
15	1 - 000		1. 0768	1.82	1.96	1.89		0.5 sap-wood	18
10			1, 0921	1. 65	1.82	1.74			1
		-	The Park of	1.00	1.02	-	67 00		
		-	1. 0905	a de la constante de la consta		2.78	67. 96		-
90			0. 5772	5. 20	5.11	5. 16	35. 97		11.0
									+
35			0. 6736	1.05	1.03	1.04		Ash of a knot, 1.85.	1
10			0.7754	1.41	1.30	1.36			
			0.7245	1699	61	1. 20	45. 15	VI	
58			0.8361	1.30	1.00	1.15			
			0.7062	0.79		0.79			
			0, 6499	0.60		0.60			1
38			0. 5619	0.86	0.81	0.84			1
			0. 6769	0. 82		0. 82			1
41			0. 6841	0.68	0.79	0.74			1
85			0.7065	1. 24	0.84	1.04			-
02			0. 6817	0.12	0.11	0.12			
			0. 6706	1. 22	1.31	1.27			
22	,	70.5		1 1000	1		TO FEE		1
8(0. 7823	1.07	0.70	0, 88		Z - // A //	
			0. 6956	(3)		0, 83	43, 35		-
01			0. 5386	0.86	0.82	0.84	Lucia	Specific gravity of wet sap-wood, 1.026	
8	7		0.7373	0.40	0.56	0.48		Second sp. gr. determination made on sap-wood	
54	0, 634	6	0.6207	0.93		. 0.93			
			0. 6299	0, 86		0.86			
8	0.626	15	0. 6413	1.04	0.99	1.02		First sp. gr. determination made on 0.5 sap-wood; second sp. gr. determination made on 0.75 sap-wood; third sp. gr. determination made on san wood	
0	2 0.674	2	0. 6742	0.75	1.01	0, 88		tion made on sap-wood. Third sp. gr. determination made on sap-wood	
8	0.711	6	0.7124	0.75	0.45	0. 60		First sp. gr. determination made on 0.25 sap-wood; second and third sp. gr. determinations made on sap-wood.	1
			0.6506		I S	0.80	40, 54		
*			0. 8144	0.42		. 0, 42			1
		***	0. 6846						
9	6	***	0. 6400	0.34		. 0.34			
		***	0.7345	0.79		. 0.79			
7	0		0. 7430	0.59	0. 69	0.64	*********		1
			0.7414	0. 90	0.72	0.81			
			0.7263		118	0.60	45, 26		1
54	4		0. 8627	1.02	1, 12	1.07		All sap-wood	-
22			0.6100	1.14	1.17	1.16		0.5 sap-wood	
36	0		0.7746	0.76	0.72	0.74			-
		100		-1					œ

	Species.	Ощое пишрег.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF WTIL
		ощее					meters.	Sap- wood.	Heart wood.
227.	Planera aquatica	758	Florida	Chattahoochee	A. H. Curtiss	Rich, alluvial	0. 246	38	
		918	do	do	C. Mohr		11 1155		
228.	Celtis occidentalis	69 751	Missouri	Allentondo	G. W. Letterman	Limestone		50	
		752		do		Alluvial			
		306	Texas	Dallas		do			
		375	Tennessee		A. Gattinger	Loam			
		864	Massachusetts		J. Robinson			4	30
		873	do		do	Loam			00
		1111	Missouri		Henry Eggert	Moist loam		23	
									3
228.	Celtis occidentalis, var. reticulata Hackberry. Palo Blanco.	652	Arizona	Santa Rita mountains.	G. Engelmann and C. S. Sargent.	Dry			
229.	Ficus aurea	486	Florida	Bay Biscayne	A. H. Curtiss	Coral	*******	******	
		3/1			Linear Vite	A Comment			3
230.	Ficus brevifolia	1204	do	Key Largo	do	do	•••••		******
231.	Ficus pedunculata	508	do	Boca Chica Key	do	do			
232.	Morus rubra	132	Missouri	Allenton	G. W. Letterman	Rich loam	*****	•••••	
		433	Tennessee	Nashville	A. Gattinger	do			
			5	PROSIM	(25)/				
233.	Morus microphylla	450	New Mexico	Silver City	E. L. Greene	Moist clay	0.078	7	25
	meanurs muurry.	1106	Texas	Austin	S. B. Buckley	Limestone	0. 098	4	25
	And the state of t						TO S		100
234.	Maclura aurantiaca Osage Orange. Bois d'Arc.	253	do	Dallas	J. Reverchon	Bottom			
		421	Pennsylvania	West Chester	S. P. Sharples	Clay loam	0.710	3	44
	PLATANACEÆ.								
235.	Platanus occidentalis	21	Massachusetts	Arnold A boretum	C. S. Sargent	Drift	0, 680	35	53
	Tree. Water Beech.	126	Missouri	Allenton	G. W. Letterman	Rich, alluvial			
		195	Ohio	Miami valley	E. E. Barney	do			
House								11.3	
	Platanus racemosa	686	California	Carmel river	G. R. Vasey	Clay	0, 280	20	
237.	Platanus Wrightii	648	Arizona	Santa Rita mount- ains.	G. Engelmann and C. S. Sargeut.	Rich, gravelly			******
499	JUGLANDACEÆ.	10	V	1-1111	0.0.0	D. IO	0.500		50
seic.	Juglans cinerea	761	The state of the s	Arnold Arboretum	G. W. Letterman	Rich loam	0. 560	5	50
		762	Missourido	do		Alluvial			
		10-				13.11.101			

000	Remarks.	Weight, per cubic foot, in pounds	TIONS.	DETERMINA	АВН	TONS.	DETERMINAT	FIC GRAVITY	SPECI
0.000	ACQUAING.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
		24				7			
7	All sap-wood		0.48	0.48	0.48	0. 5683		0. 5631	0. 5735
8	All sap-wood		0.42	0. 42	0.42	0. 4906	••••••	0. 5137	0.4674
		32.99	0.45			0. 5294			
	C. pumila		1.89	1. 89	1. 89	0.7611		0.7419	0.7802
	***************************************		0.74		0.74	0. 6858			0. 6858
			0. 68		0. 68	0. 6592			0, 6592
8		***********	1.65	1.60	1.70	0. 7274		0. 7637	0.6910
8	C. Mississippiensis		0. 94	0. 90	0.97	0. 8170		0, 7956	0.8384
8			0. 90	0.75	1.05	0. 7452	0. 7385	0. 7186	0.7784
8			0.98	1.07	0.89	0. 7837	0.7604	0.7908	0. 7999
1			0. 92	0.94	0. 89	0, 6504	0. 6396	0. 6547	0, 6570
		45, 41	1.09		//3	0.7287		la vila	
		45. 34	1. 22	1.12	1. 32	0. 7275		0. 7150	0. 7400 *
		16. 30	5. 03	4. 88	5.17	0. 2616		0. 2695	0. 2537
		00.00					WYY.		
1		39. 87	4. 36	4. 18	4, 55	0. 6398		0. 6475	0. 6321
100		29, 53	4. 92	5. 00	4. 83	0. 4739		0. 4798	0.4680
	<u> </u>		0. 68	0. 60	0.77	0. 6118		0. 5993	0. 6242
1			0.74	0, 78	0, 69	0. 5679			0. 5679
-		36, 76	0.71		0)	0. 5898			
		0511	0. 56	0.54	0. 57	0.7163		0. 7157	0.7169
1			0.81	0.82	0.79	0. 8266		0. 8262	0. 8270
1		10.10		0,82	0.73			0. 6202	0.8270
1		48. 08	0. 68			0, 7715			
		47.78	0, 88	0.88	0.87	0. 7668	*********	0. 7495	0.7841
	Cultivated. First sp. gr. determination made on limb-wood; second sp. gr. determination made on root-wood.	48, 63	0.49	0.59	0.38	0, 7803		0.7054	0. 8551
		48. 21	0. 68			0.7736			
			0. 33	0. 32	0. 35	0. 6086		0.6111	0. 6000
			0. 57	0. 67	0, 47	0, 5911		0. 5748	0. 6073
-			0.48	0. 57	0, 40	0, 5038		0, 5091	0.4986
1		35. 38	0.46			0. 5678			
		30. 41	1.11	1.05	1. 17	0, 4880		0.4609	0. 5151
	Grown at 4,000 feet altitude	29. 51	1. 35	1.36	1.34	0. 4736		0.4688	0. 4783
			0.33	0, 30	0.05	0, 4263	E TOWN	0. 4343	0.4109
			300000		0. 35	122422000		THE PROPERTY OF	0.4183
			0.46	0.43	0.49	0.4010	**********	0.4005	0.4014
1	***************************************	***********	0.69	*******	0. 69	0, 4494		0. 4355	0. 4633

Species.	Office number	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF WTH.
	Office					meters.	Sap- wood.	Heart
38. Juglans cinerea—continued	145	Illinois	Wankegan	Robert Douglas	Alluvial			
	176	Ohio	Barney & Smith	E. E. Barney				
	393	Michigan	Manufacturing Co. Lansing	W. J. Beal	Gravelly loam			29
	1057	Massachusetts	Topsfield	J. Robinson			8	37
39. Juglans nigra	112	Missouri	Allenton	G. W. Letterman	Alluvial			
Black Walnut.	117	Michigan	Dansville	W. J. Beal	Gravelly			
	149	Illinois	Waukegan	Robert Douglas	Loam			
	209	Ohio	Barney & Smith	E. E. Barney				
	318	Michigan	Manufacturing Co.	W. J. Beal	Loam	Anna Vancour		
	325	Texas	Dallas	J. Reverchon	Alluvial		24	84
	407	75023	Charlestown Navy-	S. H. Pook		1000074051		
	430	Tennessee	yard. Nashville	A. Gattinger	Limestone			
	766	Florida	Aspalaga	A. H. Curtiss	Clay	0. 286	8	23
/	934	Texas	Austin	C. Mohr	Moist, calcareous	AL .		1.3
/	951	do		do	And the second second			
40. Juglans rupestris	415	New Mexico	Pinos Altos mountains.	E. L. Greene	Alluvial	0, 207	15	3
Trustan.	672	California	Contra Costa county.	G. R. Vasey	do	0.313	11	1
	1227	Arizona	Santa Catalina mountains.	C. G. Pringle	/			
41. Carya olivæformis	3221	Mississippi	Greenville	C. Mohr	Alluvial	0, 260	33	4
Pecan. Illinois Nut.	3222	do	do			+		
	326	Texas	Dallas	J. Reverchon	do			
			O'IN'					
42. Carva alba	3	Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0. 305	25	3
Shew-bark Hickory. Shag-bark Hickory.	291	Kentucky	Danville	W. M. Linney	Shale			
	292	do	do	do	do			
	298	do	do	do	do			
	48	Missouri	Allenton	G. W. Letterman	Upland			
	1181	Michigan	Hudson	W. J. Beal	Clay			
	1182	do	do	do	do			
	1183	do	Lansing	do	do			
	152	Missouri	Allenton	G. W. Letterman	Rich upland			
	249	Virginia	Wytheville	H. Shriver	Clay			
	422	Missouri	Allenton	G. W. Letterman	Alluvial			
	531	Mississippi	Kemper's mill	A Company of the Comp	do	0. 288	28	8
	539	do		do		0.366	31	10
	816	West Virginia	Grafton	C. G. Pringle				
	1056	Massachusetts	Topsfield	J. Robinson	Rich loam	0, 250	53	
	1097	Missouri	Allenton	The second second	Alluvial			****

-	Remarks.	Weight, per cubic foot,	rions.	ETERMINAT	ASH D	ions.	DETERMINAT	TC GRAVITY	SPECIF
	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
			100	1 - 3				and the strain	
		**********	0.51	0.44	0.51	0. 4391		0. 4388	0. 4394
		**********	0.44	0.44	0.44	0.3982		0.4023	0. 3941
100		***********	0.43	0.50	0.43	0. 3379			0. 3379
-		25. 46	0. 47	0, 53	0.41	0, 4530	0, 4698	0. 4355	0. 4538
	A CONTRACTOR OF THE CONTRACTOR		0, 63		0. 63	0. 5830		0. 5881	0. 5778
			0.48	Veguence at	0.48	0, 5807		0.0002	0. 5807
			0.12	0.12	0.12	0. 5569		0, 5559	0. 5579
			0.56	0.49	0.63	0. 5145		0, 5265	0. 5025
1			0.62	0200	0.62	0. 6252		0. 6191	0. 6313
			1.06	1.99	1.92	0. 5721		0, 5833	0. 5608
			0. 65	0.69	0.60	0. 5750	******		0. 5750
			0, 99	1.05	0.93	0. 6376			0. 6876
1		J		0.65)	0.78	1		0. 6363)	0. 6415
1	First sp. gr. determination made on sap-wood		0.68	0.77	0.51	. 0.6403		0. 6400	0, 6435
-	First sp. gr. determination made on 0.5 sap-wood		1.43	1.64	1.22	0, 7916		0. 8002	0, 7830
			0.64	0.57	0.71	0. 6499		0. 6388	0.6609
-		38, 11	0, 79	4		0. 6115			
			0.00	1.00	0.55	o como		* ***	
	All sap-wood.		0.83	1.09	0.57	0. 6670	0. 6753	0. 6469	0. 6789
	3 - 1/A 11-		0. 91	0. 97	0.85	0. 5939	*********	0. 5611	0. 6266
1		40. 85	1.28	1. 42	1.15	0. 7058	************	0. 6848	0, 7258
		CIM	7 72 etc.	David Comment				- 3	
1	Second sp. gr. determination made on 0.5 sap-wood		1.07	1.18	0.96	0.7158		0. 6925	0. 7390
1	Second sp. gr. determination made on 0.5 sap-wood	T 7 1	0. 93		0. 93	0.7001		0. 6982	0.7020
-			1.40	1.46	1, 33	0, 7380		0. 7445	0. 7314
1		44. 75	1.13			0.7180	Miss		
	. All sap-wood		0.60	0. 58	0. 61	0.7716		0.7814	0.7618
4	. All sap-wood		0.73		0.73	0.9680			0.9680
	. All sap-wood		0.86		0.86	0. 9205			0. 9205
	. All sap-wood		0.65		0.65	0.9970		1.0080	0, 9859
			0.40	0.43	0.37	0. 8255		0. 8260	0. 8249
			0. 28		0. 28	0, 8028			0.8028
			0.66		0.66	0,7974			0, 7974
			1.14		1.14	0, 8019			0. 8019
			0.77	0.66	0.87	0. 7871		0.7677	0.8064
	. All sap-wood		0.78	0.93	0, 63	0.7974		0.7477	0.8470
			0. 91	0.90	0.92	0.7523		0.7756	0. 7289
+	,		0.79	0.78	0.79	0, 9033		0. 9370	0.8696
			0. 83	0.88	0.78	0.8711		0.8692	0.8729
			0.71	0.66	0.76	0. 7523		0.7505	0.7470
14			0. 62	0.69	0. 54	0. 9027	0. 9245	0.9035	0.8800
			0, 90	0.90	0. 90	0, 7443		0. 8051	0. 6835
		52.17	0.73	1000		0.8372	1		

Species.	Оббее питрег	State.	Locality.	Collector.	Soil.	Diameter of tree,	GROV	
apetto.	Office 3					in meters.	Sap. wood.	Heart wood.
	07	Wentucker	Mercer county	W. M. Linney	Limestone			
3. Carya sulcata	27	Kentucky	40		Alluvial		*******	*****
	912	do	do		do		*******	*****
Sall at the sale of the sale of	913	do	do				*******	
the state of the s	336	Tennessee	Nashville		do			144.54
	383	Missouri	Allenton	G. W. Letterman				
	301	do	do		do		** ****	*****
	1082	do	do	do	do	**********		
	1164	do	do	do	do			
	1165	do	do	do	do			
	1166	do	do	do	do			
	1170	do ,	do	do	do			
			TECLE					
					A CONTRACT OF			
		100			Title III		Himi	
44. Carya tomentosa	52	do	do	do	Rich upland			
44. Carya tomentosa Mocker Nut. Black Hickory. Bull Nut. Big-bud Hickory. White-heart Hick-	72	Kentucky	Perryville	W. M. Linney	Utica shale			
ory. King Nut.	254	Missouri	Allenton	G. W. Letterman	Rich upland			
	289	do	do	do	do	100000		
	348	Alabama	Citronelle	C. Mohr	Sandy	0, 200	42	3
	D*0	Altonim					175	
	241	THE PARTY OF THE P		~ H		100 N		
						The same		11:11
C. C	-	7(1)(
5. Carya percina	6	Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	. 0.317	29	5
ory. Switch-bud Hickory.	51	Missouri	Allenton	G. W. Letterman	Flinty	********		*****
	88	do	do	do	Rich loam	. 0.159	41	
	121	Michigan	Dansville	W. J. Beal	Gravelly clay			****
	288	Missouri	Allenton	G. W. Letterman	Rich loam	. 0,100	47	1
	442	Tennessee	Nashville	A. Gattinger	Upland			
	538	Alabama	Kemper's mill	C. Mohr	Al uvial	0.354	63	5
	1051	Massachusetts	North Reading	J. Robinson	Drift	. 0. 228	31	4
	1098	Missouri	Allenton	G. W. Letterman	Flinty			
	1168	do	do	do	do			
		The state of				M. Street		
						171		
46. Caryaamara	153	do	do	do	Rich upland			
Bitter Nut. Swamp Hickory.	401	do	do	do	181			
	155	E SERVICE CONTRACTOR			Total Control of			
	838	Massachusetts	The state of the s	dodo		1000	40	1
	871	do		do	do	0.115	18	1
				1000		10		
		The state of the s			De la constitución de la constit	1	1 3 3	100
7 Come constitution from to	007	South Canalina	Post and Densit	II W Davonal	Piek sweens	0.409	7	10
7. Carya myristicæformis	237	South Caronna	. Dunneau's Depot	H. W. Ravenel	Rich, swampy	0.402	1	1
	2012		1		0			1-
 Carva aquatica	129	do		do				
ter Pecan.	362	Mississippi	Vicksburg			0. 277	28	1
	740	Georgia	Bainbridge	A. H. Curtiss	Alluvial		******	
	917	Florida	. Chattahoochee	C. Mohr	do	0. 262	23	2
			THE BURE	Burn Marin		1 213		1
	-							

THE WOODS OF THE UNITED STATES.

Other some Loss	Remarks.	Weight, per cubic foot,	TIONS.	ETERMINAT	ASII D	TIONS.	DETERMINA	FIC GRAVITY	SPECI
1	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
			0.71	0.70	0.72	0,8779		0, 8767	U. 8791
			1.09		1.09	0,7193		0. 6850	0. 7527
			1.04		1.04	0.7345		0.0000	0. 7345
1						0.7654			0.7654
	First sp. gr. determination made on 0.5 sap-wood		0.96	0.92	0, 99	0, 8815		0.8610	0. 9020
1	and op. g		1. 07	1. 24	0.91	0, 8468	II.	0.8424	6, 8512
-	All sap-wood		0.87	0, 90	0.83	0.8904	0.8831	0. 9061	0.8911
1	-		0. 83	0, 84	0.81	0.8840		0. 8854	0. 8827
1			0.73	0.72	0.73	0.7122	0.7414	0, 6898	0.7054
	0.5 sap-wood		0. 93	0. 95	0. 90	0.8470		0. 8432	0. 8508
		see becauses	0.78	0.71	0.84	0.7563	0. 7389	0, 7275	0. 8024
					0.01	0.7003	0.1000	0.1210	0.0024
ı		50, 53	0.90			0.8108			
1	MO TO THE REAL PROPERTY.				1//	Marin .	4		
			0, 91	0.84	0. 97	0. 8346		0.8168	0.8524
	0.5 sap-wood		1.04	1.06	1.02	0.8600		0.8709	0.8610
1	Second sp. gr. determination made on sap-wood; second growth		0.89	1.05	0.72	0.8417		0, 8500	0. 8334
1			1.47	1.65	1.29	0. 7279		0.7279	
A	First sp. gr. determination made on 0.5 sap-wood; second sp.		1.01	1.03	0.99	0.8389		0.8462	0.8316
1	gr. determination made on sap-wood.	51, 21	1.06			0. 8218			
1					Man and the second				
		-1250170030	0.60	0. 60	0.60	0.8148	***********	0.8139	0.8157
-	4		1.33	1.40	1. 25	0.8827			0.8827
4	Second sp. gr. determination made on sap-wood; second growth	*******	0.85	0.85	0.85	0. 9240		0, 9290	0.9189
	·····		1.58		1.58	0.6803			0 6803
1	First sp. gr. determination made on sap-wood; second sp. gr. determination made on 0.9 sap-wood.		0,77	0.71	0. 83	0.8542		0. 8530	U. 8554
	All sap-wood	Someone S	0.69	0.70	0.68	0.7926			0.7926
K	First sp. gr. determination made on 0.8 sap-wood; second sp. gr. determination made on sap-wood.	*********	0.84	0.86	0.82	0.7841		0.7152	0.8530
-	Third sp. gr. determination made on sap-wood		0.75	0.75	0.74	0.8620	0. 8537	0.8481	0, 8842
-	Second sp. gr. determination made on sap-wood		1. 28	1.29	1. 27	0.8315		0.7640	0.8900
1	All sap-wood		1. 17	1. 19	1.15	0.7913	0. 8913	0. 7355	0.7470
-		51. 21	0.99			0, 8217			
			0. 99	0. 97	1.00	0. 7822		0. 7830	0.7814
			0, 95	0. 93	0.97	0. 5841		0. 5754	0.5927
			0.99	1.03	0. 94	0.7886		0.7142	0.7530
-	0.5 sap-wood		1. 17	0. 92	1,42	0, 9208			0. 9208
-		47. 06	1.03			0.7552		13	
-	All sap-wood	49. 96	1.06	1. 05	1. 07	0. 8016	,,,,,,,,,,,,	0, 8112	0. 7919
	All sap-wood		1. 67	2.03	1.31	0.7486		0, 7332	0.7639
	0.5 sap-wood		1. 19	1.32	1.05	0.7710		0.7700	0.7719
1	0. 5 sap-wood		1. 19	1.05	1.32	0. 8246		0. 8244	0. 8248
48	0.5 sap-wood		1.04	1. 17	0. 91	0. 6185	0, 5821	0. 6313	0.6422
						and the same of th			

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF WTH.
	Ошсе					in meters.	Sap- wood.	Heart wood.
MYRICACEÆ.								
249. Myrica cerifera	586	Florida	Saint John's river	A. H. Curtiss	Sandy loam	0. 198	18	22
250. Myrica Californica	665	California	Santa Cruz	G. Engelmann and C. S. Sargent.	Rich loam		******	******
CUPULIFERÆ.					The live		100	
251. Quercus alba	8	Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0. 560	12	88
White Oak.	26	do	Acushnet	E. A. Dana				
	321	Kentucky	Mercer county	W. M. Linney	Limestone	*********		
Control of the Control	322	do	Boyle county	do	Slate			
	323	do	do	do	Shale			
	491	Missouri	Allenton	G. W. Letterman	Rich upland		*******	
THE PART OF THE PA	492	do	do	do	do	********		
	494	do	do	do	do			
	1131	Michigan	Big Rapids	W. J. Beal	Gravelly	0.374	34	18
A Section State of the State of	1132	do	Dansville	do	Sandy			
	1133	do	Hudson	do				
	150	Illinois	Waukegan	Robert Douglas	Gravelly clay			
	160	Ohio	Pinco, Daniels & Co.	E. E. Barney	1			
	196	do	Barney & Smith	do				
STATE OF THE PARTY	2281	Vermont	Manufacturing Co. Champlain valley	C. G. Pringle	Clay			
Carlotte and the latter and	2282	do	Charlotte	do	Gravelly loam			
	2283	do	do	do	do			
	238	South Carolina	Bonneau's Depot	H. W. Ravenel	Rich, damp loam			
	250	Virginia	Wytheville	H. Shriver	Clay			F
	251	do	do	do	//	0. 225	56	
	2591	do	do	do	Gravelly			
	2592	do	7.do 2051M	.do 0 9//	do			
	2593		do	do		PRO Entratorna		
	403	Maryland		S. H. Pook		OF THE PARTY.	September 1	
	443	Tennessee	yard. Nashville	A. Gattinger		100000000000000000000000000000000000000		
	547	Alabama	Kemper's mill	The state of the s		15152107	12/2/2/19/5	7 (2) (1) (1)
	748	Florida	Chattahoochee	The state of the state of the state of	Committee Committee	The Contraction	8	4
	749	do		The same of the same of		0. 248	13	7
	895	Massachusetts		M. C. Beedle			***	
	1050	do	North Reading	J. Robinson		0, 203	7	1
	1257		Charlestown Navy-					10
	220,		yard.	3.2.2				
3C2. Quercus lobata	670	California	Redding	G. R. Vasey	Gravelly loam	0. 356	15	1
258. Quercus Garryana	985	Oregon	Weidler's saw-mill.	G. Engelmann and C. S. Sargent.				
	988	do	Portland	de	Rich loam	0. 393	30	85
	1027	do	Portland Furniture Company.	do				
	1029	do	do	do				
254. Quercus obtusiloba	371	Kentucky	. Harrodsburg		Shale	1		

SPECI	FIC GRAVITY	DETERMINAT	rions.	ASH I	ETERMINA	TIONS.	Weight, per cubic foot,	Remarks.	umber.
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number.
0. 5639 0. 5723	0. 5592 0. 5519	0. 5711	0. 5637	{ 0.54 } 0.47}		0. 51	35. 13		586
0. 6793	0. 6613		0. 6703	0. 33	0. 33	0. 33	41. 77		665
					7				
0, 7165	0.7093	**********	0.7129	0.37	0.31	0.34			8
0.7970	0.8012		0. 7991	0.30	0. 25	0. 28			26
0. 8480	0.8451	0.7965	0. 8299	0.45	0.47	0.46			321
0. 6328			0. 6328						32
0.6305			0. 6305						36
0. 6965	0. 6526		0. 6746	0.37	0.43	0.40	· · · · · · · · · · · · · · · · · · ·		49
0.7826			0.7826	0.45		0.45		And the second s	49
0.6829	0.7385		0.7107	0.30		0.30	********		49
0.6006			0, 6006	0.37	Marion.	0.37			113
0. 6852	0.7012		0. 6932	0.41		0.41			113
0.7017			0.7017	0.24		0.24			113
0.7892	0. 8735		0.8314	0.47	0.42	0.45			150
0.7672			0.7672	0.21	0. 23	0. 22			169
0, 6203	0, 6305		0, 6254	0.57	0. 65	0. 61			196
0, 8304			0, 8304	0. 39		0.39			228
0.8670			0, 8670	0.33		0.33			228
0.8091			0.8091	0. 37		0, 37			228
0.7830	0.7391		0.7611	0.43	0, 42	0.43			238
0.7874	0.7419		0.7647	0.35	0. 33	0.34			250
0. 6848	0.6984		0. 6916	0, 21	0. 25	0. 23			251
0.7556			0.7556						259
0.7069			0.7069	0.30	A	0.30	50040		259
0.8056			0.8056	0.37		0. 37			259
0.7390	0.7437	********	0.7414	0.49	0.44	0.47	LIAII.		403
0.6549			0. 6549	1. 37	1. 64	1.51	Oly		443
0.8566	0.7794		0.8180	0.45	0. 29	0.37			547
0.7732	0.7562		0.7647	0.47	0.50	0.49		Brash: rough bark	748
0.8066	0. 8228		0.8147	0.34	0.31	0. 33		Tough: smooth bark	749
0.7672	0, 7734		0.7703	0.33	0:37	0. 35	***********	Taken from beam in old court-house at Cambridge, built in 1757.	895
0. 8065	0.7584	0.7358	0.7669	0. 26	0. 22	0. 24			1050
			0. 8439						1257
	11.8		0.7470			0. 41	46, 35		1
0. 7849	0.7672	0. 6706	0.7409	0. 25	0.34	0. 30	46, 17	Third sp. gr. determination made on sap-wood	670
0.7814	0. 8425		0. 8120	0. 33	0. 25	0. 29			988
0. 6549	0. 7600		0. 8120	0.33	0. 33	0. 33			988
0.7478	0.7574	0.7704	0. 7585	0. 37	0. 41	0. 39		Brash	1027
0. 6698	0. 7369	**********	0. 7034	0. 62	0.49	0.56		Tough	1029
	The same		0. 7458		THE S	0. 39	46. 45		
0.8200	0.8008		0. 8104	0.62		0. 62		Second sp. gr. determination made on 0.5 sap-wood	. 37
0. 8765			0.8765	0.74		0.74	A STATE OF THE PARTY OF THE PAR	. 0.5 sap-wood	37

255. Quercus undulata, var. Gambelii	Kentucky	Allenton	H. W. Ravenel G. W. Letterman C. Mohr A. H. Curtisa E. L. Greene do Robert Douglas C. G. Pringle W. M. Linney do do G. W. Letterman Robert Douglas E. E. Barney J. Reverchon	Clay	0.214 0.261 0.106		
255. Querous undulata, var. Gambelii	South Carolina Missouri Alabama Florida New Mexico do Colorado Arizona Kentucky do do do do Missouri Illinois Ohio do Texas Missouri	Pinos Altos mountains. Pinos Altos mountains. do Engelmann's canon. Santa Rita mountains. do do do Allenton. Waukegan. Woodsum Machine Company. Barney & Smith Manufacturing Co. Dallas Allenton.	H. W. Ravenel G. W. Letterman C. Mohr A. H. Curtisa E. L. Greene do Robert Douglas C. G. Pringle W. M. Linney do do G. W. Letterman Robert Douglas E. E. Barney do J. Reverchon	Rich upland Clay	0.214 0.261 0.106	38 32 38	67
255. Querous undulata, var. Gambelii	South Carolina Missouri Alabama Florida New Mexico do Colorado Arizona Kentucky do do do do Missouri Illinois Ohio do Texas Missouri	Pinos Altos mountains. Pinos Altos mountains. do Engelmann's canon. Santa Rita mountains. do do do Allenton. Waukegan. Woodsum Machine Company. Barney & Smith Manufacturing Co. Dallas Allenton.	H. W. Ravenel G. W. Letterman C. Mohr A. H. Curtisa E. L. Greene do Robert Douglas C. G. Pringle W. M. Linney do do G. W. Letterman Robert Douglas E. E. Barney do J. Reverchon	Rich upland Clay	0.214 0.261 0.106	38 32 38	67
255. Quercus undulata, var. Gambelii	South Carolina Missouri Alabama Florida New Mexico do Colorado Arizona Kentucky do do do do Missouri Illinois Ohio do Texas Missouri	Pinos Altos mountains. Pinos Altos mountains. do Engelmann's canon. Santa Rita mountains. do do do Allenton. Waukegan. Woodsum Machine Company. Barney & Smith Manufacturing Co. Dallas Allenton.	H. W. Ravenel G. W. Letterman C. Mohr A. H. Curtisa E. L. Greene do Robert Douglas C. G. Pringle W. M. Linney do do G. W. Letterman Robert Douglas E. E. Barney do J. Reverchon	Rich upland Clay	0.214 0.261 0.106	38 32 38	67
256. Quercus undulata, var. Gambelii	Missouri Alabama Florida New Mexico do Colorado Arizona Kentucky do do do Missouri Illinois Ohio do Texas	Allenton Citronelle	G. W. Letterman C. Mohr A. H. Curtisa E. L. Greene do Robert Douglas C. G. Pringte w. M. Linney do do G. W. Letterman Robert Douglas E. E. Barney J. Reverchon	Clay	0.244 0.264 0.106	18	67
255. Quercus undulata, var. Gambelii	Alabama. Florida New Mexico do Colorado. Arizona Kentucky do do do do Missouri Illinois Ohio do Texas Missouri	Citronelle	C. Mohr A. H. Curtisa E. L. Greene do Robert Douglas C. G. Pringlo w. M. Linney do do G. W. Letterman Robert Douglas E. E. Barney J. Reverchon	Alluvialdo	0.244 0.203	18	677
255. Quercus undulata, car. Gambelii	Florida New Mexico do Colorado Arizona Kentucky do do do Missouri Illinois Ohio do Texas Missouri	Aspalaga Pines Altos mountains. do Engelmana's canon. Santa Rita mountains. Mercer caunty. do do Allenton. Waukegan. Woodsum Machine Company. Barney & Smith Menufacturing Co. Dallas Allenton.	E. L. Greene do Robert Douglas C. G. Pringle do do G. W. Letterman Robert Douglas E. E. Barney J. Reverchon	Rocky	0. 264	18	677
295 Sorub Oak. 295 Sorub Oak. 417 525 1150 296 Quercus macrocarpa. 297 292 793 794 137 143 168 204 310 400 412 432 583 831 832 933 1071 1072 1073	New Mexico do Colorado Arizona Kentucky do do do Missouri Texas Missouri	Pines Altos mountains. do Engelmann's cañon. Santa Rita mountains. Mercer county	E. L. Greene	Alluvialdo	0.106	18	67
### Scrub Oak. 417 525 1150 555 1150 525 1150 525 1150 525 1150 525 1150 525 1150 525 1150 525 1150 525 525 1150 525	Kentucky do do Missouri Illinois Ohio do Texas	ains. do Engelmann's cañon. Santa Rita mountains. Mercer county	W. M. Linney do do G. W. Letterman Robert Douglas L. E. Barney J. Reverchon	Alluvialdo			
56. Quercus macrocarpa	Kentucky do do do Missouri Illinois Ohio do Texas	do Engelmann's canon. Santa Rita mountains. Mercer countydododododododo.	W. M. Linney do	Alluvialdo		*******	
1150 156. Quercus macrocarpa	Kentucky do do do Missouri Illinois Ohio do Texas	Mercer countydodo	W. M. Linney do	Alluvial		*******	
56. Quercus mucrocarpa	Kentucky do do do	Mercer countydodododo	W. M. Linney	Alluvial		*******	
Burr Oak. Mossy-cup Oak. Over-cup Oak. 792 793 794 137 143 168 204 310 400 412 432 583 831 832 533 1071 1072 1073	do do do Missouri Dinois do Texas Missouri	Mercer countydododo	do	do		*******	
Burr Oak. Mossy-cup Oak. Over-cup Oak. 792 793 794 137 143 168 204 310 400 412 432 583 831 832 533 1071 1072 1073	do do do Missouri Dinois do Texas Missouri	do	do	do		*******	
Burr Oak. Mossy-cup Oak. Over-cup Oak. 792 793 794 137 143 168 204 310 400 412 432 583 831 832 533 1071 1072 1073	do do do Missouri Dinois do Texas Missouri	do	do	do		*******	
Burr Oak. Mossy-cup Oak. Over-cup Oak. 792 793 794 137 143 168 204 310 400 412 432 583 831 832 533 1071 1072 1073	do do do Missouri Dinois do Texas Missouri	do	do	do		*******	
793 794 137 143 168 204 310 400 412 432 583 831 832 933 1071 1072 1073	do do Missouri Dinois Ohio do Texas Missouri Missouri	do Allenton Waukegan Woodsum Machine Company Barney & Smith Manufacturing Co. Dallas Allenton	do	do			
794 137 143 168 204 310 400 412 432 583 831 832 933 1071 1072 1073	do	Allenton	G. W. Letterman Robert Douglas E. E. Barney do J. Reverchon	Moist upland			
137 143 168 204 310 400 412 432 583 831 832 633 1071 1072 1073 57. Quercus lyrata Over-cup Oak. Swamp Post Oak. 424	Missouri	Waukegan Woodsum Machine Company. Barney & Smith Manufacturing Co. Dallas Allenton	G. W. Letterman Robert Douglas E. E. Barney do J. Reverchon	Moist upland			
143 168 204 310 400 412 432 583 831 832 933 1071 1072 1073	Thinois	Waukegan Woodsum Machine Company. Barney & Smith Manufacturing Co. Dallas Allenton	E. E. Barney do J. Reverchen	Rich		******	
168 204 310 400 412 432 583 831 832 633 1071 1072 1073	Ohio	Woodsum Machine Company. Barney & Smith Manufacturing Co. Dallas	E. E. Barney				
204 310 400 412 432 583 831 832 933 1071 1072 1073 57. Quercus lyrata Over-cup Oak Swamp Post Oak. 424	Texas	Company. Barney & Smith Manufacturing Co. Dallas Allenton	J. Reverchon			*******	
57. Querous lyrata	Texas Missouri	Allenton	J. Reverchon				
57. Quercus lyrata	Missouri	Allenton	J. Reverehon	Rich, moist			****
412 432 583 831 832 933 1071 1072 1073 57. Querous lyrata Over-cup Oak Swamp Post Oak.			AN THE PERSON NAMED IN COLUMN TO SERVICE AND ADDRESS OF THE PERSON NAMED IN COLUMN TO	and the second second	0, 528	13	120
583 831 832 933 1071 1072 1073 57. Querous lyrata Over-cup Oak Swamp Post Oak.	Vermont		G. W. Letterman	Alluvial			
57. Querous lyrata		Charlotte	C. G. Pringle	Clay		******	****
57. Querous lyrata	Tennessee	Nashville	A. Gattinger	Allovial	********	******	
57. Quercus lyrata	Illinoia	Waukegan	Robert Douglas	**************			
57. Quercus lyrata	do	Winnebago county .	M. S. Bebb	Loam			
57. Querous lyrata	do	do	do	do			
57. Querous lyrata	Texas	Austin	C. Mohr	Alluvial			
57. Querous lyrata	Vermont	Charlotte	C. G. Pringle				
57. Quercus lyrata	do	do	do				
Over-cup Oak. Swamp Post Oak.	do	do	do				
Over-cup Oak. Swamp Post Oak.	Tennessee	Nashville	A. Gattinger	Low			*****
	Mississippi	Kemper's mill			0. 339	19	7
762	Florida	Chattaboochee		do	0, 266	20	7
953	Texas	Matagorda bay	C. Mohr	Loam			
58. Quereus bicolor	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	0. 305	8	6
	Missouri	Allenton	G. W. Letterman	Alluvial	*******		
542		do	do	do		*******	
543	do		do	do			*****
846		do					

THE WOODS OF THE UNITED STATES.

		Weight, per cubic foot,	TIONS.	ETERMINA	ASH I	rions.	DETERMINAT	FIC GRAVITY	SPECI
	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
					N. Maria				
			1.56		1.56	0.8459			0. 8459
			0.79	0.79	- 0.79	0.8991	0. 9170	0, 8882	0, 8920
			0.49	0.52	0.46	0.8350		0.8196	0.8522
			0.53	0.53	0, 52	0.7702		0.7516	0.7888
			0.76	0.88	0. 63	0.8187	0.8072	0.7942	0.8548
		52. 14	0.79			0. 8367			
					Residence in	0.8472		0, 8562	0. 8382
		***********	0.70	0.79	0.78	0.8472	0.7862		
	First sp. gr. determination made on 0.75 sap-wood	***********	1. 23	-			la l	0.7748	0.8680
		*********	0.95	1.37	1.08	0.7789		0.7894	0.7684
		CLA	0.33	0, 80	1.10	0. 9270	***********	0. 9052	0. 9487
	VO TENERAL TO THE TENERAL THE TENERAL TO THE TENERAL THE TENERAL TO THE TENERAL THE TENERAL TO THE TENERAL THE TENERAL TO THE TENERAL THE TENERAL TO THE TENERAL THE TENERAL TO THE TENERA	52, 39	0. 99	OF	3//2	0. 8407			
			0.96		0.96	0.7070			0.7070
***			0.66	*******	0.66	0.7205			0.7205
	1031	000	0.70		0.70	0. 7275		0.7275	0.7275
			1.18	S	1.18	0. 6363		0. 6300	0. 6426
	Second growth	A	0.39	0.37	0.41	0. 8469	7		0. 8469
			0.78	0.93	0.60	0.8278		0. 8276	0, 8280
			0. 32	0. 32	0.31	0. 6416	************	0. 6383	0. 6440
			0.40	0. 43	0. 37	0. 6318		0. 6177	
			1.06	Harry Co.				The second	0. 0458
***			The state of	1.03	1.08	0.7944	***********	0. 8166	0.7722
***			0.60	0.60	0.60	0. 6297		0. 6411	0.6183
	1 1 1/1 // 2 // 2 // 2 // 2 // 2 // 2 /		0. 27	0. 27	0. 26	0. 8563	***********	0. 8496	0. 8630
***		**********	0.75	0.75	0.74	0.7271			0.7271
	-/4-5 //		1. 32	1.46	1.18	0. 9387	0. 9390	C. 9543	0. 9229
	From fence-post 6 years in the ground		0.74	0.70	0.78	0. 6977		0.7112	0. 6842
***	Old fence-post		0.96	0.93	0.98	0. 6591		0. 7075	0.6107
***			1.15	1.18	1.11	0. 8018	0, 8047	0.8402	0.7605
			0.46	0.46	0.45	0.7729	0.7360	0.8087	0.7740
			0.39	0.45	0. 32	0.7929	0.8018	0. 7924	0. 7845
	*		0.40	0. 35	0, 44	0. 7515	0.7317	0.7630	0,7598
		46.45	0.71		127	0. 7453			
***			0. 58	0.56	0. 59	0. 7962		0.7863	0.8060
			0. 23	• 0.23	0. 22	0. 7652		0.7502	0.7802
+.4.1			0. 21	0.18	0. 23	0.7850		0. 7649	0.8050
- 12			1.58	1.44	1.72	0. 9790			0. 9790
		51. 81	0. 65		S I A	0. 8313			
			0. 27	0. 28	0.26	0, 7434		0. 7315	9, 7552
			0.39		0.39	0.8622		0.8628	0, 8616
			0.98		0.98	0. 6833			0. 6833
			0.98		0.98	0.7114			0.7114
**			0. 29	0.31	0. 27	0. 8307	0. 8330	0. 8186	0.8404
		47.75	0. 58	-145		0.7662	and the		

Species.	nmber.	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF
species.	Office number.	State.	Locality.		5011	in meters.	Sap- wood.	Heart wood.
59. Quercus Michauxii	240	South Carolina	Bonneau's Depot	H. W. Ravenel	Alluvial			
Basket Oak. Cow Oak.	524	Alabama	Kemper's mill	C. Mohr	do	0.322	22	69
	755	Florida	Chattahoochee	A. H. Curtiss	do	0. 260	12	32
	443	-	7. 1		Photo	1		
60. Quercus Prinus	311	Kentucky			Shale		*******	*****
	312			do			G LI	
	313			do	Charles - Charles - 11			
	35	do	2011 12 120	do		100		
	434	Tennessee	Nashville		Rocky upland	*******		
	925	Alabama	Cullman	C. Mohr	Dry, rocky	0. 436	34	84
ii. Quercus princides	28	Kentucky	Harrodsburg	W. M. Linney				
Yellow Oak. Chestnut Oak. Chinqua- pin Oak.	341	do	Mercer county	The state of the s	Limestone			1
	344	do		do	Waverly shale			
	348	do	Mercer county		Utica shale		1	1
	58	Missouri	Allenton		Poor, hilly			1/2
	273	do	do	do	Limestone	1		-
	287		do		Flinty	1		
		do	CONTRACTOR OF THE PARTY OF THE			100		*****
	323	Texas	Dallas	The state of the s			24	2
	514	Tennessee	Nashville	A. Gattinger	Alluvial			
	588	Texas	Dallas	J. Reverchon		Sameron	******	
	856	Mas:achusetts	Boxford	J. Robinson	Damp	0.364	10	12
32. Quereus Douglasif Mountain White Oak. Blue Oak.	688	California	Contra Costa county	G, R. Vasey	Clay	0.338	59	*****
33. Quercus oblongifolia	601	do	San Diego county	do	Dry, gravelly			
	700	do	San Gabriel	G. Engelmann	do	0. 202	16	
4. Quercus grisea	419		Silver City	E. L. Greene	Dry, rocky	0. 212	38	
White Oak,	698	Arizona	Santa Rita mount-	G. Engelmann and		100000		
	1145	do	ains.	C. S. Sargent. C. G. Pringle	do			
5 Quercus reticulata	3740	do	do	do	do			
· Querous retrottinas	1148	do		do				
66. Quercus Purandii	935	Texas		C. Mohr		0.164	24	3
	1103	do	do	S. B. Buckley	do			
67. Querous virens	404 799	Floridadodo	Charlestown Navy- yard. Saint John's river	S. H. Pook		0.238	89	

SPECIF	FIC GRAVITY	DETERMINAT	rions.	ASH I	ETERMINA	TIONS.	Weight, per cubic foot,		radon
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number
0. 7674	0. 8312		0. 7993	0. 33	0.48	0.40			
0. 8253	0.7704		0. 7979	0.57	0.57	0.57			
0.8200	0.8090		0. 8145	0.38	0. 35	0.37			
100000			0. 8039			0.45	50. 10		
0.7126	0.7102		0.7114	0.36		0.36			
0. 6549	0. 6659		0.6604	0.33		0.33			
0. 7726	0.0039	***********	0.7726	NAME OF TAXABLE PARTY.		0.00			
0. 8308	PARAMETER STATE		0. 8308	0.70	0.87	0.79			
0. 6870	***************************************		0. 6870	1. 94	1.93	1. 94			4
0. 8550	0. 8185		0. 8368	0.40	0.49	0.45			9
0.0000	0.000		0.7499			0, 77	46. 73		1
			-	//3	O	4		C	
0.8401	0. 8419		0.8410	1.50	1.40	1. 45			1
0.7951			0. 7951	1.49		1.49	************		
0. 8712			0.8712	0.39	0.49	0.44	*********		100
0.9643			0. 9643	1.62	·	1.62			
0. 6566	0. 6525		0.6546	1.39	1. 25	1. 32			1
0. 9237	0. 8548		0.8893	1. 16	1.31	1. 24			1
0. 8248	0.8644		0.8446	0. 64	0. 57	0. 61			100
1. 0240	1. 0728		1.0484	1. 25	1.09	1.17			1
0. 8592	0.8750		0.8671	1.43	1.49	1.46			1
0. 9183	0. 9405		0. 9294	L 38	1. 22	1.30			1
0.7652	0.7458	0.7706	0.7605	0.43	0.43	0.43			1
			0. 8605			1.14	53. 63	5//	
0. 9958	0.7898		0. 8928	0.80	0.88	0. 84	55, 64	Second sp. gr. determination made on sap-wood	
1 0079	1 0700	1.0169)		c 4 co	4 803	E	MANUE		
1.0078	1, 0790	1, 0882	1.0486	4.62	4.69	4.07		First and second sp. gr. determinations made on sap-wood	
0. 9495	1. 1500 0. 8374	1,0002)	0. 8397	0.99	4. 68)	1. 15		All sap-wood	
0.0420	0.0074		0. 9441	0.55	1.01	2. 61	58. 84	All sap word	
			0. 2441			2.01	00.01		
0. 9171	0.9835	0. 8703	0, 9236	1. 22	1.26	1. 24		0.5 sap-wood	3
0. 9897	1. 0945		0. 9897	2. 57 1. 32	3, 33	2. 95 1. 26		0.5 sap-wood	1
1. 1040	1.0945	3	1. 0092	1.02	1. 10	1. 82	62, 89		-
	1				2000				
0. 9430	0.9528		0. 9479	0.51	0, 53	0. 52	59. 07		1
0. 9762 0. 8648	0.8000		0. 8775	{ 1.71 } 1.80 }	********	1.75		0, 5 sap-wood	
0. 9640	1. 0835		1, 0238	1.82		1.82			1
			0. 9507			1.78	59. 25		
	1000				EST				
1.0350			1.0350						119

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF WTH.
	Ошсет				Marin Marin	meters.	Sap- wood.	Heart-wood.
267. Quercus virens—continued	919	Alabama	Mobile county	C. Mohr	Rich, sandy			
	954	Texas	Matagorda bay	do	Sandy loam			
					No. of Street			
268. Quercus chrysolepis	574	Oregon	Saw-mill, Ashland	G. Engelmann and C. S. Sargent.				
	649	California	San Bernardino	W. G. Wright		The state of		
	653	do	Marin county	G. R. Vasey	Gravelly			
269. Quercus Emoryi	594	Arizona	Santa Rita mountains.	G. Engelmann and C. S. Sargent.	Dry, rocky			
	con	20		(0)		0.047		
270. Quercus agrifolia	663	California	marin county	G. R. Vasey	Loam	0. 247	*******	
271. Quercus Wislizeni	677	do	Auburn	G. Engelmann				
	0							
272. Quercus rubra	7	Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0. 534	8	73
	451	Kentucky		W. M. Linney	Shale			
	452	A STATE OF THE PARTY OF THE PAR	do	do ,	and the same of th	The same of the same of		
	89	Missouri	Allenton	G. W. Letterman	Rich loam	- Marina	5	40
	921	- Laborer Contraction of	Mercer county	W. M. Linney	Vandama VIII I Vandamine et al	Charles Street		7,777,77
	140	Michigan		W. J. Beal	ATTENDED FOR CONTRACTOR	-25 St 20 C 1	Cale Des Sta	Secretary Secretary
	141	Marine Sandanie	The second secon	do	Design of the last	BOX STORESTON	11/2017/10/2019	100000
	146	Illinois	The state of the s	Robert Douglas	and the same of th		and the same	-
	197	Ohio	Barney & Smith					
	215	Vermont	Manufacturing Co Charlotte	C. G. Pringle	Gravelly			
	216	do	do	do	do			*****
	217	do	do	do	do			
	218	do	do	do	do			
	553	Alabama	Kemper's mill	C. Mohr	Alluvial	0. 368	38	97
	866	Massachusetts	Danvers	J. Robinson	Drift			
	920	Mississippl	Enterprise	C. Mohr	Alluvial			
	1043	Massachusetts	North Reading	J. Robinson	Drift	0. 230	6	27
772. Quercus rubra, var. Texana	931	Texas	Austin	C. Mohr	Calcareous	0, 118	13	20
273. Quercus coccinea	23	Massachusetts	Hingham	T. T. Bouvè	Light, sandy	5.4		
Scarlet Oak.	752	Florida	Aspalaga	A. H. Curtiss	Clay	0. 230	15	
				S				
274. Quercus tinctoria	17 361	Massachusetts Kentucky	Arnold Arboretum . Danville Junction	C. S. Sargent W. M. Linney		0. 630	8	74
A CHOICE COMP.	362		do	w. M. Linney	The second second			

SPECI	FIC GRAVITY	DETERMINAT	rions.	ABH	DETERMINA	TIOXS.	Weight, per cubic foot, in pounds	Remarks.
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Kemarks.
0, 8225	0. 9330		0. 8778	1. 25	1.30	1. 27		
1.0090	0. 9709		0. 9900	1.09	0.76	0. 93		0. 33 sap-wood
	1		37443000		19579			
			0. 9501			1.14	59. 21	
0, 7888	0. 7592		0. 7740	0.80	0. 62	0.71		
0.8830	0.8827		0. 8829	0, 33	0.34	0, 34		
0. 8787	0. 9033		0. 8910	0.73	0.79	0.76		
			0. 8493	Harris II		0, 60	52, 93	
		1 2 8						
0.9975	0. 9019 }	THE STATE OF THE S	0. 9263	5 1.86	2. 19	2, 36	57, 73	Second sp. gr. determination made on sap-wood
0. 9201	0. 8855 \$		0. 9203	2.61	2.78 \$	2. 30	31.13	Sociola sp. gr. determination made on sap-wood
0. 8290	0, 8216		0. 8253	1, 21	1.34	1. 28	51, 43	
	alesses.			127				
	0.00000	IN HER		2001	0.005			
0. 7936	0.7788 }	**********	0. 7855	{ 0.94 0.96	0.98	1. 02	48. 95	
0. 0010	0. 1001)			2//	1,107	T.		
			MA		1 49			
0. 6381	0. 6440	********	0. 6411	0.14	0, 10	0.12		
0.5186	0, 5910 0, 6251	***********	0. 5548 0. 5710	0.46	***********	0.46	THE CONTRACTOR OF THE CONTRACT	
0. 5169	0. 0201		0.7480	0. 43		0. 27		
0. 5899			0. 5899	0.47	0.47	0.47		//////////////////////////////////////
0.7516	0, 7512	0.7516	0.7515	0.15	*******	0.15		
0. 6410			0. 6410	0. 20	0.21	0.21		
0. 5932			0. 5952	0. 23	0. 24	0. 24	ROSIN	
0.7481	0, 7514		0.7498	0. 22	0.31	0.27		
0. 6516	0. 6615		0. 6566	0. 16	0.17	0. 17		
0. 6423	0. 6997		0. 6710	0. 27	0. 22	0, 25		
0. 6897	0.7090		0. 6994	0.20	0. 24	0, 22	***********	0 1 0 0 0 0
0. 6669	0. 6867	**********	0. 6768	0.20	0. 26	0. 23		Second growth from stump
0. 6765	0. 7029		0. 6897 0. 6489	0. 33	0. 32	0.33		
0, 6636	0, 6252	0, 6573	0. 6487	0. 07	0. 14	0. 11		
0. 5244	0, 5604		0. 5424	0. 25	0. 21	0. 23		
0.7130	0. 6806	0. 6920	0. 6952	0.14	0. 19	0.17		
			0. 6540			0. 26	40.75	
0. 9142	0. 9018		0. 9080	0. 93	0.76	0. 85	56, 59	0.5 sap-wood
0.7111	0.7079		0.7095	0, 11	0.16	0.14	*********	
0, 7667	0.7762		0.7715	0, 22	0. 28	0. 25	**********	
	Albert .		0.7405	-		0. 19	46. 15	
A 77047		VE TIE	A 9000	6.74	0.00	0.11		The state of the s
0. 7364	0, 7305	**********	0.7335	0.13	0.08	0.11	***************************************	
0. 6863	***************************************	**********	0, 6863	0. 21	Carron say.	0. 21		

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF WTH.
	Office 1					in meters.	Sap- wood.	Hear
4. Quercus tinctoria—continued	361	Kentucky	Danville Junction	W. M. Linney	Slate			
A SAME OF THE PARTY OF THE PART	41	Missouri	Allenton	G. W. Letterman	Hilly			
	74	do	do	do	Rich upland	0. 165	6	16
	86		140	do				
	244	Virginia	Wytheville	H. Shriver	Clay			
	247	do		do				
	437	Tennessee		A. Gattinger				
	921	Alabama	Cullman	C. Mohr				
75. Quercus Kelloggii	628	Oregon	Saw-mill, Ashland	G. Engelmann and C. S. Sargent.				
Black Oak.	963	do	Eugene City	G. H. Collier		0. 224	17	7
								No.
		100		1		17. 1		7
						, lin		
76. Quercus nigra	268	Missouri	Allenton	G. W. Letterman	As The	,		
	339	Alabama	Citronelle	C. Mohr	Sandy	0.128	13	4
7. Quercus falcata	131	South Carolina	Bonneau's Depot	H. W. Ravenel	Rich loam			
Spanish Oak. Red Oak.	245	Virginia		H. Shriver				
	2651	do		do				1
	2652	do		do				T.
	2653			A. do				
		17	Za V Hall		72.0			
The state of the s	548	Mississippi	Kemper's mill	C. Mohr	Rich loam	*********	*******	
			MILE				100	
		103	PROSIN	12-1/		174		100
78. Quercus Catesbæi Turkey Oak. Scrub Oak. Forked-loaf	342	Alabama		do	The second secon	The second second		*****
Black Jack. Black Jack.	770	Florida	Aspalaga	A. H. Curtiss	do	0. 301	62	****
70. Onevene palastris	47	16	Allenten	C W Latternan	Disk allowed			
79. Quercus palustris		Missouri		G. W. Letterman				
water Oak.	282	do	do	do	do			
30. Quercus aquatica	349	Alabama	Cottage Hill	C. Mohr	Sandy loam	0. 350	8	,
Water Oak. Duck Oak. Possum Oak. Punk Oak.	511	Tennessee	Tullahoma	A. Gattinger	do			
	742	Georgia	Bainbridge	A. H. Curtiss	Alluvial	0.310	13	3
Cumpan Spin						1		
31. Quercus laurifolia	756	Florida	Saint John's river	do	Sandy loam			
Laurel Oak.	801	do	do	do	do	0. 240	33	1
								1
82. Quercus heterophylla	1171	New Jersey	Mount Holly	S. P. Sharples	Clay	0.329	6	,
Bartram's Oak.				10 mm 10 mm				

SPECI	FIC GRAVITY	DETERMINAT	nons.	ASH 1	DETERMINA	TIONS.	Weight, per cubic foot, in pounds (average).	Remarks.	
irst.	Second.	Third.	Average,	First.	Second.	Average,	in pounds (average).	Remarks.	
0. 7749			0.7749	0.18		0.18		Mark and the course of the course	
	0 5050		0.7474	0.10	0.14	0. 16			
0. 7596	0. 7352		0. 8014	0. 17	0.14	- 1		0.00 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	
0. 8014			0. 7192	Herein and the second	0.19	0.21		0.33 sap-wood; second growth	
0.7192	0 5155		1000	0. 28	0.18	0. 23	***************************************		
0. 5070	0. 5175		0. 5123	0.44	0.63	0, 54			
0.7164	0. 6586	***********	0. 6875	0.14	0.15	0, 15			
0, 6765	0.0070	0.7100	0. 6765	0.35	0. 37	0.36			
0. 6622	0, 6972	0. 7100	0. 6898	0. 59	0.70	0. 65			
			0. 7045			0.28	43. 90		
0. 6565	0. 6582		0. 6573	0.18	0.21	0, 20			
0. 6273	0.6322		0. 6297	0.33	0.30	0.32			
			1912022	1	OL		Value		
			0. 6435	1/1	1	0, 26	40. 10		
0. 7304	0.7492		0.7398	1000	0.00	0.94			
0. 7304	0.7192	***************************************	0. 7358	0.96	0. 92	1.37		All sap-wood	
0. 7508	0.7192	**********	0. 1201	1.41	1,02	1:01		All sap-wood	
			0. 7324	7//		1.16	45. 64		
0. 6892	0, 7003		0. 6948	0.27	0, 27	0. 27			
0. 5701	0, 6780		0. 6241	0. 27	0.33	0.30			
0.6613			0. 6613	0.15		0.15			
0.7334			0. 7334	0. 22		0. 22		\\	
0. 6556			0. 6556	0. 25		0. 25		M	
0. 8052	0.7696	**********	0. 7874	0. 29	0. 28	0. 29			
			0, 6928	0		0. 25	43.17		
0. 6679	0. 6736		0. 6708	0.05	0.00	0. 83	1051		
0. 7906	0.7854		0. 7880	0.85	0.80	0.90			
0. 1900	U. 7004			0, 90	0. 90			A CONTRACTOR OF THE CONTRACTOR	
			0. 7294			0. 87	45. 45		
0. 6917	0. 6465		0.6691	0. 65	0, 57	0. 61			
0.7480	0. 6890		0.7185	0.92	1. 07	1.00		Second growth	
			0. 6938			0. 81	43. 24		
0, 7167	0.7149	12	0. 7158	0.45	0. 39	0.42			
0.7084	0.7202		0.7143	0. 82	0.84	0. 83			
0. 7237	0.7624		0. 7431	0. 35	0.19	0. 27		***************************************	
		13 23	0.7244	1000		0. 51	45. 14		
0 7474	0.7075		0.2025	0.10	0.40	0.45			
0.7474	0.7075		0. 7275	0.48	0.46	0.47		All sap-wood	
0. 8146	0. 7995	*************	0. 8071	0, 93	1.41	1.17			
	15		0. 7673			0. 82	47. 82		
0. 6818	0. 6834 }		0. 6834	0.19	0.14	0. 17	42.59		
0. 6882	0. 6802 \$		0,0001	0.13	0.14	0.11	14.08		
0.6502	0. 6337		0. 6420	1. 27	1.15	1. 21	40.00		

Species.	numb	State.	Locality.	Collector.	Soil.	Diameter of tree,	GRO	RS OF WTH.
Sycologi	Office number.		200mily.	3000000		in meters.	Sap- wood.	Heart-wood.
4. Quercus hypoleuca	416	New Mexico	Pinos Altos mountains.	E. L. Greene	Dry, rocky	0. 203	49	20
	599	Arizona	Santa Rita mountains.	G. Engelmann and C. S. Sargent.	do			
5. Querous imbricaria	401	Kentucky	Harrodsburg	W. M. Linney	Utica shale			
Divings out Dance out	402	do	do	do				100000000
	403	do	100	do	Carried Total II			PORCE ARES
	50	Missouri	Allenton					
	135	do	do	do	Rich loam		•••••	
	i		TECHX					
6. Quercus Phellos	512	Tennessee	Tullahoma	A. Gattinger	Moist, siliceous	0. 184	15	
7. Quercus densiflora	687	California	Marin county	G. R. Vasey	Gravelly	0.400	25	85
Oak. 8. Castanopsis chrysophylla Chinquapin.	729	do	Mendocino county'	A. Kellogg				
9. Castanea pumila	578	Arkansas	Hot Springs	G. W. Letterman	Sandy loam	0. 615		
0. Castanea vulgaris, var. Americana	18	Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0. 666	34	42
Chestnut.	2581	Virginia	Fancy Gap	H. Shriver	Moist			
	2582	do	do	do	do			
	2583	do	do	do	do			
	516	Tennessee	Nashville	A. Gattinger	A STATE OF THE PARTY OF THE PAR		•••••	
	727	Pennsylvania	Williamsport	C. G. Pringle			•••••	
	868	Massachusetts	Danvers	J. Robinson	Loam	0.110	4	21
1. Fagus ferruginea	9	do	Arnold Arboretum .	C. S. Sargent	Drift	0. 190	9	26
Beech.	442	Kentucky	The state of the s	W. M. Linney	Hudson River			
	448	do	do	do	shale. do			
	558	do	do	do	do			
	554	do	do	do				
	119	Michigan	Dansville	W. J. Beal		20 20 20		
	765	Florida	Chattahoochee	A. H. Curtiss		0. 272	82	
	853	Massachusetts	Hamilton	J. Robinson	do			
2. Ostrya Virginica	11	do	Arnold Arboretum	C. S. Sargent	Drift	0. 285	26	44
Hop Hornbeam. Iron Wood. Lever Wood.	87	Missouri	Allenton	G. W. Letterman	Rich loam	0. 085	35	
	870	Massachusetts	Danvers		Rocky			
	877	do	do		Rich loam			
	1047	do	North Reading	do		0.190	62	14
	1		LE HILE	MALE CONTRACTOR			CITY IS	100
3. Carpinus Caroliniana	46	Missouri	Allenton	G. W. Letterman	Damp, alluvial			

Brisc	IFIC GRAVITY	DETERMINA	TIONS.	ASH :	DETERMINA	TIONS.	Weight, per cubic foot,		mile
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number.
0.7826	0. 8304		0. 8065	1. 27	1. 27	1. 27		All sap-wood	. 4
0.7774		}	0.7952	§ 1.21	1.35}	1.41		0.5 sap-wood	. 59
0. 8208	0.7735	0. 8089 \$		1.64	1.425				
			0. 8009			1.34	49. 91		
0.7402	0. 7394		0, 7398	0. 23		0. 23			
0.7234			0.7234	0.65		0.65			. 0
0. 8332			0. 8332	0.79		0.79		-	. 0
0.7517	0.7360		0. 7439	0. 22	0.34	0.28			
0.7200	0.7285		0. 7243	0. 23	0.18	0. 21		Second growth	. 1
	William !		0. 7529			0.43	46. 92		6
0.7532	0.7412		0, 7472	0.51	0.48	0, 50	46, 56	AO/	. 5
0.6650	0.7004		0. 6827	1.55	1.41	1.49	42.55		. 6
0, 5520	0. 5627		0. 5574	0. 35		0.35	34.74	0. 33 sap-wood.	. 7
0, 5698	0. 6076	1	0, 5887	0.12	0.11	0, 12	36, 69		. 5
	The desire			The state of the s					
0. 3829	0. 3827		0. 3828	0.10	0.12	0.11			-
0.4720		*************	0. 4720	0. 26		0. 26			2
0.4716			0.4716	0. 21		0. 21		V	2
0. 4494		**********	0.4494			0.00			2
0. 4693	0.404		0.4693	0.18	0.21	0. 20		1974 776 A	. 5
0. 4663	0. 4247	0.4858	0. 4455 0. 4621	0.16	0.17	0. 17			. 8
0. 4613	0. 4094	0.4656	-	0.14	0.12	47 P	10 STA		
			0. 4504		KA	0.18	28, 07		
0. 6663	0. 6556		0.6610	0. 34	0.33	0.34			
0.6200			0, 6200	0.75		0.75		Red beech	
0.6343			0. 6343	0.70		0.70		Red beech	. 8
0.7992			0.7992	0. 57		0.57		White beech	
0.7150	0.7200		0.7175	0, 54		0.54		White beech	
0.7619	0, 6605		0.7112	0.31	0.38	0.35			1
0. 6897	0. 6560		0. 6729	0.47		0.47			7
0.7017	0, 6825	0. 6870	0. 6904	0. 29	0.38	0. 34		First and second sp. gr. determinations made on 0.5 sap-wood; third sp. gr. determination made on sap-wood.	8
	la de la		0.6883			0. 51	42, 89		-
0.7608	0. 7636		0.7622	0.34	0.37	0. 36			
0.8919			0.8919	0.49	0. 67	0.58			
0. 8512	0. 8402	0. 8870	0, 8595	0. 53	0.66	0. 60	***************************************		8
0. 8491	0, 8296	0. 8534	0. 8440	0, 55	0. 51	0. 53	***********		. 8
0. 7818	0, 7940	0.7768	0.7842	0.51	0. 39	0.45			10
1	Mary By		0. 8284			0. 50	51, 62		
			0 7001	0 0.00	0.00	0.78			1
0.7657 0.7264	0.7711		0.7684	0.76	0. 80	0. 80			100

Species.	Office number.	State.	Locality.	Collector.	Soil	Diameter of tree,		RS OF WTH.
	Office 1					in meters.	Sap- wood.	Heart wood
93. Carpinus Caroliniana—continued	77	Missouri	Allenton	G. W. Letterman	Rich, alluvial	0.052	22	
	872	Massachusetts	Danvers	J. Robinson	Low, rich	September 1		
	1038	do	do	do	Gravelly			
	TENTE:							
BETULACEÆ.			U- SPANEDARON			2/30/	20	120
04. Betula alba, var. populifolia	10	do	Arnold Arboretum	and the second of the second	Drift	0. 170	10	26
Birch.	848	do	Danvers	J. Robinson	Gravelly	0.196	16	33
		Sed	123			1		
95. Betula papyrifera	223	Vermont	Charlotte	C. G. Pringle	No. of the Control of			
Birch.	224	do	do	do	A SOURCE OF A STATE OF THE SECOND			******
	225	do	do	do			******	*****
	722	Montana	Missoula	Sereno Watson	Wet	SECOND SECTION	******	
	836	Massachusetts	Townsend	J. Robinson	***************************************	0. 234	26	*****
	990	Alaska	Chilcoot inlet	Paul Schultze C. G. Pringle		0. 188	57	*****
	1065	Vermontdo	do				******	*****
	1067	do	do					
06. Betula occidentalis	528	Colorado	Engelmann's cañon.	Robert Douglas	Wet, sandy			
	629	California	Strawberry valley	G. Engelmann and C. S. Sargent.	Wet, peaty			
97. Betula lutea	155	Vermont	Charlotte	C. G. Pringle	Swampy			
Yellow Birch. Gray Birch.	2301	do	do	do	Clay			
	2302	do	do	do	Gravelly			
	843.	Massachusetts	Danvers	J. Robinson	do	0.160	34	
	1068	Vermont	Charlotte	C. G. Pringle	do			
	1069	do	do	do	do			
	1070	do	do	do	do			
08 Retala pigra	136	Missouri	Allenton	G. W. Letterman	Moist loam			
98. Betula nigra	398			G. W. Letterman	and the same of th			
	841		North Andover	Control Control Control		0, 192	30	
	842	The second second second		do		0, 214	32	
	1184	Missouri	Allenton	G. W. Letterman	Sandy loam			
99. Betula lenta	. 4	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	0.362	12	6
Cherry Birch. Black Birch. Sweet	221	Vermont	Charlotte	C. G. Pringle	Gravelly			
Birch. Mahogany Birch.								

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THE WOODS OF THE UNITED STATES.

SPECIF	TC GRAVITY	DETERMINAT	ions.	ASH	DETERMINA	TIONS.	Weight, per cubic foot,		
First.	Second.	Third.	Average.	First.	Second.	Averaĝe	in pounds (average).	Remarks.	1
1	The dead								
0.7591	0.6907		0. 7249	0.60	0. 52	0.56	**********	***************************************	I
0.7014	0.7085	0.7137	0.7079	0.88	0. 93	0.91	**********	***************************************	
0. 7080	0. 6804	0. 6896	0. 6927	0. 55	0.65	0, 60	***************************************		-
			0. 7286		100	0. 83	45. 41		1
0. 5361			0.5361	0, 32	0.27	0.30		Sap-wood	
0. 6330	0. 6088	0. 6061	0. 6160	0. 28	0. 28	0. 28		First and third sp. gr. determinations made on sap-wood	-
			0. 5760			0, 29	35. 90		
0. 4594	0. 4757		0.4676	0. 24	0. 24	0, 24		All sap-wood	
0. 6021	0. 5979		0.6000	0, 30	0.31	0.31	faring	0.5 sap-wood	-
0. 6086	0. 6207		0.6297	0. 25	0. 22	0.24		First sp. gr. determination made on 0.5 sap-wood; second sp. gr. determination made on 0.75 sap-wood.	1
0. 6240	0. 6096		0. 6168	0. 25	0. 22	0. 24		gr. determination made on 0.75 sap-wood. All sap-wood	1
0. 6290	0. 6260	0. 6395	0. 6315	0, 20	0.19	0,20		All sap-wood	1
0.6081	0. 6060		0.6070	0, 24	0. 25	0. 25		All sap-wood	ı
0. 6801	0. 6227	0. 6112	0, 6380	0. 28	0, 26	0. 27		All sap-wood	ı
0.6002	0, 5665	0. 5843	0, 5837	0. 25	0.24	0, 25		All sap-wood	ı
0. 5894	0. 5908	0. 5745	0, 5849	0.26	0, 22	0.24		All sap-wood	١
		100	0. 5955			0, 25	37. 11		-
0. 5880	0. 6183		0.6032	0.18	0.18	0.18		All sap-wood	
0. 6543	0, 5777	0. 5767	0. 6028	0.44	0.37	0.41		· · · · · · · · · · · · · · · · · · ·	l
337			0. 6030		- W.C.	0, 30	37. 58	1/2//	
0. 5759	0. 6237		0. 5998	0, 29	0. 20	0. 25		0.5 sap-wood	
0.7047			0.7047	0. 33		0.33	MISO	0.875 sap-wood	
0. 6416	*********		0.6416	0.60	Andrea	0.60		$\langle Q \nabla / I \rangle$	
0.7032	0.7200	0.7080	0.7104	0.16	0. 25	0. 20	TAIL.	All sap-wood	ı
0.6468	0. 6293	0. 6573	0, 6445	0.28	0.25	0. 27	10.000		
0.6380	0.6472	0. 6256	0. 6369	0. 28	0. 22	0. 25			
0. 6557	0. 6543	0. 6382	0. 6494	0. 27	0, 27	0. 27			1
11			0. 6553			0.31	40. 84		
0. 5608	0. 5721		0. 5665	0.30	0. 31	0.31		All sap-wood	
0. 5554	0. 5508		0.5531	0. 27	0.31	0. 29		All sap-wood	1
0. 5910	0. 5759	0. 5811	0.5827	0.38	0.38	0.38		From butt: Sap-wood	1
0. 6049	0. 5975	0. 5965	0.5996	0.38	0.38	0.38		From top of trunk: Sap-wood	1
0. 5556	0. 5836	0. 5988	0. 5793	0.44	0.40	0.42			
			0. 5762		200	0.35	35, 91		
0. 7555	0, 7604		0. 7579	0.16	0. 20	0.18		All sap-wood	
0. 7844	0.6945		0. 7145	0. 25	0, 32	0. 29			
0. 8115	0. 8160 🤻	0. 8109	0. 8128	0. 26	0. 33	0.30		All sap-wood.	
100		1371	0, 7617			0. 26	47.47	Many transfer of the second se	1

Charles	Office number.	State.	Locality.	Collector.	Soil.	Dirmeter of tree,		RS OF WTH.
Species.	ОЩсе п	State.	Literative.	Conscion	, DOM.	in meters.	Sap- wood.	Heart-wood.
300. Alnus maritima	809 810	Delaware		W. M. Canby			25	
301. Alnus rubra	967	Alaska	Sitka					
	991	Washington territory. Oregon	Puyallup Portland Furniture Company.	G. Engelmann and C. S. Sargent. do	The state of the s	111111111111111111111111111111111111111	The same of	
302. Alnus rhombifolia	717	Montana	Missoula	Sereno Watson	Wet			
	979	Oregon	Drain	C. S. Sargent	Moist loam			
303, Alnus oblongifolia	694	California	San Bernardino	W. G. Wright		********		******
304. Alnus serrulata	541 611	AlabamaGeorgia	Stockton	C. Mohr	P. I. I.		38	
305. Alnus incana	374 862	Vermont Massachusetts	Hinesburgh	C. G. Pringle J. Robinson				No.
SALICACEÆ. 300. Salix nigra. Black Willow.	232 855	Vermont	Shelburne			Particular Property	12	50
307. Salix amygdaloides	884 908	UtahColoradodo	Cañon City	M. E. Jones				
	911		The Value of the					
308. Salix lævigata	690	California	Santa Cruz	C. S. Sargent.				
309. Salix lasiandra	1219	do	Strawberry valley	G. Engelmann and	Moist, rich			
Son Sails mountain, ver. materious	981	Oregon	Portland	C. S. Sargent. F. Skinner	Alluvial	The same of the same of		
300. Salix lasiandra, var. Fendleriana	889	Utah	City Creek cañon	M. E. Jones	Gravelly			
310. Salix longifolia	1174	Illinois	Rockford	The Market		0. 120	4	11
310. Salix longifolia, var. exigua	955	Texas	Matagorda bay	C. Mohr	Moist, saline			

THE WOODS OF THE UNITED STATES.

SPECI	FIC GRAVITY	DETERMINAT	rions.	ASH I	DETERMINA	TIONS.	Weight, per cubic foot, in pounds (average).	Remarks.	Ощее пишвет.
First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	ACMINE RO.	Ощее п
4 4000	0.5100		0.5007	0.24	0.95	0.35			801
0.4988	0. 5186 0. 4889		0. 5087 0. 4906	0.34	0.35	0. 42			810
			0.4996			0.39	31, 13		
0, 4922	0, 4851	H.	0.4887	0, 39	0.40	0.39			96
0. 4855	0. 4847		0, 4856	0. 59	0.49	0.54			99
0. 4829	0.4565		0, 4697	0.36	0,28	0. 32			102
			0. 4813		and the	0.42	29. 99		3
0.4556)				(0.39	0.45)				-
0. 4427	0. 3722	0.3604	0.4077	0.43	0. 30	0.39		First sp. gr. determination made on sap-wood; second sp. gr. determination made on 0.5 sap-wood.	71
0.4172	0.4183		0. 4178	0.19	0. 25	0.22		<u> </u>	97
			0. 4127	1/	80	0. 31	25, 72		100
0.4138	0. 3823		0. 3981	0.42	0.43	0. 42	24. 81		69
0.4714	0. 4635		0.4675	0. 32	0.34	0. 33			54
0. 4573	0. 4738		0. 4656	0. 47	0.39	0. 43			61
			0.4666			0.38	29. 08		
		N. S.							
0.4029	0. 4842	**********	0. 4436	0.47	0.40	0.44		All sap-wood	. 37
0.4960	0. 4642	0. 4732	0. 4778	0.38	0.40	0.39	28.71	0.75 sap-wood	- 86
	STATE S		0. 4607	129		0.42			
									1
0. 4327	0.4102		0.4215	0. 62	0.79	0.71	ana.l		. 2
0. 4790	0.4621	0.4676	0.4696	0.65	0.71	0.68	***********	First and second sp. gr. determinations made on 0.66 sap-wood; third sp. gr. determination made on 0.5 sap-wood.	8
			0. 4456		13	0. 70	27.77	tillid sp. gr. determination made on viv sap wood.	1
0. 4530			0. 4530	0. 55	0.89	0.72			. 8
0.4689	0.4448 }		0. 4488	5 1.08	0.91		1633	One tree	9
0.4612	0. 4201 \$	***********	0. 4400	1.38	1.08	1.11		One tree	9
			0.4509			0. 92	28. 10		
0.4916	0. 4828		0.4872	0.56	0.60	0. 58	30. 36		- 6
0.4810	0. 4702		0. 4756	0.60	0.59	0.60	29. 64		- 12
0. 450°	0. 4536		0. 4519	0.61	0.73	0. 67			- 6
0. 5063	0. 4573	0. 4089	0. 4575	1.09	0.72	0.91			. 9
	1		0. 4547		The state of	0.79	28. 34		
0. 4576	0. 4619		0.4598	0. 53	0. 58	0, 56	28. 65		
0. 4901	0. 4959		0. 4930	0.46	0.49	0.48	30. 72		. 1
		-		7,11	A THE RESERVE OF THE PERSON NAMED IN COLUMN TWO IN COLUMN		11 2200		1
0.5221	0. 5324	0.5482	0. 5342	1.02	1.09	1.06	33. 29		. 4

Species.	lumi	State.	Locality.	Collector.	Soil.	Diameter of tree,	GROV	RS OF VTH.
openes.	Office number.	State.	Locality.	Conector	501.	in meters.	Sap- wood.	Heart wood.
11. Salix sessilifolia	1143	Oregon	Mouth of Willamette river.	Jos. Howells	Alluvial			
12. Salix discolor	859	Massachusetts	Topsfield	J. Robinson	Loam	0. 091	7	6
	1225	New York	Ellenburg	J. H. Sears	do			
13. Salix flavescens	641	New Mexico	Pinos Altos mount- nins.	E. L. Greene				
	721	Montana	Pattee's cañon, Mis- soula.	S. Watson	100	The based of		
	888	Utah	City Creek caffon	M. E. Jones	Moist, gravelly	0.060	13	
13. Salix flavescens, var. Scouleriana Black Willow.	972	Washington territory,	Seattle	G. Engelmann and C. S. Sargent.	Moist, sandy	0. 160	22	10
14. Salix Hookeriana	966	Oregon	Winchester bay	do	Sandy saline			
								310
15. Salix cordata, var. vestita	1175	Nebraska		R. W. Furnas W. G. Wright			5 8	11
16. Salix lasiolepis	669	California	Santa Cruz	G. Engelmann and C. S. Sargent,	Sandy loam	0.128	16	
17. Salix Sitchensis	1161	Oregon	Sauvie's Island	Jos. Howells	Alluvial			
18. Populus tremuloides	2721	Colorado	Alpine	T. S. Brandegee	Damp			
Aspen. Quaking Asp.	272*	do	do	do	do			
	2723	do	do	do	do			
	411	Vermont	Charlotte	C. G. Pringle	Moist	********		
	1035	Massachusetts	Danvers	J. Robinson	Gravelly	0.137	17	1
						Nine of		
19. Populus grandidentata	157	Vermont	Charlotte	C. G. Pringle	Sandy loam			
Poplar.	847	Massachusetts	Danvers	J. Robinson	Gravelly	0. 220	41	
						-AT		
20. Populus heterophylla	522	Tennessee	Nashville	A. Gattinger	Alluvial			
2000 Commission Swamp Countries	554	Alabama	Stockton	C. Mohr	do			
West of the second	170	Vermont	Shelburne	C. G. Pringle	Sandy loam			
281. Populus balsamifera	159	A CTIMOMERSON			PRODUCTAL ACCORDANCE A CARACTER			

umber	Remarks.	Weight, per cubic foot, in pounds (average).	TIONS.	ETERMINA	ASH I	nons.	DETERMINAT	FIC GRAVITY	SPECI
Office number.	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
114		27, 40	0, 50	0. 50	0.49	0. 4397	0. 4319	0. 4545	0. 4326
. 05			0.49	0.40	0.40	0 4540		0.4184)	0. 4930
85		***************************************		0.49	0.48	0. 4548		0. 4643 }	0.4434
122			0. 37	0.37	0. 36	0, 3974			0. 3974
		26, 55	0, 43			0. 4261			
64			0.74	0.68	0.79	0, 4997		0. 5081	0.4912
7:			0.39	0.42	0.36	0. 5094		0. 4953	0. 5234
88		***************************************	0.70	0.72	0.67	0.4815		0. 4707	0. 4923
	V	30. 97	0.61	al	1 30	0. 4969			11.2
91		33.73	0. 39	0.34	0.43	0. 5412		0, 5504	0. 5320
					N/			12 11 1	
9		33. 34	0. 32	0. 32	0.33	0. 5350		0. 5229	0.5471
11		A	0.47	0.44	0.49	0.5716	4.1	0. 5683	0. 5750
11			0.72	0.71	0.72	0. 6422		0. 6450	0. 6393
		37, 82	0. 59			0. 6069			
				6	4/=				
6		34. 82	0.98	0. 95	1.01	0. 5587	0. 5734	0. 5323	0.5704
11		31. 61	0, 59	0. 52	0. 67	0, 5072	,	0. 5133	0. 5011
2	All sap-wood	ROSIN	0.76		0.76	0. 3785	N. E.		0. 3785
2	All sap-wood		0.72		0.70	0.3579			0. 3579
2	All sap-wood	O.L.A.A				0.3569			0. 3569
4	All sap-wood	********	0, 31	0. 31	0, 31	0.4951		0.5021	0. 4880
10	All sap-wood		0, 41	0, 39	0. 43	0. 4278		0, 4255	0.4184
1		25. 13	0. 55	I AT		0.4032			
						12//00/20			
1 8	All sap-wood		0.43	0.43	0, 45	0. 4996 0. 4268	0.4182	0. 4872 0. 4416	0. 5119
	All sap wood	28. 87	0.45	0.47	0.50	0, 4632	0. 1102	W. 1110	
an a		20,01	0.40			0, 4002			
	All sap-wood		0.72	0.70	0.74	0.4068		0, 4113	0. 4023
ŧ			0. 90	0, 90	0. 90	0.4110		0.4105	0.4115
		25. 48	0, 81		LIST.	0. 4089		16.	
				min o	1	0.000	I de Yi	0.2404	0. 3524
	All sap-wood		0.92	0.72	1.12 0.39	0. 3464	***********	0. 3404 0. 3768	0. 3524
				0.40	0.00				
		22. 65	0.66	2.3		0. 3635	943, 213	Maria de la companya della companya	

Species.	Ошее пишвег	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF WTH.
Spectos.	Ощее 1		2000000			in meters.	Sap- wood.	Heart-wood.
321. Populus balsamifera, var. candicans	1054	Massachusetts	Topsfield	J. Robinson	Gravelly	0, 203	11	19
322. Populus angustifolia	552	Colorado	Manitou Springs	Robert Douglas	Sandy loam	0.098	10	11
323. Populus trichocarpa	1012 1028	Oregondo	Saint John's Barrel Factory, Portland. Portland Furniture Company.	F. Skinner				
324. Populus monilifera	199	Ohio	Barney and Smith Manufacturing Co.	E. E. Barney	the same of the sa	AND AND ALLBOAR		muy and
lina Poplar. Big Cottonwood.	234	Vermont	Charlotte	C. G. Pringle	- Committee of the control of the co	AND STREET		STATE OF THE PARTY
	255	Missouri	Allenton	G. W. Letterman	100000 (10000 1000 1000 1000 1000 1000	Secretary of the	The state of	******
	304		do	J. Reverehon	- Anna Maria Cara Cara Cara Cara Cara Cara Cara	and the second second		
	754	Texas	Dallas	A. H. Curtiss	Contract to the contract to th	The state of	5	59
	104	Piorita	Chattanoochee	A. H. Curuss		0, 200	20	
325. Populus Fremontii	659	California	Sacramento valley	G. R. Vasey	do	0.444	16	19
325. Populus Fremontii, var. Wislizeni Cottonwood. White Cottonwood.	646	do	San Bernardino	W. G. Wright	do			
CONIFERÆ.						13		
326. Libocedrus decurrens White Cedar. Bastard Cedar. Post Cedar. Incense Cedar.	579 634	do	Saw-mill, Straw- berry valley.	G. Engelmann and C. S. Sargent.		100 m 10 m 11 m 21		Of an article
	662	do	Saw-mill, San Ber- nardino mountains.	W. G. Wright	//			
327. Thuya occidentalis	104	Vermont	Monkton	C. G. Pringle	Cold, peaty			
Trino Couur. Arour-vice.	379	do	do	do	do			
	782	New Brunswick						
	783	do	Bridgeton	Ed. Sinclair				
	790	Province of Quebec	Amqui	A. Grant				
	792 796	do		Grand Trunk rail- way.				
	874	Maine	Mattawamkeag	J. Robinson		100000000000000000000000000000000000000	19	71
	1099	Wisconsin	Ean Claire	H. C. Putnam				***
328. Thuya gigantea Red Cedar. Canos Cedar.	1017	Oregondo	Weidler's saw-mill, Portland. Portland Furniture Company.	G. Engelmann and C. S. Sargent.				
329. Chamæcyparis sphæroidea	350	Alabama	Cottage Hill	C. Mohr	Sandy, wet	0. 298	7	20
White Oedar.	850	Massachusetts	Beverly					
	851	do	do	do	do			
White and the second	852	do	do	do	do			
						1		

		Weight, per cubic foot, in pounds	rions.	ETERMINA	ASH 1	TONS.	Third. Avera		SPECII
	Remarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
	Cultivated. First and second sp. gr. determinations made on sap-wood.	25. 93	0.46	0. 43	0.48	0. 4161	0. 4301	0. 4222	0. 3959
		24. 38	0.79	0.75	0, 82	0. 3912		0. 3881	0. 3942
	Third sp. gr. determination made on sap-wood		1.17	0.87	1.47	0. 3578	0. 3567	0.3656	0. 3511
-			1, 37	1.18	1, 56	0. 4950		0. 3937	0.4163
١		23, 77	1. 27			0. 3814			
ı			1 20	7.49	1. 34	0. 3882		0. 3946	0. 3817
1			1.39	1.43	0.68	0. 3621	***************************************	0. 3302	0. 3939
			0.81	0.94	- 25	0.3380		0. 3444	0. 3315
			0. 81	0. 92	1.18	0. 3380		0. 3231	0. 3201
		CHA	1. 03	0.96	1.09	0. 4742		0. 4778	0. 4706
	X(0) XX		0. 65	0. 60	0. 69	0, 4494		0. 4632	0. 4355
-		24. 24	0. 96			0. 3889			
		and the same		R THE					
Ì	All sap-wood	30. 62	0.77	- 6	0.77	0, 4914	0. 4597	0. 4655). 5490
		28. 80	1.13	1, 09	1, 17	0.4621	0.4860	0. 4176	. 4827
		13							
			0.04	0.04	0. 03	0. 3861		0. 3830	. 3891
	,		0, 15	0.17	0. 13	0. 3599		0. 3769	3428
1	And make the control of the control		0.06	0.05	0, 08	0.4501		0. 4596	. 4586
1		25, 03	0. 08		2	0. 4017			
		MIRO	70.27	0. 25	0. 29	0. 3035		0. 3021	0. 3048
1			0. 29	0. 29	0, 20	0. 2859		0. 2870	2847
ĺ		INII	0. 50	0. 51	0.49	0. 3280		0. 3275). 3284
Ì		UINE	0.42	0.44	0.39	0. 3237	0. 3272	0. 3275	0. 3163
			0.30	0.31	0. 29	0. 3012		0. 3007	0. 3016
l			0.40	0.44	0.36	0.3166		0. 2880	3452
			0.40	0.37	0.43	0.3106		0.8104	3108
1			0. 37	0.34	0.39	0.3603	0.3697	0.3529	3584
			0.38	0.38	0. 37	0. 3177		0. 3232	3121
		19.72	0. 37	E. Wi	Bull.	0. 3164			
			0. 13	0.14	0, 12	0. 4087		0.4178	. 3996
			0. 22	0. 19	0. 24	0. 3506		0, 3551	3460
		23. 66	0. 17	2 - 31		0. 3796			. 34
			0. 92	0.90	0. 94	0, 3392		0. 3447), 3337
1			0.16	0.15	0.17	0. 3277	0.3081	0.3644	3105
			0.12	0.11	0.13	0.3085	0.3182	0. 3036	0. 3038
			0.12	0. 13	0.11	0. 3536	0. 4527	0. 3091	0. 2990
1		20.70	0. 33	123 13		0. 3322	Transi		77124

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF WTH.
	ОЩсе					meters.	Sap- wood.	Heart wood.
330. Chameoyparis Nutkaensis	969	Alaska	Sitka	Paul Schultze				M. T.
Yellow Oypress. Sitka Cypress.	983	British Columbia	Saw-mill, Victoria	G. Engelmann and				
	994	Alaska	Peril strait	C. S. Sargent. Paul Schultze				
	1000	do	Weidler's saw-mill,	G. Engelmann and				
			Portland, Oregon.	C. S. Sargent.		1000	100	
E FIRE CONTRACTOR OF THE PARTY		1		J. S. Tan		1		K.E.
331 Chammeynaris Lawsoniana	701	Oregon	Doon & Co 's som	do		W 34		Bre
331. Chamæcyparis Lawsoniana	707	do	mill, Marshfield.	do		Post Property and		
Ginger Pine.								
332. Cupressus macrocarpa	675	California	Monterey	do	Gravelly loam			
	-	100	ILCITA	7		1 -141	- Uar	100
333. Cupressus Goveniana	691	do	The state of the s	G. R. Vasey		THE PERSON	95	
	1100	do	Calistoga	W. F. Fisher	do	0. 234	36	
The state of the			00000		Albert S. R	Like M		
335. Cupressus Guadalupensis	798	Eastern Arizona	San Francisco mount-	E. L. Greene	Rocky			
	1149	Arizona	Santa Catalina	C. G. Pringle	do			
			mountains,					
	2000							
836. Juniperus Californica	1229	California	San Bernardino county.	do	Gravelly	********		
336. Juniperus Californica, var. Utahensis	887	Utah	Lewiston	M. E. Jones	do	0.072	55	12
337. Juniperus pachyphlœa	555	New Mexico	Silver City	E. L. Greene	Stony			
Juniper.	592	Arizona	Santa Rita mount-	G. Engelmann and	Gravelly			
	692	do	do	C. S. Sargent.	do			
		MAT	FINI			III V		
			Y UI				. 1	1000
338. Juniperus occidentalis	624	California	Yreka plains	do	do			
338. Juniperus occidentalis, var. monosperma	420	New Mexico	Silver City	E. L. Greene	Stony	0.175	22	64
Juniper.	527	Colorado	Manitou Springs	A DATE OF THE PARTY OF THE PART	Gravelly	0.2.0	-	
338. Juniperus occidentalis, var. conjugens	939	Texas	Austin	C. Mohr	Limestone	0. 134	23	28
Juniper.	1102	do	do	S. B. Buckley	do			
		Tap T		The same				
339. Juniperus Virginiana	14	Magazhanetta	Amold Asherston	C S Samuel	Delft	0.000	10	40
Red Cedar. Savin.	327	Massachusetts	Arnold Arboretum . Dallas	J. Reverchon	Drift	0. 230	19	49
	734	Florida	Chattahoochee	A. H. Curtiss	do	5.5547474	10	00
EA S COLUMN TO SERVE	800	do	Saint John's river	do	Sandy loam	*******		
	837	Massachusetts	Danvers	J. Robinson	reservation of the second			
	924	Florida	Chattahoochee	C. Mohr	Alluvial			
	1055	Massachusetts	Topsfield	J. Robinson	Drift	0. 203	15	37

100		Weight, per cubic foot	rions.	PETERMINA	ASH I	TONS.	DETERMINAT	IC GRAVITY	SPECIF
	Remarks.	Weight, per cubic foot, in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
1			0. 34	0, 37	0.30	0. 4248		0. 4484	0. 4011
			0. 32			0. 4999			
1	//····································			0, 34	0. 29		*********	0. 5010	0.4987
1		**********	0. 32	0. 34	0. 29	0. 5261		0. 5166	0. 5356
			0.38	0. 36	0.39	0. 4621		0.4686	0. 4555
1		29. 80	0. 34			0. 4782	9358		
			0, 10	0.12	0.07	0, 4422		0.4487	0. 4356
			0.09	0, 09	0.08	0.4819		0. 5259	0.4380
		28. 80	0.10			0, 4621	Alex S		
		39. 02	0.57	0, 59	0, 55	0. 6261		0. 6263	0. 6260
			0.00		4.4	0 1010	711 15 1	0.4000	0.4400
-	www.minimum.minimum.minimum.minimum.minimum.minimum.minimum.minimum.minimum.minimum.minimum.minimum.minimum.mi		0, 38	0. 35	0.41	0. 4613		0. 4733	0. 4492
			0. 51	0.47	0. 54	0. 4765		0, 4910	0. 4620
1		29. 22	0, 45			0. 4689			
	All sap-wood		0.41	0.38	0.43	0, 4636	0.4617	0, 4643	0.4648
	All Bap wood.	A Para	0.46	0.51	0.41	0. 5049	0. 1011	0. 5272	0. 4826
-		30.18	0. 44	1	1	0, 4843			. 1020
-		39. 15	0.75	0. 73	0.77	0. 6282		0. 6255	0. 6309
-	0.8 sap-wood	34.41	0.49	0. 51	0.47	0, 5522	***************************************	0. 5539	0. 5504
	,,/,,/,,		0. 14	0.16	0.11	0. 6355		0. 6965	0. 5744
5	One tree	Marcus	0.08	0.07	\$ 0.07	0. 5302		0. 5619 }	0. 5085
-		091		0.095	0.08		Control S	0. 5321 \$	0. 5185
1		36. 32	0.11			0. 5829			
-		35. 93	0.12	0. 12	0.12	0. 5765		0.5807	0. 5724
			0.68	0. 68	0, 68	0.7385		0.7440	0. 7329
			0.88	0.86	0. 89	0. 6852		0. 6935	0. 6768
		44.36	0.78			0, 7119			3
1			0. 46	0. 47	0. 45	0. 6967		0. 6967	
			0.46	0. 53	0.39	0. 6846	0. 6948	0.6840	6750
		43. 04	0.46			0. 6907		MAN.	
	0.1 sap-wood		0.14	0.14	0. 15	0. 5079		0. 5045), 5112
1	0.1 sap-wood		0.13	0. 14	0. 12	0.4539		0. 4493	0, 4585
1		***************************************	0.16	9	a special and	0, 5433	0. 5533	0. 5310	0. 5455
1	***************************************	***********		0.17	0.16	al and		0. 4727	0. 4901
	••••••		0. 11	0.08	0.13	0.4814	0 4799	- 1	0. 4804
-			0. 15	0.14	0.16	0. 4743	0. 4733	0. 4693	
-		************	0. 14	0. 12	0.16	0. 4761	0.4740	0.4705	0. 4838
			0. 09	0.09	0.09	0. 5111	0. 5107	0. 4937	0. 5290

Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree, in		RS OF
	Office					meters.	Sap- wood.	Heari
40. Taxodium distichum	535	Alabama	Stockton	C. Mohr	Alluvial			
Bald Cypress. Black Cypress. Red Cypress. White Cypress. Decidu-	542	do	Otis & Co., saw-mill.		do			
ous Cypress.	543	do	do		do			
	581	Arkansas	Little Rock	G. W. Letterman	THE RESIDENCE OF THE PARTY OF T			
	582	do	do		do			
	741	Florida	Chattahoochee	A. H. Curtiss		0. 514	55	230
	8941		,	Department of Ag-		3101	100	
	8942			riculture.		-278020000000000000000000000000000000000		
	923	Alabama	Stockton		Alluvial			
		11 7	TECTA	Dr. 109	STATE OF THE STATE		- 5.0	
	1212		· · · · · · · · · · · · · · · · · · ·	do				
	1213			do				
	1214	Louisiana	Bayou La Battery	do	Alluvial			*****
1. Sequoia gigantea	657	California	Tulare county	G. Engelmann and C. S. Sargent.	Granite			
Dig 1700.	666	do	do	do	do		Alexandra.	
2. Sequoia sempervirens	673 710 711 ¹	dodododo	Russian river Santa Cruz do	Turner, Kennedy & Shaw.		188		
	7112	do	do	do				
	712	do	Mendocino county	J. Kentfield & Co				
	713	do	do	do				
	714	do	do	do				
	715	do	do	do				
3. Taxus brevifolia	978	Oregon	Portland	G. Engelmann and C. S. Sargent.	Moist, rich	0. 279	8	4
4. Taxus Floridana	305	Florida	Flat Creek	A. H. Curtiss	Sandy loam			
5. Torreya taxifolia	62	do	Chattahoochee	C. S. Sargent	Alluvial			
Sunking Ceaur. Savn.	277	do	do	A. H. Curtiss	Calcareous	0. 284	12	71
6. Torreya Californica	651	California	Marin county	G. R. Vasey	Stony	0. 361	20	7:
7. Pinus Strobus	1	Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0. 510	19	5
White Pine. Weymouth Pine.	164	Michigan	Woodsum Machine	E. E. Barney		******		
	208	do	Company. Barney & Smith	do				
	222	Vermont	Manufacturing Co. Charlotte	C. G. Pringle	TARREST TO SECURITION OF THE PARTY OF THE PA			
	723	Pennsylvania	Williamsport					
	777	New Brunswick		Intercolonial rail-				
	1	The state of the s		way.			1	1

THE WOODS OF THE UNITED STATES.

Ī	SPECI	FIC GRAVITY	DETERMINA	TIONS.	ASH I	ETERMINAT	rions.	Weight, per cubic foot, in pounds		ımber.
	First.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number.
		1		1146						
	0. 4559	0.4442		0.4501	0.44	0.40	0.42			535
1	0.5114	0.4896	*********	0.5005	0.35	0. 31	0.33	**********	White cypress	542
1	0. 5017	0. 5224		0. 5121	0.66	0. 52	0. 59	***********	Black cypress	543
1	0. 4682	0. 4545 0. 5031		0.4614	0.38	0. 45	0. 32			582
	0. 4159	0. 4094	0. 3808	0.4020	0. 27	0. 36	0. 32		White cypress sap-wood.	741
	0. 2444	0. 2013	0.000	0.2020	0.56	0.00			Butt of knee.	8941
	0. 2362	0. 2394			0. 55				Top of knee	8942
	0.3442	0. 3656							(From opposite sides of center of tree next to heart)	
	0.4282	0. 3705			(0.39)				Next outside of preceding	000
	0. 4599	0, 5022		0. 4072	0.48		0.44	***************************************	One tree.	923
	0.4112	0. 4336	0.3492	- 15-1			7777	CIT	Outside of tree	100
1	0.3860	0. 3750		0.3805	0. 50	0.50	0. 50		Ontside wood	1212
	0. 4123	0.4957		0. 4540	0. 51	0.53	0, 52		Heart-wood	1213
	0.4878	0.4904		0, 4891	0.36	0.37	0.37		Black cypress	1214
				0. 4543			0.42	27. 65		No.
	v 012001			17	5/4	1				
	0.3234	0.3202		0.3240	5 0.54	0.50	0.44			657
	0.3236	0. 3289)	THE PARTY	0. 2524	0.41	0.33)	0. 57	9/18	All sap-wood	. 666
2	0 2524	0, 2523	***************************************	0, 2882	0.50	0. 64	0.50	18. 20	All sap-wood	000
			The same	0, 2004		f.	0.00	10. 20		1.31
110	0, 3788	0. 3965		0.3877	0.12	0. 23	0.17			673
	0.4242	0.4281		0. 4262	0.16	0.19	0.18		Wood from top of tree	710
	0. 3963	0. 4444		0. 4204	0.11	- miletin	0.11		Wood from butt of tree.	7113
	0. 4912	0. 4562		0. 4737	0.14		0.14		Wood from butt of tree	7112
	0.3015	0. 2982	************	0, 2999	0.06	0.11	0.09	40.00		712
	0.3610	0. 3612 0. 4714		0. 3611	0.18	0. 15	0.17	report IA		714
	0. 5226	0. 5181	***************************************	0. 5004	0.10	0. 13	0. 12	Uning	Wood with curled grain	715
	0.4021	0.0101		0. 4208	0.20	0.20	0.14	26, 22		
								100 100		000
1	0. 6390	0. 6553	0. 6230	0. 6391	0. 22	0. 22	0. 22	39, 83		. 978
	0. 6340			0. 6340	0. 20	0, 22	0. 21	39. 51		. 305
	0. 6034	0. 5369		0. 5702	1.08	1.38	1. 23			. 62
	0. 4728	0. 4447		0.4588	0. 25	0. 21	0. 23			. 277
				0, 5145			0.73	32.06		
	0, 4823	0.4696		0.4760	1. 27	1.40	1. 34	29. 66		. 651
	0. 3023	0.4000		0. 1100	1. 41	1.40	1.04	20.00		
	0. 3946	0.4106		0. 4026	0.11	0.19	0. 15			. 1
	0. 3481	0. 3459		. 0.3470	0. 13	0.17	0.15			. 164
	0. 3400	0.3418		. 0.3409	0. 22	0. 20	0.21			208
	0.4880	0. 6461		. 0. 5670	0. 23	0.21	0.22			. 222
	0.3690	0.3850		0.3770	0.18	0.12	0.15			. 723
	0.3606	0.3140		0. 3373	0.23	0.30	0.26			1

	Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,		WTH.
		ОЩеел					in meters.	Sap- wood.	Heart wood
347.	Pinus Strobus—continued	788	New Brunswick	Bridgeton	Ed. Sinclair				
		789	Province of Que-	Amqui	A. Grant				
		797	bec.		Grank Trunk rail-	A			
		1044	Massachusetts	Reading	J. Robinson	Drift	0. 215	15	16
348.	Pinus monticola White Pine.	975	British Columbia .	Hasting's saw-mill, Burrard inlet.	G. Engelmann and C. S. Sargent.				
	White Pine.	987	Oregon	Cascade mountains .	C. S. Sargent	Moist loam			
349.	Pinus Lambertiana	638	California	Saw-mill, Straw-	G. Engelmann and				
	Sugar Pine.	668	do	berry valley.	G. R. Vasey				
		730	do	Lassen's peak	Sierra Lumber Company, San Francisco.				
350.	Pinus flexilis	819	Colorado	Forest City	T. S. Brandegee	Gravelly	0. 502	38	120
		913	Nevada	Monitor range	A. Triple	do			
351.	Pinus albicaulis	992	British Columbia .	Silver Mountain val- ley, Fraser river.	G. Engelmann and C. S. Sargent.		0. 494	50	160
352.	Pinus reflexa	597	Arizona	Santa Rita mount-	do	Rocky			
	White Pine.	602	New Mexico	ains. Pinos Altos mount-	E. L. Greene	//			10000000
		661	Arizona	santa Rita mount- ains.	G. Engelmann and C. S. Sargent.	<i></i>			
				ams.	O. S. Sargent.				
353.	Pinus Parryana	656	California	San Diego county	G. R. Vasey				
354.	Pinus cembroides	1226	Arizona	Santa Catalina mountains.	C. G. Pringle				
355.	Pinus edulis	- 397	Colorado	Cañon City	E. Weston	Gravelly	0, 284	30	79
356.	Pinns monophylla	823	Eastern Arizona	San Francisco mount- ains.	E. L. Greene	do			
	I mon. If the I me.	882	Utah	Lewiston	M. E. Jones	Rocky	0. 164	19	66
		891	Eastern Arizona	San Francisco mount- ains.	E. L. Greene				
		900	California		Department of Ag- riculture.				
		915	Nevada	Danville	A. Triple	Gravelly			
357.	Pinus Balfouriana	577	California	Scott mountains	G. Engelmann and C. S. Sargent.	Rocky	0.368	75	309
		631			C. S. Sargent.				
357.	Pinus Balfouriana, var. aristata	821	Colorado	Forest City	T. S. Brandegee		0. 450	44	136
	Foxtail Pine. Hickory Pine.	914	Nevada	Prospect mountain	A. Triple	Rocky			
358.	Pinus resinosa	194	Michigan	Barney & Smith Manufacturing Co.	E. E. Barney		0.7		

THE WOODS OF THE UNITED STATES.

0. 3991	SPECII	FIC GRAVITY	DETERMINAT	rions.	ASH I	DETERMINA	TIONS.	Weight, per cubic foot, in pounds (average).	Remarks.	
10, 2004	first.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	AVAIIM AG-	
10, 2004	0. 3991	0.3970		0, 3980	0. 20		0, 20			-
0. 100 0						10000000				-
0. 2503		4010		41		5277.000.0	AV 844			
0. 4594	0. 3503	20000000	0. 3438				A.Contain			1
0. 3664 0. 3554 0. 3619 0. 15 0. 21 0. 18 Cut at 8,800 feet elevation 0. 4096 0. 4014 0. 4040 0. 17 0. 16 0. 17 0. 3782 0. 3889 0. 2835 0. 29 0. 25 0. 27 0. 3153 0. 3201 0. 4117 0. 22 0. 24 0. 22 0. 4005 0. 4011 0. 4526 0. 4507 0. 20 0. 20 0. 20 0. 4208 0. 4007 0. 4105 0. 30 0. 23 0. 4729 0. 5253 0. 5003 0. 4011 0. 4526 0. 477 0. 4690 0. 4601 0. 4547 0. 20 0. 24 0. 4729 0. 5253 0. 5003 0. 4071 0. 4076 0. 20 0. 4890 0. 4601 0. 4547 0. 4071 0. 20 0. 4890 0. 4606 0. 4773 0. 20 0. 5628 0. 5721 0. 5675 0. 56 0. 5628 0. 5721 0. 5675 0. 56 0. 5629 0. 5030 0. 5132 0. 88 0. 92 0. 00 0. 4000 0. 4644 0. 472 0. 6873				0. 3854			0. 19	24. 02		
0. 4066	0. 4291	0.4102		0, 4197	0. 26	0. 28	0. 27			
0. 4066	0. 3684	0. 3554		0. 3619	0. 15	0. 21	0. 18		Cut at 3,800 feet elevation	
0. 3782 0. 3889 0. 3835 0. 29 0. 25 0. 27 0. 22 0. 24 0. 23 0. 29 0. 20		Hank		0. 3908			0. 23	24. 35		
0. 3782 0. 3889 0. 3835 0. 29 0. 25 0. 27 0. 22 0. 24 0. 23 0. 29 0. 20	0.4066	0, 4014	200000000000000000000000000000000000000	0.4040	0, 17	0.16	0.17			
0. 3183 0. 3291 0. 3177 0. 22 0. 24 0. 23 0. 22 22. 96 0. 4905 0. 4031 0. 4206 0. 4507 0. 20 0. 20 0. 20 0. 20 0. 20 0. 4209 0. 4508 0. 4408 0. 4408 0. 4408 0. 4408 0. 4408 0. 4408 0. 4408 0. 4233 0. 4007 0. 4165 0. 30 0. 23 0. 27 25. 96 0. 4233 0. 4007 0. 4165 0. 30 0. 23 0. 27 25. 96 0. 4233 0. 4007 0. 5033 0. 50052 0. 4607 0. 20 0. 24 0. 24 0. 24 0. 24 0. 4608 0. 4608 0. 4608 0. 4607 0. 4607 0. 80 0. 27 0. 28 0. 4869 0. 4600 0. 4600 0. 4607 0. 5075 0. 54 0. 5075 0. 54 0. 54 0. 54 0. 54 0. 5605 0. 6330 0. 6388 0. 57 0. 63 0. 62 30. 81 Second sp. gr. specimen contained a knot 0. 4609 0. 4604 0. 4672 0. 67 0. 77 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 72 0. 5000 0. 5403 0. 4614 0. 4672 0. 67 0. 77 0. 72 0. 72 0. 520 0. 5414 0. 5417 0. 6878 0. 72 0. 72 0. 72 0. 72 0. 72 0. 520 0. 5509 0. 5417 0. 80 0. 5418 0. 41 0. 41 0. 5685 0. 5635 0. 5635 0. 5635 0. 5635 0. 5635 0. 5637 0. 5639 0. 5637 0. 5639 0. 5637 0. 5639 0. 5637 0. 5639 0. 5637 0. 5639 0. 5637 0. 5639 0. 5637 0. 5639 0. 5637 0. 5639 0. 5637 0. 5639 0. 563		20100000					TTO			
0. 4995	0.3153	201000		W 1992						-
0. 4239			-	0.3684			0. 22	22. 96		-
0. 4239	0. 4965	0, 4031	0, 4526	0.4507	0, 20	0, 20	0. 20		Second sp. gr. determination made on sap-wood. Cut at elevation	
0. 4233	0. 4209			0, 4209	0. 35	J	0.35		of 10,000 feet. All sap-wood.	-
0. 4729				0. 4358			0. 28	27. 16		
0. 4729 0. 5233 0. 5092 0. 4847 0. 4971 0. 24 0. 24 0. 24 0. 24 0. 24 0. 28 0. 4866 0. 4867 0. 4867 0. 4878 0. 30 0. 27 0. 28 0. 28 0. 28 0. 4889 0. 4868 0. 4878 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 54 0. 5675 0. 5	0. 4233	0.4097		0. 4165	- 0.30	0, 23	0. 27	25, 96		
0. 4866 0. 4867 0. 4877 0. 20	0. 4729	0, 5253	A CHARLES		(0.24	0. 24 7		TOTAL !		-
0. 5628	0.4986	0. 4961	0.4847	0, 4971	0.27	0. 20	0, 24		First sp. gr. determination made on sap-wood	
0. 5628	0.4869	0.4696		0.4783	0.30	0. 27	0. 28			
0. 6695		Egg. H		0. 4877	(0)		0, 26	30. 39	5//	
0. 5813	0. 5628	0, 5721		0. 5675	0.54	7	0.54	35. 37		-
0. 5813 0. 6963 0. 6388 0. 57 0. 68 0. 62 39. 81 Second sp. gr. specimen contained a knot 0. 6000 0. 5563 0. 5781 0. 78 0. 65 0. 71 0. 4499 0. 4644 0. 4572 0. 67 0. 77 0. 72 0. 6140 0. 7617 0. 6878 0. 72 0. 72 0. 72 0. 5715 0. 5230 0. 5478 0. 89 0. 76 0. 83 0. 5585 0. 5585 0. 41 0. 41 0. 5580 0. 5688 0. 5434 0. 68 35. 26 0. 5434 0. 5476 0. 5434 0. 41 0. 41 0. 5580 0. 5476 0. 5434 0. 42 0. 40 33. 86 One tree 0. 4997 0. 5319 0. 4671 0. 4996 0. 18 0. 18 0. 18 Third sp. gr. determination made on sap-wood 0. 6149 0. 6149 0. 42 0. 42 0. 42 0. 75 sap-wood	0. 6695	0. 6330		0, 0512	0.88	0, 92	0, 90	40, 58		
0. 4499 0. 4644 0. 4572 0. 67 0. 77 0. 72 0. 83 0. 83 0. 83 0. 83 0. 83 0. 441 0. 41 0. 41 0. 41 0. 41 0. 41 0. 41 0. 41 0. 41 0. 41 0. 41 0. 42 0. 40 33. 85 0. 42 0. 42 0. 42 0. 75 82 0. 75 82 0. 75 82 0. 75 82 0. 75 82 0. 75 82 0. 75 82 0. 75 82 0. 75 82 <	0. 5813	0, 6963		0. 6388	0. 57	0.68	0. 62	39. 81	Second sp. gr. specimen contained a knot	
0. 6140	0. 6000	0, 5563		0, 5781	0.78	0, 65	0.71			
0. 5715 0. 5230 0. 5478 0. 89 0. 76 0. 83 0. 5585 0. 5585 0. 41 0. 41 0. 41 0. 5434 0. 5409 0. 5273 } 0. 5434 0. 41 0. 41	0. 4499	0, 4644		0.4572	0.67	0.77	0.72			
0. 5585	0. 6140	0.7617		0. 6878	0.72	0.72	0.72		Second sp. gr. specimen was very resinous	
0. 5434	0. 5715	0, 5230		0, 5478	0.89	0.76	0. 83	******		-
6. 5434 0. 5409 0. 5273 0. 5434 0. 41 0. 41 0. 41 0. 42 0. 40 33. 86 One tree (a. 4) 0. 4997 0. 5319 0. 4671 0. 4996 0. 18 0. 18 0. 18 0. 18 0. 18 0. 18 0. 75 sap-wood 0. 6149 0. 5572 0. 30 34 72	0, 5585	1350222222		0, 5585	0.41		0.41			
0. 5580			Pit I	0, 5658			0. 68	35. 26		
0. 5580	0. 5434	0. 5409	0. 5273)	0.000	5 0.41	0.41)		4	(
0. 6149 0. 6149 0. 42 0. 42 0. 75 sap-wood 0. 5572 0. 30 34 72	0, 5580	0. 5476	}	0, 5434	0.38	0.42	0.40	33, 86	Оде нее	
0. 6149 0. 6149 0. 42 0. 42 0. 75 sap-wood 0. 5572 0. 30 34 72	0. 4997	0, 5319	0. 4671	0.4996	0.18	0.18	0.18		Third sp. gr. determination made on sap-wood	
0.5572 0.30 34 72	0. 6149	************					1			-
0.4879 0.4838 0.4855 0.22 0.18 0.20				0, 5572	1	Way.	0.30	34 72		
W. 2010 11 2000 11 2000 11 2000 11 200 11 10 10 10 10 10 10 10 10 10 10 10 10	0 4970	0.4000		0.4000	0.00	0.70	0.00			

Species.	number	State.	Locality.	Collector.	Soil.	Diameter of tree,	LAYE	RS OF WTH.
Species.	Office number.	State	Dominy.	Constant		in meters.	Sap- wood.	Heart wood.
58. Pinus resinosa—continued	315	Michigan	Hersey	W. J. Beal				
	413	Vermont	Charlotte	C. G. Pringle	Clay			
	779	New Brunswick		Intercolonial rail-		*********		
	785	do	Bridgeton	way. Ed. Sinclair				
	1074	Vermont	Charlotte	C. G. Pringle				
	1075	do	do	do				
	1076	do	do	do				
9. Pinus Torreyana	996	California	San Diego county	G. Engelmann	Sandy	0. 234	82	8
50. Pinus Arizonica	1144	Arizona	Santa Rita mount-	C. G. Pringle	Rocky			
Tettow Pine.	1154	do	do	do	do			
	1155	do	do	do	do		*******	
	1156	do	do .!	do	do			
I. Pinus ponderosa	619	Dakota	Deadwood	Robert Douglas	Gravelly			
Yellow Pine. Bull Pine.	626	Oregon	Saw-mill, Ashland	G. Engelmann and	2			
	630	California	Strawberry valley	C. S. Sargent.	Low, wet, swampy			
	632	do	do	do				
	636	Oregon	Saw-mill, Ashland	do	1			
	689	California	Saw-mill, San Ber-	W. G. Wright				
	718	Montana	nardino. Saw-mill, Missoula	S. Watson	///			
	731	California	Lassen's peak	Sierra Lumber Com-				
	907	Colorado	Cañon City	E. Weston				
	910	do	do	do				
	1007	California	Saw-mill, San Ber- nardino.	W. G. Wright				
62. Pinus Jeffreyi	578	do	Scott mountains	G. Engelmann and C. S. Sargent.	The state of the s	Children Children	100000000000000000000000000000000000000	
	633	do	do	do	do	********		*****
	667	California	Saw-mill, San Ber- nardino.	W. G. Wright				ALCON.
63. Pinus Chihuahuana	593	Arizona	Santa Rita mount-	G. Engelmann and	Dry, gravelly	0.510	102	5
o. Finus Chinganuana	664	do	ains.	C. S. Sargent,	do			
34. Pinus contorta	997	British Columbia	Vancouver's island	G. Engelmann and C. S. Sargent.	do			
85. Pinus Murrayana	293	Colorado	Forest City	T. S. Brandegee	Moist, sandy loam.	0. 269	43	2
Pine. Spruce Pine.	563	do	do	C. S. Sargent	do			
	625	California	Scott mountains	G. Engelmann and C. S. Sargent.	do			17.77.5
Dinna Sabinia	571	do	Jolan	G R Vacor			es with an	
66. Pinus Sabiniana	571 644	do	Jolon	G. R. Vaseydo	Gravelly	0.312	43	

	Remarks.	Weight, per cubic foot,	TIONS.	DETERMINA	ASH I	rions.	DETERMINAT	TC GRAVITY	SPECII
	Aemarks.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
			0, 22	0. 24	0, 20	0. 5433		0.5416	0. 5450
	All sap-wood		0.24	0.24	0.24	0.4829		0.4537	0. 5121
	All sap-wood		0. 29	0.29	0.28	0.4733		0.4911	0. 4555
			0.37	0.34	0.39	0.4441		0.4631	0. 4250
	All sap-wood		0.27	0.27	0.28	0.4869	0. 5227	0.4752	0.4627
ı	First and third sp. gr. determinations made on 0.5 sap-wood;		0.28	0. 29	0.26	0. 4899	0.4845	0.4922	0. 4931
	First and third sp. gr. determinations made on 0.5 sap-wood; second sp. gr. determination made on sap-wood. Second sp. gr. determination made on 0.5 sap-wood; third sp. gr. determination made on sap-wood.		0, 28	0.31	0. 24	0. 4777	0.4858	0. 4582	0. 4892
-		30. 25	0. 27			0.4854	All by	- Line	1
-	First and second sp. gr. determinations made on sap-wood	30. 40	0. 35	0. 33	0.38	0.4879	0.4860	0.5119	. 4659
			0.14	0.15	0.14	0. 5220		0.5079	. 5360
1	Second sp. gr. specimen very resinous.		0. 20	0.20	0.21	0. 6455		0.7844	0. 5066
			0. 23	0.26	0.19	0.4461	0.4611	0. 4204	0. 4567
-			0. 24	0. 24	0. 25	0.4016		0. 3864	0. 4168
-		31. 40	0.20	1110	3//	0. 5038			
			0. 27	0. 26	0. 27	0. 4845		0. 4813	. 4877
1	All sap-wood		0.40	0.41	0, 38	0. 4485		0.4419	. 4552
1	All sap-wood		0. 37	0.36	0, 38	0. 4362		0.4152	. 4571
1	All sap-wood		0.30	0.30	0.31	0. 5307		0. 5350	. 5264
1	All sap-wood		0, 39	0.43	0.34	0. 4212		0.4240). 4184
1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		0, 23	0. 23	0.23	0. 5204		0. 5265). 5144
1			0.38	0.36	0.40	0. 4225		0.4479	0. 3972
1	All sap-wood		0. 27	0. 25	0. 28	0. 4360		0.4437). 4284
1	All sap-wood	005/7	0,49	0.40	0.58	0.4990		0. 5305	0. 4676
1	All sap-wood		0.45	0.45	0.45	0.4417		0.4459	0. 4376
	All sap-wood	UNI	0.32	0. 33	0.30	0. 5466		0. 5412), 5521
-		29. 45	0. 35			0.4715			
	One tree. Fourth sp. gr. determination made on 0.5 sap-wood.		0, 25	0. 20	0. 22 0. 23	0. 4785		0, 4520 0, 5075	0. 4561 0. 4985
	All sap-wood		0.27	0. 24	0. 29	0. 5628		0.5274	. 5982
-		32, 44	0. 26			0. 5206			
	One tree	34. 01	0. 39	0.37}	§ 0, 37	0. 5457		0.5780}	. 5584
		11-20-2		0.403	(0.41			0. 5239 \$. 5226
		36, 24	0.19	0.16	0. 21	0. 5815	0. 5750	0. 5985	. 5709
	V		0. 33	0. 29	0.36	0.3551		0. 3551	. 3550
			0. 26	0. 25	0. 26	0.4279		0. 4267	. 4291
			0. 37	0. 37	0. 37	0.4457		0.4711	. 4204
		25, 53	0. 32	1 1		0.4096		1	
	All sap-wood)()	0.42	0.41	0.43	0.4530		0.4531	. 4528
	All sap-wood		0. 37	0. 35	0.40	0, 5150		0.5312	. 4988
4		30.16	0.40			0. 4840		100	

267. Pinus Coulteri	Species.	Office number.	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF WTH.
268 Firms institutes		ОЩеел						Sap- wood.	Heart- wood.
Monterey Prac. 866 do	367. Pinus Coulteri	1157	California	San Bernardino	W. G. Wright	Dry, gravelly			
260 Dipart inherentate of Ag Dispartment		676	do	Monterey	G. R. Vasey	Gravelly loam	0.544	35	******
### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Drift 0.034 0.034 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Moist, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Dry, sandy loam 0.312 23 ### Florida Duval county A. H. Curtiss Dry, sandy barrens 0.208 6 ### Florida Duval county A. H. Curtiss Dry, sandy barrens 0.208 6 ### Florida Duval county A. H. Curtiss Dry, sandy barrens 0.208 6 ### Florida Duval county A. H. Curtiss Dry, sandy barrens 0.208 6 ### Florida Duval county A. H. Curtiss Dry, sandy barrens 0.208 6 ### Florida Duval county Dry, sandy barrens 0.208 6 ### Florida Duval county Dry, sandy barrens 0.208 6 ### Florida Monterey Pine.	896	do		Department of Agriculture.					
### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Moist, sandy 0.034 27 ### Florida Duval county A. H. Curtiss Drift 0.034	260 Pinne tehensulata	570	do	Wount Sharto	G. Engelmann and	Gravally	0.419	70	18
Lobbidy Fine. Old-field Fine. Rose		576	do	mount Shasta	C. S. Sargent.	Graveny	0.410	- 50	10
389 dod	Loblolly Pine. Old-field Pine. Rose-			The state of the s		The state of the state of the state of	The state of	27	6
13 Massachusetts		388	North Carolina	Wilmington	Edward Kidder	Loam			
1016		389	do	do	do	do			
1016									100
1016		13	Massachusetts	Arnold Arboretum.	C. S. Sargent	Drift	0. 267	21	15
Pond Pine. Pond Pine.	Fuch Fins.	1046	do	North Reading	J. Robinson	do	0. 230	26	8
Pond Pine. Strub Pine. G21 South Carolina Alken H. W. Ravenel Dry, sandy 0,206 8 do	The state of the s								
Pond Pine. Strub Pine. G21 South Carolina Alken H. W. Ravenel Dry, sandy 0,206 8 do			4				1 199		
1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172 1100 1172		83	Florida	Duval county	A. H. Curtiss	Moist, sandy loam.	0.312	33	19
1109	373. Pinus inops	621	South Carolina	Aiken	H. W. Ravenel	Dry, sandy	0. 206	8	42
1172 New Jersey Mount Holly S. P. Sharples	boroog I mo. Soruo I mo.							28	34
Sand Pine. Scrub Pine. Spruce Pine. 321 Virginia Wytheville H. Shriver Clay 0.204 20									
Sand Pine. Scrub Pine. Spruce Pine. Spruce Pine			57	7 PROSIM	23//	No. 11			
Sand Pine. Scrub Pine. Spruce Pine. Spruce Pine	Mark the party of the second		MAT	FIINT					
Table-mountain Pine. Hickory Pine. 396 Pennsylvania. Colerain Forge. J. R. Lowrie. Slate. 0.010 14		279	Florida	Apalachicola	A. H. Curtiss	Dry, sandy barrens	0. 238	6	36
396 Pennsylvania Colerain Forge J. R. Lowrie Slate 0.010 14	375. Pinus pungens	321	Virginia	Wytheville	H. Shriver	Clay	0. 264	20	35
Obispo Pine. Bishop's Pine. 377. Pinus mitis Yellow Pine. Short-leaved Pine. Spruce Pine. Bull Pine. 278 Florida Chattahoochee A. H. Curtiss Clay 0.015 33 Spruce Pine. Bull Pine. 319 Louisiana Amite C. Mohr Sandy loam		396	Pennsylvania	Colerain Forge	J. R. Lowrie	Slate	0.010	14	
Obispo Pine. Bishop's Pine. 377. Pinus mitis Yellow Pine. Short-leaved Pine. Spruce Pine. Bull Pine. 278 Florida Chattahoochee A. H. Curtiss Clay 0.015 33 Spruce Pine. Bull Pine. 319 Louisiana Amite C. Mohr Sandy loam	278 Pinns muricata	671	California	Marin county	G R Vasav	Gravelly	0.243	20	
Spruce Pine. Short-leaved Pine. 319 Louisiana. Amite C. Mohr Sandy loam Sandy loam Sandy loam South Carolina South Carolina Bonneau's Depot H. W. Ravenel Rich upland Low, sandy Sandy loam South Carolina South Carolina South Carolina Sandy loam Sandy	Obispo Pine. Bishop's Pine.								
557 Arkansas Texarkana F. L. Harvey do do do do do do do d	Yellow Pine. Short-leaved Pine.		200	100	CONTRACTOR OF THE PARTY OF THE				
559 do	Spruce Pine. Bull Pine.				NAME OF THE PARTY	, T			
378. Pinus glabra		558	do	do	do	do			
Cedar Pine. Spruce Pine. White Pine. 544 Mississippi Gainesville C. Mohr Low, sandy		559	do	do	do	do			
Cedar Pine. Spruce Pine. White Pine. 544 Mississippi Gainesville C. Mohr Low, sandy		Type:							III.
	378. Pinus glabra	177.00	The second secon	Assessment Company	CONTRACTOR OF THE PARTY OF THE				The same of
764 Florida Chattahoochee A. H. Curtiss Low, wet		764		COMPANIAL STATE OF THE STATE OF		The state of the s	1		

1	Remarks.	Weight, per cubic foot,	TIONS.	ETERMINA	ASH I	TIONS.	DETERMINAT	C GRAVITY	SPECII
Office	Remarks.	cubic foot, in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
		NI III			+				
1	All sap-wood	25. 76	0. 37	0.40	0.34	0. 4133		0. 3994	0. 4272
			0. 23	0. 20	0, 25	0. 5098		0, 5244	0. 4952
			0.36	0. 37	0.34	0. 4050		0.4018	0. 4082
1		28. 50	0.30		14	0.4574			
		21. 81	0. 33	0.30	0.36	0, 3499		0. 3529	0. 3469
••	All s p-wood		0. 27	0. 29	0. 26	0. 5609		0, 5609	0. 5610
22	All sap-wood		0. 26	0. 26	0.25	0. 5627	*******	0. 5466	0, 5788
	Rosemary pine		0, 27	0.26	0.28	0. 5556	*********	0. 5654	0. 5458
**	All sap-wood		0, 25	0. 23	0. 27	0, 4971	**********	0.4896	0. 5045
	C.	33, 91	0, 26	0)		0. 5441			T. M.
	All sap-wood		0.20	0, 21	0.10	0, 5633		0, 5669	0. 5597
id 1	First sp. gr. determination made on sap-wood; second and third sp. gr. determinations made on 0.5 sap-wood. Fourth sp. gr. specimen very resinous.	***************************************	0. 26		{ 0.32 } 0,19 }	0.4668	1+++++++++	0, 4154	0.4065
		32. 10	0. 23		7//-	0. 5151			
	> 1	49. 49	0.17	0.18	0. 15	0. 7942	0. 7990	0.7931	0. 7904
P				100000	-		2	271222	
	All sap-wood.		0. 26	0. 27	0.24	0, 4867		0.4830	0. 4905
. 1			0. 32	0, 31	0. 32	0. 5626		0, 5680	0.5571
1	All sap-wood		0. 32	0. 23	0. 32	0. 5870	0. 5991	0. 5841	0.5778
	1/65//	33, 09	J-70. 30			0. 5309	1		
		84. 75	0.31	0.31	0, 30	0, 5576		0. 6456	0. 4696
			0.00						
		**********	0. 30	0, 30	0. 30	0, 5143		0, 5050 0, 4602	0. 5235 0. 4851
		30, 75	0. 27			0. 4935			
	Second sp. gr. determination made on sap-wood	30. 80	0. 26	0.25	0. 26	0.4942		0.4831	0. 5054
			A 05						0.5500
	All sap-wood.		0. 35	0.35	0. 35	0, 5144 0, 7333	*********	0. 4550 0. 7569	0, 5739
****	0.5 sap-wood		0. 22	0. 22	0, 22	0. 7833		0. 4569	0.7098
-		***************************************	0. 32	0.31	0. 33	0. 7247		0. 7232	0, 7262
	All sap-wood.		0.37	0.41	0, 32	0.4689	**********	0. 4689	0. 4689
		38. 04	0. 29			0, 6104			
***	Second sp. gr. determination made on sap-wood		0. 50	0. 61	0.40	0, 4297		0. 4235	0. 4358
	All sap-wood.		0.49	0.44	0, 53	0. 3487		0. 3741	0. 3232
-	All sap-wood	,	0. 35	0. 35	0, 35	0.4010		0.4002	0.4018
30		24, 50	0.45	156 1		0, 3931			- 1

Species.	Office number	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF WTH.
	Ото					in meters.	Sap- wood.	Heart
79. Pinus Banksiana	394	Michigan	Baldwin	W. J. Beal	Low, sandy			
Gray Pine. Scrub Pine. Prince's Pine.	780		Daid will	Intercolonial rail-		-		
	879			way.				10
	519			do				
80. Pinus palustris	81	Florida	Duval county	A II Counting	Sandy Jaam	0, 353	ne	119
Long-leaved Pine. Southern Pine. Georgia Pine. Yellow Pine. Hard	85		do	The second secon	The second secon	A CONTRACTOR OF	25	
Pine.			Section of the least of the last of the la	CONTRACTOR OF THE PROPERTY OF	The state of the s		46	51
	172	Mississippi	Manufacturing Co	E. E. Barney	The state of the s	O SOLI DAMESTO		*****
	243	Florida	John's river.	A. H. Curtiss	A SHEET STATE OF THE STATE OF T	ALEX SAMPLE OF		Partie No.
	302	South Carolina		H. W. Ravenel	THE STATE OF THE S			100000
	357	Alabama	Cottage Hill	C. Mohr	do	********		*****
A Sales of the Sales of the Sales	358	do	Citronelle	do	do			
The state of the s	359	do		do	The state of the s			1
	360	do	do	do	do			
	361	do	do	do	do			
	384	Florida	Saw-mill, Cedar	A. H. Curtiss				
	885	do	Keys.	do				
	390	North Carolina	Wilmington	E. Kidder				
	562	Texas		G. W. Letterman				1
	1096	Alabama	Danier State					
	1000	Ambuna	modus	C. Monr				
The state of the s								
81. Pinus Cubensis	84	Florida	Duval county	A. H. Curtiss	Moist, sandy	0.326	58	5
Slash Pine. Swamp Pine. Bastard Pine. Meadow Pine.	356	Alabama	Cottage Hill	17/				
	493	Florida		A. H. Curtiss				
			2.10	2011.0011.00	COLINE THE STATE OF THE STATE O			
				1/2//		1000		
		1000	PROSIN	123//				
82. Picea nigra	109	Vermont	Charlotte	C. G. Pringle	Gravelly			
Black Spruce.	231	do	do	do	Cold, peaty			
	373	do		do	The same of the sa		723712833	SESSIN
	776	New Brunswick	Bay of Fundy	Intercolonial rail-				ASSESSED NO.
	794	Province Quebec .	Danville	way. Grand Trunk rail-		1 1 1 1 1 1 1 1	in and the	20000
	880			wav.	***************************************		******	20102
	880	New Brunswick	Bridgeton	Ed. Sinclair				
83. Picea alba	513	New Hampshire	Stratford	C. G. Pringle		0.186	16	22
White Spruce.	620	Dakota	Terry's peak		1.00	1 1 1 1		
	773	New Brunswick	Bay of Fundy		7			
the transfer of the same of the	784	do	Bridgeton	way. Ed. Sinclair		0.00-0.0000	•••••	
As a second second	791	Province of Que-	Amqui	A. Grant				*****
	101	bec.	Amqui	A. Grant				
34. Picea Engelmanni	292	Colorado	Forest City	T. S. Brandegee	Damp	0: 320	8	70
	575	do	do	C. S. Sargent	Peaty			
	822	do	do	T. S. Brandegee		0.318	45	7
	899	do		Department of Agri-				
	905			culture.				
	2.402.77			TE		1 3		

1	Remarks.	Weight, per cubic foot, in pounds	rions.	ETERMINA	ASH D	IONS.	DETERMINAT	IC GRAVITY	SPECIF
	Aemaras.	in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	First.
			0.30	0, 33	0, 28	0. 4794		0. 4965	0. 4622
	Sap-wood		0. 20	0.19	0, 20	0.4588		0.4588	V. 4022
	Sap-wood		0. 19	0.18	0. 19	0. 4900	0. 4857	0. 5065	0.4778
		no em		4.20	0,10		0. 1001	0.0000	0.4110
		29, 67	0. 22			0, 4761			
			0.26	0.26	0. 26	0.7418		0.7284	0.7551
			0.17	0.17	0.16	0. 7117			0.7117
			0, 26	0. 26	0.26	0.6950		0.6974	0.6927
			0.25	0. 21	0.28	0.7199		0.6829	0.7569
		**********	0.31	0.24	0.39	0.5665		0.5191	0. 6139
			0.27	0. 27	0. 27	0.6609		0.6616	0.6602
	Boxed for turpentine, 1852; chipped 10 years; abandoned, 1861.		0. 24	0, 20	0.28	0.8989		0. 9325	0.8652
1	Boxed for turpentine, 1876; chipped 4 years; specimen taken		0.16	0.16	0.15	0.8479		0.8450	0.8509
1	along chip. Boxed for turpentine, 1876; chipped 4 years; specimen taken		0. 21		0.21	0.7294		0.7914	0.6673
1	above chip. Boxed for turpentine, 1878; chipped 2 years		0. 23	0. 23	0. 23	0.7663		0.7736	0.7590
	The state of the s		0.32	0.32	0.32	0. 5938		0. 5714	0. 6163
			0.28	0.28	0.28	0. 6236		0.5924	0.6549
			0.32	0. 34	0. 29	0. 5734	0, 6413	0. 6186	0.4602
			0.18	0.18	0.17	0.7245		0. 6745	0.7744
	Tree boxed for turpentine 18 or 20 years ago		0. 22	0. 26	0.19	0. 6453		0. 6490	0. 6415
		43. 62	0. 25	- LAUG		0. 6999			
ı									Bright.
-			0.31	0.31	0.31	0. 6520		0. 6506	0. 6533
			0, 16	0.15	0.16	0.7611		0.7340	0.7881
1			0.31	0.31	0.30	0. 8379	0. 8220	0.8389	0, 8529
	//25//	R 46.76	0.26	0		0. 7504			
ı			7 00	NA.	0.00	0.4040		0.4815	0.4550
1	[P. rubra]	CHAN	0. 20	0.17	0. 23	0.4646	***********	0.4715	0. 4576
1		entrantin.	0.26	0. 27	0. 25	0. 5272		0. 5256	0, 5289
1	[P. rubra]	*********	0. 29	0. 29	0. 29	0. 4386		0.4486	0, 4285
1	······································	*********	0. 28	0. 27	0. 29	0.4662		0. 4593	0. 4730
1		**********	0. 27	0. 25	0. 29	0.4087	0.3907	0. 4290	0.4065
1			0, 33	0. 28	0. 38	0.4451	0, 4425	0.4098	0.4830
	The state of the s	28, 57	0. 27	-102 Y		0. 4584			4 1
			0. 24	0. 21	0. 26	0. 4134		0. 4194	0.4074
			0.40	0.38	0.42	0, 3941		0,4034	0.3848
1			0, 36	0.38	0.34	0, 4303		0. 4375	0. 4231
			0.32	0.31	0.32	0, 3999		0.4188	0. 3809
-			0. 27	0. 29	0. 24	0, 3879		0.4020	0. 3737
		25, 25	0.32			0.4051			
			0.33	0.00	0.00	0.0551		0. 3551	0. 3550
1				0. 29	0.36	0. 3551	**********		0. 3365
1	m	**********	0.35	0.35	0.35	0. 3291	************	0. 3217	WARRANT .
1	Tree with gray bark		0. 27	0.24	0, 29	0.3518	***********	0. 3528	0. 3507
			0.33	0.33	0.32	0.3721	**********	0. 3725	0.3717
-		***********	0.34	0. 26	0.43	0.3166		0.3137	0.3195
1		21.49	0.32			0.3449			

Parales -	Ойсе титьег.	State.	Locality.	Collector.	Soil.	Diameter of tree,	GROV	
Species.	Ощее п	State.	Locality.	Confector.	Son	in meters.	Sap- wood.	Heard
5. Picca pungens	269	Colorado	Alpine	T. S. Brandegee	Damp			
White Spruce. Blue Spruce.	270	do	do	do	do			
- 2" BELLEVILLE OF G	901	do		Department of Agri-				
	906	Utah		culture.				
6. Picea Sitchensis	970	Alaska	Sitka	Paul Schultze				
Tide-land Spruce.	977	British Columbia .	Saw-mill, Burrard	G. Engelmann and				
	1015	Oregon	inlet. Weidler's mill, Port-	C. S. Sargent.		ALL AND THE	Contract of the last	-71
	1019	do	land. Saw-mill, Astoria	do		The state of the s		
	1026	do	Portland Furniture	do	The later with the same of the			2000
	1026	301	Company.					1.33
37. Tsuga Canadensis	5	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	0.382	37	5
Hemlock,	219	Vermont	Charlotte	C. G. Pringle	Gravelly			
	726	Pennsylvania	Williamsport	do	Damp			
	772	New Brunswick	1	Intercolonial rail-				
	775	do	Bay of Fundy	waydo			******	
	778	do		do				
A Line Street Bull Street Street	787	do	Bridgeton	Ed. Sinclair				
	793	Province Quebec .	Danville		1			
	817	West Virginia	Grafton	C. G. Pringle				
	1040	Massachusetts	Danvers	J. Robinson	Territoria de la constantina della constantina d	NAME OF THE PARTY OF	26	
	1042	do		do	1	0. 260	16	1
		Property	PROSIM	5				2
88. Tsuga Caroliniana	623	North Carolina	Hendersonville	A. H. Curtiss	Dry, rocky	0. 228	51	
89. Tsuga Mertensiana	971	Washington terri-	Wilkeson	G. Engelmann and C. S. Sargent.	Rich loam			
Hemlock.	995	Alaska	Sitka	Paul Schultze				
					Gravelly loam		1 11	
90. Tsuga Pattoniana	980	British Columbia	Silver peak, near Fraser river.	G. Engelmann and C. S. Sargent.	Moist	0, 276	40	1
91. Pseudotsuga Douglasii	I Balta	California					1	
Douglas Fir.	627	Control of the Contro	Saw-mill, Strawberry valley.	C. S. Sargent.				
	702	Oregon	. Saw-mill, Marshfield	do				
	704	do	do					
	705	do	E. B. Dean's saw- mill, Marshfield.	do			.vomv	
	706	do	do	do				
	708	do	do					
	709	do	do	C Watson				
	720	Montana	Saw-mill, Missoula.	S. Watson	***************************************			1
	732	California	Lassen's peak	Sierra Lumber Company. M. E. Jones	Desk			
	881	Utah	Salt Lake		Rocky			
	973	British Columbia	. Saw-mill, Burrard inlet.	C. S. Sargent			******	
	974	do	do	do	*****************			
	986	do	Saw-mill, Victoria	G. Engelmann and				Marie Co.

OF DRY SPECIMENS OF THE WOODS OF THE UNITED STATES-Continued.

	Remarks	r	Weight, per cubic foot,	TIONS.	ETERMINA	ASH 1	rions.	DETERMINA	FIC GRAVITY	SPECI
No. of	Remarks.		in pounds (average).	Average.	Second.	First.	Average.	Third.	Second.	irst.
				0. 22		0. 22	0. 3480			0. 3480
				0.31	0, 29	0, 32	0. 3549		03558	0. 3540
				0.50	0. 51	0.49	0. 4292		0. 4274	. 4309
	***************************************			0.48	0. 28	0. 69	0. 3641		0. 3517), 3764
			23. 31	0, 38	90	0.00	0. 3740		0,001	
				0.24	0.24	0. 23	0. 6257		0. 6485	. 6029
	***************************************		***********	0.17	1/10/1000	0. 16	0. 3816		0. 3974	. 3658
			***********		0.17			***********	0. 5974	
15.4	***************************************			0. 15	0. 13	0.16	0. 4280		*********	. 4280
	***************************************		******	0.18	0. 13	0. 22	0. 3463	0. 3446	0. 3423	L 3520
••••	***************************************	77		0.13	0.12	0.13	0. 3619		0. 3576	. 3661
		XC	26. 72	0.17	0		0. 4287			
				0. 25	0. 25	0. 24	0.3888		0.3896	3880
				0.70	0.67	0.73	0.4629		0.4624	. 4633
			******	0.40	0.36	0.43	0. 3820		0. 3823	3817
		Red her		0.46	0, 46	0.45	0. 4333		0.4704	, 3963
		White		0.38	0.42	0.34	0.4773		0.4707	4839
	1		VA	0. 55	0. 56	0.54	0. 3381		0. 3343	. 3418
				0.46	0.48	0,44	0. 4538		0.4538	. 4538
1000			**********	0.46	0.46	0.46	0. 5112		0. 5191	. 5033
		1			-	A Design	To be a second	******		. 3719
				0.48	0.51	0.45	0.3610	0 4504	0, 3500	
	/			0. 56	0.60	0.51	0. 4443	0. 4561	0.4554	4213
			00.40	0.42	0.31	0, 52	0. 4097	0.4098	. 0.4080	4112
N			26.42	0.46	1	No.				
13.5		N.Y	26, 64	0.40	0.41	0, 39	0.4275	***********	0, 4260	. 4289
				0.43	0.45	0.41	0. 5252	*********	0.4833	. 5671
			**********	0.41	0, 39	0.43	0. 5122	0. 5411	0.4975	4981
			32. 29	0.42			0. 5182			
			27.76	0, 44	0, 53	0, 34	0. 4454	0, 4503	0, 4396	4462
				0.16		0.16	0.4568	**********	0.4674	. 1461
				0.08	0.06	0.10	0.5612		0. 5653	. 5570
		. Coarse-		0.08	0.07	0.08	0.4214		0. 4364	. 4063
		. Grown		0.03	0.03	0.02	0. 6551		0. 6769	. 6332
	lity	. Coarse-		0.02	0, 01	0.03	0. 5233		0. 5256	. 5215
	У	. Fine-gr		0.08	0.06	0.10	0. 5715		0. 5937	. 5493
	*	100		0. 03	0.03	0. 02	0. 5987		0. 5785	. 6189
	yellow	1497 11		0.04	0, 03	0.04	0.4057		0. 3859	. 4254
			Charles and Charles	0.11	0. 12	0.09	0. 5242		0, 5215	. 5269
				0. 13	0.13	0.12	0. 4918		0. 4941	. 4896
					333	0.12	0. 4918		0. 5855	. 5251
		Part State		0.18	0.18			**********		. 4809
			**********	0.06	0.06	0.05	0.4744		0. 4679 0. 4848	. 5028
		4 . The Property of the		0. 05	0.04	0.05	0, 4938 0, 4508	***********	0. 4504	0. 4511

TABLE I.—SPECIFIC GRAVITY, ASH, AND WEIGHT PER CUBIC FOOT

	Species.	equinu	State.	Locality.	Collector.	Soil.	Diameter of tree,		RS OF WTH.
	Syecies.	Office number.	Diago.	Monthly.			in meters.	Sap- wood.	Hear
91.	Pseudotsuga Douglasii—continued	1008	British Columbia	Saw-mill, Burrard	G. Engelmann and C. S. Sargent.				
	That making a street a street	1011	Oregon	Oregon Railway and Navigation Co.	do	***************	********		*****
	the second second	1016	do .,	Weidler's saw-mill, Portland.	do		AL SECTION DESIGNATION		*****
	and the second second second	1018	do	Saw-mill, Astoria	do		The same of the same of	******	
		1020	do	Portland Furniture Company.					*****
		1022	do	Portland Furniture Company.	do			*******	****
91.	Pseudotsuga Douglasii, var. macrocarpa.	642	California	Saw-mill, San Ber-	W. G. Wright				
	Hemlock.			nardino.					
	Abies Fraseri Balsam. She Balsam.	523	North Carolina	Roan mountain				46	*****
3.	Abies balsamea	107	Vermont	Green mountains		Cold, gravelly loam		100	****
		377	do	Monkton	do	Peaty			
	Alderscholeden	4491	The second	Percet City	M C Dundage	Wolst sandwless			1
	Abies subalpina	4492	Colorado		T. S. Brandegee	The state of the s		*******	1
		820	do	do	do	do		17	1
5.	Abies grandis	959 1009 1010	Oregon	Portland	G. Engelmann and C. S. Sargent.	Rich, alluvial	0. 735	56	
96.	Abies concolor	529	Colorado	Engelmann's cañon .	Robert Douglas	Rocky	0.196	29	20222
	Trice 2 v. Danieli 2 v.	580	California	Strawberry valley	G. Engelmann and C, S. Sargent.	Alluvial			
		639	do	do	do	do		*******	
		733	do	Lassen's peak	Sierra Lumber Company.				
97.	Abies bracteata	572	do	Santa Lucia mountains.	G. R. Vasey				
98.	Abies amabilis	1004	British Columbia .	Silver peak, near Fraser river.	G. Engelmann and C. S. Sargent.	Rich, sandy loam .	0, 584	50	15
99.	Abies nobilis	965	Oregon	Cascade mountains .	do	Rich	*********		
00.	Abies magnifica	647	California	Soda Springs	do	Gravelly loam	1. 324	71	26
1.	Larix Americana Larch. Black Larch. Tamarack.	2261	Vermont	Charlotte					2222
	Hackmatack.	2262	do	do			1		279.15
		2263	do	do			Part Control House		*****
	Part of the second	774		Bay of Fundy	wav.	***************************************			• • • • •
	Bina by a man a declaration	781	do	W11792 11	do	***************			
	Harris Harris	786	do	Bridgeton	Ed. Sinclair	******************	******	*******	****
	Miles III and the second	795	do	Danville	Grand Trunk railway. J. Robinson				****

OF DRY SPECIMENS OF THE WOODS OF THE UNITED STATES-Continued.

- Hamilton	Remarks.	Weight, per cubic foot, in pounds	TIONS.	DETERMINA	ASH I	FIONS.	DETERMINAT	FIC GRAVITY	SPECI
Office number		in pounds (average).	Average.	Second.	First.	Average,	Third.	Second.	First.
. 1			0.04	0.04	0.03	0. 5266			0. 5266
. 1	Railroad tie		0.03	0. 03	0.03	0.4885		0.4867	0.4903
. 1			0.09	0.07	0.11	0. 5715		0, 5599	3. 5831
. 1			0.05	0.04	0.05	0. 5692		0. 5725	0.5660
. 1			0.09	0.11	0.07	0. 4377		0.4422	0. 4331
. 1			0.07	0.07	0.08	0.4575		0.4588	0.4562
		32,14	0.08			0. 5157			Page 1
. 1		28.44	0, 08	0,08	0.08	0. 4563		0. 4463	0.4664
		22, 22	0.54	0.60	0.47	0.3565		0. 3431	0. 3699
		CH	0. 56	0, 49	0. 63	0. 3364		0, 3342	0, 3386
			0. 84	0. 35	0.33	0. 4273	**********	0. 4299	0. 4248
		00.00	1	0.00	0,00	10000		W. 1200	V. 1210
		23, 80	0, 45			0.3819			
			0.66		0.66	0.3481		0 3515	0. 3446
			0. 33		0.33	0. 3541		0 8641	0.3442
- 1			0.34	0. 33	0. 34	0. 3405	0. 3342	0 3397	0. 3475
-		21, 66	0.44			0. 3476		A The	
		The state of the s		0.32)	0.38			0. 3371	0.3416
	One tree	21, 97	0.49	0. 57	0.63	0. 3545	0. 3531	0. 3842	0. 3643
	One tree	21.31	0.43			0. 3545	0. 5551	1-11-2-1-4	
1				0.47)	0.56			0. 3625	9. 3390
			0.88	0, 89	0. 87	0, 3665		0. 3717	0.3613
			1.12	1.12	1.12	0. 2985		0. 2910	0. 3059
		***************************************	0, 52	0.48	0.56	0. 3533		0. 3780	0.3286
	N.Y.,		0.87	1.04	0.70	0.4371		0.4500	0.4242
		22. 67	0, 85			0.3638			
1		40.07	2.04	1.00	0.00	0.0000		0.0400	n (000
		42. 27	2, 04	1, 99	2, 09	0, 6783	*********	0. 6483	0 /082
		26. 35	0, 23	0.21	0, 25	0.4228		0, 4159	0.4297
	.,,	28, 42	0. 34	0, 41	0. 27	0, 4561		0, 4497	0.4625
		29, 30	0, 30	0.30	0.30	0. 4701	0. 4738	0. 4614	0.4752
			0. 26		0. 26	0. 7024		0. 7075	0. 6973
			0. 27		0.27	0. 7362		0.7779	0. 6945
4			0. 32		0. 32	0, 6452		0. 6069	0.6835
			0, 28	0, 27	0, 30	0. 5870		0. 5765	0.5975
			0, 48	0.49	0.47	0. 5833		0, 5740	0.5925
1			0.33	0. 30	0. 35	0, 5479		0, 5570	0. 5389
+			0, 34	0. 32	0, 36	0. 5873		0.5864	0.5882
-			0, 38	0. 48	0. 27	0.6000	0.6000		********
1		38, 86	0. 33			0. 6236	1		

FOREST TREES OF NORTH AMERICA.

TABLE I.—SPECIFIC GRAVITY, ASH, AND WEIGHT PER CUBIC FOOT

	Species.	Office number.	State.	Locality.	Collector.	Soft.	Diameter of tree,	LAYE	RS OF WTH.
	species.	Ощее п	State.	Locality.	Confector.	Son.	in meters.	Sap- wood.	Heart wood.
402.	Larix occidentalis	719	Montana	Missoula	S. Watson				
	Tamarack.	984	Washington ter- ritory.	Fulda	William N. Siksdorf.	Moist			
	A Company of the Company	1006	do	do	do				***
	PALMACEÆ.								
404.	Sabal Palmetto	242	Florida	Sister island	A. H. Curtiss	Shell		27.77.77.7	
405.	Washingtonia filiferaFan-leaf Palm.	1159	California	Agua Caliente	W. G. Wright	Dry, gravelly		*******	
406.	Thrinax parviflors	504	Florida		A. H Curtiss				
		1107	do	Bahia Honda Key	do	do			
		1							1 2
407.	Thrinax argentea Silver-tap Palmetto. Brickley Thatch. Brittle Thatch.	506	do	The state of the s	do	do		******	
	Brittle Thatch.	1116	do	No-Name Key	do	do			
408.	Oreodoxa regia	565	do	Big Cypress	do	Rich humus			
		1119	do	Lost Man's river	ob	đo	9		
				LOSE MAII S IIVOI	A			2001000	10001000
		Z	Comment of the control of the contro						1
	LILIACEÆ.				/////				
409.	Yucca canaliculata	1063	Texas	Matagorda	C. Mohr	Sandy, saline			
410.	Yucca brevifolia	695	California	Mohave	G. Engelmann and C. S. Sargent.	Dry, gravelly		*******	
		696	do	do	do	do		1	
		181			The state of the s		1 2		
411.	Yucca elata Spanish Bayonet.	699	Arizona	Tucson	do	do			
412.	Yucca baccata	1003	California	San Diego	G. Engelmann	do			

OF DRY SPECIMENS OF THE WOODS OF THE UNITED STATES-Continued.

SPECI	FIC GRAVITY	DETERMINAT	cions.	ASH I	DETERMINA	TIONS.	Weight, per cubic foot, in pounds		umber.
irst.	Second.	Third.	Average.	First.	Second.	Average.	in pounds (average).	Remarks.	Office number.
		19,20				RET .		The state of the s	
0. 6663	0.5897		0. 6280	0.08	0.09	0.09	*********		710
0.7717	0.7839		0.7778	0.09	0.09	0.09	******		984
0. 8340	0.7984		0. 8162	0.07	0.12	0.09	***************************************		1006
			0.7407		TEN I	0.09	46. 16		
						HITT	SUPERIOR S		
0, 5002	0.4020	0. 4191	0.4404	7. 51	7. 80	7. 66	27.44		242
0. 5597	0.4942)				No.				10
0. 4700	0. 5453		0. 5178	1.80	1.98	1.89	32. 24		1159
0.7014	0. 7258		0.7136	2. 65	2.79	2.72			504
0. 4539	0. 4957	0. 5039	0. 4845	5, 73	4.81	5, 27		MON.	1107
			0. 5991	1		3, 99	37. 34		
0. 7357	0.7468		0.7412	1.71	2.19	1. 95		(C)	-
0. 6775	0. 6907	0.7118	0. 6933	3. 90	4. 25	4. 07	************		506
a. w. r. s.	0.0007	0.1210	0.000	3.00	4. 20				1116
		- Int	0.7172			3. 01	44. 70		
0. 2370	0. 1887		0. 2128	2. 96	2. 52	2.74		Pith)	
0. 8178	0,8807		0.8492	1.31	1.14	1. 23		Rind One tree	565
0. 7451	0, 7513		0.7482	2.79	2. 53	2. 66		Rind	1119
			0. 6034	3	H E	2. 21	37. 60		THE P
0,7162	0. 5875	0. 6994	0. 6677	7. 03	5, 52	6. 27	R 41.61	//65//	1063
0. 3473	0.3472		0.3472	5, 53	4.75	5. 14	TINI		695
0. 4002	0, 4002		0.4002	2, 66	3. 08	2. 87	OIN		696
			0. 3737			4.00	23. 29		
0. 2327	0. 6511	0. 4572	0. 4470	8. 50	10, 06	9. 28	27, 86		699
0. 1990	0, 3458	1 4	A 0704	0.01		0.01			200
o. 1990	0.3458	135015555555	0. 2724	8. 94		8.94	16, 97		1003

FOREST TREES OF NORTH AMERICA.

TABLE II.—ACTUAL FUEL VALUE OF SOME OF THE

2	mber.			WAR THE PROPERTY.	FURL	VALUE.
Office number.	Catalogue number.	Botanical name.	Common name.	Region.	Per cubic decimeter.	Per kilogram
165	8	Liriodendron Tulipifera	Tulip Tree. Yellow Poplar. White Wood	Atlantic	1425, 57	3744. 61
03	29	Bursera gummifera	Gum Elemi. Gumbo Limbo. West Indian Birch	Semi-tropical Florida	997, 32	2913, 58
12	31	Swietenia Mahogoni	Mahogany, Madeira	do	2769. 31	3802. 95
4	64	Acer saccharinum, var. nigrum	Black Sugar Maple	Atlanticdo	3091. 37 2822. 99	4345, 48
5	77	Robinia Pseudacacia	Locust. Black Locust. Yellow Locust	Mexican boundary	3291, 21	3890, 02 4352, 30
7	93	Prosopis juliflora	Mesquit. Algaroba. Honey Locust. Honey Pod.	Interior Pacific	4234. 06	4052. 90
2	115	Cercocarpus ledifolius	Mountain Mahogany	Atlantic	2255, 24	4016.46
8	155	Nyssa uniflora	Large Tupelo. Cotton Gum. Tupelo Gum	Southern Atlantic	2332. 41	4131. 83
4	184	Diospyros Virginiana	Persimmon	Atlantic	2970, 45	3781. 61
7	192	Fraxinus Americana	White Ash	do	2652. 34	4217. 42
	207	Catalpa speciosa	Western Catalpa	do	1582.42	3936. 38
3	224	Ulmus Americana	White Elm. American Elm. Water Elm	do	3247. 02	4191.87
6	235	Platanus occidentalis	Sycamore. Button Wood. Button-ball Tree. Water Beech.	do	2406. 89	4071, 83
9	239	Juglans nigra	Black Walnut	do	1984, 56	3857. 26
	241	Carya olivæformis	Pecan. Illinois Nut	do	2768. 72	3954. 75
9,					5 3851.17	4078.76
3	242	Carya alba	Shell-bark Hickory. Shag-bark Hickory	do	8 3319.79	3811.48
2	244	Carya tomentosa	Mocker Nut. Black Hickory. Bull Nut. Big- bud Hickory. White-heart Hickory. King Nut.	do	3380. 57	3904. 11
L	245	Carya porcina	Pig Nut. Brown Hickory. Black Hickory. Switch-bud Hickory.	do	3392. 12	3922. 89
3	246	Carya amara	Bitter Nut. Swamp Hickory	do	2863. 42	3903. 25
	247	Carya myristicæformis	Nutmeg Hickory	Southern Atlantic	3108, 27	3877. 58
	248	Carya aquatica	Water Hickory. Swamp Hickory. Bitter Pecan	do	3140. 33	4073.59
	251	Quercus alba	White Oak	Atlantic	3197, 41	4187. 88
	253	Quercus Garryana	do	Northern Pacific	2594. 31	3667. 39
	257	Quercus lyrata	Over-cup Oak. Swamp Post Oak. Water White Oak.	Southern Atlantic	3268. 92	4105, 65
1	260	Quercus Prinus	Chestnut Oak. Rock Chestnut Oak	do	2843. 69	3997. 32
2	272	Quercus rubra	Red Oak. Black Oak	Atlantic	3062.08	4075, 16
	274	Quercus tinctoria	Black Oak. Yellow-bark Oak. Quercitron Oak. Yellow Oak.	,do	2595. 04	3774. 60
,	276	Quercus nigra	Black Jack. Jack Oak	do	2692. 51	3713. 81
3	277	Quercus falcata	Spanish Oak. Red Oak	Southern Atlantic	3193, 28	4055, 48
	280	Querens aquatica	Water Oak. Duck Oak. Possum Oak. Punk Oak	do	2655. 82	3718.07
,	290	Castanea vulgaris, var. Americana	Chestnut	Atlantic	1868, 25	4042, 96
	291	Fagus ferruginea	Beech	do	2795, 34	3895. 04
3	294	Betula alba, var. populifolia	White Birch. Old-field Birch. Gray Birch		2509.00	4073.05
	295	Betula papyrifera	Canoe Birch. White Birch. Paper Birch	do	2582, 66	4101.41
	318	Populus tremuloides	Aspen. Quaking Asp	Atlantic and Pacific	1624. 64	4292. 31
1	324	Populus monilifera	Cottonwood. Necklace Poplar. Carolina Pop- lar. Big Cottonwood.	Atlantic	1906. 42	4242, 15
1	327	Thuya occidentalis	White Cedar. Arbor-vitse	Northern Atlantic	1411. 57	3917.77
	331	Chamæcyparis Lawsoniana	Port Orford Cedar. Oregon Cedar. White Cedar. Lawson's Cypress. Ginger Pine.	Northern Pacific	2327. 52	5263, 50
7	338	Juniperus occidentalis, var. mono- sperma.	Juniper	Pacific	3143. 57	4587. 81
3	340	Taxodium distichum	Bald Cypress. Black Cypress. Red Cypress. White Cypress. Decideous Cypress.	Southern Atlantic	1935. 71	4739. 73
	342	Sequoia sempervirens	Redwood	California coast	1985, 50	4191, 47
	347	Pinus Strobus	White Pine. Weymouth Pine	Northern Atlantic	1489. 03 1785. 40	4272, 69
	349	Pinus Lambertiana	Sugar Pine	Pacific	2248. 13	4107. 68
)	356	Pinus monophylla	Piñon. Nut Pine	Interior Pacific	2051. 75	4226.08
1	358	Pinus resinosa	Red Pine. Norway Pine	Northern Atlantic	2441. 24	4600.04
5	361 365	Pinus Murrayana	Yellow Pine. Bull Pine	Pacificdo	1791, 32	4019, 15
019	2000	71 S-14-4	Spruce Pine.	California	1804. 29	3982, 97
	366	Pinus Sabiniana	Digger Pine. Bull pine	Southern Atlantic	2031. 75	4087. 20
9	370	Pinus Tæda	Loblolly Pine. Old-field Pine. Rosemary Pine.	Atlantic coast	3472. 26	5491. 47
6	371	Pinus rigida	Pitch Pine	Southern Atlantic	3980. 96	5012.54
3	372	Pinus serotina	Pond Pine	Atlantie	2008, 20	4126. 15
1	373	Pinus inops	Table-mountain Pine. Hickory Pine	Alleghany	2054. 78	3995. 30
7	375	Pinns mitte	Yellow Pine. Short-leaved Pine. Spruce Pine.	Atlantic	3091. 92	5062, 75
	4077	Pinus mitis	Temon I me. Duote-tenveu I me. Dptuce I me.			

MORE IMPORTANT WOODS OF THE UNITED STATES.

RELATIVE F	URL VALUE.	1-1000	HE STATE	PERCENTAGE D	N DRY WOOD.		7-116			
By volume.	By weight.	Ash.	Hydrogen.	Carbon.	Oxygen.	Hydrogen combined with oxygen.	Excess of hydrogen.	Specific gravity.	Weight of cubic foot, in pounds.	Office number
67	66	0.27	6. 43	47. 29	46, 01	5, 75	0.68	0. 3807	23, 72	
69	70	2. 09	6, 02	40. 80	51. 09	6. 39	0.36	0.3423	21. 33	
32	62	1.09	6, 69	46, 76	45. 46	5, 68	1.01	0. 7282	45. 38	116
						5150		0.7114	The state of the s	
23	19	0. 56	6. 61	51. 55	41. 28	5. 16	1. 45		44. 32	1
29	58	0. 23	6. 17	49. 19	44. 41	5, 55	0. 62	0, 7257	45. 22	
14	18	2. 05	6, 61	51. 08	40, 26	5. 03	1.58	0. 7562	47. 12	
3	42	1.20	5. 45	52.14	41. 21	5.15	0.30	1. 0447	65. 10	
45	46	0.48	5. 85	50. 99	42, 68	5. 33	0. 52	0. 5615	34. 99	1
43	30	0.74	6, 97	48, 78	43, 51	5, 44	1. 53	0. 5645	35. 17	
25	63	0.77	6.44	47.37	45, 42	5. 67	0.77	0.7855	48. 95	1 3
36	24	0.30	6. 93	49.73	43. 04	5.38	1.55	0, 6289	39. 19	-
	1000		6. 92	47.44	1000	2000000	1. 27	0.4020	25. 05	H
65	52	0.47	1000000	7,59712	45, 17	5. 65			325,90	
16	26	0.74	6. 57	50. 35	42. 34	5. 29	1. 28	0. 7746	48.27	
42	40	0. 57	5, 83	51.45	42.15	5. 27	0. 56	0. 5911	36, 83	ı
53	60	0.56	6. 00	49, 28	44.16	5.52	0.48	0. 5145	32. 06	
33	50	0.95	6.15	49. 51	43. 39	5.42	0.73	0.7001	43, 63	
7	36	0.73	6,49	49. 67	43.12	5. 39	1.10	0.9442	58. 84	
13	61	0. 83	6, 13	48.45	44. 59	5. 57	0.56	0.8710	54. 28	
11	55	1.04	5, 93	49. 69	43.34	5. 42	0.50	0. 8659	53. 95	
11	00	1.04	0.00	40,00	10.04	0.42	0.01	0. 6000	00.00	
10	53	0.74	6, 28	48, 98	44.00	5. 50	0.78	0. 8647	58. 88	1
07	56	1.03	5.91	49.71	43, 29	F. 11	0.50	0. 7336	45.71	
27				48. 26		5.41	0.50	0. 8016	49, 95	1
21	59	1.06	6.37	NOTE 1	44. 31	5, 54	0, 83			10
20	38	1. 19	6. 60	49. 16	43. 05	5. 38	1. 22	0.7709	48, 04	1
17	28	0. 24	6. 59	50.44	42.73	5. 34	1. 25	0.7635	46.58	I
38	69	0.33	5.73	48.56	45, 38	5. 67	. 0. 06	0.7074	44. 08	Ш
15	33	0.58	6. 75	49, 22	43, 45	5.43	1.32	0.7962	49. 61	1
28	47	0.34	6. 33	49. 59	43.74	5.47	0.86	0.7114	44. 32	
24	37	0.15	6, 62	49. 49	43.74	5, 47	1.15	0.7514	46.72	ш
37	64	0.15	6. 09	48.78	44. 98	5. 62	0. 37	0, 6875	43. 84	
				40.50	11.00	1/2	7//	0.7056	45.10	
34	68	1.37	5. 73	48, 58	44. 32	5. 54	0.19	0.7250	45. 18	В
18	41	0.29	6.14	50.58	42.99	5. 37	0.77	0.7874	49. 07	
35	67	0.83	5.75	48, 73	44. 69	5. 58	0.17	0.7143	44. 51	
56	43	0.13	5.70	51.74	42.43	5, 30	0.40	0.4621	28, 80	4
31	57	0.54	6.11	49. 27	44.08	5.51	0.60	0.7175	44.71	В
40	39	0.29	6, 49	49.77	43.45	5, 43	1.06	0.6160	38. 05	П
39	34	0. 23	7.12	48. 28	44.37	5. 54	1.58	0. 6297	39. 24	1
63	20	0.74	6, 58	51.13	41.55	5. 19	1.39	0.3785	23, 59	П
55	22	0.65	6, 26	51, 64	41. 45	5.18	1.08	0.4494	28. 00	1
40		0.07	0.05	40.00	44.04		0.01	0.0000	22, 45	6
68	54	0.37	6. 37	48. 80 60. 07	44. 46 33. 65	5. 56 4. 21	0. 81 2. 07	0. 3603 0. 4422	27, 56	
				3000	1				1	
19	11	0.88	6. 03	54. 97	38. 12	4. 76	1. 27	0. 6852	42, 70	
54	8	0.40	6.54	54. 98	38, 08	4.76	1.78	0.4084	24. 45	1
52	27	0. 13	6. 01	52, 10	41.70	5, 22	0.79	0.4737	29. 52	1
66	21	0.12	6.08	52, 55	41. 25	5. 15	0.93	0. 3485	21.72	
59	13	0.19	6. 40	52.85	40.56	5. 07	1.33	0.4040	25. 18	18
46	32	0.83	6. 39	50.48	43. 30	5.41	0.98	0.5473	34.11	
49	23	0. 20	6.07	52.18	41. 55	5. 19	0.88	0. 4855	30. 26	
41	9	0.31	7.02	52. 60	40. 07	5. 01	2. 01	0. 5307	33. 07	1
58	45	0. 37	6. 22	50, 05	43, 36	5. 42	0, 80	0. 4457	27. 78	
		4.44	77000					A 4555	60.00	
57	49	0, 42	6. 04	50, 22	43. 32	5. 41	0. 63	0.4530	28. 28	
50	35	0. 25	6. 23	50, 60	42. 92	5. 36	0.87	0.4971	30, 98	
9	1	1, 12	7. 19	59, 00	32. 68	4. 08	3. 11	0, 6323	39, 40	
6	6	0.17	6. 80	56, 55	36. 48	4. 56	2. 24	0.7942	49. 49	
51	31	0. 26	6. 30	50.74	42.70	5. 34	0.96	0.4867	30. 33	
O.L		0.30	5.78	51, 07	42.85	5, 35	0.43	0.5143	32.05	
48	48	0.00	0.10	07+01	, many syste.					

TABLE II.—ACTUAL FUEL VALUE OF SOME OF THE

ei .	number.				FUEL	VALUE,
Office number.	Catalogue nu	Botanical name.	Common name.	Region.	Per onbic decimeter.	Per kilogram.
379	379	Pinus Banksiana	Gray Pine. Scrub Pine. Prince's Pine	Northern Atlantic	2152. 66	4393.18
s 359	1				4346. 88	5126, 64
81	1	A SECOND STATE OF THE SECO	CT 1 17 0 1 7 0 1 1		4064. 77	5480.35
385	380	Pinus palustris	Long-leaved Pine. Southern Pine. Georgia Pine. Yellow Pine. Hard Pine.	South Atlantic coast	2810. 20	4506. 42
358			S Sales Serving Serving Serving Serving		4129, 95	4594. 97
358	1				4319.67	4806. 05
356	381	Pinus Cubensis	Slash Pine. Swamp Pine. Bastard Pine. Meadow Pine.	do	3363. 40	4418.55
794	382	Picea nigra	Black Spruce	Northern Atlantic	1614.11	3949, 37
1042	387	Tsuga Canadensis	Hemlock	do	1724. 25	4208. 58
709	391	Pseudotsuga Douglasii	Red Fir. Yellow Fir. Oregon Pine. Douglas Fir.	Pacific	1766. 32	4354 84
226	401	Larix Americana	Larch. Black Larch. Tamarack. Hackmatack.	Northern Atlantic	2937.46	4182.04
242	404	Sabal Palmetto	Cabbage Tree. Cabbage Palmetto	South Atlantic coast	1653, 35	3754. 21
565	2 inn	0 1 - 1	n-17-1	S - 14 - 1 - 1 77 - 13	\$ 859.07	4037.01
1 565	§408	Oreodoxa regia	Royal Palm	Semi-tropical Florida	3708.48	4367. 63

α Boxed for turpentine 1876; chipped 4 years; specimen taken along chip.
b Boxed for turpentine 1852; chipped 10 years; abandoned 1861.

c Pith.

THE WOODS OF THE UNITED STATES.

MORE IMPORTANT WOODS OF THE UNITED STATES-Continued.

RELATIVE F	UEL VALUE.			PERCENTAGE IN	DRY WOOD.					6
By volume.	By weight.	Ash.	Hydrogen.	Carbon.	Oxygen.	Hydrogen combined with oxygen.	Excess of hydrogen.	Specific gravity.	Weight of cubic foot, in pounds.	Office number.
47	15	0. 19	6. 29	52.93	40,59	5. 67	1. 22	0. 4900	30. 54	87
1	4	0.15	7. 26	56. 19	36. 30	4.54	2.72	0.8479	52. 84	35
5	2	0. 26	7.41	58. 61	33.72	4. 21	3. 20	0.7417	46. 22	8
30	12	0.28	6.70	52, 70	40. 32	5. 04	1. 66	0. 6286	38. 86	38
4	10	0.28	6.85	52. 99	39.88	4. 99	1.86	0. 8988	55. 96	35
2	7	0. 24	6. 83	54.78	38. 15	4.77	2.06	0.8988	55. 96	35
12	14	0.16	6. 22	53. 33	40. 29	5, 93	1.19	0. 7612	47.44	35
64	51	0.30	6.58	48. 45	44. 67	5. 58	1.00	0. 4087	25. 47	79
61	25	0.48	5. 91	52, 38	41. 23	5. 15	0, 76	0.4097	25, 53	104
60	17	0.03	6.42	52. 32	41. 23	5.15	1. 27	0, 4056	25, 28	70
26	29	0.27	6.03	51. 91	41.79	5. 22	0.81	0.7024	43.77	22
62	65	7. 66	7.06	43. 35	41. 93	5. 24	1.82	0.4404	27.45	24
70	44	2.74	6. 82	47.73	42.71	5. 34	1.48	0. 2128	13. 26	5€
8	16	1.24	6.98	50.46	41. 32	5. 16	1.82	0.8492	52. 92	56

23 FOR

FOREST TREES OF NORTH AMERICA.

	ii ii					vity of d speci-	grain.	COEFFIC		apture.
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific gravity the air-dried spe men.	Direction of	First defice.	Second de- flection.	Modulus of rupture
MAGNOLIACEÆ.	,									
1. Magnolia grandiflora	346	Alabama	Cottage Hill		10	0.7051		1061	957	820
	346	do	do	do	do	0.7006		887	849	761
2. Magnolia glauca	354	do	do	do	Swampy	0. 5222	寥	976	930	132
Tree. White Laurel. Swamp Laurel.	354	do	do	do	do	0.5028		976	896	717
8. Magnolia acuminata	246	Virginia	Wytheville	H. Shriver	Clay limestone	0. 5000	図	904	1061	703
Cucumber Tree. Mountain Mag- nolia.	246	do	do	do	do	0.4755	蓼	939	921	665
	2611	do	Fancy Gap	do	Rich, light	0.4862		788	734	574
A PARTY OF THE REAL PROPERTY OF THE PARTY OF	2611	do	do	do	do	0.4564		729	723	525
	534	Mississippi	Selvers' mill	C. Mohr	do	0. 5682		1061	1050	717
	534	do	do	do	do	0. 5852	巡	1109	1085	830
4. Magnolia cordata	1178	Alabama	Winston county	do		0. 4318		888	864	564
Cavaline 2100	1178	do	do	do		0. 4625		976	1017	637
5. Magnolia macrophylla	532	Mississippi	Quitman	do	Rich, low	0. 5807	圆	1191	1085	516
Large-leaved Cucumber Tree.	532	do	do	do	do	0. 5580	蓼	1252	1252	876
6. Magnolia Umbrella	2661	Virginia	Wytheville	H. Shriver		0. 4170	2000	800	814	558
Umbrella Tree. Elk Wood.	2662	do	do	do		0. 5051		669	673	61:
	HIL							000	010	UL
7. Magnolia Fraseri	260	do	Faney Gap	The state of the s	Damp	0. 5688		939	976	81
	2601	do	do	do	do	0. 5103	Ш	887	912	60
8. Liriodendron Tulipifera	395	Michigan	Lansing	W. J. Beal	····	0.4174	圆	610	610	47
Wood.	818	West Virginia	Grafton	C. G. Pringle	·/	0, 4930	図	1085	1176	750
	818	do	do	do		0.4809		1085	1050	67
	1231	Pennsylvania	THE STATE OF THE PARTY OF THE P	P. P. Sharples		0. 4704		976	976	74
	1231	do	do	do		0. 4911	世	921	1007	82
	1231	do	do	do		0. 4619		976 976	957 848	75
	1232	do	do	do		0. 4511		976	1028	72
	1232	do	do	CONTRACTOR CONTRACTOR		0. 4550		904	921	661
	1236	Tennessee	Saw-mill at Nash-	A. E. Baird		0.4614		888	834	69
	1236	do	ville.	do		0. 4697	蓼	872	888	643
	1236	do	do	do		0. 4591		888	849	58
	1237	do	do	do		0, 4386	図	857	849	58
ANONACEÆ.	1238	do	do	do		0. 4463	圆	976	976	63
9. Asimina triloba	211	Missouri		G. W. Letterman .	Alluvial	0. 3634	圆	444	407	31
Papaw. Custard Apple.	211	do	ferson county.	do	do	9. 3575	蓼	362	315	28
	332	Tennessee	Cumberland river	A. Gattinger	do	0, 4323	0	698	723	57
10. Anona laurifolia	479	Florida	Bay Biscayne	A. H. Curtiss	Swampy	0. 5705	mm	542	514	628
Pond Apple.	479		do		the first on	0. 5794		530	488	586
CANELLACEÆ.							TIME		1	
12. Canella alba	1131	do	Elliott's Key		A THE REAL PROPERTY OF THE PARTY OF THE PART			1085	1085	905
Wild Cinnamon. TERNSTREMIACEÆ,	1131	do	do	do	do	1. 0857		1085	1148	1148
14. Gordonia Lasianthus	236	South Carolina	Bonneau's Depot	H. W. Ravenel	Wet pine-barren	0. 4844	m	718	723	499
Loblolly Bay. Tan Bay.	236	The Talent of the Control of the Con	do		do	0. 4729	6	787	763	671
	414	do	The second secon		A STANSANCE AND A STANSANCE AND ASSESSMENT OF THE PARTY O	0.5470	圆	888	- 921	778
The late of the la	414	do	do	do		0. 5605		751	769	729

THE WOODS OF THE UNITED STATES.

UNITED STATES UNDER TRANSVERSE STRAIN.

	DEFLE	OTION,	IN MIL	LIMETE	RS, UN	DER A	PRESS	SURE, 1	N KILO	GRAM	s, of—		strength:		101
50	100	150	200	(set.)	200	250	300	350	400	450	500	550	te	Remarka.	
4.1	10.2	16. 0	22.8	1.6	22.5	30. 5	39. 5	54, 6					350	Broke suddenly with long splinters	12
5.1	The second	16.7	23, 4	2. 0	23. 6	31. 2	40. 5				100000	3000	325	do	1
5. (10.5	16.0	21.7	1.0	22.0	30.0	44. 5						321	Crushed at center bearing; broke suddenly and squarely, splitting	
5.	10.9	16.7	24. 0	2.3	24. 0	31. 5	50.8						306	to the end.	***
5.	9.2	14.5	20.0	1.0	20.0	28. 8	46. 0			*****			300	Crushed at center bearing; broke with fine splinters	1
5.	2 10.6	17.0	24.0	1.9	25. 0	33. 7	*****	*****					284	.,do	1
6.		21. 0	34. 3	4.8	35, 0					*****			245	do	1
6.	CO. 100 100	21.0	31.8	3.4	20.0	07.0	*****			*****	******	*****	306	do	1
4.	2 2 2	14.5	19. 2	0.7	19. 2	26. 0	35. 0	54. 0			VI		358	do	
	44.0	17.0	00.1	0.0	07.0	13			6	0			040	Co. N. d. et austra handra annon handr	11
5.	11 - 5002	17. 3	26. 1	2.0	27. 0	32. 4	7	/		*****	10	111111	240	Crushed at center bearing; square break Crushed at center bearing; splintered break	100
	200		Control of the last of the las	200			177	V	///						
4.		13.8	19. 2	1.0	19.5		00 5				A		220	Specimen cross-grained; started at knot	自
3.	0 7.8	11.6	15. 8	0.3	15.8	20.8	28.5	40.0	~~~	*****		*****	374	Broke with the spinners	
1,	1 12.0	19.4	30.8	4.5	32.4				*****	*****			236	Splinters started at small knots	100
100	3 14.5	23, 0	34. 8	4.0	36.2	66. 0		*****					261	do	
	2 10.0	14.4	19. 6	1.0	20.0	26. 3	37. 2						346	Crushed at center bearing; broke with fine splinters	
	5 10.7	16.4	24.7	2.0	25. 5	36. 8							257	Specimen cross-grained; broke with long splinters	
	0 16.0	26. 0									*****		202	Square break	
ı.	5 8.3	12.0	16.8	0.4	16, 9	24. 5	34. 0	2			*****		322	Broke with long splinters	1
1.	5 9.3	14. 3	20.0	0.7	20.2	28.8						******	288	Crushed at center bearing; broke with long splinters	
		15. 0	20.6	0.5	20.7	28, 0	37.7		0		5.7	PD	317	Crushed at center bearing; broke with large splinters	1
i.		14. 4	20. 6	0.5	20. 5	25. 8	34. 2	50.0		7		*****	350	Crushed at center bearing; square break	1
5.	and the same of	1		0.0	40.0	21.0	01.7				H		195	Crushed at center bearing; square break at large knot	10
		14. 0	19. 2	0.5	19. 4	25. 4	36. 0	*****	*****		*****		308	Crushed at center bearing; broke with fine splinters	1
1.	4 10.6	15.7	21.5	0.6	22. 0	30, 0							282	Crushed at center bearing; broke with long splinters at knot	
	0 11.7	16.0	22.0	1.0	22. 4	31. 5	*****						296	Square break on tension side, splitting in axis	
	6 11.0	16.0	23, 0	1.4	23, 5	33. 0							275	Specimen cross-grained; broke with the grain	
	5 11.5	22334	26. 6	2.0	27. 0			*****	1 1 1 1				249	Specimen cross-grained; started at the angle of two faces	
	7 11.5 0 10.0	- mark	27. 0	2.5	28. 0	31.6							249	Square breakdo	
					-								10		l
	0 24.0 5 31.0	between a	*****	*****	*****			*****	*****	1	******		133	Broke with large splintersdo	
	0 13, 5	internal	31.0	2, 9	33. 3	*****		1		1			123	Broke with splinters at knot.	
	100000	-	Lange I	-									1		1
9.	2 1000	115633018	50. 5	10.0	55. 4	94. 0	1930	1	100000		1000	100000	268	Crushed at center bearing; broke with splinters	н
9.	2 20.0	32. 5	51. 5	10.0	54. 3	83, 0						*****	250	Square break	
4.		22000	18. 5	1.0	19. 5	25. 0		-17-011000					386	Specimen defective, 0.75 sap-wood; square break	1
4.	5 8.5	12. 5	17. 5	0.8	17, 8	22. 0	28. 0	34. 0	42. 0	50. 0			490	0.75 sap-wood; broke with long, coarse splinters	
6.	8 13.5	21. 5	32. 0	3.0	32, 5								213	Sap-wood; broke at knot with large splinters	-
6.		2000000	29. 2	2.5		40.0	****							Crushed at center bearing; broke with long, fine splinters	
5.	5 10.6	16. 3	23. 5	1.2	23. 7	31.0	44.0						. 330	do	-
6.	5 12 7	19. 5	27.0	2.0	28. 2	37. 0	58. 0						311	Broke with long, coarse splinters	1

	H.					gravity of	grain.	COEFFIC	ICITY,	arn fure
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific grather the air-drie men.	Direction of	First defice tion.	Second de- flection.	Modulus of purture
TILIACEÆ.										
7. Tilia Americana	2	Massachusetts	Arnold Arboretum	The state of the s	Drift	0.4601	EZZZ	814	781	5
can Linden. Lin. Bee Trec.	252	Missouri	Allenton	G. W. Letterman.	Alluvial	0.4008		1038	1027	8
The second second	252	do	Hersey	W. J. Beal	Rich loam	0. 5496		888	888	5
	1039	Massachusetts	Danvers	J. Robinson	Moist gravel	0.4492		698	729	1
	1039	do	do	do	do	0. 4237		668	638	- 14
						A CONTRACTOR	emm	- 10	227	-
. Tilia Americana, var. pubescens	745	Georgia	Bainbridge	A. H. Curtiss	Low	0.4702		842	834	1
	745	do	do	do	do	0. 4555		814	788	1
Tilia heterophylla	2851	Kentucky	Cliffs Kentucky river	W. M. Linney	Limestone	0.4017	0	697	634	3
White Bass Wood. Wahoe.	2852	do	Mercer county	do	do	0.3944		751	723	1
	2853	do	do	do	do	0.3026		827	814	100
	320	Tennessee	Cumberland river	A. Gattinger	Alluvial	0.4750	圆	1085	1085	1
	320	do	do	do	do	0.4924	圆	976	976	1 10
MALPIGHIACEÆ.			COMO	Avantain .						
Byrsonima lucida	1113	Florida	No-Name Key	A. H. Curtiss	Coral	0.6516	Ш	542	525	3
ZYGOPHYLLACEÆ.		0//								I
Guaiacum sanctum	476	do	Upper Metacombe	do	do	1. 1430	國	800	814	
Lignum-vitæ.	1133	do	Key. Elliott's Key	do	MARKET SHEET SHEET	1, 1582	圆	856	912	1
RUTACEÆ.							224			
. Xanthoxylum Clava-Herculis	735	do	Chattahoochee	do	Dry, sandy	0. 5240	圆	651	698	is
Toothache Tree. Prickly Ash. Sea Ash. Pepper Wood. Wild	785	do	do	do	do	0. 5353	圆	669	688	1000
Orange.	1086	Texas	Palestine	C. Mohr	Damp, sandy	0.5898		857	888	
	1086	do	do	do	do	0. 5545		659	630	16
. Xanthoxylam Caribæum	1140	Florida	Bahia Honda Key	A. H. Curtiss	Coral	0.9833	m	814	814	1
Satin Wood.	1140	do	do		do	0 9545		814	021	
SIMARUBEÆ.		BULL	MEDIUN			H				ľ
S. Simaruba glauca	487	do	Bay Biscayne	do	do	0,4560	醪	888	888	112
Paradise Tree.	487	do	do	do	do	0.4104	蓼	1061	976	1
BURSERACEÆ.	L PI	College Salls				Marie .				
Bursera gummifera	462	do	. Upper Metacombe Key.	do	do	0.3060		417	122112	1
Indian Birch.	462	do	do	do	do	0.3096			10111111	1
Amyris sylvatica	475	do	do	do	do	1. 1140	型加	1038	1085	
Torch Wood.	475	do	do	do	do	1. 1278	蓼	976	1085	1
MELIACEÆ.	The state of the s	AV AND A SECOND					1520			I
, Swietenla Mahogoni	452	do	do	do	,do	0.8364	Imm	976	976	
Mahogany. Madeira.	452	do	do	do	do	0,8221	廖	1100	1148	1
ILICINEÆ.	1	The Pull S			DIKTE X	i mili				
. Ilex opaca	280	South Carolina	. Waverly Mills	W. St. J. Mazyek	Sandy loam	0. 6000	圆	651	622	
American Holly.	280	do	do	do	do	0.7018	圆	707	664	
, Hex Dahoon	484	Florida	Bay Biscayne	A. H. Curtisa	Low, damp	0.5307	型加	610	610	
Dahoon. Dahoon Holly.	484	do	do		A Land	0.5333	1000	697	678	
CYRILLACEÆ.				THE STATE OF	10 3 2 2 1 1 1	113	Park I			1
. Cyrilla racemiflora	341	Alabama	. Chunchula	C. Mohr	Damp, sandy	0.6916	圆	465	488	
Iron Wood.	900	da	Cottone IIII	da	Wet	0, 6062	10777	698	751	
Cliftonia ligustrina	338	do	Cottage Hill	00	Wet	0. 0002	124	000	IOL	

THE WOODS OF THE UNITED STATES.

UNITED STATES UNDER TRANSVERSE STRAIN-Continued.

1	DEFLEC	TION,	IN MIL	LAMET	ens, u	NDER .	A PRES	SURE,	IN KIL	OGHAM	s, of-		ength		
0	100	150	200	o (set.)	200	250	:100	350	400	450	500	550	Ultimate strength: transverse pressure	Remarks	
	10.	00.0											0.00		
.0	10.0	20.3	32. 0	2.2	25.5	37. 0	121111						243	Crushed at center bearing; broke with fine splintersdo	1
7	9.5	14.0	19.4	1.0	19.8	25, 9	83. 5						343	do	
5	11.0	17.3	27. 6	3. 5	29, 5								224	Crushed at center bearing; broke suddenly	
0	13.4	22, 3	34. 2	4.0	36. 0				*****				236	Broke suddenly with large splinters	
3	15.3	26.4	50, 5	18.0	20.0000								200	Broke, on reloading, with large splinters	1
8	11.7	18.5	28. 6	3. 5	30, 6								243	Crushed at center bearing; square break	
o	12.4	18.8	28. 5	3.0	30.1						*****		234	do	1
0	15.4	24.6				ranio	The state of	1 000	DI CON		Tilly		172	do	ı
5	13. 5	20.3	31.0	3. 5	33. 6		*****				7.7	H	224	do	
9	12.0	18.4	29. 6	3.5	31. 3								231	do	1
5	9, 0	13.7	19.0	0.7	19. 5	26. 0	39. 5	///	2.	· design			300	do	1
0	10.0	15.3	21. 2	1.5	22. 0	29.0	41, 0						304	do	
		Tiv.	lun II			The state of	1/2	1	/		2		S		١
0	18.6	31.0											181	Specimen cross-grained; split with the grain	1
							1	1//							ı
20	-				- aura	-	2		- 7		NA T		1.9		ı
1	12.0	18.0	25. 0	1.2	25. 7	33. 0				*****			268	do	1
7	10.7	15. 9	21. 2	1.0	22. 0	27. 6	34.0	41.2	49. 0		*****	*****	404	do	1
5	14.0	21.6	31.0	3.0	32.3	43. 0	1000000			1			268	Long fracture with one large splinter	1
3	14. 2	22.5	31. 5	2.5	33. 0	43. 5	70.5					D.	302	Long fracture with two large splinters	ı
7	11.0	17.5	25. 5	2.3	27. 0	36. 0	58.0	2					323	do	J
4	15. 5	23.8	35. 5										200	Specimen cross-grained; square break	-
0	12.0	18.0	24. 0	1.3	04 5	21.0	20.0	V			07		950		1
0	10. G	15.5	21. 2	1.0	24. 5	28.0	39. 0	1	OT		*****	10000	350 293	Broke in three pieces	
	100			2.0	24. 6	20. 0	*****		1.1.		75		200	Square break on tension side with large flake on compression side; broke at knot.	ı
5.	11.0	18.0	26.5	4.0	28.0								250	Square break with large splinters	١
6	10.0	15. 5	21.7	2.0	23. 5								232	Square break, the ends splitting.	
							100								1
7	*****	******									*****	*****	78	Square break	1
		******				*****	******						48	do	1
7	9. 0	13. 3	18.0	0.3	18. 2	22.7	28. 0	33. 2	38. 3	46.3	53. 0		531	Broke with long splinters	
0	9.0	13.6	7/100	0.3	18. 2	23. 0	27.7	32.0	38.0	44.0	51.0	61.0	583	Broke with long splinters on compression side	
					233333						C) HIL	A CONTRACTOR OF THE PARTY OF TH			1
0	10.0	14. 6	20. 4	1.0	22.0	27. 0	32. 0	39. 0					382	Broke suddenly; stick shattered	
4	8.5	13.2	18, 4	0.9	18.6	24.1	30.0	35. 5	41.4	50, 5			474	do	
	100						100		- 118						1
Ti-	15.7	25, 0	40.0	5, 0	42.0	58.0	84.5		*****				300	Specimen cross-grained; broke with long split	1
9	14. 7	24.0	37.7	5. 3	39. 0	57.1	*****	2.2.2.2.2	*****		*****	*****	286	Square break	1
Q.	16.0	26. 0	39. 2	5. 5	41.0								250	Specimen cross-grained; broke with long split	1
0	14.5	23, 5	34. 3	5. 0	36. 3							*****	233	Square break on tension side with large flake on compression side	1
			I B					The same of			11.	FED	719		1
ā	20.0								100000				124	Specimen cross-grained; broke through small knots	
U	13. 0	20.0	28.8	2.3	30.0								5.49	Bushe of Ireat	
19	Ath U	-11-11	anth O	m 0	00.0	*****	*****	*****	*****			*****	245	Broke at knot	4

RHAMNACEÆ. Reynosia latifolia. Red Iron Wood. Darling Plum. Condalia ferrea. Black Iron Wood. Rhamnus Caroliniana. Indian Cherry. Rhamnus Purshiana. Bearberry. Bear Wood. Shittim Wood. Colubrina reclinata. Naked Wood. SAPINDACEÆ. Æsculus glabra. Ohio Buckeye. Fetid Buckeye.	454 460 460 803 1094 993 1139	State. Florida	Upper Metacombe Keydo	A. H. Curtissdodo	Soil. Coraldo	Specific gravity of the air-dried speci- men.	Direction of grain.	First deflec-	Second de- flection.	Modulus of rupture
Reynosia latifolia	460 460 803 1094 993	dododo	Upper Metacombe Key. do	do					1050	
Red Iron Wood. Darling Plum. Condalia ferrea Black Iron Wood. Rhamnus Caroliniana Indian Cherry. Rhamnus Purshiana Bearberry. Bear Wood. Shittim Wood. Colubrina reclinata Naked Wood. SAPINDACEÆ. Æsculus glabra.	460 460 803 1094 993	dododo	Key do	do			Ш	976	1050	100
Black Iron Wood. Rhamnus Caroliniana	460 803 1094 993	do	do		do	1, 3546	Designation 1		2000	820
Rhamnus Caroliniana	803 1094 993	do	Saint John's river	do				1191	1109	112
Rhamnus Purshiana. Bearberry. Bear Wood. Shittim Wood. Colubrina reclinata. Naked Wood. SAPINDACEÆ.	1094 993	Arkansas	The contract of the contract		do	1.3430	図	1191	1176	686
Rhamnus Purshiana. Bearberry. Bear Wood. Shittim Wood. Colubrina reclinata. Naked Wood. SAPINDACEÆ.	993		THE RESERVE OF THE PARTY OF THE	do	Rich hummock	0. 5369		814	794	51
Bearberry. Bear Wood. Shittim Wood. Colubrina reclinata Naked Wood. SAPINDACE E. Esculus glabra.		0	Jonesboro'	T. B. Kitchens		0.5066	0	718	687	61
Bearberry. Bear Wood. Shittim Wood. Colubrina reclinata Naked Wood. SAPINDACE E. Esculus glabra.	1139	Oregon	Portland	G. Engelmann and	Rich, alluvial	0. 5943	1	775	912	75
Naked Wood. SAPINDACEÆ. Æsculus glabra	1139			C. S. Sargent.			PITTI		-	- 227
Æsculus glabra		Florida	Umbrella Key	A. H. Curtiss	Coral	0.8721		921	976	121
Æsculus glabra. Ohio Buckeye. Fetid Buckeye.			TOPECO	7						
	297	Missouri	Allenton	G. W. Letterman.	Rich, moist	0, 4653	銐	751	707	4
	297	do	do	do	do	0.4602		687	651	4
	427	Tennessee	Nashville	A. Gattinger	Rich, moist	0.4970	巡	610	574	54
Æsculus Californica	684	California	Marin county	G. R. Vasey	Rich upland	0.5034	図	697	669	5
	684	do	do	do	do	0. 5228	圆	678	698	6
Sapindus marginatus	307	Texas	Dallas	J. Reverchon	Rich, damp	0, 7681	圆	888	888	6
Wild China. Soapberry.	307	do	do	do	do	0.7784	蓼	857	948	9
The second of the second	928	do	Austin	C. Mohr	Limestone	0. 5243		842	814	8
	928	do	do	do	do	0. 5310	図	688	697	7
Hypelate paniculata	463	Florida	Upper Metacombe	A. H. Curtiss	Coral	1. 0405	刨	1135	1206	12
Ink Wood. Iron Wood.	463	do	Key do	do	do	1. 0123	蓼	939	1017	11
Acer macrophyllum	982	Oregon	Portland	G. Engelmann and	Rich, alluvial	0, 5445	即加	697	734	6
Broad-leaved Maple.	982	do	do	C. S. Sargent.	do	0. 5341	國	751	751	6
	1023	do	Portland Furniture	do		0. 4907		697	842	6
	1023	do	Company.	do	,,,,, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0. 5053		729	794	6
Acer circinatum	1013	do	Portland	do	Moist, alluvial	0, 6928	1200	626	713	7
Vine Maple.	1014	Washington ter-	Wilkeson	do	do	0.7001	题	634	723	8
	299	ritory.	Allendan	G. W. Letterman.	Rich upland	0.0001	177777.	1526	1457	10
Sugar Maple. Sugar Tree. Hard Maple. Rock Maple.	376	Missouri	Allenton	C. G. Pringle	Gravelly	0. 8381		888	976	12
and any or	409	New England	Charlestown Navy-	S. H. Pook		0. 6775	刨	763	930	6
	1233	Vermont	yard. Charlotte	F. H. Horsford		0.7447	刨	1683	1953	14
	1233	do	do	do		0. 6986	蓼	1878	1808	12
	1234	do	do	do		0. 706B		1220	1395	12
	1234	do	do	do		0.7108		1395	1480	12
	1235	do	do	do		0.7137		1628	1575	12
	1235	do	do	do		0, 7189		1436	1575	11
Acer saccharinum, var. nigrum Black Sugar Maple.	213	do	do	C. G. Pringle	Clay	0.7241		1039	1149	10
	2741	Missouri	Allenton	G. W. Letterman	Low, alluvial	0, 7355	國	1085	1221	10
The state of the state of	440	Tennessee	Nashville	A. Gattinger	Rich	0.6973		888	1149	10
	757	Florida	Chattahoochee	A. H. Curtiss	Clay	0. 6979		857	930	9
	757	do	do	do	do	0. 6824		610	688	7
Acer dasycarpum	1052	Massachusetts	Topsfield	J. Robinson	Low meadow	0.6641		976	1109	10
Red Maple. Swamp Maple. Soft Maple. Water Maple.	20	do	Arnold Arboretum	C. S. Sargent	Drift	0.7148	HITE	827	864	7

UNITED STATES UNDER TRANSVERSE STRAIN—Continued.

	DEFLE	CTION,	IN MI	LLIMET	ERS, U	NDER .	A PRES	SURE,	IN KII	LOGHAN	ds, of-		strength:		
0	100	150	200	0 (set.)	200	250	300	350	400	450	500	550	Ultimate st transverse p	Remarks.	
- 6	0.2	10 =	10.0	0.5	10.0	99.6	20.0			110	130	200	350	Sacritory and all d	
5. 0	9.3	13. 5	18. 0	0.5	19. 0	23. 0	30.0							Specimen cross-grained	
.1	8.8	11.5	15. 5	0, 5	16.0	20, 0	24. 5	30.0	33.7	40.0	*****	*****	481 290	Long, shattered break	1
	10000			100		24.5							-11/10		
8	12.3	18.0	26. 5	2.4	27. 5	, , , ,	••••						221	Long break, starting at small knot	
.0	14. 2	20.1		2.0	04.0	*****								Shattered	
. 3	10.7	16. 5	22.0	1.0	23, 0	28. 0	36. 6		*****	*****			320	Long, shattered break with large splinters	-
. 3	10.0	15. 0	19. 6	0.5	19. 5	24.5	29. 0	34. 5	48.0	57. 0			519	Specimen cross-grained; shattered	
	13/1										751		17		ı
. 5	13. 8	22.4					·				M.		199	Crushed at center bearing	1
. 1	15. 0	24. 0	41.5	*****					0.				200	do	-
. 0	17. 0	27. 6	44.0	7.5	48. 6	*****							234	Crushed at center bearing; broke at knot on tension side	-
. 0	14. 6	23, 0	31.5	1.8	32. 0	44. 0	1		/				265	Long fracture; large splinters	
. 2	14. 0	21.7	30. 3	2.3	31.8	44. 2		17276					277	Long fracture	
. 5	11.0	16.6	23, 5	1.5	24. 5	32. 0	42.0	59.0			M.		383	Long, splintered fracture	
.7	10.3	15. 5	22.4	1.5	23. 4	30. 7	42.0	58.0	90.0				405	Splintered fracture	1
. 8	12. 0	19. 0	29. 0	3.0	29.7	37. 0	53. 0						350	do	
. 1	14. 0	22. 0	32.0	4.2	34. 2	45. 0							300	Long, splintered fracture	-
1. 3	8.1	12.0	16. 5	0.7	17.0	21.5	27. 0	33. 2	39.5	48. 5	62. 0		538	Shattered	
5. 2	9. 6	14.5	19. 0	1.0	19. 0	24. 0	30.5	36. 5	44.5	56, 0			477	do	
7. 0	13. 3	21. 0	30. 5	3.4	32. 0	43. 0	1			1			297	Short busels sulittles in axis of stick	
6. 5	13. 0	19.8	29. 5	3.0	31.0	42.0	1	2015	1/2000	11.5	N SOM	-	297	Short break, splitting in axis of stick	T
7. 0	11.6	17.8	25. 0	2.0	26. 0	35. 0			100/000		7	The same of	295	Slightly crushed at center bearing; splintered	
. 7	12.3	19.4	29. 0	2.5	30. 0	41.0							280	Short break with long, large splinter	
7.8	13.7	21. 5	30.5	2.0	31.4	40.3					R	I	304	Long, shattered break.	
7.7	13. 5	21.0	29. 5	2.0	30.0	39.0	50.5						349	do	
		100			BRIL								1.5		
3. 2	6.7	10, 2	13.5	0.3	13.8	17. 0	21.5	25. 8	32. 0		100000	*****	1 1	Long splinter on angle of two faces	1
. 5	10.0	15. 0	20. 0	0.7	20.3	26.0	35. 0	1.0.1.1.1	*****				288	Splintered	1
2.9	5. 0	7.7	10, 2	0.0	10. 2	12.6	15. 2	18. 2	21.7	25. 4	31. 4	38.3	599	Broke with fine splinters on back	1
2. 6	5.4	8.4	11. 2	0.0	11. 2	14.0	17. 0	20. 2	25. 3	30. 0	- Commercial	50.0	550	do	
1. 0	7.0	10, 2	13. 6	0. 2	13. 6	16.6	20. 2	24. 6	30. 0	36. 0	47.0		527	Square break on tension side, splitting in axis	
3. 5	6.6	10. 0	13.0	0.2	13. 0	16.0	19. 5	23. 4	27.7	33. 0	42.0		548	do	١
3.0	6. 2	9.6	13.0	0.0	13.0	15.8	19.7	24.7	30. 0	36. 8	1		530	do	1
3.4	6. 2	9.1	12. 2	0.0	12.5	15. 4	19. 0	22. 6	27. 6	34. 5			471	Specimen cross-grained; shattered on angle of two faces	1
4.7	8.5	13. 5	18, 2	0. 5	18.0	23, 5	30. 6	38. 0	49.5	65. 0			450	Broke with long splinters	
1. 5	8.0	12.0	15.5	0.5	16.3	20.0	26, 0	32. 0	43. 5				450	Crushed slightly at center bearing; broke with fine splinters	1
5. 5	8, 5	13.0	17.6	0.6	ALCOHOL:	22.5	29. 5	37. 0	52. 0				437	Broke with fine splinters	-
5.7	10.5	16.5	23. 0	1.5	1900017	30.7	41.5	53. 0					398	Splintered on angle, starting at small knot	
8, 0	14. 2	21.0	30.0	2.0	30.7	40.4	54. 0	*****		*****		*****	317	Broke with long, fine splinters	1
5. 0	8.8	14.0	19. 0	1.3	19. 2	25. 0	32. 0	41.0	55. 0				435	Broke with long, fine splinters	
5. 9	11.3	17. 2	24. 5	1.6	26. 0	35, 0	46. 5						315	Specimen sap-wood, cross-grained; broke at knot	
5. 6	9.4	14.2	19.5	1.2	20.0	28. 0	39. 5	58. 0		1	1		350	Crushed at center bearing; broke with fine splinters	1

		i.			1000		gravity of	grain.	COEFFIC		upture.
	Species.	Office number.	State.	Locality.	Collector,	Soil.	Specific grather the air-dried men.	Direction of	First deflec-	Second de- flection.	Modulus of rupture
36.	Acer rubrum—continued	530	Mississippi	Kemper's mill	C. Mohr	Rich, swampy	0. 5999	>	976	1028	80
		743	Georgia	Bainbridge	A. H. Curtiss	Low	0.5524	蓼	888	930	60
		743	do	do	do	do	0. 5509	圆	976	1085	79
		878	Massachusetts	Danvers	J. Robinson	do	0.6818	蓼	888	888	93
		878	do	do	do	do	0.7102	圆	775	835	83
		1048	do	North Reading	do	do	0. 6699	膠	888	904	82
		1048	do	do	do	do	0. 6710	Ш	842	913	93
7.	Negundo aceroides	290	Missouri	Allenton	G. W. Letterman	Rich bottom	0, 4750	即	610	618	4
	Box Elder. Ash-leaved Maple.	290	do	do	do	do	0.4585	蓼	626	697	57
		311	Texas	Dallas	J. Reverchon	do	0. 4773	圆	452	478	50
		311	do	do	do	do	0.4614	蓼	514	536	50
	The second second		ave of	TEU	TAIN			E21111			131
18.	Negundo Californicum Box Elder.	645	California			CONTRACTOR THE MENTER	0. 5227		939	986	71
	ANACARDIACEÆ	645	do	do	do	do	0. 5227	Ш	- 921	904	80
1.	Rhus copallina	736	Florida	Chattal:oochee	A. H. Curtiss	Dry clay	0, 4888	mm	634	638	6
	Dwarf Sumach.	736	do	do	do	do	0.5054		763	835	6
	The same of the sa				7 7 7 1		a presi	m	-	News.	V _e
3	Rhus Metopium	467	Florida	Upper Metacombe Key.		Coral	0.7967		921	1050	6
	Mountain Manchineel. Bum Wood. Hog Plum. Doctor Gum.	467	do	do	do	do	0.8105		921	1050	6
	LEGUMINOSÆ.						-17				
7.	Robinia Pseudacacia	405		Charlestown Navy-	S. H. Pook				1395	1302	14
	Locust. Black Locust. Yellow Locust.	405		yard.	do	.,.,	0.8205		857	1302	13
		405	***************************************	do	do		0.8148		1221	1268	15
		815	West Virginia	Grafton	C. G. Pringle		0. 6433		1039	1050	10
		815	do	do	do		0. 6433	圆	814	976	8
		1247	New York	Long Island	M. C. Beedle		0.7956	図	1526	1627	13
		1247	do	do	do		0.7769	國	1627	1627	13
		1248	do	do	do		0.8069		976	1123	10
		1248	do	do	do		0.8456	1	1320	1436	13
9,	Robinia Neo-Mexicana	1031	Colorado	Trinidad	W. B. Strong	Low, moist	0. 8019	圆	1061	1149	9
20	Olneya Tesota	650	California	Lower Colorado	G. Encolmonn and	Dry, gravelly	0, 9841	em.	976	1039	9
00.	Iron Wood. Arbol de Hierro.	650	do	valley.	C. S. Sargent.	do	1, 1966	即加	659	697	5
		000					1. 1000	100	000	501	-
81.	Piscidia Erythrina	564	Florida	Upper Metacombe Key.	A. H. Curtiss	Coral	1.0398	圆	740	814	8
		564	do	do	do	do	0. 9466		8;2	888	6
82.	Cladrastia tinctoria	33	Kentucky	Mercer county	W. M. Linney	Limestone	0. 7852	mm	888	976	9
	Yellow Wood Yellow Ash. Gopher Wood.	33		do		In-	0. 6444	冒	957	1028	8
		-							100000		100
14.	Sophora affinis	329	Texas				0.8697		842	857	8
		932	do	Austin	C. Mohr	do	0. 9594	10	1150	1097	7
5.	Gymnocladus Canadensis	519	Tennessee	Nashville	A. Gattinger	Limestone	0.7143	nm	872	849	7
	Kentucky Coffee Tree. Coffee Nut.	1241	Missouri			Alluvial	0. 6966	圆	1061	1110	8
		1242		do	do	do	0.6875		1221	1149	7
		1243	do	do	do	do	0. 6670		976	1085	8
							1272072	min	2000	3000	-
×6.	Gleditschia triacanthos	531		do			0. 6250		976	1149	
	Three-thorned Acacia. Sweet Locust, Honey Shucks.	532	do	do	do	do	0.6381	I	1164	1221	. 5

THE WOODS OF THE UNITED STATES.

UNITED STATES UNDER TRANSVERSE STRAIN-Continued.

	DEFLE	CTION,	IN MI	LIMET	ers, U	NDER A	PRES	sure,	IN KIL	OGRAM	8, OF-		strength:		
50	100	150	200	o (set.)	200	250	300	350	400	450	500	550	Ultimate s	Remarks.	
5. 0	9. 5	14.5	19.0	0.5	19. 2	25. 0	35, 5		1				345	Broke with long splinters	
5. 5	10.5	16.5	23, 5	2.0	24.5	32.0		hences			******	10000	256	Specimen 0.75 sap-wood; cross-grained	
5. 0	9. 0	14.5	20.0	0.7	20.5	27. 0	39. 0	*****		100000	******		340	Sap-wood; crushed at center bearing; broke with fine splinters	
5. 5	11.0	17.0	24. 0	1.2	25. 0	33, 0	42.0	61. 0	320000	*****		1	400	do	
6. 3	11.7	18.3	28, 0	3. 0	28.4	37. 5	52.5	90. 0	******	The state of	*****	******	358	Sap-wood; broke with long, large splinters	
5. 5	10.8	16. 0	22, 0	1.1	23. 0	31. 5 28. 0	42. 0 37. 0	50.0	******	*****	*****	*****	350	do	100
5, 8	10.7	15. 5	21.5	1.0	21, 8	28.0	54.0	50.0	*****				400	00	F
8.0	15.8	26.3											189	Broke at knot near center bearing	-
7.8	14.0	22.0	33. 5	3.8	35. 0								244	Crushed at center bearing; square break	
0.8	20.6	31.0	44.5	5. 0	47.0								217	Square break at knot	
9.5	18.2	30, 0	42.0	3. 5	44.0	71.0		*****					252	Flaked on tension side; broke at small knot	
5. 2	9. 9	14.2	21. 2	1.0	21. 2	28. 0	37. 5			77			335	Crushed at center bearing; broke into long splinters	
5. 3	10.8	15.8	21.0	0. 5	22.0	28. 0	36. 5	Laplace					345	Crushed at center bearing; broke into long, fine splinters	-
							1	1	//				100		
7.7	15. 3	23. 2	32.3	2.6	33. 5	43. 5	4		,				296	Shattered, splitting to the end	
6. 4	11.7	18.0	27. 0	3, 1	28. 0	37.3					*****		270	do	-
5. 3	9.3	14.5	21.3	1.6	23. 0	30.5	LE B	1//					263	Square break	
5. 3	9. 3	14.5	21.3	1.5	23. 0	30, 5	9						296	do	
		A CONTRACTOR		77.57	THE STATE OF			125207.00		100		D 10			
	0.0	4					200	-			4000	45.0	-		
3.5	8.0	11.0	14.5	0.8	14.7	18.0	22.0	25. 8	30. 2	35. 6	41.5	47.8	632	60.2 millimeters deflection with 600 kilograms; specimen cross- grained.	1
5.7	7.5	12.0	15.5	0.3	15.8	19.0	23.5	28.7	35. 0	40.0	47.0	55.0	581	Broke with fine splinters	
4.7	9.3	11.5	15.6	0. 2	15. 3	19. 0	30.0	28.0	32. 0	37. 0	44.5	51.8	646	splinters. Broke with coarse splinters.	
6.0	10.0	14. 5	19. 0	0.5	19. 5	24. 0	30. 0	88. 0 42. 0	21.1	*****			363	do	
3. 2	6.0	9. 0	12. 0	0.0	12.0	15. 0	18.0	21.0	24. 9	29. 3	34. 7	42.5	592	Splintered on corners	
3. 0	6.0	9. 0	11.6	0. 2	11.8	14.5	17.8	21. 2	25. 4	3L.2	38.0	46.5	578	Broke with fine splinters	В
5. 0	8.7	12.5	16. 6	0.4	16.8	20.8	25. 5	31.0	36. 5	45, 6			456	Broke with large splinters on corners	н
3. 7	6.8	10.0	13. 2	0.5	13.5	16.4	20.1	24. 3	28.0	33. 5	39. 0	46.4	596	do	П
		22.2	100 141	2000	2022	7220/20	2570		The same		The same of the sa	The state of the s	2000		1
4. 6	8, 5	12.4	16. 2	0.4	16.7	20. 6	25. 0	31.0			******		388	Broke with long splinters	
5. 0	9.4	14. 2	19.5	0, 5	20.0	26, 5	33. 7	42.0	54.3				402	Cross-grained; split with grain	
7. 4	14.0	21.0	29. 9	1.4	31.0		*****			*****	*****		238	Square break	
6, 6	12.0	19.5	26. 0	1.8	27.1	33. 5	43.0	51.0		*****			354	Broke with long, large splinters	ľ
5.8		17.3	24. 0	1.4	24. 5	30. 5	40.0	01.0					288	dodo	
						00.0							200		
5. 5	Post Contract	15.8	21.6	1.1	22.5	29. 0	37. 0	47.0	68. 0		*****		422	Long, large splinters on angle of two faces	
5, 1	9.5	14.5	20. 2	1.0	20, 5	28.0	*****					*****	347	Started at small knot; long, oblique fracture	
5, 8	11.4	17.0	23.0	1.5	25. 0	33. 0	42.0						350	Broke at large knot with long splinters.	
4. 4	8.9	13.0	18.2	1. 2	18.7	24. 0	31.0		1.5000		100000		341	Long, oblique break	
5 0	21.7	40 -	00.0			1000	anut au	0		Section 3					
5.6	NAME OF	18.5	29, 9	3.0	29. 0	37. 3	52. 0	******			1	1	300	Square break on tension side, splitting in axis of the stick	
4.0	1000	13.0	18.4	0.9	18.8	26. 0	37.5			*****	1		347	Splintered on angle of two faces	
5.0	- Sound	13, 7	19. 2	1.5	20. 0	28.7	46.5	*****					328	Broke with fine splinter	1.
11.00		40, 4	20.0	1.4	20. 5	28.3	44, 0	*****			*****	*****	342	do	1
5. 0	to and	12.6	16, 8	0.6	18.0	24.0	31. 0	41.0	57. 0				413	Crushed at center bearing; broke with fine splinter	-
4.2	8.0	12.9	17. 6	1.0	18, 7	25. 0	33. 0	47.0					337	Broke with fine splinter	
5. 5	11.0	30, 4	22. 5	1.0	23. 5	31.7	39, 5	55, 5			1	1713	381	Broke with long splinter	All

FOREST TREES OF NORTH AMERICA.

	ır.					gravity of dried speci-	grain.	ELAST	HENT OF	unfure
Species	Office number	State.	Locality.	Collector.	Soil.	Specific grathe air-drie men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of runture
. Gleditschia monosperma	760 760	Floridadodo	Chattahoocheedo		Alluvialdo	0.7628 0.7748	國際	1061	1149 1191	107
3. Parkinsonia Torreyana Green-bark Acacia. Palo Verde.	678	Arizonado	Lower Colorado river.	G. Engelmann and C. S. Sargent.	SWEN FIRST STREET	0. 6705 0. 6727	國	514 568	514 602	51
. Cercis Canadensis	436	Tennessee	Nashville	A. Gattinger	Limestone	0. 7323		814	904	100
	1090	Missouri	Allentondodo	G. W. Letterman	Richdo	0, 6341		588 452	610 514	6
	1091	do	do	do		0. 6250	0	651	723	5
Mesquit. Algaroba. Honey Locust. Honey Pod.	680 680	Arizonadodo	Tucsondo			0.7818	圆圆	542 596	618 630	55
	927	Texas	Austin	C. Mohr		0.7750		509	501	41
Screw Bean. Screw-pod Mesquit. Tornilla.	658 658	Californiado	Fort Yumadodo	C. S. Sargent.	Sandy	0.8068 0.8568	圖麵	814 787	835 814	90
i. Acacia Greggii	697	Arizona	Santa Rita mount-	do	Dry, gravelly	0.8714	<u></u>	1039	1085	7
0. Lysiloma latisiliqua	509	Florida	Boca Chica Key	A. H. Curtiss	Coral	0. 5670	3	488	461	£
ROSACEÆ.		9//								
2. Chrysobalanus Icaco	480	do		3/1	Swampy	0, 7753	2	957	1110	1
3. Prunus Americana	68	Missouri	Allentondo	And the second s	Rich upland	0.6003 0.5916		814 651	769 734	
210180 2 10/11	334	Texas	Dallas	J. Reverchon	Rich	0. 8045		921	976	1:
4. Prunus angustifolia	435	Tennessee	Nashville	A. Gattinger	River bluff	0. 6538	0	634	603	4
7. Prunus emarginata, var. mollis	968 968	Washington territory.	Wilkesondo	G. Engelmann and C. S. Sargent.	Low, rich	0.4699		751 751	849 872	(
						0.4750	mm			
8. Prunus serotina	15	Massachusetts	Roxburydo			0.7438	27774	775	849	11
	15	Michigan	Lansing	W. J. Beal	do	0.7386		1017	888	10
	1152	do	Dansville	do	do	0. 5315		651 814	673	1
	127	Missouri	Allenton	G. W. Letterman .	Rich loam	0. 6790		976	976	1
	127	do	do	do	do	0. 6670		1221	1028	1
	148	Illinois	Waukegan	R. Douglas	Gravelly	0. 6471		976	930	1
	317	Michigan	Hersey	W. J. Beal		0. 5315		775	800	1
	317	do	do	do		0. 5493		842	828	
	368	Vermont	Charlotte	C. G. Pringle		0. 5648	题	764	857	1
	406	Virginia or Mid-	Charlestown Navy-	S. H. Pook		0.5028		651	718	
	763	dle States. Florida	yard. Chattahoochee	A. H. Curtiss		0. 6105	初か	976	958	1
	763	do	do	do				888	976	
	1053	Massachusetts	Topsfield	J. Robinson		0. 6244		- 740	769	1
	1053	do	do		24	0. 6716		698	775	1
0. Prunus demissa	637	California	Strawberry valley	G. Engelmann and C. S. Sargent.	Low, rich	0. 7636		814	769	
1. Prunus Caroliniana	1032	Florida	Jacksonville	A. H. Curtiss	Sandy	0. 8785	認	697	718	1
Wild Orange. Mock Orange. Wild Peach.	1062	Texas	Victoria	C. Mohr	Rich, moist	0.8698		1191	1097	1
	1062	do	do	do		0.8481	P777D	976	996	5

THE WOODS OF THE UNITED STATES.

UNITED STATES UNDER TRANSVERSE STRAIN—Continued.

	DEFLE	CTION,	IN MI	LIMET	ERS, UI	NDER 2	PRES	SURE,	IN KIL	OGRAM	s, of-		trength		
50	100	150	200	(set.)	200	250	300	350	400	450	500	550	Ultimate strength: transverse pressure.	Remarks.	
4. 6	8.5	13.3	43. 2	0.6	18.0	23. 5	29. 0		42. 0				458	0.66 sap-wood; broke with long, fine splinters	
4. 0	8. 2	12. 8	18.5	1.0	19.5	25. 5	33. 0	40.5	52. 5				419	Specimen cross-grained; split with grain	
9. 5	19. 0	28. 4	43. 2	6, 4	46. 0								218	Specimen cross-grained; broke at knot	
8.6	16. 2	25. 4	35. 2	3. 0	37.7								247	Long, oblique fracture	
6. 0	10.8	15. 8	22. 9	1.6	22.7	29.7	38.0	50. 0	68. 0	75000			428	Broke with long, large splinters	
8.3	16. 0	24. 5	35.0	2.5	37.0	48.0	74.5				Post		313	do	
0.8	19. 0	29.7	43.0	6.0	45, 5	61.0							277	do	
7. 5	13.5	20.0	28.4	1.5	30.0								220	Broke at knot near support	
0.0	45.0	00.0				0.0	-			- 4		-	200	Specimen cross-grained; short, oblique fracture	
9. 0 8. 2	15. 8	23.0	30.7	1.6	31.7								245	do	
9. 6	19. 5	31. 5	30. 1	4.0							VIA		176	Specimen cross-grained; shattered	
0,0	20.0								60	1					
6. 0	11.7	17.7	24. 3	1.3	25, 0	32, 0	41.0						385	Specimen cross-grained; short, oblique fracture	1
6. 2	12.0	17. 3	24. 5	2. 2	25. 5	33. 5	42.0	53. 0					378	do	1
4.7	9.0	14.0	18.1	0.6	18.6	24. 0	29.0						338	Broke at knot near the end	-
0.0	21. 2	32.7	51. 3	8.0	55. 3		15	1//			Bal		236	Specimen cross-grained	
			NAME OF		1		6	17				1			-
5. 1	8.8	13. 0	17. 8	0.9	18.0	23. 0	31. 5	40. 0	66. 0				410	Broke with long splinters, starting at knot	
6.0	12.7	19.3	27.4	1.7	28. 0	37. 0							277	Broke with long splinters	
7. 5	13. 3	21. 0	28. 9	1.6	29. 0	36, 5				(ha)			300	Broke with long, large splinters	
5. 3	10.0	14.9	20.7	0.5	20. 6	27. 0	34. 0	41.0	50.0	61. 5	84. 0		529	Broke with fine splinters	
7.7	16. 2	26. 0	38. 5	4.5									200	Specimen cross-grained, defective; square break on tension side	-
22.2	302							10	1	The same of	1		1		ı
6. 5	11.5	17.7	25, 2	1.5	26. 0	36.0		•	0		47	PR	293	Broke with long, coarse splinters	П
6. 5	11.2	17.0	24.7	1.7	26. 0	36. 5			7	7			286	Shattered	
6. 3	11.5	17.3	23, 6	1.0	24. 2	30.0	38. 5	46. 5	57. 5	73.0			. 500	do	
4.8	11.0	15. 9	22. 0	0.6	ATTEN	28. 0	35.7	44.0	55. 0				467	Broke with fine splinters	1
7.5	- Contract		32. 0	1.6	20.51110	******				*****			. 247	Long, oblique fracture	
6.0	11.5		24. 6		T.O.L.	32.5	500000000000000000000000000000000000000				*****		309	Broke with long splinters.	Т
4.0	9.5		21. 5			28. 5	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						. 386	Shattered; long splinters	
5. 0						28.0	USA 2197.0			1			420	Broke with fine splinters	
6.3		O A PRESIDENT				36. 0		20.0					294	Shattered; long splinters on corner	ш
5.8			23. 0		The state of the s	30. 0							. 295	Broke with long splinters on corner	
6, 4			22. 6			1							. 328	Broke with coarse splinters	
7. 5	13. 6	21. 5	30.7	1.7	31.6	43. 5							. 274	Specimen cross-grained; single fracture	-
5. 0	10. 2	15. 2	21.0	0.6	21.8	26. 5	34. 0						. 340	Broke with fine splinters	1
5. 5	10.0	15. 5	20. 8	1.0	21. 5	27. 0	35. 0						. 338	Broke with long, large splinters	
6. €	12.7	19. 5	27.0	1.5	28. 0	36. 0	46.0	62. 5					. 350	Specimen cross-grained; long fracture	-
7. (12.6	19. 5	26. 5	1.5	27. 0	34. 0	46. 0	59. 5					. 350	do	
6. (12. 7	19. 5	28, 4	1.6	28, 3	36, 5							. 295	Specimen gross-grained; split with the grain	
7.0	13.6	22. 0	32. 3	4.0	34. 0	73.0							250	Specimen cross-grained	
4.1	1 000	10000	1000	1000		1 0000 AT		35. 7	41.7	53. 0	74.0		320		
5. (- Carlo	4000	313	- 32	19.0	24.5	32. 0	1 diver				1	- 30	Specimen cross-grained; shattered	

FOREST TREES OF NORTH AMERICA.

	2		7 2 3			gravity of	grain.	COEFFIC		upture
Species.	Office number.	State.	Locality.	Collector,	Soil.	Specific gravithentr-dries	Direction of	First deflec- tion.	Second de- flection.	Modulus of ruptur
113. Prunus ilicifolia	1158 1158	California	Santa Cruz	C. L. Anderson		0. 9734 0. 9678	200	751 697	751 712	820 745
117. Pyrus coronaria	1087	Pennsylvania	Nazarethdo	J. Henry	Moist	0. 7357 0. 7228	劉	751 729	751 723	441
	1088	do	do	do	do	0. 7340 0. 7382	製物	508 651	465 630	452 623
21. Pyrus sambucifolia	410	Vermont	Mount Mansfield		Gravelly	0. 5727		575	626	445
125. Cratægus arborescens	607	Georgiado	Ogeechee	A. H. Curtiss		0. 6818 0. 7126	冒额	814 788	814 763	799 443
126. Cratægus Crus-galli	328	Massachusetts	Brookline	J. Robinson	Loam	0. 6946		548	575	619
	1093	Missouri	Allenton	G. W. Letterman .	Low, wet	0.7166		508 751 751	514 775 794	586 763 768
128. Cratagus subvillosa	1093	Texas	Victoria	C. Mohr	Afluvial	0. 7946		921	913	860
29. Crategus towentosa	1081	Missouri	Nashville	A. Gattinger	Limestone	0. 8670		842 740	740	698
Black Thorn. Pear Haw.	426 926	Touldland	do	do	do	0.7527		651 718	723 674	720
32 Crategus spathulata Small-fruited Haw. 34. Crategus æstivalis	239	Louisiana	Webster parish Bonneau's Depot	H. W. Ravenel	Damp, rich	0, 7102		595	592	71:
May Haw. Apple Haw. 35. Crategus flava, var. pubescens Summer Haw. Red Haw.	767	Florida	Aspalaga	A. H. Curtiss	Dry clay	0. 7973	Ш	740	708	72
37. Amelanchier Canadensis	241 849	Kentucky Massachusetts	Brumfield Station Danvers	W. M. Linney J. Robinson	Waverly shale	0.8312 0.8472	圖圖	1191 1085	1221 1149	108
HAMAMELACEÆ.	849	do	do	do	do	0.8410		1163	1221	105
39. Liquidambar Styraciflus Sveet Gum. Star-leaved Gum. Liquidamber. Red Gum. Bilsted.	546 546	Alabamado	Kemper's mill	C. Mohr	Rich, alluvial	0. 5448 0. 5796		603 688	610 674	52
	1095 1095	Arkansasdo	Little Rockdodo	G. W. Letterman.		0. 6012 0. 5765		888 976	930 996	77
	1173	New Jersey	Mount Hollydodo	S. P. Sharples	Claydo	0.6080 0.6477		751 697	769 496	75
	1181 1181	Mississippi	Yazoo River bottom	R. Abbey	Alluvial	0. 5864	>	751 787	781 819	55
	1182 1182	do	do	do	do	0. 6250 0. 6375		976 1163	1017 1061	61
	1183 1183	do	do	do	ob	0, 5409 0, 6159	製製	814 1017	888 976	61
RHIZOPHORACEÆ. 40. Rhizophora Mangle	485	Florida		The second secon	Salt-marsh	1.1480		1627	1627	130
COMBRETACEÆ.	485	do		do	do	1. 1335	1770	1627	1684	110
41. Conocarpus erecta	489	do	do	do	do	1, 0240 1, 0292	製製	1062	913	105
142. Laguncularia racemosa	507	do	Sugar-Leaf Sound	do	do	0. 7384 0. 7239	國	698 775	634	27

UNITED STATES UNDER TRANSVERSE STRAIN-Continued.

100 150 200 0		DEFLE	CTION,	IN MI	LLIMET	KES, U	NDER	A PRES	SURE,	IN KII	OGRAM	8, OF-		strength:		
11	0	100	150	200		200	250	300	350	400	450	500	550	Ultimate st	Remarks.	-
118	3. 5	13.0	20.0	20. 0	3. 0	30.0	38. 0	56.0	90.0					350	Broke with large splinters	
18.5 21.3	. 0	18.7	22.3	32.5	4.5	35. 0	48.0	67. 0						318	Broke with long splinters	. 1
Section Sect	. 5	13. 0	21.5			*****	*****						*****	188	Broke at knot	. 1
5 18.5 24.6 36.5 4.8 37.0 51.5 .	7	13.5	21.3						*****					180	Specimen cross-grained	
Strate at linets Specimen cross-grained; pulse with one long splitter Specimen cross-grained; split with grain Specimen cross-grained; split	6	21.0	33. 5				*****						,	193	Specimen cross-grained; defective	. 1
1 12.0	5	15. 5	24. 6	36, 5	4.8	37, 0	51.5					*****		266	Specimen cross-grained	
12.8 20.5 0.0 0.	5	15, 6	25, 5											190	Broke at knots	
12.8 20.5 0.0 0.	8	12.0	18.3	26.5	1.5	27.1	35.0	47. 0						341	Specimen cross-grained broke with one long splinter	
18.0 22.5 42.3 5.0 44.0 5.0	2	SPATE.												10000		1
18.0 22.5 42.3 5.0 44.0 5.0		15.0	00.0	00.0			70.0					77	E	001		1
5 12.6 20.0 20.0 20.0 2.1 20.0 38.0 36.0 300 Square break 302 Broke at knots 301 7 10.0 22.0 1.0 20.0 34.0 34.0 263 Broke at knots 307 Specimen cross-grained; split with grain 301 10.0 10.0 20.0 10.0 20.0 34.0 263 Broke at knot 307 Specimen cross-grained; split with grain 301 10.0 10.0 20.0 10.0 34.0 301 Broke at knot 307		- Constitution		62574		100000	58.0	******				******	*****	12100		1
18.	5	20.000			1100000	DOM:	38. 0		The same							
8 11.0 16.6 25.5 21.1 20.0 34.0	5	12. 3			2000	- aratora	1000000	46. 5	1	1/2/2						
8 11.0 16.6 25.5 21.1 20.0 34.0	2	10.7	10.0	99.0	1.0	522.0	20.0	27.0	40.5				200	202	S. L	
8 13.2 20.2 20.0 2.2 30.5 39.2 .	8	Same		wast	1	-	125/1		1//	1	1 6	Right		100		4
5 13.5 21.0 30.3 3.0 32.0 41.0 59.0								0	7							1
8 14.5 22.5 33.0 2.5 34.0		10000000		1000	- ann		1 2 may 2 2 2 2	1000			1000					ч
2 16.5 28.0 39.0 5.0 41.7 57.0 83.0	0	13. 0	21.0	30. 3	3.0	32. 0	41. 0	59, 0				******		307	Broke at knot	1
6	8	14.5	22, 5	33. 0	2, 5	34. 0	10000	*01021						216	do	
1 8.0 11.5 14.6 0.0 14.0 18.5 22.3 28.0 32.5 40.5 51.5 536 Broke with fine splinters 463 46 465 463 465 46	2	16. 5	28.0	39. 0	5. 0	41.7	57. 0	83. 0			4			304	do	
1 8.0 11.5 14.6 0.0 14.0 18.5 22.3 28.0 32.5 40.5 51.5 536 Broke with fine splinters 463 46 465 463 465 46	6	13.8	23.5	34.0	4.8	35.0	44.5	70.0			133	au .		309	Broke at knot with a large enlinter	
5 8.5 12.6 17.0 0.8 17.4 22.0 22.0 36.0 47.5		73,000	-	11032		1000		1/2			Const.			100000		
2 8.0 12.4 17.0 0.7 17.7 23.0 30.0 37.0 57.0			ALC: NO	047-047	1,000,000	Sec. 1		w-A	No.	and the		17		1 2000		4
1 16.0 24.5 36.2 3.4 37.8	2	0.500	102000	- duc-	1000	Towns at		1000	The same	12 ml				Lynn		-
1 14.5 23.5 34.5 4.5 36.2 52.5							20.0	00.0	0	0		PA	T	N		1
5 10.5 16.0 22.5 1.0 23.2 30.2 45.0	1	16.0	24. 5	36.2	3.4	37. 9								222	Sap-wood; split lengthwise without breaking	-
0 9.8 14,5 20.6 0.9 21.0 28.5	1	14. 5	23.5	34. 5	4.5	36. 2	52. 5							283	Sap-wood; crushed and splintered	
5 12.7 20.5 31.0 3.5 32.0 45.0 79.0	5	10.5	16.0	22.5	1.0	23. 2	30. 2	45, 0						331	Long, shattered break	-
0 12, 0 19, 7 29, 0 2, 7 30, 4 42, 0 67, 0		1 hours	330511	1533	1 98	150	COLUMN TO SERVICE SERV		Property and	A CALCOLOR	2000	1000	12.5	HEAR		1
5 12.5 19.0 32.2 3.6 35.0		17000	1933	976	11000	1000	120000	The state of	1131323	Contract of the Contract of th	10000	1000000	2021514	of the second	The second secon	1
2 11.5 17.6 28.7 4.0 31.0		122325	1200	3330	- 1100	10000	42. 0	67. 0	Total St	- Control	The Street		1	1		4
0 9.6 14.6 20.4 1.0 21.2 29.2 286 Crushed at center bearing; broke with one long splinter 262 Broke with long, coarse splinters 263 Crushed at center bearing; broke with one long splinter 262 Broke with long, coarse splinters 263 Crushed at center bearing; shattered 263 Crushed at center bearing; shattered 263 do 2	2	1000000	Harry.	HELENIA.	La Carrie	2000			100000	The same				1 1000		1
0	0	9.6	14.6	20. 4	200.0	Ferris	29, 2	San Car	13200	1				1		1
8 10.0 15.5 23.7 2.4 26.0 40.0	2	9.2	14.7	22.0	1.2	23, 0	36, 0							262	Broke with long, coarse splinters	1
0 6.0 8.4 11.0 0.2 11.0 13.5 17.0 20.0 24.0 28.0 32.2 38.8 558 Broke with coarse splinters	0	11.0	17. 6	25, 0	1.4	25.6	35. 0		*****					282	Crushed at center bearing; shattered	-
0 5.8 8.5 11.5 0.2 11.5 14.5 18.0 21.6 25.7 29.6 472 do .	8	10.0	15. 5	23, 7	2.4	26, 0	40.0							263	do	
0 5.8 8.5 11.5 0.2 11.5 14.5 18.0 21.6 25.7 29.6 472 do .	0	6, 0	8.4	11.0	0.2	11.0	13.5	17. 0	20. 0	24.0	28.0	32. 2	38.3	558	Broke with coarse splinters	
6 8.6 12.7 17.5 9.6 17.5 22.0 28.5 35.0 45.0	0	5.8	8. 5	11.5	0.2	11.5	1000000	Della Contra	1000000							- 1
6 8.6 12.7 17.5 9.6 17.5 22.0 28.5 35.0 45.0	-	1		0.		-						1911	1			-
0 15.4 116 Broke at knot	0	-			- Aleber	a consta	a lattice of the	100 41 500								
	2	0.0	100	11.9	7. 6	11.0	22.0	28, 0	35, 0	45. 0	****	1		450	Spuntered	1
	. 0	15.4	*****	an.										110	Broke at knot	-

FOREST TREES OF NORTH AMERICA.

	f.	12 12				gravity of dried speci-	grain.	COEFFIC		upture.
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific grather the air-dried men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of rupture
MYRTACEÆ.	Total	March Street					-			
144. Engenia buxifolia	1118	Florida	Lost Man's river	A. H. Curtiss	Humus and coral .	1.0635	200	1627	1575	1055
146. Eugenia monticola	1135	do	Umbrella Key	do	Coral	0, 9405	100	1017	1085	1172
148. Engenia procera	1127	do	Miami	do	do	0, 9966		1191	1206	1179
Red Stopper.	1127	do	do	do	do	1.0023		1163	1177	1172
CORNACEÆ.							mm			
451. Cornus florida	67	Missouri	Allenton	G. W. Letterman	Upland	0, 8937		787	814	872
	67	do	do	do	do	0. 8904	即加	787	849	1012
	761	Florida	Chattahoochee	A. H. Curtiss	Calcareous	0.7795		787	794	820
	812	West Virginia	Grafton	C. G. Pringle	Dry	0. 7980	题	787	849	951
	812	do	do	G. W. Letterman	do	0.7947		763	814	886
	1077	Missourido	Allentondo	Marine Sagaran Sagaran	Gravelly	0.8647	מתכש	827 888	849	1015
	1092	do	do	do	Flinty	0.8490		610	957 647	966
	1002					0.0001	ШШ	010	091	710
152. Cornus Nuttallii	960	Oregon	Portland	G. Engelmann and C. S. Sargent.		0.7763	圆	814	976	930
	960	do	do	do		0.7807	쩰	976	1085	1052
153. Nyssa capitata	605	Georgia	Ogeechee river	A. H. Curtiss	Swampy	0. 5739	刨	610	638	694
Ogeechee Lime. Sour Tupelo. Gopher Plum.	605	do	do	MA SAL	do	0. 6170	圆	697	723	668
				TEN IN						
154. Nyssa sylvatica	235	South Carolina	Bonneau's Depot	H. W. Ravenel	Muck	0.5966		687	781	783
Black Gum.	235	do	do	do	do	0. 5735	Щ	888	849	745
	517	Tennesace	Cumberland river	A. Gattinger		0. 5979	PTTTE	814	814	689
	750	Florida	Chattahoochee	A. H. Curtiss	Clay	0.7885		800	849	996
	750	do	do	do	do	0.7936		763	781	952
	813	West Virginia	Grafton	C. G. Pringle		0. 6222	100 m	939	888	783
	813	do	do		70.00	0.6447	E2777	888	1039	899
	833	Massachusetts		J. Robinson	Rich	0.7364		740	769	912
	833	do	dodo	do	do	0.7584	E2000	651	814 713	736
	834	do	do	Mariana San Canada Cara Cara Cara Cara Cara Cara Cara C		0, 7233	E2777	660 814	872	924
	835	do	Chebacco pond			0. 7914	即加	642	651	717
	Coo		Cheoreco ponut				E/2	924	001	
155. Nyssa uniflora	128	South Carolina	Bonneau's Depot	H. W. Ravenel	Swampy	0.6648		542	592	701
Tupelo Gum.	128	do	do	do	do	0.6135		561	564	724
	550	Alabama	Stockton	C. Mohr	Alluvial	0.5455	图	444	471	628
	550	do	do	CONTRACTOR OF THE CONTRACTOR OF THE		0, 5228	图	595	585	687
	604	Georgia	Ogeechee river		Swampy	0, 5739		456	444	635
CIPPIPOTITION	604	do	do	do	do	0.5841	巡	488	444	553
CAPRIFOLIACEÆ.	201	G VA					מחוש			
156. Sambucus glauca:	681	California	Contra Costa county.	G. R. Vasey	Gravelly	0. 5216		348	305	370
159. Vibrroum prunifolium	1102	Kentucky	Mercer county	W. M. Linney	Hudson River	0.8352	6	976	957	729
Black Haw, Stag Bush.	1104	do	do	do	shale. Trenton limestone	0.9034	6	904	1028	1228
STATE OF THE PARTY	739	Georgia	Bainbridge	A. H. Curtiss	Clay	0.8270	圆	708	734	898
RUBIACEÆ.								Alg FI		
160. Exostemma Caribeum	466	Florida	Upper Metacombe Key.	A. H. Curtiss	Coral	0. 9554	蓼	1136	1085	956
BELLINES ENS	466	do	do	do	do	0. 9524	圆	1221	1302	1055

UNITED STATES UNDER TRANSVERSE STRAIN—Continued.

	DEFLE	CTION,	IN MI	LIMET	KRS, U	NDER A	PRESS	URE, I	N KILO	GRAME	, OP—		strength:		1
0	100	150	200	0 (set.)	200	250	300	350	400	450	500	550	Ultimate st transverse p	Remarks.	
				-				111	in the						
. 0	6.2	9. 5	12.5	0.3	13.0	16.5	21.0	26. 0	32.0	43, 5			450	Shattered	1
. 8	9. 0	13.5	18.5	0.7	18.5	23. 5	30. 3	37. 0	46.5	61.5	S.COVERU		500	Splintered	1
							Ou li		E LI	-					L
.1	8.1	12.5	17.0	0. 9	17.9	23. 0	28. 5	36. 0	46. 5	62. 0			503	Specimen cross-grained; splintered	
	0.0	A.M. W	10.0	0.0	- tem	www. T	20.0	30.0	40.0	01. 0	*****		500	Divas with course spinitors	1
1.2	12.0	18. 2	26. 9	2. 2	27. 6	36. 0	50.0	70.0	*****				372	Broke at knot	
1. 2	11.5	17. 0	24.5	2.0	25, 5	32.7	43.1	58. 2	84. 5				432	Maximum deflection, 120 millimeters; broke with large splinters	
1.2	12.3	20.0	29. 0	3. 5	31. 2	40.5	56. 0						350	Broke with large splinters	1
1. 2	11.5	18. 2	26.7	2.2	28. 5	36. 5	52. 0		110.0		7		406	Square break on tension side with large flakes	10
. 4	12.0	18.7	27. 0	2.5	28. 6	39. 0	55, 0	87.0	60.6		1		378	Square break on tension side with long splinters	100
. 5	11.5	16.7	23. 6	1.5	24. 5	32. 0	43. 0	57. 0	81.5				433	Broke with long, coarse splinters	10.
. 0	15. 2	24. 5	35. 3	3.6	37. 0	48.5	76.0	31.0				10	303	Specimen cross-grained; broke with large splinters.	100
							7/4	X						Special cross grantes, when the mig special services	1
. 0	10.0	14.5	20.3	0.9	20, 3	25. 5	32.0	42,5			******		397	Broke with long splinters	1
. 0	9.0	13. 2	17.5	0.4	18, 0	23. 0	29. 0	34.0	43. 0	*****	*****	*****	449	do	-
. 0	15. 3	25. 0	37.3	3. 3	38. 0	52. 0							296	Broke short and split in axis	
. 0	13. 5	20.3	29. 5	2. 2	30. 5	41.0	Mi.						285	Shattered	
1	12.5	19.6	27. 5	1.6	28. 2	37.5	51.0						334	do	
. 5	11, 5	18.0	25. 5	1.5	26.3	34. 7	54. 5						318	do	
. 0	12.0	19.5	28.7	2, 4	29. 5	38. 0							294	Long split at one end	
.1	11.5	17.7	25, 7	2, 0	26. 0	34.0	46.0	63, 0	93. 0				425	Broke into fine splinters	
. 4	12.5	19.0	26. 5	2.0	27.5	37. 0	48.5	74. 0	120.0				406	Deflected 150 millimeters and slipped from the bearing	-
. 2	11.0	16. 2	22.5	0.4	23 0	29, 0	38. 0				617		334	Shattered	100
. 5	9.4	13.5	18.0	0.4	18. 2	22, 0	27.5	35. 0	10			Land of	388	do	16
. 5	12.7	19.7	28, 7	2.3	29.7	38. 0 42. 0	53. 0	84.0	1			-	389	Sap-wood; broke with fine splinters	
.4	13.7	21. 6	32.0	3. 5	33.5	45. 0		95. 0 116. 0			*****		377	-do	
. 0	11.2	17.0	25. 0	2. 2	25. 2	32. 5	44. 0						394	Failed from small splinter on corner	
. 6	15. 0	26.0	38. 5	5. 5	40.6		100.0						306	Crumpled on compression side at knot; square break with fine	
	10.5	00.0	44.0		40.0	00.0				1	N.	100	-	splinters,	
7	16. 5	29. 0	44. 5	7. 2	46. 0	60.0	108. 0	The same of			*****		299	Broke with long splinters	1
.0	20.7	33.0	48.5	8.5	53. 0	82.0			DESTRUCT.		******		268	Shattered at the end	
. 2	16.7	26.7	39. 0	5. 0	40.8	59. 5		1			1		293	do	-
. 7	22.0	36. 5	57.5	11.5	62. 5	108. 0							271	Failed from large splinter on corner	
. 0	22.0	36.5	58. 0	12.2	60. 5					*****			236	do	
									1						1
. 0	32. 0	55. 0	the tex			*****							158	Broke at knot	
. 0	10.2	14.7	20. 6	3.5	21.0	27. 0	34.0	111111					311	do	
. 4	9. 5	14.6	19.7	0.9	21.0	26.0	33, 5	41.0	51.0	68. 5	92. 0		524	Broke at knot with one large splinter	
. 9	13. 3	20, 7	29. 0	3. 0	31, 0	40. 0	53. 0	71.0	*****				383	Shattered	
							I E		130		111				
. 3	9. 0	11.5	15.5	0, 4	15.7	20.0	23.7	28. 0	33. 5	*****			408	Specimen cross-grained; split with grain	
1.0	7.5	11, 4	15. 2	0.5	15. 4	19.0	23. 0	28.5	33. 0	38. 0			450	Broke with fine splinters	

		4					gravity of	grain.	COEFFIC		rpture.
	Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific grather the air-dried men.	Direction of grain.	First deflec- tion.	Second do- flection.	Modulus of rupture
	ERICACEÆ.										
65.	Andromeda ferruginea	1033	Florida	Jacksonville	A. H. Curtiss	Hummock	0. 7273		814	814	68
66.	Arbutus Menziesli	643	California	The second secon	G. R. Vasey	Gravelly	0.7200	圆	740	794	88
		643	do	do	do		0.7000		610	626	8
		679 679	do	Marin county	do	- 10000000	0.7454		970 842	1062 872	10
		-						FITTI	or the same		
57.	Arbutus Xalapensis	683	Arizona	Santa Rita mount- ains.	G. Engelmann and C. S. Sargent.		0.7670	题	651 531	683 549	5
		000		100			0. 1501		1001	549	0
69.	Oxydendrum arboreum	353	Alabama	Cottage Hill	C. Mohr		0, 7386	27777	787	800	4
		353	do	do	,do	do	0, 7501		939	976	9
70.	Kalmia latifolia Laurel. Calico Bush. Spoon	2622	Virginia	Fancy Gap	H. Shriver	Moist	0.7642		651	670	6
	Wood. Ivy.	2628	do	do	do	do	0. 6901		465	500	5
71.	Rhododendron maximum	2631	do	do	do	do	0. 6216	0	651	673	6
		2632	do	do	do	do	0. 6403	0	610	618	6
	SAPOTACEÆ.	100						emm		-	1
0.	Chrysophyllum oliviforme	492	Florida	Bay Biscayne			0. 9663		1136 921	1252 996	12
		7602					0. 5000		321	980	1.4.4
6.	Sideroxylon Mastichodendron Mastic.	461	do	Upper Metacombe Key.	Carlotte Control of Control of Control		0. 9872		976	1149	1
		461	do	do	do	do	0. 9827		976	1050	10
7.	Dipholis salicifolia	488	do	Bay Biscayne			0. 9602	圆	1356	1436	12
		488	do	do			0.9173		1395	1395	11
		500	do	Umbrella Key	do	do	0. 8823		1191	1177	10
8.	Bumelia tenax	746	Georgia	Bainbridge	do	Low	0.7914	圆	751	751	
79.	Bumelia lanuginosa	930	Texas	Austin	C. Mohr	Limestone	0. 5847	蓼	488	496	5
	Gum Elastic. Shittim Wood.	930	do	do	do		0. 5903	蓼	478	432	2
		1083	Missouri	Allenton	G. W. Letterman	do	0.7148	圆	488	522	3
1.	Bumelia lycioides	333	Tennessee	Nashville	A. Gattinger	Alluvial	0.8061	m	697	781	5
32.	Bumelia cuneata	1124	Florida	Boca Chica Key	A. H. Curtiss	Coral	0. 8630	1977	660	603	
	Ants' Wood. Downward Plum. Saffron Plum.	4442			and the second of the second of the		ST ALCOHOLD	EZZ	1000		
13.	Minusops Sieberi Wild Dilly,	458 458	do	Upper Metacombe Key.	do		1. 0786		996	1028 976	8
	EBENACEÆ.	400					1, 0101		909	310	1
34.	Diospyros Virginiana	61	Missouri	Allenton	G. W. Letterman	Rich upland	0.7633	>	814	794	4
	Persimmon.	61	do	do	do	do	0.7362	圆	751	751	8
		425	Tennessee	Nashville	A. Gattinger	Rich loam	0.8716	圆	1395	1837	12
		811	West Virginia	Grafton			0.8176	[]]]	610	622	8
	A STATE OF THE PARTY OF THE PAR	1084	Missouri	Allenton		100 -0	0.8119		610	603 814	9
		1084	do	do		do	0. 8125		751 574	603	8
		1162	do	The second second second			0. 8240	蓼	697	734	8
	STYRACACEÆ.							- Cita	HEVE		
86.	Symplocos tinetoria	347	Alabama	Cottage Hill	C. Mohr	Sandy	0. 5580		610	622	6
87	Halesia diptera	788	Georgia	Bainbridge	A. H. Curtiss	Low	0. 6704	100	642	673	8
	Snow-drop Tree. Silver-bell Tree.	738	1 2	do	The same of the sa				660	697	8

UNITED STATES UNDER TRANSVERSE STRAIN—Continued.

	DEFLI	CTION	, IN MI	LLIME	TRES, U	NDER .	A PRES	SURE,	IN KIL	OGRAM	is of-	1:	strength:		
50	100	150	200	o (set.)	200	250	300	350	400	450	500	550	Ultimate atr transverse pr	Remarks.	
		8							. 8						
6, 0	12.0	18. 5	26. 0	2.0	27. 5	35. 0			111100		******	*****	290	Broke at knot	10
6.6	12.3	19. 5	27. 0	1.8	28.0	35. 0	47.5	62. 5	*****				381	Specimen cross-grained	9
5.0	15. 6	24.0	33. 2	2.8	35. 0 20. 0	44. 5 25. 5	59. 0 32. 5	41.5	53. 0				353 433	Square break	
5.8	11.2	16.3	22. 5	1.0	23. 5	30. 0	38. 2	51. 0					383	Threw off large flakes on tension side	100
7.5	14.3	22.0	31.5	2.5	32. 8	43, 0							294	Large flake on tension side	
9. 1	17.8	29. 0	43. 5	5. 5	46. 0					*****			233	Broke at knot; flake on compression side	1
8. 2	12. 2	19. 0	31. 5			/20010-20					-		200	Specimen cross-grained; splinter started at large knot	
5. 2	10.0	15. 0	21.,0	1. 2	21.5	28. 0	36. 0	47. 0	65. 0				422	Crushed at center bearing; broke with fine splinters	
7.5	14.6	22.4	31. 2	2.6	33. 6	44.5				1			297	Broke at knot	
0.5	19.5	31.0	44. 0	4.8	47. 0				X.,			*****	249	Specimen cross-grained; shattered; long split with grain	
7.5	14.5	22.8	32.5	2.3	33. 5	44.0		V					295	Threw off flake from tension side	
8.0	15. 8	25. 0	34. 2	2.8	35. 5	46. 0	175						270	Broke at knot	
		3100	(a serie		1000000	72000	1	177		1			1		1
. 3	7.8	12.0	16.4	0.0	17.4	21.8	28. 2	35. 0	46.0				404	Specimen cross-grained	
5. 3	9. 8	15. 5	21. 0	1.6	22.0	38, 5	37. 2						328	do	
5. 0	8.5	12.8	17.5	0.6	18.0	24. 0	30, 0	41.0					392	Broke with large splinters	
5. 0	9. 3	13. 6	18.3	0.9	19. 0	23.5	30. 0	38. 0	49.0				436	Broke with coarse splinters	-
3. 6	6.8	10.0	13, 0	0.3	13.7	17.0	20. 0	25. 0	30. 0	37. 0	45.0		539	Broke with long, coarse splinters	
3.5	7. 0	10.6	14. 0	0.3	14.5	18.0	22. 0	27.0	31.5	37. 5	49. 0		500	do	
4.1	8 3	12.3	16, 6	0.4	17.0	21.5	27.0	33, 5	40.0				430	Broke at knot with long, coarse splinters	
ij. <u>5</u>	13.0	20. 0	29.5	2.8	31.5	41.6					4.7.		287	Specimen cross-grained; broke at knot	
0.0	19.7	31.5	46, 0	7.0	49. 2								242	Broke with a large splinter	
0. 2	22.6												113	Broke with large splinter at knot	
0.0	18.7			.,									141	Defective specimen; broke at knot	
7. 0	12.5	19.5	28. 5	2.4	29.7								240	Broke at knot with one large splinter	
7.4	16.2	26.7	40, 6	7.5	43.5			- 1					220	Specimen cross-grained; large flake on compression side	,
			17.50							M.					
5. 2	9.5	14.7	19.7	0.8	20.0	25, 2	32, 0	39. 7 42. 5	48.7				406 373	Specimen cross-grained; broke at knot	
	241.6	10.0	20.2	0.0	21.0	20. 11	00.4	20, 0				******	910	Specimen cross-granicu; mige nako irom compression side	
6. 0	12.3	18.0	26. 2	2.0	28.0	36. 0	51.0						206	Specimen cross-grained; short break on tension side, flake from	1
6. 5	13.0	19.4	29. 0	3. 2	29.7	39, 0	55. 0	*****		*****	*****		349	compression side. Short break on tension side; flake from compression side	
3.5	7.3	11.0	15. 0	0.2	15.0	19. 0	24.2	30. 0	35. 2	43. 0	56. 0	75. 0	550	Broke with fine splinters	-
8.0	16. 2	24.8	35. 3	4.0	37. 9	50.0		111.5	*****	*****			382	do	
8. 5	12.0	19.3	28. 5	2.5	39. 0	52. 5 38. 0	79. 0 52. 0	115. 5 73. 0		*****	******	*****	377	Deflected 170 millimeters before breaking; broke with fine splinters Square break on tension side, large flake on compression side	
8.5	16. 2	26. 0	38.0	5. 2	40. 2	55. 0		135. 0					361	do	1
7. 0	13.3	21. 0	30.4	3. 0	31.8	40.5	58, 0	78.0					377	do	1
8. 0	15.7	25, 6	40.0	5.5	42.0	63. 0			-				264	Specimen cross-grained	-
	day.					Sec.									-
7.6	14.5	23.0	32.0	2.5	33.0	44.0	59. 0	82. 0 96. 5	****		******		376	Shattered at one end	
	24		1000		33.0	10.0	00.0	00.0		Protes.			355	Broke with large splinters	1

	or.			1		avity o	grain.	COEFFIC	ICITY.	cuptur
Species.	Office number	State.	Locality.	Collector.	Soil.	Specific gravity of the air-dried speci- men,	Direction of	First deflec-	Second de- flection.	Modulus of rupture.
OLEACEÆ.							N.		1	
91. Fraxinus pistaciæfelia	660 660	Arizonado	Santa Rita mount- nins.	G. Engelmann and C. S. Sargent.	Lowdo	0, 6633 0, 6995	國	514 698	542 600	66 57
92 Fraxinus Americana	392	Missouri	Allenton	G. W. Letterman .	do	0. 6592	题	1110	1220	92
White Ash.	1141	Michigan	Dansville	W. J. Beal	Clay	0.4983	蓼	542	531	58
	1141	do	do	do	do	0.5469		698	679	- 63
	1148	do	Hudson	do		0. 7535		1061	1163	10
	1144	do	Lansing	do	**************	0.6622	圆	1191	1284	93
	1145	do	Dansville	do	Clay	0, 5920	圆	814	872	74
	130	South Carolina	Bonneau's Depot	H. W. Ravenel	Wet	0. 6914		1191	1284	0
	130	do	do	do	do	0, 6864		1136	1221	91
	212	Virginia	Wytheville	H. Shriver		0. 6569		976	1085	8
	212	do	do	do	G	0. 6524	题	939	1007	9
A STATE OF THE STA	227	Vermontdo	Charlottedo	C. G. Pringle do	Gravelly	0. 6347		814	930	8
	2271	do	do	do	do	0.6613	世別	888	957	8
and the state of t	2272	do	do	do	do	0, 7243	製物	1479	1302	10
	2672	Virginia	Wytheville	H. Shriver		0. 6250	認	904	976	8
	431	Tennessee	Nashville	A. Gattinger	Limestone	0. 6792	物	1191	1221	9
	551	Alabama	Kemper's mill	C. Mohr	Alluvial	0.6417	圆	976	1085	8
	551	do	do	do	do	0.6038	圆	1085	976	7
	747	Georgia	Bainbridge	A. H. Curtiss	River-bottom	0.6512	100	660	642	4
	747	do	do	do	do	0. 6250	蓼	549	564	6
	937	Texas	Austin	C. Mohr	Rich, calcareous	0.7293		697	708	6
	1045	Massachusetts	Reading	J. Robinson		0.7954	IIII	814	957	10
	1045	do	do	do		0.8205	廖	1221	1191	11
Do Thoutan American and Though	no.	Texas.	Dallas PRO	TRANS	Dry, calcareous	0.0104	eum	1000	1000	
92. Fraxinus Americana, var. Texensis.	364	dodo	do	J. Reverchon	do	0.8194		1085	1028	11
	304			do		0.7762	HILL	1163	1135	11
93. Fraxinus pubescens	139	Michigan	Lansing	W. J. Beal	Poor	0.6416		976	1122	10
Title Alone	229	Vermont	Charlotte	C. G. Pringle	Clay	0.7065	圆	720	752	7
	229	do	do	do	do	0.6812	飂	976	976	10
	1059	Massachusetts	Topsfield	J. Robinson	River-bottom	0.6080		407	308	5
94. Fraxinus viridis	57	Missouri	Allenton	G. W. Letterman.	Rich, wet	0.7273	蓼	610	592	8
Green Ash.	308	Texas	Dallas	J. Reverchon	TOWNS THE PARTY OF	0. 5977		610	610	1
	308	do	do	do	do	0. 6522	蓼	888	930	8
	438	Tennessee	Nashville	A. Gattinger	Rich upland	0.7683	國	976	1085	3
St. Jan. Ball. Burn	948	Texas	Victoria	C. Mohr	Rich, wet	0.7813		888	840	1
	948	do	do	do	do	0.8125		904	976	9
	957	do	Matagorda bay	do	do	0, 7022		775	781	9
	957	do	do	do	do	0,7684		1628	1575	11
	957	do	do	do	do	0. 6893	膠	697	729	8
95. Fraxinus platycarpa	536	Alabama	Stockton	do	Rich, alluvial	0. 4759	圆	443	476	
Water Ash.	200	2000	A. Walley	0 m v	70	22 20 10	127771	200	201	1
96. Fraxinus quadrangulata	66	Missouri	Allenton	G. W. Letterman		THE SAME OF STREET	27771	814	787	1
	195	Mishiman	do	do	Charles and the same of the sa	0.8620	(00000)	842	888	1
	125	Michigan	Lansing	W. J. Beal	Rich loam	0.5189	12/	740	751	6

UNITED STATES UNDER TRANSVERSE STRAIN—Continued.

0	W	150		O (set.)	200		300						ltimate strength:	Remarks.	
-									,			0	HE THE		-
	70.0	00.5			-11 **	24.0		The second			0		004		
.5	18.0	29. 5	42.8	5. 2	44. 5 38. 0	64. 0	27.252	ante.	200721			100510	284	Square break on tension side with large flake on compression side do	-
en .			12 0			01.0	00.0	07.0	2000			Anasm	000		
4 0	18, 4	11.5	15.9	6.2	16. 5 50. 6	21. 0	28. 0	37.0			*****		396 250	Broke with coarse splinters	1
.0	14.4	23. 2	35. 5	4.2	39. 0	54. 0				-11			264	Short break on tension side	1
ō	8.4	12.3	17. 0	1.0	17.5	22. 5	30.7	39. 0	56. 5				444	Sap-wood; broke with fine splinters	4
1	7.6	11.5	15. 0	0.4	15. 2	19. 0	24.0	30. 5	41.0				415	Broke with coarse splinters	
0	11.2	17.8	26.3	2. 0	27.5	37. 2	58.0						317	Broke with fine splinters	i
1	7. 6	11.0	16.0	0.3	16.0	20.7	26. 2	33, 2	45. 5				415	Broke with large splinters on tension side	-
3	8. 0	11.4	15.8	0.3	16.0	20.4	26.4	35. 0	47.0		· · · · ·		406	Broke with fine splinters on tension side	100
0	9.0	14. 0	19.0	0.5	19. 5	26, 0	34. 5	50.0	0.4		*****	*****	365	Broke with large splinters on tension side	
2	9.7	14. 6	20.0	1.0	20.3	26. 6	35. 0	50, 0	*****			******	387	do	
5	10. 5	15, 5	22. 0	1.0	22. 0	29. 3	39. 0	60. 0	/		111011	50.571	347	do	
3	7. 5	11.3	15. 2	0.3	15.3	19.3	24.8	30. 2	38, 2	51. 2	T. T. T. C.	******	452	Specimen cross-grained; broke with long splinters	7
	6.4	9.8	13, 0	0.2	13, 0	16.0	19.7	23. 7	29. 0	35. 5	45. 0	59. 0	550	Failed from splinter on corner.	
	10.0	14.2	19.5	0.6	20.7	27. 0	36. 0				130513		350	Square break on tension side with flake on compression side	
	8. 0	12. 2	16, 5	0.5	17.0	21. 2	27, 5	35.0	48. 5			*****	413	Square break with large splinters on tension side	-
	9. 0	13.0	19. 0	1.0	19.5	26. 0	35. 0			100000		****	343	Broke with large splinters on tension side	
5	10.0	14.5	21.5	1.3	22.5	30. 0	42.0		*****	*******			326	do	
4	15. 2	25. 3		*****	****		enther	fafeer	*****			-	177	Specimen cross-grained; broke at knot	
3	17.3	27. 6	39. 2	4.2	41.0	56. 2	-	24-7		*****	*****		296	Broke with large splinters on tension side	
0	13.8	22. 0 15. 2	32, 3 21, 5	3.6	22.0	28. 2	36.5	47.0	65.0		*****	*****	261	Specimen cross-grained; broke at knot	
	8.2	12.8	17.0	0.9	17.5	22.5	29. 0	37. 0	49.5	72.0		*****	470	Broke with fine splinters on tension side	
												PR	0.2		
	9.5	13.0	17.6	0.7	18.3	23. 0	30. 7	39. 5	53.6	79.5	1275	*****	476	Broke with fine splinters	
2	8. 0	13, 0	18, 0	0, 5	18, 4	23.5	30.5	38. 0	46. 0	63, 5	******	in to	484	Broke with fine splinters; buckled on compression side	
	8.7	12.8	17.6	1.0	17.7	22.5	28.5	35. 4	45.7	63. 2			458	Crushed at center bearing; broke with fine splinters	
	13.0	21.5	32. 2	5.0	33. 2	45.5	64.5						333	Broke with large flake on compression side	
	10.0	15, 0	21.0	1.7	21.6	27. 3	35. 4	47. 0		*****			444	Failed from two large splinters on angles of tension side	
	24.5	44. 2	76.0	18.5	81.0	*****	*****	******	*****		*****		248	Square break with large flake on compression side	
	16.5	27. 2	39. 5	5. 8	41.0	56.0	94. 0						348	Broke with small aplinters	
	16, 0	24.5	36.0	3, 5	37. 6	*****	*****	*****	*****	*****	*****		232	Sap-wood; square break, splitting in axis	
and a	10.5	15. 5	21.0	0.8	21.3	27.5		51.0				Darsell I	350	Specimen cross-grained; split in axis	
	9.0	13.5	19.0	1.0	19.5	24.6	32.4	42.0	61.0	*****	*****		410	Broke with fine splinters	
200	10.0	15.0	26. 2	2.4	26.5	35. 0 28. 5	47. 0 38. 0	50.5	90. 0				403	do	
NA NA	12.5	19. 0	26, 1	1.8	26.4	34. 0	45. 5	60.0	20.0				400	do	
,	6. 2	9.4	12.7	0.5	12.9	16.0	21. 0	26.5	32, 5	41.0	vanatru :		503	do	
,	13.4	20. 6	80.0	2. 5	30, 2	41.6	57.0	84. 0	*****				374	Square break on tension side; split in axis	1
	20.5	99 E	59.0	7.0	56.0		1	J.	Li X	12 7 1 7	1	70	900		1
)	20, 5	33. 5	52. 2	7.0	56. 0		*****				100000	******	229	Short break; shattered	1
	12.4	19. 5	27.2	2.0	28. 0	38. 0	52.0	72, 5	*****				406	Broke with fine splinters at small knot on compression side	1
3	11.0	17.0	23. 2	1.4	24.0	31. 2	41. 2						405	do	1
5	13.0	20.2	29.4	2.1	30.5	43.0	*****						289	Split and shattered	1

96. Fraxinus quadrangulata—cont'd 97. Fraxinus Oregana	286 286 291 518 964 964 1001	Kentucky		W. M. Linneydo	Soil,	Specific gravity the air-dried spe	Direction of grain.	First deflec- tion.	Second de- flection.	Modulus of rupture
97. Fraxinus Oregana	286° 291 518 964 964	do	Allenton			0.7989	CTITT		-	M
97. Fraxinus Oregana Oregon Ash.	291 518 964 964	Missouri Tennessee	Allenton	do		THE PLANT OF STREET	Щ	976	1028	110
97. Fraxinus Oregana Oregon Ath.	518 964 964	Tennessee		Marian lay lay	do	0.7914	27775	697	697	71
97. Fraxinus Oregana Oregon Ash.	964 964		Nashville	The same of the sa	Sandy loam	0.6080	E27771	651	697	78
97. Fraxinus Oregana Oregon Ath.	964	Oregon		A. Gattinger	Rich limestone	0.7923		610	651	7
Oregon Ash.	4475044		Portland		Low, wet	0.6182		939	948	8
	1001	do	do	C. S. Sargent.	do	0.6057		842	939	7
		do	Weidler's saw-mill	do		0.6285		888	913	8
	1001	do	do	do		0.6001	圝	740	781	7
	1024	do	Portland Furniture	do		0.4894		478	474	3
	1024	do	Company,	do		0.4832		425	425	3
	1030	do	do	do		0. 6430		1062	1085	7
	1030	do	do	do		0.6419	蓼	1220	1220	7
98. Fraxinus sambucifolia	122	Michigan	Dansville	W. J. Beal	Wet, peaty	0. 5215	m	814	814	6
Black Ash. Hoop Ash. Groun		Illinois	Wankegan	Robert Douglas	Low, wet	0.7371	6	976	1062	9
Ash.	839	Massachusetts	Danvers	J. Robinson	Rich, loamy	0. 7365	圆	888	849	8
	839		do	do	do	0.7575		814	763	8
	000						шп			1
99. Forestiera acuminata	737	Georgia	Bainbridge	A. H. Curtiss		0. 5875	圆	610	592	6
Privet.	737	do	do	do		0.5814		872	814	7
01. Osmanthus Americanus	283	Louisiana	Amite	C. Mohr	Rich, alluvial	0.8762	圆	1221	1328	12
Devil Wood.	283	do	do	do	do	0, 8455	圆	1062	1221	10
	584	Florida	Saint John's river		Sandy loam	0. 7330	蓼	1085	1136	9
BORRAGINACEÆ.			The same of the sa				520	APRIL ST		
04. Bourreria Havanensis	1137	do	Key Largo	do	Coral	0.7984	圆	888	996	9
	0.00	market	New Braunfels	C. Mohr	Rich, alluvial	0. 6649	2000	425	397	7
05. Ehretia elliptica	942	Texas	New Braumeis	G. Monr	Aich, andviat	0.0043	EZA	120		1
BIGNONIACEÆ.			TETT				27770			
06. Catalpa bignonioides	540	Alabama	Stockton	do	Low, wet	0, 4816	巡	669	697	
Catalpa. Catawba. Bean Tre Cigar Tree. Indian Bean.	744	Georgia	Bainbridge	A. H. Curtiss	Clay	0.4413	巡	574	610	5
	744	do	do	do	do	0.4352	Щ	567	531	4
	744	do	do	do	do	0.4585	劉	814	888	
	38	Missouri	Charleston	C. S. Sargent	Wet clay	0. 4915	Im	787	849	1
Western Catalpa.			do			0. 4915	酆	763	794	
	38	do				W. Merce	122			100
208. Chilopsis saligna	682	Arizona	Tuscon		Moist, gravelly	0. 6193	巡	514	514	4
Desert Willow.	682	do	do	C. S. Sargent.	do	0.5716	2	555	574	6
VERBENACEÆ.					Compl	1 0000	2001	1189	1177	,
10. Citharexylum villosum	1	Florida	Bay Biscayne			1. 0323		1163	200000	
NYCTAGINACEÆ.	490	do	do	do	do	1.0360		1320	1338	11
12. Pisonia obtusata Pigeon Wood. Beef Wood. Co Wood. Pork Wood.	rk 474	do	Upper Metacombe Key.	do	do	0. 6884		465	465	1
POLYGONACEÆ.		Am sa San		DEBNIE SE	PARAMETER		-	UK	T. Aust	
13. Coccoloba Floridana	473	do	do	do	TOTAL AND DECEMBER OF THE PARTY.	0.9718	<u></u>	1163	1221	1
Pigeon Plum. LAURACEÆ.	473	do	do	do	do	0.9752		1017	1050	1
	585	do	Saint John's river	do	Sandy loam	0.6427	圆	814	864	
215. Persea Carolinensis	585	A COLUMN TO SECURITA DE COMO	do		do	0.6489	蓼	814	814	
			Mobile county		Damp, sandy	0. 6216	חתק	814	839	

UNITED STATES UNDER TRANSVERSE STRAIN-Continued.

	DEVLE	CTION,	IN MII	LIMET	ers, u	NDER A	PRES	SURE,	in kil	OGRAM	s, of-		strength:		V
50	100	150	200	G (set.)	200	250	300	350	400	450	500	550	Ultimate st transverse p	Remarks.	The second of the second
5. 0	9. 5	14.3	19, 3	0.6	20.0	25, 0	31.2	38. 0	47. 0	61.0			471	Specimen cross-grained; split	1
7. ()	14.0	21.0	20, 6	2.7	32.0	44.2	66.0			*****			305	Failed at knot	100
7.5	14.0	21.4	30.6	2.3	32. 0	41.0	59.0	-	*****	*****			313	Broke with coarse splinters; shattered	1000
8.0	15 0	23. 4	33.0	3. 5	35. 0	46.5	66.5		++**				812	Shattered	1 19
5.2	10.2	15.0	20 8	0.7	21.5	28.0	30.0				*****		350	Square break on tension side with split in axis	1
3, 8	10.4	16.0	22.0	0.9	22, 5	80. 0	41.0	351770		120.55			323	Shattered	
5.5	10.7	16.2	21, 6	0.5	22.5	28.0	26.0	111111		*****	*****		343	Specimen cross-grained; square break on tension side, flake on compression side.	1
6.0	12.5	18.7	25.7	1.0	26, 0	34.0	45, 5	0.5500	*****		*****		311	Specimen cross-grained	1
0.2	20.6	******	ration:	wind:			12000		*****		*****	*****	149	do	1
1.5	23, 0	roates.	P. T. P. S. S.				*****	5130-25	*****	,,,,,,	*****	*****	150	Specimen cross-grained; flake on tension side	1
4.6	9.0	13.0	18.0	0.6	18.5	23, 5	30, 2	*****		*****	******		315	Specimen cross-grained; hreak started at knot	10
4. 0	8, 0	12, 5	17.0	0;4	17.3	21.8	*****	10000	*****	3.4.	*****	*****	327	60	1
6. 0	12.0	19.0	20.5	1.0	28.7	39. 0		4					261	Square break on tension side with coarse splinters	
5. 0	0.2	14.0	20. 6	1.7	21.0	28.0	36.0	49.0	74.0		*****		417	Square break with two large splinters	1
5. 5	11.5	18.0	26.0	2.5	27.5	35.7	58. 0	81.5	/			****	250	Square break on tension side with coarse splinters	
6, 0	12.8	22, 0	31, 2	0.9	34.0	48.0	71.0	3=40/0			13.10		346	do	
8. 0	16.5	26.5	38.7	4.5	42.0	61.0	25	1/1/-					208	Square break on tension side; shattered	
5. 6	12.0	18.0	27. 0	2.0	28. 2	38. 0	04.5						313	.do	I
															ı
4.0	7. 3	11.2	15. 3	0.4	17.7	20, 0	24.5	31.0	The state of the s	48.0	60.5	100000	513	Square break on tension side, splitting in the axis with fine splinters.	H
4.6	8.0	12.7	17.8	1.0	18.0	28.5	30.0	37.0	48.0	*****	*****	127722	433	Sap-wood; specimen cross-grained; broke with long splinters	ı
4.5	8.6	13.0	18.0	1.0	18. 2	23.5	30.0	39. 5	55. 0		****	-	400	do	
5. 5	9.8	14.6	19.8	0.5	20.0	25. 0	32.0	40.0	50. 0	1		De l	403	Specimen cross-grained; splintered	1
0.0	0.0	44,0	10.0	0.3	20.0	20.0	33.0	10.0	30.0				100	Specifical cross-granted, spiniteded	I
1.5	24.6	36.0	53. 0	6, 9	56. 0	77.5	131.0	June			775		308	Specimen cross-grained; square break on tension side; split in axis.	
				Ship!					10%			PR			
7.8	14.0	21.5	31.0	2.4	32. 5	44.0							291	Broke with coarse splinters	
8.5	16, 0	26.0	37. 6	4.5	41.0	10000					*****		223	Crushed at center bearing; broke with coarse splinters	
8.11	18.4	31, 0	63, 0	17. 5	(****								200	do	
6. 0	11.0	18.0	25, 2	1.4	26.0	35, 0							295	do	1
6. 2	11.5	17.0	23.5	1.2	24.3	88. 2	W. T.	191	1	1			287	Crushed at center bearing; splintered.	B
6.4	12, 3	20.4	30. 0	2.6	30.7	53. 0	theres.	10,5010	7.17.010		1177.53	U	254	do	ı
	2500			-7.0	000	200.0	17/337	10/4					/		ı
9, 5	19, 0	31. 6	50.5	6.0		District.	History	2117221			*****		200	Splintered on corner	ľ
8.8	17.0	26.0	37. 0	3.0	38.0	54.0	*****			*****		*****	294	Specimen cross-grained	ı
4,2	8.3	12.5	17.5	0.7	18.0	23, 0	*****						300	Specimen cross-grained; broke at knots	
3, 7	7.3	11.4	15, 0	0.4	15, 7	20.0	25, 0	30. 0	37. 0	46.0			499	Broke with fine splinters	
0.5	21.0							- Carrier					127	Specimen cross-grained; failed from large splinters on corner	
0.0													Late	Specimen cross-graneu; raieu from raige spiniters on corner	l
							1 74			16		100			
4.2	8.0	12.4	16.8	0.4	17.5	21.5	26.5	32.0					400	Shattered; large flakes on tension side	
4.8	9. 3	13. 5	10.0	8.0	18.7	24. 0	31.0	80.0	in the		12	1261-10	383	Broke with coarse splinters	
											The Party		-		
6.0	11.3	18.0	24. 3	1.0	25. 0	31.0	40.0	50.0	******				393	Shattered	
6.0	12.0	17. 6	24. 3	1.2	24, 2	30.2	40, 0	51.0	10.000				377	do	
6.0	11.5	16.6	23. 6	1.3	24.0	32.0	42.0	57. 5		1	Land.		350	Broke with coarse splinters	10

						gravity of	grain.	COEFFIC		upture.
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific gra- the air-drie men.	Direction of	First deflec-	Second de- flection.	Modulus of rupture
217. Sassafras officinale	71	Missouri	Allenton	G. W. Letterman	Low, rich	0.5280	mi	567	561	886
Sassafras.	71	do	do	do	do	0.4569		574	626	708
	387	do	do	do	Alluvial	0.4546	寥	443	465	361
	387	do	do	do	do	0.4818	寥	610	651	703
	446	Tennessee	Nashville	A. Gattinger	Rich	0.4824	寥	651	673	658
	814	West Virginia	Grafton	C. G. Pringle		0.5849	圆	567	542	600
	814	do	do	do		0.5828	圆	488	501	673
	854	Massachusetts	Danvers	J. Robinson	Rich loam	0, 4829	圆	348	337	36
	854	do ,	do	do	do	0.5034	圆	325	315	46
218. Umbellularia Californica	703	Oregon	Coos bay	G. Engelmann and		0.6813	即加	1085	1149	937
Mountain Laurel, Catifornia Lau- rel, Spice Tree, Caginut, Califor-	703	do	do	C. S. Sargent.		0. 6755	即加	888	986	671
nia Olive. California Bay Tree.	1210					25,710,000	E			10000
EUPHORBIACEÆ.		160		TY ON	Vest to the					
219. Drypetes crocea	468	Florida	Upper Metacombe Key.	A. H. Curtiss	Coral	0.9304	圆	976	1039	79
219. Drypotes crocea, var. latifolia	459	do		do	do	0. 9391	認加	842	872	590
and and them are properly only amount and	459	đơ	do	and the second second		0. 9218	1000	751	800	821
URTICACEZE.	181341			Constitution of the consti		0.0210	122	101	000	10.55
222. Ulmus crassifolia	324	Texas	Dallas	J. Reverehon	Rich loam	0. 6706	>	751	781	80
Ceaur Lim.	324	do	do	do	do	0.7348	廖	814	888	78
	929	do	Austin	C. Mohr	do	0, 8375	廖	626	610	78
	929	do	do	do	do	0.8682	國	519	531	76
non Tillian Artis	nor	77		W		0 2000	CITT	000	000	1000
223. Ulmus fulva	361	Kentucky	Mercer county	W. M. Linney		0.5875	POUR	976	976	78
Etm.	134	Missouri	Allenton	G. W. Letterman.		0.7200	9777	888	930	93
	134	do	da			0. 6933		1017	1062	93
	369	Vermont	Charlotte	C. G. Pringle	Gravelly	0. 6767	1	814	939	97
	429	Tennessee	Nashville	A. Gattinger	Clay	0.6821	製	814	857	7
224. Ulmus Americana	10	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	0. 6920	廖	976	976	98
White Elm. American Elm. Water Elm.	10	do	do	do	do	0.7080		921	939	105
	281	Missouri	Allenton	G. W. Letterman	Alluvial	0. 6477	题	718	718	75
	958	Texas	Colorado river	C. Mohr	Alluvial	0, 6596	100	751	800	83
	958	do	do	do	do	0, 6168	m	729	835	89
	1036	Massachusetts	Danvers	J. Robinson	Gravelly	0, 7370	刨	400	391	57
	1036	do	do	do	do	0, 7359	蓼	542	514	64
	1049	do	North Reading	do	do	0.7660	物	828	849	101
	1049	do	do	do	do	0.7159	100	814	857	95
225. Ulmus racemosa	1161	Michigan	Dansville	W. T. Bool	do	A CERO	971	1100	1100	200
Rock Elm. Cork Elm. Hickory			Annual Control of the			0, 8562	2771	1136	1190	136
Elm. White Elm. Cliff Elm.	1162		Big Rapids		-	0.6245	E2777	814	921	88
	1162		do		100	0. 6839		1136	1221	105
	1165		Hudson		- marine	0.7461	100	996	1073	100
	314	do	Hersey	100	Rich loam	0.7677		1220	1302	116
	314	do	do	COLUMN TO THE REAL PROPERTY OF THE PERTY OF	District Co.	0. 7466	9777	1163	1268	103
	428	Tennessee	Nashville	A. Gattinger	do	0.7442	製	651	697	86
226. Ulmus alata	133	South Carolina	Bonneau's Depot	H. W. Ravenel	do	0, 8768		452	479	74
wante. wayea Lim.	380	Tennessee	Davidson county	A. Gattinger	Loam	0.6615	I	574	568	70
	533	Mississippi	Kemper's Mill	C. Mohr	Alluvial	0.8243	圆	610	651	82
	533	do	do	do	do	0.7883	刨	697	687	90

UNITED STATES UNDER TRANSVERSE STRAIN-Continued.

, A	DEFLI	ECTION	IN MI	LLIMET	ers, u	NDER .	A PRES	SURE,	IN KILO	GRAME	s, or—		strength; e pressure.		
50	100	150	200	(set.)	200	250	300	350	400	450	500	550	Ultimate st transverse j	Remarks.	
8, 6	17. 4	28. 0	40.7	4.5	44.0	66. 0							378	Broke short and split	
3. 5	15. 6	23.4	33.8	2.7	35, 5	47.5	80.0						302	Broke with fine splinters	
. 0	21.0	35. 5	*****		*****	1555.01	*****						154	Shattered	
3. 0	15, 0	23. 2	34. 0	3.1	36. 0	*****	*****	000000	*****	******	*****	******	300	do	I
7.5	14.5	22.0	32, 5	2.0	34.0	47.0	*****	SALES OF	122001	*****	entre:	100000	281	Coarse splinters	ľ
0.0	18.0	29, 6	45.0	6.2	46. 0	74. 0 63. 0	700000	*****	*****	355505	******	*****	287	Shattereddo	
4.0	29. 0	47. 0	T400 W		200. 4	50.0		111000	155565		100000		157	Square break on tension side with large flake on compression side.	
5. 0	31.0	52. 0											198	do	
	1517.00	- TENA				1.5			Laren	7	10	III III	1000		ı
4.5	8,5	12.5	17.0	0.6	18.0	22. 5	29.5	37. 0			7.50		400	Specimen cross-grained; split	1
5. 5	9, 9	15.7	21.0	1.1	21.5	27.5					1		288		
		100						1//	50	07				X6/	
5. 0	9.4	14.6	20, 0	1.5	20, 6	26. 0	33. 6						840	Shattered	
5. 8	11, 2	17.3	24. 5	1.6	25.0	32.5	1//	V	1/				252	Sap-wood; shattered	1
6.5	12. 2	19.6	27. 2	2.0	27. 5	36. 5	46, 5	61.0				*****	852	Specimen cross-grained; sap-wood; shattered	
164 10	10.0	200	20.2			100. 11	40.0	177	1		P.	20022	000	Exponential attention of authority and an activities	1
8. 5	12.5	20. 0	29. 0	2. 2	30.0	42, 0	56.0	1-4					345	Broke with coarse aplinters	1
5, 0	11.0	16.8	23. 5	1.3	24. 5	31.0	39. 2	+				-	313	Short break on tension side	1
7.8	16.0	27.5	40.5	6.0	42.0	57. 0	84. 0	*****					336	Sap-wood; shattered	1
9. 4	18. 2	31.0	44. 0	6.5	47. 0	65. 0	97. 0						325	do	1
5. 0	10.0	15. 2	23. 3	1.7	23. 6	30.5	47.0		*****				334	Crushed at center bearing; bent and splintered without breaking.	1
5. 5	10.5	16. 0	22.8	1.6	23. 5	31. 5	43. 0	59, 2	112. 0				400	do	
4.8	9. 2	14.0	20.0	1.0	20.8	27. 0	36, 0	51. 2	86. 0		*****		400	do'	1
6. 0	10.4	15. 5	20. 3	1.0	20.3	26. 9	35. 0	47.5	60. 0	,			415	Thin scale on tension side	1
6. 0	11.4	17. 0	24. 2	1.2	25, 2	32. 6	50.0						304	Broke with coarse splinters; started at knot	1
5. 0	10.0	15, 0	20.8	1.0	21.3	26.5	35, 0	45, 8	64.0			PR	422	0.5 sap-wood; splintered on corners.	ı
5. 3	10.4	14.7	20.4	0.5	21.0	27. 0	34. 7	45.7	60. 0	100	1		448	do	1
6.8	13. 6	21. 2	31.0	3.1	31.0	41.0	60. 0	200.0	260.0	1000	100	-	339	Broke with coarse splinters,	
6.8	13: 0	21.0	30.0	3.0	31. 0	41.8	61. 5						344	do	
6. 5	12.2	19.5	28. 0	3.0	29.0	40.0	56. 6						847	Broke with fine splinters	1
6.7	11.7	17.0	25, 0	2.2	25. 6	34. 5	47.7	69.5					382	Square break on tension side, splitting in axis	ı
2. 2	25. 0	41.5	69. 2	14.4	73. 0								245	Specimen cross-grained	
9. 0	19.0	31.0	46. 2	6, 2	49, 2	71. 3							277	Broke with fine splinters	
5. 9	11.5	17. 5	25, 5	2.0	26. 2	33. 2	45. 6	63. 0	98. 2		******		431	do	
6.0	11.4	17.5	24.0	1.9	24.0	31. 5	44.0	60.0		*****			394	Buckled on compression side; fine splinters	
4.3	8.2	12.0	16.7	0.5	17. 0	22. 0	26. 5	34.0	40.8	49.0	64. 0	85. 0	581	Broke with fine splinters.	
6. 0	10.6	16. 1	22. 0	0.6	23. 0	29. 0	38.5	53. 5	1 30	20.0	OE.U	00.0	378	Crushed at center bearing; broke with fine splinters	н
4.3	8.0	12. 2	16. 5	0.4	16.7	21. 0	26. 5	34.0		65. 0	and the same of		450	Broke with fine splinters	1
4. 9	9.1	13.7	18. 2	0.7	18. 4	23. 0	30. 0	38. 0	=0.0	67. 0	No.		467	do	1
4.0	7.5	11.0	14. 9	0. 5	15.0	19.0	24.0	29. 4	10000	52. 0	1		497	do	ж
4.2	7.7	11.7	15.8	0.5	16. 0	20, 3	26, 0	32.0	3500		1		442	do	1
7.5	14.0	22.4	33, 2	3, 5	35. 0	45. 0	64. 0	The same	1,27(5)			1	371	do	1
	00.1	00.0	40.00	-	1400	0.1		111111					U Sport		1
0.8	20.4	32. 0	45.6	5.5	or or other trans	64. 5			1				318	Sap-wood; failed at knot	ц.
8.5	17. 2	28. 8	43. 5	7. 2		59, 3 48, 0							300	0.75 heart-wood; splintered at corners	Ŧ
8.0	15. 6	23. 7	34. 0	3. 0	00.0	40.0	64.0	96. 0	*****		*****	*****	350	Broke with coarse splinters	1

	#					gravity of	of grain.	CORFFIC		apture.
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific grather the air-dried	Direction of	First defloc- tion.	Second de- flection.	Modulus of rupture
227. Planera aquatica	758	Florida	Chattahoochee	A. H. Curtiss	Rich, alluvial	0.5761	圆	509	488	574
	758	do	do	do	do	0. 5926		697	751	820
	918	do	do	C. Mohr	do	0.5113	圆	407	415	469
228. Celtis occidentalis	75	Missouri	Allenton	G. W. Letterman .	Low, rich	0, 5887	min	610	665	712
Sugarberry. Hackberry.	75	do	do	do	Alluvial	0. 6023	H	787	849	808
	306	Texas	Dallas	J. Reverchon		0.7239	题	555	552	738
	306	do	do	do	do	0.7558	覅	478	528	755
	806	do	do	do	do	0.7706		751	697	846
	873	Massachusetts	Salem	J. Robinson	Loam	0.7727	m	542	564	771
	873	do	do	do	do	0.7920		626	610	762
	1111	Missouri	Saint Louis	Henry Eggert	Moist loam	0.7613	圆	787	763	891
	1111	do	do	do	do	0.7154	圆	976	939	820
228, Celtis occidentalis, var. reticulata	652	Arizona	Santa Rita mount-	G. Engelmann and	Dry	0.7920	IIIII	669	651	586
Hackberry. Palo Blanco.	652	do	ains.	C. S. Sargent.	do	0.7882	翻	976	1085	1024
					0		E23		100000	
229. Ficus aurea	486	Florida	Bay Biscayne	A. H. Curtiss	Coral	0. 3215		317	257	278
	486	do	do	do	do	0.3061	巡	222	*******	199
231. Ficus pedunculata. Wild Fig. India-rubber Tree.	508	do	Boca Chica Key	do	do	0. 5085	圆	407	10310.000	230
232. Morus rubra	132	Missouri	Allenton	G. W. Letterman.	Rich loam	0.6876	圆	1039	1062	937
acon accorder by	132	do	do	do	do	0.6784		814	904	848
	1244	do	do	do	Upland	0.6516		939	888	766
	1245	do	do	do	do	0. 6506		718	814	738
	1246	The state of the s	do	do	do	0. 6312		697	723	696
	1255	do	do	do,,	Rich	0. 6875		751	697	745
	1255	do	do	do	do	0.6646	巡	634	678	698
234. Maclura aurantiaca	253	Texas	Dallas	J. Reverchon	Bottom	0.8011	圆	857	930	1111
PLATANACEÆ.	253	do	do	do	do	0.7927		939	957	1150
235. Platanus occidentalis	21	Massachusatta	Arnold Arboretum .	C. S. Sargent	Drift	0. 5724	型加	407	454	468
Sycamore. Button Wood. But- ton-ball Tree. Water Beech.	126	Missouri	Allenton	G. W. Letterman		0. 6125		888	976	792
	126		do	The second second	do	0. 6295	题	1136	1190	642
	-5						WITTER .			-11
236. Platanus racemosa	686	California	Carmel river			0.5170		626	622	586
	686	do	do	do	do	0.4812	Ш	595	626	537
237. Platanus Wrightii	648	Arizona	Santa Rita mount-		Rich, gravelly	0. 5170	圆	407	425	468
JUGLANDACEÆ.	648	do	do	C. S. Sargent.	do	0. 5369	蓼	531	488	387
238, Juglans cinerea	16	Massachusetts	Arnold Arboretum.	C. S. Sargent	Drift	0. 4829	11111	634	651	368
Butternut. White Walnut.	16	do	do		do	0. 4579		763	787	668
	76	Missouri	Allenton		Moist, alluvial	0. 4818	一一	814	888	687
	76	do	do			0. 4375	圆	976	1017	649
	762	do	do	do	Rich, moist up-	0. 4943	圆	1136	1221	696
	123	Michigan	Dansville	W. J. Beal	land. Gravelly clay	0.3864	蓼	697	697	560
	393	Michigan	Lansing	do	Gravelly loam	0. 3205	蓼	488	424	328
	1057	Massachusetts	Topsfield	J. Robinson	Drift	0. 5284		814	814	818
239. Juglans nigra	112	Missouri	Allepton	G. W. Letterman	Alluvial	0, 5852	即加	964	1039	1029
Black Walnut.	117	Michigan	Dansville		Gravelly	0.5852	题	904	976	766
	149	Illinois	Waukegan	Robert Douglas	Carlo broad to	0. 6031	蓼	872	976	726
							1		1	100

THE WOODS OF THE UNITED STATES.

UNITED STATES UNDER TRANSVERSE STRAIN-Continued.

	DEFLE	CTION,	IN MII	A.IMETI	ers, un	DER A	PRES	SURE, 1	N KILO	GRAM	8, OF—		strength: e pressure.		
50	100	150	200	O (set.)	200	250	300	350	400	450	500	550	Ultimate str transverse pr	Remarks.	
0. 6	20, 0	33. 5	48.5	6.0	49. 6								245	Sap-wood; broke through knot	100
7. 0	13. 0	19. 9	27. 3	1.7	29.5	37, 2	51.0	80, 0				*****	350	Specimen cross-grained	
2.0	23.5	39. 0	Horn	No.								*****	260	Broke with large splinters; shattered	1
8. 0	14.7	23, 0	33. 0	3. 0	34.4	45.5	78. 0					*****	304	Breke with coarse splinters	
6, 2	11.5	17. 5	25. 3	1. 9	25, 0	33.5	48.0						345	Failed by bending; fine splinters	
8.8	17.7	27.5	40. 5	4.5	41.5	56. 0	82. 0	*****				*****	315	Specimen cross-grained; splinters on corners at knots	
0.2	18.5	29. 5	42.7	5, 5	44.5	60.0	87.0	*****		*****	*****		322	Broke with large splinters	I
6, 5	14.0	21.5	30.0	2.5	32.0	42.0	57. 5	87.0				*****	261	Broke with large scale	
9, 0	17.3	29.0	42.0	5.7	44.0	58.8	91. 6						329	Square break on tension side with coarse splinters	1
7.8	16. 0	25. 2	37. 6	4.8	39. 0	53.0	82.5	*****					325	Broke with coarse splinters	1
6, 2	12.8	20. 0	28, 0	2, 3	29. 0	37. 3	51.0	74.0		*****			380	Shaftered; large, coarse splinters	
5.0	10.4	10.0	21.7	1.1	22.3	30. 0	38, 2	virgi.		1-1			350	Broke at knot; coarse splinters	
7.3	15.0	25. 0	37. 0	5.3	38.0			///	R	,			250	Specimen cross-grained; split with grain	
5.0	9.0	14.3	20.0	1.5	20. 2	26. 5	35, 4	50. 0	70.5				437	Specimen cross-grained; broke with large splinters	1
								2/				000	5	Called the second of the secon	H
5.4	38.0	274141				/	1	14/1/	-		5		119	Square break	П
22, 0				170101			-	100000					85	do	1
2, 0		200.00	(21)21	14177	14999								98	Specimen cross-grained; split with grain	-
4.7	9. 2	14,0	20. 5	1.3	20.7	28. 0	40, 0	55. 0		18/	H.		400	Broke with coarse splinters	
6.0	10.8	16.4	23, 0	1.0	23. 5	31.0	43.0	61.0					362	- do	
5. 2	11.0	15, 8	22. 6	2,0	23. 5	32.3	46.0						327	Broke with thin flakes	
6, 8	12.0	18.5	26. 0	2, 3	27. 0	38.2	57. 0						315	Failed from splinters on the corner	
7.0	13. 5	20. 0	29, 0	2.6	30, 3	42.0				No.			297	Falled from thin scales on tension side	
6.5	14.0	21.4	82. 4	2.6	32. 2	43. 2	70.0						318	Broke with large splinters	
7.7	14.4	22.2	32. 5	3. 0	33, 5	44.3		0	·	177773			298	do	-
		25.5							100		17	PR	051		ı
5.7	10.5	15.2	20. 2	0.7	20.6	27.0	31.5	- June	47. 0	56. 4			474	Broke with fine splinters	
5. 2	10. 2	15. 2	20.4	0.4	21.0	26.4	32. 0	38, 5	47.8	58.0		1+124	491	do	1
2.0	23, 0	38. 0	55. 7	9, 2			*****				TORRES	22122	200	Specimen cross-grained; split with grain	-
5, 5	10.0	14.5	19.6	1.0	20.8	25, 0	33.0						338	Square break with coarse splinters	-
4. 3	8, 2	12, 3	17.0	0.6	17. 5	22. 6							274	do	-
7.8	15.7	24. 4	36.8	3.5	20.0	63, 0			-	2			250	Broke with fine splinters	
8. 2	15. 6	24. 6	39, 0	4.9	38, 3	00, 0	******			1 - 1			229	Broke with thin flakes from tension side	
0. 2	10.0	21.0	30, 0	4.0	41.0						1		220	arose with the same and the same same same same same same same sam	1
2, 0	23. 0	38.7	14,000	-	*****			*****					200	Specimen cross-grained; split with grain	м
9. 1	20.0	34. 2		10000							*****		165	Specimen cross-grained	1
7.7	15.0	23. 0	lv	1					1				157	Specimen cross-grained; broke at small knots	
6.4	12.4	19.0	27.5	2, 0	28.0	38. 2				1000			285	Square break on tension side; split in axis	ч
6.0	11.0	10.8	22.8	0.9	24.0	31. 7					100000		293	do	
5.0	9.6	14.5	20.3	0.6	21.0	28. 4					100		277	Crushed at center bearing; broke with long splinters	
4.3	8.0	12.4	17.0	0.9	18.0	24. 3							297	Crushed at center bearing; broke with fine splinters	ш
7.0	14.0	18.5	27.0	2.0	29. 0	****							239	Square break	
10. 0	23. 0					100000							140	do	
6. 0	12.0	17.7	24.0	1.0	24.0	31.0	40.0		*****				349	Square break on tension side, splitting in axis; shattered	-
5.4	0.1	14.0	70.0	0.0	10.0	94.6	90 5	08.0	11.0	No.			439	Specimen cross-grained; shattered	
	0.4	14.0	10.0	0.3	19. 2	24.0	20.5	35, 6	44.0				327	dodo	
5. 4	10.0	14.8	20.4	0.0	201. 1)	25. 5	32, 3		77700				041		41

	er.			11.7		vity o	grain.	COEFFIC	ICITY.	rupture
Species.	Office number	State.	Locality.	Collector.	Soil.	Specific gravity of the air-dried speci- men.	Direction of	First defice- tion.	Second de- flection.	Modulus of rupture
39. Juglans nigra—continued	318	Michigan	Lansing	W. J. Beal	Loam	0, 6619	1 1 1 1 1	976	976	58
o. bugunis ingra	325	Texas	Dallas	J. Reverchon	Alluvial	0, 6455	刨	976	930	66
	407		Charlestown Navy-	S. H. Pook		0, 5981	刨	976	1136	9:
	430	Tennessee	yard. Nashville	A. Gattinger	Limestone	0, 5724	咖	857	921	8
	766	Florida	Aspalaga	A. H. Curtiss	Clay	0. 6933	即加	1221	1221	8
	766	do	do	do	do	0. 6949	200	1627	1627	11
The state of the state of the state of							即加			1.7 263
	951	Техая	New Braunfels	C. Mohr	Moist, calcareous .	0.7483	题	1221	1191	1
	951	do	do	do	do	0. 7386		939	1017	3
0. Juglans rupestris	415	New Mexico	Pines Altes mount-	E. L. Greene	Alluvial	0.6125	圆	697	688	4
Walnut.	415	do	ains.	do	do	0.7297	m	660	679	1
	672	California	Contra Costa county	G. R. Vasev	do	0.5977	蓼	775	842	1
	672	do	do	do	to a to be a second of the second	0, 6063	蓼	626	697	100
	0.000						153			1
II. Carya olivæformis	322	Mississippi	Greenville	C. Mohr	do	0.7444		642	651	13
recun. Immos wat.	322	do	do	do	do	0.7489	劉	904	976	1
	326	Texas	Dallas	J. Reverchon	do	0.7181	圆	470	496	1
	326	do	do	do	do	0. 6250	圆	542	542	1
	1 /1			3						
12. Carya alba	3	Massachusetts	Arnold Arboretum .	C. S. Sargent		0.8295	Ш	1395	1356	13
Hickory.	3	do	do	do	do	0.7955		1320	1356	1
	291	Kentucky	Danville	W. M. Linney	Shale	0.9716	圆	1163	1220	1
	1182	Michigan	Hudson	W. J. Beal	Clay	0.8085		1356	1395	1
	1183	do	Lansing	do	do	0.8035	廖	1575	1550	1
	152	Missouri	Allenton	G. W. Letterman	Rich upland	0.8217	mi	1627	1627	1
	249	Virginia	Wytheville	H. Shriver	Clay	0.8108	蓼	1221	1191	1
	249	do	do	do	do	0.8041		1085	1163	1
	249	do	do	do	do	0.8163	iiiii	1221	1320	1
	531	Mississippi	Kemper's mill	C. Mohr	Alluvial	0, 8835		1320	1479	1
	531	do	1. do	do	do	0, 8829	初加	1356	1395	1
	531	do	do L. J.	do	do	0. 8746	初加	1526	1601	1
	539	do	do	do	do	0. 9148	5777	1285	1526	1
	Daniel S	-1	do	do		100000000000000000000000000000000000000	1000	-1000000	1.500.000	
	539	do		107 N. C.	do	0.7698		1479	1575	1
	816	West Virginia		C. G. Pringle		0.7569	Щ	1526	1627	1
	816	do	100 4000	do	do	0.7947		1628	1628	1
	1056	Massachusetts		J. Robinson		0. 8014		800	976	1
	1056	do	do	do	do	0.8439	Ш	888	921	1
	1097	Missouri	Allenton	G. W. Letterman	Altuvial	0.8261		1395	1502	1
	1097	do	do	do	do	0.7522		1221	1356	1
43. Carya sulcata	91	Kentucky	Mercer county	W. M. Linney	do	0.7130	(IIII)	976	1062	1
Big Shell-bark. Bottom Shell-bark.	912	do	do	do		0.6603		729	781	
own.	383	AND DESCRIPTION OF THE PARTY OF	-	G. W. Letterman	70	0. 9376	EUIII EUU	751	842	1
		Missouri				110000000	E2777		20.000	
	383	do				0. 9333	B	660	729	1
	383	9	do			0.9421	TOTAL TOTAL	939	1085	1
	391		do			0. 8886		872	957	1
	391		do			The Money	1	939	1007	
	1082		do			0.9000		740	849	1
	1082	do	do	do	do	0.8834		660	835	1
	1164	do	do	do	do	0,7927	100	1221	1191	1
	1164	do	do	do	do	0.8481	圆	1856	1526	1
	1164	do	do	do	do	0.7762	1977	1221	1395	1

UNITED STATES UNDER TRANSVERSE STRAIN—Continued.

1 3	DEFLEC	CTION,	IN MII	LIMETI	ers, un	DER A	PRES	SURE,	IN KIL	OGRAM	s, of-		strength:	
0	100	150	200	(set.)	200	250	300	350	400	450	500	550	Ultimate s transverse	Remarks.
5.0	10.0	15.0	21.6	0.6	21.7	THE STATE OF THE S							250	Specimen cross-grained; shattered
. 0	10.5	16.0	21. 9	1.0	21.7	28. 0							285	Specimen cross-grained; split at corner
. 0	8.6	13.0	17. 5	0.2	17.7	22. 7	28. 5	38. 0					394	Crushed at center bearing; broke in long splinters
.7	10.6	16.0	22.0	0.7	23, 0	28. 2	87.0	49.5					383	Square break; split from end to end
. 0	8.0	12.6	18.0	1.2	18.7	24. 0	32.0	41. 6	111121				850	Square break on tension side; split in axis
0	6.0	9, 8	13, 2	0.2	18.5	17, 0	21.0	26.0	32. 0	40 0			485	do
0	8.2	12.7	17, 5	1.0	18.0	23, 0	29, 5	39. 2					394	Specimen cross-grained
2	9.6	15, 0	21.0	1.5	21, 2	28, 0	36, 0	49.5					400	Shaftered
0	14.2	23. 0											197	Specimen cross-grained; broke at knot
4	14.4	21. 5	29. 0	2.0	20.4	38. 5	50.0	80 E	112.0		*****	*****	405	Failed from splinters on corners
3	11.6	17. 2	24. 0	1.0		00.0	00.0	00.0	1		700		200	Specimen cross-grained; broke at knot.
8	14.0	21.5	30.0	1.6	31. 2	******	*****				1		222	Gross-grained; broke with large splinters
0	19, 0	21.0	50.0	1.0	0.1.0	******			50	7	*****	******	244	Simon granient, in one with an Ed Spinners
6	15. 0	23.0	******		*****	******	anny.	220000			11110		195	Defective specimen; square break on tension side
4	10.0	15.7	21.4	0.9	21.6	28.0							288	Split; did not break
4	19,7	32.0	51.5	8.8	54.4	203377	10/00						248	Specimen cross-grained; square break on tension side; split in axis.
0	18.0	29, 3	43.0	5.3	44.0	61.0	1-5-	090900			******		256	Square break on tension side; long splinters
5	7.2	11.4	16.0	0.4	16.2	20, 8	27. 3	34.5	43. 0	58.0	87.0		531	Sap-wood ; broke with fine splinters
7	7.2	10.8	14.4	0.4	14.5	18. 2	23. 5	30. 0	37. 0	50. 7	75. 0		583	do
2	8.0	12. 2	17.0	0.9	17. 6	23.0	29, 5	36.0	44.0	60.4			20/45	Broke with fine splinters
6	7.0	10.5	14.0	0.6	14. 2	17. 6	21.7	26.5	32.0	46. 0			451	Broke with long flakes from tension side
1	6.3	9. 0	12.1	0.2	12.4	15.5	19.0	23. 0	29. 5	30.0			442	Broke with long, fine splinters
0	6.0	9. 2	12.5	0.2	12.8	16.0	19. 5	24.0	29. 0	B7. 0.			483	Broke with large, coarse splinters
0	8.2	13. 0	18.2	1.0	19.0	25. 0	83, 0	43.0	56. 0	76.0	1000		488	Sap-wood; broke with fine splinters
5	8.4	12.7	16.8	0.6	17. 3	21.5	28.5	36.0	46.0	64. 0			495	do
0	7.4	11.2	15. 3	0.8	15.4	19. 2	25.7	33, 5	45.0	57.0	84.0		530	do
7	6.6	10.0	13. 0	0.2	13. 2	10. 6	21. 0	25.5	33.0	41.0	17	100.0	550	Crushed at center bearing; fine splinters
6	7.0	10.2	13. 2	0.3	13.5	17. 0	21.0	26.0	23. 0	40.6	55. 0	11000	550	do
2	6.1	9.0	12. 0	0.3	12.2	15.3	19, 0	23. 5	28.4	35. 0	44.5	59. 0	616	Deflection of 88 millimeters under pressure of 600 kilograms; some
8	6.4	9.6	12.5	0.3	13.0	15. 8	20. 2	24. 0	29.5	39.0	54.0	00.0	530	crushing at center bearing. Crushed at center bearing; fine splinters.
3	6. 2	9. 2	12.6	0, 2	13. 0	16. 2	20.0	25, 0	31.5	40.0	59. 5	******	528	0.5 sap-wood; crushed at center bearing; fine splinters
2	6.0	9. 0	12.0	0.2	12.5	16.0	19.7	24.5	30.5		011.0		444	Broke with long splinters
0	6. 0	8.6	11.5	0.3	11.5	14.2	18. 2	22.5	28.5	36.0	00000000		519	do
1	10.0	14. 6	20.0	0.9	20.4	26. 2	35.0	45. 0	58. 0	81.0	- Control		485	Broke with fine splinters
5	10.6	16.0	22.6	1.9	23. 0	30.3	40.2	54. 0	74. 5	105. 0			458	Sap-wood; broke with fine splinters.
5	6.5	9. 6	12.5	0.3	13. 0	16.0	20.2	25. 0	80.7	38.0	49.5	71. 2	568	do
0	7.2	10.5	14. 2	0.5	14.4	18.0	22.5	28. 9	87. 0	48.0	70.0	100000	500	0.5 sap-wood; broke with fine splinters.
	1180	277.77		100	4.81.7	454.9		5.00	0.1.0		1000		200	av sup-nous, nouse with the spinited attention
0	9. 2	14.0	18.5	0.4	19.0	24.2	30.8	41.0	55. 6	*****			436	Broke with two large splinters on tension side
7	12.5	18.5	26. 2	1.4	27. 0	36, 0	50.0						322	Failed from thin flakes on back
. 5	11.6	17.6	25. 0	2.0	26, 1	33, 6	45, 2	60, 0	85. 0	132, 0			479	Slipped from bearings; splintered
4	13.4	21.5	30. 5	3.2	31.0	40, 0	53.0	78.5	102, 5	194. 0			450	Sap-wood; slipped from bearings; did not break
. 2	9.0	13.2	18. 3	1.0	19.1	25.0	31.4	41.4	54. 5	75. 0			495	Failed from thin flakes on back
. 6	10.2	15.0	20.5	1.1	21.0	28, 0	36.0	46.0	59. 0	91.0	185. 0	*****	500	Broke with fine splinters
. 2	9.7	14.7	20.0	1.0	20.6	26, 5	34. 0	43.0	61.5	84. 0			476	0.5 sap-wood; broke with fine aplinters
. 6	11.5	16.1	22, 2	1.0	22. 6	30, 0	40.0	54. 0	77.0	130.0	*****		464	Did not break; pushed through the bearings
. 4	11.7	16.0	21.3	1.1	22.0	27. 5	36, 0	47.0	63. 0	95. 0			462	Broke with fine splinters
. 0	8.2	12.0	16. 5	0.6	16.6	21. 0	27. 5	35. 0	45. 0	66, 5			488	do
. 6	6. 4	9. 5	12.8	0.4	12.7	16.0	20.0	24. 5	30.3	37.0	46. 0	65. 0	577	do
. 0	7.0	10.2	13.6	0.4	14.0	17.4	22.0	27.4	33. 2	42.6	56. 0		549	do

	it.					wity of dappeci-	grain.	ELAST		upture.
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific gravity of the air-dried speci- men.	Direction of	First deflec- tion,	Second de- fiection.	Modulus of rupture
243. Carya sulcata—continued	1165	Massachusetts	North Reading	J. Robinson	Drift	0.7181	蓼	1221	1221	78
	1166	do	do	do	do	0.8881		939	1007	108
	1170	do	do	do	do	0, 7836		1221	1395	102
244. Carya tomentosa	72	Kentucky	Perryville	W. M. Linney	Utica shale	0.7587	Im	904	948	91
Mocker Nut. Black Hickory. Bull Nut. Big-bud Hickory.	72	do	do	do	do	0.1058		976	1085	104
White-heart Hickory. King Nut.	254	Missouri	Allenten	G. W. Letterman .	Rich upland	0.8693		1479	1628	141
	348	Alabama	Citronelle	C. Mohr	Sandy	0.8659		814	939	114
245. Carya porcina	6	Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0, 8161	m	888	976	105
Pig Nut. Brown Hickory. Black Hickory. Switch-bud Hickory.	6	do	do	do	do	0.7818		976	1062	105
	88	Missouri	Allenton	G. W. Letterman.	Rich loam	0. 9658	蒙	1252	1395	135
	88	do	do	do	do	0. 9369	靈	1039	1149	117
	1211	Michigan	Dansville	W.J. Beal	Gravelly clay	0, 6659	圆	1085	1221	87
	288	Missouri	Allenton	G. W. Letterman	Rich loam	0.8473		976	1085	114
	442	Tennessee	Nashville		Upland	0.8452	鑿	751	814	80
	538	Alabama	Kemper's mill		Alluvial	0.8183	927771	1062	1221	109
	538	do	do	do	do	0, 6932	1000	1082	1097	92
	538 1051	Massachusetts		J. Kobinson	Drift	0. 8636	即加	525	734	110
	1051	do	do	do		0, 8750	题	996	1097	110
	1098	Missouri	Allenton	G. W. Letterman.	Flinty	0.8614	関が	888	814	96
	1098	do	do	do	do	0.8113	影響	718	751	93
	1168	do	do	do	00	0,8580		660	713	91
P 2	1168	do	do	do	do	0.8500	靈	800	880	105
246. Carya amara	158		do	do	Rich upland	0, 8153	包加	1039	1085	113
Bitter Nut. Swamp Hickory.	838	Massachusetts	Danvers	J. Robinson	Rich loam	0, 7864	即加	763	814	93
	838	do	do T. P.R.O.	do	do	0.8040	図の	957	1085	112
	838	do	do	do	60	0.8680	國	1085	1136	121
917 Carron municipal conformir	237	South Campling	Bonneau's Depet	H W Paronal	Dish swarmer	o cene	TITT	1001	1000	100
247. Carya myristicaeformis	237	do	do	dodo	do	0. 8636		1221	1302	149
	201					0,0000	Ш	7411	1020	130
248. Carya aquatica	129		do			0.7386		1062	1163	106
Bitter Pecan.	362	Mississippi				0.7546	뾜	651	697	92
	862		do	do		0.7727		976	948	100
	362 740	Georgia		A. H. Curtiss	Alluvial	0. 7813	-	976	1085	78
	740	do		do	do	0. 8470	即即	1221	1375	123
	740	do		do	də	0.8190	図が	1085	1028	46
1075 to 1075	917	Florida	Chattahoochee	C. Mohr	do	0.6415	圆	729	848	56
MYRICACEÆ. 249. Myrica cerifera	586	do	Saint John's river	A. H. Curtiss	Sandy loam	0, 6227		814	888	95
250. Myrica Californica	665	California	Santa Cruz		Rich loam	0. 6511	刨	904	976	105
NAME OF THE OWNER OWNER OF THE OWNER O	665	do	do	C. S. Sargent.	do	0. 6625	圆	976	1807	101
CUPULIFERÆ.	0	Managalanatta	Amount Antonia	O C Comment	Dule	0 5000		1 (4)430	mon	80
251. Querous alba	8	Massachusetts	Arnold Arboretum			0.7432		679	723	78
	32	Kentucky	Mercer county		Limestone	0. 8358		763 1136	888	102
	322	do	Boyle county		Shale	0.7068	四加	814	930	91
	322	do			Slate	0. 6534	TITTO	904	948	81

	DEPLE	CTION,	IN MI	LIMET	ERB, U	NDER 2	A PRES	SUBE,	IN EIL	OGRAM	s, of-		strength: e pressure.		
50	100	150	200	o (set.)	200	250	300	350	400	450	500	550	中品	Remarks.	
4.0	8.0	11.5	15. 6	0.5	16.0	20.0	25, 0						333	Broke with coarse splinters	. 1
5.2	9.7	15.0	20.8	1.3	21.0	28.0	37. 2	50.0	69, 5	137. 0		******	463	Fine splinters; not broken	. 1
4.0	7.0	10, 5	13. 5	0, 5	14.0	18.0	24. 0	34. 0	50.0	14000			435	Broke with fine splinters	1
5.4	10.3	15. 3	22. 0	1.4	23. 0	29.6	41.5	58. 0					892	Sap-wood; failed with two thin flakes on back	
5. 0	9.0	13, 8	19.6	1.1	20.0	26. 0	33. 0	44.0	62. 0	127211			444	Sap-wood; broke with fine splinters	-
3. 3	6. 0	9, 0	12. 2	0.3	12.2	15.0	19. 1	22.7	27.4	33. 0	40.0	50.0	602	Broke with coarse splinters	1
6.0	10.4	15. 6	21.4	1.1	22.0	28.0	37.1	47. 0	61.0	89. 0			489	Sap-wood; broke with fine splinters	1
5. 5	10.0	14.5	20.4	1.0	20.5	27. 0	34.0	44.0	57. 5	78.7	*****		450	0.5 sap-wood; broke with fine splinters	
5. 0	9. 2	14.2	20. 0	1.1	20.7	26. 2	35, 0	44.2	60.0				450	do	
3. 9	7.0	10.9	14.2	0.5	15.0	18.5	23. 6	81.0	36. 0	46. 0	60. 2	76. 0	578	Broke with fine splinters	
4.7	8. 5	12.5	17.5	1,1	18.0	22.5	30. 3	37. 5	49.0	66. 0	*****		500	do	
4. 5	8. 0	12.0	16. 2	0.6	16, 6	21.3	28, 0	38. 2	-				374	do	
5.0	9. 0	13.7	18.0	0.9	19.0	23. 6	30, 6	40.0	52. 0	65. 0	*****		489	Broke with fine splinters	. 3
6, 5	12.0	19.0	26.7	2.0	28, 0	36. 0	47. 0			*****			344	Broke at knot with coarse splinters	1
4.6	8. 0	11.9	16.0	0.6	16. 0	21.0	27. 0	35.0	44.0	60. 0			466	Broke with fine splinters	
4.6	8. 9	12.7	17.1	0.6	17.0	23. 0	30. 0	39.5				*****	396	do	1
4.5	8. 0	11.6	15. 7	0.9	16.4	21.2	28.6	36. 4	49. 0	68. 0			474	Square break on tension side; split in axis	1
9.3	13. 3	18.0	22.6	6. 0	23. 3	28.4	36. 0	46.5	61.0	84.0	STALL	*****	497	Broke with fine splinters	150
4. 9	8.9	13.4	18, 5	1.3	19. 0	24.5	31.0	42.5	56. 0	75. 5			473	do	1
5. 5 e o	12.0	18.8	27. 5	3.0	28, 5	37. 6	52.5	70.0	110.0				411	Broke with coarse splinters; flaked on tension eide	
6. 8 7. 4	13. 0	19.2	31.5	5.0	28. 8	37.5	51. 6	73. 0 85. 0					399	Broke with coarse splinters	
6.1	11.1	16.1	23. 0	2. 2	24. 2	31.6	41.0	55. 0	73.0	105. 0		F7 1	450	dodo	
	****	1001	200	-		01.0	1	00.0	10.0	100.0			300		1
4.7	9. 0	13.3	19. 0	1.0	18.4	24. 0	21. 3	41.5	56.4	84.0		*****	483	Broke with long splinters	100
6.4	12.0	18.5	26. 3	2. 2	27.5	37.0	50. 5	70.5			0.4.	D D	399	Broke with fine splinters	1
5. 1	9. 0	14.0	19.0	1.1	19.0	24.7	32. 5	42.5	56. 7	74.5	*****	Janes.	479	, do	
4.5	8, 6	13.7	18, 4	0.6	18.7	24. 0	30. 6	39. 0	51.0	68. 5	103. 0	*****	518	Broke with long splinters	1 9
4.0	7.5	11.2	14.6	0.3	15.0	19.0	28.7	30.0	36. 0	45.0	58. 5	77.0	553	Broke with fine splinters	1
3. 3	6, 0	9, 0	11.6	0.1	12.0	14.7	18.1	22, 0	26. 0	31. 2	38, 5	48.0	637	Deflection 63 millimeters with a pressure of 600 kilograms; broke	1
4. 6	8.4	12.0	16.5	1.0	16. 5	22. 0	29. 0	37.5	52. 5	72.0		mot less	454	with fine splinters. Shattered	1
7. 5	14.0	21.0	30.5	3.0	31. 2	41. 2	57. 2	86.0		10.0			393	0.5 sap-wood; failed from flakes on back	
5. 0	10.3	15. 2	21.5	1.2	22, 0	30.0	42.0	56.5	82. 0				400	Broke with long splinters.	
5. 0	10.0	14.7	20. 2	1.1	21.0	27.5	36. 5	49.0	68. 0	109. 0			469	Broke with coarse splinters	
5. 0	9.0	13. 5	18.0	0.7	18. 2	23. 5	30. 2						336	Failed from long splinter on corner	
4. 0	7.1	10.8	14.4	0.4	15.0	18.0	22. 2	27.0	33.0	40.0	47.2		527	Broke with coarse splinters.	
4.5	9, 5	16.5	26. 5	4. 0									200	Specimen cross-grained	
6. 7	11.8	17.0	23. 0	0.9	23. 6								240	Square break on tension side, splitting in axis	
6. 0	11.0	17.4	24. 0	1.3	24.0	31. 5	42.0						348	Shattered	100
	10.0	11.	10.0	10											
5.4	10.0	14.4	19.9	1.0	20. 0	25. 2	32.0	40.0	50.0	100000	No Peterson	. 6.9310	450	Square break on tension side; split in axis; shattered	
5. 0	9.7	14.7	20.0	1.0	20.4	26.0	33. 0	42.4	60.0		******	******	434	do	1
7. 2	13.5	21.2	30, 7	3.1	32. 0	42.0	59. 0						334	Square break on tension side; split in axis	
6. 4	11.0	16.7	23, 5	1.5	24. 0	31.0	40.0	52. 0	70.0				392	Broke with large splinters	
4.3	8, 6	13. 0	17. 6	0.4	18.0	23. 0	30.5	38. 6	48.5				439	do	
6. 0	10.5	15, 0	20.7	1.0	21.5	28, 2	37. 0	47.5					389	Broke with small splinters	
5. 4	10.3	15.5	21.5	0.7	21.6	28. C	37.0						349	Square break on tension side, splitting in axis	1

	II.					gravity of dried speci-	grain.	CORFFIC	ICITY.	runtur
Species.	Office number	State.	Locality.	Collector.	Soil	Specific gra the air-dri men.	Direction of	First defiec-	Second de- flection.	Modulus of runture
51. Quercus alba—continued	49	Missouri	Allenton	G.W. Letterman	Rich upland	0.7927	圆	976	1028	10:
	49	do	do	do	do	0.7060		740	751	8
K.	491	do	do	do	do	0.7784		872	930	9
	491	do	do	do	do	0.7501	圆	814	814	8
	493	do	do	do	do	0.7614		872	913	9
	113	Michigan	Big Rapids	W. J. Beal	Gravelly	0.6001	圆	679	697	
	1132	do	Dansville	do	Sandy	0.7149	圆	814	896	(
	1132	do	do	do	do	0.7060	圆	857	775	1
	1135	do	Hudson	do		0.7460	寥	976	976	1
	238	South Carolina	Bonneau's Depot	H. W. Ravenel	Rich, damp loam	0.8085	圆	1356	1356	10
	238	do	do	do	do	0.7797	圆	1231	1221	10
	250	Virginia	Wythevilla	H. Shriver	Clay	0.7876		1163	1221	10
	250	do	do	do	do	0.7796		1061	1191	1
	251	do	do	do		0.7102		814	842	1
	251	do	do	do	· · · · · · · · · · · · · · · · · · ·	0.7170		1163	1221	1
	2591	do	do	do	Gravelly	0.8091	圆	976	976	1
	259 ²	do	do	do	do	0.7631	圆	872	921	13
	403	Maryland	Charlestown Navy- yard.	S. H. Pook		0.7364		976	976	1
	403	do	do	do		0.7143		842	849	1
	443	Tennessee	Nashville	A. Gattinger	Rich bottom	0.6630		567	592	1
	547	Alabama	Kemper's mill	C. Mohr	Alluvial	0,8475		995	1017	3
	547	do	do		do	0. 8579		976	1177	1
	748	Florida	Chattaboochee		Clay	0.8075	製	1221	1252	1
	748	do	do		do	0.8099	圆	1320	1302	1
	749	40	do		do	0. 8233	1200	751	775	1
	749	do	do	do		0, 8655	圆	814	781	
	895	Massachusetts	michin Propos	M. C. Beedle	, information	0, 7306	圆	740	842	
	895	do		do		0.7818	圆	697	723	
	1050	do	North Reading	J. Robinson		0,8001	製	1110	1191	1
	1050	do	do	do		0, 8343		787	751	1
	1257	******************	Charlestown Navy- yard.	S. H. Pook		0.8466	1	1252	1268	1
	1257		do	do		0.8773	100	1061	1085	1
52. Quercus lobata	670	California	Redding	G. R. Vasey	Gravellyloam	0.7448	Im	679	665	
White Oak. Weeping Oak.	670	do	do	do	do	0, 7557		763	769	
	200		Total Park To							
53. Quercus GarryanaWhite Oak.	985	Oregon	Weidler's saw-mill.	C. S. Sargent.		0.7864	Ш	904	888	1
	985	do	. do	The state of the s		0.7556		814	842	
	988	do	Portland		The same of the sa	0,7142		751	787	
	988	- 12	do	Secretary of the second	Property Control of the Control	0.7548		814	857	1
	1027	do	Company.	STATES OF STATES OF THE STATES	The course with the party of the	0,7745		697	814	
	1027	The second	do	The state of the s	***************************************	0.7535		610	673	
	1029	the state of the s	do	The state of the s	Land House Handson	0.7420		888	930	
	1029	do	do	do	*************	0. 6753		697	697	
254. Quercus obtusiloba	372	Kentucky	. Harrodsburg	W. M. Linney	Shale	0, 8795	刨	763	751	1
Post Oak. Iron Oak.	151	South Carolina	Bonneau's Depot	H. W. Ravenel	Rich upland	0. 8085		763	849	1
	151	do	do	do	do	0. 8913		976	1017	3
	256	Missouri	Allenton	G. W. Letterman.	Clay	0. 8943	刨	763	781	
	351	Alabama	. Citronelle	C. Mohr	do	0.7614	圆	610	630	
	351	do	do	do	do	0. 7688	27711	751	888	1

1	DEFLEC	TION,	IN MIL	LIMETI	ERS, U	NDER A	A PRES	SURE,	IN KIL	OGRAM	s, of-		strength:		
0	100	150	200	0 (set.)	200	250	300	250	400	450	500	550	Ultimate st	Remarks.	The state of the s
. 0	9. 5	14.4	20, 0	1.0	20.0	26, 2	34. 0	43. 5	57. 5				437	Broke with fine splinters	
6	13. 0	20.4	30.0	3. 2	30.5	41.0	57.5	*****					349	Square break on tension side, splitting in axis	N
6	10, 5	17.0	24. 0	2, 5	25.4	33. 5	45. 0	59. 5	89. 0		*****		400	do ob	ľ
0	12.0	19.0	28. 0	3, 3	28.7	37. 0	48.0	*****	*****		*****	*****	347	do	
6	10.7	16.5	23. 4	1.8	24. 0	31.0	42.5	55. 0	******				393	do	
2	14.0	23. 0	33. 2	4.0	84. 5	49. 0		*****	*****	10000	******		293	do	
.0	10, 9	16. 2	22.7	1.5	23, 3	32. 5	*****	*****	*****	*****	*****		294	Broke with small splinters; slightly crushed at bearing	
. 7	12.6	20.0	30.8	3.0	31.5						*****		250	Broke with fine splinters	
.0	10.0	16.5	24. 2	2.5	25. 0	32.0	42.0	58. 0	85.0			*****	417	do	
. 6	7.2	11.0	15.3	0.5	15.4	20.5	26. 5	33.0	45.5	02.0	-	*****	450	do	
2	8.0	12.0	16. 0	0. 5	16. 3	21. 0	27. 5	35. 0	49. 2	63, 0	VIII	E	450	do*	
6	8.0	12.7	17.5	0. 6	17.7	22. 5	30.0	36.5	40. 2		10.3		396	Broke with large flakes	
0	11.6	18.0	26. 0	2.2	26.5	36.3	55.0	- Common of the	X				326	Broke with fine splinters	
2	8.0	12.0	16.0	0.3	16. 1	21.0	27. 0	33. 5	44.5	61. 5			452	Broke with large splinters.	l
. 0	10.0	16. 0	22. 8	1.5	24. 0	30. 5	39. 5	53.5	70.0			A	445	Broke with fine splinters	l
. 6	10, 6	16.3	23. 2	1.5	24.0	32.0	42.2	59. 5	1		1		360	Broke with large scale	
.0	10.0	15.3	21.8	1.5	22.2	29.5	40.8						308	Broke with fine splinters	
8	11.5	17.8	25. 3	2.2	27. 0	36.5	0	7			13		279	Broke with large scale.	ı
6	16. 5	26. 0	41.6	5. 6	43.5					75/			208	Square break on tension side, splitting in axis	ı
9	9. 6	14.5	20.7	1.3	21.3	28.5	87. 5	49. 5	69. 0			2010	440	Broke with fine splinters	١
0	8.3	12, 2	16.0	0.6	16.2	20.7	26.0	32. 5	40.7	48.7	67.5		547	do	ı
0	7.8	11.6	16.0	0.5	16. 3	20.5	27. 0	33. 5	43.0	56.0			480	do	۱
7	7.5	11.0	15, 0	0.5	15.5	19.6	25. 0	32.0	41.5	51. 2	1		492	do	ı
. 5	12.6	18.8	25. 5	2.2	27.5	34. 5	45. 5	65, 0	92. 0				445	do	
0	12.5	20.0	29. 0	3.0	30. 0	42.0	73. 0						320	Broke at knot	ı
6	11.8	17.5	24.7	1.0	25. 0	33. 5					V.T.		300	Specimen cross-grained	
0	13. 5	20. 6	29. 0	2.0	29, 6	39. 0	*****		0			*****	300	Broke with fine splinters	
4	8, 2	12,7	17.1	0.7	17. 5	22, 3	28, 5	37. 0	47.0	66. 0			494	do	
2	13.0	19.5	28, 0	2.4	28. 5	36, 0	50.0	68.5	100.0				444	do	ı
9	7.7	11.7	16.0	0.4	16.5	21.0	26. 5	33. 5	40.5	*****			429	Broke with large splinters	l
. 6	9.0	13.3	18, 6	0.9	18.7	24. 0	32.0	38. 0					392	do	1
. 2	14.7	23. 5	33. 0	4.0	34.0	45.6	62. 0	90.0					374	Specimen cross-grained; splintered on both corners	1
4	12.7	18.7	27. 3	2.5	28.4	37.0	50. 5	75.0	12-3		1	1200	363	Splintered on corner	ı
4	11.0	15.5	21.5	1.1	21.5	28.5	37. 0	47. 0	00.5	i faces		10000	447	Square break on tension side, splitting in axis.	ı
0	11.6	18.0	25. 0	1.7	26. 0	33. 0	44.0	57.5	200		1000	12300	403	Specimen cross-grained	1
5	12.4	19. 0	27. 0	2.0	27. 3	34. 7	45. 6	62.0	*****	100000		-	392	Square break on tension side, splitting in axis	
.0	11.4	16.7	23. 0	1.2	23. 5	30. 0	40.0	52.5	- 127.00	March L.		ACCUSED.	436	do	
0	12,0	18,0	25, 5	1.5	25. 6	33. 5	44.0		10.0				350	do	
0	14.5	23. 0	32. 3	2.5	33. 5	43.5	100000				1		300	do	1
5	10.5	16.0	22, 3	1.0	22. 3	29. 0	36, 5	11223	1	1,16,10,0			393	Specimen cross-grained; broke with long splinters	
0	14.0	22.0	31.0	2.2	31.0	40.7							281	do	
23/	A COUNTY OF	THE REAL PROPERTY.	Wester	0.7030			- Contract	19			-	-	100000		1
4	13, 0	19.6	27. 5	2.0	28. 0	36. 0	46.7	62. 0	Service.	105. 0	1		450	Square break on tension side, splitting in axis	1
4	11.5	17.5	24.0	1.1	24. 6	32. 0	40.0	50.6	The same				429	do	1
. 0	9. 6	14.5	19.5	1.0	19. 9	26. 0	-	(20.75)				-	447	Broke with coarse splinters	1
4	12.5	19.6	28. 2	3. 0	29, 2	· WASHIN	50.8	64. 0	1		1		389	Square break on tension side, splitting in axis	
. 0	15.5	23.0	32.5	2.7	33. 7	43.5							289	do	ď

	12					vity o	grain.	ELAST	HENT OF	Danifan.
Species.	Office number	State.	Locality.	Collector.	Soil.	Specific gravity of the air-dried speci- men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of marting
4. Quercus obtusiloba—continued	771 771	Florida	Aspalagado	A. H. Curtiss	Gravelly barrens .	0. 9172 0. 8958		888 814	930 814	8
5. Quercus undulata, var. Gambelii Sorub Oak.	417	New Mexico	ains.			0. 8489		610	610	8
	417 525	Colorado	Engelmann's cañon.	Robert Douglas	Rocky	0. 8092 0. 7996	図図	751 443	718 430	2
8 Oneses	525	do	do	do	do	0.8073		514	528	1
3. Quercus macrocarpa. Burr Oak. Mossy-oup Oak. Over- cup Oak.	79 79 ²	Kentuckydo	Mercer county	W. M. Linney	Alluvialdo	0. 7636 0. 7358		1085	1221 1163	1
	137	Missouri	Allenton	G. W. Letterman Robert Douglas	Moist upland	0. 9418		872 679	948 679	1
	310	Texas	Dallas	J. Reverchon	Rich, moist	0. 8580		1017	1028	
to the same same	310 432	Tennessee	Nashville	A. Gattinger	Alluvial	0.8466		939 976	987 930	
	831	Illinois	Winnebago county .	M. S. Bebb	Loam	0.7455		1039	1149	1
	933	Texasdo	Austindo	C. Mohrdodo	Alluvial	0.7864		697	723	
	1071	Vermont	Charlotte			0. 8313	図	729 814	712 835	1
	1072 1073	do	do	do		0.8153		904	913	100
Quercus lyrata	545		Kemper's mill	Sections	Alluvial	0. 8153	ш	1039	814	100
Over-cup Oak. Swamp Post Oak. Water White Oak.	545	do		do	do	0.7784		1221	1073 1221	2.73
	545 762	do	Chattahoochee	A. H. Curtiss	do	0.7898		1285	1302	1
	762	do	do	do	do	0. 7955	巡	1627 1744	1550 1526	17
Quercus bicolor	54	Missouri	Allenton	G. W. Letterman	Alluvial	0.9102	100	763	835	1
and the same	54 54 ³	do	do PRO		do	0.7182		976	1085	ı
	548	do	do	do	do	0. 7443 0. 7580		1062	1085 1149	1
	846 846	Massachusetts	West Newbury Arnold Arboretum	J. Robinson	Low, swampy	0.8752	靈	543	592	
Quercus Michauxii	240	South Carolina	Bonneau's Depot	C. S. Sargent H. W. Ravenel	Drift	0.8689		651	693	
Basket Oak. Cow Oak.	240	do		THE RESERVE THE PARTY OF THE PA	I COLUMN THE SAME SEED	0. 8432 0. 8687		1085	1985	Land Salah
	524 524	Alabamado	Kemper's mill		Section of the sectio	0.7898		976	930	
	755	Florida	Chattahoochee	A SUMMER TO THE PARTY OF THE SAME OF THE S	- Tradition - Property Control of the	0. 7710 0. 9199	製物	1110 828	1112 849	1
	755	do	do	do	do	0.9289	1	888	857	1
Quercus Prinus	31 31 ¹	Kentucky	Boyle county		Shale	0. 7313	匫	1221	1252	1
	35	do	do	do	Limestone	0. 7528 0. 8352		1628	1684	1
	434	Tennessee	Nashville	A. Gattinger	Rocky upland	0. 6552		581	595	
The same	925 925	Alabamado	Cullman	C. Mohr	Dry, rocky do	0, 8267 0, 7523	劉皿	1628 1221	1628 1221	1
Quercus princides	34	Kentucky	Mercer county	W. M. Linney	Limestone	0. 7983	圆	976	976	1
Yellow Oak. Chestnut Oak. Chin- quapin Oak.	342	do	Boyle county	do	Waverly shale	0.8949	國	1479	1526	1
	273 287	Missourido	Allentondodo	G. W. Letterman	Limestone	0.9864		976	1050	1

THE WOODS OF THE UNITED STATES.

	DEFLEC	TION,	IN MIL	JAMET	ens, u	NDER .	A PRES	SURE,	IN KH	OGRAN	s, of-		strength:		
20	100	150	200	0 (set.)	200	250	300	350	400	450	500	550	Ultimate str transverse pr	Remarks.	
5, 5	10.5	15.7	21.0	1.5	21.7	28.0	86. 0						345	Splintered on corner	
G. 0	12.0	18.7	26.4	2.5	27. 0	111111							248	Square break	3
8.0	16.0	25.3	36.0	4.0	37. 0	48.0	66.0						350	Broke with coarse splinters.	4
6. 5	13. 6	21.7	31.0	2.7	31. 9	41.5	58. 0	84.0	145.0				426	Sap-wood; drew off bearings; fine splinters	1
1.0	22.7	Ann					******						138	Specimen rotten; square break	1
9. 5	18.5	30. 3	43. 5	3. 2	45.0				*****				247	Split at one end; square break on tension side	1
4.0	8. 0	13.0	17. 0	9. 3	17.0	22, 0	29. 0	37. 0	47.0	64. 0	125575		450	Broke with long splinter on corner	
4.5	8.4	12.6	17. 2	0.5	17.5	22, 5	28.7	38.0	48. 5	64. 0			466	Broke with fine splinters	
5. 6	10.3	15.4	21.5	1.5	22, 0	28.0	36. 5	46. 0	60. 0	79. 0	110.0		523	Broke with large splinter on corner	
7, 2	14.4	22, 4	32.0	3. 4	33. 0	44.0			*****		*****	*****	297	Specimen cross-grained; started at knot	
4.8	9. 5	14.0	19.0	1.0	20. 0	25. 7	33.5	41.5	///	******		*****	413	Specimen cross-grained; split	
5. 2	10.1	15.3	21.6	1.5	21.6	28, 2	38. 0	49.6		1		1000	392	Splintered at corners	1
5. 0	10.5	15. 5	21.4	1.4	21. 2	29. 0	39. 5	54. 3	+4 +	TO 0	******		295	Typical	
1.7	8.5	13.4	17. 6	0.6	17. 9	23. 0	30. 5	40.0	54.5	73.0	- State	*****	450	Broke with fine splinters	
7. 0	13. 5	20.6	29. 0	3. 3	29.7	40, 2	56. 0 61. 0	73. 2	*****				343	Square break on tension side	
6.0	11.7	18.6	25, 5	2.5	26. 8	34. 0	46. 0	62, 0	79. 0		13		449	Failed from small splinters on corner	1
. 4	10.7	17. 0	23. 4	2.0	23. 6	30. 8	40.5	54. 6	73.5				439	Failed from thin flakes on back	1
. 4	12.0	18. 2	26. 1	2.5	26. 3	34. 4	47. 0	62. 5	88.5			- year	441	Failed from fine splinters on corner.	
									10		1				۱
.7	9.1	13, 4	18.0	0.8	19. 2	24.0	31.0	41.0	******	*****		DF(S)SISS	369	Square break; crushed	1
. 0	8.0	12.0	16.0	0.5	16.1	20.4	27. 0	33. 0	43. 0	56. 0		1	489	Broke with fine splinters	1
1.8	7.5	11.7	16.0	0.5	16.0	20.5	26.0	34. 0 26. 2	44. 5 32. 7	1		1	444	Failed from long splinters on tension side Broke at knot in center of stick	1
1.0	6. 3	9. 5	12.5	0.4	12. 9	16. 0	20. 0	25. 0	31.4	39. 0	*****		450	Square break on tension side.	
. 0	0. 9	47. 12	141.0	0.0	144.0	14	20.0	20.0	103.3	001.0			100		1
. 4	11.7	18.2	25. 7	1.4	26.0	33. 5	45.0	58. 0	78. 0	109.5	64.9.	0.0	472	Broke with small splintera; drew off bearing	1
. 0	9. 0	14.0	19, 0	1.0	19. 5	26. 0	34.5	45. 0	62, 0				426	Broke with long splinters	П
. 0	9. 0	13.7	19. 2	1.0	19.0	25. 3	33, 0	42.5	57.5				400	Square break on tension side, splitting in axis	1
. 6	8.5	12.7	17.0	0.6	17. 2	22, 5	29. 5	35, 5	47. 5				442	Broke with fine splinters	1
. 0	16.5	24, 5	35. 0	3.7	36. 0	41 6	50 O	55555	******	*****	*****	******	338	Broke at knot near the end Specimen cross-grained; split with grain	1
. 5	14.1	22.0	31. 6	3.3	32.1	41.5	59. 0	212752	112526	100100		*****	900	Speciaen cross-grained; spitt with grain	1
1.5	9. 0	13.5	18. 5	0.9	19.1	24. 2	31.6	40.0	52. 2	73. 0			454	Broke with fine splinters	1
. 1	10, 4	15.4	21.0	1.0	21.6	27. 6	37.0	49.5	64. 5	90.0			469	do	ш
. 0	10.5	15, 6	21.5	1.1	22.3	28, 0	37. 0	48.5	65. 0	87.0			476	do	Ш
. 4	8.7	14.0	18, 7	1.0	19. 0	24. 0	31.5	42.5	56.0	75. 5			488	do	1
5. 9	11.5	17. 5	24.5	1.8	25. 5	32. 3	43.7	54.0	76.0	99.0		*****	492	Falled from large splinter, starting at knot	1
5. 5	11.4	17.2	24, 0	2.0	24.5	32. 0	42.5	58, 0	76, 0	135. 0	******	******	481	Did not break; drew from bearing	1
4.0	7, 8	11.4	14.7	0.3	15.0	19.0	24.4	30. 0	37. 5	47.5	61. 5		520	Broke with fine splinters	+
1.7	8.5	13, 0	17. 8	0, 5	17.7	21. 5	30. 0	36, 7					397	Square break on tension side, splitting in axis	
1.0	5.8	8.5	11.0	0.3	11.6	14.0	17.5	21.5	26. 2	31. 6	40.0	55. 5	557	Crushed at bearing; broke with fine splinters	ш
8.4	16.4	26. 2	37.5	4.0	39, 0	*****	*****						233	Square break on tension side, splitting in axis	1
3. 0	6. 0	9. 0	12, 6	0.6	12.7	16. 0	22. 0	27.5	34. 5	44.0			482	Square break with large splinters	ш
4. 0	8.0	12.0	16.0	0.6	16. 6	20.7	26. 0	33. 3	41.0				448	Failed from large splinter on corner	1
5. 0	10.0	14.6	20.4	1.4	20, 8	26. 8	25. 0	46. 3	58. 0	78. 5			489	Broke with fine splinters	-
3, 3	6.4	10.0	13. 0	0.3	13. 3	16. 5	20. 6	25, 0	30. 0	36. 2	45, 0	54. 0	621	Deflection with a pressure of 600 kilograms, 68 millimeters; broke	
	100	14.0	19.0	1.0	19.3	25.0	32.5	42.0	51.5	66. 5	92. 5	135. 0	551	with fine splinters. Broke with large splinters	1
5. 0	9.3	19.0	100		1000	17537/1977	OSSET STATE								1

FOREST TREES OF NORTH AMERICA.

						rity of 1 speci-	grain.	CORPFIC		upture.
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific gravity the air-dried spe men.	Direction of p	First deflec- tion.	Second de- flection.	Modulns of rupture
261. Quercus princides—continued	323	Texas	Dallas	J. Reverchon	Calcareous	0. 9205	蓼	976	1007	1230
	323	do	do	do	do	0. 9966	寥	976	1007	1090
	514	Tennessee	Nashville	A. Gattinger	Alluvial	0. 9059	寥	1085	1149	128
	514	do	do	do	do	0. 8755		976	1062	1120
262. Quercus Donglasii	688	California	Contra Costa county.	G. R. Vasey	Clay	1. 0023	圆	888	921	1048
Mountain White Oak. Blue Oak.	688	do	do	do	do	1. 0284	圆	610	622	931
	1200		0. 19		T	7 1400	מתתפו	000		0.00
263. Quereus oblongifolia	655	do	San Diego county			1. 1408	1000	697	697	96
	655	do	do	do		1. 0474		1017	1017	46
264. Querous grisea	698	Arizona	Santa Rita mount-	G. Engelmann and C. S. Sargent.	Dry, rocky	0. 9821	寥	718	740	93
266. Quercus Durandii	1103	Texas	Austin	The Transport	Damp, calcareous.	1.0023	mm	888	888	998
	1103	do	do			1.0420	圆	800	787	98
	1000	TOLORIA CO	Okada tana 2	CHRI			Emm	4444	Tarrer.	**
267. Quercus virens	404	Florida	Charlestown Navy-	The second second second	Charles of the same of the same of the	1. 0469		1436	1502	105
	799	do	Saint John's river		Sandydo	0. 9127		1285	1395	132
	799	Alabama	A STATE OF THE PARTY OF THE PAR	South Marie Control of the Control o	The state of the s	0. 9307		1221	1191	101
	919	do	do	A market state of the state of		0.8972		1163	1122	105
	954	Texas	Matagorda bay			1. 0114		697	740	81
No. of the last of	954	do	do			1. 0193	置	751	751	64
									1000	107/0
268. Quercus chrysolepis	649	California	San Bernardino	CARLET LESS OF THE STREET		0. 8835		976	1085	130
raiso Oak.	649	do	do		77	0. 8989		1039	1149	120
	653	do	Marin county	1	Color Color Color	0. 9386		1221	1221	128
	653	do	do	do	do	0. 9204		1285	1338	121
269. Quercus Emoryi	654	Arizona	Santa Rita mount-	G. Engelmann and C. S. Sargent.	Dry, rocky	1.0264		642	638	70
270. Quercus agrifolia	663	California	PRO	5 (***********************************	Loam	0.8602	m	1061	957	93
Enceno. Coast Live Oak.	663	do	do	do	do	0.8508		976	948	92
	1			NI					2000	1.50
2/1. Quercus Wislizeni	685	do	Auburn		***************************************	0.8676	巡	904	849	78
	685	do	do	do		0.8653	巡	857	872	8
27 L Quercus rubra	7	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	0.7011	Imn	1953	1627	128
Red Oak. Black Oak.	7	do	do	do	do	0, 6872		1285	1356	117
	7	do	do	do	ds	0.6364		1136	1149	104
	7	do	do	do	do	0.6500		1356	1320	103
	451	Kentucky	Mercer county	W. M. Linney	Shale	0, 5528		976	996	83
	452	do	do	do	do	0, 6159		976	1007	90
	451		do		do	0, 5432		857	1302	78
	92	Kentucky	Mercer county			0, 6261		814	814	71
	140	Michigan		1000		0. 6787	Ш	1221	1252	9:
	141	Water and the second	do	and the second	I was a second of the second o	0.5987		763	769	71
	146	Illinois	Waukegan	The second second		0.7464	970	1221	1221	105
	215	Vermont	Charlotte			0.7293	E22	1356	1356	100
	215		do			0.6763	111111	976	1028	10
	217	The state of the s	do	The second second		0. 7316		£88 1221	1302	12
	218	do		The second second	The second second	0. 6955	STITI	1221	1268	11
	920	Mississippi	TOTAL CONTRACTOR OF THE PARTY O	I have a little of	The state of the s	0.5841	1220	857	814	6
	920	200	do			0.5852	min	976	921	7

	DEFLI	ECTION	IN MI	LLIME	CERS. U	NDER A	A PRES	SURE,	N KILO	GRAME	, or—		rength:	
50	100	150	200	0- (set.)	200	250	300	350	400	450	500	550	Ultimate strength: transverse pressure.	Remarks.
5. 0	9. 7	15. 4	20. 0	1.1	20. 5	26. 5	33, 5	43. 0	54. 0	68, 0	91. 0		525	Broke with long splinters
. 0	9.7	15. 3	21.0	1. 5	21.5	28. 0	36. 0	45. 5	59. 5	93. 0	*****	100723	465	do
1.5	8.5	12.7	17. 3	1.1	17. 5	22. 3	29. 0	36. 0	45. 0	56. 0	71.6	93. 0	550	Broke with fine splinters
5. 0	9. 2	14. 0	19.0	1.0	19. 2	25, 0	32. 0	41. 0	51.5	64. 0	******	*****	478	Shattered; cross-grained
5. 5	10.6	16.0	22. 0	1.0	22. 0	28. 0	36. 0	46. 0	56. 0				447	Specimen cross-grained; split with grain
8. 0	15.7	23. 2	32.3	2, 3	23. 0	42.5	55. 3	72.0					400	Specimen cross-grained; started at knot
7. 0	14.0	21. 0	30. 0	2.5	31. 0	40.0	52. 5	70. 0	90. 5				413	Specimen cross-grained; split with grain
4.8	9. 6	14.5	20, 5	1.2	21. 6								200	Sap-wood; broke at knot
							100					19		
6. 8	13, 2	20. 7	29. 0	2, 5	29. 8	39. 0	51.0	65. 5					400	0.75 sap-wood; heart defective; typical break
5. 5	11.0	16.5	23. 0	1.5	23. 4	29, 5	38. 3	48.5	63. 0				426	Specimen cross-grained; split with grain
6. 1	12.4	19. 3	27. 0	2.0	27. 3	35. 0	46.0	61.5	80.0				421	do
3. 4	6. 5	10. 0	14. 0	0. 2	14. 0	17. 0	21.4	26.5	38. 0	48.0	= 89	8	450	Specimen cross-grained; splinter on corner
3. 8	7.0	10.7	14.0	0.4	14.5	18. 0	22.7	28. 0	34. 0	43.5	55. 5	73. 5	564	Broke with fine splinters
4. 0	7.8	11.5	15.5	0.9	15. 7	20. 0	25.7	32.0	40.5	50. 2	66. 7	1400	517	do
4. 0	8. 2	12.3	16.3	0.5	16. 2	20.6	26.5	33. 0	55. 0	1	Barrel		431	Specimen cross-grained; broke at small knot
4. 2	8.7	12. 5	17. 1	0.2	17.0	22.0	28.4	35. 0	43.0				450	do
7.0	13. 2	20.6	29. 5	3.0	30. 0	39. 0	51.7	69, 2					348	do
1. 5	13. 0	20.0	29, 2	3.1	30.0	40.7				- Al			277	Specimen cross-grained; started at knot
			10.0	25		00.0	90.0		40.0		- n		***	
5. 0	9.0	13. 5	18. 2	0.5	18, 2	23. 0	28.0	35. 5	43. 0	Mary		120. 0	558	Broke with fine splinters
4.7	8.5	12. 2	16. 6	0.5	16.6	20. 0	25. 5	32.0	38. 0 40. 0	46. 5	59. 0 66. 0	F-0-8-21	541	Failed from large splinter on corner
4. 0 3. 8	7.3	11.2	14.7	0, 6	16. 5	21.0	24.5	30.5	36. 5	45.0	59. 0		517	Broke with coarse splinters
0.0	1.0	11.2	14. 4	0.0	10.0	10.0	220	80.5	30.0	40.0	00.0		311	broke with course spiniters.
7. 6	15.3	23. 7	33. 2	3. 5	34. 7	45. 5	62.4						300	Specimen cross-grained; split with grain
4.6	10.2	15.6	21.8	1.6	22.7	29.6	39. 2	52.0	75. 0			FR	400	Broke with fine splinters; buckled on compression side
5. 0	10.3	15.0	21.3	1.5	21. 9	29, 0	38. 0	51.0					397	Broke with long scale
		4449	0.2112							1	H		1	
5.4	11.5	17.5	25. 4	1.7	25. 8	35. 0	47. 0				*****		324	Broke at knot near the end
5. 7	11.2	16.8	23. 3	1.3	24. 0	33. 0	39. 5	51. 5	*****				374	Specimen cross-grained; square break on tension side, splitting in axis.
2. 5	6.0	9. 0	12.0	0.1	12. 2	15.3	19.0	23. 2	28, 2	34. 2	45. 2		547	Broke with fine splinters
3 8	7.2	10.7	14.4	0. 2	14.7	18.0	22.5	28. 0	35. C	45, 2	67. 0		500	do
4. 3	8. 5	12.3	16.6	0.3	16.8	21.5	27. 5	35. 0	46. 0				447	Broke with thin scale and fine splinters
3. 6	7.4	11.3	15.2	0.4	15. 3	19, 5	25. 3	32. 0	43. 0	59. 0			451	do
5. 0	9.8	14.7	20.5	0.7	20.7	27. 6	37. 6	53. 5					365	Broke with fine splinters
5. 0	9.7	15.3	21. 7	0.5	20.7	27. 0	35. 0	46. 0					385	Broke with coarse splinters
5. 7	11.5	17.0	23.7	1,2	24.7	32.5	47.5						336	Failed from scale on back
6.0	12.0	18.0	24. 5	1.3	24. 6	32. 0	42.5	11000		*****			336	0.5 sap-wood; square break on tension side, splitting in axis
1.0	7.8	11.5	15.4	0.3	15.7	20.0	26. 0	33. 0					392	Failed from large splinter on each corner
. 4	12.7	19. 2	26. 4 16. 8	1.3	26.7	35, 0	47. 0	95.5					333	Specimen cross-grained.
. 0	8.0 7.2	12.5	14.5	0.8	17. 0	22. 1 18. 7	28. 3	35. 5		114553			382	Failed from long splinter on corner
5. 0	9.5	14.5	20.0	0. 6	20. 0	26. 2	34. 5	29. 0	36. 0	43. 5	1		451 374	Specimen cross-grained; broke with large splinters
5. 5	11.0	17. 0	24. 0	2.0	24. 5	31. 0	41. 0	52.5	68. 0	92. 0			20	Broke with coarse splinters.
4.0	7.5	11.0	14.6	0. 2	14.7	18. 5	23. 0	28. 5	34.3	43. 0	- was		2000	Broke with thin scale and fine splinters
4. 0	7.7	11. 2	15.4	0.3	15. 5	19.7	25. 0	30.7	38. 0	46.0	1000		Com	Broke with time splinters
5. 7	12.0	18.0	27. 0	2. 3	27.7	39. 5							290	Failed from long scale on back.
5. 0	1	16.0	24. 0	2.0	24.5	33.0	49. 0			100			200	Broke with long, coarse splinters

	T.					gravity of	grain.	COEFFIC		of rantare.
Species.	Ощее питрег	State.	Locality.	Collector.	Soil.	Specific grave the air-difference	Direction of	First deflec- tion.	Second do- flection.	Modulus of r
272. Quercus rubra—continued	1043	Massachusetts	North Reading	J. Robinson	Drift	0.7580	Ш	1221	1320	128
	1043	do	do	do	do	0.7426		1221	1302	117
272. Quereus rubra, var. Texana	931	Texas	Austin	C. 21ohr	Calcareous	0, 8580		976	1039	125
	931	do	do	do	do ,	0.8926		1017	1028	71
73. Quercus coccinea	752	Florida	Aspalaga	A. H. Curtiss	Clay	0,7654	圆	976	1085	10
74. Quercus tinctoria	17	Massachusetts	Arnold Arboretum	C, S. Sargent	Drift	0.7102		1221	1221	11
Quercitron Oak. Yellow Oak.	17	do	do	do	do	0.6847		1085	1149	10
	361	Kentucky	Danville Junction	. Constitution of the contract	Shale	0,7284		976	1028	10
	362	dodo	do	do	Slate	0.7619	题	1221	1221	12
	74	Missouri	Allenton	G. W. Letterman	Rich upland	0. 1932		697 921	723 930	11
	74	do	do	do	do	0.8408		814	814	5
	86	do	do	do		0.7519	圆	888	930	11
	244	Virginia	Wytheville	H. Shriver	Clay	0. 5432		842	820	1
	244	do	do	do	do	0. 5026		561	558	100
	247	do	do	do	do	0.7102		1479	1479	13
	247	do	do	do	do	0.7048		1395	1436	13
	437	Tennessee	Nashville	A. Gattinger	do	0. 6949	Ш	1136	1136	13
75. Quercus Kelloggii	628	Oregon	Saw-mill, Ashland	G. Engelmannand C. S. Sargent.	************	0.6642	圆	814	849	1
Ditte Otes.	628	do	do	do		0. 6841	圆	872	921	9
	963	do	Eugene City	G. H. Collier	//	0.6960		660	651	9
	963	do	do	do	Mary Company	0. 6875		525	558	1
76. Quercus nigra	268	Missouri	Allenton	G. W. Letterman.	Clay	0.7688		976	976	16
77. Quercus falcata	131	South Carolina	Bonneau's Depot	H. W. Ravenel	Rich loam	0.7521	Imm	1395	1302	1
Spanish Oak. Red Oak.	131	do	do	do	do	0.7421		1320	1394	1
	245	Virginia	Wytheville	H. Shriver	Clay	0. 6307	豐	1221	1221	1
	245	do	do	do	do	0.6767		1320	1394	1
	265*	do	Carroll county	do	do	0.7837	圆	1526	1502	1
	2652	do		do	do	0.6933	圆	1221	1221	1
	548	Missssippi	1980			0.7875		1526	1601	1
	548	do	do	do	do	0.7614	ши	1628	1575	E
78. Querous Catesbæi	342	Alabama	Cottage Hill	do	Barren, sandy	0.6875	圆	888	948	1
leaf Black Jack. Black Jack.	342	do	do	- The state of the	do	0.7193	圆	1017	1062	1
	770	Florida		The state of the s	do	0.8395	뾜	976	1007	1
	770	do	do	do	do	0.8442	劉	1163	1122	10
79. Quercus palustris Pin Oak. Swamp Spanish Oak.	47	Missouri	Allenton	G. W. Letterman.	Rich, alluvial	0.7148	>	1526	1479	1
Water Oak.	282	do	do	do	do	0.7671	廖	957	976	10
	282	do	do	do	do	0.7534	圆	904	913	3
80. Querous aquatica	2641	Virginia	Carroll county	H. Shriver		0. 6523	圆	1085	1122	1
80. Querous aquatica	2642	do	do	do		0. 6170		1136	1191	10
	2643	do	do %	do		0, 6158	圆	1163	1149	13
	349	Alabama	Cottage Hill	C. Mohr	Sandy loam	0.7142	圆	1163	1285	1
	349	do		DE CONTRACTOR CONTRACTOR		0. 7313	圆	1221	1285	1
	511	Tennessee			1 - 11-11	0.7560	型	976	1028	13
	511	do	do	do	do	0.7411	製	1221	1338	1

	DEFLE	CIION,	IN MI	LLIMET	ers, u	NDER .	A PRES	SURE,	IN KII	OGRAN	is, or-		strength: o pressure.		
0	100	150	200	0 (set.)	200	250	300	350	400	450	500	550	Ultimate str transverse pr	Remarks.	0
. 0	7.4	11.0	14.6	0.3	15. 0	19, 0	24. 0	30. 3	37. 0	46. 0	63. 5		547	Broke with fine splinters and scale	-
. 0	7.5	11.4	15. 4	0.3	15. 6	20.0	26, 0	31.7	40.0	51.5	*****		500	Failed from splinter on each corner	
. 0	9.4	14. 0	19. 0	0, 5	19. 2	25.0	32. 0	40.0	50.7	63. 0	86. 5		534	Specimen cross-grained; broke with large splinters	1
. 8	9.5	14.7	20, 4	1.2	21. 0	27. 2	38. 0	20,0			00.0	*****	339	Specimen affected with dry rot; broke at knot near the end	
	200	** 6			1000	100	no a	400 00	00.0	00.0	1		1-0		
0	9.0	14.0	20.1	3.4	20.5	27. 0	36. 0	47. 0	62. 5	90. 0	*****	*****	450	Broke with fine splinters	
0	8.0	12.0	16, 1	0.3	16.4	21.0	27. 0	34.0	42.0	56. 5	******		491	Broke with medium splinters	1
5	8.5	12. 2	16. 5	0.4	16. 5	21.1	27. 0	34.5	44.0	55. 0			450	Broke with scales and fine splinters	
0	9. 5	14.5	20. 2	1.0	20, 4	27, 2	35. 0	45, 5	58. 2	250055		8,55,553	445	Broke with coarse splinters on corner	
0	8.0	12.0	16.5	0.6	16. 4	20.7	27. 0	32, 5	41. 5	51.7	68. 0	******	542	Broke with fine splinters	1
3	13.5	21. 4	31. 0	1.8	31. 5	42. 0 30. 6	58, 0	80. 0 51. 5	135, 0	88 5	140. 0		504	Broke with split through center parallel to pressure	1
0	12.0	18.5	25, 8	1.8	26. 3	34. 0	46, 2	60.5	Ox. U	00.0	140. 0	*****	397	Broke with fine splinters	
5	10.5	15. 7	21.7	1.5	22. 1	28, 2	36.7	47.0	57.7	75. 0			478	Failed from scale on back and splinter on corner	
8	11.9	18.0	26. 0	1.5	26. 5	37. 0	55, 0	N.			*****		339	Square break on tension side, splitting in axis of stick	
7	17.5	28. 5	43.4	5. 0	44.0			7/14				*****	235	do	-
3	6.6	10.0	14.0	0.6	14.0	17.7	22.1	27. 0	33. 0	40, 5	50, 6		548	Crushed with fine splinters	-
5	6.8	10.0	13.4	0.4	13.4	16, 7	20.5	25. 6	31.7	40. 5	51.5		538	do	
3	8.6	12.8	18.0	1.0	18. 2	24.5	33. 0	44.0	55.0				400	Failed from large scale and coarse splinter	l
0	11.5	17. 3	23.5	0.9	23. 9	31.0	40, 3	51.5		*****			371	Specimen cross-grained	1
6	10.6	16.0	22.0	0.8	22.1	28. 5	36. 0	46.7					360	do	
4	15.0	26. 0	54. 3	10.5	57. 0	88.0							283	Failed from coarse splinter on compression side	١
3	17.5	27. 5	41.5	4.8	43, 5	61.5	122329			MA			298	Shaky	
0	10.0	15.0	21. 0	1.2	21.4	28. 0	36. 0	45.0	60.0				445	Broke with fine splinters	
		10 5	+3/2	0.5			00 "								-
5	7.5	10. 5	14.0	0.5	14. 0	17.5	22. 0 21. 6	27.5	33. 0	40.5	54.0	PR	500	do	
0	8.0	12.0	16. 0	0.5	16.0	20, 2	25, 7	26. 5	42.0	41.0	55, 0	*****	444	Broke with coarse splinters	
7	7.0	10.0	13. 7	0.5	13.7	17. 0	21. 2	26.3	33. 0	43. 5	60.0		500	Crushed at center bearing; broke with fine splinters.	
2	6, 5	9.5	12.7	0.4	13. 0	16, 2	20, 7	25. 5	30, 5	88. 5	48. 0	65, 5	569	do	
0	8.0	12.0	16.0	0.5	16.0	20.0	25, 2	31.5	40.0	48, 3			500	Broke with long, coarse splinters.	
2	6.1	9. 0	12.1	0.3	12.4	15.4	19, 0	23. 0	28. 0	34. 2	40.0		540	Broke at knot with long flake	ŀ
0	6. 2	9. 3	12.0	0, 2	12, 0	15.0	18, 5	23. 0	28. 2	35. 5	46.0	63. 2	562	Crushed slightly at center bearing	ŀ
5	10.3	15.4	20, 6	0.9	21.1	27.0	34.5	44.0	55. 5				423	Broke with large splinters	
8	9.2	14.0	19. 0	1.0	19. 0	25. 0	31. 3	39.0	50. 2				438	Broke with large splinters; shattered	
0	9.7	14.6	20.2	1.1	20.0	26. 0	33. 0	41.6	51.5	66. 2		1	475	Specimen cross-grained; split through knot	
2	8.7	13.0	18.5	1.0	18.9	24. 2	31. 2	89. 0	50. 0	*****			450	Specimen cross-grained; shattered	
-1		16.9	10.0	0.0	14.0	10.0	00 F	00.0	07.7				-		
2	6.6	10. 2	21.0	1.8	14. 2	29. 0	22.5	28. 0	35. 5	44.0	63. 0		526	Crushed at center bearing; broke with fine splinters	
4	10.7	17.0	24. 0	2.1	24. 4	32. 5	44.0	60.0	91. 0	105.0	1011111	******	450	Square break on tension side, splitting in axis	
	2011	1111	24.0	a. A	27. 4	Om U	24.0	00.0	01.0	*****	10000	******	419	Broke with scale and fine splinters	
5	8.7	13, 0	17. 7	0. 7	18.0	24.0	32. 0	44.0	58. 5	*****			422	Square break on tension side, splitting in axis	
3	8, 2	11.8	16.0	0. 2	16.5	21.0	26.7	34, 0	44.6		*****	*****	449	Broke with fine scale	
2	8.5	13.0	18.0	0.9	18.3	24. 2	32, 5	44.2			*****		398	Square break on tension side, splitting in axis:	
2	7.6	11.5	15. 5	0.5	15. 6	20. 0	24.7	31.0	37. 0	47. 0	*****		493	Broke with fine splinters	
0	7.6	11.5	15. 8	0.6	16.0	20.4	26.5	34.0	44. 5	58. 5	******		478	Ducks with some order	
0	9. 5	14. 6	20.4	1.2	20. 7	26. 5	34. 3	30.0		47. 0	*****	*****	392	Broke with coarse scales	

713		4					gravity of dried speci-	grain.	COEFFIC		apture.
	Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific grav the air-dried men.	Direction of g	First deflec- tion.	Second do- flection.	Modulus of rupture
280.	Quereus aquatica—continued	742	Georgia	Bainbridge	A. H. Curtiss	Alluvial	0.7415	圆	1221	1285	806
		742	do	do	do	do	0, 8006	颤	1356	1356	1334
991	Quercus laurifolia	756	Florida	Saint John's river	do	Sandy Ioam	0. 8034	题》	1221	1177	1055
401.	Laurel Oak.	756	CONTRACTOR OF THE PARTY OF THE	do		Charles Control of the Control of	0.7980	製	1320	1221	1111
		801	COLUMN TO SERVICE STATE OF THE	do			0.8105	圆	1356	1820	1289
		801	do	do	do		0.8204	蓼	1221	1320	1266
900	Quercus heterophylla	1171	New Jersey	Mount Holly	S P Sharples	Clay	0, 7023	m	1395	1338	1165
202.	Bartram's Oak,	1171		do		The state of the s	0. 6818		1110	1085	947
		1171	do		do	do	0. 6898	圆	1221	1252	1111
*****								P77711			
283.	Upland Willow Oak. Blue Jack.	352	Alabama	Citronelle	C. Mohr	Pine-barren	0.7159		697	751	994
284.	Sand Jack, Quercus hypoleuca	674	Arizona	Santa Rita mount-	G. Engelmann and C. S. Sargent.	Dry, rocky	0.8716	圆	904	967	1120
		674	do	do	do	do	0. 8325	囫	939	921	1106
285.	Quercus imbricaria	401	Kentucky	Harrodsburg	W. M. Linney	Utica shale	0.7440	题	1136	1085	1153
	Shingle Oak. Laurel Oak.	50	Missouri	Allenton	G. W. Letterman	Rich, moist	0.7477	國	1252	1302	1284
000	Ossessa Dhallas	=10		70.00	A Coulomb	Water officers	0.7000	מוניפו		201/	000
280.	Quercus Phellos	512 512	Tennessee	Tullahoma do	A. Gattingerdo		0.7693	即加	751,	781	923 1055
		012					0. 1551	123	100	101	1000
287.	Quercus densiflora	687	California	Marin county		Gravelly	0.6910	120	872	842	846
	Peach Oak.	687	do	do	do	do	0.7205	劉	976	1085	1048
288.	Castanopsis chrysophylla	720	California	Mendocine county	A. Kellogg		0. 5739	廖	996	1007	846
	Chinquapin.	729	do	do	do	//	0. 5909	圆	1017	1017	635
189	Castanea pumila	573	*Arkansas	Hot Springs	G. W. Letterman	Sandy loam	0, 6017	EUD	1285	1221	1031
2004	Chinquapin.	578	do	do	do	do	0. 5960	题	1062	1062	949
				UTDOOS	M	7//	103	111111			
290.	Castanea vulgaris, var. Americana. Chestnut.	18		Arnold Arboretum			0, 4123	127777	498	525	415
		18	do	do	do		0, 5330		888 679	872	703
10.		2582		Fancy Gap	H. Shriver	Moist	0, 5050	図加	1221	651 1163	619 898
		2583		do	do	do	0, 5053		1085	1039	867
		516	Tennessee	Nashville	A. Gattinger	Sandy	0. 4939	圆	872	888	675
001	7							mm	4004	*****	
291.	Fagus ferruginea Beech.	9	Massachusetts	Arnold Arboretumdo	Section and Section 1	See See See See See See See See	0. 7333		1221	1302	1312
		442	Kentneky	Mercer county	W. M. Linney	Hudson Rivershale	0. 7146		1085	1221	1235
		448	do	do	do	and the second second second second	0. 6416		1039	1122	937
	The state of the state of	119	Michigan	Dansville	W. J. Beal		0.7571		1221	1302	1284
		119	do	do	do	do	0. 6945	圆	1221	1802	1180
		765	Florida	Chattahoochee	A. H. Curtiss	do	0. 6892	囫	976	1007	1024
		765	do	do	STATE STATE OF THE SAME ASSESSMENT	IN PRODUCTION OF THE PROPERTY.	0. 6770	圆	1163	1136	1048
		853	Massachusetts	Hamilton	J. Robinson		0.7000	圆	1221	1221	1106
		853		do	do		0.7324		1285	1252	1221
		853	do	do	do	do	0.7250	120	1395	1395	1256
292.	Ostrya Virginica	11	do	Arnold Arboretum	C. S. Sargent	Drift	0.7784	圆	1628	1628	1446
	Lever Wood.	11	do	do	do	do	0.7614		1395	1479	1289
		877	do	Danvers	J. Robinson	Rich loam	0. 8460	囫	1395	1395	820
		877	do	do			0. 8591		1320	1395	984
		1047	do	North Reading	Particular de la constitución de	CONTRACTOR STATE	0. 8068		1110	1163	1209
	St. Committee of the state of t	1047	do	do	do		0.8182	巡	1136	1177	1057

	DEFLE	TION,	IN MII	LIMET	RRS, UI	NDER A	PRES	SURE,	IN KILO	OGRAM	s, of-		strength:		
50	100	150	200	O (set.)	200	250	300	350	400	450	500	550	Ultimate st	Remarks.	
4.0	7.6	12.0	16.8	1.0	17.0	21.8	29, 0						344	Specimen cross-grained	
3. 6	7.2		13. 7	0.4	14.0	17.5	21. 3	26, 0	31.0	37. 0	46.5	58.0	569	Broke with coarse splinters	W
	0.0	10.0	17.0	0.0	17.0	00.7	100.00	90.0	10 0	20.0	13		150	Broke with large splinters	6
1.0	8.3	12.2	17.0	0.8	17.0	22. 5	28.7	36. 0	46.3	58.5			450	Broke with large splinters and scale on tension side	ļ,
1.6	7.4	11.0	14.5	0.5	15.0	18.7	23. 5	29. 5	36, 5	46.0	58, 5	80.0	550	0.5 sap-wood; broke with fine splinters	
.0	7.4	11.0	15.0	0.6	15. 5	19.0	24. 5	30.5	87.5	46. 7	58. 5		540	do	
	10000	The same		HI COL		DESTRUCTION OF	e Selle E				Miles		- 7		
.5	7.3	11.0	14.7	0, 5	15. 0	19.2	23.7	29.5	37. 0	48. 0	****	*****	497	Crushed at center bearing; broke with fine splinters	100
. 4	9.0	12.0	16.5	0.5	17.0	20.9	26.0	33, 0	42, 0	49. 0	*****	******	474	Broke with fine splinters	
. 0	1.0	11.0	14.7	0.5	15.3	19.0	24.0	30.5	904 4	90,0	*****		414	MANAG WITH MINO SPINICIO	1
. 0	13. 0	19.5	26. 5	1.5	27.0	35. 0	46.0	59.0	76, 0		.,		424	Cross-grained; broke with coarse splinters	
.4	10.1	15.0	20.8	1.0	21.0	27.0	35, 5	44.3	55.7	72.5			478	Broke with coarse splinters	
. 2	10.6	16. 0	22.7	1.2	22.7	30.0	37. 0	47.0	58.0	73. 0	1		472	do	
-		10.0		Tanas		0/	1		400	00.5			400	0.5 sap-wood; broke with large splinters	
. 3	9. 0	13. 5	18. 5	0.5	18. 6	24, 4 19, 8	31.5	40, 0	49.5	50.0	69.0	*****	492	Broke with fine splinters	
. 9	1.9	11.2	10. 0	0.5	10.0	19, 8	25.0	31.0	40.0	50.0	02.0		030		l
. 5	12.5	19.4	28. 0	2.1	29, 0	39. 0	52, 5	69. 0	15.00			L E	394	Broke with large splinters, starting at knot.	ı
. 4	12.4	19. 2	27. 0	1.9	27.5	36. 0	47.0	63. 0	81.5	110.0			450	Broke with coarse splinters	l
. 6	11.6	17.5	24.5	1.0	24. 4	31.0	40.5	55. 0		08/			361	Broke with scale; started at knot	
. 0	9. 0	13. 6	18. 2	0.5	18.4	23. 5	29. 5	37. 0	46.0				447	Broke with coarse splinters	
										A			000		ı
. 9	9.7	14.8	20.0	0.4	20, 2	25.5	32, 0	40.5	*****	*****		1990	271	Specimen cross-grained; shattered. Specimen cross-grained; splinter on corner	
. 8	9.6	14.6	20. 2	0.5	20.3	26.0	1	1777		******	******	11111	211	Specified cross-grained; spiniter on corner	
3. 8	8.0	12.0	16. 2	0.5	16, 2	20. 5	25. 7	82, 2	40.7	*****		****	441	Scale on tension side; broke with coarse splinters	
1, 6	9. 2	14.0	19. 0	1.2	19. 2	24. 6	31.5	41.0	62. 0		17	*****	405	Crushed at center bearing; broke with scales on tension side	1
0.8	18. 6	30. 4										RR	177	Shattered	1
5. 5	11.2	17. 0	23. 6	0.7	24. 0	30.7	40, 5						300	,do	
7. 2	15. 0	23. 5	33. 0	1.7	33. 2	45. 0					*****		264	Square break; split at end	
0.1	8, 4	13.0	17. 5	0.1	17. 6	22. 0	29. 0	38. 0			*****		383	Crushed; square break	1
. 5	9.4	14.4	19.5	0.4	19.6	25. 0	33, 0	41.0			*****		370	Specimen cross-grained; shattered	1
. 6	11.0	17.0	23. 2	0.6	24. 0	31.5		1255	107000				288	Broke with coarse splinters	
. 0	7.5	11. 6	15.7	0.5	15. 6	20. 0	26. 0	30.7	36. 5	45. 0	55, 5		560	do	
.0	8.0	12. 2	16. 2	0. 2	16.3	21.0	26.7	32. 5	42.0	54.0	75.0	*****	527	Crushed; coarse splinters	
. 5	9. 3	14.0	19.0	0.4	19. 0	25. 0	31. 5	41.0	52.5				438	Square break on tension side, splitting in axis	ı
.7	8.7	13. 6	18. 0	0, 5	18, 2	23. 7	30, 5	38. 5	52. 0				400	Scale on tension side	-
. 0	7. 5	11.0	14.7	0.4	15. 0	19.0	24. 0	30.5	37. 0	47. 0	65, 5	253165	548	Broke with coarse splinters	1
. 0	7.5	11.2	14.7	0.5	15. 0	19. 0	24, 5	30.0	37.5	46.7	70, 0		504	Broke with fine splinters; scale on tension side	1
. 0	9.7	14.2	19.4	0.7	19, 5	25, 0	32, 0	40.0	53. 0	125.73			437	Broke with coarse splinters	
. 2	8.6	13. 2	18, 0	0, 6	18.5	23, 6	30.0	39. 0	51. 5	201001			447	Specimen cross-grained; broke at knot	
. 0	8.0	11.5	16.0	0.5	16.5	19.7	25. 0	31.0	40.0	49, 5	10151	*****	472	Failed from long splinter on corner	
1, 8	7.8	11.6	15.4	0. 5	15. 5	20.0	25. 5	31.0	40.0	50. 0	76.5	in this co	521	Crushed with fine splinters	т
3, 5	7.0	10.0	13.6	0.4	14. 0	17.5	21.7	27.0	32, 5	42.0	56. 5		536	Crushed with long splinters	1
3. 0	6. 0	8.6	11.5	0.3	12. 0	15. 0	18.5	22. 0	27.0	33. 5	40.0	52. 0	617	Sap-wood; broke with fine splinters; deflection with 600 kilograms	1
3. 5	6. 6	10.0	13. 5	0.2	13. 7	17. 0	22, 0	28, 0	34.0	43. 0	60.0	75, 0	550	pressure, 64 millimeters. Sap-wood; broke with fine splinters	-
. 5	7. 0	10.4	14. 0	0.4	14.0	18.0	22, 3	28.0	02117				350	Broke at knot	1
.7	7. 0	11.0	14. 5	0.5	14.5	18.5	23. 4	30.0	37. 5				420	Square break on tension side, splitting in axis	-
4. 4	8. 4	13. 0	17. 5	1.0	18.0	23.7	30. 5	40.0	51.5	67.5	102.0		. 516	Specimen cross-grained; splintered on corner	H
1.3	8.3	12.6	17. 5	1.0	18.0	23. 5	31.0	40.0	52.0	73. 5			451	Failed from scale on back	-1

FOREST TREES OF NORTH AMERICA.

	ě				13715	wity of	grain.	COEFFIC	ICITY.	runtuna
Species.	Office number	State.	Locality.	Collector,	Soil.	Specific gravity of the air-dried speci- men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of
3. Carpinus Caroliniana	46	Missouri	Allenton	G. W. Letterman	Damp, alluvial	0.7798	圆	921	957	-11
Beech, Iron Wood.	73	Kentucky	Mercer county	W. M. Linney	Trenton limestone	0.7707	圆	1221	1285	13
	731	do	do	do	do	0.7852		1395	1395	11
	732	do	do	do	do	0.7641		888	939	10
	733	do	do	do	do	0. 7983		1285	1395	14
BETULACEÆ.	1038	Massachusetts	Danvers	J. Robinson	Gravelly	0, 7307	Ш	857	921	1
4. Betula alba, var. populifolia	10	do	Arnold Arboretum	C. S. Sargent	Drift	0.6121	寥	814	814	1
White Birch. Old-field Birch. Gray Birch.	10	do	do	do	do	0.6168	圆	465	503	1
	848	do	Danvers	J. Robinson	Gravelly	0. 5949		872	872	
5. Betula papyrifera	722	Montana	Missoula	Sereno Watson	Wet	0.6244	圆	1110	1149	1
per Birch.	722	do	do	do	do	0. 5948	圆	1221	1149	1
	836	Massachusetts	Townsend	J. Robinson	·····	0.7034	寥	1221	1320	1
	990	Alaska	Chilcoot inlet	Paul Schultze		0. 6136	圆	1039	1085	
	990	do	do	do	·····	0. 6239	圆	1221	1191	
	1065	Vermont	Charlotte	C. G. Pringle		0. 6921	圆	1526	1502	1
	1065	do	do	do		0.6653	뾜	1628	1575	1
	1065	do		do		0, 6614		1395	1526	1
	1066	do	do	do		0.6136		1085	1191	1
	1066	do		do		0. 6136		1320	1338	1
	1067		do	do		0.6409	國際	1356 1285	1356 1285	
T 4.1	-	Carlada				0 5000	E77770	000	omo	
Black Birch.	528 629	Colorado	Engelmann's cañon. Strawberry valley	G. Engelmann and	Wet, peaty	0, 5998		976	976	
. Betula lutea	843	Massachusetts	Danvers	C. S. Sargent. J. Rebinson	Gravelly	0.7147	刨	1628	1550	
Yellow Birch. Gray Birch.	843	do	do	do	do	0.7215	m	1575	1526	1
	1068	Vermont	Charlotte	C. G. Pringle	do	0, 6579	Im	1575	1601	1
	1068	do	do	do	do	0.6647	m	1628	1628	
	1069	do	do	do	do	0. 6573		1479	1628	1 12
	1069	do	do	do	do	0. 6647	寥	1628	1684	1
	1070	do	do	do	do	0.6710	廖	1479	1550	13
	1070	do	do	do	do	0. 6056	國	1953	1775	
Red Birch. River Birch.	136	Missouri	Allenton	G. W. Letterman.	Moist loam	0, 5835		1039	1085	1
Attended Attended Attended	136	do	do	do	do	0.5815	圆	1221	1221	
	841	Massachusetts	North Andover	J. Robinson	Alluvial	0.6335		1039	1085	
	841	do	do	do	do	0.6273	廖	1221	1356	3
	842	do	do			0. 6346	劉	921	904	9
	842	do	do	do	do	0. 6149		1039	1028	
. Betula lenta	4	do	Arnold Arboretum.			0.7393		1395	1436	1
Sweet Birch. Mahogany Birch.	4	do	do	do	do	0.7454		1479	1502	
	221	Vermont	Charlotte	C. G. Pringle		0.7002	200	1356	1302	
	844	Massachusetts	Danvers	J. Robinson		0.8579		1395	1415	
	844	do	do	do	do	0, 8215		1575	1502	
Alnus rubra	967	Alaska	Sitka	Paul Schultze		0.5000	1	976	1028	
	967	do	do	do		0.5017	圆	1017	1017	1
		Washington terri-	Puyallup				T-resource:			

	DEFLI	ECTION	, IN MI	LLIMET	ers, u	NDER A	PRES	SURE, 1	N KILO	GRAMS	, OF—		strength:		
10	100	150	200	o (set.)	200	250	300	350	400	450	500	550	Ultimate str transverse p	Remarks.	
5. 3	10.2	15. 2	21. 0	1. 2	21.5	28, 0	36. 4	48, 0	60.5	80, 0		*****	484	Square break on tension side, splitting in axis	
0.1	7.6	11.0	15.0	0.4	15. 0	19.0	24.0	29.7	35. 5	45.0	56.0	68, 0	578	Broke with fine splinters	
. 5	7.0	10.5	14.0	0.6	14.4	18.6	23.5	29. 0	34. 3	41.5			500	Specimen cross-grained; failed from large splinter on corner	
. 5	10.4	15.7	21.7	1.5	22.4	29. 0	37.0	50. 5	64.0	93. 5			450	Square break on tension side, splitting in axis	
. 8	7.0	10.0	13.7	0.4	14.0	17, 7	21.7	27. 2	33. 0	38, 5	48, 0	59. 0	600	Deflection with 600 kilograms pressure, 82 millimeters; broke with fine splinters.	
.7	10.6	17.0	24. 0	2. 2	24.8	33. 0	45. 0		*****	******			. 330	Specimen cross-grained; started at knot	
. 0	12.0	18.0	25. 4	0.4	26. 0	34. 2	48.5	67. 0					388	Crushed at center bearing; square break on tension side	l
. 5	19.4	30.6	46. 0	6, 5	47.8				S				250	Broke at knot	l
6.6	11.2	17.6	25. 5	2.5	26.8	36. 2	50.0	82.0					357	Crushed at center bearing; broke with fine splinters	l
	10000000	- MARKET (-	-	10000	COR.				-		1		ı
1.4	8.5	13.0	17. 2	0.5	17. 5	22.6	28.4	35. 7	46.0	65. 0	7***	HY	462	Square break on tension side, splitting in axis	1
. 0	8.5	13.4	19.0	1.0	19. 2	25. 0	33. 0	44. 0	58. 5	1	*****		430	Broke with coarse splinters	1
.0	7.4	11.0	15.0	0.5	15.0	19.0	24. 0	30, 0	37.5	49.0	1	*****	1	Failed from scale and long splinter on corner.	1
.7	9. 0	14.0	10.5	1.0	20.0	26.3	35.0	200	1000	*****		*****	348	Specimen cross-grained; broke on corner Broke with coarse splinters	
.0	8.2	12.4	17.0	0.5	17. 0	22.0	28, 0	36. 0	50.0	10000000		7	424	Crushed at center bearing; broke with fine splinters	1
. 2	6.5	10.0	13.0	0.5	13.4	17.0	21.0	26. 5	33. 0	43.0			No. of the last	Crushed at center bearing; broke with large splinter on corner	п
. 0	6.2	9. 5	13.3	0.7	13.3	17.0	21. 5	26. 5	33, 0	43.0	150		524	Square break on tension side; broke with splinters	
5	6.4	10.0	13.4	0.6	13.7	17. 0	22.0	27.0	33.0	39. 0	TO THE		456	Specimen cross-grained; broke with coarse splinters	
5	8. 2	12.6	17. 0	0.4	17.3	21.7	27.5	35. 0	44. 0				434	Crushed at center bearing; broke with fine scales	
.7	7.3	11.2	15. 0	0.4	15.5	19.7	25. 0	32. 0 28. 0	41. 6 35. 5	43. 0			484	Falled from scales and coarse splinters	
. 6	7.2	10.7	14.3	0.3	14.3	18.0	23. 0	36. 0	52. 0				419	Crushed at center bearing; splintered	
. 8	7.6	12,0	16.5	0.5	16.5	21.0	20.0	30.0	02.0	THE .				o literatura de contra de	
. 5	11.2	18.0	27. 0	2. 9	27.4	37.5	54. 0					22222	315	Specimen cross-grained; shattered	
. 0	10.0	15. 5	21.4	0.9	21.6	29. 2	40. 5	60. 0		*****			373	Crushed at center bearing; square break on tension side, splitting in axis.	
. 0	6.3	9. 3	12.7	0.5	12.7	16.2	20.0	24.5	30.5	36. 5	50. 0	11012	513	Sap-wood; specimen cross-grained; shattered	
.1	6.4	9. 2	12,5	0.4	12.6	15.7	19.5	24.5	30. 0	36, 0	47.5	60.0	550	Sap-wood; crushed at center bearing; broke with coarse splinter on	١
. 1	6.1	9.4	12.4	0.3	12.2	15.4	19. 2	23, 2	29. 0	37. 5	57. 0	-	519	Sap-wood; crushed at center bearing; broke with coarse scales	
. 0	6.0	9.0	11.5	0.3	11.5	14.5	18.0	21.7	27. 0	34. 5	49, 5		520	Crushed at center bearing; broke with fine splinters	
. 3	6.0	8.7	11.6	0.2	11.5	14.0	17. 0	20.7	25.0	81.0	40.0	55. 0	563	0.5 sap-wood; crushed at center bearing; broke with fine splinters.	
. 0	5.8	8.8	11.6	0.3	11.7	14.5	17.7	21.7	26, 5	33, 0	45. 5		517	0.75 sap-wood; crushed at center bearing; broke with fine splinters	
. 3	6.3	9.4	12.4	0.3	12.4	15. 6	19.5	24.0	30.5	38. 0			531	Sap-wood; crushed at center bearing; broke with fine splinters on	I
. 5	5.5	8.3	11.3	0.1	11.4	14.5	18.0	22, 0	27. 0	33. 7	45.5		547	corner. Heart-wood; crushed at center bearing; broke with fine splinters.	
		10.0	10.0	0.5	10.0	23. 5	30.0	39, 0	64. 5				444	Sap-wood; broke with coarse splinters at corners	
. 7	9, 0	13, 3	18. 2	0.5	18.6	21.0	27. 0	35. 5	51.0	*****			416	Sap-wood; crushed at center bearing; broke with coarse splinters	į
. 0	8.0	12,0	15.9	1 12 3	19. 4	25. 0	32. 5	45.0	66. 0				4.07	at corners. Sap wood; crushed at center bearing; splintered at corners	
.7	9, 0	14.0	19.0	0. 6	14.7	19.0	24. 0	31. 0	41.0				429	Sap-wood; crushed at center bearing; broke with fine splinters on	
0.1	10.8	17.0	23.6	1	24. 0	32. 0	45.0	61.5	100. 0				400	tension side. Sap-wood; crushed at center bearing; shattered on corner	
1.7	9.5	14.0	19. 2	0.5	19. 4	25. 0	33. 0	45.0					395	Sap-wood; specimen cross-grained; started at knot	
1676	P. W.	1	100.0	1	1	-			200	1		1			ı
. 5	6, 8	10, 0	13. 5	0.4	13. 5	17.5	21.6	27.0	34. 0	40.7	51.5	72.0	550	Sap-wood; crushed at center bearing; square break on tension side, splitting in axis.	Н
3	6.5	10.0	13, 0	0, 3	13, 5	16.7	20.8	26.0	32.0	40. 0	51.0		547	Sap-wood; splintered on corners	п
6	7.5	10.4	13. 3	0.2	13. 6	16, 5	19.7	24. 0	28. 5	34. 5	43. 7	60.0	552	Square break on tension side, splitting in axis	ij
. 5	6. 9	10.0	13, 6	0.4	13, 5	17. 2	22. 0	27. 0	34. 0		*****	*****	448	Splintered on corners	i
.1	6.5	10.0	13.7	0.4	14.0	18.0	22. 6	28, 0	35. 5	45, 5	+****		497	Specimen cross-grained	
. 0	9.5	14. 4	19.0	0.5	19.5	25. 5							. 299	Square break on tension side, splitting in axis	
. 8	9.6	14.6	19.8	1	20.0	26. 0	****						300	do	
. 8	11.0	16.7	22. 5		22.7	30. 0	37.5	50. 0	100				. 354	do	
5.8	12. 1	19.0	27. 0	1.9	27.5	37. 0	50. 0	72.0	A LEGISTRA	1	Lat-	-	. 350	do	۱

-		42		Night S			gravity of dried spect.	grain.	COEFFIC		upture.
	Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific gravithe air-dried men.	Direction of	First defice- tion.	Second de- flection.	Modulus of rupture
301.	Alnas rubra—continued	1025	Oregon	Portland Furniture Company.	G. Engelmann and C. S. Sargent.		0. 4739 0. 5084	図図	1320 1221	1285 1338	900
302.	Alnus rhombifolia	635	do	Ashland	do	************	0.4857	120	904	948	738
	Alder.	717	Montana	Missoula	Sereno Watson		0. 4545	図	679	669	567
		717	do	do			0.4886	מתש	729	751	701
		979	Oregondo	Drain do			0, 4465	题	904	948	703
		9919					0, 2010		000	010	100
303.	Alnus oblongifolia	694	California	San Bernardino	W. G. Wright		0.4170	匫	787	751	696
		694	do	do	do		0.4049	巡	787	787	677
305.	Alnus incana Speckled Alder. Houry Alder. Elack Alder. SALICACE 25.	862	Massachusetts	Danvers	J. Robinson	Wet loam	0, 5005	2	1163	1085	820
306.	Salix nigra Black Willow.	855	do	Topsfield	do	Alluvial	0, 5330	図	407	391	424
307.	Salix amygdaloides	908	Colorado	Cañon City	E. Weston		0. 4675	Im	610	514	511
	Willow.	908	do	do	do		0.4676	蓼	488	476	530
		911	do	do	do		0.4670	國	554	514	609
308.	Salix lavigata	690	Californiado	Santa Cruz	C. S. Sargent.		0. 5341		479 509	. 488 488	734 553
								11111	XIII TI		
309.	Salix lasiandra, var. lancifolia	640	do -,	Strawberry valley		Moist, rich	0.4705		542	525	584
		981	Oregon	Portland	F. Skinner	Alluvial	0. 4375		1163	1085	701
309.	Salix lasiandra, var . Fendleriana	981	Utah	City Creek cation	We - V	Gravelly	0.4614		976 330	1028	743 469
313.	Salix flavescens	721	Montana	Pattee's cañon, Missoula.	Sereno Watson	Rich, moist	0. 5057		1221	1085	809
313.	Salix flavescens, var. Scouleriana	972	Washington ter-	Seattle		Meist, sandy	0.5719	m	1285	1375	928
	Black Willow.	972	ritory.	do	C. S. Sargent.	do	0. 5278	蓼	1221	1149	888
316	Salix lasiolepis	669	California	Santa Cruz	do	Sandy loam	0. 5760	2	921	888	813
318	Populus tremuloides	2722	Colorado	Alpine	T. S. Brandegee	Damp	0. 3955		740	781	562
	Aspen Gaucing Asp.	2722	do	do	do	do	0, 3885		651	651	541
		1035		Danvers		Gravelly	0, 4580		976	913	720
		1035	do	do	do	do	0, 4828	>	888	913	881
319	Populus grandidentata	847	do	do	do	do	0.4443	圆	976	996	696
	Poplar.	847	do	do	do	do	0. 4386	蓼	904	930	748
820	Populus heterophylla River Cottonwood. Swamp Cot-	522	Tennessee	Nashville	A. Gattinger	Alluvial	0. 4155		740	723	642
321	tonwood. Populus balsamifera	961	Alaska	Chilcoot inlet	Paul Schultze	do	0.4080		857	842	574
	Gilead.	961	do	do	do	do	0.4034		888	872	527
321	Populus balsamifera, var. candicans	1054	Massachusetts	Topsfield	J. Robinson	Gravelly	0.4085	1	740	697	626
	The state of the state of	1054	do	do	do	do	0.4506	廖	751	763	593
322	Populus angustifolia	552	Colorado	Manitou Springs	Robert Douglas	Sandy loam	0, 4488		488	458	401
323	Populus trichocarpa	1012	Oregon	Saint John's Barrel	F. Skinner		0.3750		1062	1050	682
	Black Cottonwood, Balsam Cottonwood.	1012	,do	Factory, Portland.	do		0.3898		1085	1062	637
		1028	do	Portland Furniture Company.	G. Engelmann and C. S. Sargent.		0, 4108		1221	1221	694
		1028	do	do	do	**************	0. 4108		1163	1136	945

0		150		O (set.)	200			350					Ultimate strength: transverse pressure.	Remarks,	
. 7	7. 6	11.5	15. 0	0.1	15.7	20, 0	25. 2	33. 0					384	Crushed at center bearing; broke with fine splinters	1
. 0	7.3	11,0	14.7	0.0	14.8	18.5	23. 5	30.0	*****		******	172722	386	Specimen cross-grained; scaled on corner	1
. 4	10.3	15.5	20.6	0.5	21.2	27.0	35.7						315	Square break on tension side, splitting in axis	
. 2	14, 6	23.0	34.0	3.5	35. 0				*****				242	Sap-wood; cross-grained	
.7	13.0	20.4	30.0	3. 0	31.0	44.0						****	299	Square break	
.4	10.3	15.7	21.8	0.9	22.0	30.2			*****				298	Squere break on tension side, splitting in axis	1
5	10.7	16.5	22. 2	1.0	23. 0	30. 6	50.0						300	Specimen cross-grained; square break on tension side, splitting in axis.	
2	13.0	19.6	28, 3	1.3	29. 0	39. 0							297	Crushed at center bearing; square break on tension side, splitting	1
2	12, 4	19.0	27. 3	1.5	28, 0	38.7						*****	289	in axis. Crushed at center bearing; splintered on corner	
2	9.0	14.0	19.6	0.8	19.6	26, 0	35. 0	201300		art seco	15000	73.05	350	Broke with coarse splinters.	
-	3.0	14, 0	10.0	V. 0	10.0	20, 0	55.0	7			X		350	Broke with coarse spiniters.	1
0	25, 0	44.0							8		DEL STREET		181	Specimen cross-grained; split with grain	
						3			1/1			(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	170	ripermen eros-gramost, apar sum gram	ı
0	19.0	36.0	64. 5	16. 2	73.0		refer to		.,	*****			218	Crushed at center bearing; splintered on compression side	н
0	20.5	36.0	58. 0	11.0	63. 0		******	777		*****	-		226	do	1
8	19.0	32, 5	55. 0	11.5	57. 0	91.0	7	77				*****	260	Crushed at center bearing; splintered on tension side	1
2	20.0	31.2	46, 0	5, 0	47. 5	64.0	110, 0	*****				*****	313	Square break on tension side, splitting in axis; shattered	
6	20.0	32.0	46.0	4.8	48, 5	******	******		100000				236	Specimen cross-grained; flaked on tension side	-
0	18.6	31.0	46.0	5.0	48.0								249	Specimen cross-grained; broke at knot	
2	D. 0	14.2	21.0	1.2	21.5	29. 5	45.0						299	Crushed at center bearing; broke with fine splinters	-
ō	9.5	14. 8	19. 5	0.5	20.0	26. 0	36. 0						317	Crushed at center bearing; scaled on tension side	
8	32. 0	57.0	125. 0	32. 5		EFFER		1				*****	200	Crushed at center bearing; shattered	
0	9. 0	14.0	19.0	1.1	20. 0	26.5	36. 5				-60-0		345	Crushed at center bearing; splintered; square break on tension side, splitting in axis.	-
8	7.1	10.5	14.2	0.5	14.7	18.3	24. 0	31.5	0				396	Crushed at center bearing; broke with fine splinters	ı
0	8.5	12.5	16.8	0.3	17.2	22, 0	28.0	35. 0					379	Crushed at center bearing; broke with coarse splinters	ı
3	11.0	16.6	24.5	1.5	25, 0	23.0	46.0						347	Crushed at center bearing; broke with fine splinters	
6	12.5	19, 3	27.7	2.4	28.7								240	Broke with long scale.	
5	15.0	23. 2	33. 0	3.8	37. 2	244.041							231	Specimen cross-grained; broke at knot	
0	10.7	17. 0	24. 0	1.5	24. 5	32, 0	50.0						309	Crushed at center bearing	-
5	10.7	17. 0	25, 0	2, 9	26, 0	35, 0	48.0	71.5					376	Broke with many fine splinters	
0	9.8	15.0	21.4	1.5	22, 0	30. 0							297	Splintered on corner	
4	10.5	15.5	21.7	1.0	22.0	28. 7	41.0						319	Crushed at center bearing; broke with fine splinters	
6	13. 5	21.4	30. 7	3, 3	32. 0	47.0							274	do	-
7	11.6	17.4	25. 0	1.3	26. 2								245	Specimen affected with dry rot; square break	
5	11.2	17. 6	25, 5	1.7	26, 2								225	do	
		20.3			ne o										
6	14.0	22.4	34. 2	5.9	35. 8 36. 0	52. 0 62. 0	*****						267 253	Crushed at center bearing; square break	
0	21. 3	35. 2											171	Specimen cross-grained; broke at knot	-
6	9.3	14.0	20.8	1.0	20.8	28. 4							291	Square break with small splinters	
5	9. 2	14. 0	19.6	0.9	Degree	27.5	000000	20000000	10000	350755			272	dodo	
0	8.0	12, 0	18.0	1.1	17.6	24.0							296	do	1
2	8.6	12.6	17. 6	0.5	17.6	25. 0	1	- CO-A.S		SAFETANIA.		-	275	do	1

FOREST TREES OF NORTH AMERICA.

	Ej.	-				vity of dspeci-	grain.	COEFFIC		upture.
Species.	Office number	State.	Locality.	Collector.	Soil.	Specific gravity of the air-dried specimen.	Direction of g	First deflec- tion.	Second de- flection.	Modulus of rupture
324. Populus monilifera	255	Missouri	Allenton	G. W. Letterman	Alluvial	0.8552	圆	669	669	548
Carolina Poplar. Big Cotton-	304	do	do	do	do	0.8824	m	888	857	661
wood.	304	do	do	do	do	0, 3477	圆	751	723	605
	309	Texas	Dallas	J. Reverchon	do	0.5136		1136	1149	893
	309	.tdo	do	do	do	0.4858		842	842	759
	754	Florida	Chattahoochee	A. H. Curtiss	do	0.5001	膠	1221	1302	902
The Wall of the Parket of the	754	do	do	do	do	0.4909	圆	1221	1221	937
	754	do	do	do	do	0.4925	圆	1221	1191	851
325. Populus Fremontii	659	California	Sacramento valley	G. R. Vasey	do	0.4977	图加	1017	1017	584
Cottonwood.	659	do	do	do	do	0. 5000	即加	1085	1085	813
and the state of t	000		TOTAL			0, 0000		1000	1000	010
325. Populus Fremontii, var. Wislizeni . Cottonwood. White Cottonwood.	646	do	San Bernardino	W. G. Wright		0.5079	廖	651	665	743
The Court of the C	646	do	do	do	do	0. 5023	圆	069	679	687
	909	Colorado	Canon City	E. Weston		0.4867	匫	904	1149	795
	909	do milion	do	do		0.4451	圆	976	939	703
	909	do	do	do		0.4499	図	872	835	579
THE RESERVE TO SERVE THE PARTY OF THE PARTY	909	do	do	do		0.5107	図	763	794	042
CONIFERÆ.	1-12			A CONTRACTOR						
326. Libocedrus decurrens White Cedar. Bastard Cedar. Post Cedar. Incense Cedar.	634 634	California	Saw-mill, Straw- berry valley.	G. Engelmann and C. S. Sargent. do		0. 3748	圆圆	697 814	751 814	702
Signal Unicode Communication (Care Communication Communica	662	do	Saw-mill, San Ber-	W. G. Wright		0.4818	圆	872	896	783
E A P. T.	662	do	nardino mountains.	do		0.4989	蓼	872	888	€54
	662	do	do	do	//	0.4869	蓼	828	888	654
			W 1 6		12-11	2000				
327. Thuya occidentalis	379	Vermont	Monkton	C. G. Pringle	Cold, peaty	0. 3025		488	514	450
	379	do	do	do	do	0. 2902		444	452	44.
	782	New Brunswick	n. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	Intercolonial rail-	4.y.y	0. 3580	277713	519	542	54
	783	do	Bridgeton	Ed. Sinclair	.,	0. 3439		651	610	52
	783	do	do	do		0.3413		626	651	44
	790	Province of Quebec	Wir UI	A. Grant		0, 3216		588	610	58
	790	do	do	do		0. 3336		610	581	58
	792	do		Grand Trunk rail- way.		0. 2714		331	337	39
	792	do		do	•••••	0. 2612	2777	279	294	35
	792 874	Maine	Mattawamkeag			0. 2805	27770	269	260	35
	874	do	do	J. Robinson		0. 3835		763	781	586
	1099	Wisconsin	Eau Claire		Delfe	0.3902		669	729	666
THE REAL PROPERTY OF THE PARTY	1099	do	do	Section in property and	do		回	542	558	580
	1000					0.4121		514	542	65
328. Thuya gigantea	1017	Oregon	Weidler's saw-mill, Portland.	G. Engelmann and C. S. Sargent.	***************************************	0. 4312	Ш	1221	1149	818
The state of the s	1017	do	do	do		0. 4256		976	1028	820
	1021	do ,	Portland Furniture Company,	do		0. 3623		872	930	633
The state of the s	1021	do	do	do		0. 3783		1017	1028	722
329. Chamæcyparis sphæroidea	350	Alabama	Cottage Hill	C. Mohr	Sandy, wet	0. 3626	EDD)	271	257	828
White Oedar.	350	do	do	do	The state of the s	0. 3153		341	334	380
	850	Massachusetts:	Beverly	J. Robinson	Swampy	0. 3625	1000	498	488	483
	850	do	Maria Carlos Constitution of the Constitution	do		0.3602	EDTA	425	415	551
	851	de	11	do		0.3523	図が	444	444	469
THE STREET WAS INCOME.	851	do	do		do	0. 3407	関の	519	514	509
	- 10 mm			and the second s	The state of the s	4.00	12/	N. A.W.		2000

The color 100		DEFLE	CTION,	IN MII	LAMET	ers, ur	NDER /	A PRES	SURE,	IN KIL	OGRAM	s, of-	-	strength:		
1.5 1.4 37.2 34.5 1.4 57.3 34.5 3.0	50	100	150	200	1000	200	250	300	350	400	450	500	550	mate	Remarks.	Office number.
1.6 13.5 13.6 13.6 13.7 13.8 13.1 1	7.3	14.6	23. 0	33.5	155711									234	Crushed at center bearing; square break on tension side, splitting	255
4.0 8.5 13.3 18.8 1.1 19.1 29.6 25.2 51.5 29.1 Crushed at center bearing; broke with fine splinters 300	5. 5	11.4	17.2	24.2	1.4	25, 3	33, 2			177.7.7	*****		,	282	Crushed at center bearing; square break	304
5, 8, 11, 6 38, 0 25, 6 30, 0 20, 5 20, 5 20, 6 10, 0 20, 0									17,000	******	200000					1 1 1 1 1 1 1 1 1
4.0 8.5 12.0 16.0 0.4 16.0 21.7 26.8 32.0 0. 26.8 32.0 26.8 32.0 26.8 32.0 26.8 32.0 26.8 32.0 32.0 32.0 32.0 32.0 32.0 32.0 32.0				111111111111111	22,000	1100000			51.5		1			100000		100000
4.0 8.0 12.5 16.8 0.1 7.9 0.6 17.5 24.6 25.0 35.0 35.0 45.0 35.5 45.0 35.0 450 350 450 350 450 350 450 350 350 350 350 350 350 350 350 350 3					A CONTROL				99.0	******	1	1				N. Distant
4.0 0.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1									III 700 Stants	*****	1	Trans.				
4.8 8.0 6 54.8 21.4 1.7 21.8 8 2.3 3.8 44 55 55 55 55 55 55 55 56 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.				CARD ALTER	200000	STREET, ST					E CONTRACTOR	1		BEARING.		1
4.5 8.0 14.0 19.4 0.9 19.4 0.9 19.4 0.5 19.4 0.5 3 3.3 0 9.47 Specimen cross-grained; splintered on corner. 650 656 17.7 18.4 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.1 18.0 18.0	3.0	0.0	444.0	211.00	0.4	-4-4-4-6-1			(Mar. 19)		02220			000		102
7.5	4.8	9. 6	14.8	21.4	1.7	21.8								249	Started at knot; splintered at corner	659
7.3 14.4 22.0 22.6 2.5 34.0 47.0 .	4.5	9. 0	14.0	19. 4	0.9	19.4	25, 3	33. 3		110001				347	Specimen cross-grained; splintered on corner	659
5.4 8.5 3.4 19.0 1.3 11.5 25.5 34.6 389 30 30 30 30 30 30 30 3	7.5	14.7	22. 0	32, 4	2.4	33. 0	43.0	62. 5	*****					317	Specimen cross-grained; split	646
2. 4 8. 5 13. 4 12. 0 1. 2 12. 1 12. 2 2 10. 4 12. 5 25 26. 6 25 26. 6 250 Square break on fension side, splitting in axis 998 2. 6 11. 7 18. 4 20. 7 2. 1 27. 2 20. 0 42. 5 20. 6 20. 5 20. 6 20. 5 20. 6 20. 6 20. 5 20. 6 20. 6 20. 6 20. 5 20. 6 20. 6 20. 6 20. 6 20. 5 20. 6	7.3	14.4	23. 0	32, 6	2, 5	34, 0	47. 0			-				293	Crushed at center bearing; square break on tension side, aplitting	646
5.6 11.7 18.4 20.7 2.1 27.2 27.4 Broke with fine splinters 908 7.0 13.0 29.7 28.0 1.2 29.0 41.5 29.4 Square break 634 6.0 12.0 18.0 25.0 0.6 55.5 25.5 48.0 38.0 634 5.6 10.0 16.5 22.0 0.6 35.5 38.5 38.6 38.6 Specimen cross-grained; shattered 622 5.0 11.0 16.6 22.0 0.4 22.5 28.5 27.9 .0 622 5.0 11.0 16.6 22.0 0.4 22.5 28.5 28.5 27.9 .0 602 10.0 18.6 22.0 0.4 22.0 28.0 22.2 28.0 22.0 28.0 22.0 38.0 602 37.0 37.0 37.0 38.0 38.0 38.0 38.0 38.0 38.0 38.0 38.0 38.0<	5.4	8.5	13.4	19.0	1.3	19.5	25. 5	34. 6						339		909
6. 4 12. 3 20. 0 31. 0 5. 5 30. 4 41. 5 20. 0 41. 5 20. 0 41. 5 20. 0 41. 5 20. 0 41. 5 20. 0 41. 5 20. 0 20. 5 32. 5 35. 0 30	5.0	10.4	16.4	23. 0	1.5	23. 2	31.0	42.5	1					300	Square break on tension side, splitting in axis	909
7. 0 13. 0 29. 7 28. 0 1. 2 29. 0 41. 5 26. 0 306 306 306 306 306 306 306 306 306 3	5. 6	11.7	18.4	26.7	2.1	27. 2			14/24					247	Shattered	909
6. 0 12. 0 18. 0 25. 0 0. 0 25. 5 25. 5 25. 5 25. 0 29. 0 29. 0 35. 5 25. 0 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0	6. 4	12.3	20.0	31.0	5.5	30.4	43.5		,					274	Broke with fine splinters	909
6. 0 12. 0 18. 0 25. 0 0. 0 25. 5 25. 5 25. 5 25. 0 29. 0 29. 0 35. 5 25. 0 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0 29. 0 35. 5 29. 0								15				(4)				100
6. 6 10. 9 10. 5 22. 5 0. 5 23. 0 23. 0 23. 5	7.0	13. 0	29.7	28. 0	1.2	29. 0	41.5							264		
5.6 11.0 16.5 22.0 0.7 22.0 22.0 22.0 22.0 22.0 662 662 5.0 11.0 16.6 22.0 0.4 22.5 28.6 279 de 662 10.0 19.0 30.0 194 Square break; splintered. 379 11.0 21.6 34.6 225	6. 0	12.0	18.0	25. 0	0.6	25. 5	32.5	45. 0						300	do	634
5. 6 11. 0 10. 6 22. 0 0. 4 22. 5 28. 5 279 do 662 10. 0 10. 0 30. 0	5, 6	10.9	16.5		0.5	23. 0	29. 0	35. 5			100			334		662
10.0 10.0 30.0					0.7	723	29. 0		*****					279		1
11.0	5. 9	11.0	16.6	22. 0	0.4	22, 5	28. 5				1			279	do	662
9.4 18.0 28.0 38.7 2.0 40.7	10.0	19. 0	30.0	*****					Andrew .		*****	*****		194	Square break; splintered	379
7.5 16.6 24.0 33.5 1.2 34.6	11.0	21. 6	34. 6					A						188	do	379
7.8 15.0 23.2 191 Broke with coarse splinters. 783 8.3 16.0 24.5 35.5 2.0 37.0 240 Square break; splintered. 790 8.0 16.8 26.0 36.2 1.6 37.2 250 Square break; splintered. 790 14.7 29.0 50.5 168 Square break; splintered. 792 18.2 37.5 63.0 151 Square break; splint to end. 792 6.4 12.5 19.5 27.5 1.6 28.7 250 do 7.3 13.4 20.5 28.5 1.4 29.0 39.0 2284 do 874 9.0 17.5 27.0 38.0 2.4 40.5 250 do 1099 9.5 18.0 28.5 30.0 2.1 40.8 55.0 279 Square break with long splinters 1099 4.0 8.5	9, 4	18.0	28. 0	38. 7	2. 0	40.7								232	Square break on tension side, splitting in axis	782
8.3 10.0 24.5 35.5 2.0 37.0	7.5	16. 0	24, 0	33. 5	1.2	34. 6			A. Marie	1.0			P.R.	225	do Projection	783
Section Sect	7.8	15.0	23. 2								1			191	Broke with coarse splinters	783
14.7 29.0 50.5 168 Square break 792 17.5 33.2 150 Square break; split to end 792 18.2 37.5 63.0 151 Square break 792 6.4 12.5 19.5 27.5 1.6 28.7 250 do 874 7.3 13.4 20.5 28.5 1.4 29.0 39.0 284 do 874 9.0 17.5 27.0 38.0 2.4 40.5 250 do 1099 9.5 18.0 28.5 30.0 2.1 40.8 55.0 279 Square break with long splinters 1099 4.0 8.5 13.0 17.8 0.4 18.0 23.0 30.0 349 Shattered 1017 5.0 9.5 14.0 19.0 0.5 19.0 24.0 31.0 350 Square break 1017 5.6 10.5 15.5 21.7 0.8 22.2 31.0 271 Shattered 1021	8. 3	16.0	24.5	35. 5	2.0	37. 0								249	Square break; splintered	790
17.5 33.2 155 Square break; split to end. 702 18.2 37.5 63.0 151 Square break 792 6.4 12.5 19.5 27.5 1.6 28.7 250 do 874 7.3 13.4 20.5 28.5 1.4 29.0 39.0 284 do 874 9.0 17.5 27.0 38.0 2.4 40.5 250 do 1099 9.5 18.0 28.5 39.0 2.1 40.8 55.0 279 Square break with long splinters. 1099 4.0 8.5 13.0 17.8 0.4 18.0 23.0 30.0 349 Shattered. 1017 5.0 9.5 14.0 19.0 0.5 19.0 24.0 31.0 350 Square break 1017 5.6 10.5 12.5 21.7 0.8 22.2 31.0 271 Shattered 1021 4.8 9.5 14.5 20.0 0.8 20.0 26.7 37.0<	8.0	16.8	26. 0	36. 2	1.6	37. 2			*****					250	Square break; splintered	790
18. 2 37. 5 63. 0 151 Square break 792 6. 4 12. 5 19. 5 27. 5 1. 6 28. 7 250 do 874 7. 3 13. 4 20. 5 28. 5 1. 4 29. 0 39. 0 284 do 1099 9. 5 18. 0 28. 5 39. 0 2. 1 40. 8 55. 0 279 Square break with long splinters 1099 4. 0 8. 5 13. 0 17. 8 0. 4 18. 0 23. 0 30. 0 349 Shattered 1017 5. 0 9. 5 14. 0 19. 0 0. 5 19. 0 24. 0 31. 0 350 Square break 1017 5. 6 10. 5 15. 5 21. 7 0. 8 22. 2 31. 0 271 Shattered 1021 4. 8 9. 5 14. 5 20. 0 0. 8 20. 0 26. 7 37. 0 308 Square break on tension side, splitting in axis 1021	14.7	29. 0	50. 5				*****							168	Square break	792
6. 4 12. 5 19. 5 27. 5 1. 6 28. 7	100	marki		******	Section									150		40000
7.3 13.4 20.5 28.5 1.4 29.0 39.0 284 do 17.5 27.0 38.0 2.4 40.5 1099 9.5 18.0 28.5 39.0 2.1 40.8 55.0 279 Square break with long splinters. 1099 4.0 8.5 13.0 17.8 0.4 18.0 23.0 30.0 349 Shattered. 1017 5.0 9.5 14.0 19.0 0.5 19.0 24.0 31.0 350 Square break 1017 5.6 10.5 15.5 21.7 0.8 22.2 31.0 271 Shattered. 1021 4.8 9.5 14.5 20.0 0.8 20.2 26.7 37.0 308 Square break on tension side, splitting in axis. 1021 18.0 38.0 10.0 140 do 350 350 18.0 32.5 47.5 5.2 50.2 206 Square break on tension side, splitting in axis. 350 19.4 19.0 29.6 46.0 5.2 <td< td=""><td></td><td>Design of</td><td>W1 - 45</td><td></td><td></td><td></td><td>******</td><td></td><td></td><td></td><td></td><td></td><td></td><td>PHE</td><td></td><td>14300</td></td<>		Design of	W1 - 45				******							PHE		14300
9. 0		440												17900		10100
9.5 18.0 28.5 39.0 2.1 40.8 55.0 279 Square break with long splinters. 1099 4.0 8.5 13.0 17.8 0.4 18.0 23.0 30.0 349 Shattered. 1017 5.0 9.5 14.0 19.0 0.5 19.0 24.0 31.0 350 Square break 1017 5.6 10.5 15.5 21.7 0.8 22.2 31.0 271 Shattered. 1021 4.8 9.5 14.5 20.0 0.8 20.0 26.7 37.0 308 Square break on tension side, splitting in axis. 1021 18.0 38.0 140 do 350 14.3 29.2 50.5 35.0 32.5 47.5 5.2 50.2 250.2 266 Square break on tension side, splitting in axis. 350 11.5 23.5 36.0 54.0 5.6 55.0 235 Square break on tension side, splitting in axis. 850 11.0 22.0 33.2		CASTA NO.	-4-0				39, 0							100		1000
4.0 8.5 13.0 17.8 0.4 18.0 23.0 30.0 31.0 349 Shattered 1017 5.0 9.5 14.0 19.0 0.5 19.0 24.0 31.0 350 Square break 1017 5.6 10.5 15.5 21.7 0.8 22.2 31.0 271 Shattered 1021 4.8 9.5 14.5 20.0 0.8 20.0 26.7 37.0 388 Square break on tension side, splitting in axis 1021 18.0 38.0 38.0 38.0 39.0 32.5 47.5 5.2 50.2 20 206 Square break on tension side, splitting in axis 350 11.5 23.5 36.0 54.0 5.6 55.0 20 20 Square break on tension side, splitting in axis 850 11.0 22.0 33.2 20 20 Square break 20 Square break 20 Square break 351 9.4 19.0 29.6 46.0 5.2 49.5 30.0 32.5 49.5 30.0 54.0 5.2 49.5 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30		45000000					55.0					11111		(Control		-
5.0 9.5 14.0 19.0 0.5 19.0 24.0 31.0 350 Square break 1017 5.6 10.5 15.5 21.7 0.8 22.2 31.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 2	4.0	20.0	20, 0	50.0	2.1	40.0	50.0						*****	218	Square break with long spinners	1000
5.6 10.5 15.5 21.7 0.8 22.2 31.0 271 Shattered 1021 4.8 9.5 14.5 20.0 0.8 20.0 26.7 37.0 388 Square break on tension side, splitting in axis 1021 18.0 38.0 38.0 38.0 38.0 38.0 38.0 38.0 3	4.0	8.5	13.0	17.8	0.4	18. 0	23. 0	30.0						349	Shattered	1017
4.8 9.5 14.5 20.0 0.8 20.0 26.7 37.0 308 Square break on tension side, splitting in axis. 1021 18.0 38.0 140 </td <td>5. 0</td> <td>9.5</td> <td>14.0</td> <td></td> <td>0.5</td> <td></td> <td>24. 0</td> <td>31.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>350</td> <td>Square break</td> <td>1017</td>	5. 0	9.5	14.0		0.5		24. 0	31.0						350	Square break	1017
18, 0 38, 0 <		(0) (0) (0) (0)						*****			*****			271		The same of
14.3 29.2 50.5	4.8	9.5	14.5	20.0	0.8	20. 0	26.7	37.0						308	Square break on tension side, splitting in axis	1021
14.3 29.2 50.5	18, 0	38. 0			*****		7.7.7.7.7.7	*****						140	do	350
11.5 23.5 36.0 54.0 5.6 55.0 235 Square break	14.3	29. 2	50, 5	****												350
11. 0 22. 0 33. 2 200 Square break on tension side, splitting in axis 851 9. 4 19. 0 29. 6 46. 0 5. 2 49. 5	9.8	20.0	32, 5	47.5	5, 2	50.2	125757	******						206	Square break on tension side, splitting in axis	850
9.4 19.0 29.6 46.0 5.2 49.5	11.5	23. 5	36. 0	54. 0	5, 6	55, 0						*****		285	Square break	850
	11, 0	22. 0	33. 2				100000	110000						200	Square break on tension side, splitting in axis	851
12.6 26.0 38.0 63.0 8.2	9, 4	19.0	29.6	46.0	5. 2	49. 5		*****						217	Square break	851
	12. 6	26.0	38. 0	63. 0	8. 2			******						200	do	852

Species State						gravity of dried speci-	grain.	COEFFIC		Fundanto
Second S	pecies.	State.	Locality.	Collector.	Soil.	Specific gratthe the air-drie	Jo	First deflec- tion.	Second de- flection.	Modulus of r
960 Dritish Columbia Savemili, Visioria G. Esgedman and 0.057 121 122 124 125 126	oress. Sitka Cupress.		201			100000	100		814	8
Sep Alaska Pert strais Paul Schultze 0.514 110	96	STANDARD STANDARD	TO THE PARTY OF TH	G. Engelmann and			國		976 1221	10
1000	98	3do	do			0. 5114	廖	1110	1191	1
1. Chammerparis Lawsonlans	90	4 Alaska	Peril strait	Paul Schultze		0. 5074	2	1163	1149	1
1000 do Weiller's aser-mill, G. Bugelmann and 0. 5078 814 88 88 88 88 89 89 90 100 do do do do do do do	90	4do	do		Semene in the sement of	0.4913	뾜	1085	1122	1
1000 do do do do do do do	91	4do	do			0. 5267		1320	1221	
Post Ordered Critars Organics dor. Mais Color. Laure 1221 122 12	-	M Marie De Morkey	Portland.	C. S. Sargent.		District Co.			842 723	
Port Ordered Celars Organics Cale Ca		u Orozon	Doon & Co is saw.	de		TOTAL SE	9777	004		
Cypress Ginger Pine.	d Cedar. Oregon Ce-		mill, Marshfield.			market and	E277	11000		
2. Cupressus merocarpa. 675 California. Mentercy. 60 Gravelly leam 0.6307	Ginger Pine.					X 01 150 5 700	>		1502	1
Montercy Cyperess.			V		C		mm			
3. Cupressus Goveniana	hypress.	2012	The state of the s	and the same of th	Section of the sectio	0735230000000		17797	1062	1
691 do			Warin country	C. P. Vesser	Dall	The Street	5777	1100	THE STATE OF	1
1100 do					100	D 4506		(West)	1 14300 2	
1100		704		Other Manual		and contract		Sept.	2300	
Juniper. 602 do do do do do do do d				1812		A Person		13657	407	
692 do do do do do do 0.5419 595 5	achyphlæa 69	2 Arizona	Santa Rita mount-	G. Engelmann and	Gravelly	0. 5630		610	630	
Justing 14 Massichusetts Arnold Arboretum C. S. Sargent Drift 0.5316 509 50 500 14 51 509 500 500 514 51 509 500 514 51 509 500 514 51 509 500 514 51 509 500 514 51 509 500 514 51 51 509 500 514 51 510 500 500 514 51 510 510 514 51 510 510 514 51 510 510 514 51 510 51	69	2do		do	do	0. 5419	圆	595	595	
	ccidentalis, var. con-	2 Texas	Austin	S. B. Buckley	Limestone	0. 7347		751	734	
14	rginiana 1	4 Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0.5316		509	501	
327 do		4do	do	do	do	0. 5302		514	514	H
Florida Chattahoochee A. H. Curtiss do 0.5723 787 787 784 do do do do do do 0.5354 814 84 880 do Saint John's river do Sandy loam 0.5558 787 788 880 do do do do do do 0.5855 904 88 924 do Chattahoochee C. Mohr Alluvial 0.4997 888 88 1249 Tennessee Wilson county A. E. Baird 0.7373 588 68 1250 do do do do 0.6029 444 47 47 47 47 48 48 4	32	7 Texas	Dallas	J. Reverchon	Calcareous	0. 5357	圆	595	610	
734 do do do do do 0.5354 814 84 800 do Saint John's river do Sandy loam 0.5558 787 78 800 do do do do do do 0.5885 904 88 924 do Chattahoochee C. Mohr Alluvial 0.4907 888 88 1249 Tennessee Wilson county A. E. Baird 0.7373 588 68 1250 do do do do 0.6029 444 47 1251 do do do do 0.5671 488 54 1252 do do do do 0.6398 718 69 1253 do do do do 0.6398 718 69 1254 do do do do 0.5307 561 60 602 602 602 603	32	7 do	do	do	do	0. 5239		610	630	ı
Solution Saint John's river	78	4 Florida	Chattahoochee	A. H. Curtiss	do	0.5723	廖	787	787	1
800 do do do do do do 0.5385 904 88 924 do Chattahoochee C. Mohr Alluvial 0.4997 888 88 1249 Tennessee Wilson county A. E. Baird 0.7373 588 68 1250 do do do 0.6029 444 47 1251 do do do 0.5671 488 54 1252 do do do do 0.6398 718 69 1253 do do do do 0.6398 718 69 1253 do do do do 0.5307 561 60 1254 do do do do 0.5307 561 60 1254 do do do do do 0.4907 1163 112 1254 do do do do do do do d	78	4do	do	do	do	0. 5354		814	849	1
1249	SC	0do	Saint John's river	do	Sandy loam	0, 5558		787	781	ľ
1249 Tennessee Wilson county A. E. Baird 0.7373 588 68 68 68 68 68 68 6	80	0do	do	do	do	0.5385	圆	904	888	
1250	92	4 - 20 100	1000	C. Mohr	Alluvial	0.4997	뾜	888	888	
1251 .do .do	124			A. E. Baird		0. 7373		588	688	
1252 do do do do 0.6398 718 69 1253 do do do do 0.6670 581 59 1254 do do do do 0.5307 561 60 1254 do do do do do 0.5307 1163 112 1254 do do do do do do do 0.4907 1163 112 1255 Bald Cypress Black Cypress Black Cypress Black Cypress White Cypress S35 do do do do do 0.4923 1110 116 1255 Deciduous Cypress White Cypress S35 do do do do do 0.4923 1110 116 1255 do do do do do do 0.4923 1110 116 1256 do do do do do do do d						0.6029		444	474	
1253 do	125							488	542	
1254 .do .do	125	2do	All the same of th			0. 6398	巡	718	697	ı
D. Taxodium distichum	125	3do		do		0, 6670	圆	581	595	ľ
Bald Cypress. Red Cypress. Black Cypress. 535 do	125	4do	do	do		0, 5307		561	603	
Deciduous Cypress.	stichum						國		1122	
741 do	ress. White Cypress. 53	The state of the s	The Name of the last of the la		do	0. 4923	巡	1110	1163	
Sequoia gigantea							劉爾	WHAT I	904	1
Big Tree. 657dod			SAULT LIGHT TO							
666do	ANALOS CALIFORNIAS CONTRACTOR IN			C. S. Sargent.	NAME OF TAXABLE PARTY.			Talleck Co.		1
		- Charles and Charles	BELLEVILLE TO STATE OF THE STAT					1000	315	V.
2. Sequoia sempervirens 673do			Russian river					10.000	558	

THE WOODS OF THE UNITED STATES.

1	DEFLEC	TION,	IN MIL	LIMETI	RRS, U2	NDER 2	PRES	SURE,	IN KIL	OGRAM	s, of-		rength:		
50	100	150	200	0 (set.)	200	250	300	350	400	450	500	550	Ultimate st transverse p	Remarks.	
6. 0	12.0	18.0	24.7	1.0	24. 5	31.5	41.0	60.7					363	Square break; splintered	
5.5	10.0	15.0	21.0	1.0	21. 2	29. 5							297	Crushed at center bearing; square break	1
4.0	8, 0	12.0	16. 0	0.4	16. 0	20.0	25. 5	31.7	42.0				435	Crushed at center bearing; square break, splitting in axis	
4.4	8, 2	12.5	17. 0	0.5	17.5	21, 5	28. 0	36, 0					397	do	
4.2	8. 5	12.5	17. 2	0, 4	17. 0	22. 0	28. 5	39, 5		*****			372	do	
4.5	8.7	13, 5	17.6	0. 2	18, 0	22.5	29. 0	37. 0	53. 0				400	Shattered	1
3. 7	8. 0	11.5	15. 4	0.0	15.0	19, 0	24. 0	31.5	1 2222	*****			397	do	1
6. 0	11.6	17. 5	24. 2	1.0	24. 4	31.5	100001		******			200000	298	do	
6. 4	13. 5		102007		224224	*****	*****	*****	******	010017		*****	120	Specimen cross-grained; started at knot	
5.4	10.5	15.6	21.6	0.6	22.4	29. 0	37. 0						350	Square break; shattered	
4.0	8.0	12.0	16.4	0.4	16. 5	21.0	28. 0						349	Crushed at center bearing; square break on tension side, splitting	
3. 0	6.5	9.6	12.7	0.2	13.0	16.0	20.0	25. 4	32.0		X.		439	in axis. do	
			Law de						0	07				SCO / SCOTO	
5. 0	9. 2	13. 5	18. 0	1.0	18.0	22. 5	28. 0	33. 0	40.0		******		444	Square break on tension side, splitting in axis; shattered from end to end.	1
4. 5	9. 0	13.5	17. 6	0.3	18.0	22, 5	27.5	34. 0	42. 0	107000	*****	*****	449	do	۱
10.8	21.4	35. 0	49.0	5.0	49.0		4.6.					*****	222	Shattered	
9. 5	18.0	27.8	40.0	3.4	41.7	58. 0							281	do	
8. 0	16. 5	25. 5	35. 0	1.5	35.7	46.4	7	/					271	Specimen cross-grained; shattered	
0.7	24. 0												146	Specimen cross-grained; splinter on corner	
181		2012	1												
8.0	15.5	24. 0	32.5	1.0	32. 4	42. 5	55. 0						334	Shattered	1
8. 2	16.4	25. 0	34. 0	1.1	34. 0	44.0	58. 5			4			315	do	1
6. 5	13. 3	20. 5	28.0	1.6				200,000					200	Specimen cross-grained; shattered	
9.6	19.5	29. 0	40. 6	1.9	40.0	52. 0				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	17.00	200000	299	Shattered	
9. 5	19. 0	29. 0	40. 0	2.0	40.5	53. 0	70. 0					2011	317	do	
8. 2	16.0	25. 0	33. 2	1. 2	33. 5	43. 0	56. 0	73. 5					363	do Co	
8. 0	15. 5	24.0	31.0	0.8	32. 0	20.0	20.0				7	PR	240	do	
6. 2	12.4	18. 2	24. 5	0.7	24. 5	31.7	38. 5	47. 2	59. 5	45			449	0.25 sap-wood; square break on tension side, splitting in axis	
6.0	11.5	17.0	23. 0	0.4	23. 0	29.0	35. 7	45. 5	54. 5		B	3000	440	0.5 sap-wood; square break; split end to end	Н
6.2	12.5	19. 2	26. 5	1.1	26.7	35. 0	43.5			7		00000	322	Square break at knot; split to end	-
5. 4	11.0	16. 5	21. 7	0.3	22.0	28. 2	35. 0	A PROCESS	101000000	115135		1	344	Square break on tension side, splitting in axis	
5. 5	11. 0	16. 1	21.5	0.2	21.8	27. 7	34. 5	43, 5			11111-111	2000 marks	379	Square break; split parallel to pressure	
8.3	14.2	21.4	28. 0	0.8	29. 0	34.7	48.5	1000000			CO. T. L.	ALCOHOLD STATE	320	Specimen not seasoned; shattered	
1.0	20. 6	31.0	10000		(Control)				1000			1	168	Specimen not seasoned; cross-grained	
0.0	18.0	26. 0	34. 0	1.5							10000	-	200	Specimen not seasoned; cross-grained; split to end	
6.8	14. 0	21.5	28.7	1.3	30.0	36. 5	45. 2	58, 0	0.000000			CHO FET COLUMN	381	Specimen not seasoned; shattered	
8.4	16.4	25. 6	37. 0	4.1	39.0				-				222	Specimen not seasoned; square break on tension side, splitting in	
8.7	16. 2	26. 0	36. 0	2.4	37. 0	48.0	66. 0					Tarana and	300	axis. Specimen not seasoned; shattered	
	1000			11.00.00						100000000					1
4.2	8.7	12.9	17. 5	0.5	18. 2	24.5							288	Square break	н
4.4	8,4	13.0	17. 9	0.6	18, 2	24.0							284	Crushed at center bearing with flakes on tension side	н
5.4	10.8	16.7	23. 5	1.0	24.5	33, 0							293	Square break on tension side, splitting in axis	-
5, 2	10.4	16.0	22.8	1.1	23. 0	30, 8						*****	298	Broke with coarse splinters	
8. 2	16.4	25. 0	34. 0	1.2	35. 0								218	Square break on tension side, splitting in axis	
1.5	22. 0	34. 0	49. 0	3.6							1	-	200	Square break	
13. 6	31.0	54. 0		Lungar					0			100	171	Sap-wood; shattered	
		11			1				17-11	N I I					
8.5	17. 5	27.0	38. 0	2.0	38. 5	52. 5		*****					272	Square break; split to end	-
6.2	13.0	19.0	26. 2	0.5	26. 5	34.5							300	do	

	Œ.					gravity of dried speci-	grain.	ELAST	CIENT OF	1000
Species.	Office number	State.	Locality.	Collector.	Soil.	Specific gra the air-dric men.	Direction of	First deflec- tion.	Second de- flection.	A. A
	ОЩС					Spec	Dire	Firs	Seco	1000
2. Sequoia sempervirens—continued .	710	California	Santa Cruz	Turner, Kennedy & Shaw.		0, 4443	123	697	697	
	711	do	do	do		0, 4525	巡	751	751	100
	711	do	do	do		0.4419	劉	542	558	1
	712	do	Mendocino county	J. Kentfield & Co.		C. 3239	廖	543	568	1
	712	do	do	do		0. 3239	圆	651	651	1
	713	do	do	do	******************	0.3841	巡	814	849	1
	713	do	do	do		0.3648	寥	751	708	1
	714	do	do	do		0. 5289	寥	751	751	
	714	do	do	do		0. 5243	圆	651	666	
	715	do	do	do		0.5533		651	610	1
	000		* ACTION			- 2.3	מתפו			
3. Taxus brevifolia	978	Oregon	Portland	G. Engelmannand C. S. Sargent.		0. 6743	W	814	849	1
William Town	978	do	do	do	do	0.7110	國	697	673	1
. Torreya taxifolia	62	Florida	Chattahooches	C. S. Sargent	Alluvial	0.5993	國	651	651	
Stinking Cedar. Savin.	277	do	do	A. H. Curtiss	Calcareous	0.4693	题	872	921	
	277	do	do	do	do	0. 4639		939	913	ı
						0, 3000	Ш	200	*10	ŀ
. Torreya Californica	651	California	Marin county	G. R. Vasey	Stony	0.5063		407	430	
Cedar.	651	do	do	do	do	0.5135	廖	444	444	
Dinna Stanbura		7f	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0.5.5	7.0		ппп	1200	2/2	1
White Pine. Weymouth Pine.		Massachusetts	Arnold Arboretum .	C. S. Sargent	Drift	0. 4301	2770	751	849	
	1	do	do	do	do	0.4090	1 DY	921	930	ı
	222	Vermont	Charlotte	C. G. Pringle	Wet, swampy	0.6204		574	592	
	777	New Brunswick		Intercolonial rail- way.	.,	0. 3671		651	638	ı
	777	do		do		0. 3932	巡	1085	1039	
	788	do	Bridgeton	Ed. Sinclair	•••••	0.4022		1085	1062	ı
	788	do	do	do	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0.4088	廖	1039	1039	
	789	Province of Quebec	Amqui	A. Grant		0.3698	寥	763	751	
	789	do	do	do		0, 3671	蓼	775	751	ı
	797	do		Grand Trunk rail-		0.4092	寥	976	976	
	797	do		way.		0, 3938	廖	842	849	
	1044	Massachusetts	Reading	J. Robinson	Drift	0.3710	IIII	688	697	ı
	1044	do	do	do	do	0.4549	蓼	872	888	ŀ
Di-							19111	100.000	Sec. No.	ı
3. Pinus monticela	975	British Columbia	Hastings' saw-mill, Burrard inlet.	G. Engelmann and C. S. Sargent.		0. 4323		1163	1191	
	987	Oregon	Cascade mountains .	C. S. Sargent	Moist loam	0.3682	Щ	751	740	l
	987	do	do	do	do	0.3699		957	921	
). Pinus Lambertians	638	California	Saw-mill, Straw-	G. Engelmann and		0.4301	國	888	888	İ
Sugar Pine.	668	do	berry valley.	C. S. Sargent. G. R. Vasey		0.3927		740	740	
	668	do		do		0.3971		814	814	
The state of the s	730	do	Lassen's peak	Sierra Lumber		0. 3363		763	787	
	730	do	do	Company.		0. 3307	誾	740	740	1
		5				U. UAUT		1910	150	
). Pinus flexilis	819	Colorado	Forest City	T. S. Brandegee	Gravelly	0.4602		751	787	
Walle Comment	819	do	do	do	do	0.4642	圆	651	697	
	819	do	do	do	do	0.4733		787	835	1
	913	Nevada	Danwille	A. Triple	do	0.4664	Imm	381	381	
1 Pinns albiasella	000	Delites Co.	001	0 11-		THE CASE OF SERVICE	P77770	Total Control	erusa.	
1. Pinus albicaulis	992	British Columbia	Silver Mountain val- ley, Fraser river.	C. S. Sargent,	***************************************	0.5066		370	348	
	992	do	do	do		0.4587		679	673	

-	DEFLI	ction,	, PN MI	LLIME	TERS, U	NDER .	PRES	SURE, 1	N KILO	GRAME	, of-		strength:	
	100	150	200	0 (set.)	A CONTRACTOR	250	300	350	400	450	500	550	Ultimate st transverse p	Remarks.
0	14.0	21. 2	29. 5	1.0	30.0	39, 0							279	Square break
5	13. 0	19.4	26.0	0.5	26. 4	33.5							248	Square break; shattered
0	17.5	26, 6	36. 3	1.7	37.0								252	Square break
0	17.2	26.6											168	Shattered with flakes on tension side
5	15.0	22, 4	32. 0	1.5	33, 5	******							250	Square break
0	11.5	17. 2	23. 5	0.7	24.0			12220					238	Square break on tension side, splitting in axis
5	13, 8	20.0	27.7	1.0	28.4	38, 0	000501	153521	101001	500000		*****	270	Square break
5	13.0	20.0	26. 6	0.6	27.0	34.0	50. 0	102120		*****			313	Shattered from end to end
5	14.7	22.0	29, 5	0.9	30.0	38. 0	48.0	100000			227021	*****	343	Square break
5	16. 0	*****	*****			*****	*****	*****	*****		*****	*****	126	Specimen with curly grain; square break on tension side, splitting in axis.
0	11.5	17.8	24. 0	0.9	24. 0	31.5	38. 0	47.0	59. 3	75.0			490	Square break on tension side, splitting in axis; shattered
0	14.5	21.5	29.7	1.7	30.0	39.0	49.0	61. 6	84.0	A.			431	do
-	75.0	00.5	21.0		27.0	41.0	10 A	00 -	00 5				400	Shattered
5	15.0	22.5	22.3	9.4	31. 0	28.7	52. 0 35. 5	66. 5	92.5	******		*****	403	Square break on tension side, splitting in axis; shattered
3	10.6	16. 5	22.6	0. 5	22. 2	28. 5	85, 5	47. 0	77	*****	******		372	do
9	400.4	10.0	22.0	0.0	56v S	20.0	00.0	30, 2					012	
)	22.7	34, 5	50.5					1.4.4.					200	Broke at small knot at point of compression
	22.0	33. 0	46. 5	3, 1	49. 5	68, 0	-		1717.5				298	Square break on tension side, splitting in axis; also broke at knot near the end.
	11.5	17. 2	23.8	1.2	24. 2	32. 0	0				MAL	VIII	266	Square break with scale on tension side
3	10.5	16.4	22.8	0.5	23. 2	31. 0							291	Square break on tension side, splitting in axis; shattered
5	16.5	25. 0	34. 3	2.3	35, 0	46.5	62. 0						343	Square break; shattered
5	15.3	22. 6							-				181	Cross-grained
5	9.4	14.0	20.0	1.0	10000000	29. 0			0	1.	12	27	271	Started at knot
5	9. 2	14. 2	19.8	0.6	21.0	29. 0				12000			279	Crushed at center bearing; square break
7	9.4	14.8	20.5	0.3	21.0	28. 0	1						293	do
1	13. 0	20. 7	30.0	2.0	31.0								243	Square break
3	13. 0	20.0	32.3	3.6	33. 5			A				PR	225	do
)	10.0	15. 4	21.6	1.0	21. 8	30.0				1			397	Square break; split to one end
3	11.5	17.8	25. 2	1.3	25. 2	36. 0							265	Square break
1	14.0	22.4											167	Specimen cross-grained; broke at large knot
3	11.0	17.0	24.0	1,3	24. 6								249	Crushed at center bearing; splinter on corner
	8. 2	12.5	17.1	0.7	17.5	24. 0			1				000	C-1-3 -44- 1-3-1- 1-1-1/1 01/1-1-
,	13. 2	20. 2	32.1	3.8	34. 2	24. 0	*****						292	Crushed at center bearing; broke with fine splinters
	10.6	16. 2	23. 5	1.3	24. 0	35, 0							263	Square breakdo
	20.0	10.2	20.0	1.0	23.0	50,0							200	
5	11.0	17.0	23, 0	0.6	23. 0	30.2	*****	*****					293	Square break on tension side, splitting in axis
3	13, 2	20. 3	29. 0	1.2	29. 0	127723	*****				*****		246	Shattered
)	12.0	18. 2	26. 0	1.0	26. 0	35. 0	*****						280	Square break
	12, 4	18. 7	28, 0	2.4	29. 5					*****	*****		231	Crushed at center bearing; square break
3	13. 2	20. 6	32. 0	3.0	32. 8	****	*****			*****			226	Square break
,	12.4	18.9	26. 0	1.0	27.0	35, 0							293	Square break; shattered
5	14. 0	21.6	31. 0	2.0	-	46. 2							271	do
2	11.7	17.5	24. 0	0.8	12-11	32. 0	43. 0						331	Specimen cross-grained; square break on tension side, splitting in
3	25. 6	41, 5											169	axis. Square break at knot
	TO SHARE	100	- Independent	C100 (2)		11				233 4 7 8	Accessi	MIL	1000	
2	28. 0	46.0		*****		*****	*****						198	Square break; shattered
2	14.5	22.5	31.0	1.2	32. 0	42.0							299	do

		ar.		· Valley	413		d speci-	grain.	ELAST	HENT OF	upture
	Species.	Office number	State.	Locality.	Collector.	Soil.	Specific gravity of the air-dried speci- men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of rupture
352.	Pinus reflexa	661 661	Arizonado	Santa Rita mountains do	G. Engelmann and C. S. Sargent.		0. 5261 0. 5392	目额	814 939	849 *976	68 85
353.	Pinus Parryana	656 656	California	Son Diego county	G. R. Vasey		0. 6862 0. 6342		390 444	349 407	34 50
55.	Pinus edulis	397	Colorado	Cañon City		Gravelly	0. 6704		429	421	44
56.	Pinus monophylla	882 915	Utah Nevada	Lewiston Danville	M. E. Jones	RockyGravelly	0. 5894 0. 6579		421 519	415 454	28
57.	Pinus Balfouriana	631 631	California	Scott mountains	C. S. Sargent.		0. 5623		542	528	29
57.	Pinus Balfouriana, var. aristata Foztail Pine. Hickory Pine.	821	Colorado	Forest City	T. S. Brandegee	do	0. 5714		651 568	574	46
	Poster I view I trading I view	821 821	do	do	and the state of t		0. 4987 0. 4811	図図	888 842	888 763	77 68
58.	Pinus resinosa	914	Nevada Michigan	Prospect mountain.		Rocky	0. 6249		651	634 1395	69
1	Red Pine. Norway Pine.	315 785	New Brunswick	do	do Ed. Sinclair		0. 5511 0. 4951	圆圆	1320 1039	1375 1039	73
		785 1074	Vermont	do	Charles and the Charles	SECTION SECTION SECTIONS	0. 4191 0. 4886	國國	888 1221	849 1110	67
		1075 1076	STATE OF THE PARTY	do	District of the state of the st	The state of the s	0. 4789 0. 5221	<u></u>	976 1039	1007 1062	81
59.	Pinus Torreyana	1076	California	do		Sandy	0. 5164		1163 634	1221	71
		996	do	do	do	do	0. 5800		542	454	70
30.	Pinus Arizonica Yellow Pine.	1154	Arizonado	Santa Rita mountains.	C. G. Pringle	do	0. 6570		763 814	746 835	5
		1155 1155 1156	dodo	do	do	do	0.4749		814 872 729	857 888 794	71
51.	Pinus ponderosa	619	Dakota	Deadwood	Robert Douglas		0. 4250		1221	1285	8
		626 630	Oregon	Saw-mill, Ashland Strawberry valley	G. Engelmann and C. S. Sargent.		0. 4788 0. 4814		1356 191	1252 190	9
		630 632	do	Saw-mill, Straw- berry valley.	do		0. 4748 0. 5502	図図	266 1221	264 1221	90
		636	do	Saw-mill, San Ber- nardino.	W. G. Wright		0. 4429		1285	1302	104
		718 718 731	Montana	Saw-mill, Missoulado		·····	0. 4502 0. 4750 0. 4795		1163	1110 1163	8:
		731	A STATE OF THE PARTY OF THE PAR	Lassen's peakdo	pany.		0. 4795 0. 4863 0. 5206		1221 1163 313	1221 1163 305	71
		910	The state of the s		do		0. 5277		271	247	4:
62.	Pinus Jeffreyi Bull Pine. Black Pine.	633	California	Scott mountains	G. Engelmann and C. S. Sargent.		0. 5678 0. 5758	図図	498 417	506 894	3
		667	do	Saw-mill, San Ber- nardino.	W. G. Wright		0. 5948	圆圆	1221 1627	1320 1479	90

THE WOODS OF THE UNITED STATES.

- 3	DRFLEC	ction,	IN MIL	LIMETI	ers, u	NDER /	A PRES	SURE,	IN KIL	OGRAM	s, of-		ength;		1
50	100	150	200	o (set.)	200	250	300	350	400	450	500	550	Ultimate strength; transverse pressure	Remarks.	Office number
6. 0	11.5	17. 5	24. 2	1.0	25. 0	32, 0							294	Specimen cross-grained; failed with long split	. 66
5. 2	10.0	15.0	20.0	0.8	20. 2	25, 6	33, 0	43. 0					363	do	66
2.5	28. 0												148	Broke at knot near end	65
1.0	24.0	37. 2	55. 0	7. 0	59, 2								215	do	63
1.4	23. 2	39. 2											191	Broke at knot.	. 39
1.6	23. 5												120	Specimen cross-grained; broke at knot	. 88
9. 4	21.5												126	do	1
0.0	10.5				13%		300	200					201		-
9. 0	18.5	23. 2	32. 5	3. 2	34.5		*****			The - U.S.	******	******	124 238	Square break	63
1.0	14.0	44.4	04.0	0.2	34. 3	******			100100		77	TE	200	Square break	06
8.6	17. 0	25. 7	36.0	2.5									200	do	85
5.5	11.0	17.3	23. 5	0.9	23. 5	31.0	40.0	//	6.7	//	- 40		329	0.25 sap-wood; specimen cross-grained.	1 50
5.8	12.8	19.0	26.3	1.1	27. 0	36. 0	The state of the s	1		100			290	Square break with split at end	1 25
7. 5	15.4	24. 0	34. 2	3.0	35, 7	46. 2	773					*****	296	Shattered	91
3. 6 3. 7	7.0	10.7	14. 5 14. 0	0.3	14. 6 14. 0	18.8	24.0	31. 0 28. 5					382	Crushed at center bearing; square break on tension side, splitting in axis. Crushed at center bearing; square break	
4.7	9.4	14.0	19. 2	0.8	19.5	25, 7	35. 0				=0)		344	Specimen cross-grained; shattered	78
5. 5	11.5	16.8	23. 5	0.8	24. 0	32.0					DAM		286	Square break	
. 0	8.8	13. 0	17. 6	0.3	17.6	23.0	30.0						330	Square break on tension side, splitting in axis	10
. 0	9.7	15.0	20.0	0.6	20.3	26. 0	40. 2						300	Square break on tension side, splitting in axis; crushed at center	10
. 7	9. 2	14. 0	19.5	0.7	19.5	25. 0	33. 0						347	bearing. Square break; crushed at center bearing	. 10
. 2	8, 0	12.3	16. 6	0.5	17.0	21. 5	28.4	7					341	Broke with long scale	. 10
. 7	15. 5	22.4	30.8	1.9	31.5	41.5	55. 5	277					345	Shattered	. 9
0.0	21.5	34. 6	50. 2	7.5	51.7	73. 0	- control			400	office a dec	1000 Sec. 11	300	do	
	10.				20.0		40.0		0		UT	PR	25	10/25//	
. 4	13.1	20. 0	27. 5	1.0	28. 2	36. 0				1	MI T		236	Square break on tension side, splitting in axis	1000
. 0	11.4	16.6	23. 2	1.1	24.0	31.0				1	14		253	Specimen cross-grained; broke at knot	1 30
. 6	11.0	16.6	22. 1	0.8	22.1	29. 0	555 255				- Trades		328	Square break on tension side, splitting in axis; shattered	11
. 7	12.3	19. 0	26. 5	1.1	27.0	35, 0	****						276	Square break; split to one end	1 1000
	7.0	** *	15.5	0.0	15.0	10.5	07.0	111 E					nen.		
. 6	7. 6	11.5	15. 5 15. 5	0.3	15, 3	19. 5 20. 0	25. 0 24. 2	31. 5					376	0.75 sap-wood; crushed at center bearing; square break on tension side, splitting in axis. Square break; shattered	6
6.6	51.5	80.0											189	Broken at end; shattered	6
. 4	37. 0	57. 0	*****										163	Short break; shattered	6
. 0	8. 0	12.0	16.0	0.4	16. 2	20. 0	25. 0	31. 6		*****			386	Square break on tension side, splitting in axis	1
0	12.0	18.0	24.8	1.0	25. 3	33. 5	44. 0				121211		333	Square break	- 6
. 8	7.5	11. 2	14.7	0.2	15. 0	18. 5	23. 0	28. 0	35. 0	- 11			444	Square break on tension side, splitting in axis	11 8
. 5	8.8	13. 3	18.0	0.4	18.0	23. 0	30.7				•••••	7.5.7.7.00	327	do	
. 2	8. 4	12.7	17. 0	0.5	17. 0	22. 4	28.0					*****	340	Square break; split to one end.	100
. 0	8. 4	12.4	17. 0	0. 6	17.5	21.5	27. 5					******	339	Square break on tension side, splitting in axis	114
. 6	32.0	54.0				750.00		*****				1000.00	167	Sap-wood; specimen cross-grained; broke at knot.	1
3. 0	39. 5	71.0	020122							*****	*****		187	Cross-grained.	9
	10.0	20.0	12000				A SEL			IIA I		- Control	see for	And the same of th	
1.7	19.3	30, 0	40.0	3, 8	41.8	55. 5	*****		*****	LITTE.			250	Square break on tension side, splitting in axis; shattered	6
.0	7.4	11.0	15. 0	0.5	15. 0	19.0	24. 0	32. 5		*****		*****	135	Square break at knot.	-
15 M	1000		8,104 W.	40.45	100	40.0	with U	24.5	30.0		*****	******	500	Crushed at center bearing; broke with fine splinters	. 6

		12.				The training	gravity of dried speci-	grain.		CHENT OF	apture
	Species.	Ошсе вишрег.	State.	Locality.	Collector.	Soil.	Specific grave the air-dried	Direction of	First deflec- tion.	Serond de- flection.	Modulus of rupture
863.	Pinus Chihuahuana	664 664	Arizona	Santa Rita mountains.	G. Engelmann and C. S. Sargent.	and the second second second	0.5801 0.5982		626 872	651 800	90.
164.	Pinus contorta	997	British Columbia .	Vancouver's island do		do	0. 6456		1808 1395	1775 1395	104
365.	Pinus Murrayana	293 293	Coloradodo	Forest City	T. S. Brandegee	Moist, sandy loam.	0, 4551 0, 4265		542 525	501 514	28
		563 625	do	do		do	0. 4546 0. 4600		976 857	976 888	74
866.	Pinus Sabiniana	625	do	do	C. S. Sargent. do	do	0.4618	蓼	976	976 528	76
	Digger Pine. Bull Pine.	644	do	do	do	do	0.5426		651	642	82
167.	Pinus Coulteri	1157	do	San Bernardino	W. G. Wright	Dry, gravelly	0.4443	國國	1221 1062	1221 1062	70
168.	Pinns insignis	676 676	do	Monterey	G. R. Vasey		0. 4835 0. 5095	圆圆	888 1136	872 1085	80
69.	Pinus tuberculata	576 576	do	Mount Shasta	G. Engelmann and C. S. Sargent.	Gravellydo	0. 4071 0. 3901	1000	354 519	362 496	200 52
70.	Pinus Twda. Loblolly Pine. Old-field Pine. Rosemary Pine.	82 82	Floridado	Duval countydo		THE PERSON NAMED IN COLUMN	0, 0068 0, 6147		1627 1744	1627 1684	99
		355 355	Alabamado	Cottage Hilldo	C. Mohrdo	7	0. 5914 0. 5846	國國	688 888	638	79 66
		388	North Carolina	Wilmington	E. Kidderdo	Loamdo	0. 5600 0. 4806		1395 888	1302 888	56
		389	do	do	do	do	0.4675	図図	921	939 1085	79
71.	Pinus rigida Pitch Pine.	13 13 1046	do	Arnold Arboretumdodo	do	do	0, 5070		697 775	651 769	79 85
02		1046	do	North Reading	do	do	a constant	圖圖	542 376	537 368	64
72.	Pinus serotina	83	Floridado	Duval county			0. 7592 0. 7518		1136 1221	1163 1177	117
73.	Pinus inops Jersey Pine. Scrub Pine.	621 622	South Carolina	Aikendo	do	do	0. 5402 0. 5537		405 697	465 697	68 56
		1169 1169 1172	Indianado	New Albany do Mount Helly	do	×	0. 5610	10000000000000000000000000000000000000	751 542	781 528	49
		1172	do	do	do	do	0. 5920		452 373	428 358	63
4.	Pinus olausa. Sand Pine. Scrub Pine. Spruce Pine.	279	Florida	Apalachicola		Dry, sandy barrendo	0. 5341 0. 5218		542 595	528 558	57
5.	Pinus pungens	321 321	Virginiadodo	Wytheville		1/11/1	0. 5160 0. 5300	圆圆	679 976	630 976	77 68
76.	Pinus muricata . Obispo Pine. Bishop's Pine.	671 671	California	Marin county			0.5573 0.5883		1039 1221	1085 1302	100

THE WOODS OF THE UNITED STATES.

200	DEFLE	CTION,	IN MII	1.1MET	ers, un	SDER A	PRESS	URE, I	N KILC	GRAMS	, of—		strength:		
60	100	150	200	(set.)	200	250	300	350	400	450	500	550	Ultimate statements transverse pr	Remarks.	
7.8	15. 0	23, 0	31. 5	1.6	32. 0	42.0	55. 0	71.0	*****				386	Square break on tension side, splitting in axis	
5, 6	12, 2	18.2	25, 7	1.3	25, 8	32, 4	43.7				*****		324	Failed from large splinter on tension side	1
2. 7	5, 5	8, 2	11.5	0, 2	11, 6	14.4	18.0	21.6	26. 0				447	Crushed at center bearing; failed from tension side	
3, 5	7. 0	10, 2	14.0	0, 3	14.0	18.0	21.3	27. 0					400	Failed from large splinter on corner	
9. 0	19. 5	*****	*****	*****	944.0X1								122	Broke at knot	
9. 3	19. 0				*****	*****							148	Square break at knot	1
5. 0	10.0	15.0	20. 7	0.5	21.0	27. 0	37.5						317	Square break; splintered	
5. 7	10.0	16.8	23. 7	1.0	23, 5	32. 0 27. 5	35. 5				*****		288	Square break	
					9						77				
9. 5 7. 5	18. 5	29. 0	43. 0 32. 0	4.6	44. 5 33. 0	61. 0	95. 0 62. 5	******	.,,,,,		1	*****	315	Square break on tension side, splitting in axis; shattered	-
6-0	10. 2		02.0	2.0	80, 0	936.0	04.0		O			*****	550		
4, 0	8.0	12.2	16. 2	0. 2	16.6	21.3	27.5			*****			349	do	1
4. 6	0, 2	14.6	20.0	0.5	20.0	27.0	1772		*****	******	2		300	Broke at knot	1
5. 5	11.2	17.0	23, 5	1.0	23.7	31.0					*****		286	Specimen cross-grained; shattered	
1.3	0.0	14.3	19.6	0.4	19.8	26. 0	33. 4	1				*****	345	do	
. 8	27. 0		*****				-	*****					125	Sap-wood; square break	1
.4	19.7	30.6	45.0	4.8	48.0								224	do	
. 0	6.0	9.0	12.0	0.4	12. 3	15. 6	19.0	23. 0	29. 0				426	Crushed at center bearing; square break on tension side, splitting	Ì
8	5, 8	8.7	11.7	0. 2	11.8	14.5	17. 6	21.3	25.7	30. 2	37. 2		624	in axis.	1
.1	15.3	23. 3	33. 0	2.5	33. 0	44.0	57.5	76.					337	Long split at one end	
5	7.5	17.6	24. 0 15. 0	0.3	24. 5	32. 6 18. 6	23.5	29. 2	38.0				432	Long split	۱
. 5	11.0	17. 0	24.0	1.1	24. 0		20.0	0	30.0				240	Square break on tension side, splitting in axis; shattered	
.3	10.4	16.0	22.4	1.0	22.5	29.4	38. 5		S.,			P.B.	830	do	
3	9.0	13. 0	18.0	0.5	18.0	23. 0	30. 2						339	do	-
. 0	15.0	23. 6	33. 5	3.0	34. 0	45, 8	63. 5						340	Square break on tension side, splitting in axis	
. 3	12.7	20.0	28. 5	2, 4	29, 2	37. 5	50.0	68. 0					363	do	1
0	18.2	27. 5	41.6	4.0	42.7	60.0		.,					276	Shattered	
. 0	26. 5	40.0	60. 0	8. 0	63. 0	88. 0	*****				*****		283	Square break on tension side, splitting in axis	
. 3	8.4	12.3	17.0	0.6	17. 0	21.5	27. 0	33, 0	39.0	48, 5			494	Broke with coarse splinters	ı
0	8.3	12.6	17.0	0.5	17.4	22.2	27. 5	34.5	42, 5	52. 6	*****	*****	500	do	1
. 5	21.0	32. 3	49.0	6.0	51.0	71.0							201	Square break on tension side, splitting in axis	
. 0	14. 0	22. 0	31.0	0.5	33.0								240	Oblique fracture; started at knot	
. 5	12.5	19.5	27.0	1.6	27.5	35. 8	47. 0		000			March 1	-	Shattered	
.0	18.5	29.5	43. 0	5.3	45.0	71.0	114.0	1000	-	*****	A STATE OF	(excess)	213	Square break	
.8	22.8	36.0	60. 0	6.0	52, 5 63, 5	88.0	114, 0		TAX TAX	1000000	Section Co.	P. CH. CO.	308	Specimen cross-grained; shattereddo	
		2222					1910/9	0	I II	1	300	10000	174075		1
1.0	18,5	32. 0	40.0	9 7	41 0	*****		*****			1		183	Specimen cross-grained; started at knot	
1.2	17.5	28. 0	40.0	3.5	41.2	*****	******			******			245	Shattered	1
.2	15.5	24. 0	35.0	3.5	10000000	47.0	64. 0		-500	1000000	31120		329	do	1
0	10.0	16.5	23, 2	1.2	23, 2	30.8	*****	*****	*****	******	*****	*****	290	Specimen cross-grained; broke near end	1
. 7	0.0	13, 2	18.5	0.3	18.0	23. 2	29. 0	36. 0	47.0				429	Square break	1
1.0	7.5	11.8	15.0	0.0	15.2	19.0	24.0	28.5	35. 0	44. 0			452	do	4

						vity of d speci-	grain.	COEFFICI		upture.
Species,	Office number	State.	Locality.	Collector.	Soil.	Specific gravit the air-dried men.	Direction of	First deffec- tion.	Second de- flection.	Modulus of rupture
77. Pinus mitis	278	Florida	Chattahoochee	A. H. Curtiss	Clay	0. 6524	圆	1221	1252	874
Yellow Pine. Short-leaved Pine. Spruce Pine. Bull Pine.	278 319	Louisiana	do	do	do	0. 6490 0. 6516	巡	1395 1479	1415 1458	1055
78. Pinus glabra	142	South Carolina	Bonneau's Depot	H. W. Ravenel	Rich upland	0. 4650 0. 4035	<u></u>	634 642	660	469
Pine.	142 544	Mississippi	Gainesville		Low, sandy	0. 3535		220	208	26:
	544	do	do	do	do	0.3500		244	238	34
	544	do	do	do	do	0.4268	蓼	244	233	43
	764	Florida	Chattahoochee	A. H. Curtiss	Low, wet	0.5089	圆	561	542	76
	764	do	do	do	do	0.4713	0	595	592	63
79. Pinus Banksiana Gray Pine. Scrub Pine. Prince's	394 394	Michigan	Baldwin	W. J. Beal	Low, sandy	0.4912		574 814	574 769	57
Pine.	780	New Brunswick		Intercolonial rail-		0. 5191		1320	1356	94
	780	Ado V		way.		0.4297		872	939	57
	879	do /		do	9.3.	0.4839	蓼	976	930	44
	879	do		do		0. 5129	2	1039	1085	7:
80. Pinus palustris	81	Florida	Daval county			0. 9375		1628	1628	110
Georgia Pine. Yellow Pine. Hard Pine.	81	do	do	do		0. 8125		1526	1575	12
	81	do		do		0. 6950	27770	976	1062	12
	81	do		do	Moist, sandy	0, 9822		1628 814	888	8
	85	do	do	do	do	0. 6632	200	1628	1575	10
	85	do	do	do	do	0.7568	一题	1039	1085	9
	85	do	do	do	do	0.8800	一	642	630	9
	243	do	Saw-mill, Saint	do		0.7087	Im	1953	1775	12
	243	do	John's river.	do	(<u>,</u>	0.7066	廖	2123	1713	12
	357	Alabama	Cottage Hill	C. Mohr	Sandy loam	0.6643	圆	1628	1550	11
	857	do	do	do	do	0.8410		1628	1713	14
	358	do	Citronelle	do	do	0.8906	慳	1436	1395	
	358	do	do		The state of the s	A CONTRACTOR	17777	1628	1775	100
	359	do	I COMMITTED TO SECURITION OF THE PARTY OF TH	THE RESIDENCE OF THE PARTY OF		0, 7988	1,11,11	1628	1684	164
	359	DESCRIPTION OF THE PROPERTY OF THE PERSON OF	do	September 1 September 1		0.8728	21111	1628	1628	
	360	do	The Committee of the Co	100000000000000000000000000000000000000	The second section is a second second	0.7242	tim	1221	1302	120
	361	do		The second secon	THE RESERVE OF THE PARTY OF THE	0. 7585	irmi	2035	1953	700
	361	do		The second secon	and the second second second second	0.7480	152	2035	2035	1
	384	Florida		A. H. Curtiss		0. 6005		957	967	0
	384	do	Keys.	do		0. 6438		1628	1655	10
	385	do	do	do		. 0. 7038	迴	1221	1221	10
	890	North Carolina	. Wilmington	E. Kidder		0. 6739	1型	1808	1776	11
	390	do		The Residence	The state of the s	0, 6293	m	1628	1550	
	1096	Alabama				- 0. 6373	FITT	1085	The same of the sa	
	1096	do	do	do	• • • • • • • • • • • • • • • • • • • •	0. 6852	Ш	1479	1459	10
281. Pinus Cubensis	84	Florida	. Duval county	A. H. Curtiss	Moist, sandy	0. 6934	門	1479	1302	11
tard Pine. Meadow Pine.	84	do	do	do	do	0.6640	3	1163	1191	10
	84	do	A STORY OF STREET	do	and the same of th	, 0, 8314		1479	1479	pe
	356	Alabama	TO SHARWAY GOVERNMENT OF THE STATE	The same of the sa	do	. 0.7716	TIT	1878	1	N.
	356	do	do	do	do	. 0.7710		1953	1953	1

60	100	150		C (set.)		250				450			Ultimate strength: transverse pressure.	Remarks.
1. 0	7.8	11.2	15.1	0.2	15. 2	19.0	24.0	29. 2					373	Specimen cross-grained; started at knot
1.5	6. 9	10,8	14.2	0.3	14.2	18, 0	22. 0	27. 0	32. 0	45. 0			450	Square break on tension side, splitting in axis
3. 3	6.7	10.0	13.1	0.0	13. 2	16. 5	20. 2	25. 0	29, 5	34. 0	43.5	*****	507	do
7.7	14.8	23, 2	32. 0	3.0	33. 2			£4				.,	200	Specimen cross-grained; broke with long split with grain
7.6	14.8	22, 5	32. 0	2.4	32.2								243	Square break on tension side, splitting in axis
2. 2	47.0												112	do
0.0	41.0												145	Shattered
0.0	42.0	70. 5				Se a		- 33				1	184	Square break at knot
3. 7	18.0	29.0	42.0	5. 2	43.0	60.0	89. 0	200	100		1	9780	327	Shattered
1.2	16.5	26. 0	37.0	3.8	38. 0	51.0				*****	147		270	do
8. 5	17. 0	27. 0	39. 0	5. 0	40. 2	*****							245	Square break
. 0	12.7	19.6	27. 5	1.4	27.6	38. 0		· ·		1			277	Long, shattered break
3. 7	7. 2	10.8	14.3	0.3	14.3	18. 2	23. 0	28. 6	38. 0				404	Broke with small splinters
5. 6	10.4	16.4	20, 5	1.0	21. 0				Luxur				243	Broke at small knots
5. 0	10.5	17. 0					Lucia	-				*****	191	Broke at knot.
1.7	9. 0	13.7	18.4	0/4	18. 4	30. 0	37. 0	14040					308	Broke at small knots; shattered
. 0	6.0	9. 0	12, 4	0.2	12.5	15, 6	19.0	22. 6	27. 0	32. 5			495	Square break on tension side, splitting in axis
. 2	6.2	9.3	12, 4	0.3	12,7	15.5	19.0	23. 0	27. 2	31.7	37. 5		540	Crushed at center bearing; square break
. 0	9. 2	14.0	18. 2	0.4	18. 2	23.0	28. 0						350	Square break with large splinters
. 0	6, 0	9. 0	12.6	0.3	12.3	15, 6	19.0	22.0	26, 2	31. 0	39. 0		529	Square break on tension side, splitting in axis with large splinters.
. 0	11.0	17. 0	23. 2	1.5	24. 0.	31.5	41.5	55. 7					350	Square break on tension side, splitting in axis
0.1	6. 2	9. 2	12.3	0, 3	12, 3	15.5	19.0	23. 6	28. 2		17/10		442	Crushed at center bearing; square break
1.7	9.0	13. 7	18.8	1.0	18.8	24. 0	31.0	37.2	ans.	*****			400	0.5 sap-wood; splintered break
2.5	15. 5	23.5	32. 5 10. 7	0.0	33. 0	42.3 13.9	55.0	70.0	00 0	ne e	20.0	*****	899	Shattered; split to one end
2.3	5.7	8. 2	11.0	0.0	11.0	13. 6	16.6	20.0	23. 0	26.7	32. 3	39.6	540	Broke with large flakes on back
3. 0	6.3	9. 2	12.3	0.3	12. 5	15.5	19. 0	23. 0	27. 0	31.0	37.5		500	Square break with flakes on back
3. 0	5.7	8.5	11.3	0.3	11.4	14.0	17. 0	20. 6	23. 5	28. 3	33. 0	38. 5	028	45 millimeters deflection with 600 kilograms; broke with flakes on
3.4	7.0	10.0	13.4	0.4	13.7	16.8	20. 6	25. 5	30. 3	The same	1		550	back. Square break. (a) Boxed 1852; chipped ten years; abandoned 1861
. 0	5, 5	8. 6	11.4	0.2	11.5	14.0	17. 0	23. 0	27.0	32. 0	38. 0	46. 8	594	Shattered. (a) Boxed 1852; chipped ten years; abandoned 1861
. 0	5. 8	9. 0	11.6	0.3	12.0	14.5	17.5	21.0	25.0	29. 0	34. 0		526	Square break with large flakes on corners. (a) Boxed 1876; chipped
. 0	6. 0	9. 5	12.6	0, 2	12.6	15. 6	19.0	23. 0	27.0	31.5	37. 0	44.0	596	four years; specimen taken along chip. Square break on tension side, splitting in axis, (a) Boxed 1876;
2.0	5. 5	8.4	11.4	0.0	11.4	14.0	17.0	20.0	23.0	27. 0	31. 5	37.0	589	chipped four years; specimen taken along chip. Broke with thin flakes on back. (a) Boxed 1876; chipped four years; specimen taken above chip.
. 0	7.5	11.0	14.6	0.4	14.6	18.4	22.5	28. 0	33.0	40.0			499	Square break, somewhat shattered. (a) Boxed 1876; chipped four years; specimen taken above chip.
2.4	5.0	7.2	10.0	0.0	10.0	12.5	15.0	17.8	20.7	24.0	28.0		549	Square break on tension side, splitting in axis. (a) Boxed 1878; chipped two years.
1.4	4.8	7.3	9.8	0.3	10. 0	12.0	15.0	17.0	20. 2	23. 6	28. 0	34.0	564	Broke with many splinters. (a) Boxed 1878; chipped two years
.1	10.1	15.2	20.3	0.6	20. 5	26.7							274	Specimen cross-grained; split
.0	5.9	8.5	11.5	0.2	11.6	14. 2	17.5	20.8	24.5	29. 0	36. 5	*****	454	Broke with flakes on back
. 7	5.5	8.5	15.5	0.4	15.4	19.6	24, 0	29. 2	35.0	90 5	222021	200000	446	Broke with thick flakes on back
. 0	6.3	9. 2	12.4	0.0	12.8	15. 5	17.0	21.0	25. 0	38. 0			485	do
. 5	8.4	12.6	16.8	0.6	16.8	21.5	26. 5	32.5	39.0	48.0		*****	NAME OF THE PARTY	Shattered. (a) Tree boxed eighteen or twenty years ago
. 3	6.7	9.5	13.0	0.3	13. 2	16.5	20.5	24. 5	29. 0	35. 4			467	Broke with large flake. (a) Tree boxed eighteen or twenty years ago
		- 16					0-860-	SERVICE.		CONTRACTOR OF THE PARTY OF THE			17.00	Control of the contro
. 3	7.5	11.2	15.3	0. 2	15.5	19.5	24.5	30.0	35. 7	44.0			499	Specimen cross-grained; split
. 2	8.2	12.4	16.5	0.4	16.4	20. 8	25. 3	31.0	36. 5				447	Specimen cross-grained; broke with large splinters
. 3	5.0	10.0	13.0	0. 2	13. 2	16. 2	20.0	24.0	28. 5	33. 0	Later		504	Square break
. 6		7.8	10.3	0. 2	10.2	13. 0	15.5	18. 2	21.3	25. 0	30.0		542	Slightly splintered

	ŭ	DEF SERVICE	15 1115			vity of	grain.	COEFFIC		- minre
Species.	Office number	State.	Locality.	Collector.	Soil.	Specific gravity of the air-dried speci- men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of runture
1. Pinus Cubensis—continued	493	Florida	Bay Biscayne	A. H. Curtiss	Coral	0. 8406	>	1479	1479	10
	493	do	do	do	do	0.8942	蓼	1744	1684	9
	231	Vermont	Charlotte	C. G. Pringle	Cold, peaty	0. 5604	mm	1526	1479	9
2. Picea nigra Black Spruce.	231	do	do		A STATE OF THE PARTY OF THE PAR	0.5429	2777	1221	1221	9
A to make the same	373	do	Huntington			0.4587	即加	904	921	6
	776	New Brunswick .	Bay of Fundy		31111313	0.4698	即加	1062	1062	.5
	776	do	do	way.		0. 4919	阿	1221	1221	8
	794	Province of Que-	Danville	Grand Trunk rail-		0. 4296	図	996	1062	7
	794	bec	do	waydo		0.4153	题	1221	1085	7
	880	New Brunswick .	Bridgeton	Ed. Sinclair		0. 4425	一	976	888	0
	- 880	do	do	do		0.4785	蓼	939	872	7
	***	. //.0	SU 10 3		0 11	0.4455	mm	808	700	
8. Picea alba	513	New Hampshire	Stratford	C. G. Pringle	half and a conservation	0. 4455	2777	787	769	1 7
	513	do	do	do	A CONTRACTOR OF THE PARTY OF TH	0.4983	1000	679	688	3
	773	New Brunswick	Bay of Fundy	Intercolonial rail- way.	UNIVERSITY	0.4579	EZZI	1285	1252	1
	773	do	Bridgeton	Ed. Sinclair	America de la constante de la	0. 4596		1163	1136	
	784	do				0.4411	100 m	939	976	
	784	Province of Over	do			0. 4530		976	976	1
	791	Province of Que- bec.	Amqui	A. Grant		0. 4319		1221	1149	1
	791		do	00		0. 4163	120	1136	1140	
34. Picea Engelmanni	292	Colorado	Forest City	T. S. Brandegee	-Damp	0. 4325		976	1028	
White Spruce.	292	do	do	do	do	0.3642	廖	554	588	
	575	do	do	C. S. Sargent	Peaty	0.3411	廖	751	751	
	822	do	do	T. S. Brandegee	do	0.3805	廖	888	864	
35. Picea pungens	269	do	Alpine	do	Damp	0, 3939	mm	542	574	
White Spruce. Blue Spruce.	200000	do	do America		do	0, 4036	2777	444	444	
	1000000	do	4do	do	do	0. 3810		610	642	
	210		I P III			0.0010	-	010	O E D	1
86. Picea Sitchensis	970	Alaska	Sitka	Paul Schultze	*************	0.4676	図	921	957	
A title terms Sprince.	970	do	do	do	**********	0.4568	圆	1062	1085	
	977	British Columbia .	Saw-mill, Burrard inlet.	G. Engelmann and C. S. Sargent.		0.4038		1085	1149	
	977	do	do	do		0.3882		1039	1062	
	1015	Oregon	Weidler's saw-mill, Portland	do !		0.4398	120	1221	1302	
	1019	do	Saw-mill, Astoria	do		0.3517		996	976	
	1019	do	do	do		0.3688		1110	1085	
	1026	do	Portland Furniture Company.			0.3891	2777	642	651	
	1026	do	do	do	******	0.3810		610	642	
87. Tsuga Canadensia	. 5	Massachusetts	Arnold Arboretum.	C. S. Sargent	Drift	0.4210	Imm	763	814	
Hemlock.	5	do	do	do	do	0. 8989		787	781	
	219	Vermont	Charlotte	C. G. Pringle	Gravelly	0. 4716	蓼	1085	1062	
	219	do	do	do	do	0.4699	廖	1017	1007	
	772	New Brunswick		Intercolonial rail-		0. 5124		1136	1136	1
	772	do		way do		0. 5129	圆	1136	1177	1
	775	do	Bay of Fundy	do		0.4922		488	479	
the Balance Alex	775	do	do	do		0.4458	圆	432	432	
	778	do		do		0.3496	刨	679	688	
	778	do		do		0.3675		669	665	
	787	do	Bridgeton	Ed. Sinclair		0.4811	刨	976	976	
	787	do	do	do		0.4805	圆	1085	1085	

THE WOODS OF THE UNITED STATES.

R.	DRFLE	CTION,	IN MII	LIMET	ERS, UN	CDER A	PRESS	URE, IN	KILO	GRAMS	, of—		rength:		
50	100	150	200	0 (set.)	200	250	300	350	400	450	500	550	Ultimate st	Remarks.	
3. 8	6.6	10.0	13. 6	1.0	14.1	18. 2	22. 0	26.5	31. 5	37.0			454	Square break	-
2.8	5.8	8.9	12.5	0.5	12.6	16.0	20. 6	25. 0	29. 2				426	Square break on tension side, splitting in axis	П
3. 2	6.6	10.0	13. 5	0.3	13. 8	17. 0	21. 2	28.0					397	Square break with scales on back	
4.0	8.0	12.5	16, 5	0.4	17. 0	22. 0	28. 7	39. 5					385	Crushed at center bearing; square break	
5. 4	10.6	16.4	22.7	1.0	23. 0	30.0	2001					100	298	Square break on tension side, splitting in axis	Т
4.6	9. 2	14.5	21.0	1. 2	21.5								215	Square break at large knot.	
4.0	8.0	12.0	16. 4	0.5	16. 5	22. 0	29, 0	45. 0		1000			356	Square break	
4. 9	9. 2	13.8	19. 0	0.6	19.1	26. 0	41.0						306	Square break on tension side, splitting in axis	
4.0	9. 0	13.5	19.0	0.5	19.5	27. 0				5			299	Square break.	1
5.0	10.0	15.0	21. 2	0.9	21.5	30.0							293	do	Н
5. 2	11.2	17.4	23. 6	1.0	24.4	31.5	47. 0	*****					316	Square break; split to end	4
											MA	E			1
6. 2	12.7	19. 2	27. 0	1.6	27.4	37. 5	55. 5	*****		1.7.	*****	*****	314	Broke with flat scales on back	1
7.2	14.2	22.4	32.7	4.0	33. 5	45.7	00.0	*****		*****		******	300	Square break; shattered	1
8.8	7.8	12.0	16.0	0.5	16. 2	21.0	29, 2	******	*****	10000	*****		347	Crushed at center bearing; failed from flakes on tension side	1
4.2	8.6	13. 0	17.6	0.5	18.0	23. 0	31, 5		1	*****		*****	338	Square break	1
5.2	10.0	15. 3	21.3	1.0	21.8	29. 6	49.0	77	. Lan	*****	10		294	dodo	
5.0	7.9	12.0	21.3	0.6	21.5	29.5	29. 5						312		
4.0	8.5	13. 0		0.7	17.0	22.5	217. 0	199					346	Crushed at center bearing; failed from thin scale on tension side	4
4, 3	0.0	10.0	17.5	0.4	18.0	24.0	-	*****	*****	183			360	Crushed; square break	-
5.0	9.5	14.0	19.0	0.6	19.0	25, 0	36, 0			151555	*****		323	Broke with thin scale on back	
8.8	16.6	26, 4		10000	22222								179	Square break at knot near end.	
6. 5	13.0	19.0	28. 0	2.4	29. 6	33355		10000				*****	234	Square break	
5.5	11.3	17.4	26. 0	2.2	27. 2	20000		****					246	Square break with short splinters	
9. 0	17. 0	28. 0					MAY	Z	No.				188	Started at knot	
1. 0	22. 0	35. 2	000000		Service A	1							165	do	1
8. 0	15.2	24.7	39. 5	5.5	41. 2						47	5	230	Square break	ч
	100	1	-				18.7		Oly			1			
5. 8	10. 2	15, 2	22, 0	1.6	22. 5	31.0	46. 0	*****			100		313	Crushed at center bearing; broke with few thin splinters	-
4. 6	9.0	13.4	18, 2	0.7	18.7	25. 0	34, 0	*****		*****	*****		316	do	
4.5	8, 5	13. 2	19.0	1.0	19.0	27.0					*****		200	Crushed at center bearing; broke with fine splinters	
4.7	9. 2	14. 3	21.0	1.5	21.8	32. 5	(****)						174311	Crushed at center bearing; broke with thin flake	
4. 0	7.5	11.4	15.4	0.4		21.0			TO THE	1			331	Crushed at center bearing; broke with fine splinters	П
4. 9	10.0	14.8	22. 0	1.5	COMM 107	35, 3						1	262	Crushed at center bearing; broke with thin flake	А
4.4	9.0	13. 6	19.7	1.0	20.0	28. 0	120				*****		287	Crushed at center bearing; broke with fine splinters	п
7.6	15.0	24. 4	36.4	4.3	38. 0	******			-			1	236	Shattered	н
8. 0	15. 2	24.7				*****				24			184	Specimen cross-grained; split	
6. 4	12.0	17, 8	25. 0	1.0	25, 4								245	Shattered	
6.2	12.5	19.2	27. 0	2.0	27. 9								250	Square break on tension side, splitting in axis	
4.5	9, 2	14.0	19.0	0.6	19.0	24. 8	34. 5						315	Broke with large flakes on back	
4.8	9.7	14.3	19.5	0.7	19.8	25. 0	33. 0						340	Square break	
4. 3	8.6	12.8	17. 0	0.3	17.3	22, 0	28, 5	36. 4		*****			384	Square break with long split in center	Q.
4.3	8.3	12. 5	17.0	0.4	17. 2	22. 0	27. 0	36, 0					440	do	п
10.0	20. 4	34. 0	49.0	7.2	51.0	69. 5							289	Square break on tension side, splitting in axis	
1.3	22, 6	35, 5	53. 2	7.8	54. 0	72. 0							271	Shattered	ч
7. 2	14.2	21.8	32, 8	4.0	33. 0			*****					231	Square break; shattered	
7.3	14.7	22.7	34.5	3.0	36. 0			*****	*****				226	Square break	-
5 0	10.0	15.0	20, 5	0.6	21. 0	27. 5	35, 7						318	Square break; somewhat shattered	
	- Wille	13, 5	18. 5	0.6	Viendy.	24. 0	32. 5			177	100	1 13	1 - 150000	Square break	П

FOREST TREES OF NORTH AMERICA.

	į,					vity of d speci-	grain.	COEFFIC		upture.
Species.	Office number	State.	Locality.	Collector.	Soft.	Specific gravity of the air-dried speci- men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of rupture.
387. Tsuga Canadensis—continued	793 793	Province of Quebec	Danvilledo	Grand Trunk rail- way.		0. 5264 0. 5248		1136 1221	1177 1285	83
	817	West Virginia	Grafton	C. G. Pringle		0.4041	國	957	986	64
	817	do	do ,	do	**********	0. 3748	圆	814	814	55
	1040	Massachusetts	Danvers	J. Robinson	Moist loam	0. 5096		763	746	84
	1040	do	North Reading	do	do	0. 5114		751 1062	763 1028	70
	1042	do	do	do		0. 4248		921	896	70
88. Tsuga Caroliniana	623	North Carolina	Hendersonville	A. H. Curtiss	Dry, rocky	0. 5335	巨圆	697	713	46
Hemlock. 89. Tsuga Mertensiana	971	Washington ter-	Wilkeson	G. Engelmann and	Rich loam	0. 5318	图加	1017	1017	57
Hemlock.	995	ritory. Alaska	Sitka	C. S. Sargent. Paul Schultze		0. 5902		1628	1628	110
	995	do	do	do		0. 5472		1526	1479	105
90. Tsuga Pattoniana	980	British Columbia .	Silver peak, near Fraser river.	G. Engelmann and C. S. Sargent.		0. 4590	四	751	763	72
	980	do	do	do	do	0.4715	國	775	787	72
91. Pseudotsuga Douglasii	2712	Colorado	Alpine	T. S. Brandegee	Moist	0.4852	圆	814	842	77
Red Fir. Yellow Fir. Oregon Pine. Douglas Fir.	2712	do	do	do	do	0.4786	쀌	857	888	66
	2713	do	do	ĝo	do	0.4874	圆	1110	1149	8
	627	California	Saw-mill, Straw- berry valley.	G. Engelmann and C. S. Sargent.		0. 5735	匫	1744	1628	100
	627	do	do	do		0.5382	巡	1221	1356	90
	702	Oregon	Saw-mill, Marshfield	1 //-		0. 4373	62777	888	930	5
	704	do	F B Doon's now	do	//////////////////////////////////////	0. 6590	國	1526	1628	93
	706	do	E. B. Dean's saw- mill, Marshfield.	do		0. 5477		1395	1395	91
	708	do	do	do		0. 6687	認	1575	1028	124
	708	do	do	do		0. 6892	则	1808	1808	133
	709	do	do	do		0. 4375		1085	1085	7
	700	do	do	do		0.4448		1163	1085	8
	720	Montana	Saw-mill, Missoula	S. Watson	************	0. 5345		1062	1062	7
	720	do	do	do		0. 5448	圆	1221	1221	9
	732	California	Lassen's peak	Sierra Lumber Company.		0. 5227		1221	1252	8
A STATE OF THE STA	732	do	do	do		0. 5090		1163	1163	7
	881	Utah	Salt Lake	M. E. Jones		0.5601		996	976	9
	973	British Columbia	Saw-mill. Burrard	C. S. Sargent	do	0. 5705		1163	1110	9
	973	do	inlet.	do	M. C.	0, 4909		1163	1149	8
	974	do		do		0. 5306	题	1356	1436	9
	086	do	Saw-mill, Victoria	G. Engelmann and		0. 4596	刨	1085	1122	7
	989	Oregon	Saw-mill, Portland	C. S. Sargent.		0.6016		1221	1191	10
	1008	British Columbia .	Saw-mill, Burrard	do		0.4879	蓼	1252	1338	7
	1008	do	inlet.	do		0.5501	圆	1628	1628	8
	1011	Oregon	Oregon Railway and Navigation Co.	do	***************************************	0.5386	圆	1221	1356	9
	1011	do	do	0		0. 5325	圆	1191	1191	61
	1016	do	Weidler's saw-mill, Portland.			0, 5960	圆	1628	1713	9
	1016	do	do	-		0. 6085	巡	1628	1628	65
	1018	do	Saw-mill, Astoria			0.6129	图 8770	1628	1628	9
	1018	do	do			0. 6135	劉	1808	1744	99
	1020	do	Portland Furniture	do		0.4632	EUN	1110	1085	104

	DEFLE	CTION,	IX MII	LIMET	ers, u	NDER A	PRES	SURE,	IN KILO	OGRAM	s, of—		strength:		
0	100	150	200	o (set.)	200	250	300	350	400	450	500	550	Ultimate st transverse p	Remarks.	
. 3	8.3	13.0	17.5	0.5	18.0	23. 0	29, 5	39, 0					358	Crushed at center bearing with thin flake on tension side	-
. 0	7.6	11.5	15. 3	0.2	15. 6	19.5	24. 3	30.0	42.4				437	Square break; long split in center	- 40
5. 1	9, 9	15.4	22.0	0.8	22. 2	30.5	*****						273	Square break	
5. 0	12.0	18. 2	27. 0	1.5	28. 0			******					238	do	- 1
4	13.1	20.4	28. 0	2.0	28. 0	36. 0	47.0	64.0					862	Broke with flakes on tension side	- 1
. 5	12.8	18.7	25. 8	1.3	26.0	33. 5	43.0	61.0					366	Square break on tension side, splitting in axis	- 10
. 6	9.5	14.4	20.3	0.7	20.5	27. 5			*****				300	Crushed at center bearing; failed with flakes on corner	
. 3	10.9	16.4	23. 2	1.3	23. 7	32. 0						******	300	Square break; shattered	-
. 0	13.7	21. 2											197	Specimen cross-grained; started at knot	
. 8	9.6	14.4	21.0	1.4	21.5								243	Started at knots	
. 0	6.0	9.3	12.6	0.4	12.9	16.0	19.7	24. 5	30.5	39. 0	V		471	Crushed at center bearing; failed from flakes on back	-
2	6, 6	9.6	13. 2	0.2	13. 2	16.5	20 5	25. 0	34. 0				450	Crushed; splintered	
		10.	07	1 5			1	1	1			100		Square break	
. 5	12.8	19.5	27. 0	1.1	27.9	36.0	55. 5	7	Year Jane		100		307	do	- 4
3	12.4	18.9	26.4	1.4	26, 7	35. 5	48. 2	1977					307		1
. 0	11.6	17.0	23. 3	0.9	23.7	32.0	44. 0	1/4./					331	Square break and split at end	
. 7	11.0	16. 5	24.0	1.0	24. 0	33.0							284	Square break on tension side, splitting in axis	
4	8.5	13. 0	17.5	0.6	18.0	23.0	29, 5	41.2					362	Did not break; split through the center	
8	6.0	9. 2	12.6	0.0	12.6	16.0	19. 5	24. 0	30.5				418	Square break; slightly splintered	
0	7. 2	11.0	14.5	0.2	14.6	18, 2	23. 0	29. 6					400	do	-
5	10.5	17.0	22.5	1.5	23. 0								244	Flaked on tension side	
2	6.0	9. 0	12.1	0.3	12.2	15. 0	18. 5	23. 0	27. 0	33.0	38. 5		504	Square break; large splinters	
. 3	8.0	11.6	15.8	0.5	16.0	20.3	25. 5	31.5		ANO.			398	Specimen cross-grained; split with grain	
. 5	7. 0	10.4	13.6	0, 3	14. 0	17.0	22.0	27.8	39. 5				400	Crushed at center bearing; square break	
.1	6. 0	9. 0	12.3	0. 2	12.5	15.0	18. 0	22.7	27. 5	34.0	45. 6		533	Square break on tension side, splitting in axis	- 1
.7	5.4	8. 2	11.0	0.0	11.2	14.0	17.0	20.0	24.5	29. 0	34. 5	44.5	562	do	ш
. 5	9. 0	13. 6	18.7	0, 4	19.0	24.7	32, 2			-			827	Failed from large splinter on corner	- 1
2	9. 0	13. 3	17.8	0.5	18.0	23. 5	30.0	10000			THE .		842	Specimen cross-grained; splintered	- 4
6	9. 2	14.0	19.6	0.5	20.4	26.5	35. 8	1	1				300	Specimen cross-grained; shattered	- 1
0	8.0	12.0	16.2	0.4	16.8	21. 0	27. 5	34. 2	*****				393	do	
0	7.8	11.7	16.0	0.4	16.0	20.8	26. 5	35. 0	The same		1775-251	11-22	10.40	Failed from large splinters on corners	
2	8.4	13.0	17.8	0, 6	18.0	23.4	30. 5		-		The same	1000	1	Failed from large splinters on one corner	- 11
9	10.0	15. 6	22.0	1.0	22.0	29. 0	1000000	45.7	100000		A DESCRIPTION OF THE PERSON OF	C. CHENNY	A CONTRACTOR	Square break on tension side, splitting in axis	
2	8.8	13, 4	18.6	0.5	18.5	24. 6	A THEORY OF	38. 5	1		The same of the sa	100000	1 - 7	Failed from large splinter on corner	
0	8.0	12.2	17.0	0.4	17.5	22. 0	1	*****	1		1	1	1000000	Square breakdo	
2	8,5	12.7	17. 0	0.3	17. 5	22. 5	-	00.0	100000		The same of	1	1 -0.00	Failed from large splinter on each corner.	
. 6	6.8	10.1	18.0	0.3	13.6	17. 5							. 385	Square break on tension side, splitting in axis	
. 5	8,7	13. 2	18. 0	0.6	18.0	24. 2	107	95.0	10000000	1		1000	. 336	Crushed at center bearing; broke with fine splinters	
. 0	7.3	11.0	14.7	0.4		21.5		35. 0	45.0			1	326	Crushed at center bearing; broke with flakes on back	
. 0	6.0	9.0	12. 5	0. 0		15.5		98.6		1		1	383	Crushed at center bearing; broke with makes on back	
0	7. 2	11.0	14. 5	0.5		18.7		31.5						Crushed at center bearing; broke with fine splinters	
. 1	8.2	12.3	16.8	0. 4	16.9	22.2		01.0				1	2000	Started at knot; splintered on corner	m
.0	5.7	8.8	12. 0	0. 2	-120-40	15. 0	10170-0170	24. 0	32.0		1		1000	Crushed at center bearing; broke with fine splinters	•
. 0	6.0	9.0	11.6	0.2		14.8		23. 4	32. 5	1			202	Cracked at knot	
. 0	6.0	8. 8	11.8	0.2		14.6	and the same	22. 0	1000 01111					Crushed at center bearing and scaled on tension side	
. 7	5. 6	8.6	11.6	0.2	FERRICA	14.5	-	23. 0	0 300 00	100			200	Splintered	
. 4	9. 0	13. 3	18.0	0.5	-	24. 0	7854 Inch			-		1111	20.000	do	
. 0	10.0	15. 2	21. 2	0.7	21. 5	28. 5	-	1	1			12	450	do	

			1.		The State of the last	gravity of dried speci-	grain.	COEFFIC		rpture
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific gravithe air-dried men.	Direction of	First deflec- tion.	Second de- flection.	Modulus of rupture
391. Pseudotsuga Douglasii—cont'd	1022 1022	Oregondo	Portland Furniture Companydo	G. Engelmann and C. S. Sargent, do		0, 4899 0, 4735	1200	1221 1163	1221 1136	769 698
391. Pseudotsuga Douglasii, var. ma- crocarpa, Henlock.	642 642	Californiado	Saw-mill, San Ber- nardino.	W. G. Wright		0. 5357 0. 5397	回题	1062 1085	1050 1050	78
392. Abies Fraseri	523	North Carolina	Roan mountain	Walcott Gibbs	Peaty loam	0.3602		976	1017	65
	523 523	do	do	do	do	0, 3523 0, 3636	國	976	976 921	64
195. Abies balsamea Balsam Fir. Balm of Gilead Fir.	377 377	Vermont	Monktondo	C. G. Pringle	The second second	0. 4455 0. 4419	>	740 651	734 638	44 58
94. Abies sebalpina	4491	Coloradodo	Forest Citydo	T. S. Brandegee do	Moist, sandy loam	0. 3941 0. 3750	200	775 775	787 723	54
	449 ² 449 ²	do!	do		do	0.3682		872	849	58
	820	do	do	do	do	0, 3807		688	642 679	51
	820 820	do	do	do	do	0. 3350 0. 3673		751	740	4
95. Abics grandis	820	Oregon	Portland		Rich, alluvial	0, 3622		763	888 751	3
White Fir.	1010	do	do	C. S. Sargent.	do	0. 3597 0. 3641	圖	976 976	1085 1039	5
96. Abies concolor	529 529	Coloradodo	Engelmann's cañon	Robert Douglas	Rocky	0, 3602		660 775	697 787	5
	639	California	Strawberry valley	G. Engelmann and G. S. Sargent.	Alluvial	0, 4019		688	655 673	7
	733 783	dodo	Lassen's peak	Sierra Lumber Company.	/	0, 4959		1285 1252	1320 1320	9
98. Abies amabilis	1004	British Columbia .		G. Engelmann and C. S. Sargent.		0. 4754		1221	1252	7
99. Abies nobilis	965	Oregon	Cascade mountains	do	Rich	0. 5168		1221	1268	8
Red Fir.	965	do	do	do	do	0.4932		1221	1268	8
00. Abies magnifica	647	California	Soda Springs	C. S. Sargent.	do	0. 5134		542 976	939	5
01. Larix Americana	2262	Vermont	Charlotte			0, 4965		542 2325	1953	11
Larch, Black Larch. Tamarack. Hackmatack.	226 ² 774	do	do	do	do	0. 7295 0. 6147		1526 1221	1628 1356	10
	774 781		do	way do		0. 6336 0. 5973		1395 697	1479 734	7
	781 786		do	do Ed. Sinclair		0. 5742		688 1436	688 1395	7
		La grandina - allia	do	do		0. 6204 0. 6170		1285 1479	1356 1436	10
	795 840	do	do	waydo		0.6030	靈	1526 842	1395 872	8
Company of the same of the sam			do		The state of the s	0. 6272	國	814	842	8

THE WOODS OF THE UNITED STATES.

	DEFLE	CTION,	IN MII	LIMET	ers, u	NDER A	PRES	SURE,	IN KIL	OGRAM	s, of-		strength:		
50	100	150	200	o (set.)	200	250	300	350	400	450	500	550	Ultimate str transverse pr	Remarks.	000
4.0	8.0	12.0	16. 4	0.4	16.5	22.0	31. 0						328	Square break; split at end	16
4. 2	8.6	12.5	17. 0	0.4	17. 1	22. 0	29. 0						298	Square break	10
4.6	9.3	14.0	19. 0	0.4	19.3	25, 2	32.0	10			1		334	Square break on tension side, splitting in axis; shattered	
4.5	9.3	14.3	19. 4	0.4	19. 7	25. 7	33.0	42.8					388	do	
	2020		Sec. Oct.	1		See See	-	2000)	10000000			1.00	-		1
5.0	9.6	15.0	21. 0	1.0	21.5	31. 0				*****		*****	279 265	Square break; splintereddo	1
5.0	10. 6	15. 0	22. 6	1.5	23. 7	34. 0							274	do	1
0. 0.	10.0	2014	22.0		20,1										1
6. 6	13. 3	21. 0				12550				15500		1217.51	190	Square break	1
5.8	10.8	16.8	22, 5	0.5	22.5	*****		*****			*****		249	Specimen cross-grained	1
6. 3	12.4	19. 5	29. 0	2.5	29. 3						A		234	Crushed at center bearing; square break on tension side, splitting in axis.	R
6. 3	13. 5	21.5	200000	TOTAL:	101101				101				158	Square break at knot	1
5. 6	11.5	16.7	24. 5	1.5	25. 6	39. 2	10707						250	Crushed at center bearing; flaked on back	100
7. 2	15. 2				D# #		177		7				148	Specimen cross-grained; broke at knot	
7.1	14.4	22. 0	32. 0	2.4	35, 5	120505	TO THE REAL PROPERTY.	1		*****			197	Square break	
1.2	12.4	20.5	32.5	4.4	35. 0		1/4	177	areal.		RAI		210	Square break and split	
. 0	11.0	17. 0	04.0	***			0	17			K.		200	Broke with long, oblique split	1
	- Control	755	1555445	10.000	A CONTRACT		POZ	The state of	i i			***			
.4	13.0				2000						*****		142	Specimen shaky; broke with long split	
0.0	9.0	14.0	20.5	1.0	20.7							*****	225	Crushed at center bearing	
0.0	9.4	14.5	21.0	1.6	22.0	32. 0		4-4		-			265	Square break with long, thin splinter	
7.4	14.0	21.5	32. 0	2.5	34. 5						10000		237	Shattered	
3. 3	12.4	20.0	29. 0	2.0	30.0		-	7					213	Square break; shattered	1
7.1	14.9	23, 0	32. 2	1.9	33.4	44.7	64. 0	-	July.				300	Square break with flakes on tension side	
7.5	14.5	22, 4	31. 5	2, 2	32.5	43. 7	63. 5		1		(deign	PP	326	Thin flake on back	
3.8	7.4	11.0	14.9	0.4	15.0	18.5	23.4	29, 5				*****	386	Crushed at center bearing with thin flakes	
3. 9	7.4	11.3	15. 0	0.2	16.0	21.0	28, 0				1		340	Crushed at center bearing; splintered	
4. 0	7.8	12.0	16, 4	0, 6	16.8	22.0	32, 5				*****		328	Square break	1
1. 0	7. 7	11.9	16. 2	0.5	16.8	22. 0	30.0						348	Crushed at center bearing; square break	1
. 0	7.6	11.4	15. 4	0.4	16.0	21. 0	27.0	38.0					386	Crushed at center bearing; flaked	
. 0	7.7	11.7	16.0	0.4	16. 2	21.8	29. 0	47.0					350	Crushed at center bearing; splintered	
. 0	19.0	30.7	46.0	5. 5	49.4	94.0	100						250	Square break; split	ı
i. 0	10.4	15. 7	22.0	1.0	22. 5	30.0	41.0					153,53	348	Specimen cross-grained	1
0.0	18.3	29. 5	40.8	4.0	43.5	62. 0							300	Square break on tension side, splitting in axis	
	-	-	215.00									To the second	202		
.1	5.0	7.4	10.0	0.1	10. 2	12.7	16.0	1	24.0	1886			499	Crushed at center bearing; broke with fine splinters	
1.2	6.0	9. 2	12.0	0.2	12.0	15.0	18.5	1110000	20.0	1.188			450	Crushed at center bearing; broke with thin scales	
. 5	7.2	10.8	14.5	0.8	14.6	18. 0	23. 5	30.0	46. 0		*****	and the second	337	Crushed at center bearing; broke with fine splinters Large scale on tension side	
.0	13.3	21.0	29.7	2.8	30.5	40.4	55.5						300	Shattered at one end	
7.1	14.2	22.4	32. 0	2.9	32.8	44.0	63. 5		1/				306	Specimen cross-grained; square break; split	
3.4	7.0	11.0	14.5	0.5	14.6	18, 2	23.7	30.0					394	Crushed at center bearing; broke with fine splinters	1
3. 8	7. 2	10.8	14. 5	0.4	14.7	18.5	23.4	29. 0	36. 0	S S C V S P F		*****	455	Square break; splintered	
3. 3	6.8	10.0	13, 2	0.3	13. 5	17.0	21. 5	28. 5	40, 0				400	Crushed at center bearing; scaled on tension side	1
3. 2	7. 0	10.3	14.0.	0.4	14.5	18.8	24, 2	32. 5	*****			******	371	Crushed at center bearing; scaled	
5. 8	11.2	18.2	26, 3	3.0	27. 0	35. 0	49.0	****					350	Failed from large splinter on corner	1
6. 0	11.6	17.8	25.7	2.0	26. 5	35. 5	47.0	75. 0					351	Square break on tension side, splitting in axis	1

						gravity of dried speci-	grain.	COEFFIC		upture.
Species.	Office number.	State.	Locality.	Collector.	Soil.	Specific grav the air-dried men.	Direction of	First deflec-	Second de- flection.	Modulus of rupture.
402. Larix occidentalis	719	Montana	Missonla	S. Watson		0. 6255	図	1221	1221	914
Tamarack.	719	do	do	do		0. 6966	蓼	1356	1395	1106
	984	Washington terri-	Fulda	W. Siksdorf	Moist	0.8136	圆	1628	1713	1289
	984	tory.	do	do	do	0.8864	圆	1628	1713	1481
	1006	do	do	do	do	0, 8426	m	1878	1953	1287
	1006	do	do	do	do	0. 8376	蓼	1953	1953	1287
PALMACEÆ.									L U 1	PAG
405. Washingtonia filifera	1159	California	Agua Caliente	W. G. Wright	Dry, gravelly	0.6012	1	460	403	271
Fan-leaf Palm.	1159	do	do	do	do			697	723	586

TABLE IV.—BEHAVIOR OF SOME OF THE WOODS OF THE UNITED STATES.

			1/2//				ity.	press-	COEFFCI		ıpture.
	Species.	Office number.	State.	Locality.	Collector,	Soil.	Specific gravity.	Direction of ure,	Second de- deflection.	Fourth de- flection.	Modulus of rupture
The second	MAGNOLIACEÆ.	IF									
1.	Magnolia grandiflora	346	Alabama	Cottage Hill	C. Mohr	Rich loam	0. 7347		1191	1097	974
2.	Magnolia glauca Sweet Bay. White Bay. Beaver Tree. White Laurel. Swamp Laurel.	354	do	do	do	Swarmpy	0. 5262		1135	1028	816
	SAPINDACEÆ.				1	27/			ALC:		
54.	Sapindus marginatus	307	Texas	Dallas	J. Reverchon	Rich, damp	0.7838	圆	1109	1062	851
	LEGUMINOSÆ.		1100								
77.	Robinia Pseudacacia Locust. Black Locust. Yellow Locust.	1248	New York	Long Island	M. C. Beedle		0. 8476	2	1221	1221	1169
	HAMAMELACEÆ.							- 4			100
139.	Liquidambar Styraoiflua	546	Alabama	Kemper's mill	C. Mohr	Rich, alluvial	0. 6537		939	921	933
	OLEACEÆ.			THE RESERVE OF THE PERSON OF T							
192.	Fraxinus Americana, var. Texensis	364	Texas	Dallas	J. Reverchon	Dry, calcareous	0.8198		1221	1191	1172
	BIGNONIACEÆ.									100	195
207.	Catalpa speciosa	38	Missouri	Charleston	C. S. Sargent	Wet clay	0.4783	圆	957	940	698
	western Cataspa.	38	do	do	do	do	0.4757	100	939	888	703
	URTICACEÆ.		Grand - Frida	A STATE OF THE						25.00	
224.	Ulmus Americana White Elm. American Elm.	19	Massachusetts	Arnold Arboretum .	do	Drift	0. 7534		1085	1050	1118
228.	Water Elm. Celtis occidentalis	306	Texas	Dallas	J. Reverchon	Alluvial	0. 7491		888	800	916
	JUGLANDACEÆ.					Maria I		137			19
239.	Juglans nigra	951	do	New Braunfels	C. Mohr	Moist, calcareous.	0.7108		976	996	936
248.	Carya aquatica	362	Mississippi	Vicksburg	do		0.7739		976	957	958
	CUPULIFERÆ.				R F		1100	1			100
251	Quercus alba	8	Massachusetts				A Section of	HILL	708	787	892
		8	do	do	do	do	0. 6820		763	660	658

1	DEFLEC	TION,	IN MIL	LIMETI	ers, u	NDER A	A PRES	SURE,	IN KIL	OGRAM	is, of-	146	strength:		11
50	100	150	200	o (set.)	200	250	300	350	400	450	500	550	Ultimate str transverse p	Remarks.	Office numbe
4.0	8.0	12.0	16. 2	0.5	16. 5	21. 0	27.5	36. 0				*****	390	Crushed at center bearing; broke with fine splinters	71
3. 6	7.0	10.5	14.0	0.4	14. 0	18.0	22. 5	28. 0	34.0	45, 0			472	do	71
3. 0	5.7	8. 4	11.0	0.3	11.4	14.0	17.5	20.6	24, 7	28, 5	35, 7	47. 6	550	do	98
3, 0	5.7	8. 2	11.0	0.2	11.0	13.6	16.5	19.5	23.0	26.8	32, 0	36. 5	632	Deflection with 600 kilograms = 45.5 millimeters; broke with fine	93
2.6	5. 0	7.6	10.4	0, 2	10.4	13.0	16.0	19.0	22.7	27. 2	34. 0		549	splinters. Crushed at center bearing; flaked	100
2. 5	5, 0	7.5	10.0	0.2	10.0	12.6	15. 5	18. 5	22.0	26. 5		*****	549	Failed from large splinter on corner	100
10.6	24. 2												116	Twisted and split	115
7.0	13. 5	20.0	29. 4	1.8	33. 5								250	Square break	115

UNDER TRANSVERSE STRAIN: SPECIMENS EIGHT CENTIMETERS SQUARE.

DEFLECTION, IN MILLIMETERS, UNDER A PHRSSURE, IN KILOGRAMS, OF-								ength:					
400	800	1200	1600	o (set.)	1600	2000	2400	2500	3200	3600	Ultimate strength: transverse pressure.	Remarks.	Office number
2.0	4.1	6.4	8.9	0.2	9. 0	11. 2	15. 1	19. 5	26. 0		3325	Broke with large splinters on back	
2.2	4.3	6, 9	9, 5	0. 3	9. 5	12.4	16. 2				2785	Broke with large splinters	
2.2	4.4	6. 6	9, 2	0.4	9, 2	12.2	16. 0		E.A.		2903	Broke with large flake on back	
2.0	4. 0	6.1	8. 0	0.0	8.1	10.2	12.6	15. 2	19.2	25.0	3992	Broke with large splinters on back	1
2.9	5. 2	7.7	10.6	0.7	10.7	14.2	19. 3	26. 0			3184	Broke with many fine splinters	
2, 2	4.0	6. 0	8.2	0.3	8. 2	10. 2	13. 0	16.5	20. 6	26. 5	4000	Broke ward mage spinters	
2.5	5.1	7.8	11.0	0.3	11.0	15.5					2361	Crushed and split to the end	
2.8	5. 2	7. 9	11.0	0.4	11.0	15. 7	29, 6				2400	Broke with fine splinter on one corner	
2.3	4.5	6.8	9.3	0. 2	9. 4	12.0	15. 2	18.5	25. 0	35. 0	3815	Broke with fine splinters	
2.9	5, 5	8. 6	12. 2	0.8	12, 3	17. 0	23. 2	33. 0			3125	Broke with large splinter on one corner	
2. 6	5. 0	7. 5	9.8	0.4	10. 0	12, 5	15. 5	19. 5			3193	Broke with large splinters on corners	
2.5	5. 0	7.4	10. 2	0. 5	10.3	13. 6	18, 2	24. 4	36. 0	•••••	3270	Broke with large splinters	
0.7		0.0	10.4		1						20.45		
2.5	6.9	9.8	12.4	1.2	15. 0	15. 6	19. 2	27. 3	******	******	8043	Broke with large splinters on back	

FOREST TREES OF NORTH AMERICA.

TABLE IV.—BEHAVIOR OF SOME OF THE WOODS OF THE UNITED STATES UNDER

	Species.						ity.	Direction of press-	COEFFICIENT OF ELASTICITY.		ipture.
			State.	Locality.	Collector.	Soil.	Specific gravity.		Second de- flection.	Fourth de- flection.	Modulus of rupture
259.	Quercus Michauxii	524	Alabama	Kemper's mill	C. Mohr	Alluvial	0. 8107	圆	775	697	884
	Duenet Oun. Core Oun.	524	do	do	do	do	0, 8348	圝	800	745	984
260	Querous Prinus	925	do	Cullman	do	Dry, rocky	0. 8158		1085	1028	582
275.	Quercus Kelloggii	963	Oregon	Eugene City	G. H. Collier		0, 7625	0	626	564	736
280.	Quercus aquatica	349	Alabama	Cottage Hill	C. Mohr	Sandy loam	0, 7253		1366	1320	1144
	· BETULACEÆ.										
301.	Alnus rubra	991	Washington territory.	Puyallup	G. Engelmannand C. S. Sargent.	***************************************	0. 5381	蓼	729	610	524
	CONIFERÆ.			TORON	Mary						
329.	Chamæcyparis sphæroidea White Cedar.	350	Alabama	Cottage Hill	C. Mohr	Sandy, wet	0.3719	Ш	364		376
370.	Pinus Tæda	82	The state of the s	Duval county	The second secon	Moist, sandy	0, 5802	蓼	1061	1017	792
	Rosemary Pine.	82	do	do	do	do	0.7614	圆	1285	1302	826
372.	Pinus serotina	83	do	do	do	Moist, sandy loam.	0.7614	蓼	939	921	931
	Fond Pine.	83	do	do	do	do	0.8271	圆	787	751	904
80.	Pinus palustris	81	do	do	do	Sandy loam	0, 8609	圆	1436	1550	1057
	Long-leaved Pine. Southern Pine. Georgia Pine. Yellow Pine. Hard Pine.	85	do	do	do	Moist, sandy	0.7213		1085	1007	940
	Hura Line.	243	do	Saw-mill, Saint	do		0.6788	m	1221	1252	820
		243	do	John's river.	do		0, 6193	圆	1163	1221	949
81.	Pinus Cubensis Stash Pine. Svamp Pine. Bas- tard Pine. Meadow Pine.	84	do	Duval county	do	Moist, sandy	0.7633		1163	1221	1029

THE WOODS OF THE UNITED STATES.

TRANSVERSE STRAIN: SPECIMENS EIGHT CENTIMETERS SQUARE—Continued.

	DEFLE	CTION, II	N MILLIM	ETERS, I	INDER A	PRESSUI	E, IN K	ILOGBAM	5, OF-		rength		
100	800	1200	1600	0 (set.)	1600	2000	2400	2800	3200	3600	Ultimate strength: transverse pressure.	Remarks.	-
3. 2	6.3	10.0	14.0	1.5	14. 5	19.5	26.5	39. 0			3016	A large season crack at one corner; splintered on opposite corner.	
3. 2	6, 1	9. 3	13. 1	1.3	13.3	18.0	24. 2	33.0	49. 0		3303	Splinters on corners	
2,5	4. 5	7. 0	9. 5	0. 6	9. 5	13, 3		******			1987	Split lengthwise with small splinters on corners.	
4.0	7.8	12.0	17. 3	1.4	17.5	24. 0	40. 6				2513	Broke with large splinters on corners	
2, 0	3.5	5, 5	7.4	0.2	7.3	9. 3	11.8	14.6	19. 0	25. 5	3905	Crushed at center bearing; broke with fine splinters	
3. 2	6. 7	10.7	16.0	2. 0	16.7						1789	Broke with large splinters on back; shattered	
6.8	13.4	21. 0	annina t					×7.77	EC		1284	Short, square break; no splinters	
2.3	4.6	7.1	9.6	0.2	9.7	12.6	17. 0				2703	Shattered	
2.0	3.8	5. 6	7.5	0.2	7. 6	10.0	12.0	21. 5	· · · · · ·		2800	do	
2.7	5. 2	8.0	- 10. 6	0.4	11.0	13. 0	17.3	22, 0	******	******	3184	0.75 sap-wood; broke with large splinter on corner	
3.0	6. 2	9, 5	13. 0	0.9	13.4	18.0	23. 0	30.0		******	3085	0.5 sep-wood; broke with large splinter on corner	
1, 9	3. 4	5.1	6, 3	0.0	7.0	8.7	10.5	12.5	14.6	17.5	3606	Square break on tension side, splitting in axis	
2.1	4.5	7. 0	9.7	0.3	9. 9	12.6	16, 4	20. 5	27. 5	22	3207		
2, 0	4.0	5. 9	7.8	0.0	7. 9	10.0	12.2				2799	Broke with large splinter on corner; somewhat shat-	
2, 2	4.2	6. 0	8.0	0.4	8.0	9.8	12.0	16.0	23. 5	*****	3239	Square break on tension side, splitting in axis	
2.8	4.2	6. 0	8.0	0.4	8.0	10. 2	12.6	15. 5	19.5		3513	Split between rings at one end	

27 FOR

Species	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
AT A COVOT Y LOTT TO							
MAGNOLIACEÆ.	1000					De la constante	
1. Magnolia grandiflora	346 346	Alabama	I Concession of the Contest of the C	C. Mohrdo	The state of the s	7353 8056	Crushed fibers at 10 millimeters knot 28 millimeters from end. Triple flexure
0.75	0=1	-	**			more	
 Magnolia glauca. Sweet Bay. White Bay. Beaver Tree. White Laurel. Swamp Laurel. 	354 354	do		do		7212 6369	Fibers crushed at 51 millimeters from end. Fibers crushed at middle
3. Magnolia acuminata	246 246	Virginiadodo	The second secon	H. Shriver	The second secon	6795 6582	Fibers crushed at 76 millimeters from end. Triple flexure
	2613	do	Fancy Gan	do	Rich light	5126	Crushed in vicinity of knots at
of the second second	2613		And the second second	do	7.000	5570	middle.
	2000	do	13 24 1 32 2 2 3 3 1 1 1 2 1 2 2 2 3 3 5 5 5 5 5 6 5 6 5 6 5 6 5 6 6 6 6 6	And the second Table Second Se	and the second property of the second propert	24000	Crushed fibers at 63 millimeters from end.
	534	Mississippido		C. Mohrdo		7389 8333	Crushed fibers at 76 millimeters from end. Crushed fibers at 102 millimeters
		10				1000	from end and on opposite side at end.
4. Magnolia cordata	1178 1178	Alabamado		do		6577 6527	Crushed fibers at 38 millimeters from middle. Crushed fibers in vicinity of knots
					N. CONTO		63 millimeters from end.
5. Magnolia macrophylla Large-leaved Oucumber Tree,	532	Mississippi	Quitman	do	Rich, low	7357	Opened longitudinal crack be-
Darys-seasca Cavamoer 17ce.	532	do	do	do	do	8301	tween rings. Crushed fibers at 63 millimeters from end.
6. Magnolia Umbrella	2661	Virginia	Wytheville	H, Shriver		5647	Crushed fibers at 128 millimeters
Umbrella Tree. Elk Wood.	2662	do	do	do		6073	from end. Triple flexure; developed inter- secting "Cooper lines".
7. Magnolia Fraseri	260	do	Fancy Gap	do	Damp	5806	Failed at 6 millimeters knot 51
Long-leaved Oucumber Tree.	260	do	do	do		7575	millimeters from end. Fibers crushed at 51 and at 128 millimeters from end.
8. Liriodendron Tulipifera	395	Michigan	Lansing	W. J. Beal	//4//	4663	Failed at knot at middle
Tulip Tree. Yellow Poplar. White Wood.	818	West Virginia	Grafton			6341	Fibers crushed at 51 millimeters
White Wood.	20000		The state of the s	A CONTRACTOR OF THE CONTRACTOR		THE STATE OF THE S	from end; angle of crushing, 550.
	818	do	do	- and the same of	777	6636	Fibers crushed at 128 millimeters from end; angle of crushing, 65°.
	1231	Pennsylvania	Chester county	P. P. Sharples		6514	Fibers crushed at 76 millimeters from end; angle of crushing, 75°.
	1231	do	do	do	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	6169	Fibers crushed at middle
	1232	do	do	do		6305	do
	1232	do	đo	do		5874	Fibers crushed in vicinity of knot
	1236		Saw-mill at Nash-	The state of the s		5489	51 millimeters from end. Fibers crushed at 63 millimeters
			ville.				from end.
	1236	do	do	do	*****************	5606	do
ANONACEÆ.							
9. Asimina triloba	211 211	Missouri	Meramee river, Jefferson county. do		Alluvialdo		Fibers crushed at 114 millimeters from end. Crushed at knot 63 millimeters
							from end.
10. Anona laurifolia	479	Florida	Bay Biscayne	A. II. Curtiss	Swampy	4690	Fibers crushed at 63 millimeters from end; angle of crushing, 65°.
CANELLACEÆ.	479	do	do	do	do	4967	Fibers crushed on one side at middle.
12. Canella alba	1131	do	Elliott's Key	do	Coral	12746	Fibers crushed at middle and split
White Wood. Cinnamon Bark. Wild Cinnamon.				do			along grain. Fibers crushed near middle; deflected from heart.
TERNSTRŒMIACEÆ.	100		4.				
14. Gordonia Lasianthus	236	South Carolina	Bonneau's Depot .	H. W. Ravenel	Wet pine-barren	5842	Fibers crushed at knots near end.
Loblolly Bay. Tan Bay.	236	do	do	do	do	5752	Fibers crushed at 63 and at 127 millimeters from end at knots
	414	do	Aiken	do	Swampy	6790	10 millimeters in diameter. Fibers crushed at 63 millimeters
MILLIAND	Day of	A STATE OF THE PROPERTY OF THE PARTY.	Contract of the second	do	District Control of the Control of t	6396	from end. Fibers crushed at 10 millimeters knot near end.
TILIACEÆ.		LEWIS TO		The state of the s	12 -0 - 1	- W	
17. Tilia Americana Lime Tree. Bass Wood. American Linden. Lin.	2 2			C. S. Sargent			Fibers crushed at 19 and at 102 millimeters from end.
Bee Tree.	124		A 18 () A 18 () A 18 () A 18 () A 18 () A 18 () A 18 () A 18 () A 18 () A 18 () A 18 () A 18 () A	W. J. Beal			Fibers crushed at 127 millimeters from end.

OF THE UNITED STATES UNDER COMPRESSION.

744				MIL	1		ME					Remarks.
0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.51	5.08	
								4000	4000	М		7 - (-) - (1)
2041	10032000	3221	3447	3497	3670	3847	3978	4078	4209			Began to shear fibers
1724	2386	2556	2676	2805	2921	3016	3112	3189	3291		********	Slight shearing of fibers
1152	1334	1433	1547	1651	1733	1805	1846	1900	1973			Sheared fibers
1080	1829	1433	1533	1603	1667	1742	1760	1796	1873			Slight shearing of fibers
7000	20000000		121200		4	****	4800		+===			
975	1343	1429	1533	1588	1642	1696	1733	1753	1792		********	do
1016	1420	1535	1651	1737	1805	1889	1941	2037	2111	********		Splintered at pith; slight shearing of fibers
1080	1315	1420	1506	1583	1660	1674	1758	1787	1833	*******	********	Indented without shearing fibers
1157	1379	1465	1579	1665	1715	1774	1824	1864	1901		*******	Sheared fibers
1016	1442	1583	1660	1751	1860	1910	1982	2068	2114	TX.		Slight shearing of fibers
1125	1610	1769	1833	1932	2019	2105	2245	2304	2359	. A.V.		do
884	1098	1170	1238	1315	1343	1406	1483	1524	1538		A min	do
1111	1325	1402	1470	1538	1606	1660	1719	1740	1819			Fibers sheared
TOWE	322000	00000	4202	0.00		1/2		4700	73			CONT. The second
1325	1742	1882	2005	2123	2223	2318	2418	2486	2635		*******	do
1384	1647	1765	1887	2025	2078	2191	2263	2336	2404	********		do
616	975	1098	1111	1143	1216	1247	1297	1329	1343			Indented without shearing fibers
953	1270	1388	1470	1542	1619	1678	1742	1787	1855			Fibers sheared
2000	Signi	2002	ALS: NO		Sharkes	2522				BILL		
1080	1524	1665	1810	1901	1996	2082	2173	2245	2318			Indented without shearing fibers
1016	1615	1787	1914	2032	2082	2146	2195	2223	2295	77.7		Slight shearing: short specimen, 120 millimeters long; split at both ends.
907	1066	1125	1143	1175	1202	1234	1252	1297	1315		2	Sheared fibers
1025	1297	1388	1470	1533	1606	1674	1787	1792	1846			Slight shearing of fibers
749	1025	1170	1229	1311	1370	1415	1474	1524	1565			do
630	844	925	980	1043	1125	1152	1193	1220	1266			Sheared fibers
1052	1288	1397	1433	1533	1601	1656	1706	1746	1801	1///		do
794	1080	1152	1216	1257	1302	1343	1379	1384	1442			do
885	1012	1084	1120	1186	1234	1270	1335	1352	1388			do
916	1157	1229	1293	1361	1429	1479	1520	1565	1601			do
885	1116	1166	1202	1261	1306	1352	1397	1456	1515			do
667	894	957	1016	1039	1075	1111	1116	1129	1152			do
662	943	1052	1111	1157	1198	1229	1261	1288	1297			do
												The state of the s
943	1429	1610	1805	1941	2068	2159	2254	2304	2336	No. Section and Property		Slight shearing of fibers
1034	1660	1882	2019	2132	2227	2341	2386	2477	2563			do
								2011				
3674	6577	7621	8346	8573	8822	8936	8981	9344	9571	N-COLORDON	******	
3311	6668	8523	9458	9753	10206	10614	10886	10090	11227		*******	Sheared fibers and opened grain at middle and at end
		40.0				*****		****				
635	1125	1248	1343	1388	1452	1533	1579	1642	1701	12322500100	*******	
535	1021	1116	1211	1293	1347	1433	1488	1538	1597	*******		do
1089	1519	1642	1746	1867	1932	2005	2068	2146	2218			do
1134	1533	1665	1760	1846	1923	1991	2059	2123	2177			do:
								- viu	. 8			
934	1157	1297	1335	1393	1442	1497	1542	1578	1619			do
								Tarres .		10-50 February 10-50	- CONTRACTOR	

						.0	
Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
17. Tilia Americana—continued	124	Michigan	Big Panida	W. J. Beal	Gravel	4944	
17. Tilla Americana—continued	The same	Michigan	Allenton		MATERIAL STATE	7167	Fibers crushed at 114 millimeters
	252 252	Missourido		G. W. Letterman.		7235	from end. Fibers crushed at 45 millimeters
	316			W. J. Beal		6314	from end. Fibers crushed at 51 millimeters
	316	do		do		0014	from end.
	1039	Massachusetts	Danvers		Moist gravel	5080	Fibers crushed at 76 millimeters
	1039	do		do		4527	from end. Triple flexure
	1009					4001	Triple acxillo
17. Tilia Americana, var. pubes-	745	Georgia	Bainbridge	A. H. Curtiss	Low	6305	Fibers crushed at 38 millimeters from end.
cens.	745	do	do	do	do	6668	Fibers crushed at 127 millimeters
	0051	77 1 1	CHAN IZ I	W W Ti	7.	4917	from end. Fibers crushed at 102 millimeters
18. Tilia heterophylla	2851	NAME OF THE OWNER OWNER OF THE OWNER	arterial -	w. M. Linney	Limestone	5548	from end.
	2852					neces!	Fibers crushed at 51 millimeters from end.
	77.00	do	- S N		The same of the sa	5126	Fibers crushed at 152 millimeters from end. Fibers crushed at middle
	320	Tennessee	7	A. Gattinger		7666	
MALPIGHIACEÆ.	320	do	00	do	do	8278	Fibers crushed at 114 millimeters from end.
19. Byrsonima lucida	1113	Florida	No-Name Key	A. H. Curtiss	Coral	6260	Fibers crushed near middle in
Tallowberry. Glamberry.	1113	do	do	do	do		vicinity of small knots.
ZYGOPHYLLACEÆ.		175//		A M	11-31		
20. Guaiaeum sanetum	476	do	Upper Metacombe	do	do	11930	Longitudinal split; stick was ped
Lignum-vitæ.	1133	do	Key. Elliott's Key	do	do	11648	before test. Crushed fibers and split along
RUTACEÆ.							grain near end.
23. Xanthoxylum Clava-Heroulis	735	do	Chattahoochee	do	Dry, sandy	7372	Triple flexure: developed inter-
Toothache Tree. Prickly Ash. Sea Ash. Pepper Wood.	735	do	do	do	do	7698	secting "Cooper lines". Crushed at middle; deflected from
Wild Orange.	1086	Texas	Palestine	C. Mohr	Damp, saudy	7707	heart. Crushed fibers at 127 millimeters
	1086	do	do	do	do	5978	from end. Crushed fibers at knot 6 millime-
			C. Water			13.00	ters in diameter; angle of crush- ing, 400.
24. Xanthoxylum Caribæum Satin Wood.	1140	Florida	San San San San San San San San San San	A. H. Curtiss	and the second	The second	Brittle; crushing of fibers; splin- tered along grain.
	1140	do	do	do	do	10751	Fractured suddenly; shattered along grain.
SIMARUBEÆ.			CIRT	INI			The state of the s
28. Simaruba glauca		do					Fibers crushed at middle; angle of crushing, 200,
	487	do	do	do	do	6328	Split end to end along grain
BURSERACEÆ.		3 11 1				-	
29. Bursera gummifera	462		Kay	do		2350	Fibers crushed in vicinity of knots.
West Indian Birch.	462	do	do	do	do	2595	Fibers crushed at 38 millimeters from end.
30. Amyris sylvatica	475	do	do	do	do	11975	Split along grain
Torch Wood.	475		The second second second	do			
MELIACEÆ.						Line and	
31. Swietenia Mahogoni	452	do	do	do	do	11204	Fibers crushed at 89 millimeters
Mahogany. Madeira.	452			do		10115	from end: threw off splinters. Failed at 13 millimeters from end;
ILICINEÆ.						100000	knot 76 millimeters from end.
33. Hex opaca	280	South Carolina	Waverly Mills	W. St. J. Mazyek	Sandy loam	7339	Triple flexure; knot near end
American Holly.	280			do		6078	Failed at knot 63 millimeters
						1000	from end.
34. Hex Dahoon	484	Florida	Bay Biscayne	A. H. Curtiss	Low, damp	5652	Failed in vicinity of knots 76 mil- limeters from end.
a success a success at only.	484	THE REPORT OF THE PARTY OF THE	do	do	do	5512	Fibers crushed at 114 millimeters from end.
CYRILLACEÆ,			The state of the s		THE PARTY.	Mill	
38. Cliftonia ligustrina	338	Alabama	Cottage Hill	C. Mohr,	Wet	6169	Fibers crushed at end and at 64 millimeters from end.
Tree.	338	do	do	do	do	5706	Triple flexure; fibers crushed at 127 millimeters from end; grain
THE HEAD THE	1				La constant		wavy.

	1									2. 1511		Remarks.
0.23	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	9.54	4.81	5.08	Demarks.
47	2 694	753	767	794	817	852	871	918	966			Sheared fibers
82	935	916	1098	1139	1184	1247	1302	1338	1365			do
54	1 794	885	862	912	958	980	1025	1061	1095			Slight shearing of fibers
61	749	803	857	930	953	908	1039	1080	1111			do
66	2	857	903	948	1002	1034	1066	1107	1148			do
61	812	839	894	925	948	089	1021	1052	1071			do
64	821	862	903	941	984	1020	1043	1080	1107			Sheared fibers
61	2 789	866	889	907	948	980	1016	1039	1075			do
63	5 839	889	934	993	1048	1066	1120	1166	1220			do
48	1 694	767	817	898	889	898	912	966	990			do
85	1	1057	1071	1125	1175	1202	1229	1275	1311	LA		The state of the s
79		898	953	989	1012	1052	1080	1139	1170	KY		
86		1161	1216	1261	1320	1374	1420	1470	1504			do
74	- Carrie	1111	1161	1207	1247	1297	1343	1406	1438			do
170	9 2926	9100	3339	3475	3529	3620	3697	3765	3819			do
176	B 1	2198 2858	3153	3257	3393	3515	3652	3710	3756			
101	0 2404	2000	3100	0201	0000	0010	3002	3710	0100	AUR		
485	4 8663	11022	12565	13562	14289	14742	14946	14969	15105	16103	16194	Sheared fibers; split along grain
176	9 5421	8392	10614	11817	12565	13245	13653	14198	14560	15581	15740	Sheared fibers; split along grain; did not take even
												bearing.
129	3 1996	2173	2245	2259	2304	2318	2468	2522	2567	2880	3094	Sheared fibers
111	1 1819	2032	2068	2164	2223	2277	2322	2368	2400	2790	2994	do
204	3016	3157	3307	3429	3543	3647	3742	3856	3919	4626	4780	do
117	9 1882	2141	2259	2341	2363	2395	2422	2499	2563	3016	2257	do
190	5 4128	5285	5693	5987	6396	6423	6646	6895	6985	7892	7802	Sheared fibers; split along grain
271	7 4513	5262	5670	5942	6214	6419	6600	6804	6976	7802	8165	Sheared fibers
		L. mi	William	100	7720		47	P	TIN	TA		
86	1 1134	1220	1311	1315	1356	1442	1456	1488	1501	1746	1928	do
86	6 1184	1352	1388	1452	1520	1569	1579	1615	1647	1951	2078	do
56	3 720	753	803	812	843	862	885	903	934	1111	1157	Sheared fibers; specimen worm-eaten
48	2.0	662	671	685	708	712	721	739	749	852	903	do
	1699				7 10			1115	-		155	
276	2000	7417	8097	8699	9117	9426	9707		*** ****			Split along grain at ends
292	6 5829	7167	8210	8890	9208	9435	9753	10024	10433	11431		Split at ends; sheared fibers
208	7 3697	4060	4332	4559	4799	4899	5035	5193				Sheared fibers
253	Cole Cole Cole	4831	5035	5343	5534	5670	5851	5974	6110	6985	7349	do
7.77.0	100		3725		200000				376			
117	9 1792	2023	2182	2363	2490	2608	2694	2790	2980	3629	3878	Slight shearing of fibers
155	1 2518	2835	3075	3289	3429	3602	3769	3910	4073	4831	5171	Sheared fibers
124	3 1805	1905	1973	2032	2123		2232	2313	2395	2744	2948	do
88	5 1343	1452	1533	1583	1687	1774	1805	1846	1878	2200	2449	do
			-		-			C+1. 1. 7	1			
133	27.5368	2186	2390	2576	2726	2840	2971	3085	3166	3900	4287	do
120	2 1678	1882	2014	2136	2254	2350	2390	2586	2717	3193	3674	do

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
RHAMNACEÆ. 42. Reynosia latifolia	454 454	Floridado	Key.	A. H. Curtiss		13426	Split along grain
43. Condalia ferrea	460 460	do	do	do		13290 12406	Fibers crushed at knots and split along grain. Fibers crushed at knots 64 milli- meters from end.
45. Rhamnus Caroliniana	803 803	do	Saint John's river.	do	Rich hummock	7112	Fibers crushed at 140 millimeters from end.
47. Rhamnus Purshiana	993	Oregon	Portland	G. Engelmannand C. S. Sargent.	Rich, alluvial	9934	Fibers crushed near middle
SAPINDACE Æ. 50. Æsculus glabra Ohio Buckeye. Fetid Buckeye.	297	Missouri	Allenton		Rich, moist	4531	Fibers crushed at 76 and at 102 millimeters from end; splitalong grain.
	297 386 386	do	do	do	Alluvial	4985 5344 5207	Fibers crushed near middle; grain wavy. Fibers crushed at 19 millimeters from end. Fibers crushed at 127 millimeters
52. Æsculus Californica	684 684		Marin county	/ (6328 5044	from end. Fibers crushed at 51 millimeters from end. Fibers crushed at middle in vicinity of knot.
53. Ungnadia speciosa	944 944	Texasdo	New Braunfels			6305	Crushed at knot 51 millimeters from end.
54. Sapindue marginatus	305	do	Dallas .:	J. Reverchon	and the project of the same of the	7802 8641	Fibers crushed near middle Triple flexure; developed intersecting "Cooper lines" at middle.
	928 928	do	Austindodo	The state of the s	Limestonedo	7212 6436	Triple flexure; deflected about 16 millimeters without crushing. Triple flexure; split along grain
56. Hypelate paniculata	463 463	Florida	190	A. H. Curtiss		10931 10387	Fibers crushed at 102 millimeters from end; angle of crushing, 80%.
57. Hypelate trifoliata	464 464	do		dodo	CHANGE SOSSESSED IN 15	6872 7167	Deflected and split along grain
80. Acer macrophyllum	982 982		Portlanddo	C. S. Sargent.		6418	Fibers crushed at knot 76 millimeters from end. Triple flexure; knot near end
	1023	do	Company.	do		5520 5919	Fibers crushed at 25 and at 76 millimeters from end. Fibers crushed near middle and near end.
61. Aser circinatum	1013	Washington territory.	Wilkeson	do	do	7349	Fibers crushed at knot at middle
64. Acer saccharinum Sugar Maple, Sugar Tree. Hard Maple, Rock Maple,	298 298 299		Allentondodo		do		Fibers crushed near middle and at 25 millimeters from end. Fibers crushed at 127 millimeters
	376 376	Vermont	AFRICA CONTRACTOR STATE OF THE	C. G. Pringle	Gravelly	8392	from end. Fibers crushed at 76 millimeters from end.
	409 1233 1233	Vermontdo	Charlestown Navy- yard. Charlotte	F. H. Horsford		9970	Fibers crushed at 25 millimeters from end. Fibers crushed at 39 millimeters from end at 6 millimeters knot. Fibers crushed at end; cross- grained.
	1234 1234 1235	do	do	do		9957 9707 8890	Fibers crushed at 25 millimeters from end. Fibers crushed at 70 millimeters from end; specimen split before

of grain.									1134			No.	Remarks.
	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Availabo.
-	3016	6260	7892	8890	9753	10524	11158	11658	12112	12610			Sheared fibers; split at ends
	3062	6396	8119	9617	10705	11885	12383	15109	13789	14470	17237	*******	do
	3447	6033	7689	9004	10115	11113	11612	12474	13245	13903	17509		do
	2994	6260	8097	9480	10660	11794	12837	13789	14765	15603			do
	1338	1837	2032	2073	2195	2218	2304	2390	3468	2518	2880		do
	1247	1860	1982	2073	2159	2214	2277	2309	2350	2386	2858	3039	Sheared fibers
	1656	2404	2758	2930	3075	3202	8280	3339	3352	3470	3765		Slightly sheared fibers; split at ends
	490	798	885	921	971	1021	1071	1116	1157	1179	1429	.,	Sheared fibers slightly
	975	1107	1216	1247	1293	1347	1397	1429	1515	1547	1778	1928	Sheared fibers; split at end
						.,,,,,,,							
	680	1179	1452	1579	1701	1733	1801	1846	1928	1987	2331	2658	Sheared fibers
	1066	1433	1569	1651	1742	1810	1892	1978	2068	2127	2540	2835	do
	1061	1592	1801	1896	2078	2109	2195	2259	2327	2431	2744	3166	do
	1225	2132	2495	2576	2699	2785	2867	2939	2976	3075			Sheared fibers; split at ends
	1769	3153	3289	3520	3742	3874	4037	4155	4264	4468	5262	5738	Sheared fibers
	2073	3103 3692	3348 4513	3520 4944	3701 5307	3874 5398	4037 5579	4241 5974	4355 6105	4518 6214	5298 7190	6033 7553	Slight shearing of fibersdo.
	2064	3366	3955	4404	4649	4872	5062	5216	5425	5566	6759	7439	,/,/.do/,/
							2						
							.400	· · · · · · · ·		.R.O.			
	2767	4944	5715	6078	6419	6759	6931	7158	7376	7557	8210	8346	Sheared fibers; split at sides
	1796	3901	4899	5489	5874	6205	6432	6654	6895	7167	8074	8641	do
	1796	2313	2422 2785	2513 2903	2604 3012	2672 3116	2812 3216	2835 3248	2926 3339	2980 3498	3289 3792	3583 4105	Sheared fibersdo
	1633	2313	2495	2563	2613	2703	2767	2858	2985	3012	2976	3697	do
	1338	1765	1996	2073	2159	2232	2259	2381	2440	2504	2880	3129	do
	1560	2576	2835	3085	3252	3420	8574	3701	3828		4854	5307	do
	1225	2168	2758	3039	3157	3280	*******	3674	3720	3747	4468	5085	Slight shearing of fibers
	2849 2359	4355 3357	4944 3720	5307 4060	5579 4287	5874 4513	6023 4740	6101 4899	6260 4967	6328	7530	8074	Sheared fibers. Slight shearing of fibers; split at end
	2858		4626	4967	5262	5489	5693	5906	6101	6328	7485	7802	Sheared fibers
	2064	3157 2926	3393	3606 3420	3751 3602	3892 3248	4060 3819	4160 3983	4228 4055	4364 4164	4899 4763	5239 5194	do
	1724	2313	2472	2613	2794	2849	2944	3057	3107	3202	3647	3901	do
	2250	3362	3606	3801	3983	4169	4287	4418	4581	4708	5443	5987	do
	2132 2586	2767 3583	3057 3792	3257 4060	3357 4246	3502 4382	3611 4423	3706 4495	3801 4581	3969 4699	4436 5648	4899 6169	do
	2540	4128	4653	4745	4940	5149	5330	5434	5530	5625	6230	6736	do

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
64. Acer saccharinum—continued	1235	Vermont	Charlotte	F. H. Horsford	****************	9970	Fibers crushed at end
64. Acer saccharinum, var. nigrum. Black Sugar Maple.	213 213	Control of the Contro	do	C. G. Pringledo	AND THE STREET	8890	Fibers crushed at 10 millimeters knot 51 millimeters from end.
1	274 ² 274 ²	Missouri	Allentondo	G. W. Letterman	Low, alluvial	10070	Fibers crushed at 76 millimeters from end.
	757	Florida		A. H. Curtiss		8255	Triple flexure; developed inter-
The state of the s	757		do		do	6895	secting "Cooper lines". Fibers crushed at knot 102 milli-
	1167	Missouri		G. W. Letterman	A STATE OF THE PARTY OF THE PAR	9321	meters from end. Fibers crushed at middle, devel
	1167	do	do			9390	oped "Cooper lines". Triple flexure; "Cooper lines".
65. Acer dasvcarpum	1052	Massachusetts	Topsfield	J. Robinson	Low meadow	7711	Fibers crushed at 51 and at 76 millimeters from end; knots.
66. Acer rubrum	20	do	Arnold Arboretum	C. S. Sargent	Drift	7688	Fibers crushed near middle
Soft Maple. Water Maple.	20	do	do	do	do		
	530	Mississippi			Rich, swampy	7303	Fibers crushed at 89 millimeters from end.
	530	do		do		8437	Fibers crushed at 25 millimeters from end.
	743	Georgia			Low	7235	Fibers crushed near middle
	743		do			6750	Fibers crushed at middle and a
	878	Massachusetts				6963	Triple flexure; "Cooper lines".
	878	do	do	do	do	7380	Triple flexure; "Cooper lines" middle bend 115 millimeters
	1048	do	North Reading	do	do	7485	from end. Fibers crushed at 89 millimeters
	1048	do	do	do	do	7371	from end. Fibers crushed at 25 and at 105
67. Negundo aceroides	290	Missonri	Allenton	G W Letterman	Pich hottom	5080	millimeters from end.
Box Elder. Ash-leaved Maple.	290		do		1 /4 /4	5298	Fibers crushed at 76 millimeters from end. Fibers crushed near middle and
	311	Texas	The Market A.		do	200	split longitudinally. Fibers crushed at 25 millimeters
	311		do		15/11/11/11	5080	from middle. Fibers crushed at middle
			VIX		CY		
68. Negundo Californicum Box Elder.	645	California	county.			6613	Fibers crushed at knot near mid dle.
	645	do	do	do	do	7530	Fibers crushed at 32 millimeters from middle.
ANACARDIACEÆ.	-	-			CALLED V		Carried Control of the Control of th
71. Rhus copallina		Florida	Chattahoochee	A. H. Curtiss	Dry elay		***************************************
	736	do	do	00	do	6033	Fibers crushed at knot 76 milli meters from end.
71. Rhus copallina, var. lanceolata	330		Dallasdo			7666	Fibers crushed at 89 millimeters from end at 3 millimeters from knot.
	000			MV 3			
73. Rhus Metopium. Poison Wood. Coral Sumach. Mountain Manchineel. L'um Wood. Hog Plum.	467	Floridado	Upper Metacombe Key do		Control of the second	7847 9199	Fibers crushed at knot 51 milli meters from middle. Fibers crushed at 127 millimeter from end.
Doctor Gum. LEGUMINOSÆ.					A LINE		Telephone Control of
77. Robinia Pseudacacia	405		Charlestown Navy	S. H. Pook		13496	Fibers crushed at end and at 7
Locust. Black Locust. Yellow Locust.	405		yard.			12996	millimeters from end. Fibers crushed near end and spli
	441		do	Contract and contr		10229	along grain. Fibers crushed at 10 millimeter
							from knot and at 51 millimeters from end.
	815	market market trades	Graften	the management of	PROGRAMMA SECTION	19407	Ethan annohad is add the state of the
	815	100	Graftondo		The second secon	12497	Fibers crushed in vicinity of knot
	1247	A STATE OF THE PARTY OF THE PAR	Long Island	THE PARTY OF THE P	A STATE OF THE PARTY OF THE PAR	9934	Fibers crushed in vicinity of sma
	1247	Control of the last of the las	do	Company of the State of the Sta	The second secon	11294	knot at end. Fibers crushed in vicinity of small
	1248	The state of the s	do	Secretaria de la companya del companya de la companya del companya de la companya	A STATE OF THE PARTY OF THE PAR	10274	knot 102 millimeters from end. Fibers crushed at end of specimen
	1248		The state of the s	CONTRACTOR DESCRIPTION		200000	do

0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.
1941	2703	2971	3175	3379	3534	3656	3788	3933	4037	4672	5353	Sheared fibers
2313	8357	3747	3924	4110	4332	4478	4617	4781	4890	5715	6283	do
1542	2 99	3392	3579	8751	3007	4028	4164	4336	4441	5262	5715	do
2812	4219	4559	4844	5080	5262	5401	5543	5670	5784	6396	6849	do
1860	2744	2948	3166	3334	3465	3615	3801	3892	4028	4808	5208	do
2087	3379	3611	3837	4046	4173	4377	4527	4581	4753	5353	5851	do
2223	3243	3475	3652	3792	3007	4019	4069	4300	4346	4944	5389	do
3026	3978	4377	4599	4744	4962	5080	5239	5339	5452	6328	6782	,do
1951	2840	3066	3329	3479	3629	3797	3933	4033	3724	4831	4881	do
1315	2250	2576	2790	2899	3035	3157	3293	3397	3520	4219	4717	do
1951	2518	2703	2840	2935	8085	3252	3384	₫538	3615	4264	4536	do
2540	3837	4327	4500	4622	4753	4872	4985	5203	5298	6028	6568	do
2073	2976	3248	3379	3479,	3606	3742	3833	3928	4024	4626	4879	do
1533	1896	2041	2123	2254	2427	2449	2472	2567	2685	3175		Sheared fibers; split at end
1179		1715	1842	1887	1946	2028	2037	2141	2177	2531	2722	Sheared fibers
1361	1792	1860	1982	2028	2141	2214	2254	2350	2400	2722	3039	do
1706		2803 2268	3016 2427	3121 2449	3257 2580	3384 2703	3479 2776	3665 2890	3760 2935	4332 3493	4808 3742	Slight shearing of fibers
1409	2002	aavo.	-3-1	-330		2100			2000	0410	11 11	
1805	2259	2386	2508	2613	2758	2794	2939	107	3198	3652	4037	do
1361	2168	2404	2563	2703	2794	2858	2971	3039	3139	3901	4332	do
862	1071	1166	1315	1852	1433	1483	1556	1619	1678	1978	2177	Sheared fibers
984	1447	1610	1624	1710	1774	1855	1860	1905	1951	2168	2308	do
993	1352	1479	1529	1574	1660	1683	1733	1774	1819	2064	2223	,,,,do,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
1542	2250	2449	2486	2490	2531	2658	2672	2790	2794	3062	3311	do
1179	1479	1574	1633	1683	1801	1896	1982	2005	2082	2295		Sheared fibers; split at end
1202	1520	1619	1674	1756	1860	1951	1996	2073	2114	2449	2790	Sheared fibers
Laurer er					2202		1	L			-	
1134	-	1479	1551	1637	1665	1733	1801	1805	1855 2150	2087	2177	Sheared fibers; split at end
1270	1610	1678	1805	1851	1969	1991	2046	2100	2130	2381		do
1111	1438	1637	1765	1878	1946	2059	2150	2159	2159	1973	2449	Sheared fibers; split stick
1089	1669	1928	2028	2164	2168	2177	2218	2268	2259			,do
1384	1928	2395	2749	2930	3193	3293	3434	3525	3570	3969	4346	Sheared fibers; crushed obliquely at each end
1633	2000	3289	3529	3765	3901	4060	4095	4296	4395	4944	5353	Sheared fibers; split at sides
	1	Santa	-		1000		60727		735747			
2000	0070	1010			****		ware.		2000			
2926	a district	4346	4740	5126	5353	5706	5920	6283	6396	7485	8074	Sheared fibers; split at end
2676 2291		4155 3742	4436	4763 4296	5058 4522	5416 4699	5615 4844	5869 4980	6056 5112	5987		Slight shearing; split at end
	10000	1000000	2000	9200	4022	4009	3013	1000	0112	3301	*******	Sheared fibers; split at end
2944	0.500	4559	4808	4967	5103	5307	5421	5534	5670			do
771	-5.80	2722	3016	3103	3207	3343	3438		3620	4037		do
1814	2015	2486 3615	2622	2703	2835	2894	2026	3094	3216	3765	4037	Sheared fibers.
2132 1905	100	3615	3783 3878	3978 4060	4069 4237	4264	4386 4482	4500	4604	The course of		Slight shearing; split at end
2223	1000	3606	3792	3983	4237	4346	4482	4604	4662 4672	PART COLOR		Slight shearing; split at ends
2495	10000	4128	4219	0000	4100	4040	4927	4008	4072	2901	20000000	Sheared fibers; split at end

Species.	Обо питрег.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
79. Robinia Neo-Mexicana	1031	Coloradodo	Trinidaddo		Low, moist	10931	Fibers crushed at 51 millimeters from end.
80. Olneya Tesota	650 650	Californiado	Lower Colorado valley.	G. Engelmann and C. S. Sargent.	Dry, gravelly	5851	Split along grain; oblique fracture
81. Piscidia Erythrina	564 564	Florida	Upper Metacombe Key, do	A. H. Curtiss	Coral	9548	Shattered one end; cross-grained
82. Cladrastis tinctoria	333	Kentucky	Mercer county	W. M. Linney	Limestone	9934	Crushed near middle and at end
dopier nood.	439	Tennessee	Nashville	A. Gattinger	Alluvial	7167	Crushed at end and at 102 millimeters from end.
84. Sophora affinis	329 932	Texasdodo	Dallas	A Y	Dry, calcareous		Split along grain from end to end Triple flexure; took reversed bend near middle.
85. Gymnocladus Canadensis Kentucky Coffee Tree. Coffee Nut.	296 519		Allenton				Crushed at 13 and at 114 millimeters from end. Crushed and split along grain in vicinity of knots.
	1241 1242	do	Allenton	do	do	5434	Crushed at end and at 102 milli- meters from end.
86. Gleditschia triacanthos	1243 532	do	do			5343 8119	Triple flexuredo
Honey Locust. Black Locust. Three-thorned Acacia. Sweet Locust. Honey Shucks.	53 ²	Tennessee	do	NILE OF STREET	do	7711 8174	Crushed at 76 millimeters from end. Triple flexure
87. Gleditschia monosperma Water Locust.	760 760	Florida	Chattahoochee	A. H. Curtiss			Crushed at 89 millimeters from end at 10 millimeters from knot. Crushed at middle at knot 5 milli-
88. Parkinsonia Torreyana Green-bark Acacia. Palo Verde.	678 678	Arizonado	Lower Colorado river.	G. Engelmann and C. S. Sargent.	Sandydo	6078 7280	meters in diameter. Crushed at 6 millimeters knot at middle. Crushed at 64 millimeters from
91. Cercis Canadensis	436	Tennessee	Nashville		Limestone	8119 8369	end. Crushed at knot near middle Crushed near middle
	1090		do		do	6704 6849	Crushed at knot 102 millimeters from end. Crushed in vicinity of knots at
93. Prosopis juliflora	680 680	Arizona	Tueson	C. S. Sargent			middle. Split along grain from end to end; crushed near middle. Triple flexure.
	927	Texas	Austin	C. Mohr	Rich, calcareous	7462	Crushed near middle; opened cracks along grain; split before testing.
94. Prosopis pubescens. Screw Bean. Screw-pod Mes- quit. Tornilla.	658		The state of the s	G. Engelmann and C. S. Sargent.	Sandy	11431	Crushed at 6 millimeters knot at middle, Crushed near end; cross-grained
98. Acacia Greggii	697 509	Arizona	ains.	do	Dry, gravelly		Split along grain from end to end. Crushed near middle
Wild Tamarind.	1112	do	Key Largodo	d o	do	8337	Crushed at 10 millimeters knot 102 millimeters from end.
ROSACEÆ.						17	
102. Chrysobalanus Icaco	480	do	Bay Biscayne	do	Swampy		[
103. Prunus Americana	68 68	Missourido	Allentondo	G. W. Lettermandodo	Rich upland	8663 8799	Crushed at 25 millimeters from end in vicinity of small knots. Crushed at 19 and at 89 millimeters from end.
104. Pronus angustifolia	334 435	Texas	Dallas	J. Reverchon	Rich	10796	Crushed at 102 millimeters from end and at end.
Chickasaw Plum. Hog Plum.						1	Shipping of the same

-	-	-					1				· ·			1
	0.25	0.51	0.76	1.00	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.	0.00
	1905	3493	3878	4155	4427	4614	4799	5013	5126	5298	5924	6192	Sheared fibers	10
	2041	3357	3810	4037	4241	4400	4559	4786	4808	4831	5602		Sheared fibers; split at end	1
	1860	3765	5398	6849	7983	9526	10614	11521	12474	13245			Slight shearing; split at end	
	4309	8256	10387	11885	12973	14062	14787	15467	16057	16510	18008		do	
			2200	****	raen	7000	F000	8499	6007	6386			Sheared fibers; opened seasoning crack	
	2586	4173 3992	4695 4626	5126 5013	5353 5420	5693	5920 6010	6237	6396	6600	7530		Sheared fibers; split at end	
	2313	9889	4020	5020	UTAU	0.02	0010	- 1 GT (1 A)	000000000000000000000000000000000000000		1		A Superior of the second	
	1656	2078	2250	2350	2440	2540	2703	2762	2849	2935	3402	3756	Sheared fibers	11
	2518	2840	3216	3348	3434	3543	3624	3720	3847	3946	4527	4926	do	
	*******			*******		********					*******			
-	2676	2427	4808	5035	5262	5439	5715	5897	6074	6260	7190	7756	Sheared fibers; split at end; compressed area con-	3
	2041	3720	4581	5062	5434	5761	5874	6105	6559	6655	7576	7847	tained 3 millimeters knot.	1
								.,	1.0.0	10.			m 10 10 10 10 10 10 10 10 10 10 10 10 10	T
	1610	2926	3153	3357	3529	3697	3847	3933	4105	4209	4605 5289	5162 3652	Sheared fibers; split at end	1
	1656	2028 1928	2114	2254 2232	2322	2472	2540 2522	2622	2676 2672	2835 2758	5209	3002	Slight shearing; split at ends	
	1352	1787	1928	1991	2082	2168	2245	2318	2390	2454	2880		Sheared fibers; split at ends	١.
		an an		mane	0405	Coore	0010		2000	2400	2700	118	Slight shearing; split at end	
	1796	2245 1905	2313 2168	2404	2495 2404	2654 2495	2812	2939	3075 2776	3180 2862	3720 3357		Sheared fibers; split at end	
	2041	2903	2903	3071	3193	3379	3561	3847	3946	4014		5512	Sheared fibers	П
				4000				-	Bank			0070	do	
	2132	3674 3447	4219 3856	4332	4577 4264	4763 4468	5035 4658	5162 4799	5252 5026	5389	5934	6350	do	
1	2010	OHR	booo	2010	2002	7100	1000		0020	5200	1	7	V/2 //	
1	1452	2223	2699	2948	3620	3298	3484	3652	3801	3896	4527	5080	Sheared fibers and splintered at 6 millimeters knot.	п
	1833	2939	3266	3479	3620	3701	3788	3901	4024	1 4082 R O	4717	5035	Sheared fibers	-
	1116	1769	2132	2395	2663	2844	3044	3207	3357	3538	4173	4527	Slight shearing, caused by uneven loading; seasoning crack.	ı
	1769	2291	2522	2703	2880	3026	3184	3298	3388	3520	4291	4699	Sheared fibers	•
	1633	2527	2794	3057	3252	3352	3538	3583	3810	3882	4536	4105	Sheared fibers; split at end	
	1452	2263	2676	2767	2875	3071	3153	3293	3343	8425	3765	4105		
	2713	4219	4518	4790	4931	5216	5513	5648	5802	6028	6849	7394	Sheared fibers	-1
	2132	3007	4468	4699	4990	5103	5330	5425	5521	5702		0400	Sheared fibers; split at end	-1
	3611	5874	6214	6332	6532	6804	6967	7067	7117	7244	8210	8483	Sheared fibers	1
	1769	4105	4604	4967	5239	5421	5738	5860	6169			7508	do	-1
	2381	3924	4536	5080	5294	5625	5851	5965	6114	6314	7349	7983	do	•
		******	******			*****		*******						-
	1452	1860	1928	2037	2159	2241	2331	2368	2445	2486	2880	3130	Sheared fibers	
	1497	2341	2685	2821	2967	3066	3171	3248	3339	3438	3937	4241	do	
	1724	2654	2858	2930	3107	3252	3357	3456	3606	3652	4196	4491	do	
1	1724		. 3153	3484	3538	3810	3892	4150	4241	4355	5058		. Sheared fibers; split at end	
		CONTRACTOR OF THE PARTY OF THE				C) 1825	la control		200			The state of		1
	1860	2522	100000	and the same			3343				-	271111		"
	1796 2132	2449 3198	2703 3520	2890 3828		200,000	3356 4332	1700000	117730	22.4%	-27.57		Sheared fibers; split at end	1
	2102	9198	0020	0028	4014	2100	9002	4027	*002	36.13/6	3010	******	and an analysis of the contract of the contrac	1

FOREST TREES OF NORTH AMERICA.

						om- nate	
Species.	number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
	Office					Longit press	
105. Prunus Pennsylvanica	233 233	Vermontdo	Charlotte	C. G. Pringledo	The state of the s	6532 6486	Crushed at 3 millimeters knot 102 millimeters from end. Crushed at 102 millimeters from
100. Prunus umbellata	606		Altamaha river			7960	end. Cross-grained; split at end
107. Prunus emarginata, var. mollis.	968	Washington ter-	Wilkeson	G. Engelmann and	Low, rich	8051	Crushed fibers near middle
408. Prunus serotina	968		Roxbury				Crushed at 6 millimeters knot 25 millimeters from end. Failed at knot at end and split
Wild Black Cherry. Rum Cherry.	15 115		do				along grain. Triple flexure
	115	do	Dansville	do	do	8732 9979	ters knot. Crushed at 32 millimeters from end. Crushed at 25 millimeters from
	127	do	do	do	do	8890 9199	middle. Triple flexure
	317	Michigan	Hersey	W. J. Beal	Rich	7802	Crushed at end
	368 406	Vermont/	Charlotte	C. G. Pringle	Gravelly	9095	end. Crushed at middle
	763 763	dle States. Florida	yard. Chattahoochee	A. H. Curtiss	Clay	8773 9571	along grain. Crushed at 51 millimeters from end and split obliquely along grain. Crushed fibers at 38 millimeters
	1053		Topsfielddo	J. Robinson	Gravelly	8029	from end. Crushed fibers near middle of one side of specimen. Triple flexure
109. Prunus Capuli	418		Pinos Altos mountains.			THE SHAPE	Split along grain from end to end; knotty.
110. Prunus demissa	418 637		Strawberry valley	1		8165	Crushed at middle ; 3 millimeters
Wild Cherry. 111. Prunus Caroliniana	1032	C	Jacksonville	C. S. Sargent. A. H. Curtiss	23//	7847	knot. Crushed near middle at small knots.
Wild Peach.	1062 1062	Texasdo	Victoriado	C. Mohr		9503 9617	Crushed at 16 millimeters knot 102 millimeters from end. Shattered at end; cross-grained
113. Prunus ilicifolia	1158 1158	California	Santa Cruz	C. L. Anderson		8709	Crushed at ends; knot 4 milli- meters in diameter.
115. Cereocarpus ledifolius	883 883	Utahdo	City Creek cañon .	M. E. Jones	THE PARTY HOLDER OF THE THE	10478	Cross-grained; shattered
117. Pyrus coronaria	808	Delaware	Kiamensi	W. M. Canby	Clay	7485	Triple flexure
Orab.	1087	Pennsylvania		J. Henry	Moist	7756 5851	Crushed at knot 6 millimeters in di- ameter 127 millimeters from end. Crushed at knot 19 millimeters in diameter 25 millimeters from end.
	1087	do	do	do	do	6940 5874	Crushed 76 millimeters from end in vicinity of 4 millimeters knot. Crushed at 102 millimeters from end; cross-grained.
120. Pyrus Americana	1088	Vermont	Charlotte	C. G. Pringle		6328	Crushed at two 6 millimeters knots 76 millimeters from end. Crushed at middle; knots 3 mil-
Mountain Ash.	365	do		,do		5851	limeters in diameter. Crushed at 3 millimeters knot 102 millimeters from end.
121. Pyrus sambucifolia	410 363 ³	South Carolina	The same of the sa	H. W. Ravenel		6123	Triple flexure
	607	Georgia		A. H. Curtiss	Low	8346 8890	38 and 76 millimeters from end. Crushed at middle; knot 3 milli- meters in diameter. Crushed at 102 millimeters from
	007					8080	end.

	Thi	ESSURE,	IN KILOU	HAMS, K	EQUIRED	TO PRO	DUCE AN	INDENT	ATION, I	y attitudat	ETERS, C	-		
The state of the s	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.	100
	980	1257	1347	1442	1501	1538	1628	1660	1710	1805	2078		Sheared fibers; split at end	
	885	1483	1597	1724	1796	1932	1982	2073	2114	2164		n	Sheared fibers	1
	2699	4649	5280	5851	6214	6555	6759	6872	7145	5276	8029	8483	do	U
	2313	3583	4073	4527	4740	5126	5285	5416	5585	5270	0020	0900	Slight shearing; split at ends.	i
-	2010	0000	4010	304	9140	0120	0400	0110	5005	******	*******	*******	bugue sucaring; space are dates	
7	975	1021	1084	1161	1216	1306	1347	1393	1470	1483	1715	1951	Sheared fibers; split at end	
1	612	1111	1216	1252	1343	1452	1483	1542	1619	1687	2019	2078	do	
1	3112	5398	6237	6646	6885	7063	7221	7326	7372	7376	8165	8618	Sheared fibers and splintered	
	3107	5307	5489	5920	6237	6468	6646	6795	6972	7112	7530	8210	Sheared fibers	ı
	1973	2241	2468	2540	2699	2749	2849	2089	3048	3094	3620	3878	do	
			*******			*** ****						Deresta.	***************************************	
	2010	2649	2880	3075	3202	3334	3393	3493	3674	3788	4401	4944	Sheared fibers	ı
	1588	2177	2341	2536	2667	2771	2844	8026	3071	3166	3538		Sheared fibers; split at end	
					******	· from	,					· · · · · · · · ·		
	1837	2381	2753		2880	2880	2948	3075	3198	3202	3674	3901	Sheared fibers	ı
	1384	1588	1656	1765	1860	1941	2019	2087	2173	2214			Sheared fibers; split at end	1
	1225	1660	1837	1969	2078	2164	2259	2313	2427	2481	2939	3153		1
	1125	2749	1483	1500	1615	1660	1710	1760	1805	1851	2159	2268	Sheared fibers	İ
	1588	2078	2259	2336	2390	2513	2576	2631	2722	2753	3107	3334	do	ı
	1542	2123	2350	2495	2581	2713	2853	2890	2939	3048	71. Min		Sheared fibers; split at end	1
	1724	2495	2713	2812	2971	3003	3184	3302	3420	3479	4178	4581	do	1
	2313	3538	3007	4173	4432	4717	4799	4931	5062	5203	5978	6341	Sheared fibers	1
	2041	2708	/4196	4145	4241	4999	5126	5376					Split at ends	ı
	2041	3311	3738	4200	4445	4699	4940	5207	5466	5661	6740	7802	Sheared fibers: split at end	ı
							1//							ı
	2177	3221	3561	3792	3937	4087	4219	4346	4477	4531	5443	22/12/1	d6	1
l	2313	4060	4699	5216	5534	5793	6141	6386	6568	7230	******		Slight shearing; split at end; short specimen, 12	
	2223	4105	4786	5307	5557	5869	6105	6292	6523	6613	7892		centimeters long. Sheared fibers	
	2132	3606	3674	3969	4191	4518	4740	4890	4990	5153	6033		Sheared fibers; split at end	
	nout	4510	5100	Enon	E094	gon#	0400	0750	2001	noon	onno	0004	011.14.1.14.1.14.1.14	
	3221	4513	5126 3198	5625 3611	5874	6205	6482	6759	7021	7235 5071	8392 6305	9934	Slight shearing; 4 millimeters knot	1
	1452	2676	9100	9011	3901	4128	4445	4740	4899	5071	0505		Split at end	
	3153	5171	6314	7122	7372	7892	8460	8850	9199	9531	12247	13598	Sheared fibers	
	2948	5534	6804	7462	7983	8523	orio acti						Split at end	1
	1678	2404	2622	2858	3030	3198	3289	3357	3561	3674	4241	4753	Sheared fibers.	ı
	2395	3357		2000	0000	4191	0.00	5001	4536	4649	5434	5987	dodo	Т
	1792	2835	3171	3379	3583	3683	8856	4028	4173	4237	4990	0001	Slight shearing; split at end	D.
	1905	3788	4513	4831	5017	5207	5834	5507	5661	5719	6396	7076	Sheared fibers: 13 millimeters knot at corner of com-	
	2449	3652	4128	4400	4572	4786	4890	5080	5298	5325	6169	6532	pression area. Slight shearing.	
	1588	2699	3166	3470	3792	4055	4173	4318	4481	4563	5080	5693	Sheared fibers	
												1	THE PARTY OF THE P	
	1043	1533	1656	1751	1869	1887	2019	2096	2223	2268	2676	2812	Sheared fibers; split at ends	1
1		10101010	10000000	orașteas.				*******	*******		1000000	*******	***************************************	1
	680	1400	1678	1701	1715	1805	1941	2019	2032	2214	2608	2939	Sheared fibers	
	200	-	por s	The state of	page 1	00.74	Carrie II	******	-	2000	Vigna	122		
	957	1746	2254	2522	2703	2840	3016	3116	3248	3438	4150	4763	do	1
	1905	2699	3030	3207	3438	3574	8701	3901	4024	3729	4980	5398	do	4

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
92); Cratægus Crus-galli	328 328	Massachusetts	Brooklinedo	J. Robinson	Loam	6033 5806	Crushed at 64 millimeters from end. Shattered at end
2////	1093	Missouri	Allenton	G. W. Letterman .	Low, wet	7349	Triple flexure; small knots
	1093	do	do	do	do	8346	Crushed at 127 millimeters from
123. Cratægus subvillosa	949	Texas	Victoria	C. Mohr	Alluvial	8605	end and split along grain. Crushed at 19 millimeters from
Scarlet Have.	1081	Missouri	Saint Louis	H. Eggert		8618	end and along one face. Crushed at middle at knot 3 milli- meters in diameter.
12). Cratægus tomentosa	426	Tennessee	Nashville	A. Gattinger	Limestone	7434	Crushed at each end and at middle.
Black Thorn. Pear Haw.	426	do	do	do	do	6795	Crushed at middle at knot 3 millimeters in diameter.
132. Cratægus spathulata	926	Louisiana	Webster parish	C. Mohr	Clay	7280	Crushed at 16 millimeters knot 102 millimeters from end.
13 . Cratagus astivalis	239	South Carolina	Bonneau's Depot	H. W. Ravenel	Damp, rich	7122	Crushed at middle on one corner
13: Cratagus flava, var. pubescens Summer Haw. Ked Haw.	767	Florida	Aspalaga	A. H. Curtiss	Dry clay	8437	Crushed along one corner; de- flected from crushed side.
13' . Amelanchier Canadensis	241	Kentucky	Brumfield Station.	W. M. Linney	Waverly shale	11294	Crushed at 115 millimeters from
Juneberry. Shad Bush. Serv- ice Tree. May Cherry.	849	Massachusetts	Danvers	J. Robinson	Loam	10433	end. Sap-wood; triple flexure
	849	do	do	do	do	10410	Crushed at 25 millimeters from middle.
HAMAMELACEÆ.	-40	1,05//	Kemper's mill	a state	Tree and the		Combad and 1231
139 Liquidambar Styraciflus Sweet Gum. Star-leaved Gum. Liquidamber. Red Gum.	546 546	do				6795 6486	Crushed near middle; angle of crushing, 50°. Triple flexure.
Bilsted.	1095	Arkansas	Little Rock			7847	Crushed at 25 and at 102 millime-
	1095	do	do	do			ters from end. Crushed at 51 millimeters from
	1173	New Jersey	Mount Holly	S. P. Sharples	Clay	6337	end. Crushed at 64 millimeters from end and at middle on opposite face.
	1173	do	do	do	do	6396	Crushed and split at end; cross- grained.
	1181	Mississippi	Yazoo River bot-	R. Abbey	Alluvial	6940	Crushed at 64 millimeters from end; 0.75 sap-wood.
	1181		do			7870	Crushed at 64 millimeters from end.
	1182		do			8573	Crushed at middle
	1182		do			100000	Crushed at 25 millimeters from
	posenia i	do	do	do	do	8256	middle. Crushed at middle
RHIZOPHORACEÆ.						0200	
140. Chizophora Mangle	485	Florida	Bay Biscayne	A. H. Curtiss	Salt-marsh	13517	Crushed at end in vicinity of knot.
Mangrove.	485	do	do	do	do	14016	Crushed at middle; cross-grained.
COMBRETACEÆ.							
141. (onocarpus erecta	489		do			MATERIAL TELL	Crushed at 38 millimeters from end; worm-eaten.
	489	do	do	do	do	9614	Triple flexure
142. I aguncularia racemosa	507	do	Sugar-Loaf Sound	do	do	7212	Crushed near middle; cross-grained and worm-eaten.
Mangrove.	507	do	do	do	do	7167	Crushed at 76 millimeters from end; small knots.
MYRTACEÆ.	1110		*			Julian.	C-1-1-1-4 row
144. Engenia buxifolia	1118	do	Lost Man's river		Humus and coral .	14198	Crushed at 127 millimeters from end.
1-6. Eugenia monticola	1135	do	CENTRAL DESCRIPTION		Coral		Split along grain, opening season
Stopper, White Stopper.	1135	do	do			8936	cracks; split in seasoning cracks. Split and crashed near end
118. Eugenia procera	1127	do			do	200000	Triple flexure; developed inter- secting "Cooper lines".
CORNACEÆ.	1127	do	do	do	do	10567	do
151. Comus florida	67 67		Allentondo			9276 9571	Triple flexure; opened cracks at end.
	761	Laboration	Chattahoochee			7031	Crushed at 102 millimeters from end; cross-grained.

	1						100				1	
0.95	0.51	0.76	1.02	1.97	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.
1315	2313	2495	2676	2803	2980	3085	3207	3307	3397	3983	4296	Sheared fibers
1314	2155	2490	2713	2803	2976	3071	3171	3198	3484	4064	4763	do
2041	3153	3656	3937	4255	4482	4695	4859	5035	5171			Slight shearing; split at end
1701	2676	3085	3379	3611	3828	3992	4119	4264	4391	5353	6033	Sheared fibers
1315	2495	3130	3484	3788	3983	4219	4391	4581	4753	4806	6350	do
2449	3674	4119	4445	4626	4922	5013	5162	5439	5534	6759	7212	Sheared fibers; split at end
1787	3257	3765	4055	4309	4482	4658	4781	4944	5035	5851	6486	Sheared fibers
1293	2359	2948	3130	3379	3638	3742	3892	4119	4287	4035	5625	do
1315	2617	3066	3329	3484	3674	3910	4055	4164	4287	5262	5761	do
1433	2699	3130	3402	3583	3742	3856	4028	4101	4264	4990	5579	Sheared fibers; split at end
1905	3720	4445	4831	5103	5398	5625	5874	6056	6260	7394	7983	Sheared fibers; indented on 6 millimeters knot
2041	3221	3674	3992	4423	4436	4877	4990	5194	5334	6350	1000	Sheared fibers; split at end
1860	2000000	3788	4110	4491	4708	4922	5112	5316	5489	6646	7349	Sheared fibers
	CHINA CO	170 TO TO TO	4291	12200		LANGER		I LICENSES			1000000	
2449	3515	3946	4291	4536	4863	5098	5303	5484	5684	6782		Sheared fibers; split at end
1424	1914	2019	2100	2254	2381	2477	2536	2645	2717	3166	3329	Sheared fibers
1588	1883	2073	2223	2313	2395	2518	2604	2703	2799	3289	3620	do
1334	1996	2191	2250	2277	2377	2413	2486	2527	2540	2926	3121	do
771	1315	1474	1542	1574	1674	1719	1760	1860	1932			Sheared fibers; split at end
1198	1814	1996	2096	2186	2859	2472	2531	2676	2708	3289		do
2078	2844	3026	3162	3302	3438	3561	3661	3801	3042	4445	4881	Sheared fibers
1089	1506	1588	1633	1715	1760	1928	1941	1973	2014	2313	2440	do
952	1452	1574	1669	1760	1851	1887	1941	2028	2050	2404	2531	do
1384	1792	2000		2227	2300	2350	2449	2586	2649	3075	3302	do
1043	100740	1656	1814	1914	2019	2091	2141	2291	2345	2708	2899	Sheared fibers; split at end
907		1633	1923	2041	2091	2168	2273	2381	2445	2722	2926	Sheared fibers
1157	200	1678	1837	1896	1941	2073	2155	2223	2273	2100	2020	Sheared fibers; split at end
	1											
1311	4173	5806	0940	7576	8006	8464	8822	9140	9453		*******	Slight shearing; split at end
2227	4763	5987	6713	7212	7689	8052	8337	8663	8913	10637	*******	Sheared fibers; split at end
2404	4173	4854	5398	5751	6078	6396	6600	6895	7085			do
3903	4491	5216	5761	6101	6432	6759	7099	7226	7530	8799	******	do
817	1515	1796	2050	2132	2359	2436	2531	2626	2790			Sheared fibers; split at end
1270	1973	2250	2472	2640	2708	2844	2948	3035	3116	3674	3901	Sheared fibers
2336	3765	4763	5398	5851	6169	6613	6963	7294	7576			Opened seasoning cracks
4691	I Towns	5942	6373	6849	7076	7303	7553	7802	8029	9526	9753	Sheared fibers; split at end
2586	4527	5648	6033	6532	6795	7258	7475	7779	7983	9026	9753	Sheared fibers
oros	5080	5701	6432	0000	7400					*******		and the second s
2313		5761 5942	6668	6963 7235	7439 7689	7792 8119	8119	8506 8714	8786 8990	10614	11930	Sheared fibers; split at enddo
		DE LEGICIE		200000	1	-	CHAN	200000	240000	181018-010		
2948		5715	6146	6386	6754	7076	7326	7485	7729	8890	9798	Sheared fibers; 7 millimeters knot in compression surface.
1866	3720	4513	4953 3765	5180	5484	5761	5965	6192	6396	7802	8702	Sheared fibers; split at end

FOREST TREES OF NORTH AMERICA.

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	Species.	Office number,	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
151.	Cornus florida—continued	812	West Virginia		C. G. Pringle	Dry	8732	Sap-wood; triple flexure; inter- secting "Cooperlines"; split at end.
		812	CONTRACT OF THE PARTY OF THE PA			do		do
		1077	Missouri			Gravelly	9004	Triple flexure
		1077		do			8981 8210	Triple flexure; split at ends; in- tersecting "Cooper lines". Triple flexure; split at ends
152.	Cornus Nuttallii	960	Oregon	Portland			10387	Crushed at middle
	Flowering Dogwood.	960	do	do	C. S. Sargent.		10819	Crushed at 102 millimeters from end.
153.	Nyssa capitata Ogecchee Lime. Sour Tu- pelo, Gopher Plum.	605 605		Ogeechee river		The state of the s	6895	Crushed at 114 millimeters from end; split along grain.
154.	Nyssa sylvatica	517	Tennessee	Cumberland river	A. Gattinger		7349	Crushed on one face at 25 millime-
	Tupelo. Sour Gum. Pep- peridge. Black Gum.	750	Florida		A. H. Curtiss		7892	tera from middle. Triple flexure; split at ends
		750	do	do	do	do	8119	Crushed at 3 millimeters knots
		813	West Virginia	Grafton	C. G. Pringle		8414	at middle. Crushed near middle; split along
		813	do	do	do		8210	one corner. Crushed at 102 millimeters from
		833	Massachusetts	West Newbury	J. Robinson	Rich	7689	end. Triple flexure; split at ends
		833	,do	do	do	do	6623	Crushed at knots 64 millimeters
		834	do	do	do	do	6577	from end. Crushed at 6 millimeters knot 27
		834	da	do	do	do	7394	millimeters from middle. Triple flexure; split at ends
4		835	do	Chebacco pond	do		7022	Triple flexure, deflected diago- nally; split at ends.
		835	do	do	do		7176	Triple flexure; split at ends; in- tersecting "Cooper lines".
155.	Nyssa uniflora Large Tupelo. Cotton Gum. Tupelo Gum.	128 128		Bonneau's Depot		7 / /	6396 6328	Crushed at 12 and at 127 millimeters from end on opposite sides. Triple flexure; split at ends
		050	Alabama	Stockton	C. Mohr	Alluvial	5035	Crushed near middle
		550	do	do	do	,do	5715	Triple flexure
		604	Georgia	Ogeechee river	A. H. Curtiss	Swampy	6123	Triple flexure 102 millimeters
	CAPRIFOLIACEÆ.	604	do	do	. do	do	5489	from end. Triple flexure; split at end
156.	San-bucus glauca	681	California	Contra Costa	G. R. Vasey	Gravelly	4400	Shattered at end; 10 millimeters knot.
158.	Viburnum Lentago	370	Vermont	Hinesburg	C. G. Pringle	Swampy	8890	Crushed near middle; grain wavy
159.	Viburnum prunifolium Black Haw. Stag Bush.	1102	Kentucky	Mercer county	W. M. Linney do	Hudson River shale. Trenton limestone.		Crushed at ends in vicinity of knots; split along grain. Crushed 38 millimeters from mid-
		739	Georgia	Bainbridge	A. H. Curtiss	Clay	7938	dle. Crushed 26 millimeters from mid- dle; cross-grained.
	RUBIACEÆ.			Taking a paid				die; cross-grained.
160.	Exostemma Caribaeum	466	Florida	Upper Metacombe Key.	do	Coral		Shattered from end to end
		466	do	do	do	do	10660	Crushed at knot at middle; split along grain.
161.	Pinekneya pubens	381	South Carolina	Bluffton	J. H. Mellichamp .	Sandy swamp	4355	Crushed at knot 25 millimeters from middle; opened between rings.
	ERICACEÆ.							
164.	Vas cinium arboreum	343 343		Citronelle			5874 6895	Split and crushed at end; cross- grained. Triple flexure, deflected diago
165.	Andromeda ferruginea	1033	Florida	Jacksonville	A. H. Curtiss	Hummock	7802	nally. Crushed at 76 millimeters from end; cross-grained.
166.	Arbutus Menziesii	643	California		G. R. Vasey	Gravelly	7303	Triple flexure; split at ends
	Madroña.	643	do	county.	-	do		do
		679	do	Marin county	do	do	7530	Shattered and crushed at ends
		679	do	do	do	do	9548	Crushed fibers at middle

1	- 1					-			1/1/2				
•).25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.
	2041	3130	8493	3761	3983	4146	4355	4527	4677	4831	5761	6328	Sheared fibers
	1951	3130	3606	3892	4069	4250	4400	4536	4717	4899	5987	6396	do
	862	2291	3606	4418	4914	5325	5715	5878	6146	6419	7599	8663	do
	1951	385€	4491	4944	5243	5552	5711	5883	6114	6373	7394	******	Sheared fibers; split at end
	2223	2833	4509	4044	5158	5398	5606	5779	5020	6123	7212	7938	Sheared fibers
	2068	2994	3343	3615	3819	4014	4132	4323	4436	4804	5489	5829	do
	1814	3198	3556	8742	3946	4164	4287	4491	4572	4708	5579	6169	do
	2010010			Lane of	2000		-				2000		
	1406	2177	2386	2522	2713	2858	2971	3085	3143	3289	3878		do
	1452	1814	*******	2150	2254		2449	2608	2622	3039	3153		do
	1338	1796	1941	2064	2150	2245	2331	2400	2409	2622	3016		Sheared fibers; split at ends
	1792	2767	3130	*******	3538	3756	3892	4073	4219	4400	5307	5851	Sheared fibers
	2291	3130	3329	3606	3792	3992	4241	4423	4536	4726	5851	6350	do
	1951	3749	2921	3075	3243	3375	3438	3497	3588	3670	4196	4391	do
	1179	1352 2676	2019	2259	2336	2404	2495 3697	2531	2567	2617	3039	2894	do
	1724	2495	2744	3062 2971	3243 3148	3583 3307	3447	3919 3556	4055 3683	4137	5126 4581	5887 5171	Sheared fibers on one edgedo
	1257	2531	2713	2899	3030	3171	3311	3420	3502	3615	4418	5013	Slight shearing
	1384	2245	2513	2849	2921	3107	3193	3311	3484	3579	4196	4581	Slight shearing
	1901	2699	3130	3357	3515	3697	3856	8983	4105	4241	5035	5851	do
	1837	2740	3130	3311	3529	3656	3042	3946	4064	4264	5216	5615	do
	2192	2622	2875	3003	3148	3329	3475	3574	3715	3828	4401	4944	Sheared fibers
	2313	2948	3130	3207	3348	3438	3593	3742	3042	3946	4545	4944	dodo
	1043	1529	1588	1678	1765	1869	1960	2014	2059	2132	2436	2667	do
	1343	1905	2041	2168	2254	2381	2472	2586	2654	2708	3085	3334	do
	1497	2313	2654	2803	3012	3139	3216	8348	3425	3493	4219	4491	Sheared fibers; split at end
	1202	1610	1783	1805	1923	1996	2118	2195	2232	2308	2699	3039	Sheared fibers
	1452	1928	2068	2150	2218	2291	2379	2436	2486	2536			Sheared fibers; split at end
	-12-55	******					******						
	1996	2019	4649	4976	5252	5498	5715	5874	6033	6283			Sheared fibers; split at ends
	1882	3992	4854	5207	5512	5724	5965	6232	6441	6595			Slight shearing; split at ends
	2449	3438	3806	4033	4264	4463	4690	4840	4581	5162	6305		Sheared fibers on one edge; split at ends
	2948	5806	6940	7439	7938	8142	8460	8936	8981	9026	9889	10705	Sheared fibers; radial split
	3447	5761	6668	7067	7475	7756	7915	8074	8192	8301	arooar	10103	do
	E00 :	1001	1400		200000	0.0000		12.00	2000	-	10,000		
	590	1021	1406	1574	1678	1792	1851	1896	1941	1982	2214	2422	-Sheared fibers; 4 millimeters knot on indented area
	1941	3402	3833	4164	4432	4890	5171	5398	5512	6305	6918		Sheared fibers
	1905	3243	3742	4241	4522	4749	4990	5162	5362	5489	6577	7076	Slight shearing; 10 millimeters knot at edge
	1792	2699	3193	3402	3611	3633	4024	4173	4300	4491	5216	5715	Sheared fibers
	1315	2404	2694	2967	3048	3266	3393	3574	3729	3846	4468	5035	Sheared fibers
	2087	2685	2980	3243	3443	3620	3828	8992	4119	++++++			do.
	1941	2858	3243	3515	3720	3851	3996	4173	4309	4418	5126	5579	do

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Species.	Office number,	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos,	Remarks.
167. Arbutus Xalapensis	683		Santa Rita mountainsdo	G. Engelmann and C. S. Sargent.			Crushed near middle at knots 3 millimeters in diameter. Split obliquely from middle to end, crushing fibers at middle.
169. Oxydendrum arboreum Sorrel Tree. Sour Wood.	353 353	Alabama	Cottage Hill	C. Mohr	Light, rich	7430 7847	Crushed at 10 millimeters knot at middle. Crushed at 10 millimeters knot
	515	Tennessee	Nashville	A. Gattinger	Sandy rock	8799	25 millimeters from middle. Triple flexure
170. Kalmia latifolia	262 ² 262 ³	Virginia	Fancy Gap		Moist	6931 6849	Crushed at two 6 millimeters knots at end. Crushed at knot 51 millimeters
171. Rhododendron maximum Great Laurel. Rose Bay.	263 263	110000000000000000000000000000000000000		do	and the second second second	7462 6577	from end. Crushed at 25 millimeters from middle. Crushed at 3 millimeters knot at
SAPOTACEÆ. 75. Chrysophyllum oliviforme	492	The state of the s		A. H. Curtiss		Santa Contract	middle. Crushed at 25 millimeters from middle, deflecting diagonally.
176. Sideroxylon Mastichodendron.	492	do	Upper Metacombe	7	do		Crushed at knot at raiddle; split obliquely. Split along grain at end; slight
Mastic. 177. Dipholis salicifolia	461	do		do	do	9889	crushing. Crushed at end; oblique split Triple flexure
Bustic. Cassada.	488		do	do	do	12565	Crushed near middle
	500		Contract Contract State of the Contract of the	do	ACCOUNT OF THE PARTY OF THE PAR	10931	and split along grain. Crushed at 102 millimeters from end in vicinity of knots.
178. Bumelia tenax	746 930	Georgia	Bainbridge	C. Mohr	// - //	7235 5489	Split obliquely from middle to end Crushed at end
Gum Elastic. Shittim Wood.	930	do		do	The state of the s	5012 6895	Crushed at 102 millimeters from end at 5 millimeters knot. Deflected at middle; split at ends
181. Bumelia lycioides	333	Tennessee	Nashville	A. Gattinger	Alluvial	7825	Splitatend; cross-grained; seasoning crack at middle.
thorn. 182. Bumelia cuneata. Ants' Wood. Downward Plum. Saffron Plum.	1124	Florida	E	A. H. Curtiss		7643	Triple flexure, deflecting from knots.
Wild Dilly. EBENACEÆ.	458 458	do	Key.	do	do	8913 5806	Cross-grained; split obliquely from end to end. Cross-grained; split along season- ing cracks.
184. Diospyros Virgi nia na	61 61	Missouri	Allentondo		Rich upland	7892 7485	Triple flexure, deflected diagonally do
El sys reference	425 811	Tennessee West Virginia	Nashville	A. Gattinger C. G. Pringle	Rich loam	9095 7394	Crushed at end
	811 1084	do	Allenton		Rich upland	7802 8301	Triple flexure, deflected diago- nally. Deflected at 25 millimeters from middle.
	1084 1162	do	do	do	dő	8029 8415	Triple flexure, deflected diagonally; intersecting "Cooper lines".
STYRACACEÆ.	1162 347	Alabama		C. Mohr		7901 6146	Crushed at 6 millimeters knot 76
Horse Sugar. Sweet Leaf.	347	do			do	A HARMAN	millimeters from end and at 3 millimeters knot at end.
187. Halesia diptera Snow-drop Tree, Silver-bell Tree.	738 738	Georgiado		A. H. Curtiss	Lowdo	7394	Failed at 6 millimeters knot 127 millimeters from end and split along grain. Triple flexure
OLEACEÆ. 101. Fraxinus pistaciæfolia Ash.	660	Arizona	Santa Rita mountains.	G. Engelmann and C. S. Sargent.	do	6441	Crushed at middle on one face Crushed at middle in vicinity of 3
	000	do		1	1	3074	millimeters knot.

	To the				Male I								Remarks.
	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	
-	1520	2586	2976	3221	3411	3629	3801	3946	4105	4219	4922	5421	Sheared fibers
	2359	3583	3983	4250	4482	4662	4854	4990	5112	5207	6123	6623	do
	1951	3062	3479	3751	3946	4237	4414	4554	4695	4831	5670	6350	do
	1211	2223	2676	2971	3153	3284	3479	3633	3760	3856	4491	5058	do
	1497	2214	2527	2694	2849	3021	3193	3325	3493	3611	4287	4626	Sheared fibers; split at end
	1560	2254	2586	2767	2921	3003	3157	3207	3393	3438	3946		do
	2268	3289	3674	3969	4105	4237	4350	4491	4581	4690	5534		do
	2223	3447	3892	4173	4287	4432	4581	4699	4808	4890	5625	6078	Sheared fibers
	2041	2767	2980	3107	3252	3352	3434	3502	3597	3674	4264	4491	do
	1951	2468	2708	2830	2880	2994	3085	3166	3252	3302	3810	4150	Sheared fibers; split at end
	4219	5579	6033	6464	6791	7145	7430	7693	7974	8219	9753		do
	1860	3765	4626	5126	5425	5742	6014	6250	6532	6736	8119	9026	do
	2313	4536	5171	5586	5874	6201	6382	6677	6940	7117			Slight shearing; split at end
	2767	4332	4899	5307	5489	5761	5987	6123	6296	6464	7248	7847	Sheared fibers; split at end; short specimen, 121 mil-
	0007	0.000	4000	1400		Fone	5434	5.070			A		limeters long. Split at end
l	2087	3420	4082 3983	4436	4717 4608	5085 4844	4649	5398	5479	5648	6441		Sheared fibers on one edge; split at end
I	975	2486	3425	3810	4114	4364	4604	4808		5103			Sheared fibers; split at end
	907	2269	3239	3833	4073	4400	4527	4844	5013	5207	6123		do
	1474	2155	2431	2712	2894	3116	3293	3497	3710	3882	4854	5602	Sheared fibers
	1384	1923	2055	2168	2259	2381	2472	2572	2635	2703	3121	3443	do
١	975	1497	1606	1692	1801	1896	1978	2073	2177	2268	2703	3085	do
	1769	2835	3148	3425	3633	3042	4024	4191	4350	4518	5398	5851	Sheared fibers; split at corner
	880	2522	2527	3289	3529	3751	3964	4178	4364	4536			Split at ends
	658	2313	3720	4281	4581	4799	4944	5207	5479	5666	6577	7462	Sheared fibers
	2676	4355	5307	6023	6532	6895	7235	7521	7811	8029	8936	9163	do
	2359	3697	4491	5058	5470	5851	6155	100000000000000000000000000000000000000	6713	6940	8279	9026	
						fall.	- 111,53						
	1905 2041	3130	3674	4001	4214 4695	4971	4527 5067	4667 5239	4786 5362	1 STATE	5625 6486	7076	
	1960	3602	4459	4908		5561	5869	6083	6310	1 MANAGED	7666	8392	Control of the Contro
	2767	4536	5353	5738	0.797.0	57,000	6486	6849	7049	1 10001101	8256	8799	
	1905	3266	3901	4341	4604	4854	5080	5285	5434	5615	6668	7530	do
	1746	1000000	4264	4699	-	A Section	5421	5661	5811	5965	7031	7711	do
	2676		- ALEX	5194	0.000	1000000	1		6187	131/12014	7258	7756	THE STATE OF THE PARTY OF THE P
	2540	4495	5557	6065	6323	6568	6736	6881	7049	7221	8170	8663	do
	1293	3039	4060	4695	5080	5421	5606	5851	6069	6246	7417	8301	Slight shearing of fibers
	1837	2608	2744	2871	2967	3003	3039	3057	3085	3162	3720	3856	Sheared fibers
	1170	1796	1969	2064	2127	2214	2295	2381	2445	2504	2903	3239	do
	1397	-	1 2550	2998	3153	1	3.6	10000	1	100000000000000000000000000000000000000	4491	5171	

	1892	2227				1			1				

FOREST TREES OF NORTH AMERICA.

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
192. Fraxinus Americana	392	Missouri	Allenton	G. W. Letterman .	Low	7530	Triple flexure
White Ash.	1141	Michigan	Dansville	W. J. Beal	Clay	5851	do
	1141	do	do	do	do	5579	Triple flexure; split at end
	1143	do	Hudson	do		9526	Deflected diagonally; crushed a
	1144	do	Lansing	do		9934	25 millimeters from middle. Crushed at 25 millimeters from
	1145	do		do		5761	end, Crushed at 38 millimeters from
	130	South Carolina	Bonneau's Depot	H. W. Ravenel	Wet	9208	middle; "Cooper lines." Crushed at 64 millimeters from
	130	do	do	do	do	8709	end. Crushed at 114 millimeters from
	212	Virginia	Indiana lines			7983	end. Crushed at middle
	212		do			7756	Crushed at 32 millimeters from
	2271		Charlotte	The Marie The	NO. 1000.	7281	middle. Crushed at 51 millimeters from
	2273		do			7485	middle; deflected diagonally. Crushed at 3 millimeters knot 1
	2273		do			7349	millimeters from middle. Triple flexure
	2671		Wytheville			6141	Crushed at 38 millimeters from
	2673		do			6509	middle. Deflected diagonally; maximum
	431		Nashville		Limestone	8346	bend 38 millimeters from middle Triple flexure
	551		Kemper's mill	Committee of the Commit	Alluvial	7439	do
	551		do			6736	Deflected and fibers crushed at 7
	747		Bainbridge			5057	millimeters from end. Crushed at 3 millimeters knot s
	747	The part of the pa	do			5080	middle. Triple flexure; split at ends
	937	Texas		C. Mohr		7167	Crushed at end and at 76 millim
	1045	Massachusetts	The second of the second	J. Robinson		8890	ters from end in vicinity of knot Triple flexure; middle bend 1
	1045	do		do	Secretary de la seconda de la seconda de la seconda de la seconda de la seconda de la seconda de la seconda de	8686	millimeters from center.
	1045	40		40		0000	
192. Fraxinus Americana, var. Tex- ensis.	364	Texas	Dallas	J. Reverchon	Dry, calcareous	9435	Triple flexure
спета	364	do	do	do	do	7892	Crushed at 6 millimeters knot 10 millimeters from end.
193. Fraxinus pubescens	+ 2292	Vermont	Charlotte	C. G. Pringle	Clay	8301	Failed at knot 64 millimeter
Red Ash.	2293	do		do		8065	from end; cross-grained. Triple flexure
	1059		Topsfield		River-bottom	C DOWN COM	Triple flexure, deflected diag
	1000		Lopoucia				nally.
194. Fraxinus viridis	57	Missouri	Allenton	G. W. Letterman	Rich, wet	6486	Deflected at middle
	308	Texas	Dallas	J. Reverchon	do	7349	Crushed at middle on one face
	308	do	do	do	do	5829	Triple flexure
	438	Tennessee	Nashville	A. Gattinger	Rich upland	8618	Crushed at 89 millimeters from end, splitting between rings.
	948		Victoria	Contract the second	THE RESIDENCE OF THE PARTY OF T	8097	Deflected diagonally
	948		do			9753	Triple flexure; middle bend a millimeters eccentric.
	957		Matagorda bay			7892	Crushed at 6 millimeters knot i millimeters from end.
	957	do	do	do	do	7666	Triple flexure
195. Fraxinus platycarpa	536	Alahama	Stockton	đo	Rich, alluvial	4014	Crushed at 76 millimeters from
Water Ash.	000		The state of the s				end.
106. Fraxinus quadrangulata Blue Ash.	66	Missouri	Allenton	G. W. Letterman	Dry upland	8754	Triple flexure
	66		do			9299	Triple flexure, deflected diag
	125	Michigan	Lansing	W. J. Beal	Rich loam	6228	
	125	do	do	do	do*	6327	Triple flexure; developed inte secting "Cooper lines".
	2861	Kentucky	Mercer county	W. M. Linney	Limestone	9344	Deflected at middle and at 3 mill meters knot 76 millimeters fro
	2863	do	do	do	do	8428	end. Crushed at 3 millimeters knot 5 millimeters from end and nes
		36		C W T-H	Condy lase	0010	middle.
	291	Missouri	earlie San	G. W. Letterman.	Sandy loam	6849	Crushed on one face 19 millim ters from middle.
	518	Tennessee	Nashville	A. Gattinger	Rich limestone	8609	Crushed at knots 102 millimeter from end.

THE WOODS OF THE UNITED STATES.

1334 1134 749 1996	0.51	0.76										Remarks.
1134 749	-		1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	
749	2078	2400	2436	2527	2744	2930	2980	3130	3207			Split at ends; short specimen, 120 millimeters long.
	1338	1488	1597	1610	1696	1719	1783	1810	1883	2155	2413	Sheared fibers
1996	1302	1334	1542	1619	1619	1724	1787	1833	1842	2205	2472	do
	2948	3121	3298	3488	3633	3833	3964	4033	4128	4944	5579	Split at corner of specimen; fibers not sheared
1542	1882	1982	2068	2205	2304	3368	2468	2518	2576	3039	3130	do
1315	1842	2041	2164	2279	2427	2499	2586	2663	2690	3130	3357	Split at corner; slight shearing
	2109	2395	2622	2717	2939	3075	3162	3334	3488	4219		Slight shearing; split at end
1529	2654	2976	3148	3284	3434	3529	3665	3860	3937	4491	4990	Sheared fibers
1588	1769	1987	2273	2400	2486	2590	2762	2848	2985	3742	4491	Split at end; sheared fibers
1588	1741	2023	2186	2336	2504	2667	2830	2894	3057	3810	4296	Sheared fibers
1588	1973	2218	2277	2440	2536	2631	2776	2899	3089	3882	4382	do
1882	2985	3388	3611	3742	3964	4042	4137	4250	4359	5171	5285	do
1560	1619	2708	2903	2989	3162	3307	3425	3513	3946		1.	Sheared fibers; split at end
1860	2481	2744	2890	3103	3248	3388	3525	3583	3706	3856		Split at end
2449	2948	3221	3379	3574	especial.	3842	3946	4092	4132	4899	5443	Slight shearing of fibers
1551	2159	2250	2463	2579	2708	2867	2976	3134	3221	3924	4300	do
1179	1642	1801	1932	2028	2132	2195	2241	2400	2341	2926	3130	Slight shearing of fibers; split at end
1352	1579	1746	1887	1991	2123	2218	2336	2436	2522	3062	3420	Slight shearing of fibers
1538	2576	2976	3157	3234	3334	3425		3529	3579	3901	3901	Sheared fibers
1433	1801	1982	2014	2214	2313	2331	2436	2481	2531	2976	3089	Slight shearing of fibers
1905	2468	2694	2948	3152	3334	3620	3788	3901	3987	4990	5489	Slight shearing
2023	2622	2885	3198	3470	8751		4196	4559	4601	5489	6010	Slight shearing of fibers
2041	3357	3878	4082	4160	4305	4445	4522	4196	4300	5434	5851	Indented without shearing
	- Turk			200	1300	1	N/G	James 1				
1325	1996	2291	2608	2685	2866	3116	3207	3420	3529	4559	.5353	do
1837	2044	3384	3615	3669	4033	4287	4418	4473	4491	4763	· · ·	Slight shearing; split stick
1533	2518	2799	3021	3162	3343	3484	8597	3679	3751	4377	4699	Sheared fibers
1384	2427	2753	2948	3221	3311	3425	3484	3529	3674	4100	4423	
1860	2867	3148	3334	3434	3620	3774	3837	3983	4073	4626	5035	Indented without shearing
	ACCUSED.				Salve	Name of the last				NI		
1570	2767	3243	3357	3593	3710	3878	3933	4037	3810	4717	5035	do
1633	1860	1951	2100	2223	2155	2064	2563	2713	2880	3583	3092	Slight shearing of fibers
1588	2245	2409	- 2480	2567	2676	2749	2830	2890	2935	3348	3465	Sheared fibers
2041	2708	2894	3175	3379	3647	3828	3910	4055	4205	5035	5625	Slight shearing of fibers
2041	3198	3638	3969	4200	4482	4672	4844	5121	5330	6237	6940	do,
1860	3402	3992	4281	4454	4717	4808	5035	5207	5289	6078	6595	Fibers did not shear
2109	3026	3293	3470	3720	3856	3987		4196	4332	4035	5262	Sheared fibers
2177	3202	3611	3842	4028	4164	4309	4454	4572	4672	5421	5987	do
1179	1760	1932	2096	2299	2313	2877	2459	2522	2549	2912	3157	do
	8004	1001	4440	4000	1800				8040	*****	-	
2880	3901	4264	4418	4590	4722	4849	5022	5158	5316	6373	7031	Slight shearing of fibers
2359	3620	4191	4513	4886	7180	5489	5706	5965	6128	7485	8029	do
1452	1633	1656	1705	1724	1842	1896	1973	2028	2105	2427	2586	Sheared fibers
1179	1506	1574	1619	1674	1778	1873	1932	1982	2037	2381	2567	do
1542	******	3701	3974	4150	4332			******	4967	5942	6509	Slight shearing of fibers
1225	2713	3334	3720	3882	4082	4173	4296	4427	4545	5149		Sheared fibers; split at end
1973	2740	2894	2939	3071	3202	3357	3420	3479	3615	4128	4445	Indented section covers unsound knot 10 milli-

FOREST TREES OF NORTH AMERICA.

Species.	Office number.	State.	Locality.	Collector	Soil.	Longifudinal com- pression: Ultimate strength, in kilos.	Remarks.
197. Fraxinus Oregana	964	Oregon	Portland	G. Engelmann and	Low, wet	9753	Crushed at middle
Oregon Ash.	964	do	do	C. S. Sargent.	do	7938	Crushed 25 millimeters from mid-
THE RESERVE TO STATE OF THE PARTY OF THE PAR	1001	do	Weidler's saw-mill	do	***************************************	8799	dle on one face. Triple flexure, deflected diago-
	1001	do	do	do		9063	nally. Crushed at end
	1024	do	Portland Furniture	do		6441	Crushed at middle; side of speci-
	1024		Company.	do		5557	men split off. Crushed at middle; angle of crush-
	1030			do		9208	ing, 70°. Crushed at middle; angle of crush-
	1030			do		9798	ing, 53°. Crushed at 51 and at 114 millime-
	2000						tars from end.
198. Fraxinus sambucifolia	122	Michigan	Dansville	W. J. Benl	Wet, peaty	6237	Crushed on one face 25 millimeters from middle.
Ground Ash.	830	Massachusetts	Danvers	J. Robinson	Rich, loamy	7021	Triple flexure; middle bend 25 millimeters eccentric.
	839	do	do	do	do	6441	dodo
100 Tourist	***	Annales /	(C) 111	1 II Charting		#110	Split from end to end
199. Forestiera acuminata	737						
	737	60				******	***************************************
201. Osmanthos Americanus	283	Louisiana	Amite	C. Mohr	Rich, alluvial	9058	Crushed along one face
Devil Wood.	283	do	do	do	do	9063	Crushed at knot 64 millimeters
	584	Florida	Saint John's river	A. II. Curtiss	Sandy loam	8777	from end. Crushed at 76 millimeters from
	584	do	do	do	do	8119	end. Crushed at 102 millimeters from
BORRAGINACEÆ.							end.
204. Bourreria Havanensis	1137	do	Key Largo	do	Coral	10614	Crushed fibers at 38 millimeters from end.
	1137	do	do	do	do	7779	Cross-grained; oblique fracture
205. Ehretia elliptica	942	Texas	New Braunfels	C. Mohr	Rich, allavial	6078	Crushed at one corner near mid-
Knackaway. Anaqua.	942	. do		do		6305	dle. Triple flexure, deflected diago-
BIGNONIACEÆ.	477.4		WAR V		MA 17	GIOLIO.	nally.
206. Catalpa bignonioides	540	Alabama	Stockton	do	Low, wet	6827	Crushed at end
Tree. Cigar Tree. Indian Bean.	744	Georgia	Bainbridge	A. H. Curtiss	Clay	5625	Crushed at 38 millimeters from middle on one face.
Deur.	744	do	do	do	do	5012	Crushed at 38 millimeters from end.
907 Catalan enesions	. 38	Missouri	Charleston	C. S. Sargent	Wet clay	6668	Crushed at 19 and at 102 milli-
207. Catalpa speciosa	38			do		6373	meters from end.
	58	do				0010	Triple flexure
208. Chilopsis saligna	682	Arizona	Tuscon	G. Engelmann and	Moist, gravelly	4755	Failed in vicinity of 10 millimeters
Desert Willow.		The second second	The same	C. S. Sargent.			knot.
VERBENACEÆ.				F. Bu J. Fin		1000	
210. Citharexylum villosum Fiddle Wood.	1 39	The state of the s	and the second second		Coral		Crushed near middle; angle of crushing, 550.
NYCTAGINACEÆ.	490	do	do	do	,do	11000	Crushed near middle
212. Pisonia obtusata	474	do	Upper Metacombe	do	do	5398	Split along grain from middle to
Pigeon Wood, Beef Wood, Cork Wood. Pork Wood.	474			do		4527	Crushed at knots 102 millimeters
POLYGONACEÆ.					1 4 7 4 4		from end.
213. Coccoloba Floridans	473	do	do	do	ão	12292	Crushed at 38 millimeters from
Pigeon Plum.	473	do	do	do	do	12383	middle and at end. Crushed at middle
214. Coccoloba uvifera	. 453	ALL DESCRIPTION OF STREET			do	A LEWIS CO.	Split from end to end; badly eracked in seasoning.
LAURACEÆ.	453	do	do	do	do	3900	do
215. Persea Carolinensis	. 585	do	Saint John's river	do	. Sandy loam	9548	Crushed at 5 millimeters knot near
Red Bay.	585				do		middle. Crushed at end
	000				the state of the		
215. Persea Carolinensis, var. pal- ustris.	340	Alabama	Mobile county	. C. Mohr	. Damp, sandy	5216	Crushed at 64 millimeters from end.
Maritime all 19	340	do	do	do	do	6532	do
217. Sassafras officinale	. 71	Missonel	Allerton	G W Latterman	Low, rich	6069	Crushed at 51 millimeters from
Sassafras.	71	The second secon	A CONTRACTOR OF THE PARTY OF TH	The state of the s	do	1	middle and at ends.
	1			1	1	0100	millimeters from middle.

0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.
1452	2200	2504	2085	2849	2971	3075	3175	3248	3379	3878		Slight shearing of fibers; split at end
1669	2359	2576	2703	2835	2935	3089	3180	3266	3357	3878		do
1633	2436	2595	2626	2803	2980	3021	3121	3221	3298	3629		do,
1814	2003	2313	2440	2622	2749	2894	3026	3130	3243	3856	4128	do
1407	1842	1960	2118	2214	2313	2431	2531	2622	2654	3148	3470	Sheared fibers
1315	0000	2054	2096	2141	2245	2345	2381	2486	2536	2903	3107	do
1570	2223 2277	2472	2685	2880 2880	3094	3289	3357	3488 3438	3525	4128	4355	Sheared fibers; split at end
1870	AGC	2600	2654	2000	9010	3212	3302	0400	3561	4150	4708	Sheared fibers
1189	1674	1746	1819	1842	1887	1937	1982	2005	2082	2295	2427	Sheared fibers; split at end
2273	3348	3801	3983	4119	4264	4336	4527	4613	4713	5376	5489	Slight shearing of fibers
2132	2609	2849	3084	3857	3583	3810	3992	4155	4318	5285	5625	do
871	1837	2205	2331	2368	2481	2576	2635	2717	2753	2912	3583	Sheared fibers
1397	2381	2749	2930	3066	3184	3243	3375	3434	3484	4078	4287	do
0744	4000	4000	*****	****	2000	Jane	anna	0000		12122	-	
2744	4355 2640	4990 2903	5398 3212	5648 3465	5920 3742	6123 3924	6373 4150	6518 4287	6659 4432	7756	8523	do
2223	2867	3021	3334	3506	3656	3788	4014	4110	4246	5489 5058	5625	Sheared fibers; split at end; short specimen, 103 millimeters long.
2041	2486	2703	3062	3212	3425	3570	3710	3842	3969	4763	5262	Sheared fibersdo
			14-			.50.15	9		0000	MAR	0202	I ACHINE
2087	3756	4482	4877	4967	5216	5371	5489	5620	5702	6577	7076	do.,
2132	3334	3837	4146	4436	4681	4872	4990	5171	5343	6237	6713	do
1610	2790	3339	3611	3878	4037	4155	4336	4477	4572	5239	5851	do . \
1542	2608	3066	3293	3447	3651	3774	3901	4037	4150	4926	5443	do,
930	1216	1334	1420	1488	1524	1579	1606	3040	17700	9000	1-	61 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
735	848	871	925	944	980	1025	1006	1642	1728 1089	2028 1302	1433	Sheared fibers; split at end; specimen 120 milli- meters long,
717	1061	1152	1207	1257	1302	1347	1893	1402	1438	1701	1878	Sheared fibersdo
								Lating:	R	100		
098	1234	1352	1429	1488	1551	1619	1600	1674	1719	1960		Sheared fibers; split at end
703	1098	1170	1229	1266	1320	1355	1402	1442	1488	1724	1941	Sheared fibers
1270	1851	2105	2205	2304	2468	2558	2658	2731	2803	3375	3593	do
2076	3652	3991	4264	4491	4704	4895	5080	5162	5216			Slight shearing of fibers; split at end
2948	4241	4808	5153	5362	5561	5652	5942					do
749	1302	1515	1669	1746	1778	1787	1801	1796	1805	1978	2064	Sheared fibers; split at end
880	1325	1533	1669	1728	1765	1851	1878	1928	2005	2177		do
4128	5398	6260	7031	7303	7485	7621	8074	8392	8663	10115	10796	Sheared fibers
2404	3810	4499	4980	5316	5625	5860	6123	6532	6759			Slight shearing; split at end; short specimen, 120
						******	******		0			millimeters long.
*****				*******					******			
2019	3039	3230	3339	3429	3465	3534	3624	8724	3788	4309	4522	Sheared fibers
1792	2008	2762	2803	2926	2994	3075	3125	3212	3252	3856	4196	do
1951	2880	3157	3339	3515			3878	3937	3987	4491	4854	do
1551	2295	2481	2558	2631	2717	2794	2858	2980	3066	3538	3878	do
			I ILL	1121	100							

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
17. Sassafras officinale—continued.	387	Missouri	Allenton	G. W. Letterman	Alluvial	5751	Crushed at 51 millimeters from
	387	do	do	do	do	6328	end. Crushed at middle and at 64 milli
	446	Tennessee	Nashville	A. Gattinger	Rich	6713	meters from end. Crushed at 32 and at 89 milli
	814	West Virginia	Grafton	C. G. Pringle		6418	meters from end. Triple flexure, deflected diago
	814	do	do	do		6659	nally, do
	854	Massachusetts	Danvers	J. Robinson	Rich loam	4559	Triple flexure
	854	do			do	5851	do
	1163	Missouri	Allenton	G. W. Letterman	Low, alluvial	6341	Triple flexure; developed inter secting "Cooper lines".
	1163	do	do	do	do	6033	Triple flexure
18. Umbellularia Californica Mountain Laurel. California Laurel. Spice Tree. Cagi- put. California Olive. Cali- fornia Eay Tree.	703 703	Oregon	Coos bayde	G. Engelmann and C. S. Sargent.		9435 8754	Crushed at 25 millimeters from middle. Crushed at 38 millimeters from end.
EUPHORBIACEÆ.	-			4			
19. Drypetes crocea	468	Florida	Key.		Coral		Crushed in vicinity of small knots
19. Drypetes crocea, var. latifolia.	459		do		100 B 10 B 10 B 10 B 10 B 10 B 10 B 10	8256	Split suddenly from end to end
URTICACEÆ.	459	do	do	do	do	8392	Split suddenly; oblique fracture
23. Ulmus crassifolia	324	Texas	Dallas	J. Reverehon	Rich loam	7847	Crushed at 51 millimeters from
Cedar Elm.	324	do	do	do	do	8414	end. Crushed in vicinity of small knot
	929	do	Austin	C. Mohr	do	5951	102 millimeters from end. Crushed at end; cross-grained
	929	do	do	do	do	6781	Triple flexure
23. Ulmus fulva	363	Kentucky	Mercer county	W M Tinney	Limestone	7847	Deflected and crushed at end an
Red Elm. Slippery Elm. Moose Elm.	304	do	100000000000000000000000000000000000000	do	and the same of th	8573	at 102 millimeters from end. Crushed at middle
	120	Michigan		W. J. Beal		9889	Crushed at 102 millimeters from
	134	Missouri	Allenton	a see and a see a see a see a see a see a see a see a see a see a see a see a see a see a see a see a see a se	Rich, alluvial	8437	end. Triple flexure
	134	do	march masses	do		8392	Crushed near middle in vicinit
	#575			031	8//		of knot.
24. Ulmus Americana	19		Arnold Arboretum		A STORES	8641 8573	Deflected; crushed at middle an end. Triple flexure
	281	Missouri		G. W. Letterman	STATE OF THE PARTY	7598	Triple flexure; middle bend e
	281	do	do	The second second	The state of the s	6895	centric. Crushed at middle; deflected d
	958	Texas	Colorado river	Charles and the Control of the Contr	do	5851	agonally. Crushed at knot 102 millimeter
	958	do	do			4990	from end. Crushed at 10 millimeters kno
	1036	Massachusetts	Danvers	A STATE OF THE PARTY OF THE PAR	Gravelly	7022	near middle. Triple flexure, deflected diag
	1036	do	do	do	do	5579	nally.
	1049	do	North Reading	do	do	9049	Triple flexure; developed inte
25. Ulmus racemosa	116	Michigan	Describle	W. T. Pool		*****	secting "Cooper lines".
Rock Elm. Cork Elm. Hick- ery Elm. White Elm. Cliff	NO CUE	Michigan	200 May 110	do	do	The same	Triple flexure; middle deflection 25 millimeters eccentrie.
Elm.	15/40-00	do	100	do	100	9571	Crushed fibers at 32 millimeter
	10,000	do	Lancas de la constantina della	do		9571	from end. Triple flexure
	314	do			Rich loam	1212	Croshed at 25 and at 114 millim
	314	do			do	100000	ters from end. Triple flexure, deflected diag
	428	Tennessee	Carlos Total	A. Gattinger	AND THE RESERVE OF THE PARTY OF	7349	nally. Crushed at small knot at middle
							and a man
Wahoo. Winged Elm.	133	South Carolina		H. W. Ravenel		6895	Crushed at 13 millimeters kn at middle.
	133	NAME OF TAXABLE PARTY.	do	N 100 N 100	do	7847	Triple flexure, deflected diag
	380 533	Tennessee Mississippi	Davidson county . Kemper's mill	Constitution of the Consti	Loam	6260 7008	Crushed at 10 millimeters km 64 millimeters from end. Triple flexure
	533	do	do	do	do	7892	Triple flexure, leflected diag

0.25 0.51 0.76 1.02 1.27 1.52 1.78 2.03 2.28 2.54 4.81 5.08 1111 1488 1615 1665 1710 1760 1846 1873 1937 1982 2250 2440 Sheared fibers 1071 1442 1588 1642 1669 1710 1765 1801 1801 1887 2155													Remarks.	10
1412 1588 1642 1586 1642 1660 1710 1765 1891 1891 1891 2155 Sheared fibers, split at end	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08		
1402 1802 1914 1978 2065 2123 2125 2100 2250 2004 2018 2018 2018 2018 2014 2010 2016 2015 2025 2017 2011 2012 2017 2020 2013 2018 2019 2010	1111	1488	1615	1665	1710	1760	1846	1873	1937	1982	2250	2440	Sheared fibers	
1111	1071	1442	1588	1642	1669	1710	1765	1801	1801	1887	2155		Sheared fibers; split at end	
1242 1178 1982 2164 2250 2577 2531 2672 2776 2882 3561 3046 do	1452	1892	1914	1978	2055	2123	2155	2209	2259	2304	2608	2758	Sheared fibers	
1270	1111	1882	2109	2195	2254	2350	2413	2472	2490	2513	2884	3121	do	
1776 1908 2081 2468 2522 2588 2611 2658 2690 2744 3159 8334 .do		57.43-15	1982	2164	2250	2377	2531	2672	2776	2862	3561	3946	do	
1778 1900 2014 2078 2182 2177 250 2206 2427 2478 2888 3062 do.		-	10000000		100000	Anna de la compansa d			2699	2744	3139	3334	do	1
1275		I Lon							2427	2478		3062	do	
1055 2250 2968 2440 2400 2531 2576 2622 2677 2000 2968 3020 Sherred fibers.		1.034				The same			10745				The same of the sa	L
1078		The state of	1 Charles						THE WORLD	100000			The second of th	E
1978 2744 2020 2007 2108 3394 3357 3561 3628 3674 4007 4445 do	2019	2699	2971	3066	3193	3329		3561	3674	3756	4300	4672	do	
2177 2856 4554 5466 5797 0002 6373 6577 6804 5649 840 8845do		200020	2926	3057	3198	3334	3357	3561	3628	3674	4037	4445	do	
3652 5670 6528 6768 7145 7480 7766 7083 5155 5297 9480 10140 do				-					YI	EC.	HA			1
3652 5670 6528 6768 7145 7480 7766 7083 5155 5297 9480 10140 do								0						
1310 1578 2210 2477 2240 2200 3030 3106 3334 3484 4300 4860 Sheared fibers Shear	2177	3856	4854	5466	5797	6092	6373	6577	6804	6949	8340	8845	do	
1315 1878 2259 2477 2640 2893 3030 3166 3334 3484 4390 4898 5851 6192	3652	5670	6328	6768	7145	7439	7756	7983	8155	8237	9480	10160	do	
2676 3393 2620 3657 4046 4237 4359 4531 4600 4890 5851 6192 do	3130	4509	5198	5615	5874	6110	6396	6509	6749	6918	8256	8799	Sheared fibers; split at end	
2076 3856 4206 4635 4800 4609 5353 5516 5797 5065 7212 78c3 Slight shearing of fibers	1315	1878	2250	2477	2640	2803	3030	3166	3334	3484	4300	4808	Sheared fibers	
2100 3765 4100 4482 4744 4963 5163 5880 5611 5797 7031 8930 Sheared fibers	2676	3393	3620	3637	4046	4237	4359	4531	4600	4899	5851	6192	do	-
1678	2676	3856	4296	4635	4890	4699	5353	5516	5797	5965	7212	7983	Slight shearing of fibers	
1003 1470 1610 1765 1855 1899 2044 2184 2277 2850 2858 3153	2109	3765	4196	4482	4744	4953	5163	5380	5611	5797	7031	8039	Sheared fibers	
1805 1032 2223 2440 2576 2667 2758 2866 2995 2994	1678	1814	1910	2032	2223	2322	2427	2522	2067	2744	2948		Slight shearing of fibers; split at end	
1879 2277 2386 2527 2885 2799 2976 3112 3207 3206 3637	1093	1479	1619	1765	1855	1969	2064	2164	2277	2859	2858	3153	, do	
1551 2073 2090 2481 2658 2058 3089 3207 3334 4014	1565	1932	2223	2440	2576	2667	2758	2866	2935	2994	*******		do	-
1692 2350 2699 2875 2971 3121 3212 3348 3438 3529 4250 4513 Sheared fibers 1338 1905 2168 2377 2504 2645 2753 2844 2971 3057 3674 3992 1610 1960 2041 2186 2336 2372 2504 2567 2663 2744 1610 1960 1714 2664 2196 2313 2431 2549 2608 2726 3221 1610 1669 1715 1787 1882 1982 2118 2214 2331 2254 2971 3357 Sheared fibers 1324 1669 1896 2014 2109 2214 2304 2409 2459 2522 2971 3266 1656 2449 2744 2958 3139 3261 3452 3555 3607 3774 4740 5171 Slight shearing of fibers 1796 2835 3266 3315 3607 3810 3064 4046 4109 4281 4007 5353 2096 2880 3198 3434 3607 3828 4028 4182 4281 4468 5489 5874 2291 3289 3674 4037 4241 4527 4695 4886 5035 5198 Split at end; fibers did not shear 1338 1887 2041 2164 2268 2381 2477 2576 2658 2708 3266 Split at end; fibers did not shear 1170 1887 2254 2468 2013 2794 2898 3035 3125 3243 Slight shearing of fibers; split at end 1171 1295 2740 2971 3184 3402 3583 3738 3882 4019 4808 1678 2875 3348 3620 3842 4073 4200 4400 4581 4672 5625 6123 Slight shearing of fibers 2586 3901 4377 4677 5013 5243 5557 5667 5942 6669 7303 7689 .	1879	2277	2386	2527	2685	2799	2976	3112	3207	3266	3937	·/····	do	-
1388 1965 2168 2377 2504 2645 2752 2844 2971 3057 3674 3992 do	1551	2073	2300	2481	2658	2958		3089	3207	3334	4014		do.,do.	-
1610 1960 2041 2186 2336 2372 2504 2567 2663 2744 Split at ends; fibers not sheared; specimen 120 millimeters long. 1293 1769 1014 2664 2196 2313 2431 2549 2608 2726 3221 millimeters long. 1610 1669 1715 1787 1882 1982 2118 2214 2331 2254 2271 3357 Sheared fibers 1824 1669 1896 2014 2109 2214 2304 2409 2459 2522 2071 3266 do	1592	2350	2699	2875	2071	3121	3213	3348	3438	3529	4250	4513	Sheared fibers	
1610 1669 1715 1787 1882 1982 2118 2214 2331 2354 2971 3357 Sheared fibers 1524 1669 1896 2014 2109 2214 2304 2409 2459 2522 2971 3266 .do	1338	1905	2168	2377	2504	2645	2753	2844	2971	3057	3674	3992	do	
1610 1669 1715 1787 1882 1982 2118 2214 2331 2354 2971 3357 Sheared fibers 1524 1669 1896 2014 2109 2214 2304 2409 2459 2522 2971 3266 .do	1610	1960	2041	2186	2336	2372	2504	2567	2663	2744			Split at ends; fibers not sheared; specimen 120	
1524 1669 1896 2014 2109 2214 2304 2409 2459 2522 2971 3266 .do 1656 2449 2744 2958 3139 3261 3452 3556 3697 3774 4740 5171 Slight shearing of fibers. 1706 2825 3266 3515 3697 3810 3964 4046 4169 4281 4967 5353 .do 2096 2880 3198 3434 3697 3828 4028 4182 4281 4468 5489 5874 .do 2291 3289 3674 4037 4241 4527 4695 4886 5035 5198 Split at end; fibers did not shear 1338 1887 2041 2164 2268 2381 2477 2576 2658 2708 3266 Split at end; fibers did not shear 1179 1987 2254 2468 2613 2794 2898 3035 3125 3243 Slight shearing of fibers; split at end; slight shearing of fibers; split at end; slight shearing of fibers 1111 2295 2740 2971 3184 34	1293	1769	1914	2664	2196	2313	2431	2549	2608	2726	3221		do	1
1656 2449 2744 2958 3139 3261 3452 3596 3697 3774 4740 5171 Slight shearing of fibers 1706 2835 3266 3515 3607 3810 3904 4046 4109 4281 4007 5353 do	1610	1669	1715	1787	1882	1982	2118	2214	2331	2354	2971	3357	Sheared fibers	
1706 2835 3266 3515 3607 3810 3064 4046 4109 4281 4907 5353 do. do. 2096 2880 3198 3434 3607 3828 4028 4182 4281 4408 5489 5874 do. do. 2291 3289 3674 4037 4241 4527 4695 4886 5035 5198	1324	1669	1896	2014	2109	2214	2304	2409	2459	2522	2971	3266	do	1
2096 2880 3198 3434 3697 3828 4028 4182 4281 4468 5489 5874 do	1656	2449	2744	2958	3139	3261	3452	3556	3697	3774	4740	5171	Slight shearing of fibers	-
2291 3289 3674 4037 4241 4527 4695 4886 5035 5198 Split at end; fibers did not shear 1338 1887 2041 2164 2268 2381 2477 2576 2658 2708 3266 Split at end; slight shearing of fibers 1170 1987 2254 2468 2613 2794 2898 3035 3125 3243 Slight shearing of fibers; split at end 1111 2295 2740 2971 3184 3402 3583 3738 3882 4019 4808	1796	2835	3266	3515	3607	3810	3064	4046	4109	4281	4907	5353		т
1338 1887 2041 2164 2268 2381 2477 2576 2658 2708 3266 Split at end; slight shearing of fibers 1170 1987 2254 2468 2613 2794 2898 3035 3125 3243 Slight shearing of fibers; split at end 1111 1295 2740 2971 3184 3402 3583 3738 3882 4019 4808 do do 2291 2853 3075 3266 3452 3638 3765 3919 4033 4196 4808 do do do 2563 3016 3198 3966 3556 3665 3747 3946 4119 4854 do do 2565 6123 Slight shearing of fibers 2586 3901 4377 4677 5013 5243 5557 5667 5942 6069 7303 7689 do do 2586 2912 3006 4092 4404 4644 4881 5116 5389 5579 6895 7621 do do 2586 2495 2617 <td>2096</td> <td>2880</td> <td>3198</td> <td>3434</td> <td>3697</td> <td>3828</td> <td>4028</td> <td>4182</td> <td>4281</td> <td>4408</td> <td>5489</td> <td>5874</td> <td>do</td> <td>1</td>	2096	2880	3198	3434	3697	3828	4028	4182	4281	4408	5489	5874	do	1
1170 1987 2254 2468 2613 2794 2898 3035 3125 3243 Slight shearing of fibers; split at end 1111 2295 2740 2971 3184 3402 3583 3738 3882 4019 4808 .	2291	3289	3674	4037	4241	4527	4695	4886	5035	5198			Split at end; fibers did not shear	
1111 2295 2740 2971 3184 3402 3583 3738 3882 4019 4808	1338	1887	2041	2164	2268	2381	2477	2576	2658	2708	3266	******	Split at end; slight shearing of fibers	-
2291 2853 3075 3266 3452 3638 3765 3919 4033 4196 4808	1170	1987	2254	2468	2613	2794	2898	8035	3125	3243		******	Slight shearing of fibers; split at end	-
1996 2563 3016 3198 3366 3556 3665 3747 3946 4119 4854	1111	2295	2740	2971	3184	3402	3583	3738	3882	4019	4808			н
1678 2875 3348 3620 3842 4073 4200 4400 4581 4672 5625 6123 Slight shearing of fibers 2586 3901 4377 4677 5013 5243 5557 5697 5942 6069 7303 7689 do 1474 2912 3006 4092 4404 4644 4881 5116 5389 5579 6895 7621 do 1678 2495 2617 2708 2869 2971 3030 3202 3293 3348 3860 4196 Sheared fibers	2291	2853	3075	3266	3452	3638	3765	3919	4033	4196	4808		do	
2586 3901 4377 4677 5013 5243 5557 5697 5942 6069 7303 7689do	1996	2563	3016	3198	3366	3556	3665	3747	3946	4119	4854		do	
1474 2912 3606 4092 4404 4644 4881 5116 5389 5579 6895 7621dodo	1678	2875	3348	3620	3842	4073	4200	4400	4581	4672	5625	6123	Slight shearing of fibers	
1678 2495 2617 2708 2869 2971 3030 3202 3293 3348 3860 4196 Sheared fibers	2586	3901	4377	4677	5013	5243	5557	5697	5942	6069	7303	7689	do	
	1474	2912	3606	4092	4404	4644	4881	5116	5389	5579	6895	7621	do	
2381 3030 3257 3465 3620 3810 3992 4150 4287 4400 5353 5806 Slight shearing of fibers	1678	2495	2617	2708	2869	2971	3030	3202	3293	3348	3860	4196	Sheared fibers	1
	2381	3030	3257	3465	3620	3810	3992	4150	4287	4400	5353	5806	Slight shearing of fibers	

FOREST TREES OF NORTH AMERICA.

The National Property of the National Property					Control of Taxable		
	2		The state of			Longitudinal com- ression: Ultimate strength, in kilos.	
Species.	Office number.	State.	Locality.	Collector.	Soil.	tudinal sion: U igth, in	Remarks.
	Office					Longi resi stren	
227. Planera aquatica	758	Florida	Chattahoochce	A. H. Curtiss	Rich, alluvial	6373	Triple flexure
	758	do	do	do	do	6028	Triple flexure, deflected diago-
	918	do	do	C. Mohr	do	6214	nally. Crushed at 38 and at 102 millime- ters from end.
228. Celtis occidentalis	75		Allenton,			5679	Crushed on one face at 25 millime- ters from middle.
	75	do	do	The state of the s		0895	Crushed at knot 51 millimeters from end.
	306	ATTENDED OF STREET	Dallas			5579	Crushed at middle, deflected di- agonally.
	306	do	do	do	do	6169	Triple flexure, deflected diago-
	375	Tennessee	Davidson county	The state of the s	The second secon	6895	Triple flexure
	375	do	do	do	do	7031	Triple flexure, deflocted diago- nally.
	873	Massachusetts	Salem	J. Robinson	do	5489	Triple flexure
	873	do	do	do	do	7303	Triple flexure, deflected diago-
	1111	Missouri	Saint Louis	Henry Eggert	Moist loam	8278	Deflected; crushed at middle
	1111	do	do	do	do	8074	Crushed at 6 millimeters knot 102 millimeters from end.
228. Celtis occidentalis, var. reticu- lata.	652	Arizona	Santa Rita mount- ains.	G. Engelmann and C. S. Sargent.	Dry	6985	Crushed at 12 millimeters knots at end and at 102 millimeters
Hackberry, Palo Blanco, 229. Ficus aurea	486	Florida	Bay Biscayne	A. H. Curtiss	Coral	3198	from end. Triple flexure
	486	do	do	do	do	1996	Crushed at middle and at 28 milli- meters from end.
231. Ficus pedanculata	508	do	Boca Chica Key	do	do	4491	Split obliquely
232. Morus rubra	132	Missouri	Allenton	G. W. Latterman	Rich loam	8754	Crushed at middle and at 25 milli
Red Mulberry.	132	do	do	do	do	8483	meters from end. Crushed at middle and at end; de-
	433	Tennessee	Nashville	A. Gattinger	do	6827	flected diagonally. Failed at 12 millimeters knot 102
	1244	Missouri	Allenton	G. W. Letterman	Upland	6056	millimeters from end. Crushed at 25 millimeters from
	1245	do	,do	do	do	6169	middle at 3 millimeters knot. Crushed at 19 millimeters from
	1246	do	do	do	do	5087	end in vicinity of small knots. Triple flexure
	1255	do	do	do	Rich	5829	Triple flexure, deflected diago
	1255	do	do	do	do	5661	Triple flexure
234. Maelura aurantiaca	253	Texas	Dallas	J. Reverchen	Bottom	14107	Crushed at middle; angle of crush
Osage Orange. Bois d'Arc.	253	do	do	do	do	11771	ing, 50°. Triple flexure
PLATANACEÆ. 235. Platanus occidentalis	21	Mayanhugatta	Arnold Arboretum	C S Sargant	Delft	6750	Crushed at end and at 102 milli
Sycamore. Button Wood. Button-ball Tree, Water	21		do		The state of the s	18000	meters from end. Crushed at end and at 127 milli
Beech.	126	Missouri	The second second		Rich, alluvial	1000 C	meters from end. Crushed at 102 millimeters from
	126	do		The second second	do	1000	end. Crushed at 38 and at 127 milli
ma vii	Vers	0.310		0.0	en .	4327	meters from end.
236. Platanus racemosa	686 686		Carmel river				Crushed at 13 and at 76 millimeter from end and split along grain.
	,630					4000	Crushed at middle of one face
237. Platanus Wrightii	648	Arizona	Santa Ritamount-		Rich, gravelly	5398	Triple flexure, deflected diago
Sycamore. JUGLANDACEÆ.	648	do	nins. do	C. S. Sargent.	do	5058	nally. Triple flexure
238. Juglans cinerea	16	Massachusetts	Arnold Arboretum	C S Sargent	Drift	6169	Crushed at 51 and at 127 millime
Butternut. White Walnut.	16		do			I would	ters from end. Crushed at 102 millimeters from
	76	Missouri	N		Moist, alluvial	-	end. Crushed at 64 millimeters from
	76		do			merget.	end. Crushed at 51 millimeters from
1 1 1 2 1 3 1 TO 1 TO 1 TO 1 TO 1 TO 1 TO 1 TO	762		do		Market Transport	6849	end. Crushed at 25 millimeters from
	123	- CS- TOTAL	Dansville	August 1	land.	10000	end. Crushed at 10 millimeters from
	145	Tilinois			Company of the Compan	- SAR	end. Crushed at 13 millimeters from mid
	393	Michigan	Lansing	The state of the s	Gravelly loam	10000	dle and at 38 millimeters from end Crushed at 114 millimeters from
	1057	CHARLES OF THE PARTY OF THE PAR	Topsfield	The second second	Drift	107.020	end and at end. Crushed at middle
	1001			2. Montheon		1 0013	Crusiica ne minitio

	LIVE											Remarks.
0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	
1397	1996	2254	2386	2549	2749	2858	2994	3107	3212	3924	4355	Sheared fibers
1406	1941	2141	2350	2481	2622	2744	2830	2971	3094	3810	4273	Slight shearing of fibers
1134	1633	1769	1796	1973		2100	2182	2245	2313	2699	2903	Sheared fibers
1415	1860	1987	2123	2232	2841	2459	2563	2640	2722	remanti		Slight shearing; split at end
1406	2041	2245	2427	2576	2672	2799	2894	3016	4080	3652		Sheared fibers
2608	3493	3819	4037	4327	4531	4735	4899	4980	5180	6237	6940	Slight shearing of fibers
1111	2404	3003	3216	3488	3683	2869	4038	4209	4341	5421	6033	dó
1724	2699	3107	3402	3583	3837	3951	4105	4264	4350	5216	•6829	Fibers did not shear
1746	3039	3583	3865	4073	4332	4450	4617	4817	4944	5851	6396	do
1610	2703	3016	3175	3393	3562	3715	3924	4064	4110	4877	5307	do
1751	2749	3026	3320	3565	3742	3974	4119	4314	4445	5126	5625	Slight shearing of fibers
1606	2812	3243	2976	3574	3629	3742	3837	3887	3946	4649		Slight shearing; split at end
1570	2903	3339	3620	3910	4069	4309	4527	4626	4758	5670	6192	Sheared fibers
2223	3493	8946	4200	4373	4536	4699	4994	5071	5262	6078	6350	do
522	817	862	880	885	885	894	894	898	903	993	1039	Sheared fibers; specimen 120 millimeters long
640	907	980	1030	1075	1116	1161	1175	1211	1229	1429	1479	Sheared fibers
975	1080	1243	1329	1905	2019	2064	2123	2191	2313	2694	2840	do
1751	2440	2699	2840	2926	3062	3162	3266	3320	3393	3833	4105	do
1769	2576	2753	2880	2989	3116	3266	3334	3479	3543			
1100	2010	2100	2000	2000	5110	0200	0004	0419	0040	4037	4518	do do do do do do do do do do do do do d
1524	1973	2078	2168	2218	2286	2409	2481	2608	2681	3157	3620	Sheared fibers; split at end
1900	2640	2790	2926	3016	3184	3248	3379	3534	3674	4309	4786	Sheared fibers
1905	2313	2531	2076	2875	3066	3252	3515	3652	3715	4445	4944	-/- do -/-
1960	2640	2790	2926	3016	3184	3248	3379	3534	3674	4309	4786	, do
1905	2313	2531	2676	2875	3066	3252	3515	3652	3715	4445	4944	
2903	5080	5670	5720	5761	6010	6019	6192	6328	6423	7107	7608	do
2586	4740	5421	5606	5851	6069	6214	6396	6432	6577	6985	6895	Sheared fibers; split along grain from end to end
1678	2105	2331	2486	2022	2703	2880	2985	3094	3166	3107	4423	Sheared fibers
1492	1982	2177	2341	2440	2581	2527	2885	2985	3066	3583	4082	Slight shearing of fibers
1202	2404	2858	3039	3085	3134	3289	3348	3429	3488	3788	3946	Sheared fibers
1565	2136	2277	2377	2440	2549	2635	2708	2762	2826	3289	******	Sheared fibers; split at end
1039	1365	1501	1579	1665	1746	1814	1846	1901	1978	2313	2486	Sheared fibers
758	1071	1157	1257	1306	1393	1479	1533	1578	1628	2019	2200	do
1134	1656	1855	1987	2114	2191	2263	2359	2404	2495	2894	3044	do
934	1338	1438	1520	1619	1683	1765	1842	1887	1932	2313	2540	do
998	1542	1588	1669	1742	1801	1833	1905	1987	2037	2381	2590	do
1089	1452	1506	1542	1610	1678	1719	1769	1810	1860	2127	2291	do
793	1098	1134	1202	1257	1306	1343	1356	1393	1461	1669	1792	do
1025	1257	1361	1474	1615	1656	1710	1751	1783	1846	2087		Sheared fibers; split at end
839	1293	1361	1433	1479	1592	1637	1710	1769	1833	2168	2381	Sheared fibers
703	998	1102	1134	1170	1211	1243	1266	1297	1302	1479	1533	do
749	1179	1315	1406	1460	1492	1588	1628	1669	1715	1996		Sheared fibers; split at end
408	508	599	617	635	667	690	708	717	739	866	934	Sheared fibers

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
239. Juglans nigra	112	Missouri	Allenton	G. W. Letterman	Alluvial	9026	Crushed at middle
Black Walnut.	117	Michigan	Dansville	W. J. Beal	Gravelly	9957	Crushed at 102 millimeters from
W. T.	318	do	Lausing	do	Loam	9095	end. Split obliquely from end to end
	325	Texas	Dallas	J. Reverchon	Alluvial	8346	Crushed at 19 millimeters from
	407		Charlestown Navy- yard.	S. H. Pook		9934	middle. Crushed at 25 millimeters from middle.
	766	Florida	Aspalaga	A. H. Curtiss	Clay	9979	Crushed at small knot 32 millime- ters from middle.
	766	do	do			9684	Crushed at middle
	951	Texas	New Braunfels			8301	Crushed at 51 millimeters from end.
	951	do	do	do	do	9662	Crushed at 32 millimeters from end.
240. Juglans rupestris	415	New Mexico		E. L. Greene	Alluvial	5942	Shattered stick at end
Walnut.	415	do	ains,	do	do	6532	Split along grain in oblique direc-
	672	California		G. R. Vasey	do	8256	tion. Crushed at 51 millimeters from
	672	do	county.	do	do	7258	end. Crushed at 6 millimeters knot at
0/1 C	000		0			ania	middle.
241. Carya olivæformis	322	Mississippi	Greenville	C. Mohr	do	6940	Split at ends
	322 326	Texas		J. Reverchon		8256 6033	Triple flexure; developed inter- secting "Cooper lines".
	326		do			6577	Triple flexure, deflected diago-
	520	1/28//				0341	nally.
242. Carya alba	3	Massachusetts	Arnold Arboretum	C. S. Sargent		5445	Triple flexure; 60 per cent. sap- wood; deflected from sap side. Split at end
	292	Kentucky	Danville				Failed at 10 millimeters knot
	1182	Michigan	Hudson	11.000 Medical 10.000	Clay		near middle; sap-wood. Crushed at end
	1188	do			do		Crushed at 114 millimeters from
	152	Missouri	Allenton	G. W. Letterman .	Rich upland	10160	end. Crushed at 38 millimeters from
	249	Virginia	Wytheville	H. Shriver	Clay	10478	middle. Triple flexure
	249	do	do	do	do	9934	do
	531	Mississippi	Kemper's mill	C. Mohr	Alluvial	10342	Crushed at 38 millimeters from
	531	do	do	do	do	8890	middle. Crushed at knots; cross-grained
	539	do	do	do	do	10660	Crushed at 38 and at 70 millimeters
	539	do	do	do	do	10514	from end. Crushed near middle
	816	West Virginia	Grafton	C. G. Pringle	do	11204	Crushed at 51 millimeters from
	816	do	do	do	do	11022	end. Crushed at 25 millimeters from middle.
	1056		Topsfield		Rich loam	Committee	Triple flexure, deflected diago- nally toward heart; 80 per cent. sap-wood.
	1056		do			T. De Miles	Triple flexure, deflected diago- nally; 90 per cent. sap-wood
242. Como selecto	1097	Missouri	Allenton		Alluvial		Triple flexure; split from end to end; 45 per cent. sap-wood.
243. Carya sulcata Big Shell-bark. Bottom Shell- bark.	912		Mercer county			100000	
ours.	383		Allenton		do	33553 GG	Triple diagonal flexure: 60 per cent. sap-wood on concave side.
			do	A CONTRACTOR OF THE PARTY OF TH	The state of the s	- (S-)(P-22-3)	Triple flexure; 80 per cent. sap- wood on convex side.
			do		Description of the second seco	9707	Triple flexure; 30 per cent. sap- wood on concave side.
	13.000		do		Commence of the Commence of th	9571	Triple diagonal dexure
			do		the second secon	7983 8369	Triple flexure; 50 per cent. sap- wood.
	1164		do			20000000	Triple flexure; 5 per cent. sap- wood. Crushed at 25 millimeters from
	1/200		do			8845	end. Crushed at 25 millimeters from
	10000000		do			8981	end and split along grain. Triple flexure; 95 per cent. sap-
			do			9231	wood. Crushed at 6 millimeters from
244. Carya tomentosa	72		Perryville			8663	end; sap-wood. Triple flexure; sap-wood
Mocker Nut. Black Hickory. Bull Nut. Big-bud Hick-			do		THE RESIDENCE OF THE PARTY OF T	THE PERSON OF	
ory. White-heart Hickory. *King Nut.						0901	do

	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.
1452	2268	2518	2672	2767	2890	2985	3089	3184	3266	3561	3924	Sheared fibers
1560	2223	2395	2481	2576	2740	2776	2849	2912	2985	3447	3615	do
1746	2676	2894	3071	3212	3302	3497	3579	3710	3869	4400	4740	do
1769	2740	2921	3221	3388	3597	3783	3887	3955	4042	4423		Sheared fibers; split at end
1338	1851	1969	2073	2195	2250	2359	2427	2504	2545	2980	3130	Sheared fibers
1479	1951	2449	2713	2890	3003	3121	3253	3393	3456	4128	4536	do
2812	3701	3969	4082	4255	4377	4568	4649	4749	4799	5489	5738	Sheared fibers; indented section includes two 2
1905	2903	3212	3438	8638	3797	3978	4118	4264	4432	5216	5897	millimeters knots. Sheared fibers
1769	2667	2903	3175	3338	3502	3697	3783	3969	4128	4899	5534	Slight shearing of fibers
2019	8470	3924	4196	4336	4500	4604	4740	4840	4931	5625	6078	Sheared fibers
953	1928	2245	2486	2200	2830	2953	3039	3153	3289	3882		Sheared fibers; split at end
1643	1941	2214	2336	2440	2545	2622	2713	2762	2894	3289	3538	do
1170	2155	2468	2576	2658	2749	2808	2912	2976	8035	3438	3742	Sheared fibers
1951	2967	3289	3456	3652	3765	3905	4028	4119	4228	4990		Slight shearing of fibers; split at end
1928	3221	3878	4173	4423	4753	4944	5080	5398	5557	6192		Slight shearing of fibers; split at end; shaky stick
794	1882	2404	2744	2971	3103	3202	3366	\$447	3538	4105	4400	Indented without shearing fibers
1792	3039	3447	3674	3810	4037	4196	4354	4436	4672	5285	5942	Slight shearing of fibers
2200	3357	3847	4060	4363	4559	4717	4877	5035	5180	6078	6668	Slight shearing of fibers; 60 per cent. sap-wood
2948	4105	4536	5035	5239	5534	5851	6078	6250	6419	7303	7756	do
2245	4042	4581	5080	5353	5652	5851	5978	6260	6373	7439	7938	Indented without shearing fibers; sap-wood
2245	2713	3293	3620	3819	3983	4150	4281	4427	4491	5239	5706	Sheared fibers; split at end
2205	3243	3615	3837	4014	4150	4346	4482	4554	4695	5058	5376	Sheared fibers
1406	2699	3207	3529	. 3797	3955	4146	4355	4463	4608	5398	6033	Slight shearing of fibers
2812	4060	4300	4559	4717	4886	5017	5189	5294	5452	6486	6804	do
2019	3130	3783	4173	4495	4786	4944	5167	5394	5534	1		Fibers did not shear; split along grain
1429	2005	3171	3620	3933	4164	4364	4608	4744	4844	5715		Fibers did not shear; split at end
2404	3302	3652	3851	3978	4287	4495	4695	4808	4940	5579		Slight shearing of fibers; split at end
1656	2576	2926	3103	3293	3502	3652	3756	3978	4105	4854	5398	Slight shearing of fibers
1565	2613	2939	3103	3243	3447	3529	3652	3765	3882	4536	4944	Sheared fibers
1657	2590	3016	3198	3366	3511	3661	3710	3797	3887	4527	4877	do
2700	4014	4513	4917	5149	5421	5575	5761	5987	6114	7417	8142	Indented without shearing fibers; sap-wood
2994	4264	4649	4985	5353	5670	5920	6214	6477	6704	7825	8754	do
2631	3992	4626	5071	5389	5715	5851	6033	6123	6396	7439	7825	Slight shearing of fibers; 40 per cent. sap-wood
1837	8311	3765	3924	4060	4205	4341	4427	4617	4726	5489	5693	Sheared fibers; 90 per cent. sap-wood
3065		5171	5579	5965	6250	6555	6849	7212	7439	8437	9163	Sheared fibers; 85 per cent. sap-wood
2133		1346	4563	4967	5243	5516	5070	5756	5987	7031	7576	Slight shearing of fibers
3334	4355	4854	5239	5751	5797	6159	6341	6532	6704	7825	8618	do
224	3697	4241	4559	4817	5013	5162	5398	5525	5756	6895	7530	Fibers did not shear
1497	3003	3470	3774	3847	4209	4495	4649	4863	5058	6101	6691	Fibers sheared; 80 per cent. sap-wood
2200	2790	4055	4382	4581	4872	5058	5203	5298	5280	6441	6713	Slight shearing of fibers
1769	2495	2744	2840	3016	3085	3289	3425	3479	3529	4037	4491	Sheared fibers
238	3810	4332	4626	4831	5080	5271	5421	5579	5806	6940	7576	Slight shearing of fibers; 80 per cent. sap-wood
238	3493	3819	4073	4255	4509	4690	4877	4985	5116	6033	6782	Slight shearing of fibers; sap-wood
310	4037	4336	4527	4708	4976	5162	5294	5475	5652	6668	7145	Sheared fibers ; sap-wood

FOREST TREES OF NORTH AMERICA.

	100						
Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
244. Carya tomentosa—continued	254	Missouri	Allenton	G. W. Letterman .	Rich upland	11249	Triple flexure; middle deflection
					10-10-10		25 millimeters eccentric; 0.5 sap-wood.
	289	do		A CONTROLLAR OF SAME STATE OF BRIDE	do	0.000	Crushed at 13 millimeters knot 162 millimeters from end.
	348	Alabama	Citronelle	C. Mohr	Sandy	9367	Triple diagonal flexure; sap- wood.
245. Carya porcina	G	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	8105	Failed at knot at middle; 80 per cent. sap-wood.
Pig Nut. Brown Hickory. Black Hickory. Switch- bud Hickory.	6	do	do	do	do	9095	Crushed at 32 millimeters from end.
	88	Missouri	Allenton	G. W. Letterman	Rich loam	10954	Triple flexure; sap-wood
	88	do	HET WELL	do	do	9889	Triple flexure, diagonal direction; sap-wood.
	121	Michigan		W. J. Beal	Gravelly clay	9117	Triple flexure; middle deflection 25 millimeters from center.
	288	Missouri	Allenton		Rich loam	8754	m.i.s. a.
	442	Tennessee	Nashville	A. Gattinger	Upland	8845	Triple flexuredo
	538 1051	Alabama	North Reading	J. Robinson	Alluvial	9526	Triple flexure : middle deflection
	1001	Massachusetts	North Reading	J. Kobinson	Dille	9920	25 millimeters from center; 0.2 sap-wood.
	1168	Missouri	Allenton	G. W. Letterman.	Flinty	8392	Triple flexure; sap-wood
	1168	do	do	do	do	8392	do
246. Carya amara	153	do	do	do	Rich upland	8210	Triple flexure, deflected diago-
Bitter Nut. Swamp Hickory.	153	do	do	do	do	9117	nally. Crushed at 3 millimeters knot 25
	838	Massachusetts	Danvers	J. Robinson	Rich loam	7983	millimeters from middle. Triple flexure
	838	do	do	do	do	8119	do
947 Commonwell-than Commit	237	South Carelina	Bonneau's Depot .	H W Payanal	Pioh arrange	9253	Crushed at knots near middle
247. Carya myristicæformis Nutmeg Hickory.	237				dodo		Crushed at 51 millimeters from
	201	40				11100	middle; cross-grained.
248. Carya aquatica	129	do	do	do	Swampy	8437	Triple flexure, diagonal deflec- tion: 80 per cent. sap-wood on
Hickory. Bitter Pecan.	362	Mississippi	Vicksburg	C. Mohr	1/16	7280	convex side. Triple /flexure, deflected diago-
	icve.		-1/1-		1	20,830	nally; middle bend 25 millime- ters from center; sap-wood.
	362		do		2000	7439	Triple flexure; sap-wood
	740	Georgia			Alluvial	9208 7892	Fibers crushed at 102 millimeters from end. Fibers crushed at 6 millimeters
	917	Florida	Later 15 Comments		do	6509	knots 102 millimeters from end. Triple flexure, diagonal deflec-
	917	do	do	do	do	7666	tion. Fibers crushed at 64 millimeters
MYRICACEÆ.						1000	from end.
249. Myrica cerifera	586	do	Saint John's river	A. H. Curtiss	Sandy loam	7122	Triple flexure
250. Myrica Californica	665	California	Santa Cruz	G. Engelmann and C. S. Sargent.	Rich loam	7983	Crushed fibers at 51 millimeters from middle.
CUPULIFERÆ.	665	do	do	do	do	9049	Crushed fibers at middle
251. Quercus alba	8	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	5579	Deflected and split along grain
White Oak.	8		do	The state of the s	and the second second	5353	Triple flexure; split along grain
	32	Kentucky	Mercer county	W. M. Linney	Limestone	9163	Triple flexure
	322	do	Boyle county	do	Shale	8074	do
	323	do	do	do	Slate	7779	Crushed fibers at end
	49	Missouri	- The state of the	G.W. Letterman	Rich upland	9163 7702	Triple flexure 19 millimeters from end. Triple flexure
	491			40.00	do	8437	Triple flexure, deflected diagonally.
	492	do	do			7825	Triple flexure
	493	do			do	8301	Crushed fibers at end
No. of the last of the last	113	Michigan		W. J. Beal		6781	Triple flexure
	1132	do			Sandy	8437	do
	1132	do	00	do	do	7305	Triple flexure, deflected diago- nally.

													Remarks.
The last	0.25	0.51	0.76	1.02	1.27	1.59	1.78	2.03	2.28	2.54	4.81	5.08	
	2404	3788	4246	4491	4662	4831	5013	5149	5280	5412	6305	6623	Sheared fibers; sap-wood
	2268	3243	3547	3756	3083	4200	4332	4486	4604	4708			Sheared fibers; split at end; specimen 120 millimeters long.
	2350	3742	4150	4445	4662	- 4831	5013	5216	5421	5588	6509	7167	Sheared fibers; sap-wood
	2540 1905	4119 3198	4559 3611	4854 3810	5171	5307 4300	5512 4527	5670 4672	5851 4854	5933 4980	6782	7167 6159	Slight shearing of fibers; 40 per cent. sap-wood do
	2948	4400	4990	1376	5661	5924	6105	6386	6577	6759	7802	8523	Fibers did not shear; sap-wood
	2971	4423	4990	5307	5602	5806	6010	6169	6341	6568	7756	8483	dodo
	1170	1760	1928	2132	2259	2413	2531	2613	2703	2849	3348	3583	Slight shearing of fibers; split at end
		******											••••••
	2041	3583	4191	4527	4831	5058	5285	5516	5702	5883	6849	7303	Slight shearing of fibers
	3130	4473	5017	5294	5525	5738	5969	6149	6314	6382	7521	8047	do
	2586	4173	4717	5035	5307	5557	5779	5933	6159	6373	7485	8097	do
	2041	3742	4281	4527	4649	4899	5067	5248	5512	5606	6509	7054	do
	2449	4173	4695	4926	5149	5262	5579	5770	5878	6069	7031	7648	do
	1315	2744	3379	3697	3828	4032	4146	4314	4445	4545	5376	5851	do
	2032	3130	3484	3751	4073	4350	4427	4672	4804	4895	5738	6292	do
	2132	2994	3311	3475	3620	3751	3910	4037	4150	4219	4980	5489	do
	1111	2789	3397	3797	3992	4296	4527	4681	4904	5035			Slight shearing of fibers; split at end
	1792	3674	4486	4899	5194	5421	5634	5738	5996	6164	7303	8006	Slight shearing of fibers
	2812	4082	4409	4667	4890	5198	5389	5525	5715	5851	6895	7394	Sheared fibers
	1474	2667	3089	3420	3538	3720	3915	3974	4223	4296	4831	5479	/.do/
	2890	4459	4990	5285	5470	5851	6023	6101	6310	6423	7190	7756	Sheared fibers; sap-wood
	2109	3366	3633	3910	4057	4196	4386	4522	4672	4877	5693	6169	do
	2449	4028	4740	5225	5479	5096	5946	6214	7. P.	6509	7553	7892	Sheared fibers
	2590	4028	4572	5013	5316	5625	5887	6023	6292	6419	7553	8210	do
	1678	2903	3221	3465	3583	3738	3819	3910	3983	4119	4672	5035	do
	1406	2608	3026	3216	3339	3475	3593	3620	3697	3738	4219	4513	do
	1293	1973	2132	2223	2204	2486	2545	2649	2713	2758	3311	3706	do
	1325	2449	2767	2976	3198	3348	3479	3615	3710	3797	4400	4740	Sheared fibers; 3 millimeters knot in indented sec-
	1474	2232	2518	2713	2835	2026	3057	3130	3257	3379	3847	4173	tion. Sheared fibers.
	1343	1946	2059	2218	2313	2854	2499	2581	2672	2722	3168	3529	do
	2041	3239	3388	3458	3570	3633	3742	3842	3951	4046	4445	4672	do
	2404	3588	4042	4445	4808	5080	5330	5539	5711	5906	6713	7212	do
	1384	2041	2291	2440	2563	2699	2867	2980	3075	3139			Slight shearing of fibers; split at end
	1951	2563	3035	3266	3379	3447	3583	3692	3729	3819	4219	4653	Sheared fibers
	1542	2767	3130	8329	3552	3774	3837	4119	4268	4409	5080	++++++	Slight shearing of fibers; split at end
	1951	3357	3484	3751	3046	4114	4332	4495	4672	4872	5851	5987	Sheared fibers
	1442	2722	3057	3311	3106	3701	3937	4105	4309	4482	5262	5579	Fibers did not shear
	2318	3221	8406	8588	3738	3865	2978	4110	4200	4296	4922	5353	Sheared fibers
	2313	2298	3556	3E01	3660	4178	4309	4495	4686	4826	5670	6056	do
	997	1774	1932	2.50	2109	2168	2263	2400	2368	2427	2740	2953	do
	1678	2486	2604	2890	3612	3207	3298	3397	3484	1000		10000000	do

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
251. Quercus alba—continued	238		Bonneau's Depot do	The state of the s	The state of the s		Triple flexure
	238	Virginia			Clay	9617	Crushed at 89 millimeters from end. Crushed at 13 millimeters from
	250 250	The second second second	do			The state of the state of	middle
	250		do			Cook Hilliams	Crushed at middle; split perpendicular to rings. Crushed on one face at 25 millimeters from middle.
			do			100000000000000000000000000000000000000	meters from middle.
	251		do			- COUNTY	Crushed at 16 millimeters knot 51 millimeters from end.
	2591					9730	Triple diagonal flexure
	2593		do			8437	do
	403	Maryland	Charlestown Navy- yard.	S. H. Pook	****************	8799	Fibers crushed in oblique lines at middle and at ends.
	403						Fibers crushed at 32 millimeters from end,
	443		Nashville			100000000000000000000000000000000000000	Deflected at 102 millimeters from end; split at end.
	547		Kemper's mill		Alluvial	8890	Triple flexure; middle bend 25 millimeters from center.
	547		do		do	9526	do
	748		Chattahoochee		Clay	8663	Crushed fibers at 32 millimeters from end.
	749		do			8119	Triple flexure, deflected diago-
	749	do	do	do	do	7847	Triple flexure, deflected diago- nally; knot at middle.
	895	Massachusetts		M. C. Beedle		7621	Crushed at 102 millimeters from
	895	Trains /	TO BE TO SERVICE STATE OF THE	3-A		-	end; split from end to end per- pendicular to rings.
			North Reading			6396	Split from end to end, opening season cracks.
	1050					7485	Crushed fibers at 32 millimeters from end.
	1050		do		أأأ كنا أأنا الأنافية	7303	Triple flexure
	1257	***************************************	Charlestown Navy- yard. do	200		9480	do
	1257	***************************************	do	do	************	8392	Crushed fibers at 32 millimeters from end.
252. Quercus lobata	670 670	California	Reddingdo	Secretary States of the second second	and sold of the same of the same	7053 6532	Crushed at 6 millimeters knots 31 millimeters from end. Crushed at end in vicinity of knots
253. Quercus Garryana	985	Oregon	Weidler's saw-mill	G. Engelmann and C. S. Sargent.		7892	Triple flexure; bearing defective
	985					8256	do
	988		Portland			7847	Triple flexure, deflected toward heart.
	988		do			7430	Triple flexure, deflected from heart.
	1027		Portland Furniture Company.		The second secon	8483	Crushed at 127 millimeters from end and split along grain.
	1027	do	do			8483	Triple flexure
	1029	do			••••••	8754	do
	1029	do	do	do		7530	do
254. Quercus obtusiloba	371	Kentucky	Harrodsburg	W. M. Linney	Shale	7462	do
Post Oak. Iron Oak.	378		do			6541	Crushed at 6 millimeters knot at
	151	South Carolina			Rich upland	10002	middle. Triple flexure
	151		do			8799	do
	256	Missouri	Marie and the second se	the second of the	No.	1000000	
	351	Alabama	CANAL CO.			8437	Triple flexure; split along grain.
	351		do			6078	
	771		Aspalaga	and consider that		6305	Crushed at 102 millimeters from end and split along grain.
	771		do	1	Charles and American	8618 7870	Crushed at 6 millimeters knot 102 millimeters from end. Triple flexure.
255. Quercus undulata, rar. Gam-	417	New Mexico	Pinos Altos mount-	E. L. Greene	***************************************	7439	do
belii. Scrub Oak.	417	do	ains.	do		7961	Crushed at 25 millimeters from
	525	Colorado	Engelmann's cañon			6691	middle at 3 millimeters knot. Triple flexure; split along grain.
	525	do	do			4581	Crushed at knots 32 millimeters from middle (dry rot).
256. Quercus macrocarpa	79	Kentucky	Mercer county	W. M. Linney	Alluvial	8392	Triple flexure
Burr Oak. Mossy-cup Oak.							

		100										Remarks.
0.25	0.51	0.76	1.02	1.27	1.59	1.78	2.03	2.28	9.54	4.81	5.08	
2744	3574	4014	4250	4545	4735	4976	5153	5325	5489	6613	7031	Slight shearing of fibers
1633	2341	2617	2880	3094	3248.	3434	3629	3765	3891	4500		Slight shearing of fibers; split at end
2608	3447	3760	4019	4200	4468	4658	4799	5017	5194	6214	6759	do
1633	2200	2504	2703	2894	3153	3329	3465	******	******			Fibers did not shear; split at end
2313	3085	3311	3447	3488	3615	3738	3833	3887	3964	4355	4899	Sheared fibers
1438	3815	3865	2567	2713	2858	3048	3166	3248	3357	3901	4400	do
1860	2767	3016	3357	3574	3751	3933	4078	4223	4296	5103	5625	Slight shearing of fibers; split at end
1882	2495	2622	2849	3026	3162	3334	3465	3583	3692	**** ***	(44 (48 V)	do
2132	2449	2753	2948	3021	3166	3293	3411	3488	3583	4250		Sheared fibers; split at end
1483	1987	2205	2023	2150	2803	2967	3048	, 3157	3252	******	****	Split at end
1996	2980	3071	3162	3266	3343	3429	3479	3570	3633	4037		Sheared fibers
2427	3130	3402	3633	3978	4223	4445	4790	4990	4740	6260	7045	Slight shearing of fibers
1951	2812	3134	3429	3683	3901	4119	4273	4450	4595	5625	6033	Slight shearing of fibers; split at end
989	1969	2631	2976	3239	3497	3692	3856					Split at end
2499	3579	3974	4341	4672	4881	5076	5334	5525	5738	6759	7391	Indented without shearing fibers
1542	2604	2967	3248	3502	3697	3842	3983	4092	4246	4944	5380	do
2109	3311	3311	3389	3561	3656	3751	3833	3887	3960	4545	4854	Sheared fibers; split at side of stick
1179	1951	2186	2336	2440	2527	2645	2731	2817	2903	3434	3765	Sheared fibers
2313	3639	4001	4300	4536	4763	5035	5225	5271	5470	6704	7235	Slight shearing of fibers
1941	2699	3039	3284	3538	3720	8905	4105	4255	4404	5898	5942	Fibers did not shear
1438	2985	5212	3447	3574	3701	3842	4010	4114	4246	4890	5376	Sheared fibers
2223	2858	3289	3470	3611	3751	3892	3983	4042	4128	4513	4890	do
1384	2233	2581	2799	3016	3230	3388	3574	3724	3842	4617		Did not shear fibers; split at end
1860	2459	2685	2862	3012	3180	3307	3438	3588	3710	4332	4854	Slight shearing of fibers; split at end
	2,000			1000000	11.30		100	TOTAL CO.		=20000		
2313	3352	3615	3837	4028	4182	4346	4495	4626	4758	5670	6214	Sheared fibers
2041	2998	3289	3484	3742	3905	4155	4300	4427	4527	5579	5878	do
4482	3493	3742	3882	4024	4246	4305	4391	4527	4653	5330	5897	do
1896	2676	2794	2980	3157	3257	3425	3497	3674	3792	4377	4795	do
2214	3797	4119	4291	4491	4695	4831	4990	5126	5252	6123	6600	Sheared fibers; specimen split into two pieces
1588	2767	3302	3567	3788	3946	4110	4264	4427	4495	5398		Sheared fibers; split at end
1896	3833	4110	4827	4454	4613	4753	4922	5062	5194	6069	6386	Sheared fibers
885	2295	2812	2912	3080	3125	3261	3402	3525	3647	3856	********	Sheared fibers; split at end
2245	3284	3515	3742	3992	4264	4436	4581	4749	4890	5761	6214	Slight shearing of fibers
1928	3375	3983	4309	4604	4886	5062	5398	5570	5747	6804	7621	do
3357	4563	5017	5234	5579	5823	6110	6314	6482	6664	7756	8119	do
1619	2676	3316	3765	4095	4454	4763	5035	5339	5579			Split at end; fibers did not shear
2123	3379	3842	4228	4477	4740	4944	5144	5298	5466	6396	6872	Slight shearing of fibers
2586	3810	4237	4482	4681	4872	5062	5271	5398	5489	6396		Fibers did not shear; split at end
1547	2449	2767	2921	3107	3316	3425	3538	3710	3819	4473	4990	Slight shearing of fibers
2250	3479	3887	4110	4305	4527	4658	4744	4953	5002	5606	5860	Sheared fibers
2495	3928	4400	4704	4899	5089	5307	5466	4643	5711	6359	6600	do
1778	2971	3257	3529	3792	4037	4219	4423	4581	4704	5398	5992	Slight shearing of fibers
1860	2785	3112	3438	3724	3933	4250	4432	4599	4708	5534	6010	do
2032	3447	3833	4042	4246	4436	4559	4736	4863	5013	5942	6305	Sheared fibers
2291	3747	4146	4377	4527	4644	4813	4953	5067	5216	6105	6532	do
								Hall R				
2141	2803	3021	3275	3484	3647	3801	3910	4033	4101	4763	5171	do

Species.	Office number.	State.	Locality.	Collector.	Soll.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
56. Quercus macrocarpa—cont'd	137	Missouri	Allenton	G. W. Letterman	Moist upland	8754	Triple flexure
	143	Illinois	Waukegan	Robert Douglas	Rich	7076	do
	310	Texas	Dallas	J. Reverchon	Rich, moist	8609	Triple flexure; split at end
	310	,do	do	do	do	8709	Crushed at middle of one face
	432	Tennessee	Nashville	A. Gattinger	Alluvial	7255	Triple flexure, deflected diagonally.
	831	Illinois	Winnebago county		Lonm	8256	Crushed at 19 millimeters from end.
	983	Texas	Austin	C. Mohr	Alluvial	7053	Crushed in vicinity of 3 millim- ters knot.
	933	do	do	do		6613	Triple flexure, deflected diag- nally.
	1071	Vermont	Charlotte		*******	7983	do
	1072	do	do			7326	Triple flexure
	1073	do	do	do		7938	Triple flexure, deflected diag- nally.
57. Quercus lyrata Over-cup Oak. Swamp Post	424	Tennessee	Nashville	The property of the same	Low	5511	Split obliquely across the grain cross-grained.
Oak. Water White Oak.	424	do		do	The state of the s	7303	Crushed and split at ends
	545	Mississippi	Kemper's mill	The state of the s	Alluvial	8523	Crushed at middle of one face
	545	do		do		8754	Triple flexure, deflected diag
	762	Florida	Chattahoochee	A. H. Curtiss		7756	Crushed near middle; stick worn eaten.
	762	do	do	do	do	9344	Crushed near middle
8. Quercus bicolor	12	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	7530	Triple flexure; split along grain
Swamp White Oak.	12	do	do	do	do	7212	Crushed fibers at end
	54	Missouri	Allenton	G. W. Letterman	Alluvial	8596	Triple flexure; split along grain
	54	do	do	do	do	8596	Triple flexure
	542	do	do	do	do	7983	Triple flexure, deflected diag
	5411	do	do	do	do	8437	nally. Fibers crushed at 64 millimete
	846	Massachusetts	West Newbury	J. Robinson	Lew, swampy	7022	from end. Triple flexure, deflected diagnally.
	846	do	Arnold Arboretum	C. S. Sargent	Drift	7421	Triple flexure
59. Quercus Michauxii	240	South Carolina	Bonneau's Depot .	H. W. Ravenel	Alluvial	6418	Triple flexure; split along grain
Basket Oak. Cow Oak.	240	do	do	do		7756	do
	524	Alabama	Kemper's mill	DESTRUCTION OF THE PARTY OF THE	1/4	7847	Triple flexure
	524	do		do		7983	Triple flexure, deflected diag
	755	Florida	200 00 00 00	A. H. Curtiss	CONTRACTOR OF THE PARTY OF	7938	nally. Triple flexure at 8 millimete
	722					A CONTRACTOR	knot 102 millimeters from end concave side; split at end.
	755	do	do	do	do	8346	Triple flexure, deflected diag nally.
00. Quereus Prinus	31	Kentucky	Boyle county	W. M. Linney	Shale	8777	Crushed fibers at middle
Chestnut Oak. Rock Chest- nut Oak.	311	do	do	do	do	9208	Crushed fibers at end
	35	do	do	do	Limestone	10569	Crushed fibers at 32 and at 13 millimeters from cnd.
	484	Tennessee	Nashville	A. Gattinger	Rocky upland	5942	Crushed and split at end
	925	Alabama	Cullman	C. Mohr	Dry, rocky	9299	Crushed fibers at 76 millimeter from end.
	925	do	do	do	do	7892	Split at end; cross-grained
11. Quercus princides	34	Kentucky	Mercer county	W. M. Linney	Limestone	7938	Triple flexure; middle bend : millimeters from center; d
Ohinquapin Oak.	342	do	Boyle county	do	Waverly shale	11022	flected from heart. Crushed at 5 millimeters knot
	273	Missouri	Allenton	G. W. Letterman	Limestone	8663	millimeters from end. Crushed and split at end
	287	do	do	do	Flinty	9276	Triple flexure, deflected from
	323	Texas	Dallas	J. Reverchon	Calcareous	9163	heart. Deflected 76 millimeters from en
	514	Tennessee	Nashville	A. Gattinger	Alluvial	9117	and split along grain. Triple flexure, deflected toward
	514	do	do	do	do	9253	heart do
2. Operous Denotesii	800	California	Contro Cont	G D Wasse	Class	Dec 4	Constitution of the constitution
2. Quercus Douglasii	688	California	Contra Costa	G. R. Vasey	Clay	8709	Crushed fibers at 51 millimete from middle.

0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.
									-			
2676	3887	4341	4817	5167	5403	5622	5915	6033	6260	7530	7938	Slight shearing of fibers
749	2676	3184	3420	3588	3792	3933	4042	4178	4355	******	10011011	Short specimen, 120 millimeters long; split at ends.
1179	2254	2654	2812	3080	3230	3434	3602	3801	3910	4717	5126	Slight shearing; split at ends
1678	2790	2980	3134	3356	3535	3692	3792	3937	4028	4653	5153	Slight shearing
1960	2835	2935	3166	3393	3525	3638	3792	3919	3983	4881	5353	Sheared fibers
1542	2549	2858	2967	3134	3248	3456	3624	3756	3901	4690		Slight shearing of fibers; split at end
1769	2849	3148	3361	3484	3665	3779	2882	3964	4064	4763	5058	Slight shearing of fibers
1678	2926	3366	3574	3715	3856	4028	4155	4237	4314	5062	5307	do
2078	3556	2996	4336	4604	4944	5035	5252	5430	5579	6577	7145	do
2744	3456	3652	3937	4150	4341	4518	4613	4799	4969	6078	6668	do
1996	2885	3280	3470	3701	3882	4114	4291	4391	4513	5307	5806	do
0054	4500	F400	FROR	E0/7	6106	6373	6500	6600	6722	7847	8119	do
2858		5189	5606	5847	6196		1	1800		7666	8074	Sheared fibers
2481		4749	5162	6010	5869	6112 2790	6364	6559 3062	6695 3157	3720	The same	Slight shearing of fibers; split at end
1459		2068	2254	2422	2617	MY Z	2935	CERTAIN	1	11001700	5000	The state of the s
2078	200000	3320	3574	3833	3996	4114	4296	4436	4590	5443	5806	Sheared fibers
2041		2926	3180	3366	3529	3661	3751	3882	3933	4559	4990	do
1461	2059	2313	2563	2722	2985	3157	3329	3438	3593	4336	*******	Sheared fibers; split at end
1905	2640	2740	2908	3094	3230	3370	3534	3615	3729	4346		Slight shearing of fibers; split at end
1343	2073	2322	2495	2676	2844	2976	3125	3261	3348			do
1687	2776	3071	3311	3579	3742	4014	4178	4350	4554	5479		Fibers did not shear; split at end
	. 2921	3329	3683	3955	4196	4500	4717	4944	5149	6169	6459	Slight shearing of fibers
2313		3529	3683	3792	3942	3983	4237	4332	4441	5035	5625	Sheared fibers
1628	2368	2586	2744	2935	2094	3248	3388	3529	3661	4355		Slight shearing of fibers; split at end
2091	3239	3652	3919	4196	4445	4604	4735	4944	5098	6978	6459	Fibers did not shear
1951	3198	3538	3856	4046	4287	4626	4786	4971	5158	6123	6759	do
	20000	1000000	200000	and the same of	1			YT	Des	M		0//
1946	-112	3044	3339	3547	3674	3878	4028	4146	4309	5080	Special Specia	. Slight shearing of fibers; split at end
2359	3030	3402	3720	3978	4150	4486	4658	4849	5008	6033	6577	Fibers did not shear
1896	2540	2867	2948	3130	3280	3447	3606	3720	3842	4382		Fibers did not shear; split at end
1202	2050	2341	2572	2776	2930	3116	3261	3375	3461	4028	4332	AND THE RESERVE TO SERVE THE PARTY OF THE PA
3057	3656	4092	4482	4744	4990	5171	5416	5615	5793	6849	7394	Slight shearing of fibers
1860	2994	3434	3847	4173	4409	4672	4908	5126	5294	6260	6927	do
						Arran	1404					
215	- 1	3583	3674	3901	3992	4119	4191	4300	4366	4795	******	The second secon
154:	a la const	2504	2713	2921	3075	3239	3379	3479	3638		******	
186		3670	4042	4300	4531	4626	4886	4967	5262	5652	******	
224	2000000	3397	3674	3842	3983	4037	4146	4191	4246	4990	5285	
1453	2676	3039	3270	3434	3574	3720	3856	3978	4073	4626		Sheared fibers; split at end
165	2980	3325	3520	3720	3878	4033	4160	4287	4436	5035	2000200	do
158	2089	3311	3402	3561	3701	3842	3928	4024	4150	4831	5298	Slight shearing of fibers
162	3166	3593	3783	3992	4196	4382	4559	4708	4872	5706		. Slight shearing of fibers; split at end
2613	3847	4219	4495	4854	5103	5262	5498	5670	5838	7031	7756	Sheared fibers
222	3348	3697	3951	4164	4386	4563	5758	4904	5107	5851	6600	
					******	*****						knot.
1170	2767	3425	3765	3969	4164	4436	4527	4717	4877	5829	6169	Slight shearing of fibers
240	3892	4281	4559	4804	5044	5216	5398	5579	5747	6985	7439	do
						1						

						14 m	
						Longitudinal com- pression: Ultimate strength, in kilos.	
Species.	ber.	State.	Locality.	Collector.	Soil.	In the last	Remarks.
Бреслев.	num	State.	Documey.	Concount		sion sion ogth	поши, ка
	Office number.					Longi pres strei	
263. Quercus oblongifolia	655	California	San Diego county	G. R. Vasey			Stick shattered at seasoning
White Oak.	655		A STATE OF THE PARTY OF THE PAR	do	The state of the s	7621	cracks. Stick shattered at knots and sea soning cracks.
264. Querous grisea	698	Arizona		G. Engelmann and	Dry, rocky	7666	Crushed at 3 millimeters knot 25
White Oak. 266. Quercus Durandii	1103	Texas	ains.	C. S. Sargent. S. B. Buckley	Damp, calcareous.	9140	millimeters from end. Triple flexure; split along grain
CHEST SECTION OF THE SECTION	1103	do	do	do	do	7892	Crushed at knots 51 millimeter
	1103	do	do	do	do	8618	from end. Failed at knots 51 and 76 millime ters from end.
267. Querous virens	404	Florida	Charlestown Navy-	S. H. Pook	****************	10478	Crushed at middle and split; cross
Live Oak,	799	do	yard. Saint John's river.	A. H. Curtiss	Sandy	9707	grained. Crushed fibers at 25 millimeter. from middle and at 25 millime
	799	do	do	do	do	9934	ters from end. Triple flexure; developed inter
	919			C. Mohr		8165	secting "Cooper lines". Crushed fibers at end; split along
	919	do	do	do	do	8936	side. Crushed fibers at middle, 6 milli
	954	Texas	Matagorda bay	do	Sandy loam	6577	meters from knot. Crushed in vicinity of knots 102 millimeters from end.
Control of the last of the las	954	do	do	do	do	7439	Triple flexure
268. Quercus chrysolepis	649	California	San Bernardino	W. G. Wright		8845	Crushed fibers at 32 millimeters
Tive Oak. Maul Oak. Val- paraiso Oak.	649	do	do	do		9480	from middle. Crushed fibers at end
	653	do	Marin county	G. R. Vasey	Gravelly	9072	Crushed at knot 51 millimeters from middle.
	653	do	do	do	do	7485	Crushed at knot 64 millimeters from end.
269 Quereus Emeryi	654	Arizona	Santa Rita mount-	G. Engelmann and C. S. Sargent.	Dry, rocky	6759	Crushed at end and split
270. Quercus agrifolia	663	California	Marin county	G. R. Vasey	Loam	6985	Crushed at two 6 millimeters knot
Enceno. Coast Live Oak.	663	do	do	do	do	7847	19 and 57 millimeters from end Crushed fibers at 57 millimeter from middle.
271. Quercus Wislizeni	685	do	Auburn	G. Engelmann		8052	Crushed and splintered at end.
Live Oak.	685	do	do	do		9004	Crushed at end
272. Quercus rubra	7	Mannahmatta (Amold Arboratum	C. S. Sargent	Duide	0017	Crushed at 25 millimeters from
Red Oak. Black Oak.	7		1	do	72.		end; opened grain. Crushed at 32 millimeters from
	45			W. M. Linney			end. Triple flexure, deflected paralle
Principle of the land of the land	45	do	do	do	đo	7621	to rings. Triple flexure, deflected paralle
	459	do	do	do	do	6623	to rings. Crushed at 34 millimeters from
	89	Missouri	Allenton	G. W. Letterman	Rich loam	10705	end. Crushed at 102 millimeters from end.
	89	do	do	do	do	10524	Crushed at 19 and at 89 millimeter from end.
	92	Kentucky	No. of the last of	W. M. Linney	12.07 PA	6917	Triple flexure, deflected perper dicular to rings.
	140	Michigan		W. J. Beal	7	7122	Crushed at end; splitting of wedg shaped piece; cross-grained.
	141	Illinois		Robert Douglas	E-61 95	7031	Crushed at end and at 25 mili meters from middle. Crushed at 6 millimeters knot 5
	215	Vermont		C. G. Pringle		8663	millimeters from end. Triple flexure, deflected towar
	215	No literatura de la constanta		do	155	9208	heart. Crushed fibers at end
	217	do	do	do	do	9026	Triple flexure
	217	do	do	do	do	7802	Triple flexure, deflected paralle
	218	do	do	do	do	8981	to rings. Crushed fibers at end
	920	a contract the second contract to the	Control of the Contro	C. Mohr	Commence of the Commence of th	6396	Crushed fibers at 25 millimeter from middle.
	920	The second second second second	Control of the Contro	do	The second second second	5579	Crushed fibers at 51 millimeter from end.
	1043		Control Name and Control Control Control	J. Robinson	The state of the s	9957	Triple flexure; middle bend 2 millimeters from center. Crushed at end and at 102 mill
	1040					700000	meters from end.
272. Querous rubra, var. Texana Red Oak.	931 931			C. Mohrdodo	2	9321 9299	Crushed at knots 114 millimeter from end. Triple flexure; middle deflectio
AREA CASTILIZATION AND ACCUSE				I The District	La Sienz Inc		25 millimeters from center.
273. Quercus coccinea	752	Florida	Aspaiaga	A. H. Curtiss	Clay	8074	Triple flexure, diagonal deflection

1724 2359 2472 2200 2631 3130 1724 1701 2449 1769 1879 1610 2563 1633	4717 4309 4219 3828 3856 5534 3742 2971 4468 3311 3629 2994	6305 5171 4990 4354 4332 6441 4445 3579 5080 3856	7349 5761 5398 4626 4667 6782 4022 3892 5398	7983 6078 5829 4940 4904 7122 5176	8437 6477 5987 5071 5216	8981 6795 6214 5353 5466	9390 7081 6419 5489 5643	9707 7372 6623 5657 5806	9979 7566 6777 5806	1157	1293	Sheared fibers
2472 2200 2631 3130 1724 1701 2449 1769 1879 1610	4219 3828 3856 5534 3742 2971 4468 3311 3629	4990 4354 4332 6441 4445 3579 5080	5398 4626 4667 6782 4922 3892	5829 4940 4904 7122 5176	5987 5071 5216 7358	6214 5353	6419 5489	6623 5657	6777	AND DESCRIPTION OF THE PERSON		
2200 2631 3130 1724 1701 2449 1769 1879 1610	3828 3856 5534 3742 2971 4468 3311 3629	4354 4332 6441 4445 3579 5080	4626 4667 6782 4022 3892	4940 4904 7122 5176	5071 5216 	5353	5489	5657		PARA		Split at ends; sap-wood
2200 2631 3130 1724 1701 2449 1769 1879 1610	3828 3856 5534 3742 2971 4468 3311 3629	4354 4332 6441 4445 3579 5080	4626 4667 6782 4022 3892	4940 4904 7122 5176	5071 5216 	5353	5489	5657				Solit at and
2631 3130 1724 1701 2449 1769 1879 1610 2563	3856 5534 3742 2971 4468 3311 3629	4832 6441 4445 3579 5080	4667 6782 4022 3892	4904 7122 5176	5216 7358				5806	7870		Split at end
3130 1724 1701 2449 1769 1879 1610	5534 3742 2971 4468 3311 3629	6441 4445 3579 5080	6782 4922 3892	7122 5176	7358	5466	5643	5806	11010-00373	6377	7031	Slight shearing of fibers
1724 1701 2449 1769 1879 1610	5534 3742 2971 4468 3311 3629	6441 4445 3579 5080	6782 4922 3892	5176	-61				5987	7122	7666	do
1724 1701 2449 1769 1879 1610	3742 2971 4468 3311 3629	4445 3579 5080	4922 3892	5176	-61			******			******	***************************************
1724 1701 2449 1769 1879 1610	3742 2971 4468 3311 3629	3579 5080	3892		248	7576	7802	7970	8265	9117	10047	Sheared fibers
1701 2449 1769 1879 1610	2971 4468 3311 3629	5080		1000000	5470	5706	5920	6105	6382	7666	8415	Slight shearing of fibers
2449 1769 1879 1610 2563	4468 3311 3629	5080				10.000		1000	100000	Section		
1769 1879 1610 2563	3311 3629	2722734	5398	4259	4491	4753	4999	5285	5543	6940	7666	do
1879 1610 2563	3629	3856		5657	5851	6060	6223	6332	6513	7462	7802	Slight shearing of fibers; split at end
1610 2563		1400	4146	4436	4563 5602	4922	5053	5280	5362	0007	oner.	Split at end
2563	2009	4400 3769	4908 4150	5252 4391	4744	5874 5053	6128 5339	6314 5584	6577 5856	8097 7439	8845	Slight shearing of fibers
VAUL.		0109	*100	TOOL	1	1000	0000	5000	0000	1403	8188	do
1633	4001	4445	4677	4971	5289	5557	5720	5878	6078	6985	7621	do
	4128	4922	5421	5625	5965	6141	6332	6609	6745	7892	8483	do
2087	8602	4187	4495	4844	5107	5280	5512	5733	5929	7212	7924	do
1910	3456	3978	4364	4877	4971	5248	5570	5702	5929	7054	8006	do
2758	4672	5693	6283	6646		7303	7621	7870	8192	9594		Slight shearing of fibers; split at end
1424	2676	3393		4060	4377	4626	4881	5116	5312	6577	7258	Slight shearing of fibers
1520	2604	3030	3212	3479	3665	3797	3960	4092	4223	5013	5670	do
					Z		100					
2313	3856	4454	4854	5058	5421	5643	5851	6005	6250	7457	7910	do
1415	2685	3116	3402	3665	3896	4082	4264	4482	4695	5398	6305	do
1637	2295	2495	2694	2899	3157	3266	3479	3692	3783	4445	,,,,,	Slight shearing of fibers; split at end
1043	2046	2395	2622	2744	2939	3075	3289	3434	3488	4033		do
1905	2168	2286	2400	2440	2586	2690	2785	2817	2875	3366	3674	Sheared fibers
871	1651	1955	2028	2136	2286	2313	2468	2536	2599	3021		Sheared fibers; split at end
1084	1851	1955	1987	2123	2232	2295	2350	2481	2536	2958	3357	Sheared fibers
1796	2976	3393	3683	3892	4033	4359	4500	4653	4854	5715		Slight shearing of fibers; split at end
2109	2880	3153	3357	3543	3783	3983	4209	4355	.4491	5398		do
2132	2540	2862	2971	3171	3379	3543	3656	3851	3951	4559	4990	Sheared fibers
1869	2014	2164	2322	2422	2626	2803	2890	3003	3075	3774	ereteset	Slight shearing of fibers; split at end
1678	2254	2372	2518	2681	2785	2044	3021	3130	3175	3783	3901	Sheared fibers
1778	2576	2722	2858	3026	3171	3293	3420	3525	3611	4309	*****	Split at end
1951	2404	2558	2835	3003	3588	3397	3588	3756	3937	5058	5851	Sheared fibers
1837	2522	2531 2699	2767 2753	2899	3075 3075	3193 3166	3316	3393	3461 3570	4164 4264	******	Sheared fibers; split at end
1769	2454	2672	2808	2944	3121	3212	3343	3452	3570	4264	*******	Split at enddo
1905	2631	3012	3166	3329	3543	3665	3701	3797	3946	1000		Split at end; short specimen, 120 millimeters long
1560	1910	1951	2028	2141	2209	2263	2318	2354	2440	2894	3166	Sheared fibers
1084	1678	1787	1833	1869	1978	2041	2105	2164	2209	2622	2869	do
1565	2118	2418	2549	2767	2908	2985	3134	3225	3302	2022	2000	Split at end
1724	2409	2703	3334	3484	3175	3307	3438	3570	3629	4445	4854	Split at end; fibers did not shear
2495	3310	4332	4772	4971	5252	5407	5489	5711	5856	6568	7349	Sheared fibers; split at end
2109	3438	3882	4146	4359	4563	4844	5062	5252	5380	6668	7439	Slight shearing of fibers

FOREST TREES OF NORTH AMERICA.

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
274. Quercus tinctoria	17 17	and the second second	Arnold Arboretum	The state of the s		8890 9081	Crushed at end, also at 102 millimeters from end. Crushed fibers near middle
Yeuono Oak.	36 36 ²	The state of the s	Danville Junction	The state of the s	The second secon	7530 9617	Crushed 51 millimeters from end at 3 millimeters knot. Crushed fibers on one face at 13 millimeters from middle.
	36 ³	Missouri	do	G. W. Letterman	Rich upland	7326 8890	Deflected and split along grain from end to middle. Triple flexure, deflected parallel to rings.
	74 86	do	do	do	do	8256	Triple flexure, deflected from heart.
	244	do	Wytheville	do	do	5534 5103	Triple flexure, deflected parallel to rings. Crushed and split at end; brittle.
A STATE OF THE PARTY OF	247 247 437	do	do	do	do	9562 7689	Crushed at 13 and at 76 millimeters from end. Crushed at end
275. Quercus Kelloggii	628	Oregon	Saw-mill, Ashland	G. Engelmannand		8233	end. Crushed at 51 millimeters from end.
Julia dia	628 963	do		G. H. Collier		8301 6396	Crushed and splintered at end
276. Quercus nigra	963 268	Missouri	Allenton	G. W. Letterman		5806 7766	Splintered at end Triple flexure
Black Jack. Jack Oak.	339	Alabama	Citronelle			8142	Crushed in vicinity of small knot
277. Quercus falcata Spanish Oak. Red Oak.	131	South Carolina do Virginia	do	do	Rich loamdo		Crushed at 64 millimeters from end. Crushed at 25 and at 162 milli meters from end. Crushed at 19 millimeters from
	245 245 265 ²	do	do	do		10093	end. Crushed at 25 millimeters from end. Crushed on one face at 25 millime
	265 ³ 548	do	do	do		9081	. ters from middle and at end. Crushed at 102 millimeters from end. Crushed at end and at 114 milli
	548	do	do	do	do		meters from end. Crushed at 89 millimeters from end.
278. Quercus Catesbæi Turkey Oak. Scrub Oak. Forked-leaf Black Jack. Black Jack.	342 342	do	Cottage Hill	do	do	6800 7734	Triple flexure, deflected diagonally. Triple flexure; split along grain
	770	Floridado	Aspalaga	A. H. Curtiss	The state of the particular and the state of	7212 7507	Triple flexure; knot at middle Crushed at end and at 3 millimeter knot 51 millimeters from end.
279. Querous palustris	47 47		Allenton		Rich, alluvial	8437 8156	Crushed at end
	282 282		do			6895 7961	Triple flexuredo
280. Quereus aquatica	264 ¹ 264 ²	Virginia	Carroll county			111111111111111111111111111111111111111	do
sum Oux. Punk Ouk.	264 ³ 349		do	do	CONTRACTOR STATES	21893000	middle on one facede
	349		do		do		Crushed at 64 millimeters from end. Crushed at knots at middle and
	511 742	do	do	do	do	7371 8256	at 51 millimeters from end. Crushed at 6 millimeters knot 76 millimeters from end. Crushed fibers at middle
	742	do	do	do	do	8596	Crushed at 89 millimeters from end in vicinity of small knots.
281. Quercus laurifolia Laurol Oak.	756 756	Floridado	Saint John's riverdo		Sandy loamdo	8596 7884	Crushed in vicinity of 3 millime ters knot 102 millimeters from end.

0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.	
2032	2313	2495	2812	2880	3048	3075	3221	3361	3470	4173		Slight shearing of fibers; split at end	
1542	2449	2681	2849	3012	3134	3348	3434	3529	3656	4346		do	
1637	2522	4150	3012	3162	3379	3525	3593	3747	3856	4491		do	
2313	3166	3357	3543	3674	3742	3983	4037	4110	4187	4980		Split at end; fibers did not shear	
2518	3407	3665	3842	4064	4123	4237	4400	4626	4886		6532	Fibers indented without shearing	
1769	2903	3529	3819	4028	4300	4518	4649	4935	5103	6283		Split at end; fibers did not shear	
1565	3266	3992	4436	4717	5013	5398	5670	5915	6146	7212	7965	Indented without shearing fibers	
1928	2858	3130	3230	3383	3588	3810	3892	4064	4196	4944		Split at end	
1343	2291	2322	2386	2395	2454	2518	2563	2649	2685	3085	3248	Shearod fibers; split at end	
835	1569	1633	1674	1751	1842	1878	1928	1951	2078	2404	2654	Sheared fibers	
1815	2313	2576	2790	2976	3153	3252	3388	3574	3665			Split at ends	
2019	2422	2667	2867	3035	3212	3338	3443	3566	3647	4377		Slight shearing of fibers; split at end	
1547	2277	2481	2726	2880	2130	3193	3407	3547	3683	*******	4899	do	
1769	2672	2790	2803	2917	3003	3026	3026	3139	3225	3710	4037	Sheared fibers	
1642	2495	2081	2713	2776	2890	2994	3075	3193	3221	3856		Slight shearing of fibers; split at end	
989	2232	2840	2967	3066	3184	3352	3452		*******		******	Shaky stick; split at ends	
1229	1860	2141	2313	2372	2513	2586	2617	2694	2758			do	
0010	1001	7000	****		5//							(1)	
2948	4024	4277	4495	4672	4854	5026	5262	5407	5579	6486	7021	Slight shearing of fibers	
2767	4110	4010	4246	4491	4699	4881	5067	5262	5407	6392	*******	Sheared fibers; split at end	
2336	3438	3701	4042	4264	4572	4922	5044	5216	5407	6214		Slight shearing of fibers; split at end	
975	2250	2799	3053	3284	3493	3665	3828	3933	4110	4877		do	
1987	2395	2572	2722	2803	2958	3098	3230	3302	3425			Split at end	
1406	1814	1887	2087	2245	2440	2622	2767	2980	3153	3933		Slight shearing of fibers; split at end	
1728	2563	2790	2885	3021	3130	3298	3402	3497	3574		A	Split at end; fibers not sheared	
1384	2400	2617	2744	2835	2994	3125	3207	3339	3438	4128	h.	Slight shearing of fibers; split at end	
2436	2953	3293	3488	3638	3828	3942	4082	4178	4327	100,000	100	2/.do	
1751	2867	3248	3536	3697	3933	4110	4264	4386	4522	5216		,do	
2068	2753	2890	3066	3302	3429	3615	3751	3882	3983	4786	5262	Sheared fibers	
1792	2477	2703	2853	3026	3180	3302	3447	3579	3688	4468		Sheared fibers; split at end	
1597	2776	3221	3561	3756	4060	3815	4463	4717	4831	5851		Slight shearing of fibers; split at end	
2118	3411	3905	4259	4500	4817	5071	5303	5087	5706	6918	7666	Sheared fibers	
-	1000	2201	223										
1338	2268	2640	2821	2935	3130	3202	3316	3470	3538	4287	******	Slight shearing of fibers; split at end	
*****	0000			*******		20101012		******	******	*******	*******		
1456	2068	2295	2486	2703	2880	3039	3202	3352	3393	4150		Slight shearing of fibers; split at end	
2359	2939	3075	3343	3484	3715	3847	4055	4160	4327	*****		Fibers did not shear; split at end	
1624	2109	2241	2359	2486	2527	2676	2753	2840	2980	3511		Slight shearing of fibers; split at end	
1406	1842	1932	2087	2155	2214	2341	2400	2454	2495	2948		do	
1678	1955	2005	2096	2173	2295	2413	2481	2595	2676	3121		Sheared fibers; split at end	
1769	2676	2790	3139	3311	3484	3674	3901	4060	4173		1200000	Fibers did not shear; split at end	
1506	2245	2490	2744	2866	3062	3221	3388	3538	3652	4377		do	
1542	2685	3130	3475	3692	3937	4128	4191	4445	4626	5534			
1293	2313	2749	3012	3248	3393	3606	3783	3910	4037	5080			
2858	3511	3851	4196	4495	4781	5013	5239	5416	5615	6849	7349	Sheared fibers	
1542	2926	3547	3429	4092	4314	4500	4690	4790	4949	5761		Slight shearing of fibers; split at end	
noza	DTOF	400		120000	200	20110344	Lang Dr. and	100000		rentre de			
2858	3765	4219	4482	4735	5035	5262	5461	5661	5847	6736	77.2734	7521 Sheared fibers	

Species. State. Locality. Collector. Soil. The special state of the special state. State of the special state of the special state of the special state. State of the special state of the special state of the special state. State of the special state of the special state of the special state. State of the special state of the special state of the special state. State of the special state of the special state. State of the special state of the special state of the special state. State of the special state of the special state of the special state. State of the special state of the special state. State of the special state of the special state. State of the special state of the special state. State of the special st	illimeters from imeters knot 51 end. illimeters from plintered at 102 end; brittle. effected diago-
281. Quercus laurifolia—continued. 801 Florida Saint John's river A. H. Curtiss 9480 Crushed at 25 mi middle. Crushed at 89 mi end and at end. 282. Quercus heterophylla 1171 New Jersey Mount Holly 8. P. Sharples Clay 5171 Crushed at 25 mill millimeters from do do do 8029 Crushed at 102 millimeters from Crushed at 102 millimeters from Crushed at 102 millimeters from Crushed at 102 millimeters from Crushed at 102 millimeters from Crushed at 102 millimeters from Jack. Sand Jack. 283. Quercus cineres 7167 Split at end and split millimeters from Crushed at 102 millimeter	imeters from imeters knot 51 end. illimeters from plintered at 102 end; brittle. effected diago- nd.
282. Quercus heterophylla 1171 New Jersey Mount Holly S. P. Sharples Clay 5171 Crushed at 25 millimeters from Crushed at 102 m	end. illimeters from plintered at 102 end; brittle. effected diago- nd.
Upland Willow Oak. Blue Jack. Sand Jack. 284. Quercus hypoleuca	end; brittle. effected diago- nd.
284. Quercus hypoleuca	nd.
Shingle Oak. Laurel Oak. 402 do do do do do do do do do do do do do	ique spit 152
to rings.	
end. 286. Quercus Phellos	
Willow Oak. Peach Oak. 512do	
287. Quercus densiflora	meters knot. piddle bend 25
288. Castanopsis chrysophylla 729 do Mendocino county A. Kellogg 5651 Crushed at end at knot. Crushed at end 8256 Crushed at end	
289. Castanea pumila	meters knot 51
290. Castanea vulgaris, var. Amer- 18 Massachusetts Arnold Arboretum C. S. Sargent Drift 4137 Triple flexure, def to rings.	
Chestnut. 18 do do do 5298 Crushed 25 millimeted at 3 millimeted 2581 Virginia Fancy Gap H. Shriver Moist 7235 Crushed 25 millimeted	ers knot.
2582 do	
291. Fagus ferruginea	along grain.
44 ² Kentucky Mercer county W. M. Linney Hudson River shale 7566 Crushed at 76 mi end. 44 ³ do do do do 8006 Crushed at 25 and	
119 Michigan Dansville W. J. Beal Gravelly 8822 ters from end. Crushed at end 119 do do do 8346 Crushed at middle	
765 Florida Chattahoochee A. H. Curtiss do 6496 Crushed at middle 13 millimeters kn	in vicinity of
765 do .	
853 do	
Hop Hornbeam, Iron Wood. Lever Wood. 11 dodododogo34 Triple flexure; mid limeters eccentric	dle bend 25 mil-
877 do Danvers J. Robinson Rich loam 9707 Triple flexure 877 do	llimeters from
1047 do North Reading do 7983 Triple flexure, de nally perpendieu 1047 do do do 8641 Crushed at 51 mi end; opened grai	lar to rings. llimeters from
293. Carpinus Caroliniana 46 Missouri Allenton G. W. Letterman Damp, alluvial 6963 Deflected at middle ends. Water Beech Iron Wood. 73 Kentucky Mercer county W. M. Linney Trenton limestone 9390 Triple flexure	Walter Contract Contract

						- 10	_			-				-
gram.	PR	ESSURE,	IN KILO	GRAMS, R	EQUIRED	TO PROI	DUCE AN	INDENTA	ATION, IN	MILLIM	ETERS, O	V		1
Direction of grain.	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.	Office number
劉	1665	2980	3348	3674	3901	4060	4291	4463	4527	4631	5652	6056	Slight shearing of fibers	8
劉	1438	2685	3157	3438	3647	3847	3978	4164	4309	4436	5262		Slight shearing of fibers; split at end	8
m	1973	2713	2021	3157	3339	3493	3652	3828	4001	4137	5013		do	11
勠	998	1878	2155	2291	2477	2617	2713	2844	3007	3116	3788		do	11
		2132	2622	2958	3221	3375	8593	3738	3878	4019			Split at end	3
观	1610	2948	3525	3769	3978	4191	4332	4463	4559	4672	5512		Slight shearing of fibers; split at end	
勿勿	1842	3402	4128	4486	4717	4944	5153	5343	5489	5643	6623	7167	Sheared fibers	1
גננט	1851	3153	3402	3611	3788	3969	4164	4341	4513	4699	5579	6419	Indented without shearing fibers	
妙	1315	2586	3112	3434	3629	3878	4037	4196	4400	4572	5625	6214	dodo.	
	1270	2245	2744	2921	3139	3343	3538				T.A.	******	Split at ends	
2	2358	3216	3402	3605	3937	4205	4414	4626	4844	5035	5874		do	
777	1610	2835	3248	3429	3611	3801	3951	4078	4205	4300	5171	5579	Indented without shearing fibers	
勿	1143	2540	2890	3125	3293	3438	3602	3756	3878	3887	4831	5398	Slight shearing of fibers	1
	1700	0020	0150	9904	0.700	9701	2010	nnen	1000	4104	1000	2410	Sheared fibers	
300	1792 1860	2939 3012	3153 3366	3384 3525	3583 3602	3701 3806	3810 4001	3960 4191	4082	4164 4436	4899 5262	5443 5738	Sneared fibers	
<i>m</i>		12000	5000			511	4501		1010	9900		0.100		
巡加	1089	1452	1610	1733	1837	1892	2005	2073	2105	2173	2586		Sheared fibers; split at end	
21 m	1325	1606 1452	1778	1892	1987	2136	2227	2286	2354	2450	2994		do.	
24	375	1338	1746 1524	1665	1960	2028 1914	2182 1978	2223	2295	2395	2608		Slight shearing of fibers; split at end	
			2000	192025	1		1010	To an						
Щ	1338	1474	1642	1746	1914	2019	2118	2204	2227	2250	2903	3130	Sheared fibers	
7771	925 889	1506 1284	1706 1424	1787 1524	1846 1610	1910	1978	2028 1810	2073 1887	2123 1932	2413	2554	Sheared fibers; split at ends	
刻	871	1461	1637	1715	1774	1860	1901	1982	2037	2001	1.20	100000	Sheared fibers; split at end	
多别		1080	1229	1297	1347	1452	1529	1597	1647	1706	2041	X	do	
	2223	2803	3057	3212	3407	3652	3774	3905	4037	Lin	4854	5625	Sheared fibers.	
	1452	2223	2536	2713	2858	3121	3288	3420	3565	4169 3685	4491	0020	Slight shearing of fibers; split at end	
	1111	2744	2971	3162	3284	3470	3583	3701	3797	3874	4391	4877	Sheared fibers	
	2631	3193	3329	3525	3652	3774	3874	3951	3987	4132	4740	5149	do	
奶	1973	2740	3134	3248	3411	3552	3611	3697	2015	4009	4581	4990	do	
	1860	2767	3016	3293	3493	3593	3710	3856	3928	4033			Sheared fibers; split at end	
	1542	2291	2513	2703	2866	2994	3121	3289	3348	3456	4150	4581	Sheared fibers	
	1379	2123	2359	2490	2658	2758	2375	3048	3089	3193	3720		Slight shearing of fibers; split at end	1
	1683 1452	2427 2241	2640 2486	2835 2685	2985 2840	3121 2994	3207	3338 3202	3443 3438	3579 3552	4178		do	
								1000	4000		2000			ŀ
	2223	3352	3692	3964	4146	4327	4527	4658	4854	5080	6078		do	
	1678 2132	2391 3470	2713 3874	2894 4155	3130 4386	3202 4622	3438 4849	3615 5080	3774 5252	3924 5479	4854 6713	115 500 559	do	
	1973	3039	3402	3720	3983	4219	4423	4604	4808	4908	5942	100000000	do	
22000	1547	2586	2885	3103	3348	3536	3729	3833	3987	4119	4899	5579	Slight shearing of fibers	1
	1315	2381	2740	3017	3184	3393	3588	3742	3937	4046	4990	5579	do	1
观	1542	2072	2935	3139	2329	3493	3606	3665	3792	3910			Split at ends :	
	1792	2767	3012	3266	3515	8706	3955	4060	4273	4355	5489	6010	Slight shearing of fibers	
77	1501	2454	2785	3066	3438	3593	3801	3978	4119	4246	5307		Sheared fibers; split at ends	
7	1247	2576	2035	3193	3339	3593	3774	3802	4037	4146	4944	5470	Sheared fibers	1

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
BETULACEÆ.							
294. Betula alba, var. populifolia	10	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	6123	Triple flexure parallel to rings
White Birch. Old-field Birch. Gray Birch.	10	do	do	do	do	5307	Crushed at 6 millimeters knot 102
	848	do	Danvers	J. Robinson	Gravelly	5262	millimeters from end. Crushed and split at middle
295. Betula papyrifera	223	Vermont	Charlotte	C. G. Pringle	201000000000000000000000000000000000000		
Paper Birch.	223		do	do	*****		
	722	Montana	Missoula	Sereno Watson		8346	Crushed at 102 millimeters from end.
	722	do	do		do	6713	Crushed at 25 millimeters from middle; deflected diagonally.
	836	Massachusetts	Townsend		**************	7983	Crushed at 32 millimeters from middle on one face.
	836		Chilcoot inlet			8890	Crushed at 25 millimeters from end.
	990	Alaska				6486	Crushed at middle at 3 millimeters
	990		or de			6577	Crushed 76 millimeters from end at 3 millimeters knot.
	1065	Vermont	Charlotte			8346	Crushed at 8 millimeters knot at middle.
	1065		do			7485	Crushed at 6 millimeters knot at middle.
	1066		do			7485	Crushed at 38 millimeters from end.
	1066		do			7552	Crushed at 6 millimeters knot 38 millimeters from end.
	1067		do	- A	///	7847	Crushed at 76 millimeters from end and at end.
	1067	do	do	do		9662	Crushed at 38 millimeters from middle.
296. Betula occidentalis	528	Colorado	Engelmann's cañon	Robert Douglas	Wet, sandy	5670	Crushed at middle; opened grain
Black Birch.	629	California	Strawberry valley.	G. Engelmann and C. S. Sargent.	Wet, peaty	6849	three-fourths the length of stick Crushed at middle and split along grain.
297. Betula lutea Yellow Birch. Gray Birch.	843	Massachusetts	Danvers	J. Robinson	Gravelly	8279	Crushed at 51 millimeters from
Tellow Birch. Gray Birch.	843	do	do	do	do	10070	end, do
	1068	Vermont	Charlotte	C. G. Pringle	do	9934	do
	1068	do	do	do	do	10093	Triple diagonal flexure perpen
	1069	do	do	do	do	10623	dicular to rings. Crushed at 64 millimeters from
	1069	do	do	do	O.,do	10841	end.
	1070	do	do	do	do	9208	Crushed at 3 millimeters knot 2
	1070	do	do	do	do	10206	millimeters from middle. Crushed at middle
298. Betula nigra	136	Missouri	Allenton	G. W. Letterman.	Moist loam	7339	Crushed at 5 millimeters knot at middle.
Red Birch. River Birch.	136	do	do	do	do	7122	Crushed at 10 millimeters knot
	841	Massachusetts	North Andover	J. Robinson	Alluvial	7249	32 millimeters from end. Triple flexure perpendicular to
	841	do	đo	do	do	7666	rings. Crushed at 44 millimeters from middle.
	842	do	do	do	do	6600	Triple flexure toward heart
	842	do	do	do	do	6069	Crushed at 6 millimeters knot 38 millimeters from end.
299. Betula lenta	4	do	Arnold Arboretum	C. S. Sargent	Drift	9072	Crushed at 31 millimeters from
Cherry Birch, Black Birch, Sweet Birch, Mahogany	4		do				middle; deflected diagonally. Triple flexure; middle bend 3:
Birch.	221	Vermont	Charlotte		Gravelly		millimeters eccentric. Crushed at 89 millimeters from
	221	do	do	do	do	10931	end. Crushed at middle
	844	Massachusetts	Danvers		do		Crushed at 102 millimeters from
	844	do			do		end. Crushed at 19 millimeters from middle.
300. Alnus maritima	810	Delaware	Pepper's mills	W. M. Canby	Wet, sandy		
301. Alnus rubra	967	Alaska	Sitka	Paul Schultze		6976	Crushed at 32 millimeters from
Alder.	967	do		do		6033	middle. Crushed at middle
	991	Washington terri-	Puyallup	Contract of the		6010	Crushed at 76 millimeters from
	991	tory.	do	C. S. Sargent.		6829	end. Triple flexure; middle bend 51
							millimeters eccentric.

						I A WA							Remarks.
	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	
	1100	7010	1880	2048	4077	0055	0140	2223	2322	2390	2971	P100	Ch 1 01
	1179	1619	1778	1846	1955	2055	2168 1937	1991	2078	2173	2011	3198	Sheared fibers
	1406	2223	1597 2332	1701 2409	1769 2495	1877 2549	2604	2654	2703	2748	3311		Slight shearing of fibers; split at end
	1400	2000	2002	2400	2400	2010	2002	2003	2700	2190	DOLL	177223	
	1179	1669	1787	1868	1932	2014	2105	2150	2209	2254	2676	2903	Sheared fibers; indented section covers 3 millime- ters knot.
	839	1093	1170	1325	1356	1460	1565	1615	1696	1783	2087	******	Slight shearing of fibers; split at end
	1656	1978	2114	2236	2295	2391	2531	2649	2731	2799	3334	3765	Sheared fibers
	1189	1978	2223	2859	2495	2649	2740	2844	2948	3016	3529	3946	Slight shearing of fibers; indented section covers 3 millimeters knot.
	1134	1701	1878	2028	2118	2250	2345	2431	2545	2635	3198	3629	Slight shearing of fibers; split at end
	1343	1941	2064	2214	2295	2440	2549	2676	2771	2867	3470	3901	do
	1384	2028	2168	2304	2391	2531	2676	2785	2862	2935	3543	3847	Sheared fibers
	930	1479	1583	1687	1796	1864	1941	2023	2091	2177	2676	2994	do
-	1270	********	2064	2313	2427	2490	2554	2676	2748	2799	3288	melini.	Sheared fibers; split at end
	1261	1746	1883	2005	2077	2182	2295	2391	2513	2595	3207		do
	975	1338	1529	1592	1710	1796	1883	1932	2028	2114	2563	2858	do
	1021	1488	1633	1715	1819	1892	1951	2046	2073	2200	2667		Slight shearing of fibers; split at end
	1179	1533	1656	1769	1892	1978	2150	2209	2304	2391	2939	3357	Slight shearing of fibers
	794	1325	1447	1579	1683	1765	1846	1941	2023	2082	2567		Slight shearing of fibers; split at end
	930	1837	2168	2340	2459	2599	2685	2744	2862	2930	3348	3652	Sheared fibers; split at end
	749	1320	1424	1533	1597	1660	1751	1805	1892	1937	2395	2699	Slight shearing of fibers
											1		
	1746	2859	2586	2722	2867	3030	3121	3243	3357	3561	4332	4536	do
	1742	2622	2858	3062	3139	3311	8470	8574	3661	3774	4423	4590	do
	1529	1987	2214	2404	2477	2576	2731	2794	2880	2998	3652	****	Sheared fibers; split at end
	1315	1769	1987	2168	2282	2345	2504	2572	2669	2776		abreeze,	Slight shearing of fibers; split at end
	1216	2028	2254	2449	2567	2708	2758	2894	2998	3071	3606	*******	Sheared fibers; split at end
	1343	1887	2118	2254	2368	2481	2590	2654	2749	2799		The state of the s	Split at ends; fibers did not shear
	1842	2495	2699	2858	2048	3107	3221	3343	3456	3574	4241	4672	Sheared fibers
	1021	1542	1733	1851	2000	2132	2241	2345	2463	2567	3130	******	Split at end; fibers did not shear
	1225	2168	2472	2685	2790	2889	3016	3085	3162	3216	3742	4014	Slight shearing of fibers
	1216	1497	1637	1760	1851	1982	2064	2205	2308	2345		2880	Sheared fibers; split at end
	889	1343	1642	1801	1923	1982	2046	2159	2182	2232	2581	2912	Sheared fibers
	894	1379	1542	1669	1765	1855	1910	1987	2037	2082	2563	2799	Slight shearing of fibers
-	1547	2123	2254	2377	2522	2626	2717	2803	2894	2989	3674	4105	do
	1120	1515	1624	1737	1851	1896	2000	2087	2141	2205	2209	2948	do
	2136	3561	4114	4386	4572	4753	4990	5110	2057	5440	gnog	0000	4-
	1497	2440	2713	2894	3130	3230	3397	5112 3574	5257 3656	5443 3815	6396 4626		do
			27.00	ALIME .	0100	0200	0001	2079	0000	9910	4020		do
						*******	*******		*******	*******			
	1665	2685	3089	3334	3497	8720	3856	4073	4205	4905	5018	5701	
	1179	2336	2731	3030	3261	3411	3583	3801	3955	4305 4101	5216 5022	5761	Slight shearing of fibers
		1810	1932	2023							2000	5761	do
-	1270	THE REAL PROPERTY.	10000000		2068	2164	2218	2259	2341	2400	2812	*******	Sheared fibers; split at end
	1089	1270	1347	1397	1474	1492	1547	1619	1628	1665	1932	2041	Sheared fibers
	1002	1724	1923	1996	2032	2127	2177	2254	2308	2354	2803	3039	do
	1774	2064	2223	2377	2481	2572	2636	2753	2808	2930	3574	3910	do
	975	1257	1851	1910	2032	2168	2232	2295	2350	2427	2427	3198	do

FOREST TREES OF NORTH AMERICA.

	Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
301.	Alnus rubra—centinued	1025	Oregon	Portland Furniture Company.	G. Engelmann and C. S. Sargent.		7258	Crushed at 102 millimeters from end.
302.	Alnus rhombifolia	635	do	Ashland	do		7022	Crushed at 25 millimeters from middle.
	Atuer.	717	Montana	Missoula		The same of the sa	4990	Crushed at 114 millimeters from end at 3 millimeters knot.
		717		do			4899	Crushed at 102 millimeters from end on one face.
		979		Drain	TO SELECT THE PROPERTY OF STREET		5171	Crushed at 25 millimeters from middle.
		979	do	do	do	do	6396	Triple flexure
303.	Alnus oblongifolia	694 694		San Bernardino			4445 4459	Crushed at 89 millimeters from end at 3 millimeters knot. Crushed at 102 millimeters from
305,	Alnus incana Speckled Alder. Hoary Alder. Black Alder.	374	Vermont	Hinesburg	C. G. Pringle	Wet loam	4617	end at 3 millimeters knot. Crushed at 25 millimeters from middle.
200	SALICACEÆ. Salix nigra	232	do	Shelhurne	do	Wet, sandy	4545	Triple flexure perpendicular to
300.	Black Willow.	855	Massachusetts	The state of the s		Wet loam	2277	rings. Crushed at 5 millimeters knot 51
		Sec. 2	1				2570000	millimeters from end; cross- grained.
307.	Salix amygdaloides	908		Cañon City			3493	Crushed at 6 millimeters knot at middle.
		908		do	- /		4355	Triple flexure; split along grain between rings.
		911		do	-0.		3878	Crushed at 51 millimeters from end; split along grain between rings. Crushed at 5 millimeters knot 51
		011					0010	millimeters from middle.
308.	Salix lævigata	690 690		Santa Cruzdo	C. S. Sargent.		5012 5216	Triple flexuredo
309.	Salix lasiandra, var. lancifolia.	640	do	Strawberry valley	do	Moist, rich	4373	Crushed at 51 millimeters from
		981	Oregon					end in vicinity of knots. Crushed 13 millimeters from mid-
		981	do	do	do	do	6056	dle at 2 millimeters knot, Crushed at 89 millimeters from
000	0-V- V-1 1 71- 71	000		m: 0 1 - 5 -	V 70 T		4=011	end and at end.
309.	Salix lasiandra, var. Fendle- riana.	889	Utan	City Creek cañon .	M. E. Jones	Gravelly	4581	Crushed at 19 millimeters from middle at 3 millimeters knot.
313.	Salix flavescens	721	Montana	Pattee's cañon, Missoula.	Sereno Watson	Rich, moist	6532	Crushed near middle on one face.
		721	do	do	do	do	6532	Crushed at 3 millimeters knot 76 millimeters from end.
313.	Salix flavescens, var. Scoule-	972		Seattle	G. Engelmann and	Moist, sandy	8074	Crushed at middle
	riana. Black Willow.	972	ritory.	do	C. S. Sargent.	do	6895	Crushed at 5 millimeters knot
214	Salix Hookeriana	966	Oregon	Winchester bay	do	Sandy saline	7031	near middle. Triple flexure, deflected diag-
014.	SHILL HOOKEHAIR	966		do	The state of the s	dodo	6623	onally. Triple flexure
		0.00						
316.	Salix lasiolepis	669	California	Santa Cruz	G. Engelmann and S. C. Sargent.	Sandy loam	6169	Crushed near middle on one face.
318.	Populus tremuloides	272 ⁵		Alpinedo			4219 4717	Crushed at 51 and at 114 millime- ters from end; split along grain. Triple flexure parallel to rings
		1035	Massachusetts		J. Robinson	Gravelly	6260	Crushed at 38 millimeters from
		1035	do	do		do	5942	middle on one face.
010	D 11							C 1 1 1 00 - 1111 - 1 - 10
319,	Populus grandidentata Popular.	847	HARDE & COMPANDATION CONTRACTOR	do	The second secon	a constant of the constant of the	5625	Crushed at 89 millimeters from end. Triple flexure; middle bend 38 millimeters eccentric.
320,	Populus heterophylla	522	Tennessee	Nashville	A. Gattinger	. Alluvial	4527	Crushed at 16 millimeters knot
961	River Cottonwood. Swamp Cottonwood.	Dar	Alexandra S	COLD COLD TO 1	Deat Calante	Ziu.	4070	102 millimeters from end.
021.	Populus balsamifera	961	Alaskadodo	Chilcoot inlet	and the second second second second	do	4672 5579	Crushed at 6 millimeters knot 25 millimeters from end. Triple flexure; middle bend 32 millimeters eccentric.
321.	Populus balsamifera, var. can-	1054	Massachusetts	Topsfield	J. Robinson	Gravelly	4527	Crushed at 76 millimeters from
	dicans.	1054		do		200	JAMES I	end. Triple flexure perpendicular to

0.2													Remarks.
	25	0.51	0.76	1.02	1.27	1.59	1.78	2.03	2.28	9.54	4.81	5.08	
1	953	1243	1352	1461	1529	1628	1715	1769	1805	1910	2254		Sheared fibers; split at end
4	916	1529	1665	1769	1851	1937	1996	2068	2132	2200	2486	2686	Sheared fibers
	631	953	1043	1071	1080	1120	1152	1179	1234	1279	1442	1547	do
	499	857	903	948	998	1043	1084	1129	1166	1229	1497	1647	do
1	590	944	1052	1084	1125	1193	1270	1315	1347	1388	1669	1860	do
	667	1030	1111	1175	1229	1288	1847	1397	1415	1483	1678	1878	do
3	930	1089	1120	1202	1257	1302	1361	1402	1443	1489	1765	2064	do
1	658	939	998	1080	1120	1207	1225	1266	1311	1343	1624	1774	
									Ye Yay				
								DE		101	W	10	
1	907	1293	1397	1569	1628	1719	1824	1896	1941	2032	2395		Slight shearing of fibers; split at end; specimen
	644	993	1143	1297	1361	1442	1529	1574	1642	1733	2155	2518	120 millimeters long. Slight shearing of fibers
9	953	1084	1202	1252	1347	1393	1447	1524	1574	1619	2019	2232	do
1	043	1220	1361	1438	1479	1547	1642	1674	1733	1814	2168	2449	do
- 4	499	907	1016	1075	1166	1234	1306	1347	1393	1452	1774	2005	do
-	953	1016	1080	1094	1184	1216	1257	1306	1352	1624	1833		do
	885	1315	1424	1488	1569	1651	1719	1814	1923	1951	2395	2685	Sheared fibers
1	202	1851	1987	2123	2218	2286	2350	2482	2504	2590	3029	3379	do
1	134	1497	1560	1619	1674	1760	1801	1846	1892	1928	2214	2322	do
1	030	1207	1270	1388	1447	1547	1569	1624	1674	1715	2032	2232	do
1	635	880	943	1016	1080	1120	1170	1220	1266	1302	1570	1778	do
3	993	1107	1170	1266	1311	1384	1438	1488	7 1533	1579	1905	2177	Slight shearing of fibers
9	671	1229	1379	1479	1565	1615	1724	1787	1833	1865	2132		Slight shearing of fibers; split at end
To the	771	1252	1397	1565	1597	1674	1729	1801	1855	1928	2313	2654	Sheared fibers
19	862	1021	1384	1615	1678	1719	1810	1960	2019	2078	2481		Slight shearing of fibers; split at end
1	021	1687	1982	2168	2359	2486	2567	2685	2731	2858	3311		. Sheared fibers; split at end; indented section covers 6 millimeters knot.
1	066	1529	1633	1706	1769	1851	1937	1996	2069	2118	2541		. Slight shearing of fibers; split at end
					12022222		******		******	******	******		***************************************
1	1406	1851	2064	2168	2241	2291	2391	2454	2518	2595	2971	3311	Sheared fibers
	948	1134	1202	1257	1279	1311	1352	1888	1393	1397	1610	1746	
	658	735	789	758	771	807	839	848	862	898	1025	1111	
	821	1397	1565 1261	1637	1710	1756 1411	1824 1470	1905 1524	1982 1569	1991	2268 1860	2586 2019	
	640	885	934	980	1030	1075	1120	1161	1170	1211	1474	1656	
	658	844	880	903	957	998	1034	1080	1129	1170	1402	1533	
- 1	885	1084	1184	1288	1384	1438	1511	1547	1633	1669	1960		. Sheared fibers; split at end; specimen 120 millime-
. 34	817	1089	1125	1179	1238	1288	1348	1384	1393	1415	1651	1792	ters long. Sheared fibers
	885	1,030	1075	1125	1166	1166	1179	1220	1261	1306	1488	1660	
	889	943	1052	1116	1157	1198	1261	1302	1320	1361	1656	1883	Slight shearing of fibers

	-				1	lin l	
Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
322. Populus augustifolia	552	Colorado	Manitou Springs	Robert Douglas	Sandy loam	4332	Failed at 6 millimeters knot 2 millimeters from middle.
323. Populus trichocarpa Black Cottonwood. Balsam Cottonwood.	1012		Saint John's Barrel Factory, Portland.			5851 6214	Crushed at 38 millimeters from middle. Crushed at 51 millimeters from the crushed at 5
Contonaton	1028	do	Portland Furniture Company.	G. Engelmann and		6192 6713	end. Crushed at 38 millimeters from middle. Crushed at 25 millimeters from middle.
24. Populus monilifera	255				Alluvial	4763	middle. Triple flexure
Oottonwood. Necklace Pop- lar. Carolina Poplar. Big Cottonwood.	304		do	Action and the second second	The second control of the second	4264	Crushed at middle and opened along grain. Crushed at 102 millimeters from
	304		do	A STATE OF THE PARTY OF THE PAR	and have been determined	4541 6260	Crushed at 38 millimeters fro
	309		do			6214	Crushed at middle
	754 754	Floridadodo	Chattahoochee	A. H. Curtiss	Contract of the Contract of th	6192 7326	Crushed at 6 millimeters knot: millimeters from middle. Crushed at 25 millimeters from middle.
25. Populus Fremontii	659	THE PROPERTY OF THE PARTY OF TH	Sacramento valley	THE PERSON NAMED IN COLUMN	do	5987	Crushed at 38 millimeters from middle at 3 millimeters knot.
25. Populus Fremontii, var. Wis-	659				do	5625	Crushed at 38 millimeters fro end. Crushed at 25 millimeters fro
lizeni. Cottonwood. White Cotton- wood.	646	do	do	do	do	5216	middle. Triple flexure; middle bend millimeters eccentric.
	909						Crushed at 89 millimeters fro end. Crushed at 5 millimeters knot
	909					5466	millimeters from end. Crushed at 25 millimeters from end. in vicinity of 5 millimeters kno
CONIFERÆ.	909	do	do	do		5919	Triple flexure
26. Libocedrus decurrens White Cedar. Bastard Cedar. Post Cedar. Incense Cedar.		California	Saw-mill, Straw- berry valley.	G. Engelmann and C. S. Sargent.		5618 6115	Crushed at 25 millimeters from iddle. Crushed at 102 millimeters from the crushed at 102 millimeters f
	662	do	pardino mount-	W. G. Wright		8754	end; split whole length of spe men. Crushed at middle
	662	do ,	ains.	do	Q	5209	Crushed at end; opened alorgrain.
27. Thuya occidentalis	. 379		Monkton		Cold, peaty	200	Crushed at 25 millimeters fro
	379 782	New Brunswick	do	Intercolonial rail-	do	4545 5584	Crushed at 13 and at 57 millin ters from end. Crushed at 25 and at 102 millin
	782	do		way. do		5035	ters from end. Triple flexure
	783 783	đo	Bridgeton	Ed. Sinclair		5398	Crushed at 13 and at 102 millin ters from end. Triple flexure; middle bend
	790	THE STOLE SHOW THE	Amqui			4355	millimeters eccentric. Crushed at 89 millimeters from e and at end.
	790		do			4785 2994	Triple flexure; small knots middle, Crushed at 51 millimeters fro
	792			way.		3221	end. Crushed at 25 millimeters fro
	796 796					4545	Crushed at 32 millimeters fro
	874	Maine	Carrier III	2222200		5103	Triple diagonal flexure Crushed at 89 millimeters fro
	874				D-10	6532	end. Triple flexure
	1099	Wisconsindo	Eau Claire	H. C. Putnamdodo		4423 5806	Split at knot at middle; sid swelled. Crushed at 51 millimeters freend; split along grain.
28. Thuya gigantea	1017	Oregon	Weidler's saw-mill, Portland.	C. S. Sargent.		6895	Crushed at worm-hole 51 millin ters from end; splitalong grai Crushed at 32 millimeters fro
	1021	do	Portland Furniture Company.			6396	middle; sudden fracture. Crushed at 83 milkimeters fro
	1021	do	do	do			***************************************

1												5.08	Remarks.
0.:	25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.51	5.08	
	454	944	71111	1166	1225	1306	1843	1356	1397	1442	1669	1905	Slight shearing of fibers
	749	907	1002	1043	1080	1120	1161	1184	1225	1261	1474		Sheared fibers
	504	712	793	817	889	984	948	993	1030	1039			Slight shearing of fibers; split at end
	930	998	1093	1166	1216	1279	1338	1365	1429	1474			đo
	440	712	789	852	889	939	998	1043	1084	1125	1384		do
		595	653	680	726	766	807	848	852	875	1030	1179	Sheared fibers
1	666	898	939	980	998	1043	1080	1120	1166	1198	1315	1452	do
	408	608	685	726	780	830	875	903	948	984	1179		Slight shearing of fibers; split at end
	1588	2254	2395	2436	2490	2567	2622	2703	2753	2807	3302	11111111111	do
	522	1043	1157	1229	1315	1356	1447	1488	1538	1597	2032		do
	862	1320	1488	1542	1628	1687	1801	1851	1896	1946	2223		Sheared fibers; split at end
	839	1143	1220	1306	1352	1397	1442	1488	1529	1574	1837		
		****	2011	4050	*****	dest		-	where	- Aman	Done	6	
	934	1216	1311	1352	1438	1515	1569	1619	1665	1728	2087	especial.	Sheared fibers; split at end
	703	998	1179	1252	1325	1368	1442	1556	1588	1647	2023	*******	do
2	2064	2971	3143	3216	3307	8375	3420	3479	3529	3574	4037		do
	653	1125	1220	1338	1897	1470	1574	1660	1724	1805	2177	2495	Sheared fibers
1	1120	1311	1411	1438	1533	1637	1719	1756	1801	1869	2177		Slight shearing of fibers; split at end
	658	925	1061	1107	1189	1239	1279	1352	1397	1442	1701	1833	Sheared fibers; split at end
	635	835	880	930	975	1016	1071	1120	1166	1211	1433	1610	do
	817	1052	1116	1179	1243	1288	1338	1397	1447	1488	1760		do
1	1071	1179	1216	1270	1315	1365	1402	1438	1442	1465	1628	1769	Sheared fibers
1	1007	1202	1284	1447	1470	1492	1538	1574	1583	1597	1787	1896	do
	956	1334	1393	1493	1533	1578	1619	1669	1710	1751	1941	2046	Sheared fibers; split along indented face
1	1071	1805	1828	1864	1928	2000	2087	2182	2250	2400	2622	2000	Sheared fibers; split at end
	522	703	744	785	812	835	875	894	903	984	1034	1134	Sheared fibers
	508	703	717	721	730	739	753	762	798	807	934	998	do
	821	1012	1098	1116	1161	1175	1202	1225	1361	1270	1429	1542	do
	490	857	898	934	939	948	966	979	989	1007	1116	1229	Sheared fibers; split along indented face
	621	880	948	1007	1030	1034	1066	1075	1089	1112	1243	1288	Sheared fibers
	494	821	975	1034	1071	1080	1102	1116	1120	1134	1216	1243	Sheared fibers; indented face covers 3 millimeters knot.
	631	989	1016	1030	1057	1075	1107	1116	1129	1161	1811	1488	Sheared fibers
	680	839	934	957	989	1016	1030	1043	1075	1098	1215	1325	do
	549	721	767	789	812	852	875	884	894	912	1043	1075	do
	404	599	626	635	649	662	676	680	604	708	794	839	do
	671	866	907	962	1002	1043	1075	1116	1157	1170	1397		do
	703	871	898	939	984	1025	1039	1057	1075	1102	1261	1325	do
	594	789	807	868	893	907	930	939	957	980	*******		Sheared fibers; split at end
	717	953	993	1025	1039	1048	1057	1075	1089	1116	1216	1293	Sheared fibers
	572	944	1034	1075	1084	1125	1161	1193	1220	1270	1497	1610	do
	658	889	953	1016	1057	1107	1152	1207	1252	1266	1447	1542	do
	712	803	875	916	984	1034	1071	1093	1116	1161			Slight shearing of fibers; split at end
1	1680	1089	1117	1315	1415	1501	1497	1778	1406	1383	1746	1769	Sheared fibers
	567	685	753	803	844	857	898	912	939	966	1116		Sheared fibers; split at end

FOREST TREES OF NORTH AMERICA.

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
29. Chamæeyparis sphæroidea White Cedar.	350 350		Cottage Hill			4400 4105	Crushed at 25 millimeters from end.
	850 850		Beverly			4060 3756	Crushed at 78 millimeters from end at 3 millimeters knot. Crushed at middle in vicinity of
	851 851		do			4014 4581	3 millimeters knots. Crushed at end; opened grain Crushed at 3 millimeters knot 51
	852 852	do	do	do	do	4173	millimeters from end. Crushed at 32 millimeters from end; opened between rings. Crushed at 25 and at 127 millimeters.
30. Chamæcyparis Nutkaensis Yellow Oppress. Sitka Oy-	969	Alaska	Sitka	Paul Schultze		5897	ters from end. Triple diagonal dexure parallel to rings.
press.	969 983		Saw-mill, Victoria.			7031 8210	Crushed at 38 millimeters from end. Crushed at 64 millimeters from
	983 994	Alaska	Peril strait	do		7779 7711	end. Triple flexure; middle bend 38 millimeters eccentric. Crushed at 25 millimeters from
	994 1000	do		G. Engelmann and		7439 7217	end. Crushed at 13 millimeters knot 38 millimeters from middle. Crushed at 31 millimeters from end.
331. Chamæcyparis Lawsoniana	1000	do	Dean & Co.'s saw-	do		6967	Crushed at 25 and at 102 millime- ters from end.
Port Orford Cedar. Oregon Cedar. White Cedar. Law- son's Cypress. Ginger Pinc.	701 707 707	du	mill, Marshfield.	do		7235 7462 7666	Crushed at 25 and at 51 millime ters from end; split along grain Crushed at end and at 102 millime ters from end. Crushed at 51 millimeters from
32. Cupressus macrocarpa	10.700	California	Monterey	do	Gravelly loam		end.
33. Cupressus Goveniana	675		Marin county		Dry ridges		Triple flexure
	691 1100	do	do	- SHOWER SERVICE STREET	do	7349 5253	Crushed st middle, end shattered
	1100	do	Carrie Carrie Carrie	do	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	4672	split along grain. Split along grain; shattered
38. Juniperus occidentalis Juniper.	624 624	do		C S Sargent		10000000	
338. Juniperus occidentalis, var. conjugens. Juniper.	939	Texas do	Austin do	C. Mohrdo	Limestone	9049	Shattered stick at 127 millimeters from end and at end.
	1102 1102	do	do	S. B. Buckley		9662 6804	Triple diagonal flexure perpen dicular to rings. Split obliquely; cross-grained an
39. Juniperus Virginiana	327	do			Calcareous	7172	knots. Crushed at 102 millimeters from end and split along grain.
	734	Florida	Chattahoochee	Contract to the second	do	7439 7915	Triple flexure; middle bend 33 millimeters eccentric. Crushed at 25 and at 127 millime ters from end.
	734 800	do	Saint John's river	do	Sandy loam	7249 7031	Crushed at 3 millimeters knot 2 millimeters from end. Crushed at 10 millimeters knot 1:
	800 837	do	do	A CALLEST TO SECURIOR STATE OF		5715 5126	millimeters from end. Opened grain at 6 millimeters knot near middle. Triple diagonal flexure paralle to rings
	837 1055	do	Topsfield	do	Comment of the contract of the	4944 5851	to rings, do Crushed in vicinity of 13 millime
	1055 1249	Tennessee	do			7076 8256	ters knot at middle. Crushed at middle; deflected Crushed at knot at middle
	1250	do	do	do		5879	Crushed at knot near end

0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.51	5.08	Remarks.
	112		1									
340	581	726	762	803	812	848	857	875	889	1007	1125	Sheared fibers
640	984	1034	1075	1116	1166	1211	1234	1270	1270	1452	1574	do
680	889	939	962	993	1030	1061	1084	1111	1120	1306	1452	do
626	953	1139	1184	1243	1279	1293	1302	1315	1329	1429	1429	do
463	735	862	871	880	894	903	921	944	962	1034	1089	do
522	698	803	821	835	839	844	857	880	889	998	1080	do
644	1025	1193	1315	1365	1415	1474	1506	1565	1610	1805	1973	Slight shearing of fibers
544	975	1125	1311	1356	1411	1483	1551	1579	1642	1928	2132	do
549	885	971	1012	1025	1057	1093	1120	1129	1157	1306	1406	Sheared fibers
522	7.6	993	1048	1080	1120	1166	1175	1216	1234	1406	1520	Slight shearing of fibers
721	1170	1302	1393	1488	1547	1588	1642	1724	1760	2028	1020	Sheared fibers; split at end
930	1592	1787	1842	1860	1919	1960	2009	2032	2087	2313		Slight shearing of fibers; split at end
749	1247	1320	1393	1442	1492	1547	1592	1647	1687	1996	10	dodo
1125	1442	1515	1597	1683	1333	1774	1819	1860	1896	2214	afre.	Slight shearing of fibers; split at end; 3 millimeters
1320	1837	1982	2073	2114	2164	2214	2259	2400	2331	2586	2790	knot. Sheared fibers.
1542	2032	2118	2205	2254	2400	2354	2404	2481	2513	2835	2994	do.
	8394						2.40	5	2010	2000	4003	
860	1429	1520	1529	1579	1579	1651	1687	1728	1746	1928	2155	do
690	953	1080	1120	1170	1211	1229	1275	1306	1329		*******	Split along grain
610	. 989	1116	1161	1202	1207	1266	1311	1325	1361		*******	do
1656	3311	*******	3742	3860	3951	4051	4164	4187	4214	4717	4967	Sheared fibers
1709	3266	3511	3620	3724	3797	3860	3901	4014	4078			Sheared fibers; split at ends
4,110		.0044	5020			0000	A.		2010			Sheared inverse, spire at clude
1406	2540	3016	3311	3425	3515	3647	3729	3783	3842	4241	4527	Slight shearing of fibers; indented section covers two 3 millimeters knots.
1805	2413	2558	2572	2619	2672	2703	2739	2803	2821			Slight shearing of fibers; split at corner
594	1574	2118	2404	2563	2626	2681	2731	2799	2817	3166	3348	Sheared fibers
1728	2427	2558	2622	2771	2853	2944	3012	3094	3134	3606	3901	do
1343	2431	2925	3134	3202	3307	3393	3434	3484	3515	3882		Sheared fibers; split at ends; worm-eaten
1610	2459	2622	2681	2758	2826	2899	2953	3016	3094	3574	4001	do
	22100					-				N SESSE	A	
1778	3593	4291	4653	4817	4944	5103	5158	5221	5294	5987	6305	Sheared fibers
1474	3134	4046	4359	4513	4649	4854	4953	5080	6668		******	Sheared fibers; split at end
1746	3402	4033	4264	4414	4626	4726	4795	4899	4962	5579		Sheared fibers; split at ends
******	,,,,,,,	*******	*******		******		******			***** **		***************************************
1087	2014	2068	2186	2250	2304	2340	2395	2449	2504	2994	3202	Sheared fibers
1207	1932	2132	2182	2214	2236	2250	2304	2341	2350	2586		Sheared fibers; split at end
1587	2381	2699	2844	2890	2935	3030	3066	3094	3139	3438		do
	***** **	*******		*******			*******	**** **				
1384	2091	2291	2341	2363	2454	2486	2549	2590	2608	2989	3221	Sheared fibers
1043	1760	1909	2028	2082	2118	2159	2173	2214	2286	2527	2672	do
839	1438	1583	1705	1733	1765	1778	1796	1810	1824	1951	2074	do
817	1279	1424	1511	1533	1574	1579	1628	1651	1665	1878	1996	do
1061	1928	2245	2 59	2518	2540	2572	2617	2649	2681	3030		Sheared fibers; split at end
		+++++	V+++ -						******			
1588	2790	3066	3188	3334	3443	3565	3588	3674	3720	4264		Slight shearing of fibers; split at end
1202	2404	2694	2840	2985	3039	3153				- Charles		Sheared fibers

			9			om-	
	4		RIF OTHER			Lougitudinal com- pression: Ultimate strength, in kilos.	to the same of the
Species.	mpe	State.	Locality.	Collector.	Soil.	inal in d	Remarks.
	nu e		L SHE MEN	PER 1 1 1 1 1 1	THE THE	itud ission ngtl	a money self-the late.
	Office number.					Long pres stre	
340. Taxodium distichum	535	Alabama	Stockton	C. Mohr	Alluvial	8029	Crushed at 64 millimeters from
Bald Cypress. Black Cy- press. Red Cypress. White	535	do	do	do	do	7031	end. Crushed at 51 millimeters from
Cypress. Deciduous Cy-	542	do	Mobile	do		6759	end. Crushed at 38 millimeters from
	542	do	do	do		6759	middle. Crushed at 25 millimeters from
	741	Florida	Chattahoochee	A. H. Curtiss		6328	end. do
	741	do	do	do		5697	Crushed at end
341. Sequoia gigantea	657	California	Tulare county	G. Engelmann and	Granite	6341	Crushed at middle
Big Tree.	657	de		C. S. Sargent.		6078	do
342. Sequoia sempervirens	673	do	Russian river	C. S. Sargent		6917	Crushed at 25 millimeters from
Redwood.	673	In the second constitution of	do	CARLO CONTRACTOR OF THE PARTY O	PART ALL CONTRACTOR STATE OF THE STATE OF	7391	middle. Crushed at middle
	710	đo				7122	Crushed at 76 millimeters from
	711	do	đo	& Shaw.	Section of the sectio	6523	end. Crushed at middle; shattered
	711	do	do	and the same of the same		7979	Crushed at 64 millimeters from
	712	do	Mendocino county	J. Kentfield & Co.		5262	end; threw off two splinters. Crushed at 51 millimeters from
	712	do	do	do	1.2011	5307	end. Crushed at 38 millimeters fron
	713	do	do	do		7122	middle.
	713	đo	do	do		5942	Crushed at 25 millimeters from middle in vicinity of 2 milli
	714	do	do N	do		7349	meters knots Crushed at middle and at 38 milli
	715	do		do		6305	meters from end; opened grain Crushed at 102 millimeters from
	2075					Janeary I	end; splitfrom end to end; grain
343. Taxus brevifolia	978	Oregon	Portland	G. Engelmann and C. S. Sargent.	Moist, rich	C668	Failed at 19 millimeters knot a middle.
	978	do	do	do	do	8799	Crushed near middle at 3 millime ters knot.
345. Torreya taxifolia	62	Florida	Chattahoochee	C. S. Sargent	Alluvial	7258	Crushed at 6 millimeters kno
Stinking Cedar, Savin.	62		do	ä.	do	2010	51 millimeters from middle opened grain. Crushed at 19 millimeters from
	277		do	ALL DESCRIPTION OF THE PARTY OF		7349	end.
	277	do	do	OSINI	Calcareous	7008	Triple diagonal flexure perpen dicular to rings. Triple diagonal flexure
	211					1000	Triple diagonal nexure
346. Torreya Californica	651	California	Marin county	G. R. Vasey	Stony	5579	Crushed at 64 millimeters from middle at 5 millimeters knot.
ing Cedar.	651	do	do	do	do	5670	Triple flexure
347. Pinus Strobus	1	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	5398	Crushed at 51 millimeters from
White Pine. Weymouth Pine	1			do	THE RESERVE OF THE PARTY OF THE	5239	middle. Crushed at 64 millimeters from
	222	The same of the sa	The second secon	C. G. Pringle	The state of the s	6214	end. Crushed at 76 millimeters from
	777			Intercolonial rail-	- Constitution of the Cons	4427	end. Crushed at 10 millimeters knot
	777	do		way.	**************	4219	38 millimeters from middle Crushed at 10 millimeters know
	788	do	Bridgeton	Ed. Sinclair		6169	51 millimeters from end. Crushed at 51 and at 114 millime
	788	do	do	do		6305	ters from end. Crushed at 102 millimeters from
	789	Province of Quebec	Amqui	A. Grant		5806	end. Crushed at 13 millimeters from
	789	do	do	do		4695	end. Crushed at end
	797	do		Grand Trunk rail-		5842	Crushed at 64 millimeters from
	797	do		way do	***************************************	5625	middle. Crushed at end and at 32 millime
	1044	Massachusetts	Reading	J. Robinson	Drift	5534	ters from middle. Crushed at 45 millimeters from
	1044	do	do	do	do	4967	middle. Crushed at 83 millimeters from end.
348. Pinus monticola	975	British Columbia	Hastings'saw-mill.	G. Engelmann and		6123	Crushed at 76 millimeters from
White Pine.	987	Oregon	Burrard inlet. Cascade mount-	C. S. Sargent.		4981	end. Triple flexure parallel to rings .
	987		ains.	Hart Committee of the C	do	4944	Crushed at 13 millimeters from
940 Dinns Tanahanti	000	G-Ne-	s			20000	end.
349. Pinus Lambertiana	638	California	Saw-mill, Straw- berry valley.	G. Engelmann and C. S. Sargent.		6441	Crushed at three places near ends

THE WOODS OF THE UNITED STATES.

0.35					No. 1 to	*					T In		Remarks.
1440	0.25	0.51	0.76	1.02	1.27	1.59	1.78	2.03	2.28	2.54	4.81	5.08	
285	494	785	866	916	939	1002	1066	1093	1139	1175	1334		Sheared fibers; split at end
100	449	767	839	889	921	944	1007	1034	1052	1080	1247	1338	Slight shearing of fibers
468	885	1424	1597	1678	1742	1787	1824	1864	1905	1941	2205		Slight shearing of fibers; split at end
120	889	1220	1306	1352	1415	1483	1529	1551	1588	1619	1682	2087	Sheared fibers; split at corner
Sign Sign	463	1045	1325	1452	1483	1529	1569	1610	1619	1642	1796	1932	Sheared fibers
Second S	889	1120	1202	1257	1320	1356	1415	1447	1483	1529	1792	1987	do
	839	953	980	1030	1084	1098	1134	1148	1161	1184	1320	1460	do
563 552 921 953 984 1062 1025 1090 1004 1061 1179 Sheared fibers; split at end		953	971	1052	1098	1166	1225	1288	1329	1442	1524	1701	do
1012 1066 1075 1080 1084 1107 1157 1169 1221 1370 1452 Sheared fibers; split along grain.	******			******				******					***************************************
1012 1066 1075 1080 1084 1107 1157 1169 1221 1370 1452 Sheared fibers; split along grain.				********		1000	*******	*******			7.7		21. 3.41. 34. 4
Color Colo									Larrana	100000000000000000000000000000000000000	1000	A Comment	Andrew and the second second
617 780 821 866 898 994 944 962 984 1007 1116 Sheared fibers; aplit along grain		1000000						6.000	- Anna	-	1370	1	Control of the Contro
1048				-		1/200			1930.00		1110	1	X. A. A. A. S. S. S. S. S. S. S. S. S. S. S. S. S.
1975 1306 1111 1116 1189 1325 1393 1442 1470 1501 1633 1799 do		100000000			Towns !	/						19414 (8.12)	
1974 2440 2731 2853 2926 3060		3.000000		000000000		Tour !		- more	D market	THE WAY		Torres .	
1774 2440 2781 2853 2926 3008		10000 CO	3000	900000		- Dalolook			N. Name	20000000	Acres 1	2100	and the same of th
1774 2440 2731 2853 2926 3003	2.90	2009	011	041	3		1010		4	1100			
2223 3652 4037 4150 4296 4360 4436 4518 4581 4631 5103 5489 Sheared fibers 1656 2331 2013 2285 2971 3121 3206 3367 3488 Split at ends 1021 2341 2840 3035 3125 3270 3365 3456 3515 3661 4287 4527 Sheared fibers; split at ends 1257 1923 2118 2209 2254 2313 2345 2363 2386 2440 2713 Sheared fibers; split at end 1043 1529 1633 1683 1742 1796 1851 1896 1941 1964 2245 2413 Sheared fibers 1071 1293 1941 2050 2118 2205 2250 2250 2259 2394 2341 2586 2767 Sheared fibers 1053 1135 1211 1261 1297 1347 1370 1393 1429 1447 1588 1776 do	1774	2440	2731	2853	2926	3003							Split at ends
2359 3665 3878 4024 4150 4255 4386 4473 4613 4726 5421 5851 do		1	2000	18000		The state of the s	4000				AC		
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	590	903	962	980	1002	1048	1071	1075	1093	1116	1243	1361	
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	Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal compression: Ultimate strength, in kilos.	Remarks.
349.	Pinus Lambertiana—cont'd	668			a propose that is a propose to the contract of		5080	Crushed at 38 millimeters from end.
		730	do	Lassen's peak	Company.	***************	4626	Triple flexure
350.	Pinus flexilisWhite Pine.	819				Gravelly		Crushed at 25 millimeters from end.
	M. Marie E. Will.	819	do	do	do	do	10.00	Crushed at 76 millimeters from end.
		913	Nevada	Danville	A. Triple	do	4527	Crushed at 10 millimeters knot 76 millimeters from end.
351.	Pinus albicaulis	992	British Columbia .	valley, Fraser	G. Engelmann and C. S. Sargent.		4740	Triple flexure
		992	do	river. do	do		5851	do
352.	Pinus reflexa	661	Arizona	Santa Ritamount-	G. Engelmann and		8029	Crushed at 38 and at 89 millime-
	White Pine.	661	do		Fr C Common to		7621	ters from end; opened grain. Crushed at 32 millimeters from
	and the second				CHIA			end; split obliquely along grain.
353.	Pinus Parryana	656		San Diego county.	THE RESERVE OF THE PARTY OF THE	British Commencer of the Commencer of th	5262	Crushed at 64 millimeters from end at 16 millimeters knot.
		656	do	do	do		5579	Triple flexure
55.	Pinus edulis	397	Colorado	Canon City	E. Weston	Gravelly	5579	Crushed at end at 5 millimeters knot.
356.	Pinus monophylla	882	Utah	Lewiston	M. E. Jones	Rocky	4037	Split obliquely along grain
	11000. 2100 2 100.	915	Nevada	Danville	A. Triple	Gravelly	4740	Failed at 13 millimeters knots at middle.
357.	Pinus Balfouriana	631 631	California	Scott mountains do	G. Engelmann and C. S. Sargent. do	Rockydo	4763 6033	Failed at 10 millimeters knot 76 millimeters from end. Crushed at 3 millimeters knots
357.	Pinus Balfouriana, var. aristata Foxtail Pine. Hickory Pine.	10000		Forest City	A.F		5489	at middle. Crushed at 32 millimeters from end; cross-grained.
		821		do			5126	Crushed at end
		914	Nevada	Prospect mountain	A. Triple	Rocky	5012	Crushed at middle and at 3 milli- meters knot 25 millimeters from middle.
58.	Pinus resinosa	315	Michigan	Hersey	W. J. Beal		7756	Crushed at 51 millimeters from end.
		315	do	do	The second second	A Section of the second	8301	Crushed at 64 millimeters from end.
		785	New Brunswick	The second second second	Ed. Sinelair	A STATE OF THE PARTY OF THE PAR	7167	Crushed at 10 millimeters known 25 millimeters from end.
		785		do		7	8165	Crushed at end
		1074	Vermont		C. G. Pringle	The second secon	6623	Crushed at 25 and at 114 milli meters from end.
		1075	do	do	do		5942 7349	ters from end.
		1076	do	do			6886	Crushed at 51 millimeters from end. Crushed at 6 millimeters knot at
		F. 65 . 7					0000	middle.
159.	Pinus Torreyana	996		San Diego county.			4400	Crushed at 25 and at 102 milli- meters from end.
		996		do	A COLUMN TO THE REAL PROPERTY.	In reference	4876	Triple flexure; middle bend 51 millimeters eccentric.
		996	do	do	do	do	*****	
60.	Pinus Arizonica	1154	Arizona	Santa Rita mount-	C. G. Pringle	Rocky	7485	Crushed at 25 millimeters from
	20000 2 5000	1154	do	do	do	do	7849	Crushed at end
		1155		do			5330	Shattered at end
		1155		do			6350	Crushed at 51 millimeters from end.
		1156		do			0800	Crushed at 25 millimeters known at ond.
		1156	do	do	do	do	4914	do
61.	Pinus ponderosa	619	Dakota	Deadwood	Robert Douglas	Gravelly	7915	Crushed at 51 millimeters from
	A CHOW I WAS DURE I WE.	626	Oregon	Saw-mill, Ashland	G. Engelmann and C. S. Sargent.		7530	end. Crushed at 76 millimeters from
		630	California	Strawberry valley	do	Low, wet, swampy	3620	end. Triple flexure perpendicular to rings; knots.
		630	do	do			3765	do
		632	do	Saw-mill, Straw- berry valley.	do		8256	Triple flexure
		636	do	do			5942	Crushed at 51 millimeters from end.
		689	de	Saw-mill, San Ber- nardino.	W. G. Wright		7756	do

0.235 C.041 O.76		10.1				1	122	Contract Con		ag tang	1 2 24 2 2 2	phia	2151	Remarks.
Color	(0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	
1902 1905		1116	1311	1338	1406	1438	1483	1497	1524	1547	1579	1837	1982	Sheared fibers.
Corp. 1270 1406		658	871	944	962	984	1021	1061	1084	1120	1139	1261	1334	do
Corp. 1270 1406		676	1302	1525	1619	1637	1696	1728	1760	1774	1796	1973	2032	do
		1000000		1406			1574		1642	1687	1724	1941	2078	do
1986 1323 1466		1093	1669	1824	1955	2014	2119	2173	2227	2400	2341	2667	2858	
1710		866	1325	1406	1474	1501	1542	1583	1624	1665	1687	1932	2096	
1710 1905 1973 2002 2973 2123 2150		1066	1642	1796	1892	1932	2023	2073	2114	2159	2209	2495	2735	do
1184 1860 1862 2002 2003 2118 2122 2266 2273 2275 2376 2788 Sheared fibers				-										
2023 2076 3157 3243 3411 3520 3611 3670 3738 3833 4400 4654 Slight shearing of fibers 1407 2286 2608 2735 2840 2909 2909 2908 3085 2116 3266 3856 4264 Sheared fibers 1908 1908 2908 2735 2840 2908		TWING CO.	1000000	Manager 1	NAME OF TAXABLE PARTY.	120,500	1000000			12111111	nome.			knot,
1407 2386 2008 2735 2840 2926 2996 3085 3216 3366 3856 4294 Sheared fibers; split at end		1134	*1860	1932	2005	2053	2118	2182	2209	2223	2273	2576	2758	Sheared libers
1905 2700 3000 3216 3388 3498 3674 3856 3992 4146 5013 Sheared fibers; split at end		2023	2676	3157	3243	3411	3520	3611	3679	3738	3833	4400	4854	Slight shearing of fibers
1792 2123 2345 2481 2540 2664 2717 2753 2821 2894		1497	2386	2608	2735	2840	2926	2998	3085	3216	3266	3856	4264	Sheared fibers
Sign Sign		1905	2790	3030	3216	3388	3493	3674	3856	3992	4146	5013		Sheared fibers; split at end
Second S		1792	2123	2345	2481	2540	2654	2717	2753	2891	2894		21234221	de
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1116		1211	1011	1600	1020	1901	2028	2000	2081	2136	2100	2002	2010	
1997 2000 2105 2209 2208 2309 2431 2527 2622 2681 2948 3470 do		1442	2136	2286	2391	2477	2576	2645	2703	2771	2799	3311	3515	
1034 1157 1220 1288 1338 1379 1415 1442 1470 1678 Slight shearing of fibers; split at end		1116	1506	1569	1619	1674	1705	1751	1801		1842	2168	2381	do
862 1170 1275 1325 1365 1424 1488 1547 1574 1619 1860		1397	2000	2105	2209	2268	2359	2431	2527	2622	2681	2948	3470	do
744 1116 1433 1433 1479 1407 1551 1584 1624 1665 1901 2023 Sheared fibers do		671	1034	1157	1220	1288	1238	1379	1415	1442	1470	1678		Slight shearing of fibers; split at end
898 1466 1583 1647 1706 1724 1765 1787 1801 1837 2002 2168 do. do. <td></td> <td>862</td> <td>1170</td> <td>1275</td> <td>1325</td> <td>1365</td> <td>1424</td> <td>1483</td> <td>1547</td> <td>1574</td> <td>1619</td> <td>1860</td> <td>,4</td> <td> do.,</td>		862	1170	1275	1325	1365	1424	1483	1547	1574	1619	1860	,4	do.,
594 936 1025 1080 1134 1166 1207 1234 1270 1311 1497		744	1116	1343	1433	1479	1497	1551	1584	1624	1665	1901	2023	Sheared fibers
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598 1698 1765 1833 1851 1883 1932 1946 1969 1982 2214 2381 do								200.00				-	-	
1134 1343 1456 1533 1601 1669 1733 1787 1851 1901 2177 Slight shearing of fibers; split at end					32300	20000	100			100	1 1000		1	
					100000	Tayout 1		1000	12420	122		1 5 6		
1021 1179 1189 1275 1325 1343 1365 1411 1483 1529 1760 1796 Sheared fibers	13)		ATTENNA.	THE STATE OF		No. of Concession, Name of Street, or other Persons, Name of Street, or ot		1000	PER PAR	Page 1	10000	250	******	The state of the s

=							100	- A
	Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
361.	Pinus ponderosa—continued	718		Saw-mill, Missoula		A STATE OF THE PARTY OF THE PAR	6463	Crushed at end
		718 731		Lassen's peak	A CONTRACTOR OF THE PARTY OF TH	Total State of the	6477 7349	Crushed at 51 millimeters from end; 13 millimeters knotatend. Crushed at middle
		907		Cañon City	Company.	The contract of the last of the		Triple diagonal flexure; knot near middle.
		910	do	do	do		4173	Triple diagonal flexure; 6 mill meters knot at middle bend.
362.	Pinus Jeffreyi	633 633	California	Scott mountains	G. Engelmann and C. S. Sargent.	Dry, gravellydo	5443 6577	Crushed at middle at 6 million ters knot. Triple diagonal flexure paralle
		667	do	Saw-mill, San Ber-	W. G. Wright		6759	to rings; middle bend 6 mill meters eccentric. Oblique split 178 millimeters long
		667		nardino.			7938	separating stick. Crushed at 51 millimeters from end.
363.	Pinus Chihuahuana	664	Arizona	Santa Rita mount-	G. Engelmann and	Dry, gravelly	5035	Triple diagonal flexure
		664	do	ains.	do	do	5761	Shattered end; crushed at 102 mil limeters from end.
364.	Pinus contorta	997		Vancouver's island	The state of the state of the		7802 9934	Crushed at 102 millimeters from end.
nor	Di- M	1000						Crushed at 51 millimeters from end.
200.	Pinus Murrayana Tamarack. Black Pine. Lodge-pole Pine. Spruce	293 293		Forest City		- The state of the	4626	Crushed at 38 millimeters from end. Crushed at 10 millimeters kno
	Pine.	563		do			6214	19 millimeters from end. Crushed at 89 millimeters from end.
		625		Scott mountains	C & Sargont		5648 6115	Crushed at 10 millimeters kno 102 millimeters from end. Crushed at 5 millimeters knot a middle.
366.	Pinus Sabiniana	644 644	do	Contra Costa county, do	G. R. Vasey	Gravellydo	5262 5511	Triple fiexure; middle bend 2 millimeters eccentric. Failed at 13 millimeters knot a middle.
367.	Pinus Coulteri			San Bernardino			4808	Crushed at 16 millimeters kno 38 millimeters from middle.
.3		1157	do	do	do	do	6940	Crushed at 76 millimeters from end.
368.	Pinus insignis	20149-000	do	Monterey			6827 6532	Crushed at 38 millimeters from end at 5 millimeters knot. Crushed at 51 to 71 millimeter from end.
369.	Pinus tuberculata	576 576	do	Mount Shasta	G. Engelmann and C. S. Sargent.	Gravellydo	4672 3742	Crushed at 102 millimeters from end. Crushed at knots at middle an
370.	Pinus Tæda	82	Florida	Duval county	A. H. Curtiss	Moist, sandy	9154	near end. Crushed at 76 millimeters from
	Loblolly Pine. Old-field Pine. Resemary Pine.	82		do	The second secon		9185	end. Crushed at 51 millimeters fron end.
		355 355		Cottage Hill	The second secon	NAME OF TAXABLE PARTY OF TAXABLE PARTY.	4445	Triple flexuredo
		388		Wilmington	The World September 1 (1997)		7194	Crushed at 76 millimeters from
		388		do			8437	end. Crushed at 38 millimeters from end in vicinity of knots.
		389		do			5398 5783	Crushed at middle in vicinity of 5 millimeters knot. Crushed at middle in vicinity of
371.	Pinus rigida	13	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	6123	knot. Crushed at 102 millimeters from
	Pitch Pine.	13		do			7076	end. Triple flexure parallel to rings
		1046		North Reading			4808	Crushed at 64 millimeters from end.
370	Pinus serotina						4740	Triple flexure
J 1 2.	Pond Pine.	83		Duval county			7938 8219	Triple flexure perpendicular to rings. Triple flexure parallel to rings.
8 73.	Pinus inops	621	South Carolina	Aiken	H. W. Ravenel	Dry, sandy	5080	Triple flexure, contained 7 knot
		622 1169		New Albany			6577	3 to 6 millimeters in diameter. Crushed in vicinity of 3 millimeters knot 51 millimeters from end
		100000		do			5829 5480	Crushed at end at 13 millimeters knot. Crushed at 13 millimeters knot 70 millimeters from end.

1022 88 68 68 126 77 24 102 88 66 66 126 126 88 66 66 126 126 88 66 66 66 66 66 66 66 66 66 66 66 66	11 1166 17 1225 12 1769 15 1538 15 1492 11 1879 19 1769 10 1293 11 1293 11 2177 15 1787 19 96	0.76 1211 1302 1905 1769 1728 2023 1882 1379 1483 1769 2676 1905 2341	1.02 1261 1325 1982 1819 1833 2173 1946 1479 1569 1937 2858	1.27 1297 1365 2023 1860 1901 2259 1969 1547 1624 2000	1.52 1311 1402 2068 1928 1987 2309 2014 1606 1665 2105	1.78 1347 1452 2114 2000 2028 2345 2064 1651 1715	2.03 1361 1479 2155 2096 2091 2368 2082 1687 1755	2.28 1397 1542 2186 2123 2141 2418 2118	2.54 1438 1579 2218 2182 2182 2431 2150 1773	1678 1769 2540 2495 2136 2699	1878 1928 2685 2694 2849	Remarks. Sheared fibers
80 120 88 68 120 157 77 24 102 156 120	17 1225 12 1769 15 1538 15 1492 11 1879 19 1769 1315 11 1293 11 2177 15 1787 12 1996	1302 1905 1769 1728 2023 1882 1379 1483 1769 2676	1325 1982 1819 1833 2173 1946 1479 1569	1365 2023 1860 1901 2259 1969 1547 1624	1402 2068 1928 1987 2309 2014 1606 1665	1452 2114 2000 2028 2345 2064 1651	1479 2155 2096 2091 2368 2082 1687	1542 2186 2123 2141 2418 2118	1579 2218 2182 2182 2182 2431 2150	1769 2540 2495 2136	1928 2685 2694	dododododododododododododododododododo
120 88 68 120 157 80 77 24 102 156 120	12 1769 15 1538 15 1492 11 1879 19 1769 12 1315 11 1293 19 953 11 2177 15 1787 12 1996	1905 1769 1728 2023 1882 1379 1483 1769 2676	1982 1819 1833 2173 1946 1479 1569	2023 1860 1901 2259 1969 1547 1624 2000	2068 1928 1987 2309 2014 1606 1665	2114 2000 2028 2345 2064 1651	2155 2096 2091 2368 2082 1687	2186 2123 2141 2418 2118 1751	2218 2182 2182 2182 2431 2150	2540 2495 2136	2685 2694	dodododododo
88 68 126 1577 86 777 24 102 156 126 88	15 1538 15 1492 11 1879 19 1769 12 1315 11 1293 19 953 11 2177 15 1787 12 1996	1769 1728 2023 1882 1379 1483 1769 2676	1819 1833 2173 1946 1479 1569	1860 1901 2259 1969 1547 1624 2000	1928 1987 2309 2014 1606 1665	2000 2028 2345 2064 1651	2096 2091 2368 2082 1687	2123 2141 2418 2118 1751	2182 2182 2431 2150	2495 2136	2694	dodo
68 126 157 86 77 24 102 156 120	15 1492 11 1879 19 1769 12 1315 11 1293 19 953 11 2177 15 1787 12 1996	1728 2023 1882 1379 1483 1769 2676	1833 2173 1946 1479 1569 1937	1901 2259 1969 1547 1624 2000	2309 2014 1606 1665	2028 2345 2064 1651	2091 2368 2082 1687	2141 2418 2118 1751	2182 2431 2150	2136		Sheared fibers; split at end
126 157 86 77 24 102 156 120	11 1879 1769 1769 12 1315 1 1293 19 953 11 2177 15 1787 12 1996	2023 1882 1379 1483 1769 2676	2173 1946 1479 1569 1937	2259 1969 1547 1624 2000	2309 2014 1606 1665	2345 2064 1651	2368 2082 1687	2418 2118 1751	2431 2150		2849	Sheared fibers; split at end
157 86 77 24 103 156 120	9 1769 1315 1 1293 9 953 11 2177 15 1787 12 1996	1882 1379 1483 1769 2676	1946 1479 1569 1937	1969 1547 1624 2000	2014 1606 1665	2064 1651	2082 1687	2118 1751	2150	2699		
24 102 156 120	1315 11 1293 19 953 11 2177 15 1787 12 1996	1379 1483 1769 2676	1479 1569 1937	1547 1624 2000	1606 1665	1651	1687	1751				An
77 24 102 156 120	1 1293 9 953 1 2177 15 1787 12 1996	1483 1769 2676 1905	1569 1937	1624 2000	1665		10.000		1779			
77 24 102 156 120	1 1293 9 953 1 2177 15 1787 12 1996	1483 1769 2676 1905	1569 1937	1624 2000	1665		10.000			2064	2223	do
102 156 120 88	2177 25 1787 22 1996	2676 1905			2105			1796	1842	2087	2277	Sheared fibers
102 156 120 88	2177 25 1787 22 1996	2676 1905				2168	2223	2286	2354	2812		Sheared fibers; split at ends
120	2 1996	-		2939	3012	3071	3116	3175	3293	3765		Slight shearing of fibers; split at ends
120	2 1996	-	2000	2078	2164	2250	2309	2372	2440			Slight shearing of fibers; split at end
88		arO'T.	2586	2685	2830	2894	2994	3075	3166			Sheared fibers; split at end
	1071	1000	1000	1020	2070	2000	1000	11109	1011			
	7 1961	1202 1143	1229 1170	1252	1270	1279 1243	1288 1252	1293 1275	1311	1497	1669 1579	Sheared fibersdo
127		1501	1588	1665	1715	1774	1846	1910	1964	2223	2404	do
89	1000	1438	1492	1529	1565	1579	1601	1647	1665	1814		Sheared fibers; split at end
80	CT 111000	1152	1193	1252	1302	1329	1374	1406	1433	1610	1787	Sheared fibers
120	2 1778	1910	1982	2041	2087	2168	2200	2259	2313	2667	2849	do
147	E 100	2214	2332	2363	2413	2499	2545	2599	2654	3107		Slight shearing of fibers; split at end
108	9 1225	1352	1397	1470	1533	1574	1615	1651	1687	2023	2214	Sheared fibers
75	101	1374	1424	1479	1547	1574	1619	1669	1715	1973	2186	do
0.1	7 7.000	1500	1001	1000	1	0	*****	1.1510	1770	1000	0000	
95		1569 1619	1624	1665 1710	1701	1715	1737	1746 1833	1760	1969	2068	Sheared fibers; split at end
90	1400	- 100-100		100000			1		TYD		, (m)	
59	9 1093	1306	1379	1424	1456	1489	1524	1538	1569	1769	1905	Sheared fibers
76	7 1166	1261	1297	1320	1347	1379	1397	1429	1470		1746	do
	1179	1347	1393	1456	1520	1574	1637	1656	1669	******		Split at ends; fibers did not shear
120	7 1982	2218	2372	2436	2518	2563	2635	2672	2713	2994		Sheared fibers; split at ends
115	7 1447	1529	1592	1656	1706	1737	1796	1819	1855			Split at end; fibers did not shear
124	3 1764	1919	2050	2118	2223	2263	2322	2368	2418	2758	2953	Indented without shearing of fibers
88	0 1093	1161	1216	1275	1347	1442	1497	1547	1597	1905		Sheared fibers; split at ends
86	2 1120	1193	1275	1325	1406	1456	1547	1597	1637	1996		Split at end; fibers did not shear
124	7 1433	1497	1560	1633	1674	1701	1733	1774	1796	2019	2182	Sheared fibers
92	5 1520	1678	1801	1855	1901	1928	1973	2005	2037	2223	2336	do
182	8 2223	2295	2341	2449	2531	2595	2658	2740	2844	3289	3520	do
154	2 2518	2844	3089	3207	3302	3357	3488	3579	3692	4219	4491	do
98	9 1270	1343	1374	1393	1402	1433	1452	1492	1520	1678	1796	do
70	3 1179	1270	1424	1442	1483	1501	1529	1551	1565	1787	1883	do
265	4 3479	3751	3901	4019	4150	4250	4359	4409	4522	5216	5851	do
265	8 4255	4854	5239	5461	5679	5729	5625	5534	5552	5761		Sheared fibers; split along grain
152	2132	2318	2305	. 2477	2558	2608	2658	2703	2749	3030	3202	Sheared fibers
104	3 1678	2023	2127	2186	2241	2277	2309	2341	2368	2613		Sheared fibers; split at end
121	1 1796	2032	2096	2164	2195	2236	2250	2268	2286	2572	2635	Sheared fibers

FOREST TREES OF NORTH AMERICA.

						1.0	
Species.	Office number.	State.	Locality,	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
373. Pinus inops—continued	1172		Mount Holly		Clay	6033	Crushed at middle on one face
374. Pinus clausa	279	Florida	Apalachicola		Dry, sandy barrens	5579	Triple diagonal flexure
Sand Pine. Scrub Pine. Spruce Pine.	279		do			6341	knots at middle. Crushed at knots at middle
375. Pinus pungens	321		Wytheville			5987 5353	Triple flexure perpendicular to rings. Crushed at 89 millimeters from end; split at end.
376. Pinus muricata Obispo Pine. Bishop's Pine.	671 671		Marin county			8663 7621	Crushed at 114 millimeters from end at 3 millimeters knot. Crushed at 102 millimeters from
377. Pinus mitis	278		Chattahoochee		THE RESERVE TO SERVE THE PARTY OF THE PARTY	4763	end do
Pine. Spruce Pine. Bull Pine.	319		Amite	VIC		7983 10138	Crushed at small 2 millimeters kwots 25 millimeters from mid- dle, Crushed at 6 millimeters knot 25
278. Pinus glabra	142		Bonneau's Depot				millimeters from middle. Triple flexure
White Pine.	142 544	Mississippi	Gainesville	C. Mohr	Low, sandy	5398 3130	Crushed at 51 millimeters from end. Crushed at 76 millimeters from end at 16 millimeters knot.
	764	Florida	Chattahoochee	A. H. Curtiss	Low, wet	2903 5353	Triple flexure parallel to rings
379. Pinus Banksiana	764 394		Baldwin			5375 5194	Crushed 32 millimeters from mid- dle in vicinity of knot. Crushed at end at 13 millimeters
Gray Pine. Scrub Pine. Prince's Pine.	394 780	New Brunswick	do	Intercolonial rail-		4944 5080	knot. Triple flexure; opened grain Crushed at 6 millimeters knot 76
	780 879					7756 8188	millimeters from end. Crushed and opened between rings at end. Crushed at 89 millimeters from
	879		T PR	OSIN	0.7//	6813	end. Crushed at 3 millimeters knot a middle.
380. Pinus palustris Long-leaved Pine. Southern Pine. Georgia Pine. Yel- low Pine. Hard Pine.	81	do	Duvel county	do	do	10977	Split obliquely; stick broke in two pieces. Crushed at 13 to 76 millimeters from end.
	85 85	do	do	do	do	9321	Triple flexure parallel to rings. Crushed at 15 millimeters from end.
	243		John's river.	THE RESERVE TO SERVE		10160	Crushed at 19 millimeters from end. Crushed at middle
	302	do		do	do	7847 8165	Crushed at 51 millimeters from end.
	357 357	Alabamado	do	do	Sandy loamdodo	10047	Crushed at 38 millimeters from end. Crushed at 38 millimeters from middle.
	358 358		do	do	Department of the second of the second of the second of	11839	Crushed at end
	359	do	Chunchula	do	do	10931	Crushed and splintered at end
	360	do	do	do	do	1068	Crushed at 32 millimeters from end. Crushed at 64 millimeters from middle.
	361	do	do	do	do	10660	Crushed at 38 millimeters from end. Crushed at 76 millimeters from end.
	384	Floridado	Keys do	A. H. Curtissdodo		9775	Crushed at 76 millimeters from end and shattered. Crushed at 51 millimeters from end.
	385		do			. 8663 . 9017	Crushed at 89 millimeters from end. Crushed at 89 millimeters from end.

				*									Remarks.
	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	9.54	4.81	5.08	Avullat a.s.
9	1247	2404	2812	3075	3248	3343	3411	3456					Split at end
	1384	2082	2254	2304	2400	2440	2513	2572	2604	2640	2994	3198	Sheared fibers
1	1243	1941	2100	2218	2400	2377	2436	2477	2536	2576	2880		Sheared fibers; split at encs
	1134	1429	1656	1715	1801	1814	1846	1860	1869	1923	2132	2359	Sheared fibers
l	*050	1007	1000	1910	2053	2032	2118	0101	2250	2331	2767		Shooned Ohene well along mate
ı	1252 953	1687 1452	1833 1615	1705	1951	1756	1787	2191	1824	1910	2291	2495	Sheared fibers; split along grain
	000	1100	1010	1100	1700	2100	4407	11001	1043	3510	2001	2300	bacarou nocis
	1429	1901	2050	2136	2232	2286	2345	2386	2431	2490	2767		Sheared fibers; split at end
l	862	1325	1515	1601	1669	1756	1787	1842	1901	1946	2304		do
ŀ	1080	1429	1551	1624	1706	1756	1810	1887	1951	2009	2341		Slight shearing of fibers; split at end
ı	1393	2177	2481	2613	2676	2762	2781	2790	2785	2790	3139		Sheared fibers
١	1157	1538	1624	1724	1810	1864	1928	1987	2037	2096	T V		Slight shearing of fibers; split at end.
			228131		SIV.	1			A				
	1043	1769	1941	2028	2096	2154	2209	2250	2295	2345	2699	2917	Sheared fibers
	1030	1470 1198	1506	1565 1335	1606 1415	1619	1647	1665	1687	1701	1860	1951	do
	690	1148	1284	1338	1393	1442	1479	1506 1470	1533 1483	1565 1515	1746 1633	1879 1851	do
	1043	1515	1592	1660	1728	1760	1810	1851	1901	1941	2186	2336	do
	1370	1674	1787	1864	1928	1982	2005	2014	2068	2096	2404	2785	do
	707	1247	1393	1470	1529	1569	1615	1660	1683	1715	1996	2141	do
	544 1134	1452	1633	1778 1583	1851	1978 1710	2019 1778	2064	2091 1882	2146 1923	2454 2336	2653 2585	do
	807	1315	1520	1628	1687	1719	1760	1814	1842	1855	2032	2080	Sheared fibers; 3 millimeters knot in indented section. Sheared fibers; split at end
	857	1306	1406	1415	1424	1438	1524	1597	1628	1669	1769	1951	Sheared fibers
	1071	1293	1361	1443	1529	1574	1642	1687	1765	1792	2064		Sheared fibers; split at end
	1500	0000	0400	0000	5,004	0700	0007	nan	17 B	ROS	IM	200	2//
	1769	2268 1860	2499 1996	2622	2681 2168	2799	2885	2948	3021	3062 2486	3221	3866	Sheared fibers.
	1442	1624	1728	1778	1873	1941	1991	2050	2440	2460			Slight shearing of fibers; split at end
	998	1615	1778	1860	1919	1987	2046	2150	2236	2286	2699		Sheared fibers; split at end
	1588	1960	2064	2109	2191	2273	2322	2363	2409	2440	*******		Slight shearing of fibers; split at end
	1951	2803	3012	2994	2812	2880	3075	3193	3257	3302	3946		Sheared fibers; split at end
	1479	1882	1882	1905	2023	2259	2522	2622	2703	2903			Sheared fibers; opened seasoning cracks
	1125	1452	1515	1637	1710	1792	1864	2431	2486	2581	2971		Slight shearing of fibers; split at end
	1134	1442	1569	1746	1796	1892	1973	2041	2114	2168			do
	1760	2395	2558	2622	2635	2649	2676	2903	3025	3134			Sheared fibers; split at end
	1406	1683	1833	1941	2037	2127	2182	2254	2295	2350	****		Split at end; fibers did not shear
	1860	2767	2971	3039	3139	3289	3388	3484	3529	3633		******	Slight shearing of fibers; split at end
	1951	2296 3202	2495 3447	2640 3484	2808 3502	2890 3543	3071	3198 9758	3270	9908			Split at end; fibers did not shear
	1551	1837	2037	2214	2422	2540	2676	3756 2758	3842 2885	3896 2998			Split at end; slight shearing of fibers
	2041	2921	2971	2812	3153	2817	2994	3193	3316	3452			Sheared fibers; split at end.
	1883	3048	3438	3661	8751	3887	3878	3933	4014	4101	4808	5216	Sheared fibers
	1610	1960	1996	2136	22*0	2341	2422	2486	2581	2654			Slight shearing of fibers; split at end
	1406	1542	1706	1778	1914	2000	2082	2132	2177	2263			
	1452	2540	2885	3026	3116	3166	3216	3298	3357	3411			Sheared fibers; split at end
	1270	1905	2078	2218	2295	2359	2436	2522					

		3.0				in the se	
	4	1000				Jongthudinal compression: Ultimate strength, in kilos.	
Species.	number.	State.	Locality.	Collector.	Soil.	E : 4	Remarks.
	mu :					itud ssion ngel	
	Office					pres pres stre	
20 Disservation of		North Carolina	Wilmington	E. Kidder		10206	Crushed at middle and at 25 milli
80. Pinus palustris—continued	390		do			9957	meters from middle. Crushed at 51 millimeters from
	000						end.
81. Pinus Cubensis	84		**************************************		Moist, sandy		Crushed at 51 millimeters from end and at end.
Bastard Pine. Meadow Pine.	84				do	10000	Triple flexure
	356		A STATE OF THE STA		do		Crushed at 32 and at 102 millime ters from end.
	356 493				Coral		Crushed at 76 millimeters from end. Split obliquely along grain; sea
	493				do		soning cracks. Crushed at 25 millimeters from
	400					ELEUU	middle.
82. Picea nigra	231	A commenced accounts		The state of the s	Cold, peacy		Crushed at 3 millimeters knot 70 millimeters from end.
	231	DESCRIPTION DESCRIPTION OF THE PERSON.	do			6668	Crushed at 3 millimeters knots a middle and at end.
	373		Huntington		And the second second	6242	Crushed at 83 millimeters from end.
	776	New Brunswickdodo	Bay of Fundy	way.		6305	Crushed at 6 millimeters knot 5 millimeters from middle.
	776		Danville			5851	Crushed at middle at 6 millime ters knot. Triple flexure; middle bend 2:
	794	do	Sharen and the same of the same	WAY.		6373	millimeters eccentric. Crushed at 25 millimeters from
	880		Bridgeton			6464	end. Crushed at 13 millimeters from
	880		do	The state of the s		6260	middle. Crushed at middle on one face
	2000					100111	
33. Picea alba	513	A PROPERTY	Stratford		- 2	4672	Crushed at 5 millimeters knot 5 millimeters from end.
	513				do		Crushed at 13 millimeters kno at middle.
	620			A STATE OF THE STA	do		Crushed at 51 millimeters from middle.
	620				do		Crushed at 3 millimeters knot 5 from end.
	773	New Brunswick	do	way.		5715 4518	Crushed at 16 millimeters kno 25 millimeters from middle. Crushed at 16 millimeters kno
	784		Bridgeton	The state of the s		5987	102 millimeters from end. Crushed at 45 millimeters from
	784	and the first of the forest	do			5978	middle. Crushed at 51 millimeters from
	791	THE PERSON NAMED IN COLUMN TWO IS NOT THE	Amqui /	The state of the s		5670	end. Crushed at 76 millimeters from
	791	do		Ođo	A HOUSE OF THE PARTY OF THE PAR	6260	end. Crushed at 64 millimeters from
W 70 70 70 71			ATRI	# 7 T.T \ Y			end.
84. Picea Engelmanni	292	4			Damp		Triple flexure parallel to rings Crushed at 10 millimeters kno
	292 575	do	do		do		. 89 millimeters from end.
	822	do			do	5262 3901	Triple flexure Crushed at 102 millimeters from
	022					5001	end; cross-grained
85. Picea pungens		do	March March Control	do	CONTRACTOR CONTRACTOR	4046	Crushed at 102 millimeters from end at 10 millimeters knot.
	200.000	do		,do	- ALE CANADA CAMADA CAM	3792	Crushed at 16 millimeters known 76 millimeters from end.
	2702	do	do	do	do	4545	Crushed at 38 millimeters from end and at middle at 3 millime
86. Picea Sitchensis	970	Alaska	Sitka	Paul Schultze		6568	ters knots. Triple flexure parallel to rings
Tide-land Spruce.	970	do	do	do		6146	Triple flexure perpendicular t
	977	British Columbia .	Saw-mill, Burrard	G. Engelmann and C. S. Sargent.		5715	rings. Crushed at 64 millimeters from end.
	977	do	. do	do		5579	Crushed at 76 millimeters from end.
	1015	Oregon	Weidler's saw-mill, Portland	do		6486	Crushed at middle; angle of crushing, 85°.
	1019	do	Saw-mill, Astoria.	The second second second		5216	Crushed at 76 millimeters from end; angle of crushing, 85°.
	1019	do	CONTRACTOR OF THE PARTY OF THE	do	CHARLES AND EAST STATE	5625	Crushed at 76 millimeters from
1 10 10 10 10 10 10 10 10 10 10 10 10 10	1026	do	Company.	do	Contraction of the Contraction of the	5017	Crushed at 13 and at 102 millime ters from end.
	1026	do		do		4527	Triple flexure
87. Lsuga Canadensis	5	Massachusetts	Arnold Arboretum	C. S. Sargent	Drift	5987	Triple flexure parallel to rings
Hemlock.	5	do	do	do	do	5706	Crushed at 51 millimeters from
es l	219	Vermont	Charlotte	C. G. Pringle	Gravelly	7702	end. Triple flexure

Ī													Remarks.	
	0.25	0.51	0.76	1.02	1.97	1.52	1.78	2.03	2.28	2.54	4.51	5.08	Remarks.	
ľ	1015	1474	1637	1814	1887	1973	2155	2223	2277	2350	******	*****	Slight shearing of fibers; split at ends	
	1542	1941	1987	2141	2313	2431	2563	2654	2785	2944		*****	Sheared fibers; split at ends	
	1111	1406	1515	1560	1592	1687	1710	1737	1796	1824			Slight shearing of fibers; split at ends	
	1293	1769	1846	1892	1932	1982	2078	2159	2277	2331	2785		do	
	1229	1452	1588	1706	1796	1951	2041	2123	2236	2304	1000000		do	
	2313	3393	3783	3983	4073	4237	4264	4309	4418	4527			Sheared fibers; split at ends	
	2880	3892	4400	4786	5080	5252	5579	5761	5851	6214			Sheared fibers; split at end; indented section covers	-
	1837	2722	3130	3298	3438	3456	3710	3801	3887	3901	4146	4246	10 millimeters knot. Sheared fibers	
				4000	A STATE		1	lase.		Variable 1	3.			
	826	1261	1406	1442	1429	1520	1569	1606	1628	1660	1851		Sheared fibers; split at ends	
	925	1225	1488	1542	1588	1637	1678	1719	1778	1810	Tuesday	******	Slight shearing of fibers; split at ends	
	590	807	944	989	1066	1120	1166	1202	1234	1257	1452	1619	Shappad Shape	
	644	1089	1225	1261	1279	1302	1325	1347	1370	1397	1560	1724	Sheared Share sult at and	
	749	1089	1238	1302	1352	1379		1438	1479	1511	1742	1506	Sheared fibers; split at end	1
	725	962	1030	1071	1102	1125	1170	1211	1225	1247	1429	100/00	Sheared fibers	
	671	1007	1061	1071	1098	1129	1161	1202	1220	1243 1252	1388	1506	do	1
	635	962 939	1034	1093	1116	1143	1166	1207	1925	1275	1370 1488	1579	Control of the American Control of Control o	-
	000	200	1004	1090	112.7	1101	1193	1201	1238	1210	1400	1079	do	
	776	1061	1152	1179	1202	1225	1261	1293	1315	1334	1588		do	
	735	1120	1257	1325	1388	1420	1438	1456	1506	1542	1678	1824	Slight shearing of fibers	1
	726	1139	1311	1397	1447	1488	1524	1542	1565	1579	1724		Sheared fibers; 3 millimeters knot covered by indented section.	ı
	676	1084	1229	1343	1393	1438	1488	1533	1574	1637	1937	3132	Sheared fibers	1
	563	798	880	907	957	1012	1043	1080	1116	1152	1325		Slight shearing of fibers; split at end	-
	631	939	1061	1093	1125	1143	1175	1220	1266	1302	1438	1569	Sheared fibers	1
	662	817	894	989	1007	1030	1080	1098	1111	1134	1379		Sheared fibers; split at end	1
	644	916	962	966	993	1039	1061	1071	1098	1125	1261	1379	Sheared fibers	
	817	966	1021	1071	1125	1170	1220	1270	1320	1347	1533		Sheared fibers; split at end	
	640	984	1043	1071	1139	1184	1229	1261	1302	1325	1492	1637	Sheared fibers	1
	567	1080	1170	1234	1275	1325	1361	1393	1415	1447	1579	1733	do	
	953	1379	1515	1597	1665	1710	1751	1765	1778	1814		1100	Sheared fibers; 10 millimeters knot covered by in-	1
	572	835	844	857	862	866	898	944	948	953	1043	1139	dented section. Sheared fibers	
	590	903	984	1025	1066	1098	1120	1152	1175	1207	1320		Sheared fibers; split at end	
					2000				4					
	907	1279	1402	1461	1524	1565	1619	1656	1669	1683	1882	2009		1
	640	912	948	962	984	1016	1034	1052	1066	1098	1275	1370	do	1
	1016	1148	1234	1257	1293	1334	1379	1397	1443	1470	1637	1778	do	
	889	1184	1302	1415	1479	1529	1606	1660	1728	1760	2087		Sheared fibers; split at end	
	717	1325	1574	1628	1706	1765	1829	1892	1969	2068	2395	1000	Sheared fibers	1
	626	749	807	871	944	966	998	1098	1161	1252			Slight shearing of fibers; split at end	ı
	758	1143	1257	1320	1347	1388	1406	1424	1433	1456	1715		Sheared fibers	
	458	626	690	749	789	830	866	903	939	966			Split at end; fibers did not shear	ı
	721	794	848	898	957	1021	1048	1120	1139	1161	1433	(2000000)	Slight shearing of fibers; split at end	1
	726	907	925	934	971	1016	1048	1080	1116	1161	1352	· Processing	Sheared fibers; split at end	
	866	1043	1120	1170	1198	1220	1279	1325	1356	1415	1633		Sheared fibers	
	631	907	980	1025	1052	1071	1111	1125	1152	1166	1302	TO STATE OF	do	I
		2000	-4/00/04/1	- CHARA		1,100.00	The second second	71 10 2 55	-	Donas	10.015	1 2000		-
	871	1007	1084	1198	1275	1297	1306	1352					Slight shearing of fibers; split at end	П
	771	817	848	894	921	1002	1107	1170	1216	1257	1542	1732	Sheared fibers	1

		er.					d cons- Ultimate in kilos.	
	Species.	Office number	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
_ 987. ·	Tsuga Canadensis—continued.	219		PRODUCTION OF THE PROPERTY OF	C. G. Pringle	The second second second second	7892	Crushed at 51 millimeters from middle.
		772	New Brunswick		Intercolonial rail- way.	***************************************	4649	Crushed at middle at 3 millimeters knot.
		772			waydo			Triple flexure perpendicular to rings.
				CANADA CA	do	The second secon		Crushed at 45 millimeters from middle.
				TOTAL THE LEGISLES ASSESSED.	do			Triple flexure; middle bend 51 millimeters eccentric.
				Annual Section Section (Section Section do			Crushed and shattered at end in vicinity of knots.	
		MAIGO		Description of the second second	do			Crushed at middle at 10 millime- ters knot.
				The state of the s	Ed. Sinclair			Crushed at 76 millimeters from end; epened grain from end to end.
				the state of the state of	do	Harrison Harrison - Book Harrison Contract - Co.		Triple flexure perpendicular to
		793	Province of Quebec	Danville	Grand Trunk rail- way.		7403	Crushed at 6 millimeters knot 64 millimeters from end.
		Acres 1	do		way do			Crushed at 13 to 25 millimeters from end.
		817	West Virginia	The state of the s	C. G. Pringle		6323	Crushed at 19 millimeters from middle.
		3.00(0),741			do	mande promon	6101	Crushed at 32 millimeters from middle.
		1040	Massachusetts	The state of the s	J. Robinson	and the second second	6827	Crushed at 76 millimeters from end.
		1040			do		5516	Triple flexure
		1042	do	The state of the s	do	and the state of t	6486	Crushed at 76 millimeters from end.
		1042	do	do	do		5126	Crushed at 51 millimeters from middle.
_388.	Tsuga Caroliniana	623	North Carolina	Hendersonville	A. h tiss	Dry, rocky	6450	Crushed at 5 millimeters knot near middle.
389.	Tsuga Mertensiana	971 995	Washington territory.	Wilkeson	G. Engelmann and C. S. Sargent.	Rich loam	9185 7621	Crushed at 76 millimeters from end. Crushed at 6 millimeters knot 45
		995	do		do		9435	millimeters from end. Crushed at 51 millimeters from
390.	Tsuga Pattoniana,	980	British Columbia .	Silver peak, near	G. Engelmann and	Gravelly loam	5806	middle, Triple flexure; middle bend 36
		980	do	Fraser river.	C. S. Sargent.		6341	millimeters eccentric at 3 milli- meters knot. Crushed at 3 millimeters knot at
201	Pseudotsuga Donglasii	2712		Alpine		Moist	6613	middle. Triple flexure
	Red Fir. Yellow Fir. Ore- gon Pine. Douglas Fir.	627		Saw-mill, Straw-		<u> </u>	9117	Crushed at 51 millimeters from
	you I me. Dougue I'm.	627	do	herry valley	C. S. Sargent.		9390	middle. Crushed at end and at 102 milli-
		702			do		5489	meters from end. Triple flexure perpendicular to
		704	do	field.			9026	rings. Crushed at 51 millimeters from
		705	do	E. B. Dean's saw-	đo		8709	end. Triple flexure
		706		mill, Marshfield.			20550	Crushed at 89 millimeters from
		708			do		9979	end. Crushed at 45 millimeters from
		708			do		11022	end. Crushed at 25 millimeters from
		709			do		7303	end at 3 millimeters knot. Crushed at 76 millimeters from
		709		do			7212	end. Crushed at 76 millimeters from
		720		Saw-mill, Missoula			7249	middle, Crushed at 51 millimeters from
		720		do			8936	end; shattered end. Triple flexure; middle bend 38
		732	California	Account the second	Sierra Lumber		8029	millimeters eccentric. Crushed at 19 millimeters from
		732	do	do	Company.		7802	end. Crushed at end
		881	Utah	WALLS IN	M. E. Jones	Rocky	6895	Crushed at 3 millimeters knots 38
		881	do	do	do	do	6305	millimeters from end. Crushed at 13 millimeters knot at
		973	British Columbia.	Saw-mill, Burrard	C. S. Sargent		7235	middle. Crushed at middle
		973	do	inlet.	do		7779	Crushed at 38 millimeters from
		974	do	do	do		8600	end. Crushed at 51 millimeters from
		974	do	do	do		9026	end.
		986	do	Saw-mill, Victoria.	G. Engelmann and		7576	Triple flexure
		989	Oregon	Saw-mill, Portland	C. S. Sargent.		7689	Crushed at group of knots 25 millimeters from middle.
		1008	British Columbia .	Saw-mill, Burrard	do		7756	Crushed and shattered at end

0.25	0.51	0.76	1.02	1.27	1.59	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.		
667	852	******	894	975	1002	1066	1116	1152	1179	1220	1429	Slight shearing of fibers; split at end		
885	998	1120	1320	1397	1415	1438	1460	1511	1628	1760		Sheared fibers; split at end		
767	1166	1257	1315	1433	1492	1551	1637	1710	1778	2078		Sheared fibers; split at end		
1139	1343	1474	1538	1628	1724	1778	1851	1910	1969	2404	2722	Sheared fibers; split from end to end		
993	1198	1288	1352	1442	1547	1615	1687	1737	2096	2313				
730	944	1021	1075	1107	1157	1170	1211	1234	1252	1361	1497	heared fibers		
794	1311	1415	1411	1415	1447	1479	1538	1628	1674	1837	1996	do		
925	1474	1461	1461	1465	1583	1637	1705	1751	1760	1996	2141	do		
499	857	984	998	1048	1089	1143	1170					Split at end		
1338	1833	2041	2218	2241	2245	2245	2250	2254	2241	2282		Slight shearing of fibers; split at end		
1111	1452	1551	1669	1733	1792	1833	1828			2202	C. I CHARLE	do		
544	708	780	803	844	857	871	907	921	939	1034		Sheared fibers; split from end to end		
522	703	785	826	852	871	898	948	989	1002	1120	1184	Sheared fibers		
579	1034	1129	1193	1247	1288	1325	1365	1402	1456	1710		Slight shearing of fibers; split at end		
1338	1860	1837	1937	2068	2141	2259	2309	2354	2381	2676	40000	Sheared fibers; split at ends		
476	857	1093	1225	1306	1852	1397	1415	1415	1420	1520	1687	Sheared fibers		
658	771	817	871	894	939	989	1021	1034	1071			Slight shearing of fibers; split at ends		
1184	1189	1842	1928	1996	2032	2078	2091	2123	2141	2336	2495	Slight shearing of fibers; split at end		
563	848	971	1048	1093	1139	1170	1220	1261	1302	1529		Slight shearing of fibers; split at ends.		
912	1179	1315	1397	1461	1533	1597	1656	1733	1760	2223		do		
1406	2032	2132	2223	2313	2395	2495	2558	2640	2681	3053		Sheared fibers; split at ends		
862	1315	1438	1501	1551	1592	1647	1687	1737	1769	2019		Sheared fibers		
1089	1438	1533	1665	1778	1828	1910	1960	1996	2068	2381	2227	//2//		
1406	1951	2118	2277	2345	2436	2467	2531	2576	2599	2899	2595	do		
866	1170	1279	1311	1325	1361	1406	1447	1479	R 1501	1 What	227	Sheared fibers; split at end		
739	1089	1166	1221	1284	1320	1356	1406	1434	1461	1665		Slight shearing of fibers; split at end		
1306	2141	2440	2576	2667	2758	2799	2890	2930	1401	1000	i into	Shiple begins of the said to ship		
1338	2096	2209	2322	2391	2472	2245	2590	2645	2731		Total Control	Slight shearing of fibers; split at end; 10 millime- knet on indented section.		
1161	1533	1656	1710	1742	1778	1833	1896	1932	1987	2223	nozo	Slight shearing of fibers; split at end		
866	1120	1189	1257	1293	1352	1374	1411	1465	1501	1742	2359	Sheared fibers; split at end		
1769	2291	2522	2676	2817	2971	3094	3257	3411	3557	100000000	*******	do		
1134	2078	2308	2409	2499	2595	MALS II E	2740	2821	2917	4105				
1080	1207	1247	1297	1352	1370	2672 1384	1406	0.000000		1794	1000	Channel Share		
1229	1179	1089	1297	1429	1529	1642	137,230	1483	1511	1724	1833	Sheared fibers		
1035	1198	1238	-1306	1370	1411		1706	1765	1824	1951	2023	do		
971	1438	1513		0.0000000000000000000000000000000000000		1447	1497	1538	1574	1814	2005	do		
862	1107	1220	1506 1266	1515	1547 1361	1628 1433	1674 1483	1719	1774		******	Olean about a fillion with a first		
1533	2200	2295	2313	2245	2109	2132	2246	1506 2359	1556	*******	******	Slight shearing of fibers; split at end		
1833	1941	2482	2545	2595	2635	2713	2758	2821	2436 2912	9988	9501	Sheared fibers; split at end		
1315	1932	2118	2254	2300	2035			2021	2912	3266	3561	Stight changing of them, until at and		
862	957	993	916	1012	1016	2409 1084	1101	3330	2240	1400	+==0	Slight shearing of fibers; split at end		
1098	1814	1982	1941	1800	1778	1569	1161	1116	1143	1460	1579	Sheared fibers		
885	1216	1225	1202	1209	1338	1411	1565	1637	1733	2495	2722	do		
767	1089	1152	1202	1259	1338		1461	1524	1374	1824	2007	Sheared fibers; split at end		
780	862	953	1002	1048	1080	1343	1365	1402	1433	1588	1687	do		
100	002	1/4/13	1002	1090	1080	1120	1139	1170	1193	1311	10000000	do		

FOREST TREES OF NORTH AMERICA.

	er.		Tradle			of com-	
Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal pression: Uli strength, in l	Remarks.
391. Pseudotsuga Douglasii—cont'd	1008	British Columbia . Oregon	Saw-mill, Burrard inlet. Oregon Railway and Navigation	G. Engelmann and C. S. Sargent.		8981 8799	Crushed at 38 millimeters from middle. Crushed at 3 millimeters knot a middle.
	1011	do	Company.	do		6804	Crushed at 16 millimeta a knot 7
	70,100,000		Weidler's saw-mill, Portland.		The state of the s	8981	millimeters from ena. Crushed at 89 mi imeters from end.
	COLDENS -		do			9798 10002	Crushed at 5 millimeters from middle. Crushed at 51 millimeters from
	THE OWNER OF		do		CONTRACTOR OF THE PROPERTY.	9662	end. Crushed at 38 millimeters from
	1020		Portland Furniture			7892	end.
			Company.			7666	Triple flexure
	1022		do			8346 8392	Crushed at 51 millimeters from
	1022		00	40		6002	Crushed at 51 millimeters from middle.
 Pseudotsuga Douglasii, var. macrocarpa. Hemlock. 	642 642	Californiado	Saw-mill, San Bernardino.	W. G. Wright		6872 7938	Split obliquely; pieces flew from machine. Crushed at 103 millimeters from end; opened grain.
392. Abies Fraseri	523 523	North Carolina			Peaty loam	5674 5239	Crushed at 6 millimeters knot 3 millimeters from end. Crushed at 10 millimeters knot 2
							millimeters from middle.
393. Abies balsamea	377	Vermont			Peaty	1751101	Crushed at 25 millimeters from middle.
94. Abies subalpina Balsam.	449 4491	Colorado	Forest City	AL SAFE	Moist, sandy loam	Model	Crushed at middle at 25 millim ters knot.
	4401					4400	Crushed at 6 millimeters knot millimeters from middle; spl along grain.
	4491	as provided the provided by			do	3856 5661	Crushed at 10 millimeters knot middle; split along grain. Crushed at 38 millimeters from
	820	The Control of the Co	do			5398	end. Crushed at middle
	820	do	do	do	do	4808	Crushed and shattered at end
95. Abies grandis	1010		Portlanddo	C S Sargent	Rich, alluvial	6033 6477	Crushed at 25 millimeters fro middle. Crushed at 19 millimeters fro
000 Ali	500					2000	middle.
396. A bies concolor	529 529	do			Rocky		Crushed 51 millimeters from en (at end bearing transverse test split along rings. Split at 10 millimeters knots 25 mi
	639	California	Strawberry valley	G. Engelmann and C. S. Sargent.	Alluvial	6350	limeters from middle. Triple flexure
Talk to the same of the same o	639		do	do		5670	Triple flexure perpendicular i
	733		Lassen's peak	Company.	***************************************	8618 7507	Crushed at middle
		FORMULA INVOLVE			2.77		end.
398. Abies amabilis	1004	British Columbia	Fraser river.	C. S. Sargent.	Rich, sandy loamdodo	7838 7122	Crushed at 25 millimeters from midtae. Crushed at middle
999. Abies nobilis	965		Cascade mount- ains.			7235	Crushed at 51 millimeters fro end. Crushed at 25 millimeters fro
EL VESSO NE	965	do			8- 20 C	7276	middle.
100. Abies magnifica	647 647		The state of the s	C. S. Sargent.	Gravelly loamdodo	7258 6668	Crushed at 51 millimeters fro end. Triple flexure; middle bend millimeters eccentric.
01. Larix Americana Larch. Black Larch. Tama-	2261				Cold, swampy	SECONDARIO.	Crushed at 25 millimeters fro middle.
rack Hackmatack.	2261		do		do	10387 6849	Triple flexure; middle bend millimeters eccentric. Crushed at 6 millimeters knot
	2263				do	8165	middle; split from end to end. Crushed at middle; split
	774	New Brunswick do	Bay of Fundy	way.		7892 9095	Crushed at 13 millimeters knot a millimeters from end; opene between rings. Crushed at 64 millimeters from

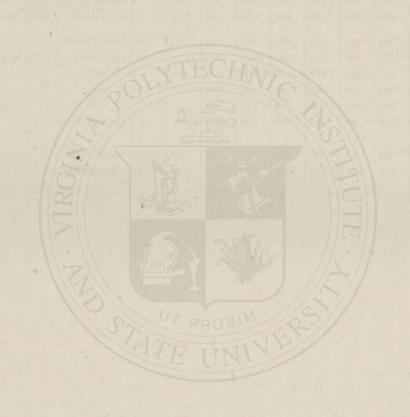
		5 0.51 0.76 1.02 1.27 1.52 1.										P	
0	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.28	2.54	4.81	5.08	Remarks.
	1315	2087	2254	2241	1996	1978	1960	2073	2227	1987	2676	2903	Sheared fibers
	771	1306	1433	1479	1520	1556	1588	1606	1633	1660	1452	1565	do
	925	1166	1216	1275	1334	1388	1429	1447	1488	1524	1724	******	Sheared fibers; split at end
	885	1107	1157	1202	1257	1302	1352	1393	1429	1438	1642		Fibers did not shear; split at end
	817	998	1048	1075	1125	1184	1234	1284	1343	1388			Slight shearing of fibers; split at end
	1043	1211	1297	1343	1393	1456	1537	1615	1669	1737	2078		do
	889	1129	1189	1229	1284	1329	1384	1447	1483	1506			do
	730	780	807	839	944	1002	1039	1071	1102	1134	1361		do
	671	862	953	930	1002	1111	1157	1198	1211	1252	1429	1624	Sheared fibers
	817	848	885	907	962	993	1030	1080	1107	1143	1306	++++++	Slight shearing of fibers; split at end
	1179	1452	1497	1406	1293	1315	1470	1651	1751	1805	1987	2313	Sheared fibers
	1080	1551	1633	1610	1615	1692	1778	1846	1910	1960	2177	2409	do
	1157	1520	1583	1624	1669	1728	1746	1760	1824	1842	2082	2186	do
	540	830	984	1061	1093	1125	1157	1170	1193	1202	1379	1442	do
	499	835	939	975	1002	1039	1080	1116	1129	1166	1306	1379	do
	644	866	993	1107	1202	1257	1306	1365	1397	1447			Slight shearing of fibers; split at end; 4 millimeters
	700	990	000			5//							knot in indented section.
	780	880	993	1048	1093	1125	1184	1211	1238	1266	1442	1588	Sheared fibers
	726	1016	1080	1111	1139	1175	1211	1247	1261	1284	1474	1597	do
	794	925	930	944	980	1007	1039	1061	1116	1116	1270	1374	do
	594	821	894	939	975	1012	1034	1052	1080	1102	1270		Sheared fibers; split at end
	590	817	866	889	894			.47.43	******				Split at end
	563	826	957	989	1007	1030	1039	1052	1039	1057	1170	1225	Sheared fibers; split at ends
	631	817	839	839	857	912	962	1012	1066	1098	1225	1379	do
	499	617	669	712	762	803	817	844	866	885	\.\\\	~0	Slight shearing of fibers; split at end
	769	1002	1093	1125	1143	1166	1170	1179	1193	1202	. 1302		Sheared fibers; split at end
	522	776	894	971	1002	1025	1052	1084	1098	1116	1225		do
	- 749	1134	1189	1198	1216	1247	1279	1320	1338	1361	1610	1769	Sheared fibers
	852	1116	1207	1270	1320	1347	1402	1438	1465	1511	1746	1905	do
	1134	1243	1338	1438	1533	1592	1692	1769	1824	1869	,		Fibers did not shear; split at end
	1134	1179	1229	1270	1275	1325	1470	1533	1592	1624	1860		Sheared fibers; split at end
	594	844	880	939	998	1080	1116	1157	1216	1257	1429		do
	680	862	930	1002	1061	1098	1129	1166	1193	1234	1452	TO STORY OF THE PARTY	do
	1050	4000			120/50			2222	1000	2010	100000	222	
	1356	1565	1701	1842	1941	2105	2218	2263	2345	2413	2858	3221	Slight shearing of fibers; split at end
	1104	1610	1696	1778	1892	1969	2050	2123	2173	2214	2586		Sheared fibers; split at end
	844	1016	1093	1148	1175	1207	1252	1275	1311	1325	1474	1651	Sheared fibers
	1021	1583	1760	1860	1914	1982	2059	2073	2118	2141	2404	2586	do
	1270	1769	2087	2241	2391	2472	2549	2581	2640	2717	2948	3130	Slight shearing of fibers; split at ends
	1225	1533	1628	1778	1869	1946	1987	2050	2114	2164	2449		Slight shearing of fibers; split at end; specimen
	1039	1533	1728	1860	1982	2073	2150	2263	2381				120 millimeters long. Fibers did not shear; split at end; specimen 120
	1724	2358	2699	2875	2939	3026	3039	3502	3506	3612			millimeters long. Slight shearill of fibers; shattered stick; speci-
	852	1143	1247	1343	1388	1429	1442	1470	1497	1538	1746		men 120 millimeters long. Slight shearing of fibers; split at end
	794	1134	-1279	1352	1447	1470	1474	1483	1506	1538	1760		do

FOREST TREES OF NORTH AMERICA.

Species.	Office number.	State.	Locality.	Collector.	Soil.	Longitudinal com- pression: Ultimate strength, in kilos.	Remarks.
401. Larix Americana—continued	786 786 795	New Brunswick	do	Ed. Sinclair Grand Trunk railway.	X	8147 8142 9390 7666 9480 8437	Triple flexure
402. Larix occidentalis	840 840 719 719	do	do	S. Watson do	do	6967 7530 9367 10047	Triple flexure parallel to rings; intersecting "Cooper lines". Crushed at 102 millimeters from end on one face. Triple flexure
PALMACEÆ.	1006	Washington territory,dodo	do	do	do	12633	Crushed at 51 millimeters from end at 3 millimeters knot. Crushed at 3 millimeters knot 19 millimeters from end. Crushed at 25 millimeters from middle. Crushed at 96 millimeters from end; opened grain.
405. Washingtonia filifera	1159 1159		The A	W. G. Wright	77.72		Split obliquely; fracture 228 millimeters long. Split obliquely; fracture 305 millimeters long.

mind to momonio	0.25	0.51	0.76	1.02	1.27	1.59	1.75	2.03	2.28	2.54	4.81	5.08	Remarks.	Office number
	993	1125	1220	1311	1388	1461	1538	1601	1674	1774	2313	2586	Slight shearing of fibers	7.
	1270	1765	1905	2041	2159	2254	2345	2422	2504	2572	3198		Slight shearing of fibers; split at end	7
四	862	934	1025	1075	1125	1189	1229	1261	1302	1325			do	7
	703	1202	1270	1325	1347	1433	1533	1624	1692	1778	2087	2313	do	7
	730	1111	1189	1288	1329	1388	1429	1442	1461	1501			do	7
	1002	1315	1429	1506	1551	1656	1769	1860	1905	1941			do	
	1315	1733	1842	1987	2082	2168	2227	2313	2422	2472	3085		Sheared fibers; split at end; indented section covers 6 millimeters knot.	
	1179	1769	1892	1946	2028	2168	2259	2390	2490	2536	3030		Slight shearing of fibers; split at end	
	953	1574	1774	1860	1928	2000	2019	2050	2118	2186	2541	2713	Sheared fibers	
	1211	1452	1579	1696	1796	1860	1946	1987	2082	2118	2449		Slight shearing of fibers; split at end	
	1315	1451	1547	1619	1710	1792	1910	, 1987	2046	2123	2563		do	
	1633	2336	2350	2845	2400	2545	2681	2803	2948	3094		4.60	do	
	1656	2681	3134	3348	3375	3470	3652	3756	3901	4051			do	
7	1406	1669	1905	2046	2159	2300	2391	2500	2549	2672			Fibers did not shear	1
	318	508	576	617	658	680	708	735	758	776	945	1048	Sheared fibers	1
1	812	1207	1325	1397	1442	1497	1551	1610	1628	1656	1932	1996	Slight shearing of fibers	

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PART III.

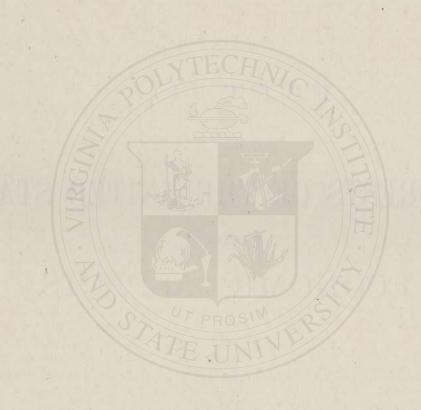
THE FORESTS OF THE UNITED STATES

IN THEIR

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ECONOMIC ASPECTS.

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THE FORESTS OF THE UNITED STATES IN THEIR ECONOMIC ASPECTS.

GENERAL REMARKS.

The maps of relative average forest density joined to this report are intended to illustrate the present productive capacity of the forest covering of the country (map No. 16, portfolio). They are based, except in the case of the extreme western states and territories, upon the returns of enumerators. In states originally wooded all land not accounted for in the returns as cleared or treeless, or otherwise known to be destitute of tree covering, is treated as forest. The county is taken as the unit, and is seldom divided, unless varied topography or different natural features in different parts makes further subdivision desirable. In the western states and territories, where topography determines forest distribution, county lines are disregarded, and the estimates are based upon special reports of census experts, or upon the published reports of the various government surveys, maps, etc. The condition and productive capacity of the forest covering have been carefully investigated at many points in each county or unit region, and the area covered with forest, obtained in the manner described above, is multiplied by the average stand of timber or other useful wood. The results thus obtained are necessarily greatly generalized to conform to the scale of the maps used.

The following statement represents the value of the forest crop of the United States for the census year, so far as it has been possible to obtain it:

Saw logs Wood used for domestic purposes as fuel (estimated) Wood used by railroads as fuel Wood used by steamboats as fuel Wood used as fuel— In the manufacture of brick and tile	306, 950, 040 5, 126, 714 1, 812, 083 3, 978, 331	Charcoal used as fnel— In manufacture of iron. In manufacture of precious metals. In the twenty largest cities. Naval stores. Southern moss. Railroad ties (29,554,694).	\$4,726,114 29,306 521,316 5,000,000 500,000 9,806,247	Wood used in the manufacture of— Handles	
In the manufacture of wool In the manufacture of salt In the production of precious metals In other mining operations	121, 681 2, 874, 593	Fence posts (for fencing railroads) Uncultivated vegetable substances used in the manufacture of medicines Uncultivated nuts	180, 000 587, 000 78, 540 1, 947, 316	Shoe pegs. Hand-made shingles Total	72, 000 47, 952

These returns are incomplete and often unsatisfactory. Many important items are omitted entirely. It was found impossible to obtain statistics of the amount and value of the wood (posts, split rails, etc.) used in fencing, with the exception of posts used by railroads. The amount of material thus consumed annually must be very large, probably exceeding \$100,000,000 in value. No returns of the amount and value of the bark of different trees used in tanning leather have been received, and there are no statistics of the amount and value of the unsawed timber produced—spars, piles, telegraph and other poles, hewed timber, hard wood exported in the log, ships' knees, etc. that is, all timber not manufactured in saw-mills into lumber. The value of the timber of this sort cut in the United States every year must be very large. The returns include the railway ties laid down by completed roads, and do not embrace those used in the construction of some 10,000 miles of new road built during the census year. It was found impossible to obtain even an estimate of the amount and value of the cooperage stock produced outside of regular saw-mills, and the returns of hand-made shingles only include those made from cypress at a few points in the south Atlantic region. Maple sugar to the amount of 36,576,061 pounds and 1,796,048 gallons of molasses were produced in the forests of the United States during the year 1879. No statistics of the value of these products have, however, been received. Statistics of the value of material consumed in the manufacture of excelsior, wood pulp, wheel stock, handles, shoe pegs, baskets, oars, and hoop-poles are incomplete, and do not fully represent the value of the wood used. The statistics of the value of wild nuts and wild vegetable substances collected are very incomplete, and it has been found impossible to separate the value of the imported from that of the native wood used in the manufacture of veneers, an industry consuming a large amount of high-priced hard wood. Could complete returns of the forest crop of the census year have been obtained it is not improbable that it would be found to exceed \$700,000,000 in value.

THE LUMBER INDUSTRY.

The following table represents the volume, by states and territories, of the lumber industry of the United States for the census year, as derived from the returns of the enumerators on the schedule of manufactures, and from the reports of special agents for manufactures in cities having at the time of the Ninth Census 8,000 or more inhabitants. No distinction between the different kinds of wood sawed was attempted in the enumeration:

THE FOREST'S OF THE UNITED STATES.

STATISTICS OF THE LUMBERING INDUSTRY OF THE

		estab-		AVERAGI	NUMBER O	F HANDS EM	PLOYED.	LABOR.	MATER	ALS.
	States and Territories.	Number of e lishments.	Capital.	Maximum at any one time in the year.	Males above 16 years.	Females above 15 years.	Children and youth.	Wages paid during the year.	Value of logs.	Value of mill supplies.
	The United States	25, 708	Dollars. 181, 186, 122		141, 564	425	5, 967	Dollars. 31, 845, 974	Dollars. 139, 836, 869	Dollars. 6, 318, 5
	labamalaska	354	1, 545, 655	2, 798	1, 611		36	424, 156	1, 517, 986	90, 6
	rizona	13	102, 450	126	77		2	33, 375	126, 486	5, 3
111111111111111111111111111111111111111	rkansas	310	1, 067, 840	2, 985	1,690		54	237, 394	1, 009, 954	60, 4
c	alifornia	251	6, 454, 718	4, 945	3, 423		11	1, 095, 786	2, 055, 635	186, 8
C	colorado	96	481, 200	1,605	870		7	112, 931	654, 500	45, 7
C	Connecticut	300	657, 300	1, 262	699		8	178, 336	609, 024	32, 5
10.00	Oakota	39	113, 750	451	286		4	54, 974	269, 235	12, 6
1972	Delaware	86	259, 250	646	378		13	40, 694	229, 763	13, 6
I	District of Columbia	1	25, 000	35	25	***************************************	.,	6, 000	32, 000	2, 0
F	lorida	135	2, 219, 550	3, 240	1, 945		85	562, 249	1, 763, 617	103, 5
G	leorgia	655	3, 101, 452	4, 971	3, 298		94	554, 085	3, 049, 435	147,7
1700	daho	48	192, 460	- 311	160		4	33, 367	213, 691	16, 8
	llinois	640	3, 295, 483	5, 799	3, 652		199	787, 867	2, 959, 537	185,
I	ndiana	2, 022	7, 048, 088	16, 252	9, 926		413	1, 571, 740	9, 290, 428	336,
	ndian territory		/-/	**********						
130	owa	328	4, 946, 390	4, 155	2, 526		463	825, 244	4, 023, 661	118,
	Centucky	146 670	262, 975 2, 290, 558	831	507 2, 506	1	9	66, 757	421, 738	25,
	ouisiana	175	903, 950	5, 140 1, 514	943		94	671, 939 200, 063	2, 238, 888 1, 106, 280	171, 80,
11.44	faine	848	6, 339, 396	9,836	6, 480	*********	183	1, 161, 142	4, 754, 613	197,
	faryland	369	1, 237, 694	1, 769	1, 216		23	223, 786	1, 041, 836	64,
Lam	fassachusetta	606	2, 480, 340	3, 130	1, 940		30	431, 612	1, 827, 497	76,
11725	fichigan	1, 649 234	39, 260, 428 6, 771, 145	30, 886 3, 772	22, 732 2, 732	143 22	1,360	6, 967, 905 924, 478	30, 819, 003 4, 408, 468	1, 432, 120,
N	fississippi	295	922, 595	2, 113	1, 123		47	197, 867	1, 190, 902	28,
	fissouri	881	2, 867, 970	6, 678	3, 408		95	669, 644	3, 113, 049	102,
	Iontana	36	208, 200	374	142			47, 945	257, 320	20,
N	Tebraeka	38	93, 375	295	136		4	29, 313	153, 823	11,
N	Tevada	9	132, 000	66	35			9, 892	151, 790	11,
	Yew Hampshire	680	3, 745, 790	4, 765	3, 056		48	548, 556	2, 159, 461	113,
	lew Jersey	284	1, 657, 395	1, 066	760		8	179, 693	942, 752	47,
	Yew Mexico	26	74, 675	282	172	***********		24, 240	100, 145	16,
	Forth Carolina	2, 822 776	13, 230, 934 1, 743, 217	17, 509 5, 334	11, 056 2, 938		389 91	2, 162, 972 447, 431	8, 628, 874 1, 490, 616	490, 86,
0	hio	2, 352	7, 944, 412	15, 277	8, 769		548	1, 708, 300	8, 603, 127	292,
	regon	228	1, 577, 875	1, 185	566		13	242, 154	1, 294, 703	36,
	ennsylvania	2, 827	21, 418, 588	21, 160	14, 443	8	463	2, 918, 459	13, 378, 589	576,
	thode Tslandouth Carolina	49	144, 250 1, 056, 265	260 2,338	139 1, 431		13	33, 143 221, 963	116, 085 1, 170, 088	4, 67,
77	ennessee	755	2, 004, 503	5 107	9 575		141	540 000	9.006.104	136,
	ennessee	324	1, 660, 952	5, 587 4, 579	3, 577 3, 136	1	49	549, 222 732, 914	2, 006, 124 1, 909, 794	186,
	tah	107	272, 750	845	375		10	65, 175	216, 619	21,
	ermont	688	3, 274, 250	4, 501	2, 411	************	100	426, 958	1, 939, 775	82,
	Tirginia	907	2, 122, 925	5, 812	3, 922		89	540, 231	1, 864, 288	119,
	Vashington	37	2, 456, 450	891	495		4	200, 539	1, 174 005	14,
1	Vest Virginia	472	1, 668, 920	3, 765	2, 057		126	459, 945	1, 307, 843	67,
	Visconsin	704	19, 824, 059	14, 079	7,748	250	467	2, 257, 218	12, 219, 097	252,
M	Tyeming	7	26, 700	68	38		************	6, 380	24, 725	2,

UNITED STATES FOR THE YEAR ENDING MAY 31, 1880.

				PRODUCTS.	BL THE			SMALL
Lumber (board measure).	Laths.	Shingles.	Staves.	Sets of headings.	Spool and bobbin stock (board measure).	Value of all other products.	Total value of all products.	Rank according to value of products.
Feet.	Number.	Number.	Number.	Number.	Feet.	Dollars.	Dollars.	
18, 091, 356, 000	1, 761, 788, 000	5, 555, 046, 000	1, 248, 226, 000	146, 523, 000	34, 076, 000	2, 682, 668	233, 268, 729	
251, 851, 000	14, 147, 000	5, 427, 000	2, 357, 000	437, 000			2, 649, 634	23
10, 715, 000	150,000	1, 760, 000	300,000	***************************************		1,010	215, 918	- 44
172, 503, 000	6, 527, 000	61, 758, 000	1, 640, 000	350,000		**************	1, 793, 848	29
304, 795, 000	2, 420, 000	138, 718, 000	2, 063, 000	1, 203, 000		3, 000	4, 428, 950	18
63, 792, 000	4, 925, 000	27, 214, 000				700	1, 051, 295	34
64, 427, 000	1, 719, 000	7, 192, 000	270,000	12,000	33, 000	12, 930	1, 076, 455	33
29, 286, 000	564, 000	4, 823, 000				500	435, 792	37
31, 572, 000	317, 000	506, 000	4, 510, 000	550, 000			411,060	38
4, 000, 000	1, 000, 000					2, 000	50,000	46
a 247, 627, 000	20, 101, 000	3, 061, 000	791,000	110,000		13, 999	3, 060, 291	21
451, 788, 000	17, 438, 000	25, 332, 000	2, 014, 000	964, 000	4,000	3, 975	4, 875, 310	12
18, 204, 000	750, 000	4, 235, 000				60, 200	349, 635	40
b 334, 244, 000	ъ 25, 977, 000	b 15, 306, 000	24, 443, 000	1, 385, 000	30,000	16, 807	5, 063, 037	11
915, 943, 000	28, 031, 000	26, 634, 900	283, 071, 000	26, 389, 000	1, 957, 000	145, 750	14, 260, 830	5
e 412, 578, 000	c 79, 924, 000	c 128, 100, 000	5, 335, 000	650, 000		38, 343	6, 185, 628	9
45, 281, 000	25, 000	835, 000	5, 835, 000	650, 000	150, 000	3, 400	682, 697	35
305, 684, 000	26, 856, 000	25, 253, 000	23, 148, 000	8, 174, 000	383,000	75, 655	4, 064, 361	14
133, 472, 000	7, 745, 000	30, 195, 000	220, 000	33, 000		15, 470	1, 764, 640	30
566, 656, 000	184, 820, 000	426, 530, 000	62, 376, 000	3, 312, 000	13, 426, 000	182, 618	7, 933, 868	7
123, 336, 000	7, 955, 000	4, 429, 000	16, 227, 000	0, 512, 000	10, 420, 000	149, 894	1, 813, 332	28
d 205, 244, 000	d 16, 947, 000	d 19, 667, 000	21, 062, 000	1,860,000	572,000	44, 395	3, 120, 184	20
4, 172, 572, 000	461, 805, 000	2, 584, 717, 000	199, 821, 000	21, 897, 000	6, 038, 000	531, 406	52, 449, 928	1
563, 974, 000	88, 088, 000	194, 566, 000	7, 825, 000	547, 000		21, 100	7, 366, 038	8
168, 747, 000	7, 908, 000	5 DEE 000	200.000	10	///	= 040	1.000.005	- 07
e 399, 744, 000		5, 855, 000	60, 000 21, 426, 000	9 969 600		5, 349	1, 920, 335 5, 265, 617	27 10
21, 420, 000	e 20, 839, 000 2, 620, 000	e 8, 832, 000 9, 627, 000	21, 420, 000	3, 363, 000		7, 097 1, 900	527, 695	36
18, 585, 000	2, 020, 000	5,021,000	0	a Phasi		1,100	265, 062	41
21, 545, 000		485, 000					243, 200	42
292, 267, 600	40 454 000	67, 086, 000	21 251 000	9 401 000	2 079 000	50 819	3, 842, 012	15
109, 679, 000	49, 454, 000 8, 948, 000	10, 717, 000	31, 354, 000 40, 000	3, 491, 000 155, 000	3, 072, 000 883, 000	58, 612 40, 385	1, 627, 640	15 32
11, 195, 000	107, 000	722, 000	20,000	200,000	550, 550	20,000	173, 930	45
1, 184, 220, 060	79, 399, 000	305, 711, 000	62, 654, 900	22, 136, 000	1,003,000	285, 263	14, 356, 910	4
241, 822, 000	13, 340, 000	8, 707, 000	45, 000	571, 000	1, 253, 000	7, 195	2, 672, 796	22
910, 832, 000	50, 625, 000	24, 876, 000	214, 245, 000	25, 779, 000	25, 000	196, 788	13, 864, 460	6
177, 171, 000	18, 245, 000	5, 040, 000	224 234 400	25,110,000		10, 500	2, 030, 463	26
1, 733, 844, 000	183, 740, 000	288, 561, 000	80, 062, 000	10, 401, 000	326, 000	393, 044	22, 457, 359	2
8, 469, 000	10,000	1, 986, 000	365, 000	************	3, 700, 000	174	240, 579	43
185, 772, 000	23, 133, 000	10, 036, 000	385, 000	93, 000		41, 700	2, 061, 507	25
302, 673, 000	21, 275, 000	14, 205, 000	4, 342, 000	570,000	6, 000	72, 998	3, 744, 905	16
328, 968, 000	14, 131, 000	112, 523, 000	******	140, 000	***************	10, 350	3, 673, 449	17
25, 709, 000	1, 563, 000	9, 293, 000				1, 765	375, 164	39
322, 942, 000	19, 745, 000	55, 711, 000	13, 219, 000	1, 572, 000	415, 000	2, 575	3, 258, 816	19
315, 939, 000	14, 402, 000	8, 223, 000	14, 333, 000	929, 000	800, 000	30, 355	3, 424, 168	18
160, 176, 000	6, 550, 000	3, 610, 000	28, 666, 000				1, 734, 742	31
180, 112, 000	12, 071, 000	3, 695, 000	41, 992, 000	1, 952, 000		40, 195	2, 481, 857	24
1, 542, 021, 000	215, 132, 000	862, 922, 000	8£, 545, 000	7, 498, 000	*************	152, 171	17, 952, 947	3
2, 960, 060	300, 000	865, 000		THE PARTY OF THE P	MINISTER STREET		40, 990	47

Including 77,500,000 feet manufactured from logs cut in A'abama,
 Including 73,700,000 feet lumber, 15,041,000 laths, and 11,226,000 shingles, manufactured from logs cut in Wisconsin,
 Including 334,199,000 feet lumber, 78,728,000 laths, and 127,591,000 shingles, manufactured from logs cut in Wisconsin.
 Including 26,000,000 feet lumber, 11,982,000 laths, and 800,000 shingles, manufactured from logs cut in New Hampshire and Vermont.

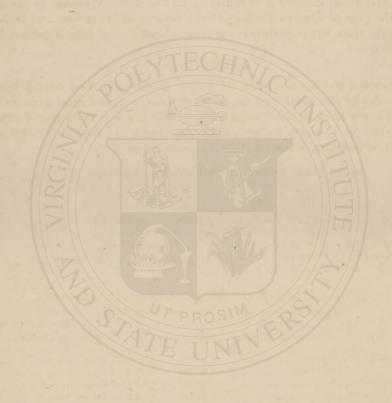
[#] Including 27,000,000 feet lumber, 12,400,000 laths, and 5,500,000 shingles, manufactured from logs cut in Wisconsin.

In the following table the average importance of the saw-mills located in the different states and territories is shown:

AVERAGE SIZE AND PRODUCT OF SAW-MILLS IN EACH STATE AND TERRITORY OF THE UNITED STATES.

	establish-		NUMB HAI EMPL	ND8	MATER	IALS AND	LABOR.			PRODUC	TS.				
States and Territories.	Total number of e	Capital	Maximum at any one time in the year.	Average.	Value of logs.	Value of mill supplies.	Wages paid during the year.	Lumber (board measure).	Laths.	Shingles.	Staves.	Sets of headings.	Spool and bobbin stock.	Value of other prod- ucts,	Total value o all prod- ucts.
The United States	25, 708	Dolls. 7,048	8. 8	5. 8	Dolls. 5, 436	Dolls. 246	Dolls. 1, 235	Feet. 703, 000	No. 68, 000	No. 216, 000	No. 48, 000	No. 5,700	Feet. 1, 300	Dolls.	Dolls. 9, 078
Alabama	354	4, 366	7.9	4. 6	4, 288	256	1, 198	712,000	40,000	15, 000	6, 000	1,000			7, 481
Alaska	*******					******		***********				******		******	
Arizona	13	7, 880	9.7	6.0	9, 729	408	2, 567	824, 000	11,000	136,000	23, 000	++++++		77	16, 609
Arkansas	319	3, 347	9.0	5. 5	3, 166	190	744	541, 000	20,000	194,000	5, 000	1,000		******	5, 623
California	251	25, 716	19.7	13. 7	8, 190	744	4, 365	1, 214, 000	10,000	553, 000	8, 000	5, 000	******	12	17, 64
Colorado	96	5, 013	16.6	9.0	6, 808	476	1, 176	664, 000	51,000	283, 000				7	10, 95
Connecticut	300	2, 119	4.0	2.0	2, 030	108	594	215, 000	6,000	24,000	1,000			43	359
Dakota	39	2, 917	11.6	7.5	6, 903	324	1,410	751, 000	15, 000	124,000				13	11, 174
Delaware	86	3, 015	7.5	4.5	2, 672	158	473	367,000	4,000	6,'000	52, 000	6,000			4,780
District of Columbia	1	25, 000	35. 0	25, 0	32, 000	2,000	6,000	4, 000, 000	1, 000, 000					2,000	50, 000
Florida	205	70 441	//	1/2600	10.004	Man		1 004 000	1	00.000	E 000	7 000		101	00 000
Georgia	135 655	16, 441 4, 735	24. 0	15.0	13, 064	768	4, 165	1, 834, 000	150,000	23, 000	6,000	1,000		104	22, 668
Idaho	48	4, 009	7.5	5.0	4, 655	225 352	845 700	690, 000 380, 000	27, 000 16, 000	39, 000 88, 000	3, 000	1,000	*******	1, 254	9, 340
Illinois	640	5, 149	9.0	6.0	4, 624	290	1, 230	522, 000	40,000	24, 000	38, 000	2,000	10000000	26	7, 911
Indiana	2, 022	3, 485	8.0	5. 0	4, 600	166	777	453, 000	14, 000	13,000	140,000	13,000		72	7, 052
	my Water	W, 200	0.0	0.0	4,000			200,000	1%, 000	10,000	140,000	10,000	*******	14	1,002
Indian territory			*******			*******							********		
Iowa	328	15, 080	12.6	9. 0	12, 267	360	2, 513	1, 258, 000	244, 000	390,000	16,000	2,000		117	19,000
Kansas	146	1, 801	5.7	3, 5	2, 888	176	457	310,000	40,000	6,000			*******	23	4,700
Kentucky	670	3, 418	7.7	3.8	3, 341	256	1,003	456, 000	40,000	37,000	34, 000	12,000	******	113	6, 066
Louisiana	175	5, 165	8.6	5. 6	6, 321	462	1, 143	762, 000	44, 000	170,000	1,000	****	*******	88	10, 08
Maine	848	7, 475	11.6	7.8	5, 607	232	1,369	668,000	218,000	503, 000	73,000	4,000		215	9, 350
Maryland	369	3, 354	4.8	3.0	2, 823	176	606	334, 000	21,000	12,000	44,000			406	4, 914
Massachusetts	606	4, 093	5.0	3.0	3,015	126	712	338, 000	28, 000	32, 000	35, 000	3,000		73	5, 149
Michigan	1, 649	23, 808	18.7	14.7	18,700	868	4, 225	2, 530, 000	280,000	1,568,000	121,000	13,000		322	31, 807
Minnesota	234	28, 936	16.0	12.0	18, 839	515	3, 950	2, 410, 000	376, 000	831, 000	33, 000	2,000		90	31, 478
Mississippi	295	3, 127	7.0	4.0	4, 037	95	671	572,000	27, 000	18,000				18	6, 509
Missouri	881	3, 255	7.6	4.0	3, 534	116	760	453, 000	23, 000	10, 600	24, 000	4,000		8	6, 000
Montana	36	5, 783	11.0	4.0	7, 148	577	1, 332	595, 000	73, 000	267, 000	24,000	4,000	******	53	14, 658
Nebraska	38	2, 457	8.0	3.7	4,048	290	771	357, 000	10,000	201,000	***********			29	6, 97
Nevada	9	14, 666	7.0	4. 0	16, 865	1, 224	1,099	2, 394, 000		54, 000					27, 023
Now Harmakin	400	5 500	MCA.	II. was	0 170	4114	674	400 505		40. 40.	40.000	F 800		(254)	2 07
New Hampshire	680	5, 508	7, 0	4.5	3, 175	167	806	429, 000	73, 000	98, 600	46,000	5, 000		86	5, 650
New Jersey	284	5, 836	3.7	2.7	3, 319	166	633	386,000	31, 000	38, 000	********			142	5, 731
New Mexico New York	26 2, 822	2, 870 4, 688	10.8	6.7	3, 851	650 173	932	430, 000 419, 000	4,000	27,000	22,000	8,000	******	101	6, 690 5, 087
North Carolina	776	2, 246	7.0	4.0	1,921	111	766 576	311, 000	28, 000 17, 000	108,000	22,000			9	3, 445
		0.000			6			0.07		-					
Ohio	2, 352	3,378	6.5	4.0	3, 658	124	726	387, 000	21,000	10,000	91,000	11,000		83	5, 895
Oregon	228	6, 920	5.0	2.5	5, 678	160	1,062	777, 000	80,000	2,000			*******	46	8, 905
Pennsylvania	2, 827	7,576	7.5	5. 0	4, 782	204	1,032	613, 000	65, 000	102, 000	28, 000		*** ****	139	7, 944
South Carolina	49 420	2, 944 2, 515	5. 0 5. 5	3.0	2, 369 2, 785	98 160	676 528	172, 000 442, 000	55, 000	40, 000 24, 000	7,000			3 99	4, 909
	1002	21/81/		1000	- A. P. (200)	-700	6000	CONTRACTOR OF THE PARTY OF THE		NE STORM		TOTAL COLOR			in the state of
Tennessee	755	2, 655	7.0	5. 0	2, 657	181	727	400,000	28, 000	18,000	5, 000			96	4, 960
Texas	324	5, 126	14.0	9.8	5, 894	577	2, 262	1, 015, 000	43, 000	. 347, 000		******		32	11, 338
Utah	107	2, 549	7.9	3. 5	2, 024	202	609	240, 000	14, 000	87, 000	******	*******		16	3, 506
Vermont Virginia	688 907	4, 759 2, 340	6.5	3, 6 4, 0	2, 819	119 131	620 595	469, 000	28, 000	80,000	19,000	2,000		33	4,736 3,786
gmm	907	4, 040	0.0	4.0	2, 055	131	090	348, 000	16, 000	9,000	15, 000	1,000		50	0,700
Washington	37	66, 390	24. 0	13.5	31, 730	380	5, 420	4, 329, 000	177, 000	97, 000	639, 000		*****		46, 885
West Virginia	472	3, 535	8.0	4.0	2,770	143	974	381, 000	25, 000	8, 000	89, 000	4,000		85	5, '52
Wisconsin		28, 159	20.0	12.0	17, 356	358	3, 206	2, 190, 000	305, 000	1, 226, 000	117,000	10,000		216	25, 500
Wyoming	7	3,814	9.7	5. 5	3, 532	375	911	423,000	43,000	123, 000				1	5, 855





Michigan is the greatest lumber-producing state in the Union. The value of its lumber product, with that of Wisconsin and Minnesota, exceeds one-third of the total value of all the lumber manufactured in the United States. This enormous development of the lumber business in the lake region is due to the excellence of its forests, the natural advantages of the country for manufacturing lumber, and the easy communication between these forests and the treeless agricultural region west of the Mississippi river.

The extinction of the forests of the lake region may be expected to seriously affect the growth of population in the central portion of the continent. The country between the Mississippi river and the Rocky mountains, now largely supplied with lumber from Michigan, Wisconsin, and Minnesota, must for building material soon depend upon the more remote pine forests of the Gulf region or those of the Pacific coast. A great development in the now comparatively unimportant lumber-manufacturing interests in these regions may therefore be expected. New centers of distribution must soon supplant Chicago as a lumber market, and new transportation routes take the place of those built to move the pine grown upon the shores of the great lakes. It is not probable, however, that any one point will ever attain the importance now possessed by Chicago as a center for lumber distribution. With the growth of the railroad system and the absence of good water communication from the great forests remaining in the country toward the center of the continent, lumber will be more generally shipped direct by rail from the mills to the consumer than in the past. In this way the pine of Mississippi, Louisiana, and Arkansas will reach Kansas, Nebraska, and the whole country now tributary to Chicago. Western Texas and northern Mexico will be supplied by rail with the pine of eastern Texas, and the prairies of Minnesota and Dakota must draw their lumber by rail, not as at present from the pine forests covering the shores of lake Superior, but from the fir and redwood forests of the Pacific coast.

FUEL.

The following table represents the consumption of forest products as fuel during the census year. The estimates of the amount and value of the wood used for domestic fuel are based upon answers to letters of inquiry addressed to persons living in every town in the United States. The average amount and value of the wood used by a family of five persons, taken as a unit, is multiplied by the number of families in each state using wood for fuel, and the result thus obtained is taken as the total state consumption:

WOOD USED AS FUEL FOR VARIOUS PURPOSES.

Use.	Cords.	Value.	Use.	Cords.	Value.
Fordomestic purposes as below	140, 537, 439 1, 971, 813 787, 862	5, 126, 714	In the manufacture of brick and tile In the manufacture of salt In the manufacture of wool	1, 157, 522 540, 448 158, 208	\$3, 978, 331 121, 681 425, 239
In mining and amalgamating the precious metals In other mining operations	858, 074 266, 771	2, 874, 593 673, 692	Total	145, 778, 137	821, 962, 378

ESTIMATED CONSUMPTION OF WOOD FOR DOMESTIC PURPOSES.

Number of persons using wood for domestic fuel, 32,375,074.

States and Territories.	Cords.	Value.	States and Territories.	Cords.	Value.	States and Territories.	Cords.	Value.
Alabama	6, 076, 754	\$8,727,377	Kansas	2, 095, 439	\$7, 328, 723	North Carolina	7, 434, 690	\$9, 019, 569
Alaska			Kentucky	7, 994, 813	13, 313, 220	Ohio	8, 191, 543	16, 492, 574
Arizona	170,017	724, 572	Louisiana	1, 944, 858	4, 607, 415	Oregon	482, 254	1, 254, 511
Arkansas	3, 922, 400	5, 095, 821	Maine (a)	1, 215, 881	4, 078, 137	Pennsylvania	7, 361, 992	15, 067, 651
California	1,748,062	7, 693, 731	Maryland	1, 152, 919	3, 170, 941	Rhode Island	154, 953	706, 011
Colorado	426, 719	1, 638, 783	Massachusetts (a)	890, 041	4, 613, 263	South Carolina	3, 670, 959	11, 505, 997
Connecticut	525, 639	2, 371, 532	Michigan	7, 838, 904	13, 197, 240	Tennessee	8, 084, 611	10, 674, 722
Dakota	422, 948	3, 028, 300	Minnesota	1, 669, 568	5, 873, 421	Texas	4, 883, 852	10, 177, 311
Delaware	177, 306	751, 311	Mississippi	5, 090, 758	7, 145, 116	Utah	171, 923	418, 289
District of Columbia	26, 902	80, 706	Missouri	4, 016, 373	8, 633, 465	Vermont	782, 338	2, 500, 180
Florida	609, 046	1, 230, 412	Montana	119, 947	460, 638	Virginia	5, 416, 112	10, 404, 184
Georgia	5, 910, 045	8, 279, 245	Nebraska	908, 188	3, 859, 843	Washington	184, 226	499, 904
Idaho	99, 910	383, 686	Nevada	155, 276	972, 712	West Virginia	2, 241, 069	3, 374, 701
Illinois	5, 200, 104	14, 136, 662	New Hampshire	567, 719	1, 964, 669	Wisconsin	7, 206, 126	11, 863, 739
Indiana	7, 059, 874	13, 334, 729	New Jersey	642, 598	2, 787, 216	Wyoming	40, 213	224, 848
Indian territory			New Mexico	169, 946	1, 063, 360	Total	140, 537, 439	306, 950, 040
Iowa	4, 090, 649	14, 611, 280	New York	11, 290, 975	37, 599, 364		***********	000, 000, 010

a Including a small amount imported from Canada.

CONSUMPTION OF CHARCOAL.

Domestic and manufacturing purposes.	Bushels.	Value.
In the twenty largest cities	4, 319, 194	\$521, 316
In the manufacture of irou	69, 592, 691	4, 726, 114
In the production of precious metals	97, 687	29, 306
Total	74, 008, 972	5, 276, 736

The forests of the United States, in spite of the great and increasing drains made upon them, are capable of yielding annually for many years longer a larger amount of material than has yet been drawn from them, even with our present reckless methods of forest management. The great pine forest of the north has already, it is true, suffered fatal inroads. The pine which once covered New England and New York has already disappeared. Pennsylvania is nearly stripped of her pine, which once appeared inexhaustible. The great northwestern pineries are not yet exhausted, and with newly-introduced methods, by which logs once supposed inaccessible are now profitably brought to the mills, they may be expected to increase the volume of their annual product for a few years longer in response to the growing demands of the great agricultural population fast covering the treeless midcontinental plateau. The area of pine forest, however, remaining in the great pine-producing states of Michigan, Wisconsin, and Minnesota is dangerously small in proportion to the country's consumption of white pine lumber, and the entire exhaustion of these forests in a comparatively short time is certain. The wide areas now covered in New England by a vigorous second growth of white pine, although insignificant in extent and productiveness in comparison with the forests it replaces, must not be overlooked in considering the pine supply of the country. These new forests, yielding already between two and three hundred million feet of lumber annually, are capable of great future development.

The pine belt of the south Atlantic region still contains immense quantities of timber unequaled for all purposes of construction, although unsuited to take the place of the white pine of the north. The southern pine forests, although stripped from the banks of streams flowing into the Atlantic, are practically untouched in the Gulf states, especially in those bordering the Mississippi river. These forests contain sufficient material to long supply all possible demands which can be made upon them.

The hard-wood forests of the Mississippi basin are still, in certain regions at least, important, although the best walnut, ash, cherry, and yellow poplar have been largely culled. Two great bodies of hard-wood timber, however, remain, upon which comparatively slight inroads have yet been made. The most important of these forests covers the region occupied by the southern Alleghany Mountain system, embracing southwestern Virginia, West Virginia, western North and South Carolina, and eastern Kentucky and Tennessee. Here oak unequaled in quality abounds. Walnut is still not rare, although not found in any very large continuous bodies, and cherry, yellow poplar, and other woods of commercial importance are common. The second great body of hard wood, largely oak, is found west of the Mississippi river, extending from central Missouri to western Louisiana. The forests of Michigan, especially those of the northern peninsula, still abound in considerable bodies of hard wood, principally maple. Throughout the remainder of the Atlantic region the hard-wood forests, although often covering considerable areas, have everywhere lost their best timber, and are either entirely insufficient to supply the local demand of the present population, or must soon become so.

In the Pacific region the great forests of fir which extend along the coast region of Washington territory and Oregon are still practically intact. Fire and the ax have scarcely made a perceptible impression upon this magnificent accumulation of timber. Great forests of pine still cover the California sierras through nearly their entire extent; the redwood forest of the coast, however, once, all things considered, the most important and valuable body of timber in the United States, has already suffered seriously, and many of its best and most accessible trees have been removed. This forest still contains a large amount of timber, although its extent and productive capacity has been generally exaggerated. The demand for redwood, the only real substitute for white pine produced in the forests of the United States, is rapidly increasing, and even at the present rate of consumption the commercial importance of this forest must soon disappear.

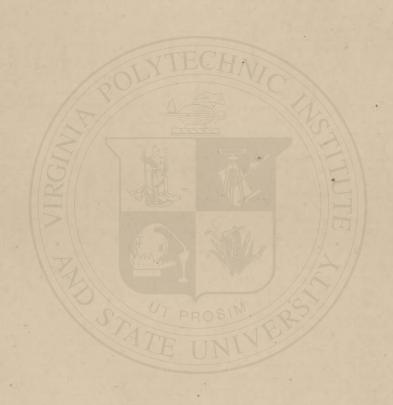
The pine forests which cover the western slopes of the northern Rocky mountains and those occupying the high plateau and inaccessible mountain ranges of central Arizona and southwestern New Mexico have not yet suffered serious damage at the hands of man. The remaining forests of the Pacific region, of little beyond local importance, are fast disappearing. The area of these interior forests is diminished every year by fire and by the demands of a careless and indifferent population; and their complete extermination is probably inevitable.

The forest wealth of the country is still undoubtedly enormous. Great as it is, however, it is not inexhaustible, and the forests of the United States, in spite of their extent, variety, and richness, in spite of the fact that the climatic conditions of a large portion of the country are peculiarly favorable to the development of forest growth, cannot always continue productive if the simplest laws of nature governing their growth are totally disregarded.

The judicious cutting of a forest in a climate like that of the Atlantic or Pacific Coast regions entails no serious or permanent loss. A crop ready for the harvest is gathered for the benefit of the community; trees which have reached their prime are cut instead of being allowed to perish naturally, and others take their place. The permanence of the forest in regions better suited for the growth of trees than for general agriculture may thus be insured. Two causes, however, are constantly at work destroying the permanence of the forests of the country and threatening their total extermination as sources of national prosperity—fire and browsing animals inflict greater permanent injury upon the forests of the country than the ax, recklessly and wastefully as it is generally used against them.







FOREST FIRES.

The extent of the loss which the country sustains every year from injury to woodlands by fire is enormous. An attempt was made to obtain, by means of circulars of inquiry addressed to enumerators of the census and other persons living in every town of the United States, some estimate of the actual destruction of forest material in this way. More than 30,000 of these circulars were sent out. The information obtained, often vague and unsatisfactory, after a most critical examination, in which all doubtful or contradictory returns were entirely thrown out, is presented in the following table and accompanying map. It must be borne in mind that estimates based upon information obtained in this manner are liable to very considerable error, and due allowance must therefore be made for inaccurate or incomplete returns. Many towns, and even counties, in which forest fires are known to have occurred during the year 1880, made no returns whatever, and the returns of other counties were excluded. It is therefore fair, perhaps, to assume that the following table, inaccurate and unsatisfactory as it no doubt is in many respects, at least does not exaggerate the annual loss inflicted upon the country by forest fires:

TABLE OF FOREST FIRES OCCURRING DURING THE CENSUS YEAR.

			7 18					A	CA	USES O	F FIRE							
States and Territories. Areas burned, in acres.	burned, in	Value of property de- stroyed.	Improving pas- turago.	Clearing land.	Locomotives.	Hunters.	Camp fires.	Smokers.	Malice.	Prairie fires.	Coal pits.	Lightning.	Indians.	Prospectors.	Travelers.	Spontaneous combustion.	Wood cutters.	Carelessness.
The United States	10, 274, 089	\$25, 462, 250	197	1, 152	508	628	72	85	262	12	9	32	56	10	2	2	3	
Alabama	569, 160	121, 225	34	16	4	20	3	101010										
Arizona	10, 240	56,000	*****		*****	*****	3	*****	2	*****		*****	2		*****	*****	******	
Arkansas	858, 115	259, 470		27	*****	20	.0	*****	2	,		1	2	******	*****	*****	*****	
California	356, 815			9	*****	222	00	*****	******	*****	*****	1	*****	*****	******	*****	*****	*****
Camornia	000, 210	440, 750	CATAC:	IN SE	*****	23	28		5	*****	*****	*****	4	*****	*****	*****	*****	*****
Colorado	113, 820	935, 500				7	10		1				5	2	2			
Dakota			******				******	*****	******	*****		******	******	*****				*****
Delaware	3, 305	15, 675	4	6	6	2	*****		1 2	*****	1	*****	******	*****	******	*****		*****
District of Columbia		15, 615	*****	A	0		7		2	*****			*****	*****	*****	******		*****
predict of Columbia				1		*****	101007	7	*****	***	******	7	*****	*****	*****			
Florida	105, 320	69, 900	11	70	hV	2			3	1//	1		19.3					
Georgia	705, 351	167, 620	21	15	2	16	NW.	******	0	7.7		*****	*****			*****		*****
Idaho	21, 000	202, 000	4.4	10		3			17/		777	2	10	6		******	******	10011000
Illinois	48, 691	45, 775		20	*****	27	12	******	8		7	2	10	0	,		*****	
Indiana	90, 427	130, 335	1	52	20	23	177	*****	4	0		*****	******		*****	******	******	*****
***************************************	50, 421	100, 000	17	04	20	40		*****	1		******		*****	*****			*****	******
Indian territory	1,000		1/	77		1		TAX										
Iowa	11, 017	45,470	4	26	5	8	100000	*****		7	*****	*****	******	*****	******	******	*****	
Kansas	7, 080	14, 700		17,000	1	1	3	*****	1	5	*****	*****		*****	*****	*****	*****	*****
Kentucky	556, 647	237, 635		51	12	33	0		10	-5							*****	******
Louisiana	64, 410	6, 800	2	2		2	******	101000	10	150000	******	******	******	*****	32000	******	*****	*****
	04, 410	0,000	-		*****	.9	*****	*****	*****			*****	*****	*****	*****	*****		*****
Maine	35, 230	123, 315		39	14	20	Luca		3						Harden !		land l	DUE-CUA
Maryland	41, 076	37, 425		31	16	14		*****	5		*****	*****	*****	100000	*****	*****		
Massachuseits	13, 899	102, 262		40	52	37.		19	8		3			*****	******	*****	*****	
Michigan	288, 271	985, 985		161	43	59	*****	3	0		0	*****	1		******	*****		******
Minnesota	250, 805	1, 395, 110		40	13	14	*****		9				8		******	******	******	
	200,000	1,000,110	*****	30	10	14	*****	******			******		0	*****		*****		*****
Mississippi	222, 800	78, 505	12	8	1	17			1								To the control in con-	
Missouri	783, 646	294, 865	27	14	16	29		1	10				250000					
Montana	88, 020	1, 128, 000	-		1	1		1	-	977==4	-	10000	1	1				3
Nebraska		CASHOLION.	397000													*****	*****	A STATE OF THE STA
Nevada	8,710	19,000				3	201015						3	*****			2002000	
											*****			*****		******		
New Hampshire	5, 954	63, 610		7	12	6		1	1									
New Jersey	71, 074	252, 240		7	28	6			7		6							
New Mexico	64, 034	142, 075	*****	37	1	2		L HEA	2				3			2		
New York	149, 491	1, 210, 785		37	43	22												
North Carolina	546, 102	357, 980		115	11	34	10	4	25			22				:		
WW.																		
Ohio	74, 114	797, 170		94	27	57		3	11				*****					
Oregon	132, 320	593, 850		7		12			4			*****	4					
Pennsylvania	685, 738	3, 043, 723	*****	129	133	17			102		****	+++++	*****	*****			*****	
Rhode Island					*****													
South Carolina	431, 730	291, 225	22	17	1	25						2				201 -		

TABLE OF FOREST FIRES OCCURRING DURING THE CENSUS YEAR-Continued.

		S militing				141			CA	USES O	F FIRE	č.,						
	Areas burned, in acres.	Value of property de- stroyed.	Improving pas- turage.	Clearing land.	Locomotives.	Hunters	Camp fires.	Smokers.	Malice.	Prairie fires.	Coal pits.	Lightning.	Indians.	Prospectors.	Travelers.	Spontaneous combustion.	Wood cutters.	Carelessness.
Tennessee	985, 430	\$5, 254, 980	19	19	6	14		1	14									
Texas	599, 359	273, 990	19	3	*****	7		2	16	*****		4					*****	
Utab	42, 865	1, 042, 800					3						4				3	
Vermont	3, 941	48, 466		10	5	2			1	*****								
Virginia	272, 319	326, 944		26	13	12											******	****
Washington	37, 910	713, 200		5		3			2			1	8					
West Virginia	476, 775	155, 280	6	22	7	13			6									
Wisconsin	406, 298	725, 610	20	58	12	15			3									
Wyoming :	83, 780	3, 255, 000				1							. 3	1				

The largest number of these fires of any one class was traced to farmers clearing land and allowing their brush fires to escape into the forest. The carelessness of hunters in leaving fires to burn in abandoned camps, next to farmers, was the cause of the greatest injury. The railroads were responsible, too, for serious damage to the forest from fires set by sparks from locomotives, while the intentional burning of herbage in the forest to improve pasturage often caused serious destruction of timber.

Only the value of the material actually destroyed by fire is included in these estimates. The loss of timber by fire, great as it is, is insignificant in comparison with the damage inflicted upon the soil itself, or with the influence of fire upon subsequent forest growth. If a forest is destroyed by fire all trees, old and young, giants ready for the ax, and germinating seedlings—the embryo forests of succeeding centuries—are swept away. Undergrowth essential to protect the early growth of trees, the roots of perennial herbage, and the seeds of all plants are consumed. The fertility, or rather the ability of the burned soil to produce again spontaneously a similar crop of trees to the one destroyed, is lost, and the subsequent recovering of burned land with the species of the original forest is only accomplished, if accomplished at all, through the restoration of fertility following the slow growth and decay of many generations of less valuable plants. A northern pine and spruce forest when destroyed by fire is succeeded by a growth of brambles, in time replaced by dwarf birch, poplar, and bird cherries, of no economic value; scrub oaks and various hard woods follow these, and pine rarely reappears except upon land long mellowed in the various operations of agriculture.

In the south Atlantic region a gradual change in the composition of the pine forests is steadily going on under the influence of fire. Less valuable species now occupy the ground once covered with forests of the long-leaved pine, through which annual fires have been allowed to run to improve the scanty pasturage they afford. Stockmen have been benefited at the expense of the permanency of the forest. Fire, too, changes the composition of the broad-leaved forests of the Atlantic region, although its influence is here less marked than upon forests of conifers, which, unlike deciduous trees, rarely grow from stump shoots, and must depend entirely upon the germination of seeds for their reproduction. Still, in regions continually burned over during a long period of time and then covered again with forests, as is the case in some portions of Kentucky and Tennessee, valuable species, like the white oak and the yellow poplar, are rare or entirely wanting in the new forest growth.

The forests of the north Pacific coast offer an exception to the law, otherwise general, for this continent at least, that a change of forest crop follows a forest fire. The fir forests of western Washington territory and Oregon when destroyed by fire are quickly replaced by a vigorous growth of the same species, and the fires which have consumed great bodies of the California redwood have not prevented the reproduction of this species by seeds and shoots. In the interior Pacific region forests destroyed by fire either do not reproduce themselves, or when, under exceptionally favorable climatic conditions, a growth of trees recovers the burned surface, poplars and scrub pines replace the more valuable species of the original forest.

The damage inflicted upon the permanency of the forests of the country by browsing animals is only surpassed by the injury which they receive from fire.

The custom of turning domestic animals into the forest to pick up a scanty and precarious living, common in all parts of the country, is universal in the southern and central portions of the Atlantic region and in California. Sheep, cattle, and horses devour immense quantities of seedling trees, the future forests of the country. They bark the trunks and destroy the vigor and often the life of larger trees. Hogs root up young pines and other plants to feed upon their succulent roots, and devour the edible fruit of many trees. In this way not only is the permanence of the forest endangered, but in the case of decidnous forests their composition is often seriously affected. Species with thin-shelled edible seeds, pines, white oaks, chestnuts, and beeches, are unable to hold their own against species with bitter or unpalatable fruit, on account of the excessive destruction of their seeds by hogs and other animals.

In the central portions of the Atlantic region the general replacement of the sweet-fruited valuable white oaks in the young forest growth by the less valuable bitter-fruited black oaks is noticeable, and seriously endangers the future value of the forests of this whole region. The damage inflicted upon the California mountain forests by sheep is immense; they threaten the complete extermination of these noble forests, and with them the entire agricultural resources of the state.

The pasturage of the forest is not only enormously expensive in the destruction of young plants and seeds, but this habit induces the burning over every year of great tracts of woodland, which would otherwise be permitted to grow up naturally, in order to hasten the early growth of spring herbage. Such fires, especially in the open pine forests of the south, do not necessarily consume the old trees. All undergrowth and seedlings are swept away, however, and not infrequently fires thus started destroy valuable bodies of timber. This is especially true, also, in the coniferous forests of the Pacific region.

The railroads of the country, using in the construction and maintenance of their permanent ways vast quantities of timber, inflict far greater injury upon the forests than is represented by the consumption of material. Railway ties, except in California, are almost invariably cut from vigorous young trees from 10 to 12 inches in diameter; that is, from trees which twenty or thirty years ago escaped destruction by fire or browsing animals, and which, if allowed to grow, would at the end of fifty or one hundred years longer afford immense quantities of valuable timber. The railroads of the United States, old and new, consume every year not far from 60,000,000 ties; the quantity of lumber in 60,000,000 ties is comparatively not very great, and would hardly be missed from our forests; but the destruction of 30,000,000 vigorous, healthy young trees, supposing that an average of two ties is cut from each tree, is a serious drain upon the forest wealth of the country and should cause grave apprehensions for the future, especially in view of the fact that in every part of the country there are now growing fewer seedling trees of species valuable for railway ties than when the trees now cut for this purpose first started.

The condition of the forests of Maine is interesting. They show that forest preservation is perfectly practicable, in the Atlantic region at least, when the importance of the forest to the community is paramount. The prosperity of this state, born of the broad forests of pine and spruce which once covered it almost uninterruptedly, was threatened by the prospective exhaustion of these forests, in danger of extermination by fire and the ill-regulated operations of the lumbermen. The very existence of the state depended upon the maintenance of the forest. The great forests of pine could not be restored, but the preservation of the few remnants of these forests was not impossible. Fires do not consume forests upon which a whole community is dependent for support, and methods for securing the continuance of such forests are soon found and readily put into execution. The forests of Maine, once considered practically exhausted, still yield largely and continuously, and the public sentiment which has made possible their protection is the one hopeful symptom in the whole country that a change of feeling in regard to forest property is gradually taking place. The experience of Maine shows that where climatic conditions are favorable to forest growth the remnants of the original forest can be preserved and new forests created as soon as the entire community finds forest preservation really essential to its material prosperity.

The production of lumber is not, however, the only function of forests; and the future extent and condition of those of the United States cannot, in every case, be safely regulated by the general law which governs the volume of other crops by the demand for them. Forests perform other and more important duties in protecting the surface of the ground and in regulating and maintaining the flow of rivers. In mountainous regions they are essential to prevent destructive torrents, and mountains cannot be stripped of their forest covering without entailing serious dangers upon the whole community. Such mountain forests exist in the United States. In northern Vermont and New Hampshire they guard the upper waters of the Connecticut and the Merrimac; in New York they insure the constant flow of the Hudson. Such forests still cover the upper slopes of the Alleghany mountains and diminish the danger of destructive floods in the valleys of the Susquehanna and the Ohio. Forests still cover the upper water-sheds of the Missouri and the Columbia, the Platte and the Rio Grande, and preserve the California valleys from burial under the débris of the sierras. The great mountain forests of the country still exist, often almost in their original condition. Their inaccessibility has preserved them; it cannot preserve them, however, much longer. Inroads have already been made into these forests; the ax, fire, and the destructive agency of browsing animals are now everywhere invading them. Their destruction does not mean a loss of material alone, which sooner or later can be replaced from other parts of the country; it means the ruin of great rivers for navigation and irrigation, the destruction of cities located along their banks, and the spoliation of broad areas of the richest agricultural land. These mountain forests once destroyed can only be renewed slowly and at enormous cost, and the dangers, actual and prospective, which threaten them now offer the only real cause for general alarm to be found in the present condition of the forests of the United States. Other forests may be swept away and the country will experience nothing more serious than a loss of material, which can be produced again if the price of lumber warrants the cultivation of trees as a commercial enterprise; but if the forests which control the flow of the great rivers of the country perish, the whole community will suffer widespread calamity which no precautions taken after the mischief has been done can avert or future expenditure prevent.

NORTH ATLANTIC DIVISION.

MAINE.

The forests of the Northern Pine Belt once extended over the state of Maine. Pine and spruce, with which were mingled maple, birch, and other deciduous trees, covered the entire state, with the exception of the immediate coast region between the Kennebec and the Penobscot rivers, a region of hard-wood forest; hemlock was common.

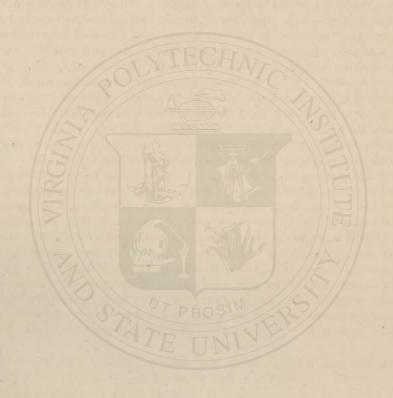
The original pine and spruce forests of the state have been practically destroyed. Pine has been cut in every township, and the largest spruce everywhere culled, except from the inaccessible region about the headwaters of the Allaguash river. Scattered bodies of the original pine, often of considerable extent and generally connected with farms, exist in the southern, and especially in the southeastern, counties, and fine hemlock of large size is still an important element of the forest in the central and southern portions of the region west of the Penobscot river. Birch, maple, and oak, too heavy for transport by raft, are still common, except in the neighborhood of manufacturing centers and the lines of railroad. Hard-wood timber is particularly fine and abundant through the central portion of the state; farther north the forest is more generally composed of coniferous trees.

The lumber business of southern and central Maine attained its greatest importance as early as 1850. In that year spruce was for the first time driven down the Kennebec with pine, and the proportion of spruce to pine has since steadily increased, until, in the season of 1879-'80, only 20 per cent. of the lumber cut on that river was pine. The lowest point of productive capacity of the forests of Maine has probably been passed. The reckless disregard of forest property which characterized the early lumbering operations of the state has been replaced by sensible methods for preserving and perpetuating the forest. This change in public sentiment in regard to the forests has followed naturally the exhaustion of the forest wealth of the state. As this disappeared the importance of preserving some part, at least, of the tree covering, the source of the state's greatest prosperity, forced itself upon public attention; for unless the forests could be perpetuated, the state must lose forever all commercial and industrial importance. It has followed that the forests of Maine, as compared with those in other parts of the country, are now managed sensibly and economically. They are protected from fire principally through the force of public sentiment, and only trees above a certain size are allowed to be cut by loggers buying stumpage from the owners of land. In the southern counties the young pine now springing up freely on abandoned farming lands is carefully protected, and large areas are planted with pine in regions where the natural growth has not covered the soil. The coniferous forests, under the present management, may be cut over once in every fifteen or twenty years, producing at each cutting a crop of logs equivalent to 1,000 feet of lumber to the acre, of which from 5 to 7 per cent. is pine,

Forest fires, which formerly inflicted every year serious damage upon the forests of the state, are now of comparatively rare occurrence. During the census year only 35,230 acres of woodland were reported destroyed by fire, with an estimated loss of \$123,315. These fires were set by farmers in clearing land, by careless hunters, and by sparks from locomotives.

The following estimates of the amount of pine and spruce standing in the state May 31, 1880, were prepared by Mr. Cyrus A. Packard, of Augusta, land agent of the state. They were made up from the results of actual surveys, and have been reviewed by a large number of experts most familiar with the condition of the forests in different parts of the state:

Basin of—	Pine (Pinus Strobus).	Spruce (Picea nigra).
	Feet, board measure.	Feet, board measure.
Saint John river and tributaries	75, 000, 000	1, 400, 000, 000
Penobscot river and tributaries	100, 000, 000	1, 600, 000, 000
Kennebee river and tributaries	50,000,000	1, 000, 000, 000
Androscoggin river and tributaries		500, 000, 000
Saint Croix, Machias, Narragaugus, and Union rivers and other small streams \ldots	200, 000, 000	500, 000, 000
Total	475, 000, 000	5, 000, 600, 000
Cut for the census year ending May 31, 1880	138, 825, 000	301, 020, 000





Quantities of logs cut in Aroostook county are driven down the Saint John river and manufactured in New Brunswick. During the season of 1879–'80 there were handled in this way 70,000,000 feet of spruce, 4,500,000 feet of pine, 2,800,000 feet of cedar, 1,500,000 feet of squared pine timber, 1,000,000 feet of squared birch timber, 110,000 feet of squared larch timber. Of this 70 per cent. of the spruce and 80 per cent. of the pine were returned to the United States manufactured into lumber, and the whole of the cedar in the form of shingles.

Important industries dependent for material upon a supply of hard wood have long flourished in the state. Large quantities of cooperage stock, woodenware, handles, spools, bobbins, etc., are manufactured, and more recently the production of wood pulp and excelsior, principally from poplar and other soft woods, has assumed important proportions. Manufacturers from nearly every part of the state report a deterioration and scarcity of the best timber, especially oak, which is now largely imported from Canada or replaced by southern hard pine. Birch, however, is still abundant, and is largely exported in the form of spool and bobbin stock. The manufacture of potash, once an important industry of the state, has been abandoned as unprofitable. Several establishments engaged in the manufacture of tanning extracts from hemlock bark are located in the state, and the numerous tanneries upon the Penobscot river consume large quantities of the same material. The demand for hemlock lumber is now good, and the logs, after being stripped of their bark, are manufactured into lumber and not allowed, as in other parts of the country, to rot upon the ground. A recently-established industry is the manufacture of kegs, barrels, and woodenware from pulp made from chips, brush, and other waste material of the forest. Partial estimates of the hoop-pole industry give a product of 5,449,200, valued at \$75,612. During the year 1879 153,334 pounds of maple sugar were produced in the state.

Androscoggin county.—One-half of this county is reported covered with woods, largely second growth; it contains, however, considerable bodies of fine first-growth white pine. Manufacturers of cooperage stock report oak exhausted, other hard woods scarce and of inferior quality, and that no second-growth timber is of sufficient size for use. A large amount of excelsior is manufactured, principally from poplar.

AROOSTOOK COUNTY.—Nine-tenths of this county is reported covered with forests, the clearings being confined to the neighborhoods of the rare settlements along the river bottoms. Logs cut in this county are largely rafted down the Saint John river, and little lumber in proportion to the cut is manufactured within its limits. The production of cooperage stock and other articles requiring hard wood in their manufacture is rapidly increasing, and with abundant material such industries seem destined to great development.

CUMBERLAND COUNTY.—One-half of this county is reported covered with woods, principally of second growth. Manufacturers of cooperage stock report a general deterioration and scarcity of material, especially hard woods, now nearly exhausted. Spruce and poplar in large quantities are manufactured into wood pulp.

FRANKLIN COUNTY.—Three-fourths of this county is reported covered with woods, principally confined to the northern portion. Staves, hoop-poles, handles, and excelsior are manufactured in large quantities.

HANCOCK COUNTY.—Seven-eighths of this county is reported covered with woods, largely composed, toward the coast, of second growth white pine. The northern portions contain fine bodies of large hemlock. Manufacturers of cooperage stock report deterioration of material; ash especially has become scarce.

Kennebec county.—Four-tenths of this county is reported covered with woods, largely second growth. Merchantable spruce and pine have been everywhere removed. Considerable areas are again covered with pine, and the wooded area is increasing. Next to Penobscot this is the most important lumber manufacturing county in the state. Numerous mills located on the Kennebec river saw logs driven from its upper waters and from beyond the limits of the county. Large quantities of poplar and spruce are consumed annually in the manufacture of wood pulp, excelsior, handles, etc. The supply of hard wood is small and of inferior quality. The poplar now used is nearly all second growth.

KNOX COUNTY.—One-half of this county is reported covered with woods, generally of second growth. Heavy timber, however, still exists in the towns of Washington, Appleton, and Union. White pine is scarce, and great deterioration in timber of all kinds is reported. Scarcity in the near future is apprehended by manufacturers. A large amount of cord-wood is consumed annually in burning lime.

LINCOLN COUNTY.—About one-half of this county is reported covered with woods, nearly all second growth. OXFORD COUNTY.—From one-half to two-thirds of this county is reported covered with woods. The northern portion still contains large areas of original forest, although pine and spruce have been culled everywhere. In the southern part of the county there are considerable bodies of second-growth white pine, and the wooded area is increasing. Cooperage stock, handles, and wood pulp are largely manufactured. Manufacturers report that timber of all kinds has deferiorated in quality and become scarce, with the exception of oak, which is still abundant and of good quality.

PENOBSCOT COUNTY.—Nine-tenths of this county is reported covered with woods. The merchantable pine and spruce have been removed from the southern portion and everywhere culled. In the northern townships hemlock is still abundant and of fine quality. Penobscot is the great lumber manufacturing county of the state, Bangor, once the principal market in the United States for pine lumber, being still the most important saw-mill center. Spruce and not pine, however, except in insignificant quantities, is now manufactured upon the Penobscot. Manufacturers using hard woods report an abundant supply of excellent material.

PISCATAQUIS COUNTY.—From eight- to nine-tenths of this county is reported covered with forests, the southern portion only being cleared of the original tree growth.

SAGADAHOC COUNTY.—One-half of this county is reported covered with woods, principally second growth. Considerable second-growth white pine is now growing up upon abandoned farm lands, and the wooded area of the county is increasing. Manufacturers report all timber of sufficient size for use scarce and of inferior quality, and apprehend early exhaustion of hard woods suitable for mechanical purposes.

Somerset county.—Five-sixths of this county is reported covered with woods, the southern portion only being cleared of its forests of spruce and pine. Excelsior, handles, woodenware, etc., are largely manufactured. Hard-wood timber of all sorts is abundant and of excellent quality, with the exception of black ash, now scarce and in great demand.

WALDO COUNTY.—From one-quarter to one-half of this county is reported covered with woods, generally of second growth. The wooded area is now gradually increasing by the growth of white pine on abandoned farming lands. Manufacturers report a scarcity and deterioration of timber of all kinds of sufficient size for use.

Washington county.—From eight- to nine-tenths of this county is reported covered with woods. In the southern portion considerable areas contain scattered bodies of large pine, and through the center of the county are large tracts of first-growth hemlock forests. No future scarcity of lumber is apprehended.

YORK COUNTY.—From one-third to one-half of this county is reported covered with woods; it contains large quantities of scattered pine. Second-growth pine is spreading on abandoned agricultural land, and the forest area is increasing. Wood pulp, cooperage stock, and handles are largely manufactured. Timber of all sorts is reported as depreciating in both quality and quantity. No immediate scarcity, however, is apprehended.

NEW HAMPSHIRE.

The forests of New Hampshire were originally composed of a belt of spruce, mixed with maple, birch, and other hard-wood trees, occupying all the northern part of the state and extending southward through the central portion; the southeastern part of the state and the region bordering the Connecticut river were covered with forests of white pine, through which considerable bodies of hard wood were scattered. The original white-pine forests of New Hampshire are practically exhausted, although in the northern counties of the state there still remain a few scattered bodies remote from streams and of small size; once of great extent and importance, these forests have disappeared before the ax of the settler and lumberman, or have been wasted by forest fires. Large areas, however, once covered with forests of pine, have grown up again, especially in the southern part of the state, with this tree. No estimate of the amount of this second-growth pine standing in the state has been possible; it furnished during the census year a cut of 99,400,000 feet of lumber, board measure. The remaining forests of the state, considered as a source of lumber supply, are composed of spruce, more or less mixed with hard woods, of which the sugar maple and the birch are the most valuable. In the northern part of the state large areas of the original spruce forest remain, although these bodies of timber are now only found at a considerable distance from streams.

Fires, which at different times have destroyed vast areas of forest, especially in the northern part of the state, are now less frequent and destructive. During the year 1880 but 5,954 acres were reported stripped of their tree covering by fires. Of such fires twelve were set by sparks from locomotives, seven by the escape into the forest of fires originally set in clearing land for agricultural purposes, six by sportsmen, one through malice, and one by the careless use of tobacco.

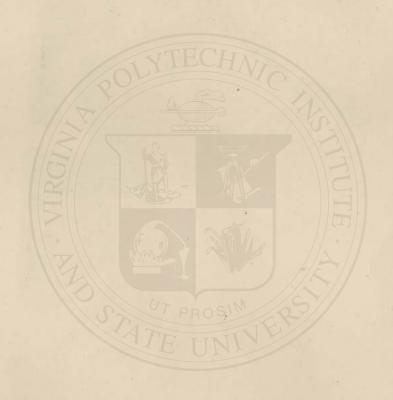
The basis of the following estimate of the amount of merchantable black spruce (*Picea nigra*) lumber standing May 31, 1880, in Carroll, Coos, and Grafton counties, where alone the spruce forests of the state are now of commercial importance, was furnished by Mr. G. T. Crawford, of Boston, and verified by the testimony of other experts:

BLACK SPRUCE (Picea nigra).

Counties.	Feet, board measure.
Carroll	60, 000, 000
Coos	1, 000, 000, 000
Grafton	450, 000, 000
Tetal	1, 510, 000, 000
Cut for the census year ending May 31, 1880 (including 26,000,000 feet sawed on the Connecticut river, in Massachusetts).	153, 175, 000

It is roughly estimated that the spruce forests of the state contain over 33,750,000 cords of hard wood and 165,000,000 feet of hemlock.





Scale

25 20 15 10 5 0

Partial returns of the hoop-pole industry give a production during the census year of 4,225,000, valued at \$29,280. New Hampshire is fourth among the states in the importance of its maple-sugar product. During the year 1879 it produced 2,731,945 pounds.

Belknap county.—From one-third to three-eighths of this county is reported covered with woods.

CARROLL COUNTY.—Five-eighths of this county is reported covered with woods. In the northern portion there are still large areas covered with an original growth of spruce. Large quantities of charcoal are manufactured in this county, and the usual method of lumbering adopted here and very generally in northern New Hampshire is first to cut the spruce large enough for saw-logs, taking all trees 6 inches in diameter 25 feet from the ground, and then cut for charcoal all the remaining growth, hard wood and soft, even the young spruce. As the land cleared is of little value for agricultural purposes, it is allowed to grow up again with wood. Deciduous trees come up at first, and these are sometimes, but not always, followed by spruce. It is necessary to exercise great care in order to prevent the newly-cleared tracts from suffering from fire, as the material for charcoal, cut into cord-wood, is often left on the ground until the second season. Mr. C. G. Pringle, who studied the forests of this region, furnishes the following notes upon the forests of Carroll county:

"The forests on the mountain sides between Crawford's and Bartlett are composed principally of the yellow and paper birch, the sugar maple, the red maple, poplars, the black spruce, and the balsam fir. About Bartlett scattering specimens of white pine make their appearance. In the more level part of North Conway the red and the pitch pine and the hemlock become common, while on the more sterile, sandy plains farther down the Saco these pines with the white birch constitute the principal arborescent growth.

"The tract known as Hart's location, lying partly in the White Mountain notch, includes 10,000 acres, 2,000 of which bear 15,000 feet per acre of spruce and hemlock—rather more of hemlock than of spruce; 10,000 acres in this tract will cut 25 cords of hard wood per acre. The town of Bartlett, partly cleared, still has 40,000 acres of woodland, which will yield an average of 5,000 feet per acre of spruce and hemlock and 15 cords of hard wood. Sargent's grant covers mount Crawford, Stair mountain, and a part of mount Washington. On this tract are 15,000 acres of timber land, carrying 20,000 feet per acre, chiefly spruce. The Thompson and Meserve purchase comprises portions of mounts Washington, Jefferson, and Madison, and covers 12,000 acres. Two thousand acres of this will yield 30,000 feet of spruce and hemlock per acre in nearly equal proportions. The remaining 10,000 acres will cut 25 cords of hard wood per acre. The Bean purchase lies north of the town of Jackson, and covers 40,000 acres. It is occupied by a dense forest, amounting to 20,000 feet of spruce and hemlock and 20 cords of hard wood per acre. Originally there was considerable pine on the streams and sides of the mountains in this vicinity, particularly on mount Kearsarge, but now there is little left. Twelve and twenty-five years ago much of the town of Bartlett was burned over, and a different growth has come up—white birch, poplar, bird cherry, etc."

A large amount of cooperage stock, excelsior, and an average of 1,000 cords of shoe pegs (from birch and maple) are annually made in this county. Considerable damage to oak and poplar caused by the ravages of the army-worm [*] are reported. The natural increase of timber is said, however, nearly to equal the present consumption by local industries, and scarcity is not apprehended.

CHESHIRE COUNTY .- About one-half of this county is reported covered with woods.

Coos County.—Nine-tenths of this county is reported covered with forests. The following is extracted from Mr. Pringle's notes upon the forests of this county:

"Everything east of the Connecticut lakes and about the upper portions of Indian and Perry streams is original forest. Such also is the condition of the Gilmanton, Atkinson, and Dartmouth College grants and the towns of Dixville, Odell, and Kilkenny. All the eastern portions of Clarksville, Stewartstown, Colebrook, Columbia, and Stratford are forest, and nearly all of Wentworth's location, Millsfield, Errol, Dummer, Cambridge, and Success. In these forests the spruce will cut 5,000 feet and the hard wood about 50 cords per acre. There is considerable hemlock, but even less pine than in Essex county, Vermont. Not much of the region has been burned over, and spruce comes into the soil again but slowly after clearings and fires.

"In the township of Kilkenny, in the mountains east of Lancaster, there are 16,000 acres of forest still untouched, though a branch railroad from Lancaster into this forest has been surveyed, and may be constructed in a few years, for the purpose of bringing the lumber down to the mills at Lancaster. Lowe and Burbank's grant is a wilderness, three-fourths well timbered and the remainder a mountain ridge of nearly bare rock. Bean's purchase is nearly inaccessible and but little lumbered. Stark, on the upper Ammonosuc, is badly cut over, only about one-quarter remaining in virgin forest. About one-half of Berlin is uncut; also the northern half of Randolph, the south half of Gorham, and the south quarter of Shelburne. Considerable land in Success was burned over some years ago, as well as some in Stark and in the eastern part of Berlin, but fires have not lately been very destructive in the New Hampshire forests."

A large amount of cooperage stock, handles, wood pulp, shoe pegs, etc., is manufactured in this county. Abundant material, with the exception of ash, is reported.

GRAFTON COUNTY.—One-half of this county is reported covered with woods, mostly confined to the northern and central portions. Shoe pegs, cooperage stock, wood pulp, and excelsior are largely manufactured. The amount of material is considered abundant for the present consumption.

32 FOR

HILLSBOROUGH COUNTY.—One-half of this county is reported covered with woods, mostly second growth. A large amount of cooperage and wheel stock is manufactured. No deterioration in the quality of material is reported, although at the present rate of consumption it must soon become exhausted.

MERRIMACK COUNTY.—One-half of this county is reported covered with woods. Cooperage stock, handles, and excelsion are largely manufactured. A slight deterioration in the quality of material is reported.

ROCKINGHAM COUNTY.—From one-quarter to five-eighths of this county is reported covered with woods, mostly second growth.

STRAFFORD COUNTY.—Four-tenths of this county is reported covered with woods, mostly second growth. Hoop-poles, cooperage stock, etc., are largely manufactured. Wood of all sorts is reported scarce and rapidly increasing in value.

VERMONT.

The forests of Vermont, as compared with those of New Hampshire and Maine, are varied in composition. About the shores of lake Champlain several western trees first appear, and throughout the state the forest is more generally composed of deciduous than coniferous species. Forests of spruce, however, spread over the high ridges of the Green mountains, their foot-hills being covered with hard-wood trees and little pine or hemlock occurring in the valleys. A forest of white pine once stretched along the banks of the Connecticut, and great bodies of this tree occurred in the northwestern part of the state, adjacent to lake Champlain. The original white-pine forests of the state are now practically exhausted. They are represented by a small amount of second-growth pine only, which furnished during the census year a cut of 6,505,000 feet of lumber, board measure.

The forests of Vermont now suffer comparatively little from fire, although at different periods during the last fifty years very serious fires have laid waste great areas of forest in the Green Mountain region. During the year 1880 3,941 acres of woodland were reported destroyed by fire, with an estimated loss of \$48,466. Of such fires ten escaped from farms into the forest, five were set by locomotives, two were traced to the carelessness of hunters, and one to malice.

Large amounts of cooperage stock, woodenware, furniture, paper pulp, excelsior, veneers, etc., are manufactured throughout the state. Material for these industries is fast disappearing, and a great deterioration in quality, especially of oak, ash, and chestnut, is reported by manufacturers.

Vermont surpasses all other states in the manufacture of maple sugar. During the year 1879 11,261,077 pounds were produced in the state.

The following estimate of the spruce standing in the state May 31, 1880, has been prepared from Mr. Pringle's report, and is based upon the statements of numerous timber-land owners and experts in different parts of the state:

BLACK SPRUCE (Picea nigra).

Regions. ROSIM	Feet, board measure.
Green Mountain range	380, 000, 000 375, 000, 000
Total	755, 000, 000
Cut for the census year ending May 31, 1880 (excluding 16,191,000 feet imported from Canada).	199, 086, 000

Partial returns of the hoop-pole industry give a production during the census year of only 43,900, valued at \$470.

ADDISON COUNTY.—About one-third of this county is reported covered with woods. Spruce and ash are scarce and rapidly disappearing. Oak of sufficient size for the manufacture of cooperage stock is exhausted.

Bennington county.—Two-thirds of this county is reported covered with woods. Manufacturers of woodenware and cooperage stock consider the prospects for future local supply favorable.

CALEDONIA COUNTY.—From one-third to three-eighths of this county is reported covered with woods, mostly confined to the northern and western portions.

CHITTENDEN COUNTY.—About one-fifth of this county is reported as woodland. The following extracts are made from Mr. Pringle's note upon the forests of Vermont:

"Except on the summits of a few of the higher peaks of the Green mountains, where black spruce and balsam fir grow to the exclusion of other trees, the arboreal growth is composed of a large number of species. In the valleys and on the foot-hills, and even on the slopes of the higher mountains in their lower portions, hemlocks mingle with spruce, beech, maple, and birch (yellow birch chiefly, for there is little white birch seen in northern Vermont); basswood, butternut, the ashes, red oaks, etc., are confined to the lower elevations and are less abundant than the trees first mentioned. Between the isolated patches of spruce and fir about the summits of the mountains and the region where hemlock is found, rock maple, yellow birch, and black spruce are the predominating species.

"To estimate the area of valuable original forest still standing in the Green mountains is not an easy task. The belt extends from the Canada line to Massachusetts, and even into that state. The outlines of this belt are made very irregular by the cleared and settled valleys which run up among the mountains, and by reason of forest clearings, so that its width is constantly varying as we proceed from one end to the other.

"The woodlands of the plateau, some 10 miles broad and elevated from 200 to 300 feet above lake Champlain, lying between the foot-hills of the Green mountains and the lower plain beside the lake, occupy, for the most part, rocky hills, and are composed principally of sugar maple, beech, basswood, white ash, black birch, and red oak. Certain limestone hills offer a favorable situation for the butternut, the ironwood, the slippery elm, and the bitter hickory. The swamps and other lowlands yield the red maple, the black ash, the white elm, and the black willow. The latter, especially along streams, is associated with alders and the sheepberry. The colder, sphagnous swamps are covered with a growth, more or less dense, of yellow cedar, black spruce, balsam, and larch; sometimes in the higher portions the white pine mingles with these, scattered or in groves. When grown in such soil this wood is liable to be extremely hard and brittle. The poplars occupy hillsides and ridges where the soil is a light, cold, sandy loam; with them the bird cherry is perpetually associated. The black cherry is scattered in a diversity of soils. White oak and hickory attain their best development on clayey soil or glades of slight elevation; on the red sand-rock hills they are smaller. Certain slopes of cold clay are still here heavily wooded with hemlock, while warm clay lands are the favored site of the burr oak. In the vicinity of the lake and its tributaries low, wet shores are scattered over with the swamp white oak and the burr oak. The chestnut oak is common on the thin, poor soil of the red sand-rock hills, ranging through the valley from the lake as far back in some places as the foot-hills of the Green mountains. The red pine appears on the sandy shores of lake Champlain, and extends far up the Winooski river. The moister and more fertile portions of the sandy plain are still occupied to some extent by white pine, the poorer portions by pitch pine. The white birch occurs on cold, wet, sandy soil near the lake; and in the mountains the black spruce becomes the most common tree; with it in stronger soil are associated the yellow birch and the sugar maple.

"Burlington.—This place is believed to rank as third, or next to Albany, among the lumber markets of the United States. More lumber may enter some ports, as Oswego and Tonawanda, for transshipment, but all lumber brought to this market is stored and sold here. The kind is chiefly white pine brought up the lake from Canada, a little of it being cut in Michigan (perhaps one-tenth); all the rest is of Canadian growth. A few of the lumber companies here own lands of limited extent among the Green mountains, from which they obtain, spruce for clapboards, etc. The general direction which the lumber sent from here takes is to the older portions of New England, Massachusetts, Rhode Island, and Connecticut, considerable pine being sent even to Maine, which once supplied to commerce so much of this material. Much lumber is dressed here and sent to Boston for shipment to foreign countries. The business still enjoys the highest prosperity, and during the census year, under the stimulus of general commercial prosperity, it was especially active. As yet no lack in the supply is felt, the loggers only having to go farther back in the Canadian forests than formerly to obtain timber enough to meet the demand. The proportion of lumber worked up here is small, there being merely a few factories producing doors, sash, blinds, packing boxes, etc."

ESSEX COUNTY.—Five-sixths of this county is reported covered with forest. The following is extracted from Mr. Pringle's report:

"Four-fifths of that part of the county of Essex lying north of Guildhall and Victory is still in virgin forest, which will yield 5,000 feet of spruce per acre. The towns of Lewis and Averill are entirely unlumbered, and so is Avery's Gore. Colton is mostly covered with forest, and so is Ferdinand. Timber-lands compose about two-thirds of Granby and East Haven, and cover the back parts of the river towns and those crossed by the Grand Trunk railroad. South of Guildhall and Victory the towns of Concord and Lunenburg are mostly cleared and settled. The proportion of hemlock in these forests is not large; there is considerable yellow cedar and a large amount of maple, birch, and beech—probably 50 cords per acre. There is but little pine in all this region, principally confined to the township of Lewis; elsewhere only occasional pine trees occur."

FRANKLIN COUNTY.—From one fourth to three-tenths of this county is reported covered with forest, mostly confined to the hills in the northeastern and northern portions. In the village of Montgomery a large establishment for the manufacture of butter tubs is located, and at East Richford birch is largely manufactured into turned ware.

GRAND ISLE COUNTY .- About a quarter of this county is reported covered with woods.

LAMOILLE COUNTY.—About one-third to one-half of this county is reported covered with woods, very generally listributed over its entire surface.

ORANGE COUNTY.—One-quarter of this county is reported covered with forest.

ORLEANS COUNTY.—One-half of this county is reported covered with woods. The following is extracted from Mr. Pringle's notes:

"At Newport, situated at the southern extremity of lake Memphremagog, are several mills for cutting veneering from birch. The product of these mills is closely packed in boxes, so that it cannot warp, and sent to the manufactories near the large cities, to be used for chair bottoms and other purposes. Southward from Newport, in the valley's of the Barton and Black rivers, which flow northward into lake Memphremagog, and of the Passumpsic river, which runs southward and joins the Connecticut, are almost continuous swamps of yellow

cedar, black spruce, and larch, from which the cedar timber is now being largely drawn to be sawed into shingles. At Barton the hard woods are largely cut into material for furniture, which is shipped toward the sea-board before being put together.

"The valley of the Clyde river from Newport to Island Pond is cleared for the most part and improved for farms. The usual species of the northern forest occupy the summits of the low hills on either side of the valley. Eastward from Island Pond, down the Neipegan river to the Connecticut by the line of the Grand Trunk railroad, we pass through the wild region from which the lumbermen have only taken some of the spruce and pine. Here, beginning 2 or 3 miles back from the railroad, or in some places much nearer to it, a virgin and unbroken forest stretches over the slopes and summits of the hills for many miles to the northward and southward; black spruce, yellow birch, sugar maple, and beech are its chief component species. In a few places, where the soil is sandy, white pine occurs in straggling groves or isolated specimens, and the swamps, as well as those of all of northern Vermont, are occupied by the black spruce, yellow cedar, and by a few scattering pines. The pine being the kind of lumber first secured, is seldom found now in these Vermont swamps. The cedars are now cut and manufactured into shingles, fence posts, railway ties, etc., for which purposes the lasting quality of the wood makes it eminently suited. There is little hemlock in northeastern Vermont, and it is believed to indicate poor soil wherever it occurs. The soil of this entire region presents a marked contrast to that of northern New York, being fertile and in other respects well adapted to agriculture. On this account land once lumbered over is generally occupied by the farmer and not allowed to come up again to forest, except in the more hilly portions."

Staves, tubs, pails, buckets, and hoops are largely manufactured from spruce, cedar, and ash. The quality of the material used is said to have deteriorated, and manufacturers report that at the present rate of consumption it will soon be consumed.

RUTLAND COUNTY.—Four-tenths of this county is reported covered with woods, principally in the eastern portion. Elm, formerly largely used in manufacture of tubs, etc., is reported exhausted, and basswood has become scarce.

Washington county.—One-third of this county is reported covered with woods, principally situated in belts along its eastern and western borders. The following is extracted from Mr. Pringle's report:

"Reaching Montpelier from the west we have left behind the Green Mountain gneiss and entered a granitic formation. Here is an extensive burned region; the fire, in consuming the forest and vegetable mold upon the surface of the land, has exposed granite bowlders thickly embedded in the soil. To replace the forest growth thus removed there is only an occasional little spruce or balsam to be found among the thickets of bird cherry. The hilltop and hillside forests east of Montpelier show hemlocks everywhere mingled with sugar maples, yellow birches, and spruce; farther east the spruce and birch predominate. Approaching the Connecticut river, hemlocks and maples again appear and second-growth white pine and paper birches take the place of the other species."

WINDHAM COUNTY .- Three-eighths of this county is reported covered with woods, mostly confined to ridges

of the Green mountains. Ash and white pine are reported very scarce.

WINDSOR COUNTY .- From one-fourth to one-third of this county is reported covered with woods, quite generally distributed over the hills. Tubs, barrels, kegs, and buckets of white and red oak, white pine, spruce, and ash are manufactured. Oak is reported by manufacturers to be already practically exhausted, spruce to be fast disappearing, and ash very scarce and in danger of speedy extermination.

MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.

The original forest which once covered these states has disappeared and been replaced by a second, and sometimes by a third and fourth growth of the trees of the Northern Pine Belt. The area covered by tree growth in these states is slowly increasing, although, with the exception of the young forests of white pine, the productive capacity of their woodlands is, in view of the heavy demands continually made upon them, especially by the railroads, rapidly diminishing. Abandoned farming land, if protected from fire and browsing animals, is now very generally, except in the immediate vicinity of the coast, soon covered with a vigorous growth of white pine. The fact is important, for this new growth of pine promises to give in the future more than local importance to the forests of this region.

These states sustain a considerable annual loss from forest fires. In Massachusetts during the year 1880 13,899 acres of woodland were reported destroyed by fire, with a loss of \$102,262. Of these fires fifty-two were set by locomotives, forty by fires started on farms and escaping to the forest, thirty-seven by hunters, nineteen by the careless use of tobacco, eight through malice, and three by carelessness in the manufacture of charcoal. No returns in regard to forest fires in Rhode Island and Connecticut have been received, but it is believed that in proportion to their forest area such fires are not less destructive in these states than in Massachusetts. Numerous important industries using hard wood have been driven from these states or forced to obtain their material from beyond their limits. On the other hand, industries like the manufacture of certain sorts of woodenware, using secondgrowth pine, are rapidly increasing in volume. The principal forests now found in these states are situated in Berkshire, Hampden, and Worcester counties, Massachusetts.

BERKSHIRE COUNTY, MASSACHUSETTS.—From one-third to one-half of this county is reported covered with woods, largely second growth. The high ridges of the hills are still covered with forests of black spruce, their slopes and intervening valleys with hard woods or hemlock, now often replaced by a growth of young white pine. Cooperage stock, baskets, and wood pulp are largely manufactured. Spruce is reported to have deteriorated in quality; manufacturers consider the supply of material, however, abundant for all present local demands.

FRANKLIN COUNTY, MASSACHUSETTS.—One-half of this county is reported covered with woods, largely second-growth white pine.

Worcester county, Massachusetts.—One-half of this county is reported covered with woods, largely second growth white pine. Winchendon, the most important point in the United States for the manufacture of woodenware, small cooperage, etc., is supplied with material from the young pine forests of this and the neighboring counties. Timber is reported to have deteriorated. The supply of pine is not equal to the demand, and is rapidly increasing in value.

In Barnstable county, Massachusetts, numerous experiments in forest planting have been made. In South Orleans and neighboring towns fully 10,000 acres of sandy, barren soil have been successfully and profitably planted with pitch pine. Similar plantations have been made upon the island of Nantucket; and many large groves of white pine planted many years ago in Bristol and Plymouth counties demonstrate the entire practicability of forest culture in this whole region.

The only important lumber manufacturing establishments found in these states are situated upon the Connecticut river, in Massachusetts and Connecticut. They are entirely supplied with material from the forests of northern New Hampshire and Vermont. Partial returns of the hoop-pole industry give a production during the census year in Massachusetts of 11,507,600, valued at \$95,009; in Connecticut, of 191,000, valued at \$9,660.

NEW YORK.

That portion of the state north of the forty-third degree of latitude, including within its limits the elevated Adirondack region, was once covered with a dense forest of maple, birch, basswood, and other northern deciduous trees, through which were scattered spruce and pine. The low hills bordering the Hudson and extending along the southern boundary of the state west of that river were covered with the coniferous species of the Northern Pine Belt. Over the remainder of the state the broad-leaved forests of the Mississippi basin spread almost uninterruptedly, except where an occasional sandy plain or high elevation favored the growth of pines. The original forest still covers large areas in the northern counties, and protects the hills through which the Delaware river forces its way in crossing the southern part of the state. With these exceptions, however, the forests of New York are now almost exclusively of second growth.

The forests of the state, especially in the north, have at different times suffered great damage from fire. During the census year 149,491 acres of woodland were reported destroyed by fire, with a loss of \$1,210,785. Of these fires thirty-seven were set by farmers clearing land for agricultural purposes and allowing them to escape to the forest, forty-three were set by locomotives, and twenty-two by the carelessness of sportsmen.

With the exception of the spruce of the Adirondack region, the forests of the state are no longer important as a source of general lumber supply; and many industries depending upon hard woods have in late years decreased in importance, owing to the want of sufficient material, or have been forced to obtain their supply of timber from the west. White oak, largely consumed by the railroads, has become scarce, and has advanced at least 50 per cent, in value during the last twelve years. Elm, ash, hickory, and other woods are reported scarce in all parts of the state. Partial returns of the hoop-pole industry give a production during the census year of 10,948,258, valued at \$155,764.

New York is only surpassed by Vermont in the amount of maple sugar produced by its forests. During the year 1879 10,693,619 pounds were manufactured in the state.

The following extracts are taken from Mr. Pringle's report upon the forests of northern New York:

"One who enters northeastern New York at Port Kent, and takes stage by way of Keeseville to the Saranac lakes, finds himself, as long as his route runs up the Au Sable river, which is as far as the Au Sable forks, passing through a region which gives evidence of having been formerly covered with pine. The white, the red, and the pitch pine are all represented here. The pitch pine is confined chiefly to the sterile sandy plains between the Au Sable and the Saranac rivers. The red pine mingles with this species, and grows on the rocky hills of the region and on the river cliffs, while the abundance of white pine in nearly all situations must have made this quarter of the state, like the region of Vermont lying opposite, a valuable pinery in former times. But fifty or seventy-five years have passed since the pine of the Champlain valley was harvested and shipped to England by way of the Saint Lawrence.

"In the valleys of the Au Sable and the Saranac rivers white pines spring up numerously whenever permitted to do so, and I am told that farmers, realizing that much of their soil is not suitable for profitable agriculture, are seriously considering whether it be not to their highest advantage to surrender much of their land to timber growing, and encourage the growth of the more valuable species, such as white pine, white oak, etc. Of non-coniferous trees

the white, red, and black oaks are conspicuous among the pines, and in the colder and wetter sands the white birch is common. But through all this region the trees are all of second growth, and lumber for building purposes is largely imported.

"The forest on the upper waters of the Au Sable and of the divide between this river and the Saranac is principally devoted to supplying fuel to numerous iron furnaces. The best butt logs only of spruce are sorted out and sent to the saw-mills as the forests are mowed down; the hemlock bark is removed for the tanneries, but everything else, young pine, spruce, and poplar, fall clean with maple and birch. Here and there, even far up on the hillsides, are seen the charcoal kilns, and around and about them, quite to the crest of the foot-hills of the Adirondacks, the woods are cut down in great swaths to feed them. Lands once cut over are left to grow up to timber again, though fires originating in the dead brushwood and consuming the sun-dried vegetable mold on the surface of the soil generally interfere with any new growth of trees.

"Little Tupper lake is situated in the heart of the Adirondack wilderness, and is surrounded by some of the most valuable timber lands to be found in all this region. The woods about the lake have never heard the lumberman's ax. The stream which connects it with Tupper lake, by way of Round pond, is not adapted to driving, and before lumber could be brought down it would be necessary to clear out the stream by blasting away much rock and building a dam with flood-gates at the foot of Round pond. The shores of this beautiful lake present a marked contrast to those of any I have as yet visited. On other shores and river banks I had seen scattering pines, but on all the points and bluffs of this lake throughout its entire circuit, and even following the ravines far back in the hills, are great groves and belts of white pine with straight and clean shafts towering high above all other trees, unless is excepted the red pine, of which a few specimens are mingled with them on the gravelly banks of the lake, vying with the white pines in height and beauty of trunk. At certain places on the shores of this lake, and particularly along the sluggish streams connecting it with Round pond below, are considerable swamps occupied chiefly by larch. It is pleasing to observe and to learn from guides that this lake region of the Adirondack woods has suffered but little from forest fires. It is only limited areas here and there on the shores of the lakes and ponds or along the rivers that have been devastated by fires originally started in hunters' camps. Seldom do these fires spread far back from the water, a fact which is to be attributed, it is believed, to the wet and mossy condition of these woods; yet, when they have been lumbered, as is the case lower down the Racket river, and a considerable proportion of the trees have been removed so as to expose the brushwood, etc., to the drying influences of the sun, much the usual liability to fire exists here.

"It is safe to assume that 2,500 square miles fairly represent the area of the virgin forests of the Adirondack wilderness. This area will average 3,000 feet of spruce (board measure) per acre, or about five billion feet in the aggregate. The amount of hemlock, variously estimated from 300 to 10,000 feet per acre, will cut at least 2,000 feet per acre, or 3,000,000,000,000 feet in the aggregate, or its equivalent; when the bark alone is considered, 3,000,000 cords of bark. The pine hardly, if at all, exceeds 200 feet per acre, or 320,000,000 feet in all. The hard wood growing over this entire region will fairly average 40 cords per acre, or 64,000,000 cords.

"Glens Falls is the great sawing center for the lumber cut upon the upper Hudson. This business here has passed the point of maximum prosperity and begun to decline; not that there was any necessity for a diminution of the yearly crop of logs from this field, if the forest could be protected from devastating fires. The lumberman leaves standing, as far as possible, the spruce trees too small for the ax, and these, the overshadowing growth being removed, grow with increased vigor, so that good crops of timber could be harvested from the soil every thirty or forty years, were it not that over at least one-half of the area lumbered fire follows the ax, burning deep into the woody soil and inducing an entire change of tree covering. Poplars, birches, and bird cherries, if anything, succeed the spruces and firs. From this cause alone the lumbering industry of the region must dwindle. A large area utterly unadapted to agriculture is being made desolate and nearly valueless, and its streams, the feeders of the water privileges and canals below, become every year more and more slender and fitful. These fires are largely set by reckless sportsmen and hunters, with whom this region peculiarly abounds in summer. They are careless in their smoking; they neglect to watch and properly extinguish the fires lighted for camp and cooking purposes, and sometimes they even delight to set fire to the dry brushwood of lumbered land in lawless sport. Again, to some extent, a class of petty pioneers follow the lumberman, obtaining for a trifling sum a title to a little land, or, squatting without rights, set fire to the dry brushwood left by the lumberers, and allow the fire to spread at will, devastating thousands of dollars' worth of property for the mere convenience of saving themselves the trouble of burning boundary strips around their fields, which might not cost them labor to the amount of \$10. The laws of New York in respect to the setting of forest fires are totally inadequate to protect the forests. The opinion prevails in the forest region of northern New York that a growth of trees removed is followed by a similar growth, the result of young seedling trees left in the soil, except in the case of pine. 'Pine once cleared off is never renewed,' was the invariable remark. This of course presumes that fire is kept out of the clearing, for after a fire has consumed the brushwood and much of the 'duff' or vegetable mold, and with this all the young seedling trees, and even the seeds of trees that may be in the soil, an entirely different growth from the hemlock and spruce springs up. Raspberry bushes are the first to appear, the seeds of which are dropped by birds flying over the clearing. Bird cherries generally appear among the first trees, the seeds being dropped everywhere in a new country by birds; poplars and small willows also appear early in a burned district, their downy seeds being widely distributed by the wind. It is only through the agency of the wind that the seeds of birches and conifers can be disseminated, and spruces and hemlocks must needs appear, if they return at all, as tardy stragglers.

"Not many miles above Glens Falls the Hudson flows out from among the lowest outposts of the Adirondacks and winds through a plain which reaches from near Troy to the vicinity of the southern ends of lakes George and Champlain. The soil of this plain is sand deposited by the waters of former periods. The hills which bound this plain on the northwest are piles of sand, gravel, and bowlders, evidently the moraines of a glacier which once flowed through the course of the Hudson. All this region, from Troy to Luzerne, among the foot-hills of the Adirondacks, must formerly have been covered with pine; among the hills and near the streams white pine, and in the more sterile central portions of the plain, red and pitch pine. To-day there exists of these species scarcely more than a scanty and scattered second growth.

"Thirty or forty years ago it was thought that all the accessible spruce in the valley of the upper Hudson had been harvested, but there is to-day nearly as much sawed at Glens Falls as there was at that time. At that time nearly all the timber standing near this river and its larger tributaries had been cut. Such as stood 5 or 10 miles back from these streams and all that was growing in the valleys of the smaller streams, or higher up the mountain slopes, would not pay the cost of hauling to the larger streams; but it is this timber which now furnishes the present supply. Logs are now driven out of streams which were then thought incapable of being driven. By damming streams so small that they may almost dry up in midsummer, throwing the logs into their courses during the winter, either above or below the dams, and in spring-time, when the dams are pouring with the floods resulting from the melting of deep mountain snows, tipping the planks of the dams and letting loose the torrents, the logs from remote places are got out to the large rivers where they can be driven. All the rivers of this region, however, are steep and rocky. The logs come down with their ends badly battered, and often with gravel and fragments of rock driven into the ends in a manner to injure the saws. They must, therefore, be 'butted' before being sawed; that is, a thin section is cut from each end, and on this account the logs are cut in the woods 4 inches or, for the worst streams, 6 or more inches longer than the standard length. The standard length for all logs brought down the Hudson is 13 feet. The character of these streams is such that long logs, for spars or other purposes, cannot safely be driven through them. Such sticks are certain to get-fastened among rocks and cause bad jams. As already stated, the lumber business upon the upper Hudson is well advanced in its decline, and a score of years hence it must become insignificant under the practices now pursued, and the future of this valley gives little promise of prosperity; the soil is inferior in quality and not adapted to agriculture, while the timber, once the chief source of its prosperity, is nearly exhausted.

"As a lumber market Albany ranks second in the United States, or next to Chicago. White pine is the variety of lumber most largely handled here, and two-thirds of it comes from Michigan by way of the Erie canal, the remaining one-third coming from Canada through lake Champlain, the white pine contributed by New York being an inappreciable quantity. Most of the lumber firms here are merely commission dealers, although in two large mills considerable lumber is dressed before being shipped. The region supplied by this market includes the banks of the Hudson, New York city, New Jersey, and the shores of Long Island sound. A little reaches Philadelphia, and much is shipped to foreign ports from the city of New York. A great deal of the lumber handled by Albany dealers, however, does not go to Albany at all, but, sold by runners, is sent direct by railroad from the Michigan mills to points south of New York. The lumber trade here is still in full prosperity.

"Leaving the beautiful Mohawk valley at Rome, the traveler by the Rome and Watertown railroad soon notes a less improved region, and one, indeed, less capable of improvement. For a long time the road stretches over a sandy plain; in the higher portions of this plain, not far from Rome, the red and pitch pines are seen, and in the wetter places hemlocks and black spruces appear, with white birch, black ash, etc. On the higher, undulating lands, 20 or 30 miles north of Rome, white pine and hemlock seem once to have been the most abundant species of the forest; they now exist only in broken and scattered ranks, although numerous stumps give evidence of a former heavy growth of these two species. Northward from Albion the country gradually rises, hard wood becoming more and more common until on the limestone banks of the Black river at Watertown the patches of woodland are mainly composed of birch and maple. Yet the soil continues sandy, and at a little distance from the river is favorable to the growth of pine, and I can readily believe that all this sandy tract east of lake Ontario was originally covered with a heavy growth, principally of pine and hemlock. The pine was long since harvested, and now the mills and tanneries are consuming the hemlock. On each of the small streams that flow into lake Ontario are established saw-mills which cut quantities of hemlock yearly. Little, however, is sawed at Watertown, although a limited amount of logs is driven down to Dexter at the mouth of the Black river, and there sawed; yet once the neighborhood of Watertown and Dexter was a great center for the production of pine lumber. This region (chiefly its swamps) still yields a little black spruce. The lumber sawed along the Rome and Watertown railroad at Williamstown, Richmond, etc., is mostly sent southward to Syracuse and other places to meet the demand there for coarse lumber. The lumber yards at Watertown are mostly filled with Canadian pine.

"Carthage, in Jefferson county, was once an important lumber center. The 'Long falls' of the Black river furnished unlimited water-power. Immense quantities of pine and hemlock lined the banks of the river and covered

the plains of the vicinity; northward lay a heavy pinery. Canal-boats laden with lumber were towed through the river to Lyon's falls and thence by canal to Utica. Now the pine is nearly all gone from this region, the saw-mills are rotting down and only a little hemlock is sawed here.

"That portion of the state which lies along the Saint Lawrence river as far east as the vicinity of Malone, and extending some 25 miles back from the river, seldom exceeds 250 feet above the sea-level and is, for the most part, clayey loam, flat and well adapted to agriculture. This tract is now pretty well settled. Proceeding to the southeastward and rising to an altitude of 250 feet a wide region of sandy soil is entered, cold, damp, and unfit for agricultural purposes. This is the region of forest lying northwestward of the mountains in the southern portions of Saint Lawrence and Franklin counties, and has not yet been badly encroached upon by the ax and fire. The destruction of this forest would be a public calamity, so useless is the soil for any other purpose than the production of timber, and so harmful to the settled country below would be the consequences resulting from clearing it. This forest is, no doubt, capable of yielding, perpetually, an annual crop double that now drawn from it. This estimate, of course, is based upon the supposition that fires are prevented. But this side of the forest is less invaded by fires than the valley of the Hudson river, and fires do not burn so deeply into the soil nor consume so much of the vegetable matter; they are, consequently, less fatal to the continuance of timber growth.

"At Canton, in Saint Lawrence county, and in its vicinity as far down as Buck's bridge, below Morley, is sawed all the lumber cut on the Grass river. From this point the lumber is shipped principally to Massachusetts and Connecticut by rail, both via Rome and via Plattsburgh and Rouse's Point.

"Colonel Colton, of Norwood upon the Racket river, explained to me at length the methods employed by him in the lumber business, and, as nearly the same methods are pursued throughout this region, I give his account. Several weeks of the summer he devotes to exploring the lands of his company, to decide from what tract the stock of logs for the following year shall be drawn. In the settlements near the margin of the forest are men whose business it is to cut and haul onto the ice of the river during winter the timber desired by the lumber companies. Contracts are made with these men to harvest the timber above a certain diameter on certain specified tracts belonging to the company. The contractors go to their respective fields of labor as soon as the snow is of sufficient depth, taking into the woods a force of men, horses, and supplies, and building camps in the vicinity of their work. When a full stock of logs is placed on the river, and the spring floods break up the ice and set the logs going, other contracts are made with the same or other men to drive the logs into the booms of the different mills at a stipulated price per log. If, as is usually the case, logs of several different companies are on the same river, all are driven down in common, and the drive is called a 'union drive'. Arrived at the uppermost boom—formed by chaining together logs floating on the surface of the water and held in place by occasional piers, strong but rude structures of logs filled in with rocks, located above the first sawing station—the logs belonging to these mills are sorted out and turned into the different booms, while those belonging below are sent on their way down the channel. Once within the boom of the mills to which they belong, they are again assorted; the pine, hemlock, and the spruce are separated, and the different grades are floated into separate booms or pockets which lead down to the different mills or saws which are to cut up each separate class. At the mills inclined planes lead down to the water from each gang of saws, up which, chains being attached to the logs, they are drawn by the machinery into the mill. After sawing, the sorting of the lumber into different grades is completed with care. The boards are run through planing-mills which smooth both sides, then through other machines which tongue and groove their edges, and finally fine saws neatly trim their ends. This dressing of the lumber at the mills makes a saving in freight when it is shipped, besides greatly facilitating sales. Colonel Colton invited me to accompany him 20 or 30 miles up the river to see the 'drive' which was just coming out of the woods. The highway by which we drove led near the river, and we could see the logs everywhere coming down, advancing endwise with the current. In many places of still water the entire breadth of the river for some distance was closely covered with them. These were not so small as those usually seen in the Maine rivers, but were from full-grown trees of the original forest-spruce from 1 foot to 2 feet in diameter. With the spruce logs were a few hemlocks, usually of larger size; a few pine logs, sometimes 2 or 3 feet in diameter, floated with the others. As the water was lowering, stranded logs were seen everywhere along the shore. They covered gravel banks and bars in the middle of the river, and were piled in disorder on the rocks of the rapids, or, pushing over the waterfalls, stood on end in the midst of the white, pouring

"A few miles above Potsdam we entered upon a sandy soil; the farms appeared less productive and the farm buildings and fences gave evidence of less thrift. As we advanced toward Colton, a region near the borders of the forest some twenty years settled, less and less prosperity among the settlers was manifest. The tilled fields appeared incapable of yielding even passably good crops; some of them could do no more than give a small crop of rye once in three years. The grass lands were red with sorrel, which comes up everywhere over this region as soon as the forest is cleared and the ground burned over. The sandy soil is cold and sour, in some places so light as to be blown about by the wind. Above South Colton we drove over sandy plains utterly incapable of sustaining the meager population, which ekes out a wretched existence by means of fishing and lumbering. My companion affirmed that settlements had been pushed farther into the forest than they can be maintained, and that they must in most places be abandoned and the land given up to forest again. All along our way the woodlands were

straggling and sadly ravaged by the ax, fire, and wind. The spruce and pine had been culled out and most of the hemlock had been cut down and barked. Half-burned stumps and logs and gaunt and blackened trunks still standing disfigured the landscape on every side.

"The species of trees observed embraced all those common in northern woodlands. In one locality black cherry was remarkably abundant. Formerly the saw-mills of Colton cut pine, as there was a larger proportion of this lumber upon the Racket than is usually found in northern New York; now they do little busness in any lumber.

"As we passed up along the river I saw small squads of 'drivers' stationed in a few places where the character of the river was such that it was liable to become obstructed with logs. By assisting the logs to pass such places great jams are prevented. The main body of the men, however, worked at the rear of the drive, scrambling over the disordered piles of logs which accumulate upon the shore or lodge against the rocks in the midst of the current. With their cant-hooks the men pry and roll the logs into the current, springing about on the pile as the logs roll from under their feet. Not unfrequently logs are left by the subsiding waters among the rocks at some distance from the main channel of the river. Files of men on each side then seize them with their cant-hooks and, splashing through the shallow water, bring them by main force into the channel. Sometimes logs become fastened among the rocks where the current is so swift that they cannot be reached by a boat or in any other way. Then hooks attached to ropes are thrown out from the shore; the logs are grappled and thus hauled off into the current. The drivers work Sundays and week days, fair weather or foul; their occupation is full of peril, and men are lost every year. Such are usually, as a driver assured me, 'men who do not know where it is safe to go.' But sometimes the most careful men become mixed with the rolling logs or seized by the current of the waterfalls and are swept away.

"Franklin county contains 995,279 acres, and 347,500 acres are still believed to be timbered. The timbered portion lies in the south end of the county, and because it is not watered through much of its area by streams of sufficient size for driving out the logs, much of the timber is inaccessible, or rather, the prices of lumber do not yet warrant hauling the logs long distances. The country across the line of the Ogdensburg and Lake Champlain railroad appears exhausted of its spruce and hemlock. Some tracts of hard wood are still standing, but the poplars, whose young growth often conceals the stumps and prostrate trunks of dead hemlocks, really seem in many places the most common species. But little timber land remains in Clinton county and, until the present season, lumbering on the Saranac had been for several years nearly suspended. This year, however, a company was cutting a few million feet of lumber drawn from the woods of Essex and Franklin counties. The lumber of the eastern side of the Adirondack wilderness mostly comes out by the way of the Saranac and the Hudson rivers. The mountain sides about lake George are being denuded of their spruce, which is sawed in the vicinity of Ticonderoga, and here, as elsewhere, fires follow the ax in their usual fashion."

The forests of the Adirondack region have suffered severe loss at different times, particularly in 1878, by the sudden death of great blocks of black spruce. Mr. Pringle carefully studied the extent of this destruction and the causes which produced it. In regard to these, great diversity of opinion exists among woodsmen and others familiar with the Adirondack forests. It has been generally supposed that the trees were killed by an unusually severe summer drought, or by the attacks of a boring insect working under the bark; but the testimony gathered by Mr. Pringle points to other causes of destruction. The spruce occupies dry mountain slopes and ridges and deep wet swamps never greatly affected by drought. It is noticed that as many trees have died in the swamps as upon the dry slopes. It is evidently not drought, then, which has caused them to perish. The opinion, too, is firmly held by the most intelligent observers that insects do not attack the trees until they are dead or nearly dead, and are never found in vigorous living specimens.

The black spruce is not a long-lived tree, and this dying out may indicate that the old trees of this forest, probably all of nearly the same age, had so nearly reached the limits of their natural existence as to be unable to withstand some unusual or severe climatic state, such as a period of intense winter cold or late spring frost. The following extracts from Mr. Pringle's report will indicate the opinions of those best able perhaps to form an opinion upon this subject:

"Mr. Mark Moody, residing at the foot of Tupper lake, a hunter and woodsman who has passed his life in the forest, testifies as follows: 'The spruce died fearfully in his vicinity about two years ago; he tried to learn the cause. Sixteen years ago the spruce had died out much in the same way as it has been doing lately. It is the older trees which die. They seem to die by crops, successively. Under the large trees were always springing up small trees to take the places of those that perish. There seems to be a narrower limit to the life of the spruce than to that of any other species. Other trees do not die in the same manner, by crops. The spruce does not seem to enjoy the same green old age, long drawn out, as other trees do, but when it has reached its full growth seems to relinquish its vitality without any apparent or sufficient cause, and before giving evidence of decay or any diminution of vigor.'

"Mr. Wardner, of Bloomingdale, Essex county, an old hunter, woodsman, and guide, testified as follows: 'The spruce timber on this side of the forest has failed clear through to its northern borders, in the same manner and during the same seasons as in other portions of the region.' Mr. Wardner first noticed the leaves falling and covering the ground in 1878; the destruction was continued through 1879, but during the past season he had met

with very few trees that were dying. Spruce timber had perished in this manner before, and he pointed out a broad valley in which most of the trees were dead and falling when he came into this region, twenty-five years before. He had carefully endeavored to ascertain the cause; was positive that insects either under the bark or upon the leaves had nothing to do with the death of the spruce trees, and he is sure that it is not due to drought, as he has seen the greatest destruction on the northern slopes. No active destructive agent being apparent, he inclines to the opinion that the spruce trees die because they have reached the limit of their life, and that it is some peculiarity of the winter rather than the summer that turns the scale against them; for this reason they perish in quantities, sometimes in sections. He has counted the rings of many trees, and considers 100 to 150 years the average lifetime of the spruce."

Whatever has caused the destruction of these forests, the damage thus occasioned, both in the loss of valuable timber and in the increased danger of forest fires from the presence of such a body of dead wood is enormous. It is believed by Mr. Pringle that from one-third to one-half of the fully-grown spruce timber left in the Adirondack region is dead.

NEW JERSEY.

The original forests of New Jersey have disappeared, except from some of the highest and most inaccessible ridges situated in the northwestern part of the state, and these, with the increased demands of the railroads for ties and other material, are now fast losing their forest covering. The forests of New Jersey are insufficient to supply the wants of the population of the state, and nearly all the lumber it consumes is brought from beyond its limits. The forests of pitch pine, which once covered large areas in the southern counties, have now generally been replaced by a stunted growth of oaks and other broad-leaved trees.

The forests of New Jersey, especially those on the dry sandy soil of the southern part of the state, have long suffered from destructive fires. During the census year 71,074 acres of forest were reported destroyed by fire, causing a loss of \$252,240. Of these fires twenty-eight were set by locomotives, seven through malice, seven by fires set on farms escaping to the forest, and six each by the carelessness of hunters and charcoal-burners.

The manufacture of cooperage stock and other industries using hard woods have been largely abandoned, owing to the decrease of the local supply of timber.

PENNSYLVANIA.

Pennsylvania once possessed vast forests of white pine and hemlock stretching over both flanks of the Alleghany mountains and extending from the northern boundaries of the state to its southern limits. East and west of the Alleghany region the whole country was covered with a heavy growth of broad-leaved trees mixed with hemlocks and occasional groves of pines. Merchantable pine has now almost disappeared from the state, and the forests of hard wood have been either replaced by a second growth or have been so generally culled of their best trees that comparatively little valuable hard-wood timber now remains. Large and valuable growths of hemlock, however, are still standing in northwestern Pennsylvania. From all parts of the state manufacturers using hard wood report great deterioration and scarcity of material, and Pennsylvania, which during the census year was only surpassed by Michigan in the value of its forest crop, must soon lose, with its rapidly disappearing forests, its position as one of the great lumber-producing states.

The following estimates of merchantable pine and hemlock standing in Pennsylvania May 31, 1880, have been prepared by Mr. H. C. Putnam. They are based upon the reports of a large number of timber-land owners and experts familiar with the forests of the state:

WHITE PINE (Pinus Strobus).

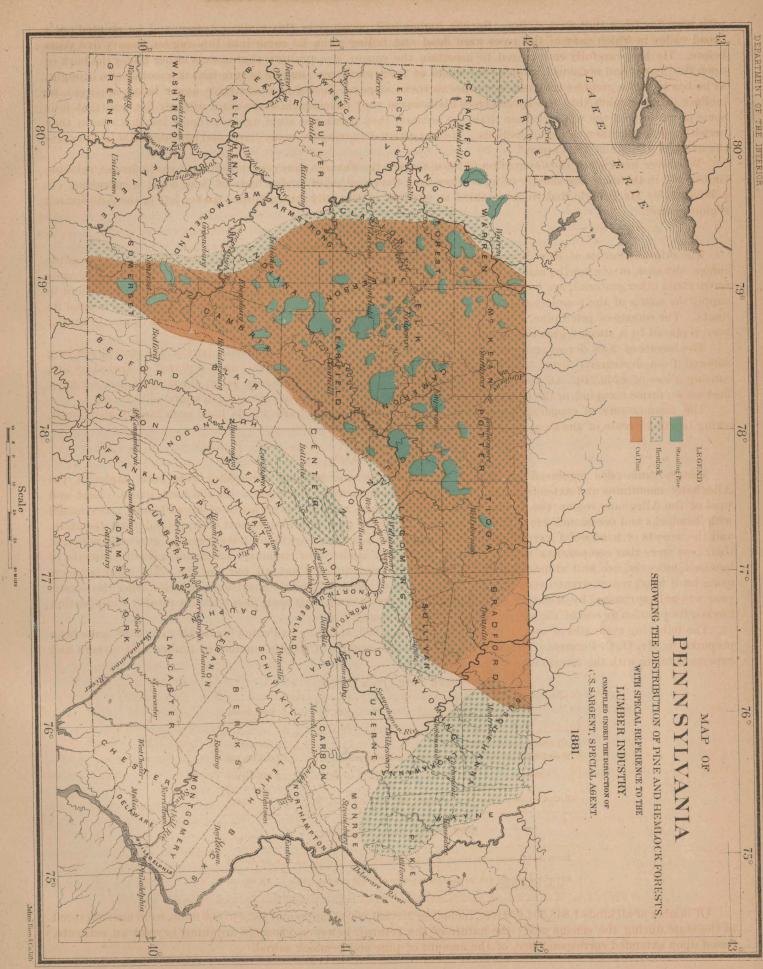
Regions.	Feet, board measure.
Alleghany river and tributaries	500, 000, 000 1, 300, 000, 000
Total	1, 800, 000, 000
Estimated amount cut for the census year ending May 31, 1880	380, 000, 000

HEMLOCK (Tsuga Canadensis).

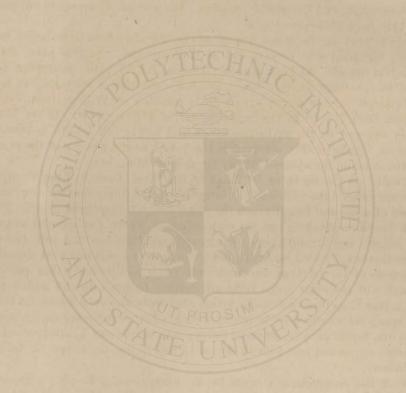
Estimated amount of hemlock standing May 31, 1880	4, 500, 000, 000
Estimated amount cut for the census year, exclusive of trees cut for their bark alone.	300, 000, 000

Of lumber of all kinds 1,848,304,000 feet, including 288,561,000 shingles and 183,740,000 laths, were manufactured in the state during the census year; the nature of the returns, however, prevents anything beyond an estimate, based upon extended correspondence, of the amount of pine and hemlock sawed.

THE FURESTS OF THE UNITED STATES



THE PORTER OF THE UNITED ENLISE



Numerous bodies of pine too small to be indicated on the map, of no great commercial importance and not included in these estimates, still remain scattered over the region originally occupied by pine forest.

The forests of Pennsylvania, especially through the mountain regions, have long suffered from destructive fires. During the census year 685,738 acres of forest were reported destroyed by fire, with a loss of \$3,043,723. Of these fires a large proportion were traced to locomotives and the escape of fires from farms to the forest.

The forests of Pennsylvania produced during the year 1879 2,866,010 pounds of maple sugar.

The following extracts are made from Mr. Pringle's report upon the principal lumber-producing regions of the state:

"Originally the broad pine belt of northern Pennsylvania, occupying the region drained by the numerous streams constituting the headwaters of the Susquehanna, extended from Susquehanna county, in the northeastern corner of the state, westward through Bradford and Tioga counties to Potter county, although this county never had as much pine as the others, and thence southwestward over Cameron, Elk, and Clearfield counties. The heaviest growth of pine in all this region was on Pine creek, in the southwest part of Tioga county. Now there is but little pine left in Susquehanna and Bradford counties, these counties being thickly settled; and in Tioga county, from which one firm alone has cut four billion feet, there now remain standing but little over one billion feet. The greatest part of the pine now standing in the Pennsylvania forests is on the upper waters of the West Branch of the Susquehanna, in Cameron, Elk, and Clearfield counties. In some of the counties adjoining these, as McKean, there was once, and still may be, a little pine timber.

"Active lumbering operations on the West Branch of the Susquehanna were begun in 1850, when the boom of the Susquehanna Boom Company was constructed at Williamsport. At this place the greatest part of the lumber on the West Branch is sawed. At Lock Haven, 25 miles above, on the same river, advantage was taken of the feeder-dam of a canal to construct another boom, and a few companies operating in lumber are now located there, about one-tenth as much lumber being sawed as is handled at Williamsport. Some of the companies, however, are removing from Lock Haven to the larger center of Williamsport. Below Williamsport no logs are driven, but a little timber squared by the ax in the woods and left at full length is made into rafts and taken down the main Susquehanna. Some of this is sawed in the towns on the river, and the remainder is taken to the large markets to supply the demand for squared timber for ship-building, etc.

"Williamsport is situated on the north or left bank of the West Branch of the Susquehanna, and for 2 or 3 miles along the river side are ranged the mills and lumber-yards of the thirty-four lumber companies operating here. We visited a large number of mills and found much the same methods employed in all. The logs are first slit up by gang-saws; then each board or plank is put through an edger, where two circular saws cut a strip from each side to give the board a square and straight edge; the boards are then assorted into two or more grades, loaded on trucks, and moved over tramways which ramify through the lumber-yards adjacent to each mill. The fragments of boards and better portions of the edgings are made into fence pickets and other portions into laths, and the fragments and strips which will not even make laths are carried to one side and added to a burning pile. The fragments thus burned (rather than thrown into the river) constitute the only waste, for the sawdust supplies the engines with fuel. This being cut chiefly from heart-wood makes better and more easily handled fuel than the sapwood strips. Even these are, however, often cut and put up into bundles of kindling-wood for city use.

"In the woods the trees are sawed into logs 12, 16, or 18 feet in length, as can be done to the best advantage and the least waste of timber.

"The West Branch of the Susquehanna must be an exceptionally fine river to drive, judging from the comparatively unbattered condition of the logs seen about the mills. The smaller streams in the woods are furnished with flood-dams, and from these extend throughout the timber belt numerous narrow-gauge railroads, tramways, and slides for bringing down the logs. Little hauling is done upon wagons or sleds, the ground in the woods being too rough, it is said, for hauling logs with teams. It is probable that snow does not fill up the depressions and smooth the surfaces to the same extent as in the northern woods.

"The lumbermen of this place at first were content to send their lumber to market in the simplest shape, but of late, as the supply diminishes more and more, mills and shops are being built for the manufacture of doors, sashes, blinds, packing-boxes, furniture, etc. Some companies have so exhausted their pine lands that they can in future only carry on business in this way, buying the rough timber from their neighbors. As the pine lands of one firm after another are exhausted the pine remaining comes to be held by a very few parties, who know its value. Not all of these are operators, but, living at a distance, sell stumpage to manufacturers.

"The following table, giving the amounts of lumber rafted out of the Susquehanna boom at Williamsport since the record has been kept, may be of interest as showing something of the rise and decline of the lumber business at this important center. The greatest prosperity or fullest development of the business was attained, as will be seen, in 1873. After that year, with the steady decrease of the supply of pine and the consequent increase of expense in securing logs, the annual stock steadily diminished until 1877. During the past three years the increasing demand for lumber has stimulated the operators to greater activity, but more than to this cause the recent gain in the yearly stocks is due to the substitution of hemlock for pine, the ratio of hemlock to pine

being at present as 1 to 4, although the average for the last seven years is but as 1 to 10. As the supply of pine timber is exhausted, hemlock will be more and more handled until it will become the most important timber of this region. The summary is made for the last eight years only:

Years.	Number logs.	Feet, board measure.	Years.	Number logs.	Feet, board measure.
1862	196, 953	37, 853, 621	1875	1, 096, 897	210, 746, 956
1863	405, 175	76, 475, 826	1876	715, 087	134, 396, 293
1864	511, 549	96, 595, 681	1877	589, 827	106, 944, 257
1865	379, 392	72, 421, 468	1878	617, 552	112, 069, 602
1866	615, 373	118, 831, 494	1879	1, 040, 278	190, 549, 111
1867	833, 388	163, 196, 511	1880 (to November 21)	763, 768	128, 558, 959
1868	853, 663	165, 338, 389	-9 to -90- (alaba sana)		1 000 040 070
1869	1, 080, 511	223, 060, 305	1873 to 1880 (eight years)	710707110	1, 382, 342, 27
1870	1, 099, 777	225, 180, 973	Logs remaining in river November 21, 1880		25, 000, 000
1871	842, 129	116, 661, 181		0.51002000000	
1872	1, 484, 103	297, 185, 652		TO DESCRIP	1, 407, 342, 275
1873	1, 582, 460	318, 342, 712	Deduct hemlock	*************	140, 734, 22
1874	989, 586	180, 734, 382	Williamsport pine, 1873-1880		1, 266, 608, 04

"It is proper to add that the variations in the yearly stock of logs shown above are in some measure due to a greater or less proportion of each annual cut being left behind in the woods or in the streams, from varying supplies of water or from other peculiarities of the season.

"The lumber manufactured at Lock Haven and Williamsport is shipped by railroad and canal to Baltimore and Philadelphia and to intermediate cities and stations.

"I found it more difficult to obtain information of the extent and limits of the hemlock woods of Pennsylvania, and of the amount of the standing timber and the annual crop of hemlock, than I did to get the same facts respecting the pine. Lumbermen agree that there was originally far more hemlock in this state than pine, and they speak of it now as inexhaustible, which is not strictly true, for it is doubtful if it holds out to supply the increasing drain made upon it by tanneries and saw-mitls for more than twenty-five years to come. Large quantities of hemlock have been wasted. Much that grew intermingled with the pine has died after the pine has been removed, partly from exposure to fuller sunlight and summer drought, and partly to forest fires induced by and following lumber operations. In the early days of the tanning industry of this region, when hemlock lumber was esteemed of little value, and whenever of late years the lumber trade has been so dull as to offer no inducement to send to market the trunks of the trees felled for their bark, large quantities of these have been left in the woods to decay. Now, however, with a good market for hemlock lumber, tanning companies owning hemlock lands, or the contractors who furnish the tanneries with bark, buying for this purpose stumpage from the proprietors of the timber-lands, often own saw-mills in the timber region, and cut and ship this lumber to market by railroad.

"Inasmuch as hemlock, besides mingling more or less with pine throughout the pine belt, seems to have formed a border entirely around the pine, the extent of the hemlock woods, as well as the quantity of hemlock timber, has always been much greater than of pine. Beginning in Wayne county, in the extreme northeastern corner of the state, the original hemlock forest extended westward through the northern tier of counties as far as Warren county, in the vicinity of lake Erie. Thence its bounds may be traced southward through Forest, Clarion, and Jefferson, and thence eastward through Clearfield, Center, Clinton, Lycoming, and Sullivan counties. Now the northeastern counties are for the most part cleared, and not only have the outskirts of these woods been cut off on all sides, but their continuity has been completely broken up throughout its whole extent by countless clearings and settlements. Yet, however much the hemlock forest has suffered, it possesses to day greater value than did all the pine standing in 1850. Quite neglected a few years ago, hemlock is appreciating rapidly in value and importance, and ere many years shall have passed it will be almost the only kind of lumber known in the Williamsport market. The best grades of hemlock bring as high a price as scrub pine, the product of the shorter and more knotty trees grown on high land. Although as a rule Pennsylvania hemlock is of superior quality, much of it being nearly as good as spruce, yet here, as well as elsewhere, considerable variation in quality is noticed. Lumbermen classify hemlock into two kinds, red and white, according to the character of the wood, but the more intelligent among them attribute the difference to soil and situation. White hemlock, being sounder, firmer, and straighter grained, constitutes the highest grade. Red hemlock is more brittle, more inclined to splinter, and liable to be found more or less decayed when the trees have gained full size. In this condition trees are said to be 'shaky'. Such timber is generally found on bottom lands, while the hemlock of high hillsides is apt to be short and scrubby. The quality of the hemlock seems to deteriorate west from the center of the state. The Pine Creek hemlock is considered better than that of the Sinnamahoning, and this better than that on the Alleghany. Seldom more than two good logs can be obtained from a trunk, the third and fourth logs being generally inferior and knotty; 8,000 feet per acre is here considered a good yield of hemlock, and 10,000 feet a large yield.

"From Williamsport to Lock Haven the valley of the West Branch of the Susquehanna is usually less than a mile in width, being bounded by abrupt and rocky ridges a few hundred feet in height. At Lock Haven we

ascended the ridge on the south side of the river, some 800 feet in altitude, in order to examine the moderate forest growth with which it was covered. In favorable places scattering specimens of white pine indicated the crop these hills have yielded the lumberman in former years. Hemlock, also, was scattered over the hillsides, but even as late as the present year most of the trees in this immediate neighborhood had been felled for their bark; their peeled trunks lay strewn over the hillsides, being left to decay within a mile or two of the saw-mills of Lock Haven. The summit of the ridge afforded a good view of the surrounding country. Parallel ridges of a similar altitude, and which appeared more heavily timbered, lay back of the one on which we stood; between them were seen narrow valleys occupied by farms. On the north or opposite side of the river successive ridges rose higher and higher as they receded from the river, and in the distance seemed to lose themselves in a plateau whose altitude was equal to that of the ground on which we were standing. The gentle slopes and rounded summits immediately above the river showed smooth, cultivated fields interspersed among woodlands of decidnous trees. The more distant heights displayed a darker forest growth where hemlock and pines predominated.

"From Lock Haven to Warren, the county-seat of Warren county, even on the hillsides overlooking the river, close to the banks of which the railroad crept, but especially where we were able to look into the deep runs coming down to the river by a gradual descent from the table-lands of the divides, seldom more than a few miles back above the river, we saw much original forest still standing and principally composed of hemlock. Some white pine appeared as scattering trees or in groves, and some hard wood. The proportion of hard wood increased as we ascended the divide between the waters of the Susquehanna and those of the Alleghany river.

"On the summit of this divide the forest had a truly northern aspect, except that we missed the spruce, not seen in Pennsylvania. The dark foliage of the hemlock mingled with sugar maples, beeches, and birches. For many miles above Lock Haven it was a second growth which occupied the hillsides, a thin growth of white oak, chestnut, locust, etc., which had followed the lumberman and forest fires. Considerable second-growth white pine was seen in a few places, but on this none of the present generation seem to set much value, and I have yet to meet any one in the state who gives a thought to encouraging and preserving such growth. To consume the forests as speedily as possible, satisfied with what can be realized from them in the operation, appears to be the spirit which rules this region. Alternating here and there with the original forest mentioned above were seen all along the railroad leading through this timber belt, but especially in the vicinity of the settlements and lumbered districts, tracts which have been ranged by fire. Sometimes the fires had spread from the clearings into unculled timber, killing everything, large and small. Sometimes 'hemlock slashes' had burned over after the trees had been cut and 'peeled'. Always the charred stumps thickly dotted the ground, and the blackened, half-consumed trunks strewn over the soil in confusion gave to the landscape an aspect of complete desolation. The bird cherries and poplars, which in the forests farther north soon cover and hide from view such wastes of ruin, are wanting here.

"I learned that the best hemlock grows on the steep sides of the deep runs, and that upon the summits of the divides were considerable barrens, the soil of which was sometimes too poor to support any arboreal growth. Farther to the west the summits of the dividing ridges are occupied by hard wood chiefly, although hemlocks mingle with the beeches and maples.

"Arrived at Warren, we find that we have passed through the woods and are in a long-settled and wellimproved country, and, judging from the scattered patches of woodlands occupying the low hills within view, the region of hard-wood forest has been reached. The coniferous forest belt only extends into the southeastern quarter of Warren county; the northern and western portions, lying beyond the Alleghany river, yield oak, chestnut, hickory, etc. Originally there was a little pine scattered over the southeastern portion of Warren county, but this has been mostly cut, and hemlock remains, as it ever has been, the most important timber in this part of the county. In Forest county, next south of Warren, pine is local, being scattered in small quantities throughout the county. On the highlands there is much hard wood, beech, maple, and white wood existing in belts between the streams. This, however, may be called a hemlock county. In McKean county a central table-land is covered principally by a growth of maple, beech, etc. In the remaining portions of the county the timber is chiefly hemlock. The valley of the Alleghany river, in the eastern part of McKean county, is mostly cleared and improved. Elk county is one of the best counties for hemlock. Through Elk, the southwestern corner of McKean, and the southeastern corner of Warren runs the Philadelphia and Erie railroad. Along the line of this road, as it passes through this portion of the timber belt, are located the largest tanneries of the United States. These are consuming the hemlock of this region at an enormous rate, and, in addition to the vast amount of bark which they consume, large quantities are shipped out of the region by railroad. The first important tanneries of Warren county were established 12 or 15 years ago, and at the present rate of consumption the hemlock of this county can hardly hold out 20 years longer. The land, after the forest has been removed, is excellent for agricultural purposes throughout this region, and on all sides pioneers are making themselves farms. These men prefer to begin in the undisturbed forest rather than locate on the slashes, because they can pay for their land with the hemlock bark which it yields; and from a radius of 15 miles bark is drawn and sold at from \$4 50 to \$5 a cord to the tanneries. On an average, four trees yield a cord or ton of bark, the equivalent of 1,000 feet of lumber, board measure. In Warren county from 5,000 to 6,000 acres of hemlock were cut down in 1880, and there is no possibility of this growth being renewed, for every foot of slashed land is eventually burned over, and sometimes the burnings are repeated until the soil is nearly ruined for agricultural purposes. From the dry slashes the fires extend to a greater or less distance through the living

woods, ruining not only heavy bodies of hemlock, but also destroying the belts of hard wood intermixed with the hemlock. Notwithstanding stringent legislation in this state upon the subject of forest fires, they seem inevitable, and especially so in the slashes. They spread from the clearings constantly made throughout this timber belt by the settlers, and, as the forest abounds in deer and its streams are stocked with fish, hunters and fishermen are always in the woods, and from their camp fires spread many conflagrations. Many fires here also are set by a tribe of half-civilized Indians residing in this region, to burn over the huckleberry fields in order that the bushes may renew themselves and yield fuller crops; or, where it is so easy to start a fire and conceal its origin, many doubtless arise from malice.

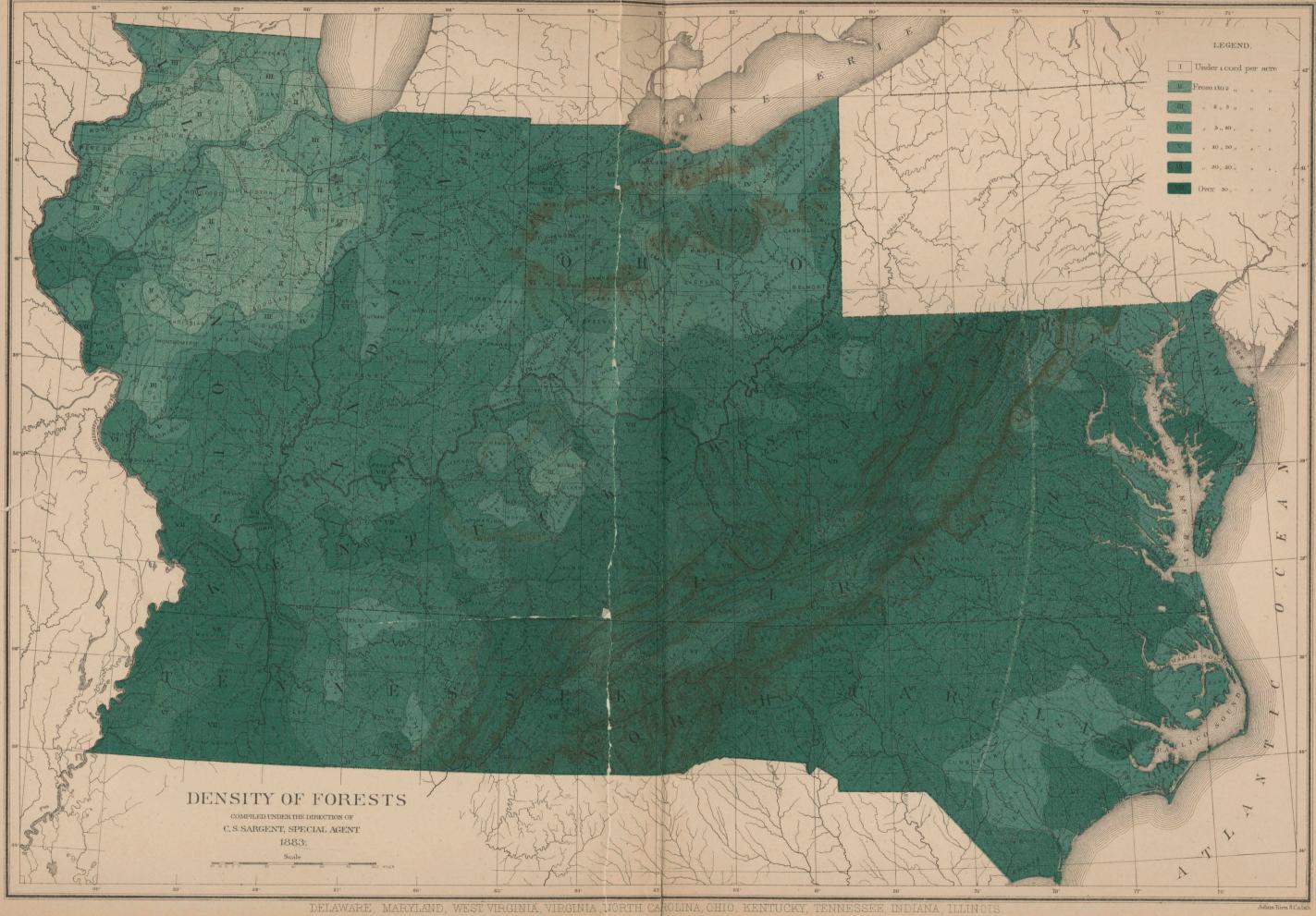
"In this region the aspen springs up on land upon which the hemlock has been destroyed, but this tree manifestly does not thrive as it does in northern woods. Yellow and black birch, bird cherry, beech, maple, white oak, chestnut, black cherry, etc., are the trees which spring up slowly among the briers, and cover burned land with a rather meager second growth. If a few pines have been left on the hilltops they may scatter a few seeds and give rise to some saplings, but as regards hemlock, fires kill it out clean, seedlings and seed; and if the 'peelers' and the fires happen to leave any scattering trees standing, these, being more sensitive to changed conditions than pines, are seldom able long to survive as seed bearers. The bird cherry only thrives on cold, wet soils here. There is another phase of the slaughter of the hemlock forest: As the pine forest gives out, large numbers of laborers turn to the hemlock woods and find employment as bark peelers. In the pine woods work is mostly suspended when spring arrives; then larger numbers of men come into the hemlock woods than can find work at satisfactory wages, and these sometimes set fires in the slashes, which spread into the living woods and kill large quantities of hemlock. To save the bark it must be peeled at once, or before it adheres to the wood and becomes injured by worms, and thus employment is given to a larger force of men.

"The pine now remaining in Clearfield county is mostly found in the northern and the southwestern portions of the county. The eastern and southeastern portions are now principally cleared and improved, as the entire county is destined to be, the soil being principally a strong, clayey loam, excellent for farming purposes. Already four-fifths of the pine timber originally standing in the county has been removed; most of the hemlock, which originally about equaled in amount the pine, remains. There are no tanneries in this region, and after the pine is cut the hemlock is next harvested, the bark being saved and shipped to the tanneries below to the amount of from 5,000 to 6,000 cords annually. Fires are here sometimes started by hunters in order to clear away the young second growth, that they may be able better to see the deer. One important reason which lumbermen have for planting their saw-mills near the woods, in preference to driving all their logs to the sawing centers below, is that they can then work into shingles, etc., many trees which, being defective by reason of rotten spots or other blemishes, would not be worth driving down the river. Such trees are seen standing here and there all through the woods, having been left behind by the lumbermen. Sometimes persons buy this culled timber and erect shingle-mills, etc., to work it up.

"With respect to the maximum yield of pine per acre, it would seem that 10,000 feet was a good yield for tracts of 400 or 500 acres in extent, although smaller tracts of 50 acres and upward will often cut 25,000 feet to the acre, and even a yield of 100,000 feet to the acre has been reported. The rough nature of the surface in all this region often necessitates the use of slides to bring the logs from the forest to the streams. They are constructed by pinning to ties of hemlock some 3 feet in length hemlock logs about a foot in diameter placed side by side, their inner sides above the point of contact being hewn with care to form a broad V-shaped trough along which the logs may be slid. Except where there is considerable descent logs cannot be slid unless the weather is frosty, when the slide can be kept icy by means of water sprinkled over it from time to time. Slides sometimes are built for 6 or 8 miles back into the woods, usually following up some run so as to get an even and gentle grade. By this means the greatest part of the logs come down to the streams, for sleds are not used in this country. Most of the hazard of lumbering depends upon the lumberman's ability to slide his logs successfully. They can be cut at any time in the woods, and almost any year can be driven to the mills when once in the water, but mild weather interrupts sliding and deep snows impede the operation; so that in open winters lumbermen are sometimes compelled to do their sliding in the night time, when ice will form on the slide. The logs, stripped of their bark, are drawn singly, by horses with chains, from the places where they have fallen to the upper end of the slide. When a sufficient number-from 6 to 40, according to the grade and the size of the logs-have been placed end to end in the slide, the hook of a chain is driven into the rear log near its forward end, and horses are attached which walk a tow-path formed on one side of the slide, and push ahead of them the 'trail' of logs, thus bringing them down to the stream.

"Only in the late autumn and in the winter is it thought expedient in Pennsylvania to fell pine; if cut in summer, when the bark will part from the wood, the sap-wood soon assumes a blackish appearance and disfigures the lumber. As a rule hemlock is here cut and peeled in summer, at the time when operations in pine are suspended; thus by alternating operations in pine and hemlock the hands are kept employed throughout the whole year. In cutting trees the several parts of the work are allotted to different men; some merely fell the trees, others measure them off into suitable lengths and cut away the limbs as far as the upper end of the last log taken, where they sever the top of the tree from the trunk by means of the ax; others follow in pairs with cross-cut saws and cut the trunk into logs."









SOUTH ATLANTIC DIVISION.

DELAWARE.

The northern portion of the state, comprising New Castle and Kent counties, was once covered with the deciduous forests of the Atlantic plain. Conifers, with the exception of the red cedar, were rare. In the sandy soil of the southern part of the state various pitch pines flourished, forming fully one-half of the forest growth. These pine forests were long ago consumed and are now replaced by a second growth, generally composed of the species which originally occupied the ground; and throughout the state the best hard-wood timber has been culled from the forest. Large quantities of wheel and cooperage stock were formerly manufactured in the northern counties; but of late years these and other industries using the products of the forest have, for want of material, generally decreased in importance. The manufacturers report a general scarcity of timber.

During the census year 3,305 acres of woodland were reported destroyed by fire, with a loss of \$15,675. Of such fires six were set by locomotives, six by the careless burners of brush upon farms, and two through malice.

Kent county.—About one-quarter of this county is reported covered with forest. A few small mills saw oak from the immediate neighborhood into shipstuff and car lumber, shipping to Wilmington, Philadelphia, and even to New York.

NEW CASTLE COUNTY.—About one quarter of this county is reported covered with woodland, mostly of second growth and attached to farms. The large establishments for the manufacture of gunpowder, located in the neighborhood of Wilmington, consume large amounts of willow wood, generally grown for the purpose upon farms in their immediate vicinity.

Sussex county.—One-third to one-half of this county is reported covered with woodland. Numerous small mills, obtaining their supply of logs from the immediate neighborhood, saw oak for shipstuff.

MARYLAND.

The northwestern portion of the state, crossed by the ridges of the Appalachian system, was once covered with the forests of white pine, hemlock, birch, and maple peculiar to this mountain region. The central portion of the state, extending from the mountains to the shores of Chesapeake bay, was covered with oaks, hickories, gums, and other deciduous trees in great variety, the eastern peninsula largely with different species of pitch pine, occupying sandy plains, or mixed with deciduous trees.

In the mountain region considerable bodies of the original forest remain upon the highest and most inaccessible slopes; in the remainder of the state this, where the land has not been permanently cleared for agriculture, is now largely replaced by a second growth, or—the best timber at least—has been everywhere culled.

A large amount of cooperage stock was formerly manufactured in this state. This industry has, however, greatly suffered from the deterioration and exhaustion of the local supply of timber; manufacturers report the best stock nearly exhausted and the substitution for oak, formerly exclusively used, of elm and other inférior woods now brought from beyond the limits of the state.

During the census year 41,076 acres of woodland were reported destroyed by forest fires, with a loss of \$37,425. These fires were traced to the carelessness of hunters, to locomotives, and largely to the escape from farms to the forest of fires set in clearing land. The principal lumber manufacturing establishments using Maryland logs are situated in Garrett county; these saw white pine, hemlock, and oak to supply a limited local demand and ship to Baltimore, Philadelphia, Pittsburgh, and Wheeling; considerable oak timber is sent to Europe from this county. During the year 1879 the northern counties produced 176,076 pounds of maple sugar.

DISTRICT OF COLUMBIA.

The original forest has disappeared from the District of Columbia and has been replaced by a second and third growth of oaks, scrub pines, and other trees. The area occupied with woods is probably slowly increasing. A single saw-mill, situated in the city of Washington, saws logs grown beyond the limits of the District.

VIRGINIA.

The forests of Virginia, like those of the Carolinas and Georgia, fall naturally into three divisions, dependent upon the elevation and soil of the different parts of the state. The mountains and ridges of its western border are

covered with a heavy growth of pine, hemlock, white oak, cherry, yellow poplar, and other northern trees; over the region extending east of the mountains oaks, principally black oaks, once formed the prevailing forest growth; through these are now mingled long stretches of various pitch pines, occupying exhausted and barren soil once devoted to agriculture. The eastern counties are covered with the forests of the Maritime Pine Belt, generally confined to the Tertiary deposits of the coast and extending inland to the head of tide-water of the principal streams; along the western borders of this pine belt the forest growth is nearly equally divided between the pines and the broad-leaved species.

The inaccessible mountain region in the southwestern part of the state still contains immense quantities of the original oak, hickory, walnut, and cherry, the scanty population of these mountains having made but slight inroads upon the forests. Railroads have hardly penetrated them, while the streams which head here are unsuited to carry to market the hard woods of which this forest is largely composed. The most valuable hard-wood forest remaining on the continent exists in southwestern Virginia and the adjacent counties of West Virginia, Kentucky, Tennessee, and North Carolina. From the central and eastern portions of the state the original forest has almost entirely disappeared, and is now replaced by a second growth, in which the Jersey pine and the old-field pine are characteristic features, generally replacing more valuable species of the original growth.

During the census year 272,319 acres of woodland were reported ravaged by fire, with a loss of \$326,944. Of such fires the largest number was traced to the careless burning of brush upon farms and to locomotives.

The manufacture of cooperage stock is increasing rapidly in the western part of the state, and great quantities of staves are exported thence directly to Europe, as well as oak, yellow poplar, and walnut in the log. The manufacture of tobacco cases from sycamore lumber is an important industry in the neighborhood of Lynchburg and other tobacco-distributing centers. Considerable quantities of hand-made shingles are produced in the cypress swamps which occupy a large portion of Norfolk and other eastern counties. A large amount of second-growth pine ($Pinus\ Txda$) is shipped from the different Virginia ports by schooner to New York for fuel, and this second-growth pine furnishes the principal building material used throughout the state. The grinding of oak and sumach bark and the manufacture of tanning extracts are important and profitable industries of the state.

WEST VIRGINIA.

The forests of West Virginia, with the exception of the belt of pine and spruce confined to the high ridges of the Alleghany mountains, are principally composed of broad-leaved trees, the most important of which are the white and chestnut oaks, the black walnut, the yellow poplar, and the cherry. The white pine and spruce forests reach within the state their southern limit as important sources of lumber supply.

The forests have been largely removed from the counties bordering the Ohio river, and the most valuable hard-wood timber adjacent to the pricipal streams, especially black walnut, cherry, and yellow poplar, has been culled in nearly every part of the state. But slight inroads, however, have yet been made into the magnificent body of hard-wood timber covering the extreme southern counties, which still contain vast quantities of oak, cherry, and poplar.

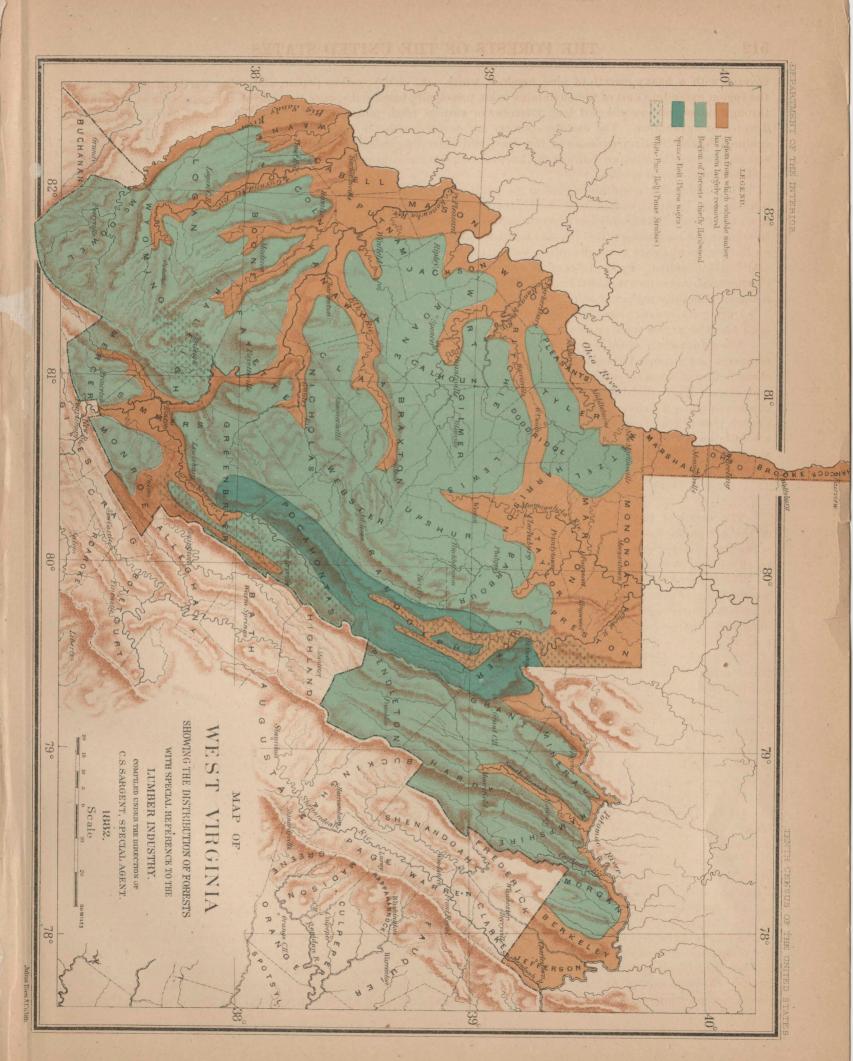
The black walnut found scattered everywhere in West Virginia is least plentiful in the northwestern and Ohio River counties, and most abundant along the upper waters of the rivers flowing into the Ohio through the southwestern part of the state. Yellow poplar is found throughout the state, and is still abundant about the headwaters of nearly all the principal streams. Large bodies of cherry are found in Greenbrier, Nicholas, Webster, and other counties immediately west of the mountains, and a large amount of hemlock is scattered through the valleys and ravines of the northeastern part of the state and along the western slopes of the Alleghanies. The area still occupied by white pine is estimated to extend over 310 square miles, and to contain about 990,000,000 feet of merchantable lumber. The principal centers of lumber manufacture are along the Kanawha river at Ronceverte, in Greenbrier county, at Parkersburg, and along the upper Potomac.

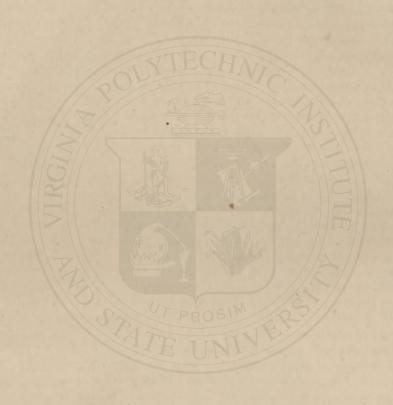
Partial returns of the hoop-pole industry gave a product during the census year of 3,549,000, valued at \$146,000. During the census year 476,775 acres of woods were reported destroyed by fire, with a loss of \$155,280. Of these fires the largest number was traced to the careless clearing of land for agricultural purposes, although many had their origin in sparks from locomotives.

The manufacture of cooperage stock is fast increasing in importance, and seems destined, with the exhaustion of the more accessible hard wood forests of the country, to a ssume a much greater development than at present Large quantities of black walnut, yellow poplar, and oak in the log are shipped to northern markets and to Europe.

The following notes upon the forests of West Virginia are extracted from Mr. Pringle's report:

"Entering West Virginia at Keyser (New Creek) by way of Cumberland, Maryland, we find ourselves in one of the narrow valleys lying among the low abrupt ridges of the northern Alleghanies, among which we have been traveling since we reached the vicinity of Williamsport, Pennsylvania. Coming south from middle Pennsylvania, however, the forest growth covering the long mountain chains within view from the railroad becomes heavier and heavier, the evidences of fire and ax largely disappearing. On the hills above Keyser fewer evergreens appeared than I had previously seen. A few slopes were principally occupied by pine in variety, but the mountains of this





region were covered with a growth of deciduous trees, white, black, red, Spanish, and chestnut oaks, hickories, butterputs, black walnuts, yellow poplars, locusts, elms, sugar maples, etc. At Piedmont some \$200,000 have been expended in the construction of a boom on the North Branch of the Potomac. At this point, as well as at Swanton and Deer Park, on the Maryland side, there are mills sawing chiefly white oak, and also considerable white pine, spruce, hemlock, poplar, white ash, etc. Some spruce which had not been seen or heard of in the timber belt of Pennsylvania is found 20 miles above Piedmont. The market for lumber manufactured here is chiefly eastward. Much of the oak is sent to Europe, partly in the form of squared timber, partly cut 5 by 12 inches and from 15 to 20 feet long. The mills at Swanton and Deer Park are located on the railroad, and cut timber is hauled to them from the vicinity. The mills at Piedmont are fed by logs driven down the river from the western portions of Mineral and Grant counties, West Virginia. This lumber is chiefly oak, spruce, and hemlock. Great difficulty is experienced in driving this part of the Potomac, as it is a swift and rocky stream. Logs, especially oak, constantly lodge on the rocks or banks, and there has been great difficulty in maintaining the boom and dam at this point.

"Rowlesburg, in Preston county, owes its existence as a lumber depot to the fact that the Cheat river, upon which it is situated, as it passes through the Briery mountains, for a distance of 25 miles below this point has so narrow and rocky a channel and so swift a current that it is not possible to get the logs farther down the stream. Above Rowlesburg the Cheat river is a good stream to drive, and any one of its branches can be driven from a point 125 miles above that point. From the mouth of the Black Fork, 30 miles above, the timber is brought down in rafts rather than as separate logs; this is because there is no boom as yet at Rowlesburg to stop the logs. There are small booms on Black and Shaver's Forks, many miles above Rowlesburg. Scattered along the river at some distance above Rowlesburg there are a few small mills, the product of which is floated down the stream on rafts. The timber of Preston county between Rowlesburg and the vicinity of the mouth of the river is oak, poplar, chestnut, ash, beech, yellow beech, hemlock, basswood, and hickory.

"The timber of Canaan valley, in Tucker and Randolph counties, is largely hemlock on the lower lands, on the higher situations and slopes sugar maple and beech; and, as soon as a suitable elevation is reached, spruce is mingled with black cherry. In other portions of Tucker county and on the tributaries of the Cheat river, flowing out of Randolph county, the timber is chiefly oak, poplar, ash, spruce, cherry, black walnut, white pine, etc. This, however, is not a black-walnut region, and there are here nowhere more than scattered trees; a careful search has failed to find any great body of this timber here. It is estimated that 2,500,000,000 feet of yellow poplar are still standing in the valleys of the Cheat and its tributaries.

"Shaver's Fork is heavily timbered with spruce. A boom has been constructed at Grafton, on Tygart's Valley river, a main branch of the Monongahela. It is a rough stream, unfavorable for lumber operations, and for a distance only of 10 miles above Grafton is smooth enough to admit of the passage of rafts. All lumber has, therefore, to come down in separate logs, and only such kinds as are light enough to float well can be got down. For this reason there is very little except poplar sawed at Grafton. Oak is too heavy to be driven successfully, and as it cannot be tied up in rafts with poplar, as is done on the Cheat, the stores of oak timber growing in the valleys drained by this river must wait the building of a railroad to bring them to market. The yellow poplar still standing in this region is estimated at 300,000,000 feet, and on the higher grounds, especially about the headwaters of streams, there are fine bodies of black cherry mixed with other trees.

"At Parkersburg are located the mill and shops of the Parkersburg Mill Company, situated on the banks of the Little Kanawha, a short distance above its confluence with the Ohio. This is the only company operating in lumber within the city of Parkersburg. It manufactures about 6,000,000 feet of lumber annually, mostly poplar, some oak, and about a quarter of a million feet of beech. Little black walnut can now be obtained here, and that of inferior quality. Rough lumber and manufactured articles of wood find a market in nearly every direction, west, north, and east. I was astonished and delighted to see how closely the lumber was worked up and the great variety of articles manufactured from slabs, edgings, culls, etc., which in other mills are so generally thrown into the waste pile. Broom handles, corn-popper handles, brush handles, brush heads, tool handles of many descriptions, and fly-trap bottoms are but a few of the articles which are turned out by millions from odd bits of wood, few of which are too small to make something or other from. The company executes orders for articles used in manufactories widely distributed over the country from Cincinnati and Chicago to Boston and New York. Poplar is used for broom handles, and beech, maple, sycamore, black walnut, cherry, etc., for smaller articles. This company does not own and operate timber lands, but buys its logs from parties who deliver rafts to its mill. Formerly much lumber was wasted in this region in clearing lands for farms, but now proprietors of land find it to their advantage to cut and save their logs, which they bring down in rafts themselves or sell to parties who make a business of rafting. Once out of the small streams, the logs are easily rafted down the Little Kanawha during favorable seasons.

"There are no booms on the Little Kanawha, except temporary constructions for special purposes, which are broken up by every flood. Several years ago it was supposed that the timber on this river was nearly exhausted, but it continues to come down in undiminished quantities to the value of some hundred thousand dollars annually, in addition to railroad ties, staves, etc. It is only about 40 miles up the main river, and to no great distance back from the stream, that the supply of oak is exhausted. The river is a hundred miles long, and about its upper 33 FOR

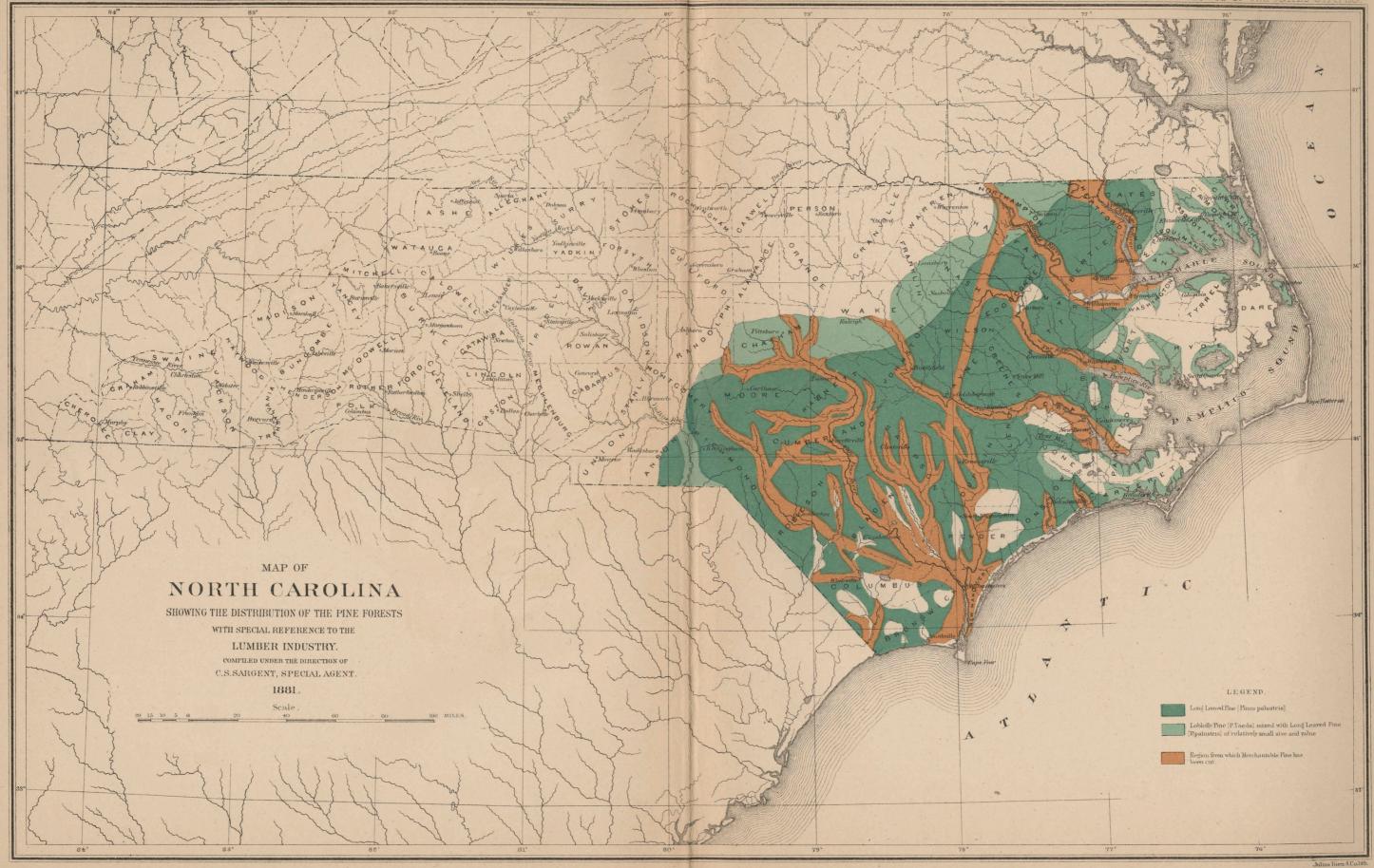
waters and those of its tributaries the oak is comparatively untouched. Much of Wirt county and the greater part of Roane, Calhoun, and Gilmer, in the upper part of the valley of the Little Kanawha, are a vast virgin forest of oak and poplar, containing a good deal of black walnut and sugar maple and some black cherry. Baxter county is magnificently timbered, as is Webster, although the timber here is yet inaccessible.

"The Guyandotte is a good river for lumbering operations. Rafts can come down from a point 100 miles from its mouth. There are yet no booms on this river, except strings of logs occasionally stretched across it for temporary purposes. On its course above Guyandotte are four or five mills, doing for the most part a local business, their product for export being only about 1,000,000 feet of sawed lumber. The rafting of this sawed lumber is attended with some risk of loss, and therefore a much greater amount is brought down in unsawed logs bound together in rafts, which are taken down the Ohio and sold to various mills along its course. These rafts are usually made 11 logs wide, and three or four of these courses are placed end to end. White oak is made up into rafts with a poplar log in the center of each course, and thus the raft is made light enough to float easily. Along the Guyandotte, in the lower part of its course, the oak and poplar have been cut for a distance of from 1 mile to 2 miles from the stream, the black walnut for some 5 miles back; but nine-tenths of the area drained by this river is still in original forest, composed of white, chestnut, and other oaks, poplar, walnut, several hickories, beech, sugar maples, sycamore, ash, etc. In this region there is, in the aggregate, a good deal of black walnut, but it exists as scattered trees rather than in groves or tracts.

"Coal river is 160 miles long, and for 36 miles, or to Peytona, is navigable for barges. The valley of this river is covered with truly magnificent forests, in which the trees of the several species composing them attain remarkable dimensions. Poplar and white oak here exist in nearly equal proportions, and together constitute about a third of the timber. Besides these there is a good deal of black cherry, lin, and locust, as well as hemlock, the latter not being considered valuable in this country. Black walnut appears more abundant in this region than in any other of similar extent of which I have yet heard. But little timber has yet been removed from the valley of this river, and it is chiefly the lower portion and the immediate vicinity of the banks which have been lumbered.

"The Elk river empties into the Kanawha at Charleston. About 2 miles above its mouth are located a boom and several saw-mills, and here are also a dam and lock which secure slack-water for some 20 miles. The river is about 180 miles in length; logs have been driven from a point 150 miles above its mouth, but its valley has only been lumbered to any great extent in the immediate vicinity of the main river, and to a distance of some 110 miles from its mouth. Most of the original growth of the forest of the Elk basin still remains, and is composed largely of white oak, hickory, chestnut, and poplar. Black walnut here, as everywhere else in this state, is scattered, although it is estimated that 10,000,000 feet of this lumber still remain in this region. Above a certain altitude and about the upper waters of this river considerable black cherry, sugar maple, and birch is found. Here also beech and basswood abound, by the streams hemlock occurs, and on the mountains a little black spruce. About the upper settlements on this river miles of fence constructed with boards of black cherry and farms fenced with blackwalnut rails may be seen. Formerly large numbers of coal-boats and salt-boats were built upon the Elk river. Once, also, the salt-works of the Kanawha required vast numbers of barrels; these were made of black as well as white oak; now but five of the sixty furnaces once boiling brine in this vicinity are in operation, and there is little demand for black oak for staves. The country along the Kanawha between the Elk and the Gauley rivers has been lumbered for 5 or 6 miles back from the streams, and about one-fourth of the timber has been cut from these valleys. The Gauley river with its several large tributaries drains a valley which covers nearly 5,000 square miles; its length is about 110 miles, much less than that of the Elk, which is a long, slender stream, but it occupies a much broader valley and has twice the volume of water of the Elk. Unlike the rivers just considered, which wear out for themselves smooth channels through the soft sandstone, the Gauley is a rough stream, tumbling rapidly over hard conglomerate rock, its bed being full of bowlders and ledges. For the first 10 miles from its mouth the fall averages 4 feet to the mile; above that 20 feet to the mile, while its upper waters are so swift and rough as to be unnavigable even for small boats. For these reasons the Gauley does not admit of the passing of rafts, and it is a difficult river upon which even to drive single logs. Its valley is but little settled, except on Meadow river and along its right bank below that stream. Above a point 15 miles from its mouth no timber has been touched except by the few settlers. In the lower part of the valley of the Gauley for 15 or more miles the timber is chiefly oak, poplar, walnut, etc: The Gauley and its large affluents, the Cherry, Cranberry, and Williams rivers, all head back in the forests of black spruce, which sometimes take entire possession of the mountain tops; a little lower, yet often mingled with the spruce, hemlocks and black cherry abound. On Cherry river the cherry trees so predominate over all others as to have given their name to the stream. Here are trees often 4 feet in diameter. The region intermediate between the upper and the lower districts of the Gauley thus described contains much beech, sugar maple, and black cherry. The white oak which abounds in the lower basin of this river disappears above an altitude of 2,000 feet. I was informed that, although lumbering operations were but lately begun on the Gauley, nearly 1,000,000 feet of poplar were brought out of the river in 1879, and that it had yielded 50,000 feet of black walnut in 1880, while there were now in the river poplar logs enough to make 3,000,000 feet of lumber. About one fourth of the cut of late years has been sawed at mills near the falls; the rest is rafted to Charleston.







"The valley of the New river is only lumbered for from 3 to 5 miles from the stream, although the walnut has been gathered 10 miles farther back. This is a rough country in which to lumber, since the streams cut deep into the earth, and New river cannot be driven.

"Ronceverte is situated on the Greenbrier river at the point where the Chesapeake and Ohio railroad first meets this stream as it descends from the Alleghany mountains. Here is the boom of the Saint Lawrence Boom Company, and here are located three or four lumber firms operating steam-mills. One of these, the New York Hoop Company, uses two million hoop-poles per annum, chiefly hickory, manufacturing hoops for flour barrrels, pork barrels, hogsheads, and tierces, besides strips for boxes, etc. The process of manufacturing hoops was explained to me as follows: The poles, of assorted lengths and sizes, are passed through machines which split each of them into two, three, or four pieces, and these are put through other machines which plane flat the inner side of each strip, leaving the bark intact. The hoops thus made are tied into bundles and shipped to New York.

"The Greenbrier river rises in the limestone sinks in Randolph county, whence it flows southwesterly through the fertile limestone valley between the Alleghany and the Greenbrier mountains for a distance of 120 miles, emptying into the New river at Hinton. Flowing through such a valley it is not a rapid stream, but from a point 12 miles below Travelers' Rest, on its headwaters, it is fine for rafting. Yet the stream needs some improvement, especially by the closing up of back channels into which the logs are borne by high water, to be left in swamps when the flood recedes.

"Only a small proportion of the timber of the Greenbrier river has been removed as yet, and it is estimated that in its valley white oak, white pine, poplar, cherry, hemlock, walnut, and ash enough remain to make 1,000,000,000 feet of boards, and that there are not less than 500,000,000 feet of white pine in this region, occupying a belt through the center of both Greenbrier and Pocahontas counties. The eastern limit of the black-spruce belt on the headwaters of the Elk and Gauley rivers, the most extensive and valuable in West Virginia, coincides with the western limits of the white-pine belt lying in Pocahontas county. Its southern line runs northwesterly from the south end of Pocahontas to near the center of Nicholas county. From this point its western line runs northeasterly through the center of Webster county to the vicinity of Huttonville, in Randolph county, the northern end of the belt covering the upper waters of Shaver's Fork of the Cheat river. Over this belt black spruce is scattered more or less densely, sometimes occupying almost exclusively the high slopes, particularly the northern slopes and the summits of the mountains.

"It is believed that 10,000,000 feet of black walnut, in paying quantities, could still be gathered in this part of the state, and that there would then be left an equal amount so scattered that it could not be profitably collected at present prices."

NORTH CAROLINA.

The forests of North Carolina were once hardly surpassed in variety and importance by those of any other part of the United States. The coast region was occupied by the coniferous forests of the southern Maritime Pine Belt; the middle districts of the state by a forest of oaks and other hard-wood trees, through which the old-field pine is now rapidly spreading over worn-out and abandoned farming lands. The high ridges and deep valleys of the Appalachian system which culminate in the western part of the state are still everywhere covered with dense forests of the most valuable hard-wood trees mingled with northern pines and hemlocks. The inaccessibility of this mountain region has protected these valuable forests up to the present time, and few inroads have yet been made into their stores of oak, cherry, yellow poplar, and walnut. The hard-wood forests of the middle districts, however, have been largely removed or culled of their finest timber, although the area of woodland in this part of the state is now increasing. These new forests, usually composed of inferior pine, are of little economic value, except as a source of abundant fuel and as a means of restoring fertility to the soil, preparing it to produce again more valuable crops. A larger proportion of the pine forest of the coast has been destroyed in North Carolina than in the other southern states. This part of the state has long been the seat of important lumbering operations, while the manufacture of naval stores, once almost exclusively confined to North Carolina, and always an important industry here, has seriously injured these forests. The original forests have been practically removed from the northeastern part of the state, the great region watered by the numerous streams flowing into Albemarle and Pamlico sounds; and although some lumber, largely second-growth pine trees of poor quality, is produced here, the importance of these forests is not great. The merchantable pine, too, has been removed from the banks of the Cape Fear and other rivers flowing through the southern part of the state, and although these streams still yield annually a large number of logs, they are only procured at a constantly increasing distance from their banks and with a consequent increasing cost for transport.

Forest fires inflict serious damage upon the pine forests of the south. During the census year 546,102 acres of woodland were reported destroyed by forest fires, with a loss of \$357,980. The largest number of these fires were traced to the carelessness of farmers in clearing land, to locomotives, hunters, and to malice.

Manufacturers of cooperage and wheel stock, industries which once flourished in the eastern and central portions of the state, already suffer from the exhaustion and deterioration of material. Such industries, however, are increasing in the extreme western counties, and promise to attain there an important development.

The following estimate, by counties, of the merchantable pine standing May 31, 1880, south of the Neuse river, the only part of the state where it is of commercial importance, was prepared by Mr. Edward Kidder, of Wilmington. It is based upon actual surveys and the reports of a large number of timber-land experts familiar with the different counties still occupied by the forests of long-leaved pine:

LONG-LEAVED PINE (Pinus palustris).

Counties.	Feet, board measure.
Bladen	288, 000, 000
Brunswick	141, 000, 000
Chatham	448, 000, 000
Columbus	288, 000, 000
Cumberland	806, 000, 000
Duplin	21, 000, 000
Harnett	486, 000, 000
Johnston	563, 000, 000
Moore	504, 000, 000
New Hanover	96, 000, 000
Onslow	34,000,000
Robeson	864, 000, 000
Sampson	602, 000, 000
Wake	48, 000, 000
Wayne	40, 000, 000
Total	5, 229, 000, 000
Cut for the census year ending May 31, 1880, exclusive of 50,190,000 feet cut in the counties adjacent to Albemarle and Pamlico sounds and along the Pamlico and Neuserivers, which is largely lobbelly pine (Pinus Toda).	108, 411, 000

NAVAL STORES.

Small quantities of crude turpentine were produced upon the coast of North Carolina, between the Pamlico and Cape Fear rivers, soon after the earliest settlement of the country. It was sent to Great Britain or converted into spirits of turpentine and rosin for home consumption. The demand for ships' stores had greatly increased the North Carolina production as early as 1818, although the field of operations was not extended south of the Cape Fear river, nor more than 100 miles from the coast, until 1836. The large demand for spirits of turpentine created during that year induced manufacturers to test the yield of trees on the west side of the Cape Fear river, up to that time considered unproductive. The result was satisfactory, although overproduction and low prices deferred until 1840 the development of this region. Since 1840 this industry has been gradually carried southward. Naval stores were produced in South Carolina in 1840, and in Georgia two years later. Turpentine orchards were established in Florida and Alabama in 1855, and more recently in Mississippi and eastern Louisiana.

The naval stores manufactured in the United States are principally produced from the resinous exudations of the long-leaved pine (*Pinus palustris*), and in small quantities from the loblolly pine (*Pinus Tada*), and the slash pine (*Pinus Cubensis*) of the Florida coast. The trees selected for "boxing" are usually from 12 to 18 inches in diameter, although trees with trunks only 8 inches through are now sometimes worked. A deep cut or "box" is made in the trunk of the tree, by a cut slanting downward, some 7 inches in depth, and generally 12 inches above the ground, and met by a second cut started 10 inches above the first and running down from the bark to meet it. In this manner a segment is removed from the trunk and a triangular trough formed 4 inches deep and 4 inches wide at the top.

Two such boxes, or upon a large trunk sometimes four, are made on each tree. A "crop", the unit of production among large operators, consists of 10,000 such boxes. The boxes are cut early in November with a narrow-bladed ax specially manufactured for the purpose, and the trees are worked on an average during thirty-two weeks. As soon as the upper surface of the box ceases to exude freely, it is "hacked" over and a fresh surface exposed, the dried resin adhering to the cut having been first carefully removed with a sharp, narrow, steel scraper. The boxes, especially after the first season, are often hacked as often as once a week, and are thus gradually extended upward until upon trees which have been worked during a number of seasons the upper surface of the box is often 10 or 12 feet above the ground. For these long boxes the scraper is attached to a wooden handle, generally loaded with iron at the lower end to facilitate the operation of drawing down the resin. Once in four weeks, or often less frequently, the resin caught in the bottom of the box is removed into a bucket with a small, sharp, oval steel spade attached to a short wooden handle. The product of these "dippings", as this operation is called, is placed in barrels and transported to the distillery. The first season a turpentine orchard is worked boxes are usually dipped eight times, yielding an average of 300 barrels of turpentine to the crop. The second year the

number of dippings is reduced to five, the product falling off to 150 barrels, while for the third season 100 barrels are considered a fair yield from three dippings. To this must be added the yield of the "scrapes", which for the first year is estimated, for one crop, at from 60 to 70 barrels of 280 pounds each, and for succeeding years at 100 barrels.

Trees can be profitably worked in North Carolina by experienced operators during four or five years, or, upon a small scale, in connection with farming operations and by actual residents, several years longer; farther south the trees seem to possess less recuperative power, and in South Carolina four years is given as the outside limit during which an orchard can be profitably worked, while in Georgia, Florida, and Alabama they are often abandoned at the end of the second and always at the end of the third year. Twenty-five men, including overseers, wagoners, distillers, coopers, and laborers can work ten crops. The average wages of such a force is \$1 a day per man, so that the cost of labor necessary to work a crop during the season of thirty-two weeks is \$480.

The following grades of turpentine are recognized in the trade: "Virgin dip", or "Soft white gum turpentine"—the product the first year the trees are worked; "Yellow dip"—the product of the second and succeeding years, and becoming darker colored and less liquid every year; "Scrape" or "Hard turpentine"—the product of the scrapings of the boxes.

Rosin is graded as follows: "W"—Window-glass; "N"—Extra pale; "M"—Pale; "K"—Low pale; "I"—Good No. 1; "H"—No. 1; "G"—Low No. 1; "F"—Good No. 2; "E"—No. 2; "D"—Good strain; "C"—Strain; "B"—Common strain; "A"—Black.

Window-glass is the lightest grade, and is only produced from the first dippings of "virgin" trees—that is, trees worked for the first time. The resinous exudation becomes darker colored and less volatile every year, as the box grows older, and the rosin produced is darker and less valuable. Trees worked during several years produce a very dark brown or black rosin. Spirits of turpentine made from virgin trees is light colored, light in weight, and free from any taste; the resinous matter yielded in succeeding years gains more and more body, and the additional heat required in distilling it throws off some resin combined with the spirits, producing in it a strong, biting taste and greater weight.

Tar, produced by burning the dead wood and most resinous parts of the long-leaved pine in covered kilns, is graded as follows: "Rope yellow", or Ropemakers' tar—the highest grade, produced with a minimum of heat from the most resinous parts of the wood; "Roany," or "Ship smearing"—the next running of the kiln; "Black" or "Thin"—the lowest grade, made from inferior wood, or the last running of the kiln, and therefore produced with the maximum of heat.

The following statistics of the production of naval stores during the census year were prepared by Mr. A. H. Van Bokkelen, of Wilmington, North Carolina, to whom I am indebted for much information in regard to the methods used in carrying on this industry:

States.	Turpentine.	Rosin.
PRO	Gallons.	Barrels.
Alabama	2, 005, 000	158, 482
Florida	1, 036, 350	68, 281
Georgia	3, 151, 500	277, 500
Louisiana	250,000	20,000
"Mississippi	250, 000	20,000
North Carolina	6, 279, 200	663, 967
South Carelina	4, 593, 200	333, 940
Total	17, 565, 250	1, 542, 170

Eighty thousand barrels of tar were manufactured during the census year in North Carolina, and 10,000 barrels in the other southern states.

The total value of this crop of naval stores at centers of distribution, and of course including freight from the forest and different brokerage charges, was not far from \$8,000,000. The net profits of the industry, even in the case of virgin trees, is very small, and at present prices is believed to be unprofitable except to the most skillful operators. The low price of southern timber-lands and the facility with which rights to operate tracts of forest for turpentine have been lately obtainable in several states have unnaturally stimulated production. The result of this has been that manufacturers, unable to make a profit except from virgin trees, abandon their orchards after one or two years' working and seek new fields of operation; the ratio of virgin forest to the total area worked over in the production of naval stores is therefore constantly increasing. It is estimated by Mr. Van Bokkelen that during the years between 1870 and 1880 an average of one-third of the total annual product of the country was obtained from virgin trees, and that in 1880 one-fourth of the crop was thus produced, necessitating the boxing in that year of the best trees upon 600,000 acres of forest. The production of naval stores is carried on in a wasteful, extravagant manner, and the net profits derived from the business are entirely out of proportion to the damage which it inflicts upon the forests of the country; the injury is enormous. Lumber made from trees

previously worked for turpentine is of inferior quality, although it is probably less injured than has been generally supposed. Comparatively few trees, however, once boxed are manufactured into lumber. It is estimated that 20 per cent. of them, weakened by the deep gashes inflicted upon their trunks, sooner or later are blown down and ruined; fires, too, every year destroy vast areas of the turpentine orchards, in spite of the care taken by operators to prevent their spread. It is customary in the winter, in order to prevent the fires which annually run through the forests of the Southern Pine Belt from spreading to the boxes, to "racket" the trees; that is, to remove all combustible material for a distance of 3 feet around the base of each boxed tree. Fire, carefully watched, has then been set to the dry grass between the trees, in order to prevent the spread of accidental conflagrations, and to give the box-choppers a firmer foothold than would be offered by the dry and slippery pine leaves. In spite of these precautions, however, turpentine orchards, especially when abandoned, are often destroyed by fire. The surface of the box, thickly covered with a most inflammable material, is easily ignited, and a fire once started in this way may rage over thousands of acres before its fury can be checked.

The manufacture of naval stores, then, decreases the value of the boxed tree for lumber, reduces the ability of the tree to withstand the force of gales, and enormously increases the danger to the forest of total destruction by fire.

Wilmington, the most important distributing point for this industry in the United States, handles 80 per cent. of all the naval stores manufactured in North Carolina. Previous to 1870 Swansboro', Washington, and New Berne were also large shipping points.

SOUTH CAROLINA.

The forest covering of South Carolina resembles in its general features that of the states immediately north and south of it. The pine forest of the coast, nearly coinciding in area with that of the Tertiary deposits, covers the eastern portion for a distance of 150 miles from the coast. The middle districts are occupied with hard-wood forests, or forests in which pines of various species are mixed with oaks, hickories, and other deciduous trees. The forests of the Alleghanies, rich in species and magnificent in the development of individual trees, spread over the mountains and valleys, which occupy the extreme western part of the state. The streams which flow through the Coast Pine Belt, often bordered by wide, deep swamps, are ill-suited to lumber operations, and less serious inroads have therefore been made into the pine forests of South Carolina than into those of North Carolina or Georgia. The merchantable pine, however, has been removed from the immediate neighborhood of the coast, from the banks of the Little Pedee river, and from along the lines of railroad.

The most accessible hard-wood timber has been cut from the forests of the middle districts, although vast quantities still remain remote from railroads or protected in deep river swamps, inaccessible except during a few months of summer. The western counties still contain great bodies of hard-wood timber, yet undisturbed except to supply the wants of the scattered population inhabiting-this almost inaccessible mountain region.

The manufacture of rough red and white oak split staves and headings for the European and West Indian trade, already an important industry in this state, is capable of large development; rice tierces and rosin barrels are also largely made in the coast region from pine. At Plantersville, in Georgetown county, and at other points along the coast quantities of hand-made cypress shingles are manufactured in the swamps.

During the census year 431,730 acres of woodland were reported destroyed by forest fires, with a loss of \$291,225. These fires were set by careless hunters, by the careless burning of brush upon farms, and by sparks from locomotives.

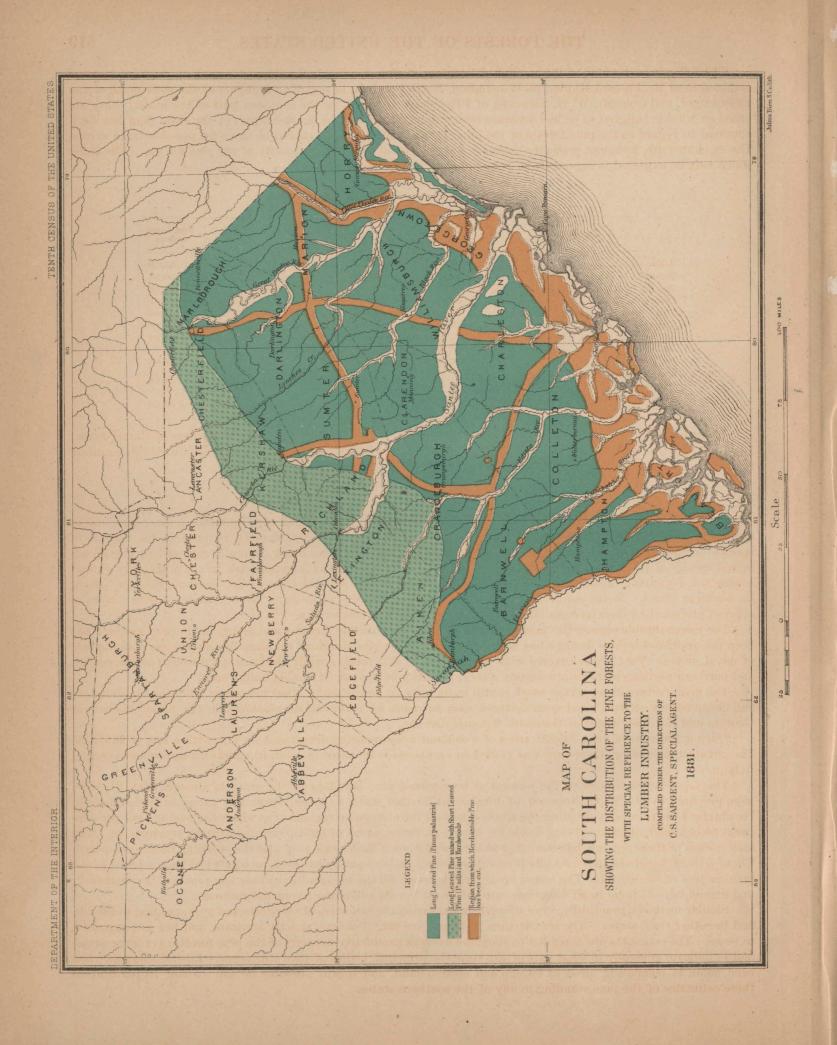
BURNING OFF DEAD HERBAGE.

The pine belt of the coast, in South Carolina as well as through its entire extent from Virginia to Texas, suffers from fires set every spring by grazers for the purpose of improving the scanty herbage growing among the trees of this open forest. These fires run rapidly over the surface stripped by the fires of previous years of any accumulation of vegetable material, without inflicting any immediate injury upon the old trees of the forest unless a turpentine orchard is encountered, when, the resinous surfaces of the boxes being once fully ignited, nothing can save the trees from total destruction. If the mature trees of the forest are not under normal conditions greatly injured, however, by this annual burning of the dead herbage beneath them, the forest itself, as a whole, suffers enormously from this cause. Slight and short-lived as these fires are, they destroy the vegetable mold upon the surface of the ground, all seeds and seedling trees, and all shrubbery or undergrowth, which, in protecting the germination of seeds, insures the continuation of the forest. They deprive the soil of fertility and make it every year less able to support a crop of trees, and in thus robbing the soil they influence largely the composition of succeeding crops. Few young pines are springing up anywhere in the coast region to replace the trees destroyed, but where seedlings protected from fire appear upon land long subjected to annual burning, they are usually, although not universally, of less valuable species, and not the long-leaved pine which gives to this forest its principal economic importance. These annual fires are slowly but surely destroying the value of the Southern Pine Belt. They destroy all seeds and seedling trees, the fertility of the soil, and its power to produce again valuable species.









The following estimates of the amount of long-leaved pine standing in the state were made up from information obtained from Mr. Edward Kidder, of Wilmington, North Carolina, in regard to that part of the state north of the Edisto river, and from Mr. W. G. Norwood, of Blackshear, Georgia, for the southern part of the state. They are based on what is believed to be less accurate information respecting the northern part of the state than has been obtained in regard to the pine forests of the other states, and allowance should be made for possible large errors. The estimates are, however, probably largely below the actual productive capacity of the pine forests of the state which may be expected to exceed by 25 or 30 per cent. the following figures:

LONG-LEAV	TED	PINE (Pinus	nalustris	١.

Counties.	Feet, board measure.	Counties.	Feet, board measure.
Aiken	209, 000, 000	Kershaw	171, 000, 000
Barnwell	340, 000, 000	Lancaster	5, 000, 000
Beaufort	49, 000, 000	Lexington	76, 000, 000
Charleston	458, 000, 000	Marion	326, 000,000
Chesterfield	183, 000, 000	Marlborough	191, 000, 000
Clarendon	332, 000, 000	Orangeburgh	465, 000, 000
Colleton	453, 000, 000	Richland	88, 000, 000
Darlington	337, 000, 000	Sumter	380, 000, 000
Fairfield	7, 000, 000	Williamsburgh	536, 000, 000
Georgetown	128, 000, 000	Total	E 23 0 000 000
Hampton	202, 000, 000	Total	5, 316, 000, 000
Horry	380, 000, 000	Cut for the census year ending May 31, 1880	124, 492, 00

The principal centers of lumber manufacture are Georgetown, Charleston, and various points in Hampton and Barnwell counties, where small railroad mills are located. Charleston and Georgetown are the distributing centers for naval stores manufactured in the state.

GEORGIA.

The northern counties of Georgia are covered with the forests of the Alleghany Mountain region, here and in northern Alabama reaching the southern limits of their distribution and considerably reduced in the number of species composing them, the pines, firs, beeches, and other northern trees being generally replaced by the broadleaved species of the Mississippi basin. From the base of the mountains forests of oak mixed with pines extend southward, occupying the central portion of the state and mingling with the trees of the Maritime Pine Belt along its northern limits. In the southern and coast counties great areas of swamps are still covered with forests of cypress, protected by their inaccessibility from the attacks of the lumberman.

The merchantable pine in the immediate vicinity of the principal streams and along the lines of railroad has been removed, and serious damage has been inflicted upon the pine forests of the state by the reckless manufacture of naval stores. Vast areas covered with pine, however, still remain, while the hard-wood forests of the central and northern portions of the state contain a large quantity of the most valuable hard woods.

The manufacture of cooperage stock is still in its infancy, and this and other industries requiring an abundant and cheap supply of hard wood seem destined soon to reach an enormous development in the upper districts of Georgia and the other states of the south Atlantic division.

During the census year 705,351 acres of woodland were reported devastated by fire, with a loss of \$167,620. The greatest number of these fires was traced to carelessness in clearing land, to sparks from locomotives, and to hunters.

The following estimates of the amount of long-leaved pine standing in the state of Georgia May 31, 1880, were prepared by Mr. W. G. Norwood, of Blackshear, in that state, a timber viewer and expert of high standing. He obtained his results by dividing the whole pine belt into irregular regions over which the average cut per acre could be obtained, allowance being made for clearings, farms, areas of culled forests, streams, swamps, etc. The area in each of these regions, by counties, was measured upon a large-scale map and the standing timber computed. These estimates include merchantable pine still standing on land partly cut over, or which has been worked in the manufacture of turpentine. The boxed areas include nearly all the regions from which any pine has been removed, and extend beyond them in all directions into the uncut forests and along rivers and railroads.

Similar methods, practically, were adopted in preparing the estimates of the amount of pine standing in Florida and the other Gulf states. The results thus obtained are not, of course, strictly accurate, and are not supposed to be so. The estimates are intended to show the average productive capacity of the pine forests over large areas, and to indicate generally in what part of the state the principal bodies of pine still occur. Liberal allowance has been made in computing areas of swamp and cleared land, and it will probably be safe to add 10 per cent. to these estimates of the pine standing in any of the southern states.

The following is an estimate of the amount of pine timber standing in the state May 31, 1880:

LONG-LEAVED PINE (Pinus palustris).

19, 000, 000 17, 000, 000 47, 000, 000 76, 000, 000 21, 000, 000 22, 000, 000 191, 000, 000 288, 000, 000 291, 000, 000 40, 000, 000 1, 064, 000, 000 128, 000, 000 236, 000, 000	Polk Pulaski. Randolph. Richmond Schley Screven. Sumter Talbot. Tattnall Taylor Telfair Terrell Thomas. Twiggs	36, 000, 000 408, 000, 000 126, 000, 000 21, 000, 000 28, 000, 000 188, 000, 000 44, 000, 000 53, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000 84, 000, 000
47, 000, 000 76, 000, 000 21, 000, 000 22, 000, 000 191, 000, 000 206, 000, 000 291, 000, 000 40, 000, 000 1, 064, 000, 000 236, 000, 000 236, 000, 000	Randolph. Richmond Schley Screven Sumter Talbot. Tattnall Taylor Telfair Terrell Thomas	126, 000, 000 21, 000, 000 28, 000, 000 188, 000, 000 191, 000, 000 44, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
76,000,000 21,000,000 22,000,000 191,000,000 488,000,000 291,000,000 40,000,000 1,064,000,000 128,000,000 236,000,000	Richmond Schley Screven Sumter Talbot Tattnall Taylor Telfair Terrell Thomas	21, 000, 000 28, 000, 000 188, 000, 000 191, 000, 000 44, 000, 000 53, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
21,000,000 22,000,000 191,000,000 488,000,000 206,000,000 291,000,000 40,000,000 1,064,000,000 128,000,000 236,000,000	Schley Screven Sumter Talbot Tattnall Taylor Telfair Terrell Thomas	28, 000, 000 188, 000, 000 191, 000, 000 44, 000, 000 58, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
22, 000, 000 191, 000, 000 488, 000, 000 206, 000, 000 291, 000, 000 40, 000, 000 1, 064, 000, 000 128, 000, 000 236, 000, 000	Screven. Sumter Talbot. Tattnall Taylor. Telfair Terrell Thomas.	188, 000, 000 191, 000, 000 44, 000, 000 53, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
191, 000, 000 488, 000, 000 206, 000, 000 291, 000, 000 40, 000, 000 1, 064, 000, 000 128, 000, 000 236, 000, 000	Sumter Talbot Tattnall Taylor Telfair Terrell Thomas	191, 000, 000 44, 000, 000 768, 000, 000 53, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
488, 000, 000 206, 000, 000 291, 000, 000 40, 000, 000 1, 064, 000, 000 128, 000, 000 236, 000, 000	Talbot. Tattnall Taylor. Telfair Terrell Thomas	44, 000, 000 768, 000, 000 53, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
206, 000, 000 291, 000, 000 40, 000, 000 1, 064, 000, 000 128, 000, 000 236, 000, 000	Tattnall Taylor Telfair Terrell Thomas	768, 000, 000 53, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
291, 000, 000 40, 000, 000 1, 064, 000, 000 128, 000, 000 236, 000, 000	Taylor	53, 000, 000 598, 000, 000 104, 000, 000 311, 000, 000
40, 000, 000 1, 064, 000, 000 128, 000, 000 236, 000, 000	Telfair Terrell Thomas	598, 000, 000 104, 000, 000 311, 000, 000
1, 064, 000, 000 128, 000, 000 236, 000, 000	Terrell	104, 000, 00 311, 000, 00
128, 000, 000 236, 000, 000	Thomas	311, 000, 00
236, 000, 000		
	Twiggs	84 000 00
000 000 000		09, 000, 00
236, 000, 000	Upson	32, 000, 00
10, 000, 000	Ware	161, 000, 00
65, 000, 000	Warren	80, 000, 00
52, 000, 000	Washington	240, 000, 00
164, 000, 000	Wayne	160, 000, 00
379, 000, 000	Webster	48, 000, 00
18, 000, 000	Wilcox	292, 000, 00
791, 000, 000	Wilkinson	152, 000, 00
35, 000, 000	Worth	512, 000, 00
2, 000, 000		10 550 000 00
220, 000, 000	Total	16, 778, 000, 00
	379, 000, 000 18, 000, 000 791, 000, 000 35, 000, 000 2, 000, 000 220, 000, 000	379,000,000 18,000,000 791,000,000 25,000,000 2,000,000 Total

The principal centers of lumber manufacture are situated along the coast at Brunswick, Darien, Savannah, and Saint Mary's. Logs sawed at these points are now driven down the various streams for a considerable distance from the coast. Large quantities of pine lumber are also manufactured in different mills located along the lines of railroad in Appling, Polk, Floyd, and other pine counties. Savannah and Brunswick are the principal points of cistribution of the naval stores manufactured in the state.

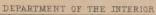
FLORIDA.

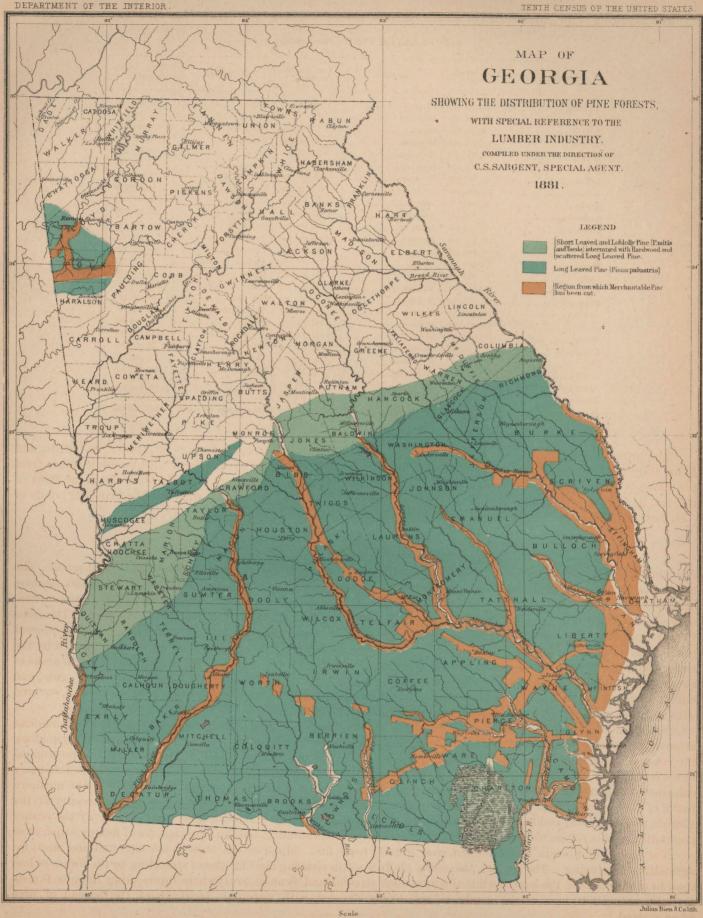
The forests of the Southern Pine Belt cover the state as far south as cape Malabar and Charlotte harbor. The long-leaved pine is replaced along the sandy dunes and islands of the coast by oaks (of which the live oak is alone of commercial importance), scrub pines, and palmettos, while a deciduous forest, largely of northern composition, occupies the high, rolling lands in a large part of Gadsden, Leon, Jefferson, and Madison counties. The pine forests gradually decrease southward in density and value, and south of latitude 29° N. are of little present commercial value. Forests of pitch pine (*Pinus Cubensis*), however, extend far south of the region occupied by the more valuable long-leaved pine bordering the coast and covering the low ridges of the Everglades. Great areas of swamp occur everywhere through northern and central Florida, covered with forests of cypress, red cedar, gum, and bordered with bays, magnolias, and other broad-leaved evergreens; while the hummocks or low elevations, covered with rich soil and everywhere common, bear oaks and other deciduous trees, often of great size.

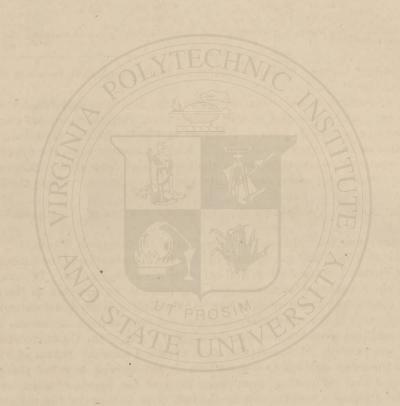
South of cape Malabar and Tampa bay the character of the vegetation changes, and the North American arborescent species are replaced by the semi-tropical trees of the West Indies. These occupy a narrow strip along the coast, cover the keys and reefs, and spread over some of the hummocks of the Everglades. This semi-tropical forest is confined to the saline shores of the innumerable bays and creeks of the region, or to the coral and sedimentary calcareous formation of the keys and hummocks. The species of which it is composed are here at the northern limits of their range; individual trees are comparatively small and the forests of the southern extremity of the Florida peninsula are commercially unimportant, although sufficiently extensive and varied to supply the scanty population of this region with lumber, fuel, and material for boat-building and the manufacture of fishing apparatus.

The forests of Florida have not suffered greatly from fire. Much of the state is uninhabited and unfit for agriculture or grazing. The danger, therefore, of fires set in clearing land for farms spreading to the forest is less than in other parts of the south, while the numerous streams and swamps everywhere intersecting the pine forests and the natural dryness of the sandy ridges, thinly covered with vegetable mold, check the spread of fires when started.

During the census year 105,320 acres of woodland were reported as burned over, with an estimated loss of \$69,900. The largest number of these fires was set by grazers to improve the pasturage for their stock.







The following estimates, by counties, of the long-leaved pine still standing in Florida east of the Apalachicola river were prepared by Mr. A. H. Curtiss, of Jacksonville; those for west Florida by Dr. Charles Mohr, of Mobile, Alabama:

LONG-LEAVED PINE (Pinus palustris).

Counties.	Feet, board measure.	Counties.	Feet, board measure.	Counties.	Feet, board measure.
Alachua	525, 000, 000	Holmes	150, 000, 000	Putnam	121, 000, 000
Baker	144, 000, 000	Jackson	233, 000, 000	Saint John's	66, 000, 000
Bradford	138, 000, 000	Jefferson	23, 000, 000	Santa Rosa	213, 000, 000
Brevard	63, 000, 000	Lafayette	425, 000, 000	Sumter	103, 000, 000
Calhoun	81, 000, 000	Levy	346, 000, 000	Suwannee	622, 000, 000
Clay	77, 000, 000	Liberty	75, 000, 000	Taylor	218, 000, 000
Columbia	455, 000, 000	Madison	· 122, 000, 000	Volusia	59, 000, 000
Duval	67, 000, 000	Manatee	200, 000, 000	Wakulla	72, 000, 000
Escambia	90, 000, 000	Marion	315, 000, 000	Walton	409, 000, 000
Hamilton	311, 000, 000	Nassau	104, 000, 000	Washington	187, 000; 000
Hernando	142, 000, 000	Orange	87, 000, 000	Total	6, 615, 000, 000
Hillsborough	162, 000, 000	Polk	210, 000, 000		0, 010, 000, 000
Cut for the census year and sawed in wester	r ending May 3 n Florida).	1, 1881 (excluding 77,500,	000 feet, estima	ted, grown in Alabama	208, 054, 000

In this estimate no account is made of timber remaining on lands which have been cut over, or of that injured by the manufacture of turpentine.

The principal centers of lumber manufacture are Pensacola, Millview, and Blackwater, in Escambia and Santa Rosa counties. The logs sawed here and at other points upon Pensacola bay are driven down the streams from the forests of Alabama, the accessible pine in this part of Florida having been long exhausted. A large amount of pine lumber is also manufactured at Ellaville, in Madison county, upon the upper Suwannee river, and at Jacksonville, Saint Mary's, and at various points upon the lower Saint John river. Logs driven from the lower Suwannee river are sawed at Cedar Keys, where are situated the most important mills in the United States devoted to the manufacture of red cedar into pencil stuff.

Jacksonville, Saint Mary's, and Fernandina are the largest centers of distribution for the naval stores manufactured in the state.

The following extracts are taken from Mr. Curtiss' report upon the forests of Florida:

"In visiting western Florida I have had particularly in view the examination of the timber of a part of the state which is unlike all others in physical conformation, and consequently in vegetation. This region differs but little from the country bordering the southern Alleghanies, and may perhaps be regarded as the southern terminus of the Appalachian range. It commences about 40 miles north of the Gulf of Mexico, and extends northward between the Chipola and Okalokonee rivers into southwestern Georgia and southeastern Alabama. North of this there is little to connect it with the southern mountains except the rugged banks of the Chattahoochee river. The surface is undulating, hilly, often precipitous. The soil, like that of the Piedmont region of Virginia and Carolina, abounds in red clay, and is therefore adapted to crops which do not succeed in other portions of Florida. The vegetation is extremely varied and interesting, comprising most of the plants of northeastern Florida, a large portion of those found in the Piedmont country and in the rich river bottoms of the interior, and a considerable number found only on the limestone with which much of this country is underlaid. In the river bottoms, which are inundated at seasons, there is found a great variety of trees, some of which attain a size probably not equaled elsewhere. In this small portion of the state of Florida is to be found nearly every species of tree growing within the limits of the state, except those semi-tropical species found on the coast south of Cedar Keys and Mosquito inlet. Fully fifty American arborescent species here reach their southern limit. A few species show marked diminution in size, and all northern species which extend southward of this Chattahoochee region here attain in Florida their largest dimensions.

"There are two trees in this region of particular interest, as they are not known to grow anywhere else; these are the stinking cedar (*Torreya taxifolia*) and the yew (*Taxus Floridana*). There is reason to believe that the *Torreya* occurs also along the Wakulla river, and perhaps elsewhere in the state, but there is no positive knowledge of its occurrence except along the Apalachicola river, on the limestone hills which border it at intervals on the east

"The forests of this region are still almost intact. Some poplar and tulip wood is cut from the river banks for northern markets, but the valuable timber on these rich shores is as yet almost untouched. The country southwest of this region, though of very little agricultural value, contains an immense quantity of the best cypress timber, hardly yet disturbed by the lumberman.

"Two mills have recently been established at Apalachicola, one of which saws nothing but cypress lumber. The product of this mill is sent to New Orleans. As white-pine lumber must soon become scarce, the attention of dealers ought to be directed to southern cypress, which will prove a good substitute for it. Although there is plenty of valuable pine in this country the swamps render it somewhat inaccessible, and the mills at Apalachicola

are more easily supplied with logs rafted down the river from Georgia. Many hewed logs of large dimensions are shipped from this point. The country near Apalachicola in surface and timber growth is much like that of northeastern Florida, all the good timber having been cut.

"PENCIL CEDAR.

"The favorite variety of red cedar, of tall and straight growth, is becoming scarce, but there remains a large quantity of quality sufficiently good for pencils in nearly all sections of the state north of a line drawn from cape Canaveral to the north end of Charlotte harbor. There is no red cedar in southern Florida, the Dixon mill at Tampa having exhausted the supply within reach of that place; but new mills have been established near Webster, in Sumter county, and at the head of Crystal river, at present the best source of supply.

"CYPRESS.

"The main body of cypress in southern Florida's located in the 'Big Cypress', a region of which I have heard much from persons who were in an expedition which went through it during the last Indian war. They entered it at the 'Little Palm hummock', 18 miles northeast of cape Romano. Traveling east about 12 miles they came to the 'Big Palm hummock', when they turned and traveled nearly due north for six days, averaging 12 miles a day. Their guide then informed them that the cypress extended 12 miles farther north; so it would seem that the main body of the 'Big Cypress' has a length of about 85 miles and a width, as they think, of about 20 miles. The cypress grows in belts running north and south, the main central belt being about 6 miles wide and consisting of large timber. There are narrow strips of cypress and pine alternating with prairie, although probably two-thirds of the whole region is covered with cypress. According to these estimates there must be at least 1,000 square miles covered with cypress timber in this region, which in times of high water could be floated out by the numerous creeks and inlets flowing toward the Gulf. There are also large quantities of heavy cypress on the swampy borders of Peace creek, the Hillsborough river, the Withlacoochee, etc., many trees squaring from 2 to 4 feet.

"The long-leaved pine extends south to Prairie creek, in about latitude 27° N. The pine between Prairie and Peace creeks, which is sawed at the mill near Ogden, belongs to this species. Timber in this region is quite shaky, and from all reports it is evident that the yellow pine in Manatee, Orange, and Hillsborough counties is quite inferior, being mostly of the rough-barked, sappy variety called in this region bastard pine. The long-leaved pine occupies nearly the whole of the interior of the peninsula north of a line drawn from Charlotte harbor to cape Malabar. At its southern limit I saw trees which measured over 2 feet in diameter and which would furnish logs 30 feet long.

"Pitch pine (*Pinus Cubensis*) appears on the west coast at Margo, 10 miles north of cape Romano, and extends northward to Prairie and Fishhead creeks, being the only pine of this region. From Charlotte harbor northward it is confined to a belt from 10 to 15 miles wide, bordering the Gulf, extending to Tampa and as far northward as Pensacola, being also scattered through the interior. This tree seldom exceeds 2 feet in diameter or 50 feet in height, and will afford a great quantity of framing timber, although it will be probably generally used in the production of naval stores, for which it is nearly or quite equal to the long-leaved pine.

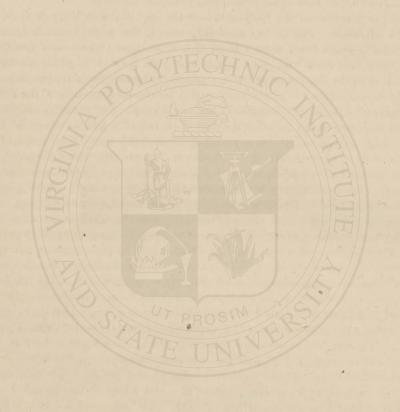
"One of the most important facts in regard to the pine forests of Florida is their permanence. Owing to the sterility of soil and the liability to inundation of most of the state, it is certain that but a very small portion of Florida will ever be cleared of its forest covering. Taking into consideration the great area covered with valuable pine forests, and the fact that there will be a continuous new growth if the spread of forest fires can be checked, only trees of the largest size being cut, it is evident that Florida will furnish a perpetual supply of the most valuable pine lumber."

The following notes upon the pine forests of western Florida were furnished by Dr. Charles Mohr, of Mobile, Alabama:

"The pine forests occupying the region between the valley of the Apalachicola river and the banks of the Choctawhatchee, and from the headwaters of the Chipola to the bay of Saint Andrew's, are yet mostly in their primeval condition and contain a vast body of valuable timber. The district between the Choctawhatchee and the Perdido is the seat of the oldest and most active lumbering industry of the whole Gulf coast. The numerous streams flowing through the pine forests of eastern Alabama to the large bays upon the coast of western Florida make fully 4,000 square miles of southeastern Alabama comparatively accessible and tributary to the region from which the lumber finds an outlet by way of the bay of Pensacola.

"The better class of the somewhat elevated and undulating timber-lands which surround Escambia, Blackwater, and Saint Mary de Galves bay were long since stripped of their valuable timber. These forests having been culled time after time during the last quarter of a century, are now completely exhausted. The low, wet pine barrens, with their soil of almost pure sand, which trend eastward along the shores of Santa Rosa sound and Choctawhatchee bay, have never borne a growth of pine sufficiently large to furnish more than a small supply of timber of very inferior quality. The ridges between the Choctawhatchee river and the Yellow river are also, for the most part, arid, sandy wastes, never yielding more than a few hundred feet of lumber per acre.





"The well-timbered portion of west Florida commences with the southern border of Holmes county. This region is now, however, nearly exhausted along water-courses large enough for rafting, while of late years canals and ditches dug into the forest afford facilities for floating timber growing remote from streams to the mills. According to those best informed regarding the amount of timber still standing in this section, there is scarcely enough left between the Escambia and Choctawhatchee rivers, in western Florida, to keep the mills on the coast supplied for another half-dozen years, even if the whole of the pine standing could be made available.

"The lumber business of Perdido bay is entirely concentrated at Millview, where three large saw-mills are established. The production of lumber commenced here in 1865, increasing rapidly from 10,000,000 feet, board measure, in that year, to three and four times that amount. All the lumber manufactured upon Perdido bay is sent to Pensacola by a railroad constructed for the purpose. Only about 400 pieces of hewed timber are shipped from Millview, although the railroad has carried an average of 37,000,000 feet of lumber annually to Pensacola, the maximum annual yield of the Millview mills having been 45,000,000 feet.

"Pensacola is the most important port of lumber export on the Gulf coast. During the year ending August 30, 1879, 403 vessels, of a combined capacity of 217,487 tons, carried from the harbor of Pensacola 3,090,469 cubic feet of hewed square timber, 3,769,527 cubic feet of sawed square timber, and 60,000,000 feet of sawed lumber, board measure. Of the squared timber four-fifths is shipped to Great Britain.

"The peninsula between the junction of the Escambia and the bay of Saint Mary de Galves is low, and, along the shore-line, bordered with marshes. The timber needed to supply the mills located upon the shores of these waters has during the past forty years been drawn from this region, and when new forests have replaced the original growth they have been cut over and over again, and still furnish a small amount of timber, as the turpentine-distiller has not followed the log-getter in these regions. The supply of timber here, however, at present is too small to be taken into account in view of the enormously increased demands of the mills. There are three large mills on Blackwater bay producing 40,000,000 feet of lumber a year. Three-fourths of this lumber is produced in the establishment of Messrs. Simpson & Co., near the mouth of the Blackwater river, at Bagdad, about half a mile below Milton. Mills sawing square timber are situated 20 or 30 miles above the mouth of the Blackwater and use mostly water-power. The mill of Messrs. Milligan, Chaffin & Co., on this river, 20 miles above Milton, sends 28,000 pieces of square sawed timber to Pensacola, averaging 32 cubic feet each; 5,000 such pieces are furnished by a few very small water-mills higher up, swelling the whole amount of square timber to 33,000 pieces. The last-named firm has acquired by purchase large tracts of public land along Black and Coldwater rivers. To reach the timber growing on their land a canal 20 miles long, with sluices that intersect the small tributaries of these streams, has been dug. By means of this canal a sufficient supply of logs is secured to keep the mill running through the year. The large manufacturers of Bagdad have adopted a similar system, and by these means, and by the construction of tramways tapping the more remote and isolated regions tributary to the waters of Black and Yellowwater rivers toward the northern part of the state, the exhaustion of the timber-lands through the whole breadth of western Florida, as far as the banks of the Choctawhatchee river, will certainly be accomplished before the end of the next five years. A sash, door, and blind factory located at Bagdad consumes a large amount of cypress lumber. This is procured from the mills situated along the shores of the upper Choctawhatchee bay, and is grown along the banks of the Choctawhatchee river. The cypress lumber is exclusively used in the manufacture of sashes, blinds, doors, moldings, and particularly in the construction of houses, of which every year a considerable number is shipped by the way of New Orleans to the treeless regions of western Louisiana and Texas. This establishment manufactures a large amount of fencing, the rails of cypress, the posts of red and white cedar, rounded and capped. This is shipped to New Orleans and to the settlements in southern Florida. Of late years it has commenced sawing pencilboards of red cedar. The logs, of very superior quality, are obtained from the hummocks and bottom lands bordering upon the Choetawhatchee. The lumber for this purpose must be entirely free from knots, of even, close grain, the woody fibers perfectly straight. These logs are cut in sections 6 inches in length, and the carefully-selected pieces sawed into slabs 2 inches broad and a quarter of an inch in thickness. Fifty gross of these slabs are packed in a case, and the establishment produces about six hundred cases annually. These are mostly shipped to a pencil factory in Jersey City, a small number going also to Germany.

"The saw-mills situated on the shores of Choctawhatchee bay extend from the mouth of Alaqua creek to Freeport, and westward to Point Washington; the logs sawed at these mills are for the most part brought down by raft from the upper waters of the Choctawhatchee and its tributaries. The lumber sawed here is mostly long-leaved pine, with a small amount of cypress. The product of these mills is mostly shipped to New Orleans in small schooners carrying from 15,000 to 20,000 feet each. The capacity of the mills upon this bay is in excess of their production, the difficulty of obtaining logs causing most of them to remain shut during half the year.

"The causes which up to the present time have prevented the destruction of the pine forests about Saint Andrew's bay, which is traversed by one fine river and bordered by another, must be traced to the difficulty of navigating these streams and to the want of a convenient outlet to the Gulf at Apalachicola. There are few saw-mills upon this bay, supplying only the local demand, and even these are furnished with logs floated down the Chattahoochee from beyond the confines of the state."

SOUTHERN CENTRAL DIVISION.

ALABAMA.

The northern and northeastern portions of Alabama, embracing the foot-hills of the southern Alleghany mountains and the valley of the Tennessee river, are covered with a rich and varied forest growth of broad-leaved trees, in which oaks, hickories, ashes, walnuts, and cherries abound. South of the Tennessee river the rolling country is covered with oaks, through which belts of short-leaved pine occur. In Cherokee and Saint Clair counties isolated bodies of long-leaved pine appear, while a narrow strip of the same species stretches nearly across the state between the thirty-third and thirty-second degrees of north latitude. South of this central belt the country is again covered with forests of hard woods, which farther south, in the rolling pine-hill region, are mixed with a heavy growth of the long-leaved pine; and this species occupies, or once occupied, almost exclusively, outside of the numerous river bottoms, the sandy plain extending along the coast and reaching nearly 100 miles inland from the shores of the Gulf. Great regions of swamp covered with heavy forests of cypress occur in the southern part of the state, especially in the region watered by the lower Tombigbee and Alabama rivers.

The forests of northern Alabama still contain great bodies of hard-wood timber, although the demands of the rapidly-increasing iron industry located here have already stripped of their tree covering many of the low hills of northeastern Alabama. The best pine has been gathered from Mobile and Baldwin counties, in the neighborhood of Mobile bay, from the lines of railroads and the banks of streams heading in the southern part of the state and flowing to the Gulf through western Florida.

The pine forests of southern Alabama have long suffered from the reckless manufacture of naval stores.

During the census year 569,160 acres of woodland were reported destroyed by fire, with an estimated loss of \$121,225. Of these fires the largest number were set to improve grazing, or by careless farmers and hunters.

The manufacture of cooperage and wheel stock, furniture, and other articles of wood is still in its infancy in Alabama and the other Gulf states. Such industries, in view of the magnificent forests of hard wood covering great areas in this region and the rapid exhaustion of the best material in the north and west, must in the near future be largely transferred to the southern states.

The cypress swamps adjacent to Mobile bay yield a large number of hand-split shingles and give employment to many persons, principally blacks.

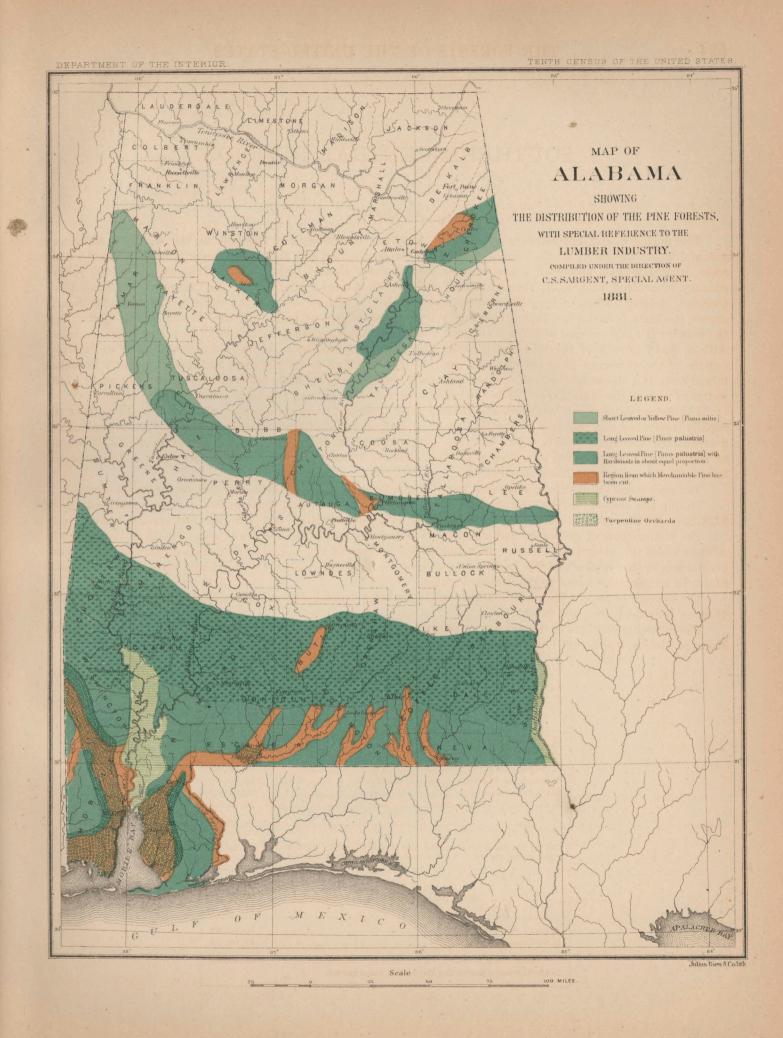
The following estimate of the amount of pine standing in the state May 31, 1880, was prepared by Dr. Charles Mohr, of Mobile, who carefully examined the whole pine region of the Gulf states:

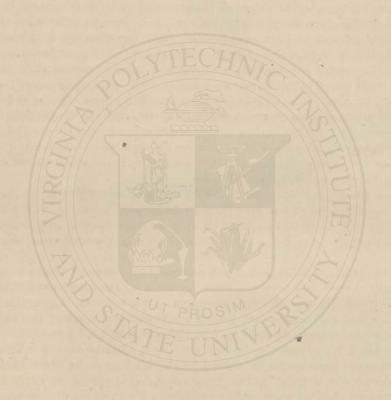
LONG-LEAVED PINE (Pinus palustris).

Regions.	Feet, board measure.
East of Perdido river	4, 055, 000, 000
West of Perdido river	2, 000, 000, 000
In the region of mixed growth	10, 000, 000, 000
In the Central Pine Belt	1, 750, 000, 000
In the Coosa River basin	900, 000, 000
In the Walker County district	180, 000, 000
Total	18, 885, 000, 000
Cut for the census year ending May 31, 1880 (including 77,500,000 feet, estimated, grown in Alabama and sawed in western Florida).	245, 396, 000

SHORT-LEAVED PINE (Pinus mitis).

In the Central Pine Belt	1, 875, 000, 000
In the Coosa River basin	432, 000, 000
Total	2, 307, 000, 000
Cut for the census year ending May 31, 1880, none reported.	





In this estimate no account is made of small timber standing on some 1,282,000 acres which have been cut over, and from which the merchantable pine has been practically removed, or on 600,000 acres injured by the manufacture of turpentine.

There are fewer pine trees per acre in the region of mixed growth than in the pine belt proper, with which it mingles on the north; but the individual trees being larger, the average amount of standing pine per acre is

greater, although generally of poorer quality.

Mobile is still the principal center in the state for the manufacture of pine and cypress lumber; a large amount of pine lumber is manufactured also along the line of the railroads penetrating the pine belt in Etowah county, and considerable hard wood is sawed in counties bordering the Tennessee river for local use and northern shipment. Mobile is also the distributing point for the naval stores manufactured in the state.

The following notes upon the forests of Alabama are extracted from Dr. Mohr's report:

"THE MARITIME PINE REGION.

"West of Mobile the road traversed for a distance of over 5 miles the plain, or so-called 'second bottom', composed of a more or less tenacious or sandy yellow clay. It has an elevation above the alluvial of the river of 15 to 25 feet, and is bordered on the west by the ridges of the stratified drift, which extend to within 6 to 18 miles of the shore-line. Near the coast this plain, flat and devoid of drainage, forms for many miles the low, wet savannas sparsely covered with a stunted growth of long-leaved pines; near the estuaries it is interspersed with tracts covered with a black, light soil, rich in humus and bearing a luxuriant growth of broad-leaved trees associated with a few Coniferae, and with the wooded swamps which extend over the depressions about the base of the higher land, and follow the low, inundated banks of the numerous streams. The prevailing forest tree of this plain, now much cultivated in the vicinity of Mobile, is the long-leaved pine. Situations offering a moister and somewhat richer soil along the hummocks and gentle acclivities bordering the swamps and the bottoms of the water courses are occupied by the loblolly pine. With this is often associated the pitch pine (Pinus Cubensis), which prefers, however, the more or less inundated and always wet, swampy forest, where its spreading crown towers above the gum trees and white cedars. Wherever in the plain the long-leaved pine has been cut down, this pitch pine principally and the loblolly pine spring up to replace it.

"Many acres can be seen in this region covered with thrifty seedlings of this pitch pine, and trees have sprung up, to my own knowledge, since 1865, which are now from 20 to 25 feet in height with a diameter of trunk of from 4 to 6 inches; and trees from 50 to 60 feet in height with a circumference of from 3 to 4 feet, forming quite extensive forests, may be seen upon the shores of the bay from which the primeval forest was removed about fifty

years ago.

"Ascending the highlands of drift, with its porous soil composed of irregular strata of white or ferruginous sands, gravels, and pebbles interspersed with layers of clay, the home of the long-leaved pine, which here arrives at perfection and forms the entire forest growth over immense areas, is entered. Upon this formation, after the removal of the original forest, either the long-leaved pine takes possession again of the soil or is replaced by a more or less stunted growth of various species of oak (Quercus Catesbæi, cinerea, nigra, obtusiloba, and falcata), the mocker-nut, and a few other small trees and shrubs. What the conditions are by which such a rotation is regulated is not apparent. It is no doubt much influenced by the conflagrations which annually sweep through the woods and which are particularly destructive to the young pines, but it cannot be explained solely upon that ground. I have, however, observed that the more broken lands with the same sandy character of surface soil, but with a more argillaceous subsoil more or less impervious to water, are mostly covered with this second growth of deciduous trees, and that the flat table-lands with either a sandy or gravelly soil are invariably covered again with a second growth of the long-leaved pine. Among such young growths of this species I have never been able to discover a single seedling of the other pines.

"Cypress swamps of the Tensas river.—The river was extraordinarily high, the lowlands being overflowed to a depth of more than 10 feet. The torrents which had fallen during the past three weeks caused a heavier freshet than any that had been experienced since the spring of 1875. Since that year no such opportunity has been offered for getting heavy cypress timber from the depths of these swampy forests. No idle man was to be found on shore; everybody who could swing an ax, paddle a boat, or pilot a log was in the swamp engaged in felling and floating cypress timber. All the mill-hands worked in the swamps; fields and gardens were left untouched, and even clerks

from the stores were sent to the swamps as overseers.

"We soon entered the deep, dark forest stocked with some fine and large cypress trees, and came upon two negroes, each standing in his little skiff, engaged in felling a tree of the largest size. It was astonishing to witness the steadiness and celerity with which they performed their work, considering the instability of their footholds in the narrow boats. Every stroke of the ax told at the designated place, and it took them scarcely longer to cut a tree in this way than if they had been working upon solid ground. The top of the tree when felled is sawed off close to the first limbs by one man working under water a single-handled cross-cut saw. Another, provided with a long pole armed with a sharp iron spike, seizes the trunk and tows it, with the aid of

the slow current, to one of the lake-like sheets of still water which, interspersed with streams, are so common in these lowlands. Here the trunks are made into rafts and can be floated down the river to the mills along the banks below after the subsidence of the flood. The greatest part of this large timber is only accessible during the time of a high stage of water, so that the energies of the whole population are devoted during the times of freshets to getting out as much of it as possible. The large number of logs harvested shows clearly with what activity the destruction of these treasures of the forest is being pushed; and the reports, as of heavy thunder, caused by the fall of the mighty trees, resounding at short intervals from near and far, speak of its rapid progress.

"In 1831 Mr. Vaughn found these cypress swamps untouched by the ax. At present their resources are so diminished by the inroads made upon them during the last twelve years that, with a prospect of a rapidlyincreasing demand for cypress lumber in the near future, he judges that they will be completely exhausted during the next ten years. This opinion is shared by all mill-owners here, who believe that in less than that time their business must come to an end. There is no hope that the supply will be continued by the natural increase of young trees. It is rare to find small trees among the large specimens. Seedlings and saplings are not found in these deep, swampy forests, and only occur in the openings and upon the banks of water-courses. The fact that the almost impenetrable shade, excluding the admission of light and air to a soil almost constantly drenched with water, is unfavorable to the growth of a new generation of the cypress, threatens to exclude it from localities where formerly this tree attained its greatest perfection. In swamps open to the influences of light and air, and not liable to prolonged periods of inundation, a growth of seedlings and small trees, especially along the banks of the smaller tributaries of the larger streams, springs up. The extremely slow growth of the cypress, however, during all stages of its existence, even if young trees spring up, destroys all hope of an adequate supply of this timber to meet the wants of coming generations. Trees of small size are as frequently cut as large ones. Saplings from 4 to 12 inches in diameter even are cut and supply the farmer, the builder, and the mechanic with material for many useful purposes. Logs not over 30 inches in diameter, however, are not worked up in the Tensas mills, which only use logs of larger size, the saplings being sent in rafts with pine logs to the saw-mills of Mobile. It is rare that a tree over 3 feet in diameter is found perfectly sound. Trees above 4 feet through are almost always invested with signs of decay. No timber seems to be open to so many defects as that of the cypress. Many of the trees are 'windshaken'; that is, portions of the body of the wood have separated in the direction of the concentric rings, causing annual splits which extend throughout a great length of the trunk, and if occurring repeatedly in the same stick render it unfit for use. A considerable number of the larger trees are rotten in sections. Logs cut from such trees may appear perfectly sound at both ends, but are found hollow and rotten in the interior. The inspection of cypress logs requires great experience and care to protect the buyer from loss. But there is one disease which particularly affects this timber, the cause of which is a perfect mystery to all interested in the matter. (a) From the center of the tree outward, although never extending into the sap-wood, occur great numbers of spindle-shaped, narrow excavations with perfectly smooth, rounded walls more or less tapering toward the ends, parallel with the bundles of woody fibers and nearly regularly disposed in the direction of the annual rings of growth. These cavities vary from one-half an inch or less to a foot in length, and are found from a few lines to an inch in width. They are filled with a yellowish-brown powder, the result of decayed, woody substance, although the walls of the cavities appear perfectly sound and unaffected by decay. These excavations are called 'pegs', and timber so affected 'peggy' timber. The cavities have no communication with the surface apparently, and remain always inclosed within the surrounding belt of sap-wood. It is only in the case of very old trees that the larger cavities produced by the junction of the pegs sometimes reach openings produced by external decay or accident. Undoubtedly these pegs cause the large hollows so often found in the center of large-sized and apparently perfectly healthy trees. Some of the timber of medium-sized specimens is honey-combed with these pegs. Such peggy stuff is useful for poles and pickets, which are found not less durable than if made from solid lumber.

"Two varieties of cypress timber are recognized according to the color, firmness, and heaviness of the wood, and are known as white cypress and black cypress; the latter has darker, closer grained, and more resinous wood than the former, and will sink in water. Its weight makes impossible the transportation of black-cypress logs by floating under ordinary circumstances, and the lumberman, unable always to recognize these peculiarities of the wood in the standing tree, cuts a chip before felling, which thrown into the water indicates, by its floating or sinking, whether it is black or white cypress. Trees of the heavy variety are deadened during the months of August and September by cutting a deep ring through the bark, and in the spring of the second season the timber is found sufficiently light to float.

"The cypress region of southern Alabama, which must be regarded as one of the great resources of its forest wealth, commences upon Mobile river, about 16 or 18 miles above its entrance into Mobile bay, extending through the lowlands upon both banks of this river, in Baldwin and Mobile counties, where it covers an extreme area of from 75 to 80 square miles. It extends northward to the junction of the Alabama and Tombigbee rivers, covering

a This injury to the cypress is caused by a fungoid plant not yet determined, although widely distributed along the Gulf coast.—C. S. S.

large tracts in the delta between them, follows northward the course of these streams, and covers the extensive swamps which border their banks and the mouths of their numerous tributaries. Upon the Alabama the cypress swamps extend to the lower part of Clarke county. Next to the Mobile River region the largest supply of cypress can be drawn from the extensive bottoms of the Tombigbee, about the mouth of Bassett creek, near Jackson. During the freshet of the present year (1880) a large number of logs from this vicinity will be sent to the mills on the Tensas.

"BALDWIN COUNTY.—A quarter of a century ago a pine forest, unequaled in the magnificence of its tree growth, and supposed at that time to contain an inexhaustible supply of timber, covered Baldwin county through its whole extent. To-day this forest, from the line of the Mobile and Montgomery railroad, along the eastern shore of Mobile bay, and along all the water-courses as far as Bonsecours bay, upon the Gulf, is entirely destroyed, and presents a picture of ruin and utter desolation painful to behold.

"The production of naval stores has been carried on in this region without regard to any of its future interests, and, the forest being exhausted, manufacturers have been driven to seek new fields of operation. In the old turpentine orchards, long abandoned, no young trees have sprung up. Too far remote to make it possible to get their timber to the saw-mills, the large trees which have sufficient strength to withstand the effects of the barbarous process of boxing drag out their precarious existence for years after the smaller and weaker trees have been laid low, and shade the ground sufficiently to prevent the start of a young growth. The wood of these old boxes, as dead pines are called, is, after the loss of their vitality, charged throughout with an excess of resinous matter, and is in that condition sold as 'fat' or 'light' wood, being greatly esteemed as fuel for the generation of steam. For this purpose this final product of the pine forest is carried to the city of Mobile in broad flatboats, propelled by one huge square sail, and steered by a ponderous horizontal beam serving as a rudder. In a few years, however, this, the least valuable and the last product of the pine forest, will have forever disappeared, and with it the last remnant of the original forest growth of this part of the state. Occasionally, under the shade of the trees left standing, a young growth of pine is found, and on the high and undulating table-land between Mobile bay and Fish river, where the soil is light and very porous, a low and scanty oak scrub has taken possession of the ground. Toward the banks of the water-courses, however, where the largest trees were first cut to furnish timber to the mills once situated on Fish river, thus early leaving the ground open to atmospheric influences, fine and promising groves of long-leaved pine now often cover areas of wide extent. I measured many trees in these young second-growth pine forests, grown up within the last twelve to twenty-five years, standing from 15 to 30 feet in height with a diameter of trunk of from 4 to 6 inches, of thrifty growth, and rapidly overcoming the small oak growth with which it had to contend for the possession of the soil. It is the turkey and the upland willow oak alone which occur in these thin soils, too poor to support the Spanish and black oaks.

"The banks of the North Branch of the Fish river are composed of marsh or white drift sand. The arid, sandy ground is covered with a dwarf growth of live oak and myrtle live oak, observed here for the first time, and which farther east formed by far the largest part of the oak scrub covering the shore-lines of the large bays of western Florida. Two or three miles beyond the forks of Fish river a belt of pine forest is reached, not yet destroyed by the mutilations of the 'box-cutter' nor bereft of its best growth by the log-gatherer; it covers the highlands and declivities between Fish river and the waters which find their way into Perdido bay. This may be regarded as a virgin forest, only slightly invaded up to the present time along the Blackwater creek, Hollenger's creek, the Perdido river, and the bay shore. The mills situated on Perdido river and bay depend entirely for their present and future supply of logs upon this forest of southern Baldwin county, although I learn that it is expected to supply them during the next five years only, even if their production of lumber does not increase. This forest extends over six townships and covers an area estimated at from 125,000 to 150,000 acres.

"THE FORESTS OF THE CHATTAHOOCHEE IN EASTERN ALABAMA, MIXED FOREST GROWTH, ETC.

"The forests which once covered the wide bottom lands of the Chattahoochee in the neighborhood of Franklin, Alabama (opposite Fort Gaines), are now reduced to small patches of woodland confined to the base of ranges of low hills bordering the plain valley to the southeast. The tree growth was found here to differ in no way from that found lower down, except that the short-leaved pine (Pinus mitis) occurs more frequently. The crab apple and the cockspur thorn are frequent along the borders of the woods, but the pond pine (Pinus serotina), which might have been expected here, was not observed. In the sandy, wet, and deeply-shaded bottoms of a sluggish stream winding along the base of these hills I found the spruce pine (Pinus glabra) abundantly associated with the loblolly bay, red and sweet bays, and stately magnolias. The live oak is not found here, and it is doubtful if it extends in this part of the Gulf region more than a few miles north of the thirty-first degree of latitude. The low hills do not rise more than 150 feet above the plain; in entering them the second division of the sylvan vegetation characteristic of the eastern Gulf states is reached—a forest of mixed growth, which must be regarded, on account of its extent as well as the variety of its vegetation, as one of the important natural features of the region. I am of opinion that the deciduous-leaved trees have an equal representation in this forest with the

conifers. This certainly was the case before the settlement of the country, but as the broad-leaved trees occupy the best land, the areas of hard-wood forest have been more reduced by the demands of agriculture than have the forests of pine.

"The distribution of the different species of trees throughout this region depends upon the nature of the soil and the topographical features of the country. In general it can be stated that the marls and calcareous Tertiary strata which form the lower ridges and more or less undulating uplands and plains are chiefly occupied by trees with decidnous leaves, and by a few yellow pines. Here oaks predominate, and especially the post oak (Quercus obtusiloba), which prefers the level or gently-swelling ground with a generous, warm, and open soil; with it is frequently found the black oak (Quercus tinctoria), the Spanish oak and black-jack upon soils of poorer quality, the last, particularly, preferring one of closer, more argillaceous character mixed with fine sand. The black-jack finds here its best development, rivaling often in size the post oak; it enters largely also into the undergrowth of the post-oak woods, forming dense thickets on lands too poor to sustain a heavier tree growth.

"The hickories are unimportant features in the forests of this region. In the dry uplands they seldom attain more than medium size, although in the more shaded and richer situations the mocker-nut and pig-nut are not rare.

"The long-leaved pine, on account of the broad extent it covers, its gregarious habit, and the splendid growth it attains here, must be regarded as the most important timber tree of this region. Confined to a siliceous, dry, and porous soil, it occupies the high ridges invariably covered with a deposit of drift, often found widely spread over the more elevated highlands. For this reason the pine forests crown the hills and cover the more or less broken plateaus. They are found also toward the southern boundaries of this region, where the sands and gravels of the drift of the lower pine region encroach upon and mingle with the strata of older formations. Under these circumstances it is evident that the line of demarkation between this and the pine region of the coast is difficult to determine. The best distinction is found in the fact that in the pine forests of the lower pine region the growth of pines upon the uplands is never broken by patches of oak, and that the short-leaved pine never occurs there. Another point of distinction is found in the nature of the second growth, which springs up after the large pines have been removed. In the pine woods in the region of mixed tree growth the subsoil, of Tertiary origin, seems more favorable to the growth of oaks than to a second growth of the long-leaved pine. This is replaced generally by oaks mixed with the short-leaved pine and various deciduous trees. It is safe to assert that the southern limits of this region coincide with a line following the northern boundary of the coast drifts, along which the lower strata have completely disappeared be neath it.

"PIKE COUNTY.—On the broad ridges which form the divide between the waters of the Pea and Conecuh rivers, upon a purely sandy soil, are found, within the forest of long-leaved pine, tracts with strictly-defined outlines from a half mile to several miles in width, covered with a dense vegetation of small trees and shrubs peculiar to the perpetually moist and cool hummocks of the coast. The soil covered with this growth presents no unusual features; it is as poor and arid as that covering the rest of these heights. Surrounded on all sides by pine forests, not a single pine tree is seen within the limits of these glades, called by the inhabitants 'pogosines', an Indian name the meaning of which I was unable to learn.

"The trees are of small growth, the willow oak, the water oak, beech, red maple, and black gum rarely rising to a height of more than 30 feet among the sourwoods, junipers, hornbeams, hollies, papaws, fringe-trees, red bays, and other trees of the coast. These glades verge upon deep ravines from which issue large springs, and from this fact I conclude that, below their sandy, porous soil, strata must exist perpetually moistened by subterranean waters near enough to the surface to supply the moisture necessary to support such a luxuriant vegetation.

"FORESTS OF THE TENNESSEE VALLEY.

"The character of the forest vegetation changes upon the limestone formation of the valley of the Tennessee. This new region of tree growth extends from the northeastern confines of Alabama to a short distance beyond the Mississippi state line with a width of from 35 to 40 miles, and reaching beyond the northern boundary of the state. Its prominent feature is the total absence of pine and the scarcity of other evergreen trees. A few scattered saplings of the loblolly pine are found on its lower borders, waifs strayed from their natural habitats, the lower part of Morgan county, the true northern limit of this species, in Alabama at least. The red cedar is the only evergreen tree common among the forest growth of this limestone region, and the durability of its wood combined with its beauty places this tree among the most useful produced in this region. The red cedar forms here almost exclusively the second growth after the removal of the original forest, covering everywhere with extensive groves the dry, rocky hillsides and flats. The timber, however, of this second growth is only fit for the most ordinary purposes. The trees branch low, and the trunks are consequently full of knots and unfit for anything except fence posts. The fertile portions of this region have been largely denuded of their forest growth, although more than half is still covered with wood, a considerable portion with almost virgin forest. This is particularly true of Lauderdale and Colbert counties and the mountainous portions of the counties of Madison and Jackson. The vast quantities of oak, ash, walnut, and poplar timber contained in these counties can be sent to northern markets as soon as the Tennessee river has been made navigable by the removal of the obstacles at the Mussel shoals.

"The road from Decatur to Moulton, in Lawrence county, leads through broad and fertile valley lands, broken, as the mountains are approached, by limestone ridges jutting out into the plain. The beautiful Moulton valley, inclosed by the low foot-hills of the Sandy Mountain range which form its southern boundary, shows only along the base of the mountains a remnant of its original tree covering. Here the water oak, willow oak, red oak, mulberries, elms, and ashes were the trees found in the lower situations, and on rolling, higher land the white oak, the black oak, post oak, sassafras, and dogwood formed the prevailing forest growth. The lower flank of the steep escarpment of the highlands, a terrace of limestone cliffs mostly destitute of soil, bears a stunted tree growth. Here the red cedar and the upland hickory abound, and where the surface is less broken and a deeper soil covers the rock, chestnuts make their appearance with white oaks and the shell-bark and mocker-nut hickories. The ascent is less precipitous as the sandstone ledges are reached, and here the yellow pine (*Pinus mitis*) and the scrub pine (*Pinus inops*) are prominent among the oak forests of the mountains. When the crest of this abrupt decline is passed the oak forest is reached. It covers the extensive table-land between the Coosa and the eastern tributaries of the Tombigbee, and extends southward from the valley of the Tennessee to the lowlands commencing below Tuscaloosa, occupying an area of nearly 6,000 square miles.

"GENERAL REMARKS.

"The forests of long-leaved pine are principally confined to the following limited regions east of the Mississippi river: 1. The Great Maritime Pine region. 2. The Central Pine Belt of Alabama. 3. The Pine Region of the Coosa.

"Pine forests of more or less extent, too, mixed with woodlands composed of deciduous-leaved trees, occupy the ridges covered with a porous siliceous soil in the region of what I have called the mixed tree growth, and which upon its southern borders verges upon the Coast Pine Belt. Upon the heights of the low ranges of the metamorphic region of Alabama are also found more or less extensive tracts of this pine, generally, however, of inferior quality and size, while as far north as the thirty-fourth degree of latitude patches of thinly-scattered pine are met on the brows of the mountains, and, rarely, on the plateau of the carboniferous sand.

"The pine forests of Alabama, from the Escambia to the Mississippi state line, in the counties of Monroe, Baldwin, Washington, Mobile, and in portions of Clarke county, cover 3,500 square miles. Of these about 1,000 square miles have already been more or less destroyed in the manufacture of naval stores. Allowing 25 per cent. for land under cultivation, or covered by a forest of different trees, by water, etc., there are still 1,875 square miles left of this forest to supply the demands of the future.

"The whole amount of long-leaved pine lumber received at the port of Mobile averages about 60,000,000 feet, board measure, representing the product of mills at that place and along the various railroad lines leading to it. The amount of hewed square timber received is still small, but the business of exporting timber of this sort promises to assume large proportions in the near future.

"The pine belt of central Alabama.—This forest occupies the deposits of drift which, in a strip varying from 10 to 30 miles in width, traverses the state from east to west. It is nearly in the center of the line connecting its eastern and western limits that its greatest width is found. This forest is estimated to cover 550 square miles, no allowance being made for lands cultivated or covered by other trees. The timber, both in quality and quantity, is unsurpassed by that growing on the best sections of the lower pine region. The manufacture of lumber and its export to northern markets has only been carried on in this region to any large extent during the last three or four years, and it is now rapidly assuming large proportions. The most important saw-mills in this region are situated on the line of the Louisville and Nashville railroad, between Clear creek and Elmore, Elmore county, and produced in the aggregate 67,000,000 feet of lumber, board measure, during the years 1879–'80. Considerable lumber is also produced along the line of the Selma, Rome and Dalton railroad, in Chilton county.

"Naval stores are not yet manufactured in this region.

"THE PINE REGION OF THE COOSA.—A detached belt of drift largely composed of coarse pebbles stretches from the eastern base of the Lookout Mountain range through the valley of the Coosa river, near Gadsden, covering nearly the whole of Cherokee county, to the Georgia state line. This forest is estimated to cover from 400 to 450 square miles, although much of the best timber nearest to the river has already been exhausted. Logs are driven down the Coosa and sawed at Gadsden. The manufacture of lumber at this place has been carried on for a number of years, and amounts to an average of 20,000,000 feet.

"NAVAL STORES.

"The manufacture of naval stores in the central Gulf states is almost entirely restricted for the present to the forest contiguous to Mobile and to the railroad lines leading to that port and to the southern confines of the pine belt in Mississippi. It is only during the past two seasons that turpentine orchards have been worked near Pascagoula, Mississippi, Pearl river, and in eastern Louisiana above Covington. The first turpentine distilleries were established on the Gulf coast a little more than a quarter of a century ago, along Fish river on the eastern and Dog river on the western shores of Mobile bay. The business soon assumed such proportions as to lead to the destruction of the

forests covering hundreds of square miles, particularly in Baldwin county. The production of naval stores in this county, as well as in the lower part of Mobile county, has at present nearly ceased, on account of the exhaustion of the forest. It is, however, now carried on with the greatest activity on the line of the Mobile and Ohio railroad. Between Mobile station, in Mobile county, and Quitman, Mississippi, there are at this date not less than thirty-three stills in operation, while along the Louisville and Nashville railroad there have been during the last five years fifty-three stills established in Alabama and Mississippi. These, with few exceptions, are controlled by Mobile capital, their whole product being handled from that market, so that the returns contained in the annual reports of the board of trade of Mobile fairly represent the whole production of naval stores in this pine region.

"According to the statements contained in the report for 1880, the crops amounted in the years 1879–'80 to 25,409 barrels of spirits of turpentine and 158,482 barrels of rosin. During a period of eight years, between 1873 and the close of the business year of 1880, 160,000 barrels of spirits of turpentine and 800,000 barrels of rosin have been produced in this same district. (a)

"The increase in prices during the last few years for all kinds of naval stores, and particularly the active demand for the best class of rosin, have given an increased impetus to this business, in consequence of which many of the older orchards have been abandoned and new ones started, while the number of new boxes cut during the present season is greater than ever before. There are no returns to be obtained of the production prior to 1875, but it can be safely assumed that up to that year 250 square miles of pine forest had been boxed. The production since 1875 must have involved a further destruction of 640,000 acres, or 1,000 square miles of forest. With the low price at which pine lands are held there is not the slightest regard paid to the utilization of their resources, and under the present system they are rapidly destroyed, regardless of the needs of the future and with the sole object of obtaining the quickest possible returns on the capital invested.

"It may be of interest to mention here the results obtained by a practical manufacturer by submitting the refuse of saw-mills, that is, slabs and sawdust, to a process of combined steam and dry distillation, with the view of utilizing the volatile products of such waste. He obtained from one cord of slabs 12 gallons of spirits of turpentine, 25 gallons of tar, 120 gallons of weak pyroligneous acid, and 12 barrels of charcoal. From one cord of lightwood he obtained 12 gallons of spirits of turpentine, 62½ gallons of tar, and 60 gallons of pyroligneous acid. The sawdust obtained from sawing 10,000 feet of pine lumber, subjected to distillation during one day, produced 22 gallons of spirits of turpentine."

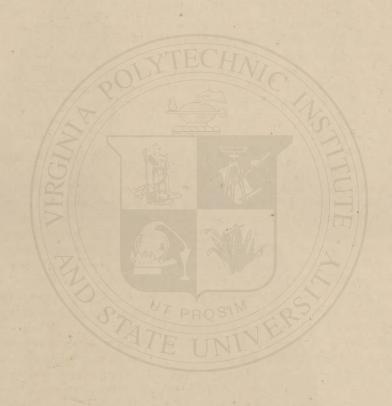
MISSISSIPPI.

The forests of Mississippi originally extended over nearly the entire state. Prairies of no great area, situated in the northern central part of the state, presented the only break in its tree covering. The forest consisted of a belt of long-leaved pine, occupying the coast plain and reaching from the eastern confines of the state to the bottom lands of the Mississippi river, and from the coast nearly to the line of Vicksburg and Meridian. The northeastern portion of this long-leaved pine forest spread over a high rolling country, and here the pines were mixed with various hard-wood trees; north of the long-leaved pine forest a long belt gradually narrowing toward the north and occupied by a growth of short-leaved pine and of hard woods reached nearly to the northern boundary of the state, while south of the Tennessee river, in Tishomingo, Prentiss, and Itawamba counties, a considerable area was covered with forests of the short-leaved pine. The remainder of the state was clothed with a growth of hard woods, which in the swamps of the Yazoo delta and the bottom lands of the Mississippi river formed vast and almost impenetrable forests, where cypresses, gums, water oaks, ashes, and other trees which find their home in the deep, inundated swamps of the South Atlantic region attained noble dimensions and great value.

The pine forests have been removed from the immediate neighborhood of the Pascagoula and Pearl rivers and from their principal tributaries within the southern tier of counties; the most accessible timber has been cleared from the Biloxi, Blind, Jordan, Wolf, and Tchefuncta rivers, flowing into Mississippi sound, and from the line of the Chicago, Saint Louis, and New Orleans railroad. The long-leaved pine of Mississippi is, however, still practically intact, and these forests are capable of supplying an immense amount of timber as soon as the means of transportation can be furnished for it. A small amount of pine has been cut in the northeastern pine region from along the line of the Memphis and Charleston railroad.

The hard-wood forests outside of the bottom lands have been largely cleared from many counties in providing for the requirements of agriculture. Such land when abandoned is again covered in the central part of the state with a growth of old-field pine, and in the north, and especially in the north-eastern counties, by a vigorous growth of short-leaved pine (*Pinus mitis*), which seems destined to become the most important timber tree of that region. The forests which cover the swamps of the state are still almost intact, although the most accessible cypress, which has long been cut in the Yazoo delta and the valley of the Pearl river to supply the New Orleans market, has become scarce.

During the census year 222,800 acres of woodland were reported destroyed by fire, with a loss of \$78,500. Of these fires the largest number was set by hunters, and by farmers carelessly starting fires in clearing land or to improve pasturage.



Establishments for the manufacture of wagons, wheel stock, cooperage, etc., have been established at different times in the northern part of the state. The industries, however, which depend upon the hard-wood forests for material are still in their infancy in Mississippi, and are capable of enormous development.

The following estimates of the standing-pine supply of Mississippi, May 31, 1880, were prepared by Dr. Charles Mohr, who carefully explored the forests of the state:

LONG-LEAVED PINE (Pinus palustris).

Regions.	Feet, board measure.	
In region west of Pearl river, tributary to the Chicago, Saint Louis, and New Orleans railroad.	6, 800, 000, 000	
East of Pearl river	7, 600, 000, 000	
Region of mixed growth, exclusive of 200,000 acres injured by the manufacture of turpentine.	3, 800, 000, 000	
Total	18, 200, 000,000	
Cut for the census year ending May 31, 1889	108, 000, 000	

SHORT-LEAVED PINE (Pinus mitis).

In the northeastern belt	1, 600, 000, 000
Total	6, 775, 000, 000
Cut for the census year ending May 31, 1880.	7, 775, 000

In this estimate no account is made of small timber standing on some 2,912,000 acres which have been cut over, and from which the merchantable pine has been practically removed.

The region of mixed growth, which adjoins the pine belt upon the north, contains a smaller number of pine trees per acre than the pine belt proper; but, the individual trees being larger, the average amount of standing pine per acre is here greater, although generally of poorer quality, than nearer the coast.

The principal centers of lumber manufacture are at the mouth of Pascagoula river, in Jackson county, at Mississippi City, in Harrison county, along the lower Pearl river, upon the line of the Chicago, Saint Louis, and New Orleans railroad in Lincoln county, and in the northeastern counties, where are located many small railroad mills, manufacturing in the aggregate a large amount of yellow-pine lumber (*Pinus mitis*).

The pine forests of the state have up to the present time suffered but little damage from the manufacture of naval stores. Turpentine orchards, however, have been recently established in the vicinity of the coast, near the mouth of the Pascagoula river, and at other points in the coast counties.

The following remarks are extracted from Dr. Charles Mohr's report upon the forests of Mississippi:

"The pine forests of southern Mississippi.—In the vicinity of Scranton, near the mouth of the Pascagoula river, little is left of the original pine forest. The old clearings are covered with fine loblolly pine, from 40 to 60 feet high, upon rather close, dry soil. The pitch pine (*Pinus Cubensis*) forms dense groves, with seedling trees from 20 to 30 feet in height upon lands of lighter soil extending to the sea-shore. Oaks are not common. Fine groves of stately live oaks, however, line the banks of the river up to Moss Point, 4 miles distant.

"The annual export of lumber during the last four or five years has averaged 45,000,000 feet from the Pascagoula river. The largest percentage of this lumber is manufactured into boards and scantling for ordinary building purposes, and is shipped to Cuba, the Windward islands, to Mexico, Brazil, and a small part, in the form of deals 2 or 3 inches in thickness, intended for ship-building, to France, Spain, Holland, Belgium, and Germany. Large quantities of charcoal burned upon the banks of Black and Red creeks are sent to New Orleans in small coasting schooners, which run also from the bay of Biloxi and the bay of Saint Louis. At Moss Point eleven saw-mills, which furnish the lumber manufactured upon it, are situated on both banks of the East Pascagoula river. The combined capacity of these mills amounts to 220,000 feet a day, although the annual production during the past years has scarcely exceeded 40,000,000 feet. The timber manufactured in these mills comes from the Pascagoula and its tributaries, the Leaf and Chickasawha rivers and their sources, the Bogue Homo, Tallahala, Bay, and Okatuma creeks, as far up as the southern limits of Covington and Jones counties. A small number of logs also. comes from the Escatawpa. The logs received at these mills average 20 inches in diameter and 40 feet in length Sticks of such average dimensions are only furnished from first-class timber-lands, which, according to the best judges, produce six or seven trees of that size to the acre. Only lands lining the streams just mentioned, in a belt not exceeding 3 miles in width on each bank, have been up to this time invaded by the log-getter to supply these mills.

"The vastness of the timber resources yet contained in the region embraced in the northern half of Harrison and the whole of Greene and Perry, up to the southern confines of Marion and Jones counties, is astonishing. As is the case in Alabama, however, trees furnishing first-class spars for masts are difficult to find; they have been cut by spar-hunters in every part of the forest which could be reached by teams.

"Cypress lumber is not manufactured in this region, and the loblolly pine furnishes so small a part of the timber manufactured that it need not be considered. In Jones and Covington counties, about the headwaters of the upper tributaries of the Pascagoula, the country is rolling, intersected by numerous small, swift streams and rivulets. This region is magnificently timbered, and devoid of the barren ridges of almost pure sand so frequently found in the pine belt of Alabama.

"The low, flat, more or less wide pine lands bordering upon the marshes of the coast are sparsely covered with pine, while the trees growing in this wet, boggy soil, devoid of drainage and overlying a subsoil impervious to water, are stunted and of little value. The lower part of Harrison county is covered with these pine meadows, which fact accounts for the comparatively small importance of the bay of Saint Louis as a lumber-producing center.

"At Pearlington, on the Pearl river, is established the large saw-mill of Poitevent & Favre, capable of producing 100,000 feet of lumber a day; at Logton, 2 miles farther up the river, are two mills, and 5 miles above these, at Gainesville, there is another. The largest part of the logs sawed at these mills is cut upon the banks of the Abolochitto creek, in Hancock county, and its tributaries extending into the lower part of Marion county, 50 or 60 miles distant. The remainder comes from the banks of the Pearl and the upper and lower Little rivers, which empty into it 10 miles above Columbia.

"The cypress is nearly exhausted from the lower Pearl river, and the 20,000 or 30,000 feet of this lumber which are sawed annually at Pearlington are derived from the cypress swamps on the upper waters of the Pearl and Jackson rivers, where there is still a large amount of this timber of good size.

"The eastern bank of the Pearl river, within the Maritime Pine Belt, is sparsely settled, and forests, the especially in Hancock county and the upper part of Marion county, are unsurpassed in the quality and quantity of their pine timber. It is estimated by good judges that these forests will yield an average of 2,000 feet of lumber, board measure, to the acre. Up to the present time a strip of land scarcely 3 miles in width, embracing the banks of the water-courses, has been stripped of its timber growth, and fine spar timber is yet to be found here a few miles back from all the streams. Almost the whole of these rich timber-lands supplying the mills on Pearl river form a part of the public domain.

"The almost unbroken pine forests covering the upper tier of counties between the Pearl and Pascagoula rivers, toward the northern confines of the pine region, are still practically intact. The wealth of these forests has as yet found no outlet to the markets of the world. Thinly settled, they are still largely the property of the government, but in view of the speedily-increasing demand for lumber and the profits derived from the lumber business, such a condition of affairs must soon come to an end. It can be safely asserted that by far the largest part of the timber, felled in the Abolochitto region is taken from government land. There can be no question of this when it is considered how insignificantly small is the area of land which has been legally entered by private persons along that stream. The necessity of adopting proper measures to protect the timber wealth upon the public domain from depredations of such enormous extent forces itself upon the most casual observer, while to one who looks closer at the consequences of the continuance of the existing state of affairs the urgency becomes appallingly apparent. The ever-increasing consumption of timber at the mills upon Pearl river, of which one alone can cut 100,000 feet of lumber a day, will prove a powerful stimulus to a people who, since the development of the lumber business in these regions, have almost completely abandoned their former agricultural and pastoral pursuits and now depend entirely for their support upon cutting pine logs, to supply this enormous demand at the expense of the public property. Already plans have been made to invade this region by tramways and railroads, in order that its timber may be brought to market. This is true, too, of the region between the Pearl and the Amite rivers, down to the marshy lands of eastern Louisiana, a region in which the forests are also particularly good.

"In the state of Mississippi it is safe to estimate that, after deducting 25 per cent. for areas of swampy and cleared land, 9,000 square miles are still covered by forests of long-leaved pine. The production of this region during the census year amounts to 108,000,000 feet; of this, 60,000,000 finds its outlet at Pascagoula, 30,000,000 by Pearl river, 6,000,000 by bay of Saint Louis, and 12,000,000 by the Chicago, Saint Louis, and New Orleans railroad to northern markets.

"In the northern part of Harrison county we crossed a tract from which twelve years ago a hurricane swept a belt a quarter of a mile wide of all tree growth. It is interesting to note the growth which has since sprung up among the prostrate charred trunks of the pines still found lying about in large numbers. Black-jack oaks, the largest not over 12 feet in height, are mixed in almost equal numbers with stunted, thin saplings of the long-leaved pine. These plainly exhibit the helplessness of the struggle to which these offspring of the great timber tree are subjected under the influence of repeated conflagrations wherever the oak scrub has sprung up and added fuel, in the abundance of its leaves, to the fires which annually sweep through these woods.

"The northeastern counties.—After crossing the Sucarnoochee river below Scooba, in Kemper county, the pines which had covered the ridges near the borders of Lauderdale county disappear; scarcely a stray sapling

of the loblolly pine is seen as Scooba is reached. The cold, wet, calcareous soil of the flatwoods and prairies is unsuited to the growth of all coniferous trees, with the exception of the cypress. Along the railroad, as it traverses the flat prairie region, the country is sparsely wooded; large tracts of the prairie lands have always been destitute of trees, and the woodlands with which they were interspersed were cleared at the first settlement of the country. What remains of the original forest growth is now confined to localities too difficult of drainage to make agriculture profitable, and to the banks of streams subject to inundation. More or less extensive patches of woods are found also on the ledges where the limestone rock comes to the surface. In the swampy land the willow oak, the water oak, the black gum, sweet gum, white ash, and along the ponds willows and cottonwoods, prevail. The post oaks, white oaks, and cow oaks are mingled more or less freely with these trees in localities enjoying better drainage. Black-jack and black oaks, mixed with various haws, viburnums, and persimmons, occupy the rocky flats. No magnolias were seen in this region. The red, willow, and water oaks, the sycamore, and the sweet gum abound along the streams here, and are so common as to deserve special mention, while on the rolling uplands black oaks, post oaks, and white oaks, with poplars, shell-bark and pig-nut hickories, are common. From Tupelo toward Corinth the country is poorly wooded. The ascent is constant, reaching the point of highest elevation between the Gulf of Mexico and the Ohio river at Booneville. Corinth is situated on a wide pine plain, bounded on the west by the valley of the Tuscumbia river and east by the ridges which mark the water-shed of the Tennessee. The soil is here a deep calcareous clay, very stiff and heavy, hard as brick in warm, dry weather, and suddenly becoming a bottomless, stiff mire in seasons of rain. Below the valley of the Tuscumbia river the road passes over low and undulating ridges, of which the higher and steeper are yet covered with the remnants of the old oak forest. Here the Spanish and post oaks predominate in numbers; then follow the black oak and the scarlet oak, while the shell-bark hickory and the mockernut form but a small part of the tree growth of these uplands. The bottoms of the Tuscumbia, although subject to frequent overflows, are covered with a primeval forest not inferior in Iuxuriance and variety to that of the Mississippi river bottom lands. White-oak timber of the finest quality is found here in the greatest abundance and perfection. The most common species is the cow oak (Quercus Michanxii). I found that this river-bottom forest contained, by actual count, an average of from twelve to fourteen trees of this species, from 30 to 35 inches in diameter, to the acre. It is known to the inhabitants here by the name of cow oak or basket oak, being easily split into narrow, thin strips. The wood is extensively used in the manufacture of baskets used by the negroes in cotton-picking. These baskets are light, and of considerable strength and durability. Next in frequency follows the willow oak, and then the over-cup swamp oak (Quercus lyrata), and finally the red oak, found especially on the outskirts of the forest.

"The white ash is not so frequently seen here as elsewhere in similar localities, and does not seem to thrive on these stiff, cold soils. It is in part replaced by the green ash, which here attains the size of a large tree. The black gum is very common, and where the soil is least subjected to overflow the true white oak is found, with fine groups of beech, overtowered by large poplars. Among the smaller trees the mulberry, hornbeam, holly, and abundant papaws must be mentioned.

"The pine hills in the eastern part of Alcorn county are reached at a distance of 6 or 7 miles in a southerly direction from Corinth. Pine occurs on the dividing ridges between the waters of the Tuscumbia river and Yellow creek, or toward the south on those between the Tombigbee and the Tennessee rivers. A short distance west of Glendale station the Cretaceous strata disappear under the ferruginous sands, and mixed with a stunted growth of post oak and Spanish oak, pines appear, forming vast forests on the crests of the hills. This pine (Pinus mitis) takes possession of all the old clearings and fields thrown out of cultivation. The rapid growth of the seedlings, which spontaneously spring up thickly after the removal of the broad-leaved trees, leaves no chance for the seedling oaks. It is therefore a certainty that in the future the short-leaved pine will be almost the sole forest tree in this part of the state, outside of the bottom lands, and that it will probably extend its domain far beyond the original limits of its growth.

"The aspect of these pine woods resembles closely that of the lower pine region. The short-leaved pine replaces here the long-leaved pine of the coast, the scrubby post and Spanish oaks take the place of the turkey and the upland willow oaks, while the black-jack is common to both these regions of identical geological formation. The flora of the two regions also presents the same general features; the asters, goldenrods, sunflowers, and various leguminous plants are often the same or belong to closely-allied species. The pine-clad drift hills interspersed between the Carboniferous and Cretaceous regions are parts of the northern interior drift belt which extends throughout Alabama. The region of the short-leaved pine of northeastern Mississippi extends from the southern border of the valley of the Tennessee river to the southern extremity of Itawamba county, and is on an average 10 miles in width, embracing an area of nearly 600 square miles. Of this region, after the deduction of the fertile bottoms of the Tombigbee and Yellow Creek valleys, where no pines are found, two-thirds can be regarded as occupied by the pine forest. As the sole supply of pine lumber in the northern part of the state, this region is of great importance. Several saw-mills, none of which have an annual capacity of more than 3,000,000 feet, are established on the railroad line at Glendale, Burnsville, and near Iuka; portable saw-mills are worked also through this forest in its whole extent, their product being hauled in wagons for miles to the nearest station on the Mobile and Ohio and the Memphis and Charleston railroads. The largest shipments are made from Burnsville and Corinth.

"The second growth of the short-leaved pine, which is already growing with great rapidity in northern Mississippi upon exhausted fields thrown out of cultivation and wherever the forest has been cut from the ridges, should be protected and fostered by the owners of the soil. The care bestowed upon the natural seeding of this useful and valuable timber tree, and in assisting it to gain a permanent foothold on lands regarded as unfit or unprofitable for agriculture, of which tens of thousands of acres are now found in this state, would lead to results of great benefit to the community. The people have it in their power to replenish their timber resources, fast failing through the ever-progressing destruction of the original forest, without other outlay than simply assisting nature in her efforts to recover from injuries sustained in the wholesale destruction of the forest. The restoration of the forest over vast areas, now barren and unproductive wastes, would add vastly to the general welfare and prosperity through the influence such forests would exert upon the climate and salubrity of the country, by the shelter they would offer to insectivorous birds ever busy in the destruction of insects injurious to farm crops, and by the formation of protective screens against the cotton-worm, the most destructive of all insects in this part of the country; for it must be admitted as an undisputed fact that the destruction caused by the cotton worm is far less upon the small farms where strips of woodland divide the fields than upon the plantations in the rich prairie lands where large areas are destitute of woods. Such forests would serve as windbreaks for crops growing in field and orchard, and as protection against the washing away of the light soil so peculiarly adapted to the cultivation of the great staple of the country, thus preventing the ruin of many productive fields, the débris from which, carried away by the rain and floods, fills the rivers and their estuaries, rendering navigation every year more dangerous.

"CENTRAL PINE HILLS.—A hilly region, the northern limit of which is near the center of Benton county, covered with upland oaks and short-leaved pines, extends eastward to the flatwoods in a belt from 8 to 12 miles in width. Farther south, in Calhoun and Sumter counties, this pine region is much wider, embracing the largest part of these and Choetaw and the western part of Oktibbeha counties; from Kosciusko, Attala county, it extends over the whole of Winston and the western part of Noxubee counties, being merged, south of Neshoba in the western part of Kemper county, with the region of mixed tree growth. This pine forest supplies a sufficient amount of lumber for the local demand, and portable saw-mills are found near the large settlements from Kosciusko to the southern limits of the region. It forms a prominent feature in the eastern Gulf states by its geographical position, and must be regarded as one of the distinct divisions which might be designated as the region of the central pine hills. Botanically this region differs from that of the mixed tree growth, upon which it borders toward the south, by the more equal distribution of the pines among the oaks, and particularly by the total absence of the long-leaved pine and other conifers, with the exception of the loblolly pine and of scattered cypress along the river banks, and by the absence of the great magnolia (M. grandiflora). The second forest growth in the northern part of this region consists almost exclusively of the short-leaved pine, which southward is associated with the loblolly pine. The short-leaved pine will in the future be the chief forest tree of this region.

"I have personally seen but little of the flatwoods proper, having only touched their southern limits in Kemper county. It is a region of close, cold soil, devoid of drainage, and covered with a stunted growth of post oak; and in its economic aspects as a timber region, or botanically, is of little interest or importance.

"Western Mississippi.—In Copiah county, below the village of Terry, fifteen saw-mills are in operation along the railroad, obtaining their supply of logs from the heavily-timbered hills in the neighborhood. This lumber is shipped by rail to Saint Louis and Chicago. This business has already reached large proportions and is still increasing rapidly, the mills running without intermission at their full capacity throughout the year.

"Beyond Crystal Springs the country loses its rolling character; the pine hills disappear, and a short distance above the northern boundary of Copiah county, near Terry, a different geological formation is entered, and a strongly-marked change in the vegetation takes place. Horizontal strata of loam, inclosing layers of what appears a whitish sand, stretch northward over a vast extent of level country, and the long-leaved pine disappears with the gravels and sands of the drift.

"North of the pine region a large amount of rich land between the Pearl and Mississippi rivers has been brought under cultivation, especially along the bottoms of the Pearl river and along the principal railway lines. At Jackson, on the Pearl river, little is left of the original tree growth which covered its banks. Still enough is left, however, to show that it was chiefly composed of sweet gums, white oaks, elms, white ashes, etc. The railroad from Jackson to Vicksburg passes through a fertile agricultural country, where only small strips of forest remain between the large plantations and farms. Pines are not seen here, and the black walnut, originally so abundant among the oak and hickory forests which covered this region, must now be regarded as entirely exterminated. Beyond the Blackwater, in the hilly region of the bluff formation, the great magnolia covers the hillsides, although in the vicinity of Vicksburg the hills for miles around the city are entirely stripped of their forests.

"Vicksburg is the center of a considerable lumber industry, depending for its supply of timber upon the cypress rafted down from the mouth of the Yazoo river. The first mill devoted to the manufacture of cypress lumber was established in Vicksburg in 1865. Before that time all the timber from the Yazoo valley was rafted down the Mississippi river, mostly to New Orleans, as is still the case with the greatest number of the rafts. A second mill has lately been built at Vicksburg, and the combined annual capacity of the two is ten or twelve million feet. No

manufactured lumber is shipped from here farther south than Baton Rouge, nearly the whole production being consumed in the erection of small dwellings in the Mississippi and Yazoo bottoms. The logs received at these mills average 25 inches in diameter, with a length of from 30 to 70 feet.

"The hillsides in the neighborhood of Vicksburg, when thrown out of cultivation, are seen covered with a stunted growth of locust, Chickasaw plums, and other shrubs. The original forests of the bluff hills consist of extensive groves of stately magnolias, stretching down the slopes and mixing with large white oaks, Spanish oaks, beeches, and towering poplars, covering the mossy ground of the small valleys with delightful shade. Many of the magnolias are from 18 inches to 2 feet in diameter. The full-grown trees, however, show that they have already passed their prime; the upper limbs have begun to die, the base of their trunks being often rotten and hollow. Small specimens and sapling or seedling trees I could not find. The large trees are cut down to supply the neighboring city with fuel, and it is inevitable that in a comparatively short time these magnolia groves will have disappeared, and that these delightfully-shaded hills must share the desolation which surrounds the town.

"The Yazoo Delta.-Indian bayou, one of the small water-courses between Pearl river, Deer creek, and Sunflower river, has a sluggish current even in time of high water. As is the case with all the streams of the Yazoo delta, its banks are elevated often to a height of 10 or 15 feet above the surface of the water, thus affording excellent natural drainage for the adjacent country, which is covered with a yellow-brown loam of unsurpassed fertility. As the land, however, recedes from the banks it gradually sinks down again toward the level of the bed of the stream, and the water-courses, following the general direction of the Mississippi river, inclose corresponding lines of depression nearly level with the beds of the streams. These troughs between the bayous and rivers are one of the characteristic features in the topography of the Yazoo delta. They are of various extent, depth, and shape; flat and wide, they form tracts of dark, wet forest swamp, more or less dry in summer; or, narrower and deeper, they form swamps rarely ever entirely free from water; sometimes they are inundated wooded marshes and canebrakes, or ponds and lagoons more or less shallow and studded with the mighty trunks of the cypress. When these depressions are of considerable depth, lakes, presenting open sheets of water sometimes miles in extent, are formed, their margins, only, overgrown with the cypress. Upon these features depend the great diversity of the forest growth which yet covers the largest part of the Yazoo valley. Along the elevated ridges fronting the streams the white oak, the willow oak, the shell-bark and mocker-nut hickories, the black walnut in great numbers, the yellow poplar and the sassafras large enough to furnish canoes of great size, the mulberry, the Spanish oak, the sweet and the black gums are the principal forest trees, with an undergrowth in the openings of dogwood, various haws, crab apples, wild grapes, buckthorns, etc. In the forests covering the lower lands, which slope back to the swamps and reservoirs, the cow oak takes the place of the white oak, while the over-cup white oak occurs everywhere in the more or less saturated soil. Here the sweet gum reaches its greatest size, and here grow also in great perfection the bitter-nut, the elms, hornbeams, white ash, box-elder, and red maples of enormous size. The honey locust, water oaks, and red and Spanish oaks are equally common. Here, among the smaller trees, the holly attains its greatest development, with hornbeans and wahoo elms, while papaws, haws, and privets form the mass of the dense undergrowth, which, interspersed with dense cane-brakes, covers the ground under the large trees.

"The region covered by these splendid forests of hard woods possesses a wealth of timber of the most valuable kinds and in surprising variety. They occupy by far the greatest part of Sunflower and the adjoining counties between the Mississippi river and the hills which border upon the Yazoo to the east. Most of the clearings made in this region before the outbreak of the war, by the planters settled lower down, have since been abandoned and are again densely covered with the young growth of the trees of which the forest was originally composed. During the last few years, however, the country has been entered again for cultivation by a class of small farmers, who from being farm hands have now risen to the position of independent landholders. It is astonishing to see the utter disregard of these settlers for the forest wealth of the country, which in a short time could not fail to be of great commercial value. On the shores of Indian bayou may be seen clearings with hundreds of the finest black walnuts among the deadened trees, while many of the noblest specimens of this valuable timber tree are felled for fence rails or trifling purposes. The amount of oak and hickory timber destroyed here annually is amazing. It is generally believed, however, that not one acre in fifty over this whole region of hard-wood forest has yet been stripped of its tree covering. Quite different is the condition of the cypress growth in the great Yazoo valley. This tree, confined to low and more or less inundated bottoms bordering on the Mississippi, the Lower Yazoo, Big Sunflower, and their numerous tributaries, was once found in the greatest abundance in this region, and immense quantities of cypress lumber have been furnished by the lower parts of Issaquena and Washington and the western parts of Warren and Yazoo counties. The most valuable timber has now, however, disappeared from the immediate neighborhood of the low river banks easily accessible at seasons of high water during every winter and spring. Only groves standing remote from the banks of the water courses, and which are only accessible to the raftsman during exceptionally high stages of water, now supply this lumber. In the upper portions of the valley, however, in the low depressions described as extending between the elevated banks of the streams, more or less limited areas of undisturbed cypress forest are found. The shallow lagoons, covered with water except during seasons of prolonged drought, and called cypress creeks, present in the spring of the year a strange sight. No object meets the eye between the immense trunks of the mighty trees, as in these cypress groves no other tree nor shrub can live in the dark, shaded, water-covered soil. These reservoirs of drainage, generally without outlet, are called cypress lakes if the water in any part of them, too deep to allow the growth of trees, confines the cypress to their more shallow borders. Here the cypress arrives at its greatest dimensions and produces timber of the finest quality. These cypress lakes and cypress brakes, remote from streams, at no time of the year connected with them, and always surrounded with a mire of forest swamp impassable to wagons, still retain their best timber. Of late years, since swamp and overflowed lands have become the property of the state, planters have added many of these cypress tracts to their estates by purchase; many others have been acquired by companies formed to construct artificial channels by which the timber may be floated to the nearest streams. The richest and most extensive of these groves of cypress, already more or less in the hands of capitalists, are found along Steele's bayon, between Deer creek and the Sunflower river, in Washington county; between that stream and the lower course of Bogue Phalia, and between the Mississippi river and Black creek above Greenville. There is also a very large body of cypress inclosing the 'California brake', upon the Little Sunflower, in the counties of Bolivar and Coahoma, extending through Tallahatchie county to the Yazoo river.

"The traffic in cypress lumber in the Yazoo region dates from 1830. In 1838 it was commenced upon the Sunflower river and Deer creek, ten years after the first settlements were established upon the banks of these streams; since that time rafts have been sent regularly to New Orleans, and camps of lumbermen have been established in every direction, the forests, particularly those upon the public domains, being regarded as the undisputed property and lawful prey of the log-getter. In consequence the cypress groves have been, if not entirely destroyed, largely culled of their best timber wherever it could be obtained without investment of capital, that is by simply floating the logs to the streams at times of freshet and overflow.

"The cutting of these cypress forests is not wisely regulated under the ownership of the state. These lands have been thrown into the market at 50 cents an acre with the condition of settlement. Beneficial as such a law might prove in the disposal of lands fit for cultivation, it results, in the case of timber-land unfit for the plow, in the reckless destruction of one of the surest sources of public revenue. The state thus sells for 50 cents what on its face is worth to the purchaser hundreds of dollars, and which, when deprived of its value and rendered forever worthless, will be turned back to the state again.

"Much of the destruction of the timber can be traced to wasteful methods practiced by the negroes. Under present methods any one having rented a plantation will, for the most trifling wants, cut down a tree, regardless of size, and without any effort to preserve for future use the parts not immediately wanted, so that the next quarter of a century will probably see the entire destruction of the vast quantities of timber stored in the whole of this great territory."

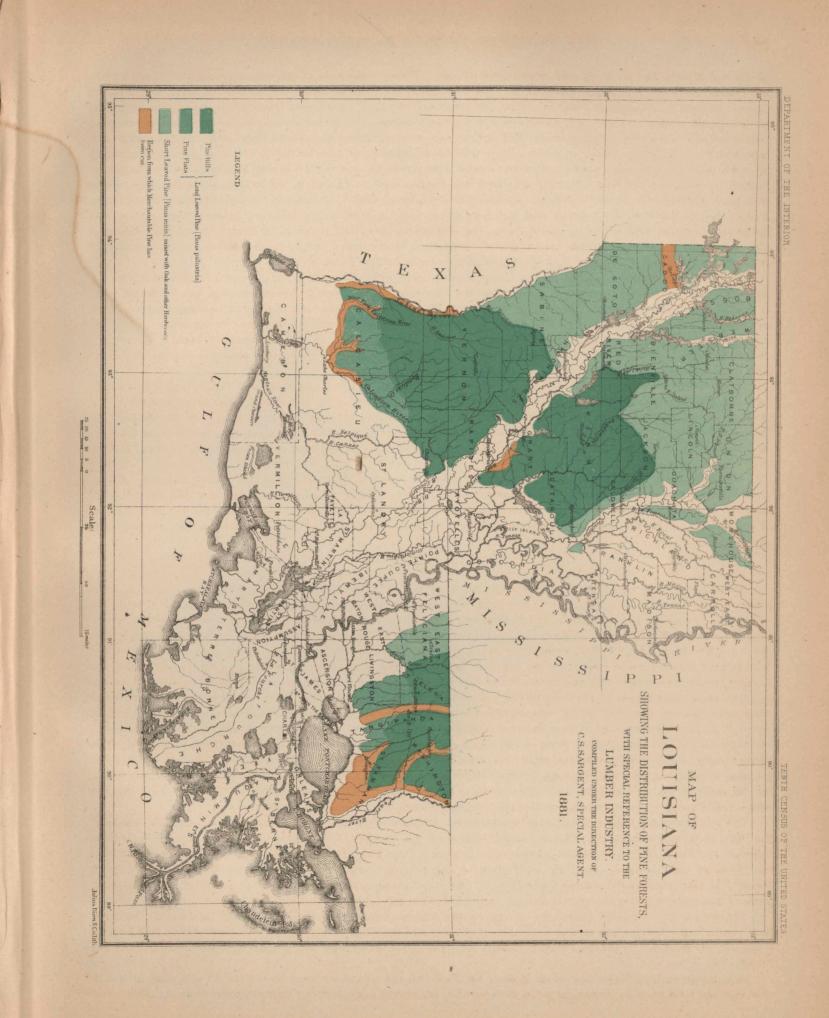
LOUISIANA.

The coast of Louisiana is bordered by saline marshes and savannas extending inland from 10 to 40 miles, or is covered with a scattered growth of cypress occupying extensive fresh-water swamps peculiar to the region. In Vermillion, Calcasieu, Saint Martin's, and Saint Landry parishes considerable treeless areas, open grassy prairies in the borders of the forest, occur. With these exceptions Louisiana was originally covered with a dense and varied forest growth. The Maritime Pine Belt covered the eastern portion of the state nearly to the Amite river, or until checked from further western development by the alluvial deposits of the Mississippi. Forests of pine, too, occupied the western part of the state north and south of the Red river. The pine flats of Calcasieu were covered with forests formed almost exclusively of the-long-leaved pine, which, farther north, mixed with oaks and various hard-wood trees, extends over the high rolling country which stretches from the Sabine northeasterly nearly to the Ouachita river. The northeastern part of the state was covered, outside of the broad bottom lands of the rivers, with a heavy forest of short-leaved pine (*Pinus mitis*) mixed with upland oaks, hickories, and other deciduous trees. The bottom lands and all that part of the state bordering the Mississippi were covered with a heavy growth of the trees peculiar to such low, rich soil throughout the Gulf region. The high bluffs which occur at different points along the Mississippi, the Atchafalaya, and other streams flowing through the western part of the state were covered with a noble forest of evergreen magnolias mingled with beeches, water oaks, and gums.

The most valuable forests of the state are still almost intact, although the pine has been cut from the banks of the Pearl river and some of its tributaries, and from along the line of the Chicago, Saint Louis, and New Orleans railroad, to furnish the New Orleans market with lumber. Pine has also been cut along the Sabine river, from both forks of the Calcasieu, along the Red river in the neighborhood of Alexandria and Shreveport, and more recently in Catahoula parish, along Little river. The river swamps and rolling hills in the eastern and northern parts of the state still contain vast bodies of valuable hard-wood forest yet untouched by the ax.

The forests of Louisiana, uninvaded as yet by the manufacturers of naval stores, have not greatly suffered from forest fires. During the census year only 64,410 acres of woodland were reported as burned over by fire, with a loss of only \$6,800. These fires were generally set to improve pasturage, or by careless hunters camping in the forest.

A small amount of cooperage stock is made in New Orleans almost entirely from cypress and pine, although that city has long been an important point of export for oak staves and headings brought there from Arkansas and





Tennessee by river. The magnificent hard woods common over much of the state can supply abundant material for many important industries which already at the north suffer from the exhaustion and deterioration of the local timber supply.

The following rough estimates of the amount of the long-leaved and short-leaved pine standing in the state have been prepared by measuring upon a large-scale map areas occupied by the pine forests, which coincide almost exactly with geological formations. From these areas the totals of clearings as returned by enumerators and all areas of swamp, bottom lands, and prairies are deducted to obtain the extent of territory covered with pine forests. By multiplying this area by the average stand of timber per acre, obtained by numerous observations in different parts of the state, the following estimate of the amount of merchantable pine standing May 31, 1880, is reached:

Parishes.	Long-leaved pine (Pinus palustris).	Short-leaved pine (Pinus mitis).	
	Feet, board measure.	Feet, board measure	
Bienville	416, 000, 000	1, 837, 000, 000	
Bossier	***************************************	1, 574, 000, 000	
Caddo		1, 696, 000, 000	
Calcasieu	4, 219, 000, 000	***************	
Caldwell	602, 000, 000	362, 000, 000	
Catahoula	1, 558, 000, 000	304, 000, 000	
Claiborne	M 1 1	1, 923, 000, 000	
De Soto		1, 971, 000, 000	
East Baton Rouge		157, 000, 000	
East Feliciana	198, 000, 000	886, 000, 000	
Grant	1, 574, 000, 000		
Jackson	• 493, 000, 000	1, 670, 000, 000	
Livingston	300, 000, 000	1	
Morehouse)	797, 000, 000	
Natchitoches	1, 792, 000, 000	618, 000, 000	
Ouachita	16, 000, 000	1, 126, 000, 000	
Rapides	2, 422, 000, 000	1.12.2.1.1.1	
Red River		643, 000, 000	
Sabine	598, 000, 000	1, 974, 000, 000	
Saint Helena	749, 000, 000		
Saint Landry	579, 000, 000		
Saint Tammany	1, 398, 000, 000		
Tangipahoa	1, 537, 000, 000		
Union		2, 522, 000, 000	
Vernon	3, 741, 000, 000		
Washington	1, 734, 000, 000		
Webster		1, 443, 000, 000	
West Feliciana	······································	122, 000, 000	
Winn	2, 662, 900, 900		
Total	26, 588, 000, 000	21, 625, 000, 000	
Cut for the census year ending May 31, 1880	61, 882, 000	22, 709, 000	

The principal point of lumber manufacture is Saint Charles, in Calcasieu parish, on the southern border of the western pine forest. Lumber manufactured here is shipped east and west by rail, and in small schooners to Mexican and West Indian ports. A comparatively small amount of lumber is manufactured at New Orleans from logs cut in eastern Louisiana and towed through lake Pontchartrain and the canals to the city, and along the river front from logs rafted out of the Red, Little, Black, and other streams of northern Louisiana. New Orleans, however, is principally supplied with lumber sawed at Gulf ports, in spite of its position with reference to the most valuable hard-pine forests upon the continent, its large local demand for lumber and all saw-mill refuse, and its facilities for export, which would seem to indicate that it must become the most important center of lumber manufacture and distribution in the south. Small quantities of pine lumber have long been manufactured upon the Red river near Alexandria; short-leaved pine (Pinus mitis) is sawed at Shreveport, and in small quantities for local consumption at other points in the northern parishes.

MOSS GINNING.

New Orleans is the center of the "moss-ginning" industry of the United States. The "moss" (Tillandsia usneoides), a common epiphyte, growing in great quantities upon the cypress, live oak, and other southern trees, is gathered, by men known as "swampers", in the swamps of Louisiana, Mississippi, Alabama, and Florida. The moss when gathered is piled near the swamps and allowed to rot during ten or twelve months. It loses in this process about 90 per cent. of its weight, and is then shipped to New Orleans, where it is cleaned, dried, and ginned, losing in this latter operation 35 per cent. in weight. The prepared moss is used in upholstery, either alone or

mixed with hair. The product of the New Orleans factories is principally shipped to the western states, a comparatively small amount being sent to Europe. Six moss factories are located in New Orleans, and there are also small establishments at Plaquemine and at Morgan City, Louisiana, and at Pensacola, Florida. New Orleans received during the year ending August 31, 1881, 3,500 bales of rough moss, weighing 10,000,000 pounds, and valued at \$315,000. A considerable amount, however, is ginned in the country and shipped direct to consumers, or is prepared by the consumers themselves. Persons most familiar with the volume of this industry estimate that the value of the prepared moss gathered annually in Louisiana, the principal region of supply, is not far from \$550,000. The amount gathered, however, varies considerably from year to year. Moss can only be profitably collected at times of high floods, when the swamps are navigable to small boats, and the moss, hanging from the branches of the trees, can be easily gathered. The wages earned by the swampers, too, are not large, and the gathering of moss is only resorted to when more profitable employment upon farms cannot be obtained.

The following extracts are from notes of a hasty journey made through the forest region of western Louisiana by Dr. Charles Mohr:

"For the investigation of the important pine region of western Louisiana I selected Alexandria as my starting point. Situated almost centrally between the forests of long-leaved pine which skirt both sides of the Red River valley, Alexandria is the seat of the actual lumber trade and the point where the lumber interests of this great timber region must be developed in the future. Little is left of the vast cypress swamps which once covered the alluvial lands on the Mississippi river below the mouth of the Red river and the lower basin of that stream. It is only in the most inaccessble swamps, cut off from all communication with the rivers, that patches of this timber remain. The ever-increasing demand for this lumber has almost exhausted the available cypress of the Red River country, and cypress is now drawn from the forest farther north bordering the Black and Ouachita rivers. lowlands along the river front, subject to inundation and devoid of drainage, present in their tree growth the same features as the low forests of the Mississippi and the Yazoo valleys. The bitter pecan flourishes here luxuriantly, and with it the white ash, the swamp over-cup oak, the persimmon, sycamore, sassafras, sweet gum, and cottonwood. The green ash is common, and in better-drained localities the willow, white, cow, and red oaks appear, with elms and occasional pecans. Twelve or 15 miles below Alexandria the first pines are seen looming up in the forest; upon a nearer approach they are recognized as the loblolly. A short distance farther up the river, upon sandy bluffs fronting the western shore, fine specimens of the short-leaved pine are observed, associated with black oaks, Spanish oak, the black-jack, and many of the shrubs peculiar to the drift of the coast pine region east of the Mississippi. The wide bottom lands of the river upon which Alexandria is situated extend west to bayou Bouf. This district, unsurpassed in fertility and regarded as the garden of Louisiana, has but little left of the forest with which it was once covered. The pecan trees alone of the original forest growth have been spared from the general destruction. Of these, fine specimens line the roadsides and dot the fields. The unsightly honey locust occupies the waste low places, in company with a second growth of willows, hackberries, and catalpas. bayou Bouf are covered with a variety of trees. Cypresses line the brink of the water; beyond these, sycamores, bitter gums, sweet and white gums, pecans, water and willow oaks, red and white elms, red maple, and ash occupy the gentle acclivities, with a dense undergrowth of smaller trees-the dogwood, several haws, wahoos, catalpas, Carolina buckthorn, southern prickly ash, etc. Ascending the ridge to the uplands the deep alluvial soil is left behind, and the light sandy loams of the Tertiary strata make their appearance, and with this change of soil the vegetation changes as suddenly. Stately loblolly pines rise above the groves of post, black, and Spanish oaks, and where the ridge descends again to what might be called the second bottom of bayou Bœuf, a forest of white oak is entered, which contains a stand of timber seldom equaled. On the long, gentle swells these are associated with fine Spanish oaks, a few pig-nuts and mocker-nuts, and in the depressions with red oak, elms, ash, and other trees found on soil of good quality in the same latitude east of the Mississippi river.

"The hills formed by the sandstone drift gravels rise suddenly from the plain covered with the forest of the long-leaved pine, comparing favorably both in the size and number of the trees with the best timber districts in the Coast Pine Belt of the eastern Gulf states. Trees under 12 inches in diameter are rarely seen, as is the case everywhere in these undisturbed primeval pine forests. The soil of this region is closer, more retentive of moisture, and richer in plant-food than that in the Maritime Pine Region east of the Mississippi. The pines here are therefore of more rapid growth and below the standard of quality for which the pine produced on the poor, siliceous ridges of lower Mississippi and Alabama is so highly valued. The numerous streams which cut their way through these pine hills are fringed with many of the evergreens peculiar to the eastern Gulf coast; and magnolias, the red and white bay, wax myrtles, willows, and the devilwood are common.

"The pine region west of the Red River valley spreads westward to the Sabine, forming part of the great pine forest which extends far into eastern Texas. Southward it constantly increases in width; and its length from north to south, where it verges upon the lower maritime prairies of the Calcasieu, is not less than 100 miles. It includes the whole of the parish of Vernon, the largest part of Calcasieu, and portions of the parishes of Natchitoches and Rapides, covering an area of about 4,500 square miles. The northern portion of this belt is one vast primeval forest. The small inroads made by the scattered settlers and the few small saw-mills which supply a small local

demand are too insignificant to be taken into account. In the southern portion of this forest the saw-mills on the Sabine river and at Lake Charles have already removed some timber from the banks of the principal streams.

"The region of long-leaved pine which skirts the eastern confines of the Red River valley, and which at its southern extremity almost touches the river banks, may be called the central pine region of west Louisiana. The village of Pineville, opposite the city of Alexandria, is the center of the lumber trade of this region. The high, undulating uplands formed of the Pliocene-Tertiary strata which here front the river bear a growth of loblolly and short-leaved pine mixed with upland oaks. A few miles to the eastward, however, upon the hills covered with drift, the forest of long-leaved pine appears. The surface in this central pine region is more broken, the soil poorer, more porous and siliceous than west of the Red River valley, and the timber produced here is of unsurpassed quality. An average of not less than fifteen trees to the acre, with a diameter of over 15 inches 3 feet from the ground, grow here. The production of lumber is limited to saw-mills situated 7 or 8 miles from the river. They have been gradually removed from its banks as the timber was exhausted on a line 7 or 8 miles in length north and south from Pineville. The production of these mills amounts in the aggregate to 40,000 feet a day. The lumber manufactured here supplies the population of the Red River valley as far west as Shreveport.

"The rolling uplands which extend to the edge of the river at Shreveport are covered with a heavy, cold, clayey soil almost impervious to water; they bear an open growth of oaks, among which the post oak is the prevailing species, finding here the conditions most favorable to its growth. The Spanish oak, invariably called west of the Mississippi river red oak, with fine black-jack makes up the larger part of the tree growth. Hickories, represented by the pig-nut and mocker-nut, are not frequent, and are of small size. The black oak is found in localities with somewhat rocky surface and loose subsoil, while white oaks occur along the base of declivities where an accumulation of vegetable matter has been deposited. The undergrowth in these woods is scanty, and consists for the most part of seedling oaks. Where, however, the forest has been entirely removed, the loblolly pine takes exclusive possession of the soil. These oak forests reach to the porthern confines of the state and extend west into Texas. In their southern extremity toward the pine region the soil is better, and the white oak becomes the prevailing forest tree. My attention was directed to the fact that since the removal of the raft of the Red river the drainage of the upper part of the valley has been greatly improved, and many of the lakes and swamps formerly continually inundated are now dry, while the swamp forest growth, including the cypress, is dying, or has already died.

"Opposite Shreveport the valley spreads out into an extensive plain from 8 to 10 miles in width, descending imperceptibly as it recedes from the bank of the river. These lowlands are mere swamps, often deeply overflowed by the backwater of the river, which finds its way through the numerous bayous and inlets which intersect this plain. The forest growth covering these swamps is of inferior size, and consists of but few species. The cypress occupies the overflowed swamps, but it is always below medium size, and I did not notice a single specimen 2 feet in diameter. The saline, gypsum soil does not seem suited to its full development. The water locust finds here its favorite home. It is very common in moist localities not subject to constant inundation. The wood of this tree is as hard and durable as that of the common honey locust, and is employed for the same purposes; that is, in the manufacture of stirrups, blocks, hubs, etc. The green ash is frequently seen here growing with the wahoo, hornbeam, holly, and privet, and forming broad clumps of great luxuriance beneath the larger trees. After passing Cross bayou the land gently rises, and, with better drainage, the trees of the swamps disappear and are replaced by a more varied and valuable timber growth. The white ash and white and red oaks are the more common trees in the woods which skirt the base of the ridges forming the eastern limits of the valley of the Red river. At this point they are separated from the low hills of the Pliocene sandy loams by a pretty, clear stream, the Red Chute, which runs swiftly over its bed along the base of the uplands; these form long, gentle, swelling slopes, or spread out into broad flats more or less deficient of drainage. The ridges are all wooded with upland oaks and short-leaved pines, while the loblolly pine, with water and willow oaks, sweet and black gums, cover the depressions and damp flats. The tree growth upon these ridges is vigorous. I have nowhere found the short-leaved pine of finer proportions, equaling in size and length of clear trunk the long-leaved species. This region of the short-leaved pine, with its low, heavily-timbered ridges, is similar in character of soil and vegetation to the pine hills of central and northern Mississippi, and might be designated as the region of the pine hills of northern Louisiana. Between lake Bodcau and lake Bistineau the surface of the country is very often imperfectly drained, and there the loblolly pine is the prevailing tree. A few miles back of Bellevue, in Bossier parish, the level forest is interrupted by a strip of prairie from 1 mile to 3 miles wide, covered with a cold, soapy, gray soil impervious to water. On these natural meadows no tree or shrub is growing, except a peculiar Cratagus, new to me. (a) It is a small tree or large shrub, forming strictly-defined, impenetrable, dense thickets a few rods or of several acres in extent. In its arborescent form it rises to a height of from 15 to 20 feet, with a more or less bent trunk 6 or 7 inches in diameter, spreading its crooked limbs at a height of from 4 to 6 feet above the ground. The fruit is said to be as large as that of the apple haw, sweet and edible; it is eagerly eaten by swine, which fatten upon it. This tree is here called by the people 'hogs' haw'.

"On the decline which leads to the valley of bayou Dauchitta, the flatwoods give way to a fine growth of

Spanish and post oaks, elms, and gums.

"The western bank of the bayou is confronted by hills of the post-Tertiary sands and gravels which westward form a succession of steep ridges heavily wooded with the upland oaks and short-leaved pine. The narrow creek bottoms inclosed between these ridges are watered abundantly by springs and clear streams shaded by white and red bay, hollies, azaleas, and kalmias. The great magnolia is not seen here, and the American olive is missing. In these gravelly hills, extending westward to the valley of the Ouachita river, the short-leaved pine is very common and the characteristics of the pine-hill region are prominent. These hills cover a large area extending northward into Arkansas, and toward the south merging gradually into the oak woods which border upon the bottoms of the numerous tributaries of the Red river. This pine-hill region is sparsely settled, and, remote from water and rail communication, its original stores of pine and hard-wood timber have scarcely been touched.

"An intimate knowledge of the forest growth in this section was obtained by an excursion over the hills to bayou Dauchitta above its entrance to lake Bistineau. In the localities of the best drainage in this valley the cow oak is very common, mixed with the white and post oaks, while sweet gums, black gums, water and willow oaks, and hackberries occupy lower situations. On the immediate banks and in the sloughs small cypress trees are common, mixed with the bitter pecan, the hornbeam, the water locust, and the sycamore. The loblolly pine takes possession of every opening in the forest, descending the high hills, while numerous haws border the edges of the forest. In the bottoms and along the declivities, the Chickasaw and the American plum are found of larger size than farther east. Loblollies and hickories with the black and post oaks occupy the lower declivities, and upon the heights the yellow pine mixed with upland oaks forms fine forests."

TEXAS.

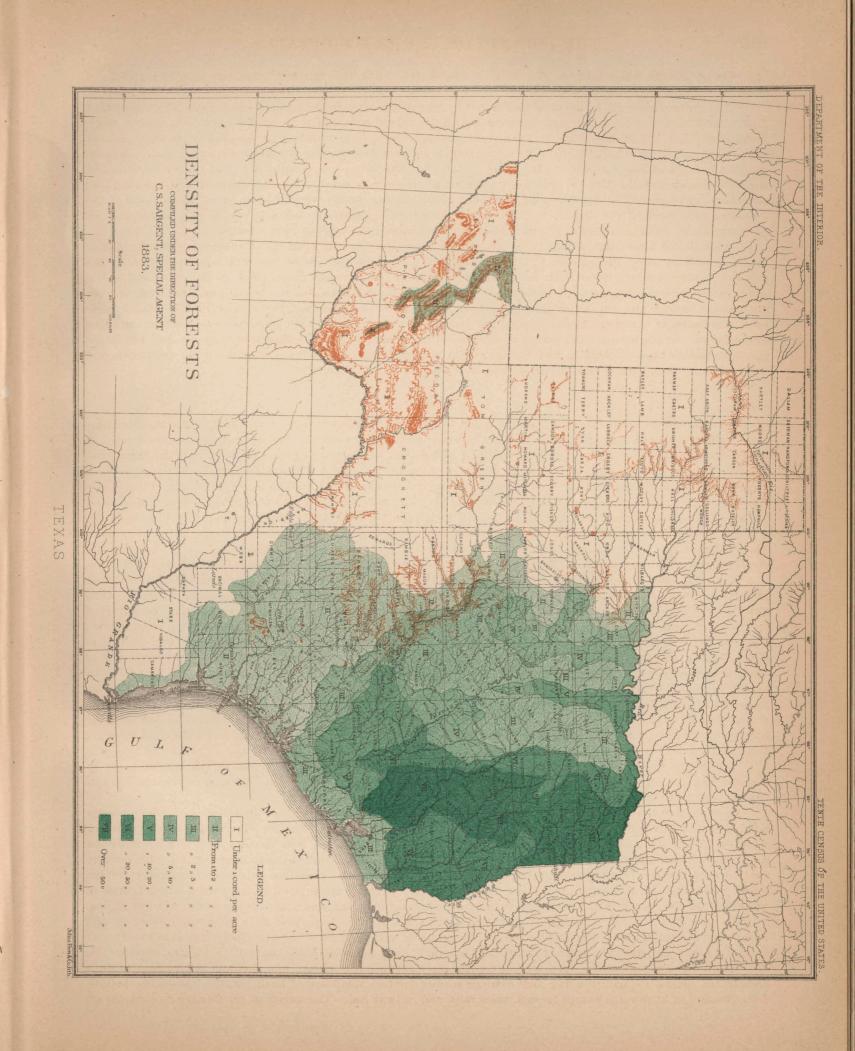
The most important forests of Texas are found in the extreme eastern part of the state, where the Maritime Pine Belt of the south Atlantic region extends to about midway between the Trinity and the Brazos rivers. A forest of long-leaved pine occupies most of the territory between the Sabine and the Brazos south of the thirty-first degree of north latitude, reaching south to within 20 miles of the coast. Beyond the long-leaved pine forests, forests of the lobbolly pine, mixed with hard woods, stretch westward 50 or 60 miles, while north of these two regions a third division of the pine belt, composed of a heavy growth of short-leaved pine mingled with upland oaks, occupies the rolling ridges which extend northward to beyond the Red river. The swamps which line the larger streams flowing into the Gulf, especially within the limits of the pine belt, still contain large bodies of cypress. The quality of the Texas cypress, however, is inferior to that grown east of the Mississippi river, and probably one-third of the timber growing in the valleys of the Sabine and the Nueces rivers is "peggy" or affected by dry rot.

West of the pine belt open forests largely composed of post and black jack oaks occur, gradually decreasing in density, and finally, west of the ninety-seventh degree of longitude, entirely disappearing. Farther west, however, the "lower" and "upper cross-timbers", two remarkable bodies of timber, composed of small and stunted specimens of these oaks, extend from the Indian territory far south into the prairie region, occupying long, narrow, irregular belts where sandy or gravelly alluvial deposits overlie the limestone of the prairie region. A belt of forest, largely composed of post and black-jack oaks, varying from 20 to 50 miles in width extends southwest of the Trinity nearly to the Nueces river, its eastern border following generally, at a distance of from 50 to 60 miles inland, the trend of the coast. The bottom lands east of the one hundredth meridian are lined with the deciduous trees which occupy similar situations in the eastern Gulf states. Near the coast the bottom lands of the large rivers, often several miles in width, are covered with dense forests composed of enormous trees. Farther west the bottoms gradually narrow, the number of arborescent species covering them decreases, and individual trees are small and stunted.

West of the Colorado river the forests of the Atlantic region are replaced outside of the bottom lands by Mexican forms of vegetation; the hills are covered with a stunted growth of mesquit, Mexican persimmon, various acacias, and other small trees of little value except for fuel and fencing.

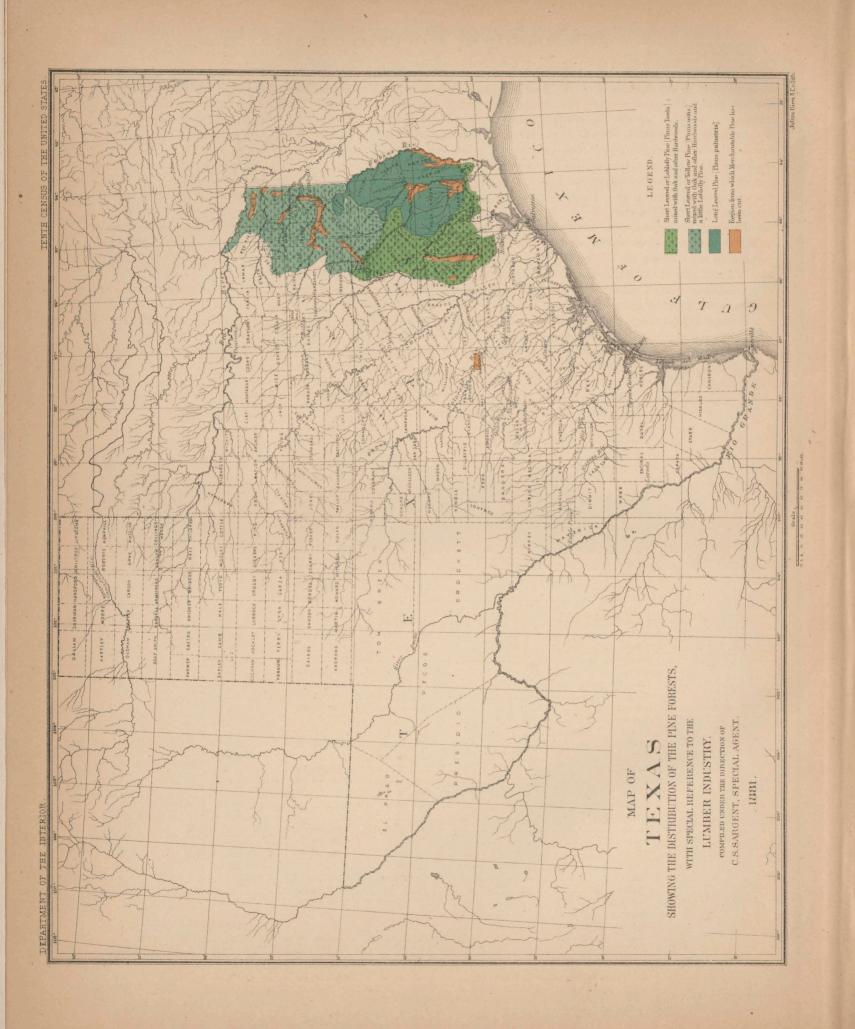
An important tree in the forest of western Texas is the cedar covering the low limestone hills which occupy hundreds of square miles north and west of the Colorado river, in Travis, Bastrop, Hays, Comal, and adjacent counties. West of the one hundredth meridian all forest growth disappears, with the exception of a few scattered cottonwoods, elms, and hackberries, confined to the narrow bottoms, and a shrubby growth of mesquit, which covers the plains of western Texas, furnishing the only fuel of the region. The mountain ranges, outlying ridges of the Rocky mountains, which occupy the extreme western part of the state, are covered with an open, stunted forest of western pines and cedars, with which mingle the post oak, the yellow oak, and other species of the Atlantic region.

The pine belt covering the eastern counties of the state is alone important as a source of lumber supply. Areas of river-bottom land covered with trees are, as compared with the area of the state, insignificant in extent, and these river belts of forest are entirely insufficient to supply even the mere local wants of the nearest settlements. The oak forests, which stretch more or less continuously between the eastern pine belt and the treeless western prairies and plains, are, except along their extreme eastern borders, composed of small, stunted trees, often hollow, defective, and of little value except for fuel, fence rails, and railway ties. The forests of the western mountains are









not luxuriant, and at the best can only supply a limited local demand with inferior lumber. It is probably no exaggeration to say that west of the pine belt, and with the exception of the small amount of hard wood found on the bottom lands near the coast, the forests of Texas do not contain a single tree fit to manufacture into first-class lumber. The pine forests, therefore, of eastern Texas and western Louisiana are important factors in the future development of Texas, as well as of the treeless northeastern provinces of Mexico, which must draw their building material from these pineries. The position of these forests, therefore, with reference to an enormous territory destitute of timber, although adapted to agriculture and grazing, and which must soon be covered with a considerable population and a net-work of railroads, their richness of composition, and the facility with which they can be worked, give to them perhaps a greater prospective value than that possessed by any body of timber of similar extent in the United States.

During the census year 599,359 acres of woodland were reported damaged by fire, with an estimated loss of \$273,990. Of these fires the larger number was set to improve pasturage, in clearing land, or through malice. These returns do not include the large areas burned in western Texas by prairie fires, checking the growth of the mesquit over a great extent of territory.

Small amounts of cooperage stock and woodenware, principally for local consumption, are manufactured in the eastern counties from oak and cypress. Manufacturers report an abundant supply of material.

The following rough estimates of the amounts of the three kinds of pine standing in the state May 31, 1880, were made by multiplying the average stand of timber per acre by the county areas occupied by the pine forests, these being obtained by deducting, from total areas of the county, estimated areas covered by clearings, bottom lands, swamps, etc.:

Counties.	Long-leaved pine (Pinus palustris).	Short-leaved pine (Pinus mitis).	Loblolly pine (Pinus Tæda).
	Feet, board measure.	Feet, board measure.	Feet, board measure.
Anderson	***************************************	336, 000, 000	1, 763, 600, 000
Angelina	1, 340, 800, 000		1, 190, 400, 000
Bowie		2, 380, 800, 000	
Camp		579, 200, 000	
Case		2, 470, 400, 000	
Cherokee		2, 230, 400, 000	585, 600, 000
Franklin		448, 000, 000	
Gregg		598, 400, 000	***************************************
Grimes			211, 200, 000
Hardin	1, 244, 800, 000		627, 200, 000
Harris			1, 827, 200, 000
Harrison		2, 326, 400, 000	***************************************
Henderson		521, 600, 000	
Hopkins		483, 200, 000	
Houston		1. J. J. J. J. J. J. J. J. J. J. J. J. J.	3, 216, 000, 000
Jasper	2, 534, 400, 000	(// 5) //	
Jefferson		AND THE RESIDENCE	288, 000, 000
Liberty	41, 600, 000		2, 147, 200, 000
Madison			233, 600, 000
Marion		1, 187, 200, 000	200, 000, 000
Montgomery		1, 101, 200, 000	2, 326, 400, 000
Morris	***************************************	729, 600, 000	2, 320, 400, 000
Nacogdoches	1, 216, 000, 000	1, 555, 200, 000	25 500 000
Newton		1, 555, 200, 000	35, 500, 000
	2, 112, 000, 000		33, 000, 000
Panola.	230, 000, 000		518, 400, 000
Polk	1, 193, 600, 000	1, 107, 200, 000	
	2, 720, 000, 000		473, 600, 000
Red River		272, 000, 000	
Rusk	115, 200, 000	2, 492, 800, 000	*******
Sabine	1, 648, 000, 000	***************	
San Augustine	1, 625, 600, 000		
San Jacinto			1, 833, 600, 000
Shelby	1, 884, 800, 000	425, 600, 600	
Smith		2, 035, 200, 000	
Titus		. 896, 000, 000	
Trinity	51, 000, 000		1, 987, 200, 000
Tyler	2, 550, 400, 000		
Upshur		1, 392, 000, 000	
Van Zandt		26, 000, 600	
Walker			1, 590, 400, 000
Waller			19, 000, 000
Wood		1, 600, 000, 000	
Total	20, 508, 200, 000	26, 093, 200, 000	20, 907, 100, 000
Amount cut for the year ending May 31, 1880	66, 450, 000	a 146, 420, 000	61, 570, 000

a Including 30,290,000 shingles.

The principal centers of lumber manufacture in Texas are Orange and Beaumont, on the Sabine and Nueces rivers, above Sabine pass. Long-leaved pine and cypress are sawed here and shipped east and west by rail, and in small quantities by schooner to Texan and Mexican ports. Loblolly pine is sawed at a number of small mills upon the line of the International and Great Northern railroad in the counties south of the Trinity river, and a large amount of short-leaved pine is manufactured in the mills upon the line of the Texas Pacific railroad in the northeastern counties, Longview, in Gregg county, being the principal center of this industry. The product of these mills is shipped west by rail to supply settlers upon the prairies of northern Texas with building material.

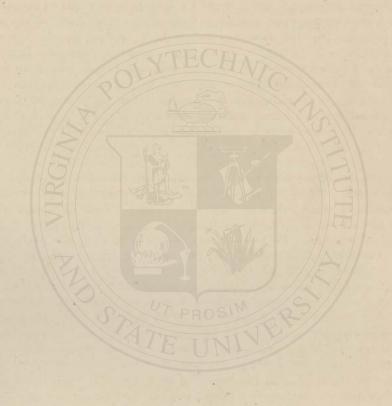
The following extracts are derived from the notes upon the forests of Texas made by Dr. Charles Mohr, of Mobile:

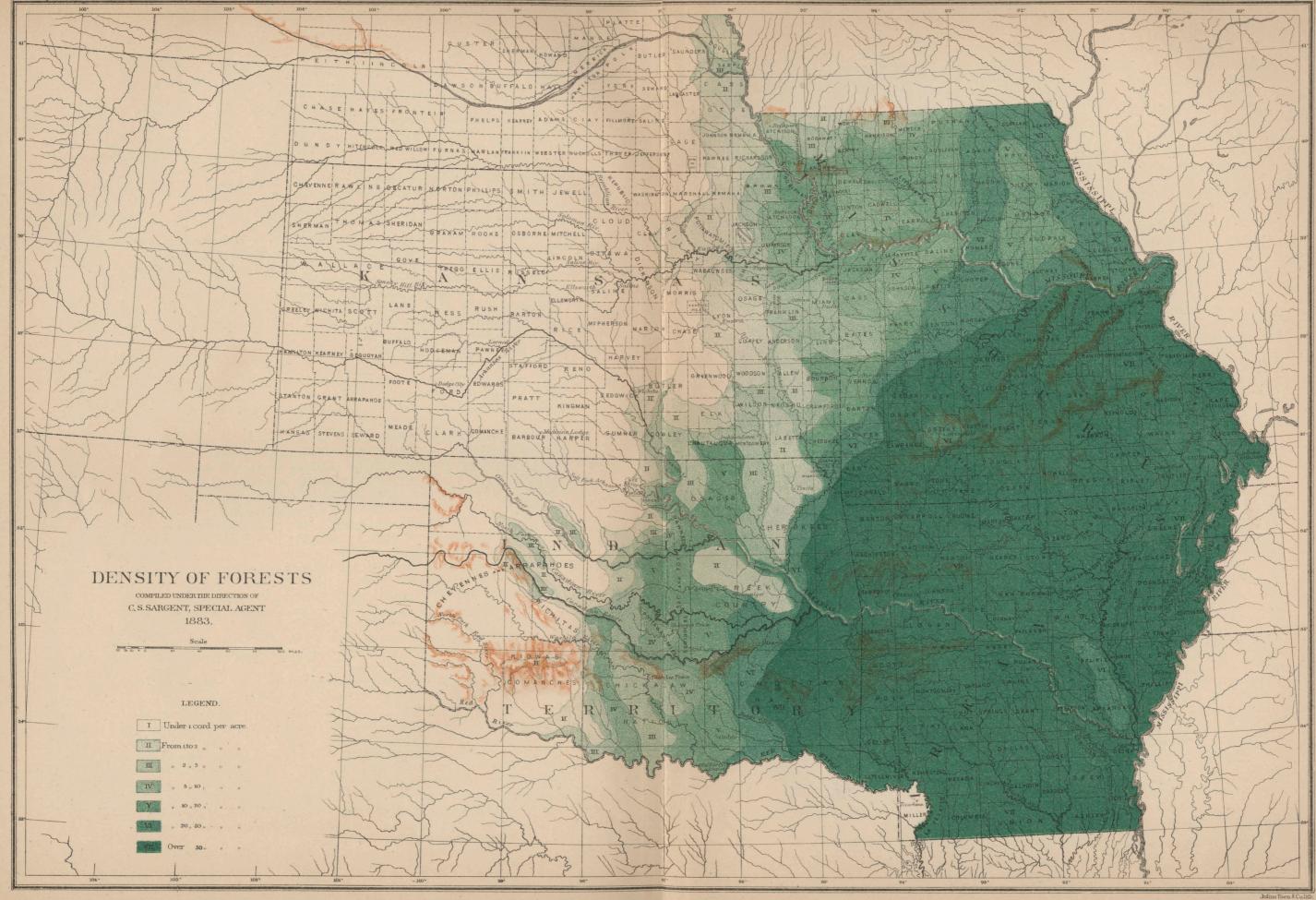
"West of Marshall, upon the Texas Pacific railroad, the surface of the land becomes more broken; the soil is lighter, more porous, and favorable to the growth of the short-leaved pine, which soon becomes the prevailing forest tree in the woods extending toward the west. Longview, a small town at the junction of the International and Great Northern and Texas Pacific railroads, is situated almost in the center of the short-leaved pine region, and is the seat of an active lumber business. These forests of short-leaved pine, more or less interspersed with oaks, extend to the northern boundary of the state, and southward with an easterly trend to the confines of the region of the long-leaved pine. The short-leaved pine finds its western limits near Mineola.

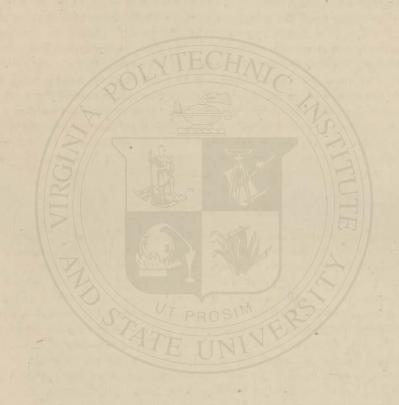
At Palestine, in Anderson county, the uplands are covered with a loamy, somewhat sandy, soil underlaid with a heavy clay. Here a more or less open oak forest is common. The black oak abounds, with the Spanish, black-jack, blue-jack, and post oak, the last, however, always the prevailing species. Next to the post oak the black-jack is the species of widest distribution in Texas, the two species being always found associated together from the northern confines of the state to the prairies of the coast, and from the east to the treeless regions of western Texas. The bois d'arc (Maclura aurantiaca) is common along the banks of the water-courses in eastern Texas, attaining a size large enough to be economically valuable. It is here, however, most probably adventitious from the region in the northwest, where it forms an almost uninterrupted belt of woods from 4 to 10 miles wide, extending from a short distance south of the city of Dallas to the northern frontier of the state, entering the Indian territory between Sherman and Paris. This tree attains a height of from 45 to 50 feet, with a diameter of from 1 foot to 2 feet, and is of great value.

"The timber growth immediately west of the Brazos is stunted and scanty; large areas of grass land intervene between the scrubby woods until all at once ligneous growth disappears, and the seemingly boundless prairie, in gently undulating swells, expands before the view on all sides. Near the center of Milam county a belt of open post-oak woods from 20 to 25 miles in width is entered. It extends from Belton, in Bell county, southward to the upper confines of Gonzales county. Post oaks stand here from 20 to 30 feet apart, with black-jacks and blue-jacks between them, the trees being all of small size. The soil of these oak hills is of poor quality, sandy, gravelly, and more or less broken, arid, and devoid of vegetable mold. Toward the southern limit of this belt, near Bastrop; a tract of loblolly pine is found covering nearly four townships, or about 90,000 acres. During the last twelve years all the useful timber on this isolated tract has been cut down. A second growth of pine, however, has sprung up, and is now growing vigorously under the fostering care of the owners of the land, and promises in a short time to afford a new supply of timber. A belt of post oak is found intersecting the prairie from the upper part of McLennan county, near Waco, and extending to the northern frontier of the state, where it joins the crosstimbers of the Wichita. It is known as the 'lower cross-timbers'. This belt of oak wood is nearly 150 miles long, with its greatest width of about 20 miles between Dallas and Fort Worth. At a distance of from 20 to 40 miles west of the lower cross-timbers another belt of oak extends from Comanche county to the northern boundary of the state, with a long western spur following the valley of the Brazos as far as the ninety-ninth meridian. This oak forest is known as 'the cross-timbers'.

"Taken as a whole, the country west of the Brazos river, except the basin of the Colorado, is a poorly-timbered region. The mesquit was first met with on the declivities of the prairie, which verge here upon the valley of the Colorado. The wood of this tree is hard, fine grained, tough, heavy, and of great durability. In the western portions of the state, almost entirely destitute of other timber growth, it serves, according to its size, a variety of purposes in the economy of the stock ranch, and is there invaluable for fencing. Burning with a clear, smokeless flame and possessing great heating powers, it is unsurpassed as fuel by any other Texas wood. It serves, moreover, another important purpose in furnishing an abundance of wholesome and nutritious food to large herds of cattle, at a season of the year when long-continued droughts have destroyed the grass upon the prairie. With the increasing settlement of the treeless-prairie region during the last 15 or 20 years, this tree has spread rapidly east and north. Near San Antonio I saw extensive districts, reported to have been, a few years ago, entirely destitute of even a trace of ligneous growth, and which are now covered with copses of mesquit. Similar growths have sprung up everywhere in the prairies of western Texas. The appearance of this new growth may be traced to the influence of the vast herds of stock which range over the prairies, and which, in voiding the seeds of this tree, assist its wider distribution, and, in keeping down the grass, diminish the quantity of combustible material which feeds the prairie fires, and thus check and finally prevent the spread of the frequent conflagrations which swept year after year over these grassy plains.







"West of the Colorado river the pecan-nut is an important product, forming one of the staple articles of export. Shipments of this nut from San Antonio average annually 1,250,000 pounds, obtained from the bottom lands of the Nueces, the Rio Frio, Medina, and Rio Concho. A million pounds, obtained from the Colorado, Guadalupe, Rio Blanco, Pierderelis, Sabinal, Llano, and San Saba rivers, are shipped from Austin, and about a quarter of a million more from Indianola, gathered on the lower Guadalupe, San Antonio, Colorado, and other streams flowing into the Gulf. The nuts are worth, on an average, 5 cents a pound to the gatherer.

"On the range of low hills extending from San Antonio to Austin, which rise at some points to a height of over 500 feet above the plain, forming the base of the terraces leading to the table land of northern Mexico, the woods are confined to the barrens and the declivities bordering upon them. The open plains on these table-lands are either entirely destitute of ligneous growth, or, when covered with deeper and more fertile soil, support low copses of mesquit. The western juniper is observed here for the first time. It is a tree of low growth, seldom exceeding 35 feet in height, or more than a foot in diameter. It branches at a short distance from the base, forming a broad, round head. The wood is of a dingy, reddish color, fine-grained, hard, and heavy, and in density and durability is not inferior to that of the red cedar. It is knotty, however, from near the base, and furnishes no sticks sufficiently long to allow its use in cabinet-making, and can only be employed for rough construction, posts, palings, etc., for which purposes it is invaluable. The home of the western cedar is found on the rugged highlands which surround the channels of the headwaters of the numerous streams which flow from the eastern declivity of these hills. Here it forms open groves, with scarcely any other woody growth among the somewhat scattered trees. These cedar woods are particularly common upon the brows of the steep escarpments from the base of which issue the large springs which form such a striking feature in this part of the state. In the vicinity of the settlements few of the full-grown trees have been left. The improvidence of the first settlers in obtaining their timber supplies and the prairie fires which ran through these cedar woods in former years have caused the destruction of large areas once covered by this valuable tree. According to my observation, the western cedar prefers a calcareous, dry soil. Its range of distribution seems limited to the hilly region bordering upon the upper part of the Colorado valley, extending toward the south a short distance below New Braunfels, and westward to the sources of the Nueces and Guadalupe rivers. Well-timbered tracts of this tree are still found west of New Braunfels as far as Boerne, in Kendall county, and on the terraces of the higher ranges in Bandera and Kerr counties."

INDIAN TERRITORY.

The forests of the Indian territory are confined to its eastern portion. West of the ninety-ninth meridian trees are only found along the narrow river bottoms, the intervening ridges being bare of all forest growth. The extreme northeastern part of the territory contains numerous extensive open prairies, south of which a heavy body of forest composed of hard woods, mixed on the high ridges with the short-leaved pine, extends southward into Texas, with a maximum width in the Choctaw nation of 60 miles. In the Cherokee nation six considerable bodies of pine, varying from 10 to 30 miles in length and 2 to 4 miles in width, occur on Spavina creek, Illinois river, Salina river, Spring creek, and Bowman's Fork, tributaries of Grand river. A large body of pine occurs also 25 miles west of Reams, a station upon the Missouri, Kansas, and Texas railroad. Smaller bodies of pine are found, too, east of Reams, and at Stringtown, where lumber is manufactured and shipped southward by rail into northern Texas.

The bottom lands of all the streams flowing through the eastern portion of the territory are heavily timbered with hard woods, and especially those of the Neosho, Verdigris, Arkansas, and Canadian rivers contain great bodies of the finest black walnut now growing. A particularly fine growth of this timber extends along the Verdigris river for 50 miles above Coffeeville.

West of the region of heavy forest the country is covered with an open growth of upland oaks, among which the most prominent are the post oak and the black-jack. These forests are interspersed with prairies, often of considerable extent, which gradually occupy the whole country outside the bottom lands. Farther west, between the ninety-seventh and ninety-ninth degrees of west longitude, the "cross-timbers" enter the territory from the south. They are composed, as in Texas, of a stunted growth of post oak and black-jack, and extend northward across the territory in straggling patches into southern Kansas. The main belt of the "cross-timbers", about 70 miles wide at the Texas boundary, gradually becomes narrower toward the north and northwest, disappearing, at about longitude 99° west, upon the ridges south of the Cimarron river.

No returns of the amount of lumber manufactured in the territory have been received, nor other than the most general information in regard to its forest covering.

ARKANSAS.

Heavy forests cover the state of Arkansas, with the exception of a few isolated prairies principally confined to Prairie and Arkansas counties, north of the valley of the Arkansas river, and the western borders of the state. North of the Arkansas river the forests are mostly composed of the deciduous trees of the Mississippi basin, through which isolated belts occur, often of considerable extent, in which the short-leaved pine, the only species found in

northern Arkansas, is mixed with the hard woods. The southwestern part of the state south of the Arkansas river and west of the broad, level plain of the Mississippi is covered outside the river-bottom lands with an almost continuous forest of pine, in which the short-leaved species occupies the high, dry ridges and the loblolly the moist soil above the bottoms. Great bodies of cypress cover the extensive swamps that stretch along the eastern border of the state or line the bottoms of the White, Arkansas, Washita, and Red rivers. The hard-wood forests of the state are hardly surpassed in variety and richness, and contain inestimable bodies of the finest oak, walnut, hickory, and ash timber. Black walnut of large size is still widely scattered over the state, and is particularly abundant in the valley of the Red and other southern rivers. The pine forests are almost intact. Settlements made for agricultural purposes have been confined to bottom lands, and only during the last few years has pine lumber been manufactured in the state, except to supply a very limited local demand. Recently, however, comparatively small quantities of lumber manufactured at numerous railroad mills, principally established south of the Arkansas river, have been shipped north and south out of the state.

The forests of Arkansas have received comparatively little damage from fire. Pine generally succeeds pine even on burned land, although upon certain gravel and clay soils the second growth is largely composed of black and red oaks, or, in the southern part of the state, the sweet gum replaces other trees on bottom lands. During the census year 858,115 acres of woodland were reported devastated by fire, with an estimated loss of \$259,470. The largest number of these fires was due to the carelessness of farmers in clearing land, or to hunters camping in the forest.

Industries consuming hard woods are still in their infancy in Arkansas, although doubtless destined to attain an important development. Rough white-oak staves are largely manufactured in the White River country and in the northeastern part of the state for eastern and European markets.

A considerable traffic exists in the southwestern counties in the wood of the Osage orange, used for wheel stock, and more recently as pavement in Saint Louis and other northern cities.

The following estimates of the amount of short-leaved pine standing in Arkansas May 31, 1880, were prepared by Professor F. L. Harvey, of Fayetteville:

Counties.	Feet, board measure.	Counties.	Feet, board measure.	Counties.	Feet, board measure.
Ashley	1, 555, 000, 000	Hot Spring	1, 348, 000, 000	Perry	1, 023, 000, 000
Baxter	187, 000, 000	Howard	1, 254, 000, 000	Phillips	21, 000, 000
Boone	124, 000, 000	Independence	93, 000, 000	Pike	1, 695, 000, 000
Bradley	1, 140, 000, 000	Izard	242, 000, 000	Poinsett	45, 000, 000
Calhoun	1, 519, 000, 000	Jefferson	518, 000, 000	Polk	2, 592, 000, 000
Carroll	159, 000, 000	Johnson	248, 000, 000	Pope	208, 000, 000
Clarke	1, 280, 000, 000	La Fayette	586, 000, 000	Pulaski	668, 000, 000
Clay	3, 000, 000	Lee	14, 000, 000	Saint Francis	7, 000, 000
Columbia	1, 866, 000, 000	Lincoln	105, 000, 000	Saline	933, 000, 000
Craighead	18, 000, 000	Little River	690, 000, 000	Scott	1, 516, 000, 000
Cross	54, 000, 000	Logan	554, 000, 000	Searcy	166, 000, 000
Dallas	1, 659, 000, 000	Lonoke	20, 000, 000	Sebastian	243, 000, 000
Dorsey	726, 000, 000	Madison	55, 000, C00	Sevier	969, 000, 000
Drew	482, 000, 000	Marion	207, 000, 000	Sharp	35, 000, 000
Faulkner	42, 000, 000	Miller	622, 000, 000	Stone	179, 000, 000
Fulton	146, 000, 000	Monroe	180, 000, 000	Union	2, 384, 000, 000
Garland	1, 865, 000, 000	Montgomery	2, 281, 000, 000	Van Buren	435, 000, 000
Grant	207, 000, 000	Nevada	1, 453, 000, 000	White	23, 000, 000
Greene	38, 000, 000	Newton	767, 000, 000	Yell	1, 306, 000, 00
Hempstead	1, 176, 000, 000	Ouachita	1, 384, 000, 000		

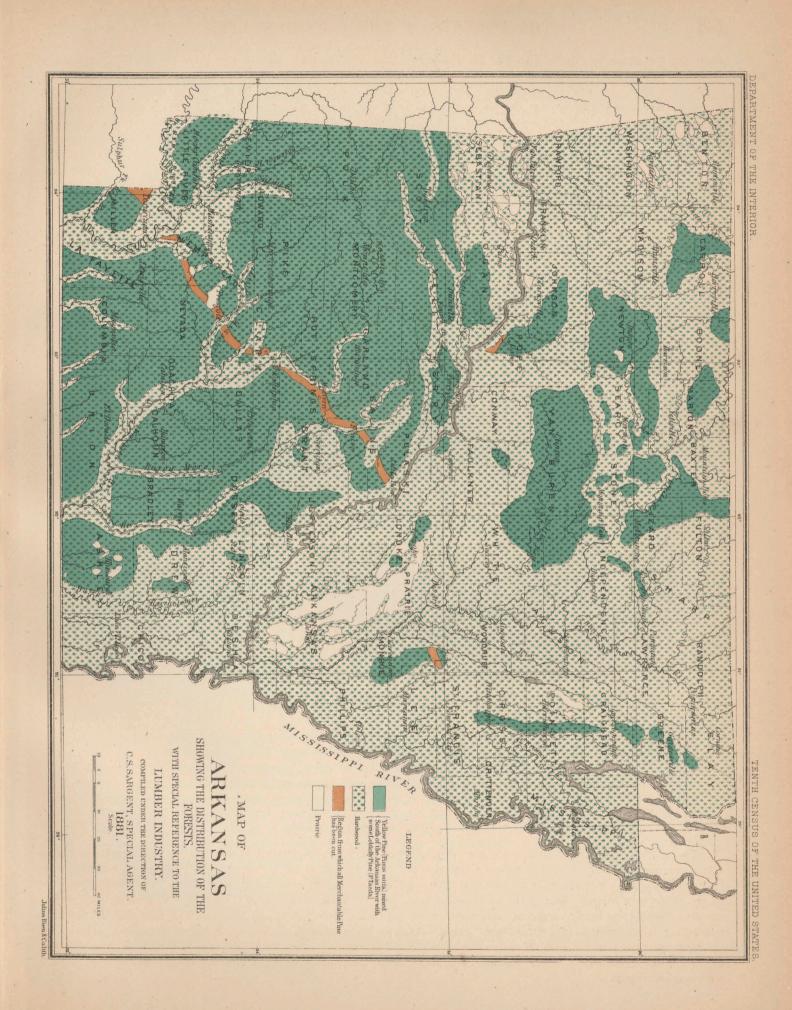
SHORT-LEAVED PINE (Pinus mitis).

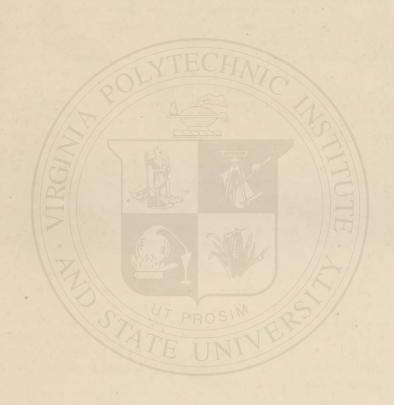
TENNESSEE.

129, 781, 000

Cut for the census year ending May 31, 1880 (including 57,943,000 shingles and 2,891,000 laths).....

The western counties of Tennessee are covered with heavy forests, similar in distribution and density to those which occupy the Yazoo region of western Mississippi. The river swamps in this part of the state still contain large bodies of cypress, while the hills are covered with oaks, hickories, and other hard-wood trees. The central portion of the state, now largely cleared for cultivation, was once covered with forests of hard wood, remnants of which are still found upon rocky ridges or land unfit for agriculture. Nearly through the center of this middle district, extending north and south, "the cedar glades" occupy an extensive region of Silurian limestone. Here the characteristic growth consists of red cedar (Juniperus Virginiana), often forming stunted forests of considerable extent, to the exclusion of other species, or is mixed with the honey locust, a characteristic species, also, of this well-marked region.





The eastern part of the state, occupied by the Cumberland plateau and the high ranges of the southern Alleghany mountains, is covered with a heavy forest of oak and other hard woods, mixed at high elevations with hemlock, pine, and spruce, and constituting one of the finest bodies of timber now standing in the United States. It contains, besides white and chestnut oak of fine quality, much yellow poplar, black walnut, and cherry. In the southeastern counties, especially in the valley of the Tennessee river, the hard-wood forests have been, however, already destroyed over large areas to furnish charcoal for the iron-manufacturing industry established here.

During the census year 985,430 acres of woodland were reported devastated by fire, with a loss of \$5,254,980. Of these fires the largest number was set in the careless clearing of land for agriculture or to improve grazing,

and by hunters, locomotives, etc.

Mr. A. G. Willey, of Manchester, Tennessee, has supplied the following statement in regard to the effects produced upon the forest growth by the annual burning of dead herbage to improve pasturage:

"EFFECT OF FIRES UPON THE FOREST.

"The practice of burning timber-land, said to have been of Indian origin, has been continued by the white settlers. The native grasses do not die down when killed by frost; they simply die standing, and the young grass in the spring has to push through the old tuft, which is often 6 or 8 inches high. The fires are set in the timber and old fields to burn these tufts, that stock may graze four or six weeks earlier than if the old herbage had been left upon the ground. In the barrens and on the Cumberland plateau the timber is principally oak of various kinds, which do not shed their leaves at once when killed by frost, or rot when partially green, but remain dry upon the trees and fall gradually during winter and spring. The largest portion, therefore, are on the ground in February, the time when fires are set. The effect of these fires is to destroy all the natural sources of fertility, grass, leaves, and fallen timber. Had these been allowed to accumulate, what are now called barren lands would be the most fertile in the state. The practice kills, too, the young trees, so that some of the most valuable timber that the land is suitable to produce is unable to stand. The black-jack, post oak, black oak, etc., however, on account of the protection afforded by their thick bark, are able to gain some headway, and so crowd out more valuable trees. The state law makes it a misdemeanor with heavy penalty for any one to set fire to and burn a neighbor's land; but the difficulty of detection and conviction in such cases makes this law non-effective. These are the causes and effects of forest fires in this section; they never occur here in summer."

Considerable cooperage and wheel stock is manufactured in Tennessee, but, except in the eastern part of the state, manufacturers report a scarcity and deterioration of the best hard woods, especially white oak. In the eastern counties the manufacture of oak staves and other industries using hard woods are capable of large development.

The principal center of lumber manufacture in the state is Nashville, where several mills saw large quantities of black walnut, poplar, cherry, ash, oak, etc., received by raft from the upper Cumberland river in Tennessee and Kentucky. The local market takes about one-third of the lumber manufactured here, the remainder being sent north and east by rail. Memphis, on the Mississippi river, is also an important manufacturing center. The mills here are largely supplied by rafts from Missouri, Arkansas, and Tennessee, and saw large quantities of cypress, ash, poplar, hickory, gum, and black walnut. * Considerable hard-wood lumber manufactured in Dyer, Lincoln, Obion, and Smith counties, and pine and hard-wood lumber in Knox and Jefferson, largely from logs obtained in the vicinity of the mills, is principally consumed locally.

KENTUCKY.

The forests of Kentucky resemble in general features those of Tennessee. Cypress, gum, and various water oaks occupy the river swamps of the western counties. The central region, now largely cleared and devoted to agriculture, was once covered with the oaks, walnuts, and hickories of the Atlantic region, while over the eastern and southeastern counties the dense forests of the Alleghany mountains extended. The eastern counties still contain great bodies of the best hard wood, especially black walnut, white oak, cherry, and yellow poplar, which are particularly fine and abundant in Bell, Harlan, and other southeastern counties. These forests, protected by the falls of the Cumberland river, which have prevented the driving of logs from its upper waters, and inaccessible to rail communication, are still practically uninjured, and probably unsurpassed in the amount, quality, and value of the timber which they contain. The destruction of forests to supply numerous iron furnaces with charcoal has been great in the northeastern counties, and no small part of this region has already been cut over.

During the census year 556,647 acres of woodland were reported devastated by fire, with an estimated loss of \$237,635. Of these fires by far the largest number was traced to farmers carelessly clearing land for agricultural purposes.

In Barren, Edmonson, and other central counties extensive tracts of prairie existed at the time of the earliest settlement of the state. The presence of these prairies in the midst of a heavily-timbered region is ascribed to the annual burning to which they were subjected by the aborigines. With the disappearance of the 35 FOR

Indians trees sprang up, and this region is now well covered with a vigorous growth of black oaks of different species. White oaks, however, are not abundant, and other species common to the region, such as the walnuts, the yellow poplar, and the beech, are wanting in these young forests, indicating perhaps the effect of fires in checking the subsequent growth or development of many useful timber trees.

PASTURAGE OF WOODLANDS.

The forests of Kentucky, as well as those of all the central and southern portion of the United States, suffer severely from the almost universal custom of using woodlands for pasturage. The evil resulting from this practice is only more apparent in Kentucky and Tennessee, because in these states the amount of live stock is proportionately larger than in other parts of the south, while in the thickly-settled agricultural sections of these states the ratio of woodland to total area is smaller. The pasturage of woodlands necessitates, or at least induces, the annual burning of the dead herbage, by which underbrush, young trees, seedlings, and seeds are destroyed and the succession and permanence of the forest endangered. What the fires spare, browsing animals devour; hogs root out seedlings, and by selecting the sweet acorns of the white oak in preference to the bitter fruit of the black oaks, are gradually changing the composition of the oak forests. Comparatively few white oaks spring up in the forests of the more thickly settled portions of the central Atlantic region, and this change of forest composition must be ascribed to the preference of domestic animals for the palatable fruit of what, as regards their timber, are the most valuable species. The injury, too, inflicted by the constant stamping of animals and consequent packing of the land about the stems of old trees is very great, and all reports speak of the gradual dying of old trees left standing in the grazing regions of Kentucky and Tennessee.

The spread of the mistletoe (*Phoradendron flavescens*), consequent upon the removal of the forest and the increase in the number of birds (the mistletoe seems to require a certain amount of light and air for its development; it does not flourish or increase rapidly in the dense forest, and cannot spread except by the agency of birds), is a cause of serious injury to the forest of this whole region. It slowly but surely destroys the trees upon which it obtains a foothold. The black walnut especially suffers from the growth of this parasite, which seems destined to destroy the finest walnut timber left standing in the settled portions of the southern central region.

Large quantities of cooperage and wheel stock are produced all over the state, and manufacturers generally report no scarcity or deterioration of timber, with the exception of white oak. The principal centers of lumber manufacture are at the mouth of the Tennessee river, in McCracken county, where a large amount of cypress, sycamore, gum, oak, walnut, and other hard wood is manufactured for the northern market from logs rafted down the Tennessee and other streams flowing into the Mississippi; at Frankfort, where poplar, oak, ash, walnut, pine, cherry, hickory, and maple logs, rafted from the upper waters of the Kentucky river, are sawed, the lumber being shipped north and east by rail; and at Louisville, where walnut, poplar, and oak lumber is manufactured for local consumption. The manufacture of pumps and water-pipes from logs of the Jersey pine (*Pinus inops*), at one time an important industry at Louisville, has, since the general introduction of city and town water-works, become unremunerative and unimportant.

NORTHERN CENTRAL DIVISION.

OHIO.

The forests of Ohio were originally composed of deciduous species, among which, in the eastern and especially in the northeastern counties, white pine and hemlock existed in isolated bodies of no great extent.

The original forest has now been generally removed, except from Ottawa, Miami, Montgomery, and a few other western counties, and from swamps and other lands unfit for agriculture; everywhere the walnut and other valuable timbers have been culled, and Ohio must soon depend almost exclusively for the lumber which it consumes upon the northern pineries and the hard-wood forests of the south.

During the census year 74,114 acres of woodland were reported destroyed by fire, with an estimated loss of \$797,170. Of these fires the largest number was traced to carelessness in clearing land, to hunters, sparks from locomotives, etc.

The production of cooperage stock has long been an important industry in the state; it has already suffered from a scarcity and deterioration of white oak, for which elm, beech, maple, and poplar are now often substituted. Manufacturers of wheel stock, furniture, woodenware, etc., report abundant material for present consumption.

Ohio is sixth among the states in the volume of its lumber-manufacturing interests. The business is widely distributed throughout the state, generally in the hands of small manufacturers operating portable mills, which threaten the rapid destruction of the remnants of her forests.

INDIANA.

Indiana was once almost entirely covered with noble forests of deciduous trees. Along its western borders these were interrupted, however, by numerous small prairies, the extreme eastern outposts of the great treeless region which, toward the north, extended over the counties of Benton, Newton, and Jasper, and over considerable portions of Lake, Porter, La Porte, Pulaski, White, Tippecanoe, and Warren counties. These prairies have gradually decreased in area with the settlement of the country, and those originally of small extent are now covered with a vigorous growth of the forest trees of the region.

The forests of Indiana are characterized by an almost entire absence of coniferous trees. Stunted white and gray pines occupy the sand-dunes which border the southern shores of lake Michigan, and "the knobs"—low, gravelly hills of small extent, in the southeastern river counties—are covered with a heavy growth of the Jersey pine. Swamps in the southwestern counties contain cypress, which finds here the northern limit of its distribution. The broad bottom lands and low ridges of this part of the state are covered with a forest growth probably unsurpassed in the development of individual trees, and rarely equaled in the richness of its composition.

The forests of the state have been largely removed in the development of its agriculture. No large bodies of the original timber remain. The black walnut with which the forests of Indiana once abounded has been everywhere culled and is now rare, while the best yellow poplar, oak, and other valuable timbers have been largely consumed.

During the census year 90,427 acres of woodland were reported injured by fire, with an estimated loss of \$130,335. These fires were set by farmers carelessly clearing land, by hunters, and by sparks from locomotives.

The forests of Indiana have long supplied material for a large manufacture of cooperage stock, furniture, wagon stock, woodenware, etc. The cooperage and furniture manufacturers already feel the scarcity and deterioration of the highest grades of oak and walnut, and very generally predict the entire exhaustion at no very distant day of the forests of the state.

Indiana is fifth among the states in the value of its lumber-manufacturing interests. Evansville, upon the Ohio river, in Vanderburgh county, is an important manufacturing center on account of the capital invested there in he lumber business and the amount of its product. The business, however, as in Ohio, is generally in the hands of small manufacturers operating portable mills and sawing logs hauled to them by farmers. At the present rate of destruction the forests of the state must soon lose all commercial importance.

ILLINOIS.

The forests of Illinois were originally confined to the southern portion of the state, the broad bottom lands of the Mississippi and the Illinois, and the southern third of the delta formed by these rivers. The remainder of the state was covered by broad, rolling prairies. The forest growth in this prairie region was confined to the narrow river bottoms and occasional open park-like groves of burr, scarlet, red, black-jack, or post oaks, known as "oak openings".

through which the prairie fires swept, destroying all undergrowth, without doing great injury to the full-grown trees. Prairie fires have gradually decreased in frequency and violence since the settlement of the state, and these open groves are now filled with a vigorous growth of young seedlings and shoots; their characteristic features have disappeared, and the area of the forest is gradually increasing.

The shores of lake Michigan are covered with a stunted growth of white pine; the dry, rocky hillsides in the western part of Union county, one of the southern counties of the state, bear a few yellow pines (*Pinus mitis*), and cypress is found in the southern river swamps. With these exceptions, of little importance commercially, the forests of Illinois are composed of deciduous species.

During the census year only 48,691 acres of woodland were reported destroyed by fire, with an estimated loss of \$45,775. These fires were generally traced to hunters, and to farmers permitting brush fires to escape to the forest.

The production of cooperage stock was once an important industry in southern Illinois. The business has greatly diminished, owing to the exhaustion of the local supply of the best hard woods. Bass, gum, hackberry, elm, sycamore, and other woods formerly considered of little value, are substituted for oak, and Illinois now receives most of its hard wood from Kentucky, Tennessee, and other southern states.

Illinois is eleventh among the states in the volume of its lumber-manufacturing interests. It owes this position to the fact that many large mills sawing pine logs rafted down the Mississippi river from the forests of Wisconsin are established within its borders, and not to the extent and value of the forests of the state. The manufacture of Illinois-grown lumber is small and totally inadequate to supply the wants of the present population of the state.

Chicago, owing to its general commercial importance and its position with reference to the great pine forests of the northwest, has become the greatest lumber-distributing center in the world.

According to the statistics gathered by the *Northwestern Lumberman* of Chicago, and published in that journal January 29, 1881, there were received in Chicago during the year 1880 1,419,974,000 feet of lumber by lake and 145,563,118 feet by rail, a total of 1,565,537,118 feet, an increase of 96,817,127 feet over the total receipts of 1879; 650,922,500 shingles were received during the same year.

Lumber was received from the lake ports during the year 1880, as follows:

Points of shipment.	Lumber.	Shingles.	Points of shipment.	Lumber.	Shingles.
	Feet.	Number.		Feet.	Number.
Ahnapee	150,000		Menominee	225, 110, 000	700,000
Alpena	4, 517, 000		Monastique	202, 000	
Ashland	5, 200, 000	1, 311, 000	Muskegon	451, 854, 000	23, 660, 000
Bay de Noquet	3, 670, 000		North Bay	110,000	
Bayfield	980, 000		Oconto	11, 003, 000	395, 000
Benton	3, 876, 000		Ontonagon	2, 503, 000	2, 886, 000
Black Creek	4, 825, 000		Oscoda	739, 000	
Black River	6, 858, 000		Packard's pier	2, 681, 000	
Canada ports	755, 000		Paul's pier	560, 000	
Caseville	200, 000	***********	Pensaukee	6, 866, 000	3, 190, 000
Codar River	17, 383, 000	100,000	Pentwater	9, 596, 000	25, 572, 000
Charlevoix	1, 541, 000		Perry's pier	45, 000	
Cheboygan	33, 250, 000		Peshtigo	51, 600, 000	7, 920, 000
Clay Bank		650, 000	Pierport	3, 355, 000	
Copper Harbor	70, 000		Point Saint Ignace	12, 985, 000	
Cross Village	233, 000		Portage Lake	735, 000	
Depere	250, 000	1,611,000	Port Huron	344,000	
Duck lake	1, 340, 000		Port Sheldon	180,000	/
Escanaba	5, 182, 000	3, 457, 000	Red River	200,000	3, 857, 000
Ford River	17, 850, 000	6, 915, 000	Rogers City	1, 966, 000	
Frankfort	9, 565, 000	531,000,000,000	Saginaw River	11, 926, 000	
Grand Haven	90, 166, 000	114, 000, 000	Saint Joseph	1, 662, 000	
Green Bay	1, 577, 000	22, 562, 000	Saugatuck	4, 014, 000	4, 000, 000
Hamlin	12, 822, 000	11, 026, 000	Sault Ste. Marie	522, 000	Shirehes
Hancock	300, 000		Silver Lake	2, 185, 000	600, 000
Holland	857, 000		South Haven	3, 650, 000	300, 000
Kewaunee	110,000	5, 881, 000	Sturgeon Bay	11, 640, 000	19, 978, 000
L'Ause	9, 430, 000	170,000	Suamico	3, 065, 000	2, 480, 000
Leland	970, 000		Traverse	23, 280, 000	74.55.4
Lincoln	1, 295, 000	300, 000	Whitefish Bay	730, 000	
Ludington	103, 713, 000	34, 330, 000	White Lake	66, 603, 000	24, 756, 000
Ludwig's pier	125, 000	3313331344		- Control Con	
Mackinaw City	275, 000		Total	1, 419, 974, 000	583, 340, 000
Manistee	165, 217, 000	259, 911, 000	Receipts by rail	145, 563, 118	67, 582, 500
Manitowoc	70,000	300, 000	=	N. Carlo Department	Visitoria and
Marquette	2, 411, 000	522, 000	Grand total	1, 565, 537, 118	650, 922, 500
Masonville	1, 030, 000	Ozz, 000			1000
	2,000,000	The second second	Complete Com		

Lumber was received by rail during the year 1880, as follows:

Names of lines.	Lumber.	Shingles.
	Feet.	Number.
Baltimore and Ohio railroad	9, 096, 000	**********
Chicago and Alton railroad	988, 000	70,000
Chicago and Eastern Illinois railroad	26, 799, 000	
Chicago and Grand Trunk railway	1, 506, 418	80, 000
Chicago and Northwestern railway	11, 727, 900	44, 642, 000
Chicago, Burlington, and Quincy railroad	3, 716, 800	
Chicago, Milwaukee, and Saint Paul rallway	12, 473, 000	13, 180, 500
Chicago, Rock Island, and Pacific railway	2, 224, 000	
Illinois Central railroad	2, 940, 000	************
Lake Shore and Michigan Southern railway	18, 636, 000	1, 385, 000
Michigan Central railroad	24, 798, 000	8, 175, 000
Pittsburgh, Cincinnati, and Saint Louis railway	12, 481, 000	
Pittsburgh, Fort Wayne, and Chicago railway	17, 567, 000	50, 000
Wabash, Saint Louis, and Pacific railway	610, 000	
Total	145, 563, 118	67, 582, 500

The following account of the early lumber trade of Chicago is condensed from a paper prepared by Mr. George W. Hotchkiss, secretary of the Chicago lumber exchange, and printed in the *Northwestern Lumberman* under date of March 19, 1881:

"Colonel Mann, residing at Calumet, brought the first raft of lumber to Chicago." It was square building timber, poled from the mouth of the Calumet to the mouth of the Chicago river. The value of this raft was \$100, and its owner found considerable difficulty in disposing of it. In 1834 or 1835 Captain Carver opened a lumberyard on the river bank, near the present site of the State-street bridge, and about the same time a man named Harrison owned a small schooner which went to some point across the lake and brought in white wood. This little vessel could not enter the river, on account of the bar across its mouth, and her cargo was unloaded upon scows and rafts, which were floated southward for half a mile or more, around the end of the bar, before they could be headed for the deep water of the river. In 1835 or 1836 a man named Rossiter had a small dock and yard on the river, between Clark and La Salle streets, and by this time other yards were started on the river. About the year 1836 a man named Cammack had a pit-mill on the north branch of the river. His son acted as pit-man, the old man being the top-sawyer. It is not unlikely that the first lumber used in Chicago was manufactured by this method, although about the same time a wind saw-mill was located not far from the present Kinzie-street bridge, which found abundant occupation in sawing white-wood timber, which then grew in the immediate neighborhood, mixed with elm, ash, basswood, and a few oak trees. History does not record, however, that the market was overstocked by the product of this mill, or that the lumber dealers of that day hurried to issue a new price-list low enough to crush the aspirations of their dangerous competitor. In fact, history is so perfectly silent upon the subject of this saw mill that it is probable its work did not cut much of a figure in the lumber trade of that day, and that, in fact, it proved a veritable windmill, of less caliber than the muscle of the Cammacks, who no doubt found greater profit, if harder work, in driving their pit-saw. Captain Carver's lumber-yard was on the river bank, just west of the present State-street bridge, having a light, temporary dock, upon which the small vessels bringing lumber to the river unloaded. There was at this time (1836 or 1837) no other lumber yard in the village upon the river. Captain Carver afterward (about 1839) sold out to George W. Snow, who occupied the same ground for a number of years.

"The earliest lumber of which Mr. Hilliard has any recollection came from Saint Joseph, Michigan; but shortly after his arrival at Chicago a man named Conroe built a mill at Manitowoc, Wisconsin, and Jones, King & Co., who were then doing a hardware and general business, received and handled his lumber as a side issue. A small pocket saw-mill, built by a man named Huntoon, in 1836, was located on the river bank not far from the present Chicago-avenue bridge. It was too small to do much work, but was esteemed a very useful and really wonderful mill at that time. The North Side was pretty well timbered with elm, oak, and white wood, and from this timber the mill obtained its stock. After the streets were cut out the wet nature of the ground compelled one who would visit this saw-mill to pick his way to it by jumping from log to log. It was so far from the village to the mill that it was seldom visited, except by those who enjoyed a Sunday walk and could find no objective point of greater interest for their stroll. The lumber-yard of Tuckerman & Higginson was located in 1843 on the north side of the river, near the present northwest end of Clark-street bridge. Clark street above Kinzie street had been cleared of timber, and a clear view was to be had as far as the eye could reach in a western direction, broken only by a few scattering trees which had been left as sentinels upon the plain. At this time George W. Snow had a yard on the river, near State street, and a Mr. Rossiter had also a yard between Newberry & Doles' warehouse, on the south branch of the river, west of what is now Clark street. Barber & Mason had a yard a little farther west, near Wells street. J. M. Underwood and Sylvester Lind each had a yard on the west side of the river, near Randolph

street. This was in 1844. Mr. Higginson obtained his supply of lumber in those days from Hall & Jerome, of Menominee, Michigan, Elisha Bailey, of Peshtigo, Wisconsin, and - Fisk, of Depere. In 1845 he had a contract for 1,000,000 feet with William F. Ferry, of Grand Haven. Lumber came also from Kalamazoo river, Saint Joseph, and Muskegon. In 1844 Mr. Higginson purchased a cargo from Mr. Rose, of Muskegon, and, as it was a beautiful lot of lumber, running 331 per cent. upper grades, he was willing to pay a good price, obtaining it at \$5 75 per thousand feet. The first cargo of Saginaw lumber which reached Chicago was brought by James Fraser, one of the original proprietors of the plat of Bay City, who built two mills at Kawkawlin, in latter years known as the Ballon mills. This was in the year 1847 or 1848, and the cargo attracted a good deal of attention, because it was the first lot of circular-sawed lumber that had ever been seen by any of the dealers, and because of its general cleanness of appearance, the attractiveness of a lot of circular-sawed sidings among it, and its excellent quality. All these combined to make the cargo a novelty in its way, and it found a sale at \$8 per thousand feet, an extra good price for those days. Average cargoes at this time were quoted at \$6 50 to \$7 for mill-run lumber, culls out, and it did not need a very coarse piece to rank as a cull. Culls were rated at half price. The retail market held common lumber at about \$8 during the summer, and \$9 was asked for dry lumber through the winter. Common included everything below first and second clear; third clear, selects, picks, and finishing grades generally, being an invention of a later day. First clear sold at from \$12 to \$16, and second clear at \$10 to \$12; clear, undressed flooring brought \$12, and common flooring \$10. The lath trade was mostly in what was known as board lath, although narrow lath arrived in small quantities. The trade of the city in 1843 was about 12,000,000 feet, and this was considered as remarkable as to us were last year's sales of 1,500,000,000 feet, or about 140 times as much more."

MICHIGAN.

Michigan once possessed a tree covering of great density, richness, and variety. The hard-wood forests of the Ohio valley covered the southern portion of the state, extending to just north of the forty-third degree of latitude. North of this hard-wood belt the character of the forest changed; the white pine appeared, occupying the drier and more gravelly ridges, and, gradually increasing in size and frequency, became the most important element in the forests of the central and northern portions of the southern peninsula. In the northern peninsula, especially in the basin of the Menominee river, it covered the sandy plains almost to the exclusion of other species. The forests of hard wood, occupying low, rich soil between the pine-covered ridges, were valuable in their stores of sugar maple, birch, ash, beech, oak, and other northern trees, while the swamps common in the northern part of the state abounded in tamarack and yellow cedar of large size and excellent quality.

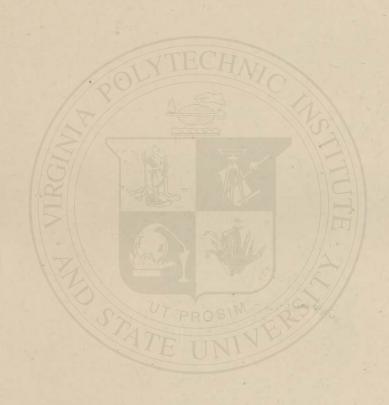
North of the central portion of the lower peninsula large tracts of barren plains exist. One of the most extensive of these tracts occupies a considerable portion of Crawford county, covering an area of several hundred square miles. A second barren region exists in Lake county, and there are others in Ogemaw and Iosco counties; similar barrens occur in the northern peninsula, the largest in Schoolcraft and Marquette counties. The soil covering these barrens is a light sandy loam, supporting a stunted growth of gray pine, birches, poplars, and scrub oak. These sandy plains owe their existence, perhaps, to the continual burning of the forest, prostrated possibly, in the first instance, by tornadoes, and thus affording abundant material for a fire hot enough to consume the vegetable mold of the surface and render the soil unfit to produce a second growth of heavy timber, or in many instances any tree growth whatever.

Serious inroads have already been made upon the forests of Michigan. The hard wood has been generally cleared from the southern counties, now largely occupied by farms, and the timber remaining in this part of the state, in small, scattered bodies, can hardly suffice for the wants of its agricultural population. The merchantable white pine has been cut from the banks of the principal streams and the shores of the lakes, and what now remains is remote from water transportation or scattered in isolated bodies of comparatively small extent. The hard-wood forests of the pine belt, however, although greatly injured by fire in parts of the state from which the pine has been cut, and invaded along their southern borders by agricultural settlements, contain, especially in the northern third of the lower peninsula and through the northern peninsula, vast quantities of valuable timber.

FOREST FIRES.

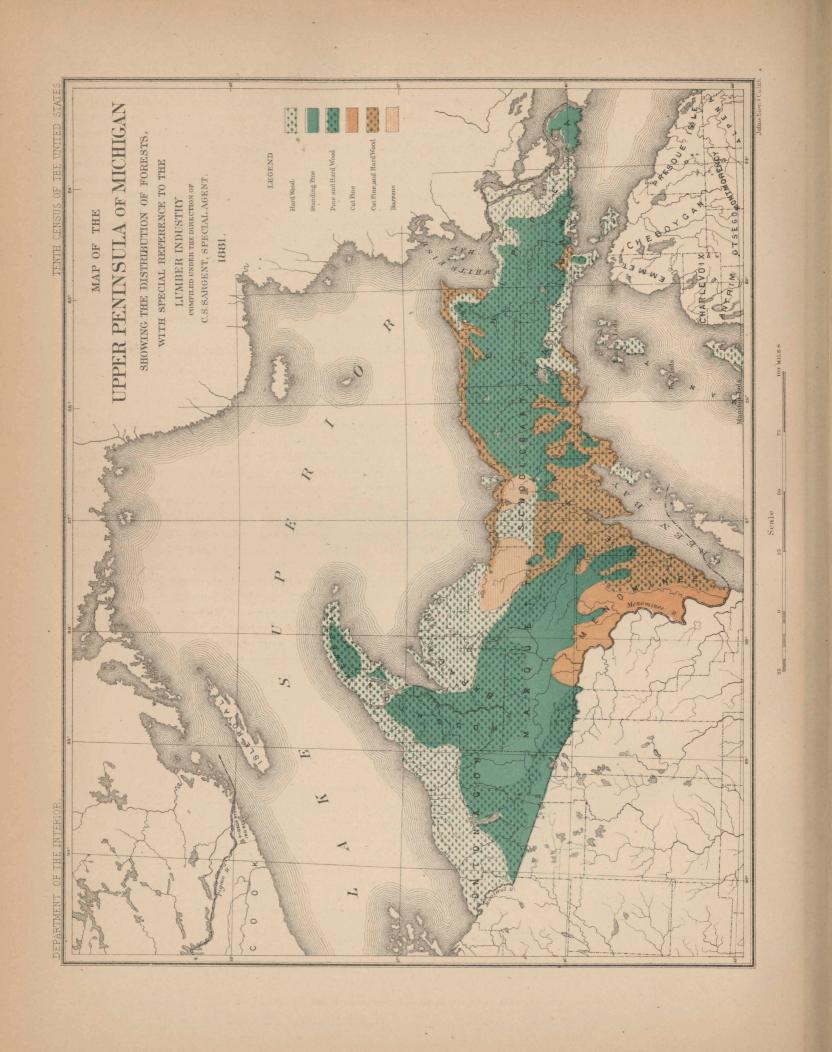
The forests of Michigan have long suffered from destructive fires. These have generally originated in the neighborhood of the loggers' camps or upon the farms of the agricultural pioneer, while the virgin forest has generally, although not always, escaped serious conflagrations. The timber prospector and the hunter are responsible for many fires in the primeval pine forest of the northwest; but, as a rule, fires follow and do not precede the lumberman. The reason is obvious: The logger in his operations leaves the resinous tops, branches, and chips of the pine trees scattered far and wide; these by the following midsummer become dry as tinder, and afford abundant material to feed a fire started by a careless hunter, log-cutter, or farmer clearing land near the forest. Such fires, which too often follow the cutting of pine forests of the northwest, have inflicted incalculable injury upon the country. They have destroyed vast quantities of hard-wood timber; they have consumed the young











pine trees left by the logger; they have robbed the soil of its fertility, and made it unfit to produce another crop of pine until the growth and decay of generations of other plants shall have restored its lost constituents. In the dense, unculled forest, on the other hand, fires, although often destructive, are less dangerous in the absence of dead material to feed the flames than when the ground is strewn with dead branches, tops, and resinous chips.

During the census year only 238,271 acres of woodland were reported destroyed by fire, with an estimated loss of \$985,985. Of the 267 fires reported, 161 were traced to fires set in clearing land for agricultural purposes, and which escaped to the forests; 59 to hunters, 43 to sparks from locomotives, 3 to smokers, while only 1 was reported set by Indians.

The hard-wood forests of Michigan have long afforded abundant material for large and important industries engaged in the production of cooperage stock, handles, oars, agricultural implements, excelsior, wood pulp, etc. Manufacturers, especially in the southern part of the state, now report, however, a scarcity and general deterioration of stock. The best oak timber has been everywhere culled to supply the wants of railroads or the demands of the Canadian market. Elm, bass, and other soft woods, which a few years ago were considered of little value, are now in great demand and are fast disappearing, except from regions remote from railroads. Much hard wood, especially in the southern peninsula, has been destroyed by fire, or, if not destroyed, rendered almost worthless for manufacturing purposes by partial burning.

Next to Vermont and New York, Michigan produces a larger amount of maple sugar than any other state. During the year 1879 3,423,149 pounds were manufactured in the state.

STATISTICS OF GROWING TIMBER.

The following estimates of the merchantable timber standing in Michigan May 31, 1880, were prepared by Mr. H. C. Putnam, of Eau Claire, Wisconsin, with the assistance, in the lower peninsula especially, of Mr. G. W. Hotchkiss. These, as well as the estimates of the timber resources of Wisconsin and Minnesota, were obtained by compiling the results of actual surveys, and have been further verified by a large number of persons familiar with the forests in the different regions of these states. It must not, however, be forgotten that the figures given represent estimates, and not facts. Statistics of the volume of any growing crop are difficult to obtain and always liable to considerable error, and the forest, from its very nature and the extent over which it is spread, presents greater difficulties to the collector of statistics of productive capacity than the more compact and more easily studied crops of the field. The estimates of pine include all trees 12 inches in diameter 24 feet from the ground. Since they were prepared the scarcity of white pine has changed the methods of the lumberman, and trees are now generally estimated and cut as small as 8 inches in diameter 24 feet from the ground. If the amount of standing pine had been estimated upon the 8-inch basis it would have added (roughly) 10 per cent. to Mr. Putnam's figures. Small bodies of pine remote from streams no doubt exist in different parts of Michigan, Wisconsin, and Minnesota, in the aggregate of some commercial importance, which are not included in these estimates. The following figures, however, are believed to represent with as great accuracy as is attainable the productive capacity of the northwestern pineries. They cover the entire region, and these pine forests now contain no great body of unexplored timber, an unknown factor in the country's lumber supply:

WHITE PINE (Pinus Strobus).

Regiona.	Feet, board measure.	
LOWER PENINSULA.		
Basins of streams flowing into Saginaw bay, including Saginaw river and tributaries.	7, 000, 000, 000	
Basins of streams flowing into lake Huron	8, 000, 000, 000	
Basins of streams flowing into lake Michigan	14, 000, 000, 000	
Total	29, 000, 000, 000	
Cut for the census year ending May 31, 1880 (including 2,988,600,000 shingles and 428,445,000 laths, but exclusive of 36,000,000 staves and 3,330,000 sets headings).	4, 068, 773, 000	
UPPER PENINSULA.		
Basin of Menominee river and tributaries (Marquette and Menominee counties).	1, 600, 000, 600	
Ontonagon, Houghton, Keweenaw, Baraga, Marquette (west and north of Menominee basin), and Menominee (east of Menominee basin) counties.	2, 400, 000, 000	
Schoolcraft, Chippewa, Mackinac, and Delta counties	2, 000, 000, 000	
Total	6, 000, 000, 000	
Cut for the census year ending May 31, 1880 (including 106,482,000 shingles and 34,266,000 laths).	328, 438, 000	

An estimated amount of 575,500,000 cords of hard wood is distributed over some 20,000,000 acres in the lower peninsula. Of this about 20 per cent. is suitable for lumber and cooperage stock. The cut of hard wood for the census year ending May 31, 1880 (exclusive of 163,821,000 staves and 18,567,000 sets headings, and including 6,038,000 feet of spool stock), was 440,944,000 feet. In scattered swamps there are standing some 5,000,000 cords of yellow cedar (*Thuya occidentalis*).

From Menominee and Delta counties the merchantable pine has been almost entirely removed. Baraga county contains little pine, and Keweenaw county a single considerable body some 30,000 acres in extent.

The northern portion of Ontonagon and Marquette counties is chiefly covered with hard wood.

An estimated amount of 124,500,000 cords of hard wood is distributed over some 10,000,000 acres in the upper peninsula. The cut of hard wood for the census year ending May 31, 1880 (exclusive of fuel and railroad ties), was 1,145,000 feet.

The southern counties of the upper peninsula contain large areas of swamp, covered with tamarack and yellow cedar (*Thuya occidentalis*), estimated, in the aggregate, at 62,500,000 cords.

Some 7,000,000,000 feet of hemlock lumber and 7,000,000 cords of bark still remain in the state.

Michigan is first among the states in the volume and value of its lumber product. Its principal centers of lumber manufacture are Muskegon, on the shores of lake Michigan, the shores of Saginaw bay, in Bay county, the Saginaw river, in Saginaw county, Manistee, and Menominee, in the upper peninsula. The valley of the Saginaw was long the seat of the most important lumber-manufacturing operations in the United States. Its supremacy, however, has departed with the destruction of the splendid pine forest which covered its water-shed, and the center of manufacture has moved westward from the shores of lake Huron across the peninsula to the waters flowing into lake Michigan.

Lumber was first manufactured in the Saginaw valley as early as 1832. Three years later a second mill, with an annual capacity of 3,000,000 feet, was built upon the Saginaw. In 1836 the first shipments of lumber were made from this mill, and from that time forward great attention was given to the manufacture of lumber for shipment. The commercial panic of 1837, however, seriously interfered with the development of this business, and it was not until 1849 that mills began to multiply. In 1844 there were 23 mills upon the Saginaw, with an aggregate capacity of 60,000,000 feet. Ten years later the number of mills had increased to 82, manufacturing 425,000,000 feet of lumber, while in 1873 there were 83 mills, which produced that year 567,000,000 feet. Since 1870 there has been an almost steady decrease in the number of mills operating in the Saginaw valley; the number finishing their "cut out" is fast increasing, and those destroyed by fire are not rebuilt. But, although the number of mills has decreased, their production has increased, their present capacity being estimated at 923,000,000 feet. A large part of the lumber manufactured upon the Saginaw is transported by lake to Ohio and New York ports, and thence to the principal eastern markets, although a considerable amount is shipped by vessel to Chicago and Milwaukee, and thence distributed by rail through the west. The wide-market open to this lumber is due to its excellent quality. Twenty years ago logs which would run 25 per cent. "uppers" were considered common; 40 per cent. was the rule, and as high as 75 per cent. "uppers" was sometimes obtained. Logs were then cut from the lower trunk of the tree below the tops, and only the largest trees were selected. Now land which has been cut over three times is gone over again, and lumbermen are satisfied if logs yield 10 per cent. "uppers".

Of late years considerable changes have been introduced into Michigan lumbering operations by railroad logging; by this means mills are able to obtain a constant supply of logs by railroads built into the forest for the purpose, and this supply can be regulated almost entirely by the demand. There are several roads in different parts of the state doing this business, the principal being the Flint and Pere Marquette and the Lake George and Muskegon River railroads. The growth of this business in the Saginaw valley and at Muskegon, Manistee, and on the Flint and Pere Marquette road is shown by the following table extracted from *Bradstreet's* of February 5, 1881:

Years.	Saginaw valley.	Muskegon.	Manistee.	Flint and Pere Marquette railroad.
1865	200, 000, 000	108, 505, 700		
1866	209, 000, 000	157, 468, 300		
1867'	429, 207, 808	288, 502, 200		****************
1868	446, 960, 583	213, 692, 600		
1869	321, 350, 663	267, 789, 900		
1870	623, 397, 353	198, 862, 600	121, 221, 395	
1871	521, 796, 927	250, 000, 000	142, 369, 817	
1872	645, 285, 278	e315, 000, 000	155, 556, 729	
1873	680, 979, 461	376, 035, 037	179, 820, 243	
1874	589, 225, 404	224, 571, 527	182, 218, 383	
1875	584, 843, 701	309, 638, 418	168, 926, 197	
1876	572, 229, 472	299, 525, 919	147, 724, 241	
1877	651, 567, 948	312, 285, 951	152, 221, 548	
1878	558, 079, 674	340, 990, 055	178, 542, 869	
1879	780, 182, 286	432, 431, 679	211, 722, 030	14, 357, 670
1880	948, 174, 274	380, 000, 000	211, 971, 000	87, 485, 547

The following extracts are made from Mr. Putnam's report upon the forests of Michigan:

"The southern boundary of the pine forest in Michigan may be represented by a line drawn from Sarnia westward across the state nearly to the mouth of the Kalamazoo river. Originally the pine forest covered the northern two-thirds of the state, and estimates made in 1835 gave the amount of pine then standing as 150,000,000,000 feet. This estimate included the northern peninsula. The present estimate of the pine standing in the whole state, the northern peninsula also included, is 35,000,000,000 feet. There are now remaining no large bodies of standing pine in the state which have not been more or less cut into, and the timber adjacent to streams has all been cut. The pine now remaining is scattered generally through the northern half of the state, lying back at a distance of from 2 to 10 miles from streams large enough to float the logs. The best pine in the state has been cut. The belt of pine which ran through the center of the state, extending north from the southern boundary of the original pine forest for some 75 miles, contained the best pine in the northwest. This pine was what was called by lumbermen 'cork pine', a soft white pine, large and sound, with a thick bark. The quality of the pine of the Saginaw valley was particularly fine, too; that on the west shore was of smaller size.

"The standing pine on the lower peninsula of Michigan is estimated at 29,000,000,000 feet, of which there are in the Saginaw valley about 7,000,000,000 feet, including the pine upon the Saginaw, Au Sable, and Cheboygan rivers and their tributaries; on the streams flowing directly into lake Huron there are some 8,000,000,000 feet more; making 15,000,000,000 feet upon the streams of the east shore. On the western shore of the state there are 14,000,000,000 feet, including the pine upon the Kalamazoo, Black, Grand, Muskegon, White, Pentwater, Aux Bec Scies, Boardman, and Pine rivers. As before stated, the quality of the timber in the eastern portion of the state is better than that upon the west shore; this is smaller and partakes more of the sapling nature, while that on the east shore is largely cork pine. The pine of the east shore and Saginaw valley is largely used for finishing lumber, and should be transported to the east; indeed all the pine in the lower peninsula of Michigan is wanted at the east, and none should be sent west. The pine of the western shore is suited for fencing, flooring, and dimension stuff, being smaller and containing more knots and sap.

"The largest bodies of pine left in the lower peninsula are in the counties of Presque Isle, Montmorenci, Alpena, Alcona, Ogemaw, Roscommon, Crawford, Missaukee, Wexford, Manistee, Grand Traverse, Lake, Osceola, Clare, Giadwin, and Charlevoix. There are bodies of pine also in other counties from 15,000 to 20,000 acres in extent which have not yet been cut. The pine left in the lower peninsula is generally scattered through hard-wood timber, into which the settlers are now entering, clearing the hard-wood forests and exposing the pine to destruction by fire and windfall. This destruction has largely increased with the settlement of the country, and will increase still more unless stringent measures can be taken to protect the pine forests from waste.

"The southern part of the state outside the pine belt was originally covered with a dense forest of hard-wood timber; this region is now largely settled and is the farming region of Michigan. There is a large amount of hard-wood timber of commercial value still scattered through this farming country, particularly in its middle and northern parts. Along the west shore as far north as the straits of Mackinaw the pine has been cut in large quantities, but there is still a large amount of hard-wood timber left upon this area.

"The pine of the northern peninsula of Michigan is estimated at 6,000,000,000 feet. This includes the pine from the Saint Mary's river westward to the Wisconsin line and the mouth of the Montreal river, and upon the south shore of lake Superior. It is divided as follows:

- "1. On the Menominee river and tributaries, 1,600,000,000 feet.
- "2. In the western portion of the peninsula, not including the Menominee and tributaries, but including all west of the line of the Chicago and Northwestern railway between Escanaba and Marquette, 2,400,000,000 feet.
 - "3. East of the line of the Chicago and Northwestern railway, 2,000,000,000 feet.
- "The largest bodies of pine in the northern peninsula are in the counties of Chippewa, Mackinac, Schoolcraft, Marquette, Houghton, and Ontonagon. There is also quite a large body in Keweenaw county, covering perhaps 30,000 acres. Ontonagon county, which extends along the south shore of lake Superior for nearly 100 miles, for 35 miles back from the lake is mostly covered with hard-wood timber, with a little pine along the streams, but not in sufficient quantities to estimate. This is also true of the northern part of Baraga and Marquette counties, extending along the southern shore of lake Superior, a distance of 125 miles from L'Anse to Onota, in Schoolcraft county. There are here a few small bodies of pine scattered through the hard wood, but it is needed by the settlers, and has no export value. The quality of the timber upon the Ontonagon and Presque Isle rivers and the upper Menominee, growing among the hard woods along the south slope of the Penokee iron range, is similar to that on the western shore of the lower peninsula. This timber is, however, somewhat difficult of access. The streams over which it must be driven (the Ontonagon and Presque Isle) are rough, broken, and require considerable improvement. The pine east of the line of the Chicago and Northwestern railway between Marquette and Escanaba, on the east half of the northern peninsula, is of poor quality, and may be classed as 'sapling pine', with occasional groves of what is called 'big sapling' scattered through the hard woods.

"In the upper peninsula of Michigan, according to the Lake Superior Canal Company's reports of examination and estimates of cord wood, there is an average of about eighteen cords of wood per acre over the whole area of the peninsula, of which two-thirds is hard wood and one-third soft wood.

"In Menominee and Delta counties, the southern part of Schoolcraft county, and the extreme southern part of Marquette county are quite large quantities of tamarack and yellow cedar. From most of these lands the merchantable pine has been removed, and where the fires have not destroyed the cedar and tamarack the railroad companies are cutting the timber and shipping it to the prairies for telegraph poles, ties, and posts. It is stated by the owners of the lands, who long since cut the pine from them, that the cedar and tamarack trees left upon the land have netted them more than the original pine harvested. What makes this timber so valuable is its close proximity to the railroads and the ease with which it can be shipped by rail or over the waters of Green bay. This shows the necessity of preserving this kind of timber for future use, and of not abandoning it for taxes, as has heretofore been done, or allowing it to be destroyed by fires and windfalls.

"There are on the Menominee river some 9,000,000,000 feet of standing pine, one of the largest bodies left in the northwest. More than half of this, however, lies in the state of Wisconsin. About 200,000,000 feet of lumber are manufactured annually upon the Menominee. All the mills upon the river are located at its mouth, in the towns of Marinette and Menomonee, in Wisconsin, and it is considered next to impossible to build more mills at that point. The river is here narrow, and the facilities for holding logs, shipping lumber, dockage, etc., are quite limited in proportion to the amount of timber left in the region tributary to this stream; and this body of pine may therefore be considered to a certain extent in reserve, and likely to outlast many larger ones. There is little danger from fire on this river; the pine which is left grows upon the hard-wood ridges, interspersed with broad areas of swamp."

WISCONSIN.

The great prairies of the central Atlantic region once found their northeastern limits in southern Wisconsin. The forest covering of all the southern part of the state was confined to the bottom lands or open upland groves of stunted oaks of no great extent or of more than local importance. The central part of the state was covered with a dense forest of hard woods, oaks, ash, maple, cherry, birch, and the other trees of the northern forest, through which, upon gravelly or sandy ridges, great bodies of white pine were scattered. These pine forests gradually change in character and decrease in productiveness as they reach northward. Lakes are more common, and swamps of tamarack, cedar, and spruce occupy in the northern part of the state a considerable proportion of the forest area. The pine trees in these northern forests are smaller and more scattered than those farther south, although generally less intermixed with hard woods, and affording lumber of poorer quality.

The forest area has somewhat increased in the prairie region of the state since its first settlement and the consequent decrease of destructive prairie fires. The growth of trees has gradually spread from the bottom lands of the streams to the hills, and the oak forests upon the uplands have gradually encroached upon the prairie, losing their open, park-like character by the appearance of a young growth which has sprung up among the old trees.

The pine has been destroyed along the entire southern borders of the pine belt, along the banks of the principal streams, and from the lines of railroad, while the hard wood has been often greatly injured or destroyed by fire in those parts of the state where pine has been cut. The amount of pine still growing in Wisconsin is nevertheless large, although it should not be forgotten that the best and most easily accessible has already been harvested. What remains is generally remote from actual lines of transportation, and often, especially in the extreme northern part of the state, of comparatively poor quality.

During the census year 406,298 acres of woodland were reported destroyed by fire, with an estimated loss of \$725,610. The largest number of these fires was set by farmers in clearing land, or by sparks from locomotives.

The manufacturers of cooperage stock report a general deterioration and scarcity of the best varieties of hard woods, and the substitution of beech, elm, and other woods for oak.

The following estimates of the amount of timber standing in Wisconsin May 31, 1880, were prepared by Mr. H. C. Putnam:

WHITE PINE (Pinus Strobus).

Regions.	Feet, board measure.
Basin of Saint Croix river and tributaries	2, 500, 000, 000
Basin of Chippewa river and tributaries	15, 000, 000, 000
Basin of Black river and tributaries	900, 000, 000
Basin of Wisconsin river and tributaries	10, 000, 000, 600
Basin of Wolf river and tributaries	600, 000, 000
Basin of Ocento river and tributaries	500, 000, 000
Basin of Peshtigo river and tributaries	1, 500, 000, 000
Basin of Menomonie river and tributaries (in Wisconsin)	6, 400, 000, 000
Shore of lake Superior	3, 600, 000, 000
Total	41, 000, 000, 000
Cut for census year ending May 31, 1880 (including 1,007,039,000 shingles and 348,301,000 laths).	2, 097, 299, 000



Of this amount 485,552,000 feet were manufactured along the Mississippi river in Illinois, Iowa, and Missouri as far south as Saint Louis.

The wooded region in Crawford, Richland, Sauk, and Vernon counties is estimated to contain 12,000,000 cords of hard wood in addition to some timber of commercial value. The cut for the census year ending May 31, 1880 (exclusive of 86,545,000 staves and 7,498,000 sets of headings), was 117,041,000 feet.

Valuable oak timber exists in large quantities in Dunn, Pierce, and Saint Croix counties.

The cedar swamps scattered through the pine belt of the state cover an area of some 1,365,000 acres, and are estimated to contain 62,800,000 posts, telegraph poles, and railroad ties, in addition to large quantities of tamarack and spruce.

Wisconsin is the third state in the importance of its lumber-manufacturing interests. The great centers of manufacture are in the neighborhood of Eau Claire upon the Chippewa river, upon the Wisconsin river, and upon the shores of Green bay and lake Superior. Logs cut in the forests of Wisconsin supply also mills located on the Mississippi river in Illinois, Iowa, and Missouri with material equivalent to nearly 500,000,000 feet of lumber.

The following is extracted from Mr. Putnam's report upon the forests of Wisconsin:

"The southern boundary of the forest coincides with a line extending northwesterly from near the city of Milwaukee on lake Michigan, to the falls of Saint Croix on the Saint Croix river, and the western boundary of the state. This includes the heavy hard-wood as well as the pine forest. There is also, or there has been, a large amount of hard-wood timber in the southeastern part of the state, south of this line, but as no large bodies of forest of commercial value are now standing there, it will not be considered here. Large bodies of hard-wood timber exist in Vernon, Crawford, Richland, and Sauk counties, covering in the aggregate fully 400,000 acres and containing at least 12,000,000 cords of wood. This region, however, is already thickly settled, and the forests are being rapidly cleared for agricultural purposes. No estimate has ever been made of the amount of pine timber standing in Wisconsin at the time of its original settlement; at the present time it is estimated that 41,000,000,000 feet of merchantable pine remain in the state, situated as follows, river basins being taken as the natural divisions of these pineries:

- "1. North of the Saint Croix river and upon the lands tributary to that stream there are 2,500,000,000 feet, covering 2,000,000 acres.
- "2. On the southern shore of lake Superior, including all the waters tributary to the lake in the state of Wisconsin, extending from the Montreal river on the Michigan line westward to the western boundary of the state, and embracing the Wisconsin pine on the Montreal river and upon the Bad, White, Bois-Brulé, Black, and Left-Hand rivers, 3,600,000,000 feet, covering 1,800,000 acres.
- "3. On the Chippewa river and its principal tributaries, the Red Cedar, West Branch, East Branch, Flambeau, Jump, Yellow, and Eau Claire, covering an area of some 6,253,000 acres, with an estimated stand of pine of 15,000,000,000 feet.
 - "4. In the Black River basin, with an area of 1,000,000 acres, containing an estimated stand of 900,000,000 feet.
 - "5. In the Wisconsin River basin, with an area of 4,500,000 acres, with an estimated stand of 10,000,000 feet.
- "The remainder of the state, lying east of the east line of the Wisconsin River division and north of the southern boundary of the original forest, is divided by rivers as follows: (1) Wolf river, with 600,000,000 feet of pine; (2) the Ocomto river, with 500,000,000 feet of pine; (3) the Peshtigo river, with 1,500,000,000 feet; (4) the Menomonee in Wisconsin, 6,400,000,000; making a total in the division east of the Wisconsin of some 7,000,000 acres, with an estimated stand of 9,000,000,000 feet of pine. This makes a grand total of pine forest area in the state of nearly 23,000,000 acres, still containing 41,000,000,000 feet of standing pine. This includes about 200,000,000 feet upon the Menomonee Indian reservation, in the county of Shawano, where very little pine has ever been cut; 100,000,000 feet on the Flambeau reservation, and 200,000,000 feet upon the Court Oreilles reservation. There is no merchantable pine standing on any of the other Indian reservations in the state.

"The quality of the pine in the state of Wisconsin varies largely with the differences in soil. The quality of the pine growing mixed with hard woods upon the southern boundary of the forest and bordering on the prairies was similar to that of the best Michigan pine. This is especially true of timber cut on the Wolf, Oconto, and Peshtigo rivers. The timber originally on the Wolf and Oconto rivers was especially fine. This has been largely cut, although there are still some very fine bodies of the best pine left on the Oconto and the western branch of the Beshtigo and northern branch of the Wolfrivers. The Black River district contained also a large amount of the best upper quality of pine, of which, however, more than half has been cut. The Eau de Galle River basin, in the counties of Pierce, Dunn, and Saint Croix, also contained at one time a large amount of the upper grade of pine, now, however, all removed. This grew among hard-wood timber, on good soil, which, when the timber is cut off, is valuable for farming purposes. The pine in this part of the state did not grow in extensive tracts. It was scattered through the hard-wood timber, from 1 to 10 large pine trees growing on an acre—trees which would scale from 1,000 to 3,500 feet of lumber each. There are still small bodies of this large pine left, but the great bulk of it is gone.

"As we go north from the southern boundary of the forest we enter a lighter soil, where cedar and tamarack swamps are interspersed between the hard-wood ridges. Many of these swamps are natural peat-bogs, covered with cedar, tamarack, and spruce. The tree growth upon them is heaviest near the outer edges, the centers

often being covered with grass or cranberry plants. These swamps, originally the beds of lakes, are now filling up and becoming gradually covered with timber. On the Wolf river the timber was very heavy. Instances are known of 10,000,000 or 12,000,000 feet of pine lumber having been cut from one section of 640 acres in the Lower Wolf River region.

"In the pine forest, away from the large bodies of mixed hard wood and pine previously described, the general character of the timber is about the same, varying somewhat in different localities, but still possessing the same general characteristics and qualities. Where the pine grows in large solid bodies there are many young trees mixed with the older, and the timber is generally of inferior or lower grade. This is true of pine growing about the head of the Flambeau and Wisconsin rivers, and the Menomonee river in Wisconsin. Large pine cannot grow and mature upon very poor soil, and where the soil is poor the trees, after reaching a certain size or age, decay and are thrown down by wind or destroyed by fire. The white pine in Wisconsin does not mature except upon the rich gravelly loam of the ridges.

"The principal points of lumber manufacture at present in Wisconsin are on lake Winnebago, at the cities of Oshkosh and Menasha, which take largely the product of the Wolf and Fox River pineries; at Green Bay and Oconto, which derive their logs principally from the Oconto river; at Peshtigo, on the Peshtigo river; at Marinette, on the Menomonee river; on the Wisconsin river, at Grand Rapids, Stevens Point, Mosinee, Wausau, and Jenny, the terminus of the Wisconsin Valley railroad, and at Necedah, on the Yellow river. Along the Wisconsin Central railroad, from Junction City to Ashland, are mills of more or less capacity at every station, the most important being at Ogema, Ashland, Medford, and Unity. Upon the Black river the principal manufacturing points are La Crosse and Black River Falls. On the Chicago, Saint Paul, Minneapolis, and Omaha railway, at Fairchild, are the large mills of Foster & Co., who are engaged in manufacturing the timber lying between the Black river and the waters of the Chippewa, included in the Chippewa estimate. On the Chippewa river the largest manufacturing establishment is the Mississippi River Logging Company, composed of fifteen of the heaviest concerns upon the Mississippi river. These firms obtain their stock mostly from the Chippewa river, the logs being driven down to its mouth into what is called the 'Beef Slough boom', where they are separated and formed into rafts and towed to the different mills below. This company cuts on the Chippewa about 400,000,000 feet a year. The principal manufacturing points on the Chippewa deriving their logs from its basin are situated at Waubeck, Dunnville, Menomonee, Meridian, and Eau Claire, where several large and important manufacturing establishments are located. Higher up the river the Badger State Lumber Company and the Grand Island Lumber Company are located, and at Chippewa Falls, the county-seat of Chippewa county, the Chippewa Lumber and Boom Company has a large water-mill, with a capacity of 65,000,000 feet a year, besides several smaller concerns. The railroad extending from Chippewa Falls eastward through Chippewa and Clark counties into Marathon county, and joining the Wisconsin Central railroad at Abbottsford, passes through a hard-wood country. Several firms are already established upon this line and have commenced the manufacture of staves and the production of hard-wood lumber for wagons, etc., and are developing a large business. This road runs through one of the finest bodies of hard wood in the state, containing large amounts of oak and maple growing on a fine soil suitable for farming. The Chippewa River country now contains the largest body of white pine of the best quality left in the states of Michigan, Wisconsin, and Minnesota. It is, however, being very rapidly cut.

"It is found in going north toward the heads of the streams that the timber stands more in large groves, and that there is less hard-wood timber mixed with the pine. When the loggers attack these forests they cut clean as they go, the timber being of more uniform size and age, and there being less undergrowth than farther down the streams. It is found, also, that the pineries on the heads of the streams do not hold out as well or yield as large an amount of timber as these farther south, where the forests border on the prairie lands and where the pines grow on better soil. This is true both of the Wisconsin and of the Michigan pineries. The poorer soils in the northern portion of the state do not grow and mature the large sapling forests of pine found in the southern portions of the pine belt. So that, while there is still a large area which has not been cut and which may appear inexhaustible, yet, owing to the fact that the timber lies more in groves, and that there are here wide extents of tamarack and cedar, swamps and open spaces, the ground will be cut over more rapidly than when the forest was first entered. This is true of the pine standing upon all the streams of northern Wisconsin in the Menomonee district—the Wisconsin, the Chippewa, Saint Croix—and on the southern shores of lake Superior. Commencing at Menomonee, on the Chicago, Saint Paul, Minneapolis, and Omaha railway, and running west through the 30 miles of 'big woods', large mills for the manufacture of hard-wood timber and of what little scattered pine there is left are established at Knapp, Wilson, Hersey, Woodville, and Baldwin stations. The principal manufactories in the Saint Croix district are at Hudson, on the Willow river, and at Stillwater, in Minnesota, which receives its logs from the Saint Croix, in Wisconsin, and which, therefore, should be treated as one of the Wisconsin pinery manufactories. At Somerset, on Apple river, there is one mill; there is one at Osceola, upon the Saint Croix, and upon the Northern Wisconsin railroad, which runs through the Saint Croix division; at Clayton, Granite Lake, and Shell Lake are large mills. There are also other mills along this road on the Lake Superior shore. There are mills of small capacity at Superior City, Bayfield, and Ashland; the latter receive their logs by the Wisconsin Central railroad from the Bad River pinery.

"On the Eau Claire river the timber is small and sound, growing very thick and long; there are frequent instances where 1,200,000 or even 1,500,000 feet of lumber have been cut upon a 40-acre lot. One tree was cut on Jump river some years ago which scaled 7,000 feet of lumber. The general character of this timber, especially upon the main Chippewa or West Branch and a portion of the Flambeau, is called 'big sapling pine'. Of the true cork pine very little is found in the northern part of Wisconsin, probably because the soil is not strong enough to permit its full development. The general character of the timber upon the Wisconsin river is very much the same as that upon the main Chippewa. There are instances of very fine pine having been cut in the hard-wood forest upon the lower part of the river, and some fine groves are found even as far north as the Tomahawk and East Branch. The Flambeau river, or East Branch of the Chippewa, has also, in ranges 2 and 3 east, extending from townships 35 to 41 north, inclusive, some excellent bodies of upper-grade pine.

"On the Jump river are some fine bodies of pine, nearly approaching in quality Michigan cork pine and running largely to 'uppers'. This is true also of the pine upon the Yellow river, where the timber grows largely scattered among hard woods and is of fine quality. One of the finest bodies of pine in Wisconsin is that which belongs to Cornell university, lying in townships 33 to 38, ranges 8 and 9, in the highest part of Chippewa county, on the divide between the Chippewa and Red Cedar rivers. On this body frequent estimates of 1,000,000 feet to 40 acres have been made. On the Saint Croix river are many barren areas timbered with scrub pine, patches of Norway pine, and small black and white oak. These barrens cover about 700,000 acres of the Saint Croix region. The soil is sandy, and fires run over the country every year. South of these barrens, in Polk, Barren, Saint Croix, Dunn, and Pierce counties, is a tract of very valuable hard wood land, upon which the greatest portion of the timber is now standing, although settlements are already largely scattered through this region. This body of hard wood contains a large amount of valuable white-oak stave timber and much timber suitable for general manufacturing purposes. It is being, however, rapidly destroyed by settlers and by the fires incident to agricultural and logging operations.

"In Clark county, which lies partly in the Chippewa and partly in the Black River region, are large bodies of hard-wood timber as yet uncut and growing upon land valuable for farming purposes. This growth extends as far north as the northern line of the county. The same body of timber extends east through Marathon and Wood counties, and is particularly fine in the western portions. The same body of hard-wood timber continues east toward lake Michigan, including the counties of Portage, Waupaca, Shawano, Outagamie, Winnebago, Brown, Kewaunee, Manitowoc, Calumet, Fond du Lac, Sheboygan, and Ozaukee. Large tracts in these counties are, of course, cleared and settled; still they contain large bodies of unoccupied hard-wood timber, and the opportunities for cheap farms are plenty.

"Of the forest region proper of Wisconsin, fully 5 per cent. is not covered with timber; this includes, swamps, lakes, rivers, bottoms, etc. In the extreme southern part of the forest area, over a region from 35 to 50 miles in width, the hard wood predominates, only about one-fifth of the forest growth being pine. North of this hard-wood region proper, perhaps one-half of the forest growth is pine and other soft woods and the rest hard woods. Hemlock is scattered through the pine forest outside of the heavy hard-wood areas. A careful estimate of the hemlock timber now standing gives the following results, the divisions agreeing with those used in estimating the standing pine: On the Chippewa river, upon 3,000,000 acres, 2,500,000,000 feet of hemlock; on the Saint Croix river, upon 1,000,000 acres, 500,000,000 feet of hemlock; on the Black river, upon 350,000 acres, 100,000,000 feet of hemlock; in the country east of the Wisconsin River division, and including the Wolf, Oconto, Peshtigo, and Menomonee rivers and their tributaries, upon 3,000,000 acres, 1,500,000,000 feet.

"The total area in the state on which hemlock timber grows is about 10,500,000 acres, containing, roughly, 5,500,000,000 feet. The quality of the hemlock timber in Wisconsin is not so good as that grown in New York and northern Pennsylvania, although it is valuable for its bark, and the timber when peeled can be driven down with the pine and sawed at the mills into dimension stuff for use where coarse lumber is required.

"Generally, therefore, the forests of Wisconsin may be divided into the hard-wood lands already described, along the southern borders, from which the pine has been mostly cut; north of this, and extending northward somewhat indefinitely, the mixed growth of hard wood and pine, growing upon soil adapted for agricultural purposes. The open meadows in this region are covered either with grass or cranberry marshes, alike valuable to the lumber and farming interests. About the head of the Flambeau river are large open spaces running into groves of heavy pine timber. These open spaces, once lakes or swamps, are drying up and the timber is gradually spreading over them. There are bodies of timber scattered through the southern portions of the state outside of the original forest area, but the amount of this timber is relatively so small that it cannot be considered of commercial importance, and hardly supplies the wants of the population occupying the thickly-settled southern counties.

"Five thousand men are employed in the pineries of the Chippewa river. They are expected to cut during the logging season about 600,000,000 feet of logs, or an average per man of over 100,000 feet. This rule is not applicable to the northwestern pineries generally, for in Michigan, as the timber is now farther from the streams, the average cut per man is not as great, and 80,000 feet per man would perhaps be a fair average, taking the pineries of the whole northwest.

"The annual increase or growth of timber is counterbalanced by the annual waste by windfalls and the natural decay of the old trees. The loss to the forest by fire is an unknown quantity, but it is quite a large amount, probably 5 per cent. of the whole. The lumbermen waste the log which runs into the top of the tree; this is knotty, but usually sound, and would make good merchantable lumber. It is left in the woods, however, because there is a good deal of work in trimming the knots and cutting off the limbs. From an ordinary-sized tree four 16-foot logs are usually taken, the rest being left. Often this top log is 22 inches in diameter at the butt and will scale from 100 to 120 feet. Loggers are paid so much per thousand feet by the lumberman, and the amount they receive is so small that they cannot afford to spend the time to finish up and take out the fifth or last log, which is therefore left in the woods and lost. Nearly one-tenth of the timber, therefore, is left in the woods and lost. The fires about the old choppings, or where lumber operations are going on, are principally caused by the carelessness of woodsmen in hunting up land-lines, or of driving-crews on the river in the spring who leave their fires, or by explorers in the forest during the month of May or June leaving their camp fires burning. In all the old cuttings the dried pine boughs and other timber left on the ground get very dry, and fire once started burns with great rapidity and violence.

"As a matter of fact, more than half the area from which pine forests have been cut in the northwest is sooner or later burned over. The fire destroys the young trees and changes the nature of the surface of the ground, so that the next crop which comes up consists of briers and poplars, and then hard woods. When pine is cut off or burned it does not come in again, and I have never seen any old choppings of pine come up with pine again, even when some trees were left and the ground had not been burned, although where a few large trees only are removed from a pine forest growing on good soil the small trees left standing, if protected from fire, will continue to grow."

MINNESOTA.

The Northern Pine Belt finds in Minnesota its extreme western limit in the United States in longitude 95° 30′, and its southwestern limit near the forty-sixth degree of latitude. Along its southern and western borders a narrow territory covered with an open growth of hard wood separates the forests of pine from the prairie, which occupies all the southern and western portions of the state.

The same general features which characterize the pine belt of Wisconsin extend into Minnesota. The pine in the southern portion, confined to gravelly ridges, is scattered through forests of hard wood. Farther north the forest changes in character, the pine being small and of inferior quality. Broad areas of barren land covered with stunted birch, gray pine, and scrub oak occur, while the whole country is thickly studded with lakes and with tamarack and cedar swamps. North of the Mississippi River divide the country is more open; the forest is stunted and of little value, and pine is only found in small, scattered clumps mixed with spruce, tamarack, and yellow cedar. The forest growth here occupies perhaps two-thirds of the rocky or swampy surface of the ground. Its productive capacity is not large, and the northern part of the state is not adapted to lumbering operations.

The pine has been removed from the principal streams of the state, and that which remains, except in the region tributary to lake Superior and in the vicinity of Red lake, is now inaccessible or of comparatively inferior quality. The best hard-wood forests of the state, as in Michigan and Wisconsin, have suffered seriously by fires started in abandoned pineries, or in clearing land for agriculture.

During the census year 250,805 acres of woodland were reported devastated by fire, with an estimated loss of \$1,395,110. The largest number of these fires was set in clearing land or by sparks from locomotives.

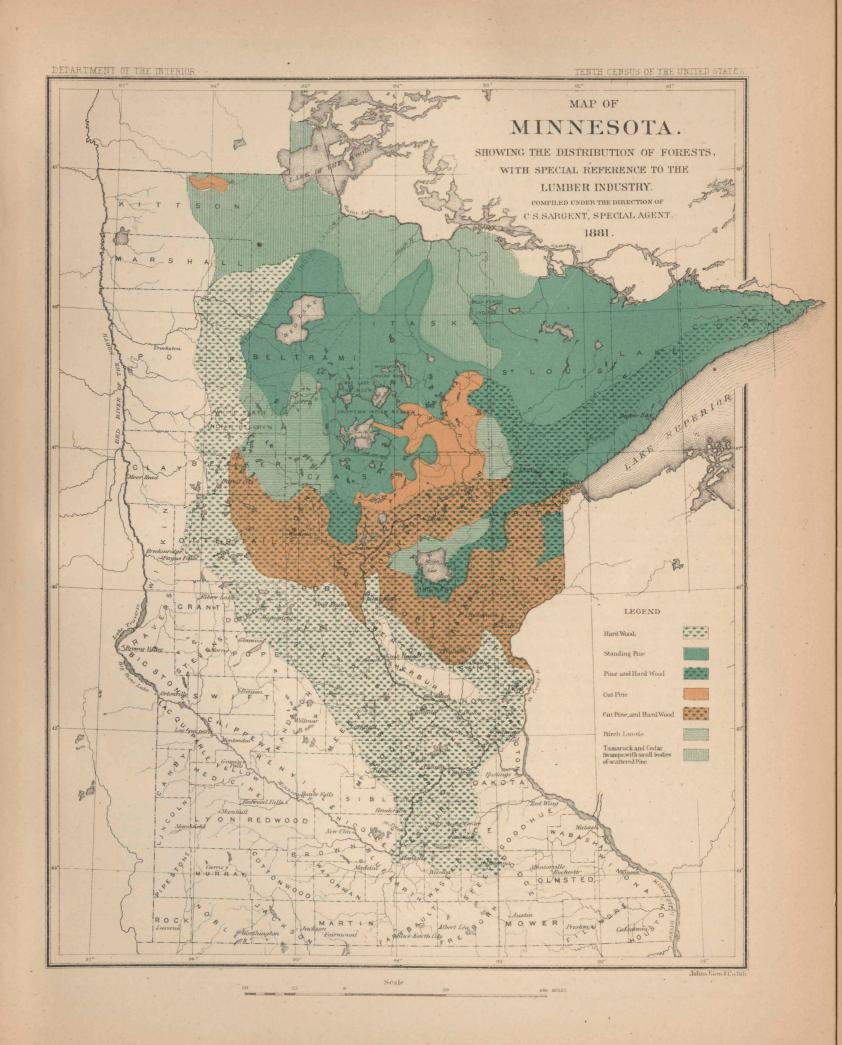
The manufacture of cooperage stock to supply the large flouring-mills of the state is an important industry. Manufacturers report a growing scarcity and general deterioration of material. Basswood, elm, and ash are largely used; oak is inferior in quality to that grown farther east and south.

The following estimates of the amount of pine timber standing in Minnesota May 31, 1880, were prepared by Mr. H. C. Putnam:

WHITE PINE (Pinus Strobus).

Regions.	Feet, board measure.	
Mississippi river and tributaries	2, 900, 000, 000	
Red Lake river and other tributaries of the Red river	600, 000, 000	
Saint Louis river and tributaries	3, 500, 000, 000 870, 000, 000	
Total	8, 170, 000, 000	
Cut for the census year, ending May 31, 1880 (including 187,836,000 shingles and 88,088,000 laths).	540, 997, 000	

In the belt of hard wood extending west and south of the pine region, and consisting of white, red, and burroak, sugar maple, poplar, etc., it is estimated that 3,840,000 acres of forest remain, capable of yielding an average





of 15 cords of wood to the acre, or 57,600,000 cords. The cut for the census year ending May 31, 1880 (exclusive of 7,825,000 staves and 547,000 sets of headings), was 36,884,000 feet.

Minnesota is the eighth state in the importance of its lumber-manufacturing interests. The principal centers of manufacture are Minneapolis, upon the Mississippi river, the Saint Croix river in Washington county, the Mississippi river in Anoka county, and Duluth, near the mouth of the Saint Louis river.

The following is extracted from Mr. Putnam's report upon the forests of Minnesota:

"The great hard-wood forest of Minnesota lies to the south and west of the pine forest, extending north and northwest from Freeborn and Mower counties on the southeast into Marshall county, and to within 50 or 60 miles of the boundary-line between Canada and the United States. This body of hard wood, which is some 300 miles long by about 20 miles wide, borders upon the prairie, and is the extreme western body of timber of any commercial value east of the Rocky mountains. This forest covers about 3,840,000 acres of land generally valuable for agricultural purposes, besides its timber, which will average about 15 cords to the acre. The surface of the land is level or gently undulating, well watered, particularly the so-called 'park region' which lies in Becker, Otter Tail, Douglas, Stearns, and Todd counties, and in fact extends through Wright, Hennepin, Carver, Le Sueur, Rice, and Steele counties.

"North and east of this belt of hard wood the pine forests commence at a point where the southern line of the Wisconsin forest crosses the Saint Croix river, near Taylor's Falls. They extend northwesterly through the counties of Chisago, Isanti, Mille Lacs, Benton, Morrison, Todd, Otter Tail, Becker, Polk, and Beltrami, nearly parallel to the line of the hard-wood forest, and, crossing Red Lake river, extend round to the north of Red lake, and thence easterly, reaching the shore of lake Superior at the Grand Portage.

"The general character of the pine in Minnesota is similar to that of northern Wisconsin, although it contains more sapling pine and a smaller percentage of 'uppers.' It is generally somewhat scattering and in smaller groves. Large areas of barren land within the forest proper are covered with birch, through which are scattered patches of small pine, while large areas of swamp bear only tamarack and cedar. The pine of Minnesota is estimated as follows:

"1. On the portion tributary to the Rainy lake and Rainy Lake river, including the Big Fork, the Little Fork, and the Vermillion rivers, 300,000,000 feet. This stands upon streams which flow northward. This pine will naturally be sent to Manitoba.

"2. On the northern shore of lake Superior, east of Duluth, and covering the waters tributary to lake Superior, of which very little is surveyed and no area is given, 870,000,000 feet.

"3. On the waters of the Saint Louis, including the Cloquet, White Face, and other small streams, 3,500,000,000 feet.

"4. On Red Lake river and its tributaries. The great body of pine in this division is principally upon Red lake and Red Lake river. It is estimated to contain 600,000,000 feet, although it is nearly all unsurveyed.

"5. On the Mississippi river and tributaries above Minneapolis, 2,900,000,000 feet.

"About one-half of the pine has been cut in Carlton county; it has all been cut in Pine county with the exception of that growing in a few townships. It has nearly all been cut in Chisago, Kanabec, Morrison, and Crow Wing counties. A great deal of pine, too, has been cut in Cass county, while Todd, Otter Tail, and Wadena have all been cut over. The principal bodies of pine now remaining are located in Cook, Lake, Saint Louis, Cass, Itasca, and Beltrami counties. There were a few thousand acres growing on the Roseau river, where it runs into northwestern Minnesota, but this has all been cut by the Canadians. There is no hemlock or spruce in Minnesota. There are occasional ridges of hard wood within the pine forest, as in Wisconsin and Michigan.

"A large portion of the northern part of the state is as yet unsurveyed and but little known, except that, in the region extending from 30 to 100 miles south from the international line, there is little pine of commercial value. It is an open country, full of bogs, swamps, rocks, and wide areas of worthless land; this region extends from the Arrow river clear through to the international line, south and west of the Lake of the Woods, and to the Vermillion lake.

"Along the line of the Northern Pacific railroad and north and east of the Mille Lacs country are large swamps covered with tamarack timber of commercial value. Through this country are many marshy lakes containing floating islands, lands in process of formation by the accumulation of vegetation. The timber in this district is growing and increasing, and if fires can be kept out of the tamarack and cedar timber the small pine will grow rapidly."

"The timber which grew on the Saint Croix river in Minnesota was tributary to Stillwater, and has all been cut and manufactured there.

"The principal manufactories of pine on the Mississippi river are at Minneapolis.

"FORESTS ON INDIAN RESERVATIONS.

"Referring to the Red Lake Indian reservation in Minnesota, and other Indian reservations on which the pine remains uncut, amounting in the aggregate to 1,000,000,000 feet, it may be said that they are nearly all unsurveyed, and are generally covered with a heavy pine forest, and that the lands are unfit for agricultural purposes and only

valuable for the pine timber which grows upon them. These reservations should be held as long as possible by the government as a timber reserve. They should not be surveyed and subdivided except so far as may be necessary for their protection, and they should not be offered for sale until some necessity, now unforeseen, arises for their disposal. The 1,000,000,000 feet of pine should be held until the amount for which it can be sold is needed by the Indians, or until a price near its value can be obtained for it. By selling the land now the value of the timber cannot be realized, while the interest of the settlers who may hereafter enter upon the prairies would seem to demand that some reservation of pine should be made for them, if possible. The proposition to bring these lands into market, subject to pre-emption and homestead entry, is against the interest of every one except the few worthless tramps and irresponsible persons who may seek to enter and procure a title to these lands; and even if the land was so open to homestead and pre-emption entry, the aim and purpose of these laws could not be carried out, for no farms will be made nor homesteads improved in this Indian country.

"The White Earth Indian reservation is largely covered with hard wood, there being no pine upon more than a quarter of its area. The land is desirable for agricultural purposes, and may be utilized for the settlement of Indians, or under the homestead and pre-emption laws by whites, but the pine lands are unfit for cultivation, and the homesteading or pre-empting of them should not be allowed."

IOWA.

Iowa lies within the prairie region. The broad bottom lands along the river of the eastern part of the state once bore heavy forests of broad-leaved trees. Farther west the tree growth was less heavy in the narrower bottoms. All over the state, however, forests lined the streams and often spread, especially in the southwestern counties, over the uplands. Since the first settlement of the state the forest area has increased by the natural spread of trees over ground protected from fire, and by considerable plantations of cottonwood, maple, and other trees of rapid growth made by farmers to supply fuel and shelter.

The natural forests have been everywhere largely culled of their most valuable timber, and in spite of their increased acreage are, in their commercial aspect, in danger of speedy extermination. Manufacturers of cooperage stock and others using Iowa timber report great scarcity and general deterioration of stock.

During the census year 11,017 acres of woodland were reported destroyed by fire, with an estimated loss of \$45,470. These fires were largely the result of carelessness in clearing land.

Iowa is the ninth state in the importance of its lumber-manufacturing interests. It owes its position to numerous large mills situated along the Mississippi river entirely supplied with logs from the pineries of Wisconsin. The amount of Iowa-grown lumber manufactured is insignificant.

MISSOURI.

Southern and southwestern Missouri was originally covered with a dense forest of hard woods, through which in the southern counties extensive areas of the short-leaved pine (*Pinus mitis*), covering gravelly ridges and the low Ozark hills, were common. The northern and western limits of the true forest region may be defined by a line entering the state from the southwest, in the southern part of Jasper county, and passing northeasterly through Dade, Cedar, Saint Clair, Henry, Benton, Morgan, and Cooper counties, and then northward to the borders of the state. West of this line the timber is largely confined to the broad bottom lands, in belts often 2 or 3 miles in width. Farther west these become narrower and less heavily timbered. The extreme northwestern counties, Atchison and Nodaway, are almost destitute of timber.

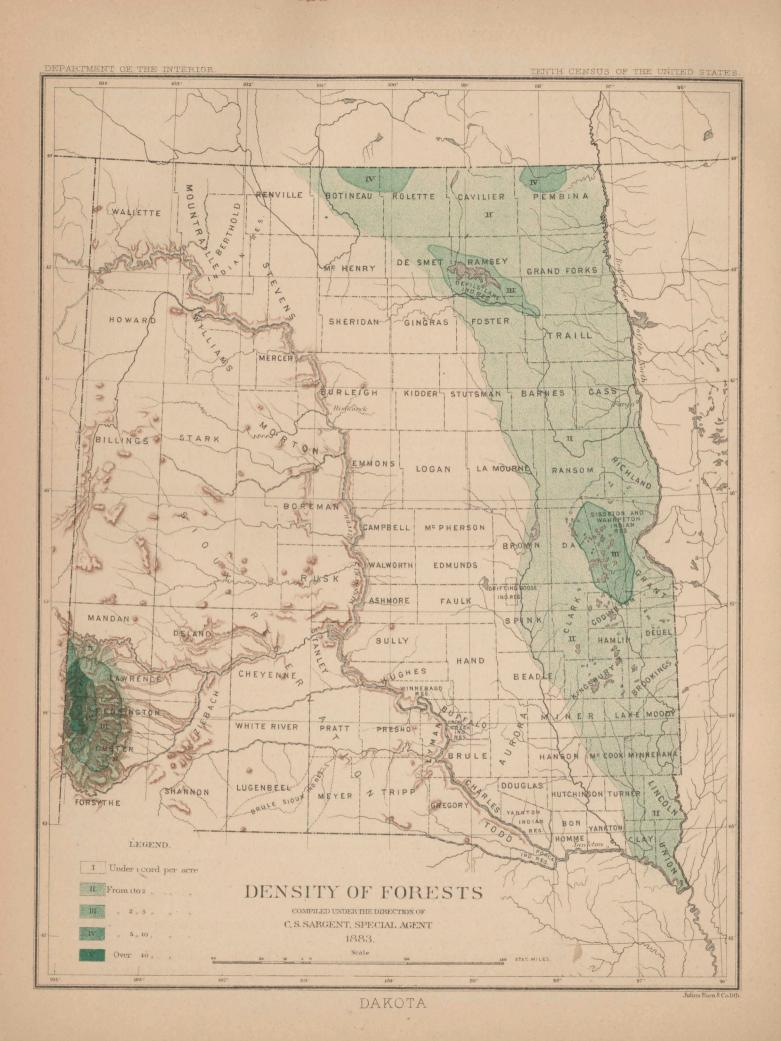
The forests of southeastern Missouri still contain great stores of valuable timber, although the best trees have been cut in the neighborhood of all settlements, and for a distance varying from 5 to 20 miles back from all lines of railroad. This is especially true of the best white oak and of black walnut, once common, but now almost exterminated in all parts of the state.

Manufacturers of cooperage stock report a growing scarcity of material everywhere, and are now forced to obtain oak from Arkansas and elm and basswood from the rivers of southern Illinois and Indiana. The further development, however, of the railroad system of southern Missouri will make available for manufacturing purposes a large amount of valuable timber now remote from transportation.

During the census year 783,646 acres of woodland were reported destroyed by fire, with an estimated loss of \$294,865. These fires were traced to careless hunters, to fires set in clearing farming land, to sparks from locomotives, etc.

A gratifying improvement in the condition of the forest in the parts of the state first settled has followed the enactment of a fence law preventing the general ranging of stock through the timber-land. A young growth has sprung up among the older trees and along the borders of woodlands protected from browsing animals, and these young forests are valuable in their prospective yield and as an indication of the methods which must be adopted to preserve and perpetuate the forests of the whole Atlantic region.





Missouri is the tenth state in the importance of its lumber-manufacturing interests. It owes its position in part to large mills located upon the Mississippi river manufacturing logs cut in the forests of Wisconsin. A much larger amount of lumber, however, in the aggregate, both pine and hard wood, is produced in numerous small railroad mills located along the line of the Iron Mountain and other railroads running through the southern part of the state.

Saint Louis is an important center of lumber distribution. It receives a large portion of the Wisconsin pine crop by raft, Michigan pine by rail, and southern pine and hard woods by rail and river.

DAKOTA.

Dakota, with the exception of its river lands and the small territory between the north and south forks of the Cheyenne river, is practically destitute of timber. The bottoms of the principal streams contain extensive groves of hard wood. As far west as the James river timber exists about the shores of the larger lakes, and upon the Low Turtle and Pembina mountains of the northern boundary, occasionally ascending the *côtes* or sides of low tables rising from the prairie. The Black hills, an extreme outpost of the Rocky Mountain system, were once heavily timbered. The yellow pine of the Pacific region is here mingled with the white spruce, the canoe birch, the burr oak, and the elm of the eastern forests, while poplars of the Atlantic and Pacific regions grow side by side.

Much timber has already been cut along the eastern rivers to supply the wants of a rapidly-increasing agricultural population, and the isolated pine forests of the Black hills, separated by hundreds of miles from any equally large or valuable body of building timber, have already suffered serious inroads. The best and most accessible pine has been cut and manufactured into lumber or consumed as fuel in the silver mines and stamping mills to which this region owes its population, and much timber has been allowed to perish in the fires which of late years have often swept through these forests.

The principal center of lumber manufacture is Deadwood, in the Black hills, where a comparatively large amount of pine is sawed. In the eastern counties a little oak and elm is manufactured, for the most part in small portable mills.

The following extracts are made from Mr. H. C. Putnam's report upon the eastern portions of the territory:

"Along the whole length of the Missouri river in Dakota there is a belt of hard-wood timber in the bottoms in bodies of from 100 to 500 acres in extent. This timber sometimes grows continuously, but more often there are open spaces between the groves. About three-fourths of the trees are burr oak, the remainder sycamore, cottonwood, green ash, box-elder, poplar, willow, etc. A similar forest growth lines the banks of the Red river north of Fort Abercrombie as far as Fort Pembina, near the international line. This strip of timber averages perhaps forty rods in width, and consists of the same varieties of trees that grow upon the Missouri river.

"In the Pembina mountains and west of Fort Pembina, on the Tongue and Pembina rivers, there are bodies of timber, generally of stunted growth, lying mostly along the streams or about the Pembina mountains in groves of from 160 to 3,000 acres in extent. This timber is situated principally in the two northern tiers of townships of Pembina county. It has no value except as fuel. The next body of timber in Dakota is in the neighborhood of Devil lake; it aggregates some 25,000 acres, distributed as follows: At Wood lake, some 20 miles north of Devil lake, there are 1,000 acres; on Graham's island, a promontory on the north shore of Devil lake, near the northwest end, are 2,500 acres of timber; east of this, on the north shore of the lake, are two groves of about 500 acres; at Rock island, which is really a promontory running into the lake, are 3,800 acres of timber; around the east and north shores, and around the whole southern shore of the lake, past Fort Totten to the extreme west end, are some 15,000 acres of forest adjacent to Devil lake; at Stump lake, a lake some 15 miles in diameter on the north side of Devil lake, there are 1,400 acres of timber; and commencing some 10 miles south of Fort Totten, and extending down along Cheyenne river into township 146, range 56, in Traill, Foster, and Grand Forks counties, are about 10,000 acres of timber. The valley here is only 1 or 2 miles in width, and the timber is generally distributed through it. Probably seven-eighths of all this Devil Lake timber is burr oak; the remainder is sycamore, green ash, etc. This timber in many places grows large, sometimes 30 or 40 feet to the first limb, and is valuable for fuel, for the construction of log houses, and for general use by settlers in the absence of other and better material.

"In the Turtle mountains, in Bottineau and Rolette counties, and extending into the British possessions, is quite a large tract of timber, principally oak of short, scrubby growth, and only valuable as fire-wood. A body of timber from 1 mile to 5 miles in width extends for 150 miles along the Mouse river, in the counties of Bottineau, McHenry, Stevens, and Renville. This timber is composed of burr oak, box-elder, sycamore, green ash, etc., and is suitable for fire-wood, house-building, and rough construction."

Mr. Robert Douglas, of Waukegan, Illinois, contributes the following remarks upon the forests of the Black Hills region, of which he made a critical examination:

"From Fort Meade the stage road runs about 2 miles along the base of the hills, and then follows up through heavy timber, gaining an altitude of over 1,500 feet above the fort when within 2 miles of Deadwood; thence down a 36 FOR

steep grade of about a mile until the valley is reached, and then up the valley by an easy grade to Deadwood. Five days' driving through the hills from the base of the foot hills to one of the highest peaks shows little variation in the species of forest trees. The yellow pine (Pinus ponderosa) is the only tree of much value in the hills, and composes nineteen twentieths of the forest, generally covering the hills from base to summit. The trees are larger and stand closer together than in Colorado, and grow here, too, more rapidly than farther south, as is shown by the width of the annual rings of growth and the shoots upon the standing trees. This is the only tree used for lumber at the saw-mills, and no other is used in the mines. The white spruce (Picea alba) grows principally near the watercourses, and here the largest trees of that species are to be found. It is scattered, however, through the pines even within 50 feet of the summit of Terry's peak. It is condemned by both saw-mill proprietors and miners as lacking strength and being very knotty, which cannot be doubted, as it retains its lower branches with wonderful tenacity, even when growing closely and in dense shade. These two species comprise all the Conifera in the Black hills, with the exception of a prostrate juniper and rare specimens of the red cedar. The burr oak is found in the valleys extending into the foot-hills and along the creeks for 40 or 50 miles into the plains. It is short, gnarly, and apparently of little value, although exceptional trees in the valley are of fair size. In the narrow valleys and along water-courses are found the common cottonwood, black willow, narrow-leaved cottonwood, green ash, white elm, box-elder, ironwood, canoe birch, and quaking aspen; in the hills canoe birch, mountain ash, hazel, choke cherry, and juneberry are found growing side by side with the snowberry and mahonia of the Pacific region. The little aspen and the canoe birch perform the same service the aspen does in Colorado, and cover the ground after the timber is burned off, thus making a shade in which the pine seedlings find protection from sun and wind, and finally repossess the hills. On the banks of the numerous creeks intersecting the 'bad lands' and plains from the Missouri river to the Black hills, box-elder, white elm, green ash, black willow, cottonwood, choke cherry, wild plum, and buffalo-berry occur, but the canoe birch is not found below the foot-hills, where it grows along the creeks 6 or 8 inches in diameter, or as a low shrub upon the hillsides.

"The region occupied by the Black Hills forests is 80 miles in length north and south, and about 30 miles wide from east to west. Forest fires are not so frequent nor so disastrous as in Colorado, although the 'big burning' of 1865, near Custer's peak, is estimated to have extended over 400 square miles. The yellow pine is largely reproducing itself over the whole of this area, the trees being now 3 or 4 feet high. As far as my observation went, this reproduction of the yellow pine over the old 'deadenings' is almost universal through the hills, although rarely or never seen in Colorado, and even in northern Wisconsin and the Michigan peninsula scarcely a single young pine has appeared in the whole burned district of 1871.

"The timber is disappearing rapidly in the vicinity of Deadwood, Lead City, Terryville, and Central."

NEBRASKA.

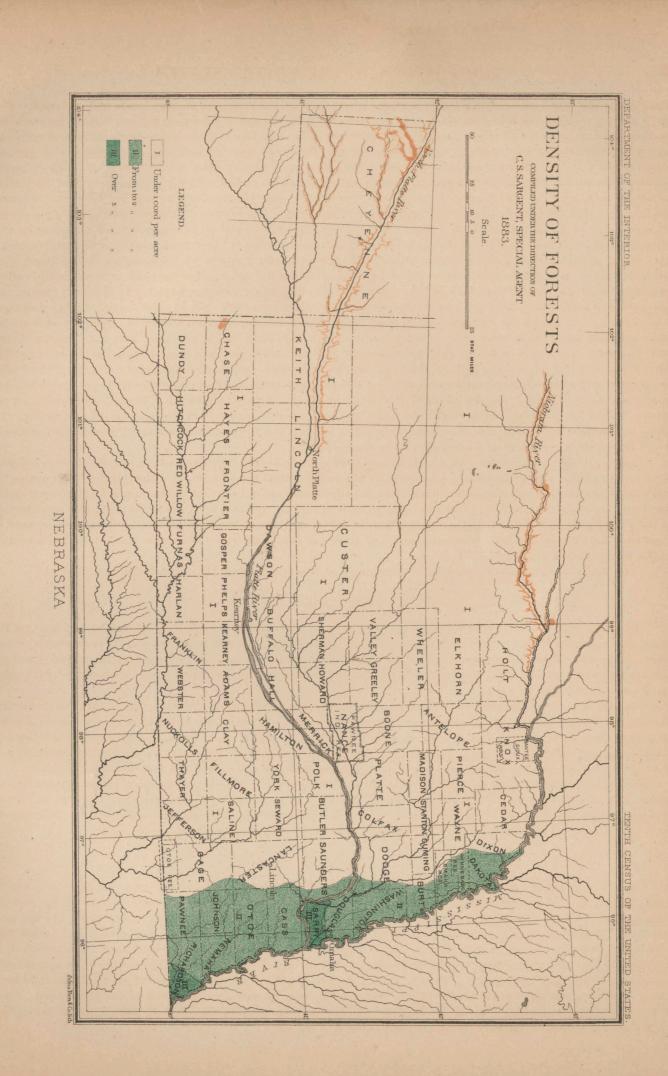
The forest growth of Nebraska was once confined to the eastern part of the state; the broad bottom lands of the Missouri and the lower Platte rivers contained groves of large oak, walnut, ash, and box-elder of considerable extent. These, under favorable conditions, spread to the bluffs and uplands. Westward the tree growth gradually became more scanty and stunted, until, west of the one hundredth meridian, only the large streams were lined with a few small cottonwoods and willows.

The best trees have already been culled from the scanty forest growth of the state, and if the area of natural woodland has somewhat increased along its eastern borders since the settlement of the country and the diminution of prairie fires, these forests are, in their commercial aspect, of little importance. Many small plantations of cottonwood and other trees of rapid growth have been made in connection with farms in the eastern countics, and these in some cases already furnish much-needed shelter to buildings and crops, and supply domestic fuel.

The lumber-manufacturing interests of Nebraska are not important. Mills at Omaha, the principal manufacturing center, saw cottonwood and a little walnut and oak, hauled to them from the neighborhood of the city, and small portable mills at other points along the Missouri saw a little cottonwood and such logs as the country tributary to them can furnish. The product of all the Nebraska mills is consumed in supplying the local demand.

KANSAS.

The heavy forest of the Mississippi basin just reaches the extreme southeastern corner of Kansas, covering nearly one-third of Cherokee county. North of this, and occupying the remaining eastern border of the state, a prairie region varying in width from 30 to 100 miles is still heavily wooded with valuable timber along the streams, the forest growth occasionally extending and covering areas of upland. West of this region of mixed prairie and woodland the timber is confined to the banks of streams. It is often, east of the ninety-seventh meridian, of considerable size and value, occurring in sufficient quantity to supply the most pressing wants of the agricultural population of this part of the state. West of the ninety-seventh meridian the tree growth gradually diminishes in vigor. Trees are here confined to the immediate banks of the large streams, and are small and of little value. West of the ninety-ninth meridian a few small stunted willows and cottonwoods, scattered at wide intervals along the large streams, represent the only forest growth of this arid region.

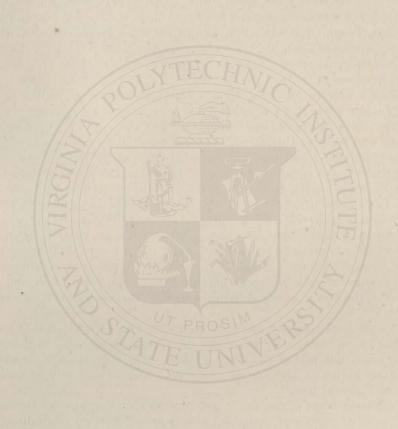




A large amount of lumber is manufactured in the eastern counties in proportion to the extent of their forest area; but much of the best timber of the state has been cut, and Kansas must soon depend, even more than at present, upon the forests of Arkansas and Louisiana for its lumber supply.

Considerable plantations made in the eastern and southeastern counties by railroads and in connection with farms promise abundant success. All attempts, however, to raise trees in the arid central and western parts of the state have resulted in failure.

During the census year 7,080 acres of woodland were reported destroyed by fire, with an estimated loss of \$14,700. The largest number of these fires originated upon the prairie.



WESTERN DIVISION.

MONTANA.

They are dense and important upon the slopes of the Cœur d'Alêne and other high ranges. Farther east, along the eastern slopes of the Rocky mountains and their outlying eastern ranges, the Big Belt, the Little Belt, the Crazy, the Snow, and the Bear mountains, and the ranges south of the Yellowstone river, the Yellowstone, Shoshonee, and Big Horn mountains, the forests are more open, stunted, and generally confined to the highest slopes, the borders of streams, or the sides of cañons. A narrow fringe of cottonwood, green ash, and willow lines the bottoms of the Missouri, Yellowstone, Tongue, Rosebud, Milk, and of the other large streams of the territory; and a few stunted pines and cedars are scattered along the river bluffs and the highest ridges of the Powder River, the Wolf, and other ranges in the southeastern part of the territory. The remainder of the territory, the eastern, northern, and southern portions, are destitute of timber.

The heavy forests of northwestern Montana, largely composed of red fir, yellow pine, and tamarack, and containing great bodies of white pine (Pinus monticola) and considerable valuable spruce (Picea Engelmanni and P. alba) constitute, with those covering the adjacent mountains of Idaho, one of the most important bodies of timber in the United States. East and west of this forest a treeless country, adapted to grazing and agriculture, and destined to support a large population which must obtain its building material and railroad supplies from it, extends over thousands of square miles. The development, too, of the important mining interests of southern Montana and Idaho is dependent upon these forests, their only valuable source of timber and fuel supply. These forests guard the headwaters of two of the great rivers of the continent, and in regulating their flow make possible through irrigation the devotion to profitable agriculture of a vast territory now an almost arid waste. The forests, largely composed of the lodge-pole pine (Pinus Murrayana), which cover the outlying eastern ranges of the Rocky mountains at an elevation of from 5,000 to 10,000 feet above the ocean level with a dense growth of slender trees or on poor soil and in exposed situations with an open, scattered forest, are, as sources of lumber supply, of comparatively little value. These forests, however, contain valuable supplies of fuel and abundant material for railway ties. They guard, too, the flow of numberless small streams, and their importance in this connection should not be overlooked.

The most important forests, commercially, of the territory are found along the valley of Clarke's Fork of the Columbia river, between the Horse Plains and the Idaho line; here the western white pine reaches its greatest development, becoming an important part of the forest growth. The valleys of the Saint Regis de Borgia and Missoula rivers contain great bodies of valuable fir and pine, which spread also in great luxuriance over the mountains east and south of Flathead lake.

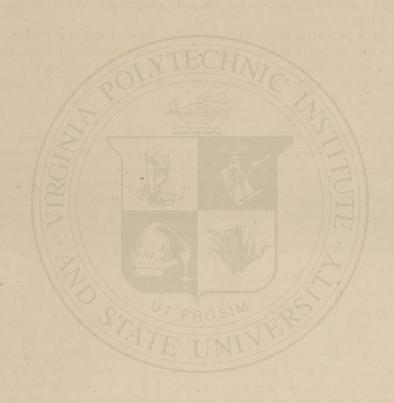
Fires destroy every year large areas of the forest covering the mountains of the western division. The long, dry summers and the character of the forest, composed as it is almost entirely of coniferous resinous trees, favor the spread of forest fires. They increase rapidly in number with the increase of population, and threaten the entire extermination of the forests of the whole interior Pacific region. During the census year 88,020 acres of forest were reported destroyed by fire, with a loss of \$1,128,000. These fires, few in number, were traced for the most part to careless hunters, prospectors, and smokers.

Little lumber is manufactured in the territory. Red fir and spruce are sawed at Missoula and in the neighborhood of nearly all the mining centers in the western part of the territory. The product of the Montana mills is entirely used to supply the local demand.

The following report upon the forests of the northern Rocky Mountain region was prepared by Mr. Sereno Watson, of Cambridge, a special agent of the Census Office, in the division of Forestry:

"The territory whose forest resources I attempted under your instructions to examine includes an area of about 150,000 square miles, extending from the one hundred and thirteenth meridian to the summit of the Cascade mountains and from the parallel of 44½° to the British boundary; or, according to political divisions, the western fifth of Montana, the northern two-fifths of Idaho, the eastern three-fifths of Washington territory, and the northeastern portion (or nearly one-half) of Oregon. It comprises a central treeless plateau of some 30,000 square miles in extent, the great 'plain of the Columbia', surrounded by more or less extensively timbered mountain systems. This tract is bounded on the east by the broad mountain range which separates Montana from Idaho, on





the north by the irregularly-broken country which lies north of the Spokane river and of that portion of the Columbia which has a westerly course in the same latitude, and on the west by the Cascade range, while on the south the circuit is less completely closed by the somewhat complicated system known as the Blue and Salmon River mountains.

"With the exception of a single county (Beaver Head) in Montana this entire region is drained by the Columbia river, since the Rocky Mountain divide, or the main central divide between the headwaters of the Columbia and of the Missouri, forms the boundary between Idaho and Montana only as far north as 45° 40′, when it turns abruptly eastward for 75 miles and then again northwestward to the British boundary in continuation of the line of the Wind River mountains of Wyoming.

"As will be seen from the detailed account which is to follow, the general character of the forest growth throughout this region is remarkably uniform, both in the kinds of trees found and in their manner of distribution. The trees of the most constant occurrence and that form the mass of the forests generally are, first, the red fir (Pseudotsuga Douglasii) and yellow pine (Pinus ponderosa), gradually giving place at higher altitudes to Picea Engelmanni and Abies subalpina or Pinus Murrayana; while of only somewhat less extended range, though sometimes more local in their distribution, are the larch (Larix occidentalis), cedar (Thuya gigantea), the white pine (Pinus monticola), the hemlocks (Tsuga Mertensiana and, less frequently, Tsuga Pattoniana), Abies grandis, and the balsam poplars. Abies amabilis only is confined to the Cascade mountains. No other species occur of sufficient size to be of importance as timber trees.

"In order to indicate more particularly the extent and distribution of the tree growth, the territories will be taken up in order by counties, and an estimate given of the area covered in each, though necessarily of the actual density of growth and amount of available timber (varying from square mile to square mile, and much of it never seen) no estimate can be given of such probably approximate accuracy as to be of any value whatever:

"MONTANA.

"Beaver Head county (4,230 square miles).—This county, nearly equally divided by the one hundred and thirteenth meridian, is surrounded on three sides, north, south, and west, by the Rocky mountains, and is divided into two portions by a lofty spur which sets off in a northeasterly direction from the middle of the western side. The valleys of Beaver Head river and Red Rock creek to the east and south of this spur are treeless, except that the latter stream is bordered with a considerable growth of *Populus angustifolia*, often 60 feet high and a foot or two in diameter. The region to the east is scantily supplied with timber of any kind, while the northern flanks of the Rocky Mountain range as far as the head of Horse Plains creek are only sparingly timbered on the ridges and in some of the cañons, the trees small and mainly red fir, with some *Pinus albicaulis*, the summits and exposed ridges wholly bare.

"The broad dividing spur, which includes Bald mountain and several other peaks from 10,000 to 11,000 feet high, is about 30 miles in length by 20 in breadth. The peaks are bare above 9,000 feet, and the western slopes have some timber in the upper ravines alone. The trees at 7,000 feet are mainly red fir, giving place above to a small growth of Pinus Murrayana and P. albicaulis. On the eastern side of the spur there are deep, densely-wooded valleys, the timber said to be chiefly red fir, Picea Engelmanni and Pinus Murrayana. On Rattlesnake creek in this region there is a single saw-mill, 12 miles from Bannock City, which supplies the town and neighboring mining camps with lumber. When a better quality is needed it is brought across the mountains from the Lemhi River district in Idaho by a road crossing the range at the head of Horse Plains creek. The fuel used in Bannock City is hauled some 12 or 15 miles, chiefly from the Rocky mountains. Beyond the head of Horse Plains creek (where the Bald Mountain spur commences) the range for about 40 miles changes in character greatly, becoming higher, broader, and more rocky, with rugged, snow-clad peaks from 10,000 to 12,000 feet high, and with high, rocky spurs to the east, separating densely-wooded valleys difficult of access and rarely visited. The forests here come down to the western edge of Big Hole valley, and are continuous. The trees are said to be largely Pinus Murrayana, but there is probably a considerable proportion of red fir, Pieca Engelmanni and Abies subalpina. The range now takes its turn to the east, forming the northern line of the county, and rises again into some high, snowy peaks, but is much less densely wooded. Where the pass crosses the range from the Big Hole valley to the Bitter Root, the prevalent tree is found to be Pinus Murrayana, mixed toward the summit of the divide (at 7,000 feet altitude) with some red fir and a small proportion of Picea Engelmanni and Pinus albicaulis. The trees are mostly young and small, evidently frequently overrun by fires, a dense new growth immediately in most cases replacing the old. The trunks very rarely reached a diameter of 15 or 20 inches. The timbered area of the county may be estimated at 1,000 square miles. No yellow pine was seen or heard of within its limits.

"Deer Lodge county (6,500 square miles).—This county, also nearly bisected by the one hundred and thirteenth meridian, is occupied by spurs of the Rocky mountains, which form its southern and eastern border, with the intervening open valleys of Deer Lodge river, Flint creek, and Big Blackfoot river. These spurs are to a large extent wholly bare of trees, only some of the ravines and ridges being covered by a more or less scattered growth of yellow pine and red fir of moderate size, and the higher northern slopes by a denser growth of Pinus Murrayana. North of the Big Blackfoot the timber is more dense, coming down into the valley, and consisting principally of

yellow pine, with some red fir and larch, and at the higher elevations (above 5,000 feet) of red fir, larch, and scrub pine. In the higher cañons of the main range to the south it is probable that Abies subalpina and Picea Engelmanni also occur, as I heard of a soft tamarack found at Gwendale, which appeared from the description to be the latter species. Total timbered area of the county is estimated at 2,250 square miles.

"MISSOULA COUNTY (21,000 square miles).—The Bitter Root mountains, which separate this county from Idaho, are a direct continuation of the Rocky mountains north from the point of divergence of that range in latitude 45° 40′. While broadening out until they cover a base of 100 miles or more, they rarely reach a height of 8,000 feet. There is nothing alpine in the character of their higher vegetation, nor do they anywhere rise above the limit of forest growth. The summits are not often very rugged, and though the slopes may be steep they are not generally greatly broken. For the most part they are well wooded upon both sides, with no meadows along the streams and little grass anywhere until the foot-hills are reached. Upon the Montana side it is from 20 to 40 miles from the base to the summit of the divides, and the Bitter Root valley, which skirts their feet for 60 miles, separates them from the low and comparatively bare spurs of the Rocky mountains on the east.

"Upon crossing the main divide upon the southern border, between the Big Hole and the Bitter Root valleys, at an altitude of 7,000 feet, the yellow pine immediately appears, of large size, and with its usual massive habit, and is henceforth the most conspicuous forest tree along the usual routes of travel, coming farther down into the valleys than any other tree, and more frequently attaining a large size, probably from its less liability to serious injury from fires. The descent from this southern divide to the Bitter Root valley is well wooded with large trees of the yellow pine and red fir (with at first some small Pinus Murrayana), which continue to be the only trees seen bordering the valley. These mountains were crossed by me on the Lolo trail up the Lolo creek, and by the Mullan road, which follows the Saint Regis de Borgia river. In the lower cañons only yellow pine and red fir are found, of the usual scattered growth—the trees rarely much over 2 feet in diameter—with larch and Abies subalpina coming down the side gulches, and white pine in the middle cañon. The yellow pine gradually gives place to Picea Engelmanni, Abies subalpina, and A. grandis, though none of these reach the size which they attain on the Idaho side of the range. The large timber is mostly confined to the neighborhood of the streams, where the larch and white pine sometimes reach a diameter of 3 or 4 feet, but it becomes much smaller upon the ridges, and in the upper cañons rarely is more than a foot or 18 inches through, while the mountain slopes are usually much burned over and covered with fallen timber, largely of Pinus Murrayana. The largest and most abundant tree in the upper cañons is probably the Picea Engelmanni. Small trees of the Thuya gigantea are also occasional, but nowhere in northern Montana does it become large enough to be of importance. The Thuya and Abies grandis extend as far south as the Nez Percé creek. I think that no hemlocks were seen on the Montana side of the range, but they

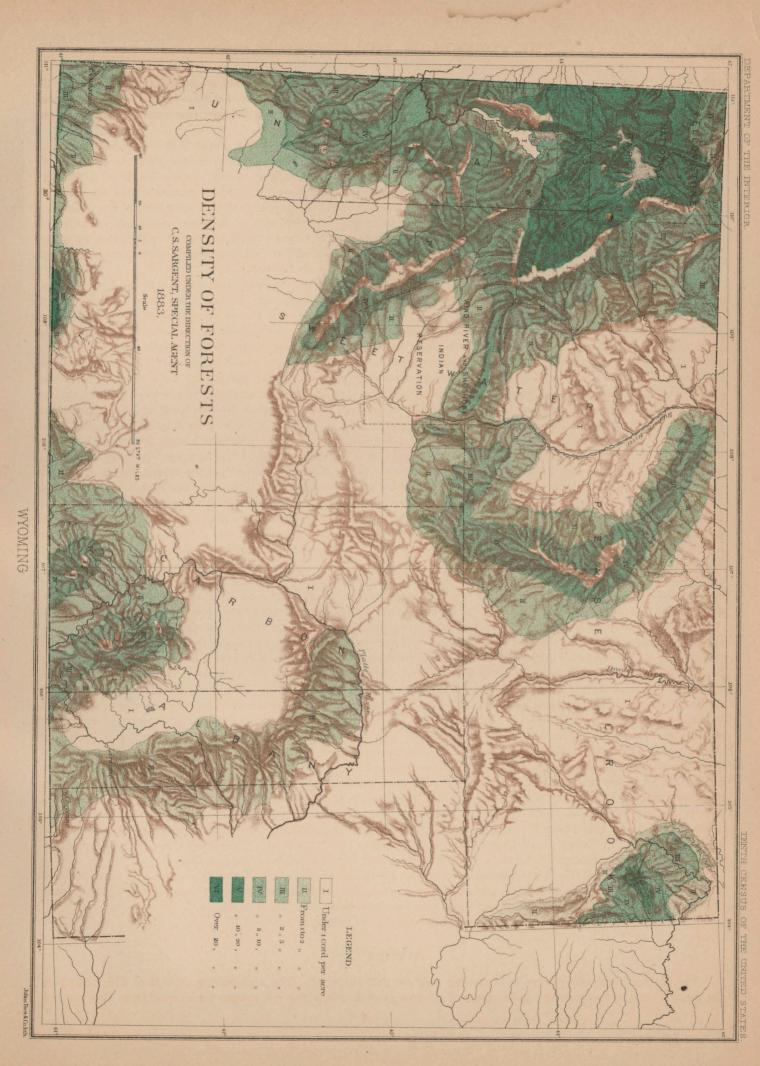
"North of the Mullan road to Clarke's Fork the eastern slopes of the range continue well wooded. On the eastern side of the county the low spur of the Rocky mountains lying to the east of Bitter Root valley is to a large extent bare, but has some young yellow pine (known as 'scrub pine' or 'black jack pine') and Pinus Murrayana. Approaching Hellgate river the timber becomes more prevalent in the ravines; and in the government timber reservation near Missoula, where there is a saw-mill run for government purposes, the timber was found to be yellow pine and red fir (not large) and considerable larch—fine trees 2 feet in diameter or more and 100 feet high. In Granite canon, in the mountains north of Missoula, where there is also a saw-mill, the lower canon was occupied by yellow pine and larch, with some red fir rarely over a foot through, and in the upper cañon Abies subalpina and Picea Engelmanni a foot in diameter. On the mountain sides above the cañon the timber is, as usual, small and worthless for lumber. In the eastern portion of the Flathead Indian reservation a very high and rugged range of mountains extends nearly as far north as the head of Flathead lake, and parallel with the main Rocky Mountain range, which here enters the county and continues across the northern boundary. Both of these ranges are throughout densely wooded, though on the eastern side of the Rocky mountains the timber wholly ceases a few miles (8 or 10) below the summit, giving place to the open grazing region of the upper Missouri. On crossing over the lower end of the western range, from the Big Blackfoot to the Jocko river, the timber was found to be at first almost entirely yellow pine, with red fir and larch in the gulches, the yellow pine ceasing toward the divide (at 5,000 feet altitude) and Pinus Murrayana taking its place, but reappearing on the northern side, with occasional Picea Engelmanni and even small Thuya gigantea. No white pine was seen. The same trees probably continue northward to the boundary (the larch is reported from about 30 miles south of the boundary).

"The remainder of the county, lying west of the Flathead River valley, is wholly occupied by mountains, of less altitude, but, so far as is known, generally densely wooded, with the exception of some of the spurs toward the Flathead river and Clarke's Fork and some small prairies bordering the streams.

"The total timbered area of the county is estimated at 17,000 square miles."

WYOMING.

The highest mountain ranges in Wyoming only are well timbered. The high rolling table-land which occupies the central part of the territory is destitute of all tree growth, while the low ranges which rise from this plateau







and border it on the south are either treeless or only support a few stunted yellow pines or firs widely scattered or forming small, isolated patches of open forest upon the highest slopes of the most sheltered ravines. The most important forests of the territory are those in the northeastern corner covering the western extension of the Black hills of Dakota, those upon the foot-hills and slopes of the cañons of the Big Horn mountains, and the dense forests of small lodge-pole pine (*Pinus Murrayana*) which occupy all the northwestern portion of the territory studded by the system of mountains surrounding the Yellowstone park.

The most valuable timber of the Big Horn mountains consists of yellow pine (*Pinus ponderosa*), attaining on the foot-hills sufficient size to furnish saw-logs. Probably one-third of this timber on the east side of the mountains has already been cut to supply mills located upon the streams from Crazy Woman creek to Tongue river. The table-land on both sides of the range between the crests of the foot-hills and the base of the Snow range is covered with a belt, from 8 to 10 miles in width, of small white fir (*Abies subalpina*). The trees are small, rarely exceeding 8 or 10 inches in diameter. They afford, however, useful material for fuel and fence and telegraph poles. This forest has suffered seriously from wind storms and fire. A heavy growth of cottonwood, with which is mingled a little green ash, occupies the banks of all the streams of the Big Horn region, with the exception of No-Wood creek, flowing from the western flank.

The forests of the Yellowstone region, composed for the most part of small lodge-pole pine, are confined to the mountain slopes and high valleys, at an elevation of between 5,000 and 10,000 feet. These forests are capable of supplying great quantities of fuel and fencing material. They contain, however, little timber suitable to manufacture into lumber.

The forests of all this arid central region suffer seriously from fire. These increase with the settlement of the country and inflict great damage upon the forest. In northwestern Wyoming, however, the forests of lodge-pole pine (Pinus Murrayana) destroyed by fire reproduce themselves, and the area occupied by this species in all the Rocky Mountain region is increasing. This is due no doubt to the fact that fire does not destroy the seeds of this species, protected in the cones, which remain closed upon the trees for years. The heat of the fire causes the cones to open and shed their seeds upon the burned surface of the soil, where they germinate quickly and freely.

During the census year 83,780 acres of woodland were reported destroyed by fire, with an estimated loss of \$3,255,000. These fires were set by Indians, trappers, and prospectors.

A little lumber, in addition to that manufactured in the Big Horn region, of which no returns have been received, is sawed in the Medicine Bow and other ranges in the southern part of the territory. A large amount of fire-wood and many railroad ties are cut in the southern mountains and delivered by chutes along the line of the Union Pacific railroad.

COLORADO.

The forests of Colorado are confined to the mountain ranges and high valleys which cover the western half of the state; the elevated, rolling plateau which extends from the eastern base of the mountains to the eastern boundary of the state is entirely destitute of tree growth, with the exception of an occasional stunted willow or cottonwood found in the bottom lands of the large streams. The important forests of the state cover the mountain slopes between 10,000 and 12,500 feet elevation, and are almost exclusively composed of spruce (Picea Engelmanni), with which are mingled different alpine pines of little economic value. Below the spruce belt a more open forest of red fir and yellow pine, occupying ravines or scattered over the ridges, extends down to the foot-hills. These are covered with an open growth in which the nut pine and the western juniper are the prevailing trees, while the borders of streams and bottoms of the cañons are occupied by cottonwoods, willows, cherries, oaks, and other deciduous trees and shrubs of little economic importance. Large areas upon the sides of the high Colorado mountains are exclusively covered with a dense growth of the quaking aspen. This tree very generally takes possession here of ground from which the coniferous forest has been removed by fire, and, as the number of forest fires is rapidly increasing in Colorado, it seems destined to become the only widely-distributed forest tree of this region. The high valleys, or "parks" as they are here locally called, when timbered at all, are covered with a dense forest growth in which the lodge pole pine (Pinus Murrayana), also common at high elevations in the spruce forests, is the prevailing and often the only species, disputing with the aspen the possession of the burned soil. The high plateau of southwestern Colorado is either treeless or is thinly covered with an open growth of small, stunted junipers.

The increase in the number of forest fires raging in the mountains of Colorado is alarming in a region where the forest once destroyed cannot easily reproduce itself, and upon mountains where forest covering is necessary to preserve the integrity of the channels and the constant flow of numerous important streams essential to the irrigation of wide areas of arid territory.

During the census year 113,820 acres of forest were reported destroyed by fire, with an estimated loss of \$935,500. These fires were set by careless hunters, miners, and prospectors, and by Indians or whites through malice.

The forests of the Colorado foot-hills afford abundant fuel and fencing material to supply the wants of the present population of this part of the state. Coarse lumber, suitable for the timbering of mines and railroad

construction, is manufactured from the fir and pines of the lower mountain slopes, which have also furnished immense quantities of fuel and railway ties. The timber, however, of this forest most accessible to mining centers and the lines of railroads has already been destroyed, while its productive capacity is everywhere impaired by wasteful methods of lumbering and destructive conflagrations. The elevated spruce forests, which contain the only great bodies of heavy timber found in the central Rocky Mountain region, have thus far, on account of the difficulties of operating in them, escaped all serious inroads from the ax of the lumberman. Small portable mills, however, have been established in these forests to supply the wants of some of the most elevated mining centers, and fires every year reduce their extent and value.

Colorado is principally supplied with lumber from Chicago; a small amount is manufactured, however, in the state, mostly upon the waters of the South Fork of the Platte river, in Jefferson county, and in the extensive pineries which cover the divide between the waters of the South Platte and the Arkansas rivers. A little lumber is also manufactured in small portable mills in nearly every county.

NEW MEXICO.

The forests of New Mexico are confined to the slopes and cañons of the high mountain ranges. The elevated plateau which occupies the whole of the eastern part of the territory is treeless, with the exception of occasional willows and cottonwoods bordering the large streams, while the high mesas of the southwest and west are sometimes dotted with an open growth of dwarf junipers and nut pines of considerable local importance as a source of fuel and fencing supply. The high mountain ranges extending southward into the northern part of the territory are covered with forests very similar in composition, density, and distribution to those covering the mountains of Colorado. Engelmann's spruce is here the important timber tree at high elevations; lower, open forests of red fir and yellow pine occupy the sides of cañons and the lower mountain slopes, and the nut pine and juniper cover the foot hills with an open, scattered growth. The detached mountain ranges which spring from the central plateau of the territory are less heavily timbered than the higher mountains north and south. The yellow pine is here the most common and important tree, mingled in sheltered cañons and at highest elevations with occasional red firs.

The most important forests of the territory cover the high group of mountain ranges west of the Rio Grande and south of the thirty-fourth degree of latitude—the San Francisco, the Tulerosa, Sierra Blanca, Sierra Diablo, Mogollon, Pinos Altos, and Mimbres. The foot-hills and lower slopes of these mountains, between 5,000 and 7,000 feet elevation, are covered with a heavy growth of junipers, nut pines, and different evergreen oaks. The banks of streams are here lined with immense cottonwoods, sycamores, cherries, ashes, and hackberries, while the arroyos or depressions in the mesas contain fine groves of mesquit. Above an elevation of 7,000 feet the yellow pine appears; and mingled with it on north slopes the red fir and white pine (Pinus reflexa); the elevated valleys contain fine groves of cottonwood, box-elder, alder, and small oaks, while the most inaccessible slopes of some of the highest ranges are covered with forests of cypress (Cupressus Guadalupensis).

The coniferous forests of these mountains are dense and valuable, and, although not yet accessible for lumbering operations except at a few points, they seem destined to become an important factor in the future development of the whole region. They can, if properly protected, supply with lumber indefinitely a larger population than will probably occupy this part of the United States.

The deciduous trees of this entire southwestern region, often of considerable size, are generally hollow, especially the oaks; they are of little value for any mechanical purpose, although affording abundant and excellent fuel.

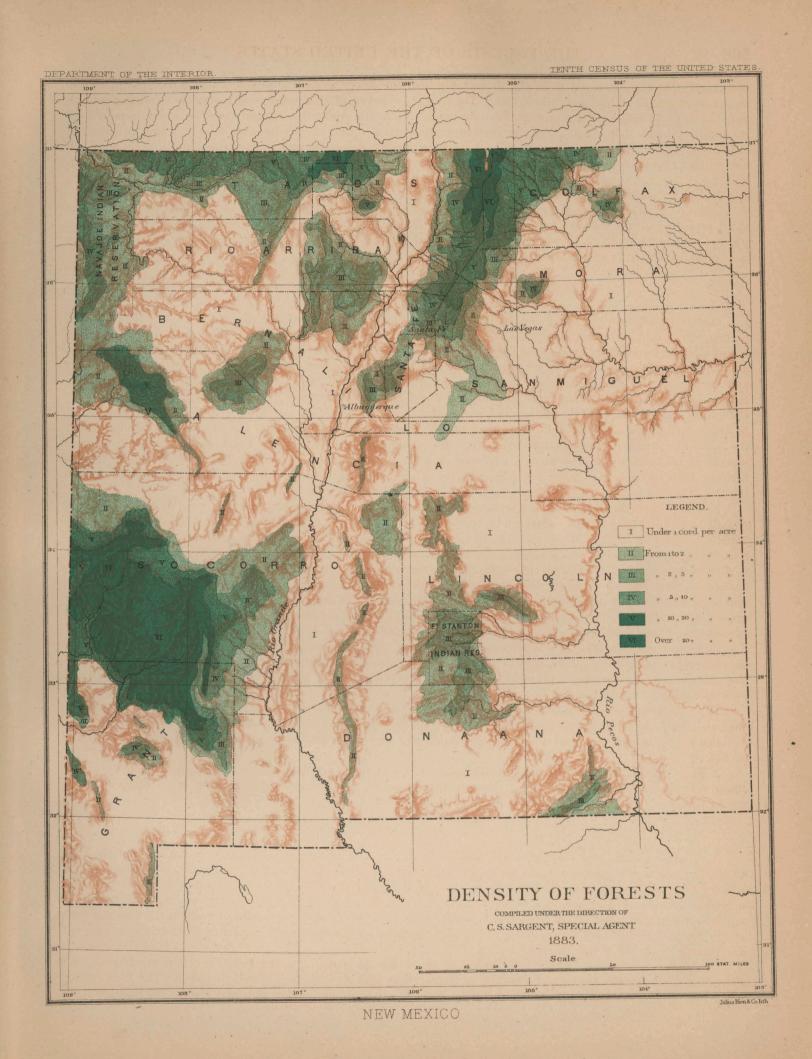
During the census year 64,034 acres of woodland only were reported destroyed by fire, with an estimated loss of \$142,075.

A small amount of coarse lumber, principally yellow pine, is manufactured in the territory, mostly in the counties of San Miguel and Santa Fé. New Mexico, however, like Colorado, obtains most of its lumber by rail from Chicago.

ARIZONA.

Northern, western, and southwestern Arizona are destitute of true forests. Ravines in the *mesas* of the high Colorado plateau of northern Arizona are occasionally covered, however, with stunted junipers. Cottonwoods and willows line the banks of the Colorado river, and the ironwood, the palo verde, the mesquit, the suwarrow, and other Mexican forms of arborescent vegetation are found in the valley of the Gila and the deserts of the southern part of the territory; individual trees are, however, widely scattered, nowhere forming forests in the true meaning of the word. The low lava ridges and arid lake beds with which the southwestern part of the territory is covered are entirely destitute of tree growth.

The mountain system culminating south of the Colorado plateau in the San Francisco mountains, and extending southeasterly through the middle of the territory into New Mexico, is well timbered. The high ranges which spring from this central elevated plateau bear heavy forests of yellow pine and red fir, the plateau itself







I883. Scale of Stat Miles being covered, over thousands of square miles, with an open growth of yellow pine of considerable size. The streams and bottoms of the high mountains are lined with deciduous trees, of which the cottonwood, the cherry, the ash, the alder, and the walnut are the largest and most important. The group of short, detached mountain ranges which occupies with a general north and south trend the southeastern part of the territory is covered with a rich and varied forest growth. The highest slopes are covered with forests of pine, in which, in the Santa Catalina range at least, great bodies of splendid cypress (Cupressus Guadalupensis) are found; a little lower the red fir and white pine (Pinus reflexa), different oaks and junipers with a madroña, are scattered over the dry, gravelly slopes and ridges between 5,000 and 7,000 feet elevation. These in turn are replaced below 5,000 feet with an open growth of small evergreen oaks. The bottoms of the cañons and the borders of the streams between 4,000 and 8,000 feet elevation are lined in these mountains with hackberry, sycamore, cottonwood, willows, cherries, and ashes. The arroyos in the mesas are often covered, as in southern New Mexico, with noble groves of mesquit, or in drier situations support a stunted growth of acacias, yuccas, cacti, and other desert plants.

The yellow pine is the only tree of Arizona of great importance as a source of lumber supply. Oaks and other hard-wood trees are invariably defective and of little value except for fuel. The red fir, white pine, and cypress occur only at high elevations, and are generally too scattered and too difficult of access to make their manufacture into lumber practicable for the present at least.

The pine forests of central Arizona and southwestern New Mexico are of great importance to the development of the treeless regions which surround them. No other body of timber of any extent or value exists near the southern boundary of the United States between the pine belt of eastern Texas and the forests of the California mountains. These southern interior forests have nowhere yet greatly suffered. Their inaccessibility has protected them. Railroads, however, now either penetrate this forest region, or will soon do so, and these, with the rapid development of the mining industry now going on in the southwest, threaten these forests with the dangers which are fast exterminating those of Colorado and Utah.

During the census year 10,240 acres of woodland were destroyed by fire, with an estimated loss of \$56,000. These fires were set by careless hunters, prospectors, and Indians.

Pine lumber is sawed in Pima and Pinal counties, principally upon the Santa Catalina, Santa Rita, and Huachuca mountains, to supply important mining centers in this part of the territory. It is also manufactured in small quantities in portable mills near Indian reservations and other centers of population throughout the forest region. Returns from 13 mills only, situated in Pima, Pinal, Apache, and Yavapai counties, have been received. Southern Arizona is now, in spite of its fine forests of pine, almost entirely supplied by rail with lumber manufactured in California.

UTAH.

The Uintah range, occupying with an east and west trend the whole of the northeastern part of the territory, the Wahsatch mountains and their southern extension, the San Pitch and the Sanpete ranges, extending north and south nearly through the center of the territory, and the mountains which bound on the east the great Colorado plateau, bear at high elevations fir, spruce, and pine forests of considerable extent. The foot-hills of these mountains and their high valleys are dotted with an open growth of nut pine, juniper, and mountain mahogany (Cercocarpus). The high Colorado plateau and the arid deserts of western and southern Utah are treeless, with the exception of a few stunted junipers and nut pines which struggle for existence upon some of the low mountain ranges, and of willows and cottonwoods which line the banks of the infrequent and scanty streams.

· The western flank of the Wahsatch mountains north of the fortieth degree of latitude has already been almost denuded of its best timber to supply the wants of the agricultural and mining settlements of the Salt Lake region, and the scanty forests of the territory have everywhere suffered serious loss from fire and wasteful methods of cutting timber and railway ties and of manufacturing charcoal.

During the census year 42,865 acres of woodland were reported destroyed by fire, with an estimated loss of \$1,042,800. These fires were set by Indians, wood-cutters, careless hunters, and prospectors.

Small quantities of lumber—pine, cottonwood, and a little spruce—are manufactured through the Wahsatch region, the principal centers of manufacture being Beaver City and Cedar City, in the south, the neighborhood of Salt Lake City, and Cache county in the extreme northern part of the territory. Utah is, however, almost entirely supplied with lumber from the eastern slopes of the California sierras and from Chicago. Small tanneries in Salt Lake City obtain a supply of red fir and spruce bark from the neighboring mountains.

The following notes upon Utah forests, made during the prosecution of a special investigation into the meatproducing capacity of the territory, have been supplied by Mr. E. C. Hall, a special agent of the Census, in the division of "Meat Production in the Grazing States and Territories":

"The timber of the Wahsatch mountains, in Cache, Rich, Morgan, and Weber counties of Utah, hardly suffices for the wants of the settlers. The trees from which lumber is obtained are cedar and a variety of white pine (*Pinus flexilis*). Some fir (*Pseudotsuga Douglasii*) is found, but it is not common north of the latitude of Salt Lake City. This tree likewise furnishes an inferior kind of lumber. In general, in Utah, north of latitude 40°, the west

base of the Wahsatch mountains has been stripped of the available timber, so that in the accessible cañons, especially in the neighborhood of settlements, it is laborious and expensive obtaining posts and poles for fencing, to say nothing of smooth planks, etc., for building. Cottonwood and occasionally box-elder are found fringing the river bottoms of the sections described.

"The Oquirrh mountains, on the east of Tooele county, and the Onaqui mountains, 30 miles west, contain cedar and considerable red fir, the latter a tree which I am told is not frequent in the Wahsatch range. The mining camps of Salt Lake and Tooele counties have largely depleted the timber areas of these mountains. More timber is standing on the Onaqui hills than on the Oquirrh range. From the vicinity of the latter to Cottonwood and Bingham Cañon mining districts the dearth of good fencing material is very noticeable throughout Box Elder, Cache, Rich, Weber, Morgan, and Salt Lake counties. Willow withes, stone walls, cottonwood poles, and sod walls flanked by ditches are among the devices for barriers against stock incursion, all pointing to the lack and costliness of lumber.

"LAKE RANGE, WEST OF UTAH LAKE.—This range of low mountains contains scattered black balsam and red fir. In winter this range is visited from the settlements of Utah valley, and the trees felled and sledded across the lake on the ice, to be used by the railroad and by farmers. No piñon pine was found in the Oquirrh or Onaqui mountains.

"The San Pitch mountains, in latitude 39° 30′, longitude 111° 52′, contain sparse timber—a so-called white pine (*Pinus flexilis*), scrubby cedar, and some other evergreen trees—at a high elevation and unavailable as lumber. No good clear planking suitable for building is obtained from these cuts.

"The low ranges west of Juab valley and flanking Dog valley, Dry valley, and Ferner valley, in latitude 39° 30′, longitude 112°, contain straggling cedar and some red fir difficult of access. The timber of the whole region north of latitude 39° and west of the main Wahsatch mountains is meager and inadequate for the purposes of the Mormon settlers.

"Fencing about Salt Lake City is of poor construction and costs \$200 per mile of pine poles and cedar posts. I saw some posts of white balsam (Abies concolor) 50 feet long, obtained from the cañons of the San Pitch range, used for fencing. At Springville, in Utah valley, posts of cedar were pointed out which were in good condition after fourteen years standing. Were it not for the existence of the 'no-fence' law, which enables a farmer to cultivate unfenced ground and claim damages from incursions of stock, the Utah farmer would be very badly off, not having means to purchase fencing material in a country so ill supplied with timber. The cedar which abounds here affords a lasting supply of fire-wood and posts, but for poles or plank the region depends largely upon imported lumber, especially for building plank, joists, etc.

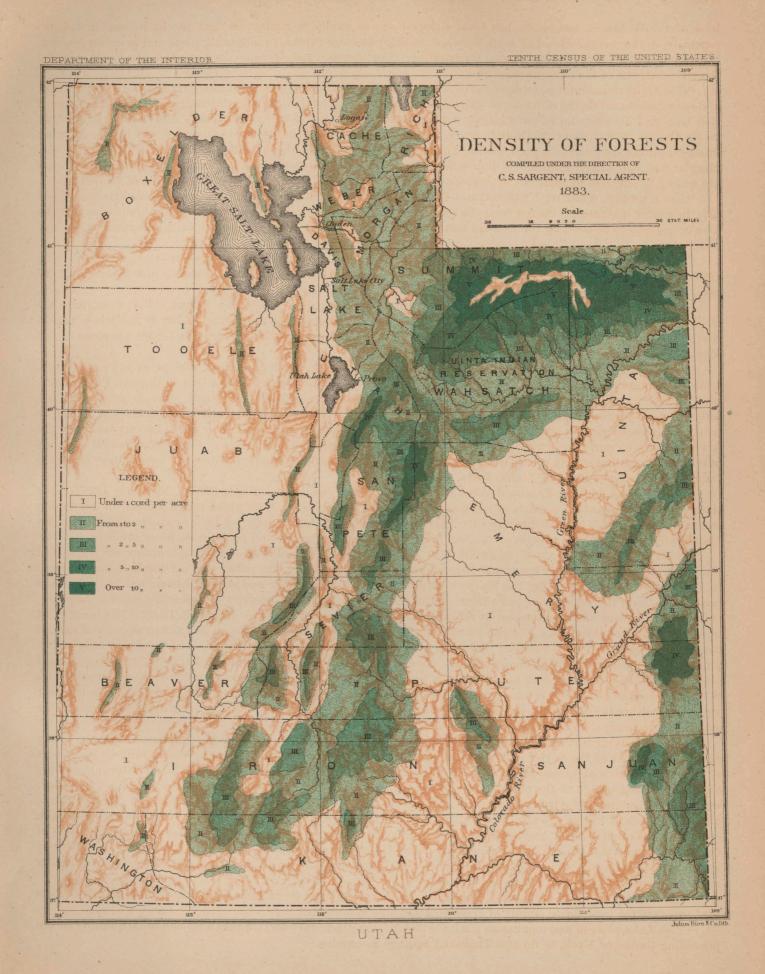
"Upon ranges flanking East and West Tintic valleys, Juab county, in latitude 39° 50′, longitude 112° 30′, the timber is not abundant; it consists of red fir and black and white balsam, from which rough lumber for the mining camps of Mammoth, Tintic, and Silver City has been extensively taken. Cedar of the usual dwarfed kind grows abundantly along the upper slopes of the foot-hills, and is used for braces and posts in shafts of mines.

"Sanpete Valley Range (longitude 111° 30′, latitude 39° 20′).—The Wahsatch mountains, on the east of Sanpete valley, carry on their spurs and through the deep canons facing the valley some of the best timber found in Utah. It is largely used by the Sanpete settlers. Yellow pine, black and white balsam, red fir, cedar, and poplar constitute the varieties of trees found. The yellow pine, less abundant now in accessible canons, furnishes, it is claimed, a clear and firm lumber, fit for building, and not surpassed by any variety in Utah. The range west of the Sanpete mountains—i.e., the San Pitch mountains before spoken of—carries on its eastern slopes and canons considerable balsam of both varieties and some red fir and poplar about the headwaters of creeks. Little yellow pine is found on the San Pitch range; at least, none is taken out at present, although I was told considerable had already been lumbered from such canons as were penetrable. Fencing of cedar posts and poplar and balsam poles is largely used in the valley; cedar posts and pine plank are also used in fencing meadows and fields. In no other valley of Utah are the Mormons so well supplied, apparently, with fair lumber of native growth. Except for furniture and house trimmings, no imported wood is used here.

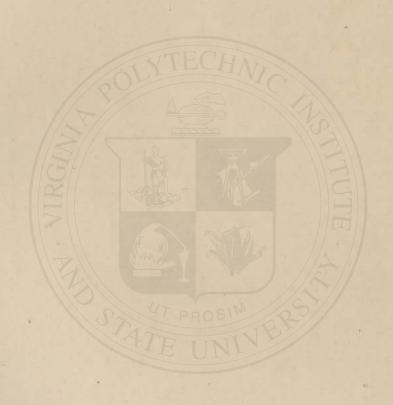
"Sevier River mountains (latitude 38° 30′ to 39° 10′, longitude 112°).—The Tushar mountains and the Valley range, on the west of the Sevier valley, are supplied with meager timber, especially the Valley range. In no part of Utah have I noticed so few and so limited areas inclosed. Timber is said to exist in inaccessible places only on the Wahsatch range to the east of the valley. This is true in regard to the ranges west of the Sevier valley, where the character of the tree growth is inferior to even the average poor quality of Utah forests. Black balsam, white balsam and red fir grow in both ranges, but are approached with great difficulty. The indigenous scrub cedar prevails often in thick groves along the foot-hills, especially on the Valley and Tushar ranges to the west of the valley. Several saw-mills at the mouths of cañon streams on the East Wahsatch range have for several years worked up all the available lumber, but the prices asked for lumber—from \$35 to \$45 per 1,000 feet—place fencing material beyond the reach of the Sevier farmer.

"All the way up the Sevier valley, and along its south and east forks, fencing is limited and lumber high, a sure proof of the inadequate supply of trees on accessible mountains.

"Fish Lake plateau and mountains (latitude 38° 33', longitude 111° 50') contain a considerable quantity of the prevailing timber of Utah, as do also Thousand Springs mountains.









"The Aquarius plateau is said by Sevier Valley stockmen to be abundantly timbered with pine, balsam, and spruce, but Boulder valley (latitude 37° 55′, longitude 110° 30′) was destitute of standing timber, save cedar and poplar on its foot-hill fringe. The country was visited by fires, the Mormons told me, in 1872–773, which destroyed large areas of the forests in the region southeast of the Grass Valley country. The whole section of Utah lying east of the Sevier valley to the Rio Colorado is better timbered, but from its rough and impenetrable location the timber is of no avail to most of the settlers, but only to such as penetrate the high valleys of Grass, Boulder, Potato, etc., lying adjacent to the timber. Fencing on Grass and Rabbit valleys, western Pinto county, is cheaper than in Sevier valley, but farmers and stockmen are so poor that they are forced to avail themselves of the no-fence law when breaking ground for crops.

"In the Paria River region fencing is very limited and lumber expensive, as timber is hard to get out of the mountain canons.

"In the Kanab River region fencing at the settlements of Upper Kanab and Lower Kanab, Kane county, is said to be expensive, as material is difficult to obtain, the canons leading to the valley affording a meager supply of cedar and black and white balsam, while some red fir and yellow pine is said to grow on the Sevier plateau (latitude 37° 30'); this, however, seldom reaches a market in the settlements, owing to the isolated situation of these forests.

"Considerable scrub oak is found on the slopes of the Oquirrh and Onaqui mountains, above referred to, in Tooele county, and many cedar thickets of considerable extent. In Tooele valley some fencing with cedar and panels of balsam occurs. Rush valley contains some bull fences of trunks of cedar, costing \$1 25 per rod, showing the cost of even poor material.

"It will be observed that outside of the Wahsatch mountains no building timber of value has been noted in Utah. The supply in this range has been largely consumed from the easily-approached canons and slopes.

"In summing up my observations, which were made wholly with a view of investigating the fencing of pasture areas and cost of same, it may be stated that Utah seemed very generally lacking in serviceable material for fencing or building. The country settled for thirty years has drawn upon the near supply of standing timber, so that now lumber is obtained by great exertion and expense in most of the valley settlements. The labor and cost of fencing caused Brigham Young to enact the no-fence law, which enabled the destitute settlers to break ground, irrigate, and raise grain without the provision of any barrier against stock inroads, the cattleman being held responsible for the damages of his herd. This law in itself is a commentary on the scarcity of timber in Utah."

NEVADA.

The tree growth of Nevada, except in a portion of Douglas county, in the extreme western part of the state, which the forests of the California sierras just reach, is confined to the low ridges of the central and southern part of the state. The most important of these—the Humboldt, Toiyabe, Monitor Creek, Timpinte, Hot Creek, Kawich, and probably others—bear near their summits, in sheltered ravines, scattered patches of stunted white pine (*Pinus flexilis*) of sufficient size to furnish saw-logs. The lower slopes of the mountains of this region are often quite thickly covered with small nut-pines and groves of the mountain mahogany (*Cercocarpus*), here attaining its greatest development. Below the nut-pine low, stunted junipers cover the foot-hills, often extending, in the central part of the state, across the narrow elevated valleys which separate the low mountain ranges.

The great development of the mining interests of Nevada has already nearly exterminated its scanty and stunted forests. The white pine has been cut in the neighborhood of mines from all the mountain ranges, and the most accessible nut-pine, juniper, and mountain mahogany have been converted into cord-wood or made into charcoal. The forests of Nevada are nowhere reproducing themselves, and a scarcity of fuel, even for domestic purposes, must soon be felt.

A considerable amount of lumber is manufactured in the neighborhood of lake Tahoe, in Douglas county, and sent in flumes down the eastern slopes of the sierras to supply Carson City and Virginia City. The lumber-manufacturing interests of the remainder of the state are necessarily small and unimportant. Their entire extermination, with the forests which furnish them material, cannot be long delayed.

During the census year 8,710 acres of woodland were devastated by fire, with a loss of \$19,000. The fires were traced to hunters and Indians.

IDAHO.

The western slopes of the Bitter Root and Cœur d'Alêne mountains, which form north of latitude 46° the eastern boundary of the territory of Idaho, are covered with dense, extensive, and valuable forests of fir, pine, and larch. The ridges of the Rocky mountains, which below latitude 46° occupy the eastern border of the territory, and the extreme eastern development of the Blue mountains of Oregon, just entering it from the west, are less heavily timbered with a scattered growth, in which yellow pine and red fir are still the prevailing trees. The great central region occupied by the Salmon River mountains is unexplored. These mountains are more or less timbered, but nothing is known of the composition or character of the forests which cover them. Judging, however, from the general elevation and climate of this region, its forests cannot be very important, nor capable of

supplying more than the local wants of its mining population. The great plains south and southeast of the Salmon River mountains, comprising fully one-third of the territory, are entirely destitute of tree covering, while the Snake River range and the ranges of the Bear River country contain in their more sheltered cañons only small areas of open, stunted forest.

During the census year 21,000 acres of woodland were reported destroyed by fire, with an estimated loss of

\$202,000. These fires originated in the carelessness of hunters, prospectors, Indians, etc.

A small amount of pine and fir lumber is manufactured at Boisé City and near other centers of population. The great forests of cedar, fir, and pine, however, in the Cœur d'Alêne region are still almost intact. These forests, with proper care, are capable of furnishing indefinitely the treeless agricultural region of eastern Washington territory and Oregon with an abundant supply of excellent building material.

The following extracts are made from Mr. Sereno Watson's report upon the forests of the territory:

"This territory north of latitude 44½° is occupied by the Rocky and the Bitter Root mountains, forming its eastern boundary, with their broad, timbered, interlacing spurs, which terminate in the high, mostly treeless plateau which extends from near the Spokane river in a southeasterly direction to this parallel of latitude. The southern and southwestern portions were not visited by me, and the statements regarding them are to some extent conjectural.

"Lemhi county (5,530 square miles).—In the extreme eastern portion of this county, where the mountains are crossed by the Utah and Northern railroad, scattered trees of red fir are first met at an altitude of 6,000 feet. Beaver cañon, up which the railroad passes, is well timbered on both sides nearly to its head at 6,600 feet altitude with red fir only, but the broad plateau at the summit (6,869 feet) is treeless. In the lateral cañons (8 to 10 miles long), coming out near the mouth of Beaver cañon, there are two saw-mills, one of which was visited. The timber was here found to be confined to the south side of the cañon, and consisted almost wholly of red fir (here called 'red pine'), averaging from 20 to 22 inches in diameter. The largest log seen measured 32 inches at the butt. A 'white pine' proved to be *Picea Engelmanni*, and a 'bird's-eye pine' was *Pinus Murrayana*, both small, as was also the balsam (*Abies subalpina*), which was found some 3 or 4 miles up the cañon. The yellow pine did not occur here.

"It is probable that the cañons westward along the range are similarly timbered as far as the Lemhi agency. Here the character of the range changes (as stated under Beaver Head county, Montana), becoming higher and more rugged, and the *Pinus Murrayana* is probably more abundant, at least at the higher altitudes. The yellow pine also appears, but at what point is uncertain; it is certainly found at Gibbonsville, on the North Fork of the Salmon river, and it probably extends still farther southward. The Salmon River mountains, lying between the Lemhi river and Rock creek, are reported to be well timbered. The southwestern portion of the county I presume to be much more open.

"The total timbered area is estimated at from 1,500 to 2,000 square miles.

"IDAHO COUNTY (10,100 square miles).—The high and crowded spurs of the Bitter Root mountains fill the entire northeastern portion of this county, extending to the line of the South Fork of the Clearwater, mostly densely wooded from base to summit. The foot-hills and plateaus between the streams are more or less covered with scattered yellow pine and red fir. The valley of the Salmon river is probably comparatively treeless, and the low mountain range between that river and the Snake is scantily timbered.

"Estimated timber area, 4,000 square miles.

"Washington county (3,000 square miles).—I have but little information in regard to this county. The southern portion has been surveyed, and is probably nearly treeless. The rest appears to be more mountainous, and may be scantily timbered.

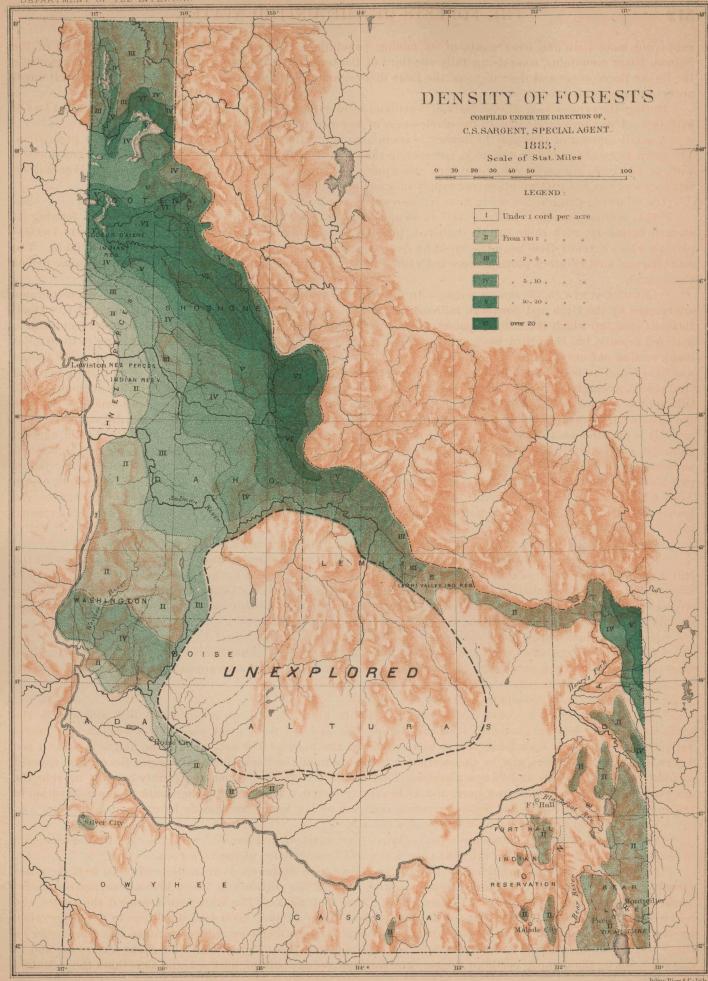
"Wooded area (say) 300 square miles.

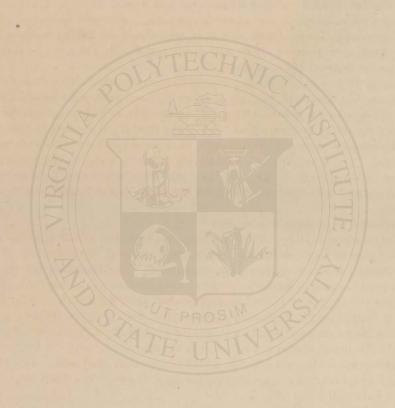
"NEZ PERCÉ COUNTY (3,400 square miles).—Mainly high plateau, at about 3,000 feet altitude, in the southeast more or less covered with scattered yellow pine and red fir of good size, on the western side nearly without timber or with occasional yellow pine. Toward the head of Potluck creek some yellow pine and red fir are found in the valleys, and in the northeast the spurs from the Rocky mountains enter the county, covered in addition with the larch and Thuya gigantea. East of the Indian reservation the county extends up into the mountains in the form of a narrow gore, and is heavily timbered. The portion lying south of the reservation in the angle between the Snake and Salmon rivers is occupied by low mountains, mostly bare.

"Total timbered area estimated at 750 square miles.

"Shoshone country (5,950 square miles).—Wholly mountainous and covered with forests, with the exception of some prairies and open country near the Clearwater and lower portion of the Lolo Fork.

"Immediately after crossing the divide by the Lolo trail from Montana, at an altitude of 6,000 feet, the forest consisted of Abies subalpina and Picea Engelmanni, with young Abies grandis and Tsuga Mertensiana, and occasional larch and red fir, and upon the creeks some small Thuya and Taxus. The trail soon ascended the ridges and followed them for about 100 miles at an altitude of from 5,000 to over 7,000 feet, doubtless to avoid the fallen timber which made the cañons impassable, though enough of it was found on the route followed. The timber on these ridges was often small and scattered—Abies subalpina and Picea Engelmanni, with Pinus Murrayana and P. albicaulis—or on the damper northern slopes with larch and red fir, balsam, hemlock, and sometimes the mountain





hemlock (Tsuga Pattoniana), the trees larger (occasionally 2 feet through, the Abies grandis being the largest). The white pine (Pinus monticola) also frequently occurred. During the last day upon this ridge the trail was through heavy timber, chiefly of hemlock sometimes 3 feet in diameter, with some Abies and rarely Pinus Murrayana and P. monticola, the ridge even at 7,000 feet being covered with the same dense growth. Descending quite abruptly from the drier extremity of the spur, which was covered with Abies, Tsuga, and Pinus (Murrayana, albicaulis, and monticola), we passed through a forest of heavy balsam (Abies grandis), with a few larch and some red fir, and at about 4,000 feet came upon cedar (Thuya gigantea) to the exclusion of everything else—the trees from 2 to 4 feet in diameter. On the stream banks at the base were found the Thuya, Pinus monticola, Abies subalpina and A. grandis, Picea Engelmanni, and Tsuga Mertensiana, all growing together, with an undergrowth of maple, mountain ash, Vaccinium, Ceanothus, Cratægus, Pachystima, Prunus, etc. With timber of this character upon the high ridges it is evident that there must be much very heavy timber in the cañons.

"After crossing a low ridge covered with cedar, larch, and red fir, and following a narrow meadow frequently interrupted by clumps of timber, the trail at length came out upon an open camass prairie 25 miles northeast of Kamai. From this point the timber covering the plateau is an open growth of yellow pine and red fir, often quite large, with young trees intermixed, and some Picea Engelmanni and the two Abies in the wetter places. Considerable timber is cut upon the Lolo Fork and Clearwater and floated down to the mills at Lewiston. It is uncertain how far south along the main range the above large variety of trees continues. It is probable, in my opinion, that the Thuya, Abies grandis, Tsuga, Pinus monticola, and Taxus do not pass beyond the headwaters of the Clearwater, or, at the farthest, that some of them may reach the North Fork of the Salmon river, while the larch may possibly be found in the Salmon River mountains.

"At the northern extremity of the county, along the Mullan road, which from the Cœur d'Alêne mission follows up the cañon of the Cœur d'Alêne river, instead of following the spurs, a distance of 37 miles, the swampy bottoms were found heavily timbered with Thuya, red fir, Abies grandis, and Tsuga Mertensiana, with some larch and Pinus monticola. Some of the drier bottoms had been burned over, and were mostly covered with Pinus Murrayana. Some Populus balsamifera occurs, 3 feet through, or more (as also on the Montana side). The sides of the ridge were also nearly bare. The Thuya, which exclusively occupies some of the swamps, attaining a large size, ceases at the base of the dividing ridge, where also the Picea Engelmanni and Abies subalpina come in. The range above Cœur d'Alêne cañon, and bounding the county on the north, is not heavily timbered, much of its upper slopes being bare.

"Total timbered area estimated at 5,000 square miles.

"KOOTENAI COUNTY (5,530 square miles).—The portion south of the Cœur d'Alêne and Spokane rivers belongs mostly to the Cœur d'Alêne Indian reservation, and is timbered, with the exception of open meadows upon the Cœur d'Alêne and Saint Joseph rivers and upon Hangman creek. The timber is principally yellow pine and red fir, with some Pinus Murrayana, and fine bodies of cedar (Thuya gigantea) near the western borders of the lake. North of the Cœur d'Alêne river the road from the mission to the fort passes through a cedar (Thuya) swamp, with many large trees, from 3 to 5 feet through, traversing cañons filled with a mixed growth of Abies subalpina and A. grandis, larch, hemlock, Picea Engelmanni, and red fir. This latter growth continues for some miles below the fort, where the valley opens out into the broad Spokane plain, which extends northeastward toward Pend d'Oreille lake without trees. The mountains south of the lake are low and not heavily timbered. The portion of the county north of Clarke's Fork and of Pend d'Oreille lake has, so far as I know, never been explored, but is probably mountainous and for the most part well timbered.

"Estimated timber area of the county, 4,500 square miles."

WASHINGTON.

Washington territory west of the summit of the Cascade range is covered with the heaviest continuous belt of forest growth in the United States. This forest extends over the slopes of the Cascade and Coast ranges, and occupies the entire drift plain surrounding the waters of Puget sound. The highest mountain peaks and the sanddunes of the coast are treeless. The narrow valleys of the Cowlitz and Chehalis rivers are dotted with small oaks and other deciduous trees, and oaks and stunted yellow pines occupy with an open growth the barren Steilacoom plain south of Puget sound; with these exceptions western Washington territory is covered with a magnificent coniferous forest. The most valuable and generally distributed timber tree of this region is the red or yellow fir (Pseudotsuga Douglasii), forming about seven-eighths of the forest growth. The valuable red cedar (Thuya gigantea) and the hemlock (Tsuga Mertensiana), often covering extensive tracts, especially near the base of the Cascade mountains, are common; the noble tide-land spruce adds value and importance to the forests bordering the coast. The forests which cover the upper ridges of the Cascade mountains are principally composed of firs (Abies amabilis and A. nobilis), spruces (Picea Engelmanni), various small pines, hemlocks, etc. These elevated forests, often of great beauty, are of little economic importance.

East of the Cascade mountains the forests are less dense, and are confined to the mountain ranges. The great plains watered by the Columbia and Snake rivers are entirely destitute of tree covering.

Stevens county, which is broken and mountainous, with the exception of the narrow valleys and occasional small prairies, is covered with a heavy, open forest growth. The most valuable trees of the forests of this county are the red fir, the yellow pine (*Pinus ponderosa*), the white pine (*Pinus monticola*), the larch (*Larix occidentalis*), and the red cedar.

The forests of Spokane county are confined to the spurs and ridges of the extreme eastern part of the county, and consist of the yellow pine, red fir, and larch of small size and inferior quality.

The forests of Yakima county cover about one-half of its area, being confined to the eastern slope of the Cascade range. The forests covering the eastern slopes of these mountains are only surpassed in density and value by those extending over their western flanks. The yellow pine occupies the lowest slopes with an open growth of large trees. Above the pine the red fir is the prevailing tree. This at a greater elevation is succeeded by hemlock and larch, with which are mingled fine bodies of spruce (Picea Engelmanni) and hemlock, while the forest growth below the timber-line consists of firs, pines, and mountain hemlock.

The western portion of Klikitat county is covered with heavy forest growth, similar in composition and density to that of Yakima.

Walla Walla county is destitute of timber except in the extreme southeastern corner, where the spurs of the mountains are thinly covered with a sparse growth of yellow pine and larch.

Columbia county is without forest except along the ridges and summit of the Blue mountains, which are covered with yellow pine, larch, and, above 5,000 feet elevation, with a continuous growth of lodge-pole pine (Pinus Murrayana).

Whitman county is destitute of forest except in the extreme southeastern corner, where there is a scattered growth of small yellow pine.

An estimate of the actual amount of timber standing in the territory is not possible with the existing knowledge of the country, and none has been attempted. The quantity of merchantable timber, however, standing in western Washington territory is enormous; a yield of 200,000 feet of lumber to the acre is not at all exceptional, while over fully 20,000 square miles a yield of 25,000 feet to the acre might be expected; such estimates certainly would not exaggerate the productive capacity of these noble forests.

The forests of Washington territory, especially in the more thickly settled portions west of the Cascade mountains, have long suffered from destructive fires. The injury inflicted by such fires is proportionately less, however, in the humid coast region than east of the mountains, where the dryness of the climate prevents the reproduction of the forest once destroyed. West of the mountains young trees of the species of the original forest, and especially the red fir, soon densely cover the burned surface and grow with astonishing rapidity and vigor. It seems reasonably certain, therefore, that, whatever may be the fate of the forests which now cover western Washington territory and Oregon, they will be succeeded by forests of similar composition, and that this whole region, ill adapted in soil and topography to agriculture, will retain a permanent forest covering long after the other great forests of the continent have disappeared.

During the census year 37,910 acres of woodland were destroyed by fire, with an estimated loss of \$713,200. These fires were set by Indians, by whites in clearing land, by hunters, prospectors, etc.

The forests bordering the shores of Puget sound, the strait of Juan de Fuca, and the lower Columbia river have been culled of their best trees for a distance inland of 1 or 2 miles to supply the important lumber-manufacturing interests of this part of the territory. The product of western Washington territory during the census year was 153,986,000 feet of lumber, 6,550,000 laths, 910,000 shingles, and 23,666,000 staves—by far the largest part being manufactured in the mills located on the waters of Puget sound.

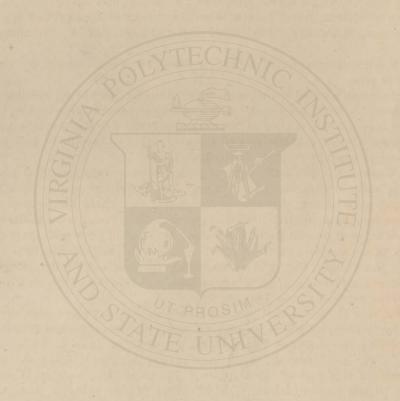
The first saw-mill built upon Puget sound was erected in 1851. It was a small water-power mill, with a daily capacity of about 1;000 feet. Two years later a similar mill was erected at Seattle, with a daily capacity of from 8,000 to 10,000 feet.

The centers of manufactures now are Port Gamble, Port Madison, Port Blakely, Port Discovery, Seabeck, Utsaladdy, Tacoma, and Seattle. At the last-named place there is a large establishment manufacturing sugar-barrel staves from cottonwood for the San Francisco market.

The lumber manufactured upon Puget sound is largely shipped to San Francisco and directly to China, Australia, New Zealand, and Mexican and South American Pacific ports.

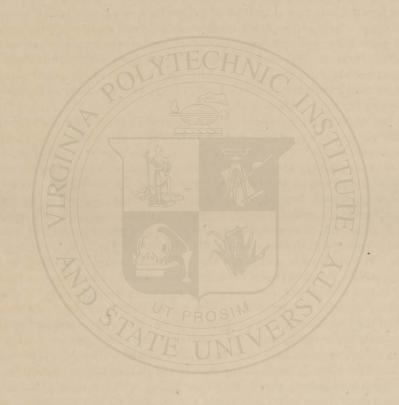
The population of the southeastern part of the territory is principally supplied with lumber, largely coarse yellow pine of inferior quality, cut on the Blue mountains in small portable mills, and delivered at Dayton, in Walla Walla county, by a flume several miles in length. No statistics, however, have been received of the amount of lumber manufactured in this county.

The methods adopted by the lumbermen of western Washington territory are wasteful in the extreme. Loggers cut only timber growing within a mile or a mile and a half of shores accessible to good booming or shipping points, or which will yield not less than 30,000 feet of lumber to the acre. Only trees are cut which will produce at least three logs 24 feet long, with a minimum diameter of 30 inches. Trees are cut not less than 12 and often 20 feet from the ground, in order that the labor of cutting through the thick bark and enlarged base may be avoided, while 40 or 50 feet of the top of the tree are entirely wasted.



WASHINGTON TERRITORY

C.S.SARGENT, SPECIAL AGENT 1883.



The following notes upon the forests of eastern Washington territory are extracted from Mr. Watson's report: "Walla Walla county (1,260 square miles).—This county is wholly without timber, which is supplied from the Blue mountains of Oregon.

"Columbia county (2,160 square miles).—A spur of the Blue mountains traverses the southern portion of this county, occupying about a fourth of its area, which is partially timbered, chiefly with red fir (*Pseudotsuga*), pine (*Pinus ponderosa*), and some *Picea Engelmanni*, none of it large. Elsewhere the county is nearly destitute of trees, though some of the streams, especially the Touchet, were at the first settling of the county bordered by scattered pines.

"WHITMAN COUNTY (5,000 square miles).—This county is destitute of timber. Some of the townships along the Idaho line were originally sparingly wooded with scattered pines upon the ridges, but these have nearly or wholly disappeared, and the supplies for fencing and fuel are brought from the neighboring mountains of Idaho. There is a saw-mill on the Palouse river, at Palouse, the logs for which are floated down from about 9 miles above.

"Spokane county (8,500 square miles).—The portion of this county to the west of the mouth of the Spokane river is wholly destitute of trees, with the exception of the high point or plateau opposite to the mouth of the Okinakane river. Here there is a small area thinly wooded, probably with yellow pine and red fir. On the eastern side of the county spurs from the mountains bordering Cœur d'Alêne lake enter between Rock creek and Spokane river, and are covered more or less densely with a growth of yellow pine, often small, with some Douglas spruce and tamarack in the ravines. There is a saw-mill at Rock creek supplied from its immediate neighborhood. Crossing Hangman's creek a scattered growth of pine appears upon the ridges between Deep creek and the Spokane river, and as far west as the head of Crab creek. Trees also border the Spokane river below the falls and to within a few miles of its mouth. The region between the Spokane and Little Spokane rivers is mostly a broad, open valley, the hills bordering it upon the north being very thinly wooded. There are two saw-mills at Spokane Falls, but the logs for them are floated down from near Cœur d'Alêne lake.

"The total area more or less covered with trees may be estimated at from 400 to 500 square miles.

"Stevens county (14,760 square miles).—This county is broken and mountainous throughout, but with no high ranges east of the Cascade mountains. The portion lying east of the upper Columbia and north of the Spokane river has several small prairies upon Chamokane creek and Colville river, and there is a narrow, open valley along the Columbia for 20 miles below the mouth of the Colville. The mountains are all low, the ridges most frequently thinly wooded or nearly bare, with the timber becoming denser in the ravines, especially northward. The most common tree is the yellow pine, but in the ravines red fir is frequent, with tamarack and lodge-pole pine. Near the Colville river were seen Picea Engelmanni, Abies grandis, small Thuyas, and fine specimens of Pinus monticola, as well as Populus balsamifera, Betula papyracea, and Alnus of considerable size. The hills bordering the Columbia above Old Fort Colville are treeless. The drift-wood brought down by the river is said to be chiefly cedar (Thuya gigantea).

"The Colville Indian reservation, lying between the Okinakane and the Columbia eastward, is comparatively little known, being crossed by but two trails, one leading directly westward from Old Fort Colville, the other following the Kettle river, and for much of the way not far distant from the British boundary. As seen from the Columbia and from the heights bordering the Okinakane, this portion appears to be more open and grassy than that east of the Columbia, and, especially toward the south, more like the bare plateau of Spokane county. Okinakane valley itself is narrow, with mainly a desert vegetation of sage-brush, Purshia, and other like representatives of the Great Basin flora, which seems to find here its only passageway northward to the British boundary. The hills eastward have thinly-scattered pines, which occasionally descend into the valley. The northern trail from Old Fort Colville shows the lower valley of Kettle river to be well wooded, but above, opening out into grassy prairies and bordered by grass-covered hills or with scattered yellow pine, red fir, and larch. Upon the more densely wooded ridges and ravines were also found Picea Engelmanni, Abies subalpina, Pinus Murrayana, and Thuya.

"The main ridge separating Kettle river from the Okinakane (about 5,000 feet high and 12 miles from the latter stream) was well grassed upon both sides with large Picea, Pseudotsuga, Pinus ponderosa, and Larix along the creeks upon the eastern side, and on the west the Pinus ponderosa only. The ridges above the Okinakane to the north appeared treeless, while the northern slopes of the nearer hills to the south were pretty well covered with underbrush. West of the Okinakane, between that river and the Methow, the country is much like that to the east—high and broken, with scattered patches of timber, which becomes more general toward the northern boundary. Upon the Methow and Similkameen creeks there are open, grassy valleys of considerable extent, but for 12 miles from the mouth of the Methow the hills close in upon it and are considerably wooded. The rest of the county, from the Methow to the Wenatchee, is occupied by spurs from the Cascade mountains, which reach the banks of the Columbia; these are exceedingly rugged and almost impassable, being seldom traversed, even by Indians. A foot-trail leads from the headwaters of the Methow over to the Skagit, and a trail which has been passable for horses crosses the ridges between the upper Chelan lake and the Wenatchee, but it is described by the Indians as dangerous and long disused by them. The whole region is probably for the most part well timbered except along the Columbia river, where the mountains for from 10 to 15 miles back are but scantily wooded, the pine (Pinus ponderosa) and red fit occasionally reaching to the river. Heavy timber is reported about the head of Chelan lake, commencing at about 15 miles from

the foot, mostly yellow pine, but also red fir, some Larix, and small Thuya. The outlet to this lake is through a deep cañon, and is obstructed by falls and rapids. The Wenatchee flows through a more open valley, and, at least in high water, could be used for floating timber to the Columbia. For 7 miles from its mouth the ridges on each side are only scantily wooded, but from that point the trees (yellow pine and red fir, mostly young) occupy the valley, and at 20 miles the thick timber begins—pine, fir, red fir, larch, white pine (Pinus monticola), and cedar, the white pine sometimes 4 feet through, the cedar not large.

"Yakima county (8,900 square miles).—Immediately south of the Wenatchee the highest of the eastern spurs of the Cascade mountains extends in a southeasterly direction to the Columbia, forcing that river to make a bend eastward. This spur has an altitude of about 5,000 feet, and its higher northern slopes, overlooking the mouth of the Wenatchee and eastward, are somewhat densely covered with pine, red fir, and larch. The southern slope, as seen from Ellensburg, appeared nearly bare. I crossed the ridge about 17 miles above the mouth of the Wenatchee and a few miles east of the high, exceedingly rocky, and snow-covered peaks called by McClellan 'Mount Stuart'. It was found mostly well wooded, but the trees not exceeding 1 or 2 feet in diameter, and usually small red fir and yellow pine, with at length some Abies grandis and Pinus monticola, rarely a small Thuya, on the higher rocky ridges small larches, and at the summit some Pinus Murrayana. The same trees were found on the southern descent, excepting the Pinus monticola. Large cottonwoods (Populus trichocarpa) occurred on the creeks. South of this range the spurs recede, leaving a comparatively level sage-brush region, wholly treeless, from 50 to 70 miles broad, between the Columbia and Yakima, and crossing the lower portion of the latter river.

"Below the mouth of the Schwank, which is at the head of what is known as 'Killitas valley', on the Yakima, the foot-hills of the Cascade mountains extend to the Yakima river, a distance of about 50 miles from the summit of the range; but the lower portions of these spurs are bare, or with only scattered pines on their northern slopes, and the chief reliance of the settlers for fencing and fuel is upon the aspens and cottonwoods bordering the streams. Following up the Yakima from the mouth of the Schwank, the valley for 10 or 12 miles is thinly timbered with pine and red fir. For 17 miles more there is some larch on the ridges, and in the bottoms some Abies grandis, and rarely a small Thuya. Timber and ties had been extensively cut here for the railroad and floated down the river. At this point the yellow pine and tamarack ceased, and a dense, heavy growth began and continued for most of the way to the summit (20 or 25 miles), consisting of red fir, hemlock, Abies grandis and A. amabilis (all these from 3 to 5 feet through and 200 feet high or more), Pinus monticola (18 inches through), and Thuya (2 feet in diameter). One spruce, not over $2\frac{1}{2}$ feet through, had a height of 225 feet.

"In like manner, upon the Nachess river, the open sage-brush country extended about 10 or 12 miles from its mouth, with only cottonwood along the stream. Scattered pines then commence, with at length red fir, but it is some 25 or 30 miles more before heavy timber is reached. A small grove of oak (Quercus Garryana) is found at the mouth of the Schwank, the only point upon the Yakima where it occurs. It is also frequent along the Nachess for 3 or 4 miles, commencing at about 12 miles from its mouth, but small and rarely over 6 inches in diameter or 15 feet in height. In Satas valley it is abundant. Along the southern border of the county there is again a long spur extending east from mount Adams to within about 40 miles of the mouth of the Yakima. This spur has an altitude of about 1,500 feet, and is mostly covered with a scattered growth of yellow pine, red fir, and Abies grandis.

"The entire wooded area of the county may be estimated at about 4,500 square miles.

"KLIKITAT COUNTY (2,300 square miles).—The spur eastward from mount Adams, just spoken of, covers much of the northern portion of this county and affords a good supply of excellent timber. The area may be estimated at 750 square miles. The high ridge overlooking the Columbia from The Dalles eastward is perfectly bare of trees."

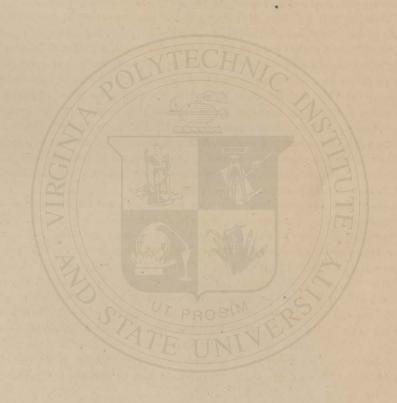
OREGON.

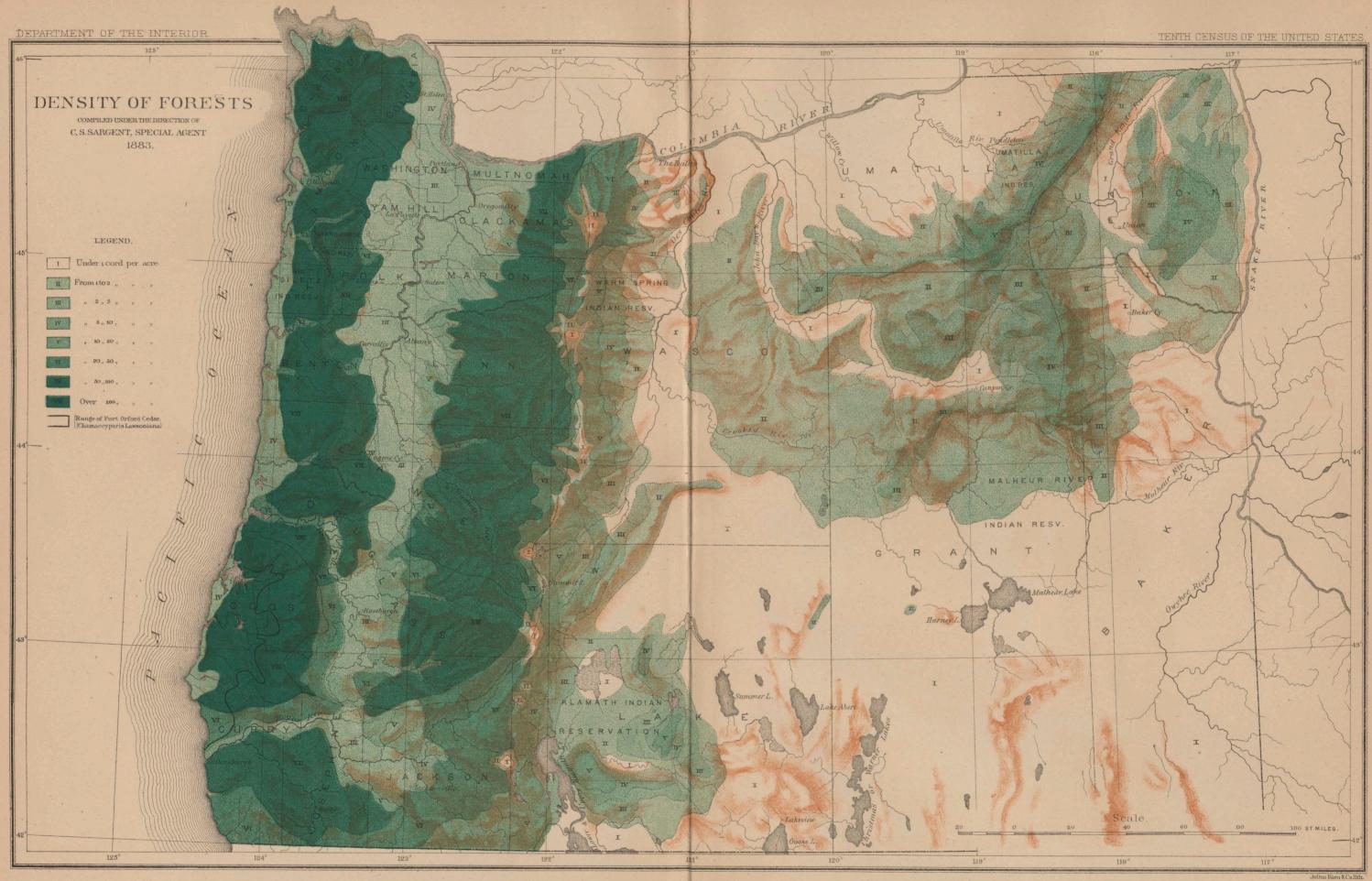
The heavy forest of western Washington territory extends through western Oregon. The most valuable timber tree of the region is the red or yellow fir (*Pseudotsuga Douglasii*), which forms fully seven-eighths of the forest. The tide-land spruce (*Picea Sitchensis*) abounds along the coast, and the red cedar (*Thuya gigantea*) and the hemlock (*Tsuga Mertensiana*) are common and of large size. South of Coos bay an important forest of Port Orford cedar (*Chamæcyparis Lawsoniana*), mixed with the red fir and the tide-land spruce, occurs.

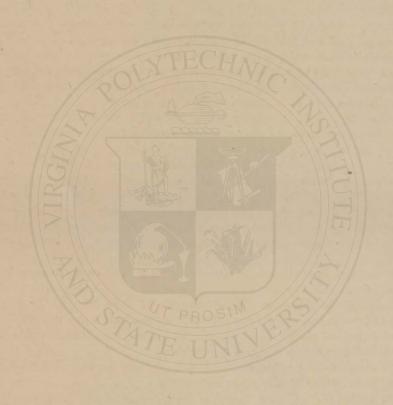
The valleys of the Willamette, Umpqua, and Rogue rivers contain an open, scattered growth of white oak (Quercus Garryana), now gradually increasing by the recent growth of young trees protected from the fires which formerly swept every season through these prairie-like valleys. South of the Rogue River valley the sugar pine (Pinus Lambertiana), the chestnut oak (Quercus densiflora), and other trees of the California forest occur in sufficient numbers to add economic value to the forests of the state.

The bottom lands of western Oregon are lined with a continuous growth of cottonwoods of immense size, willows, maples, ashes, and gigantic alders; those in the southwest, near the coast, contain great bodies of splendid gard maple (Acer macrophyllum) and laurel (Umbellularia Californica).

East of the Cascade mountains the forests are confined to the mountain ranges; they are open, scattered, and generally composed of comparatively small trees.







The forests of Wasco county, on the western slope of the Cascade range, when above 3,000 feet elevation are important. The most valuable trees are the red fir, the yellow pine, and the larch. The eastern part of the county is covered with a light growth of pine, principally yellow pine.

The slopes of the Blue mountains in Umatilla and Union counties are covered with an open, stunted forest, consisting of red fir, yellow pine, larch, and, above 4,000 feet elevation, a heavier continuous growth of lodge-pole

pine (Pinus Murrayana).

Lake county is destitute of timber except on the eastern slope of the Cascade mountains and the southern part of the county, which contain a light forest growth confined to the high ridges of the mountains, and principally composed of yellow pine.

Grant and Baker counties are treeless except in the northern part, where the Blue mountains are covered with

a light, open growth composed chiefly of yellow pine, with some larch and scrub pine.

The forests of Oregon have suffered serious losses from forest fires. Along the Coast Range, from the Columbia river to Port Orford and through the entire length of the Cascade mountains, fires have raged nearly every summer since the first settlement of the state, destroying thousands of acres of noble fir, spruce, and cedar. Forests similar in composition to those destroyed soon spring up again and cover the burned surface, but the loss in material which the state has suffered in this way is incalculable.

Forest fires are increasing in frequency, especially west of the summit of the Cascade mountains. During the census year, however, only 132,320 acres of woodland were reported destroyed by fire, with an estimated loss of

\$593,850. These fires were set by hunters, Indians, and by farmers clearing land.

The abundant spruce, cedar, cottonwood, ash, maple, and alder of western Oregon have developed flourishing industries. At Portland large quantities of ash, maple, and alder are manufactured into furniture, and cottonwood, spruce, and cedar supply numerous establishments engaged in the production of cooperage stock and all kinds of woodenware. The supply of this material is large and of excellent quality.

The principal centers of the lumber-manufacturing interests are at Portland, where fir, spruce, cottonwood, and hard woods are sawed for the local market, and at Empire City and Marshfield upon Coos bay. Port Orford cedar and red-fir lumber are manufactured here, and shipped by schooner to Portland, San Francisco, and Mexican and South American Pacific ports. The first mill was established upon Coos bay, at North Bend, 4 miles above Empire City, in 1853; other mills were soon built, and in 1854 the first shipment of Port Orford cedar was made to San Francisco. Great quantities of this timber have been cut, while fires have destroyed even more than the ax. The fire which raged through the forests of Coos bay for three months in the summer of 1867 destroyed cedar estimated to amount to between 200,000,000 and 300,000,000 feet of lumber. This tree, however, reproduces itself very rapidly, and after the forest has been burned over it is the first arborescent species to reappear, springing up generally in the third year.

The heaviest continuous body of Port Orford cedar now standing is on cape Gregory, extending south to and beyond the mouth of the Coquille river. It is about 20 miles long by an average width of 12 miles, and lies along the western slope of the foot-hills of the Coast Range, extending to within 3 miles of the coast. In this forest twothirds of the trees are Port Orford cedar, the others tide-land spruce and a few red firs. There is great danger, however, that the Port Orford cedar, one of the most valuable trees of the American forest, will soon be exterminated as a source of lumber supply, so far as this generation is concerned.

The following notes upon the forests of Wasco, Umatilla, Union, Grant, and Baker counties, the only portion

of the state visited by Mr. Watson, are extracted from his report:

"Wasco county (17,760 square miles).—The timber of this county is confined almost wholly to the steep eastern slopes of the Cascade range; the low spurs of the Blue mountains, which enter the county on the east, bordering John Day's river and southward, being only partially supplied with pines, etc. I know nothing about Walker's range and the Paulina mountains in the southwest, but they are probably low, with little or no wood. The trees of the Cascades are doubtless nearly the same as those to the north of the Columbia, the larch reaching to the headwaters of the Deschutes river, the most southern locality for it that I have seen mentioned.

"The total more or less wooded area may be estimated at from 2,500 to 3,000 square miles.

"UMATILLA COUNTY (6,100 square miles).—The Blue mountains occupy the southern and eastern borders of this county, and are the only source of timber. They are for the most part well wooded, especially in the ravines, the trees growing to a fair size, and consisting of yellow and scrub pine, spruce and balsam (Abies subalpina and

"The wooded area is about 1,500 square miles.

"Union county (4,300 square miles).-This county has the main range of the Blue mountains on the west and north and the Cedar mountains on the east, separated by the valleys of the Grande Ronde and Wallowa rivers. A large portion of these mountains is well timbered, the amount decreasing toward the east.

"The wooded area may be estimated at about 2,000 square miles.

"Grant county north of latitude 44° (5,800 square miles).-This portion of the county is traversed by the valley of John Day's river, to the north and east of which lie the main ranges of the Blue mountains, which are to a considerable extent well wooded. The mountains to the south are low and probably scantily timbered.

37 FOR

"Fifteen hundred square miles is probably a liberal estimate for the wooded area.

"BAKER COUNTY NORTH OF LATITUDE 440 (3,800 square miles).—This section is bordered on the west by a high range of the Blue mountains, which is well timbered. The remainder is almost wholly without timber.

"The estimated wooded area of this county is 900 square miles."

CALIFORNIA.

The heavy forests of California are confined to the Coast Range, the eastern and western slopes of the Sierra Nevada, and the group of mountains joining these ranges in the northern part of the state. They extend from the Oregon boundary south to latitude 34° 30′ north. The most important trees of the Coast Range forest are the redwood and the red fir. The tide-land spruce and the hemlock of the Northern Coast Forest extend as far south as cape Mendocino, although less generally multiplied and less valuable than in Oregon and Washington territory. The chestnut oak (Quercus densiflora), of which the bark is largely used in tanning, is still common in the coast forests of the northern part of the state. The most valuable forest of the western slope of the Sierra Nevada is confined to a belt between 4,000 and 8,000 feet elevation, consisting of the sugar pine (Pinus Lambertiana), the yellow pine, and the red fir. Small scattered groves of the big trees (Sequoia gigantea) stretch along the southern portion of this belt. The western slopes of these mountains below 4,000 feet elevation are more or less densely covered with various species of pine of little economic importance, and the broad valleys of the Sacramento and the San Joaquin, lying between the Coast Range and the Sierra Nevada, are covered, except at the south, with an open growth of oaks, often of immense size, although of little value except as fuel. The eastern slopes of the Sierra Nevada are covered with a heavy forest, in which yellow pines (Pinus ponderosa and P. Jeffreyi) are the prevailing and most important trees.

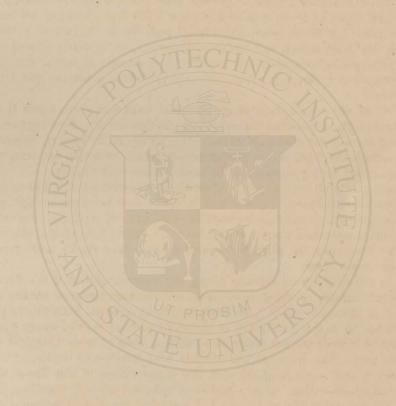
South of latitude 36° 30′ the forests, both of the Sierra Nevada and of the Coast Range, become gradually less heavy and less valuable than those covering the mountains farther north. Two degrees still farther south they are open and scattered, and have little economic value. The pine and fir forests, however, which cover the upper slopes of the San Bernardino and San Jacinto ranges are important on account of their isolated position in a region destitute of tree covering, and supply a considerable local market with lumber.

The northeastern and nearly all the southern and southeastern portions of the state are almost entirely destitute of forest covering. Oaks and occasional pines and junipers are, however, dotted over the low mountains of southwestern California, and willows and cottonwoods line the banks of streams. Forests of pine crown the highest ridges of the Inyo and other mountain ranges, rising from the desert east of the Sierra Nevada, and arborescent yuccas (Yucca brevifolia) form upon the high Mohave plateau an open forest, more remarkable in the strangeness of its growth than in economic value.

The narrow belt of redwood which extends along the western slopes of the Coast Range from the bay of Monterey to the northern boundary of the state is the most important forest of similar extent now standing. Few trees equal the redwood in economic value. No other forest can compare with this in productive capacity, and no other great body of timber in North America is so generally accessible or so easily worked. Single trees capable of producing 75,000 feet of lumber are not uncommon, while a yield of from 1,000,000 to 2,000,000 feet of lumber per acre is by no means rare. The redwood has already been practically destroyed in the neighborhood of San Francisco bay, both north and south, and through the entire extent of this forest the trees most accessible to streams and railroads have been culled. Heavy bodies of redwood are still standing, however, in the Santa Cruz region, and in Humboldt county in the valleys of Eel and Mud rivers and Redwood creek. The largest number of mills engaged in the manufacture of redwood lumber are located upon Humboldt bay, principally at Eureka and Arcata. The logs which supply these mills are generally cut within a distance of 1 or 2 miles from the shores of the bay, to which they are hauled by teams, made into rafts, and towed to the mills. Attempts made to raft logs down the mountain streams watering the redwood forests have not been successful. The rivers flowing west from the California Coast Range are short and rapid. Floods following the winter rains are sudden and severe, breaking up rafts and driving the logs out to sea, or lodging them far from the banks. At periods of low water numerous bars close these rivers to the navigation of the enormous redwood logs. The general destruction of these forests must therefore be accomplished by means of short logging railroads specially constructed to bring logs to the mills. Such a road has been built along Mad river, and there are others either built or projected near Trinidad and at other points along the coast.

Besides the mills upon Humboldt bay, there are others devoted entirely to the manufacture of redwood lumber at Crescent City, in Del Norte county; Trinidad, Rohnerville, and Bridgeville, in Humboldt county; Westport, Kibesillah, Albion, Little River, Caspar, Mendocino, Cuffey's Cove, Punta Arena, and Gualala, in Mendocino county; Duncan's mills, in Sonoma county; and at Santa Cruz.

Redwood lumber is principally shipped by schooner to San Francisco, the great point of lumber distribution upon the Pacific coast, and also direct by water to Wilmington, San Diego, and other ports of southern California, and to Mexico and South America.







The following estimates of the amount of accessible redwood standing May 31, 1880, were prepared by Mr. E. L. Allen, secretary of the Redwood Manufacturers' Association of San Francisco. They embrace only such portions of the forest as can be reached by water, or may in the future be penetrated by railroads, and do not include the small, isolated bodies of timber growing in inaccessible canons:

REDWOOD (Sequoia sempervirens).

Regions.	*Feet, board measure.
From the Oregon boundary to the mouth of Redwood creek	800, 000, 000
From the mouth of Redwood creek to the mouth of Mad river	9, 000, 000, 000
From the mouth of Mad river to the mouth of Eel river	2, 145, 000, 000
From the mouth of Eel river to the mouth of Matteli river	4, 450, 000, 000
From the mouth of Mattoli river to the mouth of Cotonavia creek.	200, 000, 000
From the mouth of Cotonavia creek to the mouth of Russian river.	7, 680, 000, 000
In the Santa Cruz region	1, 550, 000, 000
Total	25, 825, 000, 00
Estimated cut for the census year ending May 31, 1880:	
Sawed lumber	125, 390, 00
Shingles and shakes	25, 380, 00
Split railroad ties	23, 265, 00
Posts, etc	12, 600, 00
Total	186, 635, 00

No estimate of the amount of pine and fir lumber standing in the state is now possible, and none has been attempted. An enormous amount of pine of excellent quality, both white and yellow, is contained in the sierra forests. These forests have been invaded by the lumberman at only a few points; their inaccessibility and the cost of getting to market the lumber manufactured in these mountains have thus far preserved them, and these sierra forests, if protected from fire, will serve as a reservoir from which the whole Pacific coast can draw its lumber supply long after its more accessible forests have disappeared.

The forests of California suffer seriously by fire; during the census year 356,815 acres of woodland were reported thus destroyed, with an estimated loss of \$440,750. These fires were set by careless hunters, prospectors, and by farmers in clearing land. Great injury, every year becoming greater, is inflicted on the mountain forests by stockmen starting fires to improve the herbage of the alpine pastures. These fires destroy undergrowth and young trees, and often consume great quantities of valuable timber, which does not grow again upon these exposed mountain slopes.

PASTURAGE OF MOUNTAIN FORESTS.

The permanence of the mountain forests of California is severely endangered, moreover, by the immense herds of sheep, cattle, and horses driven into the mountains every year, at the commencement of the dry season, to graze. From the foot-hills to the highest alpine meadows every blade of herbage and every seedling shrub and tree is devoured. Young trees are barked and ruined, and only the most rigid and thorny chaparral shrubs are able to resist the attacks of these ravenous herds. The sharp hoofs of sheep winding around the steep acclivities tread out the roots of grasses and other perennial plants and loosen the surface of the stony soil, which, deprived of the protection of its vegetable covering, is gradually washed into the valleys, choking the bottoms of streams and preparing the way for the disastrous torrents which must follow the destruction of the sierra forests; and the destruction of these forests is certain, if the practice of using them indiscriminately as sheep pastures is continued. The life of any forest in which all young trees are destroyed as soon as they appear above the surface of the soil is limited to the life of the fully grown individuals which compose it. A period of unusual climatic conditions, the demand of an increased population for lumber, or the now unforeseen attacks of some insect enemy may at any time sweep away the old trees of the sierra forests. There are no young trees growing to replace them, and it is doubtful if the forest could ever regain its foothold upon the steep and exposed slopes of these mountains once entirely stripped of the protection of their present covering of trees.

The sheep which threaten the destruction of the sierra forests threaten also the agricultural prosperity of the state; the streams heading in the sierras and watering the great interior valleys of California are protected in their flow by the forests growing about their upper sources. If these forests are destroyed, and the protection to the surface of the ground which they afford removed, the immense accumulation of the winter's snows must melt suddenly in the spring; brooks will become torrents, sweeping with irresistible force gravel and stones from the mountain sides down into the valleys below, and burying rich bottom lands in ruin. And this is not the only danger which must follow the destruction of these forests. If the snow which supplies the mountain streams melts slowly, a steady flow of water will be maintained late into the season; if, on the other hand, the snow melts suddenly and rapidly during the first warm days of spring, the unnatural flow of water in the stream must be followed by

its equally sudden disappearance, and the torrent will suddenly diminish to a slender brook or entirely disappear. Irrigation, without which agriculture in a large part of the Pacific region is impossible, is dependent upon the constant and steady flow of streams formed by melting snow, and as the forests which cover the mountain sides are essential to prevent the sudden melting of snow, their preservation is necessary for successful irrigation on any large or comprehensive scale.

The forests of California suffer from wasteful methods of cutting. Only the best and most accessible young trees are cut; often a noble pine capable of producing 25,000 or 30,000 feet of lumber is felled, a few split shingles made from the butt-cut, and the rest of the tree left to rot upon the ground. The preference of the railroad companies of the state for split rather than sawed redwood ties causes an immense and needless waste of this valuable timber. A great amount of material under the most favorable conditions is wasted in splitting out the ties, and when trees after being cut are found to split badly from any defect in the grain they are abandoned and left to waste.

The forests of California, unlike those of the Atlantic states, contain no great store of hard woods. The oaks of the Pacific forests, of little value for general mechanical purposes, are unfit for cooperage stock. No hickory, gum, elm, or ash of large size is found in these forests. California produces no tree from which a good wine cask or wagon wheel can be made. The cooperage business of the state, rapidly increasing with the development of grape culture, is entirely dependent upon the forests of the Atlantic region for its supply of oak. Woodenware and small cooperage stock are manufactured in large quantities, however, from cottonwood, spruce, alder, and red and white fir. Wine-butts and water-tanks are universally made from redwood, which is probably unsurpassed for such purposes.

The large tanning industry of the state consumes, in preference to all other material, large quantities of the bark of the chestnut oak (*Quercus densiflora*), once a common tree in the forests of the northern Coast ranges, but now becoming scarce and in danger of speedy extermination.

The principal centers of lumber manufacture outside of the redwood belt are situated along the line of the Central Pacific railroad, upon both flanks of the Sierra Nevada mountains, in Butte, Tehama, and Mono counties, and in the San Bernardino mountains. Lumber manufactured upon the eastern slope of the Sierra Nevadas is largely shipped eastward by rail to supply Nevada and Utah. The product of the mills situated west of the mountains is largely sent to San Francisco for distribution, or direct by rail to the mining centers of southern Arizona and New Mexico.

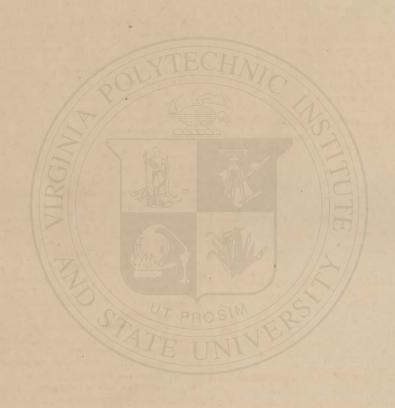
ALASKA.

Little is known to me of the present condition or productive capacity of the forests of Alaska. Their distribution, as shown on the forest map of North America, is based upon notes made by Mr. Ivan Petroff, a special agent of the Census Office, who has traced the timber limits of the territory, aided by Mr. C. W. Nelson, of the Smithsonian Institution, by whom the northern limits of the spruce forest are laid down.

The forests of the territory of any commercial value are confined to the islands and Coast ranges east and south of Prince William sound. The most valuable tree of this region is the Sitka cedar (Chamacyparis Nutkaensis). The hemlock, the tide-land spruce, and the red cedar (Thuya gigantea) attain here also a considerable size. The importance, however, of these forests, both in extent and in the value of the timber they contain, has generally been greatly exaggerated. The Coast Forest north of the fiftieth degree of latitude rapidly diminishes in density and quality, and there is nothing in the climate or soil of Alaska to produce a forest growth more valuable than that covering the Coast ranges of British Columbia.

A few saw-mills of small capacity are located at different points in southeastern Alaska to supply the local demand for coarse lumber. Alaska is, however, largely supplied with lumber from Puget sound. The treeless Shumagin and Aleutian islands and the southern settlements of the peninsula are supplied with fire-wood brought from other portions of the territory.





[Note.—In this index the names of families are indicated by "Small caps", of species by "Roman" type, and of synonyms by "Italies".]

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