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HANDBOOK OF THE
TREES
of the Northern States and Canada
East of the Rocky Mountains

ILLUSTRATED WITH PHOTOGRAPHS

By ROMEYN BECK HOUGH, B. A.
Author of American Woods

1957
THE MACMILLAN COMPANY · NEW YORK

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Nineteen hundred and seven.

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Fourth Printing 1957

PRINTED IN THE UNITED STATES OF AMERICA

TO THE MEMORY OF MY FATHER,

DR. FRANKLIN B. HOUGH, WHO, AS THE PIONEER COMMISSIONER OF FORESTRY, FIRST STROVE TO AROUSE THE PUBLIC TO CHECK THE COURSE OF DESTRUCTION OF THE AMERICAN FORESTS, AND ESTABLISH THE PRINCIPLES OF FORESTRY,

AND TO MY MOTHER,

WHOSE INTEREST IN THE PLAN OF THIS HANDBOOK AND ENJOYMENT IN ITS PROGRESS HAVE BEEN AMONG THE PLEASURES OF ITS PREPARATION, IT IS

MOST AFFECTIONATELY DEDICATED.

PREFACE.

It has been thought by the writer, and has frequently been remarked by others, that a series of carefully made photographic illustrations of the fresh leaves, fruits, leafless branchlets and typical barks of our various trees would be appreciated alike by the professional botanist, the less technical nature student, the forester and the lumberman. My natural interest in the subject and peculiar vocation made the task of the preparation of such a work peculiarly inviting to me. I am required to be much in the field observing the trees, making it my personal duty to gather the woods used in the publishing of my AMERICAN WOODS — in order that I may be able to vouch for authenticity — and this gives me unusual opportunities. I accordingly entered upon the task with enthusiasm, providing myself with an excellent camera, and adapting it to the peculiar requirements of the work.

It was not until after much experimenting, as to proper lighting, the elimination of shadow, etc., that satisfactory results were obtained. The thought of a measured background — one ruled into square inches for convenience — occurred as a most satisfactory way of indicating size, which I deemed of greatest importance, owing to the great range of sizes of the objects which I must show on plates of uniform size. It is hoped that this feature of the work will meet with the approval bespoken for it.

When once entered upon the work it was found that many and various vicissitudes must be encountered, which would unexpectedly prolong the work. Chief among these were the "off" years, during which a species does not bear fruit. For example: One season I could not find a single tree of the common Sugar Maple bearing fruit, though I examined many from northern New York to North Carolina and westward to Missouri. One winter not a solitary twig could I find of the Yellow Birch bearing its dormant catkins, and, naturally, not a tree bearing flowers or fruit the next summer. I searched in vain two successive seasons for the pistillate flowers of the common Butternut, so regularly did the late frosts of spring destroy them, though the staminate flowers appeared annually.

The shortness of the period, too, during which the flowers or fruits of certain trees are in their prime, or even exist on the trees, has necessitated close watch. The exact time must be ascertained by observation, and if, perchance, I miss it I must wait until another year for another opportunity. Then I may find it an off year (imagine my disappointment!), and still another year must be waited. Procuring specimens from lofty tree-tops are trivial ordeals compared with instances like these. Add to these vicissitudes the distribution of our trees,

and the consequent necessity of being in many places at about the same time, and it can be readily understood that the field work could not be accomplished in one or even two seasons. Indeed, it has required several more than that. Nothing but a love of the subject would fortify one with the required patience.

The necessity of visiting the trees in their native haunts is evident. This has brought me much in contact with the country folk in remote regions and has been associated with many novel and generally pleasant experiences. The visit of an "outsider" ofttimes seemed as welcome an occasion to them as the opportunities of their respective localities, and often contact with them, were enjoyed by me, and I gratefully remember many acts of kindness in these hospitable people.

Occasionally it was my good fortune to have the company of fellow botanists in the field and enjoy the benefits of their familiarity with the trees of their respective regions. Such was my experience in studying the interesting trees of Staten Island with Mr. Wm. T. Davis, for whose assistance I am very grateful.

A rare treat I found in store when I dropped in upon Prof. C. D. Beadle, botanist, at Biltmore, N. C., and enjoyed a few days' sojourn with him working up certain species of the Alleghany Mountains, and to Professor and Mrs. Beadle I am under lasting obligation.

For able counsel and assistance in many ways I am indebted to my good friend, Prof. Wm. Trelease, director Missouri Botanical Garden. To Dr. N. M. Glatfelter, whose familiarity with the Willows of Missouri was of material assistance to me, I am likewise grateful. So, too, to Mr. G. W. Letterman, with whom I made several visits to the valley of the Merrimac River, Mo. I wish to acknowledge favors extended by Mr. C. C. Laney and Mr. John Dunbar, of Rochester, Prof. C. H. Peck, of Albany, and Mr. J. G. Jack, of the Arnold Arboretum, in assistance to material illustrative of various species of Cratægus of their respective regions. To Mr. E. P. Clapp, Rev. E. J. Hill, Dr. J. Schneck, Mr. H. N. Patterson, Prof. B. O. Longyear, Prof. W. A. Buckhout, Prof. A. T. Erwin, Mr. V. R. Gardner, Mr. E. S. Steele, Mr. F. E. Boynton, Mr. T. G. Harbison, Dr. R. M. Harper, Mr. B. T. Gault, Mr. F. K. Balthis, Mr. A. J. Johnson and Mr. J. C. Teas, I wish also to extend thanks for assistance. Last, but by no means least, I gratefully acknowledge counsel and facilities extended in the use of herbarium material by Mr. Gifford Pinchot, Forester, and Mr. G. B. Sudworth, Dendrologist of the U. S. Forestry Service; by Dr. J. N. Rose of the National Herbarium, and by Dr. N. S. Britton, Director of the New York Botanical Garden.

Data as to specific gravities of woods has been taken from the Report of Tenth Census of the United States, and represent in each case the average of two or more determinations with absolutely dry wood taken from different trees.

LOWVILLE, N. Y., *June* 29, 1907.

EXPLANATION OF THE PLAN OF THE HANDBOOK.

In the illustrated portion two pages which face each other are devoted to a species, practically all of the well-defined species within the area indicated being included. The few exceptions will be found mentioned after their respective genera. (See pages 418–457.)

It will be observed that the background in the pictures of leaves, fruits and twigs are marked into squares. These are lines in all cases one inch apart; their deviation from that measurement, in the picture, indicating a proportional enlargement or reduction of the object, in order to make the plates of uniform size. On viewing the picture with the standard of measurement in mind the actual size of the object is at once evident.

The trees selected as subjects for pictures of barks are generally of medium size, as showing the phase of bark most commonly seen, and are such as could be called characteristic examples. The measure placed upon the trunks before photographing, to indicate size, is one foot in length, excepting when otherwise stated.

On the outline maps the shaded areas indicate the regions over which the trees are distributed, as indicated by outlying representatives, as nearly as is generally understood. Within the limits of such areas there are often tracts, of greater or less extent, where the tree in question is not found, on account of unfavorable conditions of altitude, perhaps, or of soil, moisture, etc., or of other less evident reasons. Such limited tracts could not be easily indicated on our much reduced maps. It cannot be claimed of these maps that they are always absolutely perfect, as trees may sometimes be found outside the areas generally accredited to them. In view of further perfecting the maps, for future use, the author would be obliged for whatever data the observers of trees may have and find it convenient to send that would be important to have in this connection.

The wood-structure pictures represent transverse sections (the end view of the grain) magnified uniformly about fifteen diameters. That is approximately the magnification secured by a good simple magnifier. Such a glass is quite essential in identifying woods, by comparison, having first exposed the end of the grain with a sharp knife to reveal its structure.

In the foot-notes, following the letter-press on the right-hand page, will be found such synonyms only as are used in recent works, where the names there adopted differ from the names used in this work. "A. W." indicates AMERICAN WOODS, in which work the species is further considered, especially with reference to its woods, and in which actual specimens of same may be seen. The Roman numeral indicates the part or volume in which a species is found and the Arabic numeral its serial number. (See pages following the index at close of this volume.)

KEY TO THE FAMILIES BASED MAINLY UPON FLOWERS.

---

a Flowers unisexual, with ovules naked on the face of a scale; leaves parallel-veined (*Gymnospermæ*), monœcious; ovules 2 or more with each scale; stamens numerous; fruit a cone with imbricated scales or so modified as to resemble a berry.
Coniferæ (p. 418).
a² Flowers with ovules inclosed in a cavity — ovary — (*Angiospermæ*) and the parts of the flower in 4s or 5s; cotyledons 2 (*Dicotyledons*); flowers
b Without a corolla (*Apetalæ*),
c Unisexual and
d Calyx absent or irregular if present; flowers appearing
e After the leaves, the staminate
f From axillary buds on growth of the previous season, in drooping aments; pistillate solitary or in few-flowered spikes terminating new shoots on the same tree; fruit a nut; leaves compound, deciduous..... **Juglandaceæ** (p. 423).
f² From the axils of evergreen simple leaves, in erect aments; fruit a wax-coated berry . . . . . **Myricaceæ** (p. 424).
f³ Mostly from the axils of bud-scales at the base of new shoots and in
g Drooping
h Long-peduncled heads; the pistillate solitary or in pairs terminating shoots on the same tree..... **Fagus, in Fagaceæ** (p. 429).
h² Slender drooping aments; pistillate flowers from axils of leaves on the same shoots ..... **Quercus, in Fagaceæ** (p. 430).
g² Erect axillary aments; the pistillate at the bases of the same aments.
Castanea, in Fagaceæ (p. 430).
f⁴ In heads arranged in terminal racemes.
Liquidambar, in Hamamelidaceæ (p. 437).
e² Before or with the leaves
f From axillary buds which are
g Covered with one or more bud-scales
h Both staminate and pistillate flowers in aments and on different trees.
Salicaceæ (p. 425).
h² Staminate only in aments; the pistillate in slender terminal spikes on same tree ..... **Carpinus, in Betulaceæ.**
h³ In panicles, dicœcious, without petals; leaves compound; fruit a samara.
Fraxinus, in Oleaceæ.
g² Naked — not covered with true bud-scales; ovary superior; fruit an elongated compressed drupe ..... **Leitneriaceæ** (p. 425).
f² Terminating shoots of the previous season and
g The staminate (only) remaining naked during the previous winter; the pistillate in spikes from lateral buds; staminate aments
h Simple; fruit a strobile.. **Betula, in Betulaceæ** (p. 428).
h² Compound, 2–5 (usually 3) united at base; fruit resembling a hop.
Ostrya, in Betulaceæ (p. 428).
g² Both staminate and pistillate remaining naked during previous winter, on same branchlets ..... **Alnus, in Betulaceæ** (p. 429).
d² Calyx present and regular: flowers appearing after the leaves; dicœcious; calyx becoming enlarged and succulent in the compound fruit.
Moraceæ (p. 433).
c² Perfect: calyx present, regular; ovary superior, 1-celled and usually 1-seeded; flowers in fascicles or racemes before or with the leaves: fruit a
d Samara, winged
e Nearly or quite all around..... **Ulmus, in Ulmaceæ** (p. 432).
e² Obliquely from one end and arranged in pairs.
Acer, in Aceraceæ (p. 446).
d² Drupe . . .. **Lauraceæ** (p. 435).
b² With a corolla and that consisting of
c Separate petals (*Polypetalæ*)
d Ovary superior
e Flowers perfect and
f Regular
g Calyx consisting of three sepals; stamens numerous; pistils
h Numerous, from an elongated receptacle; ovary 2-ovuled.
Magnoliaceæ (p. 434).
h² Few, from a globose receptacle; ovary many-ovuled.
Asimina, in Anonaceæ (p. 435).

g² Calyx consisting of five sepals; stamens
h Eight but four imperfect; flowers in autumn.
Hamamelis, in Hamelidaceæ (p. 436).
h² Numerous; pistil solitary and
i Single-celled; fruit a drupe.
Prunus, in Rosaceæ (p. 440).
i² Five-celled; leaves deciduous; fruit
j Indehiscent, a dry nut-like drupe attached to a seed-leaf which serves as a parachute ..... **Tiliaceæ** (p. 448).
j² Dehiscent, 5-valved capsule; leaves persistent.
Gordonia, in Theaceæ (p. 449).
g³ Calyx 4–5-lobed; stamens as many as the petals and
Alternate with the petals which are widely spreading.
Euonymous, in Celastraceæ (p. 446).
Opposite the petals which are hood-like and envelope them.
Rhamnus, in Rhamnaceæ (p. 448).
f² Irregular
g Leaves pinnately compound or bicompound; fruit a legume.
Leguminosæ (p. 441).
g² Leaves palmately compound; capsule with large nut-like seeds; some flowers unisexual by abortion ..... **Hippocastanaceæ** (p. 447).
e² Flowers polygamous; fruit a
f Samara
g Winged all around..... **Ptelea, in Rutaceæ** (p. 444).
g² With long oblique wing and borne in pairs.
Aceraceæ (p. 446).
f² Capsule containing a solitary seed; leaves pinnate.
Xanthoxylum, in Rutaceæ (p. 443).
f³ Drupe in terminal open thyrses.
Sapindus, in Sapindaceæ (p. 447).
e³ Unisexual
f Mostly dicœcious and occasionally perfect; fruit a
g Samara; leaves pinnate.... **Ailanthus, in Simarubaceæ** (p. 444).
g² Small dryish drupes in terminal thyrses or axillary panicles.
Anacardiaceæ (p. 444).
g³ Larger berry-like drupes in small axillary clusters or solitary.
Ilicaceæ (p. 445).
f² Monœcious, in dense globose heads; leaves alternate, simple and palmately veined; fruit an akene..... **Platanaceæ** (p. 437).
d² Ovary inferior; fruit
e Drupaceous; leaves
Twice pinnate; styles and cells of ovary 4–5.
Araliaceæ (p. 450).
Simple; styles solitary ..... **Cornaceæ** (p. 450).
e² A pome..**Pyrus, Sorbus, Cratægus and Amelanchier, in Rosaceæ** (p. 438).
c² United petals
d Ovary superior; flowers perfect; fruit a
e Capsule with
f Five cells and five valves.
Rhododendron, Kalmia and Oxydendrum, in Ericaceæ (p. 451).
f² Two cells septicidally dehiscent; flowers blue.
Paulownia, in Scrophulariaceæ (p. 457).
e² Berry subtended by accrescent calyx.
Diospyrus, in Ebenaceæ (p.. 453).
e³ Fleshy drupes in
f Axillary fascicles ..... **Bumelia, in Sapotaceæ** (p. 452).
f² Loose terminal panicles..... **Chionanthus, in Oleaceæ** (p.. 455).
e⁴ Dryish drupe; leaves simple and
f Alternate; flowers in crowded axillary clusters.
Symplocaceæ (p. 453).
f² Opposite; drupe 4-winged..... **Styraceæ** (p. 454).
e⁵ Pod-like capsule; flowers bilabiate in conspicuous terminal panicles.
Catalpa, in Bignoniaceæ (p. 456).
d² Ovary inferior; flowers perfect; corolla
e Campanulate; stamens 10; anther cells opening by a terminal pore: fruit a berry.
Vaccinium, in Ericaceæ (p. 452).
e² Rotate; flowers in compound corymbs; fruit a blue drupe with flattened pit.
Viburnum, in Caprifoliaceæ (p. 451).
e³ Tubular-funnelform; flowers in globose heads; leaves opposite or in whorls of 3.
Cephalanthus, in Rubiaceæ (p. 456).

THE NATIVE AND NATURALIZED TREES OF THE REGION OF NORTH AMERICA LYING NORTH OF THE NORTHERN BOUNDARIES OF NORTH CAROLINA, TENNESSEE, ARKANSAS AND OKLAHOMA AND EAST OF THE ROCKY MOUNTAINS, AND EXTENDING SOUTHWARD IN THE APPALACHIAN REGION TO NORTHERN ALABAMA AND GEORGIA.

WHITE PINE

Pinus strobus L.

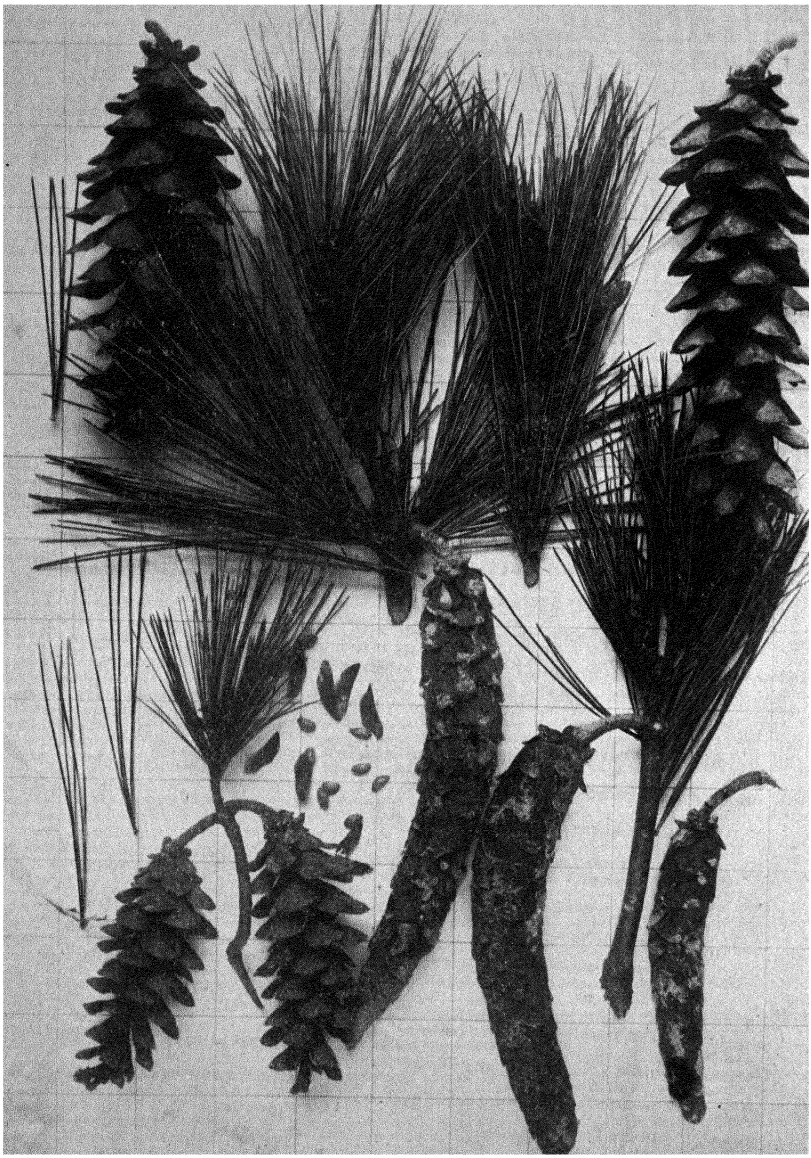
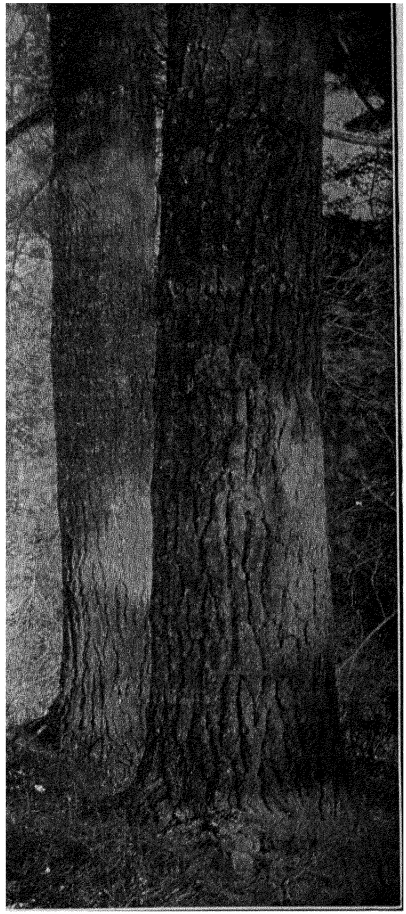


Fig 1. Branch with mature cones bearing beads of pitch, 1; detached clusters of leaves, 2; seeds, some detached from their wings, 3; young cones in autumn of first year, 4.
2. Trunks of two trees in Adirondack region, N. Y.
3. Wood structure magnified 15 diameters.

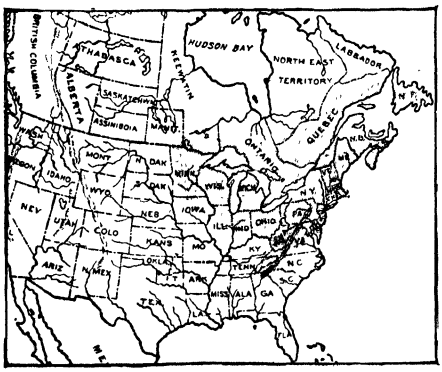
The White Pine is one of the tallest trees of the forests of northeastern America, sometimes attaining the height of 200 ft. with a long columnar trunk 3–5 ft. in diameter. When growing in the open it develops a wide pyramidal head easily distinguished from all other Pines by its bluish green fine-needled foliage and the dark deeply furrowed bark with which the large trunks are vested. It once constituted the bulk of large tracts of forest, but being by far the most valuable timber tree of its range these tracts have been largely cleared away to meet the needs and wastes of a growing population, and now only occasional monarchs, towering head and shoulders above the surrounding forests of other growth, suggest the magnificance of the primeval Pine forests. Fortunately it is quick to reproduce itself and many tracts of land, where cultivation has been neglected, become quickly covered with its new second growth.

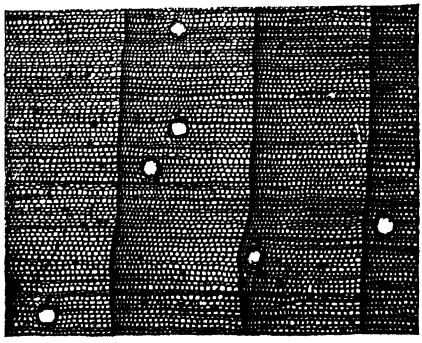
The wood of the White Pine is the most valuable of the Pines for house finishing, window-sash, blinds, etc. It is light, soft, very easily worked, durable and of a light pinkish brown color with thin lighter sap-wood. A cubic foot when absolutely dry weighs 24.02 lbs.[1]



Leaves in clusters of 5, with loose-scaled deciduous sheaths, very slender, 3-5 in. long, pale bluish green with 3-5 rows of ventral stomata, peripheral resin-ducts and a single fibro-vascular bundle; branchlets smooth, reddish green. *Flowers:* staminate yellow, about ⅛ in. long; pistillate pinkish purple, erect, terminal, peduncuIate. *Fruit:* cones become drooping and about half grown at the close of the first season, 4-10 in. long at maturity, long-stalked, cylindric and often curved, with thin unarmed scales and liberating their seeds in September; seeds about ¼ in. long, mottled and with large wings.[2]

1. A. W., II, 49.
2. For genus see p. 419.





ROCK PINE. ROCKY MOUNTAIN YELLOW PINE.

Pinus ponderosa scopulorum Engelm.[1]

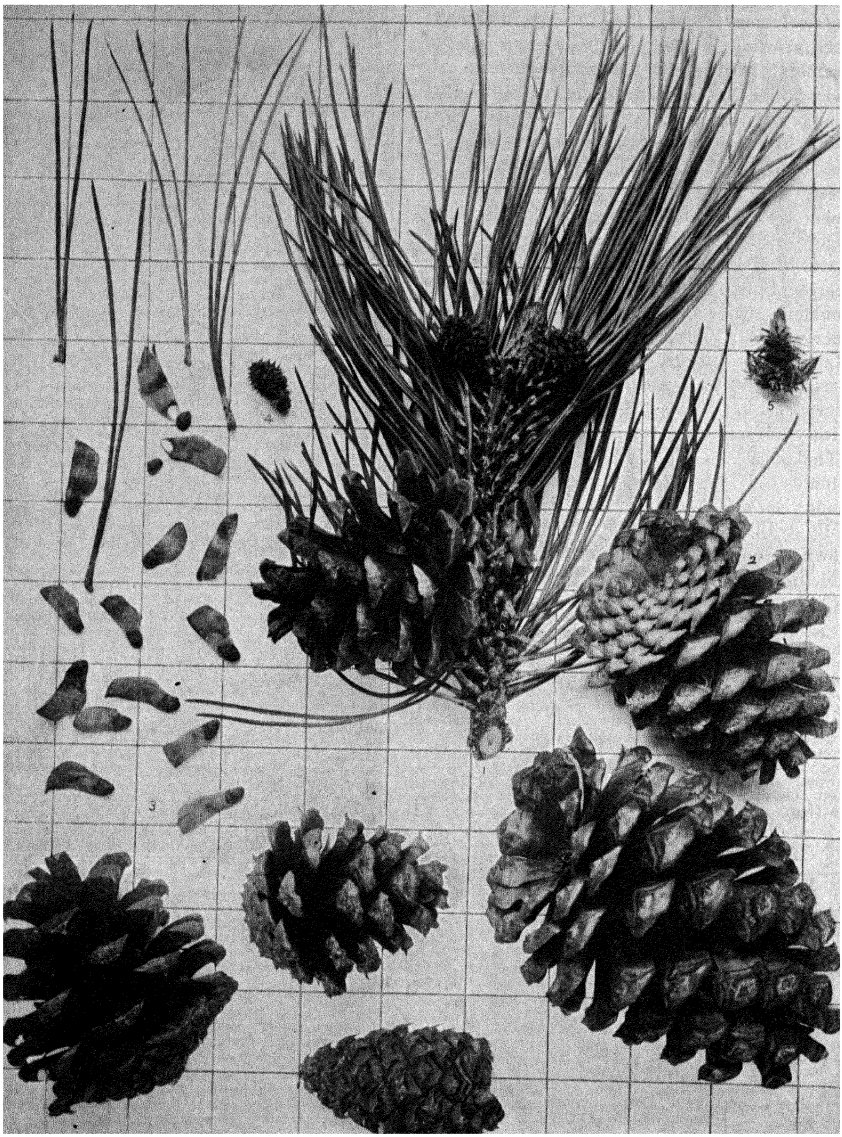


Fig. 4. Branch with mature cones and young cones at the close of the first season, 1; a detached cone, 2 (Note it has broken away from branch within the base, leaving a few scales attached to branchlet); seeds and their wings, 3; detached terminal and branch buds, 4.
5. Trunk of forest tree with cones at base.
For these specimen and photograph of trunk I am indebted to Prof. B. O. Longyear.

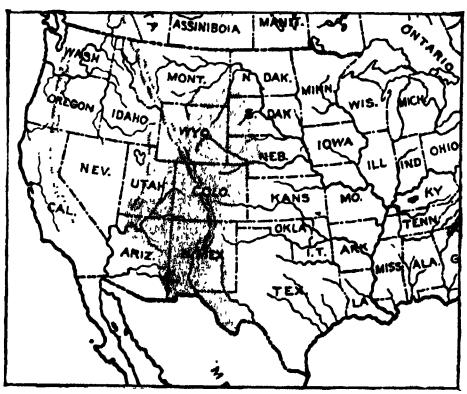
The Yellow Pine of the Rocky Mountain region is usually a medium size tree of from 50–70 ft. in height with trunk from 1–2 ft. in diameter, but where conditions are particularly favorable attains the height of 100 to 125 ft., with trunk 3–4 ft. in diameter. The bark of the younger trunks is dark and fissured into rather firm scaly ridges but these flake off with age and the bark of old trunks is more of a cinnamon-red color and broken into large scaly plates. It develops a distinct pyramidal head at first and by the gradual lengthening of the lateral branches finally a broad rounded top. It occupies well-drained uplands and mountain slopes, being particularly abundant in the Black Hills of Dakota, in northwestern Nebraska and on the mountains of Colorado at altitudes ranging from six to ten thousand feet. On the Colorado plateau of northern Arizona and New Mexico it forms vast and valuable forests.

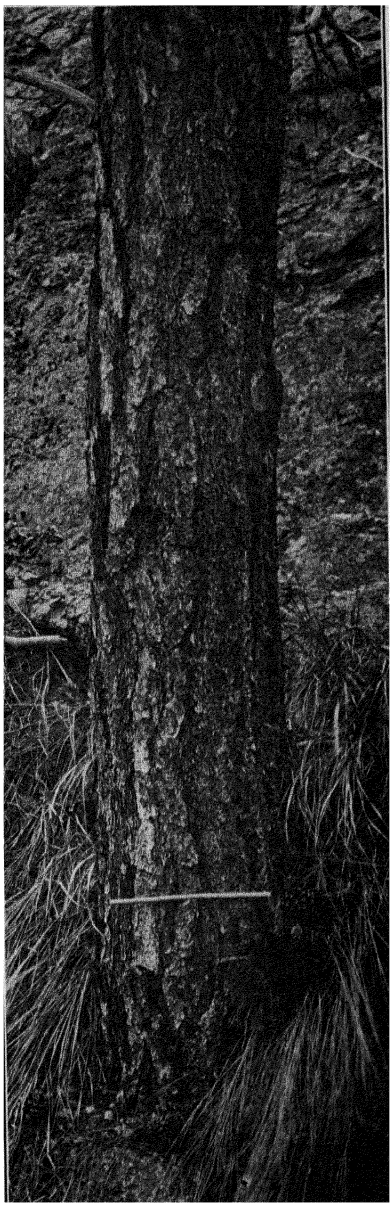
Its peculiarity in having leaves both in clusters of two and three is exceptional to the usual habit of the Pines.

The wood is rather hard, heavy and strong and useful for lumber for general construction purposes, interior finishing, etc.

Leaves both in clusters of 2 and 3, 3-6 in. long, rigid, with sheaths at first close and about ½ in. long but finally loose and shorter, stomatiferous all sides and containing 2 fibro-vascular bundles and 2-5 resin-ducts within the parenchyma. *Flowers:* staminate about 1 in. long. *Fruit:* cones 2-4 in. long, ovoid, deciduous above the lowest basal scales, somewhat oblique with scales thickened at apex and covered with slender strongly recurved prickles; seed ¼ in. long with ample wing broadest in the center.

1. Syn. *P. Scopulorum* Lem.





LOBLOLLY PINE. OLD-FIELD PINE. ROSEMARY PINE.

Pinus Taeda L.

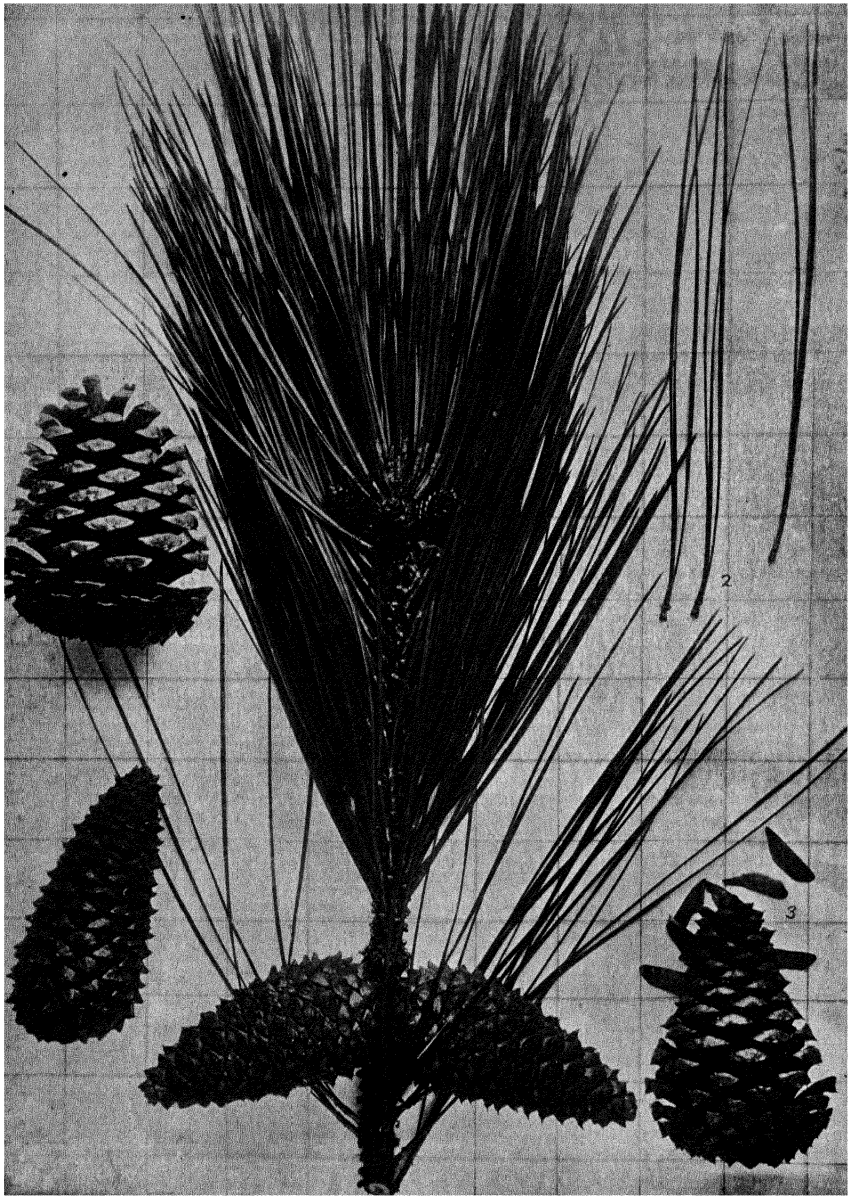


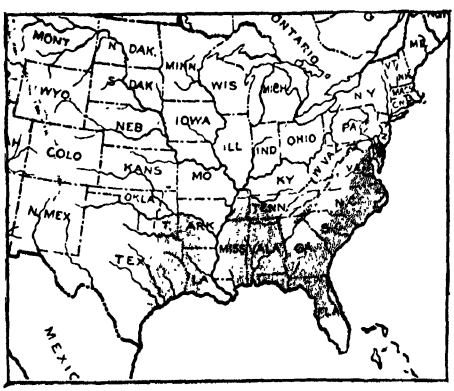
Fig. 6. Branch with leaves, mature cones and young cones, 1; detached leaf-clusters, 2; cone with escaping seeds, 3.
7. Trunk of a large tree in Eastern Virginia.

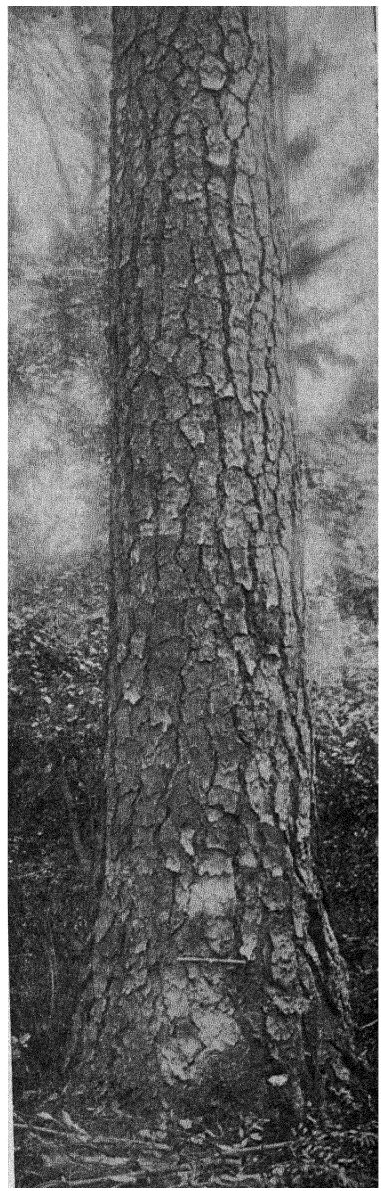
The Loblolly Pine sometimes attains the height of 125 ft. with straight trunk 2 ft. in diameter and, when growing in the open, with spreading branches which form a rounded pyramidal head. Like several others of the southern trees it extends up into the territory covered by this handbook only in the coast region, where its somber tops of dark green are familiar objects along the borders of swamps and lowlands, in company with the Short-leaf Pine, Sweet and Sour Gums, Spanish, Pin, Laurel and other Oaks, Mokernut Hickory, etc.

The wood is rather brittle, weak, coarse-grained and not durable, of a yellowish brown color and abundant lighter sap-wood. It is largely manufactured into lumber for interior finishing, general construction purposes and for the spars of vessels. The weight of a cubic foot when dry is 33.90 lbs.[1]

Leaves in clusters of 3, with close persistent sheaths, rather slender and stiff, dark green, 6-9 in. long, with large stomata on each face and two fibro-vascular bundles. *Flowers:* staminate yellow, crowded; pistillate solitary or few together, lateral (below the apex of growing shoot) yellow, short-stalked. *Cones* 3-5 in. long, lateral spreading, subsessile, reddish brown; scales thickened at apex with prominent transverse ridges and spreading prickle. The cones often remain on the branches for a year after liberating the seeds. These are mottled, about ¼ in. long and provided with a large wing broadest above the middle.

1. A. W., XI, 274.





PITCH PINE.

Pinus rigida Mill.

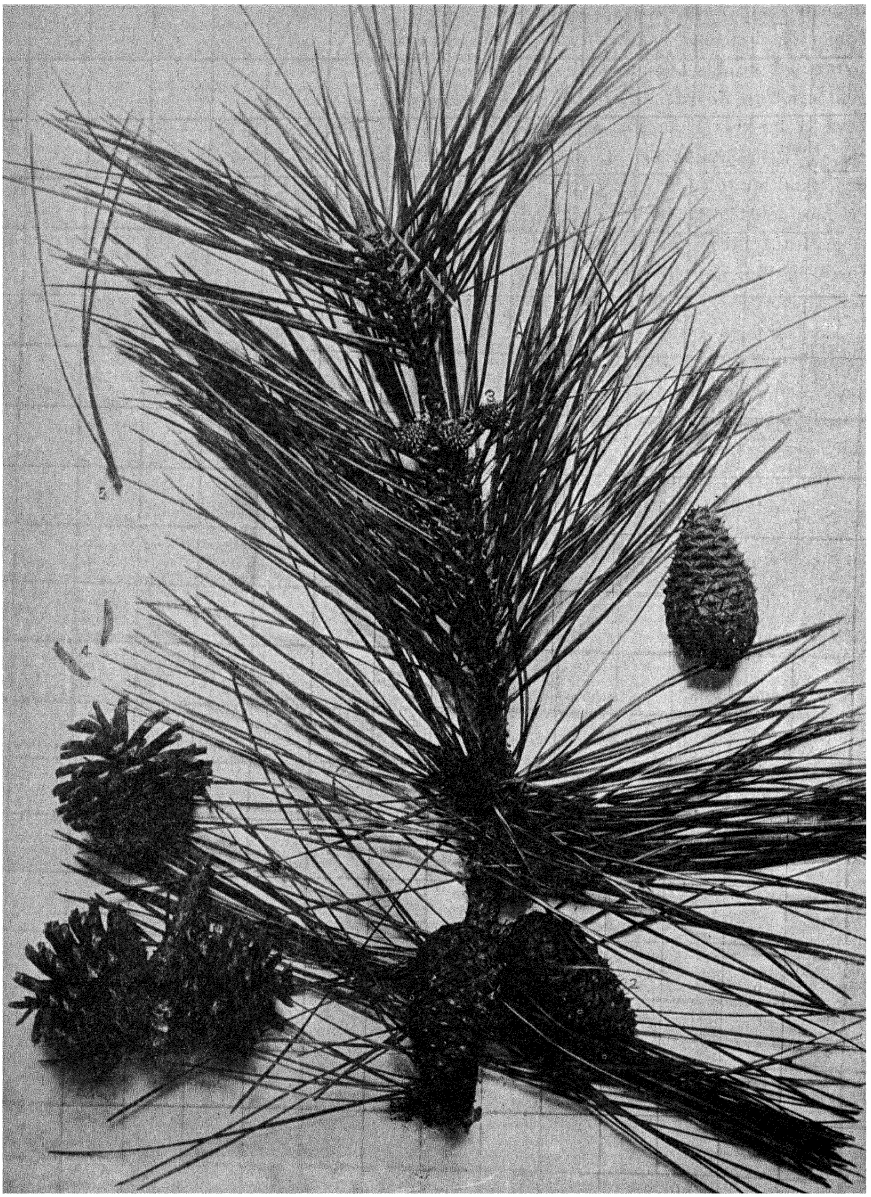


Fig. 8. Branch with leaves and mature and young cones, 1–3; seed-wings, 4; detached leaf-clusters, 5.

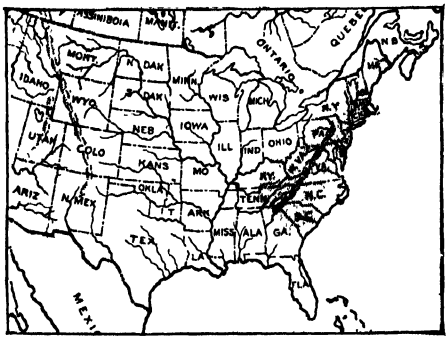
9. Trunk of a forest tree near Washington, D. C.

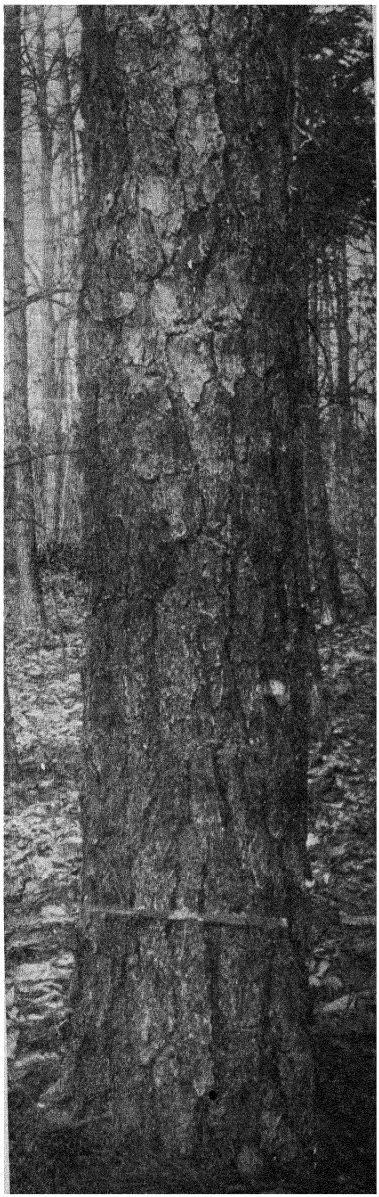
The Pitch Pine does not often attain a greater height than 70 or 80 ft. or a greater diameter of trunk than 2 or 3 ft. When growing in the open fields it develops an irregular wide pyramidal or rounded head, its rough branches usually bristling with old tardily deciduous cones. Its trunk is vested in thick dark brown bark fissured into large plates which exfoliate in irregular friable scales. It is an abundant tree in many localities of the northern states on sandy uplands which are too sterile for the support for most other trees.

The wood of the Pitch Pine is of medium weight and hardness, with coarse conspicuous grain, resinous and of a brownish red color with abundant lighter sap-wood.[1] It is used for coarse lumber, flooring, sills, etc., and to some extent for fuel and charcoal. A cubic foot, when seasoned, weighs 32.10 lbs. It is said that considerable tar, turpentine and lampblack have been derived from this tree, though the principal source of supply now is in other species.

Leaves in clusters of 3, with persistent sheaths, rigid, 3-5 in. long, dark green, with stomata on three faces, resin-ducts within the parenchyma, and 2 fibro-vascular bundles. *Flowers:* staminate numerous, yellow (rarely purple); pistillate lateral, usually in whorls of 2 or more, reddish green, with short stout stems. *Cones* 1-3 in. long, lateral, often in whorls of several, ovoid, nearly sessile, with scales thickened at apex and provided with curved rigid prickle; seeds about ¼ in. long, triangular with rounded sides and ample wing broadest below the middle.

1. A. W., II, 50.





RED PINE. "NORWAY" PINE.

Pinus resinosa Ait.



Fig. 10. Branch with leaves and mature and young cones, the former bearing considerable free pitch; 1; seeds, 2; detached leaf-clusters, 3.

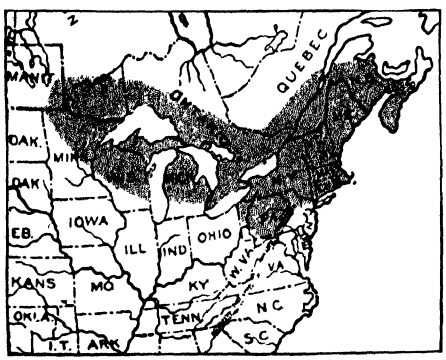
11. Trunk of tree, in Lewis Co., N. Y.

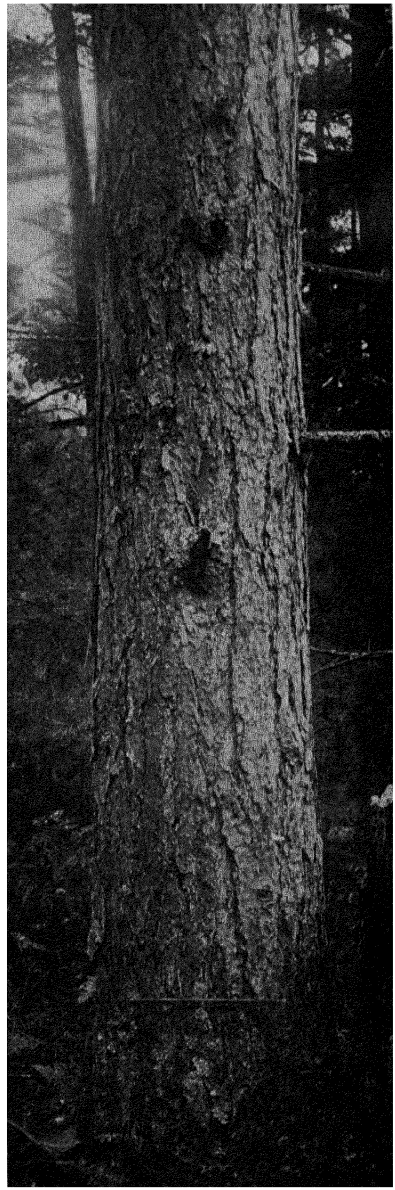
The Red Pine occasionally attains the height of 80 or 100 ft. with broad irregular pyramidal head and dark green foliage tufted in thick needles at the ends of its rough branchlets. It is an upland tree, being found on dry sandy soil and is distinctly northern in its distribution. Never forming exclusive tracts of forest of any size, it is scattered in open groves where conditions favor its development, and many of the slopes and ridges which overlook the lakes of the Adirondacks and New England are beautified by the presence of this tree. Its straight columnar trunks, rarely over 2 or 3 ft. in diameter, are vested in a reddish brown bark (hence the name) fissured into broad irregular plates and ridges which flake off in irregular scales.

The wood is moderately heavy and hard and is valued for the spars of vessels, piles, sills, and lumber for general construction purposes. A cubic foot of the dry wood weighs 30.25 lbs.[1] The bark is occasionally used for tanning purposes.

Leaves in clusters of 2 with persistent sheaths, rather slender, 4-6 in. long, bearing stomata on the ventral faces containing peripheral resin-ducts and 2 fibro-vascular bundles. *Flowers:* staminate about ½ in. long, in ample clusters, dark purple; pistillate subterminal, scarlet and with short stalks. *Cones* subterminal, ovoid-conical, about 2 in. long, subsessile, thickened at the rounded apex and unarmed; seeds about ⅛ in. long, compressed, triangular-ovoid, mottled and with ample wing broadest below the middle and oblique at apex.

1. A. W., I, 19.





JACK PINE. GRAY PINE. NORTHERN SCRUB PINE.

Pinus divaricata (Ait.) Gord.[1]

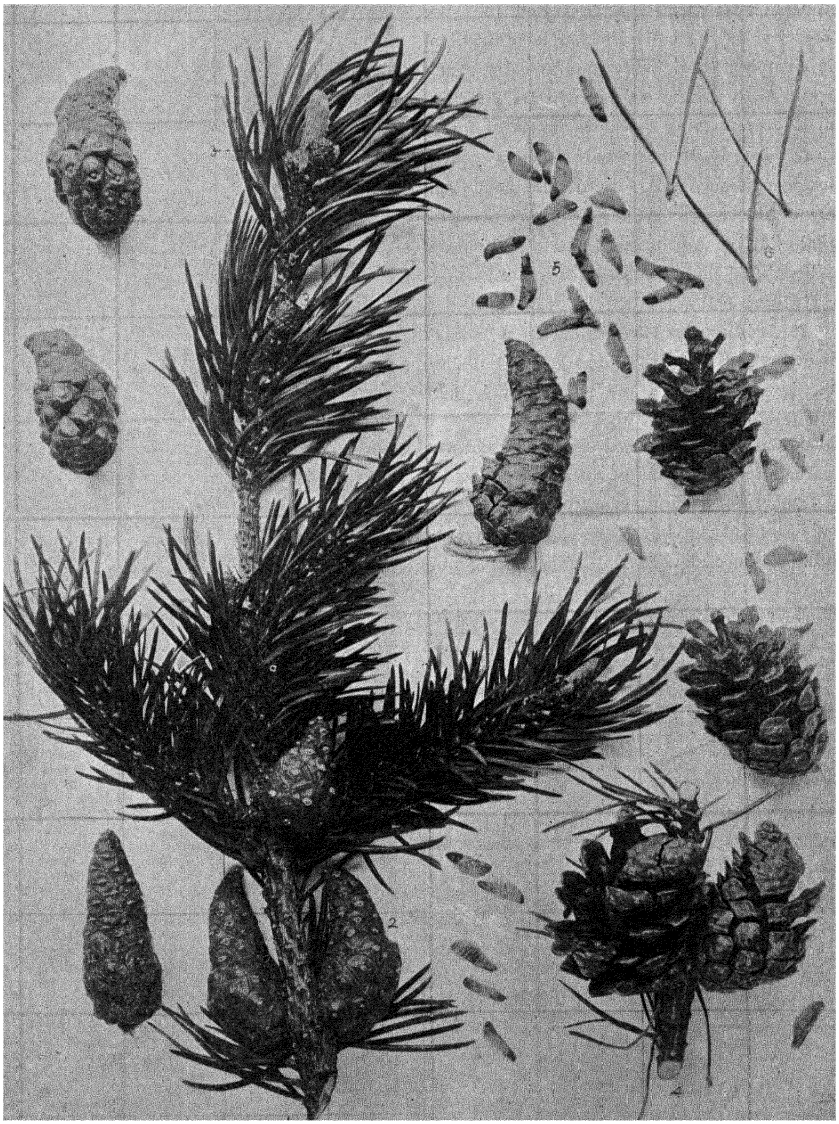


Fig. 12. Branch with leaves and closed mature and young cones, 1–3; section of branch bearing opening cones with escaping seeds, 4; scattered seeds, 5; detached leaf-clusters, 6.
13. Trunk of tree as found in Essex Co., N. Y.

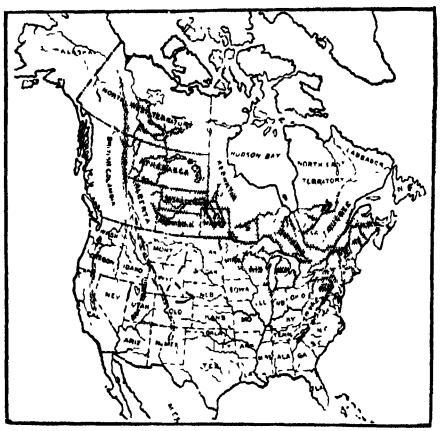
The Jack Pine attains its greatest size in the northwestern part of its range, where it is often 70 or 80 ft. in height with trunk 2 or 3 ft. in diameter, and forms forests of considerable extent. Throughout the eastern part of its range, however, it is much less abundant and more reduced in stature, commonly throwing out its branches immediately above the ground as shown in our bark picture. Its short needles and small cones incurved upon the branchlets quickly distinguish it from all of its neighbors. It develops a rather symmetrical open top of straightish branches and tough flexible branchlets and its trunk is vested in a dark reddish brown bark rough with irregular scaly plates and ridges.

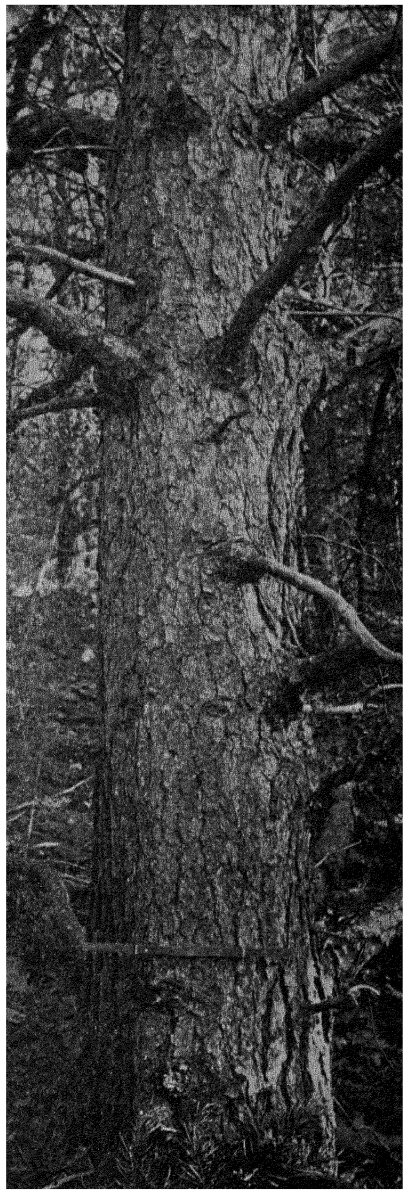
The wood, of which a cubic foot when absolutely dry weighs 29.67 lbs., is light, soft, not strong, and of a reddish brown color with thick lighter sap-wood. It is used for fuel and occasionally for railway ties, posts and lumber.[2]

Leaves in remote clusters of 2, ¾ to 1½ in. long, stout, spreading, more or less curved and distributed along the branchlet, with 2 fibro-vascular bundles and resin-ducts within the parenchyma. *Flowers:* staminate yellow, in crowded clusters; pistillate dark purple, singly or few together and occasionally clusters on same shoot. *Cones* small, 1½-2 in. long, pointed and strongly incurved, narrow conical-ovoid, oblique at base, sessile and scales thickened at apex and furnished with a weak incurved or deciduous prickle; seed rounded, triangular, nearly black and with full wing about ⅓ in. long and widest near the middle.

1. Syn. *P. Banksiana* Lamb.

2. A. W., IV, 99.





YELLOW PINE. SHORT-LEAF PINE. NORTH CAROLINA PINE.

Pinus echinata Mill.[1]

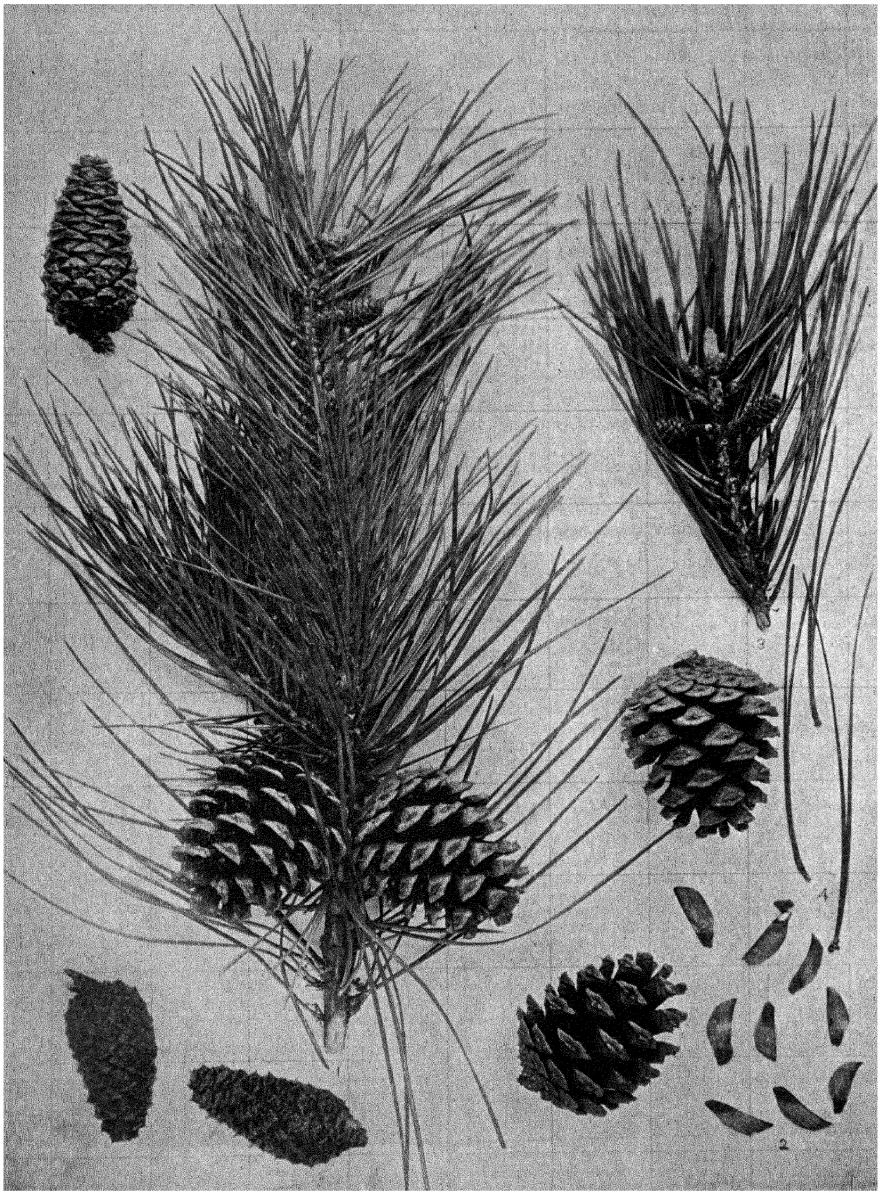


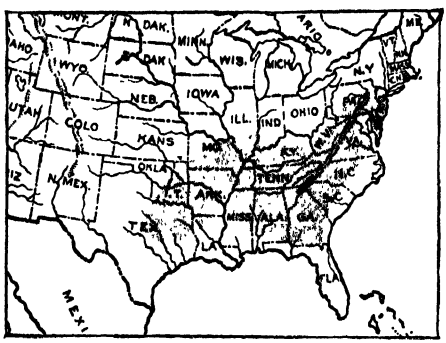
Fig. 14. Branch with leaves and mature and young cones, 3; detached leaf-clusters, 4.
15. Trunk of tree at Biltmore, N. C.

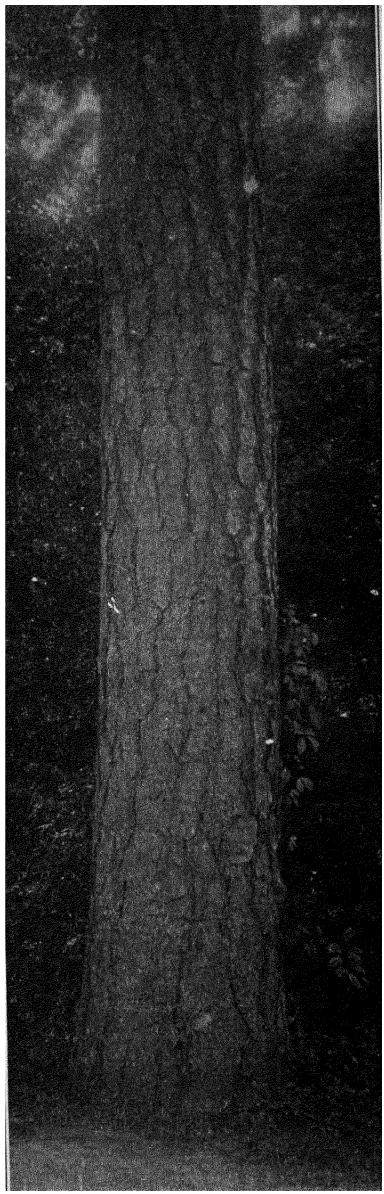
This valuable timber-tree occasionally attains the height of 100 ft., or somewhat more, with irregular wide pyramidal or rounded head and straight columnar trunk 3–4 ft. in thickness. Its bark is of a reddish brown color with wide irregular scaly plates and ridges. It is particularly abundant and well developed in the lower Mississippi basin and probably no other Pine produces as much lumber for use in the central-western states as this.

The wood, as a hard Pine, is considered only second to that of the Long-leaf Pine in value, and in being somewhat softer and less resinous than that is preferred to it for many uses. It is rather heavy and hard, a cu. ft. weighing 38.04 lbs., and of a reddish yellow color with thick lighter sap-wood. It is largely manufactured into lumber for interior finishing and general construction purposes.[2]

Leaves 3-5 in. long in clusters of 2 (occasionally 3) with persistent sheaths, rather slender, flexible, dark green; branchlets rough. *Flowers:* staminate yellowish purple, about ¾ in. long, in crowded clusters; pistillate pale rose-color, single or in whorls of 2 or 3 with stout stems. *Cones* oblong-ovoid, 1½-2 in. long, single or few together, subsessile, lateral and with scales thickened at apex and having a prominent transverse ridge and weak prickle; seeds round-triangular, about three-sixteenths in. long, mottled and with ample oblique wing broadest near the center.

1. Syn. *Pinus mitis* Michx.
2. A. W., III, 75.





JERSEY PINE. SCRUB PINE.

Pinus Virginiana Mill.[1]

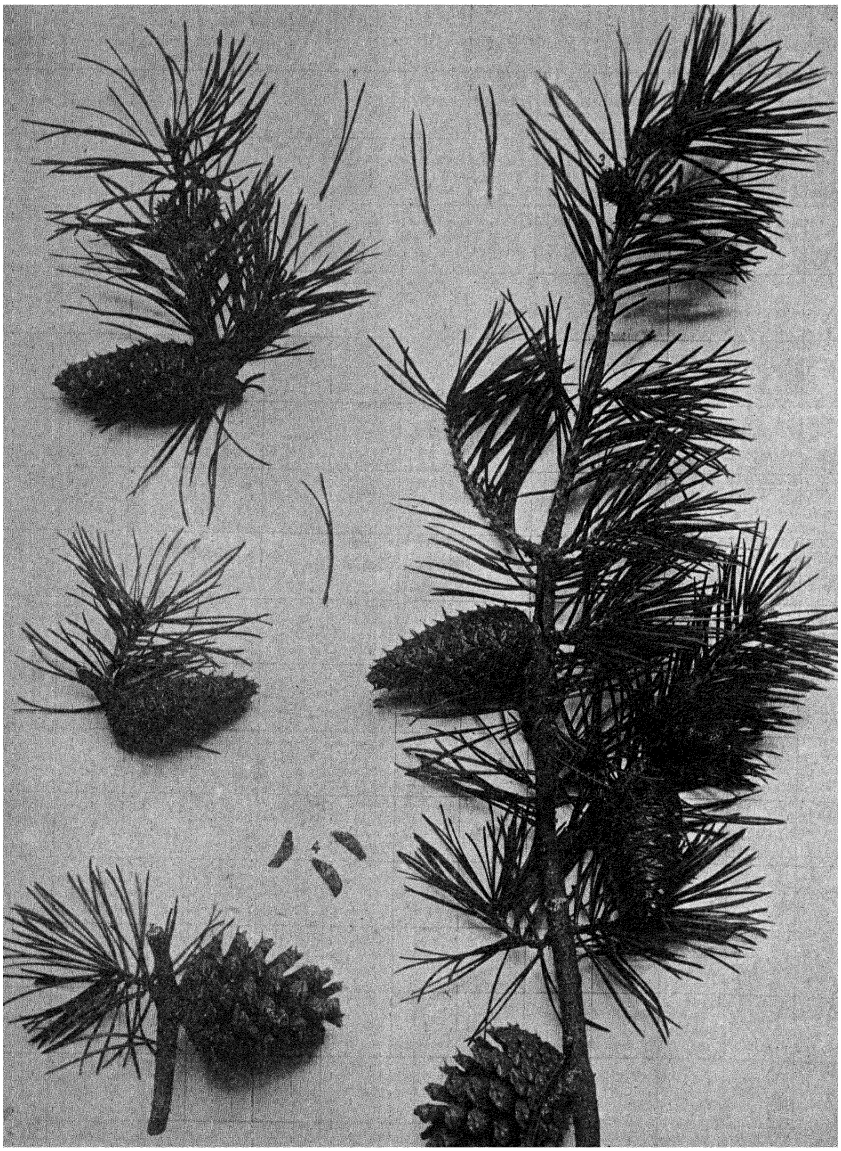


Fig. 16. Branch with leaves and mature and young cones, 1–3, seeds, 4; detached leaf-clusters, 5.
17. Trunk of tree near Washington, D. C.

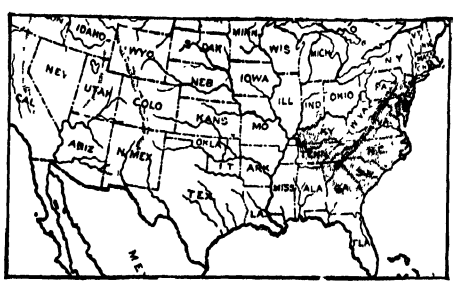
The Jersey Pine is usually a tree of medium stature, rarely more than 40 or 50 ft. in height, or of greater thickness of trunk than 18 in. In the western part of its range, however, particularly in southern Indiana, it sometimes attains twice the above dimensions. It develops a rather irregular wide rounded top of long and somewhat pendulous branches, though when young the trees are more of a pyramidal habit of growth. It is readily distinguished by its short twisted leaves distributed in pairs along its purple branchlets. The bark of trunk is dark reddish brown, rough with scaly irregular plates and ridges. The tree has little to recommend it from an ornamental or economic standpoint, its chief point of merit being the facility with which it propagates itself and covers neglected worn out agricultural land with new forest growth.

The wood is rather light, soft, not strong, brittle and of a light reddish brown color with abundant lighter sap-wood. A cubic foot when absolutely dry weighs 33.09 lbs. It is used for fuel and occasionally for lumber for general construction purposes.[2]

Leaves in remote clusters of 2, with small persistent sheaths, 1½ to 2½ in. long, dark green, stout, spreading, more or less curved and twisted, with many rows of stomata, 2 fibro-vascular bundles and resin-ducts in parenchyma; branchlets flexible and distinctly purple in color. *Flowers:* staminate orange-brown, in crowded clusters; pistillate pale and rose color, single or few together, with long stalks lateral upon the branchlets. *Cones* few, narrow ovoid, 2-3 in. long with scales thickened at apex and provided with a prickle; seeds compressed ovoid, nearly ¼ in. long and with ample wing broadest at about the center.

1. Syn. *Pinus inops* Ait.

2. A. W., IV, 98.



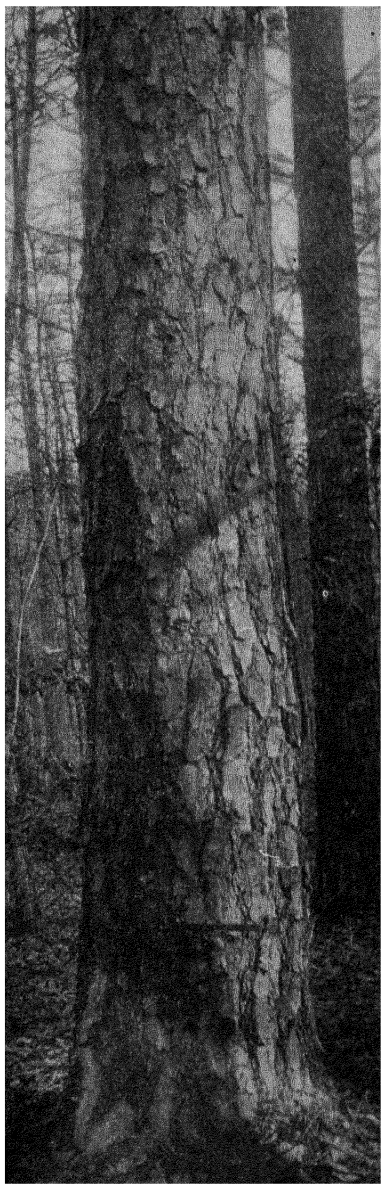


TABLE-MOUNTAIN PINE.

Pinus pungens Michx.



Fig. 18. Branch with leaves and mature and young cones, 1; seeds and detached scales of cone, 2; detached leaf-clusters, 3.

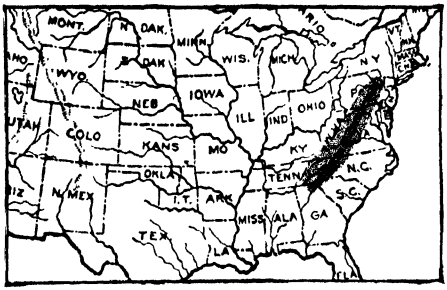
19. Trunk of tree with cones at base. Near Washington, D. C.

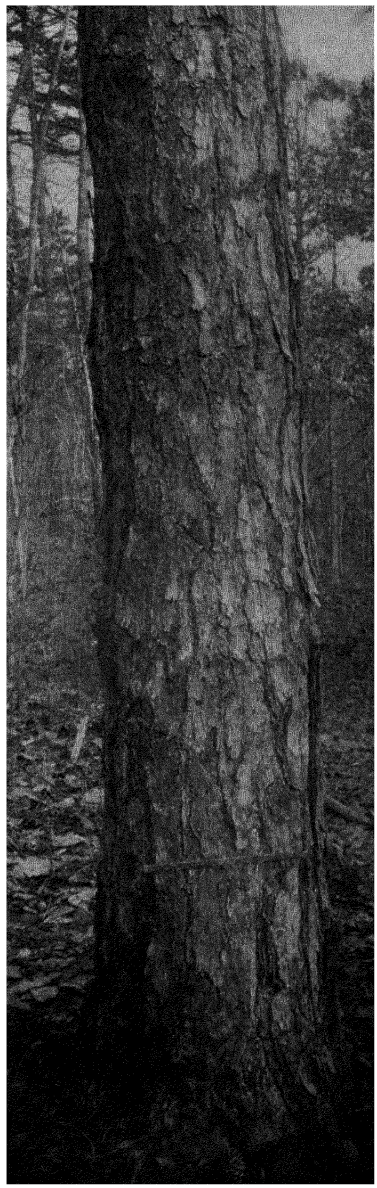
The Table-Mountain Pine deserves its name from being confined in its natural distribution mainly to the dry gravelly table-lands and slopes of the Appalachian Mts., though it is found to be hardy and thrives well when planted outside of this limited range — over the middle and eastern states generally. To the northward it is local in its distribution and generally scattered among other trees such as the Yellow, Pitch and Jersey Pines, Oaks, Hickories, etc., but in the southern Alleghenies it forms nearly exclusive forests of considerable extent. It rarely exceeds 60 or 70 ft. in height or 2 or 3 ft. in diameter of trunk, and develops a wide rounded or often irregular top. The bark of trunk is a dark reddish brown color rough with irregular scaly plates and ridges. A character by which it is readily distinguished from all other eastern Pines is its massive cones armed with very thick curved spines, more suggestive of various species of the Pacific slope than are those of any other eastern species.

Its wood is light, soft, brittle, coarse-grained and of a pale reddish brown color with thick lighter sap-wood. A cubic foot, when absolutely dry, weighs 30.75 lbs. It is little used excepting for fuel and charcoal.[1]

Leaves in crowded clusters of 2, 2-4 in. long with short persistent sheaths, stout, stiff, more or less twisted, with 2 fibro-vascular bundles and resin-ducts in parenchyma; branchlets short, dark brown and rough. *Flowers:* staminate yellow, in loose clusters; the pistillate long-stalked, lateral and generally in whorls of 2 to 5 or more. *Cones* short-ovoid, 3-4 in. long, lateral and in whorls upon the branchlet, oblique at base, sessile and with scales, especially those of the outer side near base, much thickened, with prominent transverse ridge and armed with a strong flat curved prickle; seeds rounded triangular, nearly ¼ in. long, and with wings broadest near the center.

1. A. W., XII, 298.





TAMARACK. EASTERN LARCH.

Larix Americana Michx.[1]

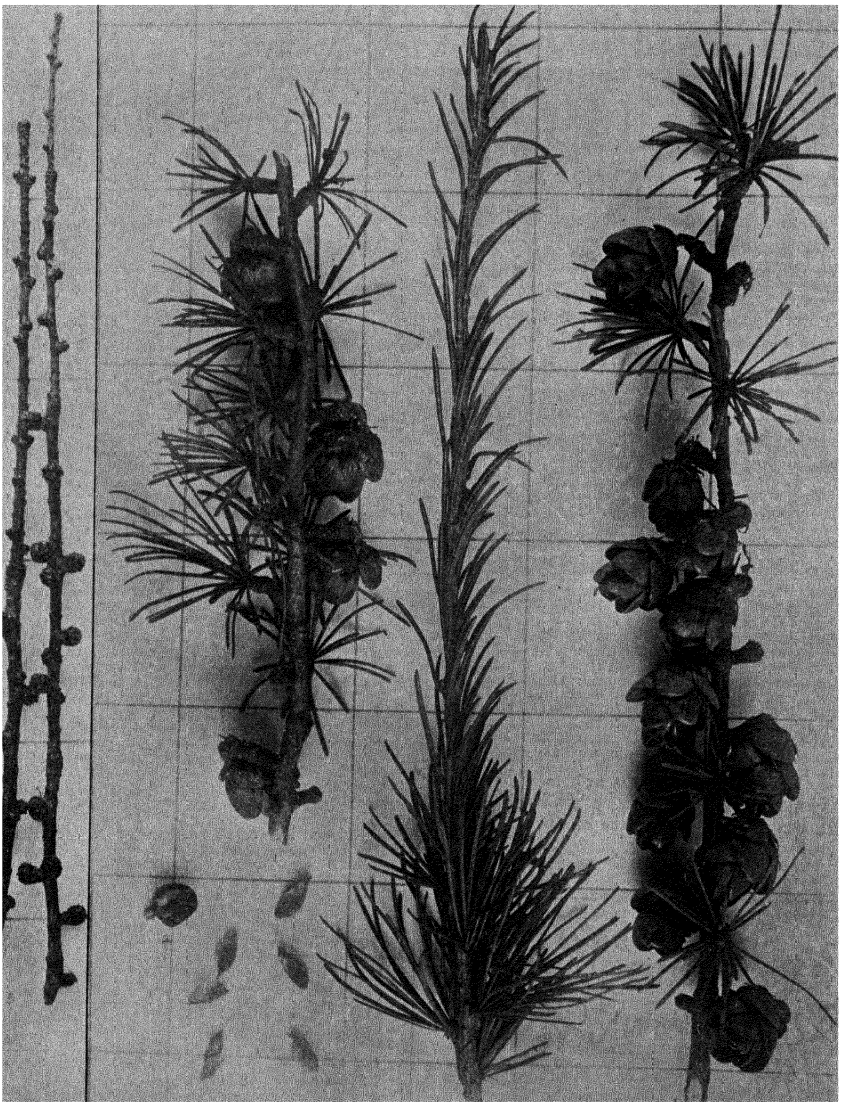


Fig. 20. Branchlets with fascicles of leaves and cones, 1; detached scale with its two seeds, 2; scattered seeds, 3; tip of branchlet showing solitary leaves on first season's growth, 4; branchlet in winter, 5.

21. Trunk of tree, in Lewis Co., N. Y.

22. Wood structure magnified 15 diameters.

The Tamarack is a beautiful tree not often over 60 ft. in height nor with trunk more than 2 ft. in thickness. Its trunk is usually straight and columnar or slightly tapering, with scaly bark showing little tendency to become ridged and its top is usually of narrow pyramidal form with short horizontal branches and open airy foliage. It is distinctively a tree of swampy lands, venturing farther out on low lake shores and quaking sphagnum bogs than any other tree excepting sometimes the Swamp Spruce and these regions it characterizes in summer with its pale green foliage or lights up in autumn with its covering of bright yellow. To the northward in its range where it is very abundant, it is found also on well drained uplands forming in places extensive tracts of open forest. With the Black Spruce it forms the vanguard of the forests in the subarctic regions and there maintains tree-form battling with the elements while its companion is prone upon the ground but still engaged in the struggle.

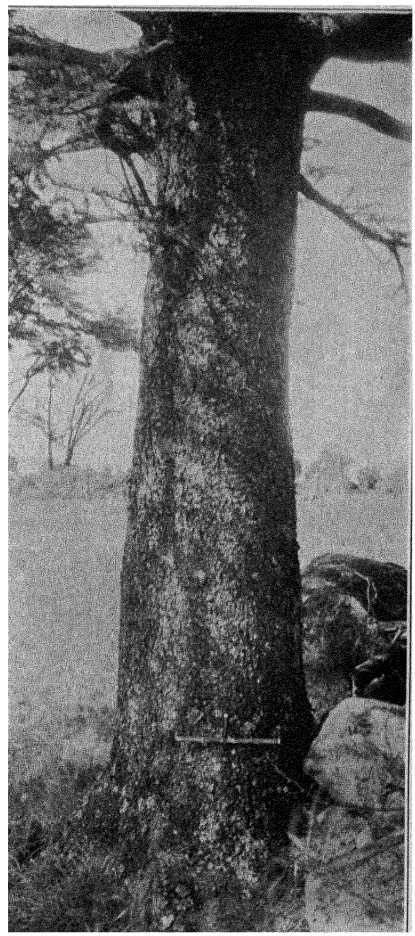
The wood, of which a cubic foot when dry weighs 38.86 lbs., is rather hard, heavy, strong and very durable in contact with the soil. It is of a light orange-brown color with thin lighter sap-wood and is valued for railway ties, posts, planks and lumber for interior finishing.[2]

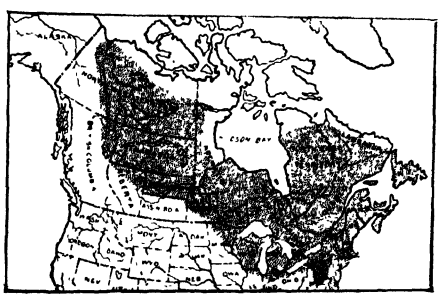
Leaves very slender, numerous, in fascicles on short lateral spurs, or singly on new shoots, ¾-1¼ in. long, linear, triangular, pale green, turning yellow and falling in autumn. *Flowers* appear with the leaves; staminate yellow, subglobose from leafless scaly buds; pistillate oblong with rose-red rounded scales, on lateral mostly leafy spurs. *Cones* oblong, about ½ in. long on short peduncles and composed of about 12 thin concave suborbicular persistent scales about twice as long as their bracts; seeds about ⅛ in. long, with light brown wing broadest at about the middle.[3]

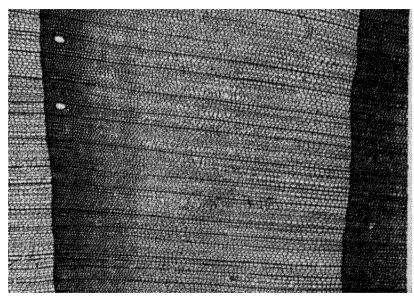
1. Syn. *L. laricina* (DuRoi) Koch.

2. A. W., I, 23.

3. For genus see p. 420.







BLUE SPRUCE. SILVER SPRUCE.

Picea Parryana (Andre) Sarg.[1]

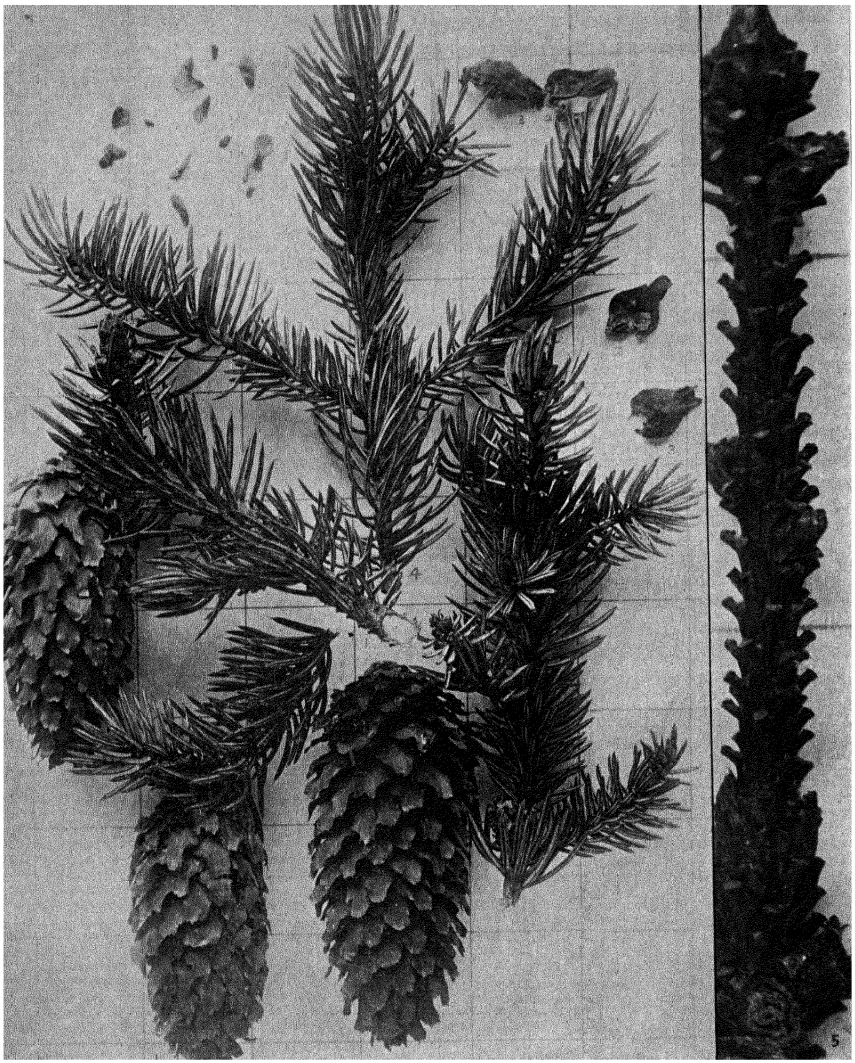
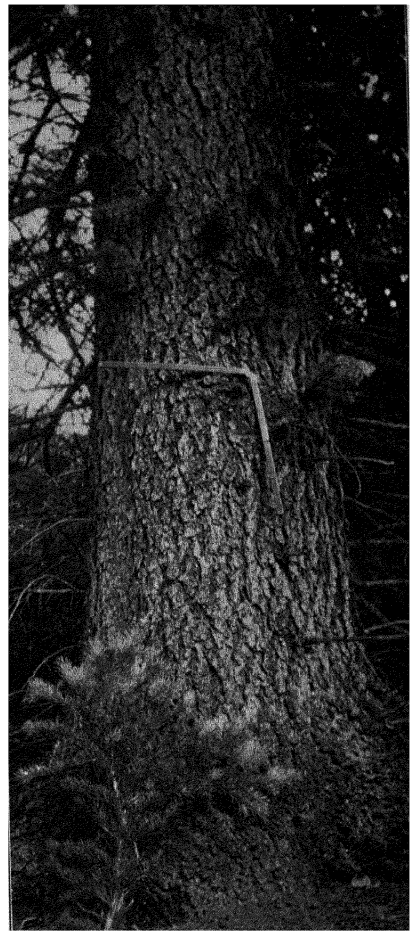


Fig. 23. Branchlets with leaves and mature cones, 1; detached scales, upper side (towards apex) showing seeds, 2; do, under side (towards stem), showing bract, 3; sterile branchlets, 4; branchlet from which leaves have been removed, magnified to show glabrous nature, persistent bases of leaves, etc., 5.

24. Trunk with foliage at base and 2-ft. rule. Rocky Mountains, Colo.

25. Wood structure magnified 15 diameters.



This beautiful Spruce is restricted in its natural home to the banks and vicinity of mountain streams of Colorado, Wyoming and Utah, between the altitudes of 6500 and 10000 ft. In these localities it sometimes attains in the forests a height of 100 or exceptionally 150 ft., with trunk 2–3 ft. in thickness and narrow often irregular open top. The isolated tree, however, especially in its youth, possesses a rare and unique type of beauty. Its branches grow out in symmetrical whorls of flattened sprays longest near the ground and successively shorter towards the top, forming a perfect and beautiful pyramid. This is farther enhanced by the massed foliage of silvery blue or tints ranging from that to a purplish blue or green, a single bed of seedlings presenting perhaps the entire range. Its beautiful form and color together with its hardiness make it one of the most valuable acquisitions for ornamental planting of recent years.

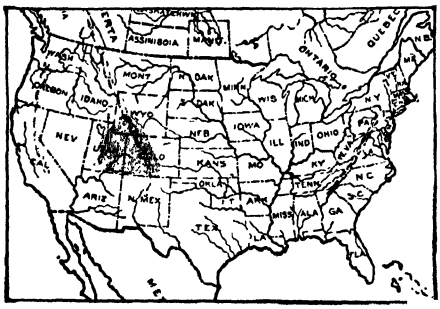
The wood of the Blue Spruce is light, a cu. ft. weighing 23.31 lbs., soft, with satiny surface and suitable for the uses mentioned of the Red Spruce.[2]

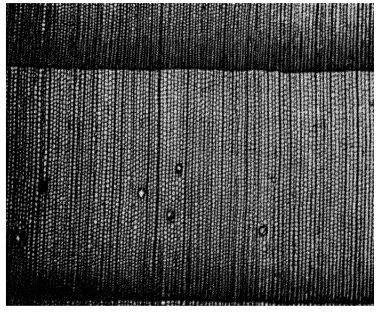
Leaves rigid, 4-sided, from ½ in. on fertile branches to 1⅛ in. long on sterile, curved, spiny, acuminate, bluish green to silvery or dull green; branchlets glabrous. *Flowers* reddish yellow; pistillate with broad denticulate scales and acute bract. *Fruit:* cones subsessile, oblong-cylindrical, 2½-4 in. long with glossy rhomboidal flexuose scales narrow and erose-dentate at the elongated apex; seed ⅛ in. long with short wide wing.[3]

1. Syn. *P. pungens* Engelm.

2. A. W., XI, 275.

3. For genus see p. 420.





WHITE SPRUCE.

Picea Canadensis (Mill.) B. S. P.[1]



Fig. 26. Portion of branch bearing cones, 1; seeds, 2; end of a sterile lower branchlet, 3; end of an upper sterile branchlet, 4; branchlet with leaves removed and magnified to show glabrous nature, persistent leaf-bases, etc., 5.

27. Trunk near Lake Placid, Adirondacks, N. Y.

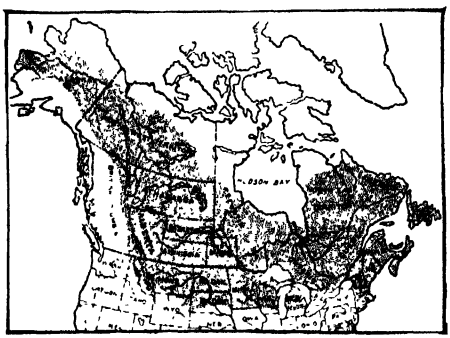
This handsome Spruce considerably resembles the Balsam Fir in habit of developing when isolated a symmetrical narrow pyramidal head of dense foliage, and then usually does attain a greater height east of the Rocky Mountains than 50 or 60 ft. When crowded in forests it attains a much greater height, sometimes even 150 ft., with straight trunk 3–4 ft. in diameter. Its bark is reddish brown, rough with irregular scales and its foliage has a marked and characteristic rank odor. In company with the Aspen, Canoe Birch, Balsam, Black Spruce, etc., it beautifies the banks of streams and lake shores of the far north, scarcely finding even in the climate of our northernmost states a temperature cold enough for its best development.

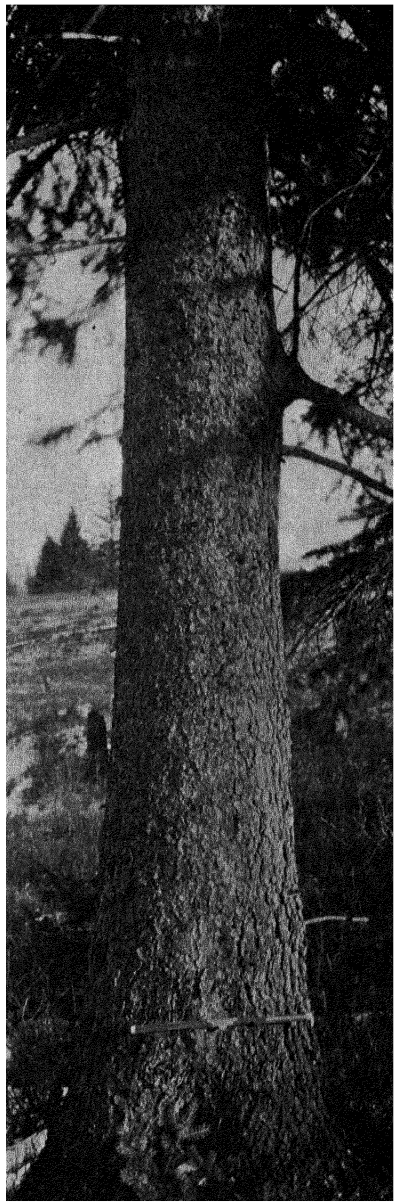
The physical properties and uses of the wood of the White Spruce are quite the same as those of the Red Spruce. A cubic foot when thoroughly seasoned weighs 25.25 lbs.[2]

Leaves ¼-1 in. long, incurved and crowded on the top of the branchlets, 4-sided with stomata on each side, glaucous green and with sharp rigid tips; branchlets glaucous. *Flowers* appear in May, oblong-cylindrical; staminate reddish yellow; pistillate greenish red with broad rounded entire scales and denticulate bracts. *Cones* nodding, slender, oblong-cylindrical, nearly sessile, about 2 in. long, mostly falling in autumn; obtuse at apex and with very thin nearly orbicular scales truncate or sometimes retuse and entire at apex; seeds about ⅛ in. long with large wing oblique at apex.

1. Syn. *Picea alba* Link.

2. A. W., IV, 100.





RED SPRUCE.

Picea rubens Sarg.[1]



Fig. 28. Branchlets with mature cones, 1; sterile lower branchlets, 2; detached scale, under side, 3; do, upper side, showing seeds, 4; separated seeds, 5; a terminal shoot, 6; branchlet magnified to show pubescence, 7.

29. Trunk and Rhododendron foliage in background. Alleghany Mountains, N. C.

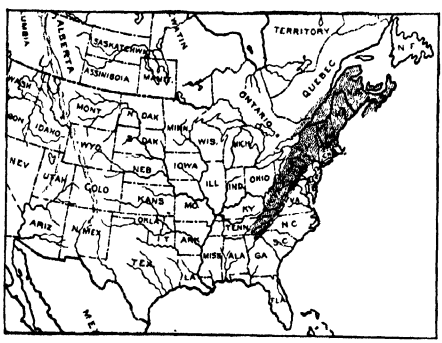
The Red Spruce occasionally attains the height of 100 ft., with trunk from 2–4 ft. in diameter, but usually is considerably smaller. When massed in the forests it develops a straight columnar trunk vested in a rather thin irregularly scaly reddish brown bark and small horizontal branches. Isolated trees, extending their lower branches farther out, downward and then curving gracefully upward, form a wide and rather open pyramidal top. It is one of the most abundant of the forest trees of northern New York and New England, where it is associated with the Hemlock, Beech, Yellow Birch, Sugar Maple, Butternut, etc. and in places forms quite exclusive tracts of forest.

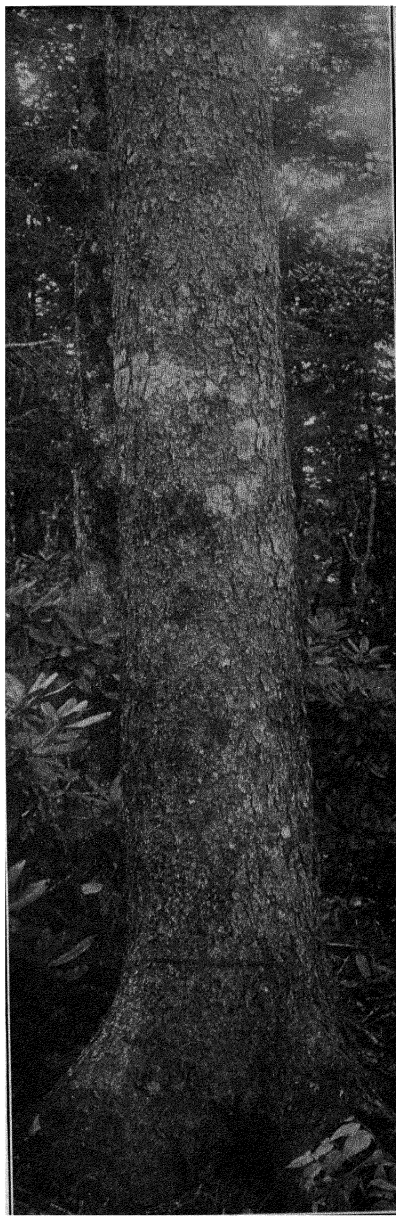
The wood is light, a cu. ft. when absolutely dry weighing 28.57 lbs., and moderately soft, but strong and elastic and is valued for lumber for general construction purposes, flooring, etc. and particularly for sounding boards for musical instruments. It is also extensively used for paper-pulp and its resinous exudation yields a large part of the Spruce Gum of commerce.[2]

Leaves from ½-¾ in. long, incurved, with acute callous tips, lustrous dark green with 4 rows of stomata above and 2 rows beneath on each side of midrib; branchlets stout, pubescent. *Flowers* open in May: staminate oblong-cylindrical; pistillate oblong with reflexed and thin rounded scales and small bracts. *Cones* ovoid-oblong, 1¼-2 in. long on short straight or incurved stalks, acute at apex with rigid puberulous scales rounded and entire or slightly eroded at apex, green or purplish, mostly falling in autumn or early winter and becoming brown; seeds dark brown, about ⅛ in. long with wing broad and rounded above the middle.

1. Syn. *P. rubra* (Poir.) Diet. *Abies nigra* Poir. (in part).

2. A. W., I, 20.





BLACK SPRUCE. SWAMP SPRUCE.

Picea Mariana (Mill.) B. S. P.[1]



Fig. 30. Branchlets with cones, 1; scale of cone, under side showing bract, 2; do, upper side, showing seeds, 3; separated seeds, 4; end of a terminal shoot, 5; leafless branchlet enlarged to show pubescence, etc., 6.

31. Trunk with spray of foliage at base. Near Lake Placid, N. Y.

The Black Spruce in forest growth, where climate and conditions are most favorable, is found sometimes attaining the height of 80–100 ft., with a trunk 2–3 ft. in diameter, but such conditions are only found in regions north of the United States where the climate is too severe for the endurance of most of our trees.

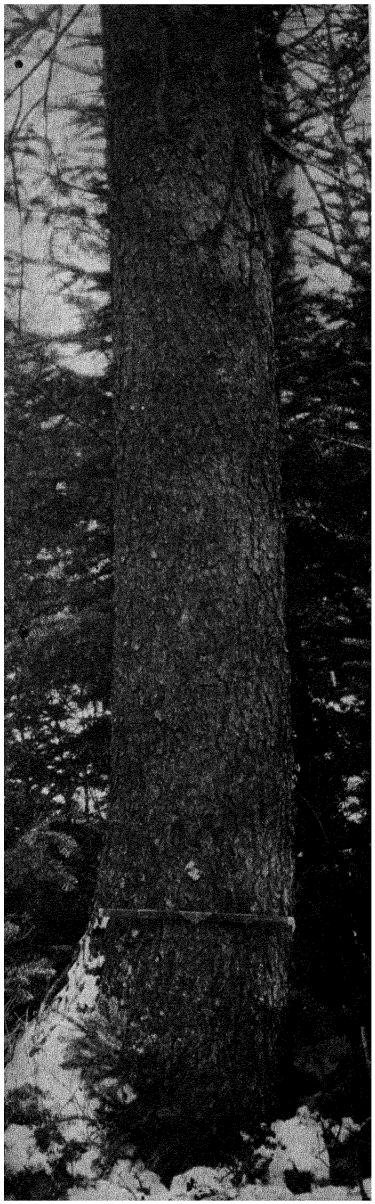
This tree with the Tamarack marks the limit of tree growth in the far north and extends in range nearly across the continent, growing alike on bottom-lands and mountain slopes. Within the limits of the United States, however, conditions seem to be less favorable. Here it is confined to low bottom-lands, sphagnum swamps and the margins of ponds, where its dwarfed and picturesque narrow forms with gracefully curved branches and bluish green foliage are pleasing and characteristic features. It is found even growing to great age in the floating bogs about the shores of small lakes in northern Minnesota and producing cones in abundance, even though no more than 2 or 3 ft. in height.

The wood of the Black Spruce is light, a cu. ft. weighing 32.86 lbs., soft and useful for paper pulp and lumber when of sufficient size.[2] Considerable spruce gum is also derived from this tree.

Leaves usually ¼-½ in. long, crowded and more or less curved, stiff and with sharp callous tips, blue-green with numerous stomata above and fewer beneath; branchlets pubescent. *Flowers:* staminate oblong with reddish anthers; pistillate oblong with thin reflexed scales and rounded erose bracts. *Fruit:* cones ovate, persisting often 2 or more seasons, strongly reflexed upon the branchlets, ¾-1½ in. long, narrowing to a strongly incurved stalk, with scales rounded and more or less erose-dentate at apex; seeds about ⅛ in. long with ample pale brown wing widest above the middle.

1. Syn. *P. brevifolia* Peck.





HEMLOCK.

Tsuga Canadensis (L.) Carr.



Fig. 32. Branchlet with leaves and cones, 1; scale of cone, upper side showing its seeds, 2; scattered seeds, 3; branchlet with two leaves (upper and under surfaces) magnified, 4.

33. Trunk with spray of foliage at base, Lewis Co., N. Y.

34. Wood structure magnified 15 diameters.

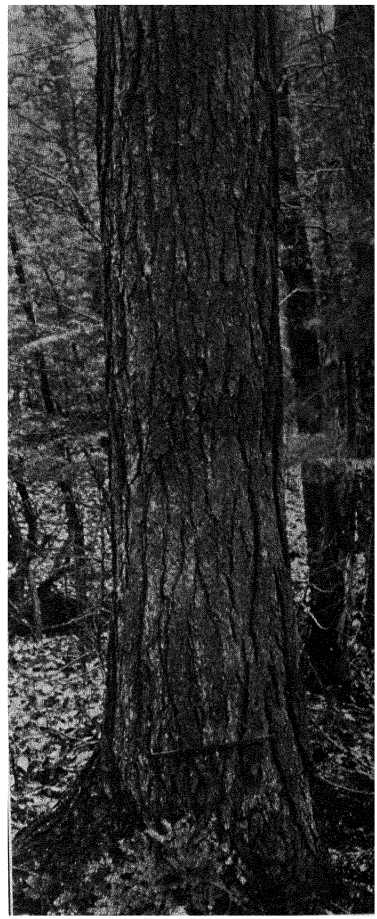
The Hemlock is a handsome tree, sometimes attaining 100 ft. in height, with trunk 3–4 ft. in diameter vested in a dark ridged bark. When growing apart from other trees it develops a rather open wide pyramidal top with outward curving or drooping branches, and the flat sprays of foliage are particularly light and graceful in appearance, of dark green color above and showing in pretty contrast the whitish under surfaces when turned up by the winds. The beauty is enhanced in early summer by each branchlet being tipped with the delicate light green new shoots of the season. It was once one of the most abundant trees of the northeastern forest, but such is the value of its bark for tanning purposes that they have nearly all been destroyed, only scattering trees now remaining. It thrives on well-drained uplands and slopes of ravines usually in company with the White Pine, Red Spruce, Maples, Beech, Yellow Birch, etc., though in places forming quite exclusive tracts of forest.

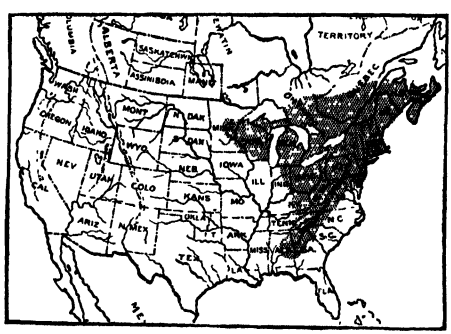
The wood is soft, light (a cu. ft. weighing 26.42 lbs.) brittle and mainly used for coarse lumber for general construction purposes. The bark of the tree for tanning purposes has, until recent advances in prices of lumber, been considered its chief point of value.[1]

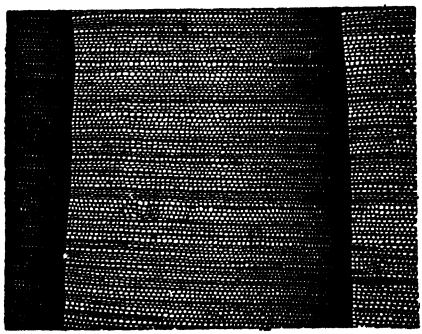
Leaves flat, oblong-linear, ⅓-⅔ in. long, rounded at apex, lustrous and centrally grooved above and whitish with 5 or 6 rows of stomata on each side of midrib beneath; branchlets rough with their persistent bases. *Flowers* appear in May: staminate light yellow; pistillate pinkish green with broad laciniate oracts shorter than their scales. *Cones* ovate-oblong, ½-¾ in. long, acute with short stalk, suborbicular scales and broad truncate laciniate bracts; seeds about one-sixteenth in. long and wings about twice as long, broadest near the bases.[2]

1. A. W., I, 21.

2. For genus see p. 420.







CAROLINA HEMLOCK.

Tsuga Caroliniana Engelm.



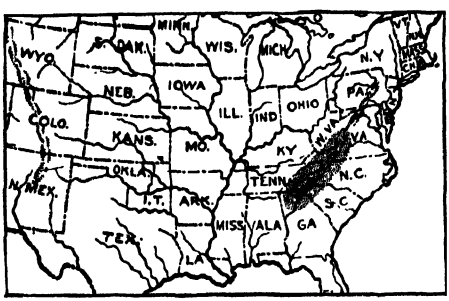
Fig. 35. Branch with leaves and open cones liberating seeds, 1; isolated seeds, 2.
36. Trunk of tree, on Blue Ridge Mountains, N. C.

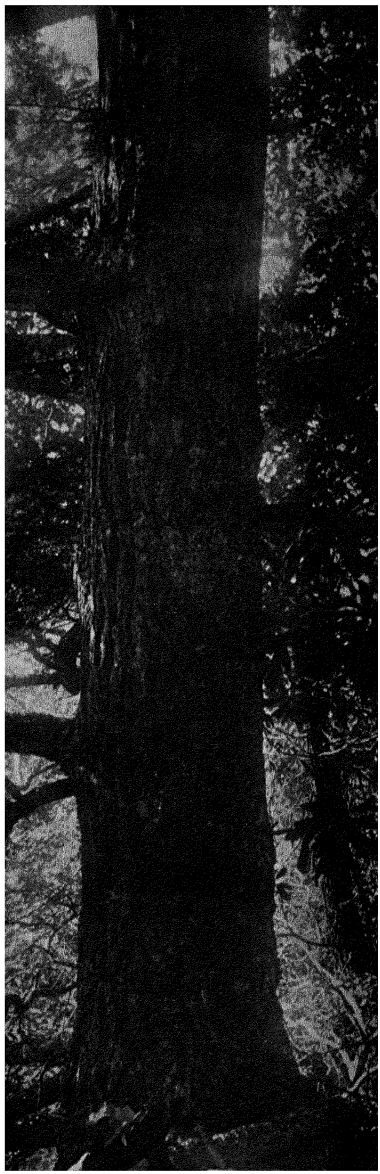
This rare tree is confined to the Blue Ridge of the Allegheny Mts., ranging in altitude from about 2000 to 3500 ft., in company with the common Hemlock, White Pine, various Oaks, Hickories, Sugar Maple, Sour-wood, Silver-bell Tree, etc., or occasionally forming quite exclusive groves. It rarely exceeds 70 ft. in height or 2 ft. in diameter of trunk, and has rather compact pyramidal top and dark furrowed bark of trunk. It is so often confined to steep and almost inaccessible crags with roots intertwined among the rocks that we are led to infer that it alone is capable of maintaining a foothold in such localities, and that the other trees of the forest must have crowded it out from places of easier footing. It is a tree well worthy of ornamental planting for which it is occasionally employed.

Its wood is very similar to that of the common Hemlock, a cu. ft. weighing 26.64 lbs., and applicable to the same uses though not abundant enough to be of commercial importance.[1]

Leaves flat, linear, ⅛-¾ in. long, petiolate, obtuse and often retuse at apex, lustrous dark green and with conspicuous central groove above, marked with white bands of 7 or 8 rows of stomata on each side of the midrib beneath and forming a flattish spray but not as flat as that of the *T. canadensis*. *Flowers:* staminate purplish; pistillate purple with broad ovate bracts about as long as the scales. *Cones* oblong, 1-1½ in. long with short stalks and oblong obtuse fine but scarcely woody puberulous scales widely spreading at maturity and ample bracts about half as long as scales; seeds about one-sixth in. long with large wing broadest near the base.

1. A. W., XII, 299.





BALSAM FIR.

Abies balsamea (L.) Mill.

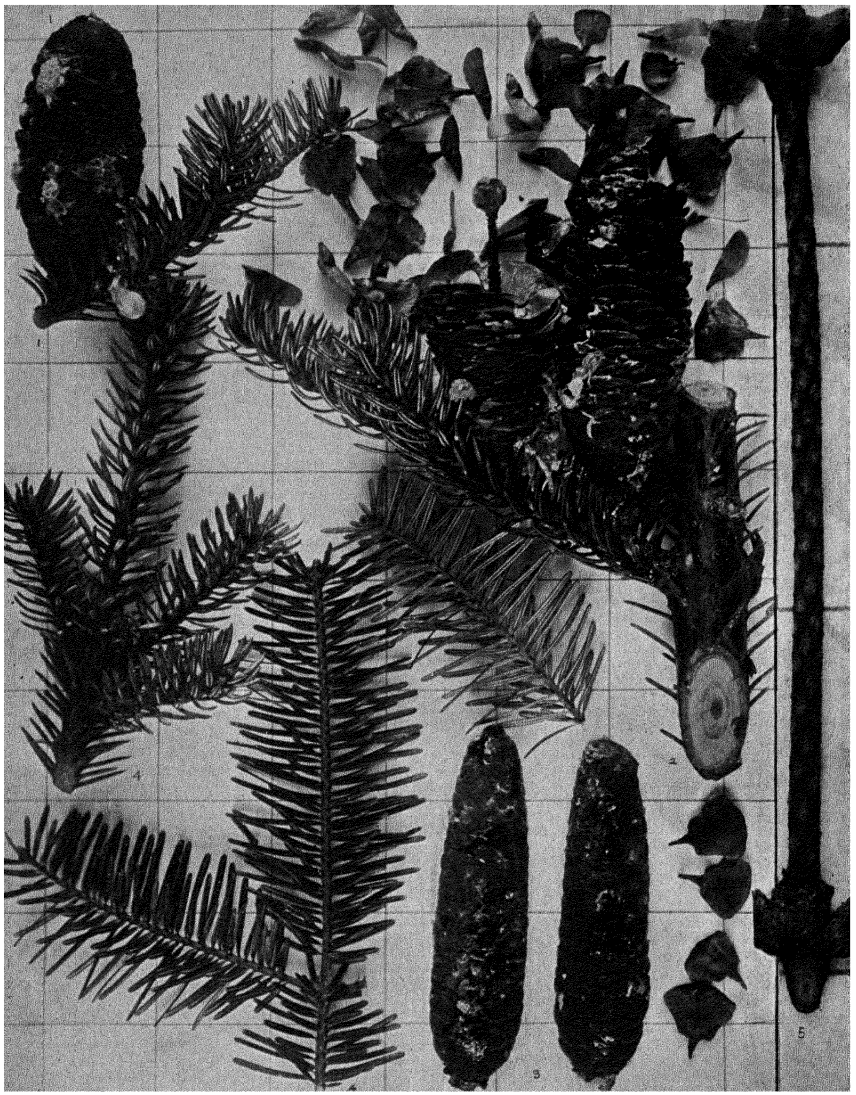


Fig. 37. Branchlet with mature closed cone bearing beads of pitch, 1; section of upper main stem of tree, with branchlet bearing disintegrating cones, and scattered scales and seeds, 2 (Note the very small bract); detached closed cones, 3; sterile branchlets, 4; leafless branchlet magnified, 5.

38. Trunk showing blisters and trickling free pitch, above.

39. Wood structure magnified 15 diameters.

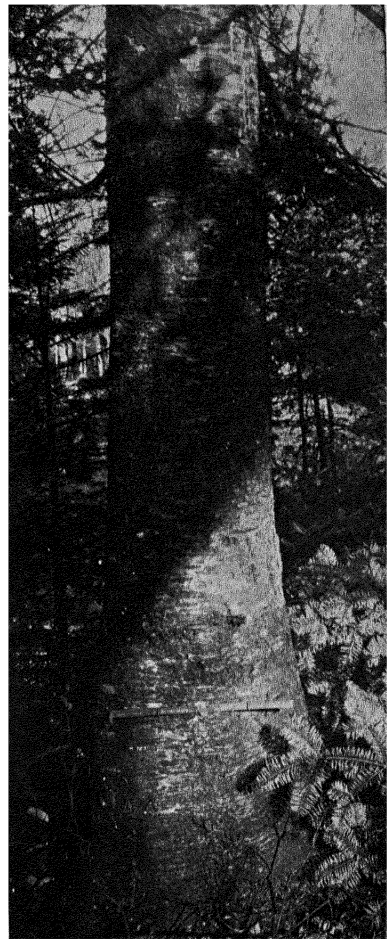
This is a handsome tree of characteristic aspect and rarely attains more than 75 ft. in height or with trunk more than 2½ ft. in diameter. Its branches are arranged in whorls usually of from 4–6, the longest at the bottom and the others successively shorter to a narrow pointed summit. The bark of all but the oldest trunks is abundantly supplied with resin blisters which yield the *Canada Balsam* of commerce. Very different from the *Fraser Fir* this tree is a lover of bottom-lands and moist slopes, and is of very wide distribution. Its abundant spire-shaped tops indicate the location of swampy tracts in northern regions from the Atlantic nearly to the Pacific, and its soft fragrant branches can be generally depended upon to furnish the favorite "balsam pillows" for campers throughout the forests of this vast range. Rarely forming exclusive forests of any extent, it associates with the Tamarack, Black Ash, Black Spruce, Arbor Vitæ, etc. or where it is less common on uplands with Beeches, Hemlocks, etc.

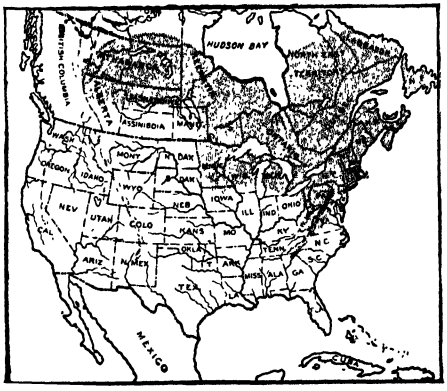
Its wood, a cu. ft. of which when absolutely dry weighing 23.80 lbs., is occasionally sawn into lumber for boxes, etc., and of late is being used in the manufacture of paper.[1]

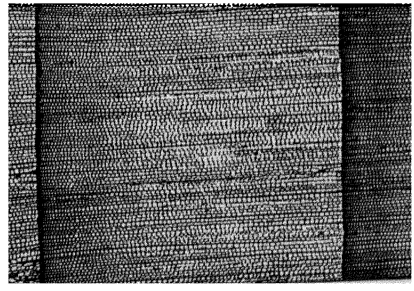
Leaves about ½ in. long and acute, on cone-bearing branches, and 1 in. or more and mostly rounded at apex on sterile branches. *Flowers* in May: pistillate with nearly orbicular purple scales smaller than the bracts which are obcordate, serrulate with projected slender tip. *Cones* 2-4 in. long, oblong-cylindrical, rounded at tip generally bearing beads of free pitch with scales about twice as long as the bracts, or rarely with bracts somewhat longer than the scales.[2]

1. A. W., I, 22.

2. For genus see p. 421.







FRASER FIR.

Abies Fraseri (Pursh.) Lindl.

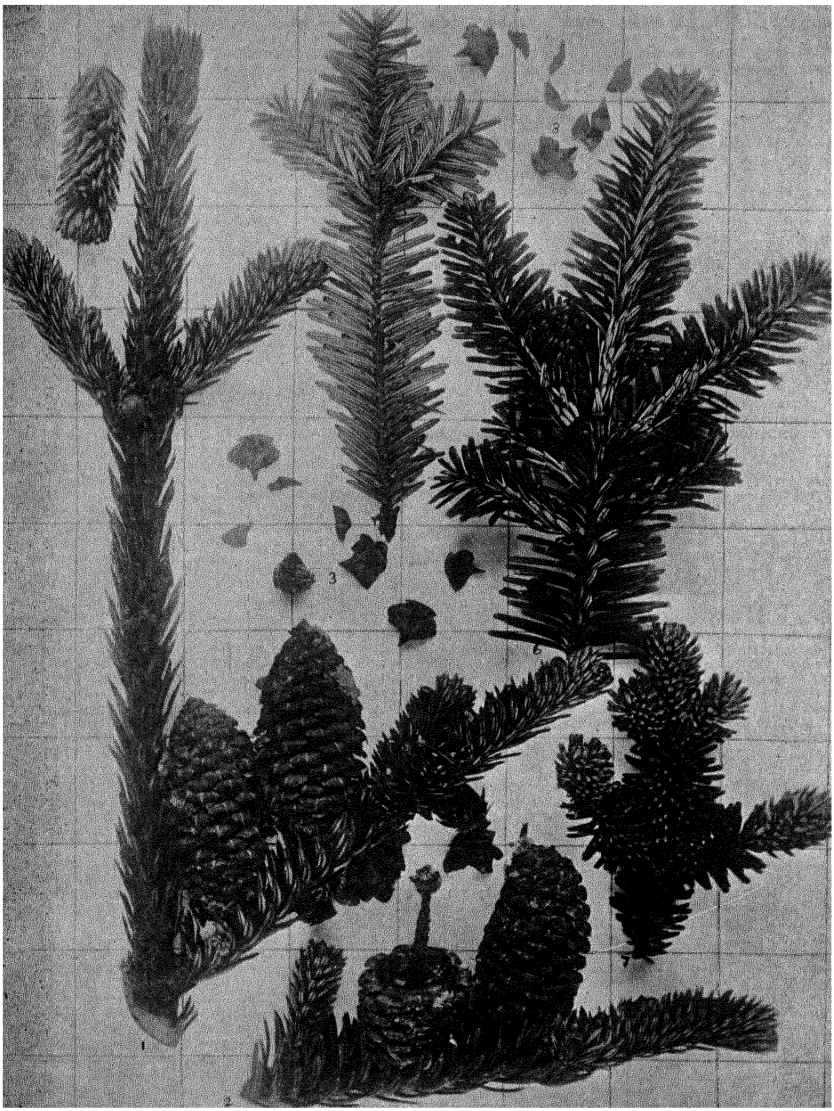


Fig. 40. Tip of main stem of tree bearing branchlet with mature cones, 1; branchlet with disintegrating cone, 2; detached scales and seed, 3 (Note the large exserted bract); sterile branchlet, terminal, 4; do, from lower branch, under side, 5; same, upper side, 6; do, from near top of the tree, 7.

41. Trunk with spray of foliage at base. Great Smoky Mountains, N. C.

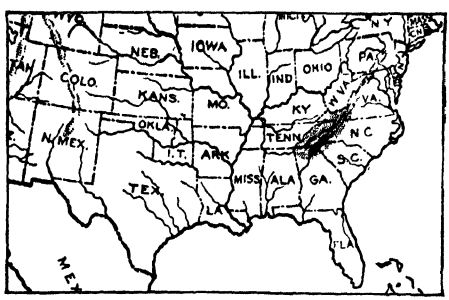


The Fraser Fir is a tree of medium size, usually 30–50 ft. in height, or sometimes 70 ft., with trunk 1–2½ ft. in diameter. When sufficiently isolated it develops a distinct pyramidal top with whorls of long horizontal lower branches, those above successively shorter to the pointed apex. The bark of the younger trunks is copiously resin-blistered, that of older trunks becoming covered with thin yellowish gray papery scales, quite different from that of the Balsam Fir. One of the most restricted trees of eastern United States in distribution it is found only at altitudes of from 4000 to 6000 ft. on the highest peaks of the Allegheny Mountains, clothing their dry summits either with exclusive groves or in company with the Red Spruce (called locally by the mountaineers "*He Balsam*" in distinction from this the "*She Balsam*") Mountain Ash, Yellow Birch, etc. This requirement in the Fraser Fir for dry localities is strangely different from the love of the Northern Balsam Fir for wet low-lands.

Its wood is light, a cu. ft. weighing 22.22 lbs. and seems to be but little used, perhaps due to inaccessibility though applicable to the uses mentioned of the other species. Its branches are popular for use in making balsam pillows.[1]

Leaves flat, ½-1 in. long, those of the sterile branches emarginate and those of the fertile acute at apex, dark green and centrally grooved above, silvery white beneath with 8-12 rows of stomata. *Flowers* in May: staminate reddish yellow; pistillate with scales much broader than long and shorter than the exserted pale yellow-green bracts. *Cones* mature in September, ovoid-oblong, 2-2½ in. long, dark purple with scales wider than long and with long exserted pale yellow-green reflexed bracts, aristate at apex; seeds about ⅛ in. long with very wide wing oblique at apex.

1. A. W., XII, 300.



BALD CYPRESS.

Taxodium distichum (L.) Rich.

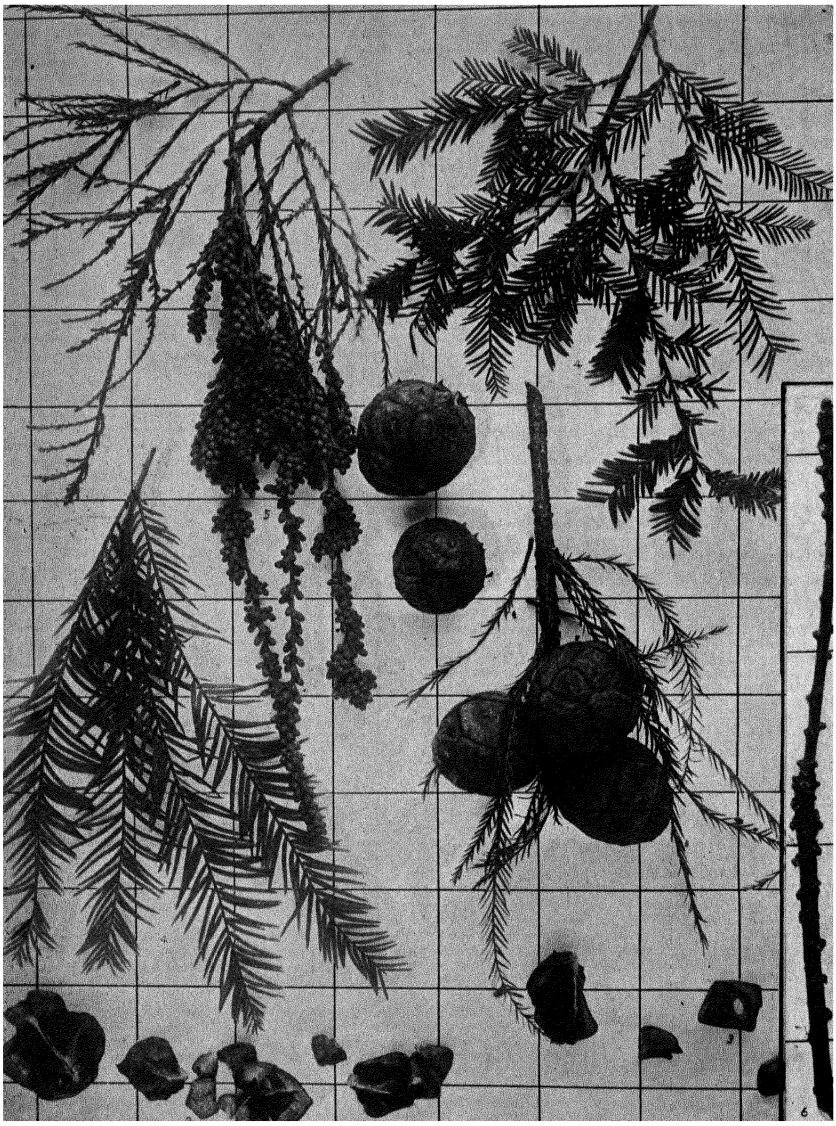


Fig. 42. Fruiting branchlet with closed cones, 1; cone disintegrating, 2; scale and seed in section, 3; sterile branchlet from lower branches, 4; branchlet bearing clusters of staminate flower-buds, 5; branchlet in winter, 6.

43. Trunks and "knees" in St. Francis River swamp, Ark.

44. Wood structure magnified 15 diameters.

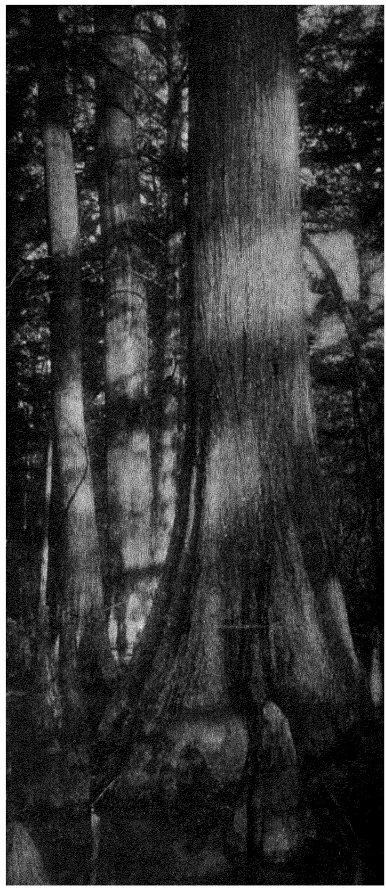
This valuable and majestic tree occasionally attains the height of 150 ft. with a trunk 8 or 10 ft. in diameter. When young it develops a symmetrical pyramidal top with upturned branches and drooping branchlets, but the old forest monarchs are more like inverted pyramids in shape, with wide and flat or slightly rounded tops narrowing down to long naked trunks. Its trunk is very wide and strongly buttressed at base, especially when growing in water or wet localities, and there it also sends up from its roots steeple-shaped projections known as "knees," the functions of which seem to be mechanical — to anchor the tree more firmly in the loose soil in which it grows. In the southern part of its range it occupies vast tracts of swampy lands, either forming nearly exclusive forests or in company with the Tupelos, Sweet Gum, Water Locust, Red Bay, etc. To the northward it is less abundant and is found in company with various swamp-loving trees.

Its wood, of which a cubic foot when absolutely dry weighs 28.31 lbs., is one of the great resources of the southern states being highly valued for railway ties, posts, shingles, lumber for general construction purposes, etc. Its great durability, immunity from the attacks of parasites and non-liability to great shrinking or warping make it one of our most valuable woods for all wood-work exposed to the weather, for tank construction, cooperage, etc. Its value for the latter use is enhanced by its comparative freedom from coloring or flavoring ingredients.[1]

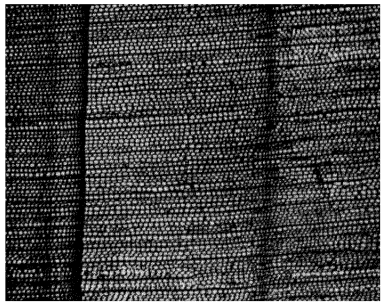
Leaves ½-¾ in. long, thin, apiculated, rather light yellow green, deciduous and forming a flat spray of which the branchlets are also deciduous; shorter scale-like leaves on flowering branches. *Flowers:* staminate in panicles 4-5 in. long; flower-buds nearly ⅛ in. long, purple at maturity. *Cones* subglobose, about 1 in. in diameter, usually few together at the end of the branch.[2]

1. A. W., V, 119.

2. For genus see p. 421.







ARBOR VITÆ. WHITE CEDAR.

Thuja occidentalis L.

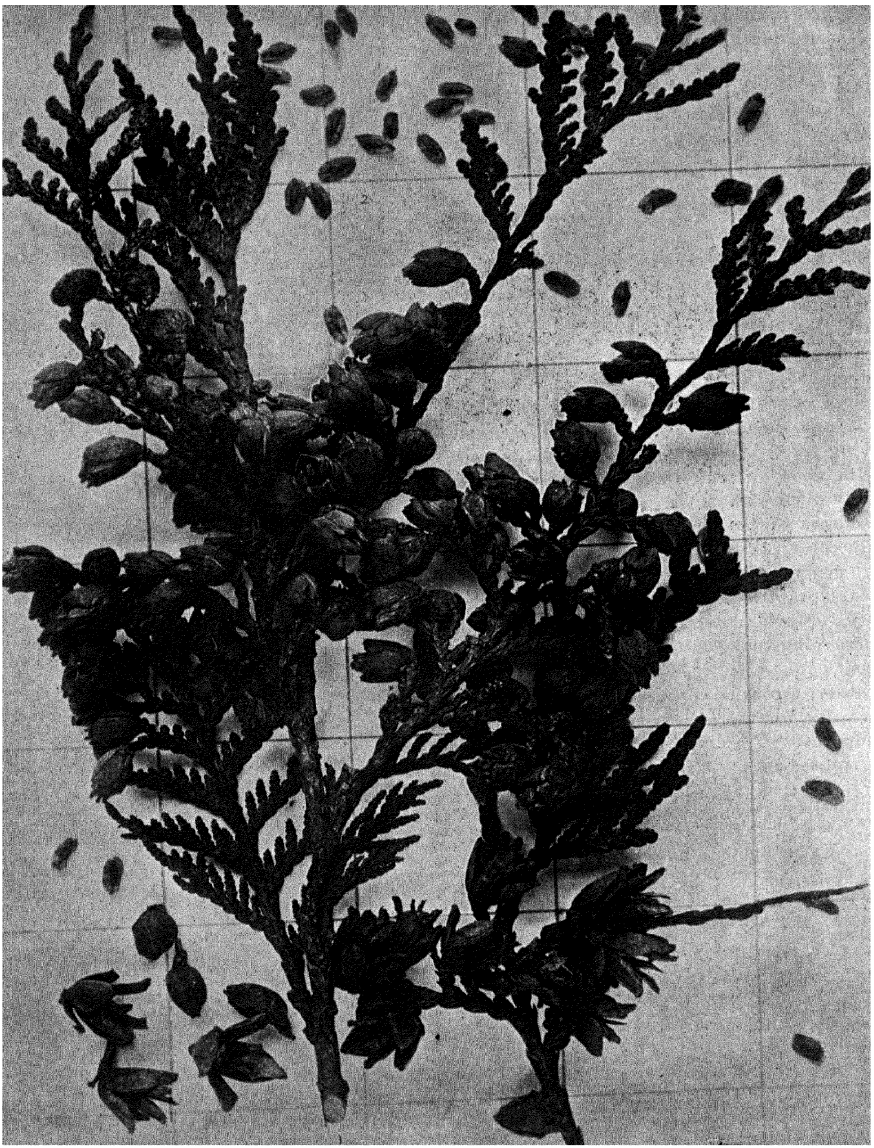
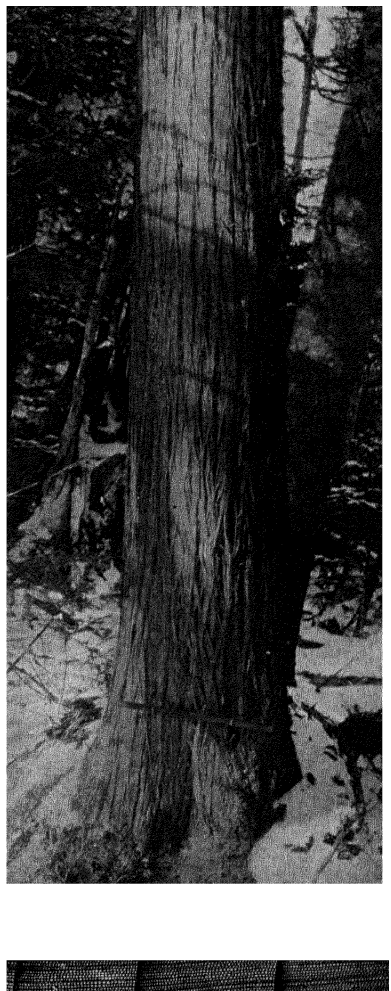


Fig. 45. Branchlets with mature cones, 1; scattered seeds, 2.
46. Trunk with branch at base. Adirondack region, N. Y.
47. Wood structure magnified 15 diameters.

The Arbor-Vitæ is a tree commonly from 50–60 ft. in height and 2–3 ft. in diameter of trunk, or sometimes larger, and develops a wide-based pyramidal head when growing apart from other trees. It sometimes forms exclusive and dense forests in swampy localities and along the banks of streams, but is oftener in company with the Black Ash, Swamp Spruce, Canoe Birch, Red and Silver Maples, Tamarack, Balsam Fir, etc. It is abundant and of quite general distribution in sufficiently moist localities throughout the northern part of its range, but in the southern Alleghenies occurs only at high altitudes.

The fragrant light wood of the Arbor-Vitæ, of which a cubic foot when absolutely dry weighs 19.72 lbs., is highly valued in the construction of light boats, canoes, etc., and is one of the best woods within its realm for shingles, and from the slim forest-grown trunks of this tree more than any other come the fence posts and telegraph poles of the northeastern states and Canada. It is often planted for ornamental purposes and several nursery forms are found. Medicinal properties are ascribed to its leaves.[1]

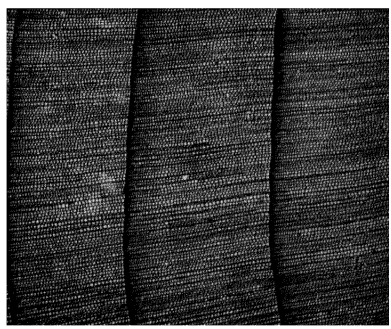


Leaves of the ultimate branchlets scale-like, appressed, about ⅛ in. long apiculate and glandular, the 2 lateral rows strongly keeled and the other two rows flat, forming a very flat branchlet. *Flowers* in April and May, inconspicuous; staminate yellow; pistillate purplish green. *Cones* mature in early autumn, ⅓-½ in. long; seeds about ⅛ in. long with wings about as broad as the body.[2]

1. A. W., I, 24.

2. For genus see p. 421.





COAST WHITE CEDAR.

Chamæcyparis thyoides (L.) B. S. P.[1]

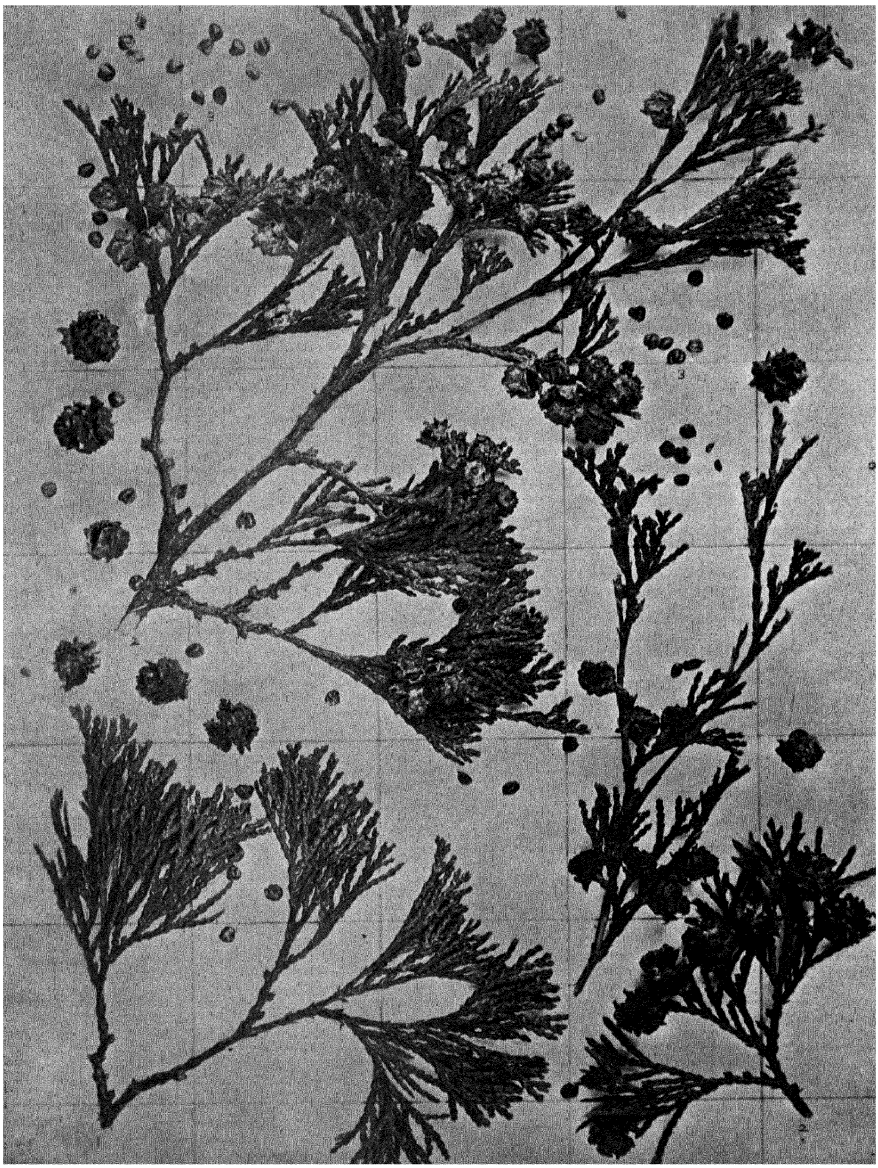
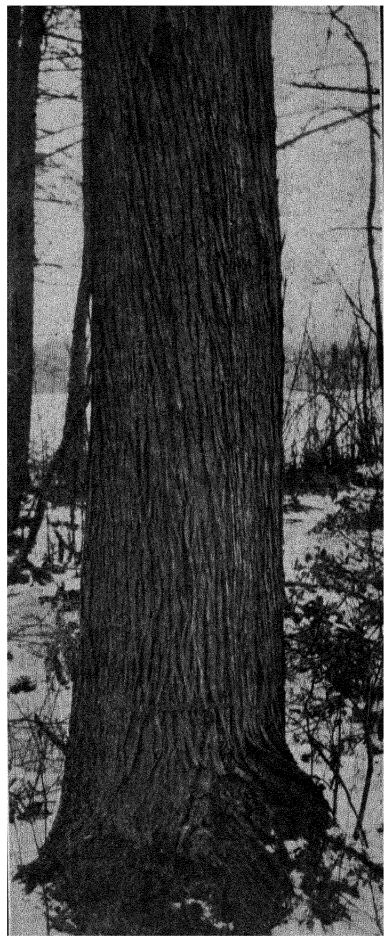


Fig. 48. Sterile branchlet, 1; fertile branchlets with mature cones, 2; scattered seeds, 3.
49. Trunk of tree, near Seaford, Delaware.
50. Wood structure magnified 15 diameters.

This is one of the most beautiful as well as one of the most useful of the cone-bearing trees of eastern America, lifting its spire-shaped top to a height of 70 or 80 ft. and having a trunk commonly 2 ft. and occasionally 3 or 4 ft. in diameter. This is vested in a reddish brown fibrous bark which exfoliates lengthwise in thin strips, giving to old forest trunks a decidedly shaggy appearance. It occupies quite exclusively cold swamps in the coast region, particularly of New England south of Massachusetts Bay, localities in New Jersey, etc., where it forms dense forests. Farther south it is often found associating with the Bald Cypress, Swamp Bay, Tupelo Gum, Holly, Sweet Gum, Pin Oak, Laurel Oak, etc.

Its wood, of which a cubic foot when absolutely dry weighs 20.70 lbs., is very light, durable and useful in the manufacture of pails, woodenware and boat building and for railway ties, posts, etc.[2]

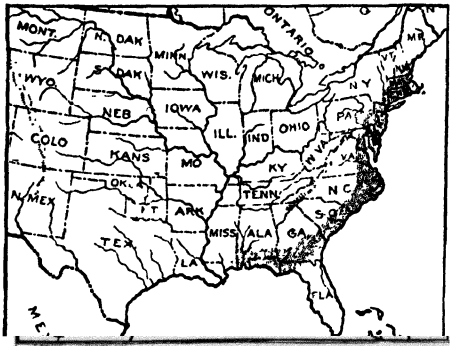
Leaves on the ultimate branches dark glaucous green, about one-sixteenth in. long, triangular-ovate, acute, closely appressed, the lateral rows keeled and the vertical convex, each having a discoid gland, making flat branchlets, usually drying and turning brown the second season and long persisting; those on vigorous shoots about ⅛ in. long and spreading at apex. *Flowers:* staminate with 5 or 6 pairs of stamens having rounded connectives; pistillate subglobose with more acute and spreading scales and blackish ovules. *Cones* globose, about ¼ in. in diameter, very glaucous at maturity, with acute or reflexed bosses and each scale bearing 1 or 2 gray-brown seeds about ¼ in. long and dark brown wings as broad as the body.[3]

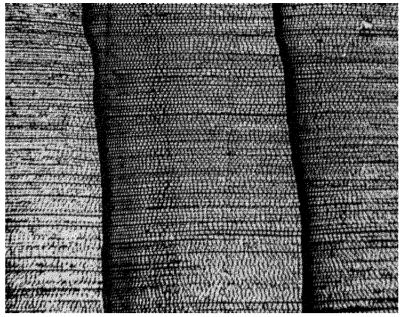


1. Syn. *Cupressus thyoides* L. *Chamaecyparis sphaeroidea* Spach.

2. A. W., III, 74.

3. For genus see p. 422.





RED CEDAR.

Juniperus Virginiana L.



Fig. 51. Fruiting branchlets, a branchlet of staminate flowers (to the left above) and a sterile branchlet from vigorous shoot (to the right).

52. Trunk of tree in southern Missouri.

53. Wood structure magnified 15 diameters.

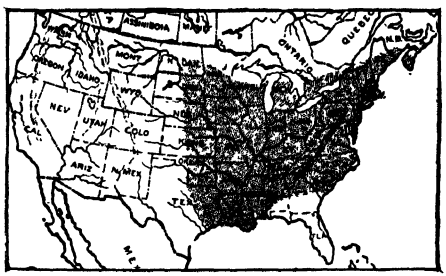
The Red Cedar is usually not over 40 or 50 ft. in height, but exceptionally twice as tall, with trunk from 2–3 ft. or more in diameter. This is frequently buttressed and is vested in a fibrous bark which exfoliates lengthwise in strips. While young its top is generally narrow and spire-shaped, but with age its branches elongate and lop outwards, forming finally a wide irregular pyramidal or rounded top. It is a tree of wide distribution and found alike on dry gravelly slopes, rocky ridges and less abundantly on rich bottom lands. Its picturesque form is a feature of almost every southern landscape from the sand-hills of the coast to the valleys of the interior, and on the bluffs of the New England coast sturdy individuals combat the winds close to the ocean's spray.

Its light fragrant wood of which a cubic foot when absolutely dry weighs 30.70 lbs. is of a purple-red color, very durable and peculiarly valuable for making moth-proof chests for clothing, for wooden ware, lead pencil coverings, fence posts, etc., and its berries and foliage possess medicinal properties.[1]

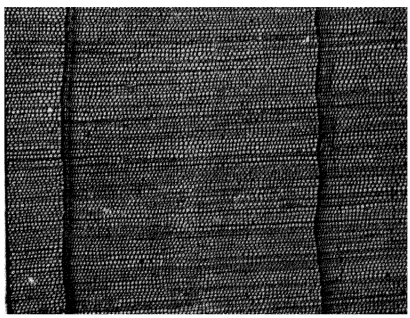
Leaves of two sorts, scale-like, opposite, closely appressed, one-sixteenth in. long and forming a slender 4-sided branchlet, generally acute or obtuse, glandular-dotted and dark green, or on young or vigorous shoots subulate, ½-¾ in. long and lighter green; buds naked. *Flowers* in very early spring, terminal, dioecious; staminate with 10 or 12 stamens with rounded entire connectives and generally 4 pollen sacs; pistillate with violet-colored acute and spreading scales. *Fruit* subglobose, about ¼ in. in diameter, dark blue with glaucous bloom, at maturity sweetish resinous flesh and usually 1 or 2 acute seeds; cotyledons.[2]

1. A. W., I, 25.

2. For genus see p. 422.







JUNIPER.

Juniperus communis L.



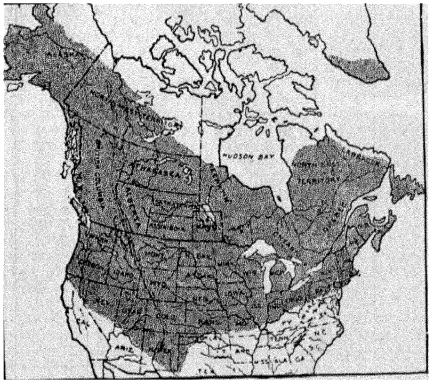
Fig. 54. Fruiting branchlets, 1; sterile branchlets, 2.

55. Small trunk with scattered leaves and spray of foliage at base. Near Bonaparte Lake, Adirondacks, N. Y.

The Juniper though generally only an humble shrub has the distinction of being the most widely distributed tree of the northern hemisphere. It is found not only ranging over the greater part of the North American continent but also central and northern Europe, and Asia as far south as nearly to the Mediterranean and to the Himilayas, but only in very limited areas of this vast domain does it become a tree; in America only on the hills of a few counties of southern Illinois. It usually sends out a cluster of stems close to the ground and these curving upwards form a flat saucer-shaped bush, sometimes 20 ft. across and only 3 or 4 ft. high. When a tree it attains the height of 20 or 30 ft. with an irregular open head and short trunk sometimes 10–12 in. in diameter.

Its wood is hard, but rather light and easily worked, very close-grained, durable and of a light brown color with lighter sap-wood. In Europe it is sometimes used for fuel and in India burned as incense. In Europe its sweetish fruit is used as an ingredient of gin.

Leaves in whorls of 3, spreading, ⅛-½ in. long, often curved, rigid with sharp tips, articulate at base, lustrous dark green or bronze-green below, snowy white with bands of stomata above; buds scaly. *Flowers* in late spring, axillary; staminate composed of 5 or 6 whorls each of 3 stamens bearing broad connectives and 3 or 4 anther-cells; pistillate consisting of 3 ovules open at apex, alternate, with 3 minute fleshy scales and surrounded with 5 or 6 whorls of ternate scales. *Fruit* matures the third season, subglobose, about ¼ in. in diameter, dark blue with bloom, sweet flesh and 1-3 bony seeds which are about ¼ in. long, angled, and penetrated with resin glands.





BLACK WALNUT.

Juglans nigra L.

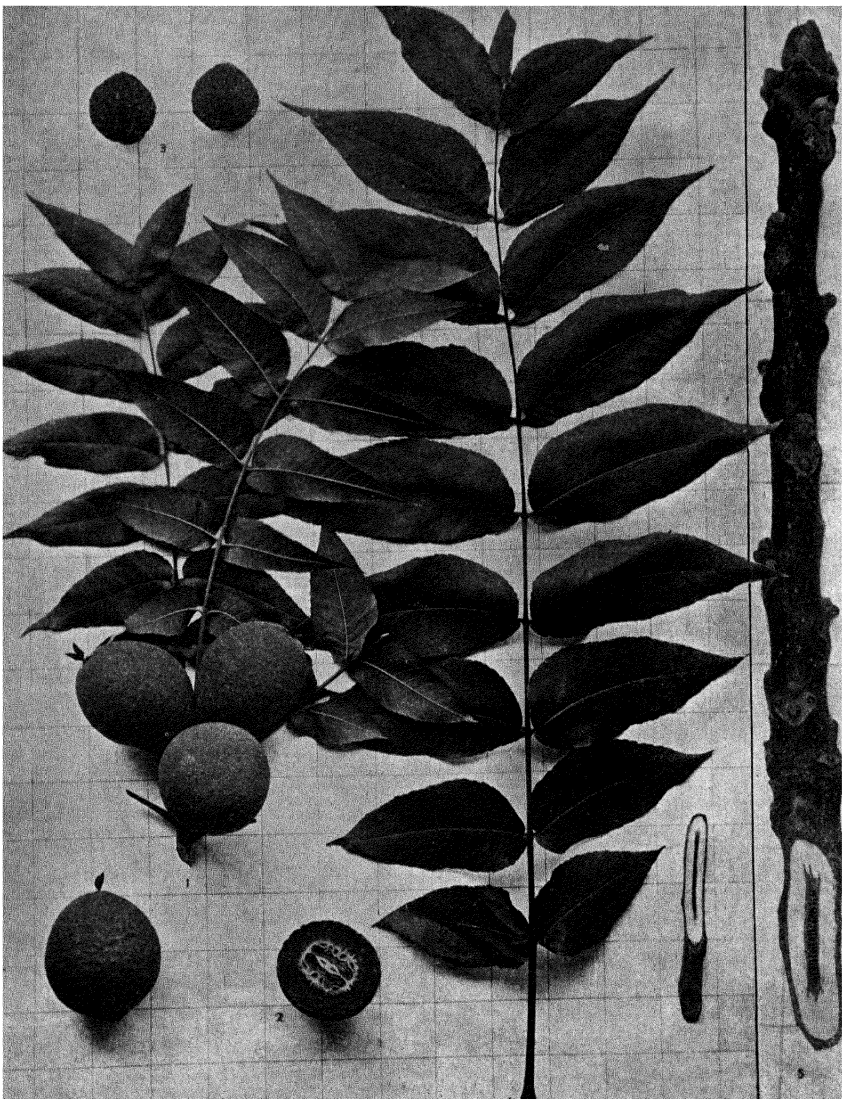


Fig. 56. Branchlet with leaves and fruit, 1; fruit in cross-section, 2; nuts with epicarps removed, 3; a vigorous leaf, 4; branchlet in winter, 5.

57. Trunk of tree in Genesee valley, N. Y.

58. Wood structure magnified 15 diameters.

The Black Walnut attains the height of 100 to 150 ft. in the forests, with a trunk 4–6 ft. in diameter, vested in a prominently ridged dark brown bark. When growing apart from surrounding objects it develops a symmetrical rounded top of beautiful foliage. Once an abundant tree and constituting a considerable portion of large tracts of forest, particularly in the great Mississippi Basin, its valuable wood has caused its almost complete destruction as a commercial product. The value of its timber was early recognized, as history tell us that it was an article of export to England early in the seventeenth century. Of late years new trees are being propagated which eventually will in a measure take the place of the natural forests.

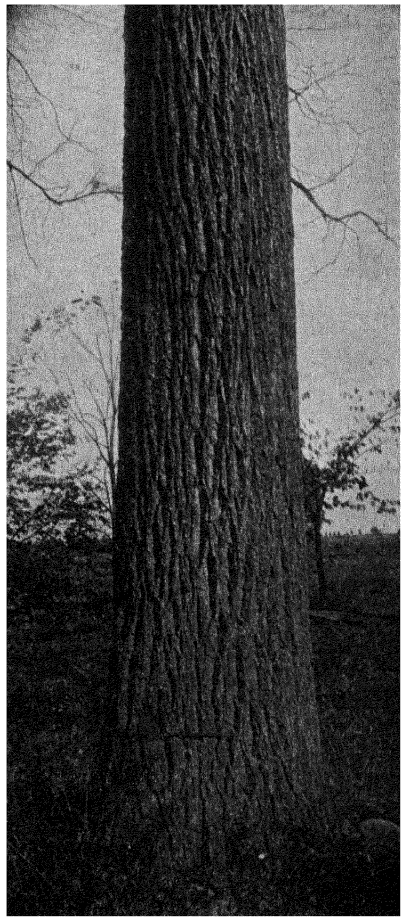
The heart-wood is of a rich dark brown color, very durable in contact with the soil, and highly prized for furniture, gun-stocks, interior finishing, etc. A cubic foot, when absolutely dry, weighs 38.11 lbs. Occasional "figured" trees are of almost fabulous value.[1] The nuts of this tree were an important article of food with the Indians and are still gathered for domestic use and the local market.

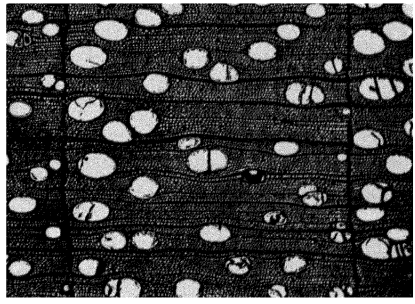
Leaves 1-2 ft. long with puberulent petioles and 13-23 ovate-lanceolate inequilateral leaflets, rounded or subcordate at base, serrate, acuminate, pubescent beneath; petioles puberulent. *Flowers* (May-June); staminate aments stout, 2-4 in. long; calyx with 6 nearly orbicular lobes, pubescent outside; bracts nearly triangular, rusty tomentose; stamens 20-30; pistillate in 2-5-flowered spikes, glandular-hairy bracts and pale reddish green plumose stigma. *Fruit* solitary or in clusters of 2 or 3, subglobose, light yellow-green, papillose; nut round-oval, compressed, sculptured, 4-celled at base; seed oily, edible.[2]

1. A. W., II, 35.

2. For genus see p. 453.







BUTTERNUT. WHITE WALNUT. OIL-NUT.

Juglans cinerea L.

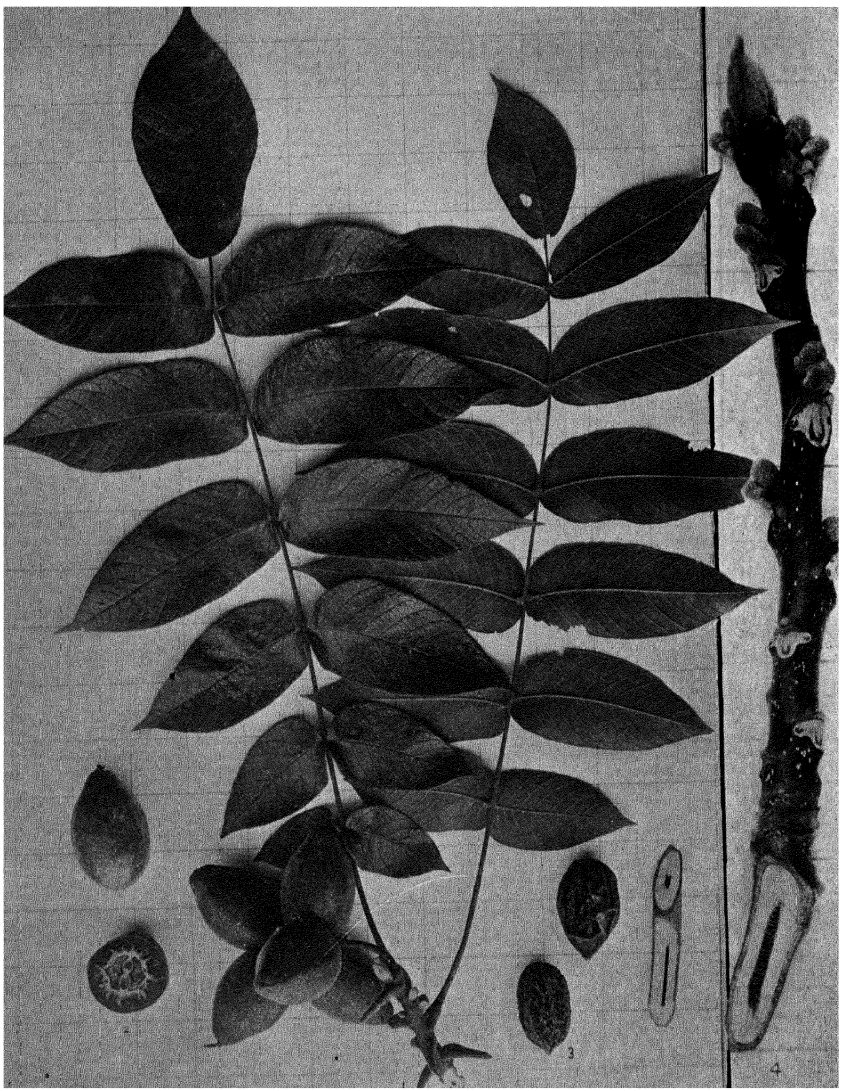


Fig. 59. Branchlet bearing leaves and cluster of fruit, 1; fruit in cross-section, 2; dried nuts with epicarp removed, 3; branchlet in winter, 4.

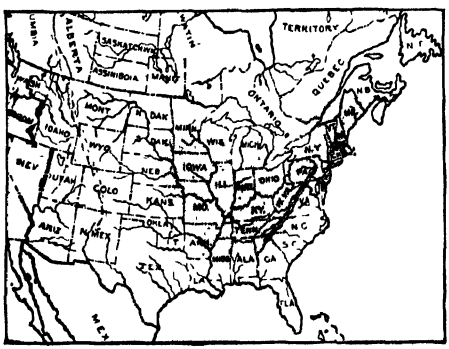
60. Isolated trunk in Black River valley, Lewis Co., N. Y.

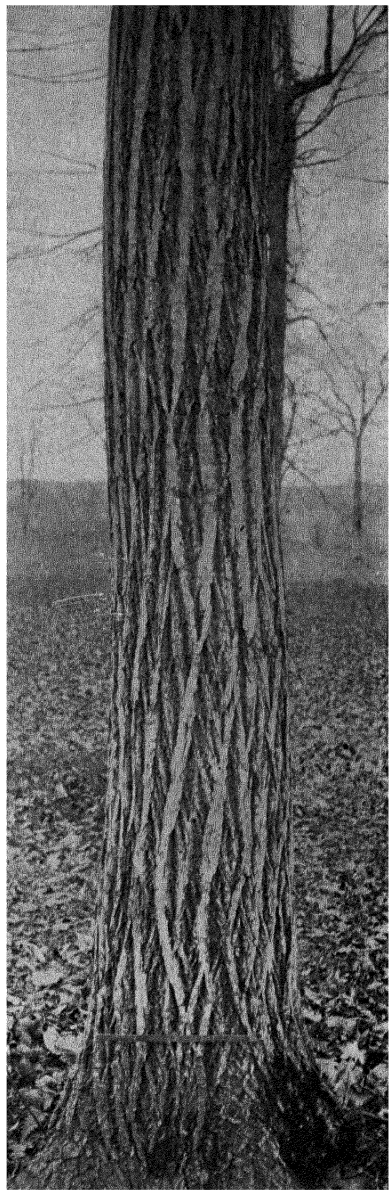
The Butternut when growing in the open rarely attains a greater height than 60 or 70 ft., its short trunk sometimes 3 or 4 ft. in diameter soon dividing into a few large branches, which spread far out and make a wide symmetrical flat or rounded top. In forests it sometimes attains the height of 100 ft. It prefers rich soil along the banks of streams and on low hill-sides, commonly in company with the Beech, Yellow Birch, Maples, Elms, Red Spruce, etc.

Its wood is light, a cubic foot when absolutely dry weighing 25.46 lbs., not strong, of a gray-brown color and is valued for interior finishing, cabinet work, etc. Its sap is rich in sugar, and a fairly good quality of syrup is made from it, though it does not harden to form cakes; its bark possesses cathartic properties; its nuts make a delicious food, and the shucks are used for dying purposes.[1]

Leaves 11-17 in. long, viscid-pubescent, with stout petioles and 11-19 oblong-lanceolate yellowish green rugose leaflets which are rounded and unequal at base, acuminate, finely serrate except at base, turning yellow in autumn and falling early. *Flowers* (May-June); staminate aments 1½-3 in. at first and elongating to 3-5 in.; calyx yellow-green usually 6-lobed with rusty pubescent acute bracts; stamens 8-12 with dark brown anthers and slightly lobed connectives; pistillate in 3-8-flowered spikes with sticky glandular hairs, pointed calyx-lobes and bright red plumose stigmas usually not fully unfolding until after liberation of pollen. *Fruit* in racemose clusters of 2-5, ovoid-oblong, 1½-2½ in. long, sticky pubescent with rough deeply sculptured 4-ribbed nut, acuminate at apex, 2-celled at base, 1-celled above and containing a very oily edible seed.

1. A. W., I, 14.





BITTER-NUT HICKORY.

Hicoria minima (Marsh.) Britt.[1]

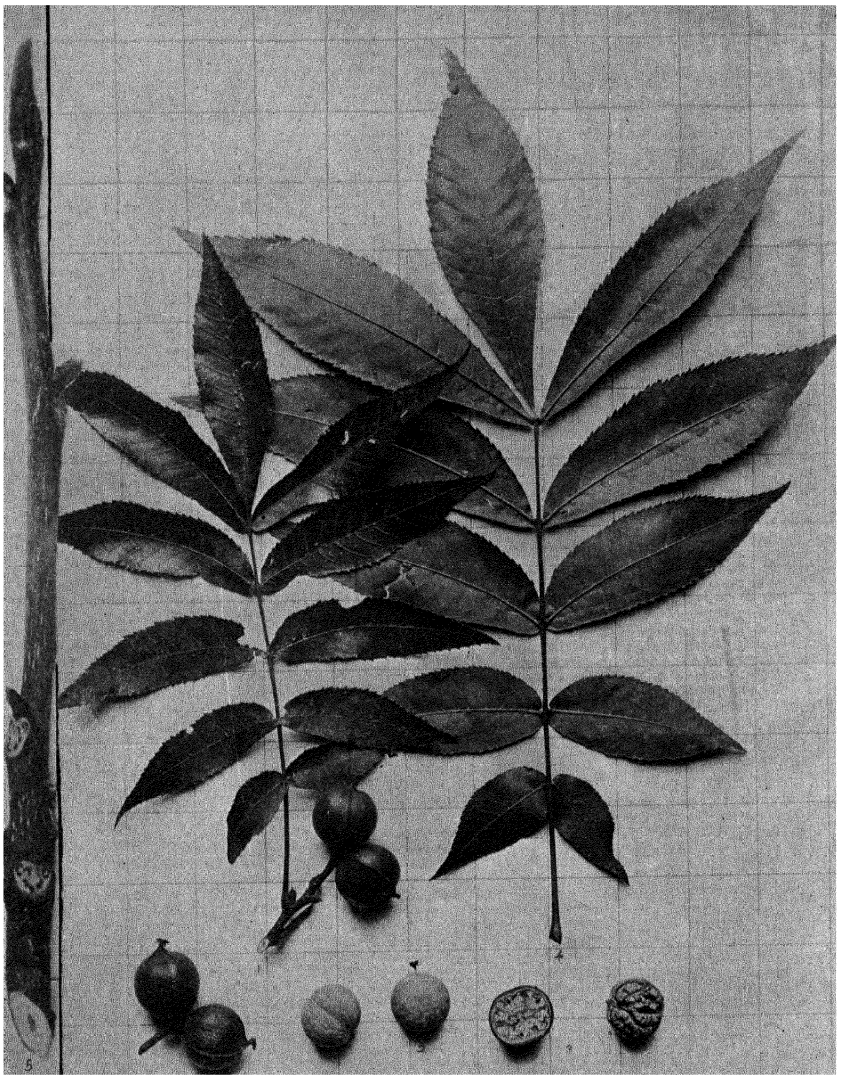


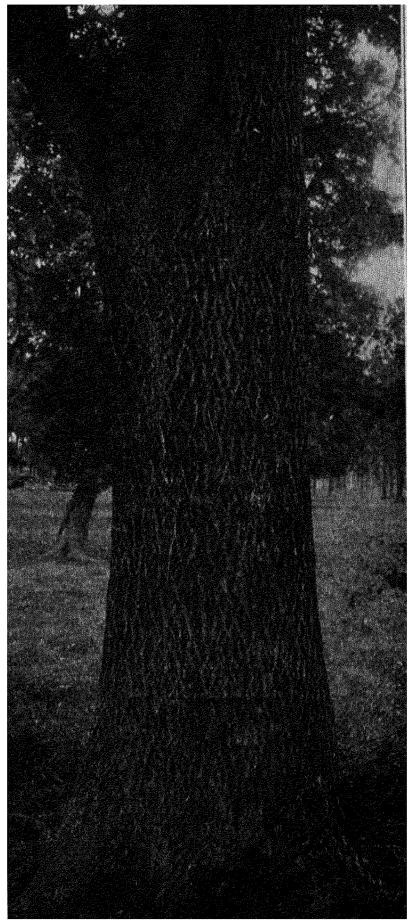
Fig. 61. Fruiting branchlet with leaf and fruit, 1; nuts with epicarp removed, nuts in section and with shell partly removed, 3; leaf from vigorous shoot, 4; branchlet in winter, 5.

62. Trunk of tree in Genesee River valley, N. Y.

63. Wood structure magnified 15 diameters.

The Bitter-nut Hickory when growing in the forests on moist bottom lands occasionally attains the height of 100 ft., and when growing apart from other trees develops a well rounded but often irregular top of handsome foliage. Its straight columnar trunk is sometimes 2 or 3 ft. in diameter and vested in a characteristic brownish gray bark with close scaly almost reticulate ridges. It thrives best in low moist soil in company with the Silver and Red Maples, Black Ash, Elms, etc., but is often found also on rolling uplands. Being very hardy and less fastidious than the other Hickories in conditions of soil in which it grows, it is more uniform in its distribution and probably the most abundant representative of its genus.

Its wood is heavy, a cubic foot when absolutely dry weighing 47.06 lbs., hard and strong and is valued for tool handles, agricultural implements, hoops, ox-yokes, etc., and makes an excellent fuel.[2]

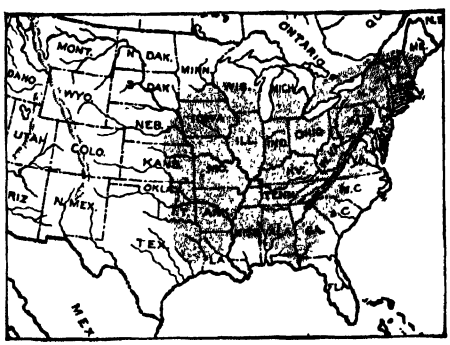


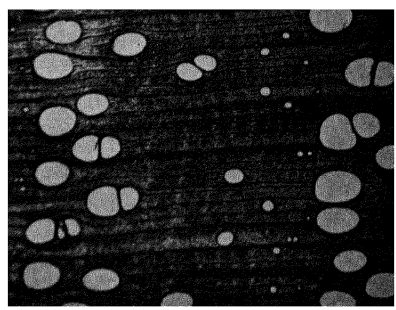
Leaves 6-10 in. long, pubescent when young, with rather slender petioles, leflets 7-11, sessile, lanceolate to obovate, 2-6 in. long, thin and firm, usually unequal at base, coarsely serrate, long taper-pointed, dark green and glabrous above, pubescent beneath; winter buds bright yellow, compressed, with 2 pairs of valvate caducous scales. *Flowers* (May-June); staminate aments 2-4 in. long, slightly pubescent; calyx-lobes about equal but middle one narrower; stamens 4; anthers yellow, deeply ermarginate. *Fruit* subglobose to obovoid, ¾-1½ in. long with 4 sutures prominently winged from apex to about the middle; husk thin, tardily dehiscent; nut thin-shelled, compressed, often broader than long; seed reddish brown, deeply rugose and very bitter.

1. Syn. *Carya amara* Nutt.

2. A. W., II, 37.

3. For genus see pp. 423–424.





WATER HICKORY.

Hicoria aquatica (Michx. f.) Britt.[1]

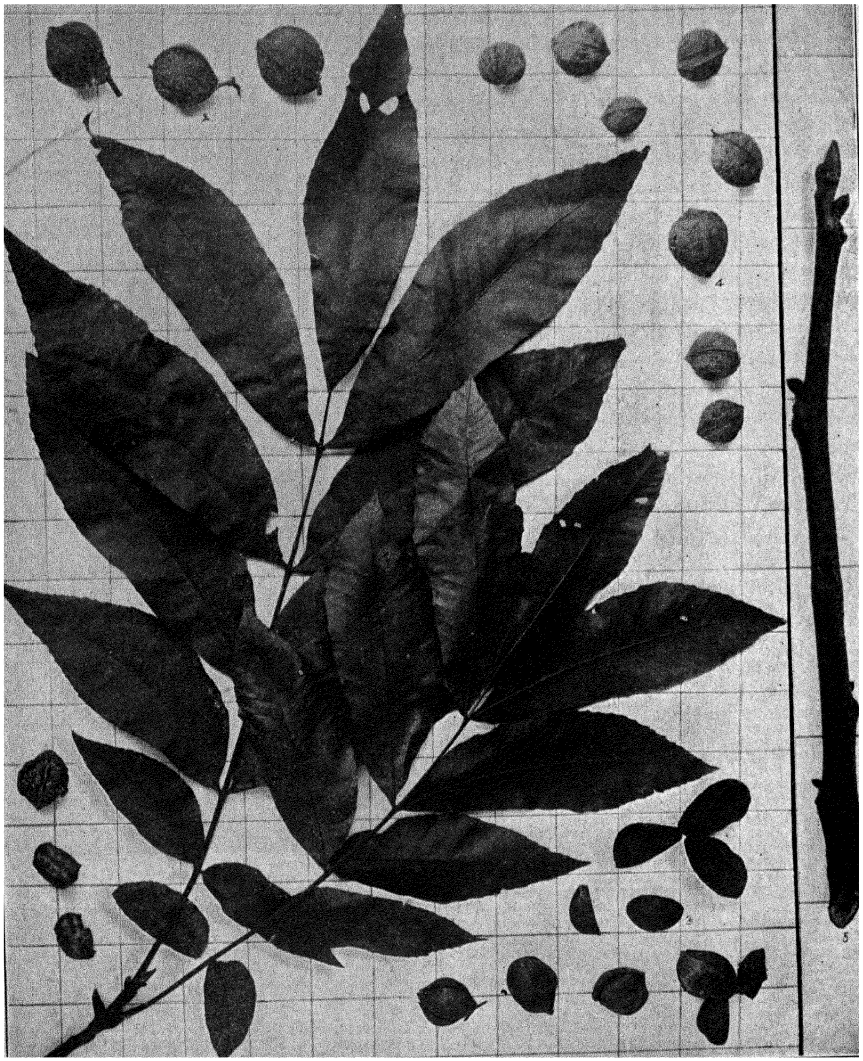


Fig. 64. Branchlet bearing leaves, 1; fruit with closed epicarp, 2; do, with epicarp partly removed, 3; isolated nuts, 4; branchlet in winter, 5.

65. Trunk of tree in Red River valley, Ark. The bark is often more shaggy than here shown.

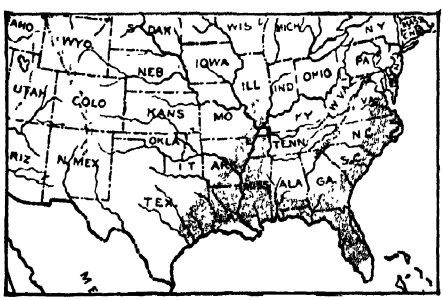
The Water Hickory is economically the least important of the Hickories. It is usually a small or medium-size tree from 50 to 70 ft. in height, but in forests of the bottom-lands of the lower Mississippi valley it attains the height of 80-100 ft. with straight columnar trunk 2–2½ ft. in diameter, and narrow irregular top. When isolated it develops an oblong or obovoid top of long rigid branches of which the lowermost are drooping.

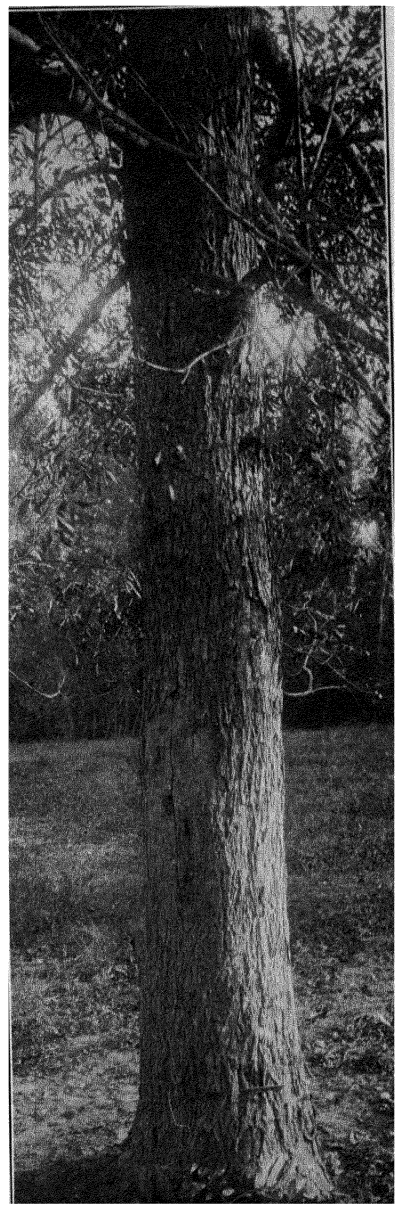
As its name implies it is distinctly a water-loving tree, being confined mostly to low swamps in the southern states, inundated during a considerable portion of the year, in company with the Planer tree, Swamp Privet, Water Locust, Water and Pumpkin Ashes, Cotton Gum, Red Titi, Cypress, Red Maple, etc. Its dark-colored angular nuts possess a kernel usually too astringent and bitter to be eaten, but I have seen a tree of this species in southeastern Arkansas yielding nuts of sweet delicious flavor.

The wood of the Water Hickory is heavy, a cubic foot weighing 46.16 lbs., hard and brittle, suitable chiefly for fuel. In sectioning this wood we have found it to be permeated with numerous dark-colored flecks and streaks of some substance of such hardness as to turn the edge of the hardest steel.[2]

Leaves 8-16 in. long, with slender scurfy-pubescent petiole and rachis and 9-13 lance-ovate leaflets the lateral more or less falcate, sessile, usually unequally wedge-shaped at base, acuminate, 2-5 in. long, thinnish, glandular-dotted, glabrous dark green above. *Flowers:* staminate aments glandular-pubescent; calyx-lobes about equal. *Fruit* compressed, obovoid-oblong, commonly oblique with winged sutures, thin yellowish pubescent husk and flattened brown prominently ridged nut and very rugose thin shell much convoluted and usually bitter kernel.

1. *Carya aquatica* Nutt.
2. A. W., V, 115.





PECAN.

Hicoria Pecan (Marsh.) Britt.[1]

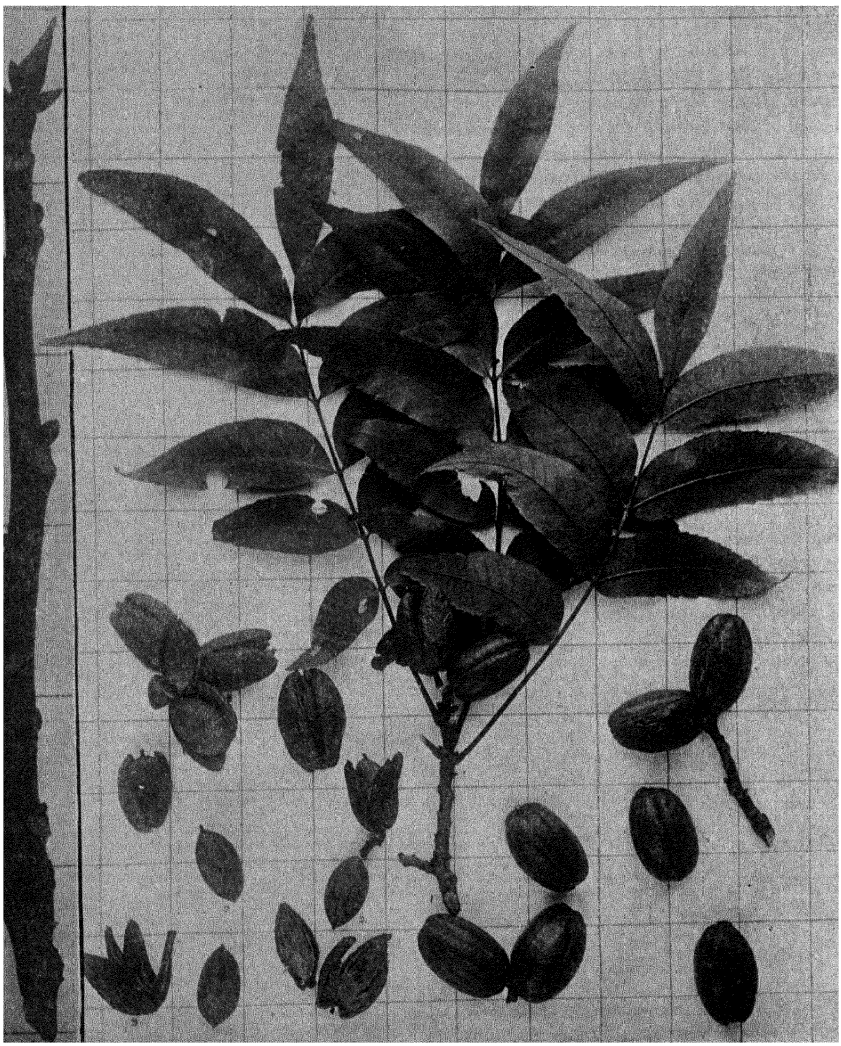
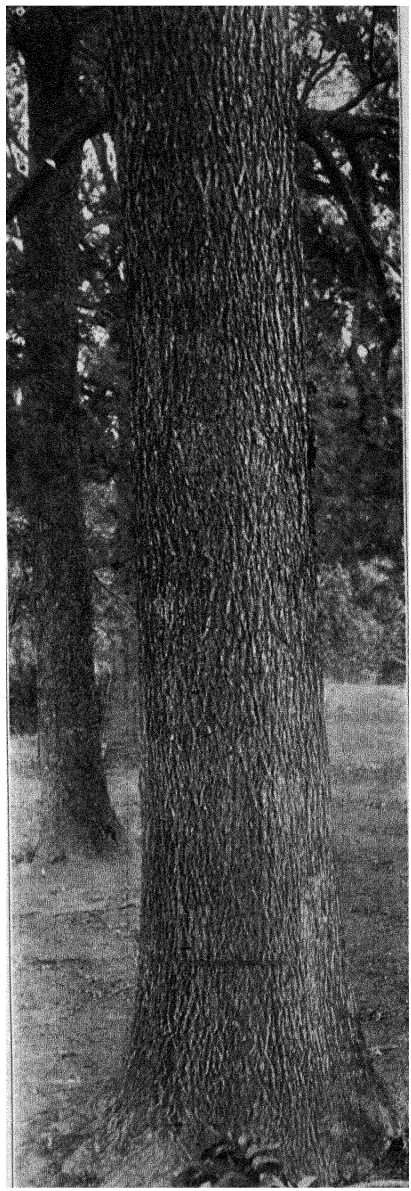


Fig. 66. Branchlet with leaves and fruit, 1; nuts with open or removed epicarp, 2; valves of epicarp, 3; leafless branchlet in late autumn, 4.

67. Trunk with leaves at base. Near Fulton, Ark.

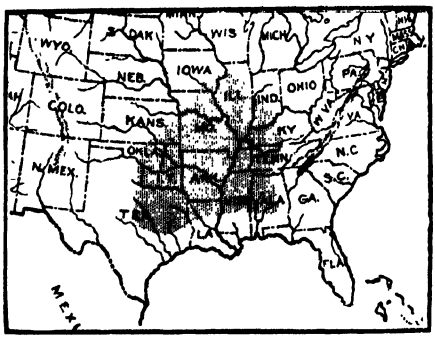
The stately Pecan tree is the largest of the Hickories, attaining sometimes in the forest a height of 160 ft., when crowded together, with massive trunk 5 or 6 ft. in diameter. When growing apart from other trees it develops a very large ovoid or obovoid rounded top, oftentimes seeming out of proportion to the size of its trunk. It prefers low rich ground in the neighborhood of streams subject to occasional inundation.

Its wood is heavy, a cubic foot when absolutely dry, weighing 44.75 lbs., rather hard and very tough and flexible, though not considered as valuable as that of the other Hickories. It is occasionally used in the manufacture of agricultural implements and is excellent for fuel.[2] Its delicious nuts, improved greatly by selection and cultivation, constitute its chief point of value and are an important article of commerce. For the production of these the tree is grown in extensive plantations.



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

1. Syn. *Carya olivaeformis* Nutt.
2. A. W., XI, 267.



SHAG-BARK HICKORY.

Hicoria ovata (Mill.) Britt.[1]

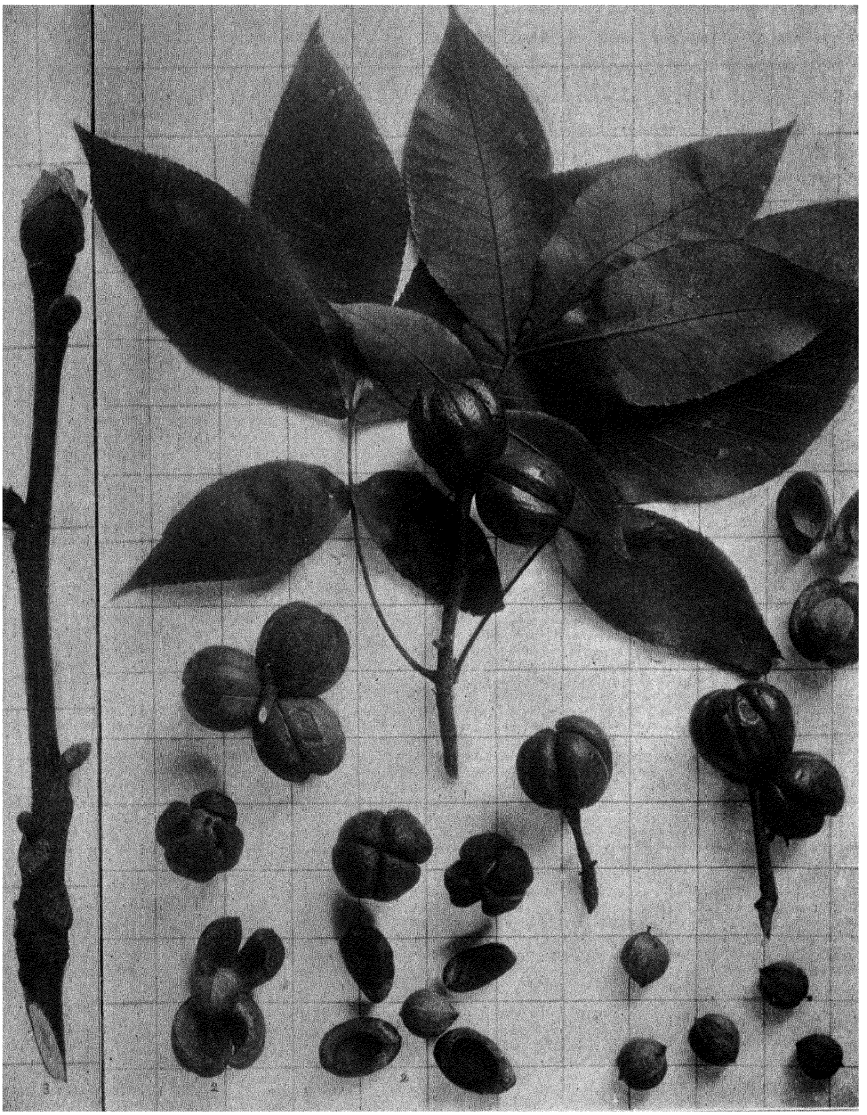
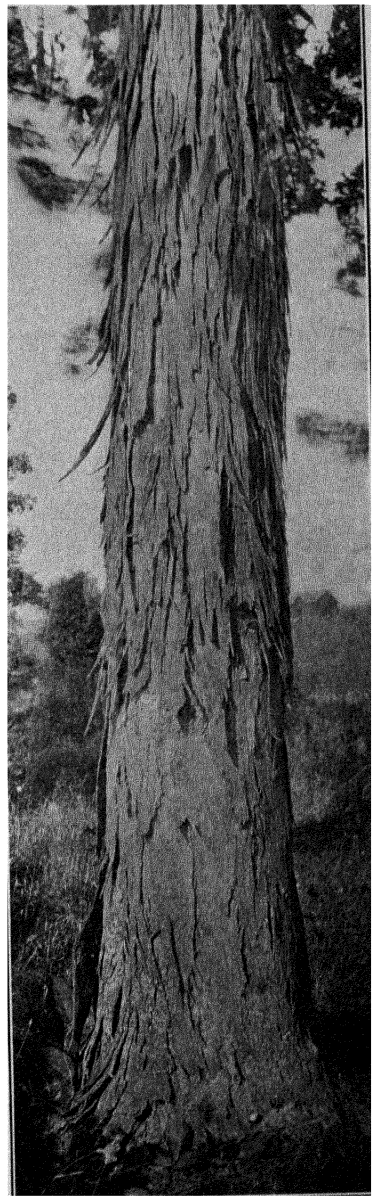


Fig. 68. Branch with mature leaves and fruit, 1; epicarp removed showing thick valves and nuts, 2; branchlet in winter, 3.

69. Trunk of a tree near North Rush, N. Y.

The Shag-bark Hickory is an important forest tree occasionally attaining or even surpassing the height of 100 ft., with straight columnar trunk 2-3 ft. in diameter vested in a singular gray bark. This exfoliates in long hard plate-like strips, which, hanging long attached at their upper ends, suggest an appearance of shagginess; hence its name. When growing apart from other trees it develops an oblong or obovoid top with strong graceful upright branches, pendent lower branches and clean handsome foliage. It thrives best on low hill-sides and along the banks of streams where it is commonly associated with the Basswood, Maples, Cottonwood, Oaks, other Hickories, etc.

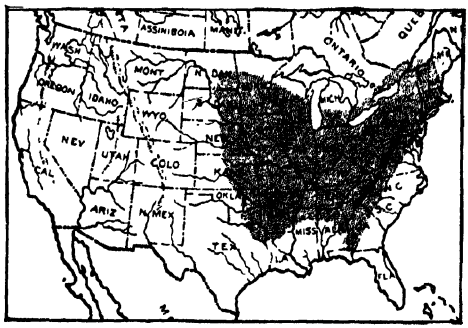
The wood of this tree is hard, strong and tough, a cubic foot when absolutely dry weighing 52.17 lbs., and is highly valued for tool-handles, agricultural implements, baskets, for fuel, etc., and it is this tree which yields the common small hickory nuts of commerce.[2]



Leaves 8-20 in. long, with rather stout petioles and 5 (rarely 7) leaflets which are ovate-lanceolate to obovate, rather cuneate and unequal at base, acuminate, serrate, thick and firm, dark green above, paler beneath; bud-scales imbricated, the inner ones accrescent. *Flowers* in May; staminate 4-5 in. long, in glandular-hairy aments; middle lobe of calyx narrow and much longer than the rounded lateral lobes; stamens 4; pistillate in 2-5-flowered spikes, rusty-tomentose. *Fruit* 1-3 together, 1-2½ in. long, subglobose, depressed at apex, with thick husk splitting soon to the base; nut whitish, compressed, more or less 4-angled, ½-1 in. long; seed with rich delicious flavor.

1. Syn. *Carya alba* Nutt.

2. A. W., II, 86.



BIG SHELL-BARK HICKORY. KING-NUT.

Hicoria laciniosa (Michx. f.) Sarg.[1]

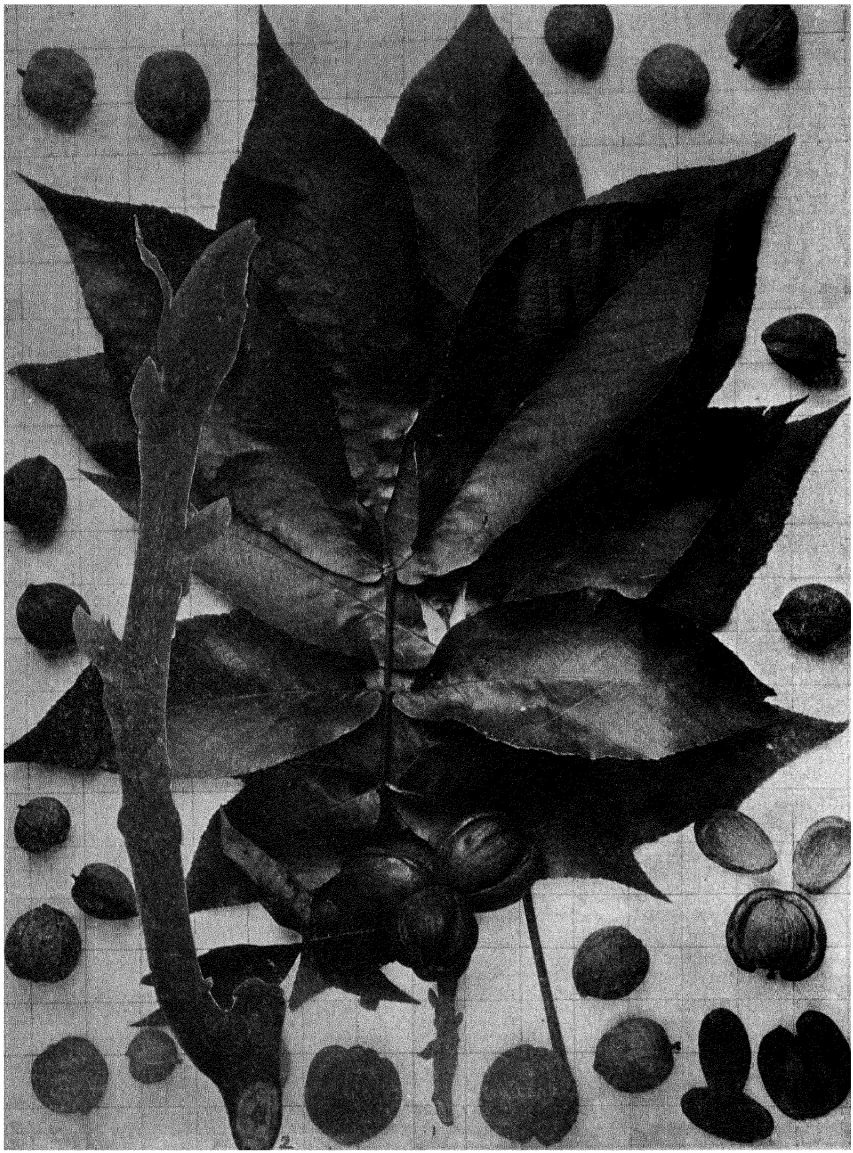


Fig. 70. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2 The superposed branchlet is natural size; the other objects considerably reduced.

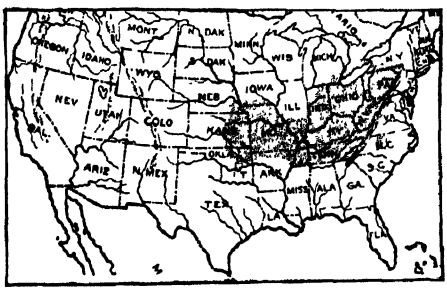
71. Trunk with leaves at base. Genesee River valley, N. Y.

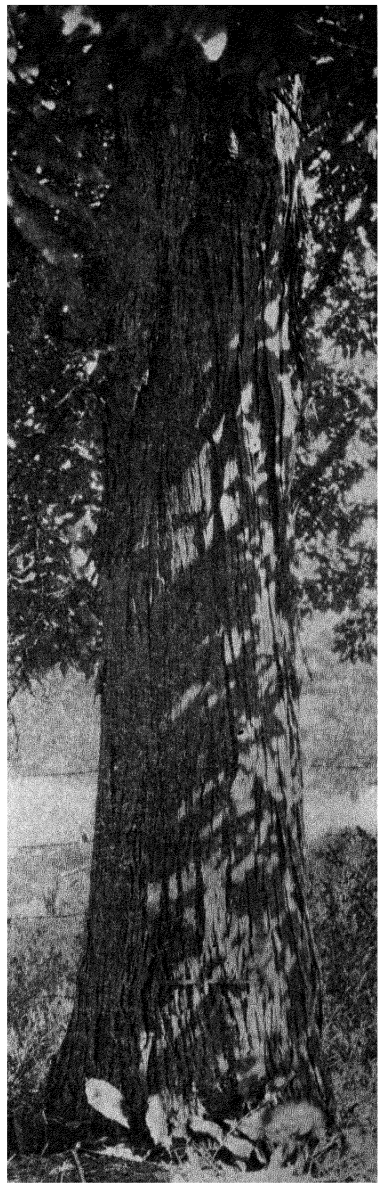
This stately Hickory occasionally attains the height of 120 ft. and 3 or 4 ft. in diameter of trunk. When growing apart from other trees it develops an oblong or subovoid top with drooping lower branches and with large handsome leaves. Its trunk is vested in very much the same kind of shaggy gray bark that is seen on the Shag-bark trunks, though the long scales as a rule do not curve outward as much as do those of that species. It is also more distinctly a tree of the bottom-lands (for which reason it is sometimes called the Bottom Shell-bark) associating there with the Cottonwood, Hackberry, Slippery Elm, Pepperidge, Sweet Gum, Swamp White and Burr Oaks, Black and Red Maples, etc.

Its wood, of which a cubic foot when absolutely dry weighs 50.53 lbs., is very similar to that of the Shag-bark in properties and valued for tool-handles, agricultural implements, etc.[2] The nuts are not considered quite as delicate as those of the Shag-bark in flavor and they do not generally command quite as high a price in the trade.

Leaves 12-24 in. long, the stout petioles often persisting late into the winter; leflets 7 (exceptionally 5 or 9), oblong lanceolate to obovate, usually oblique at base (excepting the terminal), serrate acuminate at apex, dark green above, paler and pubescent beneath. *Flowers* in May; staminate with central calyx-lobe narrow and twice as long as the lateral ones. *Fruit* solitary or 2 or 3 together, oblong, 1¾-2½ in. long with thick woody husk and compressed thick-shelled yellowish white nut 1¼-2¼ in. long with prominent stout point at base; seed bright brown, rich and delicious.

1. Syn. *Carya sulcata* Nutt.
2. A. W., III, 64.





MOCKER-NUT HICKORY.

Hicoria alba (L.) Britt.[1]

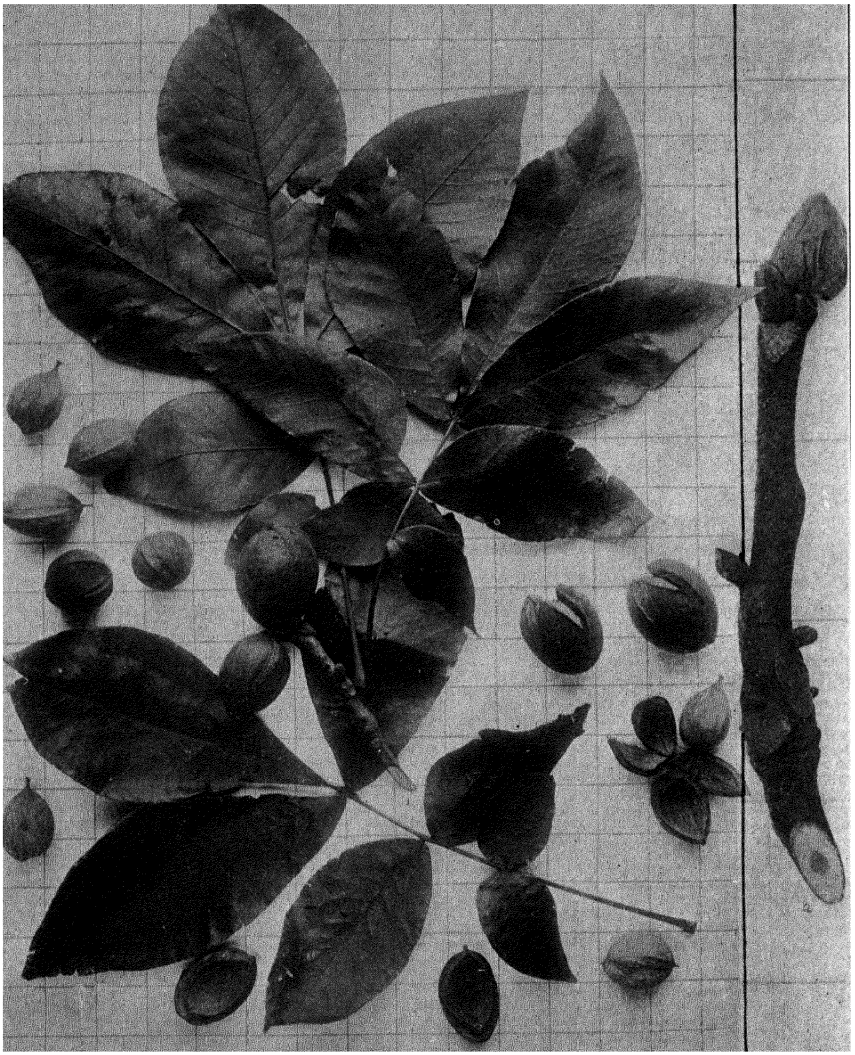


Fig. 72. Branchlet with mature leaves and fruit, 1; leafless branchlet in late winter, 2 The outer scales of the terminal bud are falling away.

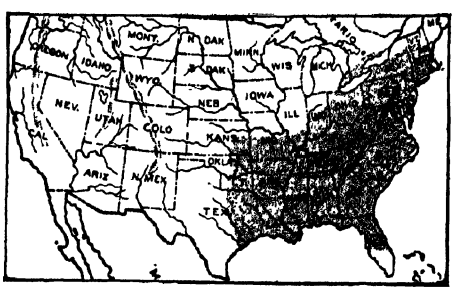
73. Trunk of a tree at Biltmore, N. C.

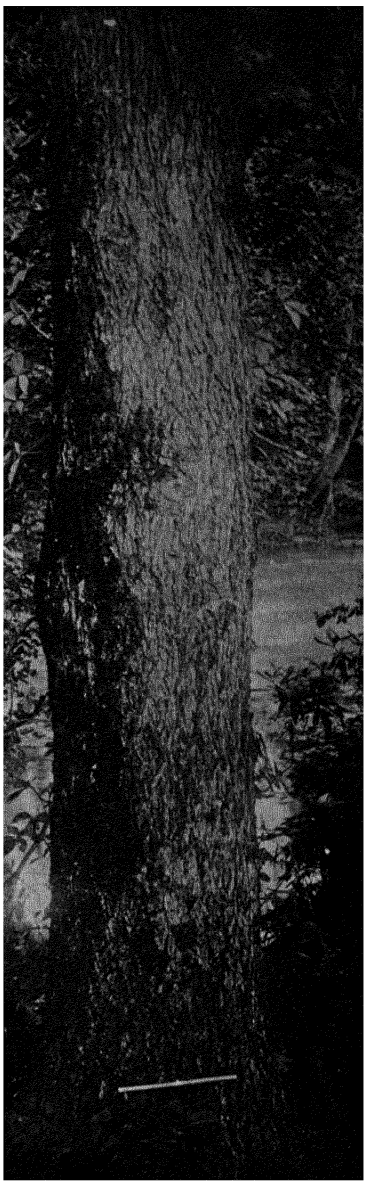
A tree sometimes attaining the height of 90 or 100 ft. with trunk 3 ft. in thickness, though usually considerably smaller. When isolated from other trees it develops an oblong or rather wide-topped head with strong upright lateral and pendent lower branches. The bark of trunk is of a gray color, rough with obscure scaly ridges. It is more commonly found on hill-sides and ridges than is the Big Shell-bark, which it leaves to the inundated river bottoms and rarely invades its territory. In the northern part of its range it is mainly confined to the coast region where it associates with the various Oaks, Red Cedar, Sassafras, Sweet Birch, Sweet Gum, Tulip, etc. To the southward it is more abundant and more generally distributed.

The wood of the Mocker-nut is heavy, a cubic foot when absolutely dry weighing 51.21 lbs., strong and tough, and is used in the manufacture of tool-handles, agricultural implements, etc., and is excellent for fuel.[2] The nuts command about the same price in the trade as those of the Big Shell-bark.

Leaves 8-15 in. long, fragrant when crushed, with stellate pubescent petioles and 7-9 oblong-lanceolate to obovate acuminate serrate leaflets which are lustrous dark green above and paler and pubescent beneath; twigs tomentose; bud-scales imbricated, the outer early deciduous, the inner tomentose and accrescent. *Flowers* in May; staminate in stellate pubescent aments; calyx with central lobe linear and much longer than the lateral ones; stamens 4 with red anthers; pistillate in 2-5-flowered spikes. *Fruit* globose-oblong, 1½-2 in. long, with thick husk splitting nearly to the base; nut brownish white, variable in shape, 4-ridged with very thick shell and sweet seed.

1. Syn. *Carya tomentosa* Nutt.
2. A. W., IV. 90.





PIG-NUT HICKORY.

Hicoria glabra (Mill.) Britt.[1]

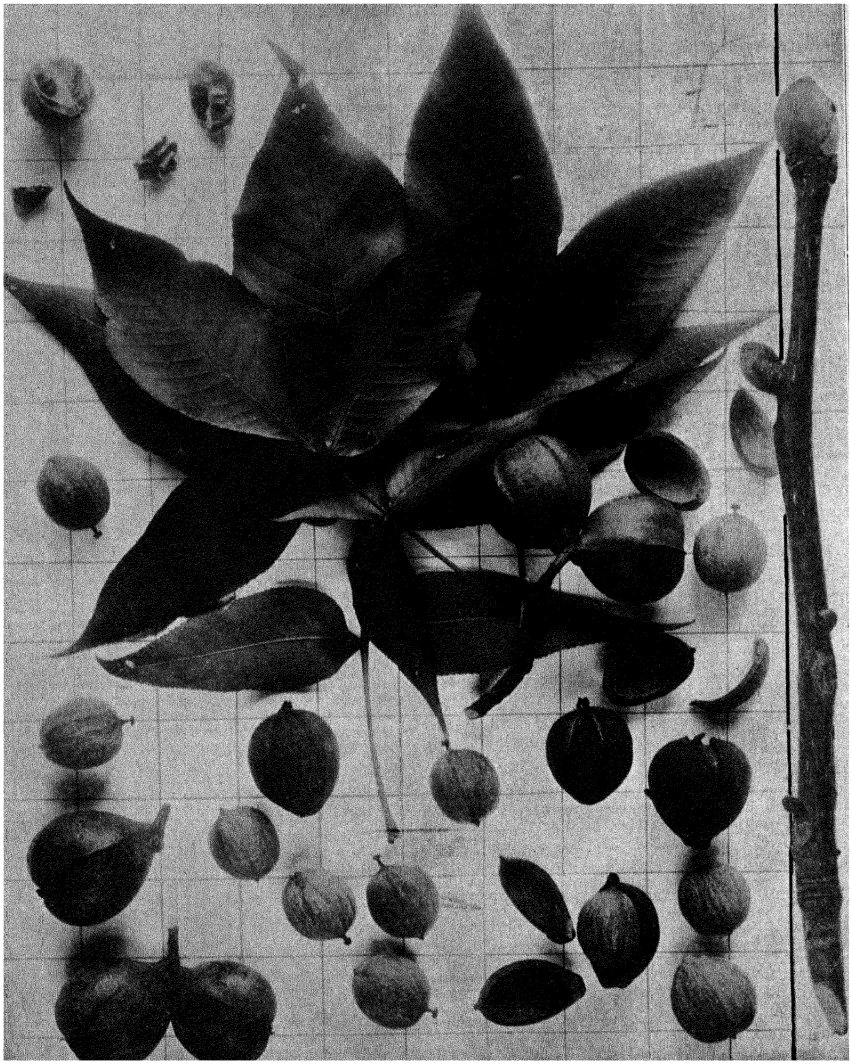


Fig. 74. Branchlet with leaves and fruit and scattered specimens of the fruit, 1; branchlet in winter, 2.

75. Trunk of a tree with leaves at base. Staten Island, N. Y.

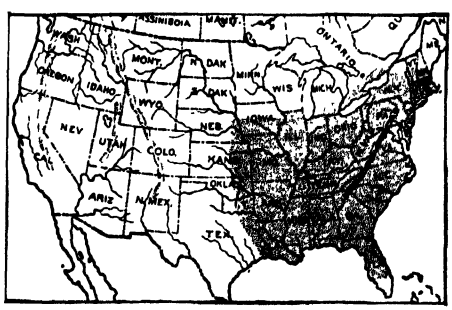
The Pig-nut Hickory in the forest attains the height of 80-100 ft. with trunk sometimes 3 or 4 ft. in diameter. When in the open fields it forks rather low and develops an oblong or obovoid top with strong upright and pendulous often contorted branches. The bark of trunk is of a grayish color and finally becomes rough with close scaly ridges. The tree inhabits uplands and ridges in abundance, especially in the northern states, and is said to be found at higher altitudes than any of the other Hickories.

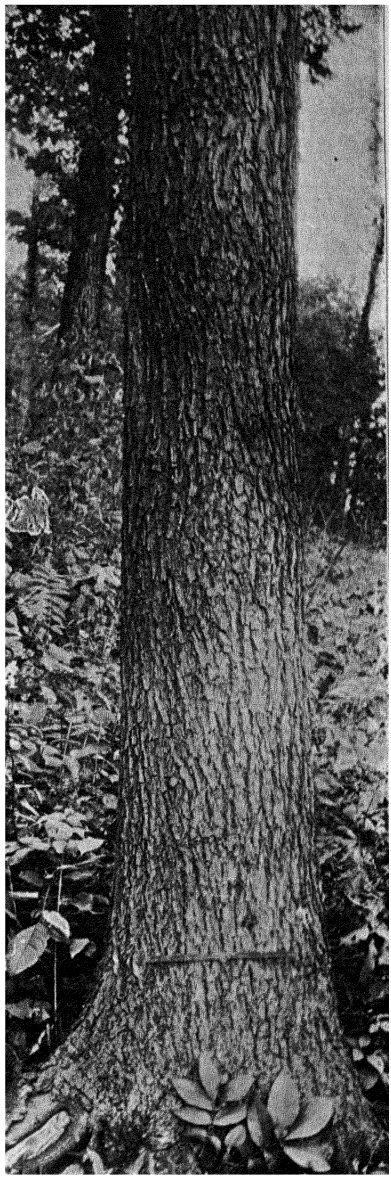
The wood of the Pig-nut Hickory is heavy, a cubic foot when absolutely dry weighing 51.21 lbs., strong and tough and is used in the manufacture of tool-handles, agricultural implements, etc., and for fuel.[2] The nuts are extremely variable in quality, some being quite astringent and others of pleasant flavor.

Leaves 8-12 in. long, glabrous at maturity and with 5-7 (rarely 9) leaflets which are from oblong-lanceolate to obovate, rounded and mostly unequal at base, sharply serrate, dark green above, paler beneath, the upper much larger than the lowest; winter buds with 8-10 imbricated scales, the outer falling early, the innermost accrescent and falling when about 1 in. long. *Flowers* in May; staminate aments 3-7 in. long; calyx-lobes usually about equal but middle one narrower; pistillate in 2-5-flowered spikes; stigmas yellow. *Fruit* obovoid-oblong or pyriform, usually compressed, with thin husk tardily dehiscent and smooth or somewhat angled brownish thick-shelled nut having astringent or edible seed.

1. Syn. *Carya porcina* Nutt.

2. A. W., III, 65.





SMALL-FRUITED HICKORY.

Hicoria microcarpa (Nutt.) Britt.[1]

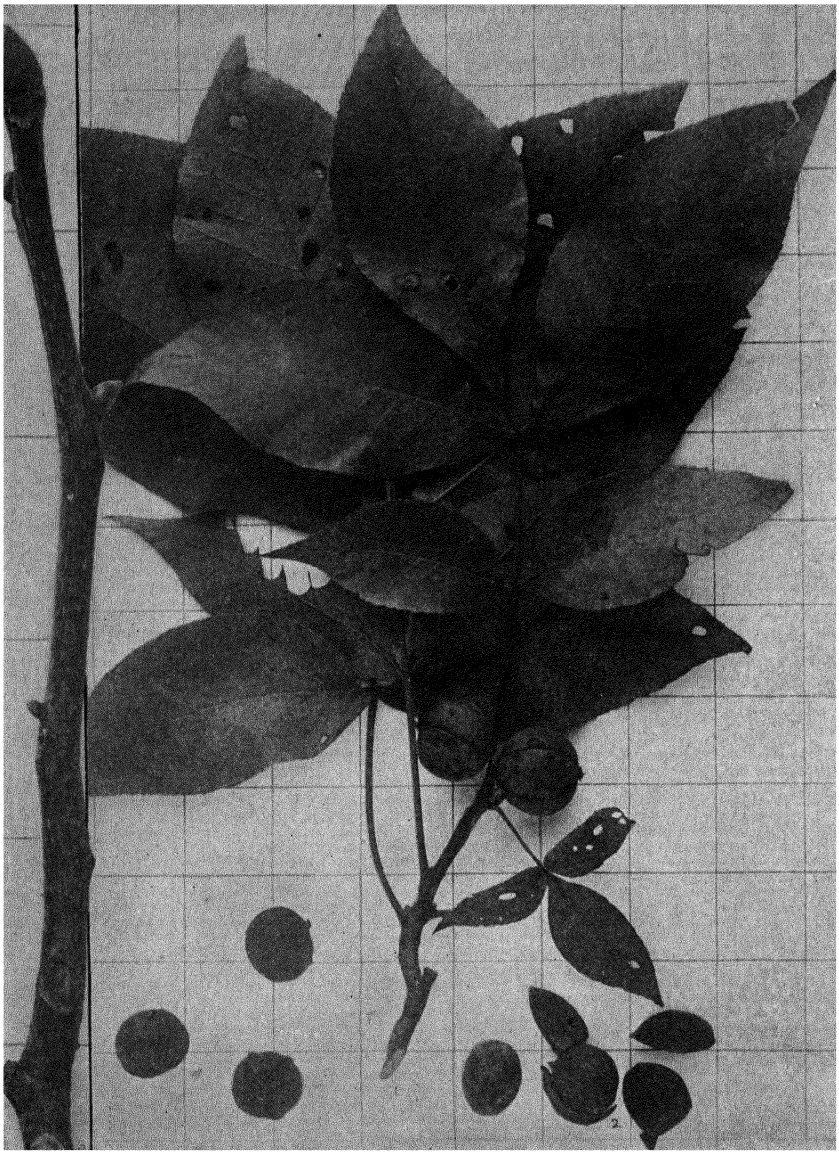


Fig. 76. Branchlet with mature leaves and fruit, 1; nut and valves of epicarp, 2; branchlet in winter, 3.

77. Trunk of a tree near Richmond, Staten Island, N. Y.

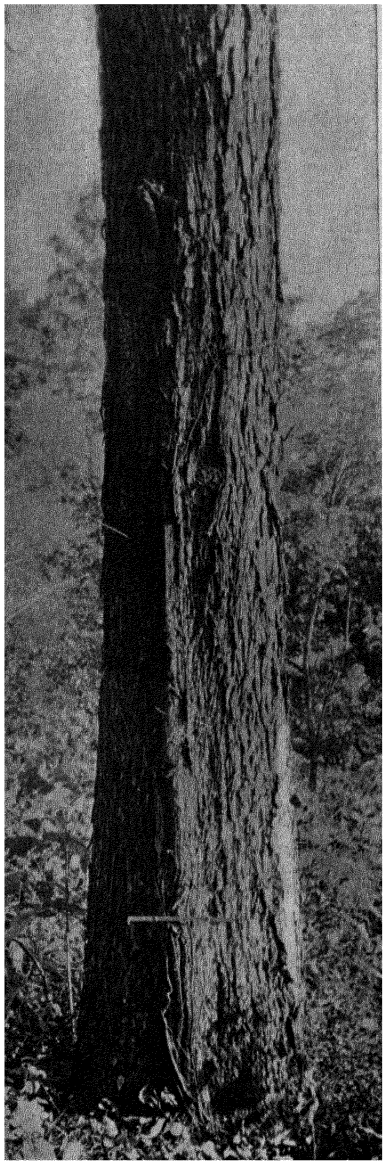
A forest tree attaining the height of 80 or 100 ft., with shapely trunk 2–3 ft. in diameter, vested in a rough gray bark which exfoliates in narrow plates. When isolated from other trees it develops a full rounded or oblong top of upright and spreading topmost and lateral branches and lowermost pendulous. It inhabits mainly well drained slopes and hillsides in company with the Pig-nut and Shagbark Hickories, various Oaks, the Red Cedar, Dogwood, Sassafras, etc.

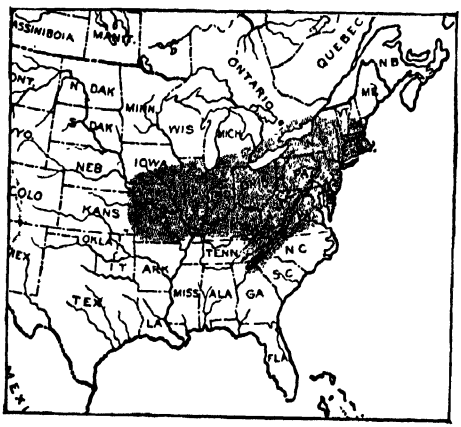
The wood is firm, strong and tough and is used in the manufacture of agricultural implements, tool-handles, etc., and makes excellent fuel.[2] The nuts are sweet and of delicious flavor but too small to be of commercial importance.

Leaves 8-12 or 15 in. long, glabrous, with 5-7 sessile leaflets mostly 3-5 in. long, ovate-lanceolate to oblong, serrate, acuminate at apex; winter buds with 6-8 scales, the innermost accrescent. *Flowers* in May; staminate aments glabrous, middle lobe of calyx equalling or somewhat longer than the lateral ones. *Fruit* (ripe in September) subglobose or globose-oblong, less than 1 in. in length, with thin husk splitting to the base; nut subglobose, slightly compressed with thin shell and sweet seed.

1. Syn. *Carya microcarpa* Nutt. *Hicoria glabra* var. *odorata* Sarg.

2. A. W., IV, 91





PALE-LEAF HICKORY.

Hicoria villosa (Sarg.) Ashe.[1]

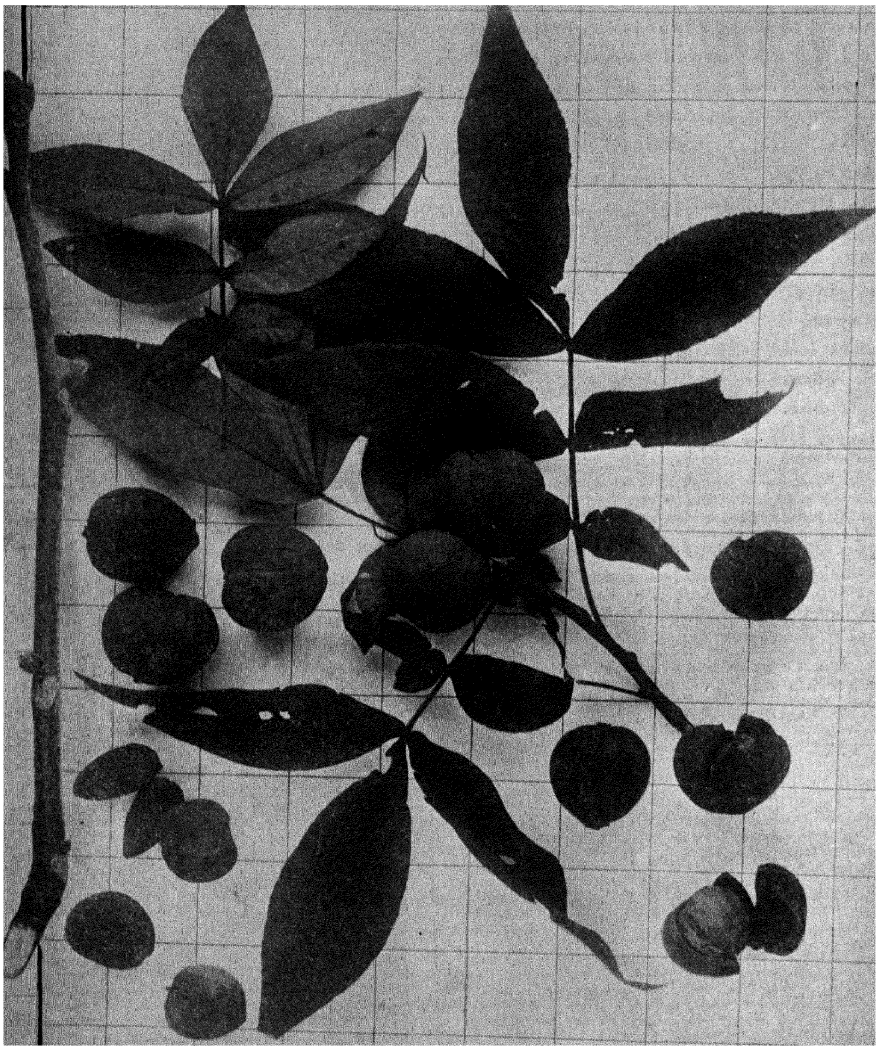


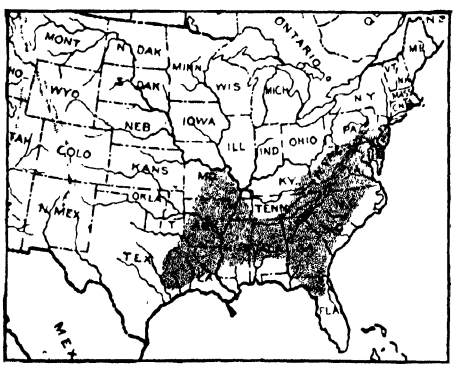
Fig. 78. Fruiting branchlet and mature nuts. Branchlet in winter.
79. Trunk of a tree in forest at Biltmore, N. C.

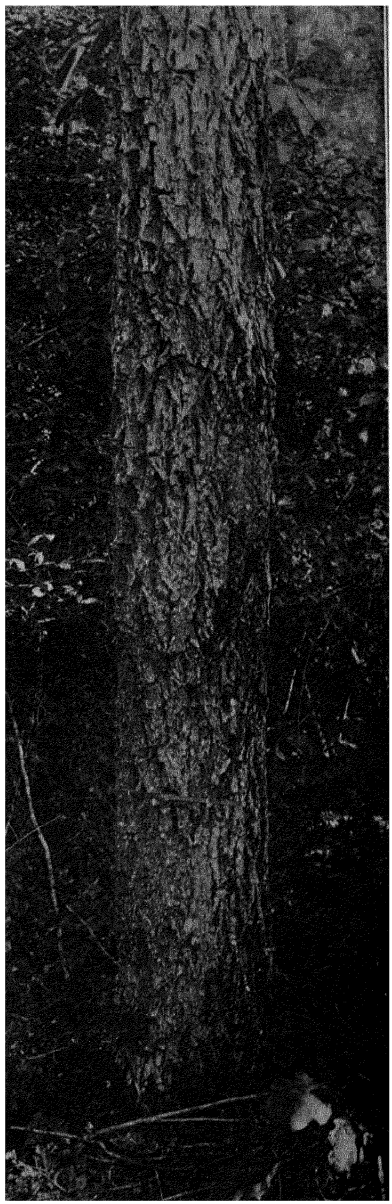
The Pale-leaf Hickory is a forest tree of medium size, not often more than 40 or 50 ft. in height or 18 or 20 in. in thickness of trunk which is covered with a grayish brown bark, very rough with prominent connected scaly ridges. When growing apart from other trees it develops a rather narrow oblong top with upright branches and pendulous lower branches. It inhabits well drained slopes, sandy plains and rocky ridges, sometimes fruiting when only a few feet in height. It is abundant in the southern part of its range, particularly the foothill region of the southern Alleghanies.

Its wood is heavy, hard, strong and tough and excellent for tool-handles, agricultural implements and for fuel.[2] The nuts are sweet and edible.

Leaves 6-10 in. long, with slender pubescent petioles and usually 7 (sometimes 5 or 9) leflets which vary from lanceolate to lance-obovate, serrate, acuminate, and when young pubescent and covered beneath with silvery peltate scales and resin-globules, but at maturity glabrous dark green above and yellowish beneath; winter buds small with 6-8 imbricated scales, the outer dotted with resin-globules. *Flowers* staminate in scurfy pubescent catkins, 5-7 in. long; central calyx-lobe much longer than the lateral ones. *Fruit* subglobose to pyriform, 1-1¾ in. long, compressed with thin husk splitting nearly to the base; nut slightly angled, pale brown with thick shell and small sweet seed.

1. Syn. *Hicoria pallida* Ashe.





WAX MYRTLE. BAYBERRY. CANDLEBERRY.

Myrica cerifera L.



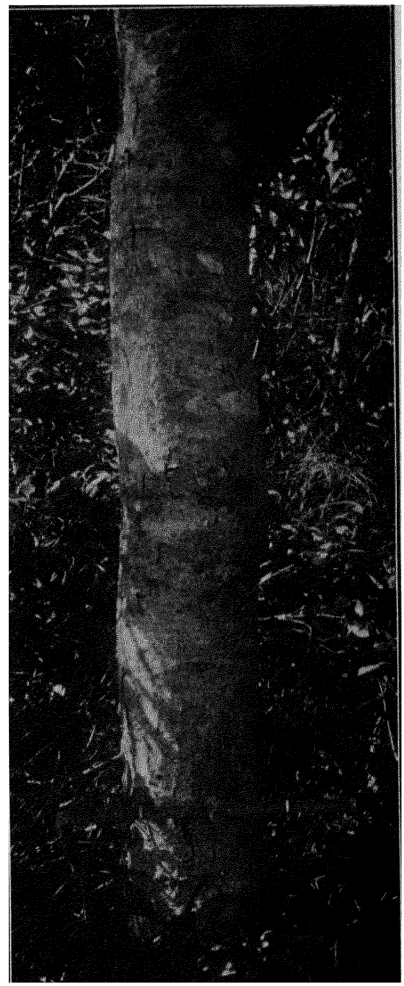
Fig. 80. Fruiting branchlets and detached leaves from vigorous shoots.
81. Trunk of a tree near coast of North Carolina.
82. Wood structure magnified 15 diameters.

The Wax Myrtle is a slender tree occasionally attaining the height of 30 or 40 ft. with usually crooked or inclined trunk 10–12 in. in diameter. When isolated from other trees it develops a rather narrow oblong top of small slender branches. It attains its largest size in the coast region of the southern Atlantic and Gulf states where it is a common tree. It is found in moist woods or encroaching upon the sand hills in the vicinity of the sea coast in company with the Yaupon, Wild Olive, Red Bay, Live Oak, etc., or, farther inland, in swamps and bottom-lands in company with the Sweet Bay, Loblolly Bay, Sparkleberry, Red Maple, Sweet-leaf, etc.

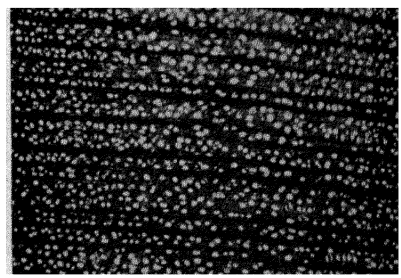
Its fine-grained soft wood, of which a cubic foot when absolutely dry weighs 35.13 lbs., is little used, though suitable for use in turnery. Its fruit is sometimes gathered by the country folk and the waxy covering removed by heating in water. This is then gathered and cast into candles which when lighted burn with a distinctly bluish light.[1]

Leaves oblong-lanceolate to oblanceolate, 1½-5 in. long, cuneate at base and decurrent on the short petiole, acute, remotely serrate chiefly above the middle or entire, dark green above and paler beneath, fragrant with yellow resin glands. *Flowers* (March-April) dioecious; staminate aments ½-¾ in. long, cylindric; stamens few; pistillate aments oblong, shorter than the staminate. *Fruit* globose drupes, ⅛ in. or less in diameter, coated with bluish white wax and tipped with base of style, ripening in early autumn and long persisting.[2]

1. A. W., XI, 268.
2. For genus see p. 424.







CORK-WOOD.

Leitneria Floridana Chapm.



Fig. 83. Branchlet with leaves and mature fruit, 1; fruit in section, 2; branchlets in winter, 3; staminate (to the left) and pistillate (to the right).

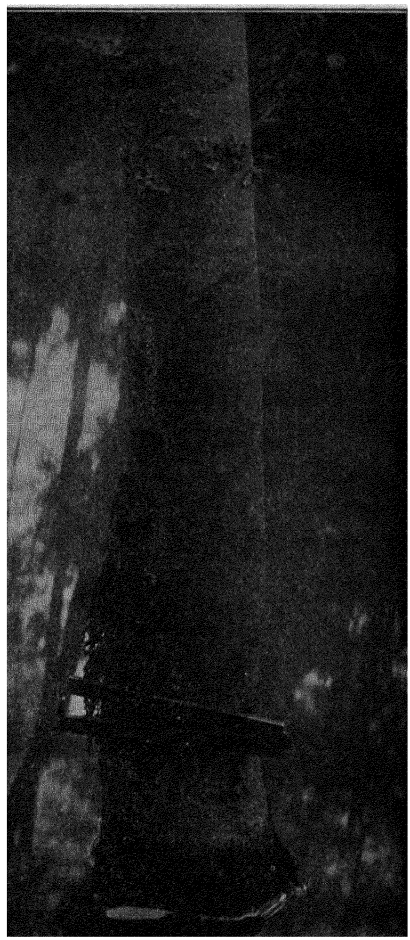
84. Trunk of tree in swamp bordering St. Francis River, Mo.

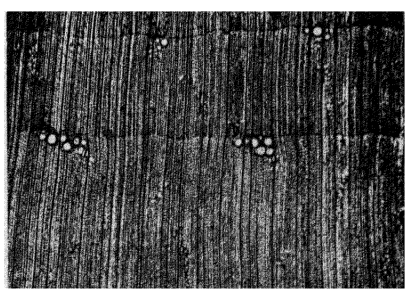
85. Wood structure magnified 15 diameters.

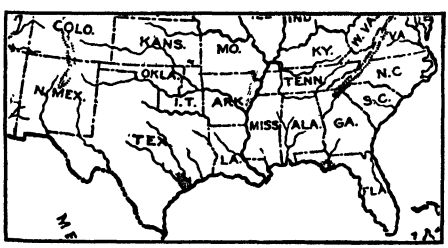
This curious and rare tree has the distinction of producing wood which is the lightest in weight of all known woods. It is a small tree, only under the most favorable conditions attaining the height of 20 ft. with loose open head of few spreading branches and trunk 5–6 in. in diameter. Few other trees are so strictly aquatic in distribution, as it thrives best in permanently inundated swamps and deep sloughs, where its roots are constantly wet, and to visit it one must go in a boat or wade through mud and water. Individuals growing in less permanently inundated localities, where the water supply is less constant, plainly suffer the deprivation and hardly grow to the height of a man's shoulder. It attains its largest size in the swamps which border the St. Francis River of Missouri and Arkansas, growing in the shade of other swamp loving trees as the Bald Cypress, Cotton Gum, Planer Tree, Pumpkin Ash, etc. Separated from this locality by a long interval it appears again in the saline marshes of the Gulf coast of Florida near Appalachicola, where it was first found and made known to science. Far to the westward it is also found in the swamps along the Brazos River near Columbia, Texas. The trunks are vested in a smooth mottled gray bark slightly fissured at their bases, which are much swollen beneath the water line and usually bearing a mass of dark moss and rootlets.

The wood is of a pale lemon yellow color with lighter sap-wood. It is lighter than cork in weight, having a specific gravity, as reported by Prof. Trelease, of 0.207, while that of common cork (the bark of *Quercus suber*, etc.) is 0.240. It is occasionally used by fishermen for making floats for their nets. For botanical characters see the ordinal and generic descriptions, this being the only species.[1]

1. For genus see p. 425.







PEACH OR ALMOND-LEAF WILLOW.

Salix amygdaloides Anders.

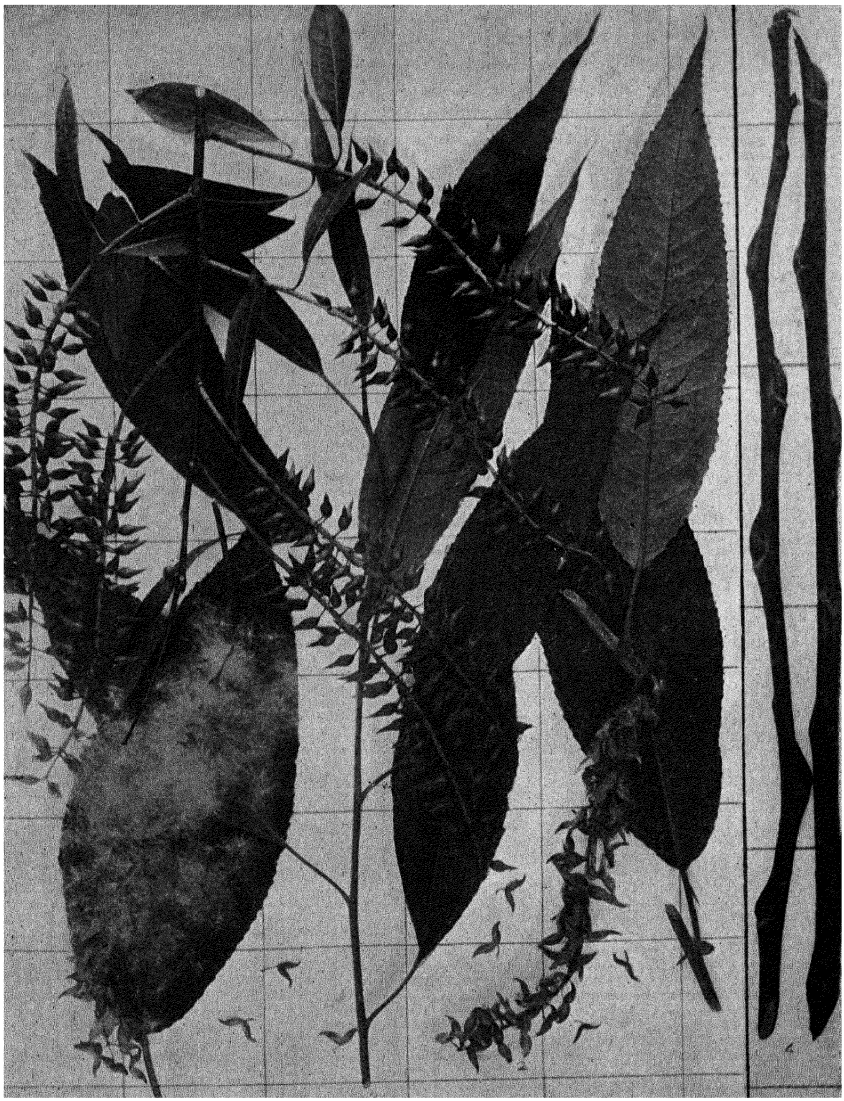


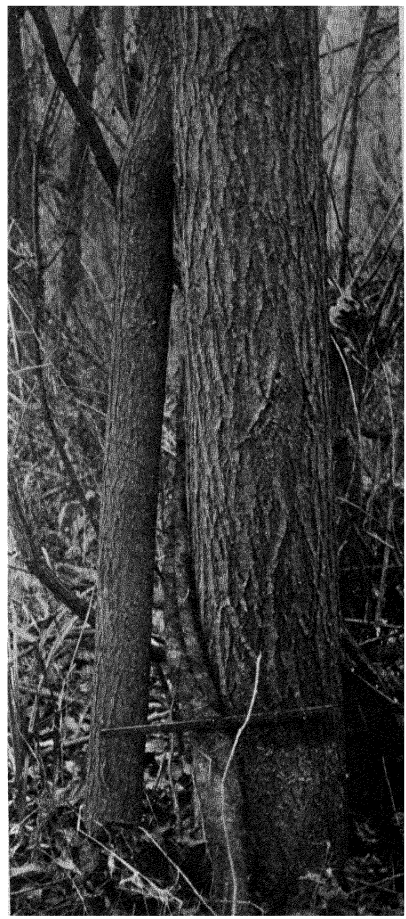
Fig. 86. Branchlet with mature leaves and fruit, 1; detached catkins of empty capsules, 2; end of leafy branchlet, 3; leafless branchlet in winter, 4.

87. Trunk of tree near St. Louis, Mo.

88. Wood structure magnified 15 diameters.

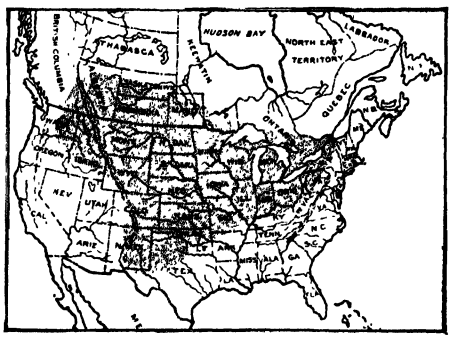
The Peach-leaf Willow is a handsome and distinct Willow, sometimes attaining the height of 60 or 70 ft. with straight columnar trunk 2 ft. in diameter. When isolated from other trees it develops a rather narrow rounded top of upright and spreading branches, and while the bark of trunk is ridged it is distinctly smoother and with more appressed scales than is that of the Black Willow, a character especially noticeable on the larger branches. Its large pendent leaves are quite suggestive of those of the Peach and Almond trees and from that fact it receives its name. In company with the Black Willow, with which it apparently freely hybridizes, it grows along the borders of streams and low lake-shores over a large area. In distribution it is an almost exact complement of that of the Black Willow, in that it is rarer in the east and more abundant westward as far as to the Rocky Mountains at least, while the reverse is true of the Black Willow.

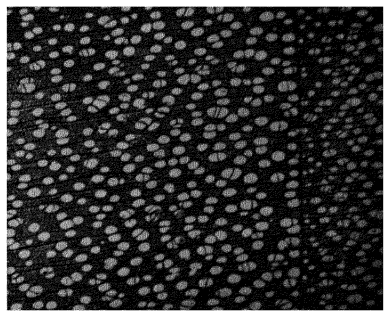
Its wood is light, a cubic foot when absolutely dry weighing 28.10 lbs., soft and not strong, and used mainly for charcoal and fuel.[1]



Leaves revolute in the bud, 2-6 in. long, ovate-lanceolate to lanceolate, from cuneate to rounded at base, finely serrate, narrowing to a long slender point; lustrous light green above, pale and glaucous beneath; petioles slender, elongated and without glands; stipules reniform but mostly fugacious. *Flowers* appear with the leaves in terminal aments on leafy branchlets; scales yellow, villous both sides, caducous; stamens 5-9 with filaments hairy at base; pistillate aments loose with long-stalked narrow-ovoid glabrous ovaries and nearly sessile emarginate stigmas. *Fruit* globose conical with long slender pedicels.[2]

1. A. W., III, 71.
2. For genus see pp. 425–426.





LONG-STALK WILLOW. WARD WILLOW.

Salix longipes Anders.[1]



Fig. 89. Fruiting branchlets, 1; detached capsules, 2; leaves from vigorous shoots, 3; branchlets in winter, 4.

90. Trunk of small tree. Meramec River valley, Mo.

A small tree, rarely over 30 ft. in height or 8 or 10 in. in thickness of trunk, which is vested in a dark brown bark rough with prominent firm ridges. It is often found fruiting as a shrub. It differs from the Black Willow in distribution in that it is found more along the rocky or gravelly banks or beds of streams, where its dark colored bark and small crooked trunks are found so close to the rushing waters that they are often bruised and battered by the passing flood-wood, while the Black Willow is found along the banks of still flowing streams of the bottom-lands, where the waters are less turbulent. Its geographic range is not yet well determined.

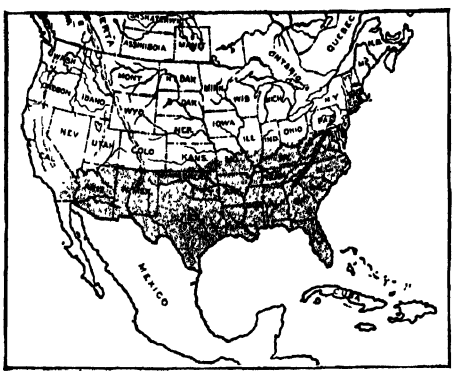
Its wood is light, soft, not strong and of a reddish brown color with thin nearly white sap-wood.[2]



Leaves involute in the bud, 4-7 in. long, lanceolate to ovate-lanceolate, cuneate or rounded and the largest leaves sometimes cordate at base, long-pointed, finely and unequally serrate, glabrous bright green above, somewhat pubescent and whitish beneath; the foliaceous stipules reniform, often ½ in. long; petioles short, without glands; winter buds small, brown, lustrous, branchlets hoary pubescent. *Flowers:* aments terminal on leafy branchlets, 3-4 in. long; scales ovate, yellow, obtuse, villous; stamens 3-7 with filaments hairy at base and yellow anthers; ovary long-stalked with nearly sessile stigmatic lobes. *Fruit* capsules about ¼ in. long, globose conical.

1. Syn. *Salix Wardi* Bebb. *Salix occidentalis* Koch.

2. A. W., XII, 296.



BLACK WILLOW.

Salix nigra Marsh.

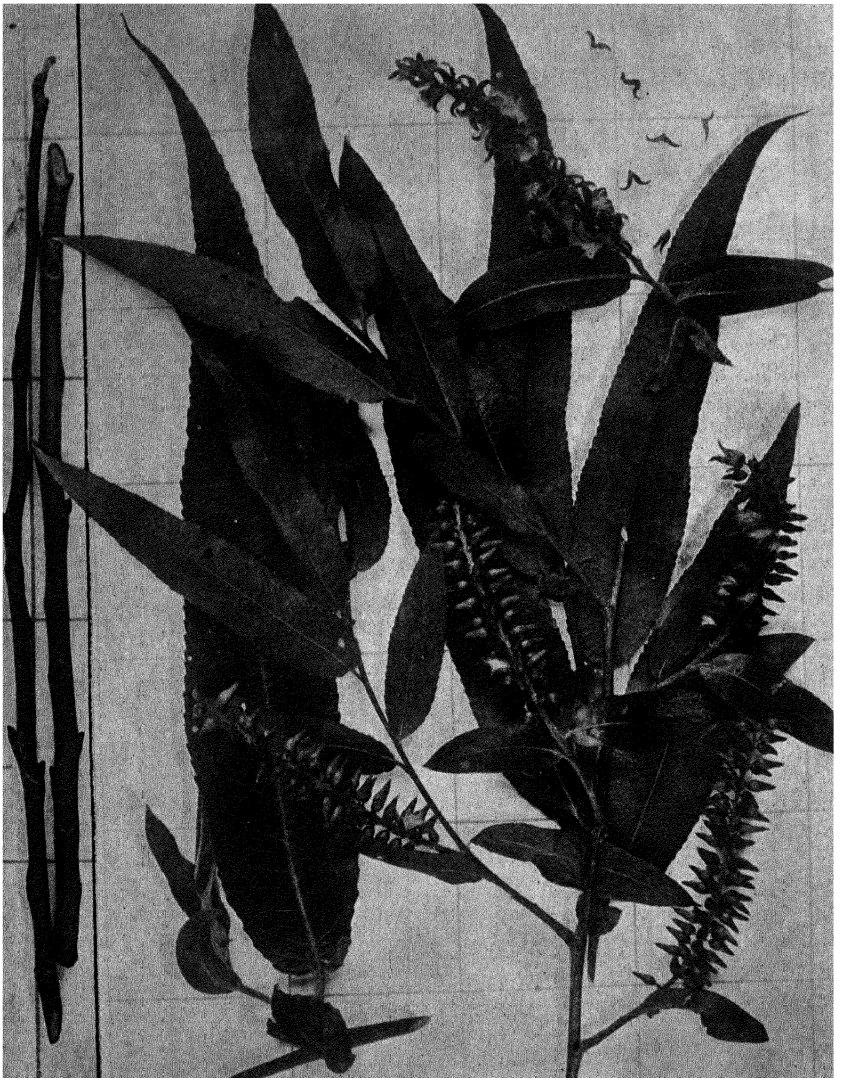


Fig. 91. Branchlet with leaves and mature fruit, leaves from vigorous shoots, showing stipules, and leafless branchlets in winter.

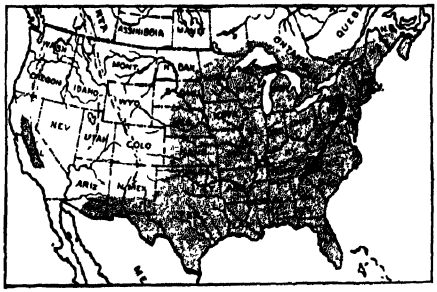
92. Trunk of tree near St. Louis, Mo.

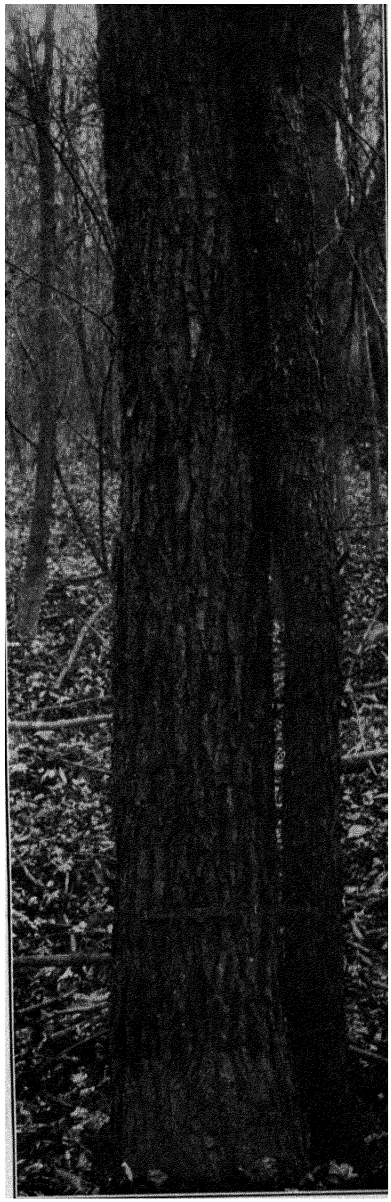
The Black Willow is the largest and most abundant of the American Willows, sometimes in the forest attaining a height of 120 ft. with trunk 3 or 4 ft. in diameter, but these dimensions are attained only under most favorable conditions and it is usually a tree of less than half the dimensions above mentioned. When isolated it develops a rather irregular broad or round-topped head with fine branchlets and drooping yellow-green foliage. It commonly sends up clusters of crooked or inclined trunks from a common base. It is a tree of very wide distribution, skirting the low banks of streams and lake shores from the Atlantic nearly to the Pacific. It is very abundant in the Mississippi valley and throughout the Atlantic states, and attains its largest dimensions in southern Illinois and in the Colorado River valley in Texas.

The light soft wood is said to check badly in drying and is little used save for fuel and for charcoal. A cubic foot when absolutely dry weighs 27.77 lbs.[1] The bark is rich in tanning and is used in domestic practice in the treatment of fevers.

Leaves involute in the bud, lanceolate, sometimes falcate (markedly so in var. *falcata*) very long attenuate often with curved tip, 3-6 in. long, wedge-shaped or rounded at base, finely serrate, glabrous light green above, somewhat paler and sometimes pubescent on the veins beneath and with the very short glandless petioles; winter buds small, about ⅛ in. long. *Flowers* expanding with the leaves; aments 1-3 in. long, terminal on short leafy branchlets; scales yellow, rounded at apex, hairy on inner surface; stamens 3-7 with filaments hairy at base; ovary long-ovoid, stalked, and with thick nearly sessile stigmas. *Fruit* (June-July): capsules ovoid, gradually narrowing above the middle, about ¼ in. long, short-stalked, glabrous. *S. nigra falcata* (Prush) Torr. is a form, with narrower and more falcate leaves green both sides, ranging from Massachusetts to Ohio and Florida.

1. A. W., II, 45.





SHINING WILLOW. GLOSSY-LEAF WILLOW.

Salix lucida Muehl.

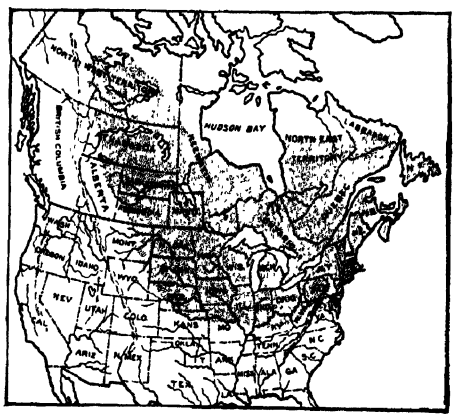


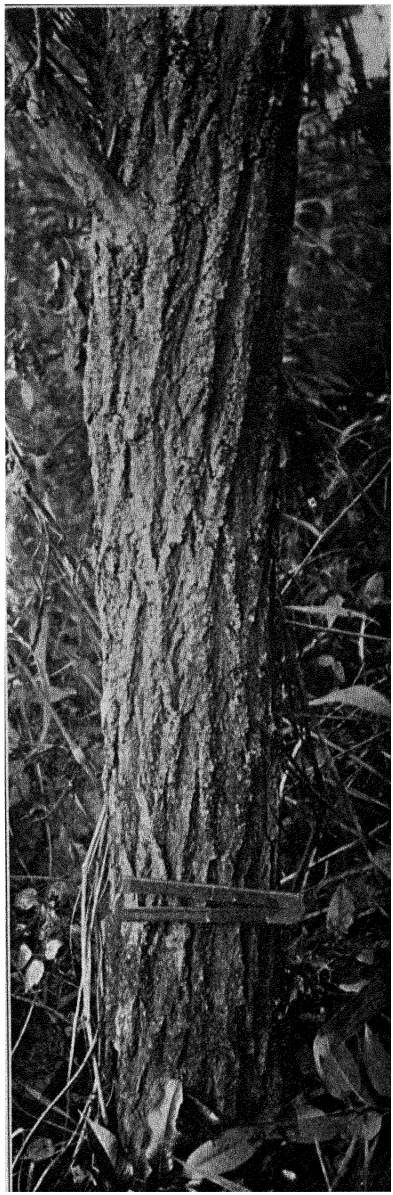
Fig. 93. Portion of a branchlet bearing mature fruit, 1; detached capsules, 2; leaves of vigorous shoots, 3; branchlet in winter, 4.

94. Trunk of tree in Lewis Co., N. Y.

The Shining Willow is a small tree attaining the height of 25 ft. with a short trunk rarely 10 or 12 in. in diameter, but it is more often shrubby than arborescent in habit of growth. Its branches grow upright and outward forming a rather broad rounded top. It inhabits the banks of streams, lake-shores and swamps in company with the Glaucous and other Willows, Alders, etc. among which its shining bright green leaves may be quickly distinguished. It is a species of quite wide distribution and greater abundance in the northern part of its range than to the southward. Economically the species is of little importance, though its conspicuous flowering aments in early spring, and later its clean glistening foliage, give it value for planting in suitable localities for ornamental purposes.

Leaves involute in the bud, lanceolate to ovate-lanceolate, wedge-shaped or rounded at base, mostly long-acuminate, finely serrate, 2-6 in. long, coriaceous, covered with scattered pubescence when they unfold but finally glabrous, lustrous dark green above, slightly paler and with broad yellowish midribs beneath; petioles stout, puberulous, glandular at apex; stipules small oblong or semicordate, glandular-serrate. *Flowers* aments terminating stout lateral leafy branchlets, erect, with thick tomentose peduncles; scales pale yellow, rounded at apex, denticulate, glabrous above; the staminate short, stout and densely flowered; stamens usually 5 with long free filaments, hairy at base; pistillate ament more slender with elongated long-stalked glabrous ovary and nearly sessile emarginate stigma. *Fruit* capsule long ovoid, acute, much longer than the pedicel, lustrous and often long persistent after liberating the seeds.





BRITTLE WILLOW.

Salix fragilis L.



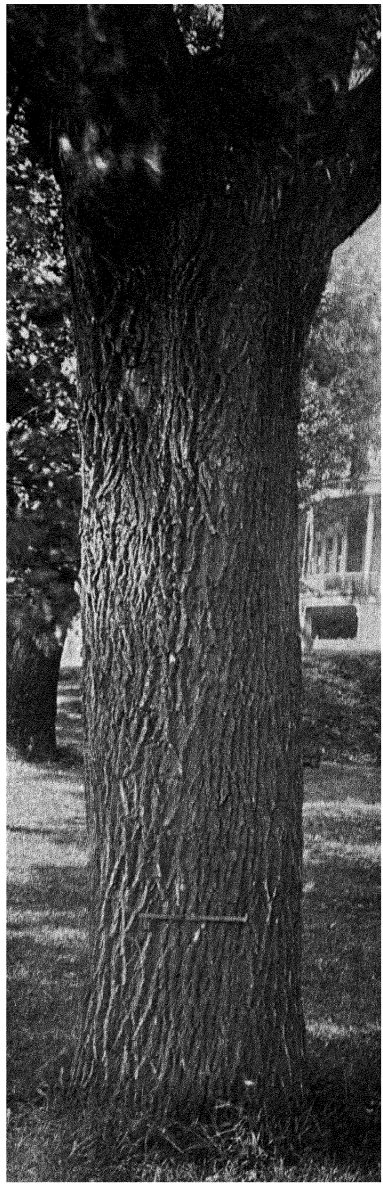
Fig. 95. Portion of branchlet bearing mature fruit, 1; end of vigorous leafy shoot, 2; branchlet in winter, 3.

96. Trunk of tree in Albany, N. Y.

The Brittle Willow is a native of Europe and Asia, where it is one of the most useful of the Willows in the production of valuable timber. It was early introduced into America and has become extensively naturalized throughout the eastern states and Canada. It is a tree of very rapid growth, attaining a large size, sometimes 70 or 80 ft. in height with trunk 3 or 4 ft. or more in thickness, covered with a rough scaly-ridged gray bark. Its full rounded top of upright and spreading branches and clean foliage make it a desirable tree for ornamental planting in moist localities, but its special value is for planting along the banks of streams to prevent erosion. This can be very easily accomplished by simply sticking stakes made from freshly cut branches into the moist soil in early springtime. Soon they become clothed with foliage and in a surprisingly short time sturdy trees. The tree takes its name from the twigs being very brittle at base, a strong wind usually leaving the ground beneath a tree strewn with them.

The wood of the Brittle Willow is very light, soft, tough and of a reddish brown color with thick whiter sap-wood. Lumber is manufactured from the tree in Europe and is said to be more durable than that of most of the Willows, but the use of the wood is confined in this country mainly to fuel and charcoal, a large part of the charcoal used in the manufacture of gunpowder coming from this source. The trees by being pollarded can be depended upon for successive crops of wood at regular intervals of a few years each.

Leaves lanceolate, commonly 3-6 in. long, cuneate at base, long acuminate, glandular-serrate, glabrous both sides at maturity, dark green above, slightly paler beneath; petioles ¼-¾ in. long, glandular above; stipules fugacious; branchlets greenish. *Flowers* appearing with the leaves on short leafy branchlets; scales deciduous; stigmas nearly sessile. *Fruit* capsules long-conical, glabrous with very short pedicels.



SAND-BAR WILLOW. LONG-LEAF WILLOW.

Salix fluviatilis Nutt.[1]



Fig. 97. Branchlet with mature leaves and fruit, 1; leafless branchlet in winter, 2.
98. Trunk of a tree near St. Louis, Mo.

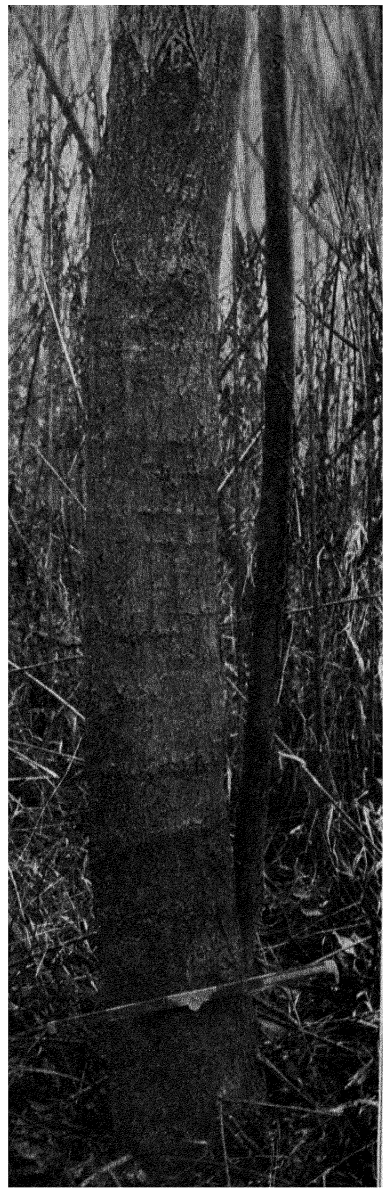
The Sand-bar Willow attains a maximum height of 60 or 70 ft. and trunk diameter of 2 ft., but only in a very limited portion of its vast area does it attain such dimensions. It is generally a small tree and often only a shrub 5 or 6 ft. in height. As a tree it develops a narrow top with upright and inclined branches, and its long narrow pendent leaves make it easily distinguishable. Comparatively rare and local in the east it is very abundant in the northern and western interior portions of the continent, covering the river banks and adjoining low-lands with great thickets of its flexible crowded stems. In these regions it is usually the first shrub or tree to spring up on the newly formed sand-bars, holding them with its strong roots and catching new deposits of silt, until the sturdy Cottonwoods can find footing and develop their towering trunks.

The wood of the Sand-bar Willow is soft and light, a cubic foot when absolutely dry weighing 30.72 lbs. and is little used save for light fuel and charcoal.[2]

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

1. Syn. *Salix longifolia* Muehl.





WEEPING WILLOW. NAPOLEON'S WILLOW. RING WILLOW.

Salix Babylonica L.

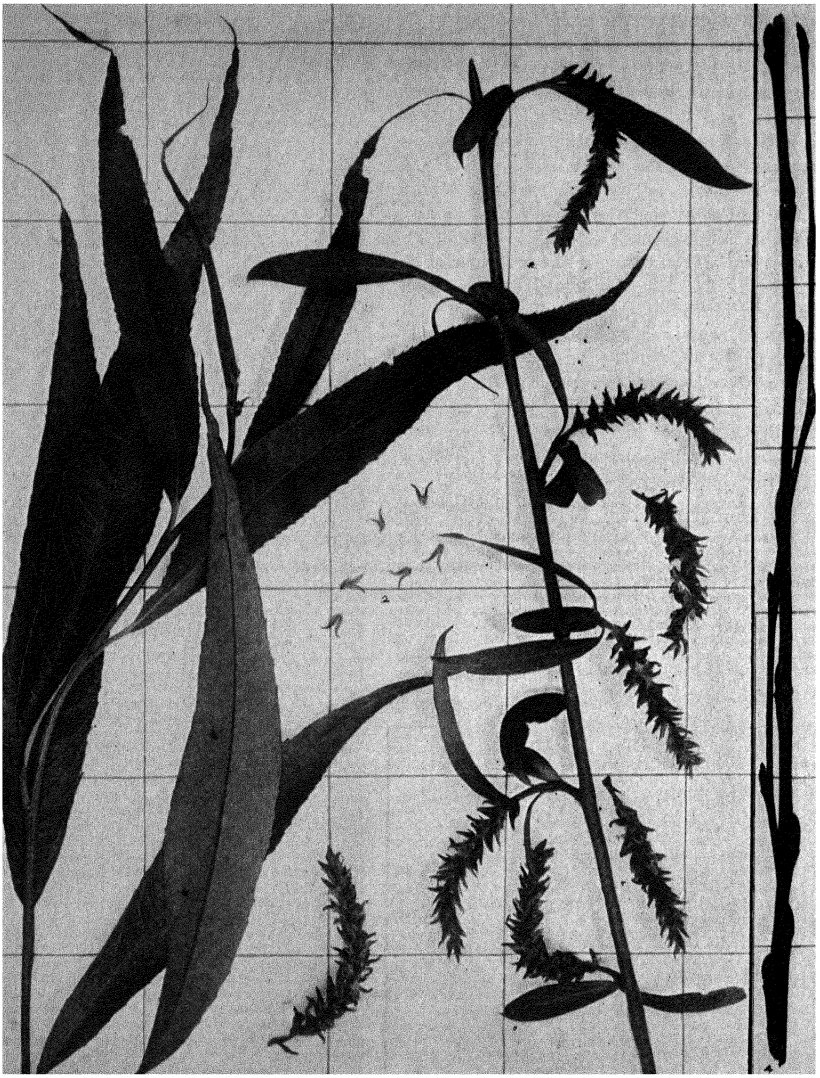


Fig. 99. Portion of branchlet bearing fruit, 1; detached capsules, 2; tip of leafy branchlet, 3; leafless branchlet in winter, 4.

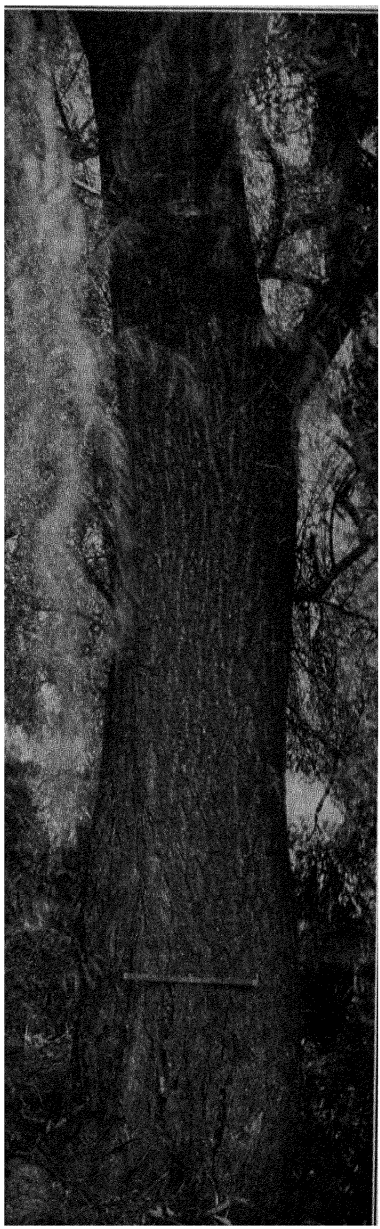
100. Trunk of tree near Rochester, N. Y.

The Weeping Willow is a familiar and singularly ornamental tree, and sometimes attains the height of 50 or 60 ft. with a short thick trunk from 3-4 or 5 ft. in diameter. This is covered with a smoothish grayish bark divided into shallow, firm and more or less reticulated ridges. It has been introduced into this country from eastern Europe and Asia and is naturalized in localities, apparently spreading mainly if not wholly by the distribution of its twigs. These falling upon the surface of a stream or lake float until they eventually find lodgement on the shore and when conditions are favorable take root and grow.

The tree thrives best in moist soil and particularly on the banks of quiet streams and ponds. Its trunk usually divides within a few feet of the ground into a few large branches which ramify and the ultimate branchlets, sometimes yards in length, droop and hang like a great natural portiere to the surface of the water. These great locks of branchlets, as they wave in the winds of a stormy day, give the tree a singular and striking appearance.

Leaves linear-lanceolate, usually 3-6 in. long, cuneate at base, tapering to a long slender point, finely serrate, pubescent when young but finally glabrous dark green above, pale beneath; stipules small semicordate; petioles usually ¼ in. or less in length, glandular above; branchlets olive-green, very long and slender. *Flowers* appearing with the leaves in small slender aments with ovate-lanceolate bracts on lateral leafy branchlets. *Fruit* capsules narrow-ovoid glabrous.

A number of varities are recognized as: var. *aurea* Hort., with yellow branchlets; var. *annularis* Forbes, with leaves curling back suggestive of rings; var. *dolorosa* Rowen, (Wisconsin Weeping Willow) a hardy northern form with leaves very glaucous beneath, etc.



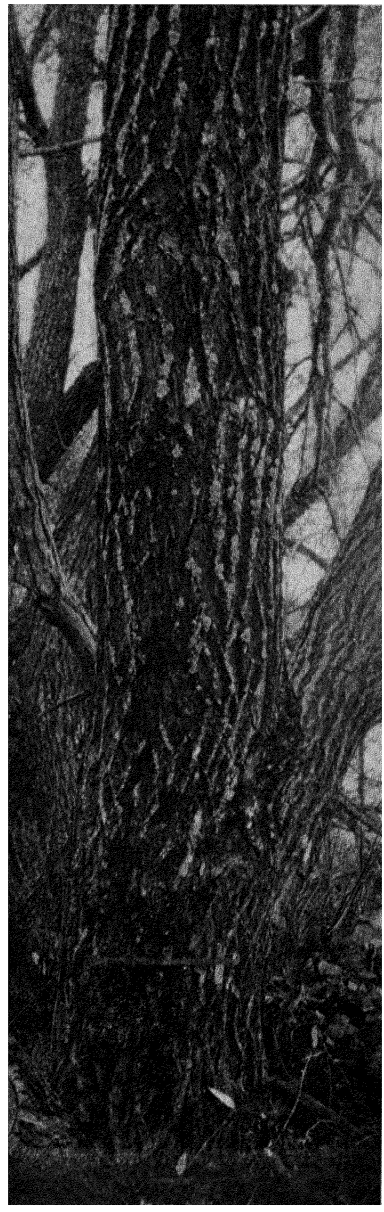
YELLOW WILLOW. GOLDEN OSIER.

Salix vitellina Koch.[1]



Fig. 101. Section of branchlet with mature fruit, 1; empty capsules, 2; tip of vigorous shoot, 3; leafless branchlet in winter, 4.

102. Trunk of tree, in Lewis Co., N. Y.



This large and beautiful Willow, like the Brittle Willow, is an immigrant from the Old World, and so prolific is it and so adapted to our climatic conditions that it is now growing spontaneously on the banks of almost every stream that flows through the populated regions of the middle and eastern states and Canada. Its bright yellow branches, especially conspicuous in early spring before the appearance of the leaves, are seen in greater abundance even than most of our native Willows. In size and habit of growth it is a noble tree sometimes attaining the height of 70 or 80 ft. with short thick trunk 3–5 ft. in diameter clothed in a dark gray bark rough with prominent scaly ridges. It divides near the ground into a few large branches, which radiate out and form a rather irregular broad or rounded top. It is a favorite ornamental tree in moist localities and particularly adapted to planting along the banks of streams and dikes to prevent erosion. Sections of fresh branches merely stuck into the wet soil in early spring is all that is required. Soon these put out leaves and grow with surprising rapidity, as though cognizant of their mission and the importance of prompt action. In a few years they become large trees, sometimes increasing in trunk diameter at the rate of 3 or 4 in. in a year, and their roots firmly bind the soil together.

The wood of the Yellow Willow is very light, soft, tough and of a light brown color with thick sap-wood.[2] Its chief use in this country is for charcoal and fuel, though adapted to other uses to which it is applied in its native land.

Leaves lanceolate, 2-5 in. long, tapering to base, long acuminate, finely serrate, silky hairy both sides when young, glabrous at maturity and dark green above, paler and glaucous beneath; stipules ovate-lanceolate, deciduous; petioles ½ in. long or less, slightly if at all glandular; branchlets glabrous, bright yellow or reddish tinted. *Flowers* appearing with the leaves aments terminating lateral leafy branchlets, scales yellowish, falling before the ripening of the fruit; stigmas nearly sessile. *Fruit:* capsules narrow-ovoid, long-pointed, glabrous, with very short pedicel.

1. Syn. *Salix alba* var. *vitellina* Koch.

2. A. W., II, 46.

MISSOURI WILLOW.

Salix Missouriensis Muehl.[1]



Fig. 103. Branchlet with mature fruit, 1; branchlet with vigorous leaves and stipules, 2; branchlet in winter, 3.

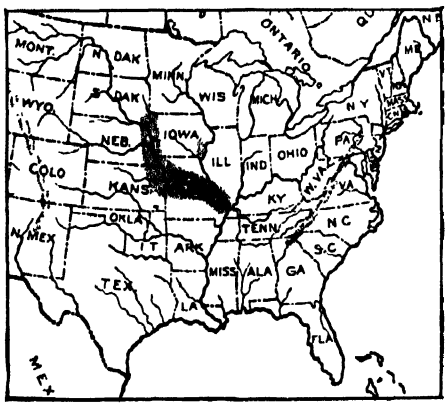
104. Trunk of a tree near St. Louis, Mo.

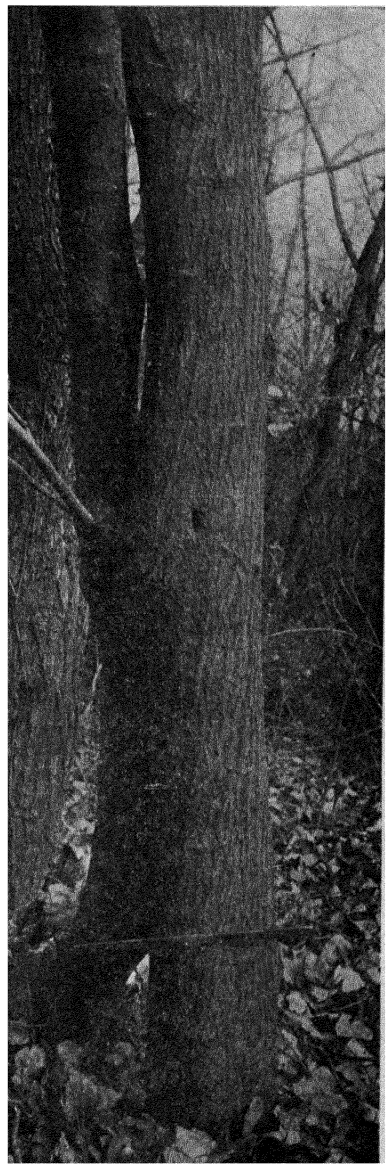
The Missouri Willow occasionally attains the height of 50 or 60 ft. with trunk from 10 to 14 in. in diameter. It develops a rather narrow rounded top of upright slender smooth-barked branches, and the bark of trunk is of a grayish color, thin and smooth or with low firm ridges. It is a tree of limited distribution and confined mainly to the low rich bottom-lands of the lower Missouri River, where it is found in company with the Black Willow, Sand-bar Willow, Peach-leaf Willow, the Sweet Gum, Green Ash, Red Maple, etc.

The wood is unimportant though sometimes used for charcoal.[2]

Leaves involute in the bud, lanceolate to oblanceolate and occasionally ovate-lanceolate, 3-5 in. long, narrowed and wedge-shaped or rounded at base, acuminate, finely serrate with small gland-tipped teeth, pubescent at first but finally nearly glabrous, dark green above, paler and often glaucous beneath; petioles pubescent; the persistent stipules semicordate, often ½ in. long; winter buds large and hoary-tomentose; branchlets pubescent the first season. *Flowers* unfold very early (February-March) on short branchlets bearing small scale-like leaves; staminate about 1½ in. long; scales light green, hairy outside; stamens 2 with long glabrous free filaments; ovary glabrous, beaked, with very short style and emarginate stigmas. *Fruit:* a narrow cylindrical ovoid long-pointed capsule with slender stalk about as long as the scale.

1. Syn. *Salix cordata* var. *vestita* Sarg.
2. A. W., XII, 297.





GLAUCOUS WILLOW.

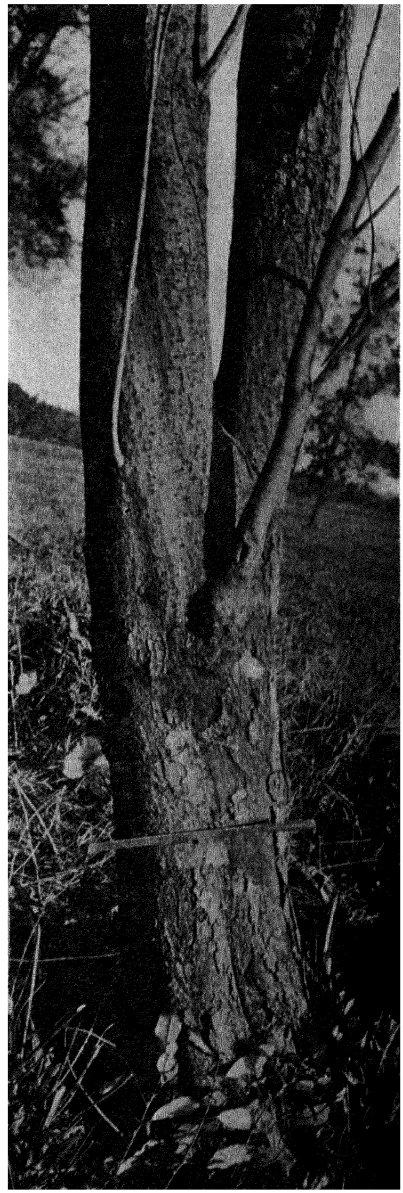
Salix discolor Muehl.



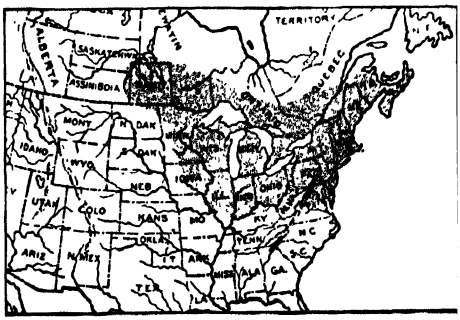
Fig. 105. Branchlet with leaves and mature fruit, 1; empty capsules, 2; branchlet in winter, 3.
106. Trunk of tree with leaves at base in Black River valley, N. Y.

The Glaucous Willow rarely attains a greater height than 20 or 25 ft. or greater diameter of trunk than 12 or 14 in., and commonly is no more than a large shrub with numerous crooked stems from a common base. When it attains the stature of a tree it develops a rather wide rounded top with numerous upright or arching branches and short trunk. It is the common *Pussy Willow* in the parlance of children, who hail with delight its enlarging hairy catkins as the first evidence of approaching spring, and gather bunches of its branches for home decoration. The tree is indeed at this season a handsome object, and when in full flower the humming of numerous bees among its branches tells us that they find in its flowers their first harvests after their long winter's rest. It is an abundant species, growing along the banks of streams and low wet meadows in company with other Willows, Ashes, Arbor-Vitæ, etc.

Its wood is occasionally used for charcoal. A cubic foot when absolutely dry weighs 26.50



Leaves convolute in the bud, narrow oblong, or oblong-lanceolate, 2-5 in. long, acute at both ends, remotely crenate-serrate, pubescent at first but finally glabrous thick and firm, dark green above, glaucous white beneath with broad midribs; stipules semicordate and commonly caducous; winter buds rather large, purple and lustrous. *Flowers* in earliest spring, before the leaves, in dense erect sessile aments, 1 in. or more in length, pale tomentose with dark red and finally blackish scales covered on the back with long silky white hairs; stamens 2, with long glabrous filaments; ovary villous with short style and entire spreading stigmas. *Fruit* capsules narrow conical, pubescent and with long point.



COTTONWOOD. NECKLACE POPLAR. CAROLINA POPLAR.

Populus deltoides Marsh.[1]

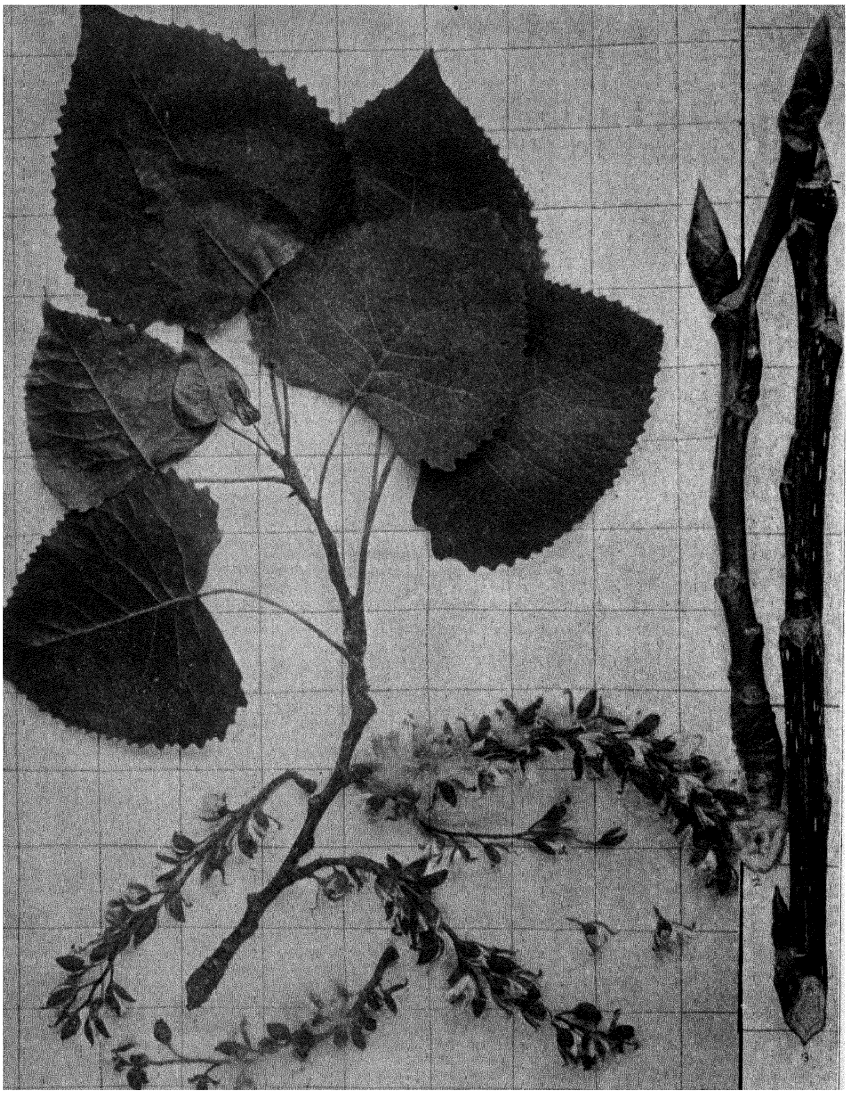


Fig. 107. Branchlet with leaves and mature fruit, 1; leafless branchlet bearing two flower-buds (the larger ones) and leaf-buds, 2; terminal of a vigorous shoot, showing angular nature, 3.

108. Trunk of tree on Genesee River bank above Rochester, N. Y.

109. Wood structure magnified 15 diameters.

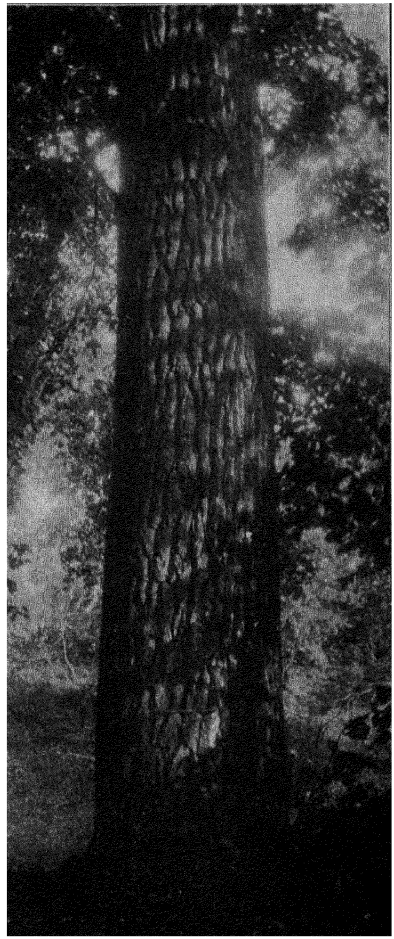
This stately tree is the largest representative of its genus, sometimes surpassing 100 ft. in height, with trunk 6–8 ft. in diameter. It develops a full wide or rounded top with few massive branches, and these often spreading far out extend their drooping branches and shining dark green leaves over a very wide area. It is confined to the rich moist soil of river bottoms and the banks of streams and along those of the mid-continental regions it is the largest and most characteristic tree. East of the Alleghany Mountains it is less abundant and a smaller tree; still here and there conspicuously large trees are found.

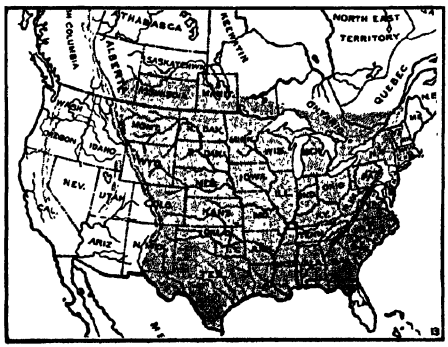
The wood is light and soft, a cubic foot when absolutely dry weighing 24.24 lbs., and is used for paper pulp, in the manufacture of lumber for packing cases and for fuel. Owing to tendency to warp and difficulty in seasoning it is little valued for lumber. In early days, however, before railroads crossed the western plains the pioneer settlers found in the Cottonwood trunks material for building purposes from the rough stockade to the houses and buildings of their first villages.[2]

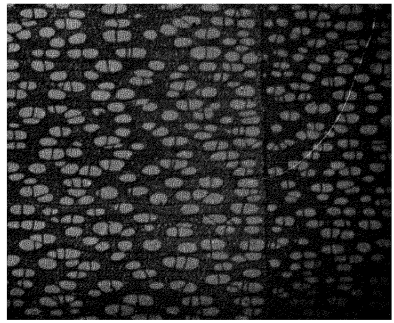
Leaves broadly deltoid-ovate, 3-7 in. long, usually abruptly acuminate at apex, truncate or slightly cordate at base, crenate-serrate, entire at base, at first gummy with fragrant exudation but finally lustrous dark green above, paler beneath; petioles long, slender, and laterally compressed. *Flowers* (April-May): aments short-stalked; staminate stout and densely flowered, 3-5 in. long; stamens numerous; pistillate at first smaller but elongating as fruit ripens; scales glabrous, laciniate. *Fruit* with ovoid 2-4-valved capsules, which liberates in May their crowded contents of small light brown seeds with cottony coma.

P. deltoides occidentalis Rydb. is a western form ranging from Sask. to New Mexico with leaves broader at base, longer-acuminate and more coarsely toothed with young branches shining, light yellow.[3]

1. Syn. *Populus monilifera* Ait.
2. A. W., II, 48.
3. For genus see pp. 426–427.







LOMBARDY POPLAR.

Populus nigra Italica DuRoi.[1]

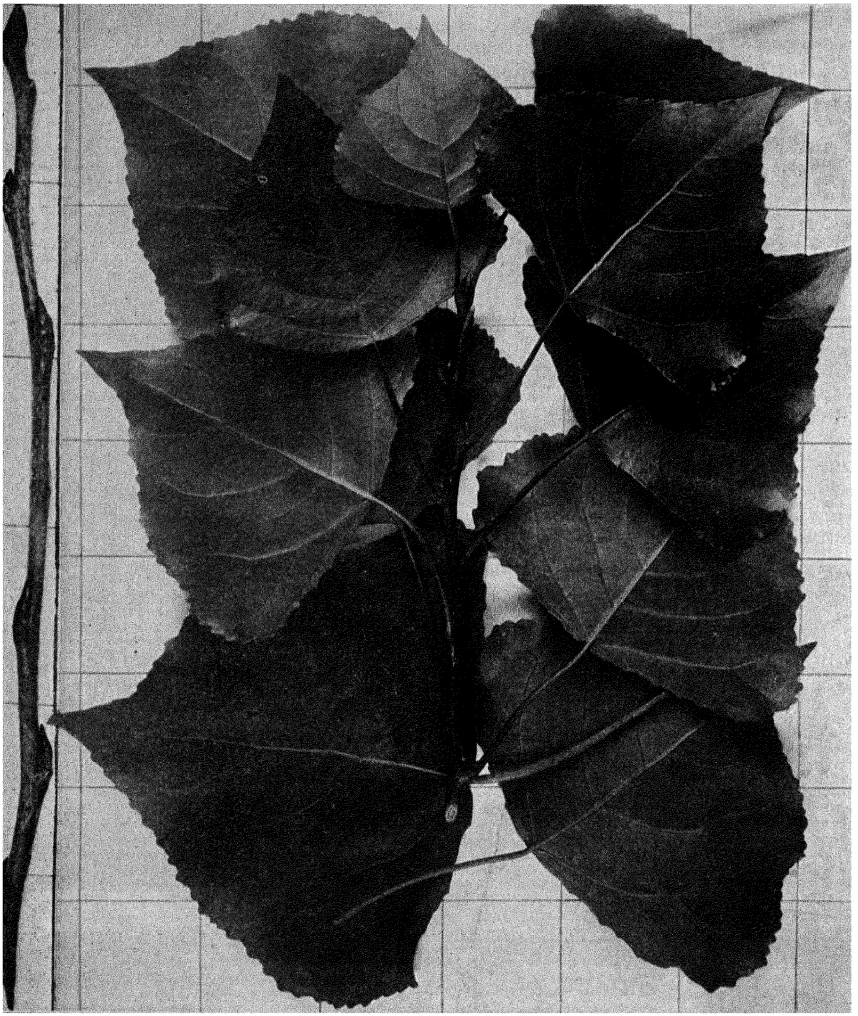
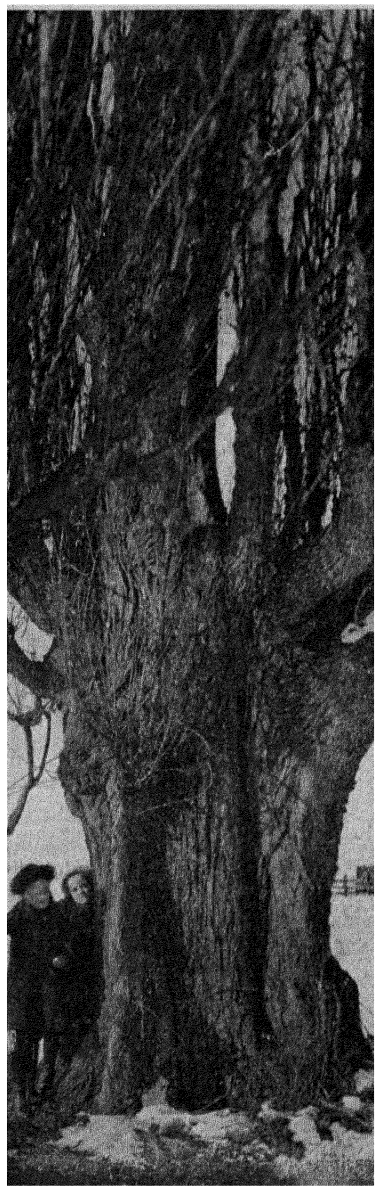


Fig. 110. Branchlet with mature leaves. As staminate trees only are found in this country we are unable to illustrate the fruit. Leafless branchlet in winter.

111. Trunk of tree near Lowville, N. Y.



The Lombardy Poplar is the most distinct of the Poplars in habit of growth, and probably no other introduced tree has been more widely planted for ornamental purposes. Its tall spire-shaped tops are land-marks in almost every populated region from the Atlantic to the Pacific and from the Canadian frontier to the Mexican boundary, and in some European countries it is much more abundant than here. It is a tree of very rapid growth and, in our northern states, short-lived, but once planted it spreads by means of suckers and persists in the soil for generations, often becoming a nuisance in its abundance. Its desirability, however, in landscape architecture, as for the relief of a monotonous sky-line, is undisputed. It sometimes attains the height of 100 ft. with short ridged and buttressed trunk 6–8 ft. in diameter, and this latter measurement is hardly more than doubled in the width of its compact narrow top. Botanically the tree is a bone of contention. Its leaf and floral characters are so close to those of the European *P. nigra L.* that it is held by some to be a sport of that species, all existing trees having come from a certain one or few trees found growing somewhere naturally many years ago. This theory would seem to be substantiated by the fact that in this country at least all of the trees are staminate, reproduction being effected by its stoloniferous roots and fallen branches. The theory is militated against by the fact that its new shoots are glabrous, while those of *P. nigra* are pubescent. For convenience we will consider it a sport of the *P. nigra*. It takes its name from the province of Lombardy in Italy, but its hardiness in far colder climates than that of Italy would indicate its origin in a more northern region. It is thought to have originated in Afghanistan where it is said to grow naturally as a forest tree.

The botanical characters, so far as we are able to observe them by a study of the tree as we have it in this country — the staminate only,— are apparently identical with those of the *P. nigra*, excepting its fastigiate habit of growth and glabrous new shoots.[2]

1. Syn. *Populus dilatata* Ait.
2. For *P. nigra* L. see p. 427.
3. A. W., III, 73.

LANCE-LEAF COTTONWOOD.

Populus acuminata Rydb.

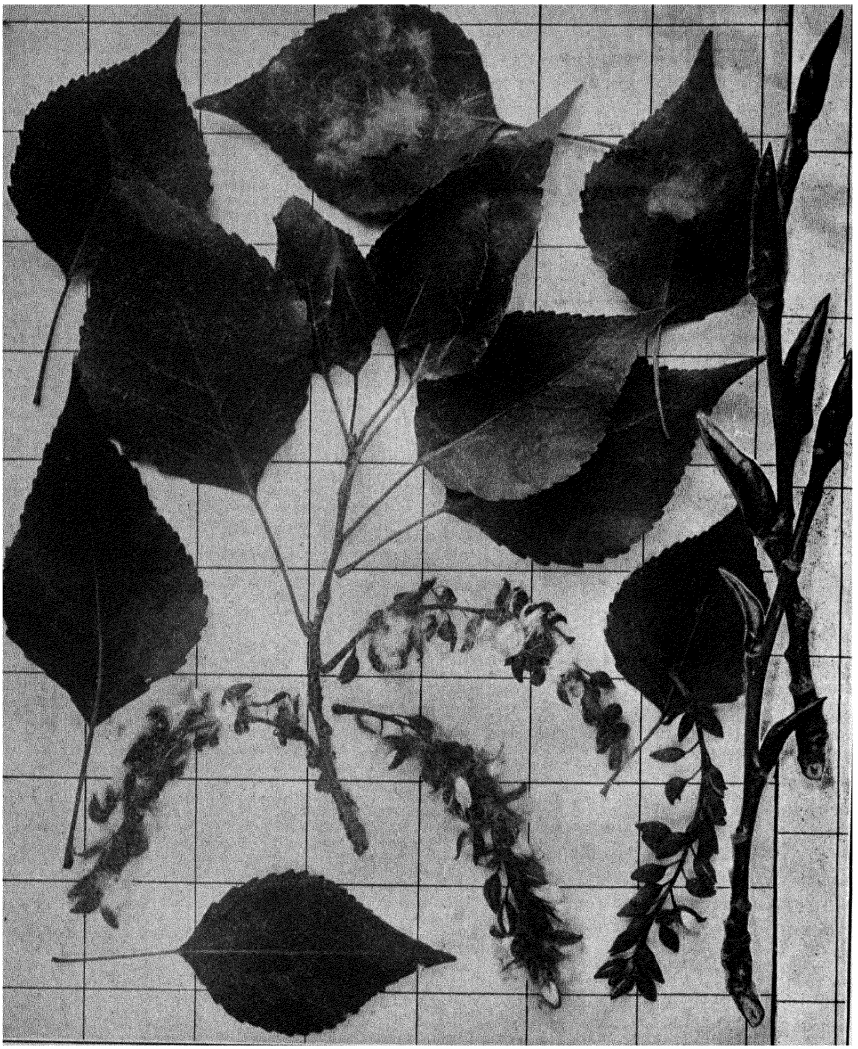


Fig. 112. Fruiting branchlet and mature leaves and fruit; branchlets in winter, the upper one bearing four flower-buds, the lower one two leaf-buds and one terminal flower-bud.

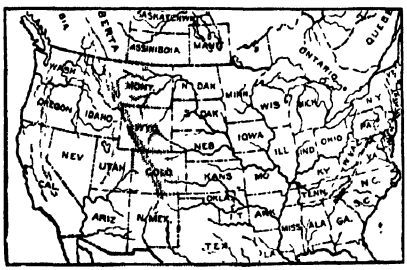
113. Trunk near Greeley, Colo.

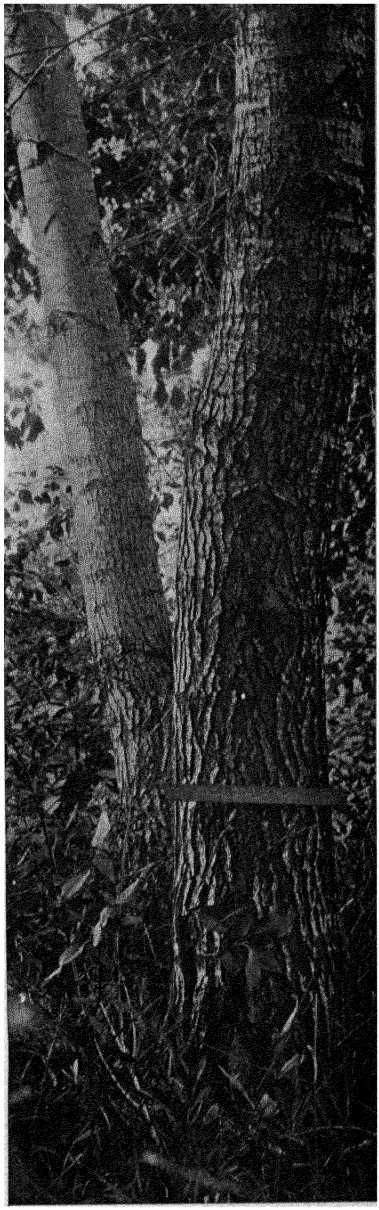
For this trunk picture and specimens the author is indebted to Prof. B. O. Longyear.

The Lance-leaf Cottonwood is the least abundant representative of the genus within the United States. It is a tree of medium stature, rarely if ever surpassing 50 or 60 ft. in height or 2 or 3 ft. in thickness of trunk, with rounded or pyramidal top of stout spreading branches. The bark of branches and upper trunk is of a pale grayish brown color fissured into narrow flat ridges. Like the Narrow-leaf Cottonwood, with which this tree was confounded until recently separated by Mr. Rydberg, the bark of branches and upper trunk is very smooth and of a pale ash-gray color, but that of the branchlets differs in being of a light greenish brown color, rather than orange-brown, and its buds are larger, more resin-coated and more curved. It is confined in its distribution, as far as now known, to the banks of streams along the eastern dry foot-hills of the Rocky Mountains from Assiniboia to New Mexico. It is occasionally planted as a shade-tree in cities and villages of Colorado and Wyoming.

The wood is light, soft, not strong and suitable for the uses to which the common Cottonwood is applied.

Leaves rhombic-lanceolate, 2-5 in. long, cuneate or rarely rounded at base, acuminate, coarsely crenate-serrate excepting at base and apex which are mostly entire, lustrous dark green above, dull green beneath; petioles slender, terete, 1-3 in. long. *Flowers* rather open loose aments; staminate 1½-3 in. long; disk of flower oblique saucer-shaped with numerous stamens; pistillate aments becoming 3-4 in. long, drooping; disk cup-shaped; stigma laciniate-lobed. *Fruit* in rather loose drooping aments with oblong-ovoid distinctly pediceled and usually 3-valved capsules.





NARROW-LEAF COTTONWOOD.

Populus angustifolia James.

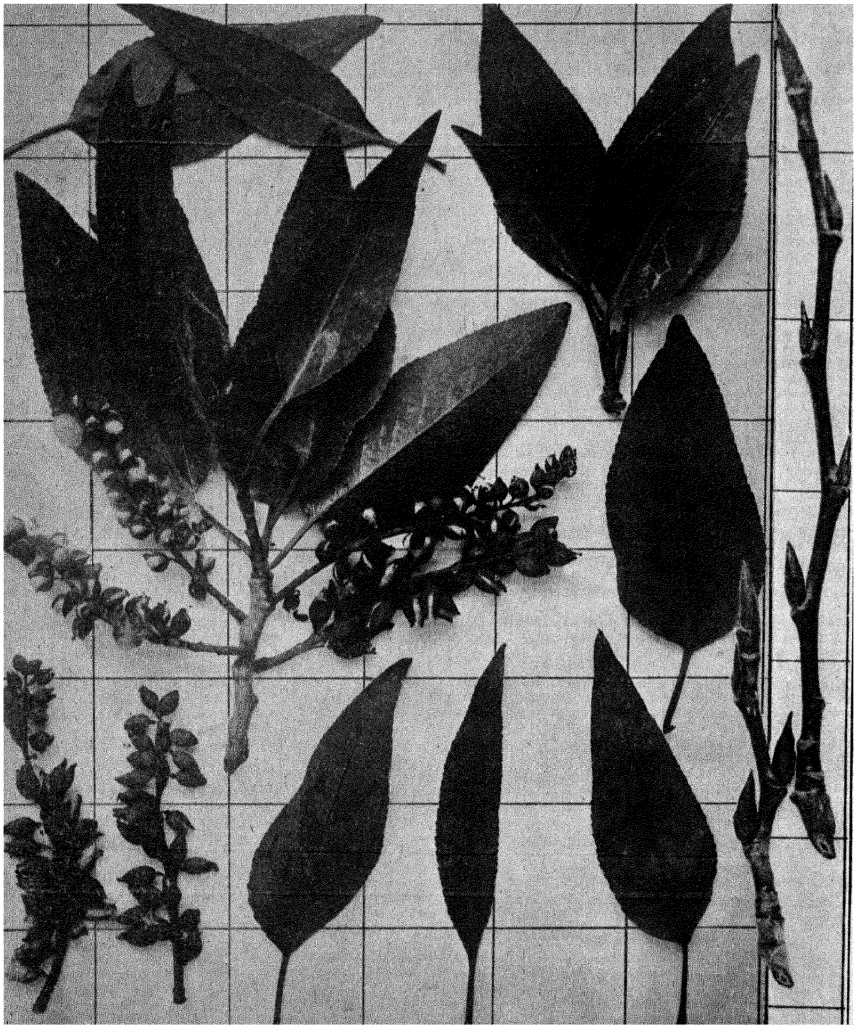


Fig. 114. Fruiting branchlet, leaves and fruit; branchlets in winter, the lower one bearing mainly flower-buds.

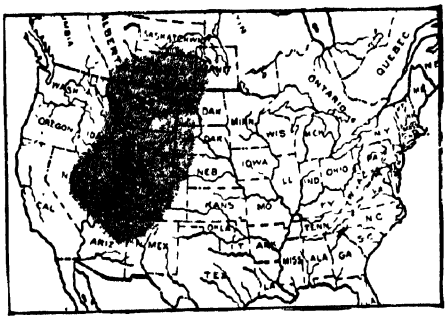
115. Trunk of tree near Fort Collins, Colo.

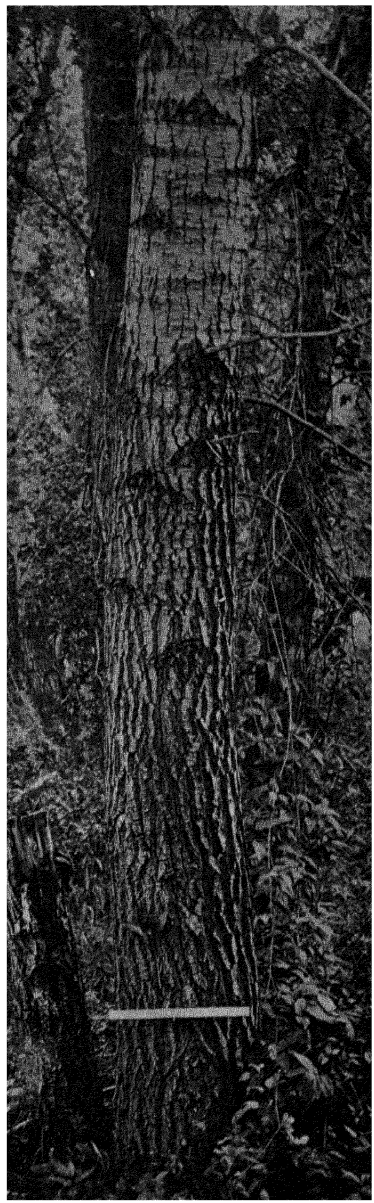
For this trunk picture and specimens the author is indebted to Prof. B. O. Longyear.

The Narrow-leaf Cottonwood is a medium-size tree rarely surpassing 60 or 70 ft. in height or 18 in. in thickness of trunk. It develops a rather narrow pyramidal top of ascending pale ashen gray branches, light orange-brown lustrous branchlets of the season and small buds. The livid smooth bark of the younger trunks becomes fissured with age, as the trunk enlarges, and finally is furrowed with dark firm ridges. Its small short-stemmed narrow green leaves are more suggestive of some of the broader-leaved Willows than of the other Poplars, and constitute a feature by which this tree is quickly recognized. It is the commonest Cottonwood over a considerable part of its range skirting the banks of streams and moist places between the altitudes of 5000 and 10000 ft. above the sea. It is extensively planted as a shade tree in the streets of towns of Colorado and Utah.

The wood is light, a cubic foot weighing 24.38 lbs., soft, not strong, and of a light brown color with lighter sap-wood.

Leaves lanceolate to ovate-lanceolate, 2-3½ in. long, rounded or cuneate at base, narrowing to an acute or blunt apex, finely serrate the entire length (or coarsely serrate on vigorous shoots) rather thin, glabrous, yellow-green above, paler beneath, with broad midribs; petioles ½-¾ in. long grooved above but not laterally flattened. *Flowers* in closely flowered glabrous short-stalked aments; staminate with cup-shaped disk and 12-20 stamens; pistillate with cup-shaped disk and broad-lobed stigmas. *Fruit* in erect or inclined aments, 2-3 in. long with broad-ovoid crowded short-pedicelled capsules.





BALM OF GILEAD.

Populus candicans Ait.[1]



Fig. 116. Mature leaves and fruit, 1; branchlet in winter, 2.
117. Trunk of a tree near Lowville, N. Y.

The Balm of Gilead when in its prime is a beautiful large Poplar, attaining the height of 70 or 80 ft. or more with broad and irregular spreading top, and trunk attaining a thickness of 3–6 ft., vested in a rather thick firmly ridged gray bark at base, while the upper trunk and branches are covered with a smooth yellowish brown bark. In a wild state it is a rare tree and apparently quite local in distribution, but from early times it has been a favorite tree for shade, and being very hardy was planted abundantly in the dooryards of country homes throughout the northern states and Canada. It is a beautiful object at first with its large parti-colored heart-shaped leaves constantly fluttering from the slightest breezes. Unfortunately it is a short-lived tree and early becomes decrepit. Then its dropping limbs make it unsightly and undesirable, but suckers generally spring up in abundance about it and eventually take its place, if allowed to do so, and in this way trees once planted continue to occupy the soil for a long time. The fragrance of the sticky buds and new leaves of this tree is so marked as to be detected sometimes at some distance from the tree, and attracts the bees to it in abundance after the sticky varnish on its buds. This they gather, pack onto their thighs and carry away to seal the crevices of their hives — the material called propolis by the bee-keepers. I have observed that goose-berry and currant bushes planted beneath the branches of this tree are not molested by the destructive currant-worm, the emanations of the tree seeming to be distasteful or disastrous to them. According to Prof. L. H. Bailey, the Balm of Gilead was an important lumber tree in the forests of Michigan in early days.

The wood is soft, light, a cubic foot weighing 25.93 lbs. when absolutely dry, easily worked and suitable for the manufacture of boxes, pails, excelsior, etc.



Leaves broad heart-shaped, 3-6 in. long, acuminate, rather coarsely crenate-serrate and ciliate-margined, pubescent when young but finally glabrous dark green above, whitish, strongly reticulated and sometimes rusty beneath; petioles nearly terete and veins beneath commonly pubescent; buds large and covered with a sticky aromatic resin. *Flowers* in pubescent aments, the scales falling early; stamens 15-30; lobes of stigma broad and large. *Fruit* capsules crowded on the stems, ovoid, 2-valved and with short pedicels.

1. Syn. *Populus balsamifera* var. *candicans* Gray.

BALSAM POPLAR.

Populus balsamifera L.

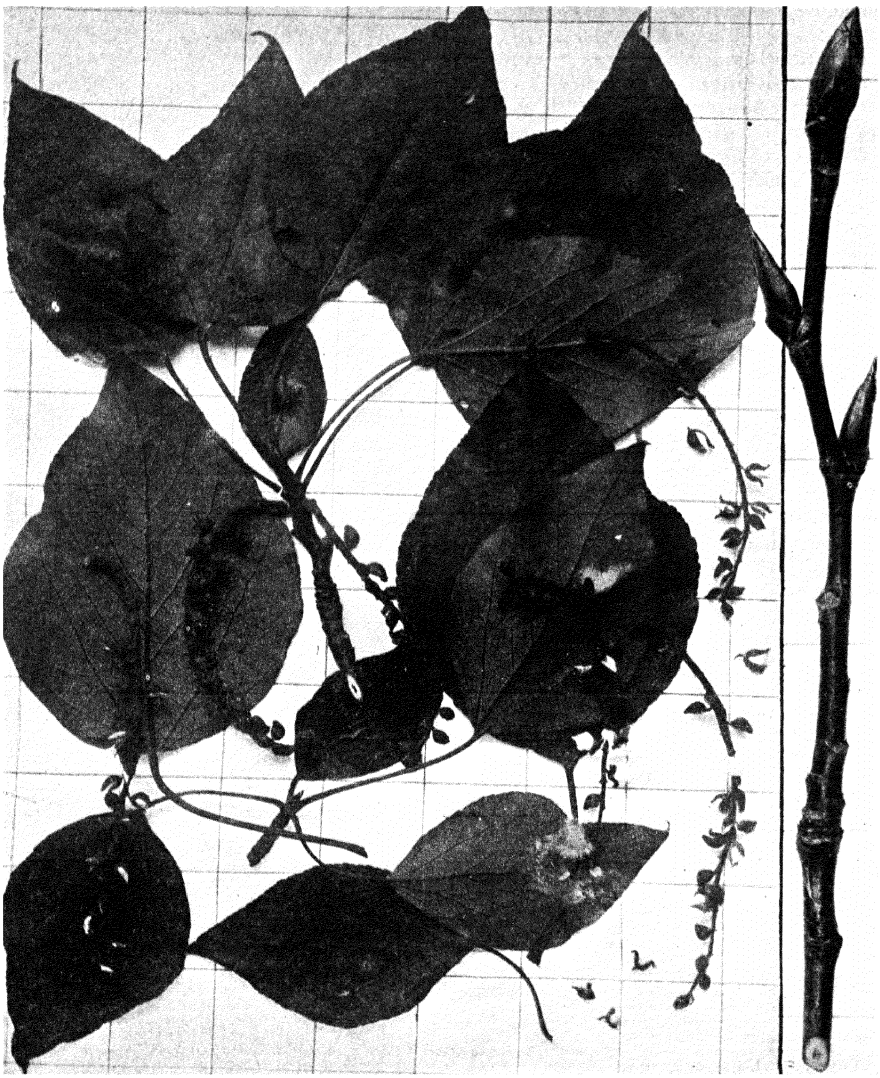
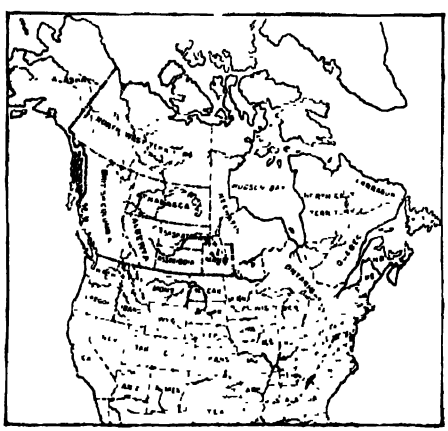


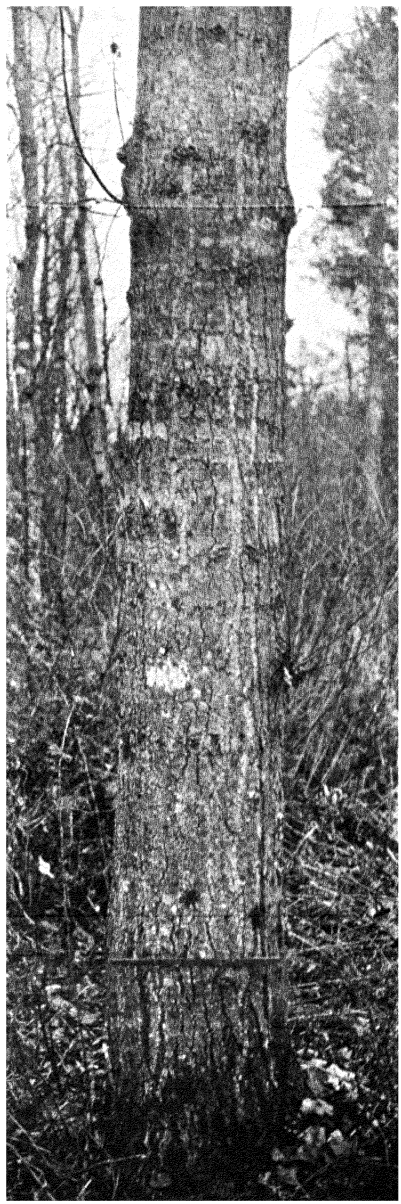
Fig. 118. Branchlet with mature leaves and fruit, 1; leafless branchlet in winter, 2.
119. Trunk of tree, in Lewis Co., N. Y.

The Balsam Poplar sometimes attains in the forest a height of 100 ft. and a trunk diameter of 5 or 6 ft. When isolated from other trees it develops a rather narrow irregular pyramidal open top of few large branches, and its parti-colored leaves, as their dark green upper surfaces and light under surfaces show successively as moved by the wind, make it a handsome object. It is distinctly a northern tree, thriving and attaining its largest size along the banks of the streams which are tributary to the Mackenzie River in a climate too severe for the existence of most other trees. In those cold regions this is the largest and most characteristic tree. It is confined mainly to alluvial bottom-lands and borders of swamps, and in our northern states, where it finds its southernmost limit of distribution, is by no means as large a tree as it is to the northward.

Its wood is soft and light, a cubic foot when absolutely dry weighing 22.65 lbs., and in the region of the Great Lakes and northern Michigan is used for paper pulp, and in the manufacture of boxes, pails, etc.

Leaves 3-6 in. long, ovate, rounded or broadly cuneate at base with crenate-serrate slightly thickened margin, acute or acuminate at apex, dark glabrous green above, much paler and conspicuously reticulated-veined and sometimes rusty beneath; petioles long, terete; winter buds large, taper-pointed and very resinous. *Flowers* (in April); scales of aments scarious, brown, laciniate lobed; stamens 20-30; ovary ovoid, slightly, 2-lobed and with 2 large dilated stigmas. *Fruit* (ripe in May) with ovoid oblong 2-valved short-pedicelled capsules; capsules about ¼ in. long.





SWAMP POPLAR.

Populus heterophylla L.

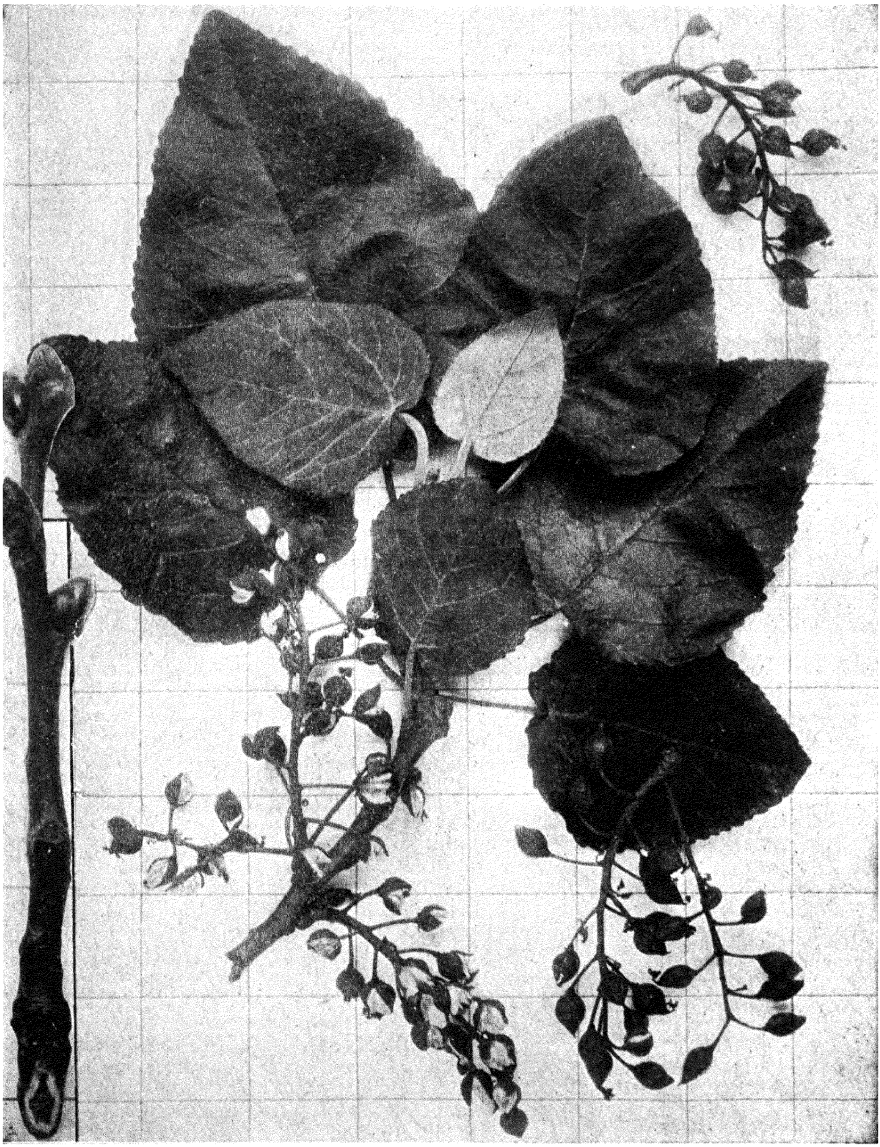


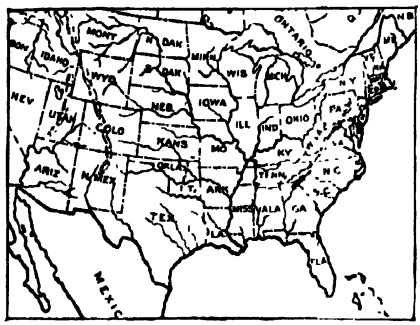
Fig. 120. Branchlet with leaves and mature fruit, 1; leafless branchlet in winter, 2.
121. Trunk of tree, with leaves at base, near Kennett, Mo.

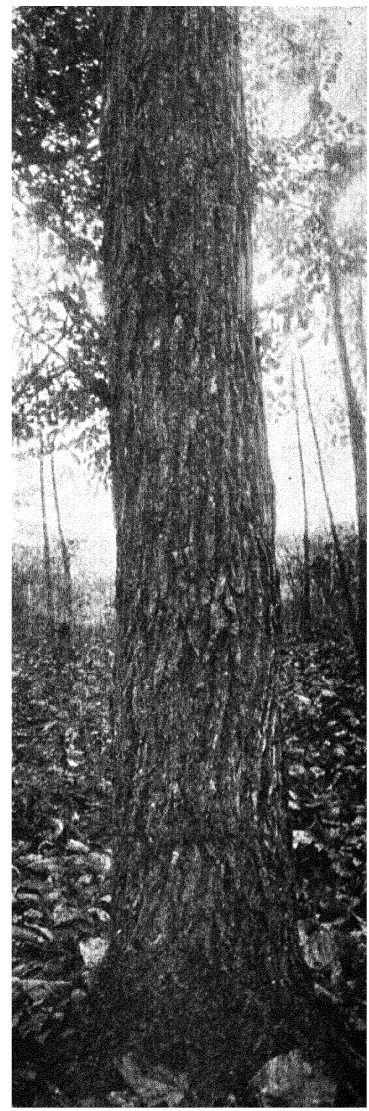
The Swamp Poplar where conditions are favorable for best development, in the lower Mississippi Valley, attains a height of 80 or 90 ft., with straight columnar trunk 2–3 ft. in diameter vested in a grayish brown bark with prominent scaly ridges, and develops an open irregular top with few large branches. In the Atlantic states it rarely attains a greater height than 40 or 50 ft. Here it is rare and local and is confined to the borders of ponds and swamps more or less permanently inundated. In the Mississippi basin it is more abundant, and it is found in company with the Honey and Water Locusts, Mississippi Hackberry, Swamp White Oak, Red and Drummond Maples, Sweet Gums, Tupelos, etc

The wood of the Swamp Poplar is of a grayish brown color with light sap-wood A cubic foot when absolutely dry weighs 25.48 lbs. It is manufactured into lumber, under the name of Black Poplar, for interior finishing, etc.[1]

Leaves 4–8 in. long, broad ovate with petioles long and terete, varying from round to cordate at base, crenate, obtuse or subacute at apex, covered with white woolly tomentum at first but finally glabrous with brown buds acute or obtuse, resinous. *Flowers* (April-May) glabrous scarious fimbricated scales, staminate aments stout, densely-flowered, finally 2–3 in. long and drooping; stamens 12–20; pistillate aments small, racemelike, few flowered with short style, ovary ovoid, and thick 2 or 3-lobed stigmas. *Fruit* (ripe in May) with ovoid-oblong pointed 2–3-valved capsules, shorter than or equalling the pedicels.

1. A. W., IV, 97.





QUAKING ASP. TREMBLING POPLAR. POPPLE.

Populus tremuloides Michx.

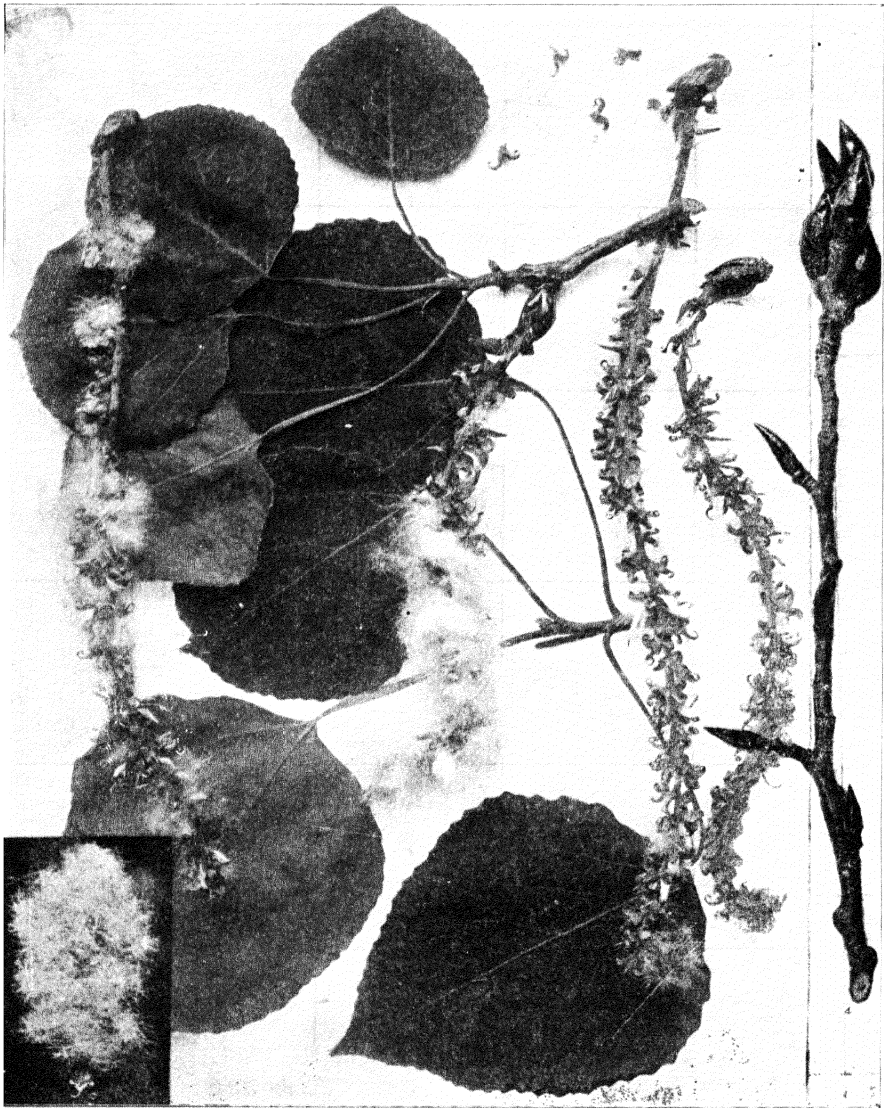


Fig. 122. Branchlets with mature and young leaves, 1; isolated empty capsules, 2; a capsule and its actual contents, procured by confining the capsule at the time of opening, 3; branchlet in winter with cluster of flower-buds near tip, 4.

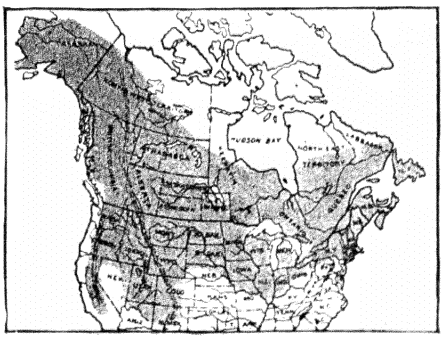
123. Trunk of tree in Essex Co., N. Y. Note the transition from smooth young bark to rough old bark.

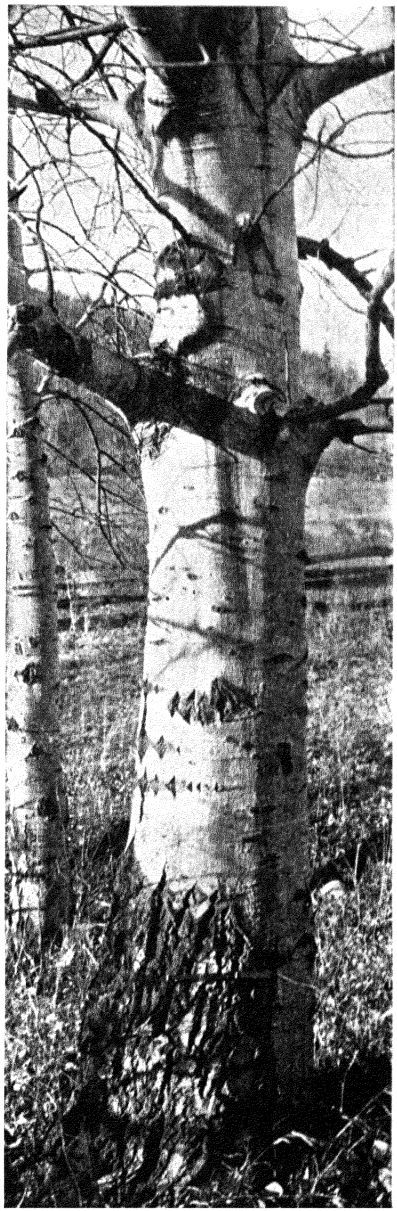
The Quaking Asp is usually a slender tree developing in the open a loose rounded top, and the trunk seldom more than 18 in. or 2 ft. in diameter, but in forests where it attains its largest size it grows to a height of 90 or 100 ft. with trunk sometimes 3 ft. in diameter. The bark of branches and young trunks is of a pale yellowish green color, or often nearly white, and on older trunks becomes fissured and divided into nearly black scaly ridges. A conspicuous feature of the tree is the constant agitation of its small rounded leaves, occasioned even by the slightest breezes, on account of their long flattened stems. It is a very useful tree in the economy of Nature in that its seeds, seeming possessed of an exceptional power of germination, are easily scattered by the winds, and it quickly covers forest lands recently denuded by fires with a fresh growth of little forest trees. In the shelter of these the tender seeds of more useful trees germinate and thrive, and eventually monopolize the soil, ungratefully crowding to the wall by their overpowering shade the slender Aspens which assisted them into existence.

The wood is light, a cubic foot when absolutely dry weighing 25.13 lbs., soft and is used mainly in the manufacture of paper pulp and excelsior.[1]

Leaves ovate to suborbicular, 1½-3 in. long, rounded or subcordate at base, short acuminate at apex, with finely crenate and ciliate margin, glabrous; petioles very slender and laterally compressed; winter buds glabrous. *Flowers* 1½-2 in. long; scales deeply 3-5-cleft into linear lobes fringed with gray hairs; staminate aments with disk entire, and 6-12 stamens; stigmas 2 with linear lobes. *Fruit* (May-June) capsules oblong conical, 2-valved; seeds about 1-32 in. long, obovate.

1. A. W., III, 72





LARGE-TOOTH POPLAR. ASPEN.

Populus grandidentata Michx.



Fig. 124. Fruiting branchlet with mature and young leaves, 1–2; isolated capsules, 3; tip of young shoot, 4 (Note the velvety pubescence as compared with the glabrous young leaves of *P. tremuloides*); branchlet in winter, 5.

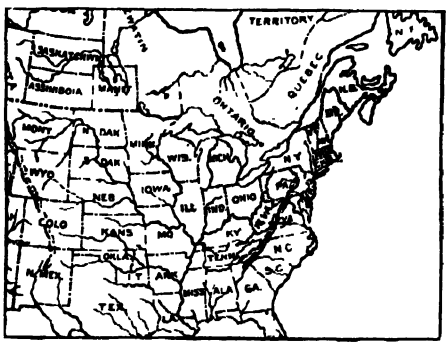
125. Trunk showing the smooth young bark above and the furrowed older bark at base. Lewis Co., N. Y.

The Large-tooth Poplar rarely if ever attains a greater height than 70 or 80 ft. or 2 ft. in thickness of trunk. When sufficiently isolated from other trees it develops a loose oval or rounded top of handsome clean foliage, always rustling with the slightest breeze, on account of the peculiar formation of petioles. The bark of branches and younger trunks is smooth and of a grayish green color. Later it becomes fissured into rough firm ridges. It is found mostly on sandy slopes and the banks of streams in company with the Hemlock, Pines, Oaks, Maples, Shad-bush, Butternut, Red Spruce, etc. As with the Quaking Asp, its hardy seeds scattered widely by the wind quickly clothe with new verdure tracts of forest lands recently denuded by fires. Then protected by the shade of these seedlings the more tender seeds of more useful trees are able to germinate and grow

Its wood is light, a cubic foot weighing 28.87 lbs., soft and not strong and is used in the manufacture of excelsior, paper, woodenware and occasionally for lumber.[1]

Leaves orbicular-ovate, 3-6 in. long, coarsely and irregularly dentate, from obtuse to rounded at base, short acuminate, densely white tomentose at first but finally glabrous, thin and firm; petioles long, slender and laterally compressed; winter buds puberulous. *Flowers*: aments 1-3 in. long; scales with silky pale hairs and irregularly 5-7-cleft; stamens 6-12; stigmas 2 with long filiform lobes. *Fruit* (May-June): capsules long-conic, 2-valved, about ¼ in. long; seeds dark brown, minute.

1. A. W., I, 18.





WHITE POPLAR. ABELE. SILVER-LEAF POPLAR.

Populus alba L.

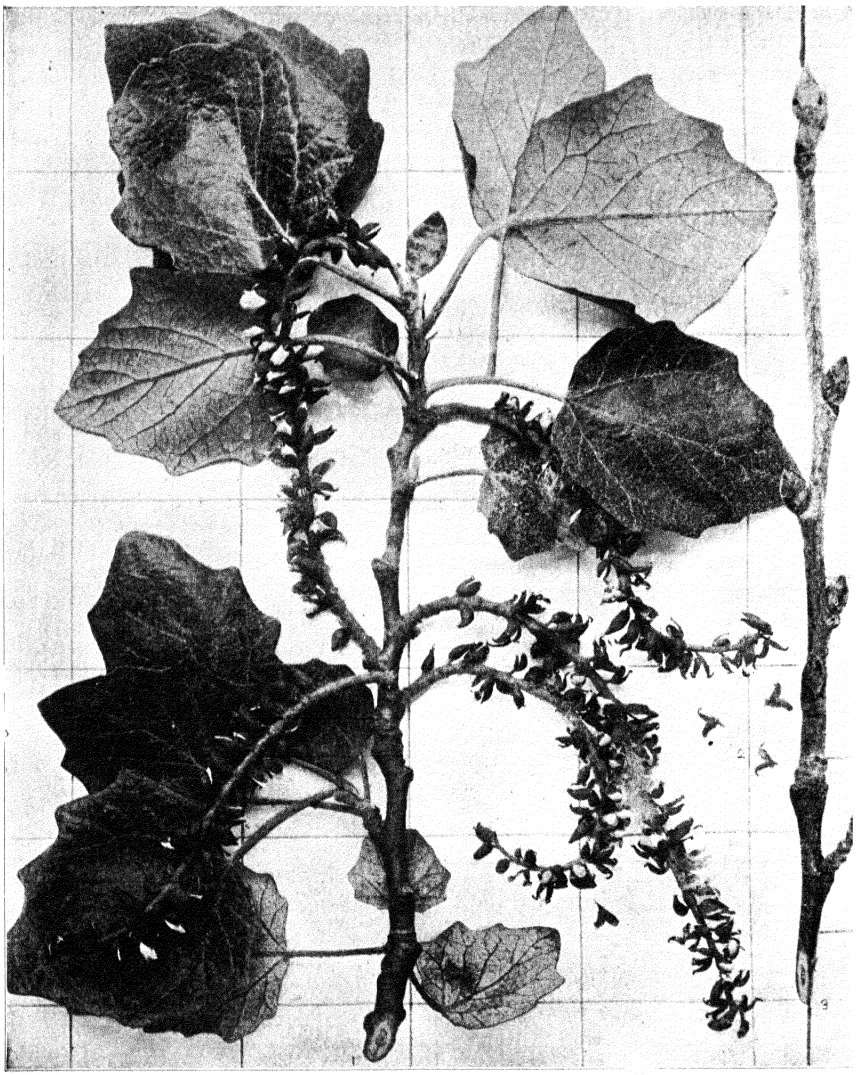
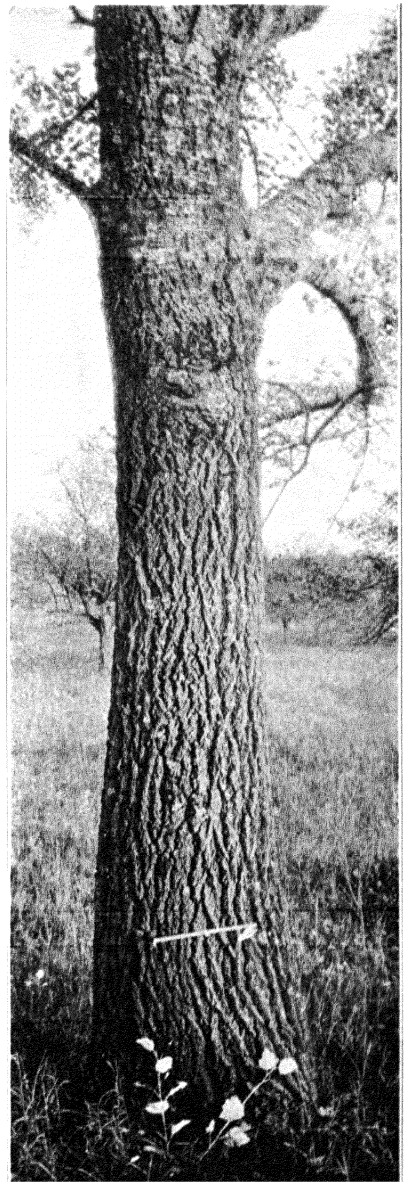


Fig. 126. Branchlet with mature leaves and fruit, 1; isolated empty capsules, 2; branchlet in winter, 3.

127. Trunk with leaves at base. Near Albany, N. Y.

The White Poplar is a native of central and southern Europe, the corresponding latitudes of Asia, as far east as the Himalaya Mountains, and of northern Africa. It was early introduced into this country for ornamental purposes and has become naturalized in many localities throughout northeastern United States and Canada. It is a large tree sometimes attaining the height of 100 ft. with trunk 3 or 4 ft. or more in diameter, vested in a characteristic greenish gray and whitish bark of branches and upper trunk, while that at the base of old trunks becomes deeply cleft into firm dark ridges. It commonly develops a large irregular open broad or rounded top. The contrast between the dark green upper surfaces of its leaves and the velvety white under surfaces causes a pleasing scintillating effect as they are agitated by the wind, and this gives to the White Poplar a peculiar ornamental value. The abundance of the trees about the sites of old country homes attests its long popularity as an ornamental tree and its hardiness, but the rapidity and persistence with which it spreads, by means of its long stoloniferous roots, makes it in some places a nuisance.

Its wood is light, soft, tough and of a reddish yellow color with nearly white sap-wood.[1]



Leaves quite variable but commonly suborbicular or broad ovate, 2-4 in. long, obtuse or acute at apex, truncate or cordate at base, irregularly dentate, sinuate-dentate or (especially on vigorous shoots) palmately 3-5-lobed and with petioles and branchlets white velvety tomentose at first, but many of the leaves becoming glabrate late in the season dark green above or by late summer often scurfy or nearly glabrous beneath, while those on vigorous shoots retain their white tomentum beneath; petioles shorter than the blade; branchlets and bud in winter white scurfy tomentose. *Flowers* staminate aments 1½-2 in. long (becoming 3-4 in. long) stout; pistillate aments more slender; stigmas digitately lobed. *Fruit*: capsules ovoid-oblong, about 3-16 in. long, 2-valved.

Populus alba var. *Bolleana* (Bolle's Poplar) was found in Turkestan in 1875. They are trees with narrow pyramidal tops of fastigiate branches and are now extensively planted for ornamental purposes in the Atlantic states. They are considered as of greater ornamental value than is the typical form.

1. A. W., IV, 96.

HORNBEAM. BLUE OR WATER BEECH. IRON-WOOD.

Carpinus Caroliniana Walt.

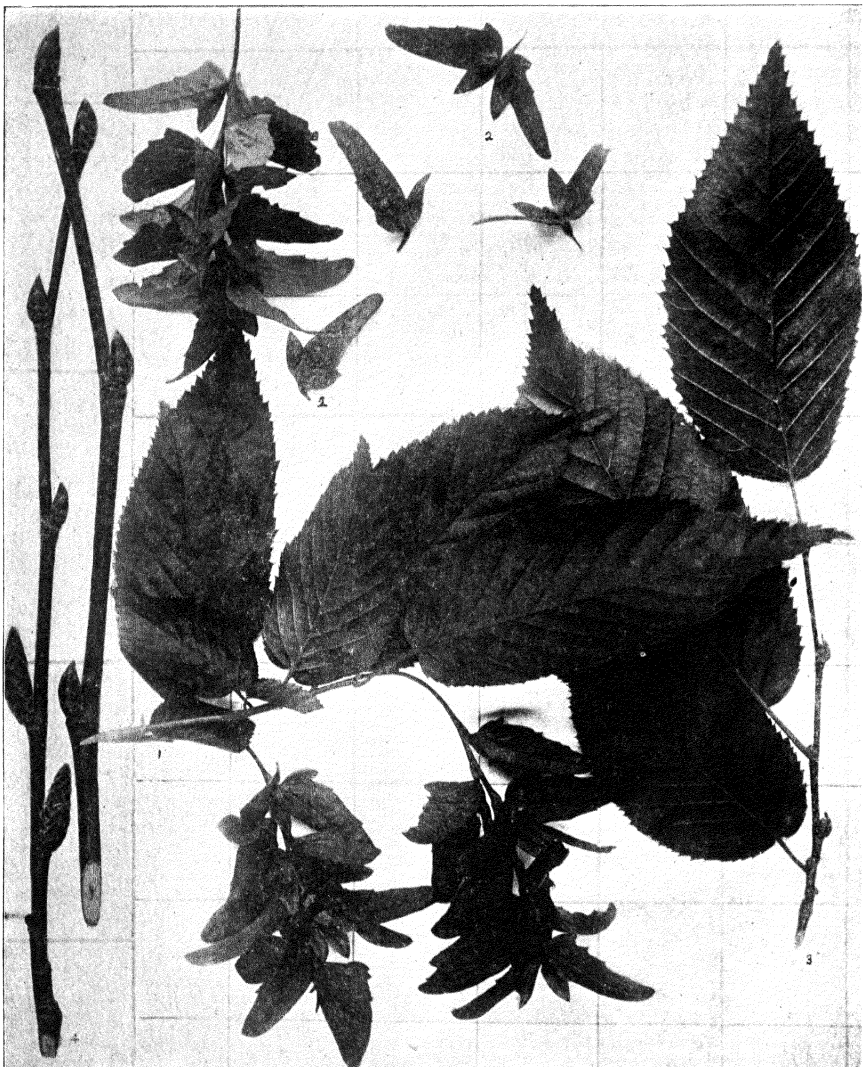


Fig. 128. Branchlet bearing leaves and fruit, 1; detached nutlets with their involucres, 2; leafy branchlet, 3; branchlet in winter, 4.

129. Trunk of tree at Biltmore, N. C.

130. Wood structure magnified 15 diameters.

The Hornbeam in the forest sometimes attains the height of 30 or 40 ft. and a diameter of trunk of 18 in. or 2 ft. vested in a thin very close and smooth bluish gray bark often mottled with lighter or darker tints. When isolated from other trees it develops a broad open head with numerous tough branches, the larger of which and the trunk are much furrowed and ridged, suggestive of knotted sinews, on account of which resemblance the Indians called it "Otantahrteweh," meaning "*the lean tree*." It grows on low moist bottom-lands in company with the Holly, Sweet Bay, Swamp Bay, Gums, Red Maple, Water Locust, Prickly Ash, etc. in the south Atlantic states, where it is more abundant than northward and attains its largest size. In the northern part of its range it is a small tree with less symmetrical and crooked trunks or often a tall shrub. Here it is commonly found along the banks of streams over whose waters it extends its many handsome sprays of beautiful foliage and curious clusters of leaf like fruit.

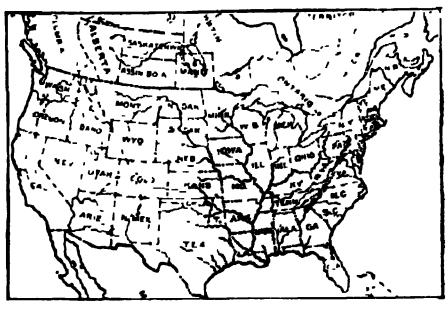
The wood of the Hornbeam is heavy, a cubic foot when dry weighing 45.41 lbs., tough, strong and of a light brown color with abundant whitish sap-wood. It is used chiefly for fuel though suitable for tool-handles, and articles of wooden ware.[1]

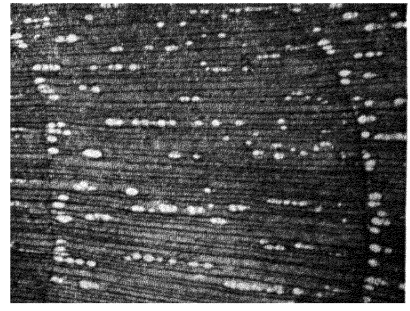
Leaves ovate-oblong, 2-5 in. long, acute or acuminate, rounded or subcordate at base, sharply and unequally serrate with stout spreading teeth, often inequilateral, pubescent and pilose at first but finally glabrous, dull green with deeply impressed veins above, paler and with tufts of white hairs in the axils of veins beneath; petioles slender, pubescent; winter buds ovoid, acute and somewhat incurved with numerous brown white-margined scales. *Flowers*: staminate aments 1-1½ in. long; pistillate ½-¾ in. long with green scales and scarlet styles. *Fruit* nuts ¼ in. long with involucres with stout stalks 1-1½ in. long with middle lobe large and serrate on one side and one lateral lobe commonly wanting.[2]

1. A. W., II, 42

2. For genus see p. 427.







HOP HORNBEAM. IRON-WOOD.

Ostrya Virginiana (Mill.) Koch.



Fig. 131. Branchlet with mature leaves and fruit, 1; involucral sacs opened, to show nutlets, and detached nutlets, 2; branchlets in winter bearing young staminate aments and leaf-buds, 3.

132. Trunk of tree, in Lewis Co., N. Y.

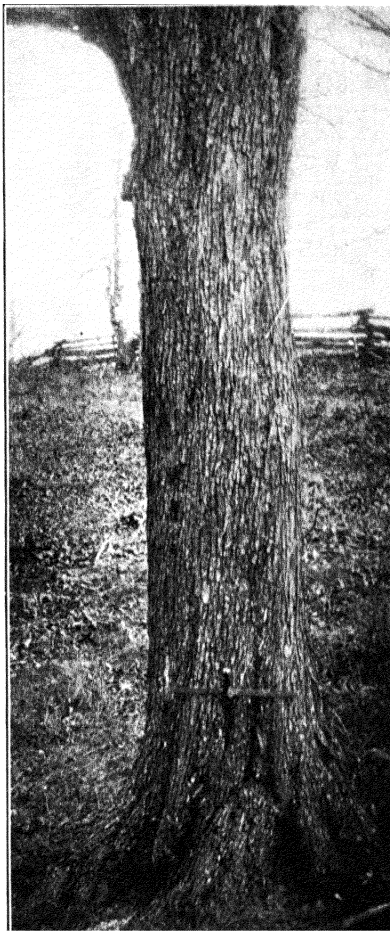
133. Wood structure magnified 15 diameters.

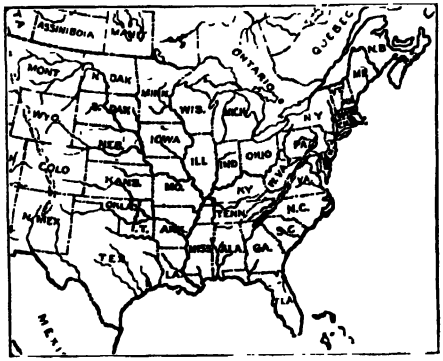
The Hop Hornbeam is a handsome tree of medium size rarely over 60 or 70 ft. in height or 2 ft. in diameter of trunk. When isolated it develops a broad rounded top of many small tough branches, and when covered with its rich yellow-green leaves and pale hop-like fruit is a handsome object. The bark of trunk is rough with narrow loose elongated scales. It inhabits well-drained gravelly ridges and slopes and in the northern Atlantic states, where it is abundant and reaches its largest size, is associated with the Beech, Sugar Maple, Yellow Birch, White and Cork Elms, Butternut, White Ash, etc.

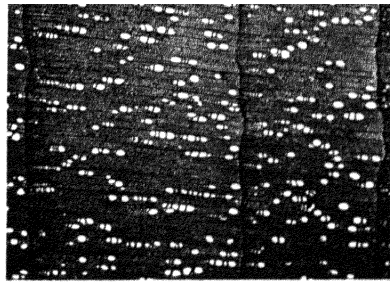
Its wood is heavy, a cubic foot when absolutely dry weighing 51.63 lbs., hard, tough, and is used in the manufacture of tool-handles and other small articles of wooden ware, for fuel, etc.[1]

Leaves ovate-oblong, 2-5 in. long, acute or acuminate, narrowed and rounded or cordate often inequilateral at base, sharply and unequally serrate, at maturity glabrous and dull yellow-green with impressed midribs and veins above, lighter and downy beneath, especially along the midribs and in the axils of the veins. *Flowers:* staminate aments about ½ in. long during the winter and when unfolding 2-3 in. long; pistillate aments very slender, with hairy stems and light green or reddish leaf-like scales, those near the base the longest. *Fruit:* strobules 1½-2½ in. long with slender stems about 1 in. long; involucral sacs about ¾ in. long, pubescent.[2]

1. A. W., II, 41.
2. For genus see p. 428.







WHITE BIRCH. GRAY BIRCH. OLD-FIELD BIRCH.

Betula populifolia Marsh.

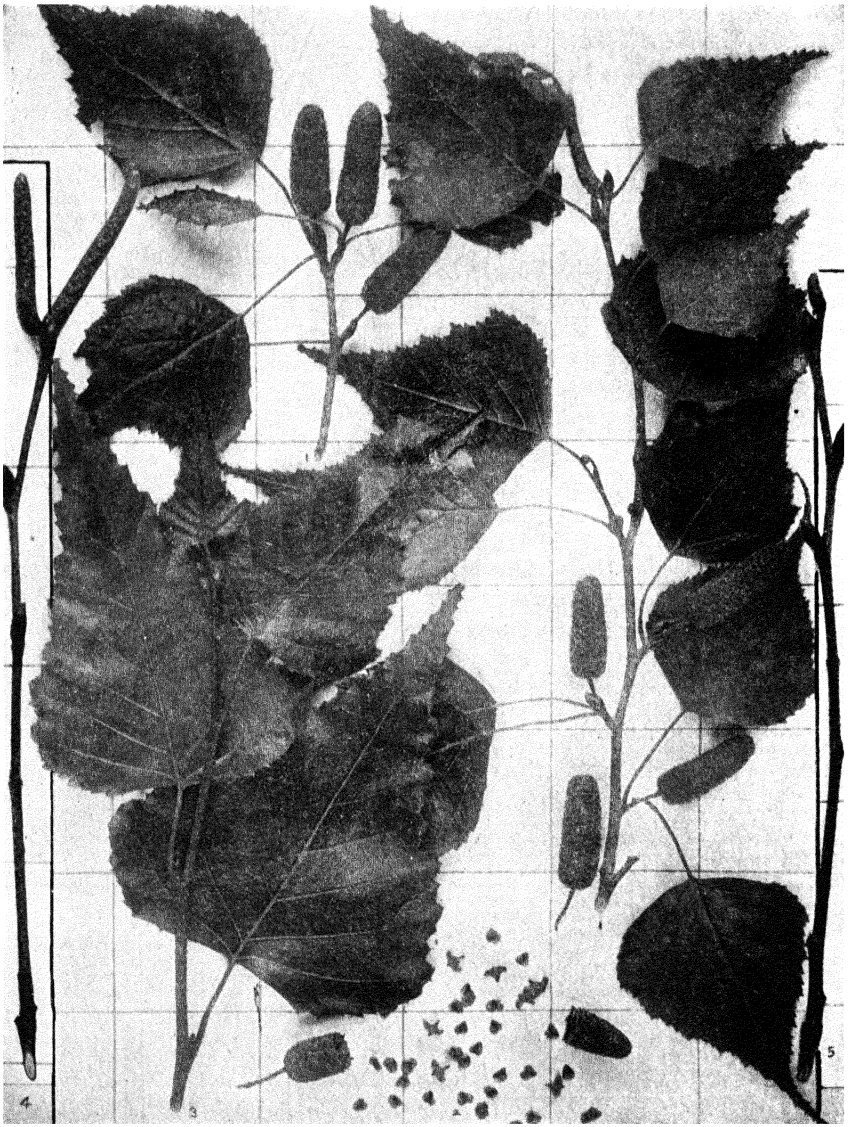
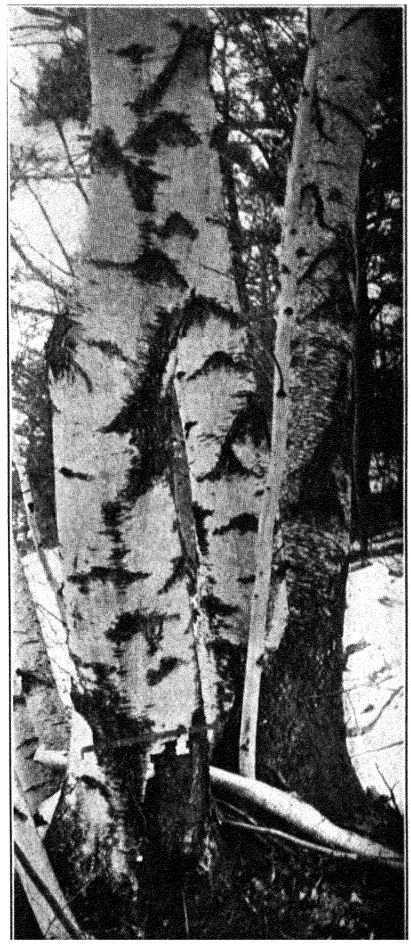


Fig. 134. Branchlets with mature leaves and fruit, the one to the right bearing also young staminate ament, 1; broken cone with scattered cone-scales and seeds, 2; vigorous leafy shoot, 3; branchlet with leaf-buds and young aments in winter, 4; do, with flower-buds only, 5.

135. Cluster of trunks, near Albany, N. Y.

136. Wood structure magnified 15 diameters.

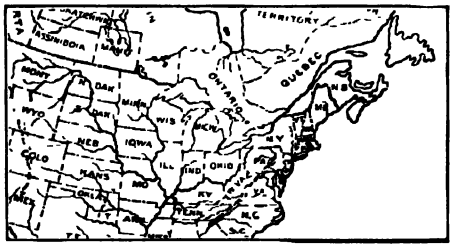


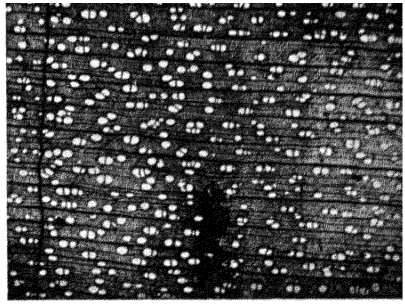
This is the smallest of the tree Birches of eastern North America, commonly not more than 20 or 30 ft., or exceptionally 40 ft., in height, with trunk sometimes 18 in. in diameter. The bark of younger trees is dull creamy white, usually with dark triangular marks at the insertion of branches, and peeling off tardily in strips around the trunk. On older trunks it is darker and rough with transverse fissures. It develops a narrow and more or less irregular top of many small branches commonly clothing the stem to the ground. With its long stemmed small leaves in constant agitation by the wind, like those of the Quaking Asp, and white bark, it is a conspicuous and interesting object. It commonly grows in dry sandy and often quite barren soil, springing up in abundance after forest fires and affording by its shade a shelter for the germinating of the more tender seeds of more useful trees.

Its wood, a cubic foot of which, when absolutely dry, weighs 35.90 lbs., is used in the manufacture of small wooden ware, as spools, clothes-pins, shoe-pegs, hoops for casks, etc., and is excellent for fuel and charcoal.[1]

Leaves triangular-ovoid, from 2-3½ in. long, with very slender points, truncate, obtuse or slightly cordate and entire at base, doubly serrate with spreading glandular teeth, dark shining green and glandular-roughened above and slightly paler and smooth beneath; petioles long and slender; branchlets resin-glandular. *Flowers* unfolding with the leaves; staminate aments solitary or in pairs, about 1 in. or less in length and slender in winter, becoming from 2-3½ in. long, with apiculate scales; pistillate aments slender, about ½ in. long, on glandular pedicels of about the same length with pale green scales. *Fruit* strobiles cylindrical, about ¾ in. long and ¼ in. thick, erect or spreading with slender peduncle; scales with lateral lobes recurved, the middle one narrow; nutlet narrower than its wings.[2]

1. A. W., III, 70.





CANOE BIRCH. PAPER BIRCH.

Betula papyrifera Marsh.[1]

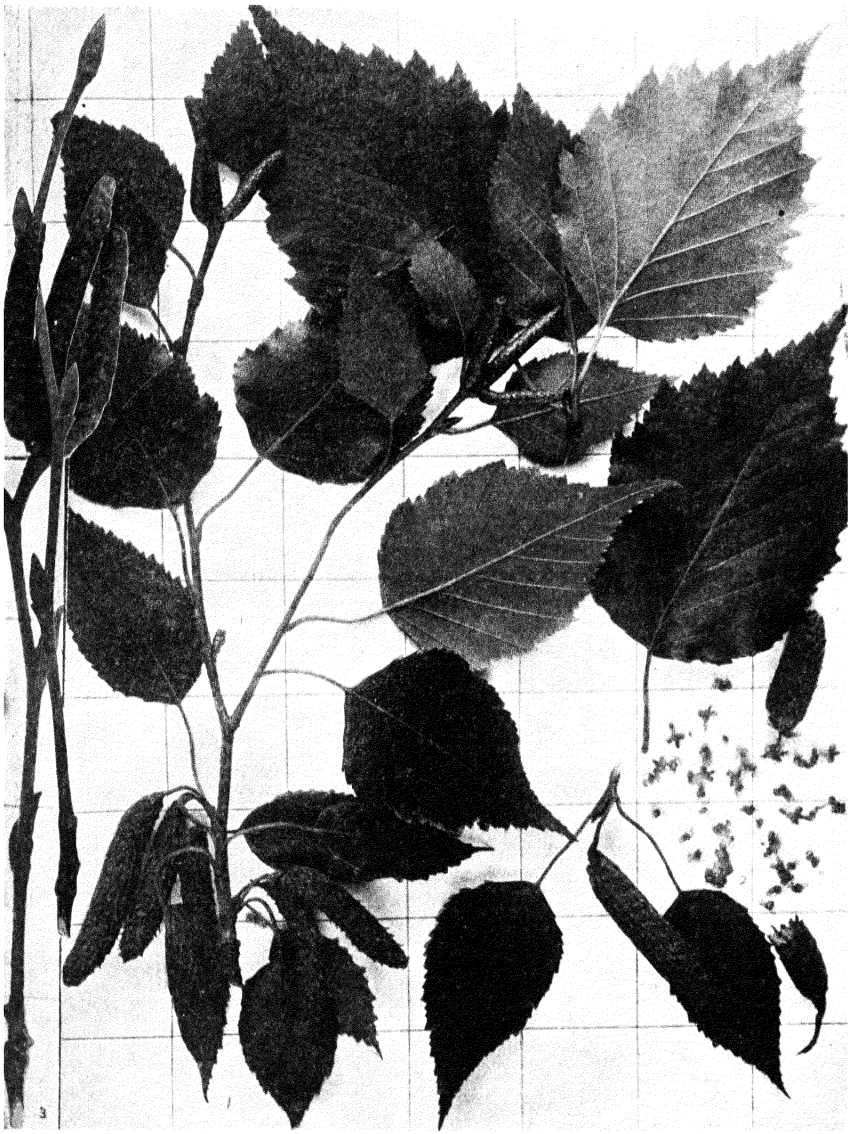


Fig. 137. Branchlet with mature leaves and fruit and young staminate catkins, 1; broken cone with scattered seeds and cone-scales, 2; branchlets in winter, one bearing young catkins for the next season's flowers, 3.

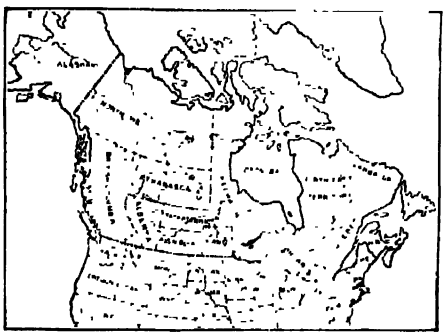
138. Trunk of tree in Adirondack region, N. Y.

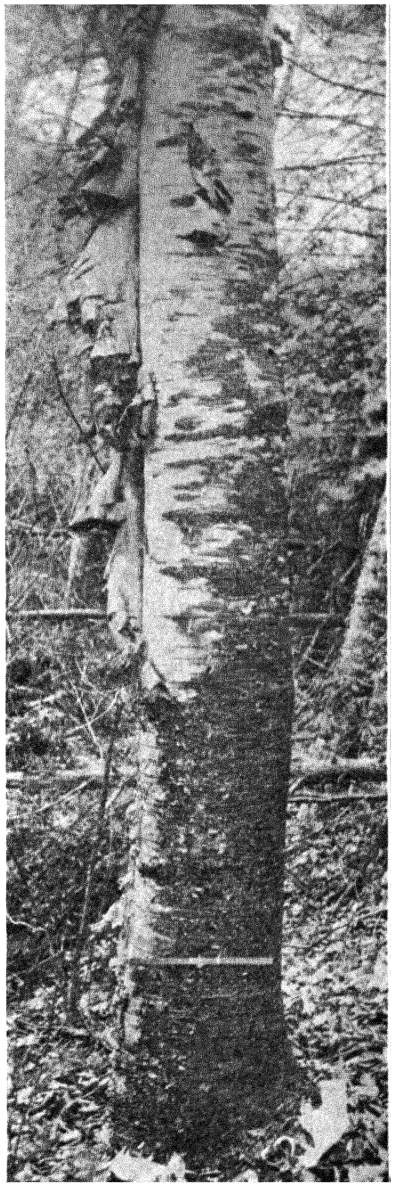
The Paper Birch, west of the Rocky Mountains, is said to attain a height of 120 ft. with trunk from 3-4 ft. in thickness, but elsewhere rarely exceeds 70 or 80 ft. in height. When isolated from other trees it develops a full rounded and usually irregular top of many branches. The bark of the larger branches and young trunks is laminate, smooth and of creamy or ivory whiteness, marked with long horizontal raised lenticels. As the trunk enlarges the bark becomes more or less streaked and blotched with blackish and the outer layers separate and roll back in large ragged sheets. On very old trunks the bark at base becomes broken into large closely appressed irregular scales. It inhabits rich slopes and ornaments the banks of northern streams and lake-shores from the Atlantic to the Pacific, ranging northward to the Arctic Circle. With the northern Indians its bark, impervious to water, is an indispensable material for the manufacture of their canoes and for many articles for domestic use.

The wood, of which a cubic foot when absolutely dry weighs 37.11 lbs., is used in the manufacture of wooden-ware, wood-pulp, etc., and is excellent for fuel.[2]

Leaves ovate, 2-4 in. long, acute or acuminate at apex, rounded or obtuse (cordate in var. *cordifolia* Fern.) and entire at base, doubly or irregularly serrate, thick and firm at maturity, glabrous dark green above, paler and pubescent on the veins and with black glands beneath *Flowers*: staminate aments 3_4-$1\frac{1}{4}$ in. long in winter, finally 3-4 in. long; pistillate aments 1-$1\frac{1}{2}$ in. long, slender, with light green scales and red styles. *Fruit*: strobiles cylindrical, about $1\frac{1}{2}$ in. long, drooping, glabrous, middle lobe of scales longer than broad; nutlet much narrower than its wings.

1. Syn. *B papyracea* Ait.
2. A. W., II, 43.





RIVER BIRCH. WATER BIRCH. RED BIRCH.

Betula nigra L.

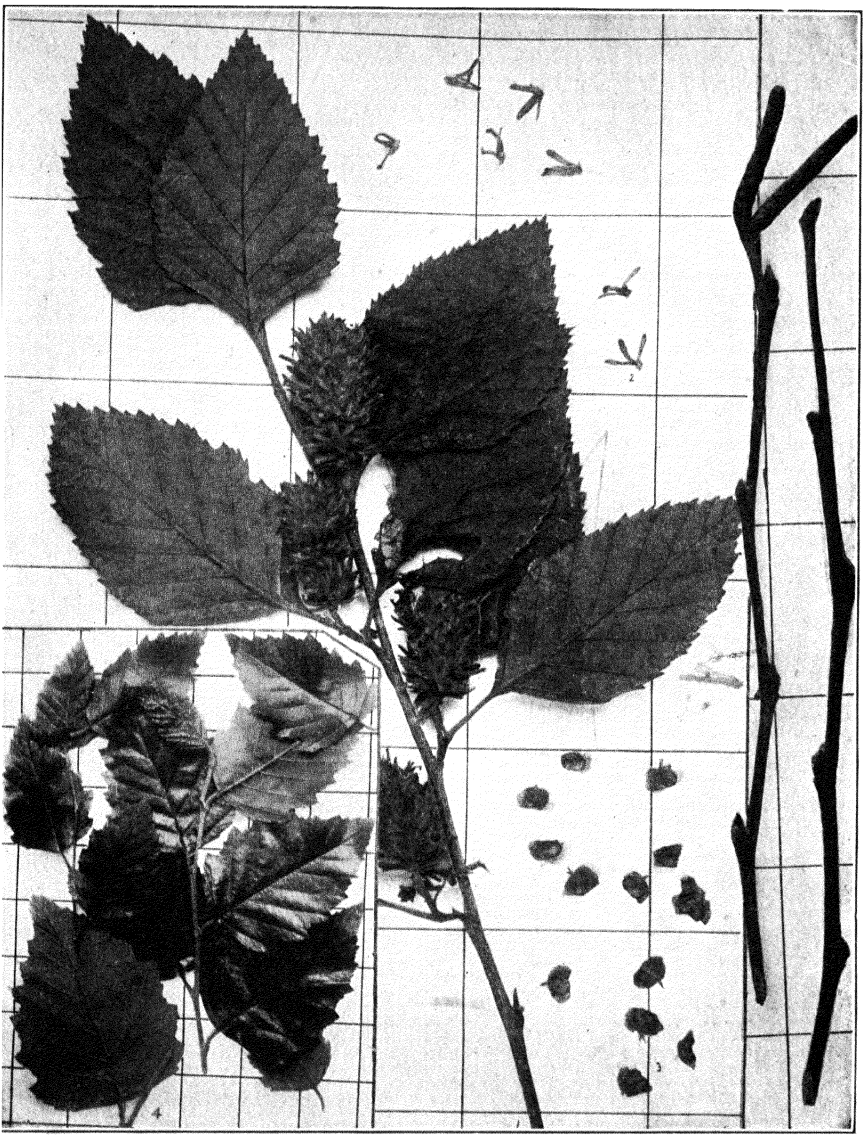


Fig. 139. Branchlet with mature leaves and fruit, 1; isolated scales of fruiting cone, 2; seeds, 3; assortment of leaves, 4.

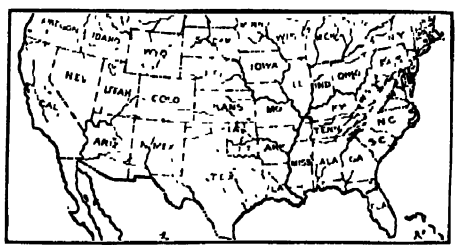
140. Trunk of tree in Washington, D. C.

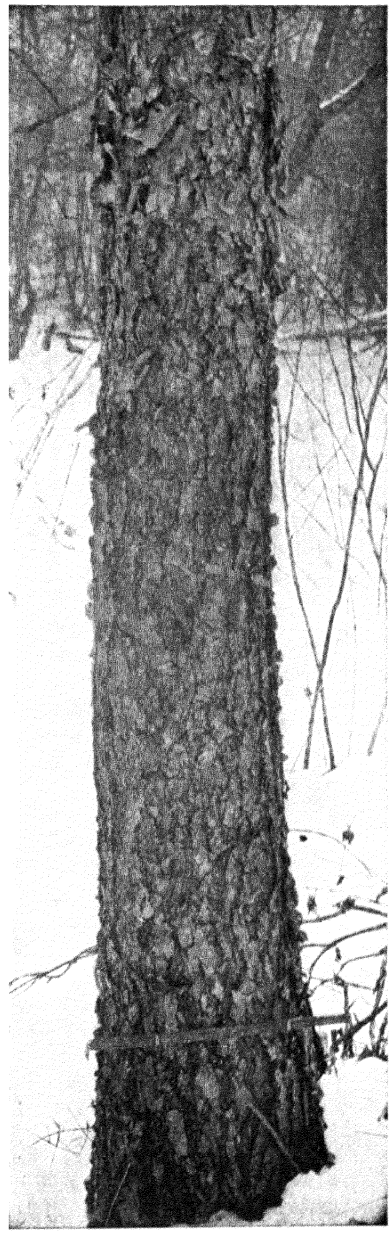
This interesting tree occasionally attains the height of 80 or 90 ft. with trunk 4 to 5 ft. in diameter. When isolated it develops a narrow oblong head of many small branches, but with age a fuller, rounder and usually irregular picturesque head. The bark of branches is smooth at first, of a lustrous reddish brown color, but with age breaks and separates into successive layers which curl up and long persist as thin papery scales of various tints of red and brown. These form a veritable mat on the larger limbs and trunks of medium size, while the bark of old trunks becomes rough with thick irregular plate-like scales. It inhabits the banks of streams subject to frequent inundation, and here its graceful branches hanging over the waters and almost touching their surface with long sprays of handsome foliage add greatly to their charm. Prof. Sargent has called attention to the fact that the early ripening of the seeds of this and other riparian trees greatly assures their germination and growth, as they fall on the banks at the season of low water, germinate and make substantial growth when a later seed would have found only water in which to perish.

The wood of the River Birch, of which a cubic foot when dry weighs 35.91 lbs., is used in the manufacture of wooden ware, etc.[1]

Leaves rhombic-ovate, acute, 2-4 in. long, wide cuneate or almost truncate and entire at base, serrate and serrately lobed or doubly serrate, pale tomentose at first but finally lustrous dark green above and tomentose on midribs and veins beneath; petioles slender, tomentose; branchlets the first season tomentose. *Flowers*: staminate aments 1 in or less long in winter with rounded lustrous scales finally 2-3 in. long; pistillate aments about ½ in. long with pubescent ciliate scales. *Fruit* ripening in May or June in cylindrical strobiles 1-1½ in. long, with short tomentose peduncles and scales with 3 about equal narrow lobes; nutlet oval and about as wide as the ciliate wings.

1. A. W., IV, 95.





SWEET BIRCH. BLACK BIRCH. CHERRY BIRCH.

Betula lenta L.

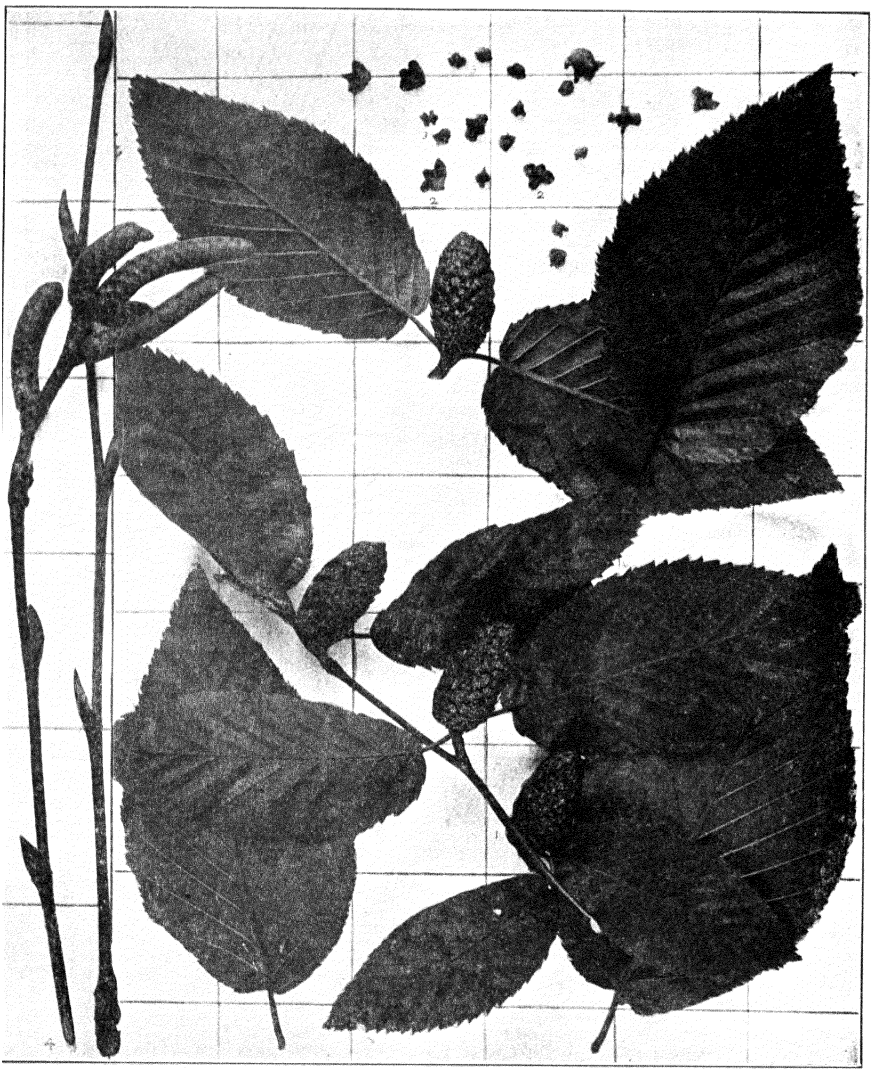


Fig. 141. Branchlet with leaves and fruit, 1; scales from cone and seeds, 2 and 3; branchlets in winter, one bearing young staminate catkins, 4.

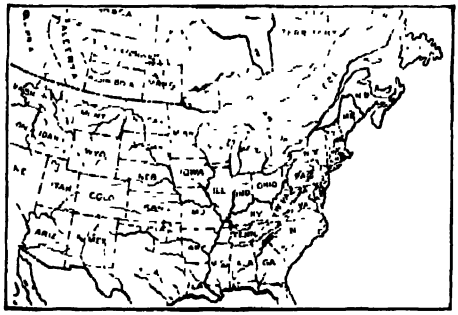
142. Trunk of tree near New York.

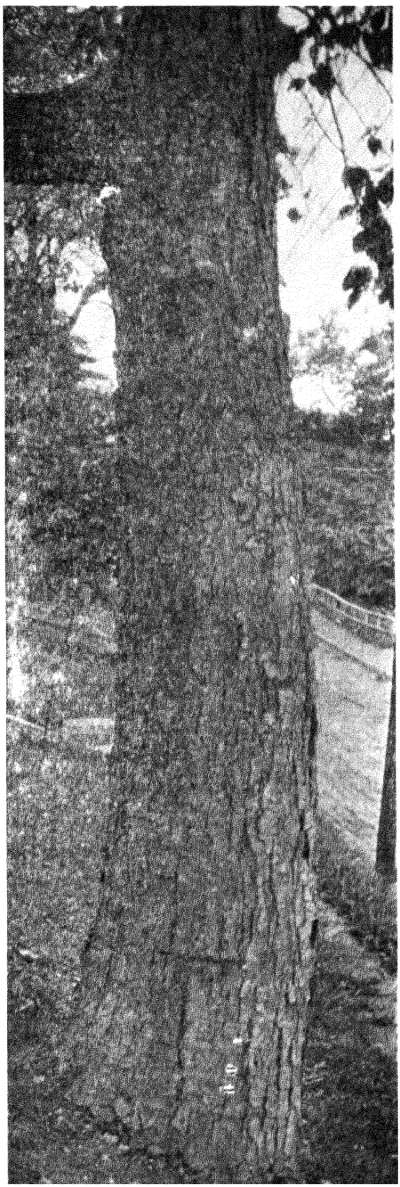
The Sweet Birch attains the height of 70 or 80 ft., with a trunk diameter of from 2-5 ft., and when growing away from other trees develops a symmetrical ovoid or pyramidal top at first with many strong small branches, but finally rounded or broad by the lengthening of the lateral branches. The bark of trunk is at first smooth and peels off transversely in thin strips, but finally becomes fissured with large and small irregular scales suggesting the bark of the Black Cherry, for which reason the tree is sometimes called the Cherry Birch. The darkness of its color gives it the name of Black Birch and from the sweet aromatic flavor of its leaves and bark it is called the Sweet Birch. It flourishes on rich well-drained uplands, and in early spring while the branches are bare of leaves and it is trimmed with its golden tassels of catkins, unloading their pollen on the lightest touch, it is a particularly handsome object.

The wood is heavy, hard and strong, a cubic foot when absolutely dry weighing 47.47 lbs., and is valued in the manufacture of furniture, agricultural implements and general wooden ware, and for fuel.[1]

Leaves ovate to ovate-oblong, 2½ to 5 in. long, acute to acuminate at apex, rounded or cordate at base, sharply unevenly serrate, silky pubescent at first but finally glabrous shining green above, paler and pubescent along the prominent veins beneath; petioles stout, hairy and grooved above. *Flowers* staminate generally in clusters, 1 in. or less in length and ⅛ in thick and scales with free apiculate tips in winter, finally 3-4 in. long in spring; pistillate aments ¾ in. long with greenish round-pointed scales and pink styles. *Fruit:* strobules erect ovoid-oblong, sessile, 1 1½ in long, glabrous with lobes of scales about equal, lateral lobes divergent, nutlet obovoid, broader than its wings.

1 A. W., II, 11





YELLOW BIRCH. GRAY BIRCH.

Betula lutea Michx.

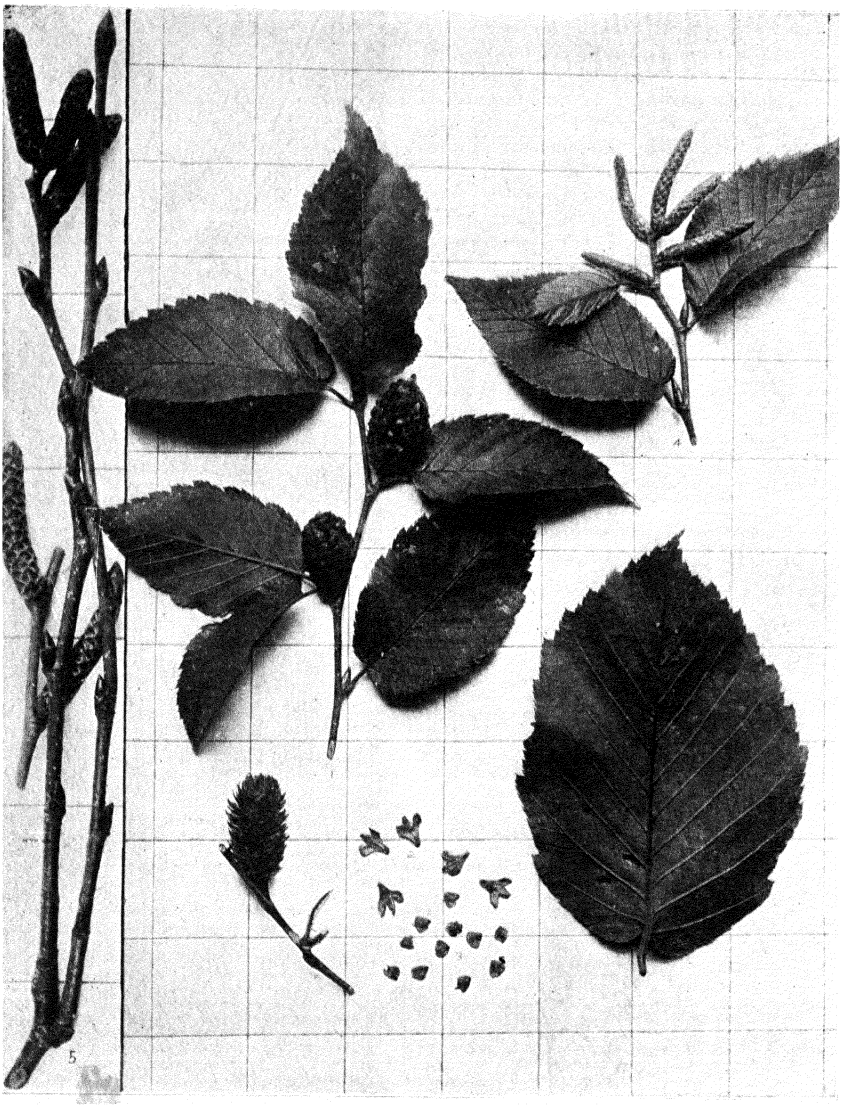


Fig. 143. Branchlet with leaves and fruit, 1; cone scales, 2; seeds, 3; branchlet bearing leaves and young staminate catkins for next season's flowering, 4; branchlets in winter, two bearing young catkins, 5.

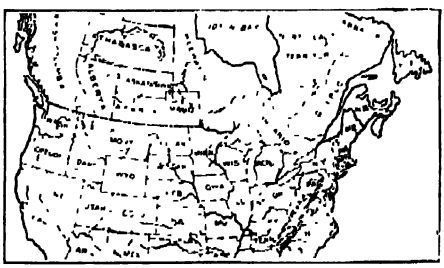
144. Trunk of tree, Lewis Co., N. Y.

The Yellow Birch is a large and important forest tree of the northeastern states and the eastern provinces of Canada, sometimes attaining the height of 100 ft. with trunk 3 or 4 ft. in diameter. When isolated it develops a broad rounded top of many small straightish branches. Its peculiar bark is its most striking feature and distinguishes it from all other trees of the forest. The bark on its branches and smaller trunks is very smooth and lustrous silvery or golden gray, breaking finally as the trunk expands and rolling back in ribbon-like strips and curls, which long remain attached rustling with every passing breeze. On very old trunks the character of the bark is quite different, as it is there rough with irregular plate-like scales. It inhabits rich moist uplands in company in our northern forests with the Beech, Sugar and Red Maples, Black and White Ash, White Elm, Hop Hornbeam, etc.

Its wood is hard and strong, a cubic foot, when absolutely dry, weighing 40.84 lbs., and is highly valued in the manufacture of agricultural implements, wooden ware, etc., and furniture, occasional "figured" trees being especially valuable for the latter use. It is also one of the best woods of its range for fuel.[1]

Leaves ovate to ovate oblong, 2-5 in. long, acute or acuminate at apex, rounded, obtuse or heart-shaped at base, sharply doubly serrate, silky pubescent at first but finally glabrous dull green above, paler and with silky hairs on midrib and prominent veins beneath; petioles slender, hairy; branchlets at first green and pilose pubescent but finally smooth. *Flowers* staminate aments usually in clusters of 2-4, 3-3½ in. long when fully expanded (¾-1 in. long in winter and ⅛ in. thick) with rounded scales; pistillate aments about ¾ in. long with acute pilose scales; styles pink. *Fruit* an erect, subsessile, pubescent oblong strobile, 1-1½ in. long with lobes of scales about equal, ciliolate and slightly spreading with obovate nutlet about as broad as its wings.

1. A. W., I, 17.





SEA-SIDE ALDER.

Alnus maritima (Marsh.) Muehl.

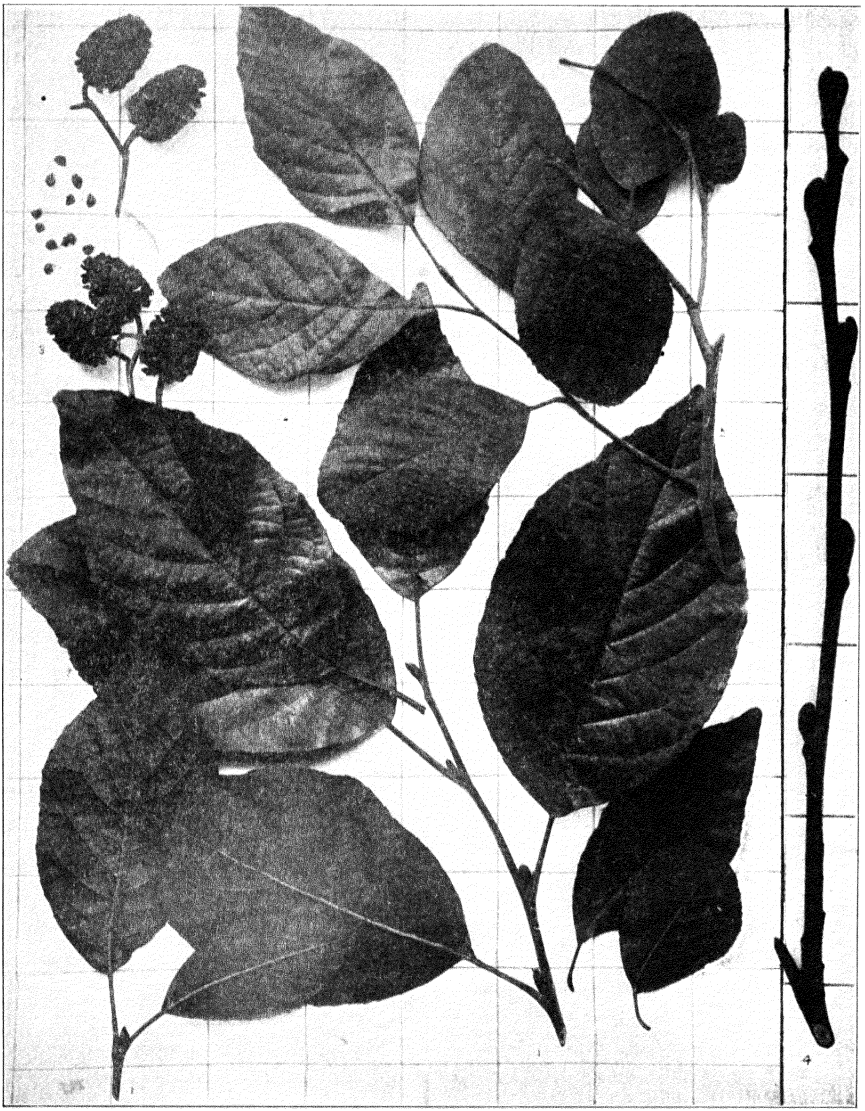


Fig. 145. Leafy branchlet in late summer, 1; do, bearing also mature fruit, 2; open strobiles and seeds, 3; branchlet in winter, 4.

146. Trunk of tree near Seaford, Del.

147. Wood structure magnified 15 diameters.

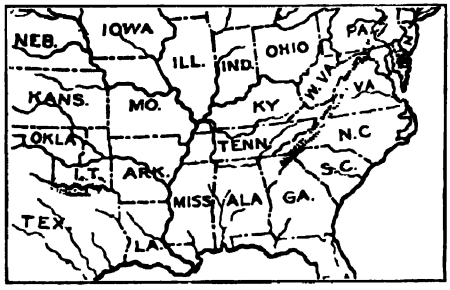
This curious and interesting Alder is a small tree, occasionally attaining the height of 30 ft., with narrow top and slender branches and smooth-barked trunk 5 or 6 in. in diameter. It is very distinct from all other Alders in several respects. Its bright glossy green foliage is in strong contrast to the dull green of the other Alders, and its period of blossoming, instead of being when the trees are leafless in early spring, as with the other species, is not until autumn. Then the effect of its golden catkins and handsome foliage together is very pleasing and gives the tree a peculiar ornamental value. Quite as different, too, as this tree is from the other Alders in its foliage and period of flowering is it in its distribution. The Alders are generally species of wide distribution, but this is limited to two small areas, one near the sea coast on the Delaware and Maryland peninsula and the other far inland on the banks of the Red River in Indian Territory.

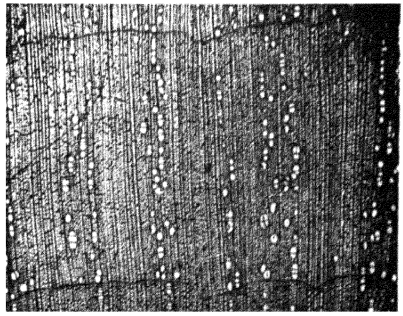
Its wood is light, a cubic foot weighing 31 14 lbs., soft and with numerous large medullary rays.

Leaves ovate-oblong to obovate, wedge-shaped at base, usually acute or acuminate at apex, remotely and sharply serrate, scurfy pubescent when young but at maturity dark green and very lustrous, pale and minutely glandular punctate beneath. *Flowers* expanding in September, the staminate aments in racemes, 1½-2½ in. long from the axils of the upper leaves, the pistillate usually solitary from the axils of lower leaves. *Fruit* strobile about ⅝ in. long with thinnish crenate-lobed scales and wingless oblong-obovate seeds liberated late in autumn of the year subsequent to fertilization.[1]

1. For genus see p. 429.







BLACK ALDER. EUROPEAN ALDER.

Alnus glutinosa (L.) Gærtn.

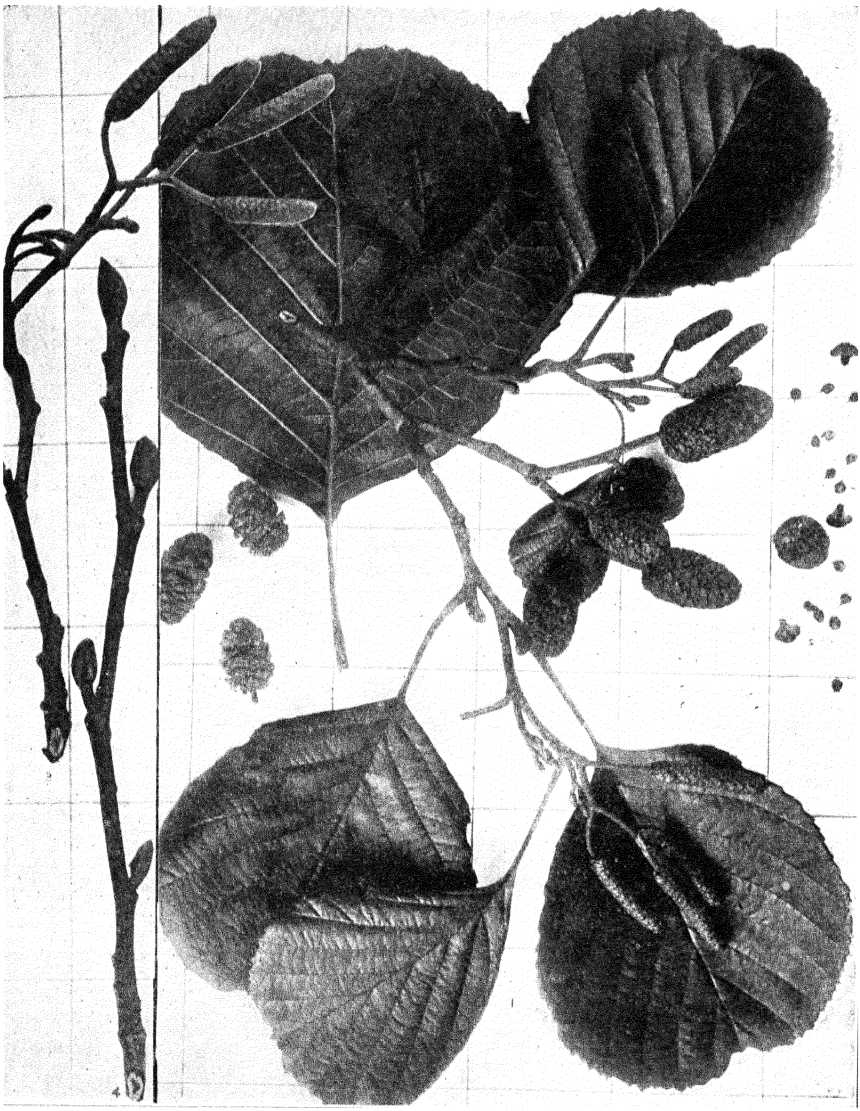
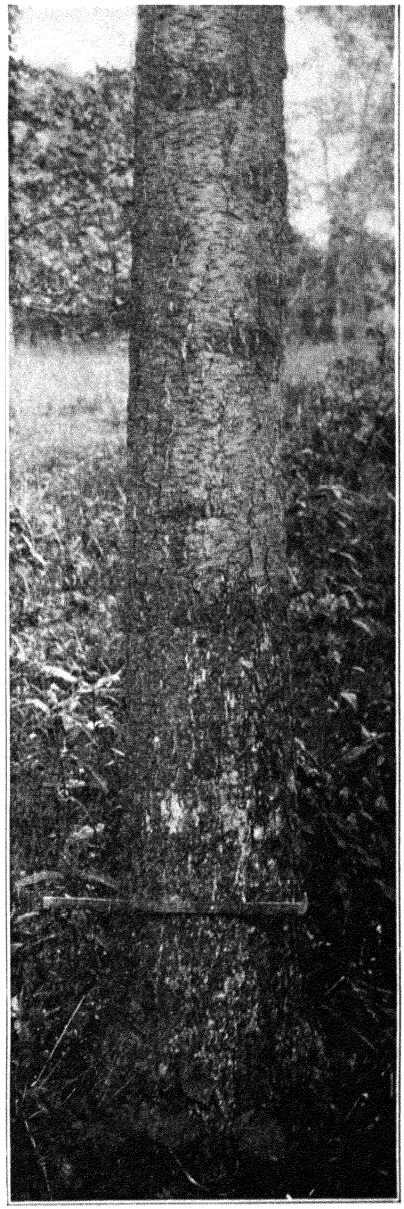


Fig. 148. Branchlet, with mature leaves and fruit, and young aments (both staminate and pistillate) for next season's flowers, 1; portion of cone with detached scales and seeds, 2; branchlet in winter bearing young staminate (the larger) and pistillate (the smaller) aments, 3; do, with leaf-buds only, 4.

149. Trunk of tree with leaves at base. Staten Island, N. Y.



The Black Alder is a naturalized tree found in various localities in the Atlantic states, particularly in southern New York and New Jersey. In its native home it is generally distributed over Europe, western Asia and northern Africa in moist localities, and attains a height of from 50 to 70 ft with a symmetrical pyramidal or when old rounded top, and with trunk 1–2 ft. in diameter. Being a vigorous growing tree of desirable qualities for ornamental planting, particularly on low grounds, it was brought to America and planted for ornamental purposes, and being possessed of a hardy adaptable constitution it seeds freely and grows spontaneously in suitable localities. Few introduced trees of the ornamental value of this are so well suited to planting in very wet localities. Those are mainly Willows and Poplars and among them the straight smooth trunks of the Black Alder, with their symmetrical tops of handsome foliage, have a very pleasing effect. They are not, however, very long lived trees with us, and individuals are not found as large as those in their native land.

In Europe the tree is of considerable commercial importance, as its soft straight-grained wood is easily worked and valuable in turnery, for wooden-ware, wooden-shoes, etc., and for carving. It is valued, too, for water pipes, pumps, piles, etc., and is largely used for charcoal and fuel. The bark and fruit are used in tanning leather and a yellow dye is made from the bark and leaves. The bark is also used in medicine, having astringent and alterative properties.

Leaves orbicular to obovate, 2-5 in. long, mostly obtuse at base and retuse or rounded at apex, irregularly serrate-dentate, distinctly glutinous at first, glabrous dull green above, green and glabrous or pubescent on the veins beneath. *Flowers* appear in early spring before the leaves; staminate aments 2-3 in. and the pistillate about ½ in. long. *Fruit*, strobile oblong-ovoid, ½-¾ in. long, with wingless seeds.

BEECH.

Fagus Americana Sweet.[1]

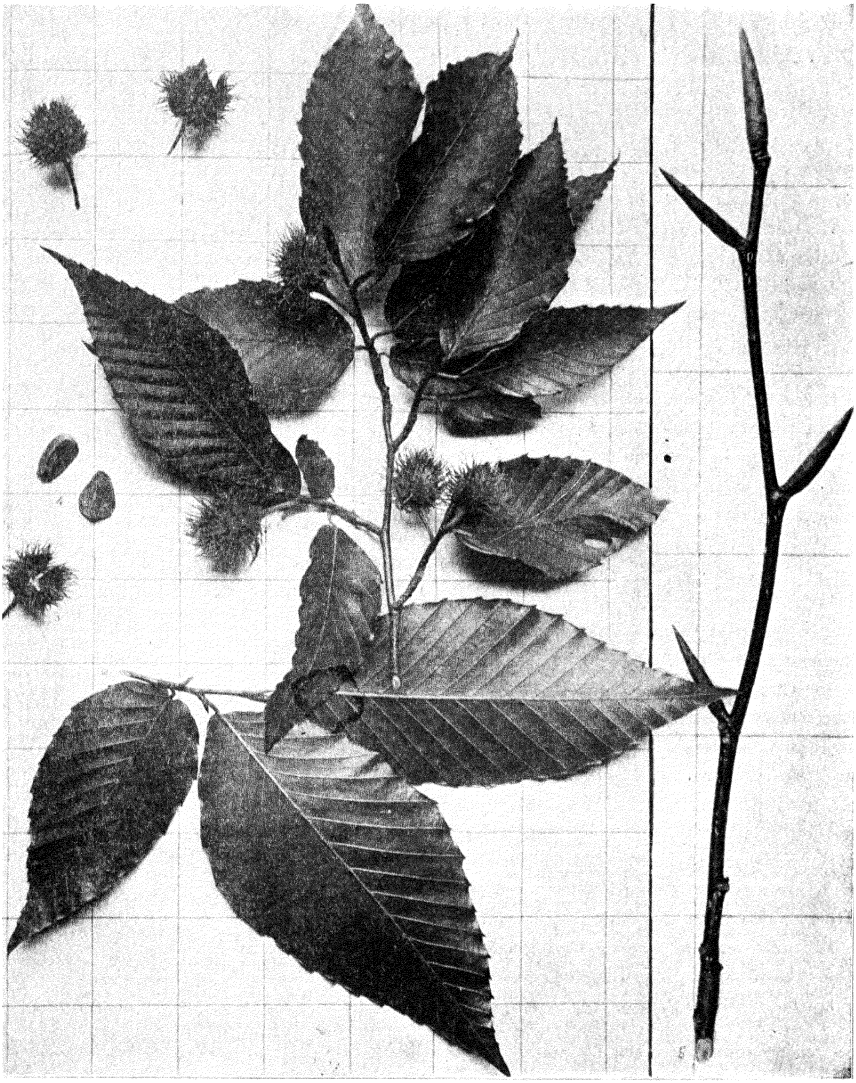


Fig. 150. Fruiting branchlet with mature fruit, 1; leafy branchlet, 2; open involucre, 3; nuts from same, 4; branchlet in winter, 5.

151. Trunk of tree on bank of Black River, Lewis Co., N. Y.

152. Wood structure magnified 15 diameters.

The Beech is one of the most distinct and beautiful trees of our eastern American forests, sometimes surpassing 100 ft. in height and with straight columnar trunk 3 or 4 ft. in thickness vested in its trim smooth bluish gray bark. When isolated it develops a rounded or broad upright spreading top of many branches and slender branchlets. It inhabits rich well-drained uplands and slopes, in the north in company with the Sugar Maple, Birches, Hop Hornbeam, Basswood, Hemlock, etc. and in the south is found along the borders of swamps and bottom-lands. It often in old age sends up many shoots from its roots which form a thicket about its base, and as the parent declines the fittest of these survive and grow into trees to take its place. It is a beautiful tree at all times, each successive season of the year giving to it a peculiar charm, and not the least of these is its leafless condition in winter. Its nuts form the chief article of food for many denizens of the forest and they are sometimes gathered and sold in northern markets.

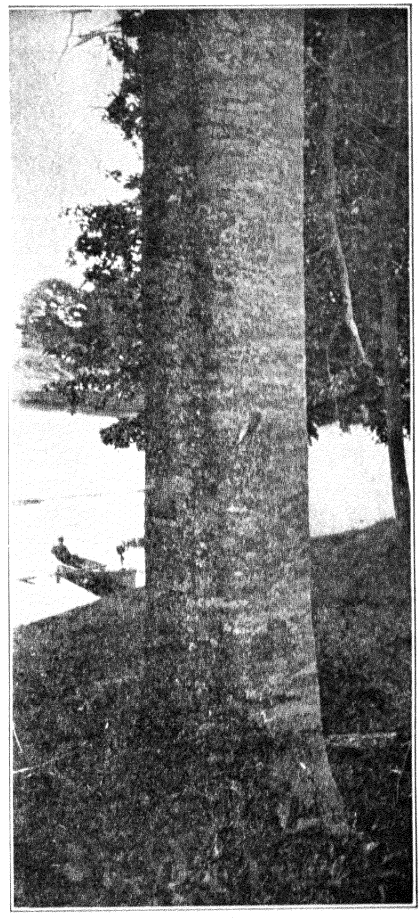
The wood, a cubic foot of which, when absolutely dry, weighs 42.89 lbs., is used in the manufacture of furniture, wooden-ware, plane-stocks, etc., and for fuel.[2]

Leaves ovate-oblong, 3-6 in. long, acuminate, wedge-shaped, rounded or cordate at base, coarsely serrate, a vein terminating in each tooth, pale green and silky tomentose when they unfold, but finally glabrous dark green above, paler and with hairs in the axils and on the midribs beneath; petioles short. *Flowers* appear after the leaves unfold. *Fruit:* nut about $\frac{3}{4}$ in. long; involucre covered with many slender prickles, with stout peduncles and persisting open upon the branchlets late into the winter.[3]

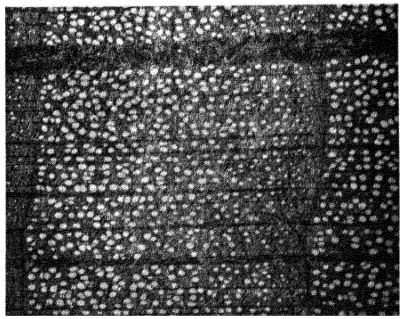
1. Syn. *Fagus ferruginea* Ait. *Fagus atropunicea* (Marsh.) Sudw.

2. A. W., I, 16.

3. For genus see p. 129.







CHESTNUT.

Castanea dentata (Marsh.) Borkh.[1]



Fig. 153. Branchlet bearing mature leaves and fruit, 1; involucres (burrs) opening to liberate the nuts, 2; branchlet in winter, 3.
154. Trunk of tree in western North Carolina.
155. Wood structure magnified 15 diameters.

When growing in the forests the Chestnut tree attains the height of 100 ft. with straight columnar trunk 3 or 4 ft. in diameter vested in a grayish brown shallow-ridged bark. It is in the open fields, however, that it shows best its noble form and proportions. There it develops a very large broad or rounded head sometimes covering an area 100 ft. across with massive branches and short sturdy trunk sometimes 8, 10 or even 12 ft. in thickness. Its long handsome leaves always give it a peculiar charm, but its beauty is greatly enhanced in early summer when it puts out its great clusters of fragrant golden catkins. These are succeeded in a few weeks by its hardly less conspicuous pale green clusters of fruit, the precious nature of which is indicated by the forbidding barricade of sharp spines which effectually protects it until ripe, and then, opening, cast it out to be eagerly coveted by both man and beast.

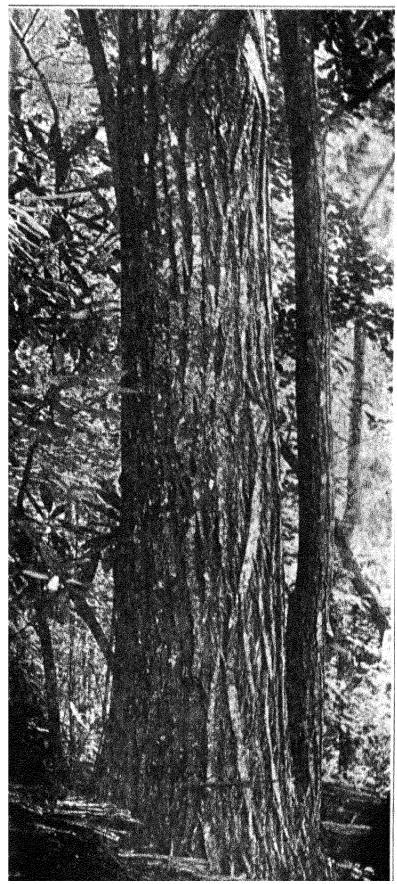
Chestnut wood, a cu. ft. of which when absolutely dry weighs 28.07 lbs., is very durable in contact with the soil and makes useful lumber for many purposes. It is also rich in tannin, which is extracted and used for tanning purposes.[2]

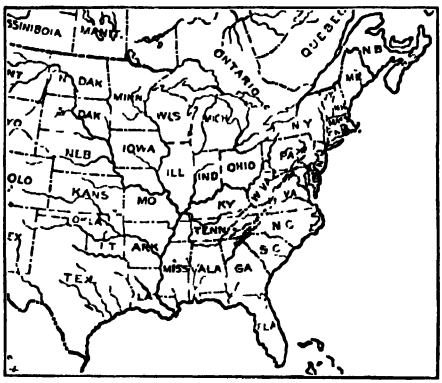
Leaves oblong-lanceolate, 6-9 in. long, cuneate, rounded or obtuse at base, pubescent at first, glabrous both sides and firm at maturity, dark green above, paler beneath; petioles short, stout, puberulous. *Flowers:* (June-July): staminate aments numerous, 3-6 in. long with stout tomentose stems; androgynous aments $2\frac{1}{2}$-5 in. long. *Fruit* nut $\frac{3}{4}$-1 in. long, much compressed and 2-3 together in each involucre which is globose, about 2 in. in diameter, densely covered with prickles.[1]

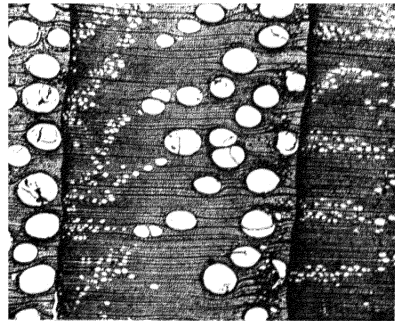
1. Syn. *Castanea vesca* var. *Americana* Michx.

2. A. W., II, 40.

3. For genus see p. 430.







CHINQUAPIN.

Castenea pumila (L.) Mill.

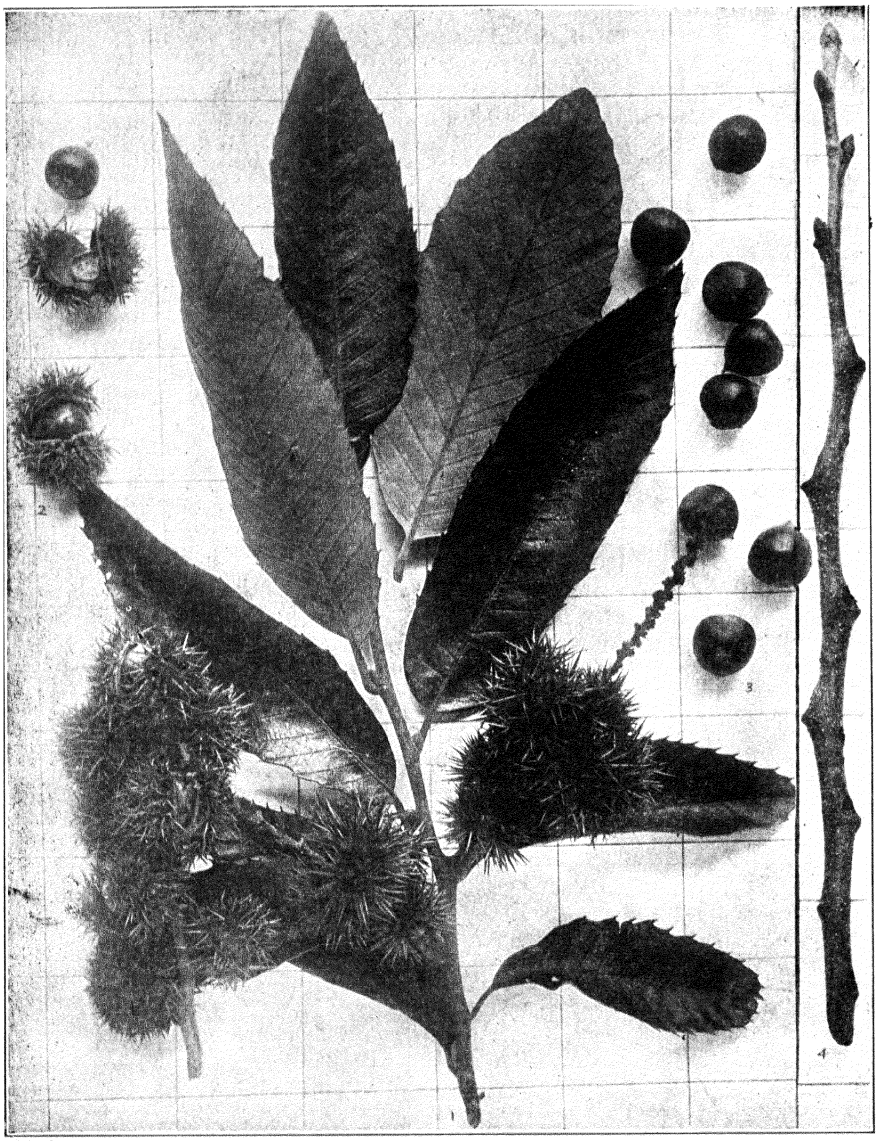


Fig. 156. Fruiting branchlet, 1; involucres opening and liberating each its solitary nut, 2; liberated nuts, 3; branchlet in winter showing leaf-buds and prominent scars, where fruit clusters were borne the season before, 4.

157. Trunks of trees near Suffolk, Va.

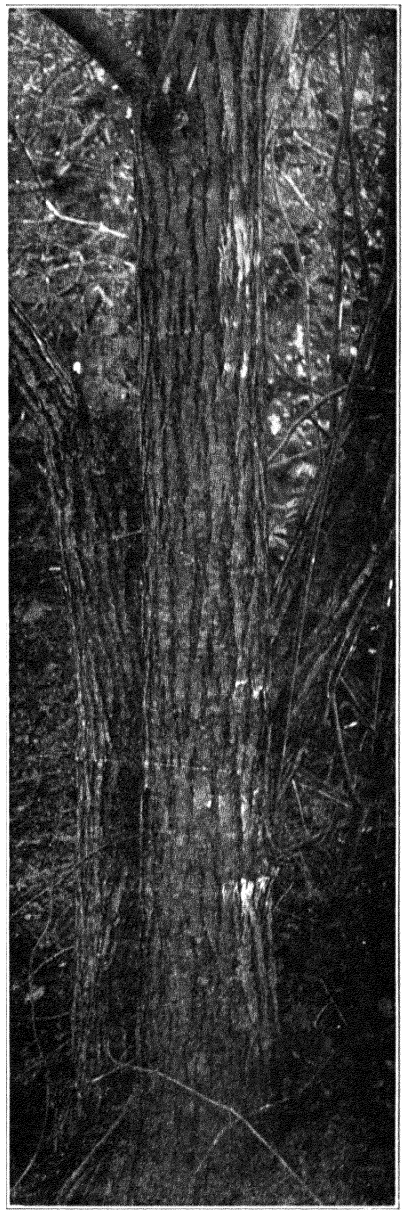
The Chinquapin is a small tree and is often found fruiting in abundance as a shrub. Under favorable conditions it attains the height of 40 or 50 ft. and a trunk diameter of 2 or 3 ft., but these dimensions are rare. When isolated it develops a low broad rounded top, similar to that of the Chestnut, but much smaller. It inhabits dry hillsides and uplands as well as rich bottom-lands and, like the Chestnut, is of greatest beauty when in early summer, after the close of the flowering season of nearly all other trees, it puts out its numerous fragrant yellow catkins. In September its well-guarded fruit, which it produces in abundance, is ripe and liberated, and this, though a small nut, is delicious in flavor and is occasionally gathered for market.

The wood is similar to that of the Chestnut with very thin sap-wood, a cubic foot, when absolutely dry, weighing 36.69 lbs., and is used for fence posts, railway ties, etc.[1]

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

1. A. W., XI, 272.





RED OAK.

Quercus rubra L.

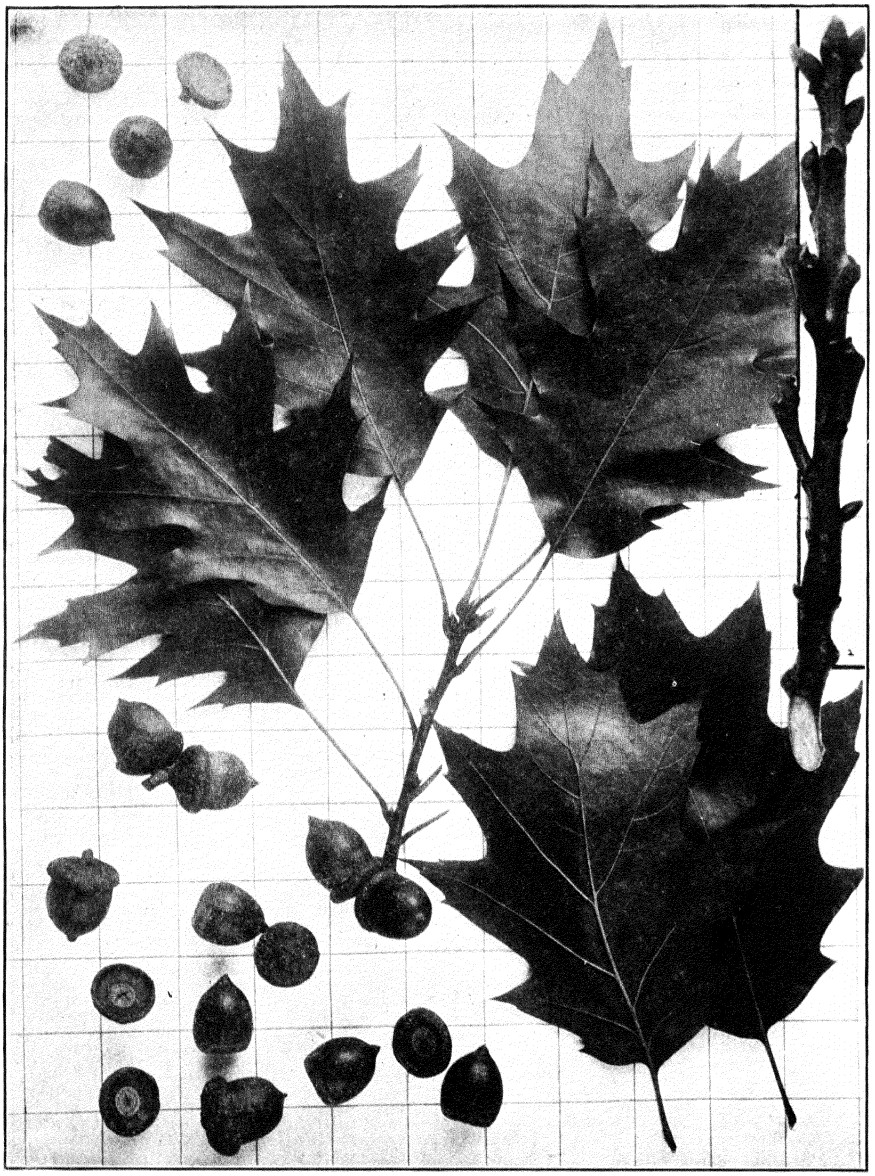
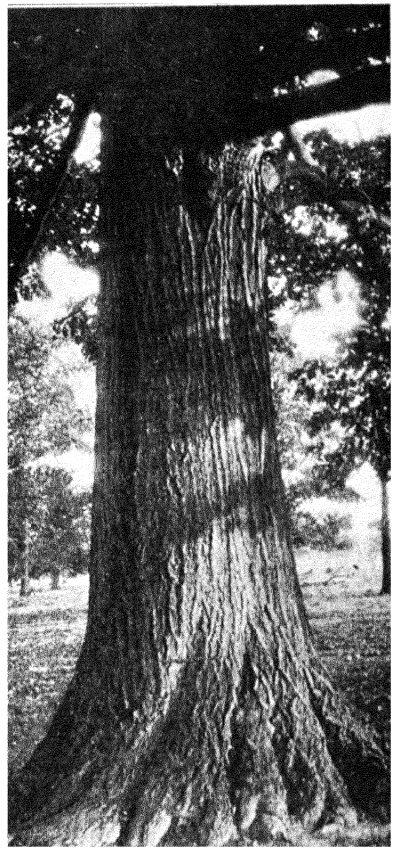


Fig. 158. Branchlet bearing mature acorns and leaves and young acorns, 1; branchlet in winter, 2 (Note the presence of young acorns resulting from flowers of the previous summer and to mature the following season).

159. Large trunk of tree in Genesee valley, N. Y.

160. Wood structure magnified 15 diameters.



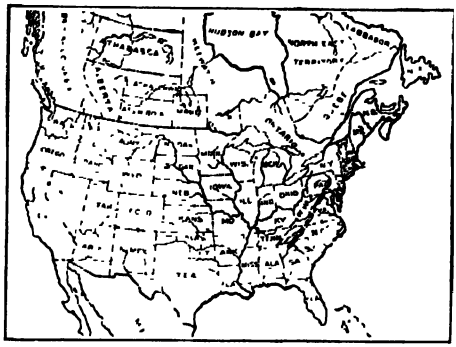
One of the commonest and largest of the Oaks of the Atlantic states, the Red Oak, in the forest sometimes surpasses 100 ft. in height with columnar trunk 3 or 4 ft. or more in diameter. When isolated from other trees it develops a wide rounded top with few large far-reaching branches. It inhabits rich uplands, well drained slopes and river banks, in company with the White and Red Pines, Aspen, Balsam Poplar, Red Maple, etc., among which its shining dark green foliage shows in pleasing contrast. Seeming possessed of a constitution hardier or more adaptable than other Oaks it ranges farther north than any other species and is more abundantly grown in Europe than any other American Oak.

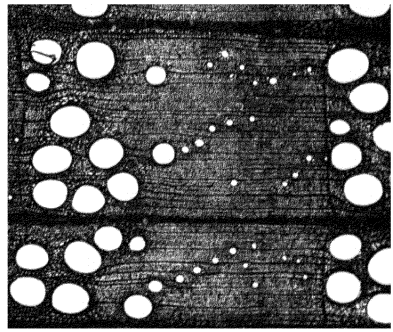
The wood of this species, though inferior to that of the White Oak, is largely used for interior finishing, furniture, etc. A cu. ft. when absolutely dry weighs 40.76 lbs.[1]

Leaves oval to obovate, 5-9 in. long, obtuse or rounded at base, acute or acuminate at apex, pinnately divided about half way to midrib with oblique sinuses rounded at the bottom and triangular lobes broad at base and 1-3 toothed at apex with bristle-pointed teeth, at maturity glabrous dark green above, paler and usually glabrous beneath. *Flowers* (May-June): staminate in pubescent aments, 3-5 in. long, calyx 4-5 lobed; stamens 4-6; pistillate flowers with glabrous peduncles; styles elongated and spreading. *Fruit*, ripe in October, of the second year after flowering solitary or in pairs, with short stalk; acorn oval with broad flat base, ¾-1¼ in. long, shell tomentose inside, abortive ovules apical, acorn subtended by a very shallow saucer of closely imbricated puberulous scales.[2]

1 A. W., I, 15.

2 For genus see pp. 430-431.





SOUTHERN RED OAK. SCHNECK'S OAK.

Quercus Texana Buckl.[1]

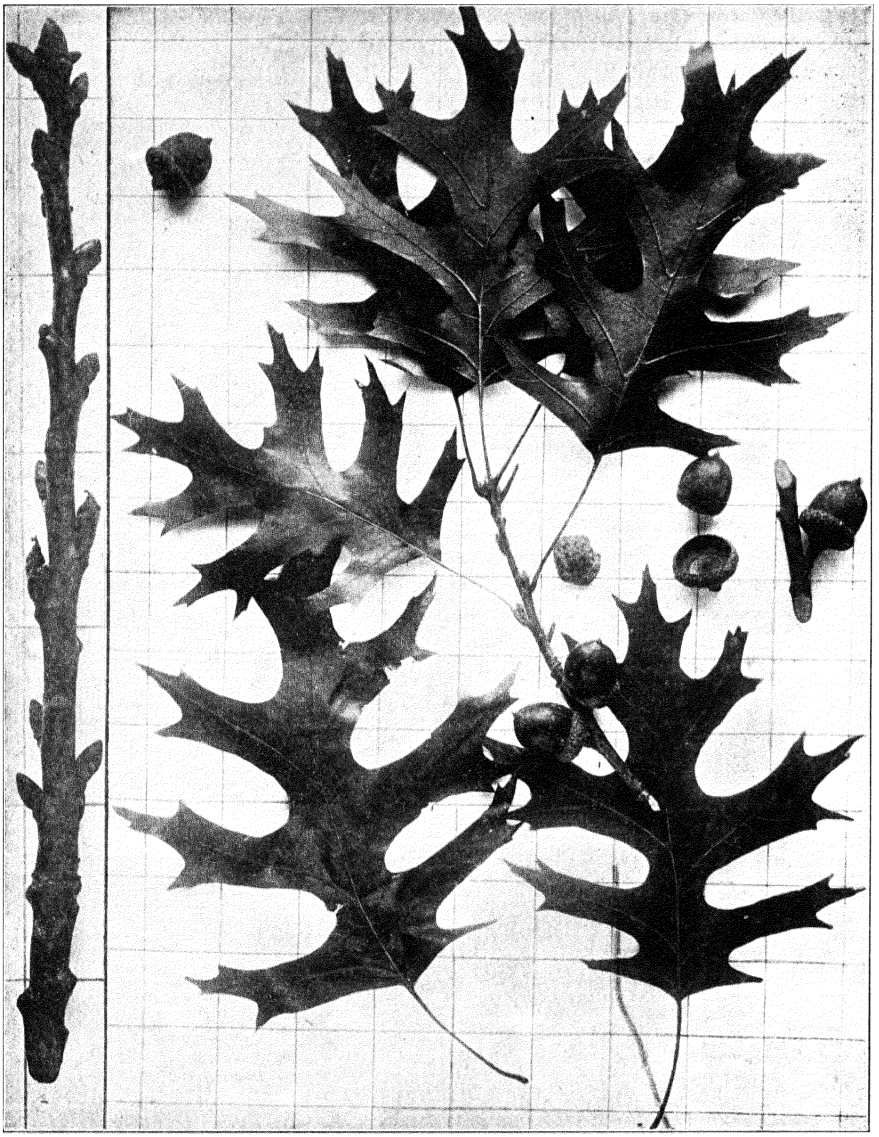


Fig. 161. Branchlet with leaves and fruit and young acorns, 1; branchlet in winter bearing young acorns and leaf-buds.

162. Trunk of tree in Meramec River valley Mo.

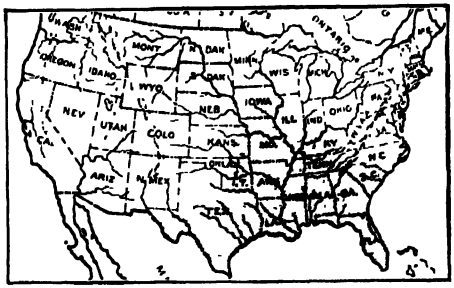
This tree in the rich bottom-lands of the Wabash River basin is said to attain a height of nearly 200 ft., with sturdy buttressed trunk sometimes 7–8 ft. in diameter and 80–90 ft. to its branches — dimensions which would make this one of the largest of the American Oaks — but such a size is very exceptional, as it is usually a much smaller tree. It is common along the banks of streams and bottom-lands of the Mississippi basin in company with the Cottonwood, River Birch, Sour Gum, Sweet Gum, Hackberry, Coffee-tree, Red and Silver Maples, etc. In the extreme western part of its range it is sometimes found fruiting as a large shrub.

Its wood is considered by lumbermen as of better grade than that of the Northern Red Oak. It is applied to the same uses as that timber and is generally not distinguished from it in commerce.[2]

Leaves ovate to broad oval, 3½-8 in. long, truncate or broad wedge shaped at base, deeply pinnatifid with broad rounded sinuses and 5-9 spreading lobes narrow below and spreading and dentate at apex with bristle-pointed teeth, at maturity thin, firm and shining dark green above paler and with tufts of whitish hairs in axils beneath. *Flowers* staminate in slender pubescent aments; calyx 4-5 with laciniately cut lobes; pistillate with short tomentose peduncles, stigmas red. *Fruit* usually solitary, sessile or with short stalks, ovoid, puberulous light brown acorn, ½-1¼ in. long, sometimes striated, 2-3 times as high as the shallow or somewhat turbinate cup with thin closely appressed light brown tomentose scales.

1. Syn. *Quercus Schneckii* Britt.

2. A. W. XII, 294.





PIN OAK. SWAMP OAK.

Quercus palustris Muench.

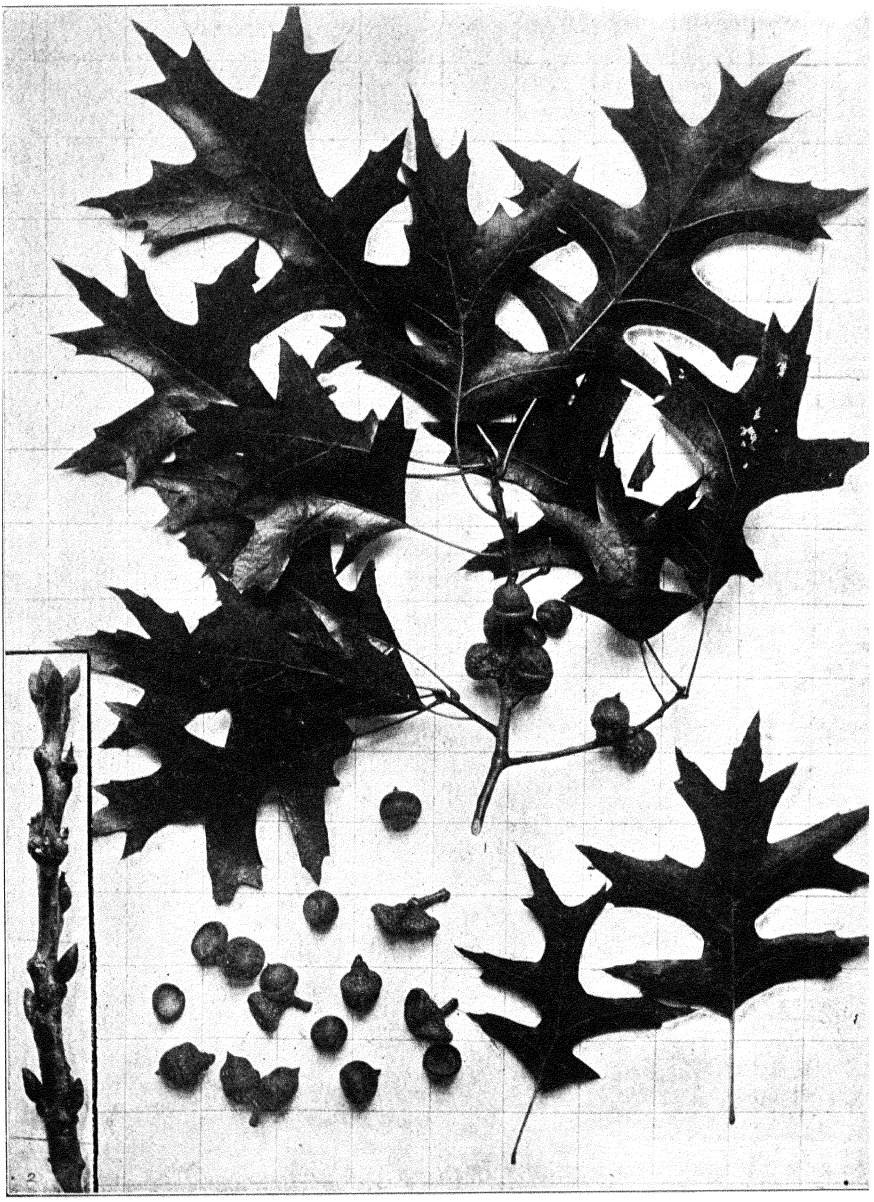
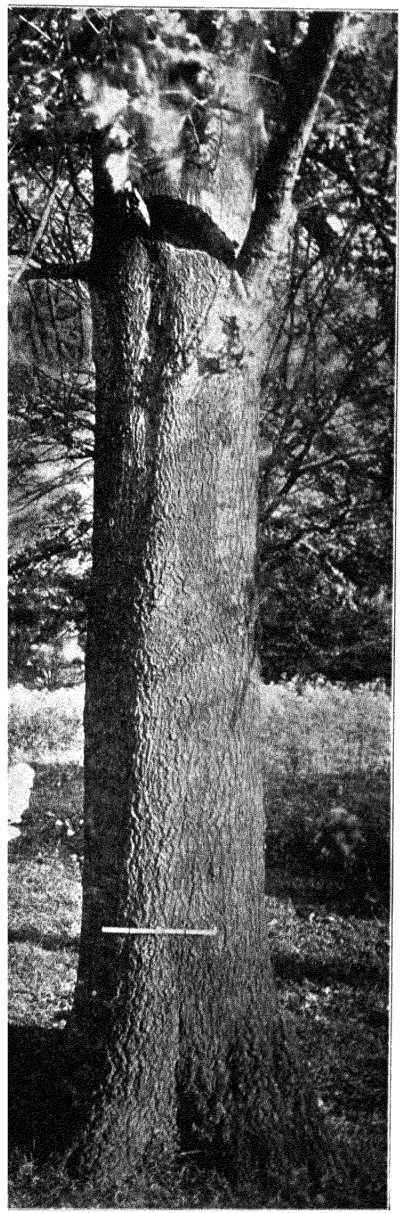


Fig. 163. Branchlets with mature leaves and fruit, 1; branchlet in winter bearing young acorns and leaf-buds, 2.

164. Trunk of tree near St. Louis, Mo.

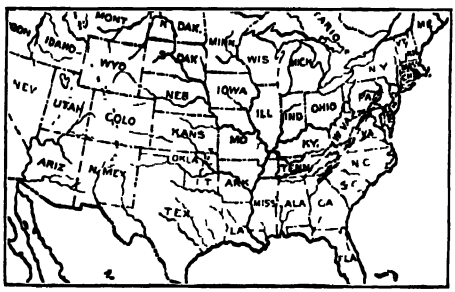
The Pin Oak occasionally attains the height of 70 or 80 ft. with trunk 2 or 3 ft. in diameter vested in a close smoothish bark. When growing in the open it develops an oblong or narrow rounded top of many upright and spreading branches, the lowermost reaching downwards nearly to the ground. It is one of our most distinct and beautiful Oaks, with its clear-cut, handsome leaves and smooth columnar trunks, and well worthy of more extensive planting for ornamental purposes. It naturally grows in deep rich soil of bottom-lands and the borders of ponds and swamps in company with the Sour Gum, Sweet Gum, Red Maple, Swamp Poplar, Water Beech, Hornbeam, etc., but thrives well when transplanted to dryer situations.

The wood of the Pin Oak is used for interior finishing, shingles, clap-boards, etc., and in cooperage. A cu. ft. when absolutely dry weighs 43.24 lbs.[1]



Leaves obovate and broad oblong in outline, 4-6 in. long, pinnatifid with broad rounded sinuses and 5-7 spreading lobes wide near apex and usually each 2-3-toothed and bristle-tipped, at maturity lustrous dark green above, paler and with tufts of pale hairs in axils beneath; petioles slender. *Flowers:* staminate aments slender, pubescent, 2-3 in. long; calyx lobes denticulate; pistillate with tomentose peduncles and slender spreading bright red stigmas. *Fruit:* acorns maturing second year, subglobose or nearly hemispherical, about ½ in. in diameter, with light brown shell, tomentose inside and with thin saucer-shaped or slightly turbinate cup with thin closely appressed puberulous scales.

1. A. W., IV, 94.



HILL'S OAK. NORTHERN PIN OAK.

Quercus ellipsoidalis E. J. Hill.



Fig. 165. Fruiting branchlet with both mature and young acorns, 1; leaves from vigorous shoots, 2; branchlet in late autumn from which leaves have been removed, 3. These specimens were taken from the type tree near Glenwood, Chicago, Ill.

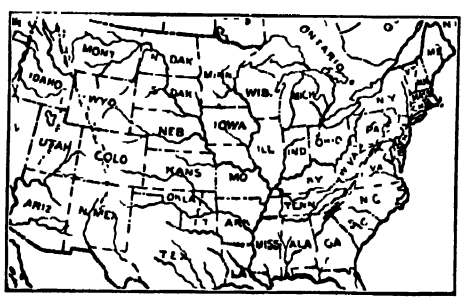
166. Trunk of tree with spray of foliage at base. Near Chicago, Ill.

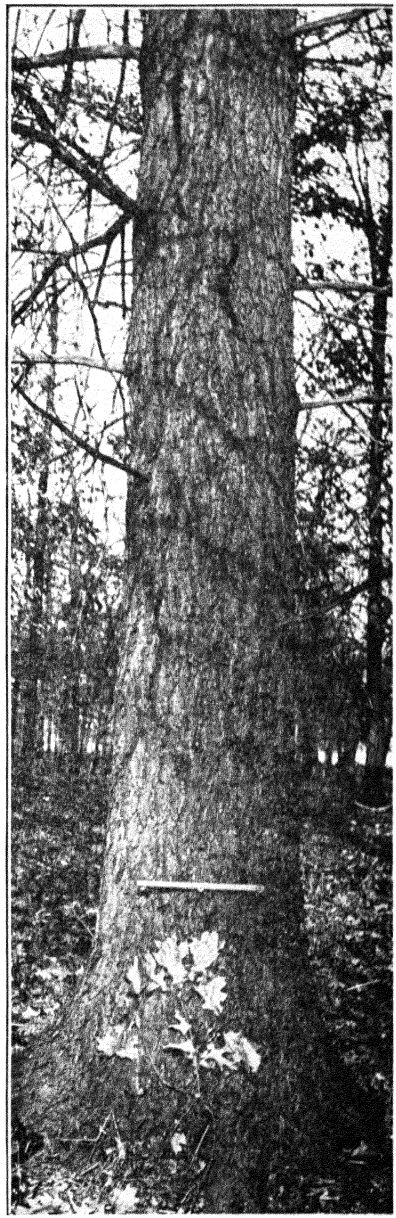
For the bark picture and specimens of leaves and fruit the author is indebted to Rev. E. J. Hill.

This interesting and distinct Oak has only recently been made known to science, through the keen observation of its discoverer whose name it bears. It is an Oak of medium size attaining the height of 60 or 70 ft., with short trunk 2 or 3 ft. in thickness vested in smoothish or closely ribbed bark similar to that of the Pin Oak. Similar to the Pin Oak, too, is its habit of developing an oblong top of many upright and horizontal upper branches and drooping lower branches, sending out many small branches near the ground. As these lowermost die in consequence of too much shade from those above, they break off and their bases persist for some time as stubs or pins about the trunk and, as Mr. Hill suggests, it is doubtless due to these that this and the southern *Q. palustris* are commonly called the Pin Oaks.

Unlike the southern species, which inhabits mainly moist low-lands, this tree is rather an inhabitant of well-drained uplands, though sometimes found on the borders of ponds and in low woods. As its habitat is north of that of the other tree, the two ranges overlapping in the latitude of northern Indiana and Illinois, and this is already known as the Pin Oak, I suggest the name Northern Pin Oak as appropriate to distinguish it from the more southern tree.

Leaves oval to obovate-orbicular in outline, 3-7 in. long, wide-cuneate or truncate at base, deeply pinnately lobed with mostly 5-7 narrow repand-dentate bristle-tipped lobes and wide rounded sinuses, lustrous green above, paler and glabrous or nearly so beneath; petioles slender, glabrous, 1-2 in. long. *Flowers* with spreading recurved styles. *Fruit* maturing the second year, solitary or in pairs, short-peduncled or sessile with mostly elliptical chestnut-brown acorns ½-¾ in. long and half invested by the thick turbinate cup of thin small puberulous closely appressed scales.





SCARLET OAK.

Quercus coccinea Muench.

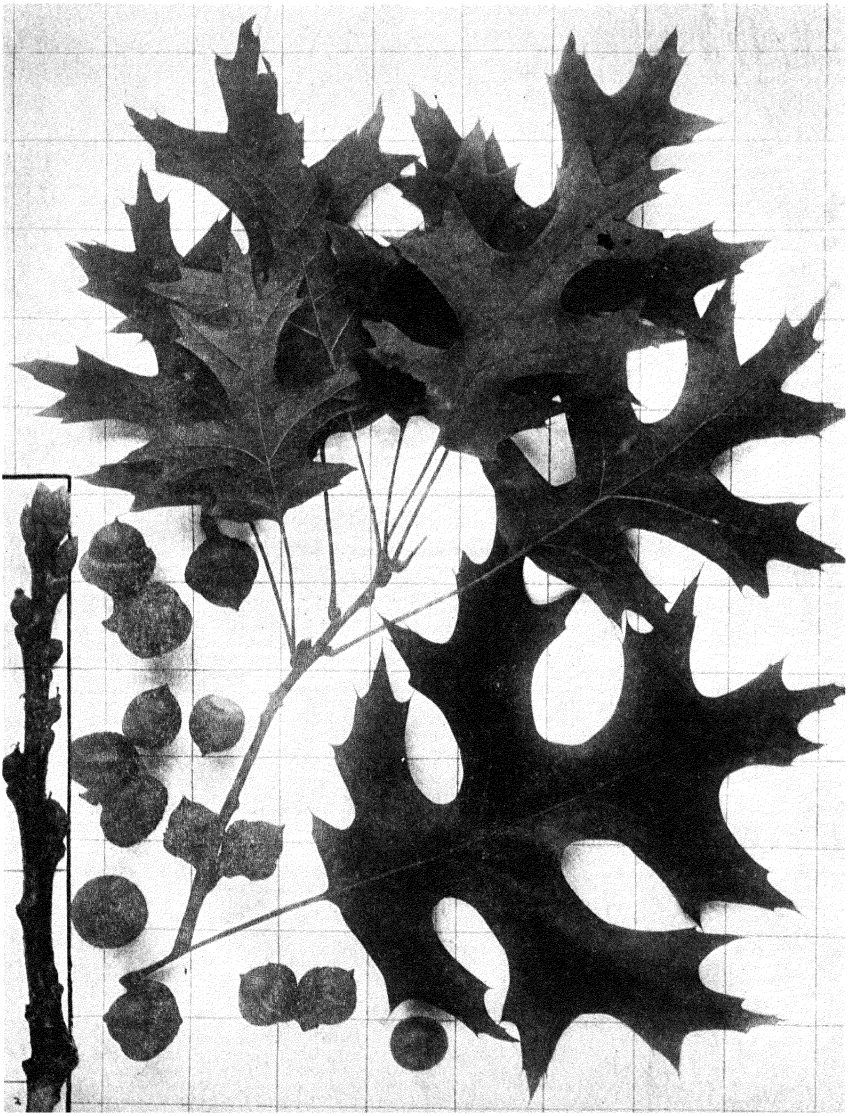


Fig. 167. A leaf from vigorous shoot and fruiting branchlet, with mature and young acorns, 1; branchlet in late winter bearing young acorns and leaf-buds, 2.

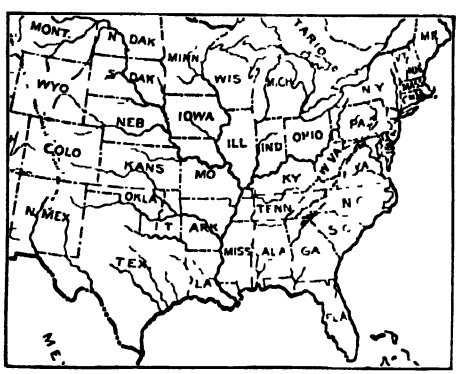
168. Trunk of tree at Biltmore, N. C.

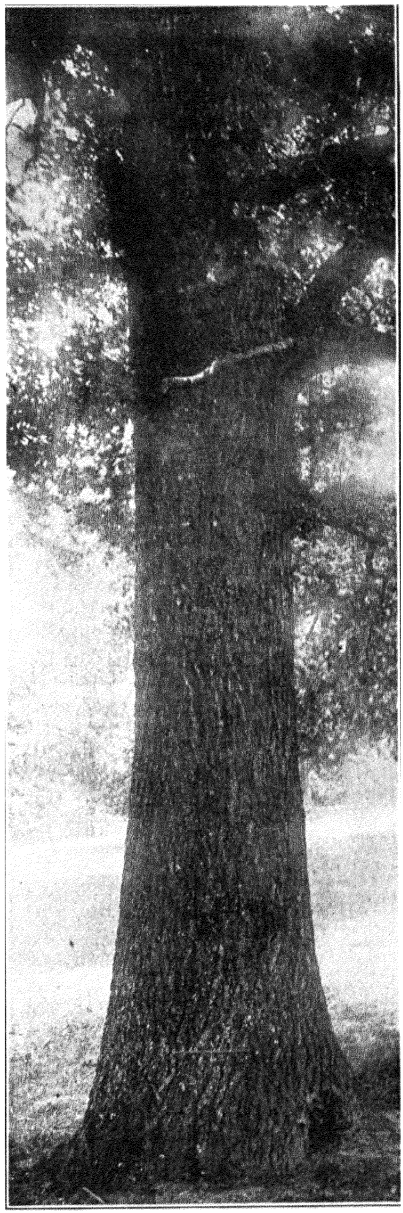
The Scarlet Oak attains the height of 70 or 80 ft. with trunk diameter of 2 or 3 ft., covered with a dark brown shallow-ridged bark, reddish internally. Its habit of growth when isolated from other trees is to form a rounded or oblong head often quite irregular and always beautiful in summer on account of its handsome deeply-lobed leaves. But it is not until it takes on its brilliant autumnal colors that its beauty and individuality are especially pronounced. Then the appropriateness of its name is at once evident, as it assumes a brilliant scarlet color, and other tints of red, and retains them until late in the autumn after the leaves of many of its associates have withered and fallen. It is an abundant tree over a large portion of its range, particularly in the coast region, growing in sandy soil and on gravelly slopes and uplands in company with the Red, Black and other Oaks, the Pig-nut and Shag-bark Hickories, the Sweet Birch, Red Cedar, etc.

Its wood is not distinguished from that of the Red Oak in commerce or in uses. A cu. ft. when absolutely dry weighs 46.15 lbs.[1]

Leaves broad obovate or oval in outline, truncate or obtuse at base, deeply pinnatifid with wide rounded sinuses and 5-9 spreading lobes repand-dentate, with few spreading bristle-pointed teeth at the ends, reddish and pale pubescent at first, then light green and at maturity glabrous, lustrous above, paler and sometimes hairy tufted in the axils of the veins beneath, petioles long, slender. *Flowers* staminate aments slender, glabrous; calyx 4-5-lobed; styles slender, recurved. *Fruit* sessile or short stalked, solitary or in pairs with usually short ovoid brown and occasionally striated acorns about half enveloped in a deep large turbinate cup with thin closely imbricated pointed scales.

1. A. W., III, 69.





YELLOW OAK. BLACK OAK. QUERCITRON OAK.

Quercus velutina Lam.[1]

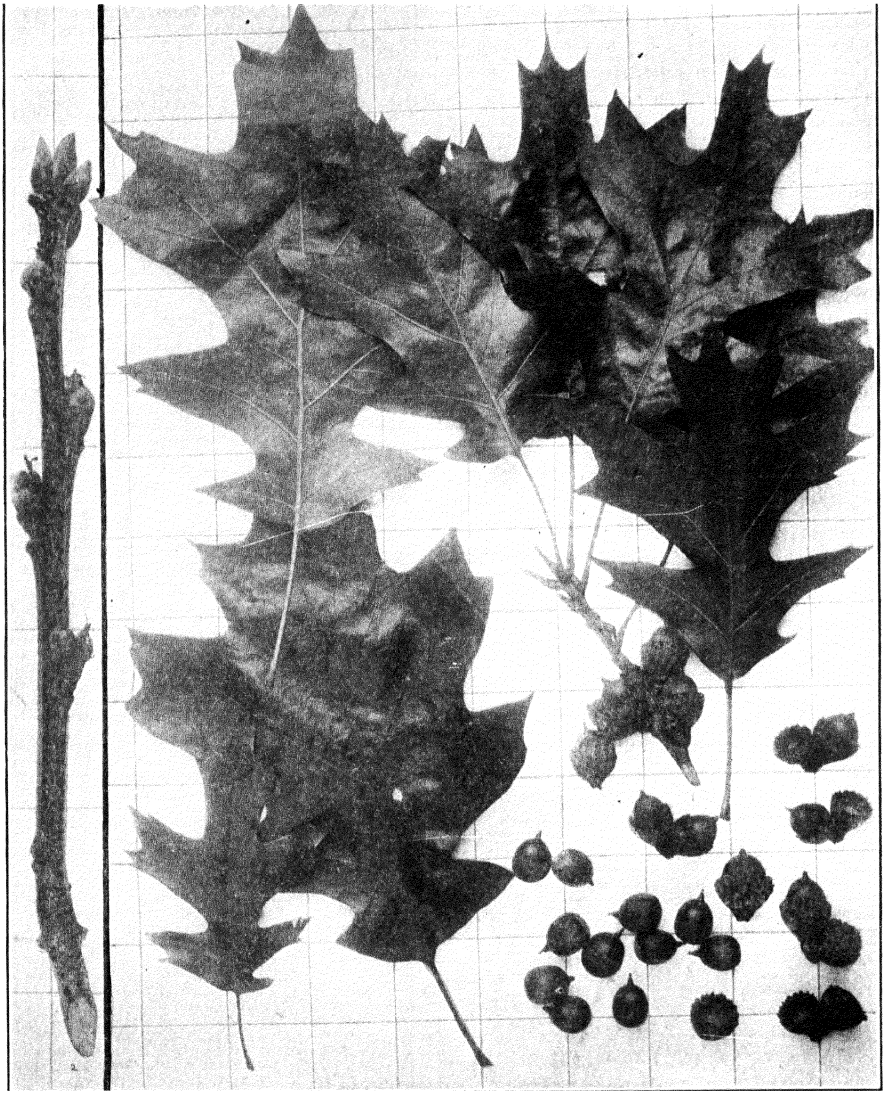


Fig. 169. Fruiting branchlet, with mature and young acorns, 1; branchlet in winter, 2.
170. Trunk of tree with leaves at base. Biltmore, N. C.

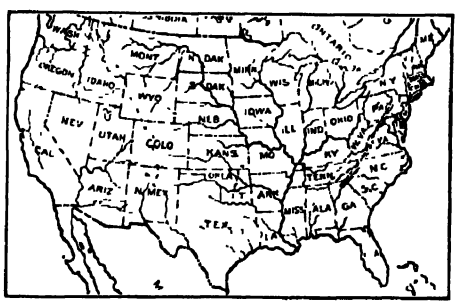
This abundant and widely distributed Oak constitutes a considerable portion of the Oak forests of the Atlantic states, frequently attaining the height of 70 or 80 ft. and has been known to considerably surpass 100 ft. in height, with trunk 3 or 4 ft. in diameter. The bark of trunk is firmly ridged, dark brown or blackish outside and distinctly yellowish within. When growing apart from other trees it develops a rather wide rounded or oblong top of which a noticeable feature is its large lustrous leaves, particularly those of its lower branches. In autumn they assume tints varying from dull red to orange and brown.

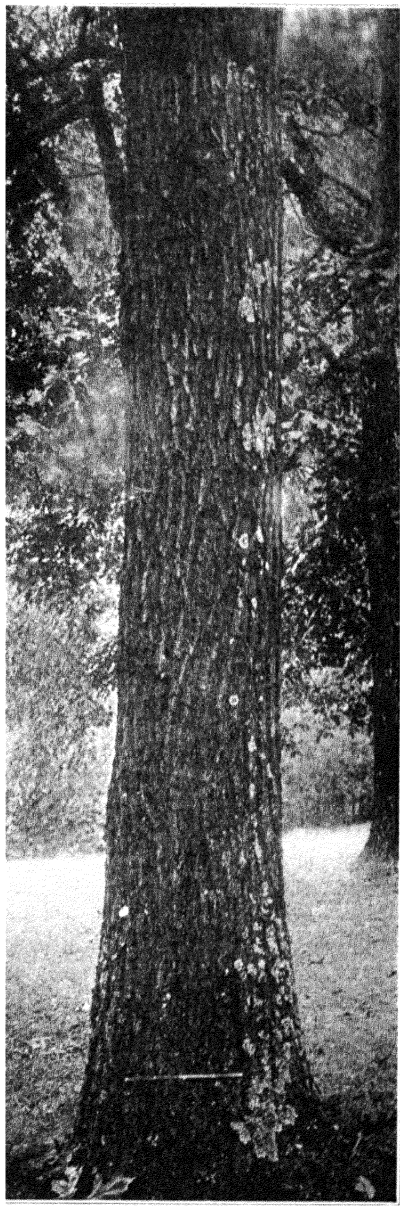
The wood, of which a cubic foot when absolutely dry weighs 43.90 lbs., is not distinguished in commerce and uses from that of the Red Oak.[2] The inner bark yields tannin, a yellow dye, and is sometimes used in medicine.

Leaves obovate to oblong in outline, 3-12 in. long, mostly obtuse but sometimes truncate or rounded at base, pinnately lobed generally to about the middle with round-pointed sinuses and usually 7 more or less oblique lobes sparingly mucronate-dentate at apex, broader at base and the terminal pair the largest, red at first then hoary-pubescent and at maturity lustrous dark green above, paler and pubescent and hairy-tufted in the axils of the veins beneath. Leaves are sometimes found hardly distinguishable from those of the Scarlet Oak. *Flowers:* staminate aments 4-6 in. long with calyx pubescent and acute lobes; pistillate aments with short tomentose peduncles and red stigmas. *Fruit* solitary or in pairs, sessile or short stalked with stout ovoid brown and often striated and sometimes pubescent acorn, ½-⅝ in. long, almost half covered with the deep turbinate cup with thin light brown scarious margined scales, closely imbricated at the base and loosely so or somewhat spreading nearer the edges of the cup.

1. Syn. *Quercus tinctoria* Bartr.

2. A. W., IV, 93.





SPANISH OAK.

Quercus digitata (Marsh.) Sudw.

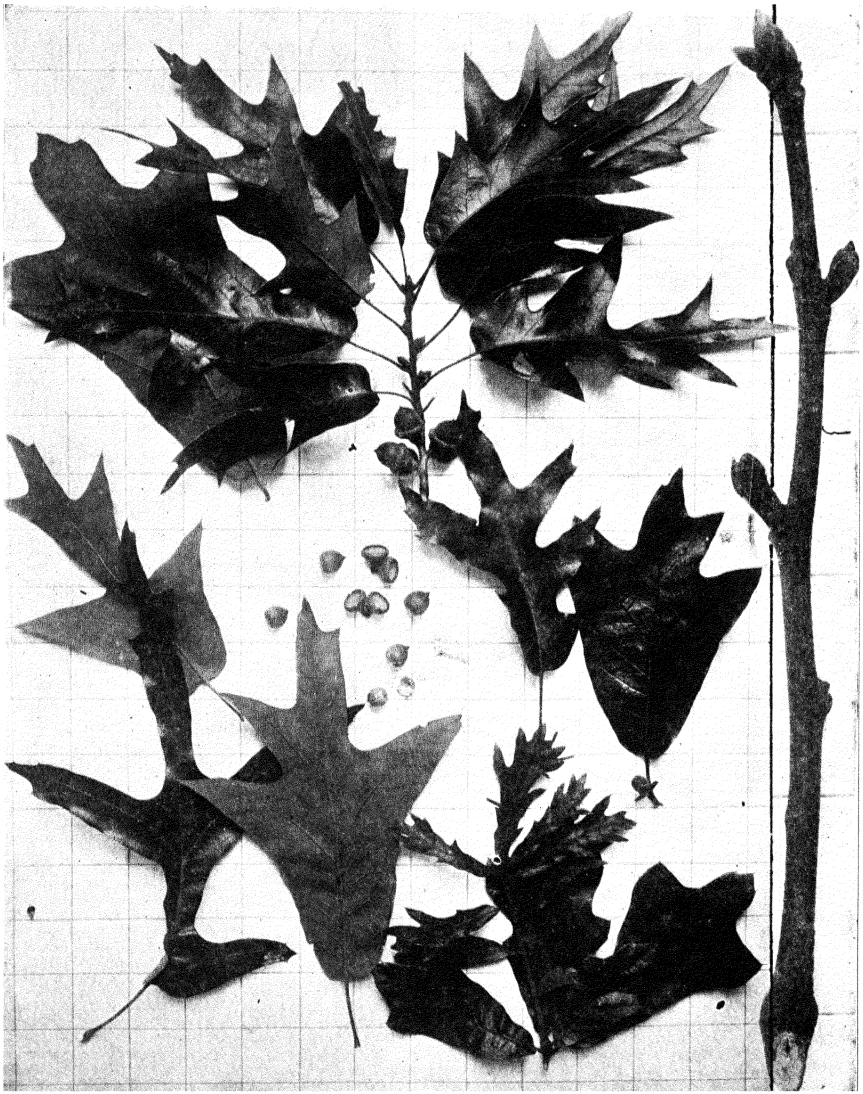


Fig. 171. Branchlet, with mature and young acorns, and an assortment of leaves; leafless branchlet in winter.

172. Trunk of tree near Suffolk, Va.

This interesting Oak is usually not more than 70 or 80 ft. in height or with trunk more than 2 or 3 ft. in diameter, but in the stately forests of the lower Ohio basin it occasionally attains 100 ft. in height with trunk 4 or 5 ft. in thickness. When isolated it develops a wide rounded top of stiff far-reaching branches and stout branchlets. The drooping nature of the leaves give the tree a peculiar aspect which is at once noticeable and quite different from that of other Oaks. It is an abundant tree of the South Atlantic and Gulf states, extending up into the northeastern states only along the coast and in the Mississippi Valley. The name Spanish Oak is said to have been given to this tree by early Spanish settlers on account of a similarity in its leaves to those of an Oak they were familiar with in Spain.

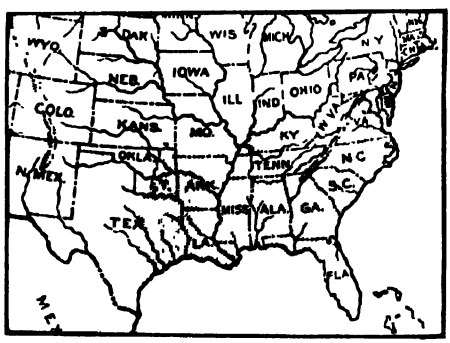
Its wood is heavy, a cu. ft. when absolutely dry weighing 43.18 lbs., hard and strong and is used for the same purposes as the Red Oak Its bark also is rich in tannin.[2]



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

1. Syn. *Quercus falcata* Michx.

2. A. W., XI, 269.



SWAMP SPANISH OAK.

Quercus pagodæfolia (Ell.) Ashe.

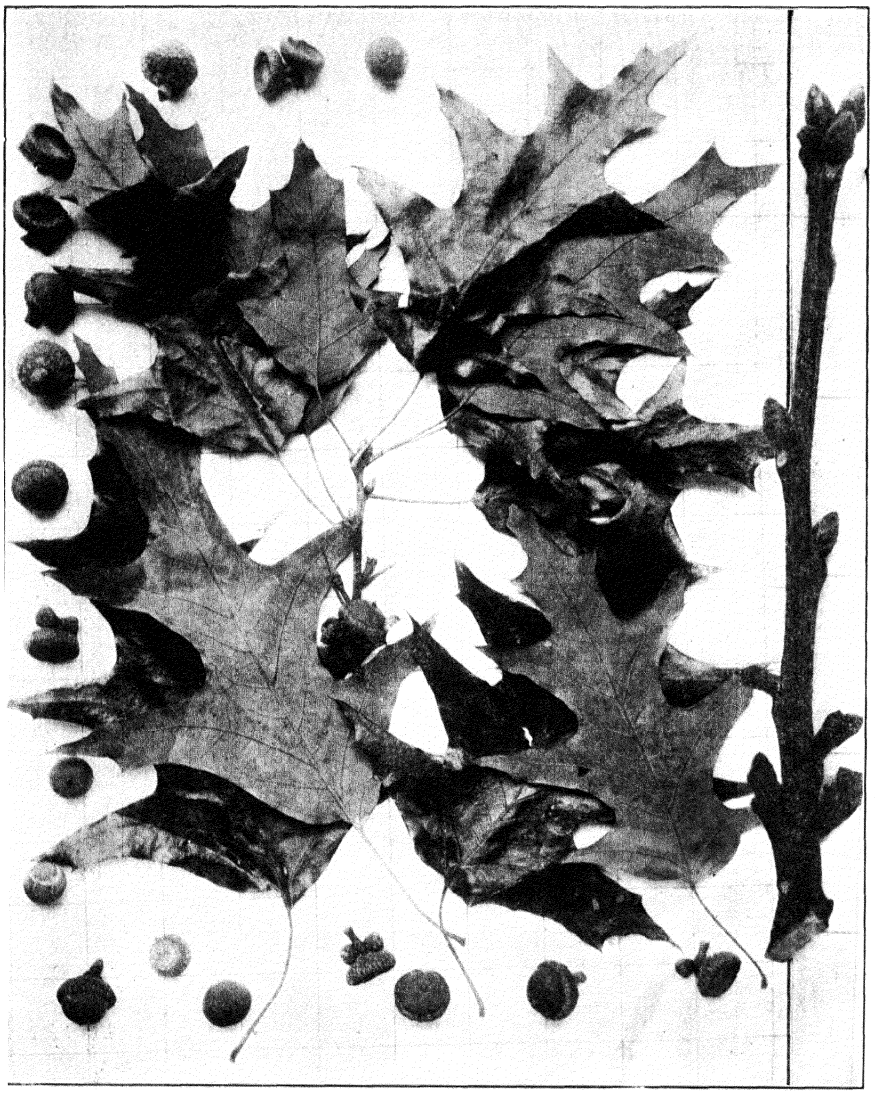


Fig. 173. Fruiting branchlet with both mature and young acorns, leaves from vigorous shoots; leafless branchlet in late autumn.

174. Trunk of tree with a spray of foliage at base. Near Mt. Carmel, Ill.

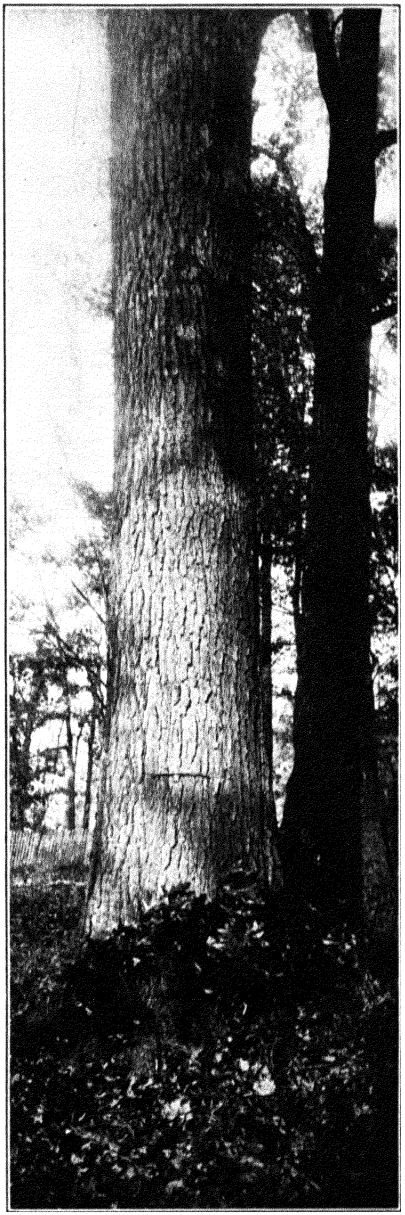
For photograph of trunk and for leaf and fruit specimens the author is indebted to Dr. J. Schenck of Mt. Carmel, Ill.

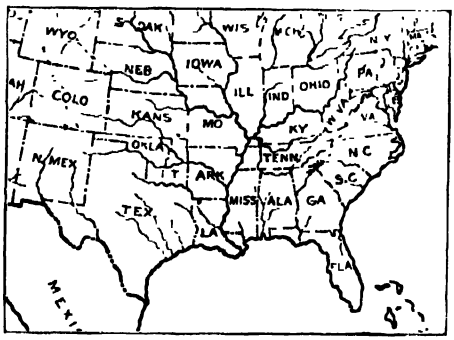
This beautiful and stately Oak attains the height of upwards of 100 ft. in forest growth with straight columnar trunk 4 or 5 ft. in diameter. When isolated from other trees, as occasionally found on river banks where it has room for full development, its massive branches form a wide rounded top, and its ample party colored leaves as they display successively their dark-green and silvery-white surfaces, when agitated by the wind, make it a beautiful object. The bark of trunk is of a dark gray color fissured into rather narrow ridges of firm small scales.

It is distinctly a tree of alluvial bottom lands and the banks of streams subject to inundation, reaching its greatest development in northern Mississippi and eastern Arkansas where it is a very valuable timber tree.

The wood is heavy, hard, and strong and useful for interior finishing, furniture, agricultural implements, etc., nearly equaling in value the wood of the White Oak and is really one of the very best of the Red Oak group.

Leaves oval to oblong in outline, 5-10 in. long, wide cuneate, truncate or rounded at base, with 5-7 wide based and often falcate narrow-pointed mostly entire bristle tipped spreading lobes, at maturity lustrous dark green above, pale tomentose beneath; branchlets tomentose at first. *Fruit* short-stalked with short subglobose puberulous acorn about ⅝ in. in diameter and nearly half invested by the flat or slightly turbinate cup of small puberulous scales.





BLACK JACK OAK.

Quercus Marilandica Muench.[1]



Fig. 175. Fruiting branchlet with mature and young acorns, 1; branchlet in winter, 2.
176. Trunk of tree on Staten Island, N. Y.



The Black Jack Oak is a tree of medium size, occasionally attaining the height of 40 or 50 ft., with a trunk rarely more than 18 in. or 2 ft. in thickness, and these dimensions are attained only by trees which are especially favored by soil and climate. When isolated from other trees it develops a rounded dome-shaped or obovoid top with wide spreading lateral branches and drooping lower branches. It is a singular fact that it is limited in distribution mainly to dry sandy barrens, the conditions there, which most trees cannot tolerate, seeming to be what this tree actually requires for its existence. Rare or local and poorly developed in the northern part of its range it is abundant southward, particularly in the lower Mississippi Valley, where it attains its largest dimensions. Its singular dark green glossy leaves, tufted at the ends of the branchlets, are pleasing and familiar objects within its range even to those who only casually observe trees.

The wood of the Black Jack is hard and heavy, a cubic foot when absolutely dry weighing 45.64 lbs., and is little used except for fuel and charcoal, for which it is excellent.

Leaves obovate, very broad and rounded and entire or more or less 3-lobed and bristle tipped at apex and rounded or cordate at the narrow base. When young stellate-pubescent above and rusty tomentose beneath, and at maturity thick and lustrous dark green above, yellowish and scurfy pubescent beneath; petioles short, stout and pubescent. *Flowers*: staminate in slender hairy aments; calyx with 4-5 broad lobes; anthers apiculate; pistillate flowers with rusty tomentose peduncles. *Fruit* sessile or nearly so with subglobose acorns puberulous near apex and half covered with the turbinate cup of rather thin loosely imbricated pubescent scales.

1. Syn. *Quercus nigra* Wang.



WATER OAK. DUCK OAK. POSSUM OAK.

Quercus nigra L.[1]



Fig. 177. Fruiting branchlet with both mature and young acorns, 1; tip of a vigorous shoot, 2; branchlet in winter, 3.

178. Trunk of tree in southwestern Arkansas.

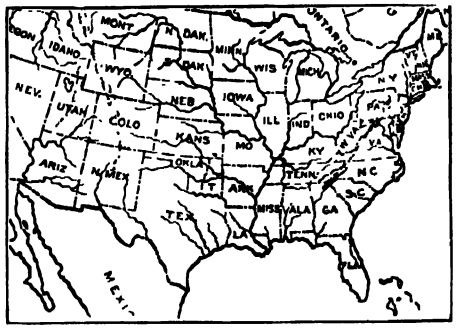
The Water Oak, as its name implies, grows naturally only on the moist bottom-lands or on ridges in the vicinity of same, and attains the height of 70 or 80 ft., with columnar trunk 2-3½ ft. in diameter. When not crowded by other trees it develops a rather narrow oblong or sometimes wide rounded top with many branches. A near enough view to reveal the many forms and sizes of its leaves surprises one accustomed only to the northern oaks, which have leaves of generally more constant forms. Being a handsome tree, of rapid growth and easily transplanted, it is used extensively as a shade tree in the streets and parks of the cities and villages of the southern states.

The wood of the Water Oak is hard and heavy, a cubic foot when absolutely dry weighing 45.14 lbs., and heretofore has been little used except for fuel and charcoal.[2]

Leaves variable but mostly narrow obovate, tapering gradually from the broad rounded and entire or more or less 3-lobed apex to a cuneate base; or on vigorous or sterile branchlets the leaves are pinnately lobed about half way to the midrib with 3-7 short triangular oblique bristle-tipped lobes; linear-lanceolate leaves with intermediate forms also occur, pubescent at first but at maturity glabrous and dark green above, paler and glabrous or with hairs in the axils of veins beneath, tardily deciduous during the winter. *Flowers:* staminate aments hairy, 2-3 in. long; calyx thin, pubescent, with 4-5 rounded lobes; pistillate with short thick tomentose peduncles; stigmas red, recurved. *Fruit* short stalked with short globose-ovoid or hemispheric acorn, about ½ in. long, rounded and pubescent at the pointed apex and scarcely half enveloped by the flat saucer-shaped cup having thin small closely imbricated pale-pubescent scales.

1. Syn. *Q. aquatica* Walt.

2. A. W., V. 118.





WILLOW OAK.

Quercus Phellos L.



Fig. 179. Branchlet bearing leaves and mature and young acorns, 1; detached acorns and cups, 2; branchlet in winter, 3.

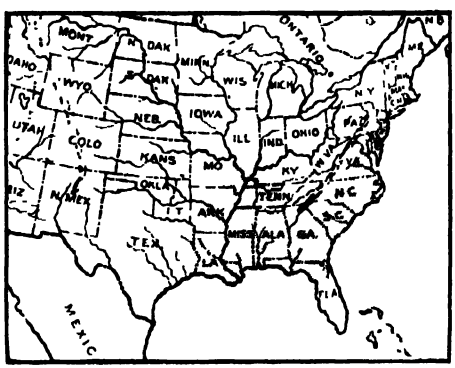
180. Trunk of tree on grounds of Smithsonian Institution, Washington, D. C.

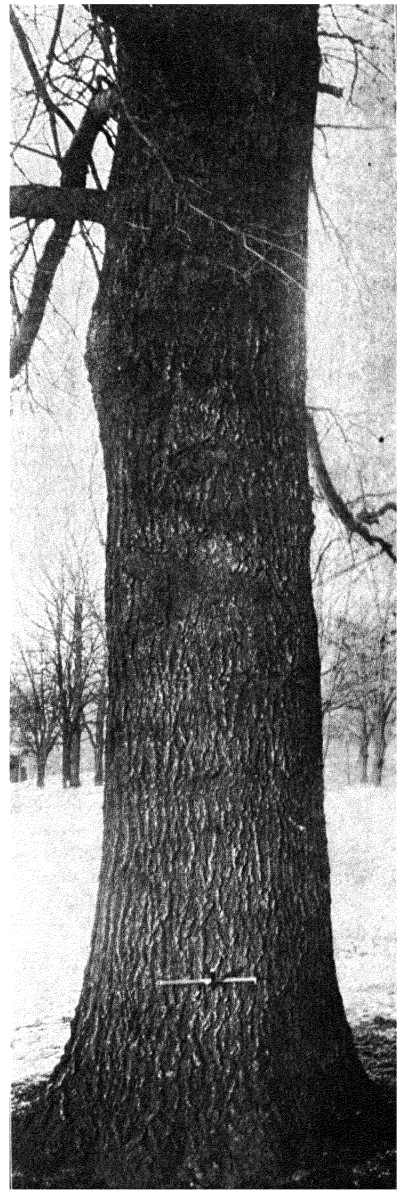
This curious Oak in forests occasionally attains the height of 70 or 80 ft., and when isolated from other trees develops an ovoid or rounded quite symmetrical top with many slender branches. The trunks are sometimes 3 or 4 ft. in thickness, columnar and vested in a smoothish bark, somewhat roughened on old trunks by shallow longitudinal ridges. It inhabits the margins of swamps and streams and sandy uplands most abundantly in the southern states (though not in the immediate vicinity of the coast) and in the lower Mississippi basin. It is a handsome tree and especially curious to those whose familiarity with the oaks is limited to the broad-leaved species of the northern states. This tree to them seems to have the leaves of a willow and the acorns of an oak — a feature which gives it its common name

Its wood is used to some extent for lumber and shingles, but mainly for fuel and charcoal. A cu. ft. when absolutely dry weighs 46.57 lbs.[1]

Leaves oblong-lanceolate 2½-5 in. long, acute at both ends with very short petiole and usually bristle-tipped, entire or with slightly undulate and revolute margins; revolute in the bud and light green and pubescent when they unfold but finally lustrous light green, paler and usually glabrous with pubescent midribs beneath *Flowers:* staminate calyx yellow, pubescent, 4-5 lobed; pistillate with short glabrous peduncles and slender recurved stigmas *Fruit* sessile or with short stalks, usually solitary, with subglobose or hemispherical pale-pubescent nut and thin flat saucer-shaped cup enveloping only its base and covered with small thin closely imbricated scales.

1. A. W., XI, 271.





LAUREL OAK.

Quercus laurifolia Michx.

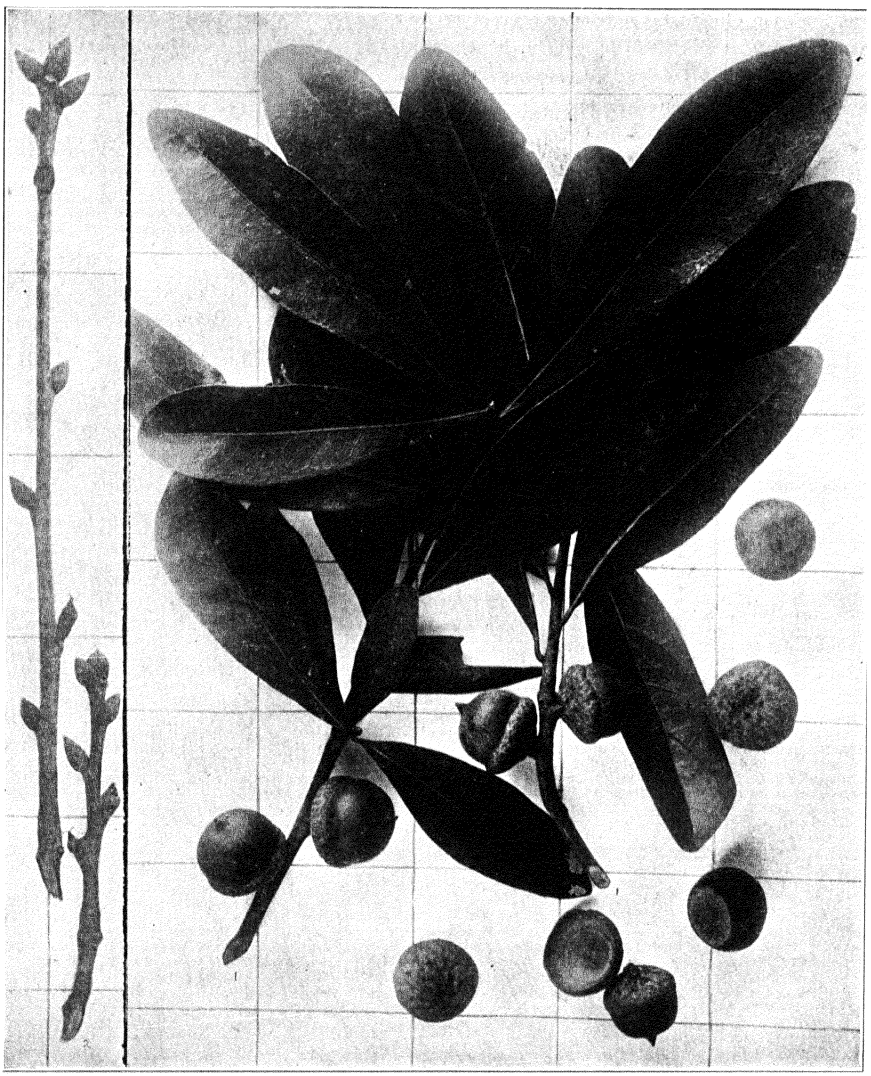


Fig. 181. Fruiting branchlet bearing leaves and fruit, 1; branchlet in winter bearing young acorns, 2.

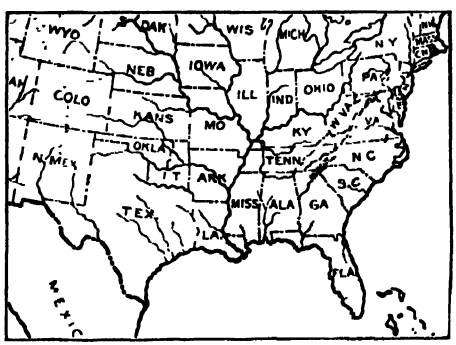
182. Trunk of tree on the border of Dismal Swamp, Va.

This interesting and stately oak, when growing among other trees in favorable localities, attains a height of 100 ft. with straight columnar trunk 3 4 ft. in diameter, clothed in quite smooth bark, but fissured on old trunks into flat firm ridges. It is distinctly a tree of the low-lands of the Gulf and Atlantic coast regions reaching its northernmost point of distribution in the Dismal Swamp of eastern Virginia. There it is common along the border of the great swamp in company with the Over-cup Oak, Red, Loblolly and Sweet Bays, Carolina Ash, Sourwood, Water, Tupelo and Sweet Gums, White Cedar, etc.

It is a beautiful tree with its laurel-like leaves and sturdy trunks and is deservedly popular as a shade tree in the southern states, where it is commonly planted and is usually called the *Water Oak*. The wood heretofore has been used mainly for fuel and charcoal, though suitable for lumber for interior finishing, etc. A cubic foot when absolutely dry weighs 47.82 lbs.[1]

Leaves narrow-oblong to oblong-obovate, sometimes falcate, 2-4 in. long, cuneate at base, rounded or acute at apex, entire or on vigorous branches unequally lobed, at maturity lustrous dark green above, paler beneath; petioles short and stout. *Flowers:* staminate in reddish hairy aments 2-3 in. long; pistillate with short stout glabrous peduncles. *Fruit* sessile or nearly so, usually solitary with short ovoid to hemispherical nut, puberulous at apex about one fourth inclosed in a thin flat saucer shaped cup with thin pale-pubescent closely imbricated scales.

1. A. W., XII, 295.





SHINGLE OAK.

Quercus imbricaria Michx.

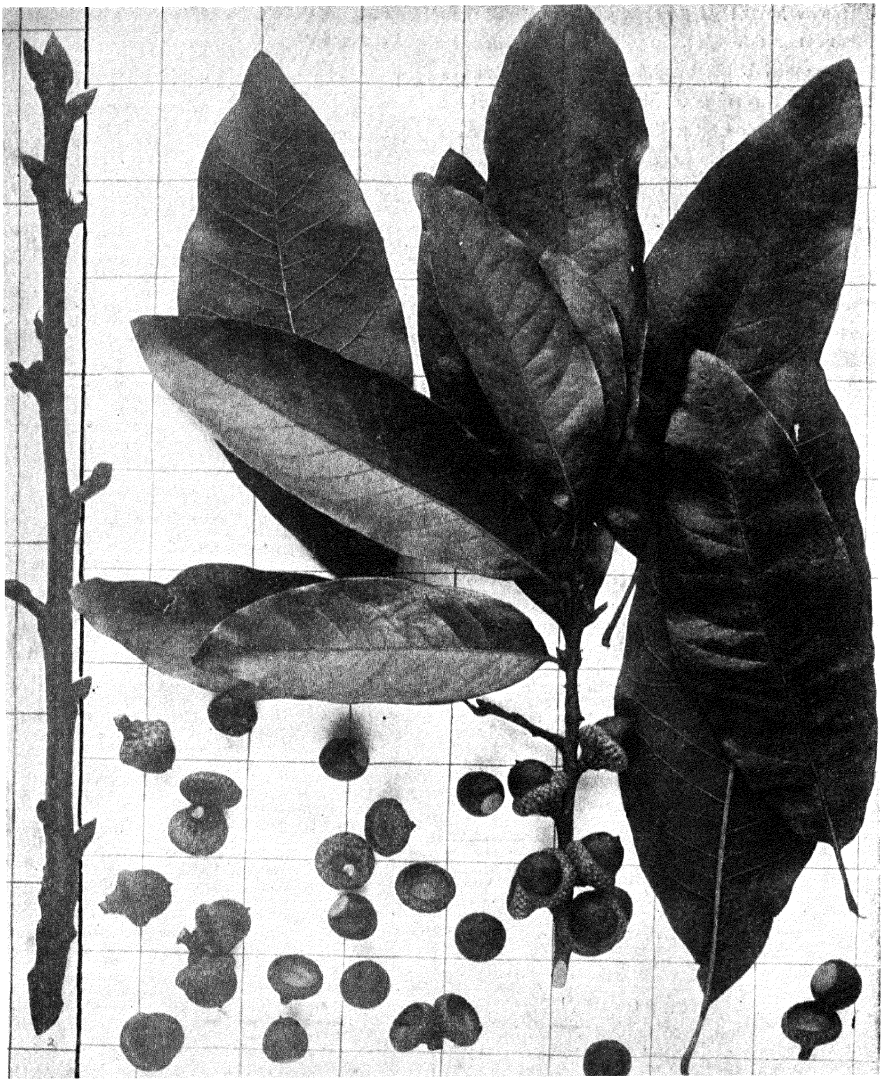


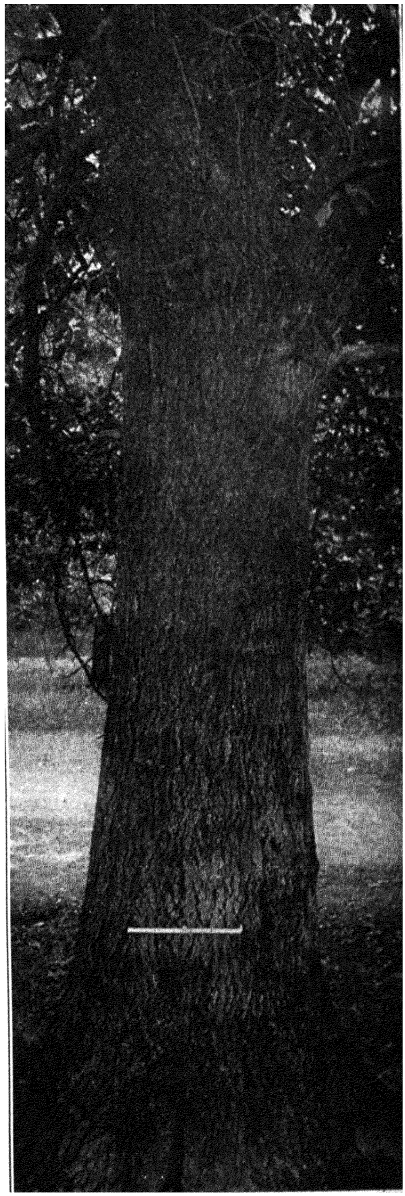
Fig. 183. Fruiting branchlet with both mature and young acorns, 1; branchlet in winter, 2.
184. Trunk of tree near mouth of River des Peres, St. Louis, Mo.

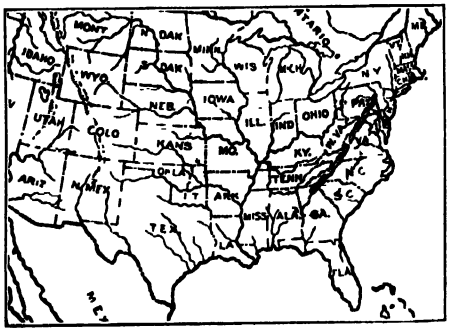
The Shingle Oak in the forest under most favorable conditions of growth sometimes attains a height of 100 ft., with straight columnar trunk 3 or 4 ft. in diameter, but is usually not more than 50 or 60 ft. in height. When isolated it develops an oblong or rounded top of numerous branches, and is conspicuous on account of its large entire leaves, which are very different from those of all other American Oaks. It is a distinctly handsome Oak inhabiting both rich uplands and fertile bottom lands, and is one of the most abundant Oaks of the lower Ohio basin and the state of Missouri.

Its wood is heavy, a cu. ft. when absolutely dry weighing 46.92 lbs., hard and strong, and is used in interior finishing, furniture and to a considerable extent for clapboards and shingles — a use from which it takes its name.[1]

Leaves oblong or oblong-lanceolate, 4-6 in. long, sometimes bristle-tipped, particularly when young, acute or obtuse at apex and wedge-shaped or rounded at base, with entire or slightly undulate margins, coriaceous, reddish or yellowish green and tomentose at first, at maturity very lustrous dark green above, paler and pubescent beneath with yellowish midribs and prominent veins; petioles short, pubescent. *Flowers* staminate aments slender and numerous, hoary-tomentose, 2-3 in. long with yellowish pubescent 4-lobed calyx; pistil with short tomentose peduncles; stigmas recurved. *Fruit* solitary or 2 or 3 together with short peduncles and subglobose dark brown or striated nut about ½ in. long and one-third inclosed in a flattish turbinate cup of small closely imbricated pubescent scales.

1. A. W., XI, 270.





WHITE OAK.

Quercus alba L.

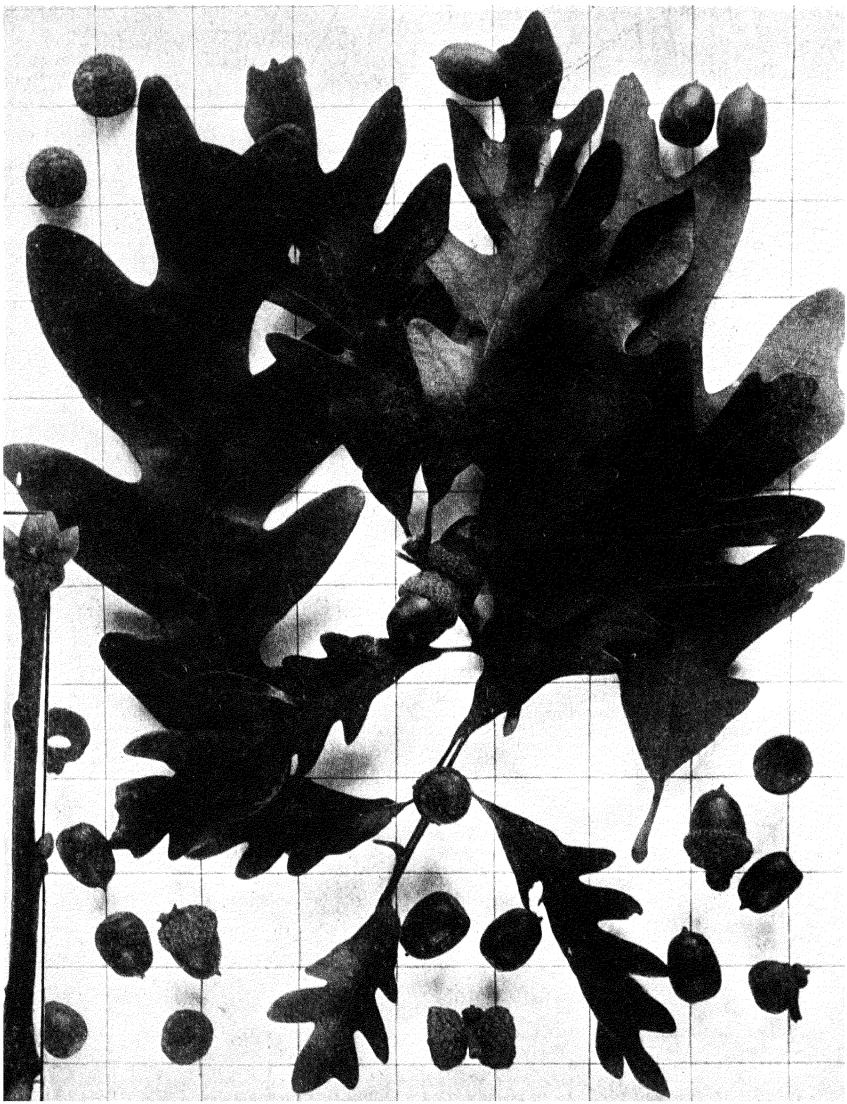


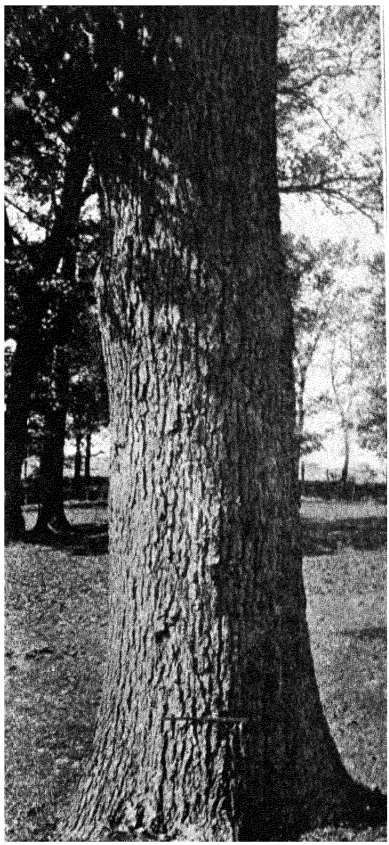
Fig. 185. Fruiting branchlet with scattered leaves and acorns, 1; branchlet in winter, 2. Note the absence of young acorns with this and the subsequent species — the annual-fruiting oaks.

186. Trunk of tree near Albany, N. Y.

187. Wood structure magnified 15 diameters.

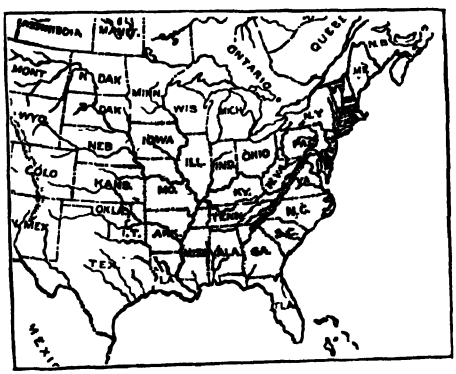
The White Oak is one of the most useful trees of the American forests, attaining under most favorable conditions when growing in the forest a height of 150 ft. and trunk 4–5 ft. in diameter. When isolated from other trees its habit is to form a very broad top of firm, rigid horizontal branches and short thick trunk — the emblem of strength and solidity. It takes its name from the light color of the scaly ridged bark, the aptness of which is shown in the accompanying illustration. It is one of the most common and generally distributed Oaks of the Atlantic states and Mississippi basin, growing alike on rich uplands and river bottoms where not too moist, in company with several of the Hickories, Tulip-tree, Sweet and Sour Gums, Magnolias, Red and other Oaks, etc.

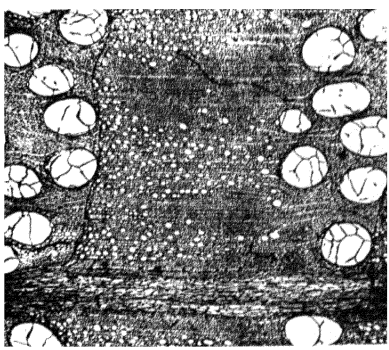
Its wood, of which a cubic foot when absolutely dry weighs 46.35 lbs., is the standard of excellence among the Oaks and is used for furniture-making, interior finishing, cooperage, the manufacture of agricultural implements, baskets, railroad ties, etc., and for fuel.[1]



Leaves obovate to oblong, wedge-shaped at base, sinuate-pinnatifid with usually 5-7 broad, but sometimes narrow, oblique-rounded entire lobes, red and pale pubescent when they unfold but finally glabrous dark green above, paler beneath, 4-9 in. long, turning rich dark red in autumn, withering and hanging to the branches until late in the winter; petioles stout glabrous. *Flowers:* staminate aments 2½-4 in long; calyx yellow, pubescent; stamens 6-8; pistillate with broad lobed scales and short dilated stigmas. *Fruit* maturing the first autumn, sessile or nearly so, abortive ovules basal; acorn ovoid-oblong, lustrous, about ⅝ in long and about ¼ covered by the flattish hemispheric tomentose cup, warty below with thickened and united scales which near the rim are thin and membranous.

1. A. W., II, 38.





POST OAK.

Quercus minor (Marsh.) Sarg.[1]

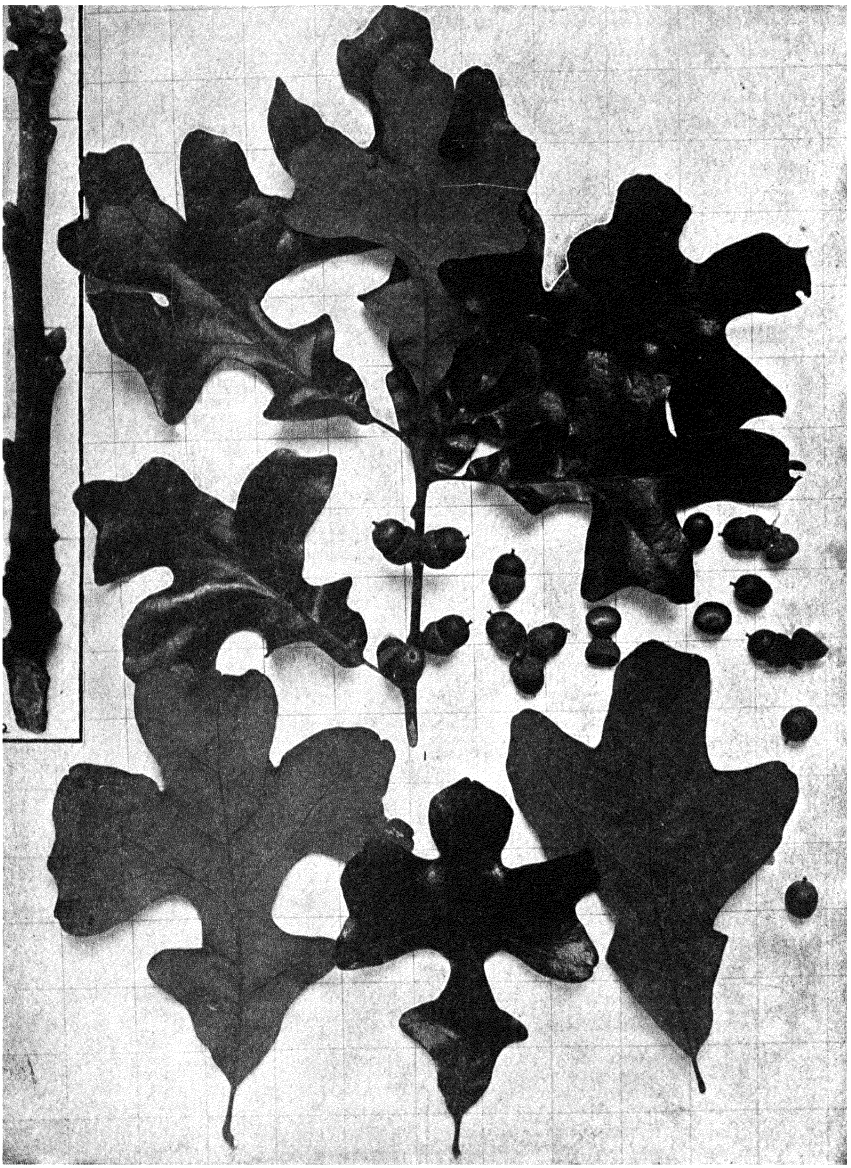


Fig. 188. Fruiting branchlet and an assortment of leaves and acorns, 1; branchlet in winter, 2.
189. Trunk of tree near St. Louis, Mo.

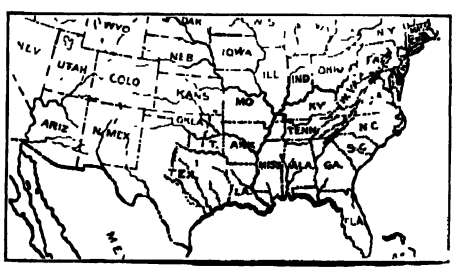
The Post Oak is usually a tree of medium stature attaining a height of 50 or 60 ft., but in the exceptional forests of the Ohio basin it is said to attain a height of 100 ft. and its trunk a diameter of about 3 ft. When growing in the open fields it develops a rounded or obovoid top with stout branchlets and shining dark green foliage, which in autumn turns to various shades of yellow and brown.

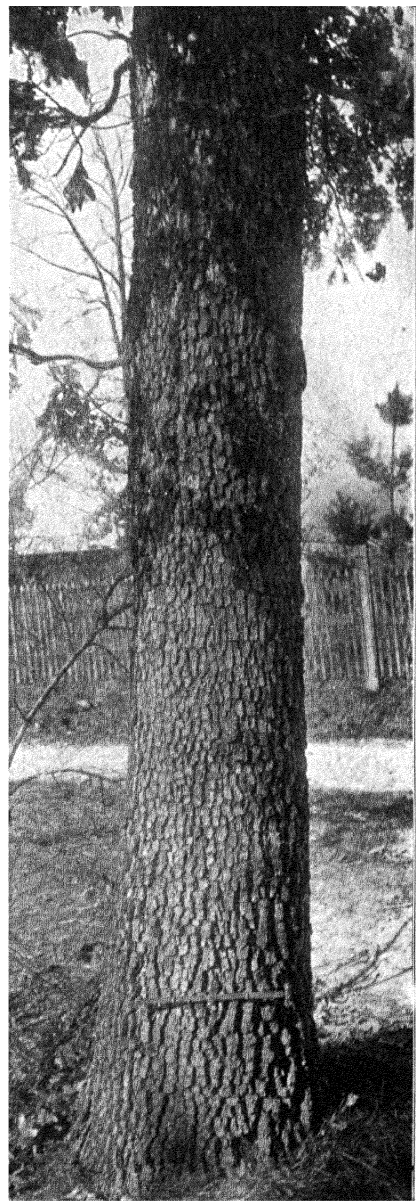
It is one of the most marked of our oaks in the peculiarity of its leaves, which, tufted at the ends of the branchlets in great star-shaped clusters, suggests at once the appropriateness of Wangenheim's name, *Q. stellata*. It inhabits limestone ridges and sandy plains in company with the Black Jack, Red, White and other Oaks, the Sassafras, Gums, Flowering Dogwood, Red Cedar, etc.

Its heavy, hard and durable wood is valued in the manufacture of agricultural implements, casks, etc., and to some extent for furniture. It is also used extensively for railway ties, fence posts, etc., and makes excellent fuel. A cubic foot when absolutely dry weighs 52.14 lbs.[2]

Leaves broad-obovate, 4-8 in. long, cuneate or rounded at base, deeply lyrate-pinnatifid with usually 5 (sometimes 3 or 7) wide divergent entire or undulate rounded lobes, the central pair much the largest and usually notched, at maturity firm shining dark green with scattered stellate hairs above, grayish or yellowish pubescent beneath; petioles and midribs pubescent. *Flowers:* staminate calyx yellow with 5 laciniately cut lobes; stigmas short, dilated. *Fruit* maturing the first year, sessile or nearly so; acorn ovoid-oblong, ½-1 in. long, about half inclosed by the hemispheric cup.

1. Syn. *Q. obtusiloba* Michx. *Q. stellata* Wang.
2. A. W., IV, 92.





BURR OAK. MOSSY-CUP OAK.

Quercus macrocarpa Michx.

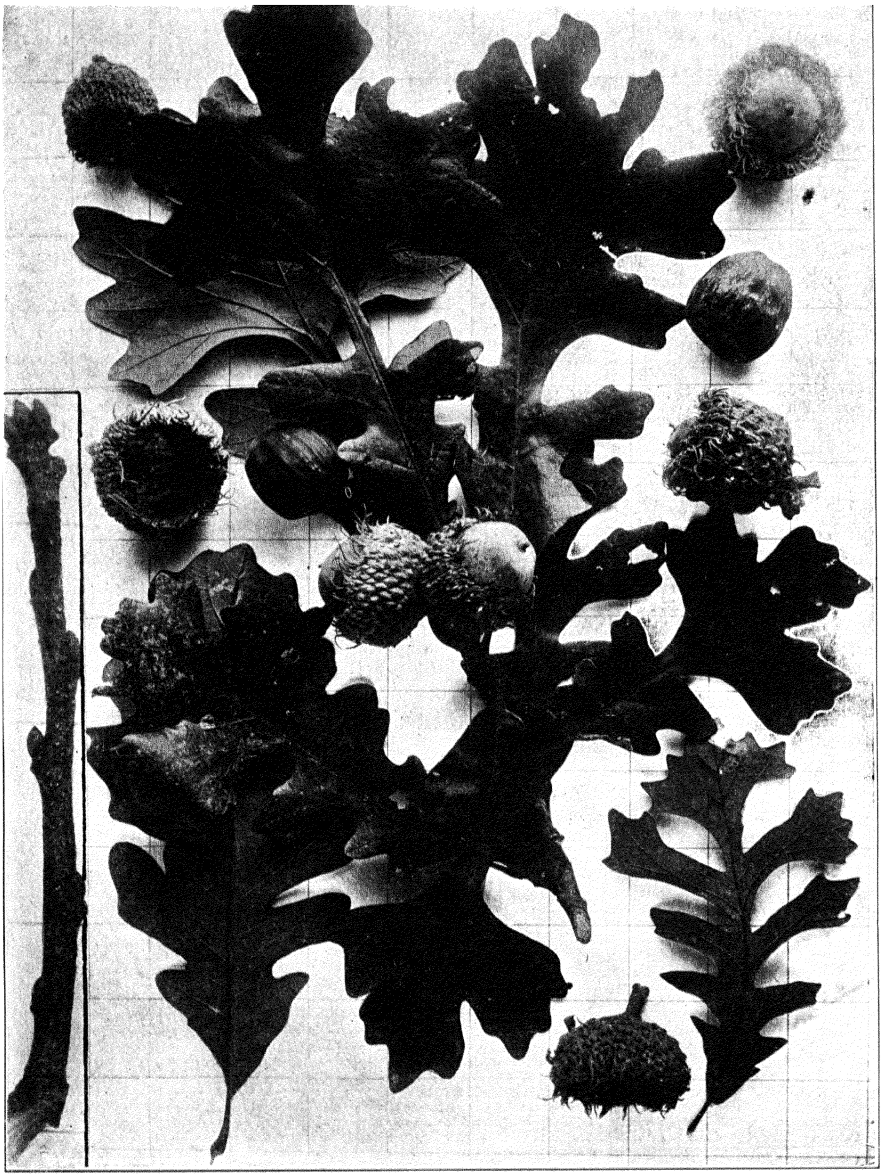


Fig. 190. Branchlet with mature fruit and leaves, 1; branchlet in winter, 2; specimens from near Lexington, Ky.

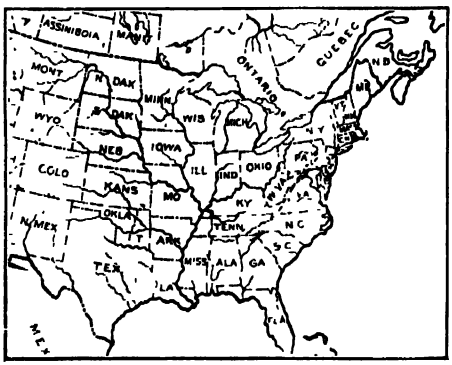
191. Trunk of tree in Genesee valley, N. Y.

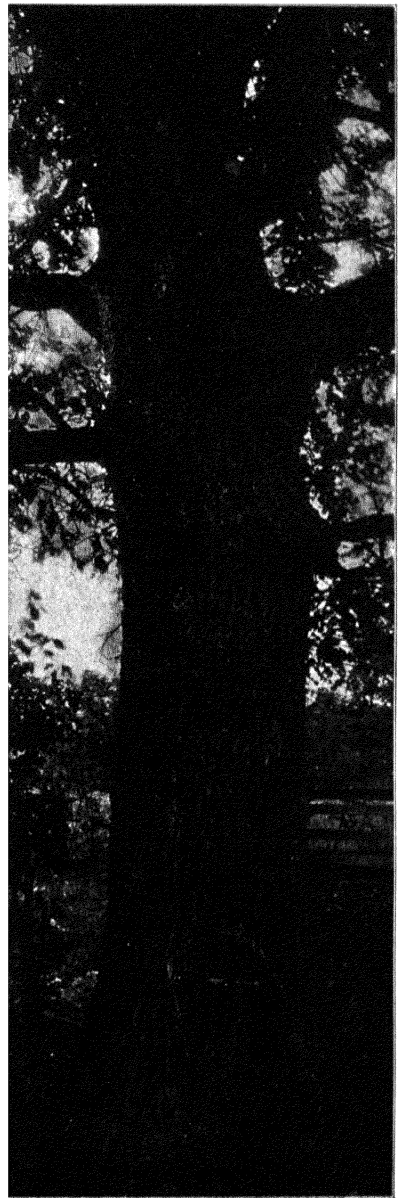
The Burr Oak has been known to attain the great height of 170 ft. and 6 or 7 ft. in diameter of trunk, in the magnificent forests of the Wabash River basin — dimensions which make this one of the very largest American Oaks, but such trees are very uncommon. When isolated it develops an ovoid or rounded top with large branches and stout branchlets. Associate with its majestic stature the beauty of its party-colored foliage and its large acorns with mossy-fringed cups and we have one of the most interesting trees of its genus. It inhabits almost exclusively rich bottom-lands, excepting the western part of its range, in company with the Swamp White Oak, the Black and Silver Maples, Big Shellbark Hickory, Hackberry, Elms, etc.

Its wood is heavy, a cubic foot when absolutely dry, weighing 46.45 lbs., tough and strong.[1] It is fully equal in properties to that of the White Oak and usually not distinguished from it in commerce. It is highly valued for ship building, furniture, interior finishing, agricultural implements, baskets, railway ties, fuel, etc.

Leaves obovate to oblong, 5-9 in. long, mostly wedge shaped at base, deeply lyrate-pinnatifid, with 5-7 lobes the terminal one the largest and irregularly crenate dentate, sometimes nearly entire, lustrous dark green above and whitish pubescent beneath; petioles short. *Flowers:* staminate aments slender, 2-6 in. long; calyx yellowish with 4-6 laciniately-toothed lobes. *Fruit* solitary or in pairs, sessile or with stalk shorter than the petioles; acorn broad-ovoid, usually rounded or depressed at apex from ½ in. in length on northern trees to 2 in. on southern trees, with usually thick tomentose cups, tuberculate below and with scales near the rim prolonged into awn-like tips forming a fringed border.

1. A. W., 11, 39.





OVER-CUP OAK.

Quercus lyrata Walt.

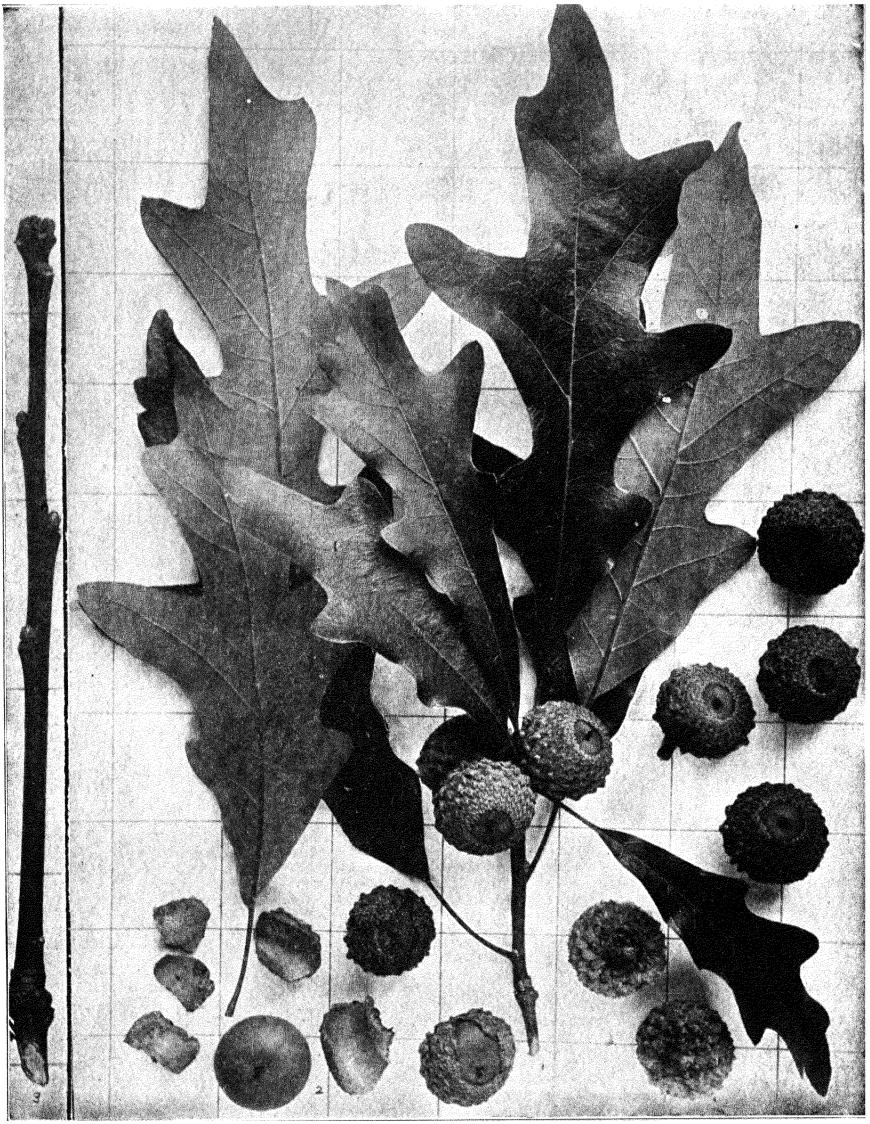


Fig. 192. Fruiting branchlet, 1; detached acorns showing laceration of cup, 2; branchlet in winter, 3.

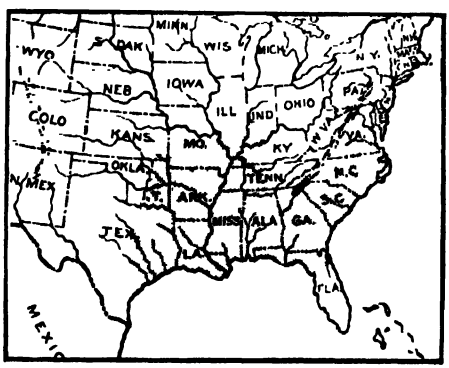
193. Trunk of tree in vicinity of Dismal Swamp, Va.

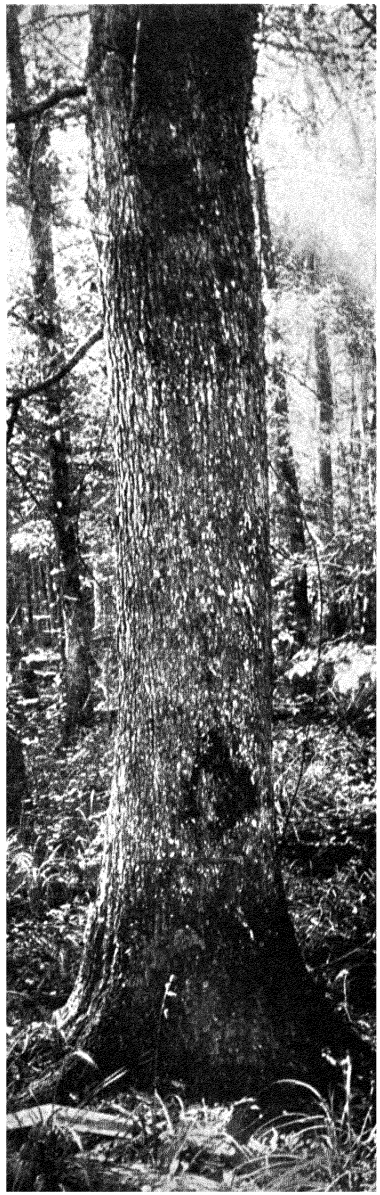
The Overcup Oak is a tree ordinarily of medium stature, but rarely attains the height of nearly 100 ft. with trunk 3 or 4 ft. in diameter. In its distribution it is confined to swamps and low wet bottom-lands, often that are more or less inundated during the greater part of the year. Its associates in these localities are the Water and Laurel Oaks, Swamp Bay, Tupelo Gum, Water Gum, Water Ash, River Birch, Cypress, etc. It is not often found isolated from other trees, but when so it has a handsome oblong or rounded top with more or less pendulous branchlets.

The wood of the Overcup Oak is heavy, a cubic foot when absolutely dry weighing 51.80 lbs., hard, strong, and is durable in contact with the soil. These desirable qualities make it applicable to the same uses as those to which the White Oak is applied, from which it is not distinguished in commerce.[1]

Leaves obovate-oblong, wedge shaped at base, lyrate-pinnatifid or lobed to beyond the middle, with 5-9 entire or sparingly-toothed triangular oblique lobes the upper pair usually the larger and more divergent, shining dark green above, white tomentose beneath. *Flowers:* staminate aments 3-6 in. long; calyx with 5 acute lobes. *Fruit* sessile or with short peduncles; nut mostly depressed globose and nearly or quite enveloped by the cup which is rather thin, hoary tomentose, with thick rugged united scales at the base but gradually thinner towards the margin, which often splits irregularly.

1. A. W., XII, 293.





SWAMP WHITE OAK.

Quercus platanoides (Lam.) Sudw.[1]

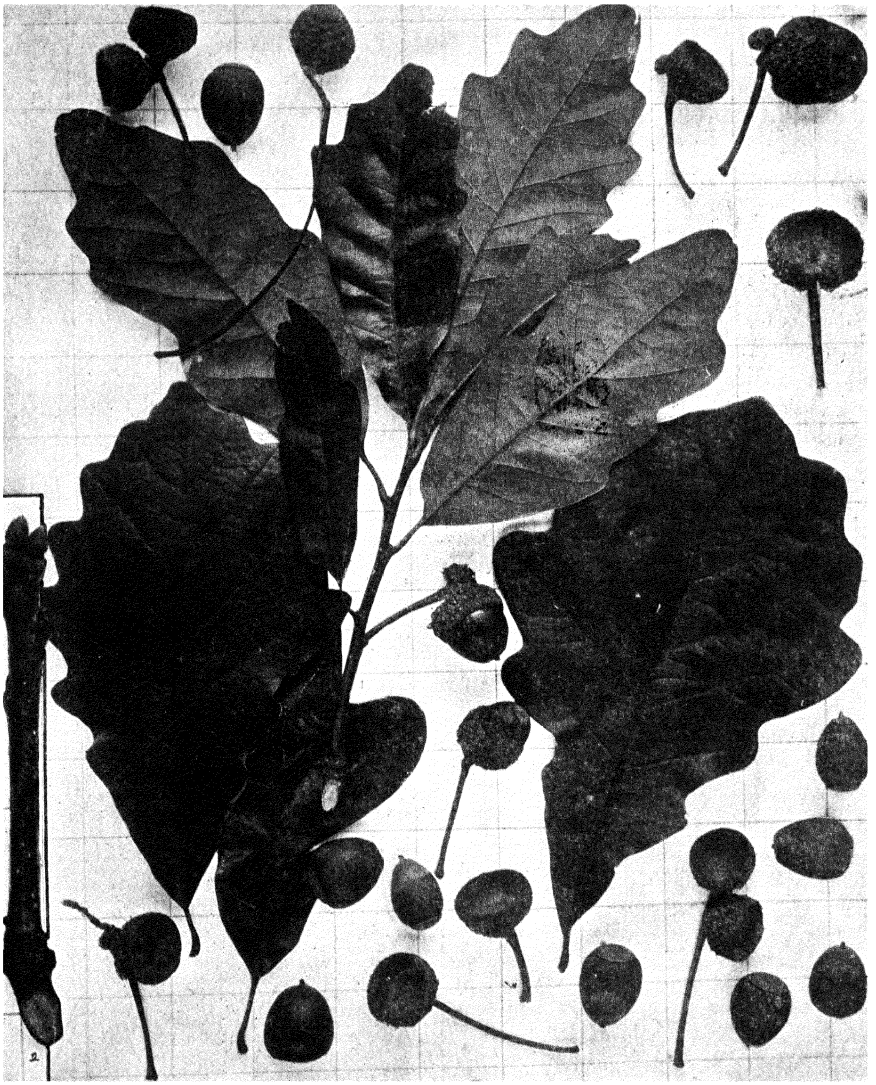


Fig. 194. Fruiting branchlet with detached acorns and an assortment of leaves, 1; branchlet in winter, 2.

195. Trunk of tree near Albany, N. Y.

The Swamp White Oak is a tree commonly 60 or 70 ft. in height with trunk 2 or 3 ft. in thickness, but when crowded by other trees in forest growth has been known to attain the height of 90 or 100 ft. The short stout trunks of isolated trees are sometimes 6 or 8 ft. in thickness. The tops of these are usually broad or rounded, with numerous tortuous branches, and more or less pendulous branchlets which often fringe the trunk above. As its name implies it inhabits the low grounds of bottom-lands growing in company with the Red and Silver Maples, King-nut Hickory, Sweet and Sour Gums, Over-cup, Pin and Burr Oaks, Green and Black Ashes, etc.

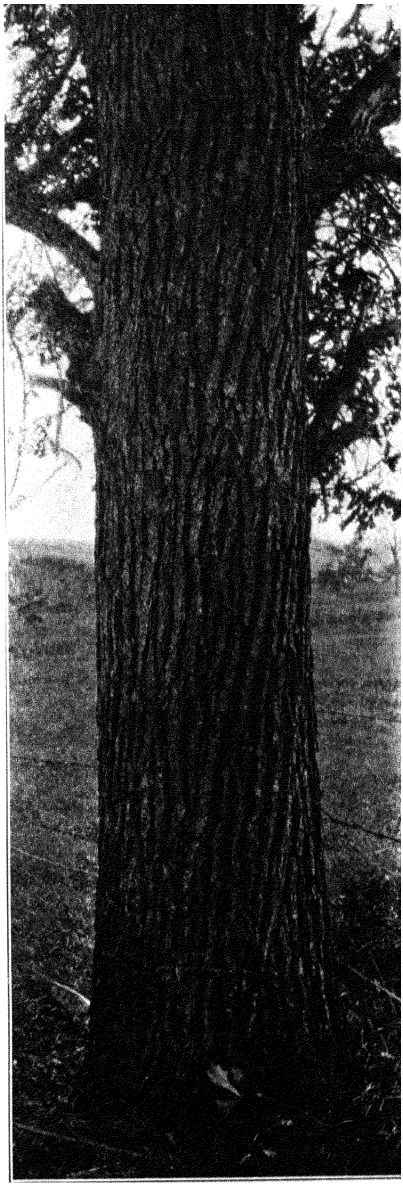
Its wood is heavy, hard and tough, a cubic foot when absolutely dry weighing 47.75 lbs. and is applied to the same uses as that of the White Oak, no distinction being made between the two in commerce.[2]

Leaves obovate to obovate-oblong, wedge-shaped at base, rounded or obtuse at apex, coarsely sinuate-crenate with 6-8 pairs of primary veins or sometimes pinnately lobed with rounded entire lobes, tomentose at first but at maturity dark green and lustrous above, whitish and more or less tomentose beneath; petioles stout ½-1 in. long. *Flowers* staminate aments 2-4 in. long with light yellow and deeply 5-9-lobed calyx; pistillate with long tomentose peduncles and short red stigmas. *Fruit* commonly in pairs with peduncle 2-6 times as long as the petioles; nut ovoid, ¾-1 in. long, pubescent at apex and about one-third enveloped by the hemispheric tomentose cup, sometimes tuberculate at base but smooth near rim and with tips of scales free and contorted.

1. Syn. *Quercus bicolor* Willd.

2. A. W., III, 66.





COW OAK. BASKET OAK.

Quercus Michauxii Nutt.

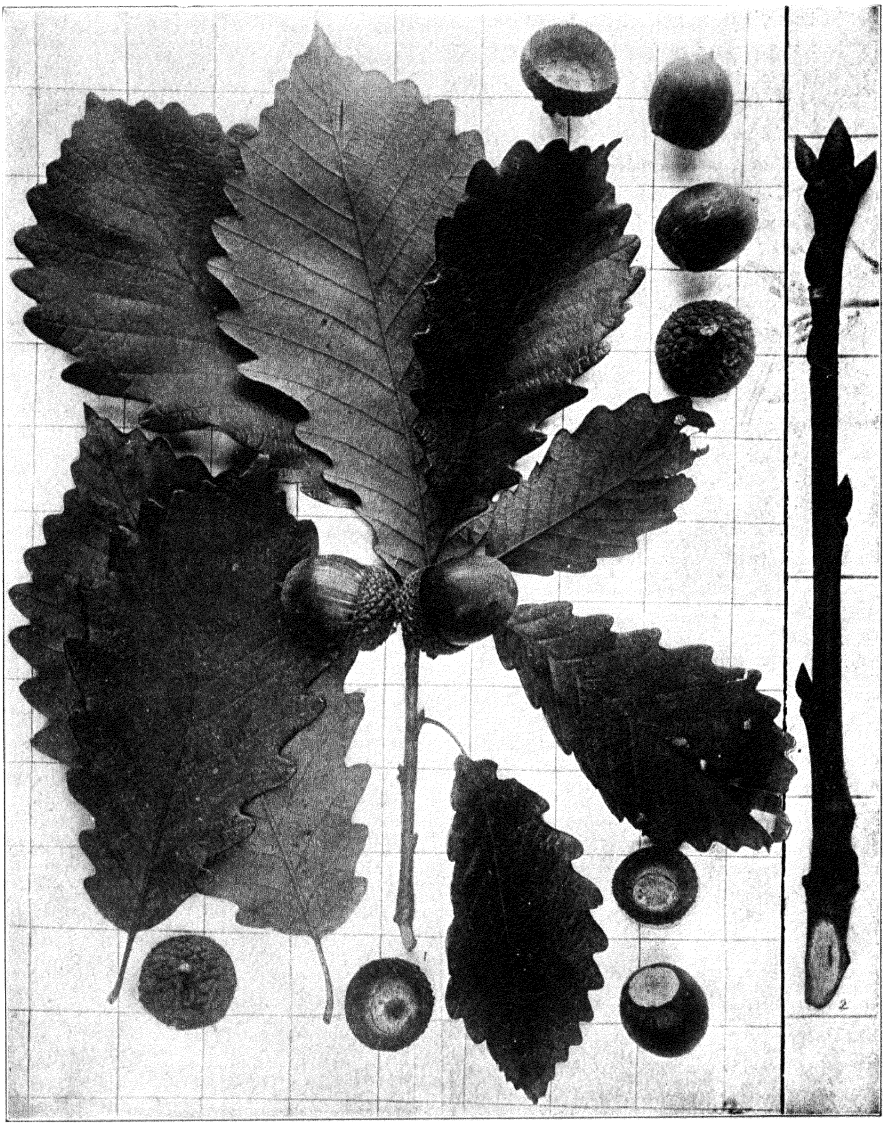


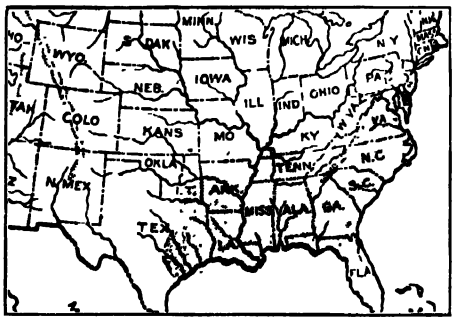
Fig. 196. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
197. Trunk of tree in border of Dismal Swamp, Va.

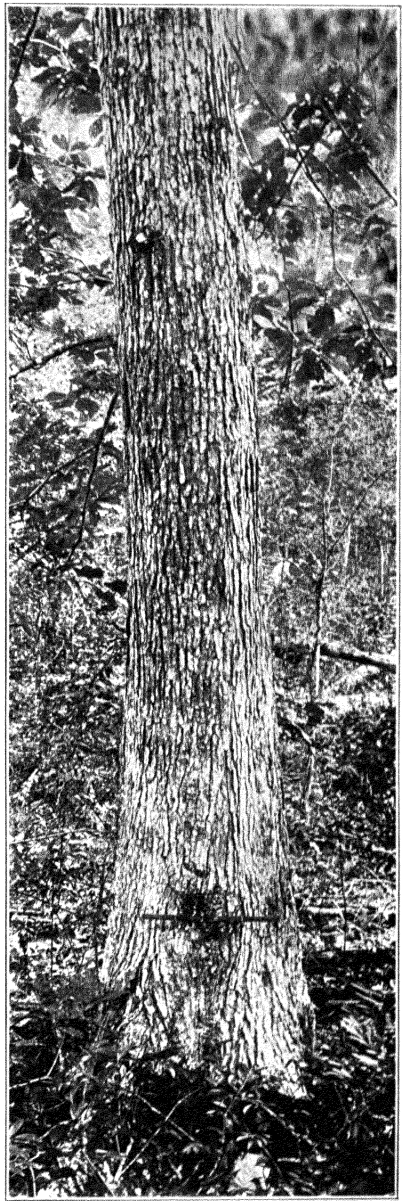
This large and important Oak is one of the most valuable timber trees of the southern states, and in forests sometimes attains the height of 100 ft., with columnar trunk 3 or 4 ft. in diameter vested in a pale gray scaly ridged bark. It is one of our handsomest Oaks with its ample leaves showing alternately their glossy dark green upper surfaces and velvety white lower surfaces, as agitated by the wind. It is confined in its distribution mainly to low swampy grounds, rich bottomlands and the borders of streams subject to frequent inundation, where it is found in company with the Water Hickory, Swamp Bay, Planer Tree, Water and Laurel Oaks, the Gums, Red Maple, etc.

Its wood, of which a cubic foot when absolutely dry weighs 50.10 lbs., is hard, tough, strong and very durable in contact with the soil and is highly valued for furniture and interior finishing, cooperage, the manufacture of agricultural implements, fence posts, fuel, etc., and is considered the best of our woods for the manufacture of baskets.[1]

Leaves obovate, usually 4-8 in. long, broad, obtuse or rounded at base, acute or acuminate, regularly crenate-toothed, with 8-12 pairs of primary veins terminating in the teeth, rather thick, lustrous dark green above, whitish and velvety pubescent beneath. *Flowers:* staminate aments slender, 3-4 in. long; pistillate with short tomentose peduncles and short red stigmas. *Fruit* solitary or in pairs, sessile or nearly so; nut 1 1¼ in. in length, ovoid-oblong and about ¼ enveloped in the hoary-tomentose closely imbricated pointed scales, those near the base thick tuberculate.

1. A. W., V, 116.





CHESTNUT OAK. ROCK OAK.

Quercus Prinus L.

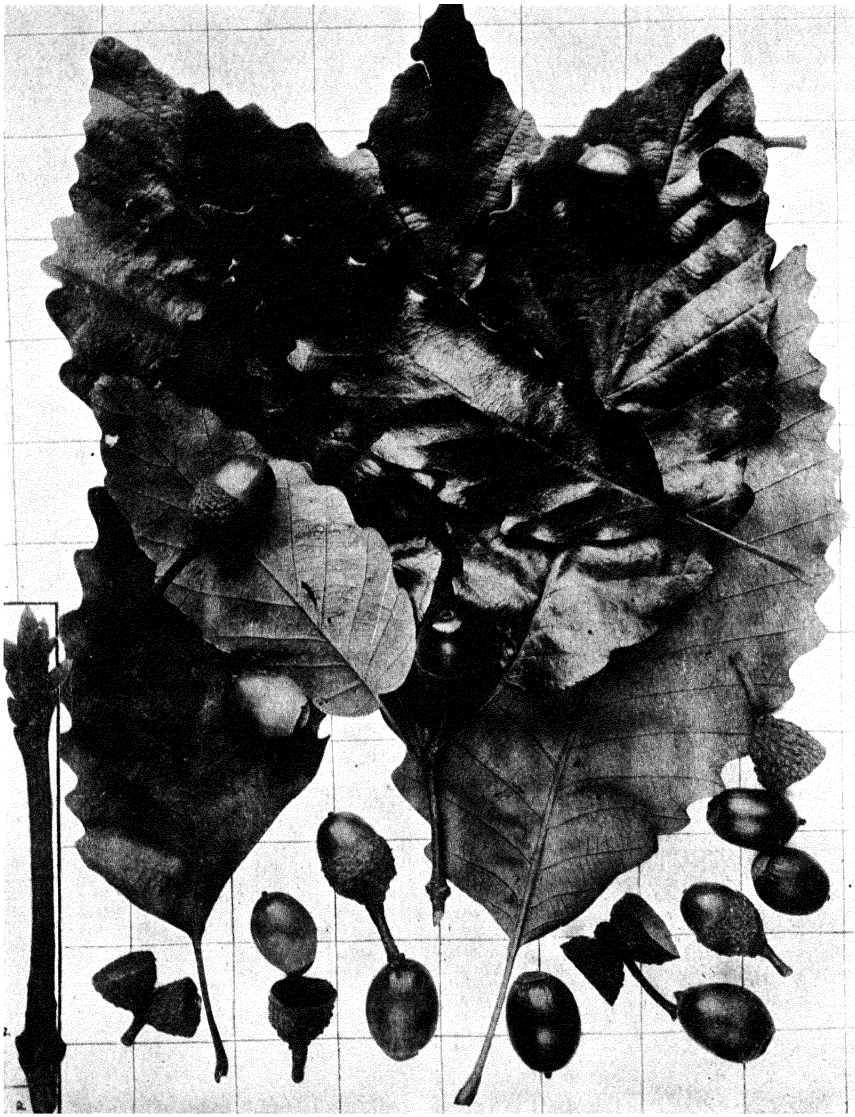


Fig. 198. Fruiting branchlet with an assortment of leaves and acorns, 1; branchlet in winter, a
199. Trunk of tree near Albany, N. Y.

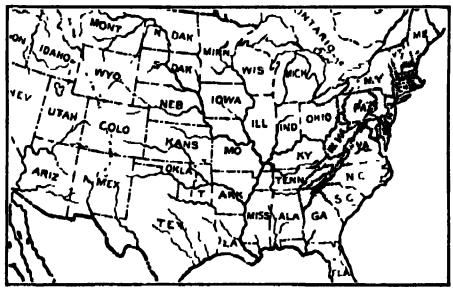
The Chestnut Oak usually attains a height of from 60 to 70 ft., but in forests where conditions are especially favorable sometimes 100 ft., with trunk 3 or 4 ft in diameter vested in a dark firm broadly ridged bark. A tree of this species of exceptional thickness of trunk, as well as being famous from historic association, is the "Washington Oak," located on the east bank of the Hudson River near Fishkill. It is 7 ft. in diameter and the estimated age of the tree, based upon the known age of a fallen companion, is eight or ten centuries.[1]

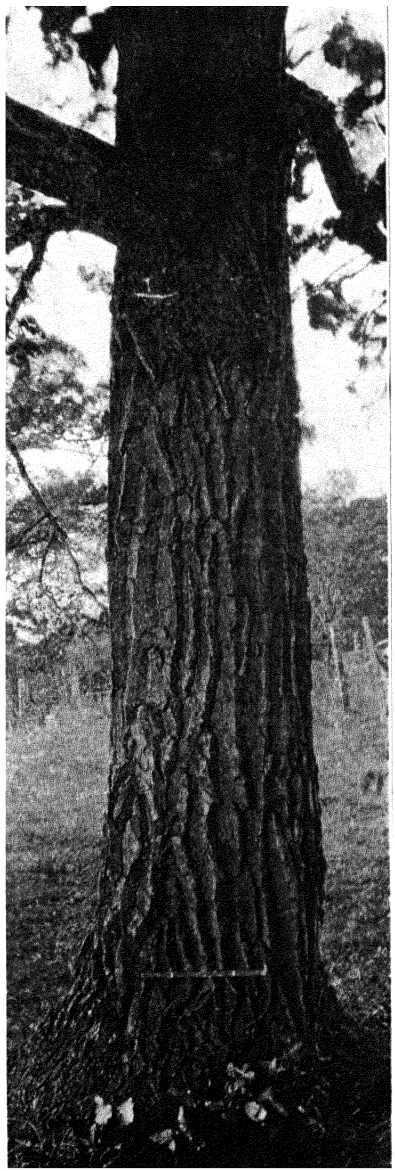
The Chestnut Oak inhabits well drained slopes, uplands and rocky ridges in company with the Shag-bark and Pig nut Hickories, various Oaks, the Tulip-tree, etc.

A cubic foot of its absolutely dry wood weighs 46.73 lbs., and is used for the same purposes as that of the White Oak. Its bark is used for tanning leather.

Leaves from oblong-lanceolate to obovate, obtuse, acute or acuminate at apex, from obtuse to subcordate at base, coarsely crenate, with 10 to 16 pairs of straight primary veins, glabrous dark green above, paler and puberulous beneath. *Flowers*: staminate with 7-9 calyx lobes; pistillate with short dark red stigmas. *Fruit* single or in pairs with pedicels shorter than the petioles; nut ovoid oblong, lustrous brown, from 1-1½ in. long and about half immersed in the thin pubescent cup which is somewhat roughened outside by the thickened centers and free tips of its scales.

1. A. W., III, 67.





CHINQUAPIN OAK. CHESTNUT OAK. YELLOW OAK.

Quercus acuminata (Michx.) Houba.[1]

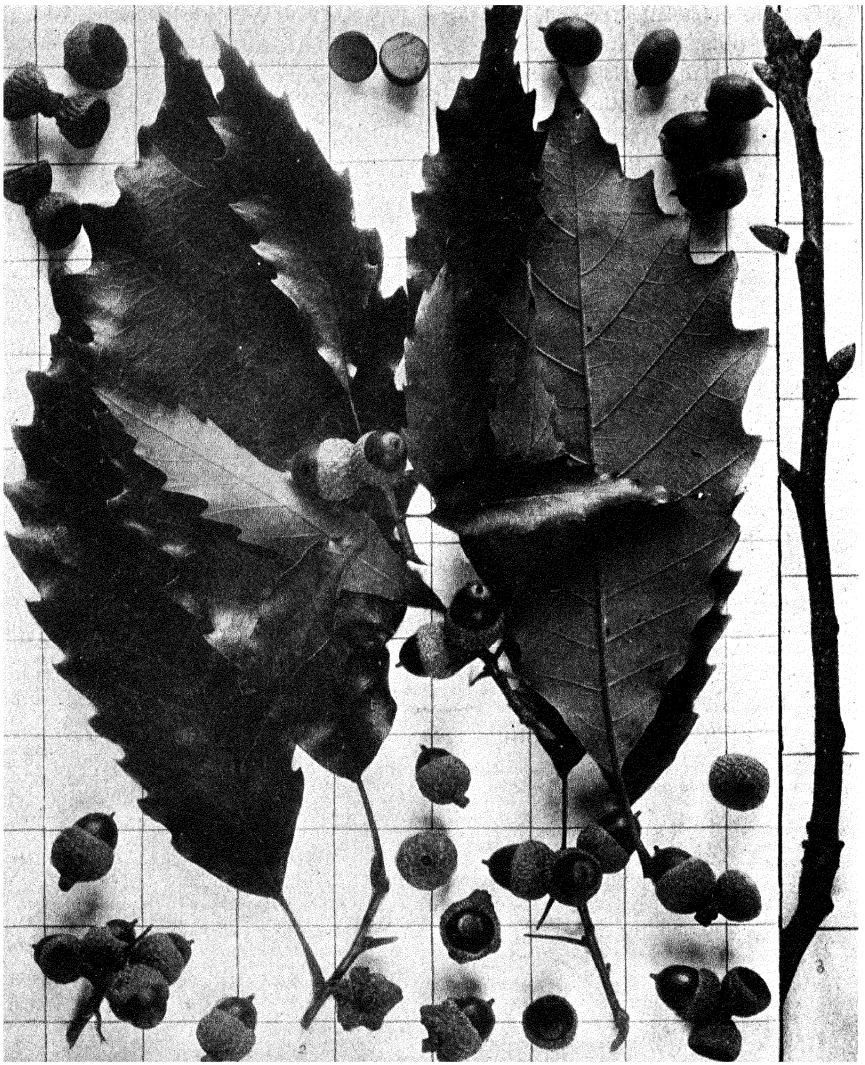


Fig. 200. Fruiting branchlets and detached leaves and acorns, 1 and 2; branchlet in winter, 3.
201. Trunk of tree near North Rush, N. Y.

The Chinquapin Oak is an abundant tree west of the Allegheny Mountains, and in the luxuriant forests of the Wabash River Valley of southern Indiana and Illinois has been known to attain the exceptional height of 160 ft., with straight columnar trunk 3–5 ft. in thickness above the wide buttressed base, but it is generally a much smaller tree and in the eastern part of its range uncommon and local in its distribution. When growing apart from other trees it develops an oblong or rounded top of many branches, and its trunk is vested in a pale gray scaly-ridged bark. Its leaves very much resemble those of the Chestnut and in autumn turn to various tints of orange and red.

The wood is heavy, a cubic foot when thoroughly dry weighing 53.63 lbs., strong and hard and is extensively used in cooperage, the construction of agricultural implements, furniture, etc., and for posts and railway ties.[2]



Leaves lanceolate-oblong, to obovate, 4-8 in long, wedge-shaped or rounded at base, acute or acuminate at apex, equally and coarsely serrate, with glandular-mucronate teeth, dark green above, whitish pubescent beneath, the straight prominent veins terminating in the teeth; petioles slender *Flowers:* staminate aments pilose, 3-4 in. long, with yellow 5-6-lobed calyx; stigmas short, red. *Fruit* sessile or short-peduncled with lustrous brown short ovoid acorn ½-¾ in long and half invested by the hoary-tomentose hemispheric cup covered with small appressed scales; seed sometimes edible.

A division of this species has recently been suggested, and the name *Q. Alexanderi* Britt applied to cover trees with leaves broader above the middle and acorns with rather shallow cups, but, inasmuch as both forms of leaves and acorns are often found on the same tree, the proposed new species would hardly seem to be valid.

1. Syn. *Q. Muhlenbergii* Engelm.

2. A. W., III, 68.



LIVE OAK.

Quercus Virginiana Mill.[1]

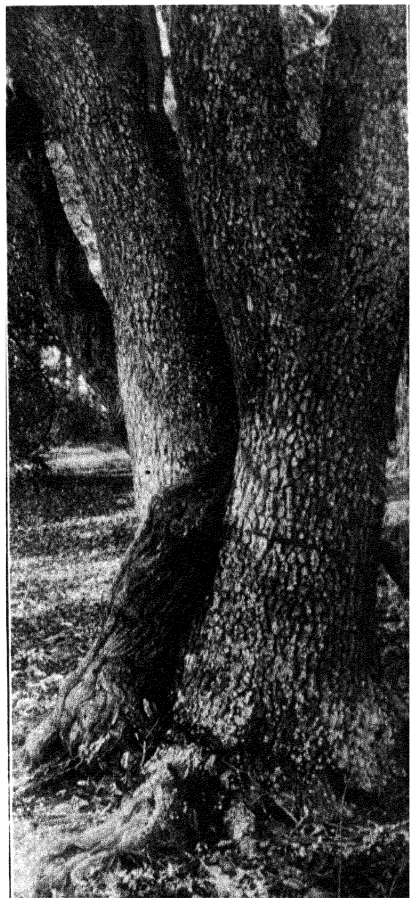


Fig. 202. Fruiting branchlets with an assortment of leaves and acorns.
203. Trunk of tree and portion of a gigantic grape-vine killed by constriction of its base, which became involved in a crotch of the oak
204. Wood structure magnified 15 diameters.

The Live Oak is the most majestic and impressive Oak of the Atlantic states. Its height, rarely more than 50 or 60 ft., is not as remarkable as its great spread of branches. Its massive trunk is sometimes 6 or 8 ft. in diameter and usually divides near the ground into a few great branches, which sometimes reach out horizontally from 50 to 75 ft. — a greater distance than those of any other American tree. Visitors to the coast regions of the Southern States are always impressed with these great and beautiful trees. After contemplating them one can hardly realize that the same species is found (in var. *minima*) on sandy barrens near the cost of Florida as a shrub bearing fruit when no more than 1 ft. in height.

Our bark picture, while it shows nicely the characteristic bark of the species, tells also the story of a long struggle for existence, which the tree had had with a gigantic Grape-vine, and the final victory of the Oak.

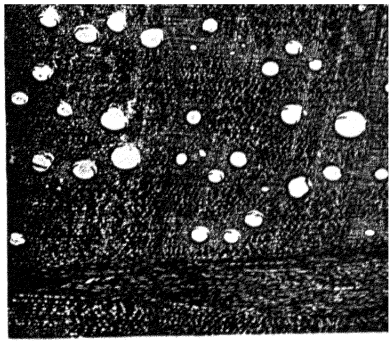
The wood of the Live Oak, of which a cubic foot when absolutely dry weighs 59.21 lbs., is so hard and difficult to work as not to be extensively used now-a-days, though it was once highly valued for ship-building before iron was substituted for that purpose, and Congress, in its early sessions, enacted laws for perpetuating the supply.[2]



Leaves evergreen, very thick and coriaceous, obovate oblanceolate to oblong, mostly rounded at apex and wedge-shaped at base with entire revolute margins (rarely spinose-dentate above the middle), shining dark green above, whitish pubescent beneath, falling with the appearance of new leaves in the spring. *Fruit* with unusually long peduncles 1-5 acorns to each peduncle; acorns small lustrous dark brown, ovoid to obovoid and one-third covered by the thin turbinate hoary-tomentose cup with small appressed scales; seed sweet.

1. Syn. *Quercus virens* Ait.
2. A. W., V, 117.





WHITE ELM. WATER ELM.

Ulmus Americana L.



Fig. 205. Branchlet with mature fruit and young leaves, surrounded with mature leaves gathered later, 1; branchlet in winter bearing three leaf-buds above and four flower-buds below, enlarged, 2.

206. Trunk of tree. Lowville, N. Y.

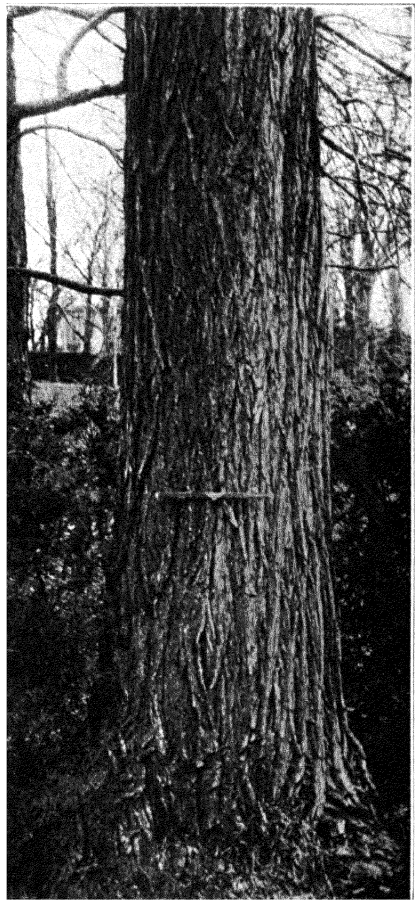
207. Wood structure magnified 15 diameters.

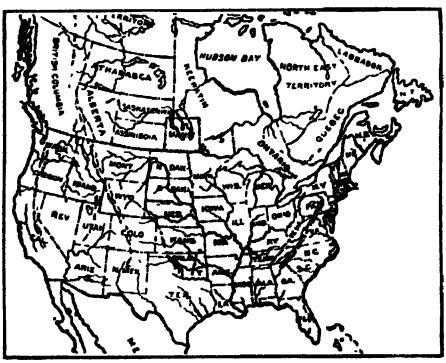
The White Elm is one of the largest trees of the Atlantic States, frequently attaining the height of 100 or 125 ft. with a trunk 6 to 10 ft. in diameter. These large trunks are widely buttressed at base and in the forest usually columnar and undivided to the height of 30–60 ft. or more. Its beautiful form when growing in the open field is a familiar and beloved feature of almost every landscape of New England and the Northern States. These trees usually divide within 20 or 30 ft. from the ground into few large branches, which rise upward, ramify and curve gracefully outward, forming a broad rounded or flat top with more or less drooping branchlets. The trunk and large limbs are often fringed to the ground with short contorted branches. It inhabits naturally moist bottom-lands and the borders of streams.

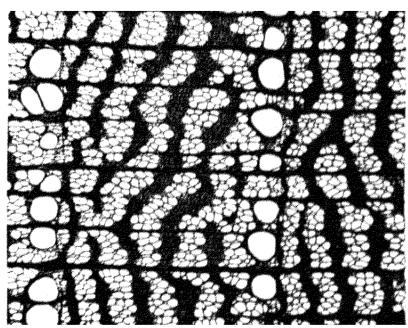
The wood when absolutely dry weighs 40.56 pounds per cubic foot, is strong, tough and difficult to split, and is a favorite timber for wagon making, particularly the hubs of wheels, and for saddle-trees, tool-handles, etc.[1]

Leaves oval to oblong-obovate, rounded or heart-shaped on one side at base and short or wedge-shaped on the other, abruptly acuminate at apex, doubly serrate, dark green and smooth or nearly so above, paler beneath. *Flowers*, before the leaves, in fascicles, with slender drooping jointed pedicels; calyx with 7-9 short rounded lobes; ovary and styles light green. *Fruit*, ripening as the leaves unfold, an oval-obovate samara short stipitate, glabrous with ciliate margins.[2]

1. A. W., II, 33.
2. For genus see p. 432.







CORK ELM. ROCK ELM.

Ulmus Thomasi Sarg.[1]

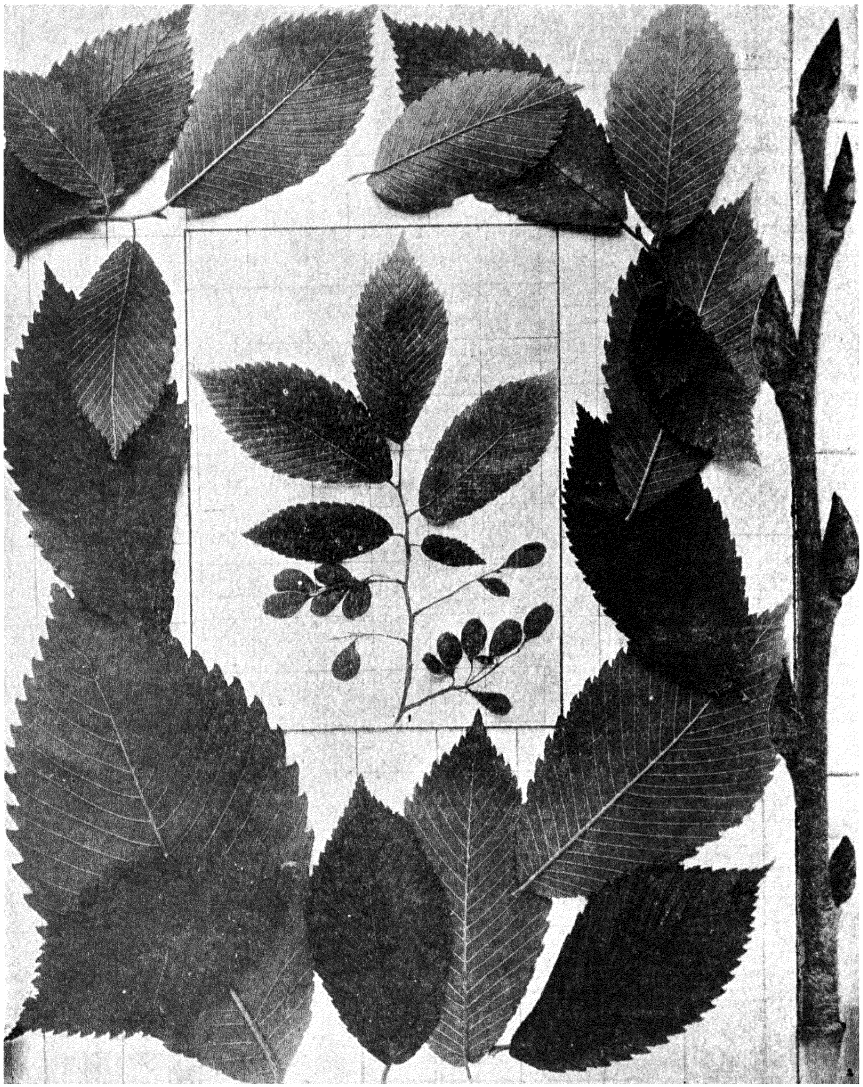


Fig. 208. Branchlet with mature fruit and leaves nearly full grown, surrounded with mature leaves gathered later, 1; branchlet in winter enlarged to show minute characters, 2.

209. Trunk of tree, in Martinsburg, N. Y.

The Cork Elm attains the height of 80-100 ft., with trunk 3 or 4 ft. in diameter, and in forests has a straight columnar trunk sometimes free from branches to the height of 60 or 70 ft. When growing outside of the forest its habit of growth is generally quite different from that of the White Elm, as it develops a rather narrow oblong top with strongly drooping lateral and lower branches and corky-winged branchlets, as shown in our trunk picture.

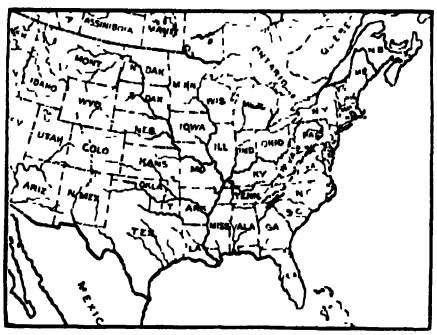
It is a tree inhabiting uplands, rocky ridges and slopes, in company with the Sugar Maple, Hop Hornbeam, Butternut, Basswood, White Ash, Beech, etc., but is much less abundant and general in its distribution than the White Elm.

Its wood is heavy, a cubic foot weighing when absolutely dry 45.25 lbs., and is especially sought where great strength, toughness and flexibility are required, as in the manufacture of heavy agricultural implements, the handles of tools, etc.[2]

Leaves obovate-oblong, narrow and obtuse to subcordate and somewhat inequilateral at base, doubly serrate, with usually incurved teeth, smooth lustrous dark green above, pale pubescent beneath; petioles and branchlets pubescent; buds taper-pointed with puberulous ciliate scales. *Flowers* in racemes with slender filiform jointed pedicels; calyx 7-8-lobed; anthers purple. *Fruit* ripening when the leaves are about half grown, samara obovate-oblong, pale, obscurely nerved, pubescent and ciliate.

1. *Ulmus racemosa* Thomas.

2. A. W., II, 34.





WINGED ELM.

Ulmus alata Michx.

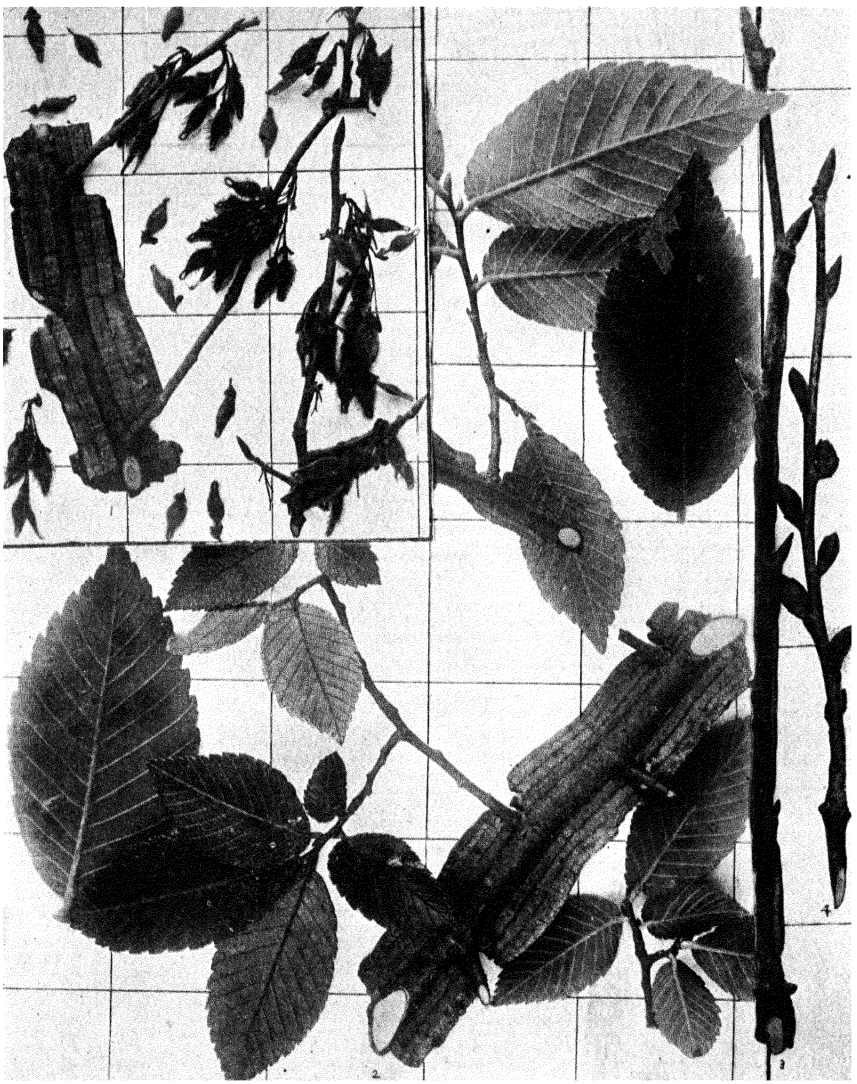


Fig. 210. Section of corky branch with branchlets bearing mature fruit, 1 (Observe the leaf-buds are scarcely as yet swollen); branchlet with mature leaves, 2; branchlet in winter showing leaf-buds and incipient corky flanges, 3; do. bearing leaf-buds above and flower-buds below, 4.

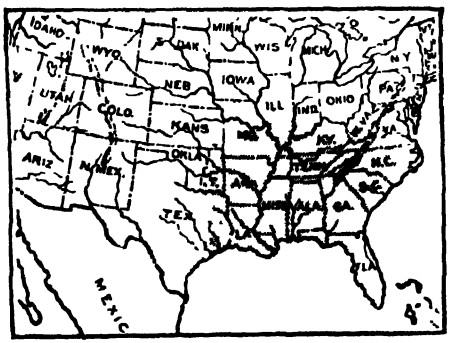
211. Trunk of tree near Kennett, Mo.

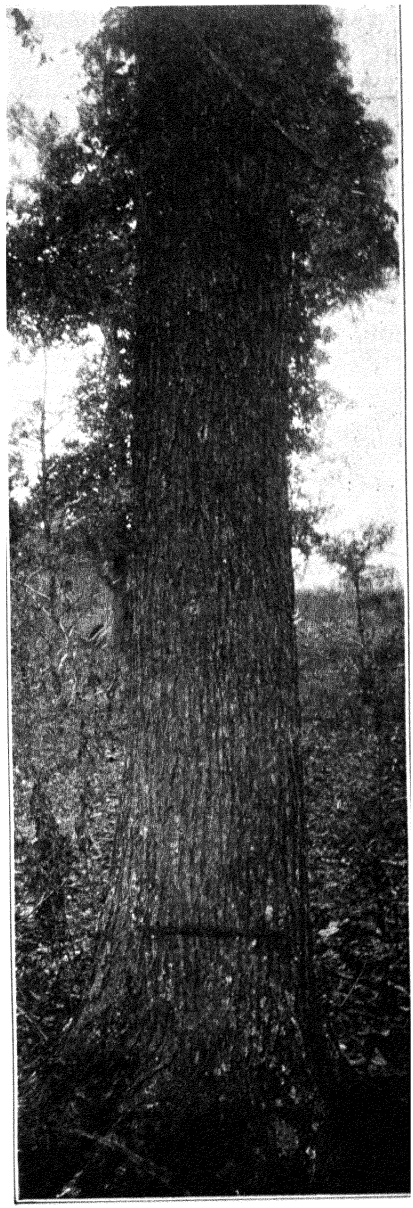
Compared with the large elms of the Northern States, the Winged Elm is a tree of medium size. It rarely attains a greater height than 50 or 60 ft. or greater thickness of trunk than 2 ft., and when isolated forms a symmetrical oblong or obovoid top. It inhabits well drained uplands and the borders of swamps and streams, being most abundant in the regions west of the Mississippi River in company with the Hackberries, Honey Locust, Willow-leaf and Shingle Oaks, Prickly Ash, etc. It differs materially from our northern elms in the size of its small leaves, and a peculiar feature is the wide wing like growths of cork which develop on opposite sides of some of its branchlets, particularly the lowermost and those near the trunk of the tree. It is from this feature that it takes both its common and technical names.

Its wood is heavy, a cubic foot when absolutely dry weighing 46.68 lbs., hard and difficult to split, though it is not considered as strong as that of the northern Elms.[1]

Leaves ovate-oblong, from abruptly wedge-shaped to subcordate at base and somewhat inequilateral, acute or acuminate, doubly serrate, at maturity firm, smooth, dark green above, pale pubescent beneath. *Flowers* appearing in early spring before the leaves, in short few flowered fascicles; calyx glabrous with 5 obovate lobes. *Fruit* ripening usually before the unfolding of the leaves, samara from ¼-½ in. in length, long-stipitate, white-hairy especially on the thickened margin; wings narrow and with protruded points incurved at apex.

1. A. W., XII, 289.





SLIPPERY ELM. RED ELM.

Ulmus pubescens Walt.[1]

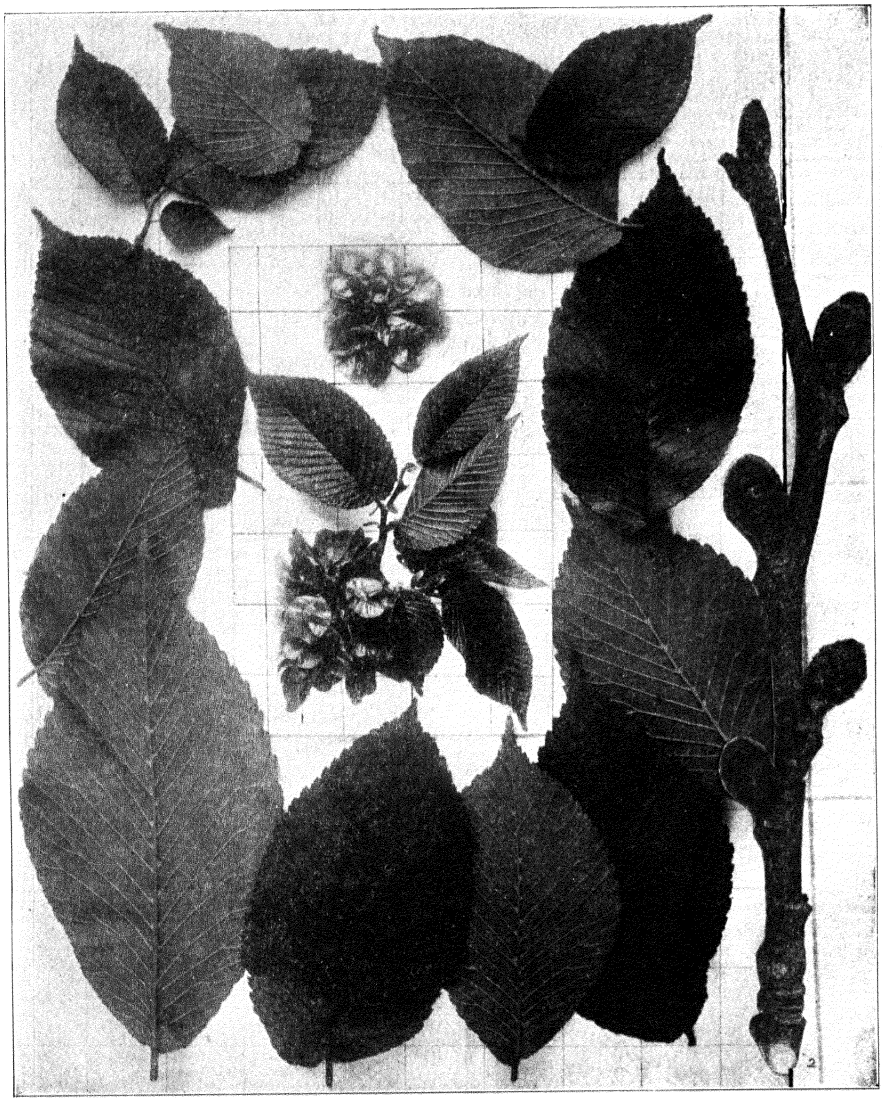


Fig. 212. Branchlet with mature fruit, young leaves and stipules, surrounded with mature leaves gathered later, 1; branchlet in winter, with leaf and flower-buds, enlarged.

213. Trunk of tree in Genesee valley, N. Y.

The Slippery Elm attains the height of 60 or 70 ft. with straight columnar trunk rarely more than 2 or 3 ft. in diameter. When isolated the trunk divides usually within a few feet of the ground into a few large limbs which branch and develop into a graceful broad-topped head, similar to that of the White Elm. Its larger rougher rugose leaves are features which readily distinguish it.

It thrives best in the rich soil of bottom-lands and along the banks of streams. Here it is usually associated with the Burr and Swamp White Oaks, Black, Silver, and Red Maples, Hackberry, etc., but it is also found, though in smaller stature, on rocky ridges and slopes. Its fragrant mucilaginous inner bark is used in medicine and is also somewhat nutricious, a fact which occasionally leads to the destruction by boys, who sometimes literally skin it alive when once its identity is discovered.

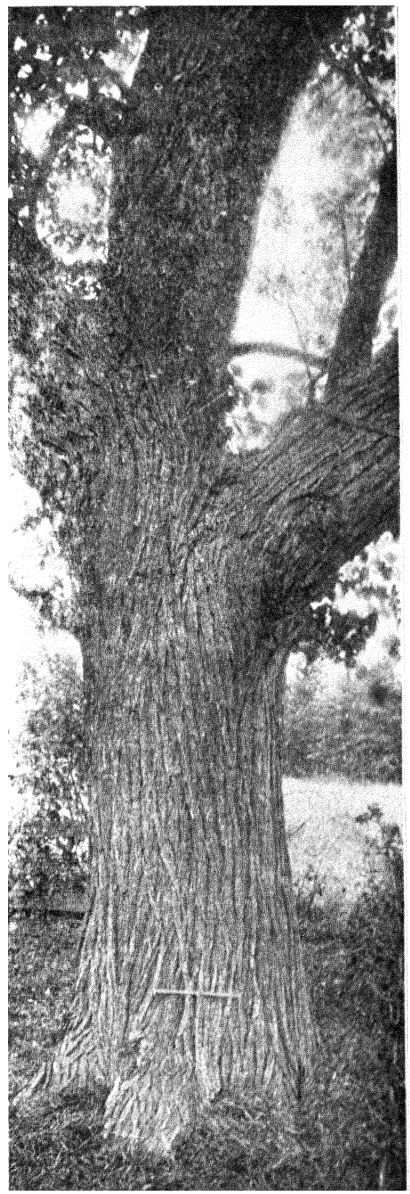
A cubic foot of the absolutely dry wood weighs 43.35 lbs. It is tough and strong and especially valued for the ribs of small boats and in the manufacture of agricultural implements, for railway ties, etc.[2]

Leaves obovate-oblong, from obtuse to subcordate and inequilateral at base, abruptly acuminate at apex, doubly serrate, thick, firm, rugose, dark green and very rough above, pale tomentose beneath, especially in the axils of the veins; buds obtuse or rounded, densely rusty tomentose. *Flowers* in crowded spreading fascicles with short pedicels; calyx 7-9 lobed; stigmas reddish purple. *Fruit* ripening when the leaves are about half grown, suborbicular, ½-¾ in. long with tomentose cell and broad thin glabrous wings.

1. *Ulmus fulva* Michx.

2. A. W., I, 11.





PLANER-TREE. WATER ELM.

Planera aquatica (Walt.) Gmel.

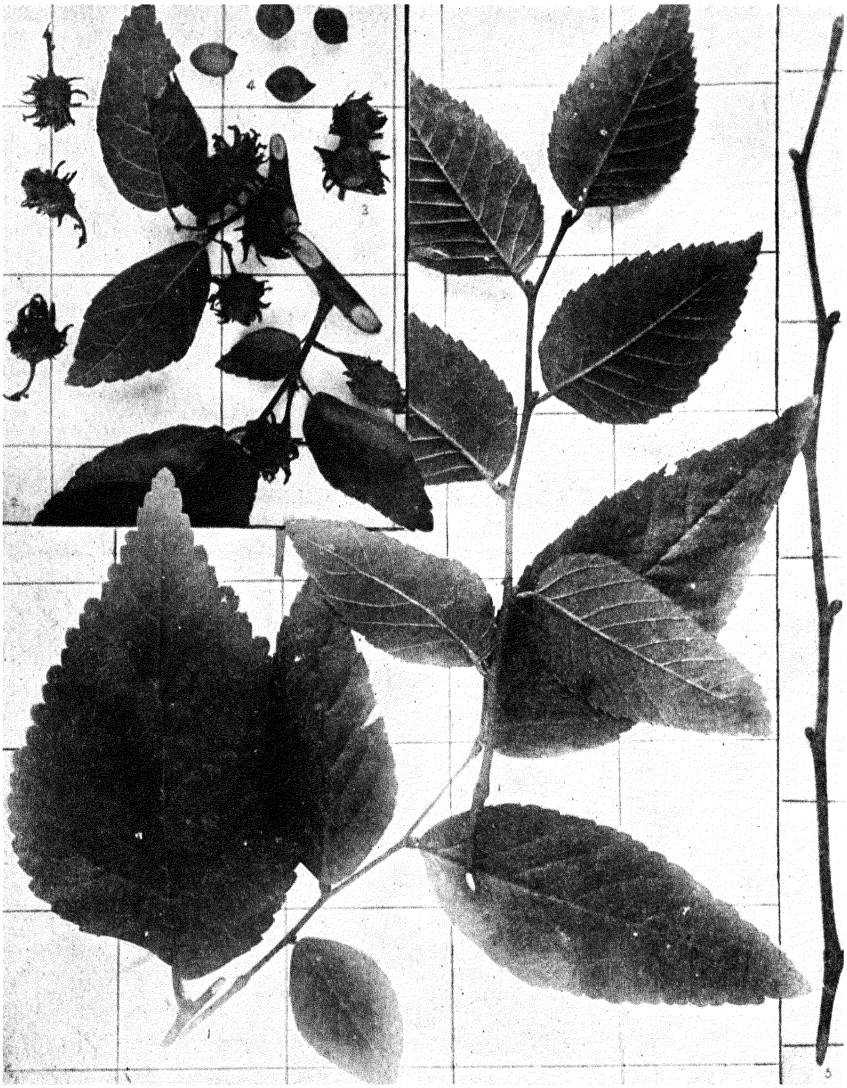


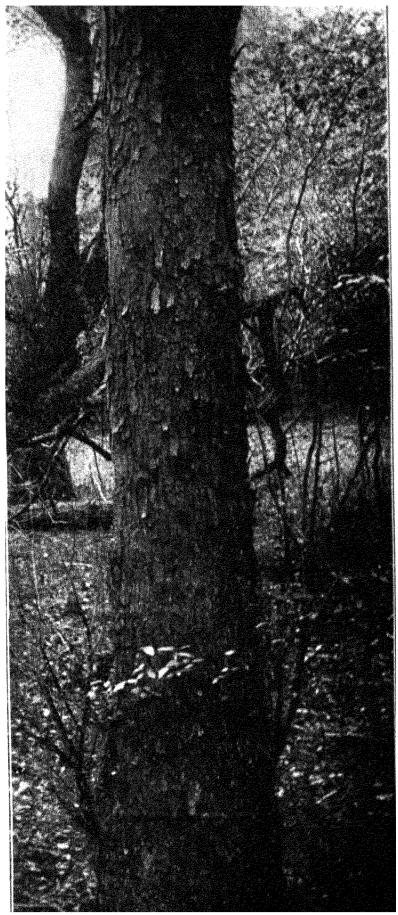
Fig. 214. Branchlets with mature leaves in summer, 1; fruiting branchlet in spring with mature fruit and young leaves, 2; fruit with epicarp opened to display seed, 3; isolated seeds, 4; branchlet in winter, 5.

215. Trunk of tree in Red River valley, Ark.

216. Wood structure magnified 15 diameters.

The Planer-tree rarely attains a greater height than 30 or 40 ft. or thicker trunk than 18 or 20 in. It is distinctly a water-loving species, being confined in its habitation to depressions in bottom-lands and deep swamps which are inundated during a considerable portion of the year. In these localities, too wet for nearly all other trees, it holds undisputed sway and presents a singular appearance, with its broad tops of irregular, contorted branches. As if by common agreement they seem determined to maintain this low habit of growth, even though it requires them to endure the shade of the taller trees about them which are constantly vieing with each other in reaching up to the light.

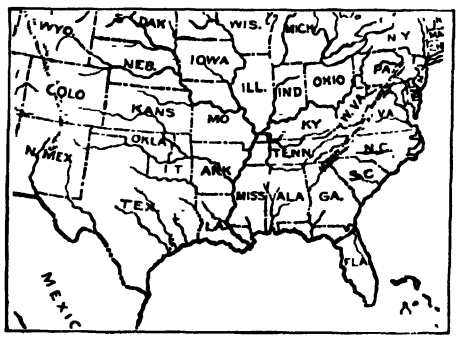
The light soft wood, of which a cubic foot when absolutely dry weighs 32.99 lbs., is of little or no commercial value.[1]

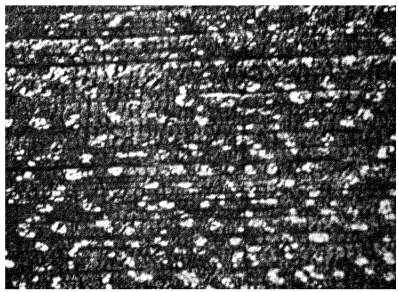


Leaves 1-3 in. long, ovate-oblong, obtuse or rounded and more or less inequilateral at base, coarsely crenate-serrate, subcoriaceous, dull dark green and roughish above, duller and with conspicuous veins beneath, and with slender puberulous petioles. *Flowers* in early spring with or before the leaves; calyx greenish, campanulate, 4-5-cleft; the staminate in fascicles from the axils of the outer scales of the bud on twigs of the previous season, short pedicelate; anthers emarginate; the pistillate are perfect flowers, 1-3 together, with longer pedicels from the axils of the leaves of the year; ovary stipitate, slightly compressed; styles two, reflexed, papillose and stigmatic on inner faces. *Fruit* ripening in April, and oblong oblique coriaceous drupe, ½ in. long, with short stipe, subtended by the calyx and tipped with the remnants of the style, ridged, and covered with fleshy processes; seed compressed ovoid with straight embryo, unequal thick cotyledons, no albumen.[2]

1. A. W., V, 114.

2. For genus see p. 432.





HACKBERRY. SUGARBERRY.

Celtis occidentalis L.[1]

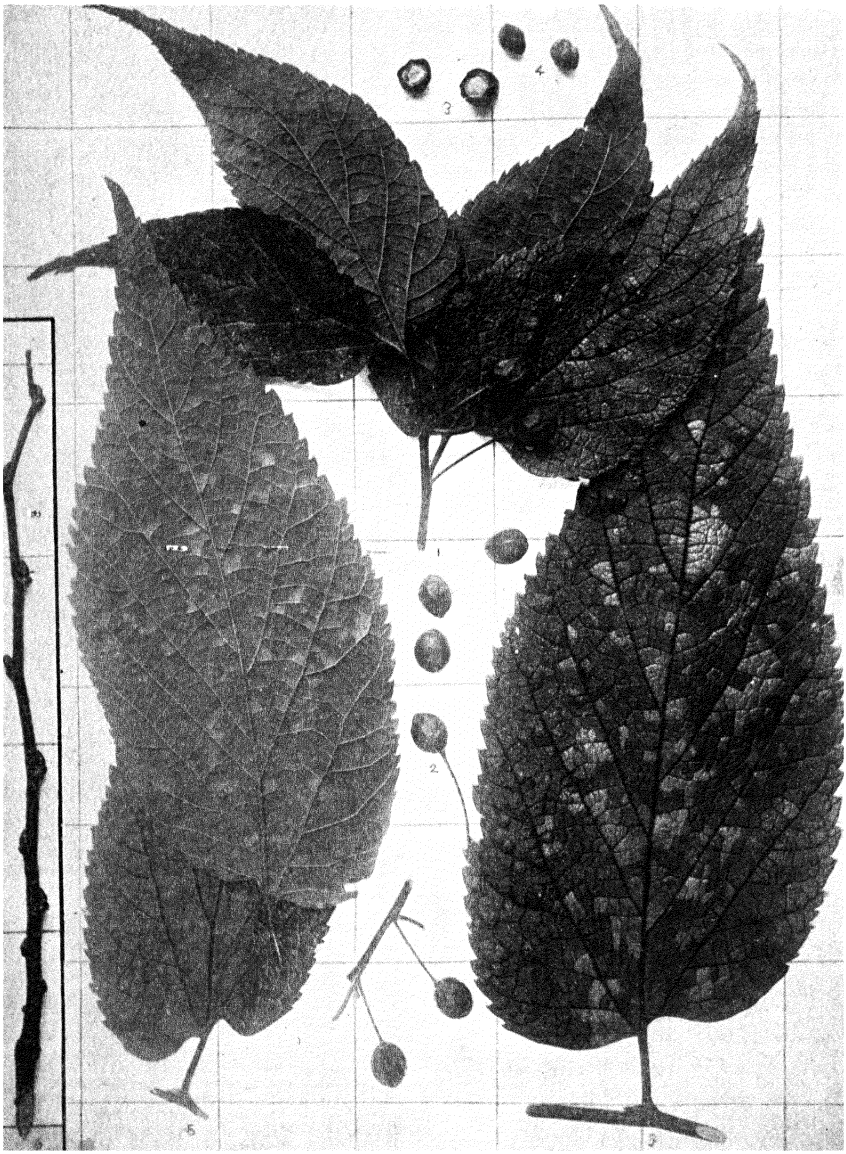


Fig. 217. Branchlet with leaves and mature fruit, 1; fruit detached, 2; fruit in section, 3; isolated pits, 4; branchlet in winter, 5.

218. Trunk of tree in Meramac River valley, Mo.

219. Wood structure magnified 15 diameters.

The Hackberry in the forests of the rich bottom-lands of the Ohio River basin sometimes exceeds 100 ft in height and its trunk is sometimes 4 or 5 feet in diameter, but when in dryer soil of regions more unfavorable to its growth it is a much smaller tree. When isolated it develops an ovoid or oblong top of many small branches and fine branchlets. It is abundant in the Mississippi basin, but in the northeastern states and Canada so uncommon or local in its distribution as not to be generally known by the country people when it is observed, and strange names are often given to it. Two large trees having considerable local celebrity as "Unknown Trees" (one near Palatine Bridge and the other near Schuylerville, N. Y.) I have found upon examination to be of this species, and my father has told me of having had several similar experiences.

The leaves of the trees of this species in the Black River valley of northern New York commonly show an interesting variegation in mid-summer and becoming more marked as the season advances. This I am informed by Dr. B. T. Galloway is due to a parasitic fungus, known as the *Phyllosticta Celtidis* E. & K.

The wood is rather heavy, a cubic foot when absolutely dry weighing 45.40 lbs. and is used in the manufacture of furniture and agricultural implements, for fuel, fences, etc.[2]

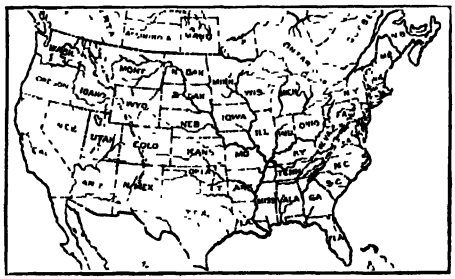
Leaves inequilateral, ovate, more or less falcate, rounded or cordate or tapering and oblique at base, coarsely serrate, thin, prominently reticulate, light green and smooth or roughish above, paler and glabrous or nearly so beneath. *Flowers* as described for the genus. *Fruit* subglobose or oblong, about ½ in. long, with thick dark purple skin, yellowish flesh and smooth pit.[1]

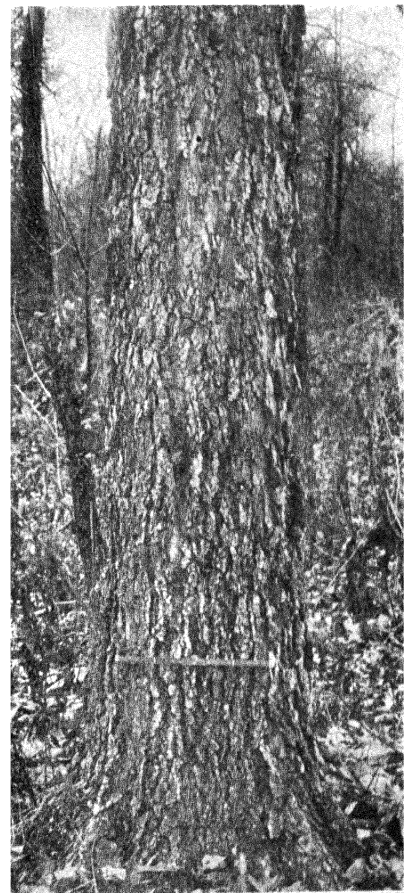
Var. *pumila* Gray, is a shrubby form of the Southern states, through Missouri and westward, with small and more rugose leaves.

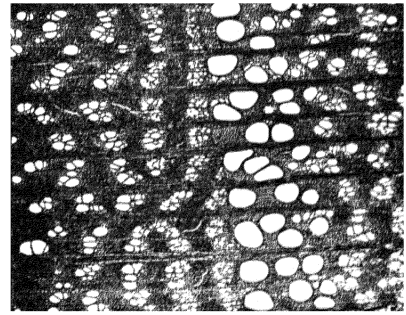
1. Including *C. crassifolia* Lam. and *C. canina* Raf. Some botanists consider these distinct, but tenable directive characters do not seem to exist.

2. A. W., I, 12.

3. For genus see pp. 432-433.







MISSISSIPPI HACKBERRY. SUGARBERRY.

Celtis Mississippiensis Bosc.

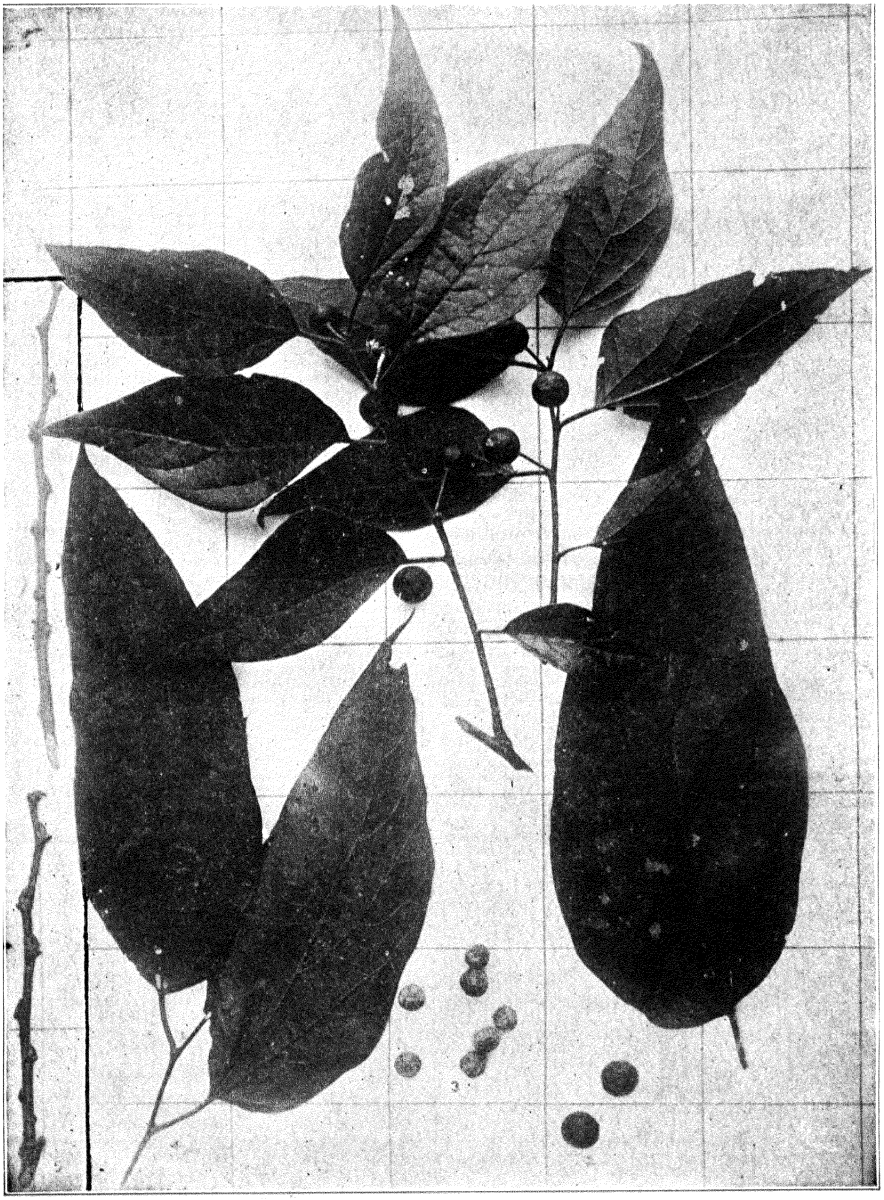


Fig. 220. Branchlets with leaves and mature fruit, 1; detached fruits, 2; isolated pits, 3; leaves from vigorous shoots, 4; branchlet in winter, 5.

221. Trunk of tree with leaves at base. Red River valley, Ark.

This tree attains the height of 60 or 80 ft. and in thickness of trunk 2 or 3 ft. It develops an open oblong head with more or less drooping lateral and lower branches, and is always of interest to one seeing it for the first time on account of its singular light gray smooth bark, covered at intervals with prominent excrescences and bosses. It is a handsome tree, as it is found hanging over the borders of lakes and bayous of the lower Mississippi valley in company with the Prickly Ash, Pecan, Nutmeg Hickory, Planer-tree, Deciduous Holly, Cypress, and other trees of the bottom-lands of those regions and the Gulf states. That its ornamental value is being justly appreciated is shown by the fact that it is being planted in the streets and parks of many of the southern cities and villages.

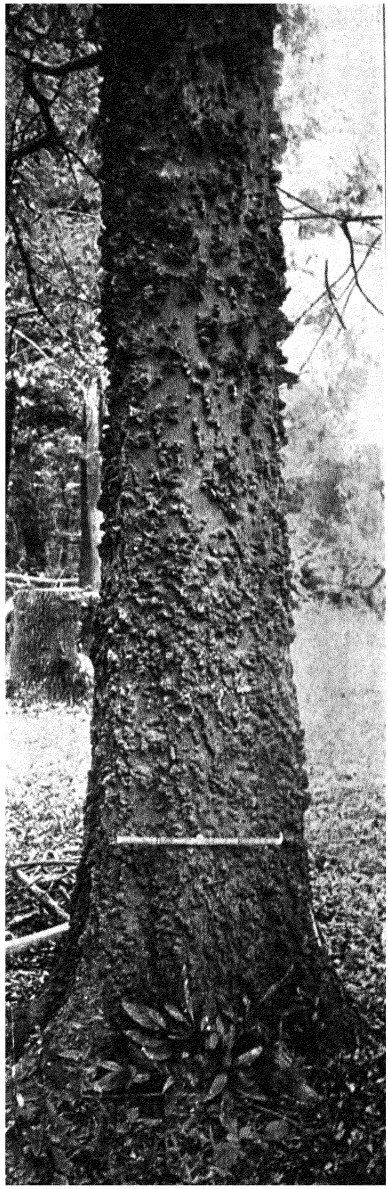
The wood is rather heavy, a cubic foot when absolutely dry weighing 49.57 lbs., and is not distinguished in commerce or uses from that of the *C. occidentalis*.[1]

Leaves ovate to oblong lanceolate, inequilateral and often falcate, 3-nerved, from wedge-shaped to rounded and very oblique at base, long taper-pointed, entire or with remote low sharp teeth, smooth dark green above, paler beneath. *Flowers* as described for the genus. *Fruit* small orange brown drupes, ¼ to ½ in. long, with thin flesh and reticulated pit.

Var. *reticulata* (Torr.) Sarg is the *Palo Blanco* of the Southwest, but not found within the area covered by this work.

1. A. W., XI, 265.





WHITE MULBERRY.

Morus alba L.

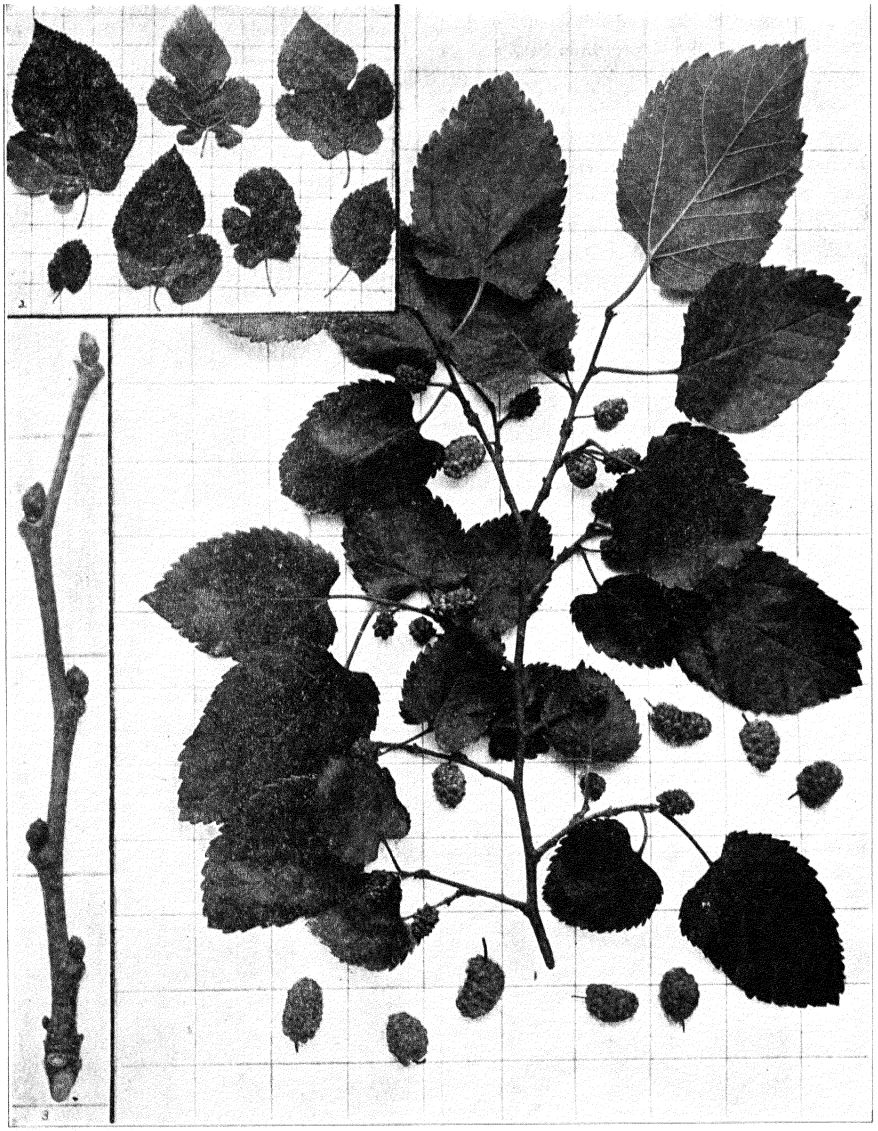


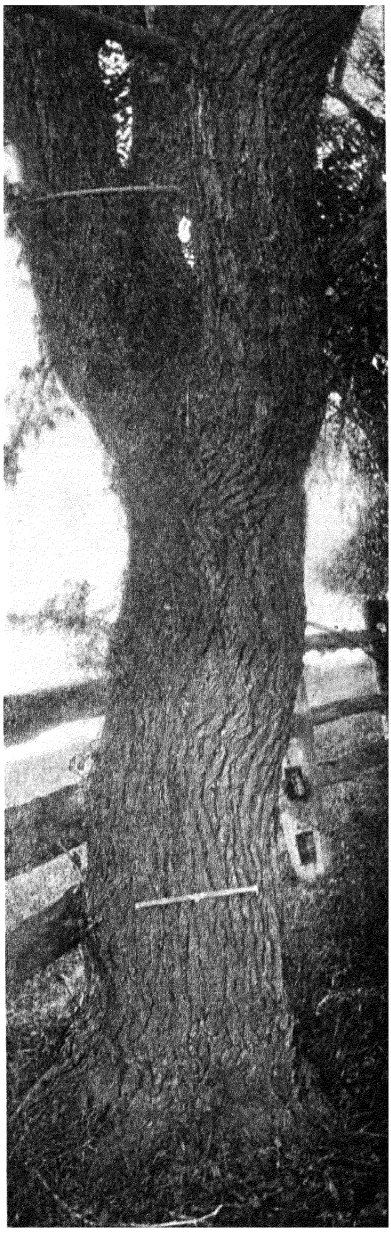
FIG 222. Branch with mature leaves and fruit, 1; an assortment of leaves, 2; branchlet in winter, 3.
223. Trunk of tree on Staten Island, N. Y.
224. Wood structure magnified 15 diameters.

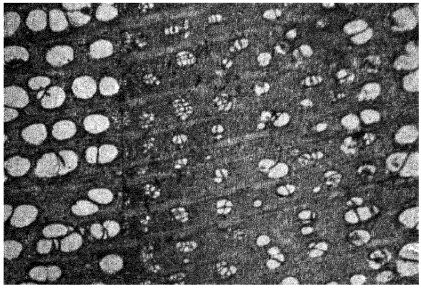
The White Mulberry, in that its leaves furnish the most valuable food known for the Silk-worm, has the distinction of being the tree about which more has been written than any other tree. Upon its existence, too, depend the employment of vastly more people and capital than any other tree, and no other tree has been so extensively cultivated. It grows naturally in northern China and Japan, but has been carried into all countries where climatic conditions are favorable. As early as in the seventeenth century it was brought to America and until the outbreak of the Revolutionary War its propagation was encouraged by the British government, as a basis for the establishment of silk production in this country. Many thousands of trees were planted and great preparations made, but the value of labor here has always made it impossible to compete with the Old World in silk production and the fortunes spent in early days were lost, but the White Mulberry tree remains as a lasting monument to the departed hopes.

The Wood of the White Mulberry is of secondary importance, but is hard and durable and used to some extent for furniture, boat-building, etc.[1] Its fruit is edible and from that of a variety growing in Turkestan it is said a flour is made.

Leaves mostly ovate, 3-7 in. long, serrate, and on vigorous shoots often with from 1-5 wide lobes, cordate or truncate at base, mostly acute at apex, thin, shining dark green above, duller beneath *Fruit* maturing in June or July, ½-1½ in long, sweet and succulent, usually white or pinkish tinted Several varieties have originated in cultivation, one with nearly black fruit.[2]

1. A. W., XII, 290.
2. For genus see p. 433.





RED MULBERRY.

Morus rubra L.

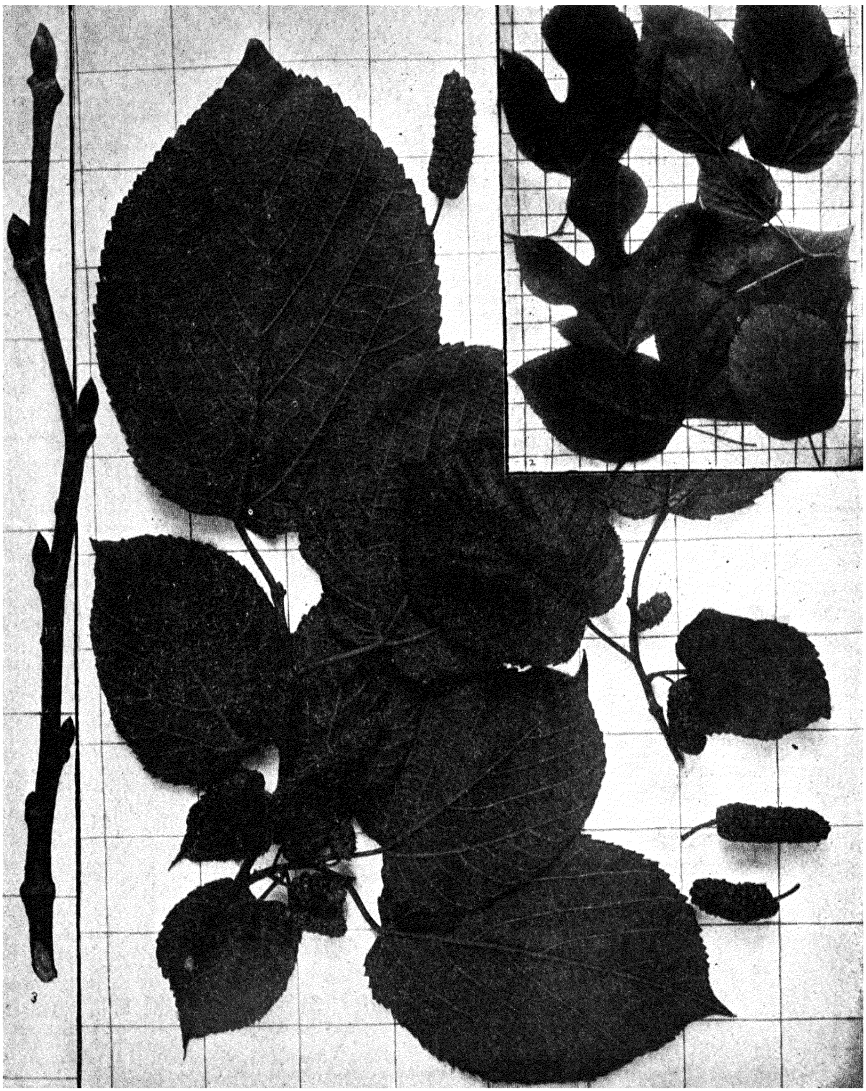


Fig. 225. Branchlets with mature leaves and fruit, 1; an assortment of leaves, 2; branchlet in winter, 3.

226. Trunk of tree in Genesee valley near Scotts Hill, N. Y.

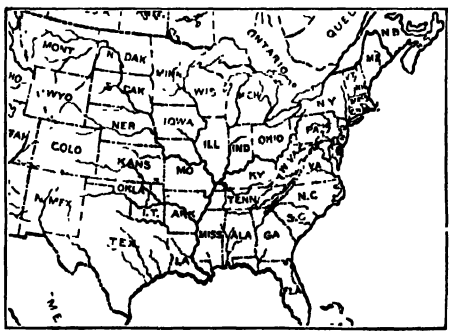
The Red Mulberry when growing in the forest attains the height of from 60 to 80 ft. and is sometimes 3 or 4 ft. in diameter of trunk. When growing apart from the influence of other trees it develops a compact, broad, rounded top of many small branches, and the short trunks of these isolated trees are sometimes thicker than the measurements above noted. It is a handsome tree with large distinct leaves, on account of which it casts a dense shade, and is well worthy of being planted as an ornamental shade tree. It inhabits rich bottom-lands and low hillsides which it enlivens in autumn with its bright pale-yellow autumnal garb. Its sweet juicy fruit, very much resembling a blackberry in appearance, is esteemed as one of our choice native fruits, and some natural varieties, distinguished on account of the abundance or size of fruit, are being propagated by horticulturists. The fruit is eagerly devored by birds and other denizens of the forest and on the farm by poultry, etc.

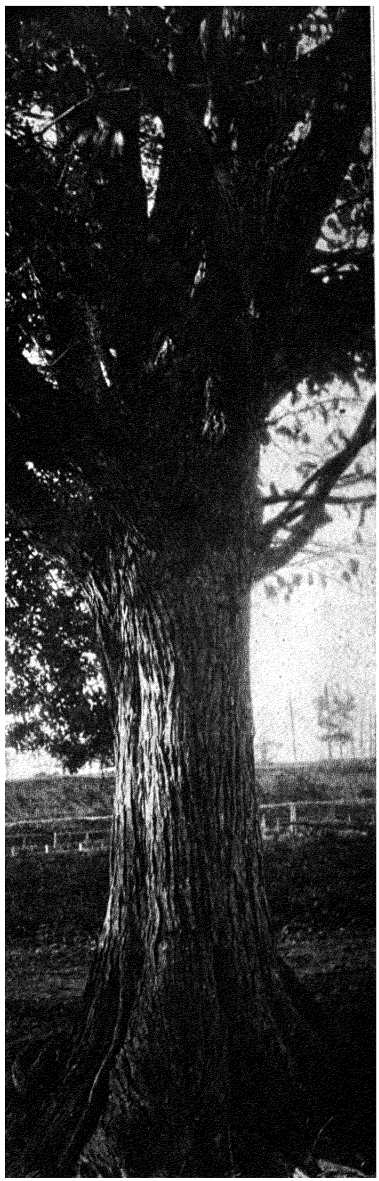
The wood is rather heavy, a cubic foot when absolutely dry weighing 45.41 lbs., moderately soft and very durable and is used in cooperage and boat building, for fences, etc.[1]

Leaves mostly orbicular-ovate, some 3 5-lobed or with single lobe on one side, from rounded to cordate at base, abruptly acuminate at apex, serrate, dark green and roughish above, pale pubescent and prominently reticulated beneath. The primary veins arcuate and united near the margins; stipules lanceolate, pale or reddish green. *Flowers*: staminate spikes drooping, with stout pubescent peduncles; stamens with flattened filaments tapering from base to anther; pistillate spike smaller and with shorter peduncles. *Fruit* purplish black when fully ripe, oblong, averaging about one inch in length, juicy and delicious.

1. A. W., III, 63.

2. For genus see p. 433.





PAPER MULBERRY.

Broussonetia papyrifera (L.) Vent.

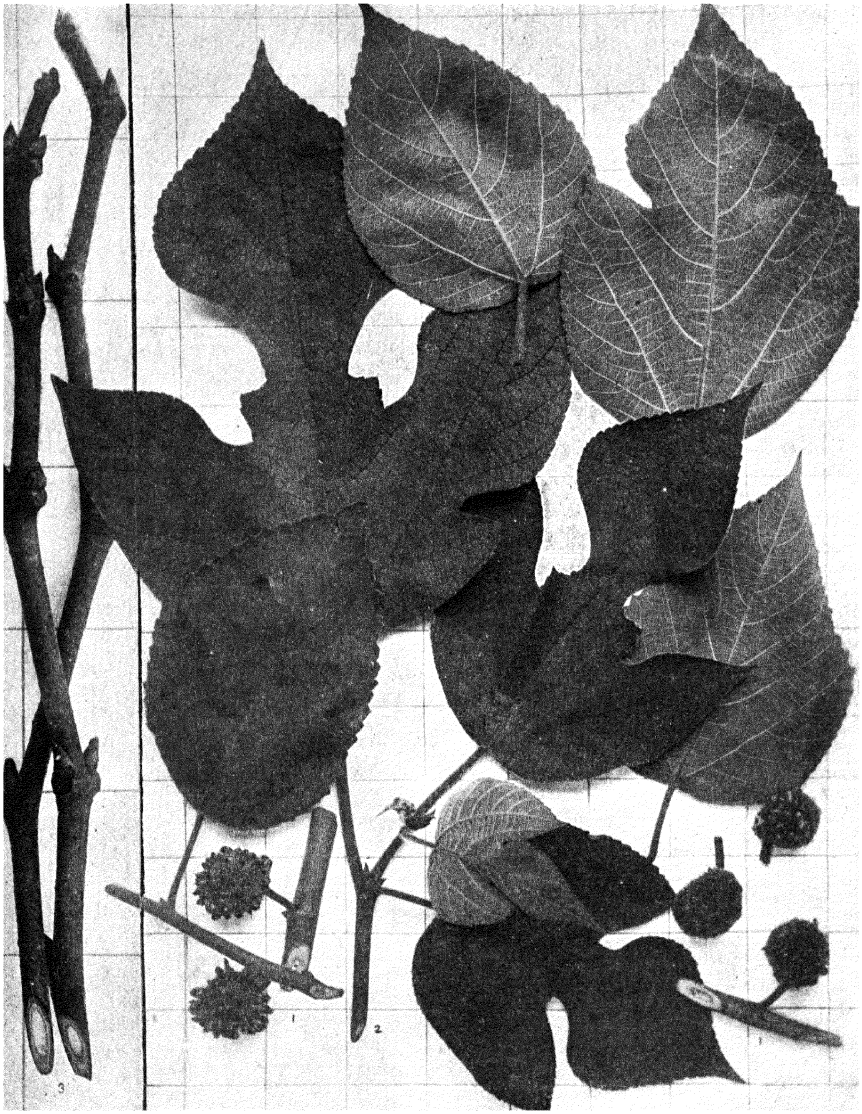


Fig. 227. Portions of branches showing mature fruit, 1; leafy branchlet, 2; branchlets in winter,
228. Base of an old gnarled trunk at Suffolk, Va.
229. Trunk of a younger tree with leaves at base, near New York.
230. Wood structure magnified 15 diameters

The Paper Mulberry is an introduced tree from eastern Asia and the neighboring islands. Introduced into this country for ornamental purposes it has escaped and become naturalized in many localities in the Atlantic states from New York to Florida and as far west as Missouri. It does not often attain a greater height than 40 or 50 ft. but develops a wide-spreading rounded top of ample vigorous foliage and short trunk 3 or 4 ft. in thickness. The bark of young trunks is quite smooth and handsomely reticulated with pale yellow lines. Old trunks commonly become singularly gnarled and convoluted. The tree is called Paper Mulberry from the fact that paper of very good quality is made in China and Japan from its inner bark. The tapa-cloth which is used extensively by the South Pacific Islanders is also a product of this tree, being made from the inner bark by maceration and pounding to remove the non-fibrous portion.

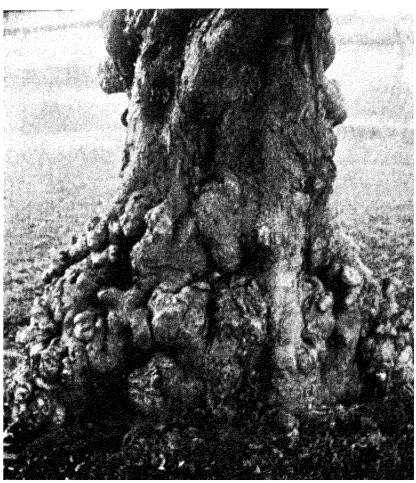
The wood is rather soft, light, coarse-grained and easily worked, but of no commercial importance in this country.[1]

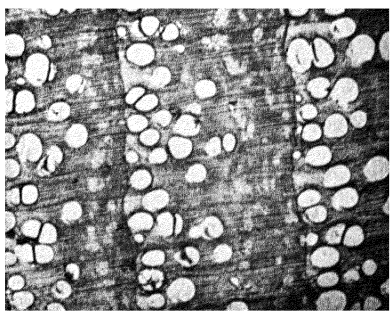
Leaves usually ovate, 3-8 in. long, not lobed and also (especially on young plants) variously 3-5-lobed or with single lobe on one side all forms commonly on the same tree, cordate or rounded at base, acuminate, serrate-dentate, rough above, velvety tomentose beneath, long petiolate. *Flowers* in middle spring, staminate aments pedunculed. *Fruit* heads, ¾ in. across, with red exserted fleshy perianth.[2]

1 A. W., XI, 266.

2 For genus see p 433.







OSAGE ORANGE.

Toxylon pomiferum Raf.[1]

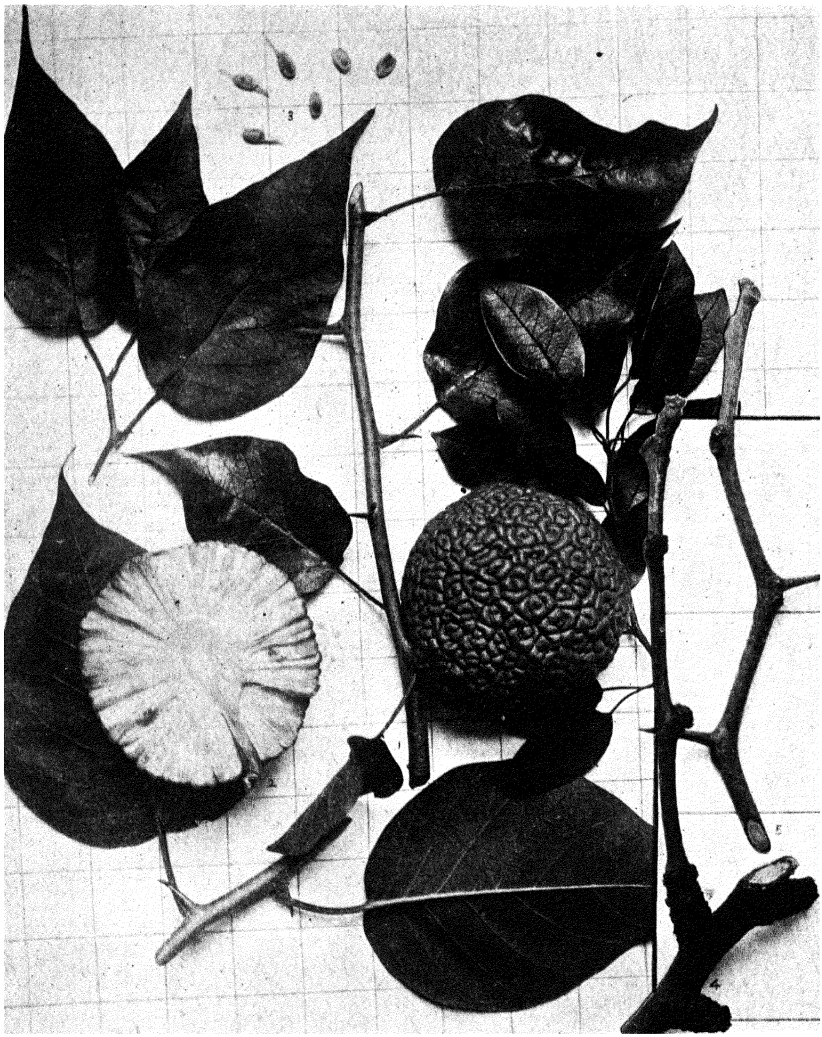
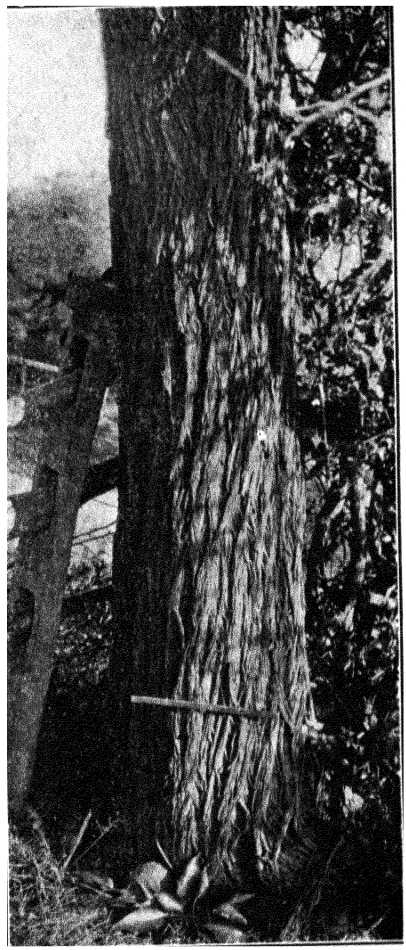


Fig. 231. Branchlet bearing leaves and mature fruit, 1; fruit in section, 2; isolated seeds, 3; section of branch with old branchlet, 4; a terminal branchlet of first season's growth, 5.

232. Trunk of tree with spray of leaves and fruit at base. Staten Island, N. Y.

233. Wood structure magnified 15 diameters.

The Osage Orange attains the height of 50 or 60 ft. when growing in the forest. When growing apart from other trees it has a short thick trunk from 18 in. to 3 ft. in diameter, and then divides into a few large limbs which send out many commonly curved branches and form a symmetrical rounded or dome-shaped top, with lower branches drooping nearly to the ground. The bark of trunk is deeply furrowed and of an orange brown color, and the stiff branches are beset with many short thick axillary spur-like spines. Its lustrous leaves and good habit of growth make it a desirable tree for ornamental purposes, for which use, however, the pistillate trees are preferable, as their beauty is greatly enhanced in summer by their large conspicuous orange-like fruit.

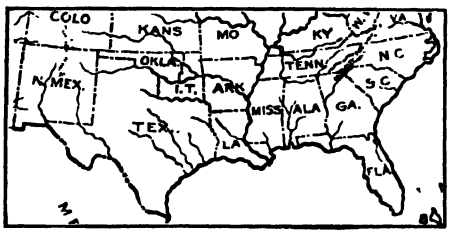


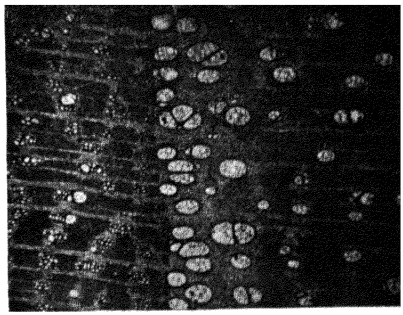
The Osage Orange is excellently adapted to use in hedges and is extensively planted for that purpose. Through this agency it has become widely naturalized, over a considerable portion of the United States, though inhabiting naturally only the limited area shown on our map.

The wood is heavy, a cubic foot when absolutely dry weighing 48.21 pounds, very strong and durable, and is valued for railway ties, fence posts, the hubs of wheels, etc. Formerly it was a favorite wood with the Indians, of the region in which it grows, for their bows, and from this fact it is commonly called in those regions "*Bow wood*" or, by the French inhabitants, "*Bois d'Arc.*"[2]

For botanical characters see description of the genus, this being the only species.[3]

1. Syn. *Maclura aurantiaca* Nutt.
2. A. W., XII, 291.
3. For genus see p. 434.





CUCUMBER TREE. MOUNTAIN MAGNOLIA.

Magnolia acuminata L.

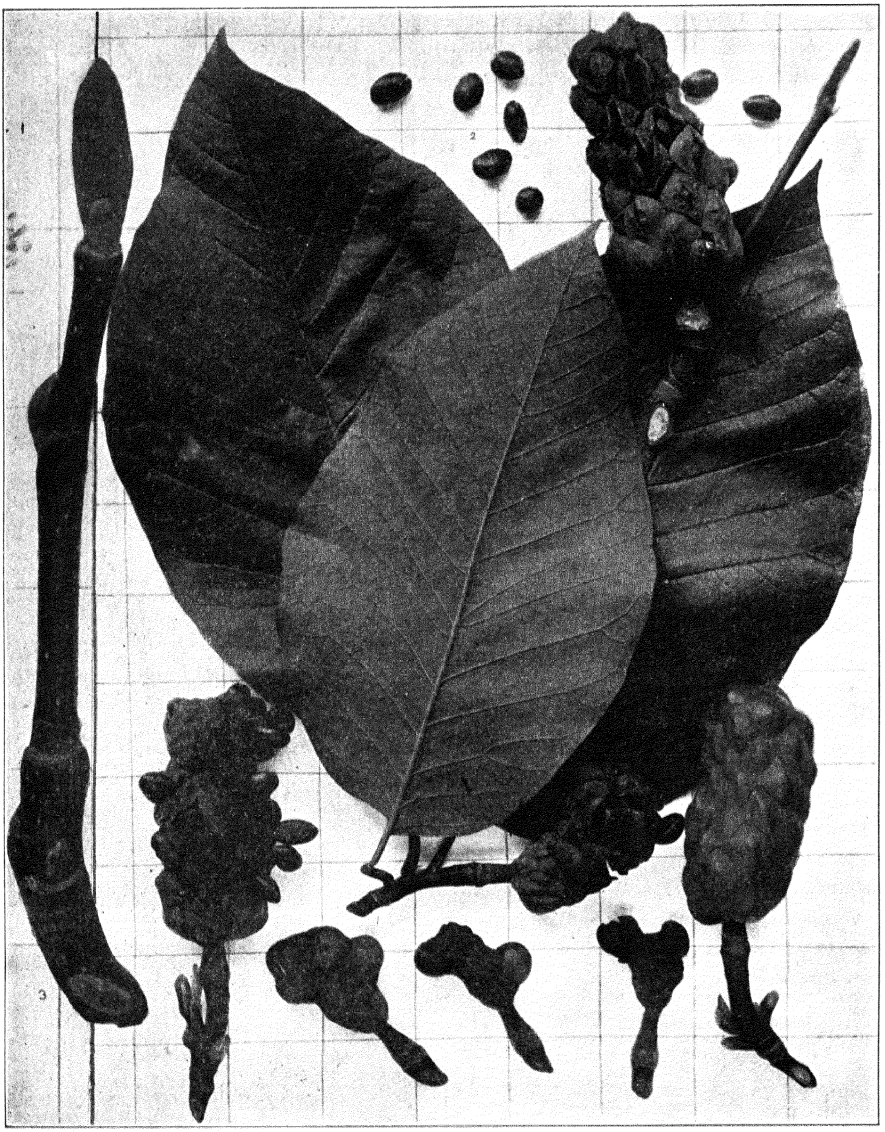


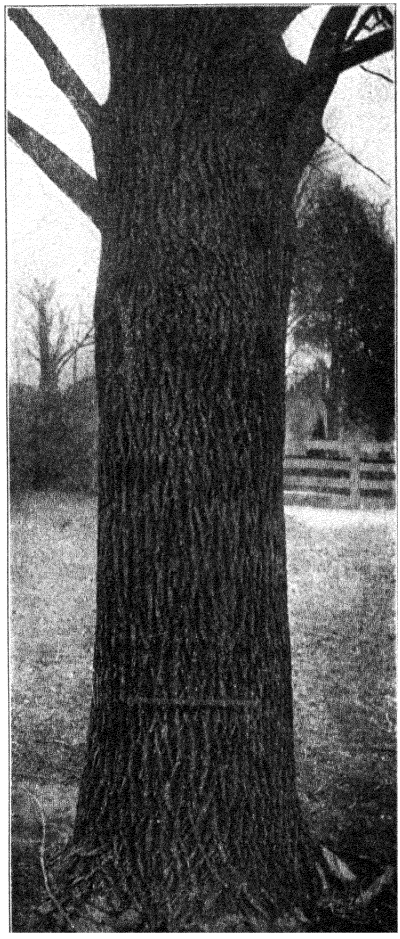
Fig. 234. Branchlet with mature leaves and fruit, 1; isolated seeds, 2; branchlet in winter, 3.
235. Trunk of tree, in northern Virgina.
236. Wood structure magnified 15 diameters.

This tree, the northernmost and one of the largest representatives of the genus in America, attains in the forest the height of 80 or 90 ft. with straight columnar trunk 3 or 4 ft. in diameter, vested in a grayish brown scaly-ridged bark. When isolated it develops a wide rounded pyramidal top and is always a tree of marked appearance on account of its large handsome leaves. It inhabits mountain slopes and the gravelly banks of streams, rarely if ever forming pure tracts of forest, but in company with various Oaks and Hickories, the Tulip Tree, Sweet Birch, Sugar Maple, White Ash, etc.

The hardiest of the Magnolias, it is extensively planted as an ornamental shade tree, for which it is peculiarly appropriate, owing to its good habit of growth and the abundance of its ample leaves, which cast a dense shade and in autumn assume a pale yellow color.

Its wood is light, a cubic foot when absolutely dry weighing 29.23 pounds, soft, easily worked and durable.

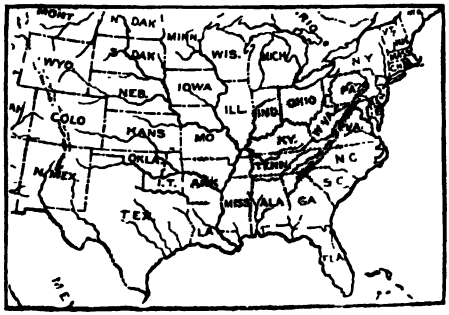
It is very similar to the White-wood in properties and applicable to the same uses. It is also valued for pump logs, troughs, etc., on account of its great durability.[1]

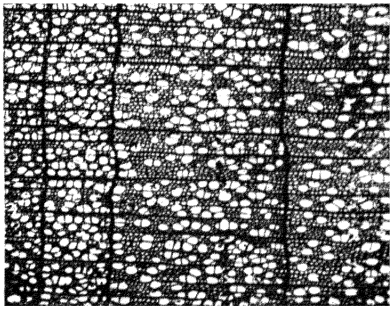


Leaves deciduous, scattered on the branchlets, 7-10 in. long, oblong or oval, rounded or slightly cordate at base, acute or acuminate at apex, thin, glabrous, dark green above, paler and more or less pubescent beneath. *Flowers* oblong bell-shaped, more or less inclosed, pale yellowish green, glaucous, the membraneous sepals 1-1½ in. long, and the thick obovate concave petals 2-2½ in long, the three of the outer row narrower than those of the inner. *Fruit* oblong, usually curved, glabrous, dark red.[2]

Var. *cordata* Sarg is a form with broader leaves and more heart shaped at base and smaller yellow flowers, is found in cultivation and approximated by wild flowers in South Carolina and Alabama.

1. A. W., I, 1.
2. For genus see p. 434.





LARGE-LEAF MAGNOLIA.

Magolia macrophylla Michx.

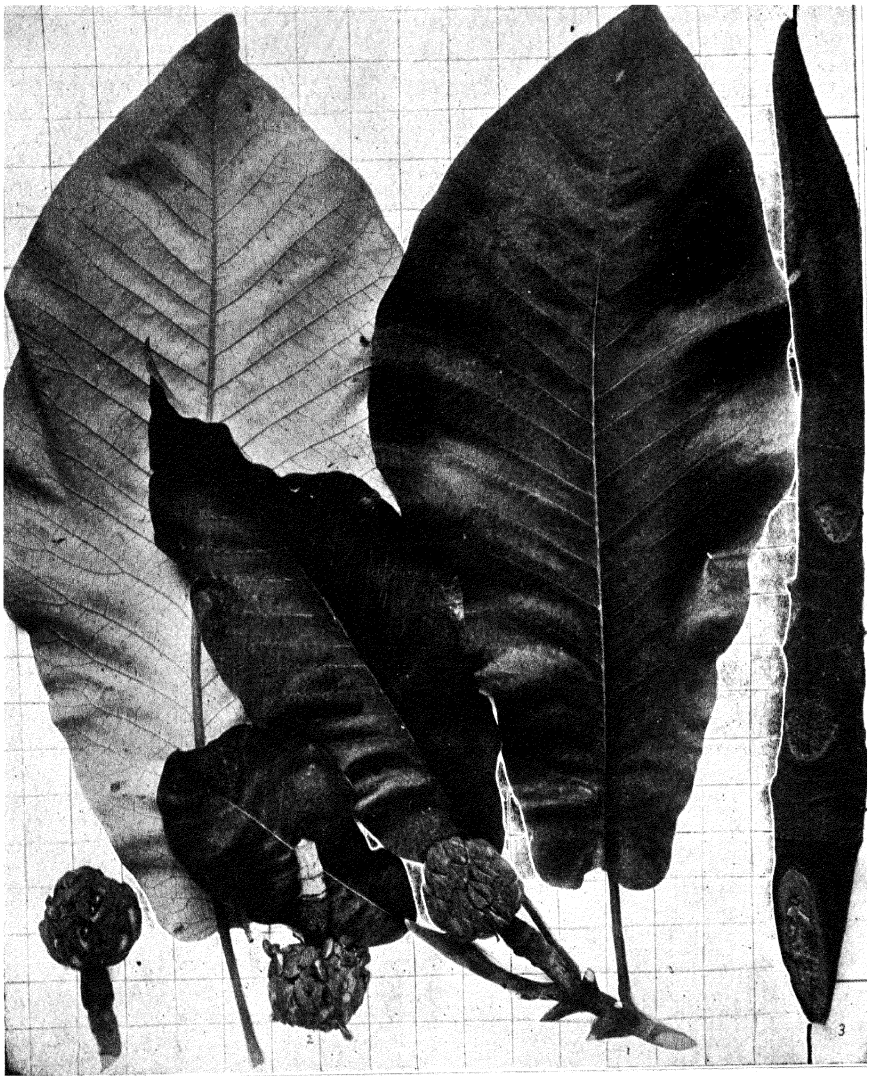


Fig. 237. Branchlet with mature leaves and fruit, 1; detached fruits showing escaping seeds, 2; branchlet in winter, 3.

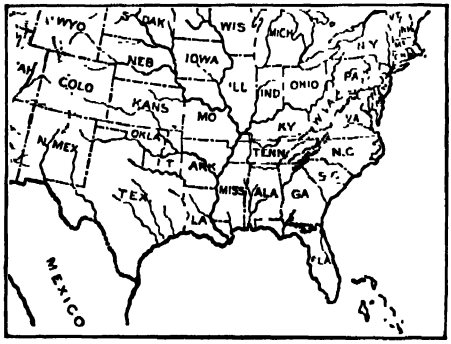
238. Trunk of tree with foliage of young shoots in background. Alleghany Mountains, Tenn.

This singular and very interesting tree rarely attains a greater height than 30-50 ft., or its trunk a greater thickness than 18 in. to 2 ft., with few large branches forming a wide-topped head. No tree in the American forests equals it in the great size of leaves and flowers, or surpasses it in ornamental value. It inhabits the rich soil of sheltered valleys and slopes of the Alleghany Mountains, in company with various Oaks and Hickories, the Sugar Maple, Dogwood, Witch Hazel, Chestnut, etc.

It seems strange that this beautiful tree is not more extensively planted as an ornamental shade tree, as it is said to be hardy as far north as Massachusetts, and few trees can be found that equal it in ornamental value and tropical effects. Not alone are its great leaves marvelous, but its pure white flowers when expanded are too large to be covered by the largest dinner plate. Later they are succeeded by its large globose pink cones, hardly less ornamental, especially when opening and dangling on slender threads their conspicuous bright red seeds, probably to induce passing birds to aid in their dissemination.

The wood is similar in appearance and properties to that of the Cucumber-tree, a cubic foot when absolutely dry weighing 33.09 lbs.

Leaves deciduous, 20-30 in. long, obovate or oblong, narrowed and cordate at base, acute or rounded at apex, bright green and glabrous above, white-pubescent beneath. *Flowers* open bell-shaped, white with purple spot at base, fragrant. *Fruit* subglobose, pubescent.





UMBRELLA TREE.

Magnolia tripetala L.[1]

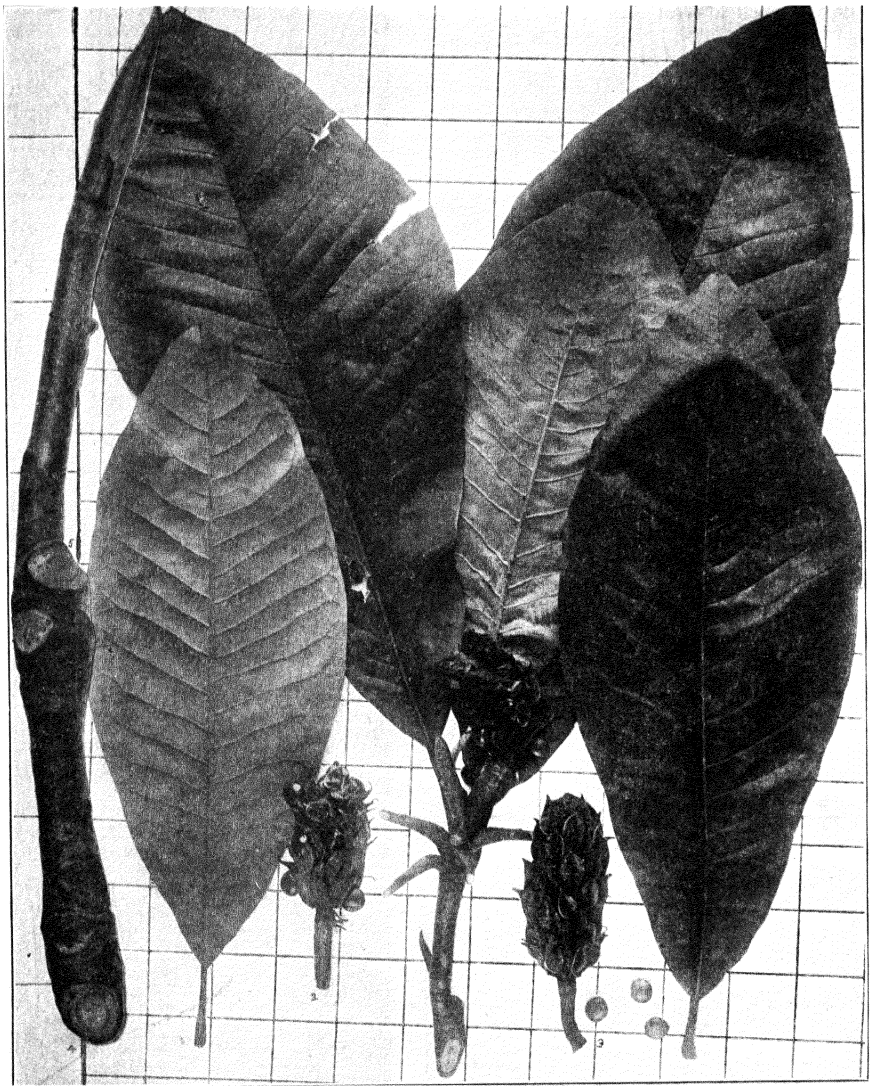


Fig. 239. Branchlet with mature leaves and fruit, 1; detached fruit with escaping seeds, 2; do, after the escape of seeds, and seeds nearby, 3; branchlet in winter, 4; scar on same indicating the location of fruit of the previous season, 5.

240. Trunk of a transplanted tree with leaves of vigorous shoots. New York City.

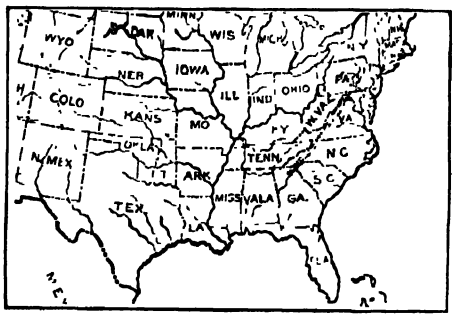
This Magnolia is a tree of medium size, attaining sometimes a height of 30 or 40 ft with straight or sometimes inclined trunk rarely more than 18 in. in diameter It sends out a few large and often contorted branches making a rather irregular open head, and often sends up several stems clustered about the main trunk. It grows in rich deep soil along the mountain streams and sheltered intervales, and is uncommon and local in its distribution. It never forms tracts of exclusive forests, but is found scattered among Chestnut Oaks, Large-leaf and other Magnolias, Rhododendrons, the Yellow Buckeye, and other trees which clothe the slopes of the Alleghany Mountains.

It is vigorous and quite hardy as far north as central New York and is largely planted as an ornamental shade tree, for which use it is peculiarly appropriate. It takes its common name from the resemblance to an umbrella found in its radiating clusters of leaves at the extremities of its branchlets.

Its wood is light and soft, a cubic foot when perfectly dry weighing 27.96 lbs.

Leaves clustered at the ends of the branchlets, deciduous, obovate-oblong, cuneate at base, acute at apex and at maturity glabrous above, paler beneath. *Flowers* white ill scented, cup shaped, 4-5 in. deep; sepals light green; petals 6-9 white, concave, those of the outer row largest; filaments light purple *Fruit* 2½-4 in. long, ovoid-oblong, glabrous, light red

1. *Magnolia Umbrella* Lam.





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

Magnolia Fraseri Walt.

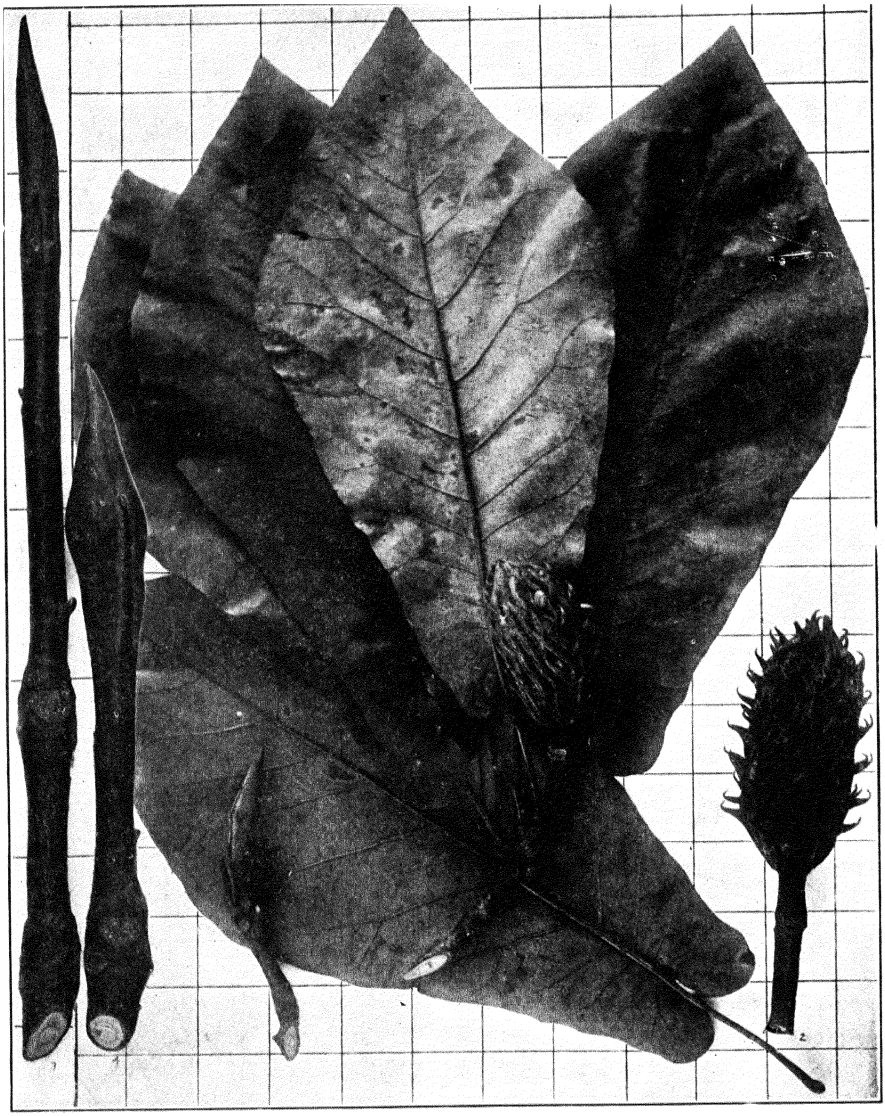


Fig. 241. Branchlet with mature leaves and fruit with escaping seeds, 1; fruit after the escape of seeds, 2; branchlet in winter showing leaf-buds only, 3; do. with terminal flower-bud, 4.

242. Trunk of tree in Mo. Botanical Garden, St. Louis, Mo.

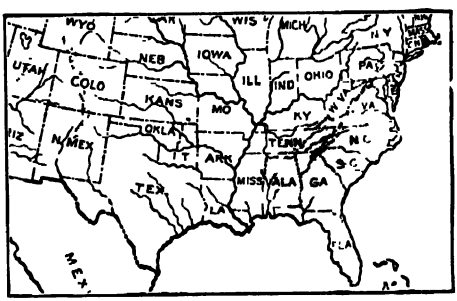
The Fraser Magnolia is never a very large tree. It attains the height of from 30 to 40 ft., and its trunk, often crooked and leaning, is rarely more than 12 or 18 in. in diameter, vested in a gray-brown smoothish bark. With few large branches it forms a wide-topped often irregular head, and frequently sends up two or more trunks from a single base. It is quite an abundant tree on the southern slopes of the Alleghanies at an altitude of from 2000 to 3000 ft. where it may be found leaning over the turbulant mountain streams in company with the Sorrel-tree, Rhododendrons, Witch Hazel, Silver-bell Tree, Black Birch, Yellow Buckeye, etc. It ranges northward among the mountains into Virginia, where, however, it is far less abundant. Not as hardy as most of the other Magnolias, it is not as extensively planted for ornamental purposes, excepting in the Southern and Middle States where it is planted as a valuable ornamental tree.

Its wood is light, a cubic foot when absolutely dry weighing 31.18 lbs., soft and easily worked.[1]



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

1. A. W., XI, 251.



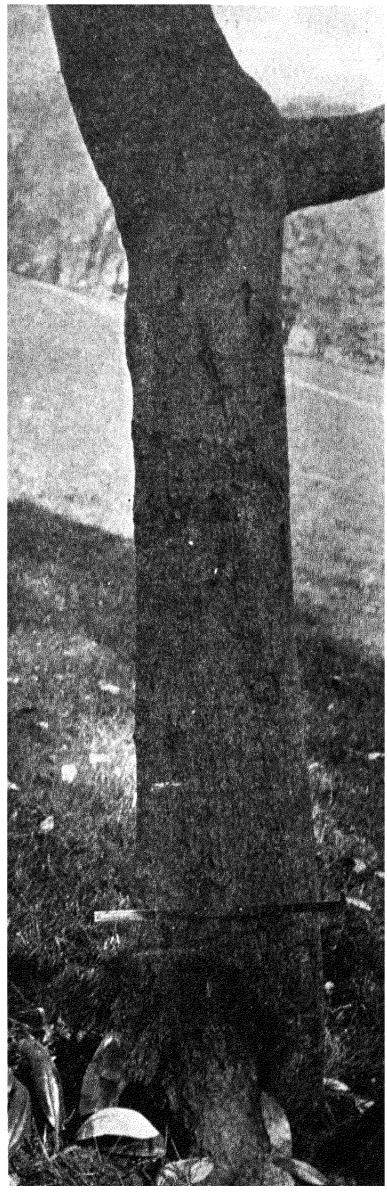
SWEET BAY.

Magnolia glauca L.



Fig. 43. Branchlets with mature leaves and fruit, one closed and one with escaping seeds, 1; fruit showing empty follicles and scattered seeds near by, 2; leafy branchlet showing flower-bud for the next season, 3; branchlets in winter, 4.

244. Trunk of a tree with leaves at base.



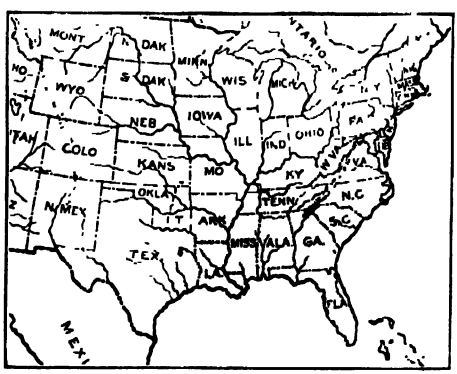
This favorite tree in the forests of the south Atlantic and Gulf states attains the height c. 60 or 70 ft., with trunk 2–3 ft. in diameter covered with a brownish gray bark, which may be universally smooth or beset with scattered boss-like excrescences. When growing apart from other trees its habit is to form an oblong or rounded shapely top. It grows in the low moist soil of swamps and about the borders of Pine-barren ponds, associated with the Loblolly and Red Bays, Wild Olive, Evergreen Magnolia, Holly, Yaupon, Red Maple, etc. Farther northward it is a much smaller tree, and, at the extreme northern limit of its range, only a shrub.

Such is its deserved popularity for ornamental planting that its handsome party-colored leaves are familiar objects in almost every American city park, where the climate will permit, and when it fills the air in early summer with the delicious fragrance of its pure white flowers it is sure to attract admiration from every visitor.

The light soft wood, which when absolutely dry weighs 31.38 pounds to the cubic foot, is occasionally used in the manufacture of wooden-ware, etc.[1]

Leaves scattered on the branchlets, oblong to oval, 3-6 in. long, obtuse or acute at both ends, lustrous dark green above, whitish pubescent beneath, thick, usually concave, and in the north deciduous in the autumn, but in the south persisting until spring. *Flowers* (May and June) creamy white, very fragrant, cup-shaped, about 2 in. across; sepals obtuse, spreading; petals short, broad, concave. *Fruit* irregular oblong, dark red, glabrous, from 1¼-2 in. long; seed about ⅛ in. long, compressed.

1. A. W., III, 51.



TULIP TREE. WHITE-WOOD. YELLOW POPLAR.

Liriodendron Tulipifera L.

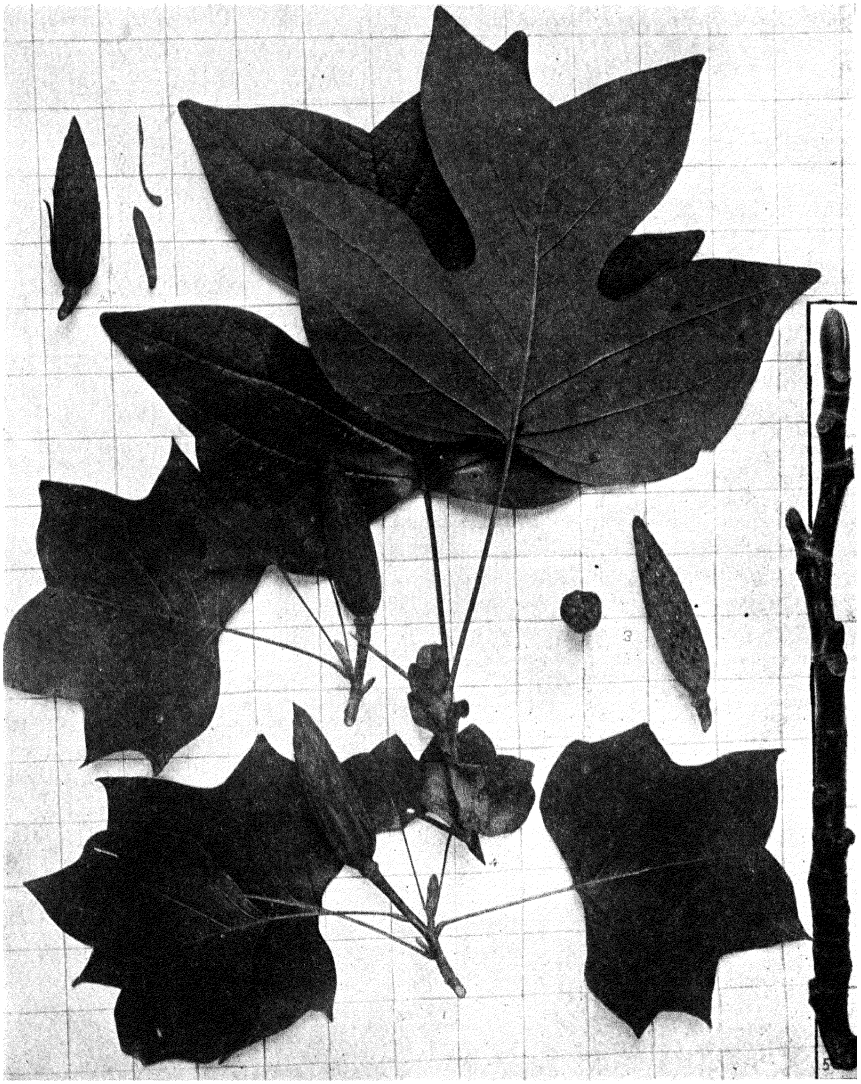


Fig. 245. Branchlets with mature leaves and fruit, 1; cone disintegrating and detached samaræ, 2; cone in transverse and longitudinal section, 3; end of vigorous shoot, showing leaves and large stipules, 4; branchlet in winter, 5.

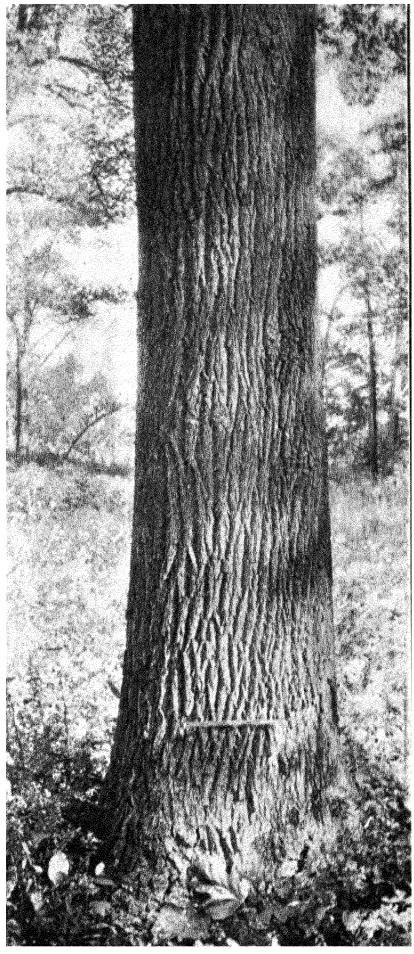
246. Trunk of tree, Staten Island, N. Y.

247. Wood structure magnified 15 diameters.

The Tulip-tree is one of the very largest and of the most valuable trees of the Atlantic States. In the valleys of the streams tributary to the Ohio River and on the slopes of the Alleghanies individuals have been found to attain the height of from 150 to 190 ft. with columnar trunks 8 or 10 ft. in diameter, and free from branches to a height of from 80 to 100 ft. — trunks unsurpassed in grandure of column by those of any eastern American tree. While such great trunks are exceptional still no eastern trees possess such uniformly straight clear trunks. It inhabits deep rich well drained soil but never forms exclusive forests.

It is largely planted throughout the Eastern states as an ornamental shade tree and few trees equal it in value for this purpose. The young trees are of a pyramidal habit of growth but the older trees have an oblong head with rather short branches. They are handsome in summer with their clean-cut distinct leaves and tulip-like flowers, and in winter when their open cones are conspicuous on leafless branches and from which the twirling samarae are carried away by every gust of wind.

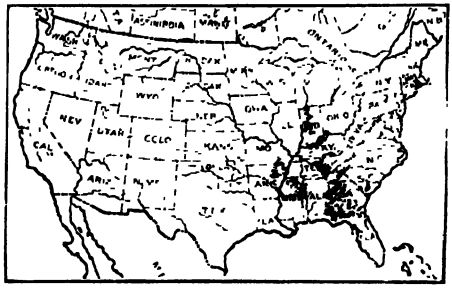
The wood, of which a cubic foot weighs when dry 26.36 lbs., is one of our most valuable woods for interior finishing, cabinet making, wooden-ware, etc.[2]

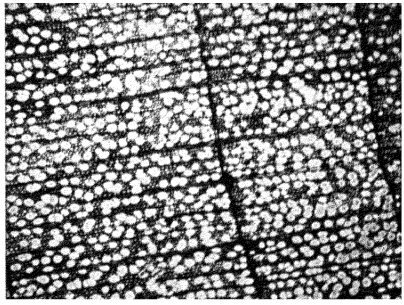


Leaves glabrous, shining dark green above, paler beneath, turning bright yellow in autumn *Flowers* tulip-like, 1½-2 in. deep. *Fruit* ripening in autumn but liberating the samarae mostly after the leaves have fallen.[3]

1. A. W., I, 2.

2. For genus see p. 435.





PAPAW.

Asimina triloba (L.) Dunal.

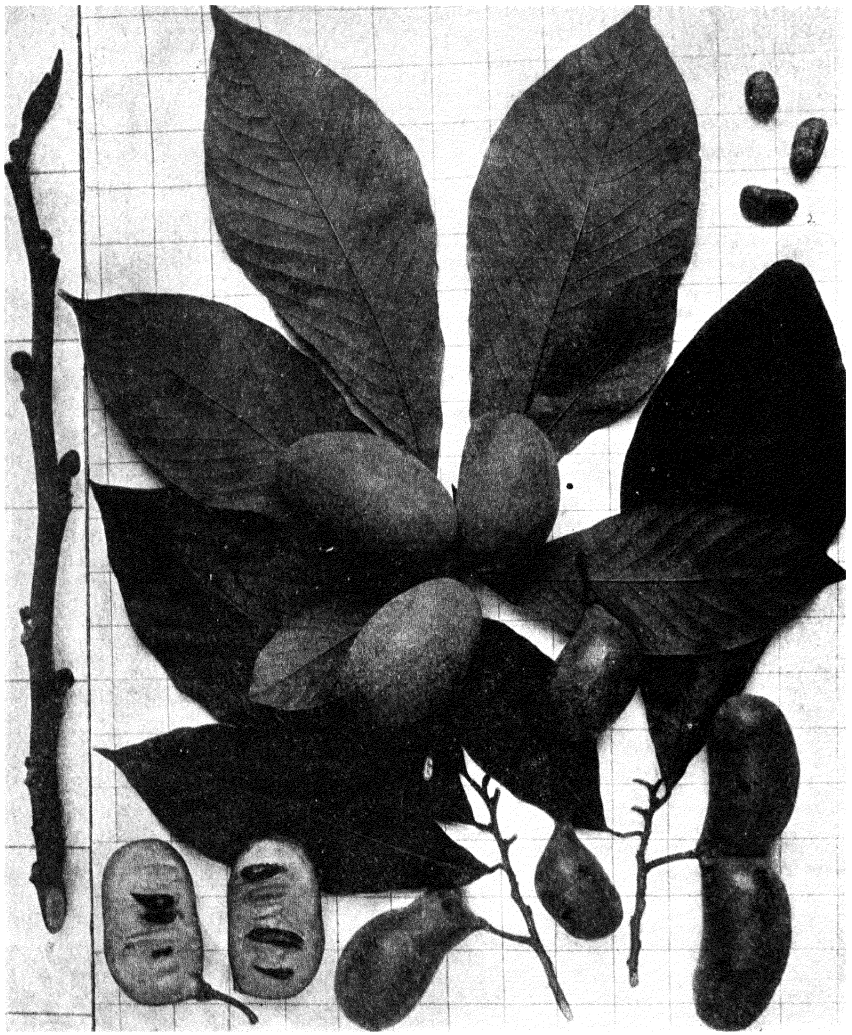


Fig. 248. Branchlets with mature leaves and fruit, one in section, 1; isolated seeds, 2; branchlet in winter, 3.

249. Trunk of tree in Missouri Botanical Garden, St. Louis, Mo.

250. Wood structure magnified 15 diameters.

Only under most favorable conditions does the Papaw attain the height of 30 or 40 ft. and is often only a large shrub. Its trunk is rarely more than from 8-12 in. in diameter, though I have seen it measuring 18 in. It commonly grows in thickets occupying the ground exclusively, and is sometimes scattered as an undergrowth in the forests of rich bottomlands. When isolated it develops a distinct pyramidal head. The bark of the trunk is of a dark brown color, thin and quite smooth, or sparingly fissured on old trunks.

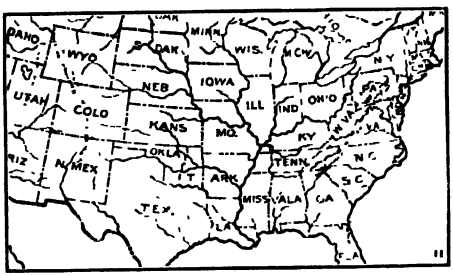
The handsome foliage of the Papaw, its beautiful flowers in early spring, and its curious fruit in autumn, strongly recommend it for ornamental planting. The fruit when very ripe is delicious and nutritious and sold in considerable quantities in local markets in regions where the trees abound.

The light wood, of which a cubic foot weighs 24.73 lbs., is of handsome greenish and yellow tints when freshly cut, but is of no commercial importance. The fibrous inner bark was formerly used for making cord for fish nets.[1]

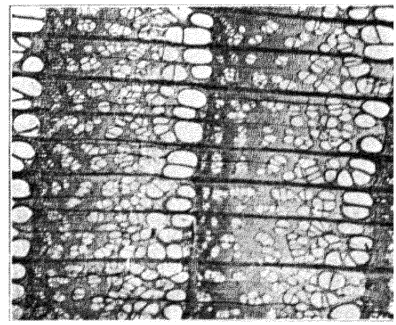
Leaves lance-obovate, 8-12 in. long, cuneate at base, abruptly acuminate or acute at apex, glabrous light green above, paler beneath. *Flowers* appearing with the leaves, dark purple, 1½ in across, with rusty tomentose peduncles, sepals broad-ovate, densely dark-tomentose; petals at first small and green but finally purple when fully grown and 2 or 3 times as long as the sepals, nectiferous at base. *Fruit* cylindrical oblong, oblique, 3-5 in. long, single or clustered 2 or 3 together with common peduncle, with smooth yellowish green rind, custard-like fragrant luscious flesh and oblong seeds about 1 in. long.[2]

1. A. W., IV, 76.

2. For genus see p. 435.







SWAMP BAY.

Persea pubescens (Pursh.) Sarg.[1]



Fig. 251. Branchlet bearing leaves and fruit not quite fully grown, 1 (The peduncles are usually somewhat longer at maturity); isolated seeds, 2; branchlet in autumn from which the leaves have been removed, 3.

252. Trunk of tree with leaves at base. Coast region of North Carolina.

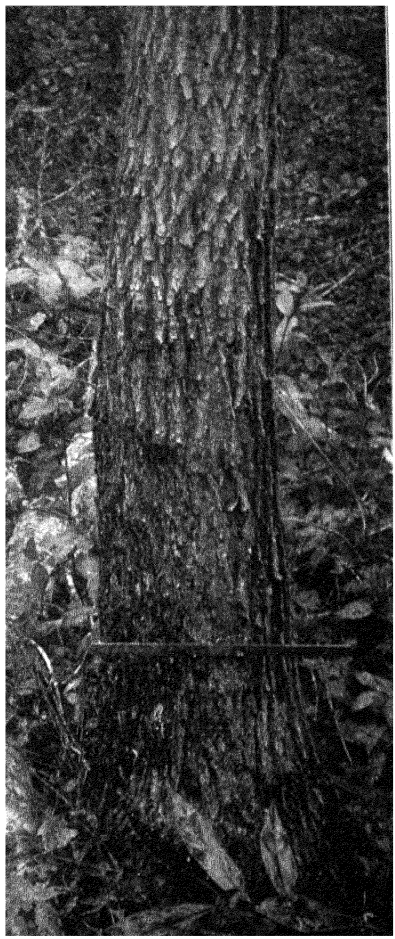
253. Wood structure magnified 15 diameters.

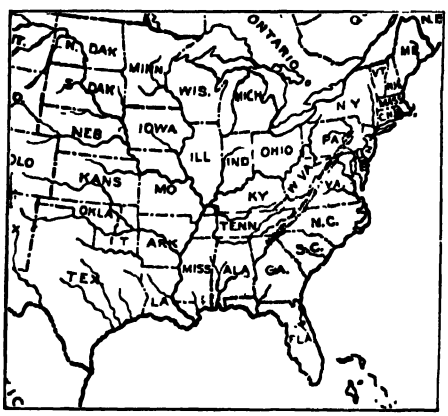
The Swamp Bay is a tree of medium size rarely more than 30 or 40 ft. in height or with trunk more than $1\frac{1}{2}$ ft. in thickness, with straight branches and copious foliage. It is confined to the coast regions of the Gulf and Atlantic states but ranges northward into Virginia, where I have seen it in the Dismal Swamp in company with the Bald Cypress, Red Maple, Tupelo and Water Gums, Water Ash, Over-cup and Laurel Oaks, etc. Further south it is more abundant occurring in pine-barren swamps, sometimes to the exclusion of nearly every other species.

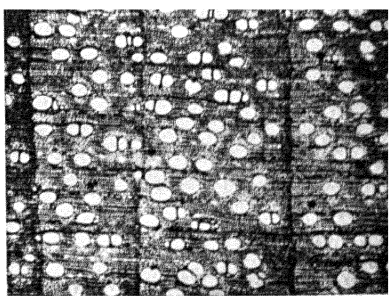
The wood is rather heavy, a cubic ft. when absolutely dry weighing 39.86 lbs., soft and strong, and when found large enough applicable to the same uses as the Red Bay.[2]

Leaves oval to lanceolate, about equally pointed at both ends, margin slightly revolute, tomentose when they unfold but when mature lustrous dark green above, paler and pubescent beneath, rusty tomentose on midrib and primary veins, veins conspicuous; petioles stout, these and the new growth generally rusty tomentose. *Flowers* with tomentose peduncles, from 1 3 in long when fully grown; calyx pale yellow with thick broad ovate pointed lobes, tomentose outside, pubescent inside, and those of the outer series about half as long as those of the inner. *Fruit* dark blue, from $\frac{1}{2}$ to $\frac{3}{4}$ in long, with thin aromatic flesh.[3]

1. *Persea Carolinensis* var. *palustris* Chapman.
2. A. W., V, 113.
3. For genus see p 435.







RED BAY.

Persea Borbonia (L.) Spreng.[1]

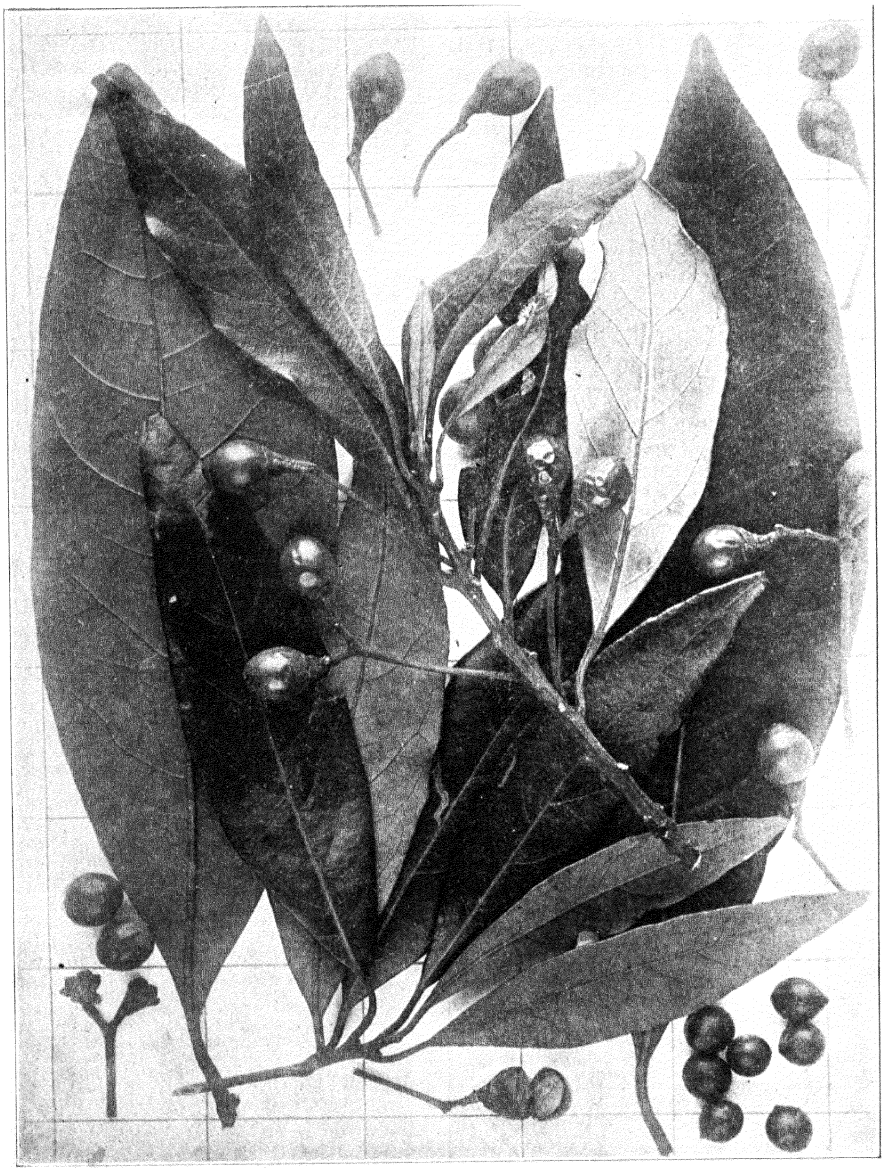


Fig. 254. Branchlets with mature leaves and fruit, fruit in section and isolated seeds.
255. Trunk of tree with leaves at base. Smiths Island, North Carolina coast.

The Red Bay ranges from 50 ft., or less, to 70 ft. in height, with stout erect branches and forming a symmetrical top. Its trunk is rarely more than 3 or 3½ ft. in diameter, and is vested in a gray-brown scaly ridged bark.

It inhabits rich moist soil along the borders of streams and swamps or occasionally drier sandy soil, associating with the Live, Water and Laurel Oaks, the Yaupon, Devil-wood, Laurel Cherry, Cuban Pine, etc.

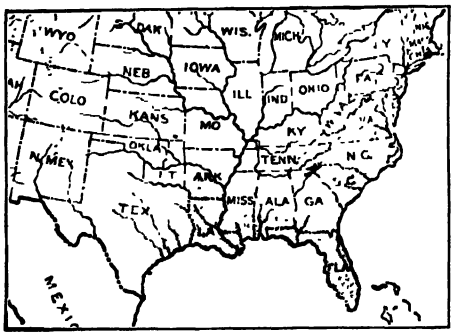
Though rarely seen in cultivation the Red Bay is well worthy of being planted for ornamental purposes, as it is one of the most beautiful evergreen trees of the American forests, with its bright green leaves and red-stemmed clusters of blue berries.

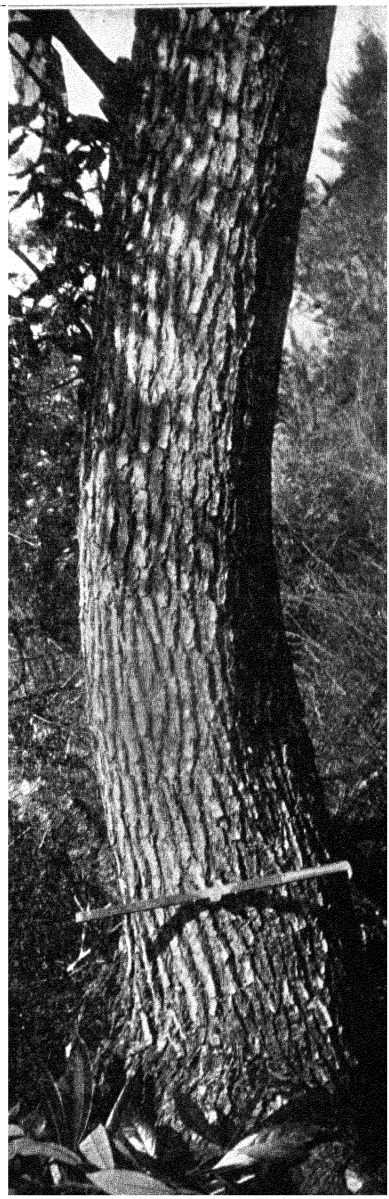
A cubic foot of the absolutely dry wood weighs 40.07 lbs. It is of medium hardness and strength and of a reddish brown color with thin sap-wood, and is used in the manufacture of lumber for interior finishing, furniture, etc., and formerly for boat building.[2]

Leaves oblong lanceolate, about equally pointed at both ends, with entire revolute margins, pilose at first but at maturity lustrous bright green above, paler and glaucous beneath, thick and firm, veins rather obscure and arcuate near the margin; petioles and new growths puberulous or nearly glabrous. *Flowers* with glabrous peduncles mostly from ½-1 in. long; calyx pale yellow. *Fruit* lustrous dark blue, about ½ in. or less in diameter with thin flesh and red stems.

1. ***Persea Carolinensis*** **Nees.**

2. A. W., XI, 264.





SASSAFRAS.

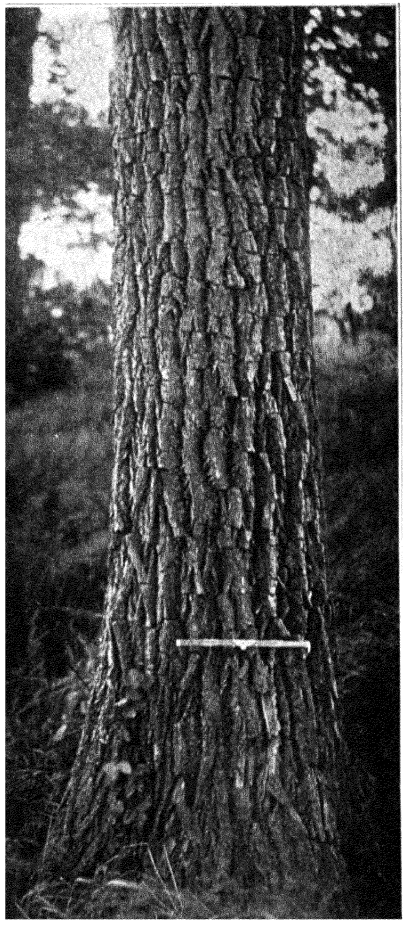
Sassafras Sassafras (L.) Karst.[1]



Fig. 256. Branchlet with mature leaves and fruit, 1; isolated drupes, 2; same in section, 3, branchlets in winter, 4.

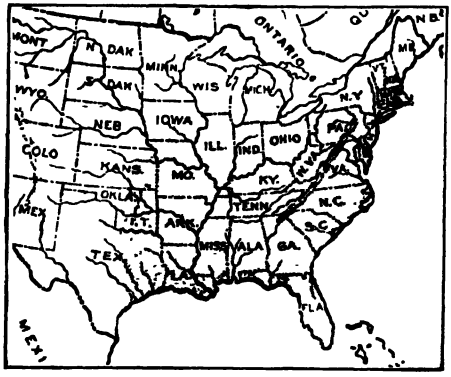
The Sassafras is a tree sometimes 80 or 90 ft. in height, with trunk from 4 6 ft. in diameter, but is usually a considerably smaller tree and in the northern part of its range is reduced to a shrub. When isolated its stout contorted branches ramify and ultimately divide into a profusion of branchlets, forming a distinctly flat-topped irregular oblong head of characteristic aspect. It is a handsome tree at all seasons of the year; in the winter on account of the unobstructed view of its red-brown furrowed bark and smooth green branchlets; in spring on account of the tufts of pale green velvety leaves and golden flowers, subtended by enlarged showy bud-scales which terminate each branchlet; in summer on account of its rich green leaves of many shapes and sizes and red-stemmed clusters of blue berries, and in autumn on account of the delicate red and yellow tints of its autumnal garb.

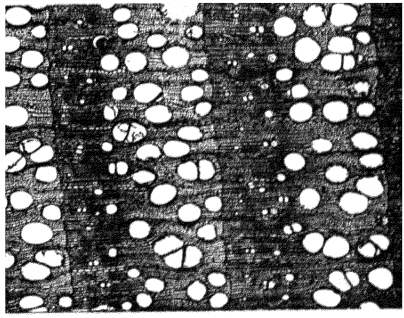
The wood of which a cu. ft. when absolutely dry weighs 31.42 lbs., is soft and brittle but very durable and is used in the manufacture of pails and buckets, for fence-posts, rails, etc.[2]



Leaves as described for the genus, 3-7 in. long. *Flowers* appear in April and May. *Fruit* ripens in August and September. See generic description, this being the only species[3]

1. Syn. *Sassafras officinale* N. & E.
2. A. W., II, 32.
3. For genus see p. 436.





WITCH-HAZEL.

Hamamelis Virginiana L.

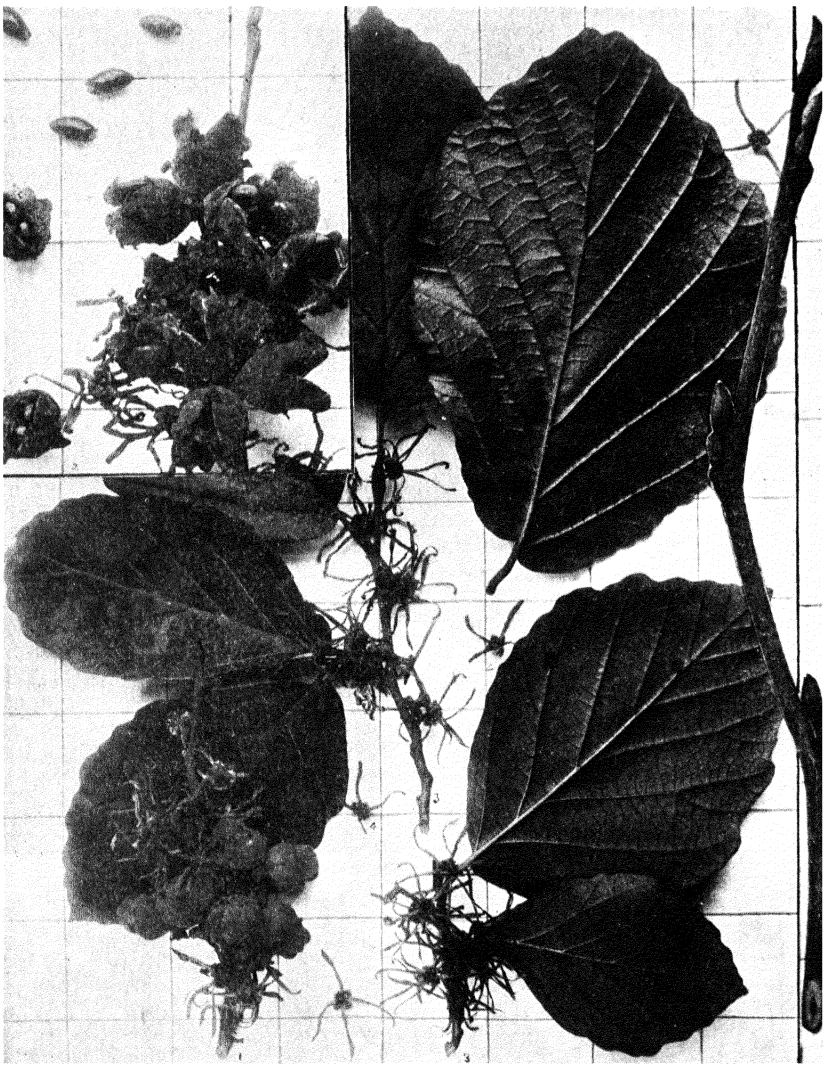


Fig. 259. Branchlet bearing mature fruit and flowers, 1; empty capsules, two opening, capsules disclosing seeds, and scattered seeds, 2; branchlet bearing leaves and flowers, 3; isolated flowers, 4; branchlet in winter, 5.

260. Trunk showing bark and lichens, Alleghany Mountains, N. C.

261. Wood structure magnified 15 diameters.

The Witch-Hazel is usually a large shrub throughout the greater part of its range, but on the slopes of the Alleghany Mountains becomes a tree 30 to 40 ft. in height with spreading crooked branches and short scaly-barked trunk from 12–18 in. in diameter. The Witch-Hazel is of special interest from the fact that it does not expand its flowers until autumn, often so late that its leaves have put on their autumnal tints or have even fallen to the ground, and the first snows of the winter sometimes find it bearing its singular golden and delicately fragrant flowers. In the autumn, too, is the time when it scatters its seeds resulting from the flowers of the previous season, and this it does in a peculiar way. It actually discharges them from their mortar-like capsules with considerable force and accompanied with an audible report. This it does by a contraction of the horny lining of the capsules upon the smooth hard seed until it is discharged, quite as one can discharge a moist apple seed by pinching it between thumb and finger.

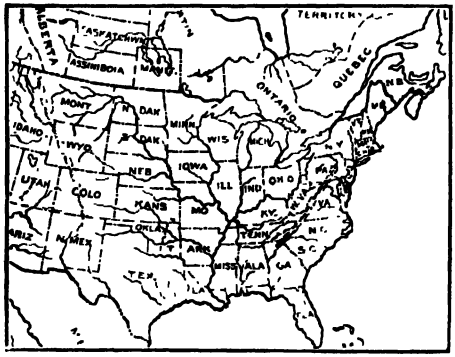
The wood is rather heavy, a cu. ft. when absolutely dry weighing 42.73 lbs., hard and very close-grained but is of no commercial importance.[1] An extract from the bark is extensively used for allaying inflammation.

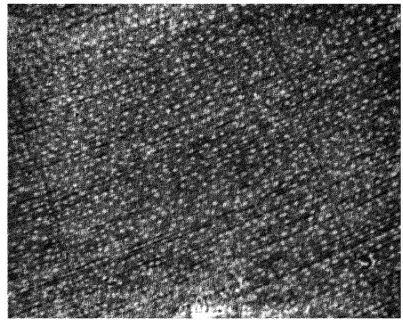
Leaves oval to obovate, short-petiolate, rounded or subcordate and very unequal at base, from rounded to acute or acuminate at apex, undulate crenate, membraneaceous, smooth dark green above, lighter and pubescent on veins beneath. *Flowers* nearly sessile; petals bright yellow, deciduous; calyx pubescent, persistent. *Fruit* capsules dull brown, opening elastically.[2]

1. A. W., XII, 281.

2. For genus see pp. 436–437.







SWEET GUM. RED GUM. BILSTED.

Liquidambar Styraciflua L.

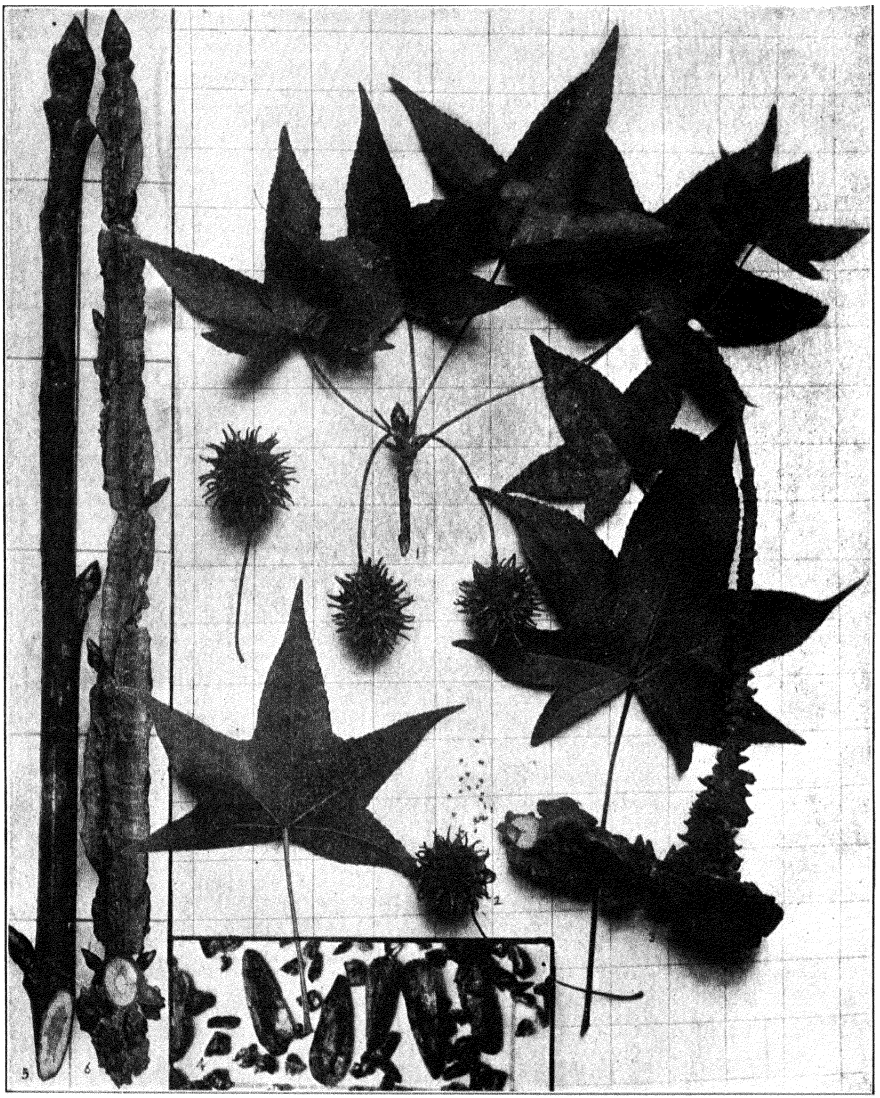


Fig. 262. Branchlet with mature leaves and fruit, 1; fruiting head with empty capsules and scattered spurious seeds, 2; branch showing corky growth, 3; fertile and spurious seeds enlarged about two diameters, 4; smooth and corky branchlets in winter, 5 and 6

263. Large trunk, in southeastern Missouri.

264. Wood structure magnified 15 diameters.

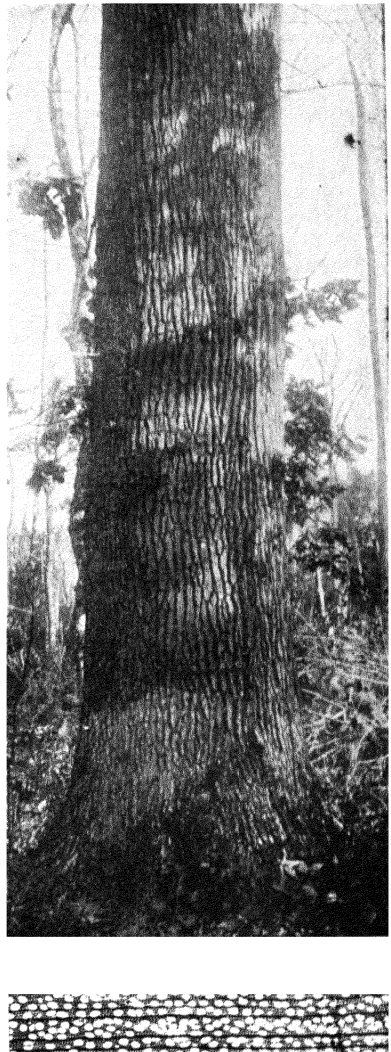
This large and beautiful tree in the southern forests attains the height of 100 to 140 ft. with straight columnar trunk 4 or 5 ft. in diameter. When isolated it develops a symmetrical oblong-pyramidal top when young, but finally becoming broad and rounded. A peculiar feature, more marked in some trees than others, however, and often entirely wanting, is the growth of wing-like projections of the bark from its smaller branches. It thrives best in the rich soil of bottom-lands where it is associated with the Red and Black Maples, the Sour, Water and Tupelo Gums, the Laurel and Water Oaks, various Ashes, etc. Few trees of the American forests equal the Sweet Gum in ornamental value, owing to its grand habit of growth and its beautiful star-shaped leaves, of a rich green in summer and conspicuous in autumn on account of their crimson and purple tints.

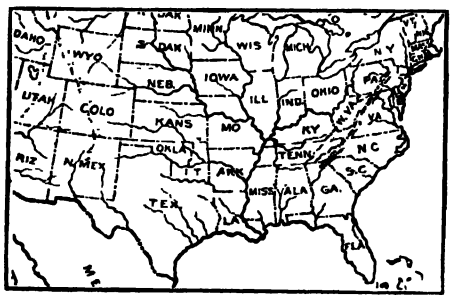
The wood, a cu. ft. of which when absolutely dry weighs 36.82 lbs., is rather soft, with straight close grain, and is used in the manufacture of wooden-ware, paving blocks, lumber for general construction, etc., and is sometimes marketed under the absurd names — *Satin Walnut*, *California Red Gum*, etc.[1]

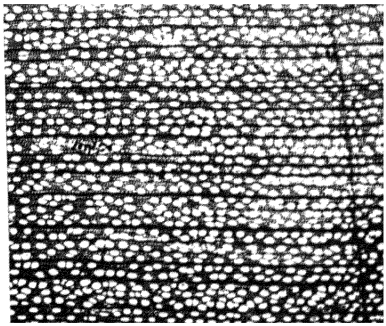
Leaves about orbicular in outline, deeply 5-7-palmately lobed with acute glandular-serrate lobes and pointed sinuses, cordate at base, lustrous bright green above and often pubescent in the axils of the leaves beneath, fragrant when bruised, purple crimson in autumn; petioles long and slender. *Flowers*: staminate racemes erect, rufous tomentose, the lower heads sometimes stalked; pistillate heads long peduncled, drooping. *Fruit*: head 1-1½ in. in diameter, liberating a few perfect and many abortive seeds in autumn and swinging empty upon the leafless branches during the following winter.[2]

1. A. W., III, 60.

2. For genus see p. 437.







SYCAMORE. BUTTONWOOD. BUTTON-BALL TREE.

Platanus occidentalis L.

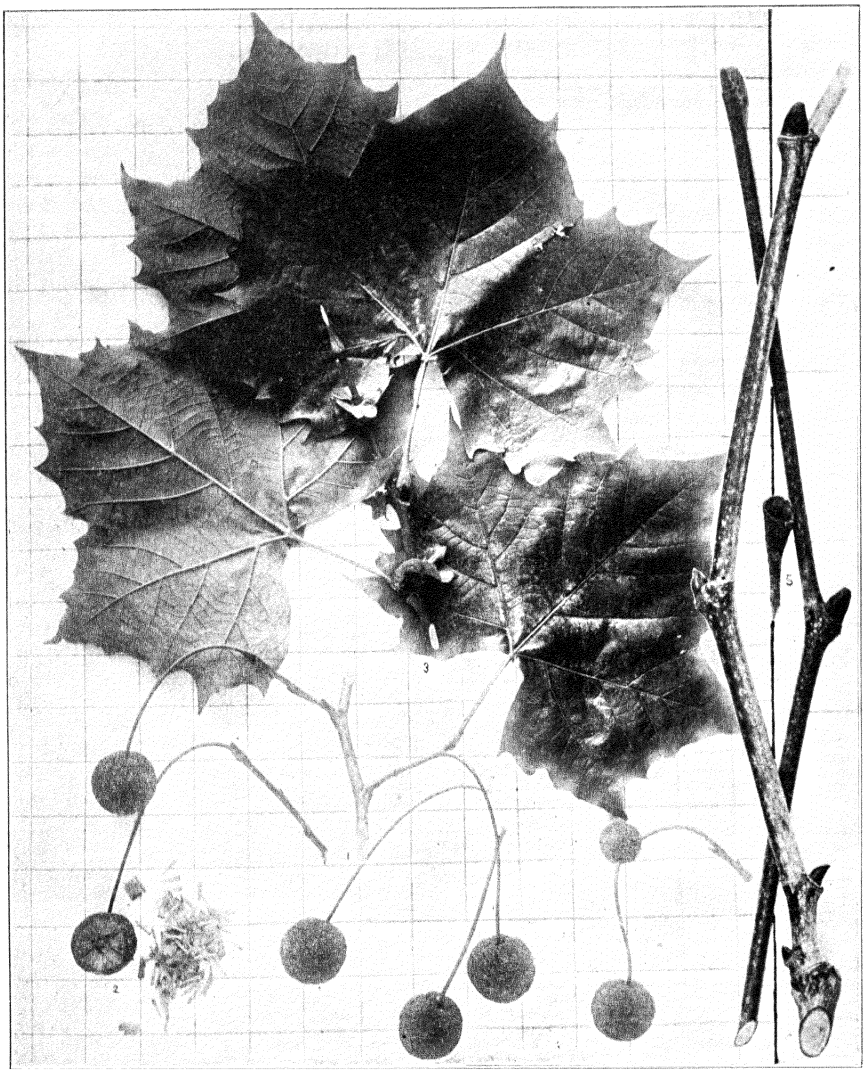


Fig. 265. Branchlet bearing mature leaves and fruit, 1; fruiting head separating, with scattered akenes and hairs, 2; branchlet from vigorous shoot showing stipules, 3; branchlet in winter, 4; base of petiole showing cup-shape nature, 5.

266. Trunk of a large isolated tree, western New York.

267. Wood structure magnified 15 diameters.

This stately tree is considered the largest deciduous tree of the North American forests, In the rich bottom-lands of the lower Ohio and the Mississippi valleys it towers to the height of one hundred and fifty to one hundred and seventy-five ft. and its trunk is sometimes ten or eleven ft. in diameter above its tapering base. The trunk commonly divides into two or three large secondary trunks, which raise its irregular or rounded head far above the tops of most of the neighboring trees; or it may have a single columnar trunk of great height but often curved or leaning.

A striking feature is the white bark of its branches, and as its favorite abode is the banks of streams their winding courses may be traced from an eminence by the white branches of the Sycamores which line their banks. Quite as interesting as the bark of these whitewashed branches is that of the young trunks and the bases of large limbs, as it is pied of many colors, as shown in our picture, according to the varying length of time the scales of outer bark have been off.

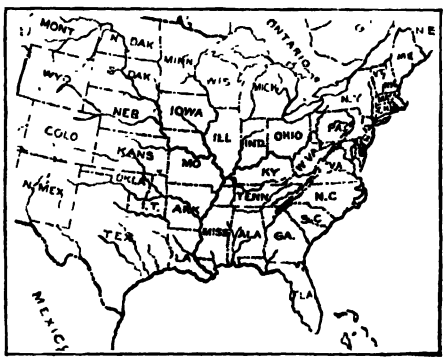
The wood, of which a cubic foot weighs 30-40 lbs., is tough, strong, and very difficult to split, and is used in the manufacture of boxes, crates, butchers' blocks, etc., and when cut quartering makes a handsome lumber for interior finishing, furniture, etc.[1]

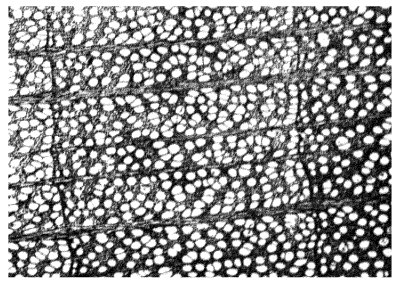


Leaves wide-orbicular in outline, palmately 3-5-lobed, with mostly broad sinuate-dentate acuminate lobes and wide sinuses, stipules on vigorous shoots 1 to 1½ in. long. *Flowers*: pistillate peduncles usually bearing one but sometimes two heads. *Fruit*: heads from 1-1¼ in. in diameter, usually solitary on glabrous stem 3-6 in. long; akenes truncate or rounded at apex.[2]

1. A. W., I, 13.

2. For genus see p. 437.





FRAGRANT CRAB.

Pyrus coronaria L.[1]

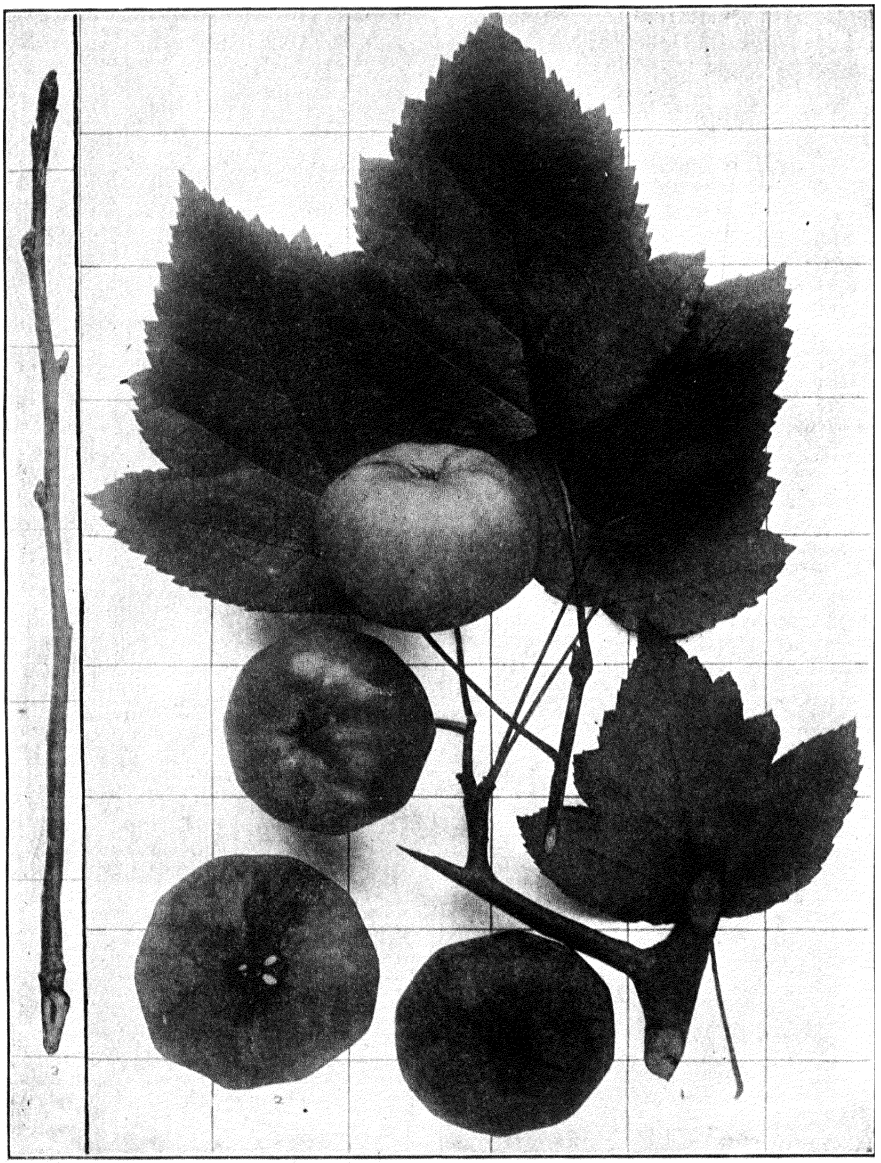


Fig. 268. Branchlet with mature leaves and fruit, 1; fruit in cross-section showing seeds, 2; branchlet in winter, 3.
269. Trunk showing bark of large tree, western New York.
270. Wood structure magnified 15 diameters.

This favorite tree attains the height of 25–30 ft., with trunk rarely more than 12–14 in. in diameter, and when isolated develops a broad top with rigid branches bearing many short branchlets terminating in sharp spur-like leafless tips.

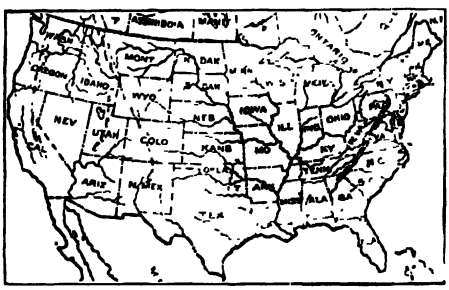
It inhabits rich, moist, but well drained soil, often in forest glades among taller trees. The beauty of its light pink flowers and their delicious fragrance, which is so marked as to actually perfume the surrounding atmosphere, are as noticeable as of the Narrow-leaf Crab. On account of these attractive features it is deservedly popular for ornamental planting in shrubberies and door-yards. Its attractiveness is not limited to the flowering season alone, for its fragrant fruit, pendent with long stems and persisting until autumn has tinted and removed many of its leaves, enhances its beauty.

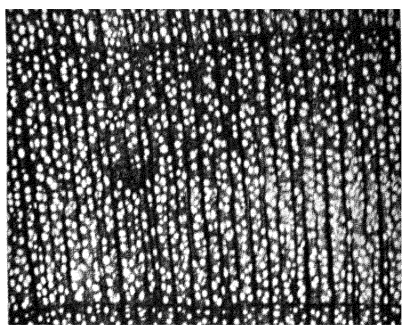
Its wood is heavy, a cubic foot when absolutely dry weighing 43.92 lbs., very close grain and useful in turnery for small articles of wooden-ware, tool handles, etc.[2] The fruit is sometimes used for preserves and for making cider and vinegar.

Leaves ovate to almost triangular, truncate, subcordate or sometimes tapering at base, acute or acuminate at apex, irregularly cut serrate or sometimes lobed on sterile shoots, membranaceous, bright green above, paler and glabrous or sparingly pubescent beneath; petioles slender glabrous and with two glands near the middle. *Flowers* very fragrant, 1½-2 in across in 5-6 flowered umbels with slender pedicels; calyx-tube tomentose with taper-pointed lobes tomentose inside; petals white or pinkish; ovary hairy; styles united at base. *Fruit* shortened globose, 1-1½ in in width, pale green, fragrant and with waxy surface.[3]

1. Syn. *Malus coronaria* (L.) Mill
2. A. W., IV, 83.
3. For genus see pp. 438–439.







NARROW-LEAF CRAB.

Pyrus angustifolia Ait.[1]

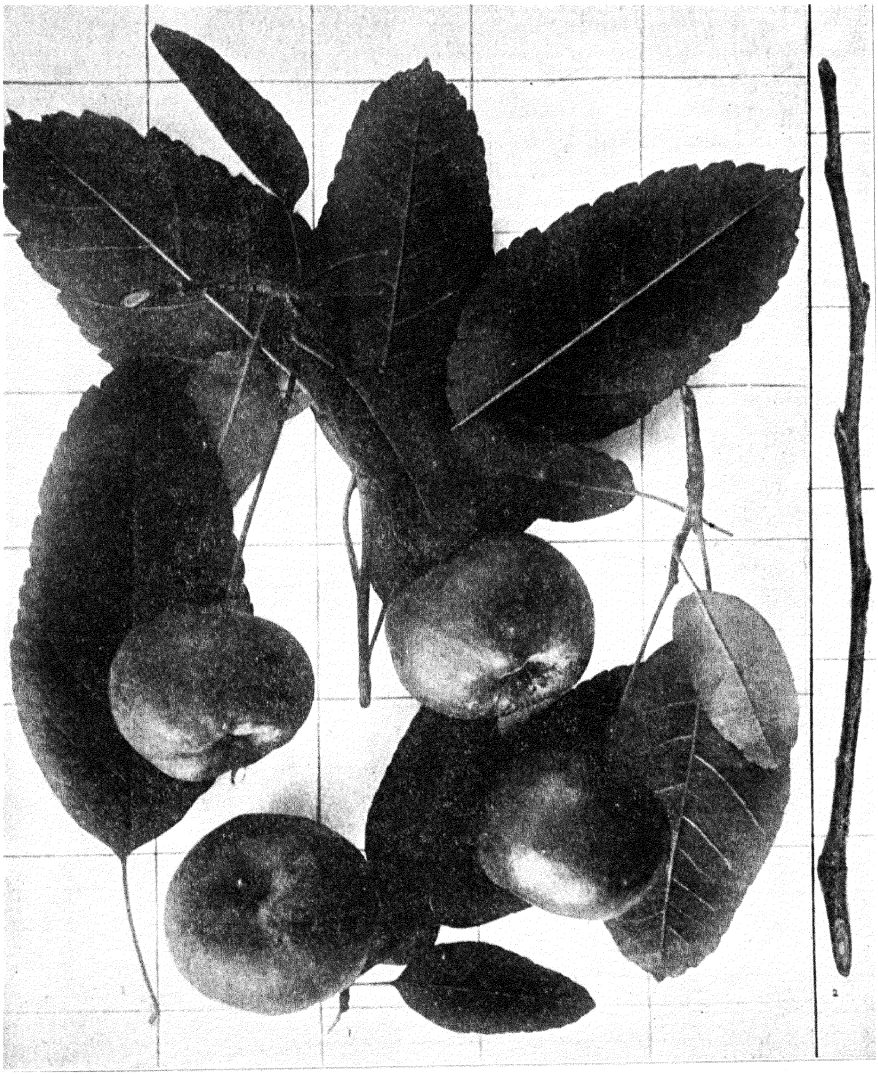
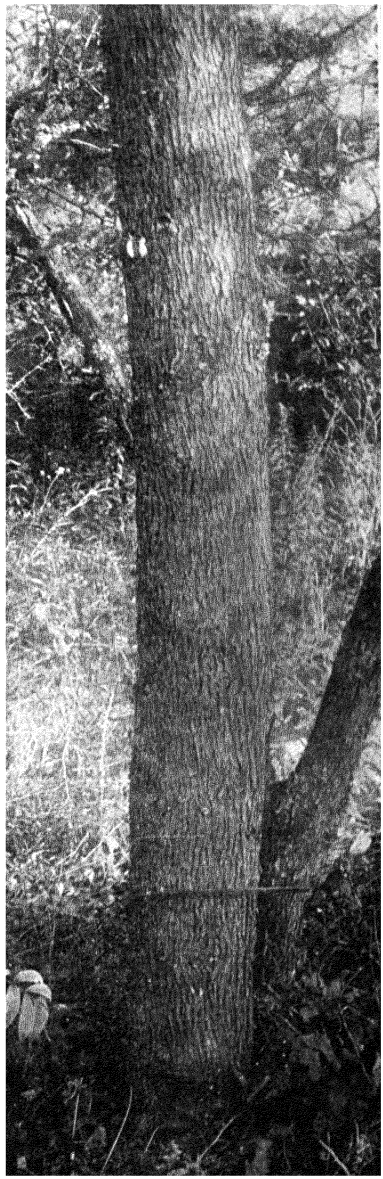


Fig. 271. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
272. Trunk of tree at Biltmore, N. C.

The Narrow-leaf Crab is a small tree, occasionally attaining the height of 25 or 30 ft., with a trunk 8–10 in. in diameter. When isolated it develops a broad top with rigid branches armed with numerous short spur-like lateral branchlets. The bark of trunk is of a grayish brown color, rough, with narrow scaly ridges.

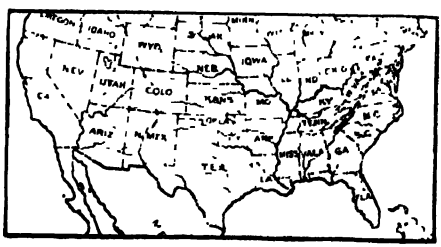
It inhabits the banks of streams and rich well drained soil, often in the glades of forests of taller trees, when it can find sufficient light there, and in these regions its beautiful white and pink fragrant flowers are especially pleasing as one happens onto them. No tree of the American forest produces flowers of more delicious fragrance. Should one visit the locality in late summer a very different yet quite as marked fragrance arrests his attention, perhaps when several yards from the tree. Now it is from its small pale yellow apples, much more pleasing to the sense of smell than of taste, for they are very acerb, though sometimes used for preserves and cider.

The wood, of which a cubic foot when dry weighs 42.97 lbs., is hard and very close grained and suitable for the manufacture of tool-handles, etc.



Leaves oblong to oblong-lanceolate, mostly tapering or rounded at base, acute or rounded and apiculate at apex, crenate-serrate, sometimes nearly entire, thickish dark green above, paler and glabrous beneath, petioles slender. *Flowers* about 1 in. across, very fragrant, with slender pedicels in few-flowered cymes; calyx-lobes narrow, tomentose inside, petals white or pink; ovary tomentose; styles distinct. *Fruit* flattened globose, about 1 in. in diameter, fragrant, yellow-green with waxy surface and very sour flavor.

1. Syn. *Malus angustifolia* (Ait.) Michx.



PRAIRIE CRAB.

Pyrus Iowsis (Wood.) Bailey.[1]

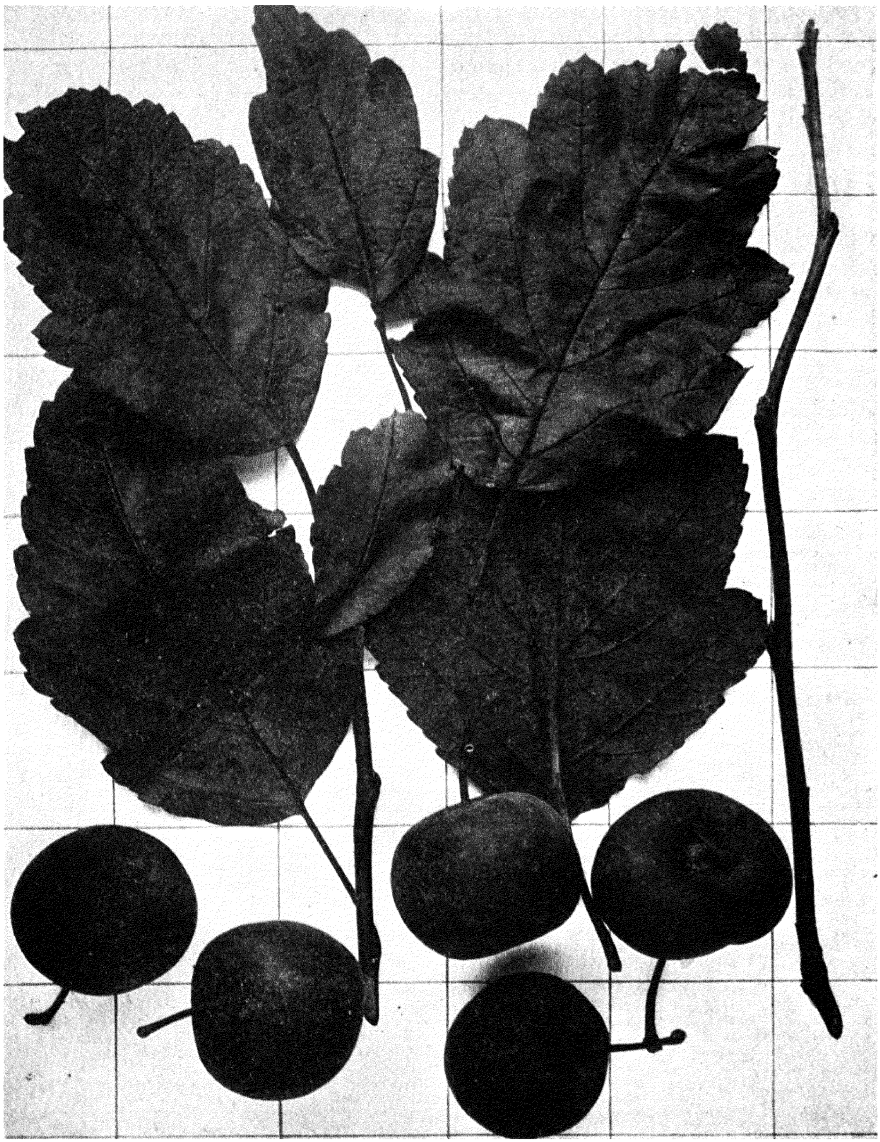


Fig. 273. Mature leaves and fruit; leafless branchlet in late autumn.
274. Trunk of tree at Ames, Iowa.

The Prairie Crab is a small tree rarely if ever exceeding 20 or 30 ft. in height or 12 to 18 in. in diameter of trunk. It develops a spreading or rounded top of many rigid tortuous branches beset with numerous short lateral thorn-like spurs. From the sides of these thorns leaves and flowers appear, while the free tip is usually a very sharp rigid thorn.

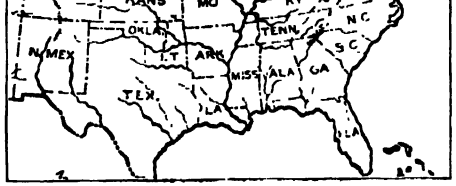
Like the other native apples its handsome flowers are characterized by a delicious fragrance, which makes the tree popular for planting in shrubberies and door-yards. In autumn its small yellow-green apples, with surface seemingly covered with wax or grease and of a strong characteristic fragrance, give it an ornamental value at that season, and later after the leaves have fallen. The attractive appearance and odor of the fruit, however, ends here, as in flavor it is too austere for most tastes to be edible, though the juice is sometimes used for making vinegar.

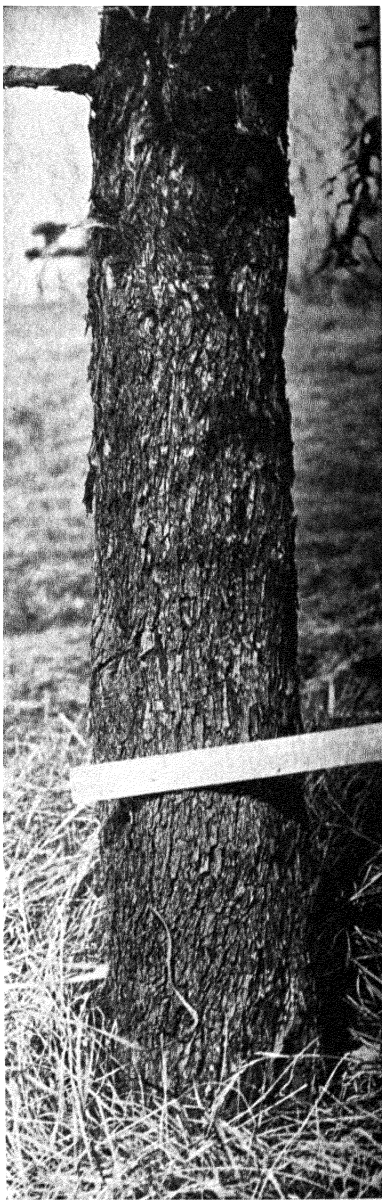
The Bechtel Crab is a form recently introduced with large double rose-colored flowers. It is of signal merit for ornamental planting.

The wood we have not examined, but it is said to be softer than that of the allied eastern species.

Leaves ovate, oval or oblong, 3-4 in. long, broad-cuneate or rounded at base, acute or rounded at apex, crenate-serrate and on vigorous shoots with short acute or rounded lobes, at maturity thick lustrous dark green above, tomentose beneath; petioles stout, pubescent. *Flowers* 1½ in. across, in small clusters with pedicels and calyx tomentose. *Fruit* mostly 1-1½ in. in diameter, greenish yellow, fragrant, greasy and with stout stems mostly ¾-1 in. long.

1. *Malus Ioensis* (Wood.) Britt.





SOULARD CRAB.

Pyrus Soulardi Bailey.[1]

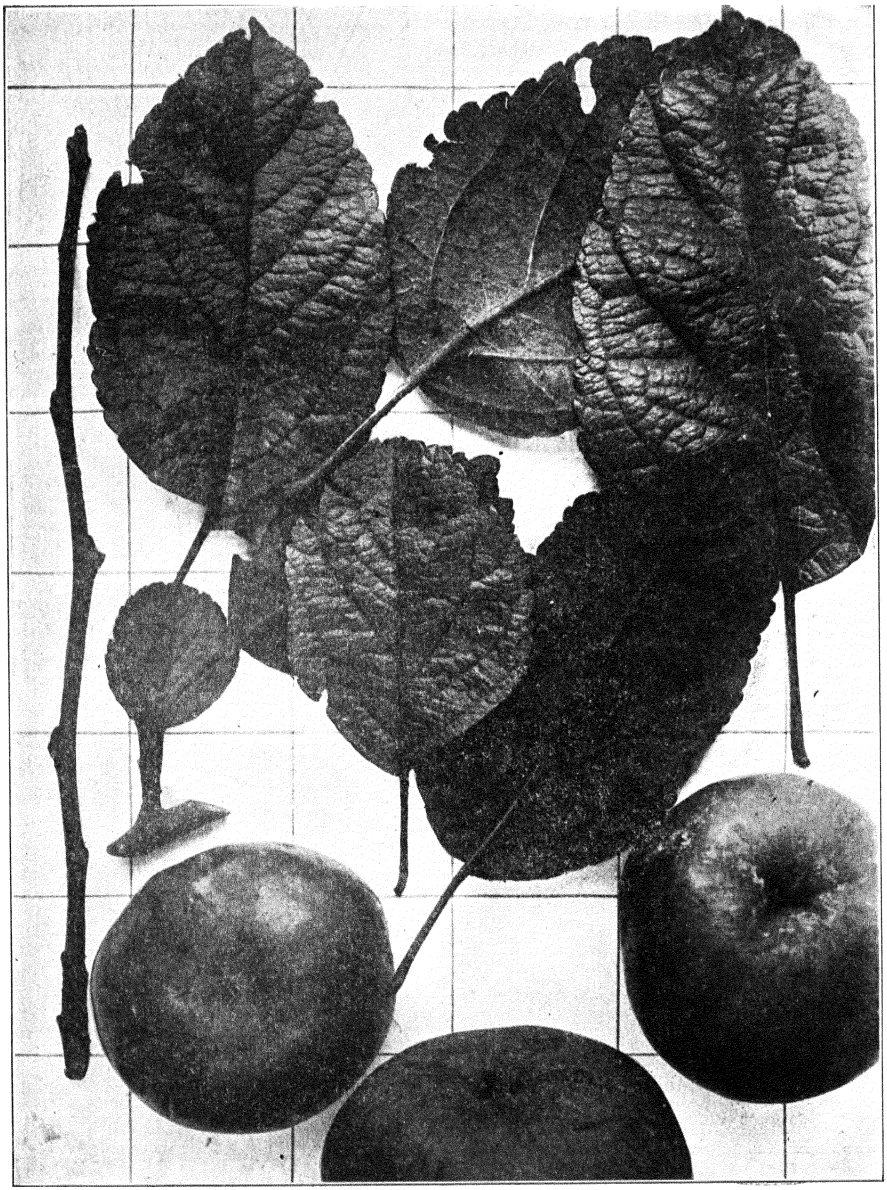


Fig. 275. Mature leaves and fruit; leafless branchlet in late autumn.
276. Trunk of large tree, Ames, Iowa.

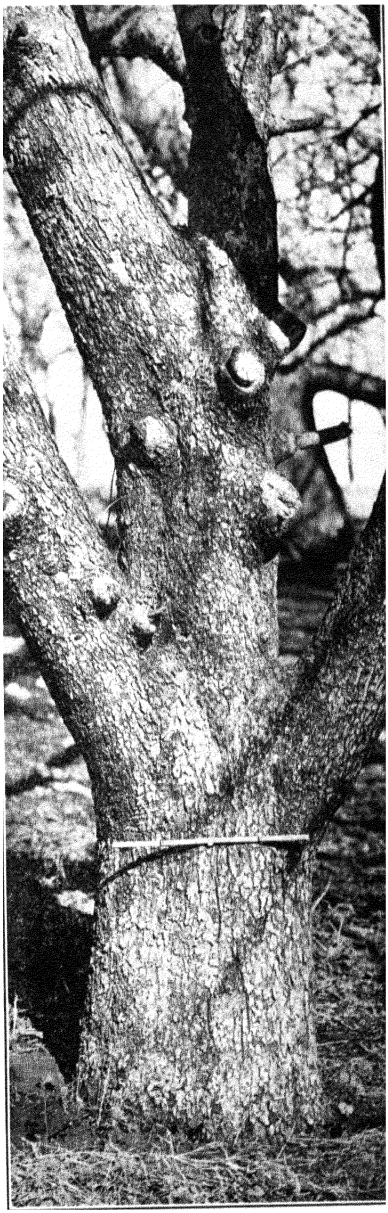
The Soulard Crab is an interesting small tree resembling the common Apple-tree in habit of growth, with broad rounded top 18 to 25 ft. in height and trunk 10–15 in. in diameter. The bark of trunk is of a grayish brown color covered with small closely appressed scales, also resembling the bark of the common Apple-tree. It is of local distribution, being found in localities in the Mississippi River valley from Minnesota to Texas, and is considered by some writers to be a natural hybrid between the Prairie Crab (*P. Iocusis*) and the Common Apple (*P. Malus*), as it is found only in regions where both those trees abound and it presents characters intermediate between them. Its fruit is fairly edible, to one fond of tart apples, and is useful for culinary purposes.

Its great hardiness commends it for cultivation in the upper Mississippi valley where the climate is too rigorous for the more tender varieties of apples, and there a few named varieties are grown. It is said to have been first introduced into cultivation by James S. Soulard of Galena, Ill., after whom it has been named.

Leaves large elliptical-ovate to oval, 3-5 in. long, mostly rounded or obtuse at both ends, irregularly crenate-serrate or slightly lobed, thick, rugose, glabrous above, tomentose beneath; petioles stout, pubescent. *Flowers* in close woolly cymes. *Fruit* from 1 2½ in. across, flattish lengthwise with shallow basin, yellow or pink-cheeked and flesh sour but edible.

1. Syn. *Malus Soulardi* (Bailey) Britt.





AMERICAN OR SMALL-FRUITED MOUNTAIN-ASH.

Sorbus Americana Marsh.[1]

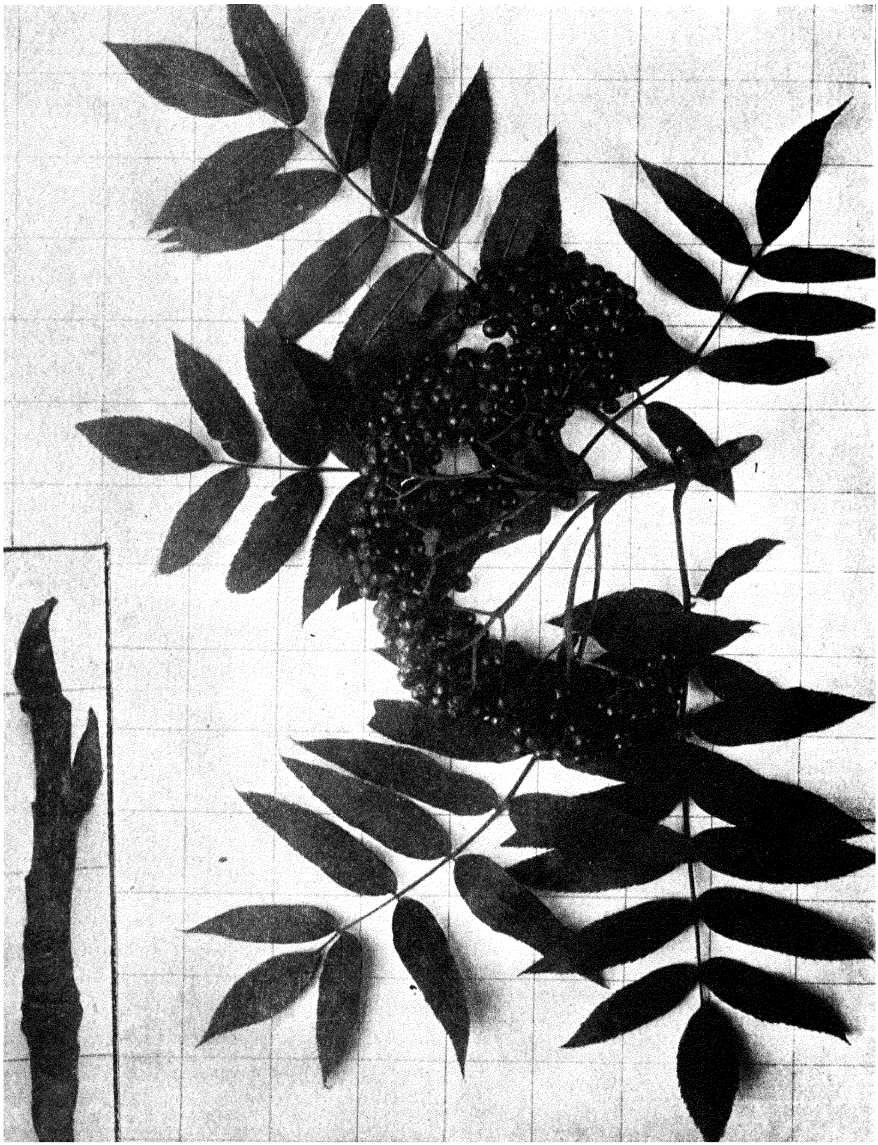


Fig. 277. Branchlet with mature leaves and fruit; branchlet in winter.
278. Trunk, northern New York.
279. Wood structure magnified 15 diameters.

The American Mountain-Ash is a slender tree rarely more than 30 or 40 ft. in height or than 12 in. in diameter of trunk, and often reduced to a shrub. When away from the influence of other trees it develops a rather narrow rounded top of slender branches and stout branchlets.

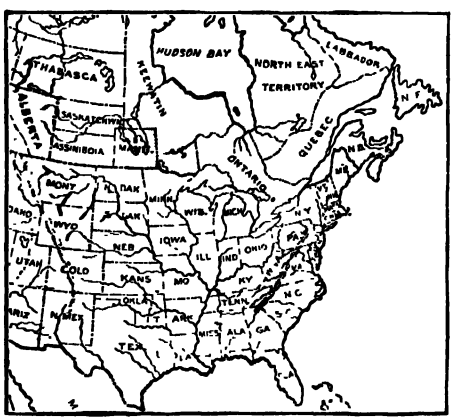
It is one of the most beautiful trees of our northern forests, as is attested by the fact that it is more abundantly than any other tree, excepting the following species, transplanted from the forests to the door yards of country homes for ornamental purposes, where its handsome foliage is a constant delight. The large bunches of small white flowers which terminate its branchlets in early summer add greatly to its beauty and offer abundant nectar to the searching bees. In autumn, when the flowers of summer are succeeded by its ample bunches of red berries, it is even a more beautiful object, and its fruit, long lingering after the leaves have fallen, offers to the departing robin and bluebird their last repast before leaving for their winter homes.

The wood is soft, light, a cubic foot weighing 33.97 lbs., and very close grained but of little economic value.

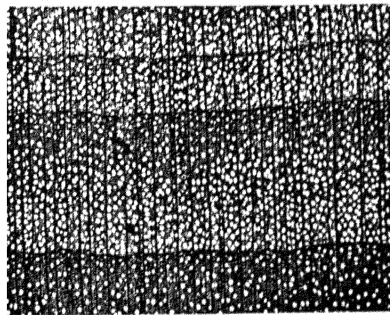
Leaves 6-8 in. long, with green or reddish petioles, and 9-17 lanceolate taper-pointed leaflets, rounded or obtuse, entire and unequal at base, sharply serrate above, subsessile (excepting the terminal leaflet) glabrous, dark green above, paler beneath; leaf-buds glabrous glutinous. *Flowers* in May, ⅛-¼ in across, in dense broad cymes, 3-5 in. across. *Fruit* subglobose, ¼ in. in diameter.[2]

1. Syn. *Pyrus Americana* DC.

2. For genus see p. 439.







LARGE-FRUITED MOUNTAIN-ASH.

Sorbus scopulina Greene.[1]

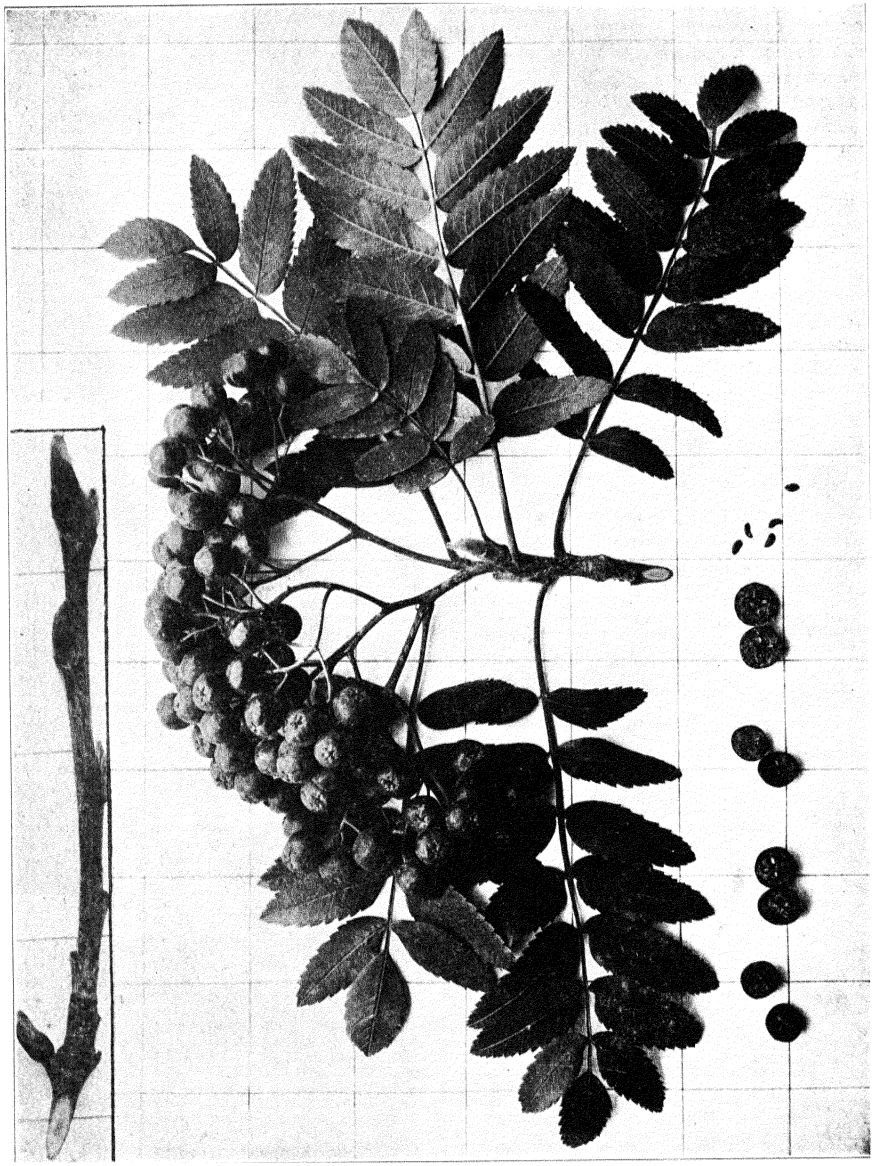


Fig. 280. Branchlet with leaves and fruit; fruit in section and scattered seeds; branchlet in winter.

281. Trunk in western New York.

The Large-fruited Mountain-Ash is a handsome tree, sometimes attaining the height of 30 ft. with trunk 12 in. in diameter and vested in a smooth lustrous silvery gray bark. When isolated from other trees it develops a symmetrical ovoid or rounded top. It is distinctly a boreal tree, being at home along the borders of swamps and streams and by the springs on mountain sides of the far north, where the beauty of its flowers and fruit are unsurpassed by those of any other tree of those regions. The tree has long been considered identical with a northern Asiatic species, the *P. sambucifolia* C. & S. (Elder-leaf Mountain-Ash) and has been so named in the books generally upon American trees. Its distinctness from that species, however, has recently been pointed out and it has been given the name *S. scopulina*. Though considered by some as a variety of *S. Americana* its specific distinctness would seem to be clearly indicated by its larger and earlier flowers in smaller clusters, its large fruit and broader, more obtuse leaflets and hairy winter buds. It is a particularly beautiful tree in autumn, when bearing among its blue-green foliage its nodding clusters of bright red fruit.

The wood is light, a cubic foot weighing 36.94 lbs., soft and but little used.[2]

Leaves usually 4-6 in. long with reddish-petioles, and 7-15 oblong-oval to ovate lanceolate, subsessile leaflets, rounded or tapering, inequilateral and entire at base, sharply serrate above, mostly obtuse or acute at apex, pubescent at first but at maturity glabrous dark bluish green above, paler and usually more or less pubescent beneath; leaf-buds hairy. *Flowers* in latter part of June, ¼-⅜ in across, in pubescent cymes 2-4 in. broad. *Fruit* subglobose, bright red, from ¼-½ in. in diameter.

1. Syn. *Pyrus sambucifolia* C. & S. *Sorbus Americana* var. *decora* Sarg.
2. A. W., IV, 84.





SERVICE-BERRY. SHAD-BUSH. SHAD-BLOW. JUNEBERRY.

Amelanchier Canadensis (L.) Med.[1]

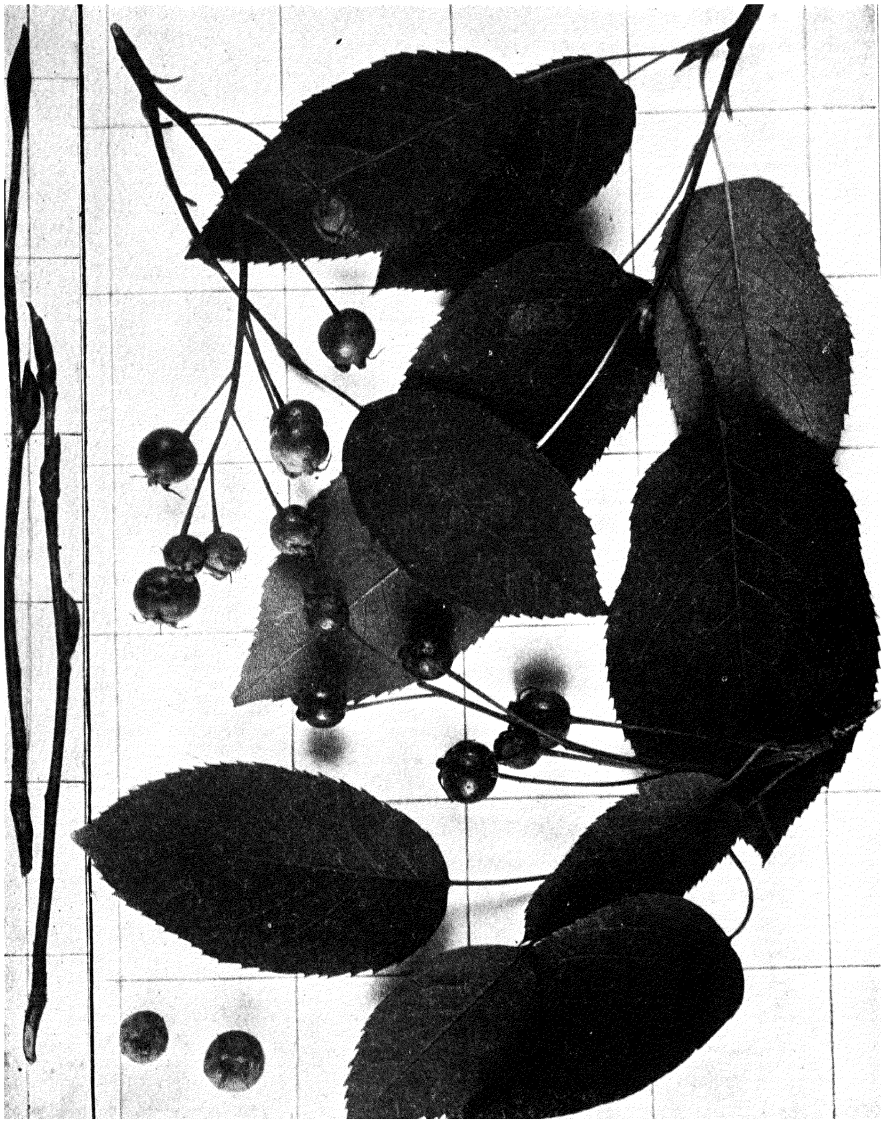


Fig. 282. Mature leaves and fruit; branchlets in late winter.
283. Trunk of medium-size tree, northern New York.
284. Wood structure showing pith-fleck, magnified 15 diameters.

The Service-berry is usually a small tree but occasionally individuals are found 40 or 50 ft. in height with trunk from 18 in. to 2 ft. in diameter, and oblong or spreading rounded top with many small limbs and fine branchlets.

It inhabits well drained slopes and uplands in company with the Quaking Asp, Hemlock, White and Red Oaks, Sugar Maple, Hackberry, etc., and in mid-spring, when its top becomes a veritable cloud of white flowers, it is one of the most beautiful and conspicuous objects in the regions in which it dwells. It is the season then when the shad come up the rivers from the sea to spawn, and hence the association of its flowers with the shad in its names of Shad-bush and Shad-blow. In June and July its ripened fruit is eagerly sought by the birds and should they spare us any it is found to be juicy and delicious.

The wood of the Service-berry, of which a cubic foot weighs when absolutely dry 48.85 lbs., is heavy, hard, very strong and close grained, valuable in turnery for the manufacture of tool handles and, under the name of "Lance-wood," is used in the manufacture of fish rods.[1]

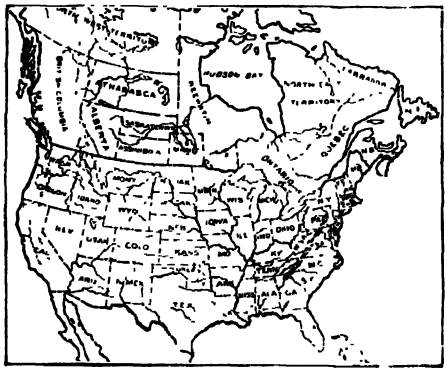
Leaves ovate to ovate-oblong, 2½-4 in. long, mostly rounded or cordate at base, acute or acuminate at apex, finely serrate with long pointed teeth, reddish and covered with white hairs when they unfold, at maturity glabrous, dark green above, paler beneath, turning yellow in autumn; petioles slender. *Flowers*, when the leaves are about 1-3 grown, in erect or nodding glabrous racemes, 2½-4 in. long, with slender pedicels bearing each two silky deciduous bracts; calyx villous inside; petals narrow obovate. *Fruit* subglobose, ¼-½ in. in diameter, dark purple, glaucous.[2]

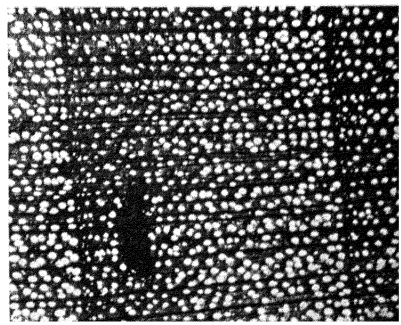
1. Syn. *A. Botryapium* (L. f.) DC.

2. A. W., III, 59.

3. For genus see pp. 439–440.







COCK-SPUR THORN. NEWCASTLE THORN.

Cratægus Crus-galli L.

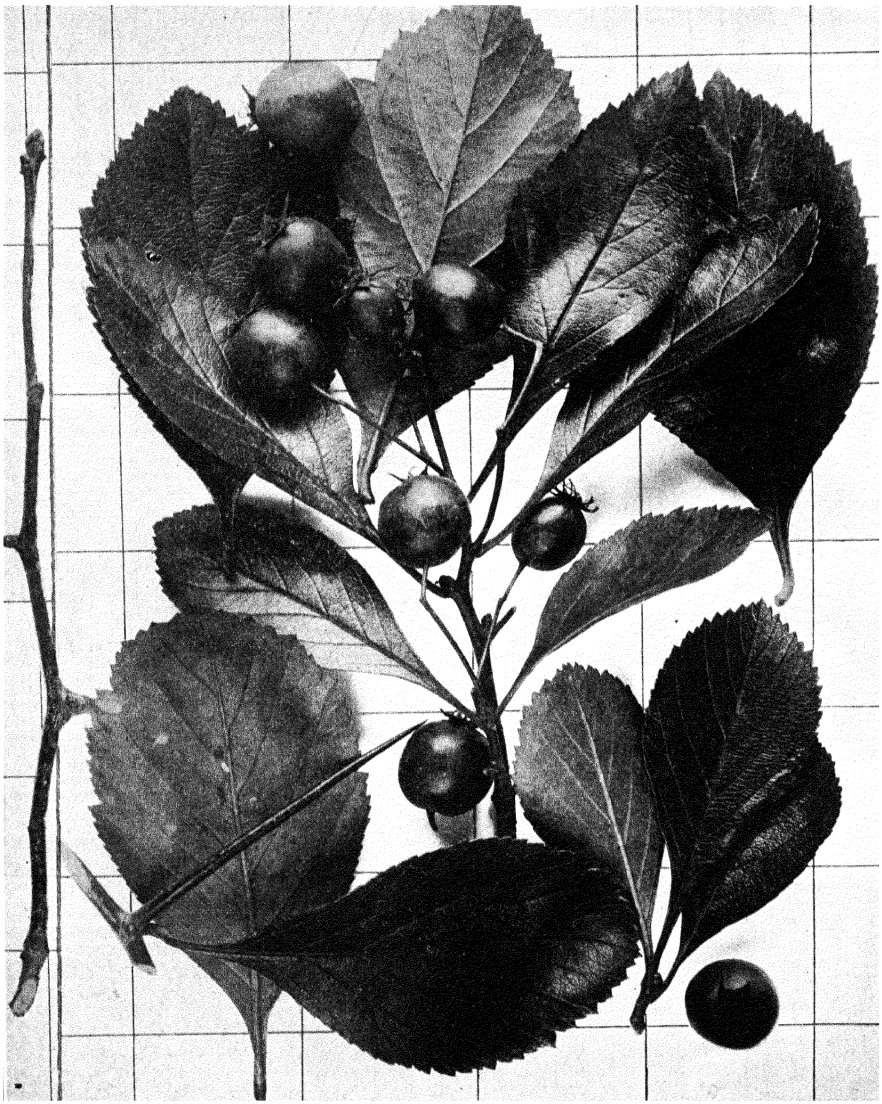


Fig. 285. Mature leaves and fruit; leafless branchlet in late autumn.
286. Trunk with leaves and fruit at base, near Albany, N. Y.
287. Wood structure magnified 15 diameters.

The Cock-spur Thorn is a low wide-spreading tree with long tortuous horizontal or drooping and very thorny branches, forming a low broad top, seldom more than 20 or 25 ft. in height. The short trunk rarely exceeds 10 or 12 in. in diameter and is rough with scaly gray-brown bark. It is one of the most striking and ornamental representatives of its genus on account of its thick shining dark-green leaves. The luster of these is seldom tarnished by insect or blight, and they preserve a freshness throughout the season which is unsurpassed by the leaves of any other tree. The ample bunches of handsome flowers appear after the leaves are fully grown, and then the tree is an object of rare beauty. It is perhaps more extensively planted both in this country and in Europe for ornamental purposes than any other American species, excepting perhaps the Washington Haw, and it is also valued for hedges. The name Newcastle Thorn has been given to it on account of its abundant use in hedges about Newcastle, Del.

Its wood is heavy, hard, very fine-grained and suitable for tool handles.[1]

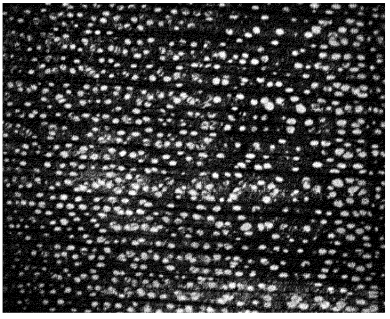
Leaves mostly obovate, 1 1 in. long, cuneate and entire at base, acute or rounded at apex, sharply serrate-dentate, thick, coriaceous, lustrous dark green above, paler and prominently reticulate-veined beneath, turning to orange and scarlet in autumn; petioles stout. *Flowers* opening in June ⅔ in. in diameter in many-flowered glabrous corymbs; calyx with narrow obconic tube and linear-lanceolate entire or glandular-serrate lobes; stamens 10, anthers rose-colored; styles usually 2, hairy at base. *Fruit* maturing in October and often remaining on the branches until spring, subglobose or short-oblong, dull red with glaucous bloom, with dry flesh and usually 2 nutlets ½ in. long, rounded at ends and ridged on the back.[2]

1. A. W., IV, 85.

2. For genus see p. 440.







DOTTED THORN.

Crataegus punctata Jacq.



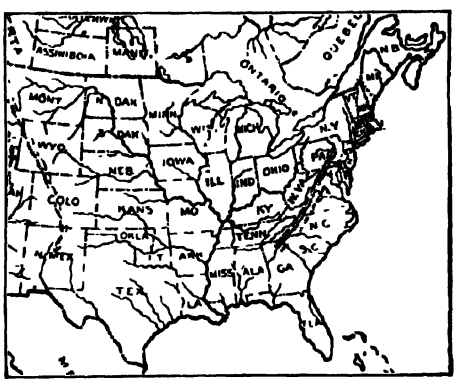
Fig. 288. Mature leaves and fruit; branchlet in late winter.
289. Large trunk, Black River valley, N. Y.

The Dotted Thorn is one of the most abundant and widely distributed of the Thorns, their picturesque flattened tops dotting the dry slopes and pasture-lands of almost every landscape of the northern Atlantic states. The tree is sometimes 25 or 30 ft. in height, usually with rigid horizontal branches which form a peculiarly flat top, and short ridged trunk 12–18 in. in diameter. The branches and trunk usually bristle with an armament of rigid sharp thorns to a remarkable degree, and on account of these the sagacious shrike or butcher-bird, which abounds in our northern fields, almost invariably chooses a tree of this kind in which to build its nest. Here effectually barricaded against cats and children it nests and rears its young in perfect safety, and upon the thorns it finds places to impale its prey. The Dotted Thorn is a handsome tree when in flower in early summer, or when bearing its large red or yellow fruit in autumn, but its foliage often loses its freshness early on account of attacks of blight or insects.

The wood is hard, heavy and close-grained and suitable for tool handles, etc. A cubic foot when absolutely dry weighs 47.87 lbs.[1]

Leaves obovate, 2-3 in. long, cuneate and entire at base, rounded or pointed at apex, irregularly and often doubly serrate, incisely lobed on vigorous shoots, pubescent at first and at maturity firm glabrous gray-green with veins impressed above, paler and often pubescent beneath. *Flowers* in May, ½-¾ in. broad in many-flowered compound corymbs; calyx with narrow acute lobes pubescent inside; stamens 20 with rose-colored or yellow anthers; styles 5 white hairy at base. *Fruit* ripe in October, mostly subglobose, ½-1 in. long, dull red (sometimes yellow) white-dotted, with dryish flesh and 5 nutlets ridged on the back.

1. A. W., III, 58.





GREEN HAW.

Cratægus viridis L.

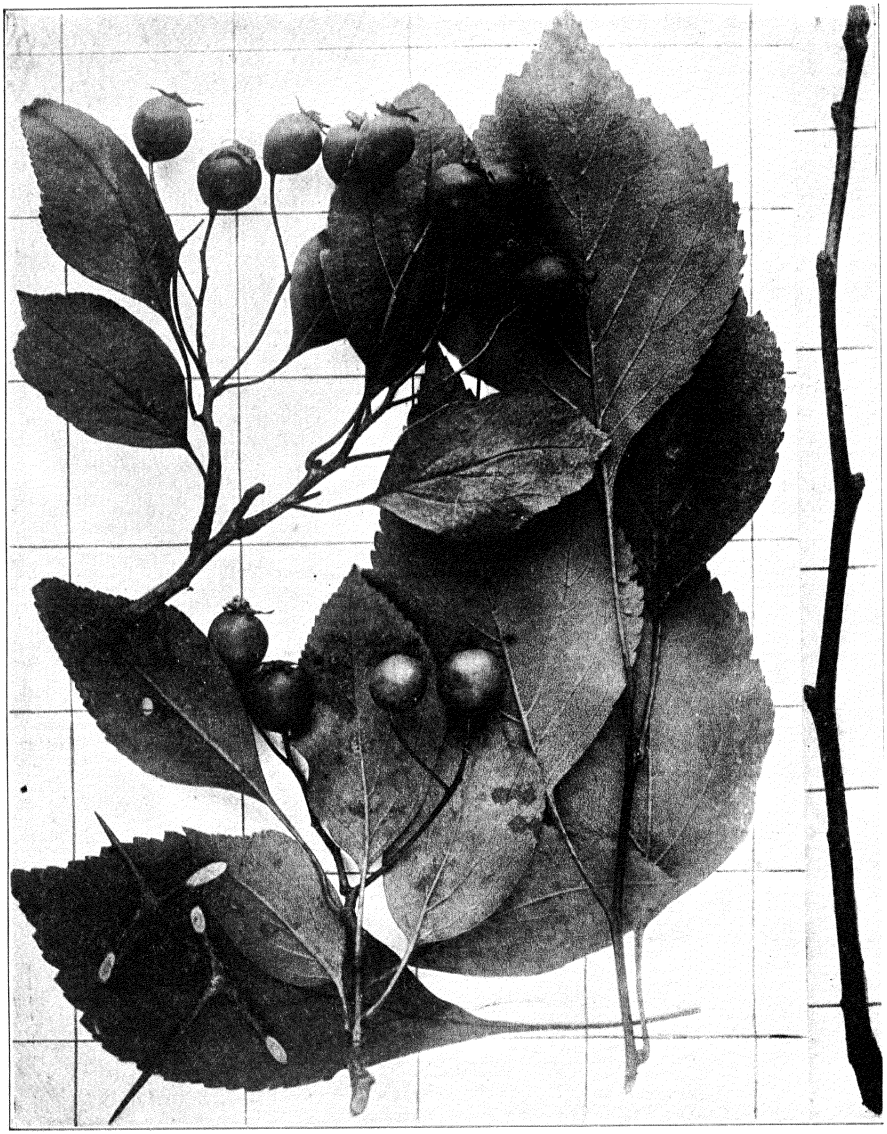
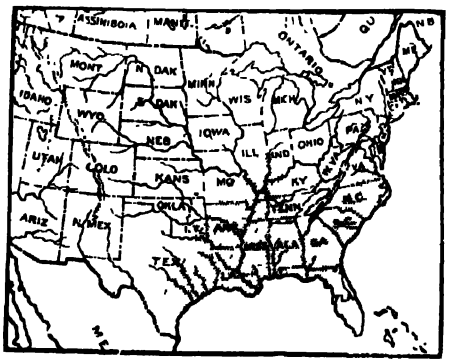


Fig. 290. Mature leaves and fruit; branchlet in winter
291. Trunk of large tree, in southern Illinois.

The Green Haw is a sturdy representative of the genus, attaining the height of from 30–35 ft. with broad or rounded intricately branched top and clear trunk 12 or 18 in. in diameter. This is often ridged and fluted and is vested in a pale gray or brownish bark, which exfoliates in small friable scales. It inhabits the banks of streams, moist low-lands and lake-shores and is particularly abundant and well developed along the bayous of the Mississippi river in the vicinity of St. Louis and southward. In these localities it is found in company with the Pecan, King-nut Hickory, Water and Honey Locusts, Forestiera, Pin and Shingle Oaks, Cottonwood, etc., and among them its full rounded top is one of the most attractive objects particularly when in flower or bearing its ripe fruit.



Leaves mostly elliptic to lance-ovate or obovate, 1½-3 in. long, cuneate or abruptly contracted and entire at base, mostly acute or bluntly pointed at apex, irregularly serrate or serrate-dentate, some on vigorous shoots with shallow lobes, glabrous or with pale hairs in the axils beneath; petioles slender 1-1½ in. long. *Flowers* in May, about ¾ in. across, in many flowered compound corymbs, with long slender glabrous pedicels; calyx glabrous, with narrow entire lobes; stamens 20, anthers pale yellow; styles usually 5 with pale hairs at base. *Fruit* subglobose or somewhat obovoid, bright scarlet or orange, about ½ in. long or less, in drooping clusters with long slender stems; flesh thin, nutlets usually 5, slightly ribbed on back.



ELLWANGER HAW.

Cratægus Ellwangeriana Sarg.

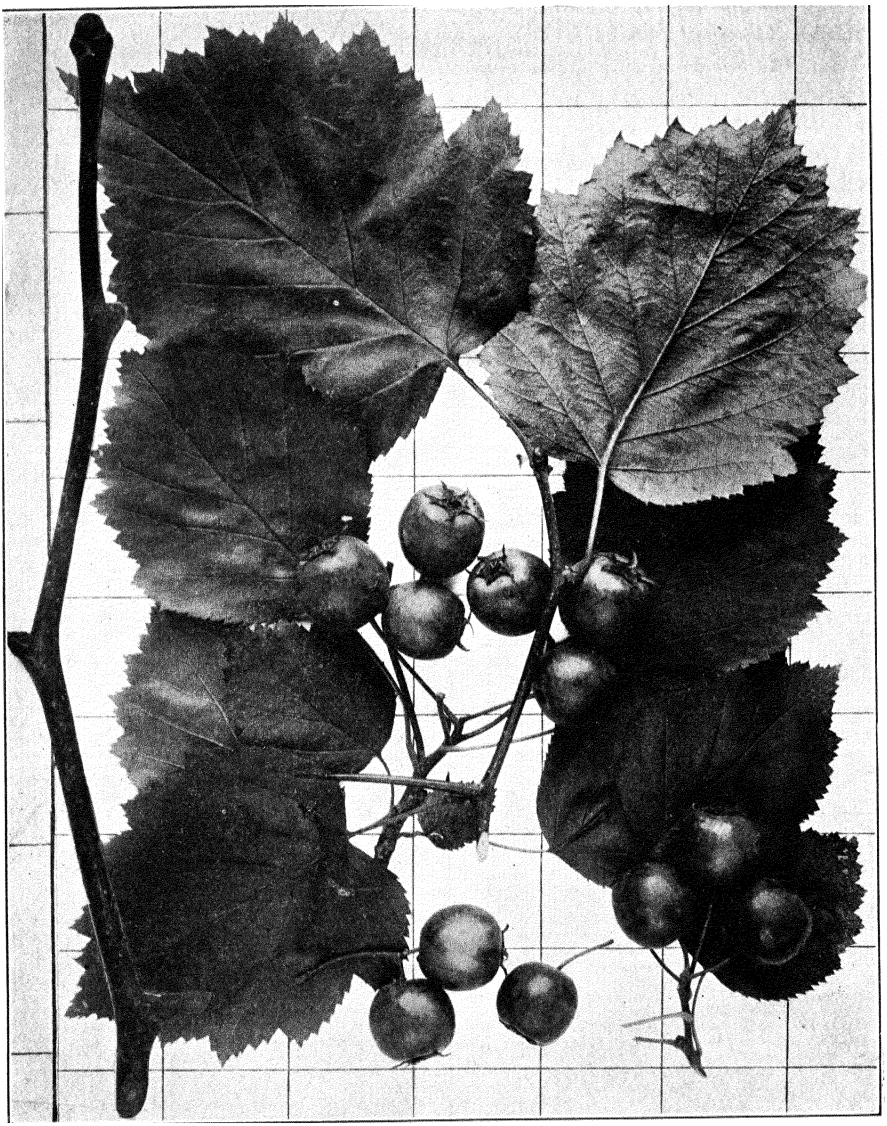
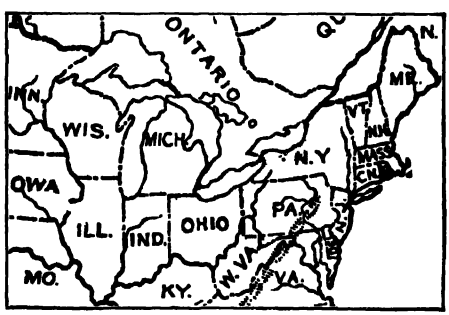
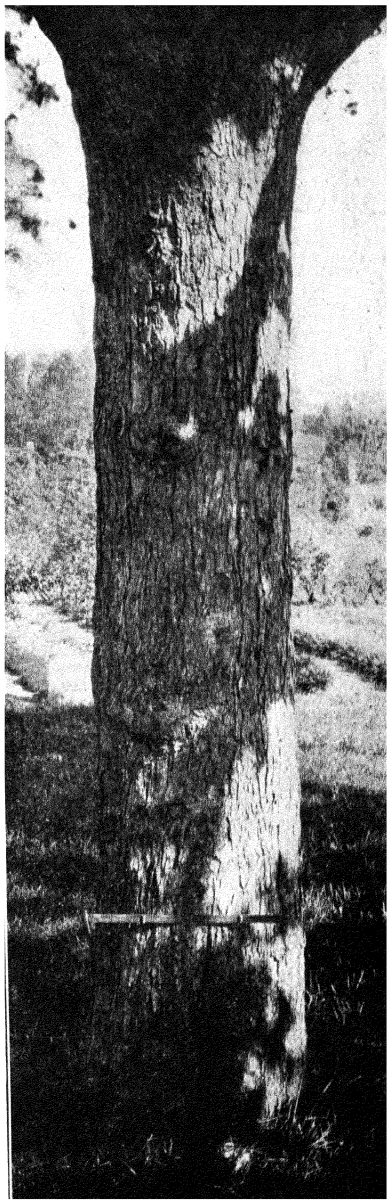


Fig. 292. Mature leaves and fruit; branchlet in winter.
293. Trunk of type tree, Rochester, N. Y.

The Ellwanger Haw, so far as now known, is quite local in distribution, as it appears to be confined mainly to Western New York, where it is common. It is a large and beautiful representative of its genus, attaining the height of from 25–30 ft., with lofty broad rounded top and clear trunk 12–18 in. in diameter. This is covered with a grayish brown bark which exfoliates in rather small friable scales. The tree from which the leaf and fruit specimens used for our illustration were taken, and whose trunk is seen in the bark picture, is the type tree of the species. It stands on the grounds of the Mount Hope Nurseries, owned by Messrs. Ellwanger and Barry, and was fittingly given the name of the senior member of the firm, whose upright character and long career as a successful nurseryman have been of great benefit to his community and country. This particular tree is one of rare symmetry and beauty, with large handsome leaves, flowers and fruit, and for ornamental planting few if any of the other Haws surpass it.

Leaves oval, 2½-4 in. long, mostly broad-cuneate or rounded (on vigorous shoots subcordate) at base, acute at apex, coarsely and irregularly serrate-dentate and with short acute lobes, membranous, dull-green and scabrous above, paler and nearly glabrous beneath; petioles slender and stipules ½ in. long, sometimes persisting till autumn on vigorous shoots. *Flowers* in middle May, 1 in. in diameter, in many-flowered villose corymbs with short pedicels; calyx with lanceolate glandular-serrate lobes; stamens 10 (or sometimes 8) with rose-colored anthers; styles 3-5. *Fruit* ripe and falling in September, subglobose to oblong, on slender glabrous pedicels, bright crimson, ¾-1 in. long; nuts 3-5, deeply grooved on back.





HOLMES HAW. SCARLET THORN.

Crataegus Holmesiana Ashe.

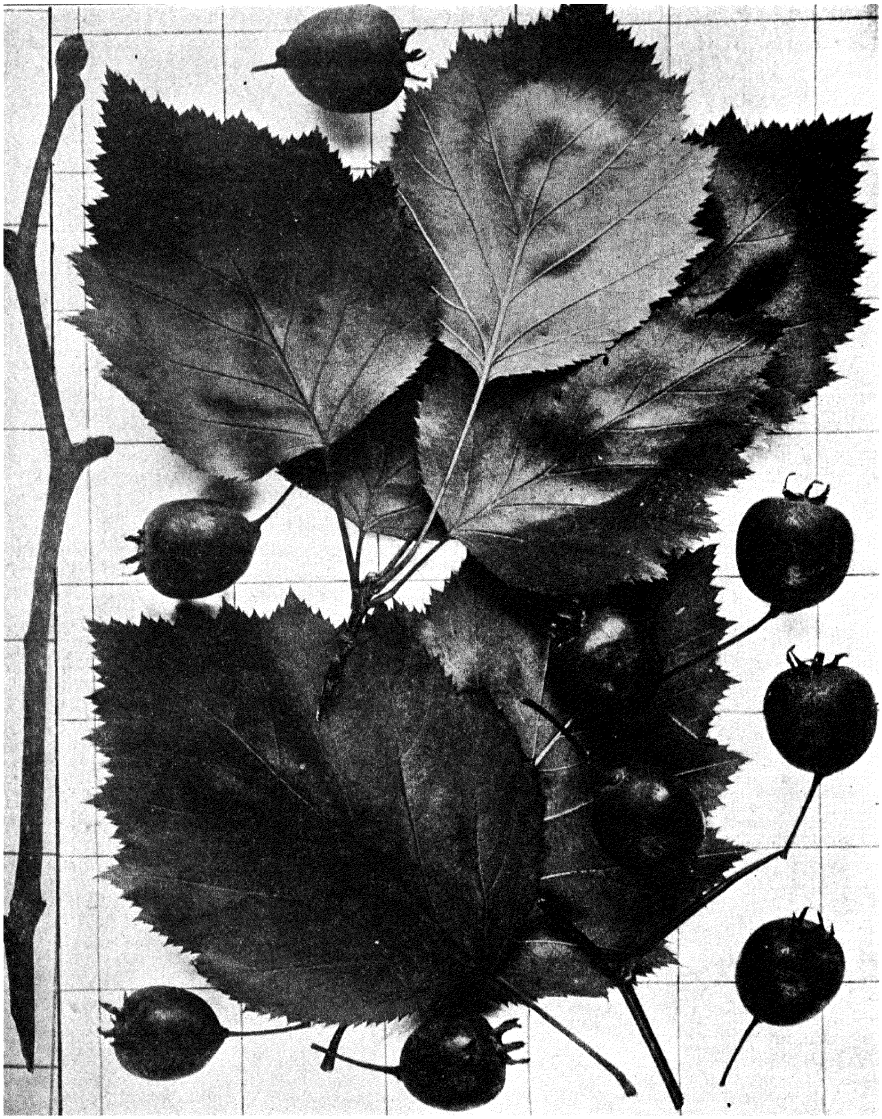


Fig. 294. Mature leaves and fruit; branchlet in winter.
295. Trunk with leaves and fruit at base, Rochester, N. Y.

The Holmes Thorn is a beautiful large Thorn sometimes 25 or 30 ft. in height with full round-spreading top and a clear trunk 12–18 in. in diameter and sometimes 5–7 ft. to the branches. This is usually ridged and fluted and is covered with a gray or light brown bark which exfoliates in thin closely appressed scales. Before the recent study and revision of the Crataegus this tree was called the Scarlet Thorn and considered to be one of the many and various forms comprehended in the species *C. coccinea* L. In the revision this form has been given specific rank and named after Prof. J. A. Holmes, State Geologist of North Carolina. It is quite an abundant tree, occupying well-drained slopes and uplands, the borders of swamps, etc., and is a tree of highly ornamental value.

The wood is heavy, hard, very close grained and suitable for use in turnery.[1]

Leaves oval to ovate, 2-4 in. long, rounded or broadly cuneate at base (subcordate on vigorous shoots), acute or acuminate, irregularly double serrate or with short lobes, thick and firm at maturity, smooth yellow-green above, 2-5 in. long; petioles slender, 1-1½ in. long. *Flowers* ½-¾ in broad, cup-shaped, in many-flowered mostly glabrous compound corymbs with slender pedicels; calyx narrow obconic with acuminate glandular-serrate or entire lobes; stamens usually 5 (or 6-8) with large dark reddish anthers; styles 3. *Fruit* ripening and falling in September, mostly short oblong or somewhat pear-shaped in drooping clusters with long slender stems, lustrous crimson ½-¾ in. long with prominent erect or incurved glandular serrate lobes; nutlets 3, prominently ridged on the back.

1. A. W., IV, 86 (as *C. coccinea* L.).





WASHINGTON HAW.

Cratægus cordata (Mill.) Ait.

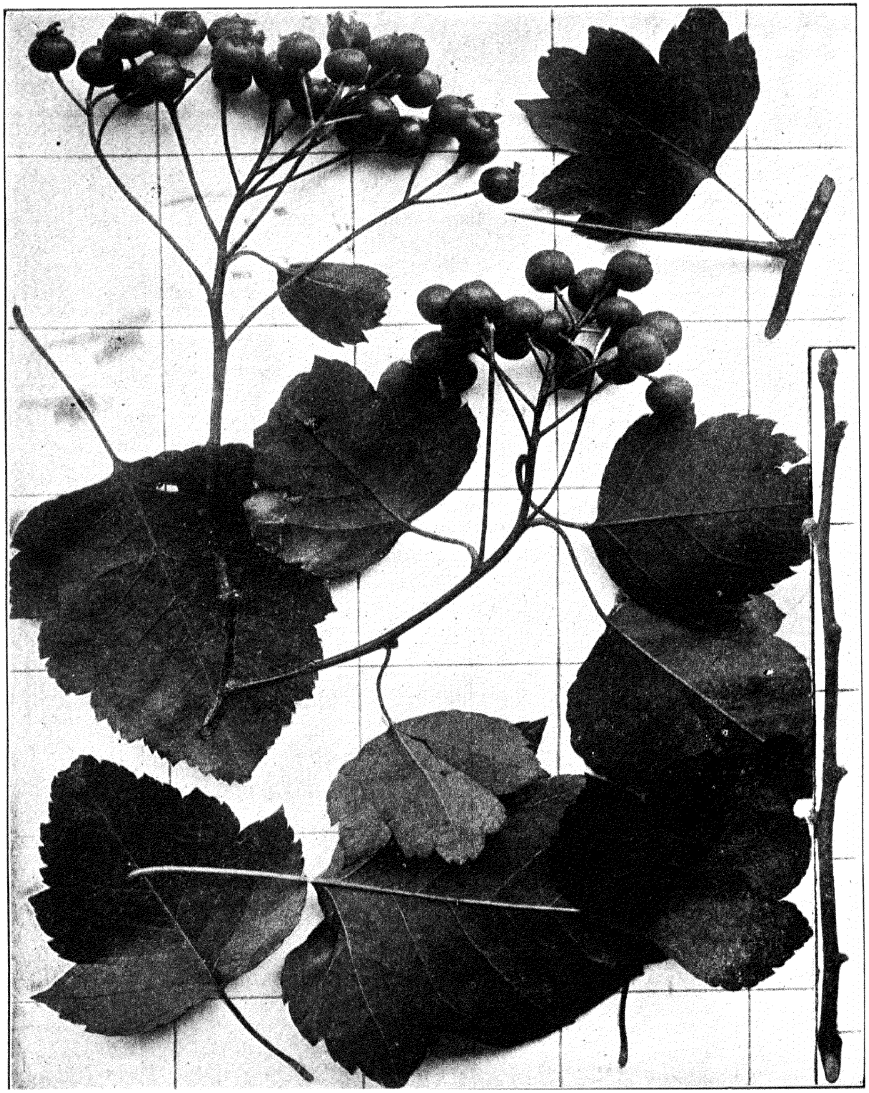
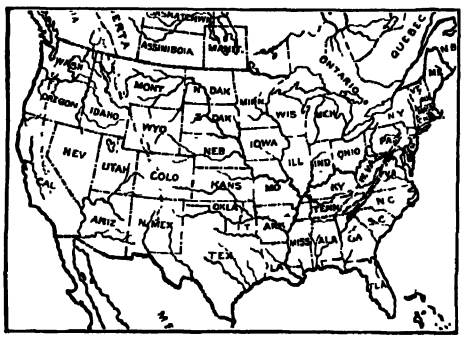
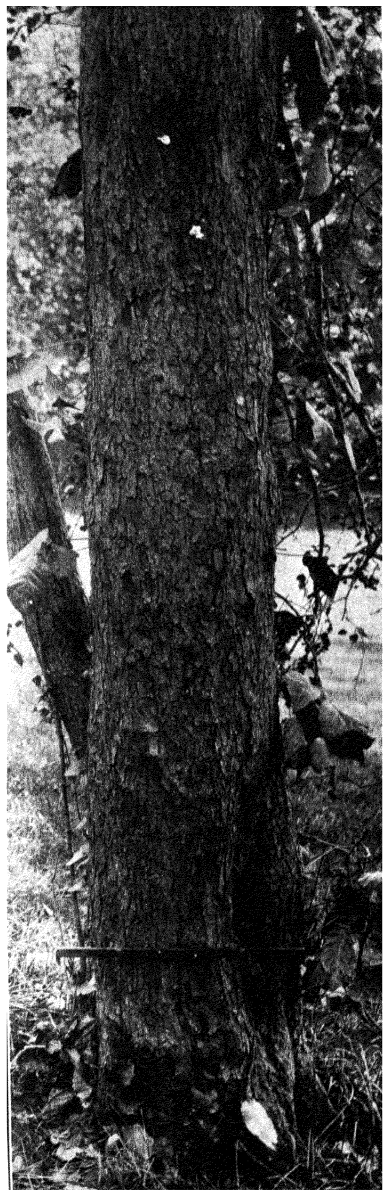


Fig. 296. Mature leaves and fruit; branchlet in winter.
297. Trunk of tree in Central Park, New York.

The Washington Haw is a beautiful and clearly defined tree with slender thorns and marked individuality. It attains the height of 25 or 30 ft. at times, with lofty rounded or spreading top and a clear trunk 10 or 12 in. in diameter and 6 or 7 ft. to the branches, or is sometimes only a large spreading shrub. The bark of the trunk is of a grayish or pale brown color and exfoliates in thin small scales. It occupies the low moist but well drained soil of bottom-lands and the banks of streams, but is nowhere abundant in a wild state. It has, however, probably been more extensively planted for ornamental purposes than any other American species, and may have become naturalized in localities outside of its native habitat indicated on the accompanying map. It is hardy at least as far north as New York. It is said to be even more extensively grown in Europe than in this country, having been introduced as early as in the seventeenth century and was named there. It has long been popular for hedges, as well as ornament, and is said to have received its common name from the fact that nearly a century ago it was introduced from the vicinity of Washington, D. C., into Chester Co., Pa., where it became popular and was extensively planted.

Leaves broad-ovate to triangular, 1¼-2½ in. long, truncate to obtuse or wide cordate and entire at base, mostly acute or acuminate, commonly with 3-7 spreading pointed coarsely serrate lobes, thin and lustrous dark green at maturity, paler beneath; petioles long and slender. *Flowers* in early June, in many-flowered glabrous corymbs, calyx with short lobes pubescent inside; stamens 20, rose-colored; styles 2-5, hairy at base. *Fruit* ripening in October and persisting on the branches until spring, depressed globose, scarcely ¼ in. in diameter, bright red, the calyx-lobes falling away; nutlets 3-5, about ⅛ in. long.





PEAR THORN. PEAR HAW.

Cratægus tomentosa L.



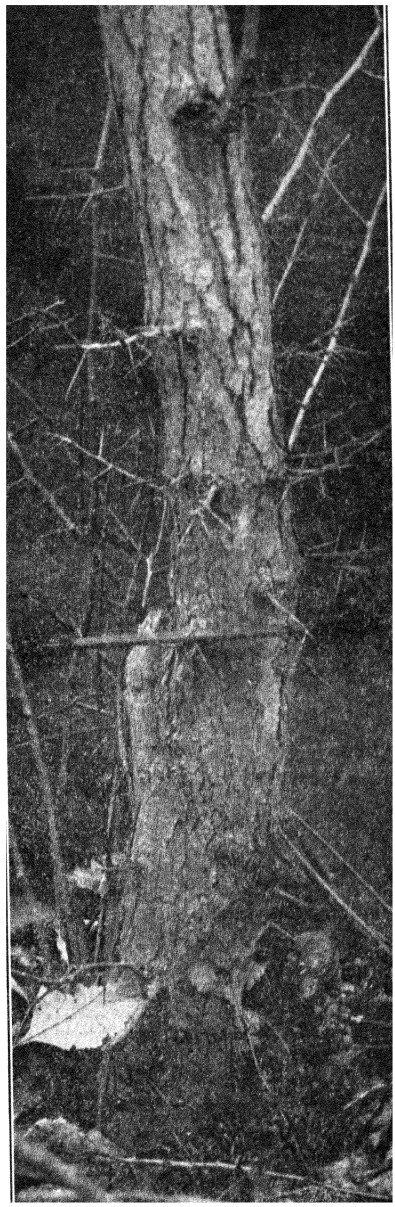
Fig. 298. Mature leaves, fruit and nutlets (the spotting of the leaves is abnormal); branchlet in winter.

299. Trunk with leaves and fruit at base. Near Rochester, N. Y.

The Pear Thorn is a very distinct species, but not of large stature. It sometimes attains a height of 18 or 20 ft. with upright or spreading top of rigid tortuous branches and trunk 5 or 10 in. in diameter, or is often shrubby with several stems. The trunks are usually well armed with formidable thorns and covered with rather smooth bark of pale gray or brown color and finally exfoliating in thinnish plate-like scales. It is of wider range than most of the American species, occupying low rich soil in localities from eastern New York to Kansas and from the Great Lakes to the southernmost slopes of the Alleghanies, but is not everywhere in this range abundant. Western New York and southeastern Missouri seem to be the regions of greatest abundance. It is easily recognizable on account of its large membranous leaves about equally pointed at both ends and its ample upright clusters of small oblong or pear-shaped fruit, which it retains long after the leaves have fallen. In this late retention of its handsome fruit and in the brilliancy of its autumnal colors lie its chief points of ornamental value, for which it is occasionally planted in American and European gardens.

Leaves elliptic to obovate-oblong, 3-5 in. long, cuneate and entire at base and decurrent on the short petiole, mostly acute at apex, sharply dentate or somewhat lobed above at maturity, thinnish, scabrous or glabrous above, pubescent beneath; petioles stout. *Flowers* in early June, about ½ in. across in many-flowered tomentose compound corymbs; calyx with narrow laciniate-serrulate lobes; stamens 20; anthers pale rose-colored; styles 2-5. *Fruit* ripens in October and persists nearly until spring, red, in erect many-fruited clusters, mostly pear-shaped or oblong, with reflexed calyx lobes; stones 2 or 3, broad rounded on the back and with two large ventral cavities.





LONG-SPINE THORN.

Cratægus macracantha (Lindl.) Lodd.

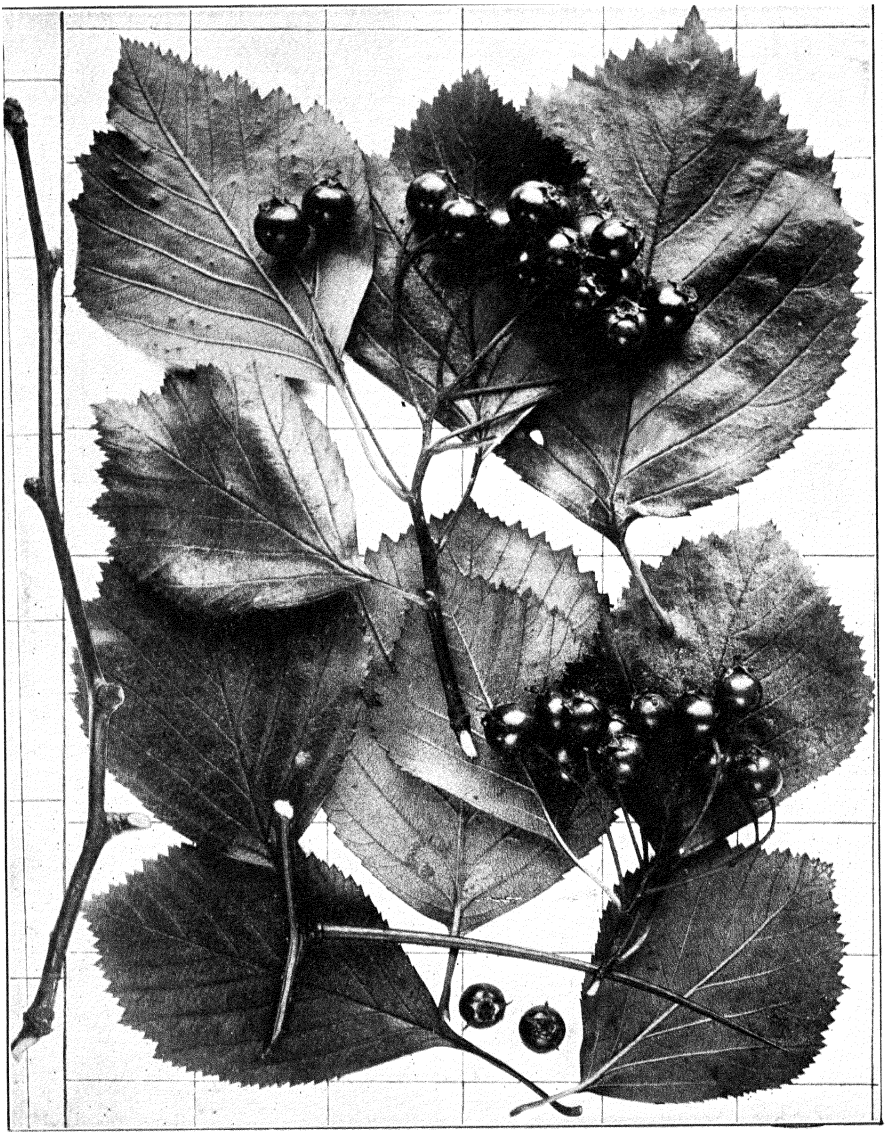
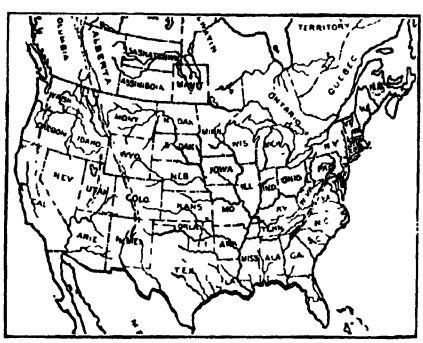


Fig. 300. Mature leaves and fruit; branchlet in winter.
301. Trunk with leaves and fruit at base. Rochester, N. Y.

The Long-spine Haw or Thorn is a tree of medium size for its genus, being seldom more than 18 or 20 ft. in height, with rigid and often crooked branches forming a rather open and irregular top, and trunk 6–8 in. in diameter. This is vested in a pale brown or gray bark which exfoliates in small elongated scales.

It inhabits the banks of streams and rich slopes, more commonly of limestone formation, and attracts the attention of even the casual observer on account of its numerous very long chestnut brown thorns, which are rather slender, somewhat curved and often 3 or 4 inches or more in length. We cannot but wonder what may be nature's plan in equipping this tree with so much more formidable an armament than she has the other species. It is a tree of handsome rich foliage and is a very beautiful object when bearing its large clusters of pure white flowers, as it is also in autumn with its lustrous crimson fruit.

Leaves broad-obovate to oval, 2-4 in. long, abruptly or gradually cuneate and entire at base, mostly acute or rounded at apex, coarsely and sometimes doubly serrate or with short pointed lobes, coriaceous at maturity and dull dark green with impressed veins above, paler and puberulous on the prominent veins and midribs beneath; petioles stout, margined above. *Flowers*, May-June, ¾ in. in diameter in many-flowered villose compound corymbs; calyx with long, narrow, acuminate lobes with dark glands; stamens usually 10 (or 8-12); anthers pale yellow; styles 2-3, tomentose at base. *Fruit* ripening in September in erect many-fruited clusters, subglobose, ½ in. in diameter, lustrous crimson with serrated calyx-lobes reflexed and persistent; nutlets 2 or 3, prominently ridged on the back and with deep ventral cavities.





ENGLISH HAWTHORN. MAY.

Cratægus Oxyacantha L.

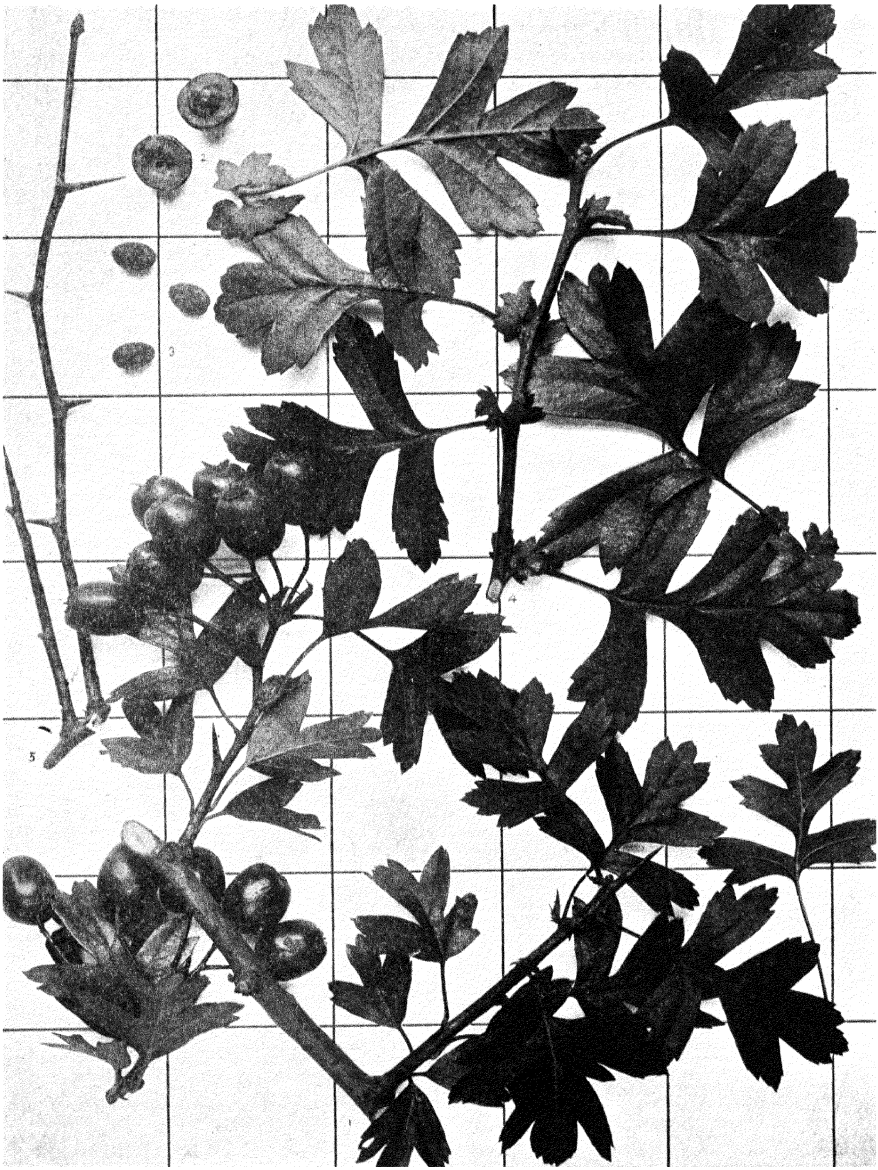
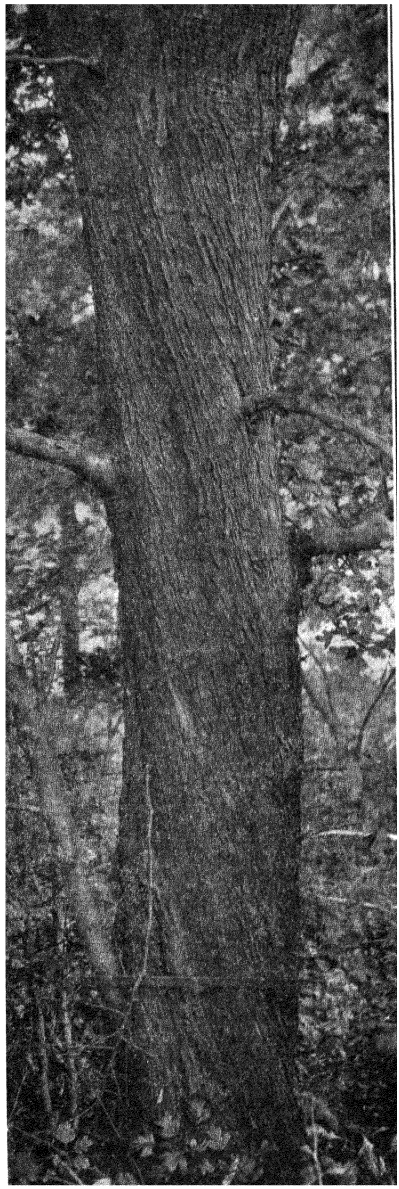


Fig. 302. Mature leaves and fruit, fruit in section and nutlets; branchlet in late autumn.
303. Trunk with leaves at base. Near New York.



The English Hawthorn, or the May of English literature, is the most widely distributed species of the genus, being found as a native distributed over the greater part of Europe and central Asia, whence it was introduced into America and is now naturalized in many localities in eastern United States. It is a species of medium stature, seldom more than 20 or 25 ft. in height, of rather upright habit of growth and with trunk 8 or 10 in. in diameter. This is more or less ridged and covered with a grayish brown bark of elongated, closely appressed scales. It has been extensively planted for ornamental purposes for centuries in all European countries and few plants equal it in popularity for hedges. So extensively is it grown in England that it is as prominent in the associations of country life there as are the nightengale and sky-lark, and the beauty of the "blossoming May" in spring time has made it famous in literature. It is particularly well adapted to hedge growth, as its many stiff branches armed with numerous sharp thorns make an effective barrier. It was for that use and for ornamental planting that it was early brought to America. Here it does not seem to be entirely suited to our climatic conditions and has never won for itself the popularity it has in England.

A few natural and several nursery varieties are found which vary widely from the normal type and some of these are of special ornamental value. Among them are forms with double white, red or variegated flowers, incised or variegated leaves, fastigiate or drooping habit of growth, etc., and in one the period of flowering is prolonged until autumn.

In Asia the tree is said to be cultivated for its fruit.

Its wood is heavy, hard and very fine-grained, and is used in turnery. It is said to be the best substitute for Boxwood in wood-engraving.

Leaves mostly broad-ovate, obovate or oval, 1-2½ in. long, wide-cuneate or truncate and entire at base with 1-3 pairs of wide spreading lobes, irregularly dentate or incisely serrate at apex, glabrous at maturity; stipules often prominent, semicordate, incisely dentate; petioles slender; branchlets with numerous short thorns. *Flowers* about ½ in. broad white or pinkish, in many-flowered corymbs; styles 1-3. *Fruit* oblong to subglobose, ⅜-½ in. long; stones 1 or 2, when in pairs with 2 furrows on the inner side.

Var. *xanthocarpa*, Roem., has conspicuous yellow fruit. Var. *monogyna* Jacq., originally described as a distinct species, has a single stone as shown in our illustration.

SWEET CHERRY. MAZZARD CHERRY.

Prunus Avium L.

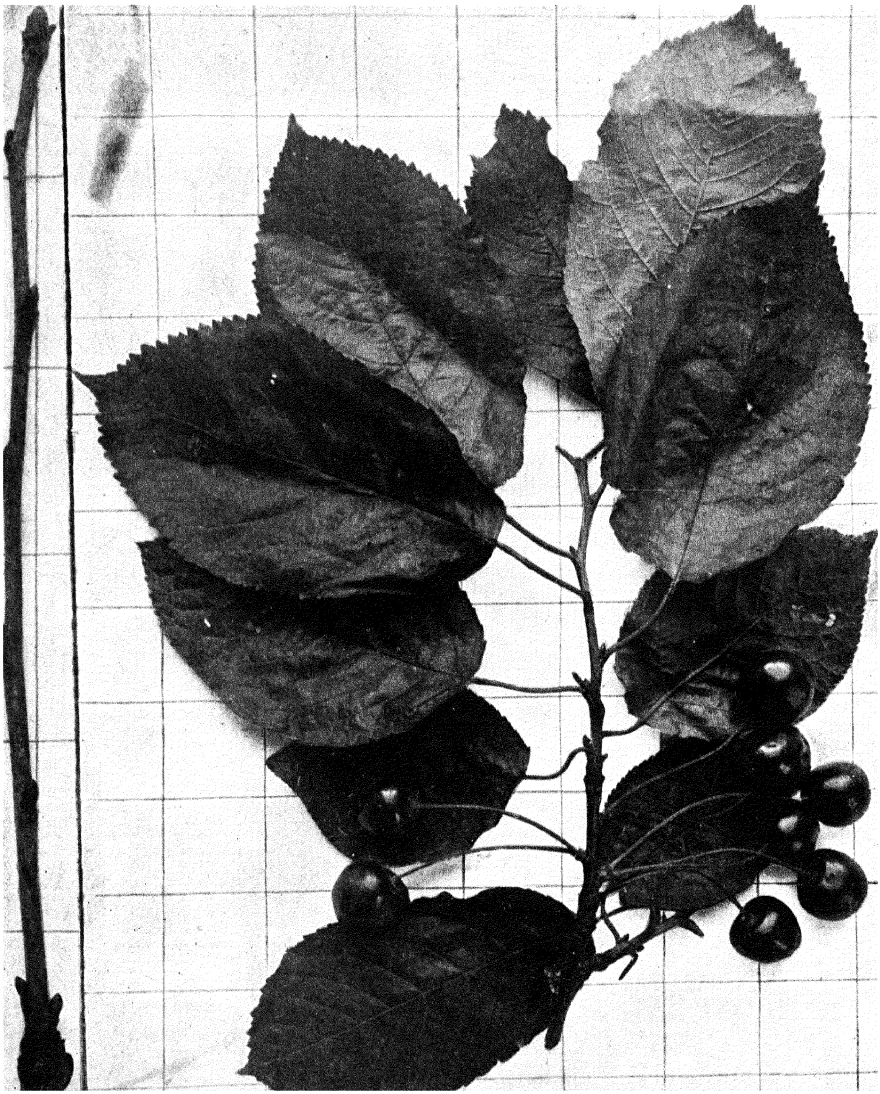
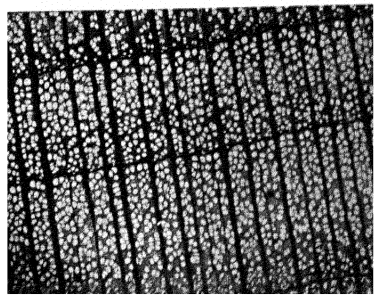


Fig. 304. Mature leaves and fruit, 1; branchlet in winter, 2.
305. Medium-size trunk. Staten Island, N. Y.
306. Wood structure magnified 15 diameters.

The Sweet or Mazzard Cherry is the most abundant of the introduced and naturalized Cherries. It is a much larger tree than the allied Sour Cherry, sometimes attaining the height of from 50 to 75 ft. with rounded pyramidal top while young, having a central leader, but with age usually becoming wide-spreading. The trunks are vested in a smooth reddish brown laminated bark peeling off in transverse strips, and only on very large trunks, which are sometimes 2 or 3 ft. or more in diameter, does it lose its laminated character and show a tendency to low scaly ridges. Its native land is thought to be regions bordering on the Caspian Sea, but it is now widely naturalized throughout southern Europe and a considerable portion of eastern United States. The garden Cherries of which there are many kinds are derived almost without exception from this and the allied Sour Cherry. Those which have their parentage in this species have generally distinctly sweeter fruit than the others and include the Black Tartarian, Bald Eagle, May Duke, Windsor, Napoleon, etc. Varieties of the tree of special value for ornament rather than for fruit have been introduced, as forms having respectively very large leaves, pyramidial habit, pendulous branches, leaves variegated with yellow or white, double flowers, etc. From the fruit of the wild tree in Europe a cordial is made and from its trunk exudes a useful gum.

Its wood in Europe is valued for the manufacture of furniture, musical instruments, etc., and in turnery.[1]





Leaves ovate-oblong, slightly obovate, mostly rounded at base and abruptly acuminate at apex, irregularly serrate, conduplicate in the bud and pubescent at first but finally thin, limp and drooping, dull dark green above, pubescent at least on the veins beneath. *Flowers* expanding with the leaves, white, about 1 in. across in scaly umbels on short lateral spurs pedicels slender. *Fruit* depressed globular or heart-shaped, from yellow to dark red with generally juicy sweet flesh and globose pit.[2]

1. A. W., III, 56.

2. For genus see pp. 440–441.

SOUR CHERRY. PIE CHERRY. EGRIOT.

Prunus Cerasus L.

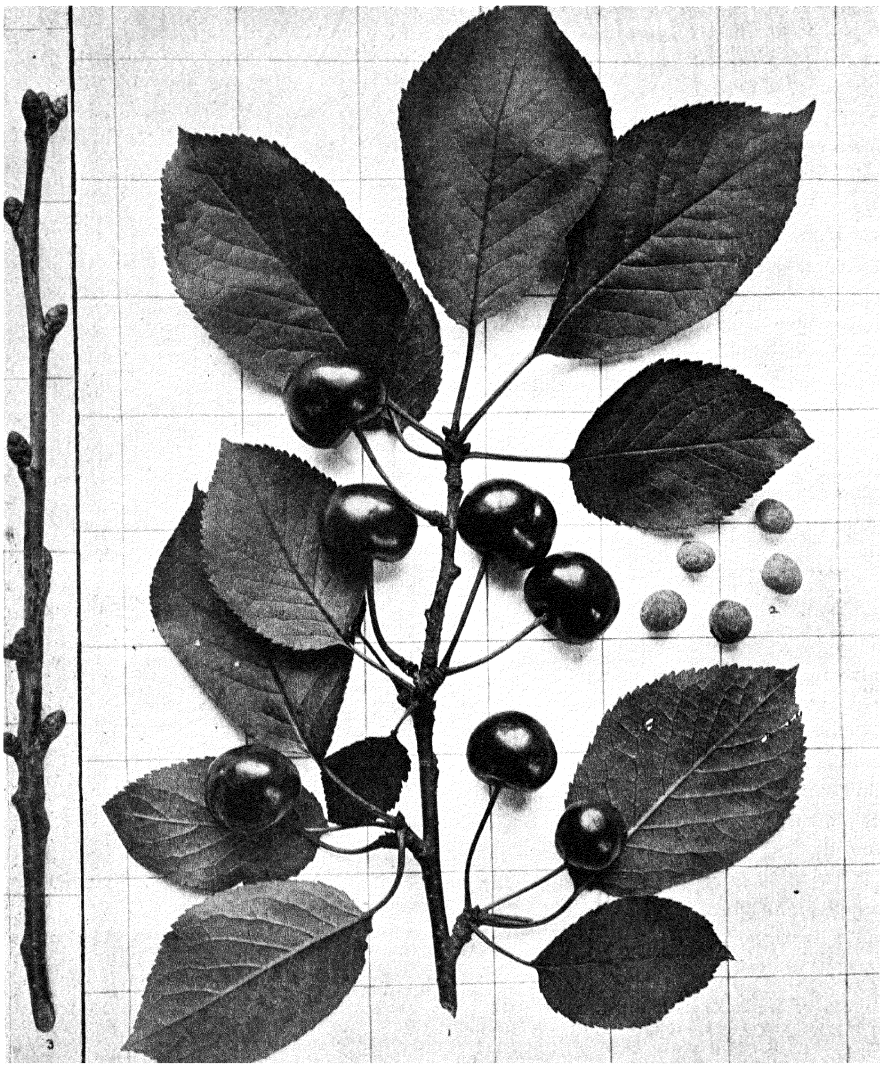


Fig. 307. Mature leaves and fruit, 1; isolated pits, 2; branchlet in winter, 3.
308. Trunk of tree. North Rush, N. Y.

The Sour Cherry is a naturalized tree in the United States, having been introduced on account of the value of its fruit, and has escaped from cultivation. It is a low spreading or rounded tree, seldom more than 20 or 30 ft. in height or with trunk more than 10 or 12 in. in thickness. The bark of young trunks is distinctly laminate, but with age breaks up and exfoliates in thin curled scales, leaving a roughish, somewhat ridged inner bark. The native home of the Sour Cherry is thought to be the forests of northern Persia and Caucasia, but it has become naturalized far outside of these limits and is found growing spontaneously in localities throughout the greater part of Europe and in northern Africa and India, as well as in the United States. It is hardier than the allied Sweet Cherry, has smaller, more rigid and more upright leaves, its spreading top is generally without a central leader and the bark of the trunk is less persistently laminate. Among the valuable garden cherries which have their origin in this species are the Amarelles, Early Richmond, Montmorency, etc., having a colorless juice, and the Morellos and Louise Philippe, etc., having a colored juice. They are all generally more tart in flavor than those of the *P. Avium* origin and the trees hardier. There are also some forms of the Sour Cherry which are of special ornamental value, on account of double white or pink-tinted flowers or leaves variegated with yellow or white. The normal characters are given below.

The wood of the Sour Cherry is rather light, hard, brittle and of a light brown color with lighter sap-wood. Though of good qualities it is small and of no commercial importance in this country.[1]

Leaves ovate to obovate, 2½-4 in. long, rounded or obtuse at base acute or abruptly acuminate unequally crenate-serrate, rather firm and thick, lustrous dark green above, paler beneath. *Flowers* white, about 1 in broad, appearing before or with the leaves in few-flowered very scaly sessile umbels from axillary buds on the growth of the previous season; calyx-lobes strongly reflexed. *Fruit* subglobose or depressed globose, about ½ in in diameter (larger in cultivation) red, without bloom, with juicy tart flesh and subglobose pit.

1. A. W., IV, 82.



PIGEON CHERRY. PIN CHERRY. BIRD CHERRY. WILD RED CHERRY.

Prunus Pennsylvanica L. f.

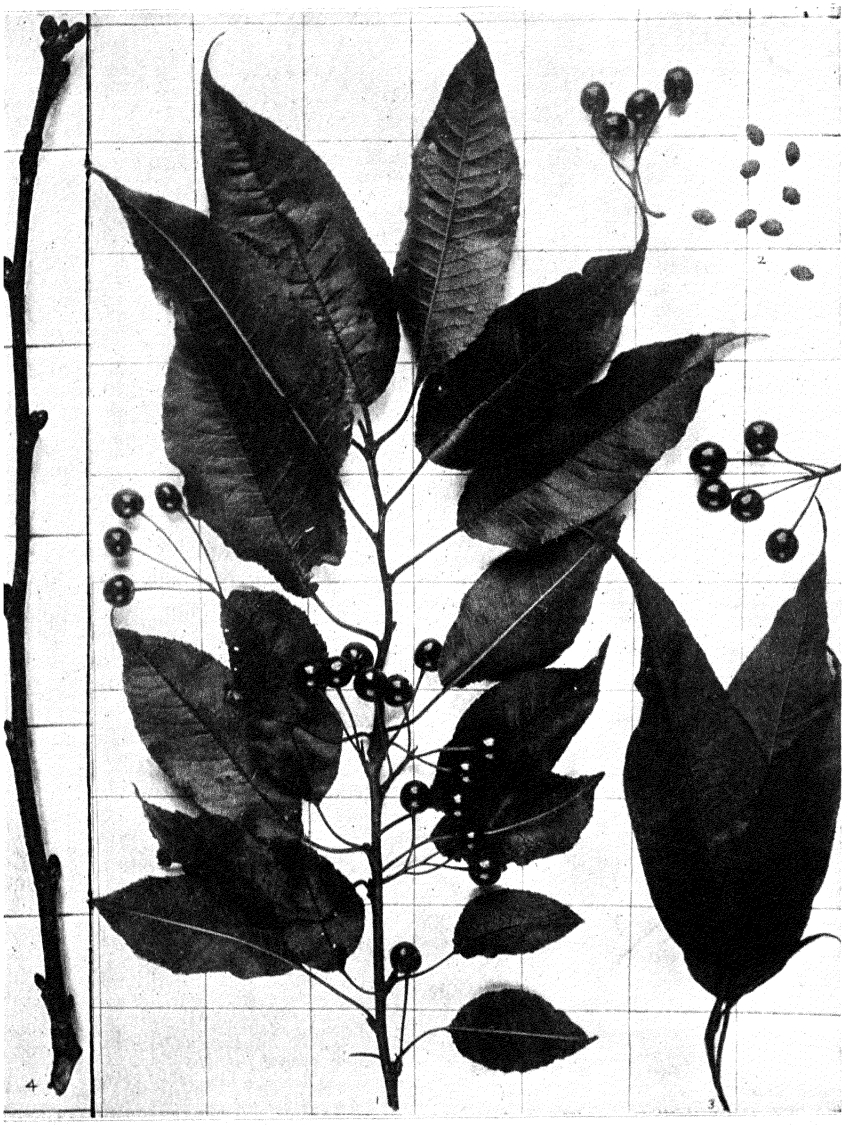


Fig. 309. Branchlet with mature leaves and fruit, 1; isolated pits, 2; leaves from sterile branch, 3; branchlet in winter, 4.

310. Two trunks, in Lewis Co., N. Y.

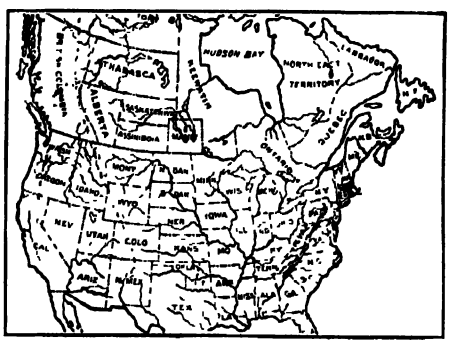
The Pigeon Cherry is a small, handsome tree occasionally attaining the height of 30 or 40 ft. and 10 or 12 in. in diameter of trunk, but is usually much smaller. It develops a rather narrow oblong top with slender upright branches. The bark of smaller trunks and branches is lustrous and of a rich wine color marked with prominent band-like lenticels and peeling off in horizontal strips. Few trees of northern regions equal it in beauty in early May, when each branchlet becomes a garland of delicate white flowers and tender bright green leaves, or in mid-summer when its flowers are succeeded by an abundance of small bright red translucent long-stemmed cherries.

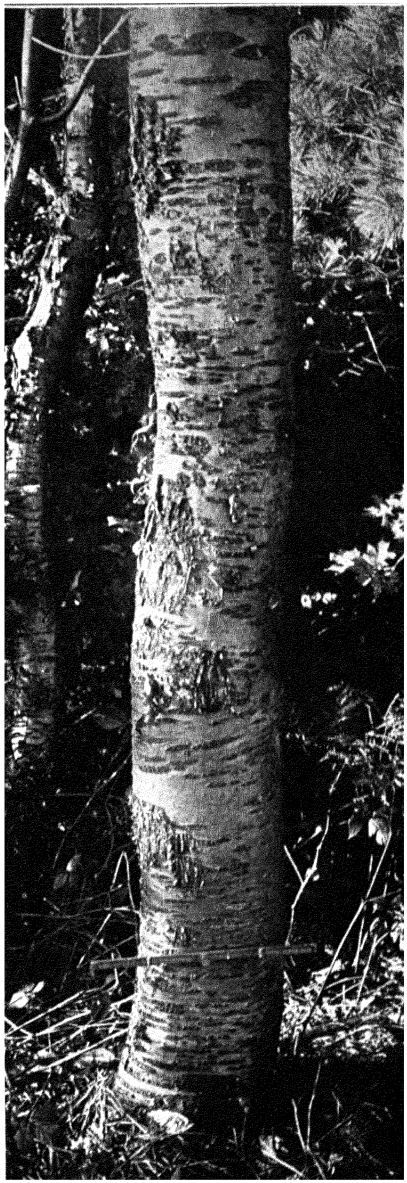
It inhabits dry sandy soil, coming up in abundance from seeds scattered by the birds on forest tracks recently denuded by fires. Here, offering shade and shelter for the more tender seedlings of other and more useful trees, it vies with the Quaking Asp in hastening reforestation. And then, as though its mission ended there, it dies as soon as its nurselings surpass it in size and really need the space it occupies.

The wood is rather light, a cubic foot weighing 31.30 lbs., soft and very close-grained but of little commercial importance.[1]

Leaves oblong-lanceolate, mostly rounded at base and acuminate at apex, finely unequally serrate, slightly viscid when young, smooth both sides at maturity, shining green above, paler beneath; pedicels slender, glandular above. *Flowers* about ½ in. across in lateral 4-5-flowered umbels or corymbs with long pedicels. *Fruit* subglobose, about ¼ in. in diameter, light red, translucent, with very tart juicy flesh and oblong slightly compressed stone about 3-16 in. long.

1. A. W., III, 55.





CANADA PLUM.

Prunus nigra Ait.

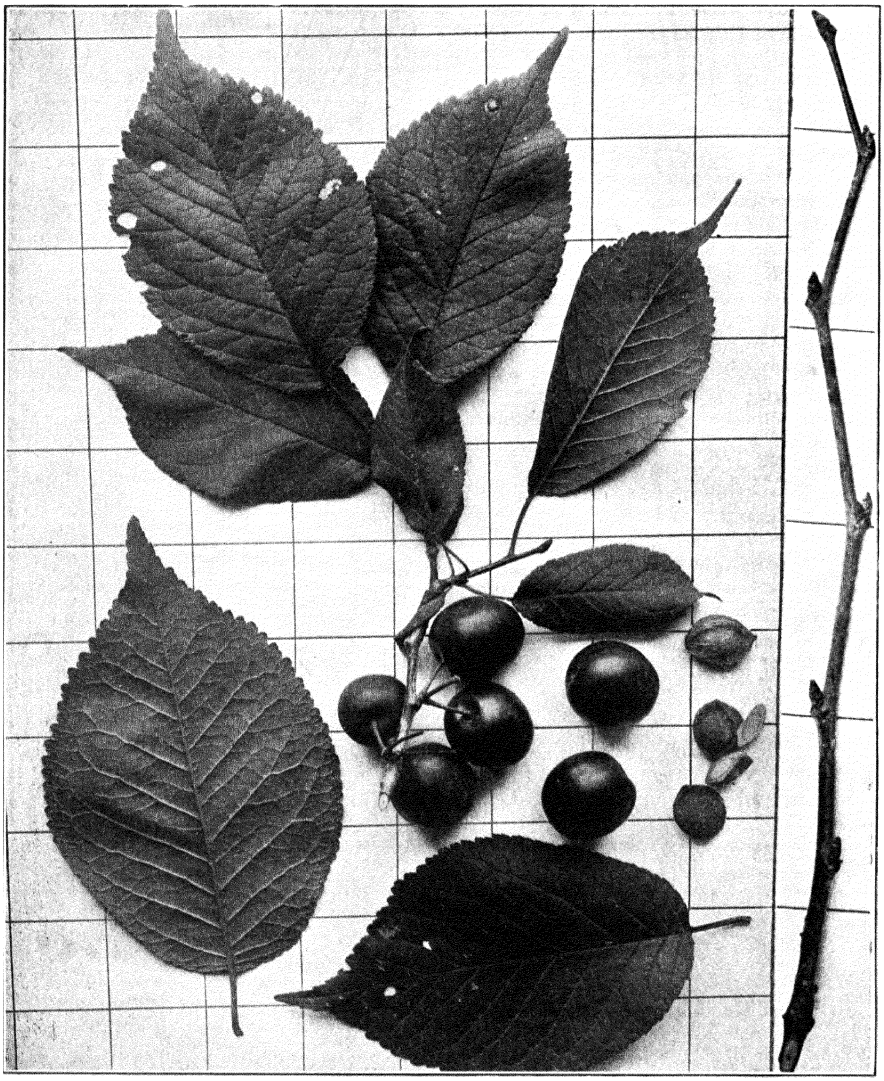


Fig. 311. Mature leaves, fruit and isolated pits, one in cross-section.
312. Trunk. Lewis Co., N. Y.

The Canada Plum attains the height of 20 or 25 ft. and its trunk is occasionally 10 or 12 in. in thickness. It develops a broad or rounded top of many stiff and more or less contorted branches and small somewhat zigzag branchlets.

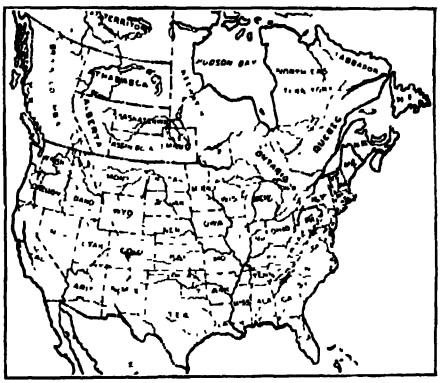
In the month of May its heretofore bare and blackened branches suddenly burst into a profusion of flowers and is at once aswarm with myriads of bees, gathering their first harvest of the summer from its abundant nectar. At this season it is a beautiful and conspicuous object.

Its orange and red fruit ripens in August and is valued both for immediate eating and for preserves and jellies. The quality of fruit varies considerably and some attention is being paid by pomologists to propagating and improving the better varieties. The Purple Yosemite, Quaker and Weaver Plums are of this origin.

The wood is heavy, a cubic foot when absolutely dry weighing 43.17 lbs., hard and very close grained.[1]

Leaves oval or ovate-oblong, mostly rounded or tapering at base, acuminate, unequally crenate-serrate, somewhat rugose, at maturity glabrous dark green above paler and prominently veined beneath; petioles with dark glands near the leaf-blade. *Flowers* about 1 in. across in 3-4-flowered lateral glabrous umbels; calyx lobes glandular-serrate and glabrous inside; petals white, ovate-orbicular with short claws. *Fruit* oblong-ovoid, about 1 in. long, with thick yellow or reddish skin and oval compressed thick-walled pit, sharply and prominently ridged on the ventral edge and slightly grooved on the dorsal.

1 A. W., IV, 81.





AMERICAN PLUM. WILD PLUM.

Prunus Americana Marsh.

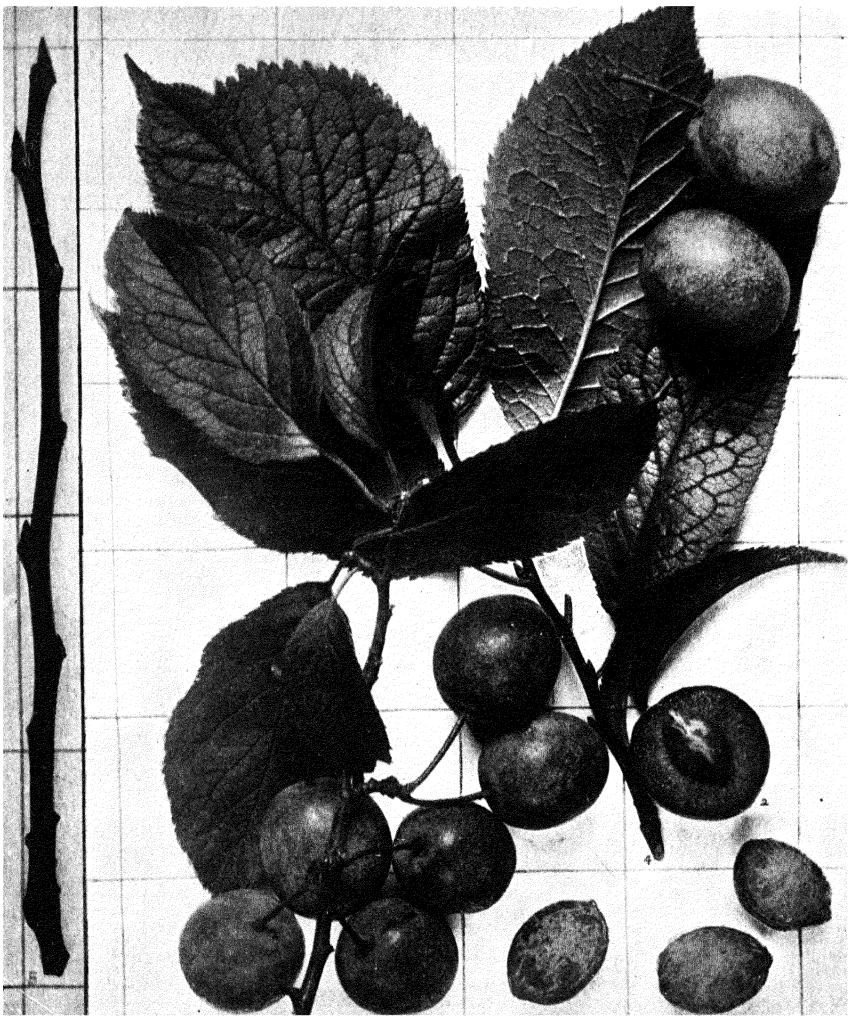


Fig. 313. Mature leaves and fruit, 1; fruit in cross-section, 2; isolated pits, 3; branchlet from sterile shoot, 4; leafless branchlet in winter, 5.

314. Trunk. Southwestern Arkansas.



The American Wild Plum tree attains the height of from 20 to 30 ft. and in regions most favorable to its growth a trunk diameter of 12 or 14 in., but is usually a considerably smaller tree and is sometimes found fruiting as a large shrub. It develops a symmetrical broad or rounded top of spreading and upright branches.

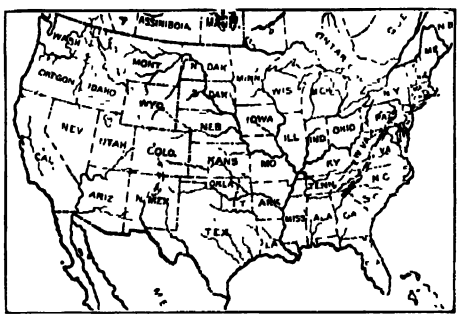
Like the more northern Canada Plum it is one of the delights of early spring, when covered with its profusion of white flowers, and in mid-summer is quite as beautiful an object with its dark green leaves and red and yellow fruit. In quality of fruit it is variable, and pomologists have devoted considerable attention to the propagation and improvement of the better sorts. The De Soto, Louisa, Itaska, Minnetonka, ets., are plums in cultivation of this origin.

Its wood is heavy, a cu. ft. when absolutely dry weighing 44.96 lbs., close-grained, hard and strong, but of no commercial importance.[1]

Leaves ovate to obovate, 2½-4 in. long, narrowed and rounded or tapering at base, acuminate at apex, sharply and sometimes doubly-serrate nearly glabrous when they unfold and at maturity rugose, dark green above, paler and with prominent reticulate veins beneath; petioles mostly glandless. *Flowers* when leaves are about half grown, in 2-4 flowered glabrous umbels; calyx lobes sometimes entire, pilose inside; petals white, rounded with claw. *Fruit* subglobose or slightly elongated with tough acerb skin orange or red often with pale spots; pit oval, rather smoothish and turgid and slightly ridged on the ventral side and obscurely grooved on the dorsal.

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

1. A. W., XI, 257.



WILD GOOSE PLUM. RIVER PLUM.

Prunus hortulana Bailey.

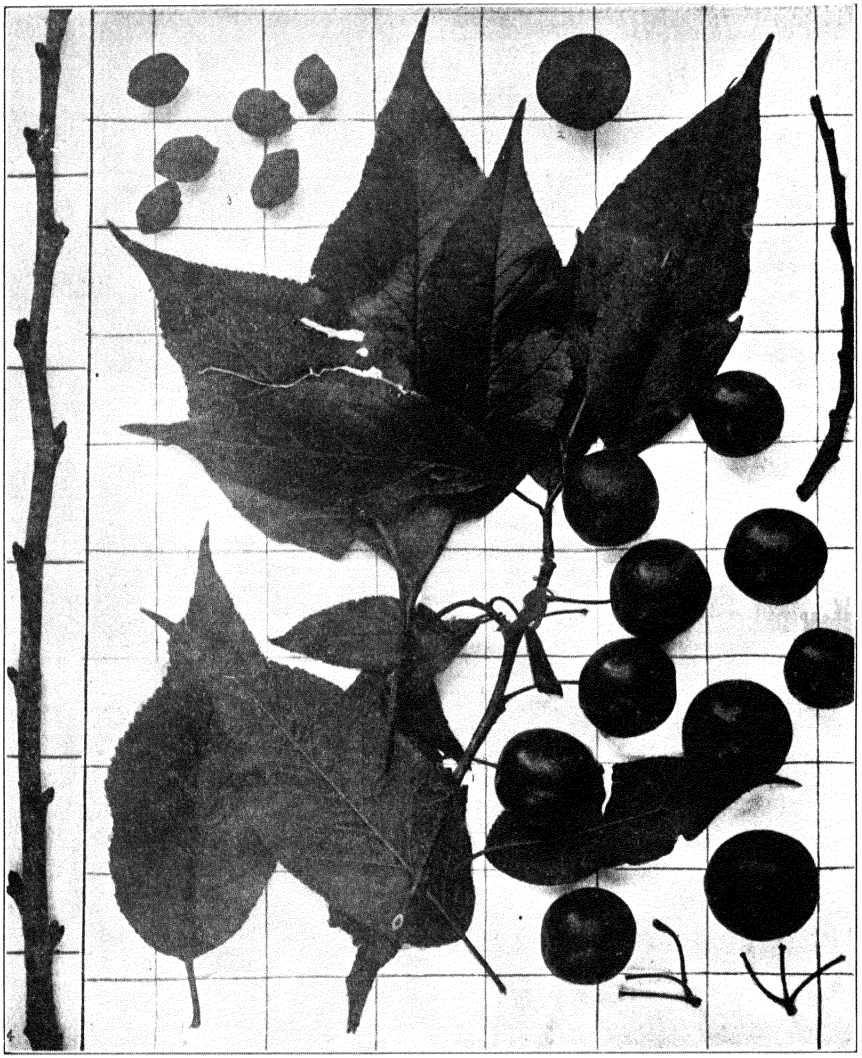


Fig. 315. Branchlet with leaves and fruit, 1; fruit in cross-section, 2; isolated pits, 3; branchlet in winter, 4.

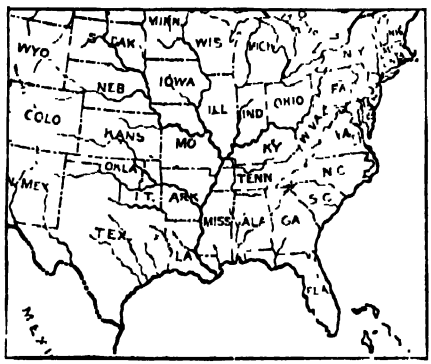
316. Trunk (of var. *Waylandi*) near Allenton, Mo.

The Wild Goose Plum attains the height of 20 or 30 ft. with broad rounded top of rigid branches and trunk sometimes 10 or 12 in. in diameter. In localities it is found as a tall shrub forming thickets of considerable extent. It inhabits the low banks and islands of streams subject to annual inundation (for which reason it is sometimes called *River Plum*) in company with the Sycamore, River Birch, various Willows, Green Ash, Box-Elder, King-nut Hickory, Red-bud, etc. It is said that it takes its common name from the fact that one of the first noticed trees was grown from a stone taken from the crop of a wild goose.

General orchard varieties are in cultivation, producing fruit of excellent quality. Among them are the Miner, Langston, Clinton, etc. (of var. *Mineri*) and the Wayland, Golden Beauty, Moreman, etc. (of var. *Waylandi*).

The wood is heavy, hard, strong, and suitable for use in turnery.

Leaves ovate-lanceolate to ovate, wedge shaped or rounded at base, long taper-pointed, closely glandular-serrate, pilose at first but at maturity glabrous, lustrous dark green above, paler and pilose in the axils of the prominent veins beneath; petioles with dark glands near the leaf-blade. *Flowers* when the leaves are about half grown, 1 in. or less across, in 2–4-flowered puberulous umbels; calyx with acute or rounded glandular-serrate lobes, pubescent both sides; petals white, rounded. *Fruit* subglobose or short-oblong, 1 in. or less in diameter, with thick tough red or yellow skin of pleasant flavor and with turgid stone prominently ridged on the ventral edge and grooved on the dorsal.





CHICKASAW PLUM.

Prunus augustifolia Marsh.[1]

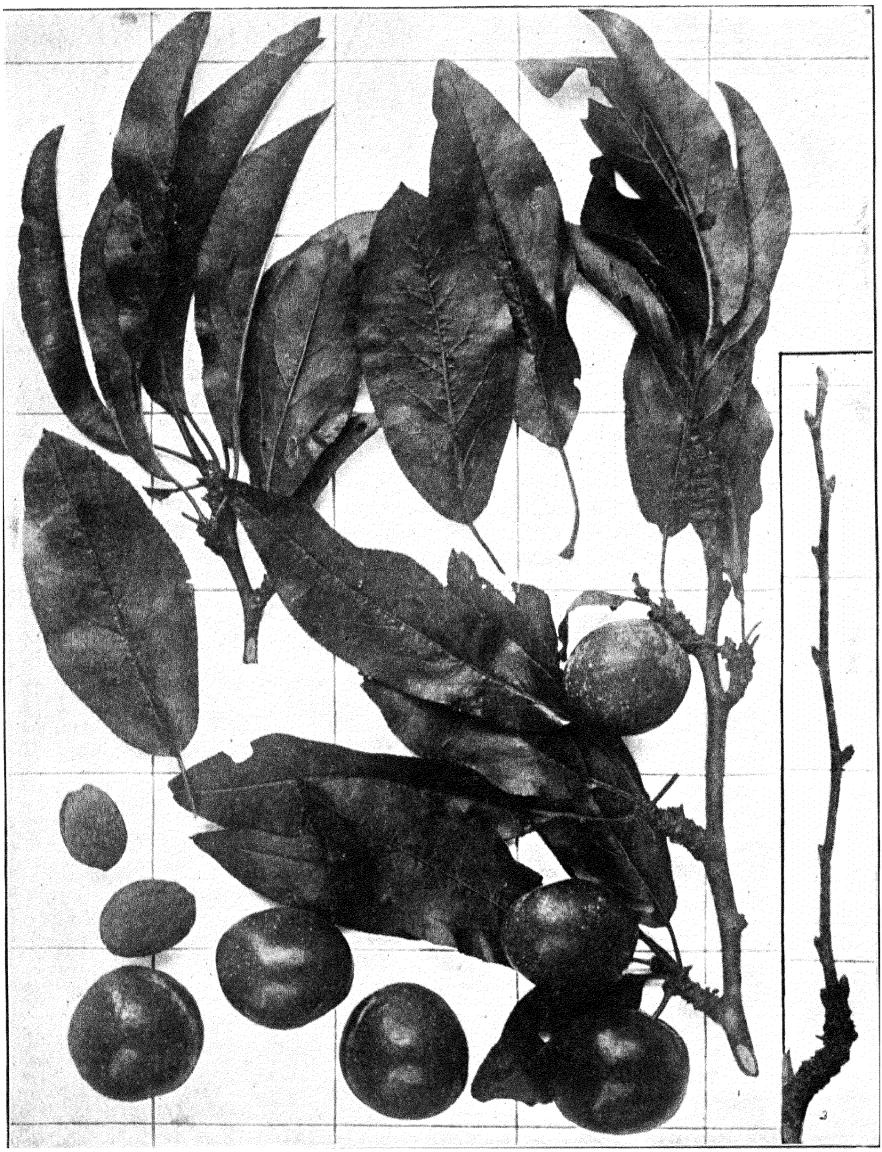


Fig. 317. Branchlet with leaves and fruit, 1; isolated pits, 2; branchlet in late autumn, 3.
318. Trunk in eastern Virginia.

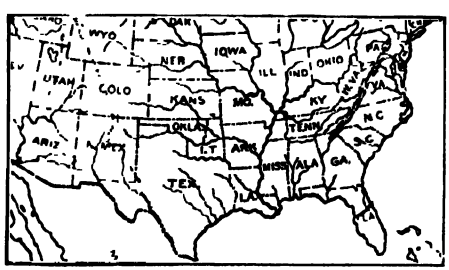
A small tree rarely over 20 or 25 ft. in height with rather wide rounded top of spreading slender branches, and trunk rarely more than 8 or 19 in. in diameter covered with a thin dark brown bark rough with closely appressed scales. It is often a shrub of but few feet in height forming thickets of considerable extent.

The fact that it is confined in its distribution mostly to old fields and roadsides in the vicinity of human habitations suggests the thought that it may be an introduced tree, but from whence it is not known. Early settlers found it growing about the settlements of the Indians in the South, among whom there was a tradition that it was brought from beyond the Mississippi River.

Its fruit is valued for immediate eating and for preserves and jellies and is regularly marketed in season in southern towns, commonly under the name of "mountain cherries." Various improved forms are sold by nursery houses but only suitable for the southern climate.

Leaves lanceolate to lance-oblong, 1-2 in. long, mostly tapering at base, acute or apiculate at apex, sharply serrate, glabrous, lustrous bright green above, paler beneath and with short glabrous or puberulous petioles having two glands near the leaf blade. *Flowers* small, about ½ in. across, expanding before the leaves in lateral 2-4-flowered umbels, with slender glabrous pedicels; calyx glabrous with lobes pubescent inside; petals white, rounded. *Fruit* ripening in early summer, subglobose, about ½ in. in diameter, lustrous red, without bloom, with thin skin, juicy subacid flesh and turgid oblong thick-walled stone with thick rounded margins and somewhat grooved in the dorsal suture.

1. ***Prunus Chicasa*** **Michx.**





ALLEGHANY SLOE. PORTER'S PLUM.

Prunus Alleghaniensis Porter.

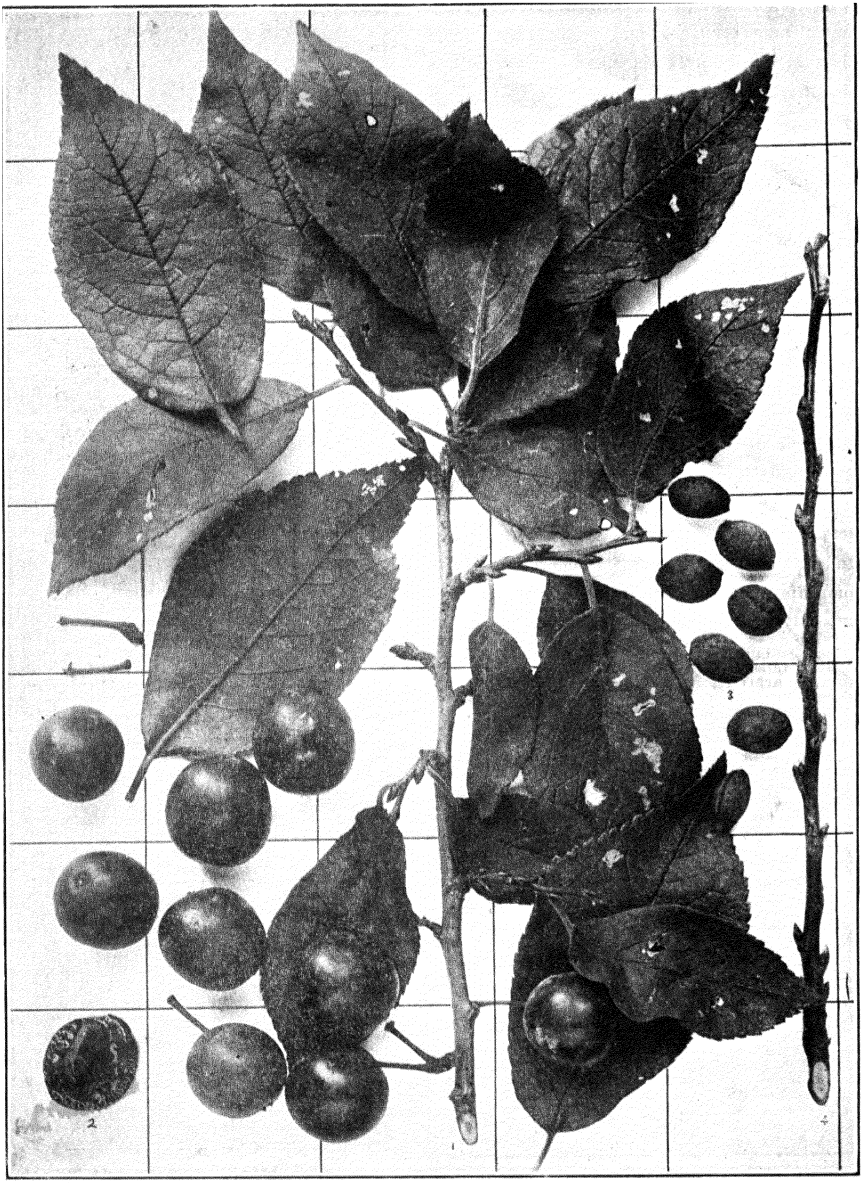
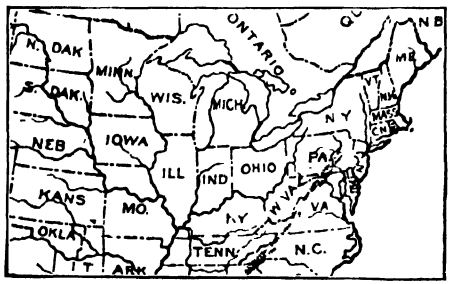


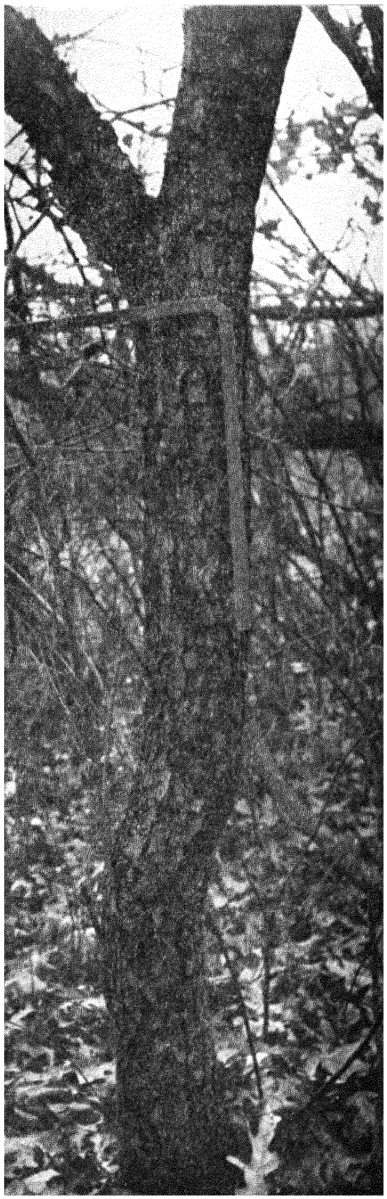
Fig. 319 Branchlet with leaves and fruit, 1; fruit in cross-section, 2; isolated pits; branchlet in late autumn, 4.

320. Trunk (bearing 2 foot rule) near State College, Pa. For specimens and trunk picture the author is indebted to Prof. W. A. Buckhout.

The Alleghany Sloe is a small intricately branched tree, at best not surpassing 18 or 20 ft. in height or 8 or 10 in. in thickness of trunk, vested in a loose scaly bark. It is usually a straggling shrub forming in places extensive thickets and occupying alike low moist soil and well-drained slopes and limestone ridges. In distribution it is the most restricted of the Plums, being confined so far as now understood to central Pennsylvania, chiefly Tussey Mountain in Huntingdon Co., Bald Eagle Mountain and Valley and the Alleghanies in Clearfield and Elk Counties. Occupying the wildest places of these regions it escaped the notice of botanists until about thirty years ago. It is well worthy of cultivation in the garden both on account of its abundant flowers and small glaucous blue-black fruit which it produces in abundance. The fruit is of a pleasant subacid flavor and is gathered and used, in considerable quantities under the name of "sloes," by the country residents, for preserves, jellies, etc. It is quite probable that it will be improved by selection and cultivation.

Leaves obovate-elliptical, 1½-3 in. long, mostly rounded or obtuse at base, acuminate at apex, sharply serrate, pubescent at first, finally puberulous, dark green above, paler and glabrous excepting on veins beneath; petioles ¼ in. long, puberulous. *Flowers* appearing in May with the leaves, ½ in. in diameter in 2-4-flowered umbels; calyx pubescent. *Fruit* ripens by the middle of August, subglobose, about ½ in. in diameter, dark purple with bloom, on stout pedicels, with thickish skin, of pleasant subacid or austere flavor and with turgid pit.





MAHALEB. PERFUMED OR ST. LUCIE CHERRY.

Prunus Mahaleb L.

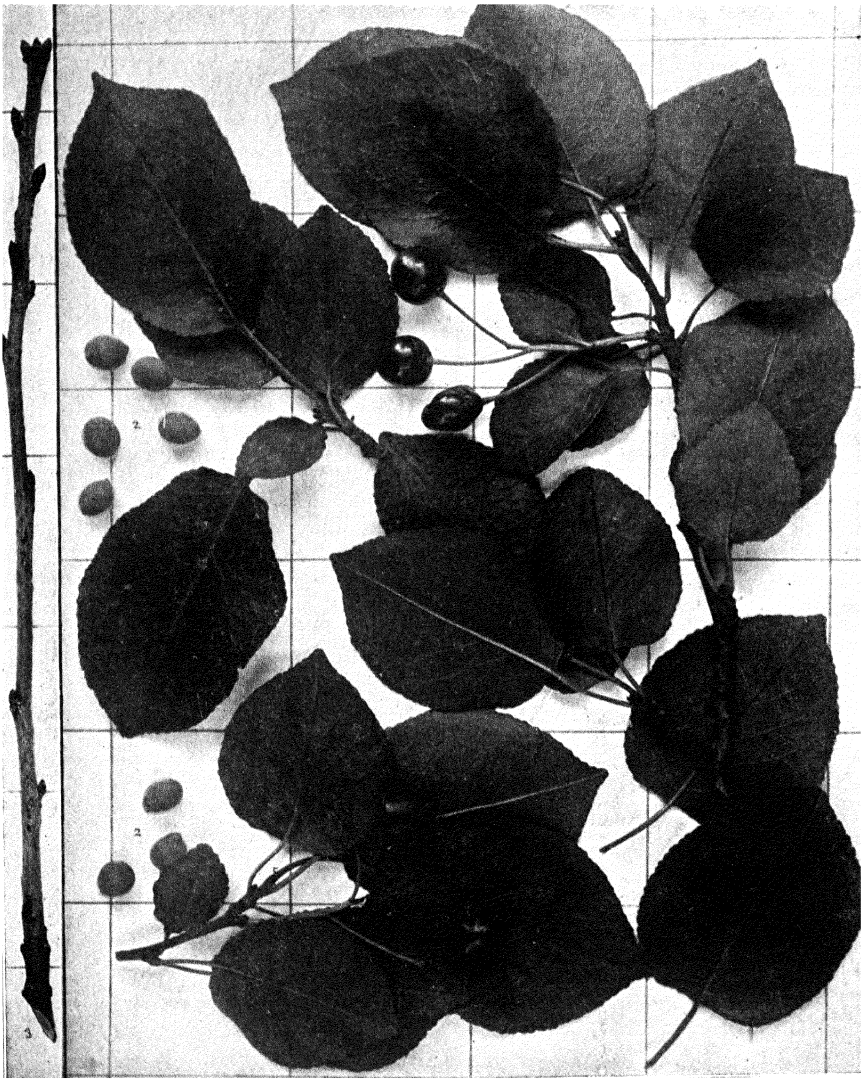
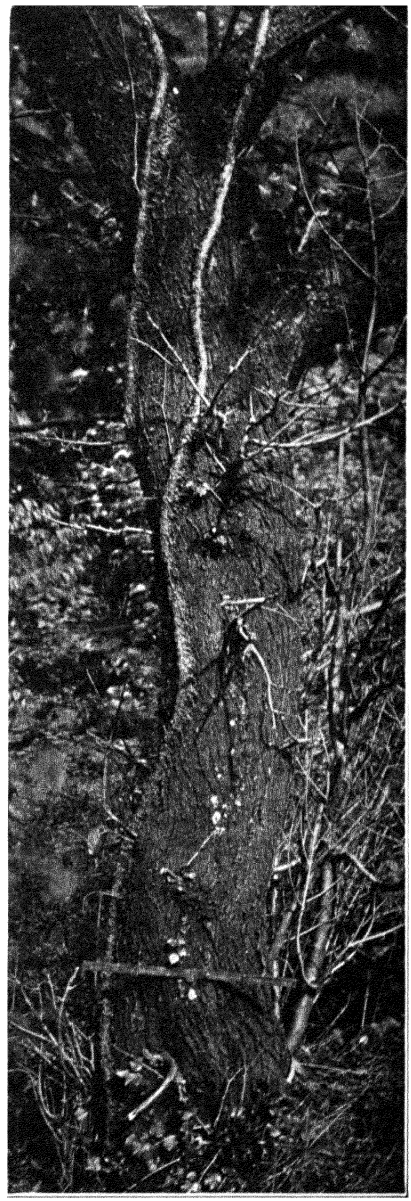


Fig. 321. Branchlet with mature leaves and fruit, 1; separated pits, 2; branchlet in winter, 3.
322. Trunk with leaves at base and supporting the stem of a poison ivy vine, Rochester, N. Y.



The Mahaleb, Perfumed or St. Lucie Cherry properly deserves its name, "Perfumed" Cherry, as it has fragrant foliage as well as fragrant flowers, and its seeds, too, are fragrant, and so is its wood. It is a small tree sometimes attaining the height of 20 to 25 ft., with rather irregular oblong or rounded top of short lateral branches and usually crooked or inclined trunk 8–10 in. in diameter. This is vested in a dark gray or brownish bark, rough with low irregular ridges and appressed scales. It is a native of middle and southern Europe and the Caucasus, whence it is extensively imported into the United States as a valuable stock on which to graft garden cherries and has become naturalized in localities. Its small fruit is too austere and bitter to be edible, but it yields a violet dye and a fermented liquor is made from it resembling Kirschwasser. The seeds possess an agreeable flavor and odor, and a fixed oil expressed from them is used in perfumery and among the Arabs is valued as a remedy against calculus in the bladder.

The wood is heavy, hard, close-grained, of a dark reddish color and fragrant. It is known in Europe as the wood of St. Lucie and is valued by cabinet-makers and by the manufacturers of tobacco pipes and other small articles of wooden-ware. The small rigid stems are used for the stems of tobacco-pipes, walking-sticks, etc. Though a very interesting tree it is not commonly planted for ornamental purposes in America and little use is made of it here except as stocks for grafting purposes.

Leaves broad-ovate to orbicular, mostly 1-2 in. long, rounded or slightly cordate at base, abruptly acute at apex, finely crenate-serrate, firm, glaucous and fragrant; petioles slender, terete. *Flowers* May-June, small, scarcely ½ in. across, white, fragrant and in umbels terminating short lateral branchlets. *Fruit* ripening in July, subglobose, ½ in. in diameter, very dark red, with thin bitter flesh and slightly flattened pit.

CHOKE CHERRY.

Prunus Virginiana L.

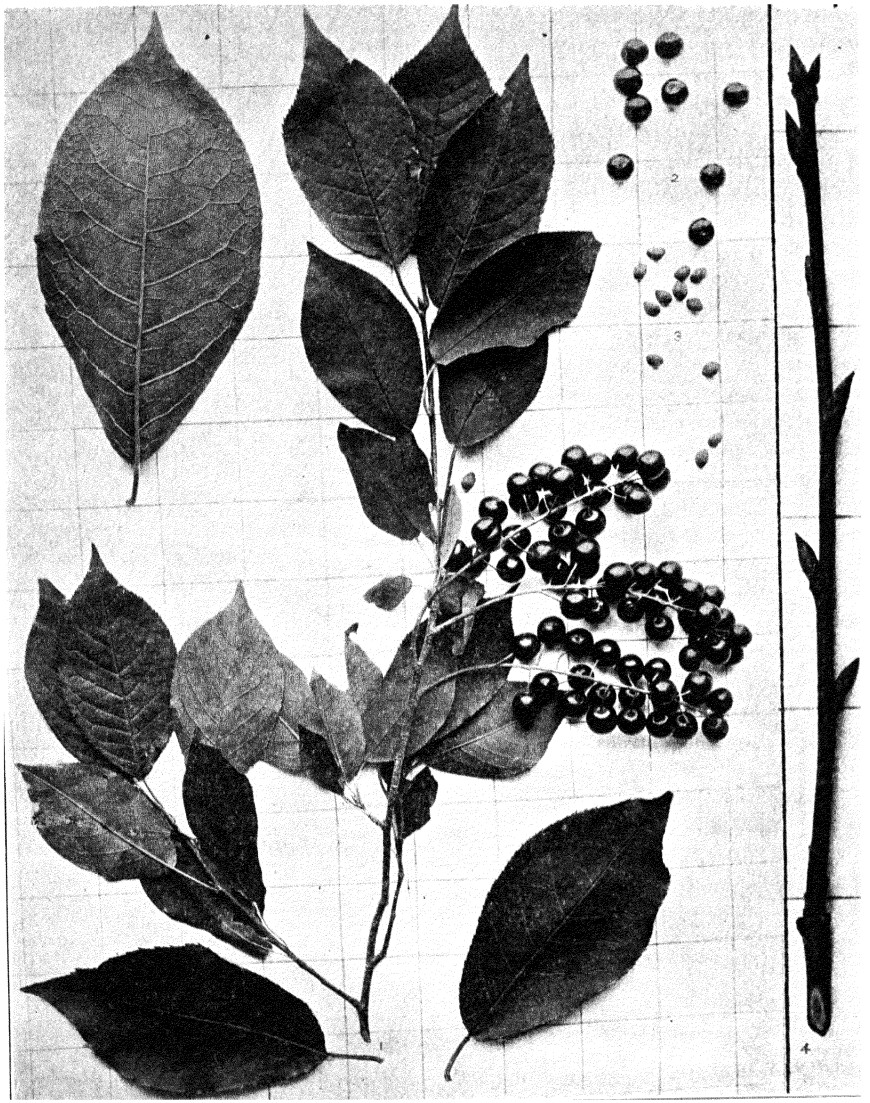


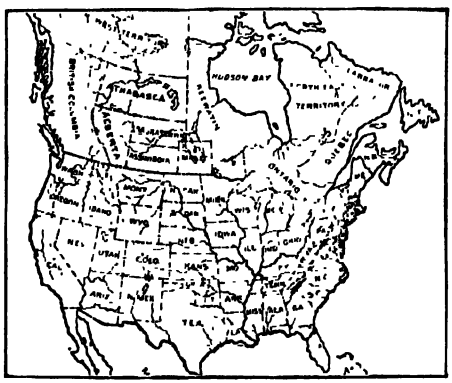
Fig. 323. Branchlet with mature leaves and fruit, 1; detached fruit, 2; pits, 3; branchlet in winter, 4.

324. Trunk in Lewis Co., N. Y.

The Choke Cherry is usually a tall shrub and only under the most favorable conditions does it become a tree 20 to 30 ft. in height, with irregular rounded top and crooked or leaning trunk. This is rarely more than 6 or 8 in. in diameter, and is vested in a grayish brown more or less mottled and rather smooth bark.

It is abundant over a large part of its range growing in moist rich soil of river bottoms and along fence-rows and road-sides, where its finger-like racemes of white flowers make it a beautiful object in the month of May, and its stems of dark red cherries when fully ripe offer refreshment to the wayfarer in the heat of midsummer. The fruit is used in making pies and jellies and is gathered for these uses and marketed in many Canadian towns. Its name is appropriately given in allusion to the consequence of attempting to eat the fruit when not thoroughly ripe, for it is then too astringent to be easily swallowed.

Leaves obovate to oval or oblong, narrow and rounded or tapering at base, abruptly acuminate or sometimes acute at apex, finely and sharply serrate with slender pointed teeth, glabrous and dull dark green above, paler and pubescent along the veins beneath. *Flowers* ½-¾ in. across in cylindrical racemes terminating leafy branchlets; petals suborbicular. *Fruit* about ½ in. in diameter, shining dark or light red (rarely yellow) subglobose austere and astringent until very ripe then edible; stone nearly globose, about ¼ in. long.





WILD BLACK CHERRY.

Prunus serotina Ehrh.

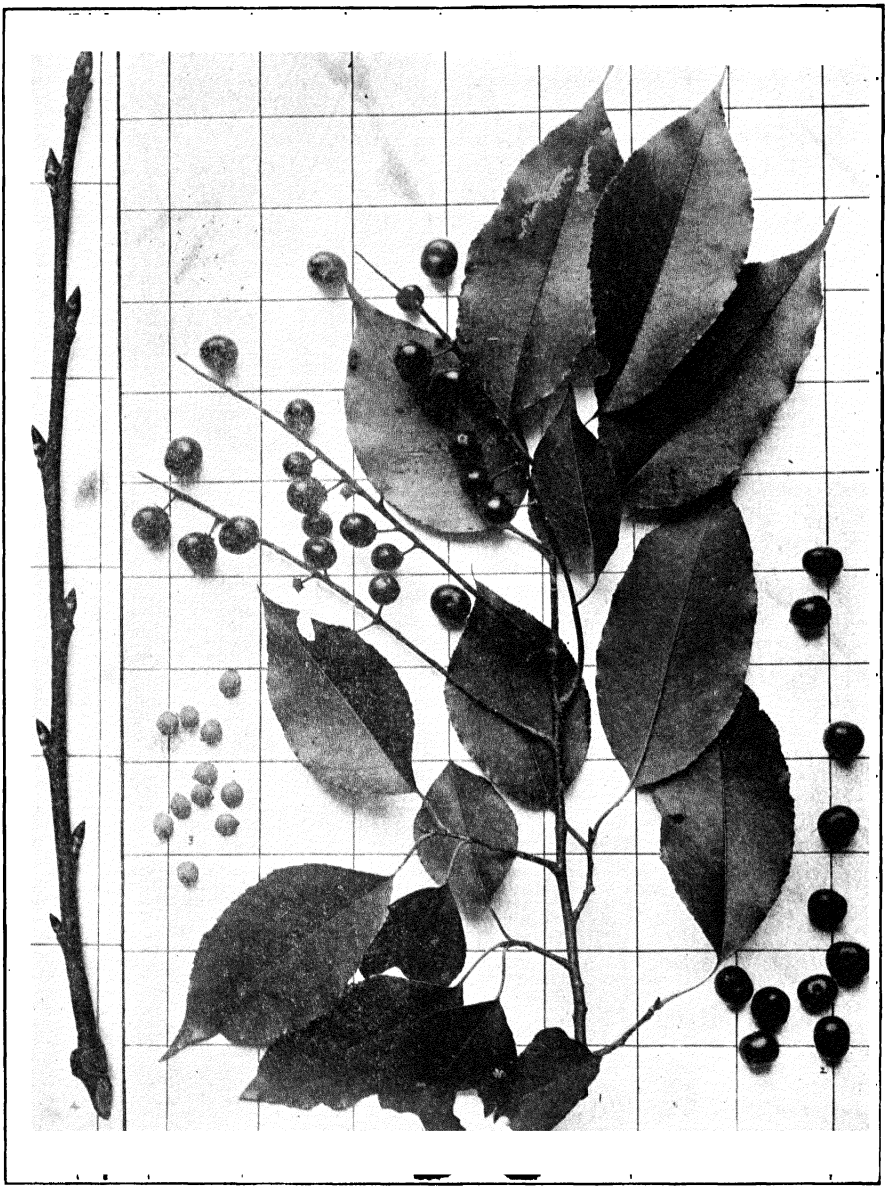


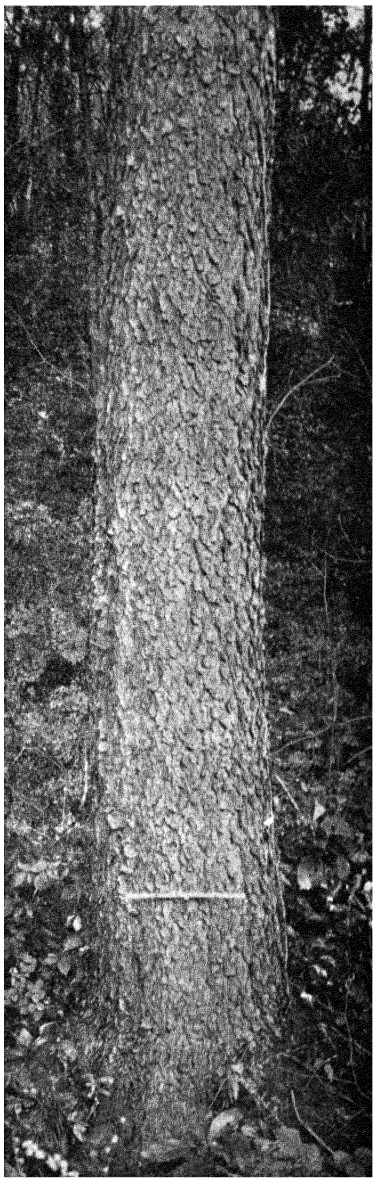
Fig. 325. Branch with leaves and ripe fruit, 1; detached fruit, 2; pits, 3; branchlet in winter, 4.
326. Trunk in forest in western New York.

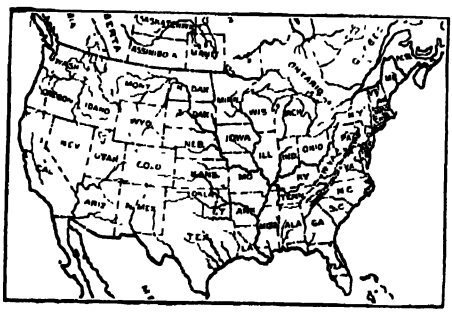
This is one of the most valuable trees of the American forests, sometimes attaining the height of 80–100 ft., with straight columnar scaly-barked trunk 3–5 ft. in thickness. When isolated it develops an oblong or rounded top of slender rigid branches, and growing alike on dry gravelly slopes and moist intervales it is one of the chief elements of many tracts of forests of the Appalachian regions. Its flowers appear later than those of other representatives of the genus (hence the specific name, from a Latin word meaning *late*) and when its leafy top is trimmed with its many nodding racemes of small white flowers it is a highly ornamental tree. Its fruit, when fully ripe is of pleasant vinous flavor and is often used in making rum, and the aromatic bark is valued as a flavoring, as a tonic and sedative medicine.

The wood of which a cubic foot weighs 36.28 lbs. is strong, rather hard and very close grained and one of our most valuable woods for furniture making and interior finishing.[1]

Leaves oval or oblong to lance-obovate, 2-5 in. long, tapering or rounded at base, taper-pointed, serrate with incurved teeth, glabrous, thick lustrous dark green above, paler beneath, with slender petioles bearing red glands. *Flowers* opening when the leaves are nearly grown, $\frac{1}{4}$ in. across in erect or nodding racemes 4-6 in long, terminating short leafy branchlets; calyx with short lobes, persistent; petals obovate. *Fruit* subglobose and somewhat lobed, $\frac{1}{2}$-$\frac{1}{2}$ in. in diameter, reddish black with juicy purple flesh of vinous flavor and stone about $\frac{1}{4}$ in. long pointed at apex.

1. A. W., II, 29.





RED-BUD. JUDAS-TREE.

Cercis Canadensis L.

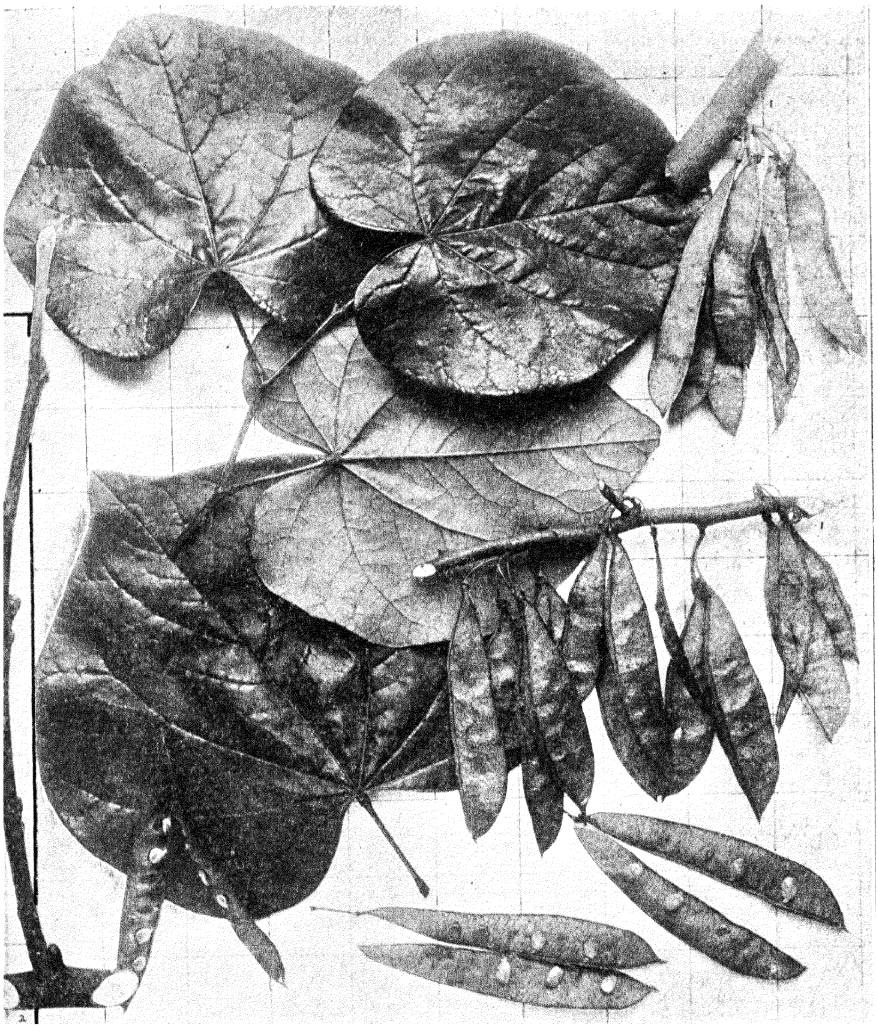


Fig. 327. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
328. Trunk with stems of poison ivy vines. Red River valley, Ark.
329. Wood structure magnified 15 diameters.

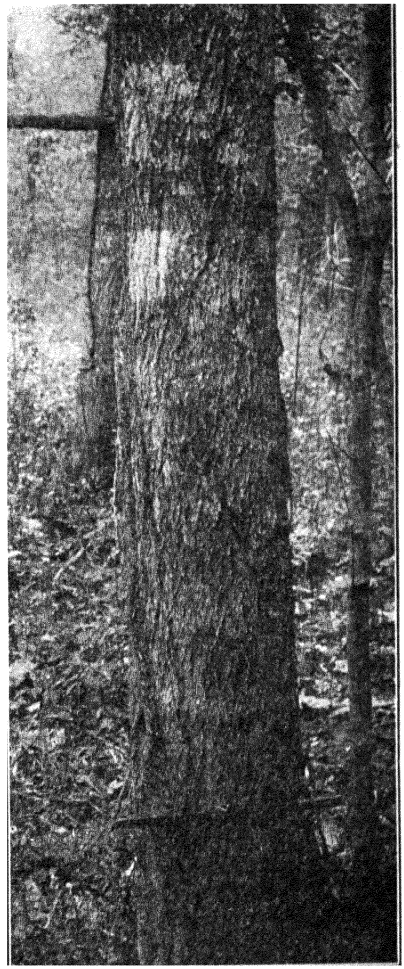
The Red-bud is a small tree, sometimes in forest growth attaining a height of 40 or 50 ft., but when isolated does not attain so great a height and then develops a low wide flat-topped or a rounded head. The trunk is rarely more than 10–12 in. in diameter, clothed in a grayish or reddish brown scaly bark.

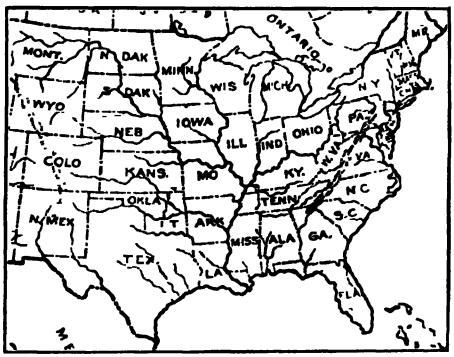
It inhabits the banks of ravines and rich bottom-lands, sometimes forming an undergrowth in forests of taller trees, and in early spring its abundant pink flowers make it a beautiful object. Associating as it does with the Flowering Dogwood and flowering at the same season of the year, one rarely sees a more beautiful floral medley than that presented by these two trees, a bank of Red bud flowers making a beautiful setting for the large white flower-heads of the Dogwood. In summer its glossy round heart-shaped leaves are unsurpassed in attractiveness by the foliage of any other tree, and it is justly popular for ornamental planting.

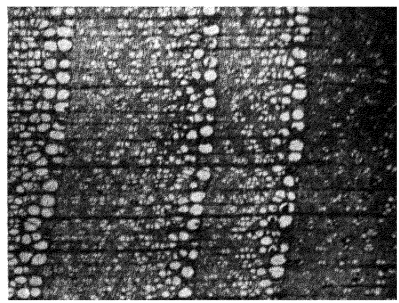
The wood, of which a cubic foot weighs 39.65 lbs., is of a yellowish brown color with thin sap-wood, and is of little commercial importance.

Leaves cordate-orbicular, 3-5 in. long and broad, truncate or cordate at base, obtuse or acute at apex, entire, thickish, lustrous above, hairy in the axils of the veins beneath, bright yellow in autumn. *Flowers* about ½ in. long, in sessile umbels; corolla pink purple. *Fruit*: pod 2½-3½ in. long, short stalked in the calyx; seeds oblong, ¼ in. long[1]

1. For genus see pp. 441–442.







COFFEE-TREE.

Gymnocladus dioicus Koch.[1]

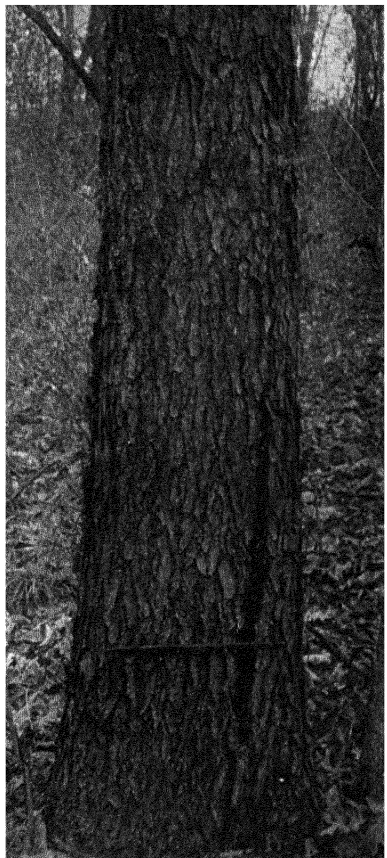


Fig. 330. Branch with leaf and mature fruit, 1; pods open and in section, 2 and 3; branchlet in winter, 4.

331. Trunk of tree near Allenton, Mo.

332. Wood structure magnified 15 diameters.

The Coffee-tree, or as it is commonly called the Kentucky Coffee-tree, sometimes attains the height of 100 ft. and in the forests with straight columnar trunk 2–4 ft. in thickness covered with a grayish bark, rough with firm prominent scales. In the open it develops a rather wide obovoid top, conspicuous in summer on account of its graceful airy foliage and perhaps interspersed with its great brown pods. On the approach of winter its manner of shedding its large bicompound leaves suggested to the common mind the erroneous idea that it is shedding also its twigs and its appearance then, when leafless, has given rise to the name *Stump-tree*. It is confined in its distribution to low rich bottom-lands in company with the Black Walnut, Buckeye, Red-bud, Hackberry, Slippery Elm, Honey Locust, Oaks and Hickories, but is nowhere abundant. Its common name, Coffee-tree, is given to it because its seeds in early days were used to some extent as a substitute for coffee.



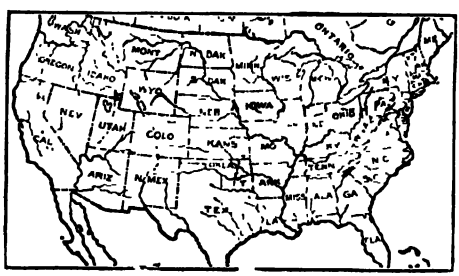
The wood, of which a cu. ft. when absolutely dry weighs 43.21 lbs., is heavy, strong and very durable, and is useful for posts, railway ties, furniture, etc.[2]

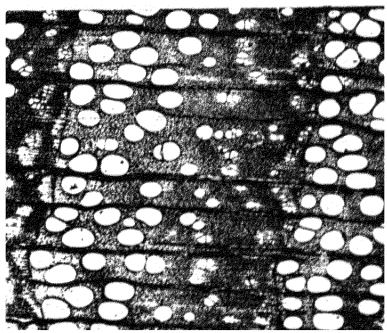
Leaves large, 2-3-ft. long, with strong petioles and 10-18 pinnæ each bearing 10-14 ovate membraneous nearly glabrous leaflets. *Flowers* staminate flower-clusters 3-6 in. long; the pistillate 10-12 in. long with longer pedicels. *Fruit* pods mostly 4-10 in long, 1½-2 in broad, remaining closed on the branchlets late into the winter with sweet pulp and seeds ¾ in. across.[3]

1. Syn. *Gymnocladus Canadesis* Lam.

2. A. W., II, 27.

3. For genus see p. 442.





HONEY LOCUST.

Gleditsia triacanthos L.[1]



Fig. 333. Piece of branch bearing leaves and fruit, the leaves being mostly "asleep" (*i. e.*, with leaflets closed together, as they do at night), 1; portion of pod with side removed, 2; leaf with leaflets spreading apart as they do in day-time, 3; large branching thorn, 4; branchlet in winter, 5.

334. Trunk near St. Louis, Mo.

335. Wood structure magnified 15 diameters.

The Honey Locust attains the height of from 75 to 140 ft. when growing in the forests, and when isolated develops a broad rounded or lofty flat-topped head with drooping lateral branches and of very characteristic aspect. Its trunk, commonly 2 or 3 ft. in diameter, exceptionally 5 or 6 ft., is vested in a dark gray bark with closely appressed firm scales. It usually bears a rigid sharp 1-3-pointed glossy purple-brown thorn above the axil of each leaf, and the trunk and bases of the large branches often bristle with very formidable branching thorns, but trees are occasionally met with in which the thorns are nearly or entirely absent. It inhabits chiefly moist bottom-lands in company with various Oaks and Hickories, the Black Walnut, Hackberry, Buckeye, etc., and although growing naturally only west of the Alleghanies and in the Mississippi valley has become widely naturalized outside of its original range. It is extensively planted for ornamental purposes, hedges, etc. From its inconspicuous flowers the bees gather much honey.

Its wood is heavy, a cu. ft. when absolutely dry weighing 42 lbs., strong and very durable and is used for railway-ties, posts and in the manufacture of agricultural implements.[2]

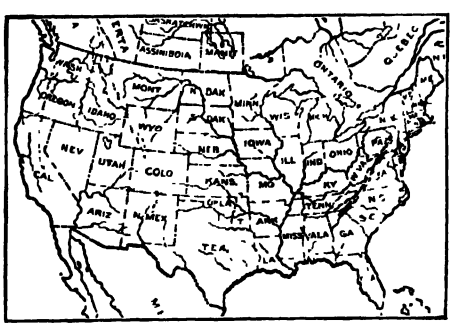
Leaves 7-10 in. long with 7-10 pairs of leaflets or 4-8 pairs of pinnæ with pubescent petioles and rachises, the leaflets short-stalked, oblong-lanceolate, inequilateral at base, obtuse or rounded at each end, crenulate, lustrous dark green above, paler and often pubescent on the midribs beneath. *Flowers* (June) from axils of the leaves of the previous season, green and rich in honey, the staminate in dense and sometimes clustered racemes, the pistillate in few-flowered and usually solitary racemes. *Fruit* pods, linear, 10-18 in. long, shining dark brown and usually contorted and twisted in short racemes and containing numerous hard oval compressed seeds separated by a sweetish succulent pulp.[3]

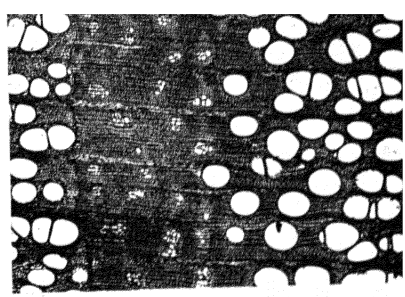
1. Sometimes spelled *Gleditschia.*

2. A. W., II, 28.

3. For genus see p. 442.







WATER LOCUST.

Gleditsia aquatica Marsh.[1]



Fig. 336. Piece of branch with leaves and fruit, 1; fruit opened, 2; isolated seeds, 3; leaf "asleep," 4; branchlet in winter, 5.

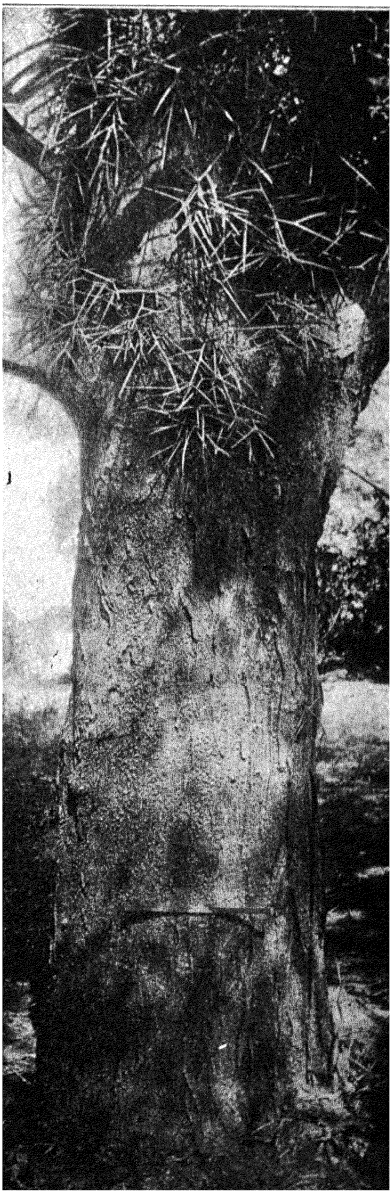
337. Trunk in southern Illinois near St. Louis.

The Water Locust attains a height of 50 or 60 ft. and its short trunk is sometimes 2 or 3 ft. in diameter. It divides usually within a few feet of the ground into several branches forming a bushy rounded top more or less flattened above, with contorted spiny branches. Sometimes the trunk also is beset with formidable great rigid branching thorns. The bark of trunk is thin, firm, rough with small corky excrescences and is sometimes sparingly scaly. It inhabits only deep swamps, the borders of sloughs and low river banks subject to long inundation, in company with the Button-bush, Forestiera, Planer-tree, Bald Cypress, Water and Tupelo Gums, various Willows, etc. and is most abundant and of largest size in the lower Mississippi valley.

The wood, of which a cu. ft. when absolutely dry weighs 45.76 lbs., is heavy, hard and strong, of a reddish brown color with thick pale yellow sap-wood.[2]

Leaves 5-10 in. long with 5-7 pairs of pinnate or bi-pinnate pinnæ of 5-12 pairs of ovate to oblong leaflets, usually oblique at base, rounded at apex, finely crenate-serrate, thick and firm, lustrous dark green above, paler beneath. *Flowers* appearing in June in slender elongated racemes. *Fruit:* pods lustrous brown, thin, 1-2 in. long, in pendent racemes, oblique-ovate, pointed at both ends, with long slender stalk, without pulp and containing a solitary (or sometimes 2) flat suborbicular yellow-brown seed ½ in. in diameter.

1. Syn. *Gleditsia monosperma* Walt.
2. A. W., V, 109.





YELLOW-WOOD. GOPHER-WOOD. VIRGILIA.

Cladrastis lutea (Michx.) Koch.

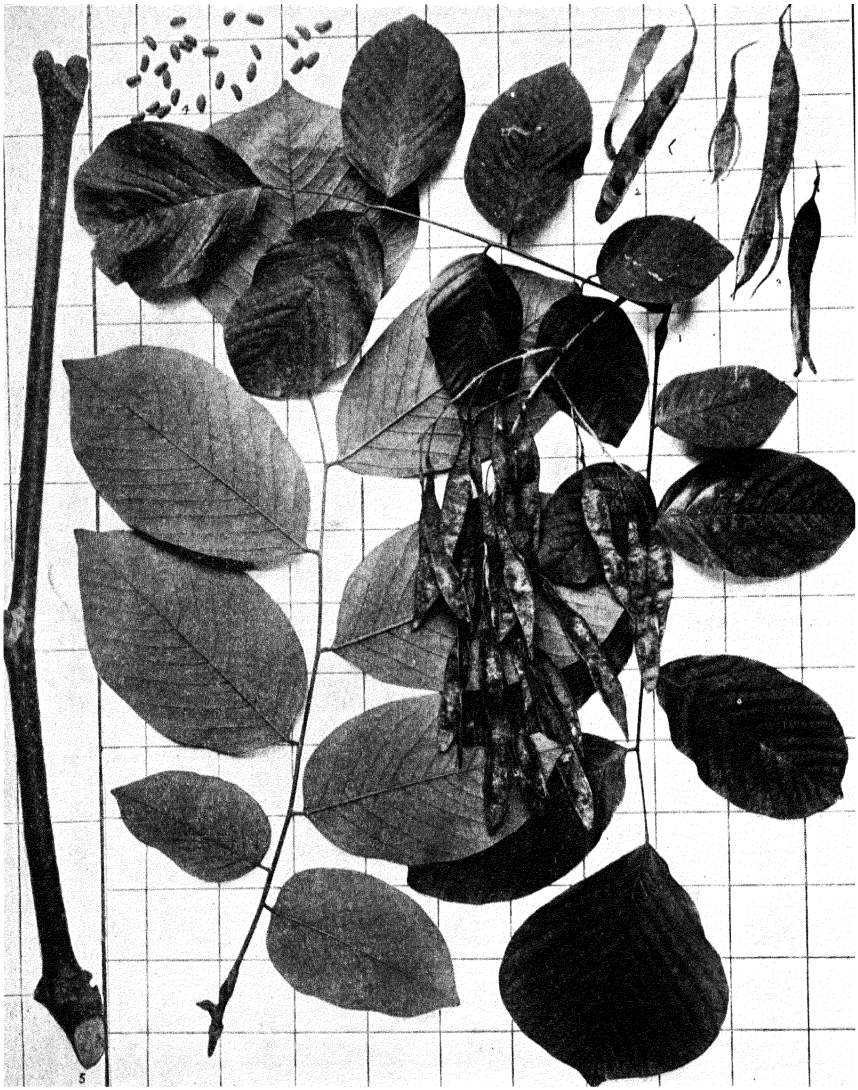


Fig 338. Branchlet with leaves and fruit, 1; pod with side removed, 2; others showing method of dehiscence, 3; isolated seeds, 4; branchlet in winter, 5.

339. Trunk in cultivation in northern New York.

340. Wood structure magnified 15 diameters.

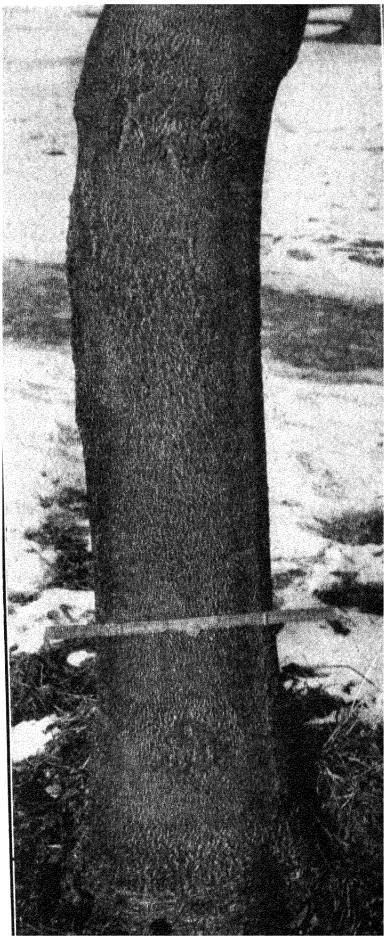
The Yellow-wood is one of the rarest as well as one of the most beautiful trees of the American forests. It attains the height of from 50 to 60 ft. with trunk from 1 to 2 or 3 ft. in diameter, vested in a thin smooth grayish beech-like bark, showing in delicate streaks the lighter inner bark as the outer becomes fissured in growth. Its short trunk usually divides within a few feet from the ground into few large branches, which ramify and form a graceful broad or rounded top, when unobstructed by surrounding trees. It grows naturally in rich well-drained soil, and mainly on lime-stone ridges along the banks of the streams which carry the waters from the western slopes of the Alleghany mountains into the Ohio River. Its desirable habit of growth, its ample clean foliage little affected by blight or insects, and its long stems of pure white flowers, showing in beautiful contrast among its rich green leaves, make it a very desirable tree for ornamental planting. This fact was recognized a century ago by its discoverer who sent its seeds to Europe, and it now lends its charm to almost every European collection. In this country, too, it is a favorite ornamental tree proving to be hardy as far north as northern New York and Ontario.

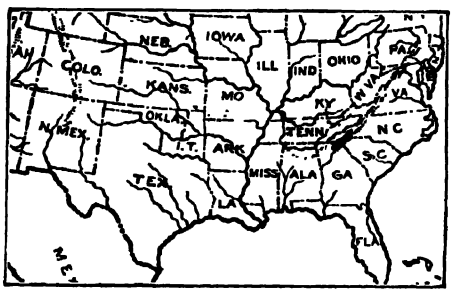
The wood is rather light, a cubic foot when absolutely dry weighing 39.12 lbs., hard and strong, the heart-wood being of a clear yellow color when freshly cut, but soon changing to brownish, and the thin sap-wood is nearly white.[1] A yellow dye is made of the heart-wood.

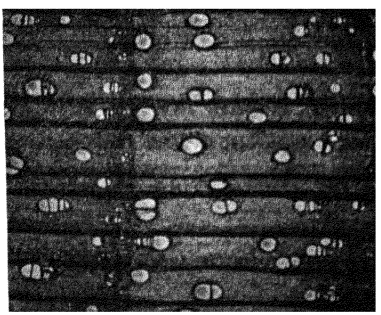
For botanical characters see generic description, this being the only species.[2]

1. A. W., XII, 280.

2. For genus see pp. 442–443.







LOCUST. YELLOW LOCUST.

Robinia Pseudacacia L.



Fig. 341. Branchlet with leaves and fruit, some showing process of dehiscence; brancalets in winter, 3.

342. Trunk of tree at North Rush, N. Y.

343. Wood structure magnified 15 diameters.

This favorite tree attains the height of 70 or 80 ft. with a trunk diameter of 3 or 4 ft. and when isolated from the influence of other trees develops a rather narrow oblong top with more or less contorted sinuous branches. Its natural home is thought to be limited to the slopes of the Alleghany Mountains as indicated on our map, but on account of its valuable wood, the delicacy and beauty of its graceful foliage and fragrant flowers it has been probably more extensively planted both in this country and Europe for ornament and use than any other North American tree, and being possessed of a hardy adaptable constitution it has become widely naturalized throughout eastern United States and Canada. Several nursery varieties are found in cultivation.

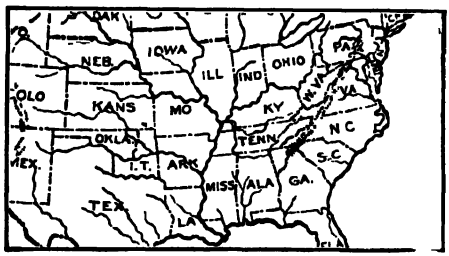
The wood of the Locust is heavy, a cu. ft. when absolutely dry weighing 45.70 lbs., hard, strong and very durable, and highly valued in ship-building, for fence posts, in turnery and especially for treenails. Medicinal properties (tonic, purgative and emetic) are found in the bark of the roots.[1]

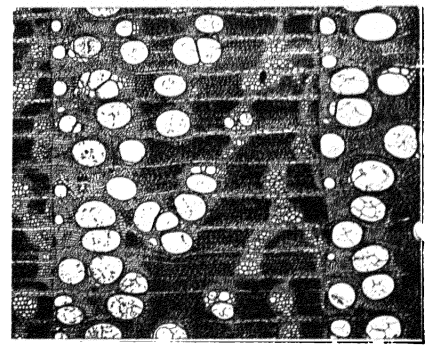
Leaves 8-14 in. long with glabrous petioles and stipules finally spiny and persistent, 7-9 ovate-oblong or oval leaflets, 1-2 in. long, rounded at both ends and emarginate and mucronate at apex, thin, glabrous, dull dark green above, paler and pubescent on the midrib beneath; stipels linear, caducous; branchlets glabrous or nearly so. *Flowers* in late spring, white, in loose puberulous racemes, 4-5 in. long, very fragrant and nectiferous: pedicels about ½ in. long; calyx gibbous, the lowest lobe acuminate and longest; petals white, standard blotched with yellow beneath. *Fruit:* pods 2-4 in. long, purplish, maturing in late autumn and persisting on the leafless branchlets late into the winter; seed 3-16 in. long.[2]

1. A. W., IV, 80.

2. For genus see p. 443.







CLAMMY LOCUST.

Robinia viscosa Vent.

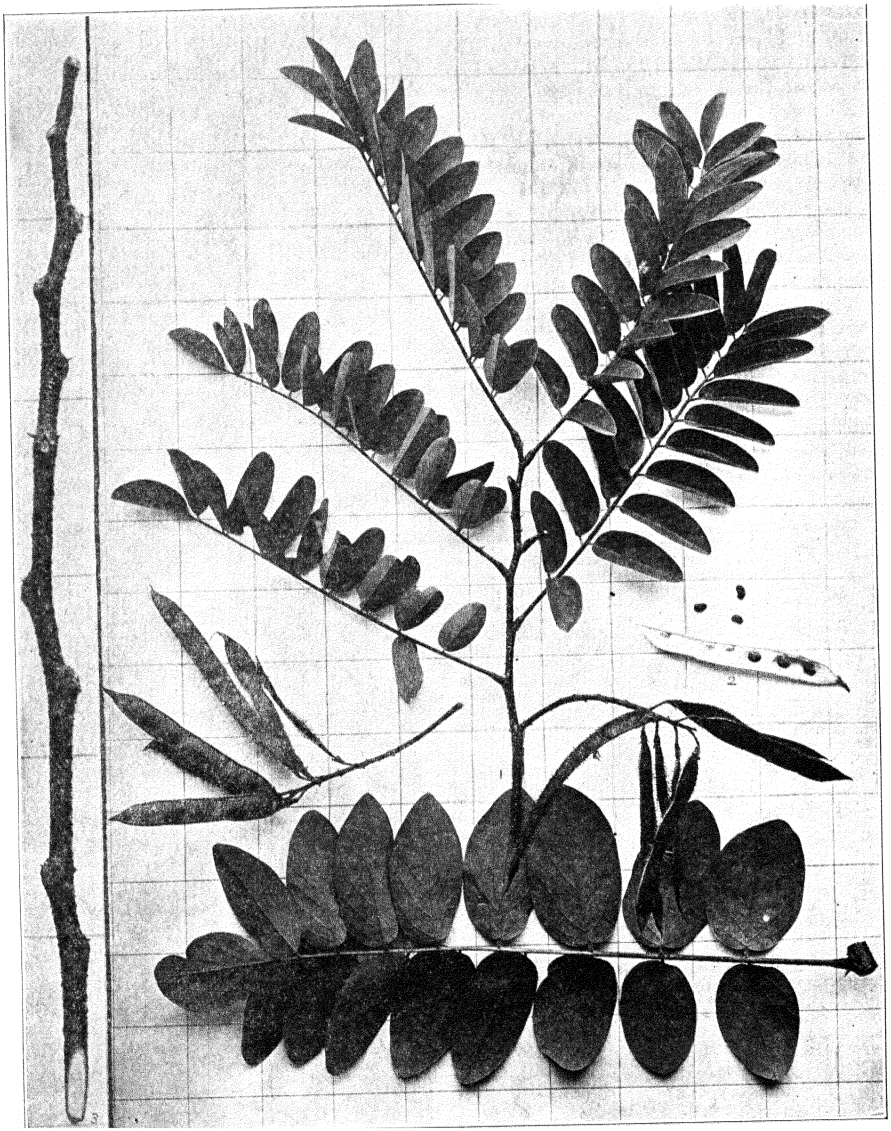


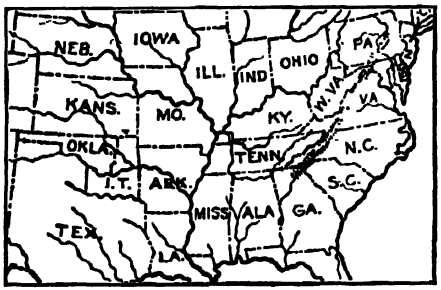
Fig. 344. Branchlet with leaves and fruit, 1; half of pod with seeds, 2; branchlet in winter, 3.
345. Small trunk with leaves at base. Staten Island, N. Y.

The Clammy Locust is a small tree, only under the most favorable conditions attaining the height of 30 or 40 ft. and 10 or 12 in. in diameter of trunk. Such individuals are rare as it is usually not of half that size and often only a large shrub, spreading, as do other representatives of the genus, by underground stems and forming considerable thickets. As an isolated tree it has a rather open oblong top with slender branches. Its branchlets and all new growths are covered with a shining sticky exudation and viscid hairs, by which it may be readily recognized.

Its native home is restricted to the high slopes of the Alleghany Mountains, in the interesting forests where only are found the Rhododendron, Kalmia, Witch Hazel, Mountain Holly, etc., in tree forms, and there it is by no means common. On account of its handsome foliage and flowers, however, it has been widely planted for ornamental purposes throughout eastern United States and Europe and has become naturalized in many localities, as far north in this country at least as the Canadian frontier.

Its wood is similar to that of the Yellow Locust, a cu. ft. when absolutely dry weighing 50.44 lbs., but is not of commercial importance.

Leaves 10-12 in. long with slender sticky glandular-hispid petioles, 11-21 ovate oblong nearly glabrous petiolulate leaflets from 1 2 in in length, rounded at base, rounded or pointed and mucronate at apex; stipules subulate and sometimes delicate spines; stipels very small and slender; branchlets and all new growths glandular hispid. *Flowers* (June) in rather dense oblong axillary racemes, not fragrant, rose-colored, the standard marked on inner face with yellow blotch. *Fruit:* pods, 2-3½ in. long, linear-lanceolate, thin gladular hispid with reniform seeds about ⅛ in. long.





PRICKLY ASH. TOOTH-ACHE TREE.

Xanthoxylum Clava-Herculis L.[1]



Fig. 346. Branchlet with mature leaves and clusters of fruit, 1; scattered empty capsules and seeds, 2; branchlet bearing prickles in winter, 3. They do not all bear prickles the first season.

347. Trunk with leaves and small prostrate trunk at base. Red River Valley, Arkansas.

348. Wood structure magnified 15 diameters.

The Prickly Ash is a small tree rarely attaining the height of 40 or 50 ft. with trunk 12–18 in. in diameter, but usually is much smaller and often shrubby. Its tendency when isolated is to develop a broad rounded top of many spiny branches, and its peculiar bluish gray bark of trunk is sure to attract attention. This is smooth and studded with scattered barnacle-like corky bossess, each tipped with a thick sharp spine which, however, finally falls away. A fancied resemblance in these spiked trunks to the club of Hercules has suggested its specific name, and the hooked spines of its branches have given it its apt colloquial names "*Wait-a-bit*" and "*Tear-blanket*," while its pungent bark has given it the name "*Sting-tongue*" among the southern negroes. This property, too, as a source of relief in tooth-ache has caused it to be known as *Tooth-ache* tree.

Its wood is light, a cu. ft. when absolutely dry weighing 31.51 lbs., soft, close-grained and of little value. Its bark, however, is highly valued among the southern negroes for the medicinal properties mentioned of the genus.[2]

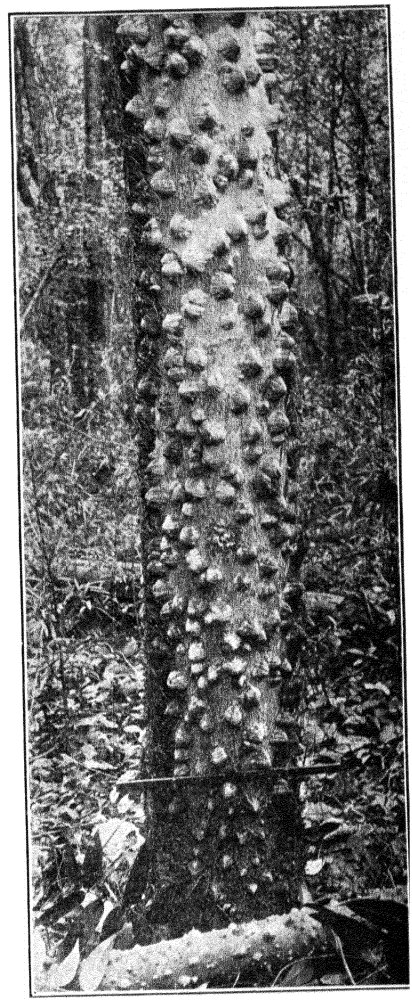
Leaves 5-15 in. long, tardily deciduous, glabrous, with more or less spiny petioles and 3-9 pairs of ovate-lanceolate, often falcate, subcoriaceous leaflets, rounded and oblique at base, acute or acuminate, shiny above, dull beneath, crenate-serrate. *Flowers* appear after the leaves in large terminal compound cymes; sepals minute, persistent; petals oval, greenish, ⅛-¼ in. long; stamens 5 with slender exserted filaments; pistils 3 or 2, with sessile ovaries and short styles bearing 2-lobed stigmas. *Fruit* mature in early autumn with oblique-ovoid pitted 1-seeded capsule, the seed after dehiscence hanging outside.

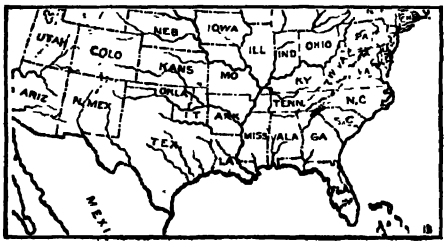
Var. *fruticosum* Gray, is a shrubby form in western Texas with short often 3 foliate pubescent leaves and blunt coriaceous leaflets.[3]

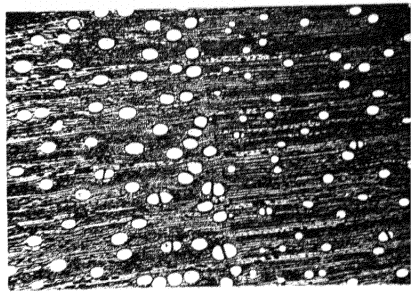
1. Syn. *Fagara Clava-Herculis* (L.) Small.

2. A. W., V, 106.

3. For genus see p. 443.







WAFER-ASH. HOP-TREE.

Ptelea trifoliata L.

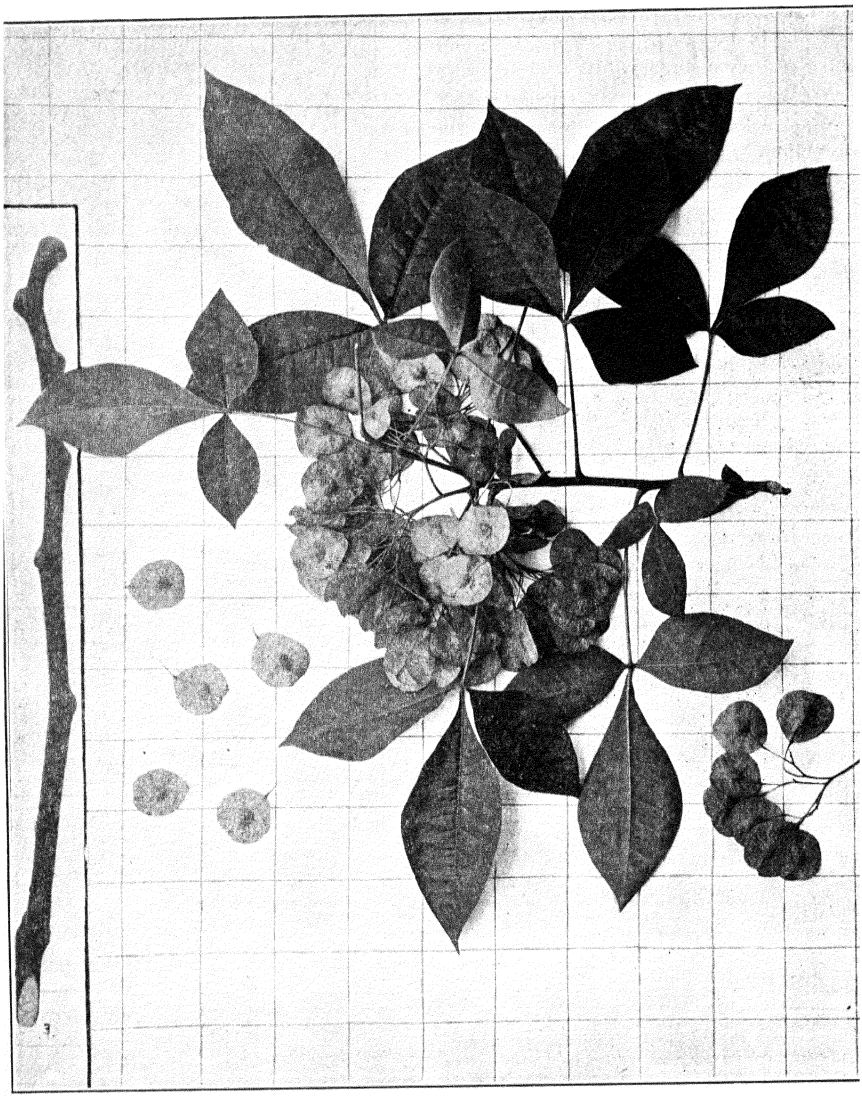


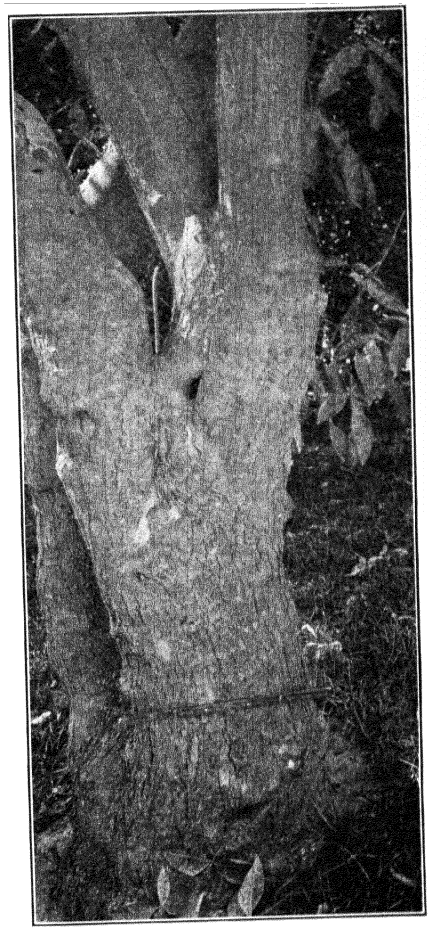
Fig. 349. Branchlet with mature leaves and fruit; leafless branchlet in winter.
350. Large trunk with leaves at base. In cultivation in New York.
351. Wood structure magnified 15 diameters.

The Wafer Ash is more often a shrub than a tree, but is occasionally found attaining the height of 20 or 25 ft. with broad or rounded top, and trunk sometimes 10 or 12 in. in diameter. I have seen it in southern Ontario with a short trunk 16 in. in diameter, but such a size is very exceptional. Its dark green trifoliate leaves and conspicuous bunches of light green wafer-like fruit make it an ornamental object in late summer, and in winter, it is hardly less conspicuous on account of the fruit which persists seared and dry upon its naked branches long after the leaves have fallen. The flavor and odor of its leaves and bark when bruised is very similar to that of the hop for which it is sometimes used as a substitute in brewing beer, and it is from that fact that it takes its name Hop-tree.

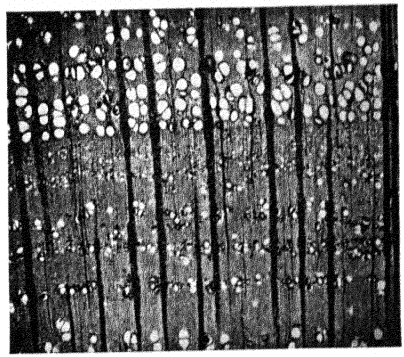
The wood is rather heavy, a cu. ft. when absolutely dry weighing 51.84 lbs., hard and close-grained.[1] An extract from its bark is sometimes used as a tonic in medicine.

Leaves with 3 subsessile ovate to oblong leaflets, varying from rounded to cuneate at base, acuminate at apex, remotely crenulate, pubescent at first but finally lustrous dark green above, glandular-dotted beneath. *Flowers* in mid-summer, of disagreeable odor. *Fruit* flat, similar to that of an elm but larger-winged all around in dense clusters and persisting on the branches nearly all winter.

1. A. W., IV, 77.
2. For genus see p. 444.







AILANTHUS. TREE-OF-HEAVEN.

Ailanthus glandulosus desf.

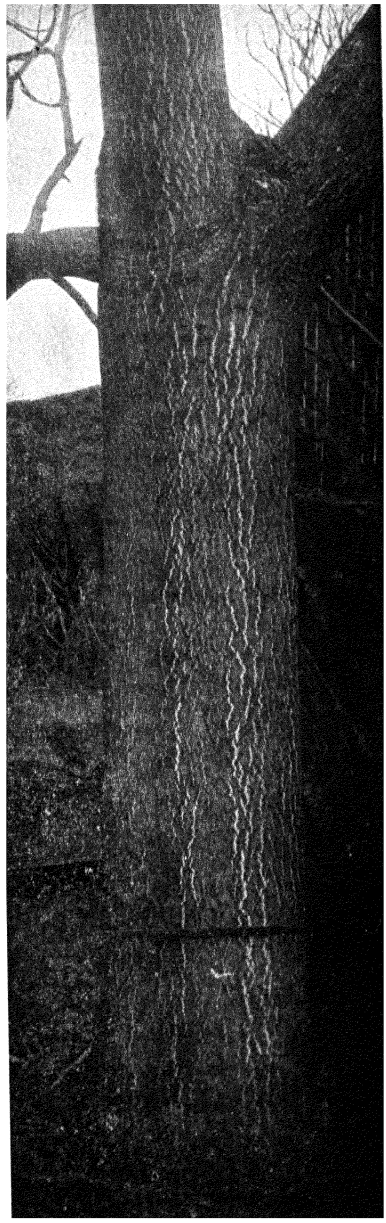


Fig. 352. Branch bearing mature leaves and fruit, 1; detached samaræ, 2; branchlet in winter, 3.
353. Trunk in southern Illinois, opposite St. Louis.
354. Wood structure magnified 15 diameters.

The Ailanthus is a handsome naturalized tree sometimes attaining, in its native land, the height of 80 or 100 ft. with rather loose open top and trunk 2 to 3 or more feet in thickness. Its large plume-like leaves are familiar objects in the door-yards and parks of many of our eastern towns, giving a tropical appearance scarcely equaled by any other tree of like hardiness. Nor is its ornamental value in late summer often surpassed by any other tree, when its frond-like foliage is interspersed with large bunches of brilliantly colored fruit. It is particularly well adapted to planting for shade and ornamental purposes, being a hardy tree of very rapid growth and little affected by the dust and smoke of cities. For this purpose, however, only the pistillate trees should be used as they are of greater ornamental value and their flowers are free from the objectionable ordor found with the staminate flowers. Those to most people are ill-scented and their pollen is said to aggravate catarrhal troubles.

The native habitat of the Ailanthus is China and Japan, where an excellent quality of silk is made from a worm which lives upon its foliage. It is widely naturalized in eastern United States.

The wood is of medium hardness and of coarse open grain.[1]



Leaves **12-36 in. long, with 13-41 stalked leaflets which are from ovate to lanceolate oblong, 2-4 in. long, rounded or subcordate at base, acuminate, entire but with 3-4 glandular teeth at base.** ***Flowers*** **(June) yellowish-green, in panicles often 1 ft. or more in length; stamens villous at base.** ***Fruit*** **samaras about 1½ in. long, spirally twisted.[2]**

1. A. W., 1, 4.

2. For genus see p. 444.



AMERICAN SMOKE-TREE. CHITTAM-WOOD.

Colinus Americanus Nutt.[1]

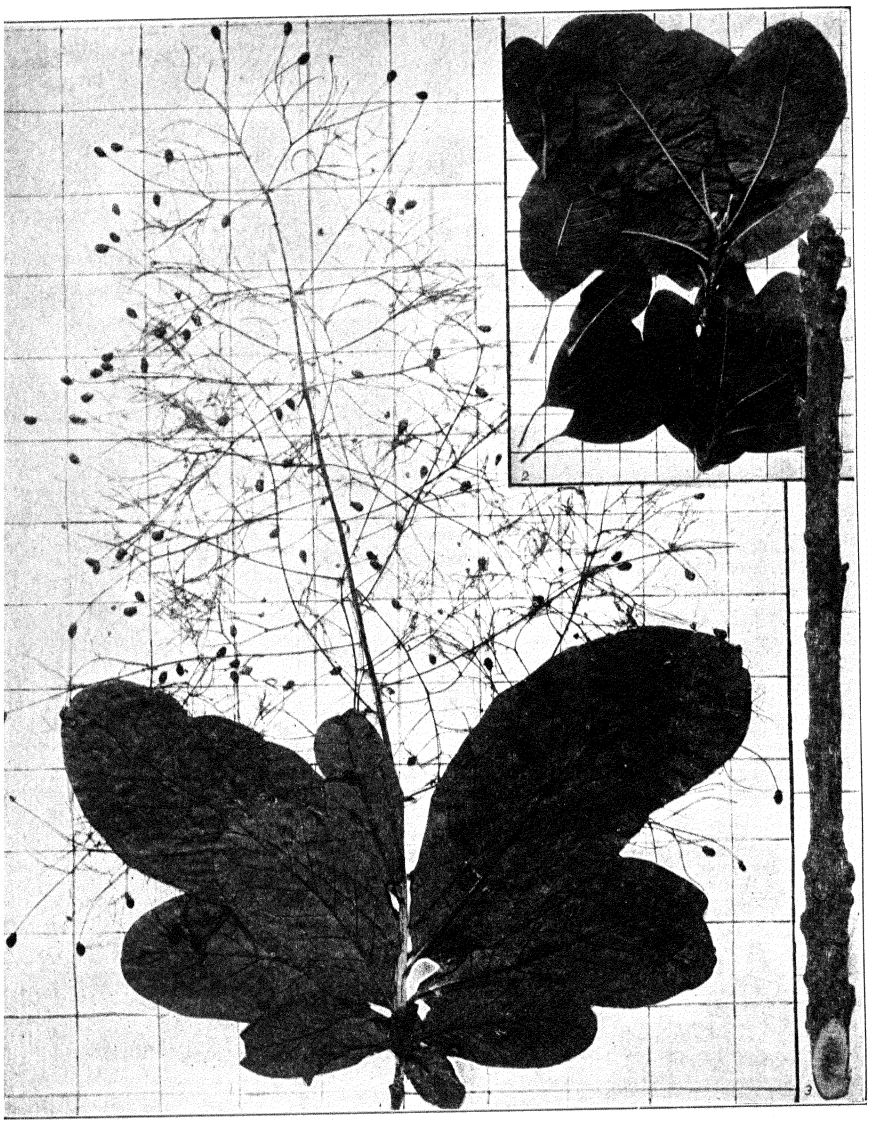


Fig. 355. Branchlet with leaves, fruit and plumose sterile pedicels (an herbarium specimen), 1; assortment of fresh leaves, 2; branchlet in winter, 3.

356. Trunk, near Carthage, Mo.

357. Wood structure magnified 15 diameters.

The American Smoke-tree is a larger tree than the European species, as it sometimes attains the height of 30 or 35 ft., with a clear trunk 12–14 in. in thickness and firm spreading branches. The trunk divides at 8 or 10 ft. from the ground into a few large branches, which form a broad open top. The bark of trunk is of a grayish color and very rough with thin oblong somewhat imbricated scales. It is one of the rarest American trees, being found on rocky slopes singly or in small groves scattered among other trees in the limited regions indicated on the accompanying map. The Venetian tree with its beautiful plumose bunches of sterile pedicels and fruit, making its top suggestive of a puff of smoke or spray, is a familiar object in ornamental shrubberies. It is a tree vastly improved by selection and propagation upon its native condition, and the American tree, while now less profuse in its display of "smoke," than the European tree may be susceptible of like improvement, while it has the additional advantage of greater size and more ornamental foliage.

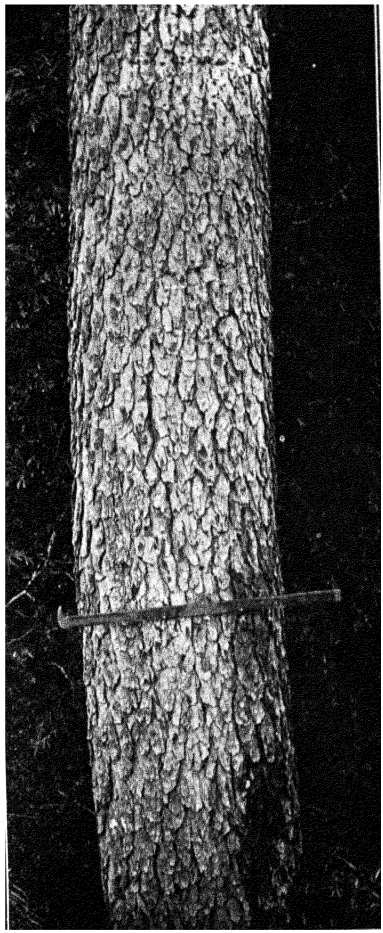
The wood is rather light, a cu. ft. weighing when absolutely dry 40.04 lbs., soft, durable and of a light yellow or orange color and very thin white sap-wood and is used locally for dying orange color.[2]

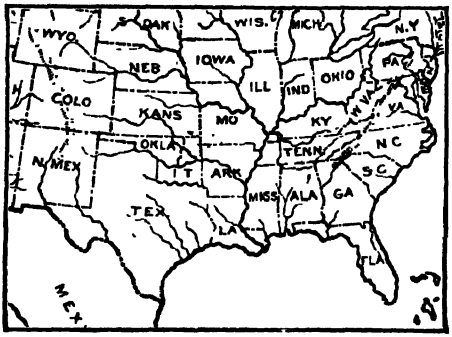
Leaves oval to obovate, 4-6 in. long, thinish, mostly petiolate but the lowermost of the season's growth subsessile, decurrent on the petioles, rounded or emarginate at apex, entire, glabrous, dark green above, paler and pubescent on the midribs beneath. *Flowers* (April May) ⅛ in. across greenish, in panicles 5-6 in. long. *Fruit* drupelets about ⅛ in long and produced sparingly among the plumose steril pedicels.[1]

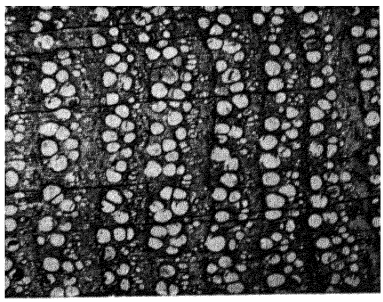
1. Syn. *Rhus cotinoides* Nutt. *Cotinus cotinoides* (Nutt.) Britt.

2. A. W., XI, 256.

3. For genus see p. 445.





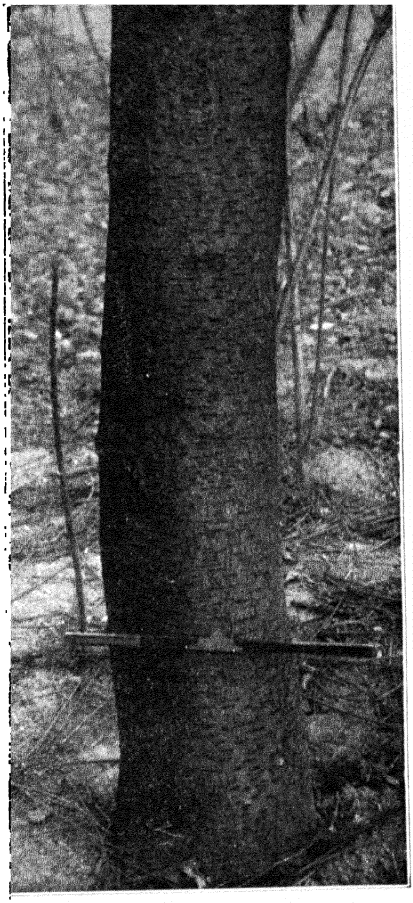


STAGHORN SUMACH.

Rhus hirta (L.) Sudw.



Fig. 358. Branchlet with leaves and fruit, 1: detached drupelets, 2; branchlet in winter, 3.
359. Trunk in St. Louis, Mo.
360. Wood structure magnified 15 diameters.



The Stag-horn Sumach is occasionally 35 or 40 ft. in height, with trunk 12–15 in. in diameter at base, but is usually much smaller and often forms extensive thickets as a shrub but a few feet in height. It usually has a more or less crooked or inclining trunk dividing into few large branches and ultimately forming a broad flat or somewhat rounded open head. Its favorite home is dry sandy or gravelly uplands or slopes where it grows in abundance in northeastern United States and Canada, enlivening desolate regions with its handsome fern-like foliage of green interspersed with large thyrses of pale yellow male flowers or later with crimson bunches of velvety fruit. Its autumnal garb of red, purple and yellow makes it an even more conspicuous object, and when leafless in autumn its velvety spreading branches are quite suggestive of the antlers of a stag in the velvet; whence its name.

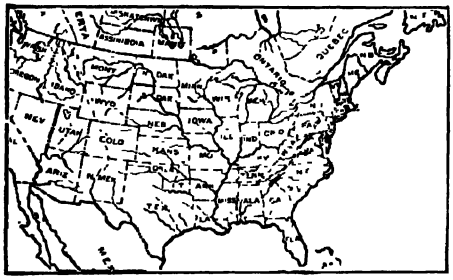
Its wood is light, a cu. ft. when absolutely dry weighing 27.15 lbs., soft, and of a golden yellow color streaked with tints of brown and green with white sap-wood.[2] The bark and leaves are rich in tannin and an infusion of the tart fruit is used as a gargle.

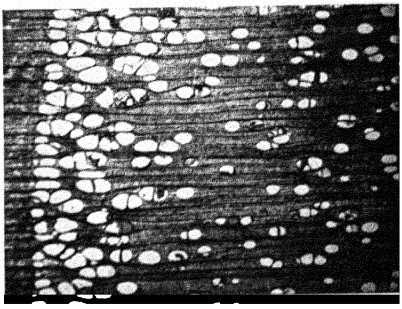
Leaves pinnate, deciduous, 12-24 in. long, velvety pubescent, with 11-31 lanceolate subsessile leaflets rounded at base, long-pointed, sharply serrate (rarely laciniate) dark green above, lighter and pubescent beneath. *Flowers* yellow-green, in terminal dense compound panicles, staminate panicles much the largest; branchlets velvety pubescent. *Fruit* drupes about ⅛ in. in diameter, globose, covered with crimson acid hairs and massed in compact panicles which are conspicuous during the entire winter at the ends of the velvety branchlets.[3]

1. ***Rhus typhina*** L.

2. A. W., I, 5.

3. For genus see p. 445.





DWARF SUMACH.

Rhus copallina L.

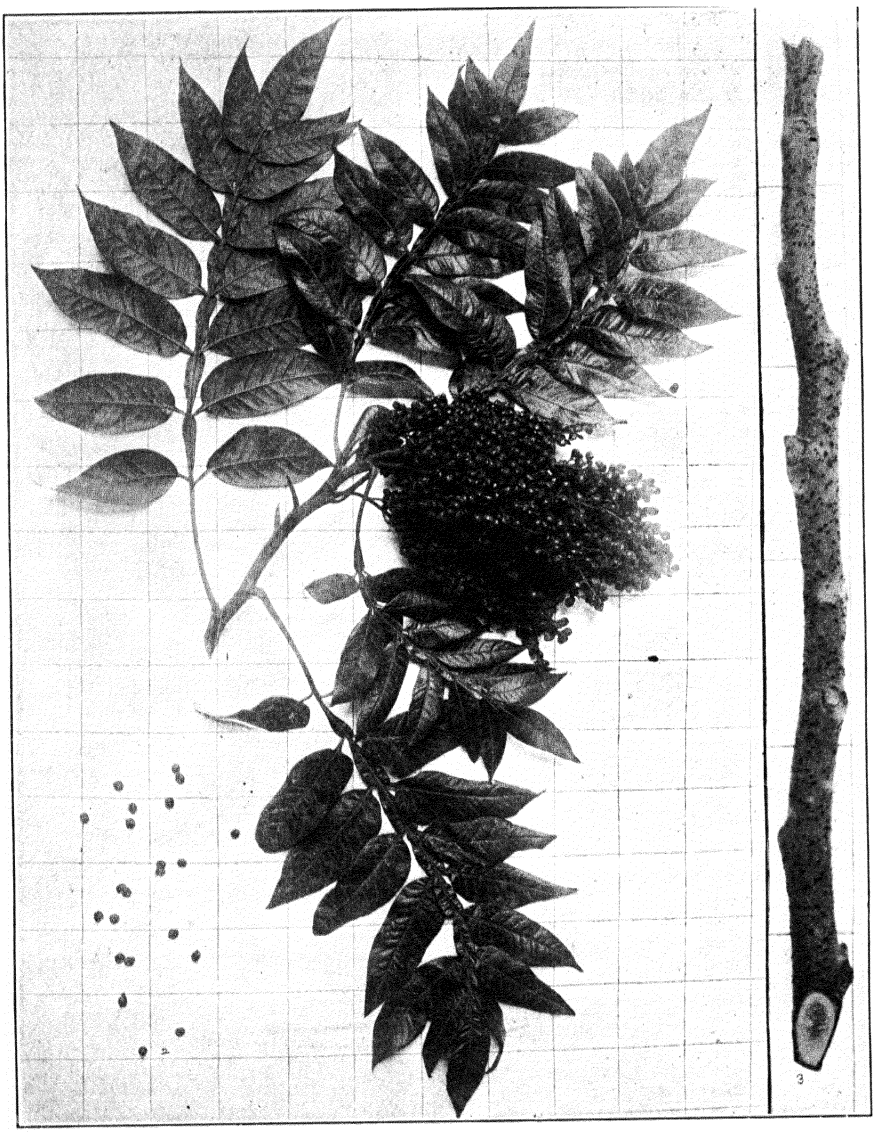
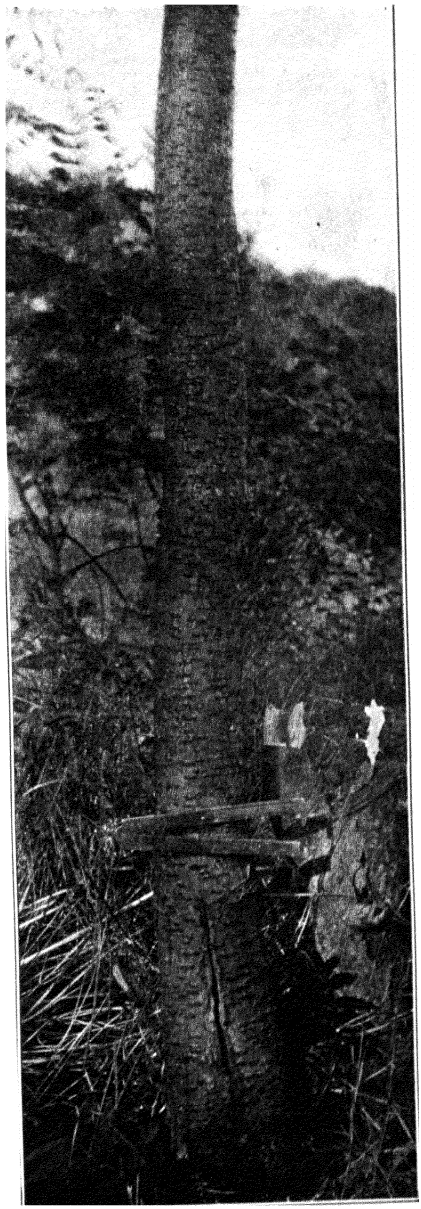


Fig. 361. Branchlet with leaves and fruit, 1; detached drupelets, 2; branchlet in winter, 3.
362. Small trunk on Staten Island, N. Y.

The Dwarf Sumach, as its name implies, is a small tree at best and much more commonly a shrub than a tree; still it sometimes attains the height of 25 or 30 ft. with trunk 8 or 10 in. in diameter. This is generally more or less leaning and divided into a few large branches, ultimately forming a wide spreading top. It is an abundant species covering dry gravelly slopes often to the exclusion of nearly everything else. Its singular and beautiful leaves, with rachises winged between the leaflets, give it an individuality at once recognizable, and its bunches of crimson fruit add not a little to its ornamental value. In autumn it is brilliant in various tints of red and purple.

The wood is light, a cubic foot weighing 32.86 lbs., soft and of a greenish brown color with lighter sap-wood. The bark and leaves are rich in tannin and the fruit similar in properties to that of the Stag-horn Sumach.

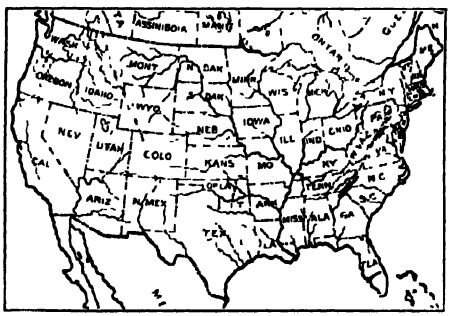


Leaves deciduous, pinnate, 6-8 in. long, with pubescent petiole and rachis, the latter winged between the leaflets; leaflets ovate-lanceolate to oblong, subsessile, entire or remotely serrate towards the apex, acute or acuminate, lustrous dark green above, paler and pubescent beneath. *Flowers* in midsummer, about ⅛ in. across, yellow-green, in short dense pubescent terminal panicles, 4-6 in. long; the pistillate considerably smaller. *Fruit* in compact erect or nodding clusters, often persisting on the branches through the entire winter; drupe about ⅛ in across, compressed, crimson, covered with short acid hairs; stone smooth.

Var. *lanceolata*, Gray, is a small tree of eastern Texas with narrower and more falcate leaflets and larger bunches of flowers and fruit.

Var. *leucantha* (Jacq.) de C. is another form found in Texas (near New Braunfels) with white flowers.

1. A. W., XII, 279.



POISON SUMACH.

Rhus vernix L.[1]



Fig. 363. Branchlet with mature leaves and fruit, 1; branchlets in winter, one with fruit still attached, 2.

364. Trunk of tree with leaves at base. Staten Island, N. Y.

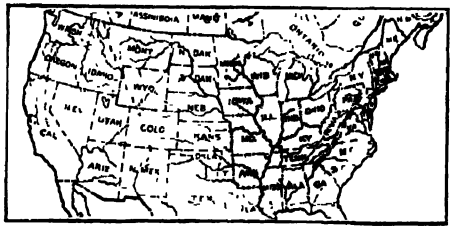
The Poison Sumach is generally stigmatized as being the most poisonous American tree. It rarely attains the height of 20 or 30 ft. and its short trunk, occasionally 8 or 10 in. in diameter, forks near the ground and sends up a few large branches which form a wide open top. It is much more common as a large shrub than a tree. Fortunately its home is exclusively swamps and the low miry banks of streams, as though nature were making an effort to keep it in places least frequented by human beings, who are easy victims to its poisonous emanations. Yet, in strange contradiction, it is given a foliage and pearl like fruit of rare beauty which tempt the unsuspecting, and then it poisons him who touches, unless he happens to be immune as some people are.[2] It is occasionally found skirting the borders of ponds, where in autumn the glory of its brilliant red and orange tints is doubled by reflection in their waters, and the beauty of such a scene is rarely forgotten.

Its wood is light, a cubic foot when absolutely dry, weighing 27.30 lbs., tough and of a golden yellow color streaked with tints of brown and green and with clear white sapwood.[3]

Leaves 7-14 in. long and with 7-13 short petiolate ovate-oblong or obovate entire leaflets (the terminal one often 2 or 3-lobed) obtuse or acute and unequal at base and mostly acuminate at apex, lustrous dark green above, paler and prominently veined beneath. *Flowers* (June) yellow green, ⅛ in across, in long loose axilary panicles. *Fruit* ripens in September and often hangs from leafless branches in the winter, in long loose panicles; drupe compressed globose, about ¼ in in diameter, shining ivory white or grayish; stone striated.

1. Syn. *Rhus vernata* det'.

2. Drs. Seward and Wakeley, of Orange, N. J., tell me that they find in the fluid extract of *Grindelia robusta* an almost infallible remedy against the poisoning of Poison Sumach, Ivy, and the allied species. They administer it both as an internal remedy (in doses of one drop every two hours) and as a topical applicant.





AMERICAN HOLLY.

Ilex opaca Ait.

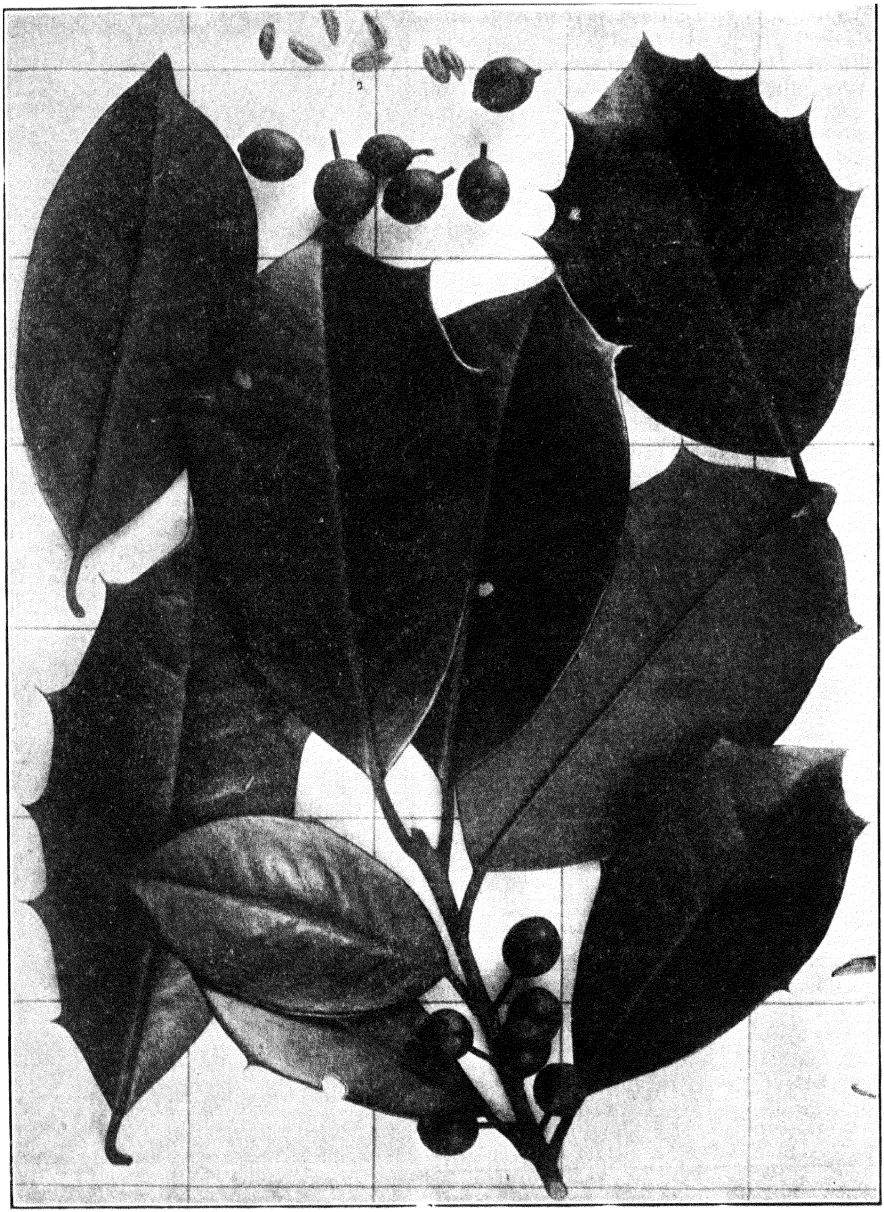


Fig. 365. Branchlet with leaves and fruit, 1; detached fruit and nutlets.
366. Large trunk in eastern North Carolina.
367. Wood structure magnified 15 diameters.

The Holly is a beautiful evergreen, whose leaves and bright berries add to the cheer of Christmas-time in almost every home throughout the land, and are familiar objects to many who do not have an opportunity of seeing a growing tree, though a common object in the forests of the Southern States. There it attains the height of 40 or 50 ft. with a narrow pyramidal top of many horizontal or drooping lateral branches and a smooth-barked trunk occasionally 2 or 3 ft. (rarely more) in diameter.

It occupies well-drained slopes and bottom-lands in company with various Oaks and Hickories, the Red Cedar, Whitewood, Magnolias, Hornbeam, etc., rarely if ever forming exclusive forests. Few trees equal it in ornamental value, especially in late autumn and winter, when its associates are mostly bare and leafless and its bright red berries show in strong contrast to its dark green leaves. But alas! with many a fine tree its beauty causes its downfall, so great is the demand for its sprays for Christmas decoration.

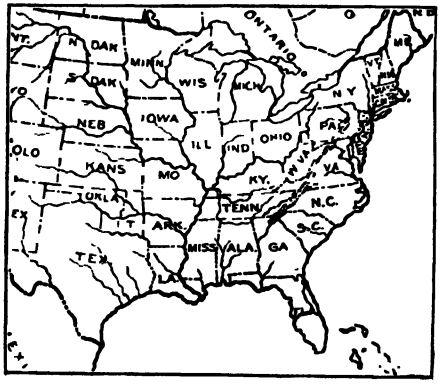
The wood is light, a cubic foot weighing 36.26 lbs., tough, close-grained and nearly white, and is valued in turnery, in cabinet-making, etc.[1]

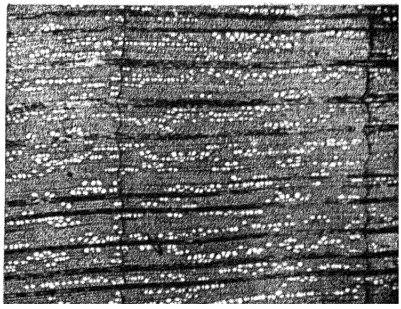
Leaves persistent, elliptical to obovate, spiny-tipped and with few spiny teeth or occasionally entire, thick, coriacious, dull dark green and centrally grooved above, paler, yellowish green and pubescent beneath. *Flowers* in the spring, from the axils of the new leaves or scattered at the base of the growth, the staminate in 3-9-flowered cymes, the pistillate singly or 2-3 together; calyx acute, ciliate. *Fruit*: drupe subglobose, ¼ in. in diameter, red or rarely yellow; nutlets prominently ribbed.[2]

1. A. W., III, 52.

2. For genus see p. 445.







CASSENA. DAHOON.

Ilex Cassine L.[1]

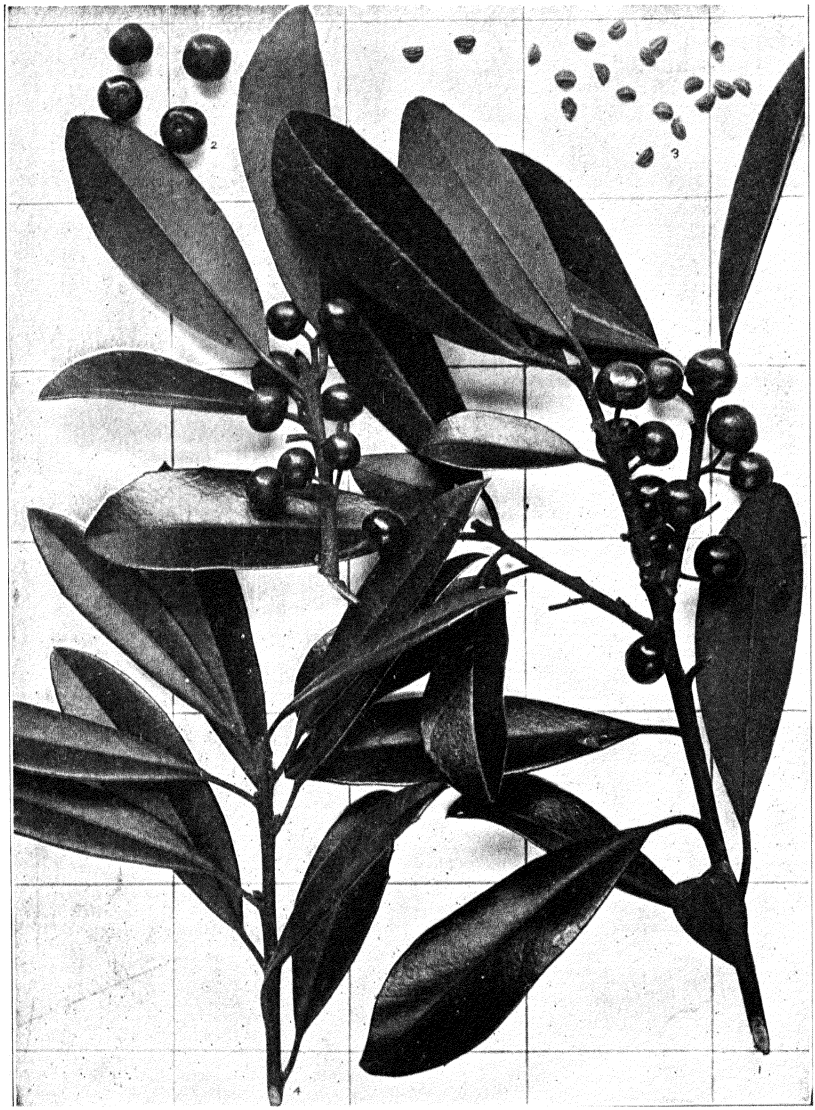


Fig. 368. Branchlet with mature leaves and fruit, 1; isolated fruits, 2; nutlets, 3; tip of vigorous shoot, 4.

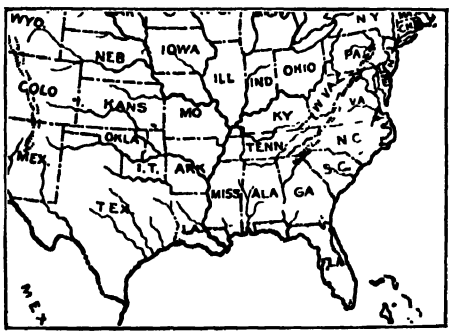
360. Trunk of tree in Okefenokee Swamp, Ga.

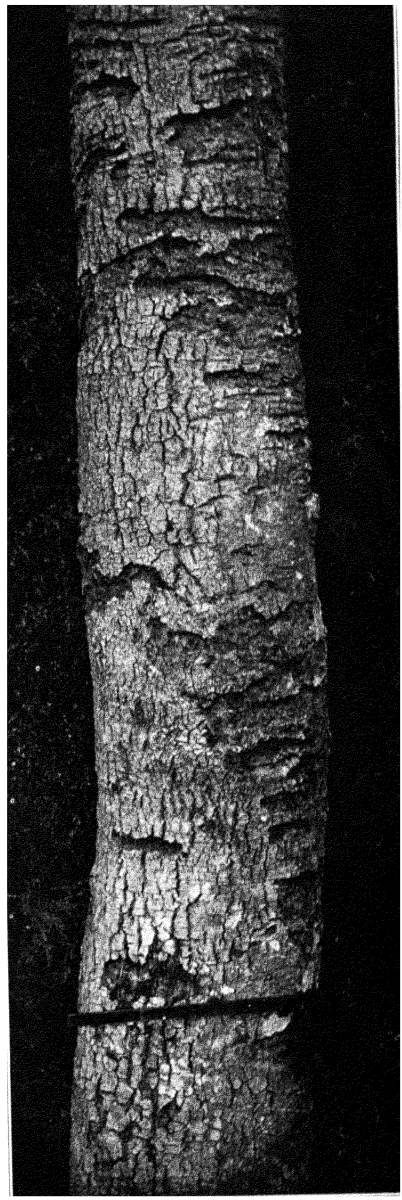
The Cassena is a beautiful small tree of the coast regions of the southern Atlantic and Gulf States, occasionally attaining the height of 20 or 30 ft. with broad rounded top and trunk sometimes 12 or 18 in. in diameter, or is often no more than a large shrub. It grows mainly in the humid soil of swamps and about the borders of pine barren ponds in company with the Cypress, Ogechee Lime, Gums, Sweet Bay, Water and Laurel Oaks, Water Hickory, Planer-tree, etc. Rare in the northern part of its range it becomes common southward, reaching its largest size and abundance in southern Alabama, Georgia and Florida. In these regions it is often known as *Henderson-wood*.

Its wood is light, a cu. ft. when absolutely dry weighing 29.95 lbs., tough, close-grained, easily worked and of a clear creamy white color.[2]

Leaves persistent, oblanceolate or obovate, 1½-3 in. long, cuneate at base, obtuse or acute or emarginate (sometimes rounded or retuse) at apex with revolute and entire margins or very remotely and sharply appressed serrate near apex, thick, shining dark green above, paler and pubescent on midribs beneath; petioles short, stout and usually pubescent. *Flowers* white, scarcely ½ in. broad, in hairy pedunculate clusters from the axils mainly of the leaves of the year, the staminate 3-9-flowered and the pistillate usually 3-flowered, common peduncles nearly 1 in. long; calyx lobes acute, ciliate. *Fruit* red drupes ripening in autumn and persisting until spring, subglobose, ¼ in. in diameter; nutlets prominently ribbed.

1. Syn. *Ilex Dahoon* Walt.
2. A. W., XII, 276.





YAUPON.

Ilex vomitoria Ait.[1]

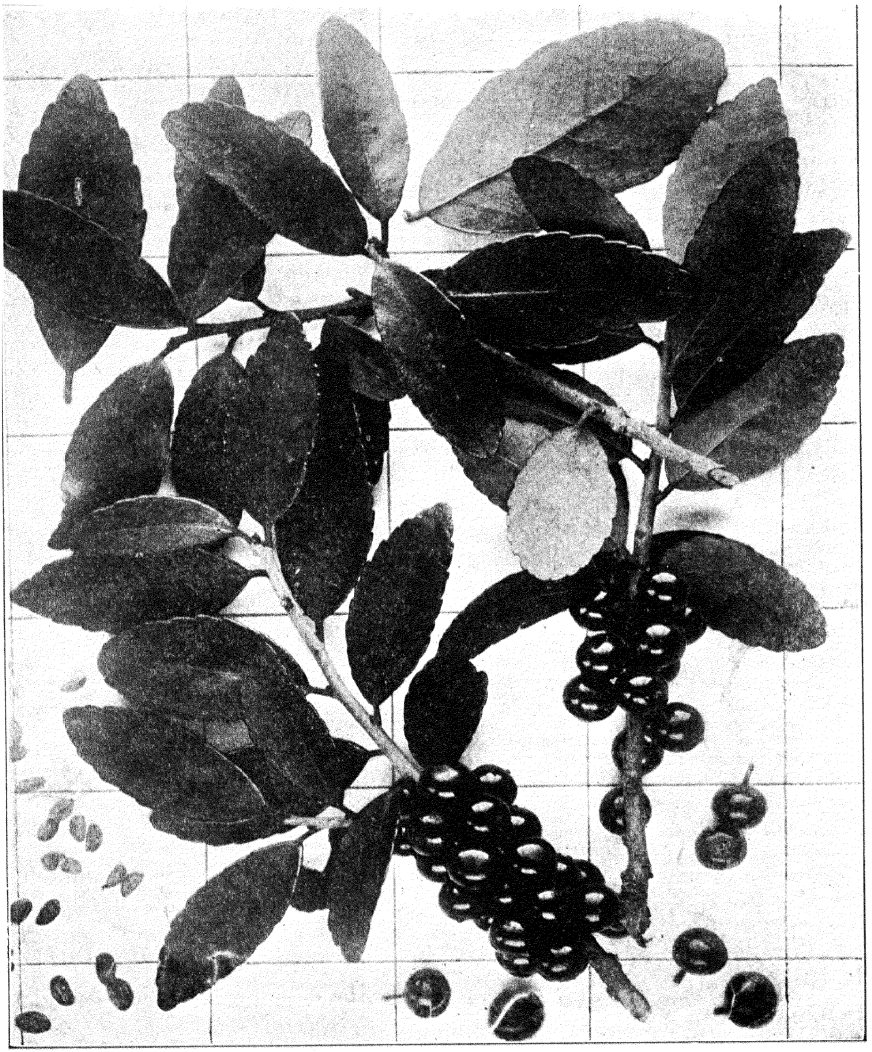


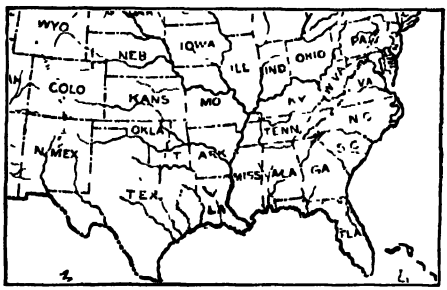
Fig. 370. Branchlets with mature fruit; scattered fruits and nutlets.
371. Trunk of small tree in eastern North Carolina.

The Yaupon is a small tree occasionally attaining the height of 20 or 30 ft., with dense top of many branches and usually more or less inclined trunk from 6 to 10 or 12 in. in diameter. It is often shrubby, sending up several trunks from a common base. It is confined to the immediate vicinity of the coast, seeming to require the influence of the sea breezes in order to maintain its existence, excepting in the lower Mississippi valley where it ventures farther inland. It is a tree of rare beauty in autumn and winter, when its brilliant red berries and handsome dark shining green leaves on livid branchlets are sought for Christmas decorations. The leaves of the species possess strong emetic properties, as implied in both the specific name and one of the vernacular names — *Emetic Holly*, — which was a fact known to the Indians in early days. From these leaves they made their "black drink" which was used both as a medicine and ceremonial drink, and to partake of it they journeyed from far inland to the coast at regular intervals.

The wood is rather heavy, hard, close-grained and of a creamy white color, suitable for use in turnery, for inlaid work, etc. A cubic foot when absolutely dry weighs 45.31 lbs.

Leaves persistent, elliptical or oblong, 1-2 in. long, obtuse at both ends, crenate, coriaceous, lustrous dark green above, paler beneath; petioles short (about ¼ in.) and thick. *Flowers* in glabrous cymes from the axils of the leaves of the previous year, the staminate short-peduncled and several-flowered; the pistillate 1 or 2-flowered and sessile. *Fruit* ripening late in autumn, subglobose, bright red, about ¼ in. in diameter, often in great abundance and persisting until spring with stems about ½ in. long; nutlets obtuse at both ends and prominently ribbed.

1. Syn. *Ilex Cassine* Walt.





SWAMP HOLLY. DECIDUOUS HOLLY.

Ilex decidua Walt.

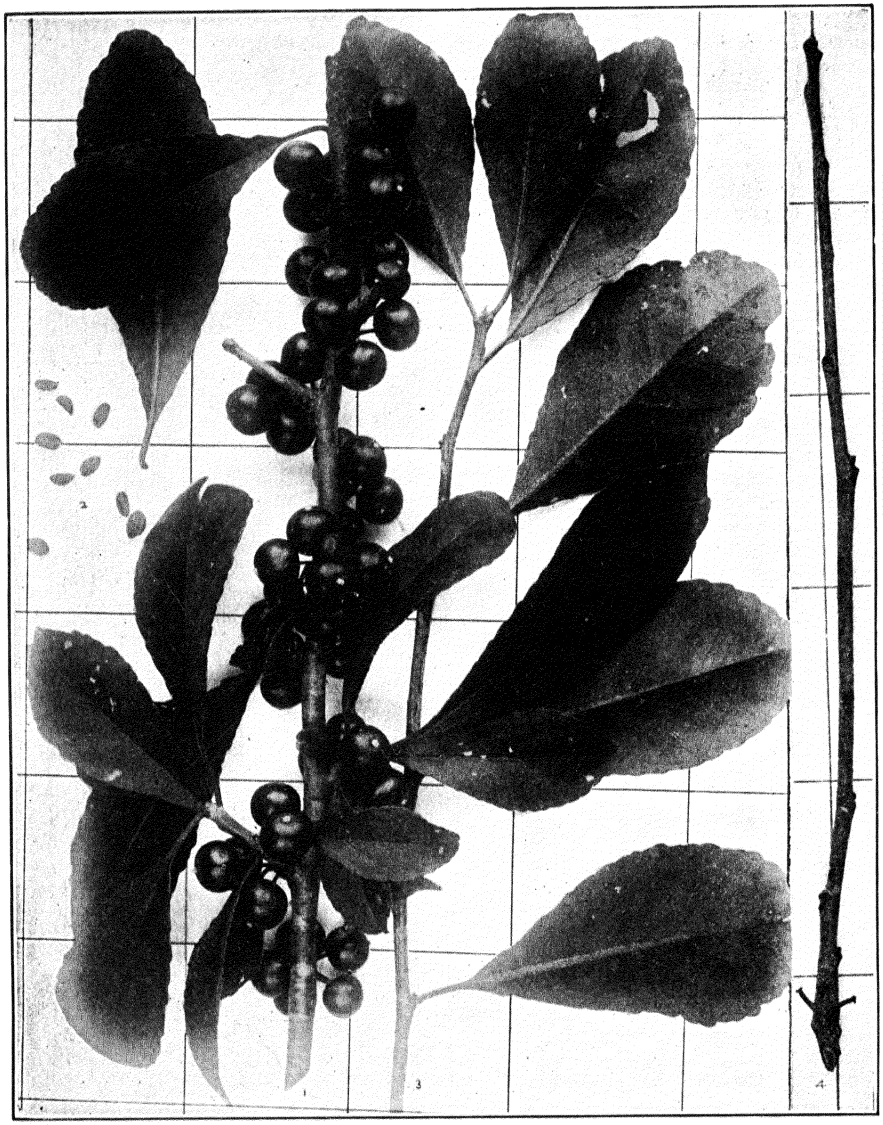


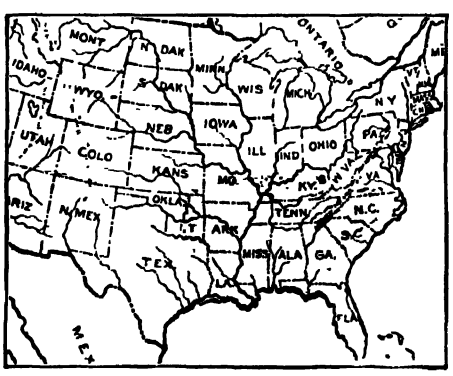
Fig. 372. Branchlet with leaves and mature fruit, 1; nutlets, 2; branchlet from vigorous shoot, 3; branchlet in winter showing persistent fruit stems at base, 4.

373. Trunk of tree in Red River valley, Ark.

The Deciduous Holly throughout most of its range is only a shrub, but in localities west of the Mississippi, particularly in Arkansas, it becomes a small straggling tree occasionally 25 ft. in height, with crooked or inclined trunk 6 or 8 in. in diameter and covered with a smooth pale gray more or less mottled bark. It inhabits swampy places overhanging the borders of lakes and streams in company with the Red-bud, Prickly Ash, Soapberry, Mississippi Hackberry, Rusty Nannyberry, Rough-leaved Dogwood, Cypress, etc. In such localities in Autumn it is one of the most beautiful objects of these interesting regions, particularly after the leaves have fallen and its conspicuous red fruit persists long upon its leafless branches.

Its wood is rather heavy, a cu. ft. when absolutely dry weighing 46.24 lbs., hard, close-grained and creamy white in color.

Leaves deciduous, lance-obovate or spatulate, 1½-3 in. long, cuneate at base, acute, obtuse or emarginate at apex, crenate, glabrous dark green above, paler and pubescent on the midribs beneath and the petioles; and branchlets silvery gray. *Flowers* (May) mainly on growth of the previous season, mostly in pairs, with slender pedicels, without bractlets, those of the staminate about ½ in. long and those of the pistillate shorter; calyx lobes triangular. *Fruit* ripening in early autumn and often persisting until spring, ¼ in. in diameter, red, depressed globose with pedicels scarcely ¼ in. long; nutlet ribbed.





MOUNTAIN HOLLY. LARGE-LEAF HOLLY.

Ilex monticola Gray.

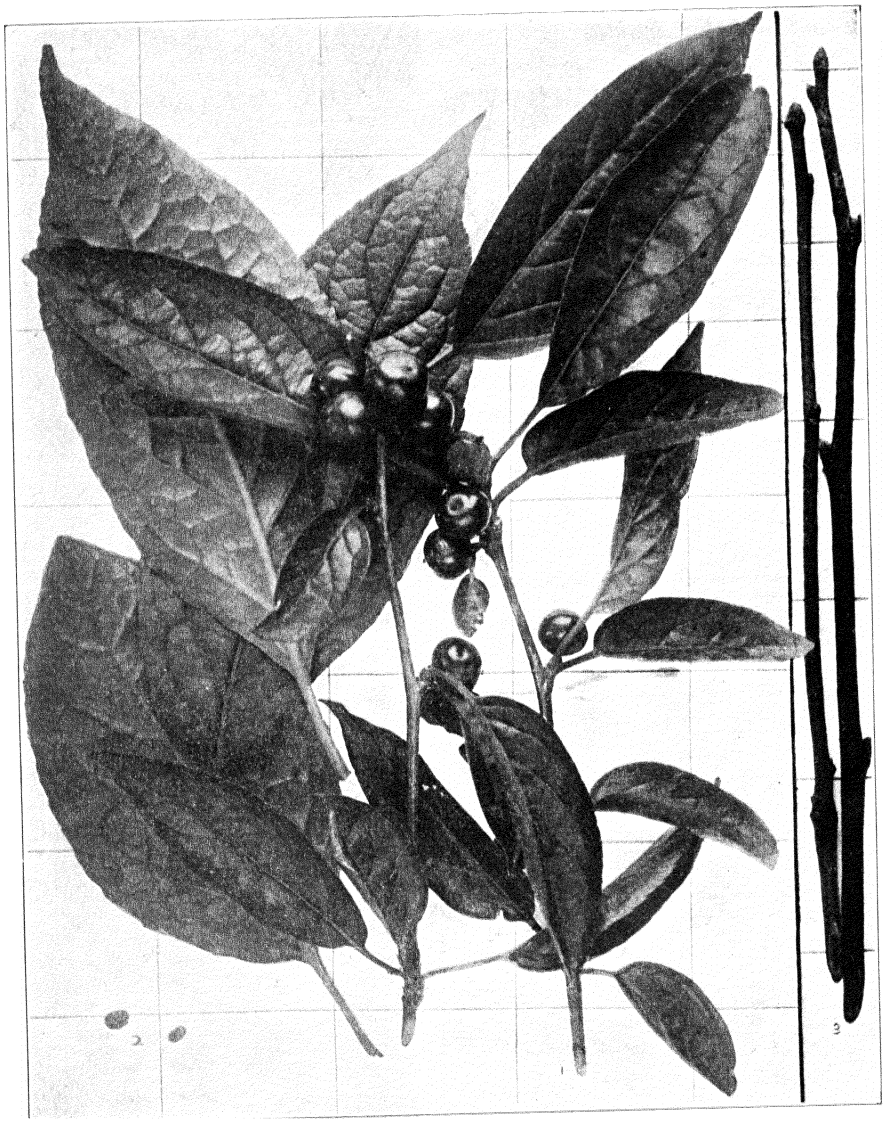


Fig. 374. Branchlet with leaves and fruit, 1; leaves from vigorous shoots, 2; branchlet in winter, 3.

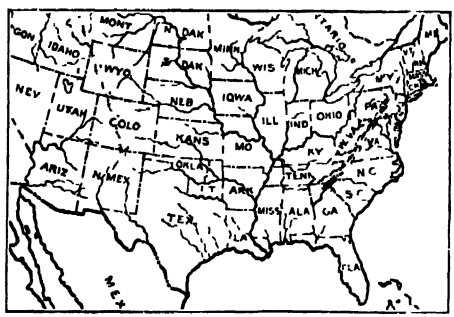
375. Trunk of tree on Alleghany Mountains in North Carolina.

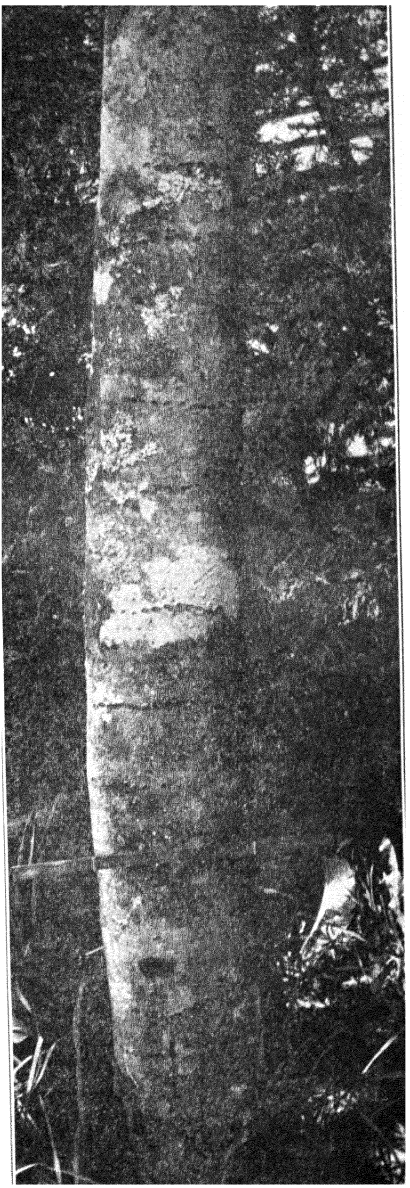
The Mountain Holly, as its name implies, is quite different from the other Hollies in being distinctly a mountain-loving tree. In the high Alleghanies of North and South Carolina and Tennessee it attains its largest size, here sometimes growing to the height of 30 or 40 ft. with slender branches forming a narrow pyramidal top and trunk sometimes 10 or 12 in. in diameter. The bark of trunk is of a brownish gray color slightly roughened with lenticels. Excepting in these high altitudes it is usually shrubby. Quite as distinct as it is from other Hollies in habitat is it also in its large leaves, which are more suggestive of those of a Plum than of a Holly, and in its somewhat larger fruit. It is a handsome tree and would doubtless be popular for ornamental planting were it not for the fact that its beauty is evanescent, as it drops both its leaves and its fruit early.

The wood is heavy, hard and strong, fine-grained and nearly white but not of commercial importance.[1]

Leaves deciduous, ovate to oblong-lanceolate, 3-5 in. long, obtuse or acute at base, acuminate or acute at apex, sharply serrate with slender pointed teeth, membranaceous, prominently arcuate-veined, glabrous dark green above, paler and somewhat glabrous on the prominent veins beneath; petioles slender, about ½ in long. *Flowers* in June, in few-flowered cymes at the ends of short spurs on the growth of the previous season, or solitary on the new growth; calyx lobes acute, ciliate. *Fruit* subglobose, scarlet, sometimes nearly ½ in. in diameter; nutlet prominently ribbed.

1. A. W., XI, 252.





WAHOO. BURNING-BUSH.

Euonymus atropurpureus Jacq.

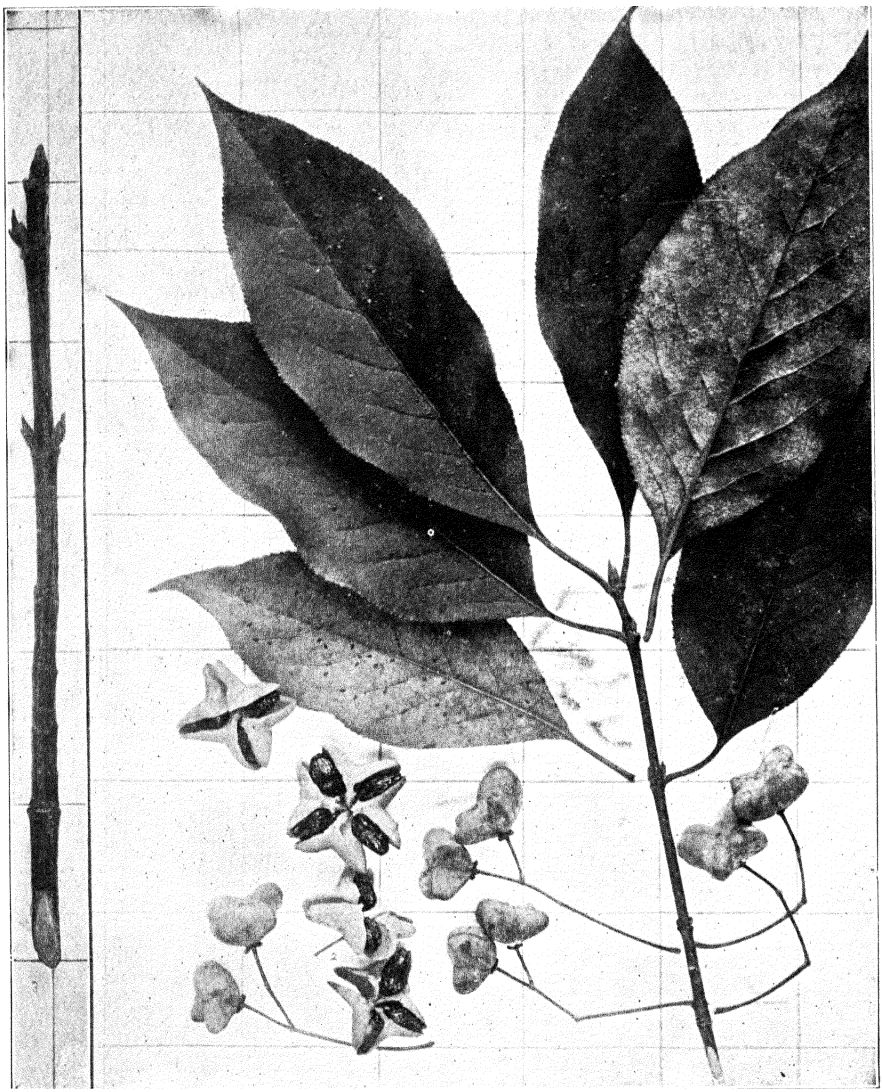


Fig. 376. Mature leaves and fruit, 1 (the former showing mildew and scale); fruit in various stages of dehiscence, 2; branchlet in winter, 3.

377. Trunk of a large tree in eastern Tennessee.

378. Wood structure magnified 15 diameters.

The interesting Wahoo is a small tree, only under the most favorable conditions attaining the height of 20 or 25 ft. with a trunk 6 to 8 in. in diameter, vested in a smoothish mottled gray bark. When isolated from other trees it develops a wide flat top of slender spreading branches. Trees of this species, however, are rare and confined mainly to the southern and western parts of its range. Elsewhere it is usually a shrub rather than a tree.

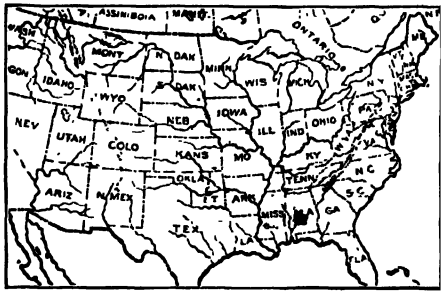
Its quite ordinary foliage and flat unassuming flowers scarcely attract attention during the summer season, but on the approach of autumn, when its leaves assume a pale yellow color and its singular scarlet purple fruit dangles from each branchlet, it is an object of conspicuous beauty, and we see in it then the aptness its occasional names "*Burning-bush*" and "*Bleeding-heart Tree*," as its opening fruit reveals its blood-red contents.

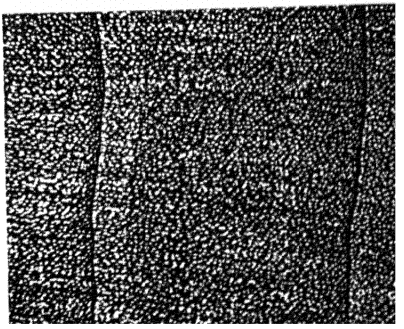
The wood is rather heavy, a cu. ft. weighing when absolutely dry 41.08 lbs., hard and close-grained.

Leaves deciduous, mostly oblong, 2-5 in. long, tapering at base and acuminate or acute at apex, finely crenate-serrate, rather thin, pubescent, paler beneath; petioles about ¾ in. long; branchlets usually more or less 4-angled. *Flowers* about ½ in. across in 7-15-flowered trichotomous cymes with slender peduncles; petals purple, obovate, undulate; anthers purple. *Fruit* ripe in October and often persisting into the winter about ½ in across, deeply 3 4-lobed, smooth, light purple; seed about ¼ in. long and covered with a thin scarlet aril.[1]

1. For genus see p. 446.







SUGAR MAPLE. HARD MAPLE. ROCK MAPLE.

Acer Saccharum Marsh.[1]

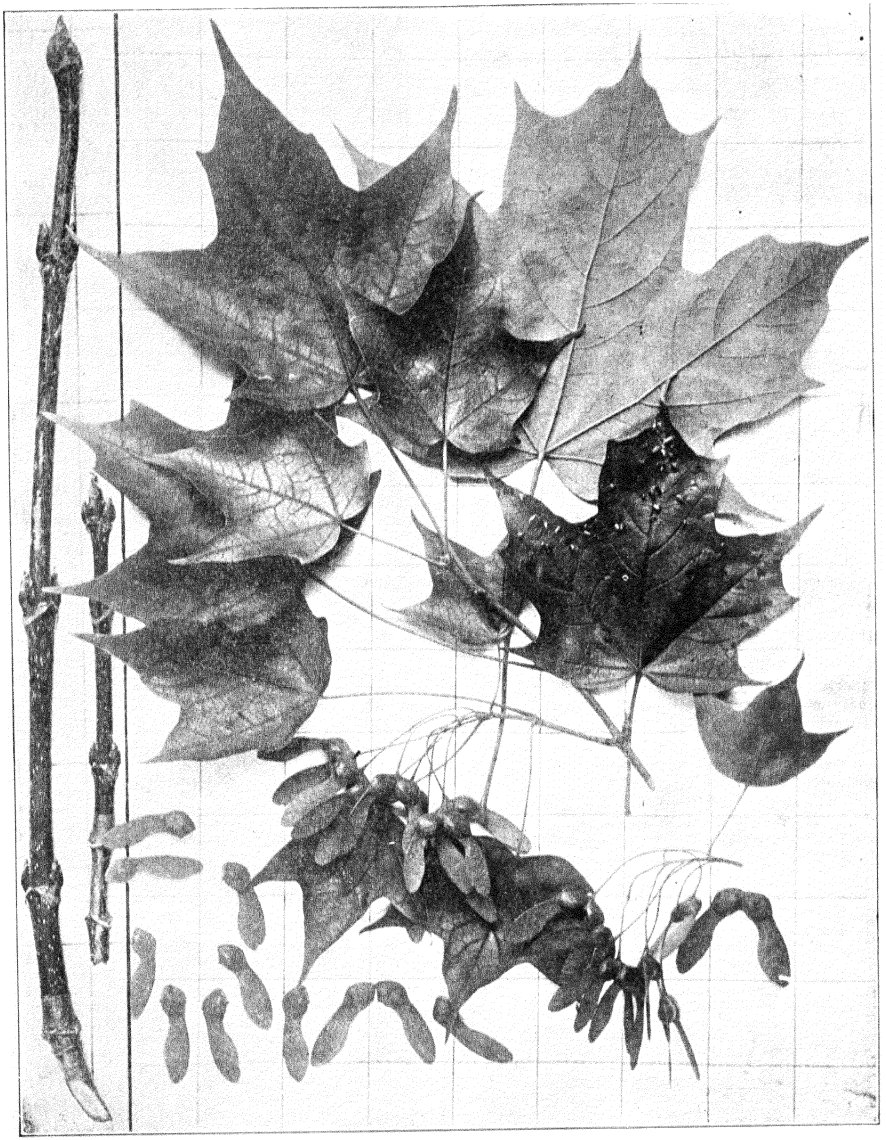


Fig. 379. Branchlet with mature leaves and fruit and a detached leaf showing galls of a mite (*Eriophyes acericola* Garm.), which commonly infests this tree, 1; branchlets in winter, 2.

380. Trunk of tree. The squirrel was a wild gray squirrel, which, on account of scarcity of food in the forest, resorted to the author's grounds, where food and shelter were offered it. It remained all winter and was photographed when about to partake of a breakfast.

381. Wood structure magnified 15 diameters.

The stately Sugar Maple in the forest sometimes attains the height of 100 ft. or more with trunk from 3 to 5 ft. in diameter, and when isolated develops a distinctly ovoid or in very old trees a broad rounded top of many branches and dense foliage. It is without doubt the most valuable hard-wood tree in America, taking into consideration the abundance of maple sugar it produces, the choice figured woods and the valuable plain wood excellent in manufactures and for fuel and rich in potash. It is abundant on well-drained uplands, particularly northward, in company with the Beech, Yellow Birch, Hemlock, Black Cherry, etc., and sometimes forms almost exclusive forests.

Its clear sweet sap is gathered in early spring and evaporated to make the maple sugar, 12 or 13 quarts of sap making a pound of sugar, and 3–4 lbs. to a tree being an average yield. I have made 23 lbs. in one season from a single tree tapped but once, which is an exceptionally good record that I have never known surpassed. The Bird's-eye and Blister Maple are almost exclusively and the Curly Maple largely products of this tree — unaccountable freaks in the development of individual trees.

A cu. ft. of the wood when absolutely dry weighs 43.08 lbs.[2]

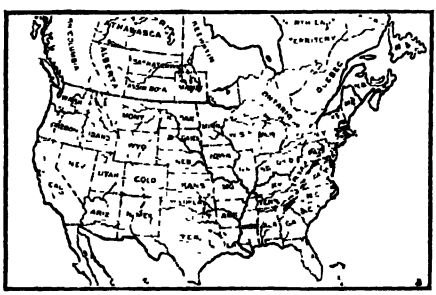
Leaves 3-5-lobed with rounded sinuses and acuminate sparingly sinuate-toothed, lobes, heart-shaped or rounded at base, pubescent at first and at maturity glabrous dark green above, paler beneath, turning yellow and scarlet in autumn. *Flowers* appearing with the leaves in hairy sessile drooping corymbs with long slender greenish yellow pedicels; calyx campanulate; corolla none. *Fruit* ripening in autumn; samaras glabrous, with slightly divergent wings nearly 1 in. long.[3]

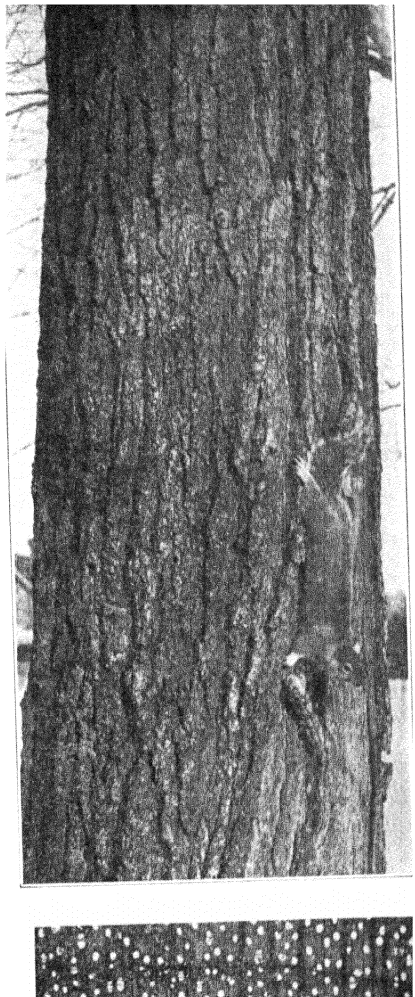
Var. *Rugelii* Rehd. is a form commonly found in the southern states, and rarely in the northern, with firm thick 3-lobed leaves having open rounded sinuses and entire acuminate lobes.

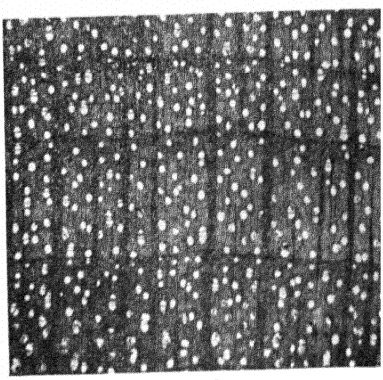
1. Syn. *Acer saccharinum* Wang. *A. barbatum* Michx.

2. A. W., I, 7, 7*a* and 7*b*.

3. For genus see pp. 446 447.







BLACK MAPLE.

Acer nigrum Michx.

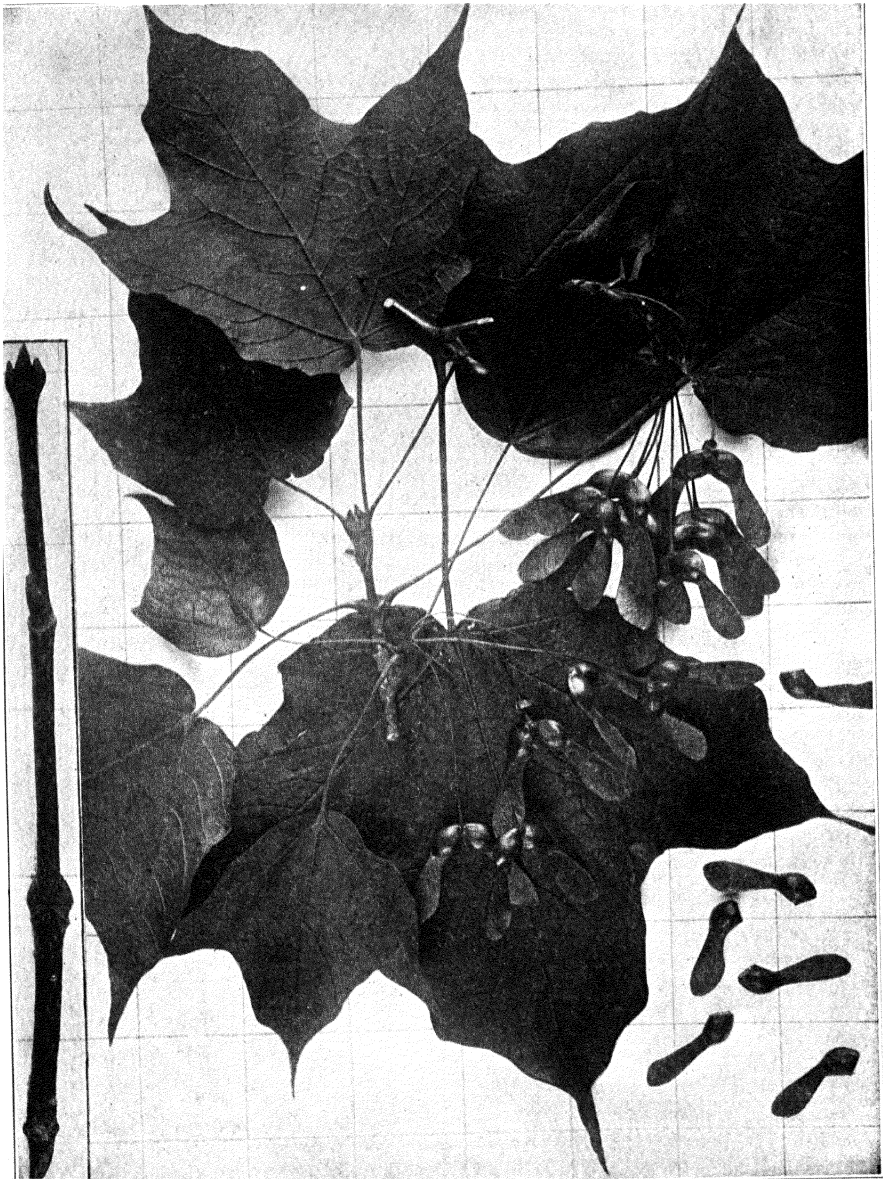


Fig. 382. Leaves and fruit. Note the presence of a few small stipules. They are occasionally much larger. Branchlet in winter.

383. Trunk of tree in Black River valley, N. Y.

The Black Maple, like the Sugar Maple, is a stately tree attaining the height of 80 or 100 ft. with trunk 3 or 4 ft. in diameter, and also when isolated develops a distinct ovoid top of upright branches, and these gradually bending outward make in old age a broad rounded top. With the country folk generally no distinction is made between this and the true Sugar Maple, and its sap is likewise used in sugar-making, but to the observer its drooping concave leaves and other botanical features indicate its distinctness. It thrives best in the rich soil of river-bottoms in company with the Silver and Red Maples, Box Elder, Swamp White Oak, Kingnut Hickory, etc. Like the Sugar Maple it is a favorite shade tree owing to its abundant foliage, which in autumn assumes gorgeous scarlet, orange and yellow tints.

The wood is hard, heavy and strong, similar to that of the Sugar Maple and applied to the same uses. A cubic foot when absolutely dry weighs 43.09 lbs.

Leaves mostly 3-lobed (occasionally 5-lobed) with broad short and generally acuminate lobes, entire or slightly undulated, cordate at base with lobes sometimes overlapping, tomentose at first but at maturity glabrous dull dark green above, yellow-green and pubescent at least on the veins beneath, firm and with drooping sides; petioles stout and generally bearing stipules at the enlarged base. *Flowers* appearing with the leaves in subsessile hairy pendent corymbs with slender pedicels 2-3 in. long; calyx campanulate; corolla none; stamens 7-8; ovary pilose. *Fruit* ripening in autumn; samaras glabrous, with quite divergent wings nearly 1 in. long.





MOUNTAIN MAPLE.

Acer spicatum Lam.

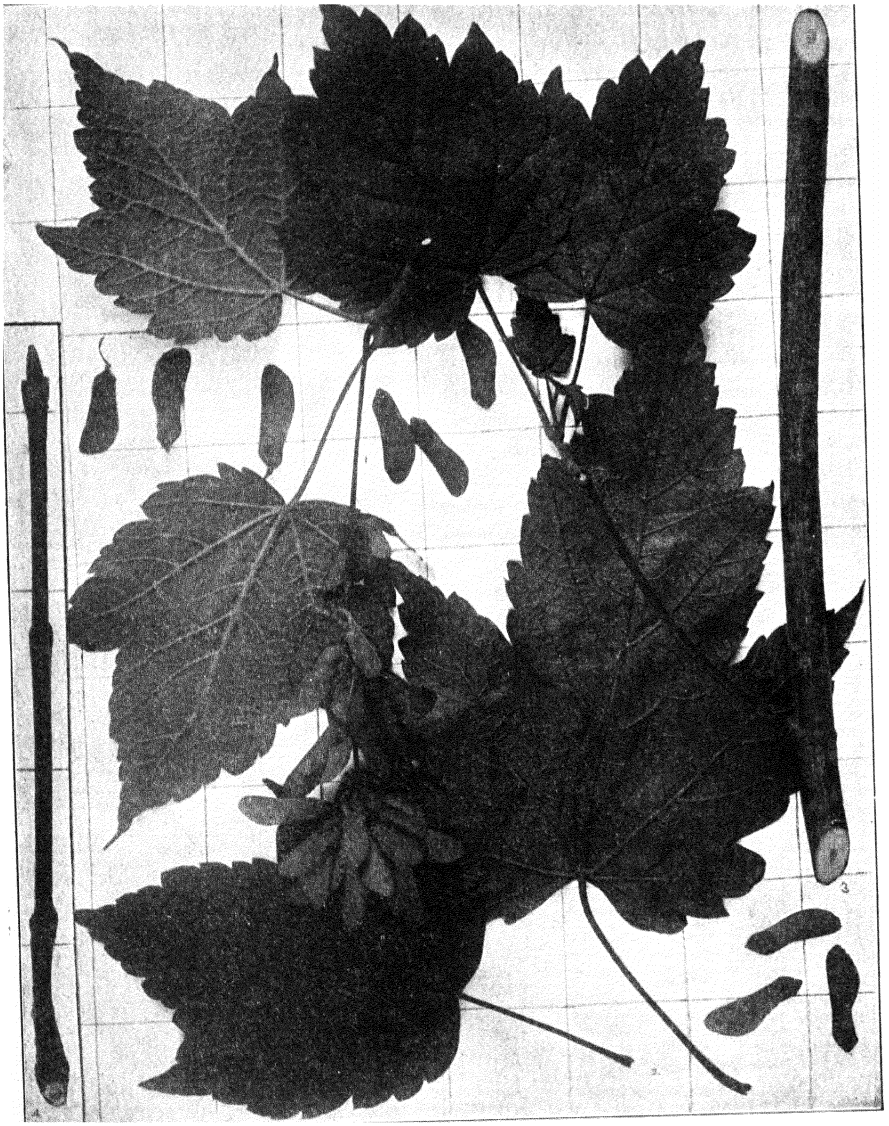


Fig. 384. Branchlet with pair of leaves and fruit, 1; detached leaves and samaræ, 2; section of small branch showing mottled bark, 3; branchlet in winter, 4.

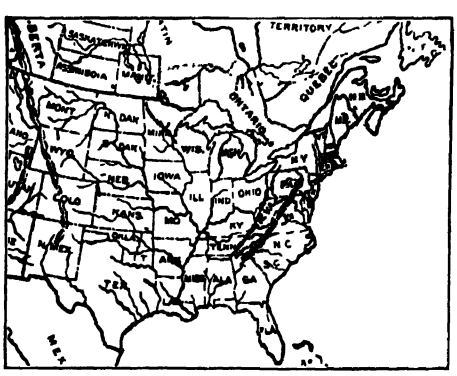
385. Trunk of tree in Lewis Co., N. Y.

The Mountain Maple is the most diminutive of our eastern Maples, as it rarely if ever attains a greater size than 25 or 30 ft. in height with a trunk 6 or 8 in. in diameter, and is commonly rather a large shrub than a tree. It is rarely ever found isolated, as it seems to require the moist rich loam and shade of the forest, and does not grow naturally away from them.

It is probably the most abundant of the shrubs and small trees that clothe the banks of mountain streams and overhang their sparkling waters throughout the northern states and Canada. Their comely leaves and upright stems of pale flowers are as intimately associated with these retreats in early summer as the songs of the Hermit-Thrush and Catbird which live within their shade, and in autumn it is an object of special beauty, its orange and red leaves being only surpassed by the brilliancy of its drooping clusters of scarlet keys.

The wood is little used save as an humble contribution to the wood pile for fuel. A cubic foot when absolutely dry weighs 33.22 lbs.

Leaves palmately 3-lobed or slightly 5-lobed, cordate or truncate at base the acute or acuminate lobes coarsely crenate-serrate with pointed teeth, membranous, conspicuously reticulated, glabrous above, pubescent beneath; petioles slender, reddish. *Flowers* (June) about ¼ in. in diameter in erect many-flowered long-stemmed pubescent compound racemes; calyx greenish yellow; petals linear-spatulate, yellow and longer than the calyx lobes; stamens 7-8, exserted in the staminate flowers; ovary hoary tomentose; style columnar. *Fruit:* samaras glabrous with broad divergent red wings and fully grown by midsummer.





STRIPED MAPLE.

Acer Pennsylvanicum L.



Fig. 386. Section of small branch showing striped bark and branchlet with leaves and fruit, detached samaræ and leafless branchlet in winter.

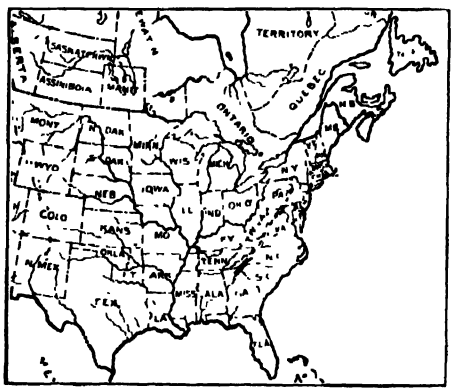
387. Large trunk with small one to the left. Lewis Co., N. Y.

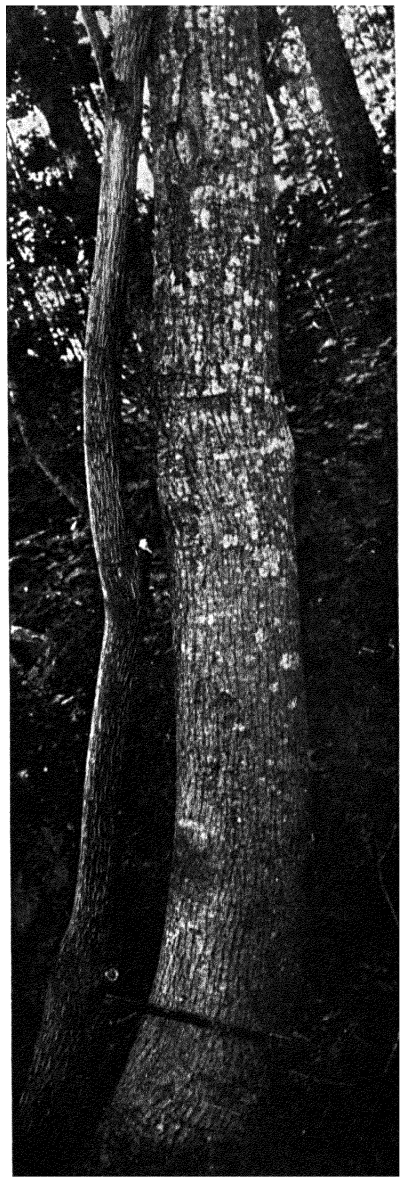
The Striped Maple, although a larger tree than the Mountain Maple, with which it is generally associated, only occasionally attains the height of 30 or 40 ft. with a trunk 8 or 10 in. in thickness, and is often a large shrub. This also is a shade-loving tree, being found scattered through forests of the Sugar Maple, Yellow Birch, Beech, Hemlock, Red Spruce, Butternut, etc., but is occasionally found isolated, having then a rather wide or rounded top of upright and spreading branches. Its handsome large leaves and gracefully drooping stems of yellow flowers, borne on smooth striped branches of rare coloration, overhang the waters of nearly every forest-covered mountain stream within its range, and in northern regions are eagerly devoured by moose and deer, for which reason it is sometimes called the *Moose-wood*.

Its wood is of a rich pinkish brown color with abundant lighter sap-wood usually dotted and streaked with pith-flecks. A cubic foot when dry weighs 32.02 lbs.[1]

Leaves palmately 3 lobed at apex with short acuminate lobes, sharply doubly serrate, cordate or rounded at base, pubescent at first but finally glabrous, yellowish green above, paler beneath, thin, prominently veined turning pale yellow in autumn; petioles stout. *Flowers*, in late spring when the leaves are nearly full grown, bright yellow, about ½ in. across in slender drooping racemes 4-6 in. long; sepals shorter and narrower than the obovate petals; stamens 7-8, shorter than the petals; ovary glabrous; styles columnar and stigmas recurved. *Fruit* drooping, glabrous, widely divergent, wings about ¾ in. long, the seed bearing portion pitted one side; seed about ¼ in. long.

1. A. W., IV, 79.





SILVER MAPLE. SILVER-LEAF MAPLE. WHITE MAPLE.

Acer saccharinum L.[1]

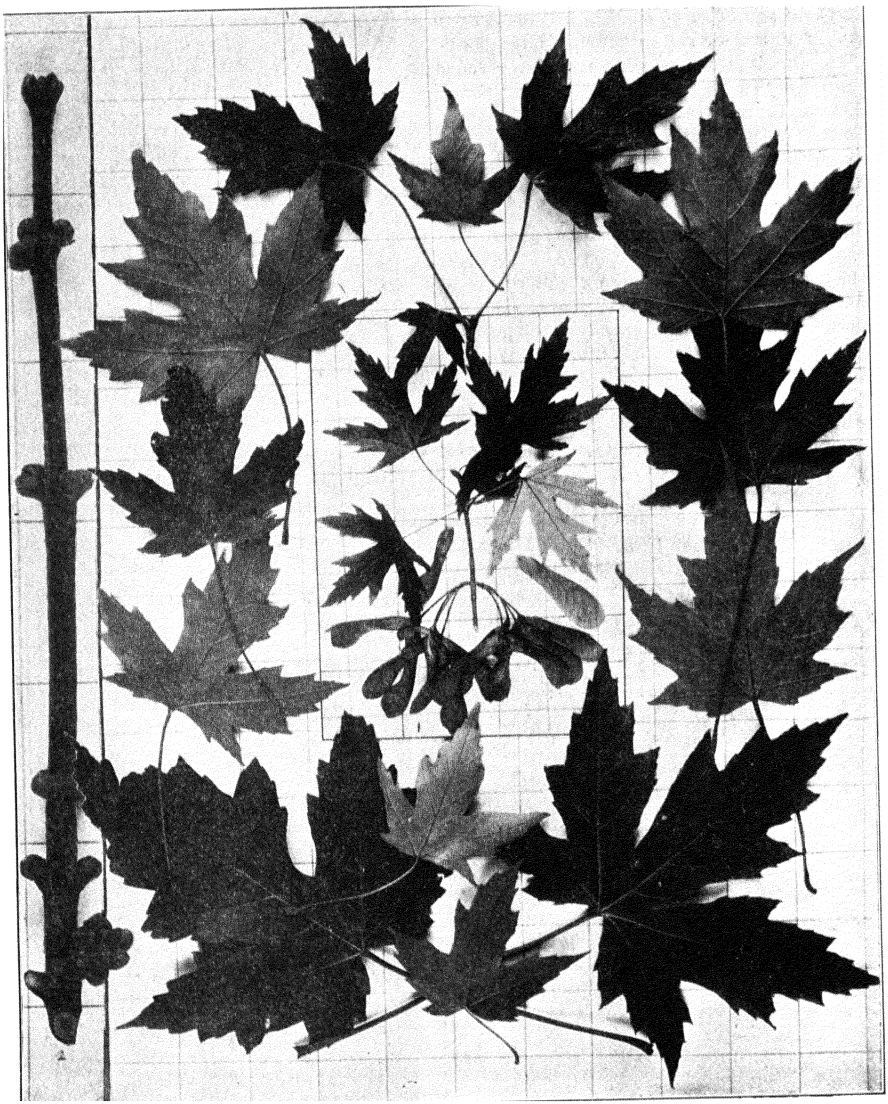


Fig. 388. Branchlet with mature fruit while the leaves are not yet fully grown, 1; these are surrounded with mature leaves gathered later. Leafless branchlet in winter, 2. Note the clustered flower-buds.

389. Trunk of large tree in Black River valley, N. Y.

390. Wood structure magnified 15 diameters.

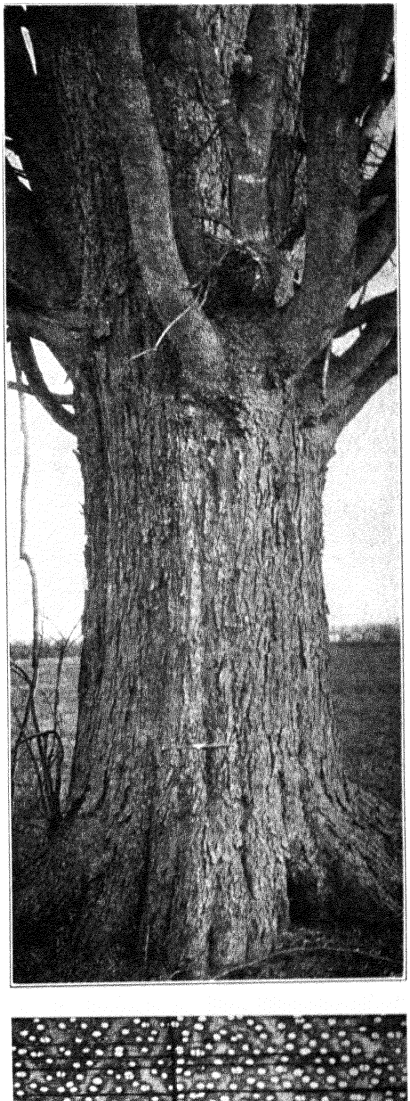
This beautiful tree when growing in the forest attains the height of 100 or 120 ft. with trunk 3–5 ft. in diameter. When isolated from other trees it forms an ovoid top with many upright branches which, however, after a time gradually incline outward and form a rounded or broad top. It thrives best in low bottom-lands, subject to occasional inundation, in company with various Willows, the Black Ash, River Birch, Red and Black Maples, Swamp White Oak, etc. In earlier days it lined the banks of most of the navigable streams of the interior of the eastern states, and early writers tell us that in it lay a large part of the charm of their picturesqueness. Its rapid growth and handsome incised leaves, which show successively their dark or white surfaces when fluttering in the wind, have long made it popular for ornamental planting. Several nursery varieties have appeared. Sugar of excellent quality is made from its sap, though it requires more to make a pound than does that of the Sugar Maple.

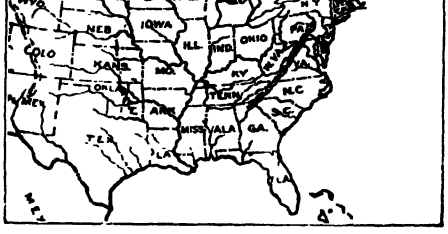
Its wood is strong, rather hard, easily worked, of very fine grain, and is used in the manufacture of furniture, etc. A cu. ft., when absolutely dry, weighs 32.84 lbs. Curly Maple is occasionally produced by this tree.[2]

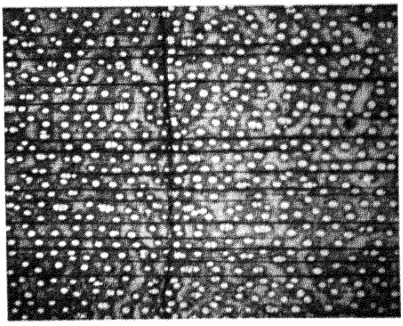
Leaves deeply 5-lobed with narrow sinuses and acuminate and irregularly coarsely dentate lobes, truncate or heart-shaped at base, 5-7 in. long, green above, silvery white and often pubescent beneath; pale yellow in autumn; pedicels long, slender and often red. *Flowers* in very early spring before the leaves, in dense sessile axillary fascicles, greenish yellow; corolla none; stamens 3-7; ovary pubescent. *Fruit* ripening in May, the samaras large 1½-2 in. long, falcate, divergent, prominently veined.

1. Syn. *Acer dasycarpum* Ehrh.

2. A. W., II. 26 and 26*a*.







RED MAPLE. SCARLET MAPLE. SOFT MAPLE.

Acer rubrum L.



Fig. 391. Mature fruit while the leaves are very immature, 1; mature leaves gathered later in the season, 2; branchlet in winter showing clusters of flower-buds and leaf-buds, 3.

392. Trunk of tree with leaves at base. Staten Island, N. Y.

The Red Maple sometimes attains the height of 100 ft. or more, when growing in the forest, with a trunk 3 or 4 ft. in diameter, and when growing away from the influence of other trees develops an oval or rounded top. It inhabits chiefly bottom-lands and the banks of streams and swamps in company in the north with the Black and Red Ash, Arbor Vitæ, Hornbeam, Tamarack, etc., and in places forms almost exclusive forests. It is one of the first trees to show its autumnal colors of brilliant scarlet and is then a very conspicuous and beautiful object. The swelling of its buds in late winter is one of the first evidences of approaching spring, and its early flowers open and offer their abundant nectar as early as it is warm enough for the bees to visit them. Even before the leaves appear in southern regions the tree is gorgeous with its crimson full-grown samaras, though in northern regions they do not attain full size until after the leaves appear.

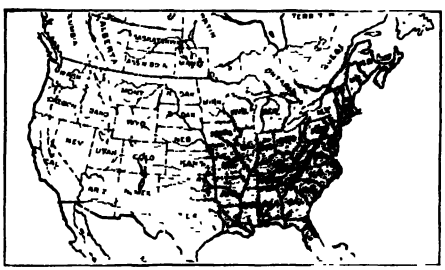
The wood is extensively used in manufacture of furniture, a cu. ft. when absolutely dry weighing 38.50 lbs., and a considerable portion of the Curly Maple of commerce comes from this tree.[1] Maple sugar is also made from its sap though as the sap is not as sweet as that of the Sugar Maple it requires more to make a pound of sugar.

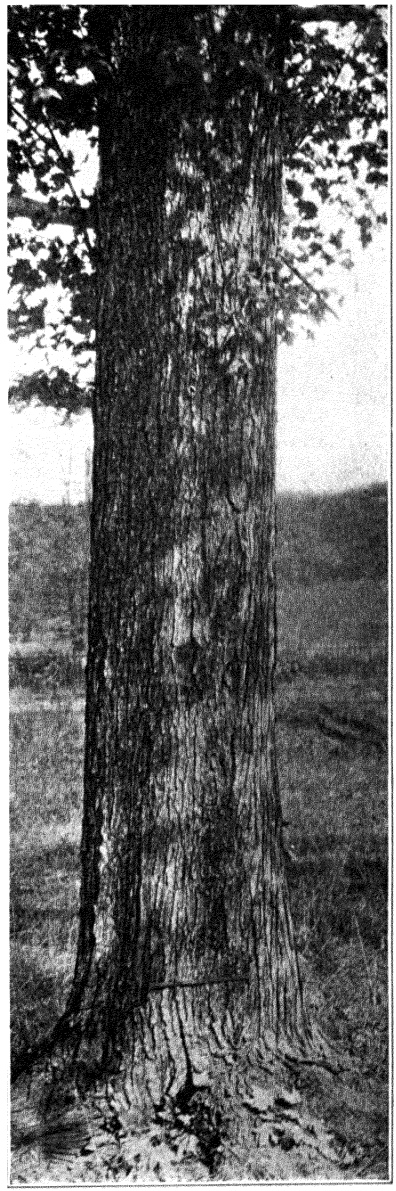
Leaves 2-6 in. long, 3-5-lobed, with shallow acute sinuses and irregularly doubly serrate acute or acuminate lobes, truncate or subcordate at base, pubescent at first, at maturity glabrous green above, whitish and mostly glabrous beneath, bright scarlet in autumn; petioles slender. *Flowers* in earliest spring before the leaves, scarlet or yellow-tinted, in lateral fascicles; petals oblong-linear; ovary glabrous. *Fruit* on drooping pedicels 2-4 in. long, divergent, glabrous, nearly 1 in. long.

Var. *tridens* Wood[2] is a form in coast region from N. J. to Fla. and Tex., having leaves mostly smaller, more obovate, narrow and cuneate or rounded at base, 3-lobed (or lateral lobes sometimes suppressed) dark green above, much lighter and glaucous beneath, thickish; fruit smaller, sometimes yellowish.

1. A. W., III, 53.

2. Syn. *A. Carolinianum* Walt.





BOX ELDER. ASH-LEAVED MAPLE.

Acer Negundo L.[1]

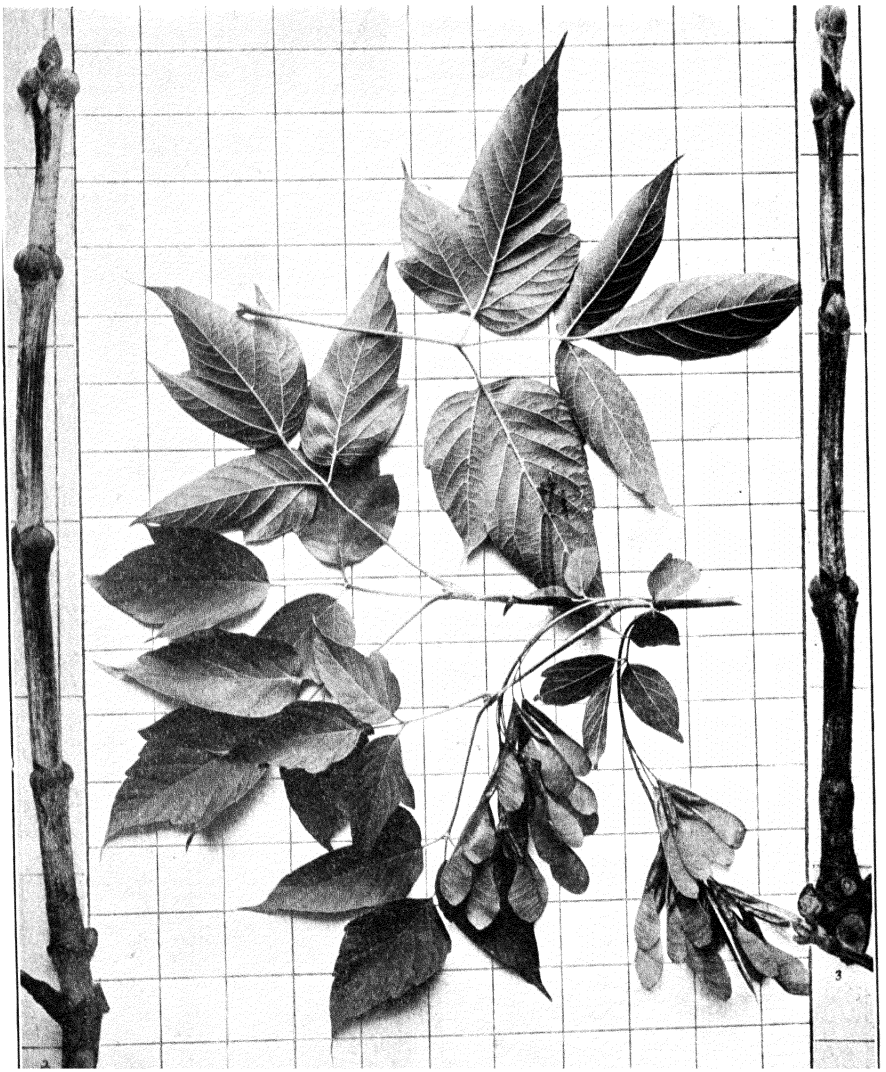


Fig. 393. Mature leaves and fruit, 1; branchlet in winter from staminate tree, 2; do, from pistillate tree, 3. They are sometimes less glaucous than here shown.

394. Trunk of isolated tree, near St. Louis, Mo.

The Box-Elder attains a height of from 50 to 75 ft. with rather wide-spreading top and short trunk 2–4 ft. in diameter. It ranges from the western slopes of the Alleghany Mountains to the limits of tree growth on the western planes. Occupying the banks of streams, lake shores and low bottom-lands, it is one of the most generally distributed and abundant trees throughout all this range, but is rare east of the Alleghanies. Its handsome foliage, rapidity of growth and unusual ability to withstand drouth make it very popular for planting as a shade-tree in the cities and towns of mid-continental regions, where it ornaments the streets and door-yards of many homes. Several nursery varieties have appeared which have won popularity both in this and European countries.

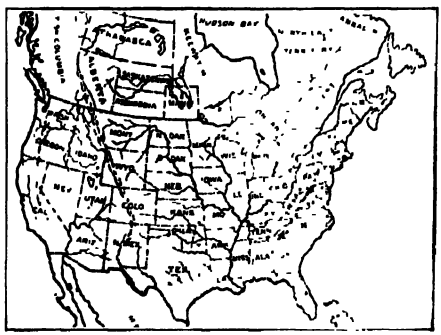
The wood of the Box-Elder is light, a cu. ft. when absolutely dry weighing 26.97 lbs., soft, close-grained, easily worked and is used in the manufacture of wooden-ware, lumber for interior finishing and paper pulp.[2] From its sap sugar is sometimes made.

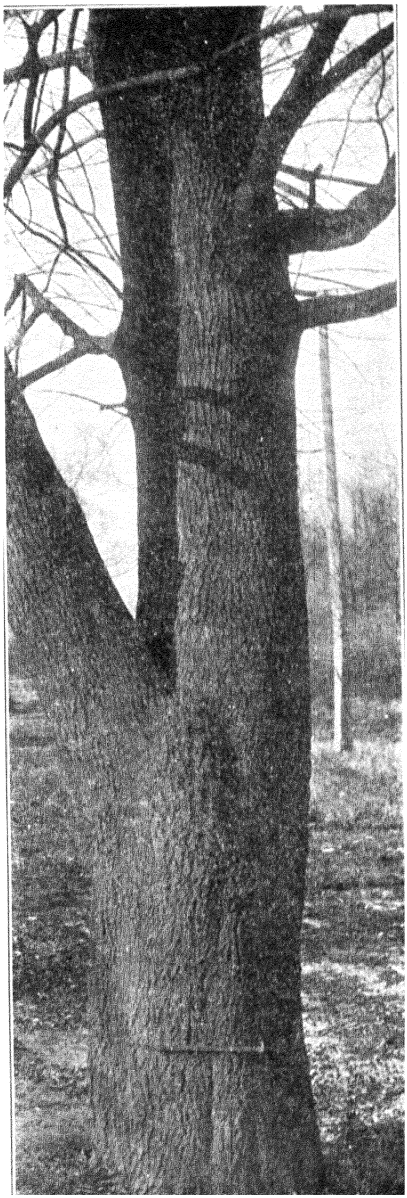
Leaves 3-5-foliate with ovate to oval leaflets, from cuneate to subcordate and entire at base, remotely and irregularly serrate or lobed above, tomentose at first but at maturity green above, paler and hairy in the axils beneath, thin, turning yellow in the autumn. *Flowers* dioecious, very small, appearing before the leaves, yellowish green; the staminate in fascicles with very slender pedicels 1-2 in. long; the pistillate in narrow racemes. *Fruit:* samaras, glabrous, 1½-2 in. long, somewhat incurved, in drooping racemes 6-8 in. long falling in autumn but stems commonly persisting until spring.

Var. *Californica* (T. & G.) Sarg., is trifoliate with more coarsely dentate leaflets, pale tomentose beneath.

1. Syn. ***Negundo aceroides*** Moench.

2. A. W., III, 54.





HORSE CHESTNUT.

Æsculus Hippocastanum L.

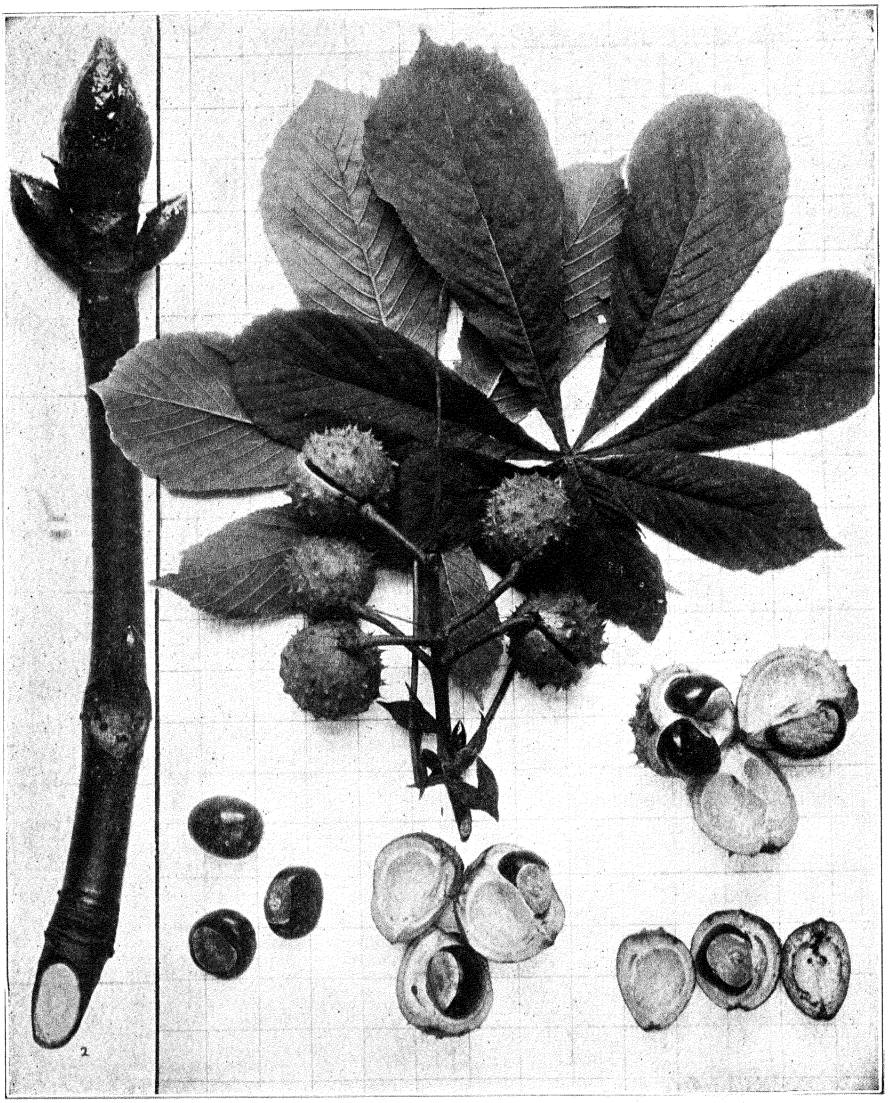


Fig. 395. Branch with mature leaves and fruit and opened capsules beneath, 1; branchlet in winter, 2.

396. Trunk of tree with leaves beneath. Staten Island, N. Y.

397. Wood structure magnified 15 diameters.

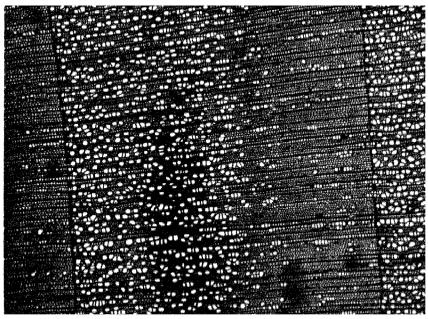
The Horse-Chestnut has long been one of the most popular shade trees of both Europe and America. Its native home is said to be southern Asia, from the Himalaya Mts. to Greece, from whence it was introduced into this country about the middle of the 18th century, and it has become naturalized in many places. It is one of the largest trees of its genus, sometimes attaining the height of 75 or 80 ft. with trunk 2 or 3 ft. in diameter. Its formal round pyramidal top is one of the most familiar objects among the trees of the parks and street-sides of all the eastern cities, and few trees equal it in beauty when, in the month of May, its dome of tender green handsome leaves is beset with showy pyramids of white flowers mottled with red. Many garden varieties have appeared; as forms with variegated and laciniate leaves, red-tinted and double flowers, etc. It is said that the bitter principle of the fruit can be removed with fresh water and it is then palatable and nutritious. The bark is rich in tannin and is used in medicine.

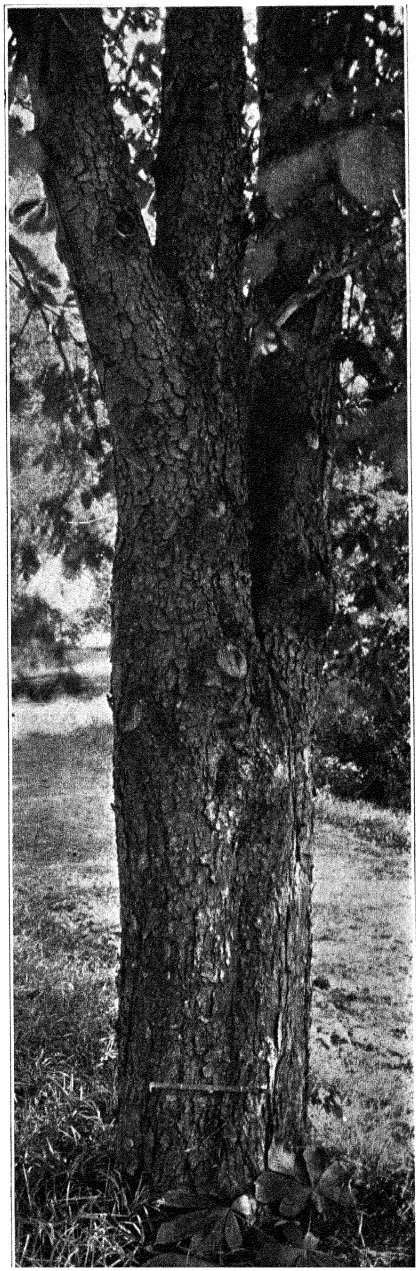
The light close-grained wood is suitable for the uses for which the Fetid Buckeye is applied. In Europe it is employed as blind wood in cabinet making, for moulds, etc.[1]

Leaves with petioles 4-7 in. long and 5-7 (usually 7) sessile obovate leaflets, cuneate at base, abruptly acuminate, irregularly crenate-dentate, rugose, thin and nearly glabrous. *Flowers* in pyramidal rather dense thyrses, white spotted with yellow and purple. *Fruit* subglobose, 2-3 in. in diameter, covered with spines; seed 1-1½ in. long with large hilum.[2]

1. A. W., I, 6.

2. For genus see p. 447.





OHIO BUCKEYE. FETID BUCKEYE.

Æsculus glabra Willd.

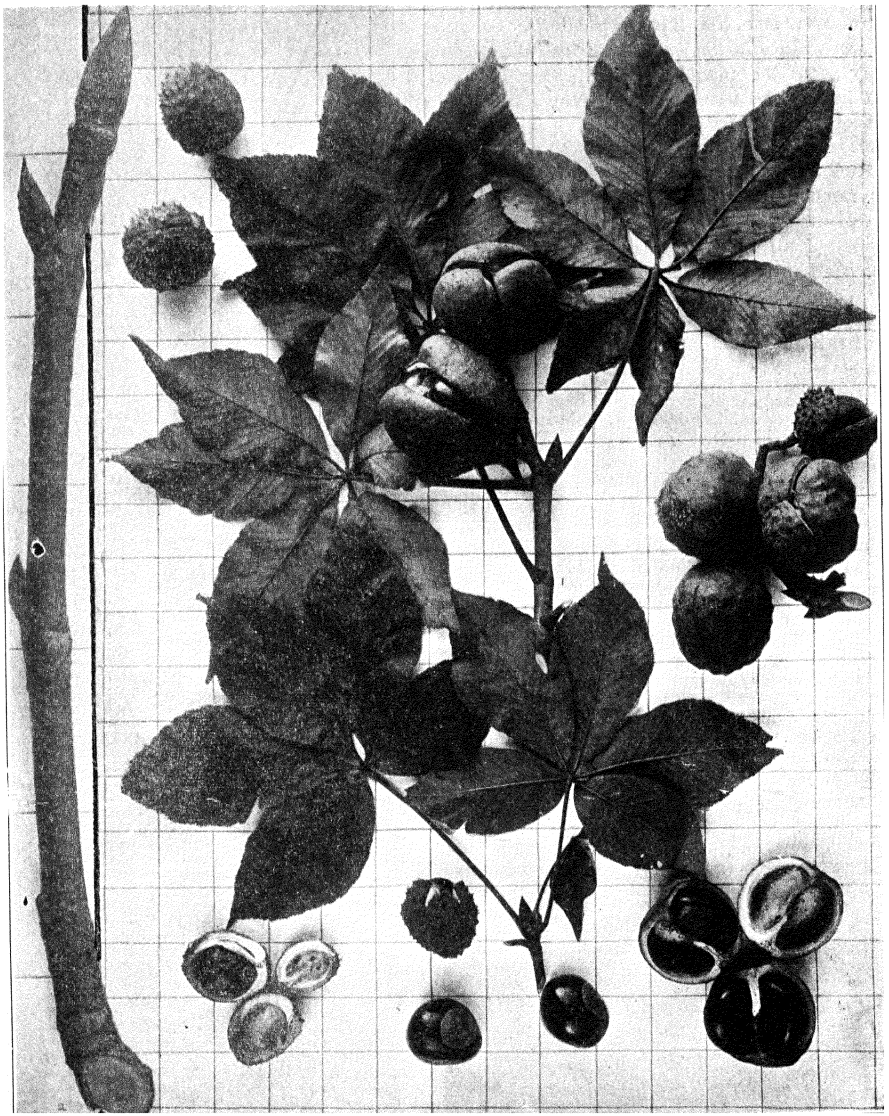


Fig. 398. Branchlet with mature leaves and fruit, 1; branchlet in winter, *2*.
399. Trunk with stem of large grapevine. Meramec River valley, Mo.

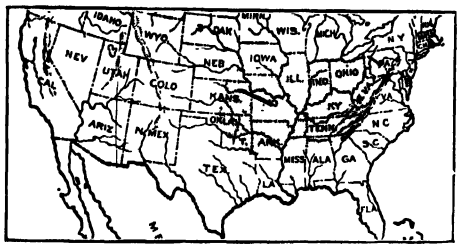
This is a medium-size tree rarely attaining a greater height than 75 ft. or thickness of trunk than 2 ft. and often no more than half that size. When isolated it develops a broad rounded umbrageous top of many branches and thick straight branchlets. It is confined in its distribution to low moist regions and the banks of streams, and is a tree of handsome aspect on account of its star shaped clusters of leaflets, which in autumn turn yellow before falling. When leafless in winter the distinctly keeled bud-scales with apiculate free tips and rather smaller buds readily distinguish it from closely allied Yellow Buckye. It is occasionally planted for ornamental purposes though ill-favored on account of the ill-smelling bark and foliage when bruised and is not as ornamental as the introduced Horse-Chestnut.

Its light wood weighs when absolutely dry 28.31 lbs. per cubic foot, is soft, close-grained, rather tough and easily worked. These qualities make it in demand for the manufacture of artificial limbs, splints and some kinds of wooden-ware, and it is also used for paper-pulp.[1] The nuts, "buckeyes," are often carried in the pockets of superstitious people with the belief that they will keep away the rheumatism.

Leaves with petioles 4-6 in. long and 5-7 oval or oblong leaflets 3-6 in. long cuneate and entire at base, acuminate, finely unequally serrate above, at maturity glabrous on upper surface, pubescent on the veins beneath and on the petioles. *Flowers* (April-May) yellowish green, about ¾ in. long, mostly unilateral in loose pubescent panicles 5-6 in. long; calyx campanulate; petals of nearly equal length the claws about equally as long as the calyx but the lateral pair broader; stamens longer than the petals, usually 7, with long curved filaments; ovary pubescent and armed with prickles. *Fruit* irregularly obovate or subglobose, 1-2 in. long, more or less roughened with prickles; seed 1-1½ in. wide.

1. Syn. *Æsculus flava* Ait.

2. A. W., XI, 253.





YELLOW BUCKEYE. SWEET BUCKEYE.

Æsculus octandra Marsh.[1]

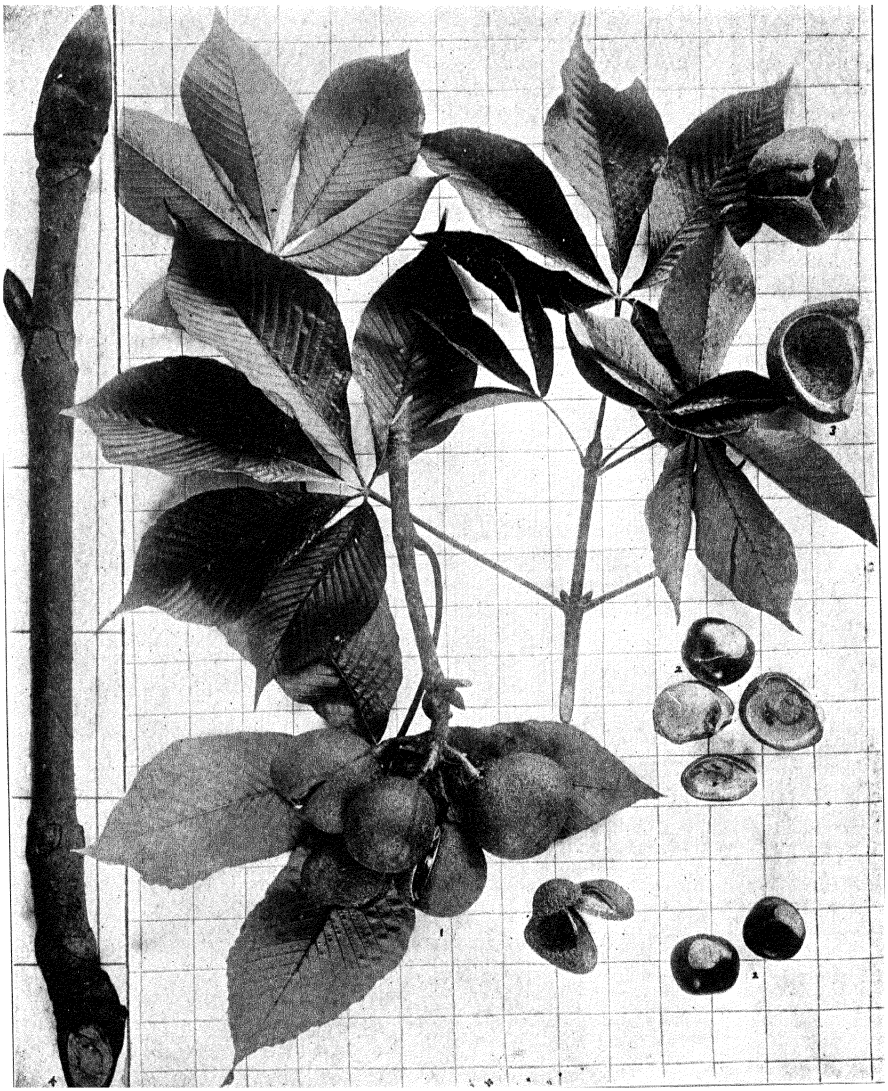
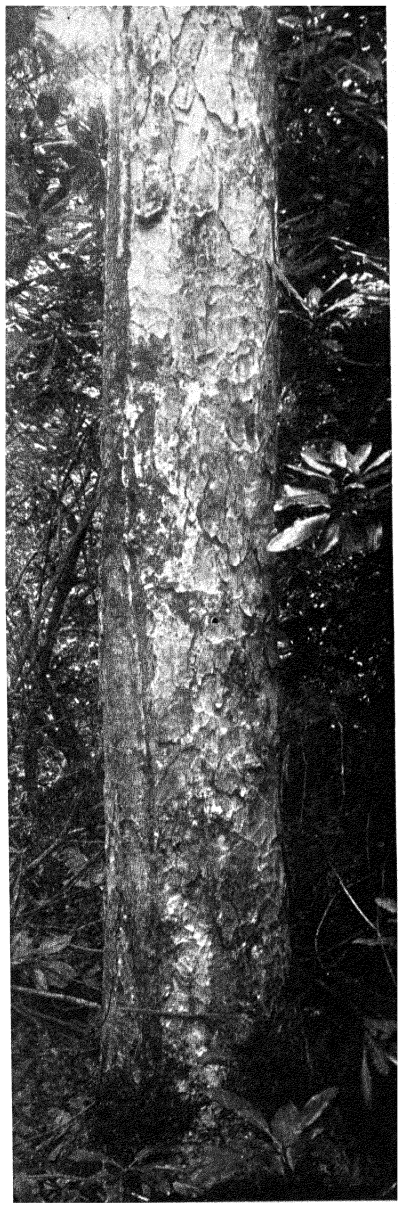


Fig. 400. Branchlets with mature leaves and fruit, 1; isolated seeds and valves of capsules, 2–3; branchlet in winter, 4.

401. Trunk of a forest tree and Rhododendron foliage. Alleghany Mountains, N. C.



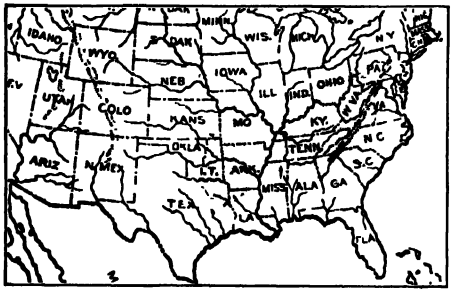
This is the largest and handsomest of the native Buckeyes, attaining the height of 75 to 90 ft., with trunk 2–3 or more ft. in diameter. It does not equal the allied Horse-Chestnut in beauty of flower-cluster or size of leaves, but is distinctly a handsome tree, especially a purple-flowered variety which is known botanically as var. *hybrida* (de C.) Sarg. The species is called Sweet Buckeye not because the nuts are sweet enough to be eaten by man, but they are sweeter than those of the Fetid Buckeye and are eagerly eaten by cattle, swine, etc. It is said that flour made from the nuts is excellent for paste, which possesses an adhesive power greater than that of ordinary paste and is less liable to be eaten by insects.

The wood is light, a cu. ft. when absolutely dry weighing 26.64 lbs., soft, tough, fine-grained, easily worked and applied to the same uses as is the wood of the Fetid Buckeye.[2]

Leaves with petioles 4–6 in. long and usually 5 (sometimes 6 or 7) obovate-oblong or elliptical leaflets, cuneate at base the lowermost oblique, acuminate, serrate, pubescent at first but finally nearly glabrous and dark green above, duller and hairy tufted in the axils beneath. *Flowers* (April-May) 1½ in. long, yellow, in loose pubescent panicles 5-7 in. long; petals 4, unequal, longer than the calyx; stamens usually 7, shorter than the petals; ovary pubescent. *Fruit* about 2 in. long smoothish, with pale brown seed about 1½ in. long.

Var. *hybrida* (de C.) Sarg. (var. *purpurascens* Gray) has pink or purple flowers and under surface of the leaflets, petioles, etc. pale pubescent.

1. Syn. *Æsculus flava* Ait.
2. A. W., XII, 278.



WESTERN SOAPBERRY.

Sapindus Drummondi H. & A.



Fig. 402. Branchlets with leaves and fruit in October, 1; fruit cut into to expose seeds, 2; separated seeds, 3; branchlet in winter, 4.

403. Trunk of tree in Red River valley, Ark.

404. Wood structure magnified 15 diameters.

This interesting tree attains the height of from 50–75 ft., with trunk 1½–2 ft in diameter, clothed in a gray rough scaly bark and strongly buttressed at base. It puts out but few large branches and along these many short contorted branches, the whole forming a top of peculiar aspect. Its dark green leaves with sickle-shaped leaflets and large clusters of golden translucent fruit terminating each branchlet are features of singular interest, and in a measure compensate for its ungainly habit of growth. On account of a resemblance in its fruit to that of the China-tree (*Melia Azedarach*) it is sometimes called the Wild China-tree. It inhabits chiefly bottom-lands in company with the Pecan, Nutmeg Hickory, Mississippi Hackberry, Prickly Ash, Honey Locust, Drummond Maple, etc.

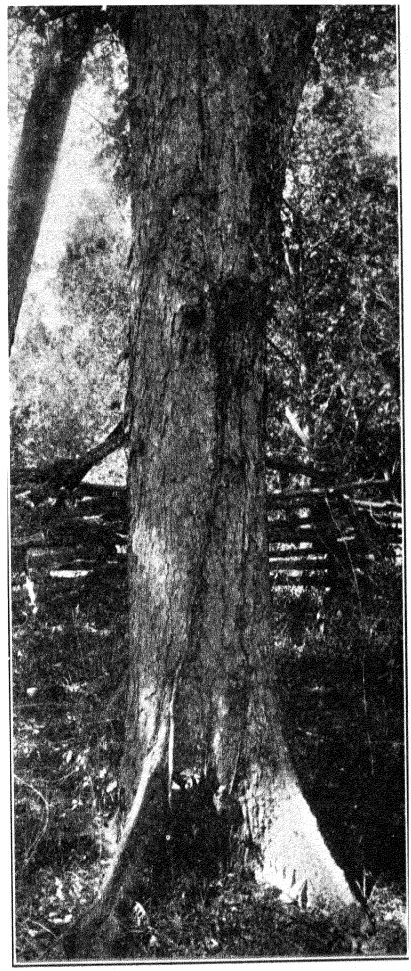
The name Soap-berry is applied to this and the allied trees on account of detersive properties found in the pulp of its fruits, which when rubbed between the hands in water, form a lather and can be used as a substitute for soap.

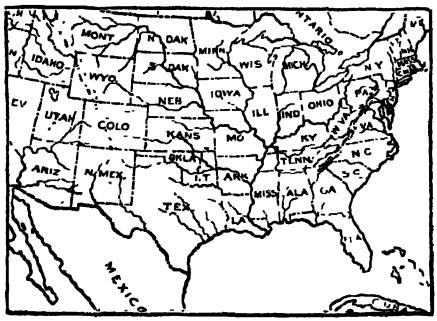
Its wood is heavy, a cu. ft. when absolutely dry weighing 50.64 lbs., strong and splitting easily between the rings. These are properties which make it valuable for splints in basket making for which it is to some extent employed.[1]

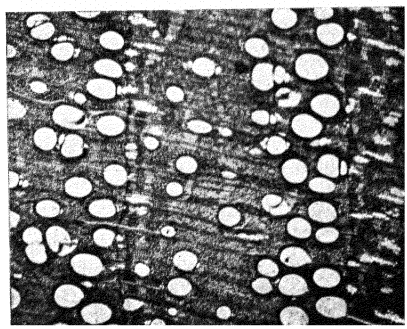
Leaves glabrous or nearly so, with slender not winged rachises and 9–11 pairs of lanceolate usually falcate acuminate short petiolate oblique entire leaflets 2–3 in. long, acute at base, glabrous above, pubescent, thickish. *Flowers* (May-June) about 3-16 in. across, white, in terminal compound panicles 6–9 in. long. *Fruit* ripening in early autumn and remaining, more or less shriveled, on the branches until spring, oval, about ½ in. long, yellow, translucent, glabrous and slightly if at all keeled; seed dark brown.[2]

1. A. W., XI, 254.

2. For genus see pp. 447–448.







COMMON OR PURGING BUCKTHORN. EUROPEAN WAYTHORN.

Rhamnus cathartica L.

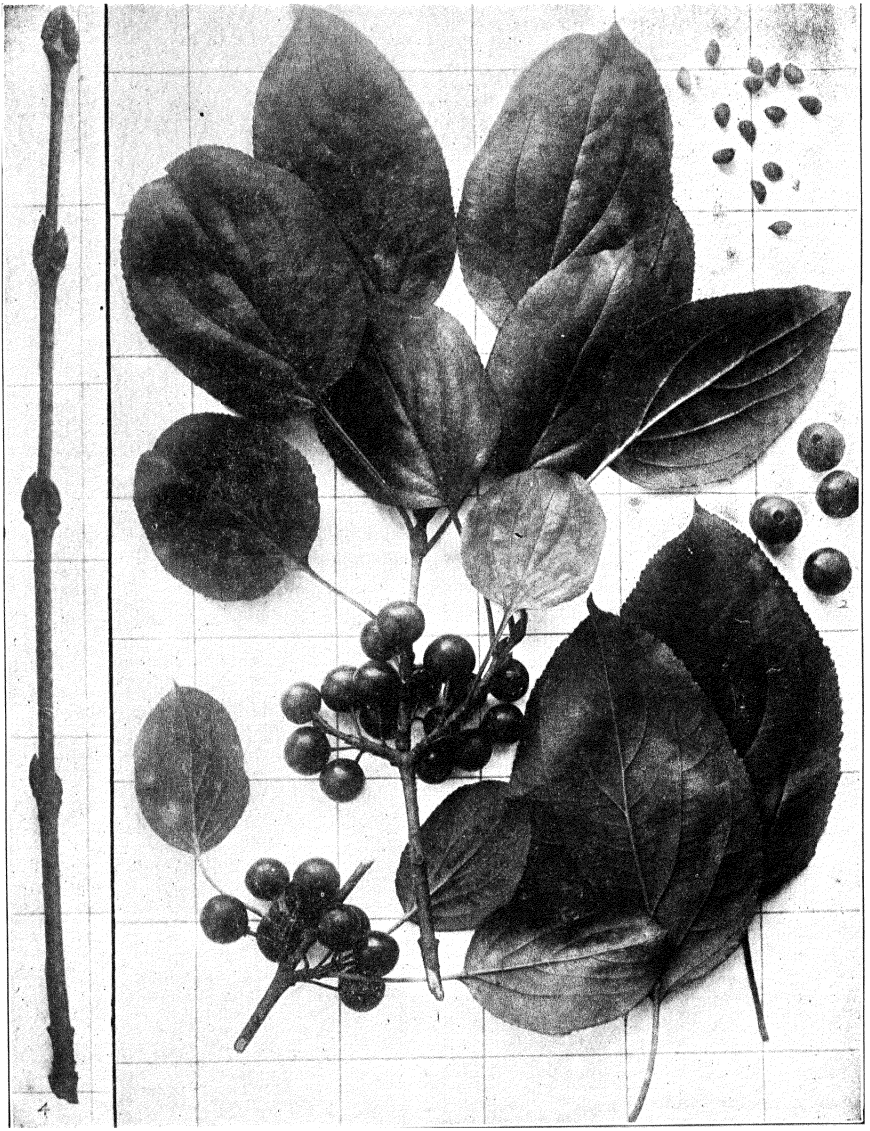


Fig. 405. Branchlets with mature fruit and leaves, 1; detached fruit, 2; nutlets, 3; branchlet in winter, 4.

406. Tree in the Missouri Botanical Garden, St. Louis, Mo.

407. Wood structure magnified 15 diameters.

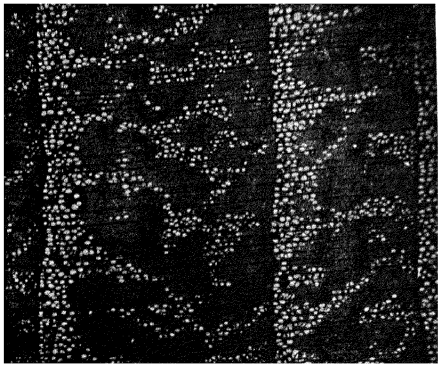
The Common or European Buckthorn or Waythorn, sometimes called also the Rhineberry, is an introduced tree in the United States, as a hedge plant, and has become naturalized in many places throughout the eastern states. It is a native of Europe and western and northern Asia. As we find it in this country it occasionally attains the height of 26 to 30 ft., and its short trunk, sometimes 12 or 14 in. in diameter, divides near the ground into large upright limbs, which develop an oblong or spreading bushy top of crooked branches and many small spiny branchlets; or it is often only a spreading bush. It is an interesting species for shrubberies, on account of its small distinct leaves and closely clustered black berries, and it is also a good hedge plant on account of its many stiff spiny branchlets. Its bark yields a medicine of strong cathartic properties, and is also used in making a yellow dye.

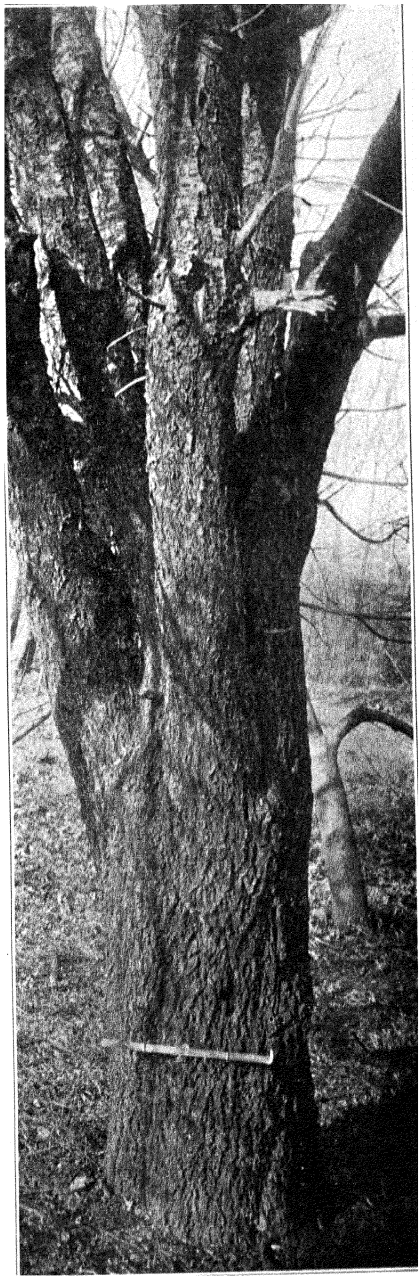
The wood is heavy, hard, firm, very durable, of characteristic fine grain and yellowish or pinkish brown color, with narrow light yellow sap-wood. It is suitable for use in turnery, for tool-handles, etc.[1]

Leaves opposite, deciduous, broad ovate or oval, 1½-3 in. long, mostly rounded or obtuse at base, obtuse or acute, finely crenate serrate, glabrous, with 2-4 pairs of prominent veins running from near the base nearly to the apex; winter buds scaly. *Flowers* (May-June) about ⅛ in. wide, in 2-5 axillary clusters, 4 numerous; petals very narrow. *Fruit* subglobose, black, about ¼ in. across, very bitter and containing 3 or 4 nutlets; seed sulcate on the back.[2]

1. A. W., XII, 277.

2. For genus see p. 448.





YELLOW BUCKTHORN. INDIAN CHERRY.

Rhamnus Caroliniana Walt.

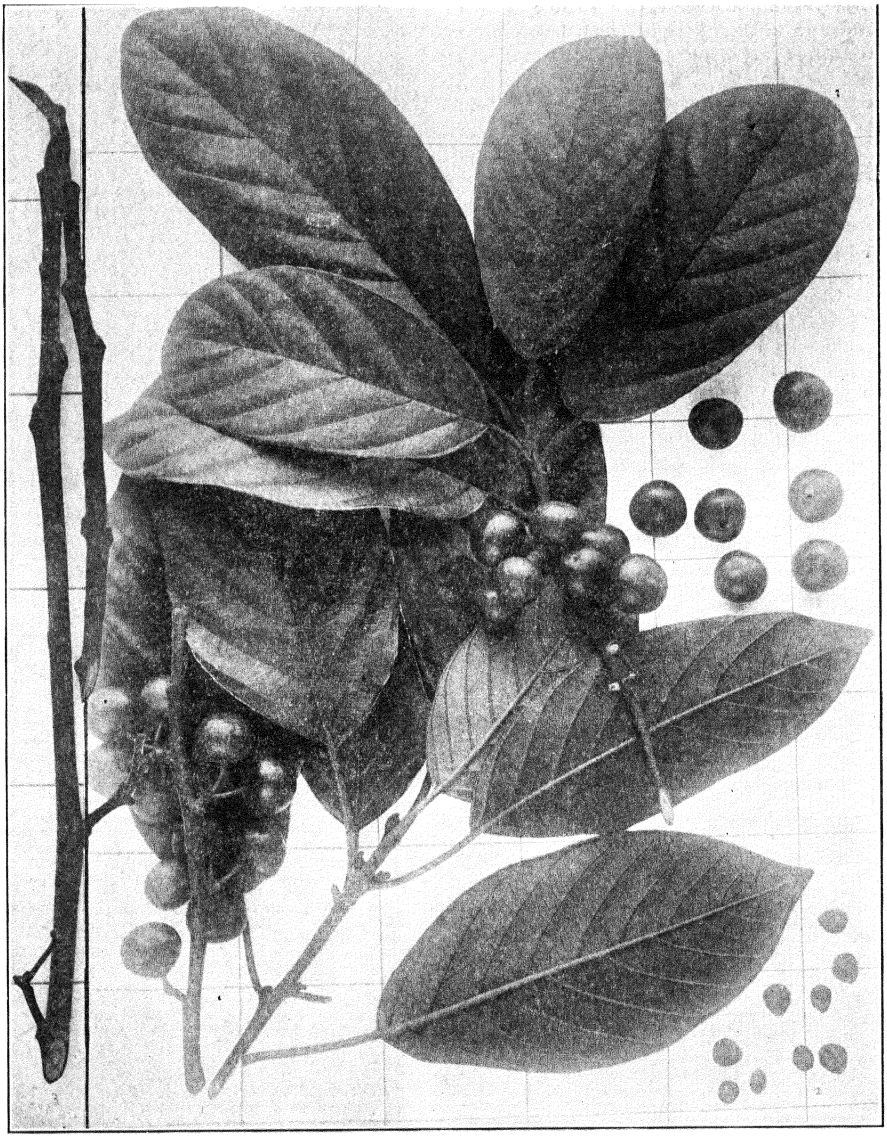


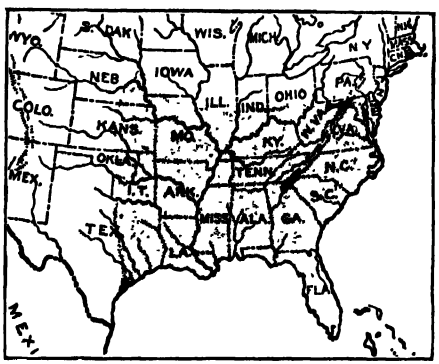
Fig. 408. Branchlet with mature leaves and fruit; detached fruit and nutlets and branchlets (one still retaining fruit stems) in winter

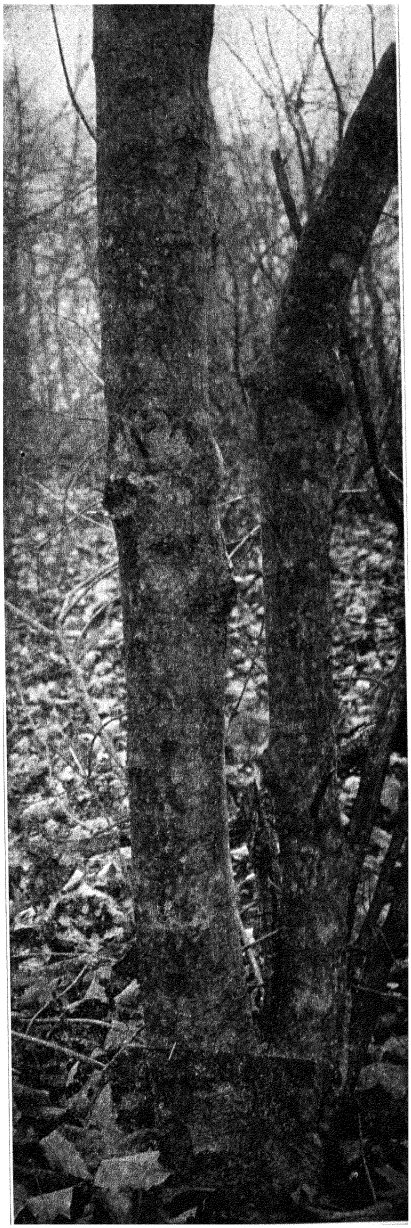
409. Tree near Allenton, Mo.

The Yellow Buckthorn or Indian Cherry, as it is also called, is a small slender tree with unarmed branches sometimes attaining the hight of 30 or 35 ft. with trunk 6 or 8 in. in diameter. It is more often, however, shrubby and scattered as an undergrowth through forests of the Black Jack, Post, Shingle and Chinquapin Oaks, Blue Ash, Bumelia, etc., on rich bottom-lands and limestone slopes. In these situations its clear bright green foliage and berries, varying from scarlet to black according to degree of ripeness, are highly ornamental and have occasioned its planting in ornamental shrubberies, for which it is well adapted. Its fruit is sweet and edible though of no commercial importance.

The wood is rather light, a cu. ft. weighing 34.04 lbs., but hard and close-grained and of a rich brown color with clear yellow sap-wood.

Leaves elliptical to ovate, 2-6 in. long with 6 or 7 pairs of veins arcuate near the margin, wedge-shaped or rounded at base, acute (or sometimes acuminate) at apex, obscurely serrate-crenate or nearly entire, tomentose at first but at maturity shining dark green with impressed veins above, glabrous or nearly so beneath; petioles pubescent; winter buds naked. *Flowers* (May-June) perfect, about ¼ in broad, in pubescent umbels or some solitary on peduncles from ¼ to ¾ in. long; calyx 5 lobed; petals 5, enveloping a short stamen. *Fruit* subglobose, ½ in. in diameter, ripening in early autumn, black and sweetish when fully ripe and containing 2-4 closely coherent nutlets rounded on back.





BASSWOOD.

Tilia Americana L.

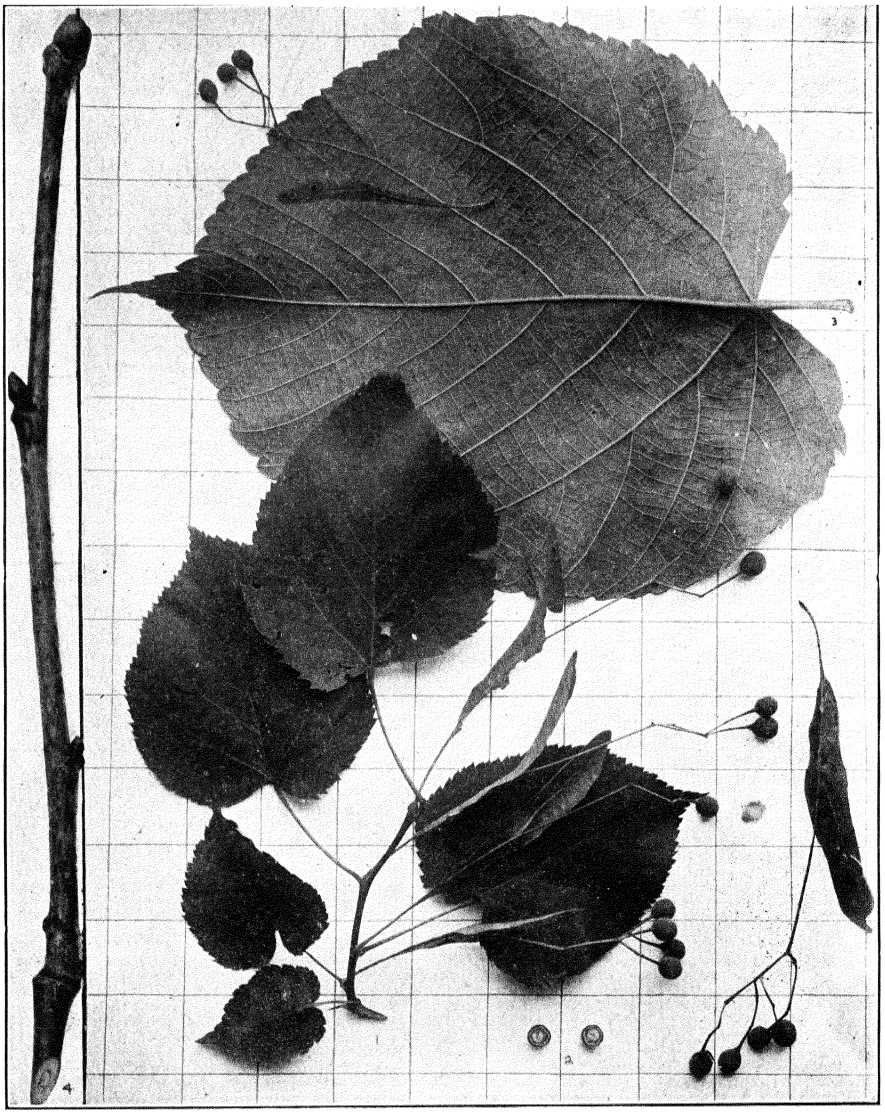


Fig. 410. Branchlet with mature leaves and fruit, 1; nutlet in section, 2; leaf from vigorous shoot, 3; branchlet in winter, 4.

411. Tree in Black River valley, N. Y.

412. Wood structure magnified 15 diameters.

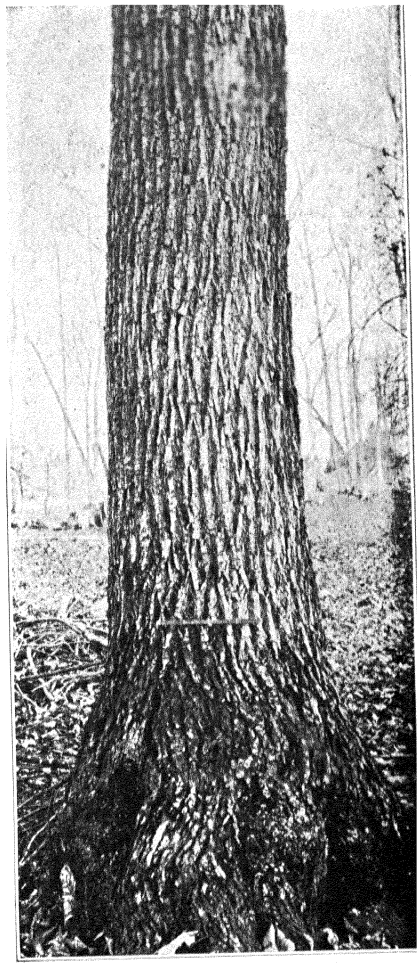
The Basswood is one of the most abundant and useful trees of eastern United States and Canada. In forest growth it has been known to attain the height of 125 ft. with straight columnar trunk 3 to 4 ft. or more in diameter. When growing apart from other trees it develops a full ovoid or rounded top very umbrageous on account of its many branches and large leaves. It inhabits preferably rich moist but well drained slopes and bottom-lands, and is a handsome and favorite tree at all seasons of the year. It is especially so in midsummer when it dangles amid its ample foliage numerous clusters of yellow fragrant flowers, which perfume the atmosphere for some distance about the tree and offer an abundance of nectar from which the honey bees make their choicest honey. In autumn we see in the Basswood a unique plan of nature to aid in the scattering of its seeds. Each cluster of a half dozen or so seeds is furnished with a special seed-leaf, which serves as a parachute and so retards their fall that the wind has an opportunity to carry them some distance away before striking the ground.

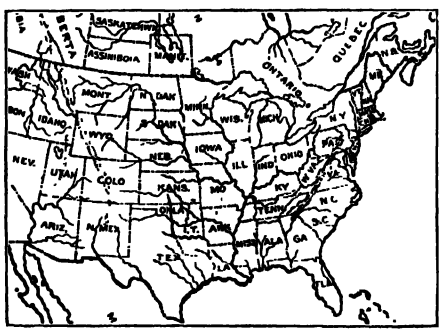
The wood is light, a cu. ft. weighing 28.20 lbs., soft and tough and largely used for furniture, carriage-building, wooden ware, etc.[1] The fibrous inner bark furnishes valuable bast for mats, cordage, etc.

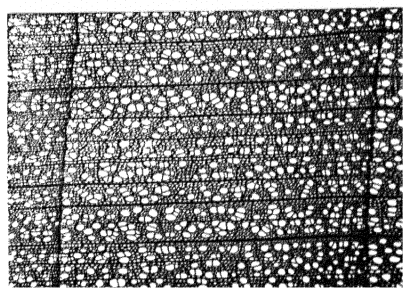
Leaves obliquely oval, 5-10 in. long, cordate at base, abruptly acuminate, sharply glandular-serrate, thick, glabrous, dull dark green above, paler and glabrous or hairy in the axils of the veins beneath. *Flowers* with pedunculate bract 3-5 in. long, cymes drooping; sepals pubescent; petals slightly longer than the sepals and the scales. *Fruit* globose-oblong, ½-½ in. in diameter, rufous-tomentose.[2]

1. A. W., I, 3.

2. For genus see pp. 448–449.







LOBLOLLY BAY.

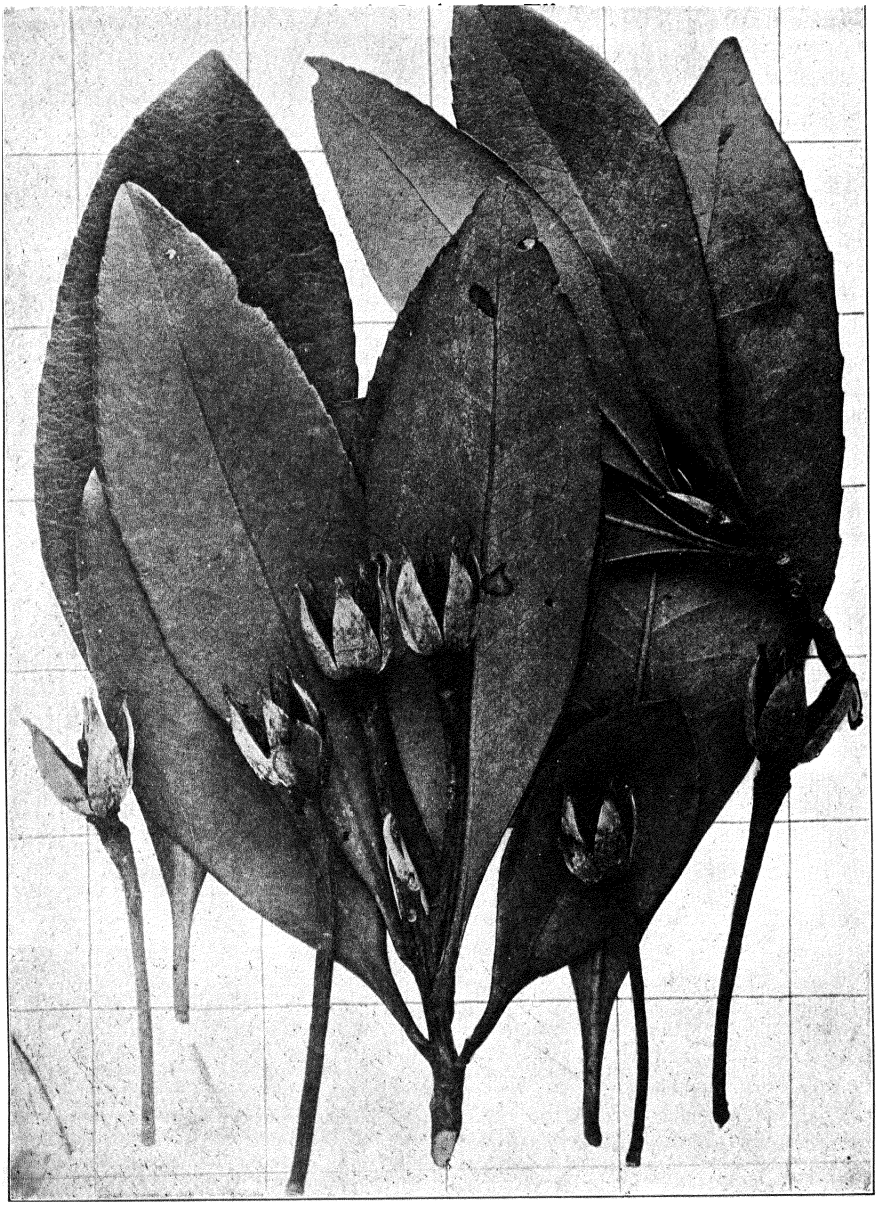


Fig. 413. Branchlet with mature leaves and empty capsules after the discharge of the seeds.
414. Tree with leaves at base. Near Rocky Point, N. C.
415. Wood structure magnified 15 diameters.

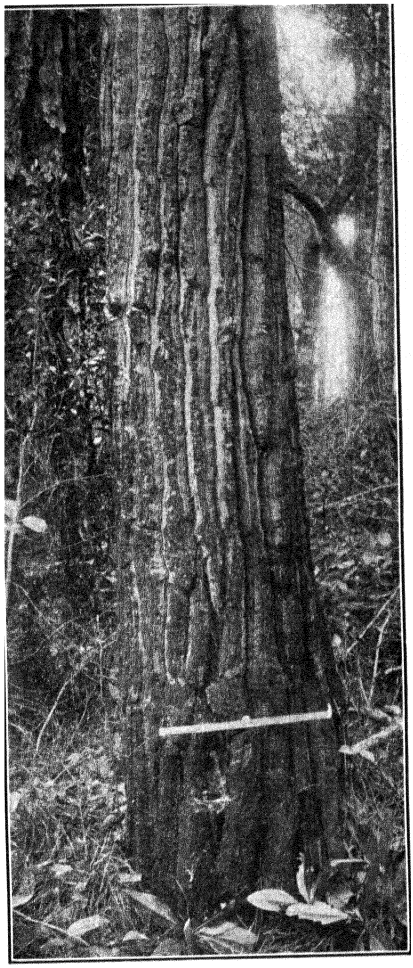
The Loblolly Bay sometimes attains the height of 70 or 75 ft. with rather slender trunk rarely over 18 or 20 in. in diameter, and usually considerably smaller. I have seen it in fruiting condition both as a shrub no more than shoulder high and as a tree of its largest dimensions in the same locality. As an isolated tree its habit is to form a rather narrow compact head, and it is particularly a handsome object on account of its bright evergreen leaves and conspicuous flowers. A striking feature is its grayish or reddish brown bark of trunk fissured into long broad rounded ridges, quite different from the barks of other trees with which it is associated.

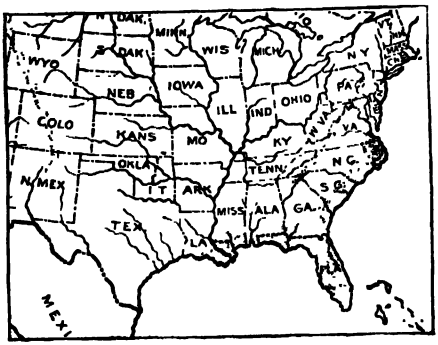
It inhabits low rich bottom-lands and the borders of swamps in company with the Red Maple, Sweet Bay, Swamp Bay, Evergreen Magnolia, Titi, Devil-wood, Gums, Loblolly Pine, etc.

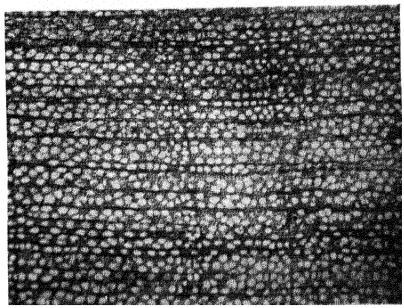
The wood is light, a cu. ft. when absolutely dry weighing 29.46 lbs., soft, not strong, and easily worked.[1] The bark contains tannin and is sometimes used for tanning purposes.

Leaves oblanceolate to oblong, nearly sessile, cuneate at base, bluntly acute at apex, appressed serrate, lustrous dark green above, 3-6 in. long. *Flowers* opening for several weeks commencing in July, 2-3 in. in diameter, with red peduncles 2-3 in. long, thickest above; sepals ciliate, pubescent outside; petals white, about 1 ½ in. long, pubescent outside; ovary pubescent; style short. *Fruit:* pointed ovoid capsules, persisting after liberating their seeds.[2]

1. A. W., V, 102.
2. For genus see p. 449.







HERCULES CLUB. ANGELICA TREE.

Aralia spinosa L.



Fig. 416. Branchlet with mature leaves and fruit greatly reduced and branchlet in winter about natural size.

417. Small trunk with foliage at base. Staten Island, N. Y.

418. Wood structure magnified 15 diameters.

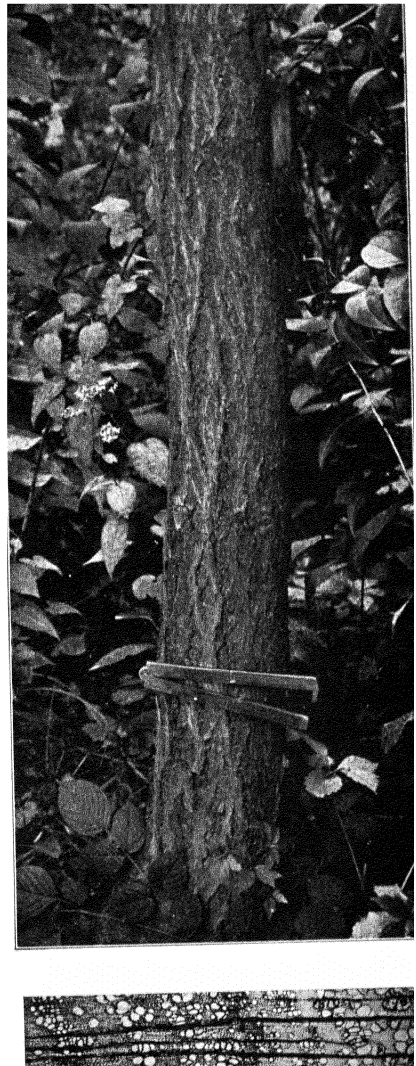
The Hercules Club is a small tree, rarely if ever attaining a larger size than 30 or 35 ft. in height with trunk 6 to 9 inches in diameter and it is often much smaller. It is commonly a vigorous shrub sending up branchless stems from a single base or from stolomferous roots. When it attains the stature of a tree it puts out a few spreading branches and forms a rather flat-topped head. Its beautiful great leaves are the largest of all leaves in the regions in which it grows, though their many small leaflets are commonly mistaken to be leaves and the leaf-stems branchlets. In keeping with the great size of its leaves are the enormous bunches of innumerable small flowers succeeded by small blue berries. The leaf-stems, the great twigs, branches and even the smaller trunks are beset with many sharp stout curved prickers, warning away intruders who might but for these pluck its royal leaves and flower clusters or break its brittle branches. It is justly popular for ornamental planting and no shrubbery is considered well equipped without it.

Its wood is light, very soft and brittle and a large hollow pith-column occupies the centre of the trunk.[1]

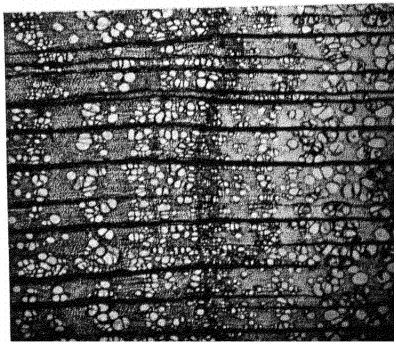
Leaves at the ends of the branches, bipinnate, 2-4 ft. long with long stout petioles armed with prickles; leaflets broad-ovate, acute or acuminate, serrate, dark green above, paler and often with prickles on midribs beneath. *Flowers* (July) about ¼ in. across, in many small umbels, arranged in a compound terminal panicle sometimes 3 or 4 ft. long; style distinct. *Fruit* ripe in August, 3-5-angled, subglobose, ⅛ in. long, black with purple juice.[2]

1. A. W., I, 8.

2. For genus see pp. 449–450.







FLOWERING DOGWOOD.

Cornus florida L.



Fig. 419. Branchlet bearing mature leaves, fruit and young flower-buds, 1; isolated nutlets, 2; branchlet in winter showing flower-buds, 3; do. showing leaf-buds, 4.

420. Trunk with leaves at base. Staten Island, N. Y.

421. Wood structure magnified 15 diameters.

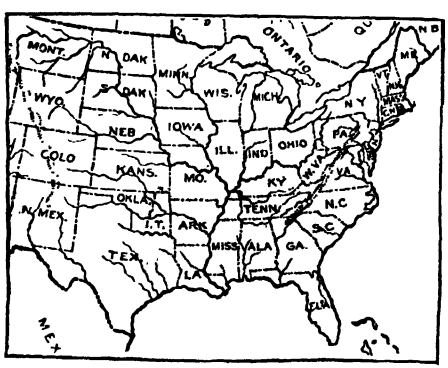
This favorite tree occasionally attains the height of 35 or 40 feet with trunk 12 or 18 inches in diameter, and when away from the influence of other trees develops a low spreading intricately branched top. It inhabits rich well drained soil along the banks of streams and often thrives in the shade of other trees. These localities it enlivens in early spring with its showy flower clusters strangely suggestive of so many separate flowers. It is especially effective when seen against a mass of the flowers of the Red-bud, with which it is often associated and which flowers at the same season. The Dogwood is again in evidence in autumn on account of the splendor of its red and purple garb and long-stemmed close clusters of shining red berries.

Its wood is heavy, a cubic foot weighing 50.41 lbs., hard, strong, very close-grained and admirably adapted to use in turnery, the handles of tools, etc. It is the wood used almost exclusively by metal-spinners for forms who purchase it from supply houses by the pound. Its bitter bark, particularly of the roots, is used in medicine on account of its astringent and aromatic properties.[1]

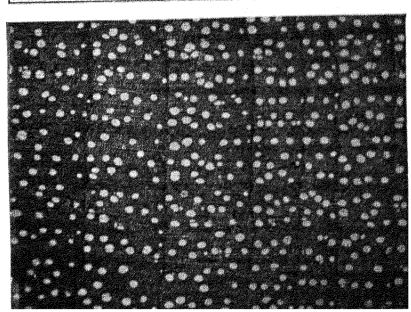
Leaves mostly in clusters at the ends of the branchlets, ovate to oval, cuneate at base, acute or abruptly acuminate at apex, entire or obscurely crenate-toothed, thickish, dark green and with scattered hairs above, pale and puberulous beneath with prominent arcuate veins; petioles short. *Flowers* greenish yellow in dense heads surrounded by four large white or pinkish (rarely red) petal-like bracts from buds formed the previous season, conspicuous during the winter, and enveloped by the bracts. *Fruit* bright scarlet berries in close heads, with mealy flesh and thick-walled, 1-few-grooved stone.[2]

1. A. W., IV, 88.

2. For genus see p. 450.







BLUE-FRUITED DOGWOOD. ALTERNATE-LEAF DOGWOOD.

Cornus alternifolia L.

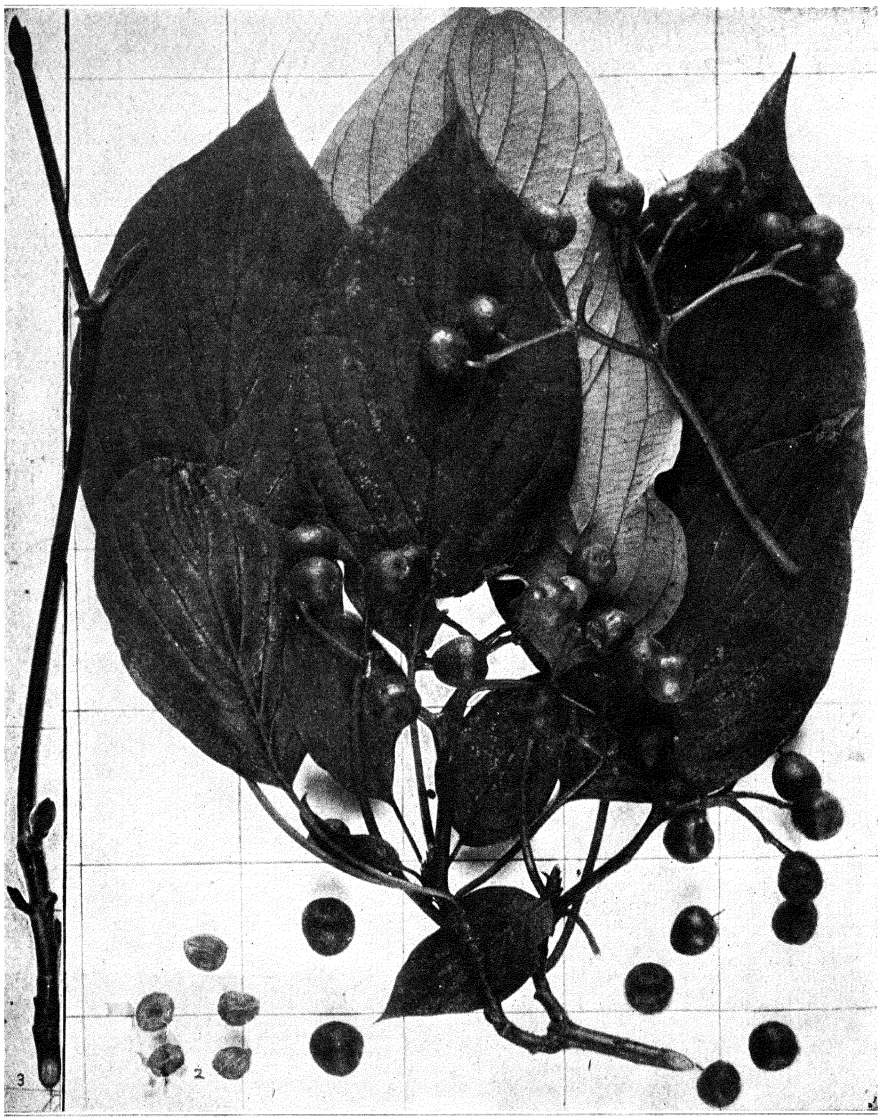


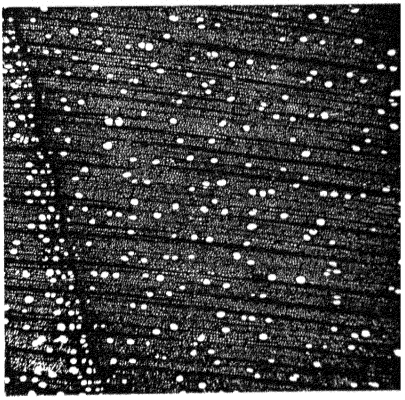
Fig. 422. Branchlet with mature leaves and fruit, 1; isolated nutlets, 2; branchlet in winter, 3.
423. Trunk of large tree, about 1 ft. in diameter, in Lewis Co., N. Y.
424. Wood structure magnified 15 diameters.

This is a small northern tree, occasionally under most favorable conditions, attaining the height of 25 or 30 ft. with trunk 6 to 8 or exceptionally 12 inches in diameter, and is commonly a tall shrub. It inhabits rich well-drained soil along the borders of forests, partially cleared land and fence rows, where its peculiar habit of ramification easily distinguishes it from its associates. It puts out horizontal and upward inclined strightish branches with many upturned branchlets on the upper side and but few if any beneath. This feature is best seen when the tree is leafless and it is then quite as interesting an object as in summer, when it is conspicuous on account of its flat sprays of foliage interspersed with clusters of white flowers, or later red-stemmed clusters of blue berries.

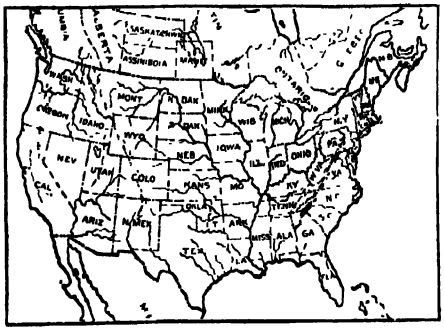
The wood is heavy, a cubic foot weighing 41.73 lbs., hard and very close-grained, adapted to use in turnery, etc.[1]



Leaves mostly alternate and clustered at the ends of the branchlets, ovate to oval, 3-5 in. long, wedge-shaped or somewhat rounded at base, long-acuminate, obscurely crenulate, pale tomentose at first, but at maturity thin, dark green and glabrous or nearly so above, pale and appressed pubescent beneath, with prominent arcuate veins; petioles slender, pubescent. *Flowers* (May-June) creamy white, about ¼ in. long in loose compound terminal cymes; petals narrow, rounded at apex and reflexed. *Fruit* a subglobose blue drupe, ¼ in. in diameter, depressed at apex, tipped with the remnant of the style, in loose red-stemmed clusters; flesh thin and bitter and short ovoid somewhat pointed 2-celled thick-walled nutlet with many longitudinal grooves.



1. A. W., IV, 87.



ROUGH-LEAF DOGWOOD.

Cornus asperifolia Michx.

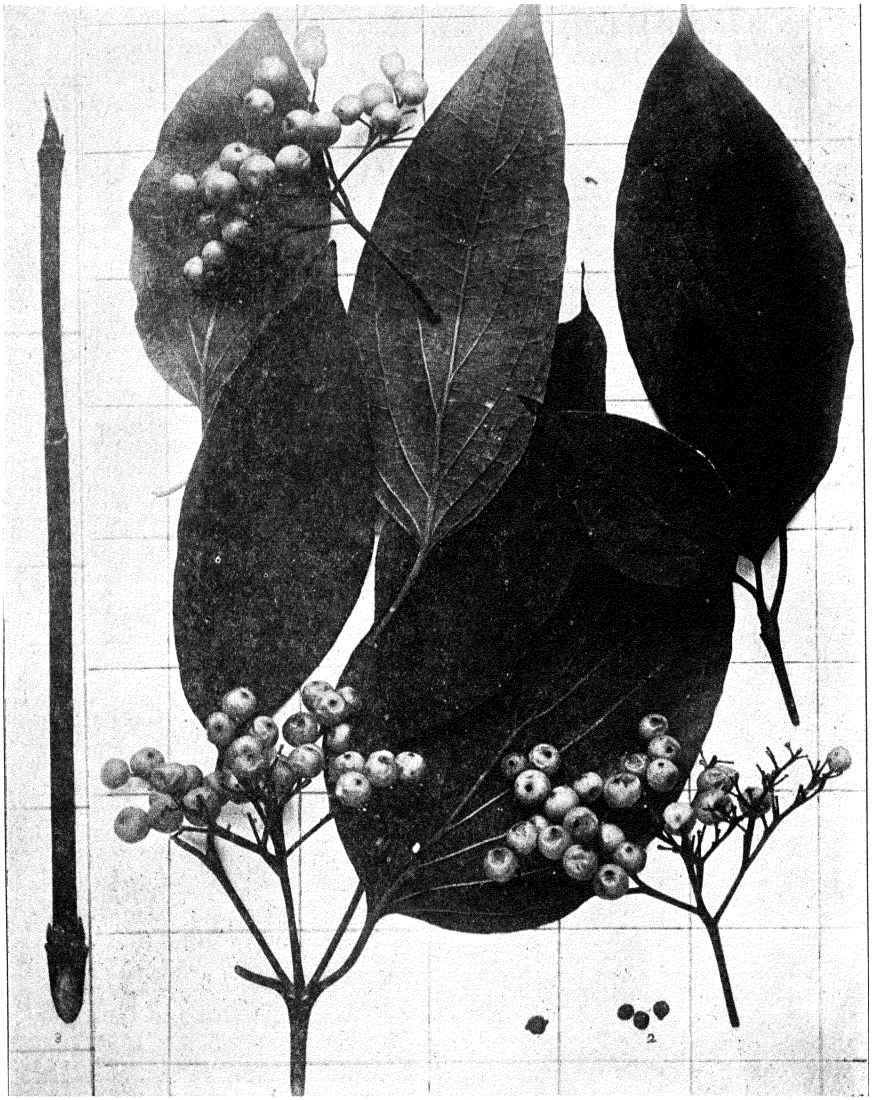
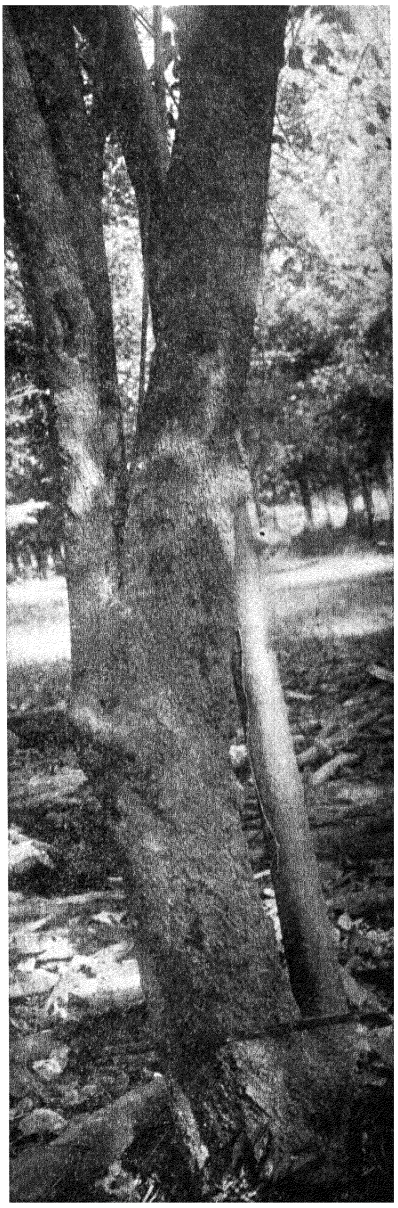


Fig. 425. Mature leaves and fruit, 1; isolated nutlets, 2; branchlet in winter, 3.
426. Large and small trunks with leaves and fruit at base. Red River valley, Ark.

The Rough-leaved Dogwood is a small tree only in a limited portion of its great range, which extends from the Atlantic coast nearly to the limits of tree growth on the western plains and from Canada to the Gulf of Mexico. Usually a shrub it becomes a tree on the rich bottom-lands of southern Arkansas, eastern Texas and northern Louisiana. Here, in company with the Pecan and Nutmeg Hickory, Prickly Ash, Rusty Nannyberry, Mississippi Hackberry, Soapberry, Drummon and Red Maples, the Water Oak, etc., it attains the height of 40 or 50 ft. with irregular open top and trunk sometimes 8 or 10 in. in diameter. It is an especially beautiful object in early summer when bearing its many clusters of creamy white flowers and in autumn with its red-stemmed bunches of white berries.

The wood is heavy, hard, strong and of fine grain, adapted to use in turnery.

Leaves mostly ovate to elliptic and oval, acute, obtuse or almost rounded at base, long-acuminate, with undulate nearly entire margins, tomentose at first, but at maturity dark green and rough with short stiff hairs above, paler and pubescent or glaucous beneath; petioles slender, rough pubescent, as is all new growth. *Flowers* (late spring) creamy white, in rather loose-flowered terminal compound long-peduncled cymes; petals narrow, oblong, acute finally reflexed. *Fruit* subglobose, about ¼ in. in diameter, white, tipped with the remnants of the style and in loose spreading clusters; flesh thin and bitter and stone 1-2-seeded slightly several-grooved lengthwise.





PEPPERIDGE. SOUR GUM. TUPELO.

Nyssa sylvatica Marsh.[1]

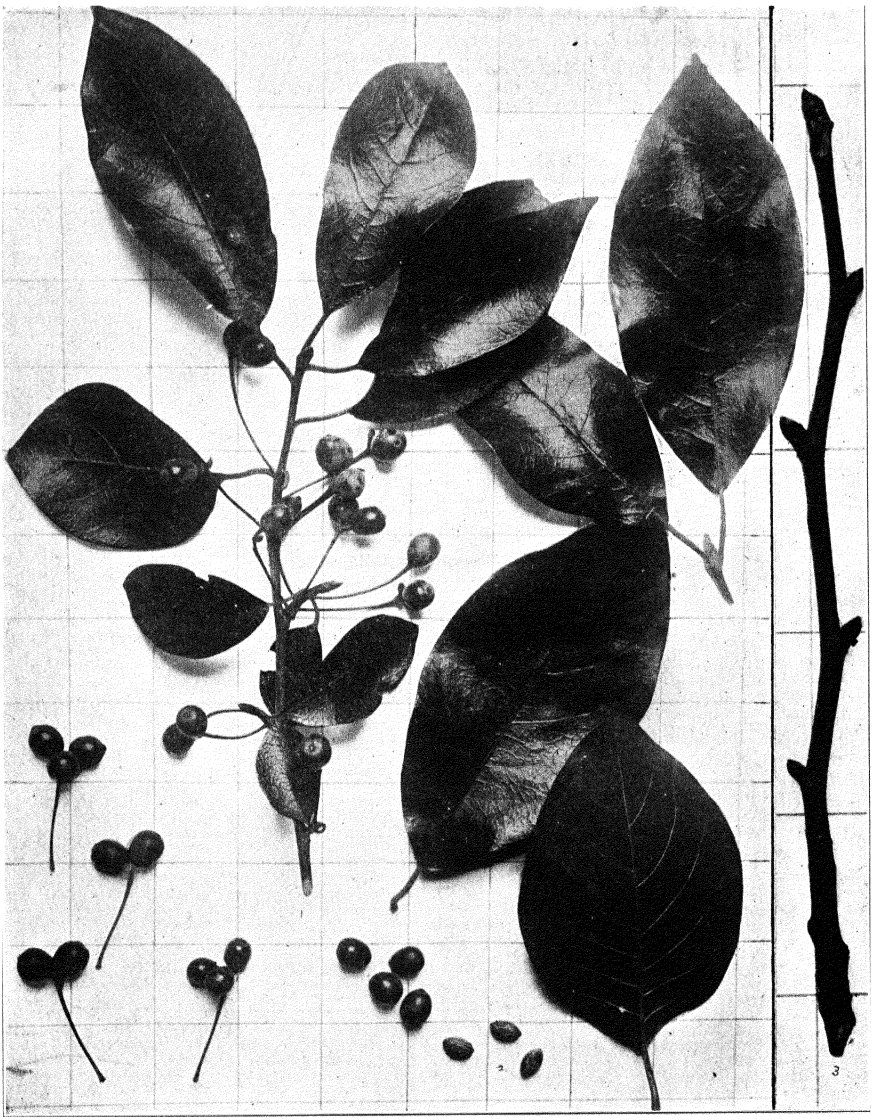


Fig. 427. Branchlet with mature leaves and fruit, 1 (There are often several more drupes in a cluster than here shown); isolated pits, 2; branchlet in winter, 3.

428. Trunk of a forest tree. Biltmore, N. C.

429. Wood structure magnified 15 diameters.

The Sour Gum in the forest occasionally attain the height of 80 or 100 ft., with trunk 3 to 5 ft. in diameter. When isolated from the influence of other trees its habit of growth is picturesque, as it sends out many spreading pendulous small tough branches, forming a rounded or cylindrical head. It inhabits generally swamps and wet lowlands, in company with the Red Maple, Swamp White Oak, Black Ash, Water Ash and other water-loving trees, but on the slopes of the Alleghany Mountains is also found on well drained uplands. Its clear bright green foliage is an attractive feature in summer, and its autumnal tints, of bright red and purple, are scarcely surpassed by the tints of any of the trees about it.

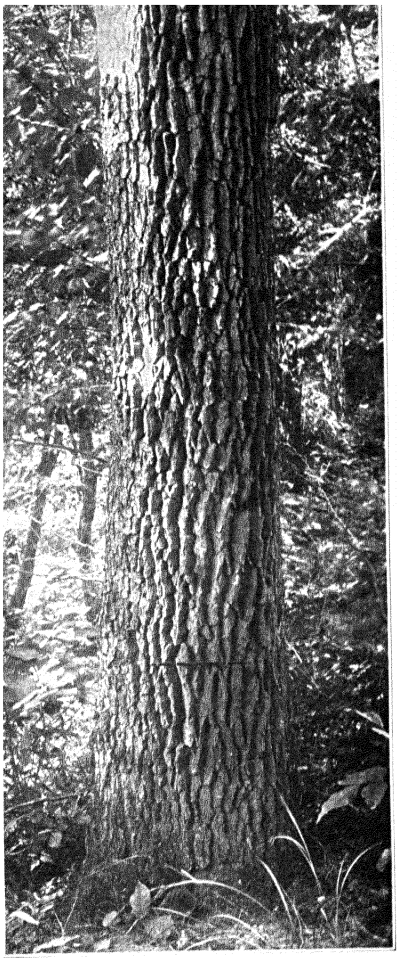
The wood of the Sour Gum is rather light and soft, of fine grain, tough and difficult to split and work, owing to its contorted fiber. These qualities, however, make it particularly valuable for certain special uses; as for wheel-hubs, rollers, wooden-shoes and many other articles of wooden-ware, and it is extensively used, when cut into thin lumber, for fruit-boxes and crates.[2]

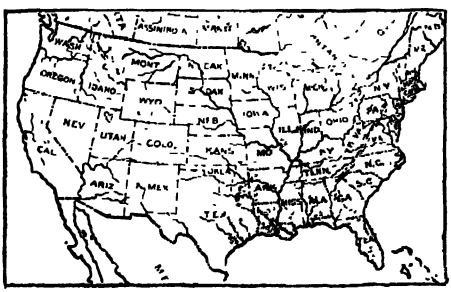
Leaves obovate-oblong to oval, 2-5 in. long, cuneate or sometimes rounded at base, acute or acuminate at apex, entire, pubescent at first but finally thick, firm and lustrous dark green above and more or less pubescent beneath. *Flowers* appearing when the leaves are nearly full grown on slender pubescent peduncles from ½ to nearly 2 in. long, the staminate in many-flowered and the pistillate in few-flowered heads. *Fruit* ripening in October, 2-3 or more in each cluster, oblong, blue-black with thin juicy sour flesh and ovoid or oblong slightly flattened stone having 10-12 low longitudinal ribs.[3]

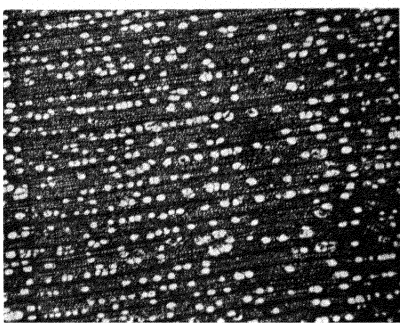
1. Syn. *Nyssa multiflora* Wang.

2. A. W., I, 9.

3. For genus see p. 450.







WATER GUM. SOUTHERN GUM.

Nyssa biflora Walt.[1]



Fig. 430. Mature leaves and fruit, 1; isolated pits, 2; branchlet in winter, 3.
431. Trunk of a forest tree in Dismal Swamp, Virginia.

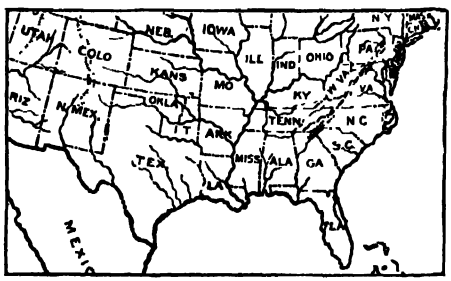
The Water Gum attains the height of from 50 to 75 ft., with trunk usually tapering from an enlarged base. It develops a rather narrow top of many small spreading branches, and, as its name implies, it is confined in its distribution to the immediate vicinity of the water. It occupies deep swamps and the margins of ponds and streams in company with the Cotton Gum, Cypress, Water, Laurel and Over-cup Oaks, Titi, Planer-tree, Forestiera, etc. In autumn it is a conspicuous object on account of the purple and red tints assumed by its foliage.

Its wood is fine-grained, light, tough and difficult to split and work on account of its contorted and twisted fiber. It is applicable to the same uses as the wood of the Sour Gum.

A forcible anecdote was once told the author to illustrate the crookedness of the grain of this wood. It was to the effect that "An Irishman was up a gum-tree one day when it was struck by lightning, and he had time to climb down before the lightning reached the ground, because it had to follow the grain." The truth of the story was not vouched for.

Leaves oblanceolate to obovate and oblong, cuneate at base, obtuse or acute (occasionally acuminate) at apex, entire, tomentose at first but finally lustrous dark green above, paler beneath; petioles stout. *Flowers* (when leaves are nearly grown) on slender hairy peduncles, 1-1½ in. long; the pistillate flowers usually in pairs. *Fruit* in pairs or occasionally solitary, ½-¾ in. long, dark blue with juicy acid flesh and distinctly flattened and ribbed stone.

1. Syn. *Nyssa aquatica* L. (in part).





COTTON GUM. TUPELO GUM. LARGE TUPELO.

Nyssa Aquatica L.[1]

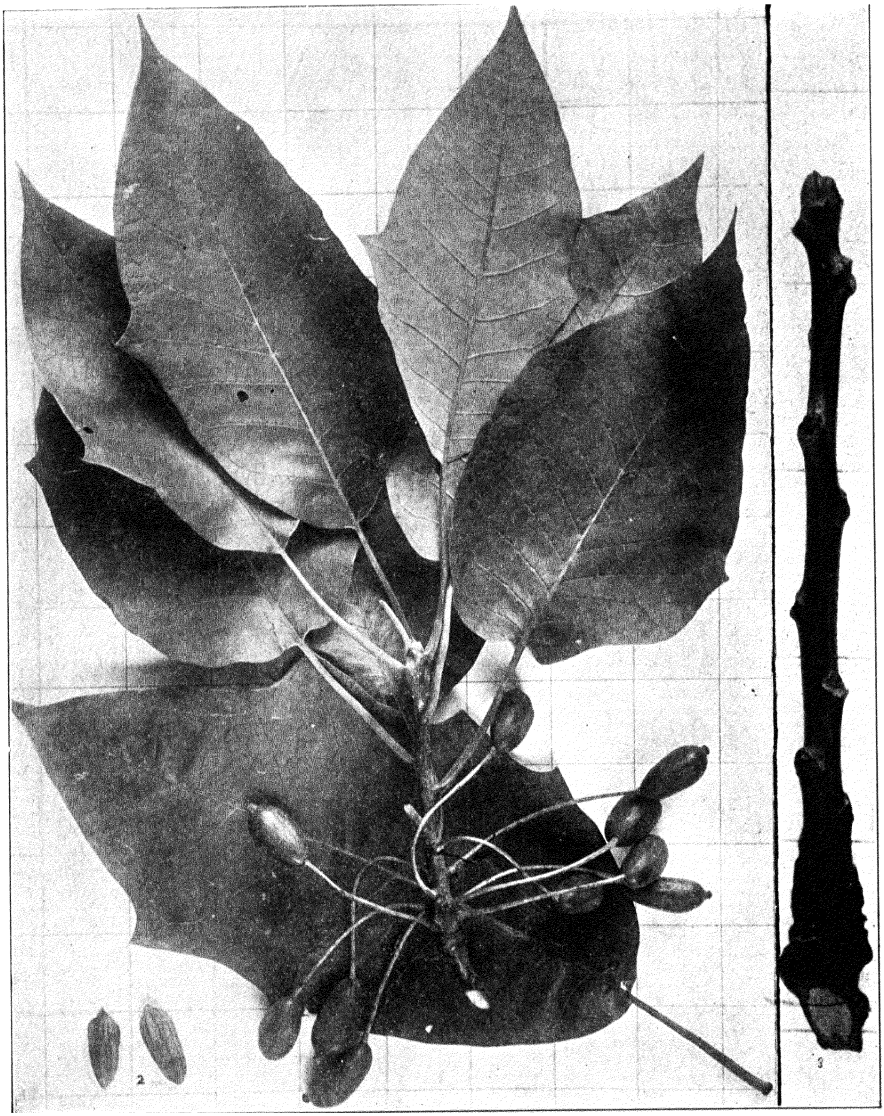


Fig. 432. Mature leaves and fruit, 1; isolated pits, 2; branchlet in winter, 3.
433. Trunk of a tree in Dismal Swamp, Va.

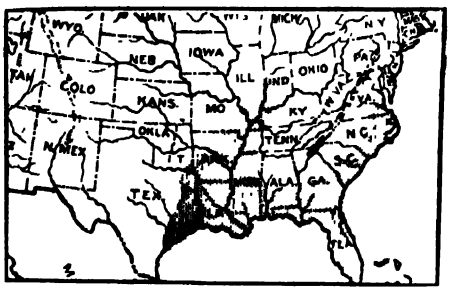
This interesting semi-aquatic tree is the statliest and most useful of the American Tupelos, sometimes attaining the height of 100 ft., with straight columnar trunk 3 or 4 ft. in diameter above its wide base. This may be 6 or 8 ft. across at the surface of the ground, and is usually hollow. The wide base is nature's provision to give the tree stability in the loose miry soil in which it grows. It inhabits deep swamps and the margins of streams and ponds, where its base is covered with water during a considerable portion of the year. Here its associates are mainly the Bald Cypress, Water Gum, Planer-tree, Water and Pumpkin Ashes, River Birch, Water Hickory, etc. Among these it is a tree of striking appearance, with its large lustrous green leaves and clusters of long-stemmed fruit, which suggest so many small dates in appearance, but the extreme opposite of them in flavor.

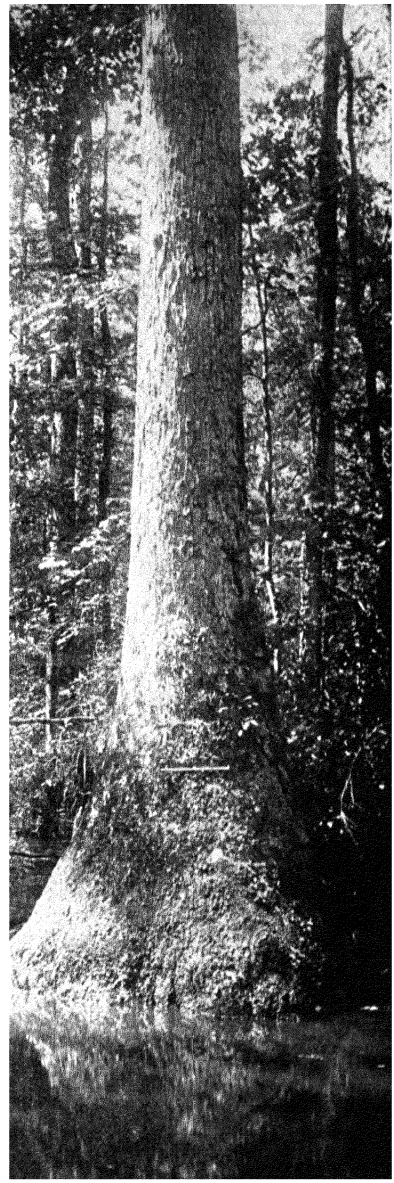
Its wood is rather light, a cubic foot weighing 32.37 lbs., soft, very close-grained and more easily worked than that of the other Tupelos. It is used in the manufacture of wooden-ware, boxes, fruit-crates, etc.[2]

Leaves ovate-oblong to oval, mostly rounded or subcordate at base, long-acuminate, irregularly angular-dentate or entire, tomentose at first but finally glabrous dark green above, pale and downy pubescent beneath, 5-10 in. long; petioles 1½-2½ in. long. *Flowers*, appear in March and April, with long slender peduncles from the axils of bud-scales below the new leaves; the staminate in dense capitate clusters, the pistillate solitary; style revolute into a coil. *Fruit* on slender drooping stems, 2-4 in. long, obovoid, tipped with the remnants of the style, about 1 in. long, dark purple with pale dots, tough skin and narrow obovoid stone, compressed and with about 10 sharp wing-like longitudinal ridges.

1. *Nyssa uniflora* Wang.

2. A. W., XII, 282.





ROSE BAY. GREAT LAUREL.

Rhododendron maximum L.

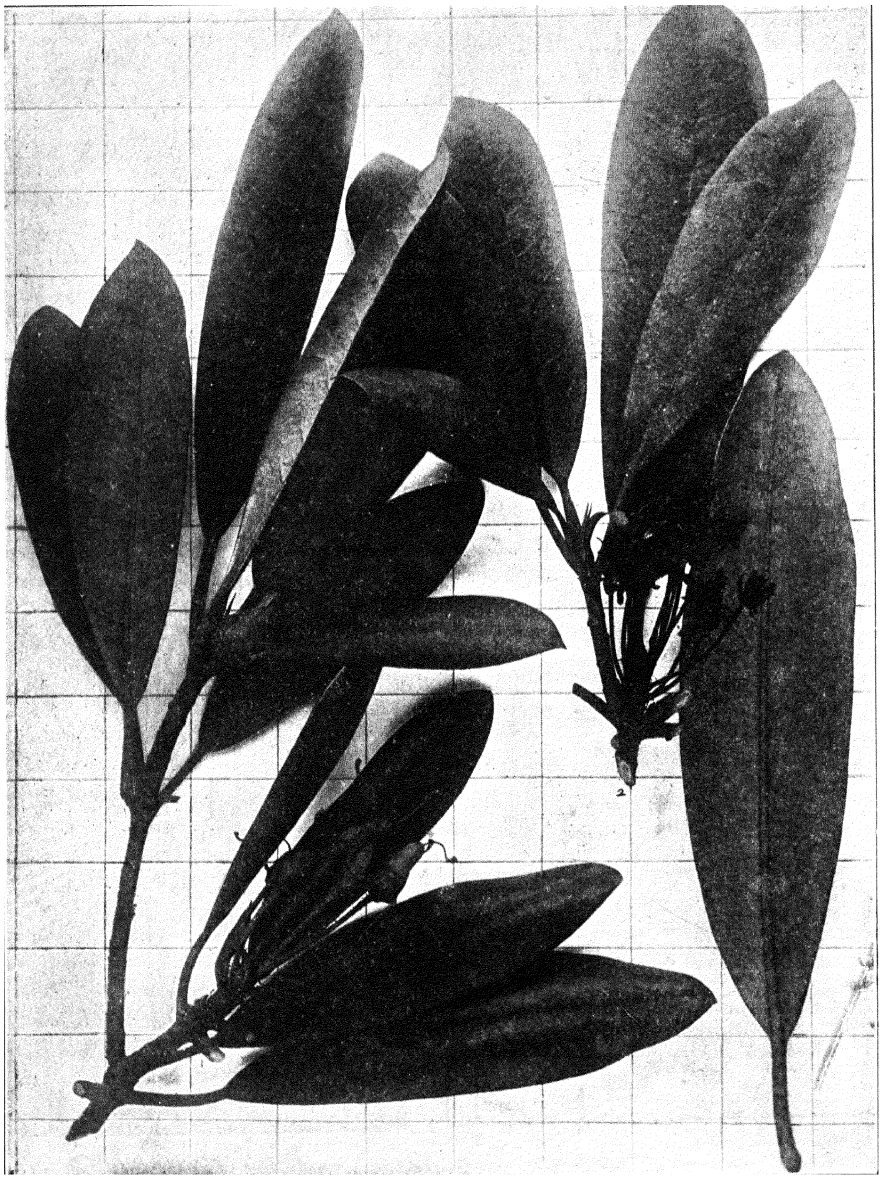


Fig. 434. Branch with mature leaves and fruit, 1; do, with open capsules, 2.
435. Forest trunk. Highlands, N. C.
436. Wood structure magnified 15 diameters.

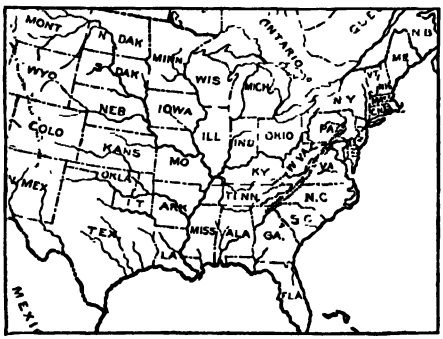
The Rose Bay is familiar as a shrub to most people, who never think of it as a tree, but in the Alleghany Mountains, of Tennessee and North and South Carolina, it becomes a bushy round-topped tree, 30 to 40 ft in height, with crooked and more or less inclined trunk 10 or 12 in. in diameter. We see in these individuals the appropriateness of one of its names—*Great Rhododendron*. It is rare and local, and in shrubby form, in the northern part of its range, only occupying certain cold swamps, but to the southward it becomes abundant, occupying mountain-slopes and intervales alike, and is commonly scattered as an undergrowth through forests among other trees, or in places forming almost impenetrable thickets of considerable extent. The beauty of the Rhododendron in flower is scarcely surpassed by any other tree or shrub of the American forests, and one's first visit to its haunts in the flowering season is sure to be long remembered.

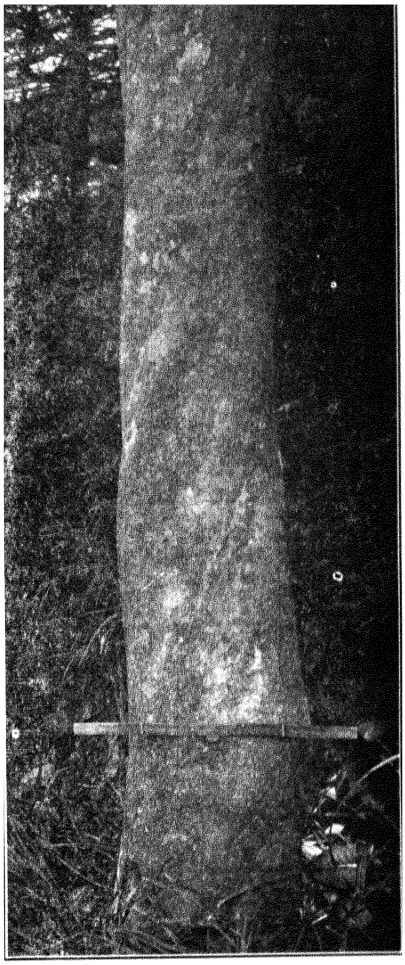
The wood is fine-grained and hard, but rather brittle, and useful in turnery for tool-handles, etc. A cubic foot when absolutely dry weighs 39.28 lbs.[1]

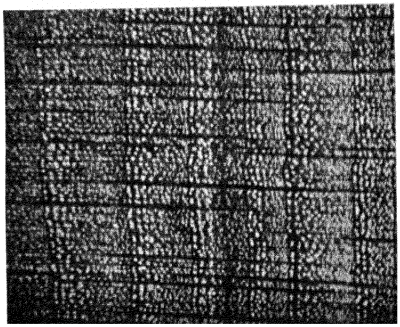
Leaves oblong-lanceolate, oblanceolate or oblong, 4-12 in. long, acute at both ends, revolute in the bud, ferruginous tomentose at first but at maturity lustrous dark green above, paler beneath, thick and stiff. *Flowers* (June-July) in 16-24-flowered umbels 4-5 in. across, with slender pink viscid-pubescent pedicels springing from the axils of the scales of the inflorescence buds; calyx-lobes oblong, rounded; corolla campanulate, gibbous posteriorly, about 1 in long, varying from rose-color or purplish to white, cleft to the middle lobes rounded, the upper one yellow spotted inside. *Fruit* capsule oblong-ovoid, ½ in long, glandular-hispid, opening and liberating its seeds in autumn and persisting during the following winter.[2]

1 A. W., XII, 284.

2. For genus see p. 457.







MOUNTAIN LAUREL. CALICO-BUSH.

Kalmia latifolia L.



Fig. 437. Branchlet with mature leaves and fruit, 1; branchlet with leaves and flower-buds for the next season, 2.

438. A burly forest trunk. Highlands, N. C.

439. Wood structure magnified 15 diameters.



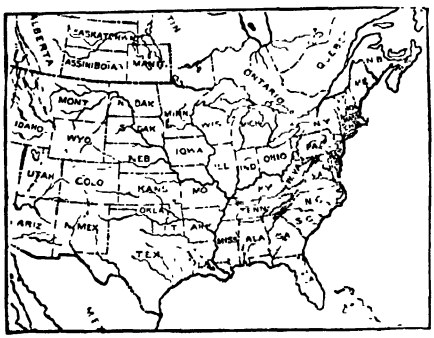
The Mountain Laurel, like the Rhododendron with which it is commonly associated, is generally a shrub rather than a tree, excepting in the heart of the Alleghany Mountains. In that interesting region, which alone affords conditions sufficiently favorable for the aborescent development of several of our American trees, the Mountain Laurel is found occasionally 30 or 40 ft. in height, with compact rounded top of rigid branches. Its trunk is usually crooked or inclined, and is sometimes 18 or 20 in in diameter. To the northward it prefers low rich bottom-lands, but in the southern part of its range, where it is more abundant, it extensively occupies rocky slopes, forming in places dense thickets, and is widely distributed as an undergrowth in deciduous forests. In flowering time it is the Rhododendron's only peer in beauty of floral display, and it has become deservedly popular for ornamental planting.

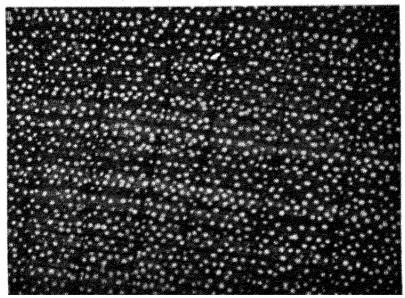
The wood is fine-grained, rather hard and brittle, and useful in turnery. A cubic foot when absolutely dry weighs 44.62 lbs.[1] Honey gathered from flowers of this species is said to be poisonous, at least to some extent, to persons eating it, though apparently not to the bees.

Leaves persistent, alternate, opposite and in threes, conduplicate, elliptic-lanceolate to oblong, acute at both ends, pubescent at first but at maturity lustrous dark green above, paler beneath, thick, rigid. *Flowers* (May-June), about ¾ in. in diameter, numerous in compound and crowded terminal corymbs, 3-6 in. across; pedicels slender, erect, glandular, pubescent; corolla white or pinkish and delicately penciled above. *Fruit* a depressed-globose glandular capsule, three-sixteenths in. in diameter with persistent calyx and style.[2]

1. A. W., XI, 259.

2. For genus see pp. 451–452.





SORREL-TREE. SOUR-WOOD.

Oxydendrum arboreum (L.) DC.



Fig. 440. Branchlet with mature leaves and fruit and (to the left) a cluster of empty capsules of the preceding season, 1; leaf from vigorous shoot, 2; branchlet in winter, 3.
441. Large forest trunk at Biltmore, N. C.
442. Wood structure magnified 15 diameters.

The Sorrel-tree is a handsome and interesting tree, occasionally in the forest attaining the height of 50 to 70 ft. or more, with long clear trunk 18 or 20 in. in diameter. When isolated it develops a rather irregular narrow-oblong top, with spreading and drooping branches.

It occupies mainly well drained slopes and ridges, in company with various Oaks and Hickories, the Sugar Maple, Sweet and Sour Gums, the Silver-bell Tree, Yellow Buckeye, etc., and attains its largest size on the lower slopes of the Alleghany Mountains. Farther east, as I have found it along the borders of the Dismal Swamp in Virginia, it is a small slender-stemmed tree, often with inclined trunk, and there thriving in moist soil. It is a distinctly ornamental tree in summer, with handsome foliage and large terminal bunches of tiny cup-shaped white flowers, and in autumn with its bright scarlet foliage.

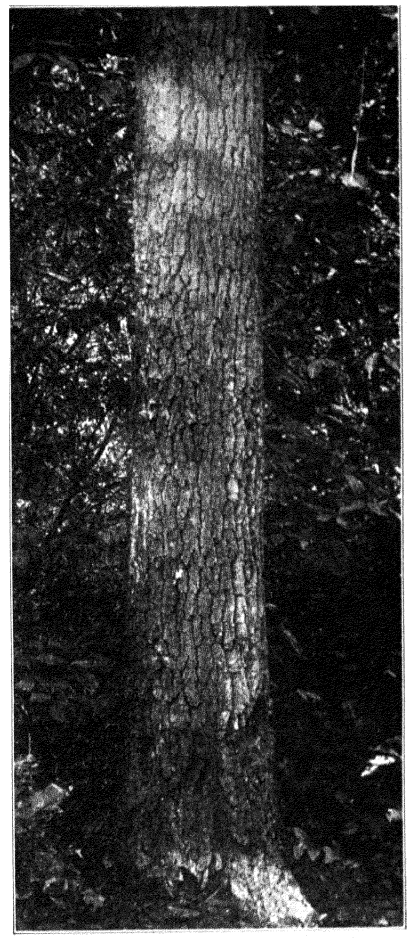
It takes its name from a slightly acidulous flavor of its leaves and branchlets, which are tonic, refrigerant and diuretic in properties.

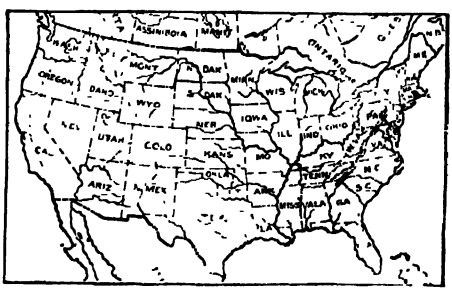
The wood is fine-grained, rather hard and heavy, a cubic foot when absolutely dry weighing 46.18 lbs., and is useful in turnery, for tool-handles, etc.[1]

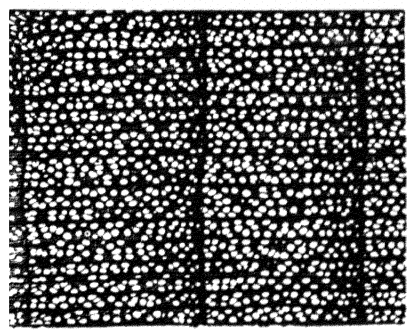
Leaves alternate, deciduous, revolute in the bud, oblong to lanceolate, cuneate at base, acute or acuminate at apex, irregularly serrulate with slender teeth, lustrous dark green above, pale and glaucous beneath. *Flowers* (July-August) numerous, white, about ¼ in. long, in terminal panicled racemes, with pubescent bibracteolate pedicels; calyx deeply 5-lobed, persistent; corolla cylindrical, ovoid, hypogenous, with 5 minute reflexed lobes; stamens 10, the filaments wider than the anthers; disk thin; ovary 5-celled with columnar style and capitate stigma; ovules numerous, amphitropous. *Fruit* a 5-celled ovoid pyramidal capsule, with remnants of persistent style and calyx, loculicidally 5-valved; seeds numerous, the testa pointed at both ends.[2]

2. For genus see p. 452.

1. A. W., XII, 283.







SPARKLEBERRY. FARKLEBERRY. TREE HUCKLEBERRY.

Vaccinium arboreum (Marsh.) Nutt.

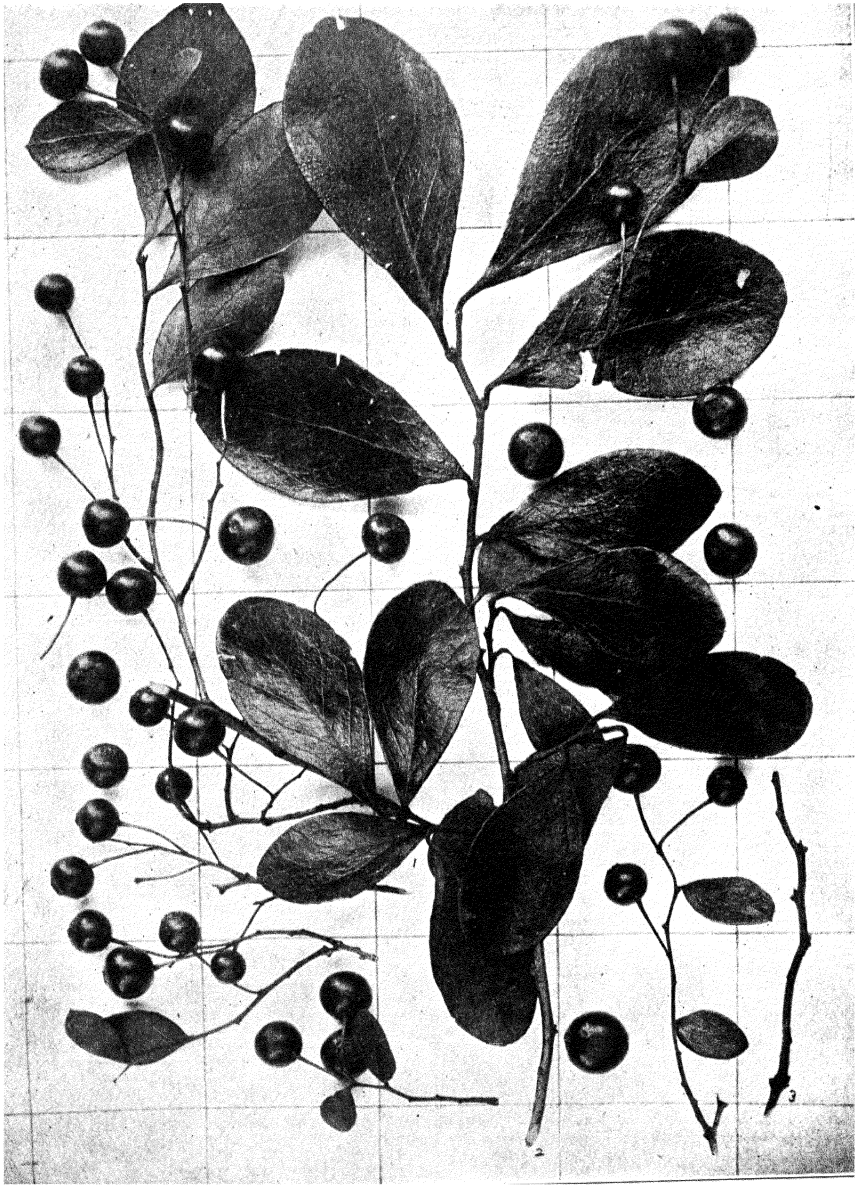


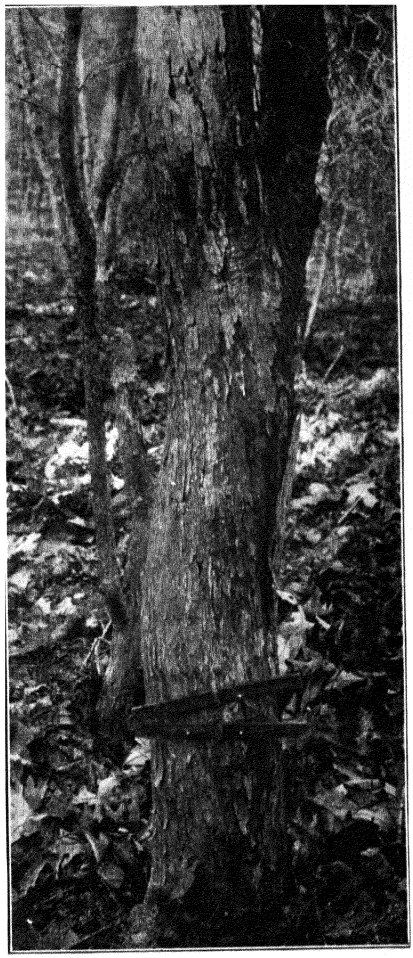
Fig. 443. Branchlets with mature leaves and fruit, 1; a vigorous branchlet with leaves only, 2; leafless in late autumn, 3.

444. A forest trunk with Florida moss to the right above. Coast region, N. C.

445. Wood structure magnified 15 diameters.

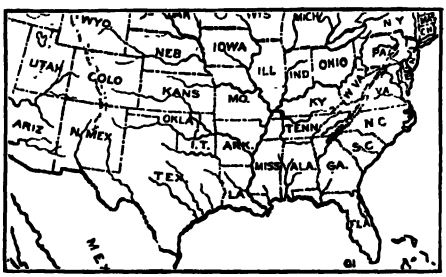
The Sparkleberry is the largest and handsomest of the American Huckleberries. It attains the height of 20 or 30 ft., with irregular open top of few slender contorted branches and short trunk. It inhabits moist bottom-lands and the borders of streams and ponds, and is generally scattered through forests of taller trees, in company with the Wax Myrtle, Sweet-leaf, Holly, Devil-wood, etc., seeming little hampered by the shade. Nor does it seem to suffer from the burden of Florida Moss (*Tillandsia*), which it is fated to carry where that abounds. It extends its branchlets between and beyond the gray locks of the epiphyte, to bear its shining green leaves and delicate white flowers unhampered, and it is then a peculiarly beautiful object, thriving in spite of adversity. Its fruit is sweet and edible, though rather dry, and, being retained on its branches during the winter, it affords food for many northern birds which winter in the southern states.

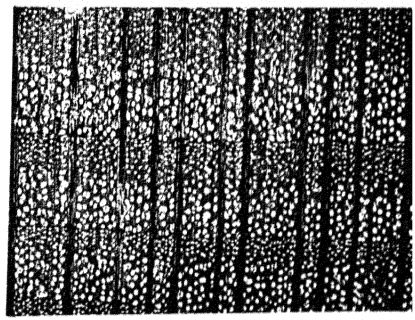
The wood is fine-grained, heavy, hard and useful for tool-handles, etc. A cubic foot, when absolutely dry, weighs 47.43 lbs. The bark is rich in tannin.[2]



Leaves deciduous northward but persistent southward, obovate to oval, ½-2½ in. long, subsessile, cuneate at base, rounded or acute at apex, with entire or obscurely denticulate and revolute margins, at maturity lustrous dark green above, paler and glabrous or puberulous beneath, coriaceous. *Flowers* (March-May) white, in leafy-bracted racemes, with slender pedicels ⅛ in. long; corolla campanulate with 5 acute reflexed lobes; stamens 10, with hairy filaments. *Fruit* ripe in October, subglobose, ¼ in. in diameter, shining black.[3]

1. Syn. *Batodendron arboreum* Nutt.
2. A. W., XI, 258.
3. For genus see p. 452.





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

Bumelia lanuginosa (Michx.) Pers.

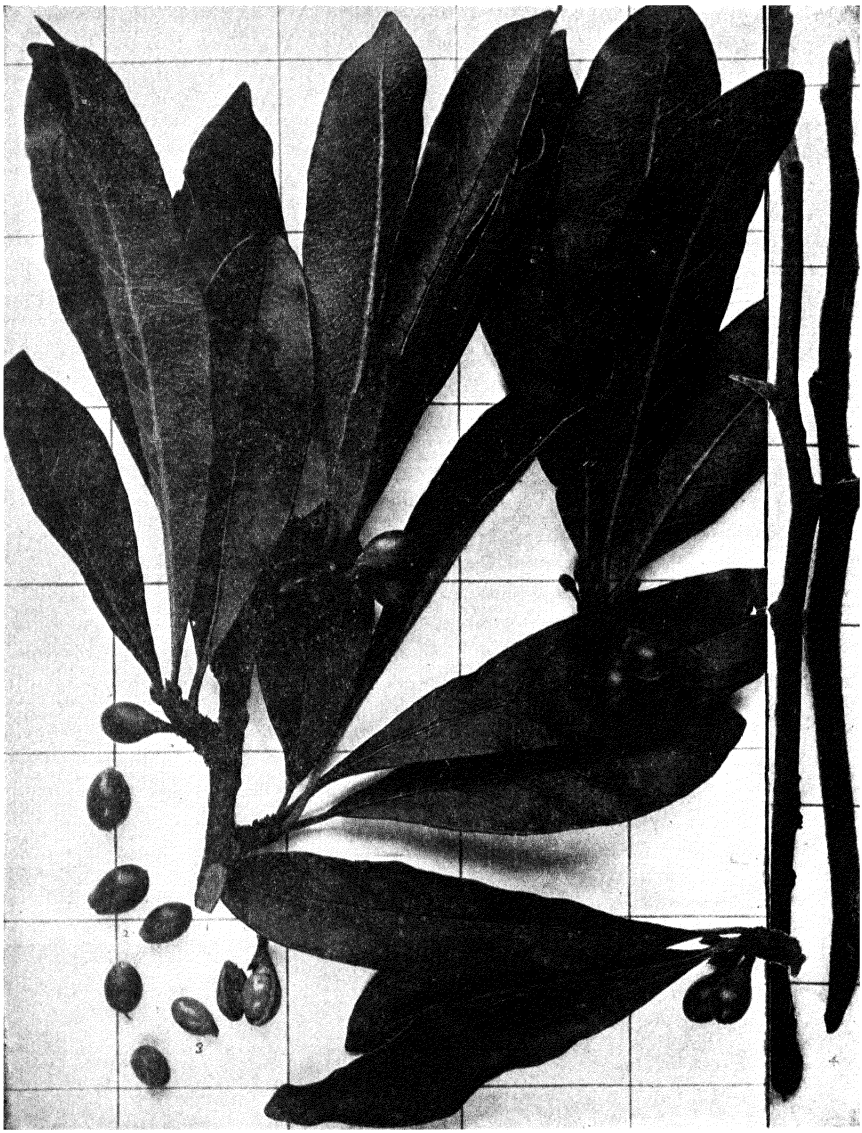


Fig. 446. Branchlets with leaves and nearly mature fruit, 1; detached fruits. 2; pits, 3; branchlets in winter, 4.
447. Trunk of an isolated tree.
448. Wood structure magnified 15 diameters.

The Woolly Bumelia is a small or medium-size tree, occasionally attaining the height of 50 or 60 ft. and 2 or 3 ft. in thickness of trunk. When isolated from other trees it develops a rounded or oblong rather open top, of rigid branches, more or less spinescent with thick sharp spines. The bark of trunk is of a brownish gray color, reticulated with firm prominent ridges.

To the northward in its range it inhabits usually well-drained gravelly or sandy soil, in company with the Post, Black-Jack, Chinquapin and other Oaks, Mocker-nut and Shagbark Hickories, Blue Ash, Red-bud, etc., but in the south it occupies moist low-lands, as well as the drier uplands. A gum exudes from it when wounded which gives it the name Gum-elastic. It is a clear viscid substance, sometimes used domestically.

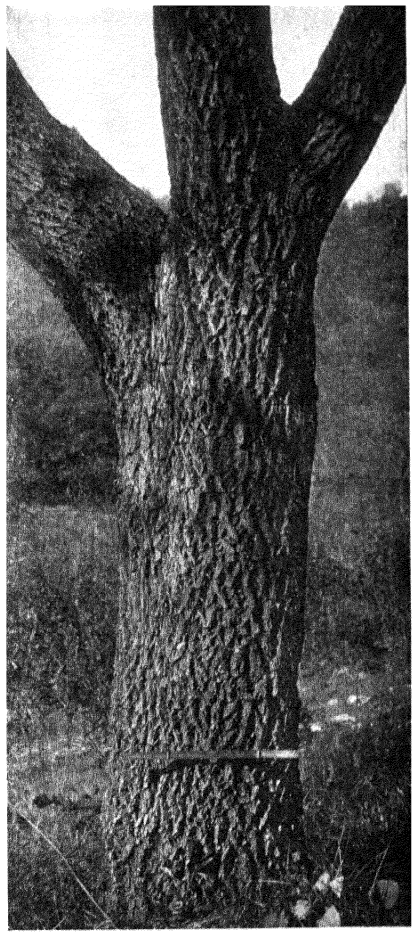
Its wood is rather hard and heavy, a cubic foot weighing when absolutely dry 40.78 lbs., tough, smooth-grained and of marked characteristic structure.[1]

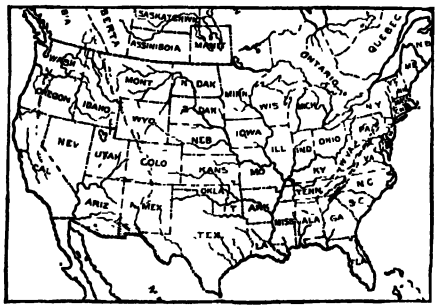
Leaves mostly obovate or oblanceolate, 1-2½ in. long, narrow, cuneate at base, rounded or bluntly pointed at apex, woolly tomentose at first but at maturity dark green and glabrous above and densely tomentose beneath as are the short petioles and all new growth, tardily deciduous. *Flowers* (July-August) in usually several-flowered fascicles with pedicels about ¼ in. long; calyx with obtuse or rounded lobes; staminodia ovate, acute denticulate. *Fruit* drupe, black, ½ in. or less in length; seed oblong, rounded at apex, about ¼ in. long.[2]

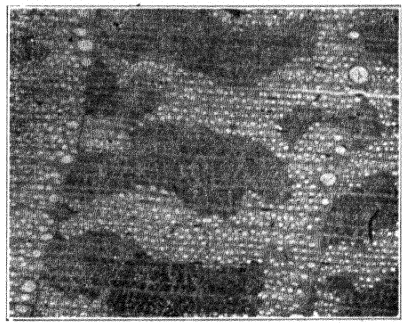
Var. *rigida*, Gray, is a form found along the Mexican boundary with rigid spinescent branchlets and smaller thicker leaves.

1. A. W., XI, 260.

2. For genus see p. 453.







PERSIMMON.

Diospyros Virginiana L.

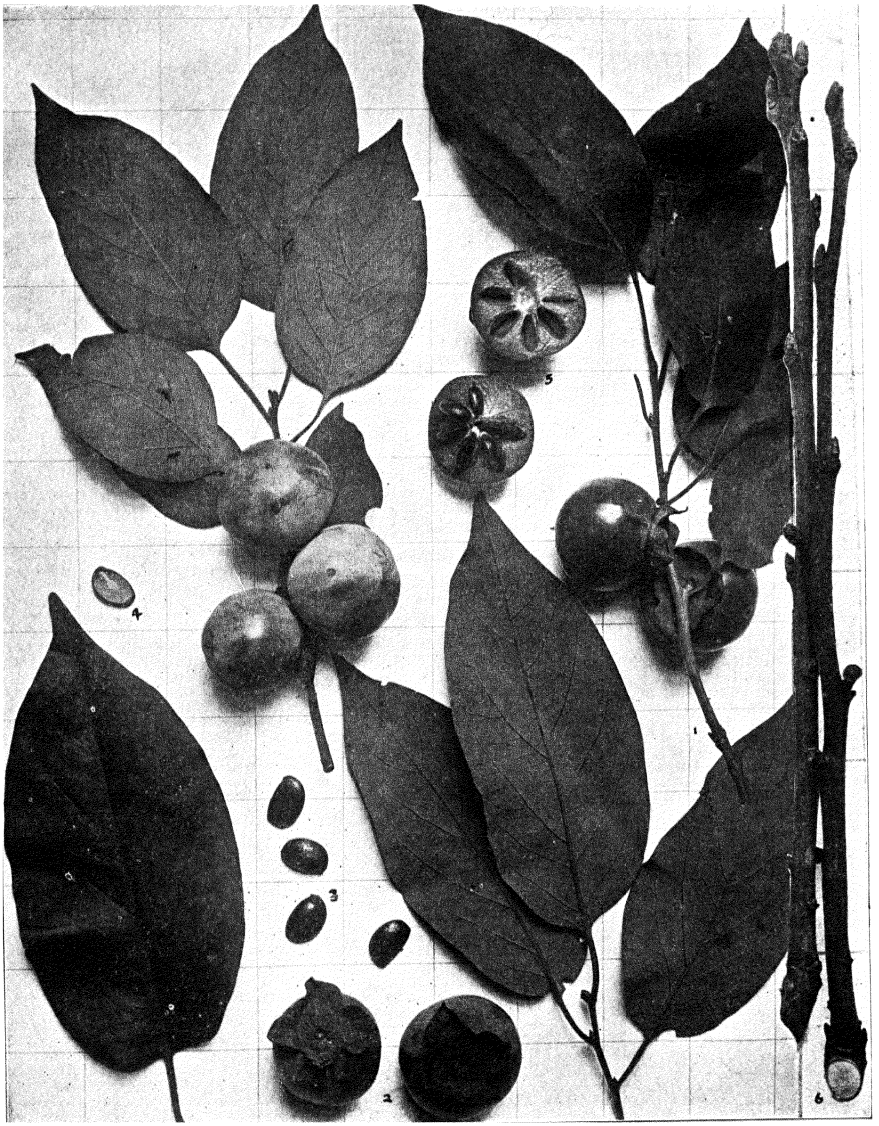


Fig. 449. Branchlets with mature leaves and fruit, 1; detached fruits, 2; seed split in two to show embryo, 4; fruit in cross-section, 5; branchlet in winter, 6 (Note the tardily deciduous fruit stems).

450. Trunk with poison ivy vine. Red River valley, Ark.

451. Wood structure magnified 15 diameters.

The Persimmon tree ordinarly does not attain a greater height than 40 or 50 ft., but in the fertile valleys of southern Indiana and Illinois it has been known to attain 100 ft. in height, with trunk 2 or 3 ft. in thickness. As an isolated tree it develops a rather broad rounded or flattened top with contorted branches. An attractive tree at all seasons, it is particularly so in autumn, when its bright orange-colored fruit shows in strong contrast to its green foliage, or later when conspicuous on its otherwise naked branches. The fruit is rich in tannin and very astringent until thoroughly ripe and soft, when it is ordinarily delicious, though individual trees differ in quality of fruit.

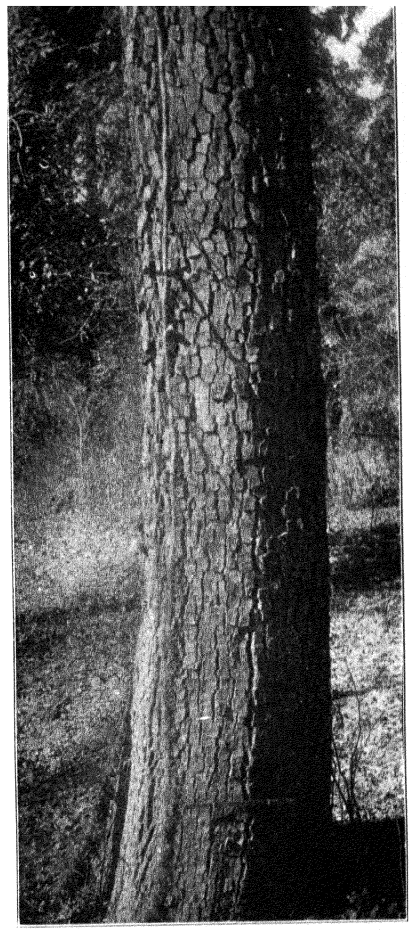
The wood is heavy, a cubic foot when absolutely dry weighing 49.28 lbs., hard and fine-grained, and is used in turnery for small articles of wooden-ware, shoe-lasts, shuttles, etc.[1]

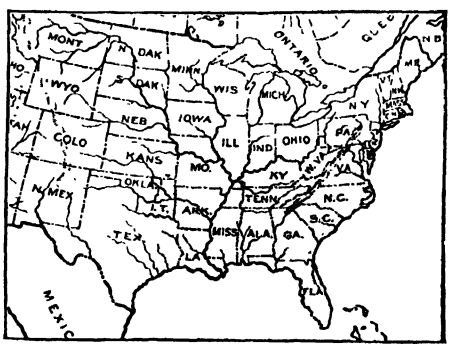
Its fruit is often found in the markets of southern cities, when in season. It is quite variable in quality, and is occasionally found comparatively free from astringent properties. By careful selection and propagation trees bearing superior fruit could no doubt be secured worthy of propagation.

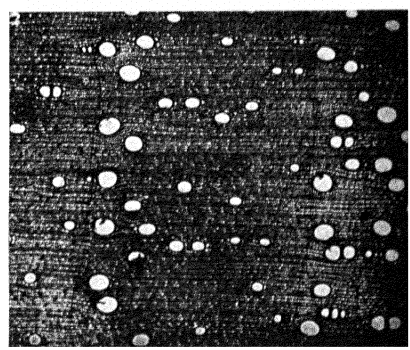
Leaves ovate to oblong and oval, obtuse, 3-7 in. long, rounded or subcordate at base, acuminate, pubescent at first but at maturity lustrous dark green above, paler and pubescent beneath, coriaceous. *Flowers* (May-June) short-pedunculate; staminate in 2-3-flowered cymes; pistillate solitary; corolla greenish yellow; stamens of the sterile flowers about 16 and of the pistillate flowers rudimentary and only 8; ovary nearly glabrous, 8-celled; styles 4, slender. *Fruit* mostly depressed globose, 1-1½ in. in diameter, pale orange, often with red cheeks, glaucous, subtended by the enlarged calyx, persistent into the winter; seeds oblong, flattened.[2]

1. A. W., III, 61.

2. For genus see p. 453.







SWEET-LEAF. HORSE-SUGAR.

Symplocos tinctoria (L.) L'Her.

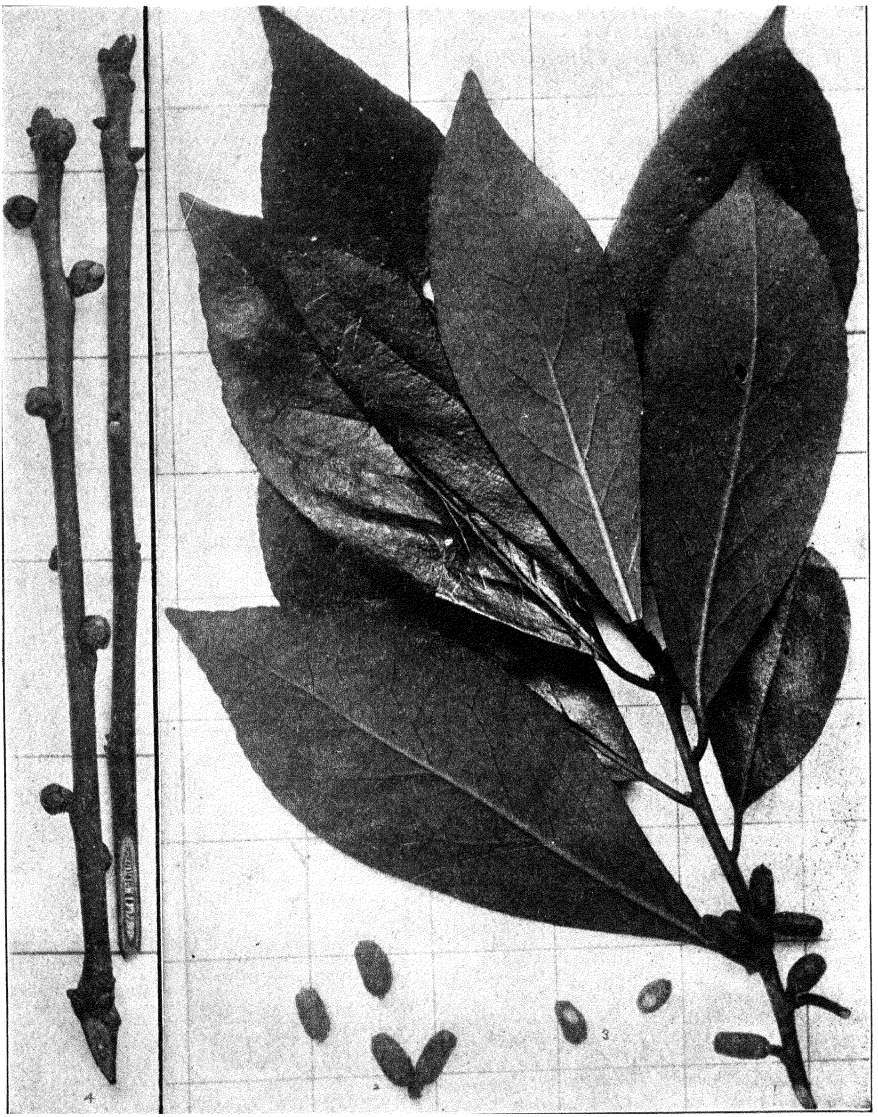


Fig. 452. Branchlet with mature leaves and fruit, 1; detached fruit, 2; fruit in section, 3; branchlets in winter, the one to the left showing flower-buds and the other leaf-buds only, 4. (Note segmented pith.)

453. Trunk with leaves at base.

454. Wood structure magnified 15 diameters.

The Sweet-leaf is a small tree occasionally attaining the height of 30 or 40 ft. with rather wide open top of slender branches, and a trunk 8 or 10 in. in diameter. Like the Sparkleberry and Wax Myrtle, with which it is associated, it loves the shade of the forest, and in these localities, so shut away from sunlight that we almost wonder at its existence, its handsome foliage is as singular as its abode. Each branchlet is upturned and bears near its tip a cluster of drooping spreading leaves. Its identity can be at once detected by the segmented pith of its branchlets and the agreeable somewhat sweetish flavor of its leaves. It inhabits rich well-drained but moist soil of the forests of the south Atlantic and Gulf states, from the coast to an altitude of about 3,000 ft. on the Alleghany Mountains, and is especially a pleasing object in early spring, when its puts out its whorls of delicate fragrant flowers, at the time when its old leaves of the preceding season are withering and falling to the ground.

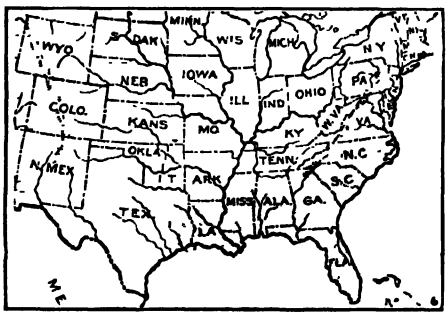
Its light soft fine-grained wood is easily worked and would be useful in turnery, a cubic foot weighing, when absolutely dry, 33.19 lbs.[1] The leaves and fruit yield a yellow dye and the bitter roots have tonic properties

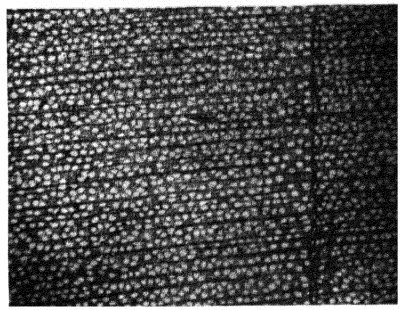
Leaves oblong to obovate, mostly 1-6 in. long, cuneate at base, acute or acuminate, obscurely crenate, serrate or subentire, revolute in the bud, tomentose beneath at first but at maturity lustrous dark green above, paler and pubescent beneath, subcoriaceous and with arcuate veins; petioles short, stout *Flowers* in early spring, creamy white and fragrant, subsessile in several-flowered clusters from the axils of the leaves of the previous season; calyx cup-shaped, puberulous, with rounded lobes; corolla ¼ in. long, oblong, obtuse, each lobe bearing a cluster of exserted stamens; ovary 3-celled with 5 nectiferous glands opposite the lobes of calyx. *Fruit* (August-September) an oblong nut-like pubescent drupe about ½ in. long.[2]

1. A. W., XII, 285.

2. For genus see pp. 453–454.







SILVER-BELL TREE. SNOW-DROP TREE.

Mohrodendron Carolinum (L.) Britt.[1]

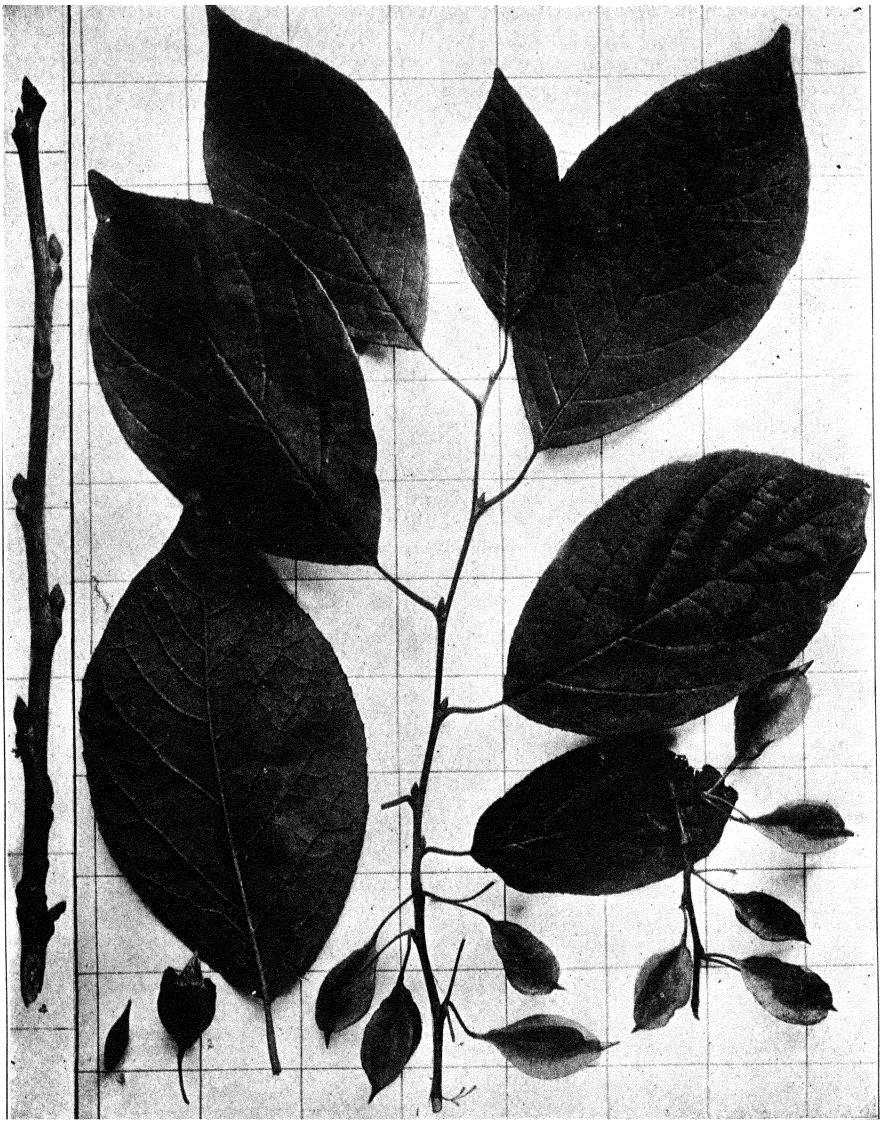


Fig. 455. Branchlet with mature leaves and fruit not quite fully grown, 1; fruit with seed exposed, 2; isolated seed, 3; branchlet in winter, 4.

456. Trunk about 1 ft. in diameter, Biltmore, N. C.

457. Wood structure magnified 15 diameters.

The Silver-bell Tree is generally of small stature, but on the high Alleghany Mountains of North Carolina and Tennessee, where several other trees find inspiration for greatest development, this one lifts its head to the height of 80 or 90 ft., with straight columnar trunk 3 ft. in diameter, but such trees are only found in this favored locality; elsewhere it is a much smaller tree, and is often a large shrub sending up several stems from the ground. When isolated it commonly forms a narrow rounded top of short stout branches. It inhabits rich well-drained wooded slopes and banks of streams, in company with various Oaks, Hickories, Ashes and Magnolias, Sugar Maple, Sorrel-tree, Great Rhododendron, Laurel, Witch Hazel, etc., and in spring, when its branches are fringed with many white bell-shaped flowers, soon after the unfolding of its leaves, it is an object of singular beauty. Indeed, that its ornamental value is generally appreciated is shown by the fact that it is often planted in city parks and on private grounds throughout the Atlantic states.

Its wood is light, a cubic foot, when absolutely dry, weighing 35.07 lbs., soft, fine-grained and suitable for use in turnery, but generally too scarce to be of commercial importance.[2]

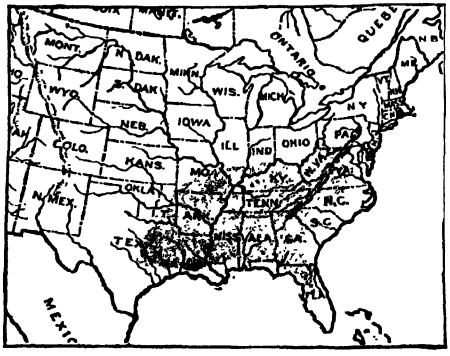
Leaves oval to obovate-oblong, 4-6 in. long, acute or obtuse at base, mostly acuminate at apex, remotely serrulate, pale tomentose at first, at maturity glabrous dark green above, paler and more or less pubescent beneath. *Flowers* (March-April) on drooping pedicels; corolla slightly lobed, about ¾ in. long; stamens 10-16 with glabrous filaments; ovary 4-celled. *Fruit* ripening in late autumn, 4-winged, 1-2 in. long.[3]

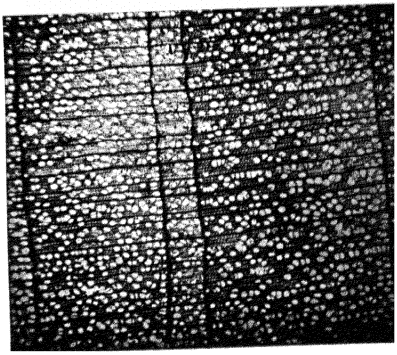
1. Syn. *Halesia tetraptera* Ellis.

2. A. W., XI, 261.

3. For genus see p. 454.







BLACK ASH. HOOP ASH.

Fraxinus nigra Marsh.[1]

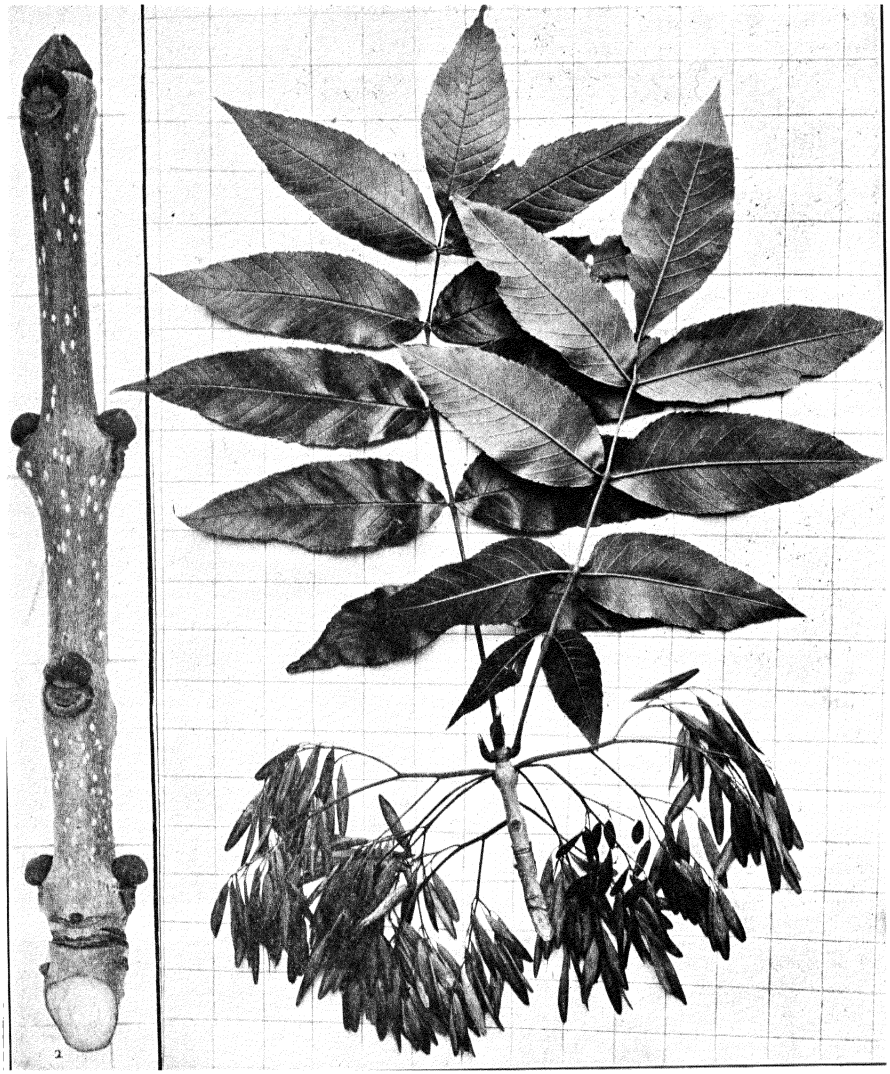


Fig. 458. Branchlet with mature leaves and fruit, 1; branchlet from staminate tree in late winter, 2.

459. Forest trunk showing small burls.

460. Wood structure magnified 15 diameters.

The Black Ash is distinctly a northern species, and in forests, under most favorable conditions, attains the height of 80–90 ft., with straight columnar trunk 3–4 ft. in diameter. When isolated it develops a rounded ovoid top, which may be recognized when leafless by its stout straight branchlets (those of the staminate tree being larger than of the pistillate) and the gray scaly bark of trunk.

It inhabits the low banks of streams and cold swamps, in company with the Arbor-Vitæ, Balsam, Tamarack, Silver Maple, Black Spruce, etc., sometimes forming a considerable portion of forest tracts.

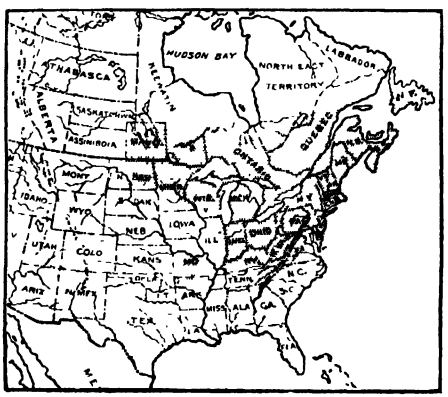
Its wood is rather heavy, a cubic foot when dry weighing 38.37 lbs., moderately hard and strong, and is valued in the manufacture of furniture and lumber for interior finishing, for barrel hoops, etc. It is extensively used in the manufacture of splints for baskets, owing to the facility with which it splits between the layers of annual growth. The "Ash Burl" veneering is a product of this tree being sliced from the "knots" or burls which form on its trunk and larger branches. Their cause or origin is not well understood.[2]

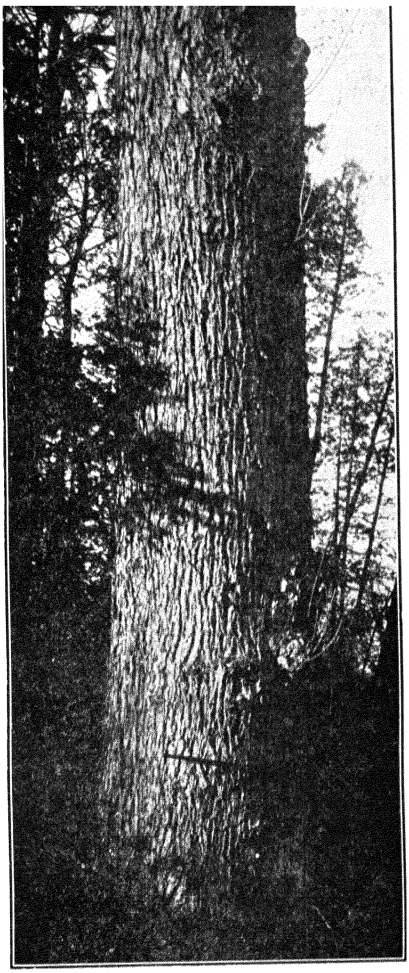
Leaves 10-16 in. long, with 7-11 oblong to oblong-lanceolate sessile leaflets, the terminal one petiolulate, rounded or cuneate and unequal at base, long-acuminate at apex, sharply serrate, tomentose at first but at maturity glabrous dark green above, somewhat paler and glabrous with rufous hairs along the midrib beneath. *Flowers* polygamo-dioecious, calyx none; petals none; stamens 2 sometimes rudimentary in the pistillate flowers. *Fruit* samara, linear-oblong, 1-1½ in. long, ¼ in. broad, winged all around and with flattened faintly-veined body and thin wing emarginate at apex.[3]

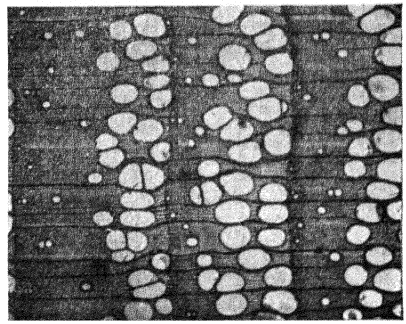
1. Syn. *Fraxinus sambucifolia* Lam.

2. A. W., III, 62.

3. For genus see pp. 454–455.







WATER ASH.

Fraxinus Caroliniana Mill.[1]

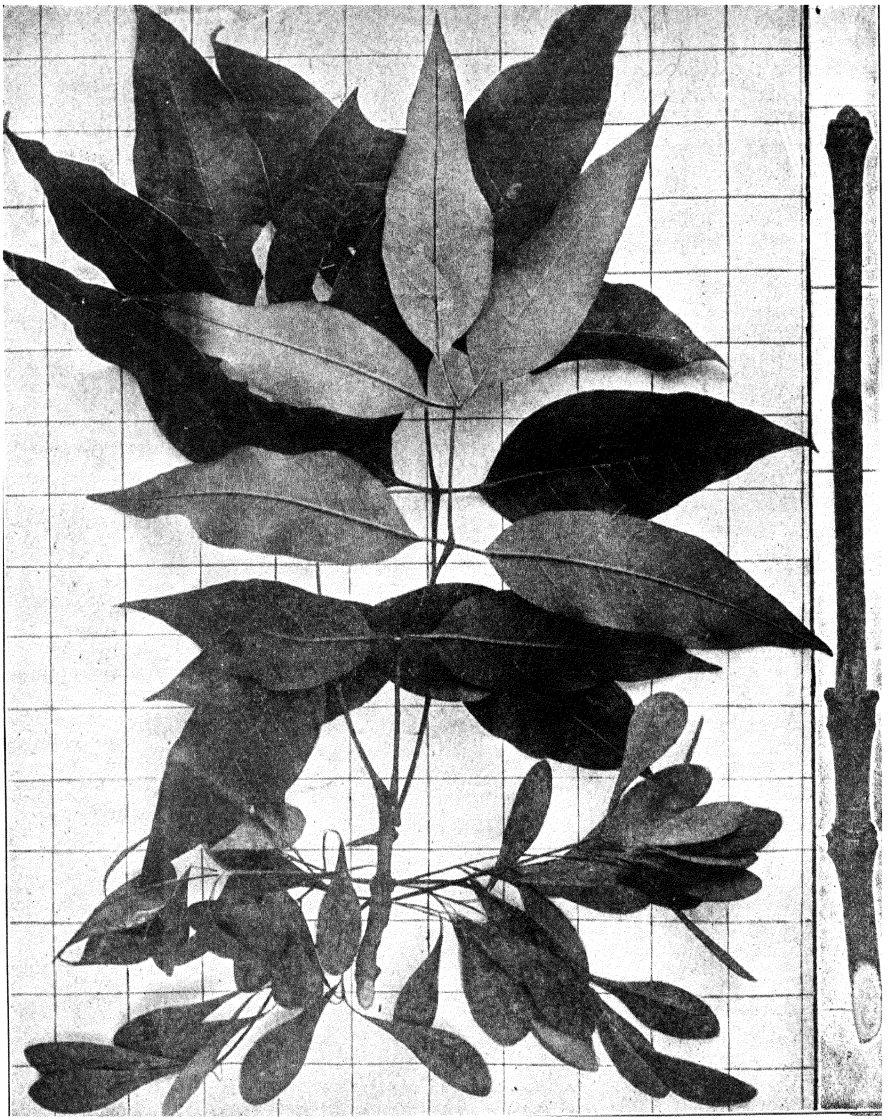


Fig. 461. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
462. A small trunk in Dismal Swamp region, Va.

The Water Ash is a tree of medium stature, rarely larger than 40 ft. in height and 1 ft. in diameter of trunk, with usually a narrow rounded top of slender branches. It inhabits deep swamps and the banks of streams inundated during a considerable portion of the year, and commonly in company with the Bald Cypress, Water and Cotton Gums, Over-cup, Laurel and Water Oaks, Red Maple, Swamp Bay, White Cedar, etc. These being generally taller trees cast their shade on the Water Ashes which, nevertheless, accept the situation seemingly without complaint, and thrive even though deprived of their due allowance of sunlight.

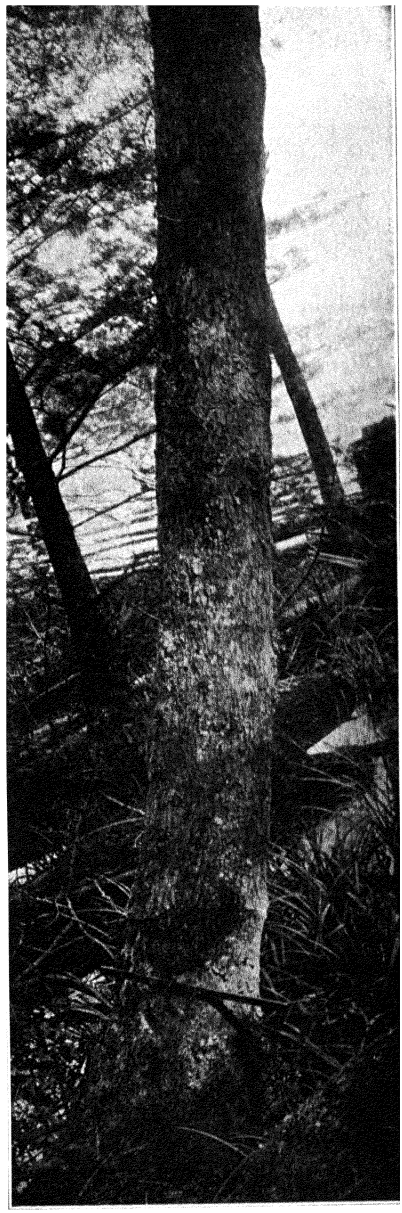
The wood of the Water Ash is light, a cubic foot, when absolutely dry, weighing 22.07 lbs., rather soft, not strong and of little commercial importance.[2]

Leaves 7-12 in. long with elongated petioles and 5-7 rather remote long-petiolulate ovate to ovate-lanceolate leaflets, usually cuneate or rounded at base and acute or acuminate at apex, closely serrate or entire, tomentose at first but finally dark green above, paler and glabrous or pubescent beneath; branchlets thick. *Flowers* (February and March) dioecious, with calyx nearly obsolete and 2 to 3 stamens; corolla none; pistillate flowers with cup shaped laciniate-lobed persistent calyx. *Fruit:* samara winged all around, obovate, spatulate or elliptical, nearly 2 in. long, ½-¾ in. broad, frequently 3-winged with persistent calyx at base, compressed body and wing pinnately veined.

1. Syn. *Fraxinus platycarpa* Michx.

2. A. W., XII, 286.





BLUE ASH.

Fraxinus quadrangulata Michx.

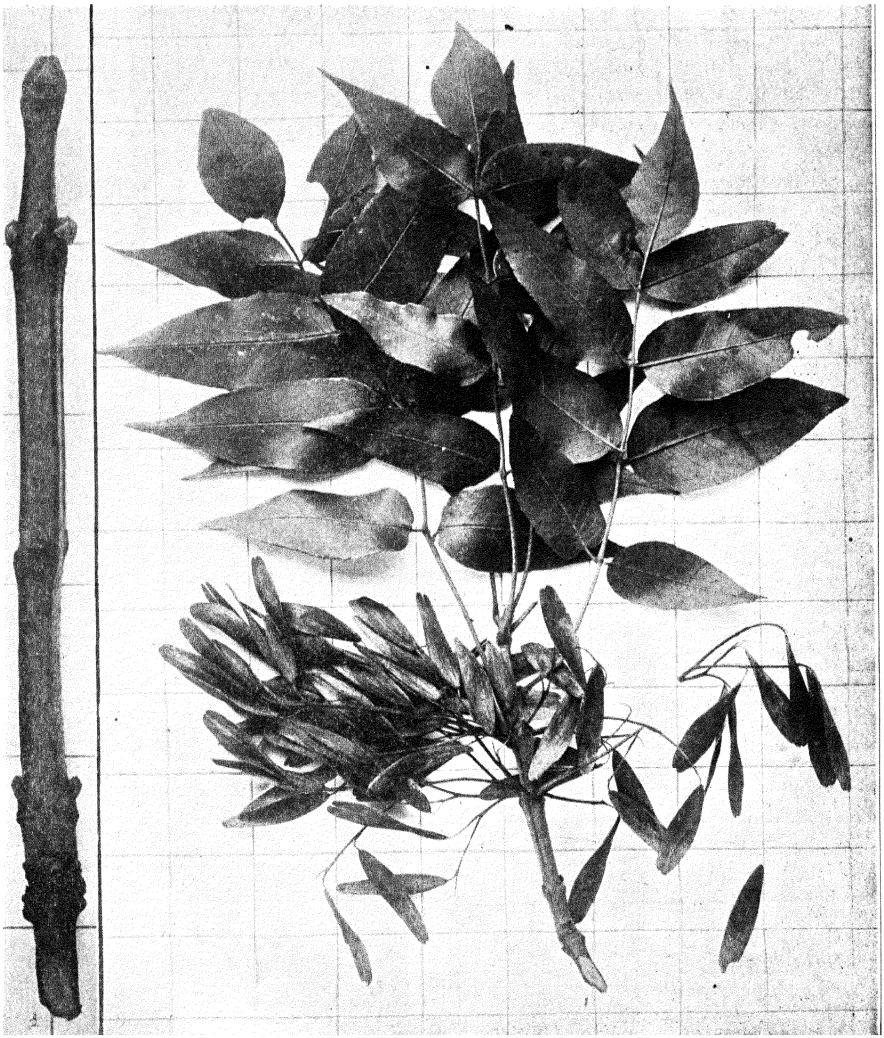


Fig. 463. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
464. Trunk of a forest tree near Allenton, Mo.

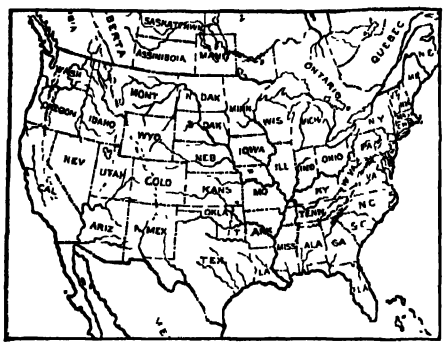
This interesting and rather uncommon Ash occasionally attains the height of 120 ft. or more, with trunk 3 or 4 ft. in diameter in the forests of the rich valleys of southern Indiana and Illinois, but elsewhere does not often surpass 75 ft. in height or 2½ ft. in diameter of trunk. Its peculiar scaly bark is a feature which at once distinguishes it in the eye of the woodman, and on very old trunks is especially interesting, the long loose plates giving it an even more shaggy appearance than those of the Shag-bark Hickory.

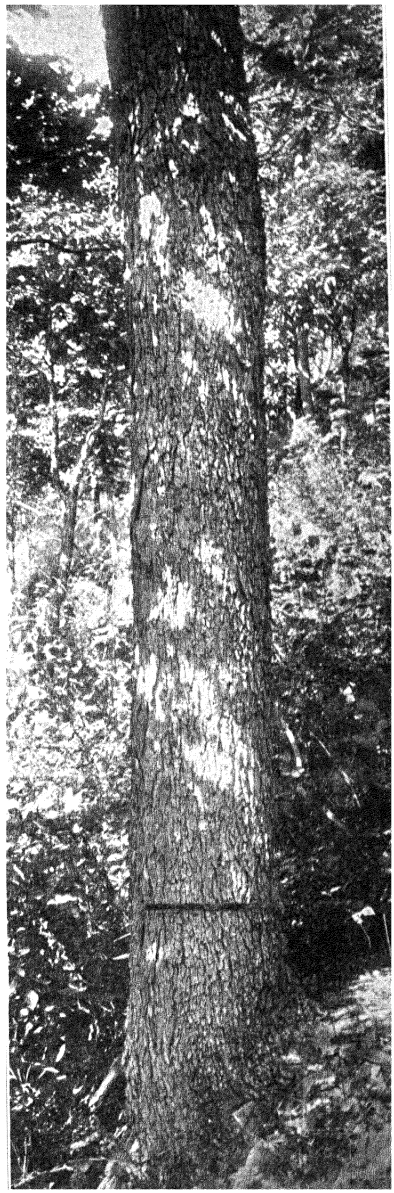
It inhabits mostly dry limestone ridges and uplands, in company with the White Ash, Texas, Chinquapin and other Oaks, Woolly Bumelia, Red-bud, various Hickories, etc., and is occasionally found in the more moist bottom-lands. It is called the Blue Ash on account of a blue dye which may be made by macerating the inner bark in water. The 4-angled nature of the twigs constitute a character by which it may be easily recognized.

The wood is heavy, a cubic foot, when absolutely dry, weighing 44.77 lbs., rather hard and strong and is used in the manufacture of flooring, agricultural implements, etc.[1]

Leaves 8-12 in. long with 7-9 ovate-oblong to lanceolate short-petiolulate leaflets 3-5 in. long, unequally rounded or obtuse at base, long-acuminate, closely serrate, tomentose at first but at maturity glabrous, dark yellow green above, paler and glabrous or hairy-tufted in the axils of the veins beneath. *Flowers* perfect, in loose panicles; calyx almost obsolete; corolla none; stamens 2 with dark purple oblong anther-cells. *Fruit* linear-oblong, 1-2 in. long, winged all around, parallel-veined and the body extending more than half way to the emarginate apex.

1. A. W., XI, 263.





WHITE ASH.

Fraxinus Americana L.

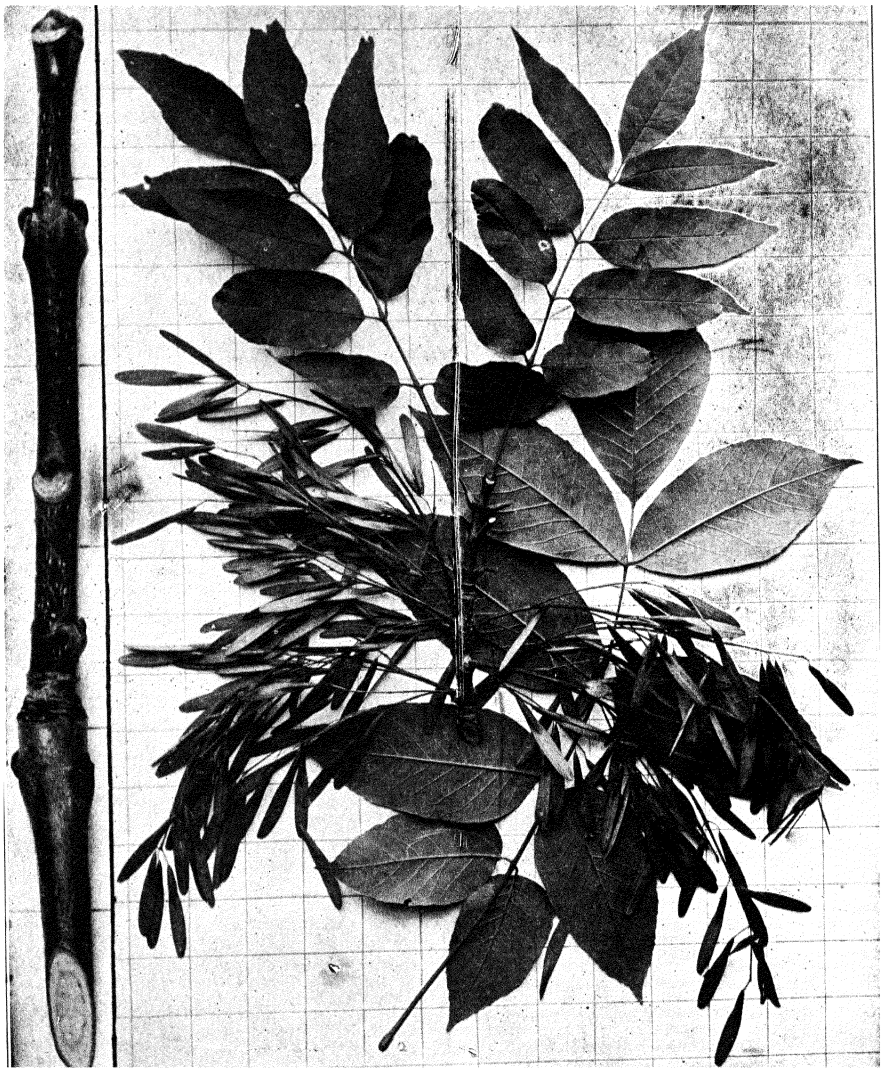


Fig. 465. Branchlet with mature leaves and fruit, 1; large leaf from vigorous shoot, 2; branchlet in winter, 3.

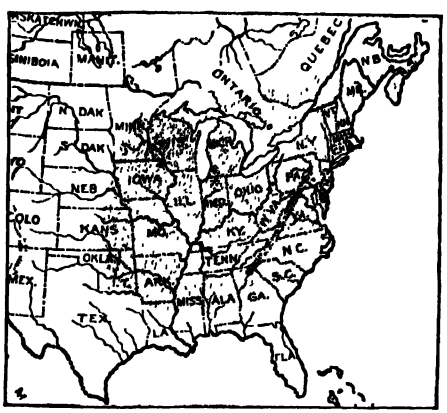
466. Trunk of isolated tree near Albany, N. Y.

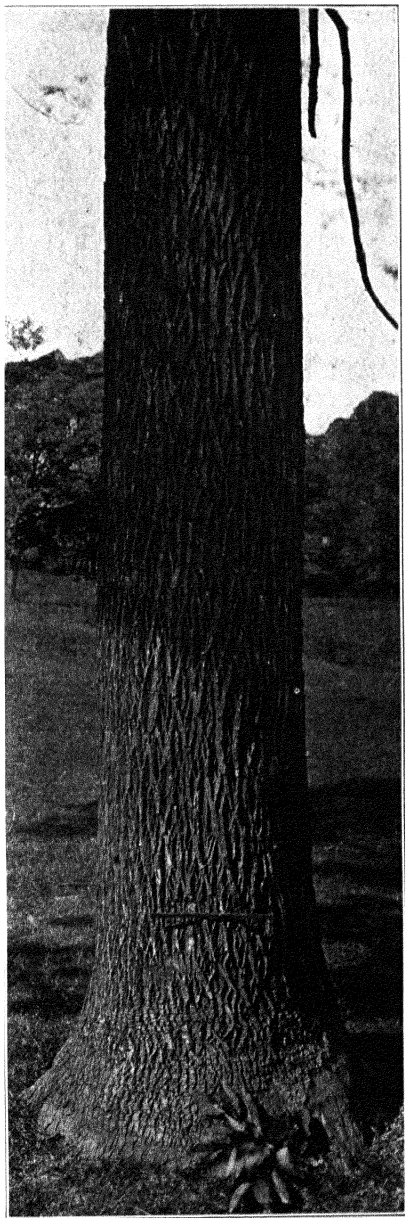
The White Ash is one of the most valuable hardwood trees of the American forests, and one of the statliest representatives of its genus. In the forests of the rich bottom-lands of the lower Ohio basin it has been known to attain the height of 120 ft. and 5–6 ft. in diameter of trunk, but these dimensions are exceptional. It occupies rich slopes and bottom-lands, where not too moist, and is an abundant tree throughout most of the eastern states and Canada. When growing apart from other trees it develops an ovoid or somewhat pyramidal top, with long slender lateral branches. It is a tree of good habit and handsome foliage and is popular as an ornamental shade tree.

The wood of the White Ash is heavy, a cubic foot weighing 40.78 lbs., hard and strong, and is used extensively in the manufacture of tool-handles, agricultural implements, cars, furniture, etc.[1] The inner bark is used in medicine.

Leaves 8-15 in. long, with 5-11 oblong-lanceolate, ovate or obovate petiolulate leaflets, rounded or cuneate at base, long-acuminate or acute at apex, entire or crenate-serrate at maturity, subcoriaceous, glabrous dark green above, whitish and glabrous or pubescent beneath. *Flowers* dioecious, calyx campanulate, 4-lobed (more deeply in the pistillate flower); petals none; stamens 2 (sometimes 3). *Fruit:* samara, 1-2 in. in length but sometimes (in var. *microcarpa* Gray) not more than ½ in., lanceolate with short terete body and terminal wing more than twice its length.

1. A. W., I, 10.





BILTMORE ASH.

Fraxinus Biltmoreana Beadle.



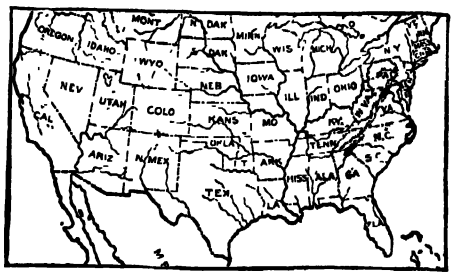
Fig. 467. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
468. Trunk of forest tree at Biltmore, N. C.
For the specimens of leaves, fruit and winter branchlet I am indebted to Prof. C. D. Beadle.

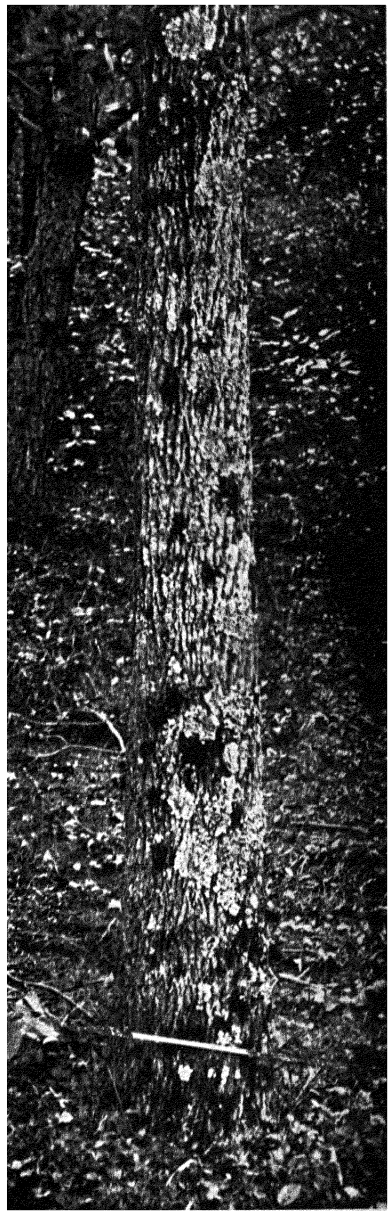
The Biltmore Ash is a tree of medium size, not often surpassing 40 or 50 ft. in height or 12 or 15 in. in thickness of trunk, and when not crowded by other trees develops an open symmetrical ovoid or rounded top, of stout spreading branches. Its bark is of a dark-gray color, fissured in rather narrow somewhat reticulate ridges, very much resembling that of the White Ash, as it does also in the quality of its wood and other characters, excepting the amount of pubescence of its foliage and branchlets. It inhabits the rich well-drained soil of slopes and the banks of streams, or occasionally low-lands, of the foot-hill region of the Alleghany Mountains, from Pennsylvania to Northern Georgia and Alabama. For its discovery we are indebted to Prof. C. D. Beadle, Botanist at the Biltmore forest estate of Mr. Geo. W. Vanderbilt, where it is a common tree, and he has appropriately given it the name of the estate.

Its wood is heavy, hard, strong, tough and of a pinkish brown color, with abundant lighter sap-wood, and is suitable for the uses to which the White Ash wood is applied.[1]

Leaves 10-15 in. long, with 7-9 ovate or ovate-oblong to lanceolate somewhat falcate long-petiolulate leaflets, 3-7 in. long, obtuse or rounded at base, acuminate, with entire or obscurely denticulate margins and at maturity firm dark green above, paler and pubescent especially on the veins beneath; branchlets velvety pubescent. *Flowers* early in May, in rather compact pubescent panicles. *Fruit:* samaras 1¼-1¾ in. long, linear or linear-spatulate with wing 2 or 3 times as long and very slightly decurrent upon the nearly terete narrowly elliptic seed-bearing portion.

1. A. W., XII, 287.





GREEN ASH.

Fraxinus lanceolata Borck.[1]

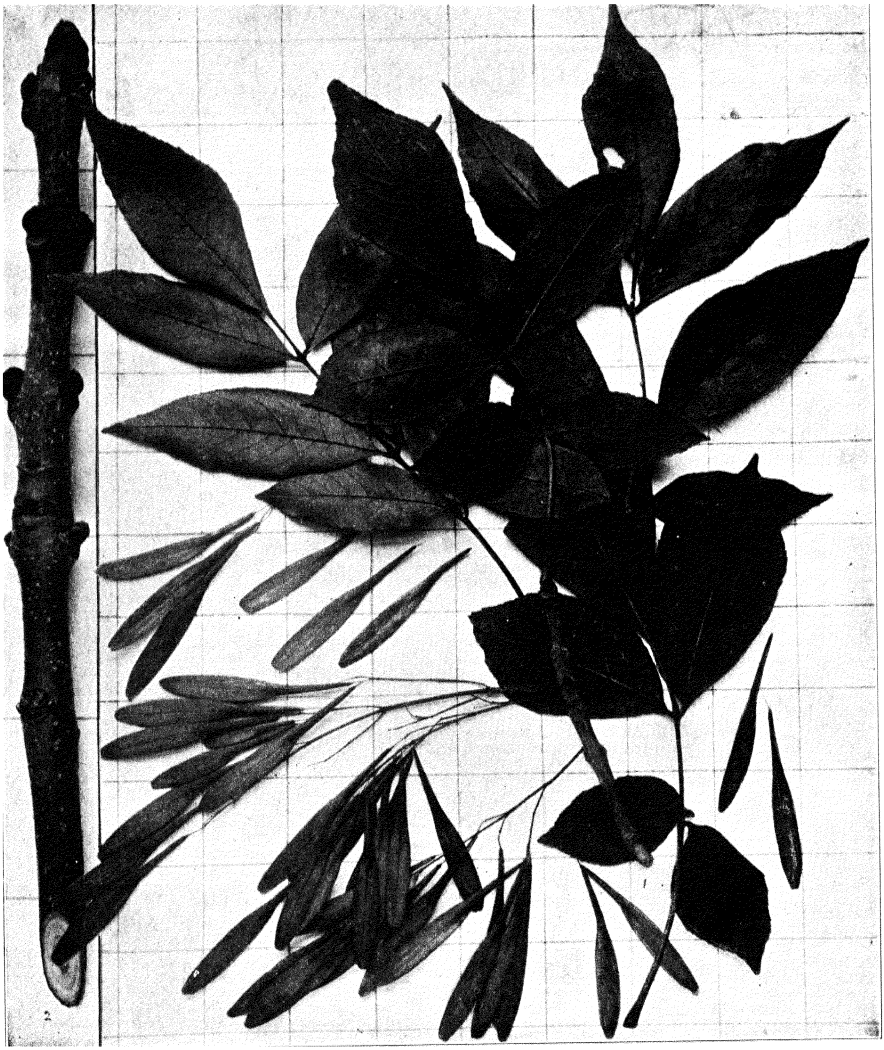
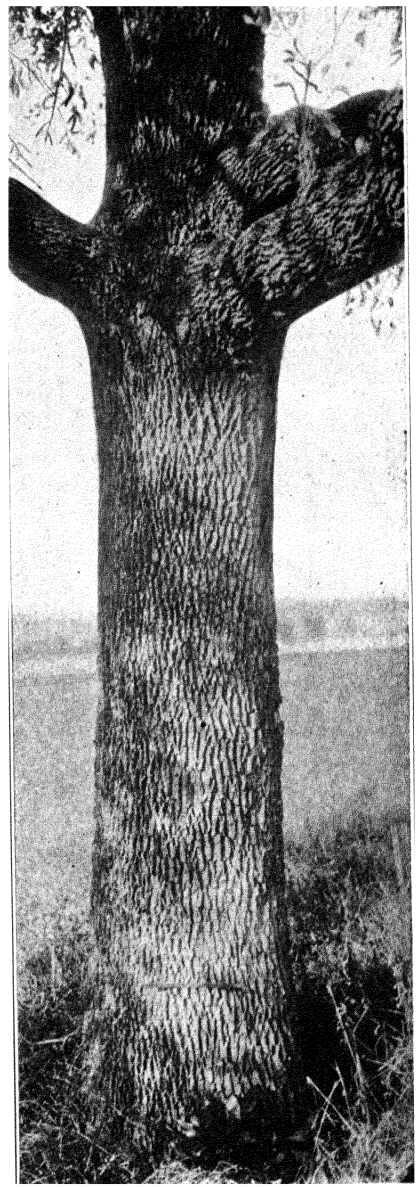


Fig. 469. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
470. Trunk of isolated tree. Meramec River valley, Mo.



This handsome tree rarely attains a greater size than 60–70 ft. in height, and 2–3 ft. in diameter of trunk. When isolated it develops a broad rounded top, of slender spreading branches.

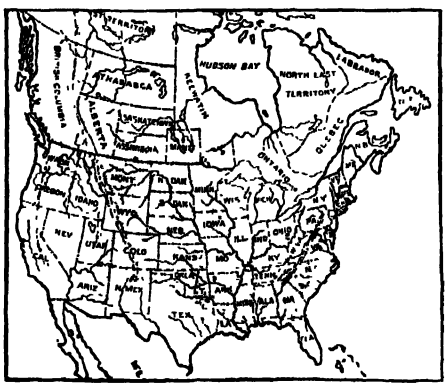
It inhabits the banks of streams, lake-shores and bottom-lands over the greater part of the United States east of the Rocky Mountains, and, in the western part of its range, it so closely approximates the Red Ash in characters that it is considered by some botanists to be a variety of that species, though it is very distinct from it in regions east of the Mississippi River. Comparatively uncommon east of the Alleghany Mountains it is very common in the Mississippi Valley. Being a very hardy tree, of rapid growth and desirable habit, it is extensively planted as an ornamental shade tree in many of the cities and towns of the central states.

The wood is heavy, a cubic foot when absolutely dry weighing 44.35 lbs., hard and strong, and adapted to the same uses as that of the White Ash, no distinction being made between them in commerce.[2]

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

1. Syn. ***Fraxinus viridis*** Michx. f. ***Fraxinus Pennsylvanica*** var. ***lanceolata*** Sarg.

2. A. W., XI, 262.



RED ASH.

Fraxinus Pennsylvanica Marsh.[1]

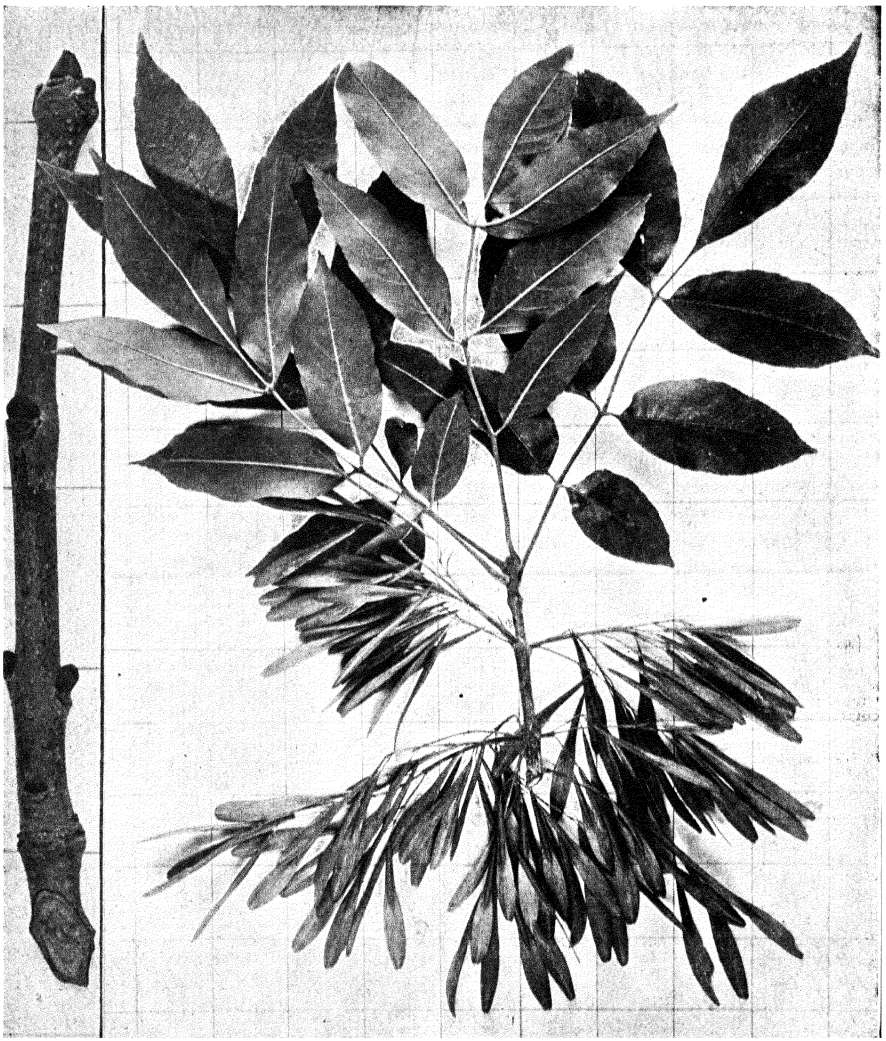


Fig. 471. Branchlet with mature leaves and fruit, 1; branchlet in winter, 2.
472. Trunk of isolated tree. Staten Island, N. Y.

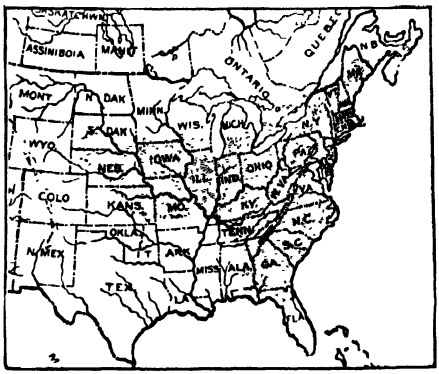
The Red Ash is a tree of medium size, rarely attaining a greater height than 40–60 ft. or a greater thickness of trunk than 2 ft. When isolated from other trees it develops a broad-ovoid or somewhat pyramidal top similar to that of the White Ash, which it also resembles in character of bark. It inhabits low rich bottom-lands and the margins of swamps and streams, in company with the Hackberry, Elms, Swamp, Pin and Water Oaks, Bitter-nut Hickory, Red and Silver Maples, Sweet and Sour Gums, etc. It is not generally distinguished by the common people from the White Ash, which, however, is more a tree of upland regions and a tree of more vigorous growth and ornamental character. The Red Ash is said to take its name from the reddish color of the inner bark of the branches.

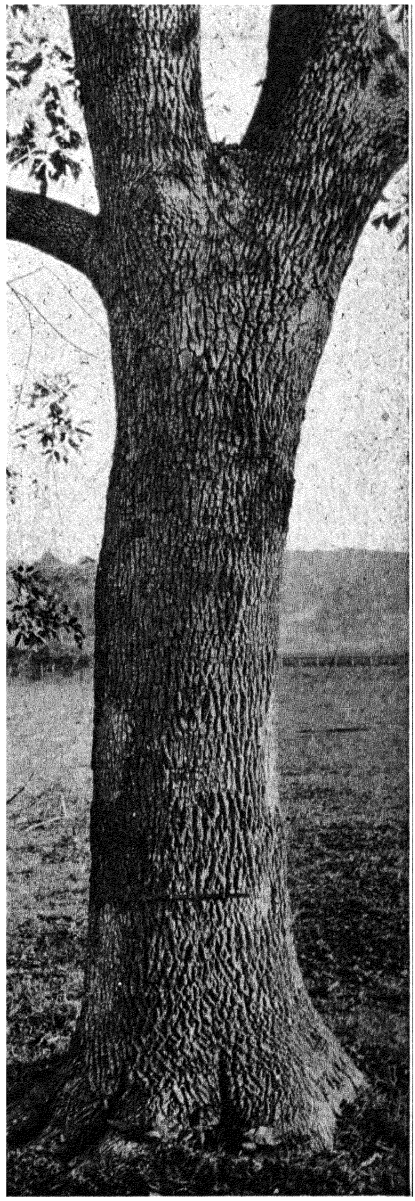
The wood is rather light, a cubic foot when dry weighing 38.96 lbs., hard and strong, and applied to the same uses as is that of the White Ash, though somewhat inferior to it in quality.[2]

Leaves 7-12 in. long, with velvety pubescent petioles and rachises, and 7-9 oblong-lanceolate or ovate petiolulate leaflets, unequally cuneate at base, usually acuminate at apex, obscurely serrate or entire below, tomentose at first, at maturity lustrous yellow-green above paler and tomentose beneath; branchlets velvety but sometimes becoming glabrous by the close of the first season. *Flowers* dioecious, petals wanting; stamens subtended by the persistent calyx. *Fruit:* samara, 1-2 in. long, with slender terete tapering body, margined above by the thin decurrent linear or spatulate wing which about equals it in length.

1. Syn. *Fraxinus pubescens* Lam.

2. A. W., II, 31.





PUMPKIN ASH.

Fraxinus profunda Bush.

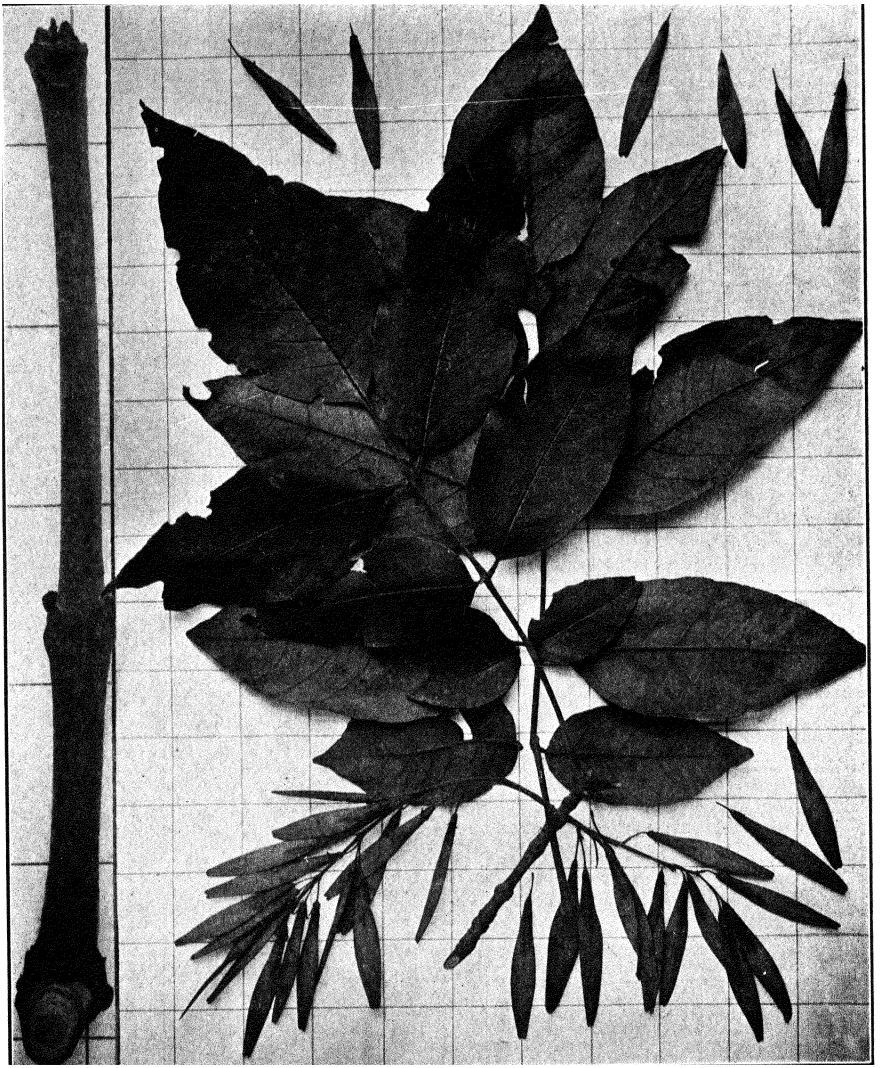
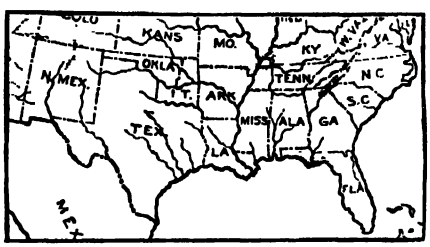


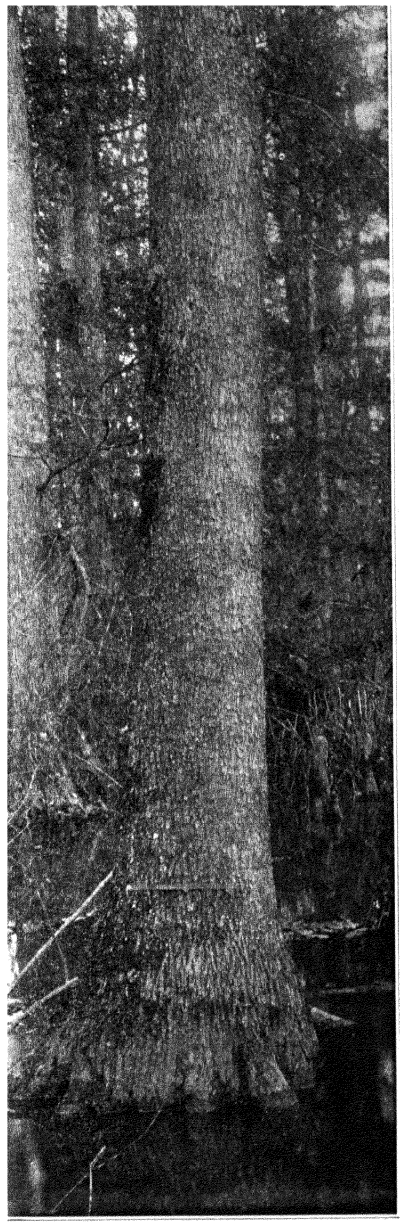
Fig. 473. Branchlet with mature leaves and fruit and leafless branchlet in winter.
474. Trunk in swamp bordering St. Francis River, Mo. Small Cypress knees in background.

The Pumpkin Ash is a large tree as found in the swampy bottom-lands of eastern Arkansas and southeastern Missouri, where it attains the height of 100 ft. or more, with columnar trunk 3 or 4 ft. in diameter above its wide base.

It inhabits deep swamps, the banks of sloughs and streams of eastern Arkansas and southeastern Missouri, and of the valley of the Appalachicola River in western Florida. It occupies these localities, inundated during a considerable portion of the year, in company with the Bald Cypress, Leitneria, Cotton and Water Gums, Planer-tree, Swamp Poplar, Water Locust, etc. The singular name, Pumpkin Ash, by which it is popularly known, is said to be given to it on account of its wide swollen base which gives it stability in the soft miry ooze in which it grows. The occurrence of the Pumpkin Ash, Leitnaria and certain other Floridian species in southeastern Missouri and eastern Arkansas indicates an interesting extension of the Floridian flora into those regions which is noteworthy, especially as few, if any, of these species have been found in the intermediate regions.

Leaves large, 9-18 in. long, leaflets 7-9, lanceolate or ovate-lanceolate and usually inequilateral, entire or nearly so, rounded or cuneate at base, acuminate, hairy tomentose at first, at maturity dark green and nearly glabrous above, pubescent beneath; branchlets and all new growths densely pubescent. *Flowers* dioecious, the staminate with a campanulate obscurely 4-toothed calyx; stamens 2-3; pistillate calyx larger, deeply 4-lobed, accrescent and persistent. *Fruit:* samaras, linear-oblong, 2-3 in. long with wing decurrent to below the middle of the terete thick seed-bearing portion.





FRINGE-TREE. OLD-MAN'S-BEARD TREE.

Chionanthus Virginica L.

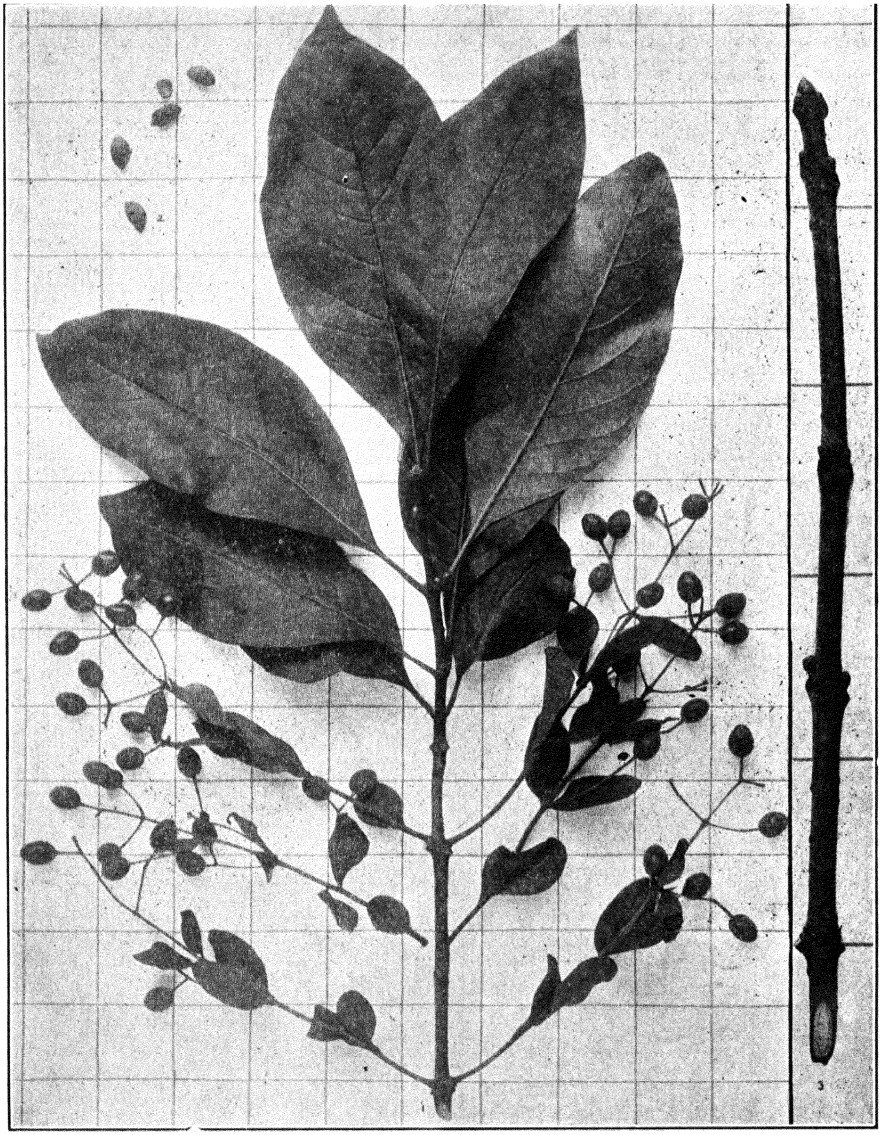


Fig. 475. Branchlet with mature leaves and fruit, 1; detached fruits with pits exposed, 2; branchlet in winter, 3.

476. Trunk, with leaves at base, of a transplanted tree in New York.

477. Wood structure magnified 15 diameters.

The beautiful Fringe-tree rarely attains a greater size than 25 or 30 ft. in height and 8 to 10 in. in diameter of trunk, and is often a shrub sending up several stout spreading stems from a common base. When isolated it develops a low rounded or oblong top of tortuous branches. It inhabits rich moist soil of sheltered ravines and the banks of streams, and is a tree of singular beauty in May and June, when its light green foliage is interspersed with numerous tassel-like or fringe-like flowers of snowy whiteness, very different from the flowers of all other trees.

There are several names by which the tree is known, as *Old Man's Beard, Grandfather Graybeard, Sunflower Tree, Snow-flower Tree, Flowering Ash,* etc., all alluding to its singular flowers. On account of these and its handsome foliage it is popular as an ornamental shade-tree throughout eastern United States and Europe, and proves hardy considerably north of its native range.

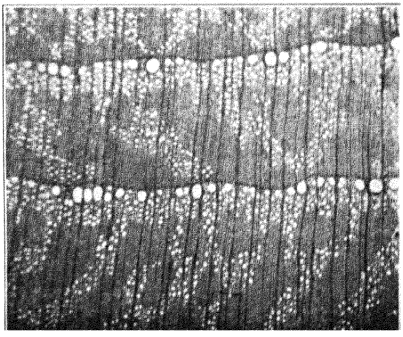
The wood is moderately light, a cubic foot when absolutely dry weighing 39.71 lbs., hard and close-grained, though of no commericial importance. The bark is used in medicine as a tonic, aperient and diuretic.

Leaves oblong or sometimes ovate or obovate, 4-8 in. long, cuneate at base, mostly acute or acuminate at apex, entire, when they unfold glabrous above, velvety pubescent beneath, at maturity dark-green above, paler and glabrous except on the conspicuous arcuate veins beneath. *Flowers* (May-June), delicate, fragrant, in slender drooping panicles with sessile leaf-like persistent bracts: petals 1 in. long, white, purple-spotted within at base. *Fruit* ripe in September, $\frac{1}{2}$-$\frac{3}{4}$ in. long, dark blue with glaucous bloom and thin pulp[1]

1. For genus see p. 455.







FORESTIERA. SWAMP PRIVET.

Forestiera acuminata Poir.[1]

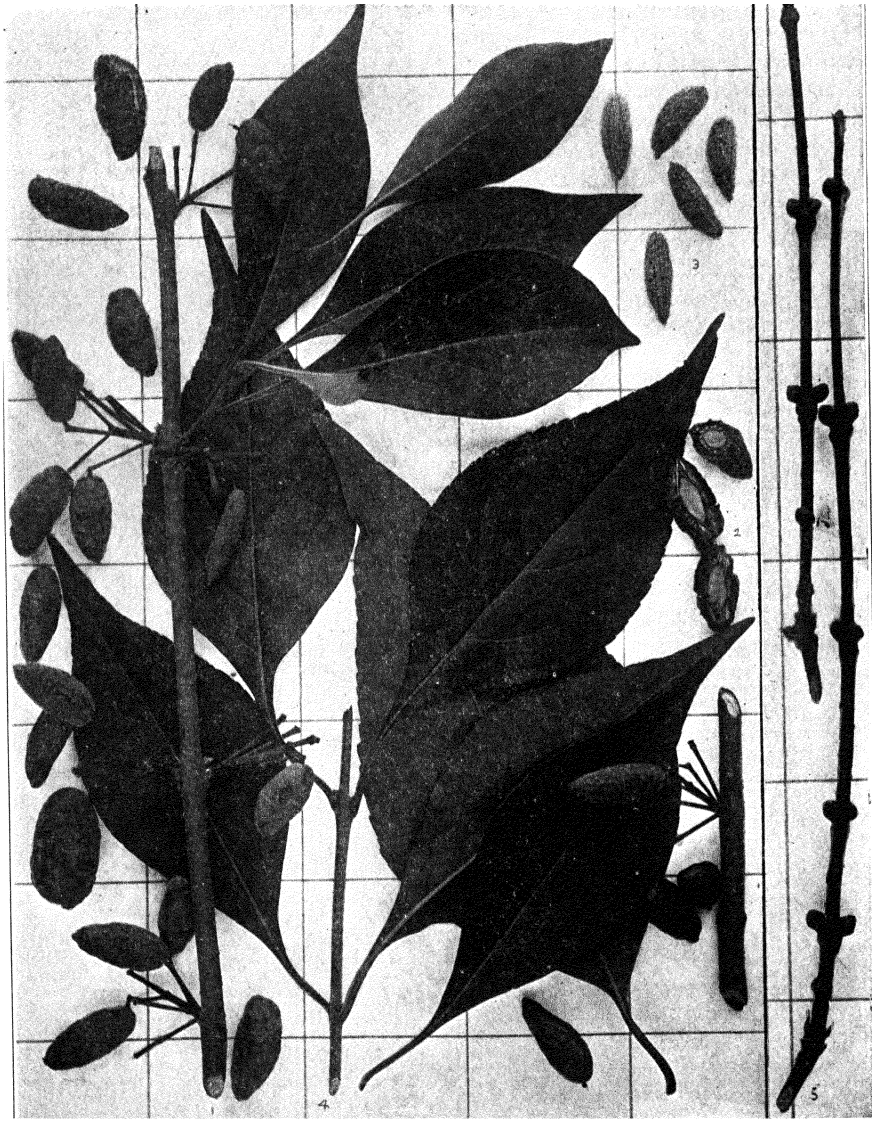


Fig. 478. Branchlet with mature leaves and scattered detached fruits, 1; fruit in section, 2; isolated pits, 3; vigorous branchlet bearing leaves, 4, leafless branchlets in winter, 5.

479. Trunk of tree near mouth of River des Peres, Mo.

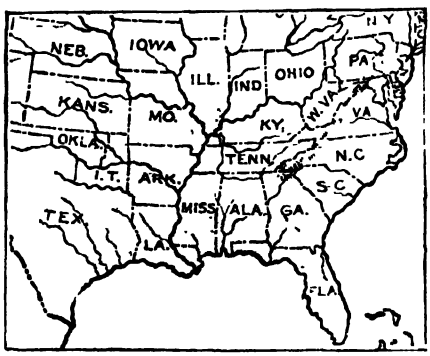
480. Wood structure magnified 15 diameters.

The Forestiera or Swamp Privet is a low wide-spreading tree occasionally 25 ft. in height and 1 ft. in diameter of trunk. It often is no more than a small shrub in stature, sending up from the ground several crooked or inclined stems. It inhabits low banks of streams, lake-shores and deep swamps subject to occasional inundation, in company with various Willows, the Button-bush, Planer-tree, Bald Cypress, Gums, Water Locusts, Water Hickory, Deciduous Holly, etc., or often occupying exclusively tracts of low river banks and swamps of considerable extent. Many such regions in the southern states are beautified by the rich green masses of its abundant foliage.

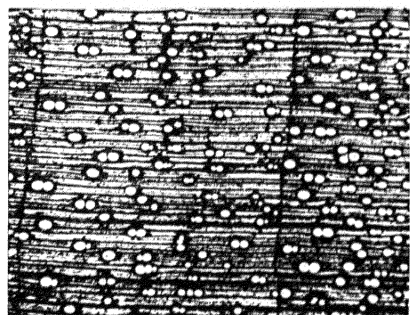
The wood of the Forestiera is rather light, a cubic foot when absolutely dry weighing 39.54 lbs., hard, strong, of close grain and suitable for use in turnery.[2]

Leaves deciduous, oval to ovate-elliptical, 2-5 in. long, about equally acuminate or acute at both ends, glabrous, crenate-serrate or entire, especially at base; petioles slender, about ½ in. long. *Flowers* in early spring, before the leaves, the staminate in dense close clusters; the pistillate mostly in short panicles; calyx wanting. *Fruit* an oblong to linear-oblong wrinkled and pitted drupe, from ½ to ¾ in long, dark blue at maturity, with coriaceous longitudinally ribbed and fibrous pit.[3]

1. Syn. *Adelia acuminata* Michx.
2. A. W., V, 111.
3. For genus see p. 455.







COMMON CATALPA.

Catalpa Catalpa Karst.[1]

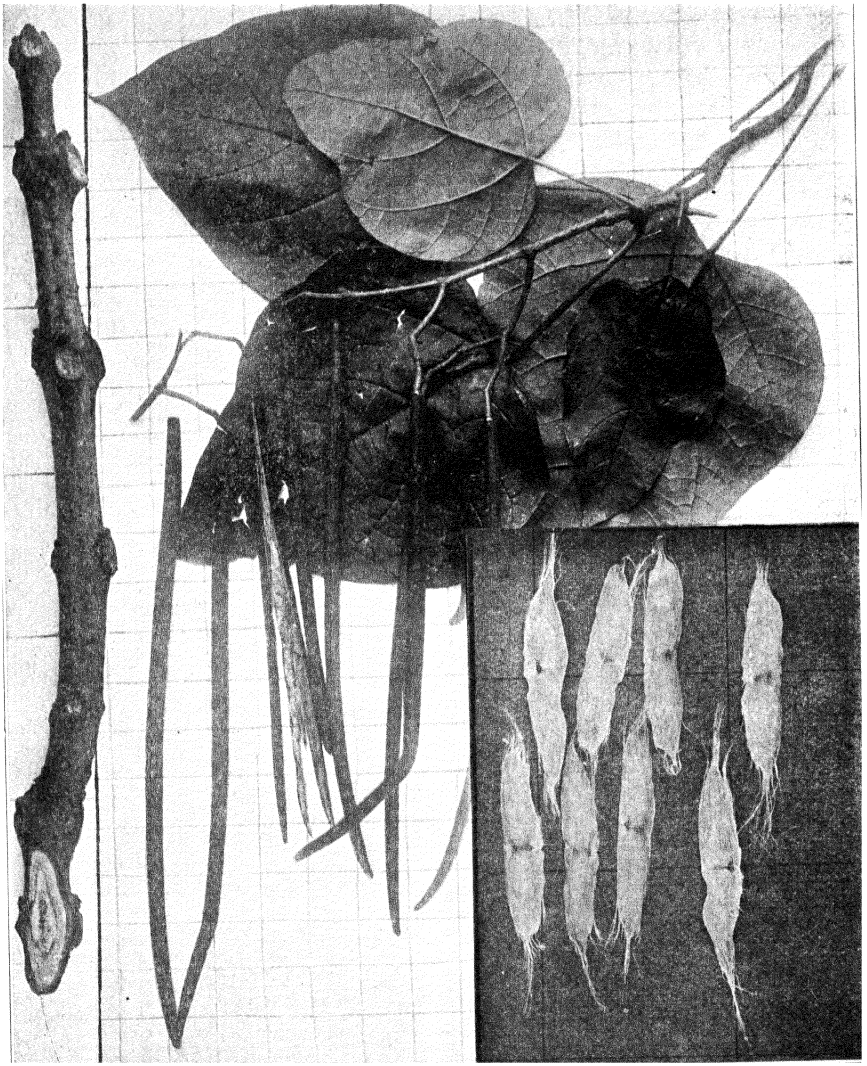


Fig. 481. Branch with mature leaves and fruit, much reduced, and isolated seeds and winter branchlet about natural size.

482. Trunk of isolated tree.

483. Wood structure magnified 15 diameters.

The Common Catalpa rarely attains a greater height than 50 or 60 ft., and its short stout trunk is sometimes 3 or 4 ft. in diameter. Its habit is to form a wide rounded top, of few spreading crooked branches and thick upright branchlets. It is late in spring, after the leaves of most of the trees are well along, when this tree opens its buds and unfolds its ample leaves, and these are soon after followed by its beautiful pyramids of flowers, which are scarcely equaled in size and attractiveness by those of any other American tree. As we contemplate the mass of heart-shaped leaves interspersed with these great pyramids of handsome flowers we do not wonder that it is extensively planted for ornament both in this country and in Europe. Through this agency it has become widely naturalized throughout eastern United States, far outside of its native habitat. The limit of its natural range cannot be determined with certainty, but its supposed limits are indicated on the accompanying map.

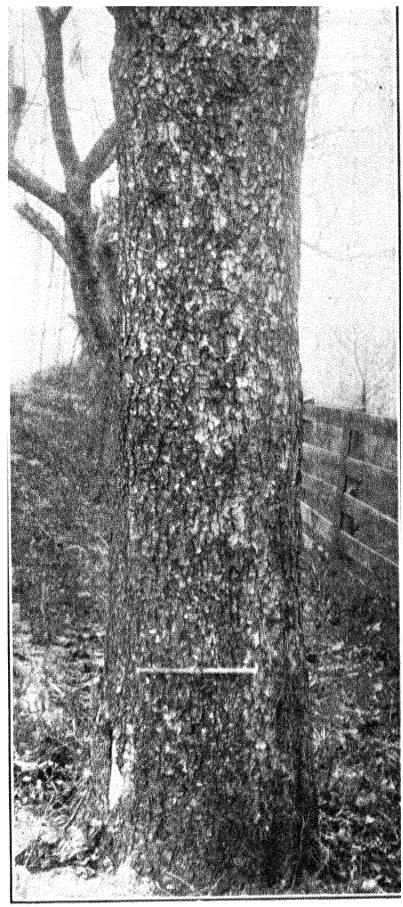
The wood is soft, coarse-grained and durable, and valued for fence-posts, rails, etc. A cubic foot, when absolutely dry, weighs 27.88 lbs.[2]

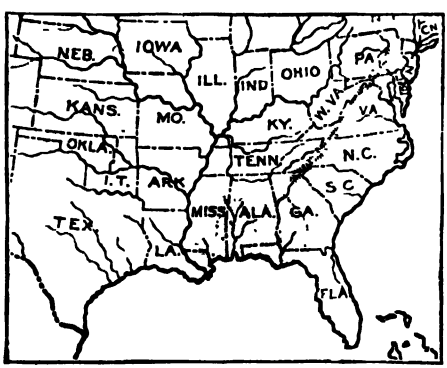
Leaves broad-ovate, 6-12 in. long, cordate at base, acute or acuminate, entire or with 1 or 2 lateral lobes, strong-scented, pale tomentose at first, at maturity light green and glabrous above, paler, pubescent and with dark glands in the axils of the veins beneath; petioles terete and nearly as long as the blades. *Flowers* numerous in large panicles, 8-10 in. long and broad; corolla nearly 2 in. in length, and 1½ in. broad campanulate, white thickly spotted within on lower side with yellow and purple; lower lobe entire. *Fruit*: capsule 10-20 in. long, ½-1 in. thick, thin-walled; seeds about ¼ in. wide with gray wings terminating mostly in pointed tufts of hairs.[3]

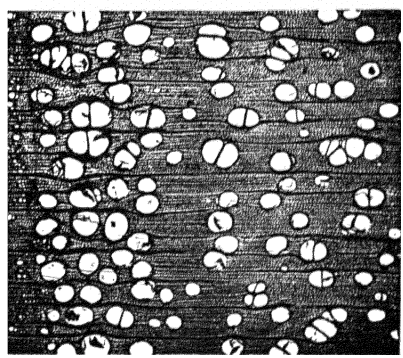
1. Syn. *Catalpa bignonioides* Walt

2. A. W., IV, 89.

3. For genus see p. 456.







HARDY CATALPA. WESTERN CATALPA. CATAWBA-TREE.

Catalpa speciosa Warder.

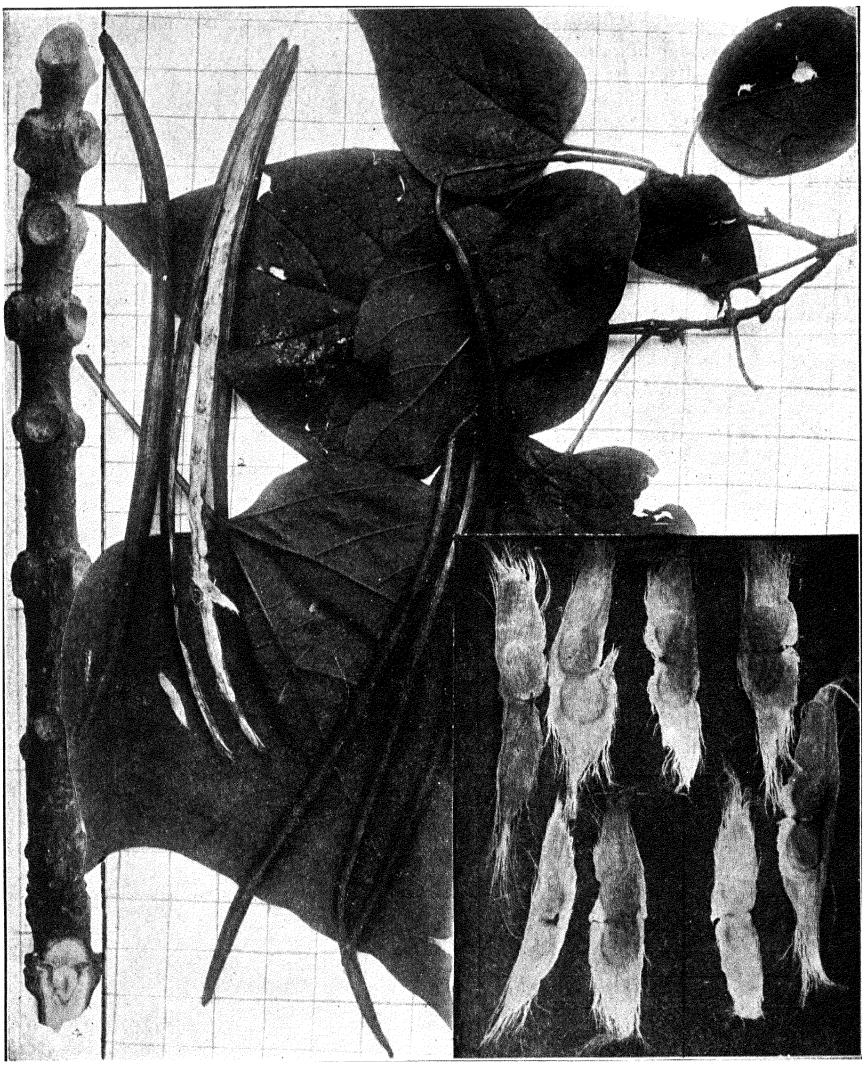


Fig. 484. Branch with mature leaves and fruit, 1; a capsule opening to liberate seeds, 2; detached seeds, 3, branchlet in winter, 4.

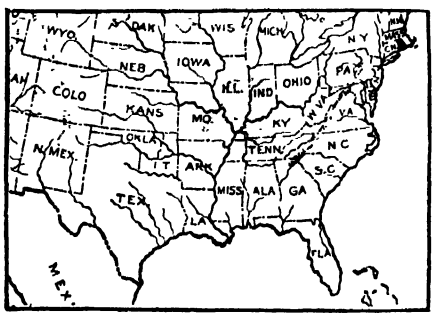
485. Trunk of a small tree in St. Louis, Mo.

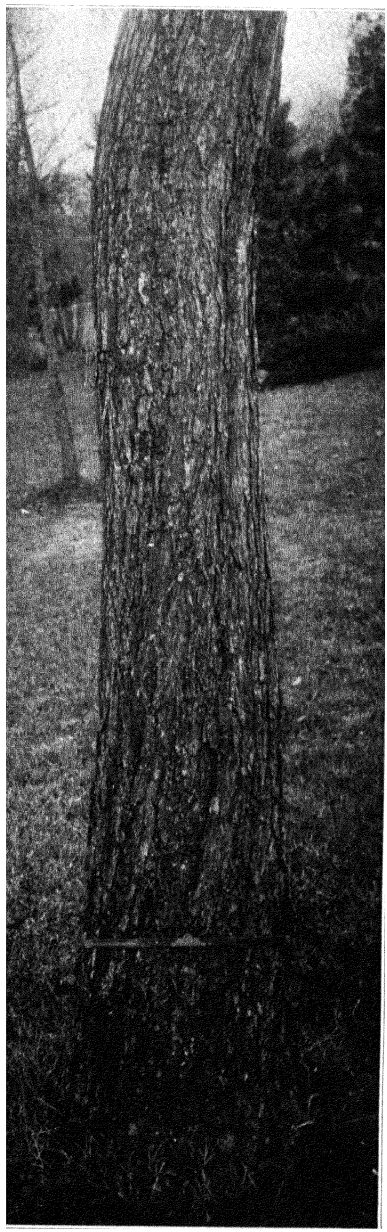
The Hardy Catalpa, in the fertile bottom-lands of the lower Ohio basin, has been known to attain the height of 120 ft., when growing in the forest, with straight columnar trunk 3 or 4 ft. in diameter, but it is usually a considerably smaller tree, and when isolated from others develops a broad top of spreading branches.

It is quite as handsome a tree as the Common Catalpa when in flower, and, though the pyramids of flowers are smaller and of fewer flowers, the individual flowers are distinctly larger. Like the other species, too, its long capsular pods swing from its leafless branches long after the leaves have fallen, and, when they open and liberate their light buoyant seeds, the wind has opportunity to carry them far from the parent tree before striking the ground.

Its light wood, of which a cubic foot, when absolutely dry, weighs 25.96 lbs., is exceedingly durable in contact with the soil, and is proving to be one of the most profitable trees to grow, at least in the middle west, for fence-posts, railway ties, telegraph-poles, etc. Large plantations of the trees are being planted especially for these uses.

Leaves broad-ovate, 8-14 in. long, cordate at base, long-pointed, entire or with 1 or 2 lateral lobes, not unpleasantly scented, at maturity glabrous dark green above, pubescent and with dark glands in the axils of the veins beneath. *Flowers* in few-flowered panicles, 5-8 in. long and broad; corolla campanulate, about 2½ in. wide, sparingly spotted with yellow and purple within, lower lobe emarginate. *Fruit:* capsule 8-20 in. long, ½-¾ in. thick, thick-walled; seeds about ⅓ in. wide with light brown rounded wings terminating in a mostly wide fringe of hairs.





BUTTON-BUSH. BUTTON-WILLOW.

Cephalanthus occidentalis L.

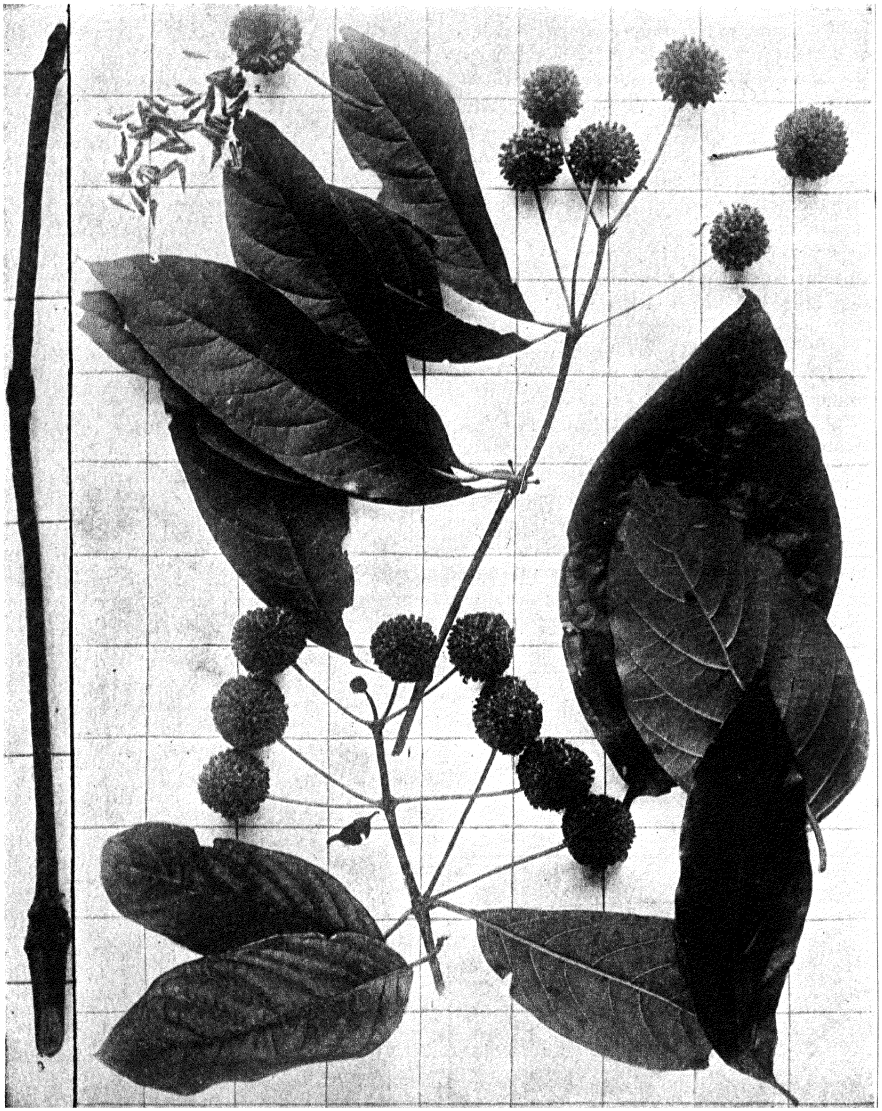


Fig. 486. Branchlets with mature leaves and fruit, 1; fruit-head disintegrating and scattered akenes, 2; branchlet in winter, 3.

487. Trunk of tree near Lake Kirkendall, Red River valley, Ark.

488. Wood structure magnified 15 diameters.

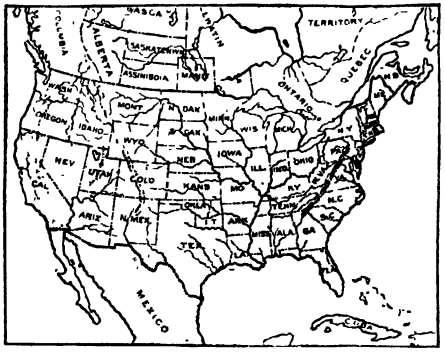
The Bottom-bush throughout the greater part of its vast range, extending from the Atlantic to the Pacific, could only be called a shrub, rarely becoming a small tree in favorable situations. In southern Arkansas and eastern Texas, however, it sometimes attains the height of 40 or 50 ft., with an irregular top of crooked spreading or upright branches and a clear often leaning trunk 1 ft. in diameter.

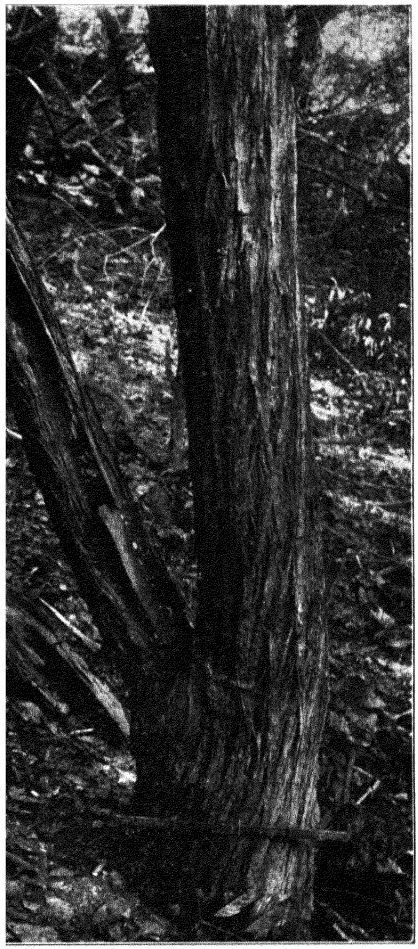
It inhabits the borders of sluggish streams, swamps and bayous, venturing farther out into the water than most of its neighbors. In southern Arkansas, where it attains its largest dimensions, it is found skirting the borders of river-bottom ponds, in company with the Swamp Privet, Planer-tree, Water Locust and various Willows. In these regions it is commonly called the *Button Willow* — a name given to it on account of the company it keeps rather than any relationship to the true Willows.

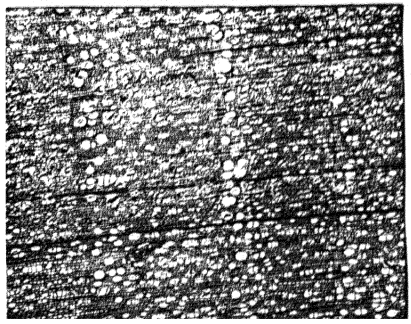
Its bark is rich in tannin, and is said to possess medicinal properties.

Leaves ovate to oval, 4-7 in. long, rounded or cuneate at base, acute or acuminate, membraneaceous, entire, dark green above, paler and with prominent light yellow arcuate veins beneath; petioles stout, ½ to ¾ in. long and between them are small triangular stipules. *Flowers* white, very fragrant and nectiferous, in panicled heads about 1 in. in diameter; calyx longer than the ovary; anthers nearly sessile and discharging their pollen before the flower opens. *Fruit* in heads ¾ in. or less in diameter.[1]

1. For genus see p. 456.







PAULOWNIA. PRINCESS-TREE.

Paulownia tomentosa (Thunb.) Bailey.

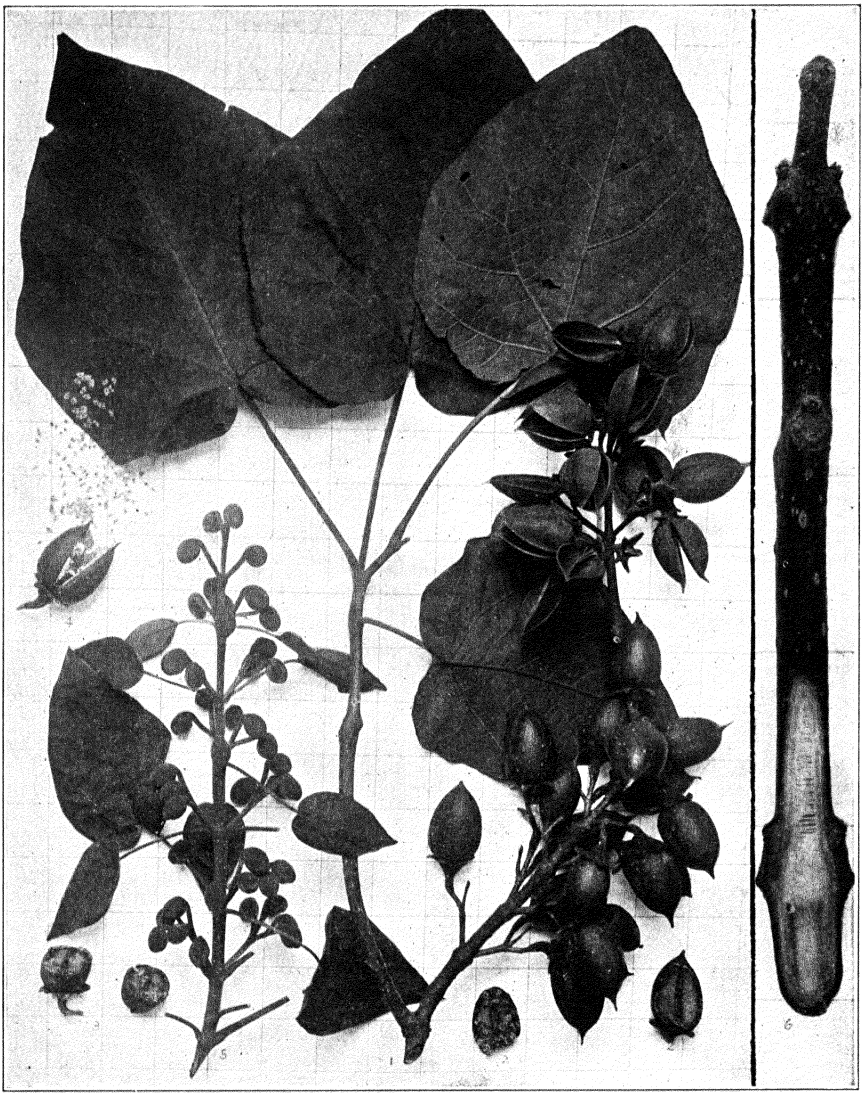


Fig. 489. Branchlet with mature leaves and fruit, and (to the right) empty capsules, 1; fruit in longitudinal section to show placentæ and seeds, 2; do, in cross-section, 3; an open capsule liberating its many small seeds, 4; cluster of flower-buds for the next season's flowers, 5; branchlet in winter cut to show segmented pith, 6.

490. Trunk with empty capsules at base.

491. Wood structure magnified 15 diameters.

The Paulownia is a beautiful tree, introduced into this country from China and Japan for ornamental purposes, and has become thoroughly naturalized in localities, where the climate is not too severe. It is wide-spreading in habit of growth, its short thick trunk, sometimes 2–3 ft. in diameter, usually dividing within a few feet from the ground into few large branches, which form a wide and often flat-topped open head, if there is sufficient room for lateral development.

It is a remarkable tree at all seasons of the year. When leafless, in winter, it bears large upright clusters of naked flower-buds, which developed the previous season to open early in the following spring, with the unfolding of the velvety young leaves, and then become so many beautiful pyramids of long blue flowers. These are delightfully fragrant, and the whole atmosphere for some distance from the tree is redolent with their perfume; but, alas! their duration is far too short, and the ground within only a day or two is strewn with their withering corollas. In summer the tree is attractive on account of its big heart-shaped leaves, which cast an abundance of shade. After these fall, in the autumn, the clusters of fruit-pods, suggestive of so many miniature bishop's miters, open and liberate to the winds innumerable small filmy-winged seeds. The clusters of empty blackened pods then persist and rattle on the leafless branches during the following winter or longer, when they detract somewhat from the ornamental value of the tree unless removed. Such is the yearly program of the Paulownia in climates south of about the latitude of New York City, which limits the boundary of its naturalization. Farther north its flower-buds usually winter-kill, but it can be and often is grown as an ornamental foliage plant as far north as Montreal. For this use it is generally cut back to the ground every year, excepting a single shoot, and this puts out great leaves a foot or two across, and sometimes attains a height of 10 to 12 ft. or more in a single season, presenting a peculiarly tropical appearance.

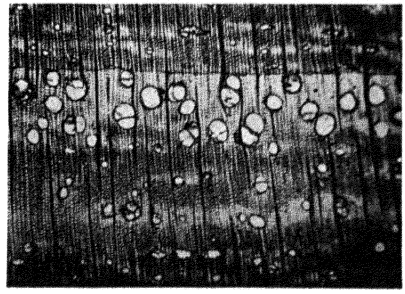
The wood of the Paulownia is soft, light, easily worked, yielding a satiny surface, and of a purple brown color with thin sap-wood. It is highly valued in Oriental countries.[2]

1. Syn. *Paulownia imperialis* S. & Z.

2. A. W., XII, 288.

3. For genus see p. 457.





BLACK HAW. SWEET HAW. SHEEP-BERRY. STAG-BUSH.

Viburnum prunifolium L.

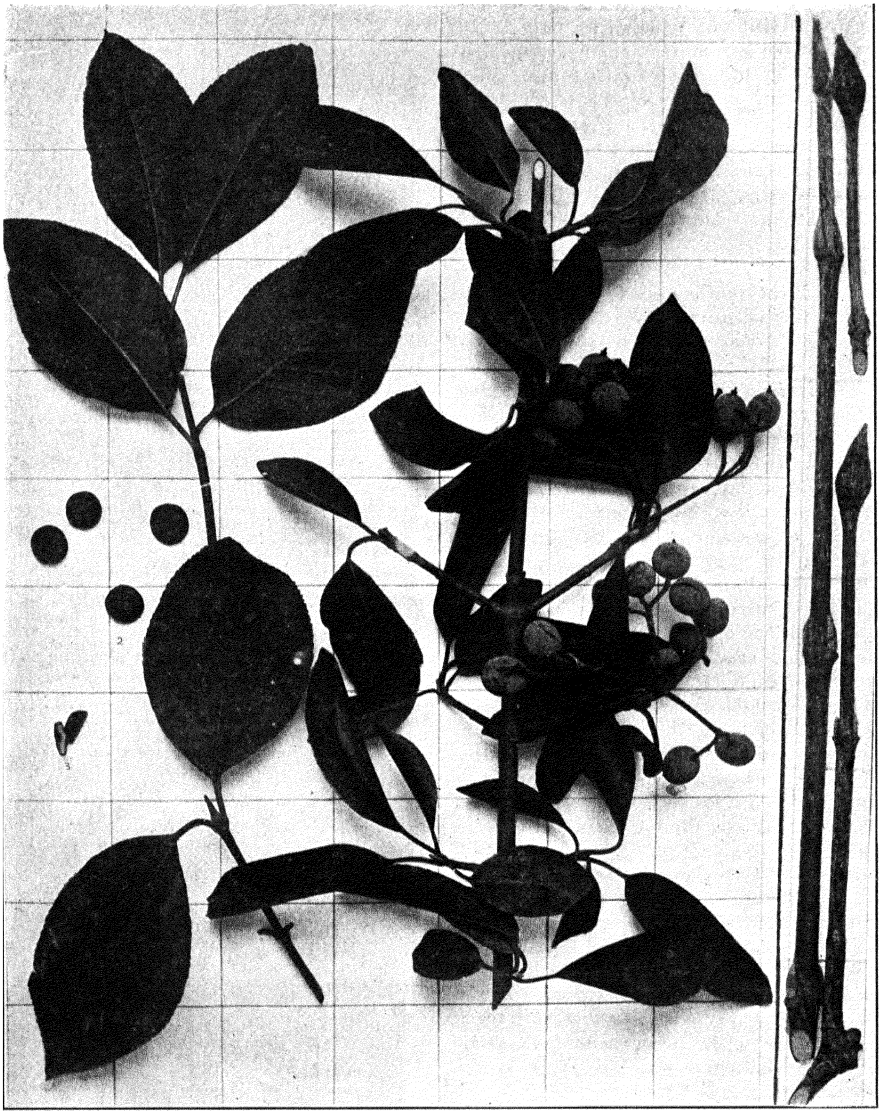


Fig. 492. Branchlets with mature leaves and fruit, 1; isolated pits, 2; one in section, 3; branchlets in winter, 4. The two large terminal buds are flower-buds.

493. Trunk with leaves at base and poison ivy foliage in background. Staten Island, N. Y.

494. Wood structure magnified 15 diameters.

The Black or Sweet Haw is a low bushy tree, sometimes attaining the height of 25 or 30 ft. with trunk 8 or 10 in. in diameter, and is often shrubby, especially in the northern part of its range. It develops a wide rounded top of many rigid branches and frequent spur-like branchlets, and its trunk is often crooked or inclined.

It inhabits mainly dry rocky hill-sides and uplands, frequently along fence rows and roadsides, where its seeds have been dropped by the birds. Rarer to the westward it is especially common in the vicinity of the coast. Like the other arborescent representatives of the genus, its glossy leaves and numerous clusters of white flowers and ornamental fruit have made this tree popular for ornamental planting, in parks and private grounds both in this country and in Europe.

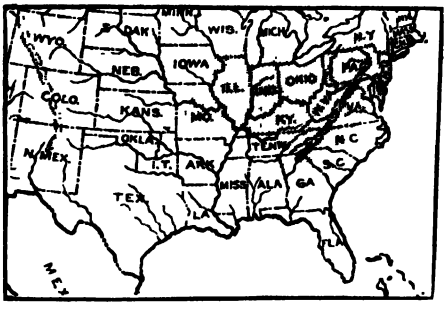
The fruit is very sweet and occasionally eaten by children, but is of no practical importance.

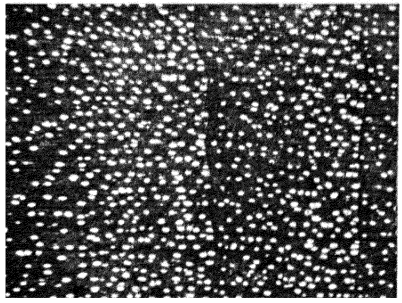
Its close-grained hard wood is unimportant commercially, but the bark is used in medicine, as it possesses neurotic, antispasmodic, tonic and diuretic properties.

Leaves oval to ovate or occasionally obovate, 1-3 in. long, obtuse or rounded at base and obtuse or acutish at apex, finely serrate, at maturity firm, coriaceous, shining dark green above, paler and glabrous beneath; petioles about ½ in. long, grooved and nearly terete or on vigorous shoots slightly margined. *Flowers* white, ¼ in. wide, in several-rayed cymes 2-4 in. across. *Fruit*, ripe in October, oval or subglobose, glaucous, blue-black in red-stemmed few-fruited clusters; stone flat or slightly convex one side, blackish.[1]

1. For genus see p. 457.







RUSTY NANNYBERRY. SOUTHERN NANNYBERRY.

Viburnum rufidulum Raf.[1]

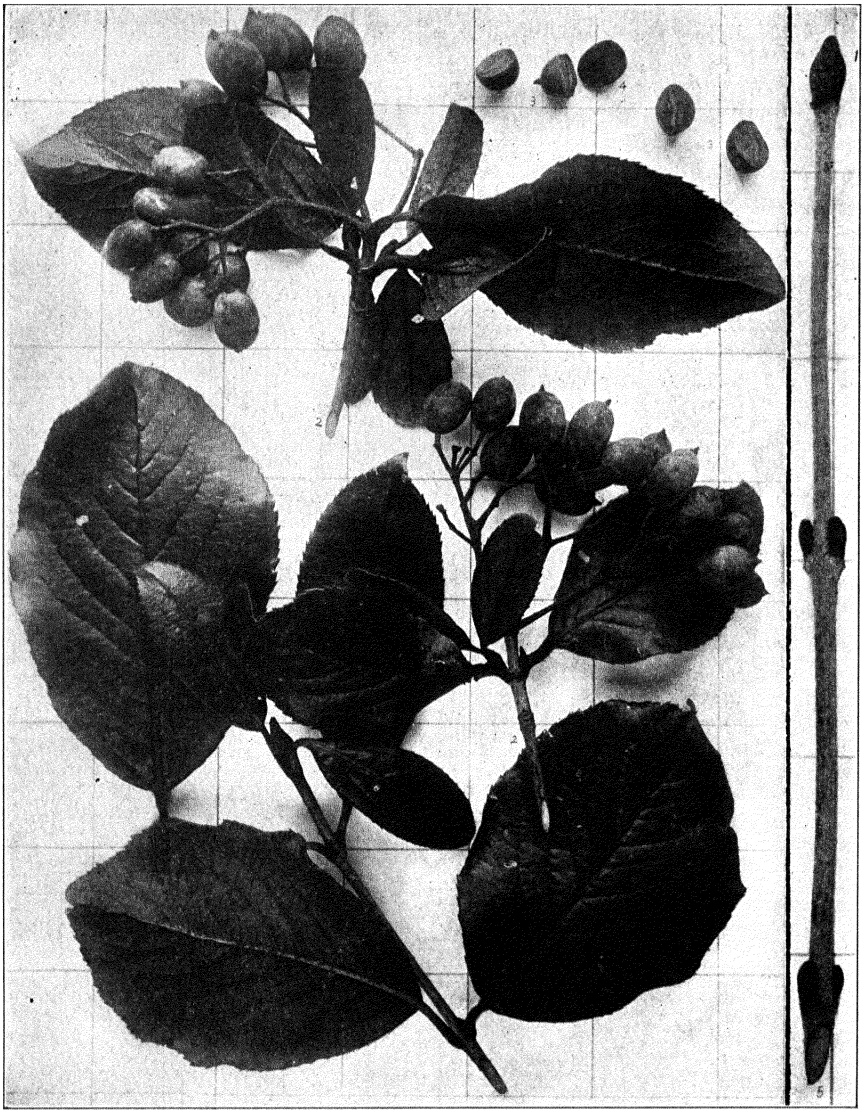


Fig. 495. Vigorous branchlet with leaves only, 1; branchlet with leaves and fully grown fruit: but still green in color, 2; fruit in section, 3; isolated pit, 4; branchlet in winter, 5.

496. Trunk of tree in coast region of North Carolina.

The Rusty Nannyberry is the largest American representative of the genus, attaining the height of 40 ft., with a trunk sometimes 12 or 18 in. in diameter, but it is generally a smaller tree and is sometimes shrubby, sending up from the ground several stems. The bark of trunk, like that of the other arborescent Viburnums, is fissured into more or less pronounced squares, by a transverse checking of its prominent longitudinal ridges.

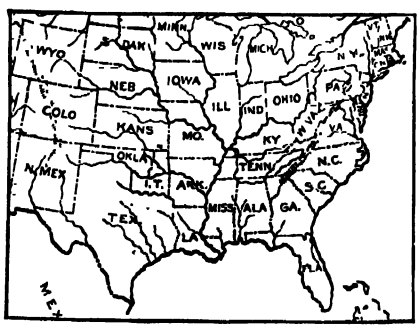
When isolated it develops a rather wide irregular open top, and, with its ample shining leaves and large flower clusters, it is a tree of unusual beauty in spring-time; and hardly less so later in autumn, when bearing its conspicuous fruit. It is well worthy of being planted for ornamental purposes, in parks and private grounds, and has been found to be hardy as far north as Massachusetts.

The wood is fine-grained, heavy and hard, but, as is the case with the northern Nannyberry, the heart-wood possesses such a strong, disagreeable odor as to render it undesirable for most uses, even if it were procurable in quantities. The disagreeable odor of the wood is communicated to the smoke when burning.

Leaves oval to elliptical and obovate, rounded or obtuse at base and mostly obtuse or occasionally acute at apex, finely and sharply serrate, at maturity coriaceous lustrous dark green above, paler and with rufous hairs on midrib and prominent veins beneath and the wide grooved and margined petioles. *Flowers* ½ in. in diameter, in compound rusty-pubescent cymes sometimes 5 or 6 in. across. *Fruit*, ripe in October, oblong, blue with glaucous bloom, about ½ in. long, in few fruited clusters with drooping red stems; stone flat, nearly orbicular.

1. Syn. *Viburnum rufotomentosum* Small.





NORTHERN NANNY-BERRY OR SHEEP-BERRY.

Viburnum Lentago L.

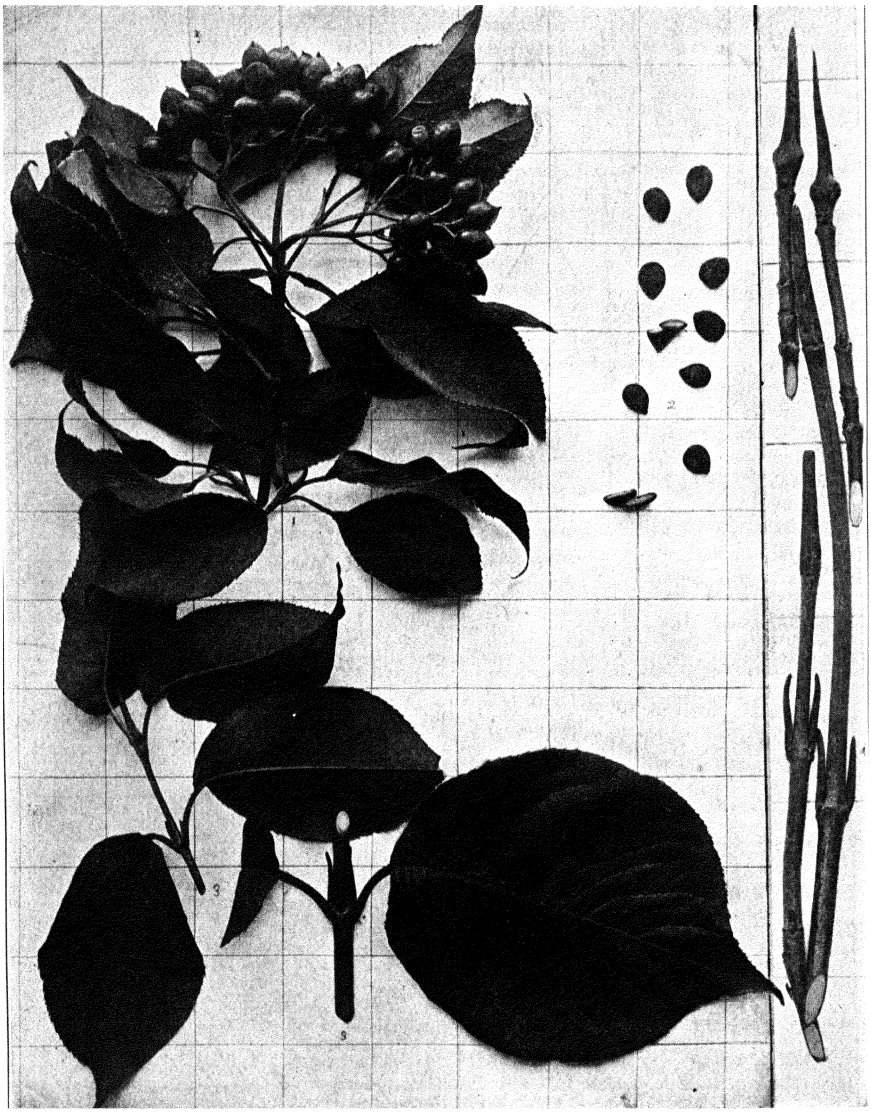


Fig. 497. Branch with leaves and mature fruit, 1; isolated pits, two in section, 2; branchlets with vigorous leaves, 3; branchlets in winter, 4. The two large uppermost buds are flower-buds; the others leaf-buds.

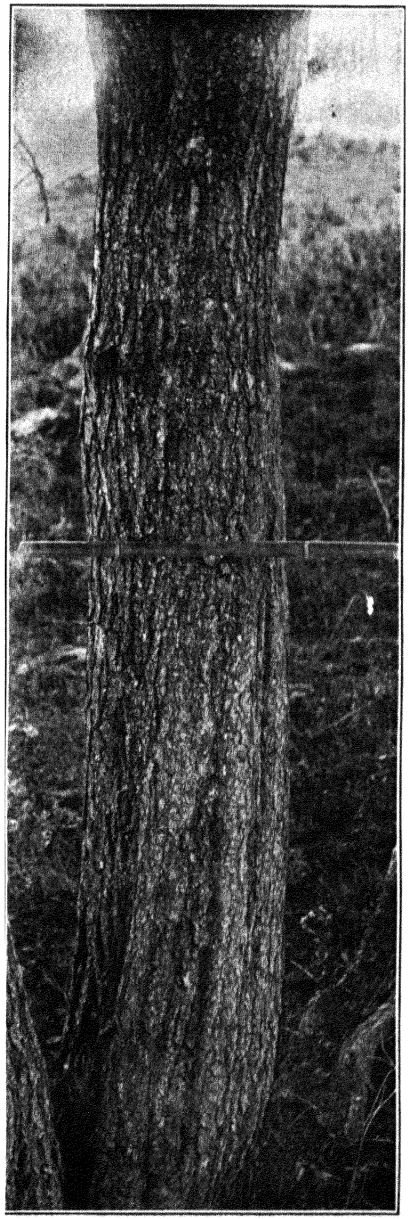
498. Trunk of a tree in Lewis Co., N. Y. Cattle rubbing against this trunk have broken off most of the square plates commonly found on the bark of this species.

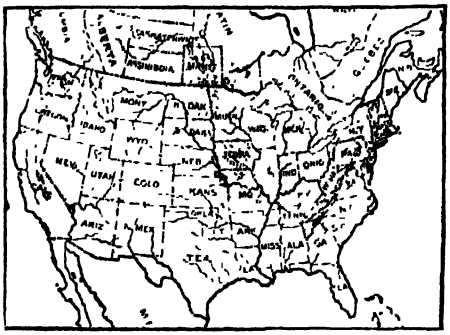
The Northern Nanny-berry is at best a small tree, only under most favorable conditions attaining the height of 25 or 30 ft., with trunk 8 or 10 in. in diameter, and is commonly only a shrub. When isolated from other trees it develops a wide rounded top with tough tortuous branches. The bark of trunk is of a dark-brown color and fissured into prominent ridges, which are more or less divided by transverse fissures.

It inhabits the banks of streams, margins of swamps and low rich bottom-lands, or sparingly hill-sides where there is an abundance of moisture, and in these localities, in the month of May, its lustrous green leaves and large clusters of small white flowers are sure to elicit admiration from even the casual observer. Its blue-black fruit in autumn presents a new phase of beauty, which the country children consider as also of utility, for they delight in eating the sweet fruit. It is then that the appropriateness of its names — *Wild-Raisin Tree and Sweet-berry* — is apparent.

The wood is fine-grained, hard and heavy, a cubic foot weighing 45.51 lbs., and the yellowish brown heart-wood is of very disagreeable and remarkably persistent odor, suggestive of the odor of rancid butter.

Leaves ovate to oval, 2½ to 5 in. long, mostly rounded at base and acuminate at apex, sharply serrate, at maturity lustrous dark green above, yellowish green and with minute black dots beneath; petioles wide, grooved above, the lowermost wavy margined, rufous-tomentose. *Flowers* ¼ in. broad in several-rayed cymes, 3-5 in. across. *Fruit* ripe in September, oblong, on drooping pedicels in red stemmed clusters with thick blue-black glaucous skin; stone very flat oval or orbicular.





SYNOPSIS

OF THE FAMILIES AND GENERA REPRESENTED IN THIS WORK WITH

ANALYTICAL KEYS

LEADING TO THE SPECIES.

CLASS I. GYMNOSPERMÆ.

The class of plants known as *Gymnospermæ* is of very ancient origin, being represented among the fossils of the Silurian Age and most numerously among those of the Triassic. It is now represented by not more than four hundred and fifty species, which have the following characters in common: They are flowering plants in which the ovules or seeds are borne naked upon an open scale (not inclosed in an ovary) and are trees and shrubs mainly with resinous juice, chiefly parallel-veined leaves and stems, consisting of bark, wood and pith, increasing in thickness by annual layers of the wood externally and of the bark internally. It consists of three families, viz.: *Coniferæ*, *Genetaceæ* and *Cycadaceæ*, the latter two being confined chiefly to tropical and south temperate regions.

PINE FAMILY. CONIFERÆ.

A family of trees and few shrubs with resinous juice and cell-walls of wood marked with circular discs. It is of greatest economic value and world-wide distribution, but chiefly in north temperate regions. Among its representatives are trees, notably the Sequoias, which are considered to be of the greatest longevity of all living organisms. It consists of thirty-one genera of which thirteen are represented in the United States.

Leaves narrow or scale-like, clustered or alternate, parallel-veined and generally persistent; buds scaly. *Flowers* in catkins or solitary with an involucre of enlarged bud-scales, unisexual and monœcious (dioecious in *Juniperus*) destitute of calyx and corolla; anthers 2-celled; pistillate flowers bearing on the inner face of each scale 2 or more ovules and becoming in *Fruit* a woody cone or rarely a berry or drupe; seeds often winged, with coat of two layers; embryo axial in copious albumen; cotyledons 2 or several.

KEY TO THE GENERA.

a Scales of cones in the axils of persistent bracts, numerous, spirally arranged and each bearing at its base above 2 seeds (*Abietineæ*).
b Cones requiring 2 years to mature; leaves needle-shaped in 2-5-leaved axillary fascicles (solitary in one species) sheathed at base with membranous scales, persistent. **Pinus.**
b² Cones maturing in one season; leaves
c In many-leaved fascicles on lateral spurs, deciduous..... **Larix.**
c² Solitary, scattered, persistent and linear or 4-sided; cones
d Pendent and scales persistent on the axes; branchlets rough with woody persistent bases of the leaves
e Leaves sessile, 4-sided or flattened above and stomatiferous all sides or above only. **Picea.**
e² Leaves petiolate, flattened and stomatiferous below only..... **Tsuga.**
d² Erect on the branchlets and scales falling away from persistent axes at maturity; leaves leaving flat or depressed leaf-scars..... **Abies.**
a² Scales of the cones without bracts
b Numerous, spirally arranged and forming a woody cone; leaves linear (sometimes scale-like) alternate (*Taxodiæ*) and deciduous ..... **Taxodium.**
b² Few, decussate; leaves decussate or in 3-ranks and often of 2 forms (*Cupressineæ*); fruit a
c Woody cone; leaves all scale-like; cones

d Oblong; scales 8-12, oblong, each bearing 2 equally 2-winged seeds. **Thuya.**

d² Subglobose, with peltate scales each bearing 2 seeds and maturing in one season. **Chamæcyparis.**

e³ Berry, formed by the coalescence of the fleshy scales of the flower.. **Juniperus.**

THE PINES. GENUS PINUS L.

The Pines are trees and a few shrubs of the northern hemisphere and chiefly of temperate regions. Many of its representatives are of greatest economic value. About eighty species are recognized of which thirty-four are natives of the United States, ten being represented in the northeastern states.

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

The name is a Latin word from Celtic *pin* or *pen, a crag.*

KEY TO THE GENERA.

Leaves in clusters of

a Five; cones with thin unarmed scales..... **P. Strobus.**

a² Three; cones with scales thickened at apex and armed with a prickle; cones

b Subterminal and deciduous above the basal scales

c Four to six inches long, heavy; buds brown..... **P. ponderosa scopulorum.**

c² Six to ten inches long, not heavy; buds white..... **P. palustris.**

b² Lateral and symmetrical; cones

c Long-ovoid with stout prickles; leaves 6-9 in. long.. **P. Tæda.**

c² Ovoid with slender prickles; leaves

Three to five inches long..... **P. rigida.**

Six to eight inches long..... **P. serotina.**

a³ Two; cones

b Subterminal; scales thickened and unarmed..... **P. resinosa.**

b² Lateral; scales

c Unarmed, or with very weak or deciduous prickles; cones small, incurved. **P. divaricata.**

c² Armed with

d Slender prickles; leaves

e Three to four in. long..... **P. echinata.**

e² One to two in. long..... **P. Virginiana.**

d² Very thick stout spines..... **P. pungens.**

For species see pp. 2–19 and the following:

LONG-LEAF PINE, *P. palustris* Mill. An important timber tree of the southern states and has been reported as occurring very sparingly as far north as southeastern Virginia. *Leaves* 8-18 in. long, dark green, densely tufted at the ends of the branchlets, arranged in 3 s, with persistent sheaths. *Flowers:* staminate rose-purple; pistillate close to the apex of the shoot. *Fruit:* cones cylindric-ovoid, 6-10 in. long, somewhat curved, subsessile, with scales thickened near apex by a transverse ridge and bearing a short recurved prickle; cones deciduous within the base, a few basal scales being left attached to the stem; seeds about ½ in. long with long wing very oblique at apex.

POND PINE, *P. serotina* Michx. A tree of the southern states required to be mentioned here only from the fact that its northernmost representatives are said to have been found in southeastern Virginia, where, however, it is very scarce. *Leaves* in 3 s, 6-8 in. long, rather slender, glaucous, stomatose all sides. *Fruit:* cones lateral, subglobose to ovoid, 2-2½ in. long, subsessile, scales thickened at apex and bearing a minute prickle; seeds about ⅛ in. long, including wing ¾ in. long.

THE LARCHES OR TAMARACKS. GENUS LARIX. ADANSON.

A genus of nine species of trees of northern and mountainous regions of the northern hemisphere producing durable and valuable lumber and other products. Three representatives are North American, two inhabiting the western side of the continent and one the eastern.

Leaves awl-shaped, three-angled (or four-angled in *Larix Lyalii*), soft, deciduous, in clusters of many each from lateral scaly spurs, excepting on the shoots of the season where they

appear singly, remote and in spiral arrangement. *Flowers* appearing with the leaves; the staminate solitary, globose, yellow, terminating lateral scaly buds or spurs on the growths of previous seasons; anthers numerous, spirally arranged, 2-celled with pointed connectives; pollen grains simple, globular; pistillate flowers pinkish green with stalked scales in the axils of longer scarlet bracts and each bearing two ovules. *Fruit* and ovoid-oblong erect short-stalked cone, maturing the first season, with thin concave scales smallest and sterile near the ends; seeds nearly triangular and shorter than their wings; cotyledons six.

The name is the classical Latin name of the *Larch*.

For species see pp. 20–21.

THE SPRUCES. GENUS PICEA LINK.

This genus consists of eighteen species of trees confined to the north temperate and subarctic regions, sometimes forming extensive tracts of valuable forests. Seven species are natives of North America, three in the Atlantic states, one is confined to the heart of the Rocky Mountains and the others mainly to the Pacific slope.

Leaves linear, 4-sided and stomatiferous all sides (in the eastern species) or flattened and stomatiferous mostly on the upper side, scattered and pointing outward and toward the end of the twig but sometimes appearing 2-ranked by a twist in those of the lower side, articulated to prominent persistent bases. *Flowers* terminal in the axils of upper leaves, staminate long-stalked, on the branchlets of the previous year; anthers with produced rounded connective and cells opening lengthwise: pistillate oblong, each scale in the axis of a bract and bearing two ovules at its base. *Fruit* ovoid or cylindrical cones, pendent mostly from the uppermost branches, maturing the first year with thin unarmed persistent scales and small not exserted bracts; seed pointed-ovoid with ample membranous wing; cotyledons four to sixteen.

Picea is the classical Latin name of the *Spruce*.

KEY TO THE SPECIES.

a Branchlets glabrous, glaucous; cones oblong-cylindric and scales
  b Narrow, elongated and erose at apex; leaves rigid and spinescent.... **P. Parryana.**
  b² Wide and entire at apex; leaves soft and flexible..... **P. Canadensis.**
a² Branchlets pubescent, brownish; cones
  b Ovate-oblong, with very short slightly, if at all, incurved stalks, subentire scales and dark yellowish green foliage..... **P. rubens.**
  b² Ovate with incurved stalks and erose-margined scales; leaves blue-green. **P. Mariana.**

For species see pp. 22–29.

THE HEMLOCKS. GENUS TSUGA CARR.

Tall somewhat pyramidal trees of the temperate regions of North America, Japan, China and the Himilaya Mountains, with horizontal and drooping branches, slender twigs and graceful flat sprays of foliage. Seven species are known of which four are inhabitants of North America, two of the Atlantic and two of the Pacific states.

Leaves linear, short-petiolate and articulated to persistent bases, flat in most species, mostly appearing 2-ranked by a twist in the base of the leaf and white stomatose beneath (but not 2-ranked and stomatose both above and below in one species) with a single dorsal resin-duct, evergreen. *Flowers* in middle spring, monœcious; the sterile subglobose clusters of stamens from the axils of the leaves of the previous year; the stipes surrounded by numerous bud-scales; anthers tipped with a short spur or knob and cells opening transversely; pistillate aments terminal on the branchlets of the previous year, erect; bracts somewhat shorter than the scales.

Tsuga is the Japanese name of the *Hemlock-tree*.

KEY TO THE SPECIES.

Cones less than 1 in. long, with orbicular scales expanding but little at maturity. **T. Canadensis.**

Cones more than 1 in. long with oblong scales widely divergent at maturity. **T. Caroliniana.**

For species see pp. 30–33.

THE FIRS. GENUS ABIES LINK.

Trees of generally strict pyramidal habit of growth with branches in whorls and bark of trunks when young containing numerous resin-vesicles. There are twenty-four known species, all natives of the northern hemisphere and chiefly of northern regions. Ten are found in North America north of Mexico, eight in the Pacific coast and Rocky Mountain regions and two in the Atlantic states.

Leaves sessile, those of young trees and sterile branches usually flat (four-sided in *Abies magnifica*) rounded or emarginate at apex, centrally grooved above, spirally arranged, but generally appearing 2-ranked by a twist in their bases and stomatiferous only below; leaves of leading shoots and fertile branches crowded, incurved and more or less quadrangular, obtuse or acute at apex, and sometimes stomatiferous above, persistent for eight or ten years and when falling away leaving a circular flat scar; resin-ducts 2; branch-buds usually resin coated. *Flowers* from the axils of the leaves of the previous year and confined to the upper branches: the staminate in abundance on the lower side of branchlets, oblong with stipe, surrounded at base with bud scales; anther-cells 2, extrorse, opening transversely and connective terminating in a knob: pistillate flowers erect on upper side of branchlet and usually only those of the topmost branches, globose or cylindrical-oblong; scales numerous, imbricated and shorter than their mucronate bracts. *Cones* erect, ovoid to cylindrical-oblong, maturing the first year, with numerous broad thin imbricated scales, each bearing 2 seeds and springing from the axil of a thin membranous bract which with the scale and seeds falls away at maturity from the straight persistent axis; seed furnished with resin vesicles and a large membranous oblique wing at apex; cotyledons 4-10, shorter than radicle.

Abies is the ancient Latin name of the *Fir-tree*.

KEY TO THE SPECIES.

Bracts of cones shorter than their scales and inclosed..... **A. balsamea.**
Bracts of cones much longer than their scales and reflexed..... **A. Fraseri.**

For species see pp. 34–37.

THE BALD CYPRESS. GENUS TAXODIUM RICH.

The genus *Taxodium* consists of two or three species of resinous trees of great economic value and polymorfic habits of growth. One is found on the table-lands of Mexico and individuals of this species are remarkable for their enormous size and age.

Leaves deciduous in our species, spirally arranged and of two sorts, viz., flat linear-lanceolate and spreading so as to appear 2-ranked, smooth, pale, and with obscure midrib and stomatose beneath; and scale-like and appressed. *Flowers* appearing in early spring before the leaves, unisexual from buds formed the previous year; the staminate numerous in long terminal drooping panicled spikes with 6-8 stamens having broad yellow peltate connectives and 2-valved anthers; pistillate aments ovoid and appearing singly or few together near the ends of branchlets of the previous year and consisting of a few bractless scales each with a pair of ovules at its base. *Cones* globose or nearly so, short-stalked, maturing the first year; scales thick woody, rhomboidal, valvate, and bearing each two seeds and large glands filled with liquid resin; seeds irregularly triangular-pyramidal, with coriaceous or woody coat; cotyledons 4-9.

The name *Taxodium* is from Greek words indicating the resemblance of the leaves to those of the Yew-tree.

For species see pp. 38–39.

THE ARBOR-VITÆS. GENUS THUYA L.

Important evergreen trees of few species with very durable wood, pyramidal head, resinous juice and handsome frond-like flat 2-ranked sprays of foliage. They are confined to the northern regions of North America, Japan and eastern Asia. Two are North American, one a valuable timber-tree of the Pacific slope and the other widely distributed in the Atlantic states and Canada.

Leaves small, decussate, closely imbricated in 4 ranks, scale-like, stomatiferous and rounded or slightly keeled on the back, those on ultimate shoots obtuse and compressed forming a flat spray and those on larger twigs more spreading and acute or subulate on seedlings. *Flowers* very small, monœcious, terminal, the two sexes usually on different branchlets, staminate subglobose with 4-6 opposite filaments having peltate connectives bearing each 4-6 anther-cells; pistillate with 8-12 opposite scales each with 2 erect ovules. *Cones* small, ovoid-oblong, maturing the first season, with few thin oblong leathery scales thickened at apex and only the 2 or 3 middle pairs fertile; seeds usually 2 at the base of each scale, oblong, compressed and usually with lateral wings not united at apex; cotyledons 2.

Thuya is the ancient Greek name of some coniferous tree and applied by Linnæus to this genus.

For species see pp. 40–41.

THE COAST CEDARS. GENUS CHAMÆCYPARIS SPACH.

Tall evergreen pyramidal trees with resinous juice, fragrant valuable wood, foliage in flat open fan-like sprays with some of the branchlets deciduous. A half dozen species are known confined to North America, Japan and Formosa, with many abnormal forms due to the gardener's art. Of the North American species two are confined to the Pacific and one to the Atlantic coast regions.

Leaves very small, opposite, in four ranks, scale-like and appressed or more spreading on older twigs and subulate on vigorous sterile shoots. *Flowers* in early spring, minute, monœcious, terminal, the two sexes on different branchlets; staminate oblong with several decussate stamens having ovate connectives decreasing in size from below upwards, and each bearing usually two globose anther-cells; pistillate subglobose with decussate peltate scales each bearing two to five erect ovules. *Cones* small, globose, erect, maturing the first season but persisting on the branchlets after discharging their seed, with thick peltate scales having central bosses or points and each bearing at its base one to five erect compressed laterally-winged seeds; cotyledons two.

The name is from Greek roots meaning "*a low Cypress.*"

For species see pp. 42–43.

THE JUNIPERS. GENUS JUNIPER L.

Evergreen trees and shrubs of the northern hemisphere having pungent aromatic juice, generally fibrous bark and very durable light odorous wood. About thirty-five species are known. In the New World they are distributed from the Arctic Circle to the highlands of Mexico, Lower California and the West Indies in eleven arborescent species and one or two shrubby. Two only of the arborescent and one of the shrubby species are found in north-eastern United States.

Leaves of two sorts, viz., opposite, scale-like, with gland-like disk and appressed in four ranks, or subulate and free in whorls of three, sessile, sharp-pointed, without gland, convex below, concave and stomatiferous above — both forms sometimes on the same plant. *Flowers* small, dioecious or sometimes monœcious, oblong, terminal or axillary, the staminate yellow, with peltate scales each bearing 2-6 globose anther-cells attached to its base; the pistillate consisting of 2-6 opposite or ternate fleshy pointed scales each bearing one or two erect ovules. *Fruit* berry-like by a coalescence of the fleshy scales of the flower, blue-black or red with white bloom, smooth or marked with points of the flower-scales, closed or open, containing usually one to six bony wingless seeds and requiring one to three years to attain maturity; cotyledons 2-6.

Juniperus is the classical Latin name of the *Juniper.*

KEY TO THE SPECIES.

a Leaves of 2 kinds, both scale-like and subulate; flowers terminal; buds naked
  Maturing its fruit in autumn of the first season..... **J. Virginiana.**
  Maturing its fruit in autumn of second season..... **J. scopulorum.**
a' Leaves all subulate; flowers axillary; buds scaly..... **J. communis.**

For species see pp. 44–47 and the following:

WESTERN RED CEDAR, *J. scopulorum* Sarg. A tree very similar to the eastern Red Cedar but with somewhat larger fruit, containing usually 2 seeds and maturing at the close of the second season.

CLASS II. ANGIOSPERMÆ.

In distinction from the class of plants known as the *Gymnospermæ* we now take up *Class II*, the *Angiospermæ*, which includes all other Flowering Plants. Its representatives are thought to be of more recent origin than those of the *Gymnospermæ* and are characterized by having flowers in which the ovules are borne in a closed cavity (the ovary) which becomes the fruit at maturity.

The Class is divided into two subclasses, viz., *Monocotyledons* and *Dicotyledons.* The former are plants in which the embryo contains a single cotyledon or seed leaf, the leaves are parallel-veined, the parts of the flower are in 3s and the stems consist of a mass of soft, pith-like tissue (parenchyma) permeated with wire-like bundles of woody tissue (fibro-vascular bundles). The Palms, Yuccas, etc., are tree representatives of this subclass, all being confined to warm climates.

Subclass 2. DICOTYLEDONS.

These are plants in which the embryo contains two cotyledons, the leaves are netted-veined, the parts of the flower are mostly in 4s or 5s and the stems consist of bark, wood and pith, increasing by annual layers of wood inside the bark. They comprise by far the greater part of the flowering plants including all of the trees of northern temperate regions excepting those of the class *Gymnospermæ.* The subclass is divided into *Apetalæ*, *Polypetalæ* and *Gamopetalæ*, which we will take up in order.

Division 1. APETALÆ.

Flowering plants in which the corolla and also the calyx sometimes is wanting.

WALNUT FAMILY. JUGLANDACEÆ.

A family of six genera and about thirty-five species of important trees with aromatic bark and watery juice, mostly of the warmer parts of the north temperate zone. Two genera are represented in the United States.

Leaves alternate, deciduous, odd-pinnate, with long grooved petioles exstipulate, the leaflets sessile or nearly so excepting the terminal one which is usually long-stalked. *Flowers* monœcious, opening after the unfolding of the leaves; the staminate in long drooping lateral aments on the growth of the previous season; calyx 3 to 6-lobed, each in the axil of and adnate to a bract; stamens several with short distinct filaments and longitudinally dehiscent anthers; pistillate in spikes or solitary terminating the new growth, bracteate and usually two-bracteolate; calyx 3-5-lobed; ovary inferior and 1-celled or incompletely 3-4-celled and containing a solitary erect orthotropous ovule; style short with 2 plumose stigmas. *Fruit* a bony incompletely 2-4-celled nut inclosed in an indehiscent or 4-valved exocarp; seed without albumen, large, solitary, 2-lobed, fleshy and very oily; cotyledons 2-lobed, corrugated or sinuose; radicle minute, superior, at apex of nut.

KEY TO THE GENERA.

Husk of fruit indehiscent; nut mostly sculptured; staminate aments simple; pith segmented. **Juglans.**

Husk 4-valved; nut not sculptured; staminate aments branched; pith not segmented. **Hicoria.**

THE WALNUTS AND BUTTERNUTS. GENUS JUGLANS L.

Trees with dark colored durable heart wood, furrowed bark, stout branchlets, laminated pith and edible nuts. Ten species are known, four of which are natives of the United States, two of the northern Atlantic states, one of the southwestern states and one of the Pacific coast region.

Leaves with stout pubescent petioles and 11-17 subsessile, oblong-lanceolate leaflets which are mostly from 2 to 4 inches long, rounded and unequal at base, finely serrate except at base, acute or acuminate and clammy pubescent at least when young, rugose above; leaf-buds superposed. *Flowers* staminate in thick drooping cylindrical aments 3-5 in. long or more; calyx usually 6-lobed, light yellowish green, puberulous outside; stamens 8-40 with nearly sessile dark brown anthers; pistillate flowers in few-flowered spikes at the ends of the shoots of the season with villous laciniated involucre; calyx 4-lobed; petals 4, alternate with the sepals and adnate to the ovary; pistil with very short style; two plumose stigmas and usually 2-celled ovary. *Fruit* globose or ovoid with fibrous somewhat fleshy indehiscent exocarp and an ovoid or flattened globose hard thick-walled rugose or sculptured indehiscent endocarp (nut) which is 2-4-celled at base; seed deeply lobed.

The name is of Latin derivation meaning *nut of Jove.*

KEY TO THE SPECIES.

Fruit subglobose, papillose (not viscid); leaflets 15-23..... **J. nigra.**
Fruit pointed-ovoid, viscid-pubescent; leaflets 11-17, viscid-pubescent..... **J. cinerea.**

For species see pp. 48-51.

THE HICKORIES. GENUS HICORIA RAF.

The Hickories are confined to the temperate regions of eastern North America ranging from the valley of the St. Lawrence River to the highlands of Mexico. There are about a dozen species, all being found within the United States excepting one. Their wood is very strong, flexible and more valuable than any other woods for certain uses. They have smooth gray bark when young, but with age become fissured into hard plates and scales. The branches are tough and flexible and the pith solid.

Leaves with thick and firm ovate to obovate leaflets, increasing in size from below upwards, often glandular-dotted, usually unequal at base, and acuminate at apex, serrate, veins commonly forking near the margins. *Flowers:* staminate aments slender, drooping and usually in threes with common peduncle from the axils of leaf-scars at the base of the shoots of the season or in clusters from buds in the axils of leaf-scars near the summit of the growth of the previous season, the lateral branches from the axils of persistent bracts; calyx 2-3-lobed, adnate to the bracts; stamens 3-10 with ovate-oblong hairy anthers; pistillate flowers sessile, in mostly 2-10-flowered terminal spikes; calyx unequally 4-lobed; stigmas short-papillose. *Fruit* subglobose, oblong, ovoid or pyriform, with husk (epicarp) woody at maturity and separating more or less completely into 4 valves, the sutures alternate with

those of the nut and falling away at maturity; nut with bony crustaceous shell (endocarp), 4-celled at base, 2-celled at apex; seed lobed and variously grooved, oily and usually edible, sometimes bitter.

The name is from the popular name which is of American Indian origin.

KEY TO THE SPECIES.

a Bud scales few, valvate; sutures of fruit winged, lateral leaflets more or less lanceolate and falcate.
  b Nut compressed and kernel usually bitter; shell
    Smooth and pale..... **H. minima.**
    Rugose, angled, chocolate-color..... **H. aquatica.**
  b² Nut not compressed; seed edible..... **H. Pecan.**
a² Bud-scales numerous, imbricated; lateral leaflets slightly if at all falcate, broader; sutures not prominent (or slightly so in *H. villosa*)
  b Husk of fruit usually thick, splitting to base
    c Bark exfoliating in long loose plates — shaggy; nuts whitish thick-shelled
      Leaflets mostly 3-5 and nut rounded at base..... **H. ovata.**
      Leaflets mostly 7-9 and nut pointed at base..... **H. laciniosa.**
    c² Bark in close rough ridges, not shaggy; leaflets 7-9; foliage fragrant and stellate-pubescent; nut usually 4-ridged and with thick brownish shell.. **H. alba.**
  b² Husk of fruit thin and usually not splitting freely to the base.
    c Fruit nearly globose and nut small with thin shell and bark of old trunks exfoliating in long narrow strips
      Nut little flattened; middle lobe of staminate calyx short..... **H. microcarpa.**
      Nut much flattened; middle lobe of calyx long..... **H. borealis.**
    c² Fruit obovoid or pyriform with smooth thick-shelled nut; bark close
      Foliage glabrous or nearly so..... **H. glabra.**
      Foliage provided beneath with silvery peltate scales..... **H. villosa.**

For species see pp. 52-69 and the following:

NORTHERN HICKORY. *H. borealis* Ashe. This is a name recently given to certain small Hickories found on dry uplands in Michigan near the Detroit River, which are allied to *H. microcarpa*, but differing from it mainly in having a longer middle lobe of the staminate calyx and fruit more flattened, with very thin rugose husk usually not splitting. The extent of their distribution is not yet determined.

SWEET GALE FAMILY. MYRICACEÆ.

Small aromatic trees and shrubs with astringent bark and of about forty species grouped in two genera only one of which is arborescent. They are of wide distribution throughout the temperate and warmer regions of both hemispheres.

Leaves simple, alternate, mostly resin-dotted and fragrant, revolute in the bud, persistent; buds small and scaly. Flowers in early spring in oblong aments from the axils of the leaves of the previous year, dioecious or monoecious, solitary in the axils of bracts; perianth wanting; staminate with 4 to several stamens inserted on the base of the scale with slender filaments united at base; anthers erect, introrse, 2-celled, longitudinally dehiscent; pistillate flowers single or in pairs, with 1-celled ovary, short style, 2 filiform stigmas; ovule solitary, erect, orthotropous. *Fruit* a small subglobose drupe covered with waxy exudation; seed erect with straight embryo, plano-convex cotyledons and no albumen.

THE BAYBERRIES. GENUS MYRICA L.

Trees and shrubs of about seven species are represented in America and of these three only are trees. One is confined to the Pacific coast region and the other two are inhabitants of southeastern United States, one of these extending northward into Virginia or in shrubby form farther north.

Leaves serrate, dentate or entire, exstipulate, mostly resin-dotted. *Flowers:* ovary subtended by 2-4 short bractlets. *Fruit* a small drupe covered with waxy exudations.

The name *Myrica*, thought to come from a word meaning *to perfume*, is the ancient Greek name of some fragrant shrub, and applied by Linnæus to this genus.

For species see pp. 70-71.

CORK-WOOD FAMILY. LEITNERIACEÆ.

Small trees and shrubs of a single genus and species, with exceedingly light wood, of southern United States and the valley of the St. Francis River in southeastern Missouri and the valley of the Brazos River in Texas.

Leaves 3-8 in. long, deciduous, alternate, petiolate, involute in the bud, oblong or elliptic-lanceolate, acute or acuminate at apex, cuneate at base, firm, rugose-reticulate, at maturity lustrous bright green above villous pubescent below as are the petioles and branch-

lets. *Flowers* dicœcious in erect tomentose aments, expanding before the leaves; staminate aments about 1 in. long near the ends of the branchlets; perianth wanting stamens 3-12, inserted on the bases of the scales, with distinct filaments and oblong introrse 2-celled longitudinally dehiscent anthers; pistillate aments smaller, with perianth consisting of small scales; ovary superior, 1-celled, with an elongated flatteneed recurved style, stigmatic on inner face; ovule solitary, laterally attached, ascending. *Fruit* an elongated compressed dry drupe, solitary or 2 or 3 together, with thin-walled nutlet; seed flattened with oblong blackish hilum, fleshy albumen, erect embryo and flat cordate cotyledons.

THE CORKWOOD. GENUS LEITNERIA CHAPMAN.

The genus is characterized as above and contains a single species. It was named after Dr. E. F. Leitner, a German naturalist who was killed in Florida during the Seminole war.

For species see pp. 72–73.

WILLOW FAMILY. SALICACEÆ.

Trees and shrubs with soft light wood, brittle twigs, bitter bark and of wide distribution, chiefly of the northern hemisphere. They are grouped in two genera, having the following characters in common:

Leaves deciduous, simple, alternate and with stipules (sometimes minute and caducous). *Flowers* dioecious, appearing in early spring before the leaves, in aments, from axillary buds, a single small flower appearing in the axil of each scale of the ament, perianth wanting; stamens 2-many, subtended by a disk and with introrse 2-celled anthers longitudinally dehiscent; pistil with short style, 2-4-lobed stigma and 1-celled ovary having 2-4 parietal placentæ and numerous anatropous ovules. *Fruit* a 1-celled 2-4-valved ovoid capsule, bearing numerous minute seeds surrounded by long silky white hairs and containing short radicle, flat cotyledons and no albumen.

KEY TO THE GENERA.

Scales of the aments entire; stamens 2-10 and buds with a single scale..... **Salix.**
Scale of the aments incised; stamens numerous and buds with several scales.... **Populus.**

THE WILLOWS. GENUS SALIX L.

Trees and shrubs of 160 or 170 species of wide distribution throughout the northern and a few in the northern hemisphere. They grow generally along the banks of streams and in low moist soil from the Arctic regions to the tropics. Numerous natural hybrids also occur. About 70 species are found in North America and of these 21 are recognized as trees of which 9 or 10 species are found in the northeastern states. Besides these we have two or three naturalized arborescent species.

Leaves commonly lanceolate but ranging from obovate to linear; petioles short, sometimes glandular at apex and more or less covering the bud; stipules oblique, serrate, large and persistent (especially so on young shoots) or small and deciduous; winter buds covered with a single scale of two coats, the inner thin and membranous. *Flowers* in aments with entire or glandular dentate bracts and disk gland-like, minute and nectiferous; stamens 2-12 (mostly 2) inserted at the base of the scale, with slender and mostly free filaments and small oblong anthers; pistillate aments usually erect or spreading; ovary sessile or short stipitate with short style, 2 short more or less recurved 2-cleft stigmas and containing 4-8 ovules on each of the 2 placentas. *Fruit* an acuminate capsule dehiscent by 2 recurved valves; seeds minute, dark brown.

The name is the ancient Latin name of the genus.

KEY TO THE SPECIES.

a Stamens 3-7, with filaments hairy at base; aments terminating leafy branchlets and with light yellow caducous scales
  b Petioles not glandular; leaves
    c Pale or whitish beneath, lanceolate to ovate-lanceolate
      With longer petioles mostly ½ in. or more long..... **S. amygdaloides.**
      With very short petioles mostly less than ¼ in. long..... **S. longipes.**
    c² Green beneath, narrow-lanceolate, long-pointed; petioles short... **S. nigra.**
  b² Petioles glandular; leaves taper-pointed
    Lustrous dark green above, pale beneath, thickish and finely serrate. **S. lucida.**
    Dull dark green (not lustrous) above, pale beneath, thinnish and more coarsely serrate. **S. fragilis.**

a² Stamens usually 2.
  b Aments both terminal and axillary; leaves linear-lanceolate and remotely denticulate; filaments hairy at base; bracts yellow, caducous..... **S. fluviatilis.**
  b² Aments terminal on lateral branchlets.

c Capsules glabrous; leaves
d Oblong-lanceolate, acute at apex..... **S. balsamifera.**
d¹ Linear-lanceolate; branchlets long and pendent..... **S. Babylonica.**
d² Lanceolate to oblanceolate; branchlets not pendent,
e Glabrous
Bright or reddish yellow; leaves glaucous beneath..... **S. vitellina.**
Light brown; leaves silky pubescent..... **S. alba.**
e² Brownish pubescent ..... **S. Missouriensis.**
c¹ Capsules hairy; style short; leaves ovate-lanceolate to oblong, acute
Glabrous and glaucous beneath; branchlets usually glabrous; pedicel of ovary shorter than the scale ..... **S. discolor.**
Pubescent beneath; branchlets pubescent; pedicel of ovary longer than scale. **S. Bebbiana.**

For species see pp. 74–93 and the following:

BALSAM WILLOW. *Salix balsamifera* Barr. A species of boreal distribution ranging from about the latitude of Mt. Washington northward and usually shrubby, but in the vicinity of Ft. Kent, Me., has been found to attain the height of 25 ft. with trunk 12-14 in. in diamater. It is characterized as follows:

Leaves elliptic to ovate, 2-4 in. long, rounded or subcordate at base, usually acute or obtuse at apex, finely glandular-serrate, thin at first, finally rigid, glabrous, dark green above, paler, glaucous and prominently reticulated beneath; stipules usually none; petioles slender ½ in. or less in length. *Flowers:* aments expanding with the leaves on leafy-bracted branchlets, the staminate dense; stamens 2, with free filaments; pistillate rather loose; scales rose-colored, villous, persistent; style very short. *Fruit* capsules narrow-ovoid, long-stalked.

WHITE WILLOW. *Salix alba L.* A large European tree willow sparingly escaped in this country and differs from the *S. vitellina* mainly in having more ashy gray and silky pubescent leaves, which gives a whitish effect to its folinge, and more brownish branchlets. Var. *cærulea* Koch., also occasionally found, has more glabrous dull bluish green leaves and olive branchlets.

BEBB WILLOW. *Salix Bebbiana* Sarg. (*S. rostrata* Rich.). A large shrub or small bushy tree, occasionally 25 ft. in height, with a trunk 6 or 8 in. in diameter, ranging from Pennsylvania to the Arctic regions, and from the St. Lawrence River to Alaska, and in botanical characters is close to *S. discolor* (*see pp. 92–93*) but differs in having leaves uusally tomentose or pubescent beneath; pedicel of the ovary longer than the scale and branchlets pubescent.

THE POPLARS AND COTTONWOODS. GENUS POPULUS L.

Trees of usually large size, rapid growth, with scaly and usually resin-coated buds and bark pale at first but furrowed when old and rich in tannin. The sticky resin of these buds is gathered by honey bees for sealing crevices in their hives, the material which bee-keepers call "propolis." About twenty-five species are recognized of which approximately half are natives of North America ranging from the Atlantic to the Pacific and from the Arctic Circle to the tropics.

The Poplars are the oldest known dicotyledonous plants, being represented among the fossils of the cretaceous formations.

Leaves lance-ovate to orbicular or deltoid, involute in the bud, usually with long stalks more or less laterally compressed causing their easy agitation by the winds; stipules small and caducous; branchlets terete or angled; winter buds pointed, more or less resin-coated and covered with several thin imbricated scales. *Flowers* expanding with or before the leaves in stalked drooping aments which elongate while maturing, with thin obovate stipitate fimbriated caducous scales, more crowded on the staminate aments; pistillate aments with broad cup-shaped, usually oblique, stipitate and persistent disk; stamens 4-60, with short free filaments; anthers purplish; ovary sessile with short style and entire digitate or broadly 2-4-lobed stigma. *Fruit* maturing often before the full growth of the leaves, in usually drooping racemes and with subglobose to ovoid-oblong capsules subtended by the persistent disk and dehiscent by 2-4 recurved valves; seeds small, brown and provided with abundant cottony hairs.

The name is the ancient Latin name of the *Poplar*.

KEY TO THE SPECIES.

a Buds coated with a sticky resin; leaves
b Broadly deltoid, acute or acuminate at apex
Very wide-cordate to truncate at base; buds large..... **P. deltoides.**
Very wide-cuneate to truncate at base; buds comparatively small. **P. dilatata.**
b¹ Rhombic-lanceolate, green both sides, long-pointed..... **P. acuminata.**
b² Ovate-lanceolate, green both sides, short-petiolate..... **P. angustifolia.**

b² Broad-ovate, cordate at base, pale or rusty beneath..... **P. candicans.**
b⁴ Ovate, pale or rusty beneath, rounded or wide cuneate at base, finely crenate-serrate, acuminate..... **P. balsamifera.**
b⁵ Heart-shaped, large, abrupt at apex, crenate-serrate and petioles slightly if at all flattened..... **P. heterophylla.**
a² Buds not resin-coated; leaves orbicular-ovate; petioles long and
b Flattened laterally (*Aspens*) and edges of leaves
Finely crenate-serrate; buds glabrous..... **P. tremuloides.**
Coarsely dentate; buds scurfy-pubescent..... **P. grandidentata.**
b² Slightly if at all flattened; leaves densely white-tomentose beneath. **P. alba.**

For species see pp. 97–113 and the following:

EUROPEAN BLACK POPLAR, *P. nigra* L. A large wide-spreading European tree and nearly a century ago was reported (as *P. Hudsonica* Michx. and *P. betulifolia* Pursh.) as naturalized in this country, but it is rare in a naturalized state. The characters given below are of the typical *P. nigra*, and are equally applicable to the Lombardy Poplar (var. *Italica*) except as noted in the consideration of that tree. *Leaves* broad-deltoid, wide-cuneate or almost truncate at base, abruptly acuminate at apex, crenate, pubescent at first but finally glabrous, firm, the blade usually wider than long; petioles long, slender and laterally compressed. *Flowers:* staminate aments 1½-3 in. becoming longer; stamens about 20; pistillate aments 2-3 in. long, becoming longer. *Fruit:* capsules oblong, obtuse, short-stalked.

BIRCH FAMILY. BETULACEÆ.

Trees and a few shrubs of the northern hemisphere commonly with fragrant aromatic properties and grouped in six genera of which five are found in North America. They have the following characters in common:

Leaves simple, alternate, petioled, pinniveined, obliquely plicate in venation, deciduous; stipules fugacious; branchlets terete. *Flowers* in early spring before or with the unfolding of the leaves, monœcious; the staminate in elongated pendulous lateral aments, in the axils of the bracts of which are borne 1-3 small flowers, with or without calyx and 2-20 small erect stamens inserted on the receptacle, with distinct filaments and 2-celled extrorse anthers opening longitudinally; pistillate flowers in short spike-like or capitate aments, from lateral buds with or without calyx, with 2-celled ovary and 2-cleft or bifurcate style stigmatic at the apex or on the inner surfaces of the branches and a single anatropous pendulous ovule in each cell of the ovary. *Fruit* a small mostly 1-celled 1-seeded nut or samara; seed solitary, suspended, without albumen, with large and fleshy cotyledons and short radicle.

KEY TO THE GENERA.

a Nutlet wingless, from the axils of deciduous scales and more or less inclosed in an involucre; staminate flowers solitary in the axils of the scales of the ament and without calyx; involucre of fruit
b Flat, open, 3-cleft and foliaceous; staminate aments in winter inclosed with bud-scales. **Carpinus.**
b² A closed bladder-like sac; staminate aments in winter naked..... **Ostrya.**
a² Nutlet more or less winged, in the axils of persistent scales and without involucre; staminate flowers 3-6 together in the axils of the scales of the aments and with calyx; bracts of the fruiting aments
b Three-lobed, thin and deciduous; stamens 2 with 2-branched filaments; winter buds covered with scales..... **Betula.**
b² Erose or 5-lobed, thickened, woody and persistent; wings of nutlet more or less reduced; winter buds naked..... **Alnus.**

THE HORNBEAMS. GENUS CARPINUS L.

Trees of about a dozen species with smooth gray Beech-like bark, furrowed and ridged trunks, and confined to the northern hemisphere, but only one is found native in North America. The following are the generic characters:

Leaves ovate, acute or acuminate, with nearly straight prominent veins. *Flowers* in April; staminate aments pendulous and with prominent nearly sessile broad ovate acute scales, in the axils of which are found the naked flowers consisting of several stamens with short slender two-branched filaments, each branch bearing a 1-celled half-anther hairy at apex; pistillate aments slender, few-flowered and terminal on leafy branchlets of the year, with small deciduous scales, each subtended by a pair of flowers which are furnished each with a small acute bract and pair of bractlets; calyx adnate to the ovary; stigmas 2, subulate. *Fruit* a small compressed ovoid prominently ribbed nut, tipped with calyx-lobes and attached at its base until maturity to a large foliaceous 3-lobed pale-green involucre formed from the enlarged bract and bractlets of the flower.

Carpinus is the ancient Latin name of the European *Hornbeam*.

For species see pp. 114–115.

THE HOP-HORNBEAM. GENUS OSTRYA SCOP.

Trees of wide distribution throughout the northern hemisphere, with scaly bark, slender terete branchlets and hard rather close-grained wood. Four species are known, two of which are North American. One of them (*O. Knowltoni* Cov.), as far as known, is found only in the Grand Canyon of the Colorado River in Arizona, and the other is a common tree widely distributed throughout the eastern United States and Canada.

Leaves open and concave in the bud, more or less plaited on the nearly straight veins. *Flowers* expanding before the leaves; staminate aments in clusters of a few each with short stalks or sessile, developed the previous season near the ends of the branchlets and naked and conspicuous during the winter; stamens 3-4, crowded on a receptacle at the base of a broad ovate pointed concave scale longer than the stamens; filaments short, 2-branched, each branch bearing a 1-celled half-anther hairy at apex; pistillate flowers in small loose suberect aments terminating leafy shoots and with large pointed deciduous scales at the base of each of which are 2 flowers each surrounded with a tubular persistent accrescent involucre; calyx adnate to the ovary; style 2-branched. *Fruit* an ovoid flattened pointed nutlet, inclosed in an enlarged pale membranous closed sac formed by the enlarged involucre and these together forming a strobile very much resembling a hop, suspended by a slender stem.

Ostrya is the classical Latin name of the European species.

For species see pp. 116–117.

THE BIRCHES. GENUS BETULA L.

The Birches constitute a considerable and important part of the forests of the Northern Hemisphere of both the Old and the New Worlds. Although a few are shrubby species most of them are large and handsome and often aromatic forest trees, some of exceptional ornamental value with more or less laminate and resinous bark, very tough slender twigs and copious watery and slightly saccharine sap.

Leaves serrate, dentate, or sometimes incisely lobed, usually thin, from scaly pointed sessile buds; stipules scarious and fugacious. *Flowers* unfolding with or before the leaves; the staminate in pendulous often clustered sessile aments which form the previous season and remain erect and naked during the winter at or near the ends of the branchlets and rapidly develop expanding their golden flowers in early spring; scales broad-ovate with the two lateral flowers adnate to their bases; calyx membranous, usually 4-lobed; stamens 2 with short 2-parted filaments, each filament bearing and anther-cell; pistillate aments small oblong or cylindrical, usually peduncled, terminating short lateral 2-leaved branchlets and with closely imbricated 3-lobed persistent accrescent scales; calyx wanting; pistil with compressed sessile ovary and 2 spreading persistent styles stigmatic at the apex. *Fruit* erect, inclined or pendulous strobiles with thin woody 3-lobed scales and 3 laterally winged nutlets to each scale and these with the scales falling away from the central axis of the strobile at maturity.

Betula is the classical name of the *Birch-tree*.

KEY TO THE SPECIES.

a Branchlets, etc., not aromatic; strobiles
- **b** Cylindrical, with long slender peduncles; wings broader than nutlet; scales
  - **c** Pubescent, lateral lobes broad and recurved; bark not easily separable into layers; leaves with long slender petioles, long acuminate and
    - Deltoid, wide and mostly truncated at base, bright green..... **B. populifolia.**
    - Ovate, mostly rounded or wedge-shaped at base, dull blue-green.. **B. cœrulea.**
  - **c'** Glabrous with spreading lateral lobes; leaves mostly ovate and rounded at base; bark creamy white and separating freely into layers..... **B. papyracea.**
- **b'** Oblong, slender, peduncled, mostly erect and lobes of scales linear-oblong; leaves acute. **B. nigra.**

a' Branchlets and inner bark aromatic; strobiles oblong-ovoid, subsessile, erect; wings not broader than nutlet; leaves sharply
- **b** Serrate; scales of stobiles short glabrous and with rounded lateral lobes; bark dark brown and scaly..... **B. lenta.**
- **b'** Doubly serrate, scales longer and with oblong lobes; bark yellow or silvery and laminate. **B. lutea.**

For species see pp. 118–127 and the following:

BLUE BIRCH, *Betula cœrulea* Blanch. A small tree occasionally 30 ft. in height with trunk 8-10 in. in diameter recently described as found in southern Vermont and northern Maine and may be found elsewhere in New England. It resembles the *B. populifolia* but is said to differ in having leaves rather ovate in outline, more cuneate at base and with dull bluish green upper surfaces. The bark of trunk is described as being more lustrous and of a pinkish white color.

THE ALDERS. GENUS ALNUS GERTN.

The Alders are trees and shrubs of about twenty species with astringent bark and durable wood, inhabiting the north temperate regions of both hemispheres, and ranging among the mountains of the New World into the tropics. Nine species are natives of North America of which six are recognized as trees, five of these inhabiting the Pacific slope, and one is a local species of the Atlantic states. Besides these there is also one species from the Old World naturalized in localities in the Atlantic states.

Leaves serrate or dentate and falling in autumn without change of color; buds naked, stipitate. *Flowers* both kinds in cymose stalked aments which appear during the previous season and, remaining dormant during the winter, develop in early spring before the leaves, or, in one American species, in late summer; staminate aments pendulous with peltate scales, 3-6 flowers in the axils of each scale and each subtended by minute bractlets; calyx 4-parted; stamens usually 4, with short simple filaments; pistillate aments ovoid-oblong, erect, with thick scales and in the axils of each are two flowers without perianth and subtended each by 2-4 minute bractlets; ovary sessile 2-celled; styles 2. *Fruit:* nutlet small, compressed, tipped with the remnants of the style and bearing lateral wings which are sometimes reduced to a mere membranous border, 2 nutlets in the axils of each scale; scales thick woody, erose or 5-toothed at apex and persistent, forming a strobile.

Alnus is the ancient Latin name of the Alder.

KEY TO THE SPECIES.

Leaves oblong, lustrous bright green above; aments expanding in autumn.... **A. maritima.**
Leaves orbicular-obovate, dull green and glabrous; aments expanding in very early spring. **A. glutinosa.**

For species see pp. 128–131.

BEECH FAMILY. FAGACEÆ.

Trees of great economic value and some shrubs of wide distribution, mainly throughout the northern hemisphere. There are nearly 400 known species grouped in six genera, five of which are represented in North America. Of these one is generally distributed throughout the United States, two others are represented in the Atlantic states only, and the remaining two are confined to the Pacific slope.

Leaves alternate, petioled, pinniveined and with narrow caducous stipules. *Flowers* monœcious, small; the staminate in aments or heads with 4-8-lobed calyx and 4-20 stamens with slender distinct filaments and introrse 2-celled anthers opening lengthwise; pistillate flowers solitary or in few-flowered clusters or spikes subtended by a scaly involucre which becomes woody in the fruit; calyx 4-8-lobed, adnate; ovary 3-7-celled with 1-2 pendulous anatropous ovules in each cell, but usually only one ovule of one of the cells maturing, and as many linear styles as there are cells of the ovary. *Fruit* a nut subtended or enveloped by an involucral covering and with a coriaceous or bony exocarp, 1-celled by abortion and containing a single membranous-coated seed without albumen; cotyledons fleshy; radicle short, superior.

KEY TO THE GENERA.

a Nut sharply triangular; staminate flowers in globose long-stalked heads..... **Fagus.**
a² Nut globose and more or less flattened at base; staminate flowers in aments; nut
Inclosed in a prickly dehiscent burr; aments suberect..... **Castanea.**
Subtended by a scaly, woody involucral cup..... **Quercus.**

THE BEECHES. GENUS FAGUS L.

Trees with smooth gray bark, hard close-grained wood and long pointed buds. About a half dozen species are known, all confined to the temperate regions of the northern hemisphere and one only is found in North America.

Leaves convex and plicate on the veins in the bud, firm, deciduous, serrate with straight veins; stipules linear-lanceolate; petioles short. *Flowers* expanding with or soon after the leaves; the staminate at the base of the shoots of the season in many-flowered drooping heads with long 2-bracted peduncles; pedicels short; calyx campanulate, greenish yellow, imbricated in æstivation, 4-8-lobed; stamens 8-16, longer than the calyx, inserted on its base and with greenish anthers; pistillate in 2-4-flowered clusters from the axils of the upper leaves and surrounded by numerous awl-shaped bracts of which the outermost are longer and caducous and the inner are united so as to form a 4-lobed burr-like covering; calyx 4 or 5-lobed, villous, adnate to the 3-celled and 3-angled ovary with 2 ovules in each cell and with 3 filiform and recurved styles. *Fruit* a sharply 3-angled ovoid nut, with thin lustrous brown coriaceous shell and inclosed usually in pairs in a 4-valved burr; seed (with the abortive ovules) suspended, oily, edible and of delicious flavor.

Fagus is the Greek derivation alluding to the edible quality of the nuts.

For species see pp. 132–133.

THE CHESTNUTS. GENUS CASTANEA ADANS.

Trees and shrubs of the northern hemisphere, with astringent watery juice, edible nuts and very porous wood and of great economic value. Four or five species are known and of these two are trees of eastern United States and one a shrub of the southern states.

Leaves convolute in the bud, ovate to oblong-lanceolate, coarsely serrate and with straight veins terminating in the teeth. *Flowers* appearing after the leaves, monœcious; the staminate in interrupted erect axillary aments, several flowers together in the axils of small caducous bracts; calyx campanulate, pale yellow, puberulous, with 6 lobes imbricated in the bud; stamens 10-20, with long exserted filiform filaments and small yellow authers, pistillate flowers mostly at the bases of the upper staminate (androgynous) aments, sessile, and usually 2 or 3 together, surrounded with an involucre of many acute green bracts; calyx urn-shaped and with 6 minute sterile stamens; ovary 6-celled, with 6 spreading white linear styles and 2 ovules in each. *Fruit* maturing in autumn, nuts 1-3 together, with a globose mostly 4-valved woody burr-like involucre, very prickly with stiff branching spines outside and velvety pubescent inside; nut flattened by mutual compression, short, ovoid, pointed and tipped with the remnants of the style, with chestnut-brown coriaceous shell, lustrous below, pubescent above and with large pale scar at base; seed solitary by abortion and marked by the abortive ovules at apex, large, starchy and of delicious flavor.

Castanea is the classical name of the Chestnut-tree.

KEY TO THE SPECIES.

Nuts 2-3 in an involucre, compressed; leaves green and glabrous both sides.... **C. dentata.**
Nuts solitary, not compressed; leaves pale tomentose beneath..... **C. pumila.**

For species see pp. 134–137.

THE OAKS. GENUS QUERCUS L.

Trees and shrubs of nearly 300 species of the north temperate regions and high altitudes of the tropics. From its representatives come some of our best hard woods, barks extensively used for tanning purposes and the corks of commerce. The acorns of many species are an important article of food for hogs, etc., and in some countries also for man. Oak-galls of commerce develop on the branches of certain species and many dyes and other products may also be recorded among the products of the genus. About fifty Oaks are natives of the United States and more than half of these are found in the Atlantic states.

Leaves deciduous or persistent, arranged in five ranks, pinnately veined and often pinnately lobed, sometimes entire and sometimes variable on the same branch; stipules scarious and caducous or occasionally persistent. *Flowers* appearing with or before the leaves; the staminate in clustered slender drooping catkins, from axils of the leaves or bud-scales of the previous year or leaves of the present year, a single flower in the axil of each caducous scale of the ament; calyx yellowish green, campanulate, deeply 6-lobed; stamens 4-12, with filiform exserted filaments and yellow anthers; pistillate flowers solitary or in few-flowered spikes from the axils of the leaves of the year, each flower subtended by a caducous bract and two bractlets; calyx urn-shaped, with tube adnate to the ovary, and limb of 6 short lobes; ovary mostly 3-celled with 2 ovules in each cell and 3 short or elongated styles, each flower nearly enveloped by a scaly imbricated accrescent involucre. *Fruit* and ovoid-oblong or subglobose 1-celled nut (acorn) maturing in 1 or 2 years, with coriaceous shell having large circular scar at base, each nut subtended or more or less enveloped in a woody cup of imbricated and more or less united scales; seed solitary and bearing abortive ovules at base or apex; cotyledons usually plano-convex and entire.

Quercus is the ancient Latin name of the *Oak-tree.*

KEY TO THE SPECIES.

a Acorns maturing in autumn of the second year; shells hairy inside; abortive ovules at apex; stamens 4-6; styles elongated; leaves or their lobes bristle-tipped, deciduous (*Black Oaks*)
  b Leaves pinnately lobed, convolute in the bud and
    c Green both sides; cup of acorn
      d Saucer-shaped, shallow and wide; cups
        e ⅝-1 in. wide, rather thick and not more than ¼ investing the acorns; leaves
          Dull green above and lobes widest at base..... **Q. rubra.**
          Lustrous green, lobes wide at apex..... **Q. Texana.**
        e[1] ⅜-⅝ in. wide, thin; leaves lustrous with lobes spreading and wide towards apex; acorn short-globose..... **Q. palustris.**
      d[1] Turbinate with
        e Small closely appressed scales
          f Acorn elliptical; cup ¼-⅓ in. wide, leaves lustrous..... **Q. ellipsoidalis.**
          f[1] Acorn ovoid; cups mostly more than ½ in. wide; leaves dull green and

With broad rounded sinuses; inner bark reddish..... **Q. coccinea.**
With narrow sinuses..... **Q. borealis.**
e² Scales larger, loosely imbricated and free at margin of cup; leaves obovate with narrower sinuses; inner bark yellowish..... **Q. vellutina.**
c² Leaves whitish tomentose beneath and mostly with
d Short broad lobes; leaves mostly obovate..... **Q. nana.**
d² Elongated and more or less falcate lobes; leaves
Rounded or obtuse at base, obovate to oblong with 3-5 mostly linear or triangular lobes..... **Q. digitata.**
Cuneate, ovate or oblong with 5-11 mostly falcate lobes.... **Q. pagodæfolia.**
b² Leaves 3-5-lobed near the apex or entire, obovate or spatulate
Wide-obovate, cuneate, rusty pubescent beneath..... **Q. Marilandica.**
Spatulate-obovate, glabrous..... **Q. nigra.**
b³ Leaves usually entire and lanceolate to oblong, involute in the bud and
Linear-oblong, acute at both ends, glabrous..... **Q. Phellos.**
Oblanceolate to oblong, shining dark green above, paler and glabrous beneath. **Q. laurifolia.**
Oblong-lanceolate to oblong or ovate, pubescent beneath..... **Q. imbricaria.**
a² Acorns maturing in the autumn of the first year; shells glabrous inside; abortive ovules basal; stamens 6-8; styles short (*White Oaks*).
b Leaves pinnately lobed or lyrate-pinatifid with lobes rounded at apex (not bristle-tipped) deciduous
c Glabrous beneath, obliquely 3-9-lobed and conduplicate in the bud; cup shallow. **Q. alba.**
c² Pubescent beneath and stellate pubescent above, usually 5-lobed, convolute in the bud. **Q. minor.**
c³ White tomentose beneath
Lyrate-pinnatifid; cup fringed with free ends of scales..... **Q. macrocarpa.**
Deeply 5-9-lobed; cup not fringed and nearly inclosing the nut **Q. lyrata.**
b² Leaves coarsely crenate-toothed
c Fruit with peduncles much longer than petioles..... **Q. platanoides.**
c Fruit with peduncles shorter than or about equal to the petiole; leaves whitish tomentose beneath
Bark scaly whitish..... **Q. Michauxii.**
Bark firmly ridged, grayish brown..... **Q. Prinus.**
b³ Leaves coarsely repand-serrate, lanceolate to obovate;
Tall trees..... **Q. acuminata.**
Shrubs or very small trees..... **Q. prinoides.**
b⁴ Leaves mostly entire, thick and evergreen..... **Q. Virginiana.**

For species see pp. 138–181 and the following:

BEAR OAK, BARREN OAK or SCRUB OAK, *Q. nana* Sarg. (Syn. *Q. ilicifolia* Wang., *Q. pumila* Sudw.). This is an intricately branched shrub ranging from Maine to Virginia, chiefly coastwise, occupying sandy barrens and hillsides and sometimes forming vast and almost impenetrable thickets. Mr. Wm. T. Davis has found it on the Pine Barrens of New Jersey assuming the habit of a small wide-topped tree 18 or 20 ft. in height with trunk 5 or 6 in. in diameter. It is characterized as follows: *Leaves* mostly obovate, 2-5 in. long with 3-7 (usually 5) short spreading bristle-tipped lobes, cuneate, more or less pubescent at first, at maturity thick firm lustrous dark green above, whitish pubescent beneath; petioles short. *Flowers* staminate aments hairy, often persisting late into the summer; pistillate flowers with red recurved stigmas. *Fruit* borne in great abundance, mostly solitary or in pairs, sessile or nearly so; acorns globose-ovoid, about ½ in. long and half invested by the usually turbinate cup of small closely imbricated scales.

SCRUB CHESTNUT OAK. *Q. prinoides* Willd. A shrubby oak distributed from Maine to North Carolina and westward into Nebraska, Kansas and Texas, occupying rocky slopes and dry sandy uplands and is usually only a stolaniferous shrub from 2-5 feet in height. West of the Mississippi River it sometimes assumes a tree-like habit of growth but only attaining a height of 10 or 15 ft. with trunk 4 or 5 in. in diameter. In botanical characters it closely resembles *Q. acuminata*, but with smaller and more remotely lobed leaves and shorter petioles, and acorns with deeper cups and more turgid scales.

GRAY OAK, *Q. borealis* Michx. f. (also *Q. ambigua* Michx. f.). A large tree, occasionally found from Ontario and Quebec to the mountains of North Carolina, bearing leaves like *Q. rubra* and fruit like *Q. coccinea*. It is considered by some a distinct species and by others, and probably more correctly, only an aberrant form of *Q. rubra*.

Many natural hybrids are found among the Oaks, some of which have been named and described by early botanists as distinct species. Their rarity and local distribution, however, and occurrence only in localities where certain other Oaks whose characters they more or less share in common occur seem conclusive evidence of hybridization. The following cases have been noted:

Q. Rudkini Britton = *Q. Marilandica* × *Q. Phellos.*
Q. Brittoni W. T. Davis = *Q. Marilandica* × *Q. nana.*
Q. heterophylla Michx. = *Q. Phellos* × *Q. rubra.*
Q. Leana Nutt. = *Q. imbricaria* × *Q. velutina.*
Q. tridentata Engelm. = *Q. imbricaria* × *Q. Marilandica.*
Other hybrids have been found which have not been named.

ELM FAMILY. ULMACEÆ.

Trees and shrubs with tough wood and of about one hundred and forty species grouped in thirteen genera and widely distributed throughout the temperate regions of the northern hemisphere. Five genera are represented in the United States, and three of these by trees of the eastern and southern states. They are characterized as follows:

Leaves deciduous, simple, petolate, alternate, in two ranks, serrate, pinnately veined, unequal at base, conduplicate in the bud and with usually fugacious stipules; buds with several scales. *Flowers* small, perfect, monœcious or polygamous, clustered, or the pistillate solitary; calyx regular, 4-9-parted or lobed; petals none; stamens as many as the lobes of the calyx and opposite them, with straight exserted filiments and introrse 2-celled anthers opening longitudinally; ovary 1-celled with solitary, anatropous or amphitropous ovule suspended from apex of the cell; styles two. *Fruit* a samera, drupe or nut; seed with little or no albumen, straight or curved embryo, and usually flat cotyledons.

KEY TO THE GENERA.

a	Fruit a samara; flowers perfect and usually expanding before the leaves....	**Ulmus.**
a²	Fruit papillose nut-like; flowers polygamous, expanding with the leaves.....	**Planera.**
a¹	Fruit a drupe; flowers on the new growth of the season.....	**Celtis.**

THE ELMS. GENUS ULMUS L.

Trees or rarely shrubs with scaly ridged bark, heavy tough wood and somewhat zigzag branchlets, and of about eighteen species, of which six or seven are found in eastern United States and four of these in the northeastern states. None are found in the Pacific states.

Leaves inequilateral, straight-veined and simply or doubly serrate; stipules scarious caducous; buds with several closely imbricated scales in 2 ranks. *Flowers* from axillary buds on twigs of the previous season's growth and usually expanding before the leaves (or in autumn from the axils of the leaves of the season), mostly perfect and in fascicles or racemes, with bibracteolate pedicels; calyx campanulate, membranaceous persistent with 4-9 imbricated lobes; stamens 5-6, exserted with slender filaments and oblong anthers; ovary sessile or stalked, compressed with 2 divergent styles stigmatic on inner faces, 1-celled and containing a single amphitropous ovule. *Fruit* a flat orbicular or oblong membranaceous 1-seeded samara winged all around (or excepting apex), subtended by the withered calyx and sometimes tipped with the remnants of the styles; seed compressed with straight embryo and no albumen.

Ulmus is the ancient Latin name of the *Elm*.

KEY TO THE SPECIES.

a	Leaves smooth or nearly so above and samara with wing-like ciliate margin	
b	As broad as seed portion	
	Samara with glabrous sides; buds glabrous and bluntly pointed..	**U. Americana.**
	Samara hairy on sides; buds acuminate and puberulous.....	**U. racemosa.**
b²	Narrower than seed portion; branchlets corky winged; samara narrow, stipitate and hirsute	**U. alata.**
a²	Leaves very rough above; samara not ciliate; buds rusty-tomentose....	**U. pubescens.**

For species see pp. 182–189.

THE PLANER TREE. GENUS PLANERA GMELIN.

A genus of a single species of small trees of southeastern United States and the lower Mississippi valley, resembling the Elms. The characters are given in the description of species.

It is named after *John Jacob Planer*, a German Professor of Botany of the eighteenth century.

For species see pp. 190–191.

THE HACKBERRIES. GENUS CELTIS L.

Trees and shrubs of fifty or sixty species, widely distributed throughout the temperate and tropical regions. Four species are found in North America, two being shrubs of the southern states and southward and the other two trees entitled to consideration here.

Leaves pointed, inequilateral pinnately-veined or sometimes 3-5-veined at base; stipules membranous, caducous. *Flowers* polygamo-monœcious, small, appearing with the unfolding of the leaves or soon after on the branchlets of the year, pedicellate; the staminate in fascicles near the base of the shoot and the pistillate solitary or few together from the axils

of the upper leaves; calyx deeply 5-7-lobed, deciduous; stamens incurved in the bud and in the staminate flowers erect and exserted, those of the perfect flowers remaining short, ovary sessile, ovoid and crowned by two diverging reflexed styles, stigmatic on the inner faces; ovule anatropous. *Fruit* a sub-globose drupe, with firm skin, thin sweetish flesh and bony or rugose pit; seed with curved embryo and scanty albumen.

KEY TO THE SPECIES.

Leaves sharply and coarsely serrate..... **C. occidentalis.**
Leaves entire or nearly so..... **C. Mississippiensis.**

For species see pp. 192–195.

MULBERRY FAMILY. MORACEÆ.

Trees, shrubs and herbs of over nine hundred species, generally with milky juice and natives of temperate and tropical regions. They are grouped in fifty-four genera of which four are represented in North American trees, three being indigenous and the fourth a naturalized species.

Leaves conduplicate or involute in the bud, petiolate, alternate, deciduous, with caducous stipules inclosing the leaf in the bud. *Flowers* monœcious or diœcious, small, in ament-like spikes or heads, from the axils of caducous bud-scales or of the lower leaves of the shoots of the season; calyx 3-5-lobed or parted; corolla none; stamens 1 to 4, inserted on the bases of the calyx-lobes; ovary superior, 1-2-celled; styles 1-2; ovules solitary, anatropous and pendulous. *Fruit* an aggregation of drupelets, each inclosed in the thick fleshy calyx.

KEY TO THE GENERA.

Both staminate and pistillate flowers in spikes; leaves dentate and lobed; compound fruit oblong..... **Morus.**
Staminate flowers racemose; pistillate capitate
Leaves crenate-serrate, velvety and on vigorous shoots, lobed..... **Broussonetia.**
Leaves entire, glabrous, not lobed..... **Toxylon.**

THE MULBERRIES. GENUS MORUS L.

Trees of eight or ten species, with milky juice and mostly of the tropical and north temperate regions of both hemispheres. Two are indigenous to the United States, one being found along the Mexican frontier and the other in most of the Atlantic states. A third is a species introduced from Japan and eastern Asia and extensively naturalized in eastern United States.

Leaves serrate-dentate and sometimes 3-5-lobed or mitten-shaped, all forms often on the same tree, 3-nerved at base. *Flowers* small, appearing with the unfolding of the leaves or soon after; the staminate in cylindrical, pedunculate ament-like spikes; calyx deeply 4-lobed; stamens 4, opposite the calyx lobes, inflexed in the bud, straightening out elastically (thereby scattering the pollen) and becoming exserted; anthers 2-celled, introrse, longitudinally dehiscent; pistillate flowers sessile, in shorter compact spikes; calyx 4-parted, with thick persistent lobes enveloping the flattened ovoid ovary which is crowned with two white spreading stigmas. *Fruit* a blackberry-like aggregation of drupelets (*sincarp*), each tipped with the remnants of the styles and formed by the nutlet enveloped by the succulent enlarged and colored calyx; seed pendulous with curved embryo and scanty albumen.

Morus is the ancient Latin name of the *Mulberry-tree*.

KEY TO THE SPECIES.

Leaves rough above, pubescent beneath; fruit purple..... **M. rubra.**
Leaves glabrous or nearly so both sides; fruit usually white..... **M. alba.**

For species see pp. 196–199.

THE PAPER MULBERRY. GENUS BROUSSONETIA VENT.

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

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

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

For species see pp. 200–201.

THE OSAGE ORANGE. GENUS TOXYLON RAFINESQUE.

A genus of a single American species. A tree with deeply furrowed orange-brown bark and slightly acrid milky juice.

Leaves involute in the bud, broad-ovate to oblong and oblong-lanceolate, rounded, obtuse or subcordate at base, acuminate, entire, pinnately veined, the veins arcuate and united near the margin, whitish tomentose at first but finally lustrous dark green above, duller and conspicuously reticulate-veined beneath, turning bright yellow in autumn; petioles rather long, terete; stipules triangular, small, caducous; branchlets armed with sharp axillary spines. *Flowers* in late spring after the unfolding of the leaves, diœcious, light green; the staminate in long-pedunculate subglobose heads from the axils of crowded leaves on short lateral spurs; pedicels slender; calyx 4-lobed to the middle, stamens 4, opposite the calyx lobes, incurved in the bud and elastically straightening and becoming exserted; anthers 2-celled; pistillate flowers in dense globose heads, sessile or with short peduncles in the axils of the leaves on the shoots of the year; calyx divided to the base with thick concave persistent lobes closely investing the ovary, the two outer lobes the largest; ovary ovoid, compressed, tipped with a long filiform style and containing a single anatropous suspended ovule. *Fruit* a globose yellowish green aggregation of elongated drupelets, each consisting of a nutlet enveloped by the enlarged fleshy calyx, the tips of the lobes of which form the roughened surface of the fruit.

For species see pp. 202–203.

Division 2. POLYPETALÆ.

Flowers with both calyx and corolla (or without corolla in *Liquidambar*, *Hamamelis*, some species of *Acer*, and some extra-limital species) and the corolla consisting of separate petals.

MAGNOLIA FAMILY. MAGNOLIACEÆ.

Trees and shrubs of ten genera and about seventy species, with bitter aromatic bark, watery juice, and thick rootlets. Of the ten genera four are represented in North America, and of these two are arborescent, both trees of the Atlantic states.

Leaves alternate, petiolate, pinnately-veined, with minute transparent dots, conduplicate and inclosed by their stipules in the bud. *Flowers* large, solitary, terminal, perfect, pedunculate, and inclosed in the bud in a stipular caducous sheath; sepals and petals generally colored alike, imbricated in the bud, hypogenous, deciduous; stamens and pistils numerous, imbricated and inserted on an elongated receptacle, the stamens beneath the pistils; ovules two, anatropous. *Fruit* compound, composed of numerous 1-2-seeded follicles or samaræ massed together.

KEY TO THE GENERA.

Carpels at maturity fleshy, dehiscent, persistent; leaves entire; anthers introrse. **Magnolia.**

Carpels dry, indehiscent, deciduous; leaves lobed; anthers extrorse..... **Liriodendron.**

THE MAGNOLIAS. GENUS MAGNOLIA L.

Trees of about twenty species confined to eastern North America, Mexico, eastern Asia, and the Himalayas. Seven species are indigenous to the United States and several Asiatic species, blossoming before the appearance of the leaves, are introduced for ornamental purposes but so far as we know none of these have become naturalized.

Leaves generally large, entire and deciduous or persistent. *Flowers* (in the American species) appearing after the leaves; sepals three, spreading; petals six to twelve, concave, in series of three each; stamens early deciduous, with very short filaments and linear 2-celled introrse anthers, and apiculate connectives; ovary sessile, 1-celled, with 2 horizontal ovules and recurved style. *Fruit* a reddish succulent cone-shaped or cucumber-shaped mass of coalescent persistent follicles, each dehiscent at maturity along its dorsal suture and liberating one or two large scarlet drupe-like compressed seeds, suspended by an extensile thread of uncoiled spiral vessels; embryo minute at the base of fleshy albumen.

Genus named in honor of Pirre Magnol, Prof. of Botany at Montpelier in the 17th century.

KEY TO THE SPECIES.

a Leaves deciduous, thin
  b Buds silky-tomentose; leaves
    Oblong, mostly rounded or obtuse at base..... **M. acuminata.**
    Obovate, auriculate at base..... **M. macrophylla.**
  b² Buds glabrous; leaves obovate or oblanceolate
    Cuneate at base ..... **M. tripetala.**
    Auriculate at base ..... **M. Fraseri.**
a² Leaves subpersistent, thick, rigid; buds silky pubescent..... **M. glauca.**

For species see pp. 204–213.

THE TULIP-TREES. GENUS LIRIODENDRON L.

Trees of two species, one of extensive distribution throughout the eastern states of North America and the other in central China. They are trees with deeply furrowed brown bark and further characterized as follows:

Leaves incurved in the bud and bent down so that the apex points to the base of the bud, alternate, deciduous, truncate, subcordate or somewhat wedge-shaped at base, truncate or with a wide sinus at apex, with 4 pointed lobes (occasionally with 2 or 6 lobes); stipules formed by the accrescent scales of the laterally compressed obtuse buds joined at the edges, strap-shaped and tardily deciduous. *Flowers* appearing after the unfolding of the leaves, conspicuous, cup-shaped, somewhat fragrant; sepals three, spreading or reflexed, concave, greenish white and early deciduous; petals 6 in 2 rows, erect, falling early; stamens with filaments about ½ as long as the linear 2-celled extrorse anthers; pistils closely massed together on the elongated receptacle; flattened, with wide style, stigmatic at the acuminate recurved apex; ovules 2, suspended from the ventral suture. *Fruit* a narrow erect light brown cone, consisting of the flattened samaræ-like indehiscent 4-ribbed carpels which separate from the axis when ripe; seeds usually 2, suspended in the small cavity at the base of the samara; embryo minute at the base of fleshy albumen.

The name is from two Greek words meaning *lily* or *tulip* and *tree*.

For species see pp. 214–215.

CUSTARD-APPLE FAMILY. ANONACEÆ.

Trees and shrubs of about fifty genera and five hundred and fifty species, with generally aromatic properties and mainly of the tropical and subtropical regions of both the Old World and the New. Two genera only are represented in North America, one in southern Florida and the West Indies and the other in the eastern states.

Leaves deciduous, alternate, entire, petiolate, pinnately-veined, conduplicate in the bud, without stipules. *Flowers* solitary, perfect and mostly axillary; sepals three, valvate in the bud; petals six in two series; stamens numerous on an elevated rounded receptacle with very short filaments and 2-celled introrse anthers adnate to the thick fleshy truncate connective; pistils few on the summit of the receptacle; ovary 1-celled, containing from one to many anatropous ovules. *Fruit* fleshy, baccate, formed by the ripening of the single or several united pistils; seed inclosed in an aril, large, anatropous, with thin lustrous brown crustaceous coat and minute embryo at the base of ruminate albumen.

THE PAPAWS. GENUS ASIMINA ADANSON.

Small trees or shrubs emitting an unpleasant odor when bruised and confined to eastern North America. Six or seven species are known, of which all are shrubby and confined to the South Atlantic and Gulf states except one, which is a small tree entitled to consideration here and the only representative of the Custard Apple Family extending far outside the tropics.

Leaves membranaceous. *Flowers* mostly from the axils of the leaves of the previous season, nodding, pedunculate, of a purplish color and disagreeable odor; sepals green, ovate, smaller than the petals, concave and early deciduous; petals six, imbricated in the bud, accrescent, hypogenous prominently reticulated, the three outer petals alternate with the sepals, spreading and larger than the three inner which are opposite the sepals and erect; stamens closely massed together, anther-cells separate on the connective; pistils few from the summit of the receptacle, with styles slightly recurved and stigmatic on the inner side above; ovules several, horizontal, in two ranks on the ventral suture. *Fruit* baccate, oval or oblong, smooth; seeds compressed and with large hilum at base.

The name *Asimina* is Latinized from the Indian name, *asimin*, of the *Papaw*.

For species see pp. 216–217.

LAUREL FAMILY. LAURACEÆ.

Aromatic trees and shrubs of about forty genera and nine hundred species of wide distribution throughout the tropical and a few in the temperate zones. Six genera, of which two are shrubby, are represented in North America, one on the Pacific slope and three in the Atlantic states.

Leaves alternate, simple, pellucid-punctate, usually thick, without stipules. *Flowers* small, regular, yellowish green, perfect, polygamous, dioecious or monoecious, usually fragrant; calyx 4-6-parted, the sepals imbricated in the bud in two series; corolla none; stamens 10-12, distinct and inserted on the base of the calyx in three or four series of three each, those of the fourth series sterile; anthers 4-celled opening by uplifted valves; ovary superior, 1-celled,

containing a single anatropous ovule suspended from the apex of the cell; stigma discoid or capitate. *Fruit* a one seeded drupe or berry; seed with thin testa, erect embryo and radical between the thick fleshy cotyledons.

KEY TO THE GENERA.

Leaves persistent, coriaceous, entire; flowers perfect; calyx-lobes persistent.... **Persea.**
Leaves deciduous, rather thin, entire or 1-3-lobed; flowers dioecious..... **Sassafras.**

THE BAYS. GENUS PERSEA GÆRTN. F.

About fifty species are recognized of this genus, all excepting one natives of the western hemisphere. Three are species of the Atlantic and Gulf Coast regions, two ranging northward into Virginia.

Leaves persistent, rigid, coriaceous, pinnately-veined, revolute in the bud. *Flowers* perfect, appearing in spring in two or three-flowered pedunculate cymes, corymbs or panicles from the axils of the leaves of the year, with two bracted pedicels; calyx campanulate, persistent, those of the outer series shortest; stamens 12, about as long as the inner sepals, those of the innermost series sterile and gland-like, and in our species the anthers of the third series extrorse and those of the others introrse; ovary subglobose, glabrous, terminating in a slender club-shaped style with discoid terminal stigma. *Fruit* a subglobose or oblong drupe subtended by the enlarged persistent calyx and with thin flesh; seed globose, pendulous, with testa separable into two coats.

Persea is the classical name of some oriental tree.

KEY TO THE SPECIES.

Branchlets and petioles tomentose; peduncles mostly elongated..... **P. pubescens**
Branchlets and petioles glabrous or nearly so; peduncles mostly short..... **P. Borbonia.**

For species see pp. 218–221.

THE SASSAFRAS. GENUS SASSAFRAS NEES AND EBERM.

Trees with pleasant aromatic properties, deeply furrowed bark and smooth green mucilaginous twigs. They are natives of eastern North America and China, those of the latter region, so far as now understood, being indistinguishable from the American species.

Leaves deciduous, membranaceous, involute in the bud, ovate to oblong and entire or with an oblique lobe on one or both sides, conspicuously reticulate-veined, cuneate at base, with arcuate veins, pilose at first but finally glabrous dark green with veins depressed above, paler beneath, mucilaginous. *Flowers* appearing with the leaves at the ends of the branchlets, pedunculate, in pilose clustered racemes, from the axils of the inner accrescent bud scales, with slender pedicels from the axils of deciduous bracts; calyx with 6 subequal spreading lobes, yellowish green; stamens 9, with elongated bright yellow filaments, those of the inner series bearing near their base each 2 orange-colored stalked glands; anthers oblong, orange-colored, introrse, those of the pistillate flowers small and usually sterile; ovary ovoid, green, glabrous, with long style and capitate stigma. *Fruit* a globose oblong lustrous dark blue drupe subtended by the red obscurely lobed calyx and enlarged end of the pedicel and having thin flesh with smooth brown oblong pointed seeds.

The name is said to be that used by the early French settlers in Florida.

For species see pp. 222–223.

WITCH HAZEL FAMILY. HAMAMELIDACEÆ.

The Witch-Hazel family consists of trees and shrubs of about eighteen genera and thirty-five species of eastern North America, Asia, Madagascar and South Africa. Three of the genera, two of which are arborescent, are represented in North America.

Leaves simple, deciduous, alternate, petiolate, with stipules. *Flowers* perfect or unisexual; calyx 4-lobed and with tube coherent to the ovary or none; petals 4 and perygenous or none; stamens 4 or 8 or numerous with 2-celled introrse anthers; ovary compound formed by the union below of 2 carpels, 2-celled and with 2 subulate styles; ovules 1 or many, anatropous and suspended from an axile placenta. *Fruit* a woody 2-beaked capsule dehiscent at the summit; seeds 1 or several with large straight embryo and scant albumen.

KEY TO THE GENERA.

Leaves pinnately veined; flowers perfect; fruit a 2-celled capsule..... **Hamamelis.**
Leaves palmately lobed; flowers unisexual; fruit a globular head of consolidated capsules. **Liquidambar.**

THE WITCH-HAZELS. GENUS HAMAMELIS L.

Small trees and shrubs of three species, one of eastern United States, one of central China and one of China and Japan.

Leaves obovate to oblong, undulate-crenate, inequilateral at base, involute in the bud, with veins conspicuous beneath; stipules infolding the bud. *Flowers* appear in autumn in the American species in 3-flowered clusters from the axils of the leaves, perfect, each subtended by 2-3 acute bracts; calyx 4-parted, persistent and adnate to base of the ovary; petals 4, strap-shaped, spirally involute in the bud, hypogenous, alternate with the sepals; stamens 8 in 2 rows on margin of receptacle, those opposite the calyx-lobes fertile, the others small and abortive; filaments very short; anthers oblong, opening by valves; ovary 2-celled, each containing a single ovule; styles 2, subulate, spreading, stigmatic at apex. *Fruit* a woody capsule, 2-4-lobed at apex, loculicidally dehiscent and when ripe forcibly discharging its seeds which are lustrous brown, oblong, pointed, cotyledons foliaceous.

The name is from two Greek words alluding to the flowering of the tree at the same time as the ripening of the fruit of the previous season.

For species see pp. 224–225.

THE SWEET GUM. GENUS LIQUIDAMBAR L.

The Liquidambars are large trees of about four species with balsamic juices, scaly bark and branchlets often corky-winged. Only one species is indigenous to the United States. The family is characterized as follows:

Leaves palmately-lobed, long-petiolate, serrate, plicate in the bud; stipules pale, lanceolate, caducous; buds scaly. *Flowers* small, naked, monœcious, rarely perfect, the staminate in subglobose heads arranged in terminal racemes, each head surrounded by 4 caducous bracts, the pistillate in solitary long-stalked heads from the axils of upper leaves; stamens numerous with filaments shorter than the oblong longitudinally dehiscent anthers; pistillate surrounded by long-awned scales in globular heads, calyces obconic confluent and with limbs nearly obsolete, stamens 4, small and usually abortive; ovary partly inferior, with long recurved persistent style stigmatic on inner side; ovules numerous. *Fruit* a globose woody head consisting of the united capsules which are tipped with the incurved enlarged persistent free beak-like styles, dehiscent by 2 valves at the summit and liberating 1 or 2 developed compressed wing-angled seeds with many that are abortive.

The name is from Latin and Arabic words meaning *fluid amber*, in allusion to the fragrant balsamic exudation of these trees.

For species see pp. 226–227.

PLANE-TREE FAMILY. PLATANACEÆ LINDL.

The Plane-tree family consists of trees with watery juice, zigzig branchlets, and bark of trunks and larger branches exfoliating in large irregular scales. It consists of a single genus.

Leaves deciduous, alternate, palmately 3-7-lobed, from cordate to broad wedge-shaped at base, leaves and all new growth stellate-pubescent when young, with long petioles enlarged at base and inclosing the bud, plicate in vernation and in autumn mostly turning brown and withering on the branches before falling; stipules large, foliaceous and sheathing the branchlet on vigorous sterile shoots, but thin scarious and caducous on flowering shoots. *Flowers* monœcious, appearing with the unfolding of the leaves, minute in unisexual pedunculate globose heads; the staminate heads axillary; calyx of 3-6 minute sepals; petals 3-6, scarious and twice as long as the sepals; stamens as many as the sepals and opposite them with very short filaments and elongate 2-celled anthers opening longitudinally and with truncate connective; pistillate heads terminal, sometimes one or more heads sessile on the side of the peduncle and often encircling it; sepals 3-6; petals of same number but larger; pistils 3-6, superior, with persistent straight hairs at base and narrowing to a long curved style stigmatic on the ventral side; ovules 1-2, orthtropous, attached to the side of the cell. *Fruit* a subglobose head of club-shaped crustaceous 1-seeded akenes tipped with the persistent style and surrounded at base with bristly hairs; seed oblong and containing a straight embryo and fleshy albumen.

THE PLANE-TREES. GENUS PLATANUS L.

A genus consisting of 6 or 7 species widely distributed in North America, eastern Europe and southwestern Asia. Three are North American, one of the Atlantic states, one of the Pacific slope and one of southwestern United States and Mexico. For characters see description of the family, this being the only genus.

The name is derived from a Greek word meaning *broad* in allusion to their broad leaves.

For species see pp. 228–229.

ROSE FAMILY. ROSEACEÆ.

The Rose Family consists of trees, shrubs and a few herbs of wide distribution throughout temperate regions, and of upwards of fifteen hundred species grouped in about ninety genera. Most of our succulent fruits are among its products. Ten of the genera are represented by arborescent species in the United States.

Leaves alternate (opposite in *Lyonothamnus*) with stipules. *Flowers* regular, perfect; calyx 5-lobed; petals 5 (0 in *Vercocorpus*) imbricated in the bud; stamens numerous, distinct and inserted with the petals on a disk lining the calyx-tube; anthers small, 2-celled, introrse (extrorse in *Lauquelenia*) longitudinally dehiscent; pistils 1-many; ovary 1-celled with generally two anatropous ovules in each cell; seeds mostly without albumen.

KEY TO THE GENERA.

a Fruit a pome, consisting of an enlarged and succulent calyx-tube and ovary with papery or horny carpels; stipules free from the petioles (Tribe *Pomoideæ*).
  b Carpels papery at maturity and
    c As many as the styles
      d¹ Leaves simple; flowers in simple cymes..... **Pyrus.**
      d² Leaves palmately compound; flowers in compound cymes..... **Sorbus.**
    c² Carpels becoming twice as many as the styles; flowers in racemes; leaves simple. **Amelanchier.**
  b² Carpels horny at maturity; leaves simple..... **Cratægus.**
a² Fruit a drupe; ovary superior, 1-celled, with single terminal style (Tribe *Prunoideæ*). **Prunus.**

THE APPLES AND PEARS. GENUS PYRUS L.

The genus *Pyrus* (also spelled *Pirus*) as here restricted consists of about 30 or 40 species of small or medium-size trees of the northern hemisphere and mainly of the Old World. Five are natives of North America, four of the Atlantic states and one of the Pacific slope. Besides these two or three introduced species are widely naturalized.

Leaves simple, deciduous, petiolate, involute in the bud; stipules free from the petioles, caducous; winter buds scaly. *Flowers* pink or white, in simple terminal cymes on short lateral and sometimes spinescent spurs; calyx with urn-shaped tube and pointed lobes imbricated in the bud and mostly persistent; petals rounded, short-clawed; stamens 20 or more; pistils usually 5, alternate with the petals, united with the calyx-tube and containing 2 ovules in each cell; styles usually 5, distinct or united at base. *Fruit* a pome, formed by the enlargement of the united calyx tube and ovaries with papery carpels joined at apex; seeds usually 2 in each cell, more or less compressed, ovoid, erect, lustrous brown with cartilaginous testa and straight embryo.

The name is the ancient Latin name of the *Pear*.

KEY TO THE SPECIES.

a Fruit usually tapering to the stem and flesh containing grit-cells; styles mostly distinct. **P. communis.**
a² Fruit usually hollowing at the stem and flesh not containing grit-cells; styles united at base
  b Leaves glabrous at maturity or nearly so and
    c Ovate, mostly truncate or subcordate at base..... **P. coronaria.**
    c² Oblong-lanceolate to oval and mostly tapering at base..... **P. angustifolia.**
  b¹ Leaves tomentose or pubescent beneath and
    c Mostly narrowed at base
      Pedicels slender, 1-1½ in. long..... **P. Ioensis.**
      Pedicels stout, ¾ in. or less in length..... **P. Soulardi.**
    c² Mostly rounded or subcordate at base; petioles and pedicels
      Short, stout, and pubescent..... **P. Malus.**
      Long, slender and glabrous..... **P. prunifolia.**

For species see pp. 230–237 and the following:

PEAR, *Pyrus communis* L. A native of southern Europe and Asia, producing (in a native state) a small inferior fruit. This has been vastly ameliorated by cultivation and hybridization, and the tree is now cultivated in all countries of temperate regions. It has escaped and become naturalized in many localities in the United States. In favorable situations it is a strong upright tree, sometimes 75 ft. in height and 2 ft. or more in thickness of trunk. *Leaves* mostly ovate-oblong, 2-4 in. long, obtuse or rounded at base, acute or acuminate, finely appressed-serrate or subentire, pubescent and ciliate at first but finally lustrous dark green above, paler and veiny beneath, very firm in texture; petioles long and slender. *Flowers* about 1 in. broad, appearing with the leaves; styles usually 5 and distinct to base. *Fruit* variable, but that of wild seedling trees usually small and more or less austere.

APPLE, *P. Malus L.* — *Malus Malus* (L.) Britton. The native land of the Apple is supposed to be southeastern Europe and western Asia. It has been in cultivation from very

early times and is now planted in all temperate regions, its fruit having been vastly improved upon its natural condition, and it has escaped and become commonly naturalized throughout eastern United States and Canada. The trees attain a height of from 30-50 ft., with wide spreading branches and the trunk sometimes 2 or 3 ft. in diameter. The close-grained hard wood is valued in turnery for certain uses. *Leaves* ovate to oval, mostly rounded or cordate at base, acute or acuminate, irregularly serrate, gray-tomentose at first (as are all new growths), at maturity glabrous dull green above, more or less pubescent beneath and soft in texture; petioles stout. *Flowers* appearing with the leaves, white or more or less pink-flushed, 1-2 in. across, in close clusters with stout woody pedicels ¾-1½ in. long; calyx tomentose. *Fruit* very various in size and quality, that of seedling trees not true to the parents and generally inferior.

SIBERIAN CRAB, *Pyrus prunifolia* Willd. Occasionally found escaped from cultivation. It is thought to be a hybrid between *P. Malus* L. and the Asiatic *P. baccata* L. It is a small spreading tree differing from the *P. Malus* in having smooth and sometimes entire leaves, with longer more slender and smaller leaf and fruit-stems and small firm tart fruit.

THE MOUNTAIN-ASHES. GENUS SORBUS L.

Trees and shrubs of about seven widely distributed species of the north temperate regions, three being natives of North America and a fourth is a naturalized species introduced from the Old World. They have a smooth aromatic bark, stout branchlets and large buds with imbricated scales, the innermost of which are accrescent.

Leaves alternate, deciduous, pinnately compound (in the American species) with serrate leaflets; stipules caducous. *Flowers* perfect, regular, white, in terminal compound cymes; calyx with urn-shaped tupe and five persistent lobes imbricated in the bud; petals 5, white, spreading, rounded, with short claw; stamens numerous; ovary inferior with usually 3 carpels, 3 distinct styles and truncate stigmas; ovules 2 in each cell, erect. *Fruit* a small red berry-like pome with thin flesh, papery carpels and containing in each cell 1 or 2 pointed erect seeds with smooth cartilaginous coat; cotyledons fleshy, plano-convex, with no albumen.

KEY TO THE SPECIES.

a	Leaflets glabrous above and Long acuminate; fruit ¼ in. or less in diameter	**S. Americana.**
	Acute or obtuse; fruit about ⅓ in. in diameter	**S. decora.**
a^2	Leaflets pubescent both sides	**S. Aucuparia.**

For species see pp. 238–241 and the following:

OLD WORLD MOUNTAIN-ASH, or ROWAN-TREE. *Sorbus Aucuparia* L. This is a round-headed tree sometimes 50 or 60 ft. in height with trunk from 1-2½ ft. in diameter growing naturally in the forests of northern Europe and Asia. It has been extensively planted in this country for ornamental purposes and has become naturalized in places. *Leaves* with 9-15 oblong to oblong-lanceolate leaflets ¾-2 in. long serrate, entire at base, more or less pubescent both sides especially beneath; branchlets and petioles pubescent; buds tomentose. *Flowers* ⅓ in. across in mostly tomentose corymbs 4-6 in. across. *Fruit* about ⅓ in. across.

THE SERVICE-BERRIES. GENUS AMELANCHIER MEDIC.

Trees and shrubs with slender branches and long-pointed buds covered with closely imbricated scales, the innermost of which are accrescent. They are of extensive distribution throughout the north temperate regions of both hemispheres. Three arborescent species are known in North America, two of which are found in the Atlantic states and the third in the Pacific coast region and eastward to Lake Superior.

Leaves deciduous, simple, alternate, petiolate, serrate or entire, pinnately-veined, conduplicate in the bud; stipules linear, pink and caducous. *Flowers* in racemes with slender bibracteolate pedicels; calyx with campanulate tube, adnate to the ovary, and five narrow acute reflexed persistent lobes; disk green, nectiferous; petals five, elongated, white, with short claws; stamens numerous inserted on the rim of the calyx tube with subulate persistent styles and oblong anthers; ovary inferior with 5 cells each partly divided by a false partition; styles 2-5 united and pubescent below, spreading above, and with truncate stigmas; ovules erect, 2 in each cell. *Fruit* a small berry-like subglobose pome, purplish or blue when ripe and crowned with the calyx lobes and remnants of the filaments, with juicy pleasantly flavored fruit and membranaceous carpels; seeds 5-10, oblong, compressed, with brown coriaceous testa, straight embryo and no albumen.

The name is the popular name of the European species in Savoy.

KEY TO THE SPECIES.

a	Leaves sharply serrate and Ovate to ovate-oblong, acute to acuminate at apex	**A. Canadensis.**
	Oblong to elliptical, acute to rounded at apex	**A. obovalis.**
a^2	Leaves coarsely dentate towards the rounded apex	**A. almifolia.**

For species see pp. 242–243 and the following:

LONG-LEAF or SWAMP SERVICE-BERRY, *A. obovalis* (Michx.) Ashe. A small tree or shrub found in swamps and moist localities of northern states and northward. *Leaves* oblong to broad-elliptical, 1½-2 in. long, mostly rounded or obtuse at base, acute or rounded at apex, finely serrate, whitish wooly when they unfold, nearly glabrous at maturity. *Flowers* in dense racemes 1½-2½ in. long, at first hairy but becoming glabrous; petals about ⅜ in. long. *Fruit* depressed globose, ⅓ in. in diameter, from red to dark purple, glaucous.

WESTERN SERVICE-BERRY or JUNE-BERRY, *A. alnifolia* Nutt. A small tree of the Pacific coast region ranging eastward to Manitoba and northern Michigan, but is only a shrub east of the Rocky Mountains. It is characterized by having thickish broad elliptical to suborbicular leaves obtuse to truncate and coarsely dentate at apex, and short rather dense racemes.

THE HAWS OR THORNS. GENUS CRATÆGUS L.

The Haws, Thorns, Hawthorns or Thorn-apples, as they are variously called, are generally low wide-spreading trees or shrubs, with very strong tortuous branches armed with stiff sharp thorns (though sometimes unarmed), with somewhat zigzag branchlets and usually with dark or gray scaly bark. They are mostly confined to north temperate regions, with the bulk of distribution in eastern United States. Twenty years ago scarcely a score of species were recognized in America and fewer abroad, but it was thought that many of the species presented almost innumerable forms.

Within the past few years much attention has been paid to the subject, and now the list of named species numbers more than six hundred. The validity of many of these, however, is extremely problematical, as observers working in different localities have made observations and assigned names quite independently of each other, and when the studies have been more extended and results compared, doubtless many of the names must be relegated to synonymy. The value of certain characters, too, upon which to determine specific rank, are matters of controversy, and can only be determined by more extensive observation and agreement. Extensive experiments are being conducted, notably at the Arnold Arboretum, under the direction of Prof. C. S. Sargent, to determine how far seedling plants will present the characters of their parents, and the results will be looked upon with much interest.

Due to the present unsettled condition of the subject it is impossible to present the genus with the completeness accorded the other genera, and it has been decided to take up and illustrate only a few of the most distinct or common species, defining them as outlined by Prof. Sargent.

Leaves conduplicate in the bud, simple, petiolate, generally serrate, and often also lobed, especially on vigorous shoots, deciduous; stipules caducous or on vigorous shoots often foliaceous. *Flowers* in simple or compound corymbs terminating short lateral leafy branchlets, lowermost pedicels of a cluster often from the axils of leaves; calyx obconic with 5 acute reflexed mostly persistent lobes and tube adnate to the carpels; petals 5, white and pinkish, spreading and inserted on the throat of the calyx; stamens normally 5 in one row and alternate with the petals or 10 in 5 pairs, or 15 in 2 rows, those of the outer row in pairs, or 20 in 3 rows, or 25 in 4 rows; filaments subulate, incurved; anthers pale yellow to nearly white, or from pink to dark rose and purple; ovary inferior, 1-5-celled with 1 or 2 ovules in each cell; styles 1-5, distinct, persistent. *Fruit* a pome from short globose to oblong or pear-shaped, mostly from red to yellow (sometimes blue or black) with 1-5 bony carpels united below and each containing usually a single erect compressed seed.

The name is from the Greek word for *strength*, referring to the toughness of the wood.

For species see pp. 244–261.

THE PLUMS AND CHERRIES. GENUS PRUNUS B. & H.

Trees and shrubs with peculiar bitter astringent properties, many containing prussic acid and exuding a gum from the bark when wounded. They are of general distribution throughout the temperate and tropical regions of the northern hemisphere and many representatives are of great economic value. There are about one hundred twenty species of which some twenty-five or thirty occur in the United States, eighteen of these being arborescent.

Leaves alternate, simple, petiolate, conduplicate or convolute in the bud, deciduous or persistent, serrate (sometimes entire); petioles often glandular; stipules small, caducous; winter buds with closely imbricated scales, the innermost accrescent. *Flowers* regular, perfect; calyx inferior, deciduous, with 5 lobes imbricated in the bud and thin annular disk;

petals 5, white, spreading, deciduous; stamens numerous, inserted with the petals on the calyx, with free filiform filaments and oval 2-seeded anthers; pistil solitary with 1-celled ovary, single terminal style, capitate stigma; ovules 2, suspended. *Fruit* a 1-seeded drupe with horny compressed pit, the seed suspended; cotyledons fleshy.

The name is the ancient Latin name of the *Plum-tree*.

KEY TO THE SPECIES.

a Flowers in axillary umbels expanding with or before the leaves; pit more or less flattened
  b Petioles rather slender and long (*Bird Cherries*)
    c Fruit mostly ½ in. or more in diameter
      Leaves pubescent beneath; fruit sweet..... **P. Avium.**
      Leaves glabrous; fruit tart..... **P. Cerasus.**
    c² Fruit about ¼ in. in diameter, very sour..... **P. Pennsylvanica.**
  b² Petioles stout and short (*Plums*)
    c Fruit red or yellow and about 1 in. or less long; leaves abruptly acuminate and
      d Obovate-oblong, thickish, dull and veins impressed; calyx-lobes
        Glabrous inside; pit much compressed..... **P. nigra.**
        Pubescent inside; pit turgid..... **P. Americana.**
      d² Ovate-lanceolate to lanceolate, thinnish; pit turgid; calyx-lobes
        Pubescent both sides; fruit austere with thickish skin... **P. hortulana.**
        Glabrous; fruit with thinnish skin..... **P. angustifolia.**
    c² Fruit dark blue with bloom; leaves ovate and petioles mostly without glands. **P. Alleghaniensis.**
a² Flowers in terminal corymbs appearing after the leaves..... **P. Mahaleb.**
a³ Flowers in racemes terminating leafy branchlets; leaves finely serrate
  b With slender spreading teeth; leaves thinnish..... **P. Virginiana.**
  b² With incurved callous teeth; leaves thickish..... **P. serotina.**
a⁴ Flowers mostly solitary; leaves oblong-lanceolate; fruit velvety... **P. Persica.**

For species see pp. 262–283 and the following:

PEACH, *Prunus Persica* (L.) S. & Z. (*Amygdalus Persica* L.). The Peach was early introduced into this country from Europe, coming originally it is thought from China, and is found naturalized in localities from southern N. Y. southward. It is a small tree, occasionally 1 ft. in diameter, with bark exfoliating in laminate scales. *Leaves* lanceolate to lance-oblong, 4-6 in. long, tapering about equally to both ends, serrate, glabrous; petioles stout, ¼ in. long. *Flowers* appearing before the leaves, solitary, pink, varying in size from ½-2 in. broad, scaly-bracted. *Fruit* a subglobose grooved drupe, velvety-tomentose, with very hard deeply pitted stone.

PULSE OR PEA FAMILY. LEGUMINOSÆ.

A very large and important family of trees, shrubs and herbs of wide distribution throughout all temperate and tropical regions, generally free from obnoxious properties and many of its representatives of the greatest economic importance. There are about 7,000 species grouped in nearly 450 genera, and of these seventeen have arborescent representatives in the United States.

Leaves alternate, usually compound, with stipules. *Flowers* regular or papilionaceous and usually perfect; stamens 10 or many, with diadelphous (sometimes distinct) filaments and 2-celled anthers opening longitudinally; pistil solitary, with one or several-celled superior ovary. *Fruit* a legume.

KEY TO THE GENERA.

a Flowers regular or imperfectly papilionaceous; lobes imbricated in æstivation; stamens with distinct filaments; seeds albumenous; flowers
  b Imperfectly papilionaceous, perfect; legume thin and flat; leaves simple. **Cercis.**
  b² Regular, diœcious or polygamous; leaves
    Bipinnate; calyx-tube elongated; stamens 10; pods thick..... **Gymnocladus.**
    Both pinnate and bipinnate; stamens 3-5; pods thin..... **Gleditsia.**
a² Flowers papilionaceous; seeds usually without albumen; leaves once-pinnate; stamens
  b Distinct; flowers in long loose panicles..... **Cladrastis.**
  b² Diadelphous; pod thin and flat; stipules spinescent..... **Robinia.**

THE RED-BUDS. GENUS CERCIS L.

Small trees and shrubs of seven species, three of which are natives of North America and the others of Europe and Asia. Of the three North American species one is a Californian shrub, another is a small tree of the basin of the Rio Grande in Texas and southward, and the third is widely distributed in the middle and eastern states.

Leaves simple, deciduous, broad, with 5-7 prominent veins, entire, long-petiolate; petioles terete, slender and enlarged near the leaf-blade; stipules small, membranaceous, caducous.

Flowers appearing before or with the leaves in short lateral fascicles, on the growth of previous seasons or even the trunk; calyx oblique-campanulate, 5-toothed; corolla somewhat papilionaceous with 5 rose-colored unguiculate petals, those forming the keel the largest and not united, the standard smaller than the wings and inclosed by them in the bud; stamens 10, distinct, declined, with filaments enlarged and pilose at base; anthers alike, oblong, versatile; ovary with short stipe; style filiform with capitate stigma; ovules numerous, in 2 ranks, attached to the dorsal suture. *Fruit* a linear oblong flat pod, acute at both ends, margined along the upper suture, reddish purple and 2-valved at maturity, with thin reticulate valves; seeds oblong, compressed, with reddish brown crustaceous testa, straight embryo and scant horny albumen.

The name is the ancient Greek name of the Old World *Judas-tree.*

For species see pp. 284–285.

THE COFFEE-TREE. GENUS GYMNOCLADUS LAM.

Trees, with stout branchlets and large pith, of two species, one of eastern North America and the other of southern and southwestern China.

Leaves deciduous, bipinnate, with single leaflets in place of the one or two pairs of lowermost pinnæ; stipules caducous; branchlets thick with large pith and 2 small impressed buds in each axil. *Flowers* regular, diœcious or polygamous, in terminal racemes, greenish white; calyx elongated, tubular, 10-ribbed, with 5 narrow nearly equal acute lobes; petals 4-5, oblong, equal, pubescent, rather longer than the calyx lobes, spreading; stamens 10 and inserted with the petals on the margin of the disk bearing the calyx tube, shorter than the petals, distinct, with pubescent filaments alternately of different lengths and uniform introrse longitudinally dehiscent anthers; pistil sessile with short style and oblique 2-lobed stigma, rudimentary or wanting in the staminate flowers; ovules numerous. *Fruit* a large thick oblong subfalcate 2-valved coriaceous pod, tardily dehiscent and containing several seeds with pulp between; seeds suborbicular, flattened, with long funicles, thick horny testa, thick orange-colored cotyledons and thin horny albumen.

The name is from two Greek words meaning *naked branch.*

For species see pp. 286–287.

THE HONEY LOCUSTS. GENUS GLEDITSIA L.

Trees of about eight or ten species of eastern United States, Asia, Japan and tropical Africa. Of these three are native of North America, one limited to a small region in Texas, another inhabiting mainly the lower Mississippi basin and southeastern states, and the third is now distributed over most of the Atlantic states.

Leaves evenly pinnate or twice pinnate or with some of the pinnæ replaced by simple leaflets often fascicled, deciduous; leaflets subsessile and irregularly crenulate; stipules small, caducous. *Flowers* regular, polygamous, small, green or white, in axillary or lateral sometimes fascicled spike-like racemes with minute caducous bracts; calyx campanulate with 3-5 nearly equal lobes; petals equal and of same number as the calyx lobes; stamens 6-10, inserted with the petals on the edge of the disk, distinct, erect, with free filaments and uniform anthers; ovary nearly sessile; style short with terminal dilated stigma; ovules 2 or many. *Fruit* a flat pod, long-linear, many-seeded and indehiscent, or short-ovate and dehiscent; seeds suborbicular or oblong, flattened, attached by long funicles; embryo surrounded with horny albumen.

The generic name (which is sometimes spelled *Gleditschia*) is in honor of Prof. J. G. Gleditsch, a German botanist of the 18th century.

KEY TO THE SPECIES.

Pods linear, many-seeded and somewhat twisted or coiled.....	**G. triacanthos.**
Pods oblique, oval, mostly 1-seeded.....	**G. aquatica.**

For species see pp. 288–291.

THE YELLOW-WOOD. GENUS CLADRASTIS RAF.

Trees of a single species of limited natural distribution in the Atlantic states, but widely planted for ornamental purposes. They have yellowish heart-wood, somewhat watery juice and smooth bark. Another tree (*Maackia Amurensis* Rupr.), of eastern Asia and Japan, is referred by some writers to this genus, but by others is considered to be generically distinct.

Leaves deciduous, odd-pinnate, with stout terete petioles enlarged at base and few large entire short-stalked leaflets; buds small, naked superposed and formed within the base of the petiole. *Flowers* white, papilionaceous, in terminal panicles or racemes; calyx narrow-campanulate, 5-toothed; petals with suborbicular reflexed standard and those of the keel incurved and distinct; stamens 10, distinct, with slender filaments and uniform versatile anthers; ovary subsessile, linear and tipped with slender incurved style with terminal stigma;

ovules several, suspended. *Fruit* a glabrous compressed linear margined tardily dehiscent legume, containing few oblong compressed seeds with slender funicle and no albumen.

Name formed from Greek roots meaning *brittle branches.*

For species see pp. 292–293.

THE LOCUSTS. GENUS ROBINIA L.

Trees and shrubs with slender zigzag branchlets and minute superposed buds covered by the enlarged bases of the petioles. They are confined to North America. Seven or eight species are known, of which four are represented in the United States, three arborescent and one shrubby.

Leaves deciduous, unequally pinnate and with spinescent persistent stipules; leaflets entire, petiolulate with minute bristle-like stipels. *Flowers* in racemes from the axils of the leaves of the year with caducous bracts and bractlets; calyx campanulate, 5-toothed, the upper pair shorter and somewhat united; corolla papilionaceous with large reflexed obcordate standard, oblong curved free wings and obtuse incurved keel-petals united below; stamens 10, the 9 inferior united and one superior free at least to base; anthers uniform or every other one smaller; pistil superior, stipitate with subulate inflexed hairy style and terminal stigma; ovules numerous, suspended from the ventral suture in two ranks. *Fruit:* pods, compressed, linear-oblong, flat-margined along the seed-bearing suture, with 2 thin membranous valves and containing several oblique reniform seeds with persistent incurved funicle, fleshy cotyledons and reflexed radicle.

The genus is named in honor of Jean and Vaspasean Robin, father and son, herbalists to Henry IV, King of France, who first cultivated the Locust tree in Europe.

KEY TO THE SPECIES.

Flowers white; branchlets and pods glabrous..... **R. Pseudacacia.**
Flowers pinkish; branchlets and pods glandular-hispid..... **R. viscosa.**

For species see pp. 294–297.

RUE FAMILY. RUTACEÆ JUSS.

An important family of trees and shrubs with pungent or aromatic properties, widely distributed throughout warm and temperate regions, especially of the Old World, and most abundant in South Africa and Australia. About eight hundred eighty species, grouped in one hundred ten genera, are recognized, but only five of the genera are represented in the United States, this number including *Citrus* (the Bitter-sweet Orange, etc.) of Florida.

Leaves compound (sometimes simple) usually glandular-punctate, without stipules or with stipular spines. *Flowers* regular, perfect or unisexual, generally in cymes; calyx with 3-5 lobes imbricated in the bud; petals 3-5, hypogynous or perigynous, imbricated in the bud; stamens as many as the petals or twice the number, distinct or united below and inserted on the receptacle; anthers introrse, longitudinally dehiscent; pistils 2-5, separate or united, sessile or stipitate, the styles usually united and ovary containing 2 pendulous anatropous or amphitropous ovules. *Fruit* usually a capsule but in other cases a samara or drupe; seed with horny or crustaceous coat and containing an axile embryo in fleshy albumen.

KEY TO THE GENERA.

Fruit a 2-valved capsule; leaves pinnate..... **Xanthoxylum.**
Fruit a samara winged all around; leaves trifoliate..... **Ptelea.**

THE PRICKLY-ASHES. GENUS XANTHOXYLUM L.

Trees and shrubs of about one hundred species, with prickly twigs and of wide distribution in tropical and temperate regions. Five species are found in the United States of which one is a shrub and the others small trees mainly of the southern states. The bark, especially of the roots, of all the representatives of the genus contains active stimulant and tonic properties and is used in the treatment of rheumatism, to excite salivation and to relieve toothache.

Leaves alternate, odd-pinnate, the leaflets generally opposite, oblique at base and entire or crenulate. *Flowers* small, whitish or greenish, in axillary or terminal pedunculate cymes; sepals 4-5 or obsolete; petals 4-5; stamens 4-5 and alternate with the petals; pistils 2-5, oblique, stipitate; ovaries distinct, 1-celled, 2-ovuled; style short, slender and connivant. *Fruit* a capsule with two thickish valves and containing 1-2 oblong seeds with smooth black shining crustaceous testa, and often hanging from the open carpel at maturity suspended by a slender funicle; cotyledons foliaceous.

The name is from two Greek words meaning *yellow wood.*

For species see pp. 298–299.

THE WAFER-ASHES. GENUS PTELEA L.

Small trees or shrubs without prickles and with bitter bark. Five or six species are known, all natives of the United States and Mexico, one only being arborescent and that widely distributed throughout central and eastern United States.

Leaves usually 3-foliate, long petiolate and without stipules; leaflets conduplicate in the bud, ovate or oblong, entire or serrate, pellucid-punctate. *Flowers* greenish-white, polygamous, in compound terminal cymes; calyx with sepals 4-5 or wanting; petals 4-5, imbricated; stamens of same number and alternate with them with subulate filaments, pilose at base and shorter in the pistillate flowers; pistil superior, stipitate, with compressed, 2-3-celled ovary, short style and 2-3-lobed stigma. *Fruit* an indehiscent 2-3-celled samara, surrounded by a broad reticulate wing (or rarely wingless); seed pointed at apex, rounded at base and with coriaceous testa.

The name is the ancient Greek name of the Elm, given to this genus on account of a resemblance in the fruit.

For species see pp. 300–301.

QUASSIA FAMILY. SIMARUBACEÆ DC.

Trees, shrubs and a few herbs with generally bitter milky juice and confined mostly to tropical regions. About one hundred forty-five species, grouped in twenty-eight genera, are known. Of these one arborescent genus (*Simaruba*) is indigenous to the United States in subtropical Florida. Another (*Ailanthus*) is extensively naturalized throughout eastern United States and Canada.

Leaves generally alternate and pinnate, not glandular-punctate, without stipules. *Flowers* mostly in axillary racemes or panicles and dicœcious or polygamous, regular; calyx 3-5-lobed or parted, imbricated in the bud; petals 3-5 (rarely wanting), hypogenous; disk annular or elongated; stamens as many as the petals or twice as many, with distinct filaments each with a scale or hairs at base and inserted under the disk; anthers 2-celled introrse; pistils composed of 2-5 united carpels each of a single cell and containing a single anatropous ovule; style 1-5. *Fruit* a drupe or samara.

THE AILANTHUS. GENUS AILANTHUS DESF.

Large handsome trees with pale bark and of two or three species, natives of China, the East Indies and Australia and represented in the United States by a single naturalized species.

Leaves simple, altrenate, deciduous, odd-pinnate, with numerous somewhat oblique subentire leaflets. *Flowers* small, in large terminal panicles; calyx with 5 short lobes; petals 5, valvate, spreading; disk hemispheric, 10-lobed; stamens 10 (only 2 or 3 in the pistillate flowers); ovary deeply 2-5-lobed; styles 2-5, united. *Fruit* samaras usually 2-5 together, linear-oblong, with membranous veiny wing and cell containing a solitary compressed seed at about its center.

The name is from the native Mallaca name of the tree — *Ailanto*, meaning *Tree of Heaven*.

For species see pp. 302–303.

SUMACH FAMILY. ANACARDIACEÆ LINDL.

Trees and shrubs with resinous or milky juice, of about fifty genera and four hundred species mainly of warm or tropical regions. Three genera are represented in the trees of the United States.

Leaves mostly alternate and without stipules; branchlets terete and with large pith. *Flowers* small, regular, polygamous, dicœcious or perfect; calyx lobes mostly 5; petals of same number and imbricated in the bud or none; stamens as many as the petals or twice as many (rarely fewer) and inserted with them on the edge of an annular hypogenous disk; filaments filiform and anthers oblong, introrse, 2-celled, longitudinally dehiscent; ovary usually 1-celled and containing a solitary anatropous ovule suspended by a slender funicle rising from the base of the ovary; styles 1-3, stigmas terminal. *Fruit* generally a small drupe; seed with membranous or crustaceous coat; cotyledons fleshy and containing little or no albumen.

KEY TO THE GENERA.

Styles lateral; fruit compressed with many abortive plumose pedicels; leaves simple. **Cotinus.**

Styles terminal; fruit symmetrical; leaves compound (simple in some western species). **Rhus.**

THE SMOKE-TREES. GENUS COTINUS ADANS.

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

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

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

For species see pp. 304–305.

THE SUMACHS. GENUS RHUS L.

Trees, shrubs and climbing vines of about one hundred twenty species, natives mainly of the warmer parts of the north and south temperate regions. Some are of great economic value, as those producing the lacquer and vegetable wax of Japan, tannin, etc., and several possess poisonous properties. Sixteen or seventeen species are natives of the United States of which about a half dozen may be considered as trees.

Leaves lostly unequally pinnate and deciduous, a few simple and persistent, alternate. *Flowers* mostly dioecious in compound axillary or terminal panicles; calyx mostly 5-cleft or parted and persistent; petals spreading and longer than the calyx-lobes; stamens 5, alternate with the petals and inserted with them under the margin of the annular disk; pistil solitary, sessile, with three terminal styles. *Fruit* a subglobose drupelet mostly in thyrses with thin dry hairy or glabrous outer coat and a single bony or crustaceous stone; cotyledons foliaceous.

Rhus is the classical Green name of the European *Sumach*.

KEY TO THE SPECIES.

a Fruit pubescent, red, with smooth stone, in terminal thyrses
  Rachis of the leaf not winged villose..... **R. hirta.**
  Rachis winged between the leaflets..... **R. copallina.**
a' Fruit glabrous, white, with striated stone in axillary panicles..... **R. vernix.**

For species see pp. 306–311.

HOLLY FAMILY. ILICACEÆ LOWE. (AQUIFOLIACEÆ DC.)

Trees and shrubs with watery sap and terete branchlets of five genera and about one hundred seventy species. They are widely distributed in both temperate and tropical regions of both the Old World and the New. Only one genus contains arborescent representatives in the United States.

Leaves alternate, persistent or deciduous, petiolate, entire, crenate or toothed and with minute stipules. *Flowers* small, regular, axillary, white or greenish, dioecious or polygamous; calyx with 4-6 lobes imbricated in the bud, generally persistent, hypogenous; petals 4-6, imbricated, deciduous, separate or united at base; disk none; stamens as many as the lobes of the corolla, alternate with them and inserted on the corolla; anthers oblong; pistil solitary, superior, compound with 4-8-celled ovary, short style or none and capitate stigmas of the same number as the cells of the ovary; ovules usually 1 in each cell, suspended, anatropous. *Fruit* a drupe with thin flesh and as many horny or crustaceous nutlets as carpels; seeds pendulous with minute straight embryo and fleshy albumen.

THE HOLLIES. GENUS ILEX L.

Trees and shrubs of about one hundred sixty species of which thirteen inhabit eastern North America (none the western side of the continent) and five of these are trees.

The characters are those given of the family.

The name is the ancient Greek name of the *Holly Oak* of southern Europe.

KEY TO THE SPECIES.

a Leaves evergreen, thick; nutlets ribbed: leaves.
  Spiny-toothed ..... **I. opaca.**
  Entire or remotely serrate..... **I. Cassine.**
  Coarsely crenate ..... **I. vomitoria.**

a² Leaves deciduous, thinnish; nutlets ribbed; leaves
Small, obovate to oblanceolate-oblong, crenate..... **I. decidua.**
Large, ovate to oblong and lanceolate, serrate..... **I. monticola.**

For species see pp. 312–321.

STAFF-TREE FAMILY. CELASTRACEÆ LINDL.

Trees, shrubs and climbing vines of about three hundred fifty species of tropical and temperate regions and grouped in forty genera. Four genera are represented among the trees of the United States, mainly southern.

Leaves simple and with stipules small and caducous or none. *Flowers* regular, generally perfect, in axillary clusters and mostly with jointed pedicels; calyx 4-5-lobed or parted, imbricated in the bud, persistent; petals 4-5, spreading, imbricated in the bud; stamens 4-5, inserted on the disk with 2-celled introrse anthers longitudinally dehiscent; ovary 2-5-celled with 1 or 2 anatropous ovules in each cell (6 sub-horizontal in *Canotia*). *Fruit* a fleshy 2-4-celled dehiscent capsule or drupe; seed furnished with a colored aril, containing copious albumen and foliaceous cotyledons.

THE WAHOO OR BURNING BUSH. GENUS EUONYMUS L.

Small trees and shrubs of about fifty species mainly of the northern hemisphere and most numerous in southern Asia and Japan. Four species of which one is arborescent are natives of the United States.

Leaves opposite, petiolate, entire or serrate; stipules caducous. *Flowers* generally perfect, in few-flowered cymes, from the axils of the lower leaves of the season, greenish or purple; calyx 4-5-lobed; petals of same number, spreading and inserted beneath the thick 4-lobed disk; stamens as many as the petals, alternate with them and inserted on the disk; filaments very short; anthers with 2 cells, spreading below; ovary 4-celled with short style or none and depressed stigma; ovules usually 2 in each cell. *Fruit* a 4-lobed and 4-celled capsule, fleshy, smooth (in the American species) or winged; longitudinally dehiscent; seeds 1 or 2 in each cell, ascending and surrounded by a red aril.

The name is the classical Greek name of a European species.

For species see pp. 322–323.

MAPLE FAMILY. ACERACEÆ ST. HIL.

Trees and a few shrubs with generally watery and saccharine sap and of wide distribution. It consists of two genera, *Acer* and *Dipteronia*, the former largely represented in America and the latter a genus of a single species in China.

Leaves deciduous, opposite, long-petiolate, simple and palmately lobed or pinnate, usually without stipules; winter-buds scaly, the innermost scales accrescent. *Flowers* regular, polygamous or dioecious, in axillary or terminal fascicles, cymes or racemes; calyx generally 5-parted, imbricated in the bud; petals of same number or none; disk thick, annular, lobed; stamens 4-12, usually 7-8, hypogenous with anthers 2-celled, introrse, the cells opening longitudinally; ovary 2-lobed, 2-celled, compressed, wing-margined; styles 2, inserted between the lobes and stigmatose on their inner surfaces; ovules 2 in each cell, anatropous or amphitropous, attached to inner angle. *Fruit* a pair of long-winged and usually 1-seeded samaras joined at base; wings papery, thickened on the outer margin; seed usually solitary, compressed, ascending, without albumen; cotyledons thin, folded.

THE MAPLES. GENUS ACER L.

The genus consists of about seventy-five species widely distributed over the northern hemisphere, only one species in Sumatra and Java extending south of the equator.

About thirteen species are represented in North America most of them having sweet sap, from which sugar can be made, and several producing valuable lumber.

Acer is the classical name of the *Maple-tree*.

KEY TO THE SPECIES.

a Leaves simple and palmately veined and lobed; flowers appearing
b After the leaves from terminal buds; fruit ripening in autumn
c Without petals, in long-pedicelled tassel-like corymbs; leaves thick
Pale beneath, glabrous, nearly flat and lobes coarsely undulate-dentate. **A. Saccharum.**
Green beneath; concave and pubescent below; lobes undulate or entire. **A. nigrum.**
c² With petals; flowers in
Erect racemes; leaves coarsely serrate-dentate..... **A. spicatum.**
Drooping racemes; leaves finely and often doubly serrate. **A. Pennsylvanicum.**

b² Before the leaves in very early spring, in fascicles from lateral buds; fruit ripening in early summer
c Flowers subsessile, without petals; ovary tomentose; leaves deeply lobed. **A. saccharinum.**
c' Flowers with pedicels and petals; overy glabrous; leaves not deeply lobed and
Glabrous or nearly so beneath..... **A. rubrum.**
White-tomentose beneath ..... **A. Drummondii.**
a² Pinnately compound; flowers dioecious..... **A. Negundo.**

For species see pp. 324–337, and the following

DRUMMOND MAPLE — *Acer Drummondii* H. & A.; *rubrum* var. *Drummondii* Sarg. A large tree inhabiting deep river swamps of the Gulf states from Georgia to Texas and up the Mississippi Valley to southeastern Missouri, where in a limited area it is found within the territory covered by this work. *Leaves* 3-lobed, or sometimes partially 5-lobed with short broad acute or acuminate nearly entire lobes, cordate or rounded at base, thick and densely hoary-tomentose beneath, as are the petioles and all new growth. *Flowers* scarlet, in dense lateral clusters, expanding before the leaves, with pedicels and petals. *Fruit* ripening in March or April with or before the expanding of the leaves, bright scarlet samaras 1½-2½ in. long with wings ½-¾ in. broad and with slender pedicels 1-2 in. long.

HORSE-CHESTNUT FAMILY. HIPPOCANTANACEÆ T. AND G.

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

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

THE BUCKEYES AND HORSE-CHESTNUT. GENUS ÆSCULUS L.

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

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

KEY TO THE SPECIES.

a Flowers white; winter buds resin-coated; leaflets mostly 7..... **A. Hippocastanum.**
a' Flowers yellow; winter buds not resin-coated; leaflets mostly 5; stamens
Longer than petals; capsules spiny at least when young..... **A. glabra.**
Shorter than petals; capsules quite smooth..... **A. octandra.**

For species see pp. 338–343.

SOAPBERRY FAMILY. SAPINDACEÆ R. BR.

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

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

THE SOAPBERRIES. GENUS SAPINDUS L.

Trees and shrubs of wide distribution mainly in tropical regions and most abundant in Asia. Their fruits contain a saponaceous juice which makes a lather in water, like soap, for which they are sometimes used as a substitute. The horny seeds of some species are used for beads and buttons. About forty species are known of which three are found in southern United States, one ranging as far north as southern Missouri.

Leaves mostly pinnate, deciduous. *Flowers* small, with short pedicels, in ample racemes or panicles; sepals 4-5, unequal; petals of same number and alternate with the sepals, each usually with a scale at its base inside and inserted under the edge of the disk; stamens 8-10 inserted on the disk, equal, usually with hairy filaments included in the perfect flowers but much longer and exserted in the staminate flowers; anthers versatile; ovary ascending and 3-celled with a single ovule in each cell; style columnar, short, and 2-4-lobed stigma. *Fruit* a 1-3 seeded drupe-like berry, subglobose or 2-3-lobed, seed one in each carpel, obovate, with smooth testa and hilum surrounded with silky hairs.

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

For species see pp. 344–345.

BUCKTHORN FAMILY. RHAMNACEÆ DUMORT.

Trees and shrubs with watery bitter juice and of about five hundred seventy-five species, grouped in forty-five genera. They are natives of warm and temperate regions, and six of the genera have arborescent representatives in the United States, *Rhamnus* only being represented in the northeastern states.

Leaves simple, mostly alternate and often 3-nerved; stipules small mostly deciduous. *Flowers* small, greenish, mostly perfect; calyx 4-5-lobed valvate; petals 4-5 inserted on the calyx; disk annular and lining the calyx-tube or none; stamens opposite the petals and inserted with them on the edge of the fleshy disk; anthers introrse, versatile; ovary superior, 2-5-celled with 1 anatropous ovule in each cell; style columnar with terminal stigma. *Fruit* a drupe or drupe-like, tipped with the remnants of the style; seed usually with albumen.

THE BUCKTHORNS. GENUS RHAMNUS L.

Trees and shrubs with bitter bark and often spinescent branches, of about seventy species, inhabiting chiefly northern temperate and tropical regions. Five or six species are indigenous to the United States and at least one or two others are naturalized from Europe.

Leaves mostly alternate and deciduous or persistent, petiolate, conduplicate in the bud. *Flowers* perfect or polygamous in small axillary cymes, racemes or panicles; calyx campanulate, 4-5-lobed; petals 4-5-emarginate and hooded around the stamen or none; stamens 4-5 with very short filaments; ovary ovoid, free from the disk; style 3-4-cleft or lobed. *Fruit* a drupe with succulent flesh and 2-4-nutlets each containing a single erect grooved seed with large foliaceous cotyledons and scant albumen.

The name is the classical Green name of the European *Buckthorn.*

KEY TO THE SPECIES.

a Leaves opposite, with 3 or 4 pairs of arcuate veins running lengthwise; nutlets grooved. **R. Cathartica.**

a² Leaves alternate, with 6-10 pairs of veins running to margin; nutlets smooth.
Flowers and fruit in short-peduncled umbels..... **R. Caroliniana.**
Flowers and fruit in sessile umbels..... **R. Frangula.**

For species see pp. 346–349 and the following:

ALDER BUCKTHORN. *Rhamnus Frangula* L. A small tree or shrub of Europe, northern Africa and western Asia, occasionally planted in this country for ornamental purposes and has run wild in localities. It is very similar to the *R. Caroliniana*, differing chiefly in having rather smaller more obtuse leaves and flowers and fruit in sessile umbels.

LINDEN FAMILY. TILIACEÆ JUSS.

Trees, shrubs and herbs of about one hundred thirty-five genera and two hundred forty-five species, chiefly tropical and more numerously represented in the southern hemisphere than in the northern. Three genera are represented in North America of which the following only is arborescent.

Leaves simple, deciduous, mostly alternate and stipules small and caducous. *Flowers* regular, perfect, generally in cymes or panicles; sepals mostly 5, valvate, deciduous; petals of same number and hypogenous, rarely more; stamens numerous; pistil solitary, sessile, 2-10-celled; ovules mostly anatropous; style terminal columnar; stigma capitate. *Fruit* drupaceous or nut-like; seeds in fleshy albumen; cotyledons foliaceous.

THE LINDENS OR BASSWOODS. GENUS TILIA L.

The Basswoods are widely distributed throughout the temperate regions of the northern hemisphere, none, however, being found in western America or central Asia. They are generally trees of great economic importance in the production of a soft valuable wood, a fibrous

inner bark and honey and perfume from their flowers. About twenty species are known five or six of which are found among the trees of eastern North America.

Leaves deciduous, long-petiolate, mainly cordate and oblique at base, acute or acuminate, serrate. *Flowers* light yellow, very fragrant and nectariferous in pedunculate axillary cymes, each peduncle furnished with a large pale floral membranous bract to which it is adnate for about half its length; sepals 5; petals 5, imbricated in the bud, yellowish white stamens in 5 clusters each cluster (in the American species) united with a petal-like scale opposite each petal, the filament filiform and forked at the apex, each fork bearing an extrorse half-anther; ovary 5-celled, each cell containing 2 anatropous ovules; style columnar and with 5 spreading stigmatic lobes. *Fruit* nut-like, dry, woody, 1-celled and containing 1-2 amphitropous seeds; cotyledons palmately 5-lobed.

The name is the classical name of the European *Linden*.

KEY TO THE SPECIES.

a	Leaves green and glabrous beneath.....	**T. Americana.**
a'	Leaves whitish and	
	Tomentose beneath	**T. heterophylla.**
	Stellate pubescent with tufts in the axils of the veins beneath.....	**T. Michauxii.**

For species see pp. 350–351 and the following:

WHITE BASSWOOD, *T. heterophylla* Vent. A large tree ranging from southern N. Y. to Fla., particularly of the Alleghany Mts. *Leaves* ovate-oblong to oval, 5-10 in. long, cordate or truncate and oblique at base, abruptly acuminate, serrate, at maturity thin, dark green above, whitish and tomentose beneath; branchlets glabrous. *Flowers* with pedunculate bract 4-5 in. long, decurrent nearly to base. *Fruit* oblong to subglobose, about ⅓ in. long, rusty-tomentose.

MICHAUX BASSWOOD, *T. Michauxii* Nutt. Similar to the above and often confounded with it and with *T. pubescens* Ait. of the southern coast region. Its distribution, apparently extending from the vicinity of Montreal, Canada, to the Gulf states, is not well understood. *Leaves* broad-ovate, mostly cordate and very oblique at base, short acuminate or acute at apex, serrate, at maturity rather firm, glabrous dark green above, whitish stellate pubescent with tufts of hairs in the axils of the veins beneath. *Flowers* floral bract pedunculate, spatulate-obovate, decurrent to within ½-¾ in. of the base of the peduncle. *Fruit* subglobose, about ⅛ in. in diameter, hoary-tomentose.

TEA FAMILY. THEACEÆ DC.

Trees and shrubs of about one hundred and sixty species, grouped in sixteen or seventeen genera, and confined chiefly to the tropics of the New World and southern and eastern Asia. The most important genus is *Camellia*, yielding the tea of commerce and shrubs with beautiful flowers.

Leaves alternate without stipules. *Flowers* showy, regular, perfect; sepals and petals 5, imbricated in the bud, hypogenous; stamens numerous with 2 longitudinally dehiscent cells; ovary mostly 3-5-celled and stigma 3-5-lobed. *Fruit* a woody 3-5-celled caspule; seed with large cotyledons and no albumen.

THE LOBLOLLY BAY, ETC. GENUS GORDONIA (L) ELL.

Trees and shrubs of about a dozen species mainly of southeastern Asia. One species is represented in the flora of southeastern United States. Another tree, the Franklinia, by some considered a species of this genus, is more properly considered the type of another genus of that name.

Leaves alternate, evergreen, coriaceous. *Flowers* long-stalked and solitary in the axils of the leaves; sepals unequal, silky, concave, rounded and persistent; petals white, obovate, slightly united at base, concave; stamens numerous with short filaments inserted on 5 fleshy disks each adnate to the base of a petal; anthers introrse, yellow; ovary sessile with elongated style, 5-lobed and stigmatic at apex; ovules 4 in each cell, anatropous. *Fruit* a woody pointed ovoid loculicidally dehiscent capsule; valves 5, entire; seeds usually 4 in each cell, pendulous, compressed and an oblong wing at the tip.

Named in honor of James Gordon, a London nurseryman of the 18th century.

For species see pp. 352–353.

GINSENG FAMILY. ARALIACEÆ VENT.

Trees, shrubs and herbs of about four hundred fifty species, grouped in thirty-two genera, and widely distributed throughout tropical and to a lesser extent temporate regions.

A single arborescent species is native to the flora of eastern United States.

Leaves deciduous, alternate or verticillate, compound, petiolate, mostly with stipules *Flowers* in racemose or panicled umbels or heads, 5-numerous; calyx-tube adnate to the ovary; petals sometimes united; disk epigynous; stamens as many as the petals, alternate with them, and inserted on the disk; ovary 1-several-celled, each cell containing a solitary anatropous pendulous ovule; styles as many as the cells of the ovary. *Fruit* baccate; seeds with thin testa, small embryo and abundant albumen.

THE HERCULES-CLUB, ETC. GENUS ARALIA L.

Spiny trees, shrubs and herbs of about thirty species about a half dozen of which are natives of North America, the remaining of Asia. Of the American species one only is arborescent.

Leaves pinnately or ternately decompound, the petioles enlarged and clasping at the base. *Flowers* mostly perfect, small, greenish white; pedicels pointed; calyx-lobes minute, valvate; petals imbricated in the bud; stamens with filiform filaments and oblong introrse, 2-celled anthers longitudinally dehiscent; ovary inferior, mostly 2-5-celled, styles of same number, dehiscent or united at base. *Fruit* a 2-5-seeded berry laterally compressed or 3-5-angled and tipped with the remnants of the styles and calyx-lobes and containing 2-5 compressed seeds with straight radicle and oblong cotyledons.

The name is of obscure derivation.

For species see pp. 354–355.

DOGWOOD FAMILY. CORNACEÆ LINK.

The Dogwood Family consists of trees and shrubs of about sixteen genera and eighty-five species mainly of north temperate regions. Two genera have arborescent representatives in North America.

Leaves deciduous, simple, variously arranged and without stipules. *Flowers* regular, in cymes, heads, or solitary; calyx adnate to the ovary, its limb 4-5-toothed or none; petals 4-5 or none; disk epigenous; stamens as many as the petals and inserted with them on the margin of the disk; anthers introrse, 2-celled with a solitary anatropous suspended ovule in each cell. *Fruit* a 1-2-seeded drupe; seed oblong with foliaceous cotyledons and copious albumen.

KEY TO THE GENERA.

Flowers perfect, arranged in fours; leaves mostly opposite..... **Cornus.**
Flowers dicœcious or polygamous, petals 5, very small or none; leaves alternate.... **Nyssa.**

THE DOGWOODS OR CORNELS. GENUS CORNUS L.

Trees and shrubs of about forty species widely distributed throughout the north temperate zone and one species in Peru. Sixteen or seventeen species are found in North America of which four are arborescent.

Leaves deciduous, mostly opposite. *Flowers* perfect, small, in cymes or heads, the latter with an involucre of showy white bracts in some species; calyx with 4 small lobes, valvate in the bud; disk epigenous; petals 4, valvate; stamens 4, alternate with the petals exserted and with slender filaments; ovary 2-celled, each cell containing a single ovule, with simple columnar style and capitate or truncate stigma. *Fruit* an oblong drupe with thin flesh and bony or crustaceous 2-celled and usually 2-seeded stone.

The name is from the Latin *cornu, horn*, alluding to the hardness of the wood of some of the species.

KEY TO THE SPECIES.

a Flowers greenish, in dense heads with 4 large white involucral bracts; fruit red. **C. Florida.**

a' Flowers white, in loose cymes, without bracts
Fruit blue; leaves smooth above..... **C. alternifolia.**
Fruit white; leaves scabrous above..... **C. asperifolia.**

For species see pp. 356–361.

THE TUPELOS. GENUS NYSSA L.

Trees of five species of which four are natives of eastern North America and the remaining one of southeastern Asia. They produce very fine grained tough wood, with contorted fiber and annual rings indistinctly indicated. The fruit is very tart and is sometimes used in conserves.

Leaves alternate, petiolate, conduplicate in the bud. *Flowers* small, greenish, polygamo-dicœcious, in capitate clusters (or the fertile ones sometimes solitary) with slender peduncles, from the axils of the lower leaves or of caducous bracts, the staminate flowers numerous: calyx minutely 5-lobed; petals 5, minute and thick or none; stamens 5-15 in the staminate flowers, exserted and inserted with the petals on the edge of the entire or lobed disk; pistillate flowers sessile at the end of the peduncle, few together, bracted: stamens included; ovary 1-2-celled and style elongated, slender, curved and stigmatic towards the apex on one side. *Fruit* an oblong or ovoid drupe with thin tart juicy flesh and thick-walled horny compressed ridged or winged stone; embryo straight.

Nyssa is the name of a water nymph and applied to the genus because of its species growing in wet places.

KEY TO THE SPECIES.

a Leaves entire; fruit less than ¾ in. long
  Stone little flattened and indistinctly ribbed..... **N. sylvatica.**
  Stone distinctly flattened and prominently ribbed..... **N. biflora.**
a² Leaves remotely dentate; fruit 1 in. or more long; stone with acute ridges. **N. aquatica.**

For species see pp. 362–367.

Division 3. GAMOPETALÆ.

Plants with petals more or less united, or sometimes separate or wanting.

HEATH FAMILY. ERICACEÆ DC.

A large and interesting family of trees and shrubs of world-wide distribution in tropical and temperate regions. A few over a thousand species are known, grouped in about sixty genera. Of these twenty-one genera are found within the United States, seven having arborescent representatives.

Leaves alternate, simple, and without stipules. *Flowers* regular, perfect; calyx free from the pistil, 4-5-lobed; corolla regular, hypogenous, 5-lobed or parted (exceptionally 4-lobed or somewhat 2-lipped) imbricated; stamens as many or twice as many as the lobes of the corolla and mostly free; anthers introrse, 2-celled, each cell opening by a terminal pore commonly prolonged and bearing an appendage; ovary superior (inferior in *Vaccinium*), 4-10-celled, with numerous anatropous ovules; style simple, columnar and with capitate stigma. *Fruit* a capsule, drupe or berry; seeds with small embryo and albumen.

KEY TO THE GENERA.

a Fruit a septicidally dehiscent capsule; leaves persistent: flowers in
  Terminal clusters; corolla bell-shaped, 5-cleft; leaves revolute..... **Rhododendron.**
  Axillary clusters; corolla 5-lobed saucer-shaped and containing pouches; leaves flat. **Kalmia.**
a² Fruit a loculicidally dehiscent capsule; flowers in terminal panicles; leaves deciduous. **Oxydendrum.**
a³ Fruit a berry; anther-cells prolonged; corolla campanulate or urceolate, white; leaves deciduous ..... **Vaccinium.**

THE RHODODENDRONS. GENUS RHODODENDRON L.

Small trees and shrubs with bitter astringent properties and showy flowers, of some over one hundred and fifty species of eastern and southern Asia and the adjacent islands and North America. They are largely grown for ornamental purposes and many garden varieties have been produced by hybridization and selection. Of the eight species found in the United States one is arborescent on the Atlantic coast region and another rarely on the Pacific slope.

Leaves clustered at the ends of the branchlets, persistent and coriaceous with revolute entire margins; midribs broad, petioles stout. *Flowers* in terminal corymbs or umbels from terminal scaly cone-like buds; calyx 5-lobed or parted, persistent; corolla campanulate with 5 nearly regular lobes; disk fleshy, lobed; stamens usually 10 and somewhat unequal, declined and spreading; filaments pilose at base and attached to the backs of the anthers; ovary 5-celled with slender exserted persistent style and many anatropous ovules in each cell attached to the axile placenta. *Fruit* a woody capsule, 5-20-valved, septicidally dehiscent from the summit and containing many seeds with coat laciniated at the ends.

The name is from Greek words meaning *Rose-tree*.

For species see pp. 368–369.

THE LAURELS. GENUS KALMIA L.

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

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

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

For species see pp. 370–371.

THE SOUR-WOOD OR SORREL-TREE. GENUS OXYDENDRUM DE C.

A genus of a single American species of the south Atlantic and Gulf states and the lower Mississippi basin. They are trees with roughly furrowed bark, somewhat acidulous juices and twigs with segmented pith.

Leaves deciduous, revolute in bud, petiolate, narrow-oblong, about equally pointed at both ends, subentire or denticulate, lustrous dark green above, paler and with yellowish veins beneath. *Flowers* (in summer) in terminal unilateral racemes, with bibracteolate pedicels; sepals 5, persistent; corolla ovoid-cylindric, white, puberulous, with 5 miunte reflexed lobes; stamens 10, with broad filaments and narrower linear anthers opening by clefts; ovary ovoid, 5-celled, with numerous amphitropous ovules and thick exserted style having terminal stigma. *Fruit* a 5-angled, 5-celled, ovoid-pyramidal capsule, tipped with the remnants of the style, loculicidally dehiscent, and at maturity liberating numerous elongated seeds pointed at both ends.

The name is from two Greek words referring to a slightly tart flavor of the leaves.

For species see pp. 372–373.

THE BLUEBERRIES, ETC. GENUS VACCINIUM L.

This genus consists of shrubs (some epiphytal) and a few small trees with slender branchlets and many of its representatives with edible fruits. They are of wide distribution in the north temperate and boreal regions and at high altitudes within the tropics. About one hundred and twenty-five species are known, of which twenty-five and several varieties are North American. Only one of these is arborescent.

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

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

For species see pp. 374–375.

SAPODILLA FAMILY. SAPOTACEÆ REICHENB.

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

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

THE BUMELIAS. GENUS BUMELIA SW.

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

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

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

KEY TO THE SPECIES.

Leaves beneath, pedicels and calyx tomentose..... **B. lanuginosa.**
Leaves beneath, pedicels and calyx glabrous or nearly so..... **B. lycioides.**

For species see pp. 376–377 and the following:

SMOOTH OR BUCKTHORN BUMELIA, *B. lycioides* (L.) Gaertn. f. An interesting small tree of the southern states, ranging sparingly as far north as into southern Virginia and southern Illinois. *Leaves* mostly oblanceolate or oblong-lanceolate, 1½-4 in. long, cuneate at base, usually acute or acuminate at apex, glaucous bright green above, paler and glabrous (or somewhat pubescent at first) and finely reticulate beneath, thinnish, deciduous; petioles about ½ in. long; branchlets glabrate and mostly unarmed. *Flowers* (in midsummer) in crowded glabrous fascicles, pedicles about ½ in. long; calyx glabrous. *Fruit* oblong to subglobose, black, about ½ in. long.

EBONY FAMILY. EBENACEÆ VENT.

Trees and shrubs of wide distribution mostly in tropical countries and of about 275 species grouped in 5 genera. The following single genus is represented in the United States by 2 species — one widely distributed in the Atlantic states and the other in Texas and northern Mexico.

Leaves simple, alternate, entire and without stipules. *Flowers* small, mostly dioecious or polygamous, solitary or in cymes, axillary, regular; calyx 3-7-lobed, inferior, persistent; corolla with 3-7 convoluted lobes, deciduous; stamens more numerous than the lobes of corolla and inserted on its tube, with short filaments and erect introrse anthers; disk none; ovary superior, several-celled, with 1-3 suspended ovules in each cell; styles 2-8. *Fruit* a berry subtended by the enlarged persistent calyx and containing oblong seeds with small axile embryo and copious albumen.

THE PERSIMMONS. GENUS DIOSPEROS L.

This genus, consisting of about 160 species widely distributed in tropical regions and most abundantly in southern Asia, is the most important of the family. Some of its representatives yield the ebony of commerce and others valuable fruits.

Leaves alternate, simple, entire, and without stipules. *Flowers* dioecious, polygamous, or rarely perfect, regular, solitary or in cymes in the axils of the leaves of the season; calyx inferior, 3-7-lobed, persistent and commonly accrescent; corolla hypogenous, regular, 3-7-lobed, the lobes convolute in the bud; disk none; stamens 2-3 times as many as the lobes of the corolla and inserted on its tube, some imperfect in the pistillate flowers; filaments short and anthers 2-celled, introrse; ovary several-celled with usually 2 anatropous suspended ovules in each cell; styles 2-8. *Fruit* a berry with from 1-several seeds; seed with axile embryo in fleshy albumen.

The name is from two Greek words meaning the *wheat or food of Jove.*

For species see pp. 378–379.

SWEET-LEAF FAMILY. SYMPLOCACEÆ MIERS.

A family of the following single genus of trees and shrubs.

Leaves simple, alternate, without stipules; buds scaly. *Flowers* regular, mostly perfect and yellow, in axillary or lateral clusters; calyx 5-lobed, campanulate, the tube adnate to the ovary; corolla deeply 5-lobed, with imbricated lobes; disk none; stamens numerous, more or less united at base into clusters, with long filiform filaments and small 2-celled anthers opening laterally; ovary 2-5-celled with simple style, terminal stigma and usually 2 anatropous ovules suspended in each cell. *Fruit* usually a dry drupe crowned with the persistent calyx-lobes, thin flesh and one bony stone; embryo straight in fleshy albumen.

THE SWEET-LEAF OR HORSE SUGAR. GENUS SYMPLOCOS L'HER.

The genus *Symplocos* comprises about 180 species, so far as known, chiefly of the tropical regions of America, Asia, and Australia. One inhabits southeastern United States ranging as far north as southern Delaware.

For characters see description of the family, this being the only genus.

The name is from Greek roots referring to the fact that the stamens are *united together* in clusters.

For species see pp. 380–381.

STORAX FAMILY. STYRACEÆ. A. DC.

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

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

THE SILVER-BELL TREES. GENUS MOHRODENDRON BRITT.

Trees and shrubs of the southern Atlantic states of North America and comprised in three species of which two are arborescent and 1 shrubby. One of the former ranges as far north as southern Illinois.

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

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

For species see pp. 382–383.

OLIVE FAMILY. OLEACEÆ LINDL.

Trees and shrubs widely distributed throughout tropical and temperate regions, particularly of the northern hemisphere, and some of great economic value. There are about 20 genera and 500 species. Five genera are indigenous to the United States and of these four have arborescent representatives.

Leaves mostly opposite, simple or compound and without stipules. *Flowers* perfect, dioecious or polygamous, regular and in panicles, cymes or fascicles; calyx inferior, 2-4-lobed or none; corolla of 2-4 petals or none; disk none; stamens 2-4 with short filaments and introrse 2-celled anthers, dehiscent usually by lateral longitudinal slits; ovary superior, 2-celled with 2 pendulous anatropous ovules in each cell; style simple. *Fruit* in the American arborescent representatives a samara or berry with pendulous seeds containing straight embryo and fleshy albumen.

KEY TO THE GENERA.

a Fruit a samara; leaves compound; flowers mostly unisexual and without petals. **Fraxinus.**

a² Fruit a drupe; leaves simple
Flowers dioecious, mostly apetalous, appearing before the leaves..... **Chionanthus.**
Flowers perfect with 4 linear petals, appearing after the leaves..... **Forestiera.**

THE ASHES. GENUS FRAXINUS L.

Trees and shrubs of about 40 species with tough wood, stout branchlets having large pith and obtuse or rounded scaly buds, the terminal one the largest. It is of wide distribution in north-temperate regions and within the tropics on the islands of Cuba and Jamaica. About 16

species are found within the United States, all arborescent though one is more commonly a shrub than a tree.

Leaves deciduous, odd-pinnately compound, petiolate; leaflets conduplicate in the bud and usually serrate. *Flowers* in early spring, from the axils of the leaves of the previous season, mostly dioecious or polygamous (occasionally perfect) in fasciculate panicles; calyx small, campanulate or none; corolla 2-4-parted or none; stamens usually 2 with short terete filaments and large oblong anthers opening by lateral slits; ovary mostly 2-celled with single style and 2-lobed stigma. *Fruit* a samara, with terete or somewhat flattened and usually 1-seeded body and terminal wing; seed elongated, pendulous.

Fraxinus is the ancient Latin name of the *Ash-tree*.

KEY TO THE SPECIES.

a Samara with seed-bearing portion flattened and wing extending the entire length
  b Lateral leaflets sessile; calyx in the fertile flowers none..... **F. nigra.**
  b² Lateral leaflets stalked; calyx present
    Samara obovate to spatulate; twigs terete..... **F. Caroliniana.**
    Samara elliptic to spatulate; twigs 4-sided..... **F. quadrangulata.**
a² Samara with seed-bearing portion subterete; wing not extending to base; leaflets stalked; calyx present in fertile flower
  b Wing almost entirely terminal — slightly if at all decurrent on body
    c Leaves and branchlets glabrous or nearly so..... **F. Americana.**
    c² Leaves beneath and branchlets pubescent..... **F. Biltmoreana.**
  b² Wing decurrent somewhat on sides of body but not to base
    c Wing of samara spatulate
      d Branchlets and leaves glabrous or nearly so; leaves green beneath. **F. lanceolata.**
      d² Branchlets and petioles velvety pubescent
        Samara less than 2 in. long; calyx small..... **F. Pennsylvanica.**
        Samara mostly 2 in. long or more; calyx enlarged..... **F. profunda.**
    c² Wing of samara long-linear..... **F. Darlingtonii.**

For species see pp 384–399 and the following:

DARLINGTON ASH. *F. Darlingtonii Britt.* This is a little known species described from material from Lancaster, Pa., and is similar to the *F. lanceolata* and *F. Pennsylvanica*, with foliage and twigs pubescent or glabrate and samara 2-3 in. long with linear wing decurrent upon the seed-bearing portion one third to one fourth its length.

THE FRINGE-TREES. GENUS CHIONANTHUS L.

Trees or small shrubs of two species one of the middle and southern United States and the other of China.

Leaves simple, deciduous, opposite, conduplicate in the bud. *Flowers* perfect or polygamous, white, in loose drooping panicles from the axils of the leaves of the preceding season; calyx small, 4-parted, inferior, persistent; corolla of 4 linear white petals slightly united at base; stamens 2, inserted on the base of the corolla, with very short terete filaments and ovate apiculate anthers; ovary ovoid with short columnar style and thick fleshy 2-lobed stigma; ovules 2 in each cell, pendulous. *Fruit* an ovoid or oblong drupe tipped with the remnants of the style, nearly black thick skin, dryish flesh and usually 1 but sometimes 2 or 3 thick-walled crustaceous stones.

The name is from two Greek words meaning *snow-flower*.

For species see pp. 400–401.

THE FORESTIERA. GENUS FORESTIERA POIR. (ADELIA P. BR.)

Shrubs or small wide-branching trees of about fifteen species natives of America. Six or 8 species are found in the southern United States, one of these only attaining the dignity of a tree, and that ranging as far north as southern Illinois.

Leaves simple, opposite, deciduous or rarely evergreen, and usually small. *Flowers* small and mostly polygamous, yellowish or greenish, dioecious, appearing before the leaves in fascicles or racemes from scaly buds in the axils of the leaves of the previous year; calyx with very short tube and 4-5 unequal lobes; corolla none or with 1 or 2 deciduous petals; stamens 2-4 with extrorse anthers; ovary ovoid, 2-celled, with slender style and thick usually 2-lobed stigma and 2 pendulous ovules in each cell. *Fruit* a drupe with 1 or 2 seeds with membranous testa and fleshy albumen.

The name is in compliment to M. Forestier, a French physician.

For species see pp. 402–403.

TRUMPET-CREEPER FAMILY. BIGNONIACEÆ PERS.

Trees, shrubs, climbing vines and a few exotic herbs mostly with large showy flowers and widely distributed in tropics with a few representatives in temperate regions. About 500 species are known, grouped in nearly 100 genera. Of the five genera represented in the United States 3 are arborescent, one of the southwestern states, another of Florida and the third of the Atlantic states.

Leaves simple in the arborescent representatives in the United States mostly opposite and without stipules. *Flowers* perfect, large, showy and more or less irregular; calyx hypogenous, bilabiate; corolla hypogenous, somewhat bilabiate, 5-lobed, imbricated in the bud; stamens 2 or 4 inserted on the base of the corolla with introrse 2-celled anthers longitudinally dehiscent; staminodia 1 or 3; ovary 1 or 2-celled, with simple slender 2-lobed style, stigmatic at the apex; ovules numerous, anatropous and horizontal. *Fruit* a pod-like 2-valved capsule or berry and seeds without albumen.

THE CATALPAS. GENUS CALTAPA SCOP.

Trees of tonic and diuretic properties with stout terete branchlets large pith and soft durable wood. Seven species are known of which two are natives of eastern United States and the others of eastern China and the West Indies.

Leaves opposite or in whorls of three, long-petiolate, involute in the bud, entire or sparingly lobed, deciduous. *Flowers* in showy terminal compound panicles or corymbs; calyx splitting irregularly into two lobes in opening; corolla thin and membranaceous, oblique with broad campanulate tube and 2-lipped 5-lobed limb, the lobes spreading and with crisped margins; stamens 2, ascending under the anterior lip of the corolla, with glabrous divergent anther-cells and flattened arcuate filaments, staminodia 3, rudimentary, filiform; ovary, 2-celled, with long filiform style, 2-lobed stigma and ovules inserted in several rows on the central placenta. *Fruit* an elongated nearly terete pod-like capsule loculicidally dehiscent, persisting during the winter; seeds numerous, flat, oblong, with broad lateral fimbriated wings ending in white hairs; cotyledons broader than long.

The name is the Cherokee Indian name of one of the American species.

KEY TO THE SPECIES.

Flowers about 1½ in. wide, in many-flowered panicles; lower lobe entire.... **C. Catalpa.**
Flowers about 2½ in. wide, in few-flowered panicles; lower lobe emarginate.. **C. speciosa.**

For species see pp. 404–407.

MADDER FAMILY. RUBIACEÆ B. JUSS.

Trees, shrubs and a few herbs of about 550 species grouped in some 350 genera. They are chiefly natives of tropical regions and comprise several species which yield products of great economic importance, such as coffee, quinine, ipecac, madder, etc.

Leaves simple, opposite or verticillate, entire, mostly with stipules and turning black in drying. *Flowers* regular, perfect; calyx 4-5-toothed or lobed and with tube adnate to the ovary; corolla 4-5-lobed, stamens as many as the lobes of the corolla, alternate with them and inserted on the tube with filaments free or united at base and introrse 2-celled anthers opening longitudinally; disk epigynous; ovary 1-10-celled with slender style and ovules 1 to many in each cell. *Fruit* a capsule, drupe or achene; seeds with membranaceous coat and without albumen.

THE BUTTON-BUSH. GENUS CEPHALANTHUS L.

Shrubs and small trees of about a half dozen species of North and South America and Asia, one only inhabiting the United States.

Leaves both opposite and verticillate, petiolate, deciduous. *Flowers* yellow or white, sessile in the axils of glandular bracts in dense globular pedunculate panicled heads; calyx tube obpyramidal its limb with four or five short lobes; corolla tubular funnel-form with four short lobes; stamens 4, inserted on the throat of the corolla with very short filaments and oblong-sagitate anthers; ovary 2-celled with a solitary pendulous ovule in each cell and a long filiform exserted style bearing a capitate stigma. *Fruit* dry, obpyramidal, 1-2-seeded; seeds oblong with a white aril at the apex and cartilaginous albumen.

The name is from two Greek words indicating that the *flowers are in heads.*

For species see pp. 408–409.

FIGWORT FAMILY. SCOPHULARIACEÆ LINDL.

This family consists chiefly of herbs, but some shrubs and trees, and is of very wide distribution. About 2,500 species are known, grouped in 165 genera.

Leaves various, without stipules. *Flowers* mostly perfect, complete and irregular; calyx inferior, variously cleft or divided, persistent; corolla gamopetalous, irregular, with imbricated lobes; stamens 2-5, didynamous or nearly equal and inserted on the corolla alternate with its lobes; anthers 2 or 1-celled; pistil solitary with slender style, entire or 2-lobed stigma and mostly 2-celled ovary containing anatropous or amphitropous ovules on axile placentæ. *Fruit* a capsule usually containing numerous seeds with small embryo in copious albumen.

THE PAULOWNIA. GENUS PAULOWNIA SIEB. & ZUCC.

This is a genus composed of possibly two or three species of Asiatic trees but is generally known only by the single species *P. imperialis* S. & Z., now naturalized in America.

Leaves opposite, long-petioled, mostly 5-8 in. long larger on vigorous shoots, broad-ovate, cordate, acute or short acuminate, entire or with a single short-pointed lobe on each side, velvety pubescent especially at first; long-petioled, branchlets with segmented pith. *Flowers* before or with the leaves, fragrant, in large erect rusty tomentose terminal panicles from buds formed the previous summer and remaining naked during the winter; calyx with 5 thick lobes; corolla 1½-2 in. long, pale violet or blue, somewhat irregular, with 5 spreading lobes, puberulent outside; stamens 4, didynamous, included, with divaricate anther-sacs. *Fruit* broad-ovoid woody abruptly pointed 2-celled capsule, about 1½ in. long, loculicidally dehiscent and containing many small membranous-winged seeds.

The genus is named after Princess Anna Paulowna, daughter of the Czar Paul I.

For species see pp. 410–411.

HONEYSUCKLE FAMILY. CAPRIFOLIACEÆ BENT.

Trees, shrubs, vines, and perennial herbs of about 260 species and grouped in ten genera. They are most abundant in the north temperate zone, but a few extend into the tropics and the southern hemisphere.

Leaves opposite, petiolate, involute in the bud and mostly without stipules. *Flowers* regular, perfect, and in terminal compound cymes; calyx-tube adnate to the ovary with 5-toothed limb; corolla 5-lobed and sometimes 2-lipped; stamens 5, inserted on the tube of the corolla and alternate with its lobes, exserted, with slender free filaments; anthers oblong, introrse, 2-celled, longitudinally dehiscent; ovary inferior, 1-6-celled with short style and 3-5-lobed capitate stigma; ovules solitary, anatropous and suspended from the apex of the cell. *Fruit* a 1-6-celled drupe, capsule or berry; seeds with membranous coat, minute embryo and copious albumen.

THE NANNY-BERRIES, ETC. GENUS VIBURNUM L.

Shrubs and small trees with tough branches of nearly 100 species widely distributed in north temperate regions and a few in the tropics. Several species are important on account of their ornamental flowers and fruit. About 75 are natives of North America, all shrubby except three, which are small trees of the Atlantic states.

Leaves deciduous, generally without stipules and the first pair rudimentary; petioles broad; buds large and enveloped with a single pair of scales. *Flowers* white or rarely pink, in terminal or axillary compound cymes with minute caducous bracts and bractlets, the outer flowers sometimes radiant and neutral; calyx with tubinate tube and stout 5-toothed limb, persistent in the fruit; corolla rotate with 5 spreading and finally reflexed lobes; ovary 1-celled, inferior, with short conical style, 3-lobed and stigmatic at apex. *Fruit* an oblong or subglobose and sometimes flattened drupe with thin sweet or acidulous flesh and a single stone which in the American species is dark brown, coriaceous and much flattened.

The name is ancient Latin name of one of the European species.

For species see pp. 412–417.

GLOSSARY.

Abortion. Imperfect or non-development of a part.
Achene or akene. A dry, hard, 1-celled and 1-seeded indehiscent fruit.
Acuminate. Tapering to a rather long point.
Acute. With a short sharp point.
Adnate. Closely united or growing to (literally "born with").
Æstivation. The arrangement of the parts of a flower in the bud.
Albumen. Nutritive material surrounding the embryo in some seeds.
Albumenous. Furnished with albumen.
Alternate. Not opposite; applied to leaves and flowers.
Ament. A spike of unisexual flowers, each subtended by a bract; a catkin.
Amphitropous. Said of a straight ovule or seed when half inverted.
Anatropous. Said of straight ovules or seeds when inverted, the micropyle being near the hilum.
Androgynous. Said of an infloresence composed of both staminate and pistillate flowers.
Angiospermous. Having seeds borne in a closed pericarp.
Anther. The portion of a stamen which contains the pollen.
Anthesis. The time of the opening of a flower.
Apetalous. Without petals or corolla.
Apiculate. With a short pointed tip.
Arcuate. Curved.
Aril. An appendage growing about the hilum of a seed.
Aristate. Terminating in an awn or bristle.
Articulated. Joined by a more or less easily separable joint.
Ascending. Growing upward.
Auriculate. Furnished at base with ear-like lobes.
Attenuate. Long-tapering.
Awn. A bristle-like appendage.
Awned. Furnished with awns.
Axil. The upper angle between the leaf and the stem or branch which bears it.
Axillary. Of or from the axil.
Axile. Situated in the axil.
Baccate. Berry-like with fleshy pulp.
Berry. A fruit with wholly pulpy pericarp.
Bifid. 2-cleft.
Bipinnate. Twice pinnately compound.
Bract. Altered scale-like leaf of an inforescence.
Bractlet. Diminutive of bract, a secondary bract.
Bracteate. Furnished with bracts.
Bracteolate. Furnished with bractlets.
Caducous. Falling very early — earlier than deciduous.
Calyx. The outer of the two series of floral envelopes.
Calyx-tube. The tube formed by the union of the sepals.
Campanulate. Bell-shaped.
Campylotropous. Said of an ovule or seed which is curved, so that the micropyle and hilum are near together.
Canescent. Hoary with a whitish pubescence.
Capitate. Forming a head.
Capsular. Pertaining to a capsule.
Capsule. A dry dehiscent fruit formed from two or more carpels.
Carinate. Having a keel-like medial ridge.
Carpel. A simple pistil or element of a compound pistil.
Carpellary. Of or belonging to a carpel.
Caruncle. An appendage at the hilum of a seed.
Catkin. An ament.
Caudate. With a tail-like appendage.
Chalaza. The point of attachment of an ovule or seed with its coats.
Chartaceous. Having a paper-like texture.
Ciliate. Fringed with small hairs on margin like miniature eye-lashes.
Ciliolate. Minutely ciliate.
Cinereous. Of an ash-gray color.
Circinate. Coiled from the top down.
Clavate. Club-shaped.
Cleistogamous. Fertilized in the bud.
Claw. The narrow stalk-like base of petal, sepal, etc.
Cleft. Cut about to the middle.
Coccus. (pl. cocci) One of the portions into which a lobed fruit with 1-seeded cells splits.
Cochleate. Spiral; like a snail-shell.
Columella. The persistent axis of some capsules, etc.
Coma. The hairs at the end of some seeds.
Comose. Furnished with a coma.
Compound. Composed of two or more similar parts.
Compressed. Flattened laterally.
Conduplicate. Folded together lengthwise.
Connate. United or grown together.
Connective. The portion of a stamen which connects the anther-cells.
Connivent. Coming in contact.
Convolute. Rolled together lengthwise.
Cordate. Heart-shaped.
Coriaceous. Leather-like in texture.

Corolla. The inner of the two series of floral envelopes.
Corymb. A form of flower-cluster which is flat-topped and the sequence of flowering is from the margin inward, and the outer pedicels longest.
Corymbose. Arranged in corymbs.
Cotyledon. A seed-leaf or rudimentary leaf of an embryo.
Crenate. Scalloped.
Crenulate. Finely crenate.
Cuneate. Wedge-shaped.
Cuspidate. Tipped with a sharp rigid point.
Cyme. A form of flower-cluster usually flattened above with the sequence of flowering from within outward and the outer pedicels longest.
Cymose. Bearing cymes, or in cymes.
Diciduous. Not persistent; falling away.
Decompound. More than once compound.
Decumbent. Reclining but with ascending top.
Decurrent. Said of leaves where the blade runs down on the petiole.
Decussate. Said of opposite leaves when the successive pairs are arranged at right angles to each other.
Deflexed. Bent abruptly downward.
Dehiscent. Opening, as of an anther or capsule, to emit contents.
Deltoid. Of the shape of the capital Greek letter Delta.
Dentate. Toothed, with pointed teeth directed outward.
Denticulate. Diminutive of dentate.
Diadelphous. Said of stamens which have filaments united into two sets.
Diandrous. Having two stamens.
Dichotomous. Branching regularly in pairs.
Dicotyledonous. Having two cotyledons.
Didymous. Twin, *i. e.*, in pairs.
Didynamous. Said of stamens to indicate two pairs of unequal length.
Digitate. Said of an arrangement, as of leaflets, suggestive of the fingers of one's hand.
Dimorphous. Of two forms.
Dicœcious. With staminate and pistillate flowers on different plants.
Discoid. Resembling or pertaining to a disk.
Disk. A development of the receptacle of some flowers at the base of a pistil.
Dissepiment. The partition of an ovary or capsule.
Distichous. Arranged in two vertical ranks.
Distinct. Separate from each other.
Divaricate. Widely divergent.
Dorsal. Pertaining to the back, as of the outer angle of a carpel.
Drupaceous. Resembling a drupe.
Drupe. A simple indehiscent fruit with fleshy exterior (pericarp) and bony usually 1-seeded interior (endocarp); as a plum or peach.
Drupelet. Diminutive of drupe.
Duct. An elongated cell or tube found in woody stems.
Echinate. Covered with prickles.
Eglandular. Without glands.
Elliptical. With the outline of an ellipse.
Emarginate. Slightly notched at apex.
Embryo. The rudimentary plant while in the seed.
Endocarp. The inner portion of a pericarp.
Endogenous. Said of the stems of plants which increase in thickness by a growth within—not external layers.
Entire. Said of leaves, etc., when the margin is not notched or toothed.
Epicarp. The thin outer layer of a pericarp.
Epigynous. Borne upon the ovary.
Epipetalous. Borne upon the petals.
Epiphyte. Said of plants growing upon other plants but not deriving nourishment from them.
Equitant. Astride. Said of leaves which enfold each other in two ranks.
Erose or Erroded. Irregular, as though gnawed.
Exalbumenous. Without albumen.
Excurrent. Extending beyond the apex.
Exfoliating. Cleaving off, as of the outer layers of bark.
Exocarp. The outer layer of a pericarp.
Exogenous. Said of stems which increase in thickness by the growth of layers outside of the wood and inside of the bark.
Exserted. Projecting beyond the surrounding organs.
Exstipulate. Without stipules.
Extrose. Said of anthers which open outward.
Falcate. Scythe-shaped.
Fascicle. A bundle or cluster.
Fasciculate. Arranged in fascicles.
Farinose. Covered with meal-like powder.
Feather-veined. With veins projecting from midrib suggestive of a feather.
Fastigiate. Said of branches which are erect and near together.
Ferruginous. Rust-colored.
Fertile. Said of flowers (or the branches which bear them) producing seeds or fruit.
Fibro-vascular. Containing woody fibres and ducts.
Filament. The portion of a stamen supporting the anther; a thread-like substance.
Filamentous or Filamentose or Filiform. Thread-like or composed of threads.
Fimbriate. With fringed margin.
Fistular or Fistulose. Hollow like a tube.
Flabellate. Fan-shaped.
Flaccid. Lax, not rigid.
Fleshy. Succulent, juicy.
Flexuose. Zigzag or sinuous.
Floccose. Covered with soft woolly hair.
Foliaceous. Of a leaf-like nature.
Foliate. Having leaves.
Foliolate. Having leaflets (the number usually indicated by a prefix).
Follicle. A pod dehiscent along the ventral suture only.
Follicular. Similar to a follicle.
Free. Not adnate to another organ.
Friable. Breaking easily.
Frutescent or Fruticose. Of a shrubby nature.

Fugacious. Falling away very early.
Funicle or Funiculus. The stalk of an ovule or seed.
Fuscous. Grayish brown.
Fusiform. Spindle-shaped.
Gamopetalous. Having petals more or less united.
Gibbous. Swollen or extended on one side.
Glabrate. Nearly or becoming glabrous.
Glabrous. Smooth — without hairs or roughness of any kind.
Gland. Secreting cell or group of cells or a protuberance resembling same.
Glandular. Supplied with glands.
Glaucescent. Becoming or nearly glaucous.
Glaucous. Furnished with a bluish or whitish bloom, as seen on the cabbage leaf.
Globose. Spherical or nearly so.
Gymnosperm. (adj. Gymnospermous) A plant having naked ovules or seeds not inclosed in an ovary.
Gynœcium. The pistil or pistils collectively.
Gynophore. The stipe or stalk of a pistil.
Habit. The form or general appearance of a plant.
Habitat. The area over which a species is found.
Hastate. Shaped like an arrow-head but with lobes directed outward.
Head. A dense cluster of sessile or nearly sessile flowers.
Heart-wood. The mature and usually darker colored central portion of an exogenous trunk.
Hilum. The scar or place of attachment of an ovule or seed.
Hirsute. Covered with rather coarse stiff hairs.
Hispid. Covered with bristly stiff hairs.
Hoary. Covered with fine grayish pubescence.
Hybrid. A cross between two species.
Hypogenous. Growing from beneath the ovary.
Imbricated. Overlapping like the shingles of a roof.
Imperfect. Applied to flowers indicates that either pistils or stamens are lacking.
Incised. Cut into rather deeply.
Included. Said of stamens which do not project beyond the perianth.
Incomplete. Applied to flowers in which one or more of the four sets of floral organs are wanting.
Incumbent. Lying upon, as the radical against the back of a cotyledon.
Indehiscent. Not opening at maturity.
Induplicate. With edges folded inward.
Inequilateral. Unequal-sided.
Inferior. Said of an ovary when it is adnate to the calyx-tube.
Inflorescence. The arrangement of a flower-cluster.
Innate. Said of an anther when it is seated, as it were, on the end of a filament.
Internode. The portion of a stem between the points from which the leaves grow.
Interpetiolar. Between the petioles.
Introrse. Facing inward.
Involucrate. Furnished with an involucre.
Involucre. A whorl of bracts subtending a flower.
Involute. The sides rolled inward.
Irregular. Said of flowers in which similar parts differ in size or form.
Keel. A central ridge; also the united anterior petals of a papilionaceous flower.
Key. A dry winged indehiscent fruit; a samara.
Laciniate. Cut into long irregular teeth.
Lamella. A thin flat scale or plate.
Lamellate. Composed of lamellæ.
Laminate. Consisting of plates.
Lanceolate. Lance-shaped, wide below and tapering to apex, but narrower than ovate.
Leaflet. One of the small blades of a compound leaf.
Legume. A simple dry fruit, composed of a single carpel and dehiscent usually along both sutures; a pod, as of the Pea.
Leguminous. Producing legumes.
Lenticel. Small lens-shaped corky growths seen in young barks.
Lenticular. Lens-shaped.
Lepidote. Bearing small scurfy scales.
Ligulate. Strap-shaped, or provided with ligules, descriptive of corollas, etc.
Limb. The expanded part of a petal or sepal.
Linear. Descriptive of a narrow leaf with margins approximately parallel, as a blade of grass.
Lobe. A prominent division of an organ.
Lobed. Divided with rather deep sinuses.
Loculicidal. Said of capsules which open into the cell along the dorsal suture.
Loment. A pod constricted between the seeds.
Lyrate. Lyre-shaped; said of pinnatifid leaves where the terminal segment is largest.
Marcescent. Withering but still persisting.
Medulla. The central pith-column of exogenous stems.
Medullary-rays. Lines of specialized cells of woods radiating from the pith-column to the bark.
Micropyle. The orifice of an ovule or the corresponding point of a seed.
Midrib. The main central rib of a leaf; the mid-vein.
Monadelphous. Stamens with filaments united.
Moniliform. Resembling a string of beads.
Monocotyledonous. With a single cotyledon.
Monœcious. With stamens and pistils on the same plant but in different flowers.
Monopetalous. With petals united.
Mucro. A small abrupt tip.
Mucronate. Furnished with a mucro.
Muricate. Rough with short rigid points.
Naturalized. Said of introduced plants which are reproducing by self-sown seeds.
Nectar. A sweet secretion in flowers, which becomes honey after being gathered by bees.
Nectariferous. Bearing nectar.
Nectary. An organ secreting nectar.
Nerve. A simple or unbranched vein.

Node. The place on a stem where the leaves appear.
Nodose. Knotty.
Nut. A hard 1-celled, 1-seeded indehiscent fruit.
Nutlet. Diminutive of nut.
Obconic. Inversely conical.
Obcordate. Inversely heart-shaped.
Oblanceolate. Inversely lanceolate, *i. e.*, broader towards the apex.
Oblique. Slanting or with unequal sides.
Oblong. Longer than broad, with sides approximately parallel.
Obovate. The inverse of ovate, *i. e.*, broader towards the apex.
Obovoid. The inverse of ovoid.
Obtuse. Bluntly pointed; greater than right angle.
Opposite. Said of leaves or leaflets arranged in pairs on opposite sides.
Orbicular. Circular.
Orthotropous. Descriptive of a straight erect ovule with hilum at one end and micropyle at the other.
Oval. Broadly elliptical.
Ovary. The ovule-bearing portion of a pistil.
Ovate. Applied to leaves, etc., which are egg-shaped in outline, broader towards base.
Ovoid. Egg-shaped, applied to solids.
Ovule. The embryonic seed.
Ovuliferous. Bearing ovules.
Palmate. Hand-shaped, with lobes or leaflets radiating from apex of petiole like fingers.
Panicle. A compound raceme.
Paniculate. Arranged in panicles.
Papilionaceous. Butterfly-like, descriptive of flowers of the Pea family.
Papillose. Rough with minute blunt projections.
Parietal. Pertaining to the wall, as of an ovary.
Parted. Divided but not entirely to base.
Pectinate. Pinnatifid with narrow close comb-like teeth.
Pedicel. The stalk of a single flower in a flower-cluster.
Pedicellate. Borne on a pedicel.
Peduncle. The stalk of a flower-cluster or of a solitary flower.
Pedunculate. Borne on a peduncle.
Peltate. Shield-shaped. A flat organ attached by a central stem.
Perennial. Lasting from year to year.
Perfect. Said of flowers which have both stamens and pistil.
Perfoliate. Said of leaves through which the stems seem to pass.
Perianth. The calyx and corolla of a flower collectively.
Pericarp. The matured wall of an ovary.
Perigynous. Said of an ovary united with the perianth a portion of its length.
Persistent. Remaining long attached to the organs supporting them; as leaves attached over winter, or calyx-lobes after the flowering season.
Petal. One of the divisions of a corolla.
Petaloid. Resembling or colored like a petal.
Petiolate. Having a petiole.
Petiole. The stalk or stem of a leaf.
Petiolulate. Having a petioule.
Petioule. The stalk of a leaflet.
Phyllodium. A specialized petiole resembling or performing functions of a leaf.
Pilose. Hairy with long soft hairs.
Pinna. (pl. Pinnæ) One of the first divisions of a bipinnately compound leaf.
Pinnate. Said of compound leaves with leaflets arranged on opposite sides of a stem — the rachis.
Pinnatifid. Pinnately cleft to the middle or farther.
Pinnule. A secondary pinna.
Pistil. The central organ of a perfect flower in which the seeds are produced.
Pistillate. Provided with a pistil.
Placenta. The portion of the interior of an ovule which bears the ovules.
Plicate. Said of leaves folded or plaited (like a fan) in the bud.
Plumule. The bud or terminal of an embryo.
Pollen. The fertilizing grains or element of the stamen.
Polliniferous. Bearing pollen.
Polygamous. Bearing both perfect and imperfect flowers.
Polypetalous. Having separate petals.
Pome. A fleshy fruit resulting from the development of an ovary and an adnate calyx-tube, as the apple.
Posterior. Said of the side of an axillary flower towards the axis.
Prickle. A small spine growing out from the bark.
Procumbent. Trailing or resting on the ground.
Puberulent or Puberulous. With very short fine hairs.
Pubescent. Covered with short soft hairs, *i. e.*, pubescence.
Pulvinate. Cushion-shaped.
Punctate. Bearing translucent or colored dots or pits.
Punctulate. Minutely punctate.
Putamen. The hard part of a stone-fruit; a pit.
Raceme. A form of flower-cluster where the flowers are arranged with pedicels of about equal length on an elongated axis, as in the currant.
Racemose. In racemes.
Rachis. The central axis of a compound leaf or of a spike or raceme of flowers
Radial. Said of a longitudinal section of a stem when on the radius.
Radicle. The portion of an embryo below the cotyledons.
Ramification. Branching.
Ray. A branch of an umbel; also the marginal flowers of an inflorescence when distinct from the inner flowers.
Receptacle. The portion of a flower bearing the sepals, petals, etc.
Recurved. Curved backward.
Reflexed. Bent abruptly backward.
Reniform. Kidney-shaped.

Repand. With slightly wavy margin.
Reticulate. Netted.
Retrorse. Turned backward.
Retuse. With very shallow notch at apex.
Revolute. Rolled backward from the sides.
Raphe (or Rhaphe). The ridge connecting the hilum and chalaza of an anatropous or amphitropous ovule.
Ringent. Said of the gaping mouth of a two-lipped corolla.
Rostrate. With a beak-like tip.
Rotate. Said of a corolla with flat round limb; wheel-shaped.
Rugose. Wrinkled.
Ruminate. Said of an albumen which looks as if it had been chewed.
Runcinate. Incised with segments directed backward.
Sagittate. Of the shape of an arrow-head.
Salver-shaped. Said of a corolla with slender tube and abruptly expanded flat limb.
Samara. A simple dry indehiscent winged fruit.
Scabrous. Rough.
Scarious. Membranous, thin and dry; not green.
Secund. Said of a raceme where flowers are borne on one side of the rachis.
Sepal. One of the divisions of a calyx.
Septicidal. Said of a capsule opening along the partitions between the cells.
Serrate. Having saw-like teeth directed forward.
Serrulate. Diminutive of serrate.
Sessile. Without stalk.
Setaceous. Bristle-like.
Setose. Covered with bristles.
Setulose. Covered with minute bristles.
Simple. Of one piece, *i. e.*, not compound.
Sinuate. With markedly wavy margin.
Sinus. The cleft or space between two lobes.
Spatulate. Shaped like a spatula; abruptly wide at apex and narrow below.
Spicate. Arranged in a spike.
Spike. An elongated flower-cluster with sessile or nearly sessile flowers.
Spine. A sharp woody outgrowth from a stem.
Spinose. Covered with spines.
Spinule. Diminutive of spine.
Spinulose. Covered with spinules.
Stamen. One of the male or pollen-bearing organs of a flower.
Staminate. Said of flowers which bear stamens without pistils.
Staminodium. A sterile stamen.
Standard. The upper dilated petal of a papilionaceous flower.
Stellate. Star-shaped.
Stigma. The portion of a pistil which receives the pollen and through which fertilization is effected.
Stigmatic. Belonging to or of the nature of a stigma.
Stipe. The stalk-like support of some pistils.
Sterile. Not productive of spores or seeds.
Stipel. An appendage of some leaflets corresponding with the stipules of a leaf.
Stipitate. Having a stipe.
Stipulate. Having stipules.
Stipules. Appendages on either side of a leaf at the base of the petiole.
Stolon. A runner or prostrate branch rooting at the nodes.
Stoloniferous. Bearing stolons.
Stoma. (pl. Stomata) A little mouth or breathing pore in the epidermis (chiefly of the leaves) through which transpiration occurs.
Stomatiferous. Bearing stomata.
Striated. Striped lengthwise.
Strobile. A cone.
Style. The part of a pistil connecting the ovary and stigma.
Sub-. A prefix indicating somewhat; as subcordate, somewhat cordate, etc.
Subulate. Awl-shaped.
Suffrutescent. Somewhat shrubby.
Suffruticose. Diminutively shrubby.
Sulcate. Furrowed or grooved.
Superior. Said of an ovary growing above or free from the calyx.
Symmetrical. Said of a flower in which there is the same number of parts in each set of organs.
Syncarp. A fleshy multiple fruit.
Tangential. Said of a wood section when made lengthwise of the grain and tangential to the rings of growth.
Tegmen. The inner lining of a seed.
Terete. Columnar; circular in cross-section.
Ternate. Arranged in threes.
Testa. The outer covering of a seed.
Thyrsoid. Like a thyrsus.
Thyrsus. A campact panicle; as a bunch of grapes or lilac flowers.
Tomentose. Densely pubescent; covered with tomentum.
Tomentulose. Diminutive of tomentose.
Tomentum. Dense matted hairs.
Torose. Cylindrical with contractions at intervals.
Torulose. Diminutive of torose.
Torus. The receptacle of a flower.
Tortuous. Considerably bent or twisted.
Trachæ. The ducts or canals in wood.
Tracheids. Wood cells.
Transverse. Said of a wood section when made across the grain or axis of a log.
Tri-. In composition, thrice or three.
Triandrous. Having three stamens.
Trichotomous. Three forked.
Trifoliate. Having three leaflets.
Truncate. Ending abruptly, as if cut off.
Tuberculate. Covered with rounded projections.
Tumid or Turgid. Swollen.
Turbinate. Top-shaped.
Umbel. A form of flower cluster in which the pedicels radiate from the same point, similar to the rays of an umbrella.
Umbellate. Borne in umbels.
Umbellet. A secondary umbel.
Umbo. A projection or boss.
Umbonate. Bearing an umbel.
Undulate. With wavy margin.

Unguiculate. Contracted into a claw.
Uni-. In composition, one; as unisexual, of one sex, etc.
Urceolate. Urn-shaped.
Utricle. A bladder-like organ; a small 1-seeded fruit with a bladder-like pericarp.
Valvate. Said of sepals, etc., which are in contact along their margins only (not overlapping) in the bud.
Valve. One of the parts into which a capsule splits.
Vascular. Possessing ducts or vessels.
Vein. One of the branches of the framework of a leaf.
Veinlet. A branch of a vein.
Venation. The arrangement of veins.
Ventral. Pertaining to the anterior or inner face of an organ; opposed to dorsal.
Ventricose. Inflated on one side.
Vernation. The arrangement of leaves in the bud.
Verrucose. Covered with wart-like elevations.
Versatile. Said of an anther attached at about its middle and swinging freely.
Verticil. Same as whorl.
Verticillate. Arranged in a whorl.
Villous or Villose. Covered with long soft not matted hairs.
Virgate. Slender or wand-like.
Viscid. Sticky, glutinous.
Whorl. An arrangement of three or more leaves or branches radiating in a circle from the same node.
Wing. A thin filmy expansion.

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