

FARM FORESTRY

I—FOREST APPRECIATION

4-H CLUB CIRCULAR 45

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**COOPERATIVE EXTENSION WORK IN
AGRICULTURE AND HOME ECONOMICS**

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE AND THE UNITED
STATES DEPARTMENT OF AGRICULTURE COOPERATING

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CONTENTS*

	Page
I. Forest Appreciation.....	3
1. Introduction.....	3
2. What is Forestry?.....	3
3. Forest Influences.....	4
4. Wild Life.....	4
5. The United States Forest Service.....	4
6. Making a Tree Collection.....	5
7. Mounting Wood Specimens.....	8
8. Making a Collection of Leaf Prints.....	11
9. Identification Characters.....	13
10. Summer and Winter Keys to the Common Forest Trees of Missouri.....	14
(1) A Non-technical Summer Key.....	21
(2) A Non-technical Winter Key.....	26
II. Common Forest Trees of Missouri.....	29
1. List of Common Forest Trees.....	29
2. Description of 60 Missouri Trees.....	31-92
III. Member's Report Blank.....	(See Middle of Book)
IV. Objectives of Forest Appreciation.....	93
V. General References.....	93

*The Leader's Guide on Farm Forestry I - Forest Appreciation
is to be used with this 4-H Club circular.

FOREST APPRECIATION*

Introduction

Until recent years our country has been blessed with adequate forests of great variety and fine quality. Early American history had as its setting a vast forest which extended in unbroken cover from the Atlantic seaboard to the prairies beyond the Mississippi River. The pioneer was confronted on all sides by forests which seemed to have no end. It required many centuries of nature's best efforts to produce these matchless primeval forests. Untouched by the axe of man, the forest afforded a wonderful environment for the pioneer family.

What is Forestry?

Forestry concerns itself with groups of trees and with the life of trees, rather than with the planting and care of individual ornamental trees and shrubs. Trees in time grow old and die; but forests need not. For countless thousands of years the same forest may live on, one generation of trees succeeding another. Forestry then is the science which studies this life and the art that applied the knowledge so obtained for whatever purposes desired by man.

Trees ripen at a certain age and can be harvested just like farm crops, but if others take their place the result is not greatly different from letting the old trees die and fall where they grew. The forest lives on.

The farmer grows crops upon tillable land; but the forester grows trees upon land which is not suitable for agricultural crops.

Forestry generally involves the cutting and using of trees as well as the growing of them. It requires that the land be protected from fire and that the cutting be done in such a manner that young trees will take the place of the old and provide us with wood, but we must perpetuate our forests to have wood products.

A nation-wide program for the conservation of the forest resources is being developed through the cooperation of many agencies. Because of the number of years required to grow a crop of wood, farm boys and girls, as future land owners, will reap direct benefits from having applied some of the basic principles of forestry in this project.

*This circular was prepared by Peter Fletcher, Junior Forester, under the direction of G. W. Pike, Forest Supervisor, United States Forest Service, in collaboration with T. T. Martin, State Club Agent. It does not represent entirely original work by the writers. Much of the information contained herein has been compiled from numerous sources. The writers wish especially to acknowledge their indebtedness to the following men for material used in the preparation of this manuscript: H. P. Brown, Gardiner Bump, J. A. Cope, Caroline Dormon, J. S. Illick, R. B. Miller, and L. R. Tehon.

Revised by Ralph H. Peck, Extension Forester, July, 1937.

Forest Influences

In addition to their importance as growers of wood, the forests are essential to human welfare, due to the beneficial effect of a forest cover in regulating stream-flow and preventing erosion, or the washing away of the soil from steep slopes. Practically everywhere in the world, the destruction of forests on steep mountain slopes has resulted in destructive floods. The forest has aptly been called the "Mother of Waters". There must be a steady and adequate supply of water for drinking and other domestic uses, for power purposes and for navigation. In order to retain our fine streams, rivers, lakes and canals, we must keep the headwaters of the streams clothed with forests.

The forest also offers opportunities for pleasure and recreation for both young and old. It is an ideal camping place; it furnishes playgrounds and shaded resorts for picnics and excursions; its streams and lakes are the delight of the fisherman; its dusky recesses are the Mecca for the naturalist. The beauty and splendor of the forest, its atmosphere and quiet, and the glimpse of wild life have an irresistible appeal to all.

Wild Life

Not only does the forest contain myriad varieties of plant life, but it is also the home of many members of the animal kingdom. Wild game and fur-bearing animals, which the forests harbor, are valuable resources.

All wild life has a place in nature's scheme. At various times and in special places, certain kinds of birds and animals seem to get out of control and become harmful to man. A careful study of the whole situation, however, has shown that usually it is unwise to completely destroy all the individuals of any species of wild life, since many of them prey upon one another and help men to keep them in check with nature balanced.

The forests provide natural refuges, breeding places, food and water, and preserve wild life for the best uses of mankind.

The United States Forest Service

At the present time, the United States Forest Service of the Department of Agriculture has charge of two National Forests composing eight Purchase Units in the Missouri Ozarks. These areas will be extended as rapidly as conditions warrant. In the nation at large there are 148 National Forests.

The Supervisor is the administrative officer in charge of the National Forests. He must see that a continuous supply of timber is produced and that the proper use is made of all other forest resources.

Every National Forest is divided into smaller units, or Ranger Districts, each under the supervision of a District

Ranger. The Rangers manage their districts in accordance with the general administrative plans of the Supervisor, and perform the routine work required in the supervision of timber sales, grazing, free use, and special use of the forest. They also look after the construction of roads, trails, bridges, telephone lines and other permanent improvements. Rangers have charge of the recreational features of the forests and see that the vacationists do not abuse the privileges granted them. The most constant and difficult phase of the Ranger's work, however, is in protecting the forest from fire. The Forest Ranger is a hard-working, highly important unit in the successful management of the National Forests.

MAKING A TREE COLLECTION

Appreciation Background

To have a real appreciation of the forest is to know the importance of the forest to agriculture and industry, to have a thorough knowledge of the trees of which the forest is composed, and to know the relative values of these trees in producing crops of timber. The first step, therefore, in the appreciation of the forest is to become familiar with the various kinds of trees, the individuals of the forest community. They must be met at home, in the forest, where they can be found in conditions most natural to their growth. Each kind of tree will be found to have certain characteristics that distinguish it from other trees. No two trees have bark, leaves, or fruit exactly alike. Varying as much as these external characteristics of the tree is the wood, and upon the characteristics of that wood depends the use to which it can be put. In growing timber for a definite use, or in choosing trees to be cut for a certain purpose, it is important to know what woods can be put to that use or will answer to that purpose.

There are probably a hundred distinct varieties of trees native in the State, but some of them are so small that they are in this State scarcely more than shrubs and do not deserve to be classed as trees. No attempt has been made, therefore, to provide an all-inclusive list of trees in this publication, but rather to pick out and to describe the commoner trees that are distributed throughout the State and that are likely to be found in the average woodlot.

With this circular as a guide, it should be possible for every boy or girl, electing the 4-H Farm Forestry Club Project, to become familiar with all the forest trees in the neighborhood. As future woodland owners, this basic knowledge of trees of the forest will put them in a position to cut wisely and well in bringing about better forests.

Making a Tree Collection

The first requirement of the Forest Appreciation project is to make a collection of (1) a winter twig, (2) a

leaf, and (3) a fruit of at least fifteen of the native forest trees in the locality. We hope that you will want to know all the forest trees of your section, but as tangible evidence of your year's work a collection of only fifteen is required.

Collecting the Specimens for Mounting

1. Twigs.--The twigs may be collected in the fall, any time after the leaves drop. Using a sharp knife, cut a section about five inches long from the end of the twig, taking the twig from a side branch, never from the top shoot. Do not take the twig from a stump sprout or a very vigorous-growing young sapling as it will not be average; on the other hand, do not collect from a small lower branch that is dying back. Cut the end of the twig slanting to show a section of the pith. This is particularly important in the case of the walnuts, gum, hackberry, and others. In collecting a number of twigs in any one day, each should be tagged, so as to avoid mistakes in identify later.

2. Leaves.--If the project starts in the fall, there will be many deciduous-leaved trees whose leaves cannot be collected until the following spring, but by the end of May most leaves will be out in an average season. Here again, avoid taking specimens from little seedlings or sprout growth. Have a good-sized notebook along when making a leaf collection so that the leaves can be spread out flat and carried home in that condition. In the case of compound leaves, such as locust, ash or walnut, remember that the whole leaf must be shown, not just a single leaflet. Many such leaves are longer than the 8½ x 11 inch standard paper used for the collection, but usually a typical, though somewhat smaller-sized leaf can be found.

3. Fruit.--It will be important to begin looking in the autumn for the fruit of some of the trees. If you wait until June of the following year, the collection will be incomplete. The time of year when the fruit matures is given in Chapter II for every tree.

Preparing the Specimens for Mounting

1. Twigs.--After collecting the twigs they should be stored in a cool, dry place where they will dry out gradually with the least amount of shriveling and consequent destruction of the distinguishing characters. The name of the tree, written on a piece of paper and the twig stuck through the paper will keep the twigs separate.

2. Leaves.--Leaves for mounting must be carefully dried and pressed as soon as brought in from the woods. For this, use a press, which can be made by alternating newspapers and blotters between two flat surfaces, and weighted down by a board and weights. Place the specimens between the two blotters, slip the blotters between the newspapers, and add the weight on top of the pile. Best success will be had by moving the specimens around on the blotters each day or every several days, so that the blotters may completely dry out the leaf and preserve the natural color as much as pos-

sible. Allow the leaves to remain in the press for several weeks, until they are thoroughly dry.

3. Fruit.—Fruit and seeds need not be pressed, but should be kept in envelopes or paper sacks with the name of the tree written on the outside.

Mounting the Specimens on Paper

Heavy white paper or light cardboard, either white or buff, is to be preferred for mounting the leaves, twigs and seeds. Mount your specimens on one side of the page only, so that they will all appear on the right-hand page as one opens the book in which they are bound. (See page 15)

1. Twigs.—Twigs will be mounted on the right-hand side of the page. The twig should be turned and mounted to expose the slant cut through the twig and the central pith. Use stout thread or very fine wire to hold the twig in place. Punch tiny holes with a needle on either side of the twig, both near the top and the bottom of the specimen. Insert the wire or thread through the holes, and bind it on the lower side of the card.

2. Fruits.—Fruits which are small and more or less flat, such as those of the black locust, maples, ashes, elms, blue beech, basswood, poplars, can be mounted easily on the cardboard below the twig. A seed where it is easily separable, as in the black locust or the blue beech, should also be mounted alongside the fruit. Sometimes it is difficult to mount the fruit because of its shape, size or condition, but the seed may be easily mounted. This applies to the evergreens, birches, hop hornbeam, sycamore, cherries, cucumber and others. In these cases the fruit may be cut in half lengthwise and glued securely to the sheet, cut-side down. As a substitute, draw a sketch of the fruit, first in pencil, then inked in, making it as nearly natural size as possible. Large-seeded species, such as the walnuts, oaks and hickories may also be sketched. In some cases, too, the nut may be put in a vise and a thin cross-section made with a saw, which may be glued on the cardboard.

3. Leaves.—Have on hand a supply of gummed-cloth mending tape or adhesive transparent mending tape which may be bought at any five and ten-cent store for a nickel. Cut across the tape, making little strips about one-eighth inch wide. Place the mounting paper on a flat surface and spread the leaf out on the central and left portion of the sheet, leaving at least two inches of space below for the name of the tree and its principal uses. In cases of larger leaves, especially compound leaves, only one can be placed on the sheet, but two average-sized leaves can be mounted usually, one above the other, showing both the upper and lower surfaces. Do not fail to have all of the leaf stem along with the leaf.

To hold the leaf in place, paste strips of gummed cloth across the stem and points of the leaf. Use as few gummed strips as possible to hold the leaf firmly in place; too many strips spoil the neatness of the mount. In the case

of the needle-leaved southern cypress and shortleaf pine, it will be necessary to glue each needle to the mounting paper; otherwise, the needles will eventually fall off and leave the twig bare. (See Exercise Number 2, Chapter I for Making a Collection of Leaf Prints.)

Labelling the Mounted Specimens

In the space left at the bottom of the mounting paper, neatly write in ink the common name of the tree from which the specimens were taken, together with the most important uses of the wood of the tree. Trees must be labelled by their full names. For example, it is not sufficient to write maple for sugar maple, or oak for white oak. Learn and use the common names given in the circular even if you have known the tree by other names. The common names given in Chapter II are the ones which are most widely used in the United States. Do not depend on what is written in the circular for the uses of the tree. If you know of other uses, by all means put them down. Make inquiries in your neighborhood from lumbermen and find new uses in that way.

Having collected, identified and mounted the twigs, fruit and leaves of the trees, and having properly labelled them, you will want to make a suitable cover for the collection. You might place a four-leaf clover emblem on the cover, with the name of your club, your name, address, together with other designs and information. A logical arrangement of the sheets would follow the arrangement of trees used in this bulletin. (See Chapter II.) At least, all needle-leaved trees and broad leaved trees should be grouped separately. All trees in the same family should be together, as the oaks, or the maples.

When you have finished your collection of twigs, fruits, and leaves, some of you may wish to further increase your knowledge of these trees by mounting wood specimens. Exercise 1, Chapter I contains information which will help you to make a collection of mounted wood specimens.

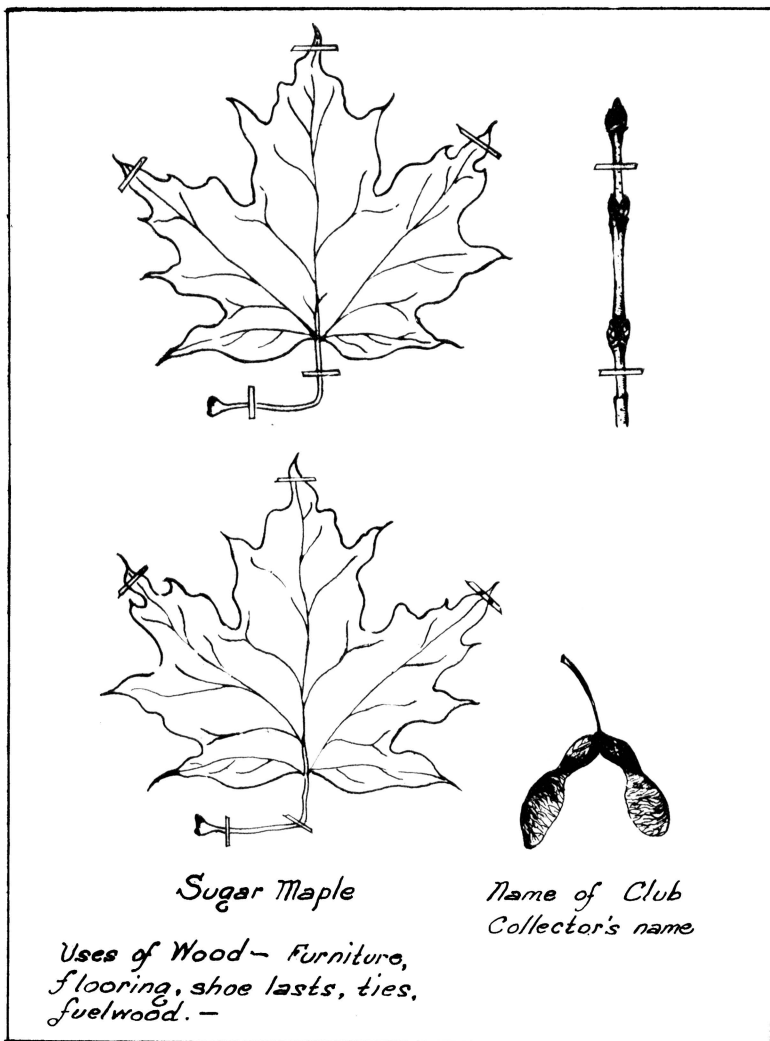
Mounting Wood Specimens

This exercise has been written for those 4-H Farm Forestry Club members who may wish to complete their leaf, twig and fruit collection with a collection of mounted wood specimens.

The purposes of this exercise are:

1. To enable the boys and girls to identify logs and sawn lumber by the appearance of the wood.
2. To instill in them an appreciation of the many and varied uses of wood products in our everyday lives.
3. To have something of beauty and value for exhibition purposes.

Wood products always have been indispensable in our civilization, and as one of the renewable natural resources, wood always will continue to be a necessity. We need wood

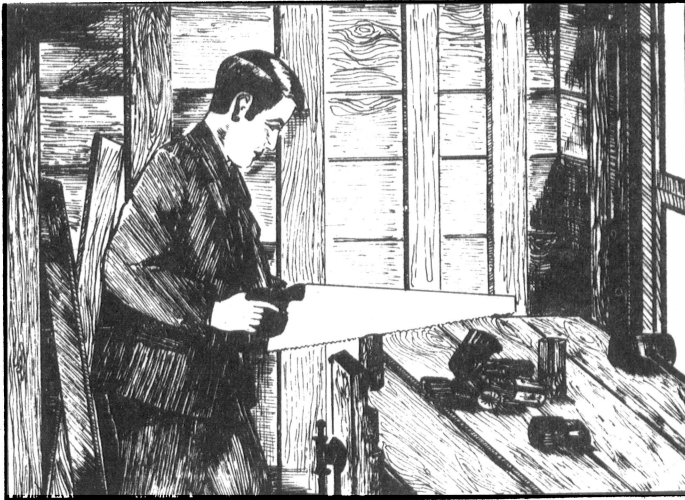


Mounted leaf, twig, and fruit

to construct houses and buildings; to burn as fuel; to make furniture, vehicles, barrels, crates, boxes, tool handles, paper, agricultural implements, toys; for various medicines, naval stores, wood tannins, maple sugar and syrup, oils and chemicals, and a practically endless variety of articles which we need in our everyday lives.

Wood in one form or another is either used or plays an important part in producing, manufacturing, or transporting our food, clothing and shelter - the three essentials of life. Wood is the most widely used single commodity that we have. When you consider the many ways in which we depend upon wood, you will realize why we never have and never can get along without it.

Farmers as a class are the greatest users of wood products. It is therefore important that boys and girls on the farm should know more concerning lumber products and their uses, and appreciate the value of a good farm woodlot. If for not other reason, we must have forests to furnish wood.



Collect and mount wood specimens of those trees identified, for which you have the leaves, fruits, and twigs. The specimens should be cut from the live trees, taking sections 6 - 12 inches long from limbs $1\frac{1}{2}$ to 2 inches in diameter. Specimens should be of uniform size and character, taken from the same parts of trees of the same ages. The bark should be retained and the ends cut square across. Specimens may be collected at any time of the year, preferably during the winter.

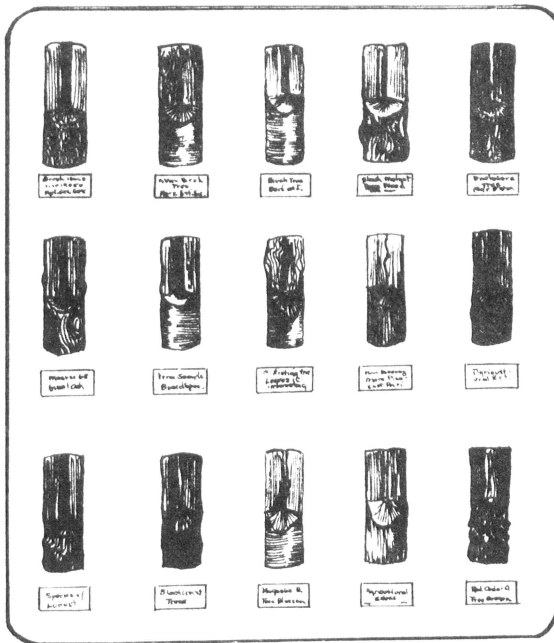
Place the specimen in a vise, and with a splitting saw, split it through the heart, down about $1\frac{1}{2}$ inches. Then turn the specimen on its side and saw on a bevel to meet the first cut at a forty-five degree angle. Cut off the bottom squarely, making all the specimens the same length, about 4 inches.

After drying in a cool, dry place for a month, the specimens may be smoothed with chisel, block plane, wood rasp, broken glass edge, or sandpaper. Treat one-half of the smooth surfaces with two coats of white shellac or spar varnish. The purpose of this is to contrast the "grain" or "figure" of the wood before and after it is varnished or shellaced. The untreated surface will appear dull and indistinct in contrast to the treated surface.

Mount the specimens on a 1/4 - 3/8 inch dressed board large enough to hold the whole collection. Insert a small screw-eye in the top of each specimen, and suspend them from rows of hooks in the board, with the varnished surfaces in front. Just below each specimen place a small white slip of paper neatly labeled with the name of the tree and a few of the principal uses of the wood.

Great care should be taken to see that each specimen is properly labeled. When the sections are collected and first cut, they should all be either marked or tagged, so that they may be correctly identified later.

A neat collection of wood specimens, mounted leaves, prints and twigs, make a good exhibit for local, state and county fairs.



Prize Sample Board Showing Correct Mounting.

Making a Collection of Leaf-Prints

This exercise has been written for those 4-H Forestry Club members who may wish to know more of the forest trees of Missouri in addition to the fifteen trees required, for

which you have made leaf, fruit and twig collections.

Collecting the leaves.-Collect the leaves in the spring, selecting a small though typical leaf showing average or representative characteristics. Carefully spread the leaves between the pages of your field notebook so that they may be carried home in good condition. Take several leaves of each tree, as you may spoil one or two of them in making a good print.

Making the Leaf-Prints.-As soon as you get home with the leaves, and before they have a chance to dry out and wrinkle, begin making the prints. Have on hand a quantity of good-grade white paper, letter size (8½ x 11 inches). Have also a self-inking stamp pad, size 3 x 6 inches or larger if possible, which may be purchased from a book store or perhaps a printer or hardware store for twenty-five cents. A stamp pad consists of a small metal box with a cover, containing an absorbent cloth pad saturated with printer's ink. Indeed a simple but effective pad may easily be made by soaking a thick blotter with India ink.

Remove a leaf from the notebook and place it on the stamp pad, putting the lower side of the leaf in contact with the ink. Gently press the leaf down upon the pad, cover it with a piece of newspaper, and rub it lightly with a circular motion. If the pad is smaller than the leaf, move the leaf about until every part of the bottom surface has come into contact with the ink.

Lift the leaf from the pad and spread it out with the inked surface touching the paper. Cover it with a newspaper and lightly rub it. Your first print will in all probability be nothing but a large smeary blot. Here are some of the reasons why:

1. Too much ink.
2. The paper or the leaf moved slightly, causing a smear.
3. The leaf was crushed and pressed too lightly against either the pad or the paper.

Experiment a little with some scrap paper. If there seems to be an excess of ink in the pad, soak a little out on a blotter. Perhaps the blot was caused by pressing too tightly. Examine the under side of the leaf. You will notice that the veins are prominent and raised a little above the leaf surface. The principle involved in making a leaf-print is simply to get ink on all the veins, without touching the portions between the veins. Then, when the leaf is transferred to the paper and lightly pressed, only the veins will print.

After you have smeared several prints because the paper on the leaf moved a little, you will see that one obviously cannot make an exact print unless the paper is held firmly and the leaf kept from moving across the paper while printing. In time, you will have better luck, and after several attempts you will be making clear-cut prints for your collection. Neatly label the leaves and arrange them in groups following the order given in this publication. Bind the

sheets together and make a suitable cover to hold the lection.

When completed, you will have a permanent trophy of which you may justly be proud. You will have eliminated all the trouble involved in pressing and mounting the leaves. Mounted leaves make a bulky collection, and are apt to fade after several years. In time they become brittle and fall from the sheets. Leaf-prints, on the other hand, may be bound in book form, preserving for all time the chief distinguishing characteristics of leaves - outline and venation.

Identification Characters

The place, of course, to study the trees is in the woods. Take this circular along with you, look for the characters - bark, twigs, buds, leaves, fruit - which will help you to distinguish one tree from another.

Pay considerable attention to the bark. It is always present, summer and winter, and even in the log you can easily identify the tree if you know the bark. Keep in mind such characteristics as color, texture, whether smooth or furrowed, scaly or firm, etc.

The twigs are interesting to study in the winter time. They, too, vary in color. Some are brittle, while others are tough and pliable; some are slender, others coarse; one twig may be hairy, another smooth. Sometimes a taste of the twig will help, as in the case of the cherries.

The buds go along with the twigs as part of the winter study of trees. You will note that all deciduous-leaved trees are listed as having either a terminal bud present or absent. Study the twig carefully. It is obvious that hickories have a terminal bud, as do also the maples and ashes. Others may look at first glance as if they had a terminal bud, but on closer examination you will see that there is really a leaf-scar on the end of the twig and the bud is a little below and to one side. The color of buds will also be helpful; for example, by a glance at the color of the bud you can tell at once whether you have a soft or a hard maple. Under "leaves" you will find a statement as to whether they are arranged opposite or alternate. This will, of course, apply to the twigs and buds and will help in telling some trees apart.

Leaves are, for those just starting in the study of our forest trees, the easiest approach. As you study the leaves and compare them, look for the following points: are they simple (one leaf to a stem) or compound? Are they arranged opposite on the twig or alternate? How is the margin of the leaf shaped? This is very important. In some leaves the margin is entire (no breaks at all); in some, it is like the fine teeth of a carpenter's saw, these we have called serrate (saw-like); still others are doubly serrate; in others, the margin is more deeply notched, as in the chestnut and beech; these we have called toothed. Then we come to the oaks and some others where the margin is very deeply cut and the leaves are described as lobed, and the hollows

between are called clefts.

Trees have flowers as do most of our green plants, but they are as a rule inconspicuous and high up in the tree tops where they cannot easily be obtained to aid in identification. In the interest of using available space for more important features, the description of flowers has been omitted.

The fruit of the tree is an important item in the appreciation of the forest, not so much as a means of identifying the tree, but as recognition of the origin from which the different forest trees must spring. The term fruit, it should be remembered, does not mean in this connection necessarily fleshy, edible products such as apples or cherries, but includes any seed and the covering in which it develops, whether cone, pod, samara (winged-seed), burr, or husk. Make careful note as to the time of year the seed matures, which is given in the text of Chapter II in every case.

Summer and Winter Keys

As a further help to the identification of the common forest trees of Missouri, simple keys have been made for both summer and winter.

A key is a scheme for easily and quickly identifying any unknown object under observation. It is based usually upon the most striking similarities and differences shown by the various parts of the object. The leaves and fruits have been selected for the summer key and the buds and twigs for the winter key, as these are the most easily available parts of the tree showing differences and similarities upon which to base the key.

One passes by a succession of subdivided steps from the beginning of the key to a point where the name of the tree is found, just as he might go from the bottom floor of a large building to any room he wishes by choosing properly labelled stairways and corridors. Two alternatives are usually presented, either a character is or is not present; these are the only choices possible. These two opposed characters are preceded in the key by the same numbers (1 and 1, or 2 and 2) and are set at the same distance from the left-hand margin of the page. 1 and 1 are subdivided further into other groups on the basis of other differences, the characters of which are opposed (with several exceptions which are evident in the key). If the desired character is found in the first group (1), there is no need to look in the second group (1), and your study need be confined to the subdivisions of the first group only.

By way of further explanation, let us take the leaf of the beautiful and important Yellow Poplar or Tulip Tree:

The leaves of our specimen are not evergreen as required in the first group (1), so we drop straight down to the second group (1); they are not small and narrow as required in the first group (2), so we drop down to the second

group (2); since there are neither three nor two, but only one leaf at a joint of the stem, the plant must be confined to the third or last subdivision of group (3); the leaves are not "compound" like those of the locust or a hickory in the first group (5), we confine ourselves to the next subdivision directly beneath, or the second group (5); the margin of the leaf is neither entire, first group (8), nor toothed, second group (8), but cut more deeply, (lobed), which takes us down into the third group (8); the leaves have several ribs or veins radiating from the base, first group (13); the absence of a milky sap, the broad leaves, and the fact that they seem to have been cut off in a shallow notch at the end leads unquestionably to the name of the tree, Yellow Poplar.

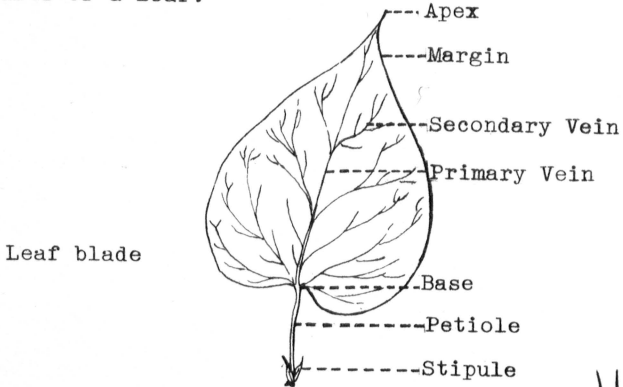
To verify and substantiate your key work, turn to the page in the text, Chapter II, and check up by comparing the leaf with the illustration and description given there.

A key not only makes it easier to trace and identify an unknown object (leaf or winter twig), but it also serves to arrange in a condensed form the outstanding characteristics by which any one object may be distinguished from all other objects in the same group. Once mastered, the key enables one to quickly trace and identify trees without referring to the long descriptions found in the text. For instance - leaves broad, arranged opposite, compound, leaflets spaced along the stalk serve to identify the ashes from all the other trees in this circular. Others may not be so easy as that, but a little practice and study will help you to master the entire key.

In order to familiarize you with the characters of leaf, fruit, twig, and bud which are used in the key, the following charts have been included.

Summer Key Characters:

Parts of a leaf:



Leaf Characters:

A. Kind



Broadleaf



Scale-like



Needle-like

B. Arrangement



Whorled

(Leaf-scars at node)



Opposite



Alternate

C. Form or Composition:

Simple



Compound



Palmate



Pinnate

Twice-Compound



D. Margin:



Entire



Serrate



Doubly-Serrate



Toothed

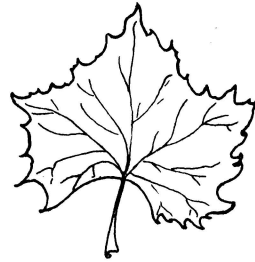


Lobed

E. Lobes:



Pinnate



Palmate

F. Shape:



Ovate



Heart



Linear



Triangular



Lanceolate

G. Base:



Oblique



Rounded



Square

H. Apex:



Blunt



Sharp



Truncate

J. Fruit.-

The seed bearing portion of a seed plant is called the fruit - (Ovary and adhering parts).

1. Compound Fruits - derived from more than one pistil.

a. Aggregate - from a number of pistils in the same flower - Yellow Poplar.

b. Multiple - from the combined pistils of several flowers in a cluster - Mulberry.

2. Simple Fruits.-

a. Fleshy fruits.-

(a). Berry - Ovary wall fleshy, with seeds imbedded in the soft tissue - Persimmon.

(b). Pome - Compound ovary, with outer wall fleshy, inner wall papery - Apple.

(c). Drupe - Simple ovary, with inner wall boney, outer wall fleshy - Cherry.

b. Dry Fruits.-

(a). Dehiscent - open along definite sutures or seams.

Legume - simple ovary, two sutures - Locust.

Follicle - like legume, one suture - Magnolia.

Capsule - compound ovary, several sutures - Poplar.

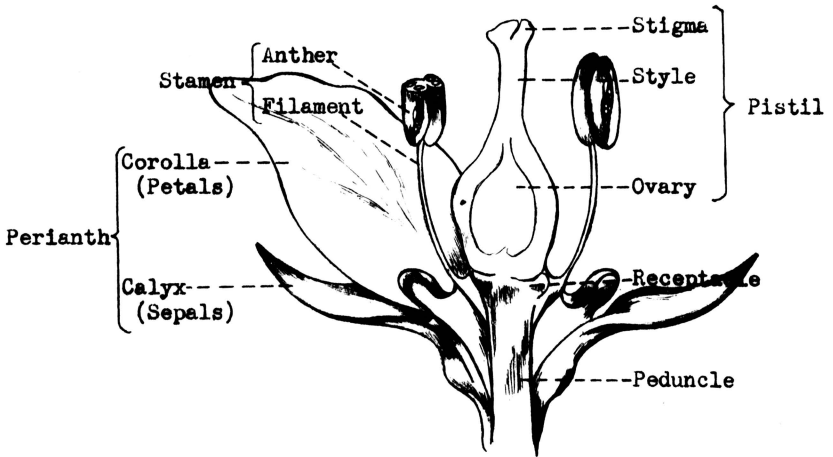
(b). Indehiscent - no definite sutures.

Akene - one celled, one seeded - Sycamore.

Samara - Membranous winged akene - Maple.

Nut - one celled, one seeded, with bony woody, or leathery wall, subdivided by an involucre - Walnut.

I. Structure of a Complete Flower:



A NON-TECHNICAL SUMMER KEY TO THE COMMON FOREST TREES OF MISSOURI

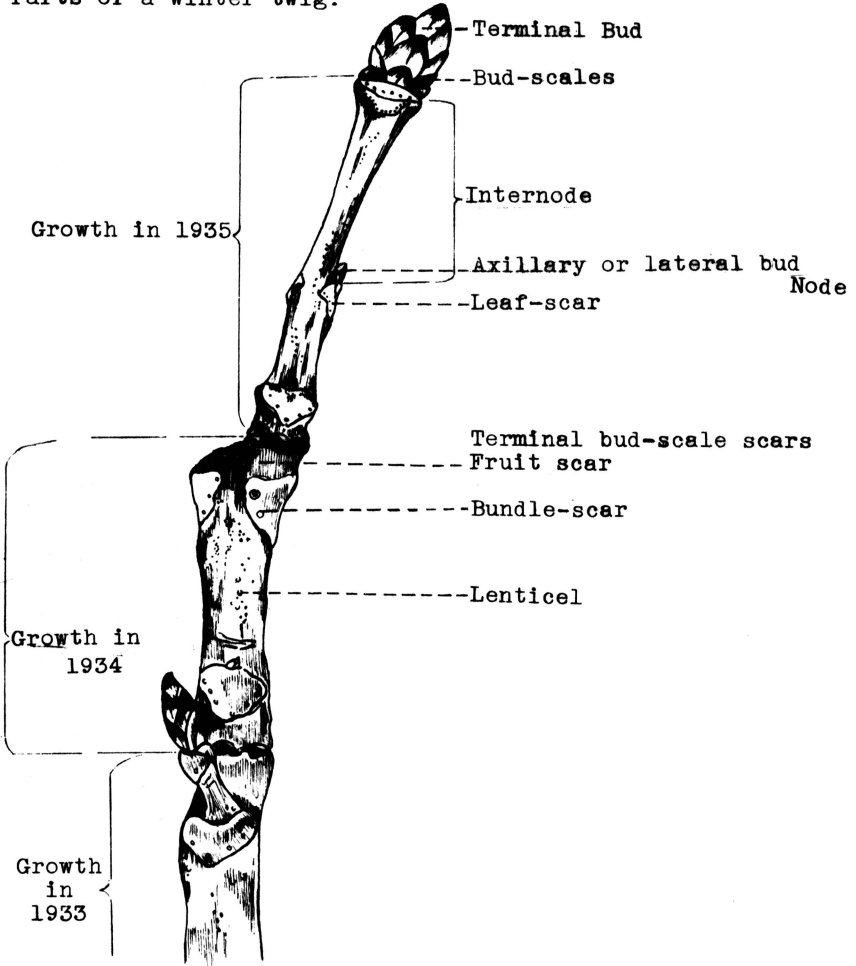
	<u>Page</u>
1 Leaves evergreen; needle-like, awl-shaped, or scale-like.	
Leaves long, flexible, needle-like; borne in clusters; fruit a cone - <u>Shortleaf Pine</u>	31
Leaves, short, stiff, awl-shaped or scale-like; fruit a dry berry - <u>Eastern Red Cedar</u>	33
1 Leaves deciduous (falling in the autumn),	
2 Leaves small and narrow, tiny, borne singly on opposite sides of the twig; fruit a small cone.....- <u>Southern Cypress</u>	32
2 Leaves broad, and fruit never a cone.	
3 Three large, simple, heart-shaped leaves at each node; fruit a long slender capsule.....- <u>Hardy Catalpa</u>	92
3 Two leaves at each joint (node) on opposite sides of the stem.	
4 Leaves simple (of one blade.)	
Margin of leaf entire; fruit scarlet, berry-like...- <u>Dogwood</u>	88
Margin of leaf not entire (lobed); winged fruit....- <u>Maples</u>	80 - 84
4 Leaves compound (of several leaflets).	
Pinnately compound, leaflets spaced along the stalk; winged fruit.....- <u>Ashes</u>	90 - 91
Palmately compound, leaflets all from one point; fruit a large woody capsule.....- <u>Ohio Buckeye</u>	85
3 One leaf at each joint (node) on alternate sides of the stem.	
5 Each leaf with several blades or leaflets (compound).	
6 Margins of leaflets entire; fruit a pod.	
7 Prickles or spines present.	
Two short prickles at base of leaf; leaflets simple.....- <u>Black Locust</u>	79
Branched spines on stem, long; often doubly-compound (leaflets again compound)- <u>Honey Locust</u>	78
7 Prickles or spines absent; doubly compound..- <u>Coffee-tree</u>	77
6 Margins of leaflets not entire, but serrated; fruit a nut.	
Leaflets 5 - 11; pith solid.....- <u>Hickories</u>	36 - 40
Leaflets 11 - 23; pith chambered.....- <u>Walnuts</u>	34 - 35
5 Leaves simple (of one blade).	
8 Margin of leaf entire, that is, not lobed or deeply cut.	
Sap milky; twigs spiny; fruit orange-like.....- <u>Osage Orange</u>	63

	<u>Page</u>
Sap not milky, nor twigs spiny.	
Leaf as long as broad, heart-shaped; fruit a pod - <u>Redbud</u>	76
Leaf longer than broad.	
Aromatic odor when crushed; fruit a dark blue-black berry..... - <u>Sassafras</u>	67
Aromatic odor absent.	
Leaves more than 6 inches long; narrow scar around twig at each node; fruit a dry cone-like structure..... - <u>Cucumber Magnolia</u>	64
Leaves less than 6 inches long, without such a scar.	
Leaf widest above the middle; fruit edible, banana-like..... - <u>Papaw</u>	66
Leaf widest at or below the middle.	
Pith with cross plates; fruit a small dark blue berry..... - <u>Black Gum</u>	87
Pitch without cross plates; fruit a 1-inch orange colored berry..... - <u>Persimmon</u>	89
8 Margin of leaf toothed.	
9 Leaf with several strong veins from the base.	
Sap milky..... - <u>Red Mulberry</u>	62
Sap not milky.	
About as long as broad, heart-shaped; fruit nut-like..... - <u>Basswood</u>	86
Longer than broad; twig containing chambered pith; fruit berry-like..... - <u>Hackberry</u>	61
9 Leaf with only one strong vein from the base.	
10 Twigs rather spiny; fruit a small apple.	
Spines 2 - 3 inches long..... - <u>Scarlet Hawthorn</u>	72
Stubby spurs, $\frac{1}{2}$ inch long..... - <u>Sweet Crab Apple</u>	70
10 Twigs not spiny.	
11 Leaf-margin single-toothed (the teeth entire).	
12 Teeth coarse.	
Leaf about as broad as long, triangular; fruit a catkin..... - <u>Southern Cottonwood</u>	41
Leaf longer than broad.	
Buds long and sharp; fruit a small prickly burr..... - <u>Beech</u>	46
Buds short	
Leaves widened upwards; fruit an acorn..... - <u>Oaks</u>	48 - 58

	<u>Page</u>
12 Teeth fine.	
Leaf-stalk with small glands; pronounced odor when crushed; fruit a drupe	- <u>Cherries</u> 73 - 75
Leaf-stalk without glands; no pronounced odor	
Leaves five times as long as broad; fruit a catkin.....	- <u>Black Willow</u> 42
Leaves broader.	
Bark scaly; fruit blue-black, berry-like.....	- <u>Serviceberry</u> 71
Bark not scaly; fluted, muscular appearing; fruit a nut within an envelope.....	- <u>Blue Beech</u> 43
11 Leaf-margin doubly-toothed (teeth again toothed).	
Leaf base inequilateral (oblique); winged fruit.....	- <u>Elms</u> 59 - 60
Leaf base symmetrical; fruit a catkin.	
Bark scaly.....	- <u>Hop Hornbeam</u> 44
Bark thin, papery, orange.....	- <u>River Birch</u> 45
8 Margin of leaf cut more deeply (lobed).	
13 Leaf with several strong veins from the base.	
14 Sap milky; fruit black, juicy.....	- <u>Red Mulberry</u> 62
14 Sap not milky.	
15 Margins of lobes entire.	
2 - 3 lobed when not entire; aromatic odor; fruit a blue-black berry.....	- <u>Sassafras</u> 67
3 - 4 lobed; leaves notched or truncate at apex; fruit cone-like.....	- <u>Yellow Poplar</u> 65
15 Margins of lobes not entire, but toothed.	
3 - 5 shallow lobes, sparsely toothed; narrow scar around each node; fruit a "button-ball" of light brown seeds.....	- <u>Sycamore</u> 69
5 - 7 definite lobes with margins sharply serrated; no such scar as above; leaf star-shaped; fruit armed with incurved spines.....	- <u>Red Gum</u> 68
13 Leaf with only one strong vein from the base.	
Mucilaginous and aromatic; fruit a blue-black berry.	- <u>Sassafras</u> 67
Not mucilaginous nor aromatic	
Pith round; twigs with spines; fruit a small apple- Pith star-shaped when cut across; twigs without spines; fruit an acorn.	- <u>Scarlet Hawthorn</u> 72
Lobes rounded, not bristle-tipped; acorn maturing in one year.....	- <u>White Oaks</u> 55
Lobes pointed, bristle-tipped; fruit an acorn maturing in two seasons.....	- <u>Black Oaks</u> 48 - 53

Winter Key Characters:

Parts of a winter twig:



Terminal branch of Ohio Buckeye.

Twig and Bud Characters:

A. Arrangement:



Alternate



Opposite



Zig-zag

B. Size:



Stout



Slender

C. Pith:



Chambered



Solid



Star-shaped

D. Buds:



Terminal



Not Terminal



Lateral



Clustered

E. Bud-scales:



Many



Two



One

A NON-TECHNICAL WINTER KEY TO THE COMMON FOREST TREES OF MISSOURI

	<u>Page</u>
1 Leaves evergreen; needle-shaped, awl-shaped, or scale-like.	
Leaves long, flexible, needle-like; borne in clusters; fruit a large cone.....	- <u>Shortleaf Pine</u> 31
Leaves short, stiff, awl-shaped or scale-like; fruit like a dry berry.....	- <u>Eastern Red Cedar</u> 33
1 Leaves deciduous (falling in the autumn), leaving evident scars.	
2 Three scars at a joint (node), whorled.....	- <u>Hardy Catalpa</u> 92
2 Two scars at a node (opposite).	
End bud half an inch or more in length; twigs thick.....	- <u>Ohio Buckeye</u> 85
Buds much smaller.	
Leaf-scars very small, raised; twig slender.....	- <u>Dogwood</u> 88
Leaf-scars narrow, V-shaped.....	- <u>Maples</u> 80 - 84
Leaf-scars broader and not V-shaped.....	- <u>Ashes</u> 90 - 91
2 Only one scar at a node (alternate).	
3 Fruit a "cone".....	- <u>Southern Cypress</u> 32
3 Fruit not a "cone".	
4 A narrow scar around the twig at each node.	
Buds long, sharp, spreading; bark thin, smooth, gray.....	- <u>Beech</u> 46
Buds not long and sharp.	
Buds with 2 scales meeting at the edges.....	- <u>Yellow Poplar</u> 65
Each bud covered by one scale.	
Bud hairy; leaf-scar U-shaped.....	- <u>Cucumber Magnolia</u> 64
Bud not hairy; leaf-scar encircling the bud; brown outer bark scales off exposing smooth, pale inner bark.....	- <u>Sycamore</u> 69
4 Without a narrow scar around each node.	
5 Pith usually with cavities (chambered) when split.	
Twigs very slender; trunk covered by wart-like bark.....	- <u>Hackberry</u> 61
Twigs moderately thick.	
Twigs and pith angular; leaf-scars large.....	- <u>Walnuts</u> 35
Twigs round; leaf-scars small.....	- <u>Persimmon</u> 89
5 Pith solid.	
6 With firmer cross-lines when split.....	- <u>Black Gum</u> 87
6 Without firmer cross-plates.	
7 Sap milky.	
Twigs spiny.....	- <u>Osage Orange</u> 63
Twigs without spines.....	- <u>Red Mulberry</u> 62
7 Sap not milky.	
8 Twigs very thick; leaf-scars large; bark scaly, ridged--	- <u>Coffee-tree</u> 77
8 Twigs slender or moderate.	
9 Twigs mucilaginous and aromatic.....	- <u>Sassafras</u> 67

	Page
9 Twigs not aromatic.	
10 Small buds covered by leaf-scars.	
Two prickles at each node.....	- <u>Black Locust</u> 79
Long, branched, spiny thorns.....	- <u>Honey Locust</u> 78
10 None of the buds covered by leaf-scars.	
11 End bud without scales (naked).....	- <u>Papaw</u> 66
11 End bud, if present, with specialized scales.	
12 Lowest bud-scale directly over leaf-scar.	
Only one bud-scale, pith round.....	- <u>Black Willow</u> 42
Several scales; pith angular.....	- <u>Southern Cottonwood</u> 41
12 Lowest scales at the side of the bud.	
13 Pith star-shaped in cross-section.	
14 Three large scars (bundle-scars)	
on each leaf-scar.....	- <u>Red Gum</u> 68
14 Small scars clustered in groups	
on each leaf-scar.....	- <u>Hickories</u> 36 - 40
14 Numerous small scars on each	
leaf-scars	
Twigs angular at end.....	- <u>Oaks</u> 48 - 58
Twigs round.....	- <u>Chestnut</u>
13 Pith flattened, 3-sides; twigs very	
slender; bark peels off in thin	
orange papery pieces.....	- <u>River Birch</u> 45
13 Pith round in cross-section.	
15 Commonly with spiny twigs.	
Bud-scales fleshy and colored-	- <u>Scarlet Hawthorn</u> 72
Bud-scales dry.....	- <u>Sweet Crab Apple</u> 70
15 Twigs not spiny.	
16 Buds becoming sharp and re-	
latively long.....	- <u>Serviceberry</u> 71
16 Buds short or blunt.	
17 Twigs three-ridged at nodes..-	- <u>Redbud</u> 76
17 Twigs not prominently ridged.-	
18 Each leaf-scar with 3	
bundle-scars on it.	
19 Scales in two rows on	
each bud.....	- <u>Elms</u> 59 - 60
19 Scales of buds not in	
two rows.	
20 Trunk fluted with	
smooth bluish-gray bark.-	- <u>Blue Beech</u> 43
20 Trunk uniformly	
rounded, bark scaly.	
Twigs with a bitter	
almond flavor...-	- <u>Cherries</u> 73 - 75

	<u>Page</u>
Not suggesting bitter almonds.....- <u>Hop Hornbeam</u>	44
18 Leaf-scars without 3 separate bundle-scars. Twigs and buds somewhat hairy.....- <u>Persimmon</u>	89
Not hairy, often colored red.....- <u>Basewood</u>	86

COMMON FOREST TREES OF MISSOURI

<i>Pinus echinata</i> , Miller	Shortleaf Pine
<i>Taxodium distichum</i> , (Linnaeus) Richard	Southern Cypress
<i>Juniperus virginiana</i> , Linnaeus	Eastern Red Cedar
<i>Juglans cinerea</i> , Linnaeus	Butternut
<i>Juglans nigra</i> , Linnaeus	Black Walnut
<i>Hicoria Pecan</i> (Marsh) Britton	Pecan
<i>Hicoria cordiformis</i> (Wangenheim) Britton	Bitternut Hickory
<i>Hicoria ovata</i> (Miller) Britton	Shagbark Hickory
<i>Hicoria alba</i> , (Linnaeus) Britton	Mockernut Hickory
<i>Hicoria glabra</i> (Miller) Sweet	Pignut Hickory
<i>Populus deltoides virginiana</i> , (Castiglioni) Sudworth	Southern Cottonwood
<i>Salix nigra</i> , Marshall	Black Willow
<i>Carpinus caroliniana</i> , Walter	Blue Beech
<i>Ostrya virginiana</i> , (Miller) Koch	Hop Hornbeam
<i>Betula nigra</i> , Linnaeus	River Birch
<i>Fagus grandifolia</i> , Ehrhart	Beech
<i>Castanea dentata</i> , (Marshall) Borkhausen	Chestnut
<i>Quercus borealis maxima</i> , Michaux f.	Northern Red Oak
<i>Quercus imbricaria</i> , Michx.	Shingle Oak
<i>Quercus palustris</i> , Muenchhausen	Pin Oak
<i>Quercus coccinea</i> , Muenchhausen	Scarlet Oak
<i>Quercus veluntina</i> , LaMarck	Black Oak
<i>Quercus rubra</i> , Linnaeus	Southern Red Oak
<i>Quercus marilandica</i> , Muenchhausen	Blackjack Oak
<i>Quercus alba</i> , Linnaeus	White Oak
<i>Quercus stellata</i> , Wangenheim	Post Oak
<i>Quercus macrocarpa</i> , Michx.	Bur Oak
<i>Quercus muehlenbergii</i> , Engelmann	Chinquapin Oak
<i>Ulmus americana</i> , Linnaeus	American Elm
<i>Ulmus fulva</i> , Michaux	Slippery Elm

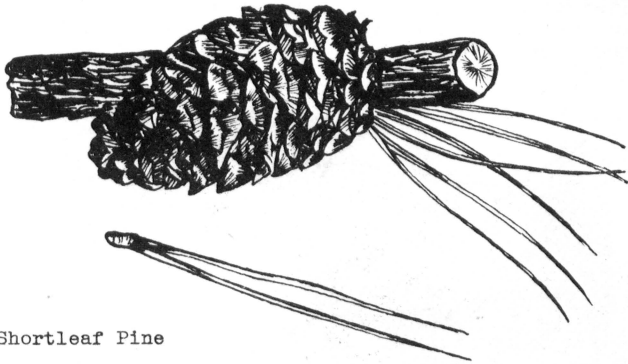
<i>Celtis occidentalis</i> , Linnaeus	Hackberry
<i>Morus rubra</i> , Linnaeus	Red Mulberry
<i>Toxylon pomiferum</i> , Rafinesque	Osage Orange
<i>Magnolia acuminata</i> , Linnaeus	Cucumber Magnolia
<i>Liriodendron tulipifera</i> , Linnaeus	Yellow Poplar
<i>Asimina triloba</i> , (Linnaeus) Dunal	Papaw
<i>Sassafras variifolium</i> (Salisbury) Kuntze	Sassafras
<i>Liquidambar styraciflua</i> , Linnaeus	Red Gum
<i>Platanus occidentalis</i> , Linnaeus	Sycamore
<i>Malus coronaria</i> (Linnaeus) Miller	Sweet Crab Apple
<i>Amelanchier canadensis</i> , (Linnaeus)	Serviceberry
<i>Crataegus coccinea</i> , Linnaeus	Scarlet Hawthorn
<i>Prunus americana</i> , Marshall	Wild Plum
<i>Prunus serotina</i> , Ehrhart	Black Cherry
<i>Prunus virginiana</i> , Linnaeus	Choke Cherry
<i>Cercis canadensis</i> , Linnaeus	Redbud
<i>Gymnocladus dioicus</i> , (Linnaeus) Koch	Kentucky Coffee-tree
<i>Gleditsia triancanthos</i> , Linnaeus	Honey Locust
<i>Robinia pseudoacacia</i> , Linnaeus	Black Locust
<i>Acer saccharum</i> , Marshall	Sugar Maple
<i>Acer saccharinum</i> , Linnaeus	Silver Maple
<i>Acer rubrum</i> , Linnaeus	Red Maple
<i>Acer negundo</i> , Linnaeus	Boxelder
<i>Aesculus glabra</i> , Willdenow	Ohio Buckeye
<i>Tilia glabra</i> , Ventenat	Basswood
<i>Nyssa sylvatica</i> , Marshall	Black Gum
<i>Cornus florida</i> , Linnaeus	Dogwood
<i>Diospyros virginiana</i> , Linnaeus	Persimmon
<i>Fraxinus americana</i> , Linnaeus	White Ash
<i>Fraxinus nigra</i> , Marshall	Black Ash
<i>Catalpa speciosa</i> , Warder	Hardy Catalpa

SHORTLEAF PINE.

Pinus echinata (Miller)

Shortleaf pine, also known as old-field pine, yellow pine, rosemary pine, etc., is widely distributed in sections of the Ozark Mountains. Sometimes mixed with hardwood types, and sometimes in pure second-growth stands, it is found in the hills and on ridge lands. When grown in thick stands, the trunks are tall, straight and clean, capped by a large, oval or round head of living branches. Although the Shortleaf pine thrives in well-drained, light, sandy and gravelly soil, it is most commonly found on the rocky ridges and plateaus, especially on southern and south-western slopes. The Shortleaf pine belongs to the hard pine group; that is, the pines having relatively hard wood. It is a very useful wood, being utilized for the interior and exterior finishing of houses, for general construction, for manufacturing paper pulp, excelsior, cooperage stock, mine props and numerous other purposes.

Bark - The cinnamon-red bark, sometimes an inch thick, is divided into irregularly angular, scaly plates by a network of deep fissures.



Shortleaf Pine

Natural size.

Twigs - Stout, brittle, slightly rough, at first often covered with glaucous bloom, later becoming reddish-brown.

Winter Buds - Ovoid, dull-pointed, covered with sharp-pointed dark brown scales.

Leaves - Usually in clusters of two, sometimes three or even four, slender, flexible, faintly toothed, abruptly pointed, dark bluish-green, three to four inches long, surrounded by a persistent sheath, and persisting for two to five years.

Fruit - The nearly sessile staminate cones are about three-fourths of an inch long. Pistillate cones occur in pairs or in groups of three or four, near the end of the seasons' growth on short, stout stalks. At maturity they reach a length of one and one-half to two inches (the smallest of all the pine cones), and become chestnut-brown. Old cones remain attached to the branches for several years. The ends of the cone scales are slightly thickened and bear weak, deciduous prickles.

SOUTHERN CYPRESS

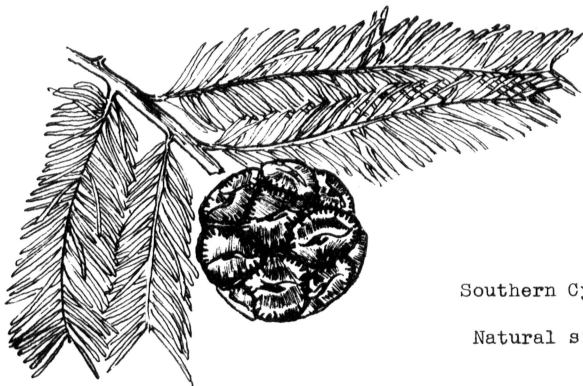
Taxodium distichum, (Linnaeus) Richard.

Southern cypress, sometimes known as bald cypress, is found in the deep swamps of the southeastern corner of Missouri, where water stands for at least a part of the year. It will grow, however, where water never stands if the soil is rich and moist. The tree is oddly attractive.

It is tall, straight, with a flaring, buttressed base, long slender branches that give young trees a narrow pyramidal shape, but on old trees spread out to form a very broad, low crown. The wood is light, soft, easily worked, and extremely durable in contact with weather and soil. Hence it is much in demand for shingles, well curbing, posts, poles, cross-ties, boat and ship building, and exterior trim of buildings. It has popularly been called, "The Wood Everlasting".

Another characteristic feature is the way the roots push up above the water level for air, forming irregular points called "knees". This only occurs where water stands about the base of the tree for at least part of the year.

Bark - The straight trunk is clothed with cinnamon-red bark, one to two inches thick, which is divided by narrow fissures into broad, flat ridges.



Southern Cypress

Natural size.

Twigs - The short, lateral branches usually extend nearly at right-angles to their supporting branch, and fall from the tree in the autumn with the leaves still adhering.

Leaves - The tree is easily recognized by its fern-like foliage. The tiny leaves are set evenly and closely along opposite sides of the twigs, clusters resembling the small fern-fronds.

Fruit - The fruit is a rounded cone, or "ball" about one inch long. It encloses little seeds, which have wings nearly one-fourth inch long.

EASTERN RED CEDAR.

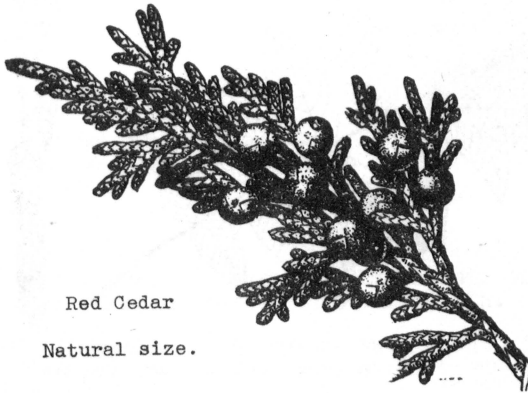
Juniperus virginiana, Linnaeus

Eastern red cedar, a small-sized, slow-growing forest tree, is common to the dry, rocky glades of the Ozarks and is familiar to everyone as a fence-row tree. It is adapted to a wide range of soil conditions, most frequently found growing only in open woods and pastures where plenty of sunlight is obtained. The wood is soft, light, fragrant, brittle, dull red in color with contrasting white sap wood, extremely durable in contact with the soil, and is easily worked. It is largely used in the manufacture of pencils, cedar chests, cabinet work, and interior finish. As a post wood, it has few superiors.

Bark - light reddish brown in color, separating in long, narrow shreddy strips fringed along the edges.

Twigs - generally 4-sided on mature trees, green in color from the covering of minute leaves, not flattened or arranged in fan-shaped clusters, becoming reddish brown in color after the fall of the leaves.

Winter Buds - minute, covered by the overlapping scale-like leaves.



Red Cedar

Natural size.

Leaves - various shades of green to reddish brown in color, persistent from three to four years, 2 kinds: (1) scale-like, closely overlapping, opposite in pairs, giving a 4-sided appearance; (2) awl-shaped, from one-half to three-fourths inch long, usually on young trees or more vigorous shoots and yellowish green to light bluish green in color, very sharp-pointed.

Fruit - a berry-like cone, one-fourth inch in diameter, light blue in color, with bloom at maturity in the autumn of the first year. Fruit remains on the tree during the winter, highly prized by birds. Seeds - from one to two, wingless, brown in color, covered with a thin, sweet flesh with resinous flavor.

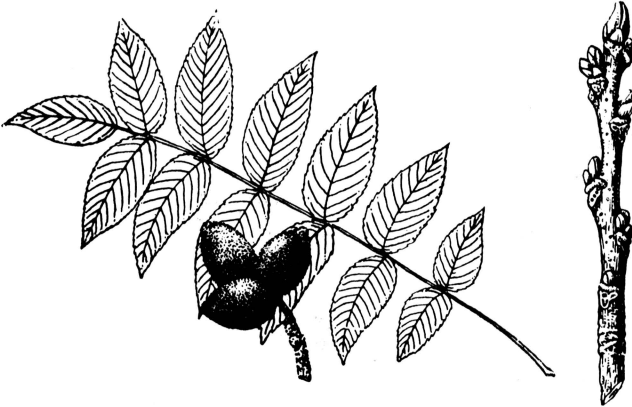
BUTTERNUT.

Juglans cinera, Linnaeus

Butternut is closely akin to the black walnut though not so valuable a timber tree. It produces attractive wood and edible nuts, but branches freely and seldom reaches a large size. It is common in moist soils, especially along fences and roads throughout the state. The wood is light, soft, not strong, coarse-grained, light brown in color and easily worked and polished. It is used for interior trim and furniture.

Bark - smooth on young trunks and branches, light gray in color; on older trunks deeply divided into long, broad, flat-topped, whitish ridges.

Twigs - stout, brittle, greenish-gray in color, often hairy, easily identified by a dark-brown furry growth, or "mustache", found just above most leaf-scars; chambered pith dark brown as contrasted with the light brown chambered pith of the black walnut.



BUTTERNUT

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

Winter Buds - terminal bud pale, downy, blunt-pointed, from one-half to three-fourths inch long, flattened, longer than wide; lateral buds smaller and shorter.

Leaves - alternate, compound, with from eleven to seventeen practically stemless long-pointed leaflets, margins serrate as in black walnut; leaves up to two and one-half feet in length; leaf stalk, hairy where it joins them.

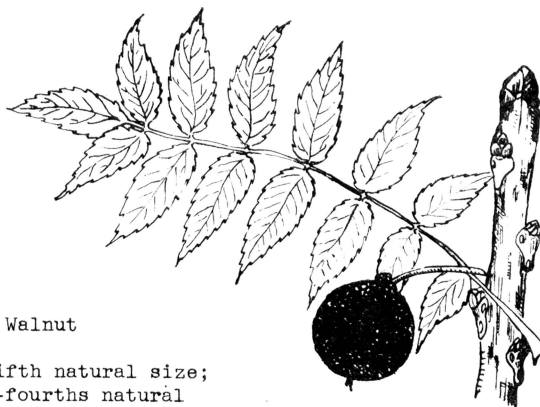
Fruit - a rather large nut, one and one-half inches long, tapering at the end, black with fine cut ridges, enclosed in a sticky, green husk usually in clusters of from three to five, ripening in October of the first season. Kernel - sweet, oily, but somewhat difficult to extract. The butternut has the advantage of curing without removing the outer husk.

BLACK WALNUT.

Juglans nigra, Linnaeus.

Black walnut is one of the most valuable timber trees native to this State. It reaches a large size and produces highly prized wood and large edible nuts. It is common in rich, well-drained bottom-lands. The wood is heavy, hard, strong, durable, rich dark brown in color, easily worked, and takes a fine polish. It is largely used in cabinet-making interior trim, and for gunstocks. It deserves protection and planting in suitable locations.

Bark - thick, dark, deeply furrowed with rounded ridges between, grayish brown in color; inner bark dark chocolate brown in color.



Black Walnut

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

Twigs - at first hairy, later smooth, stout, brittle, orange brown in color, cream colored chambered pith.

Winter buds - terminal bud pale, downy, scarcely longer than broad, blunt-pointed, less than one-third inch long; lateral buds less than one-sixth inch long.

Leaves - alternate, compound, with from thirteen to twenty-three leaflets; leaflets from three to four inches long, sharp-pointed, serrate along margin, usually stalkless, leaves up to two feet in length.

Fruit - a round nut, one and one-half inches in diameter, black, the surface roughened by rather coarse ridges, enclosed in a yellowish green, fleshy, husk, usually solitary or in clusters of two, ripening in October. Kernel - sweet, edible, and when properly cured somewhat easier to extract than the butternut. It is necessary to remove the outer husk if nuts are to be stored.

PECAN(Hicoria Pecan (Marsh)(Britton))

Pecan, the largest of the hickories, occurs in all sections of Missouri, chiefly on rich, bottom-land soil along the larger rivers and creeks. Because of its excellent nuts, and high value for shade, it has been widely planted, often in orchards and groves. Wood usually less valuable than other hickories, heavy, hard, brittle, coarse-grained, light reddish brown in color, used for fuel and occasionally in manufacture of handles and agricultural implements.



PECAN
One-quarter natural size.

Bark - light brown tinged with red, smooth in early stages, tending to divide with age into irregular, narrow, forked ridges.

Twigs - stout, reddish-brown, with conspicuous concave leaf scars.

Winter buds - sharp-pointed, covered with clusters of bright yellow hairs, terminal bud $\frac{1}{2}$ " long.

Leaves - alternate, compound, 12"-20" long, with 9"-17" long-pointed, saw-tooth edged leaflets, 4"-8" long, 1"-3" wide, with rounded or wedge-shaped bases.

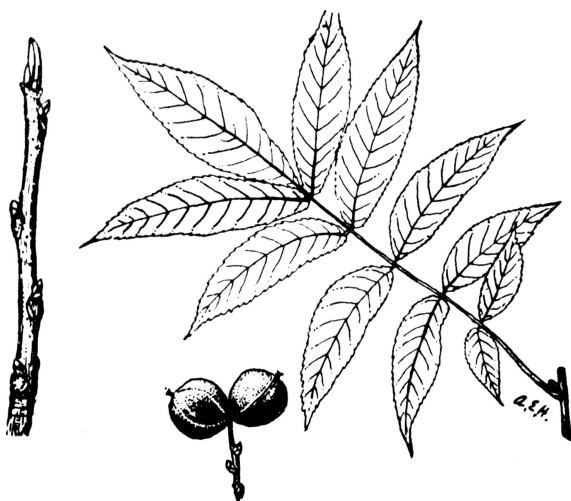
Fruit - a nut, borne in clusters of from 2 to 11, pointed and four winged, 1"-2 $\frac{1}{2}$ " long, $\frac{1}{2}$ -1" in diameter, with thin, hard husk, splitting at maturity to discharge nut, and often remaining on tree during winter. Seed sweet, reddish-brown, and commercially valuable.

BITTERNUT HICKORY.

Hicoria cordiformis (Wangenheim) Britton.

Bitternut hickory is an occasional forest tree in most sections of the State. It is by preference a bottom-land tree growing on west sites in pastures, fields, and along streams, though it is occasionally found on hillsides. It grows well on moist, rich soil such as is found in many farm woodlots. The wood is heavy, very hard, strong, tough, and dark brown in color with paler sapwood. It is inferior to that of the other hickories but is used for practically the same purposes.

Bark - thin, close, with shallow furrows and narrow regular ridges, usually does not scale or shag off, light gray in color.



BITTERNUT HICKORY

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

Twigs - slender, often yellowish in color, hairy toward the end; grayish or orange brown in color during the first winter.

Winter buds - long, flattened, blunt-pointed, covered by four sulfur-colored scales; terminal bud from one-third to three-fourths inch long; pith brown and unlike any other hickory in this respect.

Leaves - alternate, compound, from six to ten inches long, with from seven to eleven long, narrow, sharp-pointed leaflets which are smaller and more slender than are those of other hickories.

Fruit - a nearly round nut, thin-husked, brown in color, from three-fourths to one inch long, without ridges. Kernel - bitter, not edible. Husk - clings to the nut after falling. Shell is so thin that it can easily be crushed between the fingers.

SHAGBARK HICKORY.

Hicoria ovata, (Miller) Britton.

Shagbark hickory is the best known and most valuable of our hickories in the State. It is common in deep, moist soils throughout Missouri. In the forest it is a tall straight-branched tree but in open fields and along hedge-rows where it often grows it usually forks near the ground into stout ascending limbs. The wood is very heavy, tough, elastic, close-grained, and is used chiefly for handles, vehicles, agricultural implements, and fuel.

Bark - light gray in color, smooth and seamy, becoming shaggy with age and peeling off into long strips which are loose at both ends and attached in the middle, thus giving rise to the name "shagbark hickory".



SHAGBARK HICKORY

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

Twigs - covered with numerous light dots, extremely tough and pliable, reddish brown to gray in color.

Winter buds - large, ovate, blunt-pointed, with papery, dark brown, loose bud scales, the outer scales much darker, persistent through the winter; terminal buds usually more than one-half inch long.

Leaves - alternate, compound, from eight to fourteen inches long, with from five to seven leaflets, the three upper ones being by far the largest.

Fruit - a smooth, white, 4-angled nut, enclosed in a thick, round husk that splits into four sections as the nut falls after heavy autumn frosts. Kernel - large, sweet.

MOCKERNUT HICKORY.

Hicoria alba, (Linnaeus) Britton.

Mockernut hickory is found most commonly throughout Missouri in the rich valleys on rich, moist soil, bottomland benches, where there is considerable moisture and sunlight. The wood of this hickory equals or excels that of the other hickories because of the large amount of white sapwood. It is a valuable component of the farmer's woodlot, and every effort to develop and perpetuate this tree in our forests is justified.

Bark - Gray, close, not shaggy nor smooth, roughened by irregular furrows which separate into broad, flat, close, rounded ridges.



Mockernut Hickory

Leaf, one-fourth natural size;
fruit, one-fourth natural size
twig, one-half natural size.

Twigs - Compared with the other hickories, very stout, usually decidedly downy, reddish brown; pith angular.

Winter buds - Terminal bud very large, ovate, densely hairy, blunt-pointed; the outer pair of over-lapping scales drop off in the fall, exposing inner yellowish gray, silky scales; lateral buds small; reddish brown.

Leaves - Alternate, eight to twelve inches long, compound, seven to nine leaflets; fragrant, often downy on lower surface; leaf stalks hairy, flattened, grooved, enlarged at base.

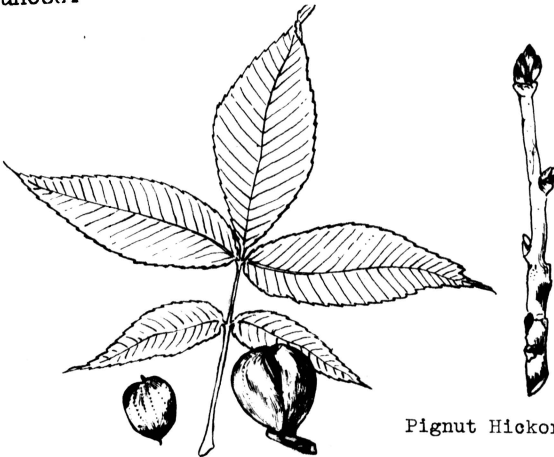
Fruit - Globular or ovoid, one and one-half to two and one-half inches long, with a thick, hard husk which splits to the middle or base. Nut - globular, brownish, four-ridged at apex, thick shelled, containing a small sweet kernel.

PIGNOT HICKORY.

Hicoria glabra, (Miller) Sweet.

Pignut hickory is a fair-sized, upland species preferring dry ridges and hillsides throughout the State. The wood is strong and very tough. Its uses are similar to those of shagbark hickory.

Bark - typically close-fitting, dark gray in color, marked with shallow furrows and narrow ridges which are seldom shaggy, though sometimes becoming detached at end. The variation in bark characteristics of the pignut hickory is very pronounced.



Pignut Hickory

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

Twigs - comparatively slender, smooth, tough, and pliable, reddish brown to gray in color.

Winter buds - small, oval, blunt-pointed, covered with reddish brown scales, the outer pair of which often drop off in winter; terminal bud less than one-half inch long, much smaller than the terminal bud of the shagbark hickory.

Leaves - alternate, compound, from eight to twelve inches long, with from five to seven leaflets all of which are alike or nearly alike as to size.

Fruit - a pear-shaped to nearly round, thin-husked, buff-colored nut without ridges, one inch long, thick shelled. Kernel - at first sweet, later somewhat bitter. Husk - contrasted with shagbark hickory, all or part usually clings to the nut after it has fallen to the ground.

SOUTHERN COTTONWOOD.

Populus deltoides virginiana.
(Castiglioni) Sudworth.

Southern cottonwood is an exceedingly rapid-growing, moisture-loving species, occurring locally in moist places and along streams and lakes throughout the State except at the higher elevations. The wood is light, soft, weak, and dark brown in color with thick nearly white sapwood, warping badly in drying. It is used for pulp and for boxes. The cottonwood has been extensively planted as an ornamental tree along streets, but as such it has few merits as it is short-lived and the roots often penetrate and clog drains and sewers. It is not easy to destroy, for, once cut down, the stump continues to sprout vigorously.

Bark - smooth on young trunks and branches; light yellowish green in color, becoming thick, ashy gray in color, and deeply furrowed with age.

Twigs - stout, round and ridged below the bud, bright yellow or greenish yellow in color; rank odor when broken.



COTTONWOOD

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

Winter buds - terminal buds present, large, resinous, glossy smooth, chestnut brown in color; lateral buds smaller, in many instances bending away from the twig.

Leaves - alternate, simple, broadly triangular, from three to five inches long, coarsely serrate margin, square base, long and laterally flattened leaf stalk.

Fruit - a scattered cluster of capsules as in the aspens, though somewhat larger (three to six inches long), arranged in long, drooping tassels. Seeds - within capsule, numerous, small, surrounded by a mat of fine hairs, ripening in the spring, conveyed long distances by the wind. The cotton-like mat of fine hairs is responsible for the name "cottonwood".

BLACK WILLOW.

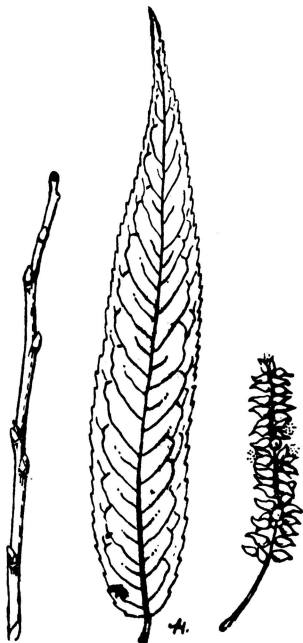
Salix nigra, Marshall.

Black willow is the largest and most widely distributed of our native willows. It prefers moist or wet soils along streams or lakes but will sometimes be found on fresh, gravelly or sandy soils where it can get plenty of light. It is of little importance as a timber tree as it often divides into several crooked medium-sized trunks close to the ground and the wood is soft and weak. It is used chiefly for boxes, excelsior, pulp, and also for artificial limbs on account of its lightness.

Bark - thick, rough with wide ridges covered by thick scales, varies in color from light to dark brown.

Twigs - slender, smooth, somewhat drooping, very brittle at the base, reddish brown in color; falling to the ground they may take root and grow.

BLACK WILLOW
Twig, leaf, and fruit, two-thirds
natural size



Winter buds - terminal bud absent, lateral buds small, sharp-pointed, reddish brown in color; only one bud scale.

Leaves - alternate, simple, linear, sharp-pointed, finely serrate margin, dark green in color above, pale green below.

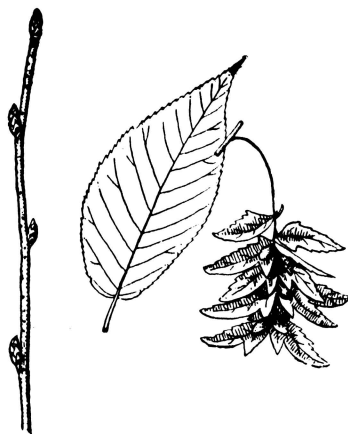
Fruit - a smooth capsule, about one-eighth inch long, occurring in large numbers on drooping tassels, ripening in the spring, reddish brown in color. Seeds - within capsule, covered with a dense, tuft of long silky hairs.

BLUE BEECH.

Carpinus caroliniana, Walter.

Blue beech is a small-sized, bushy tree frequent along water courses and along the edges of swamps generally throughout the State. It is rarely more than six inches in diameter and may be classed as a "weed" tree. The wood is very heavy, hard, strong, close-grained, and is occasionally used for mallets on account of its hardness.

Bark - smooth, thin, dark bluish gray in color, close-fitting with smooth, rounded lengthwise ridges that resemble tensed muscles.



BLUE BEECH

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

Twigs - very slender, dark red in color, and shining.

Winter buds - terminal bud absent; lateral buds small, narrowly ovate, pointed, covered with many reddish brown scales.

Leaves - simple, alternate, ovate from two to four inches long, finely and doubly serrate on margin.

Fruit - a small prominently ribbed nutlet, one-third inch long, enclosed in a 3-lobed leaf-like bract. Bracts with their enclosed nutlets are in long drooping clusters which ripen and fall before winter.

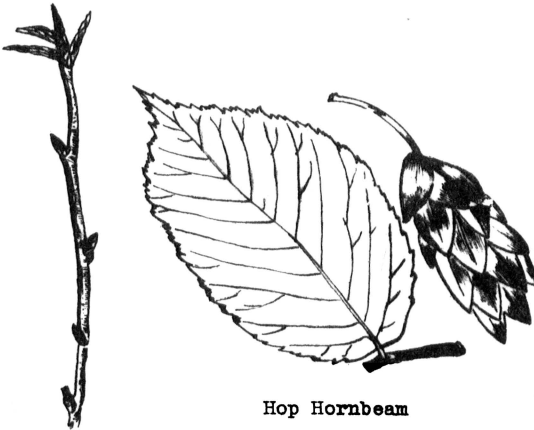
HOP HORNBEAM.

Ostrya virginiana, (Miller) Koch.

Hop hornbeam is another "weed" tree closely related to the blue beech and is rather generally distributed throughout Missouri on dry, gravelly, and stony soils of slopes and ridges, sometimes taking possession of woodlots in northern Missouri to the exclusion of other species. The tree is slow-growing and is rarely found larger than ten inches in diameter. The wood is very heavy, hard, and strong, hence the name, "ironwood". It is used for tool and implement handles, and for levers and makes excellent fuel wood when seasoned.

Bark - thin, very markedly flaky, light grayish brown in color, broken into narrow, flattish pieces, loose at the ends.

Twigs - fine, reddish brown in color, smooth and shiny; a very easy winter character for identification of the tree, particularly of young saplings.



Hop Hornbeam

Twig, leaf, and fruit, one-half natural size.

Winter buds - terminal bud absent as in birches and elms; lateral buds small, light reddish brown in color, bending away from the twig.

Leaves - alternate, simple ovate, from three to five inches long, doubly and finely serrate on margin.

Fruit - a small, seed-like nutlet, enclosed in an inflated, sac-like bract. Bracts - in clusters, from one to two inches long, resembling hops, hence the name "hop hornbeam". Fruit usually falls before winter.

RIVER BIRCH.

Betula nigra, Linnaeus.

Red or river birch is a moderately large tree, divided at a height of fifteen or twenty feet into two or three up-tilted limbs which divide in turn into slender branches that form a narrow, picturesque crown. The river birch, as its name implies, is a tree of stream-banks and wet locations, never found on dry ridges. The fairly hard, close-grained wood of the river birch, light brown in the heart and pale in the wide sapwood, is light but strong. It has little commercial importance, used to some extent in the manufacture of cheap furniture and other wooden articles, in turnery, and fuel for the production of charcoal. However, it is economically important in such situations where moisture-loving trees are required to bind soil, as along streams or where it is desirable to establish a stand in an extremely swampy hollow. It is attractive as an ornamental.



River Birch

Natural size.

Bark - the bark on young trees and the upper limbs of older trees peels off into thin, film-like, papery scales which are reddish-brown in color and persist for several years as a ragged fringe exposing the close, light red bark beneath. On the lower part of the older trunks the bark is dark and roughened by fissures which separate irregular plates.

Twigs - slender, at first hairy and greenish, later smooth, reddish brown, covered by pale horizontally elongated lenticels.

Winter buds - ovate, sharp-pointed, shining, smooth or slightly hairy, covered with chestnut brown overlapping scales.

Leaves - alternate, simple, ovate, irregularly-toothed, long-pointed at apex, dark green and smooth above, pale green and hairy below, stand on slender, hairy, somewhat flattened petioles about one-half inch long.

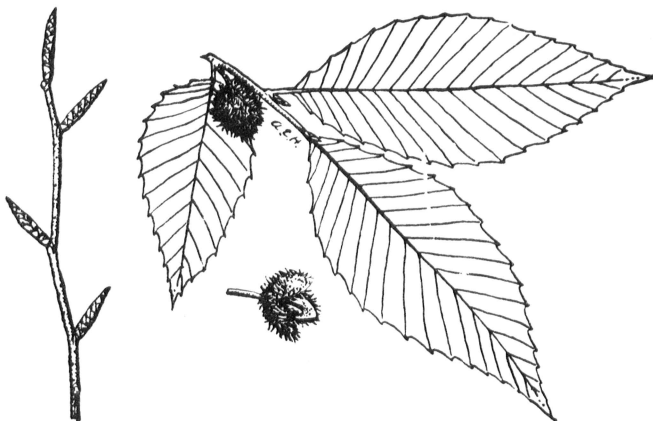
Fruit - catkins one and one-half to two inches long, smooth and erect with 3-lobed scales and small winged nutlets. The catkin ripens in May and June into a woody, cylindric, hairy "cone" which stands erect on a stout, woody stalk about one-half inch long.

BEECH.

Fagus grandifolia, Ehrhart.

Beech is frequently found in the hardwood forests of the State, especially in rich, moist coves. Though the tree is of large and stately size, the wood is less valuable than that of many of its associates in the woodlot section of the State, with the result that it has been left standing. Because of its heavy shade, it has also excluded more valuable trees. In such conditions, it is, in effect, a "weed" tree. The wood is heavy, hard, strong, tough, and close-grained, and is excellent as fuel wood. It is also used largely in the acid-wood industry and to some extent for furniture.

Bark - smooth, close, steel gray in color, easily recognized by this character.



BEECH

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

Twigs - slender, zigzag, smooth, shining, reddish brown in color becoming gray on older twigs.

Winter buds - terminal bud present, slender, three-fourths inch long, sharp-pointed, covered with light brown scales; lateral buds not much smaller than terminal bud.

Leaves - simple, alternate, from three to four inches long, ovate, coarsely toothed on margin, bristle tipped; at maturity very thin, dull green in color above, pale green beneath.

Fruit - a stalked burr, covered with soft, curving prickles, containing a nut. Burrs - usually in pairs, open up to let the nuts fall in the early autumn, remaining on the tree into the winter. Nut - triangular, pale brown in color, shining, with sweet edible kernel.

THE OAKS.

Of the three hundred oaks known in the world, fifty-five are native to North America, and most of these occur in the eastern United States. The oaks make up the largest group of forest trees native to Missouri. They grow under a wide range of conditions and show wide variations in form and other distinguishing characteristics.

The best way to get acquainted with Missouri oaks is to divide them into two major groups, the one group to comprise the white oaks and the other the black oaks. It is easy to place the oaks in these two groups by remembering the following characteristics of each:

The white oaks - The leaves of the members of the white-oak group have rounded lobes (not bristle-tipped), and the kernels of the acorns are usually sweet. All the oaks of this group mature their acorns in a single season, for this reason they are sometimes called "annual oaks". The most important members of the group in Missouri are white oak, post oak, and chinquapin oak.

The black oaks - The leaves of the members of the black-oak group have bristle-tipped (not round-lobed) leaves, and the kernels of their acorns are usually bitter. All the oaks of this group require two seasons to mature their acorns; for this reason the representatives of this group are sometimes called "biennial oaks". The immature acorns are very helpful in recognizing the members of the black-oak group, especially during the winter months when the trees are without leaves. The most important member of this group in Missouri are black oak, red oak, scarlet oak, pin oak and blackjack oak.

NORTHERN RED OAK

Quercus borealis maxima, (Marshall) Ashe

Red oak is the fastest growing and largest of all the oaks native to Missouri. It shows adaptability to a wide variety of soil conditions and ranges farther north than any other oak in the State. The wood is heavy, hard, strong, light reddish brown in color, and is used for furniture, interior finish, ties, and general construction, though less durable than white oak.

Bark - on young trees smooth, gray green in color, with age tardily breaking into rather regular, firm, elongated, flat-topped ridges with shallow furrows between. The smooth ridge tops are markedly lighter in color than are the furrows. On very large trees, this characteristic is lost at the base but is evident higher up the trunk. Inner bark is red in color.



Red Oak

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

Twigs - stout or slender, reddish to greenish brown in color.

Winter buds - clustered at end of twigs, oval, sharp-pointed, one-fourth inch long, generally smooth (particularly on the lower half).

Leaves - alternate, simple, from five to nine inches long, from four to six inches wide, from seven to nine lobes; lobes sparsely toothed, bristle-tipped; wide rounding clefts extending halfway to midrib. At maturity thin, dark, shiny green in color above, paler and smooth below.

Fruit - an acorn, borne solitary or in pairs, either with or without stalk, maturing in the autumn of the second year; one of our largest acorns. Nut - chestnut brown in color, three-fourths inch long, only one-fifth enclosed in a wide, shallow cup. Meat - pale yellow in color, bitter.

SHINGLE OAK

(*Quercus imbricaria*, Michx.)

Shingle Oak, usually erroneously called pin oak and laurel oak is found commonly throughout the state, and occurs on a wide variety of sites. Often conspicuous because of the symmetrical, spherical crown, with smooth-edged oblong leaves, which generally persist throughout the winter. Wood is heavy, hard, close grained, reddish-brown, of little value, and was used in early days for shingles and clapboards. Use today limited to inferior fence posts and fuel.

Bark - Smooth, light-brown, thin on young trunks, divided by shallow fissures into broad, dark-brown ridges on mature trunks.



SHINGLE OAK

Leaf, one-third natural size.
Twig, three-fourths natural size.

Twigs - Slender, dark green, lustrous, becoming dark brown in second year.

Winter Buds - 1/8" long, sharp-pointed, covered by overlapping chestnut-brown scales.

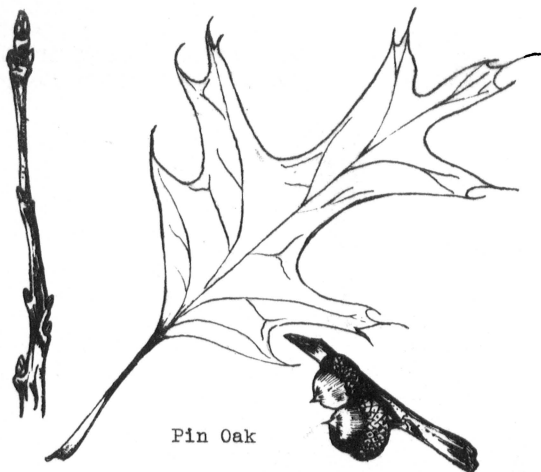
Leaves - simple, alternate, oblong, to oval in shape, with sharply-rounded upper end, no indentations, resembling laurel leaves, dark green and lustrous above, pale-green and slightly hairy below, 1"-2" wide, by 4"-6" long.

Fruit - acorn, solitary or in pairs, on stems nearly 1/2" long. Almost round, dark brown, enclosed from 1/3 to 1/2 its length in thin, reddish-brown cup.

PIN OAK.

Quercus palustris, Muenchhausen.

Pin oak is a medium-sized tree with a straight, continuous trunk, bearing a symmetrical, conic crown if open-grown. It occurs in rich, moist soil of river bottomlands, streams, swamp borders, and rich slopes. The wood is not very valuable, but the tree is singularly beautiful as an ornamental for park and street planting. The wood may be used for cheap construction, cooperage, ties, and occasionally for interior finish.



Pin Oak

Leaf, twig, and
fruit, one-half
natural size.

Bark - on old trunks, slightly roughened by shallow fissures, shining and smooth on young trunks.

Twigs - slender, tough, lustrous, at first hairy, later smooth, dark red to grayish brown.

Winter buds - smooth, small, ovoid, sharp-pointed, covered with light brown scales.

Leaves - alternate, simple, four to six inches long, two to four inches wide, ovate in outline, five to nine-lobed; lobes bristle-pointed, separated by broad, deep, round-based sinuses.

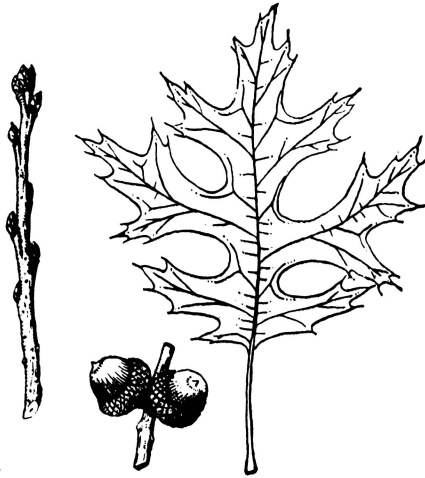
Fruit - an acorn maturing in two years; nut, globose, light brown; cup thin, saucer-shaped, enclosing only about two-fifths of the nut; kernel, pale yellow, bitter.

SCARLET OAK.

Quercus coccinea, Muenchhausen.

Scarlet oak, so called from the brilliant coloring of its autumnal foliage, thrives on poor soils. The wood is hard, heavy, strong, and coarse in texture. It is of inferior commercial value except for props, ties, and fuel. Because of the characteristic habit and brilliant coloring of the leaves in autumn, it is often used for ornamental purposes.

Bark - on young trunks, smooth, light brown in color; with age dividing into irregular ridges with shallow furrows between; in general, ridges not so regularly flat-topped as in red oak or so roughly broken up as in black oak; inner bark reddish in color.



SCARLET OAK

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

Twigs - medium, stout to slender, light red in color.

Winter buds - broadly oval, blunt at the top, clustered at end of twig, dark reddish-brown in color, somewhat woolly.

Leaves - simple, alternate, from three to six inches long, from three to five inches wide, from five to nine lobes; lobes toothed, separated by wide, rounding clefts, extending well over halfway to the midrib; at maturity leaves thin, firm, shiny, dark green in color above, paler below.

Fruit - an acorn, borne singly or in pairs with or without stalks, maturing in autumn of second year. Nut - oval, reddish brown in color, from one-half to one inch long, from one-half to one-third enclosed in reddish brown cup. Meat - pale, bitter.

BLACK OAK.

Quercus velutina, LaMarck.

Black oak is another dominant forest tree of the southern part of the State though not so valuable or so fast growing as the red oak. It is usually found in gravelly soils, and on drier sites than red oak. The wood is hard, heavy, strong, but is not considered so valuable as red oak. It finds its chief use for ties, construction and fuel wood.

Bark - on young stems smooth, dark brown in color, soon becoming dark gray to black, very rough, broken by deep furrows into thick ridges which are further divided by cross furrows; roughened especially at the base of trunk even in quite young trees; inner bark orange yellow in color, rich in tannin, yields a yellow dye.



BLACK OAK

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

Twigs - stout, reddish brown in color mottled with gray.

Winter buds - cone-shaped, sharp-pointed, from one-fourth to one-half inch long, covered with yellowish gray wool, clustered at end of twig.

Leaves - simple, alternate, from four to ten inches long, from three to six inches wide, from five to seven lobes, toothed, bristle-tipped, separated by wide rounded clefts, extending over halfway to midrib; at maturity leaves thick, dark green in color and shining above, paler and woolly beneath (particularly along midrib).

Fruit - an acorn, borne singly or in pairs, with or without stalks, maturing in autumn of second year. Nut - reddish brown in color, from one-half to three-fourths inch long, enclosed about one-half its length in light brown cup. Meat - yellow, very bitter.

SOUTHERN RED OAK.*Quercus rubra*, Linnaeus.

Southern red oak is very similar to red oak, a tree with a more northerly range. As distinguished from the latter, the southern red oak commonly grows on southerly and western exposures, on poorer soils. It is not characterized by the smooth, gray, clean branches of the crown, nor the smooth, flat-topped, continuous ridges of bark of the northern red oak. Its uses are the same, and other features of the tree are almost identical, making it extremely difficult to distinguish between these two oaks. It will be sufficient for 4-H Farm Forestry Club members to be able to distinguish the red oaks as a class from the black oaks and white oaks, rather than attempt to determine the kind of red oak in question.



Southern Red Oak

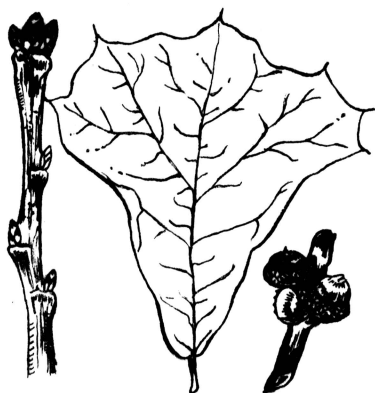
Leaves and fruit, one-half natural size; twig, two-thirds natural size.

BLACKJACK OAK.

Quercus marilandica, Muenchhausen.

Blackjack oak is the common "weed" tree of poor, dry, rocky ridges and sterile soils, very prevalent over extensive areas of the Ozark Mountains. It is a small tree of no commercial importance, but may be used occasionally for fuel, charcoal, or rough lumber.

Bark - thick, roughened by deep fissures which separate broad, angular plates; coarse, black, rough.



Blackjack Oak

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

Twigs - stout, at first hairy, later smooth.

Winter buds - ovate, distinctly angular, sharp-pointed, rusty pubescent, reddish brown.

Leaves - alternate, simple, deep green, thick, leathery, smooth above, often rusty brown below; obovate leaves, dilated or widened near the apex.

Fruit - an acorn; nut, ovoid; cup hemispheric, deep, covering one-half or more of the nut, light brown and downy inside, covered with large reddish brown, loosely over-lapping scales; small scales rim the margin of the cup.

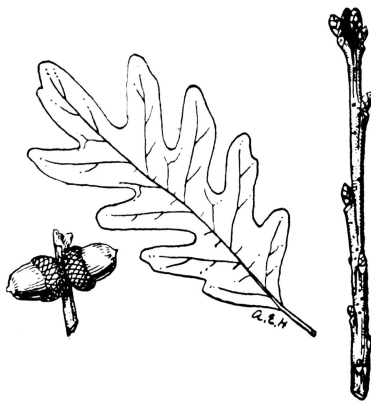
WHITE OAK.

Quercus alba, Linnaeus.

White oak is one of the most important forest trees in the State, growing to large size and producing lumber of high grade and value. It is found in moist as well as in dry locations, and was once particularly abundant on what are now the best farm lands in Central Missouri. The wood is hard, heavy, strong, and durable. It is highly prized for furniture, flooring, implements, ties and in general construction where strength is required.

Bark - ashy gray in color, broken by shallow furrows into long, irregular, thin scales which readily flake off; on old trunks furrows frequently become deep.

Twigs - medium in thickness, greenish red to gray in color, smooth, sometimes covered with a bloom.



WHITE OAK

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

Winter buds - clustered at end of twigs, blunt, reddish brown in color, one-eighth inch long.

Leaves - alternate, simple, from five to nine inches long, with from five to nine rounded lobes, generally deeply cleft toward midrib, dark green in color above, paler below, frequently staying on tree over winter.

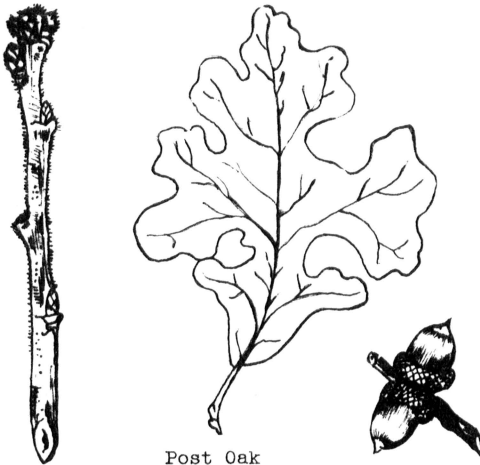
Fruit - an acorn, either with short stalk or stalkless, maturing in one year. Nut - light brown in color, three-fourths inch long, one-fourth enclosed in the cup, falling in September, frequently starts sprouting in late autumn. Meat - white, slightly bitter.

POST OAK.

Quercus stellata, Wangenheim.

Post oak is a very common tree on dry, upland ridges and plateaus, especially throughout the Ozarks. Gravelly or rocky uplands, limestone hills and sandy plains are common habitats. The wood resembles white oak and is sold as such, or for stave bolts, ties, etc. Post oak grows on poorer soil than the white oak, but it is difficult to transplant and grows very slowly.

Bark - very similar in appearance to the bark of the white oak, only darker, rougher, less scaly, and often more regularly fissured.



Post Oak

Leaf, fruit, and twig,
one-half natural size.

Twigs - stout, covered with yellowish, rusty pubescence, at first orange, later dark brown. The season's growth is very light in color, in contrast with the previous season's growth,

Winter buds - broadly ovate, one-eighth inch long, blunt-pointed, covered with numerous over-lapping reddish brown, slightly hairy scales.

Leaves - alternate, simple, obovate-outline, thick, leathery; upper surface bright green, shiny; the middle lobe is the largest and is separated by deep sinuses or clefts.

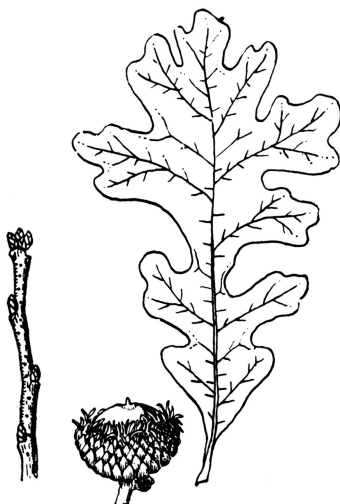
Fruit - an acorn; oval nut, one-half to three fourths of an inch long, hairy at apex, striped with darker brown, enclosed by cup for one-third to one-half of its length; cup thin, hairy within, and covered with thin, pale, flat, woody scales.

BUR OAK

(Quercus macrocarpa Michx.)

Burr Oak, also called mossy cup oak, occurs generally over the entire state, reaching its maximum size on moist, well-drained soils in creek bottoms and on lower slopes. It is one of the most important timber trees of north and central Missouri. The wood is hard, strong, close-grained and durable, and is in demand for construction timbers, flooring, cooperage, agricultural implements, cabinet work, railroad ties, fence posts and fuel.

Bark - brownish gray in color, deeply furrowed, and broken on the surface into irregular, often red-tinged, plate-like scales.



BUR OAK
One-third natural size.

Twigs - medium, greenish-brown to light orange in color, smooth during first year.

Winter buds - broadly blunt, $1/6''$ - $1/4''$ long, with red-brown scales coated with fine, soft hairs.

Leaves - simple, alternate, somewhat wedge-shaped, with deep indentations on border near base, and wavy notches on broad middle and upper portions. Dark green, lustrous above, pale beneath. $5''$ - $10''$ long, $2''$ - $5''$ wide.

Fruit - acorn, round to oval, set deeply in fringed cup, sometimes $1\frac{1}{2}''$ in diameter, varying widely in size and shape.

CHINQUAPIN OAK.

Quercus muehlenbergii, Engelm.

Chinquapin oak is usually found on dry ridges and limestone soils. The wood is inferior to that of white oak, and checks very badly. The tree grows more slowly than the white oak.

Bark - thick, rough, close, fissured into long irregular ridges which break up into grayish scales; closely resembles the bark of white oak.



Chinquapin Oak

Twig, leaf, and fruit, one-half natural size.

Twigs - slender, at first hairy, becoming smooth and longitudinally ridged; pith star-shaped.

Winter buds - very similar to the buds of the white oak, only slightly smaller.

Leaves - resemble those of the chestnut, but have a sharper, more acuminate apex.

Fruit - an acorn, usually short-stalked; nut, ovoid, chestnut brown; cup, thin, enclosing about one-half of the nut, covered by pale, woolly scales with thickened bases.

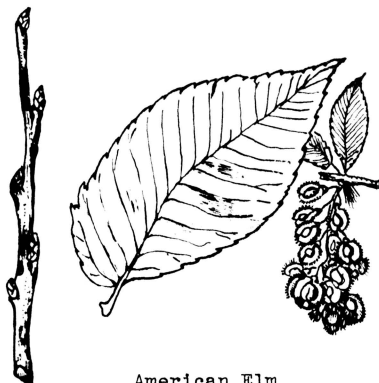
AMERICAN ELM.

Ulmus americana, Linnaeus.

American elm is one of the most beautiful, graceful and best known of our forest trees. It occupies a wide range of sites though typically a tree of the bottomlands, and grows to be one of the largest trees in the State. The wood is heavy, hard, strong, tough, coarse-grained, difficult to split, and light brown in color; largely used for veneer, barrel staves and hoops, crates and wheel hubs. The graceful symmetry of the crown makes the elm highly prized for ornamental planting.

Bark - dark gray in color, divided by irregular up-and-down furrows into broad flat-topped ridges, rather firm or occasionally in old trees flaking off; inner bark in alternate layers of brown and white.

Twigs - slender, smooth, reddish brown in color, not mucilaginous when chewed.



American Elm

Twig, leaf, and fruit,
one-half natural size.

Winter buds - winter twig obviously ends in leaf scar, hence larger bud near the end of twig not truly terminal; lateral buds somewhat smaller, ovate, pointed, light reddish brown in color, smooth, one-eighth inch long.

Leaves - simple, alternate, from four to six inches long, oblique at the base, margin doubly serrate, at maturity dark green in color above, lighter beneath, midrib and parallel veins prominent; upper surface of leaf somewhat rough to the touch, though not so pronounced as in slippery elm.

Fruit - flat, winged, deeply notched at the end, one-half inch long, containing one small seed; in clusters, ripens in early May as the leaf buds unfold, falling soon thereafter.

SLIPPERY ELM.

Ulmus fulva, Michaux.

Slippery elm is a medium-sized tree of stream banks and low fertile slopes and is common throughout the State. The wood is hard, heavy, strong, coarse-grained, and fairly durable in contact with the soil. This tree is not an important commercial species but is used for fence posts, ties, barrel staves and hoops.

Bark - grayish brown in color, more or less deeply furrowed, the ridges tending to lift more along one edge than the American elm; layers of outer bark reddish brown in color, shows no alternate layers of brown and white as in the American elm; inner bark, next to the wood, whitish, strongly mucilaginous, giving the name "slippery elm".



Slippery Elm

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

Twigs - light gray in color, hairy, somewhat rough, characteristically mucilaginous when chewed.

Winter buds - terminal bud absent as in American elm; lateral buds one-fourth inch long, dark chestnut brown in color, covered at tip with long, rusty hairs.

Leaves - alternate, simple, oval, from five to seven inches long, oblique at the base, margin doubly serrate; at maturity thick, dark green in color above, decidedly rough to the touch, paler and white-hairy below; midrib and parallel veins prominent.

Fruit - flat-winged, but not notched at the end, from one-half to three-fourths inch long, containing one seed; in clusters, maturing in late May or early June when the leaves are about half grown, falling soon thereafter.

HACKBERRY.

Celtis occidentalis, Linnaeus.

Hackberry is usually a rather small tree on poorer soils, but on rich bottomlands becomes quite large, often eighty feet in height and three or four feet in diameter. It is a spreading tree with long pendulous branches, grows rapidly, and is often planted as a shade tree since in the open it is symmetrical and attractive. The wood is soft, close-grained, not strong, and light yellow. It is used to some extent in the manufacture of low-grade furniture. Quite often the better grades are mixed with low grade ash, and used for slack cooperage, hoe handles, agricultural implements, boxes, crates and fencing.



Hackberry

Leaves, fruit, and twig,
one-half natural size.

Bark - grayish brown, sometimes as smooth as birch bark; usually a very rough bark due to harsh, warty projections.

Twigs - slender, somewhat shiny, occasionally slightly downy, brownish, and containing a chambered, white pith.

Winter buds - small, sometimes swollen, sharp-pointed, covered by three to four closely, over-lapping bud scales, sometimes striated and dark - margined.

Leaves - alternate, simple, ovate, two to four inches long, acute at apex, slightly rounded at base, serrate on margin, rough on upper surface, with prominent primary veins. Petioles slender, slightly hairy, grooved.

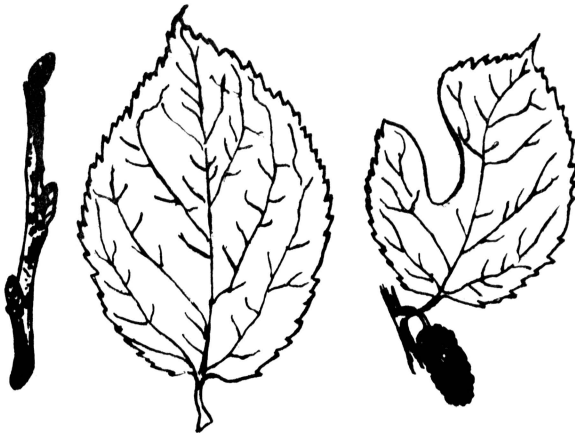
Fruit - a berry-like, dark purple, globular drupe, one-fourth to one-half inch in diameter, which ripens in September and often persists into winter.

RED MULBERRY.

Morus rubra, Linnaeus.

Red mulberry is a tree of moderate size, with a dense round-topped head of stout, spreading branches. The trunk is usually short, subdividing near the ground. The mulberry prefers rich, moist soil in valleys and occurs mixed with other hardwoods. The golden brown wood of the red mulberry, which darkens with age and exposure, is soft and weak, though coarse-grained and tough. Because of its durability in the soil, farmers frequently reserve their mulberry trees and make fence-posts for their own use. Occasionally used for scythe snatches, cooperage, boat building and barrel making.

Bark - On young trees smooth and mottled, on older trees, becoming grayish brown and divided into irregular, elongated plates.



Red Mulberry

Leaf, twig, and fruit,
one-half natural size.

Twigs - Light red brown to orange, slender, zigzag branchlets, with a milky juice when cut.

Winter buds - Oval, sharp-pointed, above rather large, nearly circular leaf-scars, borne on enlarged nodes of the twig.

Leaves - Alternate, three to five inches long, somewhat heart-shaped base, serrate on margin, usually with three primary veins; occasionally lobed, mitten-shaped, three-lobed; slightly rough on upper surface.

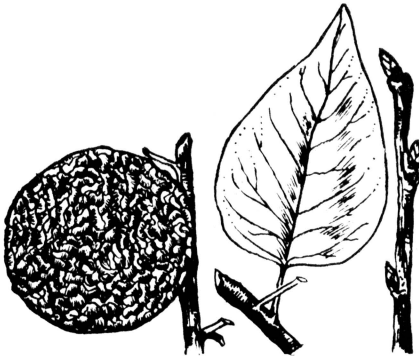
Fruit - Sweet, juicy fruit appears about July, being on aggregate about one inch long, composed of many small drupes, at first green, later red, finally dark purple, nearly black.

OSAGE ORANGE.

Toxylon pomiferum, Rafinesque.

Although the Osage orange has been planted widely as a hedge tree in all kind of situations, its natural habitat is the rich bottomland of streams where it is a small or medium sized tree. It has an open, round-topped head of stout, often tilted, spreading branches. The trunk is short and stout, often covered with a dense growth of sprouts. Hedge trees are especially gnarled and the trunks covered with stiff spiny branchlets. The wood is flexible, coarse-grained, and exceedingly hard, strong, and durable. It is bright yellow, turning brown on exposure. No wood is more valuable for fence posts, for it is very durable in the soil. The Osage and other Indians used this wood for bows and war-clubs. It is sometimes called Bois d'arc or bow-wood. The wood does not shrink with weather changes, and has been used in wagon felloes, wooden machinery, insulator pins, and tool handles.

Bark - Deeply and irregularly divided into broad, rounded ridges, separating on the surface into thin hard scales; sometimes used in the tanning of leather.



Osage Orange

Leaf, fruit, and twig,
one-half natural size.

Twigs - Alternate, rather stout, at first greenish and slightly pubescent, later yellowish brown, contain yellow pith, marked by pale yellow lenticels. Younger branches are often armed with stout, straight, axillary spines and stout, spur-like lateral branches.

Winter buds - Equal-sized, broad, circular, globular in the axils of the leaves.

Leaves - Alternate, simple, ovate in outline, wedge-shaped at the base, acute at apex, entire on margin, dark green above, pale green below.

Fruit - A dry, pale green orange-like, aggregate composed of many small drupes. When punctured the fruit exudes a milky juice which turns black upon exposure.

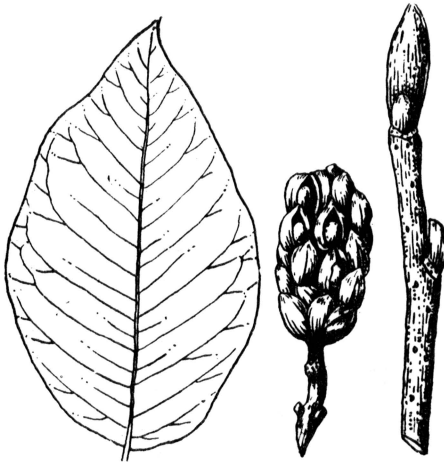
CUCUMBER MAGNOLIA.

Magnolia acuminata, Linnaeus.

Cucumber magnolia, so called because of its cucumber-like fruit, is a frequenter of rich woods, on moist slopes, and along streams. The wood is light, soft, close-grained, brittle, and light yellowish brown in color. It resembles that of yellow poplar and has much the same uses. Because of its yellowish green flowers, its large leaves, its rapid growth, and its red seeds, it is often found in lawns and parks.

Bark - grayish brown in color, with long narrow furrows, separating into rather loose, scaly, flat-topped ridges.

Twigs - brittle, brown in color, smooth or shiny, aromatic odor.



Cucumber Magnolia

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

Winter buds - terminal bud oblong, somewhat curved, thickly covered with pale, silky hairs, pointed, about one-half inch long; lateral buds smaller, blunt, also hairy.

Leaves - alternate, simple, ovate, pointed at the tip, from four to ten inches long, entire margin.

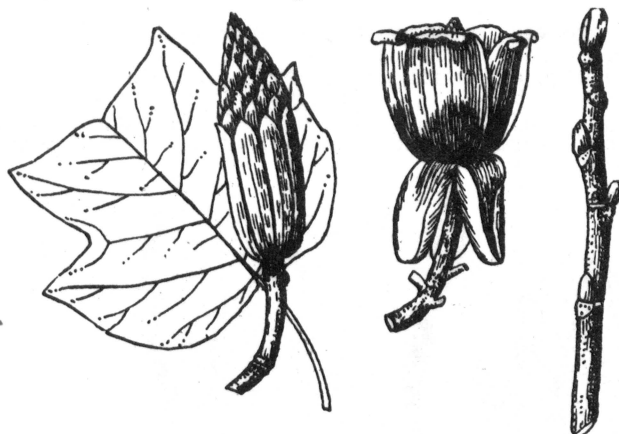
Fruit - a cone-like or cucumber-like, cylindrical mass, often curved, about two and one-half inches long, containing a large number of scarlet, pea-like seeds which dangle from the ends of short, white threads when ripe in the early autumn.

YELLOW POPLAR.

Liriodendron tulipifera, Linnaeus.

Tulip tree or yellow poplar is one of our most distinctive and attractive trees. It is abundant in deep, rich, moist soils. Its large tulip-like, greenish yellow flowers have given rise to the name "tulip tree". The wood is light, soft, brittle, not strong, straight-grained, light yellow or brown in color, and is largely made into lumber and used where a soft, easily worked wood is required.

Bark - on young trees, smooth, ashy gray or brown in color; on older trunks, light gray to brown, thick, distinctly and regularly furrowed and ridged.



Yellow Poplar

Flower, fruit, and leaf, one-half natural size; twig, two-thirds natural size.

Twigs - smooth, shiny, rather stout, reddish brown in color, often branching the first year, aromatic odor, very bitter taste.

Winter buds - terminal bud smooth, flattened, about one-fourth inch long, simple, blunt, covered by two reddish brown bud scales giving an appearance of a mitten; lateral buds similar but much smaller.

Leaves - alternate, simple, from four to six inches long, almost square in outline, usually three or four-lobed with truncate tip; the most distinctive and unusual leaf of any of our native forest trees.

Fruit - a cone, light brown in color, upright, pointed, from two to three inches long. Seeds - long winged, ripening in September, and for the most part falling soon after; outer ring of winged seeds may stay on the tree into the next season.

PAPAW.

Asimina triloba, (Linnaeus) Dunal.

The papaw is an odd but attractive, small tree, usually ten to forty feet in height. The trunk is short and slender. Though it grows naturally under the shelter of tall forest trees, it bears much better in open, sunny spots, but requires a rich, moist soil. It occurs in the vicinity of streams, sometimes forming dense thickets. The wood is light, weak, and spongy, yellow in color, and is of no known value.

Bark - thin, close, sometimes slightly fissured, dark brown and smooth on young trees. Older trees become blotched with gray, and bear a few small, wart-like excrescences.

Twigs - finely grooved, dark red twigs, enlarged at the nodes, rather slender, at first often somewhat hairy toward apex; later smooth, covered with a few fine lenticels; pith small and white.

Winter buds - pointed, somewhat flattened, hairy buds about one-eighth inch long. Terminal and lateral leaf and flower buds differ in size and form.



Papaw

Leaf, one-third natural size; fruit, one-fourth natural size; twig, one-half natural size.

Leaves - alternate, sharply pointed, smooth-margined, conspicuously obovate, four to twelve inches long, thin, pointed apex, tapering base, entire margined, dark green above, paler beneath, and not at all hairy.

Fruit - the dark brown to blackish fruit is most unusual. It is three to five inches long and one and one-half to two inches wide, has a whitish to orange, edible flesh within which are large, dark brown, shiny, flattened seeds. When ripe they fall to the ground, turning dark brown and looking like an over-ripe stubby banana. The deep yellow flesh is delicious though some do not care for its very decided flavor.

SASSAFRAS.

Sassafras variifolium
(Salisbury) Kuntze.

Sassafras is a small to medium-sized tree, best known, perhaps for its bark and root which have long been used for making sassafras tea. Its wood is soft, weak, brittle, coarse-grained, aromatic, and very durable in contact with the soil. It is used locally for fence posts.

Bark - reddish-brown in color, deeply furrowed even in young trees, with flat-topped ridges crossed by horizontal cracks; inner layers bright cinnamon red in color.

Twigs - slender, brittle, spicy to smell, at first light yellowish green in color, later becoming reddish brown.

Winter buds - terminal bud present, from one-third to three-fifths inch long, pointed, greenish in color; lateral buds much smaller.



Sassafras

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

Leaves - alternate, simple, from four to six inches long, entire margined. The leaves present a great variation in shape on the same tree, some are ovate, others mitten-shaped (both left and right handed), still others are three-lobed, more rarely five-lobed.

Fruit - berry-like, small, dark blue in color, containing a stony seed one-fourth inch long, on a stout red stem, usually in clusters; ripens early in autumn.

RED GUM.

Liquidambar styraciflua, Linnaeus.

The red gum, also commonly known as the sweet gum, is a moderately large forest tree, with a tall, clean, slightly tapering trunk bearing a narrow head. Open-grown trees have short trunks bearing regularly spreading branches in a symmetrical and rather conical crown. It occurs on almost every type of soil, is abundant in second growth in cut-over woods and abandoned fields. It prefers, however, deep, rich, bottom soils and must have abundant light to survive. The wood is rather heavy, hard, with interlocked grain, making it somewhat difficult to work, but it is not very strong nor very durable upon exposure to weather and soil. Because of alternating red and black streaks, it is used often for interior finish where a figured pattern is desired, as in door and wall panels, and also for flooring and baskets. It is used to some extent as a substitute for walnut, mahogany, or circassian walnut under the trade name "satin walnut".

Bark - deeply furrowed, light gray, with rough, corky scales on old trunks.



Sweet Gum

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

Twigs - round, at first rusty, hairy, later smooth, light brown to dark reddish brown, and after the second season often roughened by corky-winged ridges of the bark. Pith rather large, angular, and very light brown.

Winter buds - ovate, blunt-pointed to sharp-pointed, glossy, fragrant when crushed.

Leaves - alternate, simple, thin, bright green and shiny, finely toothed, star-shaped, three to five inches long, broader than long. The slender petioles are five to six inches long.

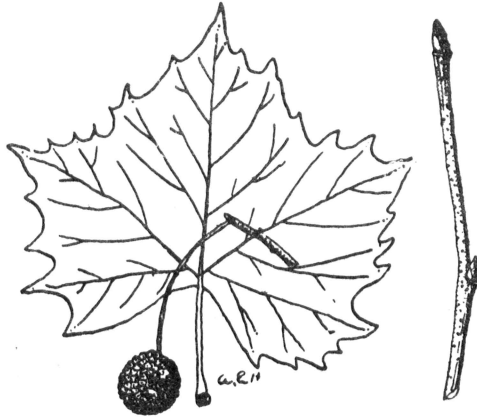
Fruit - a prickly ball, made up of a number of capsules with projecting spines. After the capsules open, releasing the seeds, the long stemmed balls often swing on the tree until late winter. Many small birds feed on the seed.

SYCAMORE.

Platanus occidentalis, Linnaeus.

Sycamore is a large-sized forest tree throughout the State. Wherever the soil is moist and fertile, along streams, in river bottoms, in low, damp woods, and occasionally in dryer places it is likely to be found. Its wood is heavy, tough, hard, not strong, coarse-grained, reddish brown in color, and is difficult to split or work. It is used for crates, tobacco boxes, butchers' blocks, novelties, and occasionally for furniture and for interior woodwork.

Bark - dark brown in color at base of older trunks, shallowly furrowed into broad ridges which are broken up into small plate-like scales; higher up on trunk and branches, peeling off in large, thin plates exposing areas of whitish, yellowish, or greenish inner bark which are very striking in winter.



SYCAMORE

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

Twigs - rather stout, somewhat shiny, zigzag, at first green in color, and fuzzy, later grayish or brownish and smooth.

Winter buds - terminal bud absent; later buds conical, dull-pointed, smooth, reddish brown in color, one-fourth inch long, only one scale visible forming a cap over the bud.

Leaves - alternate, simple, broad, from four to ten inches across, from three to five shallow lobes, thin, firm, smooth, bright green in color above, pale green and white woolly below.

Fruit - a ball, brown in color, about one inch in diameter, borne on a long stem, made up of tiny seeds. Seeds - each furnished with a long tuft of hairs, seed balls seldom break up before spring.

SWEET CRAB APPLE.

Malus coronaria, (Linnaeus) Miller.

The sweet crab apple is a small tree which may attain a height of twenty-five feet. The trunk is usually short, bearing rather slender, spreading, and crooked branches which form a rather broad round-topped crown. It is usually found in thickets and open woods where rich, moist soil is present, most frequently on little knolls near streams and ponds. The light reddish brown wood is hard, heavy, and is used for carving, engraving, tool handles, and some turned articles.

Bark - reddish brown, roughened by longitudinal furrows which separate low ridges often covered with scales.

Twigs - rather stout, at first white, woolly, later smooth, reddish brown, and bearing stubby spurs or even spines after the first year.



Sweet Crab Apple

One-half natural size.

Winter buds - small, bright red, blunt-pointed, or on vigorous terminal shoots, sharp-pointed and curved.

Leaves - alternate, simple, ovate, rounded base, pointed apex, sharply serrate on margin, usually smooth, dark green above, pale green below.

Fruit - apple-like, ripening in October, borne on long, slender stalks, one to one and one-half inches in diameter, yellowish green, fragrant; flesh clear, bitter; seeds chestnut brown.

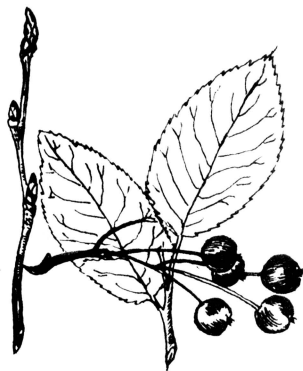
SERVICEBERRY.

Amelanchier canadensis, (Linnaeus) Medicus.

Serviceberry (also known as shad bush), is an attractive tree though not commercially valuable because of its small size. In the spring when the shad are ascending the rivers, its small white flowers are commonly noticed along the drier banks of the streams, along fence rows, and on hill-sides in open woods. It is common through most parts of the State, particularly in the central and southern highlands. Its wood is heavy, harder than white oak, strong, close-grained, and dark brown in color often tinged with red. It is occasionally used for tool handles.

Bark - very smooth, grayish brown in color, with age often marked with dark lengthwise streaks.

Twigs - slender, somewhat zigzag, olive green to purplish brown in color, smooth, but usually covered by a thin grayish outer layer.



Service-berry

Twig, leaf and fruit,
two-thirds natural size.

Winter buds - terminal bud from one-fourth to one-half inch long, slender, sharp-pointed, greenish or purplish brown in color; lateral buds somewhat smaller than terminal bud or undeveloped.

Leaves - alternate, simple, ovate, from two to four inches long, sharp-pointed, finely serrate on margin.

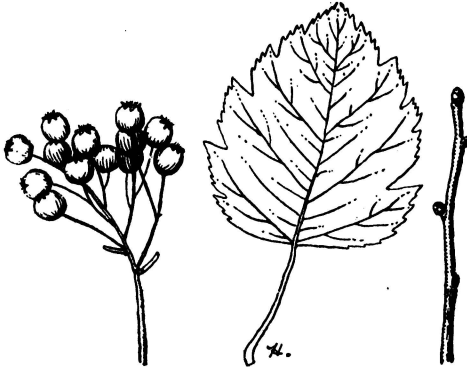
Fruit - a berry, sweet, reddish purple in color, about one-third inch in diameter, contains many seeds; borne in clusters; ripening in June or July; a favorite food of birds.

SCARLET HAWTHORN.

Crataegus coccinea, Linnaeus.

Scarlet hawthorn, a member of the hawthorn group, is a small-sized tree. More than a score of varieties of this group are common in Missouri. The differences are chiefly in flower and fruit and it seems advisable in this publication to call attention to the general characteristics of the group without going into the minute differences that separate the many species. The very small size of the trees, generally less than twenty feet, make them of no commercial value. In fact, some members of the group may be regarded as a serious pest, because of the rapidity with which they seed up old pastures, shading out available pasturage or rendering costly the preparation of the land for forest planting.

Bark - generally dark brown to gray in color, scaly.



Scarlet Hawthorn

Twig, leaf, and fruit, two-thirds natural size.

Twigs - stiff, zigzag, armed with large, generally unbranched thorns from one and one-half to two inches long.

Winter buds - round, chestnut brown in color; terminal bud usually present but no larger than lateral buds.

Leaves - simple, alternate, from three to four inches long, from two to three inches wide, serrate on the margin; in some species leaves more or less ovate, others from five to nine-lobed.

Fruit - berry-like, in a cluster, each fruit the size of a small cherry; when mature in early autumn, usually red, with from one to five nutlets in center of fleshy covering; highly prized by birds in winter.

WILD PLUM.

Prunus americana, Marshall.

The wild plum is a small tree, divided upward into many spreading branches which form a broad head, of graceful form. Unlike many other members of the plum family, this species never forms thickets. The wild plum inhabits a great variety of situations, including both swamps and mountain slopes. Though possessed of high technical qualities, the wood of the wild plum is not used extensively. It is hard, heavy, strong, close-grained, reddish brown, shiny, with thin sapwood.

Bark - red-tinted brown, at first smooth, later breaking up into thin dark brown plates like the wild cherry.

Twigs - rather stout, at first hairy and light green, later smooth and reddish brown, covered with a few roundish lenticels; often bear numerous spur-like spines.



Wild Plum

One-half natural size.

Winter buds - about one-third of an inch long, broadly conical, sharp-pointed, brown covered with triangular scales, hairy along the margin.

Leaves - alternate, firm, dark green, rough above, pale and hairy below, narrowly obovate, taper-pointed at apex, rounded at base, sharply and doubly serrate on margin.

Fruit - globular, plum drupe, maturing in late summer or early autumn, becoming reddish purple and very fragrant; about one inch in diameter, with a thick, tough skin and a flattened, rough, oval nut.

BLACK CHERRY.

Prunus serotina, Ehrhart.

Black cherry is the largest of the cherry trees found in Missouri. It prefers rich, bottomlands, and moist hill-sides, but is also found in drier situations. It is common in most sections of the State, though seldom found in the rougher sections of the Ozarks. Its wood is light, strong, hard, close-grained with pale reddish brown heartwood and is much in demand for cabinet-making, interior finishing, tools, and ties. It is most valuable, being a fast-growing timber tree and should be encouraged in every woodlot.

Bark - at first smooth, reddish brown in color, marked with easily seen, long, white breathing pores, with age becoming much roughened by irregular, close, dark scaly circular plates with upturned edges.



Wild Black Cherry

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

Twigs - slender, smooth, reddish brown in color, having bitter almond taste which is characteristic of all cherries.

Winter buds - smooth, ovate, from one-eighth to one-sixth inch long, sharp-pointed, chestnut brown in color; terminal bud present.

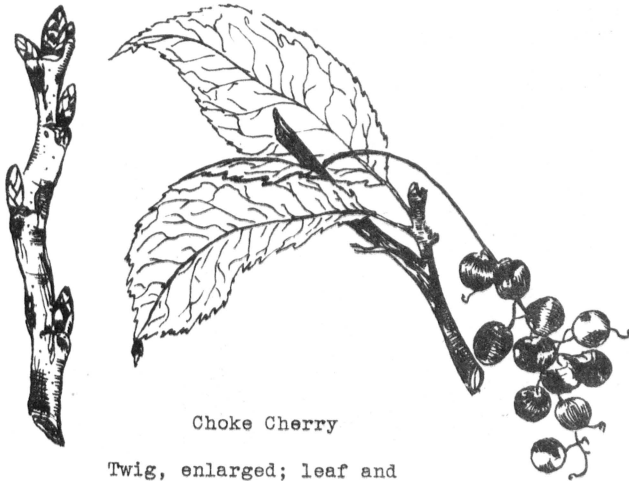
Leaves - alternate, simple, from two to five inches long, lanceolate, fairly long-pointed, margin finely serrate, tufts of hair along midrib on undersurface leaf.

Fruit - a single-seeded, juicy fruit, about one-half inch in diameter, grouped on very short stems, in long scattered, drooping clusters, purplish black when ripe in late summer. Birds and animals eat the fruit, though its flavor is decidedly bitter.

CHOKE CHERRY.*Prunus virginiana*, Linnaeus.

The choke cherry is a decidedly small tree with a small crown of small branches. It is frequently found in thickets, in open woods, along fences, in abandoned fields, along streams and on dry situations. The wood is similar to that of black cherry, but weaker though heavier and of no commercial importance. The cherries, however, if not gathered too soon, may be made into delightfully flavored jelly.

Bark - on young trunks smooth, shiny, brownish, peels off easily in thin, film-like layers, exposing the green inner bark. On older trunks about two-fifths of an inch thick, dark grayish, slightly roughened by shallow fissures. Inner layers of the bark have a very disagreeable odor.



Choke Cherry

Twig, enlarged; leaf and fruit one-half natural size.

Twigs - rather stout, usually smooth, light brown to reddish brown, covered with numerous conspicuous, dull yellowish lenticels; pith white. Bruised twigs have an ill-scented odor.

Winter buds - conical to ovate, smooth, sharp-pointed, brownish, covered with six to eight closely over-lapping scales.

Leaves - alternate, oval, oblong, rather thin, bright green above, pale below, two to four inches long, sharply serrate on margins with fine slender teeth.

Fruit - a shiny red to dark crimson, juicy drupe, about one-half inch in diameter in an open drooping cluster. Flesh of cherries is dark and the juice "puckery". Seed - smooth and stony; fruit harsh and astringent.

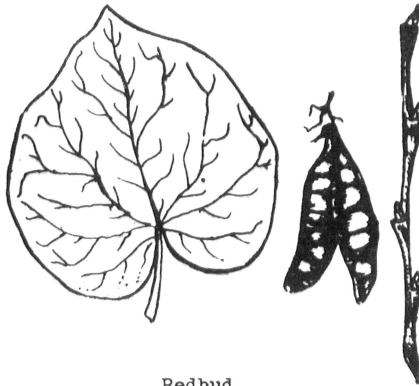
REDBUD.

Cercis canadensis, Linnaeus.

The redbud, a tree of only very moderate height, usually branches ten feet or so upward into a flat, wide crown of stout limbs. This charming small tree is one of the most striking trees in the understory of our woodlands when its brilliant pink flowers appear in the spring. It vies with the dogwood in popularity. It blooms so early in the spring, it is always with a shock of surprise that one sees its exquisite color massed along the banks of streams, around the borders of a field. The rich, brown, red-tinted wood of the redbud, though hard and close-grained, is not strong and has practically no commercial use. As an ornamental tree, however, it is used extensively in gardens and parks and along highways. It grows rapidly, is free from disease, and is comparatively easy to transplant.

Bark - red-brown, deeply fissured into long narrow plates, the surface separating into thin scales.

Twigs - dull or shiny brown.



Redbud

One-half natural size.

Winter buds - small, scaly buds above the triangular, fringed leaf-scars.

Leaves - alternate, very broad, rounded, heart-shaped leaves stand on petioles two to five inches long, entire margin, smooth, bright green.

Fruit - a very thin, dry bean, with tiny shiny seeds. The pinkish or rosy pod, two to three inches long, contains numerous brown seeds about one-fourth inch long.

KENTUCKY COFFEE-TREE

Gymnocladus dioicus, (Linnaeus) Koch.

The coffee-tree or Kentucky coffee-tree is usually a medium-sized tree, having a short trunk which soon subdivides into two to four almost parallel secondary stems. The crown is narrow, round-topped, and composed of stout branchlets. It prefers rich woods and bottomlands and occurs solitary, never in clusters or pure stands. The coarse-grained, heavy wood of the coffee-tree, though not very hard, is strong and reputed to be very desirable. It is not used to any great extent for any commercial purposes, although it is cut for fence posts, rough timbers and small amounts are used in cabinet-making.

Bark - dark gray to dark brown, roughened by shallow fissures, separating low but sharp, horny ridges, covered with thin recurved scales.



Coffee-tree

One-half natural size.

Twigs - very stout, blunt-pointed, greenish-brown, often coated with a whitish, crusty film, occasionally fine hairs. Pith large, pink or brown in color.

Winter buds - small, downy, imbedded in twig, surrounded by incurved, hairy ring of bark.

Leaves - alternate, twice compound, one to three feet long, one and one-half to two feet broad. Leaflets ovate, two to two and one-half inches long, entire or wavy margin.

Fruit - a broad, flat, thick, stubby, reddish brown pod which persists far into winter and remains closed. Seeds dark brown, flat, six to nine to a pod, surrounded by a somewhat sticky, sweet pulp.

HONEY LOCUST.

Gleditsia triacanthos, Linnaeus.

Honey locust, while native throughout the State, has been widely planted as a hedge and ornamental tree. The wood is hard, strong, coarse-grained, but not so durable in contact with the soil as is the black locust. It is not commercially important on account of its scattered distribution and the knotty character of the wood due to its being open-grown as contrasted with forest-grown.

Bark - on young branches smooth, grayish brown in color, with age becoming roughened into firm, broad, blackish ridges with edges that curve outwards.

Twigs - rather stout, smooth, glossy, zigzag, usually bearing stiff, sharp-branched thorns from three to four inches long, above leaf base (node).

Winter buds - terminal bud absent; lateral buds very small, not easily seen.



HONEY LOCUST

Leaf and fruit, one-fourth natural size; twig, three-fourths natural size

Leaves - alternate, simply or, more usually, doubly compound, from six to eight inches long; if singly compound, with from eighteen to twenty-eight leaflets; leaflets usually even in number, elliptical, one and one-half to two inches long; if doubly compound, with from four to seven pairs of secondary leaf stems.

Fruit - a pod, flat, usually twisted, reddish brown in color, from ten to eighteen inches long, one and one-half inches wide, from two to three in a cluster, ripening in late autumn but staying on the tree well into the winter; each pod containing from ten to twenty brown oval seeds, one-third inch long. The fleshy part of the pod is sweet, hence the name "honey locust".

BLACK LOCUST.

Robinia pseudoacacia, Linnaeus.

Black locust was not originally a native of the State, but was a great favorite with early settlers as a dooryard tree from where it has escaped to form dense thickets along the roadside in many sections of the State. In favorable locations, its spread by means of root suckers is very rapid. It grows with exceptional rapidity on well-drained fertile soils, and in such locations seems better able to survive attacks of the locust borer which in some sections has rendered the tree worthless. The wood is very strong, heavy, hard, and extremely durable in contact with the soil. As a post wood it has no equal. It is also used for insulator pins on pole lines and for ties and fuel wood.

Bark - rough even on young trunks, yellowish brown in color, becoming deeply furrowed into distinct, thick, rounded ridges, which are not scaly.



BLACK LOCUST

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

Twigs - slender, brittle, reddish to greenish brown in color; generally bearing short stiff spines from one-fourth to one-half inch long, in pairs at base of leaves (nodes).

Winter buds - terminal bud absent; lateral buds very small, in a cavity below leaf-scars, rusty brown in color, covered with down.

Leaves - alternate, compound, from eight to fourteen inches long, with from seven to nineteen entire leaflets arranged along a central stem; leaflets usually odd in number, short-stalked, oval in shape, from one and one-half to two inches long.

Fruit - a pod, flat, smooth, brown in color, from two to four inches long, containing from four to eight small brown or black seeds, ripening in September. Pods - hang on into the winter; finally torn off by the wind in halves with seeds attached, the dried pod acting as a sail to carry the seed considerable distances.

THE MAPLES.

Maples are a very important group of forest trees in Missouri. Of the nine maples occurring east of the Rocky Mountains, four are common in the State. In the order of their abundance, they are sugar maple, red maple, silver maple, and ash-leafed maple. The first three only are important timber trees.

Maples as a group are readily distinguishable from other trees by the opposite arrangement of buds, leaves, and twigs together with the characteristically shaped simple maple leaf, (the ash-leafed maple as an exception has a compound leaf). The fruit of the maple group is also very distinctive. They are without exception winged-seeds borne in pairs, and popularly known as maple keys.

The ash-leafed maple is a medium-sized forest tree found in moist locations at lower elevations but very common and of little commercial importance. It is the only maple that has a compound leaf.

The three important maples of the State, sugar, red, and silver, are divided by lumbermen into two groups, the hard and soft maples. The sugar maple is classed as a hard maple due to that characteristic of the wood, while both the red and silver maples are classed as soft maples to denote that characteristic of their wood.

The foliage of both the sugar and red maple is particularly brilliant in the fall, and for that reason these species are often planted as shade trees.

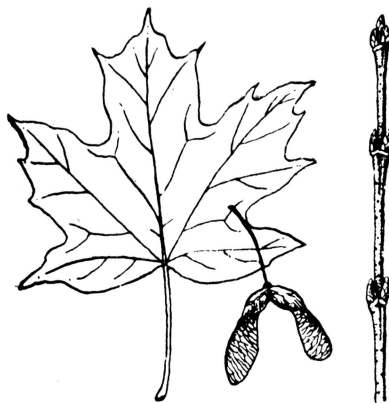
Two important maples from Europe are worthy of mention because of the frequency with which they are planted in the States for shade and ornament. These are the Norway maple and the sycamore maple.

SUGAR MAPLE.

Acer saccharum, Marshall.

Sugar maple is a magnificent forest tree everywhere abundant in the State. Besides providing beautiful borders to many miles of highways, and thousands of gallons of maple syrup from the many hundreds of sugar bushes in the northern States, it yields a wood of high grade. It is hard, strong, close-grained, and tough, with a fine, satiny surface, and is in great demand for flooring, interior finish, furniture, shoe lasts, rollers and as a fuel wood of the best quality.

Bark - on young trees dark gray in color, close, smooth, and firm, becoming furrowed into long irregular plates lifting along one edge.



SUGAR MAPLE

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

Twigs - slender, shining, the color of maple sugar.

Winter buds - very narrow, sharp-pointed, brown in color, the terminal bud much larger than the laterals.

Leaves - simple, opposite, from three to five inches long and fully as wide, from three to five shallow lobes with wide-spread coarse teeth, dark green in color above, paler below; the clefts are rounded at the base.

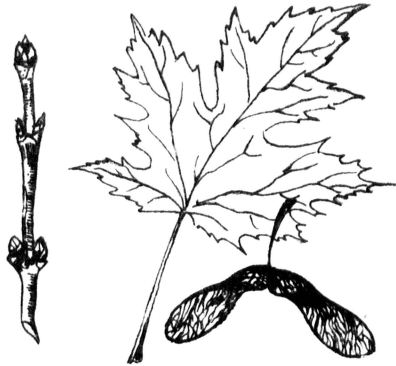
Fruit - maple keys, in short clusters, ripening in September.

Seeds - join each other in a straight line. Wings - turn down almost at right angles.

SILVER MAPLE.

Acer saccharinum, Linnaeus.

Silver maple is generally distributed throughout the State, but is not nearly so common as is red maple. It prefers the same general moist soil conditions, and the wood is used for the same purposes as the red maple with which it is included under the term "soft maple" by lumbermen. Frequently it is planted as a shade tree on account of its rapid growth.



Silver Maple

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

Bark - on young trunks, smooth, gray in color with reddish tinge; with age becoming reddish brown in color, more or less furrowed, the surface separating in long thin flakes which becomes free at the ends and flake off.

Twigs - similar to red maple but having a distinctly rank odor when broken or crushed.

Winter buds - similar to red maple but larger, usually very dense clusters of lateral buds.

Leaves - simple, opposite, from three to five inches long, fully as wide, five-lobed; margins of lobes coarsely serrate; clefts between lobes, particularly the middle two, very deep; at maturity leaves pale green in color above and silvery white below, hence the name "silver maple".

Fruit - maple keys, much larger than in the red maple though maturing at about the same time in the spring. Wings - more widely divergent than those of the red maple. Sometimes only one side of the key develops.

RED MAPLE.

Acer rubrum, Linnaeus.

Red maple derives its name from its brilliant autumnal foliage. While common in swamps all over the State, it is also found abundant on moist slopes. It is extremely rapid-growing, furnishing a fairly strong, close-grained wood, extensively used for cheap furniture, in the manufacture of baskets and crates, for mine props, railroad ties, and fuel wood.

Bark - on young trunks smooth, light gray in color, often resembling beech; with age becoming darker and roughened into long ridges, often shaggy or scaly on surface; bark character extremely variable on different trees in the same stand.

Twigs - rather slender, bright or dark red in color, without odor when cut or broken.



Red Maple

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

Winter buds - broad, blunt-pointed, clustered, short stalked, red in color; terminal bud slightly larger than lateral buds; numerous large, plump flower buds along the twig.

Leaves - simple, opposite, from three to four inches long, fully as wide, usually three-lobed; the clefts between lobes shallow and sharp angled as contrasted with deep clefts of silver maple; margins of leaf lobes coarsely serrate; at maturity leaves light green in color above, pale greenish white below.

Fruit - maple keys, in clusters on long stalks, ripening in May or early June. Seeds - joined more or less end on end. Wings - diverge at wide angles.

BOXELDER.

Acer negundo, Linnaeus.

The Box-elder or Ash-leaved maple is a tree of only moderate size, with a number of main stems which arise near the ground and form a broad crown. It thrives best in moist soil, but is also tolerant of drier situations. Commonly found along streams, borders of lakes, swamps, drainage ditches, boxelder is widely planted for ornamental purposes. It grows rapidly and makes a quick shade, but on the other hand the leaves fall early, with none of the brilliant autumn coloration of the other maples. The branches are brittle and break easily if loaded with snow or sleet; the tree is short-lived and rather subject to disease. The wood is light, soft, creamy-white, close-grained, weak, not durable, used in the manufacture of woodenware, cooperage, wood pulp and sometimes in cheap furniture.



Box Elder

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

Bark - smooth and grayish-brown on young trunks or branches; thick and narrow, ridged on older trees.

Twigs - stout, purplish green or green, brittle, sometimes smooth often covered with a whitish bloom.

Winter buds - short-stalked, large, white, woolly, covered by bud scales, the outer pair usually completely enclosing the inner pair.

Leaves - opposite, compound, with three to five leaflets; leaflets ovate, coarsely and irregularly serrate, light green above, paler beneath.

Fruit - the fruit is like that of the other maples, maturing in September. Fruit stalks may persist far into the winter.

OHIO BUCKEYE.

Aesculus glabra, Willdenow.

The Ohio buckeye, also known as the Fetid buckeye, is usually a small tree with a short, slender trunk, topped by a deep, broad crown of small, spreading branches. It prefers banks of streams, or moist ravines, bluffs or bottomlands. The wood is weak, soft, whitish or pale yellow, lustrous, used to some extent for paper pulp, woodenware, artificial limbs, etc. It is often sold on the market as basswood which it resembles both in its whiteness and the ease with which it can be worked. The Ohio buckeye is occasionally planted as an ornamental, but it is less popular than the horse-chestnut.



Ohio Buckeye

One-half natural size.

Bark - gray, thick, fissured, scaly.

Twigs - stout, at first downy and brown, later smooth, reddish brown to ashy gray; ill-smelling if bruised. Pith large, light green, circular in outline.

Winter buds - two-thirds inch long, sharp-pointed, resinous, covered by nearly triangular, reddish brown scales.

Leaves - opposite, compound, consisting of five long, oval, pointed, toothed, yellow-green leaflets set like the fingers of a hand (palmate) at the top of a slender petiole, four to six inches long. Foliage ill-smelling if bruised.

Fruit - a thick, round, prickly or warty capsule containing one or two large smooth, lustrous brown nuts about one inch in diameter. The falling fruit leaves a large scar on the twig.

BASSWOOD

Tilia glabra, Ventenat.

Basswood is a valuable forest tree in Missouri because of its rapidity of growth and the wide range of use for its lumber. It does best in deep, moist soils of the woodlot sections but is found generally distributed throughout the State. The wood is soft, even-grained, light, and fairly strong, and is in demand for boxes, crates, veneer, cheap furniture, woodenware, and paper pulp; often used as a substitute for white pine.

Bark - on young stems smooth, dark gray in color; on older trunks firm but easily cut, becoming furrowed into rather narrow flat-topped ridges; on still older trunks furrows deeper, ridges more rounding and broader, surface scaly.

Twigs - rather slender, smooth, bright red or greenish in color or covered by a gray skin, zigzag, slightly mucilaginous when chewed; fibers of bark on twigs very tough, may be used as rope.



BASSWOOD

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

Winter buds - terminal bud absent; lateral buds large, smooth sometimes lopsided or humped, bending away from the twigs, dark red or sometimes green in color.

Leaves - simple, alternate, heart-shaped, from five to ten inches long, sharp-pointed, coarsely serrate along margin.

Fruit - a nut, round, woody, about the size of a pea, borne singly or in clusters, with a common stalk, attached midway to a leafy bract, ripening in late fall but sometimes remaining on the tree into the winter. Bract- acts as a sail to scatter the seed.

BLACK GUM.

Nyssa sylvatica, Marshall.

The black gum is a medium-sized tree usually with a straight, slender, rather columnar trunk. The crown is long and narrow, wavy lateral branches are horizontal, some of the lower ones drooping. Old trees may have a low, flat crown. Found in variable habitats, the black gum is common on burnt-over areas, dry mountain slopes and abandoned fields, but it reaches its best development in the low wet bottoms. The wood is cross-grained, tough to split, difficult to work, moderately strong and stiff, not durable, light yellow. The black gum has always been despised since it is hard to split and difficult to season. Use has recently been found for the wood in the manufacture of crates, wheel hubs, boxes, ironing boards, rolling pins, chopping bowls, excelsior, broom handles, baskets, gun stocks, rollers, mallets, rough flooring, etc. However, it is not of sufficient importance to be recommended for forest planting.



Black Gum

One-half natural size.

Bark - reddish brown to grayish black, very rough and scaly on older trunks, forms what is known as "alligator" bark on very old trunks characterized by quadrangular and hexagonal blocks.

Twigs - smooth, grayish to reddish brown, pith rather large, white, separated by faint layers into solid compartments.

Winter buds - ovate, reddish brown, one-fourth of an inch long, usually smooth.

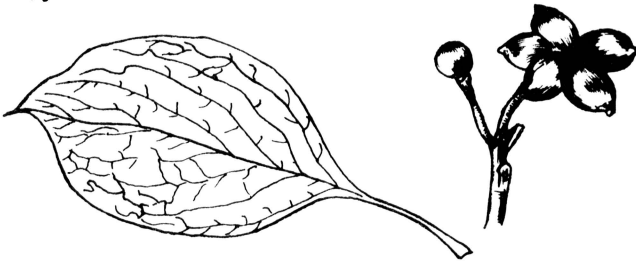
Leaves - alternate, simple, oval, entire and slightly thickened on margin, dark green and shiny above, often hairy below, turning to a gorgeous red and scarlet in the fall.

Fruit - a small dark blue, fleshy berry or drupe, ovoid two-thirds of an inch long, one to three in a cluster, borne on long stalks and ripening in October. The "blackgum berries" cling to the trees all winter long, and are much appreciated by the birds.

DOGWOOD.

Cornus florida, Linnaeus.

The dogwood, sometimes called the flowering dogwood is a small, bushy tree, with a flat crown of slender spreading branches and branchlets, up-tilted at their ends. Its dark red autumnal foliage, its beautiful, white flowers of spring, and its brilliant red berries give color and character to our woodlands. As one of the understory trees, the dogwood is commonly found throughout the forests of the entire State, thriving best in rich, well-drained woodlands. This attractive tree should be planted extensively as an ornamental, on light well-drained soils, taking care to mulch and protect the surface soil since the roots are very shallow. Few trees surpass the dogwood in beauty when it is in bloom or fruiting. It should be maintained adjacent to highways and camping places for the enjoyment of everyone. The wood is very heavy, hard, strong, tough, pale reddish brown with a light colored sapwood. It is used commercially for spools, shuttles, bobbins in cotton mills; turnery, engravers' blocks, golf stick heads, brush blocks, wedges, tool handles and bearings for wooden machines.



Dogwood

Natural size.

Bark - light brown to gray on young stems and branches. Reddish brown to black on older stems, broken up with regular square scaly blocks, the inner bark being very bitter.

Twigs - usually red, sometimes tinged with green, smooth, glossy, often covered with a glaucous bloom; pith white and gritty.

Winter buds - terminal flower buds larger than the lateral leaf buds; terminal buds reddish, slightly downy, covered by two gaping bud scales.

Leaves - opposite, simple, firm, bright green, minutely hairy, oval blades, pale beneath with an entire margin. Midrib and primary veins prominent.

Fruit - a scarlet ovoid drupe about three-fifths of an inch long, containing a grooved stone ripening in October; borne solitary or in clusters of two to five on a stalk.

PERSIMMON.

Diospyros virginiana, Linnaeus.

The persimmon is a very common tree which grows everywhere, on almost any kind of soil, but seems to prefer open spots such as old fields and glades. Sometimes this tree takes complete possession of an opening and forms a thick grove of small trees. In the forest it may grow to be quite large. The trunk is usually short and slender, with a high, broad-topped crown. The wood is heavy, hard, compact, strong, susceptible to a high polish. The sapwood is wide, yellowish, often streaked with black. The heartwood is brown to black, usually present only in old trees; called American ebony. This wood is much sought for shuttles, golf stick heads, billiard cues, mallets, parquet flooring, brush backs, veneer.

Bark - on old trunks, thick, hard, dark gray or black, cinnamon red at the bottom of the fissures; thick squarish blocks, peeling off into thin scales.



Persimmon

One-half natural size.

Twigs - slender, bitter, astringent, grayish to reddish brown, darker in the second year, usually pale, pubescent, with a large pith or pith chamber.

Winter buds - broadly ovate, closely pressed against the twig, sharp-pointed, covered by two dark brown glossy scales.

Leaves - alternate, simple, oval, thick, dark green, shiny above, often hairy below and entire on margin.

Fruit - a juicy, spherical orange-colored, often red-cheeked berry, one to one and one-half inches in diameter, bitter when green, but sweet and juicy when ripe; flesh yellow-brown surrounding flattened, hard-coated seeds.

WHITE ASH.*Fraxinus americana*, Linnaeus.

White ash shares with the basswood the distinction of being one of the most valuable and rapid growing trees in the woodlots of Missouri. It is common throughout the State, preferring rich, moist woods near water. The wood is heavy, hard, strong, close-grained, and tough. Large quantities of it are used for agricultural implements, tool handles, oars, furniture, and in the automobile industry.

Bark - dark grayish-brown in color, deeply furrowed with narrow flat-topped firm ridges which on older trunks are somewhat scaly; ridges in some instances tending to run together enclosing diamond-shaped fissures.

Twigs - very stout, smooth, shining, grayish brown in color, brittle, flattened at leaf bases (nodes).



WHITE ASH

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

Winter buds - plump, blunt-pointed, dark brown or nearly black in color; terminal bud one-fifth inch long, larger than lateral buds; last pair of lateral buds almost on level with terminal bud.

Leaves - opposite, compound, from eight to fifteen inches long, with from five to nine leaflets; leaflets sharp-pointed from three to five inches long, with slightly and sparsely serrate margins; borne on short stems, by this characteristic may be told from black-ash leaflets which are stemless.

Fruit - a winged seed, from one to two inches long, broadly paddle-shaped with the wing occupying the position of the blade; borne in long, open, drooping clusters, ripening in September, often not dropping off until early winter.

BLACK ASH.

Fraxinus nigra, Marshall.

Black ash, is a tree of cold deep swamps. It is common in moist places and in the central and southern parts of the State. Its wood is heavy, rather soft, tough, coarse-grained and durable. Because of its toughness, the wood is used for hoops, chair bottoms and baskets.

Bark - ashy, gray in color, somewhat furrowed but generally without deep ridges, forming thin, smoothish scales which are easily rubbed off.



Black Ash

Twig, natural size;
 Fruit, one-half natural size
 Leaf, one-third natural size

Twigs - very stout, similar to those of white ash but not shiny and usually a lighter gray in color.

Winter buds - buds resembling those of white ash though usually decidedly black; terminal bud as long or longer than broad, sharp-pointed; lateral buds much smaller, blunt-pointed; last pair of lateral buds at some distance from the terminal bud instead of nearly on a level with it as in the white ash.

Leaves - opposite, compound, from ten to fourteen inches long, with from seven to eleven leaflets; leaflets similar to those of white ash but much longer in proportion to their width, without stems.

Fruit - a winged seed, similar to that of white ash though the wing is broader and distinctly notched at the tip; in clusters ripening in the early autumn.

HARDY CATALPA.

Catalpa speciosa, Warder.

The hardy catalpa is usually a rather small tree with a round-topped but narrow, high, symmetrical crown of slender branches. The trunk is often short, crooked, angular and unattractive. Naturally an inhabitant of bottomlands, the catalpa prefers moist and fertile situations but will persist on poor, dry sites. Planted as an ornamental, this tree has escaped cultivation throughout the State and is now widely naturalized. The light brown, coarse-grained wood of the catalpa, with its thin white sapwood and dark heartwood is neither hard, heavy nor strong, so that its common uses are limited to rougher purposes. It has an odor somewhat like kerosene; durable in contact with soil, used mainly for cross-ties, posts and poles.

Bark - light brown; rather thin, shallowly ridged, scaly, bitter.



Hardy Catalpa

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

Winter buds - lateral buds small, almost imbedded in bark, covered with five to six tiny brown bud-scales.

Leaves - opposite or whorled, that is, more than two at a node, simple, six to ten inches long, four to five inches broad, ovate, heart-shaped at base, acute at apex, entire or wavy margin.

Fruit - a long, cylindrical, bean-like capsule which often persists far into winter and contains many flattened, winged seeds, the wings being fringed at the ends.

OBJECTIVES OF FOREST APPRECIATION.

The objectives of each club member are to identify 15 or more common forest trees, found in the locality and to make a collection of leaves, or leaf prints, fruits (seed) and winter twigs, as available of each tree identified, and to mount and label them properly. It is preferable to start project work in September, October or November and in March, April or May.

GENERAL REFERENCES.

The following is a list of publications which may be secured from the Superintendent of Documents, Government Printing Office, Washington, D. C.:

- Heisley, M. F. (1933)
Our Forests. What They are and What They Mean to Us.
Misc. Pub. 162: 34 pages; Price 5 cents.
- Mattoon, W. R. (1928)
Forestry and Farm Income
Farm Bulletin 1117: 35 pages; Price 5 cents.
- Mattoon, W. R., and E. H. Shinn (1930)
Forestry Lessons on Home Woodlands.
Dept. Bulletin 863: 44 pages; Price 10 cents.
- Missouri Conservation Commission, Jefferson City, Mo.
Forest Trees of Missouri, No. 20.