# ...CTICAL FORESTRY

AND

# FOREST TREES OF CONNECTICUT

CONNECTICUT FOREST AND PARK ASSOCIATION

# Practical Forestry

*By* EDGAR L. HEERMANCE

AND

# Forest Trees of Connecticut

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Connecticut Forest and Park Association
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THIS beginners' book on practical forestry was prepared for the use of 4-H clubs, Scout troops and schools. We hope that older people will also find it of interest and value. All of us can use our eyes more as we go through the woods. And it is important for everyone here in Connecticut to learn how trees grow and to grasp the main principles of forest management.

The hurricane of 1938 awakened a new interest in forestry. Our Association welcomes another opportunity to push the principle of sustained yield, which it has been preaching for over forty years. Many of the practical foresters in the State have helped in the preparation of the present pamphlet. We shall be dealing with woodland rather than landscape trees. The emphasis is on hardwood stands, as it needs to be here in Connecticut, and on natural reproduction rather than expensive planting operations. If dollars and cents are kept in the foreground, it is because that side of forestry has been so often ignored. Forests have many non-commercial values, but our privately owned woodlands will not be safe or at their best until they can be made to pay their way.

The section on Forest Trees of Connecticut was prepared some years ago by our State Forester, in collaboration with Wilbur R. Mattoon of the U. S. Forest Service, and has been in use as a separate pamphlet. Most of the drawings of leaves and twigs were by Mrs. A. E. Hoyle of the Forest Service.

The picture of the Charter Oak shown on the cover was made from the painting by Charles D. Brownell. The tree was a white oak, which, according to tradition, was saved from the original forest in 1636, at the request of the Indians. It stood near Dutch Point in Hartford, and was the hiding place for the charter of the Connecticut Colony during the Andros tyranny, in 1687. The tree blew over in a gale on August 21, 1856.

EDGAR L. HEERMANCE, *Secretary,*
*Connecticut Forest and Park Association.*

May 1, 1939.

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## FOREST TREES OF CONNECTICUT

*Listed Alphabetically*

# TO THE COMING GENERATION

THIS booklet does not tell all there is to know about forestry. Even the teacher in a Forest School could not do that, for he is still learning. We hope you will go on and read some of the good books which have been published about trees and the way to manage them. There is hidden treasure in Connecticut woodlands, if the owners will hunt for it. After you have begun to practice forestry, the Extension Forester at Storrs or someone from the County Farm Bureau will be glad to go over your woodland with you. They can help you to improve your methods, and explain some of the fine points.

## I. CONNECTICUT A FOREST STATE

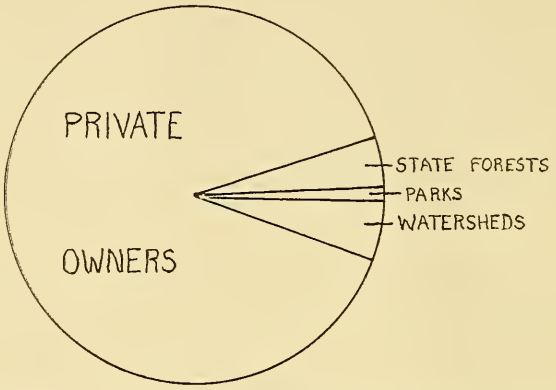
It sounds queer to call Connecticut a forest State, and yet it's true. More than half of our land area is now classed as woodland. This is a fine place to grow trees, for we have good soil and plenty of rain. When the first settlers arrived, Connecticut was one unbroken forest, except in the swamps and along the rivers and the shore. There was no way of traveling through the thick tall woods except by the Indian trails.

FROM THE FORESTS OF YESTERDAY

What became of that early forest? The settlers cut down some of the trees to make buildings and the ships which carried their farm products to the West Indies. The first war vessel of the American navy was built at Essex out of Connecticut oak. Some of the heavy timbers used for house framing, put together with wooden pins, are still standing just as sound as ever, after 200 years or more. Wood was all people had for fuel in those days. They used it not only for heating their houses, but for smelting iron and brass and making bricks. Forest fires took a heavy toll. Lots of fine timber was butchered and burned just to clear the land, so that the settlers could grow crops, or pasture cattle and horses and sheep.

A hundred years ago, the forest started to come back. Not as much farm land was needed, and hand labor gave place to machines, which could not be used where the ground was steep or full of rocks. Nature does not like to see land go to waste, so she began to seed these abandoned

fields and pastures with new tree growth. As you walk through the woods, you come on stone walls which once marked the boundary of cultivated fields. Forest land in Connecticut has doubled since the Civil War. In recent years it has been increasing at the rate of 20,000 acres a year. Today nearly 2,000,000 acres are woodland, or six acres out of every ten.



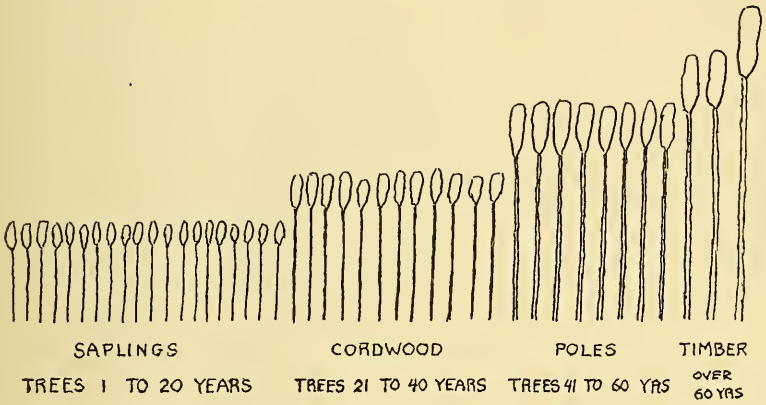

OWNERSHIP OF CONNECTICUT WOODLANDS

Who owns this forest land? If you look at the chart, a small slice from the pie is used for public parks, and another as protection for water supplies. Another small slice, 80,000 acres, which ought to be three times as large, is in State Forests. Some day, many of our towns will have their town forests. But the larger part of the big timberland pie is in the hands of private owners.

What are we going to do with these 2,000,000 acres? We shall never need them again for farming. Forests are pleasant to look at, if they are well taken care of. We enjoy them for hiking and picnicking and hunting. But they cost the owner money for taxes and interest, and he needs to get some return. If our woodlands are handled right, they will produce good lumber, just as they did in the early days. Connecticut can supply building material from her own forests, instead of bringing it long distances from the Southern States and the Pacific Coast. We can make our own skis and axe handles and furniture and flooring. And that means that our woodlands, instead of being an expense as they are now, will bring us a good income year after year.

Take a walk through our Connecticut forests and see what they are like. Most of our woodlands are made up of hardwoods. That isn't a very good term, because some of our "hardwoods," such as poplar, are not hard, but we generally use that word to include the broad-leaved or deciduous trees, which shed their leaves every year. "Softwoods" are evergreens or conifers, like pine and hemlock, which have needle-like leaves. This is a natural hardwood country, and less than a tenth of our forest is softwood.

Now start a guessing game, to see how old these woodlands are. If most of the larger trees are four inches through (we usually measure at breast height, or four and a half feet from the ground), it is a safe guess that they are about twenty years old. Trees vary in their rate of growth, but that would be a fair average. These trees are in what we call the Sapling Class. That includes everything from young brush up to twenty years. If you could walk through all the woods of Connecticut, you would find that about a third of them are still only saplings.




AGE CLASSES OF CONNECTICUT FORESTS

The ideal proportion, as we see from the diagram on page 24, would be to have a fifth of our trees under twenty years old, instead of a third. Where the trees are eight inches in diameter, they are probably forty years old. We call this the Cordwood Class, which takes in another third of the Connecticut woods. Above that is the Pole Class, from forty-one to sixty years. After that age they are in the Timber Class, where the woodland begins to pay a satisfactory profit.

It was to these larger trees that the hurricane of 1938 did the most damage, but you would find that at least a third of our woodlands today are over forty years old. The heavy cutting of Connecticut hardwood stopped about the end of the last century, when people turned from wood to coal and oil, as fuel for their homes and industries. Since then our hardwood forests have had a chance to grow. Many of them, as you see, have a forty year start. If we handle them right, it will not be long before they will produce saw logs and a good income. Forestry in Connecticut does not necessarily mean planting pine trees, and waiting sixty years until they are good for something. It means taking our present hardwood stands and managing them so that they will be profitable. Before we study how that can be done, we need to find out something about trees and the way they grow.

## II. WHAT IS A TREE?

A tree is a laboratory, where Nature takes chemical elements from earth and water and air and builds them into wood fibre. This wood is stored up in the trees until we have good use for it, just as we put money in a bank. The laboratory is not active during the Winter months; the sap retires into the roots and the tree goes to sleep. In the Spring, the sap starts running again. Perhaps you have tapped a sugar maple, when the sap was rising on sunny days in early March.


Cut a cross section of a log and examine it closely. Notice the rings. Each represents one year of growth, so that we have a chance to check our guess as to how old the tree was. Some of the rings are thicker than others, showing that in those years the conditions for growth were specially favorable. The inner sets of rings are drier and harder, and usually of a darker color; we call that the heartwood. The softer outside layers are the sapwood.

The sap is the life blood of the tree. As it rises, at least after the first Spring uprush, it is mostly water, carrying mineral elements from the soil. The tree needs plenty of water and plenty of food materials; if there are enough of these in the ground, the roots will get hold of them and see that the tree is kept supplied. The sap goes up the trunk by way of the sapwood, and out through the branches to the leaves. And here a remarkable thing happens. Green leaves contain a substance which is able to capture some of the carbon dioxide found in the air in minute quantities, and turn this into sugar. It can do that only under the action of sunlight, which is why the tree must have plenty of light if it is to grow. This sugar is dissolved in water brought up from the roots, and then carried down by the sap in the inner part of the bark, to produce around the tree a layer of new wood. Growth is most rapid during the Spring. The more compact Summer growth forms the boundary line which marks the outside of each ring. Of course the tree grows each year in height and spread, as well as in bulk. All height growth is at the top; if someone drove a nail at five feet, it would remain at the same height. We hope he will not try that experiment, because it would be hard on future axes and saws. The buds which will start next year's growth on each twig are formed in the early Summer. Try

making a Winter collection of cut (not broken) twigs, and standing them in vases of water. You can watch the buds swell and unfold, each species in its own way.

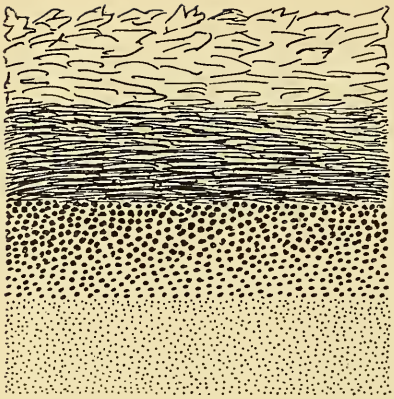
The bark is the tree's protecting skin. If you examine a cross section of bark under the microscope, you see that it is made up of layers, like the wood. Each year a new layer is added inside the bark, while the outer layers may crack and wear off. When the bark is broken, disease germs have a chance to enter. Sometimes the tree can heal the wound before trouble starts, by pushing out new bark from the edges. When a large branch is cut or broken off, decay is apt to enter that spot sooner or later, unless we treat the wound, which would be too expensive for forest trees.

A tree generally starts from seed. Some hardwoods, such as the maple and birch, have a profusion of flowers every Spring. The light seeds may be carried a considerable distance by the wind. Oak, hickory and beech develop their seeds in the Fall, in the form of nuts; in some years there are only a few seeds, or none at all. It is interesting to gather different kinds of tree seeds, and sprout them in a box of sand in the house, or in open spots in the woods.

When a vigorous hardwood is cut down, one or more sprouts generally come up from the stump, and start new trees. In the woods, if a tree is standing by itself, you may be pretty sure it is a seedling. If there are several trunks in a clump, they are sprouts, or "coppice," even where nothing is left of the old stump. The trouble with sprout growth is that, as the stumps decay, rot is likely to spread to the butts of the new trees. For that reason, we usually select seedlings for our future crop trees. A sound tree may keep on growing and piling up wood fibre for a hundred years or more. Many of the trees which broke off at the butt during the hurricane, instead of being torn up by the roots, were sick trees. They were already weakened by stump rot, or old age, or starvation.

## III. THE FOREST FLOOR

Let us now examine the forest floor, from which trees draw most of their food material. Dig down under a thick stand of trees. Below the dry leaves of last Autumn are the half rotted leaves of the year before. With oaks, where the leaves decay very slowly, you can make out two or three separate layers. Every year the forest is dropping at least a ton of leaves and branches on each acre, to enrich the soil. Soon you come to the black layer of disintegrated litter called humus, resting on and mixing with the mineral soil. Notice how spongy it is. The melting snow sinks into it, and heavy rains are absorbed, instead of running off to cause floods. If the land has been in forest for a long time, the years of decaying vegetation have made the humus very rich. In every cubic foot of top soil there are thousands of little animals, from angle worms down to creatures so small that we never see them, which get their living there, and help to prepare food for the trees. The tree roots send fine branches into the forest floor to draw rations.




Underneath the humus is the soil proper. The soil and the humus carry on a steady exchange of chemical elements. It is from these lower levels that many of the tree roots secure their water and food material. We have many kinds of soils here in Connecticut. Some of them are deep, and some of them, especially on steep hillsides, are shallow. Some are well drained, and others not. They vary in the size of their particles (as between sand, sandy loam and clay), and in the mineral elements available for plant food. Certain species prefer certain soils. Wherever there is a good natural soil, the tree growth tends to be heavier, with more litter and a richer humus.

Destroy the humus and you starve the trees. In an open grove, or under a shade tree on the lawn, notice how hard the ground is. If a woodland is cut off, although new sprouts and seedlings will come up, the strong sunlight will dry out the soil. Where cattle are allowed to graze in the woods, they not only destroy much of the young growth, but they pack down the earth. In all these cases, the tiny organisms, which once made the soil so rich, can no longer live in it. The angle worms depart for moister climes. The soil becomes hard, instead of sponge-like. It freezes more deeply in Winter, and the water from snow and rain flows off over the surface. Not only is it harder for the trees to secure food, but it is harder for them to find water. This condition can be avoided by better management. The Government has been paying a bonus to farmers for fencing their woodland, so as to keep cattle out. And if we want our woodlot to do a good job at building up wood fibre, we must keep the forest floor well shaded, and protect it from fire.

## IV. CONTROL OF FIRE

Fire does a number of serious things to the forest. Older trees may be killed outright, or scarred so badly that disease will enter the butts. In two or three years you see a fungus growth on the scar; decay eats in and weakens the tree, so that it will blow over some day. Fire takes

down the brush and young trees, which would form the future stand, and it will require a number of years for them to catch up again. Tree seeds lodged in the forest floor are destroyed. Another result is the loss of the leaf litter, which is the raw material for plant food. For some time the ground will be drier, and animal life in the soil less active. It will take from five to ten years before the food supply will be as good as it was before. Repeated fires will destroy the humus entirely and leave nothing but mineral soil, which will be lean picking for the trees that are left. If we want to save our trees, build up the forest, and pile up wood fibre at a rapid rate, we must keep out fires.

DIDN'T HE HAVE AN ASH TRAY IN HIS CAR?

There are two fire seasons in Connecticut. One is in the Spring, from early March until about the middle of May. After that, the new leaves have come out to shade the forest floor and keep it damp, so that usually there is not much danger during the Summer. By the middle of October, the leaves are falling and making a tinder pile, and we must be on the lookout for fires again until the first snowfall. During these dangerous seasons, fires may start whenever there are a few dry days with strong wind. They will not start after sunset, or until the dew is off the ground, but in the middle of the day, watch out. The hurricane left a mass of debris in the woods, which will make a bad fire hazard for several years. In dry Summers, we are apt to have slow, deep-burning fires.

Connecticut has built up a good system of forest fire protection, with lookout towers and patrolmen and trained fire fighting crews. During the Spring and Fall, no one is allowed to burn brush or light a campfire, without a permit from the local forest fire warden, who will refuse a permit if fires are not safe. Anyone who sets fire to the woods with

a match or a cigarette can be fined up to $500 and put in jail for six months. We hope the judge gives him the limit.

If you find a fire in the woods, first send word to the fire warden; better know his telephone number ahead of time. A small fire can be stamped out around the edges, as it burns through the leaves. For a larger fire, we generally try to pinch it out, working along both sides to narrow the front. A spading fork is a good tool, as you can use it to rake leaves away from the blaze, to beat out the fire, or to shovel dirt on it. But it often pays to keep on hand a set of regular fire fighting tools. In Connecticut, we use water rather than chemicals for extinguishing fires, and the knapsack pump is very effective. The old method of starting back-fires has been given up, as it is likely to cause more damage than it saves.

## V. SOME OTHER ENEMIES

Caterpillars eat the leaves of the trees, and so make it impossible for them to manufacture food, unless a new crop of leaves comes out. In some years the small green inch worms do a good deal of damage. The tent caterpillars, though their nests are unsightly, prefer wild cherry and other fruit trees, and do little harm in the forest. The worms of the gipsy moth attack birches, poplars and oaks, and sometimes kill them, but so far we have been able to confine this pest within certain small areas of the State. The beetle which carries the Dutch elm disease works only on elms. Some of our hickories are now being attacked by a borer, which penetrates the bark. When rot enters the base of a tree, ants may follow and complete the destruction. If you see a woodpecker working on a tree, there are grubs of some kind inside for him to get.

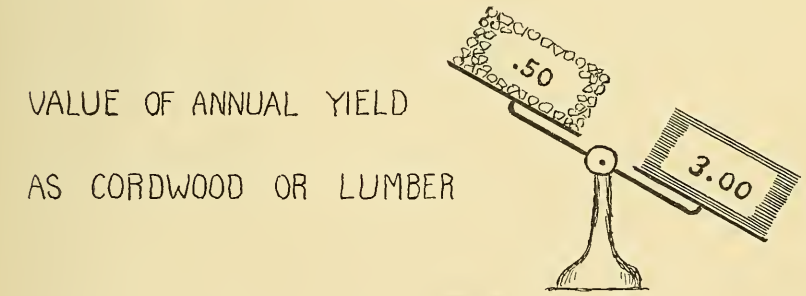
Other living enemies are the various kinds of fungi which are carried by the wind. A good example is the chestnut blight which keeps spreading from diseased trees to new sprouts. Again, if you see a tree with a big open scar and swellings on both sides of it, that is probably a Nectria canker. It is specially common on the birches, but sometimes attacks scarlet and black oaks. The disease often gets in through an old branch stub. Another canker, the Strumella, is found chiefly on oaks. You can detect it by a big bulge on the trunk.

In a Winter with sharp changes in temperature, long frost cracks may develop up and down the trunk, which give an opening for decay. Even if the crack heals over, it will mean a defect in the log. Heavy ice storms may break off some of the upper branches, and spoil the shape and usefulness of the tree. Another natural enemy is wind, with its breakage and destruction. A healthy well-rooted tree can stand up against ordinary winds. It is only at long intervals that we have anything like the hurricane of 1938.

In spite of the many handicaps, a large proportion of our forest trees would survive their natural enemies, and keep on growing until they were of real value, if it were not for man and the way he has treated the woodland. People have looked on the forest as a mine instead of as a crop, which calls for the same attention as any other crop.

## VI. THE YEARLY GROWTH

How much wood fibre will our woodlot put in the forest bank each year? Except on rocky or sandy land, where the soil is thin, if we keep fire out and the ground well shaded by trees, so that there is plenty of food and water in the forest floor, well-stocked woodland will produce ninety cubic feet of wood fibre on each acre. We can count on that, though it may do very much better. That is the equivalent of a cord of wood, which is a pile four feet wide, four feet high, and eight feet long, or 128 cubic feet. There are air spaces between the sticks, and we generally consider that a cord contains ninety cubic feet of solid wood. In later stages, we use as a measure the board foot, which is a piece of lumber one inch thick, one foot wide and one foot long. If all of our ninety cubic feet could be converted into lumber, it would make about 1000 board feet, but we can only utilize about half of that. A cord of seasoned oak weighs 4,000 pounds, or two tons. Pine land may produce twice as many cords or board feet, but it weighs only half as much, so that the weight of wood produced on each acre is about the same. An acre, by the way, is 43,560 square feet, or a space 209 feet square.




That is our annual crop, ninety cubic feet, or a cord an acre. When, at some future time, we take that amount of wood fibre out of the forest bank and turn it into money, what is it worth? On the stump, that is before any labor is spent on it, if we sell it for cordwood, we may be able to get fifty cents. That is hardly enough to pay interest and taxes, not to speak of giving us a profit on our woodland. There is no money in cordwood. In fact cordwood is not a crop, but only what we call a by-product. The real product of the forest is saw logs. If we will let that cord an acre a year pile up until it makes saw logs of high grade, our annual crop, instead of being worth only fifty cents, will bring us about $3.00.

The owners of woodland have been making two mistakes. The first was to strip off their timber every thirty or forty years, as soon as it was big enough to sell for cordwood. They lost money, because what they received was less than what it had cost them to carry that woodland for thirty or forty years. Not only that, but they were lowering the quality of the forest soil, and of the future forest. This practice is at its worst in clear cutting, where even the brush is cut, and the ground is

left bare. The wood chopper loses money too, because a stick of cordwood less than three inches through does not pay for the labor that is put on it.

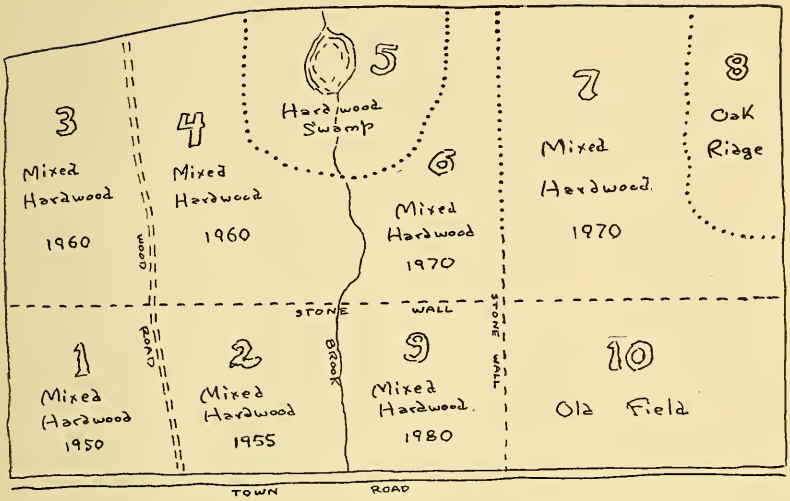
The second mistake has been to go through the woodland and take out the best trees, usually before they had reached their limit of growth, and leave the poorer trees. If a farmer did that to his dairy herd or his flock of poultry, the quality would be going down all the time. The same thing happens in woodland. Forestry means improving the forest, and managing it so as to bring the largest possible return.

## VII. MAPPING THE WOODLAND

If you are going to practice forestry, the first thing to do is to go carefully over your woodland to see what you have to work with. The larger part of it is likely to be what we call Mixed Hardwoods, about half oak, growing on fairly good soil. It is there that we have a chance to make our woodland pay. There may be some Hardwood Swamp, chiefly red maple and yellow birch, which seldom will be good for anything but cordwood. There may be Oak Ridge, where scarlet and chestnut oaks are growing on shallow soil; not much better chance there, as the trees seldom reach large size. Again we have Old Field, where abandoned farmland or pasture has seeded to gray birch and other weed trees, with a sprinkling of valuable species. By encouraging the good trees, we shall again have a forest there, but it will take a long time. In pine regions, we also have Softwood stands, and a mixture of Softwood-Hardwood.

The next thing to do is to make a rough map of the woodland. Those who do not have a timber tract of their own may be able to secure permission from an owner to make such a map, which calls for a good deal of exploration and study, and is fine practice. Since each portion of the woodland, whether it is large or small, will need attention about every ten years, it is convenient to divide the area into ten blocks of fairly equal size. There are certain natural division lines, such as stone walls, wood roads and brooks. The kind of tree growth may be different in one part from what it is in another part, as between Mixed Hardwood, for example, and Hardwood Swamp. Then there will be differences in age, because some tracts have been cut over more recently, and so are made up of younger trees. If necessary, make an arbitrary division line, and mark it with piles of stone.

We can number the blocks on our map. And it is a good thing to note, wherever possible, the date when the larger trees in the block will enter the Timber Class, or twelve inches in diameter. In making this estimate, you can consider each inch of diameter as roughly equivalent to five years of growth. Thus, on a block where the larger trees average ten inches in diameter, they have 2x5 or ten years to go before they will be approximately sixty years old, and begin to be classed as Timber trees. Usually the best forest is one that contains trees of all ages, but the dominant trees on Block 2 may have a fifteen years start over




EXAMPLE OF WOODLAND BLOCKS
WITH DATES FOR ENTERING TIMBER CLASS.

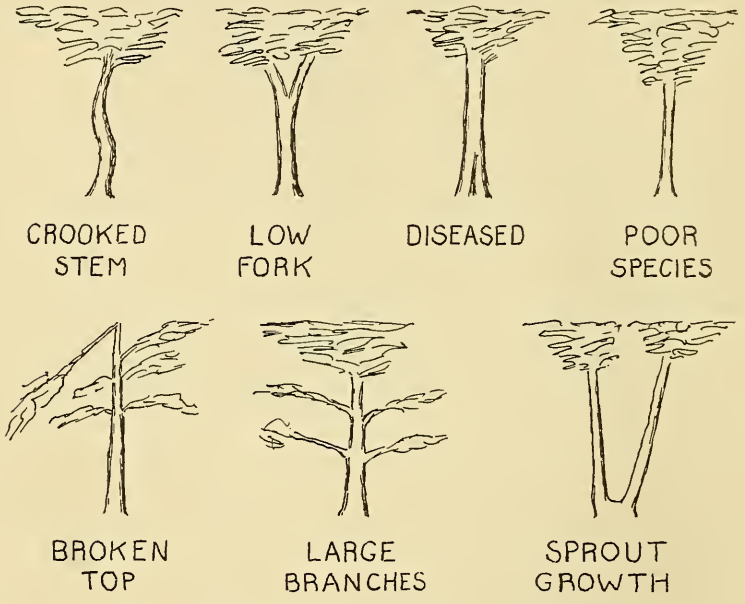
those on Block 6. By sending sixty-five cents to the Federal Land Bank, Springfield, Mass., you can secure a cruising stick, which may be used for taking diameters and heights, and estimating the amount of wood in a tree.

Each year a certain amount of improvement work should be done on the woodland. There is a difference of opinion as to whether we should start with the older or the younger stands. Some of our foresters claim that the weeding of the younger stands is more important. The amount of labor expended there will pay more in the long run, because we have a chance to determine the character of the future stand. Other foresters say to start with the older stands, for two reasons. First, there are so many wide spreading "wolf trees," and other specimens of poor promise, which need to be taken out, because they are shading the more desirable trees. Second, what you take out has some commercial value, and your forestry work will bring you an immediate return.

Start in this year with the block which has the oldest trees. (Or the youngest; it doesn't make a great deal of difference, as we shall be planning to cover the entire woodland every ten years or so.) We do what cutting is needed to improve the forest, or harvest the ripe crop. Next year we go into the second oldest block, and so on down the line. By the time we have gone through the last block, the first block has had ten years further growth, and is ready for some more cutting. And now let us see what trees should be cut and why, and what to leave.

## VIII. SELECTING THE CROP TREES

The woodland has been mapped out, and we start forestry work on the first block. Forestry is merely helping Nature do a better job. Improvement work can be tried out even on an acre or half-acre, secured for a demonstration plot. The CCC has established about 200 demonstration plots throughout the State, and these are worth studying.




Begin by looking over the trees of fair size and selecting your future crop trees. For that purpose, we want trees that are going to be profitable, because they will produce saw logs of high grade, with the largest possible amount of clear lumber. Choose the more desirable species, such as oak, hard maple, whitewood, ash and hickory. Seedlings are to be preferred, rather than sprouts from old stumps. Choose vigorous trees, with tall straight trunks and few side branches, free from fire scars, cankers and broken tops. The Charter Oak on our cover, in spite of its years and its historical interest, would not have made a good crop tree.

At the start, until the recognition of good crop trees comes to be almost instinctive, it will be worth while to mark these selected specimens in some way, perhaps with a band of paint, so that you will not cut them down by mistake, before they have had a fair chance to build up wood fibre. Since our present Connecticut woodlands are understocked, it may be hard to find enough good trees, properly spaced, but

we can pick trees of all ages. For even-aged oak in the Timber Class, we probably could use 70 crop trees. In working with younger stands, this number should be increased, to allow for casualties. For species like hickory and whitewood, which have smaller crowns, we can allow more crop trees to the acre.

## IX. IMPROVEMENT CUTTINGS

After you have chosen your crop trees, look up at the crowns, to see whether poorer trees are overtopping them and cutting off their light. Take out these competing trees, so as to give the crop trees a better chance. At the same time you can get rid of wind-thrown timber, and of some of the other trees that are diseased or never will amount to anything. But don't take out too many at one operation. If someone else is to do the cutting, be sure to mark with an axe blaze, or in some other way, the trees that are to come out. As you go back to that block every ten years for these improvement cuttings, more and more of the annual growth of ninety cubic feet an acre is going into the crop trees, and piling up money in the bank. What you take out is only good for cordwood, but you will have all the cordwood for which you can find a market.

We try to get our crop trees to grow as tall as possible before they fork, so as to secure more saw logs. For that reason we leave a good

EIGHTY-YEAR STAND, AFTER SEVERAL THINNINGS

many other trees in the forest to serve as trainers. Usually we do not start thinning until the forest is twenty years old, or four inches in diameter. Up to that time, the thicker the better, because the trees will grow tall, and with few side branches. At each cutting we leave trainers in the forest, up to the time when our crop trees begin to fork. After that we don't want height, but increase in diameter, so all the remaining trainers can be taken out, leaving only the crop trees, and the younger trees that are coming on to make a later crop. With no more competition for light, these selected trees will forge right ahead, and their growth will be chiefly in clear wood, which commands the highest price. Our annual crop of ninety cubic feet per acre, which has long outgrown the fifty cent class, may now be worth even more than $3.00. As long as our crop trees are putting money in the bank at that rate, it is foolish to cut them. For oaks, wait until the crop trees are about two feet in diameter. Hickory and ash, if they are to be used for tool handles, should be cut when they have reached twelve inches in diameter. We call that a shorter rotation.

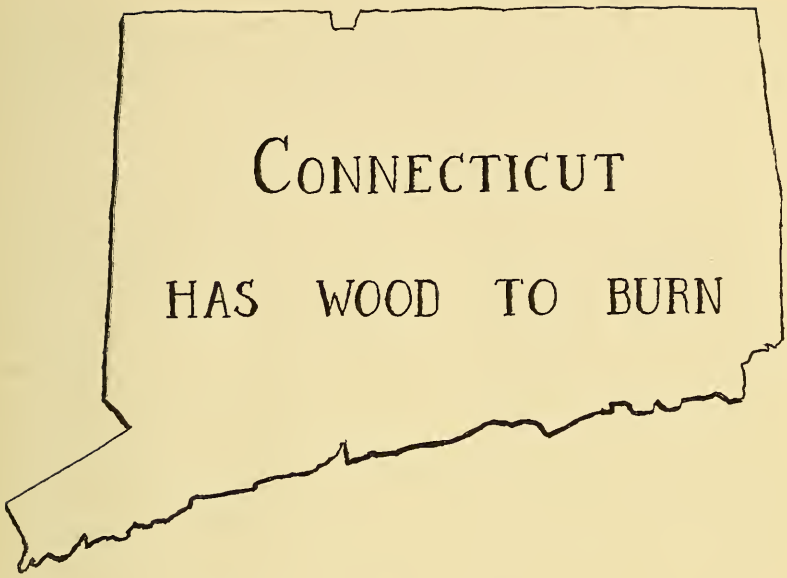
In Hardwood Swamp and Oak Ridge, where there is no chance for real crop trees, cutting may be done when there are enough trees six inches in diameter or over to make it worth while. In Old Field stands, it pays to hack down the gray birch and other weed trees when they are ten to fifteen years old, so as to release the oaks and other possible crop trees. Old Field areas often can be combined with other blocks, as there is not as much work to be done, and this work does not supply a product which can be sold.

## X. CORDWOOD

Cordwood is not a crop, but we shall have plenty of it, if we are going to develop crop trees. We cannot improve the forest without thinning, but if we can find a market for the wood we take out, the improvement work ought to pay for itself and something over. When we cut trees for saw logs, there will be additional cordwood, from the tops and branches. The debris that is left in the woods does not need to be burned. That would be an added expense, and a waste of soil-building material. If the brush is trimmed a little and scattered so that it lies close to the ground, decay will be rapid, and in two or three years the debris will hardly be noticed. A forest should not be picked up clean like a park.

Wood must season for about a year before it is ready to sell, to give a chance for the sapwood to lose most of its moisture. Sticks should be split, to help in this drying process and avoid rot. The wood, cut in four-foot lengths, should be piled on stringers, to keep it off the ground. If kept more than a year, the quality begins to go down, unless you protect the pile from rain by a covering of slabs or old boards, in which case it will last four or five years.

We have so much cordwood to get rid of, that the Marketing Committee of the Connecticut Forest and Park Association has been studying how to make use of it. Send for their pamphlet on "How to Burn




Wood." A cord of Connecticut hardwood, when air dry, has about as much heat value as a ton of coal. New wood-burning stoves and furnaces have been devised, which need to be fed only once or twice a day, and save money on fuel bills, as compared with coal or oil. Wood can also be chipped up and fed by a chain belt to a factory boiler. Where there is a good market for fireplace wood, it pays to grade it. Put into a separate pile the straight sound sticks of oak, hickory, hard maple and black birch, that will command a better price. The brick yards still buy a good deal of cordwood, although they pay low prices.

Wood choppers usually are paid at the rate of $2.00 a cord, and an exceptionally good man can cut and pile two cords a day. Later on, it will be hauled from the woods to the nearest road, where it can be picked up by a truck. If this work costs another dollar and a half, and the owner is paid $4.00 a cord at the roadside, he receives fifty cents for "stumpage." Even if he gets only a small return for his cordwood, the labor of improving his forest has cost him nothing. Where families do their own cutting and hauling, they have a chance to make good money during the slack months of Fall and Winter. Sawing into stove and fireplace lengths costs between $1.25 and $2.00 a cord.

Good roads through the woodland are very important, especially if we are bringing out cordwood or logs every few years. On a fully developed forest, the owner can afford to spend considerable money on his road system, but he cannot do that at the start. All through our Connecticut woodlands there are old wood roads, laid out with a good deal of skill, so as to bring out forest products on a down grade or over level ground. Because we are going to need them, these old roads should be brushed out and the bridges kept in repair. Drain the water off, instead

of allowing it to gully the road. Every hour's labor spent on our wood roads will reduce our costs. Don't do heavy hauling in early Spring. Wood roads also serve as fire breaks, and make it possible for light fire trucks to get in to save the forest.

## XI. POSTS AND POLES

Some of the material taken out in improvement cuttings is big enough to make posts and poles, which will bring a higher price than cordwood. Now that the chestnut is gone, we have to find other kinds of wood for this purpose. The trouble is that most of our species would rot quickly when set in the ground, so that we must use a preservative. The simplest method is to take a green post, with the bark still on, and stand it up, with part of an old tire tube on top to serve as a funnel. Into this we pour a solution of zinc chloride, which works down through the post, driving out the sap and taking its place. If you are interested, write the Connecticut Agricultural Experiment Station at New Haven for their Circular 123. Posts treated in this way will last for many years. Any species with thick sapwood can be used, such as maple, elm, aspen, birch and pine.

Highway fence posts are now being treated with creosote. The Creosoting Plant at Portland is paying twenty-five cents apiece delivered, or thirty-five cents if the posts are peeled. They buy oak, pitch pine, black and yellow birch, and locust. The posts should be seven and one-half feet long, with a top diameter of six to ten inches, and well seasoned. Here is another good market for some of our improvement cuttings.

There is a market for longer logs to be used for piling, which bring a good price. And after the timber salvaged from the hurricane has been used up, it will be possible to make railroad ties from some of the larger trees taken out in improvement cuttings. The railroad usually wants oak. Logs for ties are cut eight and one-half feet long, and must be at least nine inches in diameter. But don't waste good crop trees for railroad ties.

## XII. SAW LOGS

Even if we must wait a number of years before our crop trees have stopped growing rapidly and are ready to cut, a good many of the trees thinned out from the older blocks will make saw logs. The trunk is sawed into logs, usually in twelve to sixteen foot lengths, with an extra four inches to allow for trimming. The stump should be cut as low as possible. In felling trees and hauling them out of the woods, we try to do as little injury as possible to the younger growth.

Hurricane timber salvage taught us a good deal about the various grades of logs and their value. In Connecticut, to make the first grade, hardwood logs had to be at least eight feet long and fifteen inches in diameter at the small end, inside the bark. They must be straight, with two-thirds of the surface free from knots, and with three-fourths of the

volume free from splits, woodpecker holes and other imperfections. Logs like that bring a good price, especially in oak and whitewood and hard maple, perhaps as high as $12.00 a thousand board feet, on the stump. Longer logs generally bring more than short ones. A log twenty inches in diameter and sixteen feet long will make 370 board feet. Logs of smaller diameter, and those with more knots and imperfections, fall into lower grades, and there may be so much cull that the log is worth very little. For the uses which can be made of the various species, see the State Forester's list of Forest Trees at the back of this pamphlet. We have been so careless with our Connecticut forests, and our native lumber has been so poorly manufactured, that our woodlands have not been giving us as much return as they should.

Plan to visit a sawmill, to see what is done with our logs. The log is sawed lengthwise into slices, which later will be trimmed with another saw, to remove the rounded edges of bark and make the boards or planks of equal width. The slabs, or outside slices of the log, with a good deal of bark, can be used for fuel. In a high grade log, the outer layers of wood will make clear lumber, but the center will have small knots left by the branches of the young tree. A good sawyer tries to secure the largest possible amount of clear sound lumber from each log.

A woodland owner who has only a few logs to sell will have trouble in finding a good market. The mill that might be glad to buy that kind of logs may be fifty miles away. If we are going to practice forestry in Connecticut at a profit, our marketing of logs and other forest products must be better organized. We are working on plans for cooperative marketing associations, or perhaps one association for the entire State. The association would employ a trained manager, who would study the market, find out where each timber owner's product could be sold to the best advantage, and make arrangements for the sale. That saves the owner time and trouble, besides bringing him better prices, and he would pay a small commission for this marketing service.

## XIII. PLANTING EVERGREENS

Thus far we have been talking about hardwood forests, which Nature planted for us years ago. Nine-tenths of our woodland in Connecticut is like that. The practice of forestry is much the same in natural groves of pine or hemlock, or where there is a mixture of softwoods and hardwoods.

On old fields, it is often possible to plant white pine or other softwood species. Very few people can afford to do this, because, although it does not cost much money, they must wait fifty or sixty years before there will be any return. But if we are already practicing forestry on our woodland, it is worth while to plant an acre or two each year. The best time for that is in the Spring, as soon as the frost is out of the ground. If set six feet apart, 1,210 trees are needed for an acre. The planting stock, if bought through the Connecticut Agricultural Experiment Station at New Haven, will cost about $10.00. Labor, whether you employ yourself or someone else, is worth perhaps $5.00 more. In plant-

ing evergreens, it is well to leave unplanted strips at intervals, to provide food and cover for wildlife. A mixed forest has a richer soil than a pure softwood forest. If we plant brushland, it will be necessary to go through the plantation two or three times, to hack down the hardwood sprouts that are beginning to shade the pine, which requires a great deal of light.

Evergreens have their own special enemies. The deadly white pine blister rust can be controlled by pulling up all currants and gooseberries within 1,000 feet of the nearest pine stand, as these plants act as hosts for the fungus. There is a weevil that kills the top shoot of young white pines, so that one of the side shoots must take its place, and there will be

TWENTY-THREE-YEAR WHITE PINE PLANTATION, THINNED AND PRUNED

a bad bend in the stem. Weevil damage can be reduced by planting under a partial canopy. The red pine has a European shoot moth which does even greater damage, and may in time kill a young tree. About all we can do on a commercial forest, without too great expense, is take out these misshapen specimens later on, after they have served as trainers for our crop trees.

Good pine land can support 100 or more crop trees to the acre. We begin thinning when the plantation is about twenty years old, and go through it again every ten years. Until the trees reach a good size, the thinnings have little value and may be left on the ground to rot. This looks messy and creates a fire hazard for a short time, but it costs too much to drag the thinnings out of the thick stand. When the trainers we take out will make logs six inches in diameter at the small end, it may be possible to haul them out to make rough lumber.

Pruning is very important. In pine, as in hardwood, the real value comes from the clear butt log, which makes lumber that is practically free from knots. Everywhere there is a branch, there is a knot in the wood. Of course there will be small knots in the center of our best logs, because of the side branches formed when the tree was young, but these will be small and grown over with a deep layer of clear wood. In order to secure these clear butt logs on our softwood crop trees, we prune off all side branches when they are about four inches in diameter, taking all living and dead branches up to half the total height of the tree. A few years later we go through the plantation again and prune up to seventeen feet. The same thing should be done with natural pine stands, if we can catch them young enough. Otherwise the trees will have so many side branches that they will be of little value for lumber.

The advantage of pine is that it produces about twice as many board feet to the acre, as compared with hardwood, and the price is as high or higher. Clear pine logs ought to be worth at least $16.00 a thousand board feet on the stump. Besides pine, hemlock may be used as planting stock. It will stand a great deal of shade, so that it may be planted in the woods to fill gaps. Norway and white spruce do not need quite as much light as pine. All of these species will make fairly good lumber.

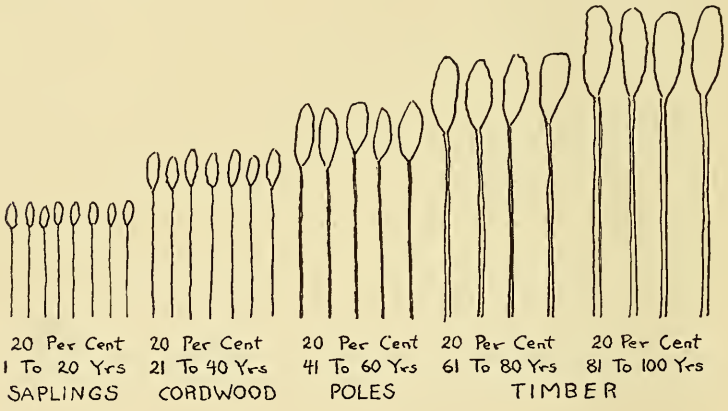
## XIV. MINOR WOODLAND PRODUCTS

The earlier thinnings of spruce plantations, or spruce tops left from lumbering, may be used as Christmas trees. We can also grow Christmas trees as a regular crop, bringing them to maturity in eight or ten years. For this the fir balsam is preferable. If the tree is cut above a live branch, this branch may form a new tree, very much more quickly than we can secure one by replanting.

Speaking of Christmas, have you any mountain laurel on your woodland? Most of the laurel sold for Christmas decorations has been stolen, or at least taken without making any payment to the owner. There is a law that anyone transporting laurel or other greens, without a signed statement from the owner, may be arrested and fined. The

trouble is that people do not know the value of this crop. Why not harvest it yourself? Oak Ridge is good land for this purpose. Laurel will come up again better than ever after it is cut. Ground pine may be harvested in the same way, if you are careful to leave plenty of the long runners to make new growth.

Bittersweet always commands a good market in the Fall. Hemlock branches are in demand all through the year in city cemeteries, to cover open graves at funerals. That may be a way to make some use of our hemlock thinnings, or the branches and tops from lumbering. In south central Connecticut, there is a market for witch hazel and black birch branches, for which the makers of extracts pay about $6.00 a ton, delivered. One timber owner found that the brass foundries need a certain quantity of hickory saplings. If we keep our eyes open, there are many ways to earn something from our woodland, while we are waiting for it to reach its full growth.




IDEAL DISTRIBUTION OF AGE CLASSES
IN FOREST MANAGED ON ROTATION OF 100 YEARS

## XV. THE IDEAL FOREST

Some day, when every landowner in Connecticut is practicing forestry, as they have learned to do in the older countries, we shall have better forests than Nature could have grown without our help. The forest floor will be kept rich, and protected from fire. Each woodlot will have all the crop trees the soil can support, carefully selected for species and shape and vigor. Every year some of these crop trees will become ripe and ready to cut, so that the owner is receiving a steady income. And it will be a good income, because part of each tree will make clear lumber that commands a high price. Through the rest of the woodlot will be other stands of various ages, from which future crops will come. With the cordwood which we take out in the way of im-

provement cuttings, we shall be heating our houses and supplying power for our factories, unless we find a use for it in making wood acid or paper or fibre board. Forest land will go up in price, because of what it is able to earn year after year. Cooperative marketing associations will find the best market for all our forest products. And because of the steady supply of raw material, our country villages will again have their wood-using industries, just as they did in the early days. Forestry will pay so well that the timber owner will wonder why anyone ever stripped off his woodland just for cordwood.

That picture is in the future, but perhaps not a very distant future. You and I may live to see it. Let us start to make it come true on our own woodland.

## XVI. SOME GOOD READING

*CCC Forestry.* Superintendent of Documents, Washington, D. C., $1.00. A good general treatment of forestry, with helpful illustrations.

Joseph S. Illick, *Outline of General Forestry.* Barnes and Noble, New York, $1.50. Includes selected references for each chapter.

Albert F. Blakeslee and Chester D. Jarvis, *Trees in Winter.* Macmillan, $2.50. Pictures especially valuable for tree identification.

H. P. Brown, *Trees of the Northeastern United States.* Christopher Publishing Co., Boston, $3.00.

*Handbook of American Trees and Wood Finishing.* S. C. Johnson and Son, Racine, Wis., twenty-five cents. Pictures for identifying 125 trees, with location in U. S.

### STANDARD BOOKS ON FORESTRY

Ralph C. Hawley, *Practice of Silviculture.* Wiley, $3.00.

Herman H. Chapman, *Forest Management.* J. B. Lyon Co., Albany, N. Y., $3.50.

Ralph C. Hawley, *Forest Protection.* Wiley, $2.75.

John S. Boyce, *Forest Pathology.* McGraw-Hill, $5.00.

Samuel A. Graham, *Principles of Forest Entomology.* McGraw-Hill, $3.50.

Ralph C. Bryant, *Lumber, Its Manufacture and Distribution.* Wiley, $5.00.

Nelson C. Brown, *Forest Products, Their Manufacture and Use.* Wiley, $5.00.

### SOILS

Louis A. Wolfanger, *Major Soil Divisions of the U. S.* Wiley, $2.00.

C. F. Marbut, *Soils of the United States.* Separate section of Atlas of Am. Agriculture. Superintendent of Documents, Washington, D. C., paper, $5.00.

*Soils and Men.* Year Book of Agriculture 1938. Superintendent of Documents, Washington, D. C., $1.75. Series of articles covering 1200 pages.

## MAGAZINES

*Connecticut Woodlands,* issued Winter, Spring and Fall, fifty cents a year; free to regular and junior members. Conn. Forest and Park Assn., P.O. Box 1577, New Haven, Conn.

*American Forests,* monthly, $4.00 a year. American Forestry Assn., 919 Seventeenth St., Washington, D. C. Interesting articles, with fine illustrations.

*Wooden Nutmeg,* monthly, free. State Forester, P.O. Drawer 1558, Hartford, Conn.

## FREE PAMPHLETS

State Forester, P.O. Drawer 1558, Hartford, Conn. *Connecticut Laws relating to Forests and Forestry;*

*Forest Property in Connecticut Safeguarded from Excessive Taxation and other Hazards;*

*How to Plant Forest Trees,* by Raymond Kienholz;

*Biennial Reports* of State Park and Forest Commission, 1938 and alternate years. Includes detailed reports by State Forester.

Conn. Agricultural Experiment Station, New Haven, Conn. Bulletin 412, *Survey of Diseases and Defects in Conn. Forests,* by Raymond Kienholz and C. B. Bidwell;

Circular 123, *Use of Water Soluble Preservatives in Preventing Decay in Fence Posts,* by H. W. Hicock.

Conn. Forest and Park Assn., P.O. Drawer 1577. *How to Burn Wood.*

# FOREST TREES OF CONNECTICUT

## WHITE OAK (*Quercus alba* L.)

Within its natural range, which includes practically the entire eastern half of the United States, the white oak is one of the most important timber trees. It commonly reaches a height of sixty to 100 feet and a diameter of two to three feet; sometimes it becomes much larger. It is found in a wide variety of soils. When grown in a dense stand it has a straight continuous trunk, free of side branches for over half its height. In the open, however, the tree develops a broad crown with far-reaching limbs. Well-grown specimens are strikingly beautiful.

WHITE OAK

Twig, one-half natural size. Leaf, one-third natural size.

The **leaves** are alternate, simple, five to nine inches long and about half as broad. They are deeply divided into five to nine rounded, finger-like lobes. The young leaves are a soft silvery gray or yellow or red while unfolding, becoming later bright green above and much paler below.

The **fruit** is an acorn maturing the first year. The nut is three-quarters to one inch long, light brown, about one-quarter enclosed in the warty cup. It is relished by hogs and other livestock.

The **bark** is thin, light ashy gray and covered with loose scales on broad plates.

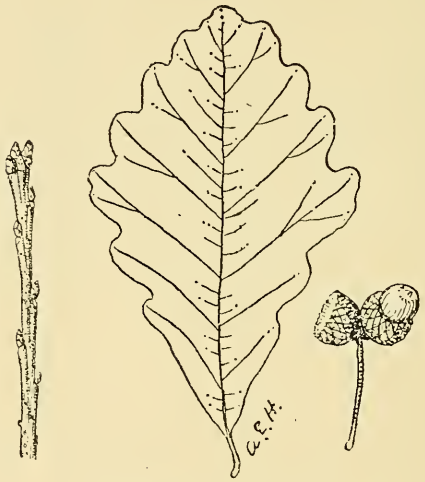
The **wood** is useful and valuable. It is heavy, strong, hard, tough, close-grained, durable, and light brown in color. The uses are many, including construction, shipbuilding, tight cooperage, furniture, wagons, implements, interior finish, flooring, and fuel. Notwithstanding its rather slow growth, white oak is valuable for forest, highway and ornamental planting.

## SWAMP WHITE OAK (*Quercus bicolor* Willd.)
(formerly *Q. platanoides* Sudw.)

The swamp white oak, as the name implies, inhabits the low grounds and bottom lands, and in general appearance is much like that of the true white oak. It is found chiefly in the southern part of the State in association with several other kinds of oaks, maples, ash, and hickories.

The **bark** is deeply and irregularly divided by fissures into broad ridges of a grayish-brown color.

The **leaves** are generally broader at or above the middle length (pear-shape) and wedge-shaped toward the base. They are wavy and indented along the margin, dark green and shiny above and grayish and fuzzy beneath, and five to six inches in length by two to four inches in width.



SWAMP WHITE OAK

The **acorn,** or **fruit,** occurs commonly in pairs and, like all of the white oak group, requires only one season to mature. It is borne on slender stalks from two to four inches in length. The nut or acorn proper is about one inch long by two-thirds of an inch thick and enclosed for about one-third its length in a thick narrow-shaped cup.

The **wood** is heavy, hard, strong and tough, and used for similar purposes as the true white oak, such as furniture, cabinet work, flooring, cooperage, ties, fence posts and fuel.

## CHESTNUT OAK (Rock Oak) (*Quercus montana* Willd.)
(formerly *Q. prinus* L.)

Chestnut oak, also known as mountain oak and rock oak, has acquired these names from its leaf, which resembles that of the chestnut, and from its fondness for rocky or mountain ridges. It is found widely distributed throughout the mountains on dry gravelly and rocky slopes,

ridges and stream banks, and less commonly in the upland part of the State in similar dry, rocky situations. It is noticeably a spreading tree of medium height; at fifteen to twenty feet, the trunk frequently divides into several large, angular limbs, making an open, irregular-shaped head.

CHESTNUT OAK
One-third natural size.

The **bark** is dark reddish-brown, thick, deeply divided into broad, rounded ridges, and is of high commercial value for the extraction of tannic acid.

The **leaves** are simple, alternate, oblong, often rounded at the point, irregularly scalloped or wavy on the edge (not sharp-toothed as in chestnut), five to nine inches long, and shiny yellowish green above, lighter and slightly fuzzy beneath.

The **fruit** is an acorn about an inch long, oval, shiny brown, and enclosed up to half its length in a cup. It ripens in one season, and, like the acorn of the white oak, sprouts in the autumn soon after falling to the ground.

The **wood** is generally similar to that of the other upland white oaks, heavy, hard, strong, and durable in contact with the soil. It is extensively cut into crossties and heavy timbers for bridge, railroad, and other rough construction, and used for fence posts and fuel.

## RED OAK (*Quercus borealis maxima* Ashe)
(formerly *Q. rubra* L.)

The northern red oak occurs throughout the State, but is most common and of best quality in the higher situations. It is not found in swamps. It usually attains a height of about seventy feet and a diameter ranging from two to three feet, but is sometimes much larger. The forest-grown tree is tall and straight with a clear trunk and narrow crown.

RED OAK
Leaf, one-third natural size.
Twig, one-half natural size.

The **bark** on young stems is smooth, gray to brown, on older trees thick and broken by shallow fissures into regular, flat, smooth-surfaced plates.

The **leaves** are simple, alternate, five to nine inches long and four to six inches wide, broader toward the tip, divided into seven to nine lobes, each lobe being somewhat coarsely toothed and bristle-tipped, and firm, dull green above, paler below, often turning a brilliant red after frost.

The **flowers,** as in all the oaks, are of two kinds on the same tree, the male in long, drooping, clustered catkins, opening with the leaves, the female solitary or slightly clustered.

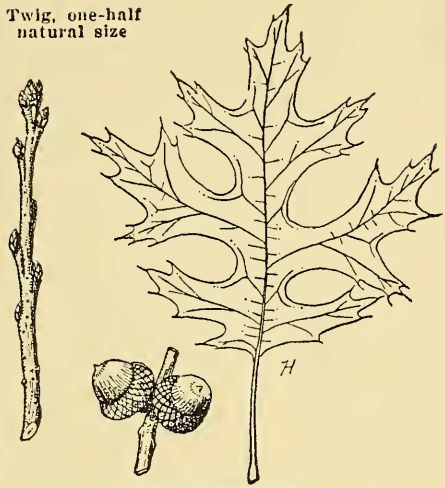
The **fruit** is a large acorn maturing the second year. The nut is from three-fourths to one and three-fourths inches long, blunt-topped, flat at base, with only its base enclosed in the very shallow dark-brown cup.

The **wood** is hard, strong, coarse-grained, with light reddish-brown heartwood and thin lighter-colored sapwood. It is used for cooperage, interior finish, construction, furniture, and crossties. Because of its average rapid growth, high-grade wood, and general freedom from insect and fungus attack, it is widely planted for timber production and as a shade tree.

## SCARLET OAK (*Quercus coccinea* Muench.)

Scarlet oak, also known as pin, Spanish or spotted oak, occurs usually on dry, rocky, or sandy soils, throughout the uplands of the lower mountains, but is nowhere very abundant or of first importance. It usually reaches a height of sixty or eighty feet, with a trunk diameter of two or three feet, and is sometimes larger. The branches droop at the ends and form a narrow, open crown and the trunk tapers rapidly.

The **bark** on young stems is smooth and light brown. On old trunks it is divided into ridges not so rough as those of the black oak and not so




SCARLET OAK
Leaf, one-third natural size.

flat-topped as those of the northern red oak. The bark is often mottled or spotted with gray. The inner bark is reddish.

The **leaves** are simple, alternate, somewhat oblong or oval, three to six inches long, two and one-half to four inches wide, usually seven-lobed, the lobes bristle-pointed and separated by rounded openings extending at least two-thirds of the distance to the midrib, giving the leaves a very deeply "cut" appearance. The leaves turn a brilliant scarlet in the Autumn before falling.

The **flowers** are of two kinds on the same tree and appear when the leaves are two-thirds or one-half grown.

The **fruit** takes two years to mature. The acorn is one-half to one inch long, reddish-brown, often striped, and about half-enclosed in the cup.

The **wood** is heavy, hard, strong and coarse-grained. The lumber is sold as red oak and has the same uses. It is usually somewhat inferior in quality and sometimes known as pin oak. Scarlet oak is used considerably in ornamental planting.

## BLACK OAK (*Quercus velutina* Lam.)

The black oak, sometimes called yellow oak or yellow-barked oak, usually grows to be about eighty feet in height and one to three feet in diameter. It is found commonly throughout the State on dry plains and ridges, but seldom on rich ground. The crown is irregularly shaped and wide, with a clear trunk for twenty feet or more on large trees.

The **bark** on the very young trunks is smooth and dark brown, but soon becomes thick and black, with deep furrows and rough broken ridges. The bright yellow color and bitter taste of the inner bark, due to tannic acid, are distinguishing characteristics.


Twig, one-half natural size.

BLACK OAK
Leaf, one-third natural size.

The **leaves** are alternate, simple, five to ten inches long and three to eight inches wide, shallow or deeply lobed, the shape varying greatly. When mature, the leaves are dark green and shiny on the upper surface, pale on the lower, more or less covered with down and with conspicuous rusty brown hairs in the forks of the veins.

The **fruit** matures the second season. The light brown nut is from one-half to one inch long, more or less hemispherical in shape, and from one-half to three-quarters enclosed in the thin, dark brown, scaly cup. The kernel is yellow and extremely bitter.

The **wood** is hard, heavy, strong, coarse-grained and checks easily. It is a bright red-brown with a thin outer edge of paler sapwood. It is used for the same purposes as red oak, under which name it is put on the market. Its growth is rather slow.

## PIN OAK (*Quercus palustris* Muench.)

Pin oak is rarely found naturally except on the rich moist soil of bottomlands and the borders of swamps. It is usually not abundant in any locality, but found scattered with other kinds of trees. It more commonly attains heights of fifty to seventy feet, with diameters up to two feet, but is sometimes larger. The tree commonly has a single, upright stem with numerous long, tough branches, the lower ones drooping, the middle horizontal, and the upper ascending. The many small bristling twigs and branches give the tree its name.

The **bark** on young stems is smooth, shining and light brown; on old trunks light gray-brown and covered by small, close scales. Because of its beauty, its hardiness, and its fairly rapid growth, pin oak makes an exceptionally fine street tree.

The **leaves** generally resemble those of scarlet oak, but the rounded openings do not extend quite so near to the midrib; they average somewhat smaller, being three to five inches long and two to four inches wide.

PIN OAK
Leaf, one-third natural size.
Twig, one-half natural size.

The **flowers** are of two kinds on the same tree, and appear when the leaves are about one-third grown.

The **fruit,** taking two years to mature, is an acorn nearly hemispheric, about one-half inch long, light brown, often striped, enclosed only at the base in a thin, shallow, saucer-shaped cup.

The **wood** is heavy, hard, strong, and usually knotty. It is light brown, with thin, darker colored sapwood. It is sold and has the same uses as red oak, although it is generally not so good in quality.

## BUTTERNUT (*Juglans cinerea* L.)

The butternut, known as white walnut in the South, is a smaller tree than the black walnut, though where it attains its best development, it reaches a height of seventy feet and a diameter of three feet. The trunk is usually forked or crooked and this makes it less desirable for saw timber.

The **bark** differs from that of the black walnut in being light gray on branches and on the trunk of small trees, becoming darker on large trees. This tree may also be distinguished from black walnut by the velvet collars just above the scars left by last year's leaves.

The compound **leaves** are fifteen to thirty inches long, each with eleven to seventeen sharp-pointed, oblong, finely toothed leaflets two to three inches long.

The **flowers** are of two kinds on the same tree, the male in long yellow-green drooping catkins, the female recognized by the rather conspicuous red-fringed stigmas.

The **fruit** is a nut enclosed in an oblong, somewhat pointed, yellowish-green husk, about two inches long, which is covered with short, rusty, clammy, sticky hairs. The nut has a rough, grooved shell and an oily, edible kernel.

BUTTERNUT
Twig, one-half natural size. Leaf, one-sixth natural size.

The **wood** is light, soft, not strong, coarse-grained, light brown, and takes a good polish. It is used for interior finish of houses and for furniture. A yellow or orange dye can be made from the husks of the nuts.

## BLACK WALNUT (*Juglans nigra* L.)

This valuable tree is very rare in Connecticut, although it is a native of the State. In the forest, where it grows singly, it frequently attains

BLACK WALNUT
Leaf, one-fifth natural size.
Twig, three-quarters natural size.

a height of 100 feet with a straight stem, clear of branches for half its height. In open-grown trees the stem is short and the crown broad and spreading.

The **leaves** are alternate, compound, one to two feet long, consisting of from fifteen to twenty-three leaflets of a yellowish-green color. The leaflets are about three inches long, extremely tapering at the end, and toothed along the margin.

The **bark** is thick, dark brown in color, and divided by rather deep fissures into rounded ridges.

The **fruit** is a nut, borne singly or in pairs, and enclosed in a solid green husk which does not split open, even after the nut is ripe. The nut itself is black with a very hard, thick, finely ridged shell, enclosing a rich, oily kernel, edible and highly nutritious.

The **heartwood** is of superior quality and value. It is heavy, hard and strong, and its rich chocolate-brown color, freedom from warping and checking, susceptibility to a high polish, and durability make it highly prized for a great variety of uses, including furniture and cabinet work, gun-stocks, and airplane propellers. Small trees are mostly sapwood, which is light colored and not durable. Walnut is easily propagated from the nuts and grows rapidly on good soil, where it should be planted and grown for timber and nuts.

## SHAGBARK HICKORY (*Hicoria ovata* Britton) (*Carya ovata* K. Koch)

The shagbark hickory is known by every child of the community because of its sweet and rich-flavored nuts. It is a large commercial tree,

**SHAGBARK HICKORY**
**Leaf, one-third natural size.**
**Twig, one-half natural size.**

averaging 60 to 100 feet high and one to two feet in diameter. It thrives best on rich, damp soil and is common along streams and on moist hillsides throughout the State.

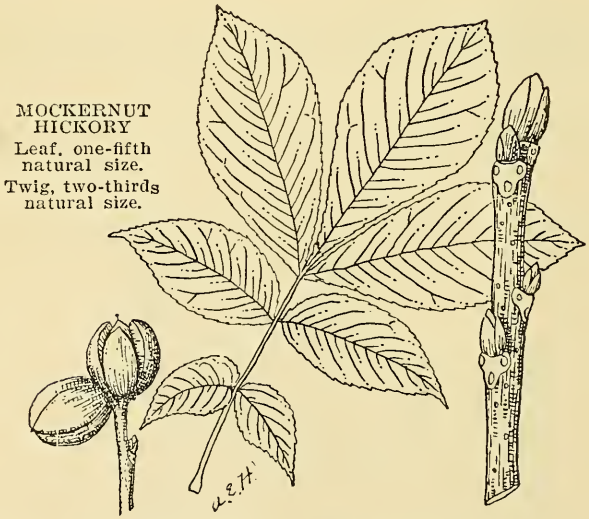
The **bark** of the trunk is rougher than on other hickories, light gray and separating into thick plates which are only slightly attached to the tree. The terminal winter buds are egg-shaped, the outer bud-scales having narrow tips.

The **leaves** are alternate, compound, from eight to fifteen inches long and composed of five, rarely seven, obovate to ovate leaflets. The twigs are smooth or clothed with short hairs.

The **fruit** is borne singly or in pairs, and is globular. The husk is thick and deeply grooved at the seams. The nut is much compressed and pale, the shell thin, and the kernel sweet.

The **flowers** are of two kinds, opening after the leaves have attained nearly their full size.

The **wood** is heavy, hard, tough and very strong. It is used largely in the manufacture of agricultural implements and tool handles, and in the building of carriages and wagons. For fuel the hickories are the most satisfactory of our native trees.



MOCKERNUT HICKORY
Leaf, one-fifth natural size.
Twig, two-thirds natural size.

**MOCKERNUT HICKORY (Bigbud Hickory)** (*Hicoria alba* Britton) (*Carya alba* K. Koch)

The mockernut, white hickory, whiteheart, or bigbud hickory is common on well-drained soils throughout the State. It is a tall, short-limbed tree averaging sixty feet high and one to two feet in diameter.

The **bark** is dark gray, hard, closely and deeply furrowed, often apparently cross-furrowed or netted. The Winter buds are large, round,

or broadly egg-shaped, and covered with downy, hard scales. The recent shoots are short, stout and more or less covered with a downy growth.

The **leaves** are large, strong-scented and hairy, composed of seven to nine obovate to oblong, pointed leaflets which turn a beautiful yellow in the Fall.

The **flowers,** like those of all other hickories, are of two kinds on the same tree; the male in three-branched catkins, the female in clusters of two to five.

The **fruit** is oval, nearly round or slightly pear-shaped with a very thick, strong-scented husk which splits nearly to the base when ripe. The nut is of various forms, but is sometimes four to six ridged, light brown, and has a very thick shell and small, sweet kernel.

The **wood** is heavy, hard, tough and strong; it is white excepting the comparatively small, dark brown heart, hence the name white hickory. It is used for vehicle parts, handles and picker sticks. It furnishes the best of fuel. This and the other hickories are very desirable both for forest and shade trees.

## PIGNUT HICKORY (*Hicoria glabra* Britton) (*Carya glabra* Sweet)

The pignut hickory is a medium to large upland tree, occurring plentifully in all parts of the State. It has a tapering trunk and a narrow oval head.

PIGNUT HICKORY
Leaf, one-third natural size.
Twig, one-half natural size

The **bark** is close, ridged and grayish, but occasionally rough and flaky. The twigs are thin, smooth and glossy brown. The polished brown Winter buds are egg-shaped, the outer reddish brown scales falling in the Autumn.

The **leaves** are smooth, eight to twelve inches long and composed of five to seven leaflets. The individual leaflets are rather small and narrow.

The **fruit** is pear-shaped or rounded, usually with a neck at the base, very thin husks splitting only half way to the base or not at all. The nut is smooth, light brown in color, rather thick-shelled, and has an edible kernel.

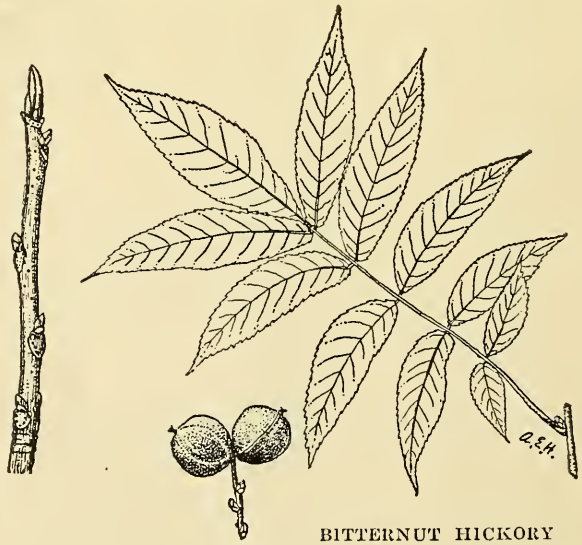
The **wood** is heavy, hard, strong, tough and flexible. Its uses are the same as those of the other hickories.

The small-fruited hickory (*Hicoria microcarpa* Nutt.), by some considered a variety of the pignut hickory, differs from it in having a round fruit and a bark which frequently separates into narrow plates.

The pale-leaved hickory (*Hicoria pallida* Ashe) is found scatteringly in the upland woods. It has pale, delicate foliage. The leaves are woolly or hairy underneath, and when young are covered with silvery scales. The husks are thicker than those of the pignut.

## BITTERNUT HICKORY (*Hicoria cordiformis* Brit.)
(*Carya cordiformis* K. Koch)
(formerly known as *H.* or *C. Minima*)

The bitternut hickory is a tall slender tree with broadly pyramidal crown, attaining a height of 100 feet and a diameter of two to three feet. This is less common in Connecticut than the other species of hickory. It is well known by its roundish bitter nuts.




BITTERNUT HICKORY

The **bark** on the trunk is granite-gray, faintly tinged with yellow, and less rough than in most of the hickories, yet broken into thin, plate-

like scales. The Winter buds are compressed, scurfy, bright yellow, quite different from those of its relatives.

The **leaves** are alternate, compound, from six to ten inches long, and composed of from seven to eleven leaflets. The individual leaflets are smaller and more slender than those of the other hickories.

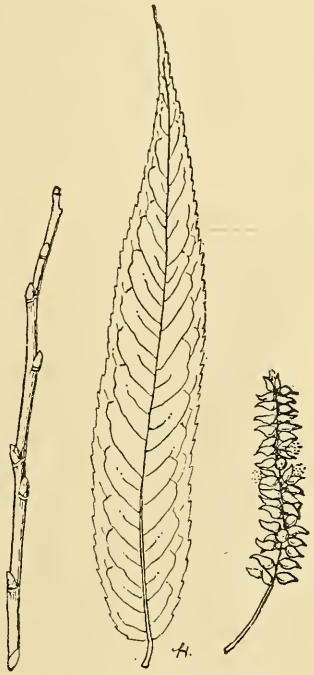
The **flowers,** like those of all the hickories, are of two kinds on the same tree.

The **fruit** or nut is about one inch long and thin-husked, while the nut itself is usually thin-shelled and brittle, and the kernel very bitter.

The **wood** is hard, strong and heavy, reddish-brown in color. From this last fact it gets its local name of red hickory. It is said to be somewhat inferior to the other hickories, but is used for the same purposes.

## BLACK WILLOW (*Salix nigra* Marsh.)

The black willow is common along streams throughout the State except in the high mountains. It rarely grows to be over fifty feet in height and is frequently found singly or in clumps along the water courses. In Winter the easily separable bright reddish-brown or golden, naked twigs are quite conspicuous.



BLACK WILLOW
Two-thirds natural size.

The **leaves** are from three to six inches long and less than one-half an inch wide; the tips are very much tapered and the entire margins finely toothed. The leaves are bright green on both sides, turning pale yellow in the early Autumn.

The **flowers** are in catkins, the male and female on separate trees.

The **fruit** is a pod bearing numerous minute seeds which are furnished with long silky down, enabling them to be blown long distances.

The **bark** is deeply divided into broad, flat ridges which separate into thick plate-like scales. On old trees it becomes very shaggy. In color it varies from light brown tinged with orange to dark brown or nearly black.

The **wood** is soft, light and not strong. A high grade of charcoal, used in the manufacture of gun-powder, is obtained from willow wood, and it is the chief wood used in the manufacture of artificial limbs.

There are many species, or kinds, of willows not easily distinguished. They are of high value in checking erosion and waste along stream banks, for which purpose they should be more extensively planted.

## ASPEN (Popple) (*Populus tremuloides* Michx.)

This is one of the most widely distributed trees in North America. In the State it is one of the first species to come in after cutting or fire. The aspen is a small to medium-sized tree, reaching heights of eighty feet and diameters of twenty inches, but usually somewhat less. The young branchlets are reddish-brown and shiny, after the first year turning to gray and becoming roughened. The Winter buds are about one-fourth inch long, pointed and slightly resinous.

ASPEN
Three-fourths natural size.

The **bark** is thin, yellowish-brown to orange-green, often roughened.

The **leaves** are alternate along the stem, broadly oval, short-pointed at the end, and toothed along the margin, with small swellings or "glands" on the teeth. They are green and shiny above and dull green below, ranging in size up to about four inches in length as well as in breadth.

The **flowers,** like those of all the poplar family, are of two kinds borne on separate trees—the male catkins about two inches long and the female, or pistillate, flowers in a long slender cluster up to four inches in length.

The **fruit** ripens in late Spring or early Summer before the full expansion of the leaves and contains tiny rounded seeds.

The **wood** is light brown, surrounded with nearly white sapwood. It is light, not strong, and extensively used for pulpwood for book and magazine paper, and for boards for food containers, such as lard pails, jelly buckets and fish kits. It is short-lived when used in the ground.

## LARGE-TOOTH ASPEN OR POPLAR (*Populus grandidentata* Michx.)

This is nearly as common as the aspen and frequently grows in mixture with it. It is a rapid grower, sometimes reaching a height of sixty to eighty feet and a diameter of ten to twenty inches. It is a tree of sandy or rich soils that are moist, especially along the borders of streams, ponds or lakes. Its natural range extends from Nova Scotia westward

LARGE-TOOTH ASPEN OR POPLAR

to Minnesota, and southward to the Ohio River and along the Appalachians to North Carolina.

The **bark** is smooth, of a greenish-gray color. At the base of old trees it is dark and divided into broad, flat ridges.

The **buds** are more or less pale and downy and are somewhat larger than those of the other species.

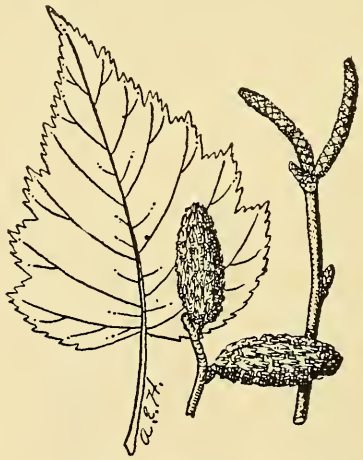
The **leaves** serve to distinguish this species from the popple. They are larger, being three or four inches long, and have a dark green upper surface. The edges are coarsely and irregularly toothed in contrast to the regular and fine toothed edges of the popple.

The **flowers** are in catkins similar to those of the other species.

The **wood** is light brown, with thin and nearly white sapwood, weak, and soft. It is used in the manufacture of paper, excelsior, and to a small extent of woodenware.

## GRAY BIRCH (*Betula populifolia* Marsh.)

The gray birch is a small and comparatively short-lived tree. This is the tree which comes in most prolifically on the abandoned farm lands of Connecticut. It is often called white birch, but should not be confused with the real white birch, which is a much more valuable species.



GRAY BIRCH
Three-quarters natural size

The slender, often angular or twisted, and drooping branchlets with many large pores, or lenticels, are characteristic marks. The bark is reddish brown the first year, with many resinous glands, turning later to light gray, and when older to dull gray.

The **leaves** are doubly toothed, long pointed, and nearly triangular in shape. They are thin, tough, dark green, shiny, and roughened on the

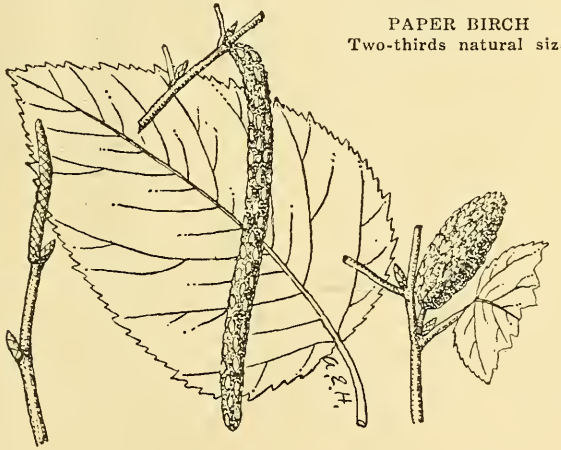
upper surface, about two to three inches long by one and one-half to two inches wide, and turn pale yellow in the Fall.

The **flowers** are of two kinds borne on the same tree. The male, or staminate, are on long slender aments, which appear in Summer or early Fall, but "open" in the Spring; the female, or pistillate, are on a shorter stem, and the tiny seeds, or "nuts," ripen in the Autumn.

The **wood** is light, soft, weak, close-grained, light brown in color with nearly white sapwood. It is used for spools, shoe pegs, and paper pulpwood. It is a cheap wood and much used as firewood.

## WHITE BIRCH (Canoe Birch, Paper Birch) (*Betula papyrifera* Marsh.)

A tree found chiefly in the northwest part of the State in mixture with other trees and often in nearly pure stands covering small areas. It is fond of cool and moist locations and soils. The twigs are dull orange or red during the first Winter, but later become dark brown.



PAPER BIRCH
Two-thirds natural size

The tree trunk is covered with thin, papery **bark,** which becomes pure white with age. It is marked by many pores, or "lenticels," and separates into thin sheets which often roll up. Near the ground on old trees the bark thickens and forms dark-colored scales. A number of varieties are found. The paper birch is much planted for ornamental purposes.

The **leaves** are oval in shape, pointed and at the base rounded, and irregularly or doubly toothed. They are two to three inches long by one to two inches broad, and become thick and leathery in texture, dull green on the upper side and yellowish-green on the lower side.

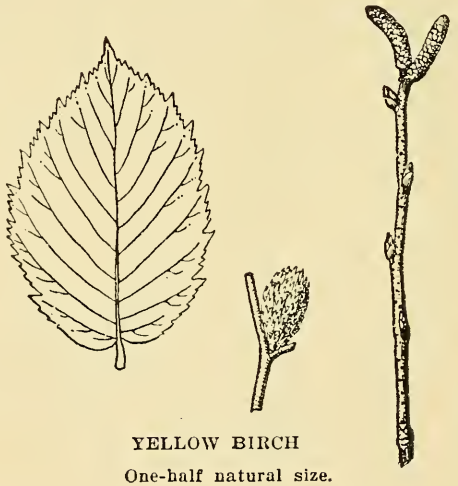
The male **flowers** appear in the Fall, but ripen in the Spring when the female flowers appear and mature. The clusters, or "aments," of

each kind are about twice as long as those of the gray birch, and the **fruit** bears a tiny "nut" about one-sixteenth inch long.

The **wood** is hard, strong, tough, light in weight, brown tinged with red, with nearly white sapwood. It is much used for spools, shoe pegs and lasts, toothpicks, turnery, paperpulp and firewood. The bark was extensively used by the northern Indians for covering their canoes and often their wigwams, and for making baskets, cups, bags, and other useful and ornamental things.

## YELLOW BIRCH (*Betula lutea* Michx.)

The yellow birch is the most valuable birch of New England. In the virgin forests it often attained a large size. Trees 100 feet high and four feet in diameter were common.



YELLOW BIRCH
One-half natural size.

The **bark** of the young trees and branches is silvery or yellow, with thin papery layers separating and often curling at the edges, giving the trunk a ragged appearance. The twigs are light brown, lustrous and slightly aromatic, but less so than those of the black birch. On the large trees the bark is made up of irregular brown plates.

The **leaves** are simple, alternate, oval or approximately oblong, doubly and finely toothed, three to five inches long, dark green and lusterless on the upper surface.

The **flowers** are in catkins; the male, or staminate catkins, purplish and visible all the Winter previous to opening; the female, or pistillate, catkins greenish, erect, shorter and thicker than those of the black birch, and developing in the Spring.

The **wood** is heavy, strong, hard, close-grained. The sapwood is light colored, but the heartwood is dark red, which gives the name of

"red birch" to the lumber from old trees. It is used for flooring, woodenware, furniture, and other uses. It is prized as firewood.

## BLACK BIRCH (*Betula lenta* L.)

The black birch is characteristic of the better and moister soils of the lowlands of the State. On such sites it reaches an average height of seventy feet and a diameter of two feet. The tree is moderately slow growing, but is of value for its products and protection to the soil in the high mountains.

BLACK BIRCH

Twig, one-half natural size. Leaf, one-half natural size.

The **bark** of the trunk is dark brown, almost black, dull and broken into large irregular, but not papery, plates. The small branches and twigs, also dark in color but lustrous and very aromatic, are frequently cut and distilled for the production of birch oil, much used as wintergreen flavoring.

The **leaves** are simple, alternate, oval or approaching oblong, three to four inches long, finely toothed and dark green, dull on the upper surface.

The **flowers** are of two kinds; the male catkins, usually three to four on a shoot, forming in the Summer and blooming the following Spring when the female catkins or "cones" open from the Winter buds. The seeds ripen in late Summer or Autumn and fall with the loosened scales of the "cone."

The **wood** is heavy, very strong, hard and compact. The dark brown color of the wood has given rise to the common local name of mahogany, or mountain mahogany. It is used for furniture, often being sold as "mahogany," and for flooring and interior trimming; locally it is prized as firewood.

## HOP HORNBEAM (Ironwood) (*Ostrya virginiana* K. Koch)

The tree gets its common name from the qualities of its wood and the hop-like fruit. It is a small, slender, generally round-topped tree, from twenty to thirty feet high and seven to ten inches in diameter. The top consists of long slender branches, commonly drooping toward the ends. It is found mostly on rather dry soils throughout the upland and mountain regions.

HOP HORNBEAM
Twig, one-half natural size.
Leaf, three-fourths natural size.

The **bark** is mostly light brown or reddish-brown, and finely divided into thin scales by which the tree, after a little acquaintance, can be easily recognized.

The **leaves** are simple, alternate, generally oblong with narrowed tips, sharply toothed along the margin, sometimes doubly toothed, from two to three inches long.

The **flowers** are of two kinds on the same tree; the male, in drooping catkins which form the previous Summer, the female, in erect catkins on the newly formed twigs.

The **fruit,** which resembles that of the common hop vine, consists of a branch of leafy bracts one to two inches long, containing a number of flattened ribbed nutlets.

The **wood** is strong, hard, durable, light brown to white, with thick pale sapwood; often used for fence posts, handles of tools, mallets and other small articles.

## BLUE BEECH (Hornbeam) (*Carpinus caroliniana* Walt.)

The blue beech, known also as ironwood, hornbeam, and water beech, is a small, slow-growing bushy tree with a spreading top of slender, crooked or drooping branches. It is found along streams and in low ground throughout the State. Its height is usually from twenty to thirty feet and its diameter four to eight inches, although it sometimes grows larger. The trunk is fluted with irregular ridges extending up and down the tree.

BLUE BEECH
Leaf, one-half natural size.
Twig, one-half natural size.

The **bark** is light brownish-gray to dark bluish-gray in color, sometimes marked with dark bands extending horizontally on the trunk.

The **leaves** are simple, alternate, oval, long-pointed, doubly toothed along the margin, two or three inches in length. They resemble those of the black or sweet birch, but are smaller.

The **flowers** are borne in catkins separately on the same tree; the male catkin about one and one-half inches long, the female about three-fourths of an inch, with small, leaf-like, three-lobed green scales.

The **fruit** is a nutlet about one-third of an inch long. It falls, attached to the leaf-like scale which acts as a wing in aiding its distribution by the wind.

The **wood** is tough, close-grained, heavy and strong. It is sometimes selected for use for levers, tool handles, wooden cogs, mallets, wedges, etc. The tree is of little commercial importance and often occupies space in the woods that should be utilized by more valuable kinds.

## BEECH (*Fagus grandifolia* Ehrh.)

The beech occurs throughout the State, but makes the best growth on the cool slopes of Litchfield county, where it is mixed with sugar maple and yellow birch. It is one of the most beautiful of all trees, either in Summer or Winter.

The simple, oval **leaves** are three to four inches long, pointed at the tip, and coarsely toothed along the margin. When mature, they are almost leathery in texture. The beech produces a dense shade. The Winter buds are long, slender and pointed.

The **bark** is, perhaps, the most distinctive characteristic, as it maintains an unbroken, light gray surface throughout its life. So tempting is this smooth expanse to the owner of a jackknife that the beech has been well designated the "initial tree."

The little brown, three-sided beech **nuts** are almost as well known as chestnuts. They form usually in pairs in a prickly burr. The kernel

BEECH
One-half natural size.

is sweet and edible, but so small as to offer insufficient reward for the pains of biting open the thin-shelled husk.

The **wood** of the beech is very hard, strong, and tough, though it will not last long on exposure to weather or in the soil. The tree is of no great economic importance as a lumber tree, though the wood is used to some extent for furniture, flooring, carpenters' tools, and novelty wares.

## CHESTNUT (*Castanea dentata* Borkh.)

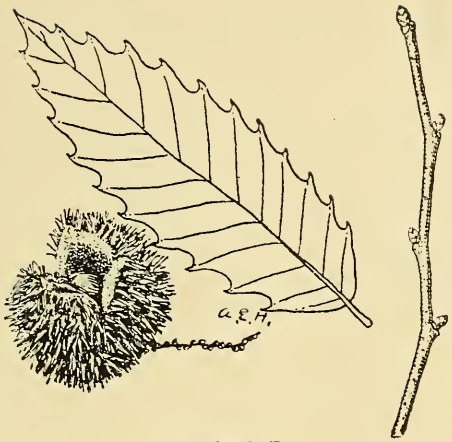
Until recently chestnut was the most important tree of Connecticut. Its wonderful sprouting ability had enabled it to reproduce prolifically after repeated cutting for railroad ties, poles and other products. About twenty years ago it fell a victim of the chestnut blight, which is the most disastrous tree disease of our forests. This disease was imported from Asia and has spread rapidly throughout New England and the Appalachian region. Occasional live sprouts may be found, but these soon become diseased and die.

The long-pointed **leaves** with their coarse teeth, each bearing a slender spine, are quite distinctive. They are simple, alternate, average five to ten inches in length, and are dark green in color.

The **flowers** are of two kinds on the same tree, the long, slender, whitish catkins opening in midsummer.

The **fruit** is a prickly burr, which opens at the first frost, or earlier, and drops two or three shiny, brown, sweet, edible nuts.

The **bark** becomes broken into light gray, broad, flat ridges, which often have a tendency toward a spiral course around the trunk.



CHESTNUT
Leaf, one-third natural size.
Twig, one-half natural size.

The **wood** is light, soft, not strong, coarse-grained and very durable in contact with the soil—qualities which make it particularly valuable for posts, poles, crossties, as well as for light building construction. The wood is rich in tannin, and in the southern Appalachians it is extensively cut and used for the extraction of this valuable commercial product.

## AMERICAN ELM (White Elm) (*Ulmus americana* L.)

The famous shade tree of New England, whose range, however, extends to the Rocky Mountains and southward to Texas. Within this vast area, it is generally common except in the high mountains and wet bottom lands. It often reaches a height of 70 to 100 feet and a diameter of two to three feet.

AMERICAN ELM
Leaf, one-third natural size.
Twig, one-half natural size.

The **bark** is dark gray, divided into irregular, flat-topped, thick ridges, and is generally firm, though on old trees it tends to come off in flakes. An incision into the inner bark will show alternate layers of brown and white.

The **leaves** are alternate, simple, four to six inches long, rather thick, somewhat one-sided, double-toothed on the margin, and generally smooth above and downy below. The leaf veins are very pronounced and run in parallel lines from the midrib to leaf-edge.

The **flowers** are small, perfect, greenish, on slender stalks sometimes an inch long, appearing before the leaves in very early Spring.

The **fruit** is a light green, oval-shaped samara (winged fruit) with the seed portion in the center and surrounded entirely by the wing. A deep notch in the end of the wing is distinctive of the species. The seed ripens in the Spring and by its wing is widely disseminated by the wind.

The **wood** is heavy, hard, strong, tough, and difficult to split. It is used for hubs of wheels, saddle trees, boats and ships, barrel hoops, and veneer for baskets and crates.

Because of its spreading fan-shaped form, graceful pendulous branches, and long life, the white elm justly holds its place as one of the most desirable shade trees.

## SLIPPERY ELM (Red Elm) (*Ulmus fulva* Michx.)

The slippery elm, or red elm, grows in all sections of the State except in the high mountains, but is nowhere abundant. It is found principally on the banks of streams and on low hillsides in rich soil. It is a tree of small to moderate size, but noticeably wide-spreading. It is usually less than forty feet in height and six inches in diameter, although trees of larger dimensions are occasionally found.


Twig, one-half natural size. SLIPPERY ELM Leaf, one-third natural size.

The **bark** on the trunk is frequently one inch thick, dark grayish-brown, and broken by shallow fissures into flat ridges. The inner bark

is used to some extent for medicinal purposes, as it is fragrant and, when chewed, affords a slippery, mucilaginous substance, whence the tree gets its name.

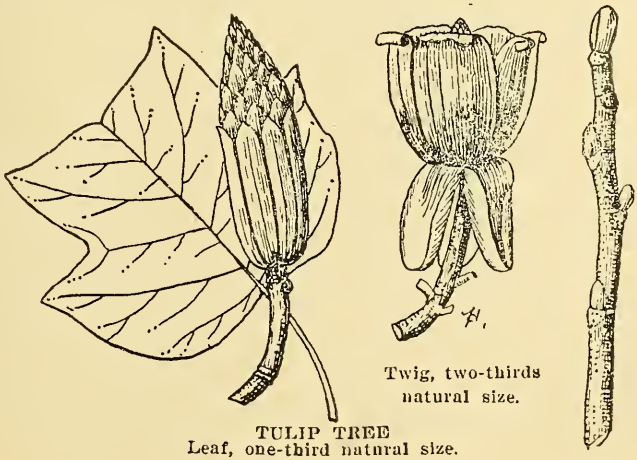
The **leaves** are simple, alternate on the stem, four to six inches in length, sharp-pointed, their bases unsymmetrical, doubly-toothed on the edges, thick, dark green, and rough on both sides.

The **fruit** consists of a seed surrounded by a thin, broad, greenish wing, about one-half an inch in diameter; the flowers appear in early Spring and the fruit ripens when the leaves are about half grown.

The **wood** is close-grained, tough, strong, heavy, hard, moderately durable in contact with the soil. It is used for fence-posts, crossties, agricultural implements, ribs for small boats and for some other purposes.

## TULIP, WHITEWOOD (Yellow Poplar) (*Liriodendron tulipifera* L.)

The tulip tree receives its name from the attractive tulip-like flowers. It is one of the largest and most valuable hardwood trees of the United States. It occurs commonly in the warmer parts of the State, and reaches its largest size in the deep moist soils along streams. As more commonly seen it has a height of sixty to eighty feet and a diameter of two to four feet. Original-growth trees further south attain heights of 150 to 190 feet and diameters up to ten feet. The yellow color of the heartwood gave the tree its lumber-trade name of "yellow poplar." Growing with a straight central trunk like the pines, and often clear of limbs for thirty to fifty feet, it has a narrow pyramidal head which in older age becomes more spreading. The tree is reproducing rapidly and remains one of the most important and valuable trees in the young second-growth forest. It has been planted as an ornamental and shade tree.



Twig, two-thirds natural size.

TULIP TREE
Leaf, one-third natural size.

The **leaves** are simple, four to six inches in length and breadth, four-lobed, dark green in Summer, turning to a clear yellow in the Fall.

The greenish-yellow tulip-shaped **flowers** appear in April.

The **fruit** is a narrow light brown, upright cone, two to three inches long, made up of seeds, each enclosed in a hard bony coat and provided with a wing which makes it easily carried by the wind.

The **wood** is light, soft, easily worked, light yellow or brown, with wide cream-colored sapwood. It is extensively cut into lumber for interior and exterior trim, vehicle bodies, veneers, turnery and other high-grade uses.

## SASSAFRAS (*Sassafras officinale* N. and E.)

The sassafras is a small, aromatic tree, usually not over forty feet in height, or a foot in diameter. It is common throughout the State on dry soils, and is one of the first broad-leaf trees to come up on abandoned fields, where the seeds are dropped by birds. It is closely related to the camphor tree of Japan.

SASSAFRAS

**Twig, one-half natural size.** **Leaf, one-third natural size.**

The **bark** of the trunk is thick, red-brown and deeply furrowed and that of the twigs is bright green.

The **leaves** are very characteristic. It is one of the few trees having leaves of widely different shape on the same tree, or even on the same twig. Some are oval and entire, four to six inches long; others have one lobe, resembling the thumb on a mitten; while still others are divided at the outer end into three distinct lobes. The young leaves and twigs are quite mucilaginous.

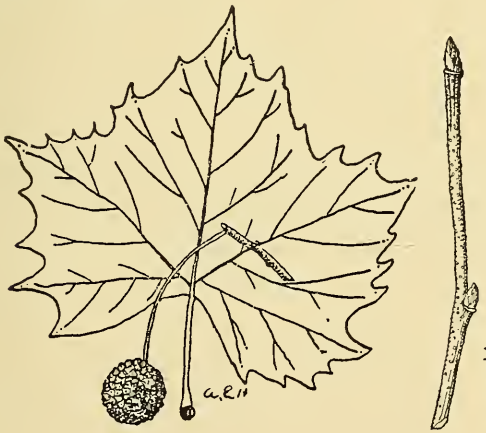
The **flowers** are clustered, greenish-yellow, and open with the first unfolding of the leaves. The male and female flowers are usually on different trees.

The **fruit** is an oblong, dark blue or black, lustrous berry, containing one seed and surrounded at the base by what appears to be a small orange-red or scarlet cup at the end of a scarlet stalk.

The **wood** is light, soft, weak, brittle, and durable in the soil; the heartwood is dull orange-brown. It is used for posts, rails, boat-building, cooperage and for ox-yokes. The bark of the roots yields the very aromatic oil of sassafras much used for flavoring candies and various commercial products.

## SYCAMORE (*Platanus occidentalis* L.)

The sycamore, also called buttonwood, is considered the largest hardwood tree in North America. It occurs throughout the State, but is most abundant and reaches its largest size along streams and on rich bottomlands. A particularly large specimen, over four feet in diameter, stands on the east bank of the Farmington River near the Weatogue bridge. It is one of the more rapid-growing trees. It often forks into several large secondary trunks, and the massive spreading limbs form an open head sometimes 100 feet across.



SYCAMORE
Leaf, one-third natural size.
Twig, one-half natural size.

The **bark** of the sycamore is a characteristic feature. On the younger trunk and large limbs it is very smooth, greenish-gray in color. The outer bark yearly flakes off in large patches and exposes the nearly white younger bark. Near the base of old trees the bark becomes thick, dark brown and divided by deep furrows.

The **leaves** are simple, alternate, four to seven inches long and about as broad, light green and smooth above, and paler below. The base of the leafstalk is hollow and in falling off exposes the Winter bud.

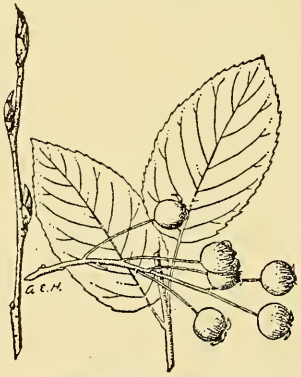
The **fruit** is a ball about one inch in diameter, conspicuous throughout the Winter as it hangs on its flexible stem, which is three to five inches long. During early Spring the fruit ball breaks up, and the small seeds are widely scattered by the wind.

The **wood** is hard and moderately strong, but decays rapidly in the ground. It is used for butchers' blocks, tobacco boxes, furniture and interior finish.

The European sycamore, or plane tree, is less subject to disease than our species and has been widely planted in this country for ornament and shade.

## SHADBUSH OR SERVICE BERRY (*Amelanchier canadensis* Medic.)

The shadbush, as it is more commonly called, has no importance except for its frequency throughout the State and the touch of beauty its flowers give to our forests early in the Spring before the foliage has come out. It is a small tree twenty to fifty feet high and seldom over eight inches in diameter, with a rather narrow, rounded top, but is often little more than a shrub. The name shadbush was early given by the settlers who noticed that it blossomed when the shad were running up the streams.



SERVICE BERRY, OR SHADBUSH
One-half natural size.

The **leaves** are alternate, slender-stalked, ovate, pointed, finely toothed, two to four inches long, purplish-brown until nearly mature, then becoming a light green, and early covered with scattered silky hairs.

The white **flowers** appear in erect or drooping clusters in early Spring, before or with the leaves, making the tree quite conspicuous in the leafless or budding forest.

The **fruit** is sweet, edible, rounded, dark purple when ripe, one-third to one-half an inch in diameter, ripening early in June. Birds and other denizens of the forest are very fond of the fruit, and men have been known to cut down and destroy the trees to gather one good crop of fruit.

The **wood** is heavy, exceedingly hard, strong, close-grained and dark brown. It is occasionally used for handles. This is a desirable ornamental tree and should be planted for this purpose and to encourage the birds.

## BLACK CHERRY (*Prunus serotina* Erh.)

A medium-sized tree, up to about seventy feet high and one to three feet in diameter, black cherry as a tree is at its best in the high mountains. The forest-grown trees have long clear trunks with little taper; open-grown trees have short trunks with many branches and irregular spreading crowns.

BLACK CHERRY
Leaf, one-third natural size.
Twig, two-thirds natural size.

The **bark** on branches and young trunks is smooth and bright reddish-brown, marked by conspicuous narrow, white, horizontal lines, and has a bitter-almond taste. On the older trunks the bark becomes rough and broken into thick, irregular plates.

The **leaves** are alternate, simple, oval to lance-like in shape, with edges broken by many fine incurved teeth, thick and shiny above, and paler beneath.

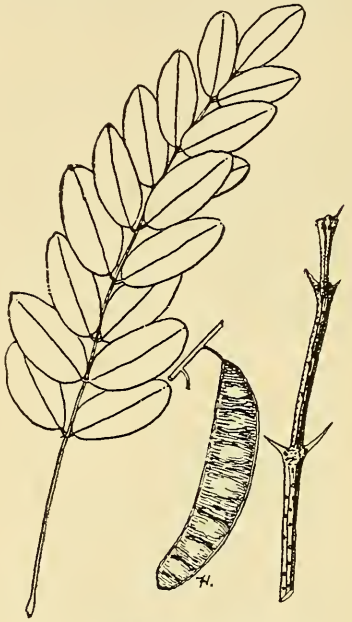
The **fruit** is dull purplish-black, about as large as a pea, and is borne in long hanging clusters. It ripens in late Summer, and is edible, although it has a slightly bitter taste.

The **wood** is reddish-brown with yellowish sapwood, moderately heavy, hard, strong, fine-grained, and does not warp or split in seasoning. It is valuable for its lustre and color and is used for furniture, interior finish, tools, and implement handles. With the exception of black walnut, the cherry lumber has a greater unit value than any other hardwood of the eastern United States.

## BLACK LOCUST (*Robinia pseudacacia* L.)

Although native the black locust can hardly be classed as a forest tree in Connecticut. It occurs in clumps usually run wild from trees planted about houses. It is so badly infested with the locust borer that, except on the best soils, it has little value in this State. The twigs and

branchlets are armed with straight or slightly curved sharp, strong spines, sometimes as much as one inch in length, which remain attached to the outer **bark** for many years. The bark is dark brown and divides into strips as the tree grows older.



**BLACK LOCUST**
Leaf, one-third natural size.
Twig, two-thirds natural size.

The **leaves** are pinnate, or feather-like, from six to ten inches in length, consisting of from seven to nineteen oblong thin leaflets.

The **flowers** are fragrant, white or cream-colored, and appear in early Spring in graceful pendant racemes.

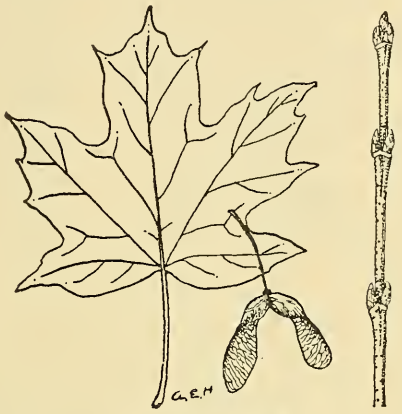
The **fruit** is a pod from three to five inches long, containing four to eight small hard seeds which ripen late in the Fall. The pod splits open during the Winter, discharging the seeds. Some seeds usually remain attached to each half of the pod, and this acts as a wing upon which the seeds are borne to considerable distances before the strong Spring winds.

The **wood** is yellow in color, coarse-grained, very heavy, very hard, strong, and very durable in contact with the soil. It is used extensively for fence posts, poles, tree nails, insulator pins and occasionally for lumber and fuel.

## SUGAR MAPLE (*Acer saccharum* Marsh.)

The sugar maple has been used as a source of sugar ever since the days of the Indians. Sugar "orchards" or "bushes" have always been

characteristic of the farms of northern New England. In Connecticut they are becoming very scarce and are practically confined to Litchfield County. The tree, however, is widely scattered in our northern forests, and is extensively used as a street tree because of its symmetrical form



**SUGAR MAPLE**
**Leaf, one-third natural size.**

The **bark** on young trees is light gray to brown and rather smooth, but as the tree grows older it breaks up into long, irregular plates or scales, which vary from light gray to almost black. The twigs are smooth and reddish-brown, and the Winter buds sharp-pointed. The tree attains a height of more than 100 feet and a diameter of three feet or more. The sap yields maple sugar and maple syrup.

The **leaves** are three to five inches across, simple, opposite, with three to five pointed and sparsely toothed lobes, the divisions between the lobes being rounded. The leaves are dark green on the upper surface, lighter green beneath, turning in Autumn to brilliant shades of dark red, scarlet, orange and clear yellow.

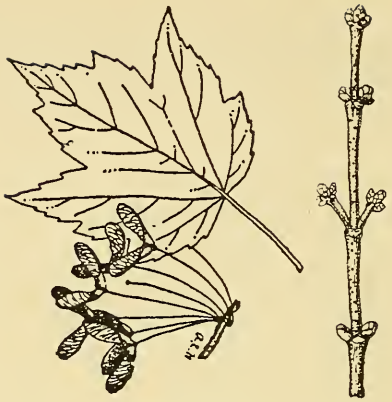
The **flowers** are yellowish-green, on long thread-like stalks, appearing with the leaves, the two kinds in separate clusters.

The **fruit,** which ripens in the Fall, consists of a two-winged "samara," or "key," the two wings nearly parallel, about one inch in length and containing a seed. It is easily carried by the wind.

The **wood** is hard, heavy, strong, close-grained and light brown in color. It is known commercially as hard maple, and is used in the manufacture of flooring, furniture, shoe-lasts and a great variety of novelties.

## RED MAPLE (*Acer rubrum* L.)

The red maple, or swamp maple, is widely distributed throughout the State. It is usually a medium-sized tree, quick-growing and relatively short-lived. It is used as a shade tree, though inferior for this purpose to the other maples, especially the sugar maple.



RED MAPLE
Leaf, one-third natural size.
Twig, one-half natural size.

The **bark** is smooth and light gray on young stems, and dark gray and rough on the old limbs and trunk.

The **leaves** are two to five inches long and have from three to five pointed, saw-toothed lobes, which are separated by sharp angular sinuses or openings. The upper surface when mature is light green and the lower surface whitish and partly covered with pale down. In Autumn the leaves turn to brilliant shades of red, orange and yellow.

The red **flowers** in dense clusters appear in early Spring before the leaves, the buds turning a deep red some time before they open. The Winter buds are small, red and round or blunt-pointed.

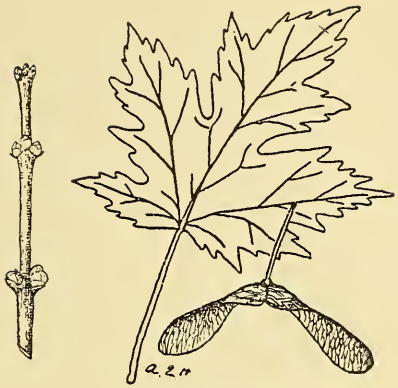
The **fruit** ripens in late Spring or early Summer. It consists of pairs of winged seeds, or keys, one-half to one inch in length, on long drooping stems, red, reddish-brown or yellow in color.

The **wood,** which is commercially known as soft maple, is heavy, close-grained, rather weak and of a light brown color. It is used in the manufacture of furniture and for turnery, woodenware, and also for fuel.

## SILVER MAPLE (White Maple) (*Acer saccharinum* L.)

The silver, white, or soft maple occurs rarely except on moist land and along streams. It attains heights of 100 feet or more and diameters of two feet or over. It usually has a short trunk which divides into a number of large ascending limbs. These again subdivide, and the small branches droop but often turn upward at the tips.

The **bark** on the old stems is dark gray and broken into long flakes or scales; on the young shoots it is smooth and varies in color from reddish to a yellowish-gray. The silver maple grows rapidly and has been much planted as a shade tree. Because of the brittleness of its wood, it is often damaged by Summer storms and Winter sleet.



SILVER MAPLE

The **leaves** are opposite on the stem, have from three to five lobes ending in long points with toothed edges, and are separated by deep angular sinuses or openings. They are pale green on the upper surface and silvery-white underneath.

The **buds** are rounded, red or reddish-brown, blunt-pointed, generally like those of red maple.

The **flowers** appear in the Spring before the leaves, in dense clusters, and are of a greenish-yellow color.

The **fruit** ripens in late Spring. It consists of a pair of winged seeds or "keys" with wings one to two inches long on slender, flexible, thread-like stems about an inch long.

The **wood** is soft, weak, even-textured, rather brittle, easily worked, and decays readily when exposed. It is considerably used for box boards, furniture and fuel.

## BASSWOOD (*Tilia* species)

The basswoods are a group of forest trees distinctive, yet as a group so similar that they are being considered together. They are found over the State, but more abundantly in the mountains, where they are valuable timber trees, attaining heights of eighty feet and diameters of three feet.

The **bark** is light brown, deeply furrowed, and is often peeled for making rough camp buildings. The inner bark furnishes bast for making mats.

The **leaves** are more or less heart-shaped, three to six inches long, thin, saw-toothed, smooth on both sides in some species, but woolly on the under surface of others.

The **flowers** are yellowish-white, in drooping clusters, opening in early Summer, and the flower stem is united to the middle of a long, narrow, leaf-like bract. They are very fragrant and from them the bees make large amounts of choice-grade honey.

The **fruit** is a berry-like, dry, one or two seeded and rounded pod, one-quarter to one-half inch in diameter, covered with short, thick and

BASSWOOD
Leaf, one-third natural size.
Twig, one-half natural size.

brownish wool. It remains attached in clusters to the leafy bract, which later acts as a wing to bear it away on the wind.

The **wood** is light, soft, tough, not durable, light brown in color. It is used in the manufacture of pulp, woodenware, furniture, trunks, excelsior and many other articles.

The common species in Connecticut is *Tilia glabra* Vent (formerly *T. americana* L.)

## DOGWOOD (*Cornus florida* L.)

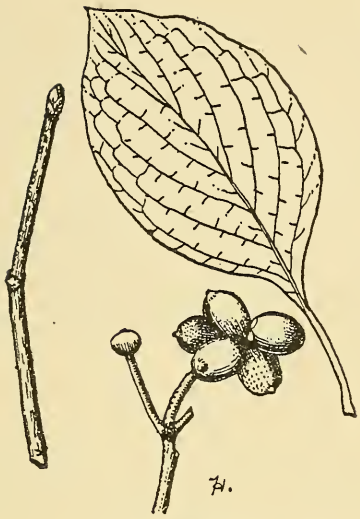
The dogwood, sometimes referred to in books as flowering dogwood, is found growing throughout the State, usually under the larger forest trees. It is a small tree, usually fifteen to thirty feet high and six to twelve inches in diameter, occasionally larger, with a rather flat and spreading crown and short, often crooked trunk.

The **bark** is reddish-brown to black and broken up into small four-sided scaly blocks.

The **leaves** are opposite, ovate, three to five inches long, two to three inches wide, pointed, entire or wavy on the margin, bright green above, pale green or grayish beneath.

The **flowers,** which unfold from the conspicuous, round, grayish Winter flower buds before the leaves come out, are small, greenish-yellow, arranged in dense heads surrounded by large white or rarely pinkish petal-like bracts, which give the appearance of large spreading flowers two to four inches across.

The **fruit** is a bright scarlet "berry" one-half an inch long and containing a hard nutlet in which are one to two seeds. Usually several



DOGWOOD
Leaf, one-half natural size.
Twig, two-thirds natural size.

fruits, or "berries," are contained in one head. They are relished by birds, squirrels and other animals.

The **wood** is hard, heavy, strong, very close-grained, brown to red in color. It is in great demand for cotton-mill machinery, turnery handles and forms. One other tree has quite similar wood—the persimmon.

The dogwood, with its masses of early Spring flowers, its dark red Autumn foliage and its bright red berries, is probably our most ornamental native tree. It should be used much more extensively in roadside and ornamental planting.

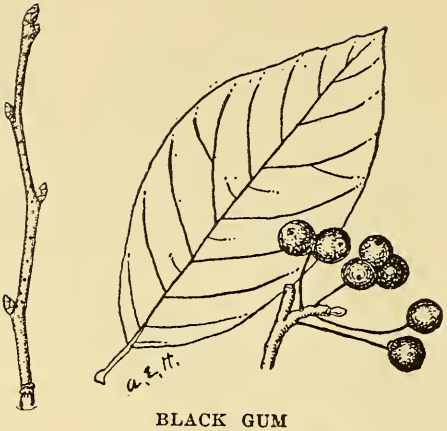
## BLACK GUM (Pepperidge) (*Nyssa sylvatica* Marsh.)

The black gum, often called pepperidge, has been considered a weed in the forest. Weed-like, it finds footing in many types of soil and conditions of soil moisture throughout the State. In the lowlands it is occasionally found in year-round swamps and in the hills and mountains on dry slopes with oaks and hickories.

The **leaves** are simple, two to three inches long, entire, often broader near the apex, shiny, and dark green in color. In the Fall the leaves turn a most brilliant red.

The **bark** on younger trees is furrowed between flat ridges, and gradually develops into quadrangular blocks that are dense, hard and nearly black.

The greenish **flowers** on long slender stems appear in early Spring when the leaves are about one-third grown. They are usually of two kinds, the male in many-flowered heads and the female in two, to several, flowered clusters on different trees.



BLACK GUM
Two-thirds natural size.

The **fruit** is a dark blue, fleshy berry, two-thirds of an inch long, containing a single hard-shelled seed, and is borne on long stems, two to three in a cluster.

The **wood** is very tough, cross-grained, not durable in contact with the soil, hard to work, and warps easily. It is used for crate and basket veneers, box shooks, rollers, mallets, rough floors, mine trams, pulpwood, and fuel. In the old days, the hollow trunks were used for "bee-gums."

## WHITE ASH (*Fraxinus americana* L.)

The white ash is found throughout the State, but grows to best advantage in the rich moist soils of mountain coves and river bottom-lands. It reaches an average height of fifty to eighty feet and a diameter of two to three feet, though much larger trees are found in virgin forest.

WHITE ASH
Twig, one-half natural size. Leaf, one-third natural size.

The **bark** varies in color from a light gray to a gray-brown. The rather narrow ridges are separated with marked regularity by deep, diamond-shaped fissures.

The **leaves** of the white ash are from eight to twelve inches long and have from five to nine plainly stalked, sharp-pointed leaflets, dark green and smooth above, pale green beneath. The ashes form the only group of trees in eastern America that have opposite, compound leaves with five or more leaflets. This fact in itself provides a ready means of identifying the group.

The **flowers** are of two kinds on different trees, the male in dense reddish-purple clusters and the female in more open bunches.

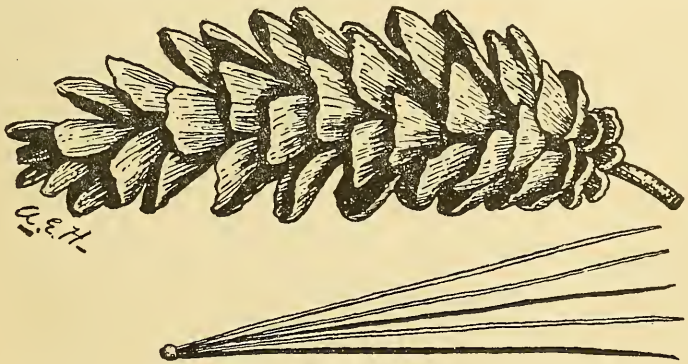
The **fruit** of the ash is winged, one to one and one-half inches long, resembling the blade of a canoe paddle in outline, with the seed at the handle end. The fruits mature in late Summer and are distributed effectively by the winds.

The **wood** of the white ash is extremely valuable on account of its toughness and elasticity. It is preferred to all other native woods for small tool handles, such athletic implements as rackets, bats and oars, and agricultural implements. It is also used extensively for furniture and interior finish.

## WHITE PINE (*Pinus strobus* L.)

The white pine was an important tree throughout the northern part of the State and was probably scattered in other sections. It was highly prized by the early settlers for ship masts as well as for building purposes. The old white pine paneling of the colonial houses is now greatly valued. Its straight stem, regular pyramidal shape and soft gray-green foliage make it universally appreciated as an ornamental tree. Its rapid growth and hardiness, and the high quality of the wood make it one of the most desirable trees for forest planting.

The trunk is straight, and, when growing in the forest, clear of branches for many feet. The branches extend horizontally in whorls



WHITE PINE
Two-thirds natural size.

(i. e., arranged in a circle on the stem), marking the successive years of upward growth.

The **bark** is thin and greenish-red on young trees, but thick, deeply furrowed and grayish-brown on older trees. The Cathedral pines in Cornwall and the Quinnebaug pines in Putnam bear evidence to the size which this species can attain. Trees 140 feet in height and three feet in diameter may be found in these stands.

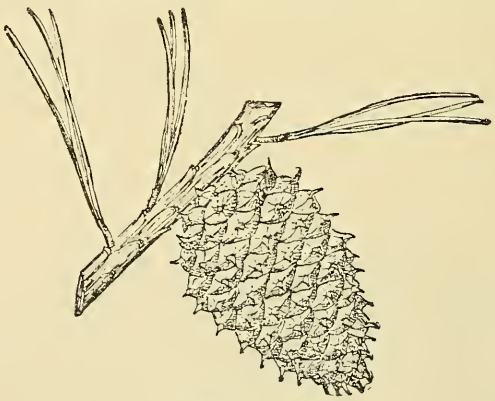
The **leaves,** or needles, are three to five inches in length, bluish-green on the upper surface and whitish beneath, and occur in bundles of five, which distinguishes it from all other eastern pines.

The **cone,** or fruit, is four to six inches long, cylindrical, with thin, usually very gummy scales, containing small, winged seeds which require two years to mature.

The **wood** is light, soft, not strong, light brown in color, often tinged with red, and easily worked. The lumber is in large demand for construction purposes, box boards, matches and many other products.

## PITCH PINE (*Pinus rigida* Mill.)

The pitch pine grows on dry ridges and slopes. It occurs mostly scattered, or in small groups with hardwoods or other pines. It attains a height commonly fifty to seventy-five feet and a diameter of one to two feet. The trunk is erect, and at heights of twenty to thirty feet branches into a close head made up of rather large branches and noticeably thick foliage. It has shorter leaves and larger cones, or burrs, and generally a rougher and less straight trunk than the Norway, or red, pine.



PITCH PINE
One-half natural size.

The **leaves,** which are found in clusters of three each, are three to five inches long, stiff, dark yellowish-green in color and stand out straight from the twigs. They fall during the second year after forming.

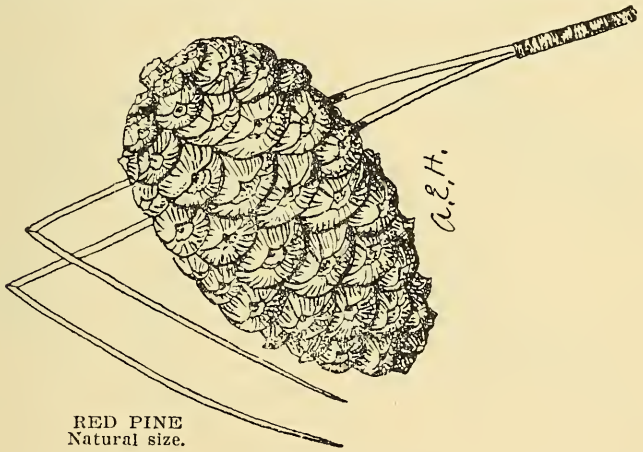
The **cones** are one to three inches long and light brown in color. They usually cling to the branches for several years, sometimes for ten to twelve years.

The **bark** on the stems and branches is rough. On mature trees it is dark gray or reddish-brown, and irregularly divided into broad, flat, continuous ridges.

The **wood** is light, soft and brittle. It is sawed into lumber for general construction and is used for fuel. This tree is able to grow on very poor soil and has the capacity, when young, of sprouting successfully from the base of the stump when burned or cut back.

## RED PINE OR NORWAY PINE (*Pinus resinosa Ait.*)

The red, or Norway, pine is of importance in Connecticut chiefly because of its increasing popularity for planting. Its freedom from disease and insect attack have recommended it to take the place of the white pine, especially in locations where wild currants are common. It is, however, a native of the State, being found occasionally in the woods of Union and Norfolk and on Canaan Mountain in Canaan.



RED PINE
Natural size.

In northern New England and in Minnesota the Norway pine sometimes reaches a height of 100 feet and a diameter of thirty to thirty-six inches. Its rate of growth is about the same as that of white pine. As the tree matures, its bark becomes divided into large reddish-brown plates which gives the tree its characteristic appearance and one of its common names.

The **leaves,** which occur in clusters of two each, are about four to six inches long. They are dark green and less stiff than those of the pitch pine. The red pine is the only native pine in the Northeast having two needles, or leaves, in the sheath. It might be confused with the Austrian pine, whose needles, however, are much stiffer.

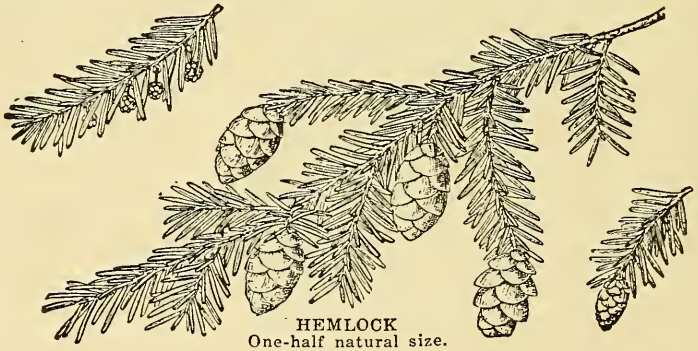
The **fruit** is a cone about two inches long and light brown in color, fading to gray. The thin, slightly concave cone-scales are without spines, or prickles. Like all the pines, it requires two years for the cones to ripen. They mostly persist on the branchlets until the following Sum-

mer. The seeds are small—about one-eighth inch long—dark or mottled brown, winged, and widely borne by the wind.

The **wood** is medium heavy, hard, and pale red with thin, nearly white sapwood. The lumber, which is coarser grained than that of the white pine, is used for general construction purposes.

## HEMLOCK (*Tsuga canadensis* Carr.)

The hemlock was one of the important trees in the original New England forest. It is characteristic of the cool ravines and north slopes, but is also found on our trap-rock ridges and on the borders of swamps and is an important factor in the beauty as well as the value of our woods. Trees originally attained a height of 130 feet and a diameter of three feet or more. Until recently the bark was highly prized for tanning purposes, but this industry, which was once one of the most important in the State, has now disappeared. Its horizontal or ascending branches and drooping twigs, forming a pyramidal crown, make it one of our handsomest and most desirable trees for shade or ornament. As such it is widely planted for decorative purposes.



HEMLOCK
One-half natural size.

The **leaves** are from one-third to two-thirds of an inch in length, oblong, dark green and lustrous on the upper surface and whitish beneath, and although spirally arranged, appear to be two-ranked on the stem; they fall during the third season.

The **cones** are oblong, about three-fourths of an inch long, light brown in color. The cone scales are broadly ovate and about as wide as they are long. The seed is small and winged, maturing in the Fall and dropping during the Winter.

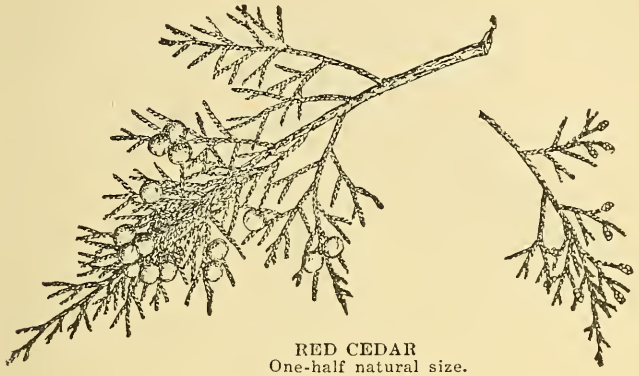
The **wood** is light, soft, not strong, brittle and splintery. It is used for coarse lumber and for paper pulp.

The **bark** on old trunks is cinnamon-red or dark gray and divided into narrow, rounded ridges, and is one of our chief sources of tannin.

## RED CEDAR (*Juniperus virginiana* L.)

A valuable tree found in all classes and conditions of soils—from swamp to dry rocky ridges—seeming to thrive on barren soils where

few other trees are found. Growing singly in fields or following fence lines and driveways, its narrow pyramidal form makes it most noticeable.



RED CEDAR
One-half natural size.

There are two kinds of **leaves,** usually both kinds being found on the same tree. The commoner kind is dark green, minute and scale-like, clasping the stem in four ranks, so that the stems appear square. The other kind, usually appearing on young growth or vigorous shoots, is awl-shaped, quite sharp-pointed, spreading and whitened.

The two kinds of **flowers** are at the end of minute twigs on separate trees. Blooming in February or March, the male trees often assume a golden color from the small catkins, which, when shaken, shed clouds of yellow pollen.

The **fruit,** which matures in one season, is pale blue, often with a white bloom, one-quarter of an inch in diameter, berry-like, enclosing one or two seeds in the sweet flesh. It is a favorite Winter food for birds.

The **bark** is very thin, reddish-brown, peeling off in long, shred-like strips. The tree is extremely irregular in its growth, so that the trunk is usually more or less grooved.

The heart **wood** is distinctly red, and the sapwood white, this color combination making very striking effects when finished as cedar chests, closets and interior woodwork. The wood is aromatic, soft, strong and of even texture, and these qualities make it most desirable for lead pencils. It is very durable in contact with the soil, and on that account is in great demand for posts, poles and rustic work.

## WHITE CEDAR (Juniper) (*Chamaecyparis thyoides* B. S. P.)

The white cedar swamps in the eastern and southern part of the State were highly prized by the early settlers and were held as common property in many cases. In some swamps the red maple is encroaching and tending to take the place of the cedar as the latter is cut out. The branches are very short and horizontal, so that even when grown in the open the tree has a long, narrow, conical shape.

WHITE CEDAR
One-half natural size.

The **leaves** are minute, scale-like, overlapping, four-ranked, of a bluish-green color, and entirely cover the ends of the slender, drooping twigs.

The **fruit** is a rather inconspicuous, smooth cone, nearly round, about one-fourth inch in diameter, maturing in one year and containing from four to eight winged seeds.

The **bark** is quite thin, varies in color from ashy-gray to light reddish-brown, and readily separates into loose plate-like scales, which easily peel off in long fibrous strips.

The **wood** is light, soft, close-grained, slightly fragrant, especially in contact with water. These qualities make it in demand for boat and canoe building, cooperage, shingles and fence posts. It is being substituted for chestnut for telephone poles, as the supply of the latter species becomes scarcer. Because of the limited supply available, its lumber is not well known in the general markets.

## ARBOR VITAE (White Cedar) (*Thuja occidentalis* L.)

The common white cedar of Northern New England is rare in Connecticut. It is apparently native in the northwestern part of the State, and has escaped from cultivation elsewhere. In its northern habitat it reaches a height of seventy feet and a diameter of three to four feet.

The **trunk** is often twisted, and frequently divided into two or more erect stems. The branches are short and horizontal. Trees sometimes form almost impenetrable thickets, as the dead branches are very stiff. In the open it develops a conical, symmetrical crown.

The **bark** is gray to reddish-brown, separating off in long, narrow, shreddy strips.

The **leaves** are scale-like, one-eighth of an inch long and are so arranged as to make the small branches flat. They have an aromatic odor when crushed and a pleasant taste.

The **fruit** is a small, oblong cone about one-half inch long with six to twelve scales.

ARBOR VITAE

The **wood** is light, soft, brittle, coarse-grained, durable, fragrant, pale brown. It is used in the Northern States for fence posts, railroad ties and shingles.

There are numerous ornamental or garden varieties of the Arbor Vitae. One closely related to it is the Oriental Arbor Vitae—*Thuja orientalis*—also extensively planted for ornamental purposes.

## TAMARACK (American Larch, Hackmatack) (*Larix laricina* K. Koch)

This tree is found chiefly in a few swamps in the northern part of the State. Large trees are rare, as old specimens were killed years ago by an insect. It is the only conifer of New England which sheds its leaves in Autumn. When in foliage it is very beautiful.

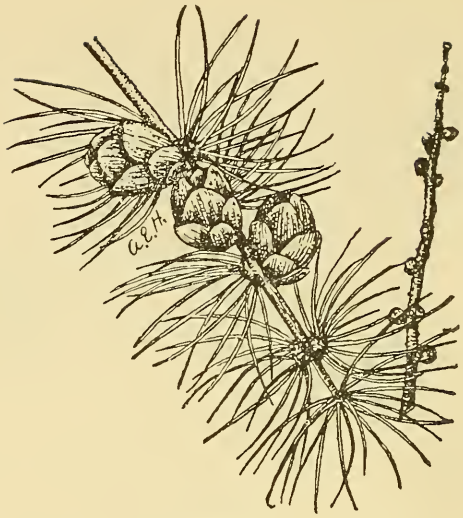
The **bark** separates on the surface into thin scales of a reddish-brown color. The twigs are glossy brown and covered with numerous tiny spurs.

The **leaves** are flat, soft, slender and about one inch long, and are borne in clusters of ten or more. They are bright green in Spring and turn a dull yellow in September or October just before they fall.

The **cones** are small, only two-fifths of an inch wide, and three-fourths of an inch long, nearly spherical, and light brown. They open in the Fall to liberate the small winged seed and usually remain on the tree several years.

The **wood** is heavy, hard, and durable in contact with the soil. It is therefore used for posts, poles, ties, and was formerly extensively used in ship-building.

The European larch (*Larix decidua* Mill.) has been planted considerably in Connecticut. It has larger and usually erect cones, stouter

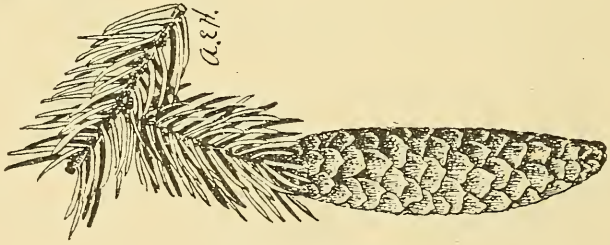


TAMARACK

and yellower twigs, longer leaves, and more scaly bark than its native relative.

## NORWAY SPRUCE (*Picea Abies* L.)

Although the Norway spruce is not native in Connecticut, it has been so extensively planted for decorative purposes that it is one of the most common spruces in the State.



NORWAY SPRUCE

The **leaves** are one-half to one inch long, four-sided, sharp-pointed. The foliage is dark green. As the tree matures the branches and twigs take on a drooping appearance which is quite characteristic.

It is also distinguished by its **cones,** which are four to six inches long, cylindrical and usually hang down from the end of the branches.

The **bark** becomes roughened with large reddish-brown scales as the tree grows older.

The **wood** is soft, straight-grained, easily worked. It is used for lumber and pulp.

This is one of the most common and most valuable trees of central Europe, and is one of the species responsible for the name of the famous Black Forest in Germany.

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## FOREST TREES OF CONNECTICUT

*Listed Alphabetically*