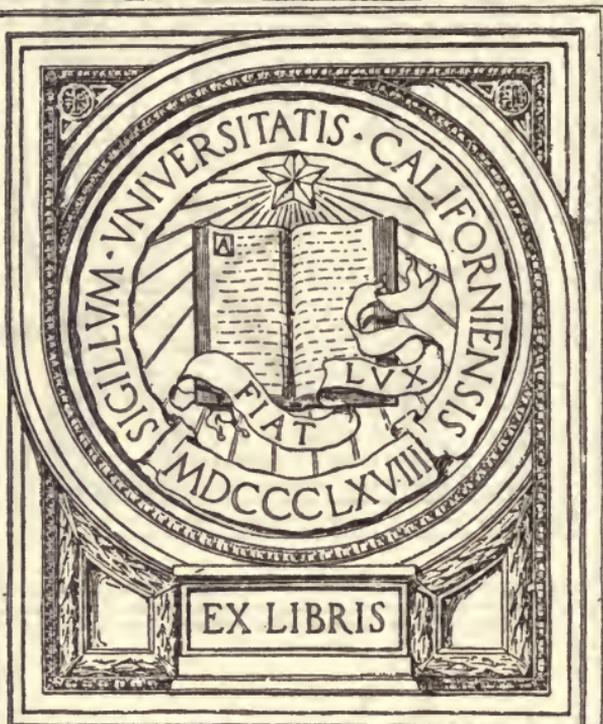


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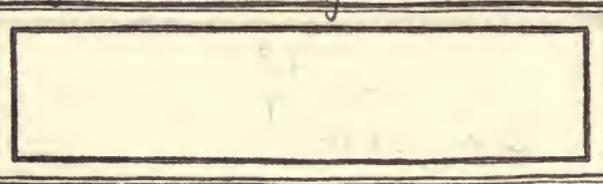


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MASSACHUSETTS FORESTRY PAMPHLETS

VOL. V

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HOW YOU MAY
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MASSACHUSETTS FORESTRY SERVICE

VOL. V

Forest Trees of Massachusetts. A Forest

Manual by D. A. Clarke.

Forestry from a Commercial Standpoint.

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Forestry

TO THE
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MASSACHUSETTS FORESTRY SERVICE



THE COMMERCIAL
FOREST TREES
OF MASSACHUSETTS

HOW YOU MAY
KNOW THEM



A POCKET MANUAL

By D. A. Clarke, under the direction of F. W. Rane, State Forester,
State House, Boston, Mass., U. S. A.



BOSTON: WRIGHT & POTTER PRINTING COMPANY, STATE PRINTERS,
EIGHTEEN POST OFFICE SQUARE, NINETEEN HUNDRED AND EIGHT



SECOND EDITION

APPROVED
BY THE STATE BOARD OF PUBLICATION



*Agric. Forestry
Manual*

TO THE
STATE BOARD OF PUBLICATION

PURPOSE OF THIS HANDBOOK

THIS handbook has been planned and published by the State Forester in order to have a practical working description of the commercial trees at the command of Massachusetts citizens.

Technical terms necessarily used in botanical and forestry books are bewildering to the practical, everyday lumberman, farmer or average person. The attempt, therefore, of this treatise is to point out clearly how one can tell the commercially valuable trees of Massachusetts in a plain and untechnical manner.

The really most important points or characters the tree has, which distinguish it from all others, are first pointed out. This will be all many persons may care to know. If five needles growing in a cluster always denote a white pine, for example, and people have their attention called to it, few will ever mistake that tree for others. They can settle the matter easily by examining the tree for themselves. Likewise, other trees can be told by following the same plan of identification.

Acknowledgments

Mr. Daniel A. Clarke, a Harvard instructor and man of recognized experience and ability in forest botany, was selected to prepare this manuscript. The individual characteristics for identifying each species are Mr. Clarke's arrangement.

MASSACHUSETTS FOREST TREES

The cuts illustrating the foliage and seed production were kindly loaned the State Forester by Director J. L. Hills of the Vermont Experiment Station. These cuts were used to illustrate a bulletin on "The Trees of Vermont," prepared under the direction of Prof. L. R. Jones of the University of Vermont.

The cuts illustrating the winter twigs and buds are from originals made by Miss Helen B. Mason, from carefully-selected specimens collected by Mr. Clarke.

Six cuts, credited under each, are from Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin & Co.



It is hoped this handbook will be a source of inspiration toward assisting people, generally, in knowing our trees.

When we shall have created in our people, from youth up, a natural inborn love for Nature, the fundamentals of practical forestry will solve themselves as naturally as water flows down hill. Meanwhile, we have a pleasant task in bringing these conditions about. The more one knows about trees, the more he wants to know; and the natural outcome will be both better economic and æsthetic conditions.

This handbook is offered by the State, free of charge, believing that the persons possessing it will find it a useful and helpful companion.

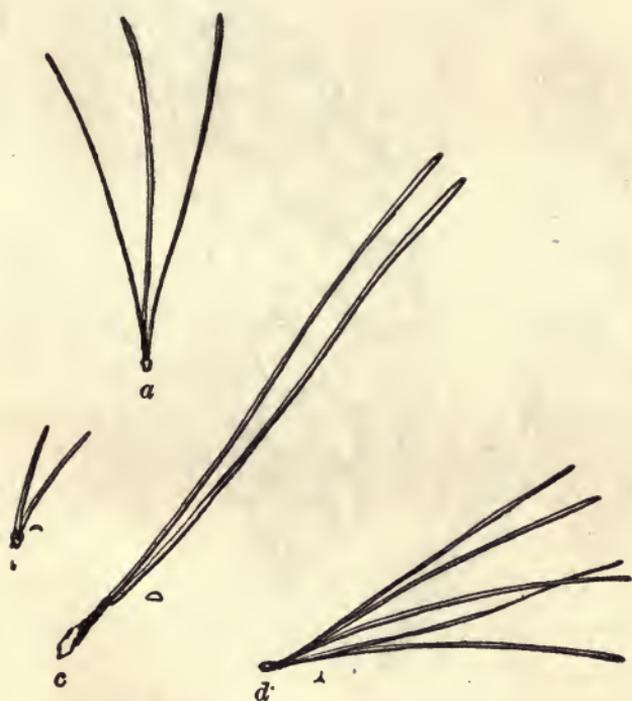
F. W. RANE, State Forester

MASSACHUSETTS FOREST TREES

PINES

How to know the Pines

White Pine (<i>Pinus strobus</i> L.)	Red Pine (<i>Pinus resinosa</i> Ait.)	Pitch Pine (<i>Pinus rigida</i> Mill.)
Leaves Arranged in 5-leaved clusters. Slender, flexible, bluish-green and 3 to 5 inches long.	Leaves Arranged in 2-leaved clusters. Flexible, dark green and 5 to 6 inches long.	Leaves Arranged in 3-leaved clusters. Stiff, dark yellow-green and 3 to 5 inches long.



PINE LEAF CLUSTERS

a, Pitch; *c*, Red; *d*, White. All one-half natural size.

NOTE.—The Austrian and Scotch Pines are sometimes planted in Massachusetts. Both are introduced or imported. The Scotch Pine has two leaves in a cluster, two to four inches long, flat and of a bluish-white hue. The Austrian has dark green, slender, rigid leaves, two in a cluster, four to six inches long.

MASSACHUSETTS FOREST TREES

WHITE PINE (*Pinus strobus* L.)

THE White Pine is abundantly distributed throughout the State. It occurs on fertile soil, in moist situations, or on uplands.

When standing in the open, the young tree has a symmetrical, pyramidal outline. In the forest, its trunk is usually without branches for a considerable distance and the head is narrow. In old age the tree becomes



WHITE PINE CONE

With scales open and seeds gone. White Pine needles grow in clusters of five.

very irregular and picturesque. The trunk is continuous, gradually tapering, commonly from fifty to seventy feet in height and one to two feet in diameter. The branches are usually in whorls of five and extend horizontally.

The bark on young stems is thin, green tinged with red. On the old trunk it is thick and almost black, and divided by shallow fissures into broad, flat ridges.

The leaves are arranged in clusters of five. They are

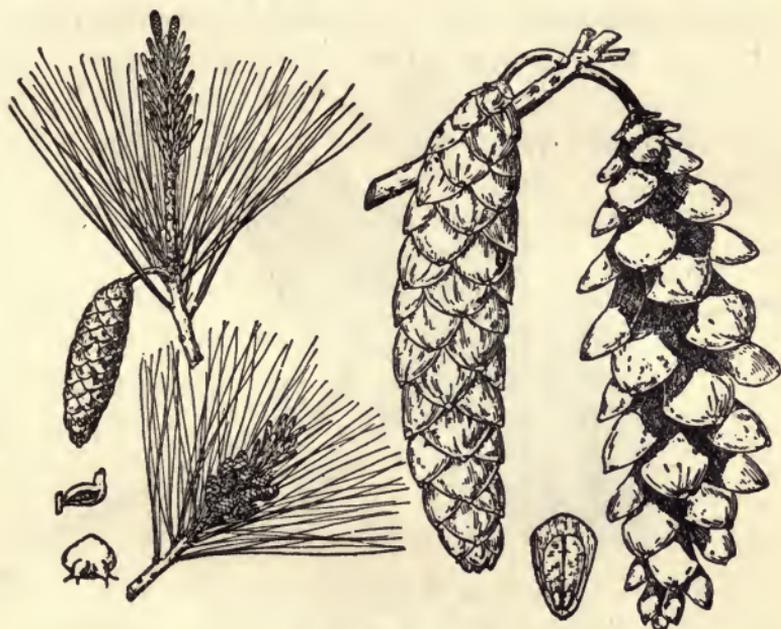
MASSACHUSETTS FOREST TREES

White Pine — *Concluded*

from three to five inches in length, bluish-green on the upper surface and whitish on the under.

The cone is cylindrical and from four to six inches in length. The seeds are small and winged. The cones open early in September of their second season.

The wood is very useful. It is light in color, light in weight, durable, except when in contact with the soil, and not easily warped by the sun. It supplies



WHITE PINE

Embryo and Mature cones. One-half natural size.

From Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin & Co.

boards of good size, free from knots and of light weight. It is sawed into lumber, shingles and laths. It is used in cabinet-making, for interior finishing and for masts. In this State it is very largely worked into "box-boards" for the making of boxes. Then, in addition to serving so well these various utilitarian ends, it is a rapid-growing tree, increasing in height on the average at least a foot each year. So, all in all, the White Pine is one of the most valuable trees in the State and most deserving of being grown for forestry purposes.*

* Send to the State Forester for a pamphlet, "How and When to collect White Pine Seed."

MASSACHUSETTS FOREST TREES

RED PINE (Norway Pine) (*Pinus resinosa* Ait.)

IN Massachusetts the Red Pine — appropriately so called both on account of the pale red color of the heart-wood and the distinctly reddish cast of the bark — occurs only locally and then chiefly in the northern and western sections. Usually it grows on light and somewhat dry soils.

When young it has an attractive conical outline ; in old age it becomes somewhat irregular. It usually attains a height of fifty to seventy-five feet and has a continuous trunk, two to three feet in diameter. The branches are stout, usually extend horizontally and clothe the trunk quite or nearly to the ground.



RED PINE. — One-half natural size.

From Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin & Co.

The bark is light red-brown in color and divided by shallow fissures into broad, flat ridges.

The leaves are in clusters of two, flexible, dark green and five to six inches long. They remain on the tree for four or five years.

The cones are egg-shaped, two to three inches long and mature in the fall of their second season.

The wood is light, strong, hard and pale red in color. It is used in construction, for building, and to a certain extent for masts.

The name Norway Pine has so little fitness as applied to this tree, and is so evidently misleading that its use is to be discouraged.

The Latin name suggests a resinous wood, but in fact it is less so than either of the other Pines.

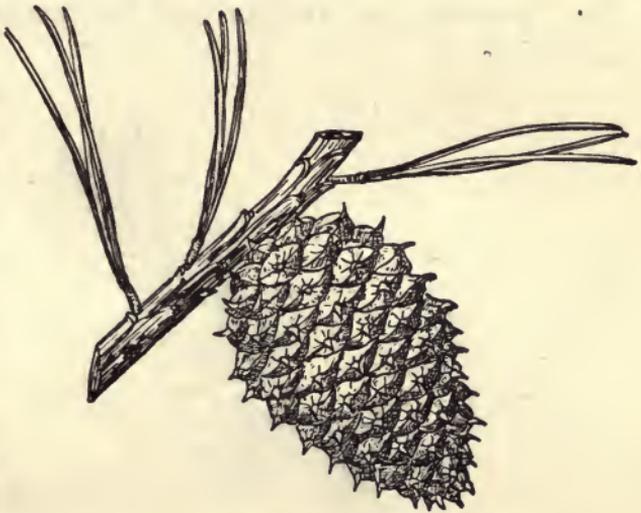
MASSACHUSETTS FOREST TREES

PITCH PINE (*Pinus rigida* Mill.)

THE Pitch Pine grows in poor, sandy and gravelly soil in all parts of the State, often forming a considerable tract of almost pure growth, as in the south-eastern sections near the coast.

In habit it is usually a low tree with irregular and variable outline. Normally, the height is from thirty to forty feet and the diameter from one to two feet. The trunk is continuous, straight and tapers rapidly. The branches, grouped in threes about the trunk, are thick and

often contorted. The bark on young stems and branches is rough. On old trees it is deep gray or reddish-brown, and irregularly divided into broad, flat, continuous ridges. The



PITCH PINE.— One-half natural size.

From Sargent's "Manual of the Trees of North America,"
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leaves are in clusters of three. They are three to five inches long, stiff, dark yellow-green and fall during their second year.

The cones are one to three inches long and light brown in color. They often remain on the tree for ten or twelve years. The scales are tipped with sharp prickles,—a character likely to aid in the recognition of the species.

The wood is light, soft and brittle. It is sometimes sawed into coarse lumber and is used for charcoal and for fuel. It is chiefly valuable because it will do well on extremely sterile soil, although it is a slow grower. Turpentine and tar were once made from this species in New England. There is a growing tendency to use this species for box-board lumber.

MASSACHUSETTS FOREST TREES

TAMARACK (Hacmatack, Larch) (*Larix laricina* Koch)

PREFERRING cool, swampy situations, though often growing on uplands, it occurs in most parts of the State, more commonly in the northern sections than elsewhere.

In habit it is a tall tree with regular and narrow pyramidal outline. Ultimately it acquires a height of fifty to sixty feet and a diameter of eighteen to twenty inches. The trunk is continuous and tapers rapidly. The branches are slender and horizontal or slightly ascending.



TAMARACK

Branchlet and cone. One-half natural size.

The leaves are borne in clusters. They are linear in shape, from three-fourths of an inch to one and a quarter inches in length and bright green in color. In the autumn before they fall they become yellow.

The cones are small, almost globular, nearly three-quarters of an inch long and light brown in color. The seeds are small and winged.

The wood is close-grained, heavy, strong and durable. It is used in shipbuilding, and for posts and railroad ties.

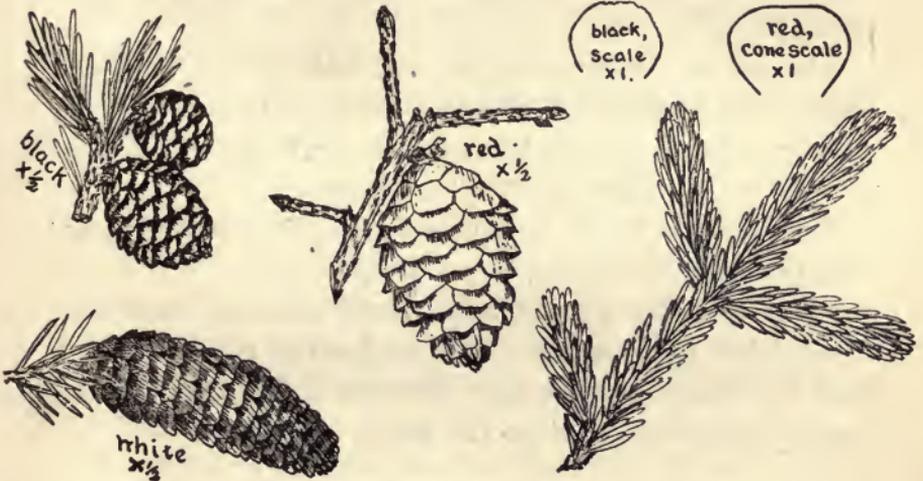
While this species is found in moist places, it often does equally well when planted on upland.

MASSACHUSETTS FOREST TREES

SPRUCES

How to know the Spruces

<p>Black Spruce (<i>Picea mariana</i> B. S. P.)</p> <p>Leaves Blue-green and not glossy.</p>	<p>Red Spruce (<i>Picea rubens</i> Sarg.)</p> <p>Leaves Dark yellow-green and very glossy.</p>
<p>Cones One-half to one and a half inches in length. Usually remain on the tree for many years.</p>	<p>Cones One to two inches in length. Usually fall during the first year.</p>



SPRUCES

Branch, cones and cone-scales.

NOTE.—The Norway Spruce, so commonly planted as an ornamental tree and for hedges, is an introduced species. It has a large, slender cone, five to seven inches long, which easily distinguishes it from others. The branches are also more drooping or pendulous.

MASSACHUSETTS FOREST TREES

BLACK SPRUCE (*Picea mariana* B. S. P.)

THE Black Spruce is a small and rather unimportant tree which is of frequent occurrence in the northern and western sections of the State. Usually it grows in swamps and on the borders of streams, though sometimes on uplands.

In habit it is a conical tree with a height of twenty to thirty feet and a diameter of six to twelve inches. The branches are short, horizontal or slightly declining and tend to turn upwards at the extremities, somewhat after the manner of the Norway Spruce.

The bark on the trunk is grayish-brown and broken into three scales.

The leaves are about one-half inch long and blue-green in color.

The cones are egg-shaped, one-half to one and one-half inches in length and grayish-brown in color. They usually remain on the trees for several years and often persist for as many as twenty years.

The wood is light, soft and weak. It is seldom used here except for making paper pulp.

Black and Red Spruce have, until recently, been considered the same species, but under the new classification the Black Spruce now becomes a far less valuable tree, commercially, than the Red.



MASSACHUSETTS FOREST TREES

RED SPRUCE (*Picea rubens* Sarg.)

THIS Spruce is common in the western and northern parts of the State, almost always growing in the well-drained soil of uplands or mountain slopes.

As to habit, its outline is narrowly conical in youth and middle age, and frequently irregular and picturesque in old age. It is a medium-sized tree, commonly reaching a height of forty to fifty feet and acquiring a diameter of one to two feet. The trunk is straight and tapers very slowly. The branches are rather long, frequently slightly pendulous, clothe the stem nearly to the ground and persist for a long time.

The bark is red-brown and broken into irregular scales.

The leaves are about one-half inch in length, dark yellow-green and glossy.

The cones are oblong, one to two inches in length and reddish-brown.

The wood is light, soft and less durable than Pine when exposed to the action of the weather. It is largely used for building-timber and for clapboards and shingles. Owing to the fact that it imparts no flavor, spruce is used in the manufacture of butter-tubs and boxes. Great quantities are consumed in the pulp mills.

This species, Professor L. R. Jones of Vermont says, was responsible for the suggestion of the name Green Mountain State to that Commonwealth.

It is not uncommon for lumbermen to designate this species as Black Spruce, but, as this is the only commercial Spruce of importance to Massachusetts, we should readily appropriate the right name, or Red Spruce.



MASSACHUSETTS FOREST TREES

HEMLOCK (*Tsuga canadensis* Carr.)

THE Hemlock is found in most parts of the State, though it is much more abundant in the western sections. It delights in the moist, cool shade of rocky ridges and river gorges.

In the open, it is a beautiful, pyramidal tree with branches extending quite or almost to the ground. In the forest, it has a tall, gently-tapering trunk which is surrounded by a rather small, round head. As a rule, it attains a height of fifty or sixty feet and a diameter of two or three feet. The branches are slender, horizontal or slightly pendulous near the ends and persist for a long time.

The bark on the old trunk is cinnamon red or dark gray and divided into narrow, rounded ridges which are covered with scales.



HEMLOCK

Spray and cone. One-third 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.

The cones are oblong, about three-fourths of an inch long and light brown in color. The seed is small and winged, maturing in the fall and shedding during the winter.

The wood is very light, soft and brittle. When exposed to the air it perishes quickly. It is sawed into coarse boards and used for cheap building material and sometimes for fuel. The bark is of value for tanning.

MASSACHUSETTS FOREST TREES

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

THE White Cedar grows almost wholly in swamps, particularly those that are flooded for most of the year. In Massachusetts it occurs in patches of considerable area in the southeastern sections and to a limited extent in other parts.

As to habit, its slender, horizontal branches form a narrow, conical head of neat appearance. The trunk is continuous and attains a height of twenty to forty feet and a diameter of eight to fifteen inches.



WHITE CEDAR.—One-half natural size.

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On the trunk the bark is reddish-brown and flakes off in thin scales. On old trees, particularly near the base, it is irregularly furrowed.

The leaves are scale-like, not over an eighth of an inch in length and dull blue-green in color.

The cones are roundish, about a half-inch in diameter and red-brown at maturity. The seed is small and winged.

The wood is light, soft, weak, very durable and aromatic. It is used for boat-building, interior finishing and for posts. For this last purpose it is particularly desirable.

MASSACHUSETTS FOREST TREES

RED CEDAR (Red Juniper) (*Juniperus virginiana* L.)

THIS tree receives its popular name, Red Cedar, from the red color of its heart-wood. Growing on dry and gravelly soil and sometimes on rather moist ground, it is common in the eastern sections of the State and of occasional occurrence in the central and western parts.

In habit it is variable. In youth its outline is normally conical, and in old age it is broad and round. The trunk is continuous and attains a height of twenty-five to thirty feet and a diameter of eight to fifteen inches.



RED CEDAR

Two-thirds natural size.

The bark on the trunk is light brown tinged with red. When the tree has acquired age it separates into long, narrow, ribbon-like flakes.

The typical leaves are scale-like, about a sixteenth of an inch in length and dark blue-green in color. On young trees and sometimes on the mature plants, there are needle-shaped leaves about one-half inch in length.

The fruit is berry-like, globular, about the size of a pea and dark blue.

The wood is light, close-grained, not strong, easily worked and durable. It is red in color and pleasantly aromatic. It is used for posts, for pails and in cabinet-making.

MASSACHUSETTS FOREST TREES

WALNUTS *

How to know the Walnuts

<p>Butternut (<i>Juglans cinerea</i> L.)</p> <p>Habit Low, wide-branching, with a broad, round-topped head.</p>	<p>Black Walnut (<i>Juglans nigra</i> L.)</p> <p>Habit Tall, straight, destitute of branches for a considerable distance from the ground, with a narrow, round-topped head.</p>
<p>Bark on Trunk Dark gray and divided into broad, flat ridges.</p>	<p>Bark on Trunk Dark brown or almost black and deeply divided into rounded ridges which cross each other obliquely.</p>
<p>Leaves Leaflets 11 to 17 in number.</p>	<p>Leaves Leaflets 15 to 23 in number.</p>
<p>Fruit Oblong, cylindrical and covered with sticky hairs.</p>	<p>Fruit Globular, without sticky hairs, and somewhat rough.</p>

The Black Walnut and Butternut are easily cultivated, being grown readily by planting the nuts where they are to remain. Seedlings can also be transplanted, but care must be exercised, as they have a pronounced tap-root. The Black Walnut makes a valuable forest tree, and both species make good shade trees and are also valuable for their nuts.

* The true Walnuts. New England people use this name commonly for the Hickories. (See Hickories.)



MASSACHUSETTS FOREST TREES

BUTTERNUT (*Juglans cinerea* L.)

GROWING in rich, moist soil near streams and on low, rocky hills, the Butternut occurs throughout Massachusetts, though most abundantly in the eastern and central portions.

It is a low, broad-headed tree, usually rising to a height of thirty to forty feet with a trunk diameter of one to four feet. It branches a few feet from the ground, sending out long, rather stout, horizontal limbs.

The bark on the trunk is dark gray and divided into broad, flat ridges. The leaves



BUTTERNUT

Winter twig.
One-half
natural size.



BUTTERNUT

Leaf and fruit. One-third natural size.

are alternate, from fifteen to thirty inches long and have from eleven to seventeen leaflets. The nuts, which are borne in drooping clusters, are oblong-cylindrical in shape, about three inches long and covered with sticky hairs.

The wood is light, soft and weak. It is employed for the interior finish of houses and used in the manufacture of furniture.

MASSACHUSETTS FOREST TREES

BLACK WALNUT (*Juglans nigra* L.)

THE Black Walnut is rather rare in Massachusetts, though it occurs more frequently in the western part of the State than in the eastern. When found, it is usually growing in rich bottomlands or on fertile hillsides.

It is a large tree of upright growth and narrow, round head, which normally attains a height of fifty to seventy-five feet and a trunk diameter of two to five feet. The branches are stout and rigid and the lower ones extend horizontally.

The bark on the trunk is blackish and deeply divided into rounded ridges which have a tendency to cross each other obliquely.

The leaves are alternate, from one to two feet long and have from fifteen to twenty-three leaflets.

The fruit is a globose nut, about two inches in diameter, with a slightly roughened surface.

The wood is heavy, hard, strong, durable and capable of taking a fine polish. It is very valuable for cabinet-making and the interior finish of houses. The older the tree, generally speaking, the darker and more valuable is the wood.



BLACK WALNUT
Winter twig and buds.
One-half natural size.



BLACK WALNUT.— One-half natural size.

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MASSACHUSETTS FOREST TREES

HICKORIES

How to know the Hickories

Bitternut <i>(Hicoria minima</i> Britton)	Shagbark <i>(Hicoria ovata</i> Britton)	Mocker Nut <i>(Hicoria alba</i> Britton)	Pignut <i>(Hicoria glabra</i> Britton)
Bark on Trunk Less rough than in the other species. Light granite-gray tinged with faint yellow and broken into thin, plate-like scales.	Bark on Trunk Rougher than in other species. Light gray and separates into long, thick plates which are only slightly attached to the tree.	Bark on Trunk Dark gray, with numerous ridges and without flaking plates.	Bark on Trunk Dark gray. Comparatively smooth. Often broken into plates.
Leaves Leaflets 7 to 11 in number.	Leaves Leaflets usually 5, rarely 7.	Leaves Leaflets 7 or 9 in number.	Leaves Leaflets 3, 5 or 7 in number.
Winter Buds Covered with two pairs of scales and bright yellow.	Winter Buds Terminal bud egg-shaped. Outer scales are dark reddish-brown with long, narrow tips and persist until spring.	Winter Buds Terminal buds broadly egg-shaped. Outer scales are dark reddish-brown and fall in autumn. Inner scales light green.	Winter Buds Terminal buds elliptical. Outer scales are dark reddish-brown and usually fall in the autumn. Inner scales yellow-green.
Twigs Smooth.	Twigs Smooth or coated with soft hairs.	Twigs Stout and covered with a woolly growth.	Twigs Smooth.
Fruit Husk thin. Nut thin-shelled and kernel bitter.	Fruit Husk thick and deeply channeled at the seams. Shell usually thick and the kernel sweet.	Fruit Husk thick and strong-scented. The shell thick and the kernel small and sweet.	Fruit Husk usually thin. The shell either thick or thin and the kernel sweet or bitter.



MASSACHUSETTS FOREST TREES

BITTERNUT (*Hicoria minima* Britton)

INHABITING wet woods near streams and sometimes hilly slopes, the Bitternut is common in most sections of Massachusetts.

Like most of the genus, its trunk tapers gradually to the point of branching and develops a tall cylindrical head with a breadth of twenty to thirty feet. Commonly it grows to a height of fifty feet and has a trunk diameter of one to two feet.

The bark on the trunk is granite-gray faintly tinged with yellow and less rough than in most of the species, yet broken into thin, plate-like scales. The new growths are smooth and orange-green



BITTERNUT HICKORY
Leaf and fruit. One-third natural size.



BITTERNUT
Winter twig.
One-half
natural size.

in color. The winter buds are 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 in the case of the other species. The fruit is about one inch long and thin-husked, while the nut is usually thin-shelled and brittle and the kernel very bitter. The wood is heavy, hard and strong. It is used in making hoops and ox-yokes and for fuel.

MASSACHUSETTS FOREST TREES

SHAGBARK (*Hicoria ovata* Britton)

GROWING in rich, deep soil near streams and on fertile hillsides, the Shagbark is of common occurrence throughout the State.

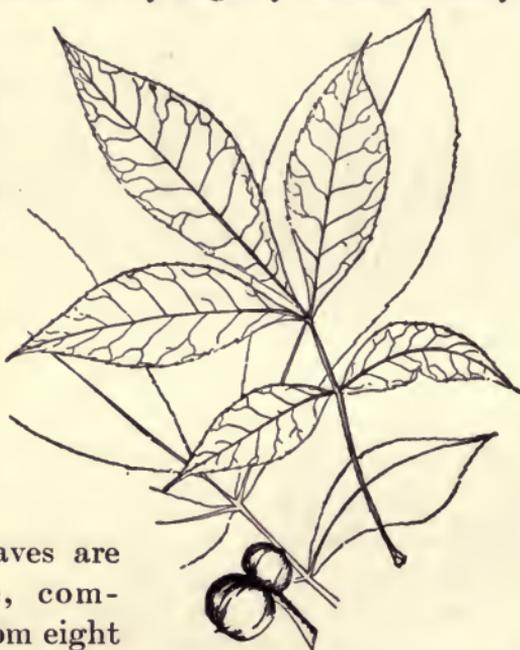
The tallest of the Hickories, it has the characteristic habit of the group, a tapering trunk destitute of branches for a considerable distance and a cylindrical head of relatively narrow spread. Usually it attains a height of fifty to seventy-five feet and a trunk diameter not exceeding two feet.

The bark on the trunk is light gray, separating into thick plates often a foot long. When these are only slightly attached, they give to the trunk a shaggy appearance in which is the significance of the popular term Shagbark Hickory.

The leaves are alternate, compound, from eight to fifteen inches long and composed of five,

rarely seven leaflets. The fruit is borne singly or in pairs and is globular. The husk is deeply grooved at the seams. The kernel is sweet.

The wood is heavy, hard, tough and very strong. It is used largely in the manufacture of agricultural implements and in the building of carriages and wagons. For fuel it is the most satisfactory of our native trees. The nut is a valued article of commerce.



SHAGBARK HICKORY
Leaf and young fruit. One-third natural size.



SHAGBARK
Winter twig. One-half size.

MASSACHUSETTS FOREST TREES

MOCKER NUT (*Hicoria alba* Britton)

THE Mocker Nut — probably so called because of the size of the nut and the smallness of the kernel — is distributed throughout the State and is common in the eastern sections. It grows in various soils, on ridges, rocky slopes and in rich bottom-lands.

In habit it is very similar to the Shagbark. It is a tall tree, fifty to sixty feet in height and one to two and one-half feet in diameter.

The bark is dark gray, much like that of the Pignut, yet with much more numerous ridges and without the flaking plates. The recent shoots are short, stout and more or less covered with a downy growth.

The leaves are alternate, compound, eight to ten inches in length and composed of seven to nine leaflets.

The fruit is borne singly or in twos and ripens in October. It is variable in size and shape. Usually it is globose and has a strong-scented husk. The nut is thick-shelled and the kernel small and sweet.

The wood is heavy, hard, tough and strong. It serves for the same purposes as does that of the Shagbark and is only slightly inferior.



MOCKER NUT

Winter twig.
One-half natural
size.



MOCKER NUT. — One-half natural size.

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MASSACHUSETTS FOREST TREES

PIGNUT (*Hicoria glabra* Britton)

THE Pignut is abundantly distributed throughout Massachusetts. It seems to prefer the dry ridges and hillsides and is usually in the company of other trees.

Naturally a tall tree, its height seldom exceeds fifty to sixty feet and its diameter is from one to two feet. It has a tapering trunk and a cylindrical head of relatively narrow spread. The bark on the trunk is dark gray.

On old trunks it is comparatively smooth, though often it is broken with plates, somewhat after the manner of the Shagbark.

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



PIGNUT
Winter twig.
One-half natural size.



PIGNUT HICKORY
Leaf and fruit. One-third natural size.

The fruit, which ripens in October, is borne singly or in pairs and is very variable in shape. Sometimes it is pear-shaped, sometimes round; at other times it is egg-shaped. The fruit is usually small and the husk thin. The wood is heavy, hard, strong, tough and flexible. It is employed in the manufacture of wagons, agricultural implements and tool handles.

MASSACHUSETTS FOREST TREES

POPLARS

How to know the Poplars

<p style="text-align: center;">Aspen (American) (<i>Populus tremuloides</i> Michx.)</p> <p style="text-align: center;">Leaves</p> <p>Roundish. Margin finely toothed. Upper surface lustrous.</p>	<p style="text-align: center;">Largetooth Aspen (<i>Populus grandidentata</i> Michx.)</p> <p style="text-align: center;">Leaves</p> <p>Broadly egg-shaped. Margin coarsely scalloped. Upper surface not lustrous.</p>
<p style="text-align: center;">Winter Buds</p> <p>Conical, lustrous and somewhat sticky.</p>	<p style="text-align: center;">Winter Buds</p> <p>Broadly egg-shaped. Not sticky and covered with whitish, matted hairs.</p>
<p style="text-align: center;">Bark</p> <p>Very bitter.</p>	<p style="text-align: center;">Bark</p> <p>Not bitter.</p>

NOTE. — *Introduced species.* — In addition to these native Poplars, two European species are very commonly planted — the Lombardy Poplar (*P. nigra Italica*), recognized by its tall, spire-like form, and the White Poplar (*P. alba*), easily distinguished by its leaves, green above and very white-cottony beneath.

The Poplars belong to the Willow family and resemble the Willows, especially in flower and fruit characters. The nodding, worm-like, staminate and pistillate catkins are borne upon different trees and, opening before the leaves, are conspicuous in early spring. The Poplars are quite widely distributed, extending from the Arctic circle to Mexico and from the Atlantic to the Pacific.

The wood of Poplars is very soft and light and especially liable to warp, but is cheap and useful for making toys, boxes and smaller furniture. Much of it now goes to the pulp mills.

The Poplars, like the Willows, can be propagated easily from cuttings.



MASSACHUSETTS FOREST TREES

ASPEN (American) (*Populus tremuloides* Michx.)

THE Aspen is a rapid-growing tree common to all parts of Massachusetts, thriving in many soils and situations but preferring a moist, somewhat sandy soil. It is frequently the first tree to take possession where forests have been burned or cut off.

Here it is a small, graceful tree, seldom exceeding a height of thirty to forty feet and a diameter of eight to fifteen inches. The branches are slender, extend at right angles to the stem, are slightly pendulous toward the ends and form a narrow, round head.

The bark is smooth and pale green, marked with patches of dark brown. On the old trunk it is ash-gray, although at the base of the tree it is almost



AMERICAN ASPEN

Leaves and flowers; 1 staminate, 2 pistillate. One-third natural size.

black and conspicuously ridged. The bark is very bitter and has a taste similar to that of quinine.

The leaves are simple, alternate, roundish, about two inches in length, finely toothed, and dark green and lustrous on the upper surface. The leaf stalk is flattened at right angles to the blade of the leaf.

The flowers are in catkins and appear in April before the leaves.

The wood is soft, weak and very perishable when exposed to the weather. It is of little value although it is used to a certain extent in the making of paper pulp, box-boards and occasionally for fuel.

MASSACHUSETTS FOREST TREES

LARGETOOTH ASPEN (*Populus grandidentata* Michx.)

THE Largetooth Aspen is of common occurrence throughout the State, growing in various soils and situations, but preferring rich, sandy soil in the vicinity of streams and swamps.

It is a quick-growing tree, very similar in habit to the Aspen. Naturally it attains a height of thirty to forty feet and a trunk diameter of twelve to twenty inches.

The bark is smooth and greenish-gray in color. On old trees it is somewhat darker and divided into broad, flat ridges.



LARGETOOTH ASPEN

Leaves and flowers; pistillate above, staminate below.

One-third natural size.

The leaves are simple, alternate, broadly egg-shaped, three to four inches in length, coarsely scalloped on the margins and dark green on the upper surface. The leaf stalk is flattened at right angles to the blade of the leaf.

The flowers are in catkins and appear in March or April, before the leaves.

The wood is similar to that of the preceding, being light, soft and of little value. It is used for paper pulp, box-boards and sometimes for fuel.

MASSACHUSETTS FOREST TREES

BIRCHES

How to know the Birches

Gray Birch <i>(Betula populifolia Marsh.)</i>	Paper or White Birch <i>(Betula papyrifera Marsh.)</i>	Yellow Birch <i>(Betula lutea Michx. f.)</i>	Sweet or Black Birch <i>(Betula lenta L.)</i>
Bark Grayish-white and chalky on the outer surface and orange on the inner. Does not separate into papery layers.	Bark Creamy-white and lustrous on the outer surface and orange on the inner. Separates readily into thin layers.	Bark Silvery-gray or light orange in color. Separates into thin, persistent layers. On young branches aromatic.	Bark Dark, almost black and without lustre. Broken into large, irregular plates. On young branches aromatic.
Leaves Triangular, long-pointed and coarsely doubly toothed. Lustrous on upper surface.	Leaves Egg-shaped and not long-pointed. Usually doubly toothed. Not lustrous.	Leaves Egg-shaped to oblong. Sharply doubly toothed.	Leaves Egg-shaped to oblong. Sharply toothed.
Flowers Winter catkins borne singly or in pairs.	Flowers Winter catkins borne in clusters of three.	Flowers Winter catkins not clustered. Three to four on a shoot.	Flowers Winter catkins not clustered. Three to four on a shoot.

NOTE.—The European White Birch (*B. alba*), an introduced species, is commonly planted for ornamental purposes. It is a beautiful tree, closely resembling the native White Birch. There are numerous horticultural varieties, some with finely-cut leaves and pendulous branches.

The wood of Birches is valued chiefly for cabinet-making, for spools and other small articles.

Birches yield quantities of seed and are extremely valuable in reseeding waste and barren lands, and rendering the conditions favorable to White Pine coming in. The White Pine then replaces them in clean stands.

When young, the saplings of all the species look more or less alike.



MASSACHUSETTS FOREST TREES

GRAY BIRCH (*Betula populifolia* Marsh.)

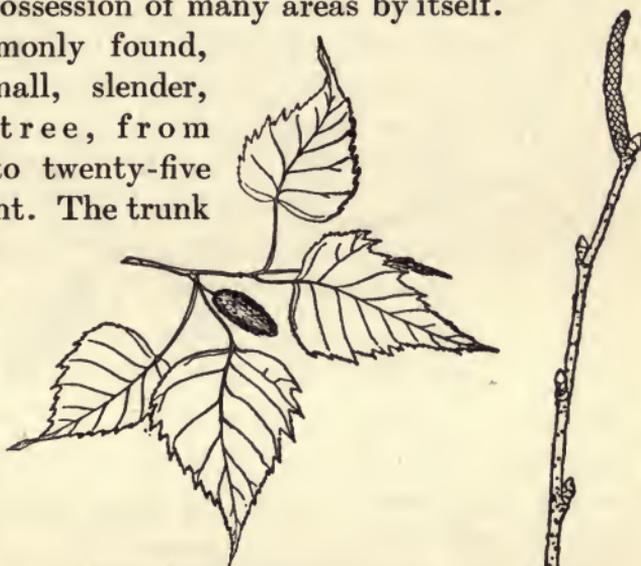
THE Gray Birch grows abundantly in all parts of the State, thriving on the poorest sandy soils, yet by no means limiting itself to such unfavorable situations. This is the tree that is usually the first to take possession of fields or pastures that have gone into disuse, mingling with other plants of similar desires or taking possession of many areas by itself.

As commonly found, it is a small, slender, pyramidal tree, from twenty to twenty-five feet in height. The trunk as a rule ascends obliquely. Branches are short, slender and often pendulous and clothe the trunk to the ground.

The whole appearance of the tree is light and airy. The bark on the trunk is grayish-white and chalky on the outer surface and orange on the inner. Unlike some of the other birches, its bark does not easily separate into layers. The branches are blackish and the young shoots are brown. The leaves are simple, alternate, triangular, long-pointed, two and one-half to four inches in length, coarsely toothed and dark green and glossy on the upper surface.

The flowers are in catkins. The sterile ones appear in the fall and are usually solitary.

The wood is light, soft and not durable. It is used in the manufacture of spools and shoe pegs and is useful for summer fuel. The tree is chiefly valuable for the rapidity with which it grows on poor soil.



GRAY BIRCH

Leaves and fruit. One-third natural size.



GRAY BIRCH

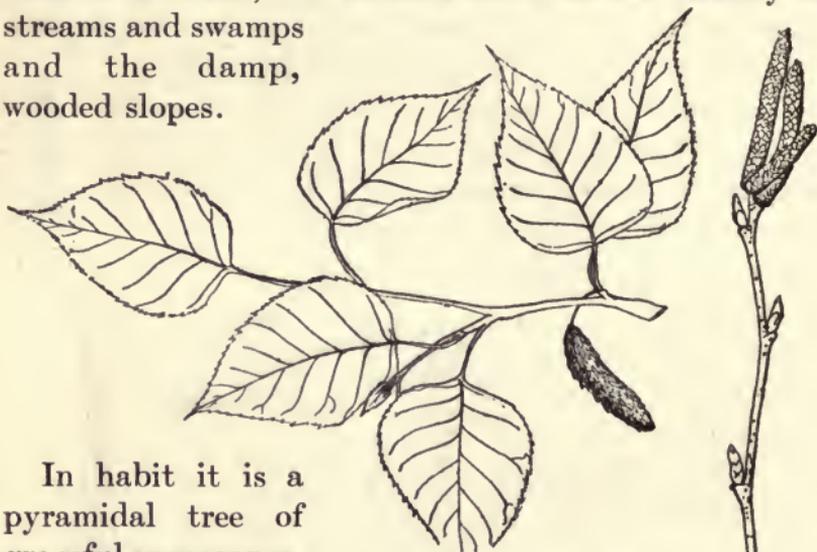
Winter twig and buds.

One-half natural size.

MASSACHUSETTS FOREST TREES

PAPER OR WHITE BIRCH (*Betula papyrifera* Marsh.)

IN Massachusetts the Paper Birch, so called because of the use to which the early settlers put the bark, grows commonly in the middle and western parts of the State and is very infrequent in the eastern sections. Wherever found, its favorite home is the vicinity of streams and swamps and the damp, wooded slopes.



WHITE OR PAPER BIRCH
Leaves and fruit.
One-third natural size.

In habit it is a pyramidal tree of graceful appearance, commonly attaining a height of about fifty feet and a diameter of one to two feet.

The trunk is usually continuous, though it may sometimes divide, and the slender branches are horizontal or slightly pendulous. When old or crowded, the Paper Birch loses its lower branches and assumes a small, round head. The bark on the trunk is white and lustrous on the outer surface and orange on the inner. It separates freely into thin, papery scales. The leaves are simple, alternate, egg-shaped, apex not long-pointed, three to four inches long, doubly toothed and dark, lustreless green on the upper surface. The flowers are borne in catkins. The sterile catkins which appear in the fall are mostly in clusters of three. The wood is light, strong and hard. It is used for spools, shoe lasts, pegs, in the making of paper pulp and for fuel.



WHITE OR PAPER BIRCH
Winter twig and buds.
One-half natural size.

MASSACHUSETTS FOREST TREES

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

THIS Birch is common throughout Massachusetts, inhabiting the low, rich woods and hillsides or mountain slopes.

It is the largest of the native birches and often attains a height of fifty to sixty feet and a trunk diameter of two to three feet. Usually the trunk divides at a considerable distance from the ground, continuing in two or three large limbs. The branches are numerous and slender. In the woods the head is small and irregular, while in the open it is broad and round.

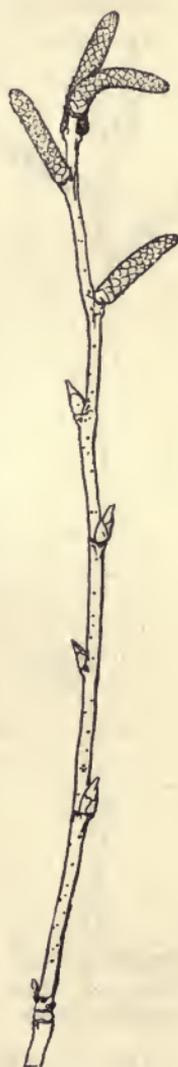
The bark on the trunk is silvery-gray or light orange in color and separates into thin, persistent layers. On very old trees the trunk is rough, gray or blackish and without lustre. The young twigs are light brown, lustrous and aromatic, but to a less degree than those of the Sweet Birch.

The leaves are simple, alternate, egg-shaped or approximately oblong, doubly toothed, three to five inches long and dark green and lustreless on the upper surface.

The flowers are in catkins. The winter catkins are three to four in number and not in clusters.

The wood is heavy, strong, hard and flexible. It is used in the making of furniture, in the building of carriages, for flooring and for fuel.

When this species is in clear stands it should be thinned as soon as it gets large enough for use, as it is attacked by a fungus which depreciates the value of the stand for future results. This species takes on a deep bronze when very old.



YELLOW
BIRCH

Winter twig. One-
half natural size.

MASSACHUSETTS FOREST TREES

SWEET OR BLACK BIRCH (*Betula lenta* L.)

THE Sweet Birch is of frequent occurrence throughout the State, though it rarely grows in the vicinity of the coast. Its favorite habitat is the rich, moist soil of woods or the banks of streams.

As commonly found, it is a medium-sized tree, having a height of about fifty feet and a trunk diameter of one to two feet, although specimens may exceed these dimensions. The trunk is upright and the branches



SWEET BIRCH
Winter twig. One-half natural size.



SWEET OR BLACK BIRCH
Leaves and fruit.
One-third natural size.

are slender, extending almost horizontally, with the lower ones often somewhat pendulous. In the open the tree develops a symmetrical, round head.

The bark on the trunk is dark, almost black, dull and broken into large, irregular plates. On old trunks it very much resembles that of the Sweet Cherry, wherefore the term Cherry Birch is often applied to the tree. The young shoots are dark brown, lustrous and very aromatic. It is this last characteristic which justifies the name Sweet Birch.

The leaves are simple, alternate, egg-shaped or approaching oblong, three to four inches long, sharply toothed and dark green and dull on the upper surface.

The flowers are in catkins. Of the winter ones there are three or four on a shoot.

The wood is heavy, very strong, hard, durable and easily wrought. It is used largely in the making of furniture and is highly esteemed for fuel.

MASSACHUSETTS FOREST TREES

HOP-HORNBEAM OR IRONWOOD

(*Ostrya virginiana* Koch.)

THE Hornbeam, so called because of its general resemblance to the European Hornbeam, is a small, slender, round-topped tree, usually not more than twenty to thirty feet tall and eight to twelve inches through. Its branches are long, slender and somewhat drooping at the ends. It occurs commonly throughout the State, growing on gravelly and rocky slopes, often in rather open woods.

The bark on the trunk is light brown tinged with red and breaks into fine scales. These separate easily, are narrower than the scales of any rough-barked tree and become finer and narrower as the tree grows older.

The leaves are simple, alternate, egg-shaped or nearly oblong, sharply toothed, two to three inches long and very similar to those of the Blue Beech.

The flowers are borne in catkins, the sterile ones appearing in the fall, usually in clusters of three, and the fertile ones appearing in the spring.

The fruit, which ripens in September, very closely resembles a cluster of hops.

The wood is compact, close-grained, strong, tough, durable and very heavy. It is good for levers, stakes, binding poles, handles, mallets and the like.



HORNBEAM OR IRONWOOD

Leaves and fruit. One-third natural size.

MASSACHUSETTS FOREST TREES

BLUE BEECH OR HORNBEAM (Water Beech)

(*Carpinus caroliniana* Walt.)

INHABITING wet woods and the border of swamps and streams, the Blue Beech is of common occurrence throughout the State, though less frequent near the coast than inland. It is a slow-growing, small tree, ten to thirty feet high, with a short trunk not more than six to twelve inches in diameter. The branches are irregular and crooked and extend at varying angles. The head is compact, broad and flat or somewhat roundish. The trunk is



BLUE BEECH

Winter twig. One-half natural size.



BLUE BEECH

Leaves and fruit. One-third natural size.

marked with irregular, longitudinal ridges. Its bark is smooth like that of the Beech and of a bluish-gray color. For this reason it is called

the Blue Beech. The leaves are simple, alternate, egg-shaped or oval, sharply and irregularly toothed, two to three inches in length and very similar to those of the Sweet Birch, though the aromatic flavor is wanting. The flowers are borne in

catkins. Both the fertile and the sterile ones appear in the spring.

In the fruit, the leaf-like body which subtends the nutlet is three-lobed and not inflated, differing in this respect from the fruit of the Hornbeam.

The wood is compact, close-grained, tough, durable and very strong. It is sometimes used for levers, beetles and the handles of tools.

MASSACHUSETTS FOREST TREES

BEECH (*Fagus atropunicea* Sudworth)

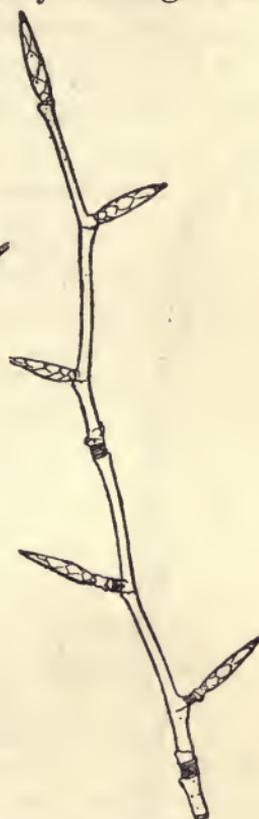
THE Beech is of common occurrence throughout the State, yet it is more abundant in the western sections than the eastern. Its home is on cool rocky slopes.

In habit it is a spreading tree with a broad and dense head, usually growing from fifty to sixty feet high and having a diameter of one and one-half to three feet. Not infrequently the stem is without branches for ten to



BEECH

Leaves and fruit. One-third natural size.



BEECH

Winter twig and buds.
One-half natural size.

twenty feet. The bark on the trunk is smooth and blue-gray in color. It is not to be mistaken for that of any other native tree, except possibly that of the Blue Beech.

The winter buds are long and slender and taper slowly to a sharp point. The leaves are simple, alternate, oval, from three to five inches in length, coarsely serrate and green on both surfaces. The fruit is a four-valved, prickly bur which encloses a triangular nut. Its wood is hard, strong, tough, perishable and liable to warp. It is employed in the manufacture of some kinds of furniture, for shoe lasts, for the handles of tools and for fuel.

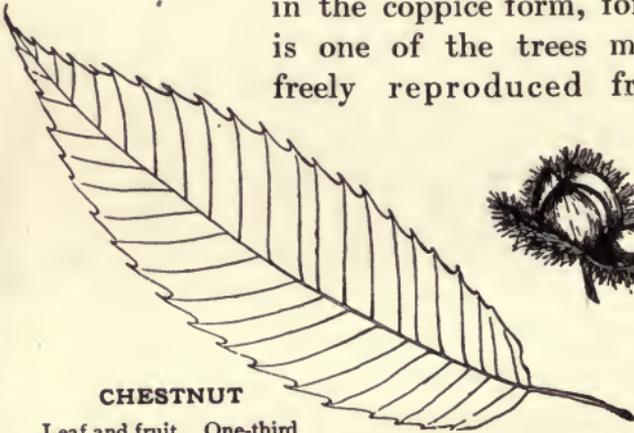
MASSACHUSETTS FOREST TREES

CHESTNUT (*Castanea dentata* Borkh.)

THE Chestnut is found commonly throughout Massachusetts, though less frequently near the sea-coast than inland. Its habitat is rich, well-drained soil. A rapid grower and one of the tallest and straightest of our trees, it usually has a single trunk destitute of limbs for a considerable distance and a rather small, round head. However, when it is uncrowded, the trunk often separates into several stout branches which form a low, round head of great breadth. In the former case it often attains a height of sixty to eighty feet and has a diameter of three to four feet. Most frequently it is met with in the coppice form, for it is one of the trees most freely reproduced from



CHESTNUT
Winter twig and buds. One-half natural size.



CHESTNUT
Leaf and fruit. One-third natural size.

sprouts. In this case it has a height of thirty to forty feet and a diameter of eight to fifteen inches.

The bark on the trunk of a small tree is dark gray and smooth. On the old trunk it is thick and divided by shallow furrows into broad, flat ridges. On the twigs the bark is dark brown. The leaves are simple, alternate, five to ten inches in length, sharply toothed and dark yellow-green in color. The fruit is a round, four-valved, prickly bur and contains, as a rule, two to three dark brown nuts. The wood is coarse-grained, light, soft, weak, but durable when exposed to alternations of dryness and moisture. It is used in the making of furniture, for house finishing, for railway ties, fence-posts and for fuel.

MASSACHUSETTS FOREST TREES

OAKS

How to know the Oaks

<p>White Oak (<i>Quercus alba</i> L.)</p> <p>Bark Light ashen-gray and broken into thin, irregular flakes.</p>	<p>Chestnut Oak (<i>Quercus prinus</i> L.)</p> <p>Bark Dark brown or almost black and divided into broad, rounded ridges.</p>	<p>Swamp White Oak (<i>Quercus platanooides</i> Sud.)</p> <p>Bark Grayish-brown and deeply and irregularly divided into broad, flat ridges.</p>
<p>Leaves With rounded lobes.</p>	<p>Leaves Not lobed but coarsely and irregularly scalloped.</p>	<p>Leaves Scalloped or slightly lobed.</p>
<p>Fruit Matures first year.</p>	<p>Fruit Matures first year.</p>	<p>Fruit Matures first year.</p>
<p>Winter Buds Broadly egg-shaped, acute or obtuse at apex, and red-brown.</p>	<p>Winter Buds Egg-shaped, rather long-pointed and chestnut-brown.</p>	<p>Winter Buds Roundish, obtuse at apex, and brown.</p>
<p>Red Oak (<i>Quercus rubra</i> L.)</p> <p>Bark Dark gray or almost black and coarsely and irregularly ridged, yet never extremely rough. Inner bark reddish.</p>	<p>Scarlet Oak (<i>Quercus coccinea</i> Muenchh)</p> <p>Bark Dark gray and broken into small, irregular ridges. Inner bark reddish.</p>	<p>Yellow Oak (<i>Quercus velutina</i> Lam.)</p> <p>Bark Dark, almost black, and deeply divided into broad, rounded ridges. Inner bark often yellow.</p>
<p>Leaves Lobes with sharp tips. Upper surface without lustre.</p>	<p>Leaves Lobes with sharp tips. Upper surface lustrous.</p>	<p>Leaves Lobes with sharp tips. Upper surface lustrous.</p>
<p>Fruit Matures second year.</p>	<p>Fruit Matures second year.</p>	<p>Fruit Matures second year.</p>
<p>Winter Buds Conical, reddish-brown and smooth.</p>	<p>Winter Buds Small, reddish-brown and smooth.</p>	<p>Winter Buds Large, strongly angled and coated with matted wool.</p>

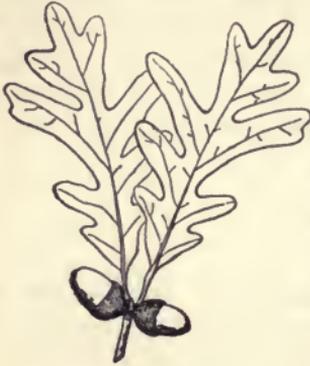
MASSACHUSETTS FOREST TREES

WHITE OAK (*Quercus alba* L.)

THE White Oak, which receives this appellation because of the light color of the bark on the trunk, grows very commonly in Massachusetts, though it is perhaps less abundant in the western sections than elsewhere. It occurs in a variety of soils and situations, usually on the lighter ground of the uplands, yet sometimes on moist land.



WHITE OAK
Winter twig
and buds.
One-half
natural size.



WHITE OAK
Leaves and fruit.
One-third natural size.

A tall tree, commonly developing a height of fifty to seventy-five feet and a trunk diameter of three to four feet, it shows a considerable diversity of habit. In the woods it has a tall, single stem, with a narrow head. In the open the bole is short and the large, diverging

limbs, many of them nearly horizontal, form a broad, round-topped head.

The bark on the trunk is light ashen-gray and broken into thin, irregular flakes.

The leaves are simple, alternate, from four to seven inches in length and usually divided into seven lobes. The upper surface of the leaf is bright green and the lower, pale green or whitish. In the autumn the foliage turns to a deep wine-red. Not infrequently it remains on the tree during the winter. The flowers appear in May when the leaves are half grown. The fruit

matures the first season and ripens in September. The acorn is about three-fourths of an inch in length, light chestnut-brown and enclosed for about one-fourth its length in the cup. Its wood is the most valuable of the native trees. It is hard, heavy, tough, close-grained and durable. It is employed for ship-timber, carriage-making, agricultural implements and for furniture and interior finishing. The bark is valuable for tanning.

MASSACHUSETTS FOREST TREES

CHESTNUT OAK (*Quercus prinus* L.)

THIS tree derives the justification for its common name, Chestnut Oak, from the resemblance which its leaves bear to those of the Chestnut. It occurs in the eastern parts of Massachusetts, sometimes rather frequent locally, as in the Blue Hills. Usually it may be found in rich, moist soil on rocky slopes and banks.

Here it is a small or medium tree, twenty-five to forty feet in height with a trunk diameter of one to one and one-half feet. Nevertheless it may sometimes assume greater dimensions. In the former case the trunk is usually continuous. The branches are small and form a narrow, round head.

The bark on the old trunk is dark reddish-brown or almost black and divided into broad, rounded ridges which have small surface scales.

The leaves are simple, alternate, five or six inches long, oblong or lance-shaped, coarsely and irregularly scalloped, and yellowish-green and lustrous on the upper surface.

The flowers appear in May when the leaves are partially grown.

The fruit matures the first year.

The acorns are about an inch long, light brown in color and slightly or almost half enclosed by the cup.

The wood is heavy, hard, strong and durable when in contact with the soil. It is employed for fencing, for railroad ties and for fuel. The bark is used in tanning. Chestnut Oak is considered to be equal in value to the White Oak.



CHESTNUT OAK
Winter twig and buds.
One-half natural size.

MASSACHUSETTS FOREST TREES

SWAMP WHITE OAK (*Quercus platanooides* Sud.)

THIS species gets its popular designation, Swamp White Oak, from its resemblance to the White Oak and its frequent fondness for swampy situations. Growing in rich soil along streams and swamps, it occurs throughout the State and is rather common in some of the eastern sections. In habit it bears a general likeness to the White Oak, though its branches are not so spreading and its head is less regular and narrower. Ordinarily its height is from forty to fifty feet and its diameter is from two to three feet.

The bark on the trunk is grayish-brown and deeply and irregularly divided into broad, flat ridges. The bark of the White Oak is somewhat lighter and the scales finer. On the young branches the scales hang loosely, giving a marked appearance to the tree.

The leaves are simple, alternate, obovate or oblong, four to six inches long, scalloped or slightly lobed and dark, lustrous green on the upper surface.

The flowers appear in May when the leaves are partially grown.

The fruit ripens the first season. The acorn is about one inch long, light chestnut-brown in color and enclosed in the cup for about one-third its length.

Its wood is very similar to that of the White Oak and only slightly inferior in quality. It is used in construction, in carriage-building, for interior finishing, for furniture and for fuel.



SWAMP WHITE OAK
Leaf and fruit. One-third natural size.

SWAMP WHITE OAK
Winter twig and buds. One-half natural size.

MASSACHUSETTS FOREST TREES

RED OAK (*Quercus rubra* L.)

THE Red Oak is very abundantly distributed throughout Massachusetts. It occurs in various soils and in various situations, excepting, however, wet land.

One of the most rapid-growing of the Oaks and the largest of the native species, it attains a height of sixty to seventy feet and a diameter of three to four feet. Frequently a specimen exceeds these dimensions. Normally the trunk is continuous. The branches are stout, upright or horizontal, develop higher up on the trunk than do those of the White Oak and form a narrow or sometimes broad head.

The bark on the young tree is smooth and gray. On the old it is dark gray or almost black and ridged coarsely and irregularly, yet never becoming extremely rough. The leaves are simple, alternate, five to eight inches in length and variable in outline.



RED OAK
Leaf and fruit. One-third natural size.

RED OAK
Winter twig
and buds.
One-half
natural size.

Frequently they are oblong and show seven to nine lobes. The upper surface is a dull, dark green and the lower surface is yellowish-green. The flowers, the earliest of the Oaks, appear in late April or early May when the leaves are partially grown. The fruit matures the second season. The acorn is from three-fourths to one and one-fourth inches in length and is larger than that of any other native Oak. The wood is heavy, hard and strong. It is less valuable than that of most of the Oaks, though it is used for furniture and interior finishing. For fuel it is held in little esteem.

MASSACHUSETTS FOREST TREES

SCARLET OAK (*Quercus coccinea* Muenchh)

THE deep scarlet which the leaves assume in the autumn is responsible for the popular name which the tree possesses. Normally growing on dry soil, it occurs abundantly in the eastern sections of Massachusetts, frequently in the central portion and only rarely in the western.

As to habit, it is usually a medium-sized tree, thirty to fifty feet in height and one to two feet in diameter. The trunk is straight and tapering. The branches are slender, horizontal and drooping towards the ends. The head is rather narrow and open.

The bark on the old trunk is dark gray and broken by shallow fissures into irregular ridges. The inner bark is reddish.

The leaves are simple, alternate, three to six inches in length, variable in outline but usually oblong or egg-shaped, divided into seven or sometimes nine lobes and bright, lustrous green on the upper surface.

The flowers appear in May when the leaves are about half grown.

The fruit matures the second season. The acorn is about one-half inch long, bright reddish-brown, often striped and enclosed in the cup for about one-half its length.

The wood is heavy, hard and strong. In value it ranks a little lower than that of the Red Oak and serves to a limited extent for the same purposes.

Chiefly because of its beautiful autumnal coloring it is rather commonly planted for ornamental purposes.



SCARLET
OAK

Winter twig
and buds.
One-half
natural size.

MASSACHUSETTS FOREST TREES

YELLOW OAK (*Quercus velutina* Lam.)

THE Yellow Oak, or, as it is more frequently called, the Black Oak, occurs in all parts of Massachusetts and is really abundant in the eastern sections. Its usual home is on poor soil, particularly on gravelly uplands and ridges.

As to habit, it is intermediate between the Red Oak and the Scarlet Oak. The trunk commonly attains a height of fifty to sixty feet and a diameter of two to three feet. The branches are stouter than those of



YELLOW OAK

Leaf and fruit. One-third natural size.

the Scarlet Oak, yet not so stout as those of the Red. The head is narrow and roundish.

The bark on young stems is smooth and dark gray or brown. On old trunks it is dark, almost black, and is deeply divided into broad, rounded ridges. In this last respect it differs from the Red Oak, the bark of which has flat ridges and is never quite so rough.

The winter buds are large, strongly angled and covered with a matted, woolly growth.

The leaves are very variable, sometimes resembling those of the Scarlet and sometimes those of the Red Oak. They are simple, alternate, egg-shaped or ob-

MASSACHUSETTS FOREST TREES

Yellow Oak — *Concluded*

long, mostly seven-lobed, sometimes divided nearly to the midrib and again nearly entire, and dark green and glossy on the upper surface.

The flowers appear in the early part of May when the leaves are nearly half grown.

The fruit matures the second year. The acorn is one-half to three-fourths of an inch long, light red-brown, often marked with lines of a darker color and enclosed in the cup for about one-half its length.

The wood is heavy, hard, coarse-grained and strong. It has little use except for fuel. The bark is used in tanning and in medicine.



YELLOW OAK

Winter twig and buds. One-half natural size.

MASSACHUSETTS FOREST TREES



ELMS

How to know the Elms

<p>Slippery Elm (<i>Ulmus pubescens</i> Walt.)</p> <p>Habit Medium height. Head broad and almost flat.</p>	<p>White Elm (<i>Ulmus americana</i> L.)</p> <p>Habit Tall and variable in outline, yet typically vase-shape.</p>
<p>Bark on Trunk Dark brown tinged with red. Inner bark mucilaginous.</p>	<p>Bark on Trunk Ashy-gray. Inner bark not mucilaginous.</p>
<p>Leaves Very rough on the upper surface and nearly as rough on the lower.</p>	<p>Leaves Somewhat rough on the upper surface and smooth on the lower.</p>
<p>Winter Buds Dark brown and covered with rusty hairs.</p>	<p>Winter Buds Brown and smooth.</p>



MASSACHUSETTS FOREST TREES

SLIPPERY ELM (*Ulmus pubescens* Walt.)

THE Slippery Elm, a common name attached to this species because of the mucilaginous inner-bark, is very rare or wanting in the eastern sections of the State, but is rather frequent in the western parts. It has a preference for low, rich soil, though it sometimes occurs on higher ground.

In habit it is a lower tree than the American Elm and, in proportion to its height, more spreading. It is a medium-sized tree, attaining a height of forty to fifty feet and a trunk diameter of one to two feet. The head is very broad and almost flat.

The bark on the trunk is thick, dark brown tinged with red, divided by shallow fissures into flat ridges and covered with flat scales.

The winter buds are obtuse, dark brown in color and covered with rusty hairs.

The leaves are simple, alternate, four to six inches long, sharply doubly toothed, dark green and very rough on the upper surface and rough on the under-surface.



SLIPPERY ELM

Winter twig and buds.
One-half natural size.



SLIPPERY ELM

Leaves and fruit. One-third natural size.

The flowers appear before the leaves about the middle of April and the small fruit ripens in late spring.

The wood is very similar to that of the American Elm, being heavy, strong and durable. It is employed in the manufacture of agricultural implements, for the hubs of wheels, in the construction of vessels and for fence-posts.

MASSACHUSETTS FOREST TREES

WHITE OR AMERICAN ELM (*Ulmus Americana* L.)

THE American Elm is very common everywhere in Massachusetts and reaches its maximum development in the Connecticut Valley. Its favorite habitat is the moist ground along streams and rich bottom-lands.

Its graceful habit, typically vase-shape, yet often varied, is very familiar. Commonly from fifty to sixty feet in height, it often grows to a height of one hun-



AMERICAN ELM

Winter twig and buds. One-half natural size.



WHITE ELM

Leaves and fruit. One-third natural size.

dred feet or more and acquires a trunk diameter of six to ten feet. It is usually a quick-growing tree.

The bark on the trunk is ashy-gray, thick and divided by deep fissures into flat ridges which separate into thin scales.

The leaves are simple, alternate, two to five inches in length, coarsely

doubly toothed and dark green and somewhat rough on the upper surface.

The flowers appear in late March or early April before the leaves, and the small, winged fruit ripens in May before the leaves are fully developed.

The wood is heavy, hard, strong and tough. It is employed for the hubs of wheels, in boat and ship building, for flooring and in cooperage.

MASSACHUSETTS FOREST TREES

HACKBERRY (*Celtis occidentalis* L.)

GROWING in various situations, sometimes in moist, rich ground, yet more frequently on gravelly soil or rocky hillsides, it occurs occasionally throughout the State, nevertheless it is somewhat more abundant in the southeastern sections near the coast. Here it is a slow-growing tree, of medium dimensions, and attains a height of twenty to forty feet and a diameter of eight to twenty inches. Its habit is somewhat variable. The trunk is short and the branches are stout, spreading and angular. The twigs are extremely slender. The head is low and round.



HACKBERRY
Winter twig
and buds. One-
half natural size.



HACKBERRY
Leaves and fruit.
One-third natural
size.

The bark on the trunk of old trees is grayish and is broken into thin scales. It is often marked with ridges or with varying excrescences. The bark on the season's shoots is reddish-brown.

The leaves are simple, alternate, two to four inches long and variable in outline. They bear some resemblance to the leaf of the American Elm. The flowers are greenish and appear in May with the leaves.

The fruit is a globular drupe about one-fourth of an inch in diameter. The flesh is sweet and the outer surface is purplish-red, changing in winter to brownish-orange. The wood is heavy, rather soft, weak and quick to decay. It is employed in making the cheaper grades of furniture.

MASSACHUSETTS FOREST TREES

SASSAFRAS (*Sassafras sassafras* Karst.)

THE Sassafras occurs in almost every part of Massachusetts. It grows in various soils and situations but prefers a rich, somewhat sandy, well-drained soil. For the most part it is a small tree. Usually its height would not be much above thirty feet and its

diameter much over twelve inches. The stem is rarely erect, and is often bent and crooked. In young trees the branches have a whorled appearance. They



SASSAFRAS

Leaves and young fruit. One-third natural size.



SASSAFRAS

Winter twig and buds. One-half natural size.

are always short and stout, and frequently they are contorted. The head is narrow and flat. The bark of the old trunk is thick, dark reddish-brown and strongly ridged. On young stems the bark is greenish and finely striate. The twigs are yellowish-green and have strong aromatic properties, as does the bark of all the parts.

The leaves are simple, alternate and of greatly varying outline. Sometimes they are entire and then again they are three-lobed. In summer the foliage is dark green and in the autumn it turns to yellow or to orange tinged with red. The flowers are small, greenish-yellow and appear in May when the leaves are unfolding.

The fruit is a small, dark blue, lustrous berry which ripens in early fall. The wood is light, soft, brittle and very durable when in contact with the soil. It is used for posts, in construction of light boats and in cooperage. The roots supply the oil of sassafras.

MASSACHUSETTS FOREST TREES,

SYCAMORE (Buttonwood) (*Platanus occidentalis* L.)

THIS, the largest of the New England trees, occurs occasionally throughout the State, frequenting the borders of streams and rich bottom-lands. It grows from fifty to one hundred feet in height and has a trunk diameter of three to eight feet. The trunk may spread near the ground into several large, secondary limbs, or it may rise without branching for a considerable distance and then have large, spreading branches.

The branchlets are very often tufted in appearance, due to the activities of a fungus. The bark on the trunk and large



SYCAMORE
Winter twig and
buds. One-half
natural size.



SYCAMORE
Leaf and fruiting head. One-third natural size.

limbs is greenish-gray in color and flakes off in broad scales, exposing the inner bark which is at first whitish or light green, then darker. The leaves are simple, alternate, three to five lobed and light green. The base of the leaf-stalk is swollen and includes the winter bud. The fruit is in the shape of a ball and is about an inch in diameter. It contains very many small seeds and usually remains on the tree until spring. The wood is hard and firm but very perishable when exposed to the weather, and liable to warp. It is used for tobacco boxes, furniture and interior finish of houses. It is fairly good for fuel.

MASSACHUSETTS FOREST TREES

WILD RED CHERRY (Bird Cherry)

(*Prunus pennsylvanica* L. f.)

THE Wild Red Cherry is a tree of little value, which often takes possession of areas cleared by fire. It occurs in the State, being more abundant in the central and western sections than elsewhere. While it grows in a variety of situations, it really prefers a moist, rich soil.

In habit it is a small tree, seldom exceeding a height of twenty-five to thirty feet and a diameter of ten inches. The trunk is continuous and the branches slender. The head is narrow and roundish or oblong.



WILD RED CHERRY

Leaves, flowers and fruit. One-third natural size.

The bark on the young trunk is smooth and reddish brown, while in the old it is dark red-brown and broken into thin plates. The inner bark possesses bitter, aromatic properties.

The leaves are simple, alternate, oblong or lance-shape, three to four inches in length, finely toothed on the margin and bright green and lustrous on the upper surface.

The flowers appear in May when the leaves are about half grown. They are white and occur in clusters of four or five.

The fruit is globular in shape, a little larger than a pea and bright red.

The wood is light and soft and without economic value.

MASSACHUSETTS FOREST TREES

BLACK CHERRY (*Prunus serotina* Ehrh.)

FOR the economic value of its wood, the Black Cherry is the most important of the native Cherries. It is of common occurrence in all parts of the State, growing on many soils and in many situations, yet preferring moist, rich ground.

As to habit, though sometimes a mere shrub, it usually reaches a height of thirty to forty feet and acquires a diameter of ten to fifteen inches, — at times even exceeding these dimensions. The trunk is usually continuous and the branches are small and horizontal. The head is narrow and oblong.



BLACK CHERRY

Leaves and fruit. One-third natural size.

The bark on young stems is red-brown and somewhat lustrous. On the old trunk it is darker and broken into small, irregular plates. The inner bark is bitter to the taste.

The leaves are simple, alternate, oblong to lance-oblong in shape, three to five inches in length, the margin notched with fine teeth, somewhat leathery in texture and dark green and lustrous on the upper surface.

The flowers appear in late May or early June, when the leaves are only half grown. They are small, white

BLACK CHERRY — *Concluded*

and borne in many-flowered racemes which are four to five inches in length.

The fruit is globular, about the size of a pea, dark purple in color and usually slightly bitter.

The wood is light, close-grained, rather hard, not liable to warp and capable of taking a good polish. It is employed in cabinet-making and for interior finishing.

The fruit and bark possess valuable medicinal properties.



BLACK CHERRY

Winter twig and buds. One-half natural size.

MASSACHUSETTS FOREST TREES

LOCUST (*Robima pseudacacia* L.)

ALTHOUGH the Locust is not native to the State, it has become so thoroughly naturalized that it is as common as many of the indigenous species. It prefers rich ground, yet it is found in various soils and situations.

When young it is a rapid-growing tree, often attaining a height of twenty feet in half as many years. After that period its increase is much slower. Here it is usually a small tree, from twenty-five to fifty feet in height and from eight inches to two feet in diameter. The trunk is erect or sometimes oblique and irregular. The branches are small and brittle and form a narrow, oblong head.

The bark on the old trunk is dark gray, thick and deeply and irregularly furrowed. The young branches are armed with spines which disappear as the tree ages.

The leaves are pinnately compound and composed of seven to twenty-one leaflets. The individual leaflets are small, about an inch or an inch and a quarter in length and oval in outline.

The flowers, which appear in early June after the leaves unfold, are borne in loose racemes, four to five inches in length. They are creamy-white, showy, fragrant and much frequented by bees.

The fruit is a pod which is smooth, flat, dark brown and about three inches in length.

The wood is heavy, exceedingly hard, strong and very durable when in contact with the soil. It is employed for shipbuilding, for fence-posts, in turnery and for fuel.

MASSACHUSETTS FOREST TREES

MAPLES

How to know the Maples

<p>Striped Maple (<i>Acer pennsylvanicum</i> L.)</p> <p>Habit A shrub or small, erect tree. Trunk continuous.</p>	<p>Sugar Maple (<i>Acer saccharum</i> Marsh.)</p> <p>Habit When young the outline is usually narrowly egg-shaped. Later it may become roundish. Trunk continuous.</p>	<p>Silver Maple (<i>Acer saccharinum</i> L.)</p> <p>Habit Normally, trunk separates at a few feet from ground into three or four upright stems. Branches slender and often pendulous.</p>	<p>Red Maple (<i>Acer rubrum</i> L.)</p> <p>Habit Trunk upright and usually continuous. Occasionally it divides into 2 or 3 upright stems. Head narrow and roundish.</p>
<p>Bark on Trunk Reddish-brown or dark green with whitish longitudinal striations.</p>	<p>Bark on Trunk Gray in color. On old trunk, rough with long ascending scales which project irregularly at the edges.</p>	<p>Bark on Trunk Dark gray with a reddish tinge. More or less furrowed. Separates into thin scales.</p>	<p>Bark on Trunk Dark gray. Marked by longitudinal ridges and broken into plate-like scales.</p>
<p>Leaves Roundish, 3-lobed and finely and sharply doubly toothed.</p>	<p>Leaves Usually 5 lobes, sometimes 3. Bays between lobes rounded. Lobes sparingly toothed</p>	<p>Leaves Usually 5 lobes, rarely 3. Lobes long, narrow and toothed. Silvery white on under-surface.</p>	<p>Leaves Lobes 3 to 5. Lobes broad and irregularly doubly serrate or toothed. White on under-surface.</p>
<p>Flowers Bright yellow, in slender racemes. Appear when leaves are fully developed.</p>	<p>Flowers Greenish-yellow, in clusters, on long, threadlike stalks. Appear with the leaves.</p>	<p>Flowers Greenish-yellow or pinkish, in clusters. Appear long before the leaves.</p>	<p>Flowers Scarlet or yellowish-red, in clusters. Appear before the leaves.</p>



MASSACHUSETTS FOREST TREES

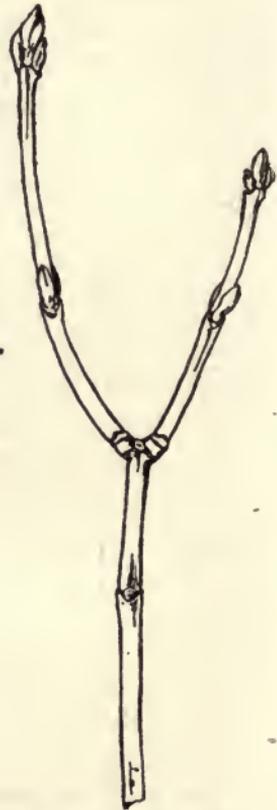
STRIPED MAPLE (*Acer pennsylvanicum* L.)

THIS Maple is of common occurrence in the central and western sections of Massachusetts, but rare or absent near the coast. In the tree form it is slender and graceful, attaining a height of twenty to twenty-five feet and a diameter of five to eight inches. Its favorite habitat is cool, rocky woods.

The bark on the trunk is reddish-brown or dark green, striped longi-



STRIPED MAPLE
Leaf and fruit. One-third natural size.



STRIPED MAPLE
Winter twig and buds.
One-half natural size.

tudinally with whitish lines which in time turn brown. The bark on the twigs is bright reddish-brown.

The leaves are simple, opposite, from five to six inches in length and nearly as broad, three-lobed and pale green. In the autumn they change to a clear, light yellow.

The flowers, which are bright yellow in color, appear in slender racemes in late May or early June when the leaves are fully developed.

The wood is light, soft and without direct commercial value.

MASSACHUSETTS FOREST TREES

SUGAR MAPLE (Rock Maple) (*Acer saccharum* Marsh.)

THE Sugar Maple may be found abundantly throughout the State, although its occurrence is much less frequent toward the seacoast. Wherever it may grow, it is much at home in cool, rich woods and on moist, rocky slopes. Normally, it is a tree growing from fifty to sixty feet high, yet it often reaches a height of at least one hundred feet. In the open the branches develop at a distance of eight or ten feet above the ground and make an acute angle with the trunk, thus forming, at least when the tree is young, an egg-shaped head. Later in life the tree may assume a roundish form.

The bark on the old trunk is gray and roughened with long vertical scales which project irregularly at the edges. The young twigs are reddish-brown in color and lustrous.

The leaves are simple, opposite, from three to five inches in length and have three to five lobes. The upper surface of the leaf is dark green, and the under-surface is pale green. In the autumn the foliage takes on brilliant shades of red, scarlet and orange. The flowers, which are greenish-yellow in color, are borne on long, thread-like flower stalks and appear about the middle of April.

The wood is heavy, hard, durable, close-grained and capable of taking and retaining a good polish. It is used largely in the interior finish of buildings, in the making of furniture and in shipbuilding.



SUGAR MAPLE

Leaf and fruit. One-third natural size.

SUGAR MAPLE

Winter twig and buds. One-half natural size.

MASSACHUSETTS FOREST TREES

SILVER MAPLE (*Acer saccharinum* L.)

THE Silver Maple is met with occasionally in the central part of the State, though in the eastern sections it is rare or absent. It grows chiefly along streams and in rich intervals.

Normally, it is a tree from fifty to sixty feet in height, having a trunk which separates at a few feet from the ground into three or four upright stems that are destitute of branches for a considerable distance.



SILVER MAPLE

Leaves and fruit. One-third natural size.

The branches proper are long, slender and not infrequently pendulous.

The bark on the trunk is dark gray with perhaps a reddish tinge, more or less furrowed and separates into large, thin scales. The bark on the twigs is chestnut-brown in color and lustrous.

The leaves are simple, opposite, from six to seven inches in length and deeply five-lobed. The upper surface of the leaf is pale, while the lower surface is silvery-white. In autumn the foliage becomes a pale yellow.

The flowers, which are greenish-yellow or sometimes pinkish, appear before the leaves, in late March or early April.

The wood is soft, weak and perishable. It is used in the making of furniture and sometimes for floors.

MASSACHUSETTS FOREST TREES

RED MAPLE (*Acer rubrum* L.)

GROWING in a variety of situations, though usually where it is wet, the Red Maple appears commonly throughout the State. It is a rapid-growing tree of medium size, with a low, narrow, round head. Normally, it rises to a height of forty to fifty feet and has a diameter of one to two feet. Usually the trunk is continuous, though occasionally it divides into two or three upright stems. The branches proper are rather slender and come out at varying angles with the trunk.

The bark on older trees is dark gray, marked by longitudinal ridges and broken with plate-like scales. On the young shoots the bark is red and shiny.

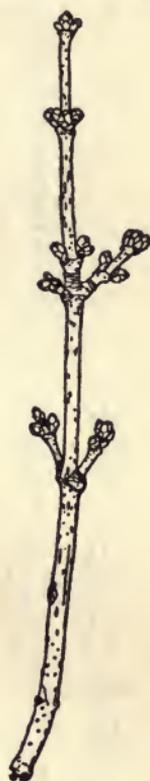
The leaves are simple, opposite, from three to four inches in length and have from three to five lobes. The upper surface of the leaf is light green and the under-surface white. In the fall the green gives place to varying shades of scarlet or scarlet and orange.

The flowers appear before the leaves, in early April, and are scarlet or yellowish-red. Likewise, the fruit, which ripens in June, has a reddish coloring.

The wood is heavy, close-grained, easily worked and capable of taking a good polish. However, it lacks strength and decays speedily when exposed to alternations of moisture and dryness. It is used in the making of furniture, in turnery, for gun-stocks and for fuel.



RED MAPLE
Leaf and fruit. One-third natural size.



RED MAPLE
Winter twig and buds. One-half natural size.

MASSACHUSETTS FOREST TREES

BASSWOOD OR LINDEN (*Tilia americana* L.)

THE Linden is found in rich, moist soil in almost every part of the State. In habit it is a large tree, with an average height of fifty to sixty feet and a diameter of two to three feet. The branches are very numerous, comparatively small and slender and often somewhat pendulous. The head may be broad and round-topped or it may be conical.

On young trees the bark is gray and smooth, while on older trunks it is darker and deeply and irregularly furrowed. The twigs are yellowish-green or reddish-brown in color.

The leaves are simple, alternate, very broadly egg-shaped, from four to five inches in length and toothed.

The flowers are greenish-yellow and appear in late June or early July. The stalk which bears the flowers is attached to an oblong, yellowish,

leaf-like body. The flowers themselves are pleasantly fragrant and rich in honey.

The fruit is globular, about the size of a pea, woody and gray in color.

The wood is light, close-grained, soft and more tough and pliable than almost any other wood. It is employed for paper pulp, in carriage-making, for furniture and for wooden utensils.

The tree is a favorite with bee-keepers, for bees collect from its flowers a large amount of honey of a very desirable quality.



BASSWOOD
Winter twig
and buds. One-
half natural
size.

BASSWOOD
Leaf and fruit. One-third natural
size.

MASSACHUSETTS FOREST TREES

BLACK GUM OR TUPELO (*Nyssa sylvatica* Marsh.)

THE Black Gum occurs rather commonly throughout Massachusetts, where it inhabits the borders of swamps and streams.

Here it is a small or medium-sized tree, of slow growth and of very variable habit. Its height development ranges from twenty-five to fifty feet and its diameter from one to two feet. The branches are slender and angular, the lower ones horizontal or slightly drooping and the upper horizontal or slightly rising. The head is of varying form, cylindrical, conical, pyramidal, often flat-topped and usually picturesque.



BLACK GUM

Leaves and staminate flower clusters.
One-half natural size.

The bark on the trunk is dark gray. On the old trunk it is divided

into many small scales. The leaves are simple, alternate, entire and from two to five inches long. In summer the leaves are dark green and lustrous on the upper surface. In the autumn the foliage takes on brilliant hues of scarlet and crimson.

The fruit, which ripens in October, is about one-half inch long, blue-black and sour.

Its wood is heavy, soft, strong and not very durable. It is used for the hubs of wheels, for rollers and piles. It is difficult to split; hence, when it is made to serve for fuel, the logs are usually employed.



BLACK GUM

Winter twig and buds. One-half natural size.

MASSACHUSETTS FOREST TREES



ASHES

How to know the Ashes

<p>Black Ash (<i>Fraxinus nigra</i> Marsh.)</p> <p>Leaves Leaflets 7 to 11 and without stalks, excepting the terminal one.</p>	<p>White Ash (<i>Fraxinus americana</i> L.)</p> <p>Leaves Leaflets 7 to 9 and supported by short stalks.</p>	<p>Red Ash (<i>Fraxinus pennsylvanica</i> Marsh.)</p> <p>Leaves Leaflets 7 to 9 and supported by short stalks.</p>
<p>Winter Buds and Twigs Buds black. Shoots olive-green, smooth.</p>	<p>Winter Buds and Twigs Buds brown. Shoots olive-green, smooth and lustrous.</p>	<p>Winter Buds and Twigs Buds brown. Shoots greenish and more or less covered with down.</p>



MASSACHUSETTS FOREST TREES

BLACK ASH (*Fraxinus nigra* Marsh.)

THE Black Ash is found to a certain extent throughout the State, though more abundantly in the central and western portions than in the eastern. It confines itself almost exclusively to rich, moist ground in the vicinity of streams and swamps.

In habit it is a very slender tree, usually growing to a height of sixty to seventy feet and having a diameter of one to two feet. In the woods the trunk is slim and without branches until near its very top. In the open it may have a broad, round head.

The bark on the trunk is dark gray and marked by parallel ridges. The season's shoots are olive-green and smooth, and the buds are black.



BLACK ASH

Leaf and fruit. One-third natural size.

The leaves are opposite, twelve to fifteen inches in length and consist of seven to eleven leaflets. These are oblong, four to five inches long, remotely toothed and without stalks, except in the case of the terminal one.

The flowers and fruit for all superficial purposes resemble those of the White Ash.

The wood is heavy, soft, tough and durable. It is used in cabinet work, for interior finishing, for hoops and for baskets. For this last purpose it is held in very high esteem.

MASSACHUSETTS FOREST TREES

WHITE ASH (*Fraxinus americana* L.)

THIS rapid-growing tree occurs in all parts of Massachusetts and on every kind of ground, although it thrives best in deep, rich soil in the vicinity of streams.

As to habit, it usually attains a height of fifty to seventy-five feet and a trunk diameter of two to three feet. In the open the trunk divides at a few feet from the ground into two or three large limbs, then assumes a broad, round head.



WHITE ASH

Leaf and fruit. One-third natural size.

The bark on the trunk is dark brown or deep gray. It is deeply divided by furrows, which are parallel or connect at intervals into broad, flattened ridges. The season's shoots are olive-green and smooth.

The leaves are opposite, eight to twelve inches in length and composed of seven to nine leaflets. The individual leaflets are egg-shaped or oblong, three to five inches in length, stalked, remotely toothed and dark green on the upper surface.

The flowers appear in May before the leaves.

WHITE ASH — *Concluded*

The fruit is a winged body, oblong in shape and one to two inches in length. It ripens in late August or September and often hangs on into the winter.

It is a valuable forest tree and the most useful of the Ashes. The wood is heavy, hard, strong, tough and elastic. It has many uses. It is employed in the manufacture of agricultural implements, in the making of furniture, for the handles of tools, in carriage-building and sometimes for interior finishing.



WHITE ASH

Winter twig and buds. One-half natural size.

MASSACHUSETTS FOREST TREES

RED ASH (*Fraxinus pennsylvanica* Marsh.)

THE Red Ash, not infrequently mistaken for the White Ash, occurs occasionally throughout Massachusetts. Its home is in low, rich soil near streams and swamps.

In habit it is very much like the White Ash, though it is usually smaller in every way. It seldom grows to a height of more than fifty or sixty feet and its diameter rarely exceeds eighteen to twenty inches. In the open the head is rather broad and round-topped.



RED ASH

Leaf and fruit. One-third natural size.

The bark on the trunk of a mature tree is dark gray or brown and furrowed, but less deeply and more regularly than in the case of the White Ash. The season's shoots are greenish-gray and coated with numerous fine hairs which often persist until the second season.

The leaves are opposite, compound, ten to twelve inches in length and composed of seven to nine leaflets.

The flowers and fruit, to all intents and purposes, are similar to those of the White Ash.

The wood is heavy, hard and brittle. It is much inferior to that of the White Ash, though it is used for many of the same purposes.





FOREWORD

The writer has been unable to supply the requests that have come in for this address, hence it is issued herewith from the State Forester's office for general distribution to Massachusetts citizens

Approved by the State Board of Publication

Marshall S. Hildford
1908.

FORESTRY

FROM A COMMERCIAL STANDPOINT



BY F. W. RANE, STATE FORESTER OF MASSACHUSETTS



HERE are few if any problems of greater moment and more economic importance to the State of Massachusetts at the present hour than that of forestry. Doubtless there are those present who have known this forest patient when she was healthy, vigorous and strong; how beautiful primeval forests dotted this good old Bay State in those days and how, year by year, they have succumbed to our mad rush of uneconomic commercialism, until to-day finds us in a sadly depleted and unrational condition, viewed from the standpoint of modern forest management. It is always easy to point out mistakes after they have happened; but experience, though a dear teacher, is nevertheless extremely effective. Year by year the primeval forest growth was cut and harvested. Second growth, inferior but valuable, has followed, where conditions have been favorable, and this has, in turn, been utilized as soon as it reached merchantable size. Demand for forest products has been increasing in greater and greater proportion as we have been developing the State and nation, while the products themselves have likewise been approaching exhaustion. Our people have looked upon the forest products as inexhaustible, thinking naturally that, though Massachusetts should be depleted, there are plenty of other States at our very doors

COMMERCIAL FORESTRY

with indefinite supplies. Many of our country-loving and far-sighted citizens have time and again in the past predicted our present calamity; but the commercial era has absorbed us, and the successful business man of America has been the admired of admirers. Æsthetics in a new country are as nothing compared with commercial activities, when the bases of the commodities dealt in are free gifts and cost only for the marketing. The balance finally comes with the nation's development.

From the substantial old-time sawmill, — formerly so common upon our streams, now only relics of bygone days, — our evolution has developed to the portable mill. Instead of taking the logs to the mill, we now take the mill to the logs. While it is easy to comprehend this change of milling operations and the economy therein, the effect upon forestry itself and the country community has changed most remarkably. When logs were taken to the mills, most farmers employed their teams and labor during the winter months in getting out lumber for home consumption, but sold enough to make the effort and time profitable. The old-fashioned method, too, of not cutting clean but taking only the larger and mature trees, did not destroy the forest, for replacement followed rapidly. Our present method is to sell the stumpage; and, as the purchaser finds he is able to market every vestige of the product, the forest area is stripped of vegetation. In earlier days this extreme of clearing was done only when the land was to be used for agricultural purposes. Where the larger growth only was taken out in the past, in twenty years or so the same land could be cut over

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again at a profit; under the present practice it will require a period of nearly or quite twice as long for similar results. Again, even the cutting clear practice was not so productive of ill results until it came into such common use. When only here and there a tract was cut, the surrounding growth reseeded it; to-day the reseeded factor, also, is cut, leaving great areas where Nature is unable to assist as formerly. The white pine, for example, will re-establish itself whenever the conditions are favorable. When, as in earlier times, the ill-shaped and limbed specimens contained no commercial value, they were allowed to remain standing. These trees make our best seed trees, hence were responsible for reforesting the land with this species. To-day even these seed trees have value. No matter how pronged or crooked, they will make box-boards, pails, tubs, matches, etc., and bring prices of from \$14 to \$16 a thousand, when delivered. The results of this practice are, as we find them, altogether too common. Portable mills are operating at the present on wood lots that in earlier times could not be used commercially. Where the diameters of trees were thought of in terms of feet, we have simply changed the feet to inches for present practical usage. The commercial pine tree of to-day hardly reaches the seed-producing age before it is harvested.

What is true of white pine is equally true of many other of our forest trees. Our pulp companies chew up practically everything of the spruce and even balsam fir, which a few years ago was considered practically worthless, but which at present is of equal value in limited amounts. Hemlock was little thought of for joists and gen-

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eral framing material in buildings not long since, but our carpenters now are not so particular. The American larch, commonly called tamarack or hackmatack, found growing in low, moist situations, was valueless until railroad ties and telegraph poles grew scarce; and then they found immediate value, now having largely disappeared. Hickory, commonly called walnut in New England, was the only wood thought suitable for tools, ax-handles, whiffle-trees, etc.; but go to the market and see what are being substituted in its place. Of course our tools do not last as long as formerly. Were there time, it could be shown that each and every kind of wood has special qualities that adapt it for specific usefulness. The more we advance in commerce, industries and manufactures, we continue to discover new economic uses for all of our raw materials and products. There is not a species of wood grown at present but has a recognized standard of value. The time has come when simply the growing of cordwood in most sections of Massachusetts is a promising crop. Particularly is this true where the burning of brick is an important industry.

We, as a Commonwealth, are at an extremely interesting stage at the present time as regards our forestry problem. It is not only true of Massachusetts, but of New England and, for that matter, the whole country, to a greater or less extent.

As long as the prices of forest products remained low, we laughed at the idea of forest depletion. Experience is a wise teacher; and although the histories of older countries point out very clearly the mistakes they have made, their errors are seldom heeded in a new country until many of the same experiences have resulted.

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When our forefathers came to these shores, New England was a vast wilderness, a primeval forest. We are told of the magnificent forests, and how individual trees reached great proportions throughout this whole section. Even the decaying stumps still extant remind us that but yesterday, in point of time, these monarchs of the forest which had been growing for centuries were with us. To-morrow a forest tree producing over a thousand feet board measure will be a veritable curiosity. We country-loving and public-spirited people are extremely anxious that the nation reserve certain portions of the White Mountains and the southern Appalachian range, that coming generations may enjoy, take pride in and benefit therefrom. A birthright for them as small as this is a pittance compared with the vast and almost endless expanse of virgin forest areas that was ours.

Viewing the subject as a whole, therefore, we must recognize that the time is ripe for action and public concern. To accomplish results, much thoughtful study and definite systematic planning must be done, in order that there will be no obstructions in the way. Education and example are our tools to work with.

“Forestry is the science and art of forming and cultivating forests; the management of growing timber.” Forestry, therefore, as the title of my address indicates, is concerned with the economic production of merchantable wood and timber. Forestry should rightfully be thought of as a commercial industry. The forest products of a country should be one of her greatest assets, just as much as that of any other crop, agriculturally speaking, and even more to be relied upon than

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our income from mining; for, with proper management, the investment will be permanent, inexhaustible, and hence fundamental to the nation's life and prosperity.

Lumbering is as important to successful forestry as is the digging of potatoes or the harvesting of any crop when it is ripe. The same essentials of culture, also, must be understood in getting maximum returns in the one case as in the other.

Forestry and commercial forestry are synonymous terms. Forestry in its true sense, when managed properly, will utilize our three million acres of land in Massachusetts, — at present seen scattered in every section, known as waste land, abandoned pastures, sprout lands, barrens, plains, etc., — returning them to forest culture. The same culture that will return saw logs to our mills, make work for our country folk in winter, replenish our town treasuries, repaint the old red schoolhouse, pay the sexton to again ring the church bell, make better roads and, in short, return the former substantial livelihood of country life, will also conserve moisture, protect and enrich the soil, give an equable climate and return to Massachusetts and New England the natural beauty we all would love so much to see.

If commercial forestry will do this, the æsthetic man, who now and then sets out a shade tree and spends more time criticising the practical lumberman, can employ his time to better advantage.

Our portable mill operators, who are to be found in nearly every country town, are, generally speaking, our best and most public-spirited citizens and, as a matter of fact, the leaders of the communities. These men also are the most approachable men in the world, and willing to foster and

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further every reasonable and commendable project. These men, I am confident, will be the men of the future, to be relied upon to do things in forestry. The fact that forest products are valuable and likely to increase rather than diminish, — it being an easy matter to demonstrate, even at present prices, that reforestation and better forestry management will pay, — gives life and interest to the undertaking.

Go into any rural section, or city, for that matter, in Massachusetts to-day and discuss modern forestry intelligently, beginning with the collecting of the seed, time of year to gather them, when to plant, how to care for the seedling, distance apart to set for results, when to thin and whether to prune, number of years to maturity, the kind of soils for different species, probable returns upon the investment, etc., and there is little trouble in interesting our people.

For the rest of my time to-day I want to give some forestry data likely to be of interest. Any data given upon forestry is, generally speaking, only suggestive; but if the basis of estimating is also given, comparative adaptations can be made where conditions vary.

In giving the following estimates, I have taken precaution to be conservative. It is better, it is thought, to give the data as it really exists, although the picture may not be as attractive. The rate of interest, the price of land and the assessed valuation upon the increment growth are all variable and elastic factors for basing computations.

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PROFITS FROM WOODLAND UNDER PRESENT CONDITIONS IN MASSACHUSETTS

Term of years, forty. Taxes and valuation, figured at 4 per cent, compound interest. Average price of woodland, free of growth, estimated at \$6 per acre. As the trees grow, an addition of \$5 per acre every ten years is allowed, as follows:—

First ten years,	\$6 00
Second ten years,	11 00
Third ten years,	16 00
Fourth ten years,	21 00

The average tax rate throughout the State is \$17 per thousand.

Second growth white pine, chestnut and sprout hardwood growth are those we are most familiar with.

(1) SPROUT HARDWOOD GROWTH

In sprout hardwood growth it is generally considered that a cord per year can be obtained in average conditions on an acre. Therefore, forty years equals forty cords; stumpage value, \$50 to \$80, depending on locality and proximity to market.

INVESTMENT AT END OF FORTY YEARS

Compound interest of valuation, \$6, for forty years, \$22 81

Taxes, with interest:—

First ten years,	\$3 97
Second ten years,	4 48
Third ten years,	4 83
Fourth ten years,	4 29
	<hr/>
	17 57
Total cost,	\$40 38

Profit, \$10 to \$40 in forty years per acre, or 25 cents to \$1 an acre per year.

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(2) CHESTNUT GROWTH

Can expect about 100 good telephone poles or 300 ties with 15 cords of wood, total net approximate value of \$100. Investment at end of forty years, same as for sprout hardwood growth, \$40. This leaves a net profit of \$60 per acre in forty years, or \$1.50 a year per acre average.

(3) SECOND GROWTH WHITE PINE (NATURAL REPRODUCTION)

From actual measurements, this growth was found to yield on an acre 25 cords of white pine and 15 cords of hardwood. White pine is worth \$5 per cord net for lumber, and hardwood for cord wood 1. Total, 40 cords, equals \$140. Deducting \$40, the investment, which is the same as for sprout hardwood growth and chestnut, leaves a net return of \$100 an acre in forty years, or a net income of \$2.50 a year per acre.

(4) NATURAL PASTURES (SO CALLED)

There are in Massachusetts over 1,000,000 acres of pasture lands. Assuming that all cattle and sheep are pastured at the average rental, statistics show that these lands do not average \$1.50 a year per acre. If from this sum we subtract \$1 a year, the amount allowed for taxes on valuation and compound interest on valuation, the same amount as allowed in the case of forestry lands, the net income for an acre per year is only 50 cents. This shows that there are thousands of acres of pasture lands in Massachusetts that rightfully and economically should be turned over to forestry.

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Time was when this State was a great producer of grazing animals that were raised at a profit. Conditions now are greatly changed; and if we have learned anything in scientific agriculture in recent times, it is that concentration on smaller areas and a more definite rotation of crops make the successful farmer. This same logic and philosophy turn over acres upon acres of lands of our farms, at present in an unproductive and unprofitable stage, to an industry with not only great possibilities commercially, but improving a condition at present greatly needed.

(5) WHITE PINE PLANTED (NURSERY STOCK)

White pine seedlings, set 6 x 6 feet, require 1,210 per acre. Two-year seedlings are worth \$5 per 1,000.

Compound interest on valuation, \$11, for forty years,	\$41 81
Compound interest, 1,210 seedlings, at \$5,	\$6 05
Compound interest, transplanting 1,210 seedlings,	4 95

Total,	\$11 00
\$11 at interest for forty years,	52 80
Taxes, with interest:—	
First ten years,	\$6 63
Second ten years,	7 15
Third ten years,	6 34
Fourth ten years,	6 33

	26 45

Total cost,	\$121 06

Product at end of forty years, 40,000 B. M. feet, at \$5, equals \$200, leaving a net profit of \$78.94, or \$1.97 a year per acre.

These figures are based upon the maximum

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cost of seedlings and planting, also the valuation of pasture land at \$11, instead of waste lands, as considered under (1), (2) and (3), at \$6.

(6) WHITE PINE PLANTED (HOME GROWN OR NATIVE SEEDLINGS)

Compound interest on valuation, \$6, for forty years,	\$22 81
Initial outlay for seedlings and planting, \$5 per acre,	
plus interest for 40 years,	29 00
Taxes, with interest, forty years,	17 57
	\$59 38

Returns at end of forty years, 40,000 B. M. feet, at \$5, equals \$200. Subtracting cost, \$69.38, leaves the net profits in forty years \$130.62, or an average of \$3.26 a year per acre.

Reducing the whole to tabular form, we have the following:—

1. Under favorable natural conditions of reforestation; returns per acre in forty years and average an acre each year:—

Growth:—	Per Acre in Forty Years.	Aver. an Acre Each Year.
Hardwood,	\$0 00 to \$40 00	\$0 00 to \$1 00
Chestnut,	60 00	1 50
Second growth white pine,	100 00	2 50

From pasture land, valuation \$11, average \$0.50 an acre per year.

2. Where trees are planted; returns per acre in forty years and average return an acre each year:—

White pine:—	Per Acre in Forty Years.	Aver. an Acre Each Year.
Valuation, \$11.		
Seedlings, planting, \$11 +	\$70 00	\$1 75
Valuation, \$6.		
Seedlings, planting, \$5,	130 62	3 26

From these calculations it is shown that, even under present conditions, forestry can be practised

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commercially with a reasonable profit. As a long time investment the returns must be considered as offering exceptional opportunities. The rate of interest under each example cited, per year, for the principal first used, at the end of the forty year period, is in each case as follows:—

	Per Cent.
(1),	0 to 16
(2),	25
(3),	41
(4),	4
(5),	9
(6),	29

No matter how attractive we may make it, the fact still remains that few people are willing to make long time investments and wait for their fruition. The time is coming, however, when far-sighted business men will recognize this source of investment as a safe and profitable one. The State of Massachusetts, it is believed, can well afford to make a beginning in this direction by purchasing at low cost much of our cheap lands and restocking them as forest reserves. Not only can they be made a valuable asset in the future to the Commonwealth, but to serve as examples of forestry methods.

Forest fires are a great menace to practising modern forestry in Massachusetts and are undoubtedly one of the greatest drawbacks to forestry undertakings. Our present laws regulating this problem are not effective enough. We have bills before the present General Court of Massachusetts looking toward an improvement in this direction. [Has become a law.]

The laws relative to the taxation of forest lands are in no way systematized or deduced to secur-

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ing the best results. It is to be hoped that some simple, practical and expedient forest taxation laws may be formulated at an early time.

The greatest of all needs, however, — and we must come back to it as the foundation upon which our whole forestry structure must stand for success, — is a well-defined educational system, by which our people may be taught not only to recognize the importance of forestry, but how to get best results from a practical knowledge of the theory and practice combined.

In conclusion, I would say, let us be wise and farsighted. The Massachusetts and New England of the future will be what you and I make it. History repeats itself. In the Old World the rise and fall of the Roman Empire had its associations with commercial forestry. Spain, — once the country of equable climatic conditions and beautiful meadows, the native country of the merino sheep and a progressive and prosperous agriculture, — has cut down her forests, denuded her mountains; and what is her present condition? We are told that in Biblical times certain valleys in Palestine were so fertile that they sustained and nourished great flocks and herds. Figuratively speaking, these valleys flowed with milk and honey. In those days the cedar of Lebanon and other forest trees were found in all their glory. What sort of a country is Palestine to-day? Travellers tell us it is dangerous to travel without a guide; the country is parched, dry and desolate.

What do we propose for the future of this nation or, for that matter, Massachusetts? If we are public-spirited, as I believe we are, and have a love for our country and Commonwealth,

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we will awake to our responsibility ere it is too late.

Instead of following the example of countries like those mentioned, let us emulate the example of Germany, where modern forestry is practised successfully. Then, and only then, can we feel proud in believing we have done our full duty toward the forest interests of our native land.





















Massachusetts

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~~James H. Hobbins~~

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