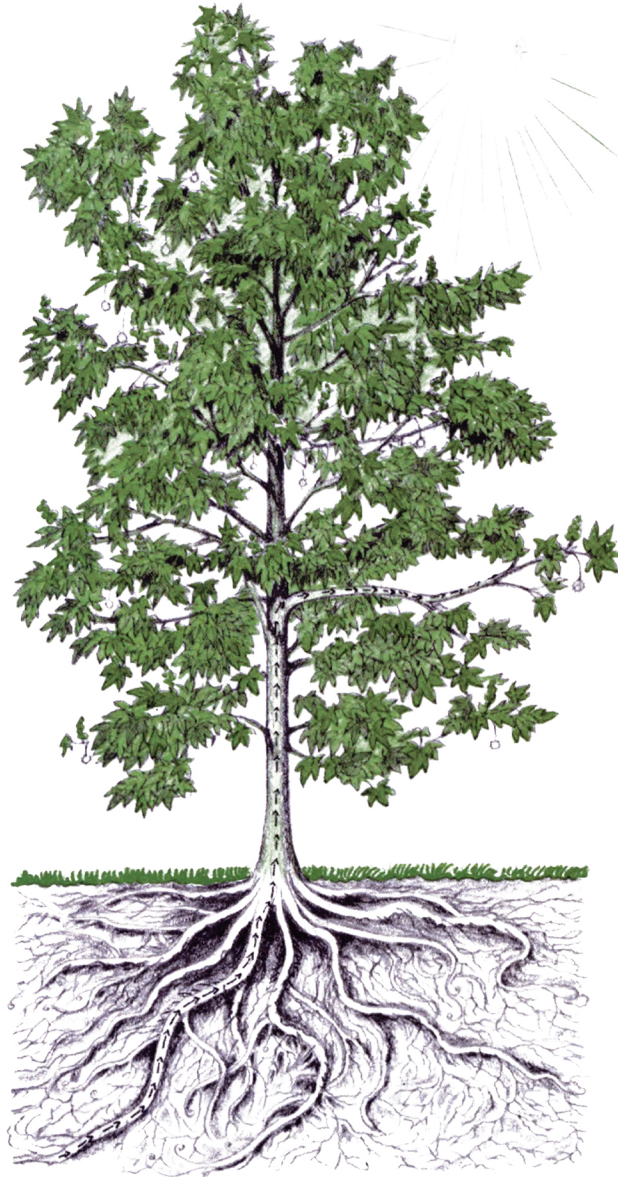


THE FIRST BOOK OF **TREES**



by M. B. Cormack







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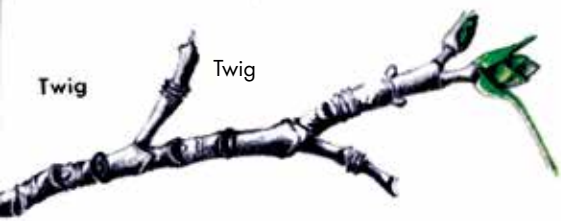


THE FIRST BOOK OF **TREES**

By M. B. CORMACK
Director, Roger Williams Park Museum
Providence, R. I.

Pictures by HELENE CARTER





LIST OF ILLUSTRATIONS



Growth of a tree8
 Seeds.....13
 Eastern cottonwood.....14
 American basswood, or linden.....15
 American elm.....16
 Leaf scars.....17
 Leaves 18, 19
 Sycamore.....21
 Sweet gum.....22
 Black walnut23
 Twigs24
 Shagbark hickory27
 Mockernut hickory28
 Trunk of a tree.....30
 Northern red oak32
 Pin oak33
 Black oak.....34
 Canyon live oak.....35
 Live oak.....36
 White oak.....37
 Canoe birch38
 Gray birch39
 White ash40
 Catalpa41
 Longleaf pine.....43
 Pinyon pine.....44
 Ponderosa pine.....45
 Lodgepole pine.....46
 Loblolly pine.....47
 Jack pine.....48
 Pitch pine.....49
 Eastern and western white pine.....50
 Eastern white pine tree.....51
 Blue spruce53

Red spruce54
 Eastern hemlock55
 Douglas fir56
 Balsam fir57
 White fir58
 Northern white cedar59
 Common juniper60
 Utah juniper61
 Giant sequoia.....62
 Redwood63
 Tamarack, or eastern larch.....64
 Western larch.....65
 Simple leaves.....66
 Compound leaves67
 Horse chestnut68
 Ailanthus.....69
 Honey locust.....70
 Black locust.....71
 Sugar maple72
 Norway maple73
 Red maple74
 Silver maple75
 Bigleaf maple76
 Bald cypress78
 Cypress swamp.....79
 American beech81
 Quaking aspen82
 Tulip tree.....83
 Joshua tree84
 Black willow.....85
 Pussy willow86
 Sassafras90
 Ginkgo.....91





America is a land of trees. They grow almost everywhere in our country. Most of us see them so often that we sometimes forget how important they are. Thousands and thousands of things come from trees. Right this minute you may be sitting in a chair made partly of wood from a tree. You may live in a wooden house. Perhaps you are wearing a rayon blouse. That was made from wood treated in a special way. The paper in this book was made from wood pulp, which comes from trees. You may have a camera and like to take pictures. The film you use was made from wood. Perhaps you had an orange for breakfast this morning. That came from a tree. Apples, nuts, maple sugar, hickory baseball bats... you can think of many things that we wouldn't have if there were no trees.

WHAT IS A TREE?

A tree is a special kind of green plant with a wooden stem that grows upward. This stem is covered with bark and is called a trunk. Most trees have a single main trunk, but sometimes this divides into two or more.

Most trees have branches growing from the big trunk.

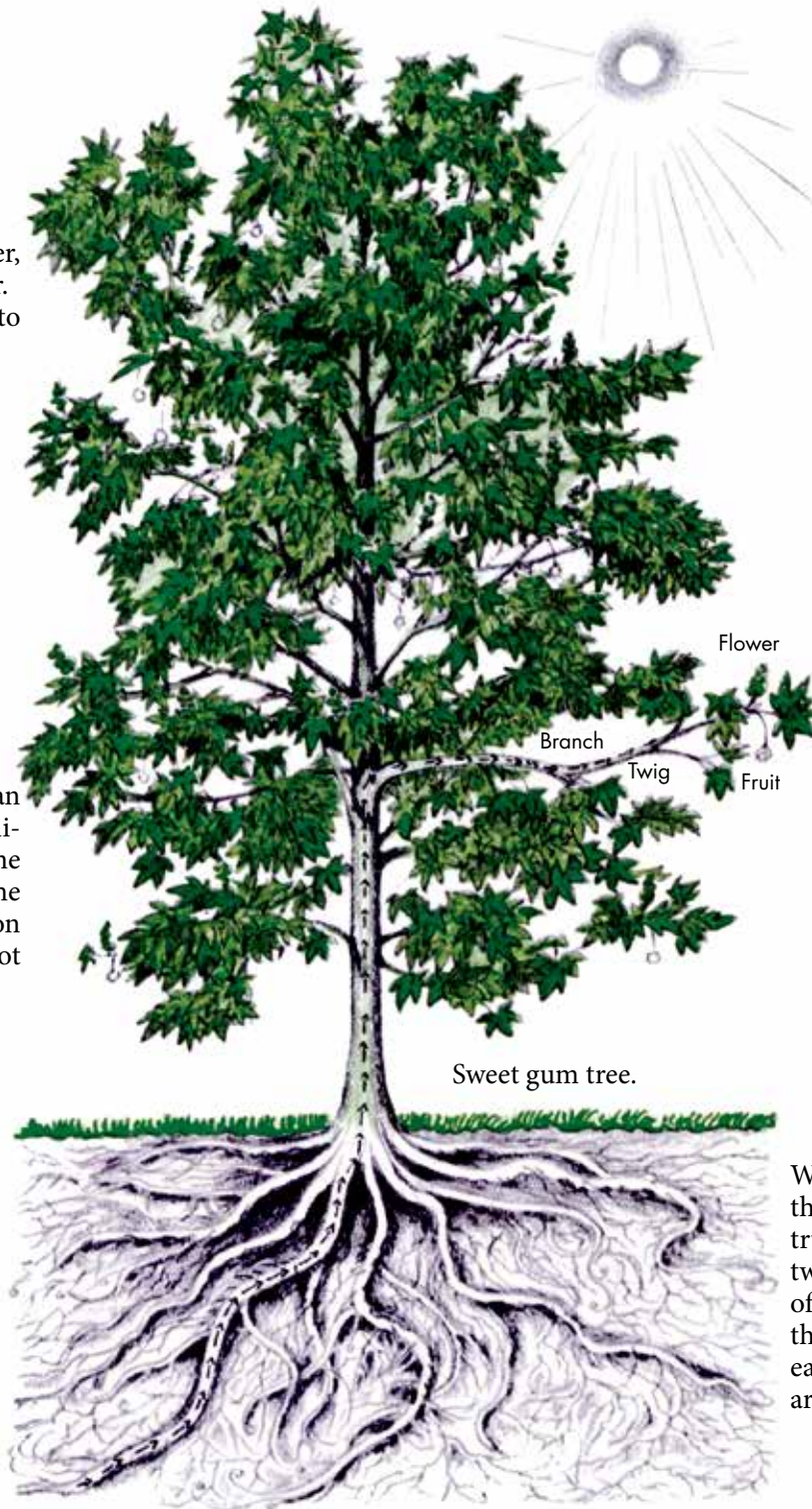
Air comes in to leaf through tiny windows in its surface.

Out of air and water, the leaf makes sugar. Sugar is changed into wood.

Sugar is changed into wood.

Only green leaves can make food. No animals can make one morsel of food. If the green leaves went on strike we could not live on the earth.

Water is taken from the soil particles by each root hair.



Sunlight falls on the green leaf and gives it the energy to do its work.

A big tree gives off fifty barrels a day as vapor. It moistens the winds. The leaf also gives off oxygen as a byproduct of sugarmaking.

Water is passed up through the root, trunk, branch and twig into the stem of the leaf and out through the veins to each cell, where sugar is made.

A GROWING TREE, THE MOST WONDERFUL FACTORY IN THE WORLD

Growing from these are smaller branches, and from these, even smaller twigs. All these spread out into various shapes—a different one for each kind of tree. The twigs hold the buds, leaves, flowers and seeds.

Trees have roots that spread underground in great networks that help to anchor them to the earth and keep them from being blown over.

Trees live a long time. Some may have lived 5,000 years. They go on growing year after year instead of dying each fall when frost comes, as many plants do.

HOW TREES MAKE THEIR FOOD

In one way trees are like all plants with green leaves. They make their own food out of air and water. In the water are little bits of mineral. Imagine being able to make your food from water and the air you breathe.

You are probably wondering what kind of food trees can make. They make sugar. We all know the sugar from one kind of tree: maple sugar. We get it from the tree's sap. Other trees make sugar, too, but we do not use it to eat.

The trees use some of their sugar day by day for their needs. They make the rest into wood.

It is strange to think of a tree making food from only air and water. No one really understands exactly how it does this, but we do know that chemistry helps.

Air and water are made up of little atoms, or blocks, of the very chemicals needed to make sugar.

Air is made of carbon, oxygen and some other substances. Water is made of hydrogen and oxygen. To make sugar you need all three things: carbon, hydrogen and oxygen. The trick is to take air and water apart and put them together again in the right way to make sugar.

This is done in the leaves. Each leaf is a little work-shop. It does its work with the heat from the sun, and only green leaves can do it. The green coloring in leaves is called chlorophyll, a long word that comes from two Greek words meaning "leaf" and "green." Chlorophyll and sunlight are what leaves need to change air and water into sugar.

Leaves get air through many tiny windows all over their surfaces. The water comes from farther away. The little root hairs on the underground roots take in moisture from the ground. The roots and trunk have special tubes just made for passing the water upward. Other tubes pass it out through every branch and every twig until it flows into all the leaves. Each leaf has its own water-ways, called veins. They carry water to every part of the leaf.

Now the leaf has all it needs to make sugar. It splits the air and water and rebuilds the chemicals into sugar. Each night, when there is no more sunlight, and the leaf's work is done, it passes the liquid sugar down through other special tubes under the bark to the trunk and roots for storage.

In great chemical laboratories, scientists are trying to discover the leaf's secret. If we could copy it we might take the leaf-green chlorophyll and make food for ourselves. Up until now only green plants have ever done this.

And while they are doing it they purify the air. Pure oxygen, left over from food-making, flows out of the leaf windows. Out of them, too, comes moisture. The moisture and oxygen air-condition the places where the plants grow. That is why the air in a forest is so pleasant to breathe.

HOW TREES WORK

Each part of the tree has its special job to do. The roots anchor the tree and hold it firmly in the earth. They also store food. The little root hairs collect water to send up to the leaves.

The trunk supports the branches and twigs. It has the tubes that take water up and food down.

The branches hold the twigs. The twigs hold the buds, leaves, flowers and seeds. Notice that each leaf seems to be reaching up for the sun. Each stem bends and twists until its leaf gets all the sun-light it can. If you stand under a tree in summer it makes an almost perfect parasol.

The bark is a waterproof coating that covers the wood of the tree. It helps keep the water inside of the trunk, and protects the food tubes that are just under the bark. Many animals eat bark. Porcupines and beavers strip it off for food. Hungry deer eat it in winter. Then the trunk is unprotected. The food tubes are broken, and often the tree dies. Sometimes

a tree heals over, where bark was stripped off, but an ugly wart or lump is left on the tree.

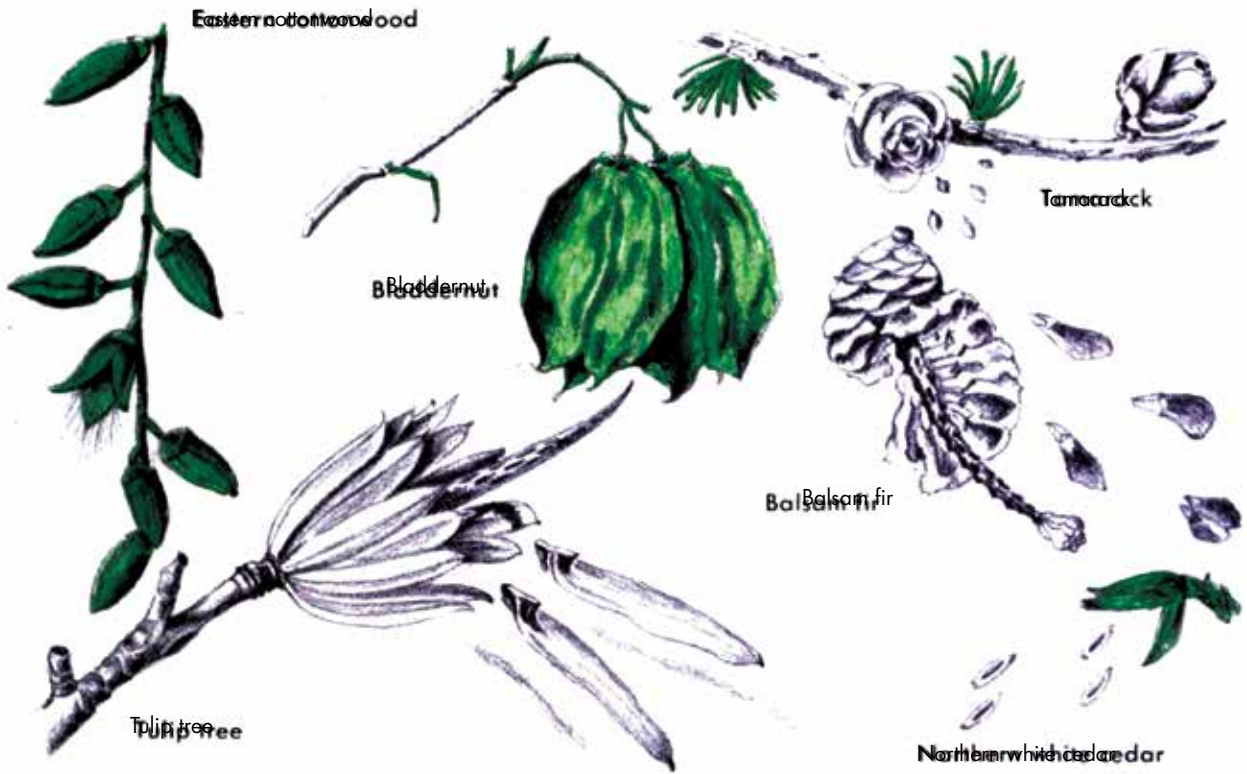
Trees have three kinds of buds: some that make leaves, some that make flowers, and some that make both leaves and flowers. Different trees have different kinds of buds.

Different trees have different kinds of flowers, too. Some, like those on the catalpa and horse chestnut, are large, beautiful and showy. Others are small, dull and not very noticeable. The flowers are male and female. Sometimes the male and female parts are both in the same blossom. Sometimes there are two separate kinds of flowers, male and female, on the same tree—oaks, hickories and birches are among those that are like this. And sometimes the male and female flowers grow on separate trees—willows and poplars are two that are like this. The male flower makes a powder called pollen, which blows onto the female flower, or is carried there by bees and other insects, and starts the making of seeds and fruit. And the seeds and fruit scatter to grow into new trees.

HOW TREES SCATTER THEIR SEEDS

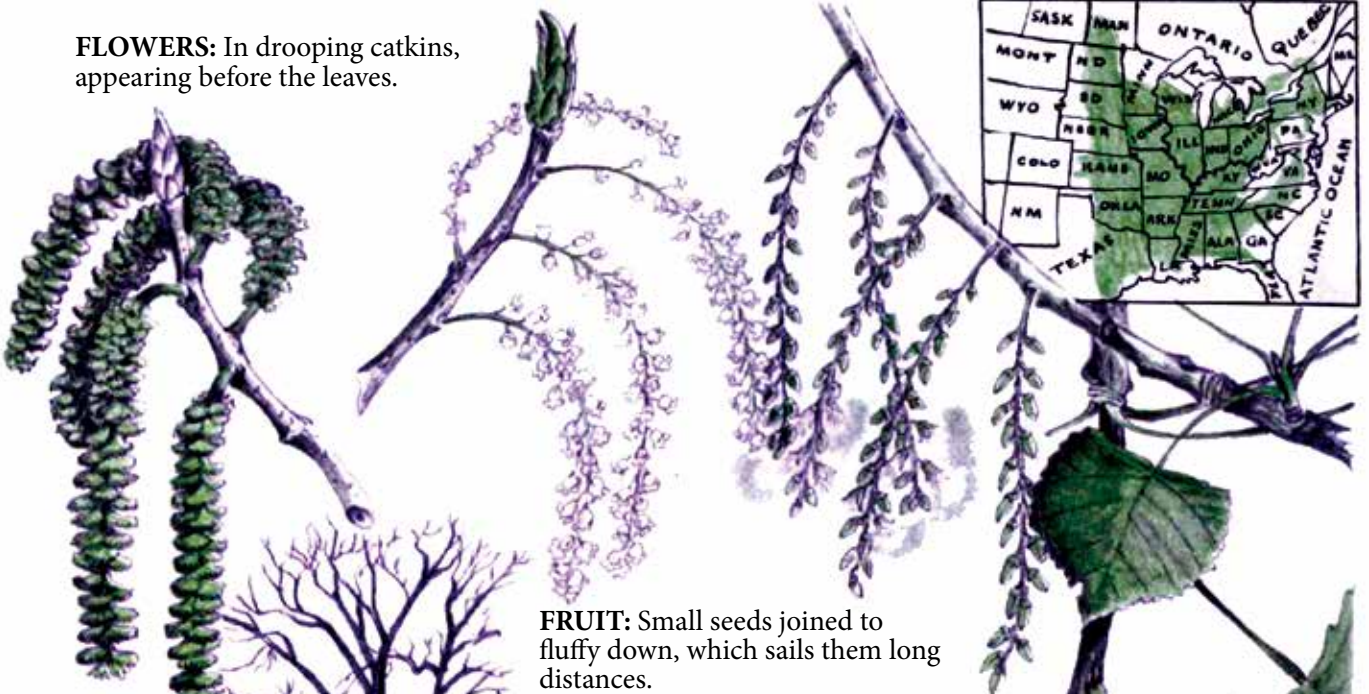
Trees have seeds shaped in many ways so that they will spread as far as possible, to grow.

Some of the seeds have wings to help them float through the air. Maple trees have twin-winged seeds called keys. They look like old-fashioned clock keys.



Cottonwood seeds are covered with white fluff, like cotton, to help them float some distance through the air. The basswood tree has seeds in clusters of little balls, with a sort of airplane rudder on each cluster to carry it away. Some trees, like pines, have their seeds in cones, and each seed has a wing. When the cone opens, the seeds blow away. Bladdernut's seeds float on the water like air-chamber canoes. Many trees have fruits you can eat. These fruits are the tree's way of tempting animals and people to take the seeds and scatter them. Be sure to notice the seeds of trees. They come in surprise packages, very neatly designed. It's fun to watch for them.

FLOWERS: In drooping catkins, appearing before the leaves.



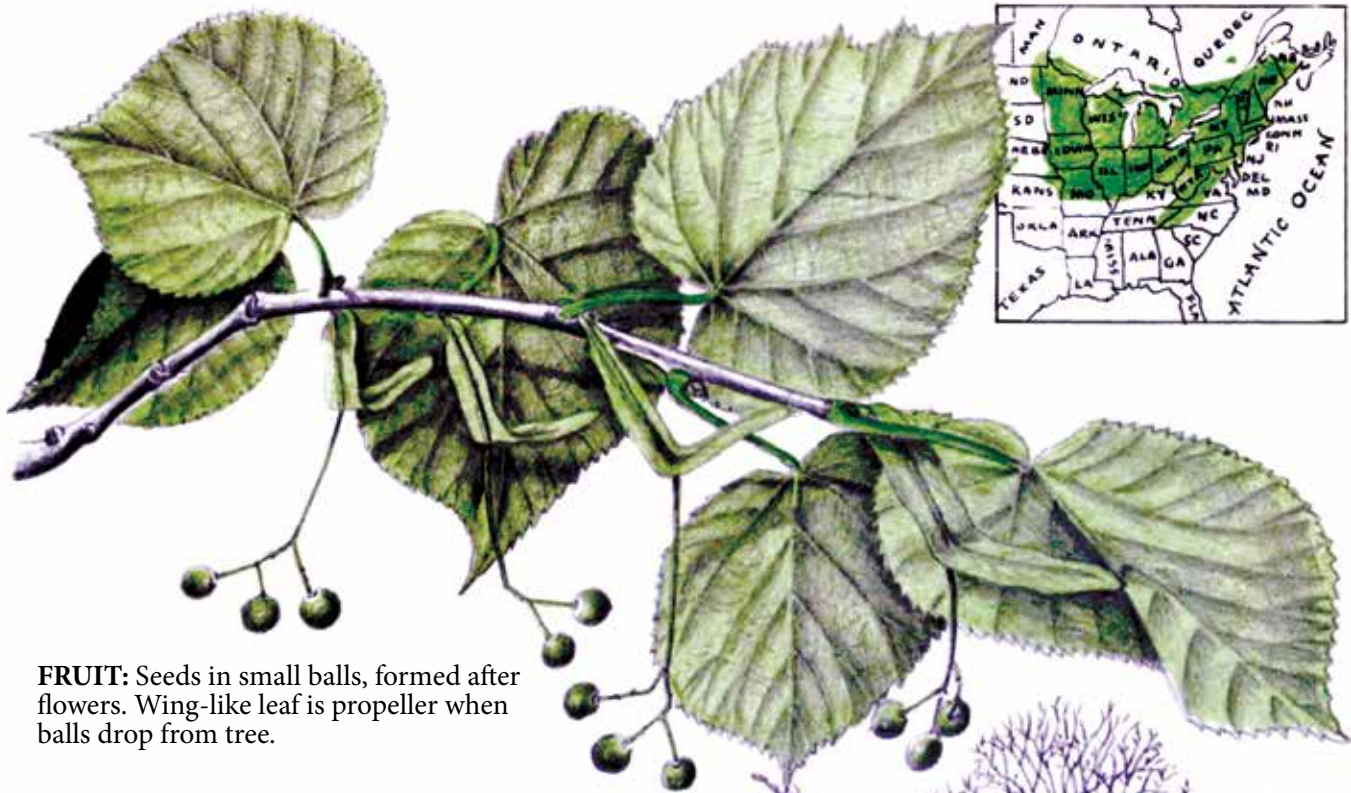
FRUIT: Small seeds joined to fluffy down, which sails them long distances.

EASTERN COTTONWOOD *Populus deltoides*

Deciduous. Grows to 100 feet. One of the poplar family, to which the quaking aspen also belongs. Like the aspen, the Cottonwood has leaves forever rustling. This is a tree that can endure the prairie heat and cold, and was a blessing to the pioneers on their westward journey. Where no other tree would grow, there was the cottonwood. A fast-growing tree that is used only for very rough lumber.



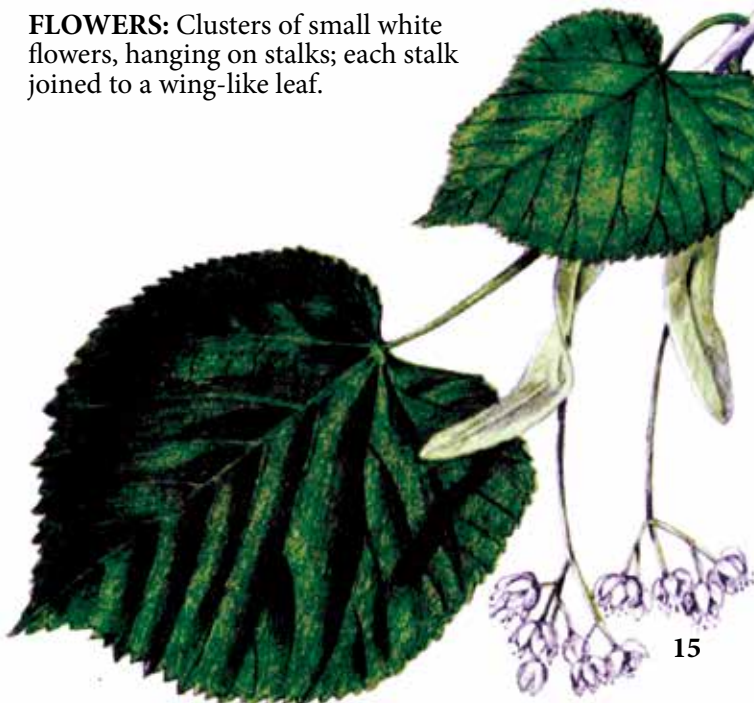
LEAVES: 4-6 inches long. Simple; alternate. Shiny and green, wide at the bottom, but ending in a sharp point.



FRUIT: Seeds in small balls, formed after flowers. Wing-like leaf is propeller when balls drop from tree.

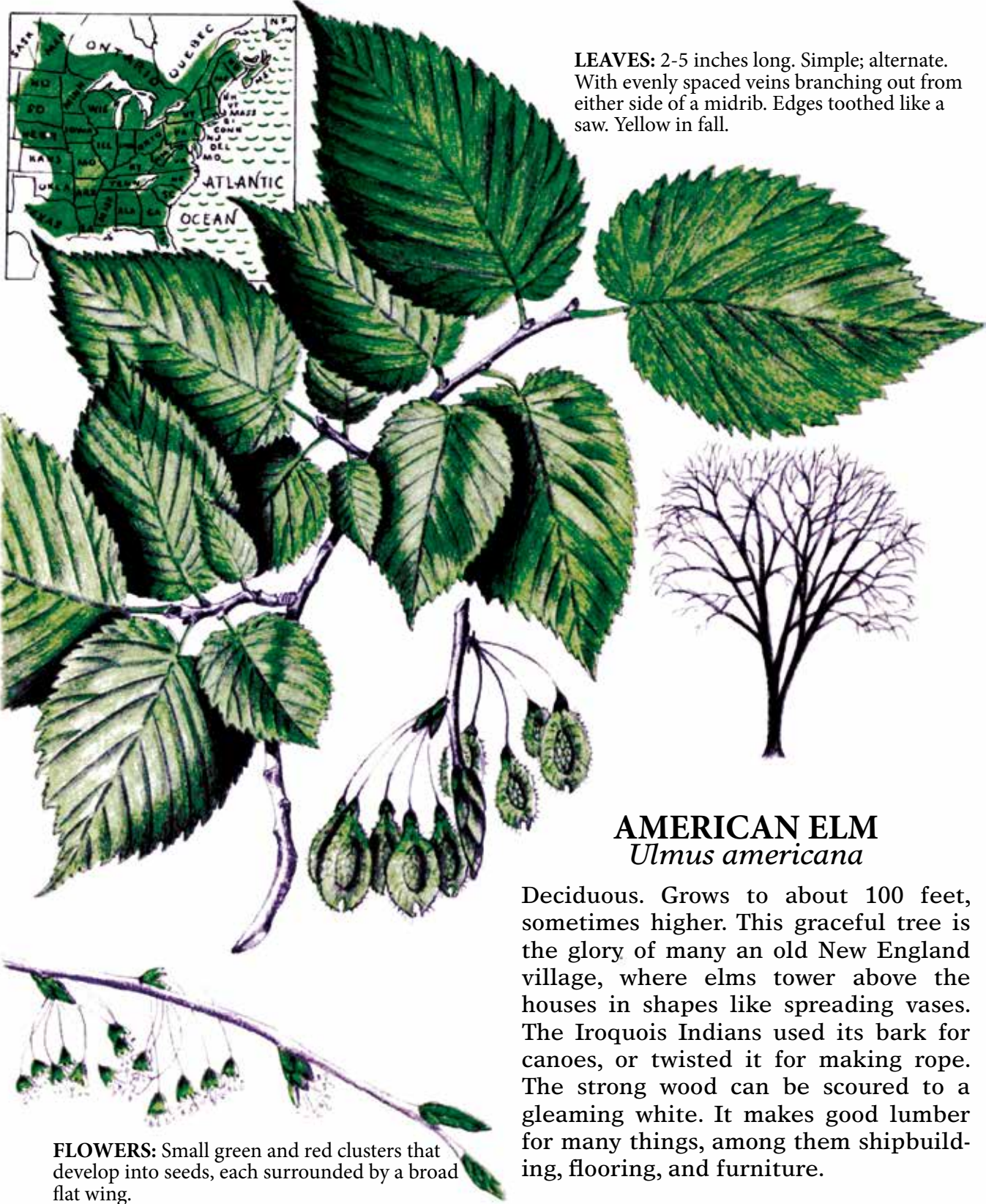
LEAVES: 3-6 inches long. Simple; alternate. Shaped somewhat like a heart, but with a sudden sharp point at the tip. Yellow in autumn.

FLOWERS: Clusters of small white flowers, hanging on stalks; each stalk joined to a wing-like leaf.



AMERICAN BASSWOOD *Tilia americana*

Deciduous. Grows to about 100 feet. Bees love the fragrant flowers of this tree, and make a fine honey from their nectar. The inner bark has a tough fiber that Indians used to make rope and thread. Also called "linden," "lime," and "limetree."



LEAVES: 2-5 inches long. Simple; alternate. With evenly spaced veins branching out from either side of a midrib. Edges toothed like a saw. Yellow in fall.

AMERICAN ELM
Ulmus americana

Deciduous. Grows to about 100 feet, sometimes higher. This graceful tree is the glory of many an old New England village, where elms tower above the houses in shapes like spreading vases. The Iroquois Indians used its bark for canoes, or twisted it for making rope. The strong wood can be scoured to a gleaming white. It makes good lumber for many things, among them shipbuilding, flooring, and furniture.

FLOWERS: Small green and red clusters that develop into seeds, each surrounded by a broad flat wing.

WHEN FALL COMES

In many parts of the world there is a season each year when it is either very cold or very dry. During this season, the trees stop working and wait for warmer or moister weather to come again. And many trees lose their leaves. You remember that all summer long they gave off moisture. If they did this in winter when they can get no water from the soil, they would die. They are “deciduous” trees.

Most trees with broad leaves like maples and elms must drop their leaves in autumn. That is why we have given this season another name: fall.

Before each leaf drops, it seals up the spot where it grew from the twig. It does this with a layer of cork. So, when the leaf drops there is no open wound where it left the tree, but a nicely healed cork scar. This is called a leaf scar.

Each kind of tree has its own kind of scar, always shaped the same way. The horse chestnut has one that looks somewhat like a horseshoe, with little dots that look like nails in the shoe. These dots mark the ends of the tubes that brought water up to the leaf.

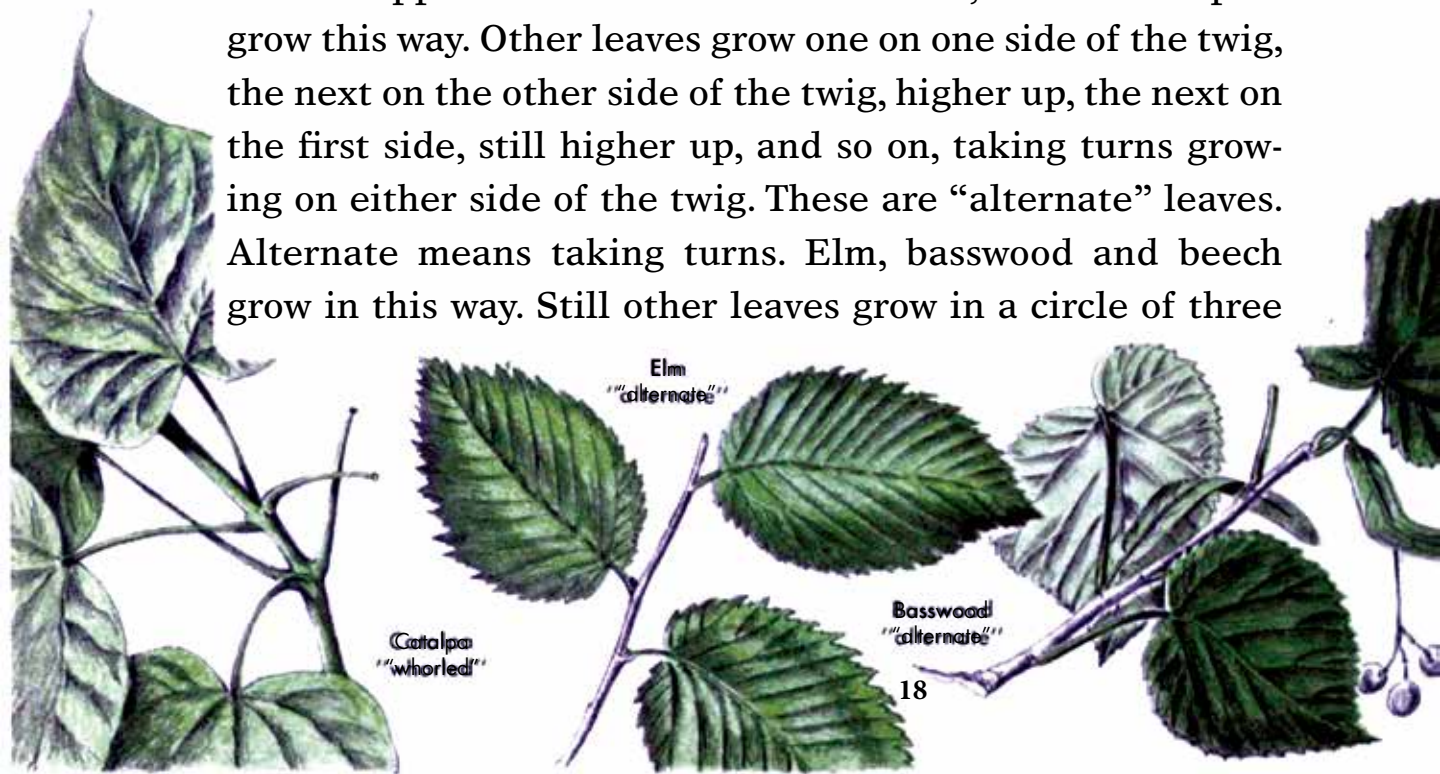


Horse chestnut leaf scar

Before they fall, some leaves turn to brilliant shades of red, yellow and purple. This is because they are stopping work and they no longer have green chlorophyll. Without chlorophyll, leaves fade to yellow. But some kinds of trees that live in cool climates and that are very rich in sugar turn other colors. Oak and maple leaves are often very red, ash are sometimes purplish, and sweet gum may be red and yellow, red and orange, or purple.

LEAVES GROW IN DIFFERENT WAYS

If you look closely at twigs on several different kinds of trees, you'll see that their leaves do not all grow out in the same way. Some of them branch out from the twig in pairs, directly opposite to each other. When they do this they are called "opposite" leaves. Horse chestnut, ash and maples grow this way. Other leaves grow one on one side of the twig, the next on the other side of the twig, higher up, the next on the first side, still higher up, and so on, taking turns growing on either side of the twig. These are "alternate" leaves. Alternate means taking turns. Elm, basswood and beech grow in this way. Still other leaves grow in a circle of three



Catalpa
"whorled"

Elm
"alternate"

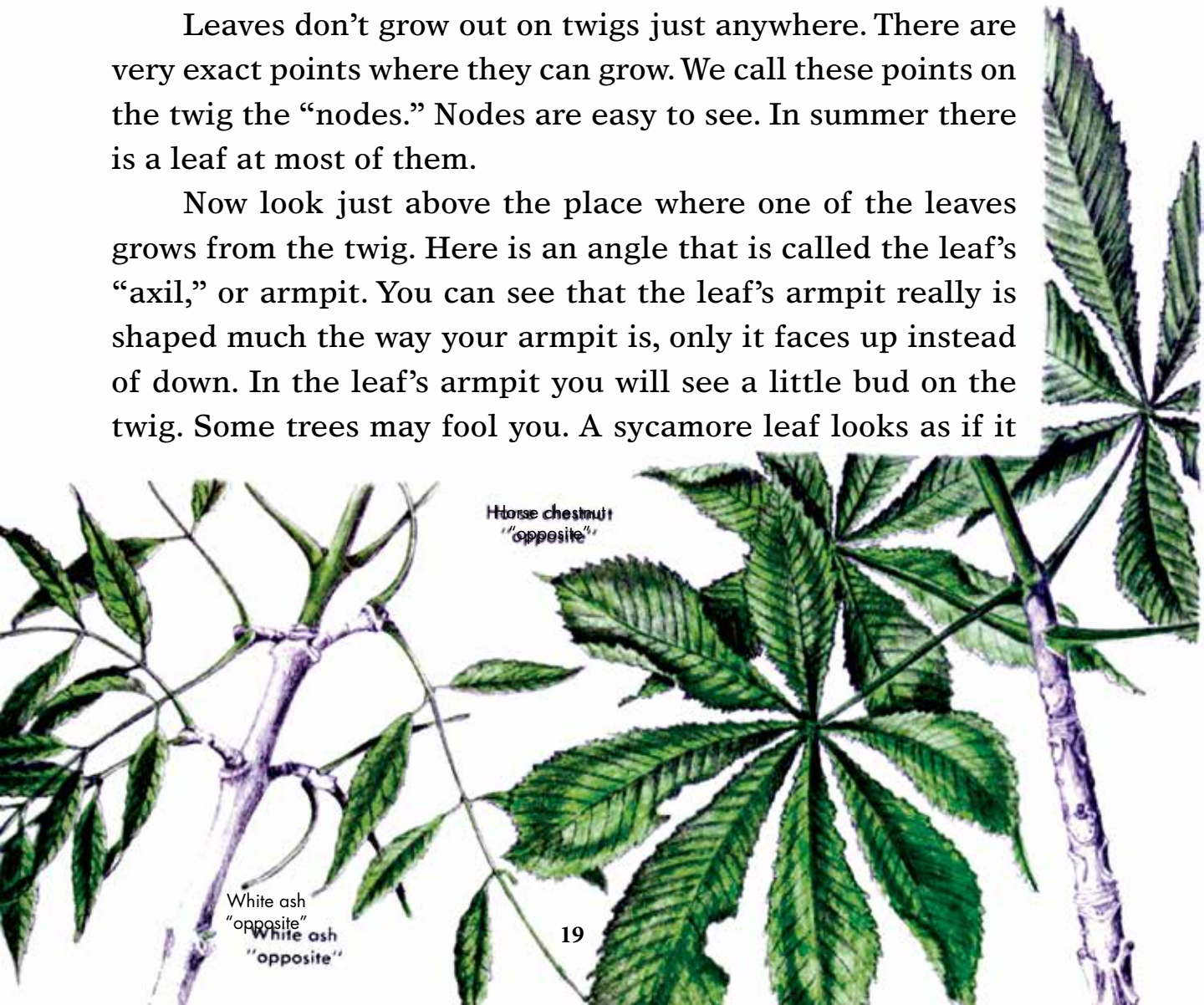
Basswood
"alternate"

or more around the twig in what is called a whorl. These are “whorled” leaves. The best-known tree that grows this way is the catalpa. Each kind of tree has its own kind of leaf plan that never changes. That is one way you can tell which tree it is.

A TREE’S BUDS

Leaves don’t grow out on twigs just anywhere. There are very exact points where they can grow. We call these points on the twig the “nodes.” Nodes are easy to see. In summer there is a leaf at most of them.

Now look just above the place where one of the leaves grows from the twig. Here is an angle that is called the leaf’s “axil,” or armpit. You can see that the leaf’s armpit really is shaped much the way your armpit is, only it faces up instead of down. In the leaf’s armpit you will see a little bud on the twig. Some trees may fool you. A sycamore leaf looks as if it



Horse chestnut
"opposite"

White ash
"opposite"
White ash
"opposite"

has no bud. But just pull the leaf stem off. The bud is hidden on the twig inside the stem. A sycamore leaf's stem is hollow and fits right over the bud. Walnut and butternut leaves sometimes have more than one bud in each armpit. All these armpit buds are called side buds because they are on the side of the twigs.

Most twigs also have buds at their tips. These are called end buds.

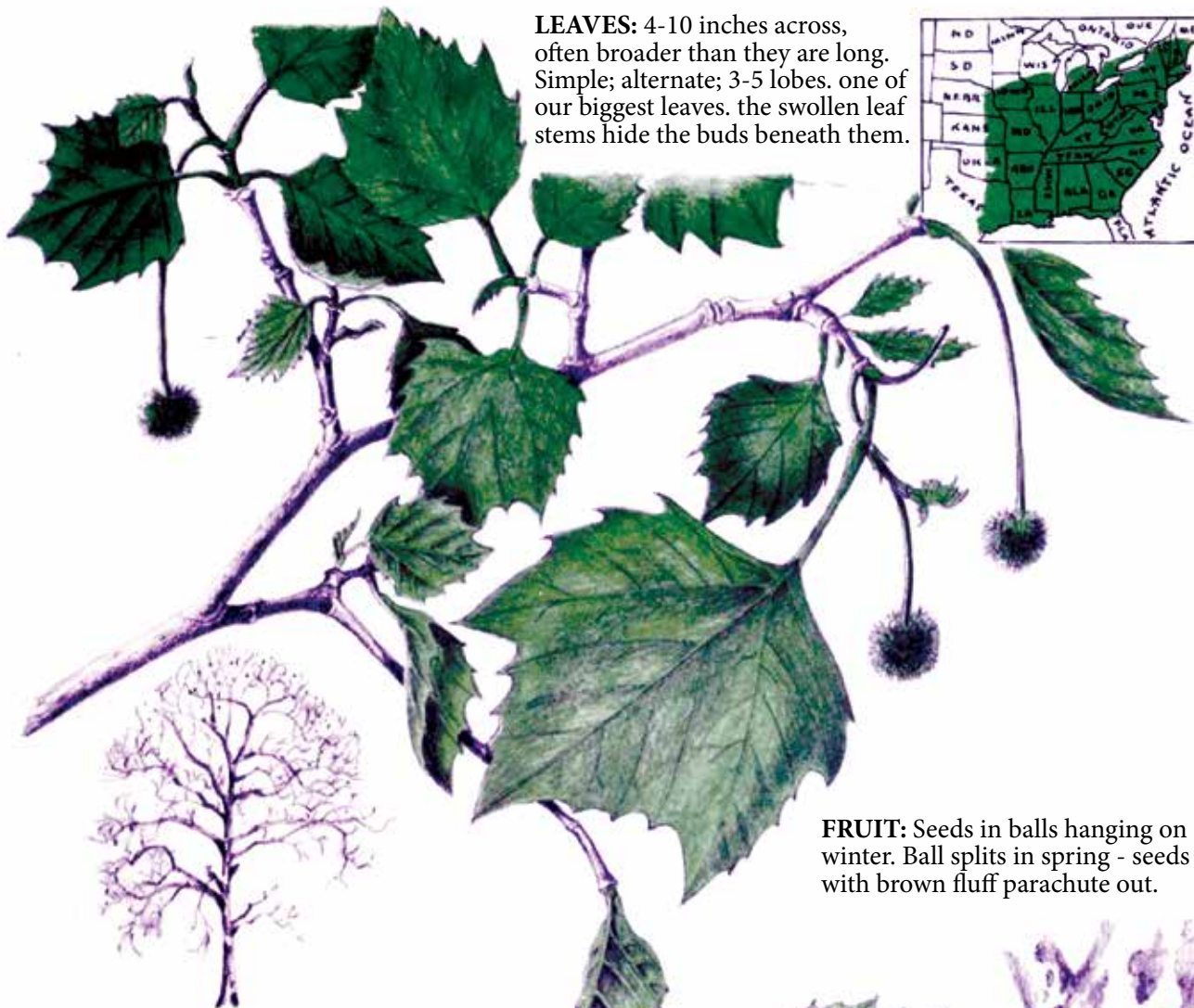
All these buds are very important. They show you where the tree will grow the next year. Nothing can grow out of a branch except from a bud.

WHEN SPRING COMES

After the leaves fall off the trees in autumn these buds lie quiet all winter long. In the spring they start to grow. They may be flower buds, or leaf buds, or they may be mixed buds that will grow both flower and leaf. Flowers and leaves were formed last summer and have been packed away all winter long in the tightly sealed buds. They need only water and the warmth of the spring sun to make them swell and burst from the bud.

New twigs grow from buds, too. They grow from side buds, and, in time, will become branches. The end buds of each twig and branch grow a new little section each year, also. Some grow barely an inch, others many feet in a single year. Wrinkled lines all around the twig mark the place where it started growing each year, as in the sweet gum.

LEAVES: 4-10 inches across, often broader than they are long. Simple; alternate; 3-5 lobes. one of our biggest leaves. the swollen leaf stems hide the buds beneath them.



FRUIT: Seeds in balls hanging on all winter. Ball splits in spring - seeds with brown fluff parachute out.

SYCAMORE *Platanus occidentalis*

Deciduous. Grows to 120 feet, sometimes more. This is one of the biggest of our hardwood trees, with sturdy trunk and long side branches. You can always tell it by the bark, which peels off in large flakes to leave white, green or yellowish spots in a giraffelike pattern. Also called “buttonwood” for its seed balls; or “plane tree.”

FLOWERS: Two kinds—not very noticeable: small red clusters; and small green balls on threadlike stems.



SWEET GUM

Liquidambar styraciflua

Deciduous. Grows to 120 feet. This tree is at its finest in the South, where it is an important lumber tree. Everything about it is striking. Its leaves, star-shaped, and brilliant-colored in fall, may well be the handsomest of any forest tree. The inner wood of the twig is star-shaped, too. The seed balls, hanging on in winter, give the tree an always-decorated look. Especially in the South, the bark gives off a fragrant gum. The tree is also called “liquidambar,” for its gum; “red gum,” for its reddish heartwood; and “alligator tree” because it sometimes has rough bark that looks like alligator skin.

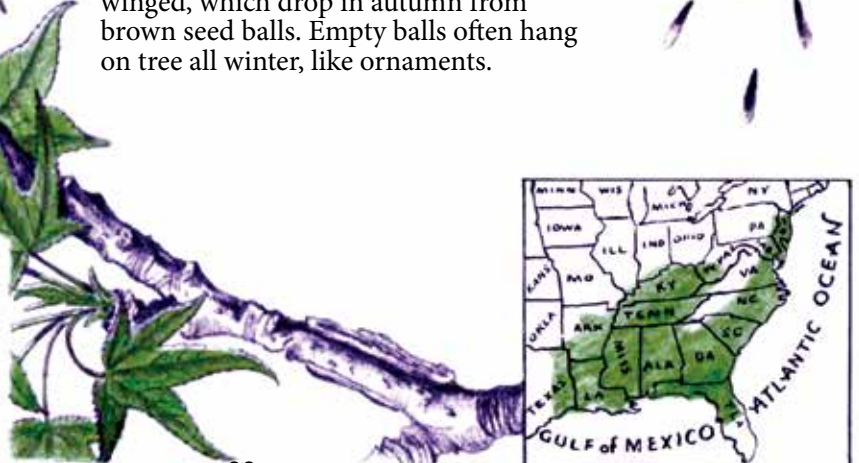
LEAVES: About 7 inches long. Simple; alternate, or growing in clusters at tips of branches. Star-shaped, 5-7 points; shiny green. Red, yellow, orange or purplish in autumn.



FRUIT: Seeds, some winged, some un-winged, which drop in autumn from brown seed balls. Empty balls often hang on tree all winter, like ornaments.



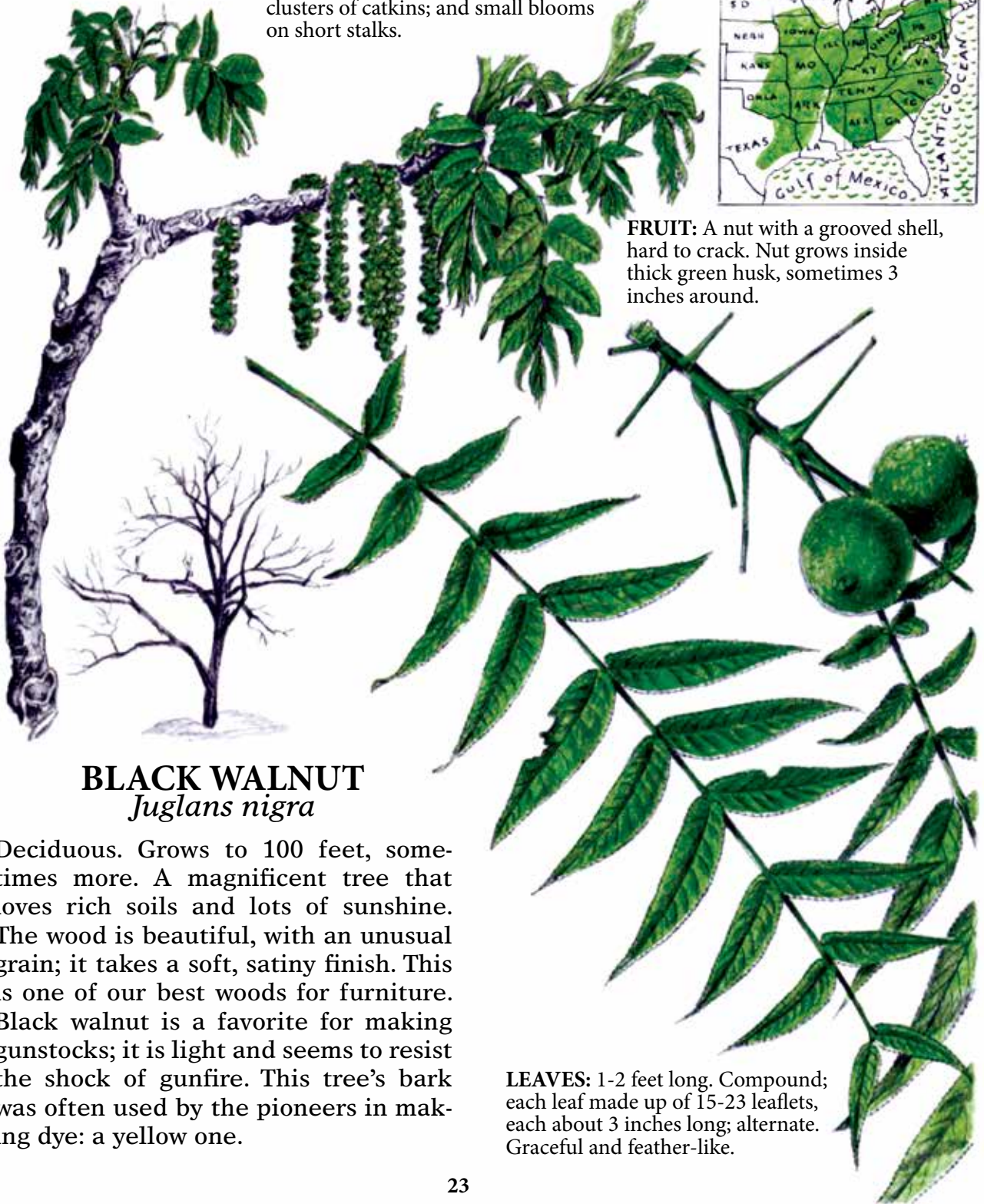
FLOWERS: Two kinds—clusters of green stalks, 2 or 3 inches long, at end of new growth; and green balls about one inch across, hanging from stems at base of leaves.



FLOWERS: Two kinds—drooping clusters of catkins; and small blooms on short stalks.



FRUIT: A nut with a grooved shell, hard to crack. Nut grows inside thick green husk, sometimes 3 inches around.



BLACK WALNUT *Juglans nigra*

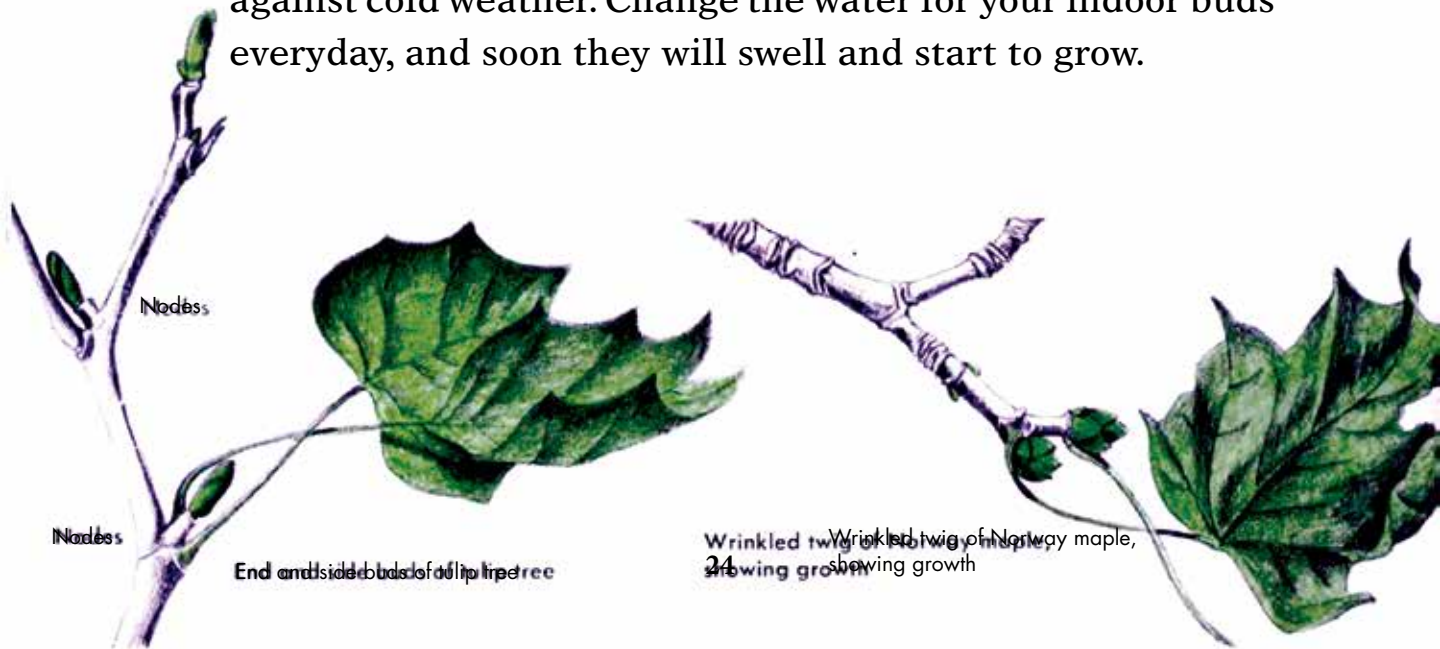
Deciduous. Grows to 100 feet, sometimes more. A magnificent tree that loves rich soils and lots of sunshine. The wood is beautiful, with an unusual grain; it takes a soft, satiny finish. This is one of our best woods for furniture. Black walnut is a favorite for making gunstocks; it is light and seems to resist the shock of gunfire. This tree's bark was often used by the pioneers in making dye: a yellow one.

LEAVES: 1-2 feet long. Compound; each leaf made up of 15-23 leaflets, each about 3 inches long; alternate. Graceful and feather-like.

This is the way that a tree's branches grow longer and spread out each year: They grow a little at the tip, and also branch out from side buds. As a twig or branch grows, its tip moves forward each year.

A branch doesn't grow longer each year between the places where there are buds. It makes new buds at its nodes and tip each summer and lets them lie quiet all winter. Then in the spring it grows from the new buds. Notice the distance between the branches on a tree. Several years from now they will be the same distance apart because a tree grows wider and taller from the tips of its twigs and branches only. It starts new branches from its side buds.

If you want to see how the buds grow, gather some twigs in February or March and put them in some water in a warm, light place indoors. Notice how different the buds are. Some are covered with scales like overlapping shingles. Some of the scales are sticky, like the horse chestnut bud's. Some buds, like the walnut's, are covered with a sort of wool instead of with scales. The scales and wool protect the buds against cold weather. Change the water for your indoor buds everyday, and soon they will swell and start to grow.



THE TRUNK OF A TREE

Trees grow in another way each year. They grow bigger around. To understand the way they do this, you must understand what the trunk of a tree is like. It is round, and covered with a layer of bark. Under the bark is a very thin layer of food tubes all around the tree. These are made of many long little tubes joined end to end, with little sieves between them. They are called "sieve tubes." Through these the food travels downward from the leaves, passing through the sieves from one little tube to the next one.

Farther inside the tree is another collection of tubes through which the water passes upward from the roots to the leaves on the twigs.

Between these two sets of tubes is the important part of the trunk that makes it grow bigger around each year. This is another very thin layer all around the tree. Each spring this little layer starts growing out thicker. It adds new layers of growth to the food and water tubes on either side of it. This makes the trunk bigger all around. The same thing happens in all the branches, too.

The tree does this growing in the spring and early summer. By midsummer the thin growing layer has finished its work and the trunk is through growing till the next year.

Look at the trunk of a tree that has been cut down. You can see how much the tree grew each year. Each year's layer of