

Minnesota's Forest Treasures



What Is a Tree?

A tree is any woody plant that can reach a height of 15 feet or more at maturity and that usually is single-stemmed and has a crown, or branched-out area at the top. That distinguishes trees from shrubs, which are woody but short and multi-stemmed, and from vines, which may be long and woody but lack a crown.

Minnesota's Own

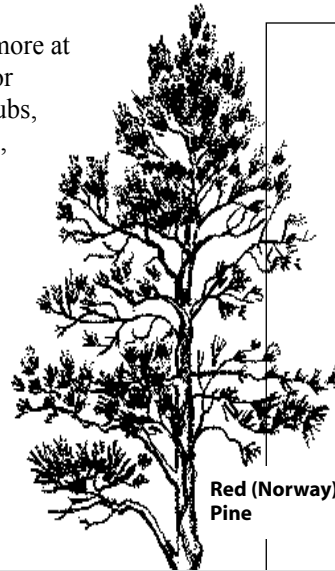
To 52 species of trees, Minnesota is home. This poster shows 35 of these "natives." Not shown are hemlock, American mountain ash, northern mountain ash, river birch, pin cherry, Kentucky coffeetree, rock elm, slippery elm (red elm), eastern hophornbeam (ironwood), American hornbeam (blue beech), black maple, mountain maple, red mulberry, black oak, chinkapin oak, northern pin oak, and swamp white oak.

Down to Basics

All of Minnesota's native species belong to one of two basic categories: gymnosperms or angiosperms.

Gymnosperms are trees whose seeds are not encased in a structure such as a fruit or nut. Most gymnosperms bear their seeds in cones, so they are also called conifers ("conebearers"), and have thin needlelike leaves that sometimes earn them the name needleleaf. Virtually all are evergreen, meaning they shed only a portion of their needles each year. People in the wood products industry often refer to coniferous trees as softwoods.

The second major kind of tree, the angiosperms, have covered seeds. Also known as deciduous or broadleaf trees, trees in this category drop their leaves each autumn. They are the ones that make the forest so colorful each fall. These trees are sometimes referred to as hardwoods (even though their wood is not necessarily harder than that of softwoods!).

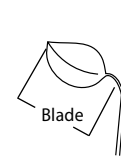


Red (Norway) Pine

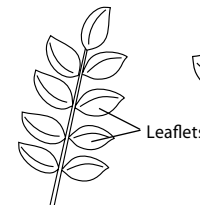
Fun Fact

The Norway pine, Minnesota's state tree, has nothing to do with Norway—in fact, in most places this species is called the red pine. It may have been given its "Minnesota" name by English settlers, who thought it resembled the Norwegian scotch pine. Others speculate that it took its name from the town of Norway, Maine, another locale where red pine was observed by early settlers.

A Quick Guide to Leaf Types



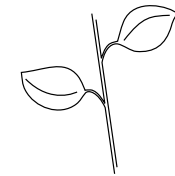
Simple leaves have only one leaf blade.



Compound leaves have many leaflets.



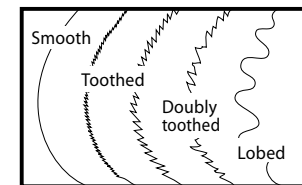
Opposite leaves grow directly across from one another, in pairs.



Alternate leaves grow singly along a branch, with space between each leaf.

Leaf Edges

Smooth leaves have smooth edges. Toothed leaves have jagged edges. Lobed leaves have rounded sections.



References

To obtain more information about trees and their identification and care, try these places:

Minnesota's Bookstore
117 University Avenue
St. Paul, MN 55155
(651) 297-3000 (Metro)
(800) 657-3757 (Toll free)

Minnesota Extension Service
Distribution Center
University of Minnesota
Room 20, Coffey Hall
1420 Eckles Avenue
St. Paul, MN 55108-6069

Trees of Minnesota, stock number 9-1, is a pocket-size, spiral-bound field guide to Minnesota's native tree species.

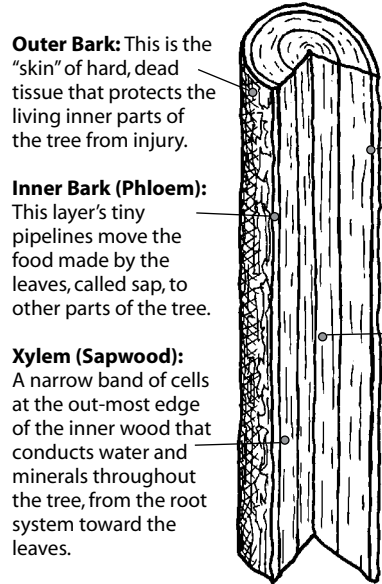


A Beginners' Guide to Minnesota Trees, BU-6593 and *Minnesota Trees*, BU-0486 are also excellent resources for identifying Minnesota trees.

Parts of a Tree

Trees have three main parts—crowns (canopies), trunks, and roots. Each part has a special job to do in keeping the tree healthy and growing.

The trunks of most trees are made up of five layers. These layers are:



Outer Bark: This is the “skin” of hard, dead tissue that protects the living inner parts of the tree from injury.

Inner Bark (Phloem): This layer’s tiny pipelines move the food made by the leaves, called sap, to other parts of the tree.

Xylem (Sapwood): A narrow band of cells at the out-most edge of the inner wood that conducts water and minerals throughout the tree, from the root system toward the leaves.

Cambium: A thin layer of growing tissue on the outside of the xylem. Its job is to make the trunk, branches, and roots grow thicker.

Inner Wood (Heartwood): Woody, nonconducting tissues in the center of the tree that store growing compounds and sugars and support the tree.

Crown (Canopy)

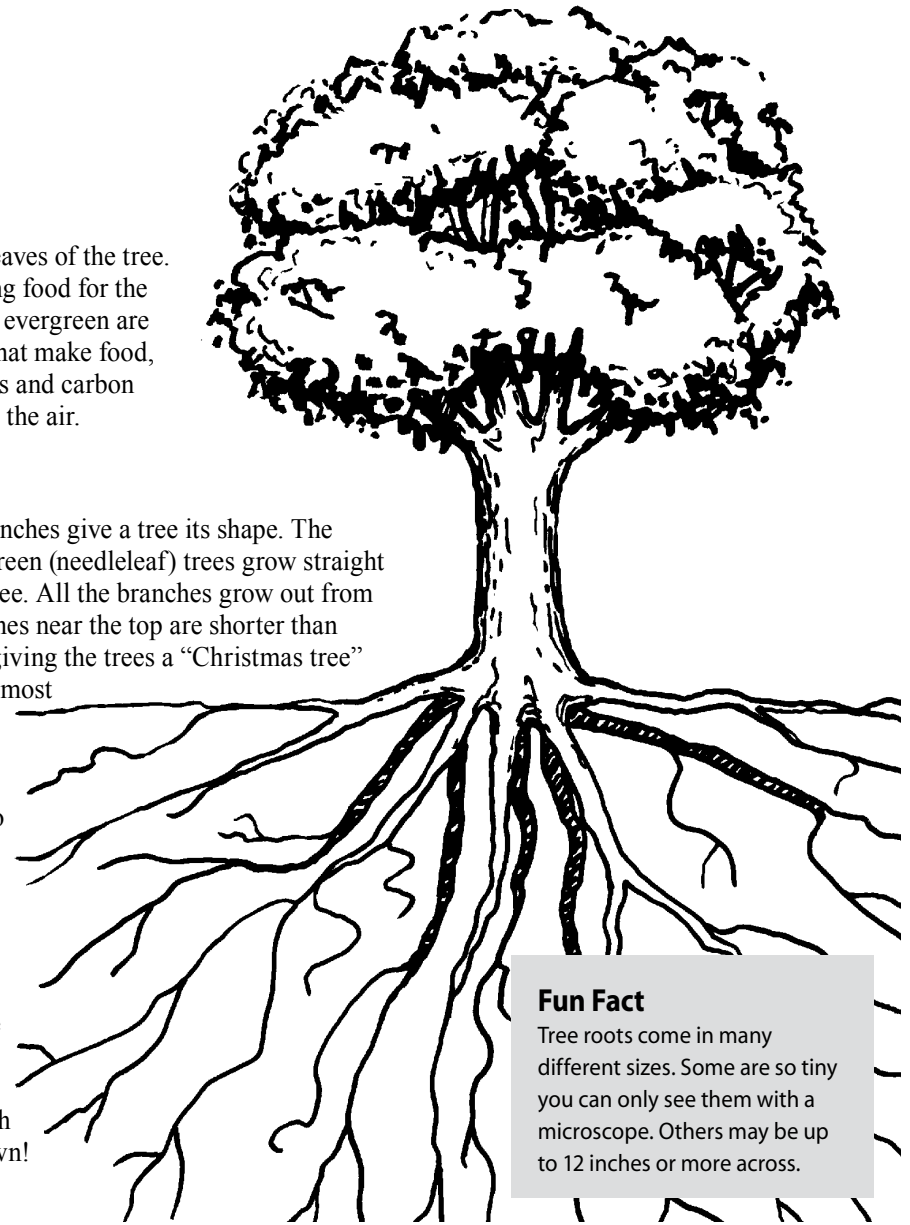
The crown is the branches and leaves of the tree. It has the important job of making food for the tree. The leaves (the leaves of an evergreen are its needles) are tiny “factories” that make food, using water absorbed by the roots and carbon taken from the carbon dioxide in the air.

Trunk

The trunk and its branches give a tree its shape. The trunks of most evergreen (needleleaf) trees grow straight up to the top of the tree. All the branches grow out from the trunk. The branches near the top are shorter than those farther down, giving the trees a “Christmas tree” shape. The trunks of most broadleaf trees do not reach to the top of the tree. Instead, the trunk divides into spreading branches, giving the crown a rounded shape.

Roots

Roots hold the tree in the ground and absorb water and minerals that the tree needs to make food. Roots often spread much farther than the crown of the tree. Large, woody roots grow horizontally (side to side), mainly in the top 12 inches of the soil and usually no deeper than 3 to 7 feet. They often stretch out from the trunk to take up a space four to seven times larger than the crown! These roots spread across an area that can be twice the height of the tree.



Fun Fact
Tree roots come in many different sizes. Some are so tiny you can only see them with a microscope. Others may be up to 12 inches or more across.

Sizing Up a Minnesota Tree

Foresters aren't the only ones who can "size up" a tree. Here's how you can do it, too.

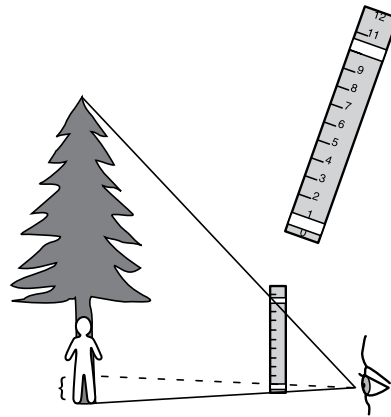
Around the Middle

Measure, to the nearest inch, the distance around the tree, about $4\frac{1}{2}$ feet up from the ground, to get the *circumference*. A flexible tape measure is a good tool to use.

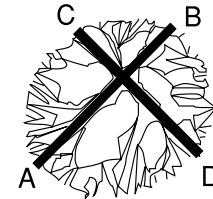
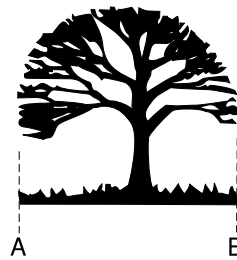


How High

Take a 12-inch ruler and mark the 1-inch and 10-inch lines on the ruler with tape. Work in pairs. One person stands at the base of the tree. The other holds the ruler up in front of his or her own eyes at arm length and moves back until he or she can see the whole tree from top to bottom between the 0-inch and the 10-inch mark on the ruler. He or she then moves the ruler until the base of the tree is exactly at 0 inches and the top of the tree is sighted exactly at 10 inches. Then he or she sights out from the 1-inch mark to a point on the trunk above the base. The partner marks this spot on the trunk with tape.



Measure the distance from the base of the tree to the 1-inch mark. Multiply by 10 to get an approximate idea of the height of the tree.

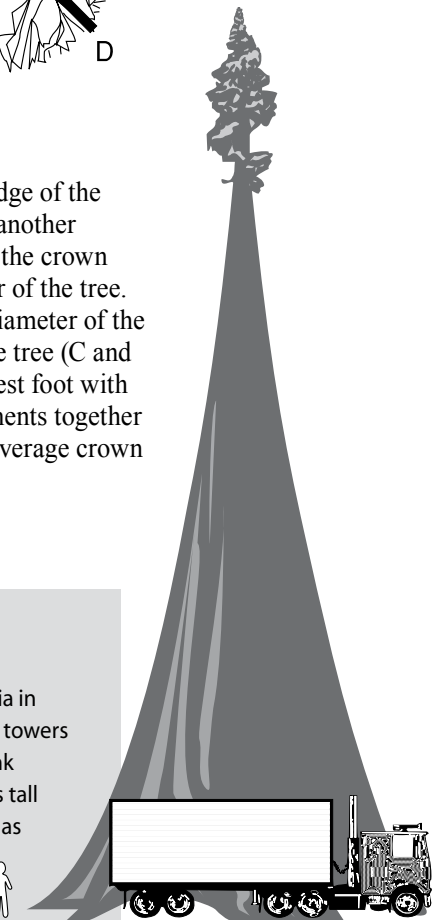


Crown Size

Set a stake directly under the outside edge of the crown farthest from the trunk (A) and another directly opposite it at the outer edge of the crown (B) on a line passing through the center of the tree. Next, set stakes marking the shortest diameter of the crown passing through the center of the tree (C and D). Measure both distances to the nearest foot with a tape measure. Add the two measurements together and divide the sum by two to find the average crown spread.

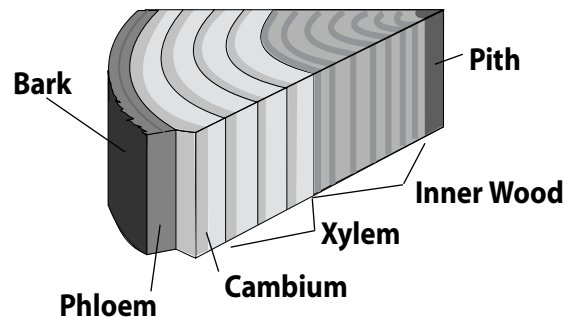
Fun Fact

The U.S.A.'s largest living thing is the General Sherman Tree, a giant sequoia in Sequoia National Park in California. It towers more than 272 feet tall and has a trunk about 36 feet wide. That means it's as tall as a 20-story building and its trunk is as wide as a semitrailer is long. It's probably almost 3,000 years old.



Read the Rings

How do trees keep growing new wood every year? It's a fascinating story. Most trees in North America add new wood to their girth each year in a regular, predictable way. The new tissue is added right inside the bark by a thin layer of cells called the cambium. With the warmth of spring, cambium cells begin to divide. The cambium cells on the outside become part of the tree's phloem, a band of inner bark through which the tree's food supply moves. The cambium cells on the inside become the xylem, a system of tiny tubelike cells that carry the tree's water supply. These xylem layers give us the annual rings.



Fun Fact

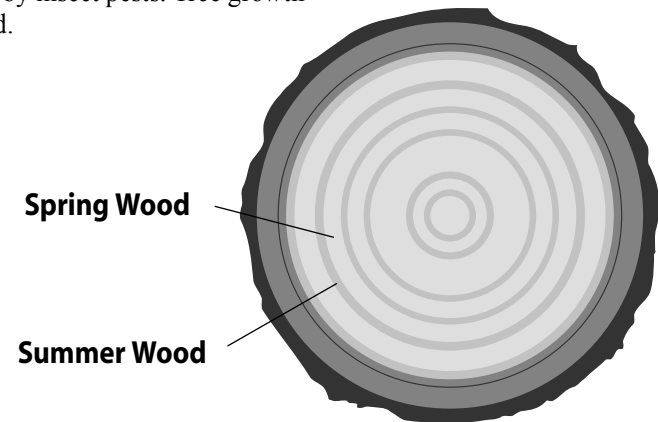
Trees require enormous quantities of water. A large apple tree in full leaf may absorb as much as 95 gallons of water from the soil every day. Most of the water goes to the leaves. On a sunny summer day, some trees move water up through their trunks at the rate of three feet per minute. A tree's wood is about half water.



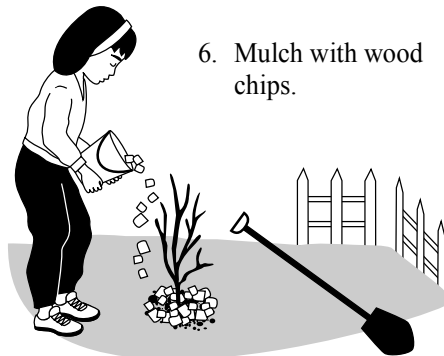
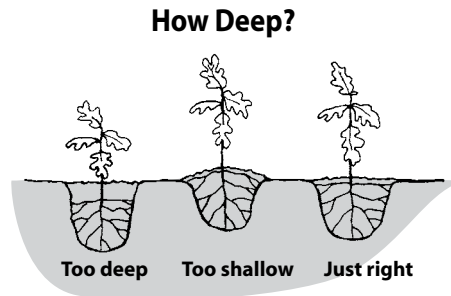
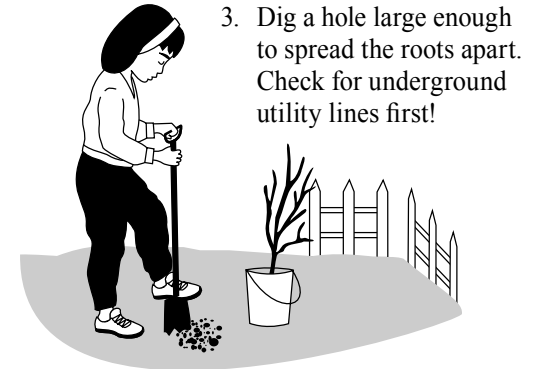
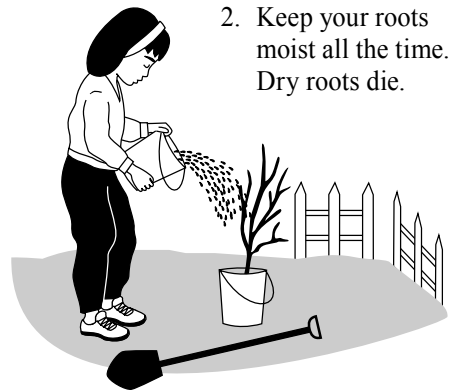
As spring begins, new cells are added quickly, and the tree increases in diameter. In a cross section of a stump, this growth appears as a wide, light-colored band called earlywood or spring wood. But as the season moves on into summer and fall and the soil is less moist, the cells are added more slowly. The rings—latewood or summer wood—are narrower and darker. Finally, the cold dry days of fall halt growth altogether.

One light band and one dark band together make up a single year's growth and show as one annual ring. A new annual ring is added under the bark each year.

School children everywhere are intrigued by figuring the age of a tree through counting its rings. (Start at the outer, newest ring just inside the bark and count in toward the center to know the age of the tree.) But scientists find many other fascinating bits of information tucked into the annual rings. Best known is the relationship between weather, growing conditions, and the width of the rings. Wide, light rings mean spring weather was good: warm days, lots of rain, good growing conditions. Narrower rings mean spring was probably cold or dry, and/or growing conditions were stressed. Perhaps the tree was crowded by others, shaded, or stressed by insect pests. Tree growth was limited.

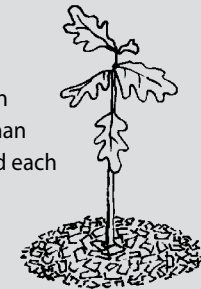


Planting a Tree



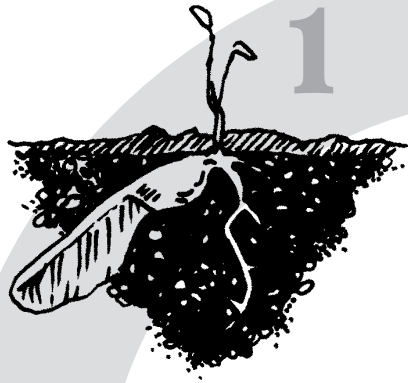
Fun Fact

More trees are planted in Minnesota than are harvested each year.

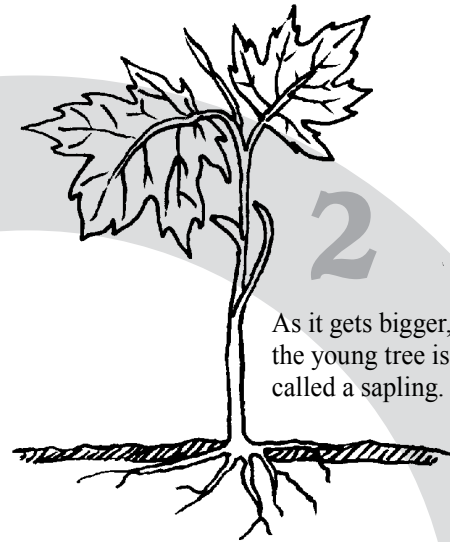


Cycles of Life

A tree starts out as a tiny seed. With soil, moisture, and warmth, the seed becomes a seedling.



1



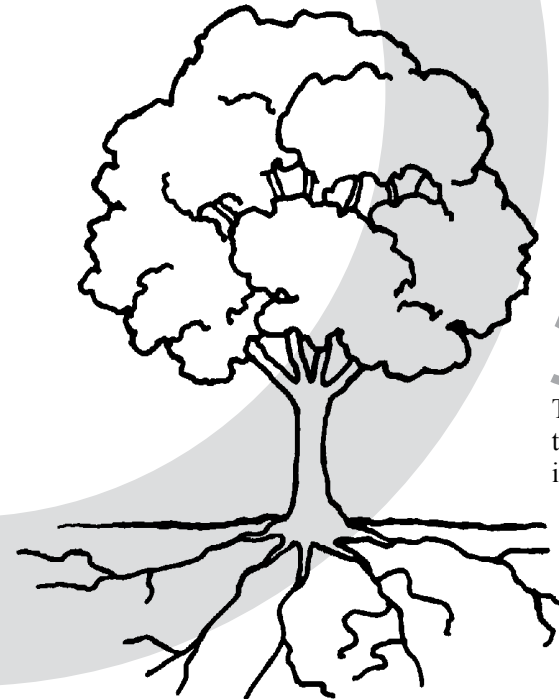
2

As it gets bigger, the young tree is called a sapling.



4

When it gets very old, the tree dies. As it decays, it turns into soil again, and becomes food for new trees to grow.

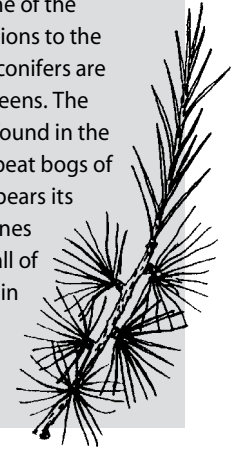


3

The tree gets taller and thicker every year. At last it is full grown.

Fun Fact

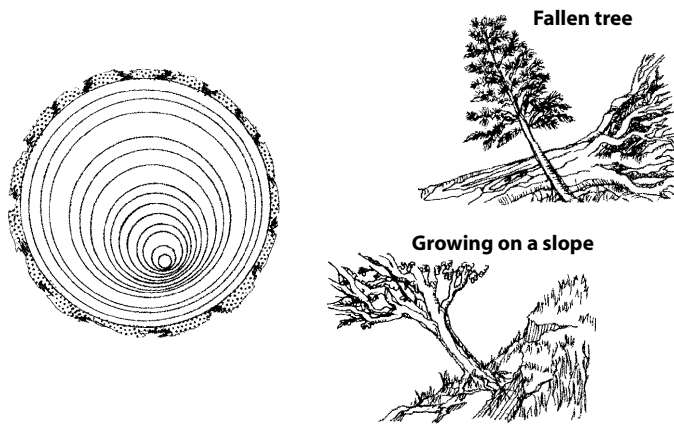
Minnesota is the proud home of one of the rare exceptions to the "rule" that conifers are also evergreens. The tamarack, found in the sprawling peat bogs of the north, bears its seeds in cones but sheds all of its needles in the winter.



Factors That Affect Tree Growth

Cross Section A:

The uneven growth shown in the rings could have been caused by a fallen tree leaning against the tree. The tree grew more on one side than the other, and curved up around the fallen tree. This uneven ring pattern could also belong to a tree growing on a steep slope.



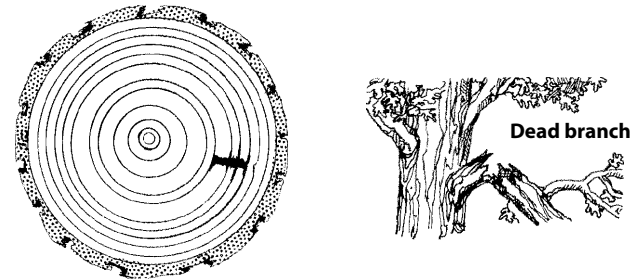
Cross Section B:

The scarring on this cross section was caused by a forest fire during the tree's sixth growing season.



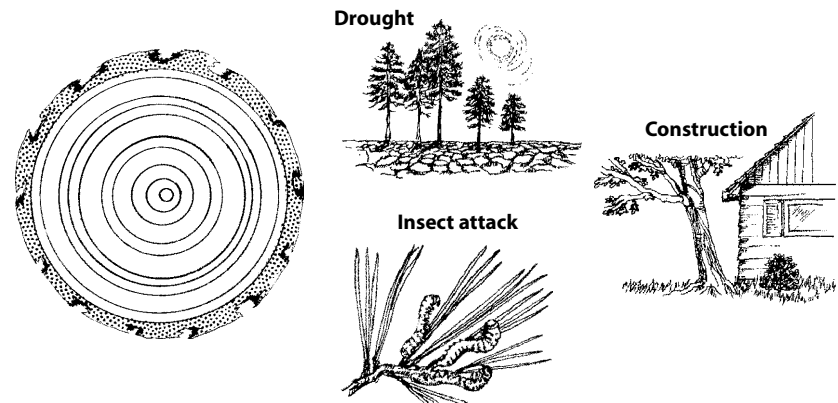
Cross Section C:

The mark beginning in year six is all that's left of a branch that died and fell off. Eventually the tree's trunk grew around the remains of the branch and covered it. (The branch could also have been broken or cut off.)



Cross Section D:

The narrow rings shown in this cross section could have been caused by several things such as drought, heavy insect damage, or damage from construction. If a tree loses all or most of its leaves because of an insect attack or drought, it is not able to make food and grows very little that year. Root damage from the construction of a house or sidewalk too close to the tree reduces the water and minerals the roots can absorb.



Layers

When you walk through a forest, you probably see a lot of what's happening at about eye level. But that's just a tiny slice of the picture. The forest ecosystem stretches all the way from the tops of the highest trees to the tips of their deepest roots. Though the specifics vary from forest to forest, each layer has its own stories to tell.

- The **canopy**, or top layer, is the powerhouse of the forest. Here millions of leaves combine sunlight, carbon dioxide, and water to create food for themselves and the rest of the ecosystem. Canopy critters in a northern Minnesota forest may include northern flying squirrels, red-eyed vireos, and tent caterpillars.

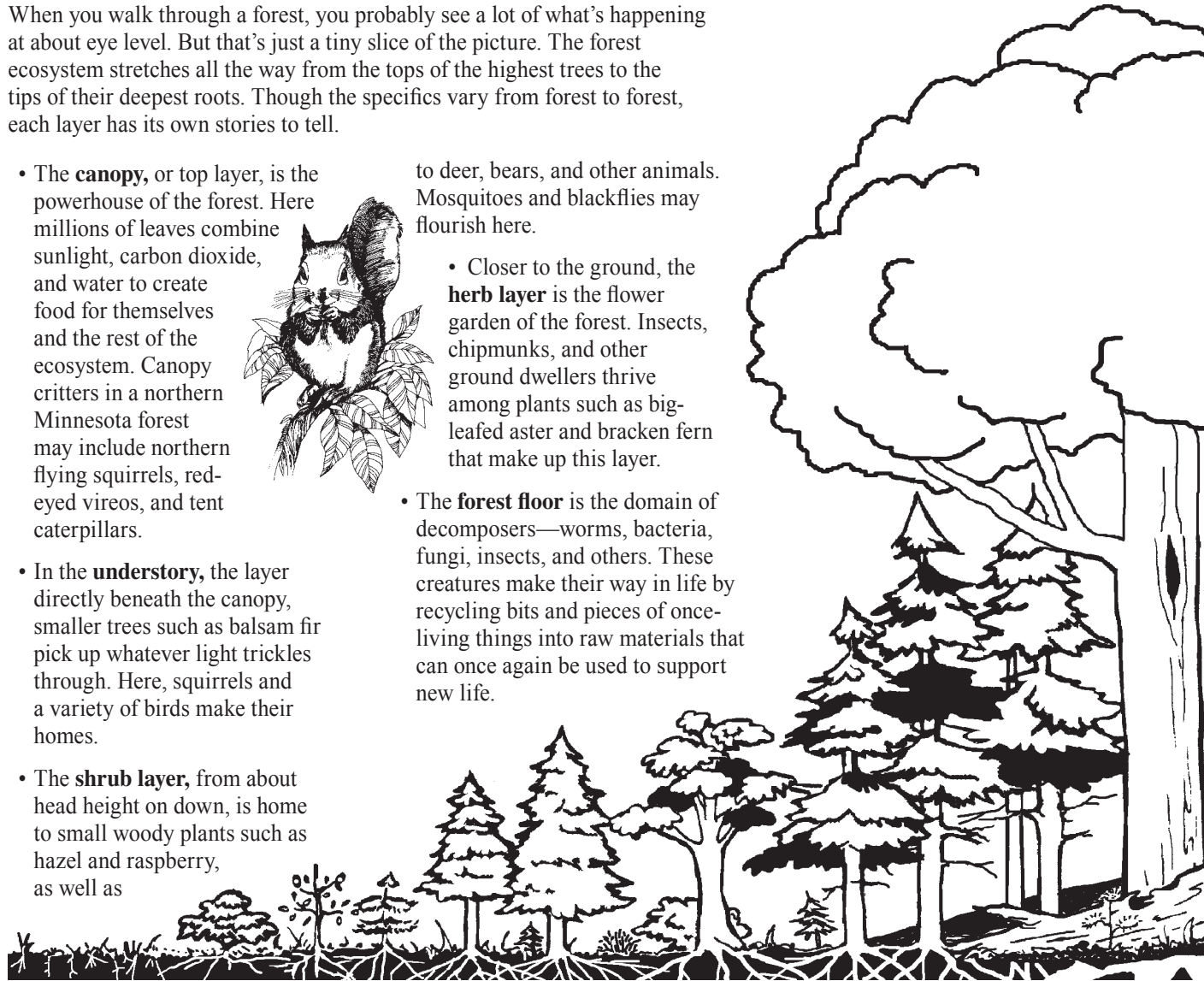


to deer, bears, and other animals. Mosquitoes and blackflies may flourish here.

- In the **understory**, the layer directly beneath the canopy, smaller trees such as balsam fir pick up whatever light trickles through. Here, squirrels and a variety of birds make their homes.
- The **shrub layer**, from about head height on down, is home to small woody plants such as hazel and raspberry, as well as

- Closer to the ground, the **herb layer** is the flower garden of the forest. Insects, chipmunks, and other ground dwellers thrive among plants such as big-leafed aster and bracken fern that make up this layer.

- The **forest floor** is the domain of decomposers—worms, bacteria, fungi, insects, and others. These creatures make their way in life by recycling bits and pieces of once-living things into raw materials that can once again be used to support new life.



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