Forest Facts

How a Tree Grows

IT STARTS WITH A SEED...

With the right mix of water, light and warmth, a seed sprouts, sending its first shoot up and its first root down. The young leaves begin to soak up the sun. Like all green plants, trees make their own food by a process called photosynthesis. Photosynthesis takes place in the leaves, with the help of a green substance called chlorophyll. Fueled by the sun's energy, water, nutrients and carbon dioxide combine to make sugar and oxygen. The tree releases the oxygen into the air. The tree uses the sugar to produce all of its parts - leaves, wood, bark, roots, flowers and fruits – and to grow larger.

QUESTION:

How far out do a tree's roots grow?

ANSWER:

Most trees' roots extend beyond the widest branch tips.

TREES GROW UP

Trees grow taller when new cells are produced at the tips of twigs, causing the twigs to grow longer.

TREES GROW OUT

Tree trunks and branches grow thicker as new cells are added beneath the bark. These cells make up vessels, called xylem and phloem, that carry water and food throughout the tree.

Xylem carries water and nutrients from the roots up to the leaves. Active xylem is called sapwood. Old xylem no longer carries water. It forms the heartwood of the tree and may be a different color from the sapwood.

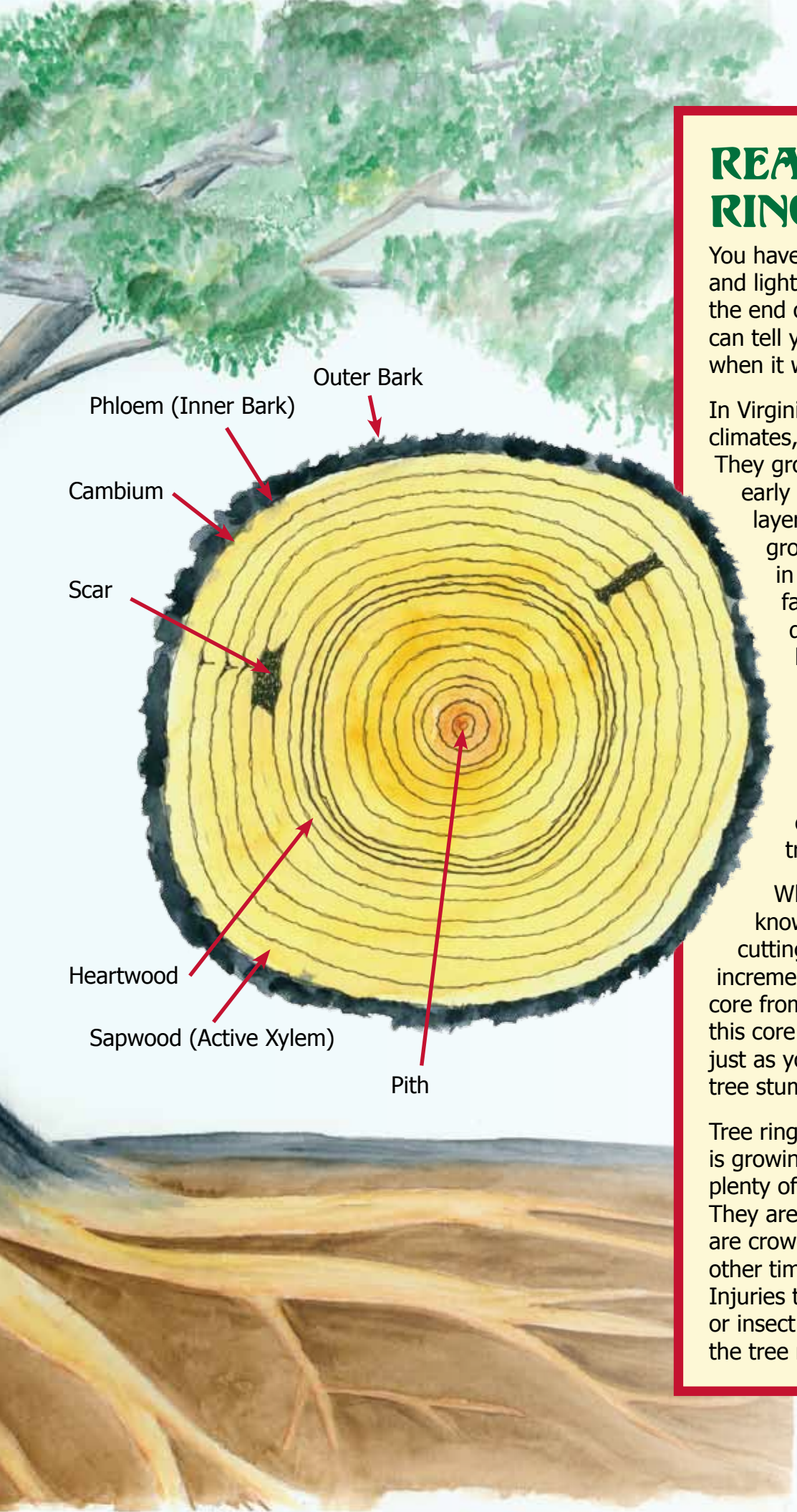
Phloem, also called inner bark, carries food from the leaves to the branches, trunk and roots. Outside the phloem is the outer bark, which protects the tree from injury.

The cambium is found between the phloem and xylem. If you looked at a tree stump, you could not see the cambium, because it is only one cell layer thick. The cambium's job is to make new xylem and phloem cells.

TREES GROW DOWN

Tree roots grow from specialized tissue at their tips. Roots anchor a tree in the soil and absorb the water and nutrients a tree needs. Most of a tree's roots are found in the top two feet of soil, even when the tree is very large.

Root hairs near the growing tips take in water from the soil. You'd need a microscope to see these tiny, tubelike hairs; yet, in a large tree, they can absorb hundreds of gallons of water each day. Surprisingly, only a small amount of this water is used in photosynthesis. The rest is released from the leaves in a process called transpiration.



READING THE RINGS

You have probably seen the dark and light rings on a tree stump or the end of a cut log. These rings can tell you the age of the tree when it was cut.

In Virginia and other temperate climates, trees do not grow all year. They grow fastest in spring and early summer, laying down a layer of light-colored wood. As growth continues more slowly in late summer and early fall, the tree adds a layer of darker, denser wood. These light and dark layers show up as rings in the wood. One light plus one dark ring equals one year of growth. By counting rings inward from the bark, you can determine how old the tree was when it was cut.

When foresters want to know the age of a tree without cutting it down, they use an increment borer to remove a small core from the trunk. The rings on this core sample can be counted, just as you can count the rings on a tree stump.

Tree rings are wider when the tree is growing fast, such as when it has plenty of light, space and water. They are narrower when the trees are crowded, or during drought or other times of environmental stress. Injuries to a tree, such as fire scars or insect attacks, can show up in the tree rings, too.

How A Tree Grows

QUESTION:

Do trees growing in the tropics have rings?

ANSWER:

Most do not, although there may be faint lines that show differences in growth during dry and wet seasons.

QUESTION:

Do all new trees start from a seed?

ANSWER:

No. Some new trees begin as shoots that come up from roots still living in the soil after a tree has died.

QUESTION:

If you make a mark on a tree's trunk, will the mark move higher off the ground as the tree gets taller?

ANSWER:

No. Height growth happens only at the ends of twigs. The trunk does not stretch out as the tree grows.

QUESTION:

When you build something out of wood, which tree tissue are you using?

ANSWER:

Xylem, which makes up most of the trunk and large limbs.

Illustrations by
Mike Steele, Virginia Master Naturalist

Virginia Department of Forestry
900 Natural Resources Drive, Suite 800
Charlottesville, Virginia 22903
Phone: (434) 977-6555
www.dof.virginia.gov

VDOF F00005; 08/2010

This institution is an equal opportunity provider.