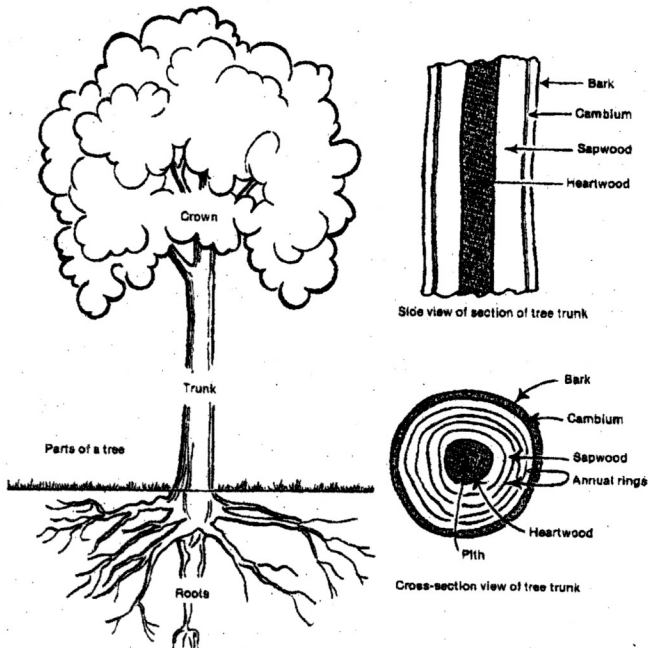


How a Tree Grows



The growing parts are the buds, the root tips, and the cambium just inside the bark. The tree grows in height and spread through the buds at the tips of the branches. Likewise, the roots grow in length and spread through the root tips.

The twigs and stem of the tree increase in length by a process known as apical growth. Every year, a new shoot grows from the end of the twig. By the end of the growing season the new twig is fully grown and keeps the length it has reached for the rest of its life. In some trees, the shoot ends in a terminal bud that develops during the summer. These trees include softwoods such as pine and some hardwoods such as

ashes, maples, and frequently beeches and oaks. In other hardwoods, however, such as birches, elms, and poplars, the part of the twig beyond the last lateral or side bud dies off, and the lateral bud starts the new growth the next spring.

The tree grows in diameter (thickness) through the action of the cambium, a thin layer of material between the bark and the sapwood. This cambium layer grows wood on the inside and bark on the outside. The wood formed during the growing season is called an annual ring. In many trees, two distinct bands of wood make up the annual ring: the light-colored, wider band known as the early or spring wood, and the dark-colored, narrower band known as the late or summer wood. In some hardwood trees such as ash, however, the early and late wood are almost the same color. The pores of the wood are different, though; the spring wood has larger pores than the summer wood.

Inside the tree itself, the wood is divided into two layers: the outer layer of light-colored wood called sapwood, and the inner layer of dark wood called the heartwood. The sapwood carries sap from the roots up through the trunk to the leaves. The heartwood is a dead core that carries no sap, but simply gives strength to the tree. In some trees the sapwood is only $\frac{1}{4}$ to $\frac{1}{2}$ inch thick; in others it is 6 to 10 inches thick.

The pith is the soft tissue at the very center of the stem or trunk. In the newly formed twig, the first woody growth took place around the pith. You can see it easily in young stems or twigs, but in large stems or trunks it is crushed and therefore hard to see.

The roots absorb water that contains minerals in solution. In the tree, the sapwood (xylem) carries this water, called sap, up to the leaves, and there the sap combines with carbon dioxide from the air to make food. The inner bark (phloem) carries this food to all growing parts of the tree, even down to the root tips. What the tree doesn't use as food is stored to help the tree in the growth during the next season.