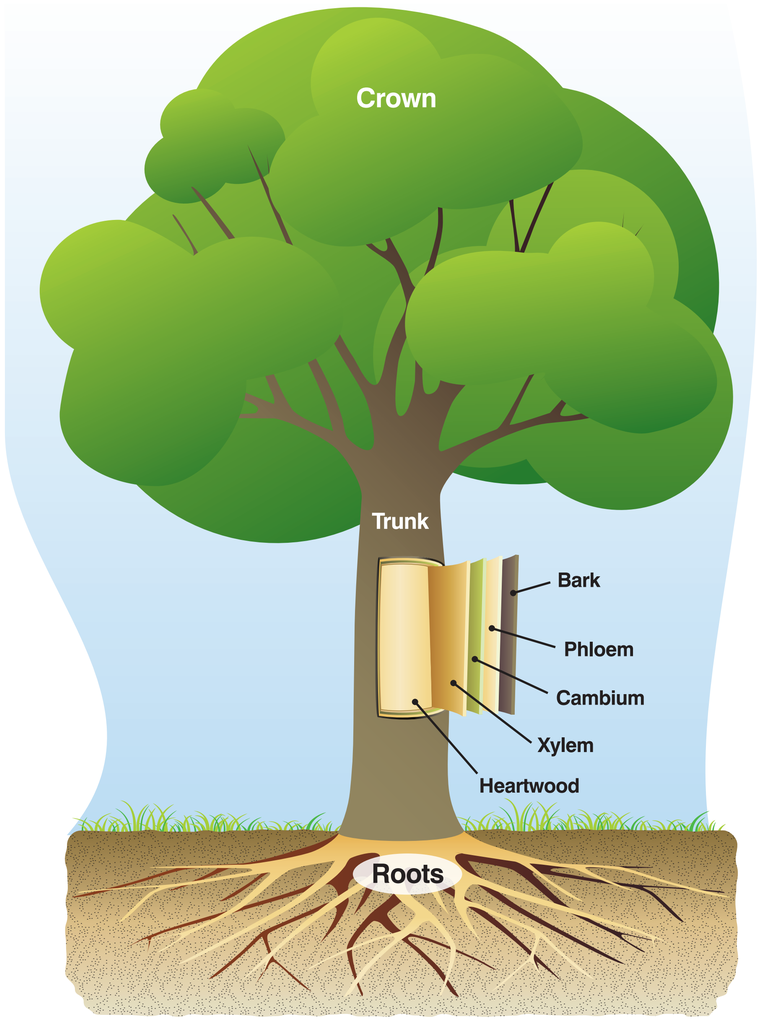
Tree Biology

Parts of a Tree



Roots

A tree's roots absorb water and nutrients from the soil, store sugar and anchor the tree upright in the ground. All trees have lateral roots that branch into smaller and smaller roots and usually extend horizontally beyond the branch tips. Some trees have a tap root that reaches down as far as 15 feet. Each root is covered with thousands of root hairs that make it easier to soak up water and dissolved minerals from the soil. The majority of the root system is located in the upper 12 to 18 inches of soil because the oxygen that roots require to function properly is most abundant there.

Crown

The crown, which consists of the leaves and branches at the top of a tree, plays an important role in filtering dust and other particles from the air. It also helps cool the air by providing shade and reduces the impact of raindrops on the soil below.

The leaves are the food factories of a tree. They contain chlorophyll, which facilitates photosynthesis and gives leaves their green color. Through photosynthesis, leaves use the sun's energy to convert carbon dioxide from the atmosphere and water from the soil into sugar and oxygen. The sugar, which is the tree's food, is either used or stored in the branches, trunk and roots. The oxygen is released into the atmosphere.

Trunk/Stem

The trunk, or stem, of a tree supports the crown and gives the tree its shape and strength. The trunk consists of four layers of tissue. These layers contain a network of tubes that runs between the roots and the leaves and acts as the central plumbing system for the tree. These tubes carry water and minerals up from the roots to the leaves, and they carry sugar down from the leaves to the branches, trunk and roots.

Heartwood

As a tree grows, older xylem cells in the center of the tree become inactive and die, forming heartwood. Because it is filled with stored sugar, dyes and oils, the heartwood is usually darker than the sapwood. The main function of the heartwood is to support the tree.

Xylem

The xylem, or sapwood, comprises the youngest layers of wood. Its network of thick-walled cells brings water and nutrients up from the roots through tubes inside of the trunk to the leaves and other parts of the tree. As the tree grows, xylem cells in the central portion of the tree become inactive and die. These dead xylem cells form the tree's heartwood.

Cambium

The cambium is a very thin layer of growing tissue that produces new cells that become either xylem, phloem or more cambium. Every growing season, a tree's cambium adds a new layer of xylem to its trunk, producing a visible growth ring in most trees. The cambium is what makes the trunk, branches and roots grow larger in diameter.

Phloem

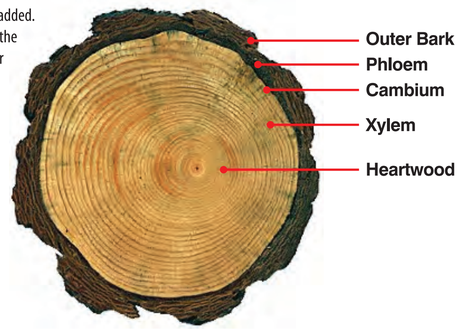
The phloem or inner bark, which is found between the cambium and the outer bark, acts as a food supply line by carrying sap (sugar and nutrients dissolved in water) from the leaves to the rest of the tree.

Bark

The trunk, branches and twigs of the tree are covered with bark. The outer bark, which originates from phloem cells that have worn out, died and been shed outward, acts as a suit of armor against the world by protecting the tree from insects, disease, storms and extreme temperatures. In certain species, the outer bark also protects the tree from fire.

Tree Rings

Each year, a new layer of sapwood is added. A ring forms, which is lighter in the spring, turning darker as summer progresses. Each of these rings, light on the inside and dark on the outside, represents a single year of growth.



You can find out how old a tree is by counting its rings. Because trees can be many times older than we are, growth rings tell a story about the climate of the region in the distant past; droughts, wet seasons, injuries, and forest fires can be seen in the variable growth of tree rings. The good years and the bad years are seen in the relative width of the rings. For example, a wide ring indicates a year when the tree grew a lot. There was plenty of moisture, it was warm, and there were no insect pests or diseases.

Many wide rings near the center of the tree indicate that it had plenty of sunshine, water and nutrients when it was young, and little competition from other trees.

Narrow rings indicate years when the tree hardly grew at all, perhaps because of bad weather or lack of rainfall (drought). Many narrow rings when the tree was young might indicate that there were a lot of other trees nearby competing for the available moisture and nutrients.

Rings that are elongated hint that the tree grew on a slope, or grew around some sort of obstruction.

The presence of covered-over wounds in the rings can tell you when there were fires, insect or disease attacks, or other damage to the tree. Because each ring represents one year, you can determine the exact year when the damage or poor weather occurred.

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