DIFFERENCES BETWEEN HEARTWOOD AND SAPWOOD

Sapwood is the outer light-colored portion of a tree trunk through which the water passes from the roots to the leaves, and in which excess food is stored temporarily. Heartwood is the central core of the trunk. In most woods the heartwood can be distinguished from the sapwood by its darker color. But in hemlock, aspen, cottonwood, some beeches, all spruces except Sitka spruce, basswood, holly, hackberry, tupelogum, and the true firs (not Douglas fir), there is very little difference in the color of the heartwood and the sapwood.

As new sapwood is formed on the outside of the tree trunk, the inner sapwood changes to heartwood. During this change the living cells in the sapwood die; the pores of some woods become plugged up with a froth-like growth, known as "tyloses"; and the cell walls, and in some species the cell cavities, become infiltrated with various substances, some of which darken the wood. In certain species these infiltrations are known to add appreciably to the weight of the wood, for example, in ebony and rosewood, in which the pores become filled with insoluble deposits; and in redwood and black locust, in which the soluble infiltrations may add 5 to 15 per cent to the dry weight.

In over 500,000 tests, which have been made by the Forest Products Laboratory, Madison, Wisconsin, on the various species of wood grown in the United States, no effect upon the mechanical properties of the wood due to its change from sapwood into heartwood has been found in most species. The heartwood of oak, pine, and Douglas fir, for example, is not intrinsically stronger than the sapwood, as has often been supposed to be the case; nor
is the sapwood of hickory and ash intrinsically stronger than the heartwood, as is sometimes claimed in connection with handle stock. However, in some species, in which the heartwood is high in infiltrations or "extractives," such as redwood, western red cedar, and black locust, the heartwood has been found to be considerably stronger in certain strength properties than the sapwood. In these species, however, the amount of sapwood in virgin-growth timber is relatively small.

The essential differences between heartwood and sapwood are as follows:

Heartwood, as a rule, is more durable than sapwood in damp locations and less subject to attack by stain, mold-producing fungi, and certain insects. It usually is colored and therefore considered more ornamental than the white sapwood, except in a few cases; in yellow pine interior finish and maple flooring, for example, the white sapwood is preferred. Heartwood is less permeable to liquid and therefore more suitable for tight cooperage, tanks, and conduits; and it responds more slowly to changes in atmospheric humidity, which often is of advantage when uncoated wood is exposed for a relatively short time to a different humidity. The heartwood of some species contains more valuable extractable materials, such as tannin and dyes, than does the sapwood.

Sapwood, as a rule, takes preservative treatment better than heartwood. It seasons faster, but when green usually contains a larger percentage of moisture which often makes it heavier. Because sapwood is the outer portion of the tree it contains fewer common defects, such as knots, shakes, and pitch streaks. In resinous species the sapwood usually contains less resin than the heartwood. Sapwood is more free from odor and taste, which is an advantage in some cases, and a disadvantage in other cases.