SOME COMMON FALLACIES ABOUT WOOD

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In the course of its work the Forest Products Laboratory continues to encounter various false ideas about wood, many of which lead to unnecessary trouble, expense, or dissatisfaction in the use of wood. Some common misconceptions of this kind are the following:

Fallacy 1.--That all wood in the course of time "naturally" decays as a result of age.

This fatalistic concept ignores the true cause of decay and may lead the user to neglect the proper precautions against it. Time or age itself has nothing to do with the decay of wood. The White House, when remodeled in 1949, was found to contain sound timbers that had been in place since 1816. The Fairbanks house, a wood structure in Dedham, Mass., is standing structurally intact after three centuries. Timbers several hundred years old have been recovered from the ruins of Indian pueblos in Arizona and New Mexico. A part of a Roman emperor's house-boat that sank long ago in Lake Nemi was sound enough nearly 2,000 years later to be identified by the Forest Products Laboratory as spruce. A log 7 feet in diameter was found some years ago in a tunnel being dug 150 feet below the bed of the Yakima River in Washington. A piece of it was sent to the Forest Products Laboratory and the wood was identified as an extinct species of sequoia, of an age estimated by geologists at 12 million years. During the progress of thousands or perhaps millions of years wood constantly immersed in water or wet soil gradually undergoes chemical changes (not to be confused with true decay) that result in a loss of some of the original strength. This millenial process that involves only immersed wood, however, has no practical significance for current structures.

These examples prove that wood does not necessarily decay with age at all. Decay is the result of one thing only, and that is the attack of wood-destroying fungi. In the cases mentioned the wood had been kept

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free of fungus attack in one of two ways: it had been kept dry, as in weatherproof structures or in a dry climate, or it had been kept thoroughly and permanently saturated. A fungus is a plant. If the wood is too dry for it to grow and spread, decay does not occur. If the wood is thoroughly saturated, the fungus is "drowned out." The range of activity of fungi lies between 20 percent moisture content of the wood and a "soaking wet" condition in which all air is excluded.

Fallacy 2.—That some woods never decay, regardless of exposure and service conditions.

Both this fallacy and the first one are answered by the fact that no woods decay when fully protected from fungi, and that any wood will decay when exposed to fungus attack that is severe enough and continued long enough.

The conditions that bring about decay of wood are, briefly, dampness and mild to warm weather. If you have a house, porch, or shed built over damp, poorly drained ground, with the foundations bricked or boarded in, look out for decay. Sills of untreated wood resting directly on damp ground are sure to rot. Likewise untreated posts and poles set in the ground are exposed to ideal conditions for fungus attack, and their service will usually be terminated by decay near the ground line, no matter what wood is used.

The sapwood of all species is easily and quickly destroyed by decay. (Sapwood is the outer, light-colored part of the tree trunk). But it is a fact that the HEARTWOOD of some species resists decay longer than the heartwood of others. This is the advantage of using for fence posts, and so on, such decay resistant species as cedar, catalpa, chestnut, baldcypress, juniper, black locust, osage-orange or bois d' arc, and redwood. They may last for years. Do not imagine, however, that the underground parts of the post will remain just as you put them in; in a comparatively short time decay will eat away the sapwood, and the business of holding up the fence will be left to a core of the more resistant heartwood. Of course, by treating the wood with a good preservative you change the picture materially. Most of the preservative goes into the sapwood and protects the part that is most vulnerable to decay.

But to suppose that the use of cypress, cedar, or any other special wood will excuse you from all precautions against decay is a bad mistake. Don't expect too much of Nature. In the first place, remember that only the heartwood is the durable part, and then take care of the service conditions as well as you can. A Laboratory man once went to inspect a floor that was falling in. It happened that the subfloor was of genuine cypress, specifically put there to ward off decay, but alas! It was laid directly over damp ground and was covered with tar paper before

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laying the upper boards. What the owner had was a high-powered fungus pit for his cypress, and the fungus literally ate up the subfloor and spread to other parts of the building at the owner's expense.

Fallacy 3.--That there is such a thing as "dry rot" of wood.

Much has been written or said about "dry rot" in buildings. Any brown, crumbly rot is so called, but the term is a misnomer. No fungus can grow without water. Wood is the food for the wood-destroying fungi, but they cannot use that food unless it contains at least 20 percent of water (based on the weight of the oven-dry wood). However, the fungi that are responsible for some of the decay in buildings are capable of rott ing wood that is apparently much drier, for they produce water-conducting strands which carry water from some source, usually in the ground, up into buildings where the wood normally would be dry. Moreover, some wood-destroying fungi can remain dormant in dry wood for months or even years and then revive and continue their destructive work as soon as moisture becomes available.

Call it dry rot if you wish, the fungi that come sneaking into a house carrying their water supply are bad ones, and should have been kept out by proper precautions when the house was built. The Latin name of the most common one in the United States is Poria incrassata. It is at home in the South, on the Pacific Coast, and at least as far north as Pennsylvania and Nebraska.

Here is an example: a house was completely wrecked by this destroyer in less than 10 years. Investigation showed that some floor joists were allowed to rest on an old stump that happened to be in just the right place -- or the wrong place. Don't give this wrecker a chance to get into your home by leaving planks or timbers connecting the structure with the ground. After Poria incrassata gets started it can set up its own connections with the damp ground, an ugly rootlike growth sometimes as big as your finger and thumb.

A good, dry, well-built frame house is in practically no danger from decay if just a few normal precautions are taken. (1) Build on a well-drained site and avoid construction that allows moisture to accumulate in joints or pockets; (2) secure well-seasoned lumber; (3) do not allow the selected material to lie on the ground after it has been delivered on the job; (4) untreated lumber should not be allowed to come in contact with the soil or with foundations or walls which are liable to be damp, and should not be embedded in concrete or masonry without leaving ventilation around the ends of the timbers; (5) wood flooring, unless it has been chemically preserved, should never be laid directly on the soil or on concrete that is in contact with the soil; (6) remember that dry wood will not decay.

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Fallacy 4.--That wood used in construction is under all conditions more dangerous than steel in case of fire.

It is true that wood when exposed to fire temperatures will burn and be converted to charcoal, whereas steel does not burn under similar exposure conditions. But wood, when used in heavy timber construction, has a tremendous advantage over unprotected steel. Where thick beams constitute the supporting members of a structure, the outside surfaces, on exposure to severe fire conditions, will become charred, while a substantial core of wood, because of its low heat conductivity, remains at low temperature, uncharred and intact, and retains most of its strength for some time. Steel, under the same fire exposure conditions, because of its good heat conduction, will quickly become heated throughout and lose much of its rigidity and load-bearing capacity and thus permit collapse of a structure sooner than timbers of the same initial strength. For structural purposes, the working strength of unprotected wrought iron and steel as reported in Johnson’s Materials of Construction, must be regarded as regularly diminishing while the temperature increases, the rate of diminution being about 4 percent per 100° F. increase in temperature.

It is for this reason that steel members are commonly required to be enclosed in concrete or some other protective material.

Fallacy 5.--That a fence post will give better service if set in the ground "upside down.”

A tradition seems to exist in some quarters that setting posts bottom end up (opposite the position of growth) makes them last longer. There is neither evidence nor theoretical basis to support this idea, so far as we are aware. On the contrary we should expect posts so reversed to rot more quickly than if set upright. They would have less material at the ground line for fungus to rot through, and a greater proportion of that material would be sapwood, which is generally an easy prey to fungus. Furthermore, the less wood a post has at the ground line the weaker it is, like a fishing pole grasped at the small end.

Fallacy 6.--That oak, hickory, or other heavy hardwood, has a higher fuel value than pine.

This may be true as between a cord of hickory and a cord of pine, as the cord of hickory weighs more; but pound for pound the pine gives off more heat. Resinous woods in general have a higher heat value per pound than nonresinous. What this means is that for a quick, hot fire you would use pine; but for practical home heating or cooking purposes no general means has yet been devised to "tame down" the burning of resinous woods and make them last like a hickory backlog, for instance.
Fallacy 7.--That the sap "rises" in a tree in the spring and "goes down" in the late fall.

The difference about sap is that it is moving or circulating actively in the spring and summer. It is always "up" and never "down." By actual weighing, logs are heavier in the winter than in spring, showing that they have more sap in the inactive season. If the sap were "down," no tree could freeze in winter as they often do, with a loud "crack."

Fallacy 8.--That trees exposed to storms and rough weather all their lives form stronger and better wood than sheltered trees.

This idea is mere poetic license, as it never affects the selection of wood in manufacture and actual use. Trees exposed to extra severe conditions are apt to be deformed, gnarly, twisted, stunted, and fit mostly for firewood. Trees grown under normal forest conditions make the best lumber because they are straight and regular in grain. Piece for piece, their wood is as strong if not stronger than that grown under the wildest conditions of exposure.

Fallacy 9.--That wood of a given species grown in one State or region is superior to that grown in another State or region.

Examples are "Michigan maple" or "Vermont maple," northern vs. southern ash, etc.

Tests of more than 600,000 specimens at the Forest Products Laboratory prove that a tree's location inside or outside certain imaginary geographical lines has nothing at all to do with the strength of its wood. If the tree or species in question is growing within its proper range of climate, it is not affected by its north, south, east, or west location within that range. The immediate influences of its site, such as moisture, drainage, fertility, and exposure have the controlling effect. Properties of the wood in any one State or region will show a wider variation than any general geographic difference. The test of wood quality lies within the piece or the shipment itself, and not in where it came from.

Fallacy 10.--That limbs rise higher from the ground as the tree grows older.

This phenomenon would obviously require the stretching of the interior wood where the limb is attached, and trees simply do not grow that way. A new layer of wood is put on every year over the tree as it stands, limbs and all. What goes on this year stays put. If there is a limb 10 feet from the ground now, that is where it will be next year, unless it breaks off or is cut off.
Fallacy 11.--That an expert can tell the age of a piece of wood by looking at it.

This question sometimes comes up in the case of a violin purporting to be a "geniune Stradivarius," according to a Latin label stuck on the inside. This label, put into thousands of cheap new violins, means nothing to the trade except that the instrument is shaped like a Strad; but to the owner the discovery of the secret Latin inscription is often wildly exciting. Hence, an urgent call to the wood expert to inspect the wood and see "how old it is."

Except for the "aging" of wood in color, which may be purely artificial, the expert can determine the age of wood only by counting the rings in the stump when the tree is cut. Looking at a stray piece of wood only shows a certain number of rings or growth layers, telling how many years the piece took to grow; the growth may have occurred since 1900 or away back in the Middle Ages, so far as anybody can tell from a single piece. (The research of Professor Douglass on timbers from the old pueblos is a different story which we can hardly go into here.)

Fallacy 12.--That some woods "breed" bedbugs and cockroaches; meaning, perhaps, that some woods favor the development of such vermin within their cracks and crannies.

The insects in question appear supremely indifferent to the kind of wood of which a house is built; their interest lies in other directions. To blame poor housekeeping on one or another species of wood of which the house is built is grossly unfair to Mother Nature.

Fallacy 13.--That lumber on the market today is not what it used to be in the "good old days."

Popular opinion to the contrary notwithstanding, timber cut today is as good as Paul Bunyan ever laid ax to. Lumber is now machined better, graded better, and seasoned better than formerly. In addition, a wider selection of species and items is available. It is true that strong competition between dealers and between materials in some localities has resulted in bringing on the market lumber that is not what it should be with respect to size, grade, and seasoning. However, this does not mean that good lumber is not available at economical prices. It does mean that discrimination is necessary in buying lumber as well as in buying other materials -- undoubtedly more necessary today than it was in the past.
Fallacy 14.--That wood exposed to very low temperatures is "brittle as glass" and has little strength.

Some people have had the idea that when wood is frozen or exposed to very low temperatures, as in arctic regions, it is seriously damaged and loses most of its strength. There have been reports that a piece of wood dropped on the frozen ground is likely to shatter into small pieces, much as though it were made of glass. Careful investigation has failed to produce any real evidence of such occurrences. Occasionally, a piece of wood of the commonly used species may have natural characteristics, such as knots or slope of grain, that are very severe and damaging to the strength, or the piece may have such low density that it could readily break when dropped or mishandled, even at normal temperatures.

The fact is that tests on wood at temperatures as low as 300° below zero (F.) show that the strength properties of dry wood, including shock resistance, increase as the temperature is reduced. In the case of wood that is saturated with water, the expansion of the water upon freezing may sometimes cause the wood to crack open (see Fallacy 7), but evidence indicates that wet wood also increases in strength when the temperature is reduced.

It is possible that fastenings, such as nails and screws, may tend to loosen somewhat in wood that is repeatedly frozen and thawed, much as they do in wood that is repeatedly wetted and dried. If this does occur, however, it would be a slow process.