value will be destroyed. Therefore currant and gooseberry bushes in the immediate vicinity should be destroyed in order to eliminate the source of new infections before an attempt is made to cut out the diseased parts. Details of the treatment of ornamental white pine infected with blister rust can be obtained from Circular 177, United States Department of Agriculture.

Less Serious Diseases of White Pine

By Haven Metcalf, Pathologist, U. S. Department of Agriculture

Compared with the blister rust, all other diseases of white pine are of negligible importance. The most conspicuous one, if it may be called a disease, is the so-called "white pine blight." There have been several occurrences of this trouble, of which the most sensational was that of 1907 and 1908. Over a large area of country from central Maine to central Pennsylvania the young trees, and particularly the ends of the youngest needles, suddenly appeared brown. This was at first popularly believed to be an epidemic of some kind, but no specific causal organism was ever isolated, and after about two years all but about three per cent of the trees recovered. The cause of the trouble is not definitely known, but it is generally believed to be an unusual type of winterkilling. Frequently dead areas of sapwood will be found inside of the sound bark. Conditions of this kind are sometimes local, but usually widespread over a considerable area of country. Under conditions surrounding the golf course, the most important thing to remember, in a case of this kind, is to refrain from cutting down a tree because it looks unsightly. As indicated above, more than 97 per cent of such trees recovered spontaneously. It is good advice in general, in dealing with ornamental trees, particularly conifers, not to cut them down until you are absolutely sure they are dead.

In general, the white pine is a sensitive tree, particularly liable to serious and permanent injury from wounds which may appear to be almost of a trivial nature. If a young tree becomes sharply bent, without any external indication of breakage, it is almost sure to die. A comparatively small wound extending less than one-third the circumference of the stem will usually kill a tree, especially the very young trees. On this account greatest care must be taken that white pines are not injured by being bent, by having bark knocked off by lawn mowers, or otherwise injured.

The white pine, although often broken by ice storms, the weight of snow, and high winds, does not as a rule suffer as seriously in this regard as many other trees. Any damage of such a nature should, however, receive prompt attention, following the lines of treatment advocated in Farmers' Bulletin 1178, United States Department of Agriculture. The principles of tree repair and tree surgery discussed in that bulletin are too extensive to consider within the limits of an article as short as this, but they are easily put into practice. Every caretaker of a golf course should have a copy of that bulletin, which can be obtained free upon request made to the Department of Agriculture.

The white pine is sensitive to smoke, and particularly to a great number of chemical by-products which frequently occur in the smoke of manufacturing cities. The death of white pines, and indeed of all conifers on many old golf courses which are within the atmospheric influence of manufacturing cities, is thus easily explained. There is no remedy for

this condition. In cases where all conifers have been killed, the much-desired evergreen effect can often be obtained by planting holly where that tree is within its climatic range. In many places the holly has proved particularly resistant to smoke.

Frequently, particularly serious damage to or even death of white pines and other trees will be noticed along driveways. This may often be observed to be due to change of level in the process of grading roads or paths. A change in the level of the surface of the ground raises or lowers the water-table in the soil, thus drowning or drying the roots. Few trees are able to resist such changes. Often materials used in road building or repairing, such as calcium chloride, get deposited under certain trees, resulting in the death of the trees at a later period, when perhaps the presence of the salt has been forgotten. A coal-burning fire-engine operating under a large tree on a curb will often leave no conspicuous immediate effect, but the tree will die within the following year.

Finally it must be remembered that there are cultural limits to the well-being of large trees particularly. Growing naturally in close association with its fellows, and under the right forest humus, the white pine, like all other trees, is unfavorably affected by the hard soil and shaved lawn of the average golf course and park. It is well recognized that it is necessary to maintain a certain minimum of fertility in order to save the trees beyond a certain age; and finally it must be remembered that the age limit for ornamental trees in general is much lower than for the same trees growing in the forest. A great deal of money is wasted in trying to save trees which have reached the term of their existence under the unnatural conditions in which they grow. The death of such trees can be foreseen with a reasonable degree of accuracy; and all such mature trees should therefore have understudies, eventually to take their places.

Insects Injurious to White Pine

By William Middleton, Specialist in Shade Tree Insects, U. S. Department of Agriculture

The most serious insect pest of white pine in the southern portion of its range is the southern pine beetle or pine barkbeetle (*Dendroctonus frontalis* Zimm.). This insect feeds on the inner bark of living pines, making mines which destroy the living tissues, thus girdling and killing the trees.

Pines infested by barkbeetles very rarely are so lightly attacked as to permit their recovery, and they are a menace to the neighboring healthy trees. It is important to recognize infested trees early in the course of the attack of the barkbeetles and before these tree-killing species have an opportunity to complete their development and leave the trees. Infested pines are recognized by the following characters. The foliage fades through pale green, becoming yellowish and finally pale brown. The bark of the trees will usually show some fresh pitch tubes or crater-like resinous masses in which fragments of reddish bark are mixed. When the bark is removed, small blackish to reddish-brown beetles or small whitish to yellowish grubs are found in their galleries between the bark and the wood. Such trees should be located and marked between November 1 and March 1, and treated by removing and burning the infested bark before March 1, either by peeling and burning, or cutting down the tree and burning it, or