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COLLAR CRACK OF BIRCH

The name "Collar crack" is suggested for a condition of birches observed in the past 4 years during field studies of forest disease problems in the White Mountains of New Hampshire. The first close observations of this condition were made during the summer of 1963. This is a report on those observations and an explanation of the possible cause.

The symptoms observed were vertical cracks from a few inches to several feet long at the bases of yellow birch (*Betula alleghaniensis* Britt.) and paper birch (*B. papyrifera* Marsh.) trees (fig. 1). On some trees the base is so weakened that windthrow results (fig. 2). On other trees the crowns become thin and the leaves chlorotic as the dead areas around the basal cracks coalesce and girdle the tree.

The affected trees were usually concentrated in certain areas, but some were found scattered. Affected trees were found on dry hillsides as well as on moist, flat, low land. Many such trees were found on the Bartlett Experimental Forest and throughout the Saco River area on the eastern slopes of the White Mountains. (But no affected trees were found on the Hubbard Brook Experimental Forest, on the western slopes of the mountains.)

Observations

The affected trees were most abundant on sites having more than 50 percent softwoods — especially fir. On some of these sites more than half of the birch trees were affected. A study of the history of one such site of about 5 acres on the Bartlett Experimental Forest revealed that the land had once been cleared for farming and the trees that later grew

Figure 1. — Vertical cracks at the base of this paper birch tree indicate root and butt decay.

Figure 2. — Many affected trees break at the base during storms. *Armillaria mellea* is fruiting on the root of this tree.

on the land were cut for fuelwood and other purposes at frequent intervals.

Basal cracks were noted on trees ranging in size from 4 to 18 inches d.b.h., on sprouts and single stems, and on trees on hummocks and in depressions. Small cracks just beginning to form were seen on small young trees as well as on large old specimens. Some cracks were very large, and in them were found fruiting bodies of the principal fungi that cause decays in birch: *Pholiota* sp., *Fomes igniarius* var. *laevigatus,* and sterile conks of *Poria obliqua.* Basal cracks were noted on many dead windthrown trees.

Roots of several trees were dug and examined after the trees were cut for study. The humus and soil were dug away from many shallow roots on trees that were not cut. The decay varied from small areas on the undersides of the roots to completely decayed large roots. Every tree that had basal cracks had some root decay.

Sections were cut from decayed roots and from decayed and discolored areas in the butts. In the laboratory, *Armillaria mellea* (fig. 3) was isolated consistently from the decay in the sample root sections. Although this fungus was isolated from the decays in some of the butt sections, other decay fungi were isolated more commonly. An unidentified dark nonsporulating fungus was isolated from the dark zone lines in the decay caused by *A. mellea* (fig. 3).

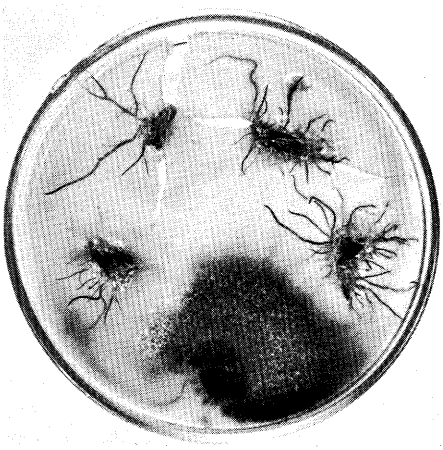

Figure 3. — *Armillaria mellea* growing in culture from chips of decayed wood. Rhizomorphs often form in culture. The black fungus was isolated from the dark zone lines in the decay.

Figure 4. — Fruiting bodies of the honey mushroom, *Armillaria mellea.*

Figure 5. — *Armillaria mellea* at the base of a living yellow birch.

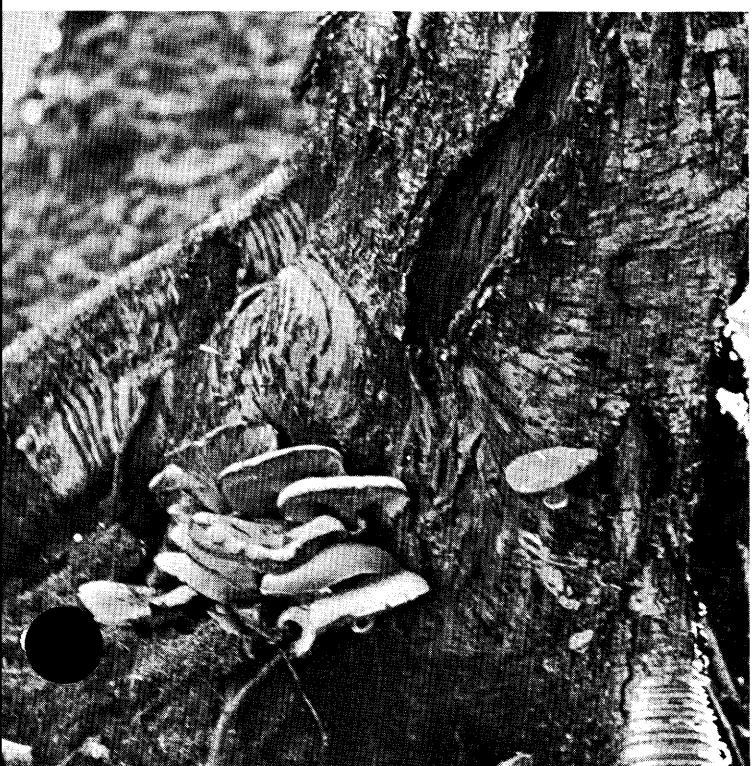

Figure 6. — Mycelial fans of *A. mellea* 6 feet up the stem of a living yellow birch.

During the latter half of September, fruiting bodies of *A. mellea* — commonly called the honey mushroom — were abundant throughout the forest (fig. 4). Because the fungus forms rhizomorphs — black stringy strands of fungus tissue — the common name of the disease caused by this fungus is "shoestring root rot." The fruiting bodies were found on the roots and bases of many of the trees that had been studied earlier (fig. 5). They were found in the cracks as high as 3 feet above the base. Very few rhizomorphs were found on the dead areas on the living trees.

On the Bartlett Experimental Forest, more than 50 trees were observed that had basal cracks and the fruiting bodies of *A. mellea* either on the roots or on the base. Fruiting bodies were observed also on an equal number of affected trees in many areas along the eastern part of the Kancamagus Highway near Conway, New Hampshire.

White fans of fungus tissue were found under recently killed bark patches as high as 6 feet above the bases of some trees. These mycelial fans were a few inches from living tissues (fig. 6). A dull red liquid oozed from spots in the dead and dying bark. Small insect holes were commonly observed near the centers of the wet spots.

Discussion

A wide variety of woody plants throughout the world are attacked by *A. mellea.* (See Leaphart, Charles D. *Armillaria root rot.* U. S. Dept. Agr. Forest Pest Leaflet 78, 8 pp., illus., 1963.) The fungus generally is thought to become an aggressive parasite only after other factors have weakened the host.

Our observations suggest that *A. mellea* is the cause of the root rot on the birch trees examined, that the rot is usually followed by cracking at the tree base, and that other decay fungi invade the trees through the basal cracks after *A. mellea* has ceased to grow upward in the butt.

An extensive study was not made, but on the basis of the information gathered it is recommended that trees with basal cracks be cut and used as soon as possible. Decay fungi entering through the cracks cause a rapid decrease in the value of the tree and also cause the base of the tree to be so weakened that the chances for windthrow are increased.

— ALEX L. SHIGO

Forest Pathologist
Northeastern Forest Experiment Station
Forest Service, U. S. Dept. Agriculture
Laconia, N. H.