Coral spot canker. Coral spot canker (*Nectria cinnabarina*) is common on sugar maple and other hardwood trees. It usually attacks only dead twigs and branches but also can kill branches and stems of young trees weakened by freezing, drought, or mechanical injury. It is common and highly visible.

The fungus infects dead buds and small branch wounds caused by hail, frost, or insect feeding. It is especially important on trees stressed by drought or other environmental factors. The degree of stress to the host determines how rapidly the fungus develops. It kills the young bark, which soon darkens and produces a flattened or depressed canker on the branch around the infection. The fungus develops mostly when the tree is dormant and produces its distinctive fruiting bodies in late spring or early summer.

Numerous spherical fruiting structures, 0.05 to 0.1 inch (0.5 to 1.5 mm) in diameter and height, develop all over the dead bark (Fig. 85). They range from flesh-colored to pink-orange initially, and later become brown or nearly black. This nonsexual stage of the fungus produces abundant spores. Later during the summer and fall, clusters of small red fruiting bodies also appear among the black forms produced earlier. The red structures are the sexual stage of the fungus. Both stages often are found on the same twig. Spores of both can infect fresh wounds.

Coral spot canker is considered an “annual” disease. The host tree usually regains enough vigor during the growing season to block the later invasion of new tissue. Maintaining good stand vigor should suffice as an effective control in forest stands.

*Steganosporium ovatum* is another common fungus of dying and dead maple branches (Fig. 86). It produces black fruiting structures on branches of trees stressed previously, especially by defoliation. Steganosporium appears to hasten dieback of stressed branches.

*Maple canker*. An annual canker that occasionally is found in large numbers on sugar maple, it first appears as a sunken area on stems or branches, with dead cambium underneath. As callus tissue develops around the dead area, the sunken...
bark falls away, exposing the underlying wood. Subsequent callus formation may completely close the lesion, and normal bark may form again during one growing season.

These cankers are lenticular and can be from 0.5 inch (1 cm) to several feet long, and from 0.5 to 8 inches (1 to 20 cm) wide (Fig. 87). They provide openings for secondary decay and stain organisms. Similar-looking cankers have been observed on red maple, black cherry, red oak, and white ash.

Cankers develop between late fall and early spring (during the dormant season). A species of *Fusarium*, probably *F. solani*, is suspected as the causal organism. This fungus is a common inhabitant of soil and of healthy bark of trees, apparently infecting bark wounds that extend to the cambium. Trees stressed by factors such as windstorms, sudden drops of temperature, or insect wounds are affected. Tree growth usually is not impaired and the lesions close over after a good growing season.

**Canker Rots**

Canker rots are perennial, canker-like distortions of tree stems. They are caused by certain wood-decay fungi that also can kill the inner bark (phloem) and cambium. Most canker-rot fungi enter stems through wounds and produce cankers by killing overlying bark tissues and decaying the wood underneath. After decaying the wood at the original wound, some canker rots form a mass of fungus tissue that spreads slowly through the bark and eventually kills the adjacent cambium and reinfecst the wood underneath. These cankers enlarge as this process is repeated.

*Inonotus glomeratus.* Formerly *Polyporus glomeratus,* this fungus causes a relatively common canker rot on sugar maple. It reportedly is the most important decay fungus of sugar maple in Ontario, accounting for up to 40 percent of volume losses. It also is found on red maple and beech.

Branch stubs and wounds are the primary entry points for infection. Once the decay is advanced in the stem, the fungus produces a sterile, thick mass of tissue that spreads over the wound area or around the branch stub. This soon
tums, Mack, crusty, and cracked. The canker is irregularly shaped and generally becomes elongate with raised margins.

Canker rots produce fertile fruiting bodies or conks only after the tree dies. Canker rots cannot be eliminated from the forest, but maintaining healthy and wound-free trees and removing infected ones should reduce the incidence of these diseases.

Decays of Stems and Roots

Internal decays of stems and roots are inconspicuous. They develop slowly in trees for several years before their presence can be detected. Once they become visible it is too late to prevent damage. Sometimes the first signs are conks on stems or roots. Sometimes decays are not noticed until groups of trees begin to die back. When this occurs, decay already is extensive within the stems or roots systems. Once trees are badly decayed, the only remedy is to remove them. Conducting forestry activities in ways that minimize the number and severity of wounds to residual trees is the primary means of preventing stem and root decays.

Stem Decay

Stem-decay fungi infect trees through dead branches, branch stubs, cankers, and other wounds that expose the wood. Spores of decay fungi are common and abundant in the forest. Once a decay fungus has successfully invaded a tree stem, its progress cannot be controlled. However, unless the fungus also attacks the roots, the growth rate of the tree will not be reduced noticeably. Only after the decay becomes extensive within the tree is the damage easily detected.

Decayed trees may break and fall, creating large openings in the stand canopy. Sugaring operations can be adversely affected when good sap-producing trees die prematurely due to stem breakage or extensive decay.

Some Common Decay Fungi

Ganoderma applanatum. Formerly Fomes applanatus, G. applanatum primarily affects living and dead aspen, basswood, beech, birch, cherry, elm, maple, oak, and poplar. Its common and easily recognized conk is semicircular or bracket-like, and has a woody texture (Fig. 88). A conk can live from 5 to 10 years. Each year it adds a new spore-producing layer over the previous one. The white surface of this layer and the new margin of growth visible on top of the conk contrast sharply with dark brown to gray older parts. When bruised or scratched, the white layer of this fungus immediately turns brown. Because of this, G. applanatum is known as the "artist's conk." Some conks may grow more than 3 feet (1 m) wide.

These conks dispense spores profusely from spring to fall. The spores are carried upward by air currents and sometimes form conspicuous brown deposits on or near the upper surfaces of the conks (Fig. 89). The relationship of tree wounds and infection by this fungus is well documented. By the time conks develop, the stem has extensive decay and is prone to break during a wind or ice storm.

Figure 88.—Conk of Ganoderma applanatum (artist's conk) on a sugar maple stem.

Figure 89.—The artist conk on a sugar maple log. Note the brown deposits of its spores on its top and on nearby leaves.
Oxyporus populinus. O. populinus, formerly Fomes connatus, is another major decayer of red and sugar maples. It is found primarily on ash, aspen, basswood, beech, birch, and elm. Like other decay organisms, infection occurs through wounds deep enough to expose the wood. The resulting decay seldom extends more than 3 feet (1 m) above or below the conks (Fig. 90). The conks often occur in clusters within old wounds, in cracks (Fig. 91), or at the centers of Eutypella (Fig. 83) or Nectria cankers. The irregularly shaped conks are white, spongy, shelf-like, and rarely larger than 6 inches (15 cm) in diameter. Typically, they have green moss growing on the upper surface (Figs 83, 92).

Fomes fomentarius. Fructing bodies of Fomes fomentarius, known as the “tinder conk,” can be found on sugar maple, but they are more common on birches and beech. They are perennial, woody, hoof-shaped, about 4 inches (10 cm) wide and relatively thick, and have a gray surface (Fig. 93). They are found on dead trees and on dead portions of living trees. Once the decay within a tree is extensive, the fungus produces conks on the stem in locations that bear no relationship to the presence of stem wounds.

Figure 90.—Split bolt of red maple showing part of a Oxyporus populinus conk (on left) with decay caused by this fungus extending above and below it.

Figure 91.—Fructing bodies of Oxyporus populinus in a crack on a sugar maple stem.

Figure 92.—Typical shelf-like conks of Oxyporus populinus, covered with green moss, on a sugar maple tree butt.
Climacodon septentrionalis, a conspicuous conk occasionally seen on maple. C. septentrionalis (formerly Steocherinum septentrionale) is a large, fleshy, creamy white fruiting body composed of a cluster of shelf-like projections placed one above the other (Fig. 94). The entire structure may be as much as 1 foot (30 cm) wide and 25 to 30 inches (60 to 75 cm) long. The fungus infects through wounds and cracks and less commonly through dead branches, causing a white spongy rot with characteristic black zone lines in the advanced decay. Decay in the tree is extensive by the time conks appear.

Laetiporus sulphureus. Another conspicuous fruiting body is produced by L. sulphureus (formerly Polyporus sulphureus). Clusters of shelf-like structures appear on infected trees in summer and early fall (Fig. 95). They are soft, fleshy, and bright sulfur-orange to salmon colored when fresh. Fruiting bodies can be 8 to 12 inches (20 to 30 cm) wide. This fungus causes one of the most important brown rots of maple, ash, beech, cherry, oak, and several other broad-leaved and coniferous trees. L. sulphureus decays roots, butts, and stems. It significantly reduces wood strength, rendering infected trees susceptible to breakage and windthrow. Infection sites for this fungus are not known.

Root and Butt Rots

Root and butt rot fungi can substantially reduce the growth of affected trees. The examples discussed here are the most important and common rots that affect sugar maple.