

# THE BARK BEETLES

By Douglas C. Allen

## IMPORTANCE

The bark beetle family Scolytidae (skol-lit-i-dee) is represented in North America by more than 500 species, among them some of our most important forest pests.

Forestowners should be concerned about scolytids; because nationwide, members of this family kill more trees than any other agent. Most especially, it is a handful of species associated with commercially valuable conifers (i.e., "softwoods" or cone-bearing trees) that pose serious economic threats. Pines, spruces and firs, for example, are highly susceptible once they are weakened by drought, defoliation, poor site conditions, physical damage, excessive crowding, or old age.

Many hardwoods also are host to bark beetles, but generally the latter are not as damaging as their conifer-feeding cousins. The European elm bark beetle is an exception, of course. This introduced pest, and the fungus that it carries, is responsible for the demise of one of our premier shade trees.

## APPEARANCE

Adults are 1/32 to 3/8 of an inch long (Fig. 1), and hard bodied. Depending on the species, they can be light tan, reddish brown or almost black. Beetles are found on or beneath the host bark.

The immature stage or larva is 1/5 of an inch or so long when fully grown, legless and distinctly segmented with a fleshy, whitish, elongate to slightly curved body (Fig. 2). The tan to brownish head has well developed chewing mouthparts. After the larva completes feeding it transforms into an immobile, nonfeeding stage called a pupa (pew-puh), which is whitish and resembles the adult in size and general appearance. It is during the pupal stage that adult characteristics are formed. Larvae and pupae occur only beneath the bark.

## LOCATION OF DAMAGE

Bark beetles are often referred to as innerbark insects, because the damaging life stages feed and burrow immediately beneath the host bark. Heavy infestations girdle the trunk and (or) branches of an infested tree by destroying important food conducting tissues and cells responsible for

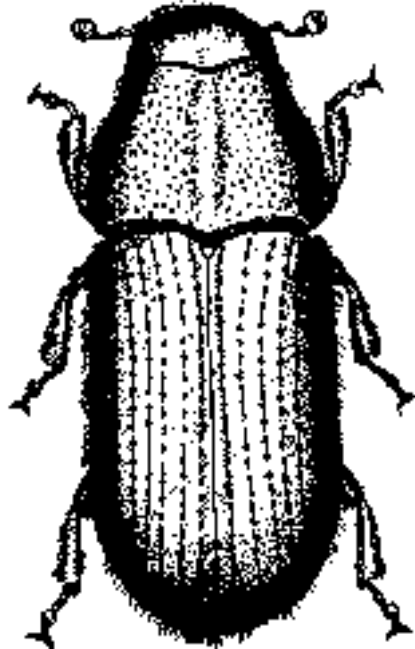


Figure 1. Top view of bark beetle.

growth. Innerbark borers do not excavate tunnels into the sapwood or heartwood of the host as do true wood borers. However, the galleries of some scolytids, collectively known as "engraver beetles," are etched on the surface of the sapwood (the area exposed when you peel bark off a log).

## ECOLOGICAL ROLE

These insects are considered secondary in an ecological sense, because generally they require a stressed or weakened host. Normally, they are unable to successfully attack a healthy individual, either because it is not chemically attractive to them or beetles are unable to overcome the defensive mechanisms of a vigorous tree. There

is an important exception to this behavior. Populations of some bark beetles, most especially those associated with conifers, may build to very high densities in stressed trees, slash or extensive blow downs. When a large number of adults emerge and seek another host to continue the life cycle, they may mass attack healthy trees and overcome the host's ability to produce abundant resin (pitch), the major line of defense. The first wave of beetles is killed by excessive resin flow as individuals attempt to penetrate the bark of a healthy tree, but siblings that follow can readily establish because the host is now stressed and resin flow is impeded.

Bark beetles play an important beneficial role in forest communities by breaking down dead and dying woody material, one of the initial steps in nutrient recycling. Their presence in standing trees signifies the occurrence of a stress or disturbance that predisposed the host to attack. More often than not, this predisposition is associated with human activity.

## HOST FINDING

Scolytids could put a blood hound to shame! The tiny beetles have evolved an incredibly sophisticated ability to detect chemical odors associated with a stressed host and to sense chemicals produced by host colonization. This powerful sense of "smell" is due to highly modified sensory cells in their antennae.

## SPECIES OF CONCERN IN NEW YORK

In our region, the most important species in this family are the pine engraver, *Ips pini*; eastern larch beetle, *Dendroctonus simplex*; red turpentine beetle,

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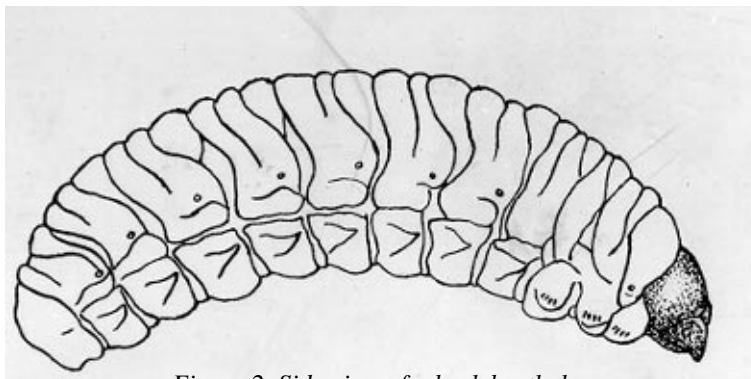


Figure 2. Side view of a bark beetle larva.



Figure 3. Pine bark with two pitch tubes; arrow designates an entrance hole.

*Dendroctonus valens*; and spruce beetle, *Dendroctonus rufipennis*. A newcomer that is gaining notoriety as a threat to the Christmas tree business is the introduced pine shoot beetle, *Tomicus piniperda*. Species of *Ips* (pronounces as “hips” without the h) are most often associated with severely stressed standing trees, trees that have been felled recently and freshly cut logs. Members of the genus *Dendroctonus* (Den-drock-toe-nus), literally meaning “killer of trees”, generally are found in standing trees. *Tomicus* breeds in newly cut pine logs and stumps. When adults emerge in the spring, they damage Christmas trees by boring into, and killing, the tips of lateral shoots

#### DETECTION

The first evidence of bark beetle activity is the appearance of very fine, almost powdery, reddish brown boring “dust”. This material is produced as adults burrow through host bark. Borings accumulate in bark crevices or at the base of standing trees immediately below each entrance hole. On

downed logs or branches, it collects in small piles on the ground and may also coat areas of bark.

The next sign of activity in a needle-bearing host appears shortly after beetles penetrate the bark of a live tree and, in the process, sever resin canals. The sticky resin, commonly referred to as “pine pitch” or “spruce gum”, flows out the entrance hole and eventually accumulates as a hardened mass attached to the bark around the opening (Fig. 3, whitish mass beneath arrow). Species that periodically sweep their egg galleries clean of borings must extend the entrance hole to the outside of this mass (Fig. 3, see arrow). A mass of hardened pitch with a hole in the center is referred to as a “pitch tube”. Once the adult is beneath the bark, he or she (depending on the species) excavates a brood gallery (Fig. 4,A) where eventually eggs are deposited.

Shortly after eggs hatch in the brood gallery, larvae begin feeding in the innerbark, on the same plane as the brood gallery but moving away from it (Fig. 4,B). The combined damage that results when many brood and larval galleries coalesce eventually destroys so much innerbark tissue that foliage becomes discolored. Reddish-brown or “fading” foliage and the presence of entrance holes, dust and (or) resin is clear evidence of a bark beetle attack.

#### WHAT TO DO?

The best hedge against a bark beetle problem in conifer stands is prevention through maintenance of tree and stand vigor:

- i) Plant species on sites to which they are well adapted (consider soil, aspect, elevation, geographic location, etc.);
- ii) Thin stands at appropriate times in their development to avoid excessive competition for growing space;
- iii) When doing stand improvement work or prescribed thinnings, avoid a large buildup of slash that may serve as breeding material;
- iv) During silvicultural operations, take care to minimize physical damage to the residual stand;

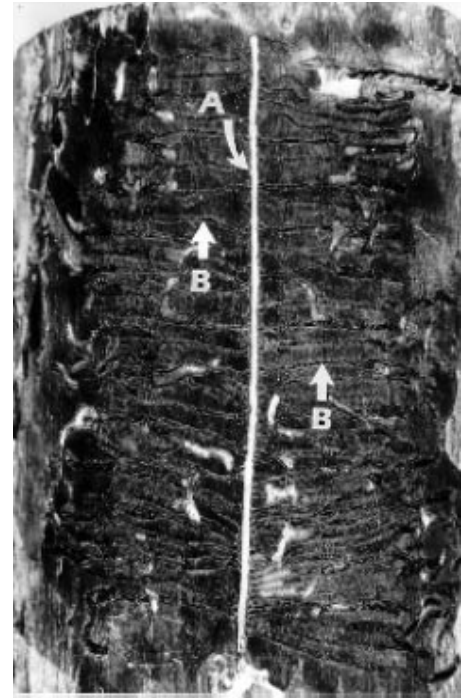


Figure 4. Bark beetle galleries in inner bark; A - brood or egg gallery (white vertical line) made by adult, B - two of several larval galleries perpendicular to the egg gallery.

v) Remove trees heavily damaged by severe weather such as ice, lightning or high winds.

If one of your objectives is to manage pine or spruce for sawtimber, trees or freshly cut logs that are infested with bark beetles should be processed and dried as quickly as possible. Bark beetles introduce many different microorganisms into infested material. One group, the blue stain fungi, rapidly discolors wood and this may result in serious grade loss.

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