

THE TWOLINED CHESTNUT BORER

—*nemesis of weakened oaks*

By Douglas C. Allen

In the early 1900s when American chestnut was still a widespread and valuable component of eastern hardwood forests, this inner bark borer attracted the attention of forest owners because of its association with trees infected with chestnut blight. With the demise of chestnut, the beetle gained even more notoriety due to its affinity for oaks stressed by gypsy moth defoliation.

Twolined chestnut borer belongs to a unique group (the genus *Agrilus*; ah-grii-luss) within a family of insects known as metallic beetles or metallic wood borers. These common names refer to the shiny appearance or metallic sheen typical of most adults. Another frequently used common name for this family is flatheaded borer, which refers to the appearance of the larval stage.

Many species of *Agrilus* occur throughout the United States, but two stand out as major tree pests in the northeast; twolined chestnut borer (*A. bilineatus*) and bronze birch borer (*A. anxius*). Both species are "secondary" in that they successfully attack only stressed or low vigor hosts. For birches, the predisposing stress often is drought, high aphid populations, repeated defoliation by birch leaf miner, or a combination of these events.

Drought also plays a major role in the susceptibility of oaks, especially chestnut and white oaks, to the twolined chestnut borer. However, defoliation of oak by gypsy moth is the most significant source of stress that sets the stage for infestations of this beetle.

APPEARANCE

Adults are dark colored and 0.2 to 0.5" long with two light brown to golden, longitudinal stripes on the back (Fig. 1). The immature stages (larvae) are legless, distinctly segmented, and off-white to yellowish with a head that is only slightly flattened compared to larvae of other metallic beetles. The full grown larva (Fig. 2) is approximately 1" long and its last body segment has a pair of dark brown hook-like structures. The slightly flattened head and presence of terminal hooks separate members of *Agrilus* from other flatheaded bor-

ers, which lack these hooks and have distinctly flatter heads.

DAMAGE

The larval stages damage oaks by feeding on the inner bark and, to some degree, the outer sapwood. Feeding by large numbers of the worm-like larvae (lar-vee) essentially girdles the host. The damage is



Fig. 1. Adult of twolined chestnut borer.

similar to that caused by true bark beetles. Usually it takes two to three years of successive attacks to kill the host.

EVIDENCE OF ATTACK

The first symptom of an *Agrilus* attack occurs in mid- to late summer when foliage wilts and eventually turns brown. Wilted foliage usually remains attached to the tree for several weeks before dropping.

At this time, the bark of infested branches or areas of the tree trunk that have been invaded by the borer show little evidence of damage, because entrance holes are very

small and the insect does not push frass (a mixture of fecal matter and wood chips) to the outside. Instead, this material is packed behind each larva in the narrow, winding galleries that result from feeding (Fig. 3).

BIOLOGY

When each larva completes feeding, usually in one year, it prepares an overwintering cell in the inner bark region and with the arrival of spring transforms into an adult. Beetles exit the host through a characteristic "D"-shaped emergence hole approximately 0.2" wide. They are active throughout much of the summer. Females deposit eggs in bark cracks, and when eggs hatch the young larvae immediately enter the inner bark. Research suggests that beetles locate suitable hosts because the latter give off an odor which is different from that of a healthy tree.

MANAGEMENT

Under most conditions, inner bark feeding insects such as species of *Agrilus* are difficult and impractical to control with insecticides. Preventative methods aimed at maintaining tree vigor are the key to minimizing damage. Strategies include such things as encouraging or placing a tree species on a site to which it is well adapted (soil, aspect, available moisture), preventing physical damage to the trunk and roots, applying insecticides (chemical or biological, if the latter is available) to minimize the effects of defoliation, and watering ornamentals and shade trees when soil conditions become unusually dry. Overstocked oak stands should be thinned at appropriate times to enhance the vigor of the remaining trees.

Nothing can be done to ameliorate drought conditions in forested situations, but appropriate monitoring will help to determine extent and frequency of significant defoliation. As a guide, if a stand of oak has been heavily defoliated (e.g., 70% or more of foliage consumed) for one year and indications are that there is likely to be a

(Cont'd)

6 a second consecutive year of similar damage, a concerned landowner should consider protecting foliage. Following two or more years of heavy defoliation, oaks (especially white and chestnut) usually are susceptible to attack by twolined chestnut borer. ▲

This is the 34th in the series of articles contributed by Dr. Allen, Professor of Entomology at SUNY-ESF.

NYFOA has prepared: 1) a book of these articles suitable (digitized @600dpi; updated annually) for reproduction and distribution by institutions and others (\$25-mailed); 2) photocopies suitable for individual use (\$6-mailed.) Contact the editor or NYFOA's toll free number, 1-800-836-3566.

Fig. 3. Gallery pattern (dark lines) on the surface of oak sapwood. The bark has been removed (Below).

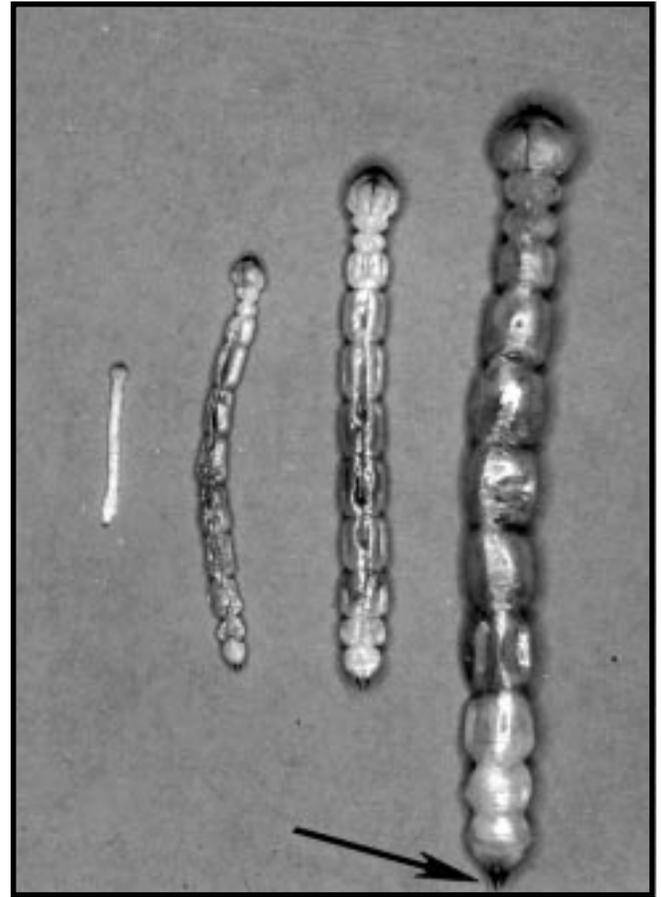


Fig. 2. Larval stages of twolined chestnut borer (Above). Arrow indicates hook-like structures of the mature larva.