Elm Spanworm

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The elm spanworm, *Ennomos subsignarius* (Hübner), is a native insect that has intermittently caused serious damage to trees in the United States and Canada for over a century. The spanworm attacks a wide variety of plants, including forest, shade, and fruit trees. It causes severe defoliation in hardwood forests. There have been at least 20 major outbreaks in eastern North America.

Distribution

The elm spanworm occurs throughout most of the eastern half of the United States and a large area in southeastern and south Central Canada (fig. 1). It has been recorded as far north as Nova Scotia, as far south as mid-Florida, and as far west as Texas and Saskatchewan. Spanworn populations in an area are often marked by sudden increases separated by long intervals of sparse population.

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Description of Stages

The eggs are about 1/25 inch long and are bright olive green when laid. As winter approaches, they darken and often attain a bronze hue or a grayish cast. The eggs are laid in compact masses of 1 to 250 (fig. 2).

The mature spanworm larva is a smooth, twiglike caterpillar, slightly more than 2 inches long. The body coloration is variable and apparently depends upon the extent to which developing insects are crowded together. During severe outbreaks when populations are large, the elm spanworms are a dull slate black with a bright rusty head capsule. Less common, but usually present in small numbers, are caterpillars that are uniformly green or yellow or mottled brown, tan, and rose.

The pupa is oval and about 0.6 inch long. At its tapered end is a cluster of hooklets. These secure the pupa to silk strands attached to a branch or partially eaten leaf while it changes to a moth. Pupal coloration varies from a pale yellow to a dark brown heavily

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Revised March 1971

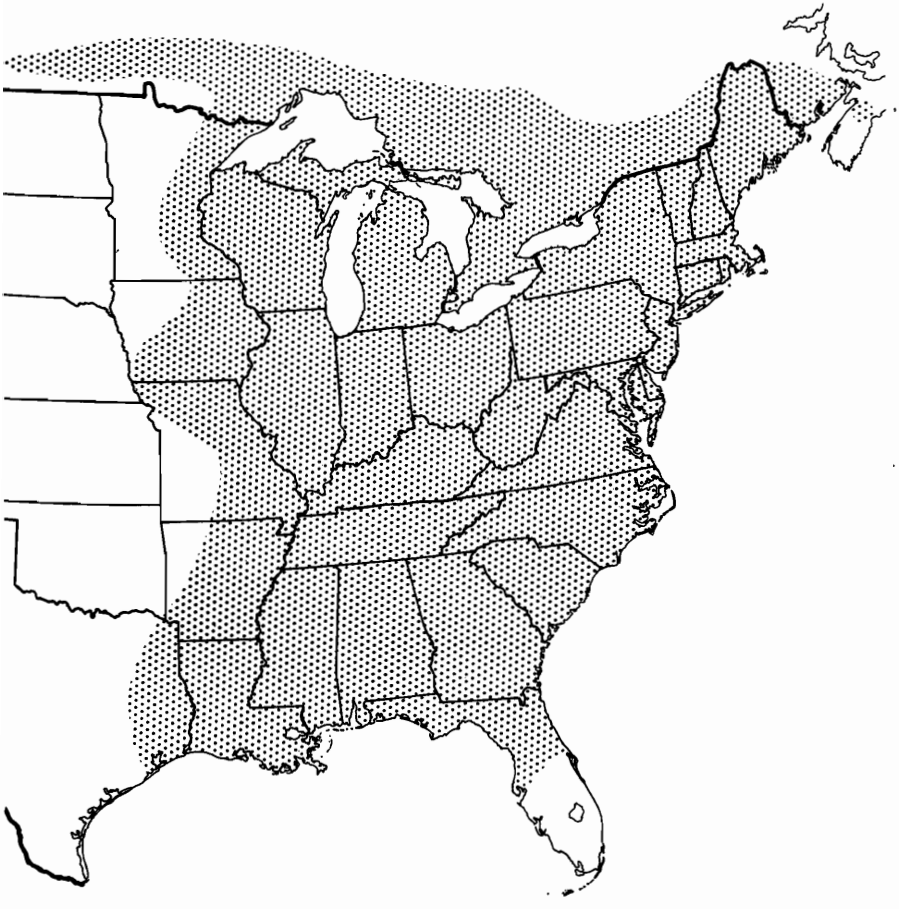

Figure 1.—Generalized geographic distribution of the elm spanworm.

speckled with pepperlike spots.

The adult of each sex is a powdery white moth with a light tan spot in the central area on the underside of each wing. A male moth can be immediately distinguished from a female by its feathery antennae; antennae of the female are beaded and straight. Although only slightly larger than the male, the female has a decidedly stockier abdomen. The total wingspan of the adult is about 1¼ to 1½ inches.

Life History and Habits

The overwintering eggs begin to hatch with the onset of warmer weather in early spring. This occurs in the southern Appalachians toward the end of April and in the Northeast during mid-May or even in early June. The newly hatched "loopers" start feeding on the tender foliage almost immediately. During this time they are sometimes windborne for considerable distances on fine, silken threads. This may be an impor-

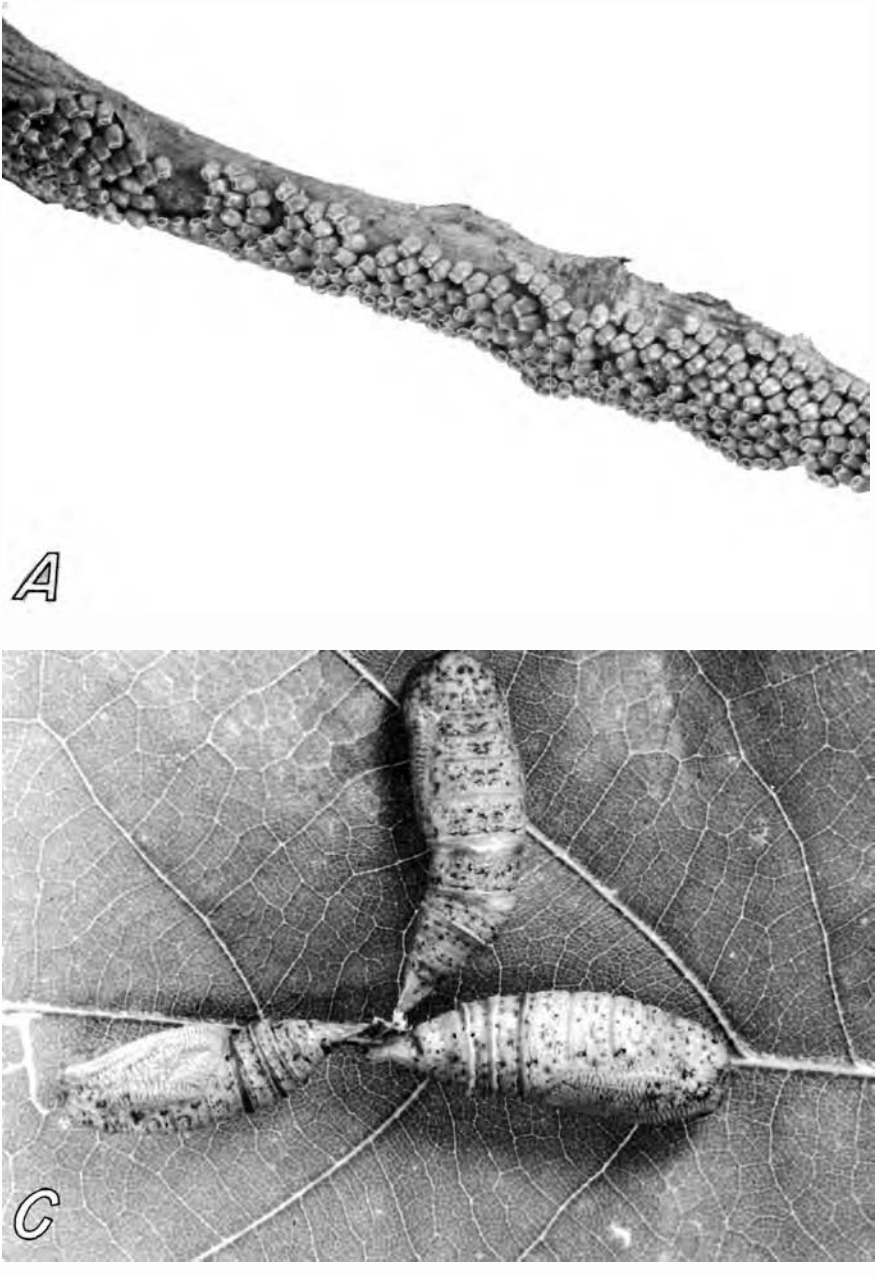

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Figure 2a.—Stages of the elm spanworm; *A*, egg mass; *B*, larvae.

tant means of distributing the spanworm.

As feeding continues, the larva rapidly increases in size and defoliation accelerates. There are normally only five instars. Occa-

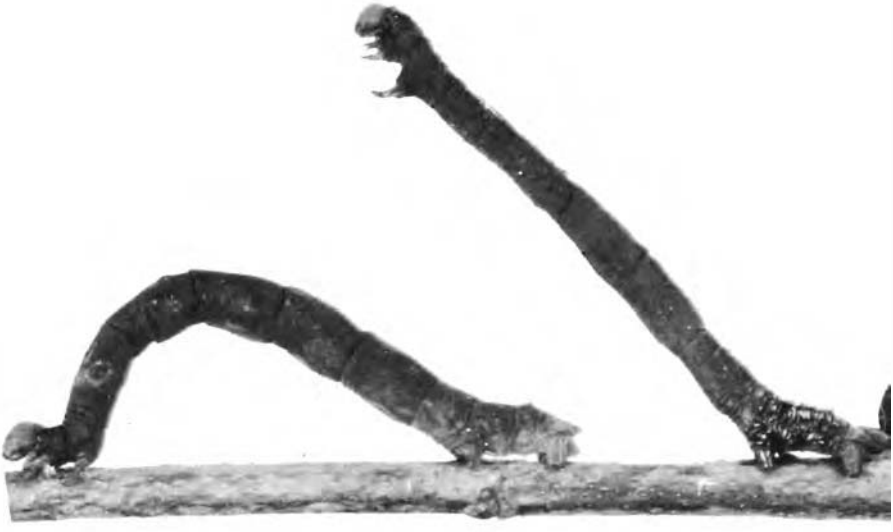

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Figure 2b.—Stages cont'd.: *C*, pupae; *D*, female (left) and male (right).

sionally an additional instar may occur, particuarly among spanworms that become females in the adult stage. The period between successive molts is approximately 5 to 10 days. During the final two

instars, defoliation is greatest and the dropping of frass often becomes distinctly audible.

Spanworm larvae are most active on warm, cloudless days. During the feeding period considerable migration takes place through intersecting tree canopies and by means of threads suspended from leaves or branches. Migration also takes place on the ground. The larvae are gregarious, and dense populations soon center on favored host species. In heavy infestations, however, the larvae quickly spread onto practically all vegetation, stripping the timber and many understory plants as well.

When feeding is completed, the spanworm forms a coarse, netlike cocoon of silken threads. The cocoons are usually found on partially consumed leaves, where 1 to 10 spanworms may pupate. Larvae on totally denuded trees pupate on exposed branch tips or in leaf axils or drop to the undergrowth. Other suitable pupation sites are bark crevices and old stumps.

After a pupal stage of about 10 days, the adults emerge. Mating soon follows, and the female deposits her eggs in tight, irregular masses on the undersides of branches. Shortly after laying her eggs, the female moth dies.

The moths are nocturnal and, superficially, do not appear to be strong fliers. However, during many summer evenings moths in country areas are attracted to the glow of light from distant towns and cities. In towns situated near heavy infestations, mass flights following periods of peak emergence are responsible for occasional so-called midsummer "snow showers." Practically all the moths comprising these flights are males.

Host Trees

Elm spanworm caterpillars feed on the foliage of a great variety of trees and shrubs. Although marked feeding preferences are usually apparent, nearly all hardwoods except yellow-poplar are subject to intensive attacks in areas of high larval concentration. Some common trees and shrubs may be arranged into four categories of preference by the spanworm:

1. *Highly favored—attacked in most infestations:* ash, hickory, walnut.

2. *Favored—variably attacked; defoliation from 0 to 100 percent:* basswood, beech, buckeye, cherry, chestnut, cottonwood, dogwood, elm, hophornbeam, hornbeam, locust, maple, oak, sweetgum, tupelo, willow.

3. *Less favored—attacked only in severe infestations by mature larvae*: ailanthus, catalpa, kalmia, mulberry, rhododendron, sassafras, sycamore.

4. *Unfavored—rarely attacked:* yellow-poplar.

Damage

Severe infestations of the elm spanworm have occurred in cities located near sea level and in hardwood swamps. Typically, however, the most intensive feeding takes

place on the wooded ridgetops of mountainous areas.

The spanworm is capable of defoliating vast areas of mixed hardwood forest within a relatively short time. Normally, stripped trees will refoliate later in the year. Radial growth loss may be evident after an initial defoliation by the spanworm. Limb dieback and, ultimately, timber mortality often follow two or more successive summers of defoliation. Trees weakened from spanworm attack—oaks in particular—are subject to attack by other insects, such as the two-lined chestnut borer, *Agrilus bilineatus* (Weber). Such secondary attacks result in widespread host mortality. Periodically the spanworm causes serious damage to apple crops and seriously weakens valuable shade trees.

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Figure 3.—Calosoma beetle capturing a spanworm larva.

Natural Control

More than 40 different parasites and predators are known to attack spanworm larvae, pupae, and adults. These natural enemies include such diverse groups as wasps, parasitic flies, birds, spiders, piercing and sucking bugs, and ground beetles (fig. 3). Their combined effect is usually less important in preventing outbreaks than in modifying the intensity of an infestation.

Potentially more significant as a control factor under forest conditions is a minute flylike insect, *Telenomus alsophilae* Vier., which parasitizes overwintering spanworm eggs in the early spring. When these parasites are abundant, they can contribute substantially to the decline of existing epidemics. Adverse weather in early spring, when larvae normally begin to hatch, may complement the beneficial influence of egg parasites.

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☆U.S. GOVERNMENT PRINTING OFFICE: 1971 O—411–334

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