

By Douglas C. Allen

One of the most fascinating habits displayed by insects is the adaptation many species have made to life within a leaf. Leaf mining occurs in all four of the largest and most evolutionarily advanced insect groups; moths and butterflies, beetles, flies, and wasps. Presumably, this behavior offers some protection from natural enemies, provides a degree of stability in terms of temperature and moisture



Fig. 1. This cartoon illustrates the feeding behavior of leafminers.

conditions in the insects' immediate environment and assures a readily accessible supply of food.

What is a leafminer? - This term is used in reference to any species of insect whose larva (the immature stage that feeds) spends its life between the epidermal or outer layers of a leaf (Fig. 1). Leafminers can be found on most woody plants and many spe-

Fig. 2. Light brown areas indicate parts of needles mined by lodgepole needleminer.



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cies of herbaceous vegetation. The larval stage of several defoliators that feed on broadleaved or needle-bearing trees may begin life as a leafminer, but eventually they vacate the mine and feed in a more typical manner exposed on the surface or margin of the leaf. For example, when young caterpillars of the infamous spruce budworm emerge from their overwintering site, they may begin feeding by mining one or two host needles if buds are too hard to penetrate. In this case, the young caterpillar is a true leafminer for only a short time; older caterpillars are more typical leaf feeders.



Fig. 3. Black locust foliage with blotches caused by locust leafminer.

Leafminer biology - Leafminers generally deposit their eggs in or on suitable foliage and upon hatching the young larvae (lar-vee) bore into the leaf. When feeding is complete, the insect transforms into an adult within the leaf, or it may vacate the leaf and undergo this change in the soil or litter beneath the host plant, depending on the species of leafminer. For example, both the lodgepole needleminer (Fig. 2) and locust leafminer (Fig. 3) complete development through their adult stage (moth and

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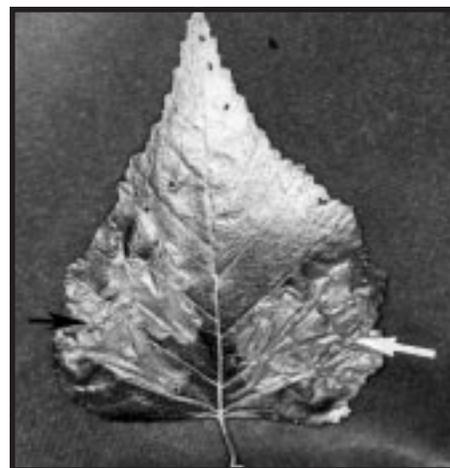
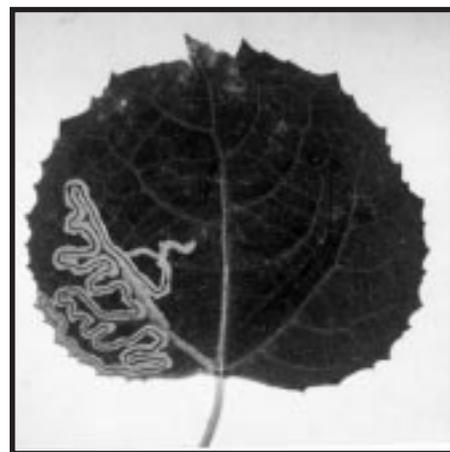


Fig. 4. Birch leafminer. Arrows indicate brownish, blister-like mines.

beetle, respectively) within the leaf, but mature larvae of the birch leafminer (Fig. 4) abandon leaves and wasps are formed in the soil beneath the host.

Appearance - The size, pattern and location of a leaf mine are usually very useful diagnostic characters for identifying leafminers. Typically, mines are blotch-like, linear or appear as blisters (Figs. 2-5). The mined area of a leaf is usually a shade of brown and translucent when held to the light, because all of the chlorophyll bearing tissue at that spot has been consumed by the insect. The thin skin or epidermis of a leaf does not contain this substance. **Cont'd**

Fig. 5. A linear leafminer on aspen. Black stripe in center of mine is fecal material.



80 The adult, be it a moth, beetle, fly, or wasp, is tiny and rarely seen. Larvae are especially modified to live and feed in a confined space. Most are distinctly flattened, legless and their chewing mouthparts are projected forward rather than downward to facilitate feeding in their confined habitat.

Importance - Usually, leafminers are merely curiosities and should be of little concern to the forest owner. However, the feeding damage can attract much attention because of the conspicuous discoloration and, in rare instances of very heavy damage, premature leaf fall. Birch leafminer (*Fig. 4*) often is a serious pest of both or-

namental and wild birch, because high populations may weaken the host and make it susceptible to more damaging insects. An infestation of locust leafminer (*Fig. 3*) can significantly discolor foliage of black locust, but generally trees recover. Outbreaks of the lodgepole needleminer (*Fig. 2*), on the other hand, last for many years and are capable of killing lodgepole pine over large areas of the western United States and Canada.

In addition to black locust, several other trees that occur in New York are frequently infested with leafminers; for example, sugar maple, oaks, aspen, cherry, basswood, white cedar, hemlock, and spruces.

Oak especially is subject to outbreaks resulting in extensive discoloration and untimely loss of foliage.

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