

# GALL MAKING INSECTS

## unsightly, yet ingenious

By Douglas Allen

Every kind of tree and many other types of vegetation are host to insects or mites that cause abnormal, often bizarre looking, growths called galls. All plant parts are susceptible, but generally each gall maker restricts its activity to one type of substrate: a leaf, twig, bud, root, or stem. Not only is the location of a gall consistent for a given species of gall maker, but the size, shape and color of the gall also are remarkably similar from one generation to the next.

### WHAT IS A GALL?

Insects and mites have the ability to initiate gall formation as a consequence of their feeding or egg laying activities. The mechanisms responsible for this abnormal growth are not completely understood, but evidence indicates that both the parasite and the host plant probably play a roll. Gall formers, for example, inject chemical substances into the host during the process of egg laying, or via their saliva when feeding. These chemicals stimulate the plant to produce unusually large cells and (or) an unusual number of cells. Simultaneously, the plant may transport chemicals of its own to the feeding site in an attempt to wall off the injured area or to neutralize the introduced toxicants. The abnormal growth of plant tissue that results (i.e., the gall) provides a relatively stable habitat for the parasite. It produces a reliable source of food, affords protection from many natural enemies and acts as a buffer against adverse weather. In short, this parasitic relationship between insect (or mite) and plant is another example of ingenious adaptations found in the world of insects!

### ORGANISMS RESPONSIBLE

Most of the known gall makers belong to a small group of mites and six groups of insects: moths, beetles, wasps, flies, aphids, and adelgids (*ah-dell-gids* are related to aphids).

Additionally, some species of nematodes, bacteria, fungi, viruses, and a few parasitic plants (mistletoes) are able to stimulate gall formation.

### HOW INJURIOUS ARE GALLS?

As with any insect, whether or not a gall maker attains pest status is determined largely by landowner objectives. Certainly under forest conditions, most galls amount to little more than curiosities. On ornamental plants, shade trees and situations where trees are intensively managed, such as in nurseries or Christmas tree plantations, however, infestations may be severe enough to change the desired appearance of a tree (color, form) or to reduce growth (height, diameter). Host mortality is rare.

### CONTROL

Synthetic organic chemicals are available where large-scale control is desired. Timing the application of a contact insecticide is important, because generally there is only a narrow window of opportunity when an accessible life stage is present. For example, adults of the balsam gall midge are susceptible to treatment (i.e., exposed, not yet within the gall) only in late May or early June. A contact material can be applied effectively against a stage of the Cooley spruce gall adelgid only in late April to early May.

Whenever dormant oils are approved for use, the window of opportunity widens. These high grade oils are applied when the host plant is dormant to avoid phytotoxic effects. They are physical poisons that encase each insect in a fine film of oil and impair their respiratory apparatus. The result is suffocation.

Systemic insecticides are available for certain gall makers, such as the balsam gall midge. Systemics are synthetic organic chemicals that do not kill on contact but are absorbed by plant foliage and (or) roots and act as stomach poisons when ingested by the gall maker feeding on host sap or tissues.

Certain types of gall damage can be managed by conscientious mechanical control. Removing and destruction of galls made by Cooley and eastern spruce gall adelgids at the right time of year (when galls are greenish and still contain the pest),

for example, is an effective way to minimize damage to small ornamentals. After the galls turn brown, their removal may improve tree appearance, but because the insects have vacated the gall this treatment has little effect on the infestation per se.

### SOME EXAMPLES

Two species familiar to most people are the Cooley spruce gall and eastern spruce gall adelgids. The former creates a banana-shaped structure that encompasses the entire current year's shoot (Fig. 1), a gall of the latter looks more like a pineapple and is restricted to the base of the current twig (Fig. 2). Cooley spruce gall adelgids are found only on blue spruce. The eastern spruce adelgid prefers Norway spruce, but will infest red, white and blue spruces as well.

The gouty vein midge (a small fly) causes pouch-like swellings along a major vein on the underside of a sugar maple leaf (Fig. 3).

The spindle-like structures that commonly appear on the upper surface of maple and cherry leaves (Fig. 4) are created by mites that enter from the underside of the leaf.

Gall wasps are responsible for an amazing variety of abnormalities, most especially on oaks (Fig. 5). Recently, a gall wasp that infests the branches of black oak has been associated with extensive, unsightly damage to trees on Long Island (Fig. 6).

The author thanks Carolyn Pike for the photograph in Figure 6. ▲

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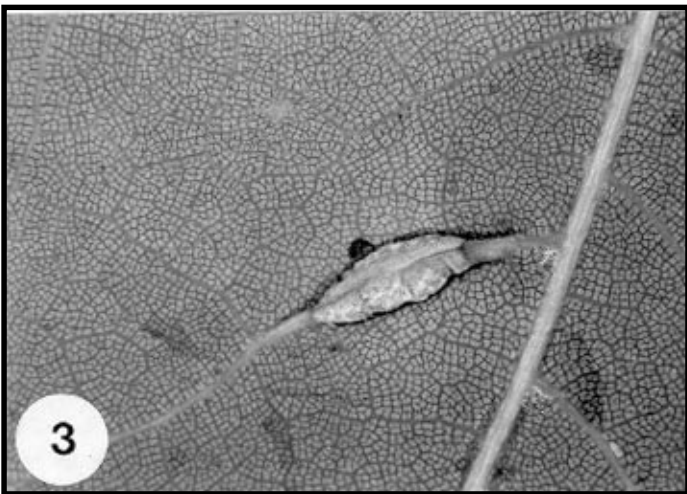
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*Cooley spruce gall adelgid.*



*Eastern spruce gall adelgid.*



*Gouty vein gall midge on the underside of a maple leaf.*



*Bladder mite on top of a maple leaf.*



*An oak twig gall.*



*Gall damage to black oak twig.*