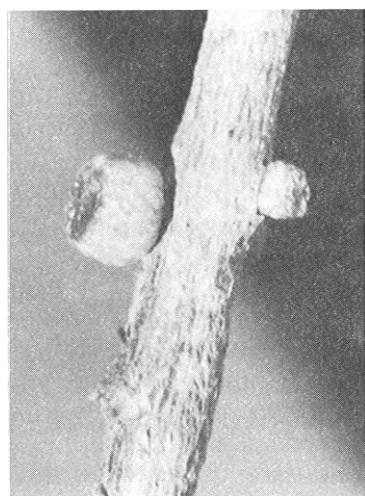


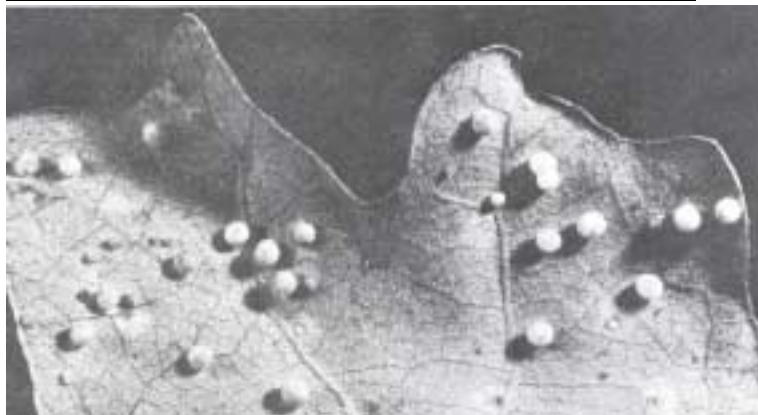
"Oak apples" induced by the gallwasp *Andricus californicus*. This is the largest insect caused gall found in California and occurs commonly on valley oak.



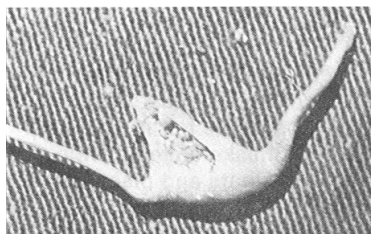
Several kinds of insects and their relatives, the mites, cause curious swellings on plants called galls. They are common on oak, willow, poplar, rose and many other plants grown in California. The native oaks support far more different types of galls - more than 100 - than any other plants. No part of an oak is free from infestation - galls may be found on leaves, flowers, buds, twigs, branches, roots and even acorns. However, much remains to be discovered about galls and gallmakers, for this area of biology has received relatively little study.



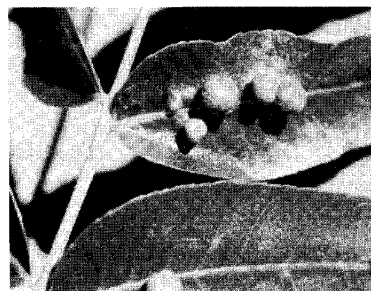
GALLS ON PLANTS CAUSED BY INSECTS



"Jumping oak galls" formed by the gallwasp *Neuroteras Saltatorius*. After falling to the ground, these pinhead-sized galls jump about for several days.



← A petiole gall on Lombardy poplar formed by the aphid *Pemphigus bursarius*. The gall has been cut open to show the aphid colony inside.



Insects and Mites That Form Galls

The most common gallmakers are tiny, dark wasps called cynipids or gallwasps. The larvae of certain moths, beetles, flies and a few other insects also form galls. Eriophyid mites, microscopic wormlike animals, are gallmakers on some kinds of vegetation.

How Galls Are Formed

Galls consist only of plant tissue. In most cases, normal plant cells have been stimulated to multiply at an unusually high rate by the activity of a gallmaker. To successfully form a gall the insect or mite must begin its attack at a very precise moment in the plant's growth cycle.

A gallwasp initiates the process by piercing a selected plant part

↑ Walnut purse galls are caused by an eriophyid mite

← Twig galls caused by the gallwasp *Disholcaspis washingtonensis*. These occur on many trees of the white oak Group and exude a sweet sticky material that is collected by honeybees.



↑Gallwasps clustering about the opening buds of valley oak.
 ↑Stem gall on ceanothus caused by the larva of the moth *Periploca ceanothiella*.
 ↑A Large gall on twig of poplar caused by the poplar bud gall Mite, an eriophyid mite
 ↑Galls on the leaves of manzanita formed by the aphid *tamalia coweni*.



Galls on a branch of a pyracantha shrub → caused by the woolly apple aphid *Eriosoma lanigerum*. This aphid also forms similar galls on the roots.



with its egg-laying device and depositing an egg inside the plant tissue. Fluids deposited with the - egg cause the plant cell multiplication process to begin. The larvae that hatches from the egg produces additional substances that maintain and control cell division. The larva develops within a cavity inside the gall, feeding on material produced on the cavity lining. At maturity, it transforms into a pupa, and later it becomes an adult that chews its way out of the gall. By causing the plant to form a gall, the gallmaker has pro

vided food and shelter for its offspring. Certain less specialized insects cause galls by folding over a leaf margin or otherwise distorting vegetation to form an enclosed habitat in which to live and feed.

Each gallmaker forms a gall of a particular size, shape and color; no other species forms one quite like it. Gallmakers are specific about the plants and plant parts they attack. One that forms a gall on a tree of the white oak group (for example, valley oak or blue oak) will not infest a member of the black oak group. The same kind of gall that is formed on a leaf would never be found on a twig. Some galls contain more than a single immature gallmaker, but usually each lives within its own cavity.

Gall Invaders
 A variety of other insects inhabit or invade galls during or after the residency of the gallmaker. Some are parasites of the gallmakers. Others utilize fleshy galls as a food source or scavenge on materials left behind by other inhabitants or intruders.

Few Galls Are Harmful
 Most insect- or mite-caused galls in California are not harmful to the plant. Several cause a scorching or spotting of leaves and a few result in the death of twigs they infest. In nearly all cases prevention of gall formation is exceedingly difficult and is not considered practical. For many insect and mite species that cause galls, means of prevention or control are unknown.

For Additional Reading About Galls
 Russo, Ronald A. 1979. Plant Galls of the California Region. The Boxwood Press, 183 Ocean View Boulevard, Pacific Grove, CA 93950. 203 pages.

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