ENTOMOLOGY NOTES

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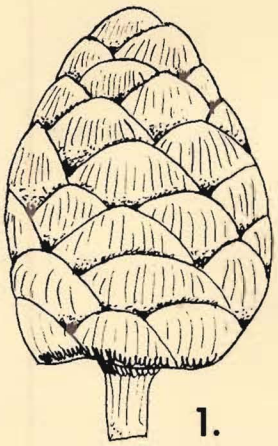
Insect Galls

Have you ever seen a pine cone growing on a willow tree? "But, pine cones don't grow on willow trees," you say! Well you're right, but some kinds of willows sometimes have cone-like growths on them that are so similar to the cones of pine that even beginning college forestry and botany students often misidentify specimens brought to them. This unusual growth on willow is called a gall and produced by an insect many times smaller than the gall.

There are thousands of kinds of galls on nearly as many kinds of plants. Besides insects, some mites, roundworms, and disease organisms also make galls. Each gall is distinct from the other; its form and size depending upon the kind of plant, the type of gall-maker and where it makes its home on the plant. Galls can be collected and observed directly or even subjected to experiments.



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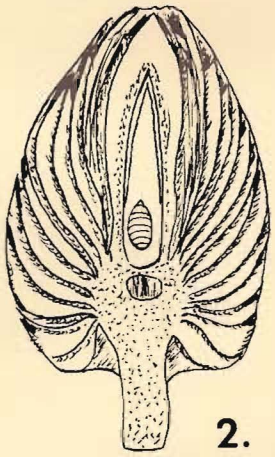

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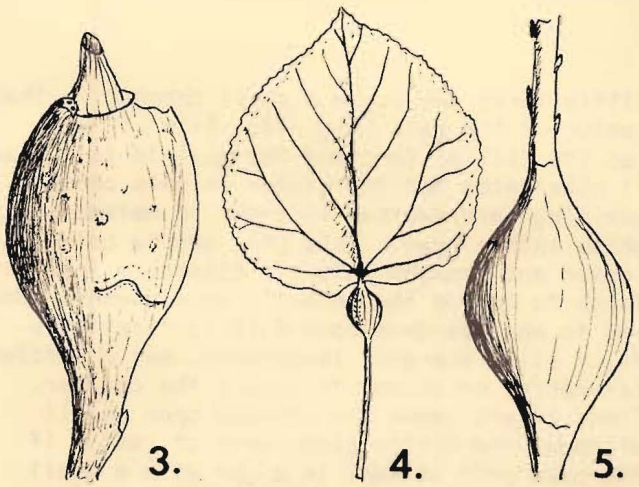
The pine cone willow gall (Fig. 1)--the one that so closely resembles a cone--is made by the larva of a small mosquito-like fly called a gall gnat. The larva contains a powerful growth substance, which when released makes the willow stem grow abnormally, but in a way to fit its needs. By releasing this chemical at the correct time the young gnat prevents the stem from elongating and causes the immature leaves to broaden and harden in the shape of scales on a cone. The little larva dwells in a small chamber in the center of the gall (Fig. 2). After it has had its fill of food and the gall is full size, it hibernates for the winter in this chamber awaiting warm weather in order to metamorphose into a gnat. This gall can be collected and brought into the classroom in early March to follow the insect's development. One way to observe development is to first carefully slice the gall lengthwise, but a little off-center so as not to injure the chamber. Then, if you tease the chamber open you'll discover the little pink larva at rest. If the open gall is kept in a jar with a small wad of wet cotton the insect will transform into a pupa within a few days, and then change again into the little gnat-fly a week or so later. Another interesting way to observe its behavior is to attach one or more whole galls by their bases to a piece of cardboard or styrofoam with straight pins and place them in a jar with moist cotton. Within a week or two you will see a pupa poke its head out of the top of each gall. Minutes after this the pupal skin splits and the delicate mosquito-like gnat breaks out leaving the skin stuck in the gall.

Don't be surprised if small wasp-like or other kinds of insects emerge from the gall instead of, or along with, the gall gnat. The wasp-like insects are called insect parasites, or more correctly parasitoids, and make their living by eating the gall gnat. Other insects that appear are gall "guests" or inquilines--ones that have taken up residence under the scales and feed upon the gall tissues. Normally they do not bother the gnat.

You can easily find several other kinds of galls on willow and on many other plants too. The willow beaked gall (Fig. 3) which is also made by a gall gnat is reddish and resembles a tiny pointed apple. Aspen has interesting galls on the swollen leaf stems which are made by aphids (Fig. 4). A round hard gall made by a fly is common on goldenrod (Fig. 5). Gall-makers include several groups of insects such as flies, beetles, moths, aphids, and wasps as well as non-insect organisms such as mites, nematodes and

fungi.

The more serious investigator will want to start a gall collection. Innumerable variation occurs and galls are attractive and worth collecting for their own sake. E. P. Felt, a renouned expert on galls, refering to their beauty, once stated "...the fresh well developed creamy-white, pink spotted gall of the wool sower is one of the most beautiful of natural objects, while the delicately colored cypress 'flower galls'...suggest an attractive spray of dainty flowers".



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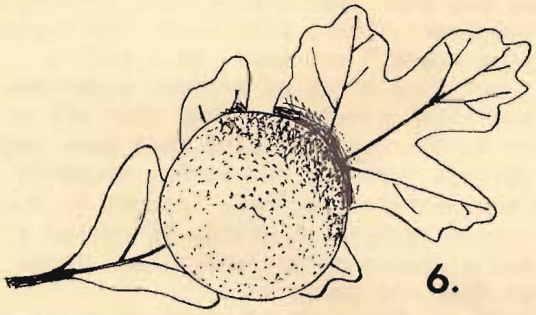
Collecting galls is easy. Galls are found all year long and those with woody tissues such as those on stems require no preparation other than labeling and displaying them. Soft-galls from buds, leaves, and fruit require some preservation. Most of the leaf galls will remain intact if pressed between newspapers until dry. Large galls should be slipped into a large envelope and allowed to dry. Very soft galls should as a rule be kept in 70 percent alcohol or other preservative to maintain their shape.

Where do you find galls? On every kind of plant--on leaves, stems, roots, buds, and flowers. Oak trees are excellent hunting grounds for the serious collector to start as oak has more kinds of galls than any other plant. The oak apple gall (Fig. 6) which develops on a leaf is a most fascinating object. This gall often is two inches or more in diameter, yet its maker--a tiny gall wasp --is less than 1/8 inch long. Many oak galls of interest have picturesque names such as *bullet, club, bunch, gouty, noxious, potato,* and *hedgehog.*



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If you think you're interested in galls go out and find a few. Cut a few open and see what's inside. Rear some to watch their habits and to see what insects will emerge. You'll find this an enlightening pastime. A good reference to help identify your galls is "Plant Galls and Gall Makers" by E. P. Felt.

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