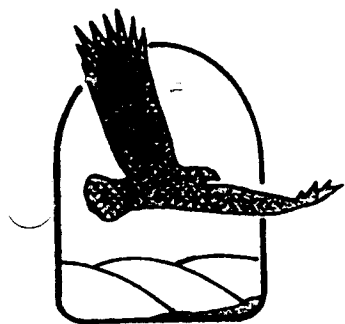




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PLANT GALLS of the SANTA YNEZ VALLEY

BY MARION SCHLINGER

Plant galls are variable in size and shape and are often ornately adorned differentiated plant tissues that are a reaction to an invasion of that area of the plant by several different causative organisms. These organisms responsible for galls can be fungi, mites, aphids, flies or wasps. The technical term for the study of plant galls and the organisms that induce galls is Cecidology. And in fact the gall midges (a family of small gall forming flies/midges) are called the Cecidomyiidae. So the root 'Cecid' means gall.

Galls are tumor like growths of plant cells that abnormally multiply in number or size, that appear as simply a swelling on that area of the plant or that may have some cell differentiation causing bizarre shapes or 'ornamentation'. These galls are the plant's reaction to either mechanical or chemical stimulus, from the gall forming agent. In the case of the chemical stimulus, an insect (often the wasps) inject protein fluids along with the egg(s) they deposit in the plant tissue which have nucleic acids that genetically program the plant tissue growth in that area. The mechanical stimulus is a gall forming as a result of the larva feeding (chewing) and the larva's excretions or salivary secretions which in turn stimulate the plant tissue. In either event a gall is created that provides both shelter and food for the larva (or larvae).

Galls can form on various parts of plants and the type of gall and location is specific to the biology of the gall producer. Typical locations are on

the stem, bud, roots, leaves, flowers or fruits.

Probably only 50% of leaf galls are known, and they are a very diverse group and very successful because the photosynthetic activity in the leaf enables rapid gall growth.

A great example is our Quercus agrifolia (Coast Live Oak) which supports galls all year long. The gall wasp Callirhytis congregata causes elongate fleshy galls on the spring flowers and catkins. Another Callirhytis quercussuttoni causes bulbous stem/twig galls which begin in spring and develop over the summer and often the multiple wasps developing inside over winter in the gall to emerge the following spring. These are but two examples of a whole array of galls caused primarily by many species of gall wasps. Many of these galls then remain on the tree throughout the year providing food, shelter and hibernation protection for the gall agent so it can emerge the following year to produce the cycle once again.

The types of galls include roll, fold or pouch galls on leaves as well as 'erineum', hair lined depression on leaves. The manzanita by the Cachuma entrance gate has some wonderful red colored, folded leaf galls caused by the gall aphid, Tamalia coweni. Peach leaf curl is caused by a fungus, Taphrina deformans. Small bumps on the leaves of toyon, Heteromeles arbutifolia, are caused by a mite. There are stem or branch galls that range from a small swelling to the larger protruding 'oak apples' caused by the California gall fly, a cynipid wasp, Andricus californicus. A fuzzy white stem gall on California sagebrush is caused by the gall midge, Rhopalomyia floccosa. Mark galls are those that protrude or hang from a leaf surface, and

are easily found on our oak species. Then there are witches brooms often seen on coyote bush. Baccharis pilularis, where dense clusters of shoots and stems come out of a swelling area on the stem.



The gall wasps in particular have fascinating life cycles that often include a sexual and an asexual generation over the course of the year. With each particular generation, the structure of a gall can vary on the leaves or one generation may use leaves and the other will use stems. A typical life cycle example would be: in February parthenogenic female generation (reproducing by laying eggs that develop without being fertilized) emerge from galls on the oaks and oviposit (lay eggs) on the oak leaves. A bisexual generation develops in the resulting galls during March and April. In May the males and females from these galls emerge, mate and the females oviposit this time on the branches and stems of the oak. By June the galls form containing the 'unisexual' (parthenogenic) generation of females and their larvae develop and grow in July and August, with pupation occurring in the gall in September. At this point they remain in the gall, diapausing during November to January and emerging as another adult female population in February to start the cycle again.

Galls also provide a habitat for other organisms. Ingullnes can live in and coexist with the gall maker, ultimately competing for the same food resource. After the emergence of the primary gall maker, the gall often provides a food or shelter resource for tiny beetles and other small insects. Many of the gall wasps have parasites (other wasps that live in or on the gall wasp consuming most of its tissues and ultimately killing the gall wasp host).

In some cases there can be parasitism rates of 70%.

Most galls in California are on native shrubs and trees. Rose, willow, some compositae, manzanita, creosote, baccharis, sagebrush, oaks and pines are all host to gall makers. Over half of the known galls in America occur on oaks. Galls are fun to look for and easily found around the Nature Center and on the Nature Walk. It is also fun to carefully cut them open (best with the softer tissue ones) and find the larva and look at it under the dissecting scope.

The preceding was the "Educational Minute" at the August Docent Meeting presented by Marion Schlinger. We looked at those larva under our new binocular microscope. It was fascinating !! Thanks Marion.

NEWSFROM THE GIFT SHOP

The Video of Huell Howser's Road Trip to San Marcos Pass, featuring Lake Cachuma, the Nature Center and Neal Taylor, is for sale in our Gift Shop for \$19.95. This should make a nice addition to your video library.



Neal and Halli with Huell Howser

The Gift Shop has t-shirts, sweat shirts, baseball caps, visors, and bucket style hats embroidered with Cachuma Lake Nature Center and the Bald Eagle emblem. These would make great gifts.

Be sure to check out our books on the Chumash and other natural history topics, such as birds, insects, native plants and trees, geology, and a whole new selection of children's field guide books.

We're open Wed. (usually) 10-2, Sat. 10-4 and Sun. 10-4.

GIBRALTAR DAM

A Brief History of Its Role in the Santa Barbara Water System

BY DON WIMPRESS

As early as 1806 the Santa Barbara Mission and the Presidio started a water system consisting of a dam in Mission Canyon and aqueducts to the two locations. This, and local wells, was the only water system in Santa Barbara for a hundred years.

In the late 1800's Santa Barbara began looking north of the Santa Ynez Range to the Santa Ynez River to augment its water supply. Between 1904 and 1912, a tunnel was drilled some 4 miles through the mountain to tap the Santa Ynez River. This tunnel, at stream level at the Santa Ynez River, came out in Mission Canyon above what is now the Botanic Garden.

Since the river is nearly dry during the annual dry season, it was decided to build a dam just upstream of the tunnel to ensure a year-round water supply. The Gibraltar Dam was started in 1914 and completed in January 1920. It was a concrete arch dam some 150 feet in height, and impounded a lake of 14,000 acre-feet. Construction materials were hauled to the site on an electric railway built through the tunnel to a site on the north side of the river just below the dam site.

Silting soon became a threat to the dam's capacity and in 1936-37 some debris basins were constructed upstream of the dam to intercept this sand and silt. Unfortunately, a couple of wildfires in the area, plus an extremely heavy rainfall in the spring of 1938, produced so much silt as to completely fill these basins and still have enough left over so as to deposit another 4,000 acre-feet in the

lake bottom. By 1944 only 7400 acre-feet of capacity remained. The dam was raised 23 feet (to a total height of 173 feet) to produce a total capacity (silt and water) of some 22,000 acre-feet. However, silting continued to fill the lake and in 1969 an unusually heavy rain, right after the disastrous Coyote Fire, put another 4,000 acre-feet of sediments into the lake. By 1984, even with the raised dam and the debris basins, the lake capacity was only 8,000 acre-feet.

In order to reduce silting as the result of wildfires, extensive prescribed burning has been carried out in the watershed to reduce the magnitude of these wildfires.

Dredging operations have removed some of the sediments but this is an expensive operation costing approximately \$1600 per acre-foot, and there is now no place, with the existing environmental concerns, to conveniently dump this material. It would be nice to transport it completely to the beaches, as the river normally would have done, but this would cost some \$13,000 per acre-foot. It's much cheaper to obtain that capacity by other means such as enlarging Lake Cachuma, building another dam, or importing state water.

Lake Cachuma has been lucky so far in that in the last fifty years only about 16,000 acre-feet of sand and silt has been deposited. However, Cachuma has not experienced a serious wildfire in its watershed followed by torrential rains. This is bound to happen some day, and Lake Cachuma will become one big level meadow some eight miles long.

The preceding was the subject of Don's "Educational Minute" given at the September Do-cent Meeting. Thanks Don.

CACHUMA LAKE NATURE CENTER

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RECIPE OF THE MONTH

This salad was a hit at our luncheon on October 3 to honor camp hosts Darryl and Elaine for the terrific job that they have done these past months at the Nature Center.

Cachuma Oriental Salad

Brown in 1/2 cube margarine or butter & let cool:

8 Tbps. (or less) sesame seeds

8 Tbps. slivered almonds

2 pkgs. crushed Top Ramen Noodles (omit seasoning packet)

Dressing: 4 Tbps. sugar

1 tsp. salt

6 Tbsp. rice vinegar (unseasoned)

Mix together and add:

1 cup salad oil

Shred one large head of cabbage and add:

4 or more green onions, sliced thinly into rounds

Just before serving mix greens and dressing. Add crunchies last. This makes a lot of salad. It is easy to make just half a recipe. Chicken, grapes, pineapple or other fruit can be added.



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