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Jumpin' galls!

Chico State biology professor illuminates weird world of the California jumping gall wasp

By [Claire Hutkins Seda](#)

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On the corner of Fifth and Orient streets stands a healthy valley oak tree with something very peculiar happening beneath it. Don Miller, an entomologist and professor of biological studies at Chico State, recently took a visit to the tree carrying a handful of tiny vials. Below his feet, the hot July pavement was in motion with tiny poppy-seed-sized galls, each containing a wasp larva that caused it to jump around.

Many galls—those oddly shaped outgrowths of plant tissues caused by insects, fungi and other parasites—often go unnoticed; but this time of year, these particularly strange galls that look like minuscule brownish pebbles catch the attention of Chicoans when they fall from the leaves.

“They are truly dinky. I mean, they’re probably about a millimeter long,” Miller said of the diminutive galls that can be found jumping under some trees in the thousands,



Don Miller holds a vial of jumping galls.

coating the pavement or ground, creating a faint sound reminiscent of a muffled rainstick. Each tiny gall contains the larva of the California jumping gall wasp, *Neuroterus saltatorius*, a cynipid-wasp larva which will emerge in the spring as an equally tiny and inconspicuous adult cynipid wasp. (All oak-gall wasps are members of the Cynipidae family, and are smaller and generally harmless to humans, compared to their cousins, the picnic-plaguing vespid wasps with their annoying stings.)

Miller collects some of the jumping galls to chill them in his refrigerator, halting their development until he pulls them out for his animal-behavior class at Chico State in the fall, when they will begin to jump anew. He poses to his students the inevitable question on everyone's mind: Why do they jump?

"By jumping around, they move into cracks and crevices [in the ground], and they're better hidden, and they're a little bit more protected from the sun—I think that's a very good hypothesis," Miller said, referring to the answers he's gotten from students. The fact is, jumping gall wasps haven't been sufficiently studied to give a conclusive answer.

Miller's own hypothesis? "It's kind of like a box of cereal," he said, referring to the usual warning on the box that its contents may have settled. "If I scrape off the top layer of duff—the leaves and sticks [under the oak]—I'll find vast numbers [of galls] underneath. These larvae inside these little tiny galls are settling down and protecting themselves a little bit more" by moving themselves down through the leaf litter to the ground through their odd jumping.

"Among the half-dozen or so oak species we have here, there are upward of 100 galling wasps found," Miller said, although this is the only type that jumps.

In addition to the jumping gall, the most noticeable galls are those produced by the oak apple gall wasp. The golf-ball-sized (and larger) oak-apple galls can be found growing on valley oaks across Chico.



A valley oak leaf is covered in jumping galls, before they fall off and jump around on the ground.

But plenty of others can be found: “There are flat ones. There are spangled galls that look like something Janis Joplin would’ve worn. There’s one that looks like cotton candy. There are little tiny pompoms. There are some that are just mere swellings on the stems. There are some that look like little tiny [sea] urchins—they’re called urchin galls. There are others that look like red Hershey’s Kisses.

“As soon as you start looking carefully at the leaves and stems of the valley oak, you’ll start to see—wow, look at all the different galls on this plant! And each type of gall is made by a different gall-maker,” Miller noted. In addition to certain wasps and aphids, some species of midges, beetles, moths and thrips produce galls.

Miller, who primarily studies galling aphids on manzanita trees, pointed out that many different plants act as hosts besides oaks, including members of the rose family (Rosaceae), the heather family (Ericaceae), and the sunflower family (Asteraceae).

As if the jumping isn’t bizarre enough, the rest of the jumping gall wasps’ two-year life cycle is as weird as an alien sci-fi movie. One year, the wasps make jumping galls, and the next year, the same wasps make non-jumping galls that look very different. The adult-female jumping gall wasps—the ones that emerged from jumping galls the previous year—inject eggs into the plant tissue of the oak tree, which can be either the valley oak or blue oak, another common oak tree found in the foothills around Chico.

The wasps are “probably producing chemical compounds,” said Miller, compounds that he refers to as “plant-hormone analogues.”

“They cause the plant to grow in weird ways that it wouldn’t [normally] grow,” he explained. In this case, the oak will create a flattened-out tiny brown gall on the leaf. That flattened gall doesn’t jump. It stays on the leaf and is part of the wasp’s “bisexual generation,” Miller explained, and it’s not how it sounds.

“Bisexual in this context means that there are two sexes—there are male and female [larvae],” explained Miller. The larvae in the non-jumping galls emerge as adults and mate. The females then lay eggs in the oaks for the next year’s galls. But this time, all the larvae will end up being female. This “unisexual-generation” gall—the tiny round gall that drops to the ground and jumps—is vastly different, despite being the offspring of the same type of insect laying eggs in the same type of host tree.

This all-female unisexual generation will drop from the trees (as larvae inside their galls) and do their pavement dance in July, ending sometime in August before emerging as adults in the spring.

Those unisexual female jumping-gall wasps then lay the next—bisexual—generation without fertilization in a process called parthenogenesis, or virgin birth, and the peculiar two-year cycle begins again.

As for the concern that all this gall-making activity might hurt the trees, Miller said “it’s pretty much of no consequence. It is such a small, aggregate effect—I just don’t think it matters very much for the tree.”

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