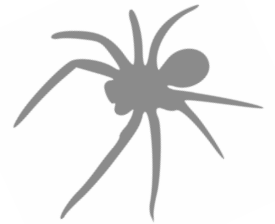


# NATURALIST'S CORNER

## The Misunderstood Wasp



Like most people I do not like wasps. I especially disliked them when my grandkids got stung multiple times on a hike and ended up in the hospital. So why do I feel it is important to write about them here?

Wasps are fascinating animals that do wondrous things. Our speaker this coming September is a beekeeper. We all know that bees are important for pollination and honey. We would not have any bees if there had not first been wasps.

Insects were the first animals to start living on land rather than in the ancient sea. They arrived at the same time that land plants got their start and, ever since, have had a close relationship with plants. Insects predate the dinosaurs by more than 200 million years. Indeed, fossils reveal that wasps have existed for more than 400 million years. One branch of wasps has evolved vegetarian habits, preferring to get nitrogen by eating pollen rather than other insects. This branch consists of the insects we today know as bees. Later on, another wasp lineage lost its wings, giving rise to ants. The rest of the wasps carried on, becoming even more diverse than the beetles.

Many wasp species have evolved an amazing diversity of life strategies enabling them to avoid competition with other species of wasps. Some species — called hyperparasites — live inside other wasp parasites! Most wasps are so small that science has had a difficult time settling on a species count. To date, scientists have classified ~100,000, but many researchers believe that these represent only 10% of all living wasp species. By way of comparison, there are only ~6000 species of mammals.

Other lineages of organisms have evolved in concert with the tremendous diversity of wasps. Figs, for example, are exclusively pollinated by wasps. There are 700 species of figs, and each depends on a different species of wasp for pollination.

For many of us, the mere mention of “wasp” conjures up thoughts of that pesky picnic pest that likes to land on sandwiches — the yellowjacket — or one of those paper nests up in the eaves that must be removed with great caution. These conspicuous wasps are the exception. Most wasp species are much smaller and lead solitary lives. As a result, even when wasps live close to our own homes, we may never notice them.

One key evolutionary innovation was the wasp waist. This cinching at the middle makes the wasp body flexible. It also improves the accuracy of egg placement by enabling the insect to aim its ovipositor. Over time, the ovipositor evolved the ability to deliver venom and numb prey into compliance. These innovations enable wasps to protect the nest against giants like my grandkids. Social living is a more recent development. Roughly 1% of extant wasp species are social. These species live communally and have exquisite divisions of labor. Among the other social insects descended from wasp ancestors are some bee species and all ant species.

The typical solitary wasp dines on flowers and fruit until it is time to reproduce. Then, the female digs a hole and uses the venomous cocktail in her stinger to paralyze a grasshopper or spider, but not kill it. She then drags the immobilized animal to the hole and lays her eggs inside the hapless creature. Her eggs hatch and her progeny dine on the paralyzed, still-living victim, eating it from the inside out. I once saw a wasp species known as the tarantula hawk do exactly this with a very large desert spider. The tarantula hawk paralyzed the spider, then dragged the spider into a hole, setting her offspring up with a good start to life inside of a still-living tarantula!

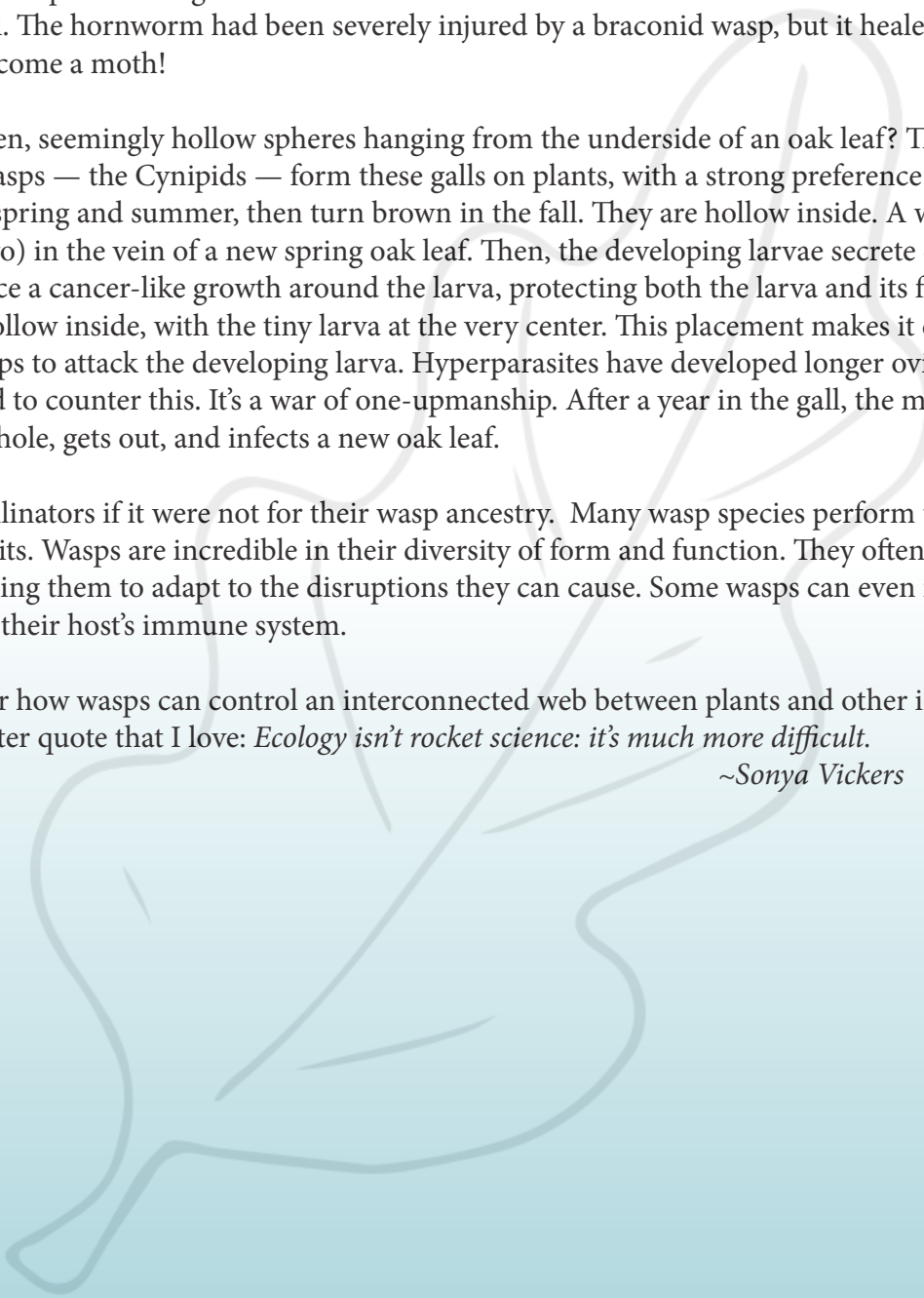
Have you ever seen a garden caterpillar with what looks like white grains of rice protruding from it? If so, you've spotted a caterpillar being eaten from within. In this case, a wasp laid her eggs inside the living caterpillar and the young then went about developing inside while the caterpillar continued to move and eat. The developing wasps first eat parts that the caterpillar can survive without, ensuring that fresh meat remains available for some time. They then chew a hole in the caterpillar and wiggle out. Sometimes, one hundred wasps emerge from a single caterpillar! Only then does the caterpillar die. I got to see this firsthand in a tobacco hornworm and drew the sequence of events in my journal. The hornworm had been severely injured by a braconid wasp, but it healed the 20 or so holes and went on to become a moth!

Have you seen those spotted green, seemingly hollow spheres hanging from the underside of an oak leaf? The ~800 species in one lineage of wasps — the Cynipids — form these galls on plants, with a strong preference for oak trees. The galls are green in spring and summer, then turn brown in the fall. They are hollow inside. A wasp lays a single egg (occasionally two) in the vein of a new spring oak leaf. Then, the developing larvae secrete chemicals that cause the oak to produce a cancer-like growth around the larva, protecting both the larva and its food supply. These galls are mostly hollow inside, with the tiny larva at the very center. This placement makes it difficult for other hyperparasitic wasps to attack the developing larva. Hyperparasites have developed longer ovipositors to try to infect the larva and to counter this. It's a war of one-upmanship. After a year in the gall, the mature tiny wasp, if it survives, chews a hole, gets out, and infects a new oak leaf.

Bees would not have become pollinators if it were not for their wasp ancestry. Many wasp species perform this service, too, in figs and other fruits. Wasps are incredible in their diversity of form and function. They often drive the ecology of other species, forcing them to adapt to the disruptions they can cause. Some wasps can even inject viruses that change their host or their host's immune system.

We are just beginning to discover how wasps can control an interconnected web between plants and other insects. Wasps epitomize a Steve Carpenter quote that I love: *Ecology isn't rocket science: it's much more difficult.*

~Sonya Vickers



In nature, nothing exists alone.  
-Rachel Carson