

Mind-Controlling Parasites

Parasites are organisms that live off and at the expense of others, the “hosts.” Some parasites go so far as to essentially hijack the lives of their hosts! In a process that is truly creepy, and still largely a mystery to science, they convert their hosts into unwilling or unwitting slaves. Gruesome to the point of fascinating, let’s take a look at parasites and how they operate.

Among the over one million species of flying insects that populate the world is the ladybug. This is the familiar small round insect with the hard, spotted red or orange shell covering its back. Their cute appearance makes them arguably the most beloved type of bug. Ladybugs appear as friendly caricatures in children's books and clothes. Some kids even dress up as ladybugs on Purim.

In fact, there is more to their popularity than just their homey appearance. Ladybugs are appreciated for their role in helping humans. They devour aphids, which destroy the leaves of fruit trees, eat up vegetables and lay waste to fields of crops at a time.

Ladybugs are actually quite sophisticated. All insects have two antennae that they wave back and forth to sense and feel out their surroundings. Ladybugs use their antennae to detect chemicals that are released by leaves and plants when aphids attack them. Once they're tipped off to the presence of aphids, ladybugs use other senses to track them down and eat them. A single ladybug can consume several thousand aphids over its lifespan.

The ladybug enjoys an advantage over other insects in that it is very well protected against predators. Its red shield with black spots, which make it look so cute to us, is actually a warning to would-be predators: "Don't start up with me or you'll regret it." If a bird or larger insect tries to attack a ladybug, the ladybug will release a noxious odor. One taste and the hapless predator will spit out the ladybug in disgust. From now on it will keep its distance from that redcoat with the black spots.

Creatures that "Invade" Ladybugs

Their hard shells and bitter secretions protect ladybugs against most predators. At first glance, one might think that this affords the ladybugs a "sheltered life." However, there is a creature that literally invades the ladybugs and enslaves them.

Entomologists studying ladybugs were

surprised to learn that they are converted into "zombies" and enslaved by a wasp known as *Dinocampus coccinellae*, which is about the size of the colored sprinkle on your cookie or ice cream. These wasps lay their eggs *inside* the body of a ladybug. They do this by stinging the ladybug's soft underbelly and injecting an egg through the stinger, along with a special chemical blend.

The larva that emerges from the egg feeds off its unwilling host's innards. The ladybug is literally eaten up alive from inside, even though outwardly there is no change to its appearance. The ladybug even continues its daily routine of consuming aphids. However, the nutrients it should be getting from the aphids are instead stolen by the wasp larva.

After three weeks, the larva has developed enough to leave. It partially paralyzes the ladybug and bores its way through the abdomen to take its first look at the world outside. Remarkably, around 30% to 40% of ladybugs survive this ordeal, largely because the larva avoids its most integral organs



Aphids on a leaf.



Ladybugs work on clearing a leaf of aphids.

while consuming the rest of the ladybug's insides.

Now the larva must spin a cocoon in which it can undergo the metamorphosis needed to transform into an adult wasp. It spins its silken cocoon beneath the protective shell of the ladybug. Now it could release the ladybug from its bondage, but the wasp larva is not yet finished. It still needs to be protected from predators that would love to have a juicy wasp larva for lunch. By remaining in its cocoon between the legs of the ladybug, the wasp larva benefits from the ladybug's protection. If a predator approaches, the stationary ladybug will fight it off.

Somehow the larva transforms the ladybug into its personal bodyguard which will defend it vigorously against an attacker. The ladybug will loyally protect its parasite until the larva has emerged from its cocoon as a fully grown wasp and flies away. Now the ladybug's servitude is over. Only a small percentage of these hospitable hosts survive the entire ordeal.

Other Parasitic Creatures

The story repeats itself thousands of times each year in different parts of North America. In the woods, yards and farm fields, wasps conscript ladybugs to serve as their zombie lifeguards. But ladybugs are not the only ones to be used in this manner.

Scientists were shocked to discover that there are many different creatures that serve as unwilling hosts to parasites. Not only do these parasites feed off their hosts' bodies, but they take control of their minds as well. Nor is this behavior limited to the insect world. Parasitism affects fish and animals too. These hosts serve their parasites loyally even when the parasite orders them to jump to their death!

One example is the house cricket known as *Acheta domesticus*. It is invaded by the horsehair worm known as *Paragordius varius* that inhabits the dead insects the cricket feeds on. The cricket lives on land, but the worm must reach water to thrive.



After leaving the ladybug's abdomen, the larva spins its cocoon beneath the ladybug's protective body.

Somehow, the worm is able to mind-control the cricket so that it leaves the security of land and jumps into the nearest body of water, drowning itself. Once the cricket is dead, the horsehair worm—often a foot in length!—emerges.

Scientists struggle to understand how parasites succeed in convincing their hosts to endanger their own lives for the benefit of their invaders. Not only do the hosts protect the parasites, but they provide them with other "services" as well. In one example, a certain fly larva infects bumblebees, causing them to dig in the ground in autumn. This is just before the fly is ready to