

How evolution gave rise to zombie ladybugs and mind-controlling wasps

A predator protected from other predators, the ladybug would seem to have the perfect insect life—were it not for wasps that lay their eggs inside its living body.

One of these wasps, *Dinocampus coccinellae*, is about the size of an ice-cream sprinkle. When a female wasp is ready to lay an egg, she alights near a ladybug and swiftly inserts her stinger into its underside, injecting an egg into her victim along with a blend of chemicals. When the egg hatches, the larva feeds on the fluids that fill its host's body cavity.

Even when the ladybug's body is free of the parasite, its mind remains enthralled. As the wasp larva wraps itself in a silk cocoon beneath it, the ladybug remains immobile.

From the wasp's point of view, this is a very positive development. A growing *D. coccinellae* wasp nestled in its cocoon is intensely vulnerable. Lacewing larvae and other insects will happily devour it. But if one of these predators approaches, the ladybug will thrash its limbs, scaring off the attacker. In effect it has become the parasite's bodyguard.

How mutations and natural selection could give rise to such creepy powers is a particularly intriguing puzzle for evolutionary biologists. One useful concept for thinking about it comes from biologist Richard Dawkins, author of the landmark book *The Selfish Gene*.

In that book Dawkins argued that genes evolve to make copies of themselves more successfully. Our bodies may be important to us, but from our genes' point of view, they are nothing more than vehicles to get themselves intact into the next generation. The entire collection of the genes that make up you or me is called our genotype. The sum total of all the bodily parts and functions that our genotype creates to advance its cause—you or me—is called our phenotype.

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