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A story about a wasp, a caterpillar and a fungus ends with more dominating female wasps

By Krishna Ramanujan

Understanding survival of a species can be a lot more complicated than meets the eye because ecosystems are so interrelated.

Take, for example, a parasitic wasp that grows up inside a checkerspot butterfly caterpillar, eventually killing the caterpillar. In a recent study, a Cornell researcher discovered that host caterpillars that eat fungus-infected plants harbor more female than male wasp larvae by 2-to-1.



Saskya van Nouhuys

The checkerspot caterpillar is the larva of the Glanville fritillary butterfly, *Melitaea cinxia*.

That's good for the survival of the wasp because only the females are able to colonize more new host caterpillars. This is essential in their fragmented habitat. Indeed, the researcher found that over six years, a butterfly population was more than twice as likely to be colonized by the wasp if the local plants were infected with fungus than if the plants were healthy.

That's bad for the survival of the butterfly, which is already an endangered species, because its populations become more vulnerable to parasites.



Zdravko Kolev

Illustration of the parasitoid wasp *Cotesia melitaearum*. Larvae of the wasp live inside the checkerspot caterpillar (*Melitaea cinxia*), eventually killing it.

"The fungus affects the wasp through two intermediary species, a plant and a caterpillar," said Saskya van Nouhuys, a Cornell visiting assistant professor for the last decade in the Department of Ecology and Evolutionary Biology and a researcher at the University of Helsinki's Department of Biological and Environmental Sciences. "It's exciting because the plant's pathogen affects the

population dynamics of the wasps through its effect on the sex ratio of the baby wasps rather than the number of baby wasps."

The study, recently published in the Proceedings of the Royal Society B, focused on the fungus



Cornell Chronicle:

Krishna Ramanujan
(607) 255-3290
ksr32@cornell.edu

Media Contact:

Press Relations Office
(607) 255-6074
pressoffice@cornell.edu

(*Podosphaera plantaginis*), the plant (*Plantago lanceolata*), the checkerspot caterpillar (*Melitaea cinxia*) and the parasitoid wasp (*Cotesia melitaeorum*) that share habitat in Åland, Finland.

The story is complicated partly because the female parasite wasp can determine the sex of the eggs she deposits in the caterpillar. And, in general, said van Nouhuys, the wasp chooses to lay female eggs in the healthiest caterpillars. But in this case, van Nouhuys suspects that the skewed sex ratios of the wasp larvae may not be due to the mother choosing to lay more female eggs, but because males and females compete for food inside the host caterpillar. And then the males lose, perhaps because they are smaller.

The fungus is not lethal to the plant but changes the chemistry of infected leaves. Although caterpillars that eat these leaves end up the same size as their non-fungus-eating counterparts, their development rate is slower.

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