

Caterpillars borrow weapons from viruses in battle against parasitic wasps

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A *Microplitis mediator* female ovipositing into a 2nd instar *Mamestra configurata* larva. Credit: Agriculture and Agri-Food Canada

Exactly how the caterpillars are winning this tiny evolutionary arms race is the subject of an article just published in the journal *Science* by an

international research team including scientists from University of Saskatchewan (USask).

"The objective was to determine the underlying molecular mechanism that allows some [viruses](#) to prevail," said Dr. Martin Erlandson (Ph.D.), USask adjunct professor and lead investigator of the Canadian component. "We identified insect-specific viruses that encode proteins that inhibit the development of competing [parasites](#)."

In lepidopterans, a category of insect which include butterflies and moths, viruses specific to the insects create a [protein](#) which kills off or stunts the growth of the larvae of some parasitic [wasps](#).

Erlandson also identified similar genes to produce the parasite killing protein in caterpillars, suggesting that multiple horizontal gene transfer events occurred where DNA for different toxic proteins was transferred between viruses and from viruses to the caterpillar host.

"Large populations of insects can be the targets of multiple parasites and pathogens resulting in a biological arms race where parasite and pathogen compete for the same host as well as the host evolving defenses against these agents," Erlandson said.

The researchers found that northern armyworm—an insect potentially devastating to maize, sorghum, and rice crops—when infected with entomopoxvirus, were lethal to the larva laid by *Cotesia kariyai*, their most common parasitic wasp adversary, as well as other closely-related varieties of wasps.

A better understanding of how viruses and parasitic wasps interact could present new, improved strategies for environmentally sustainable insect pest control through the combined use of viruses and parasites, Erlandson said.

More information: Laila Gasmi et al, Horizontally transmitted parasitoid killing factor shapes insect defense to parasitoids, *Science* (2021). [DOI: 10.1126/science.abb6396](https://doi.org/10.1126/science.abb6396)

Provided by University of Saskatchewan

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