

Citizen science brings monarch butterfly parasitoids to light

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Photo by Derek Ramsey. Via Wikipedia.

Thanks to citizen volunteers, scientists now know more than ever about the flies that attack monarch butterfly caterpillars.

Since 1999, volunteers participating in the Monarch Larva Monitoring Project have collected and raised more than 20,000 monarch eggs and caterpillars, and they've recorded incidents of those specimens being parasitized by fly larvae. They have also collected more than 1,100 specimens of those flies and sent them to entomologists at the University of Minnesota for identification. Findings from this long-running collaboration are published today in the *Annals of the Entomological Society of America*.

"Our paper provides an unprecedented view of monarch-parasitoid associations across space and time. It documents the main parasitoid enemies of [monarchs](#), their relative abundance and impact on monarchs, and how parasitism varies with host stage. This sheds new light on understanding monarch larval ecology," says Karen Oberhauser, Ph.D., professor in the Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota and director of the UM Monarch Lab.

Monarch butterflies (*Danaus plexippus*) are well known for their vibrant colors and their incredible migration through North America, but they are also threatened by habitat loss. Fly species that parasitize monarchs aren't considered a major threat to their survival, but knowing typical rates of parasitism helps scientists better discern between natural and human-driven impacts on monarchs as they continue to monitor their populations.

Volunteers in the [Monarch Larva Monitoring Project \(MLMP\)](#) are trained in rearing caterpillars and accurately reporting data, and the pool of more than 1,300 monitoring sites across the United States comprises schools, museums, and other community programs, in addition to individuals. Participants report monarch larvae collection and rearing outcomes through a data portal, and those who collect parasitoid specimens are asked to wait until the flies hatch and then freeze them until sending them to the researchers.

Oberhauser and colleagues identified seven different species of flies, all from the family Tachinidae, among the parasitoid specimens collected from monarchs by volunteers.

- Overall, 9.8 percent of monitored monarchs were parasitized, though frequency increased through larval stages, with a maximum of 17 percent among fifth-stage larvae.

- By far, the most abundant parasitoid species (75 percent of tachinid fly specimens collected) was *Lespesia archippivora*, currently known as a generalist parasitoid of several moth and butterfly species. However, the researchers suspect the species may represent a "complex" of multiple, closely related subspecies, one of which specializes in parasitizing monarchs. This will be a focus of future research, Oberhauser says.
- Three of the tachinid species identified had not been previously reported as monarch parasitoids, one of which appears to be a new, previously unknown species.
- The third most abundant parasitoid species collected (10 percent) was *Compsilura concinnata*, a species that was introduced to North America in the 20th century to control gypsy moth. Specimens sent in by volunteers in Texas represent the first recording of *C. concinnata* in that state.
- The researchers found a small number of cases of multiparasitism, in which more than one tachinid [species](#) emerged from a monarch host, which had previously never been reported.

"Our large, comprehensive dataset could not have been collected without the participation of citizen scientists spread through monarchs' range," says Oberhauser. Collection continues, and as the researchers accumulate more data, they hope to further analyze patterns in monarch parasitism over space, time and plant habitat, she says. And the ensuing analysis gives volunteers the chance to see the results of their citizen science.

"Contributing to a project like this is not only fun and interesting, but it also is deeply satisfying to contribute to our understanding of the natural world and hopefully make a difference in conservation of that world," says Ilse Gebhard, a Monarch Larva Monitoring Project [volunteer](#) and co-author of the study.

More information: Karen Oberhauser et al, Tachinid Fly (Diptera: Tachinidae) Parasitoids of *Danaus plexippus* (Lepidoptera: Nymphalidae), *Annals of the Entomological Society of America* (2017). DOI: [10.1093/aesa/sax048](https://doi.org/10.1093/aesa/sax048)

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