

Monarch butterflies use medicinal plants to treat offspring for disease: study

October 11 2010



(PhysOrg.com) -- Monarch butterflies appear to use medicinal plants to treat their offspring for disease, research by biologists at Emory University shows. Their findings were published online Oct. 6 in the journal *Ecology Letters*.

"We have shown that some species of milkweed, the larva's food plants, can reduce [parasite infection](#) in the monarchs," says Jaap de Roode, the

evolutionary biologist who led the study. "And we have also found that infected female [butterflies](#) prefer to lay their eggs on plants that will make their offspring less sick, suggesting that monarchs have evolved the ability to medicate their offspring."

Few studies have been done on self-medication by animals, but some scientists have theorized that the practice may be more widespread than we realize. "We believe that our experiments provide the best evidence to date that animals use medication," de Roode says.

"The results are also exciting because the behavior is trans-generational," says Thierry Lefevre, a post-doctoral fellow in de Roode's lab. "While the mother is expressing the behavior, only her offspring benefit. That finding is surprising for [monarch butterflies](#)."

The findings also may have implications for human health, says University of Michigan chemical ecologist Mark Hunter, who collaborated with de Roode's group on the research.

"When I walk around outside, I think of the plants I see as a great, green pharmacy," Hunter says. "But what also strikes me is how little we actually know about what that pharmacy has to offer. Studying organisms engaged in self-medication gives us a clue as to what compounds might be worth investigating for their potential as human medicines."

Monarch butterflies are known for their spectacular migration from the United States to Mexico each year, and for the striking pattern of orange, black and white on their wings. That bright coloration is a warning sign to birds and other predators that the butterfly may be poisonous.

Monarch caterpillars feed on any of dozens of species of milkweed

plants, including some species that contain high levels of cardenolides. These chemicals do not harm the caterpillars, but make them toxic to predators even after they emerge as adults from their chrysalises.

Previous research has focused on whether the butterflies choose more toxic species of milkweed to ward off predators. De Roode wondered if the choice could be related to the *Ophryocystis elektroscirrha*. The parasites invade the gut of the caterpillars and then persist when they become adult monarchs. An infected female passes on the parasites when she lays her eggs. If the adult butterfly leaves the pupal stage with a severe parasitic infection, it begins oozing fluids from its body and dies. Even if the butterflies survive, they do not fly as well or live as long as uninfected ones.

Experiments in de Roode's lab have shown that a female infected with the parasites prefers to lay her eggs on a toxic species of [milkweed](#), rather than a non-toxic species. Uninfected female monarchs, however, showed no preference.

Researchers have studied the kinds of leaves that primates eat in forests, but this work with butterflies stresses the point that even insects in our own back yard can be useful indicators of what might be medicinally active, Hunter says.

More information: Paper: [onlinelibrary.wiley.com/doi/10...
10.01537.x/abstract](https://onlinelibrary.wiley.com/doi/10.1002/ece3.6010)

Provided by Emory University

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