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Fly may be depleting U.S. giant silk moths

Some of the giant silk moths of North America are taking a beating because an early 20th-century attempt to control another insect went bad, researchers in Massachusetts suggest.

Cecropia moths, with wing spans of up to 5 inches, fall prey in substantial numbers to a parasitic fly first brought to the United States to rein in gypsy moths, report George H. Boettner and Joseph S. Elkinton of the University of Massachusetts-Amherst and Cynthia Boettner of the U.S. Fish and Wildlife Service in Turners Falls, Mass. In a controversial article in the December CONSERVATION BIOLOGY, the researchers propose that attacks by the imported fly, *Compsilura concinnata,* may be an overlooked factor in what seem to be population decreases of the flashy giant silk moths.

No one has done a complete survey, but entomologists worry that the giant silk moths have declined in the Northeast. Scientists have blamed shrinking habitat, mercury-vapor lights that sabotage mating, and pesticides such as DDT.

Elkinton, however, points out that in New England, the area of forests, the typical habitat of giant silk moths, has roughly doubled since 1890 with the decline of agriculture there. Also, mercury-vapor lights are used in other parts of the country without such dire effects, and the moths haven't bounced back since the DDT ban in 1972. He suspects that there's something else going on.

Elkinton and the Boettners are investigating the possibility that early attempts to control gypsy moths loosed a rampant slayer of other species. The gypsy moth, imported from Europe, had escaped from a Boston entrepreneur trying to breed a silk moth practical for North America. Starting in 1906, U.S. entomologists brought in the parasitic fly to try to keep the runaway moth in check. Later, they deployed *C. concinnata* against 12 other pest species in a series of releases ending in the 1970s.

This parasitic fly resembles the familiar housefly but has a hairier rear, explains George Boettner. The species is particularly destructive. It attacks any of 180 other insect species. Each female carries about 200 eggs. When she spots a meaty caterpillar, she hatches one egg in her oviduct and then injects the larva directly into her victim.

Elkinton and the Boettners simultaneously performed two tests measuring the impact of the parasites. In one, the researchers set out 500 young cecropia caterpillars in small groups on trees. Observers saw flies emerge from and kill only three of them, but many caterpillars simply disappeared.

In the other test, the researchers put out 100 caterpillars at each of their first three life stages, or instars. When about half had died or disappeared, the researchers brought the survivors into the lab. There, the researchers saw flies emerge from and kill more of the caterpillars: 13 percent of the recaptured first instars, 27 percent of the second instars, and 70 percent of the third instars.

"Mortality from *C. concinnata* far exceeded that from any other cause," Elkinton says. The research team concludes that the parasitic fly "has become a dominant cause of mortality of the moths in our region."

"There hasn't been any information about the fly's impact on these moths, or on just about any other nontarget moth or butterfly, for that matter," Elkinton adds.

Such a scenario is plausible, but "plausibility doesn't make it a fact," cautions population ecologist Keith Hopper at the Department of Agriculture's Beneficial Insect Introduction Research Unit in Newark, Del.

A female insect may lay 200 eggs, but only two or so need to survive to keep the population stable, Hopper explains, and if 20 survive, the population explodes. "Distinguishing

between 2 and 20 surviving out of 200 is really, really hard," he emphasizes. He says he would perform many kinds of tests before concluding what's controlling an insect population.

Hopper says that today nobody would introduce such a parasite. "With a host range of nearly 200 species!" he says. "That wouldn't even make the list of possibilities."

Elkinton, however, would like to see tighter regulations on releases. He says that he supports biocontrol "when it's done right."

Francis G. Howarth of the Bishop Museum in Honolulu, Hawaii, also worries about rogue biocontrol agents. He says, "I think this paper should be a wake-up call for the biocontrol community."

—S. Milius