

Pathogens chase down migrating gypsy moths

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Gypsy moth caterpillars killed by the fungal pathogen *Entomophaga maimaiga* hang on the trunk of an oak tree.

(PhysOrg.com) -- Cornell researchers discovered that the gypsy moth's fungal and viral pathogens follow close behind migrating populations, making control efforts unnecessary, reports entomologist Ann Hajek.

When the gypsy moth -- whose caterpillars have defoliated entire forests -- started spreading westward more than 100 years ago from New England to Wisconsin where they are now, Cornell researchers discovered that its fungal and viral [pathogens](#) followed close behind, reported entomologist Ann Hajek at a national conference last week.

The findings are important because gypsy moth populations 'can develop

unpredictably and erratically, with lots of caterpillars eating all the leaves off of most of the trees," said Hajek, Cornell professor of entomology, at the Cornell-hosted 8th Annual Ecology and Evolution of Infectious Disease workshop and conference, June 3-4. But now land managers can rest assured that pathogens will follow the migrating moths, providing controls.

Her talk, "Pathogens Chasing Spreading Host Populations," was part of the opening Epidemics and Pandemics session of the conference. Other session topics included Climate and Disease and Host as Habitat.

"We were pretty surprised ... no one knew how long it took the pathogens to chase their hosts," Hajek added.

Gypsy moths are slowly moving west across the United States after being introduced to Massachusetts from Europe in 1869, said Hajek. They migrate slowly because the females do not fly. By tracking the edges of the migration, where population densities are low, researchers have an opportunity to investigate how long it takes their viral and fungal pathogens to catch up, she said.

The [fungal pathogen](#) (*Entomophaga maimaiga*) was first reported in 1989 and attacks the caterpillars. Land managers gather fungal spore-containing caterpillar cadavers and spread them to try and control new populations of gypsy moths. The virus (*Lymantria dispar* nucleopolyhedrovirus), which was accidentally introduced near Boston in 1906, also infects gypsy moth caterpillars and is used in a spray by the U.S. Forest Service to control the moths in environmentally sensitive areas.

Hajek and colleagues studied "leading edge" populations of moths and pathogens in central Wisconsin in 2005-07. They set pheromone traps west of the migrating population and then traveled east to lay traps to

catch the flying males. Once their traps caught more than 74 moths each in one year, there was a more than 50 percent chance of finding the fungus in that area in the following year; when more than 252 moths were trapped in a year, there was more than 50 percent chance of finding the virus the next year.

"Our data show that the fungus spreads into lower density leading edge populations sooner than the virus, but the virus eventually colonizes the populations, too," Hajek said.

Fungal spores actively shoot out of the moth cadavers and disperse in the environment, thereby spreading quickly; the virus spreads from one caterpillar to another, and possibly via parasitoid flies and predators, which is a slower process, she said.

Hajek has also discovered that the efforts of land managers to release the pathogens along the leading edges of spreading moth populations are ineffective and unnecessary. Hajek and colleagues found no association between the release of pathogens nearby and presence of the pathogens among the moths.

"These results suggest that the pathogens are dispersing on their own and land managers don't need to release them in leading edge gypsy moth populations, because they'll get there on their own anyway," said Hajek.

Provided by Cornell University

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