

Taming the winter moth

By **Joseph S. Elkinton**/Special To The Tab
Wednesday, May 3, 2006

My laboratory at the University of Massachusetts in Amherst has embarked on an effort to control the winter moth, *Operopthera brumata*, a major new threat to our forests and shade trees. The winter moth is native to Europe and has recently invaded eastern Massachusetts and caused widespread defoliation of many kinds of deciduous trees, including all species of oak and maple. In addition, it represents a threat to blueberry and apple crops. Severe tree defoliation has occurred at sites near Cape Ann and throughout the South Shore and Cape Cod. It has probably been established in eastern Massachusetts for about a decade, but no one knows how it got here or exactly where it was first established. Until 2003, it was thought to be a native species, the fall cankerworm, *Alsophila pometaria*. Close examination of the adult females in December 2003 proved that it was neither fall cankerworm nor the Bruce spanworm, *Operopthera bruceata*, a native species that is very closely related to the winter moth. All three species are in the inch-worm family of moths that feed in early spring and then drop to ground in late May where they form earthen cocoons in the soil or forest litter. The adult winter moths emerge in November or December. The females have no wings. They climb the trunks of trees and produce a pheromone that attracts the winged males. After mating they lay eggs in bark crevices, which then hatch the following spring. Many people in eastern Massachusetts have been startled by the large numbers of male winter moths they have seen flying in early evening at Christmas time. This phenomenon accounts for the name winter moth.



Cyzenis albicans, a parasite of the winter moth, courtesy of Nicholas Conder, Canadian Forest Service, Victoria, British Columbia.

We believe we have an excellent chance to use natural controls to prevent future defoliation by winter moth and to convert it to a non-pest status similar to that of the hundreds of native caterpillar species that exist in our forests without ever causing outbreaks. Invasions of winter moth have occurred at other sites in North America, namely Nova Scotia in the 1950s and in the Pacific Northwest in the 1970s. In each case, a decade-long outbreak has been successfully and permanently controlled by the introduction of a parasitic fly called *Cyzenis albicans*, from Europe, where it is one of the naturally occurring parasites of winter moth. In Nova Scotia, they first released *C. albicans* in 1954. High levels of parasitism did not occur until 1961, but after that winter moth retreated to low density where it has remained ever since.

One of the most attractive features about *C. albicansis* that it specializes on winter moth and does not attack any other species with the possible exception of Bruce spanworm. That means that *C. albicansis* will not have any unintended effects on other species and when it suppresses winter moth densities, it will suppress its own density as well. People will be unaware that this fly is present in their back yards just as they are unaware of the many native species of parasitic flies and wasps that attack native insects in their yards.

In April 2005, we received about 5,000 winter moth pupae shipped to us from Victoria BC by colleagues in the Canadian Forest Service. Many of these pupae were infested with *C. albicansis*, and from this batch we obtained 832 adult flies of which about half were females. On May 4, 2005, we released 225 *C. albicansis* at a site in Wompatuck State Park in Hingham, where we have collected data on parasitism of winter moth since 2004. The remaining flies were held in the laboratory to produce eggs for production of more flies for next year. Based on similar work in Nova Scotia, we do not expect to see much, if any, parasitism for several years, because the eggs laid by a few hundred released flies are dispersed among the millions of winter moths at this site.

We believe that our efforts to control winter moth by introducing *C. albicansis* are almost guaranteed to work because the approach has already worked before at two other locations in North America. If so we will achieve permanent solution to the winter moth outbreak that will require no further expenditures once we get *C. albicansis* established. However, in order for the introduction to work within a reasonable time frame (e.g. five years) we must invest sufficient funds to be able to release several thousand *C. albicansis* from as many sites as possible each year. Otherwise it could be a decade or more before the parasitoid population catches up with the already huge winter moth population. Last year we estimated that there were approximately a quarter million winter moth eggs being laid in each tree. With several million trees infested, the estimated size of the winter moth population in eastern Massachusetts is several trillion!! It will take some years for a few thousand *C. albicansis* to multiply sufficiently to catch up. As with any biological control project, we must release a sufficient number of parasitoids at each site in order to assure that the next generation of parasitoids are abundant enough to find mates. Luckily the Massachusetts state legislature is considering a bill to provide the necessary funding for this initiative.

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