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Where Have All the Giant Moths Gone?

By Eric Olson, Senior Lecturer in Ecology at Brandeis University

Even for the most insect-phobic among us, certain butterflies and some moths are so big and so beautiful, they seem to attain the status of honorary birds. These are bugs with a fan base. Monarch butterflies are the rulers of this rarified elite, and for years various wildlife groups have been nominating monarchs to Congress as the National Insect.

As a boy, I was most enamored of the giant silkmoths, with their big caterpillars, showy adults, and common names drawn from the Greek myths, like Polyphemus, Prometheus, Io, Luna. With my maternal grandfather's help, I collected my first Luna Moth from a plate-glass window, and he helped me frame it between glass and a bed of cotton. I still have it today, 50 years later. Biking my newspaper route in a suburb of Detroit, I would watch for the surprisingly big frass pellets (deer droppings in size!) of giant Cecropia Moth caterpillars, and I'd sometimes return with my dad to hunt for them in the branches above. These experiences shaped my future in ways I could not have imagined, for they led eventually to a PhD in ecology and a dissertation on tropical insect dietary ecology. The caterpillar of choice for my field experiments was the Rothschildia Moth, a



Wild Luna Moth at rest. Memorial Day Weekend 2012, Lake Winnepesaukee, NH.

giant silkmoth found from Mexico to Brazil.

Unfortunately, New England's silkmoths are no longer as common as they once were, and that means fewer youngsters will share in the delights of raising their caterpillars or discovering the adults below their porch lights on an early summer morning. A

number of factors account for the rarity of these insects today, but one in particular – a biological control agent called *Compsilura*, deliberately introduced against Gypsy Moths, may well be the dominant cause. Its story serves as a cautionary tale as entomologists seek to control more recent insect invaders.

The Challenge of Invasive Insects

The story of *Compsilura* needs a bit of context to explain the “why” and “how” of biological control efforts aimed at invasive species like the Gypsy Moths. Many of us are all too familiar with invasive species. Dozens of Conservators and friends have joined in weed-pulls in recent years, aimed at garlic mustard, Japanese knotweed, and other non-native plants encroaching on Newton's open spaces. Go up a step in nature's food chain, though, to invasive insects like Winter Moth and Hemlock Woolly Adelgid, and we

amateurs are at a loss. Homeowners and local governments may succeed at control on a small scale, tree-by-tree, and volunteers can help to monitor the spread of Emerald Ash Borer and the Asian Long-Horned Beetle. But when it comes to intervening in a major way against insect threats, we have to look to professional entomologists and hope they come up with some means to stop or at least slow their spread.

Because of the highly mobile nature of insect invaders, most entomologists believe that biological control is the most cost-effective approach over the long term and is certainly better than spraying forests with broad-spectrum insecticides. A biocontrol program begins with researchers traveling to the place where an insect invader is native. There, in collaboration with local specialists, they work to identify all the enemies — especially the parasitoid wasps and flies — that have the potential to control a target insect. Once identified, some of these wasps and flies are brought back home, reared up in large numbers, and released into the wild with the hope that they will establish successfully. The initial cost of such programs can run into millions of dollars, but once a new natural enemy becomes established, costs drop to zero, as the insects reproduce themselves year after year.

This cheerful scenario is likely to cause some readers to cringe, and I can hear the questions now: “So you intend to control one non-native insect by introducing more? That sounds like a recipe for biological chaos.” The answer comes in two parts. First, some invasive insects are already wreaking chaos. It’s a bit late to say, “Just leave nature alone, and it’ll right itself.” We might lose all the hemlocks of North America, for example, as the adelgid continues its spread northwards, aided by warmer winters (another aspect of human-caused chaos). Second, entomologists have learned some harsh lessons from the mistakes of the past and are much more careful now about the kinds of biocontrol agents they propose for introduction.

I know of no better example of a past error that most entomologists wish they could undo than that of the tachinid parasitoid fly *Compsilura*, introduced years ago to control Gypsy Moths. The Gypsy Moth was brought from Europe to the US in 1868 by a resident of Medford, who had the notion that the US could have its own silk industry.

Some of his caterpillars escaped, and we’ve been suffering outbreaks of Gypsy Moths ever since. In the years to follow, in their desperation to halt defoliation events that left entire forests leafless, entomologists introduced a dozen species of Eurasian wasps, flies, and other natural enemies. *Compsilura* was one.



PHOTO: ERIC OLSON

A wild Cecropia Moth male mating with a reared female, through the chicken wire mesh of a cage placed out in the woods along the Charles River, 5 June, 2016.

Like other parasitoid flies, *Compsilura* females lay their eggs on or near a caterpillar, and the maggots burrow in and devour the caterpillar from the inside out. It’s a grim sight, but in a healthy ecosystem parasitoids do help prevent caterpillars from becoming too common.

The trouble with *Compsilura* is, first, there’s no good evidence it has any effect on Gypsy Moth outbreaks, and,

worse still, it is not a specialist, so it readily attacks our native butterfly and moth caterpillars. We now know that it attacks scores and probably hundreds of species of our native caterpillars. And sad to report, research in Prof. Joe Elkinton’s lab at UMASS Amherst has shown that populations of our native silkmoths are impacted by this killer fly. In a good faith effort to save New England’s forests, spectacular moths have been caught up in the entomologists’ version of friendly fire.

The good news is that Luna, Cecropia, Polyphemus, and others are not going extinct and appear to be in no danger of complete extinction. However, they certainly are rarer than they once were. Some still exist in Newton, though, and here’s how I know: each summer I raise Cecropia moth caterpillars in cages in my yard, keep the cocoons in my shed over winter, and the following spring, I set out newly emerged female moths in mating cages (see photo). During the night, a female moth emits her powerful pheromone to attract a male — and, of course, it works only if there are wild males around. I have tried this for two different years now, setting out reared females near the Blue Heron Bridge in West Newton. Both times, my Cecropia females have successfully called males — not on the first night, and not necessarily on the second night, but by the third night, a male has arrived.

Compsilura is not the only threat to these night insects — they also can become “stuck” at a streetlight and bang

into the light aimlessly instead of searching for a mate (males) or laying eggs (females). We're fortunate that these glorious insects are still hanging on in spite of all the various obstacles we've set in their way.

Would you like to help our native moths and butterflies? The best way to do so is to plant native trees and shrubs in

your yard and to help control invasive plants in Newton's parks. The caterpillars of most butterflies and moths cannot feed either on invasives or on many of the common plantings used by the nursery trade to landscape suburban properties. For more on making Newton more welcoming to native insects, read Prof Doug Tallamy's book, *Bringing Nature Home*, or visit www.bringingnaturehome.net. ■

President's Message

With high daily temperatures in the 40s and 50s as I write this note, it's hard to believe that Thanksgiving is almost here. New England asters and White Turtlehead (*Chelone*) flowers still are blooming in my garden. The first juncos of the season have arrived, but some grackles still have not started their journey south. It's great to be outside wearing just a sweater, but the thoughts of climate change rarely are far from my mind when the temperatures are so high in November.

On October 26, several Conservators' board members and advisors joined Boston University faculty and students to hear NC advisor Professor Richard Primack deliver the 2016 University Lecture titled "Walden Warming: Climate Change Comes to Thoreau's Woods" (also the name of Dr. Primack's book on the same topic).

By using bloom dates recorded at Walden Pond by Henry David Thoreau in the 1850s, Professor Primack was able to document the definite effects of climate change in our region. According to Susan Seligson of *BU Today*, "Even in light of other factors, such as development and loss of habitat, the changes at and around Walden reveal potentially destructive changes ranging from bird migration times to the ripening of the fruits those birds feed on."

In this newsletter, Eric Olson's article on moths and Brooks Mathewson's article on red-backed salamanders provide further distressing—but fascinating—evidence of the negative effects of climate change. Let's be inspired to conserve energy and to encourage our political leaders to do so on a larger scale—and to plan for how the state will deal with the higher ocean levels and other impending consequences of climate change.

Help Wanted

The members of the Newton Conservators' board are very grateful for all of our members.

It's time for annual membership renewal, and we hope to welcome everyone back to support our many projects for another year. As we plan for next year, we also need some help with specific tasks. There are two ongoing positions we'd like to fill.

- ▶ **Newsletter Editor:** An exciting challenge four times a year. Would you like to shape the conservation news that goes to Conservators' members? On-the-job training would be provided.
- ▶ **Walks Coordinator:** Assemble the popular walks that take place every fall and spring.

It's time to update the Conservators' Trail Guide. There are three limited-time projects connect to that task:

- Trail guide editor
- Trail guide designer
- Trail guide production person

As an associated project, we'd need a Web Designer to help to combine pages for Newton's open spaces on the website for the city's Conservation Commission with those on the Conservators' website (to which visitors to conservation areas can connect by means of QR codes on local signs). This would be a great project for a student!

If you can help us with any of those tasks, please reply to president@NewtonConservators.org.