

# Wandering the Woods with Matt

## A Hyperparasite and winning a double lottery

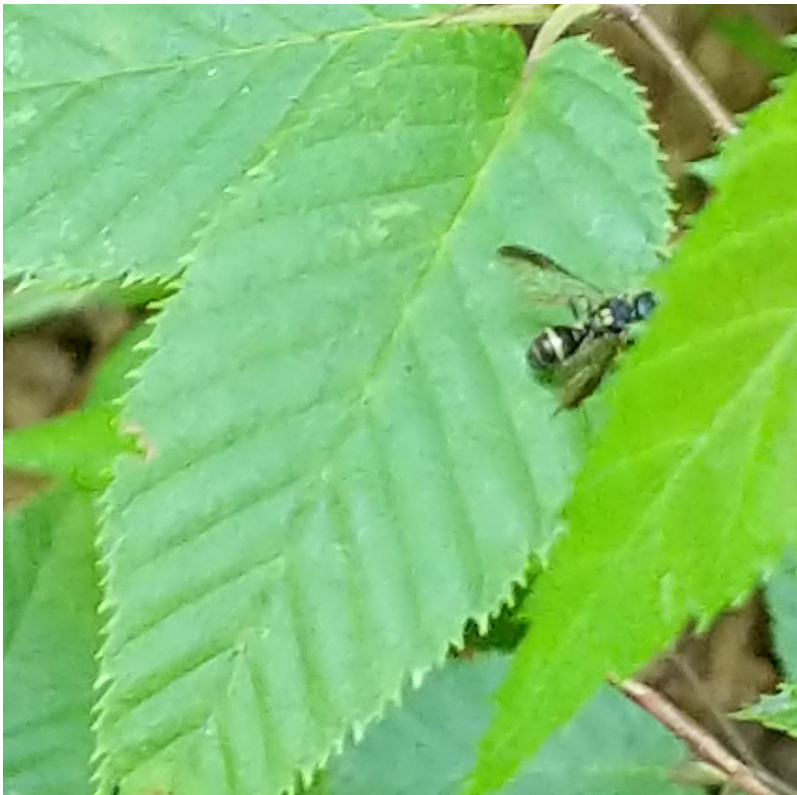
“Observation of the Week” - August 9, 2021

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As I was walking through the woods a few weeks ago during a monitoring visit to the Brodhead Hunting and Fishing conservation easement, I saw a small wasp behaving a bit unusually.

I have been paying pretty close attention to most life-forms I see for the last few years, and I can usually notice if I see something that looks different or is acting differently than what I’ve seen in the past. My eyes perk up a bit, my heart-rate increases and I try to photograph whatever it is that caught my attention before it flies away. Yes, I’m a bit obsessed, but I’m still finding new things every week.

In this case, the wasp’s movements drew my attention. The wasp would skitter around the top of a leaf, stop for a second or so, and then continue its skittering dance. Physically, the wasp seemed to have typical coloration, an assortment of yellow stripes and dots on a black body. The dark edges of the wings and transparent remainder seemed a bit unusual – almost as if it were mimicking the narrow wings of stinging social wasps like yellowjackets. With the near constant movement, I got the best photos I could, relatively crappy, out-of-focus photos, and hoped that they would be good enough for later identification.



And it turns out that they were good enough. The wasp was IDed as *Taeniogonalos gundlachii*. It is the only species in North America of its genus and one of just five members of the family, which are known as trigonalids. In the insect world, that is a species-poor family. (For comparison, a large genus might have 500 species. The most speciose genus in all of the animal kingdom, *Agilus*, contains over 3000 species).

The wasp was described as a hyperparasite. Parasite, I get – you’ll find them everywhere you look. Female Brown-headed cowbirds and cuckoos lay their eggs in other birds’ nests. Parasitic plants tap into other plants’ root systems. Ichneumonid and braconid wasps and tachinid flies lay eggs in other organisms, especially caterpillars.

Why just the other day, at our new Rail Gap Nature Preserve, I came across this parasitized caterpillar:



But enough of creepy caterpillars.  
Let's get back to our wasp...

So what is a hyperparasite?

They parasitize the parasites.

And how they do it makes you think, “That can’t possibly work,”  
but also reminds you of the ubiquity of parasitism in the natural world.

Ecologists think of reproductive strategies on a spectrum. At one edge are species that invest lots of time and energy in parental care: humans, elephants, bison. Their offspring are helpless when they are young, take a long time to reach sexual maturity, and generally require a lot of time and resources from the parents. These are known as r-selected species. At the other end of the spectrum are k-selected species. Offspring of these species probably never will see their mother and she provides little or no resources for them.

Hyperparasites are on the extreme k-selected end of the spectrum. The females are flying egg-laying machines. One female of a related genus laid 10,000 eggs over a 14 day period. Another gravid female was dissected and found to have 8218 mature eggs and an

undetermined number of immature eggs (side note – who are these ecologists who are counting eggs like this?!)

Source: <https://www.biodiversitylibrary.org/page/16145052#page/88/mode/1up>

Every few seconds, these females are squeezing out an egg, flying to a new leaf, squeezing out some more, always on the leaf margins.

The trigonalid wasp's whole reproductive strategy is based on two unlikely events. First, before the tiny eggs whither, a caterpillar has to happen upon the leaf on which the wasp's eggs were laid, then eat along that leaf margin and incidentally ingest the eggs. Second, that caterpillar itself also needs to be parasitized by a different parasite (this can include ichneumonid wasps, social wasps, tachinid flies, and probably others). In the meantime, the ingested trigonalid egg hatches inside the caterpillar, and the larval trigonalid wasp consumes the other parasite species before or as they are feeding on the unlucky caterpillar from the inside. It doesn't end well for the caterpillar either way!

As a hyperparasite, it seems like the lucky trigonalid has to win the lottery twice. First, to have her eggs eaten by a caterpillar, and second, to have that caterpillar also be the victim of a different parasite which then serves as the food source for the growing trigonalid wasp. Successful reproduction is so uncertain and unlikely for these wasps, in fact, that they actually reproduce asexually rather than relying on finding a mate (hey, one wasp can't be that lucky!) For this reason, trigonalid wasps are almost always female, and finding a male is extremely rare. Even still, for a female to successfully reproduce only one egg per every thousand or so she lays, winning the double lottery is her only real shot at success.

Check out the iNaturalist community for more observations of the trigonalid wasp. Explore the comments section for more research links and interesting information:

- <https://www.inaturalist.org/observations/88858244>
- <https://www.inaturalist.org/observations/88858170>

And for further reading:

- <https://news.mongabay.com/2014/03/wonderful-creatures-life-is-a-gamble-inside-a-caterpillar-for-the-trigonalid-wasp/>
- <https://bugguide.net/node/view/132680>

*Like to learn new things? Explore more of Matt's observations on our website:*  
<https://www.phlt.org/wandering-woods-series.html>