The Outside Story

If It Looks Like A Snail, It Might Be A Caddisfly

By: Declan McCabe

While sampling in the LaPlatte River, students noticed what looked like rough black pebbles about the size and shape of well-worn pencil erasers. I suppressed my mild distress as they started to discard the 'pebbles;' when sampling aquatic insects, I discard little.

I gathered the students around and balanced one of the pebbles on my finger and simply said "watch." Shortly thereafter, the pebble was making its way off my fingertip seeking wetter and cooler places.

We placed several of the animals in dishes and distributed them along with hand lenses. Discoveries and observations were made on all sides. "When you see it up close, it's obviously a snail." "Hang on, it seems to have legs." "It just blew a bubble out the back end." "Hey, they pull back into the shell if you poke them." "Somehow they stick to my forceps."

Unplanned observations testing no particular hypothesis are essential components of field biology. The animals were snail-cased caddisflies, *Helicopsyche borealis*. When empty cases were first observed, a biologist described them as snails with the unique ability to incorporate sand grains into their shells.

The truth is more interesting. Caddisflies in the genus *Helicopsyche* bind sand grains together to make protective cases. Case making is common in caddisflies, but snail-shaped cases are unique to just one genus, at least in North America. That snails and caddisflies have evolved to produce very similar protective structures is a remarkable example of convergent evolution.

In common with snail species, *Helicopsyche* shells, or cases, generally coil in one direction. When Robert Hinchliffe and Richard Palmer from the University of Alberta examined 150 *Helicopsyche* cases from the Royal Ontario Museum collection, they found that all coiled to the right. When I look at preserved specimens in my collection, I have yet to see any coiled to the left, but now I'm inspired to look more carefully.

As my students looked carefully at their specimens, they made observations I can't make from pickled samples; for example, the bubble that escaped from one case. Like many caddisflies, *Helicopsyche* larvae wriggle to create small water currents through their cases. This brings in oxygenated water and flushes away caddisfly waste. The waste produced by a single *Helicopsyche* must be scant indeed; but in aggregate I'm sure that their output, together with that of other species grazing on the rocks of the LaPlatte River, provides organic matter for an array of other tiny organisms that eke out their existence by gathering or filtering particles from the water.

Helicopsyche larvae eat periphyton – a blanket term that refers to the algae, diatoms, bacteria, and fungi that grow on clean rock surfaces. In some situations, the snail-shaped *Helicopsyche* case serves as a mobile garden. Jennifer Cavanaugh and colleagues from the University of Wisconsin discovered that larvae from one caddisfly species grazed periphyton right off the cases of their peers. It would be interesting to see if *Helicopsyche* cases provide similar movable feasts in the LaPlatte River.

Why the caddisfly cases stuck to students' metal forceps proved to be the most challenging question of the afternoon. My first thought was that the caddisflies were grabbing on with their six limbs, as river insects do. My students rapidly disabused me of this simplistic notion. I was schooled when one student showed me that even when the insects were completely withdrawn into their protective armor, the cases seemed magnetically attracted to the forceps.

Magnetism proved to be the answer. After preserving some *Helicopsyche* cases in alcohol, and bleaching off the periphyton, the mystery was solved. The now empty cases still clung to metal. On examination under the microscope, small black grains were present among the brown and white sand grains. And when I carefully disassembled the cases, and dissected out the black grains, only the black grains were attracted to the forceps. The caddisflies had incorporated some magnetite into their cases.

We counted our caddisflies and other insects before returning them to the stream. Data sheets were filled, metrics of biodiversity calculated, and hypotheses tested; this was the planned point of the trip. But a great many more interesting lessons were learned simply by watching an insect as small as a shirt collar button. I like that it was many people looking closely and that each person noticed something different – the best part of an overall lovely afternoon, I thought.

Declan McCabe teaches biology at Saint Michael's College. His work with student researchers on insect communities is funded by Vermont EPSCoR's Grant NSF EPS Award #1556770 from the National Science Foundation. The illustration for this column was drawn by Adelaide Tyrol. The Outside Story *is assigned and edited by* Northern Woodlands *magazine (www.northernwoodlands.org) and sponsored by the Wellborn Ecology Fund of New Hampshire Charitable Foundation (wellborn@nhcf.org).*

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