

The Outside Story

Phantom Midges: Late Night Feeders

By Declan McCabe

Phantom midges are among the most common, but least seen, planktonic insect larvae in lakes and ponds. These members of the genus *Chaoborus* earn the “phantom” moniker from both their unique appearance and their unusual behaviors.



Measuring nearly an inch long, phantom midges are virtually impossible to see. Their almost transparent bodies warrant another common name: glass worms. Other than a small eyespot, their most visible structures are two pairs of air-filled sacs. Those sacs facilitate the midges’ ability to move through the water vertically.

Phantom midges rise to the lake surface for midnight snacks. Their late-night tendencies are another reason humans rarely see them. Finding them, however, is reasonably easy, particularly if you are camping or living near a lake or pond. To join the hunt, you need a bucket, a headlamp, and a pair of nylon stockings.

Head to your nearest lake well after dark, and dip some water into your bucket. Pour the water through the nylon stockings – and repeat. The more water you pour through the stockings, the more plankton you will accumulate. After you’ve collected the plankton, add a little water to your bucket, and turn the nylons inside out to rinse the concentrated plankton into your bucket. A white bucket helps the plankton stand out.

Why is night time the right time for phantom midges? It comes down to food and predators. Phantom midges occupy the middle of the food chain. At the food-chain base, algae harness solar energy to string carbon atoms into sugars and starches. Algae are eaten by small zooplankton, including water fleas and mosquito larvae. These tiny animals are eaten by phantom midges, which in turn are eaten by small fish.

Because the sun drives the system, most food is near the surface, where light penetrates – and phantom midges must be up there to feed. But the light presents a problem: fish that eat phantom midges are visual predators, so visible midges become dead midges. The solution for phantom midges is to dine near the surface at night, and spend daylight hours at the murky lake bottom, where hiding is easier and

low oxygen concentrations exclude most fish. Phantom midge species that don't migrate and are found only in fishless lakes.

Reasons for phantom midge migration are well known, but how this feat is accomplished remained mysterious until recently. In January 2022, Evan McKenzie from the University of British Columbia and colleagues described a unique buoyancy control mechanism in these larvae that comes down to acidity. After a night's foraging near the surface, the larvae increase the acidity surrounding their air sacs, which causes bands of a protein called resilin to contract, compressing the gas in the sacs. Compressing the air sacs makes the organism denser than water, and the larvae sink. The system reverses to alkaline at night and – presto! – the larvae bob back to the surface.

Phantom midges are superbly adapted both for vertical migration and for capturing prey. In deep lakes, they travel hundreds of feet during a daily commute that takes them from the security of the lake floor to open water densely stocked with delectable snacks.

When the larvae arrive closer to the surface, they hunt until dawn drives them back to depth. Like other true fly larvae, phantom midges lack legs to tackle prey. Instead, their antennae have evolved raptorial function that would make Hugh Jackman's Wolverine claws in X-Men look positively tame. Part grappling hooks, part impaling devices, these multi-tool antennae work with the larva's mandibles to pierce and crush prey items that will nourish larvae onto their next life stage.

When the time comes, the midges pupate until it is time to emerge as adult midges. These adult midges are non-biting, but may indulge in some nectar sipping. It is for this brief portion of their lifecycle that they may finally come to the notice of people – as clouds of small flies on a summer's evening. These flies live for a few days, then lay rafts of eggs on the water surface to complete their life's mission before succumbing and, perhaps, at last becoming fish food.

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