THE GREAT OUTDOORS

Craters made by antlions. At the center of the conical beneath the ground lurks the tiny predator, an antlion. Photo by author.

Funnels of Death:

Antlions, or doodlebugs, are fun to watch – unless you're the ant that's being captured by its trap.

By J. Morton Galetto, CU Maurice River

Our subject creature today is the antlion or doodlebug. University of Florida entomologists inform us that there are 22 species in the Eastern United States, while worldwide there are evidently about 2,000 species in the family.

The lacewings, antlions, owlflies, and their relatives comprise the insect order known as Neuroptera, which have evolved likely from a common ancestor. Fossilized evidence is scarce at best, but larvae preserved in amber have allowed for comparisons between extinct and extant species. Studies show they date back to Triassic, Jurassic, and even Permian Periods, possibly as long as 290 million years ago. For comparison our hominid predecessors date back about 200,000 to 300,000 years.

My first introduction to antlions was with entomologist Pat Slavin in the mid-eighties on a field trip. He asked me if I was familiar with them and I was admittedly clueless. He explained that in larval form these insects excavate elaborate sand funnels to entrap ants, beetles, termites, and other insect cohorts. As such they are fossorial and out of view – camouflaged by grains of sand. Unsuspecting surface-dwelling victims are trapped in their sandy funnel. To illustrate his point he took a pine needle and gently stroked the side of the conical-shaped pit we were observing and the bottom of the pit appeared to leap up. “Lions, oh my!” - I was hooked.

Their common name, doodle bug, comes from the trail in the sand that

they leave as they travel about on the soil's surface in an erratic backwards motion. The antlion name is earned because they lie in wait for a victim, attacking it with crushing jaws - more correctly pinchers.

Note the antlion's pincers that it uses to grasp its victim and suck it dry. Photo credit: Dr. Michael J. Raupp, Ph.D., On-line "Bug of the Week."

They are considered beneficial insects because they eat garden pests. Evidently they are purchased by gardeners and even by pet enthusiasts! Do they bite? Well, they can, but they are unlikely to unless you specifically stress them. And the discomfort of their bite lasts only a few minutes. Or so I'm told.

Antlions run backward in rings, flinging sand, to dig a tiny conical-shaped hole. Pits I have seen vary in size from ¾ -2 inches across and about an inch deep.

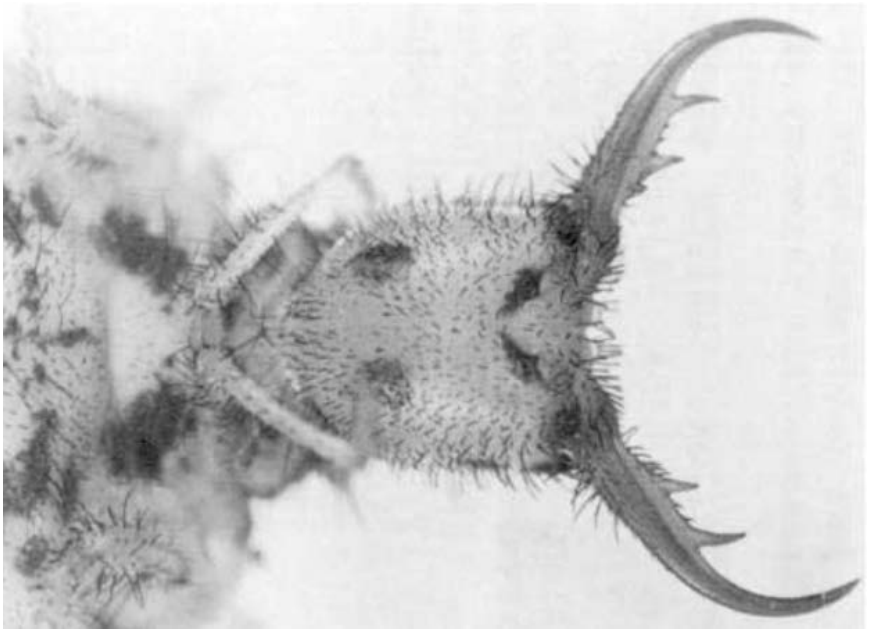
The angle of the pit's sides are designed such that loose grains of sand will roll to the crater's bottom with the slightest disturbance. Prey finds it difficult to escape the pit as the sides are continually undermined with each step. Grains of sand fall like a landslide and the victim tumbles downward with them.

To further ensure capture the antlion stays at the center of the conical pit's base, covered by a thin layer of sand, often with its pinchers above-ground. It tosses grains of sand upwards with its head and large pinchers. Being pelted by sand increases the difficulty level for the victim trying to navigate its way out of the tapered hole. It also further destabilizes the side wall of the funnel-shaped pit, causing the prey to lose its purchase so that the larval antlion can finally grab it with its long pinchers/mandibles.

I have watched many an ant captured in such a fashion and seen it slowly disappear beneath the soil's surface, as if in quicksand, as the predatory antlion drags it beneath the soil. Antlions can eat approximately 22 ants per day.

Once the antlion has its victim in its pinchers it injects venom that paralyzes it. Then it adds enzymes that break down the innards, allowing it to sip the

liquified meal in a straw-like fashion, much like a spider digests its meal. Once drained, the hollowed-out exoskeleton is tossed out of the lair in the same fashion as sand was excavated to make the trap. The antlion restores the walls to the proper angle and again awaits another unsuspecting creature.



This magnification of the antlion larva Glenurus gratus shows its head and mandibles. Photo: Dept. of Agriculture, Division of Plant and Industry, FL.

Glenurus gratus, one species of antlion native to NJ, spends most of its life in the larval stage - about 2 years. It lives in tree trunks and at the bottom of sand pits as already described. Under the sands it will make a ½ inch cocoon in which it transforms to its adult form after about four weeks.

The adult form looks a bit like a damselfly with antenna, and lives about four weeks. In this stage they nectar on pollen and eat other insects. The adult lays eggs from which the larva pupates. The larva molts three times and takes up the hunting activity in pits and in the trunks of trees. The lifecycle of adult, egg, larva, cocoon, pupa and once again adult is the same for all antlions, but I suspect the time frame and size varies from species to species.

Glenurus gratus lives about four weeks as a winged adult versus up to tow years in the larval form. Photo: A. Reago and C. McClarren, Flickr.

The adult *Glenurus gratus* has a wingspan up to about 3.7 inches and a body length of about 2 .4 inches. They are weak flyers, nocturnal and primarily seen by night lights. Adults feed on aphids and caterpillars. From my limited investigation I believe other

species of antlion are similar in regards to flight, and also eat small insects.

French scientists Fertin and Casas studied the construction of antlion traps for efficiency of capture. Their physical analysis of the architecture and observations of this predator's behavior resulted in some interesting conclusions. They found that the most effective traps guided prey right into the mandibles of the antlion, and attacks/sand tossing were often unnecessary to deliver the meal into its jaws. They studied angles of the repose and height of walls, analyzing the minimum angle at which the prey would tumble down the funnel, in other words what shape produced the best landslides. As you would rightfully guess the correlation between conical size and prey size plays a major factor in trap effectiveness. People study these biomechanics in order to discover what might later dictate useful design details for various other mechanisms. I suppose uses are limited only by one's imagination. Nature is an amazing architect on which we can rely for both inspiration and solutions.

So antlions are really cool garden beasts, but as far as pets, I'll admit I'm sticking with dogs, thank you!

(please scroll for sources)

Sources:

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