

## The Artful Architects of Subterranean Pits

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### Abstract

Antlions are interesting insects best known for their grub stage, during which they dig pits in the sand to catch ants and other prey. Antlions are part of the order Neuroptera and family Myrmeleontidae. They go through four stages: egg, grub, pupa and adult. The grubs are predators that trap insects in their pits and use a special toxin to paralyze them. Antlions help keep insect populations in check and live in dry sandy areas. This review highlights the unique life cycle and behaviours of antlions, showing their importance in nature.

**Keywords:** Antlions, Pit-building, Predation and Ecological role.

### Introduction

Antlions are remarkable insects renowned for their grub stage, where they construct pits to trap prey, predominantly ants. Antlion typically refers to this grub stage, characterized by predatory behaviour and unique morphological adaptations. Found globally in dry, sandy environments, antlions have a distinct life cycle and ecological role. This article delves into the systematic classification, behaviour and ecological significance of antlions, emphasizing their pit-building prowess and interactions with other species.

### Systematic Classification

**Domain:** Eukaryota

**Kingdom:** Animalia

**Phylum:** Arthropoda

**Class:** Insecta

**Order:** Neuroptera

**Superfamily:** Myrmeleontoidea

**Family:** Myrmeleontidae

**Genus:** Myrmeleon sp.



Antlion Sand Pit Traps



Antlion Laying Eggs in Sand



Grub



Pupa



Adult

## Biology of antlions

### Order Neuroptera

Antlions belong to the order Neuroptera, commonly referred to as nerve-winged insects due to the intricate pattern of veins in their wings. This order includes various predatory, nocturnal species such as lacewings, alderflies, snakeflies, and dobsonflies. Antlions, specifically, are part of the family Myrmeleontidae, which comprises over 600 described species.

### Life cycle

Antlions undergo complete metamorphosis with an egg, grub, pupa and winged adult

#### Egg

Ant lions undergo complete metamorphosis. "The life cycle begins with the female laying eggs in suitable soil, tapping the egg-laying spot with her abdomen before inserting her ovipositor into the ground to deposit the eggs.

#### Grub

The grub stage, where antlions are predatory, involves the construction of funnel-shaped pits in loose, sandy soils. With a low metabolic rate, they can survive extended periods without food and hibernate in their pits during winter.

**Pupa**

Upon reaching maximum size, the grub forms a round cocoon buried deep in the sand. After approximately 30 days, they emerge as adults.

**Adult**

The adult antlion can be easily recognized by its long, clubbed antennae, setting it apart from a damselfly. It flies weakly and flutters around at night to find a mate. The adult does not eat and lives for about 20-25 days, sometimes up to 45 days. Mating is essential to keep its species going. The most interesting part of its life cycle starts when the female lays her eggs in the sand, and the grub hatch from these eggs.

**Antlion grub behaviour: Digging the pit**

The ant lion grub constructs its pits in dry, sunny areas that are shielded from wind and rain, typically on south-facing slopes. It prefers soil that is light and easily movable. To create the pit, the grub begins by drawing a circular outline on the ground, then spirals inward while digging deeper, using its head to throw out the excavated soil. Within about fifteen minutes, the grub has formed a funnel-shaped crater. It then hides at the bottom of the pit with only its head exposed, waiting for prey. The size of the pit is influenced not by the grub's size but by its level of hunger; the longer it has been without food, the larger the pit it digs. Additionally, ant lions exhibit a monthly rhythm, making larger pits during the full moon, with a cycle of approximately 29.5 days

**GroEL protein and antlion predation**

Antlions capture and feed on other insects by first paralyzing them with a toxin produced by bacteria in their salivary glands, which is then used to suck out the prey's bodily fluids. This paralyzing toxin is similar to GroEL, a heat-shock protein found in the bacterium *Escherichia coli*, where it functions as a molecular chaperone. In antlions, the GroEL protein might interact with insect receptors to induce paralysis, suggesting that this protein could have evolved its insecticidal role to benefit the symbiotic relationship between the antlion and its bacteria. It remains unclear whether such insecticidal proteins are also produced by endosymbionts in other fluid-feeding predatory insects.

**Ecological role**

Antlions play a crucial role in their ecosystems by controlling insect populations. Their pits are commonly found in sandy washes and riverbeds, particularly under trees or



overhanging rocks. Despite their ferocious appearance, antlion grub pose no threat to humans and are fascinating to observe in their natural habitat or captivity.

### **Effect of rain on antlion pits**

Climate and landscape changes impact the abundance and behaviour of antlions. During the rainy season, trap construction is influenced, and traps are smaller compared to those in summer, allowing ants to escape more easily.

### **Do antlions bite? Are they dangerous?**

While antlions can bite if threatened, the pain is usually short-lived. They are harmless to humans, pets, and gardens, and their presence can help manage ant populations. Adult antlions feed on pollen and nectar and are not a threat to plants.

### **Interrelationship with other insects**

Ant lions serve as hosts for parasitic insects. For example, Australian horse fly grub share the benefits of trapping food in antlion pits, and chalcid wasps parasitize antlion grub by ovipositing into the membrane between the grub's head and thorax.

### **Conclusion**

Antlion grubs, known for their predatory behaviour and unique pit-building abilities, play a significant role in managing ant populations. While the grub are voracious predators, adult antlions are harmless, contributing to the ecological balance. Their fascinating life cycle and interactions with other species underscore their importance in the natural world.

### **References**

- Busse, S., & Buscher, T. H. (2021). "The functional morphology of antlion larval mandibles and their role in prey capture." *Journal of the Royal Society Interface*, 18(182), 20210539.
- Griffiths, D. (1980). "The feeding ecology and behaviour of ant-lion larvae." *Journal of Animal Ecology*, 49(1): 99-110.