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Larval morphology of the antlion *Myrmecaelurus trigrammus* (Pallas, 1771) (Neuroptera, Myrmeleontidae), with notes on larval biology

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Abstract

Morphology and behaviour of third instar larvae of the Holomediterranean antlion species *Myrmecaelurus trigrammus* (Pallas) are described. Larvae are facultative pit-builders, they either ambush their prey at the surface, or dig pitfall traps that prey fall in to. Dark brown spots on dorsal and ventral sides of the head and on dorsal side of the thorax are characteristic of the larvae. Eye tubercles are not prominent. Jaws are equipped with long bristles, campaniform sensilla, sensilla coeloconica, and digitiform sensilla. A unique feature is the shape of the tips of all three teeth that is screw-like with a polyhedral surface. The body surface is covered with longitudinally grooved bristles and plumose hairs. On the tip of the antennae and on terminal and subterminal parts of labial palps sensilla basiconica occur. On the 9th abdominal segment there are two bulges, each of them bearing four digging bristles. Non-prominent eye tubercles and numerous mandibular bristles are morphological traits of pit-builders. Most of the behavioural traits are related to pit builders, whereas forward movement, waiting for prey without a pit and frequent changing of ambush location are traits of non-pit builders.

Key words: Sensilla coeloconica, sensilla basiconica, campaniform sensilla, digitiform sensilla, facultative pit-building antlion

Introduction

Antlions (Myrmeleontidae) are the largest family of Neuroptera, with about 2000 described species occurring on all continents and most large islands of the world (Stange 2004). Larval antlions have adopted a variety of predation strategies (Mansell 1996, 1999). Only a few antlion species build pitfall traps, and this is considered to be the most specialized strategy for capturing prey (Mansell 1996, 1999; Gepp 2010).

The antlion genus *Myrmecaelurus* Costa includes 50 species and is confined to central and southern Europe, North Africa, and large parts of Asia (Aspöck *et al.* 2001; Stange 2004). The only European species, *Myrmecaelurus trigrammus* (Pallas, 1771), has a Holomediterranean distibutional pattern (Aspöck *et al.* 2001).

The oldest description of a *M. trigrammus* larva dates back to the second half of the 19th century when Redtenbacher (1883, 1884a,b) presented its morphology. In three further descriptions only a few details concerning larval morphology were presented (Doflein 1921; Steffan 1975; Mirmoayedi 2008). Solid depictions of third instar larvae of *M. trigrammus* were provided later (Willmann 1977; Gepp 2010; Krivokhatsky 2011; Badano 2012), thereof two excellent descriptions based on antlions from the Dodecanese Islands (Willmann 1977) and from Italy, Romania and Turkey (Badano 2012). Notes on behaviour of the larvae are given by Doflein (1921) and Popov (1984).

The larva of *M. trigrammus* is unique among antlions. Its behaviour has been studied in detail because it combines two prey-capture methods; it either ambushes its prey at the surface, or digs pitfall traps that prey fall in to (Doflein 1921; Popov 1984). The use of one capture method or the other depends on a combination of the influences of past net energy gain and the antlion's most recent change in encounter rate with prey, as it was demonstrated for an unidentified Israeli *Myrmecaelurus* species (Elimelech & Pinshow 2008). Thus, the larva of

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