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Larval morphology of *Epomis circumscriptus* (Duftschmid 1812) and of first instar *E. dejeani*, Dejean, 1831, (Coleoptera, Carabidae, Chlaeniini), with morphofunctional remarks

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Abstract

The larval stages of *Epomis circumscriptus* (Duftschmid 1812) and the first instar of *Epomis dejeani* Dejean, 1831, are described and illustrated for the first time. *Epomis* adults were collected in Israel and larvae obtained *ex ovo* under laboratory conditions. The larvae have an unusual mandibular morphology, with a long-hooked retinaculum in the first instar. This character is probably linked to the predatory habits of these carabids, which feed on body fluids and inner tissues of amphibians. The genus *Epomis* deserves an isolated position within Chlaeniini, and a new diagnosis for the larvae of this tribe is proposed. The life form of *Epomis* larvae seems intermediate between "surface runners" and "walkers".

Key words: Ground beetles, Chlaeniini, larvae, description, life forms, anurans

Introduction

In this paper, the larval morphology of two chlaeniine ground beetles, *Epomis circumscriptus* (Duftschmid) and *dejeani* Dejean (first instar), is described for the first time. The genus *Epomis* Bonelli includes about 20 species widely distributed in the Mediterranean region, in the warm parts of the Palearctic area (Japan, Korea and other countries of Southeast Asia) and in Africa (Jeannel 1942; Kirschenhofer 2003; Vigna Taglianti 1993; Kryzhanovskij *et al*. 1995). The first *Epomis* larva was described by Kurosa (1959), while the third stage of *E. dejeani* was recently described by Makarova (2005).

The larval morphology of *Chlaenius* and related genera has been studied by several authors: the first descriptions were by Schiødte (1867) on *Chlaenius vestitus* and *nigricornis*, and many Chlaeniini taxa were subsequently reported on by Raynaud (1934), Boldori (1940), Habu & Sadanaga (1965), Hůrka (1966), Luff (1980; 1993), Zetto Brandmayr *et al*. (2000) and Bonacci *et al*. (2005; 2007).

The specimens used in this study were made available by Avital Gasith and co-workers (Gil Wizen and Alex Shlagman; Department of Zoology, Tel Aviv University), who investigated the predatory habits of *Epomis* larvae in Israel for five years. They found that both *Epomis* species live around small rain pools on clayey and sandy soils in habitats where *Bufo viridis* and *Hyla savignyi* breed (Elron *et al*. 2007). Field and laboratory observations by Gasith and co-workers (2005-2009) showed typical predation on juvenile anurans (*Bufo viridis* and *Hyla savignyi*) by all three larval stages.

Here we provide a new diagnosis for the genus *Epomis* within the Chlaeniini. The larval characteristics of the two *Epomis* species are also interpreted from a morphofunctional point of view.

Materials and methods

Six larval individuals (N = 3 L1, N = 2 L2 and N =1 L3) of *Epomis circumscriptus* were reared in the laboratory (by Gil Wizen and Alex Shlagman) from adults collected in February 2006 at Dora site, 32° 17'

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