



Fine morphology of the myrmecophilous larva of *Paussus kannegieteri* (Coleoptera: Carabidae: Paussinae: Paussini)

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Abstract

After one century, the third instar myrmecophilous larva of *Paussus* (*Semipaussus*) *kannegieteri* Wasmann 1896 (Coleoptera, Carabidae, Paussinae, Paussini), is redescribed and illustrated according to modern scientific standards. A fine morphological study performed with the aid of both light and scanning electron microscopes, reveals the presence of several peculiar types of trichomes, sensilla, glandular pores and other cuticular structures often overlooked by previous authors. These microstructures, especially those connected to myrmecophily, greatly vary among the taxa of Paussini known at larval stage (mainly *Arthropterus* vs. *Paussus*+*Platyrhopalopsis*), indicating that different strategies for interacting with ants may have evolved within this tribe. They also seem to be good candidates as diagnostic taxonomic characters within the genus *Paussus* Linnaeus 1775. The possible function of these and other derived structures of the *P. kannegieteri* larva are discussed.

Key words: larval taxonomy, functional morphology, sensilla, glands, myrmecophily, S.E.M.

Introduction

Paussini is a pantropical monophyletic tribe, belonging to the subfamily Paussinae (Coleoptera, Carabidae). The tribe is classified into 6 subtribes, 22 genera and about 565 described species (Lorenz 2005), and is the most speciose of the four tribes (Metriini, Ozaenini, Protopaussini and Paussini) into which the subfamily is generally divided. Members of this tribe are myrmecophiles (obligate guests of ants) with morphological adaptations for living in ant nests, during at least a portion of their lifecycle (Darlington 1950; Nagel 1979, 1997; Di Giulio & Moore 2004; Geiselhardt *et al.* 2007).

Paussinae share a unique type of larva defined as “discotelic” for the presence of a wide, transverse, plate-like structure at the end of an up-curved abdomen (see Fig. 25). This structure, usually called the “terminal disk” (Di Giulio 1999; Di Giulio *et al.* 2000), is composed of three pairs of plates: two dorsal plates (abdominal epipleurites IX fused with tergum VIII), two smaller lateral plates (abdominal epipleurites VIII), and two modified urogomphi (branched in Metriini and Ozaenini and flattened in Paussini). The terminal disk is an apomorphy of the subfamily (Bousquet 1986). According to laboratory and field observations, the terminal disk of free-living Metriini and Ozaenini larvae is used to trap prey through an ambush feeding strategy, after prey are attracted to it by pleasant substances secreted from pores on the disk (Costa *et al.* 1988; Di Giulio 1999, Di Giulio & Vigna Taglianti 2001). This ambush feeding strategy was hypothesized to be a pre-adaptation for the evolution of myrmecophily within the subfamily, suggesting that larval myrmecophily predates the evolution of adult myrmecophily in the Paussinae (Di Giulio 1999; Di Giulio & Vigna Taglianti 2001). The terminal disk most likely functions as a symphylic organ in myrmecophilous larvae of Paussini (Bøving 1907; Oberprieler 1985; Bousquet 1986; Luna de Carvalho 1989; Di Giulio & Moore 2004).