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Redescription of late-instar larva of *Ptinella aptera* (Guérin-Méneville, 1839) (Coleoptera: Ptiliidae)

PAWEŁ JAŁOSZYŃSKI
Museum of Natural History, University of Wrocław, Sienkiewicza 21, 50-335 Wrocław, Poland. E-mail: scydmaenus@yahoo.com

Abstract

The late-instar larva of the featherwing beetle *Ptinella aptera* is redescribed. A coding system for chaetotaxic structures for ptiliid larvae is proposed and possible serial homology of setae across body segments is discussed. Previous, fragmentary and inaccurate descriptions of larval stages of *P. aptera* are discussed. The structures of immature *P. aptera* are compared with those of *P. tenella* and possible homologies and differences are indicated.

Key words: Coleoptera, Staphylinoidea, Ptiliidae, *Ptinella*, larval morphology, chaetotaxy, Palaearctic

Introduction

The current state of knowledge of immature featherwing beetles (Ptiliidae) shows an interesting paradox. On the one hand, descriptions of larval ptiliid morphology are relatively scarce and mostly incomplete, presenting only selected structures, and even if the chaetotaxic characters were illustrated with sufficient care for detail, they were not formally coded and annotated for the purpose of comparative analyses. On the other hand, as the world smallest beetles, Ptiliidae attracted some attention as interesting subjects to study possible adaptations toward body miniaturization and fine anatomical details of selected larvae were comprehensively described. The early works of Perris (1846, 1853, 1862), Matthews (1872), Böving & Craighead (1931), Paulian (1941) or Hinton (1941) provided basic knowledge on immature featherwing beetles, but the most valuable works belonging to the first above-mentioned category include the so far most comprehensive treatment of a number of genera by Dybas (1976), papers by De Marzo (2002a, 2002b) and Kilian & Burakowski (2000); some illustrations of selected structures can also be found in Hall (1999). Predominantly anatomical studies with a wealth of detailed data on internal organs, including the musculature and architecture of vital systems were published by Grebennikov & Beutel (2002) and Polilov & Beutel (2009). The most complete illustrations of chaetotaxic structures were presented by Kilian & Burakowski (2000) for the larva of *Nossidium pilosellum* (Marsham, 1802) and Grebennikov & Beutel (2002) for immature *Ptinela tenella* Erichson, 1845. However, the chaetotaxic characters in Kilian & Burakowski (2000) were not coded, and the unique numerical coding adopted by Grebennikov & Beutel (2002) was developed to enable detailed descriptions in that paper, and not as a chaetotaxy system for ptiliids. Yet, even a simple numerical annotation of setae highly facilitates comparative study and discussions, as experienced by the author of the present paper while attempting to compare the chaetotaxy of the larva redescribed below with that of *P. tenella*. This task appeared technically difficult without at least a preliminary attempt to employ a rational coding system.

Although the larva of *Ptinella aptera* (Guérin-Méneville, 1839) was described by Perris (1853) and again by Paulian (1941), these papers lack detail, are inaccurate and do not allow for the species identification. Moreover, Paulian (1941) illustrated structures that have never been observed by later authors in any genera of ptiliids (discussed by Dybas (1976)). During a field research I had an opportunity to collect a larva accompanied by numerous adults of *P. aptera*; the larva highly resembled that of *P. tenella* described by Grebennikov & Beutel (2002). Structures of this specimen are described in the present paper, and to compare the chaetotaxic characters and to facilate further studies a system for coding chaetotaxy is proposed.

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Beutel (2002) focused on *P. tenella*. This paper includes not only the external morphology but also internal structures, and gives details about differences between two possible instars identified (presumed first-instar and advanced stage larvae). Two instars were also postulated for *P. mekura* by De Marzo (1996), who based his conclusions on the morphometric analysis of the head width and length of the urogomphus; however, not all larvae were possible to unambiguously assign to two main size groups. The older-instar larva of *P. tenella* is highly similar to *P. aptera* in the chaetotaxic characters, with most of setae possible to homologize between these two species. Major differences include (numeric code numbers of *P. tenella* after Grebennikov & Beutel (2002)): head capsule in *P. aptera* without equivalents of setae *12, 20, 27*; antennomere 3 in *P. aptera* with one apical seta (*A*) instead of two (*37*, *39*); maxilla in *P. aptera* with mesal seta near base of mala (absent in *P. tenella*); tibiotarsus in *P. aptera* with seven setae (six in *P. tenella*; equivalent of *Da1* missing); protergal plate in *P. aptera* with two lentiform structures along posterior margin (three pairs in *P. tenella*); meso- and metatergal plates in *P. aptera* without anterior lentiform structures (each with a pair of lentiform structures along anterior margin in *P. tenella*). There are also differences in the setae and lentiform structures on abdominal segments; listing all of them remains beyond the scope of the present study.

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