

Are Dermaptera the hosts of the genus *Orionis* S.R. Shaw (Hymenoptera: Braconidae: Euphorinae)?

BY LENNART BENDIXEN & MARK R. SHAW

LB: *Parades 3b*, 24405 Mohrkirch, Germany; email: lennartbendixen@gmx.de
MRS: National Museums of Scotland, Chambers Street, Edinburgh EH1 1JF, U.K.;
email: markshaw1945@gmail.com (address for correspondence)

Article history: Received: 23 July 2024; Accepted: 23 July 2024; Published: 25 October 2024

ABSTRACT

An observed and photographed instance of apparent oviposition by the euphorine braconid *Orionis coxator* into an adult female of the earwig *Apterygida albipennis* is reported from Saxony, Germany. If verified by future work this would be the first host known for the genus *Orionis* and the first known ichneumonoid primary parasitoid of Dermaptera. This preliminary publication aims to enable others to seek the necessary confirmation.

Keywords: *Apterygida albipennis*, *Orionis coxator*, putative earwig parasitoid, koinobiont, rearing suggestions, Germany

INTRODUCTION

The braconid subfamily Euphorinae (in which we do not include Meteorinae) is remarkable in parasitising adult insects or, in the minority of cases when the host group is exopterygote, also advanced nymphs (M.R. Shaw & Huddleston 1991). Many genera are associated with Coleoptera; certain other orders (Hemiptera, Orthoptera, Psocoptera, Hymenoptera, Neuroptera) are host to other genera. All are koinobiont endoparasitoids and most euphorines are solitary parasitoids, though gregarious development occurs in a few species in several genera. An overwhelming criterion determining whether or not a particular insect order has been adopted by Euphorinae appears to be that the adult stage of the host must have a sufficiently long and well-nourished life for the parasitoid to complete its larval development. Orders in which adult lives are usually short (*e.g.*, Diptera* and Lepidoptera) appear not to have been colonised.

Several of the 61 genera of Euphorinae considered valid worldwide have no host records at all. One such is the genus *Orionis* S.R. Shaw, 1987, one species of which (*O. coxator* (Belokobylskij, 1995) described from the Russian Far East) has recently been found quite widely in Europe (Belgium, England, Netherlands, Germany; Broad & Stigenberg 2021). Presumably this fairly distinctive insect, well-illustrated by Broad & Stigenberg (2021), is a recent arrival rather than a long-overlooked native in Europe.

In this paper we present evidence suggesting that *O. coxator* parasitises adult earwigs (Dermaptera). Perhaps this is the case with all species of *Orionis*?

* A paper detailing parasitism of adult Drosophilidae by a *Syntretus* species (<https://doi.org/10.1038/s41586-024-07919-7>) published while the present paper was in press showed this presumption to be untrue.



Photo: Lennart Bendixen

Fig. 1. — *Orionis coxator* (Belokobylskij, 1995) ♀ apparently ovipositing into an adult ♀ *Apterygida albipennis* (von Mühlfeld, 1825), 29.ix.2023 in north Germany.

FIELD OBSERVATION

One of us (LB) observed and photographed a female euphorine braconid apparently ovipositing into an adult female *Apterygida albipennis* (von Mühlfeld, 1825) in a curled leaf of spindle (*Euonymus europaeus* L.) caused by the aphid *Aphis evonymi* Fabricius, 1775 (Fig. 1). This took place in his garden at Mohrkirch, Schleswig-Holstein in northern Germany on 29.ix.2023 between 2:48 and 3:03 pm on the southern side of shrubbery. Unfortunately neither host nor adult wasp was retained, in the belief that the parasitoid species would be obvious from the literature, but when that proved not to be the case LB forwarded the photos taken to MRS who was able to identify the adult wasp as *Orionis coxator*.

DISCUSSION

This is the first record of (apparent) primary parasitism by any ichneumonoid of an earwig (Dermaptera) as well as the first host record for the genus *Orionis* – of course, in need of confirmation by an actual rearing. Because earwigs are sometimes parasitised by Tachinidae (Diptera) (genera *Octata* and *Triarthria* in particular; Phillips 1983) there is a theoretical possibility that the *O. coxator* female was attempting to act as a true (koinobiont) hyperparasitoid of a tachinid, but this seems highly improbable; not least because it would be completely alien to the known biology of Euphorinae (M.R. Shaw & Huddleston 1991).

Although the exopterygote order Dermaptera are long-lived as adults and thus potentially within ecological range for a euphorine, it is a surprise that *Orionis* (in

particular) apparently uses them because it is classified in the tribe Perilitini which is otherwise associated with the endopterygote order Coleoptera (S.R. Shaw 1985, 1987; Stigenberg, Boring & Ronquist 2015). The colonisation of so many host groups in the radiation of Euphorinae is truly remarkable and unparalleled by any other koinobiont endoparasitoid group of Ichneumonoidea, but the proximity in the classification of taxa parasitising the two components of this major insectan dichotomy is especially noteworthy (if confirmed).

Neither of us has realistic opportunity to try to follow up this preliminary observation to demonstrate fully the suggested host association, but we hope that someone else can successfully follow the clue. *Orionis coxator* has been collected as an adult in late summer and autumn although its voltinism remains uncertain. *Apterygida albipennis* (= *media*, homonym) is univoltine, adult from late summer and persists through the winter (Matzke 2002). When the time comes it is likely that the parasitoid larva would erupt from the earwig's body and spin a cocoon nearby; but it is uncertain whether this would be before or after winter. Whether or not the much commoner earwig *Forficula aurantiaria* (Linnaeus, 1758) can also be parasitised is unknown, but it too is univoltine, adult from late summer, and persists through the winter and early spring. Females of both earwig species tend their eggs, usually laid in early spring, and are most easily collected from late summer to early winter, before they retreat to concealed sites (often underground) to overwinter and then oviposit.

The best time to collect the adult earwigs to try to rear the parasitoid would therefore be during autumn. The male earwigs also have a long adult life but would be less nutritious than females (and might be more difficult to keep alive in captivity). These earwigs largely feed on small insects but also commonly eat fruit and other plant material.

A good alternative to keeping alive earwigs collected as adults from the wild would be to expose them to a female *Orionis coxator*, should one be found alive, and this might be the more fruitful approach.

ACKNOWLEDGEMENTS

We are grateful to Kees van Achterberg for his count of the recognised genera of Euphorinae, and Gavin Broad for his review of this paper.

REFERENCES

- Broad, G.R & Stigenberg, J. 2021. The genus *Orionis* Shaw (Hymenoptera, Braconidae, Euphorinae) in the Old World. *Journal of Hymenoptera Research* **88**: 131–145.
- Matzke, D. 2002. Zur Biologie und Phänologie des Gebüschohrwurmes *Apterygida media* (Hagenbach, 1822) (Dermaptera, Forficulidae). *Articulata* **17**(2): 1–11.
- Phillips, M.L. 1983. Parasitism of the common earwig *Forficula auricularia* (Dermaptera: Forficulidae) by tachinid flies in an apple orchard. *Entomophaga* **28**: 89–96.
- Shaw, M.R & Huddleston, T. 1991. Classification and biology of braconid wasps (Hymenoptera: Braconidae). *Handbooks for the Identification of British Insects* **7**(11): 1–126.
- Shaw, S.R. 1985. A phylogenetic study of the subfamilies Meteorinae and Euphorinae (Hymenoptera: Braconidae). *Entomography* **3**: 277–370.
- 1987. *Orionis*, a new genus from Central America, with an analysis of its phylogenetic placement in the tribe Euphorini (Hymenoptera: Braconidae). *Systematic Entomology* **12**: 103–109.
- Stigenberg, J., Boring, C.A. & Ronquist, F. 2015. Phylogeny of the parasitic wasp subfamily Euphorinae (Braconidae) and evolution of its host preferences. *Systematic Entomology* **40**: 570–591.