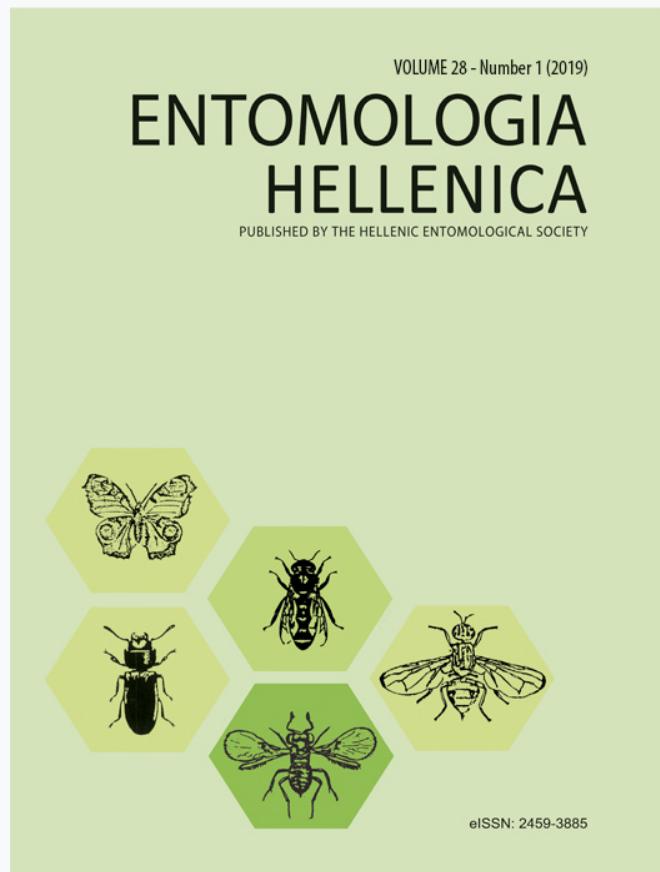


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**First record of wormlion *Vermileo vermileo* (Diptera: Vermileonidae) from Greece**

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## SHORT COMMUNICATION

## First record of wormlion *Vermileo vermileo* (Diptera: Vermileonidae) from Greece

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### ABSTRACT

In this work, we present the first record of the species *Vermileo vermileo* from Greece. The larvae and pupae of *Vermileo vermileo* (Linnaeus, 1758) (Diptera, Vermileonidae) and *Myrmeleon inconspicuus* Rambur, 1842 (Neuroptera, Myrmeleontidae) species were collected from pits on a dry soil surface, in well-protected from rain places, from the Greek island of Thasos during the summer of 2017, in close proximity to Potos and Skala Potamias resort areas. The individuals were further kept under laboratory conditions for definite identification. According to available literature, the dipteran species *V. vermileo* is new for the Greek fauna.

KEY WORDS: Vermileonidae, *Myrmeleon inconspicuus*, antlion, Thasos, pits.

The family Vermileonidae, among the order of flies (Diptera), is rather limited regarding number of species. Worldwide, the known ten genera comprise less than 80 described species. In Europe, two genera (*Lampromyia* and *Vermileo*) are represented by only nine species (Stuckenberg 1965, 1998). According to Santos (2008), the *Vermileo* genus is represented by only ten species worldwide: 3 spp. from the Palearctic region (1 sp. from Greece, 1 sp. from southern France, and 1 sp. from the Iberian Peninsula), 1 sp. from the Afrotropical region, 3 spp. from the Neotropical region and 3 spp. from the Nearctic region.

The wormlion (Vermileonidae) larvae are unique in the dipteran families as they build pitfall traps similar to antlions (Myrmeleontidae) and with their help they capture their prey (Wheeler 1930, Séméria

2006). The pits of the wormlion are steeper, have a conical form, while in the case of the late instar larvae, their diameter is smaller compared to that of antlion's pitfalls (Lackinger 1972, Devetak 2008a, b). Diameter of pitfall traps of early instar wormlion larvae is on average 2.2 mm (Hafez and El-Moursy 1956a), while it can reach up to 3.0–3.5 cm for late instar larvae, based on the records during this laboratory breeding. On the other hand, diameter of pitfall traps of well-developed antlion larvae can reach 4–7 cm depending on the species (Lackinger 1973). Wormlions prefer very fine-grained, sandy or dusty soil (especially in shaded areas), while antlions are less selective and can be found in both fine and coarse-grained soils (Devetak 2008a). The pits of wormlion larvae are always found in groups, very often in dozens.

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Newly-hatched wormlion larvae have an average length of 2.5 mm (Hafez and El-Moursy 1956a), while for mature ones their length can reach over 12–14 mm prior pupation (Fig. 1). The colour of the larvae is light yellowish, their body is translucent, and the alimentary canal and its content is clearly visible and recognisable. The eighth abdominal segment terminates in four conical fleshy lobes. The building of pitfall trap is performed by the head, while in the case of antlions the terminal setae of the abdomen has also an important digging role. Total developmental period of larvae is extremely long (3 to 4 years) during which several larval instars are included. The duration of the larval stage is largely influenced by the quality and quantity of nutrients, as well as by climatic conditions (Séméria 2006). Development of the wormlion pupae lasts 9–10 days, depending on temperature (Le Faucheu 1961).



FIG. 1. Dorsal view of a late instar larva of *Vermileo vermileo* (photo: Z. L. Nagy).

Adults of *V. vermileo* emerge from the end of May and early June in Europe, however, in Egypt emergence is achieved much earlier due to climatic conditions (Hafez and El-Moursy 1956b). The adults are relatively small, bristless, and fragile insects (Fig. 2) with short, stylate type antennae (Nagatomi 1997, Devetak 2008a). The first and second leg pair is lighter and less powerful, compared to the third one. The body is shining dark brown or black, while on the abdomen yellowish rings can

be seen. On the mesonotum, three longitudinal blackish-brownish stripes are characteristic. The abdomen of the male is slenderer than that of the female (Nagatomi and Iwata 1976), and bulkier at the end. The pedicel of the halters is yellow, while its clubby capitulum is dark brown. The wings are vitreous and strongly iridescent (Séguy 1926). The males are generally smaller and slenderer than females; their body length is 6–7 mm, while that of the females is 7–9 mm. The wing expanse at males is usually 9.8–10.7 mm, while in the case of females is 9.8–14 mm (Hafez and El-Moursy 1956b). Under laboratory conditions, emergence occurs around 9–11 am (Hafez and El-Moursy 1956b). The adults have short life span, primarily restricted to reproduction.

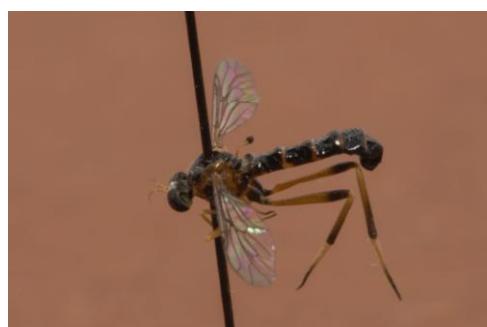


FIG. 2. Lateral view of a female adult, *Vermileo vermileo* (photo: Z. L. Nagy).

In this study, several wormlion larvae were recorded and collected on the island of Thasos, close to two resort villages: 21 larvae from the village of Potos which is located near the sea coast (N40.61071°; E24.60575°), on June 6, 2017, from fine-grained dry soil under a broad eaves, while 14 larvae near Skala Potamias (N40.70404°; E24.77604°), on June 8, 2017, in a Mediterranean shrubby habitat crossed by a pathway, from dusty soil under a rock protrusion. The pits of wormlion were well protected from the rain and shaded in both collecting sites. At the collecting site in Potos, a second instar *Myrmeleon inconspicuus* Rambur, 1842 antlion larva

was also discovered [identification was based on Badano and Pantaleoni (2014)] in one of the pits of the wormlion colony (see red arrow on Fig. 3), which is rather surprising, because according to the literature this species generally lives in open and rain-exposed habitats (Gepp and Hözel

1989). The wormlions and antlions most often avoid each other regarding their habitat, which is largely explained by the different preference for fine-granular composition of soil substrates (Devetak 2008a).



FIG. 3. Pitfall traps of wormlion larvae (*Vermileo vermileo*) with various larval stages scattered under a roof in Potos (blue arrow: a pit of wormlions; red arrow: the pit of an antlion, *Myrmeleon inconspicuus*) (photo: Z. Papp).

All larvae were collected from their pits by sieving and maintained until adult stage in the same soil from which they were collected under controlled conditions at 20–25°C, 60–70% RH, and in shadow. Smaller ant specimens as well as by fruit flies (*Drosophila melanogaster*) were provided as food source. Larvae that managed to develop until adult stage (one antlion and 11 wormlion individuals) were identified up to species level (March 2018)

using specific keys for wormlion and antlion adults given by Séguy (1926), Nagatomi (1997), Séméria (2006), and by Aspöck et al. (1980), respectively. Adults of *V. vermileo* were maintained alive for a maximum of seven days at 16–20°C. Until now, only one wormlion species was known in Greece described from Crete, namely *Vermileo ater* Stuckenberg, 1965. According to the literature *V. vermileo* has been recorded in Portugal, Spain, France,

Italy (including Sicily and Sardinia), Malta, Switzerland, Austria (Southern Tyrol), Slovenia, Croatia and Bulgaria (Séguy 1926, Stuckenbergs 1965, Ebejer 1995, Séméria 2006, Devetak 2008a, Fauna Europaea 2019), therefore this dipteran species is new for the Greek fauna.

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## Πρώτη αναφορά του *Vermileo vermileo* (Diptera: Vermileonidae) στην Ελλάδα

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### ΠΕΡΙΛΗΨΗ

Σε αυτή την εργασία, παρουσιάζουμε την πρώτη αναφορά του είδους *Vermileo vermileo* στην Ελλάδα. Οι προνύμφες και οι νύμφες των ειδών *Vermileo vermileo* (Linnaeus, 1758) (Diptera, Vermileonidae) και *Myrmeleon inconspicuus* Rambur, 1842 (Neuroptera, Myrmeleontidae), συλλέχθηκαν από λάκκους σε επιφάνεια ξηρού χώματος, σε σημεία καλά προστατευμένα από βροχή, από την Θάσο, κατά την περίοδο του καλοκαιριού του 2017, κοντά στις τουριστικές περιοχές Ποτό και Σκάλα Ποταμιάς. Τα συλλεχθέντα άτομα διατηρήθηκαν σε εργαστηριακές συνθήκες για την τελική αναγνώριση. Σύμφωνα με την διαθέσιμη βιβλιογραφία, το είδος δίπτερου *Vermileo vermileo* είναι νέο για την Ελλάδα.