Orphilus aegeanus (Coleoptera, Dermestidae, Orphilinae): a new species from Greece and Turkey

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Orphilus aegeanus (Coleoptera, Dermestidae, Orphilinae): a new species from Greece and Turkey

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The family Dermestidae Latreille 1804 contains over 1700 species worldwide (Háva 2021). The subfamily Orphilinae LeConte 1861 is small containing only two genera: *Ranolus* (Blair 1929) with seven species distributed across Australasia and Indonesia, and *Orphilus* Erichson 1846 with six species from the Palaearctic and Nearctic (Háva 2021). Of the *Orphilus* species, *O. ater* Erichson 1846 and *O. subnitidus* LeConte 1861 occur in North America, *O. kabakovi* Háva and Kadej 2014 occurs in Asia, whilst *O. africanus* Háva 2005, *O. beali* Zhantiev 2001, and *O. niger* (Rossi 1790) are found in Europe (Háva 2021).

Orphilus species externally are very similar to each other, and this has most likely impeded the development of the taxonomy of the genus, at least in the Palaearctic. Until 2000, all individuals from the Palaearctic were believed to belong to the same species, *O. niger*. Since 2000, two further species have been discovered (Zhantiev 2001; Hava 2005) through dissection of male genitalia, which show substantial structural differences among species. During a survey of over 150 specimens held in the collection of one of us (AH), a further *Orphilus* species, *O. aegeanus*, was discovered. In the current study, we describe *O. aegeanus* and compare it to the most likely confusion species, *O. africanus*.

All insects were floated from the mounting card and macerated in 2% acetic acid for a period of 5 days prior to dissection. Dissection was carried out under a Brunel BMSL zoom stereo LED microscope and involved detaching the abdomen from the rest of the insect using two entomological needles. The soft tergites were then peeled away from the harder ventrites to expose the genitalia. The aedeagus was pushed out between abdominal sternites IX and X using an entomological needle. The aedeagus was then detached from the sternites.

Images of habitus were captured at ×20 magnification using a Canon EOS 1300D camera mounted on the BMSL microscope. The antennae were teased out and images were captured at ×100 magnification using the EOS 1300D camera mounted on a Brunel monocular SP28 microscope. Using the same set up, dorsal and ventral surfaces of the aedeagi were captured at x100 magnification, and images of the tips of the median lobe were captured at x 200 magnification. All images were fed through Helicon Focus Pro version 8 focus-stacking software. Morphometric measurements were made using DsCap.Ink Software version 3.90. Measurements taken:

body length (BL): distance from anterior margin of pronotum to the apex of the elytra, and

body width (BW): maximum distance across the elytra.

After dissection, all body parts were mounted on card.

British Natural History Museum, London (BNHM).

Orphilus aegeanus sp. nov.

Specimen examined. Holotype: *Orphilus aegeanus* **sp. nov.** Greece, Larissa, Thessalia (39.63N, 22.42E) 8 July 2002 A. Herrmann leg. Holotype male BNHM. Paratypes 9 males: Turkey, Kemer (36.60N, 30.56E) 19 May 1996, Lars O. Hansen leg. (3 specimens), Greece, Peloponnese, Menalo (37.54N, 22.31E), 11 June 2001, Josef Louda leg. (1 specimen), Greece, Thessalia (39.63N, 22.42E), 8 July 2002, A. Herrmann leg. (4 specimen), 10 July 2002 A. Herrmann (1 specimen),

External characteristics. Mean BL = 3.45±0.37mm (holotype = 3.25mm), mean BW = 2.17±0.21mm (holotype = 2.1mm) (Fig. 1A). Holotype description: head with one median ocellus on vertex. Cuticle black. Surface of body glabrous and covered in punctures. Distance between punctures on elytra = width of punctures. Punctures on thorax

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slightly smaller, distance between punctures = 1.5 times width of punctures. Microstructure on cuticle between punctures. Scutellum triangular and black with punctures on anterior central part of scutellum with lateral margins to posterior tip unpunctured and shining. Elytra with pronounced humeral calli. Legs black. Antennae and palps red. Antenna with 11 antennomeres, and with well-defined three-segmented club (Fig 1B).

Internal characteristics. Aedeagus shown in Fig 2A. Parameres broad. Outer margins of parameres almost parallel for majority of length before angling in sharply to paramere tips. Tips of parameres pale contrasting with otherwise chestnut brown coloration. Tips of parameres almost totally glabrous on ventral surface, at most a few small, scattered setae (Fig 2B). Tip of median lobe (Fig. 2B) carrying a small, upturned, sharp tooth on ventral surface. Median lobe narrowing to rounded tip that extends well beyond tooth such that the angle between the median lobe and the tooth is 90^{o} or less.

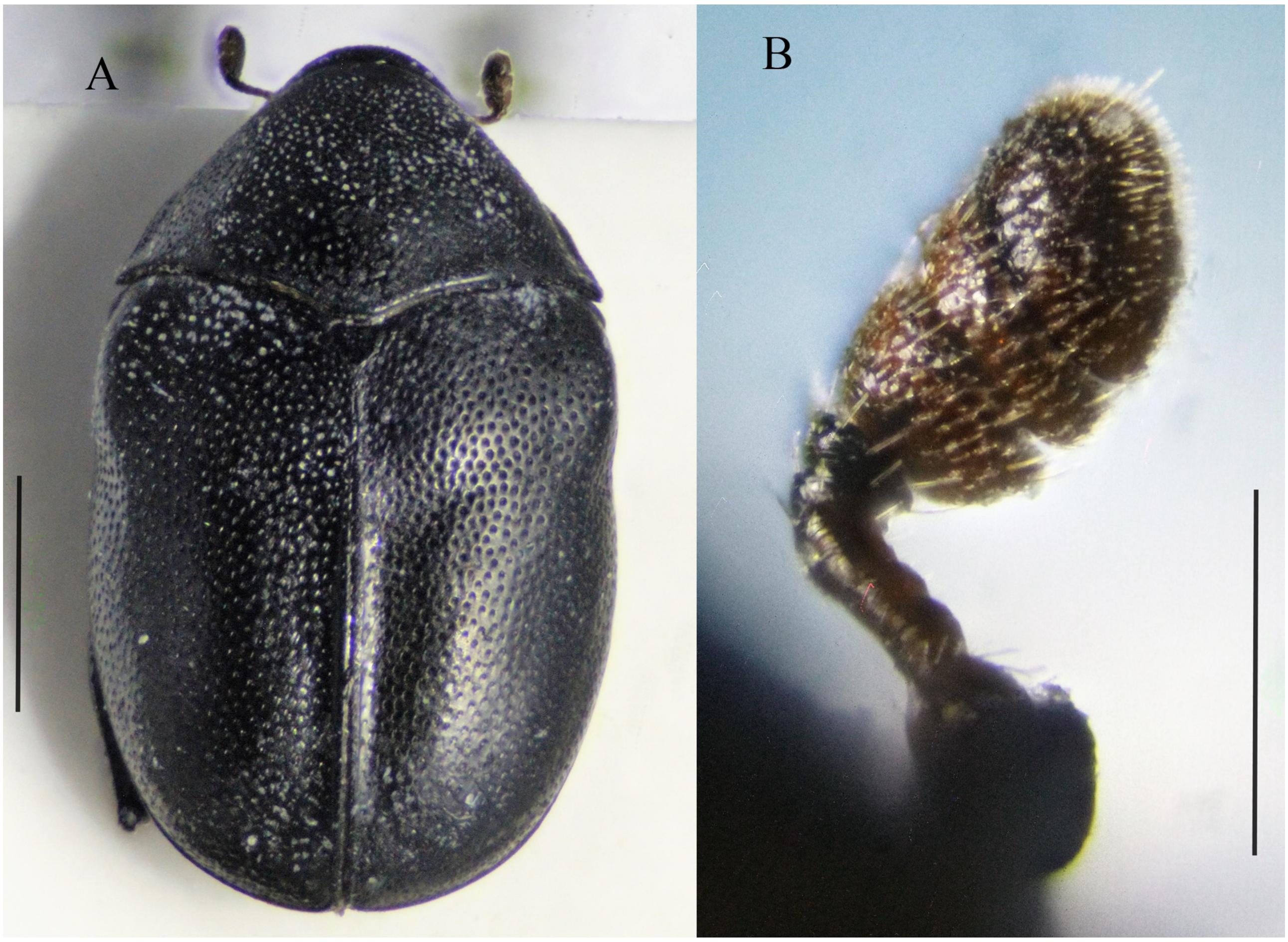

FIGURE 1. *Orphilus aegeanus* holotype **A:** habitus dorsal aspect, male, scale bar = 1mm, **B:** antennal club, scale bar = 0.2mm

The Palaearctic *Orphilus* spp. are similar externally so require dissection for definitive identification. The male genitalia of *O. niger* and *O. beali* are described elsewhere (Zhantiev 2001) and will not be confused with *O. aegeanus*. The likely confusion species on dissection is *O. africanus*. Fig 3A shows an aedeagus of *O. africanus*. The parameres are narrower and the outer margins of the parameres bulge outwards slightly about halfway before curving smoothly inwards towards the tips. There is no clear angle in the outer margins of the parameres as shown by *O. aegeanus*. In addition, the paler coloration at the tips of *O. africanus* parameres extends further back than *O. aegeanus* parameres. The tips of the parameres carry obvious setae on the ventral surface (Fig 3B). *Orphilus africanus* median lobe is shown in Fig 3B. The median lobe does not narrow to the rounded tip and is blunter than in *O. aegeanus*. The tooth is joined to the median lobe very close to the tip such that the angle between the tip of the median lobe and the tooth is greater than 90^{o}.

This study focusses on male genitalia. More work is required to definitively allocate variation in ovipositor structure to the different species. *Orphilus africanus* is currently known only from Spain and Morocco, whilst *O. aegeanus* have been collected from Greece and Turkey. It is possible that *O. africanus* has a western Mediterranean distribution and *O. aegeanus* only occurs in eastern Mediterranean. Although the aedeagi of the two species described here differ substantially in structure, geographic distribution might be a very easy way of allocating species.

The tooth on the ventral side at the end of the median lobe in both *O. africanus* and *O. aegeanus* has not been noted before as far as we are aware. Researchers have worked with *Orphilus* in the past but usually remove soft tissue from the genitalia using aggressive cleaners such as KOH, or pepsin which targets proteinaceous structures. The tooth on the median lobe is soft and most likely protein which would not survive treatment with KOH or pepsin. In this study we only used weak acetic acid to soften specimens for dissection which is the most likely reason why the tooth survived intact on the median lobe.

The discovery of *O. aegeanus* brings the number of known *Orphilus* species to seven.

Etymology: the species name *aegeanus* refers to the location of discovery in the proximity of the Aegean Sea.

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FIGURE 2. *Orphilus aegeanus* holotype **A:** aedeagus dorsal surface, **B:** median lobe lateral aspect illustrating shape of tip of lobe, position of 'tooth' on ventral surface of lobe, and lack of setae on ventral surface of paramere tips, scale bars = 0.2 mm

FIGURE 3. *Orphilus africanus* **A:** aedeagus dorsal surface, **B:** median lobe lateral aspect illustrating shape of tip of lobe, position of 'tooth' on ventral surface of lobe, and setae on ventral surface of paramere tips, scale bars = 0.2 mm

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