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First record of the terrestrial isopod *Platyarthrus parisii* Arcangeli, 1930 (Crustacea: Oniscidea: Platyarthridae) for the European continent, with remarks on *Platyarthrus schoblii* Budde-Lund, 1885

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The terrestrial isopod *Platyarthrus parisii* Arcangeli, 1930 (Oniscidea: Platyarthridae), a myrmecophilous species, is recorded for the first time at continental Europe. All the specimens studied come from different locations in the south of the Iberian Peninsula (Cádiz, Tarifa and Jerez de la Frontera, in the region of Andalusia, Spain). Besides, some morphological traits of this species are illustrated for the first time. Differences with *Platyarthrus schoblii* Budde-Lund, 1885, of which it was considered a subspecies, are discussed. The validity of the current subspecies *Platyarthrus schoblii intermedius* Vandel, 1946 is also discussed.

Key words: *Isopoda*; *Oniscidea*; *Platyarthrus*; *Iberian Peninsula*.

PRIMERA CITA DE L'ISÒPODE TERRESTRE *Platyarthrus parisii* ARCANGELI, 1930 A EUROPA CONTINENTAL AMB NOTES SOBRE *Platyarthrus schoblii* BUDDE-LUND, 1885. Es cita per primera vegada a Europa continental l'isòpode terrestre mirmecòfil *Platyarthrus parisii* Arcangeli, 1930 (Oniscidea: Platyarthridae). Tots els exemplars estudiats procedeixen de diverses localitats del sud de la península Ibèrica (Cádiz, Tarifa i Jerez de la Frontera, a la regió d'Andalusia, Espanya). S'il·lustren per primer cop alguns dels seus caràcters morfològics i es discuteixen les diferències entre aquesta espècie i *Platyarthrus schoblii*, de la qual va ser considerada una subespècie. També es discuteix la validesa de la subespècie *Platyarthrus schoblii intermedius* Vandel, 1946.

Paraules clau: *Isopoda*; *Oniscidea*; *Platyarthrus*; *Península Ibèrica*.

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Introduction

The genus *Platyarthus* Brandt, 1833 comprises about 28 described species of small terrestrial isopods (Oniscidea: Platyarthridae), most of them are myrmecophilic. Species of this genus are mainly distributed by the Mediterranean region and part of the Middle East, besides in some oriental Atlantic islands and coasts, central Asia, India and Yemen (see Schmalzfuss, 2003; Taiti & Checcucci, 2009). Because of their ability for living inside the ant nests, some *Platyarthus* species have been transported by man, with their host ants, beyond their natural distribution area (see Garthwaite & Taiti, 1989; Tartally *et al.*, 2004). So far both in the Iberian Peninsula and the Balearic archipelago, there have been recorded 6 species of this genus (see Schmalzfuss, 2003).

Platyarthus parisii Arcangeli, 1930 is a myrmecophilous species, known so far only from the Canary Islands and Morocco (Arcangeli, 1930; Taiti & Rosano, 2015). In this paper, it is mentioned for the first time in the Iberian Peninsula and also in the European continent.

Some of the male morphological characters and the tergal structure are illustrated. Up to date, the mouthparts, have not been illustrated yet. The morphology of this parts has been also drawn to facilitate further comparisons with other related species. The studied morphological characters of *Platyarthus parisii* have been compared with those of *Platyarthus schoblii* Budde-Lund, 1885, that Vandel (1946) have considered as a subspecies of the former.

Method

The specimens were found in the field, under stones or inspecting ant nests, and collected by a brush impregnated with alcohol. They were preserved and stored in 70% ethanol.

For the morphological study, they were treated for a few hours with Aman's Lactophenol liquid and dissected under the stereomicroscope (Olympus VMT and Euromex Nexius). Appendices and mouthparts have then been mounted on a slide using Faure's liquor. The drawings were made in pencil under an Olympus CH30 optical microscope equipped with an Olympus DA camera lucida. The final illustrations have been inked by hand, tracing the sketches with a light box.

To analyze the dorsal sculpture, an entire specimen was dyed with methylene blue dissolved in the lactophenol, to highlight the tergal ribs by contrast. The sample was then photographed using a digital Dino-Lite microscope and the final image, once desaturated, were modified to improve brightness and contrast levels.

Results

Platyarthus parisii Arcangeli, 1930

Platyarthus schöbli parisii Vandel, 1946

Platyarthus parisii Taiti & Rosano, 2015

Studied material:

10/06/2006 Cádiz, Los Barrios, Montera del Torero, Manuel Baena leg. 4 ♀; no ants were collected. 01/04/2018 Cádiz, Tarifa, Daniel Rojas leg. 10 ♀, 4 ♂; in two nests of *Pheidole pallidula*. 21-04-2018 Cádiz, Jerez de la Frontera, Álvaro Pérez Gómez leg. 3 ♀; inhabiting with *Pheidole pallidula*. The samples are deposited in the collection of the first author.

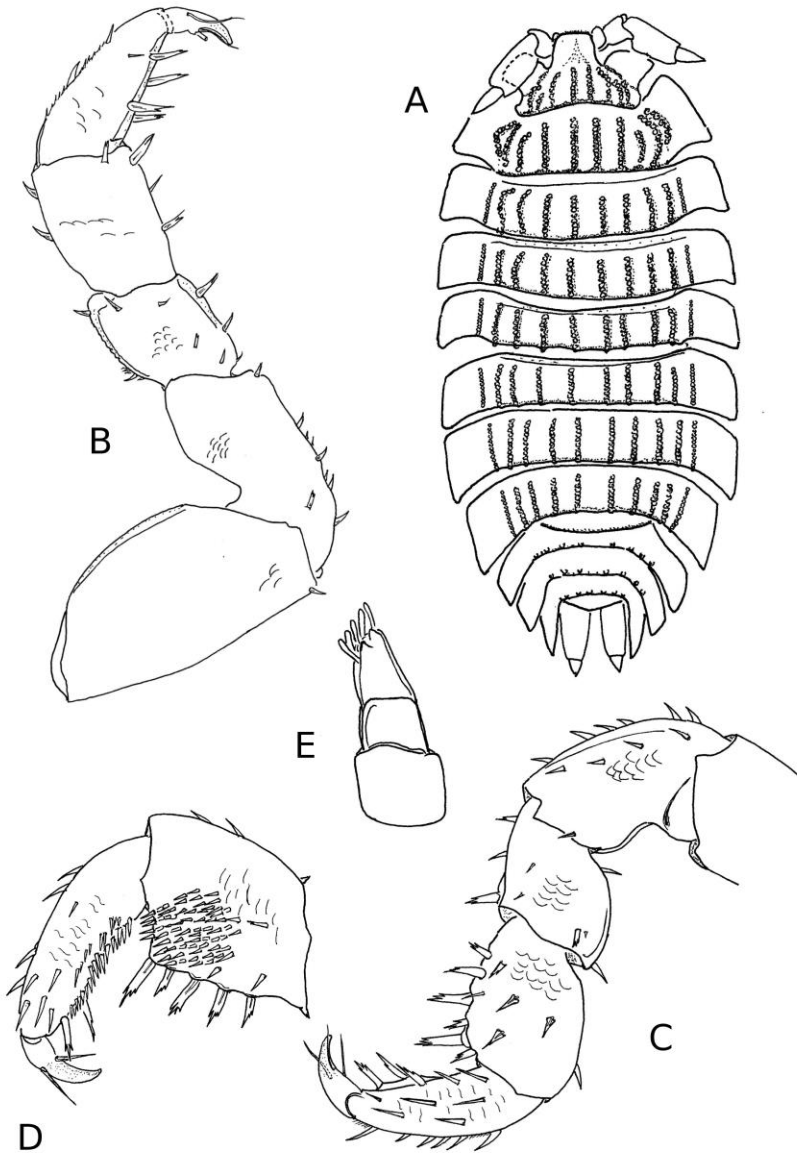


Fig. 1. *Platyarthrus parisii* . Cádiz (Spain). A. ♀ Habitus. B. ♂ Seventh pereopod (frontal). C. ♂ First pereopod (caudal), D. ♂ First pereopod (frontal). E. First antenna.

Fig. 1. *Platyarthrus parisii* . Cádiz (Espanya). A. ♀ Hàbitus. B. ♂ Setè pereopodi (frontal). C. ♂ Primer pereopodi (caudal). D. ♂ Primer pereopodi (frontal). E. Antènula.

Taxonomical remarks

The maximum size observed corresponds to a non-ovigerous female of 2.82 mm total length (excluding the uropods). The specimens have been identified based on the dorsal sculpture and other somatic characters and also on the structure and shape of the first pleopod of the male. Some of the characters of the male (i.e. first pleopod and the first and seventh pereopods) have recently been depicted with material from North Africa (Taiti & Rosano, 2015), but the original description (Arcangeli, 1930) is based only on female specimens.

As in the type illustrated by Arcangeli (1930) and Taiti & Rosano (2015), in our specimens (Figs. 1A, 3B) the cephalothorax and the tergites are traversed longitudinally by five pairs of ribs, each of them formed by groups of 10-12 aligned scale-setae. In the first tergite the rib number 1 is short and domed and the rib-3 is reduced and does not reach as the others, to the front edge of the segment. The rib number 4 lack. This is one of the morphological characteristics of this species according to Vandel (1946). It is also characterized by the frontal lobe that in this species tends to take quadrangular shape and lifted upwards. The lateral lobes are large with rounded anterior external angles.

Mouthparts, male sexual characters and other morphological details as illustrated (Figs. 1 B-E, 2 A-H).

Discussion

Vandel (1946) considered *Platyarthus parisii* as a subspecies of *Platyarthus schoblii*. However, within the variability of *Platyarthus schoblii*, specimens with the first tergite with this shape of the external

rib and an incomplete third rib have not been described so far. The uropods of *Platyarthus parisii* have a relative short exopodite, measuring less than a third of the length of the basipodite. In *P. schoblii* the exopodite of the uropods reaches half the length of the basipodite. The shape of the first and second pleopods of the male is also different, especially the endopodite, which would confirm its belonging to a different species (compare the Figs. 2 A-B and 3 C-D-E-F). In fact, Arcangeli (1952) again considers *P. parisii* as an independent species of *P. schoblii* but without illustrating its main differential characteristics. As Taiti and Rosano (2015) indicated, the small differences in the shape of the cephalothorax observed between the specimens from Morocco and those of the Canaries drawn by Arcangeli (1930), do not allow to clarify if they are due to a variability of the species since in the Canaries it was never collected again. It would be necessary a completed examination of more individuals of the Canarian archipelago and of the other localities in order to reach a definitive conclusion.

Remarks on *Platyarthus schoblii*

Schmalzfuss (2003) considered that the systematic situation of the *Platyarthus schoblii* complex is obscure and it is necessary to study the morphology of new material to elucidate if some of the subspecies of *P. schoblii* should be considered as different species. In this line we have also studied specimens of *Platyarthus schoblii* presenting a short fourth rib in the first tergite, characteristic that according to Vandel (1946; 1962) would be corresponded to that of *Platyarthus schoblii* ssp. *intermedius*, while in the nominal species this rib is totally missing.

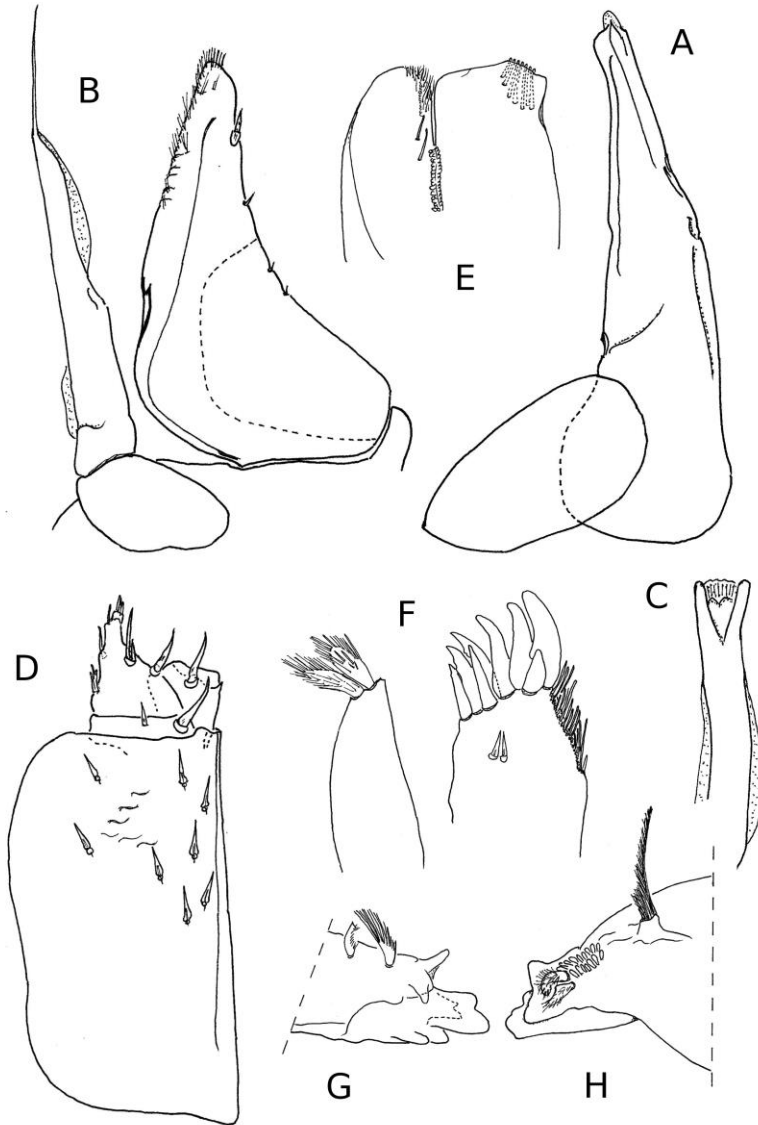


Fig. 2. *Platyarthrus parisii*. Cádiz (Spain). A. ♂ First pleopod. B. ♂ Second pleopod. C. ♂ Genital papilla. D. Maxilliped. E. Second maxilla. F. First maxilla. G. Right mandible. H. Left mandible.

Fig. 2. *Platyarthrus parisii*. Cádiz (Espanya). A. ♂ Primer pleopodi. B. ♂ Segon pleopodi. C. ♂ Apòfisi genital. D. Maxil·lípede. E. Maxil·la. F. Maxil·lula. G. Mandíbula dreta. H. Mandíbula esquerra.

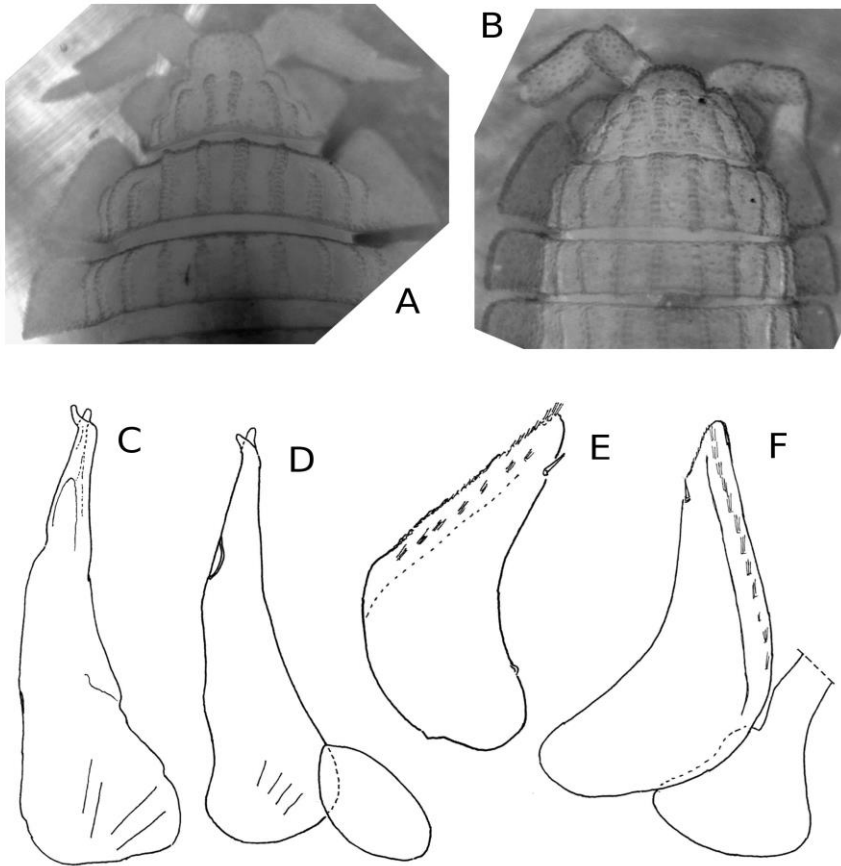


Fig. 3. Cephalon and first tergites, dorsal view of (A) *Platyarthus parisii* . Cádiz (Spain) and (B) *Platyarthus schoblii intermedius* . Córdoba (Spain). C. ♂ First pleopod endopodite of *Platyarthus schoblii intermedius* .D. ♂ First pleopod endopodite of *Platyarthus schoblii schoblii*. E. ♂ Second pleopod exopodite of *Platyarthus schoblii schoblii*. F. ♂ Second pleopod exopodite of *Platyarthus schoblii intermedius*.

Fig. 3. Cèfalon i primers terguits en vista dorsal de (A) *Platyarthus parisii*, Cádiz (Espanya) i de (B) *Platyarthus schoblii intermedius*, Córdoba (Espanya). C. ♂ Endopodi del primer pleopodi de *Platyarthus schoblii intermedius*. D. ♂ Endopodi del primer pleopodi de *Platyarthus schoblii schoblii*. E. ♂ Exopodi del segon pleopodi de *Platyarthus schoblii schoblii*. F. ♂ Exopodi del segon pleopodi de *Platyarthus schoblii intermedius*.

In the south of Spain and the Balearic Islands there are populations of *Platyarthus schoblii* with individuals that have the typical form and others in which

present traces, more or less apparent, of rib-4 in the first four terguites, an additional characteristic of the subspecies *intermedius* (Fig. 3B). However, the males of the forms

we attribute to the nominal species and those that could be classified as belonging to the subspecies *intermedius* have identical first pleopods (compare Figs. 3 C-D and 3 E-F). But, within the same population, all the specimens examined present the same dorsal sculpture. For this reason, it seems pertinent to maintain the validity of the subspecies *intermedius* for *Platyarthrus schoblii*.

Additional material

Platyarthrus schoblii schoblii, 9/6/1998 Isla Congreso, Chafarinas Islands, Spain, Guillem X. Pons leg. 4 ♀; 29/12/2002 Sóller, Mallorca, Spain, Lluc Garcia leg. 2♂, 4♀; 20/03/2004 Jálón, Alicante, Spain, José L. Lencina leg. 1♂.

Platyarthrus schoblii intermedius, 12/04/2003 Carcabuey, Córdoba, Spain, Manuel Baena leg. 1♂, 2♀; 22/04/2006 Zuberós, Córdoba, Spain, Manuel Baena leg. 2♂, 6♀; 18/10/2005 Eivissa, Balearic Islands, Spain, 1♂, 4♀, Lluc Garcia leg.

Acknowledgment

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