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Rediscovery of the endogean terrestrial isopod *Paraschizidium hispanum* Arcangeli, 1935 (Crustacea: Oniscidea: Armadillidiidae) in the Iberian Peninsula

Lluc Garcia [1] & Daniel Rojas [2]

[1] *Museu Balear de Ciències Naturals/Grupo de Ecología Interdisciplinaria, Universitat de les Illes Balears. Apartado de correos 55. Sóller, Mallorca 07100, Islas Baleares. llucgarciaisopoda@gmail.com*
[2] *C/ Estrella, 4, 11510 Puerto Real, Cádiz (ESPAÑA). danrp93@gmail.com*

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Redescubrimiento del isópodo terrestre endogeo *Paraschizidium hispanum* Arcangeli, 1935 (Crustacea: Oniscidea: Armadillidiidae) en la península ibérica.

Palabras claves: *Isopoda; Armadillidiidae;* Paraschizidium hispanum*; new record; endogean fauna; Cadiz; Tarifa; taxonomy*
Keywords: *Isópodo terrestre; Armadillidiidae;* Paraschizidium hispanum*; nuevo registro; fauna endogea; Cádiz, Tarifa; taxonomía.*

Abstract

The endogean terrestrial isopod Paraschizidium hispanum*, endemic to the Iberian Peninsula, has been rediscovered in Tarifa, Cadiz (Spain), 86 years after its original description from Algeciras, in the same Spanish province. Its main morphological features have been re-illustrated, and some taxonomic details are discussed.*

Resumen

El isópodo terrestre endogeo Paraschizidium hispanum*, endémico de la Península Ibérica, se ha redescubierto en Tarifa (Cádiz), 86 años después de su descripción, de Algeciras, en la misma provincia española. Sus principales características morfológicas se han ilustrado de nuevo y se comentan algunos detalles taxonómicos.*

Introduction

Paraschizidium hispanum Arcangeli, 1935 is an endogean species, endemic to the south of the Iberian Peninsula, belonging to the family Armadillidiidae. This species was only known from its original description from Algeciras (Cadiz) (Arcangeli 1935) and had not been collected again until now. All later citations of *P. hispanum* (Arcangeli 1948; Schmölzer 1965; 1971; Schmalfuss 2003) only refer to the original description.

The recent finding of a population of *P. hispanum* in Tarifa, in the same Andalusian province, means its rediscovery after almost 90 years without any records. Its morphological study confirms its correct inclusion in the genus *Paraschizidium* Verhoeff, 1919. In this paper, the main distinctive characteristics of *P. hispanum* have been illustrated again to facilitate future identifications. Some taxonomic, ecological and biogeographical aspects have also been discussed.

Figure 1. Record sites of *Paraschizidium hispanum* in the Iberian Peninsula (Strait of Gibraltar area): four pointed star, Arcangeli (1935); six pointed star, present record. (Photo from NASA-Satellite imagery taken by screenshot from NASA World Wind software, Public Domain; modified).

*Autor para correspondencia. Email: llucgarciaisopoda@gmail.com

Material and methods

The specimens were collected by hand, preserved in 75% ethanol and dissected under a stereomicroscope (Euromex Nexius). Body parts were prepared on slides with Faure's liquid. The drawings were made with the aid of a camera lucida mounted on Olympus CH30 and Motic K-400 microscopes. The final illustrations were prepared with a graphic tablet (INTUOS) using the GIMP software (Montesanto 2015). The assignment of these specimens to *P. hispanum* was based on the original description (Arcangeli 1935). The specimens are deposited in the collection of the first author.

Results

Family Armadillidiidae Brandt, 1833
Genus *Paraschizidium* Verhoeff, 1919
Type species: *Armadillidium* (*Paraschizidium*) *olearum* Verhoeff, 1919, junior synonym of *Paraschizidium coeculum* (Silvestri, 1897).

Paraschizidium hispanum Arcangeli, 1935
P. hispanum, Arcangeli 1935: 173-176, figs. 1-12; 1948: 256-258. Schmölzer, 1965: 309; 1971: 62. Schmalfuss, 2003: 195.

Material examined. 8 males and 24 females. SPAIN, Cadiz, Tarifa; coastal grassland; 17 February 2021; leg. Daniel Rojas Pichardo.
Figs. 2-3

Morphology and taxonomy remarks
The morphological features that define *Paraschizidium* are summarized as follows: simple head structure, with a poorly defined frontal shield and a rudimentary post-scutellar line; posterior angles of the first pereonite without schisma, and antennules of 2 articles or 3 articles. All the species included in the genus lack eyes and are subterranean or endogean (Taiti & Ferrara 1996; Taiti & Montesanto 2018).

The specimens collected in Tarifa (Figs. 2-3) are morphologically almost identical to those studied by Arcangeli (1935), who illustrated the following characteristics: cephalon and first pereon-tergite, antennula, antenna, maxilliped, maxillula, pleotelson, seventh pereopod and the first and second male pleopods. The only significant difference observed is the shape of the endopodite of the second male pleopod, which is straight in the original description and sinuous in our male specimens (Fig. 3 D). But in particular, the original drawing of the second pleopod cannot be taken as a valid reference, since it was probably wrongly interpreted by the author, who drew the endopod divided into four articles, when it is two-segmented in all the Chrinocheta.

The total length of the specimens studied ranges between 2.4 and 3.7 mm. All male specimens collected are smaller than the females. Living animals can roll into an ovoid ball (Fig. 2 B)

Discussion

Paraschizidium was erected by Verhoeff (1919) as a subgenus of *Armadillidium*, to accommodate *Armadillidium olearum*. Later, the same author (Verhoeff 1935), raises it to the category of genus. Five species are currently included in *Paraschizidium*: *P. coeculum* (Silvestri, 1897); *P. hispanum*; *P. roubali* Frankenberger, 1940; *P. esterelanum* Juchault & Legrand, 1962 and *P. ferrarai* Taiti & Montesanto, 2018 (Taiti & Montesanto 2018; WoRMS 2022). *P. olearum* Verhoeff, 1919, and probably also *P. roubali*, are synonyms of *P. coeculum* (Manicastri & Taiti 1994). In the Iberian region, *P. coeculum* and *P. hispanum* have been cited. Only two records of the former are known on the island of Menorca (Balearic Islands), as *P. olearum* (Vandel 1960; Cruz 1989).

The rediscovery of *P. hispanum* after 86 years represents a new advance in the knowledge of the lesser-known Iberian

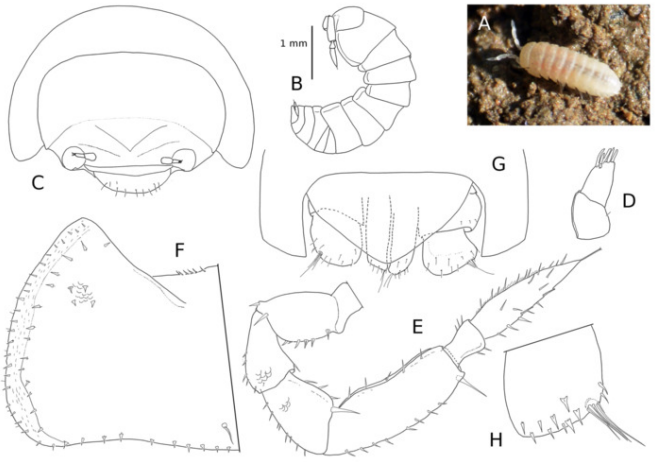

Figure 2. *Paraschizidium hispanum*. Tarifa (Cádiz, Spain). A. A live specimen. B-H. Male specimen: B. Habitus, lateral view. C. Cephalon and first pereonite, frontal. D. First antenna. E. Second antenna. F. First pereonite, dorsal (extended). G. Fifth pleonite, pleotelson and uropods, dorsal. H. Uropod.

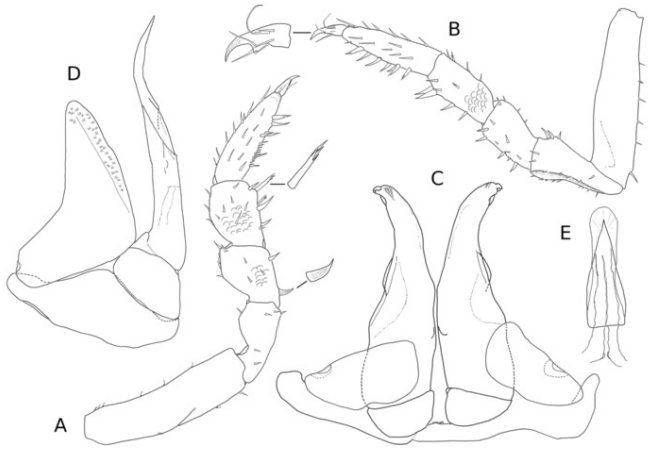

Figure 3. *Paraschizidium hispanum*, male specimen. Tarifa (Cádiz, Spain). A. First pereopod. B. Seventh pereopod. C. First pleopods. D. Second pleopod. E. Genital papilla.

species of terrestrial Isopods. Although its original description is precise, a direct study of specimens confirms its correct inclusion in the genus *Paraschizidium*, in the sense established by Taiti and Ferrara (1996).

Arcangeli (*op. cit.*) qualifies this species as humicolous; there is no data on the habitat in which their specimens were collected by the Catalan entomologist Ascensi Codina, in January 1923. However, like the other representatives of the genus, *P. hispanum* is most likely an endogean species, in the sense of Vandel (1960), that lives in deep moist soil and, only after heavy rains, can be found under semi-buried stones.

In Tarifa, *P. hispanum* were collected from beneath stones in a coastal grassland, together with other endogean species, until now endemic to the Iberian Peninsula: *Trichorhina silvestrii* Arcangeli, 1936 and a new species of Spelaeoniscidae that was initially attributed to the genus *Spelaeoniscus* Racovitza (Garcia & Rojas 2021) but which belongs to a different genus (Garcia, in press).

In the Iberian Peninsula and the Balearic Islands, the family Armadillidiidae is represented so far by 32 species, belonging to nine genera. Five of them, i.e. *Eleoniscus* Racovitza, 1907, *Cristarmadillidium* Arcangeli, 1936, *Ballodillium* Vandel, 1961, *Estenarmadillidium* Cifuentes, 2021 and *Iberiarmadillidium* Recuero, Rodríguez-Flores & García-París, 2021, are endemic (Schmalfuss 2003; Cifuentes 2021; Recuero *et al*. 2021). This diversity contrasts with that of North Africa, since in the Maghreb, an area geographically very close to southern Iberia, only *Armadillidium* (15 species) and *Eluma* (2 species) have been recorded, although it is possible that the smaller species of Armadillidiidae have gone unnoticed.

Acknowledgment

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