

# On the identity of *Porcellionides glaber* (C. Koch in Rosenhauer, 1856): a redescription with nomenclatural and taxonomical remarks (Isopoda: Oniscidea: Porcellionidae)

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The morphological characteristics of the terrestrial isopod *Porcellionides glaber* (C. Koch in Rosenhauer, 1856), present in the Balearic Islands (Menorca), southern Iberian Peninsula and North Africa, are described and illustrated. Since its description on material from Malaga, the taxon has been mentioned in an unclear manner by different authors. As for nomenclature, it has been considered a name of dubious application (*nomen dubium*) and, as for taxonomy, it has been included in different categories of genus, species or subspecies level, although it has mainly been considered a subspecies of *Porcellionides sexfasciatus* (Budde-Lund, 1885). Currently, there are those who continue to consider it an uncertain taxon or one of disputed taxonomic validity (*taxon inquirendum*), given that the type material is considered lost and cannot be compared. The study of more than 120 specimens from different localities in its distribution area (including an almost topotypical locality) has allowed, on the one hand, to confirm that the taxon is identifiable based on its original description and, on the other hand, that all the specimens present little variable morphological characteristics that allow it to be differentiated from *P. sexfasciatus* and its valid subspecies, and can therefore be considered as an independent species.

**Keywords:** Crustacea, woodlouse, Menorca, Andalucia, North Africa, Betic-Rifian/Balearic species.

SOBRE LA IDENTITAT DE *Porcellionides glaber* (C. KOCH IN ROSENHAUER, 1856): REDESCRIPCIÓ AMB OBSERVACIONS NOMENCLATURALS I TAXONÒMIQUES (ISOPODA: ONISCIDEA: PORCELLIONIDAE). Es descriuen i il·lustren les característiques morfològiques de l'isòpode terrestre *Porcellionides glaber* (C. Koch in Rosenhauer, 1856), present a les Illes Balears (Menorca), sud de la península Ibèrica i el Nord d'Àfrica. Des de la seva descripció sobre material procedent de Màlaga, el tàxon ha estat esmentat de forma poc clara per diferents autors. Pel que fa a la nomenclatura, ha estat considerat un nom de dubtosa aplicació (*nomen dubium*) i, quant a la taxonomia, ha estat inclòs dins distinques categories de nivell gènere, espècie o subespècie, tot i que principalment s'ha considerat una subespècie de *Porcellionides sexfasciatus* (Budde-Lund, 1885). Actualment hi ha qui el segueix considerant un tàxon incert o de discutida validesa taxonòmica (*taxon inquirendum*), atès que el material tipus es considera perdut i no se pot confrontar. L'estudi de més de 120 exemplars de diferents localitats de la seva àrea de distribució (incloent una localitat quasi topotípica) ha permès, d'una banda, confirmar que el tàxon és identifiable sobre la base de les seva descripció original i, d'altra banda, que tots els exemplars presenten característiques morfològiques poc variables que permeten dife-

renciar-lo de *P. sexfasciatus* i de les seves subespècies vàlides, podent ser considerat, per tant, com una espècie independent.

**Paraules clau:** Crustacis, Somereta del Bon Jesús, Menorca, Andalusia, Àfrica del Nord, espècie bètica-rifenyà/balear.

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## Introduction

The genus *Porcellionides* Miers, 1878 (=*Metoponorthus* Budde-Lund, 1879) is known from approximately 93 nominal species (Boyko *et al.*, 2008 onwards), most of which are distributed in the western Palearctic except for *Porcellionides pruinosus* (Brandt, 1833), a species that has become cosmopolitan due to human activity. In the Iberian Peninsula, North Africa and the Balearic Islands, 17 species of *Porcellionides* are known so far, some of them being endemic (Schmalfuss, 2003; Boyko *et al.*, 2008 onwards). Current knowledge of the genus *Porcellionides* makes the identification and designation of new species extremely difficult, as many of the named species lack precise diagnoses or illustrations (Lefebvre & Marcadé, 2005). Some *Porcellionides* species from the Iberian Peninsula and northern Africa were described at the end of the 19th century or at the beginning of the 20th century, and their diagnoses are confusing or insufficient.

Among these poorly-known species there is *Porcellionides glaber* (C. Koch in Rosenhauer, 1856). This is a problematic taxon described in the mid-19th century on material from the province of Málaga (South-eastern Iberian Peninsula) as *Porcellio glaber*, a name previously occupied by *Porcellio glaber* Fitch, 1855, which is a junior synonym of *Cylisticus convexus* (De Geer, 1778). Later, Budde-Lund (1885) included C. Koch's species in

the genus *Metoponorthus* (which is a junior synonym of *Porcellionides* Miers, 1878) and also provided a diagnosis. Subsequently, Dollfus (1892) included it in his catalog, with the same name. Throughout the 20th century, other authors have reported this species in different parts of the Iberian Peninsula and also in the Balearic Islands. Jackson (1926) attributed specimens collected in Lisbon (Portugal) to *P. glaber* and published precise illustrations of their main morphological characteristics (see Discussion). Vandel (1946; 1958; 1961; 1962) again treated this species as a subspecies of *Porcellionides sexfasciatus*, although under the genus *Metoponorthus*, which was not considered equivalent to *Porcellionides*. Other authors who have studied Iberian terrestrial isopods (Garcia & Cruz, 1986; Cruz, 1989) have followed the criterion of including *P. glaber* as a subspecies of *Porcellionides sexfasciatus*, a polymorphic species that in the Iberian Peninsula is represented by the nominotypical subspecies and by other subspecies and geographical varieties (Vandel, 1946, 1953). Schmalfuss (2003, pers. comm. 2006) considers *P. glaber* as a *nomen dubium*, a subjective nomenclatural classification that includes several main categories, not all of them applicable to the case of this taxon (see Dubois, 2008). Cifuentes (2021) does not mention this taxon in his catalogue of terrestrial isopods from Andalusia. Finally, other authors currently consider that *P. glaber* should be

categorized as a *taxon inquirendum*, that is, of uncertain or disputed taxonomic validity (see Boyko *et al.*, 2008, onwards). According to Schmalfuss (pers. comm. 2006) the type material of C. Koch is lost.

In this confusing context, more than 120 specimens of *Porcellionides* sp. with similar habitus and sexual and integumentary characteristics were studied. The material comes from the Balearic Islands (Menorca), Southern Iberian Peninsula (Málaga, Cádiz, Córdoba) and North Africa (Ceuta). These are specimens that present a set of morphological features different from those of *P. sexfasciatus* and that, in my opinion, largely coincide with the characters of *P. glaber* provided by C. Koch (1856). The material is fully illustrated to facilitate future identifications.

## Material and methods

The specimens were collected by hand and preserved in 75% ethanol. For the morphological study, the usual methods and resources were used. The appendages of the dissected specimens were firstly mounted temporarily in glycerine they were finally prepared with Faure's liquid or preserved in microtubes with 75° alcohol. Tergites were lightly treated with lactophenol to facilitate their extension, and integumentary characteristics were studied through their temporary inclusion in glycerine. They were then transferred to microtubes with 75° alcohol for preservation. Additionally, the integumentary details were studied using Hitachi Scanning Electron Microscope (SEM).

## Taxonomy

Order Isopoda Latreille, 1817  
Suborder Oniscidea Latreille, 1802  
Family Porcellionidae Brandt, 1831

Genus *Porcellionides* Miers, 1878  
Type species: *Porcellio (Porcellionides) jelskii* Miers, 1878

### *Porcellionides glaber* (C. Koch in Rosenhauer, 1856)

Figs. 1-9

*Porcellio glaber*, C. Koch, 1856, p. 420-421  
[Non *Porcellio glaber* Fitch 1855 = *Cylisticus convexus* (De Geer, 1788)]

*Metoponorthus glaber*, Dollfus, 1892, p. 182.

*Metoponorthus glaber*, Budde-Lund, 1885, p. 166-167.

*Metoponorthus glaber*, Vandel, 1946, p.229; p. 235.

*Metoponorthus (Polytretus) sexfasciatus* ssp. *glaber*, Vandel, 1958, p.129 (tentative, i.e.: only females); 1961, p. 257; 1962, p. 609.

*Metoponorthus sexfasciatus glaber*, Schmölzer, 1971, p. 30 (part, i.e.: only Andalusian and Balearic records).

*Porcellionides sexfasciatus glaber*, Cruz, 1989, p. 91; Garcia & Cruz, 1996, p. 87.

*Porcellionides glaber*, Schmalfuss, 2003, *nomen dubium*.

*Porcellionides glaber*, Boyko et. al 2008 onwards  
LSID: urn:lsid:marinespecies.org:taxname: 262518, *taxon inquirendum*.

Non *Porcellionides glaber*, Jackson, 1926, p. 185, pl. V, figs. 106-114.

Non *Metoponorthus sexfasciatus glaber*, Schmölzer, 1971, p. 92, on identification key (= *P. glaber*, sensu Jackson, 1926).

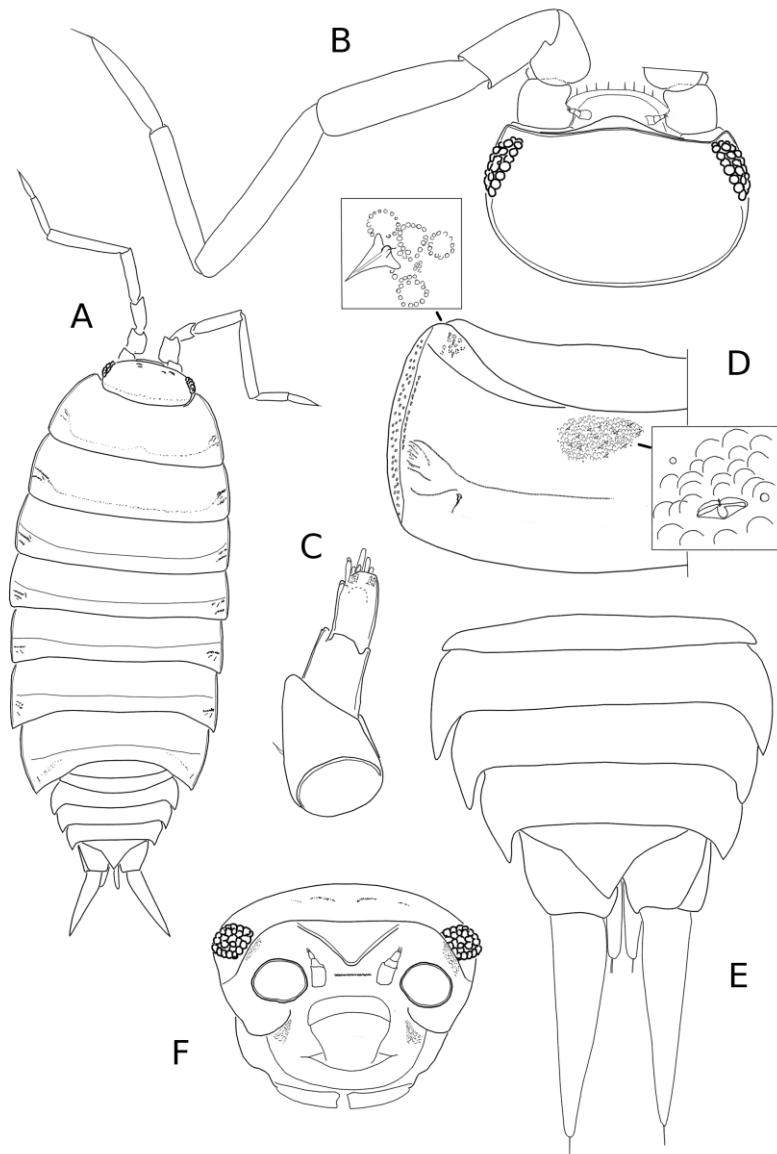
## Material examined

SPAIN, Cádiz, Tarifa, 1 male, 4 females; 13-I-2020, leg. Daniel Rojas; 1 male, 2 females, 6-II-2020, leg. Daniel Rojas; Córdoba, Sierra de Córdoba, El Bejarano, 2 males, 24-I-2004, Manuel Baena leg. Málaga, Antequera, Sierra de las Cabras, 2 males and 4 females, 27-XII-2003, Manuel Baena leg. Cádiz, Jerez, Montes de Propios, 2 males, 1-XI-2016, Álvaro Pérez leg. Cádiz, 2 males 1-XI-2016, Álvaro Pérez leg. Cádiz, Algeciras, 1 female, 1-XI-2016, Álvaro Pérez leg. Huelva, Parque Nacional

de Doñana, finca Caracoles, 3 males, 4 females, 30-XI-2020. Álvaro Pérez leg. North Africa, Ceuta, Monte Hacho, 6 males, 17 ovigerous females, 1-V-2021, F.L. García-Aguilar leg. Balearic Islands, Menorca, Puntarró, 5 males 7 females, 28-XII-1982, J. L. Pretus leg. Menorca, Camí dels Alocs, 4 males, 2 females, 15-I-2006, Lluc Garcia leg. Menorca, Cala Santa Galdana, Macarella, 5 males, 5 females, 14-I-2006, Lluc Garcia leg. Menorca, carretera de Fornells, 5 males, 5 females, 15-I-2006, Lluc Garcia leg. Menorca, Arenal d'en Castell, 3 males, 2 females, 15-I-2006, Lluc Garcia leg. Menorca, Carretera Sant Tomàs-Es Migjorn, 4 males, 4 females, 14-I-2006, Lluc Garcia leg. Menorca, Ferreries, Puig de s'Ermita, 2 males, 3 females, 14-I-2006, Lluc Garcia leg. Menorca, Mercadal, Es Puig Mal, Binisséguí Vell, 6 males, 3 females, 14-I-2006. Menorca, Cala Santa Galdana, Hort de Binissaïda, 3 males, 3 females, 14-I-2006, Ll. Garcia leg.

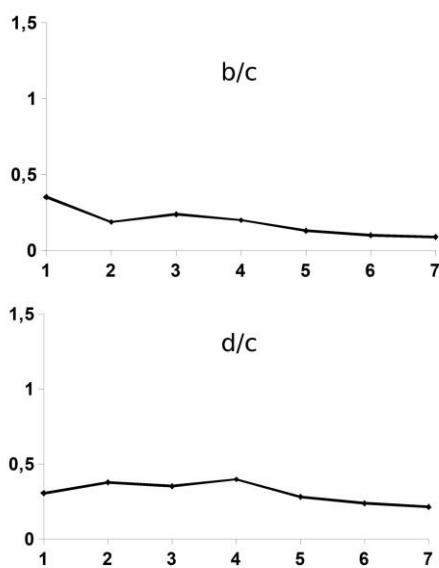
**Redescription:** *Dimensions*: male, 12.5 mm; female 13.6 mm. Habitus and body shape, as in Figs. 1 and 9. *Colour* (Fig. 9 A-D) very variable: orange, more or less light brown or grey; with a white line on the limit of the epimera. Dorsum with light spots. Epimera red, dark brown or orange. Pereon traversed longitudinally by a dark central stripe. Pleon with two dark central lines, more or less blurred, bordered with white. Neopleura, pleotelson and uropods, pigmented. The *noduli laterales* stand out on a dark background. Some specimens have the three basal articles of the second antennae red or dark (Fig. 8 A-D). *Dorsum* (Figs. 1 D, 3 A-C) with imbricate scales, tricorn type scale-setae and some minute tergal pores; anterior parts of tergites with circles of spherules and tricorns (Figs. 1 D, 2 A-C). *Lateral glandular fields* (Figs. 1 D, 4 A-C) occupying the whole length of the

epimeral margin, with numerous pores evenly distributed along a well-defined epimeral groove; the field of the first pereon tergite contains between 40 and 50 pores (Figs. 1 D, 3 A-C). *Noduli laterales* (Fig. 2) aligned at the same distance from the lateral margin and progressively closer to the posterior margin. *Pereon tergites* 1-7 with a transverse impression in the posterior third and 3-5 lateral transverse ridges, parallel to the transverse groove (Fig. 4 A-C). *Pleon tergites* and pleotelson (Fig. 1E) smooth. *Cephalon* (Fig. 1B, 1F) with V-shaped supraneuronal line; without marked lobes; frontal line slightly curved in the middle and small anterolateral corners. Eyes with about 20 ommatidia. *Pereon tergites* 1-3 with convex hind margin; 4 with posterior margin straight; 5-7, concave at sides, with pointed posterior corners directed backwards. *Pleon* epimera with well-developed posterior tips, directed backwards; those of pleonite 5 do not exceed the basal part of pleotelson. *Pleotelson* (Fig. 1E) triangular, with weakly angled sides; the tip does not reach the posterior edge of the uropod protopods. *Uropods* (Fig. 1E): protopods with straight hind margin; exopods straight, without noticeable sexual dimorphism. *First antenna* (Fig. 1C) with subequal articles; distal article with 8-10 aesthetascs. *Second antenna* (Fig. 1B), when extended backward, reaching the posterior margin of pereon tergite 2; third peduncular article toothed; fifth peduncular article shorter than flagellum; first flagellar article slightly longer ( $\times 1.3$ ) than distal. *Mandibles* (Fig. 5D): left mandible *pars incisiva* with 5 tips; *lacinia mobilis* as long as incisive process; hairy lobe with 2 penicils; 6 free penicils in a row; *pars molaris* with 10-12 hairy setae; right mandible *pars incisiva* with 3 tips; *lacinia mobilis* with a prominent cusp; hairy lobe with 1 penicil and 4 long hairs; 4 free penicils in a row; *pars molaris* with 10-12



**Fig. 1.** *Porcellionides glaber*. Male from Andalucía (Tarifa). A. Habitus, dorsal view. B. Cephalon and left antenna, dorsal view. C. Antennula. D. First pereon-tergite, dorsal view, with cuticular structures, scale setae, glandular field and tergal pores. E. Pleon tergites 3-5, pleotelson and uropods, dorsal view. F. Cephalon, frontal view.

**Fig. 1.** *Porcellionides glaber*. Exemplar masclle d'Andalusia (Tarifa). A. Habitus, vista dorsal. B. Cefalon i antena esquerra, vista dorsal. C. Antenula. D. Primera tergita del pereon, vista dorsal, amb estructures cuticulars, seta-escates, camp glandular i porus tergals. E. Tergites 3-5 del plèon, pleotèlson i uropodis, vista dorsal. F. Cefalon, vista frontal.



**Fig. 2.** *Porcellionides glaber*. Noduli laterales coordinates (b/c and d/c).

**Fig. 2.** *Porcellionides glaber*. Posició relativa dels noduli laterals (b/c i d/c).

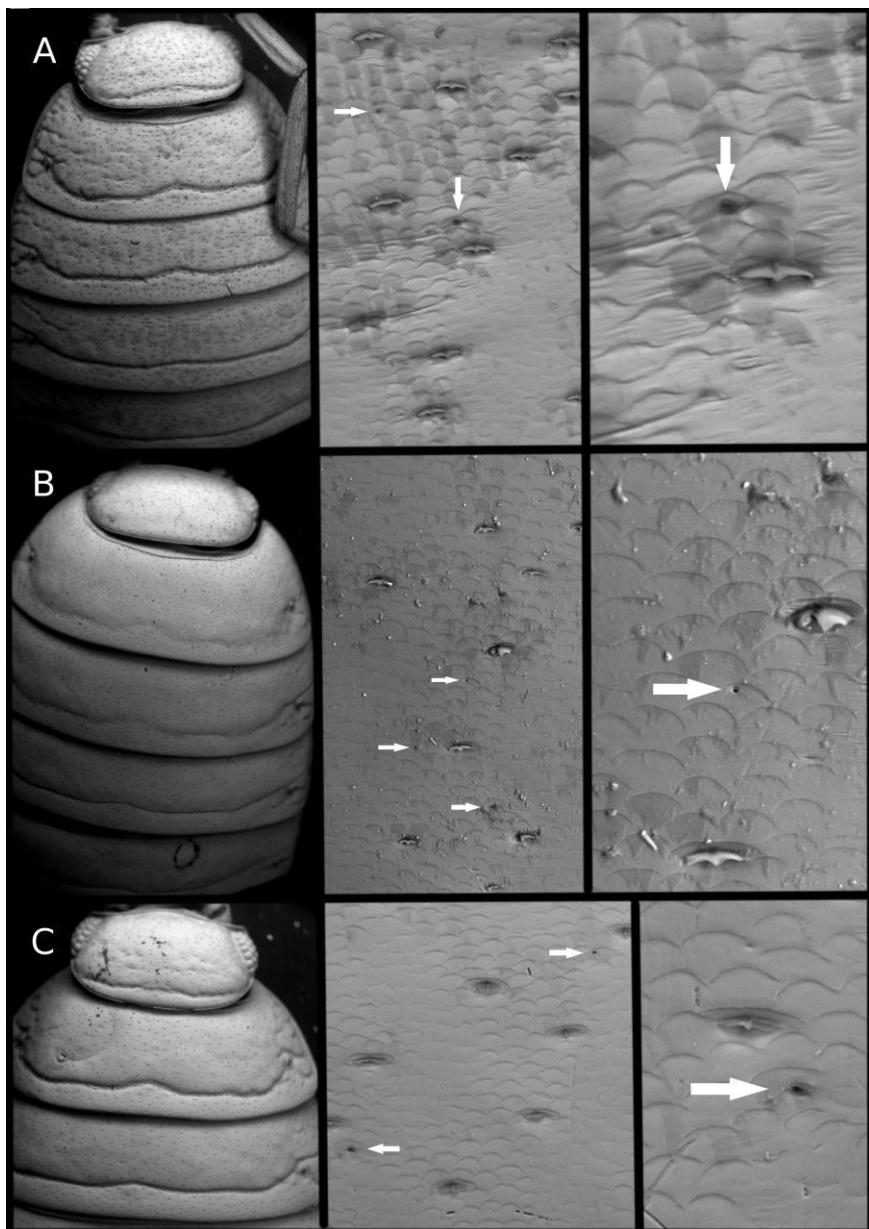
hairy setae. *Maxillula* (Fig. 5C): outer branch with 4 strong teeth and 6 smaller, 4 of them with divided tip and 2 thinner; inner branch with 2 long penicils and sharp, straight, posterior corner. *Maxilla* (Fig. 5B): outer lobe distally rounded, twice as wide as inner one. *Maxilliped* (Fig. 5A): first palp article with 2 strong setae; second palp article with two groups of setae; distal article with tuft of short setae; endite with 3 triangular teeth on anterior margin and one submarginal; 1 strong seta on caudal face; caudal face of basis covered with scales and long scale-setae.

**Male:** *Pereopod 1* (Fig. 6A) without sexual modifications; merus and carpus similar than in female, without ventral brush of setae and with distal and medial ornamental spines. *Pereopods 2-6* without modifications. *Pereopod 7* (Fig. 6B) without

modifications. *Pleopod 1* exopod (Figs. 6C, 8 A-D) with short posterior lobe, distally curved inwards and pointed; outer margin concave; respiratory field without indentation; thick endopod, 1.7 times longer than exopod, distally rounded, with spines and long hairs in the inner margin (ventral) and subapical conical lobe (frontal). *Pleopod 2* (Fig. 6D): exopod triangular with straight inner margin; outer margin with 4-5 spines; respiratory field without indentation; endopod 1.2 times longer than exopod. *Genital papilla* as in Fig. 6 E. *Pleopods 3-5* as in Fig. 7 A-C.

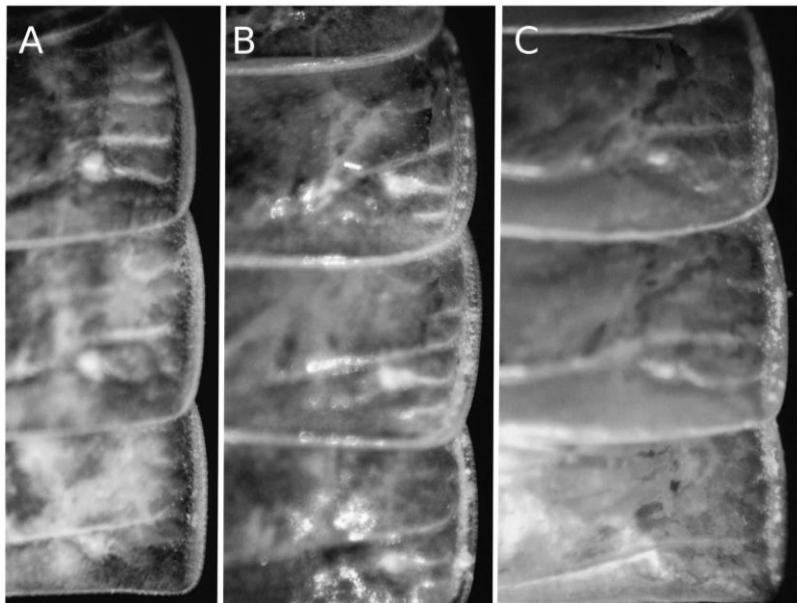
#### Remarks

Vandel (1946) pointed out the great importance of the integumentary characteristics to differentiate different *Porcellionides* species. All the species of this genus that he reviewed had the same type of tergal structures (i.e., ellipses and spheres) but these features were not checked in all the representatives of the genus. Otherwise, imbricated scales are present in *Acaeroplastes* and tergal pores are characteristic of *Soteriscus* (Vandel, 1946, 1960). In *P. glaber* the typical integumentary formations of other *Porcellionides* can only be seen in the anterolateral parts of each tergite and there are some cuticular pores between scale-setae (Figs. 1D, 3A-C); in living animals the visible dorsal part of tergites is shiny and devoid of pruinosity, showing the colouration pattern (Fig. 9). The exopod of the first male pleopod of *P. glaber* is very similar to that of *P. sexfasciatus* ssp. *lusitanus* (Vandel, 1946), but differs from this taxon by having the dorsal surface of tergites with imbricated scales, minute scale-setae and tergal pores, vs. different color pattern, lack of transversal impression on pereon-tergite 1; granulated dorsum; less number of epimeral pores and absence of



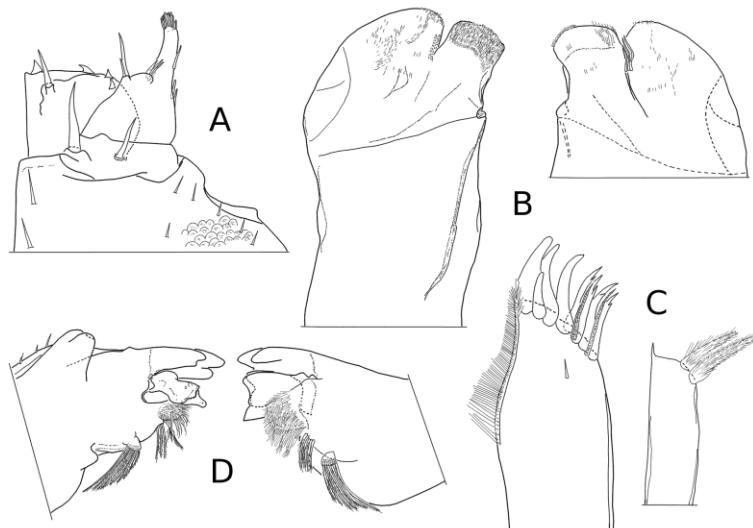
**Fig. 3.** *Porcellionides glaber*. SEM (Scanning Electron Microscope) photographs of cephalon and first pereon-tergites. A. Specimen from Ceuta. B. Specimen from Tarifa. C. Specimen from Menorca. Arrows point to some tergal pores.

**Fig. 3.** *Porcellionides glaber*. Fotografies SEM (Microscopi Electrònic d'Escàndalatge) del céfaló i primeres tergites del pereon. A. Exemplar de Ceuta. B. Exemplar de Tarifa. C. Exemplar de Menorca. Les fletxes indiquen alguns porus tergals.



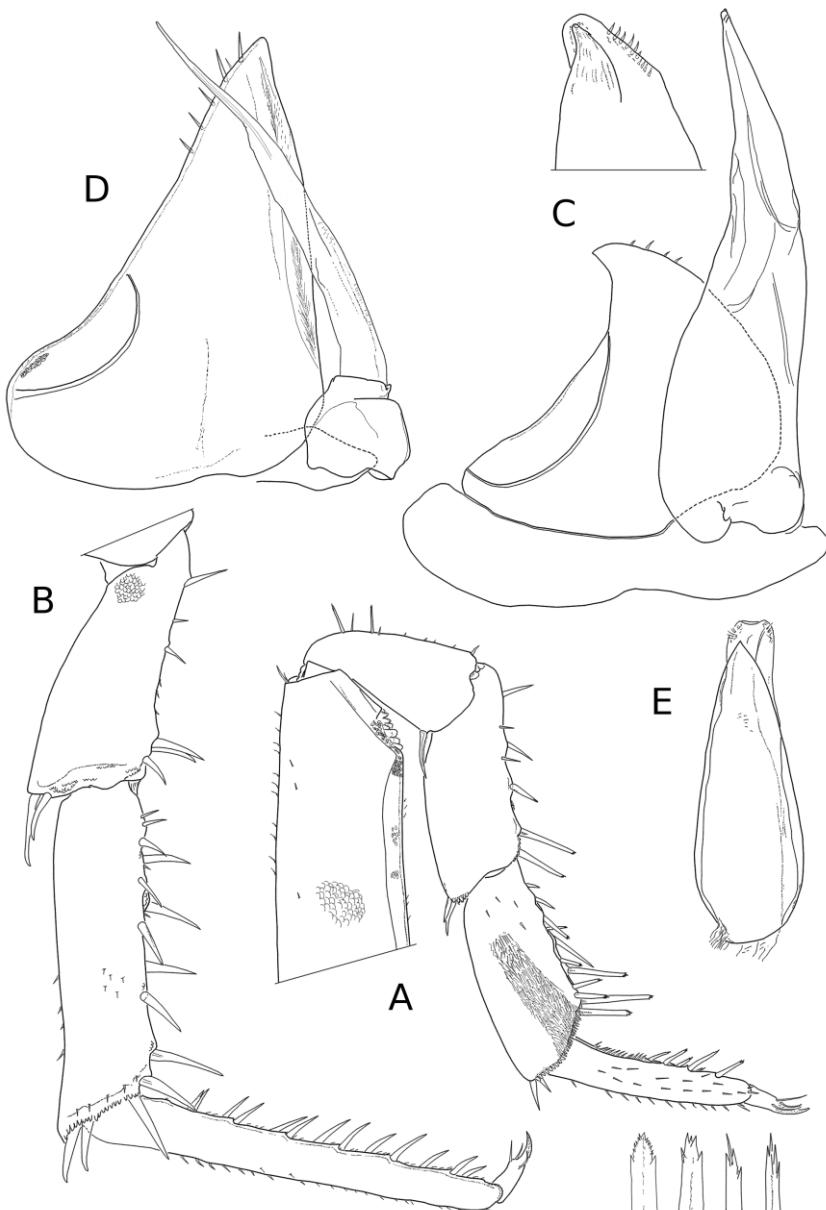
**Fig. 4.** *Porcellionides glaber*. Detail of pereon-epimera 2-4. A. Specimen from Ceuta. B. Specimen from Tarifa. C. Specimen from Menorca.

**Fig. 4.** *Porcellionides glaber*. Detall de les pleures 2-4 del pereon. A. Exemplar de Ceuta. B. Exemplar de Tarifa. C. Exemplar de Menorca.



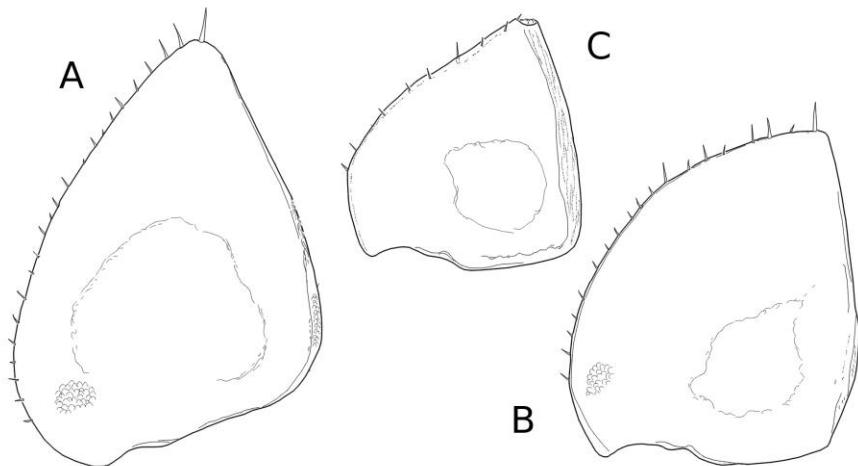
**Fig. 5.** *Porcellionides glaber*. A. Maxilliped. B. Maxilla (frontal and caudal views). C. Maxillula. D. Mandibles.

**Fig. 5.** *Porcellionides glaber*. Maxil·líped. B. Maxil·la (vistes frontal i caudal). C. Maxil·lula. D. Mandíbules.



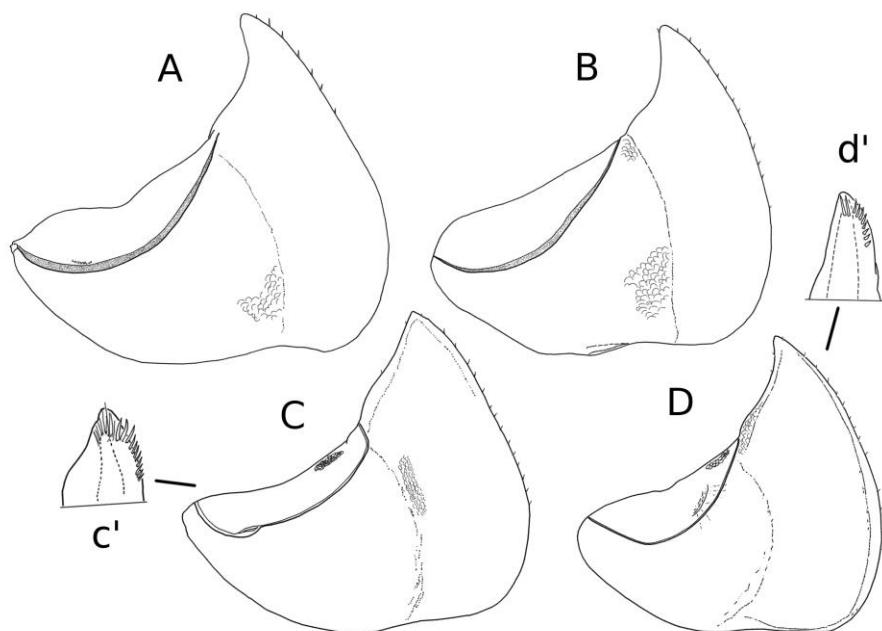
**Fig. 6.** *Porcellionides glaber*. Male. A. First pereopod. B. Seventh pereopod. C. First pleopod and distal part of the endopodite. D. Second pleopod. Genital papilla.

**Fig. 6.** *Porcellionides glaber*. Mascle. A. Primer pereopodi. B. Setè pereopodi. C. Primer pleopodi i detall de l'extrem distal de l'endopodit. D. Segon pleopodi. E. Apòfisi genital.



**Fig. 7.** *Porcellionides glaber*. Male. Pleopod exopods 3 (A), 4 (B) and 5 (C).

**Fig. 7.** *Porcellionides glaber*. Mascle. Exopodis dels pleopodis 3 (A), 4 (B) i 5 (C).



**Fig. 8.** *Porcellionides glaber*. Male first pleopod variability. A-B. Balearic islands, Menorca (exopods). C-c'. Andalucía, Málaga (exopod and distal portion of endopod). D-d'. North Africa, Ceuta (exopod and distal portion of endopod).

**Fig. 8.** *Porcellionides glaber*. Variabilitat del primer pleopodi masculí. A-B. Illes Balears, Menorca (exopodis). C- c'. Andalusia, Málaga (exopodi i extrem distal de l'endopodi). D-d'. Nord d'Àfrica, Ceuta (exopodi i extrem distal de l'endopodi).



**Fig. 9.** *Porcellionides glaber*. Habitus of alive specimens. A-C. Andalucía, Tarifa. D. Balearic islands, Menorca.

**Fig. 9.** *Porcellionides glaber*. Habitus d'exemplars vius. A-C. Andalusia, Tarifa. D. Illes Balears, Menorca.

tergal pores, among other characteristics (see Garcia, 2019). The exopods of male pleopods are different from those of the other subspecies of *P. sexfasciatus* (see, Vandel, 1946, 1953). The subspecies of *P. sexfasciatus* described so far do not present a transverse incision in pereonite 1 (see Vandel, 1946), while it is present in *P. glaber* (Figs. 3A-C). The subspecies *P. sexfasciatus molleri*, like *P. glaber*, has an apparent epimeral groove, but differs from it because of its lack of supra-antennal ridge and lack of transverse impression on tergites 1-7 (see Vandel, 1946).

## Discussion

Vandel (1946, 1953) divided the Iberian specimens of *P. sexfasciatus* into several subspecies, which were designated on the basis of geographic varieties, which are usually highly localized. The nominotypical subspecies of *P. sexfasciatus* (i.e., *P. sexfasciatus sexfasciatus*) is also present both in Andalusia, central and eastern Spain, North Africa and Balearic Islands (Garcia & Cruz, 1996; Cifuentes, 2021). Some populations of *P. sexfasciatus sexfasciatus* present a marked polymorphism that affects the colouration of the body (Achouri & Charfi-Cheikhrouha, 2001, 2009), but the integumentary characteristics remain cons-

tant and do not overlap with those of *P. glaber*.

The studied specimens from Menorca, Andalusia and Ceuta are morphologically identical, without appreciable variability between individuals of the different populations (Figs. 2, 6 and 7). Intrapopulation variability is limited to different colour patterns. The species is easily recognized by its large body (more than 13 mm in total length in the largest females) and brightly coloured back.

As a result of this study, the consideration of *P. glaber* as *nomen dubium* is not justified, since:

**a.** The characters established by C. Koch in his original diagnosis, can be recognized in the material studied, especially for the following: body colouration; integument smooth and shiny; presence of a strong sinuous transverse impression on pereon-tergites 1-7 and several short, elongated, protuberances on the lower lateral part of the pereon-epimera.

**b.** Other authors (Vandel, 1958, 1961, 1962; Cruz 1989; Garcia & Cruz, 1996) have also identified as *P. glaber* similar specimens with the same distribution area (although they have considered it a subspecies of *P. sexfasciatus*).

Therefore, I consider that the studied specimens correspond to the species described by C. Koch as *P. glaber* and also that it is a clearly different species from *P. sexfasciatus*, from which it is differentiated mainly by its integumentary and sexual characteristics.

The illustrations of *P. glaber* provided by Jackson (1926) are based on a specimen from western Portugal (Lisbon) whose morphological characters (mainly mouthparts and male pleopods) do not coincide with those of *P. glaber* from Balearic Islands, southern Iberian Peninsula (including material collected near to the

typical locality), nor from Ceuta. Probably, Jackson's illustrations correspond to an undescribed species.



**Fig. 10.** Literature records (four pointed stars) and localities of material studied (six pointed stars) of *Porcellionides glaber*. Question mark: record that needs to be confirmed. Exclamatory mark: record corresponding to a different, probably undescribed, species.

**Fig. 10.** Registres bibliogràfics (estrelles de quatre puntes) i localitats de material estudiat (estrelles de sis puntes) de *Porcellionides glaber*. Signe d'interrogació: registre que cal confirmar. Signe d'exclamació: registre corresponent a una espècie diferent, probablement no descrita.

The known distribution of *P. glaber* goes from the eastern Balearic Islands to western Andalusia, the North Africa (Gurugú mountain, in Melilla, Ceuta and Moroccan Rif region) and western Algeria (Vandel, 1958; 1962) (Fig. 10). This distribution coincides mainly with the so-called Betic-Rifian model. The record from Algeria should be confirmed. The occurrence of *P. glaber* in Menorca is more difficult to explain from a biogeographic point of view; However, numerous flightless invertebrates such as terrestrial mollusks and tenebrionid beetles that inhabit all or some of the Balearic Islands have a similar Ibero-

African distribution which, in some cases, has been explained by the fact that the Balearic promontory is an emerged part of the ancient Betic-Rifian massif (Colom, 1978; Rodríguez & Gelabert, 1988). Future integrated studies (i.e., including morphological and molecular data), currently outside our scope and objectives, should reinforce in the future our conclusions, only based on morphology. This research should include all subspecies and varieties of the *P. sexfasciatus* complex, as well as other Iberian species.

## Acknowledgment

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