

***Armadillidium nahumi* n. sp. (Crustacea: Oniscidea: Armadillidiidae), a new terrestrial isopod from catalan Pre-Pyrenees (Iberian Peninsula)**

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SOCIETAT D'HISTÒRIA
NATURAL DE LES BALEARS

Garcia, Ll. 2020. *Armadillidium nahumi* n. sp. (Crustacea: Oniscidea: Armadillidiidae), a new terrestrial isopod from catalan Pre-Pyrenees (Iberian Peninsula). *Boll. Soc. Hist. Nat. Balears*, 63: 89-96. ISSN 0212-260X. e-ISSN 2444-8192. Palma (Illes Balears).

A new species of terrestrial Isopod of the Iberian Peninsula: *Armadillidium nahumi* n.sp. (Armadillidiidae) is described. The specimens come from the southernmost catalan Pre-Pyrenees area. The new species is closely related with others of the so-called "*Armadillidium serratum*-group", that inhabit this area of the northern Iberian peninsula, North Africa and the Balearic Islands.

Key words: Terrestrial isopods, new species, *Armadillidium*, Catalonia, Iberian Peninsula.

Armadillidium nahumi n. sp. (CRUSTACEA: ONISCIDEA: ARMADILLIDIIDAE), UN NOU ISÒPODE TERRESTRE DELS PREPIRINEUS DE CATALUNYA (PENÍNSULA IBÈRICA). Es descriu una nova espècie d'Isòpode terrestre de la península Ibèrica: *Armadillidium nahumi* n.sp. (Armadillidiidae). Els espècimens provenen de la part més meridional de l'àrea prepirenenca de Catalunya. La nova espècie és molt propera a altres incloses dins l'anomenat "grup *Armadillidium serratum*" que habiten aquesta mateixa àrea del nord de la península Ibèrica, el nord d'Àfrica i les Illes Balears.

Paraules clau: Isòpodes terrestres, nova espècie, *Armadillidium*, Catalunya, Península Ibèrica.

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Recepció del manuscrit: 2-10-2020; revisió acceptada: 9-11-2020; publicació online: 28-11-2020.

Introduction

Within the terrestrial Isopods of Europe, the family Armadillidiidae Brandt, 1833 is one of the richest in number of species. The family includes 16 genera, the genus *Armadillidium* Brandt 1831 being one of the most diverse, especially in the territories that border the Mediterranean sea and also in their islands (See Schmalfuss, 2003). So far, circa 188 species of *Armadillidium* are considered valid species

(Boyko *et al.*, 2008 onwards). In the Iberian Peninsula, North Africa and the Balearic Islands, 27 species have been recorded (Cruz-Suárez, 1993; Garcia, 2003; Schmalfuss, 2003). In the present article is described a new species of this genus, from the prepyrenaic area of Catalonia, which in accordance with its set of morphological features we consider should be included in the "*Armadillidium serratum*-group" proposed by Vandel (1956; 1958; 1962).

Material and methods

The specimens were preserved in 75% ethanol. For the morphological study, the habitual methods and resources have been used (see Garcia *et al.*, 2019). In this case, the appendages of the dissected specimens were temporarily mounted in glycerin and later permanently mounted in Faure's liquid or preserved in microtubes with 75% ethanol. Tergites have been lightly treated with lactophenol to facilitate their extension, and integumentary characteristics have been studied through their temporary inclusion in glycerin. They were then transferred to microtubes with 75% ethanol for preservation. Additionally, some integumentary details were studied using scanning electron microscope (Hitachi S-3400N).

Taxonomy

Family Armadillidiidae Brandt, 1833

Genus *Armadillidium* Brandt, 1831

***Armadillidium nahumi* n. sp.**

Figs. 1-4

<http://zoobank.org/urn:lsid:zoobank.org:act:A10F8519-2AD4-4931-A81B-F6B9ADD6643F>

Diagnosis

Integument scabrous, densely covered with circular cavities; head granulated, with complete scutellar ridge forming the frontolateral corners, and regularly curved, strong, postscutellar ridge; first pereon tergite with 4-5 transversal rows of granulations; pereon tergites 2-7 with two transversal rows of granulations: one in posterior third and another in the posterior margin; pereon epimera smooth; pleon and pleotelson with some flat protuberances; pleotelson trapezoidal, with the smaller base 88/100 of the largest; exopod of the first male pleopod with rounded posterior

lobe and with indented respiratory field; second male pleopod exopod with very narrow posterior lobe, sharply ended, and with indented respiratory field.

Derivatio nominis: This new species is dedicated to Nahum Nieto, from Lleida (Catalunya, Spain) who collected the specimens and sent them for identification.

Examined material

Holotype: Female, Vilanova de la Sal (Les Avellanes-Santa Linya), Lleida, Spain; on wet gravel ground next to a stream; 15-V-2020, Nahum Nieto leg. Deposited in the carcinological collection of the Balearic Museum of Natural Sciences, Sóller, Mallorca (MBCN 21310). **Paratypes:** 2 males, same data as holotype, (MBCN 21311 and 21312); 2 females, same data as holotype, (MBCN 21313 and 21314); 1 male, (dissected specimen divided on one vial and two micropreparations) and 1 female, same data as holotype, both in the personal collection of Lluç Garcia.

Description

Maximum length: male, 10,5 mm; female 11,9 mm. Habitus and general body form, as in Figs 1 A-C and 4 D-E. Colour uniforme grey-brown. Conglobation pseudosphaeric. Dorsum scabrous, densely covered with circular cavities; scale-setae triangular, tricorn-type, situated between the integumentary depressions (Figs. 1D and 4C); noduli laterales small, on a prominent tubercle; in the first tergite they are in the median posterior zone, very far from the lateral margin and near the posterior edge. Prominent granulations only in the posterior part of cephalon and medial posterior half of pereon tergites; anterior parts of pereon tergites smooth. Pereon epimera, pleon and pleotelson without prominent granulations (Figs. 1A-C; 4A-E).

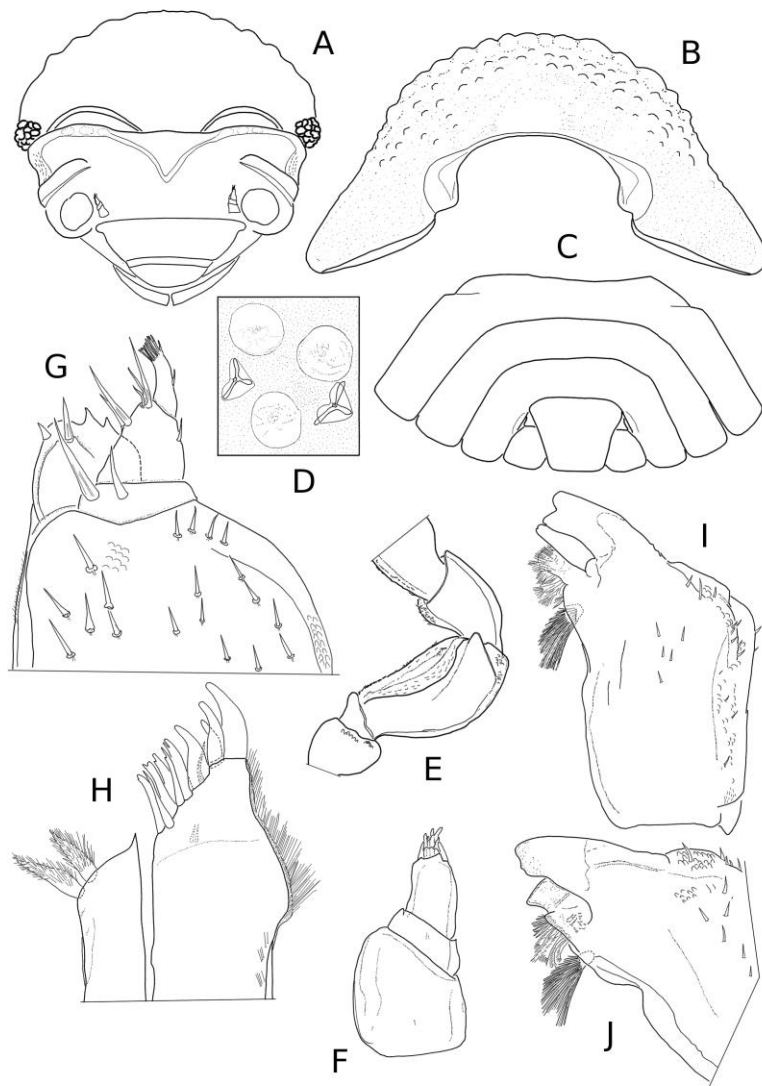


Fig. 1. *Armadillidium nahumi* n. sp. Male paratype. A. Cephalon, frontal view (granulation omitted). B. First pereon tergite, frontal view. C. Last three pleon tergites and pleotelson, dorsal view (dorsal sculpture omitted). D. Scale-setae and circular cavities of integument. E. Second antenna peduncular articles. F. First antenna. G. Maxilliped. H. Maxillule. I. Left mandible. J. Right mandible.

Fig. 1. *Armadillidium nahumi* n. sp. Paratip mascle. A. Cèfalon, vista frontal (granulació no representada). B. Primer pereonit, vista frontal. C. Darrers tres pleonits i pleotelson, vista dorsal (escultura dorsal no representada). D. Seda-escates i cavitats circulars del tegument. E. Articles pedunculars de l'antena. F. Antènula. G. Maxil·liped. H. Maxil·lula. I. Mandíbula esquerra. J. Mandíbula dreta.

Cephalon (Fig. 2 A) duplocarinate-type; scutellar ridge (or 'ligne frontale') strong, complete, forming frontolateral corners, with three unpigmented spots on each branch; post-scutellar ridge regularly curved on each side; frontal shield with sides slightly concave and upper margin curved. *Eyes* composed by 15 -16 omatidia. *First pereon-tergite* (Fig. 1 B) very sinuous with angled posterolateral edge and thickened and raised anterior half; anterior distal edge extending beyond eye position. *Epimera* laterally extended. *Pleotelson* trapezoidal with broad hind margin (Fig. 4 B). *Uropodal exopods* with posterior margin somewhat rounded and slightly protruding from pleotelson distal margin (Figs. 1 C and 4 B).

First antenna (Fig. 1F): length of basal article equal to 2+3; medial article short; distal article with 7-8 aesthetascs, one accessory sensory seta and rounded lobe. *Second antenna* short, just reaching first pereon tergite hind margin (Fig. 4 D-E); basal articles carinated, with many granules and scales (Fig. 1E); flagellum with basal article $\frac{1}{2}$ of distal one.

Right mandible (Fig. 1J): molar process slightly bicuspidate; lacinia mobilis trapezoidal; hairy lobe with 7-8 single setae; 5 setae between lobe and pars molaris; dichotomized molar penicillium, with about 20 setae. *Left mandible* (Fig. 1 I): pars incisiva bidentate; lacinia mobilis narrow, as long as incisor process; hairy lobe with 1 penicillium; intermediate part with 2-3 large and 2 small setae; dichotomized molar proces with 10-15 setae.

Maxillule (Fig. 1H): external branch with 4 + 6 teeth, five of smaller ones toothed and one supplementary; internal branch with 2 thick penicils and sharp posterior corner. *Maxilla* (not illustrated) bilobate, without special features.

Maxilliped: (Fig. 1 G) first palp article with 2 setae; second palp article with two groups of 3 setae each; distal article with tuft of short setae; endite without penicil, with 3 triangular teeth on anterior edge and caudal face with one strong seta; caudal face of basis covered with long scale-setae.

Male: *Pereopod 1* (Fig. 2A) with ventral brush on meropod and carpopod. *Pereopod 7* (Fig. 2B) ischiopod with slightly concave upper margin and marked distal piliferous blade; upper margin of meropod with rounded distal lobe. *Pleopod 1* (Figs 2 C-D): exopod with short, distally rounded, posterior lobe; respiratory field upper margin indented; endopod with sharp tip and subapical dentate lamella in ventral part. *Pleopod 2* (Figs. 2 E-F): exopod with wide basal part and narrow, triangular, posterior lobe; respiratory field upper margin indented; endopod progressively narrowed. *Pleopods 3-5* as in Figs. 3 A-C.

Remarks

Armadillidium nahumi n. sp. is closely related to *A. serratum* Budde-Lund, 1885, the type species of the so-called "*Armadillidium serratum*-group" as defined by Vandel (1956; 1958; 1962). The species initially included within this group share the following features: conglobation pseudosphaeric; epimera more or less extended to the sides; head with complete scutellar ridge and a postscutellar ridge; and markedly granulated or spinose body. In addition to the type species, this group includes: *A. pardoi* Vandel 1956 and *A. djebalensis* Vandel, 1958, both from the Rif mountains in North Africa. Subsequently, it also been considered to be close related or belonging to the same group *A. strinatii* Vandel 1960, *A. serrai* Cruz & Dalens, 1990, *A. pretusi* Cruz, 1990 and *A. cruzi* Garcia, 2008, all of them from the Balearic

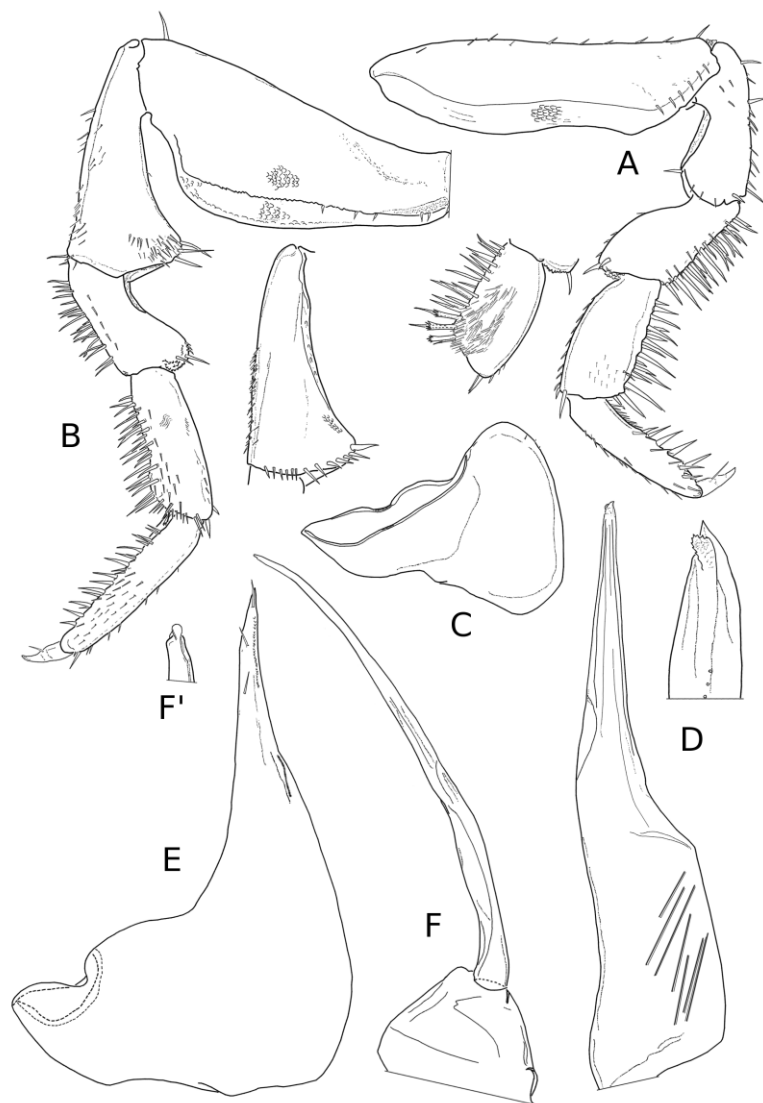


Fig. 2. *Armadillidium nahumi* n. sp. Male paratype. A. First pereopod (caudal and carpopod frontal). B. Seventh pereopod (frontal and ischiopod caudal). C. Pleopod 1 exopod (caudal). D. Pleopod 1 endopod (frontal and distal part caudal). E. Pleopod 2 exopod (frontal). F. Pleopod 2 endopod. F' distal part of pleopod 2 endopod.

Fig. 2. *Armadillidium nahumi* n. sp. Paratip mascle. A. Primer pereopodi (caudal i detall carpopodit frontal). B. Setè pereopodi (frontal i detall isquiopodit caudal). C. Exopodit del 1er pleopodi (caudal). D. Endopodit del 1er pleopodi (frontal i part distal caudal). E. Exopodit del 2on pleopodi (frontal). F. Endopodit del 2on pleopodi. F'. Part distal de l'endopodit del 2on pleopodi.

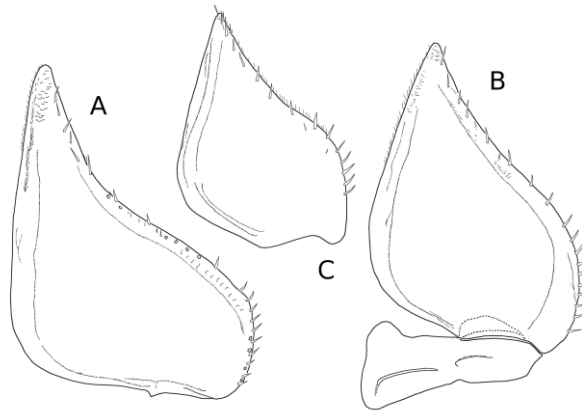


Fig. 3. *Armadillidium nahumi* n. sp. Male paratype. A. Pleopod 3 exopod. B. Pleopod 4 exopod. C. Pleopod 5 exopod.

Fig. 3. *Armadillidium nahumi* n. sp. Paratip mascle. A. Exopodit del 3er pleopodi. B. Exopodit del 4rt pleopodi. C. Exopodit del 5è pleopodi.

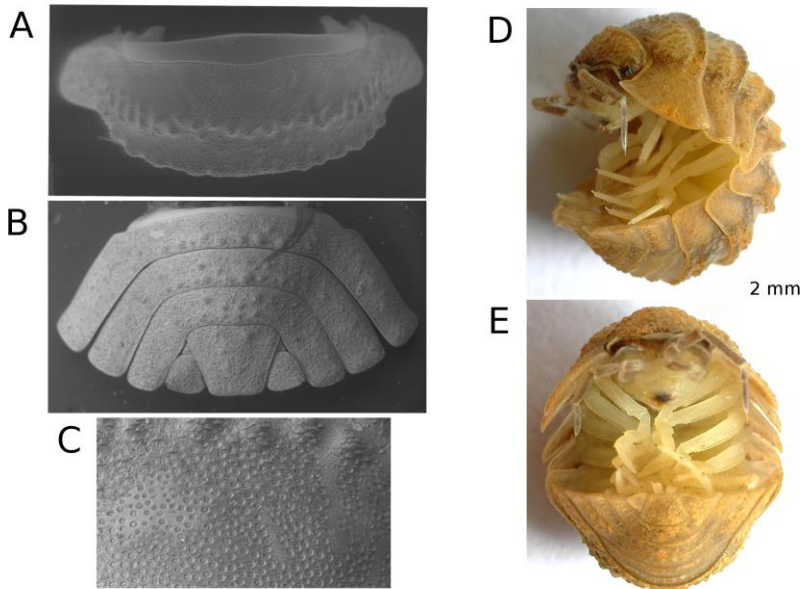


Fig. 4. *Armadillidium nahumi* n. sp. Male paratype. A-C, details of the dorsal ornamentation. A. Second pereon tergite. B. Last three pleon tergites and pleotelson. C. Scale setae and circular cavities of pereon tergites. D-E. Habitus.

Fig. 4. *Armadillidium nahumi* n. sp. Paratip mascle. A-C, detalls de l'ornamentació dorsal. A. Segon pereonit. B. Darrers tres pleonits i pleotelson. C. Seda-escates i cavitats circulars del tegument dels pereonits. D-E. Habitus.

Islands (Menorca and Mallorca), and *A. espanoli* Cruz, 1990 from the East of the Iberian Peninsula (Vandel, 1960; Cruz, 1989; Cruz & Dalens, 1990; Cruz, 1990; Garcia, 2008).

According to their body sculpture, these species can be divided into two subgroups: species without dorsal granulations, i.e. *A. strinatii*, *A. espanoli* and *A. cruzi*; species more or less granulated or spinose, i.e. *A. serratum*, *A. pardoii*, *A. djebalensis*, *A. serrai*, *A. pretusi* and *A. nahumi* n.sp. All of them also present an indentation in the respiratory field of the exopodites of the first two male pleopods (although it is necessary to note that the male sexual characteristics of *A. pretusi* have not yet been described).

A. nahumi n.sp. shows all the characteristics of the "*Armadillidium serratum*-group" but differs from all other species through its specific combination of characteristics: pleotelson trapezoidal-shaped with a very broad minor base, a characteristic that it only shares with *A. strinatii* and *A. serrai*; it differs from *A. strinatii* by having a marked dorsal sculpture instead of smooth integuments and by the shape of the exopodite of the first male pleopod; it is distinguished from *A. serrai* by body shape, clear differences in cephalic structure (ie: a regularly arched rather than angulose postscutellar line); smooth pleonites instead of two rows of tubercles in each one; the form of the exopodite of the first male pleopod, which in the new species shows a posterior lobe with a rounded tip, whereas *A. serrai* does not have a posterior lobe; both species share the same type of circular integumentary depressions. The presence of dorsal granulations also makes it possible to differentiate it from *A. espanoli* and *A. cruzi*. Finally, it is distinguished from *A. serratum*, *A. djebalensis* and *A. pardoii*, by

the shape of the pleotelson, that in all these species is triangular, and by the arrangement of the granulations.

Acknowledgments

The author thanks Frederick Price the help in editing the final text. Thanks also to Ferran Hierro-Riu, (Scientific-technical services, University of Balearic Islands), for taking the SEM photographs.

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