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The terrestrial isopods (Isopoda: Oniscidea) of Greece. 23rd contribution: The genus *Armadillidium* (Armadillidiidae) on the Peloponnese[1]

Helmut Schmalfuss

Abstract

Based on the investigation of new collections and on a survey of the literature, 18 species of *Armadillidium* are reported from the Peloponnese, including five species new to science (*A. bensei* **n. sp.**, *A. grimmi* **n. sp.**, *A. kuehnelti* **n. sp.**, *A. maniatum* **n. sp.**, and *A. stymphalicum* **n. sp.**). New synonyms of *A. arcadicum* Verhoeff, 1902: *A. humile* Strouhal, 1936 and *A. zuellichi* Strouhal, 1937. For every treated species the diagnostic characters are described and illustrated, the majority by SEM-photographs. The Greek records of all treated species are mapped. A list of all *Armadillidium* species known up to now from Greece is added, zoogeographical and phylogenetic aspects are discussed.
Keywords: Isopoda, Oniscidea, *Armadillidium*, Greece.

Zusammenfassung

Die Untersuchung neuer Aufsammlungen und die Durchsicht der Literatur ergaben 18 *Armadillidium*-Arten auf der Peloponnes, einschließlich fünf Arten, die neu für die Wissenschaft sind (*A. bensei* **n. sp.**, *A. grimmi* **n. sp.**, *A. kuehnelti* **n. sp.**, *A. maniatum* **n. sp.** und *A. stymphalicum* **n. sp.**). Neue Synonyme von *A. arcadicum* Verhoeff, 1902: *A. humile* Strouhal, 1936 und *A. zuellichi* Strouhal, 1937. Die diagnostischen Merkmale aller behandelten Arten werden beschrieben und illustriert, die meisten mit Hilfe von REM-Aufnahmen. Die griechischen Nachweise der behandelten Arten wurden kartiert. Alle bis jetzt von Griechenland bekannten *Armadillidium*-Arten werden aufgelistet, zoogeografische und phylogenetische Aspekte werden diskutiert.

Contents

[1] 22nd contribution see Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie) 685 (2005).

1 The genus *Armadillidium* Brandt, 1833

With 178 nominal species *Armadillidium* is the terrestrial isopod genus with the second highest number of species, after *Porcellio* with 197 nominal species (see SCHMALFUSS 2003). The genus is distributed throughout Europe and in a narrow belt along the non-European coasts of the Mediterranean and the Black Sea (SCHMALFUSS 2000, fig. 1). Two species, *A. vulgare* and *A. nasatum*, have been introduced to other parts of the world by human activities and are secondarily cosmopolitan today.

Diagnosis of the genus *Armadillidium*:

1. All species are able to conglobate, with the antennae hidden inside the rolled-up animal ("endo-antennal");
2. size of adult specimens between 8 and 23 mm;
3. eyes with 10–30 ommatidia;
4. frontal line developed into a triangular frontal shield which medially reaches or surpasses the upper part of the head and which is always separated from the head by a groove between frons and triangle;
5. lateral parts of interocular line always present;
6. pereion-epimeron 1 without a posterior schisma;
7. telson triangular or trapezoidal;
8. antennal flagellum with two segments;
9. male ischium 7 with sexual specializations;
10. pleopod-exopodites 1 and 2 with polyspiracular lungs;
11. uropod-exopodites trapezoidal and terminally truncated, not surpassing the telson, and filling the space between telson and pleon-epimera 5.

The most complete documentation of the external morphology of a species of *Armadillidium* is found in SCHMIDT (2003: 155, figs. 164–170 = 37 single figures) for *A. quinquepustulatum*.

The only character that may be a synapomorphy of the species of *Armadillidium* is the separated frontal triangle. The question of monophyly of the genus is still open

to debate, which means also that presently we can only speculate about the phylogenetic relations inside the genus. As far as the treated species from the Peloponnese are concerned some groups of species can be suggested which are probably monophyletic (see chapter 6), but to reach safe results more detailed morphological investigations and the critical use of molecular data will be necessary.

Abbreviations

A.	*Armadillidium*
ex.	example(s), specimen(s)
SMNS	Staatliches Museum für Naturkunde Stuttgart

Acknowledgments

The following persons have donated isopod material used in this revision: Dr. M. Baehr (Munich/Germany), D. Bartsch (SMNS), M. Beder (Ismailia/Egypt), U. Bense (Mössingen/Germany), G. Delmastro (Carmagnola/Italy), Dr. F. Erhard (Enzklösterle/Germany), Dr. D. Grimm (Boston/USA), Dr. R. Grimm (Tübingen/Germany), Dr. K. Hausen (Tübingen/Germany), S. Huber (Oberuhldingen/Germany), Prof. Dr. R. Kinzelbach (Rostock/Germany), Dr. E. Kohler (Schwäbisch Hall/Germany), J. Kontschán (Budapest/Hungary), Prof. Dr. W. Kühnelt † (Vienna/Austria), D. Liebegott † (Frankfurt a. M./Germany), Dr. H. Malicky (Lunz am See/Austria), I. Maurer (Plochingen/Germany), Dr. G. Osella (L'Aquila/Italy), K. Paragamian (Iráklio/Greece), Dr. H. Pieper (Kiel/Germany), Dr. C. Rieger (Nürtingen/Germany), Dr. W. Schawaller (SMNS), J. Schönfeld (Westum/Germany), Dr. S. Sfenthourakis (Pátra/Greece). The latter and Drs. F. Ferrara and S. Taiti (Florence/Italy) made valuable suggestions to improve an earlier draft of this paper. Dr. J. Gruber and Dr. P. Dworschak (both Naturhistorisches Museum, Vienna) loaned type material of species described by Strouhal. Dr. K. Wolf-Schwenninger and S. Leidenroth (both SMNS) operated the scanning electron microscope, and Dr. H.-P. Tschorsnig and J. Reibnitz (both SMNS) edited the SEM-photographs and the maps. To all of them I wish to express my sincere thanks.

2 Methods

The material used for the SEM-preparations was, if not otherwise stated, air-dried. The mounted material was coated with a 20 nm Au/Pd layer and examined with an ISI-SS40 scanning electron microscope at 10 kV. Digital photographs were directly aquired by using DISS 5 (point electronic).

3 *Armadillidium* in Greece

The following list includes all species ever recorded from Greece under the genus *Armadillidium*, also those names which in the meantime have turned out to be synonyms or to belong to different genera. The list is extracted from my world catalog of terrestrial isopods (Schmalfuss 2003). Today we recognize 46 valid species from Greece. In the present paper five new species are described, which adds up to 51 Greek species. I have, however, seen at least five additional undescribed species from Greece in different collections, so this number will increase with further investigations. Valid species names are given in bold type.

***Armadillidium aegaeum* Strouhal, 1929**
***Armadillidium aeginense* Strouhal, 1939**
***Armadillidium albanicum* Verhoeff, 1901**
***Armadillidium album* Dollfus, 1887**
***Armadillidium ameglioi* Arcangeli, 1914**
Synonyms: *A. ephesiacum*, *A. samium*

***Armadillidium arcadicum* Verhoeff, 1902**
Synonyms: *A. humile*, *A. zuellichi* (see chapter 5.1)
***Armadillidium argolicum* Verhoeff, 1907**
Synonyms: *A. hydrense*, *A. mycenaeum*
***Armadillidium artense* Strouhal, 1956**
Armadillidium astriger (C. Koch, 1841) = nomen dubium
***Armadillidium atticum* Strouhal, 1929**
***Armadillidium beieri* Strouhal, 1937**
***Armadillidium bicurvatum* Verhoeff, 1901**
Synonym: *A. schulzi*
Armadillidium bimarginatum Strouhal, 1929 = ***A. peloponnesiacum***
Armadillidium cavernarum Vandel, 1958 = ***Platanosphaera c.*** (see SCHMALFUSS et al. 2004)
***Armadillidium cephalonicum* Strouhal, 1929**
Armadillidium clausi Verhoeff, 1901 = nomen dubium
***Armadillidium corcyraeum* Verhoeff, 1901**
Synonyms: *A. graecorum*, *A. odysseum*
***Armadillidium cythereium* Strouhal, 1937**
Armadillidium emmae Strouhal, 1937 = ***A. insulanum***
Armadillidium ephesiacum Strouhal, 1927 = ***A. ameglioi***
Armadillidium epirense Strouhal, 1956 = ***A. janinense***
***Armadillidium epiroticum* Strouhal, 1956**
***Armadillidium fossuligerum* Verhoeff, 1902**
***Armadillidium frontemarginatum* Strouhal, 1927**
***Armadillidium frontetriangulum* Verhoeff, 1901**
Armadillidium globosum Vogl, 1876 = nomen dubium
Armadillidium graecorum Verhoeff, 1907 = ***A. corcyraeum***
***Armadillidium granulatum* Brandt, 1833**
***Armadillidium hauseni* Schmalfuss, 1985**
Armadillidium holtzi Strouhal, 1929 = ***A. janinense***
***Armadillidium humectum* Strouhal, 1937**
Armadillidium humile Strouhal, 1936 = ***A. arcadicum*** (see chapter 5.1)
Armadillidium hybridum Budde-Lund, 1896 = ***Schizidium h.***
Armadillidium hydrense Strouhal, 1937 = ***A. argolicum***
***Armadillidium inflatum* Verhoeff, 1907**
***Armadillidium insulanum* Verhoeff, 1907**
Synonyms: *A. emmae*, *A. lemnium*, *A. samothracium*, *A. scyrium*
***Armadillidium irmengardae* Strouhal, 1956**
***Armadillidium janinense* Verhoeff, 1902**
Synonyms: *A. epirense*, *A. holtzi* (type investigated)
***Armadillidium jonicum* Strouhal, 1927**
***Armadillidium justi* Strouhal, 1937**
***Armadillidium kalamatense* Verhoeff, 1907**
***Armadillidium kalamium* Strouhal, 1956**
***Armadillidium laconicum* Strouhal, 1938**
***Armadillidium laminigerum* Verhoeff, 1907**
Armadillidium lemnium Strouhal, 1937 = ***A. insulanum***
***Armadillidium lobocurvum* Verhoeff, 1902**
Armadillidium luridum Verhoeff, 1907 = ***A. peloponnesiacum***
***Armadillidium lymberakisi* Schmalfuss, Paragamian & Sfenthourakis, 2004**
***Armadillidium marmoratum* Strouhal, 1929**
Synonym: *A. rhodium*
***Armadillidium messenicum* Verhoeff, 1902**
Armadillidium mycenaeum Strouhal, 1937 = ***A. argolicum***
Armadillidium naupliense Verhoeff, 1902 = ***A. granulatum***
Armadillidium naxium Verhoeff, 1901 = nomen dubium
Armadillidium odysseum Verhoeff, 1901 = ***A. corcyraeum***
Armadillidium oertzenii Budde-Lund, 1896 = ***Schizidium o.***
Armadillidium olympiacum Strouhal, 1937 = ***A. tripolitzense***

***Armadillidium pallasii* Brandt, 1833**
Armadillidium parvum Strouhal, 1938 = ***A. lobocurvum*** (see Remarks in chapter 5.10)
***Armadillidium pelionense* Strouhal, 1928**
***Armadillidium peloponnesiacum* Verhoeff, 1901**
Synonyms: *A. bimarginatum*, *A. luridum*, *A. propinquum*
Armadillidium propinquum Strouhal, 1929 = ***A. peloponnesiacum***
***Armadillidium pseudovulgare* Verhoeff, 1902**
Synonym: *A. veluchiense*
Armadillidium pubescens Strouhal, 1956 = ***Trichodillidium p.***
Armadillidium rhodium Strouhal, 1937 = ***A. marmoratum***
Armadillidium samium Strouhal, 1929 = ***A. ameglioi***
Armadillidium samothracium Strouhal, 1937 = ***A. insulanum***
Armadillidium schellenbergi Strouhal, 1929 = ***A. vulgare***
Armadillidium schulzi Strouhal, 1929 = ***A. bicurvatum***
Armadillidium scyrium Strouhal, 1929 = ***A. insulanum***
***Armadillidium simile* Strouhal, 1937**
***Armadillidium stolikanum* Verhoeff, 1907**
Armadillidium thessalorum Verhoeff, 1902 = nomen dubium
***Armadillidium tripolitzense* Verhoeff, 1902**
Synonyms: *A. olympiacum*, *A. voidiense*
Armadillidium veluchiense Verhoeff, 1902 = ***A. pseudovulgare***
***Armadillidium versluysi* Strouhal, 1937**
Armadillidium voidiense Strouhal, 1937 = ***A. tripolitzense***
***Armadillidium vulgare* (Latreille, 1804)**
Synonym: *A. schellenbergi*
***Armadillidium werneri* Strouhal, 1927**
***Armadillidium xerovunense* Strouhal, 1956**
Armadillidium zuellichi Strouhal, 1937 = ***A. arcadicum*** (see chapter 5.1)

In former publications (SCHMALFUSS 1981b, 1982, 1985) I have revised and redescribed the 18 species which were rather insufficiently described from Greece by VERHOEFF between 1901 and 1907, and in SCHMALFUSS 2000 the distribution patterns of the Greek species of *Armadillidium* are analyzed. It is planned to treat the Greek species of *Armadillidium* in a number of papers dedicated to different regions of Greece. This series starts with the present article on the species populating the Peloponnese. As far as it is possible from the material at hand, the main diagnostic characters are illustrated for every species, supplemented by some SEM-photographs of morphological details which have not been published before.

4 Diagnostic characters of the species of *Armadillidium*

The genus *Armadillidium* has undergone remarkable speciation processes in southeastern Europe (Italy and the Balkans). These events seem to have taken place in geologically recent times, probably caused by rather rapid climatic changes during the Pleistocene. Accordingly the differences inside these young species swarms can be slight, and identification can be delicate. Among the Greek species the following characters have turned out to be of diagnostic value:

1. The structure of the head: the shape and position of the frontal triangle (which probably corresponds to the linea frontalis) is very variable and can be species-specific in some species, in others there is an intra-specific variability or there can be allometric differences depending on the size of the animal. The same holds true for the linea interocularis and the shape of the antennal lobes. For every treated species

two views of the head are depicted (if possible by SEM-photographs), a frontal view of the "face" and a dorsal view as seen when the animal is observed in a dorsal position.

2. The hind margin of the first pereion-epimeron is characteristic for every species inside a limited intra-specific variability. The concavity can be sharply angled to completely rounded, a feature of unknown function; it is depicted in a dorsolateral view with the frontal and the caudal corner in one plane.

3. The telson has always a specific shape. The sides can be straight to concave, and the apex can be narrowly rounded to broadly truncated. It is depicted in a dorsofrontal view, with the telsonic plate in the viewing plane. The form of the telsonic apex corresponds to the frontal part of the head and to the conglobating strategy of the species.

4. The antenna (antenna 2) can be slender to stout, and the relation of the flagellar segments can be different. Inside certain species groups the antenna can, however, be very similar.

5. The male pereiopod 1 can have dense ventral brushes of spiny setae on carpus and merus or only on the carpus or it can lack these brushes and have only rows of spines as they are present in the female. These brushes are functioning as anti-slide structures in copulation behavior, and their presence or absence is often related to the surface structure of the tergites; in species with very smooth tergites as in *A. vulgare* the brushes are well developed not only on the male pereiopod 1 but also on the pereiopods 2 to 6, while in species with roughly tuberculated tergites these brushes can be missing. This character is functionally independent from the antennal grooming apparatus on the frontal side of carpus 1, which is present also in females. For the majority of the treated species an SEM-photograph of the frontal side of the male carpus 1 and merus 1 is given.

6. The ischium of the male pereiopod 7 exhibits a high degree of species-specific differentiation. It is important to note that surface structure and setal armature show pronounced differences between the frontal and the caudal side of this segment. The frontal side is in most species equipped with a groove and a distal field of short setae, while the caudal side is usually without grooves and setae except a distal row of strong spines. Ventrally the ischium can be straight to strongly concave. Because of the pronounced differences of frontal and caudal face SEM-photographs of both sides are presented where possible.

7. The first male pleopods are another species-specific character. In the exopodite a medial hind-lobe can be missing or it can have a varying length. An illustration of the exopodite is given for every species, normally from the caudal side, with details of the respiratory field. The endopodite exhibits differences in the form of the apex. It can be completely straight or bent outwards to a varying degree. There is, however, the problem that this curvature is influenced by the procedure of fixing and the chemical compounds used for fixation. Therefore the endopodite 1 is illustrated only for a few species.

The antennula (antenna 1) seems to be very similar in all species of the genus, so it is depicted only for one species.

Concerning the mouthparts it is not yet known whether there exist any pronounced differences inside the genus. A complete set of high-quality drawings of all mouthparts can be found in SCHMIDT (2003: 157), as well as figures of all pereiopods and all pleopods. Neither the mouthparts nor the pereiopods 2–6 and pleopods 2–5

have been found to be of any additional diagnostic value, so in the present paper these appendages are not figured.

Because of its secondarily worldwide distribution, and since it can be kept and bred very easily, *Armadillidium vulgare* has become the best known species of the terrestrial isopods. It has been the object of many investigations concerning anatomy, cytology, ultrastructure, molecular biology, molt processes, glands, respiration, physiology, genetics, sex determination, reproduction, population dynamics, ontogenetic development, behavior, nutrition and other ecological aspects (publications listed in SCHMALFUSS 2003: 44). So for this species a number of morphological structures are depicted beyond the diagnostic characters which may be of interest for further studies on comparative and functional morphology.

5 The *Armadillidium* species of the Peloponnese

5.1 *Armadillidium arcadicum* Verhoeff, 1902
(Figs. 1–21 and map Fig. 22)

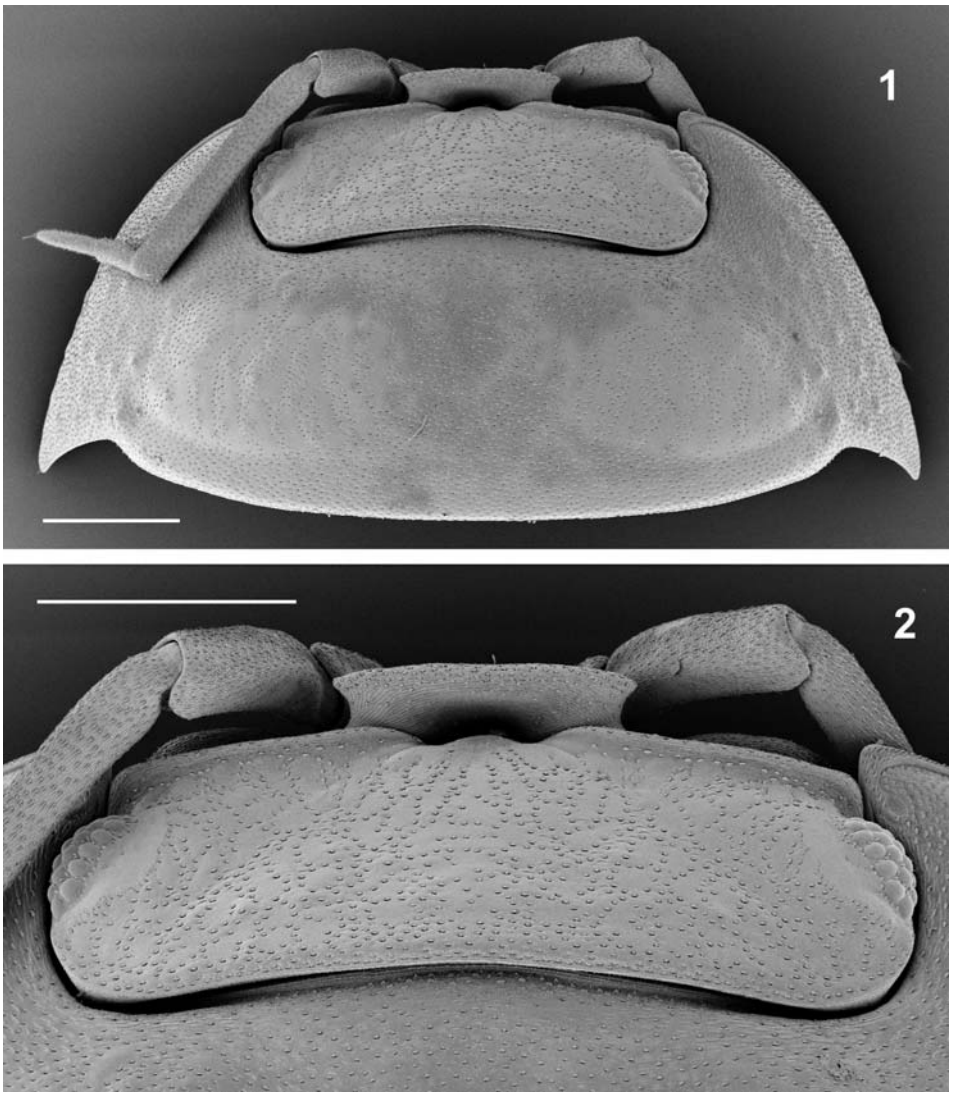
Synonyms: *A. humile* Strouhal, 1936 (**n. syn.**), *A. zuellichi* Strouhal, 1937 (**n. syn.**).

Literature records

VERHOEFF 1902: 243 (GR, Peloponnese: "Tripolitza in Arkadien" = Trípoli); VERHOEFF 1907: 467; VERHOEFF 1930: 56, fig. 68; STROUHAL 1936: 103, figs. 21, 22 (*A. humile*, GR, Ionian island Kefaloniá); STROUHAL 1937b: 124, figs. 14, 15 (*A. zuellichi*, GR, western Peloponnese: Olimpía); STROUHAL 1938: 41, figs. 19–21 (*A. zuellichi*, GR, central Peloponnese: Trípoli); STROUHAL 1939: 185, figs. 4–6 (*A. humile*, GR, Ionian island Zákinthos); ?SCHMALFUSS 1975: 55 (*A. zuellichi*, partim, GR, southern Peloponnese, not the samples from Attica); SCHMALFUSS 1981b: 277, figs. 8–13; SCHMALFUSS 1999: 7 (*A. humile*, GR, Ionian islands Kefaloniá and Zákinthos).

Material examined

Greece: 9 ex., Ionian island Kefaloniá, 9 km N of Lixúri, beach, leg. ERHARD & SCHMALFUSS, 6.V.1996 (SMNS 2555). – 1 ex., Ionian island Zákinthos, Argási, leg. MALICKY, 27.V.1977 (SMNS 1168). – 153 ex., Ionian island Zákinthos, 11 localities, leg. ERHARD & SCHMALFUSS, 11.–15.V.1996 (SMNS 2564, 2565, 2566, 2569, 2570, 2571, 2572, 2574, 2575, 2576, 2577). – 9 ex., Ionian Islands, Strofádes Islands 50 km S of Zákinthos, Stamfáni Island, leg. PIEPER, 14.IX.1980 (SMNS 1343). – 2 ex., SW-Peloponnese, Kiparissía, beach, leg. MAURER, 29. VIII.1987 (SMNS 2168). – 2 ex., SW-Peloponnese, W of Petalídi, Mount Likódimo, 700 m, *Quercus coccifera*, leg. BENSE & SCHMALFUSS, 1.X.2004 (SMNS 2834). – 1 ex., SW-Peloponnese, Meligalás, leg. DELMASTRO, 28.V.1999 (SMNS 2652). – 1 ex., western Peloponnese, 7 km NW of Andrítsena, 500 m, *Quercus coccifera*, leg. BENSE, 3.X.2004 (SMNS 2840). – 28 ex., western Peloponnese, 5 km SW of Andrítsena, 700 m, *Quercus* (deciduous), *Platanus*, leg. BENSE, SCHAWALLER & SCHMALFUSS, 3.X.2004 (SMNS 2839). – 1 ex., western Peloponnese, 15 km S of Andrítsena, 800 m, *Quercus coccifera*, leg. SCHMALFUSS, 2.X.2004 (SMNS 2838). – 2 ex., central Peloponnese, Ménalo Mountains, Levídi, Ménalo Ski Resort, leg. DELMASTRO, 20.V.1999 (SMNS 1079). – 10 ex., central Peloponnese, Ménalo Mountains N of Trípoli, 5 km S of Vitína, *Abies*, 1300 m, leg. SCHAWALLER, 25.IX.2004 (SMNS 2817). – ?3 ex., southern Peloponnese, Selasía 12 km N of Spárti, leg. KINZELBACH, 18.IX.1973 (SMNS 1608, published by SCHMALFUSS 1975 as *A. zuellichi*). – ?1 ex., southern Peloponnese, 10 km W of Gíthio, leg. KINZELBACH, 4.X.1973 (SMNS 1609, published by SCHMALFUSS 1975 as *A. zuellichi*). – ?2 ex., southern Peloponnese, 10 km NE of Gíthio, leg. KINZELBACH, 21.IX.1973 (SMNS 1607, published by SCHMALFUSS 1975 as *A. zuellichi*).



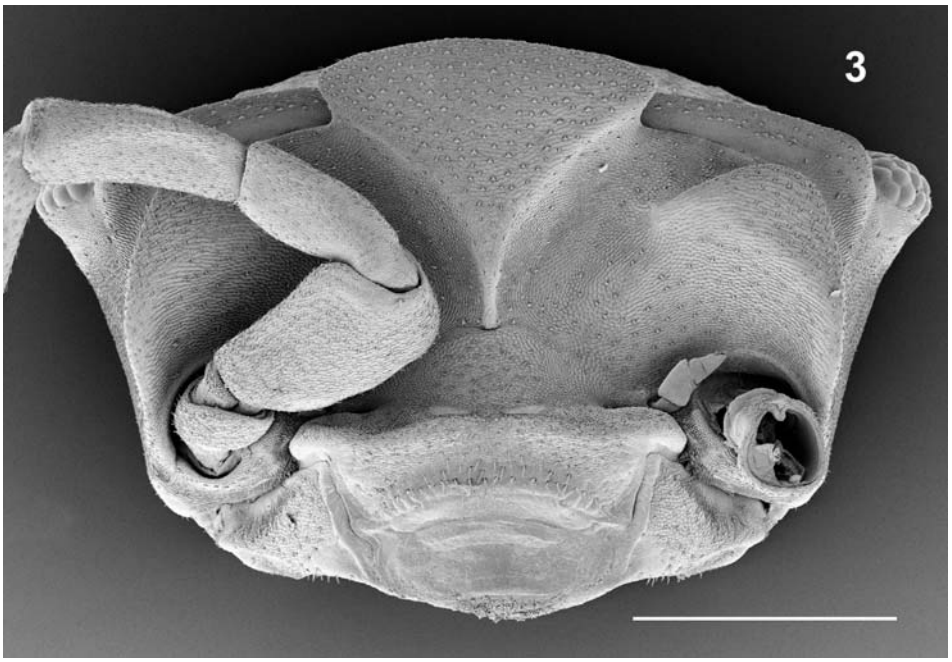
Figs. 1–2. *Armadillidium arcadicum*, ♀, 15 mm long (western Peloponnese, Andrítsena, SMNS 2839). – **1**. Head and pereion-tergite 1 in dorsal view. **2**. Head in dorsal view. – Scales: 1 mm.

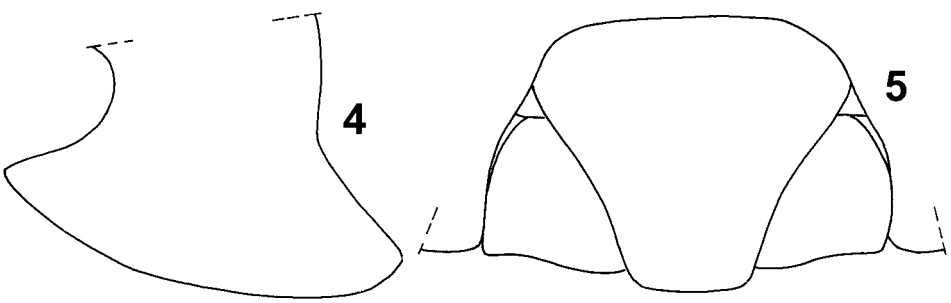
Diagnostic characters

Maximum dimensions: 15.0 × 7.5 mm, STROUHAL (1938: 43) reports 16 × 8 mm for *A. zuellichi*.

Coloration: Males blackish grey-brown, females browner.

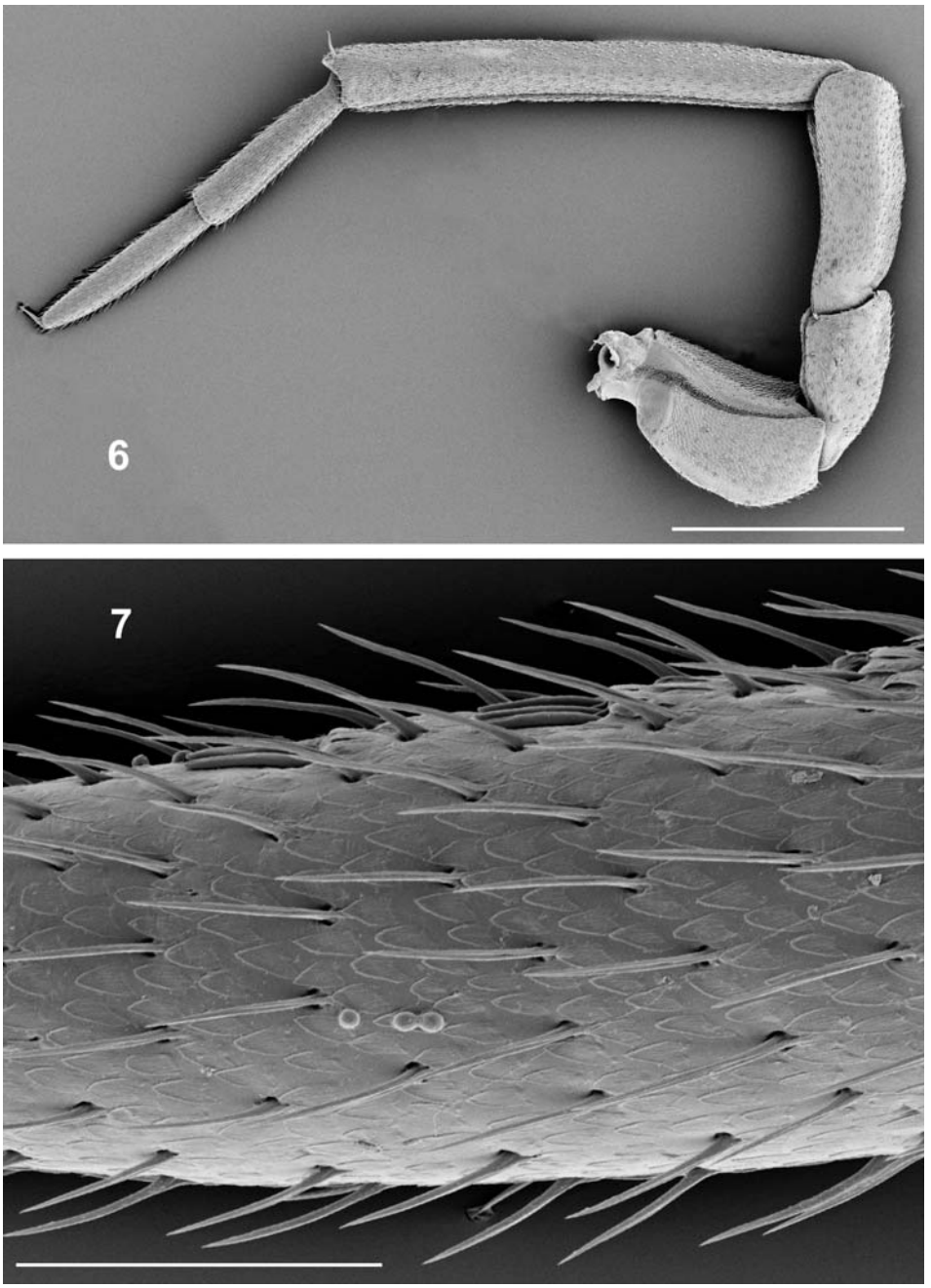
Cuticular structures: Tergites with faint tubercles (compare Fig. 1), specimens from the Ménalo Mountains completely smooth, the populations described as *A. zuellichi* with pronounced tuberculation (compare Fig. 17).



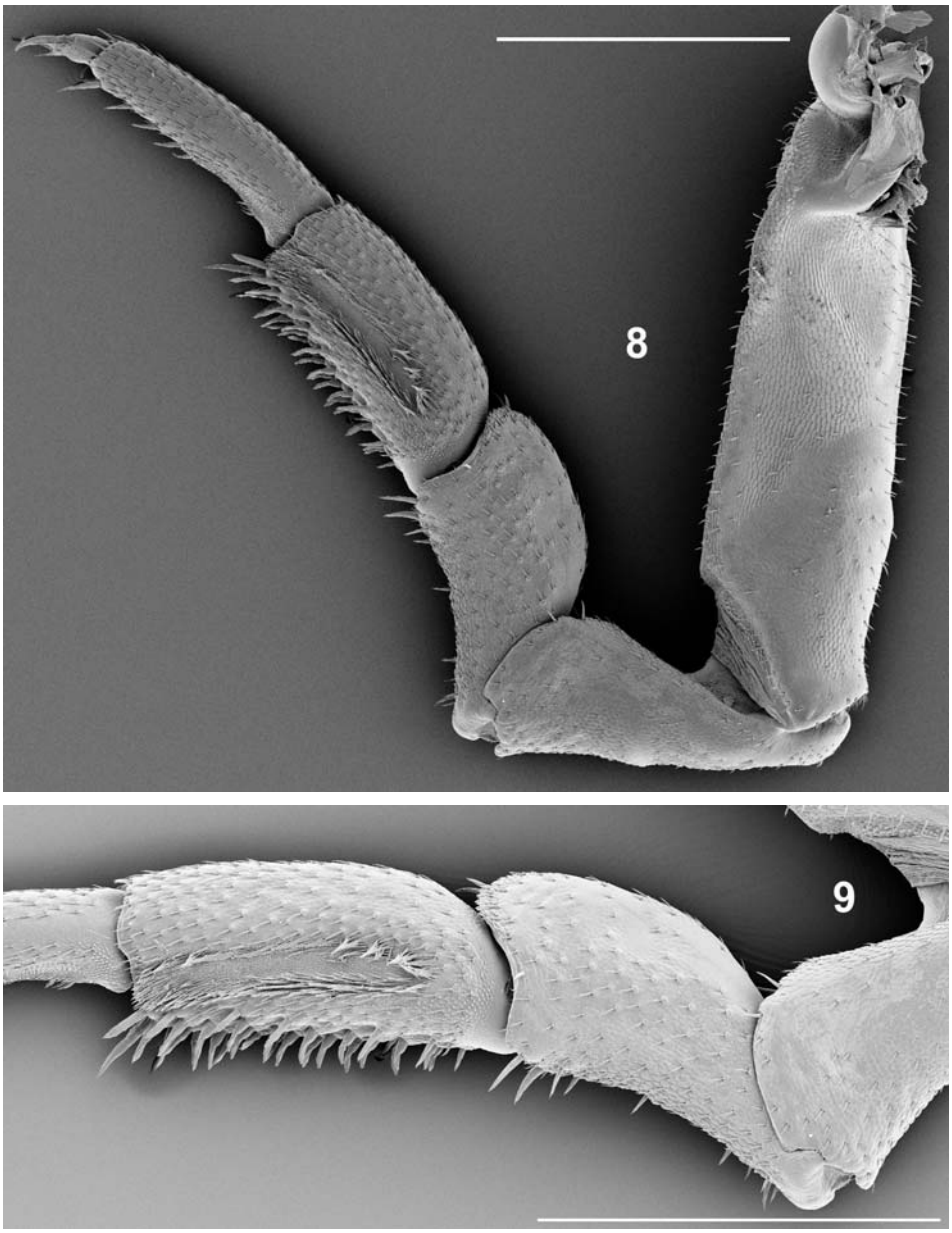


Figs. 3–5. *Armadillidium arcadicum*, ♂, 15 mm long (western Peloponnese, Andrítsena, SMNS 2839). – **3**. Head in frontal view. **4**. Pereion-epimeron 1 in lateral view. **5**. Telson and uropods in dorsal view. – Scale: 1 mm.

Frontal shield from behind one fifth as high as it is wide, lateral angles pointed (Fig. 2). Antennal lobes triangular, not bent outwards (Fig. 3). Hind margin of pereion-epimeron 1 with obtuse angle (Fig. 4). Telson with slightly concave sides and broadly truncated apex (Fig. 5). Antenna with flagellar segments of equal length (Fig. 6), detail with aesthetascs see Fig. 7. Pereiopod 1 with usual grooming structures on frontal side, male carpus with ventral brush of spines (Figs. 8, 9). Male ischium 7 ventrally strongly concave, frontally with distal hair-field (Figs. 10, 11). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 12), endopodite 1 straight with apex slightly bent outwards (Figs. 14, 15). Male pleopod 2 see Figs. 13 and 16.



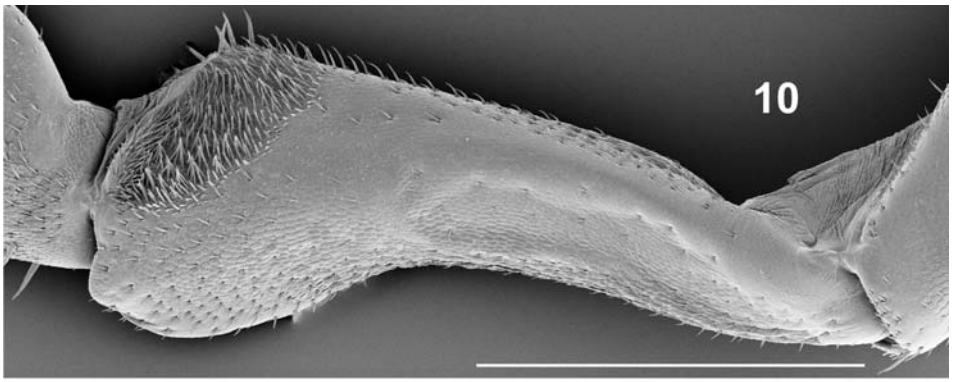
Figs. 6–7. *Armadillidium arcadicum*, ♂, 15 mm long (western Peloponnese, Andrítsena, SMNS 2839). – **6**. Antenna. **7**. Detail of distal segment of antennal flagellum, with aesthetascs on upper margin. – Scales: 1 mm (6), 0.1 mm (7).

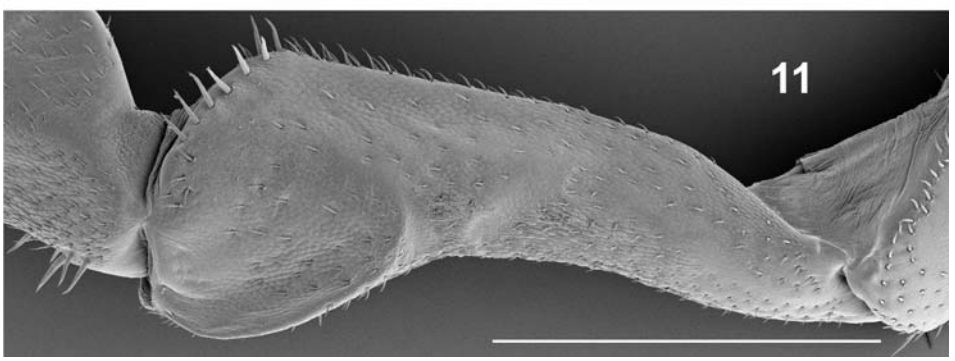


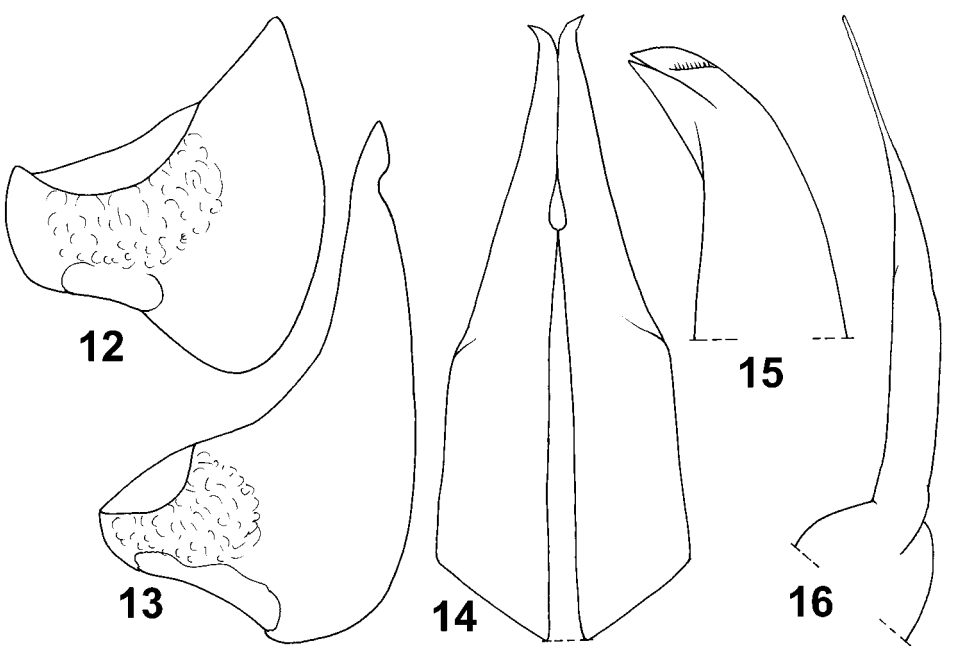
Figs. 8–9. *Armadillidium arcadicum*, ♂, 15 mm long (western Peloponnese, Andrítsena, SMNS 2839). – **8**. Pereiopod 1, frontal view. **9**. Carpus and merus 1, frontal view. – Scales: 1 mm.

Distribution

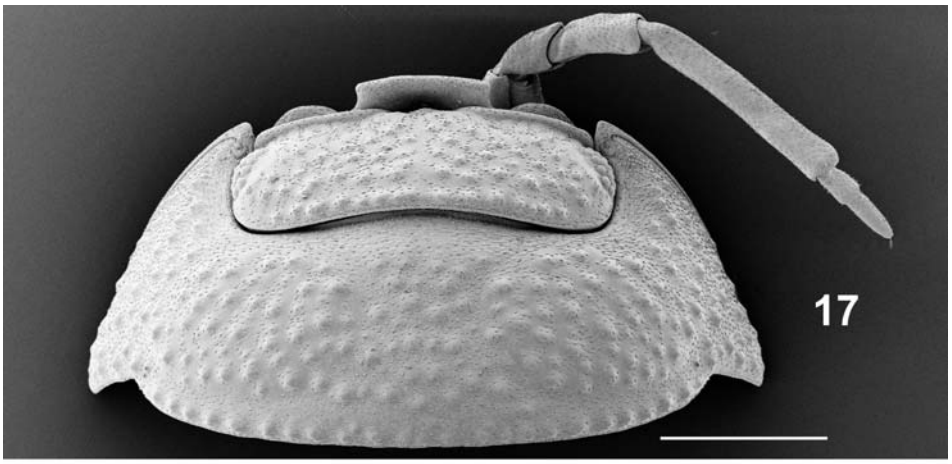
Ionian islands Kefaloniá and Zákinthos (described as *A. humile*), western, central and southern parts of the Peloponnese (see map Fig. 22).

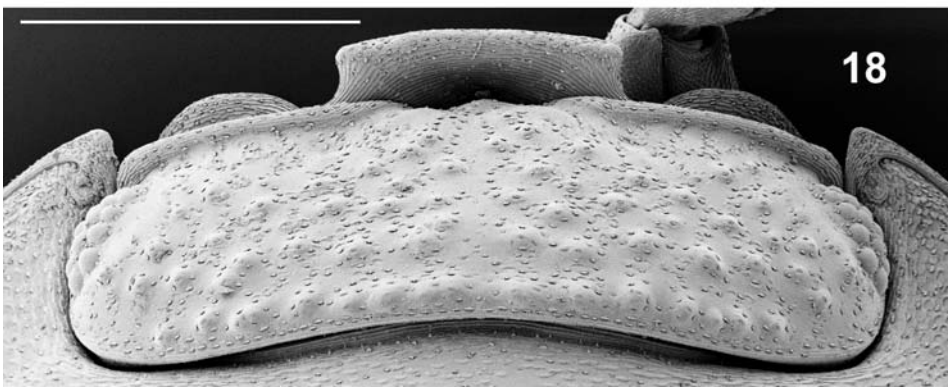


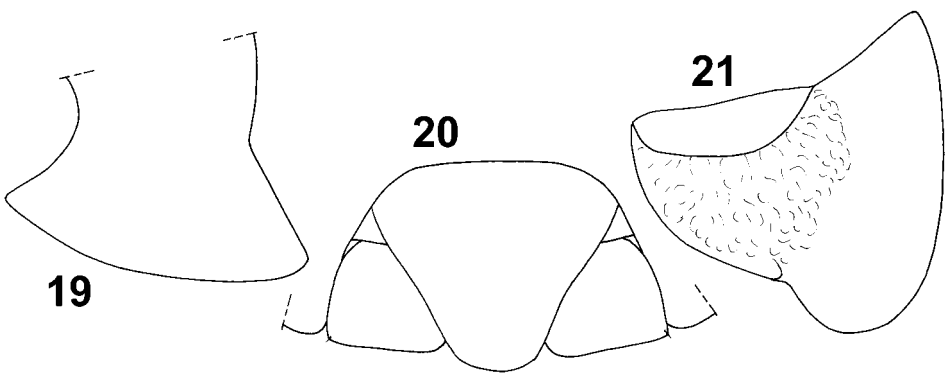




Figs. 10–16. *Armadillidium arcadicum*, ♂, 15 mm long (western Peloponnese, Andrítsena, SMNS 2839). – **10**. Ischium 7, frontal view. **11**. Ischium 7, caudal view. **12**. Pleopod-exopodite 1, caudal view. **13**. Exopodite 2, caudal view. **14**. Pleopod-endopodites 1, frontal view. **15**. Apex of pleopod-endopodite 1, frontal view. **16**. Pleopod-endopodite 2. – Scales: 1 mm.







Figs. 17–21. *Armadillidium "zuellichi"* (compare Remarks in chapter 5.1), ♂, 10 mm long (southern Peloponnese, Gíthio, SMNS 1607). – **17**. Head and pereion-tergite 1 in dorsal view. **18**. Head in dorsal view. **19**. Pereion-epimeron 1 in lateral view. **20**. Telson and uropods in dorsal view. **21**. Pleopod-exopodite 1, caudal view. – Scales: 1 mm.

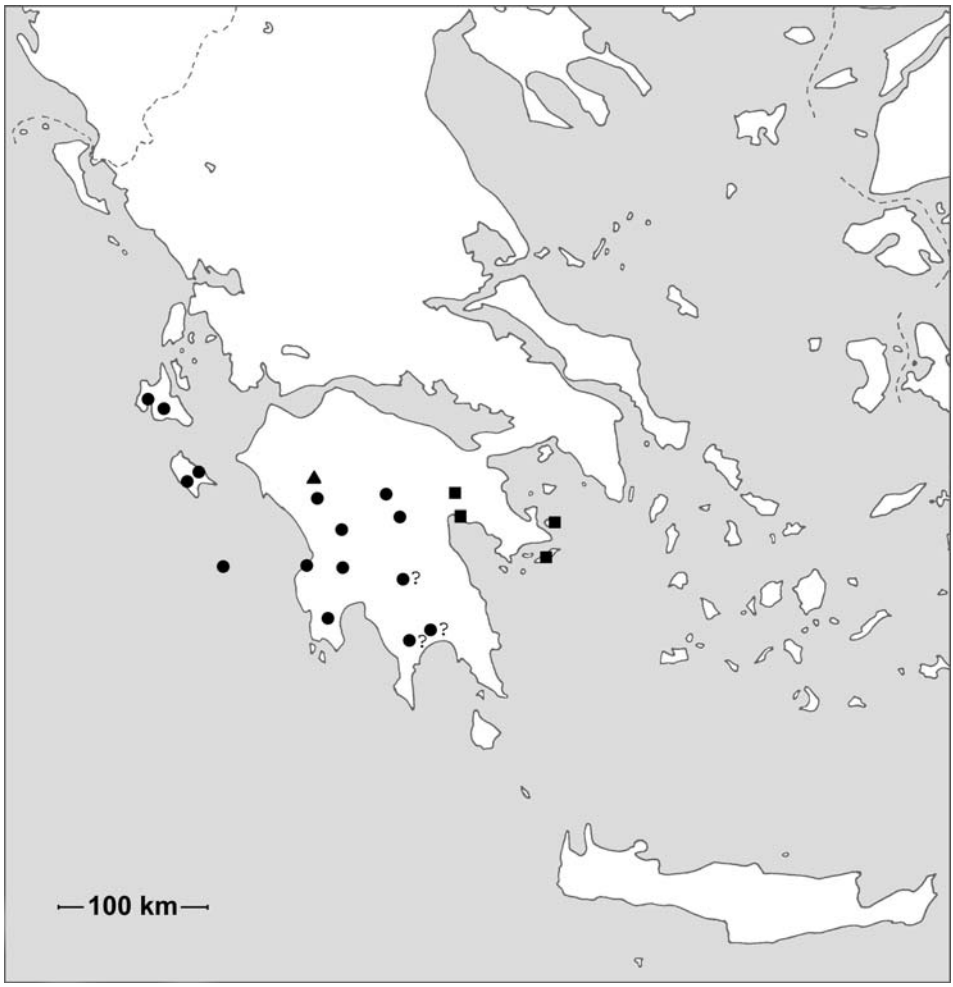
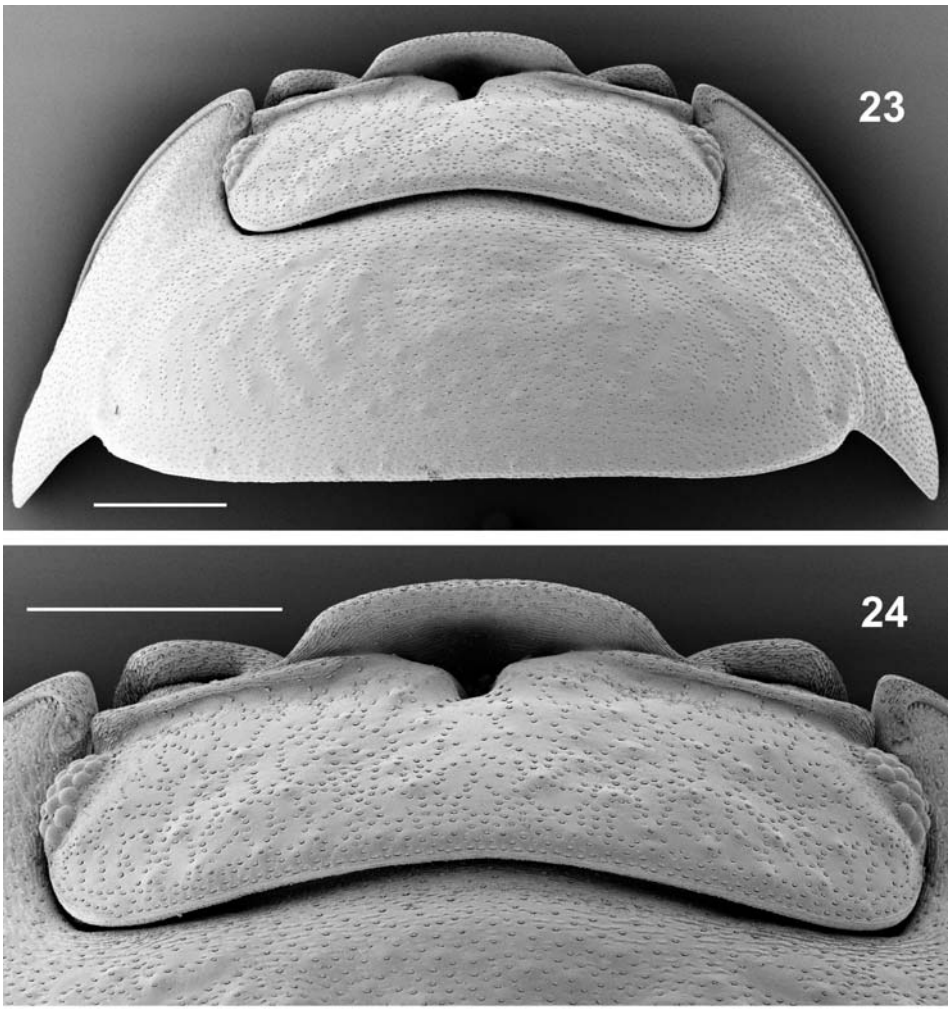


Fig. 22. Records of *Armadillidium arcadicum* (●), *A. argolicum* (■) and *A. bensei* n. sp. (▲).

Remarks

A. humile Strouhal, 1936 from the Ionian Islands corresponds in all diagnostic characters to *A. arcadicum*, so it is considered a junior synonym of the latter. *A. zuellichi* Strouhal, 1937 differs from *A. arcadicum* by its strong and conspicuous tuberculation; all other diagnostic characters are, however, inseparable from those of *A. arcadicum*, especially the male sexual characters (compare STROUHAL 1938: 42, figs. 19–21 with the figures given for *A. arcadicum* in the present paper). Also the distributional records show a mosaic pattern inside or adjacent to the distribution area of *A. arcadicum*. Therefore I consider *A. zuellichi* as a junior synonym of *A. arcadicum*, which has been applied for strongly tuberculated populations of the latter species. The three samples reported with question marks in the present publication from the southern Peloponnese east of the Taígetos Mountains exhibit slight differences towards the more northern *arcadicum*-populations (Figs. 17–22); more samples are needed to clarify their exact systematic status.



Figs. 23–24. *Armadillidium argolicum*, ♂, 15 mm long (island Ídra, SMNS 2301). – **23**. Head and pereion-tergite 1 in dorsal view. **24**. Head in dorsal view. – Scales: 1 mm.

5.2 *Armadillidium argolicum* Verhoeff, 1907
(Figs. 23–30 and map Fig. 22)

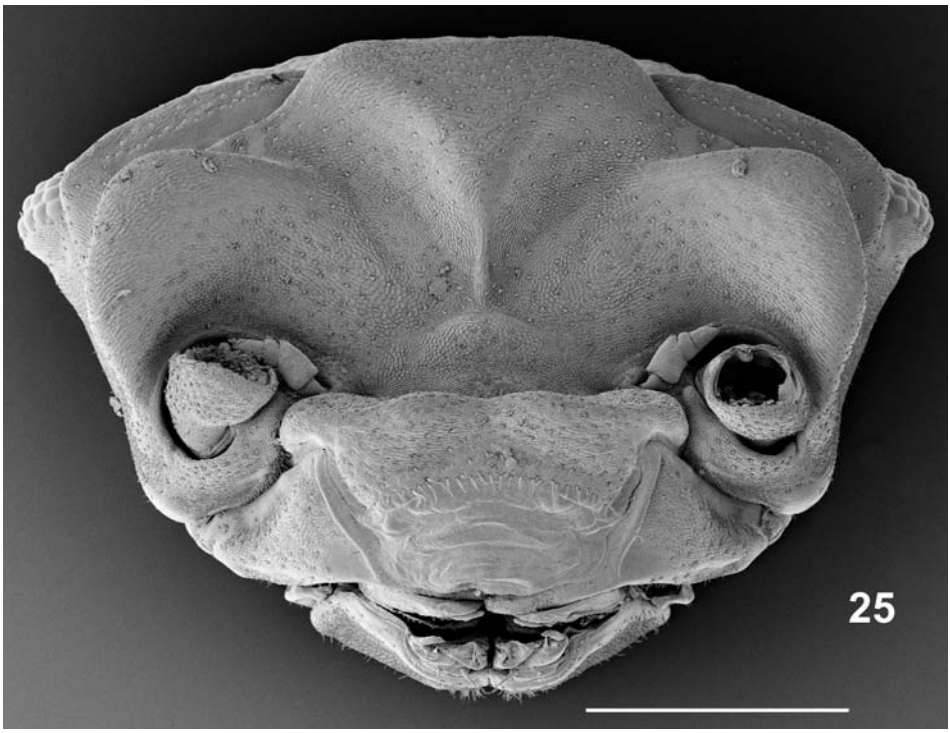
Synonyms: *A. hydrense* Strouhal, 1937, *A. mycenaeum* Strouhal, 1937.

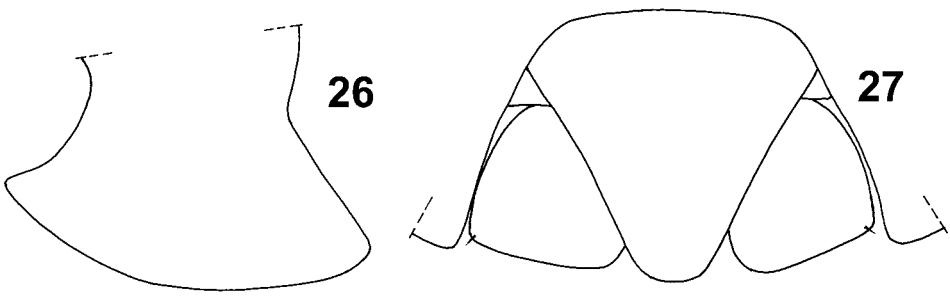
Literature records

Verhoeff 1907: 476 (GR, NE-Peloponnese: Náfplio); Strouhal 1937b: 123, figs. 12, 13 (*A. mycenaeum*, GR, NE-Peloponnese: Mikínes [= Mykenai]); Strouhal 1937c: 108, fig. 6 (*A. hydrense*, GR, off NE-Peloponnese: island Ídra [= Hydra]); Schmalfuss 1981b: 279, figs. 14–20; Schmalfuss 1985: 290.

Material examined

Greece: 4 ex., off NE-Peloponnese, islet Módi E of island Póros, leg. Botsaris, III.1991 (SMNS 2709). – 2 ex., off NE-Peloponnese, island Ídra (= Hydra), leg. Malicky, 9.IV.1978





Figs. 25–27. *Armadillidium argolicum*, ♂, 15 mm long (island Ídra, SMNS 2301). – **25**. Head in frontal view. **26**. Pereion-epimeron 1 in lateral view. **27**. Telson and uropods in dorsal view. – Scale: 1 mm.

(SMNS 2062). – 13 ex., island Ídra (= Hydra), leg. SCHMALFUSS, 6.–9.IV.1987 (SMNS 2155). – 31 ex., island Ídra (= Hydra), leg. SCHMALFUSS, 14.V.1991 (SMNS 2301).

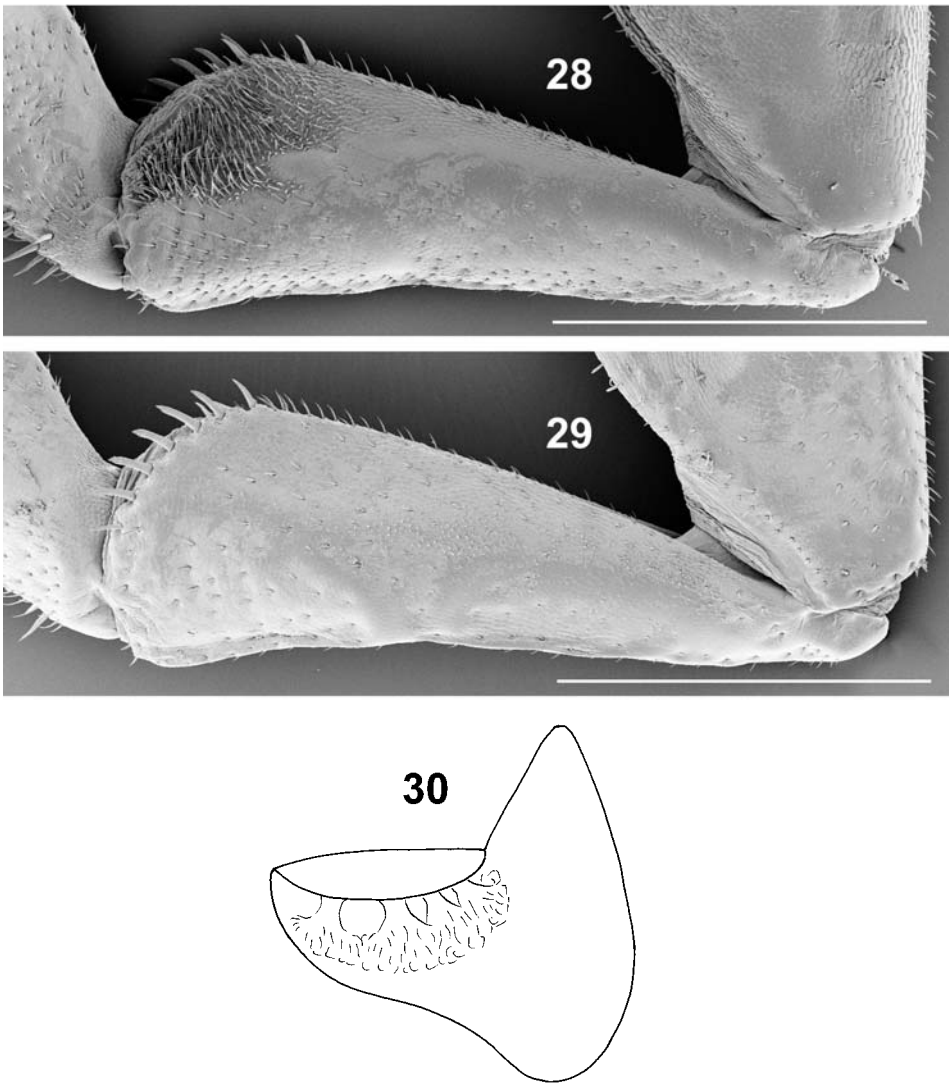
Diagnostic characters

Maximum dimensions: 20.0 × 9.0 mm (♀ from island Ídra).

Coloration: Greyish brown with usual yellowish muscle-spots.

Cuticular structures: Tergites with very faint tubercles (compare Fig. 23).

Frontal shield from behind one fourth as high as it is wide, laterally rounded, with conspicuous groove caudally (Fig. 24). Antennal lobes trapezoidal, not bent out-

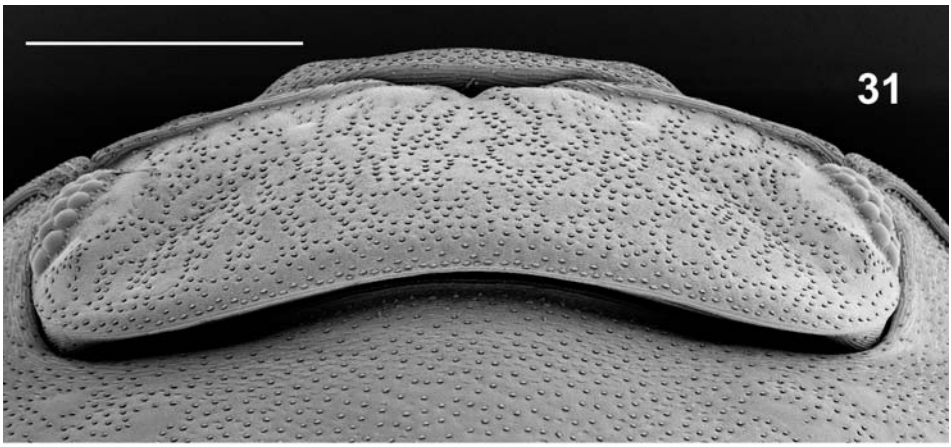


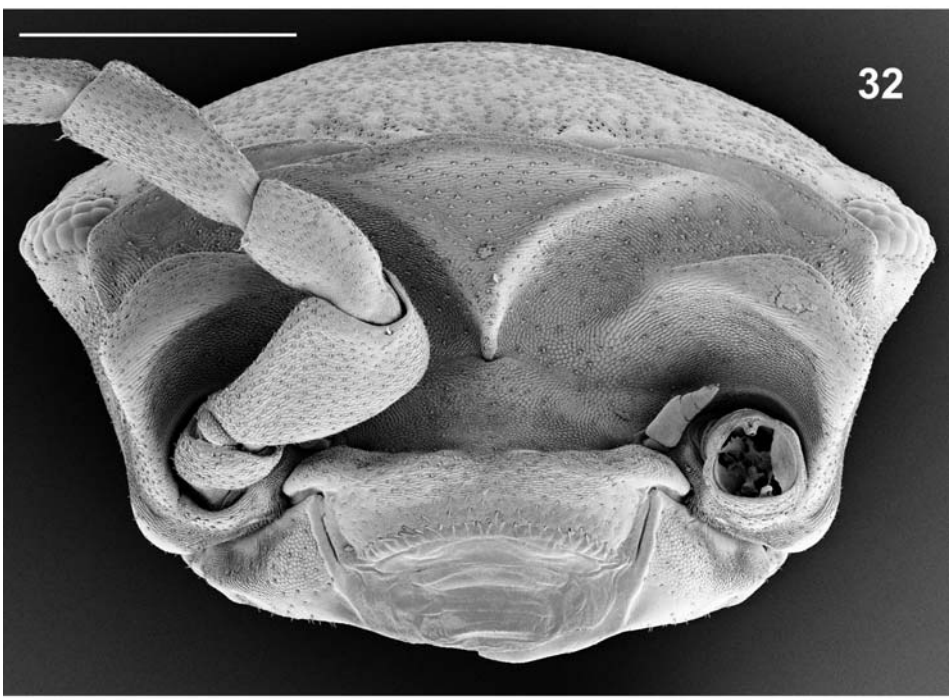
Figs. 28–30. *Armadillidium argolicum*, ♂, 15 mm long (island Ídra, SMNS 2301). – **28**. Ischium 7, frontal view. **29**. Ischium 7, caudal view. **30**. Pleopod-exopodite 1, caudal view. – Scales: 1 mm.

wards (Fig. 25). Hind margin of pereion-epimeron 1 with distinct angle (Fig. 26). Telson with straight sides and broadly rounded apex (Fig. 27). Antenna and male pereiopod 1 as in *A. arcadicum*. Male ischium 7 ventrally straight, frontally with distal hair-field (Figs. 28, 29). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 30), endopodite 1 straight.

Distribution

Northeastern Peloponnese including the adjacent islands (see map Fig. 22).





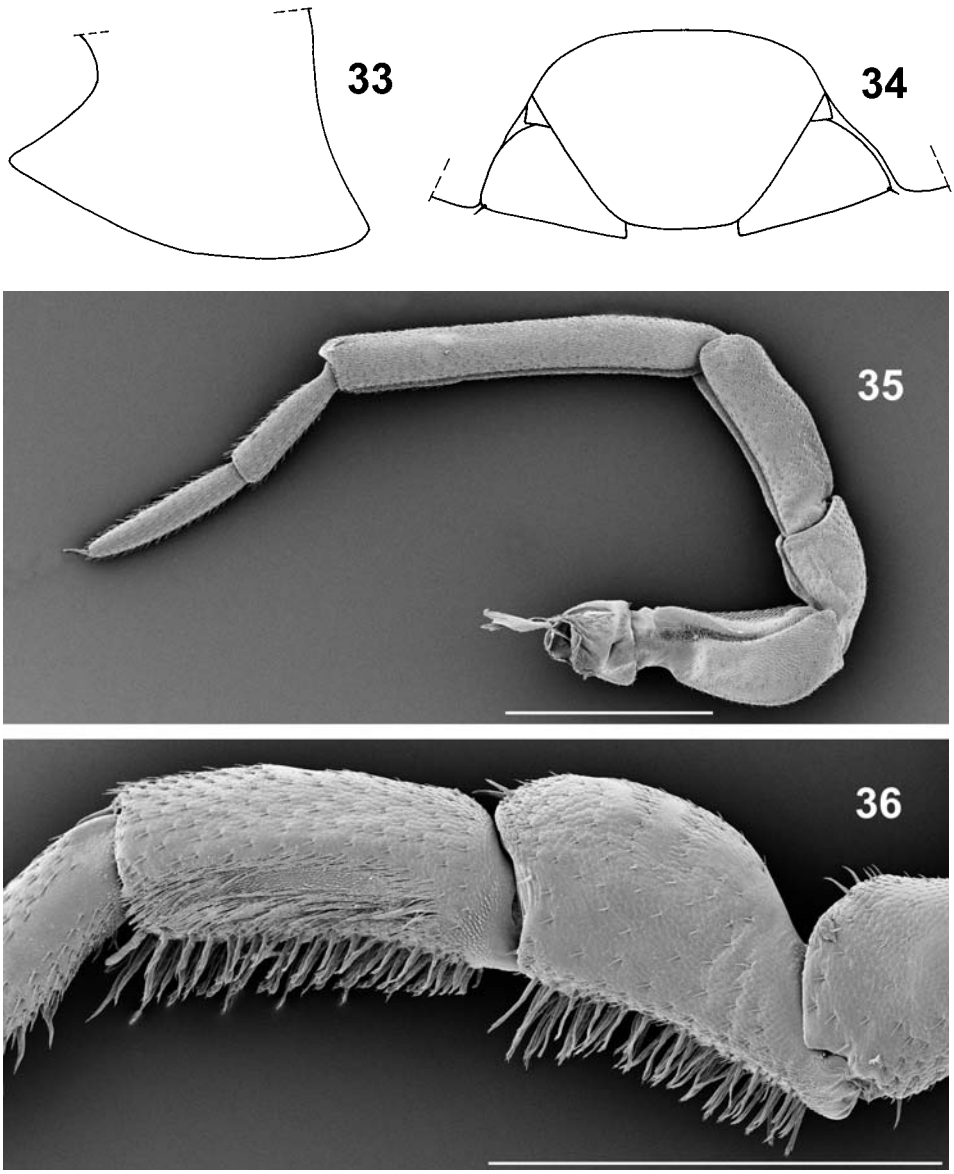
Figs. 31–32. *Armadillidium bensei* n. sp., ♀, paratype, 14 mm long (SMNS T594). – **31**. Head in dorsal view. **32**. Head in frontal view. – Scales: 1 mm.

5.3 *Armadillidium bensei* **n. sp.**
(Figs. 31–39 and map Fig. 22)

Material examined

Holotype: ♂, 16.5 × 6.8 mm, Greece, western Peloponnese, 10 km N of Lálas, deciduous *Quercus* forest, 750 m, leg. SCHAWALLER, 4.X.2004 (SMNS T592).

Paratypes: 2 ♀♀, same data as holotype (SMNS T593). – 3 ♂♂, 4 ♀♀, western Peloponnese, 14 km NE of Lálas, deciduous *Quercus* forest, 700 m, leg. BENSE, SCHAWALLER & SCHMALFUSS, 4.X.2004 (SMNS T594).



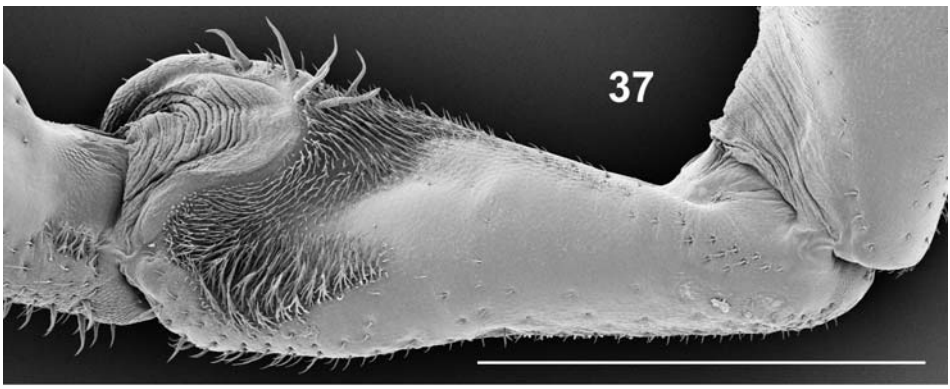
Figs. 33–36. *Armadillidium bensei* n. sp., ♂, holotype, 16.5 mm long (SMNS T592). – **33**. Pereion-epimeron 1 in lateral view. **34**. Telson and uropods in dorsal view. **35**. Antenna. **36**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.

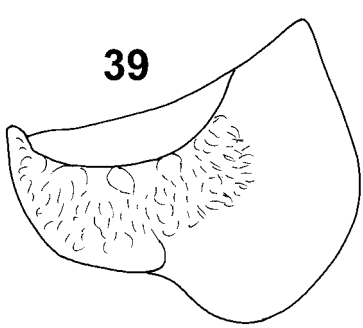
Derivatio nominis

The species is named after Ulrich Bense (Mössingen/Germany), who was a very helpful companion on three major collecting missions in Greece.

Description

Maximum dimensions: 18.0 × 8.5 mm.





Figs. 37–39. *Armadillidium bensei* n. sp., ♂, holotype, 16.5 mm long (SMNS T592). – **37**. Ischium 7, frontal view. **38**. Ischium 7, caudal view. **39**. Pleopod-exopodite 1, caudal view. – Scales: 1 mm.

Coloration: Males dark blackish grey, females grey-brown with yellow spots; the coloration is very similar to that of *A. vulgare*.

Cuticular structures: Tergites completely smooth.

Frontal shield from behind only very slightly surpassing frontal margin of head, laterally very obliquely "fading away", caudally with very small triangular groove (Fig. 31). In frontal view the frontal shield is wider than in most other species of the genus, and the surface is concave (Fig. 32). Antennal lobes trapezoidal (Fig. 32). Hind margin of pereion-epimeron 1 completely rounded (Fig. 33). Telson very short, length : width index 3 : 4 or less, with nearly straight sides and broadly truncated apex (Fig. 34). Antenna see Fig. 35, distal segment of flagellum slightly longer than proximal one. Male merus and carpus 1 with dense brush of spines (Fig. 36). Male ischium 7 ventrally straight, frontally with distal hair-field, caudally with bulbous distal enlargement, and as in *A. granulatum* there are areas of short "furry" setae also on the caudal side of ischium 7 and on the medial part of the proximal segment of pereiopod 7 (Figs. 37, 38). Male pleopod-exopodite 1 with small triangular hind-lobe, medial margin slightly concave (Fig. 39), endopodite 1 with straight apex.

Distribution

Known only from the deciduous *Quercus* forests in the Folói Mountain area, central western Peloponnese (map Fig. 22).

Remarks

The new species is remarkably similar to *A. vulgare*, is, however, easily recognized by a different structure of the head, the very peculiar male ischium 7 and the male pleopod-exopodite 1. With *A. granulatum* it has the "furry" areas on the male pereiopod 7 in common.

5.4 *Armadillidium bicurvatum* Verhoeff, 1901
(Figs. 40–50 and map Fig. 51)

Synonym: *A. schulzi* Strouhal, 1929.

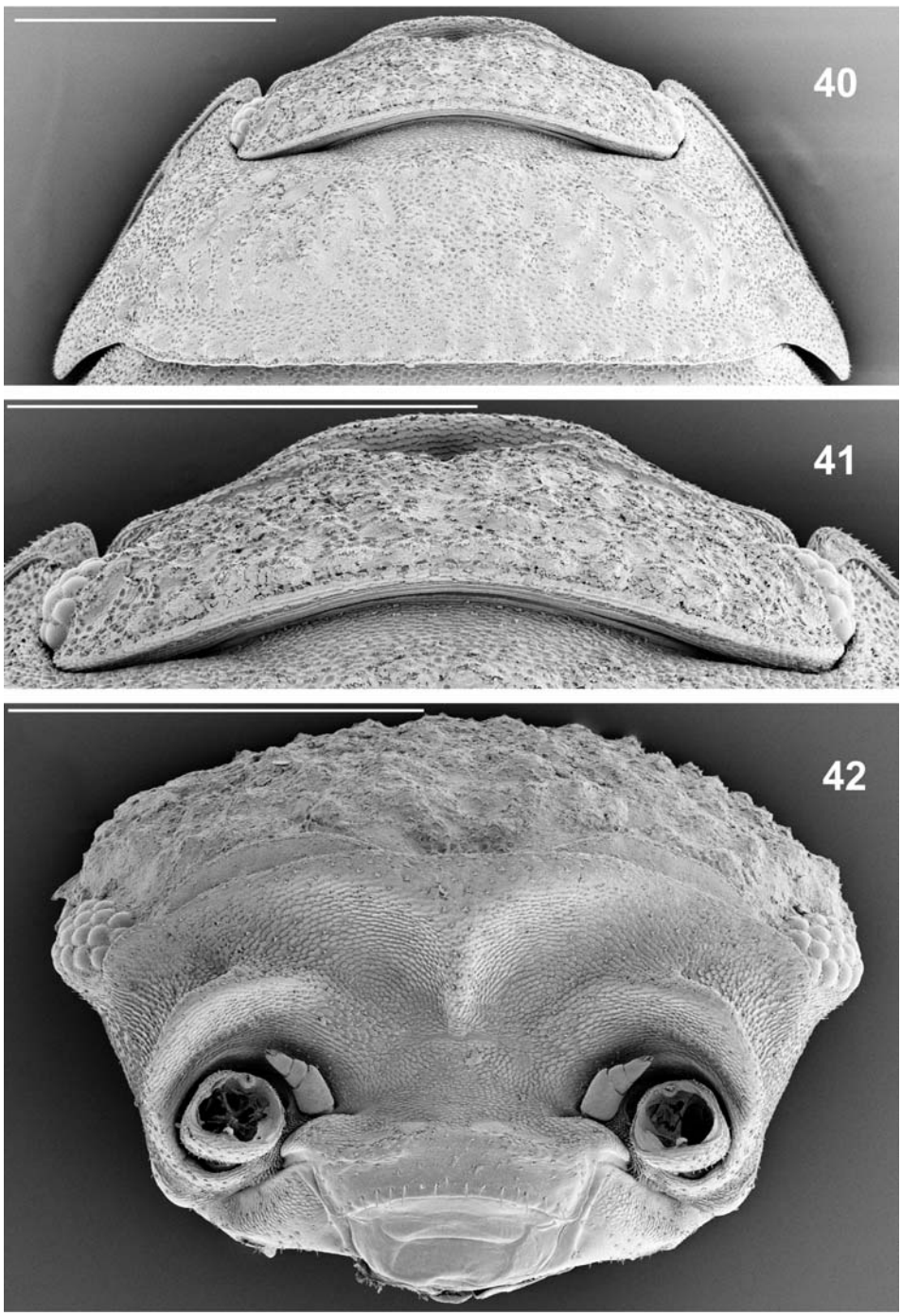
Literature records

Verhoeff 1901a: 69 (GR, Ionian island Kérkira); Verhoeff 1907: 463 (GR, northwestern mainland ["Epirus"]); Strouhal 1929a: 105 (GR, Ionian island Kérkira); Strouhal 1929b: 59, figs. 23–30 (*A. schulzi*, GR, western Crete); Strouhal 1936: 96 (GR, Ionian island Kérkira); Strouhal 1937b: 125, fig. 16 (GR, northeastern Peloponnese); Strouhal 1956: 590 (GR, Ionian island Kérkira and northwestern mainland); Strouhal 1966: 303 (GR, Ionian island Kérkira); Arcangeli 1952: 12 (southern Albania); Schmalfuss 1975: 54 (*A. schulzi*, GR, southern Peloponnese); Schmalfuss 1981b: 279, figs. 21–26 (GR, Ionian island Paxí S of Kérkira and western Macedonia); Schmalfuss 1985: 290, map fig. 12 (GR, Ípiros, central mainland, Peloponnese, western Crete); Sfenthourakis 1992: 159 (GR, Ípiros and southern Peloponnese); Sfenthourakis 1993: 623 (GR, island Antikíthira NW of Crete); Schmalfuss et al. 2004: 36 (GR, western Crete).

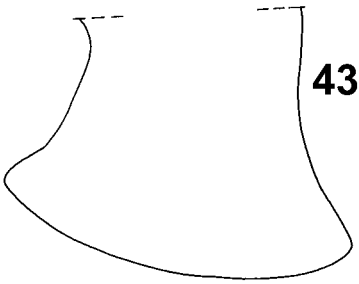
Material examined

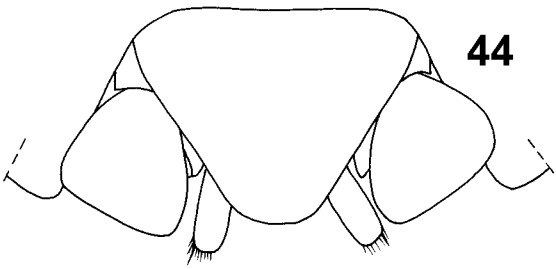
Albania: 6 ex., southernmost Albania, "Periferi Gjirokastër", 4 km SW of Poliçan, leg. Feher et al., 12.X.2004 (SMNS 5544).

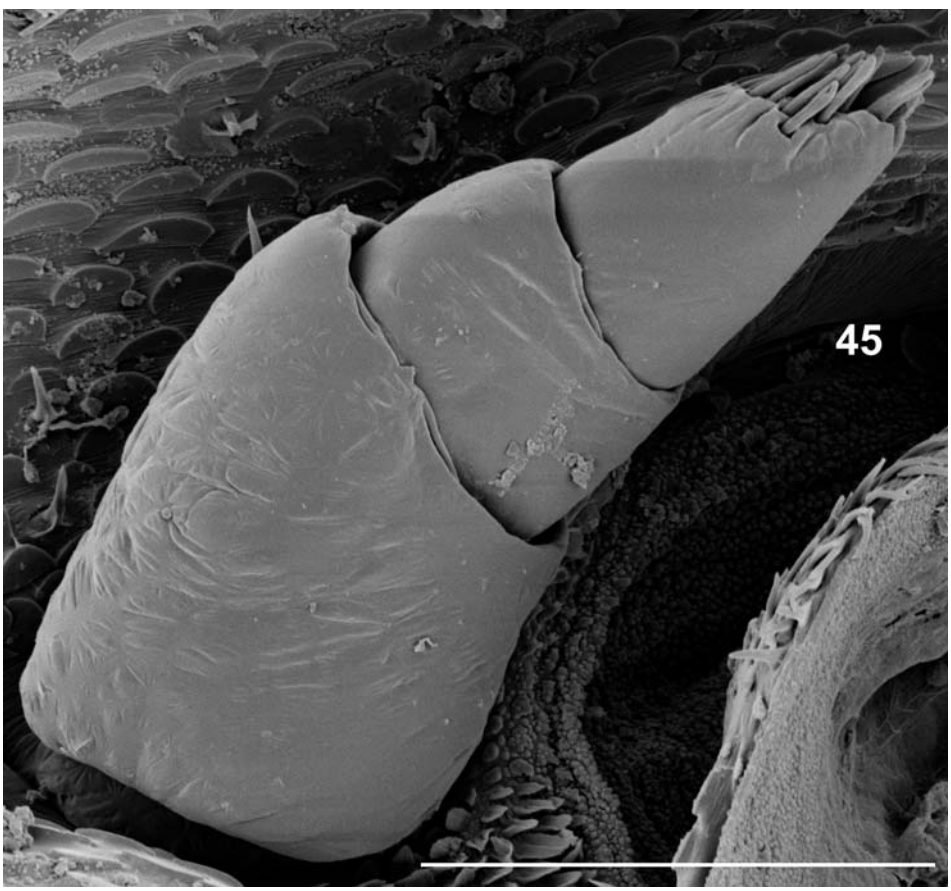
Greece: 1 ex., Ionian island Kérkira, S of Kávos, olive trees, leg. Schawaller & Scheuern, 13.IV.1981 (SMNS 1394). – 8 ex., southwestern mainland, Lake Amvrakiá, northeastern shore, leg. Schmalfuss, 9.X.2000 (SMNS 2675). – 3 ex., southern mainland, Vardúsia Mountains, 5 km N of Koniákos, 900 m, *Abies*, leg. Schmalfuss, 6.X.2000 (SMNS 2669). – 10 ex., southern mainland, Vardúsia Mountains, above Koniákos, 800 m, *Abies*, *Quercus coccifera*, leg.



Figs. 40–42. *Armadillidium bicurvatum*, ♂, 7.5 mm long (Peloponnese, SMNS 2846). – **40**. Head and pereion-tergite 1 in dorsal view. **41**. Head in dorsal view. **42**. Head in frontal view. – Scales: 1 mm.

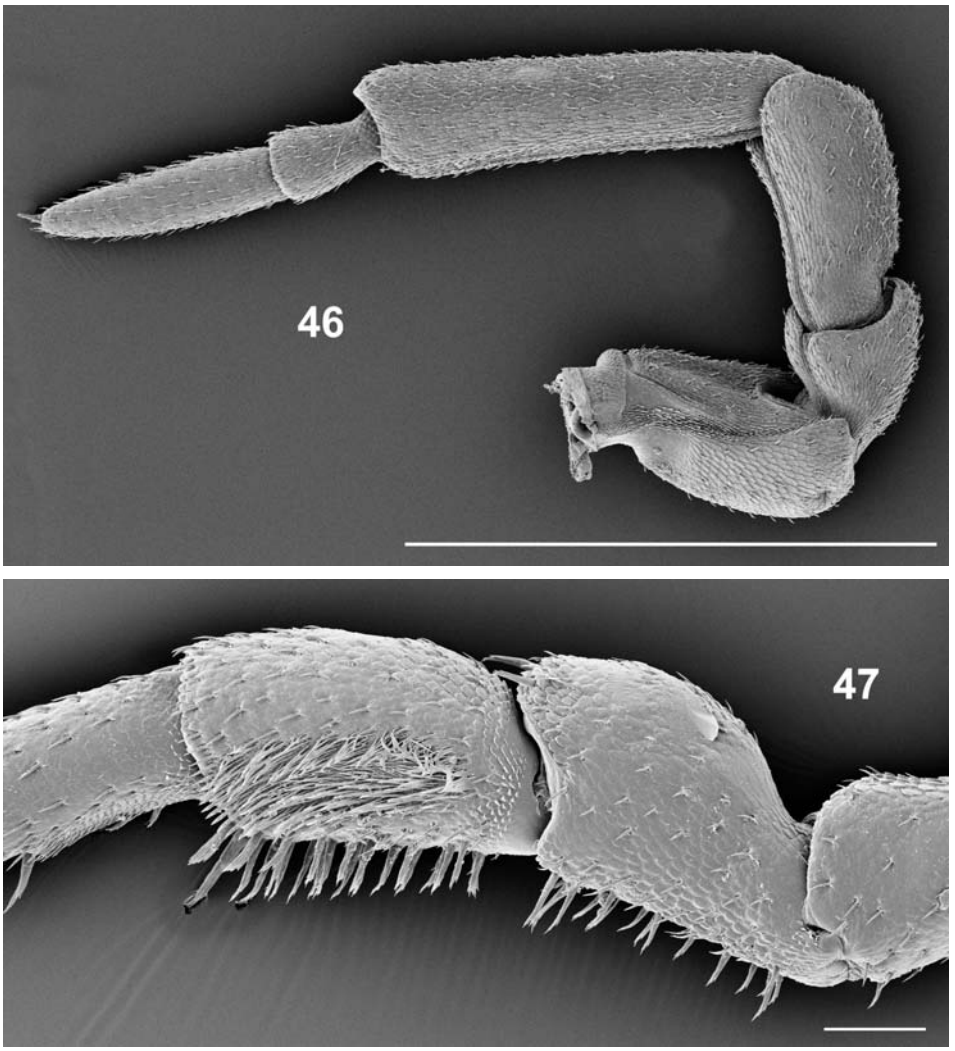






Figs. 43–45. *Armadillidium bicurvatum*, ♂, 7.5 mm long (Peloponnese, SMNS 2846). – **43**. Pereion-epimeron 1 in lateral view. **44**. Telson and uropods in dorsal view. **45**. Antennula (antenna 1). – Scale: 0.1 mm.

SCHMALFUSS, 6.X.2000 (SMNS 2667). – 27 ex., southern mainland, Gkióna Mountains, Panurgiás, 800 m, maquis, leg. SCHMALFUSS, 5.X.2000 (SMNS 2664). – 3 ex., southern mainland, Gkióna Mountains, Sikéa, 800 m, *Platanus*, *Abies*, leg. SCHMALFUSS, 5.X.2000 (SMNS 2663). – 4 ex., NW-Peloponnese, Lámpia Mountains, 10 km NE of Panópulos, 1000 m, *Quercus coccifera*, leg. SCHMALFUSS, 5.X.2004 (SMNS 2845). – 5 ex., NW-Peloponnese, Lámpia Mountains, 18 km NE of Panópulos, 950 m, *Abies*, *Quercus coccifera*, leg. SCHAWALLER & SCHMAL-



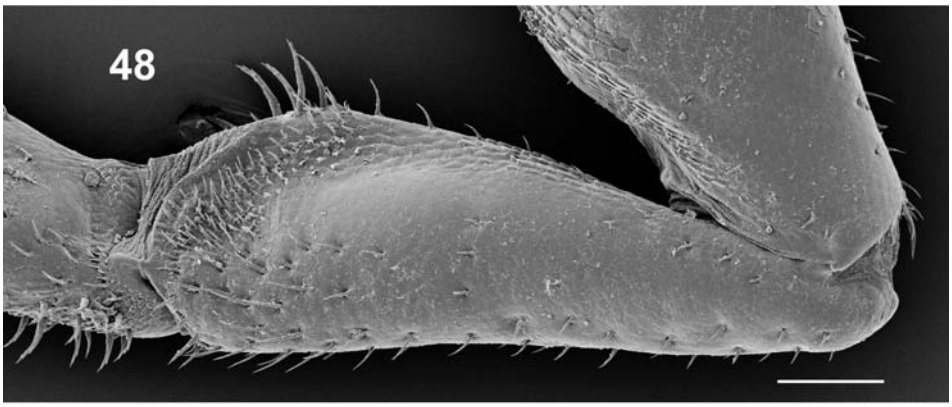
Figs. 46–47. *Armadillidium bicurvatum*, ♂, 7 mm long (central Greek mainland, SMNS 2664). – **46**. Antenna. **47**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm (46), 0.1 mm (47).

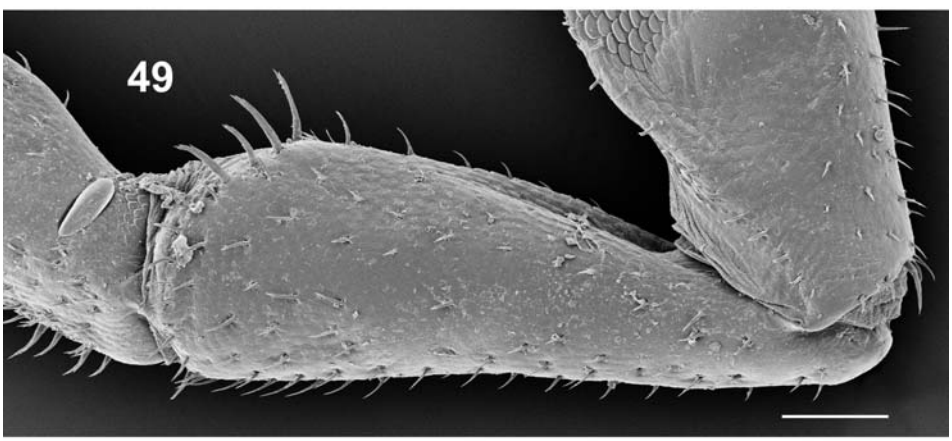
FUSS, 5.X.2004 (SMNS 2846). – 4 ex., NE-Peloponnese, Ermióni, Agía Eléni, leg. BOTSARIS, 14.XII.1989 (SMNS 2708). – 12 ex., eastern Peloponnese, 20 km W of Leonídio, 750 m, *Quercus coccifera*, leg. SCHAWALLER & SCHMALFUSS, 26.IX.2004 (SMNS 2819). – 3 ex., southern Peloponnese, Taígetos Mountain, Profítis Ilías, 1500 m, leg. KINZELBACH, 28.IX.1973 (SMNS 1610, published as *A. schulzi* by SCHMALFUSS 1975). – 1 ex., SE-Peloponnese, southern Párnonas Mountain, S of Kallithéa, 600 m, *Quercus coccifera*, leg. SCHMALFUSS, 27.IX.2004 (SMNS 2822).

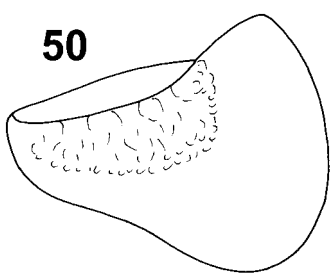
Diagnostic characters

Maximum dimensions: 11.2 × 5.0 mm.

Coloration: Yellowish with four grey-brown tergal rows; males may be darker.







Figs. 48–50. *Armadillidium bicurvatum*. – **48**. ♂, 7 mm long (central Greek mainland, SMNS 2664), ischium 7, frontal view. **49**. As before, caudal view. **50**. ♂, 7.5 mm long (Peloponnese, SMNS 2846), pleopod-exopodite 1, caudal view. – Scales: 0.1 mm.

Cuticular structures: Tergites on frontal parts strongly tuberculated, caudal parts to a lesser degree (compare Fig. 40).

Belongs to the so-called duplocarinate species. These species have the ridge forming the upper edge of the frontal triangle extended to the sides of the head, running parallel to the interocular line and forming the lateral corners of the head. Frontal triangle in caudal view surpassing frontal part of head only slightly, but with conspicuous groove caudally (Fig. 41). Antennal lobes rounded, not bent backwards as

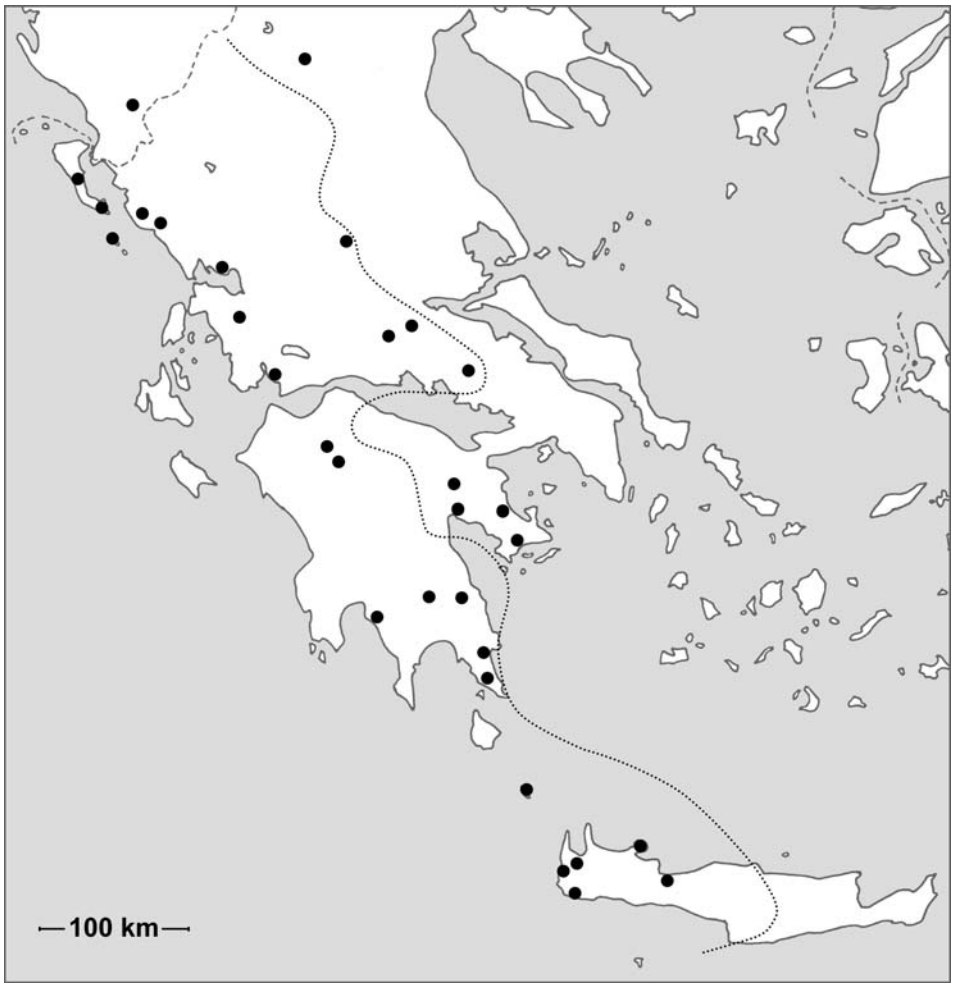
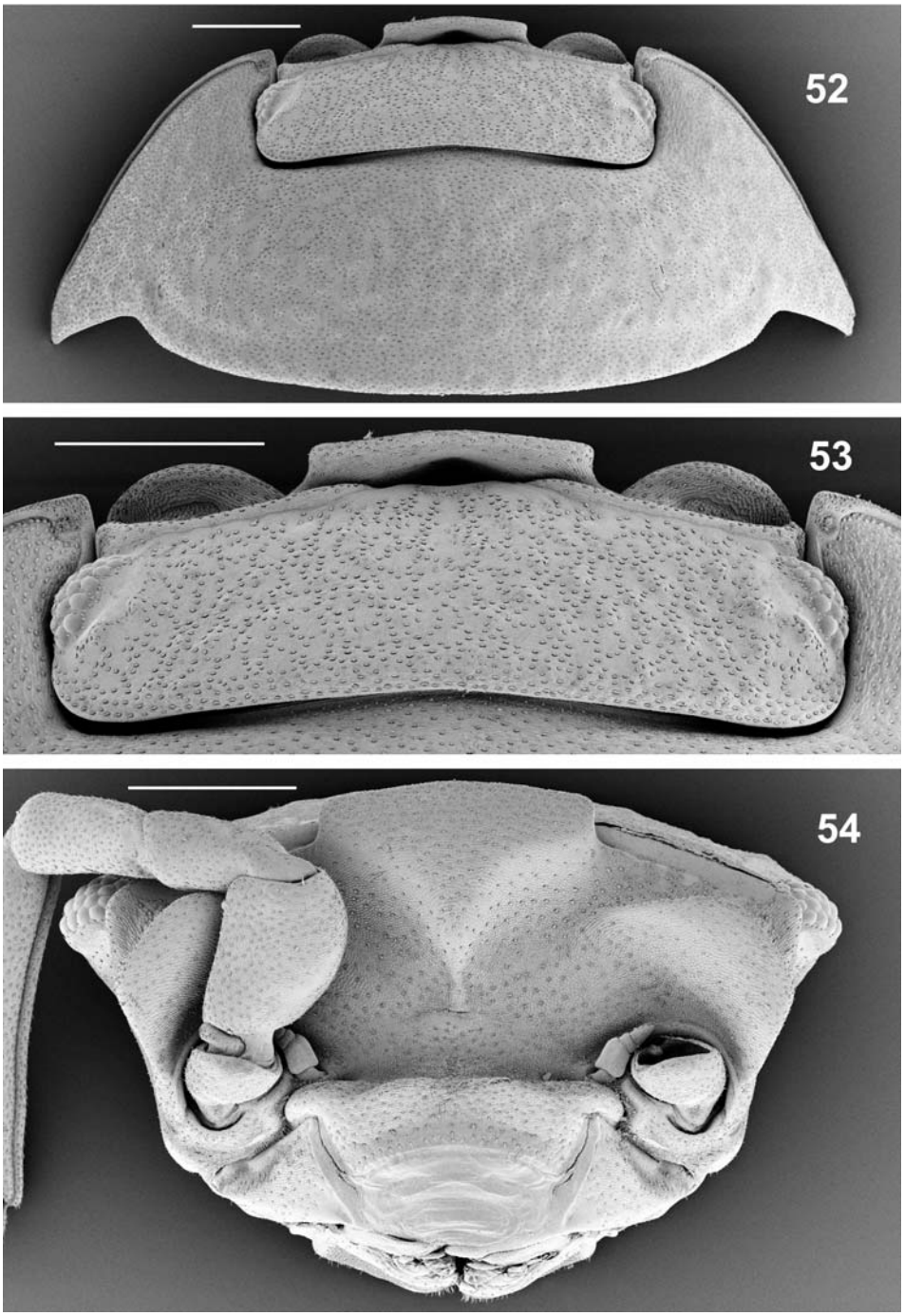


Fig. 51. Records of *Armadillidium bicurvatum*. The dotted line represents the 100 mm precipitation line for December (lowering to the east, after PHILIPPSON 1948).

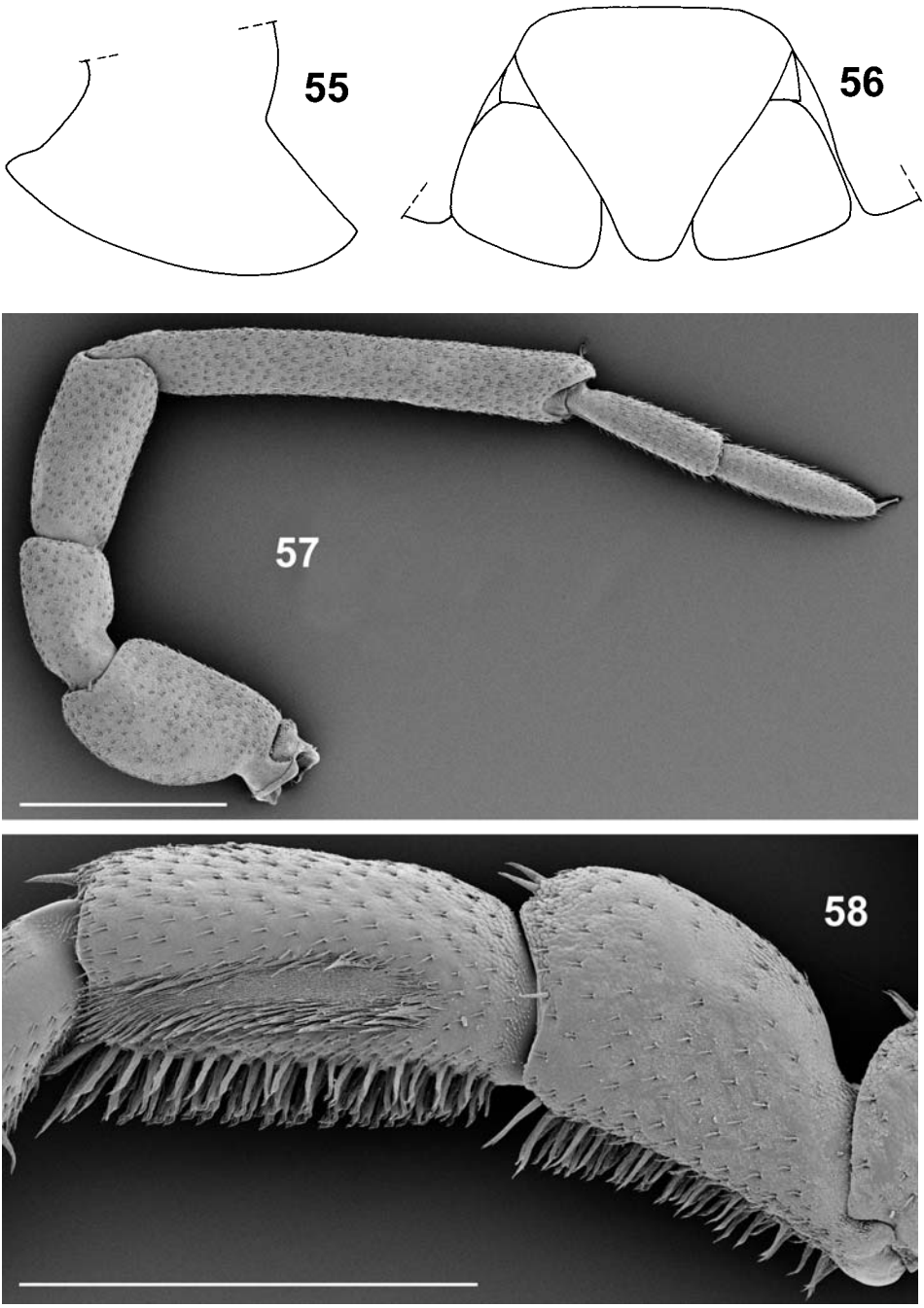
in most of the other species (Fig. 42). Hind margin of pereion-epimeron 1 only slightly concave and completely rounded (Fig. 43). Telson shorter than wide, with straight sides and broadly rounded apex (Fig. 44). Antenna short and stout, flagellum with distal segment about twice as long as proximal one (Fig. 46), antennula see Fig. 45. Pereiopod 1 with ventral brush of spiny setae on carpus (Fig. 47). Male ischium 7 ventrally straight, frontally with distal hair-field (Figs. 48, 49). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 50), endopodite 1 straight.

Distribution

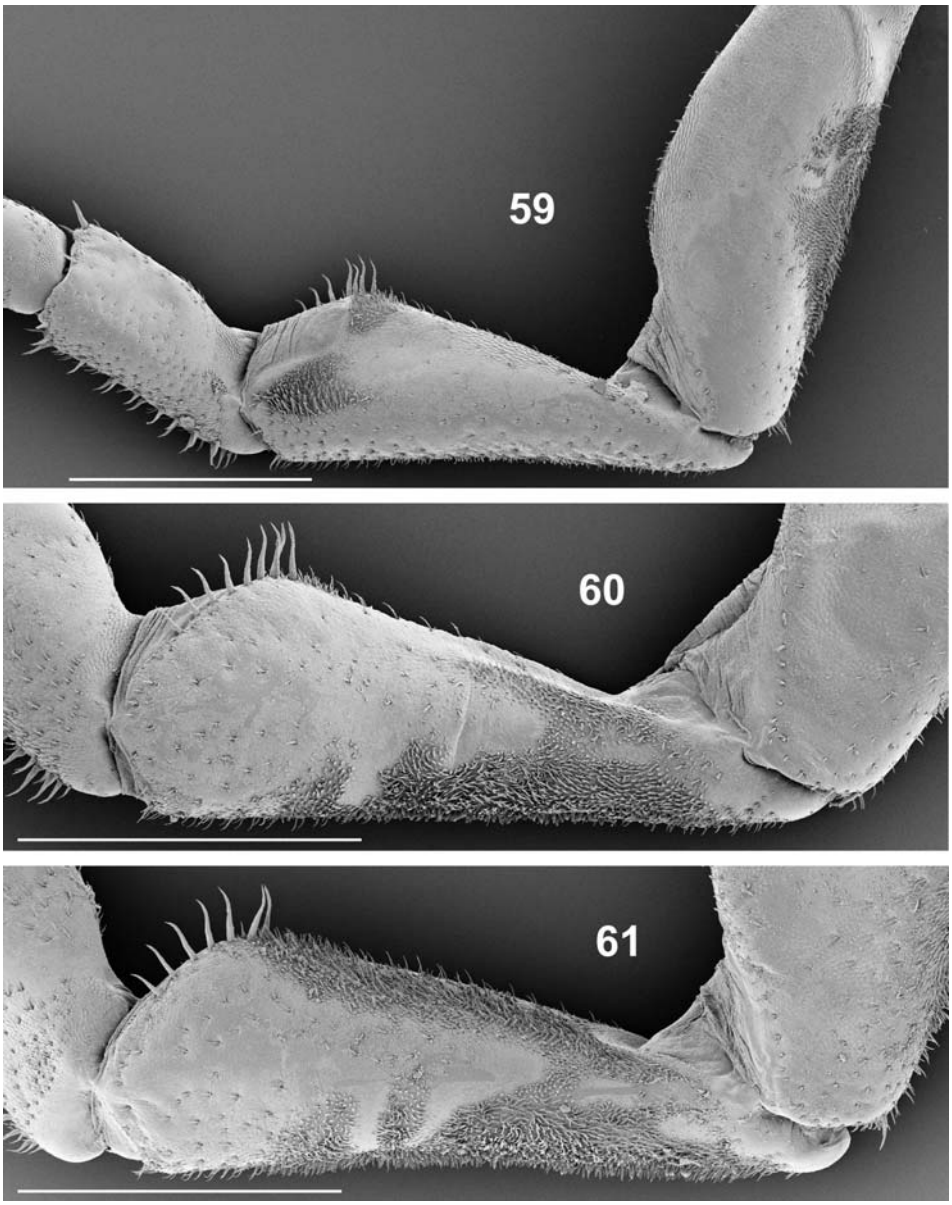
Southern Albania and western Greece including Peloponnese and western Crete (see map Fig. 51). From the records on the map it is tempting to consider the 100 mm precipitation line for December as the distribution border towards the east.



Figs. 52–54. *Armadillidium granulatum* (Aegean island Kárpathos, SMNS 1055). – **52**. ♂, 17.5 mm long, head and pereion-tergite 1 in dorsal view. **53**. As before, head in dorsal view. **54**. ♂, 19.5 mm long, head in frontal view. – Scales: 1 mm.



Figs. 55–58. *Armadillidium granulatum*, ♂, 18 mm long (Aegean island Kárpathos, SMNS 1055). – **55**. Pereion-epimeron 1 in lateral view. **56**. Telson and uropods in dorsal view. **57**. Antenna. **58**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.

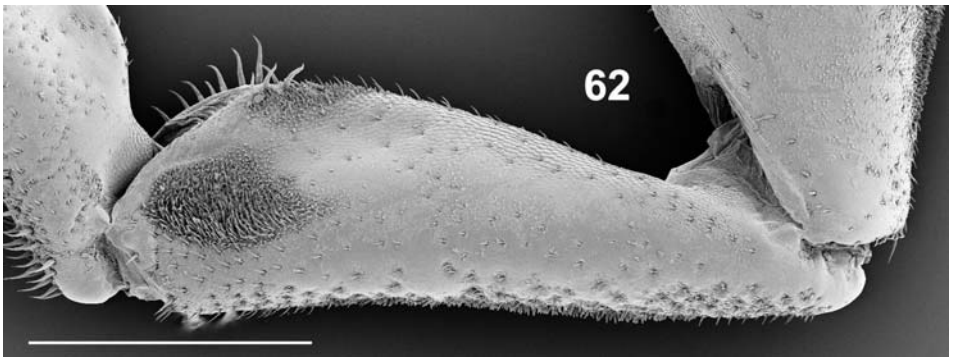


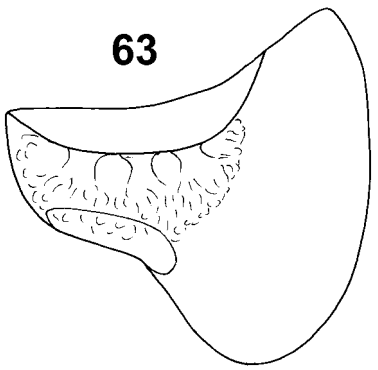
Figs. 59–61. *Armadillidium granulatum* (Aegean island Kárpathos, SMNS 1055). – **59**. ♂, 17.5 mm long, proximal part of pereiopod 7, frontal view. **60**. As before, ischium 7, frontal view. **61**. ♂, 19.5 mm long, ischium 7, caudal view. – Scales: 1 mm.

5.5 *Armadillidium granulatum* Brandt, 1833
(Figs. 52–63 and map Fig. 64)

Literature records

VANDEL 1962: 796, figs. 383A–G; SCHMALFUSS 2000: 78, fig. 3 (map of overall distribution); SCHMALFUSS 2003: 33.





Figs. 62–63. *Armadillidium granulatum*. – **62**. ♂, 20 mm long (southern France, Perpignan, SMNS 3068), ischium 7, frontal view. **63**. ♂, 18 mm long (Aegean island Kárpathos, SMNS 1055), pleopod-exopodite 1, caudal view. – Scale: 1 mm.

In Greece *A. granulatum* was partly mixed up with other similar species. Therefore I used for the distribution map of Greece only the samples in the Stuttgart collection and the records of SFENTHOURAKIS 1993 and 1994.

Material examined

France: 14 ex., Mediterranean coast, S of Perpignan, Cap Bléar, leg. HAUSER, 3.I.1996 (SMNS 3068).

Greece: 5 ex., Ionian Islands, Strofádes Islands 50 km S of Zákinthos, Stamfáni Island, leg. PIEPER, 14.IX.1980 (SMNS 1343). – 1 ex., SW-Peloponnese, Pílos, leg. KÜHNELT, 11.IV.1970 (SMNS 1140). – 1 ex., SW-Peloponnese, Pílos, castle, leg. SCHÖNFELD, 31.VII.2003 (SMNS 2858). – 2 ex., SW-Peloponnese, Methóni, leg. KÜHNELT, 12.IV.1970 (SMNS 1835). – 11 ex., SW-Peloponnese, Methóni, castle, leg. SCHÖNFELD, 31.VII.2003 (SMNS 2859). – 3 ex., NE-Aegean, island Lésvos (= Mitilíni), Antíssos, leg. PIEPER & RUNZE, 21.IX.1978 (SMNS 1887). – 16 ex., SE-Aegean, island Kárpathos, "Südland", leg. MARTENS, 2.IV.1963 (SMNS 1055). – Additionally numerous samples from the following south Aegean islands were checked: Síros (SMNS 1630, 1632, 1696, 1698), Mílos (SMNS 2342), Santoríni (SMNS 1624, 1930, 1954, 1955, 1956, 1957, 2072, 2131), Crete (SMNS 1167, 1208, 1214, 1219, 1221, 1301, 1317, 1318, 1911, 2061, 2065, 2143, 2693, 2765), Kos (SMNS 1352, 1587, 1588, 1604, 1691, 1771, 1801), Nísiros (SMNS 1524, 1530, 2298), Tílos (1348, 2297, 2636), Símí (SMNS 1347), Ródos (1147, 1149, 1153, 1154, 1160, 1385, 1404, 1411, 1660, 2742), Khálki (1452), Kárpathos (1013, 1053, 1055, 1449, 1478, 1982, 2537), Kásos (1511, 1973, 1978, 1979, 2038), Armáthia (1967).

W-Turkey: 1 ex., Black Sea coast, Amasra, leg. KOHLER, VIII.1973 (SMNS 11004). – 49 ex., southwestern Asia Minor, Marmaris (opposite island of Ródos), leg. HAUSEN, 1971 (SMNS 11007, 11008).

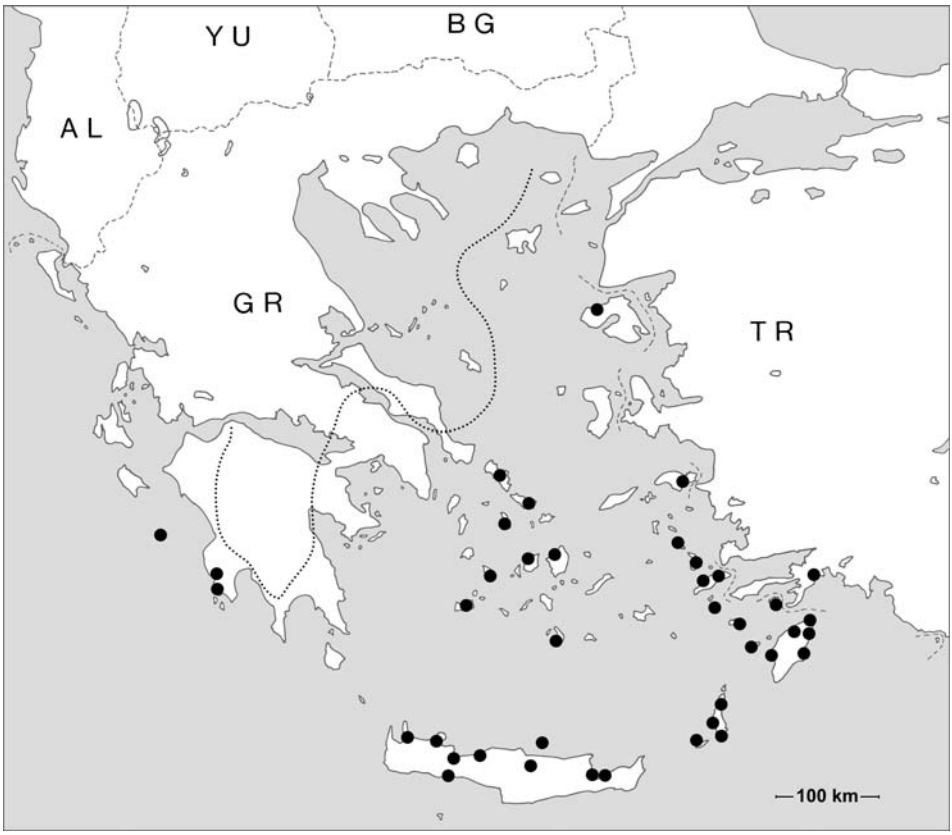


Fig. 64. Safe Greek records of *Armadillidium granulatum*. The dotted line represents the 5 mm precipitation line for July (lowering to the southeast, after PHILIPPSON 1948).

Diagnostic characters

Maximum dimensions: 21.0 × 9.5 mm; VANDEL (1962: 797) records 23 × 11 mm.

Coloration: Grey-brown with yellow muscle-spots.

Cuticular structures: Tergites with variable granulation, more pronounced in juvenile specimens (compare Fig. 52).

Frontal shield from behind eight times as wide as its lateral height, laterally with right angles and with a narrow but deep groove caudally (Fig. 53). Antennal lobes trapezoidal (Fig. 54). Hind margin of pereion-epimeron 1 with distinct angle (Fig. 55). Telson with straight sides and narrowly rounded apex (Fig. 56). Antenna with flagellar segments more or less equal (Fig. 57). Male merus and carpus 1 with dense brush of spines (Fig. 58), to a lesser extent also on male pereiopods 2–7. Male ischium 7 ventrally straight, frontally with distal hair-field, but contrary to all other species of the genus except *A. bensei* n. sp. there are large areas of short "furry" setae also on the caudal side of ischium 7 and on the medial part of the proximal segment of pereiopod 7 (Figs. 59–62). Male pleopod-exopodite 1 with short triangular hind-lobe (Fig. 63), endopodite 1 with straight apex.

Distribution

Coasts of the Mediterranean Sea east to Asia Minor and Libya; southwestern coast of the Black Sea; isolated records from the Atlantic coast of Portugal and northern France (Normandy). A map of the overall distribution is found in SCHMALFUSS 2000: 78, fig. 3, for safe Greek records see map Fig. 64.

5.6 *Armadillidium grimmi* **n. sp.**
(Figs. 65–74 and map Fig. 75)

Material examined

Holotype: ♂, 18.5 × 8.2 mm, Greece, SE-Peloponnese, southern Párnonas Mountains, Kremastí, 1000 m, leg. PIEPER, 10.V.2005 (SMNS T581).

Paratypes: 6 ex., same data as holotype (SMNS T582). – 4 ex., SE-Peloponnese, northeastern Párnonas Mountains, Paleokhóri, 800 m, leg. PIEPER, 11.V.2005 (SMNS T583). – 4 ex., SE-Peloponnese, S of Ástros, coastal maquis, leg. SCHMALFUSS, 16.IX.1978 (SMNS T584). – 1 ex., SE-Peloponnese, Párnonas Mountains, 8 km NE of Kosmás, leg. R. GRIMM, 4.VII.1982 (SMNS T585). – 2 ex., SE-Peloponnese, Leonídio, leg. SCHMALFUSS, 16.IX.1978 (SMNS T586). – 2 ex., SE-Peloponnese, 7 km W of Skála, leg. KINZELBACH, 21.IX.1973 (SMNS T587).

Derivatio nominis

The new species is dedicated to Dr. ROLAND GRIMM (Tübingen/Germany), who, for many years, has donated his interesting isopod collections from many parts of the world to the SMNS.

Description

Maximum dimensions: 21.0 × 9.7 mm.

Coloration: Tergal parts show a very conspicuous orange-brown; the animals from Leonídio are, however, grayish brown.

Cuticular structures: Tergites slightly granulated (Fig. 65).

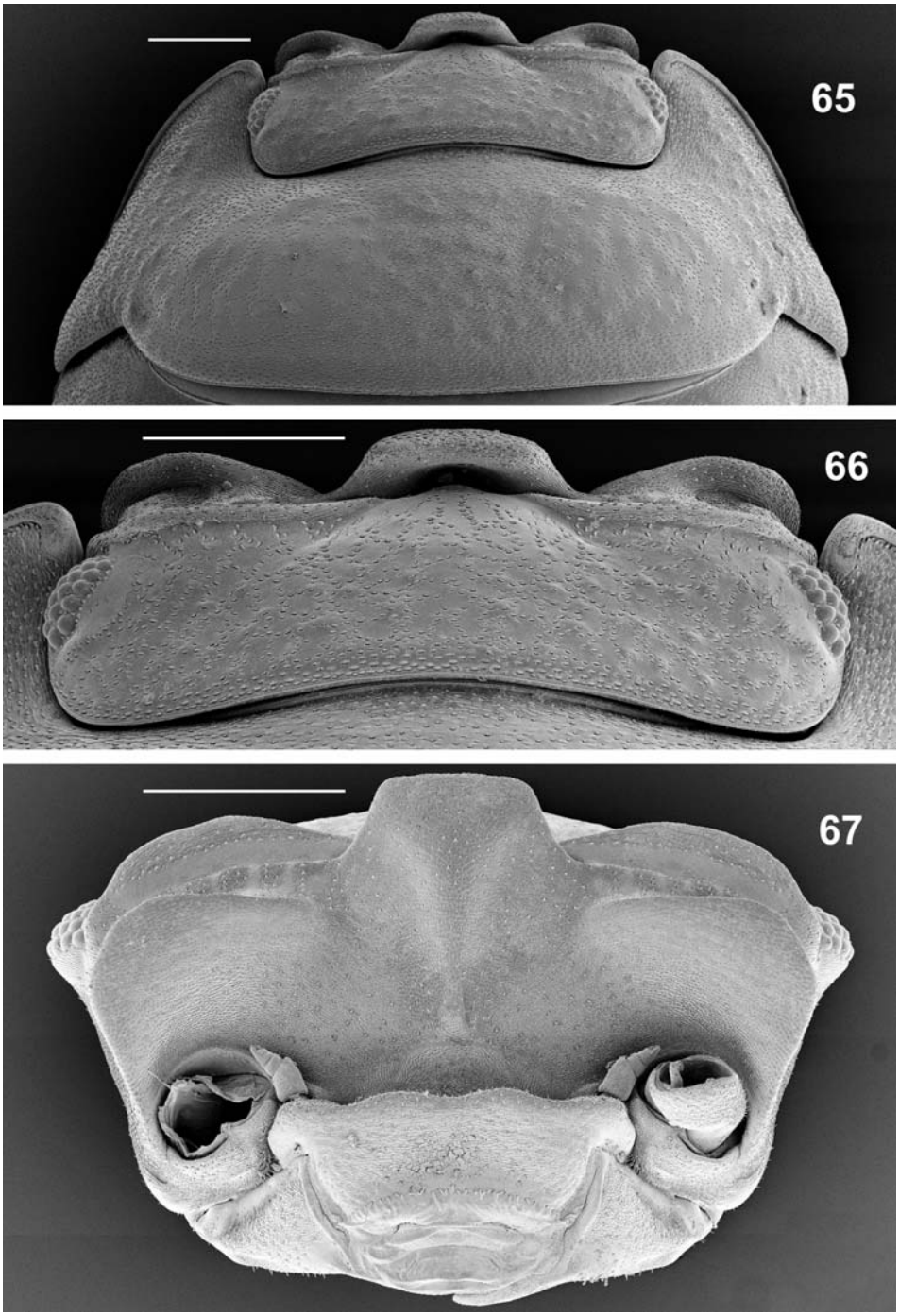
Frontal shield from behind unusually narrow and high, surpassing frontal margin of head by one third of its width, laterally with oblique angles (Fig. 66). Antennal lobes trapezoidal (Fig. 67). Hind margin of pereion-epimeron 1 with pronounced angle (Fig. 68). Telson slightly longer than wide, with nearly straight sides and rounded apex (Fig. 69). Antenna long and thin, distal segment of flagellum slightly shorter than proximal one (Fig. 70). Brush of spiny setae on male carpus 1, but not on merus 1 (Fig. 71). Male ischium 7 ventrally slightly concave, frontally with distal hair-field (Figs. 72–73). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 74), endopodite 1 with apex straight.

Distribution

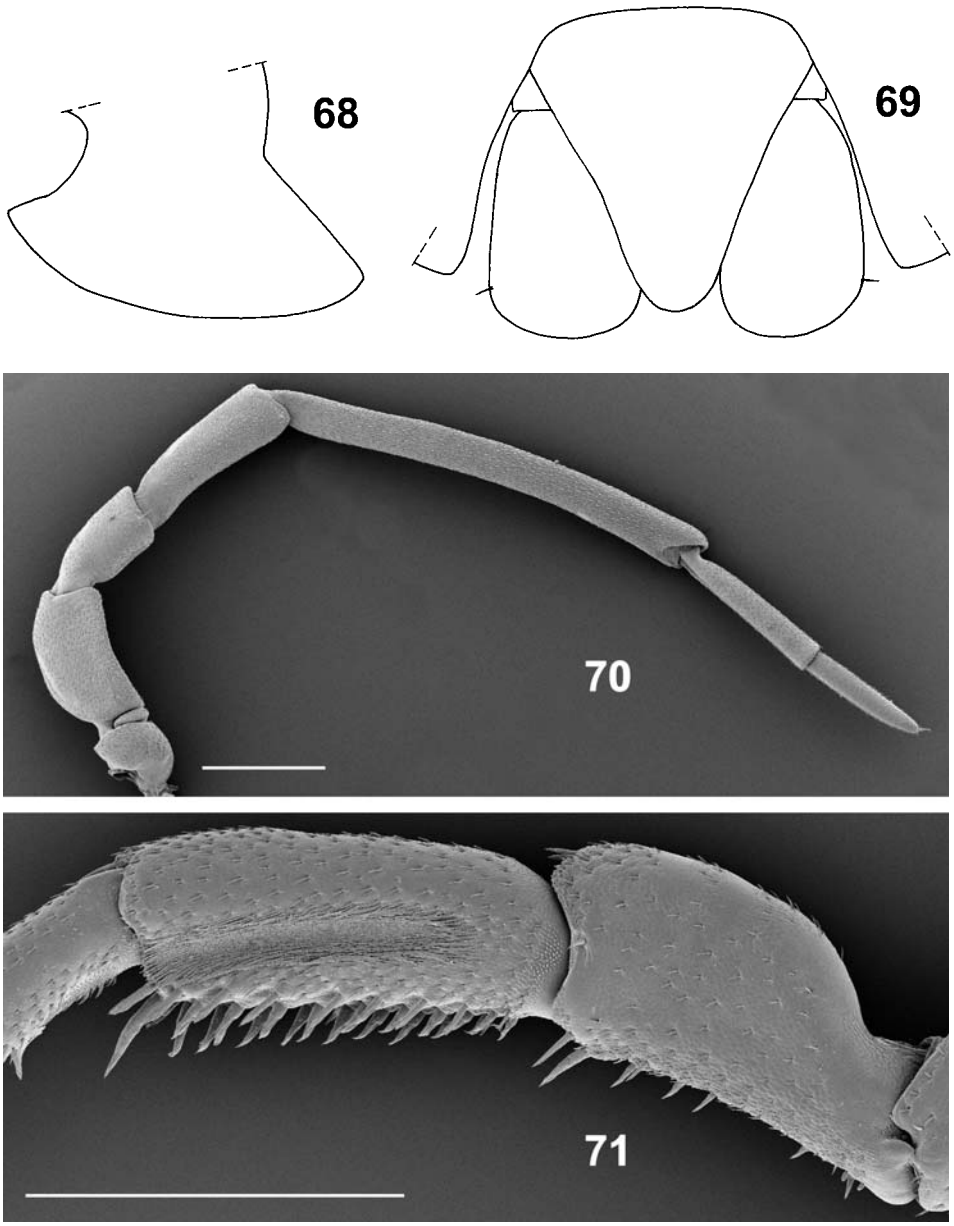
Southeastern Peloponnese (see map Fig. 75).

Remarks

The new species is clearly a member of the *nasatum*-group, which is distributed in Italy and on the eastern coast of the Adriatic Sea and the northern coast of the Aegean Sea. The characters indicating these affinities are the high and narrow frontal shield, the flat pereion-epimera, the long and pointed telson and the long uropod-exopodites, whose rounded terminal parts are a medial extension, which is indicated by the subterminal position of the originally terminal seta. For illustrations of diagnostic characters of *A. nasatum* see GRUNER 1966: 313, figs. 244–246; some other

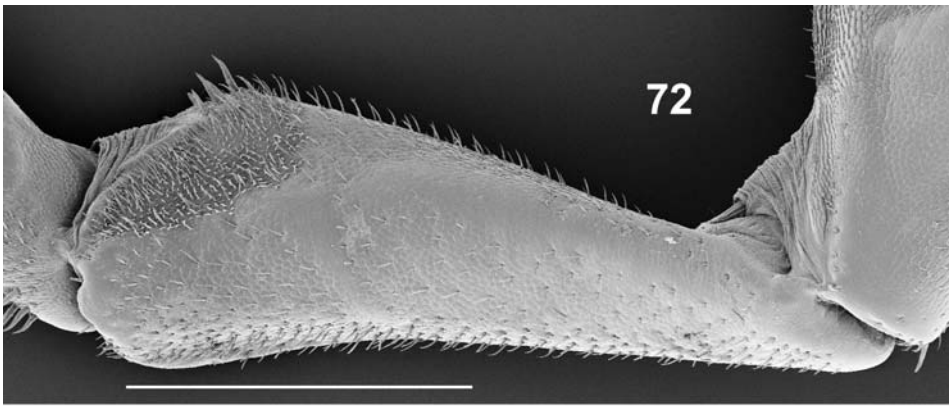


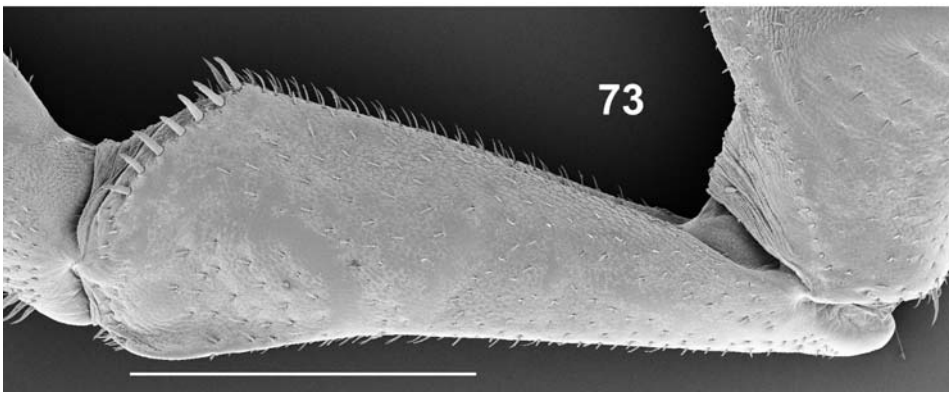
Figs. 65–67. *Armadillidium grimmi* n. sp., ♀, paratype, 18 mm long (SMNS T582). – **65**. Head and pereion-tergite 1 in dorsal view. **66**. Head in dorsal view. **67**. Head in frontal view. – Scales: 1 mm.

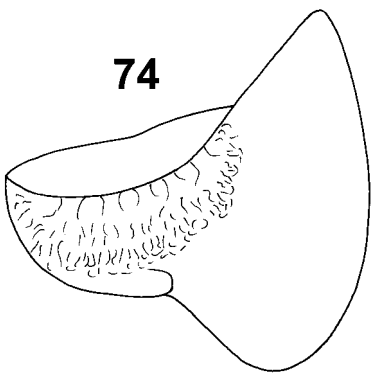


Figs. 68–71. *Armadillidium grimmi* n. sp., ♂, holotype, 18.5 mm long (SMNS T581). – **68**. Pereion-epimeron 1 in lateral view. **69**. Telson and uropods in dorsal view. **70**. Antenna. **71**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.

species of this group are depicted in FERRARA & TAITI 1978: 69 ff. *A. grimmi* n. sp. is obviously an isolated relict of this *nasatum*-complex, and it differs from the other species of this group by the detailed structure of the frontal part of the head, the size and the coloration.







Figs. 72–74. *Armadillidium grimmi* n. sp., ♂, holotype, 18.5 mm long (SMNS T581). – **72**. Ischium 7, frontal view. **73**. Ischium 7, caudal view. **74**. Pleopod-exopodite 1, caudal view. – Scales: 1 mm.

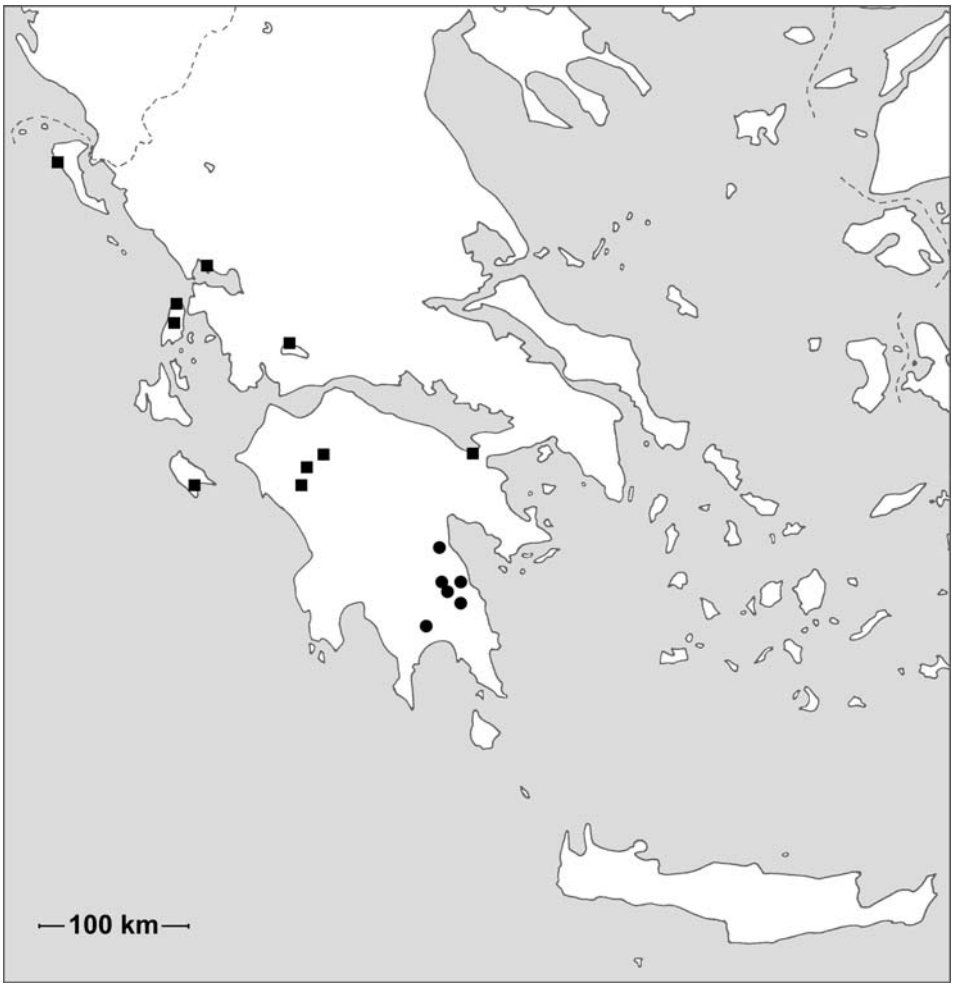


Fig. 75. Records of *Armadillidium grimmi* n. sp. (●) and *A. humectum* (■).

5.7 *Armadillidium humectum* Strouhal, 1937
(Figs. 76–86 and map Fig. 75)

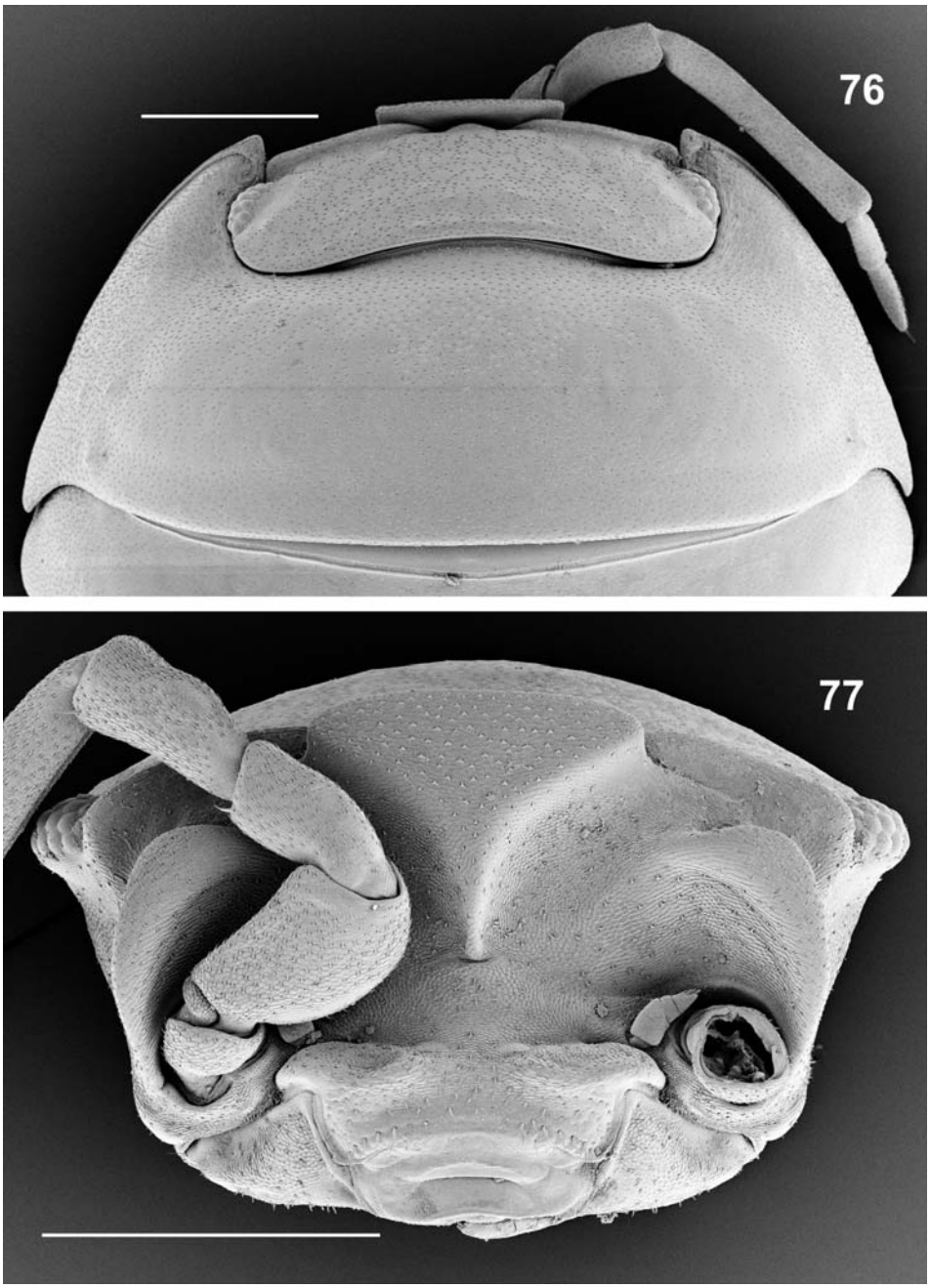
Synonym: ?*A. parvum* Strouhal, 1938 (see Remarks below).

Literature records

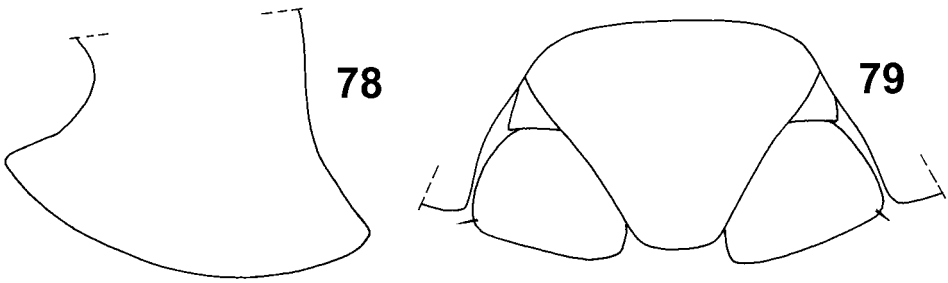
STROUHAL 1937a: 57, figs. 12–14 (GR, Ionian island Lefkáda); ?STROUHAL 1938: 49, figs. 30, 31 (*A. parvum*, GR, western Peloponnese: Olimpía); STROUHAL 1939: 184 (GR, Ionian island Zákinthos); STROUHAL 1956: 607, fig. 35 (GR, Ionian island Kérkira); STROUHAL 1966: 304 (GR, Ionian island Kérkira).

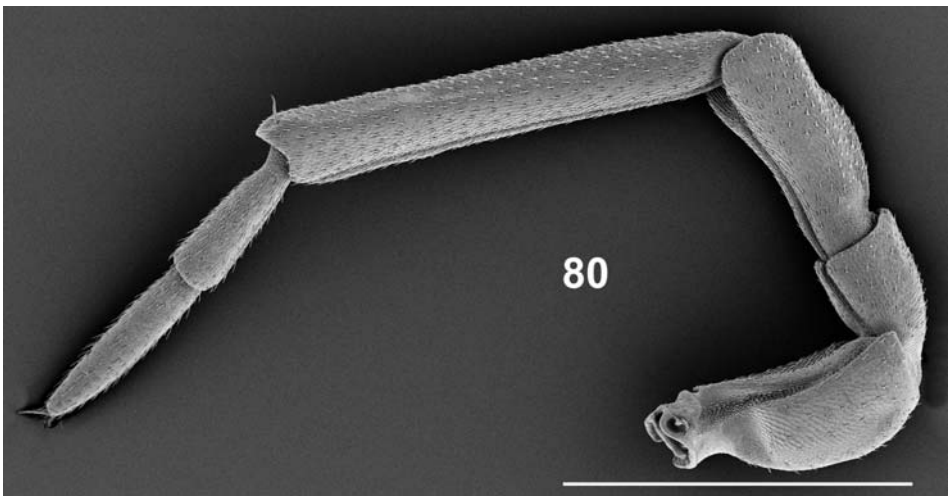
Material examined

Greece: 5 ex., southwestern mainland, Amvrakikós Gulf, 5 km W of Koronisía, leg. BAEHR, 19.IV.1983 (SMNS 2011). – 4 ex., southwestern mainland, Lake Trikhonída, Pantánassa, leg. SCHMALFUSS, 25.IX.1978 (SMNS 1086). – 30 ex., Ionian island Zákinthos, Límni Keríu, swampy area, leg. ERHARD & SCHMALFUSS, 10.V.1996 (SMNS 2563). – 3 ex., northern Pelo-



Figs. 76–77. *Armadillidium humectum*, ♀, 11.5 mm long (Ancient Kórinthos, SMNS 2750). – **76**. Head and pereion-tergite 1 in dorsal view. **77**. Head in frontal view. – Scales: 1 mm.





Figs. 78–80. *Armadillidium humectum*, ♂, 10.5 mm long (Ancient Kórinthos, SMNS 2750). – **78**. Pereion-epimeron 1 in lateral view. **79**. Telson and uropods in dorsal view. **80**. Antenna. – Scale: 1 mm.

ponnese, Erímanthos Mountain, summit, 2200–2300 m, leg. OSELLA, 23.VII.1981 (SMNS 1923). – 1 ex. (juv.), northern Peloponnese, Erímanthos Mountain, Spartiá, 700–900 m, leg. MALICKY, 28.V.1987 (SMNS 2479). – 42 ex., NW-Peloponnese, Lámpia Mountain 10 km NE of Panópulos, *Quercus coccifera*, 1000 m, leg. BENSE, SCHAWALLER & SCHMALFUSS, 5.X.2004 (SMNS 2845). – 31 ex., NW-Peloponnese, Lámpia Mountain 18 km NE of Panópulos, *Quercus coccifera*, *Abies*, 950 m, leg. BENSE, SCHAWALLER & SCHMALFUSS, 5.X.2004 (SMNS 2846). – 7 ex., NW-Peloponnese, Lámpia, leg. DELMASTRO, 17.V.1999 (SMNS 2651). – 7 ex., NE-Peloponnese, Ancient Kórinthos, leg. SCHÖNFELD, 25.VII.2002 (SMNS 2750).

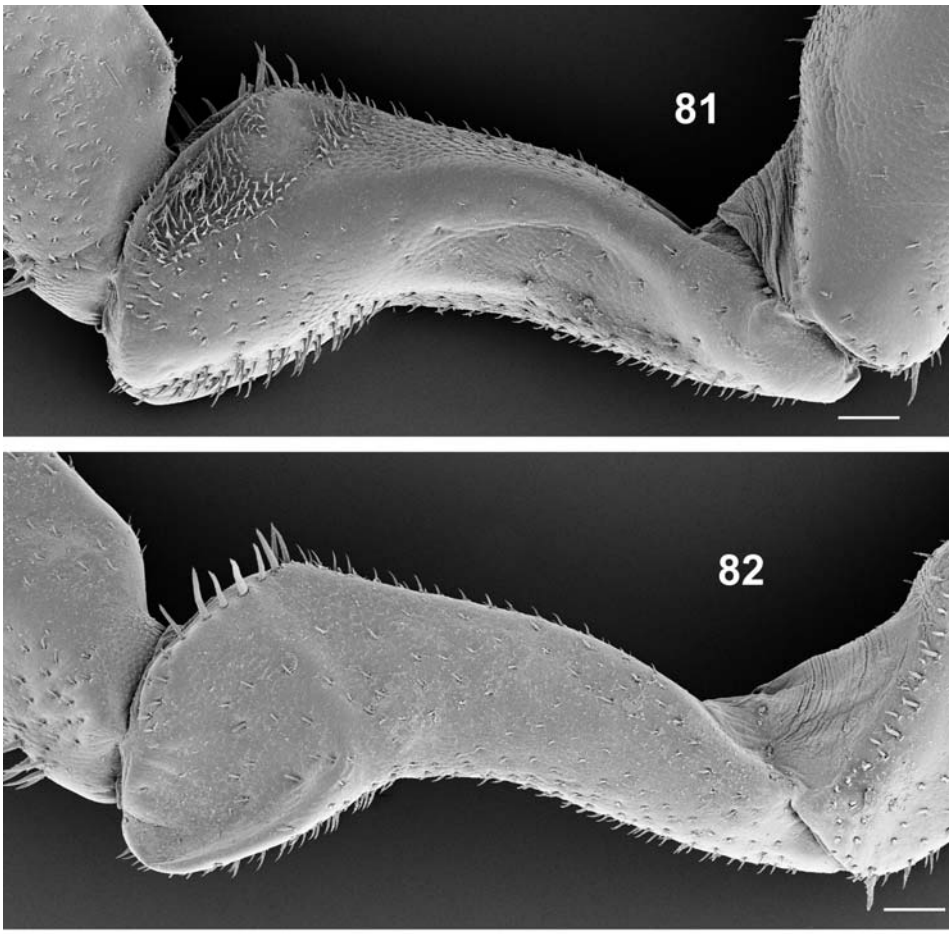
Diagnostic characters

Maximum dimensions: 13.8 × 6.3 mm.

Coloration: Specimens from the Peloponnese are grey-brown to blackish brown, males darker, epimera lighter; specimens from Zákinthos are lighter brown, and the animals from the mainland are yellowish without any dark pigmentation.

Cuticular structures: Tergites smooth (Fig. 76).

Frontal shield from behind surpassing frontal margin of head by one tenth of its width, laterally with right angles (Fig. 76). Antennal lobes triangular (Fig. 77). Hind margin of pereion-epimeron 1 completely rounded (Fig. 78). Telson wider than long,



Figs. 81–82. *Armadillidium humectum*, ♂, 10.5 mm long (Ancient Kórinthos, SMNS 2750). – **81**. Ischium 7, frontal view. **82**. Ischium 7, caudal view. – Scales: 0.1 mm.

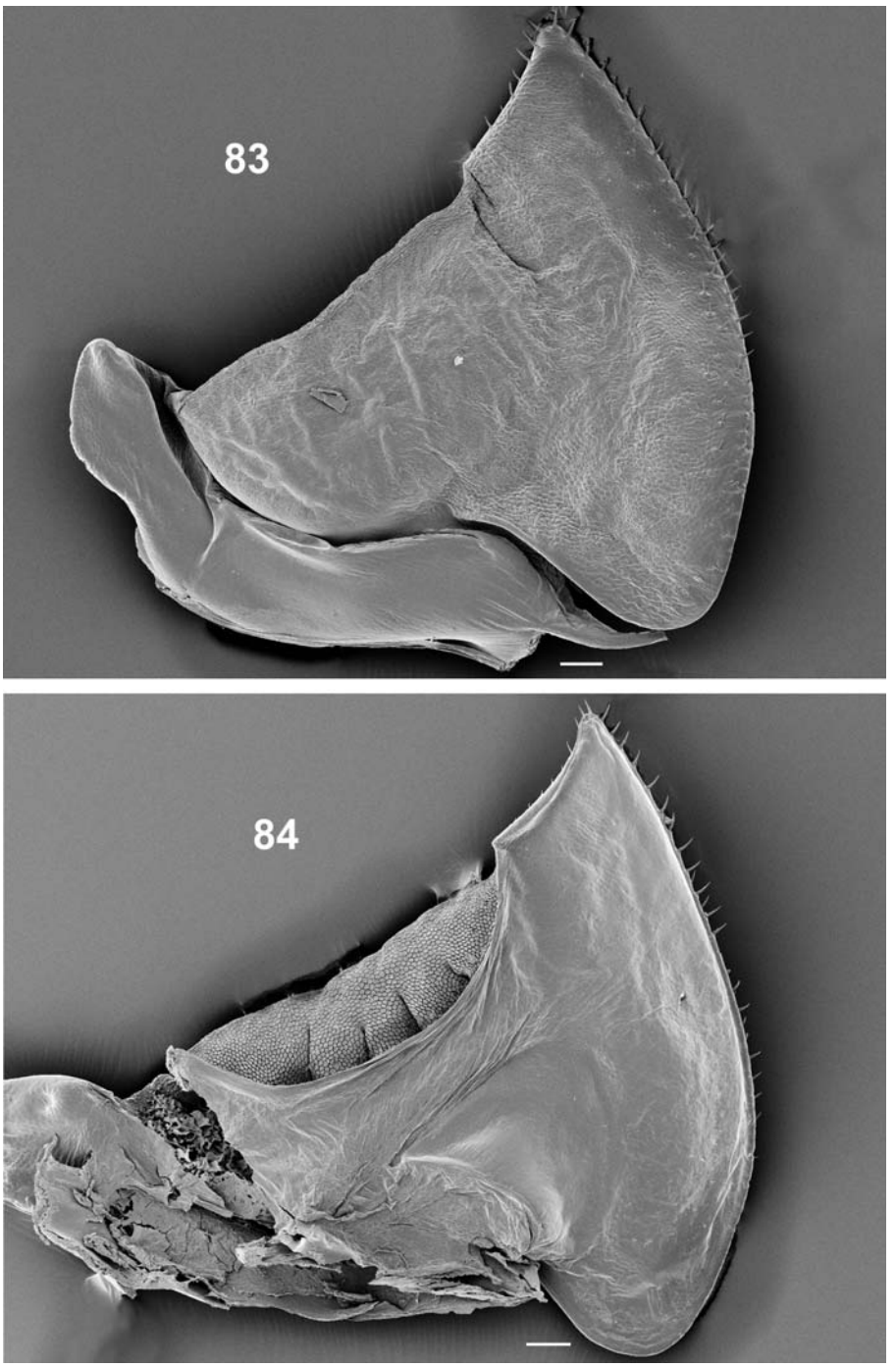
with nearly straight sides and truncated apex (Fig. 79). Antenna see Fig. 80, distal segment of flagellum slightly longer than proximal one. Male pereiopod 1 as in *A. lobocurvum*. Male ischium 7 ventrally strongly concave, frontally with distal hair-field, (Figs. 81, 82). Male pleopod-exopodite 1 with triangular hind-lobe (Figs. 83, 84), endopodite 1 with apex bent outwards (Figs. 85, 86).

Distribution

Greece: Ionian islands Kérkira, Lefkáda and Zákinthos; southwestern mainland; northern Peloponnese (map Fig. 75). The isolated record from Ancient Kórinthos may be a population introduced from the coherent western distribution area.

Remarks

Concerning the coloration there are pronounced differences between the samples from the Peloponnese, from the island Zákinthos and from the mainland (see above).



Figs. 83–84. *Armadillidium humectum*, ♂, 14 mm long (Lámpia Mountains, SMNS 2846). – **83**. Pleopod-exopodite 1, frontal view. **84**. Pleopod-exopodite 1, caudal view. – Scales: 0.1 mm.

Figs. 85–86. *Armadillidium humectum*, ♂, 14 mm long (Lámpia Mountains, SMNS 2846). – **85**. Pleopod-endopodites 1, caudal view. **86**. Pleopod-endopodites 1, apices, caudal view. – Scales: 0.1 mm.

The morphological characters of these different populations are, however, identical, so at the present state of knowledge it seems reasonable to consider these populations as conspecific.

Morphologically *A. humectum* is nearly identical with *A. lobocurvum*, the only differences concern the structure of the male pereiopod 7; these differences are, however, constant and conspicuous, in my view justifying a separation in two different species.

A. parvum Strouhal, 1938 from Olimpía (western Peloponnese) was described after juvenile specimens with a maximum length of 7.3 mm. I have examined the type specimens (Naturhistorisches Museum Wien/Vienna) and I interpret them as belonging to *A. humectum*. However, for a clear decision of this question adult specimens from Olimpía must be found and investigated.

5.8 *Armadillidium kalamatense* Verhoeff, 1907
(Figs. 87–95 and map Fig. 96)

Literature records

Verhoeff 1907: 474, 494 (GR, Peloponnese: Kalamáta); Strouhal 1938: 43, fig. 22 (GR, Peloponnese: Kámpos, Kardamíli, Taígetos Mountains, Gíthio); Schmalfuss 1982: 218, figs. 1–7 (GR, southern Peloponnese; the samples from Khelmós, Killíni and Kalávrita belong to *A. kuehnelti* n. sp.); Sfenthourakis 1992: 159 (GR, Peloponnese, Taígetos Mountains).

Material examined

Greece, southern Peloponnese: 1 ex., NE of Kalamáta, 6 km SE of Artemisía, leg. Schönfeld, 25.VII.2003 (SMNS 2856). – 5 ex., northern Taígetos Mountains, pass 18 km W of Spárti, *Pinus*, 1300 m, leg. Rieger, 8.VII.1992 (SMNS 2346). – 11 ex., as before, leg. Schawaller & Schmalfuss, 29.IX.2004 (SMNS 2831). – 8 ex., northern Taígetos Mountains, Kéntro 10 km E of Kámpos, leg. Bartsch, 7.VII.2005 (SMNS 2867). – 9 ex., S of Kardamíli, Neokhóri, 300 m, leg. Rieger, 22.VII.1992 (SMNS 2345). – 3 ex., S of Kardamíli, Stúpa, leg. Bartsch, 1.VII.2005 (SMNS 2866). – 6 ex., Taígetos Mountains, "Marmarókastro", leg. Kühnelt, 30.IV.1961 (SMNS 1866). – 1 ex., Taígetos Mountains, 2400 m, leg. Malicky, 20.V.1984 (SMNS 2113). – 14 ex., Taígetos Mountains, E of Kardamíli, above Saidóna, *Abies*, 900 m, leg. Schawaller & Schmalfuss, 28.IX.2004 (SMNS 2827). – 3 ex., Taígetos Mountains, 11 km E of Saidóna, *Abies*, 1500 m, leg. Schmalfuss, 28.IX.2004 (SMNS 2828). – 24 ex., Taígetos Mountains, eastern flank of Profítis Ilías, *Abies*, *Pinus*, 1300–1500 m, leg. Schawaller & Schmalfuss, 29.IX.2004 (SMNS 2829). – 2 ex., Taígetos Mountains, eastern flank of Profítis Ilías, Manganiári spring, *Abies*, *Pinus*, 1000 m, leg. Schmalfuss, 29.IX.2004 (SMNS 2830). – 3 ex., Taígetos Mountains, eastern side, above Paleopanagiá, 1800 m, leg. Kinzelbach et al., 25.VII.1980 (SMNS 1353). – 8 ex., northern Máni peninsula, cave Díru, leg. Schönfeld, 2.VIII.2003 (SMNS 2860). – 27 ex., northern Máni peninsula, 7 km E of Areópoli, *Quercus macrolepis*, 300 m, leg. Schawaller & Schmalfuss, 27.IX.2004 (SMNS 2825). – 18 ex., southern Máni peninsula, NE of Àlika, 100 m, leg. Schmalfuss, 27.IX.2004 (SMNS 2824). – 3 ex., northern Párnonas Mountains, 1100 m, leg. Schmalfuss, 26.IX.2004 (SMNS 2821). – 3 ex., Párnonas Mountains, W of Leonídio, 15 km N of Kosmás, *Abies*, 950 m, leg. Schawaller & Schmalfuss, 26.IX.2004 (SMNS 2820). – 6 ex., Párnonas Mountains, 20 km W of Leonídio, *Quercus coccifera*, 750 m, leg. Schawaller & Schmalfuss, 26.IX.2004 (SMNS 2819).

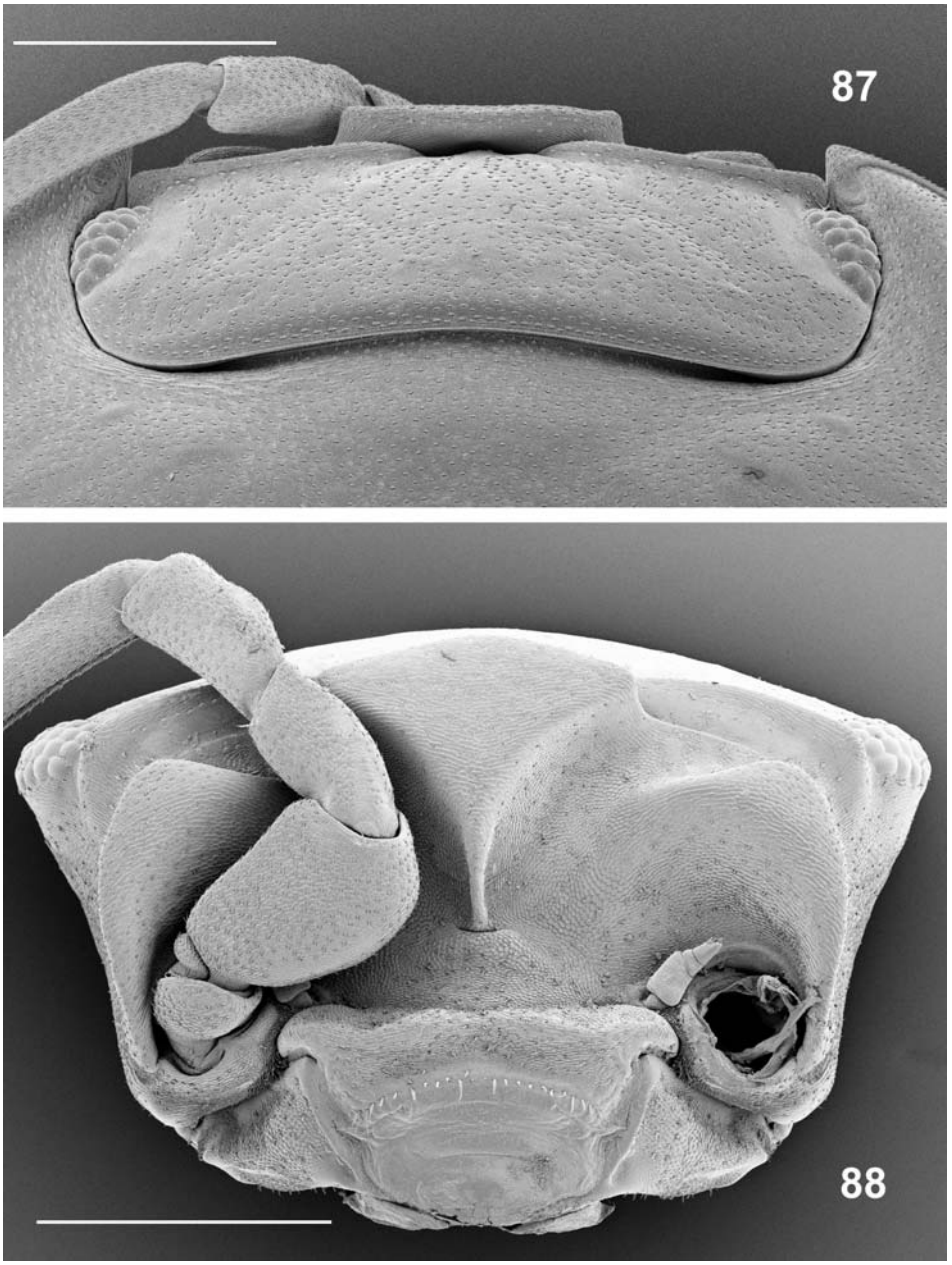
Diagnostic characters

Maximum dimensions: 13.0 × 6.5 mm.

Coloration: Bluish dark grey or black, with usual light muscle spots.

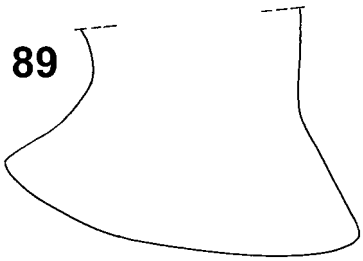
Cuticular structures: Tergites with faint tubercles in high altitude specimens and with rather pronounced tubercles in specimens from low altitudes.

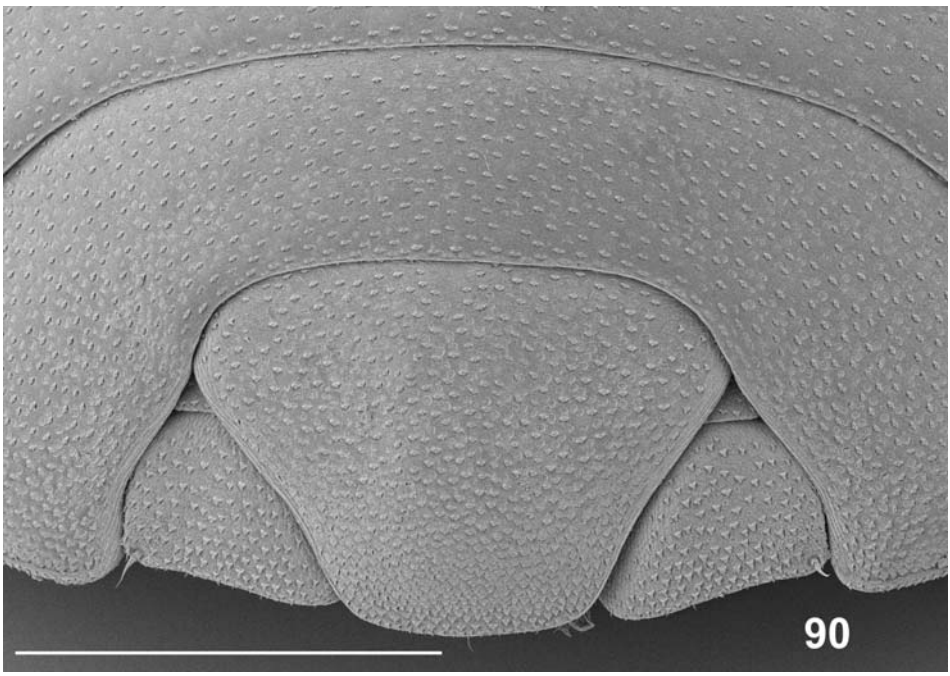
Frontal shield from behind one fifth as high as it is wide, lateral corners forming right angles (Fig. 87). Antennal lobes triangular (Fig. 88). Hind margin of pereion-epimeron 1 with obtuse angle (Fig. 89). Telson very short, length : width index 5.5 : 8, with straight sides and broadly truncated apex (Fig. 90). Antenna and male pereiopod 1 as in *A. kuehnelti*. Male ischium 7 ventrally concave, frontally in specimens from Taígetos with distal field of scales instead of hairs (Figs. 91, 92), in specimens from Párnonas with usual hair-field (Fig. 93). Male pleopod-exopodite 1 with well-



Figs. 87–88. *Armadillidium kalamatense*, ♀, 13 mm long (Taígetos Mountains, SMNS 2829). – **87**. Head in dorsal view. **88**. Head in frontal view. – Scales: 1 mm.

developed triangular hind-lobe (Fig. 94), endopodite 1 with apex bent outwards (Fig. 95).

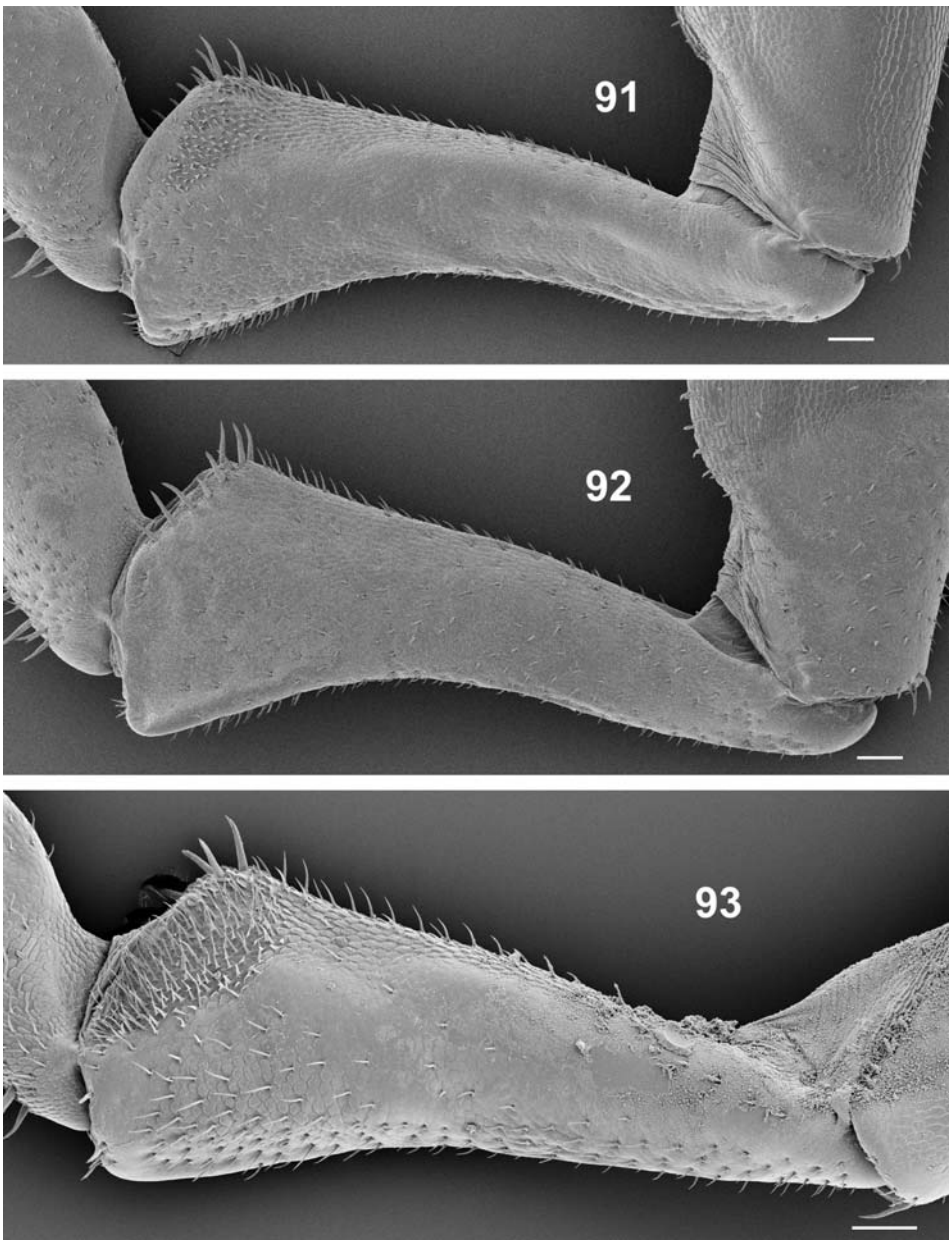




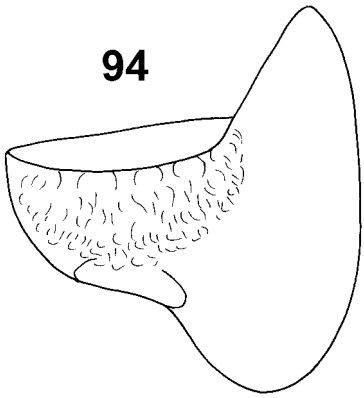
Figs. 89–90. *Armadillidium kalamatense* (Taígetos Mountains, SMNS 2829). – **89**. ♂, 12.5 mm long, pereion-epimeron 1 in lateral view. **90**. ♀, 13 mm long, telson and uropods in dorsal view. – Scale: 1 mm.

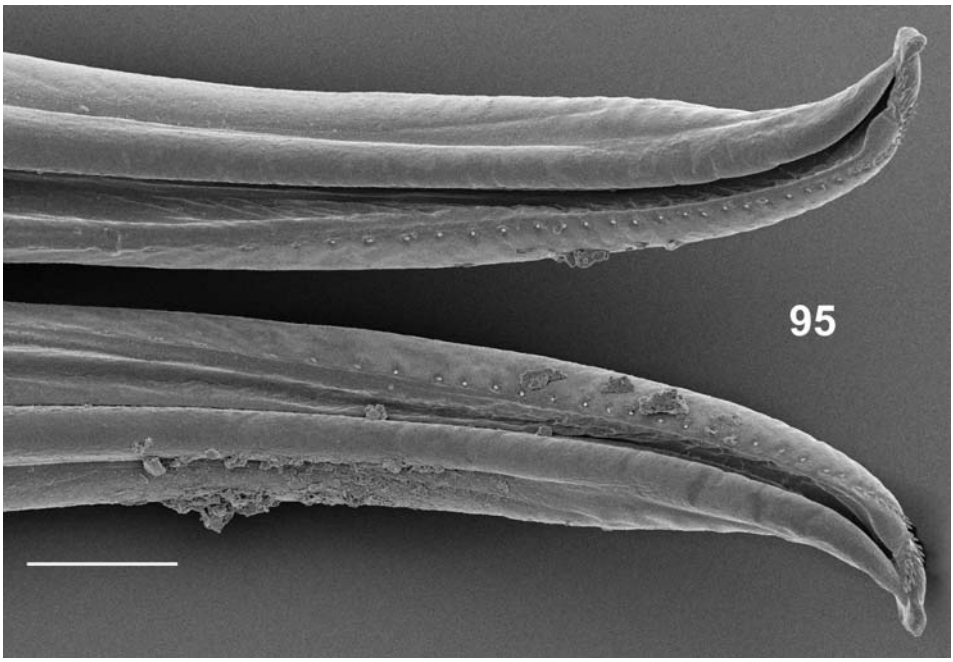
Distribution

Southern Peloponnese: Taígetos and Párnonas Mountains from 1800 m down to the sea coast (see map Fig. 96).



Figs. 91–93. *Armadillidium kalamatense*. – **91**. ♂, 13 mm long (Taígetos Mountains, SMNS 2829), ischium 7, frontal view. **92**. As before, ischium 7, caudal view. **93**. ♂, 11 mm long (Párnonas Mountains, SMNS 2821), ischium 7, frontal view. – Scales: 0.1 mm.





Figs. 94–95. *Armadillidium kalamatense*, ♂, 13 mm long (Taígetos Mountains, SMNS 2829). – **94**. Pleopod-exopodite 1, caudal view. **95**. Pleopod-endopodites 1, apices, caudal view. – Scale: 0.1 mm.

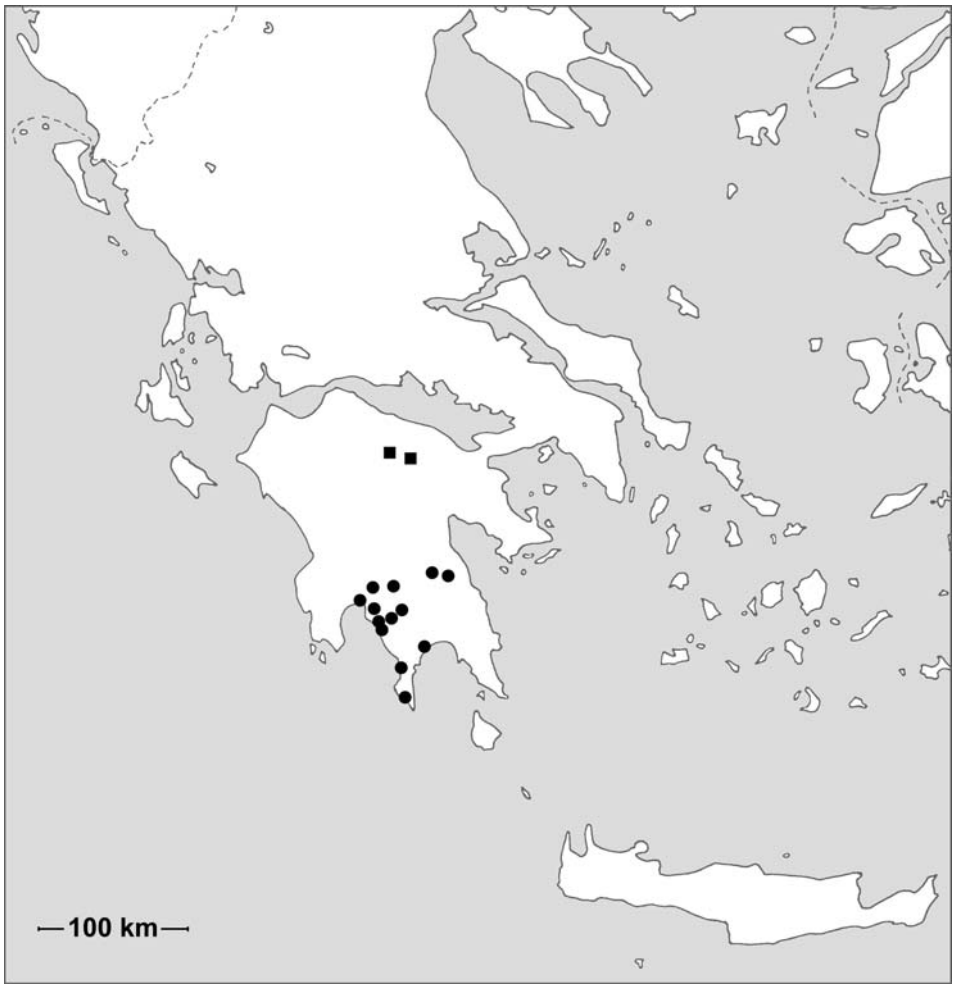


Fig. 96. Records of *Armadillidium kalamatense* (●) and *A. kuehnelti* n. sp. (■).

5.9 *Armadillidium kuehnelti* **n. sp.**
(Figs. 97–109 and map Fig. 96)

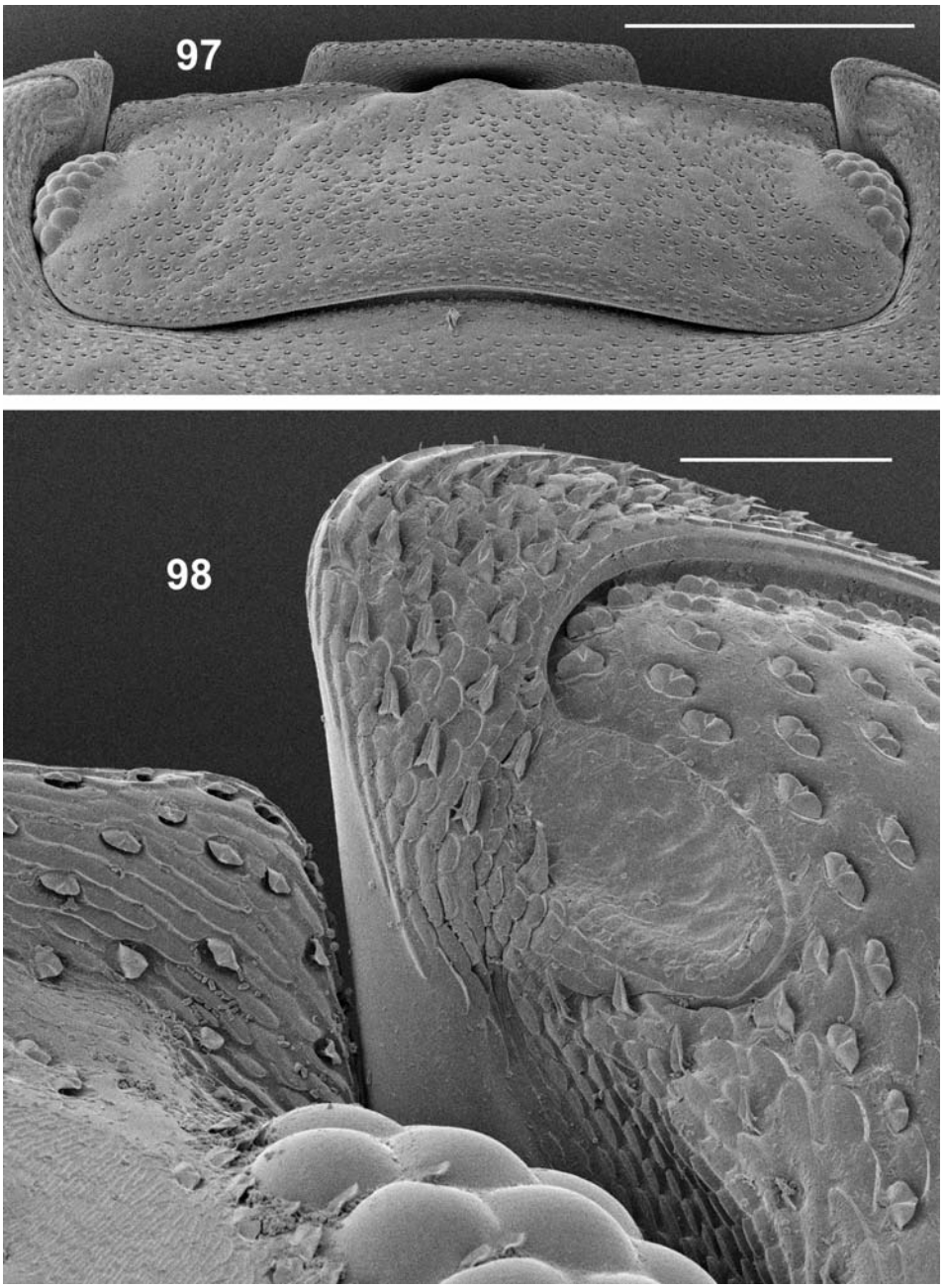
Material examined

Holotype: ♂, 13.5 × 5.7 mm, Greece, northern Peloponnese, E of Khelmós Mountain, 2 km S of Zarúkhla, *Abies*, *Pinus*, 1100 m, wet bank of stream with running water, leg. SCHAWALLER & SCHMALFUSS, 23.IX.2004 (SMNS T574).

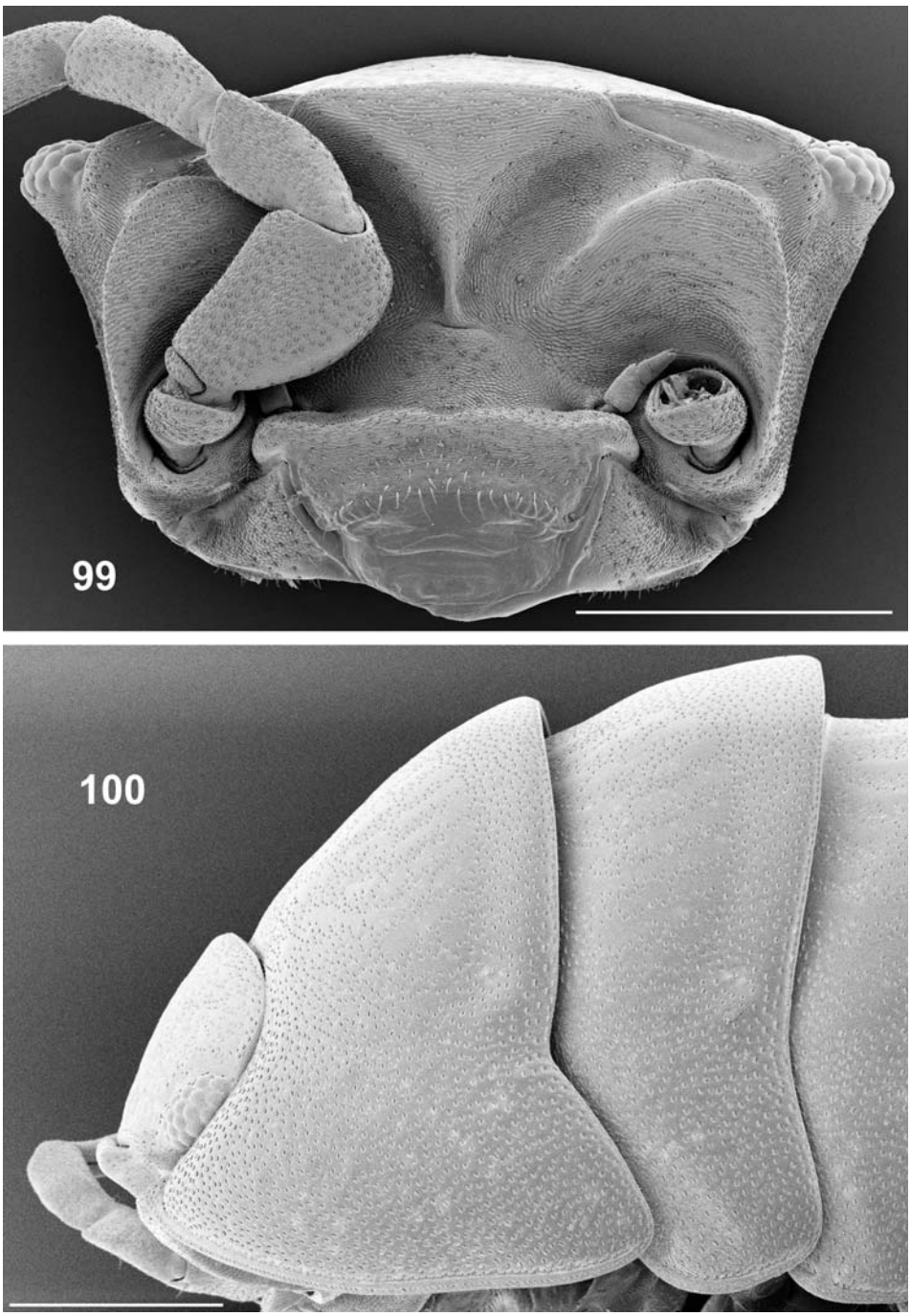
Paratypes: 12 ex, same data as holotype (SMNS T575). – 3 ex., northern Peloponnese, Kalávrita, leg. KÜHNELT, 14.VII.1967 (SMNS T576). – 1 ex., northern Peloponnese, Khelmós Mountain, "Xirokambi", leg. KÜHNELT, 15.VII.1967 (SMNS T578). – 3 ex., northern Peloponnese, Killíni Mountain, "hochalpin", leg. KÜHNELT, 20.IV.1960 (SMNS T577).

Derivatio nominis

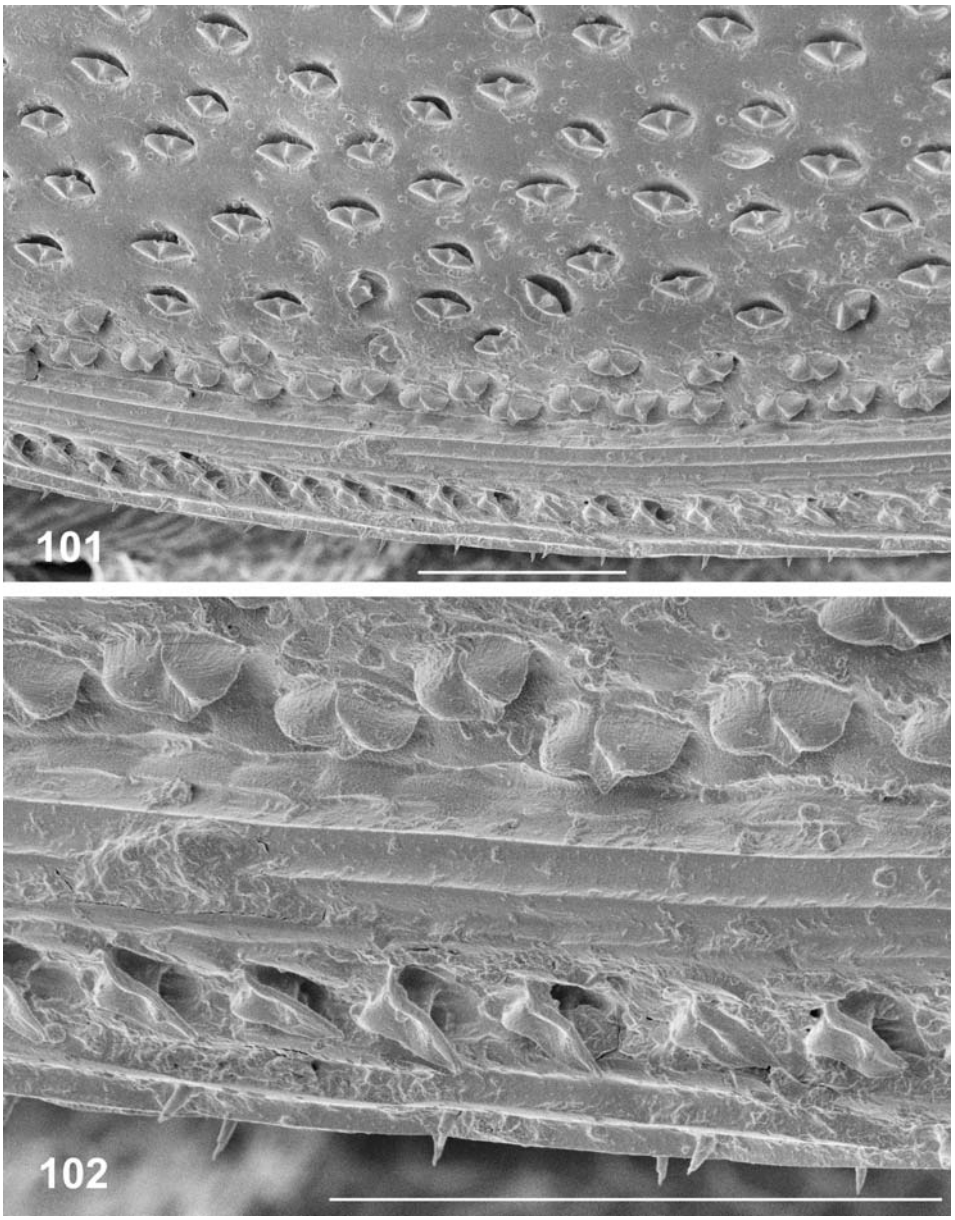
The species is dedicated to Prof. Dr. W. KÜHNELT † (Vienna), who was a pioneer in collecting terrestrial arthropods in many mountain areas of Greece.



Figs. 97–98. *Armadillidium kuehnelti* n. sp., ♂, paratype, 13 mm long (SMNS T575). – **97**. Head in dorsal view. **98**. Detail of anterior corner of right pereion-epimeron 1 in dorsal view. – Scales: 1 mm (97), 0.1 mm (98).



Figs. 99–100. *Armadillidium kuehnelti* n. sp. – **99**. ♀, paratype, 12 mm long, head in frontal view (SMNS T575). **100**. ♀, paratype, 11 mm long, head and pereion-tergites 1 and 2 in lateral view (SMNS T575). – Scales: 1 mm.



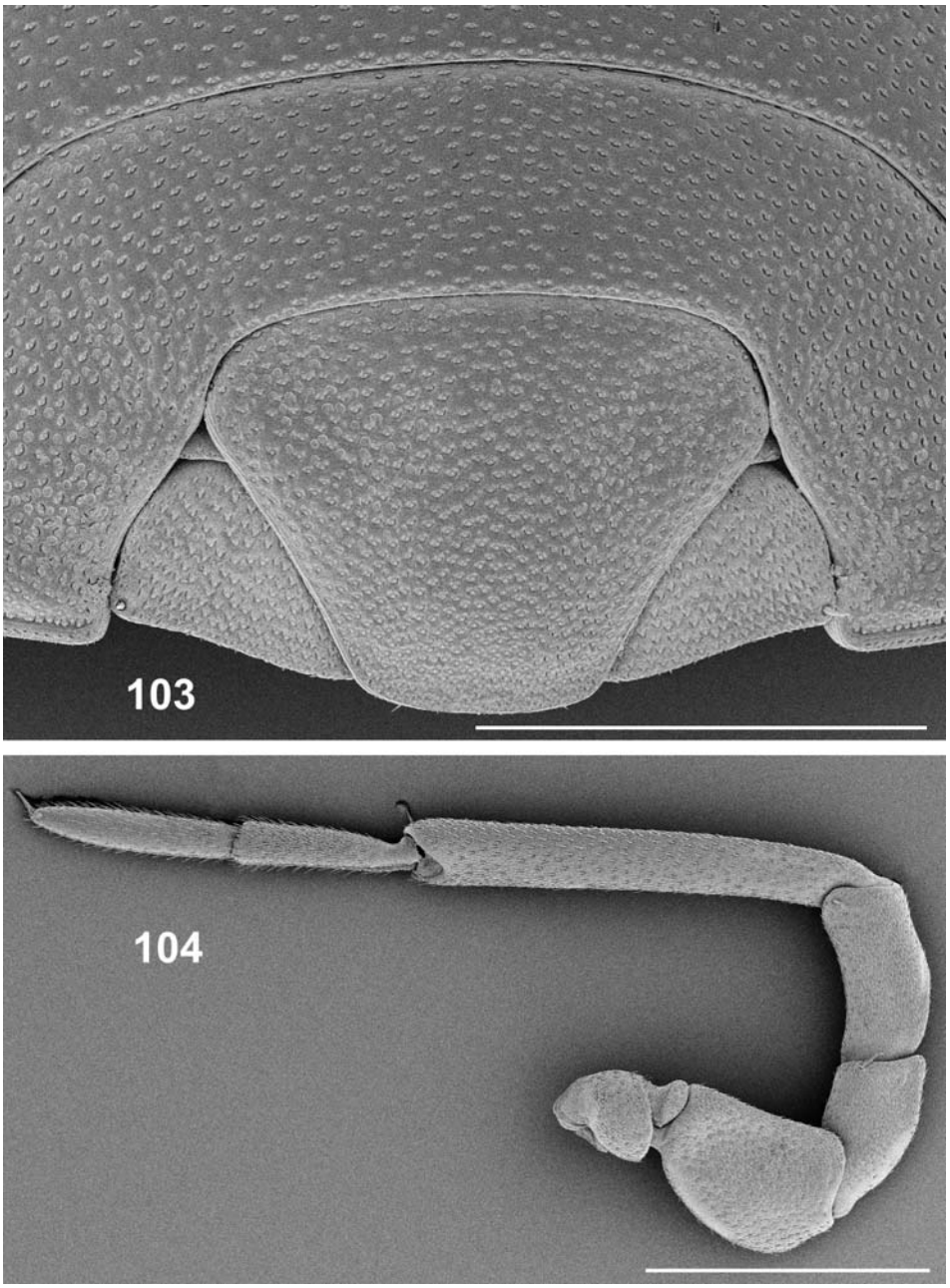
Figs. 101–102. *Armadillidium kuehnelti* n. sp., ♀, paratype, 11 mm long (SMNS T575). – **101**. Detail of pereion-epimeron 1. **102**. Detail of margin of pereion-epimeron 1. – Scales: 0.1 mm.

Description

Maximum dimensions: 14.0 × 6.5 mm.

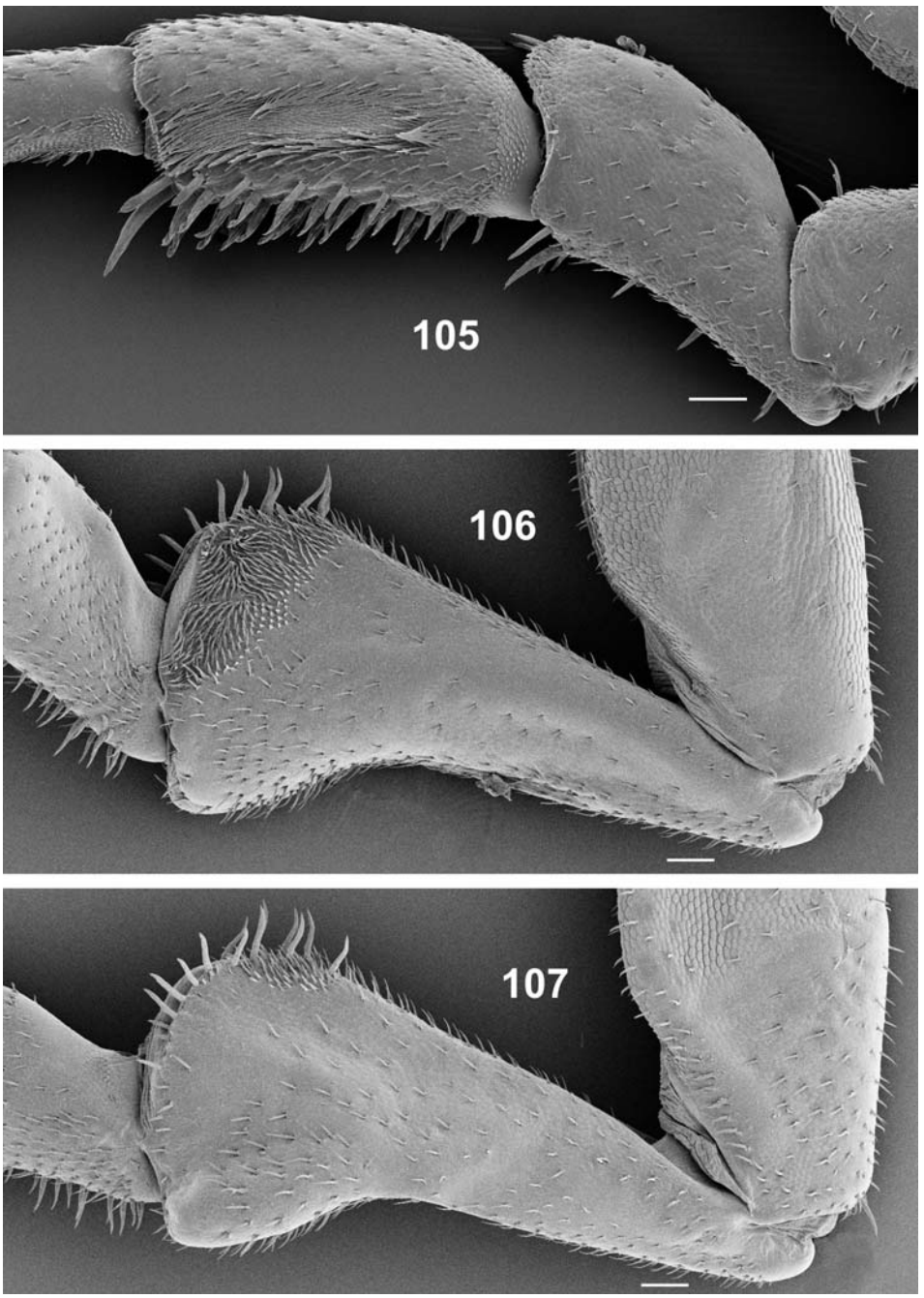
Coloration: Tergites in males dark blackish grey, in females and juveniles mottled with yellowish.

Cuticular structures: Tergites smooth.

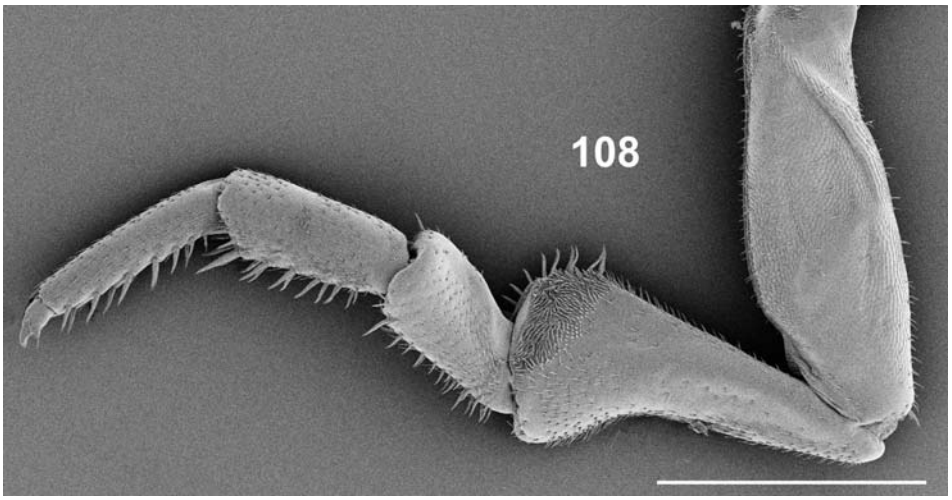


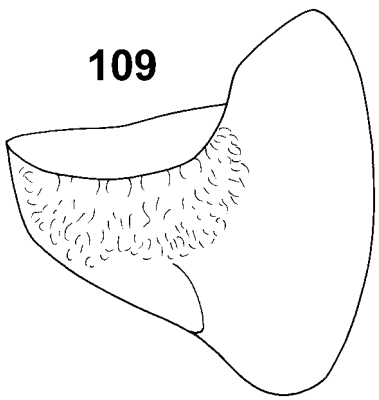
Figs. 103–104. *Armadillidium kuehnelti* n. sp., ♂, paratype, 13 mm long (SMNS T575). – **103**. Telson and uropods in dorsal view. **104**. Antenna. – Scales: 1 mm.

Frontal shield from behind one fifth as high as it is wide, lateral corner forming pronounced angles (Fig. 97). Antennal lobes triangular (Fig. 99). Hind margin of pereion-epimeron 1 with pronounced angle (Fig. 100); details of epimeron 1 see



Figs. 105–107. *Armadillidium kuehnelti* n. sp., ♂, paratype, 13 mm long (SMNS T575). – **105**. Pereiopod 1, carpus and merus, frontal view. **106**. Ischium 7, frontal view. **107**. Ischium 7, caudal view. – Scales: 0.1 mm.





Figs. 108–109. *Armadillidium kuehnelti* n. sp. – **108**. ♂, paratype, 13 mm long (SMNS T575). Pereiopod 7, frontal view. **109**. ♂, holotype, 13.5 mm long (SMNS T574), pleopod-exopodite 1, caudal view. – Scale: 1 mm.

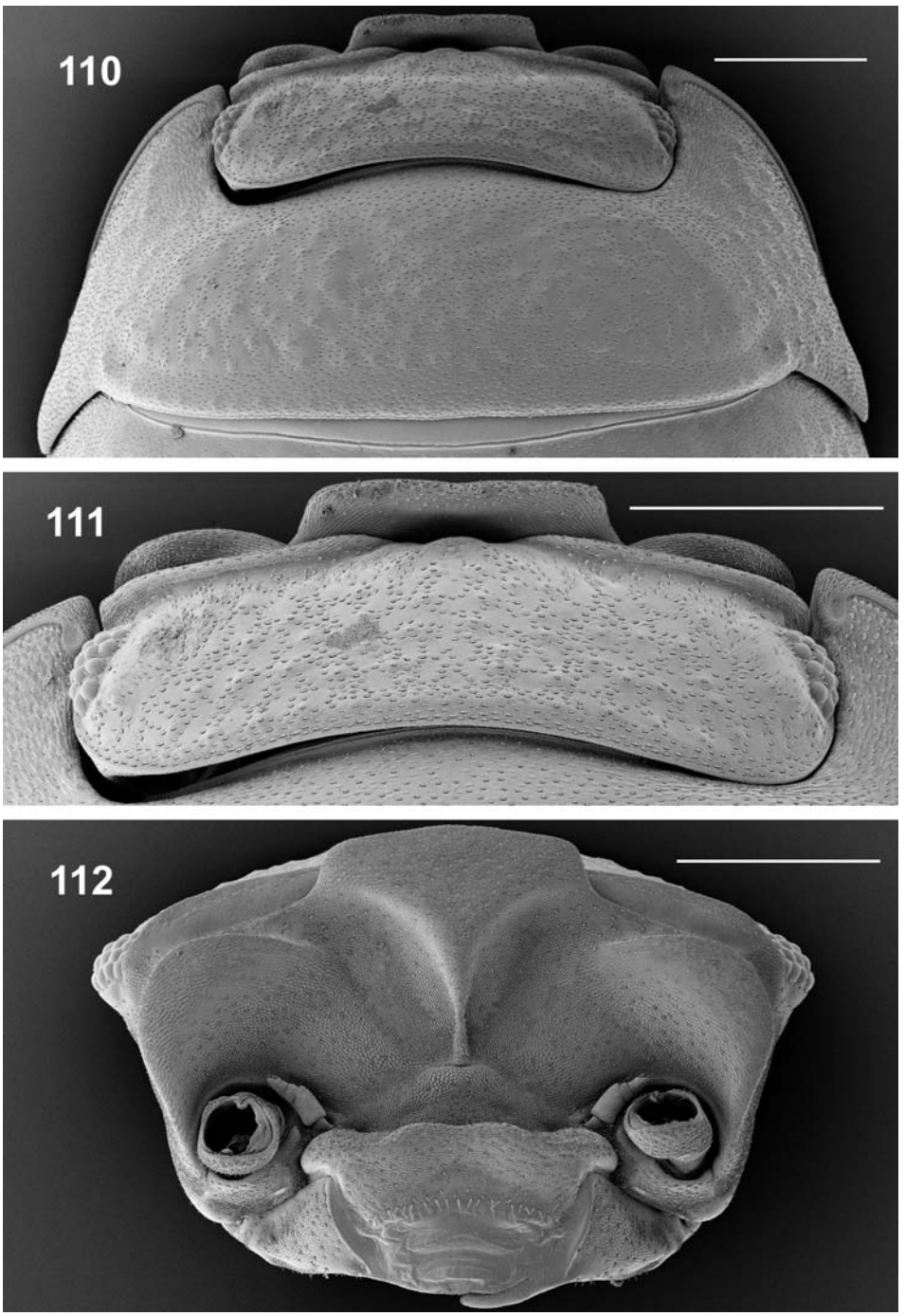
Figs. 98, 101, 102. Telson very short, length : width index 5.5 : 7.5, with straight sides and broadly truncated apex (Fig. 103). Antenna see Fig. 104, distal segment of flagellum slightly longer than proximal one. Male pereiopod 1 with ventral brush of stout short spines on carpus, but not on merus (Fig. 105). Male ischium 7 ventrally strongly concave, frontally with distal field of hairy setae (Figs. 106–108). Male pleopod-exopodite 1 with well-developed rounded triangular hind-lobe (Fig. 109), endopodite 1 with apex bent outwards.

Distribution

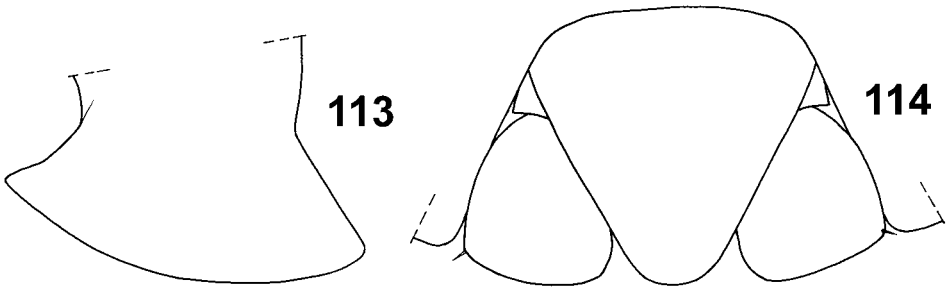
Northern Peloponnese: Khelmós and Killíni Mountains (map Fig. 96).

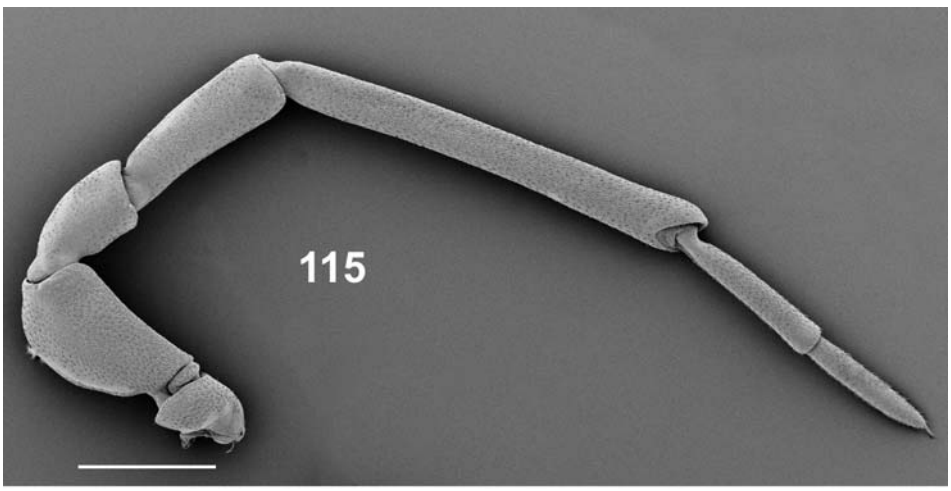
Remarks

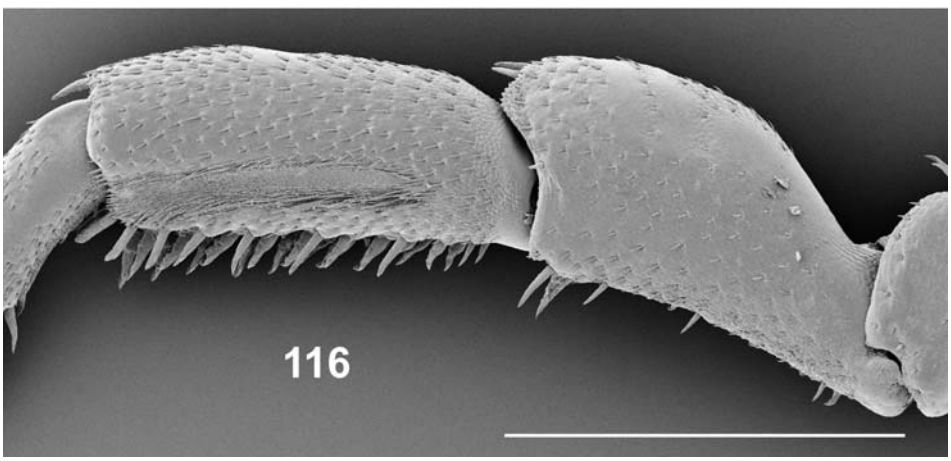
The new species shows conspicuous similarities with *A. kalamatense* (compare head and telson), the male pereiopod 7 is, however, clearly different and justifies a specific separation.



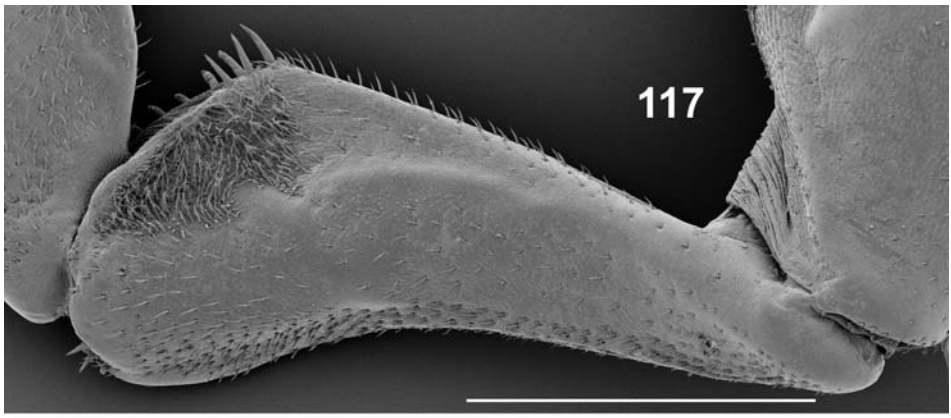
Figs. 110–112. *Armadillidium laconicum* (Monemvasía, SMNS 1873). – **110**. ♂, 13.5 mm long, head and pereion-tergites 1 and 2 in dorsal view. **111**. ♂, 13.5 mm long, head in dorsal view. **112**. ♂, 15 mm long, head in frontal view. – Scales: 1 mm.

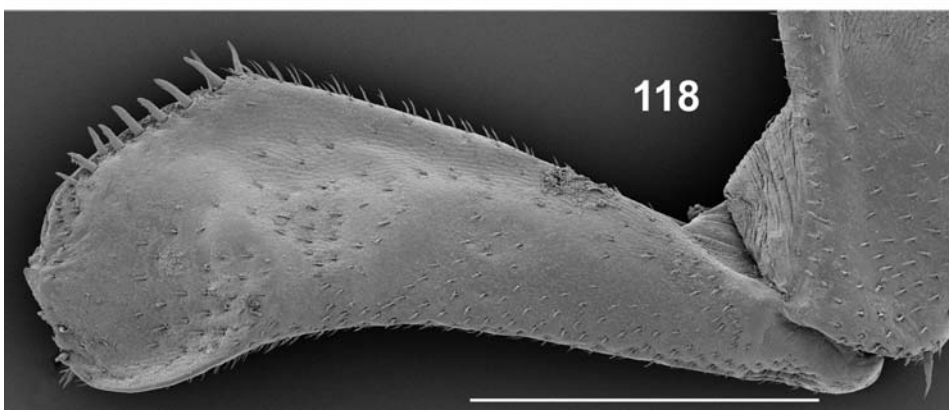


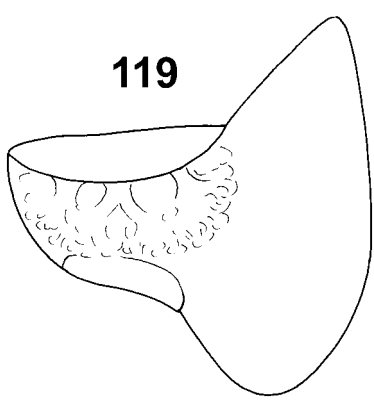




Figs. 113–116. *Armadillidium laconicum* (Monemvasía, SMNS 1873). – **113**. ♂, 15 mm long, pereion-epimeron 1 in lateral view. **114**. ♂, 15 mm long, telson and uropods in dorsal view. **115**. ♂, 20 mm long, antenna. **116**. ♂, 20 mm long, pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.







Figs. 117–119. *Armadillidium laconicum* (Monemvasía, SMNS 1873). – **117**. ♂, 20 mm long, ischium 7, frontal view. **118**. ♂, 20 mm long, ischium 7, caudal view. **119**. ♂, 13.5 mm long, pleopod-exopodite 1, caudal view. – Scales: 1 mm.

5.10 *Armadillidium laconicum* Strouhal, 1938
(Figs. 110–119 and map Fig. 120)

Literature record

STROUHAL 1938: 34, figs. 12–14 (GR, SE-Peloponnese: Monemvasía).

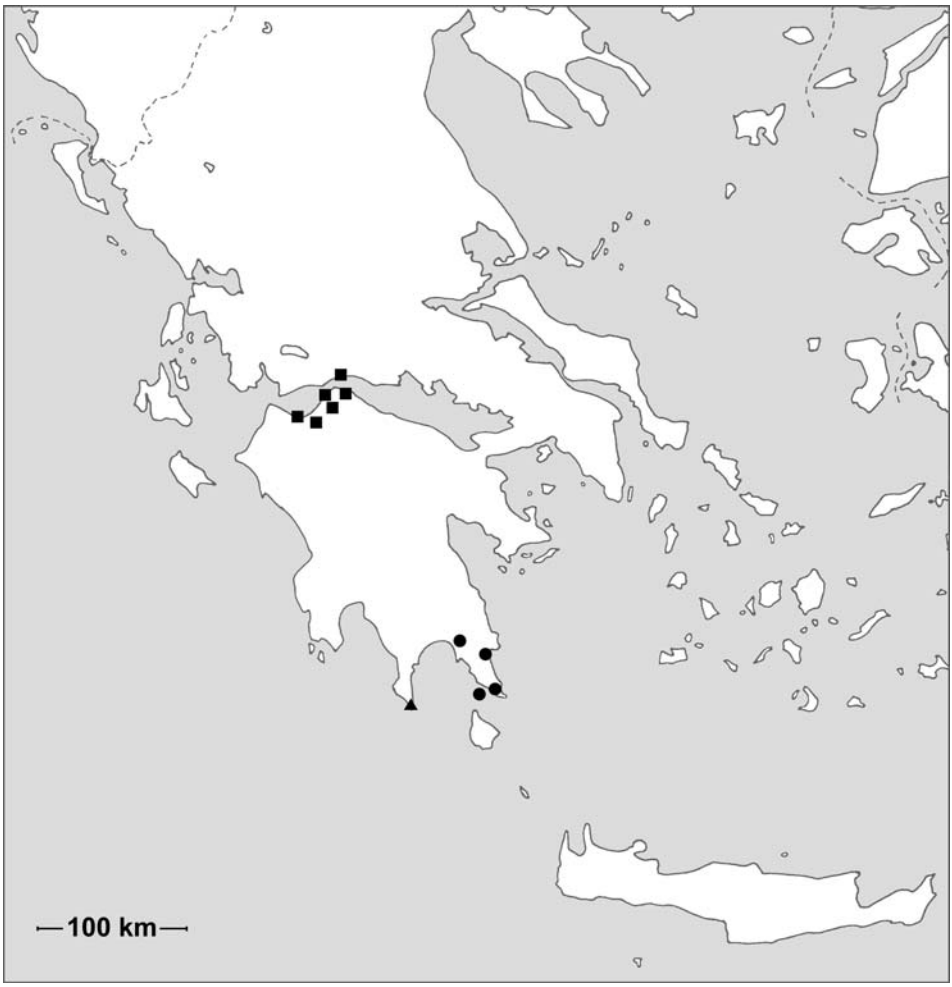


Fig. 120. Records of *Armadillidium laconicum* (●), *A. lobocurvum* (■) and *A. maniatum* n. sp. (▲).

Material examined

Greece: 13 ex., SE-Peloponnese, Molái, leg. KÜHNELT, 31.III.1970 (SMNS 1816). – 14 ex., SE-Peloponnese, Monemvasía, leg. KÜHNELT, 29.–30.IV.1970 (SMNS 1818, 1833). – 6 ex., SE-Peloponnese, S of Monemvasía, bank of stream, leg. SCHMALFUSS, 20.IX.1978 (SMNS 1873). – 19 ex., SE-Peloponnese, E of Neápoli, leg. SCHMALFUSS, 18.IX.1978 and 13.IV.1987 (SMNS 1081, 2179). – 1 ex., SE-Peloponnese, Velanidiá, pebble beach, leg. SCHMALFUSS, 18.IX.1978 (SMNS 1876). – 24 ex., SE-Peloponnese, island Elafónisos, leg. SCHMALFUSS, 19.IX.1978 and 12.IV.1987 (SMNS 1877, 2180).

Diagnostic characters

Maximum dimensions: 18.0 × 8.7 mm.

Coloration: Grey-brown with yellowish muscle-spots, young animals lighter; in a number of samples the animals are light yellowish brown without any dark pigmentation.

Cuticular structures: Tergites with faint tubercles (compare Fig. 110).

Frontal shield from behind one fourth as high as it is wide, trapezoidal, laterally with pronounced angles (Fig. 111). Antennal lobes in frontal view trapezoidal (Fig. 112). Hind margin of pereion-epimeron 1 with distinct angle (Fig. 113). Telson with straight sides and narrowly rounded apex (Fig. 114). Antenna with distal flagellar segment slightly shorter than proximal one (Fig. 115). Male pereiopod 1 on carpus with ventral brush of spines, on merus only a row of strong spines (Fig. 116). Male ischium 7 ventrally concave, frontally with distal hair-field (Figs. 117, 118). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 119), endopodite 1 straight.

Distribution

Populates the southeastern peninsula of the Peloponnese (see map Fig. 120).

Remarks

A comparison with samples from the island Kíthira showed that *A. laconicum* is not a synonym of *A. cythereium*, as I suspected in earlier publications.

5.11 *Armadillidium lobocurvum* Verhoeff, 1902
(Figs. 121–133 and map Fig. 120)

Literature records

VERHOEFF 1902: 249 (GR, NW-Peloponnese: Pátra and Lampíri 20 km E of Pátra); STROUHAL 1938: 45, figs. 23–27 (GR, NW-Peloponnese: "Englikas", Purnarókastro [western flank of Panakhaïkó], Panakhaïkó Mountain, 1600–1900 m); SCHMALFUSS 1982: 219, figs. 15–20; SCHMALFUSS 1985: 295, fig. 10 (central Greece, Nomós Fokídas: 15 km NE of Náfpaktos; the specimen from the Killíni Mountain does not belong to *A. lobocurvum*).

Material examined

Greece: 20 ex., NW-Peloponnese, Káto Akhaïa SW of Pátra, leg. SCHÖNFELD, VII.2002 (SMNS 2747). – 6 ex., NW-Peloponnese, Khaïkáli 12 km SE of Káto Akhaïa, leg. DELMASTRO, 15.V.1999 (SMNS 2650). – 4 ex., northern Peloponnese, between Pátra and Kastrítsi NE of Pátra, leg. HAUSER, 17.IV.1972 (SMNS 2177). – 1 ex., northern Peloponnese, Pirgáki W of Égio, leg. SCHÖNFELD, 17.VII.2002 (SMNS 2749). – 2 ex., northern Peloponnese, Platáni 10 km NE of Pátra, leg. SCHMALFUSS, 7.X.2004 (SMNS 2853). – 15 ex., northern Peloponnese, Panakhaïkó Mountain, northern flank, *Abies*, 1100 m, leg. BENSE & SCHMALFUSS, 7.X.2004 (SMNS 2852). – 2 ex., northern Peloponnese, Panakhaïkó Mountain, northern flank, *Abies*, *Quercus coccifera*, 1000 m, leg. SCHMALFUSS, 7.X.2004 (SMNS 2850). – 6 ex., northern Peloponnese, Panakhaïkó Mountain, northern flank, *Quercus coccifera*, 800 m, leg. BENSE, SCHAWALLER & SCHMALFUSS, 7.X.2004 (SMNS 2849).

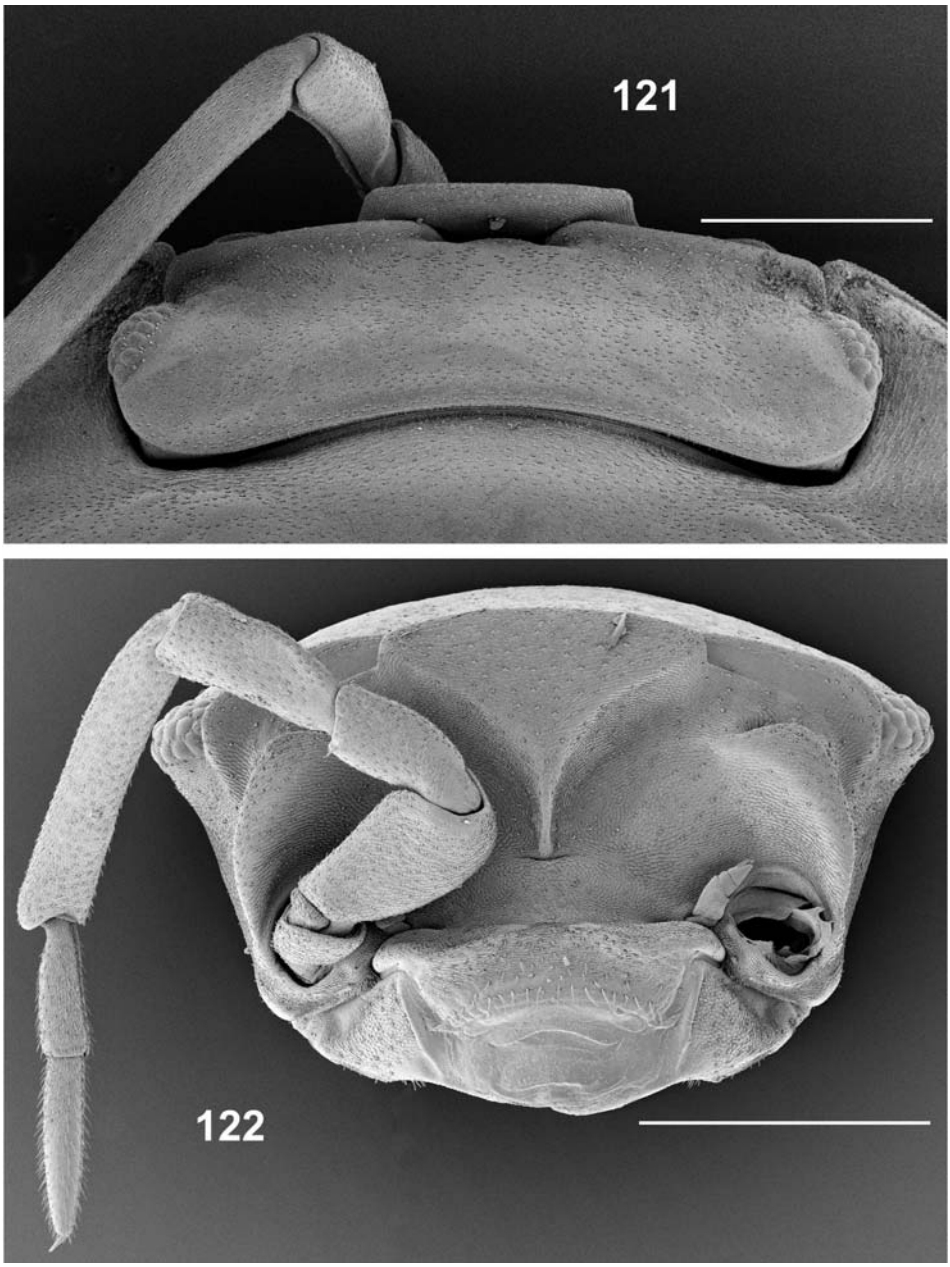
Diagnostic characters

Maximum dimensions: 20.0 × 8.4 mm.

Coloration: Greyish to blackish brown with yellowish muscle-spots, epimera lighter.

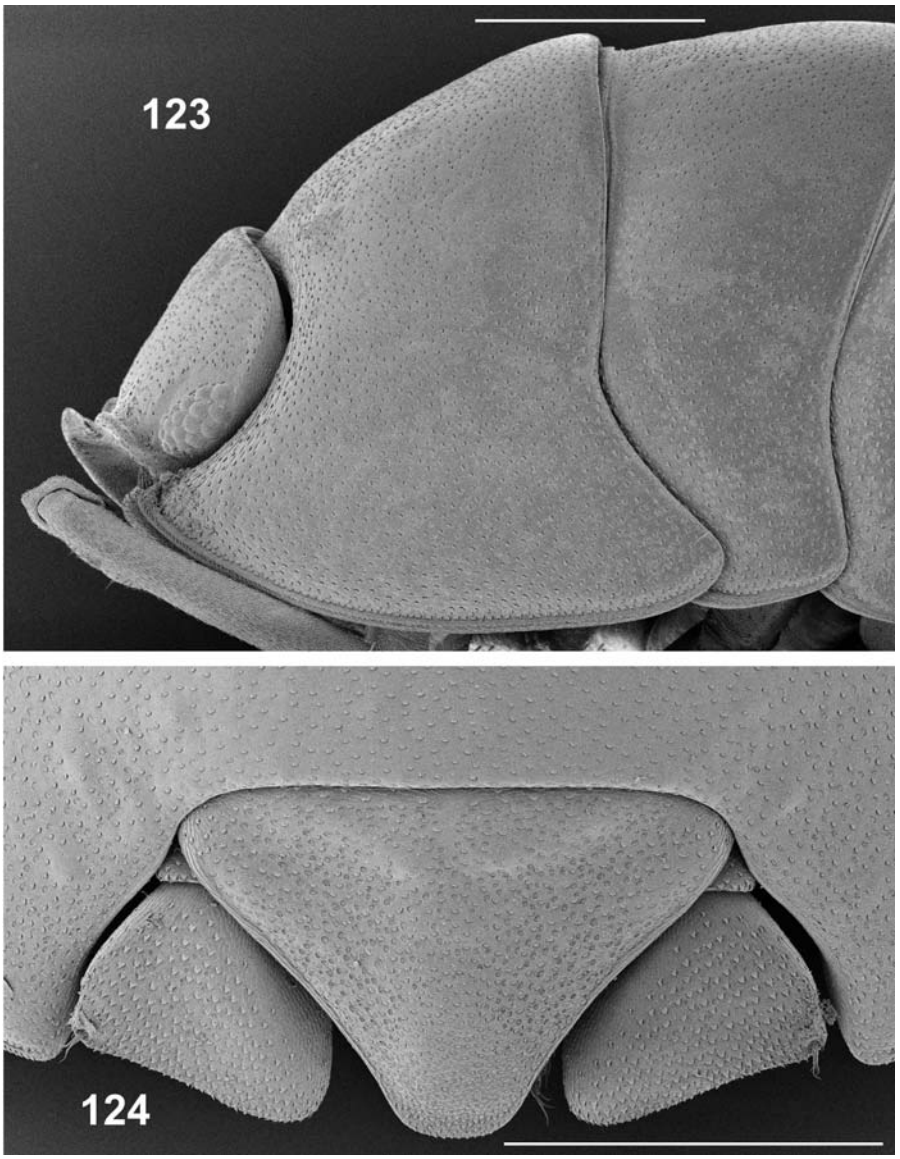
Cuticular structures: Tergites smooth.

Frontal shield from behind surpassing frontal margin of head, upper margin straight, laterally with pronounced angles (Fig. 121); in bigger animals the shield can be higher and the upper margin can be more rounded. Antennal lobes in frontal view triangular (Fig. 122). Hind margin of pereion-epimeron 1 rounded (Fig. 123). Telson with slightly concave sides and truncated apex (Fig. 124). Antenna as in *A. humectum*. Male pereiopod 1 on carpus (but not on merus) with ventral brush of spines



Figs. 121–122. *Armadillidium lobocurvum* (Panakhaïkó Mountain, SMNS 2852). – **121**. ♀, 14 mm long, head in dorsal view. **122**. ♀, 11 mm long, head in frontal view. – Scales: 1 mm.

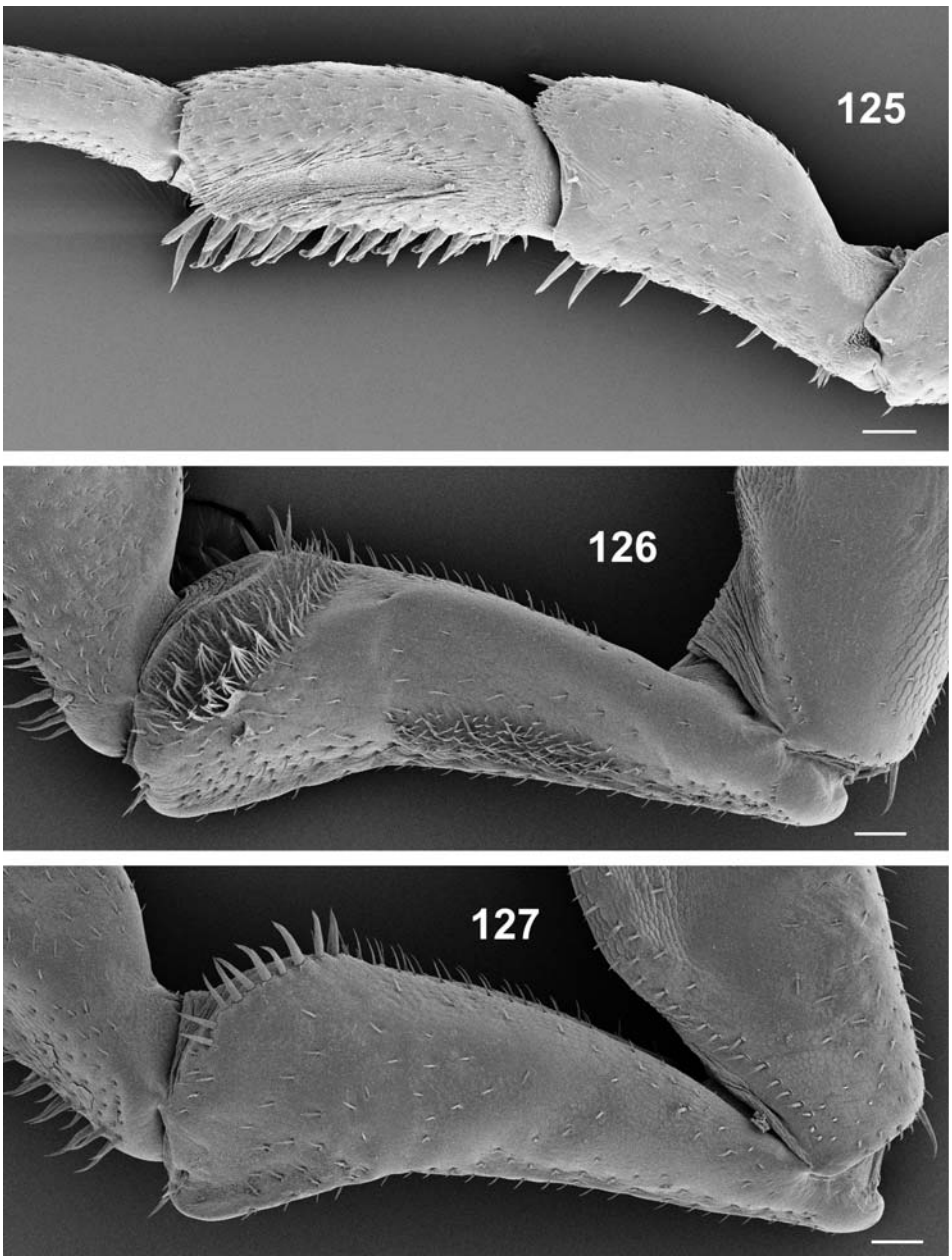
(Fig. 125). Male ischium 7 ventrally concave, frontally with distal hair-field and a proximal band of hairy setae (Figs. 126, 127). Male pleopod-exopodite 1 with triangular hind-lobe (Figs. 128–130), endopodite 1 straight, the very tip turned outwards (Figs. 131–133).



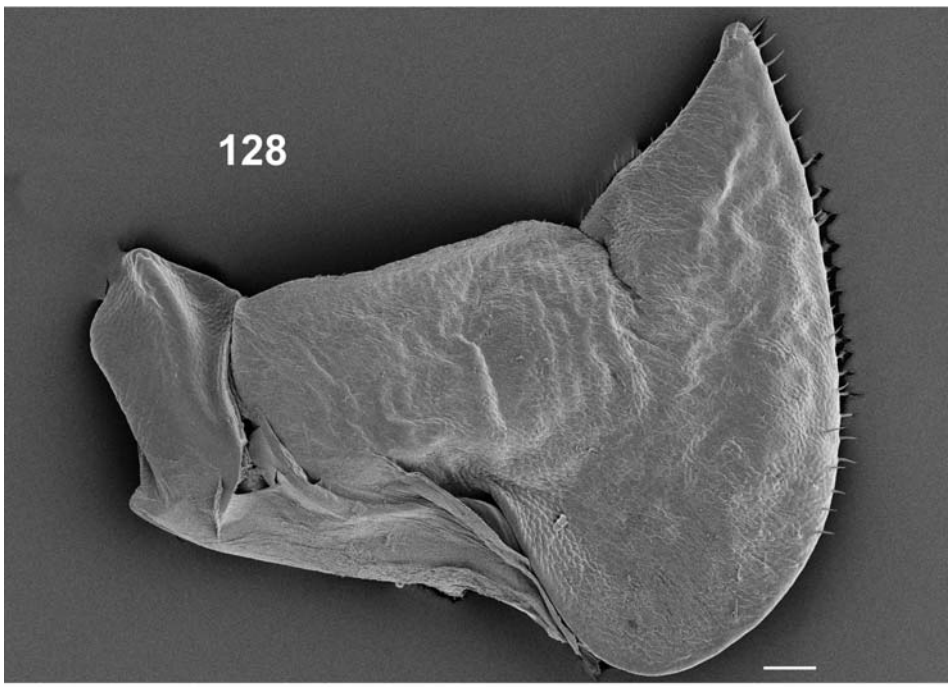
Figs. 123–124. *Armadillidium lobocurvum* (Panakhaïkó Mountain, SMNS 2852). – **123**. ♂, 20 mm long, head and pereion-tergites 1 and 2 in lateral view. **124**. ♀, 14 mm long, telson and uropods in dorsal view. – Scales: 1 mm.

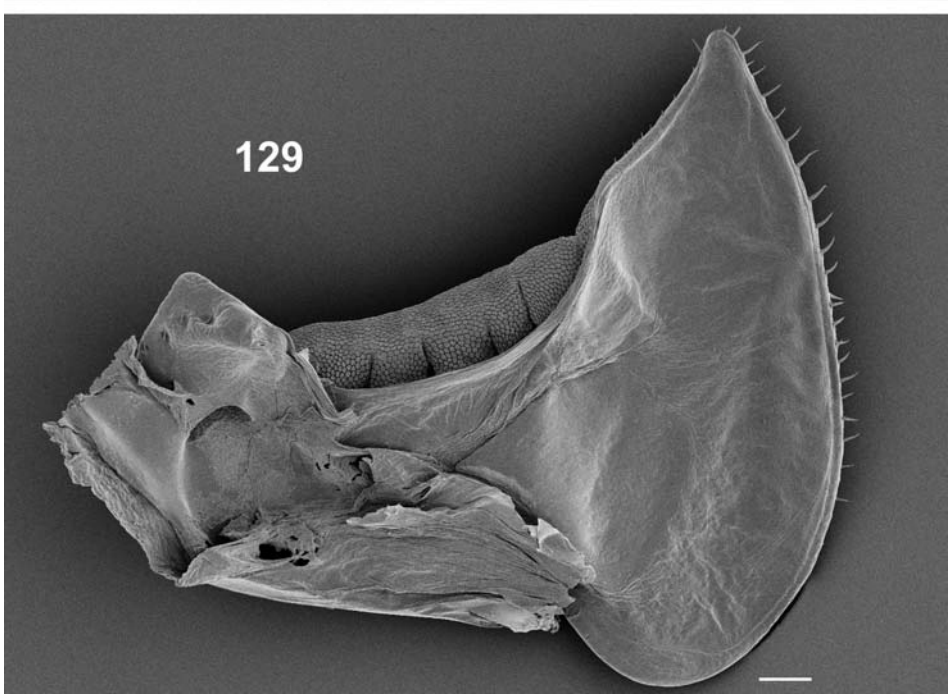
Distribution

Central Greek mainland (Efpálio NE of Náfpaktos opposite northern coast of Peloponnese) and the region of the Panakhaïkó Mountain on northwestern Peloponnese (map Fig. 120).

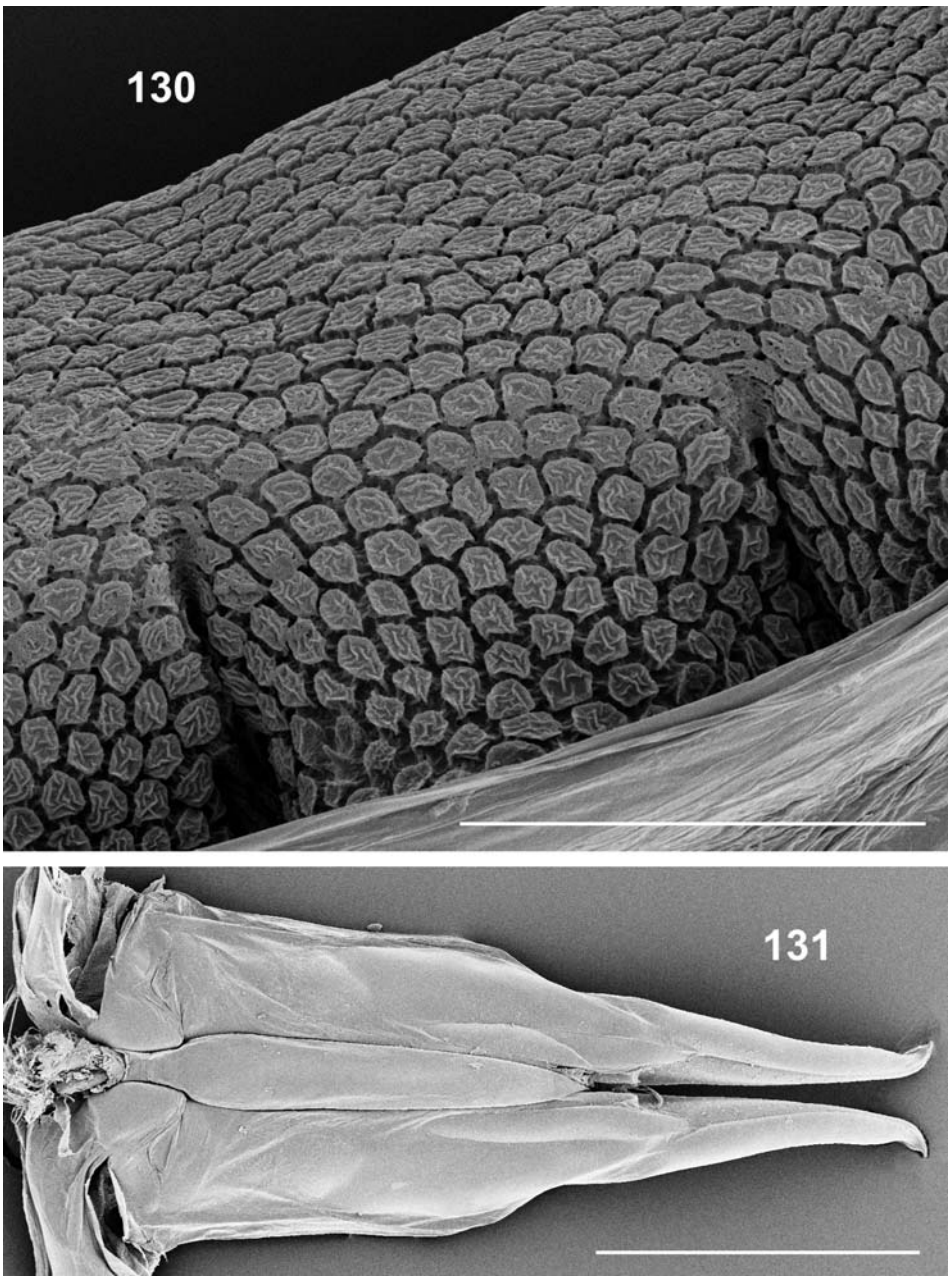


Figs. 125–127. *Armadillidium lobocurvum*, ♂, 12 mm long (Panakhaïkó Mountain, SMNS 2852). – **125**. Pereiopod 1, carpus and merus, frontal view. **126**. Ischium 7, frontal view. **127**. Ischium 7, caudal view. – Scales: 0.1 mm.

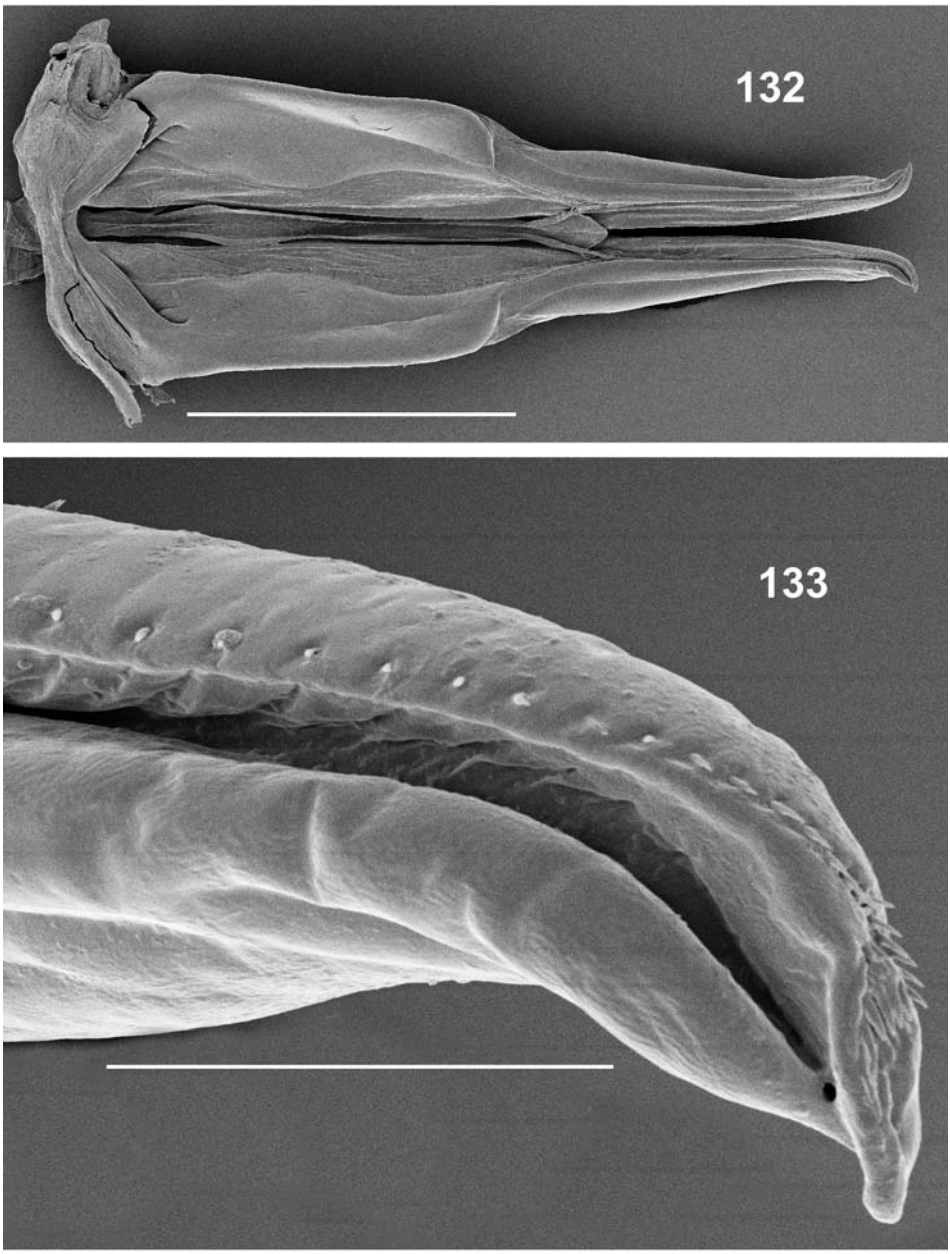




Figs. 128–129. *Armadillidium lobocurvum*, ♂, 12 mm long (Panakhaïkó Mountain, SMNS 2852). – **128**. Pleopod-exopodite 1, frontal view. **129**. Pleopod-exopodite 1, caudal view. – Scales: 0.1 mm.



Figs. 130–131. *Armadillidium lobocurvum*, ♂, 12 mm long (Panakhaïkó Mountain, SMNS 2852). – **130**. Pleopod-exopodite 1, caudal view, detail of respiratory field. **131**. Pleopod-endopodites 1, frontal view. – Scales: 0.1 mm (130), 1 mm (131).



Figs. 132–133. *Armadillidium lobocurvum*, ♂, 12 mm long (Panakhaïkó Mountain, SMNS 2852). – **132**. Pleopod-endopodites 1, caudal view. **133**. Apex of pleopod-endopodite 1, caudal view. – Scales: 1 mm (132), 0.1 mm (133).

5.12 *Armadillidium maniatum* **n. sp.**
(Figs. 134–142 and map Fig. 120)

Material examined

Holotype: ♂, 17.0 × 8.7 mm, Greece, southern Peloponnese, southern Máni peninsula, Váthia, coast, leg. ADAMA, 7.V.1980 (SMNS T572).

Paratypes: 1 ♂, 1 ♀ without marsupium, same data as holotype (SMNS T573).

Derivatio nominis

The new species is named after the peninsula of Máni in whose southernmost part the type locality is found.

Description

Maximum dimensions: 17.0 × 8.7 mm.

Coloration: Without pigmentation except black eyes and dark stripes at the hind margins of the pereion-tergites.

Cuticular structures: Tergites completely smooth.

Frontal shield not surpassing frontal margin of head, bent backwards and very tightly fitting to the frontal part of the head (Fig. 134). Antennal lobes in frontal view trapezoidal (Fig. 135). Hind margin of pereion-epimeron 1 with deep and sharp angle (Fig. 137). Telson with straight sides and rounded apex, wider than long (Fig. 138). Antenna with a conspicuously enlarged third segment, flagellar segment of equal length (Fig. 136). Male pereiopod 1 on carpus and to a much lesser degree on merus with ventral brush of spines (Fig. 139). Male ischium 7 ventrally straight, frontally without distal hair-field, but caudally with a proximal band of hairy setae, and coxopodite medially with a stripe of hairs (Figs. 140, 141). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 142), endopodite 1 with completely straight apex.

Distribution

Known only from the type locality on the southern tip of the Máni peninsula, southern Peloponnese (map Fig. 120).

Remarks

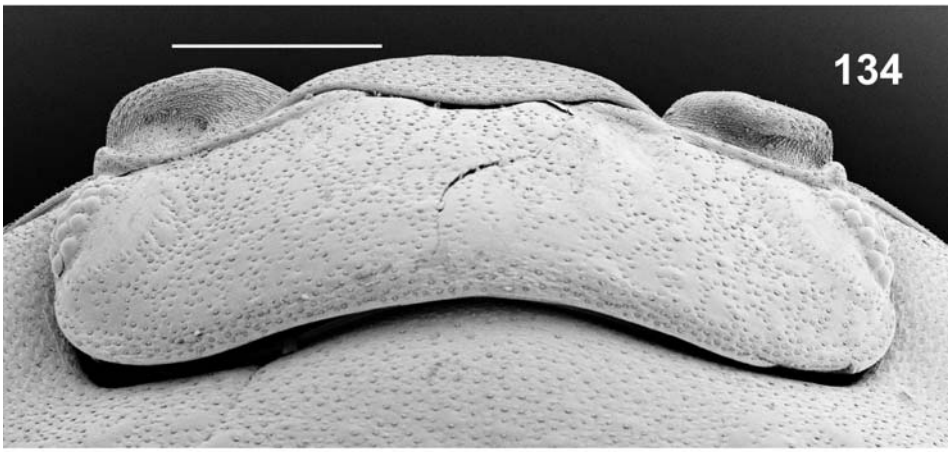
This rather enigmatic species does not show any closer affinities to other species of the genus from the Peloponnese or the Aegean islands. It also seems to live an endogean life, judging from the lack of pigmentation.

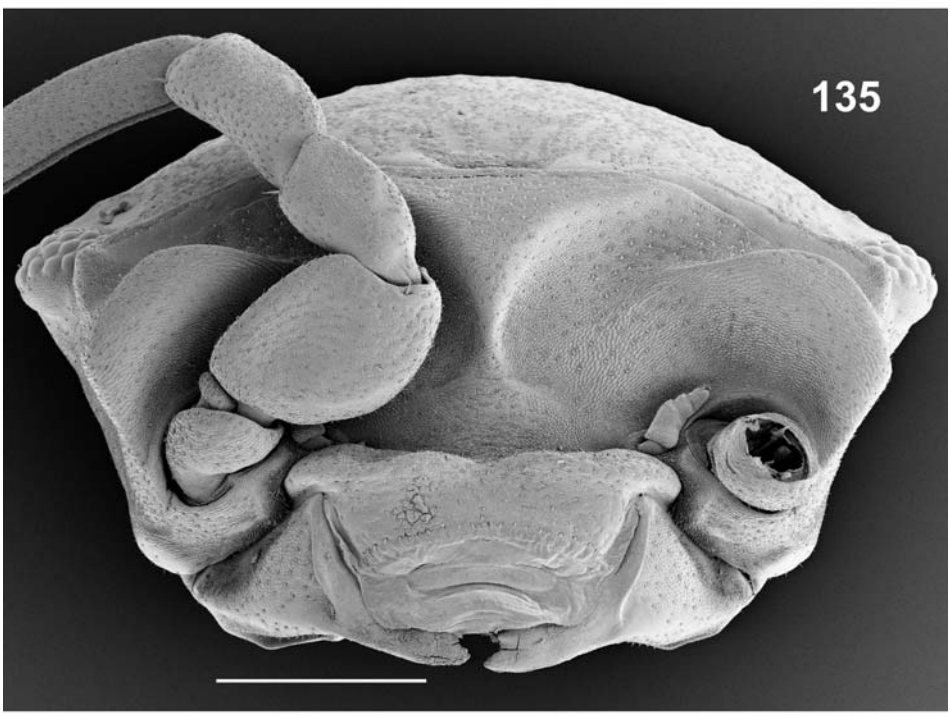
5.13 *Armadillidium marmoratum* Strouhal, 1929
(Figs. 143–152 and map Fig. 153)

Synonym: *A. rhodium* Strouhal, 1937.

Literature records

ARCANGELI 1914: 8 (*A. "zenckeri"*, GR, Aegean island Ródos); ARCANGELI 1934: 38 (*A. "arcangelii"*); ARCANGELI 1937: 76 (*A. "arcangelii"*, GR, Aegean islands Ródos and Kos); STROUHAL 1929b: 64, figs. 34–38 (GR, western Crete); STROUHAL 1936: 67, 101 (GR, Ionian island Lefkáda); SCHMALFUSS 1972a: 50 (*A. "arcangelii"*, GR, eastern Crete); SCHMALFUSS 1972b: 597 (*A. "arcangelii"*, GR, Aegean islands Ródos and Kárpathos); SCHMALFUSS 1975: 49 (*A. "arcangelii"*, GR, Thessaly: Lamía, Aegean islands Náxos and Kárpathos); SCHMALFUSS 1981a: 18 (GR, Northern Sporades: island Kirá Panagiá); SCHMALFUSS 1998: 265; SCHMALFUSS 1999: 5, 6 (GR, Aegean islands Límnos, Lésvos, Tílos, Armáthia, Kásos); SCHMALFUSS 2000: 79, 81, fig. 4; SCHMALFUSS & SCHAWALLER 1984: 13 (GR, Aegean island Santoríni); SFEN-



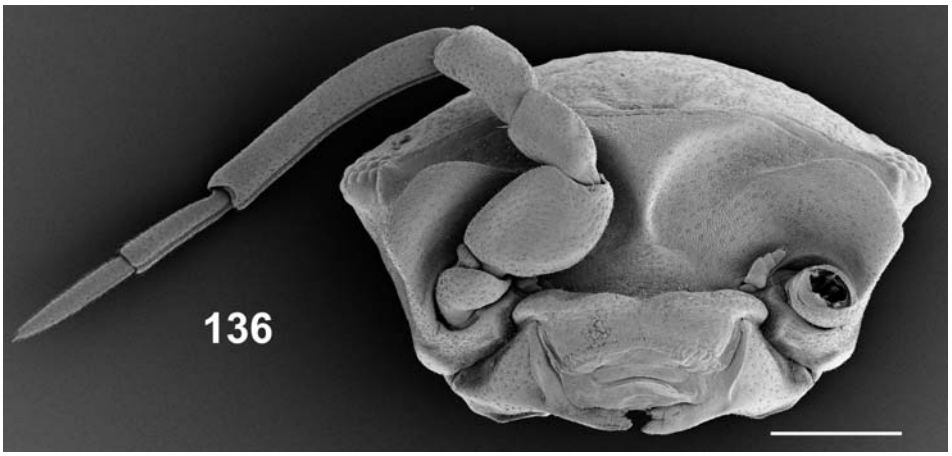


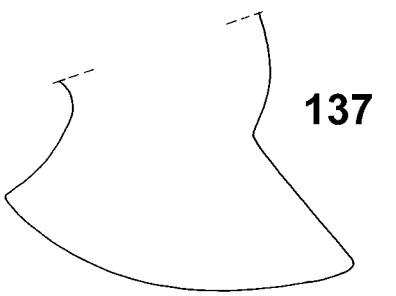
Figs. 134–135. *Armadillidium maniatum* n. sp., paratypes (SMNS T573). – **134**. ♂, 16.5 mm long, head in dorsal view. **135**. ♀, 16.5 mm long, head in frontal view. – Scales: 1 mm.

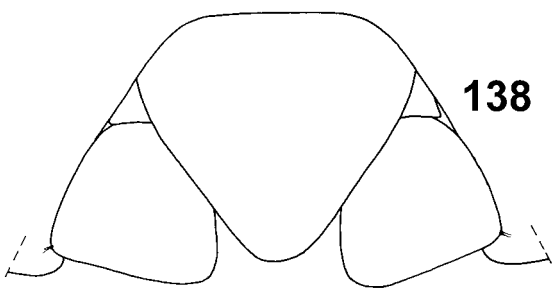
THOURAKIS 1994: 133, 173, fig. 137 (GR, Aegean islands Sámos, Kos, Kálimnos, Léros, Nísiros, Pátmos, Astipálea, Levítha, Náxos, Páros, Antíparos); SFENTHOURAKIS 1996: 698; WARBURG & HORNUNG 1999: 1474 (Israel); SCHMALFUSS et al. 2004: 40.

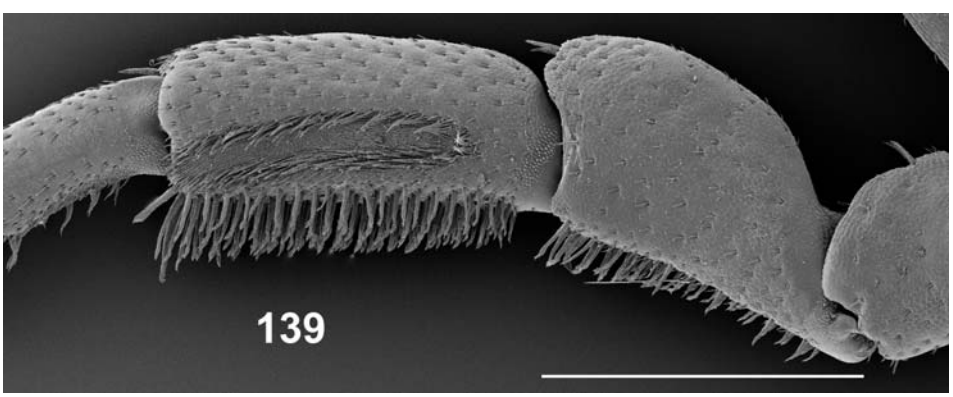
Material examined

Greece: 2 ex., northeastern mainland, Porto Lágos, shore of lagoon, leg. SCHMALFUSS, 22.IX.1988 (SMNS 2240). – 30 ex., northeastern mainland, Ímeros S of Komotiní, leg.



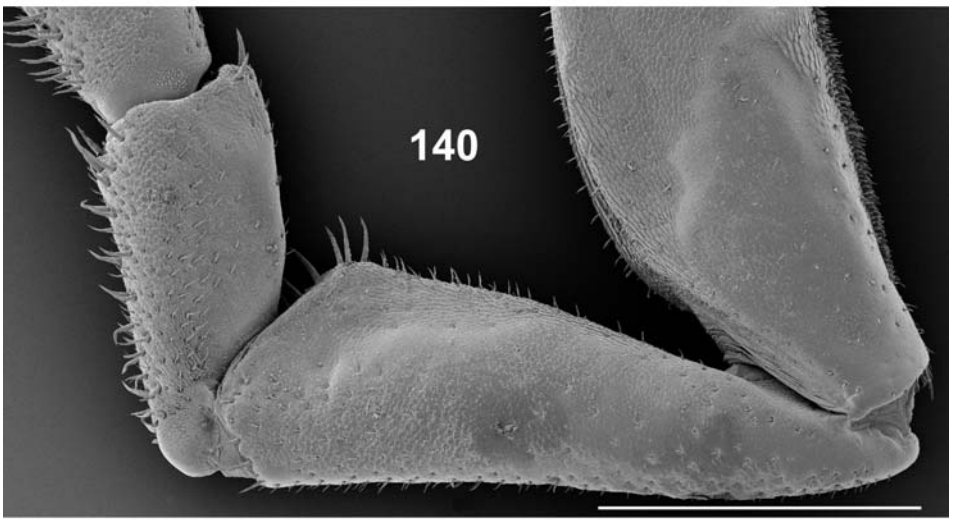


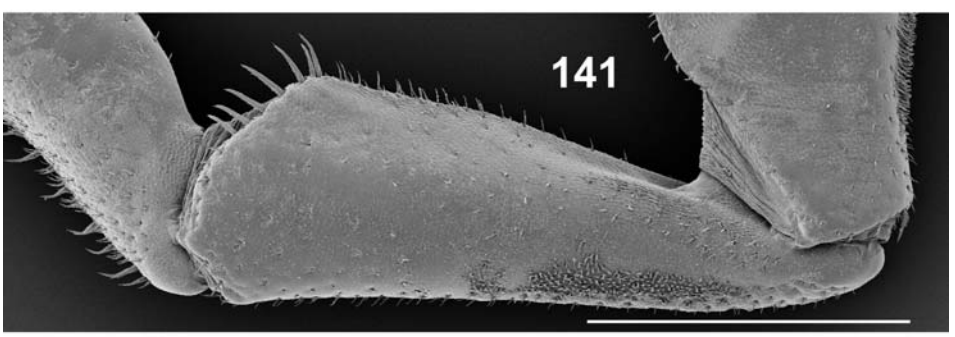


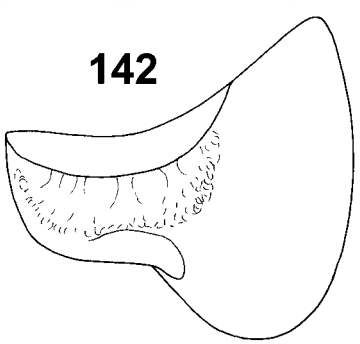


Figs. 136–139. *Armadillidium maniatum* n. sp. – **136**. ♀, 16.5 mm long, paratype (SMNS T573), head in frontal view with antenna in situ. **137**. ♂, holotype, 17 mm long (SMNS T572), pereion-epimeron 1 in lateral view. **138**. As before, telson and uropods in dorsal view. **139**. As before, pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.

Schawaller & Schmalfuss, 24.IV.1990 and 24.IV.1994 (SMNS 2296, 2421). – 12 ex., north-eastern mainland, delta of river Évros E of Alexandrúpoli, leg. Schawaller & Schmalfuss, 22.IV.1994 (SMNS 2408). – 1 ex., northern Aegean, island Thásos, Liménas, leg. Schmalfuss, 26.V.1999 (SMNS 2646). – 22 ex., northern Aegean, island Límnos, leg. Erhard & Schmalfuss, 24.–25.V.1995 (SMNS 2516, 2517, 2518, 2520). – 48 ex., NE-Aegean, island Lésvos

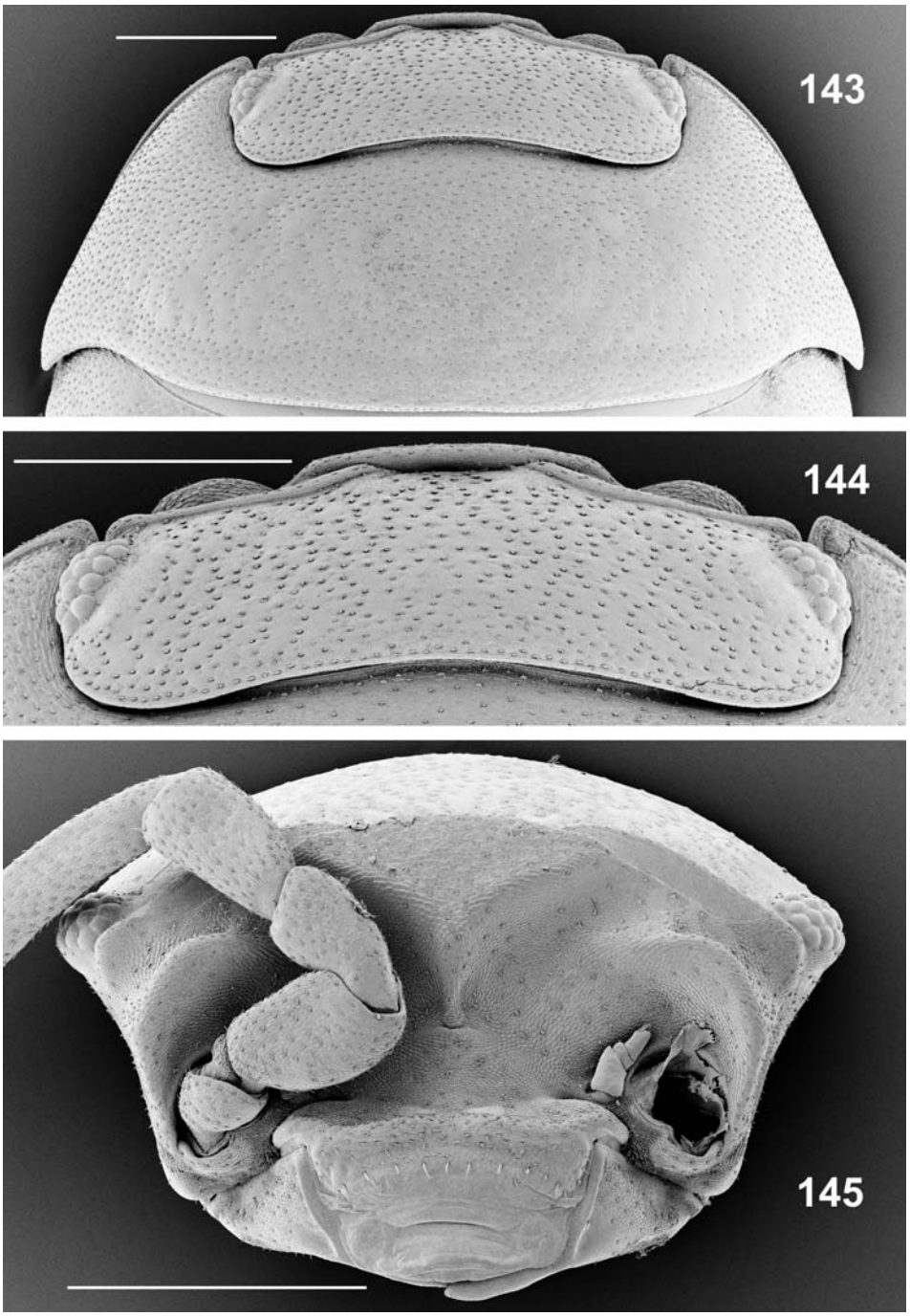




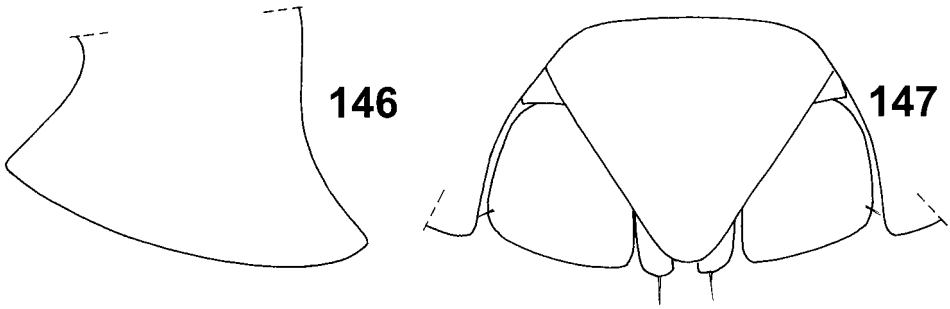


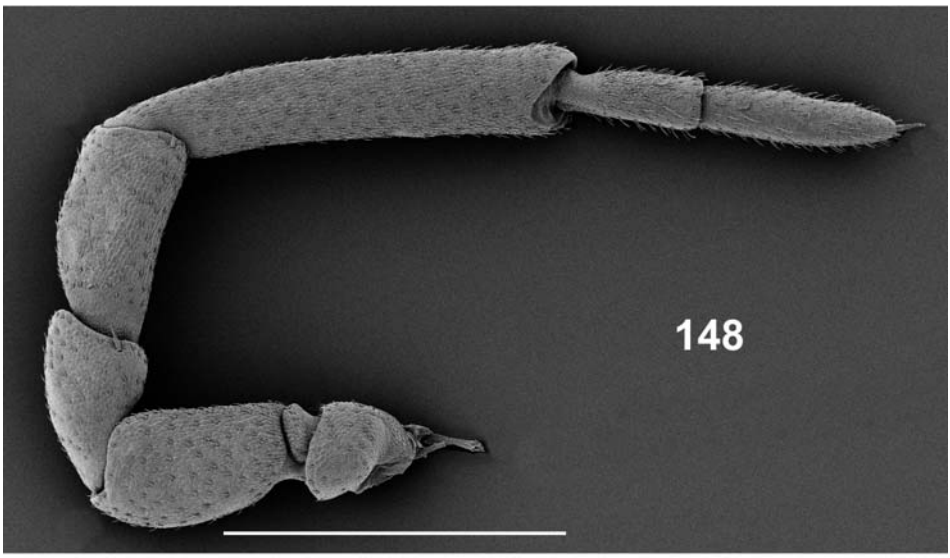
Figs. 140–142. *Armadillidium maniatum* n. sp., ♂, holotype, 17 mm long (SMNS T572). – **140**. Ischium 7, frontal view. **141**. Ischium 7, caudal view. **142**. Pleopod-exopodite 1, caudal view. – Scales: 1 mm.

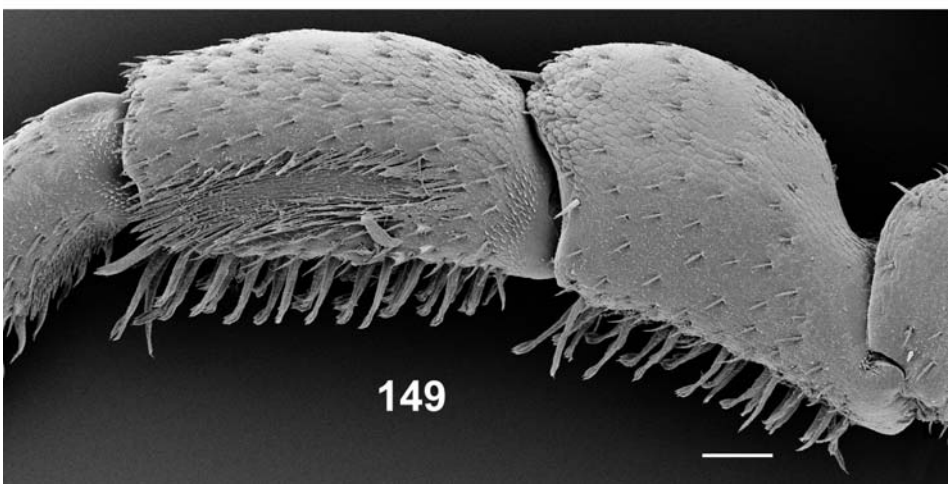
(= Mitilíni), western and southeastern coast, leg. ERHARD & SCHMALFUSS, V.1995 (SMNS 2494, 2506). – 12 ex., NE-Aegean, island Lésvos (= Mitilíni), beach S of Kalloní, leg. D. GRIMM, 18.–20.V.1996 (SMNS 2582, 2584). – 5 ex., central mainland, S of Lamía, Thermopíles, leg. SCHÖNFELD, 14.VII.2001 (SMNS 2713). – 1 ex., island Évvia, NW, Límni, leg. KÜHNELT, 9.IV.1972 (SMNS 1829). – 1 ex., island Évvia, lagoon NW of Khalkída, leg. SCHMALFUSS,



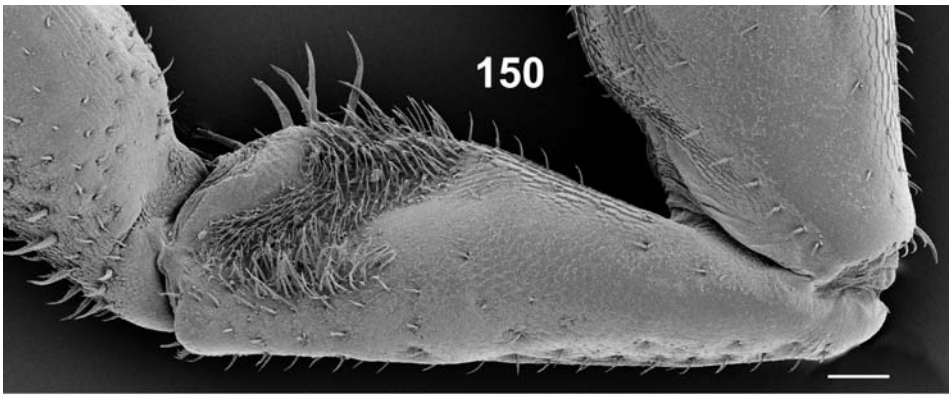
Figs. 143–145. *Armadillidium marmoratum*, ♂, 12 mm long (Aegean island Kárpathos, SMNS 1020). – **143**. Head and pereion-tergite 1 in dorsal view. **144**. Head in dorsal view. **145**. Head in frontal view. – Scales: 1 mm.

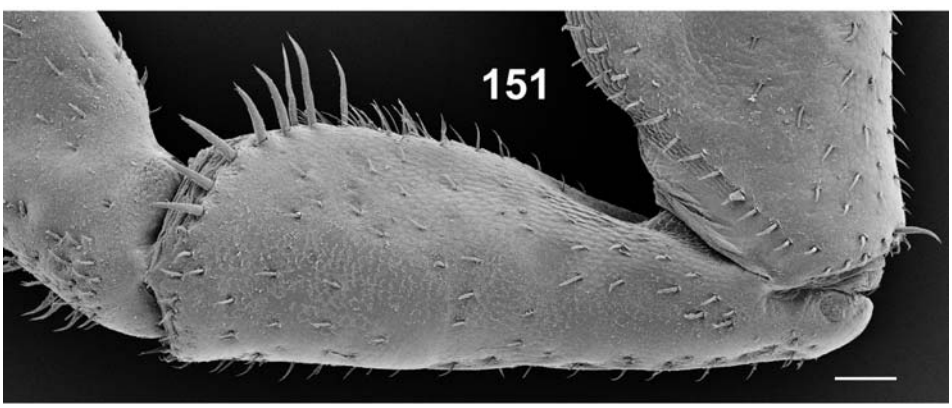


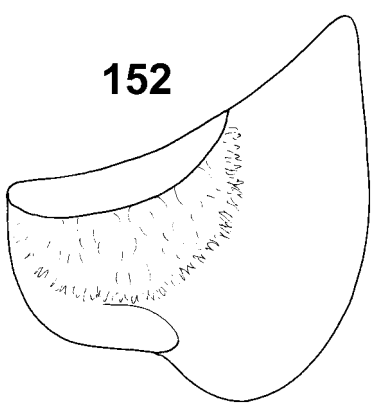




Figs. 146–149. *Armadillidium marmoratum*, ♂, 12 mm long (Aegean island Kárpathos, SMNS 1020). – **146**. Pereion-epimeron 1 in lateral view. **147**. Telson and uropods in dorsal view. **148**. Antenna. **149**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm (148), 0.1 mm (149).







Figs. 150–152. *Armadillidium marmoratum*, ♂, 12 mm long (Aegean island Kárpathos, SMNS 1020). – **150**. Ischium 7, frontal view. **151**. Ischium 7, caudal view. **152**. Pleopod-exopodite 1, caudal view. – Scales: 0.1 mm.

20.IV.1978 (SMNS 1842). – 2 ex., Athens, near airport, leg. Charfi, V.2001 (SMNS 2743). – 1 ex., NW-Peloponnese, Killíni, beach, leg. Erhard, 26.IV.1996 (SMNS 2539). – 8 ex., NE-Peloponnese, Ancient Kórinthos, leg. Schönfeld, 25.VII.2002 (SMNS 2750). – 2 ex., eastern Peloponnese, N of Ástros, beach, leg. Schawaller & Schmalfuss, 25.IX.2004 (SMNS 2818). – 22 ex., island Ídra (= Hydra) off northeastern Peloponnese, leg. Schmalfuss, 8.IV.1987

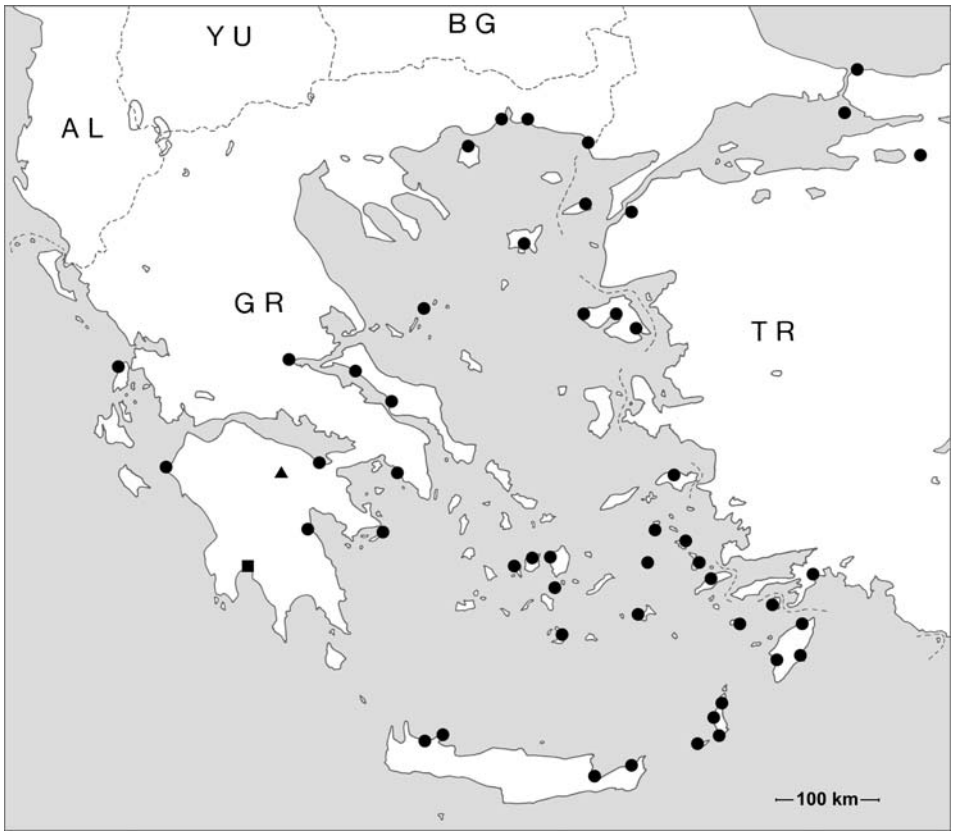


Fig. 153. Records of *Armadillidium marmoratum* in Greece and western Turkey (●), and type localities of *A. messenicum* (■) and *A. stymphalicum* n. sp. (▲).

(SMNS 2155). – Additionally numerous samples from the following south Aegean islands were checked: Iráklia (SMNS 2082), Náxos (SMNS 1536), Santoríni (SMNS 1931), Kos (SMNS 1677, 1687), Nísiros (SMNS 1435), Sími (SMNS 27241), Tílos (SMNS 2636), Ródos (SMNS 1152, 1154, 1388, 1404, 1409, 1410, 2320, 2328, 2640), Kárpathos (SMNS 1020, 1023, 1054, 1067, 1472), Kásos (SMNS 1454, 1494, 1978, 1979), Armáthia N of Kásos (SMNS 1967, 2035), Crete (SMNS 1212, 1235, 2188, 2688, 2695, 2767, 2769).

W-Turkey: 2 ex., northeastern Aegean, island Gökçe Ada, Merkez, leg. LIEBEGOTT, 12.VI.1986 (SMNS 11388). – 5 ex., Dardanelles, Çanakkale, leg. LIEBEGOTT, 15.VI.1989 (SMNS 11054). – 8 ex., Bosporus, northeastern shore (Asiatic side, Black Sea), Anadolu Kavağı, leg. D. GRIMM, 11.XII.1995 (SMNS 11438). – 1 ex., Sea of Marmara, SE of Istanbul, island Büyükada, leg. HUBER, 8.XI.2000 (SMNS 11488). – 5 ex., 80 km E of Bursa, Osmaneli, leg. OSELLA, 13.VII.1972 (SMNS 11476). – 3 ex., Marmaris opposite island Ródos, leg. SCHÖNFELD, X.2002 (SMNS 11544).

Cyprus: 13 ex., district Lemesós, 1 km N of Akrotíri, salt lake, leg. BARTSCH & BERG, 23.III.2000 (SMNS 11478). – 2 ex., Lárnaka, leg. LIEBEGOTT, 12.X.1981 (SMNS 11140).

Israel: 2 ex., Haifa, beach, leg. SCHAWALLER & SCHMALFUSS, 11.II.1987 (SMNS 11274). – 38 ex., S of Haifa, Caesarea, leg. SCHMALFUSS, 11.II.1987 (SMNS 11275).

Egypt: 3 ex., NE, Ismailia, leg. BEDER, 12.XII.1987 (SMNS 15442).

Diagnostic characters

Maximum dimensions: 12.7 × 5.8 mm.

Coloration: Adult males blackish, females grey-brown, epimera lighter.

Cuticular structures: Tergites completely smooth.

Frontal shield only very slightly surpassing frontal margin of head and tightly fitting to the frontal part of the head (Figs. 143, 144). Antennal lobes in frontal view trapezoidal (Fig. 145). Hind margin of pereion-epimeron 1 completely rounded (Fig. 146). Telson with straight sides and rounded apex, wider than long (Fig. 147). Antenna with distal flagellar segment longer than proximal one (Fig. 148). Male pereiopod 1 on carpus and merus with ventral brush of spines (Fig. 149). Male ischium 7 ventrally straight, frontally with conspicuously extended distal hair-field (Figs. 150, 151). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 152), endopodite 1 with completely straight apex.

Distribution

Greece: Ionian island Lefkáda, Peloponnese, Aegean islands, northern Aegean coast; western Turkey including Black Sea coast; Cyprus; Israel; Egypt. A map of the overall distribution is found in SCHMALFUSS 2000: 79, fig. 4, for safe Greek records see map Fig. 153.

Remarks

The species was misidentified as *A. zenckeri* by ARCANGELI 1914 and 1922 and later on identified as *A. arcangelii*, which is a synanthropic species in Italy and very similar to but probably not identical with *A. marmoratum*. STROUHAL (1937d) called the species recorded from Ródos island by ARCANGELI "*A. rhodium* nom. nov." which is a junior synonym of *A. marmoratum*.

5.14 *Armadillidium messenicum* Verhoeff, 1902
(Figs. 154–160 and map Fig. 153)

Literature records

VERHOEFF 1902: 246 (GR, Peloponnese: Kalamáta); STROUHAL 1938: 38, figs. 17, 18 (GR, Peloponnese: Kalamáta); SCHMALFUSS 1982: 221, figs. 21–27 (reproduced in the present publication).

Diagnostic characters

Maximum dimensions: 14.0 × 7.3 mm.

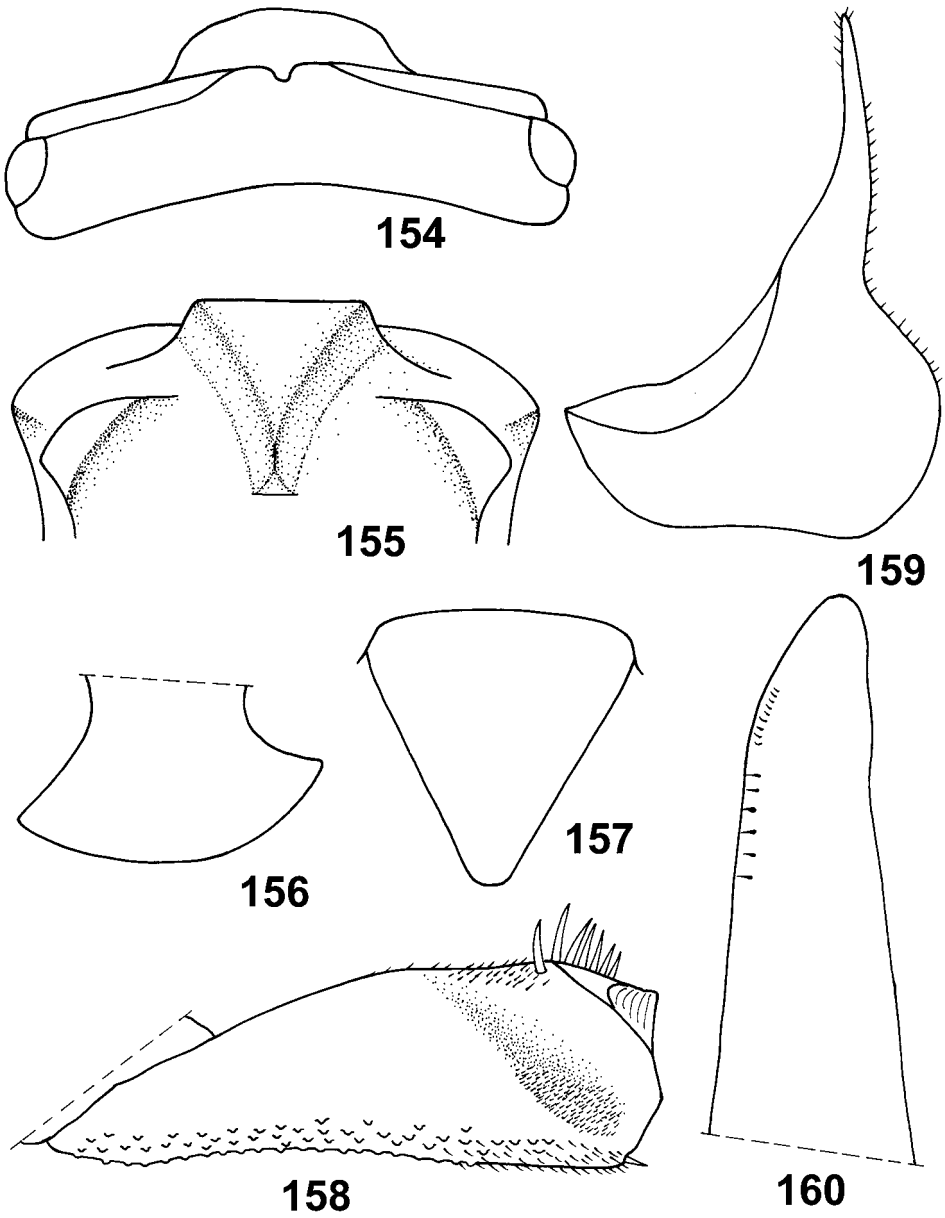
Coloration: Grey-brown with yellowish muscle-spots.

Cuticular structures: Tergites with pronounced tubercles.

Frontal shield from behind one fourth as high as it is wide, upper margin semicircular (Fig. 154). Antennal lobes in frontal view trapezoidal (Fig. 155). Hind margin of pereion-epimeron 1 completely rounded (Fig. 156). Telson with straight sides and narrowly rounded apex (Fig. 157). Male ischium 7 ventrally straight and covered with a number of small knobs, frontally with distal hair-field (Fig. 158). Male pleopod-exopodite 1 with elongated narrow hind-lobe, medial margin indented (Fig. 159), endopodite 1 straight (Fig. 160).

Distribution

Greece, SW-Peloponnese: Kalamáta (map Fig. 153).



Figs. 154–160. *Armadillidium messenicum*, ♂, holotype, 14 mm long (from SCHMALFUSS 1982). – **154**. Head in dorsal view. **155**. Head in frontal view. **156**. Pereion-epimeron 1 in lateral view. **157**. Telson in dorsal view. **158**. Ischium 7, frontal view. **159**. Pleopod-exopodite 1, caudal view. **160**. Apex of pleopod-endopodite 1.

Remarks

As there is no new material available I include the drawings which I published in 1982 and which are based on a redescription of the holotype. The species seems to be very closely related to *A. tripolitzense*, judging from the structure of the head and

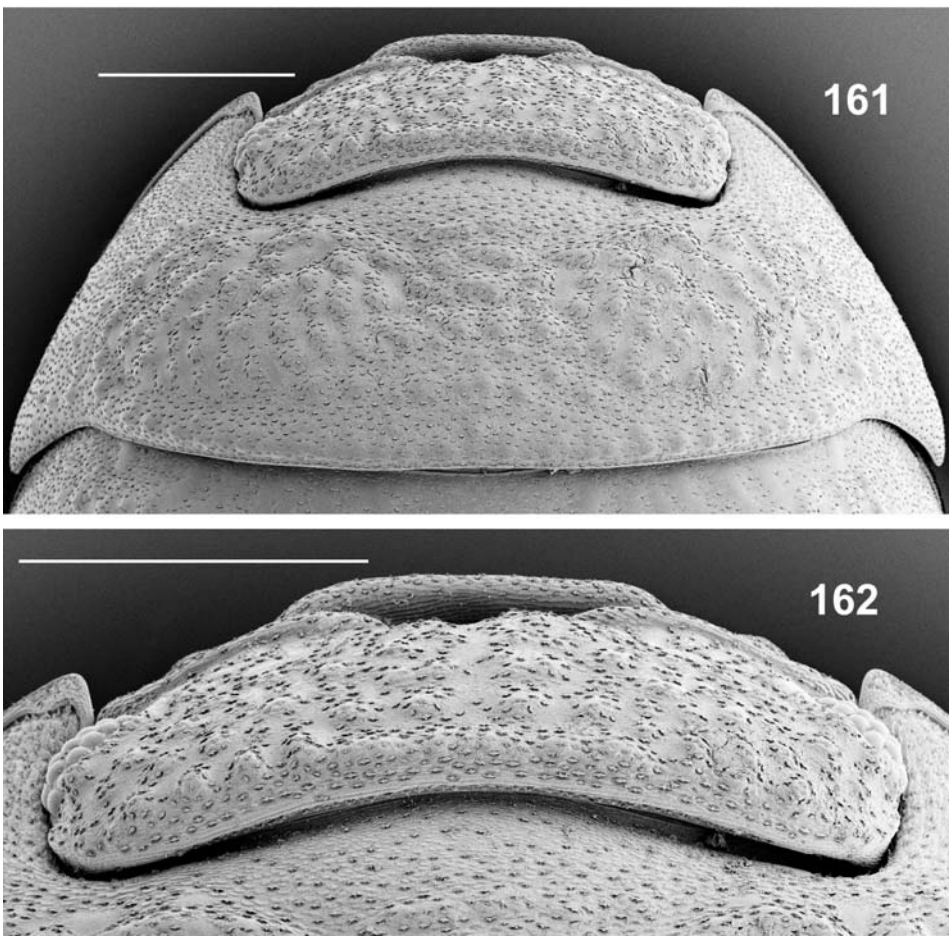
especially from the morphology of the male ischium 7. The main difference is the long and narrow hind-lobe of the male pleopod-exopodite 1.

5.15 *Armadillidium peloponnesiacum* Verhoeff, 1901
(Figs. 161–171 and map Fig. 172)

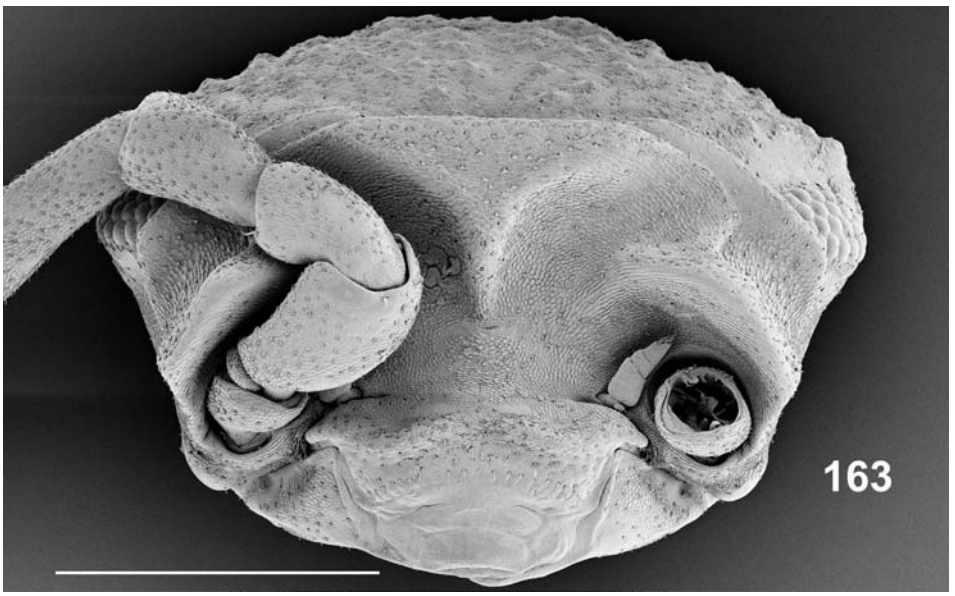
Synonyms: *A. bimarginatum* Strouhal, 1929, *A. granulatum peloponnesiaca* Verhoeff, 1901, *A. luridum* Verhoeff, 1907, *A. propinquum* Strouhal, 1929.

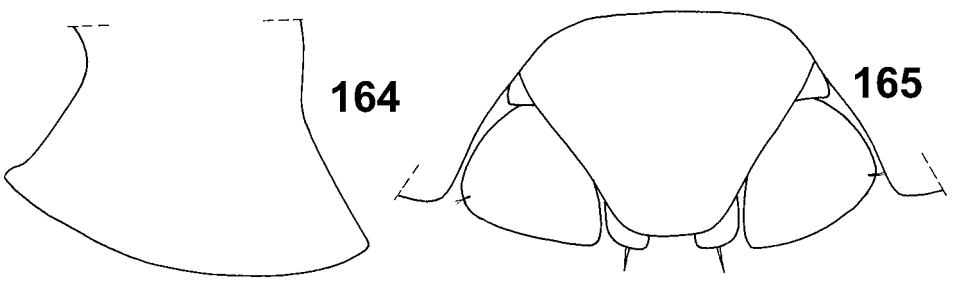
Literature records

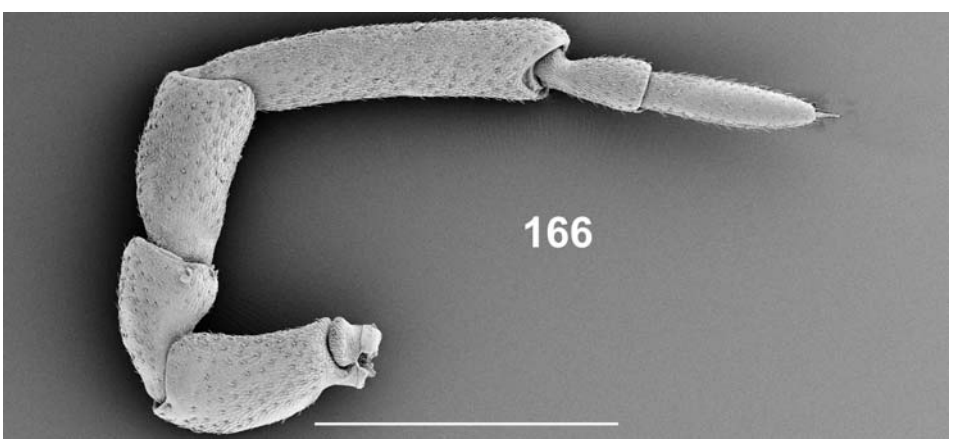
Verhoeff 1901b: 139 (GR, NE-Peloponnese: Náfplio); Verhoeff 1902: 245; Verhoeff 1907: 475 (*A. luridum*, GR, NE-Peloponnese: Náfplio); Verhoeff 1936: 3, figs. 1, 2; Verhoeff 1939: 9, figs. 11, 12 (GR, island Évvia: Stení); Strouhal 1929a: 97, figs. 33–37 (*A. propinquum*, GR, central mainland: Agrínio; Peloponnese: Olimpía. – *A. bimarginatum*, Attica: Imittós Mountain); Strouhal 1929b: 63 (*A. bimarginatum*, GR, Aegean island Skíros); Strouhal 1936: 98 (*A. propinquum*, GR, Ionian island Kefaloniá); Schmalfuss 1975: 51



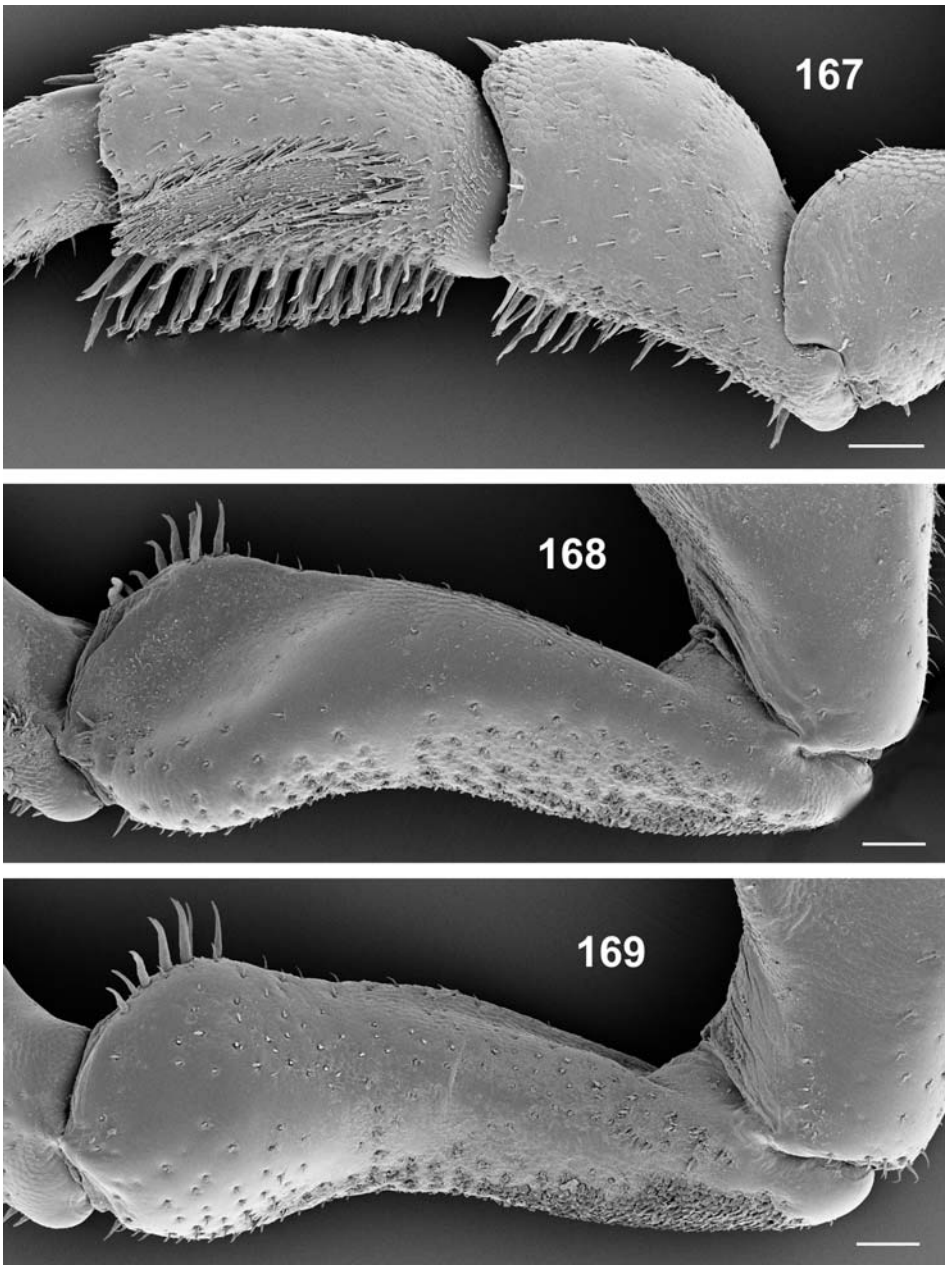
Figs. 161–162. *Armadillidium peloponnesiacum*, ♂, 11 mm long (Ionian island Kefaloniá, SMNS 2541). – **161**. Head and pereion-tergite 1 in dorsal view. **162**. Head in dorsal view. – Scales: 1 mm.





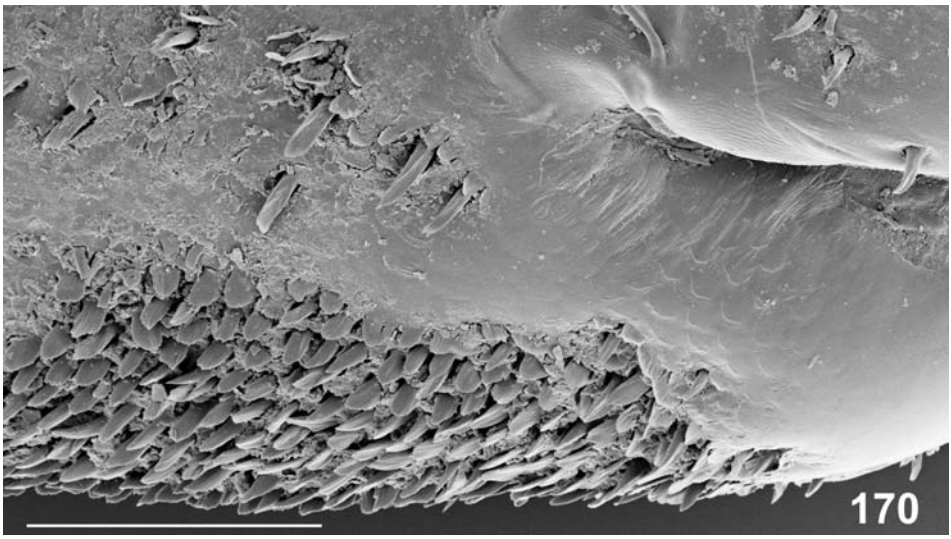


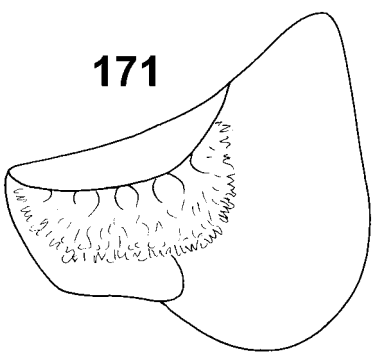
Figs. 163–166. *Armadillidium peloponnesiacum* (Ionian island Kefaloniá, SMNS 2541). – **163**. ♂, 11 mm long, head in frontal view. **164**. ♂, 11 mm long, pereion-epimeron 1 in lateral view. **165**. ♂, 11 mm long, telson and uropods in dorsal view. **166**. ♂, 10 mm long, antenna. – Scales: 1 mm.



Figs. 167–169. *Armadillidium peloponnesiacum*, ♂, 10 mm long (Ionian island Kefaloniá, SMNS 2541). – **167**. Pereiopod 1, carpus and merus, frontal view. **168**. Ischium 7, frontal view. **169**. Ischium 7, caudal view. – Scales: 0.1 mm.

(GR, southern Peloponnese: Taígetos Mountains and Gíthio); SCHMALFUSS 1982: 221, figs. 28–34 (GR, Ionian island Kefaloniá; Peloponnese, 4 records; Attica, 2 records; island Évvia, 3 records); SCHMALFUSS 1985: 296 (GR, Ípiros: Ioánnina and Métsovo; Ionian island Lefkáda; central mainland: Domokós, Parnassós Mountains and 2 records from Nomós Fokí-





Figs. 170–171. *Armadillidium peloponnesiacum*, ♂, 10 mm long (Ionian island Kefaloniá, SMNS 2541). – **170**. Ischium 7, caudal view, detail of ventral-proximal part. **171**. Pleopod-exopodite 1, caudal view. – Scale: 0.1 mm.

das; island Égina S of Athens; Peloponnese: Killíni Mountains); SCHMALFUSS 1999: 7 (GR, Ionian islands Kefaloniá and Zákinthos); SCHMALFUSS 2000: 79.

Material examined

Greece: 131 ex., Ionian island Kefaloniá, surroundings of Póros, leg. ERHARD & SCHMALFUSS, 27.IV.–2.V.1996 (SMNS 2540, 2541, 2542, 2543, 2544, 2545, 2548). – 40 ex., Ionian island Kefaloniá, Énos Mountain, 700–1600 m, leg. ERHARD & SCHMALFUSS, 3.V.1996 (SMNS 2549, 2550). – 2 ex., Ionian island Kefaloniá, Mírtos Beach, leg. ERHARD, 5.V.1996 (SMNS 2554). – 37 ex., Ionian island Kefaloniá, surroundings of Lixúri, leg. ERHARD & SCHMALFUSS, 6.–7.V.1996 (SMNS 2555, 2556, 2557). – 1 ex., Ionian island Kefaloniá, 3 km SSW of Sámi, leg. ERHARD, 8.V.1996 (SMNS 2560). – 132 ex., Ionian island Zákinthos, leg. ERHARD & SCHMALFUSS, 11.V.1996 (SMNS 2565, 2566, 2569, 2570, 2571, 2572, 2574, 2575, 2577). – 1 ex., central Greece, Vardúsia Mountains, above Koniákos, 800 m, *Abies*, *Quercus coccifera*, leg. SCHMALFUSS, 6.X.2000 (SMNS 2667). – 5 ex., Attica, Athens, leg. SCHMALFUSS, 25.III.1967 (SMNS 1516, published as *A. zuellichi* in SCHMALFUSS 1975). – 4 ex., NW-Attica, Patéras Mountains, leg. BOTSARIS, 10.V.1991 (SMNS 2778). – 8 ex., central Peloponnese, Lagkádia, 1100 m, leg. SFENTHOURAKIS, 29.III.1990 (SMNS 2710). – 1 ex., NW-Peloponnese, SW of Pátra, Káto

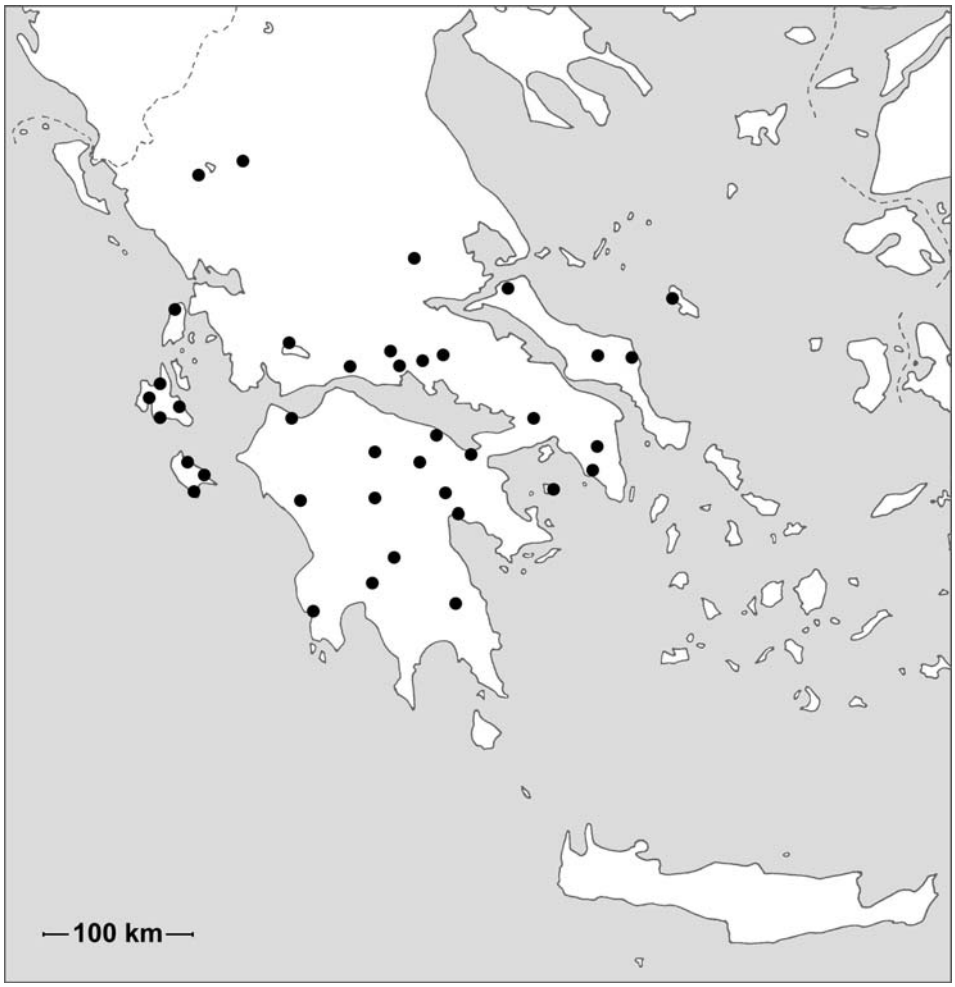


Fig. 172. Records of *Armadillidium peloponnesiacum*.

Akhaïa, leg. SCHÖNFELD, VII.2002 (SMNS 2747). – 2 ex., western Peloponnese, Olimpía, leg. SCHÖNFELD, 15.VII.2002 (SMNS 2748). – 3 ex., northern Peloponnese, 7 km SE of Kalávrita, *Abies*, 1200 m, leg. SCHAWALLER & SCHMALFUSS, 21.IX.2004 (SMNS 2811). – 2 ex., NE-Peloponnese, Ancient Kórinthos, leg. SCHÖNFELD, 25.VII.2002 (SMNS 2750). – 1 ex. SW-Peloponnese, Pílos, castle, leg. SCHÖNFELD, 31.VII.2003 (SMNS 2858). – 5 ex., SW-Peloponnese, 20 km N of Kalamáta, fields, 600 m, leg. SCHAWALLER, 30.IX.2004 (SMNS 2833). – 1 ex., SE-Peloponnese, Párnonas Mountains, "Arachowa", leg. KÜHNELT, 5.IV.1970 (SMNS 1817).

Diagnostic characters

Maximum dimensions: 12.0 × 5.6 mm.

Coloration: Males dark grey-brown, females lighter, mottled with yellowish speckles and with conspicuously lighter epimera.

Cuticular structures: Tergites with pronounced tubercles (Figs. 161–163).

Frontal shield from behind only very slightly surpassing frontal margin of head (Fig. 162). Antennal lobes in frontal view trapezoidal (Fig. 163). Hind margin of

pereion-epimeron 1 with obtuse angle (Fig. 164). Telson wider than long, with straight sides and truncated apex (Fig. 165). Antenna with distal segment of flagellum twice as long as proximal one (Fig. 166). Male pereiopod 1 on carpus, but not on merus, with ventral brush of spines (Fig. 167). Male ischium 7 ventrally concave, frontally without distal hair-field, proximally on ventral side with an unusual field of scales (Figs. 168–170). Male pleopod-exopodite 1 with triangular hind-lobe (Fig. 171), endopodite 1 straight.

Distribution

Western, central and southern Greece including Ionian islands Lefkáda, Kefaloniá and Zákinthos, and the Aegean islands Évvia and Skíros (map Fig. 172).

5.16 *Armadillidium stymphalicum* **n. sp.**
(Figs. 173–182 and map Fig. 153)

Material examined

Holotype: ♂, 18.0 × 7.5 mm, Greece, NE-Peloponnese, Lake of Stimfalía, northern shore, below ruins of ancient Stymphalos, 800 m, leg. SCHAWALLER, 25.IX.2004 (SMNS T588).

Paratypes: 13 ex., same data as holotype (SMNS T589). – 1 ♂, NE-Peloponnese, Killíni Mountain, "Ziria Lakka", leg. KÜHNELT, 21.IV.1960 (SMNS T590). – 1 ♀, NE-Peloponnese, Killíni Mountain, Áno Tríkala, leg. KÜHNELT, 22.IV.1960 (SMNS T591).

Derivatio nominis

The new species is named after the ancient settlement Stymphalos.

Description

Maximum dimensions: 18.0 × 7.5 mm.

Coloration: Dark grey with usual yellow muscle-spots.

Cuticular structures: Tergites granulated (Fig. 173).

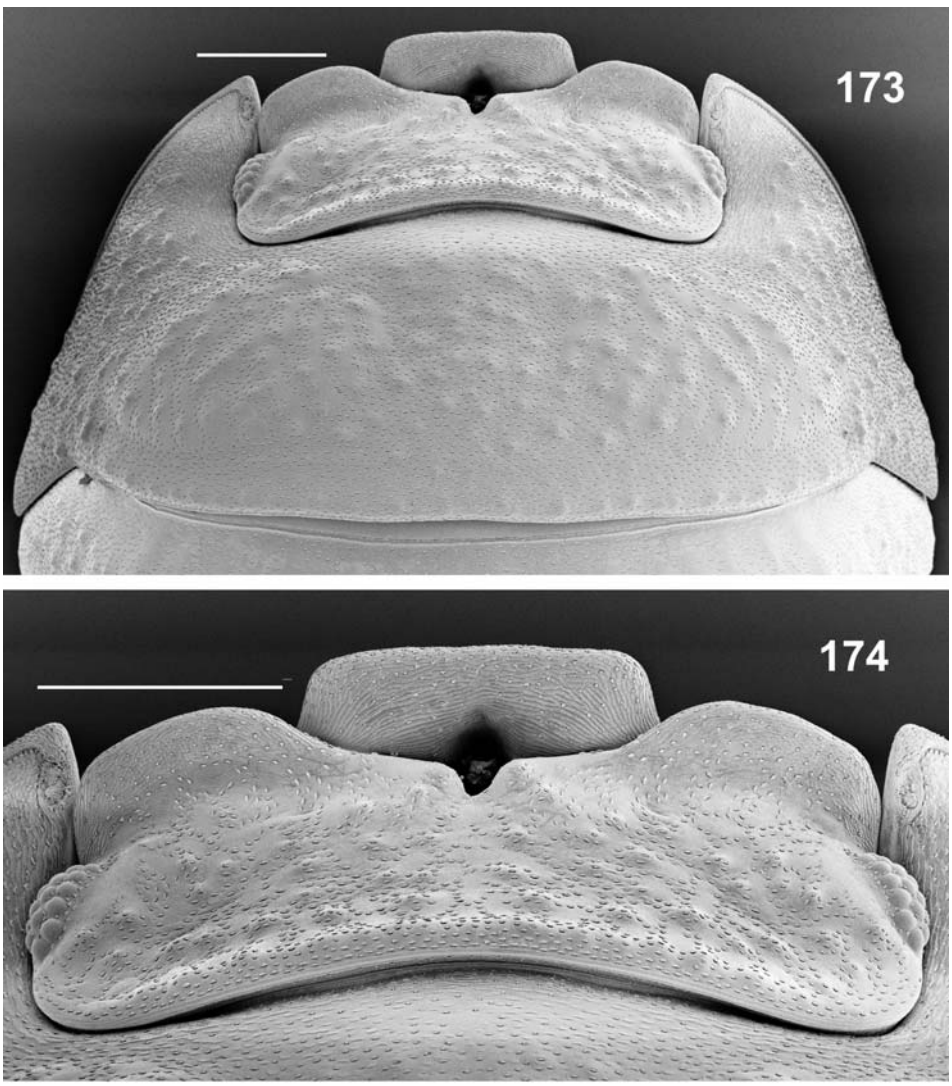
Frontal shield from behind one third as high as it is wide, trapezoidal, laterally with rounded angles, caudally with a deep groove; interocular ridges forming high rounded crests, but not as high as frontal shield (Fig. 174). Antennal lobes in frontal view triangular (Fig. 175). Hind margin of pereion-epimeron 1 with distinct angle (Fig. 176). Telson as wide as long, with straight sides and rounded apex (Fig. 177). Antenna long and slender, flagellar segments of about equal length (Fig. 178). Male pereiopod 1 on carpus, but not on merus, with ventral brush of spines (Fig. 179). Male ischium 7 ventrally straight, frontally with distal hair-field (Figs. 180, 181). Male pleopod-exopodite 1 with triangular hind-lobe with rounded tip (Fig. 182), endopodite 1 straight.

Distribution

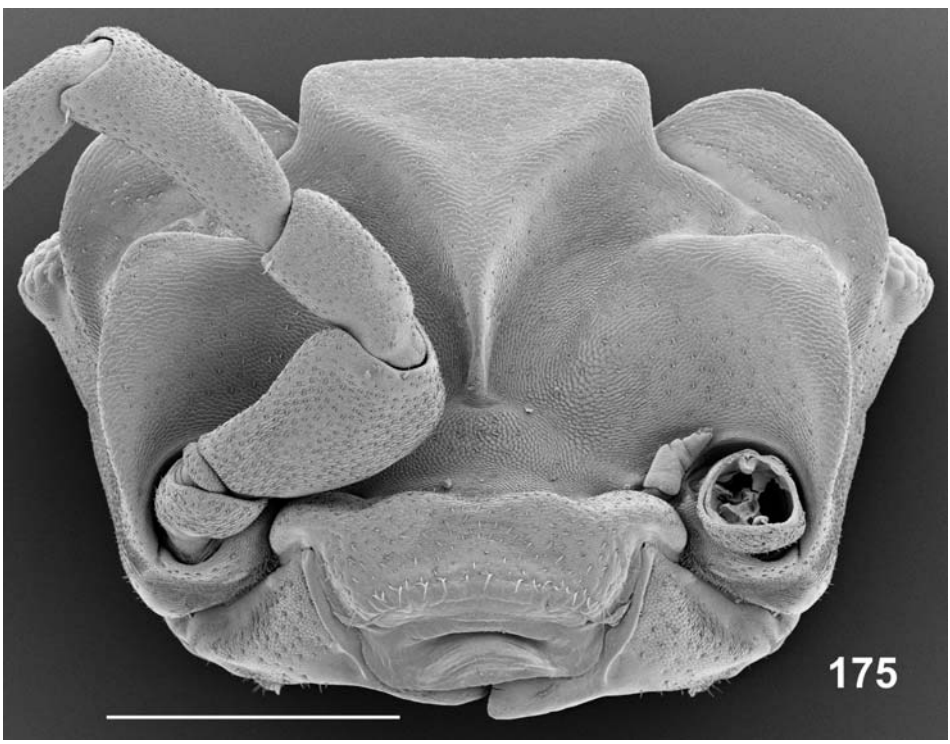
Northeastern Peloponnese, the region around the Killíni Mountain (map Fig. 153).

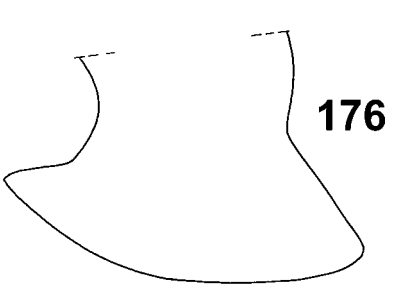
Remarks

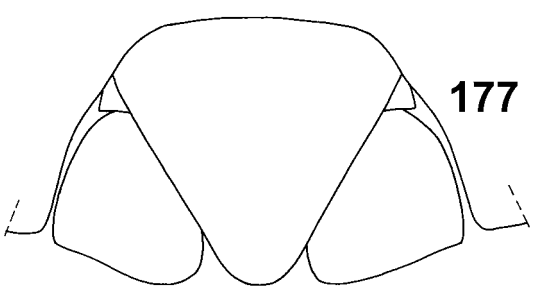
The new species is very similar and certainly closely related to *A. frontemarginatum* from the Ionian Islands, shows, however, clear and consistent differences in the structure of the head and in the shape of the male ischium 7.



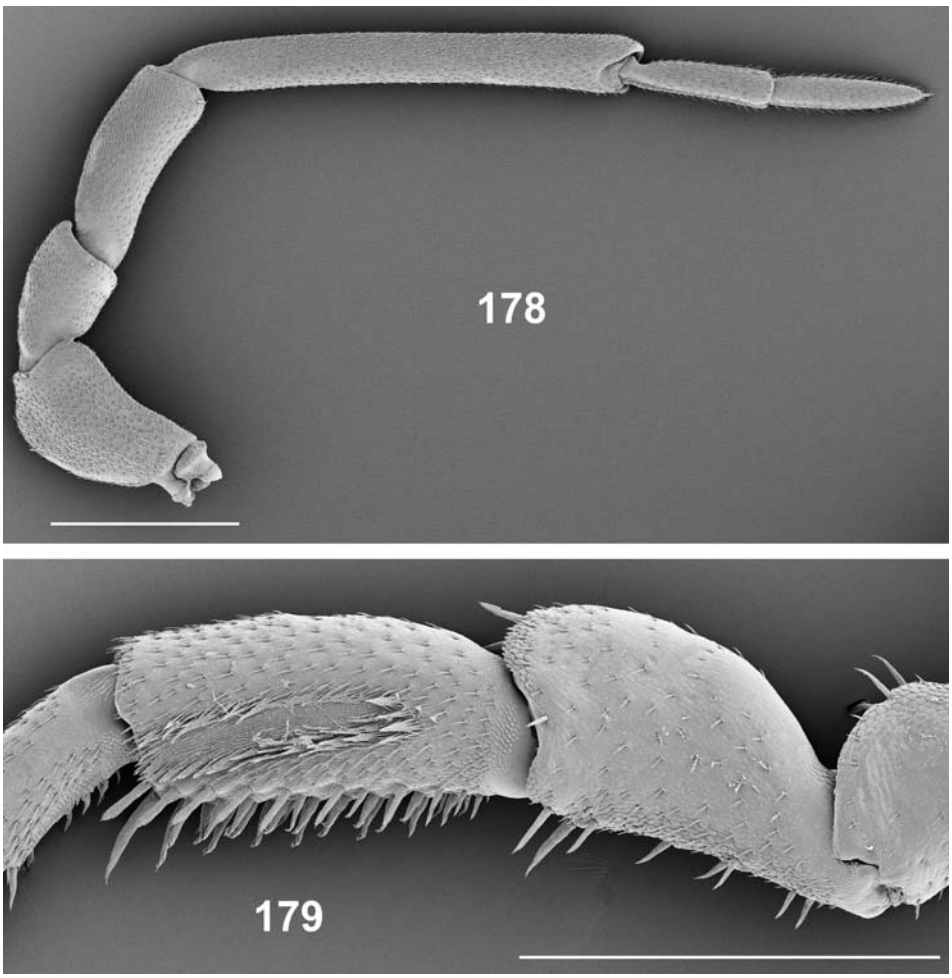
Figs. 173–174. *Armadillidium stymphalicum* n. sp., ♀, paratype, 17 mm long (SMNS T589). – **173**. Head and pereion-tergite 1 in dorsal view. **174**. Head in dorsal view. – Scales: 1 mm.



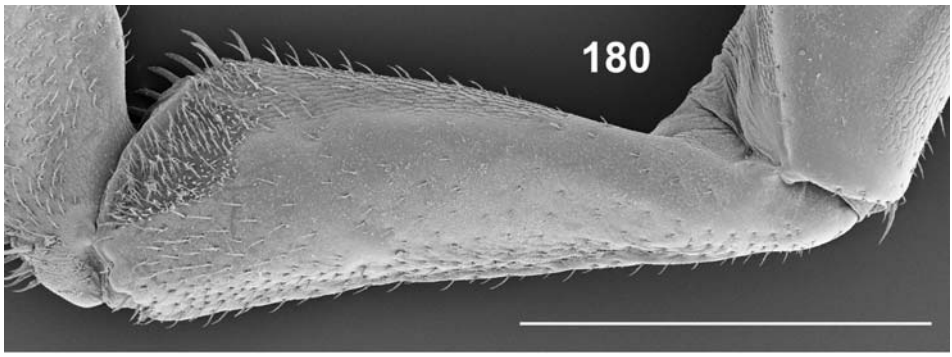


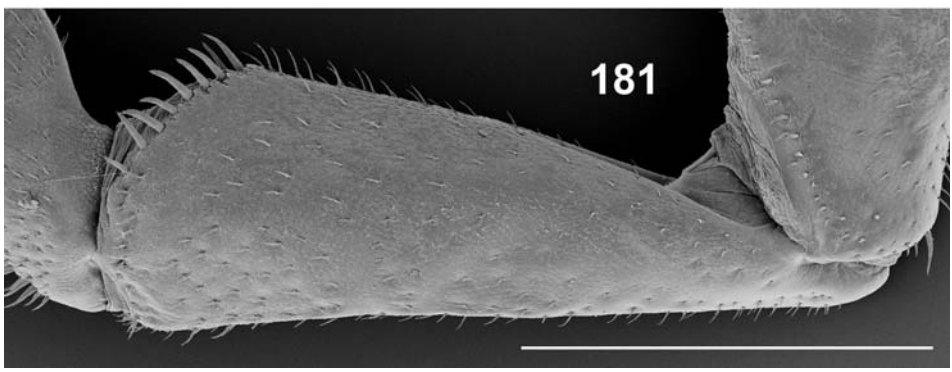


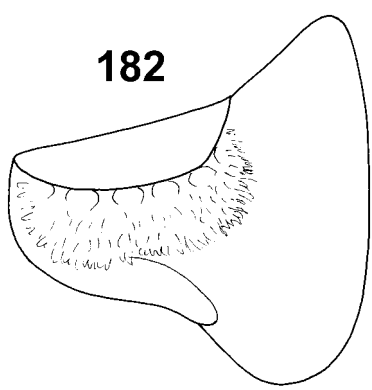
Figs. 175–177. *Armadillidium stymphalicum* n. sp. – **175**. ♀, paratype, 17 mm long (SMNS T589), head in frontal view. **176**. ♂, holotype, 18 mm long (SMNS T588), pereion-epimeron 1 in lateral view. **177**. As before, telson and uropods in dorsal view. – Scale: 1 mm.



Figs. 178–179. *Armadillidium stymphalicum* n. sp., ♂, holotype, 18 mm long (SMNS T588). – **178**. Antenna. **179**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.







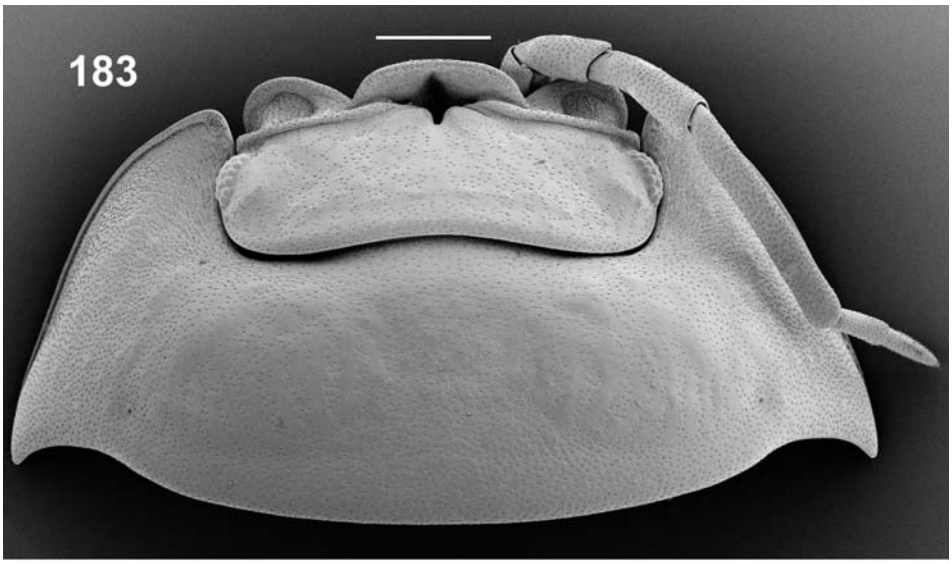
Figs. 180–182. *Armadillidium stymphalicum* n. sp., ♂, holotype, 18 mm long (SMNS T588). – **180**. Ischium 7, frontal view. **181**. Ischium 7, caudal view. **182**. Pleopod-exopodite 1, caudal view. – Scales: 1 mm.

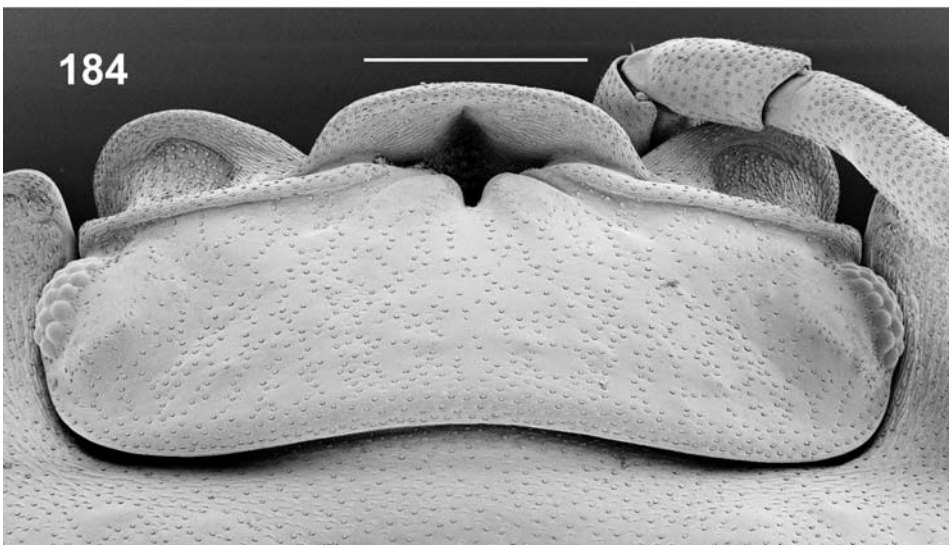
5.17 *Armadillidium tripolitzense* Verhoeff, 1902
(Figs. 183–192 and map Fig. 193)

Synonyms: *A. olympiacum* Strouhal, 1937, *A. voidiense* Strouhal, 1937.

Literature records

Verhoeff 1902: 246 (GR, central Peloponnese: Trípoli; SW-Peloponnese: Ithómi Mountain N of Messíni); Verhoeff 1907: 476; Strouhal 1937a: 56, figs. 10, 11 (*A. voidiense*, GR,



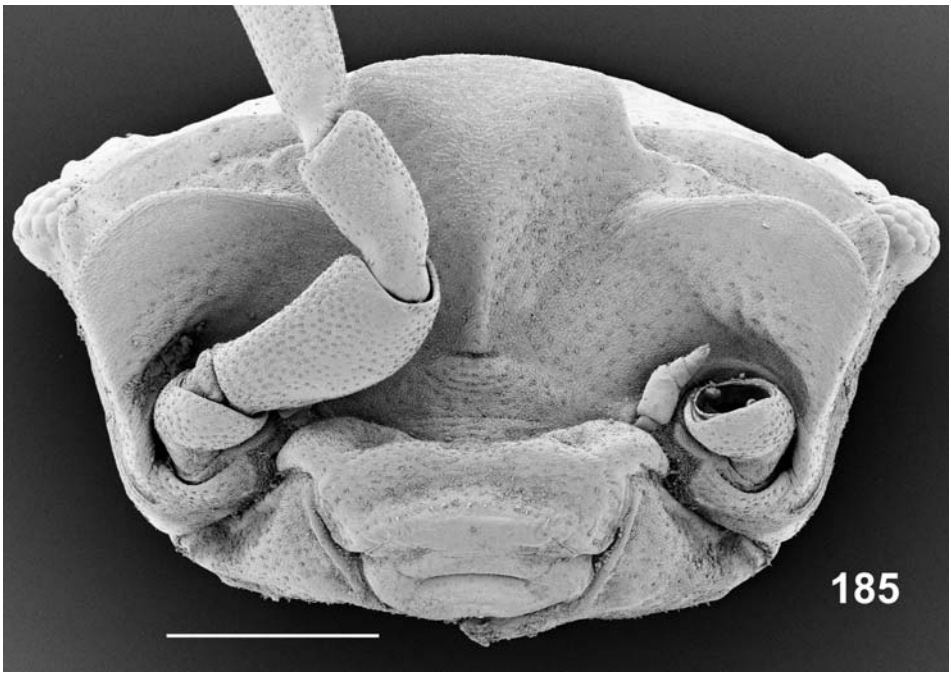


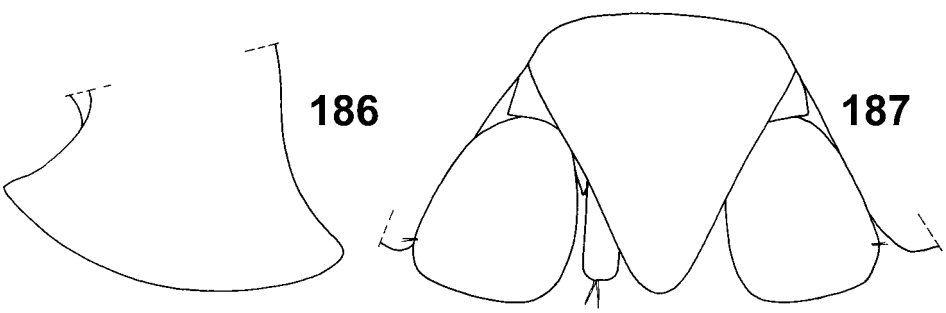
Figs. 183–184. *Armadillidium tripolitzense*, ♂, 19 mm long (Erímanthos Mountains, SMNS 1923). – **183**. Head and pereion-tergite 1 in dorsal view. **184**. Head in dorsal view. – Scales: 1 mm.

northern Peloponnese: Panakhaïkó Mountain); STROUHAL 1937b: 120, figs. 1–6 (*A. olympiacum*, GR, NW-Peloponnese: Olimpía); STROUHAL 1938: 36, figs. 15, 16 (*A. voidiense*, GR, central Peloponnese: Trípoli), 48, figs. 28, 29; SCHMALFUSS 1982: 228, figs. 46–52 and map fig. 54 (GR, Peloponnese: Khelmós Mountain, Killíni Mountain, Ithómi Mountain, Taígetos Mountains, Párnonas Mountains); SFENTHOURAKIS 1992: 159 (GR, southern Peloponnese: Taígetos Mountains).

Material examined

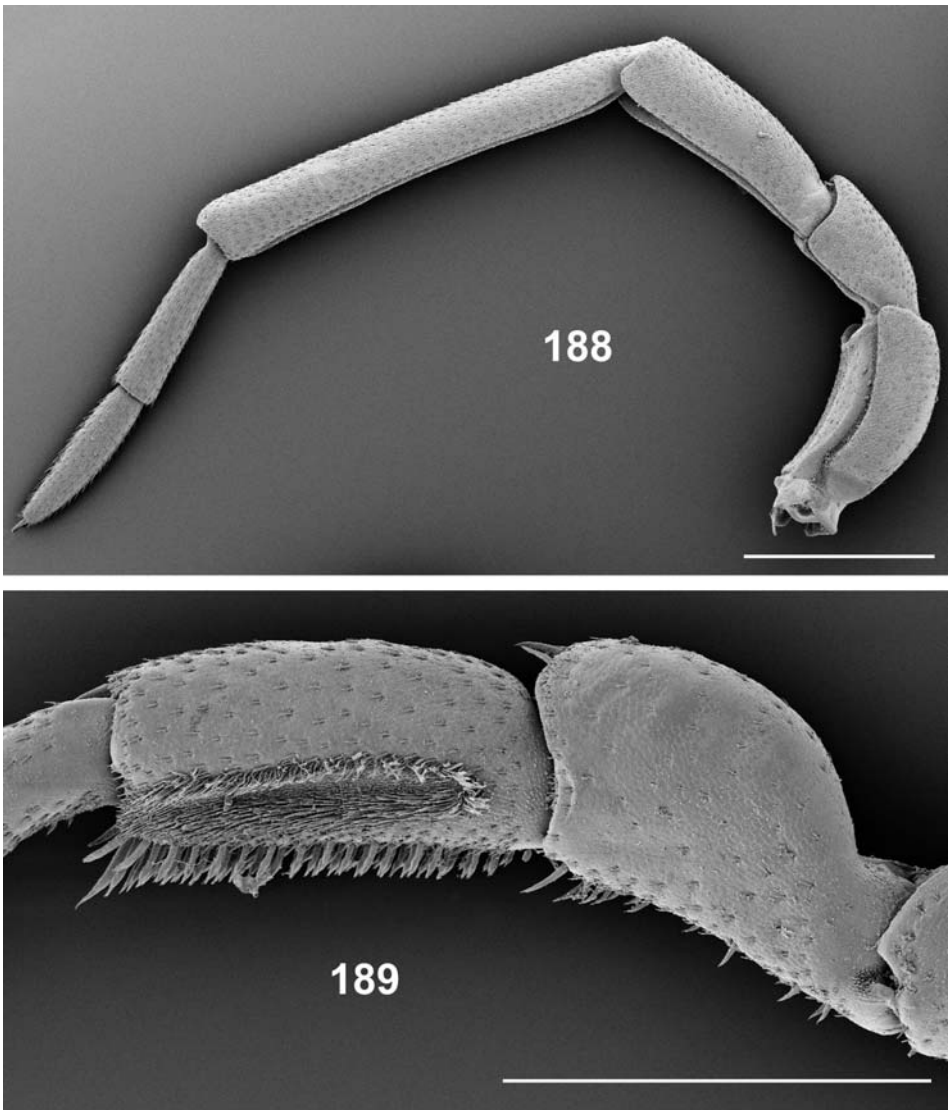
Greece: 105 ex., Attica, Párnitha Mountain, *Abies* forest, 1200 m, leg. SFENTHOURAKIS, VI.1992 (SMNS 2352). – 6 ex., NW-Peloponnese, Erímanthos Mountains, summit, 2200 m,





Figs. 185–187. *Armadillidium tripolitzense* (Erímanthos Mountains, SMNS 1923). – **185**. ♀, 20.5 mm long, head in frontal view. **186**. ♂, 19 mm long, pereion-epimeron 1 in lateral view. **187**. As before, telson and uropods in dorsal view. – Scale: 1 mm.

leg. Osella, 23.VII.1981 (SMNS 1923). – 2 ex., northern Peloponnese, Kalávrita, *Abies*, 1200 m, leg. Schawaller, 21.IX.2004 (SMNS 2811). – 6 ex., northern Peloponnese, pass 25 km S of Kalávrita, *Quercus coccifera*, 1100 m, leg. Schmalfuss, 5.X.2004 (SMNS 2847). – 9 ex., northern Peloponnese, Khelmós Mountain, *Abies*, timberline, 1800 m, leg. Schawaller & Schmalfuss, 22.IX.2004 (SMNS 2812). – 47 ex., western Peloponnese, SE of Zakháro, 6 km E of Néa Figalía, deciduous *Quercus* forest, 700 m, leg. Schawaller & Schmalfuss, 2.X.2004 (SMNS 2837). – 25 ex., western Peloponnese, 15 km S of Andrítsena, *Quercus coccifera*, 800 m, leg. Bense, Schawaller & Schmalfuss, 2.X.2004 (SMNS 2838). – 44 ex., western Peloponnese, 7 km NW of Andrítsena, *Quercus coccifera*, 500 m, leg. Bense, Schawaller & Schmalfuss, 3.X.2004 (SMNS 2840). – 36 ex., southern Peloponnese, Taígetos Mountains, Profítis Ilías, 2400 m, leg. Malicky, 20.V.1984 (SMNS 2113).



Figs. 188–189. *Armadillidium tripolitzense*, ♂, 19 mm long (Erímanthos Mountains, SMNS 1923). – **188**. Antenna. **189**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.

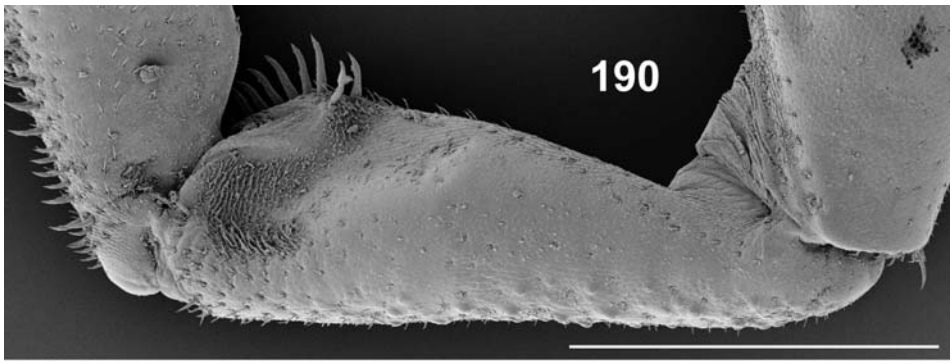
Diagnostic characters

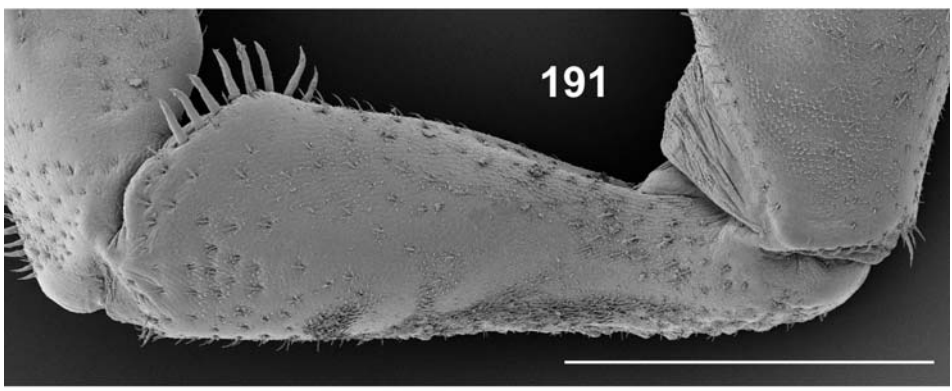
Maximum dimensions: 20.5 × 9.3 mm.

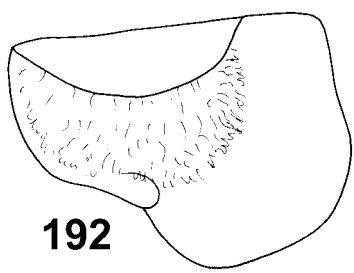
Coloration: Dark blackish brown, juveniles can be mottled yellowish and brown.

Cuticular structures: Tergites with very faint granulation (compare Fig. 183).

Frontal shield from behind one fifth as high as it is wide, trapezoidal, upper margin rounded, caudally with conspicuous deep groove (Fig. 184). Antennal lobes in frontal view semicircular (Fig. 185). Hind margin of pereion-epimeron 1 completely rounded (Fig. 186). Telson slightly longer than wide, with straight sides and narrowly rounded apex (Fig. 187). Antenna see Fig. 188. Male pereiopod 1 on carpus, but







Figs. 190–192. *Armadillidium tripolitzense*, ♂, 19 mm long (Erímanthos Mountains, SMNS 1923). – **190**. Ischium 7, frontal view. **191**. Ischium 7, caudal view. **192**. Pleopod-exopodite 1, caudal view. – Scales: 1 mm.

not on merus, with ventral brush of spines (Fig. 189). Male ischium 7 ventrally straight, frontally with distal hair-field and knobs on ventral face (Figs. 190, 191). Male pleopod-exopodite 1 without hind-lobe, on medial margin concave (Fig. 192), male endopodite 1 straight.

Distribution

Greece: Mountains of Attica and Peloponnese (map Fig. 193).

Remarks

A. tripolitzense is a mountain species, often found on the tops above the timber-

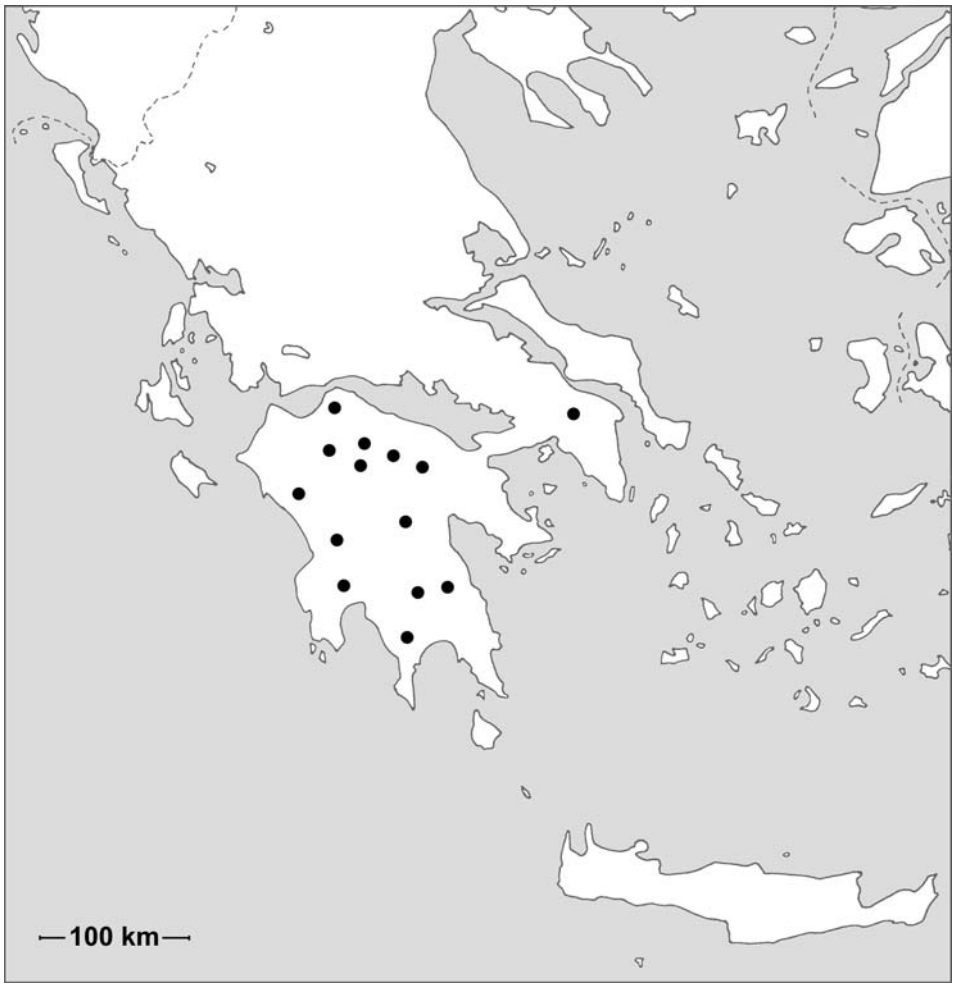


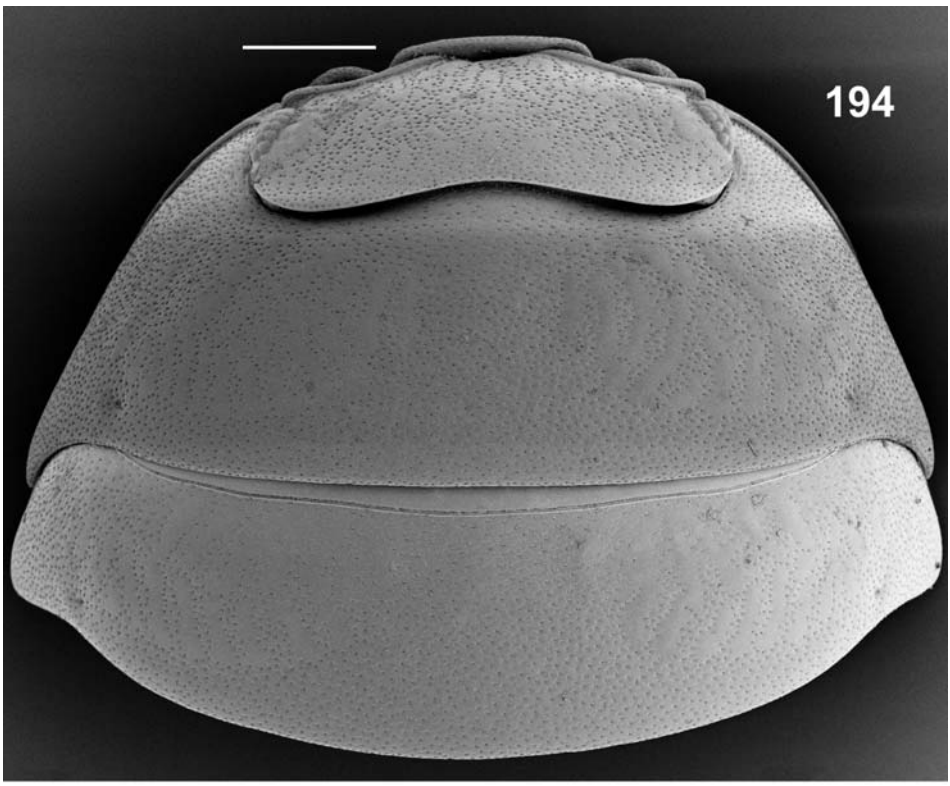
Fig. 193. Records of *Armadillidium tripolitzense*.

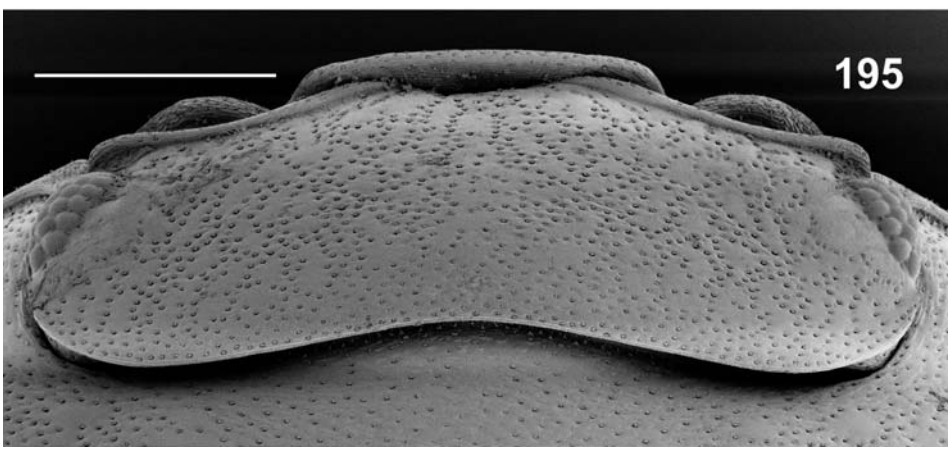
line. Possibly it is a remnant from colder and wetter glaciation periods. The species shows a very conspicuous similarity with *A. zenckeri* Brandt, 1833 from eastern central Europe (SFENTHOURAKIS, pers. comm., compare GRUNER 1966: 319, figs. 249, 250). In contrast to other species of the genus *A. zenckeri* lives in cold and wet swamps and moors. It is tempting to surmise an ancestor species which lived during the last glaciation period in a coherent distribution area between central Europe and Greece. *A. janinense* Verhoeff, 1902 could be a representative of this species group on the northwestern Greek mainland. Today the central European and the Greek populations seem to be separated by a gap covering the area of ex-Yugoslavia, in any case no corresponding species has been found in this region. The species *A. assimile* Budde-Lund, 1885 seems to be the representative of this species group in Italy, southern France and the Iberian Peninsula (compare TAITI & FERRARA 1980: 289, figs. XIV, XV).

5.18 *Armadillidium vulgare* (Latreille, 1804)
(Figs. 194–210 and map Fig. 211)

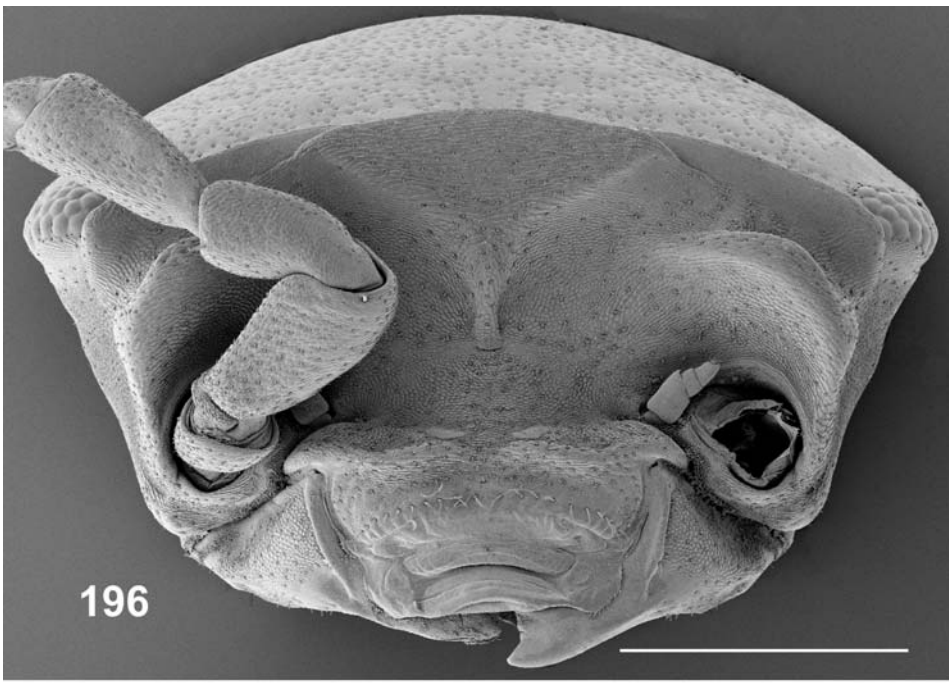
Literature records

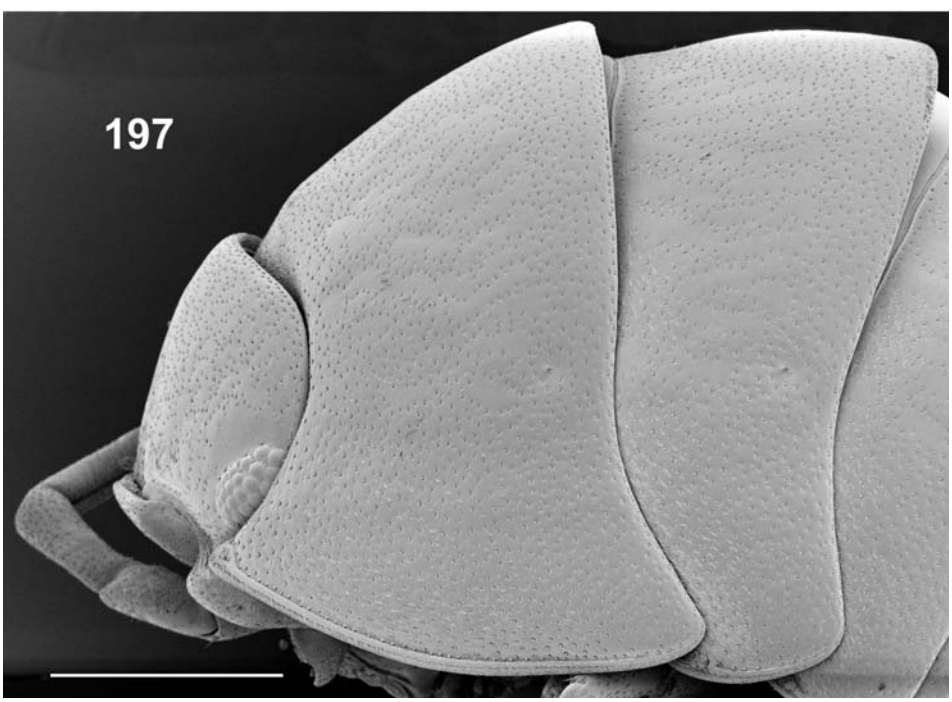
VANDEL 1962: 826 (synonymy, biology, bibliography); SCHMALFUSS 2003: 44 (synonymy, bibliography).



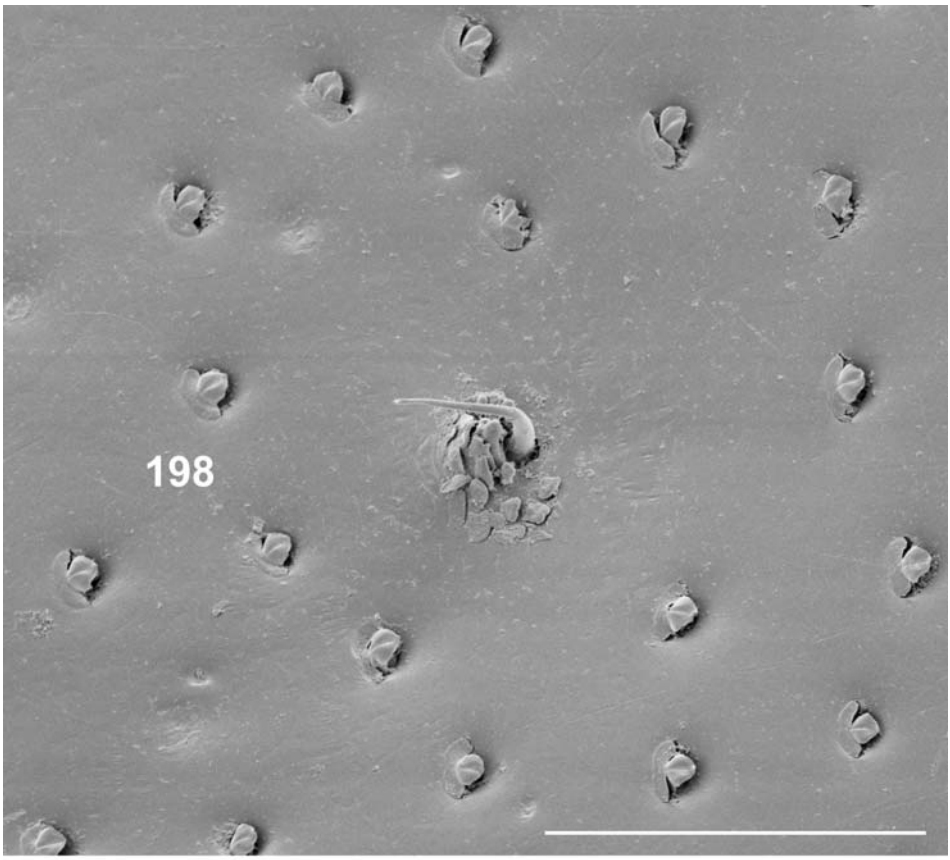


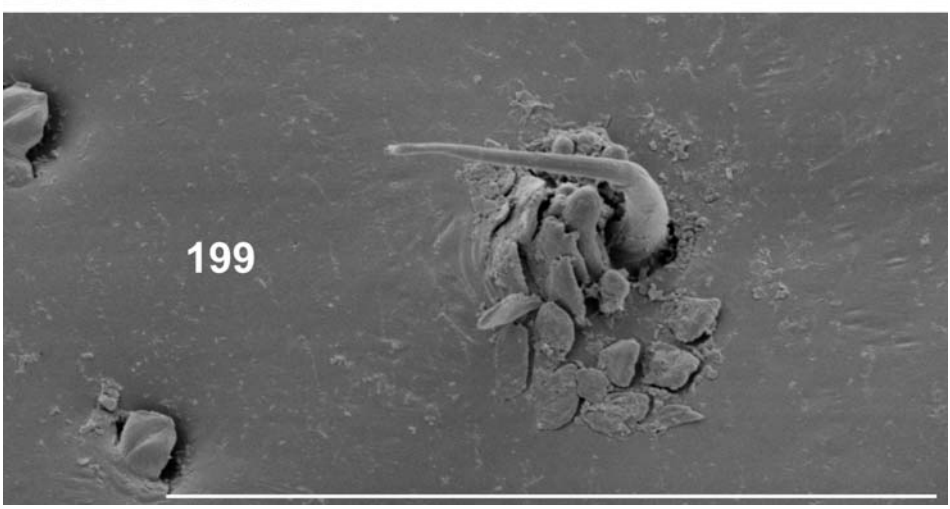
Figs. 194–195. *Armadillidium vulgare*, ♂, 16.5 mm long (Northern Sporades, SMNS 1113). – **194**. Head and pereion-tergites 1 and 2 in dorsal view. **195**. Head in dorsal view. – Scales: 1 mm.



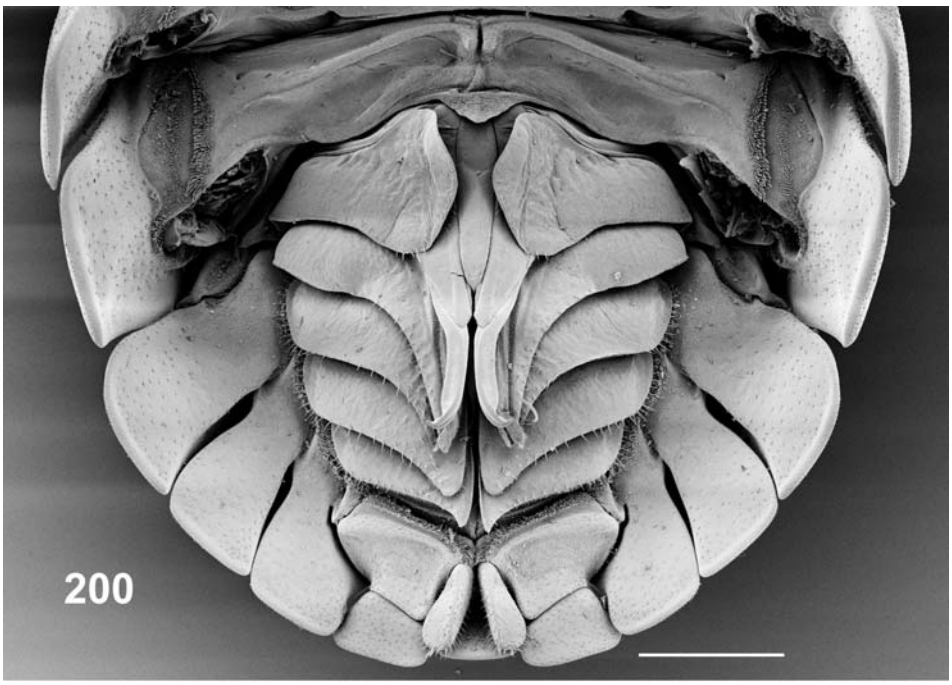


Figs. 196–197. *Armadillidium vulgare* (Northern Sporades, SMNS 1122). – **196**. ♂, 12.5 mm long, head in frontal view. **197**. ♀, 11 mm long, head and pereion-tergites 1 and 2 in lateral view. – Scales: 1 mm.

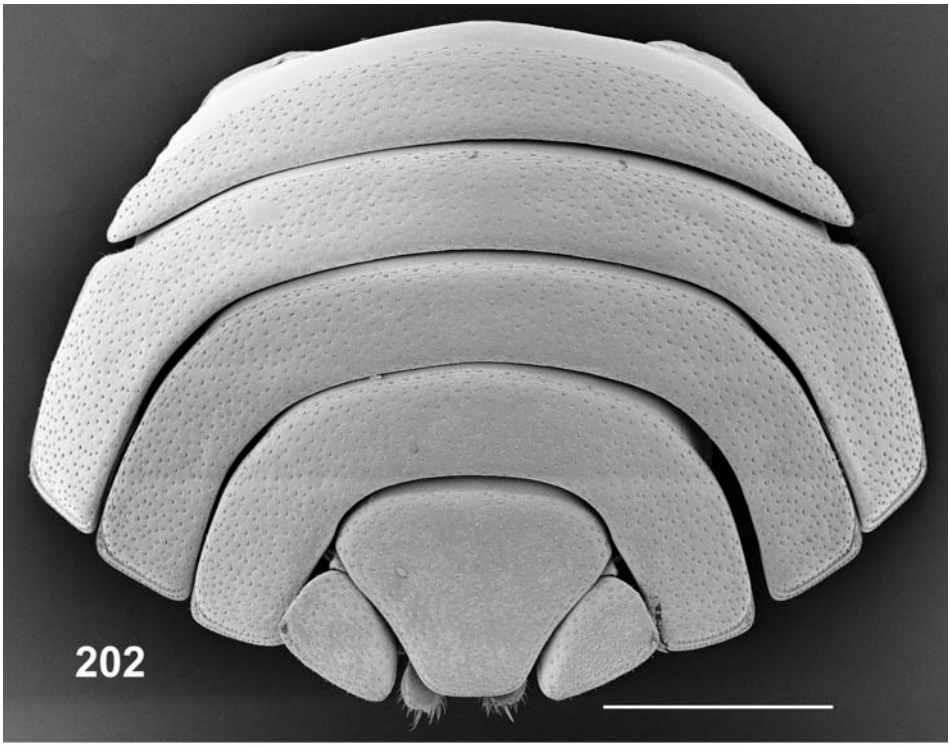


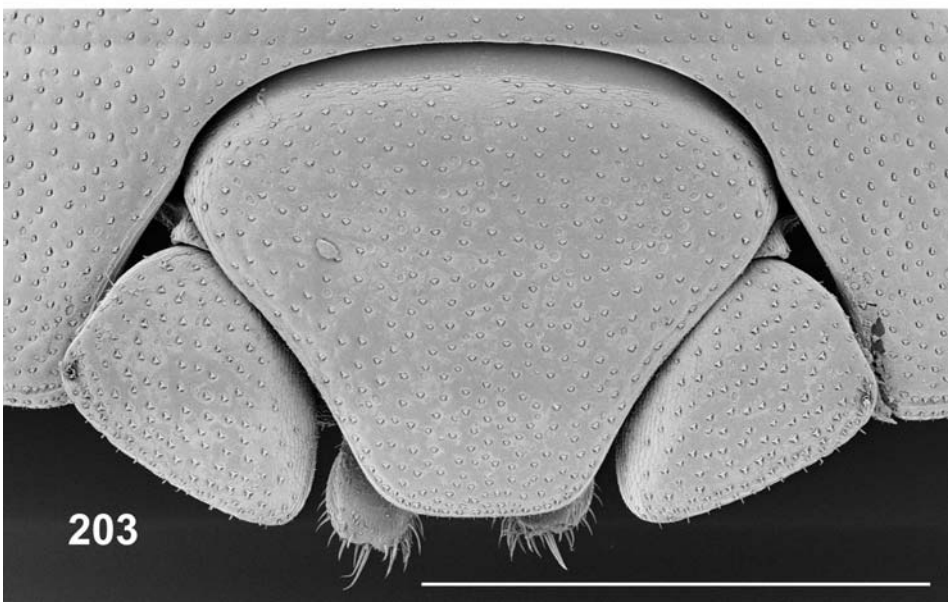


Figs. 198–199. *Armadillidium vulgare*, ♀, 11 mm long (Northern Sporades, SMNS 1122). – **198**. Detail of pereion-epimeron 1 with nodulus lateralis. **199**. Nodulus lateralis and "scale-spines" (= tergal tactile organs). – Scales: 0.1 mm.

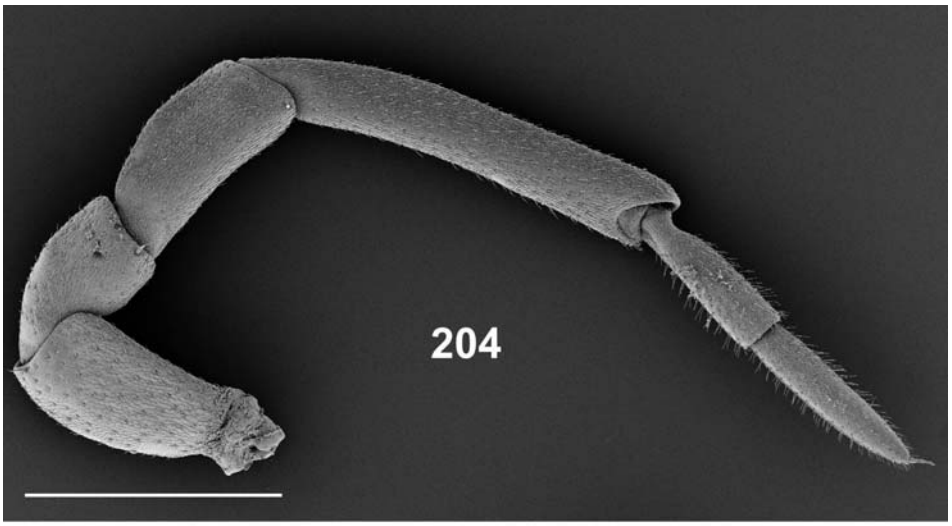


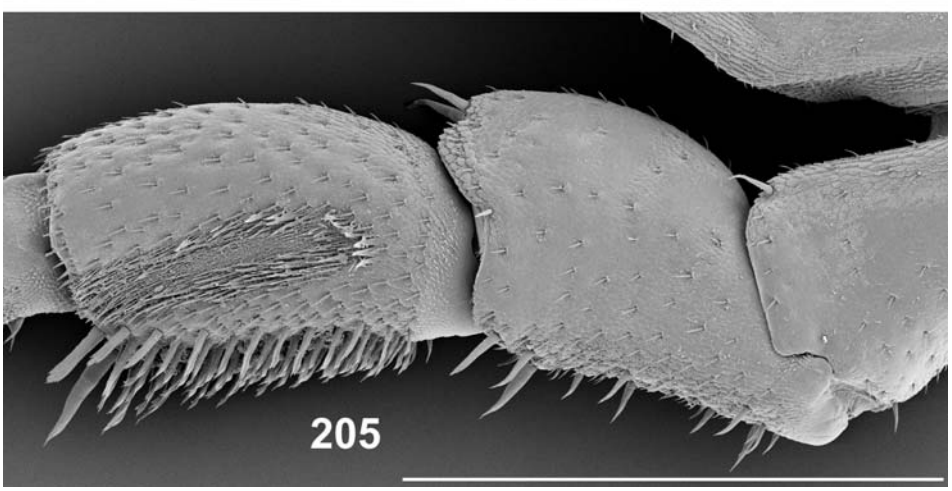
Figs. 200–201. *Armadillidium vulgare*, ♂, 20 mm long, critical point treatment (Northern Sporades, SMNS 1109). – **200**. Pereion-segment 7 (pereiopods detached) and pleon in ventral view. **201**. Structures of water conducting system on ventral side of pereion-epimeron 7. – Scales: 1 mm (200), 0.1 mm (201).





Figs. 202–203. *Armadillidium vulgare*, ♂, 12.5 mm long (Northern Sporades, SMNS 1122). – **202**. Pleon in dorsal view. **203**. Telson and uropods in dorsal view. – Scales: 1 mm.





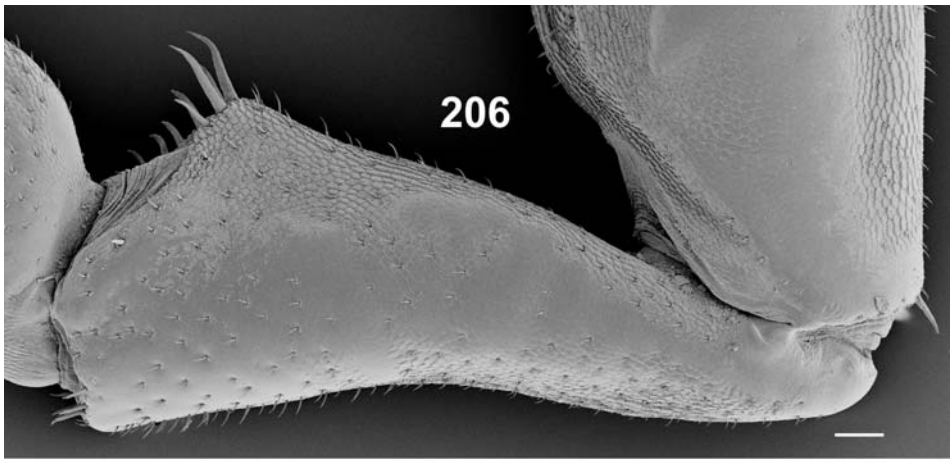
Figs. 204–205. *Armadillidium vulgare*, ♂, 14 mm long (Northern Sporades, SMNS 1121). – **204**. Antenna. **205**. Pereiopod 1, carpus and merus, frontal view. – Scales: 1 mm.

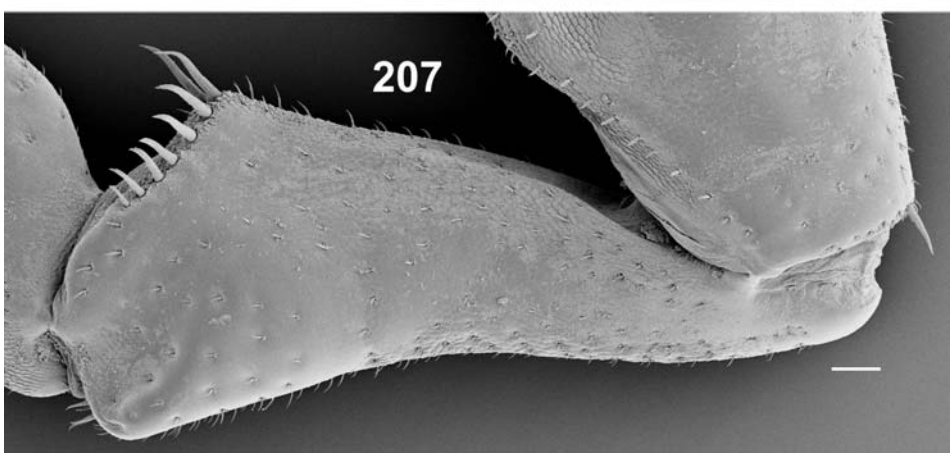
In Greece the species has been recorded from many localities all over the country, for bibliography see SCHMALFUSS 1975: 55.

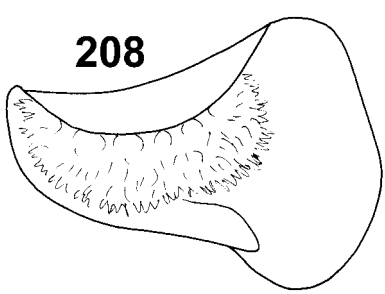
Records from the Peloponnese: STROUHAL 1938: 49.

Material examined

Greece, Peloponnese: 4 ex., NW, Killíni, sandy beach, leg. ERHARD, 26.IV.1996 (SMNS 2539). – 2 ex., NW, Káto Akhaïa, leg. SCHÖNFELD, 15.VII.2002 (SMNS 2747). – 1 ex. NW, Platáni 10 km NE of Pátra, 100 m, leg. SCHMALFUSS, 7.X.2004 (SMNS 2853). – 1 ex., NE, Kartéri W of Lake of Stimfalía, leg. MALICKY, 25.VII.1974 (SMNS 1655). – 1 ex., NE, Lake of Stimfalía, shore, leg. SCHMALFUSS, 20.IX.2004 (SMNS 2816). – 2 ex., NE, Ancient Kórinthos, Akrokórinthos, leg. KÜHNELT, 25.VII.1967 (SMNS 1667). – 5 ex., NE, 8 km S of Náfplio, beach, leg. MAURER, 2.IX.1986 (SMNS 2136). – 2 ex., SE, northern Párnonas Mountains, *Abies*, 1100 m, leg. SCHAWALLER, 26.IX.2004 (SMNS 2821). – 1 ex., SE, Párnonas Mountains, "Arachowa", leg. KÜHNELT, 5.IV.1970 (SMNS 1817). – 3 ex., SE, S of Monemvasía, leg.



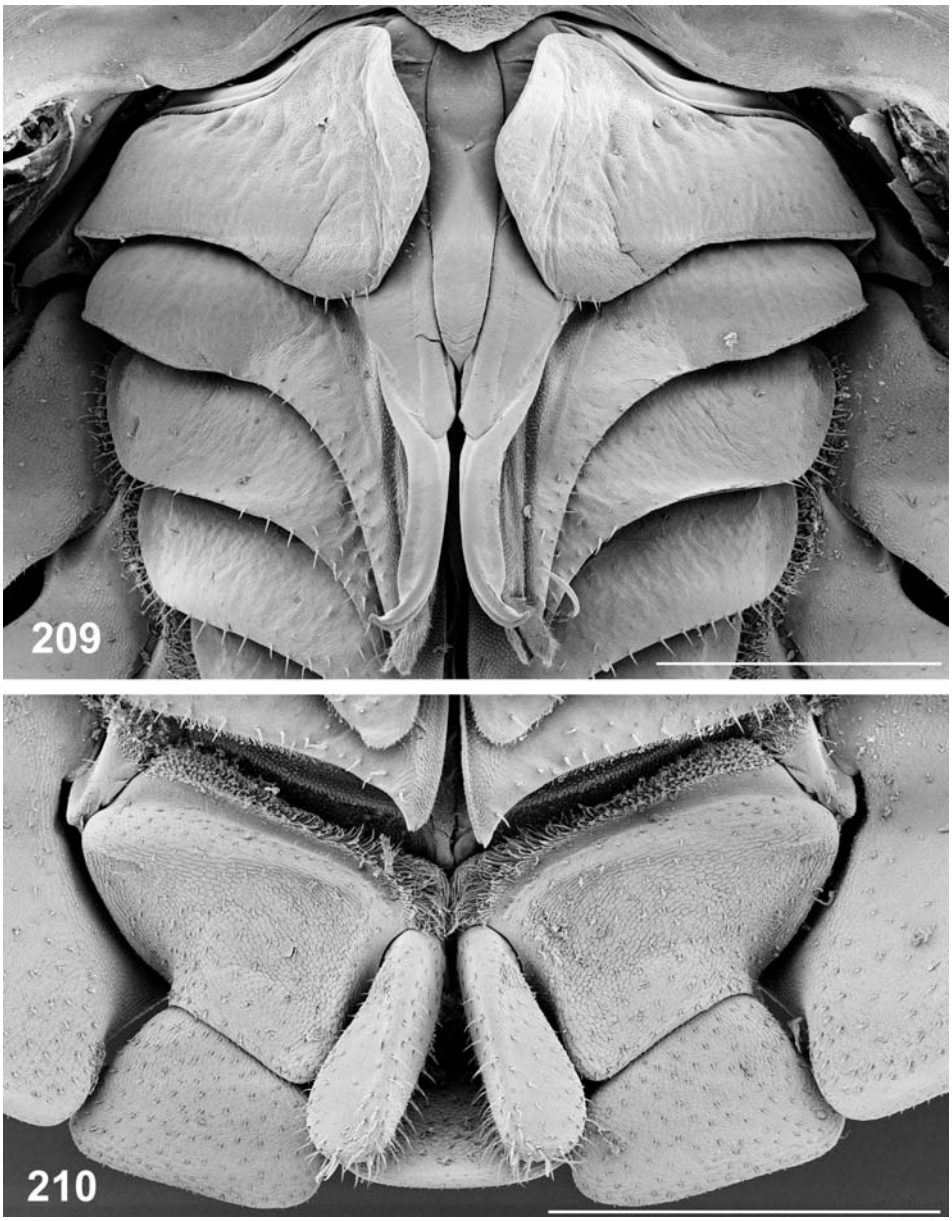




Figs. 206–208. *Armadillidium vulgare* (Northern Sporades). – **206**. ♂, 14 mm long (SMNS 1121), ischium 7, frontal view. **207**. As before, ischium 7, caudal view. **208**. ♂, 18 mm long (SMNS 1113), pleopod-exopodite 1, caudal view. – Scales: 0.1 mm.

SCHMALFUSS, 20.IX.1978 (SMNS 1873). – 2 ex., SE, Gíthio, leg. KINZELBACH & SCHEUERN, 7.IV.1977 (SMNS 1778, 1790).

The Stuttgart collection contains hundreds of samples of *A. vulgare* from all other regions of Greece. I refrain from quoting them here in detail, the map Fig. 211 is based on these records.



Figs. 209–210. *Armadillidium vulgare*, ♂, 20 mm long, critical point treatment (Northern Sporades, SMNS 1109). – **209**. Pleopods in situ, ventral view (= frontal sides). **210**. Uropods in situ, ventral view. – Scales: 1 mm.

Diagnostic characters

Maximum dimensions: 20.3 × 8.4 mm for Greek samples (from Northern Sporades); VANDEL (1962: 828) records 21 × 11 mm for specimens from Italy.

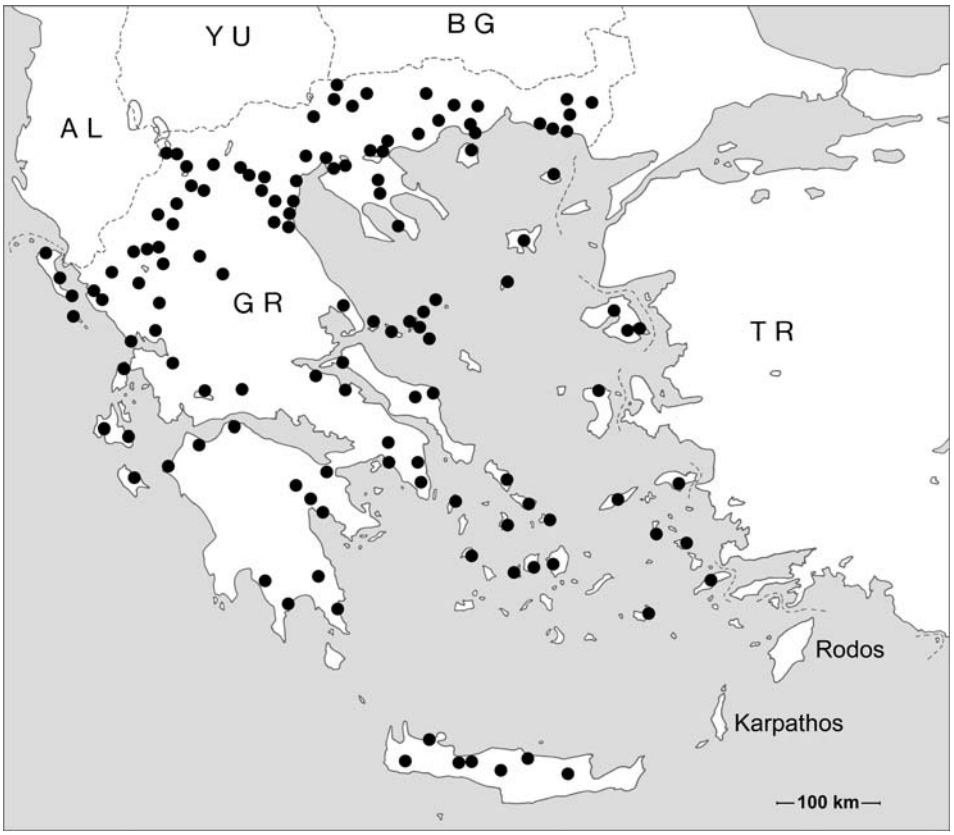


Fig. 211. Greek records of *Armadillidium vulgare*. Note the absence of the species on the well-investigated islands Ródos and Kárpathos.

Coloration: Adult males dark violet-brown, females and juvenile males grey-brown mottled with yellowish.

Cuticular structures: Tergites completely smooth (compare Fig. 194).

Frontal shield from behind tightly fitting and not surpassing the frontal part of the head (Fig. 195). Antennal lobes in frontal view trapezoidal (Fig. 196). Hind margin of pereion-epimeron 1 with completely rounded concavity (Fig. 197); nodulus lateralis of pereion-epimeron 1 see Figs. 198, 199. Fig. 200 shows pereion-segment 7 and pleon in ventral view, details of water conducting system on the basis of pereiopod 7 see Fig. 201. Pleon in dorsal view see Fig. 202. Telson with straight sides and broadly truncated apex (Fig. 203). Antenna see Fig. 204, distal flagellar segment slightly longer than proximal one. Male pereiopod 1 on carpus, but not on merus, with dense ventral brushes of spiny setae (Fig. 205). Male ischium 7 ventrally concave, frontally without distal hair-field (Figs. 206, 207). Ventral view of male pleopods in situ see Fig. 209; male pleopod-exopodite 1 without hind-lobe, mediodistal corner rounded (Fig. 208), endopodite 1 strongly bent outwards (Fig. 209); ventral view of uropods in situ see Fig. 210.

Distribution

The species originated in the Balkan region and was synanthropically introduced to all parts of the world, thriving in secondarily changed biotopes. In Greece it can be encountered nearly everywhere (records see map Fig. 211), it is, however, missing on some larger well investigated islands in the Aegean, e. g. Ródos. In former publications I have interpreted this as a possible case of competitive exclusion, with species of *Schizidium* as competitors; in the meantime *Armadillidium vulgare* and *Schizidium oertzenii* have been found sympatrically on a number of Aegean islands (Náxos, Sérifos etc.), so the reason for the absence of *Armadillidium vulgare* is probably a combination of competitors, climatic factors as very hot and dry summers and the lack of suitable biotopes (SCHMALFUSS 2000).

6 Zoogeographical and phylogenetic considerations

The geographical distribution of the treated species suggests that several guilds have colonized the region. There is the "ancient" group which was already living there in Tertiary times when the Aegean Sea was still mainland. These species are *A. granulatum*, *A. marmoratum*, *A. bicurvatum* and possibly *A. vulgare*. An additional species is *Armadillidium album*, which has not yet been recorded from the Peloponnese but certainly occurs at its shores. Also *A. grimmi* belongs to these old inhabitants of the region, being a relict member of the *nasatum*-group known from Italy and the northern shores of the Adriatic and the Aegean Sea. The species *granulatum*, *marmoratum* and *album* are ecologically connected to the sea shore and are widely distributed in the northeastern Mediterranean. *A. bicurvatum* reaches the Aegean region only in western Crete, but it seems that its eastern distribution boundary is determined by ecological rather than by historical factors (see map Fig. 51). Concerning *A. vulgare* there is presently no way to decide whether it is autochthonous in the treated region or whether it has been introduced there in historical times (as it is certainly the case in many places outside Europe).

The remaining species living on the Peloponnese now, perhaps with the exception of the enigmatic *A. bensei* and *A. maniatum*, seem to have colonized the Peloponnese in Pleistocene times, arriving in waves from the north with the cooler and wetter climate of the pluvial periods. By that time the Aegean mainland was drowned by the tectonic dynamics of the region, and the Peloponnese was isolated from the remaining Aegean islands. None of these species has expanded to these islands beyond the Peloponnese, with the exception of Kíthira close to the southeastern tip, and the islands lying just in front of the northeastern part of the Peloponnese.

One phyletic line has differentiated into a number of separate allopatric species, facilitated by rapidly changing climatic conditions during the Ice Age. The following species seem to belong to this group: *A. humectum*, *A. lobocurvum*, *A. kuehnelti*, *A. arcadicum*, *A. kalamatense* and perhaps *A. laconicum*. They probably have been isolated on the different mountain ranges during the warmer interglacial periods.

Other lines that have arrived from the north are *A. tripolitzense* and *A. messenicum* (see Remarks in chapter 5.17), *A. peloponnesiacum*, *A. argolicum*, and *A. stymphalicum* which is closely related to *A. frontemarginatum* from the Ionian Islands.

The enigmatic *A. bensei* may be a derivative of the *vulgare*-line and thus may belong to the "ancient" stratum, and the same holds true for *A. maniatum*, which may be a derivative of the *granulatum*-line.

At the moment the morphological data do not allow a reconstruction of the degree of phylogenetic relationship between the different lines of *Armadillidium* under discussion.

The Aegean islands are nowadays populated by members of the genus *Schizidium* and the related species described under the genus *Paraschizidium*. These do not occur, however, anywhere on the mainland or on the Peloponnese. This suggests the possibility that the colonization of the Peloponnese by various lines of *Armadillidium* during the Ice Age, in combination with rapidly changing climatic conditions, led to the extinction of *Schizidium* and its relatives in that region (compare SCHMALFUSS 2005: 37).

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