# The terrestrial isopods (Isopoda: Oniscidea) of Greece. 27th contribution: The genus *Armadillidium* (Armadillidiidae) on the Ionian islands[1]

Helmut Schmalfuss

Abstract

Based on the revision of the literature, the reinvestigation of type material and the investigation of new collections, 21 species of *Armadillidium* are reported from the Greek Ionian islands. Eleven species were treated in previous contributions of this series. The diagnostic characters of the ten remaining species are described and illustrated, mostly by SEM-photographs, and the Greek records of these species are mapped.

K e y w o r d s : Isopoda, Oniscidea, *Armadillidium*, Greece, Ionian islands.

Zusammenfassung

Die Untersuchung neuer Aufsammlungen, die Durchsicht der Literatur und die Nachuntersuchung von Typenmaterial ergaben 21 *Armadillidium*-Arten für die griechischen ionischen Inseln. Elf Arten wurden in vorangehenden Beiträgen dieser Serie behandelt. Die diagnostischen Merkmale der übrigen zehn Arten werden beschrieben und illustriert, meist mit Hilfe von REM-Aufnahmen, und die griechischen Nachweise dieser Arten werden kartiert.

Contents



## 1 Introduction

In the first four parts of this new revision of the Greek species of *Armadillidium* (Schmalfuss 2006a, 2006b, 2008, 2010) the 43 species known from the Peloponnese, the Aegean islands and the northern mainland (provinces Thrace, Macedonia and Epirus) were treated. In the present fifth part the species from the Greek Ionian islands are dealt with (map Fig. 1). In contrast to the Peloponnese (five new species) and the provinces of Macedonia and Thrace (seven new species) the material investigated from the Ionian islands contained no new species. The Ionian islands,

[1] 26th contribution see Stuttgarter Beiträge zur Naturkunde A, Neue Serie 3: 1–31 (2010).

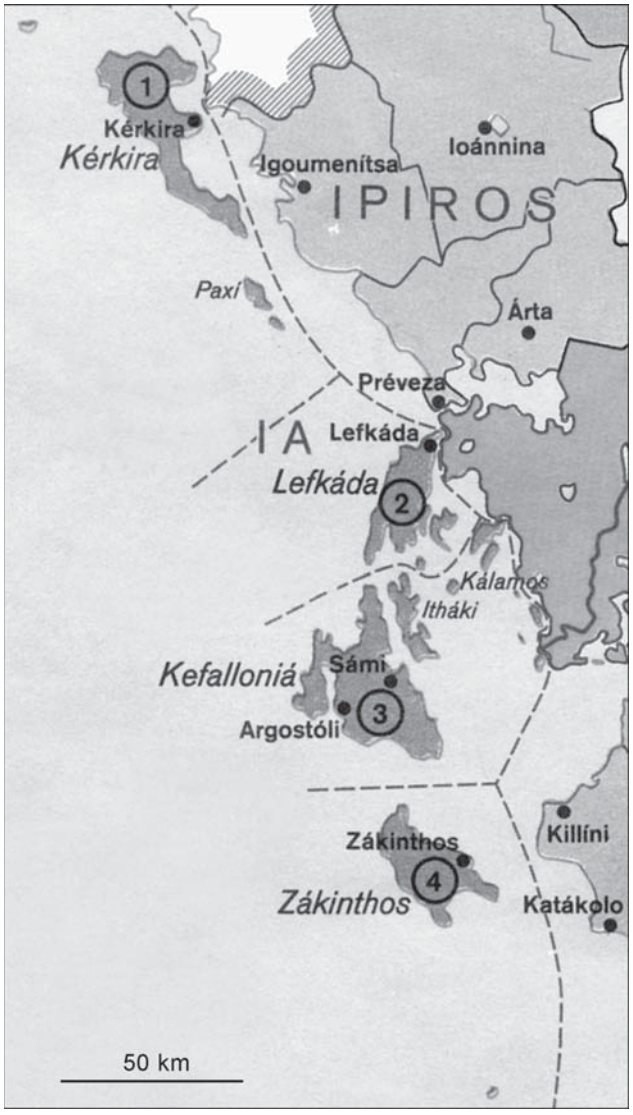


**Fig. 1.** Map of the Ionian islands. – The numbers indicate the political prefectures (nomoí) of the Ionian islands: 1 = Kérkira, 2 = Lefkáda, 3 = Kefalloniá, 4 = Zákinthos.

as well as the adjacent mainland province Epirus, have been intensively surveyed in the first half of the 20th century, and the collected isopod material has been published in numerous articles by Verhoeff and Strouhal (see references in the present paper and in Schmalfuss 2010). Including the species from the Ionian islands we arrive at 53 species of *Armadillidium* which have up to now been treated and described or redescribed from the mentioned parts of Greece. One more paper on the central Greek mainland is planned, from where, at the present state of knowledge, six more species are known. This adds up to 59 species of *Armadillidium* known from Greece.

Abbreviations

| | |
|---|---|
| *A.* | *Armadillidium* |
| ex. | example(s), specimen(s) |
| NMW | Naturhistorisches Museum Wien (Vienna) |
| SMNS | Staatliches Museum für Naturkunde Stuttgart |

Acknowledgments

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Dr. S. Sfenthourakis (Pátra/Greece) and Dr. S. Taiti (Firenze/Italy) reviewed the present paper.

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 acquired by using DISS 5 (point electronic).

## 3 The genus *Armadillidium* on the Ionian islands

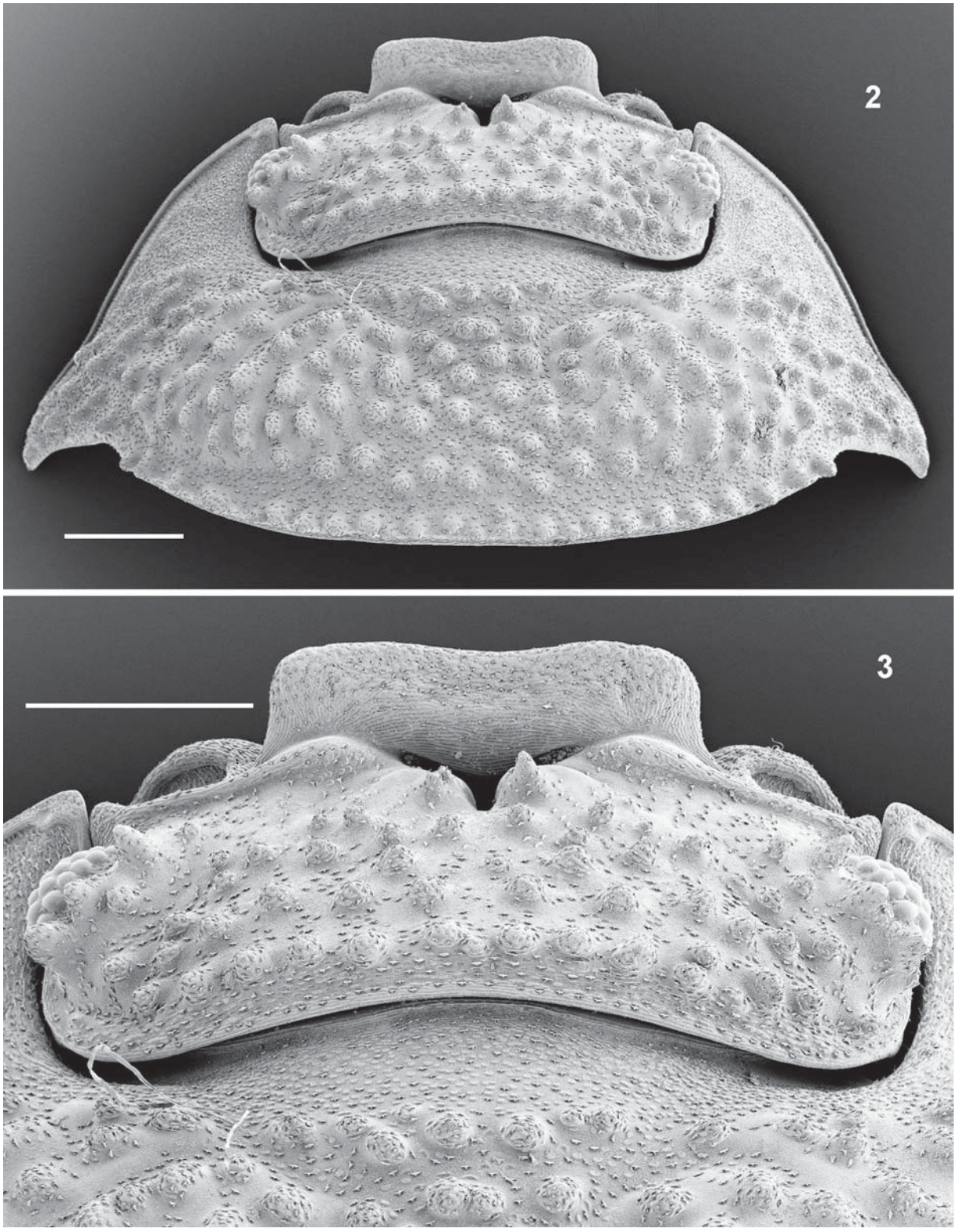
### 3.1 *Armadillidium albanicum* Verhoeff, 1901

This species was treated in the 26th contribution of this series (Schmalfuss 2010). It is known from southern Albania, the Greek island Kérkira and the northwestern Greek mainland.

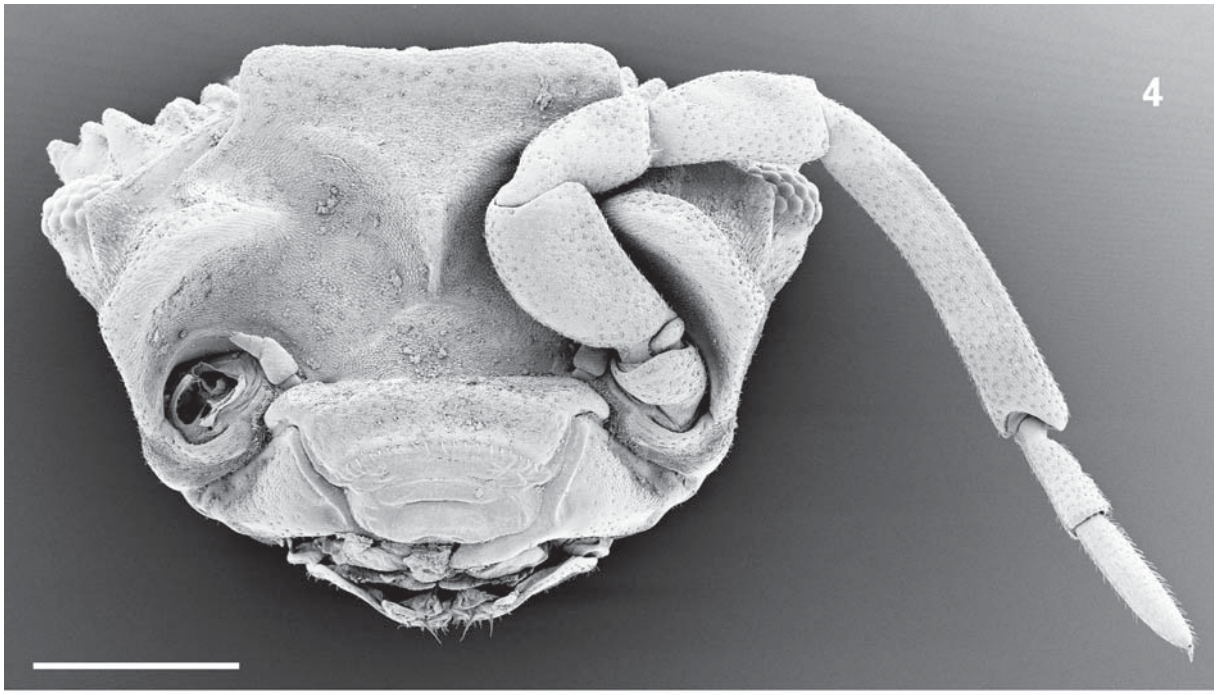
Possibly *A. albanicum* is conspecific with *A. klugii* Brandt, 1833. To clarify this question a detailed redescription of the type material of *A. klugii* is necessary, which is beyond the scope of the present publication.

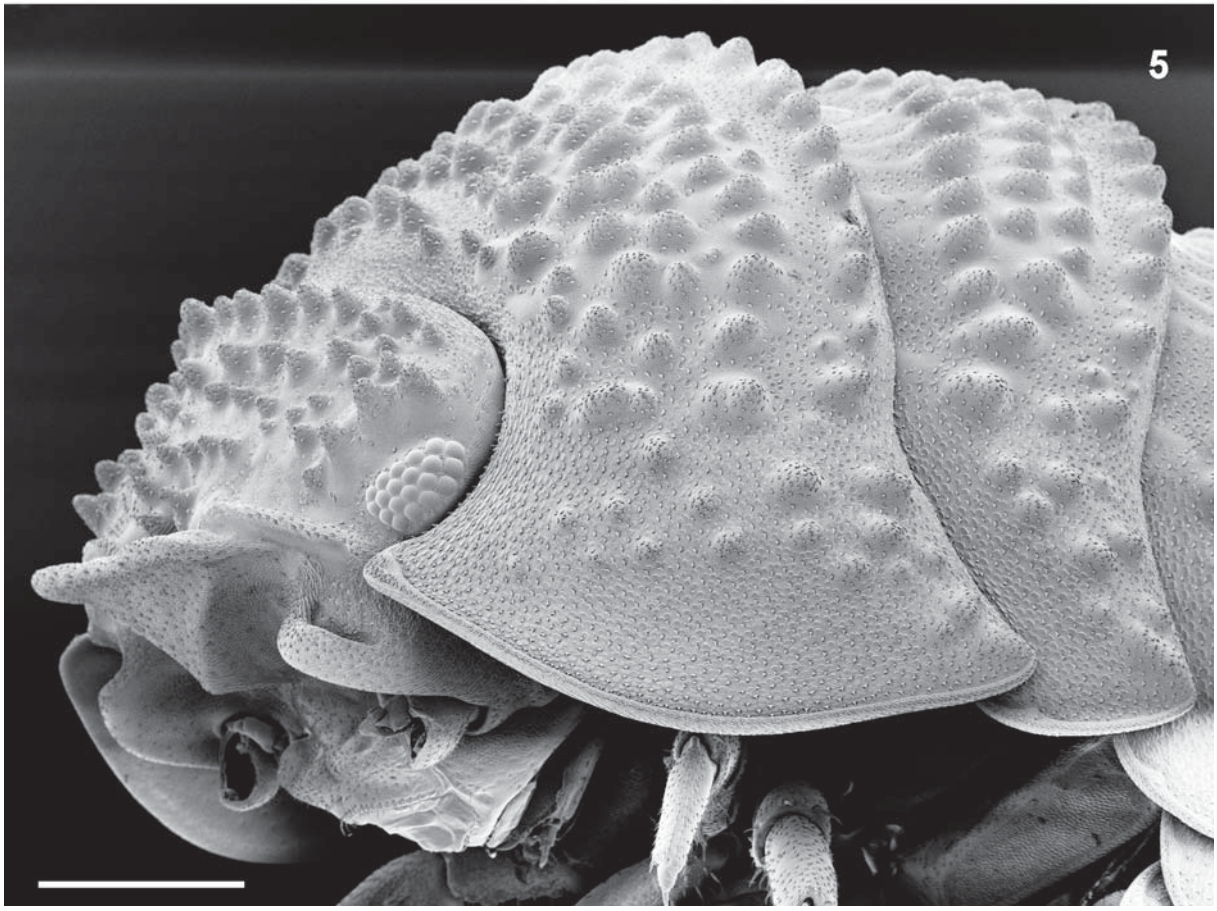
### 3.2 *Armadillidium album* Dollfus, 1887

This species was treated in the 25th contribution of this series (Schmalfuss 2008). It is known from the Mediterranean coasts and the Atlantic coasts of Europe. In Greece it has been found on the Ionian island Zákinthos and on the Aegean coast of the northeastern mainland.

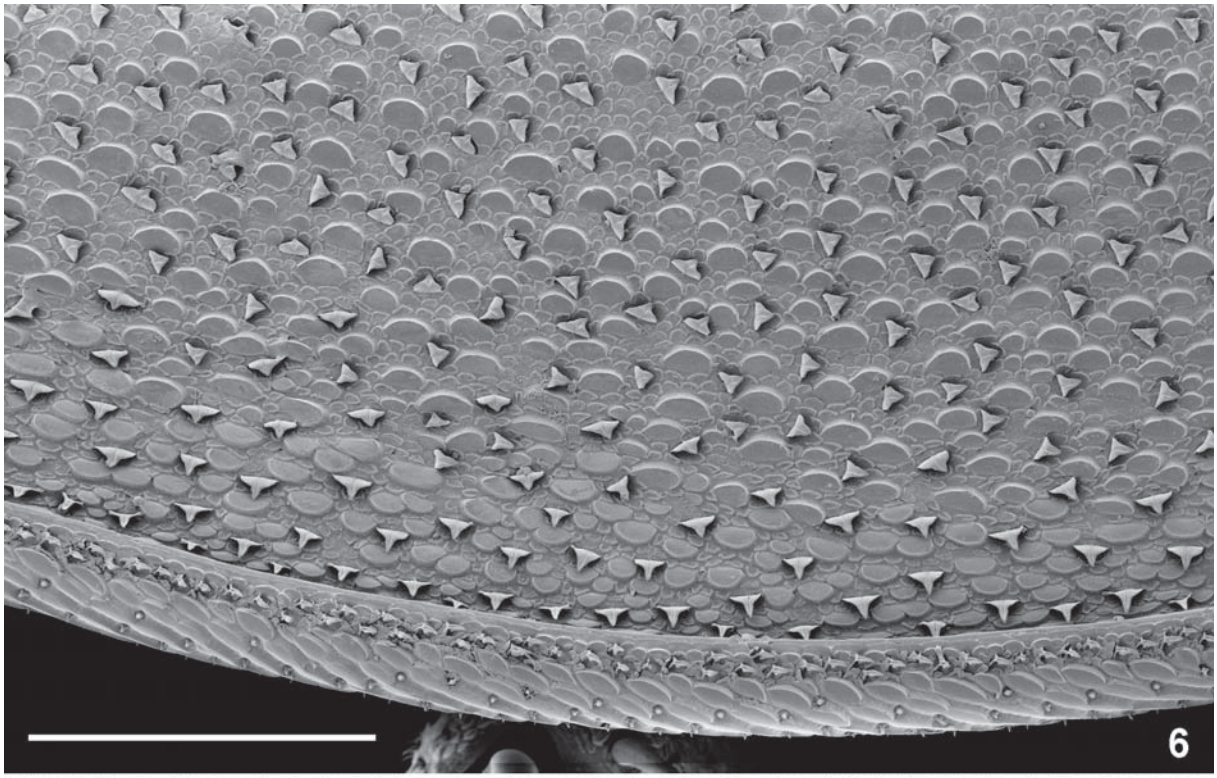


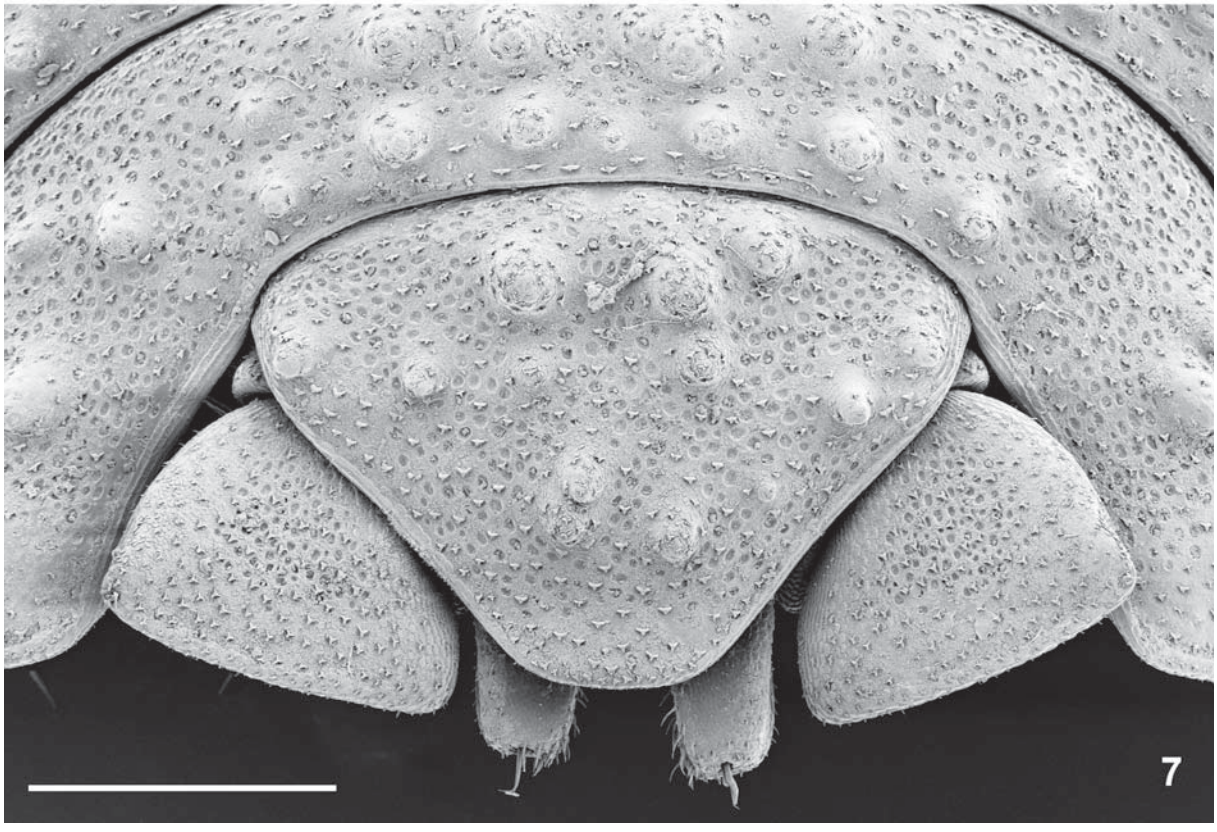

**Figs. 2–3.** *Armadillidium beieri* (island Kefalloniá, SMNS 2551), ♂, 18.0 × 7.8 mm. – **2**. Head and pereion-tergite 1, dorsal view. **3**. Head, dorsal view. – Scales: 1 mm.



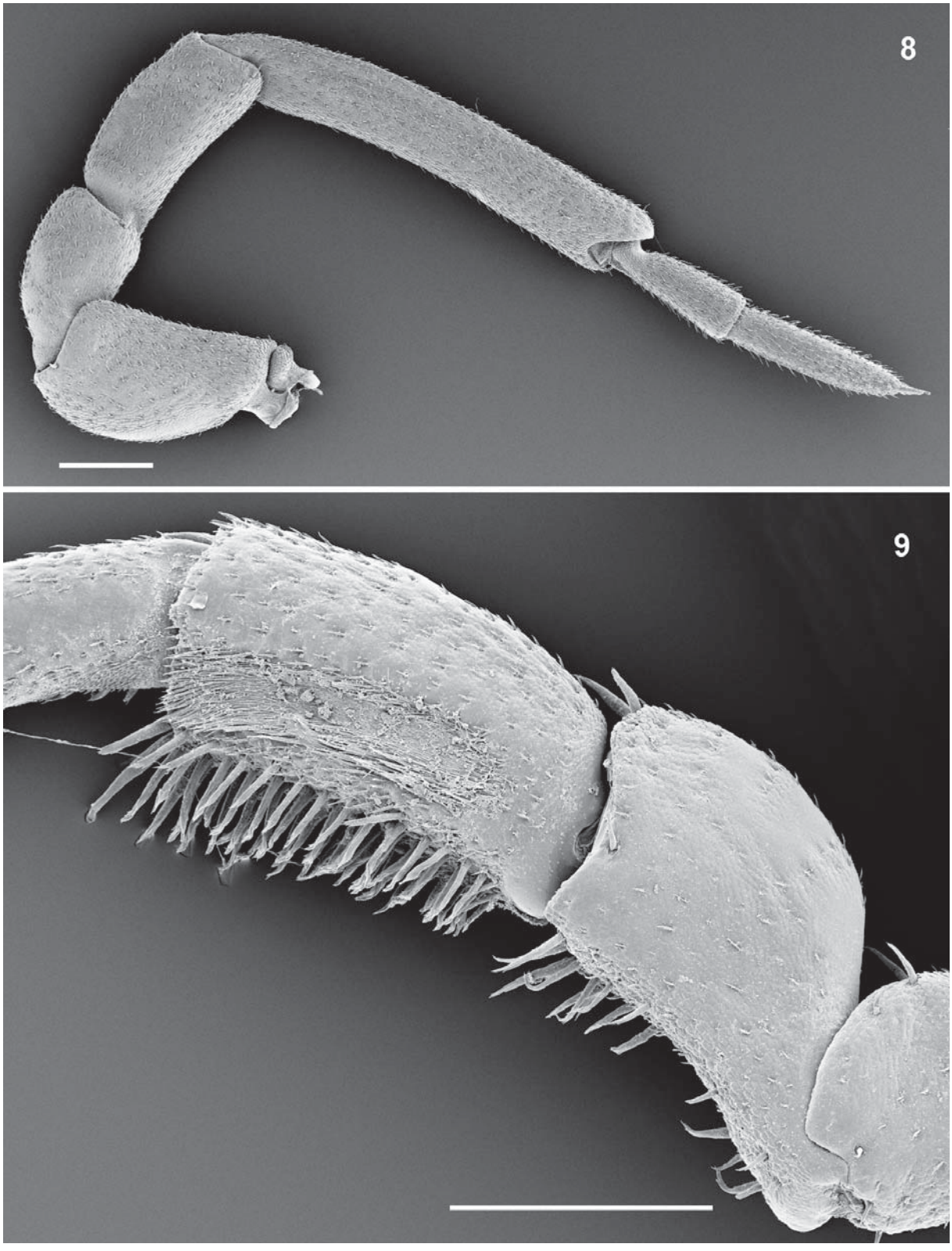




**Figs. 4–5.** *Armadillidium beieri* (island Kefalloniá, SMNS 2551). – **4**. ♂, 15.2 × 7.0 mm, head, frontal view. **5**. ♀, 15.0 × 7.0 mm, head and pereion-tergite 1, lateral view. – Scales: 1 mm.

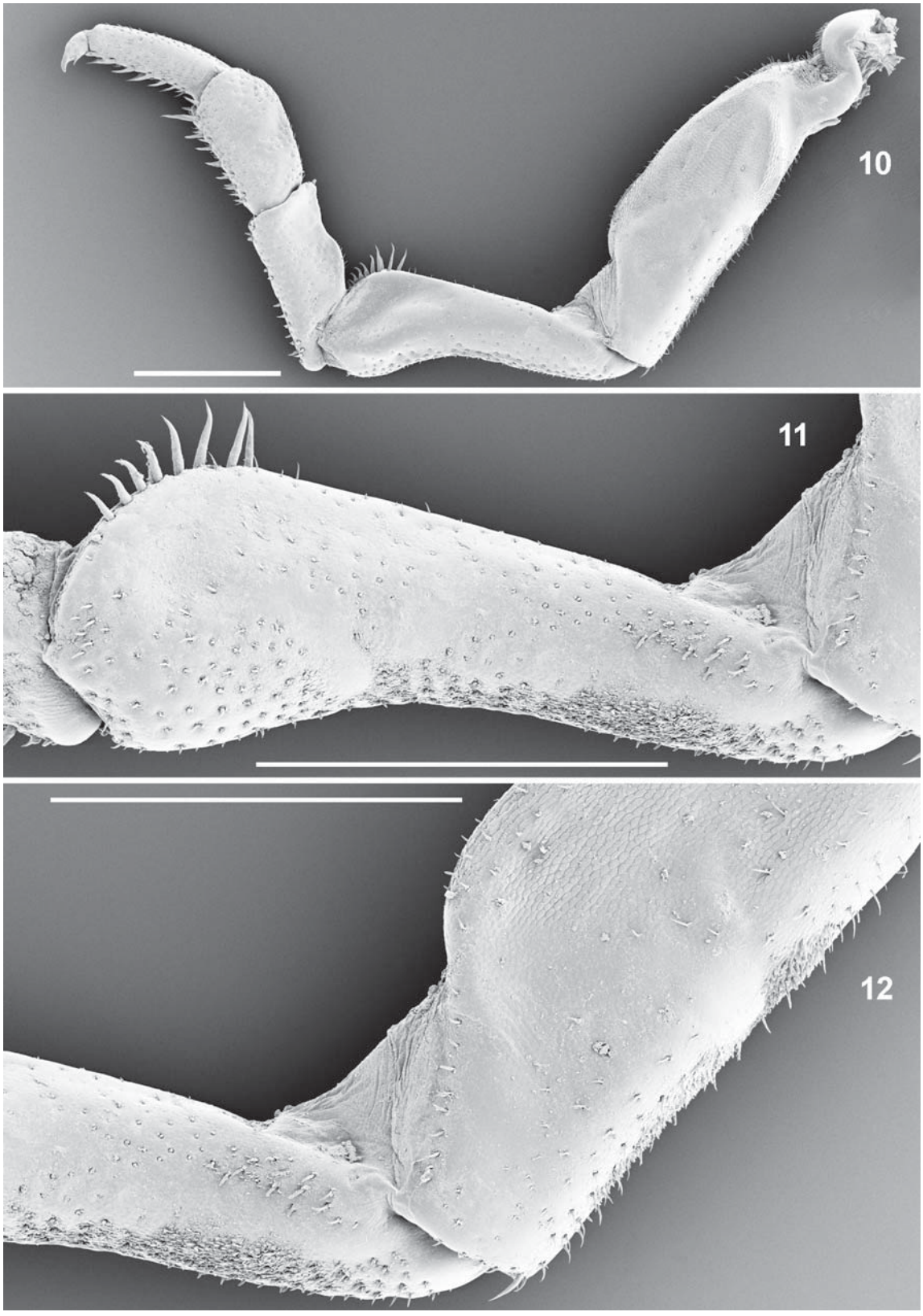



**Figs. 6–7.** *Armadillidium beieri* (island Kefalloniá, SMNS 2551). – **6**. ♀, 15.0 × 7.0 mm, lateral margin of pereion-tergite 1, detail. **7**. ♂, 15.2 × 7.0 mm, telson and uropods, dorsal view. – Scales: 0.3 mm (6), 0.7 mm (7).




**Figs. 8–9.** *Armadillidium beieri* (island Kefalloniá, SMNS 2551), ♂, 18.0 × 7.8 mm. – **8**. Antenna. **9**. Pereiopod 1, frontal view. – Scales: 0.5 mm.




**Figs. 10–12.** *Armadillidium beieri* (island Kefalloniá, SMNS 2551), ♂, 18.0 × 7.8 mm. – **10**. Pereiopod 7, frontal view. **11**. Ischium 7, caudal view. **12**. Pereiopod 7, proximal part, caudal view. – Scales: 1 mm.

### 3.3 *Armadillidium arcadicum* Verhoeff, 1901

Synonym: *Armadillidium humile* Strouhal, 1936.

This species was treated in the 23rd contribution of this series (Schmalfuss 2006a). It is known from the Ionian islands Kefalloniá and Zákinthos (described as *A. humile*) and the western, central and southern parts of the Peloponnese.

### 3.4 *Armadillidium beieri* Strouhal, 1937 (Figs. 2–14, map Fig. 15)

#### Literature records

Strouhal 1936: 92 (nomen nudum, Greece, Ionian island Lefkáda); Strouhal 1937a: 45, figs. 1–2 (Ionian island Lefkáda); Strouhal 1956: 586, figs. 1–2 (Ionian islands Lefkáda and Kálamos).

#### Material examined

**Greece**: 70 ex. and appendage preparations of 4 ♂♂ (syntypes), island Lefkáda (= Levkas), Sívros, leg. Beier, 25.IV.1929 (NMW). – 52 ex., island Kefalloniá, northern peninsula, 1 km W of Fiskárdo, maquis, 100 m, leg. Erhard & Schmalfuss, 4.V.1996 (SMNS 2551). – 5 ex., island Kefalloniá, northern peninsula, Ássos, maquis, leg. Hauser, 6.IV.1970 (SMNS 2115). – 3 ex., island Kefalloniá, 5 km E of Ássos, phrygana, 600 m, leg. Erhard & Schmalfuss, 5.V.1996 (SMNS 2552).

#### Diagnostic characters

Maximum dimensions: 18.0 × 7.8 mm.

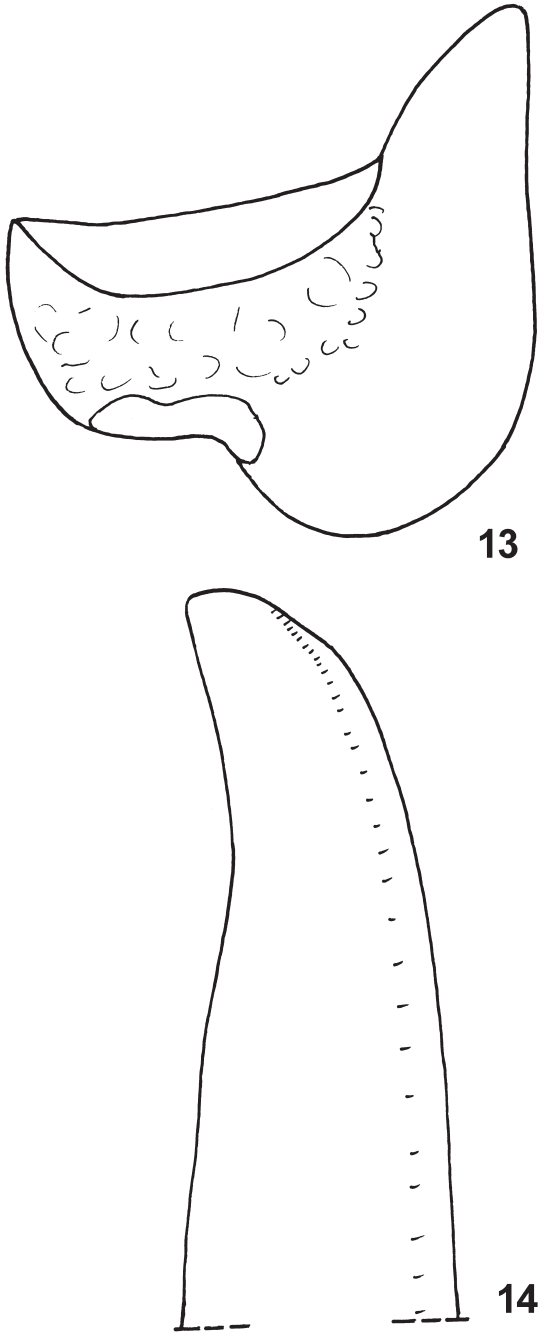
Coloration: Brownish gray, females and juveniles lighter with yellowish epimera.

Cuticular structures: Tergites with very pronounced pointed tubercles (Fig. 2).

Frontal shield from behind conspicuously surpassing frontal margin, upper margin slightly concave (Fig. 3); antennal lobes in frontal view trapezoidal (Fig. 4). Hind margin of pereion-epimeron 1 with faint blunt angle (Fig. 5), cuticular structures (scale-setae etc.) on lateral part (see Fig. 6). Telson considerably wider than long, with slightly concave sides and truncate apex (Fig. 7). Flagellum of antenna with distal segment one third longer than proximal one (Fig. 8). Male pereiopod 1 with brush on carpus, but not on merus (Fig. 9). Male pereiopod 7 with dorsally enlarged carpus (Fig. 10), ischium 7 ventrally concave, frontal side without distal hair-field (Fig. 10), proximally on ventral part of ischium and on medial side of basipodite with short scaly hairfields (Figs. 11, 12). Male pleopod-exopodite 1 with pointed triangular hind-lobe (Fig. 13), endopodite 1 with apex slightly bent outwards (Fig. 14).

#### Distribution (map Fig. 15)

Greece, Ionian islands Lefkáda, Kálamos and Kefalloniá. Not recorded from Zákinthos, as erroneously reported in Schmalfuss (2003).




**Figs. 13–14.** *Armadillidium beieri* (island Lefkáda, NMW), ♂, syntype, Strouhal's preparation. – **13**. Pleopod-exopodite 1, dorsal view. **14**. Pleopod-endopodite 1, apex.

#### Remarks

The preparations made by Strouhal and labeled as "Type" contain the appendages of four males. Therefore no lectotype is designated.

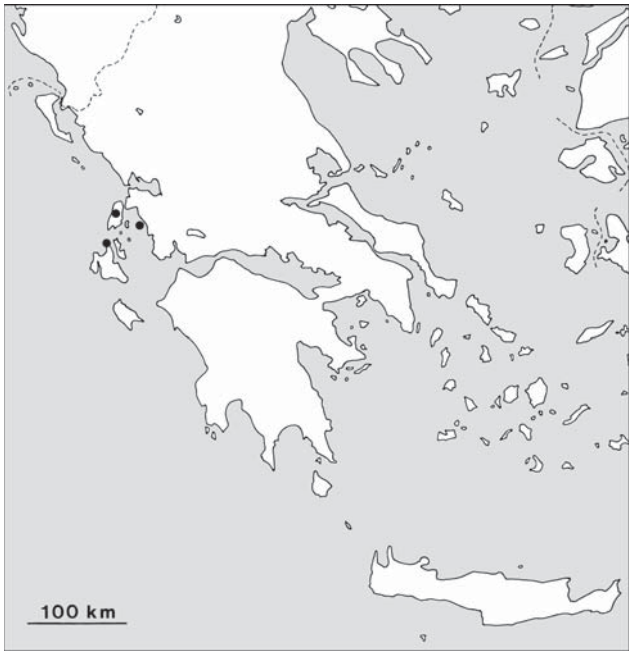



**Fig. 15.** Records of *Armadillidium beieri*.

### 3.5 *Armadillidium bicurvatum* Verhoeff, 1901

This species was treated in the 23rd contribution of this series (SCHMALFUSS 2006a). It is known from the western parts of Greece including the Peloponnese and western Crete and has also been found in southern Albania.

### 3.6 *Armadillidium cephalonicum* Strouhal, 1929 (Figs. 16–24, map Fig. 25)

#### Literature records

STROUHAL 1929: 110, figs. 49–50 (Greece, Ionian island Kefalloniá); STROUHAL 1936: 101, figs. 18–20 (Ionian island Kefalloniá); ?ARCANGELI 1952: 9 (Albania and Yugoslavia).

#### Material examined

**Greece**: 89 ex., island Kefalloniá, Énos Mountain, leg. MALICKY, 2.VI.1977 (SMNS 1169). – 3 ex., island Kefalloniá, 1 km W of Póros, *Platanus*, leg. ERHARD & SCHMALFUSS, 27.IV.1996 (SMNS 2540). – 9 ex., island Kefalloniá, between Póros and Skála, maquis, leg. ERHARD & SCHMALFUSS, 28.IV.1996 (SMNS 2541). – 32 ex., island Kefalloniá, 10 km SSW of Argostóli, sandy beach, leg. ERHARD & SCHMALFUSS, 2.V.1996 (SMNS 2546). – 2 ex., island Kefalloniá, 14 km ESE of Argostóli, pebble beach, leg. ERHARD & SCHMALFUSS, 2.V.1996 (SMNS 2547). – 9 ex., island Kefalloniá, Énos Mountain, 1300–1600 m, *Abies*, leg. ERHARD & SCHMALFUSS, 3.V.1996 (SMNS 2550). – 2 ex., island Kefalloniá, north, 1 km W of Fiskárdo, maquis, 100 m, leg. ERHARD & SCHMALFUSS, 4.V.1996 (SMNS 2551). – 24 ex., island Kefalloniá, beach NNE of Komitáta, leg. ERHARD & SCHMALFUSS, 5.V.1996 (SMNS 2553). – 48 ex., island Kefalloniá, 9 km N of Lixúri, swampy beach, leg. ERHARD & SCHMALFUSS, 6.V.1996 (SMNS 2555). – 7 ex., island Kefalloniá, beach below Zóla, leg. ERHARD & SCHMALFUSS, 6.V.1996 (SMNS 2556). – 8 ex., island Kefalloniá, 3 km SW of Lixúri, pasture, leg. ERHARD & SCHMALFUSS, 7.V.1996 (SMNS 2557). – 3 ex., island Kefalloniá, Lixúri peninsula, southern tip, rocky beach, leg. ERHARD & SCHMALFUSS, 7.V.1996 (SMNS 2558). – 18 ex., island Zákinthos, Alikés, lagoons and olive groves, leg. ERHARD & SCHMALFUSS, 9.V.1996 (SMNS 2562).

#### Diagnostic characters

Maximum dimensions: 15.2 × 6.2 mm.

Coloration: Tergites grayish brown with yellow muscle spots, epimera yellow.

Cuticular structures: Tergites smooth (Fig. 16).

Frontal shield from behind slightly surpassing frontal margin of head, upper margin straight, with right angles laterally (Fig. 17); antennal lobes in frontal view trapezoidal (Fig. 18). Hind margin of pereion-epimeron 1 with faint rounded concavity (Fig. 19). Telson slightly wider than long, with straight sides and rounded apex (Fig. 20). Antenna see Fig. 19, the two segments of the flagellum of nearly the same length. Male carpus 1 with brush of short setae (Fig. 21). Male ischium 7 ventrally slightly concave, frontally with distal hair-field and ventrally setose (Figs. 22, 23). Male pleopod-exopodite 1 with well-developed pointed hind-lobe (Fig. 24).

#### Distribution (map Fig. 25)

Greece, Ionian islands Kefalloniá and Zákinthos (see Remarks below).

#### Remarks

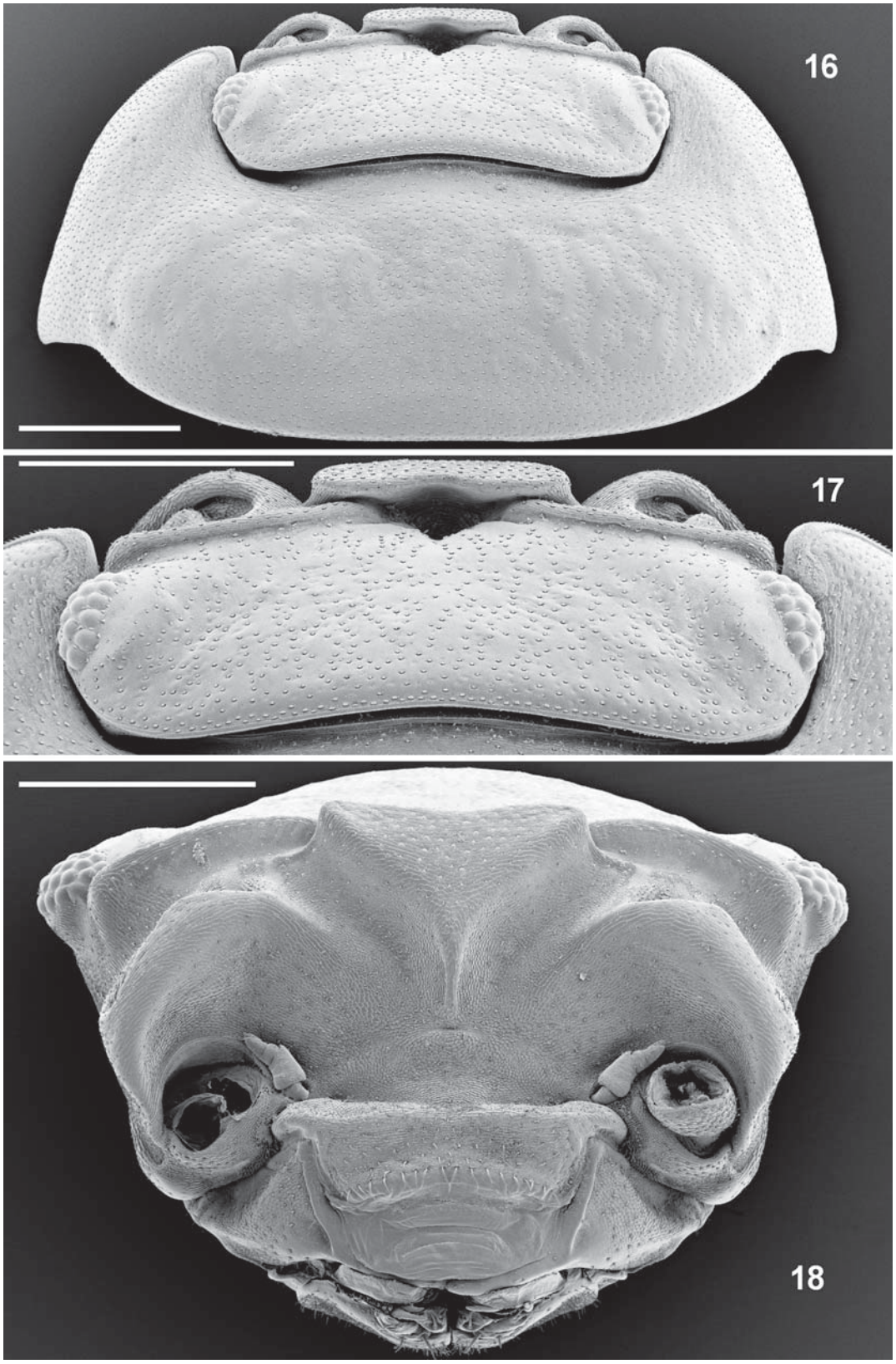
ARCANGELI (1952) synonymized *A. obenbergeri* Frankenberger, 1941 with *A. cephalonicum* and reported this species from Albania and "Yugoslavia". From the description and from the distributional data it seems, however, that *A. obenbergeri* is a separate species and that the specimens reported by ARCANGELI belong to this species.

### 3.7 *Armadillidium corcyraeum* Verhoeff, 1901

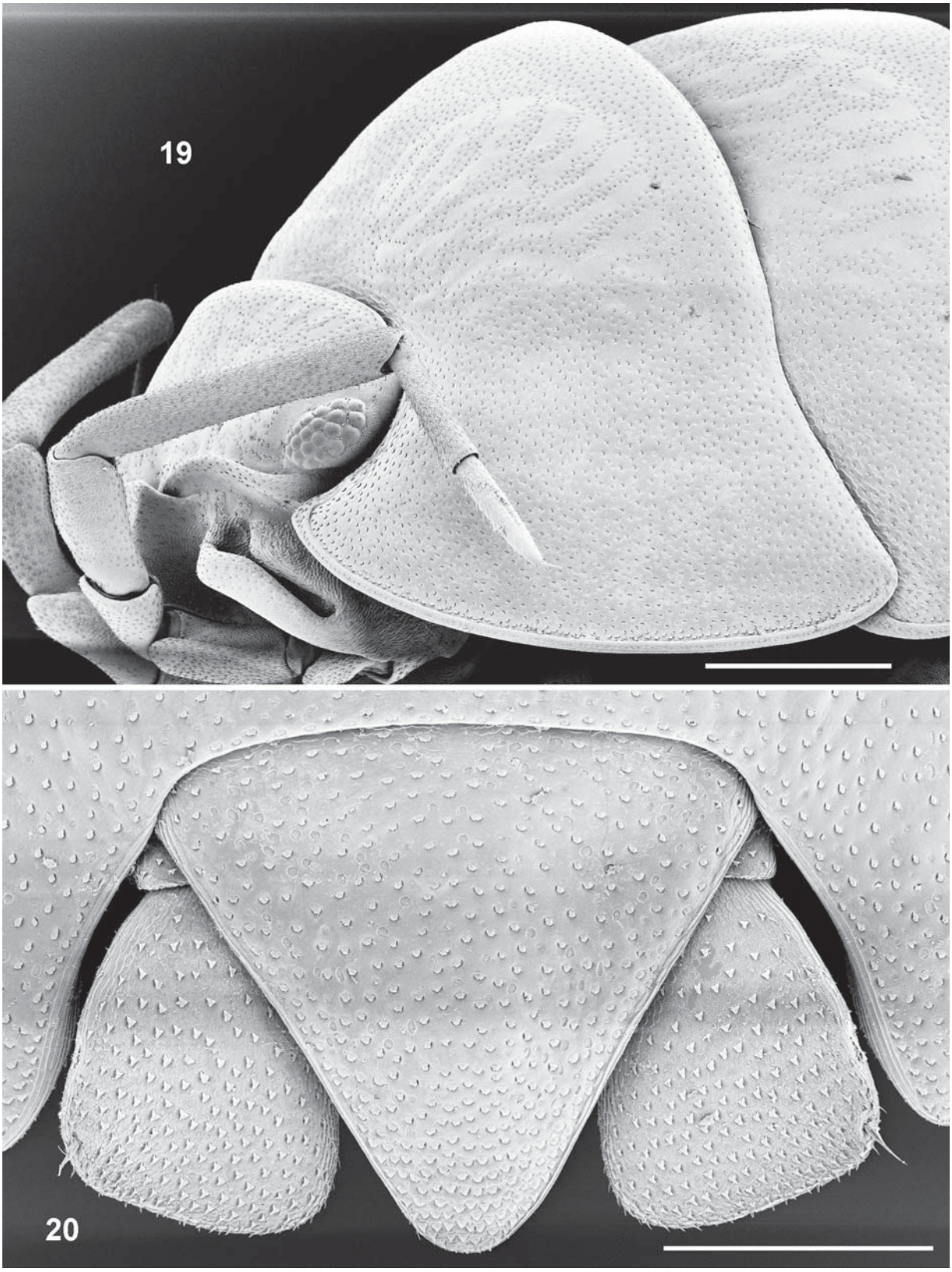
Synonym: *Armadillidium odysseum* Verhoeff, 1901.

This species was treated in the 26th contribution of this series (SCHMALFUSS 2010). It is known for sure from the Ionian islands Kérkira and Lefkáda and the adjacent mainland of the western Epirus, but to be expected also in southern Albania.

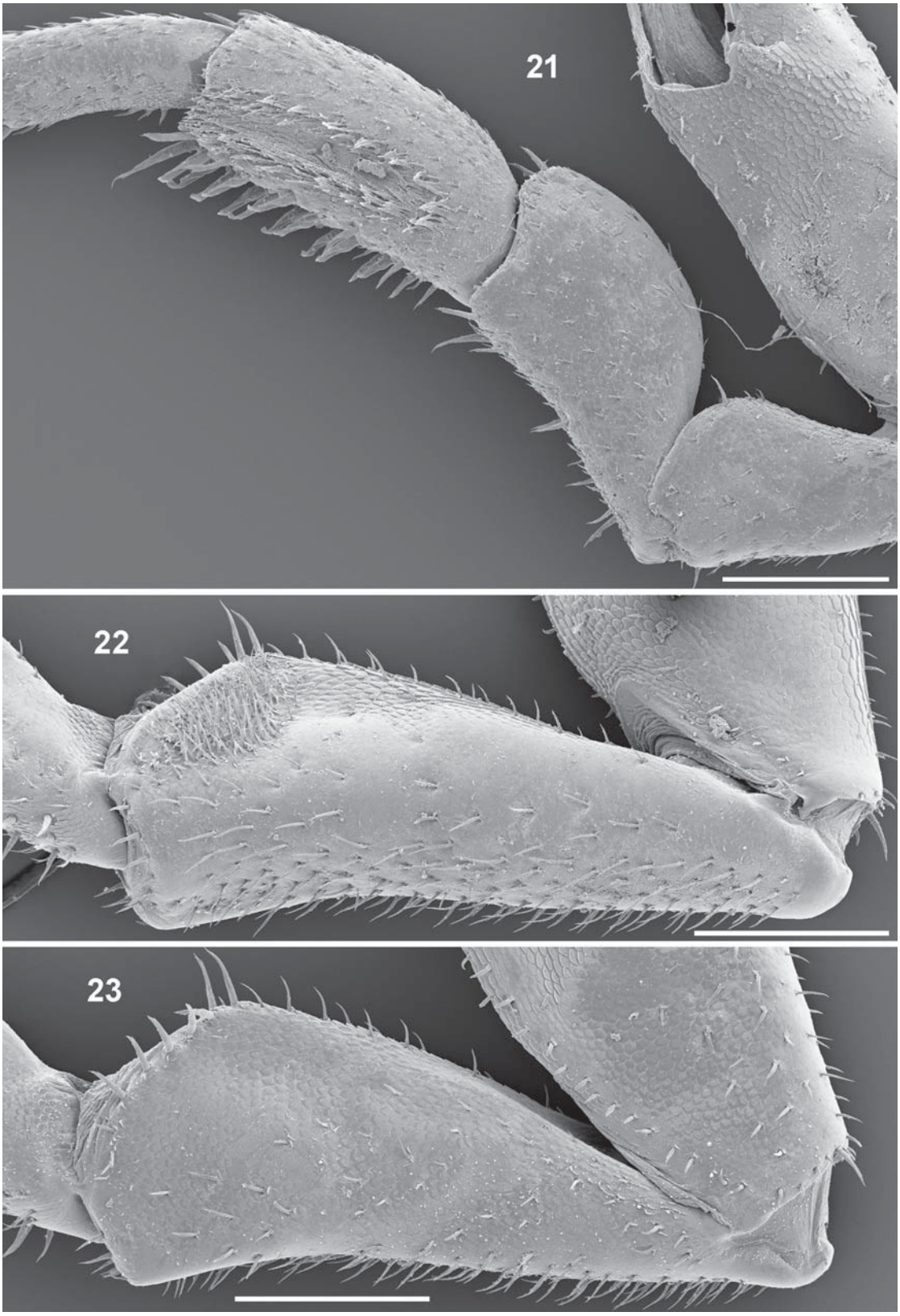
### 3.8 *Armadillidium frontemarginatum* Strouhal, 1927 (Figs. 26–35, map Fig. 36)




**Figs. 16–18.** *Armadillidium cephalonicum* (island Kefalloniá, SMNS 2555). – **16**. ♂, 12.2 × 5.0 mm, head and pereion-tergite 1, dorsal view. **17**. ♂, 12.2 × 5.0 mm, head, dorsal view. **18**. ♀, 15.2 × 6.2 mm, head, frontal view. – Scales: 1 mm.




**Figs. 19–20.** *Armadillidium cephalonicum* (island Kefalloniá, SMNS 2555). – **19**. ♀, 15.0 × 6.2 mm, head and pereion-tergite 1, lateral view. **20**. ♂, 12.2 × 5.0 mm, telson and uropods, dorsal view. – Scales: 1 mm (19), 0.5 mm (20).




**Figs. 21–23.** *Armadillidium cephalonicum* (island Kefalloniá, SMNS 2555), ♂, 11.5 × 4.7 mm. – **21**. Pereiopod 1, frontal view. **22**. Ischium 7, frontal view. **23**. Ischium 7, caudal view. – Scales: 0.3 mm.

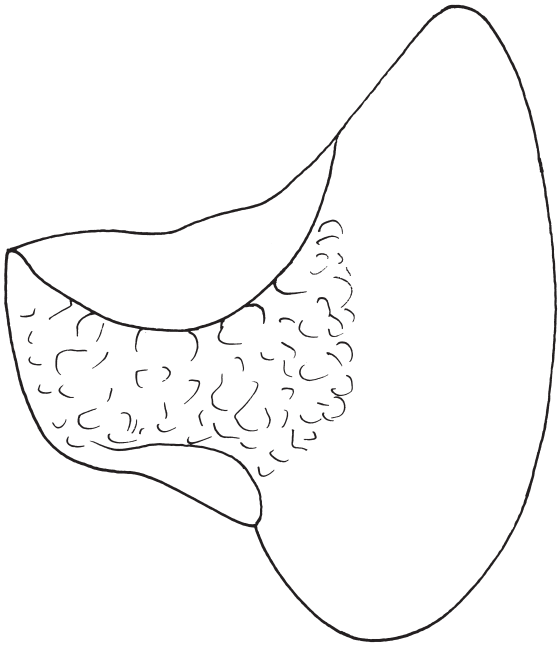


**Fig. 24.** *Armadillidium cephalonicum* (island Kefalloniá, SMNS 2555), ♂, 11.5 × 4.7 mm, pleopod-exopodite 1, dorsal view.

Literature records

STROUHAL 1927: 18, figs. 8–10 (Greece, Ionian island Kefalloniá); STROUHAL 1936: 63, 93, figs. 14–17 (Ionian islands Lefkáda and Kefalloniá); STROUHAL 1939: 183 (Ionian island Zákinthos); STROUHAL 1956: 587 (Ionian islands Lefkáda, Kálamos and Meganísi).

Material examined

**Greece**: ♀ (lectotype, 18 mm long), island Kefalloniá, leg. WERNER, IV.1894 (NMW). – 14 ex., island Lefkáda, leg. H. GOESSLER, VII.1910 (SMNS 2068). – 4 ex., island Kefalloniá, Valsamáta, leg. HAUSER, 11.IV.1970 (SMNS 2120). – 48 ex., island Kefalloniá, southeast, 1 km W of Póros, *Platanus*, leg. ERHARD & SCHMALFUSS, 27.IV.1996 (SMNS 2540). – 5 ex., island Kefalloniá, between Póros and Skála, maquis, leg. ERHARD & SCHMALFUSS, 28.IV.1996 (SMNS 2541). – 32 ex., island Kefalloniá, 3 km NW of Póros, *Pinus* and maquis, leg. ERHARD & SCHMALFUSS, 29.IV.1996 (SMNS 2542). – 10 ex., island Kefalloniá, 6 km WNW of Póros, Lake Ávithos, 300 m, leg. ERHARD & SCHMALFUSS, 30.IV.1996 (SMNS 2543). – 4 ex., island Kefalloniá, 5 km WNW of Póros, stream, 200 m, leg. ERHARD & SCHMALFUSS, 30.IV.1996 (SMNS 2544). – 26 ex., island Kefalloniá, Énos Mountain, northern foothills, 3 km W of Digaléto, maquis, 700 m, leg. ERHARD & SCHMALFUSS, 3.V.1996 (SMNS 2549). – 46 ex., island Kefalloniá, north, 1 km W of Fiskárdo, maquis, 100 m, leg. ERHARD & SCHMALFUSS, 4.V.1996 (SMNS 2551). – 40 ex., island Kefalloniá, 5 km ESE of Ássos, phrygana, 600 m, leg. ERHARD & SCHMALFUSS, 5.V.1996 (SMNS 2552). – 15 ex., island Kefalloniá, beach NNE of Komitáta, leg. ERHARD & SCHMALFUSS, 5.V.1996 (SMNS 2553). – 28 ex., island Kefalloniá, 2 km S of Ássos, Mírtos Beach, leg. ERHARD & SCHMALFUSS, 5.V.1996 (SMNS 2554). – 1 ex., island Kefalloniá, beach below Zóla, leg. ERHARD & SCHMALFUSS, 6.V.1996 (SMNS 2556). – 3 ex., island Kefalloniá, 3 km SW of Lixúri, pasture, leg. ERHARD & SCHMALFUSS, 7.V.1996 (SMNS 2557). – 6 ex., island Kefalloniá, 3 km SSW of Sámi, maquis, olive trees, stream, leg. ERHARD & SCHMALFUSS, 8.V.1996 (SMNS 2560). – 18 ex., island Zákinthos, Alikés, lagoons and olive groves, leg. ERHARD & SCHMALFUSS, 9.V.1996 (SMNS 2562). – 19 ex., island Zákinthos, Lake Keriú, swamp and pebble beach, leg. ERHARD & SCHMALFUSS, 10.–15.V.1996 (SMNS 2563, 2577). – 2 ex., island Zákinthos, 2 km W of Lithákia, maquis, leg. ERHARD & SCHMALFUSS, 14.V.1996 (SMNS 2575).

Diagnostic characters

Maximum dimensions: 18.5 × 8.0 mm.

Coloration: Dark bluish gray, juveniles lighter.

Cuticular structures: Tergites granulated (Fig. 26).

Frontal shield from behind one third as high as it is wide, laterally with right angles, caudally with a deep groove; interocular ridges forming high trapezoidal crests (Fig. 27); antennal lobes in frontal view semicircular (Fig. 28). Hind margin of pereion-epimeron 1 with sharp angle (Fig. 29). Telson wider than long, with nearly straight sides and truncate apex (Fig. 30). Flagellum of antenna with distal segment slightly shorter than proximal one (Fig. 31). Male carpus 1 with ventral brush of setae (Fig. 32). Male ischium 7 ventrally concave, frontal side without distal hair-field (Figs. 33, 34). Male pleopod-exopodite 1 with pointed triangular hind-lobe (Fig. 35).

Distribution (map Fig. 36)

Greece, Ionian islands Lefkáda, Meganísi, Kálamos, Kefalloniá and Zákinthos.

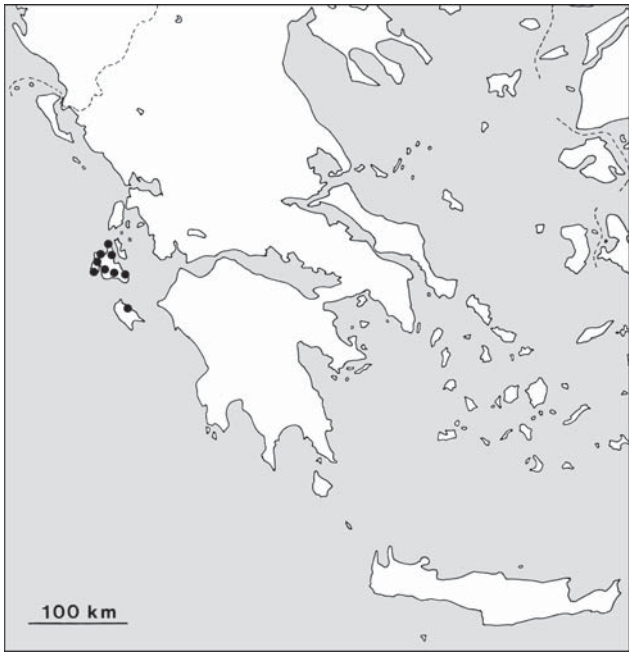
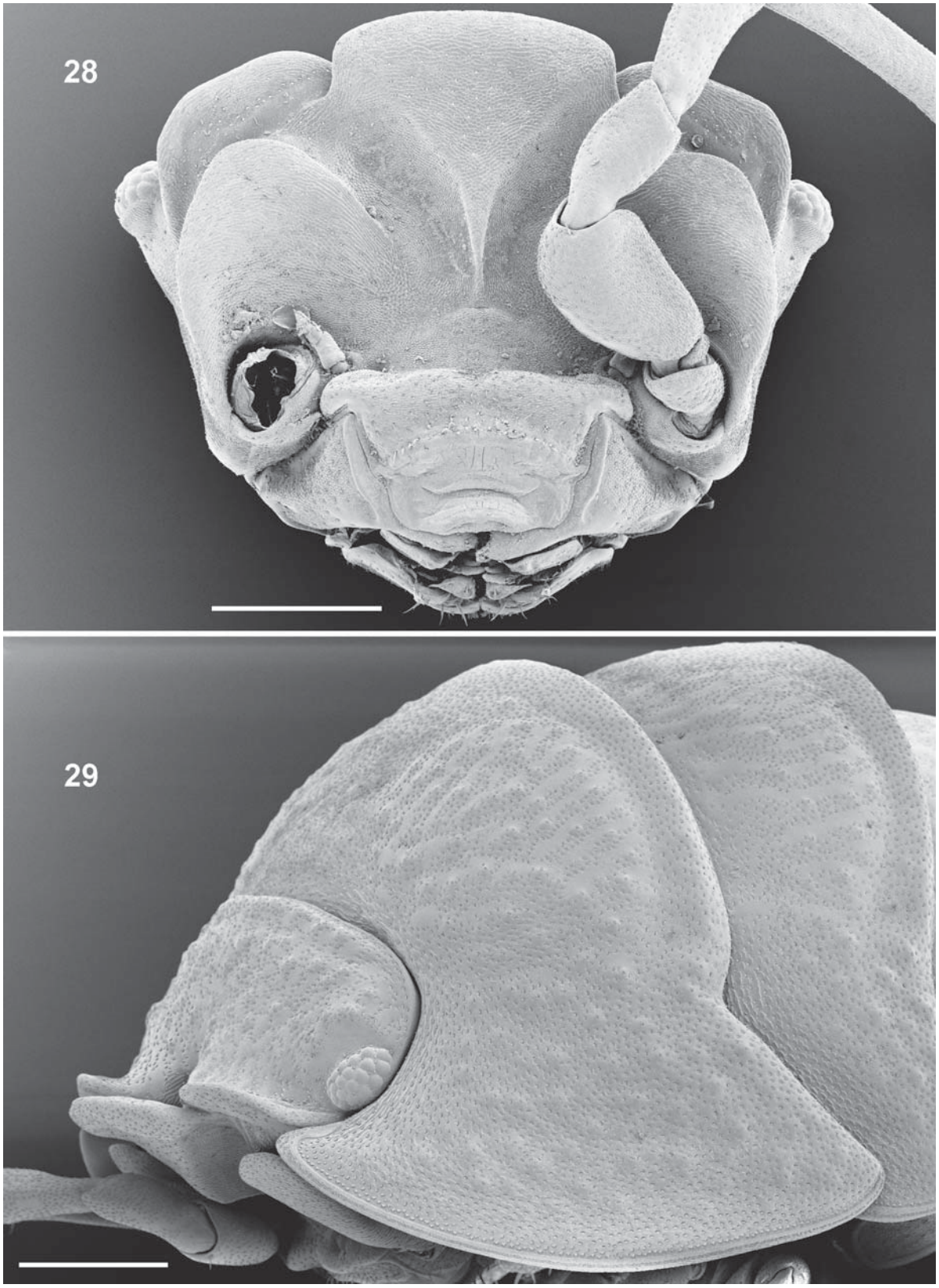
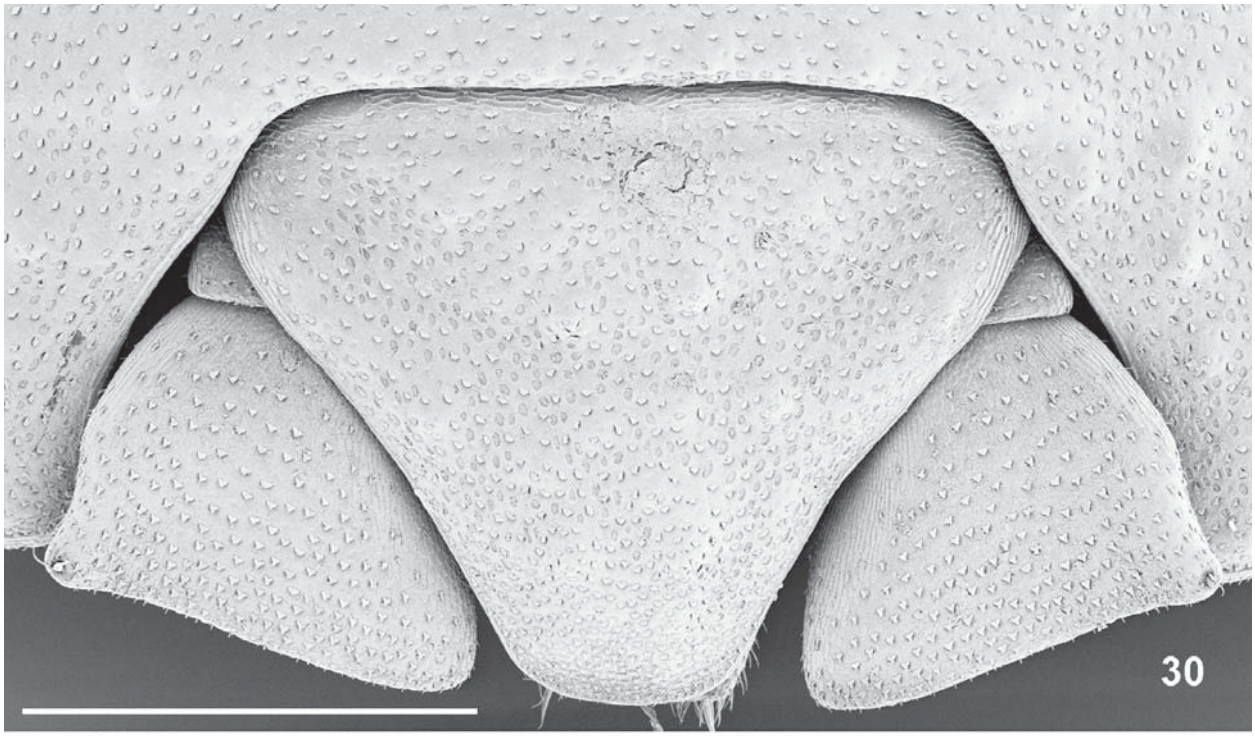


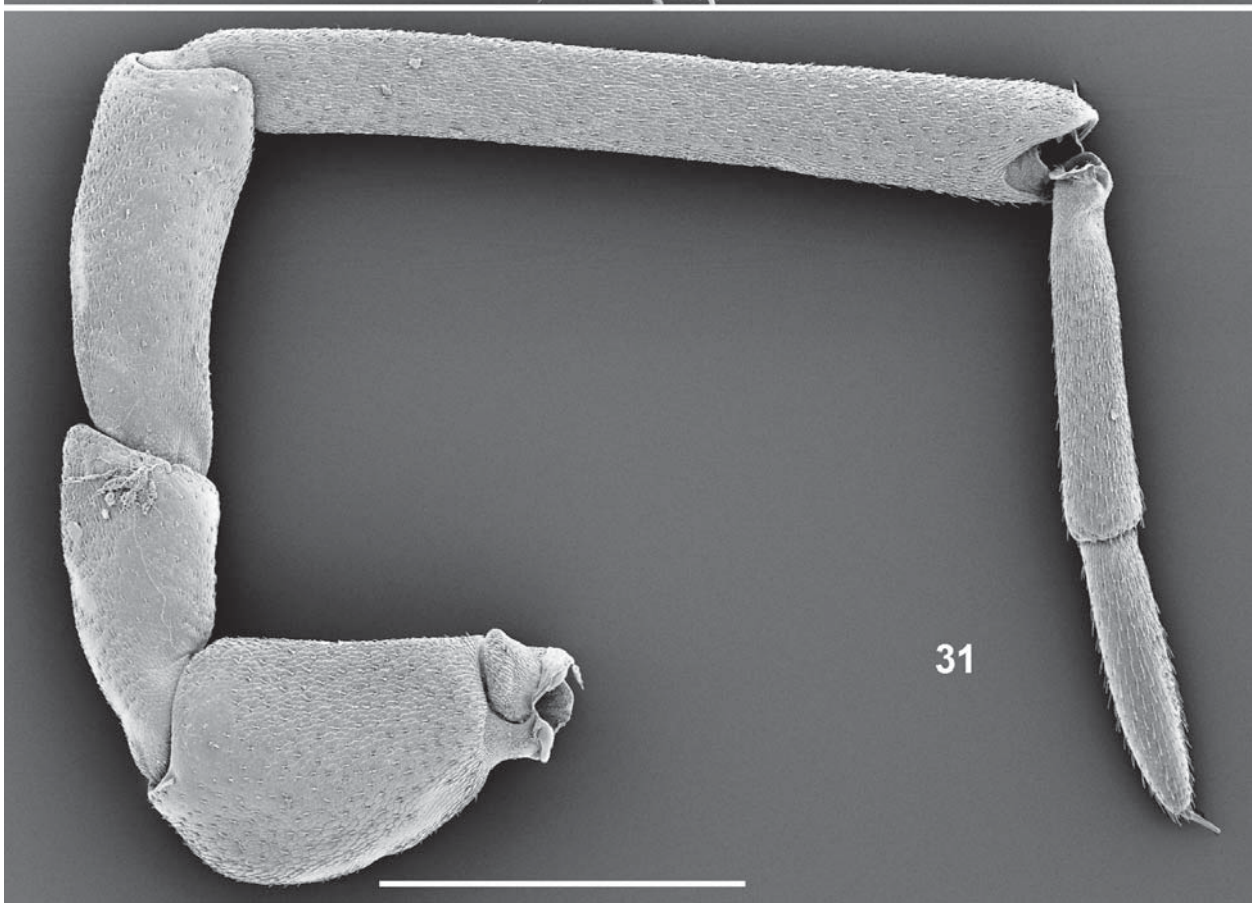

**Fig. 25.** Records of *Armadillidium cephalonicum*.


**Figs. 26–27.** *Armadillidium frontemarginatum* (island Kefalloniá, SMNS 2552), ♂, 18.5 × 7.4 mm. – **26**. Head and pereion-tergite 1, dorsal view. **27**. Head, dorsal view. – Scales: 1 mm.

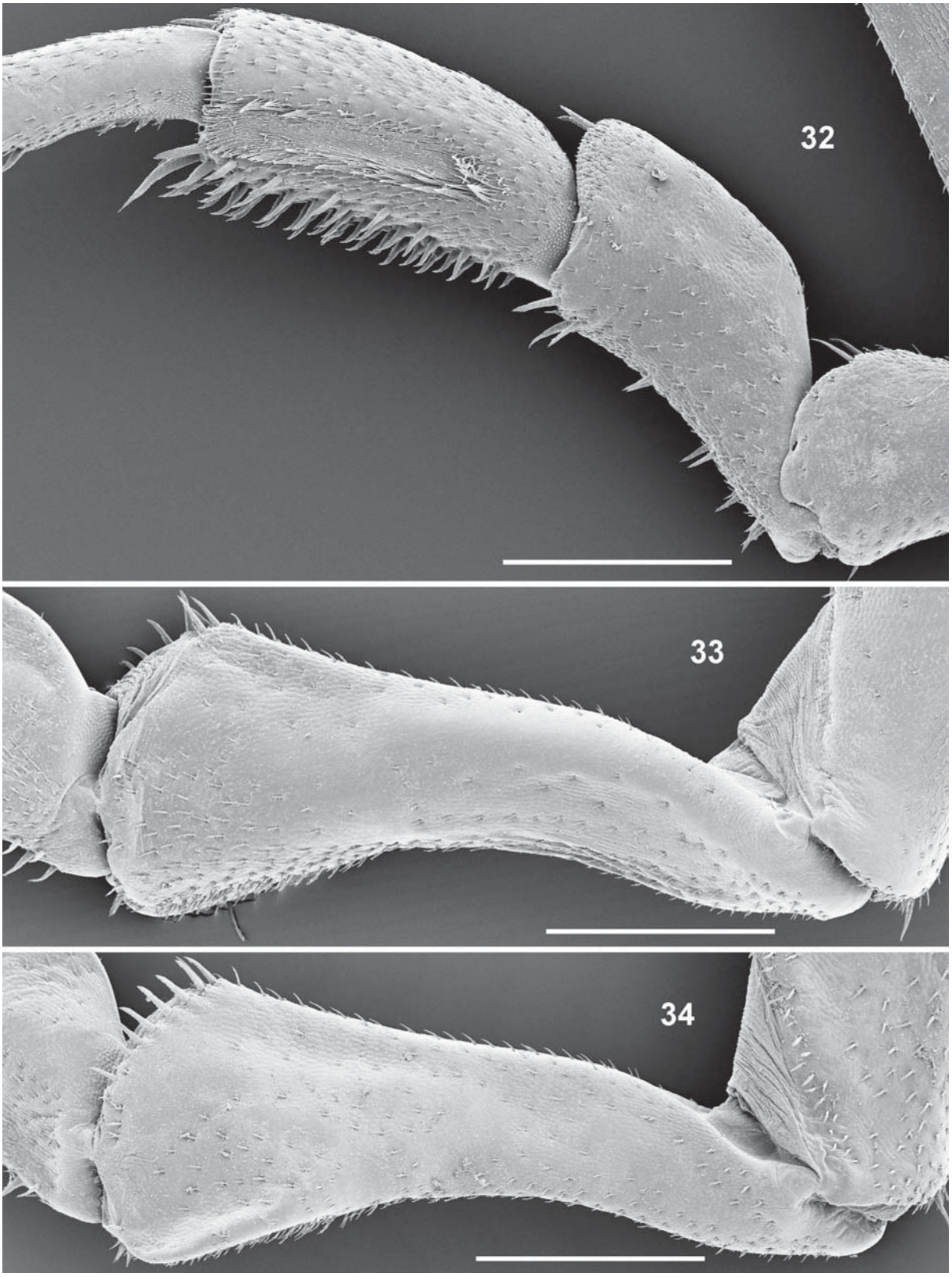



**Figs. 28–29.** *Armadillidium frontemarginatum* (island Kefalloniá, SMNS 2552). – **28**. Head, frontal view. **29**. Head and pereiontergite 1, lateral view. – Scales: 1 mm.




**Figs. 30–31.** *Armadillidium frontemarginatum* (island Kefalloniá, SMNS 2552). – **30**. ♀, 18.5 × 8.0 mm, telson and uropods, dorsal view. **31**. ♂, 18.5 × 7.4 mm, antenna. – Scales: 1 mm.




**Figs. 32–34.** *Armadillidium frontemarginatum* (island Kefalloniá, SMNS 2552), ♂, 18.5 × 7.4 mm. – **32**. Pereiopod 1, frontal view. **33**. Ischium 7, frontal view. **34**. Ischium 7, caudal view. – Scales: 0.6 mm.

Remarks

The very conspicuous head structure shows the species to be the closest relative of *A. stymphalicum* Schmalfuss, 2006 from the Peloponnese (compare SCHMALFUSS 2006a: 80).

### 3.9 *Armadillidium frontetriangulum* Verhoeff, 1901

This species was treated in the 26th contribution of this series (SCHMALFUSS 2010). It is known from the Greek island Kérkira and the northwestern Greek mainland.

### 3.10 *Armadillidium granulatum* Brandt, 1833

The species has been treated in the 23rd contribution of this series (SCHMALFUSS 2006a). It is known from the coasts of the Mediterranean Sea, east to Asia Minor and Libya, and the southwestern coast of the Black Sea; isolated records exist from the Atlantic coast of Portugal and northern France. In the Ionian islands it has been recorded from Lefkáda and Kefalloniá (STROUHAL 1936) and the Strofádes islands which lie about 60 km S of Zákinthos (SCHMALFUSS 2006a).

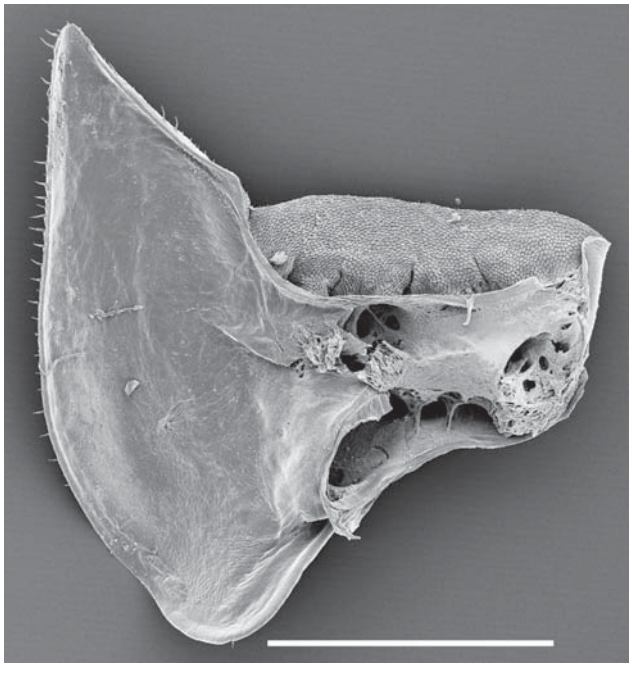


**Fig. 35.** *Armadillidium frontemarginatum* (island Kefalloniá, SMNS 2552), ♂, 18.5 × 7.4 mm, pleopod-exopodite 1, dorsal view. – Scale: 0.8 mm.

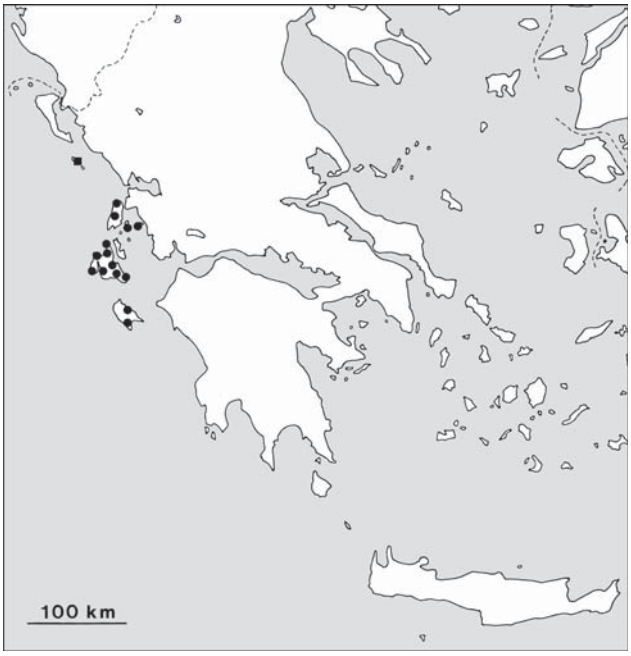



**Fig. 36.** Records of *Armadillidium frontemarginatum* (●) and *A. hauseni* (■).

### 3.11 *Armadillidium hauseni* Schmalfuss, 1985 (Figs. 37–46, map Fig. 36)

Literature record

SCHMALFUSS 1985: 2, figs. 2–6 (Greece, Ionian island Paxí).

Material examined

**Greece**: ♂ (holotype), island Paxí, leg. SCHAWALLER & SCHEUERN, 19.IV.1981 (SMNS T149). – 4 ♂♂, 8 ♀♀ (paratypes), collecting data as before (SMNS T150). – 1 ♂ (paratype), island Paxí, leg. HAUSEN, IV.1979 (SMNS T151).

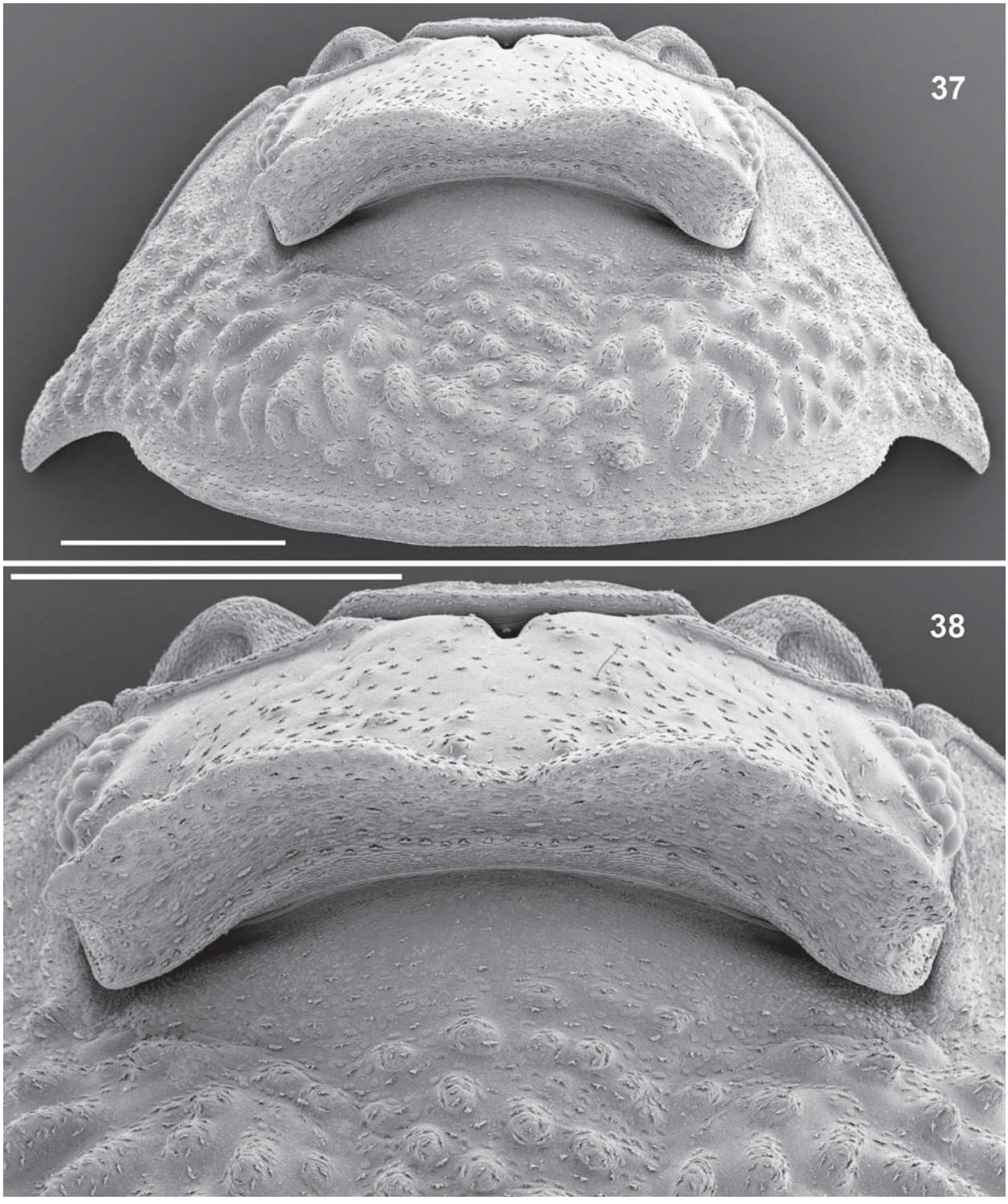
Diagnostic characters

Maximum dimensions: 14.0 × 7.3 mm.

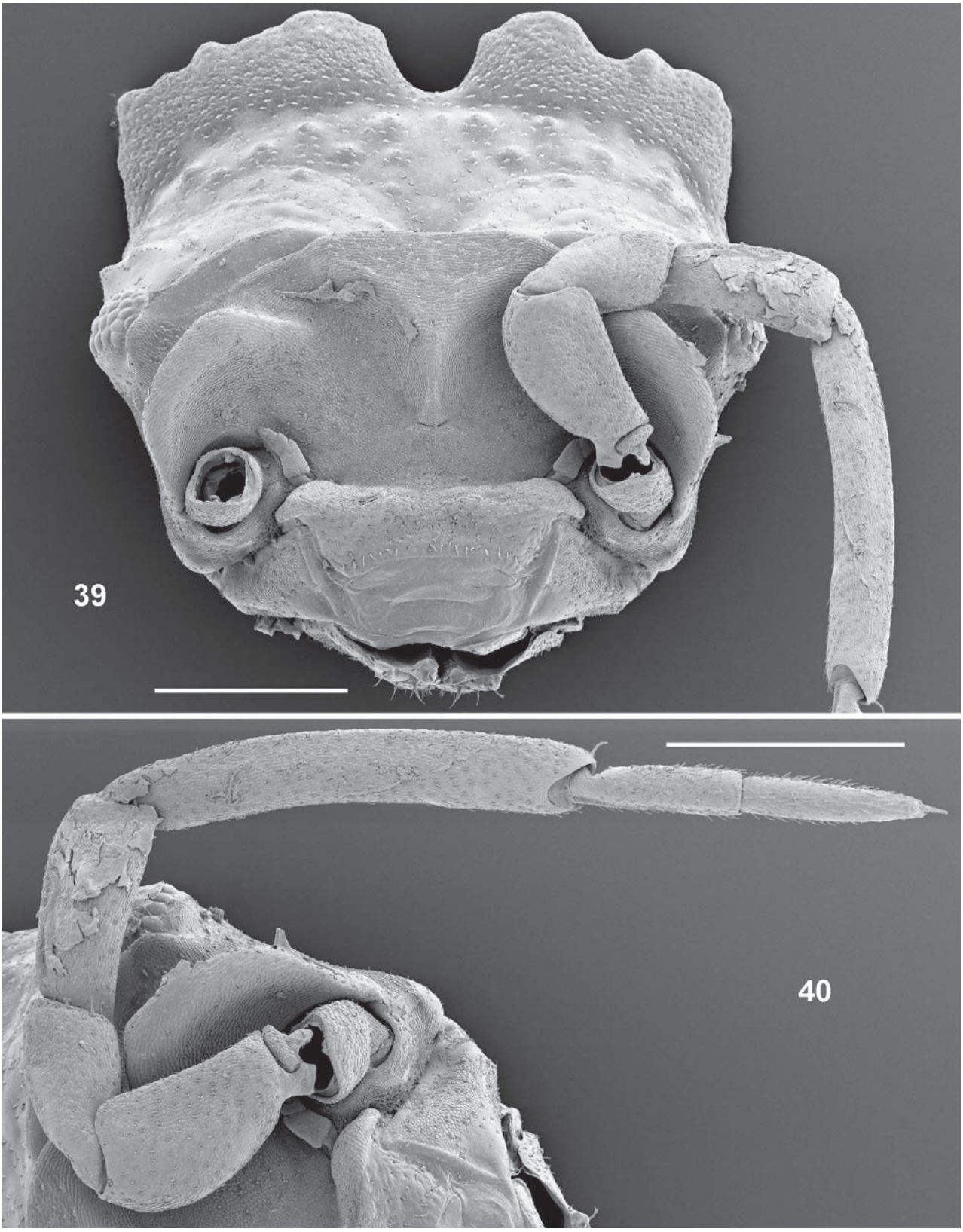
Coloration: Body colour yellowish white, eyes black.

Cuticular structures: Tergites with pronounced tubercles, which are highest on first pereion-tergite (Fig. 37); head caudally with very high tubercles which are fused and form an upright ledge obliquely pointing backwards (Figs. 38, 39).

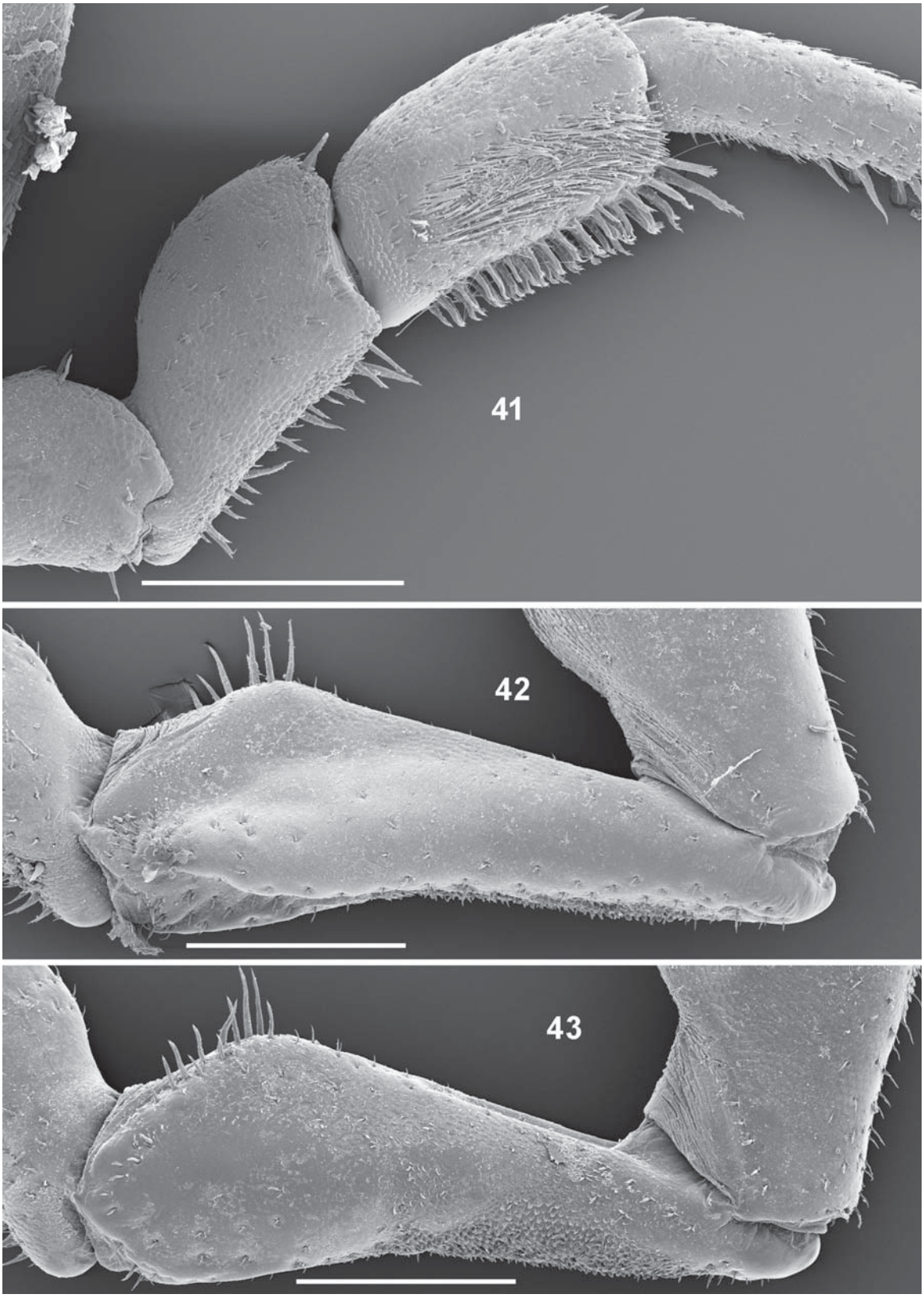
Frontal shield from behind not surpassing frontal margin, upper margin straight (Fig. 38); antennal lobes in frontal view trapezoidal (Fig. 39). Hind margin of pereion-epimeron 1 with flat rounded angle (Fig. 44). Telson slightly wider than long, with straight sides and broadly rounded apex (Fig. 45). Flagellum of antenna with the two segments of equal length (Fig. 40). Male carpus 1 ventrally



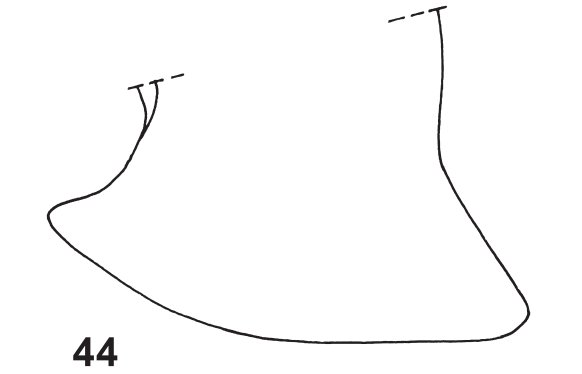

**Figs. 37–38.** *Armadillidium hauseni* (island Paxí, SMNS T151), ♂, paratype, 10.0 × 4.7 mm. – **37**. Head and pereion-tergite 1, dorsal view. **38**. Head, dorsal view. – Scales: 1 mm.

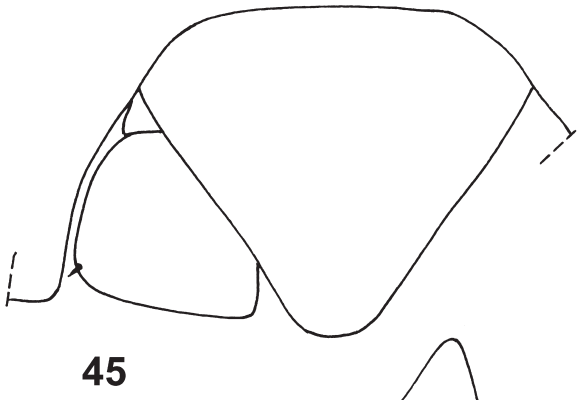


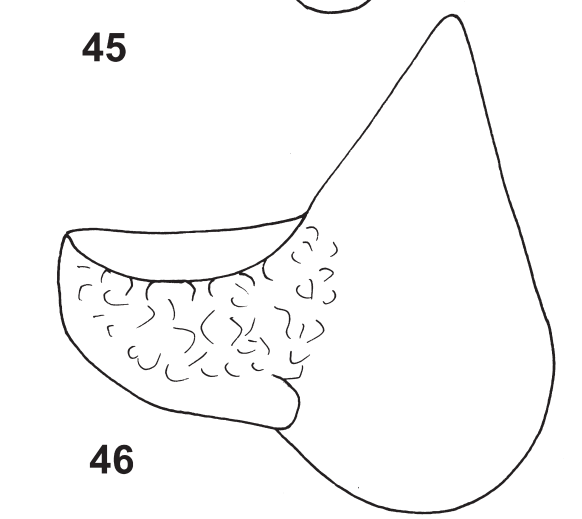

**Figs. 39–40.** *Armadillidium hauseni* (island Paxí, SMNS T150), ♀, paratype, 14.0 × 7.3 mm. – **39**. Head, frontal view. **40**. Antenna. – Scales: 1 mm.




**Figs. 41–43.** *Armadillidium hauseni* (island Paxí, SMNS T151), ♂, paratype, 10.0 × 4.7 mm. – **41**. Pereiopod 1, frontal view. **42**. Ischium 7, frontal view. **43**. Ischium 7, caudal view. – Scales: 0.4 mm.




**Figs. 44–46.** *Armadillidium hauseni* (island Paxí, SMNS T149), ♂, holotype, 12.0 × 5.5 mm. – **44**. Pereion-epimeron 1, lateral view. **45**. Telson and uropod, dorsal view. **46**. Pleopod-exopodite 1, dorsal view.

with brush of setae (Fig. 41). Male ischium 7 ventrally slightly concave, frontal side without distal hair-field, but with a distal crest, caudally with a proximal field of short spiny scales (Figs. 42, 43). Male pleopod-exopodite 1 with acutely pointed hind-lobe (Fig. 46).

Distribution (map Fig. 36)

Greece, Ionian island Paxí.

Remarks

In the genus *Armadillidium* the upright ledge at the posterior margin of the head is unique, but comparably modified tubercles are found in *Stegosauroniscus horridus* Schmölzer, 1974 (family Eubelidae, tropical Africa), in some species of the genus *Coronodillo* Taiti, Paoli & Ferrara, 1998 (family Armadillidae, New Zealand), and in the genus *Hemilepistus* (family Agnaridae, western Asia). The function of this structure in the present species is unknown.

### 3.12 *Armadillidium humectum* Strouhal, 1937

The species has been treated in the 23rd contribution of this series (Schmalfuss 2006a). It is known from the western part of Greece (Ionian islands, western mainland and northern Peloponnese) and from the southwestern coast of Albania (see also Schmalfuss 2010).

### 3.13 *Armadillidium jonicum* Strouhal, 1927 (Figs. 47–55, map Fig. 56)

Literature records

Strouhal 1927: 22, figs. 18–22 (Greece, Ionian island Kefalloniá); Strouhal 1936: 66, 100; Strouhal 1937a: 54, figs. 8–9 (Ionian island Lefkáda); Strouhal 1956: 597 (Ionian island Kálamos).

Material examined

**Greece**: ♂ (lectotype, herewith designated), island Kefalloniá, leg. Werner, IV.1894 (NMW). – 8 ex. (syntypes of *A. j. leucadium*), island Lefkáda (= Levkas), Sívros, leg. Beier, 25.IV.1929 (NMW). – 10 ex., island Itháki, monastery Katharón, 600 m, leg. Hauser, 19.IV.1972 (SMNS 2170). – 1 ex., island Kefalloniá, 1 km W of Póros, *Platanus*, leg. Erhard & Schmalfuss, 27.IV.1996 (SMNS 2540). – 8 ex., island Kefalloniá, 1–3 km NNW of Póros, beach, maquis, leg. Erhard & Schmalfuss, 1.V.1996 (SMNS 2545).

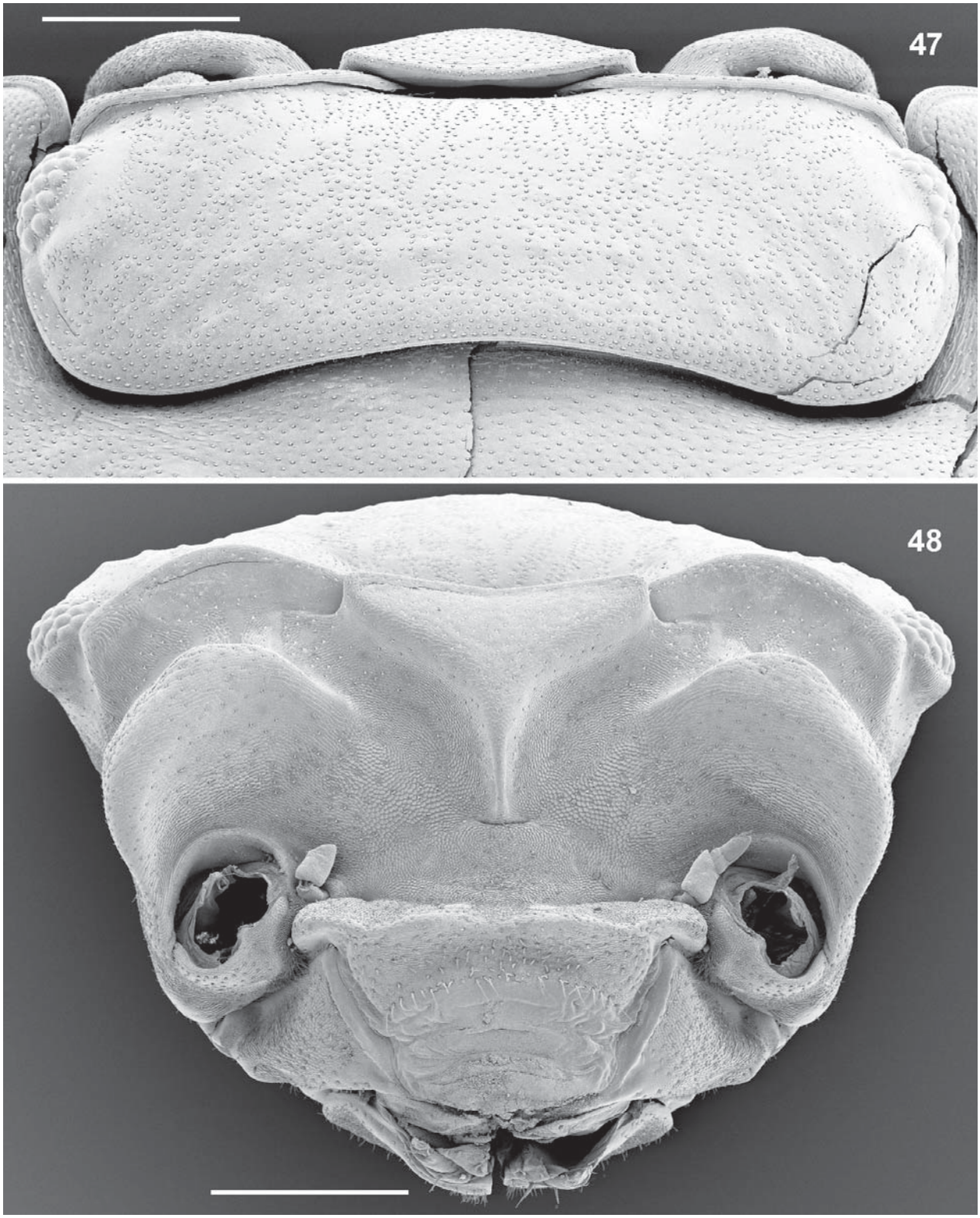
Diagnostic characters

Maximum dimensions: 21.5 × 10.2 mm.

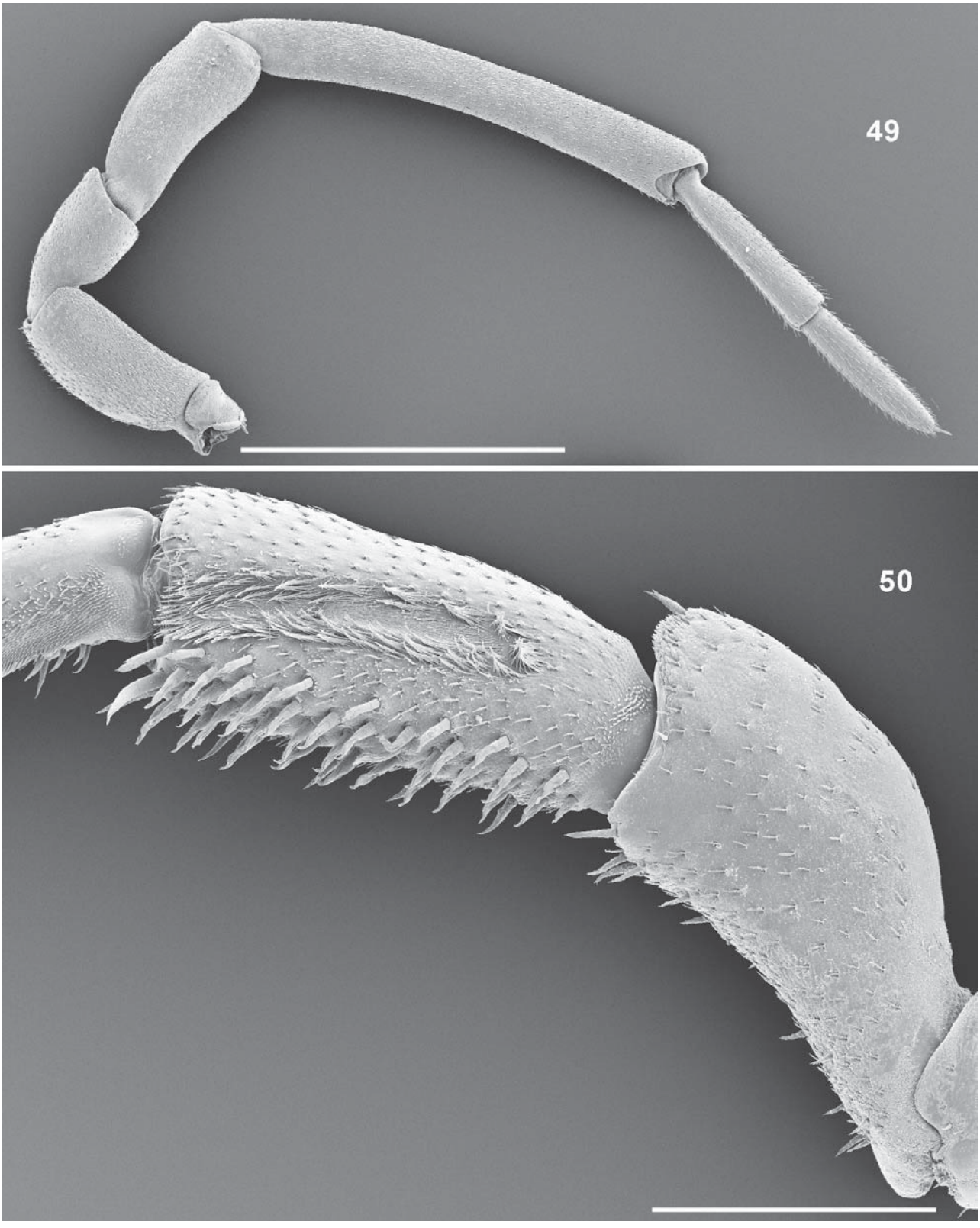
Coloration: Bluish gray, with three conspicuous rows of yellow spots on the pereion-tergites and with yellowish epimera.

Cuticular structures: Tergites with slight granulation.

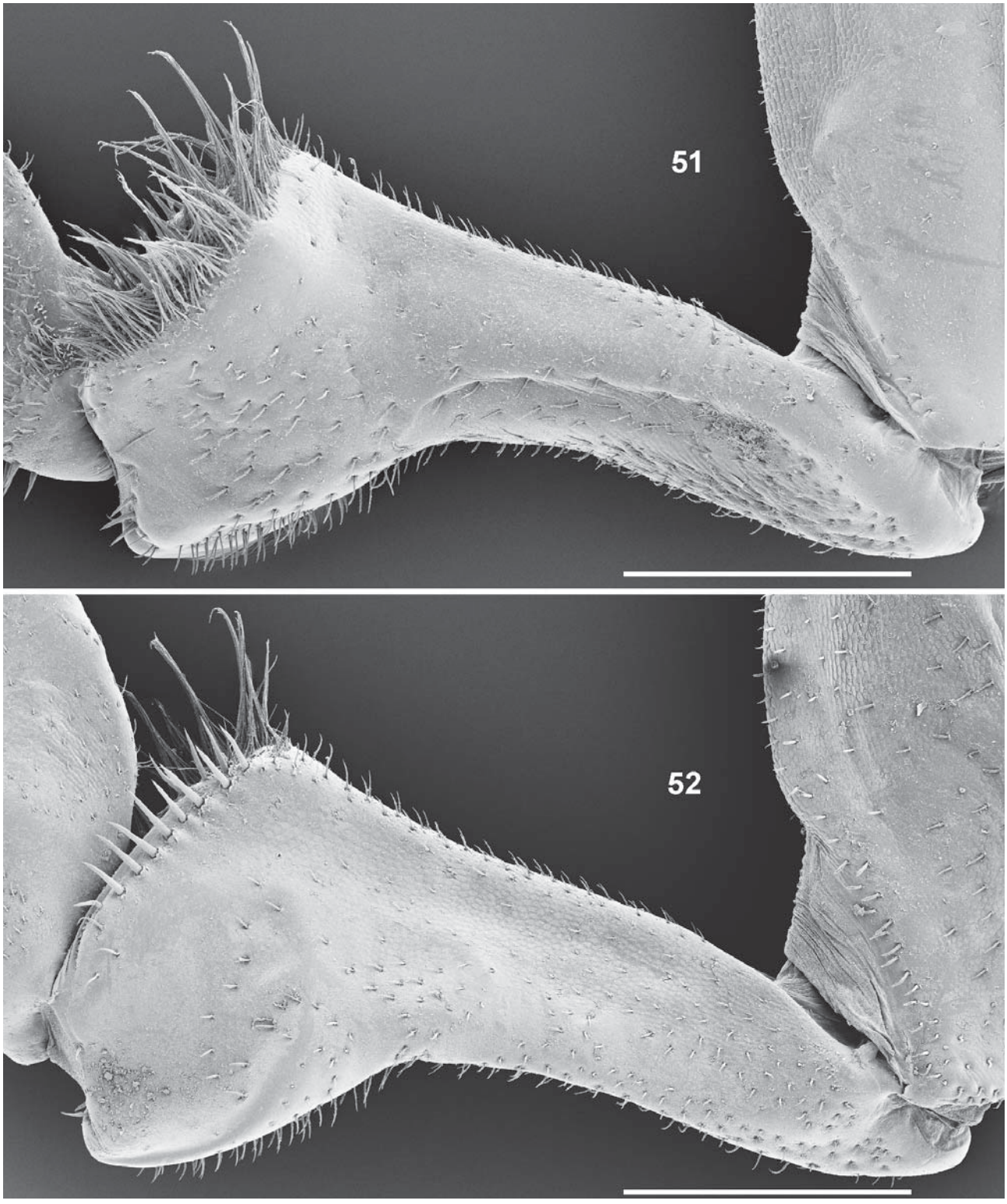
Frontal shield from behind not surpassing frontal margin, upper margin straight, laterally with sharp angles, surface of the triangle in a very oblique angle towards dorsal part of head (Figs. 47, 48); antennal lobes in frontal view trapezoidal (Fig. 48). Hind margin of pereion-epimeron 1 with pronounced pointed angle (Fig. 53). Telson longer than wide, with slightly concave sides and narrowly rounded apex (Fig. 54). Antennal flagellum with distal segment



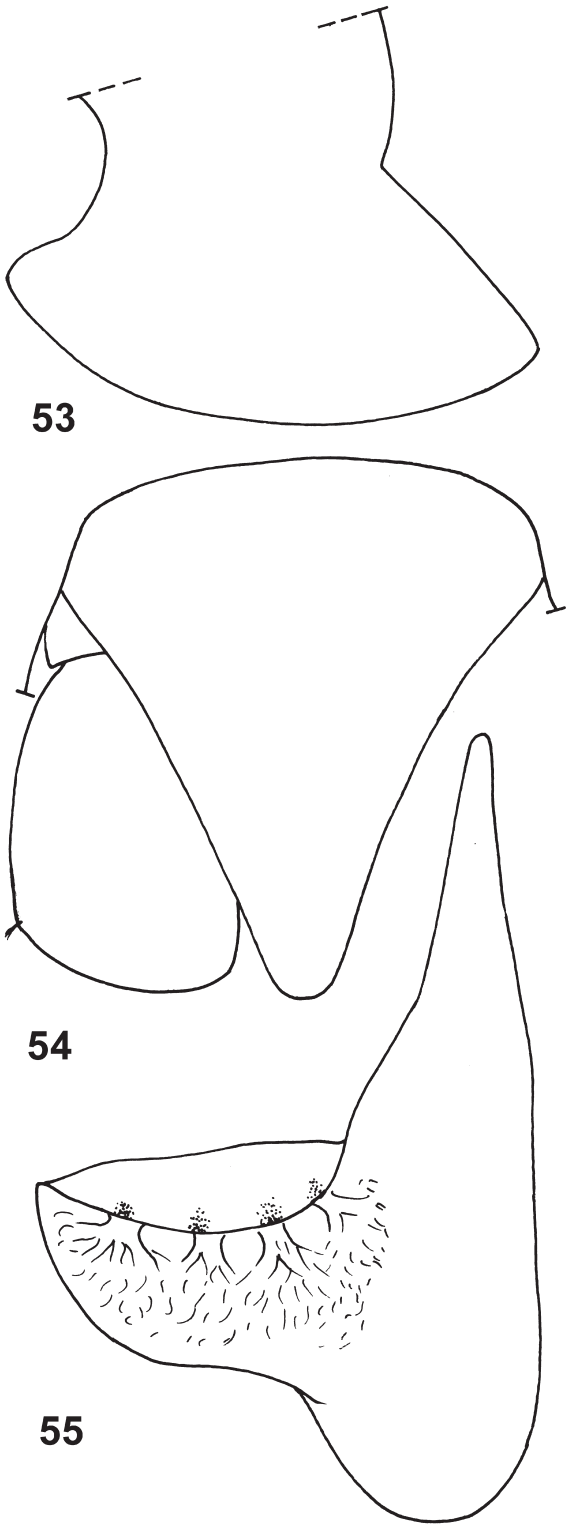

**Figs. 47–48.** *Armadillidium jonicum* (island Itháki, SMNS 2170). – **47**. ♂, 21.8 × 9.8 mm, head, dorsal view. **48**. ♀, 21.5 × 10.2 mm, head, frontal view. – Scales: 1 mm.




**Figs. 49–50.** *Armadillidium jonicum* (island Itháki, SMNS 2170), ♂, 21.8 × 9.8 mm. – **49**. Antenna. **50**. Pereiopod 1, frontal view. – Scales: 2 mm (49), 0.7 mm (50).




**Figs. 51–52.** *Armadillidium jonicum* (island Itháki, SMNS 2170), ♂, 21.8 × 9.8 mm. – **51**. Ischium 7, frontal view. **52**. Ischium 7, caudal view. – Scales: 0.8 mm.




**Figs. 53–55.** *Armadillidium jonicum* (island Kefalloniá, NMW), ♂, lectotype, 20 mm long. – **53**. Pereion-epimeron 1, lateral view. **54**. Telson and uropod, dorsal view. **55**. Pleopod-exopodite 1, dorsal view.

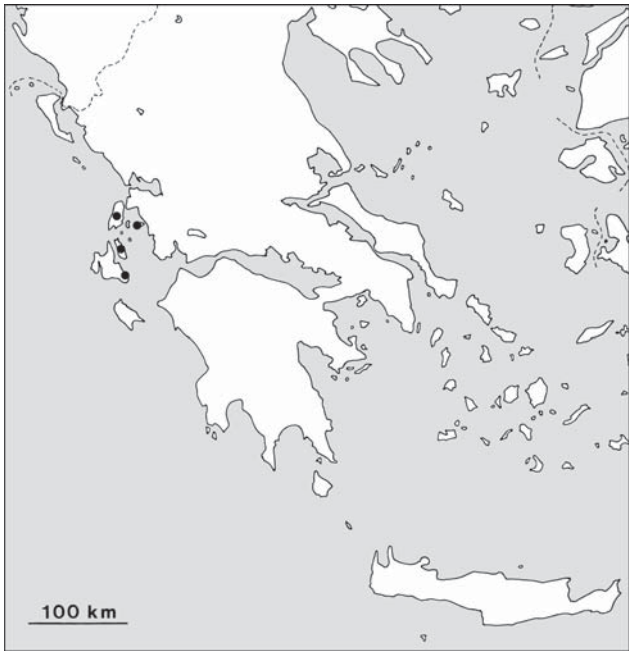



**Fig. 56.** Records of *Armadillidium jonicum*.

slightly shorter than proximal one (Fig. 49). Male carpus 1 with short brush of setae (Fig. 50). Male ischium 7 ventrally strongly concave, frontally with dense hairy setal comb (Figs. 51, 52). Male pleopod-exopodite 1 with long pointed hind-lobe (Fig. 55).

Distribution (map Fig. 56)

Greece, Ionian islands Lefkáda (= Levkas), Kálamos, Itháki and Kefalloniá.

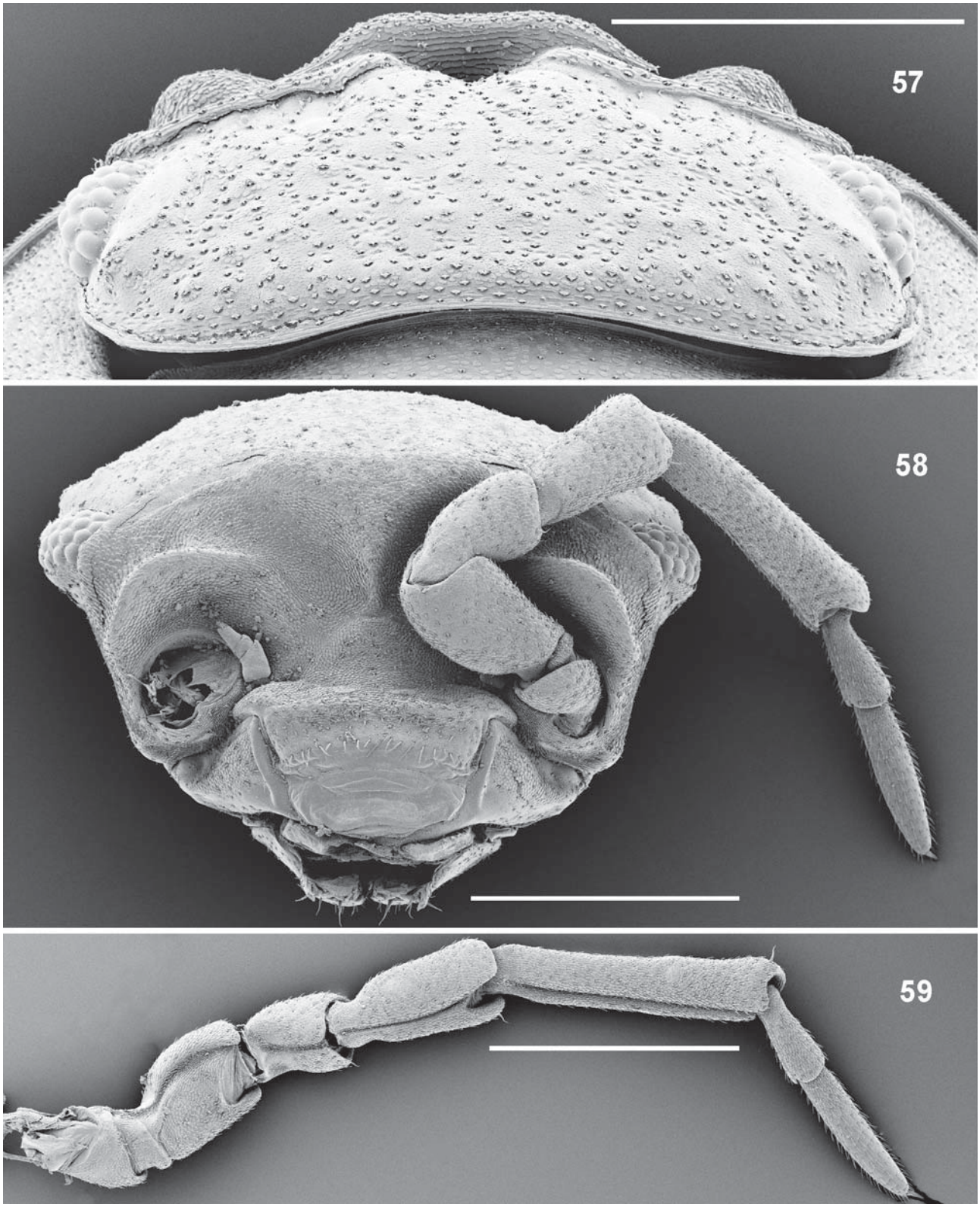
Remarks

Strouhal (1937a, 1956) has described two additional subspecies of *A. jonicum*, *A. j. leucadium* and *A. j. epiroticum*. While the differences of *leucadium* towards the nominate race fall inside the variability spectrum of *Armadillidium* species, the subspecies *epiroticum* shows differences which are used inside the genus for taxa differing on the species level. Therefore I consider *leucadium* only as a variety of *A. jonicum*, while *epiroticum* is treated as a different species (see Schmalfuss 2010).

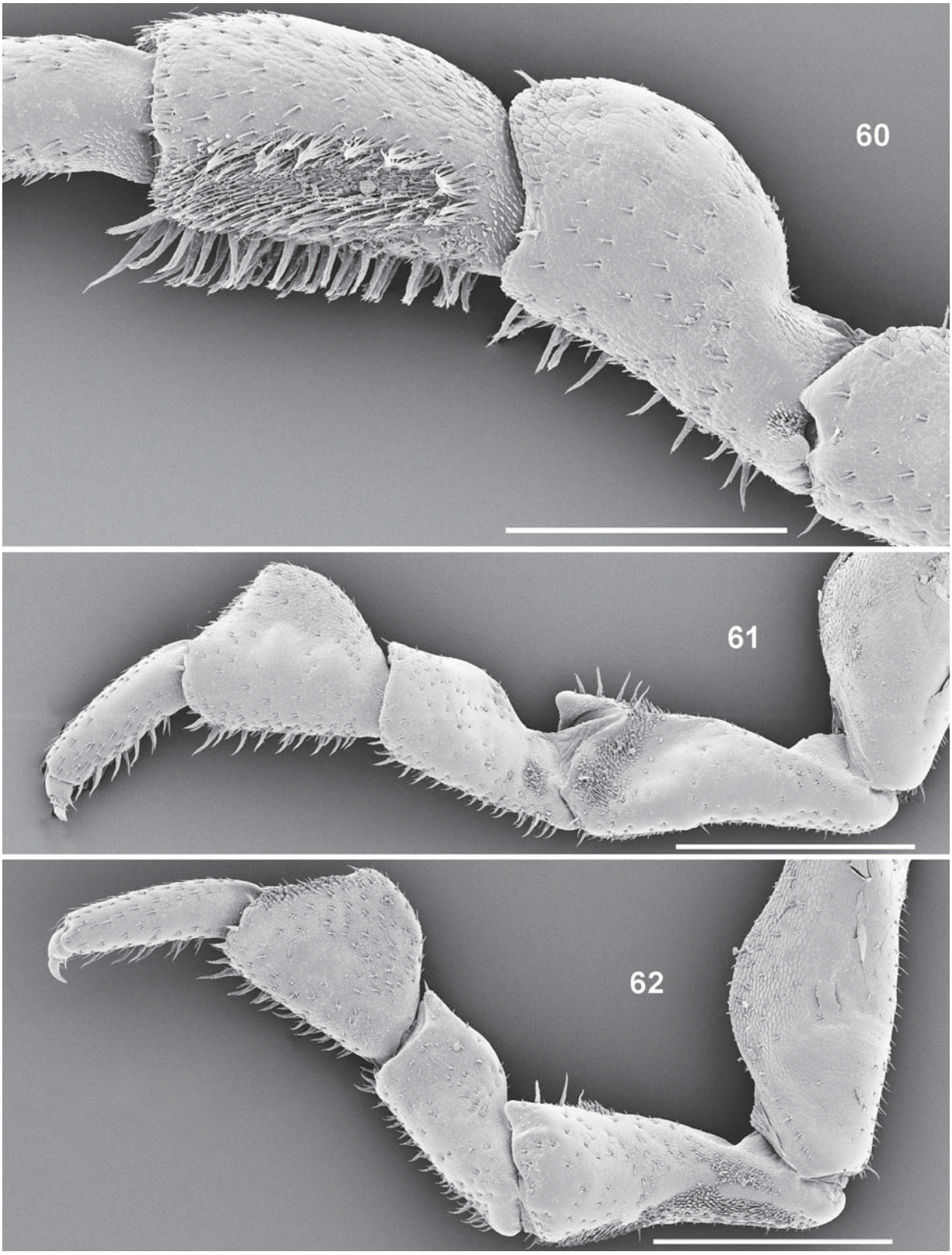
### 3.14 *Armadillidium justi* Strouhal, 1937
(Figs. 57–65, map Fig. 66)

Literature records

Strouhal 1936: 97 (nomen nudum; Greece, Ionian island Lefkáda); Strouhal 1937a: 48, figs. 3–4 (Ionian island Lefkáda); Strouhal 1956: 591, figs. 9–10 (Ionian islands Lefkáda, Meganísi, Kálamos).



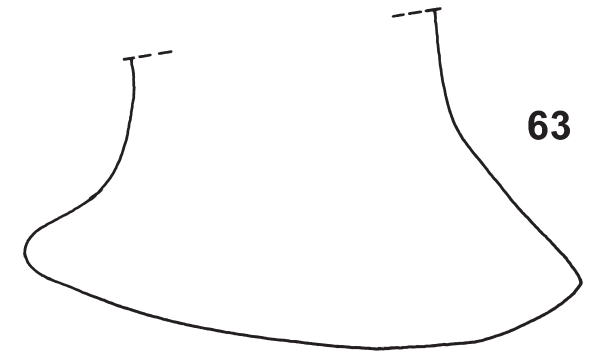

**Figs. 57–59.** *Armadillidium justi* (island Lefkáda, SMNS 2169). – **57**. ♂, 10.0 × 4.0 mm, head, dorsal view. **58**. ♂, 10.0 × 4.3 mm, head, frontal view. **59**. ♂, 10.0 × 4.0 mm, antenna. – Scales: 1 mm.

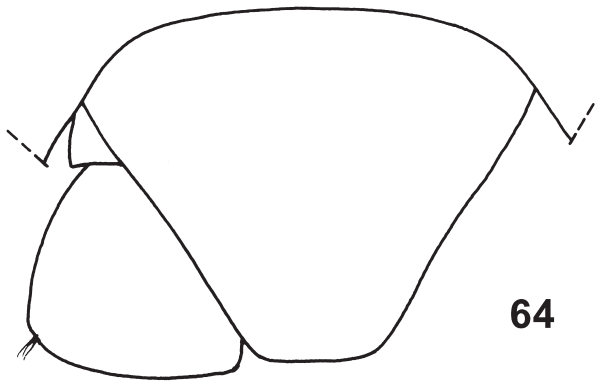


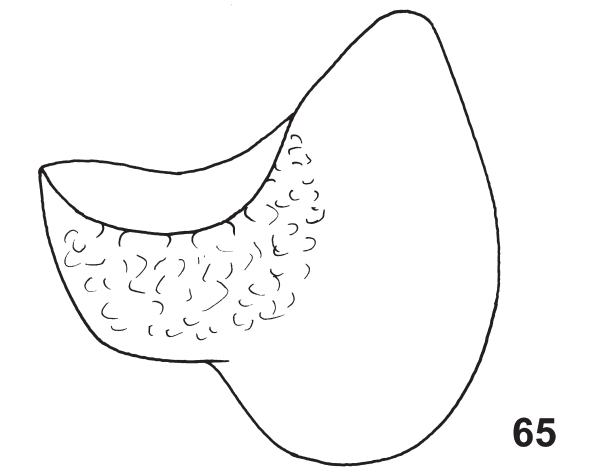

**Figs. 60–62.** *Armadillidium justi* (island Lefkáda, SMNS 2169), ♂, 10.0 × 4.0 mm. – **60**. Pereiopod 1, frontal view. **61**. Pereiopod 7, frontal view. **62**. Pereiopod 7, caudal view. – Scales: 0.4 mm (60), 0.8 mm (61, 62).

Material examined

**Greece**: ♂ (syntype), island Lefkáda (= Levkas), near town Lefkáda, olive grove, leg. Beier, IV.1929 (NMW). – ♂ (syntype, preparation made by Strouhal), island Lefkáda, Kaligóni, leg. Beier, IV.1929 (NMW). – 3 ex., island Lefkáda, Kaligóni, olive grove, leg. Hauser, 26.III.1971 (SMNS 2169).




**Figs. 63–65.** *Armadillidium justi* (island Lefkáda, NMW), ♂, syntype, 10 mm long (63, 64) and ♂, syntype, Strouhal's preparation (65). – **63**. Pereion-epimeron 1, lateral view. **64**. Telson and uropod, dorsal view. **65**. Pleopod-exopodite 1, dorsal view.

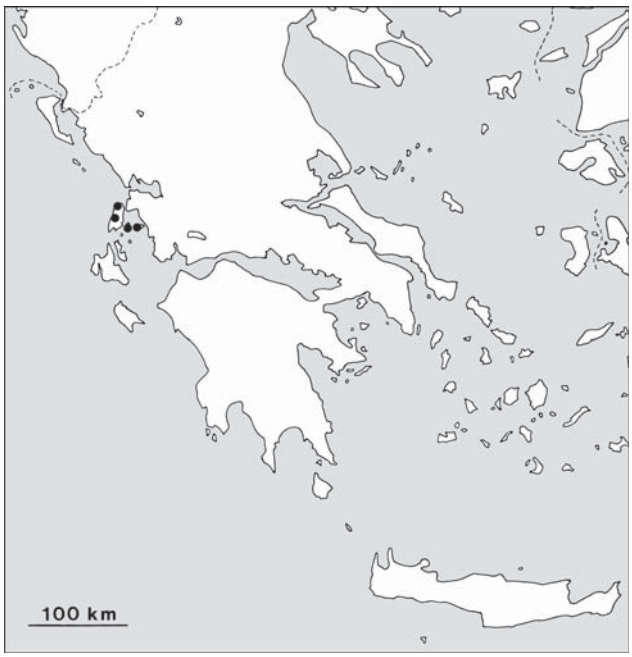



**Fig. 66.** Records of *Armadillidium justi*.

Diagnostic characters

Maximum dimensions: 12.0 × 5.0 mm (Strouhal 1956).

Coloration: Upper parts light grayish brown, with usual yellowish muscle spots.

Cuticular structures: Tergites slightly granulated.

Frontal shield from behind surpassing frontal margin, upper margin straight (Fig. 57); antennal lobes in frontal view trapezoidal (Fig. 58). Hind margin of pereion-epimeron 1 with completely rounded concavity (Fig. 63). Telson slightly longer than wide, with straight sides and truncate apex (Fig. 64). Flagellum of antenna with proximal segment three fifths of distal one (Figs. 58, 59). Male pereiopod 1 with ventral brush of setae only on carpus (Fig. 60). Male pereiopod 7 with carpus dorsally strongly enlarged, ischium 7 ventrally slightly convex, frontal side with distal hair-field, caudal side with ventral scale areas (Figs. 61, 62). Male pleopod-exopodite 1 with short triangular hind-lobe (Fig. 65).

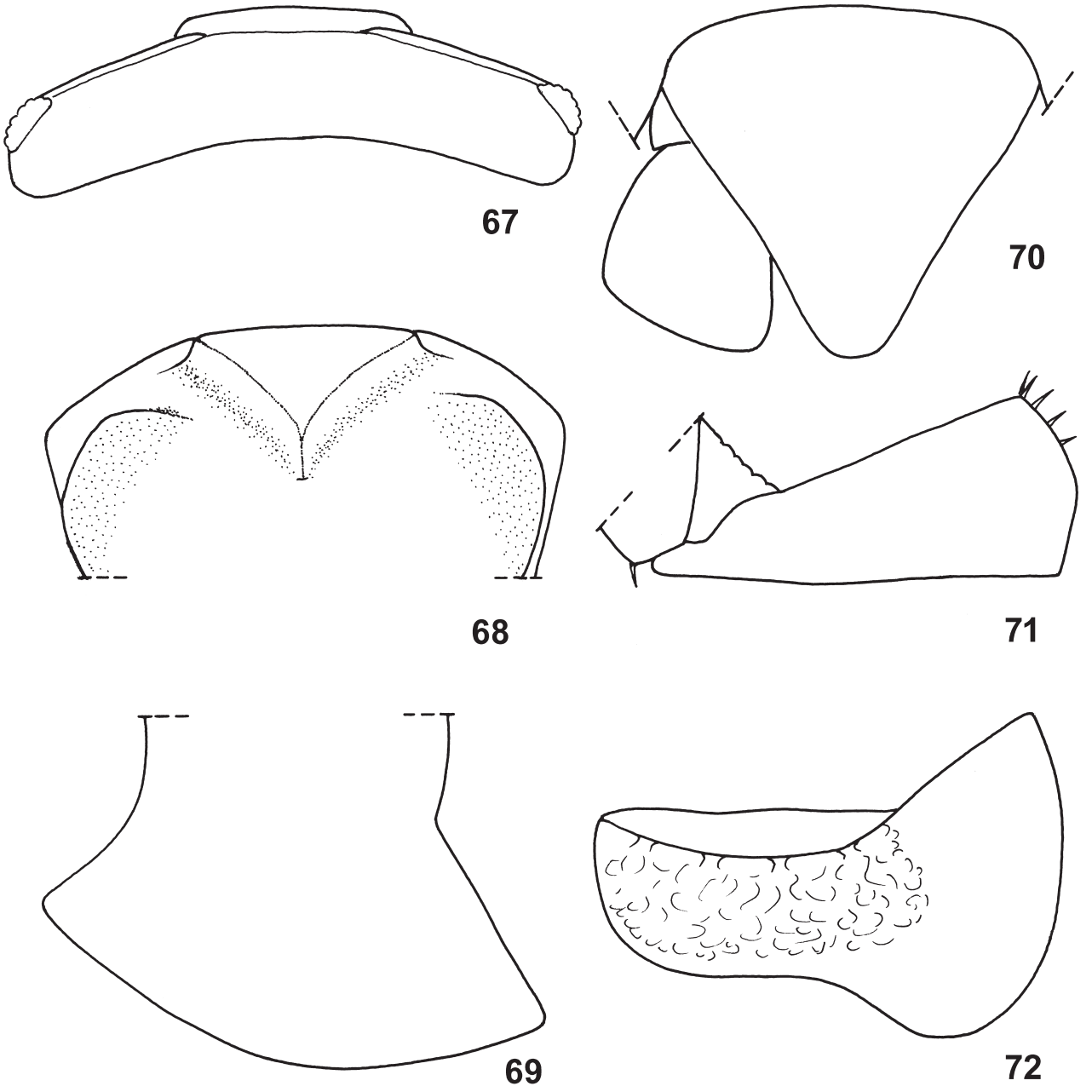
Distribution (map Fig. 66)

Greece, Ionian islands Lefkáda, Meganísi and Kálamos.

### 3.15 *Armadillidium kalamium* Strouhal, 1956 (Figs. 67–72, map Fig. 73)

Literature records

Strouhal 1942: 149 (nomen nudum; Greece, Ionian island Kálamos); Strouhal 1956: 594, figs. 11–16.




**Figs. 67–72.** *Armadillidium kalamium* (island Kálamos, NMW), ♂, syntype, 10 mm long. – **67**. Head, dorsal view. **68**. Head, frontal view. **69**. Pereion-epimeron 1, lateral view. **70**. Telson and uropod, dorsal view. **71**. Ischium 7, caudal view. **72**. Pleopod-exopodite 1, dorsal view.

### Material examined

**Greece**: 1 ♂, 1 ♀ and appendage preparations of the two type ♂♂ (syntypes), island Kálamos, olive grove, leg. Beier, 21.V.1933 (NMW).

### Diagnostic characters

Maximum dimensions: 17 × 8 mm (Strouhal 1956). The maximum size of the two males of the type series is 11.6 × 5.5 mm.

Coloration: Bluish gray, margins of tergites lighter (Strouhal 1956).

Cuticular structures: Tergites very slightly granulated.

Frontal shield from behind slightly surpassing frontal margin, upper margin straight (Fig. 67); antennal lobes in frontal view nearly semicircular (Fig. 68). Hind margin of pereion-epimeron 1 with acute angle (Fig. 69). Telson slightly shorter than wide, with straight sides and rounded apex (Fig. 70). Male ischium 7 ventrally straight (Fig. 71).

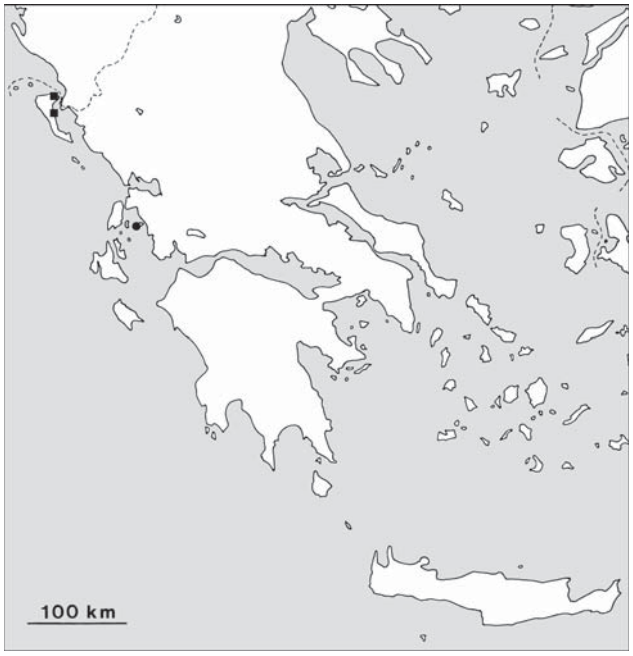



**Fig. 73.** Records of *Armadillidium kalamium* (●) and *A. simile* (■).

Male pleopod-exopodite 1 very wide, with short triangular hind-lobe (Fig. 72, compare Remarks below).

Distribution (map Fig. 73)

Greece, Ionian island Kálamos. The species can be expected also from the very close coast of the adjacent mainland.

Remarks

The species is only known from the type series. The appendages of the two male type specimens are mixed up in two appendage preparations, therefore no lectotype is designated. The male type specimens seem to be immature, the ischium 7 and the pleopod-exopodite 1 show a female morphology, probably the specimens have not yet developed the adult male morphology of these appendages. Future collection of adult males from Kálamos should clarify this question.

### 3.16 *Armadillidium marmoratum* Strouhal, 1929

This species was treated in the 23rd contribution of this series (Schmalfuss 2006a). It is known from western Turkey (Aegean and Black Sea coasts), Cyprus, Israel, Egypt, and in Greece from the Ionian island Lefkáda, the Peloponnese, the Aegean islands and the northern Aegean coast.

### 3.17 *Armadillidium pallasii* Brandt, 1833 (Figs. 74–83, map Fig. 84)

Synonyms: *Armadillidium frontesignum*, *A. frontirostre*, *A. frontisignum*, *A. pallasii frontirostre*, *A. pallasii garganum*.

Literature records

Brandt 1833: 185 (?Ukraine, "Taurica Chersonesus?"); all subsequent records of the species (see Schmalfuss 2003 under *A. frontirostre*) should be reinvestigated concerning identification and doubtful records which is, however, outside the scope of the present publication.

Material examined

**?Ukraine**: 3 ex. (♂, lectotype, herewith designated in order to fix the name-bearing type, and 1 ♂, 1 ♀, paralectotypes), "Taurica Chersonesus?" (= Crimea) (Berlin, Brandt 1833, compare Remarks below).

**Italy**: 2 ex., peninsula Gargano, Peschici, leg. Ammermann, 10.VI.1971 (SMNS 7010). – 3 ex., peninsula Gargano, NE of Monte Sant'Angelo, leg. Bils, 1976 (SMNS 7030). – 3 ex., peninsula Gargano, Vieste, leg. Schmalfuss, 10.VII.1988 (SMNS 7306).

**Croatia**: 8 ex., "Istrien", leg. Verhoeff, 1901 (SMNS 5063). – 6 ex., island Krk, N of Krk, coast, leg. Schawaller, 13.VIII.1999 (SMNS 5520). – 12 ex., island Cres, leg. Grabert, VI.1986, VI.2000, IV.2001, IV.2002 (SMNS 5129, 5522, 5523, 5527). – 15 ex., island Lošinj, northern tip, leg. Schmalfuss, VIII.1969 (SMNS 5011). – 1 ex., island Susak, leg. Strubelt, 9.IX.1972 (SMNS 5028). – 2 ex., island Pag, Novalja, oak forest, leg. Schmalfuss, 9.VIII.1970 (SMNS 5021). – 8 ex., beach N of Biograd, leg. Schmalfuss 25.V.1969 (SMNS 5003). – 15 ex., Split, Biological Station, leg. Rieger, IV.1970, and leg. R. Grimm, III.1972 (SMNS 5004, 5040). – 2 ex., mouth of Neretva near Ploče, leg. Schmalfuss, 26.V.1969 (SMNS 5000).

**Greece**: 2 ex., island Kérkira, Mirtiótissa, leg. Oliver, IV.1982 (SMNS 1459).

**Bulgaria**: 3 ex., Sozopol, leg. V. Haas, 15.VIII.1971 (SMNS 5438).

**NW-Turkey**: 34 ex., Black Sea coast, Amasra, leg. Kohler, VIII.1973 (SMNS 11003).

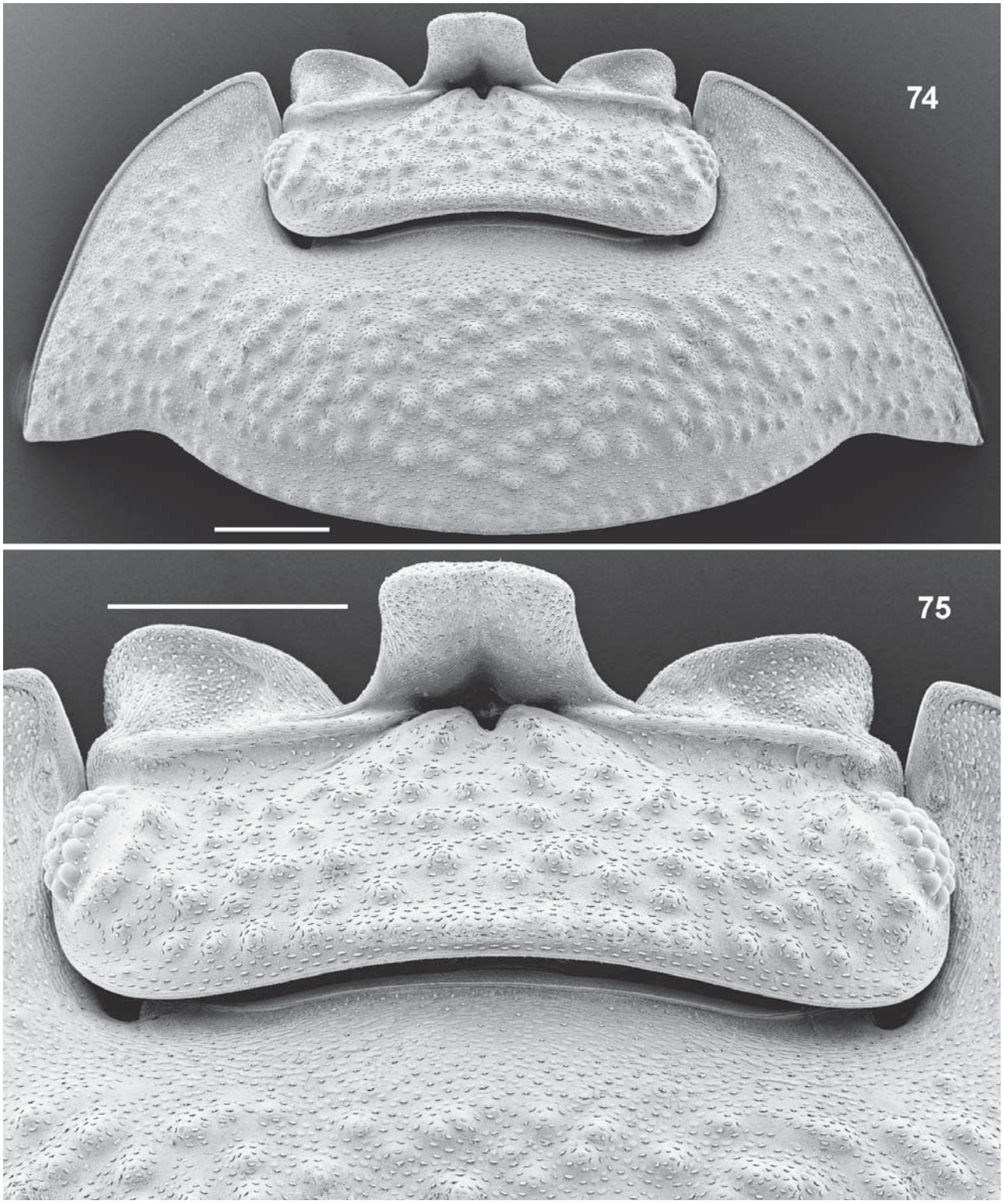
Diagnostic characters

Maximum dimensions: 21.5 × 9.5 mm.

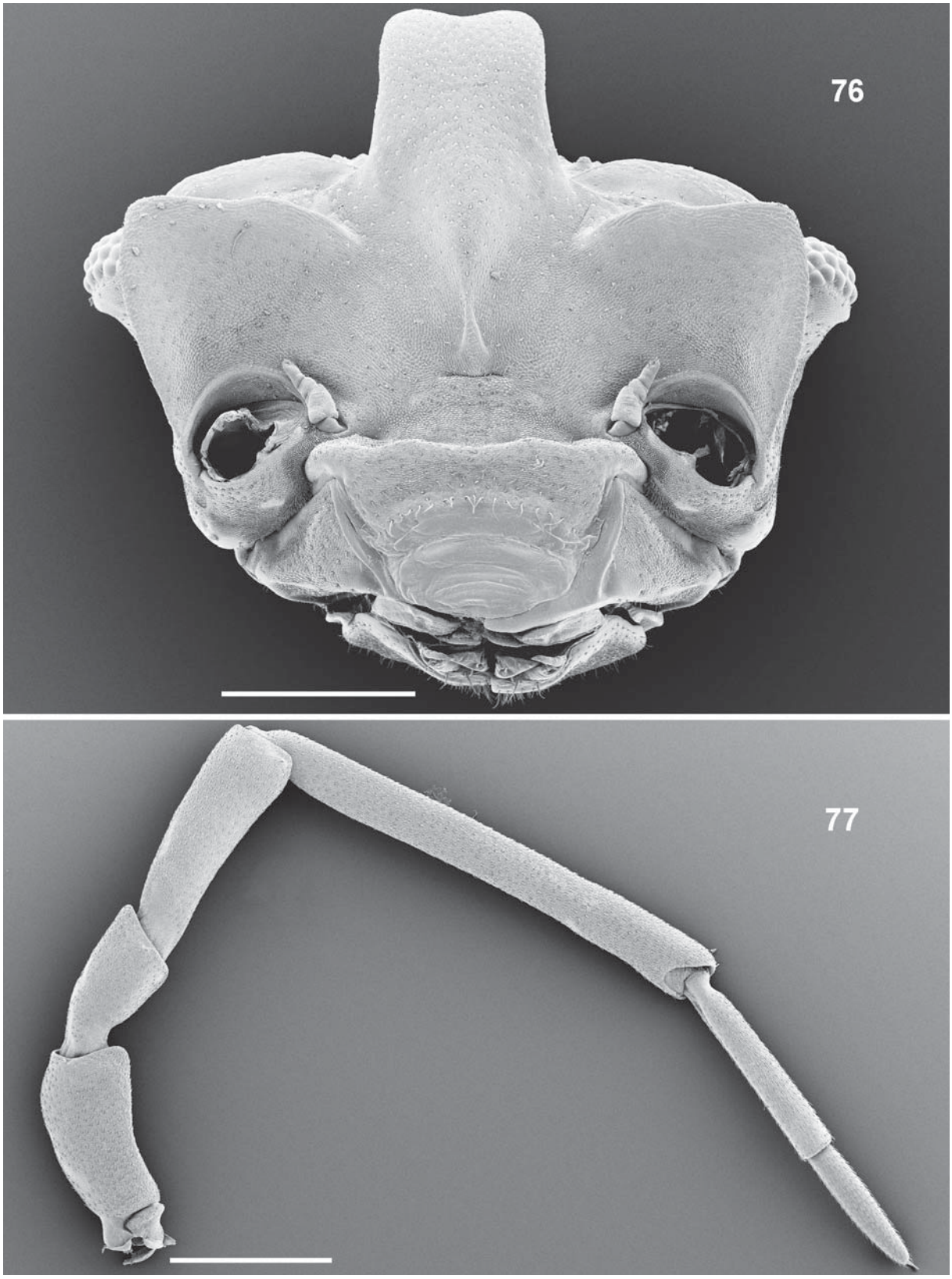
Coloration: Gray to blackish gray, with inconspicuous muscle-spots.

Cuticular structures: Tergites with pronounced tuberculation (Fig. 74).

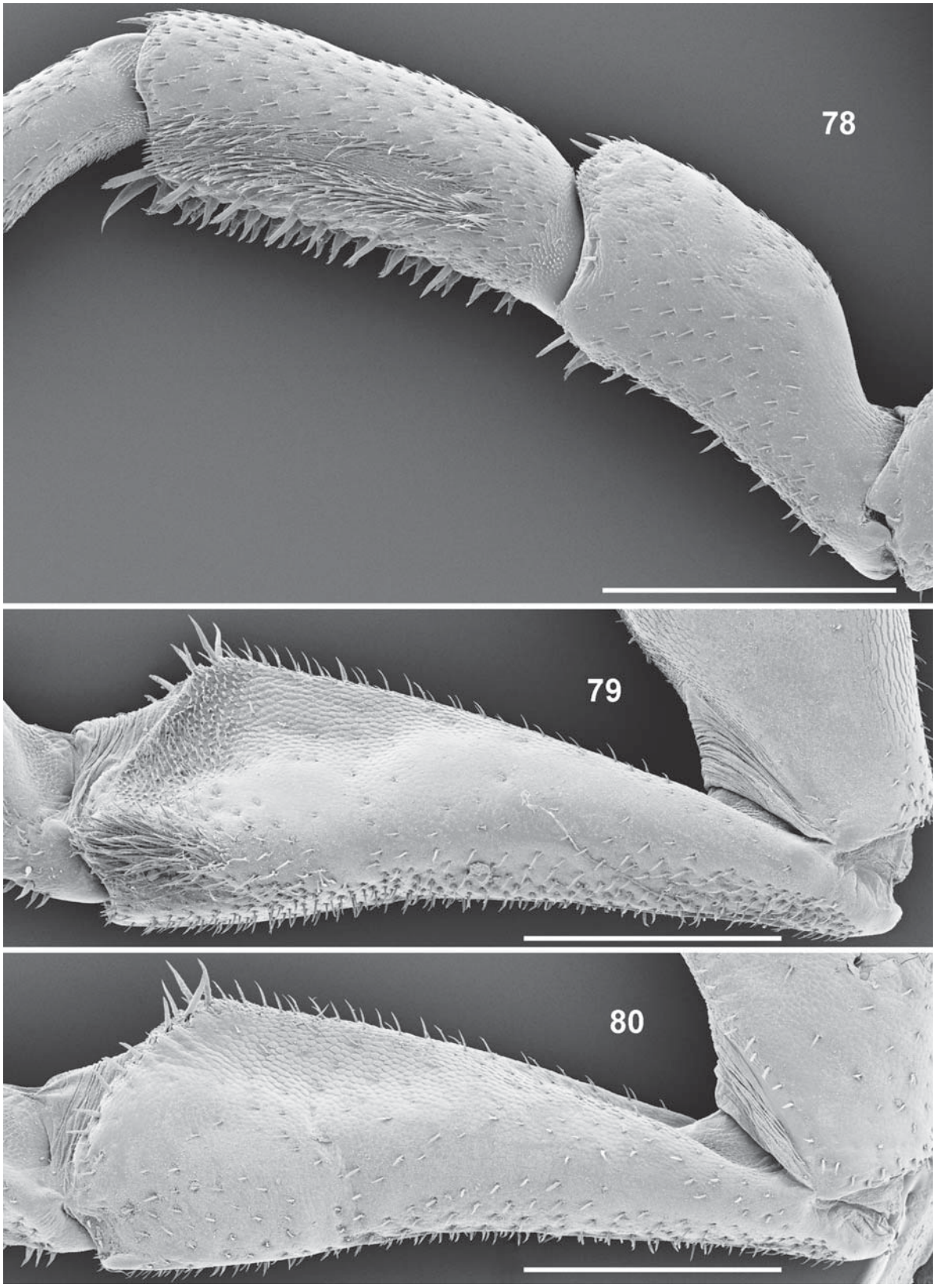
Frontal shield narrow, from behind as high as it is wide, dorsal margin not wider than the middle part (in contrast to *A. peraccae*), with rounded angles laterally, caudally with conspicuous groove (Fig. 75); antennal lobes in frontal view triangular (Fig. 76). Hind margin of pereion-epimeron 1 with rounded angle (Fig. 81). Telson clearly longer than wide, with nearly straight sides and broadly rounded apex (Fig. 82). Antenna see Fig. 77, distal segment of flagellum one third shorter than proximal one. Male carpus 1 with brush of short setae (Fig. 78). Male ischium 7 ventrally very slightly concave, frontally




**Figs. 74–75.** *Armadillidium pallasii* (island Kérkira, SMNS 1459), ♀, 17.0 × 7.7 mm. – **74**. Head and pereion-tergite 1, dorsal view. **75**. Head, dorsal view. – Scales: 1 mm.

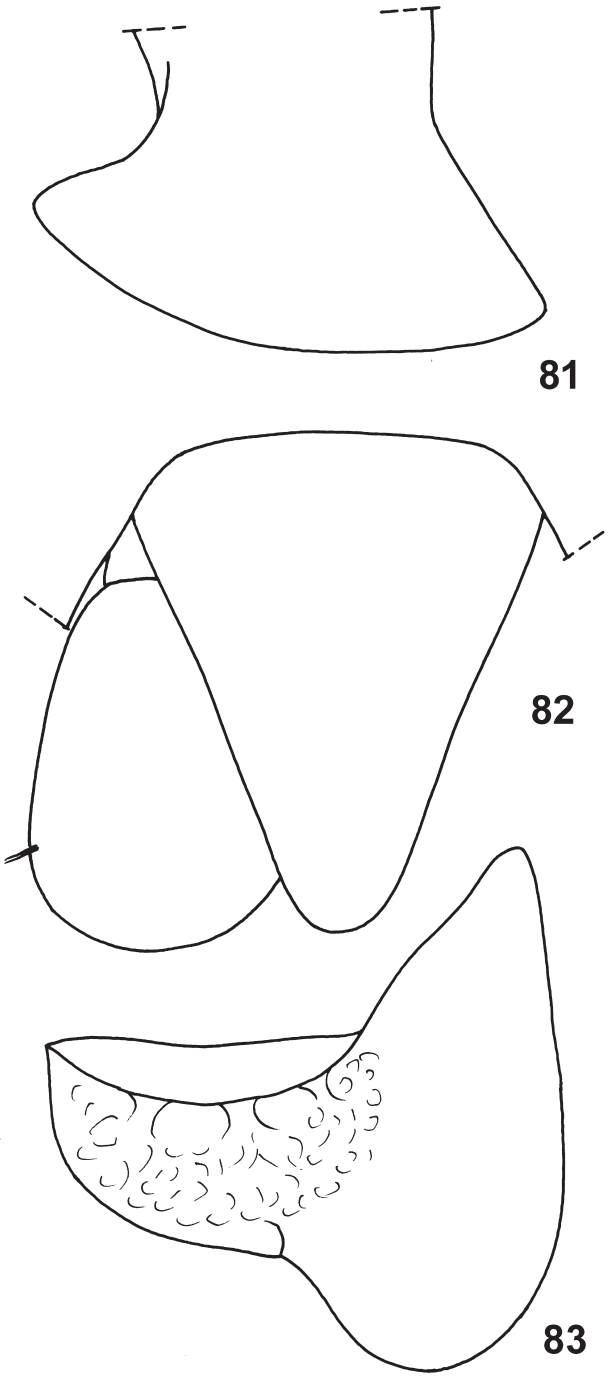



**Figs. 76–77.** *Armadillidium pallasii* (island Kérkira, SMNS 1459), ♂, 18.3 × 8.0 mm. – **76**. Head, frontal view. **77**. Antenna. – Scales: 1 mm.




**Figs. 78–80.** *Armadillidium pallasii* (island Kérkira, SMNS 1459), ♂, 18.3 × 8.0 mm. – **78**. Pereiopod 1, frontal view. **79**. Ischium 7, frontal view. **80**. Ischium 7, caudal view. – Scales: 0.7 mm.

with distal field of short spiny setae in the dorsal part and a dense brush of long hairy setae in the ventral part (Figs. 79, 80), in contrast to *A. peraccae*, which has only a normal setal field in the dorsal part (compare SCHMALFUSS 2006a: fig. 94). Male pleopod-exopodite 1 with triangular hindlobe (Fig. 83), forming an obtuse angle with the respiratory field, in contrast to *A. peraccae* (compare SCHMALFUSS 2006a: fig. 96).




**Figs. 81–83.** *Armadillidium pallasii* (island Kérkira, SMNS 1459), ♂, 18.3 × 8.0 mm. – **81**. Pereion-epimeron 1, lateral view. **82**. Telson and uropod, dorsal view. **83**. Pleopod-exopodite 1, dorsal view.

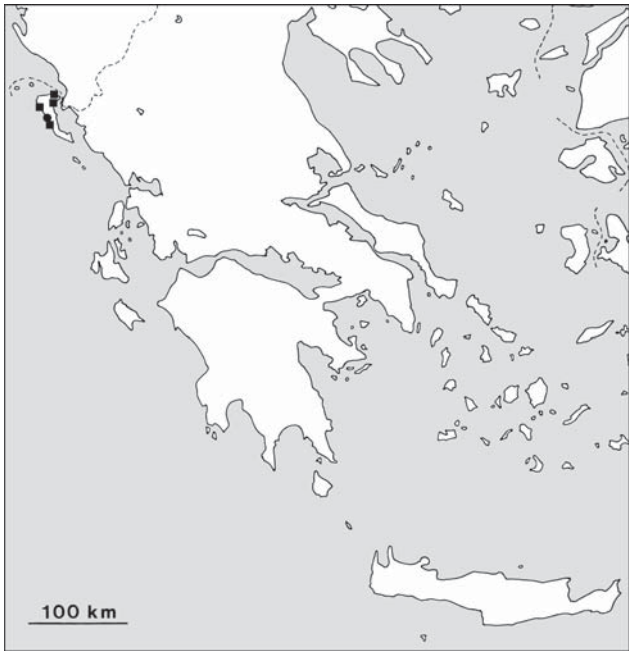



**Fig. 84.** Greek records of *Armadillidium pallasii* (●) and *A. werneri* (■).

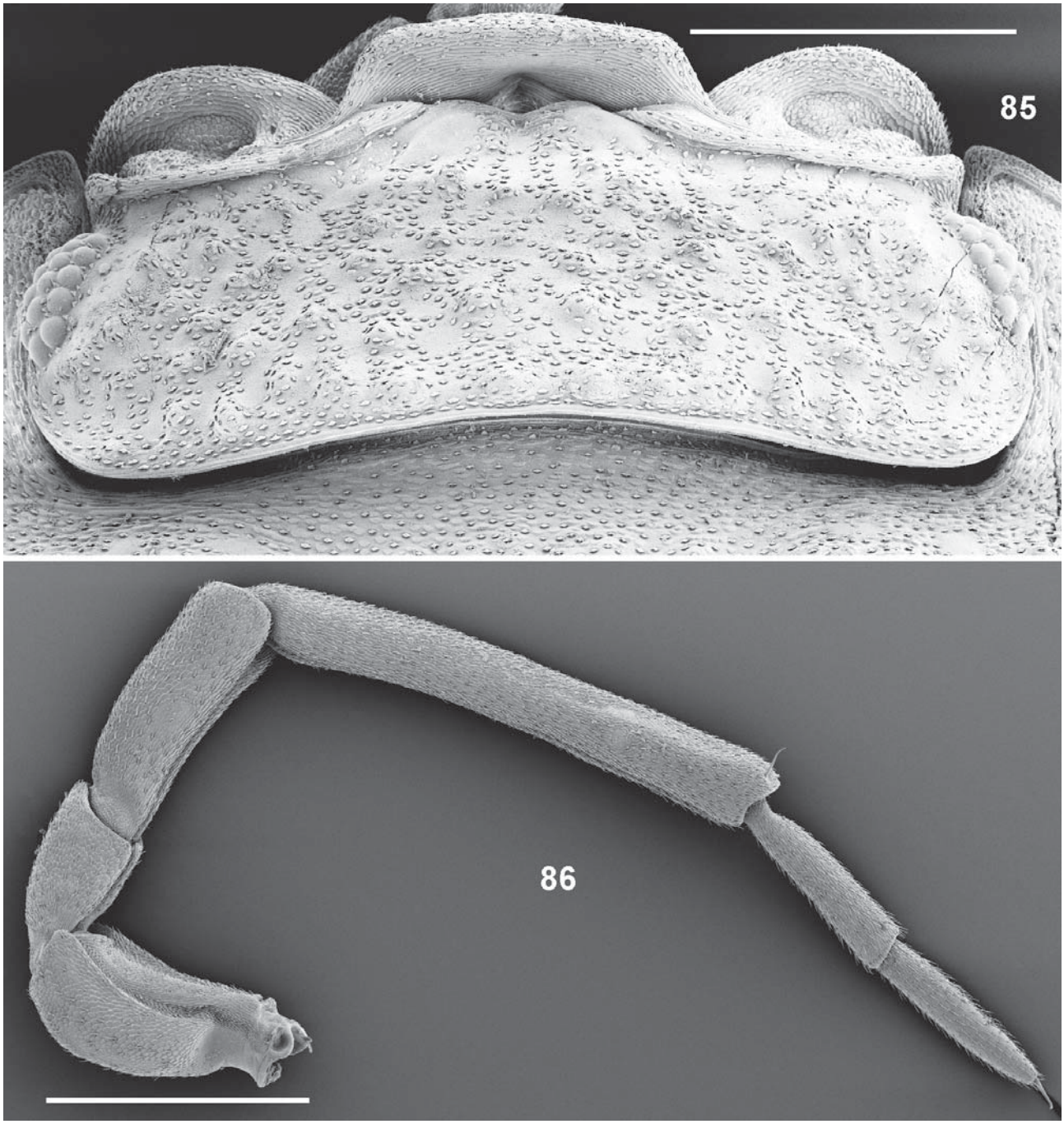
Distribution (map Fig. 84)

Eastern coast of Italy, Dalmatian coast and islands down to Greek island Kérkira, coasts of the Marmara Sea, Turkish and Bulgarian coast of Black Sea, ?Crimea.

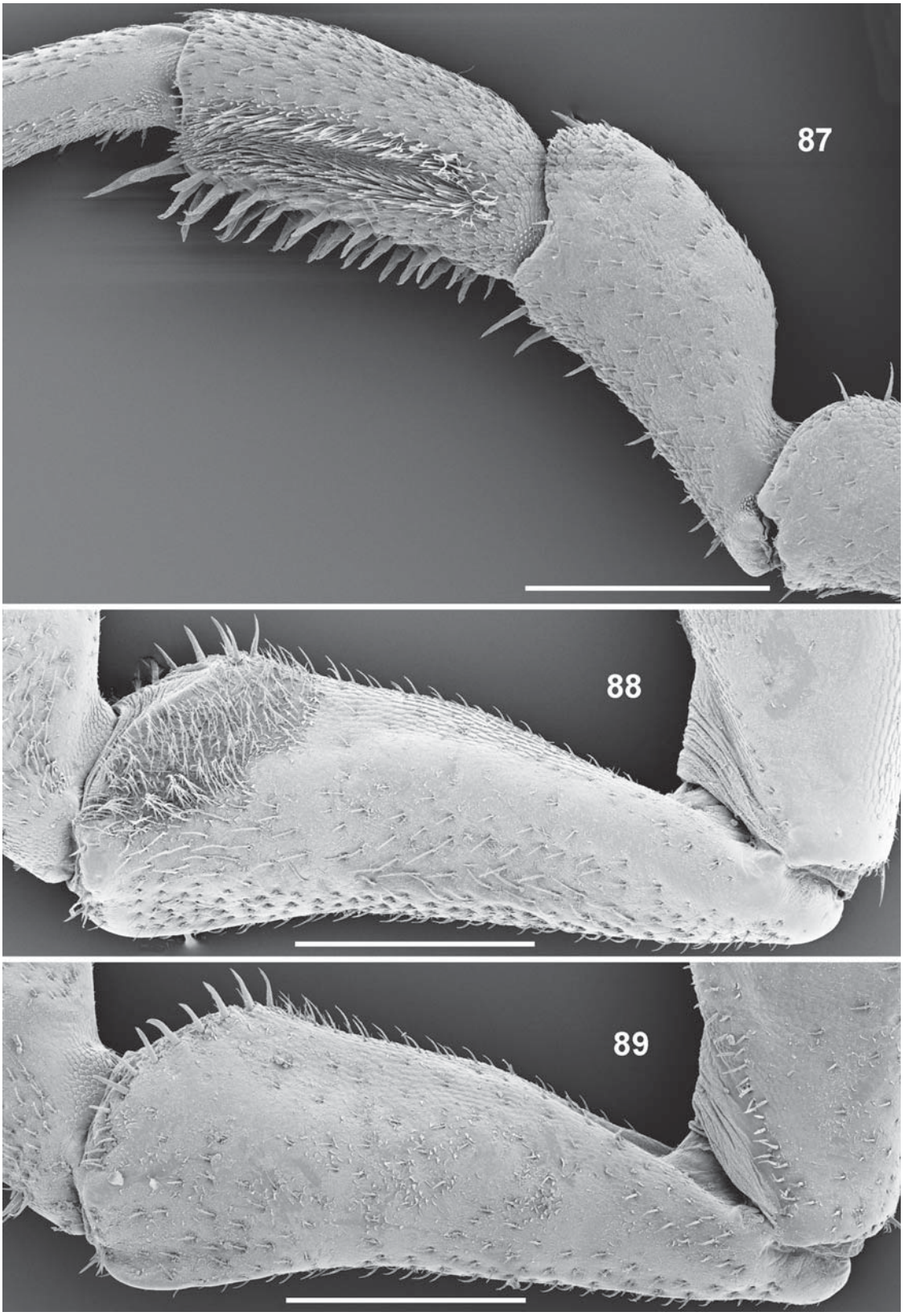
Remarks

The type specimens of *A. pallasii*, which I had the opportunity to investigate, show that *frontirostre*, *frontisignum* and *pallasii garganum* are synonyms of *pallasii*. In contrast, *A. peraccae* is here considered a separate species (SCHMALFUSS 2006b), although the strange mosaic distribution pattern of the two species cannot be explained at the present state of knowledge. BRANDT (1933: 185) gives the type locality "Taurica Chersonesus?" (= Crimea). The question mark indicates that it may be a labeling error, the type specimens are very similar to specimens from the Dalmatian coast. Nevertheless, the specimens from the Black Sea coast mentioned above (Bulgaria, Turkey) do not differ from the Dalmatian samples. New collections from the Crimea could help to solve this problem.

*A. pallasii* is a member of the *A. nasatum*-group, with the frontal shield morphology and the shape of telson and uropods as common derived characters (synapomorphies).




**Figs. 85–86.** *Armadillidium simile* (island Kérkira, SMNS 1531), ♂, 14.3 × 6.2 mm. – **85**. Head, dorsal view. **86**. Antenna. – Scales: 1 mm.




**Figs. 87–89.** *Armadillidium simile* (island Kérkira, SMNS 1531), ♂, 14.3 × 6.2 mm. – **87**. Pereiopod 1, frontal view. **88**. Ischium 7, frontal view. **89**. Ischium 7, caudal view. – Scales: 0.5 mm.

3.18 *Armadillidium peloponnesiacum* Verhoeff, 1901

This species was treated in the 23rd contribution of this series (Schmalfuss 2006a). It is known from western, central and southern Greece. In the Ionian islands it has been found on Lefkáda, Kefalloniá and Zákinthos.

3.19 *Armadillidium simile* Strouhal, 1937
(Figs. 85–93, map Fig. 73)

Literature records

Strouhal 1936: 100 (nomen nudum, Greece, Ionian island Kérkira); Strouhal 1937a: 52, figs. 5–7 (Ionian island Kérkira); Strouhal 1966: 298, pl. 6, figs. 29–33 (Ionian island Kérkira).

Material examined

**Greece**: 1 ♀ and appendage preparations of a ♂, 9.2 mm long, island Kérkira, Kassiópi, olive grove, leg. Hauser, 20.IV.1960 (NMW, Strouhal 1966). – 1 ♂, island Kérkira, near Lútses, leg. Hauser, 12.IV.1972 (SMNS 1531).

Diagnostic characters

Maximum dimensions: 14.3 × 6.2 mm.

Coloration: Tergal parts light grayish brown.

Cuticular structures: Tergites tuberculated.

Frontal shield from behind surpassing frontal margin, upper margin straight, laterally with obtuse angles (Fig. 85); antennal lobes in frontal view trapezoidal (Fig. 90). Hind margin of pereion-epimeron 1 with sharp angle (Fig. 91). Telson slightly longer than wide, with straight sides and truncate apex (Fig. 92). Flagellum of antenna with segments of equal length (Fig. 86). Male pereiopod 1 with ventral brush of setae only on carpus (Fig. 87). Male ischium 7 ventrally very slightly convex, frontal side with distal hair-field (Figs. 88, 89). Male pleopod-exopodite 1 with triangular hind-lobe, medial margin slightly concave (Fig. 93).

Distribution (map Fig. 73)

Greece, Ionian island Kérkira (= Corfu).

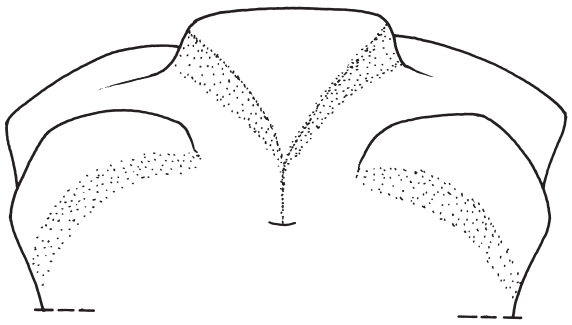
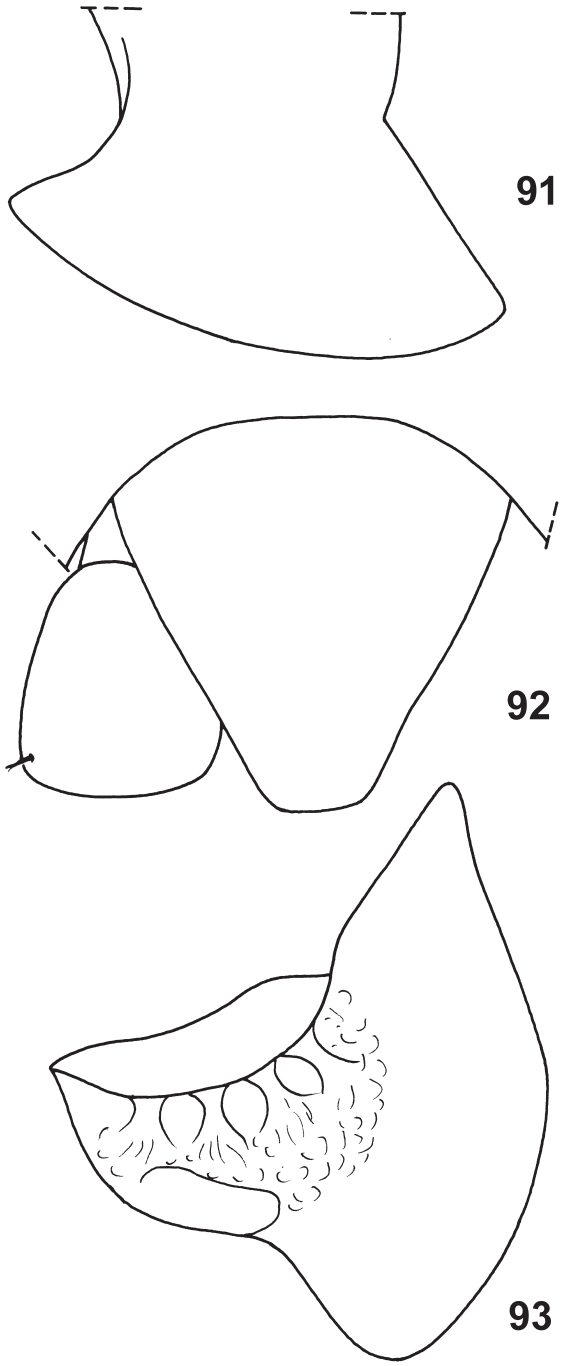


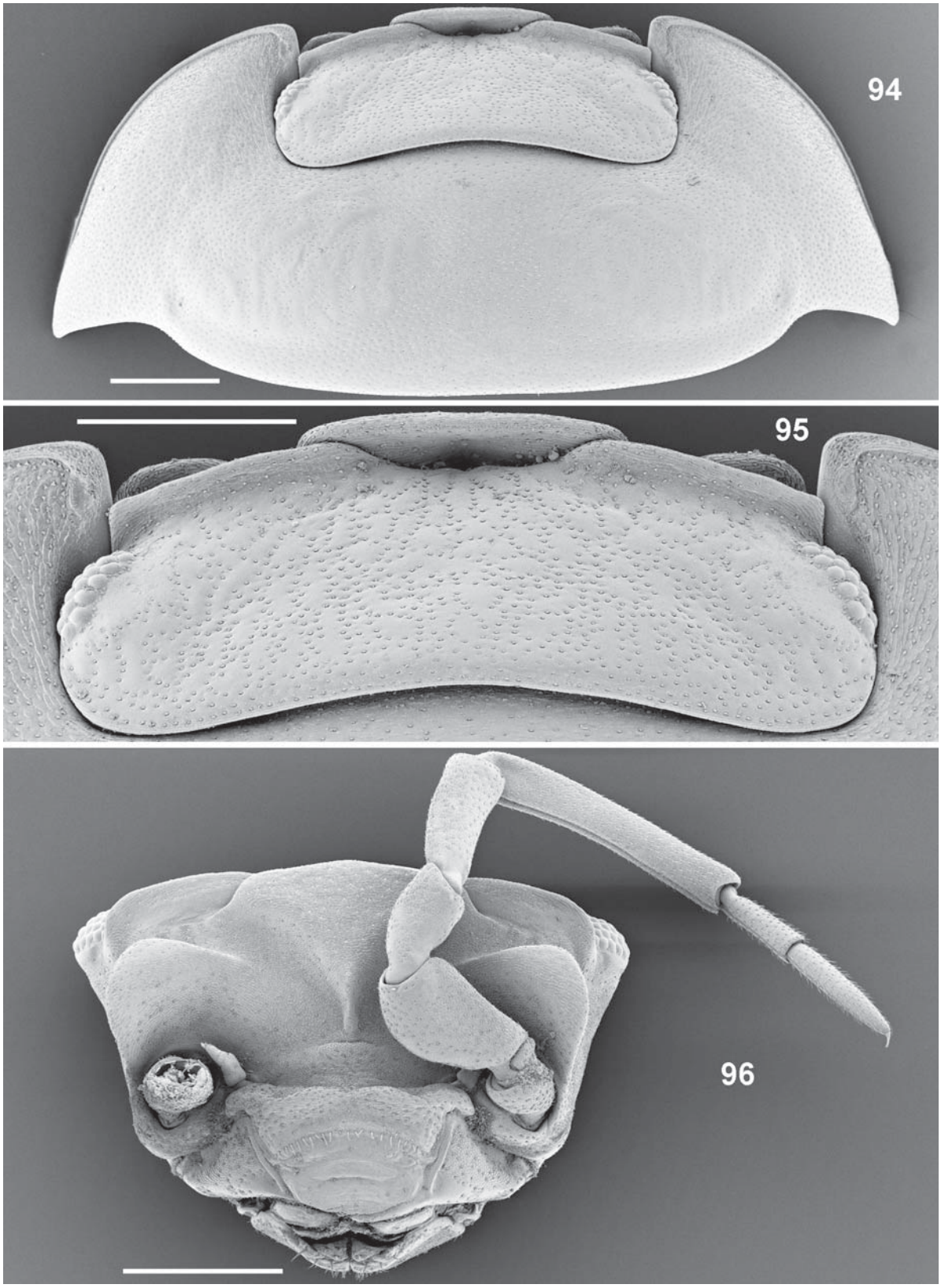
**Fig. 90.** *Armadillidium simile* (island Kérkira, SMNS 1531), ♂, 14.3 × 6.2 mm, head, frontal view.



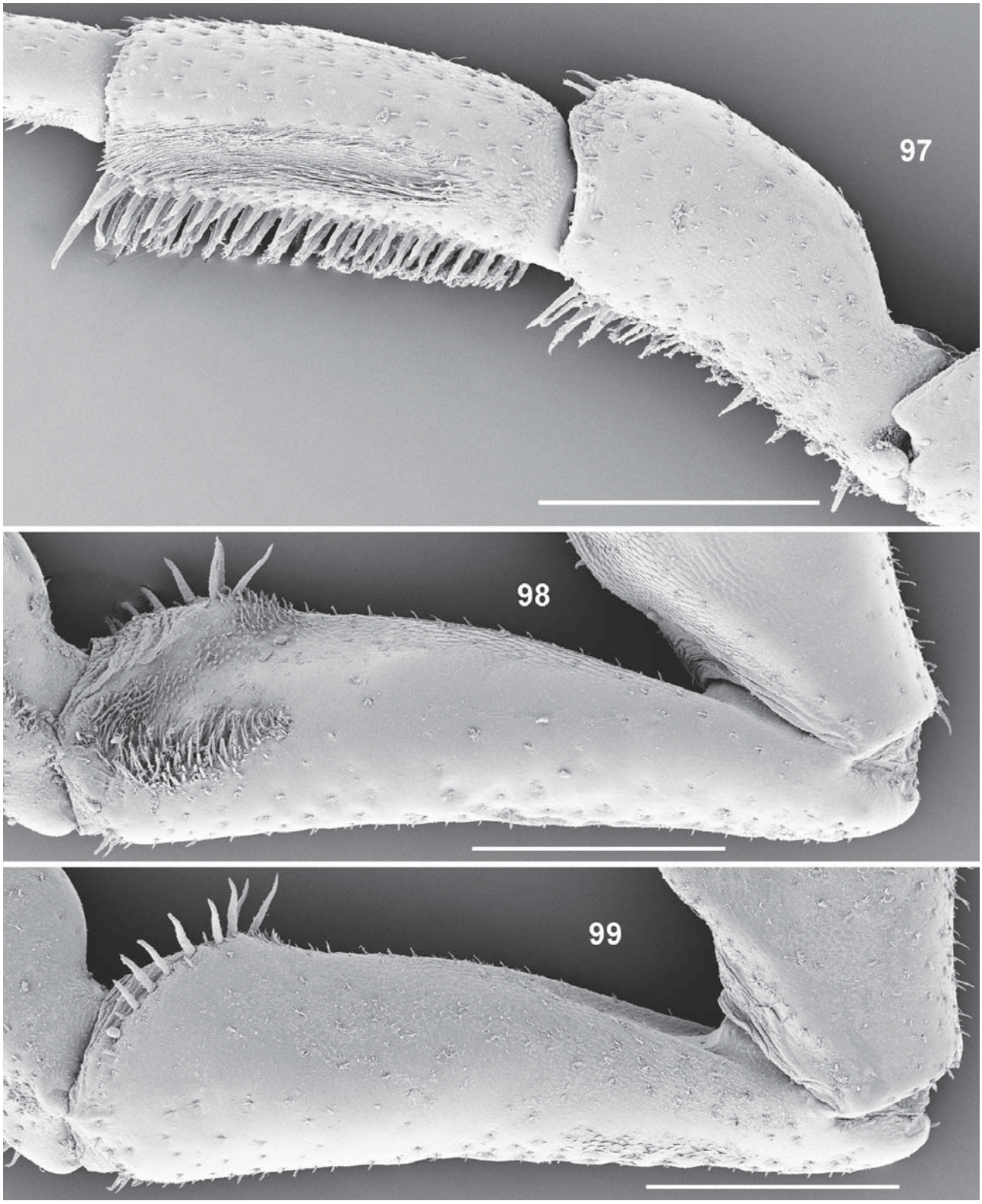

**Figs. 91–93.** *Armadillidium simile* (island Kérkira, SMNS 1531), ♂, 14.3 × 6.2 mm. – **91**. Pereion-epimeron 1, lateral view. **92**. Telson and uropod, dorsal view. **93**. Pleopod-exopodite 1, dorsal view.

3.20 *Armadillidium vulgare* (Latreille, 1804)

This species was treated in the 23rd contribution of this series (Schmalfuss 2006a). It originated with great probability in southeastern Europe and has been transported by human activities to all parts of the world, where it thrives




**Figs. 94–96.** *Armadillidium werneri* (island Kérkira, SMNS 2788), ♂, 16.0 × 7.6 mm (94, 95) and 15.0 × 7.3 mm (96). – **94**. Head and pereion-tergite 1, dorsal view. **95**. Head, dorsal view. **96**. Head, frontal view. – Scales: 1 mm.




**Figs. 97–99.** *Armadillidium werneri* (island Kérkira, SMNS 2788), ♂, 16.0 × 7.8 mm. – **97**. Pereiopod 1, frontal view. **98**. Ischium 7, frontal view. **99**. Ischium 7, caudal view. – Scales: 0.6 mm.

mostly in disturbed biotopes where the indigenous fauna was destroyed together with the original vegetation for agricultural reasons. A map of all Greek records is given in SCHMALFUSS (2006a).

### 3.21 *Armadillidium werneri* Strouhal, 1927
(Figs. 94–102, map Fig. 84)

#### Literature records

STROUHAL 1927: 19, figs. 11–16 (Greece, Ionian island Kefalloniá, compare Remarks below); STROUHAL 1936: 96 (Ionian island Kérkira); STROUHAL 1937b: 128 (Ionian island Kérkira); STROUHAL 1956: 590 (Ionian island Kérkira); STROUHAL 1966: 293, fig. 22 (Ionian island Kérkira).

#### Material examined

**Greece**: 2 ex., island Kérkira, Spartílas, 350 m, leg. B. & K. THALER, 12.V.1996 (SMNS 2799). – 3 ex., island Kérkira, Pantokrátor Mountain, 900 m, leg. B. & K. THALER, 31.V.1996 (SMNS 2788). – 8 ex., island Kérkira, Áno Korakianá/Ágios Márkos, olive grove, leg. B. & K. THALER, 27.V.1996 (SMNS 2793). – 3 ex., island Kérkira, Pantokrátor Mountain, leg. KHATZIKARALAMBOS, 5.XI.1990 (SMNS 2526). – 2 ex., island Kérkira, Glifáda, leg. OLIVER, IV.1982 (SMNS 1460). – 3 ex., island Kérkira, Nisáki, leg. SCHAWALLER, 24.IV.1981 (SMNS 1396).

#### Diagnostic characters

Maximum dimensions: 21 × 10 mm.

Coloration: Five rows of yellow spots on pereiontergites, epimera and telson yellow.

Cuticular structures: Tergites smooth (Fig. 94).

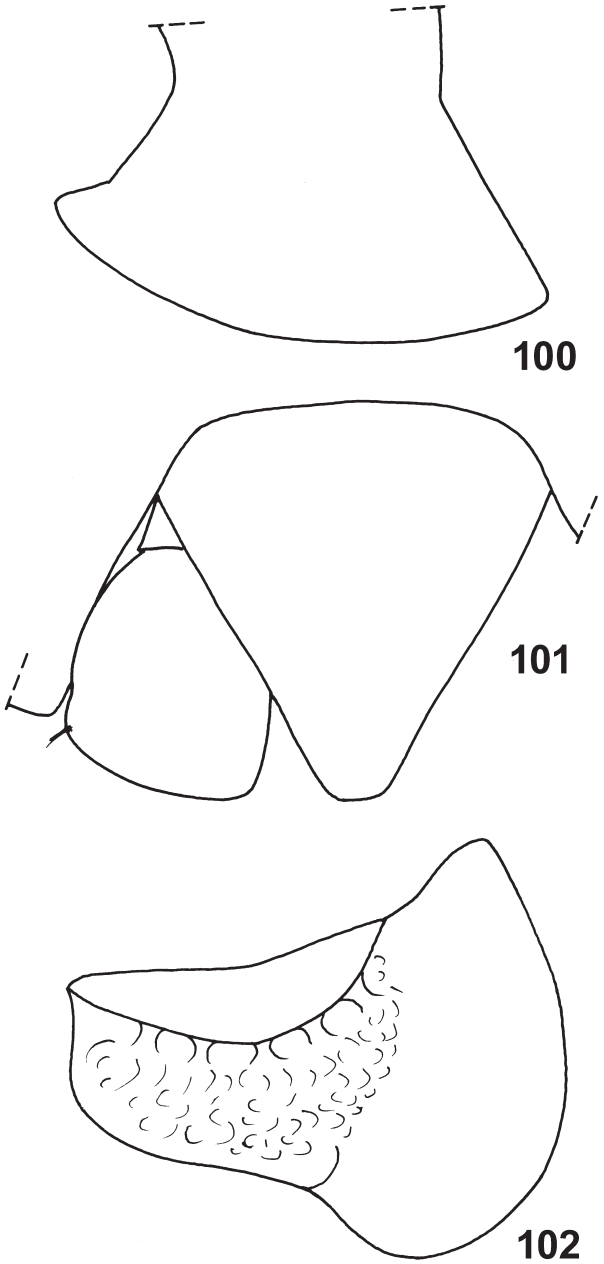
Frontal shield from behind surpassing frontal margin of head, and lateral parts of frontal line also forming crests nearly as high as frontal shield (Fig. 95); antennal lobes in frontal view triangular, with convex rounded lateral margin (Fig. 96). Hind margin of pereion-epimeron 1 with obtuse angle (Fig. 100). Telson as long as it is wide, with straight sides and rounded apex (Fig. 101). Flagellum of antenna with distal segment slightly longer than proximal one (Fig. 96). Male pereiopod 1 with dense brush of short setae on carpus, but not on merus (Fig. 97). Male ischium 7 ventrally nearly straight, frontally with a distal field of setae (Figs. 98, 99). Male pleopod-exopodite 1 with short triangular hind-lobe (Fig. 102).

#### Distribution (map Fig. 84)

Known from the Greek Ionian island Kérkira (= Corfu).

#### Remarks

The species was described from the Greek Ionian island Kefalloniá (STROUHAL 1927), but the locality seems to be a labeling error (STROUHAL 1936: 96, 1956: 590) like the record of *A. frontetriangulum* from that island (both leg. WERNER!). The species has never been found again on Kefalloniá in spite of extensive collecting activities in the 20th century.




**Figs. 100–102.** *Armadillidium werneri* (island Kérkira, SMNS 2788), ♂, 16.0 × 7.8 mm. – **100**. Pereion-epimeron 1, lateral view. **101**. Telson and uropods, dorsal view. **102**. Pleopod-exopodite 1, dorsal view.

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