The terrestrial isopods (Isopoda: Oniscidea) of Greece.
24th contribution: The genus *Armadillidium* (Armadillidiidae) on the Aegean islands

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**Abstract**

Based on the investigation of new collections and on a survey of the literature, 13 species of *Armadillidium* are reported from the Aegean islands. Six of them occur also on the Peloponnes and are treated in the previous contribution on that region. For the remaining seven species the diagnostic characters are described and illustrated, the majority by SEM-photographs, and the Greek records are mapped. *A. aeginense* Strouhal, 1939 is shown to be a **new synonym** of *A. argolicum* Verhoeff, 1907. The morphology of the mandibles in *Armadillidium* is documented by SEM-photographs for three species from different species-groups. **Keywords**: Isopoda, Oniscidea, *Armadillidium*, Aegean Islands.

**Zusammenfassung**


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1 23rd contribution see Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie) 693 (2006).
1 Introduction

With 50 described species (A. aeginense is shown in the present contribution to be a synonym of A. argolicum) and certainly further undescribed ones the genus Armadillidium is the terrestrial isopod genus with the highest species number in Greece. Accordingly the systematic situation is still more confused than in any other group. To clarify the picture at least to a certain degree I have started a profound revision of the Greek species. Every valid species will be redescribed, with illustrations (mostly SEM-photographs) of the important diagnostic characters. This is possible because in the Stuttgart museum a huge number of samples have been accumulated from all parts of Greece during the past 40 years, with material of most of the often insufficiently described species and of all the species described as new. This material enabled me to give a rather advanced picture of the distribution inside Greece for every treated species. For practical reasons the revision is subdivided according to different regions of Greece. In a first part (Schmalfuss 2006) the 18 species known from the Peloponnese were worked up, including the descriptions of five new species. Additionally a list of all nominal species ever recorded from Greece was presented, as well as a definition of the genus and a discussion of the diagnostic characters inside the genus.

In the present contribution the species of the Aegean islands are dealt with. There are 13 species known from this region, six of which are also present on the Peloponnese and thus were treated in the first part.

Abbreviations

A. Armadillidium
ex. example(s), specimen(s)
SMNS Staatliches Museum für Naturkunde Stuttgart
ZSM Zoologische Staatssammlung München

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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 mandibles in *Armadillidium*

The mouth parts have not been found to differ significantly inside the genus *Armadillidium*. This means that all the species of this genus have very similar nutritional strategies. Nevertheless it seems worthwhile to have a closer look to these appendages, and the present series of publications on the genus offers the possibility to do this step by step.

The mandibles are the main cutting organs in terrestrial isopods. They are always asymmetric, the left one being the bigger and stronger partner. The distal part of the appendage consists of a strongly sclerotized *pars incisiva* forming a three-pointed cutting tooth, a *lacinia mobilis* (connected with a joint to the main body of the mandible) which is much bigger on the left side, and three brush-like groups of setae. This distal armature is depicted on SEM-photographs for *A. vulgare* (Figs. 1–4, otherwise treated in the previous contribution) and two of the species treated in the present paper (Figs. 5–8). I chose species of different phyletic lines: *A. vulgare* of the *vulgare*-group, *A. peraccae* of the *nasatum*-group, and *A. ameglioi* which is a somewhat aberrant eastern species. A comparison of these three species and of *A. quinquepustulatum* depicted in SCHMIDT (2003: 157, fig. 165) shows that the mandibular armature is practically identical in all four species. Furthermore it is very similar to the mandible of *Porcellio* (compare SCHMIDT 2003: 150, fig. 159). The conclusion is that these species should have a very similar way of handling their food materials. The bulk of the ingested food consists of dead plant material in a certain state of decay which is cut into pieces and swallowed. It should be mentioned that the decisive components of the food are not the walls of the plant cells consisting of cellulose, but the overgrowth of bacteria and fungi. In the stomach there are combs and brushes scratching this overgrowth from the dead plant material and transporting these essential components of the food into the hepatopancreas, where they are digested while the leaf pieces are egested unaltered. For publications on feeding ecology see bibliographies of *Porcellio scaber* and *Armadillidium vulgare* in SCHMALFUSS (2003).
Armadillidium vulgare, \( \varphi \), 16 mm long. –

1. Distal part of right mandible. 2. Distal part of left mandible. 3. Ventral brush ("pars molaris") of right mandible. 4. Ventral brush of left mandible. – Scales: 0.1 mm.

Figs. 1–4.
Figs. 5–8. Distal parts of right (5, 7) and left (6, 8) mandibles. – 5–6. *Armadillidium peraccae*, ♂, 16 mm long (Greece, northern Aegean island Thásos, SMNS 2647). – 7–8. *A. ameglioi*, ♂, 19 mm long (Greece, island Ródos, SMNS 2322). – Scales: 0.1 mm.
4 The genus *Armadillidium* on the Aegean islands

Up to now 13 species of *Armadillidium* have been recorded from the islands of the Aegean Sea. Six species occur also on the Peloponnese, so they have been treated in the previous contribution (Schmalfuß 2006). Two species are island endemics, *A. cythereium* on Kíthira and Antikíthira, and *A. lymberakisi* in the alpine zone of the Lefká Óri mountains on Crete. Some species show a conspicuous geographical variability (*A. ameglioi, A. insulanum*), so further research may lead to a splitting up into a number of more restricted specific taxa and thus to a higher number of island endemics.

4.1 *Armadillidium aegaeum* Strouhal, 1929  
(Figs. 9–18 and map Fig. 19)

Literature records

Strouhal 1929a: 102, figs. 42–45 (GR, Northern Sporades, islands Skíros and Skópelos, from the latter as *A. spec.); Schmalfuß 1981a: 17 (GR, Northern Sporades, islands Alónisos, Gáídaros, Kórakas, Skántzura, Lékhuása, Kirá Panagiá, Pappús, Giúra).

Material examined


Diagnostic characters

Maximum dimensions: 17.0 × 7.3 mm.

Coloration: Dark grey, yellowish brown or completely without pigmentation. It seems that the populations living on small uninhabited islands tend to reduce pigmentation, the reasons for these differences are as yet unknown.

Cuticular structures: Tergites variable, smooth to conspicuously granulated.

Frontal shield from behind surpassing frontal margin of head, upper margin completely rounded, no angles laterally, caudally with conspicuous groove (Figs. 9–10); antennal lobes trapezoidal (Fig. 12). Hind margin of pereion-epimeron 1 with very obtuse angle (Fig. 13). Telson as wide as long, with nearly straight sides and rounded apex (Fig. 14). Antenna see Fig. 11, segments of the flagellum more or less the same length. Male carpus 1 with brush of short spines (Fig. 15); male ischium 7 ventrally concave, frontally with distal and ventral hair-fields (Figs. 16–17). Male pleopod-exopodite 1 with short triangular hind-lobe (Fig. 18), endopodite 1 with apex straight.

Distribution

**Greece**: Northern Sporades (including the Skíros archipelago) and Évvia (see map Fig. 19).
Figs. 9–11. *Armadillidium aegaeum* (Greece, Northern Sporades, SMNS 1104). – 9. ♀, 17 mm long, head and pereion-tergite 1 in dorsal view. 10. ♀, 17 mm long, head in dorsal view. 11. ♀, 14 mm long, head with right antenna in frontal view. – Scales: 1 mm.
Figs. 12–15. Armadillidium aegaeum (Greece, Northern Sporades). – 12. ♀, 17 mm long (SMNS 1104), head in frontal view. 13. ♂, 13.5 mm long (SMNS 1110), pereion-epimeron 1, dorsolateral view. 14. ♂, 13.5 mm long (SMNS 1110), telson and uropods in dorsal view. 15. ♂, 17 mm long (SMNS 1110), carpus 1, frontal view. – Scales: 1 mm (12), 0.5 mm (15).
Remarks

The species shows similarities with *A. argolicum* concerning the structure of the head, but differs from this species conspicuously by the characters of the male ischi-um 7. The separation of *A. aegaeum* and *A. insulanum* is delicate, the former is big-
ger and has a more uniform light color; adult males show unambiguous differences in the structure of the ischium 7 (in *A. aegaeum* the adult male ischium possesses ventrally a band of dense setae, which is never present in *A. insulanum*, compare Figs. 16 and 68), but juvenile males of *A. aegaeum* can be mistaken for *A. insulanum*.

4.2 *Armadillidium ameglioi* Arcangeli, 1914
(Figs. 7–8, 20–37 and map Fig. 19)


Literature records

Arcangeli 1914: 1, figs. 1–3 (GR, Aegean island Ródos); Arcangeli 1934: 38 (subgenus *Catatrigonium*); Strouhal 1927: 16, figs. 1–5 (*A. ephesiacum*, western Turkey, Ephesos); Strouhal 1929b: 56, figs. 19–22 (*A. samium*, GR, Aegean island Sámos); Strouhal 1937a: 246 (GR, island Ródos); Schmalfuß 1972: 595, figs. 70–71 (GR, island Ródos); Schmalfuß 1999: 6 (GR, island Kastelórizo 130 km E of Ródos); Sfenthourakis 1994: 126, figs. 89–92 (GR, Aegean islands Náxos, Amorgós, Ikaría, Alatonísi, Sámos, Khálki).
Material examined


Figs. 20–21. *Armadillidium ameglioi*, live animal from Ródos island, walking (20) and rolled up, forming a lemon-shaped structure (21).
Figs. 22–24. *Armadillidium ameglioi* (Greece, island Ródos, SMNS 1146). – 22. ♂, 18 mm long, head and pereion-tergite 1 in dorsal view. 23. ♂, 18 mm long, head in dorsal view. 24. ♂, 15 mm long, head in frontal view. – Scales: 1 mm.
Figs. 25–27. Armadillidium ameglioi. – 25.  ♂, 18 mm long (island Ródos, SMNS 1146), pereion-epimeron 1 in dorsolateral view. 26. ♂, 15 mm long (island Ródos, SMNS 1146, critical point dried), pleon, ventral view. 27. Geographic variability of telson shape: (a) southeastern Aegean island Ródos (SMNS 1146); (b) southeastern Aegean island Simi (SMNS 1664); (c) western Turkish mainland, Izmir (SMNS 11033); (d) southwestern Turkish mainland, Muğla (SMNS 11044). – Scale: 1 mm.
Diagnostic characters

Maximum dimensions: 22 × 12 mm (♀ from Khios).

Coloration: Light brown or grey, with dark markings at the hind margins of the tergites. Some samples are entirely yellowish without any dark pigmentation (e.g. from Profitis Ilias on Ródos, Khálki), others are bright reddish brown with yellow markings (eastern part of Ródos, Figs. 20–21).
Cuticular structures: Tergites smooth to slightly granulated.

“Pseudospheric” species, epimera less steep, rolled-up animal thus forming a lemon-shaped ball (Fig. 21). Frontal triangle with a narrow upper part surpassing...
frontal margin of head, not higher than the well-developed lateral crests (Figs. 22–23); antennal lobes triangular (Fig. 24). Hind margin of pereion-epimeron 1 with more or less pronounced angle (Fig. 25). Ventral view of pleon see Fig. 26. Telson exhibiting a clinal variability, in specimens from Náxos and Ródos as broad as long with broadly rounded apex, on Sími with narrowly truncated apex and on Sá-
mos, Khíos and the mainland of Asia Minor with broadly truncated apex (Fig. 27). Antenna – compared with other species of the genus – slender, distal segment of flagellum slightly shorter than proximal one (Fig. 28). Male carpus 1 with ventral brush of spiny setae with enlarged apices (Figs. 29–30); pereiopod 7 long and slender (correlated with the pseudospheric body shape); male ischium 7 ventrally straight, frontally without distal hair-field, (Figs. 31–32). Male pleopod-exopodite 1 with short, more or less rounded hind-lobe (Figs. 33–35), endopodite 1 with apex bent outwards at a right angle in mature males (Figs. 33–34); depending on size and/or season the apex can have a different shape in males from the same locality, with the tip bent outwards only at a very slight angle (Figs. 36–37).

**Distribution**

Greece: Aegean islands Khíos, Sámos, Alatsonísi, Ikaria, Náxos, Amorgós, Khálki, Sími, Ródos and the Greek island Kastelórizo 130 km E of Ródos; SW-Turkey (records from Greek islands and Aegean coast of Turkey see Fig. 19, overall distribution map see **SCHMALFUSS 2000: 80, map fig. 7**).

**Remarks**

At the present state of knowledge *A. samium* Strouhal, 1929 and *A. ephesiacum* Strouhal, 1927 are considered as synonyms of *A. ameglioi*, because the investigation of more material from the Aegean islands and Asia Minor has shown that differences are gradual and concern only the shape of the telson (see figs. 89–92 in SfENTHOURAKIS 1994 and Fig. 27). Further detailed investigations including molecular studies may prove *A. ameglioi* to be a sort of superspecies, but then probably every island population will have to be treated as a separate species. As long as these different populations are vicariant and not sympatric it gives a much clearer picture if we treat them under the common name *A. ameglioi* sensu lato.

*A. naxium* Verhoeff, 1901 from Náxos Island is very probably identical with *A. ameglioi*, but the description is insufficient and the types are lost, so *A. naxium* remains a nomen dubium.

### 4.3 Armadillidium argolicum Verhoeff, 1907

**New synonym:** *A. aeginense* Strouhal, 1939 (see Remarks below).

This species was treated in the 23rd contribution of this series (*Armadillidium* on the Peloponnese, **SCHMALFUSS 2006**). It was up to now known from the northeastern Peloponnese and the adjacent islands Ídra (= Hydra) and Módi E of island Póros.

**Additional material examined**

**Greece:** 13 ex., Attica, island Égina, pine forest, leg. **SFENTHOURAKIS**, 19.V.2006 (SMNS 2231).

**Remarks**

A comparison of the new material with *A. argolicum* from the island of Ídra (= Hydra) shows that the species described by **STROUHAL** (1939: 253, figs. 1–4) as *A. aeginense* is a junior synonym of *A. argolicum*. 
4.4 *Armadillidium atticum* Strouhal, 1929  
(Figs. 38–47 and map Fig. 48)

Literature records (all from central Greece)

Strouhal 1929a: 99, figs. 38–41 (near Athens); Strouhal 1937a: 242–244, figs. 37–38 (*A. a. atticum*, *A. a. var. brevipes*, *A. a. kytbnium*, Évvia: Stení, islands Salamína and Kíthnos); Strouhal 1937b: 108 (island Salamína W of Athens); Strouhal 1937c: 129 (Athens); Strouhal 1938: 39 (?Peloponnese, Kórinthos); Strouhal 1939: 258 (Athens and island Égi-

na); Vandel 1946: 181 (see Remarks); Theodorides 1960: 322 (surroundings of Athens); Schmalfuss 1975: 50 (Athens); Sfenthourakis 1994: 127 (island Kíthnos).

Material examined

**Greece**: 18 ex., Attica, Pentéli NE of Athens, leg. Kühnelt, 17.IV.1960, and leg. Schmal-


Diagnostic characters

Maximum dimensions: 13.5 \( \times \) 5.8 mm.

Coloration: Light greyish brown, epimera lighter.

Cuticular structures: Tergites granulated.

Frontal shield from behind surpassing frontal margin of head, about four times as wide as high, laterally with pronounced angles, caudally with conspicuous groove (Figs. 38–39); antennal lobes trapezoidal (Fig. 40). Hind margin of pereion-epimeron 1 rounded (Fig. 41). Telson as wide as long, with nearly straight sides and rounded apex (Fig. 42). Antenna see Fig. 43, distal segment of flagellum slightly longer than proximal one. Male carpus 1 with weakly developed brush of short spines (Fig. 44); male ischium 7 ventrally concave, frontally with a longitudinal distal hair-field (Figs. 45–46). Male pleopod-exopodite 1 with narrow elongated hind-lobe (Fig. 47), endopodite 1 with straight apex.

Distribution

Central Greece (Attica) and islands Évvia, Salamína, Égina and Kíthnos (map see Fig. 48).

Remarks

This is certainly the sister-species of the *A. insulanum* complex, as Sfenthourakis (1994: 132) suggested. The only consistent difference is the elongated male pleopod-exopodite 1. The different shape is, however, probably correlated with differences in copulation behavior, and thus *A. atticum* should have reached the state of a separate species and not only a subspecies.

Vandel (1946: 181) reports this species from Metéora (Kalampáka, Thessaly). I have identified samples from the same locality (Schmalfuss 1981b: 281) as *A. corcyraeum*. After a comparison of “true” *A. corcyraeum* from the island Paxí (SMNS 1139), the specimens from Metéora (SMNS 1721, 1843) and the “true” *A. atticum* from Athens (SMNS 1517) I come to the following conclusion: The animals from Metéora may be conspecific with *A. corcyraeum*, but certainly not with *A. atticum*; the specimens are bigger, much less tuberculated, have a different coloration and have the male ischium 7 ventrally straight instead of strongly concave. They also show differences towards the “true” *A. corcyraeum*, which are inside a geographical
Figs. 38–40. *Armadillidium atticum* (Greece, Athens, SMNS 1518). – 38. ♂, 13.5 mm long, head and pereion-tergite 1 in dorsal view. 39. ♂, 13.5 mm long, head in dorsal view. 40. ♀, 13.5 mm long, head in frontal view. – Scales: 1 mm.
Figs. 41–44. *Armadillidium atticum* (Greece, Athens, SMNS 1518). – 41. ♀, 13.5 mm long, pereion-epimeron 1, dorsolateral view. 42. ♀, 13.5 mm long, telson and uropods in situ, dorsal view. 43. ♂, 13.5 mm long, antenna. 44. ♂, 13.5 mm long, carpus 1, frontal view. – Scales: 1 mm (43), 0.5 mm (44).
intraspecific variability, but which could also mean a separation on the species level. A solution of this question will depend on further collections between Metéora and Ionian islands.

Figs. 45–47. Armadillidium atticum, ♂, 13.5 mm long (Greece, Athens, SMNS 1518). – 45. Ischium 7, frontal view. 46. Ischium 7, caudal view. 47. Pleopod-exopodite 1, dorsal view. – Scales: 0.5 mm.
4.5 Armadillidium bicurvatum Verhoeff, 1901

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

4.6 Armadillidium cythereium Strouhal, 1937

(Figs. 49–58 and map Fig. 48)

Literature records

STROUHAL 1937b: 106, fig. 5 (island Kíthira); SFENTHOURAKIS 1993: 623 (islands Prasonísi and Antikíthira between Kíthira and Crete).

Material examined

Greece: 3 ex., island Kíthira S of SE-Peloponnese, W of Avlémonas, leg. MALICKY, 8.V.1976
Figs. 49–51. Armadillium cythereium (Greece, island Kithira, SMNS 2865). – 49. ♂, 13 mm long, head and pereion-tergite 1 in dorsal view. 50. ♂, 13 mm long, head in dorsal view. 51. ♀, 11.5 mm long, head in frontal view. – Scales: 1 mm.
Figs. 52–55. *Armadillidium cythereium* (Greece, island Kíthira, SMNS 2865). – 52. ♂, 13 mm long, pereion-epimeron 1, dorsolateral view. 53. ♂, 13 mm long, telson and uropods in situ, dorsal view. 54. ♂, 12 mm long, antenna. 55. ♂, 12 mm long, carpus 1, frontal view. – Scales: 1 mm (54), 0.5 mm (55).

Diagnostic characters

Maximum dimensions: 13 \times 6 \text{ mm}.

Coloration: Greyish brown with usual yellowish muscle spots and conspicuously lighter epimera.

Cuticular structures: Tergites tuberculated.

Frontal shield from behind surpassing frontal margin of head by nearly one third, upper margin straight, laterally with rounded angles (Figs. 49–50); antennal lobes trapezoidal (Fig. 51). Hind margin of pereion-epimeron 1 with pronounced angle

Figs. 56–58. Armadillidium cythereium, ♂, 12 mm long (Greece, island Kithira, SMNS 2865).
- Scales: 0.5 mm.
(Fig. 52). Telson slightly wider than long, with nearly straight sides and broadly rounded apex (Fig. 53). Antenna see Figs. 51 and 54, segments of the flagellum more or less the same length. Male carpus 1 with brush of short spines (Fig. 55); male ischium 7 ventrally concave, frontally with distal field of short spiny setae (Figs. 56–57). Male pleopod-exopodite 1 with pronounced pointed triangular hind-lobe (Fig. 58), endopodite 1 with apex straight.

**Distribution**

Island Kíthira S of southeastern Peloponnese and further islands between Kíthira and western Crete (where it is certainly missing) (see map Fig. 48).

**Remarks**

*A. cythereium* is the sister-species of *A. laconicum* from the south-eastern Peloponnese. In former publications I considered the two species as probably conspecific. A closer investigation revealed however clear differences between these two forms. In *A. cythereium* the frontal shield is higher, the antennal lobes are trapezoidal and not semicircular, the antennae are shorter and stouter, and the male pleopod-exopodite 1 shows a slightly different shape. So for the moment I treat the two forms as two different species.

### 4.7 Armadillidium granulatum Brandt, 1833

This species was treated in the 23rd contribution of this series (*Armadillidium* on the Peloponnese, Schmalfuß 2006). 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 (Normandie).

### 4.8 Armadillidium insulanum Verhoeff, 1907

(Figs. 59–70 and map Fig. 71)


*A. insulanum kigatense* Verhoeff, 1943 from Istanbul is *A. granulatum* (types investigated).

**Literature records**


**Material examined**

Figs. 59–61. Armadillidium insulanum (Greece, Cyclades, island Kufonisi, SMNS 2085). – 59. ♂, 10 mm long, head and pereion-tergite 1 in dorsal view. 60. ♂, 10 mm long, head in dorsal view. 61. ♀, 9.5 mm long, head in frontal view. – Scales: 1 mm.

Figs. 62–63. Armadillidium insulanum, ♂, 10.5 mm long (Turkey, northeastern Aegean island Gökçe Ada, SMNS 11273). – 62. Head and pereion-tergites 1 and 2 in dorsal view. 63. Head in dorsal view. – Scales: 1 mm.
Figs. 64–67. Armadillidium insulanum (Greece, Cyclades, island Kufonísi, SMNS 2085). – 64. ♂, 11 mm long, pereion-epimeron 1, dorsolateral view. 65. ♂, 11 mm long, telson and uropods in situ, dorsal view. 66. ♂, 10 mm long, antennal flagellum. 67. ♂, 10 mm long, merus and carpus 1, frontal view. – Scales: 0.5 mm.
Figs. 68–70. Armadillidium insulanum (Greece, Cyclades, island Kufonísi, SMNS 2085). – 68. ♂, 10 mm long, ischiium 7, frontal view. 69. ♂, 10 mm long, ischiium 7, caudal view. 70. ♂, 11 mm long, pleopod-exopodite 1, dorsal view. – Scales: 0.5 mm.
Diagnostic characters

Dimensions: Maximum size 12 × 6 mm; smallest ♀ with marsupium 7 mm long (from island Adelfí, Northern Sporades).

Coloration: Light brown with usual yellowish muscle spots, epimera lighter, in many specimens conspicuously yellow without dark pigmentation.

Cuticular structures: Tergites granulated; in the specimens from the northern Aegean islands and the northeastern mainland the granulation is hardly recognizable.

Frontal shield from behind slightly surpassing frontal margin of head, upper margin straight, laterally with angle or more rounded, caudally with more or less con-
spicuous groove (Figs. 60, 61, 63); antennal lobes trapezoidal (Fig. 61). Hind margin of pereion-epimeron 1 with obtuse angle (Fig. 64). Telson wider than long, with nearly straight sides and broadly rounded apex (Fig. 65). Antenna with proximal segment of flagellum shorter than distal one (Fig. 66). Male carpus 1 with brush of short spines (Fig. 67); male ischium 7 ventrally concave, frontally with distal hair-field (Figs. 68–69). Male pleopod-exopodite 1 with short triangular hind-lobe (Fig. 70), a certain variability in the shape can be recognized if Fig. 70 is compared with figs. 2 and 9 in SCHMALFUSS (1985); endopodite 1 with apex straight.

Distribution

The species in its present definition is recorded from the northeastern mainland from Kavála eastward, from the Turkish coast of the Aegean, and from nearly all Aegean islands south to Milos and Íos (see map Fig. 71).

Remarks

*A. insulanum* is a very variable species, the dorsal tuberculation, the frontal shield, the shape of pereion-epimera 1 and the telson show a clinal variation in a considerable degree (compare Figs. 59–60 with Figs. 62–63). There are, however, no abrupt differences between neighboring populations, exhibiting a gradual change of these characters, so presently there is no reliable basis for dividing this taxon into different species or subspecies, as it has been done in the past on the basis of single specimens. As in the case of *A. ameglioi* more detailed studies may plead for a separation of the *insulanum*-complex into a number of separate species, for the time being it seems, however, a tenable and reasonable solution to treat these populations under the common name *A. insulanum* sensu lato. One exception I make is *A. pelionense* Strouhal, 1928 (compare STROHAL 1928: 103, figs. 10–14) from the Pílio Mountains on the mainland adjacent to the Northern Sporades. This taxon is certainly a representative of the *insulanum*-group in the Pílio region, the differences towards the populations of the Northern Sporades are, however, consistent and conspicuous, so for the time being I treat *A. pelionense* as a distinct species (one sample investigated: 3 ex., eastern central Greece, Pílio Mountains, pass above Portariá, leg. PIEPER & RUNZE, 28.IX.1978, SMNS 1891).

For separation from *A. aegaeum* see Remarks under that species.

4.9 *Armadillidium lymberakisi* Schmalfuss, Paragamian & Sfenthourakis, 2004

(Figs. 72–82 and map Fig. 83)

**Literature records**

SCHMALFUSS et al. 2004: 37, figs. 56–65 (Crete: Lefká Óri).

**Material examined**

**Greece:** 10 ex., Crete, Lefká Óri, 2000 m, pitfall traps, leg. LYMBERAKIS, 1992 (SMNS 1173).

**Diagnostic characters**

Maximum dimensions: 8.5 × 3.5 mm.
Coloration: Greyish brown with usual muscle-spots, epimera lighter.
Cuticular structures: Tergites completely smooth as in *A. vulgare*.
Frontal shield from behind surpassing frontal margin of head, with straight upper
margin (Figs. 72–73); antennal lobes trapezoidal (Fig. 74). Hind margin of pereion-epimeron 1 with obtuse angle (Fig. 75). Telson wider than long, with nearly straight sides and broadly rounded apex (Fig. 76). Antenna see Fig. 77, distal segment of flagellum twice as long as proximal one. Male carpus 1 with brush of short spines (Fig. 78); male ischium 7 ventrally slightly concave, frontally without distal hair-field

Figs. 72–74. Armadillidium lymberakisi, ♂, 6 mm long (Crete, Lefká Óri, SMNS 1173). – 72. Head and pereion-tergite 1 in dorsal view. 73. Head in dorsal view. 74. Head in frontal view (from SCHMALFUSS et al. 2004). – Scales: 0.5 mm.
(Figs. 79–80). Male pleopod-exopodite 1 with short rounded hind-lobe (Fig. 81), endopodite 1 with apex straight (Fig. 82).

Distribution

The species is known only from the alpine zone around 2000 m in the Lefká Óri on Crete (see map Fig. 83).
4.10 *Armadillidium marmoratum* Strouhal, 1929

This species was treated in the 23rd contribution of this series (*Armadillidium* on the Peloponnese, *Schmalfuss* 2006). It is known from the coasts of Greece (Ionian island Lefkáda, Peloponnese, Aegean islands, northern Aegean coast), western

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**Figs. 79–82.** *Armadillidium lymberakisi*, ♂, 6 mm long (Crete, Lefká Óri, SMNS 2085). – 79. Ischium 7, frontal view. 80. Ischium 7, caudal view. 81. Pleopod-exopodite 1, dorsal view (from Schmalfuss et al. 2004). 82. Apex of pleopod-endopodite 1 (from Schmalfuss et al. 2004). – Scales: 0.1 mm.
Turkey including Black Sea coast, Cyprus, Israel and Egypt. A map of the overall distribution is found in SCHMALFUSS (2000: 79, fig. 4), for safe Greek records see map fig. 153 in SCHMALFUSS (2006).

4.11 Armadillidium peloponnesiacum Verhoeff, 1901

Also this species is treated in SCHMALFUSS (2006). It is a Greek endemic recorded from western, central and southern Greece including Ionian islands Lefkáda, Kefaloniá and Zákynthos, and the Aegean islands Évvia and Skíros (map fig. 172 in SCHMALFUSS 2006).

4.12 Armadillidium peraccae Tua, 1900

(Figs. 5–6, 84–96 and map Fig. 83)

Literature records

The complete literature treating this species is listed in my World Catalog (SCHMALFUSS 2003: 39). These publications concern only records from southeastern Italy. In the meantime I consider the record of “Armadillidium peraccae kosswigi Verhoeff, 1936” from the coast of the Sea of Marmara and the material from the Greek Aegean islands Thásos and Lésvos to be
conspecific with *A. peraccae* – in the Catalog (Schmalfuss 2003: 38) this taxon was supposed to belong to *A. pallasii* Brandt, 1833.

Material examined


Figs. 84–85. *Armadillidium peraccae*, ♂, 18 mm long (Greece, northern Aegean island Thásos, SMNS 2592). – 84. Head and pereion-tergites 1 and 2 in dorsal view. 85. Head in dorsal view. – Scales: 1 mm.
Diagnostic characters

Maximum dimensions: $19 \times 10 \text{ mm}$.

Coloration: Grey to blackish grey, with inconspicuous muscle-spots. The specimens from Bari (eastern Italy) are yellow without any dark pigmentation.

Figs. 86–87. *Armadillidium peraccae* (Greece, northern Aegean island Thásos). – 86. $\delta$, 15.5 mm long (SMNS 2591), head in frontal view. 87. $\delta$, 18 mm long (SMNS 2592), pereion-epimeron 1, frontal corner. – Scales: 1 mm (86), 0.1 mm (87).
Cuticular structures: Tergites heavily tuberculated.

Frontal shield narrow, from behind as high as wide or slightly higher than wide, sides concave, dorsal margin wider than the middle part, with pointed angles laterally, caudally with conspicuous groove (Figs. 84–85); antennal lobes semicircular

**Figs. 88–89. Armadillidium peraccae, δ, 18 mm long (Greece, northern Aegean island Thásos, SMNS 2592). – 88. Pereion-tergite 1, lateral part with nodulus lateralis (arrow). 89. Detail with nodulus lateralis. – Scales: 0.5 mm (88), 0.1 mm (89).**
(Fig. 86). Hind margin of pereion-epimeron 1 with acute angle (Fig. 90), details of marginal parts of tergite 1 with nodulus lateralis see Figs. 87–89. Telson clearly longer than wide, with nearly straight sides and narrowly rounded apex (Fig. 91). Antenna see Fig. 92, distal segment of flagellum clearly shorter than proximal one. Male carpus 1 with brush of short spines (Fig. 93); male ischium 7 ventrally very slightly concave, frontally with distal hair-field (Figs. 94–95). Male pleopod-exopodite 1 with short triangular hind-lobe (Fig. 96), endopodite 1 with apex straight.

Figs. 90–93. *Armadillidium peraccae*, ♂, 18 mm long (Greece, northern Aegean island Thásos, SMNS 2592). – 90. Pereion-epimeron 1, dorsolateral view. 91. Telson and uropods in situ, dorsal view. 92. Antenna. 93. Merus and carpus 1, frontal view. – Scales: 1 mm.
Distribution
Southeastern coast of Italy, northern Aegean islands Thásos and Lésvos, coasts of the Marmara Sea.
In Fig. 83 the Greek records are mapped.
The reason for the distribution gap between the Adriatic coast and the Aegean and Black Sea records is unknown. The species could have been introduced from the Italian coast to the Aegean coasts or the other way round.

Remarks
*Armadillidium peraccae* differs from *A. pallasii* by heavily tuberculated tergal parts (in *pallasii* only moderately granulated), a frontal shield higher than wide with upper margin
wider than base (in *pallasii* wider than high with base wider than upper margin), a very pronounced angle on epimeron 1 (in *pallasii* an obtusely rounded angle) and a long telson with narrowly rounded apex (in *pallasii* with broadly rounded apex).

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

4.13 *Armadillidium vulgare* (Latreille, 1804)
(Figs. 1–4)

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

5 References


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