

Three new gastropod species from Greece and Turkey (Mollusca: Gastropoda: Rissooidea) with notes on the anatomy of *Bythinella charpentieri cabirius* Reischütz 1988

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Abstract. In Greece we found one new species of the genus *Pseudorientalia*, and two new species from Turkey of the genus groups *Torosia* n. gen., and *Pseudamnicola*. We compared these species with the known species from Greece and Turkey and we found that all three species are new. The new species are described here as *Pseudorientalia tsekovi* n. sp., *Pseudamnicola vinarskii* n. sp. and *Torosia proschwitzii* n. gen. n. sp. In addition, D. Georgiev collected in Greece *Bythinella charpentieri cabirius* Reischütz 1988. Because Reischütz did not depict the anatomy of the species (Reischütz 1988), we provide herewith the morphology of the penis for the first time.

Key words: *Pseudorientalia*, *Bythinella*, *Pseudamnicola*, *Torosia* n. gen., new descriptions, Greece, Turkey.

Introduction

The Rissooidea of Greece have not been well studied in the past. For instance, Schütt (1987) mentioned two *Bithynia* spp. from Greece, while new investigations carried out by Glöer & Pešić (2006), Glöer et al. (2007), Glöer & Maassen (2009), and Glöer et al. (2010), revealed at least seven *Bithynia* spp., and nine *Pseudobithynia* spp. from Greece and in Turkey new *Bithynia* spp. could also be found (Glöer & Yıldırım 2006). Benke et al. (2011) found hot spots of the genus *Bythinella* which coincide with those found in other freshwater taxa. However, Greece and Turkey are hot spots of Hydrobiids. In addition, Strong et al. (2008) mentioned Greece as one of the worldwide hot spots of freshwater gastropod diversity. On the other hand Szarowska & Falcinowski (2011) reported on destroyed and threatened localities of rissooid snails in Greece, known from the literature, and urgent protection of freshwater habitats is needed. Therefore, detection of new species is important to expand the knowledge of the high endemic mollusc fauna of Greece and Turkey, and to understand how evolution works.

From Greece only a few *Pseudamnicola* spp. are known, some of which only occur in islands e.g. *P. brachia* (Westerlund 1886), *P. chia* (E. von Martens 1889), *P. macrostoma negropontina* (Clessin, 1878), and *P. pieperi* Schütt 1980; while *P. exilis* (Frauenfeld 1863), and *P. macrostoma macrostoma* (Küster 1852) live in the mainland, although the

latter one is found in some islands, too (Bank 2006). Species of the genus *Pseudorientalia* have never been mentioned from Turkey (Yıldırım 1999, Yıldırım et al. 2006), but the shells of *Pseudorientalia* and *Torosia* look similar to the shells of *Pseudamnicola*, so we had to compare the species under discussion with the *Pseudamnicola* spp. known from Turkey and Greece.

This paper is intended (i) to improve the knowledge about the biodiversity in Greece and Turkey, and (ii) to describe the new species.

Material and methods

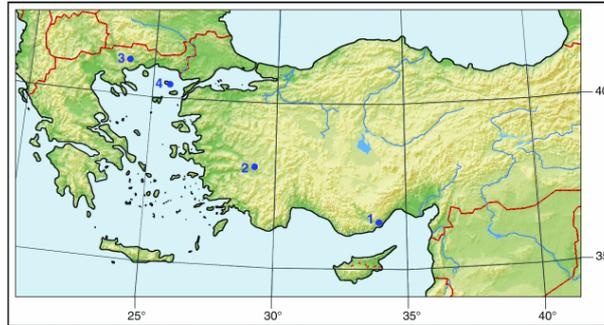
The snails were collected by hands from stones in spring waters from four sampling sites (Fig.1). The samples were put into ethanol (75%). The dissections and measurements of the genital organs and the shells were carried out using a stereo microscope (Zeiss, Germany). The photographs were made with a digital camera system (Leica R8).

Results

Conchological and anatomical investigations revealed three new species which belong to the genus groups *Pseudorientalia*, *Pseudamnicola*, and the new Genus *Torosia* n. gen. as well. Because for the most parts the genus groups of the Hydrobiidae can be identified by the morphology of the penis (Radoman 1983), we were able to identify the genus groups of the new species.

Figure 1. The sampling sites.

- 1: East of Silifke, sampling site of *P. vinariskii*,
- 2: West Toros Mts., the sampling site of *Torosia proschwitzii*,
- 3: Kefalari, the sampling site of *Pseudorientalia tzekovi*,
- 4: Samothraki island, the sampling site of *Bythinella charpentieri cabirius*.

**Genus *Pseudamnicola*** Paulucci 1878Type species: *Paludina macrostoma* Küster 1853***Pseudamnicola vinariskii* n. sp.**Material examined: 82 ex. from type locality, 4 dissected.Holotype: shell height 2.0 mm, 1.3 mm width, Zoological Museum Hamburg ZMH 79191.Paratypes: 10 ex., ZMH 79192, 30 ex. coll. Georgiev, 37 coll. GlöerLocus typicus: Turkey, Mediterranean sea coast, east of Silifke, spring on the bottom of a medium sized river in limestone area, N36°23'35.2" E34°03'06.0", 15.08.2009 D. Georgiev leg.Habitat: Underwater spring from the bottom of a coastal medium sized river (maximal depth around 2 meters) with clear water. The species lives on stones around the spring (Fig. 2).**Figure 2.** The type locality of *Pseudamnicola vinariskii* n. sp.Etymology: Named after Dr. Maxim Vinarski (Omsk), the outstanding expert on freshwater molluscs of Russia.Diagnosis: The horn coloured shell is elongated conical and has 4.5 regularly growing whorls, which are slightly rounded and separated

by a clear suture (Fig. 3.1). The surface is silky, opaque and finely striated. The umbilicus is closed and the operculum is orange. Shell height: 1.5 – 2.0 mm, width 1.2 – 1.3 mm.

Animal: Mantel pigmentation brownish. The eyes are large and situated at the basis of the tentacles. The snout is brown with a broad white border. The triangular penis is broad at the basis and pointed at the tip (Fig. 3.2).**Genus *Torosia* n. gen.**Diagnosis: Shell small and globular, penis broad with two small wings near the distal end, penis tip pointed (Fig. 4.3).Type species: *Torosia proschwitzii* n. gen. n. sp.***Torosia proschwitzii* n. gen. n. sp.**Material examined: 42 ex. from type locality, 4 dissected.Holotype: shell height 1.5 mm, 1.4 mm, Zoological Museum Hamburg ZMH 79193.Paratypes: 5 ex., ZMH 79194, 14 ex. coll. Georgiev, 18 ex. coll. GlöerLocus typicus: Turkey, West Toros Mts., east of Golhisar, karst spring, N37°07'28.4" E29°50'46.8", 1774 m alt., 17.98.2009 D. Georgiev leg. (Fig. 5).Habitat: Under stones in the spring area of a small mountain river, about 5-10 cm deep, flowing through dry and steep limestone slope of the Toros Mountain.Etymology: Named after Dr. Ted von Proschwitz (Göteborg), who helped the senior author to identify syntypes of Westerlund's collection in many times.Diagnosis: The shell is globular, whitish and fragile but not thin. The 4.5 whorls are convex with a deep suture (Fig. 4.1). The surface is silky. The aperture is circular to oval with a sharp peristome, which is thickened at the columella. The umbilicus is closed. Shell height 1.5 – 2.0 mm,

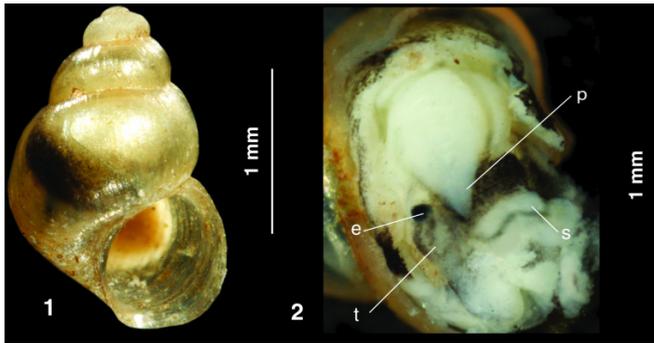


Figure 3. *Pseudamnicola vinarskii* n. sp.
1: the shell (Holotype),
2: the head.

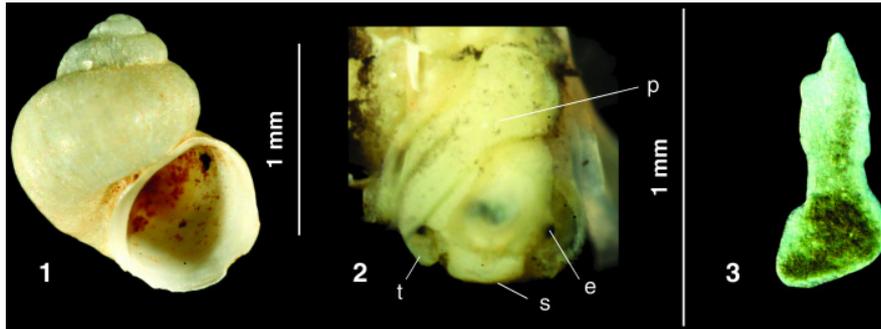


Figure 4. *Torosia proschwitzi* n. gen. n. sp. 1: the shell (Holotype), 2: the head, 3: the penis.



Figure 5. The type locality of *Torosia proschwitzi* n. gen. n. sp.

1.2 – 1.3 mm width. The operculum is orange.

Animal: The head is yellowish, the mantle is black coloured. The eyes are at the basis of the broad and short tentacles (Fig. 4.2).

Genus *Pseudorientalia* Radoman 1973

Type species: *Paludina natolica* Küster 1852 (Synonym: Schütt 1965: 61, *Pseudamnicola natolica*).

***Pseudorientalia tzekovi* n. sp.**

Material examined: 15 ex. from type locality, 4 dissected.

Holotype: shell height 1.8 mm, 1.2 mm width, Zoological Museum Hamburg ZMH 79189.

Paratypes: 4 ex., ZMH 79190, 2 ex. coll. Georgiev, 5 ex. coll. Glöer

Locus typicus: Greece, thermal spring at fish tanks in the village of Kefalari (North Greece, near Drama town), 01.02.2009 Angel Tzekov leg.

Habitat: On stones in a thermal spring at fish tanks.

Accompanied fauna: *Theodoxus fluviatilis*.

Etymology: Named after Dr. Angel Tzekov (Plovdiv University), who collected the specimens.

Diagnosis: The whitish shell is elongated conical with a dominant body whorl. The 4.5 whorls are slightly convex with a clear suture. The surface is glossy and finely striated. The apex is obtuse, the umbilicus closed. The aperture is oval, angled at the top, with a broad periostome, especially at the columella (Fig. 6.1). Shell height

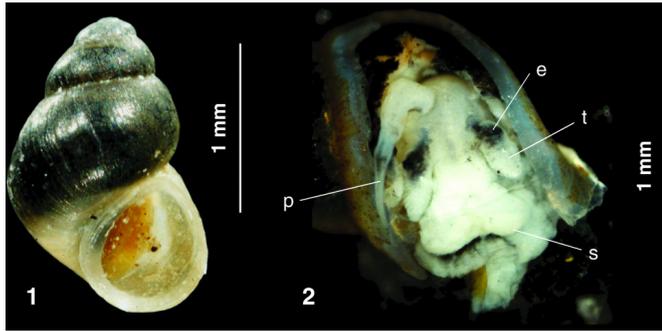


Figure 6. *Pseudorientalia tzekovi* n. sp.
1: the shell (Holotype),
2: the head.

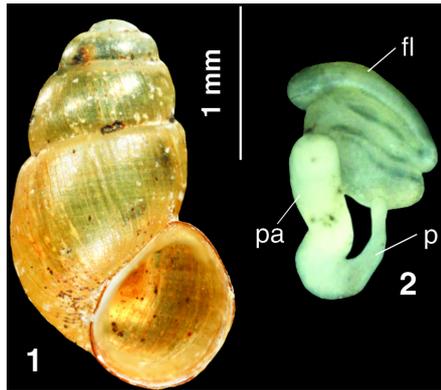


Figure 7. *Bythinella charpentieri cabirius* Reischütz 1988.
1: the shell, 2: the penis with flagellum.

1.7 - 1.8 mm, width 1.2 mm. The operculum is yellowish to light orange. A sexual dimorphism is not visible.

Animal: The animal is light grey with a black coloured mantle. The tentacles are broad and long with the eyes at their basis. The penis is long and pointed at the tip, the proximal part is broad. The middle part of the penis is dark coloured (Fig. 6.2).

Genus *Bythinella* Moquin-Tandon 1855

Type species: *Bulimus viridis* Poiret 1801

Bythinella charpentieri cabirius P.L. Reischütz 1988

Sampling site: Greece, Samothraki island, water source above Hora village, N40°27'42.6" E25°31'46.5", 334 alt., 03.08.2008 Dilian Georgiev leg.

Habitat: Because it was found only in a metal tank for cattle watering at a very dry maquis area at the west slope of Fengari Mountain, we suppose it is a part of an underground population of the species. The area is mainly composed of volcanic rocks.

Diagnosis: The cylindrical shell is light brown. The 4.5 whorls grow regularly and are slightly convex with a clear suture (Fig. 7.1). The surface is glossy. The apex is obtuse, the umbilicus closed. The aperture is oval with a strong peristome, beaded especially at the columella and the angled top. Shell height 1.9 - 2.5 mm, width of the last whorl 1.1 - 1.2 mm.

Animal: The head is brown with a black mantle. The tentacles are broad with the eyes at their basis. The penis is slightly shorter than the penial appendix. The flagellum is slim at the distal end and club-shaped at the proximal end (Fig. 7.2).

Discussion

The type species of the genus *Pseudorientalia* is *Paludina natolica* Küster 1852 (Radoman 1983, Yıldırım 2006), often mentioned as *Pseudamnicola natolica* (e.g. Schütt 1965, Yıldırım 1999). This species is distributed SE from the Marmara Sea (Schütt & Bilgin 1970). Radoman was the first who tried to arrange the many small hyrobiids to different genus groups by its anatomy. Not all authors accepted or noted this, thus many species are mentioned as belonging to the genus *Pseudamnicola*. Because the penis of *Pseudorientalia tzekovi* n. sp. is awl-like, smooth and pigmented in the middle part (Fig. 6.2), it cannot belong to the genus *Pseudamnicola* which has a triangular penis. The genus *Pseudorientalia* could not be found in Greece until now, it is only known by its type species which occurs in NW Turkey. Thus there are only two disjunct areas known where *Pseudorientalia* occurs and we believe that in this region more species of this genus can be found. *Pseudorientalia tzekovi* n. sp. differs from *P. natolica* by the deeper suture, the more convex whorls, the more promi-

ment body whorl and the obtuse apex, which is acute in *P. natolica*. *Pseudorientalia tzeкови* n. sp. has a broad peristome, which is angled at the top, while *P. natolica smyrnensis* (Schütt & Bilgin 1970) has a sharp edge of the aperture. In addition *P. natolica smyrnensis* only occurs in the region of Izmir and Aydın and the shell of the species is larger: height 2.0 mm, width 1.5 mm vs. 1.8 and 1.2 mm in *P. tzeкови*.

Pseudammicola vinariskii n. sp. is a characteristic species of the circum-mediterranean genus *Pseudammicola* (see penis in Fig. 3.2). We had to compare this species with the known species from Turkey: *P. geldaiyana* Schütt & Bilgin 1970, *P. intranodosa* Schütt & Şeşen 1993, and *P. bilgini* Schütt 1993. The latter two species are distributed in E Anatolia and their shells are very solid. In addition *P. intranodosa* differs from all other *Pseudammicola* spp. by its knotted columella. *Pseudammicola geldaiyana* possibly does not belong to the genus *Pseudammicola*, considering the depicted penis by Schütt & Bilgin (1970: 154, fig. 10). *Torosia proschwitzi* n. sp. has a penis morphology, not known until now. Considering only the shell it could belong to the genus *Pseudammicola* but in Turkey no *Pseudammicola* with a globular shell is known.

Considering the high levels of endemism of the genus *Bythinella* both in Greece and Bulgaria (Benke et al. 2011, Glöer & Georgiev 2011) we consider that *Bythinella charpentieri cabirius* is a separate species and has to be renamed to *Bythinella cabirius*.

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