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 tzekovi n. sp., Pseudamnicola vinarskii n. sp. and Torosia proschwitzi 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 & Falniowska (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. bicauda (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.
**Genus** *Pseudamnicola* Paulucci 1878  
**Type species:** *Paludina macrostoma* Küster 1853

*Pseudamnicola vinarskii* 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. Glöer  
**Locus 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).  
**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 proschwitzi* n. gen. n. sp.  

*Torosia proschwitzi* 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. Glöer  
**Locus 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 periostracum, which is thickened at the columella. The umbilicus is closed. Shell height 1.5 – 2.0 mm.
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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 peristome, 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:** *Bulinus 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 columnella 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-
Pseudamnicola tinarski n. sp. is a characteristic species of the circum-mediterranean genus Pseudamnicola (see penis in Fig. 3.2). We had to compare this species with the known species from Turkey: P. geldiayana Schütt & Bilgin 1970, P. intranodosa Schütt & Şeşen 1993, and P. bilgini Schütt 1993. The latter two species are distributed in East Anatolia and their shells are very solid. In addition P. intranodosa differs from all other Pseudamnicola spp. by its knotted columella. Pseudamnicola geldiayana possibly does not belong to the genus Pseudamnicola, considering the depicted penis by Schütt & Bilgin (1970: 154, fig. 10). Torosia proshwitzii n. sp. has a penis morphology, not known until now. Considering only the shell it could belong to the genus Pseudamnicola but in Turkey no Pseudamnicola 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, Göler & Georgiev 2011) we consider that Bythinella charpentieri cabirius is a separate species and has to be renamed to Bythinella cabirius.

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References