Three new hydrobiid species from Thassos Island (Greece) with a re-description of Amnicola charpentieri Roth, 1855

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Abstract
A recent field work carried out by Dilian Georgiev revealed four samples with three hydrobiid species. These species have been misidentified by Clessin (1890), Angelov (1950), and Reischütz (1983). Re-examination of these species provided two Grossuana spp. and one Bythinella sp., all new for science.

In addition the samples of syntypes of Bythinella charpentieri of Roth’s collection in The Bavarian State collection of Zoology (ZSM) revealed a new Bythinella sp.

Key words: Greece, new species, Gastropoda, springs, taxonomy.

Introduction

First data on Hydrobiidae snails on Thassos Island (N Aegean, Greece) was reported by Angelov (1959). He published a finding of “Bythinella alta Clessin 1890 (=B. bavarica Clessin, 1877, type locality in Bavaria) collected in 1942 on Thassos Island in village of Rachoni...smaller than the typical form. Height 3-3.5 mm and width 1.6-1.9 mm.”, and “In Limen town, in karst spring”. Other species reported by the same author was “Lithoglyphoides virescens Küster,1853 (= Pseudamnicola virescens, type locality in Dalmatia) collected in 1942 on Thassos Island, village of Rachoni, in the karst spring at the monastery.”

When Roth 1855 described Amnicola charpentieri (= Bythinella charpentieri) he gave only a short characterization of this species in Latin (Fig. 1). Roth did not mention an exact type locality, but only “in springs of mountaines region of Attica”. The noteworthy characters of his description are: convex whorls, peristome reflexed at the columella, slimness of the shell, 3.5 mm high and 1/2 mm broad.

The following authors of his century used this description in a wide sense for Bythinella charpentieri: Frauenfeld (1857: 575) compares P. compressa with P. charpentieri and believes that both are a little similar because both shells are stout. Frauenfeld (1857: 569) reports on the collections he could study, but the collection of Roth is missing in his list. Frauenfeld (1863: 204) reports on samples stored in the “kaiserlichen Sammlung” in Vienna of Attika collected by Charpentier and from Athen and Hymettus.
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collected by Heldreich, but without any description. O. Boettger (1883: 338) compared *B. charpentieri* with *B. austriaca*, but “*B. charpentieri* has less convex whorls”. Boettger (1885: 198) report on large samples from Laconia, Elis, Achaia in Morea, Phthiotis and on Euboea of this “common species” which has also been collected in a spring in front of the monastery of Hagios Demetriosissa Ossa Mountain in a characteristic form (2.5-3 mm high, diameter max. 1.6-1.9 mm). Martens (1898: 179) wrote that he identified after original specimens from Roth samples of *B. charpentieri* from Parnes in Attika and from Karystos in southern Euboea, the samples of which he has got from Mr. Leonis. Boettger (1892: 63) described a new subspecies with the type locality in Anargyros-spring near Agoriani in the phokish Parnass, common “beside the rare *B. charpentieri*". He compared it “with ten samples of *B. charpentieri* from different sampling sites in Greece”. He reports on the size of this species of which he has only a few large specimens (> 3.25 mm) in his collection but from the surrounding area of Athen (from Pentelikon [Pendéi Mountain] und Hymetos) they are usually only 3.0-3 1/8 mm in height. In Morea this species is much smaller.

Figure 1. Faksimile of the original description of *Ammicola charpentieri* Roth, 1855

When Schütt (1980) published about the Hydrobiidae of Greece he believed that all *Belgrandiella (Turcorientalia)* spp. of NE Greece belong to *B. hohenackeri* (Küster, 1853) (type locality spring in Kefalari at Lerna, Greece, see Boeters et al. 2017 for neotype) and all *Bythinella* spp. of Greece belong to *B. charpentieri* (Roth, 1855) (type locality: mountains of Attika). Later authors followed him, thus Reischütz (1983) reported a *Bythinella* species from Limenas town (in a spring at the ruins of Agora) as *Bythinella charpentieri* (Roth, 1855) and *Belgrandiella hohenackeri* (Küster, 1853) (= *Grossuana hohenackeri*) from two localities: a spring south of Kinira and a spring at Theologos. From these publications it was evident that on Thassos Island at least two different species of hydrobiids occur, and are with an unclear taxonomical status. So it paid attention to D. Georgiev to visit this island in a search of these species. Here we describe three hydrobid species as new to science: two from the already known localities (Rachoni and south of Kinira), and an additional one, newly found (Fig. 2).

The aim of this paper is to correct the faunal list of Thassos Island and to describe the new species from there. In addition we give a re-description of *Bythinella charpentieri* (Roth, 1855) and describe a new *Bythinella* sp. from Roth’s collection.

Material and Methods

Live specimens were collected by hand and preserved in 75% ethanol. The empty shells were collected by sieving through 1 x 1 mesh size sieve. The dissections and measurements of the shells were carried out using a stereomicroscope and an eyepiece micrometer considering the criteria of Radoman (1983) and Hershler & Ponder (1984) by both authors. The photographs were taken with a digital camera system. The penis was photographed under glycerin on a slide with a digital camera (Canon) through a microscope. The opinion of Radoman (1983) that most of the genera differ in their penis morphology was accepted for this paper. The female genitalia have not been investigated.

To clear the identity of *Bythinella charpentieri* we borrowed the type materials of Roth’s collection, housed in The Bavarian State Collection of Zoology, Munich (ZSM) in addition to photos of samples of *B. charpentieri* stored in SMF, made by Senckenberg Museuem Frankfurt (SMF).
Figure 2. The sampling sites of the species under discussion on Thassos. 1: Rachoni village: type locality of Bythinella rachonica n. sp., locality of Grossuana beroni n. sp.; 2: Drakotrypa cave, Panagia village: locality of Grossuana beroni n. sp.; 3: type locality of Grossuana beroni; 4: type locality of Grossuana thasia n. sp., 5: Pernes Mountain, type locality of Bythinella reischuetzi n. sp., 6: Hymettos, type locality of Bythinella charpentieri (Roth, 1855).

Results

Grossuana beroni n. sp. (Figs. 2, 3, 6-8)
https://zoobank.org/urn:lsid:zoobank.org:act:F8C2DAFC-0535-4E8E-A891-6F9ECFFA88AC

Material studied:
- **Holotype:** shell height 1.7 mm, width 1.2 mm, from type locality (ZMH 140789).
- **Paratypes:** 43 specimens in ethanol (ZMH 140790), 5 specimens in coll. Glöer, 22 specimens in coll. Georgiev.

Additional localities: (1) Greece, Thassos Island, spring below Drakotrypa cave, Panagia village N40 44 06.3 E24 44 02.2, 124 m a.s.l. (ZMH 140792: 35 specimens, 6 specimens coll. Glöer) and (2) Greece, Thassos Island, North Aegean, a big spring in the yard of the church of Rachoni village, N40 45 29.6 E24 38 17.3, 107 m a.s.l. (ZMH 140791: 5 specimens, 4 specimens in coll. Glöer).

**Type locality:** Greece, Thassos Island, North Aegean, a spring (water source) south of Skala Potamia near the round road of the island, N40 41 01.1 E24 46 16.7, 115 m a.s.l. (Fig. 1).

**Etymology:** Named in honor of Prof. Petar Beron (National Natural History Museum - Sofia) who paid attention on this island and inspired D. Georgiev in its young age by his books.

**Description:** Shell: The corneous, small shell is ovate with a prominent body whorl. The 4-4.5 whorls are convex with a weak suture, with smooth surface and fine growth lines. The aperture is rounded ovate with a sharp peristome thickened at the columella. The umbilicus is closed (Fig. 2). The operculum is dark red.

**Animal:** The animal is mostly dirty whitish or gray colored. The mantle is white or gray with a black wide stripe in its middle. The snout and tentacles are whitish or gray. Small patches of black pigment are visible around eyes and at the base of the snout. The penis is nearly regularly broad with a long tapered penistip and a bilobed outgrowth in the middle part on the left side. There is a dark spot near the penis-tip.

**Differentiating features:** Grossuana beroni n. sp. is most similar to Grossuana marginata (Westerlund, 1881) from which it differs by more regularly growing whors, sharper and thinner peristome and lighter soft body pigmentation. The new species is also similar to Grossuana sidironerensis Glöer, Reuselaars & Papavasileiou, 2018 described from the area of Drama at the mainland of Greece (Glöer et al., 2018) but the
last species has a penis with shorter tip, black colored mantle, and its whorls are fast growing (as in *G. marginata*).

**Distribution:** Known only from few springs on Thassos Island: a spring (water source) south of Skala Potamia near the round road of the island (type locality), spring below Drakotrypa cave, Panagia village, and a big spring in the yard of the church of Rachoni village.

![Figure 3-5](image)

**Figures 3-5.** 3: Type locality of *Grossuana beroni* n. sp., water source south of Skala Potamia near the round road of the island. 4: Type locality of *Grossuana thasia* n. sp., a spring south of Kinira near the round road of the island. 5: Type locality of *Bythinella rachonica* n. sp.

![Figure 6-10](image)

**Figures 6-10.** The *Grossuana* spp. 6-7: *G. beroni* n. sp. (paratypes), 8: penis of *G. beroni* n. sp. 9: *G. thasia* n. sp (holotype), 10: penis of *G. thasia* n. sp.
Habitat: Karst spring in a mixed broad leaf forest (mainly Platanus orientalis and Quercus spp.). Found on moss, dry leaves, sand and stones.

Grossuana thasia n. sp. (Figs. 2, 4, 9-10)
https://zoobank.org/urn:lsid:zoobank.org:act:019E5D1D-E033-4913-896D-4C779ACA9198

Material studied:
- Holotype: shell height 1.7 mm, width 1.1 mm, from type locality (ZMH 140793).
- Paratypes: 5 specimens in ethanol (ZMH 140794), 5 specimens in coll. Glöer, 11 specimens in coll. Georgiev.

Type locality: Greece, Thassos Island, North Aegean, a spring (water source) south of Kinira near the round road of the island, N40 38 07.5 E24 45 52.2, 144 m a.s.l. (Fig. 3).

Etymology: Named after Thassos Island on which the species lives.

Description: Shell: The corneous shell is elongate ovate with a prolonged body whorl (Fig. 2). The apex is rounded and often eroded. The 4-4.5 whorls are slightly convex with a weak suture, with rough irregular growth lines. The aperture is ovate slightly angled at the top with a sharp periostome thickened at the columella. The umbilicus is closed. The operculum is dark red. Animal: The animal is mostly black colored. The mantle is black with a thin white border. The snout and tentacles are black with white or grayish tips. Penis: The penis is nearly regularly broad with a long tapered penis-tip. There is a dark spot at the near the penis-tip.

Differentiating features: The new species is most similar to Grossuana angeltsekovi Glöer & Georgiev, 2009 which is known to be widely distributed in Bulgaria and North Greece (Georgiev 2013, Georgiev et al., 2015, Falniowski et al. 2015, Glöer et al., 2018). From this species Grossuana thasia n. sp. differs by its more elongated and slender shell with flatter whorls, which have rough surface with irregular growth lines, and by its more rounded, often eroded apex. The whorls of the shell of the new species are 4-4.5 while in G. angeltsekovi they are 5-5.5 and the later is larger (height of the holotype = 2.1 mm). In addition G. thasia has a well visible bifurcated penis lobe, while in G. angeltsekovi it is very small and hardly visible (Glöer & Georgiev, 2009).

Grossuana thasia n. sp. is similar by its shell morphology to Grossuana stenaensis Glöer, Reuselaars & Papavasileiou, 2018 described from the nearby mainland of Greece (Glöer et al., 2018) but this species has a penis with broader base and shorter and thicker tip.

Previously all Grossuana of Thassos were assigned to G. hohenackeri (Küster, 1853) (Reischütz, 1983). It was later re-described and split into two species: Radomaniola tritonum (Bourguignat, 1852) and Grossuana tembii Boeters, Glöer & Falniowski (2018) (Boeters et al., 2018). G. thasia n. sp. differs from G. tembii by its higher whorl number (3.25-3.5 in G. tembii) and longer penis tip.

Distribution: Known only from the type locality.

Habitat: Karst spring in a mixed broad leaf forest (mainly Platanus orientalis and Quercus spp.). Found on moss, dry leaves, sand and stones.

Bythinella charpentieri Roth, 1855 (Figs. 1, 2, 9-15)

Type locality: Hymettos, east of Athens, Attika.

There are four samples (Kephesos, Attika, 2x Hymettos) marked as Syntypes in ZSM. Only one sample contained a specimen which corresponds to the original description. Thus we designate this species as the lectotype (ZSM 20012106).
Re-description: The ovate-cylindrical shell has 4.5-5 regularly growing convex whorls with a deep suture. The aperture is ovate with a round angle at the top. The aperture height takes $\frac{1}{3}$ of shell height. The peristome is sharp, somewhat reflexed at the columella. The umbilicus is closed. The shell is 3.3 mm high and 1.8 mm broad.

Figures 11-17. Bythinella charpentieri, syntypes and others from collections ZSM and SMF. 11: lectotype of B. charpentieri Roth, 1855 from Roth’s collection ZSM 20012106. 12: paralectotype, Hymettus, ZSM29912124, 13: topotype, Hymettus SMF141584, 14: Kessisos ZSM20012113, 15: Attika ZSM20012106, 16: Attika, ZSM20012110, 17: Parnes, SMF141838.

Bythinella reischuetzi Glöer & Georgiev n. sp. (Figs. 2, 18-21)
https://zoobank.org/urn:lsid:zoobank.org:act:5FFCFB24-AF6F-4625-9A57-70520A01B94D

Materials studied:
- Holotype: shell height 2.5 mm, shell width 1.7 mm, ZSM Mol 20202395, coll. Roth.
- Paratypes: numerous (> 150) specimens, ZSM Mol 20012100, coll. Roth.

Type locality: Greece, Párnis (Mountain) in Parnitha National Park.
Etymology: Named after Peter L. Reischütz (Vienna), outstanding expert on Hydrobiids of the Balkans, who already pointed out in 2008 (p. 35) that the *Bythinella* spp. of the Peleponnese is much more diverse than believed at that time.

Figs 18-21. *Bythinella reischuetzi* n. sp. 18: holotype, 19: original label, 20: paratype, 21: apical view.

Description: The ovate shell is thick-walled with 4-4.5 slightly convex whorls, separated by a clear suture. The first whorl lies in a plane and is not visible from frontal view. The aperture is ovate with a slight angle at the top. The peristome is thickened at the columella. The umbilicus is closed. The shell is 2.5 mm high and 1.7 mm broad.

Differentiating characters: The species differs from all other *Bythinella* spp. of Greece by the first whorl which lies in a plane. Thus the compressed shell shape is characteristic of this species.

Distribution: Only known from type locality.

Remark: In this region another *Bythinella* sp. occurred (see Fig. 15), distinct from *B. reischuetzi* n. sp. Unfortunately we do not know the exact locations because these have not been mentioned at the labels.

*Bythinella rachonica* n. sp. (Figs. 2, 22-25)
https://zoobank.org/urn:lsid:zoobank.org:act:DD058BE9-160A-4CA0-8ECB-7F5E642420DC

Materials studied:
   Holotype: shell height 3.1 mm, width 1.75 mm, from type locality (ZMH 140795).
   Paratypes: 3 specimens in ethanol (ZMH 140796), 1 specimen in coll. Glöer.

Type locality: Greece, Thassos Island, North Aegean, a big spring in the yard of the church of Rachoni village, N40 45 29.6 E24 38 17.3, 107 m a.s.l. (Fig. 4).

Etymology: Named after village of Rachoni where the new species was found.

Description: Shell ivory, cylindrical with 4.5 whorls, separated by a deep suture. Surface silky and finely striated. Apex obtuse, umbilicus closed. Aperture oval, with a sharp peristome, angled at the top. Shell height 2.9-3.1 mm, width 1.8 mm. Penial appendix twice longer than the penis, tubular gland medium-sized, with 5 half loops, tapering from distal to proximal part (Fig. 5).

Differentiating features: From this region no *Bythinella* spp. are known (Glöer & Hirschfelder 2020, Glöer & Reuselaars 2020a, b, c), except from the neighbouring Samothrace Island, from where Reischütz described *Bythinella charpentieri cabirius* P.L. Reischütz 1988 (considered as a separate species by Glöer &
Georgiev 2012), which is a small and slim species (2.5-2.7 mm high and 1.2-1.3 mm broad) (Glöer & Georgiev 2012) and in this way different from *Bythinella rachonica* n. sp.

**Figures 22-25.** *Bythinella rachonica* n. sp., 22: shell, 23: penis in situ, 24: penis with penial appendix, 25: tubular gland.

**Distribution:** Known only from the type locality. The spring at the Agora of Limenas was checked but no living snails were found. Some empty, eroded shells of a *Bythinella* species were found by D. Georgiev in sand deposits in a spring below Panagia village (N40 43 56.8 E24 44 26.6, 49 m a.s.l.) but it is not clear if they belong to *Bythinella rachonica* n. sp.

**Habitat:** Found in a spring (captured under the church of Rachoni, with a concrete bed) on stones and submerged mosses.

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