



## New Species of Freshwater Snails (Gastropoda: Bithyniidae, Hydrobiidae and Planorbidae) from Corfu Island (Greece) and Bulgaria

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**Abstract:** Freshwater mollusc species were collected in Bulgaria (2007, Varna Region) and Greece (2013, Corfu Island) by one of the present authors (MLZ). Within this material, five new species were detected and described in the present article: *Bithynia beloslavensis* n. sp. from Bulgaria and *Bithynia corfuensis* n. sp., *Pseudobithynia nigra* n. sp., *Gyraulus messonghi* n. sp. and *Pseudamnicola kavosensis* n. sp. from Corfu Island, Greece. The descriptions are illustrated with photos of the holotypes and details of the penis morphology.

**Key words:** Greece, Corfu, Bulgaria, *Pseudobithynia*, *Bithynia*, *Pseudamnicola*, *Gyraulus*

### Introduction

Only a few freshwater molluscs are known from Corfu Island. The first data were by MOUSSON (1859) who reported on molluscs of Corfu; he only provided a list of the species found on this island, which included mainly land snails and no species of the genera discussed here. HESSE (1883) reported on *Planorbis rotundatus* (= *Anisus leucostoma* Millet, 1813), *Bythinia similis* (= *Mercuria similis* Draparnaud, 1805) and *Bythinia viridis* (Poiret, 1801) (= *Bythinella viridis*). BOETTGER (1989) added *Planorbis umbilicatus* O.F. Müller, 1774 (= *Planorbis planorbis* (Linnaeus, 1758)) and *Bythinia leachi* Sheppard, 1823. var. *graeca* Westerlund, 1879. *Bithynia graeca* is much larger than mentioned by BOETTGER (1889: 137) and is possibly endemic to Lake Ioannina (GLÖER & PEŠIĆ 2006). STEPHANIDES (1948) listed *Bithynia leachi* Sheppard (sic!) var. *graeca* West., *Bythinella viridis* Poiret, and *Planorbis spirorbis* L. from Corfu. In 1971, he added *Bithynia tentaculata* (Linnaeus, 1758) and *Gyrau-*

*lus albus* (O.F. Müller, 1774) (det. John F. Peake, British Museum of Natural History). However, all these identifications are doubtful because the species mentioned above, except *Bithynia graeca*, occur in regions far away from the Balkans.

LETOURNEUX (1887) was the first who found that the species on Corfu are distinct from already described species, thus he described four *Digyreidum* (= *Bithynia*) spp. from Corfu as new, all collected near the village of Corfu. However, these were all lumped together as *Bithynia renei* (Letourneux, 1887) by GLÖER (2019) because of the high morphological plasticity of this species.

According to GEORGIEV & HUBENOV (2013), only a few *Bithynia* spp. are known from Bulgaria: *Bithynia danubialis* Glöer & Georgiev, 2012, *B. tentaculata* (Linnaeus, 1758) and *B. rumelica* Wohlberedt, 1911, the latter being a thermophile species occurring in Central Bulgaria.

This paper is intended to expand the knowledge about freshwater molluscs of Corfu and Bulgaria by describing several new gastropod species.

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## Materials and Methods

The snails were collected during holiday trips of one of the present authors (MLZ) in 2007 and 2013. The gastropods were sampled using a hand net or by picking up by hand. The samples were stored in 75% ethanol. The dissections and measurements of the genital organs and the shells were carried out using a stereomicroscope (ZEISS). The photographs were made with a digital camera system (Leica R8). The holotypes and some paratypes are deposited in the Zoological Museum Hamburg (ZMH). Some paratypes are stored in the Senckenberg Natural History Collections Dresden (SNSD) and in the collection of the first author.

The sampling sites were as follows:

Station 1: Bulgaria, Oblast Varna, channel or ditch near Razdelna, flowing into the Lake Beloslav, 43.1677°N; 27.6361°E, altitude 4 m, leg. M.L. Zettler, 25<sup>th</sup> October 2007.

Station 2: Greece, Corfu, creek near Karousades, 1 km east of Kavallouri, 39.7775°N; 19.7659°E, altitude 12 m, leg. M.L. Zettler, 10<sup>th</sup> July 2013.

Station 3: Greece, Corfu, Creek Messonghi, 1 km west of Episkopiana, 39.4931°N; 19.9051°E, altitude 19 m, leg. M.L. Zettler, 9<sup>th</sup> July 2013.

Station 4: Greece, Corfu, temporary creek, 1 km south-west of Kavos, 300 m north-east of water reservoir, 39.3761°N; 20.1095°E, altitude 15 m, leg. M.L. Zettler, 14<sup>th</sup> July 2013.

## Results

### Family Bithyniidae Gray, 1857

#### Genus *Bithynia* Leach, 1818

**Diagnosis:** Shell conical. Calcareous operculum present. Penis with penial appendix.

*Bithynia corfuensis* n. sp. (Figs 4–6)

**Material examined:** Holotype – shell height 5.25 mm, width 4.0 mm, ZMH 140811. Paratypes – 3 specimens ZMH 140812, 3 specimens coll. Glöer, 10 specimens SNSD Moll S10178.

**Type locality:** Greece, Corfu, Creek near Karousades, 1 km east of Kavallouri, 39.7775°N; 19.7659°E, leg. M.L. Zettler, 10<sup>th</sup> July 2013.

**Etymology:** Named after the island where the species lives.

**Description:** Shell brownish, with 4.5 stepped whorls separated by deep suture. Aperture ovate, somewhat oblique, with sharp peristome. Umbilicus slit-like to closed. Shell 5.25–6.9 mm high and 4.0–5.2 mm broad. Anatomy: Penis broad, with blunt penis tip. Penial appendix short.

**Differentiating characters:** From *Pseudobithynia renei* (Letourneux, 1887), the new species



**Fig. 1.** Sampling sites. 1. Beloslav, Bulgaria (*Bithynia beloslavensis* n. sp.). 2. Kavallouri, Corfu (*Bithynia corfuensis* n. sp., *Pseudobithynia nigra* n. sp.). 3. Messonghi (*Gyraulus messonghi* n. sp.). 4. Kavos (*Pseudamnicola kavosensis* n. sp.).

differs by the proportion of shell height to width, which is 1.35–1.36 in *B. corfuensis* and 1.08–1.25 in *P. renei*; that means that *P. renei* is relatively broader because the body whorls are more inflated.

**Remark:** This species occurs syntopically with *Pseudobithynia nigra* n. sp. Because the anatomy of *P. renei* is unknown, it could be that *P. renei* is a *Bithynia* in fact and should be compared with *B. corfuensis*.

*Bithynia beloslavensis* n. sp. (Figs 7–9)

**Material examined:** Holotype – shell height 5.25 mm, width 4.0 mm, ZMH 140813. Paratypes – 3 specimens ZMH 140814, 3 specimen coll. Glöer, 6 specimens SNSD Moll S10179.

**Type locality:** Bulgaria, Oblast Varna, channel or ditch near Razdelna, flowing into the Lake Beloslav near the town Beloslav, 43.1677°N; 27.6361°E, leg. M.L. Zettler, 25<sup>th</sup> October 2007.

**Etymology:** Named after the lake or town of the type locality.

**Description:** Shell ivory, with 4.5 convex whorls separated by deep suture. Surface silky, with slight growth lines. Aperture nearly circular, with sharp peristome. Umbilicus closed. Shell 4.5–5.5 mm high and 4.4–5.0 mm broad. Anatomy: Penis broad, tapered at distal end. Penial appendix as long as penis.

**Differentiating characters:** All other *Bithynia* spp. from Bulgaria have less convex whorls.

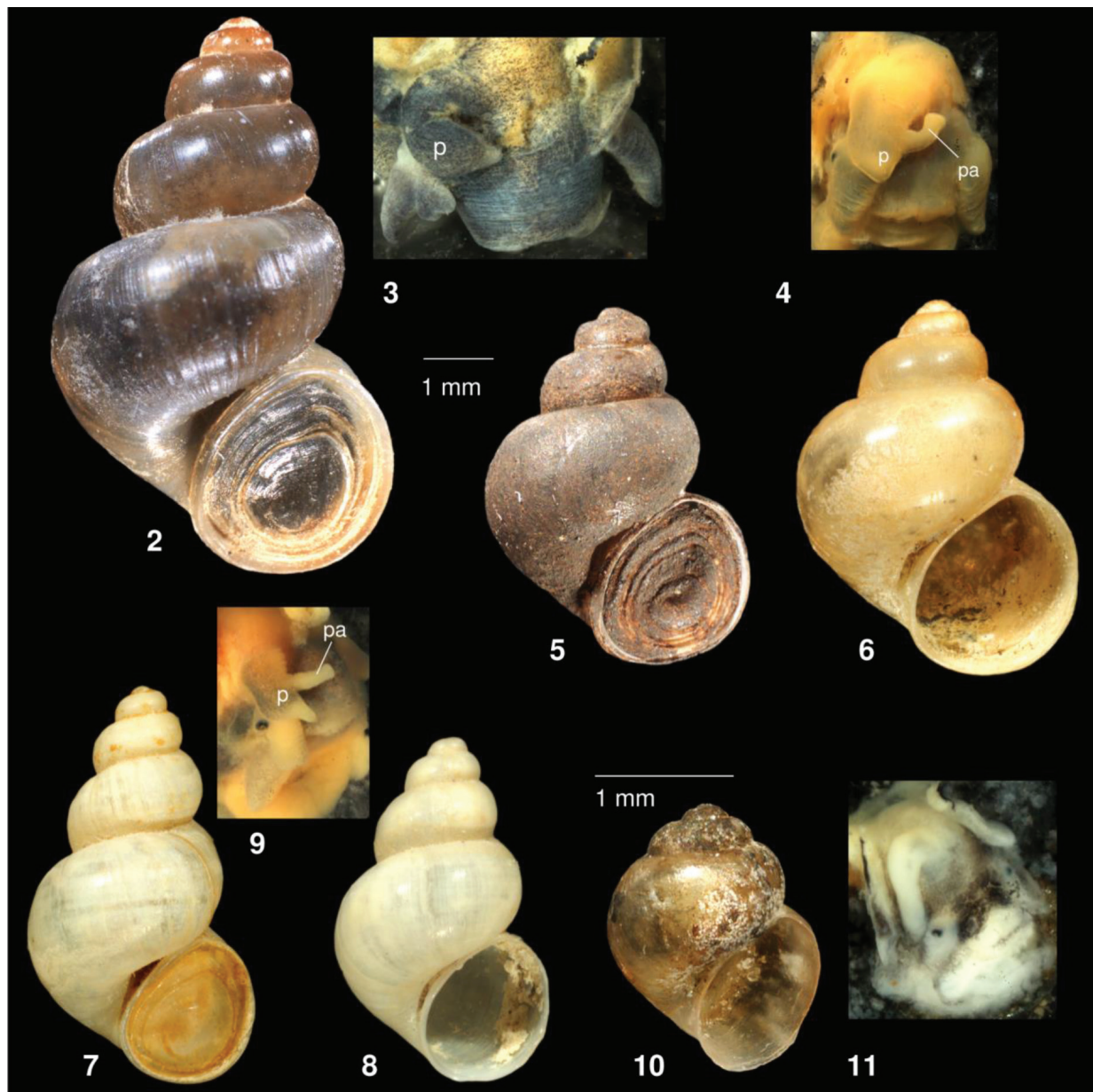
**Genus *Pseudobithynia* Glöer & Pešić, 2006**

**Diagnosis:** Similar to *Bithynia* but penial appendix lacking.

*Pseudobithynia nigra* n. sp. (Figs 2–3)

**Material examined:** Holotype – shell height 8.2 mm, width 5.1 mm, ZMH 140815.

**Type locality:** Greece, Corfu, creek near Karousades, 1 km east of Kavallouri, 39.7775°N; 19.7659°E, leg. M.L. Zettler, 10<sup>th</sup> July 2013.



**Figs 2–12.** New prosobranch snails from Bulgaria and Corfu. 2–3. *Pseudobithynia nigra* n. sp. (2 – holotype, 3 – penis *in situ*). 4–6. *Bithynia corfuensis* n. sp. (4 – penis *in situ*, 5 – holotype, 6 – paratype). 7–9. *Bithynia beloslavensis* n. sp. (7 – holotype, 8 – paratype, 9 – penis *in situ*). 10–11. *Pseudamnicola kavosensis* n. sp. (10 – holotype, 11 – penis *in situ*). Abbreviations: p = penis, pa = penial appendix.

**Etymology:** Named after the dark brown colour of the shell and the dark pigmentation of the snout, tentacles and penis.

**Description:** Shell brownish, with 5.5 inflated stepped whorls separated by deep suture. Surface glossy, finely striated. Aperture ovate, with sharp peristome. Umbilicus slit-like to closed. Shell 8.2 mm high and 5.1 mm broad. Anatomy: Penis flat, with tapered penis tip. Penial appendix lacking.

**Remark:** This species occurs syntopically with *Bithynia corfuensis* n. sp., unfortunately only one specimen could be collected.

#### Family Hydrobiidae Stimpson, 1865

#### Genus *Pseudamnicola* Paulucci, 1878

**Diagnosis:** Shell elongate-conical to globular. Penis more or less triangular, simple, without outgrowths.

*Pseudamnicola kavosensis* n. sp. (Figs 10–11)

**Material examined:** Holotype – shell height 2.0 mm, width 1.6 mm, ZMH 140816. Paratypes – 3 specimens ZMH 140817, 2 specimens coll. Glöer, 10 specimens SNSD Moll S10180.

**Type locality:** Greece, Corfu, temporarily creek 1 km south-west of Kavos, 300 m north-east



Figs 12–15. *Gyraulus messonghi* n. sp. 12. Apical view. 13. Umbilical view. 14. Frontal view. 15. Penis.

of water reservoir, 39.3761°N; 20.1095°E, leg. M.L. Zettler, 14<sup>th</sup> July 2013.

**Etymology:** Named after the village Kavos where the species has been found.

**Description:** Shell: brownish, with 4.5–5 convex whorls separated by deep suture. Body whorl prominent. Surface glossy. Aperture ovate, with a sharp peristome. Umbilicus closed. Shell is 2.0 mm high and 1.6 mm broad. Animal: Head black, with white border. Tentacles and penis colourless. Anatomy: Penis long and simple.

**Remark:** Molecular studies by Szarowska et al. (2016) revealed that *Pseudamnicola* spp. are very diverse in Greece and every island harbours one or more distinct *Pseudamnicola* spp.

#### Family Planorbidae Rafinesque, 1815

#### Genus *Gyraulus* Charpentier, 1837

##### Subgenus *Gyraulus* s. str.

##### *Gyraulus* (*Gyraulus*) *messonghi* n. sp. (Figs 12–15)

Shells coiled in a plane; whorls rounded to keeled. Upper margin of aperture pulled forward. Penis with stylet. Phallotheca longer or with same length as preputium. Prostate gland bearing 8–40 diverticula.

**Material examined:** Holotype – shell height 0.9 mm, width 2.6 mm, ZMH 140818. Paratypes – 3 specimens, ZMH 140819; 2 specimens, coll. Glöer; 4 specimens SNSD Moll S10181.

**Type locality:** Greece, Corfu, Creek Messonghi 1 km west of Episkopiana, 39.4931°N; 19.9051°E, leg. M.L. Zettler, 9<sup>th</sup> July 2013.

**Etymology:** Named after the river/creek Messonghi, a small creek flowing to the eastern coast of Corfu with its mouth near the town Messonghi.

**Description:** Shell light brownish, thick-walled, finely striated and dull. Whorls 3.5–4, regularly increased, separated by deep suture. Right side widely patellate; aperture ovate. Shell 0.9 mm high and 2.6 mm broad. Anatomy: penis clearly separated in phallotheca and preputium, both of nearly same length. Prostate gland bearing about 10 scattered short diverticula.

#### References

- BOETTGER O. 1889. Zur Molluskenfauna von Corfu. Nachrichtenblatt der deutschen malakozoologischen Gesellschaft 21: 133–138.
- GEORGIEV D. & HUBENOV Z. 2013. Freshwater Snails (Mollusca: Gastropoda) of Bulgaria: An updated annotated checklist. Folia Malacologica 21: 237–263.
- GLÖER P. & PESIC V. 2006. On the identity of *Bithynia graeca* Westerlund, 1879 with the description of three new *Pseudobithynia* n. gen. species from Iran and Greece (Gastropoda: Bithyniidae). Malakologische Abhandlungen 24: 29–36.
- GLÖER P. 2019. The Freshwater Gastropods of the West-Palaearctis. Vol. 1. 399 pp.
- HESSE P. 1883. Beiträge zur Molluskenfauna Griechenlands. Jahrbücher der Deutschen Malakozoologischen Gesellschaft 10: 73–81.
- LETOURNEUX A. 1887. Aperçu Monographique sur le genre *Digyreidum*. Bulletins de la Société Malacologique de France 4: 67–72.
- MOUSSON A. 1859. Notizen von einer Reise nach Corfu und Cefalonien im September 1858. Vierteljahrsschrift der naturforschenden Gesellschaft in Zürich 4: 147–175.
- STEPHANIDES T. 1948. A survey of the freshwater biology of Corfu and of certain other regions of Greece. Praktika of the Hellenic Hydrobiological Institute 2: 1–263.
- STEPHANIDES T. 1971. Freshwater Mollusca of the Island of Corfu, Greece. Hellenic Oceanology and Limnology 10: 125–128.
- SZAROWSKA M., OSIKOWSKI A., HOFMAN S. & FALNIOWSKI A. 2016. *Pseudamnicola* Paulucci, 1878 (Caenogastropoda: Truncatelloidea) from the Aegean Islands: a long or short story? Organisms Diversity and Evolution 16: 121–139.

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