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Some new *Bythinella* spp. from southern Greece (Gastropoda: Bythinellidae)

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Abstract

In addition to a recent compilation of the Greek *Bythinella* spp. nine more species are described as new for science from Parnassus Mountains, Peloponnese Peninsula and Kithira Island. They are compared with the hitherto known species. For the protection of the mostly very small populations we only took a few specimens, not enough for dissections. Therefore, the descriptions are based on shell characters only which show a great diversity in Greece.

Key words: Greece, Peloponnese, Parnassus Mountains, Kithira Island, *Bythinella*, new species.

Introduction

Recently Glöer & Reuselaars (2020) summarized the hitherto known nine *Bythinella* spp. from Greece and described twelve additional *Bythinella* spp. from mainland Greece and the islands Lesbos and Samos as well. All these species seem to be locally endemics, supported by Falniowski & Szarowska (2011) who found in addition to many endemic species one sympatric population in Agio Theodori (their station 5, Peloponnese) and two sympatric populaions north of Dhrakia, east of Volos (their stations 23 and 25, Thessalia).

This paper is intended to describe nine new *Bythinella* spp. from Greek mainland (Parnassus Mountains, Peloponnese Peninsula) and Kithira Island.

Material and methods

During field trips in 2017, 2018 and 2019 the second author (partly together with his wife Andrea and Klaus and Theresia Kittel) investigated several springs in southern Greece (Parnassus Mountains, Peloponnese Peninsula and Kithira Island) for the occurrence of freshwater molluscs. If present, living snails were collected by hand from stones and leaves and fixed in 75% ethanol. In most cases the spring habitats are very small, often less than 1 m². Therefore, only few specimens were collected to avoid disturbing the tiny and highly endangered populations. Anatomical studies were not possible due to insufficient material.

The measurements of the shells were carried out using a stereo microscope (Zeiss). The type material is stored in the Zoological Museum of Hamburg (ZMH), Germany, whilst some paratypes are deposited in the private collection of the co-author. The shell photos were made with a digital camera system (Leica R8).

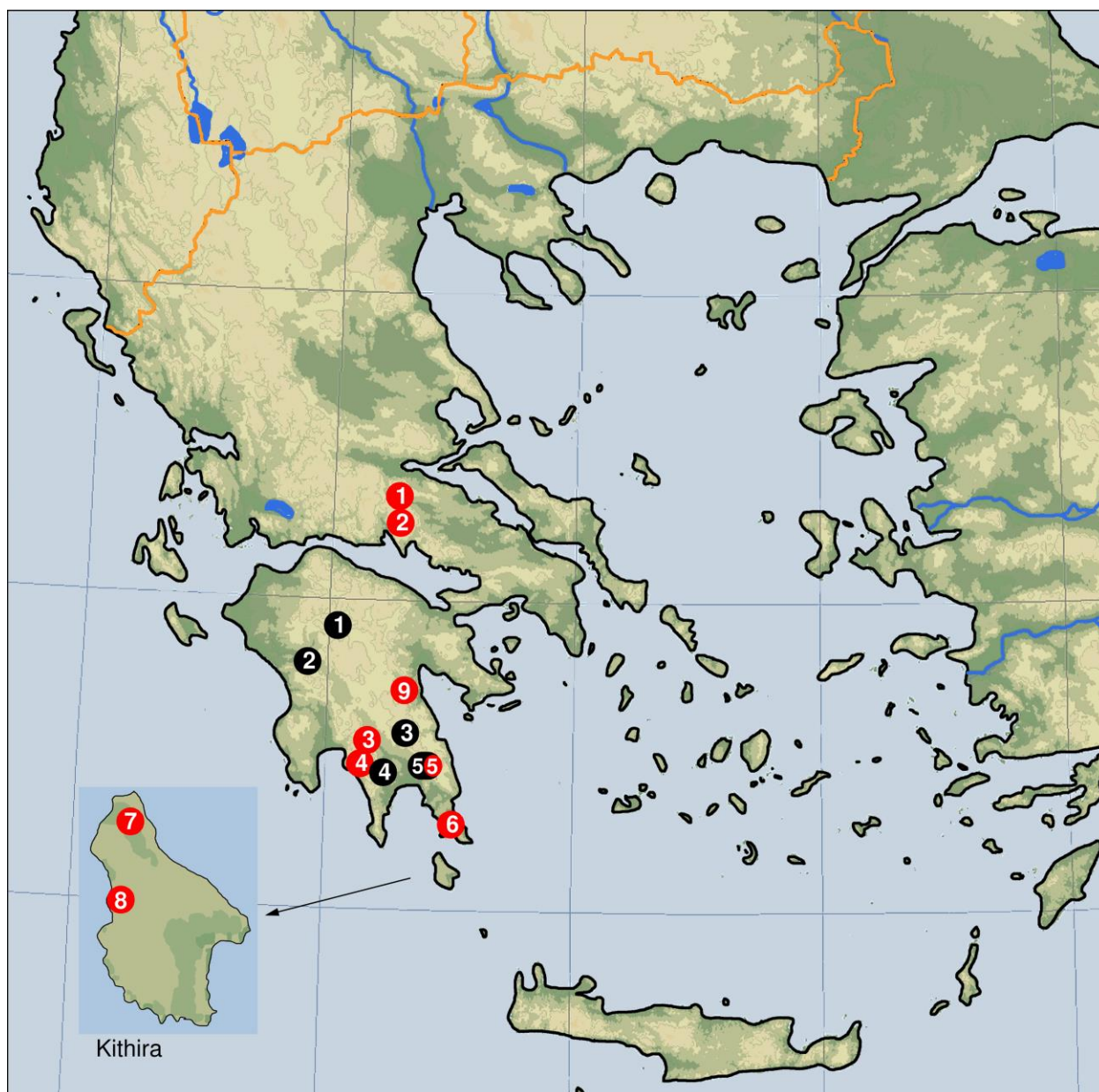


Figure 1. The sampling sites of the new *Bythinella* spp. (red dots) and the hitherto known species from Peloponnese (black dots). Black dots: 1: *Bythinella kwanti*, 2: *B. atypicos*, 3: *B. petrosensis*, 4: *B. liandinaensis*, 5: *B. beckmanni*; red dots: 1: *B. eleousae* n. sp., 2: *B. kastaliae* n. sp., 3: *B. taygetensis* n. sp., 4: *B. kambosensis* n. sp., 5: *B. alexpeteri* n. sp., 6: *B. ellinikae* n. sp., 7: *B. amira* n. sp., 8: *B. kithiraensis* n. sp., 9: *B. corrosa* n. sp.

Results

On Peloponnese Peninsula some *Bythinella* populations described by Reischütz et al. (2008) and Glöer & Reuselaars (2020) could be confirmed and additional springs were investigated. Four species turned out to be new to science and one species from Mari, recently figured by Reischütz et al. (2008), can be formally described. In Parnassus Mountains (Phocis) two new species were found. No *Bythinella* sp. has hitherto been described from Kithira Island. We found populations in the “Valley of the Mills” near Mylopotamos and in Amir Ali close to Karavas. They show different shell characters in comparison with the Peloponnese species.

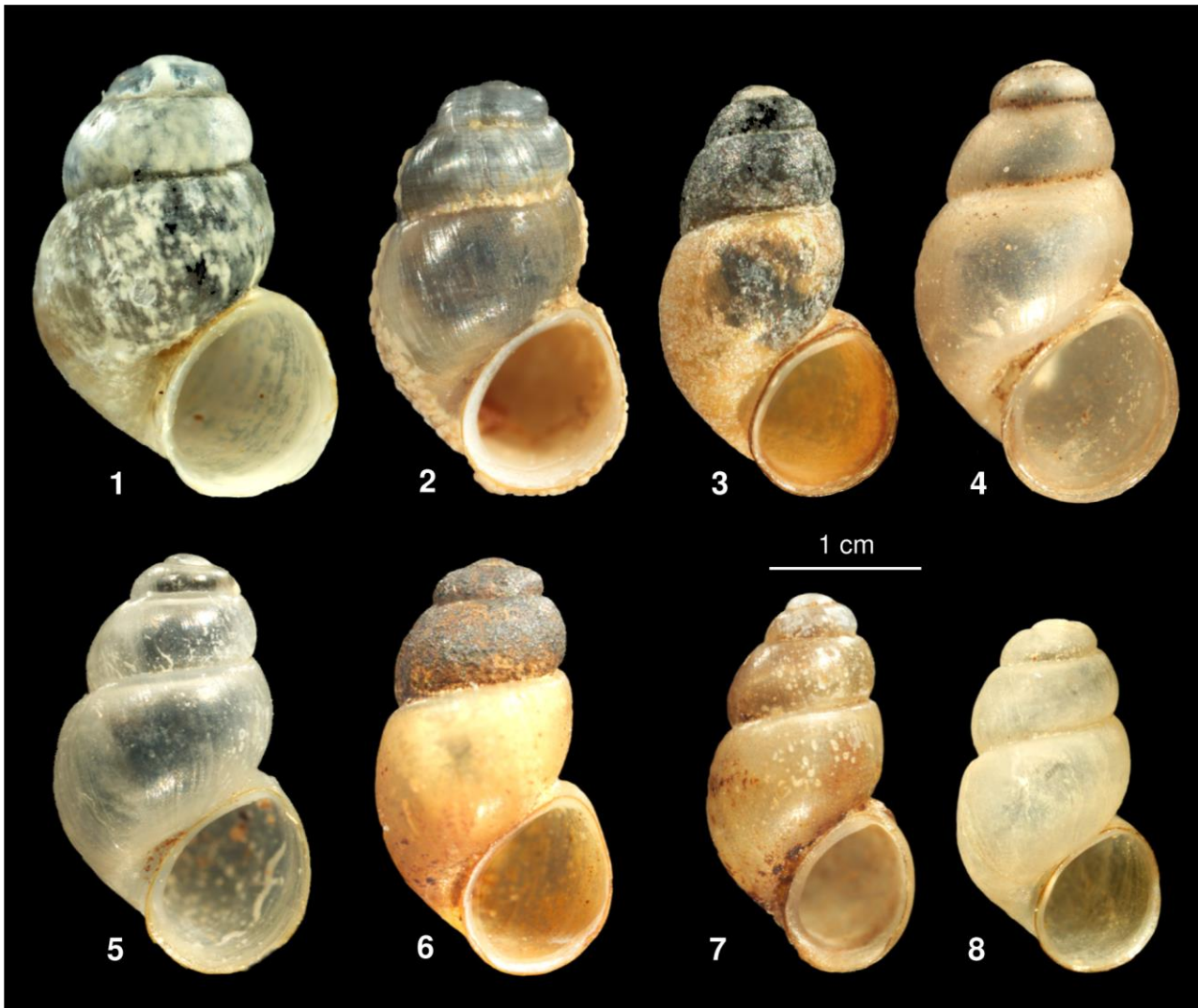


Figure 2. The new *Bythinella* spp. from Greece. 1: *Bythinella eleousae* n. sp., 2: *B. kastaliae* n. sp., 3: *B. taygetensis* n. sp., 4: *B. kambosensis* n. sp., 5: *B. alexpeteri* n. sp., 6: *B. ellinikae* n. sp., 7: *B. amira* n. sp., 8: *B. kithiraensis* n. sp.



Figure 3. The hitherto known *Bythinella* spp. from Peloponnese Peninsula. 1: *Bythinella kwanti* Glöer & Reuselaars, 2020, 2: *B. atypicos* Reischütz et al., 2008, 3: *B. petrosensis* Glöer & Reuselaars, 2020, 4: *B. liandinaensis* Glöer & Reuselaars, 2020, 5: *B. beckmanni* Reischütz et al., 2008.

In summary, 29 *Bythinella* spp. are now known from Greece. One additional ssp. (*B. charpentieri cabirius* Reischütz, 1988) might be a separate species too. On Peloponnese Peninsula occur twelve species and two on Kithira Island.

Family **Bythinellidae** Locard, 1893

Genus **Bythinella** Moquin-Tandon, 1856

Type species by designation: *Bulimus viridis* Poiret, 1801

***Bythinella eleousae* n. sp.** [fig. 2.1]

Type locality: Greece, Phocis, Parnassus Mountains, Polidrosos, Kifisou Spring at the ruin of the Byzantine church Agia Eleousa, 1.5 km SW of Polidrosos, N 38°37'45.1" / E 22°31'12.4", 311 m a.s.l., 07.05.2017, leg. Hans-Jürgen & Andrea Hirschfelder.

Type Material: Holotype (ZMH 140676): Shell height 2.95 mm, shell width 1.9 mm. Paratypes from type locality: ZMH (140677/1), coll. Hirschfelder (7 adult, 2 subadult).

Etymology: The new species is named after the Byzantine church Agia Eleousa. The type locality is situated just below that ruin.

Description:

Shell: The shell is cylindrical with a flat apex and relatively broad. The 4.5-5 whorls are slightly convex with a clear suture. The body whorl takes about 0.75 of shell height. The aperture is ovate, with a sharp peristome. The umbilicus is slit-like. The shell is 2.8-3.1 mm high and 1.8-1.9 mm broad.

Differentiating characters: The new species exhibits the smallest length to width ratio (1.50-1.55) of all Greek *Bythinella* species. The most similar form is *B. kwanti* Glöer & Reuselaars, 2020, from the area of Kalavrita with a ratio of 1.6. In all other species that ratio is (much) higher.

Distribution: Only known from type locality on the northern slope of the Parnassus Mountains.

***Bythinella kastaliae* n. sp.** [fig. 2.2]

Type locality: Greece, Phocis, Delphi, Kastalia Spring, N 38°28'58.8" / E 22°30'19.1", 530 m a.s.l., 05.05.2017, leg. Hans-Jürgen Hirschfelder.

Type Material: Holotype (ZMH 140678): Shell height 2.8 mm, shell width 1.7 mm. Paratypes from type locality: ZMH (140679/1), coll. Hirschfelder (5 adult, 6 subadult).

Etymology: The new species is named after the type locality Kastalia Spring in Delphi.

Description:

Shell: The shell is ovate cylindrical with a small and flat apex. The 4.5-5 whorls are convex with a deep suture. The body whorl takes about 0.7 of shell height. The aperture is ovate and slightly angled at the top. The peristome is sharp, somewhat thickened at the columella. The umbilicus is closed. The shell is 2.5-2.8 mm high and 1.6-1.7 mm broad.

Differentiating characters: The length to width ratio of the new species (1.65) is between the higher and more slender *B. charpentieri* (Roth, 1855) from Attica (2.2) and *B. eleousae* n. sp. from northern Parnassus Mountains (<1.55).

Distribution: Only known from type locality in Delphi.

***Bythinella taygetensis* n. sp.** [fig. 2.3]

Type locality: Greece, Laconia, eastern slope of Taygetos Mountains, Anavriti, spring at the southern edge of the village, N 37°01'48.1" / E 22°22'10.8", 890 m a.s.l., 15.04.2018, leg. Hans-Jürgen Hirschfelder.

Type Material: Holotype (ZMH 140680): Shell height 2.8 mm, shell width 1.6 mm. Paratypes from type locality: ZMH (140681/1), coll. Hirschfelder (5 adult, 1 subadult).

Etymology: The new species is named after the Taygetos Mountains.

Description:

Shell: The shell is elongated cylindrical. The 4.5-5 whorls are slightly convex with a clear suture. The body whorl takes about 0.7 of shell height. The aperture is ovate, angled at the top, with a sharp peristome which has a brown border. The umbilicus is closed. The shell is 2.4-2.9 mm high and 1.4-1.6 mm broad.

Differentiating characters: The new species is similar in general shape to *B. liandinaensis* Glöer & Reuselaars, 2020, which occurs only 15 km south, but the shell is less slender, the apex is broader and the umbilicus is closed in most specimens.

Distribution: Only known from type locality on the eastern slope of Taygetos Mountains.

Bythinella kambosensis n. sp. [fig. 2.4]

Type locality: Greece, Messenia, western slope of the Taygetos Mountains, spring along the road between Akrogiali and Kambos, about 2.5 km from the turnoff from the coastal road, N 36°56'56.0" / E 22°10'00.8", 222 m a.s.l., 18.04.2018, leg. Hans-Jürgen & Andrea Hirschfelder.

Type Material: Holotype (ZMH 140682): Shell height 2.95 mm, shell width 1.8 mm. Paratypes from type locality: ZMH (140683/2), coll. Hirschfelder (7 adult, 7 subadult).

Etymology: The new species is named after Kambos Gorge, into which the source drains.

Description:

Shell: The shell is slightly conical ovate with a small apex. The surface is silky. The 4.5-5 whorls are slightly convex with a clear suture. The body whorl takes about 0.75 of shell height. The aperture is ovate, slightly angled at the top, with a sharp peristome. The umbilicus is closed. The shell is 2.7-3.0 mm high and 1.7-1.8 mm broad.

Differentiating characters: The new species differs from the neighbouring *B. taygetensis* n. sp. by the stout and more conical shell (length to width ratio of 1.7, which is about 1.8 in *B. taygetensis* n. sp.) and from most of the Greek species by a characteristically silky sheen.

Associated species: *Pseudamnicola exilis* (Frauenfeld, 1863).

Distribution: Only known from type locality on the western slope of the Taygetos Mountains.

Bythinella alexpeteri n. sp. [fig. 2.5]

Type locality: Greece, Arcadia, Mari, travertine spring at the northern end of the village, N 37°01'58.7" / E 22°49'33.5", 634 m a.s.l., 10.04.2018, leg. Hans-Jürgen Hirschfelder.

Type Material: Holotype (ZMH 140684): Shell height 2.9 mm, shell width 1.8 mm. Paratypes from type locality: ZMH (140685/5), coll. Hirschfelder (17 adult, 13 subadult).

Etymology: The new species is named after Alexander and Peter Reischütz, who figured this species in 2008 for the first time without formal description and compared it with the syntopic *Bythinella beckmanni*.

Description:

Shell: The shell is ovate cylindrical with a small apex. The 4.5-5 whorls are slightly convex with a deep suture. The body whorl takes about 0.75 of shell height. The aperture is ovate, angled at the top with a sharp peristome, somewhat thickened at the columella. The umbilicus is closed. The shell is 2.6-2.9 mm high and 1.7-1.8 mm broad.

Differentiating characters: The syntopic *Bythinella beckmanni* Reischütz et al., 2008, is much smaller (2 mm) and more slender with a less deep suture. *B. kwanti* is very similar, but the umbilicus is slit-like. The latter species occurs at a distance of 120 km in the Aroania Oros and therefore it seems unlikely that both species are conspecific.

Associated species: *Bythinella beckmanni*.

Distribution: Only known from type locality in Mari at the southern slope of the Paron Mountains.

Remarks: The sympatrically occurring *Bythinella beckmanni* [fig. 3.5] was not found again in 2018. That species might be extinct as already suspected by Reischütz et al. (2008).

Bythinella ellinikae n. sp. [fig. 2.6]

Type locality: Greece, Laconia, Neapoli Peninsula, spring along the road from Xifias to Elliniko, 400 m east of Elliniko, N 36°36'35.0" / E 22°59'15.3", 500 m a.s.l., 17.04.2018, leg. Hans-Jürgen & Andrea Hirschfelder.

Type Material: Holotype (ZMH 140686): Shell height 2.9 mm, shell width 1.7 mm. Paratypes from type locality: ZMH (140687/2), coll. Hirschfelder (8 adult).

Etymology: The new species is named after the village Elliniko.

Description:

Shell: The shell is cylindrical with a small apex. The 4.5-5 whorls are convex with a deep suture. The body whorl takes about 0.6 of shell height. The aperture is ovate, slightly angled at the top with a sharp peristome which has a dark yellowish border. The umbilicus is closed. The shell is 2.7-2.9 mm high and 1.6-1.7 mm broad.

Differentiating characters: The new species is more cylindrically shaped and exhibits a greater length to width ratio (> 1.8) than *B. kwanti* and *B. alexpeteri* n. sp. (1.6). *B. liandinaensis* and *B. taygetensis* n. sp. show the same ratio of about 1.8, but the apex is smaller and not that flat.

Distribution: Only known from type locality in southern Neapoli Pensinsula.

***Bythinella amira* n. sp.** [fig. 2.7]

Type locality: Greece, Attica, Kithira Island, Karavas, spring-fed brook in Amir Ali, N 36°20'43.9" / E 22°56'57.4", 110 m a.s.l., 19.10.2019, leg. Hans-Jürgen Hirschfelder.

Type Material: Holotype (ZMH 140688): Shell height 2.5 mm, shell width 1.4 mm. Paratypes from type locality: ZMH (140689/2), coll. Hirschfelder (8 adult, 6 subadult).

Etymology: The new species is named after the small village and ravine Amir Ali.

Description:

Shell: The shell is cylindrical to slightly conical with a small rounded apex. The 4.5-5 whorls are convex with a deep suture. The body whorl takes about 0.7 of shell height. The aperture is elongated ovate, with a thickened peristome. The umbilicus is closed. The shell is 2.3-2.6 mm high and 1.3-1.4 mm broad and all specimens are encrusted with blackish-brown Fe/Mn.

Differentiating characters: see *Bythinella kithiraensis* n. sp.

Associated species: *Pseudamnicola magdalena* Falniowski, 2016 (type locality), *Gyraulus* sp. and *Melanopsis buccinoidea* (Olivier, 1801).

Distribution: Only known from type locality in northern Kithira Island.

***Bythinella kithiraensis* n. sp.** [fig. 2.8]

Type locality: Greece, Attica, Kithira Island, Mylopotamos, "Valley of the Mills", tiny spring beside the big waterfall, N 36°14'38.8" / E 22°56'42.0", 275 m a.s.l., 19.10.2019, leg. Hans-Jürgen Hirschfelder.

Type Material: Holotype (ZMH 140690): Shell height 2.4 mm, shell width 1.4 mm. Paratypes from type locality: ZMH (140691/1), coll. Hirschfelder (2 adult, 6 subadult).

Etymology: The new species is named after Kithira Island.

Description:

Shell: The shell is cylindrical with a small and broad flat apex. The 4.5-5 whorls are convex with a deep suture. The body whorl takes about 0.6 of shell height. The aperture is ovate, with a sharp peristome. The umbilicus is closed. The shell is 2.2-2.5 mm high and 1.3-1.4 mm broad.

Differentiating characters: Both Kithiran species are smaller than the species of southern Peloponnese except *B. beckmanni*. The shell of *B. amira* n. sp. is in average higher, more conical with a smaller apex than *B. kithiraensis* n. sp. and the length to width ratio is about 1,9 whereas the latter shows a ratio of about 1.75.

Associated species: *Pseudamnicola magdalena*, *Gyraulus* sp.

Distribution: Only known from type locality in western Kithira Island.

Remarks: This species was not found in the big spring in the center of Mylopotamos.

Bythinella corrosa n. sp. [fig. 4]

Type locality: Greece, Arcadia, Astros, spring 2.7 km south of Astros, below the main road to Leonidio on the bank of Limni Moustou, N 37°23'06.2" / E 22°44'36.5", 1 m a.s.l., 01.05.2017, leg. Hans-Jürgen & Andrea Hirschfelder.

Type Material: Holotype (ZMH 140692): Shell height 2.6 mm, shell width 1.5 mm. Paratypes from type locality: ZMH (140693/2), coll. Hirschfelder (5 adult, 23 subadult).

Etymology: The new species is named after the always corroded shell.

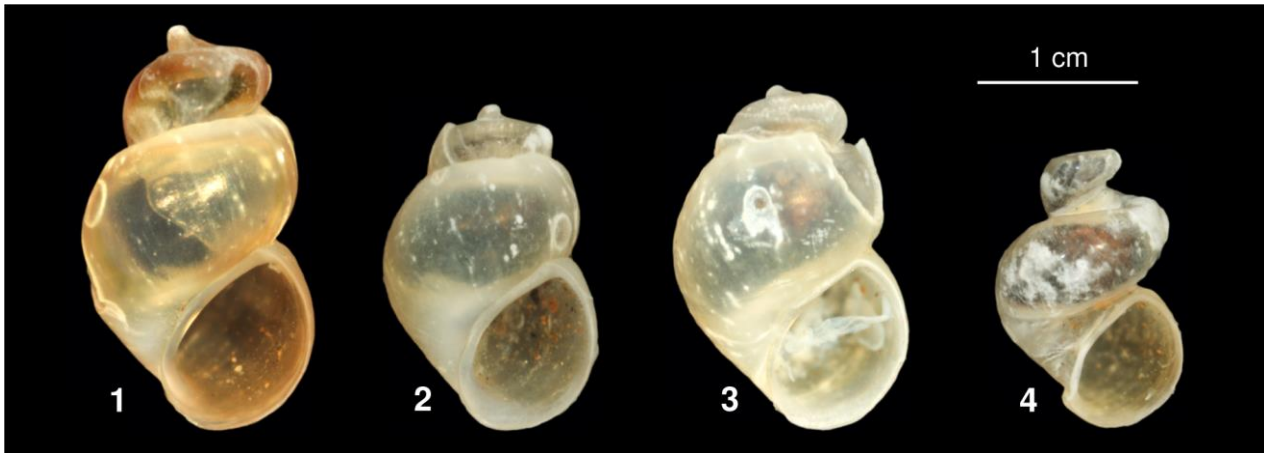


Figure 4. *Bythinella corrosa* n. sp. 1: Holotype, 2-4: paratypes.

Description:

Shell: The shell is conical with the uppermost part of the embryonic whorl erected and detached. In some specimens two or more whorls are detached with a corkscrew-like appearance. The first whorls are more or less strongly corroded. The aperture is ovate, with a sharp peristome. The umbilicus is closed. The shell is 1.8-2.6 mm high and 1.3-1.5 mm broad and has about 3-3.5 whorls.

Differentiating characters: No other Greek species shows an erected apex and partly detached whorls. *B. beckmanni* with the same size is much more slender and cylindrical.

Distribution: Only known from type locality at the shore of Limni Moustou.

Remarks: All specimens are strongly corroded and more or less deformed. Out of more than 30 investigated specimens no one showed a “normal” shape. The reason is unknown and could be due to parasitism or chemical influences. This species is the only one in Greece that lives at sea level.

Bythinella petrosensis Glöer & Reuselaars, 2020 [fig. 3.3]

Remarks: The sampling site was investigated again on 28.04.2019. *Bythinella petrosensis* was found for the first time in natural habitat few meters beside the artificial basin (type locality). The Bogreika Kalivia Spring consists of several sources that are scattered in a small valley in mountain forest. The species was found only in one tiny spring next to the main brook. The artificial basin was nearly dried out and no specimens could be found there in 2019.

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