

Two New Species of Stygobiotic Snails from the Genus *Bythiospeum* (Gastropoda: Hydrobiidae) from Bulgaria

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Abstract: In this paper two new species of *Bythiospeum* Bourguignat 1882 - a genus including only stygobiotic species, from two caves in Bulgaria: *Bythiospeum pandurskii* n. sp. - Vodna Pesht cave, near Lipnitsa village, Botevgrad town district, Stara Planina Mt., and *Bythiospeum dourdeni* n. sp. - Chuchura cave near Velchovtsi area of Stantchov Han village, Tryavna district, Stara Planina Mt. are described.

Key words: subterranean waters, caves, gastropods

Introduction

The first stygobiotic snail species from Bulgaria were described by WAGNER (1927) from Temnata Dupka cave near Lakatnik town, Stara Planina Mt., on the base of their shell morphology. That is sometimes the only way to describe such stigobiotic snail species, because there is no possibility for researchers to reach living populations in the underground and study the soft body of gastropods. The species *Paladilhiopsis bureschi* Wagner 1927, *Belgrandiella hessei* Wagner 1927, *B. bureschi* ANGELOV 1976, *B. pussila* Angelov 1959, and *Iglica acicularis* Angelov 1959 were registered in Bulgaria only by empty shells, found in the emerging from the caves rivers deposits (ANGELOV 2000). The species *I. macrostoma* Angelov 1972 from genus *Insignia* was also described only by empty shells. The investigations of ANGELOV (1959, 1965, 1967, 1972, 1976), supported by some newer studies in Bulgaria (GLÖER, GEORGIEV 2009, GEORGIEV 2009, 2011a, 2011b, 2011c, 2012; GEORGIEV, GLÖER 2011), showed that the family Hydrobiidae evidently has a hot spot of species radiation in country and an intensive research on this group is needed. In this paper we describe two new species of *Bythiospeum*

Bourguignat 1882, a genus including only stygobiotic species, from two caves in Bulgaria.

Material and Methods

The living snails were collected and preserved in 70% ethanol. The shells were collected by sieving the cave river deposits by 1x1 and 2x2 mm width of mesh sieves. The material from the smaller meshed sieve was then brought to the laboratory and dried. After that it was again put into water and the floating shells were collected by a strainer and small brush. Material was collected from two caves: Vodna Pesht cave, near village of Lipnitsa, Botevgrad town district, Stara Planina Mt, N43 00 40.2 E23 44 46.5, 462 m a.s.l., and Chuchura cave near Velchovtsi area of the village of Stantchov Han, Tryavna district, Stara Planina Mt, N42 47 58.0 E25 34 23.7, 573 m. The measurements were carried out by means of CETI stereo microscope and an eye-piece micrometer, and photographs were made with camera system with a digital adapter. The material is stored in the Hungarian Natural History Museum (HNHM), Budapest.

Abbreviations used: H - shell height, W - shell width, AH - aperture height, AW - aperture width, LH - last whorl height.

Results

Genus *Bythiospeum* Bourguignat 1882

Bythiospeum pandurskii n. sp.

Material examined: 02. 2011, 1 shell, Dilian Georgiev leg., and 05.01.2012, 1 ex. in ethanol, Tanyo Markov and Dilian Georgiev leg., from the type locality.

Holotype: H = 1.62 mm, W = 0.79 mm, AH = 0.58 mm, AW = 0.51 mm, LH = 1.06 mm, W/H = 0.49, AH/H = 0.36, AW/W = 0.65, LH/H = 0.65, HNHM 98752.

Paratype: H = 1.58 mm, W = 0.83 mm, AH = 0.53 mm, AW = 0.56 mm, LH = 1.02 mm, W/H = 0.52, AH/H = 0.33, AW/W = 0.68, LH/H = 0.65, HNHM 98753.

Locus typicus: Vodna Pesht cave, near village of Lipnitsa, Botevgrad town district, Stara Planina Mt., N43 00 40.2 E23 44 46.5, 462 m.

Differential diagnosis: The new species is the smallest one from all known species from the genus in Bulgaria (compared with all unpublished data of the author, considering of about 4 other new species, which will be included in further publications), with $H < 1.62$ mm. Considering the species which was only known from the country for many years, *B. bureschi*, the new species differ and by its not so well developed aperture lip, more fast growing whorls, and the ovoid aperture (versus ovoid to pyriform in *B. bureschi*).

Description: The shell is translucent, elongate-conical, consisted of 4.5 slightly rounded whorls that have shining surface with fine growth lines. The apex is rounded the umbilicus is slit-like. The aperture is ovoid with slightly thickened periostome forming a small lip. The operculum is translucent. The animal is pigmentless, and does not have eyes.

Etymology: Named after Dr Ivan Pandurski (Institute of Zoology, BAS) a specialist on stygobite Copepoda who firstly registered Vodna Pesht cave as a locality of Hydrobiidae snails.

Distribution: Known only from the type locality.

Ecology: According our intensive search in the small cave stream of Vodna Pesht cave during both visits, and findings of only two specimens, we con-

sider, that the species does not have a constant population in this cave, and only occasionally (and very rarely) single empty shells or living specimens are brought there by deeper flowing subterranean waters.

According to Beron *et al.* (2009) the cave has following characteristics: total length 1100 m, displacement +40 m, and its entrance is 3 m wide and 6 high.

Bythiospeum dourdeni n. sp.

Material examined: 11 shells, 25.6.2012, from the type locality, Dilian Georgiev leg.

Holotype: H = 1.52 mm, W = 0.66 mm, AH = 0.53 mm, AW = 0.46 mm, LH = 1.02 mm, HNHM 98749.

Paratype: HNHM 98750.

Locus typicus: Chuchura cave near Velchovtsi area of the village of Stantchov Han, Tryavna district, Stara Planina Mt., N42 47 58.0 E25 34 23.7, 573 m.

Differential diagnosis: The small irregular rounded axial ribs and ridges on the shell surface and the almost cylindrical shell in most of the specimens discern the new species from the rest of Bulgarian representatives of genus *Bythiospeum*. Also considering the mean values of shell morphometry it is one of the smallest species in the country (together with *B. pandurskii* n. sp.).

Description: The shell is very small ($H < 2.0$ mm), elongate-conical to almost cylindrical with 4-5 (most often 4, only in one specimen were 5) slightly rounded whorls that have shining surface with fine

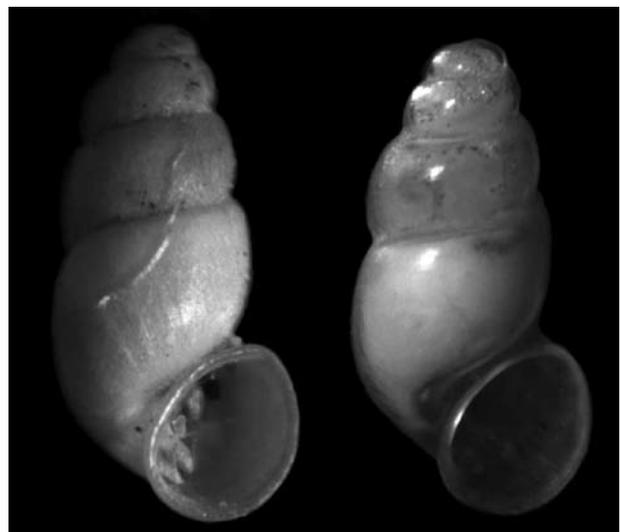


Fig. 1. *Bythiospeum pandurskii* n. sp., shells: holotype (left) and paratype (right).

growth lines, which are forming irregular rounded axial ribs. The apex is rounded, the umbilicus is mostly closed, in some specimens slit-like. The aperture is ovoid with a simple lip, in most specimens moved under the spire to the shell axis. The operculum and the soft body are unknown.

H = 1.22-1.78 mm, W = 0.56-0.74 mm, AH = 0.41-0.53 mm, AW = 0.26-0.48 mm, LH = 0.79-1.06 mm, W/H = 0.41-0.52, AH/H = 0.31-0.36, AW/W = 0.47-0.74, LH/H = 0.59-0.68 (Table 1).

Etymology: The new species was named after the character of the fantasy writer R. A. Salvatore, Drizzt Do`Urden – a dark elf born in the deep subterranean world.

Distribution: Known only from the type locality.

Ecology: The species possibly lives deep underground, and only empty shells are brought in the short only few meters, small cave stream with sandy bottom and few small stones, all checked carefully for living snails. In the stream deposits there were found also empty shells of *Belgrandiella* aff. *stanimirae* Georgiev 2011 (which was described not so far, from Zmeyova Dupka cave, but situated in different mountain massif).

Discussion

The genus *Paladilhiopsis*, mentioned by RADOMAN (1983), and ANGELOV (2000) from the Balkans is, considering BOETERS (1998), a synonym of *Bythiospeum* Bourguignat, 1882, which is distributed from France and W. Germany in the West to the Balkans, Asia Minor, Caucasus and Uzbekistan in the East. Even we consider the differences between *Paladilhiopsis* and *Bythiospeum* mentioned by BERNASCONI (1990), all our specimens could be assigned to the last genus. According same author *Paladilhiopsis* differs from *Bythiospeum* by spiral lines microsculpture on

the shell crossing the growth striate, which are lacking from the species, we have examined.

The high endemism of Balkan, Apennine, and Iberian Hydrobiidae is very likely related to former processes of geographic isolation and hydrobiids limited dispersal capacity. Their circummediterranean distribution was considered as a result successive dispersal, vicariance, speciation and extinction processes that took place during the Eocene-Miocene, and species survival on the three peninsulas of Europe as refugees without glaciation during the Pleistocene (ARCONADA, RAMOS 2003). The invasion of the subterranean habitats of Stara Planina and the Pre-Balkan (a large area of foothills of the mountain from the north) possibly began at the end of Eocene and continued during Oligocene. Considering BOSHEV *et al.* (1966) at this period the area was a stable land of coastal habitats of Paratetys. Isolation of the cave habitats

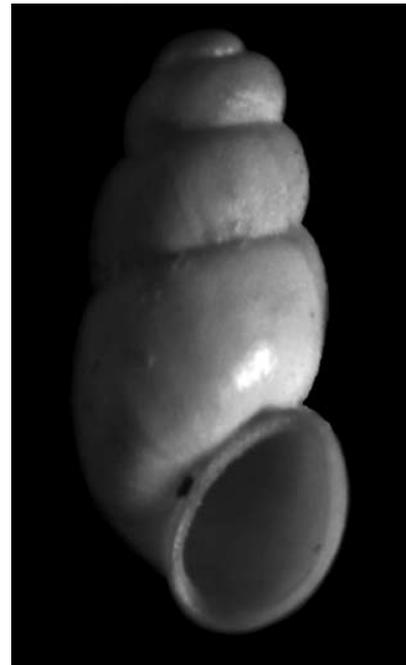


Fig. 2. *Bythiospeum dourdeni* n. sp., shell of a paratype.

Table 1. Shell measurements of *Bythiospeum dourdeni* n. sp. (for abbreviations see Material and Methods).

№	H	W	AH	AW	LH	W/H	AH/H	AW/W	LH/H
1	1,52	0,66	0,53	0,46	1,02	0,43	0,35	0,70	0,67
2	1,27	0,56	0,46	0,41	0,86	0,44	0,36	0,74	0,68
3	1,78	0,73	0,53	0,48	1,06	0,41	0,30	0,66	0,59
4	1,49	0,69	0,53	0,48	0,97	0,47	0,36	0,69	0,66
5	1,22	0,56	0,41	0,26	0,79	0,46	0,34	0,47	0,65
6	1,60	0,68	0,50	0,46	0,99	0,42	0,31	0,68	0,62
7	1,44	0,74	0,50	0,46	0,96	0,52	0,34	0,62	0,67
Average	1,47	0,66	0,49	0,43	0,95	0,45	0,34	0,65	0,65

probably began to play a big role in species radiation during Miocene when the whole Bulgaria already became a dry land, and the mountain and hilly areas of Stara Planina range were lifted higher by the natural geological processes.

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