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THE FIRST RECORD OF *PONTOBELGRANDIELLA* RADOMAN, 1978 FROM GREECE (CAENOGASTROPODA: TRUNCATELLOIDEA: HYDROBIIDAE) WITH THE DESCRIPTION OF A NEW SPECIES

HANS D. BOETERS[1], PETER L. REISCHÜTZ[2], ALEXANDER REISCHÜTZ[3]

[1]Karneidstr. 8, D-81545 München, Germany (e-mail: boeters@t-online.de)
[2]Puechhaimgasse 52, A-3580 Horn, Austria (e-mail: peter.reischuetz@gmx.at)
[3]Puechhaimgasse 52, A-3580 Horn, Austria (e-mail: alexander.reischuetz@gmx.at)

ABSTRACT: The first species of *Pontobelgrandiella* Radoman, 1978 from Greece is described as *Pontobelgrandiella lavrasi* n. sp.

KEY WORDS: *Belgrandiella*, *Pontobelgrandiella*, Bulgaria, Greece

INTRODUCTION

Until 2016, it was commonly accepted that the distribution range of *Belgrandiella* A. J. Wagner, 1928 extended from France to the Balkans including Bulgaria. However, in 1978 a new genus *Pontobelgrandiella* was erected with the Bulgarian *Belgrandiella nitida* Angelov, 1972 as the type species (RADOMAN 1978: 30). GEORGIEV (2013a) described *P. tanevi* as another species of *Pontobelgrandiella* from Bulgaria. Recently RYSIEWSKA et al. (2016), based on genetic analyses, presented evidence that several Bulgarian species, initially described within *Belgrandiella* A. J. Wagner, 1928, were also representatives of *Pontobelgrandiella* Radoman, 1978. Thus, besides *P. nitida* and *P. tanevi*, in Bulgaria (ANGELOV 1972a, b, GEORGIEV & HUBENOV 2013) the genus comprises also *P. angelovi* (Pintér, 1968), *P. bachkovoensis* (Glöer et Georgiev, 2009), *P. dobrostanica* (Glöer et Georgiev, 2009), *P. pandurskii* (Georgiev, 2011), *P. stanimirae* (Georgiev, 2011) and *P. zagoraensis* (Glöer et Georgiev, 2009). The affiliation of *P. bulgarica* (Angelov, 1972), *P. bureschi* (Angelov, 1976), *P. delevae* (Georgiev et Glöer, 2015), *P. hessei* (A. J. Wagner, 1928), *P. hubenovi* (Georgiev, 2012), *P. lomica* (Georgiev et Glöer, 2015), *P. petrovi* (Georgiev, 2014) and *P. pusilla* (Angelov, 1959) to *Pontobelgrandiella* still needs genetic confirmation.

Until now, representatives of *Pontobelgrandiella* have been known from Bulgaria only (GEORGIEV et al. 2017, OSIKOWSKI et al. 2017). Thus, it can be assumed that the easternmost species of *Belgrandiella* is *B. bumasta* Schütt, 1960 in Kosovo. It is possible that two other species described from within the distribution area of *Pontobelgrandiella* in Bulgaria belong to *Belgrandiella* and not to *Pontobelgrandiella*: *Belgrandiella maarensis* Georgiev, 2013 and *Belgrandiella zaschevi* Angelov, 1959, the type of the monotypic *Cavernisa* Radoman, 1978. However, RYSIEWSKA et al. (2016) "undoubtedly reject the occurrence of representatives of *Belgrandiella* in Bulgaria" (RYSIEWSKA et al. 2016: 7). In any case, no species of *Pontobelgrandiella* has been mentioned from outside Bulgaria.

The report of *P. bulgarica* (Angelov, 1972) from "GR-GRC", the Greek mainland (including inter alia "Evia"), by BANK (2006: 55 & 66 under *Belgrandiella*) was erroneous (BANK in litt. 01.X.2017). BANK (2006) cited REISCHÜTZ's (1988: 345) record of *P. bulgarica* from Greece (as *Belgrandiella hohenackeri bulgarica* (A. J. Wagner, 1928 [non Angelov, 1972]),

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from Paradisos in East Makedonia vis-à-vis the island of Thasos, and ANGELOV's (1959a: 298) mention of *Lithoglyphoides virescens bulgaricus* A. J. Wagner, 1928, also from Thasos. According to WAGNER's figures (1928: pl. 13 figs 85–88), REISCHÜTZ's (1988) view of *Lithoglyphus* (*Lithoglyphoides*) *virescens bulgaricus* A. J. Wagner, 1928 as a subspecies of *Paludina hohenackeri* Küster, 1853, a member of the *Radomaniola/Grossuana* group, is convincing.

MATERIAL AND METHODS

MATERIAL EXAMINED

Greece, Halkidiki [Chalkidiki], Ag. Oros, Athos.

1. Spring north of Megistis Lavras; PETER L. REISCHÜTZ & ALEXANDER REISCHÜTZ lg. IX. 2013:
   (i) *Pontobelgrandiella lavrasi* n. sp. – NMW 112.014 (1 shell, holotype); REI (4 shells + 1 fragment); BOE 3399 (2 shells)
   (ii) *Bythinella* sp. – REI (1 shell, measurements: height 1.625 mm and diameter 0.925 mm)
   (iii) *Grossuana marginata* (Westerlund, 1881) – REI (16 animals); BOE 3391 (8 shells)
2. Spring Agiasma at Ag. Athanasiou; PETER L. REISCHÜTZ & ALEXANDER REISCHÜTZ lg. IX. 2013:
   (i) *Pontobelgrandiella lavrasi* n. sp. – REI (10 shells); BOE 3408 (3 shells)
   (ii) *Grossuana marginata* – REI (ca. 100 animals)

Abbreviations: BOE – Collection Boeters (München); NMW – Naturhistorisches Museum (Wien); REI – Collection P. L. &. A. Reischütz (Horn)

METHODS

The whorls were counted according to GITTENBERGER et al. (1970). The shell length and diameter were measured with a 5 mm measure plate (0.05 mm grading) at 25× magnification; measurements were rounded to the nearest 0.05 mm. The photographs of shells were taken with a Leica R8 digital system.

RESULTS

Pontobelgrandiella lavrasi n. sp.

Figs 1–3

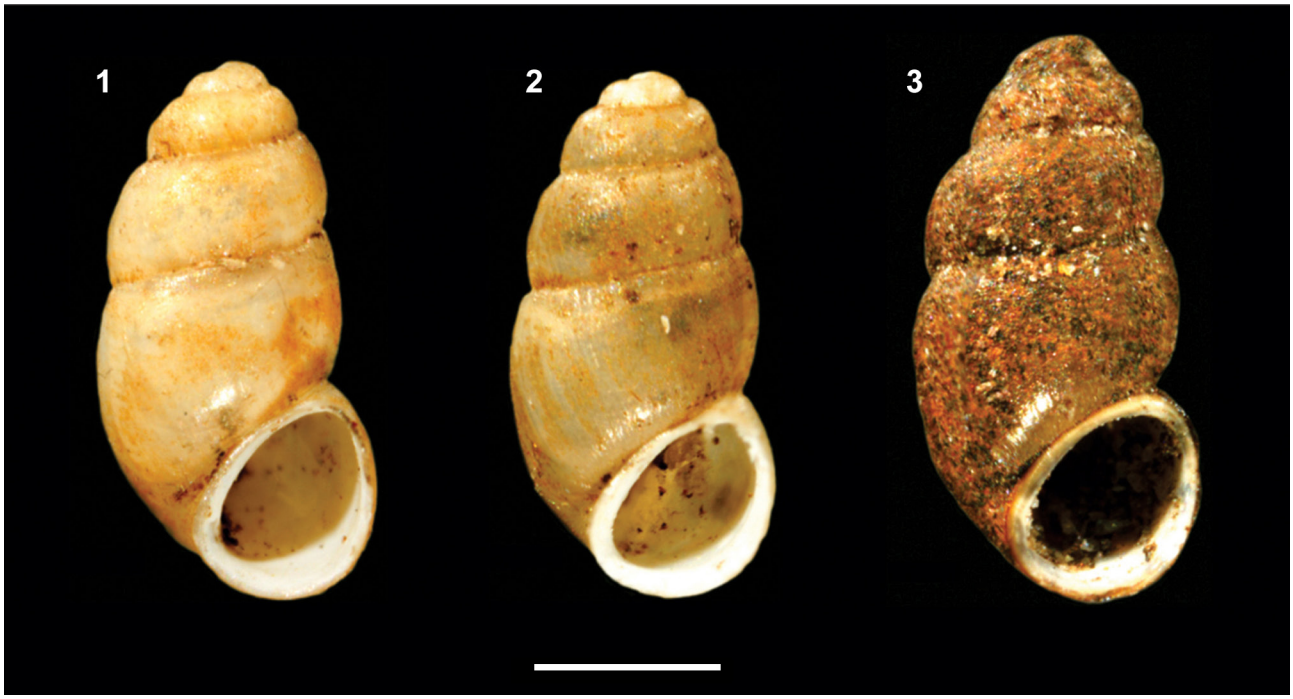
Shell description. Shell transparent and smooth, ovoid with conical spire, 4.25–4.50 whorls, convex and shallow suture, body whorl especially on its left side in front view below suture hardly vaulted; last fourth of body whorl gradually ascending on shell wall; edge of aperture in side view straight; aperture almost crescentic, parietal margin forming a chord; parietal margin of aperture fused with shell wall and sealing the umbilicus or leaving it short slit-like open; palatal and basal margins of aperture not broadened, but slightly thickened; columellar and parietal margins forming a rounded angle. Measurements (n = 7; type locality): height 1.73–1.98 mm (mean 1.83 mm), diameter 0.93–1.03 mm (mean 0.98 mm), height : diameter ratio 1.74–1.87 (mean 1.84); see also Table 1.

Operculum unknown.

Animal unknown.

Table 1. Shell measurements of *Pontobelgrandiella lavrasi* n. sp. (H – shell height, D – shell diameter, AH – aperture height, AD – aperture diameter, BH – body whorl height)

	H (mm)	D (mm)	AH (mm)	AD (mm)	BH (mm)	D/H	AH/H	BH/H	H/D	H/AH	H/BH
Megistis Lavras; type locality											
	1.82	0.97	0.67	0.61	1.27	0.53	0.37	0.70	1.88	2.72	1.43
	1.80	0.92	0.65	0.62	1.20	0.51	0.36	0.67	1.96	2.77	1.50
	1.92	0.98	0.71	0.65	1.28	0.51	0.37	0.67	1.95	2.67	1.49
mean	1.85	0.96	0.68	0.63	1.25	0.52	0.37	0.68	1.93	2.72	1.47
Ag. Athanasiou											
	1.80	0.93	0.65	0.68	1.25	0.51	0.36	0.69	1.95	2.77	1.44
	1.68	0.90	0.65	0.60	1.13	0.54	0.39	0.67	1.86	2.58	1.49
	1.70	0.93	0.65	0.65	1.23	0.54	0.38	0.72	1.84	2.62	1.39
mean	1.73	0.92	0.65	0.64	1.20	0.53	0.38	0.69	1.88	2.66	1.44



Figs 1–3. *Pontobelgrandiella lavrasi* n. sp., Greece, Halkidiki [Chalkidiki], Ag. Oros, Athos, spring south of Megistis Lavras: 1 – holotype (NMW 112.014); 2, 3 – paratypes (BOE 3399). Scale bar 1 mm

Habitat and distribution (Fig. 4). To date known from two localities at Athos, Ag. Oros, Halkidiki [Chalkidiki], Greece (REISCHÜTZ & REISCHÜTZ 2014: 69, localities 8–9 in fig. 3), (i) type locality, spring north of the monastery Megistis Lavras, sympatric with *Bythinella* sp. and *Grossuana marginata*, and (ii) from spring Agiasma at Ag. Athenasiou, sympatric with *Grossuana marginata*.

Comparison with syntypes of *Amnicola marginata* Westerlund, 1881 (BOETERS et al. 2017) suggests that the species of the *Radomaniola/Grossuana* group is *Grossuana marginata* as genetically characterised by FALNIOWSKI et al. (2012: 33, fig. 14 G12; 2016: 308, table 1).

Species differentiation. Table 2 lists all species known to date as belonging to *Pontobelgrandiella*. The newly described species differs from its congeners in the following features:

1. *P. angelovi* (Pintér, 1968) – in front view the palatal margin is not a straight prolongation of the contour of the last two whorls but surmounts it slightly (GLÖER & GEORGIEV 2009: 130 fig. 9);
2. *P. bachkovoensis* (Glöer et Georgiev, 2009) – the parietal margin is nearly straight, but the transition of parietal and columellar margins is arched; the transition is not angled (GLÖER & GEORGIEV 2009: 131 fig. 12.1);
3. *P. bulgarica* (Angelov, 1972) – the shell of *P. lavrasi* n. sp. is smaller and slimmer; its height, diameter

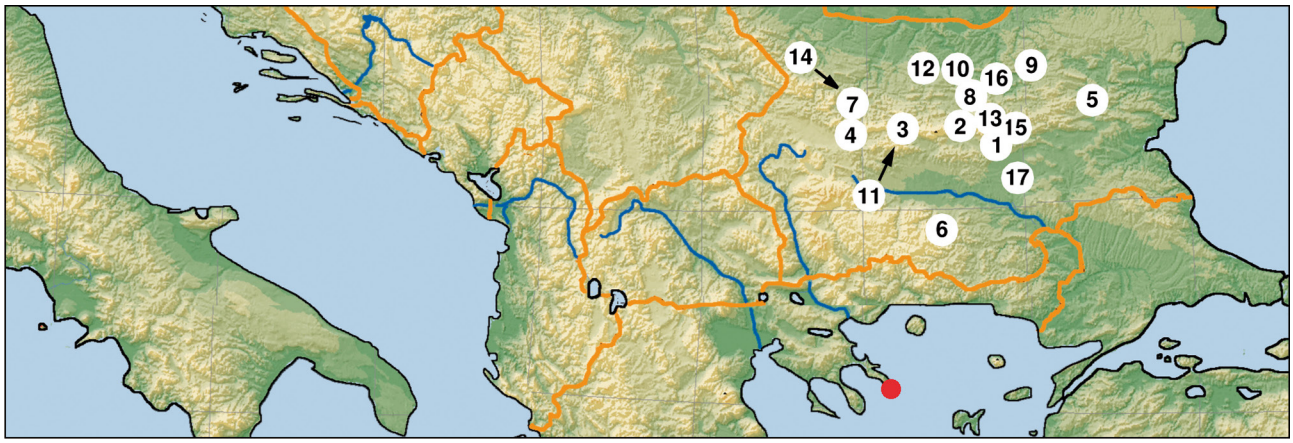


Fig. 4. Type localities of species of *Pontobelgrandiella* or regarded as belonging to this genus in the Balkans (for numbers see Table 2); red dot – *P. lavrasi* n. sp.

Table 2. List of nominal taxa of *Pontobelgrandiella* or regarded as belonging to this genus in the Balkans

No.	Species	Type locality	References for		
			type material	genitalia description	molecular data
1.	*Pontobelgrandiella angelovi* (Pintér, 1968) [*Belgrandiella*]	Bulgaria, Balkan Mts (Stara Planina), spring at Schipka Pass, north of village of the same name, 42°45'N, 25°19'E	holotype (Pintér 1968: 62, fig. 1) paratypes (Boeters 1970: pl. 9, fig. 29; Glöer & Georgiev 2009: 130, fig. 9)	male (Georgiev 2013b: 266, figs 1–6)	Rysiewska et al. (2016: 3, table 1)
2.	*Pontobelgrandiella bachkovoensis* (Glöer et Georgiev, 2009) [*Belgrandiella*]	Bulgaria, Bachkovo village, West Rhodopes, stream [sic], 320 m a.s.l., 42°57'10.1" N, 24°51'41.2" E	holotype (Glöer & Georgiev 2009: fig. 12)	male (Glöer & Georgiev 2009: 131, fig. 12, "the penis is simple without an appendix")	–
3.	*Pontobelgrandiella bulgarica* (Angelov, 1972) [*Belgrandiella*]	Bulgaria, Karst spring cave exit at village Polaten, north of Tetewen town, 42°55' N, 24°15' E	holotype (Angelov 1972a: 110, fig. 2 [drawing])	male (Angelov 1972a: 110, fig. 2, penis simple)	–
4.	*Pontobelgrandiella bureschi* (Angelov, 1976) [*Belgrandiella*]	Bulgaria, Karst spring supplying bath at village Bankja (district Tran) with water, 42°50' N, 22°40' E	syntype (Angelov 1976: fig. 1)	–	–
5.	*Pontobelgrandiella delevae* (Georgiev et Glöer, 2015) [*Belgrandiella*]	Bulgaria, Lednica Cave, Zloten area, near Kotel town, East Stara Planina Mts, 42°56'00.96" N, 26°30'46.08" E	holotype (Georgiev & Glöer 2015: 22, fig. 7)	male (Georgiev & Glöer 2015: 22, fig. 8)	–
6.	*Pontobelgrandiella dobrostanica* (Glöer et Georgiev, 2009) [*Belgrandiella*]	Bulgaria, Gargina Dupka cave, ca. 20 m from entrance, Mostovo village, 915 m a.s.l., 41°51'0.4" N, 24°55'57.1" E	holotype (Glöer & Georgiev 2009: 131, fig. 11.1–3)	male (Glöer & Georgiev 2009: 131, fig. 11.4)	Rysiewska et al. (2016: 3, table 1)
7.	*Pontobelgrandiella hessei* (A. J. Wagner, 1928) [*Belgrandia* (*Belgrandiella*)]	N. Bulgaria, cave Temnata Dupka near Lakatnik in Iskerdéfilé, Balkans, 43°05' N, 23°40' E	syntype (A. J. Wagner 1928: pl. 13, figs 74–77) topotype (Pintér 1968: 62, fig. 2)	–	–
8.	*Pontobelgrandiella hubenovi* (Georgiev, 2012) [*Belgrandiella*]	N. Bulgaria, Water tank (Vodnata) near village Musina, 43°13'14.9" N, 25°25'39.6" E, 198 m a.s.l.	holotype (Georgiev 2012: 106[2], fig. 1)	–	–
9.	*Pontobelgrandiella lomica* (Georgiev et Glöer, 2015) [*Belgrandiella*]	Bulgaria, Deposits of small stream flowing from village Golyamo Gradishte at its inflow to Kalakoch River near village Krepcha, Danube River plain, 43°27'55.49" N, 26°06'38.86" E, 203 m a.s.l.	holotype (Georgiev & Glöer 2015: 22, fig. 6)	–	–
10.	*Pontobelgrandiella* **(?)** *maarensis* (Georgiev, 2013) [*Belgrandiella*]	N. Bulgaria, Urushka Maara cave, near village of Krushuna, Devetashko Plateau, 43°14'41.7" N, 25°02'45.4" E, 191 m a.s.l.	holotype (Georgiev 2013a: 60, fig. 1A)	male (Georgiev 2013a: 60, fig. 1C, 61, fig. 2B, "The penis … with … a small lobe in the middle on its left side")	–

Table 2 continued

No.	Species	Type locality	References for type material	References for genitalia description	References for molecular data
11.	*Pontobelgrandiella nitida* Angelov, 1972 [*Belgrandiella*]	Bulgaria, Karst spring at cave exit at village Polaten, north of Teteven town, 42°55' N, 24°15' E	holotype (Angelov 1972a: fig. 3 [drawing]) topotype (Radoman 1983: pl. 8, fig. 129)	male (Radoman 1978: 30, fig. 3) female (Radoman 1983: 111, fig. 59)	–
12.	*Pontobelgrandiella pandurskii* (Georgiev, 2011) [*Belgrandiella*]	N. Bulgaria, Devetashka cave, near village Devetaki, Lovech town area, Devetashko Plateau, 43°14'00.5"N 24°53'07.8"E	holotype (Georgiev 2011a: 9, fig. 1.1–2)	male (Georgiev 2011a: 9, fig. 1.3)	Rysiewska et al. (2016: 3, table 1)
13.	*Pontobelgrandiella petrovi* (Georgiev, 2014) [*Belgrandiella*]	Bulgaria, Chuchura Cave near Velchovtsi area of village Stantchov Han, Tryavna district, Stara Planina Mts, 42°47'58.8" N, 25°34'23.7" E, 573 m a.s.l.	holotype (Georgiev 2014: 48, fig. 2–1)	–	–
14.	*Pontobelgrandiella pusilla* (Angelov, 1959) [*Belgrandiella*]	Bulgaria, Karst spring "Petreski Isvor" near train station Lakatnik, West Balkan Mountains, Teteven town, 43°05'00.3"N 23°22'43.1"E	syntype (Angelov 1959b: 52, fig. 1 [drawing]) topotype (Pintér 1968: 62, fig. 3)	–	–
15.	*Pontobelgrandiella stanimirae* (Georgiev, 2011) [*Belgrandiella*]	Bulgaria, Zmeyova Dupka cave, near Tryavna town, Stara Planina Mts, 42°52'35.0" N, 25°28'35.1" E, 512 m a.s.l.	holotype (Georgiev 2011b: 91, fig. 5)	male (Georgiev 2011b: 91, fig. 5)	Rysiewska et al. (2016: 3, table 1)
16.	*Pontobelgrandiella tanevi* Georgiev, 2013	N. Bulgaria, Parnitsite cave, near village of Bezhanovo, Pre-Balkan area, 43°12'02.1" N, 25°25'58.4" E	holotype (Georgiev 2013a: 62, fig. 3A)	male (Georgiev 2013a: 62, fig. 3C and 4)	Rysiewska et al. (2016: 3, table 1)
17.	*Pontobelgrandiella zagoraensis* (Glöer & Georgiev, 2009) [*Belgrandiella*]	Bulgaria, spring near Bedechka River, park "Krairechen", Stara Zagora town	syntype (Glöer & Georgiev 2009: 130, fig. 10.1)	male (Glöer & Georgiev 2009: 130, fig. 10.2)	Rysiewska et al. (2016: 3, table 1)

1. The type locality of *Belgrandiella zaschevi* Angelov, 1959 is „Die große Karstquelle bei der Höhle „Duschnik", Dorf Iskrez [Iskretz north of Sofia, 42°58' N, 23°15' E], W-Balkangebirge" in Bulgaria. A syntype was illustrated by Angelov (1959b: 52, fig. 2 [drawing]) and male and female genitalia by Radoman (1978: 32, fig. 4; 1983: 111, fig. 60). The question whether it represents the monotype of the genus *Cavernisa* Radoman, 1978, belongs to *Pontobelgrandiella* because of the location of its type locality in Bulgaria, or is really a *Belgrandiella* such as perhaps *P.* (?) *maarensis*, since there are no striking anatomical differences, has been clarified by Georgiev et al. (2017) in favour of *Cavernisa*.
2. Since the type locality of *Belgrandiella maarensis* Georgiev, 2013 with its characteristic male genitalia is within the distribution area of *Pontobelgrandiella* which is clearly separated from that of *Belgrandiella*, the species is here listed with reservation as *Pontobelgrandiella* (?) *maarensis*.

and height : diameter ratio are of 1.83 mm, 0.98 mm, and 1.84 (n = 7), while the corresponding values for *P. bulgarica* are 2.16 mm, 1.28 mm and 1.67 (n = 6);

4. *P. bureschi* (Angelov, 1976) – the spire is rounded and not conical (see Angelov 1976: fig. 1) and the shell height is only 1.20–1.40 mm (Georgiev 2011a: 9, table 2);
5. instead of four whorls and a height : diameter ratio of 1.85–1.90 as in *P. delevae* (Georgiev et Glöer, 2015), the shell of *P. lavrasi* n. sp. has 4.25–4.50 whorls and its height : diameter ratio is 1.74–1.87. Furthermore, in *P. lavrasi* n. sp. parietal and columellar margins are more broadened;
6. *P. dobrostanica* (Glöer et Georgiev, 2009) – the parietal margin is nearly straight, but the transition of parietal and columellar margins is arched, the transition is not angled (Glöer & Georgiev 2009: 131, figs 11.1–3);
7. *P. hessei* (A. J. Wagner, 1928) – the whorls in *P. lavrasi* n. sp. are less convex, moreover, in *P. lavrasi* n. sp., in frontal view, the left convex vault of

the body whorl culminates above the aperture, whereas in *P. hessei* it culminates at the level of the bent uppermost margin of the aperture (PINTÉR 1968: 62 fig. 2);

8. *P. hubenovi* (Georgiev, 2012) differs from *P. lavrasi* n. sp. in lateral view in a slightly guttered basal margin;
9. with the height of 2.1 mm the shell of *P. lomica* (Georgiev et Glöer, 2015) is larger than that of *P. lavrasi* n. sp. with the height of 1.73–1.98 mm (mean 1.83 mm);
10. *P.* (?) *maarensis* (Georgiev, 2013) – the whorls are more convex and the suture is fairly pronounced;
11. *P. nitida* (Angelov, 1972) – the shell has fewer whorls and is less elongated (RADOMAN 1983: pl. 8, fig. 129);
12. *P. pandurskii* (Georgiev, 2011) – its shell is ovoid rather than conical (GEORGIEV 2011a: 9, fig. 1.1–2);
13. *P. petrovi* (Georgiev, 2014) differs from *P. lavrasi* n. sp. in a slightly guttered basal margin;
14. *P. pusilla* (Angelov, 1959) – its shell is only 1.40–1.60 mm (GEORGIEV 2011a: 9, table 2);
15. *P. stanimirae* (Georgiev, 2011) – similarly as in P. *bureschi*, the spire is rounded and not conical (GEORGIEV 2011b: 91, fig. 5);
16. whereas in *P. tanevi* Georgiev, 2013 the columellar margin at transition between the parietal and the basal margins of the aperture is well rounded, in *P. lavrasi* n. sp. the transition is slightly angled;
17. *P. zagoraensis* (Glöer et Georgiev, 2009) – the parietal margin itself is slightly angled immediately before the columellar margin (GLÖER & GEORGIEV 2009: 130, fig. 10.1).

Recently GEORGIEV et al. (2017) have confirmed *Belgrandiella zaschevi* Angelov, 1959 as representative of the monotypic genus *Cavernisa* Radoman, 1978. Unlike the shell of *B. zaschevi* (RADOMAN 1983: pl. 8, fig. 130; GEORGIEV et al. 2017: 22 figs 28–34, 23 figs 36–39), the shell of *P. lavrasi* n. sp. is elongated ovoid and not conical.

DISCUSSION

Belgrandiella and *Pontobelgrandiella* inhabit springs and subterranean waters. It is commonly understood that the distribution areas of species of these genera might be quite small. Recently FALNIOWSKI & BERAN (2015) critically discussed this view for four nominal taxa of *Belgrandiella*. They argued that "The shell alone cannot be the basis of species discrimination in the Truncatelloidea". However "congeneric species may not differ in their soft parts' morphology and anatomy" (RADOMAN 1983: 190). Based on their genetic investigations, FALNIOWSKI & BERAN (2015) stated that their "molecular data strongly suggest that all four nominal species represent one real biological entity: one species, genetically slightly variable". The geographical distance between the most remote investigated populations was about 240 km.

RYSIEWSKA et al. (2016: 1) studied genetically 16 Bulgarian populations of *Pontobelgrandiella*, and distinguished four clades. Interestingly, they added that "The Principal Component Analysis of seven shell measurements showed some morphological distinctness of the representatives of the distinguished clades, although with some overlapping variability". They found that the largest geographical distance between populations of the same clade was about 150 km (RYSIEWSKA et al. 2016: 6, fig. 4, clade II), however, the smallest distance between populations of different clades was less than 10 km (RYSIEWSKA et al. 2016: 6, fig. 4, clade IV versus clades I and III). This means that the size of the distribution area depends on the specific case.

However, in regard to the discovery of a new species of *Pontobelgrandiella,* namely *P. lavrasi* n. sp., in Greece, it should be borne in mind that the distance to the distribution area of the nearest Bulgarian representative of *Pontobelgrandiella, P. dobrostanica,* is more than 200 km. On the other hand FALNIOWSKI & BERAN (2015) investigated populations of a "real biological entity" up to 240 km apart, but within the distribution area of *Belgrandiella*; the locality of *P. lavrasi* n. sp. lies about 200 km outside of the known distribution area of *Pontobelgrandiella* species. This fact combined with morphological differences, as described above, supports the status of *P. lavrasi* n. sp. as a distinct new species. Live specimens are needed to confirm its distinctiveness and its attribution to *Pontobelgrandiella* by anatomical and molecular studies.

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