

SOME NEW FRESHWATER GASTROPODS FROM SOUTHERN EUROPE (MOLLUSCA: GASTROPODA: TRUNCATELLOIDEA)

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ABSTRACT: A western Balkan representative of the Moitessieriidae collected in a spring is described as *Bosnidilhia vreloana* n. gen. n. sp. A species of the Hydrobiidae from the Republic of Srpska (Bosnia and Hercegovina) is described as *Islamia dmitroviciana* n. sp.

KEY WORDS: Moitessieriidae, new genus, new species, *Bosnidilhia vreloana*, *Islamia dmitroviciana*

INTRODUCTION

Representatives of the Moitessieriidae were previously known from Spain, France, Italy and Greece. *Moitessieria simoniana* Saint Simon, 1848, *M. massoti* Bourguignat, 1863 and *Sardopaladilhia plagigeyrica* Manganeli, Bodon, Cianfanelli, Talenti et Giusti, 1998 were known to occur in Italy, and only *Clameia brooki* Boeters et Gittenberger, 1990 was recorded from Greece. No moitessieriid was known from the area between Italy and Greece. The Moitessieriidae live in subterranean habitats; their members often occur together with or near other species of the Moitessieriidae, or of the Hydrobiidae, for example of

Islamia Radoman, 1973. It seemed promising to look for Moitessieriidae and other subterranean species within the gap between Italy and Greece.

Recent field work in the northwestern Balkans (Republic of Srpska, Bosnia and Hercegovina, Fig. 1) revealed an unknown representative of the Moitessieriidae. It is the first record for this family within the area between Italy and Greece. The new species was found rather close to the locality of a new species of *Islamia*; the two species occur in springs and their subterranean drainage areas, respectively.

MATERIAL AND METHODS

All material from Bosnia and Hercegovina was collected by DEJAN DMITROVIĆ (Banjaluka) in the following localities (Fig. 1): (A) Republic of Srpska, area of Banjaluka city; spring “Vrelo u Vranješima”, 438 m a.s.l., 44°42.419'N, 17°13.419'E and spring “Izvor ispod Čelinskog raskršća”, 603 m a.s.l., 44°42.470'N, 17°15.674'E; (B) Republic of Srpska, area of Banjaluka city; spring “Stuban”, 289 m a.s.l.; 44°41.550'N,

17°13.319'E. The specimens were preserved in 70% ethanol.

Benthic samples were collected using a Surber sampler, and freshwater snails were sorted in the laboratory with the aid of a stereo microscope. The shells and genitalia were examined under a stereo microscope; photographs were taken with a Leica digital camera system. Preservation and dissection of snails

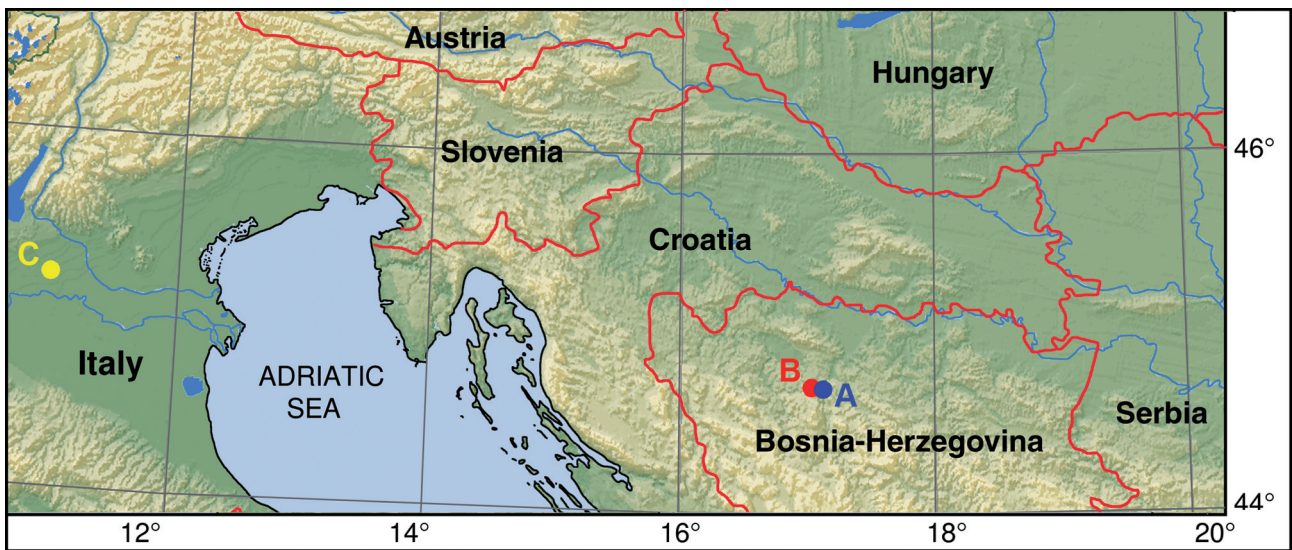
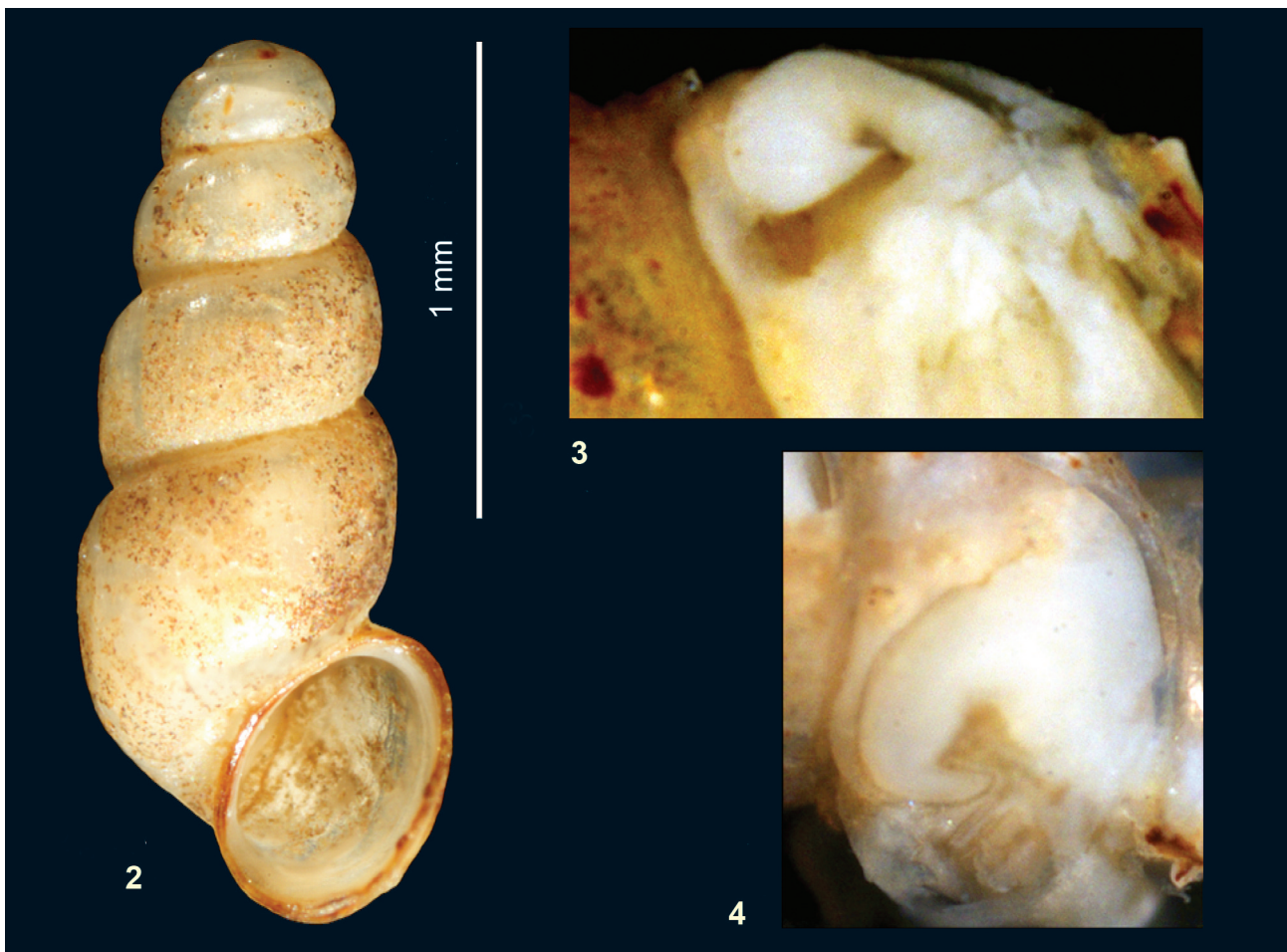


Fig. 1. Sampling sites of material under discussion: A – *Bosnidilhia vrelcana* n. gen., n. sp.; B – *Islamia dmitroviciana* n. sp.; C – one of the original localities (Veneto, Colli Euganei) of *Islamia ruffoi*

was carried out in accordance with BOETERS (1998, 1999a). Whorls were counted according to GITTENBEGER et al. (1970).

The following abbreviations of repositories are used in the text: BOE = BOETERS Collection, ZMH = Zoological Museum, Hamburg.



Figs 2–4. *Bosnidilhia vrelcana* n. gen. n. sp.: 2 – holotype; 3–4 – penis in situ (Photo: P. GLÖER)

RESULTS

FAMILY: MOITESSIERIIDAE BOURGUIGNAT, 1863

Genus: *Bosnidilhia* n. gen.

Description: A genus of the Moitesseriidae. The shell is of elongated tapered shape (Fig. 2). Upon leaving the style sac the intestine does not closely surround the sac toward the stomach, but first runs toward the mantle cavity wall before turning back, to touch the distal wall of the stomach and turn straight toward the anus along the prostate, albumen and capsule glands. The penis is simple, without any lobe. There is no gono-pericardial duct in female; the intestine ends with the anus close behind the mantle skirt, the gonopore lies about a quarter of the body whorl behind it. For other shell and body characters see the species description.

Differentiating characters: *Bosnidilhia vreloana* n. gen. differs from the eight known genera of the Moitesseriidae in the following characters (Table 1). Contrary to *Bosnidilhia* n. gen., the shells of *Baldufa*, *Clameia*, *Corseria*, *Henrigirardia*, *Moitessieria*, *Palacanthilhiopsis*, *Sorholia* and *Spiralix* have a dense spiral or grid-like sculpture. *Paladilhia* differs in the pallial tentacle and *Palaospeum* in the distal receptaculum (RS1), characters which are absent in *Bosnidilhia* n. gen. In *Bosnidilhia* n. gen. the receptaculum is not simply positioned in the gap formed by the renal oviduct with the pedunculus of the bursa, but touches

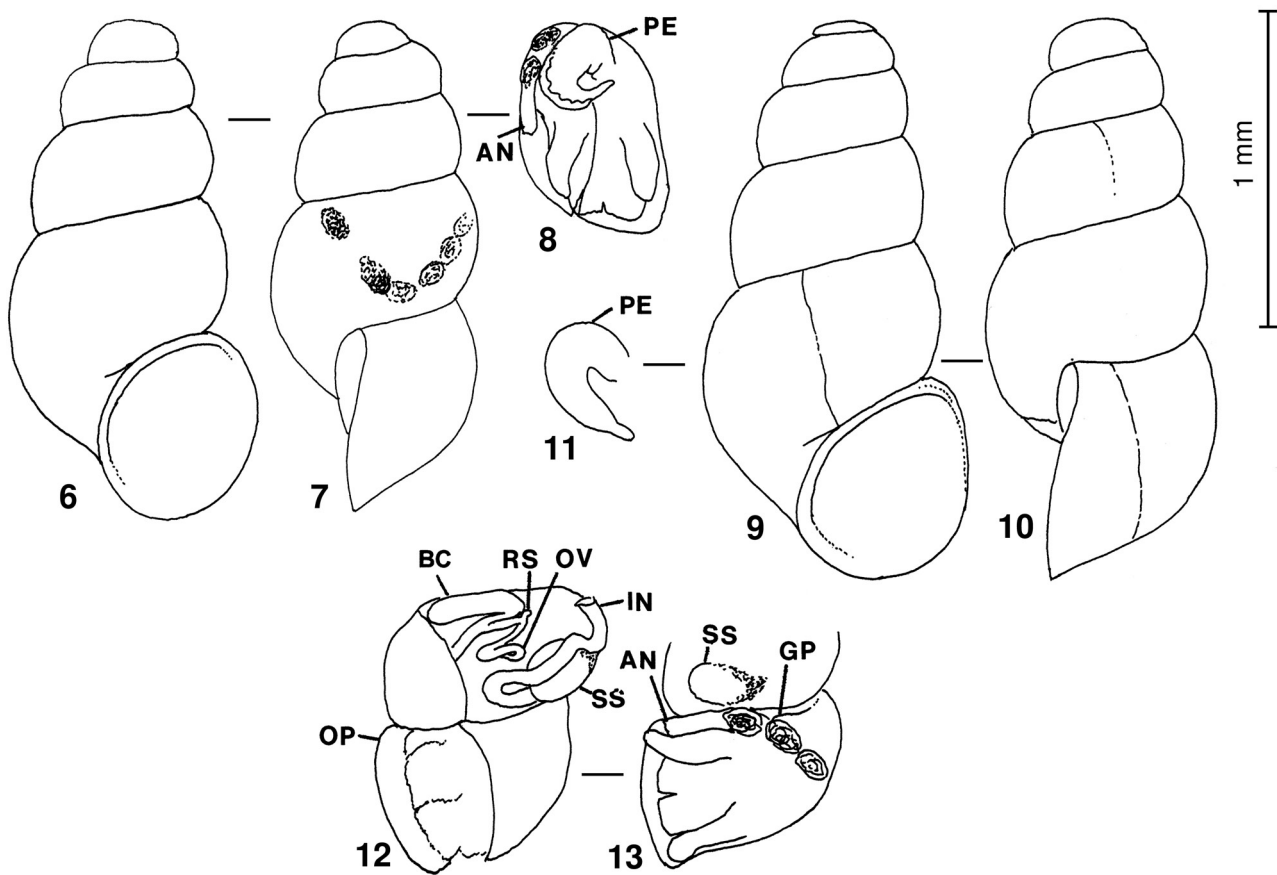


Fig. 5. Type locality of *Bosnidilhia vreloana* n. gen. n. sp. (Photo: D. DMITROVIĆ)

Table 1. Differentiating features of the genera of the Moitesseriidae

	Spiral or grid shell sculpture		Pallial tentacle		RS1		RS on bursa		Intestine loop in roof of mantle cavity	
<i>Baldufa</i>	+	(12)	?		?		?		?	
<i>Bosnidilhia</i> n. gen.	-		-		-		+		-	
<i>Clameia</i>	+	(16)	-	(1)	-		+	(1)	+ ♀♀	(1)
<i>Corseria</i>	+	(17)	?		-	(2)	-	(2)	?	
<i>Henrigirardia</i>	+	(18)	?		?		?		?	
<i>Moitessieria</i>	+	(19)	-	(3)	-	(3)	-	(3)	-	(3)
<i>Palacanthilhiopsis</i>	+	(20)	-	(11)	-	(11)	+	(11)	-	(11)
<i>Paladilhia</i>	-	(21)	+	(4)	-	(5)	+	(5)	-	(5)
<i>Palaospeum</i>	-	(22)	-	(6)	+	(7), (8)	-		-	(6)
<i>Sardopaladilhia</i>	-	(13)	-	(15)	-	(15)	+	(15)	-	(15)
<i>Sorholia</i>	+	(14)	-	(9)	-	(9)	-	(9)	-	(9)
<i>Spiralix</i>	+	(23)	-	(10)	-	(10)	-	(10)	+	(10)

Remarks: "+" – present, "-" – absent, "?" – not known. (1) *Cl. brooki* – BOETERS & GITTENBERGER 1990: 126, 127 fig. 9, 128 for ♀♀; (2) *C. corsica* – BERNASCONI 1994: 13; (3) *M. simoniana* – BODON & GIUSTI 1991: 7 fig. 4L–M; (4) *P. pleurotoma* – BOETERS 1971: 171 fig. 5; (5) *P. pleurotoma* – BODON & GIUSTI 1991: 18 fig. 12L; (6) *P. bessonii* – BOETERS 1999b: 194, 196; (7) *P. bessonii* – BERNASCONI 1999: 391 fig. 13; (8) *P. bessonii* – BOETERS 2003: 26 fig. 84; (9) *S. lescherae* – BODON & GIUSTI 1991: 18 fig. 12L; (10) *Sp. rayi* – BODON & GIUSTI 1991: 15 figs 9I and 9L; (11) *P. kuiperi* – GIRARDI 2009a: 101 fig. 8d; (12) *B. fontinalis* – ALBA et al. 2010: 174 fig. 16; (13) *S. plagigeyrica* – MANGANELLI et al. 1998: 61, fig. 9; (14) *S. lescherae* – BOETERS & FALKNER 2009: pl. 20 fig. 2; (15) *S. plagigeyrica* – MANGANELLI et al. 1998: 62 fig. 19; (16) *Cl. brooki* – BOETERS & GITTENBERGER 1990: 126 figs 3–6; (17) *C. corsica* – BERNASCONI 1994: 13 fig. 18; (18) *H. wienini* – GIRARDI 2001: 36 pl. 1 figs A–E; (19) *M. simoniana* – BODON & GIUSTI 1991: 4 fig. 2; (20) *P. kuiperi* – GIRARDI 2009a: 92 fig. 6; (21) *P. pleurotoma* – BODON & GIUSTI 1991: 8 fig. 5E–F; (22) *P. bessonii* – BOETERS 1999b: 195 figs 5–6; (23) *Sp. rayi* – BODON & GIUSTI 1991: 26.



Figs 6–13. *Bosnidilhia vrelolana* n. gen., n. sp., Srpska, area of Banjaluka city: 6–7 – spring “Vrelo u Vranješima” (male; FL4 14b), shell with faecal pellets seen through shell wall; 8 – head seen through mantle slit to expose penis with vas deferens (same male as in Figs 6–7); 9–10 – spring “Izvor ispod Čelinskog raskršća” (male; FL4 07a), shell; 11 – penis (same male as in Figs 9–10); 12–13 – spring “Vrelo u Vranješima” (female; FL4 14b), body whorl with body wall and intestine partially removed to show renal oviduct, bursa copulatrix and receptaculum seminis. Abbreviations: AN – anus, BC – bursa copulatrix, GP – gonoporus, IN – intestine, OP – operculum, OV – oviduct, PE – penis, RS – receptaculum seminis, SS – style sac. (Drawings: H. BOETERS)

the bursa like in *Clameia*, *Palacanthilhiopsis*, *Paladilhia* and *Sardopaladilhia*. In *Corseria*, *Moitessieria*, *Sorholia* and *Spiralix* the bursa has no receptaculum. Except *Baldufa*, *Corseria* and *Henrigirardia*, not yet examined in this respect, the intestine without any loop in the roof of the mantle cavity is characteristic of the new genus, as well as of *Moitessieria*, *Palacanthilhiopsis*, *Paladilhia*, *Palaospeum*, *Sardopaladilhia* and *Sorholia*. Contrary to these genera, the type species of *Clameia* and *Spiralix* show such a loop. The characters are summarised in Table 1.

Bosnidilhia vrelolana n. sp. (Figs 2–19)

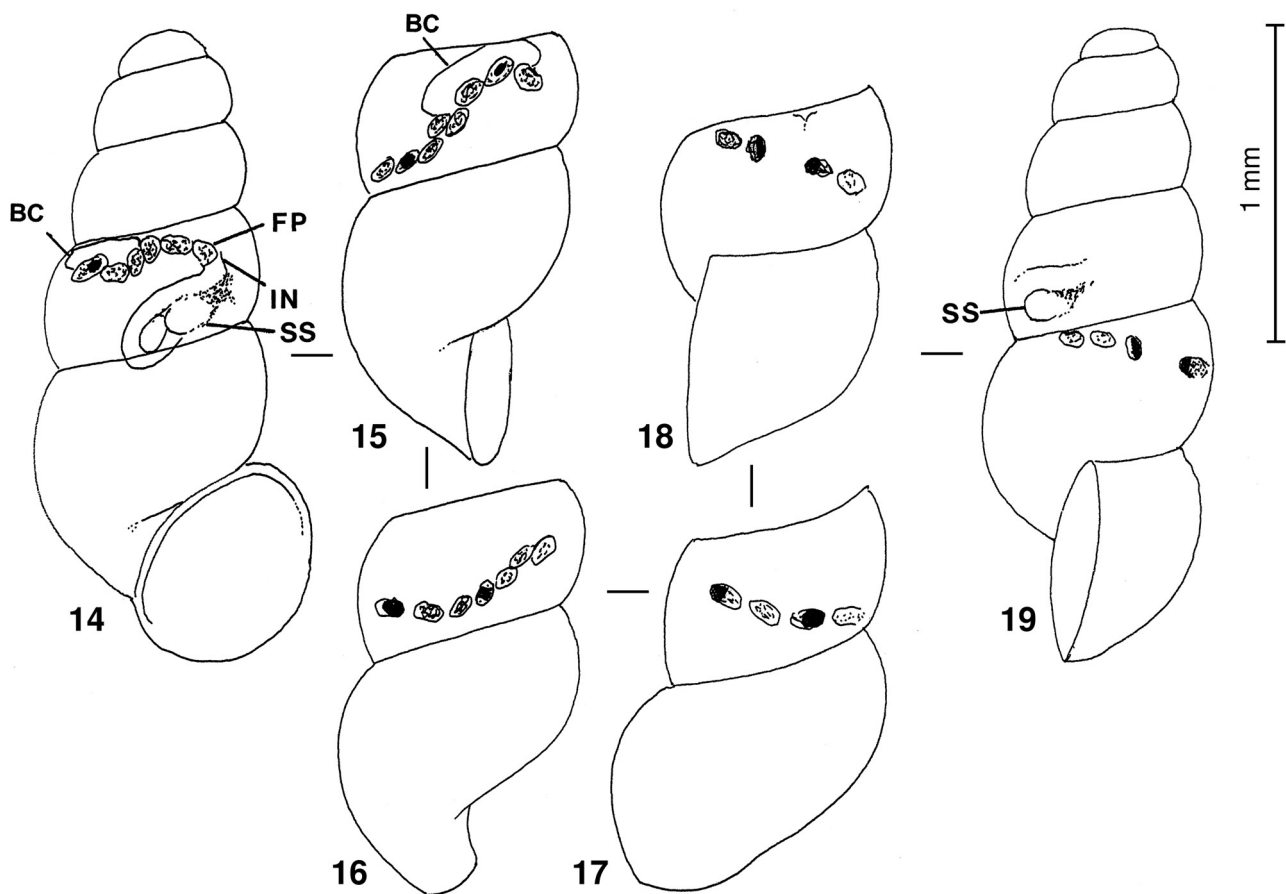
Material examined: Bosnia and Hercegovina, Republic of Srpska, area of Banjaluka city; FL4 014b: spring “Vrelo u Vranješima”, 438 m a.s.l., 44°42.419’N, 17°13.419’E, DEJAN DMITROVIĆ leg. 21.03.2010 (3 specimens); FL4 07a: spring “Izvor ispod Čelinskog raskršća”, 603 m a.s.l., 44°42.470’N, 17°15.674’E, DEJAN DMITROVIĆ leg. 21.03.2010 (9 specimens plus 1 shell).

Holotype: shell height 1.9 mm, width 0.8 mm, ZMH 79663.

Paratypes: 1 specimen from type locality ZMH 79664, 1 specimen GLÖER collection, 7 specimens from “Izvor ispod Čelinskog raskršća” BOE 3264, 3 specimens from type locality BOE 3263.

Type locality: Bosnia and Hercegovina, Republic of Srpska, area of Banjaluka city; spring “Vrelo u Vranješima” (Fig. 5), 438 m a.s.l.; 44°42.419’N, 17°13.419’E.

Shell: The transparent shell is elongated cylindrical, slightly tapered (Figs 2, 6, 9); the shell wall is smooth, without any spiral or grid sculpture; 4.25 to 5.0 well rounded whorls are separated by a distinct suture; occasionally the last whorl ascends slightly before the aperture; in frontal view the aperture is of slightly oblique ovate shape, it touches the shell wall over a short distance and leaves the umbilicus open; the peristome is sharp and slightly widened only at its base; in lateral view the aperture edge is opisthocline (Figs 7, 10). Height 1.95 mm, diameter 0.62 mm (1♀), height 1.58–1.90 mm, diameter 0.74–0.79 mm



Figs 14–19. *Bosnidilhia vreloana* n. gen., n. sp., Srpska, area of Banjaluka city: 14–19 – crystal sac, intestine with faecal pellets and bursa copulatrix seen through shell wall (same female as in Figs 12–13). Abbreviations: BC – bursa copulatrix, FP – faecal pellets, IN – intestine, SS – style sac. (Drawings: H. BOETERS)

(2♂♂). Operculum paucispiral, without thickening or peg in its centre, horn-coloured.

Body: No eye spots. Gill present, five lamellae (1♀). No pigmentation except for the style sac which is proximally surrounded by black pigment grains. The intestine leaving the style sac does not closely surround the sac toward the stomach, but runs towards the mantle cavity wall to turn back and touch the distal wall of the stomach and turn straight toward the anus along the prostate, albumen and capsule glands; no loop in the mantle cavity (Figs 7, 13–19). Sex ratio: 2♂♂ : 1♀ (FL4 14b).

Male genitalia: The simple penis is broad and long without any lobe; its short final section is teat-shaped (Figs 3–4, 8, 11).

Female genitalia: The renal oviduct runs down from the ovary and makes a Z-shaped loop in the neighbourhood of the style sac before reaching the albumen gland without any branching off of a pericardial duct (Fig. 12). The last distal bend of the loop carries a minute receptaculum which touches the bursa. The bursa is cylindrical; its pedunculus enters the renal oviduct distal to the receptaculum. The intestine ends with the anus close behind the mantle skirt; the

gonopore lies about a quarter of the body whorl behind it.

Habitat and distribution: Known only from two springs in the Republic of Srpska in Bosnia and Hercegovina (at type locality 10°C on 21.03.2010). Accompanying species: *Bythinella schmidtii*, *Galba truncatula*, *Radix balthica*.

FAMILY: HYDROBIIDAE STIMPSON, 1865

Genus: *Islamia* Radoman, 1973

Islamia dmitroviciana n. sp. (Figs 20–24, 26–31)

Material examined: FL07 015b: DEJAN DMITROVIĆ leg. 21.03.2010 (22 specimens); FL07 015c: DEJAN DMITROVIĆ leg. 15.03.2010 (11 specimens).

Holotype: 1.15 mm height, 1.55 mm width, ZMH 79665.

Paratypes: 5 specimens from type locality, ZMH 79666; 14 specimens, GLÖER collection; 23 specimens, BOE 3265 and 11 specimens, BOE 3266.

Type locality: Bosnia and Hercegovina, Republic of Srpska, area of Banjaluka city, spring “Stuban” (Fig. 20), 289 m a.s.l.; 44°41.550'N, 17°13.319'E.



Fig. 20. Type locality of *Islamia dmitroviciana* n. sp.: spring Stuban in March (left) and in August (right), both 2010 (Photo: D. DMITROVIĆ)

Shell: valvatiform with 2.75 whorls and with a flat conical spire (Figs 21–23, 26, 29); the body whorl not ascending or descending; in frontal view the aperture is nearly circularly rounded, only slightly impressed where it touches the shell wall over a short distance and slightly bulged at its upper periphery; the peristome is gradually and very slightly widened at its base; the umbilicus diameter is about 1/3 of the whorl vis-à-vis the aperture. Diameter 1.350–1.380–1.425 mm (6♂♂; FL7 015b) and 1.300–1.430–1.550 mm (3♂♂; FL7 015c); overall 1.30–1.40–1.55 (SD 1.40±0.08) (9♂♂). Operculum paucispiral, without thickening or peg in its centre, horn-coloured, with a red-brownish centre.

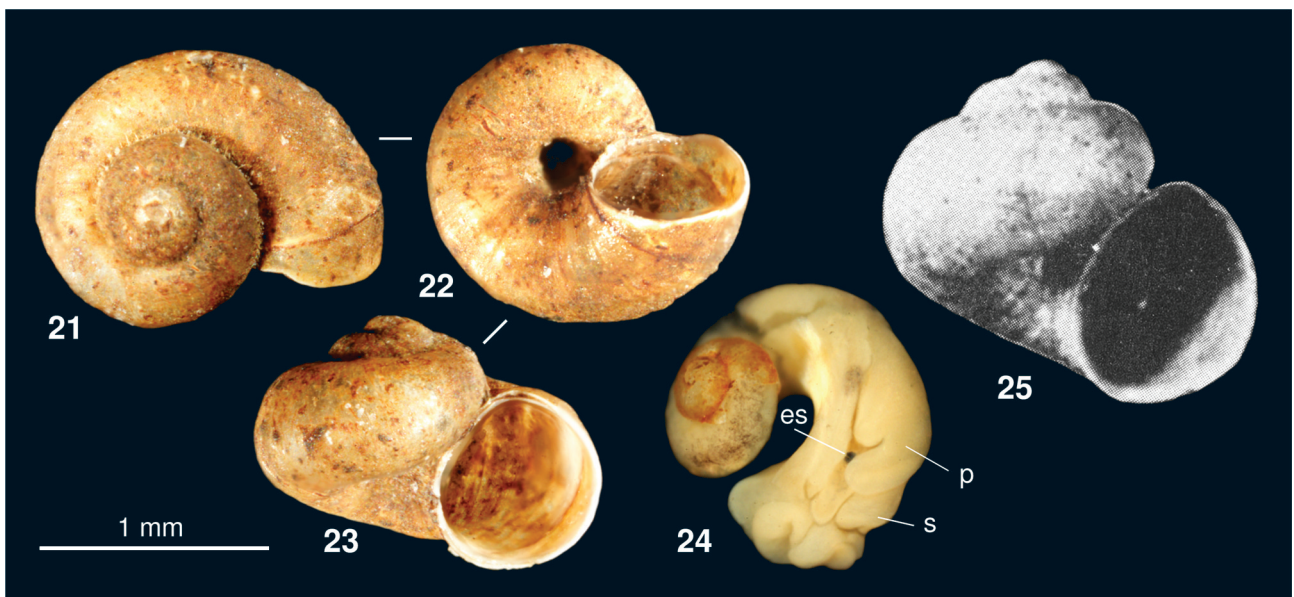
Body: Only the eye spots and a part of the body whorl are pigmented black. Kidney brownish. Gill present, five lamellae (1X). The Z-like loop of the intestine behind the stomach and its style sac is followed by a

V-like terminal section (Figs 28, 30). Sex ratio: 6♂♂ : 1♀ (FL7 015b) and 3♂♂ : 1♀ (FL7 015c).

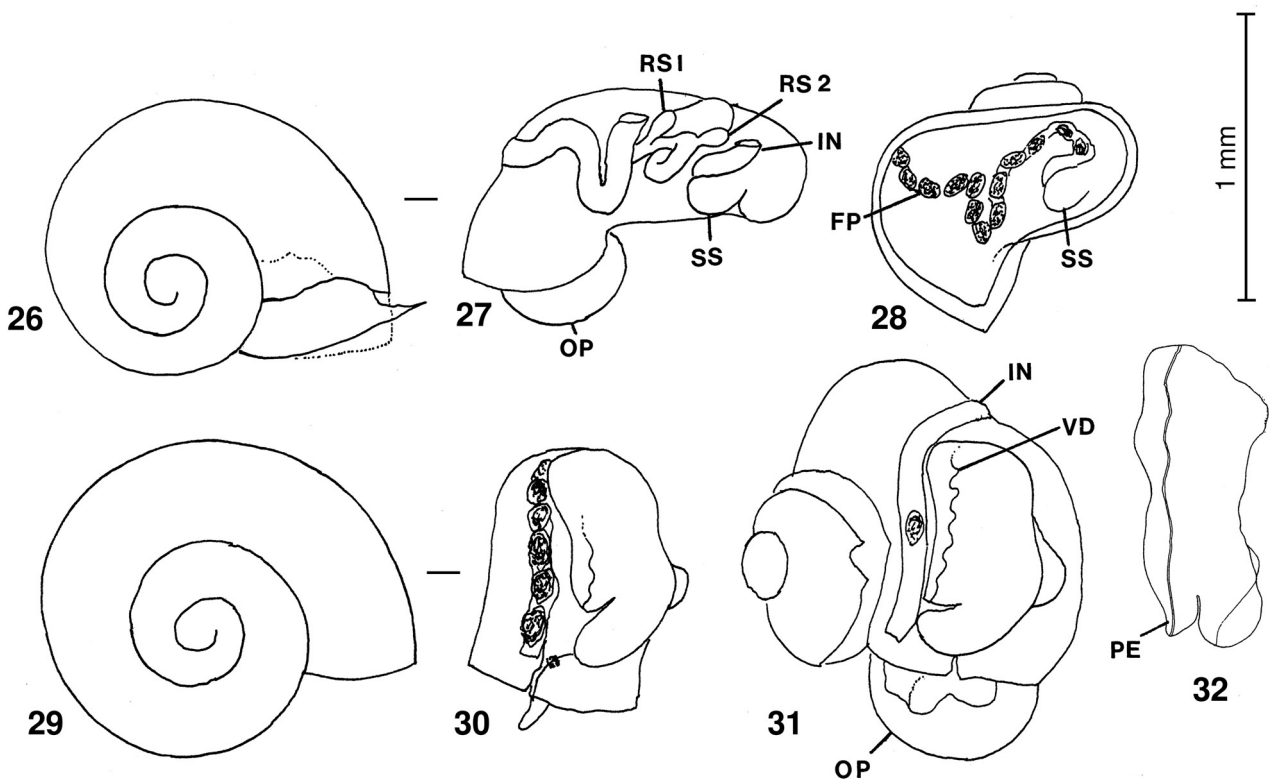
Male genitalia: The male copulatory organ originates in the mantle cavity under the distal branch of the V-like loop of the final section of the intestine (Fig. 31). It is apically bifid and mitten-shaped (Figs 24, 30–31), that is on its left side the penis is provided with a large penial lobe. On its ventral side and in front of the bifurcation the copulatory organ carries a lamella which extends somewhat beyond the left side of the penial lobe when seen from above; the penial duct zig-zags through the penis towards its tip (Fig. 31).

Female genitalia: No bursa. The distal and proximal receptacula (RS1 and RS2) of roughly the same size (Fig. 27).

Habitat and distribution: Known only from the type locality, a spring (9°C), in the Republic Srpska in Bosnia and Hercegovina. Accompanying species: *Bythinella schmidtii*, *Galba truncatula*.



Figs 21–25. *Islamia dmitroviciana* n. sp.: 21–23 – holotype, 24 – penis in situ (Photo: P. GLÖER); 25 – *Islamia bosniaca* Radoman, 1973 (after RADOMAN 1983: pl. 9, fig. 149, enlarged by 1.6 to correspond to scale). Abbreviations: es – eye spot; p – penis; s – snout



Figs 26–32. *Islamia dmitroviciana* n. sp., Republic of Srpska, area of Banjaluka city, spring “Stuban”: 26 – shell, aperture damaged except for remainders of periostracum (female, FL7 015b); 27 – body whorl, body wall and intestine partially removed to show renal oviduct and distal and proximal receptaculum seminis (RS1 and RS2) (same female as in Fig. 26); 28 – intestinal loop with faecal pellets seen through shell wall (female, FL7 015c); 29 – shell (male, FL7 015c); 30 – head with one eye spot and ommatophore seen through mantle slit to expose copulatory organ with vas deferens (same male as in Fig. 29); 31 – animal with nearly completely removed shell and slit mantle to expose copulatory organ with vas deferens (male, FL7 015b); *Islamia bosniaca* Radoman, 1973, Bosnia, about 11 km from Doboj toward Zenica, spring Podgaj: 32 – male copulatory organ with vas deferens (after RADOMAN 1973: 230, fig. 3, reduced by 1:1.3 to correspond to scale). Abbreviations: FP – faecal pellets, IN – intestine, OP – operculum, PE – penis, RS – receptaculum seminis, SS – style sac, VD – vas deferens. (Drawings: H. BOETERS)

Differentiating characters: At present six species of *Islamia* from the Balkans are well known and discussed below. Further, some comments are made on four other valvatoid species from the Balkans, of unclear generic affiliation, and also on the Italian *I. ruffoi*.

(1) *I. valvataeformis* (Möllendorff, 1873). Compared to *I. valvataeformis*, in *I. dmitroviciana* n. sp. the penis is smaller than the penial lobe. While *I. valvataeformis* is provided with two neighbouring seminal receptacula, in *I. dmitroviciana* n. sp. the distal receptaculum (RS1) arises close to where the renal oviduct enters the albumen gland, and the proximal receptaculum (RS2) arises at the loop of the renal oviduct (for *I. valvataeformis* see: male – RADOMAN 1973a: 227, 231, 233, fig. 3 *servaini*; GIUSTI et al. 1981: 66, fig. 4.3 *servaini*; RADOMAN 1983: 124, 126, fig. 69C; BODON et al. 2001: 132, figs 111–115, 133; female – RADOMAN 1973a: 227, fig. 2 *servaini*; 1973b: 6, 10; 1983: 40, 124, figs 69A–B).

(2) *I. bosniaca* Radoman, 1973. The distance between the type localities of *I. bosniaca* and *I. dmitroviciana* n. sp. is about 70 km. According to

RADOMAN (1973a: 228, fig. 1B, 231; 1983: 206, pl. IX, fig. 149) in *I. bosniaca* the spire of the shell is more conical (Fig. 25) compared to *I. dmitroviciana* n. sp., and whereas the shell diameter of *I. bosniaca* is 1.64–1.93 mm, in *I. dmitroviciana* n. sp. it is only 1.30–1.55 mm. Furthermore, in *I. dmitroviciana* n. sp. the number of whorls is about 2.75, whereas RADOMAN (1983: 206) mentions 3.25 to 3.50 whorls for *I. bosniaca*. Even assuming that RADOMAN's counting differed by 0.25 additional whorl (see GITTENBERGER et al. 1970: 17, fig. 4b), the number of whorls would only be 3 to 3.25, and thus still greater than that of *I. dmitroviciana* n. sp. In addition, in *I. dmitroviciana* n. sp. the penis is less pronounced than in *I. bosniaca* (Figs 30–31 versus Fig. 32). Even though the female genitalia have not been figured by RADOMAN, he at least stated “que l’anatomie de toutes espèces [*I. valvataeformis*, *bosniaca*, *latina* and *zermanica*] soit identique” except the male copulatory organ (1973a: 231). This means that the same differences apply as those listed above in comparison to *I. valvataeformis*.

(3) In *I. zermanica* Radoman, 1973 and (4) *I. latina* Radoman, 1973 the male copulatory organ is slimmer and more bifurcated than in *I. bosniaca* (RADOMAN 1983: 125, figs. 70A–B) and thus, of course, than in *I. dmitroviciana* n. sp.

(5) *I. graeca* Radoman, 1973 and (6) *I. trichoniana* Radoman, 1979 are restricted to Greece and occur in a completely different habitat, i.e. lakes and not springs and their subterranean drainage areas. In both these species the penis and penial lobe are small and short.

(7) *I. (?) edlingeri* A. et P. Reischütz, 2004 and (8) *I. (?) hadei* (Gittenberger, 1982) are also regarded as endemic to Greece (BANK 2006: 56). They live in brooks, have not yet been anatomically examined and their generic affiliation is unclear. *I. (?) hadei* is characterised by a nearly flat spire and *I. (?) edlingeri* by a completely flat spire.

DISCUSSION

MOITESSIERIIDAE, HYDROBIIDAE AND BYTHINELLIDAE

BOETERS & GITTENBERGER (1990) listed conchological and anatomical differences between Hydrobiidae and Moitessieriidae. However, since these differences have not always been confirmed by other authors, and sometimes even ignored, doubted or perhaps overlooked (BODON & GIUSTI 1989: 30; MANGANELLI et al. 1998: 54, 62, fig. 19) and since the new genus *Bosnidilhia* n. gen. is assigned to the Moitessieriidae, it seems reasonable to update the list of differentiating characters provided by BOETERS & GITTENBERGER (1990). This updating acknowledges the Bythinellidae as a separate family apart from the Hydrobiidae. We also take into consideration WILKE's et al. (2013: 722) statement that the Moitessieriidae are insufficiently studied and their phylogenetic relationships and taxonomic status require further study.

(1) Gonopericardial duct. In the Moitessieriidae the gonopericardial duct is absent while it is present in the Hydrobiidae and Bythinellidae.

Moitessieriidae: *Clameia* (BOETERS & GITTENBERGER 1990: 10 *C. brooki*); *Moitessieria* (BOETERS 1972: 100 spec; 1973: 64 spec.); *Paladilhia* (BOETERS 1972: 100; 1973: 65 *P. pleurotoma*).

Hydrobiidae: *Belgrandia* (RADOMAN 1973a: 235, fig. 8A *B. vjetrenicae*); *Belgrandiella* (RADOMAN 1975: 30, fig. 1; 1983: 99, fig. 50 *B. kusceri*); *Bythiospeum* (KRULL 1935: 436 *B. quenstedtii*; HAASE 1995: 123, fig. 11B *B. cf. geyeri*); *Horatia* (RADOMAN 1966: 249, fig. 8; 1983: 48, fig. 20 *H. klecakiana*); *Hydrobia* (RADOMAN 1977: 206, fig. 2C und 2E; 1983: 25, fig. 6B *H. acuta*; GIUSTI & PEZZOLI 1982: 127, fig. 1G *H. acuta*); *Mercuria* (GIUSTI et al. 1995: 133, fig. 69 *M. cf. similis*); *Peringia* (KRULL 1935: 436 *P. ulvae*); *Potamopyrgus* (KRULL

(9) According to BODON et al. (2001: 179) it is an open question whether *I. bendidis* Reischütz, 1988 and (10) *I. epirana* (Schütt, 1962), also known from Greece, belong to *Islamia* at all.

(11) Finally, as regards *Islamia* in the neighbouring western Europe, reference is made to *I. ruffoi* Bodon et Cianfanelli, 2012. However, whereas in *I. ruffoi* the male copulatory organ is bifurcated into the penis and its lobe (BODON & CIANFANELLI 2012), in *I. dmitroviciana* n. sp. the male copulatory organ carries in addition a lamella like in other Balkan species of *Islamia*.

Remarks: We had no opportunity to examine the types of *Islamia bosniaca* Radoman, 1973. No topotypes could be collected since the territory of the type locality situated in the Federation of Bosnia and Hercegovina, close to the border of the Republic of Srpska, is said to be still mined.

1935: 436 *P. jenkinsi*); *Pseudamnicola* (RADOMAN 1972: 198, fig. 4A *P. conovula*; 1983: 27, fig. 10 *P. lucensis*); *Sadleriana* (RADOMAN 1965: 125, fig. 4 *S. fluminensis*); *Ventrosia* (KRULL 1935: 436 *V. ventrosa*; RADOMAN 1977: 208, fig. A; 1983: 27, fig. 8A *V. stagnorum*).

Bythinellidae: *Bythinella* (RADOMAN 1976: 138, fig. 4D *B. viridis*); *Marstoniopsis* (KRULL 1935: 436 *M. steini*; RADOMAN 1976: 148, fig. 7; 1983: 175, fig. 107B *M. macedonica*).

(2) Style sac and intestine. Whereas in the Hydrobiidae and Bythinellidae the intestine upon leaving the style sac (i.e. prior to pellet compressor) encloses the sac semicircularly, in the Moitessieriidae the intestine coils loosely at a distance around the sac. Moitessieriidae: *Moitessieria* (BERNASCONI 1984: 211, fig. 6d *M. lineolata*; BODON & GIUSTI 1991: 7, fig. 4L *M. simoniana*); *Palacanthilhiopsis* (GIRARDI 2009a: 99, fig. Ab *P. carolinae*); *Paladilhia* (BODON & GIUSTI 1991: 18, fig. 12M *P. pleurotoma*); *Sorholia* (BODON & GIUSTI 1991: 18, fig. 12B *S. lescherae*); *Spiralix* (BODON & GIUSTI 1991: 15, fig. 9I *Sp. rayi*).

Hydrobiidae: *Belgrandia* (RADOMAN 1973a: 234, fig. 7 *B. vjetrenicae*); *Belgrandiella* (RADOMAN 1975: 49, fig. 10 *B. umbilicata*); *Heleobia* (GIRARDI 2009b: 150, fig. 2c *H. stagnorum*); *Hydrobia* (RADOMAN 1977: 206, fig. 2A; 1983: 25, fig. 6A *H. acuta*); *Mercuria* (GIUSTI & PEZZOLI 1980: 5, fig. 2 *M. zopissa*); *Pseudamnicola* (RADOMAN 1972: 198, fig. 4D *P. conovula*); *Ventrosia* (DAVIS et al. 1982: 157, fig. 6A–B *V. truncata*).

Bythinellidae: *Bythinella* (RADOMAN 1976: 137, fig. 3A *B. schmidtii*).

(3) Anus and gonopore. Whereas in the Moitessieriidae the anus opens at the mantle skirt, the gonopore opens into the proximal part of the mantle cavity floor, as for example in *Spiralix* (BODON & GIUSTI 1991: 15, fig. 9L *Sp. rayi*). A similar situation is



occasionally found in the Hydrobiidae, such as *Alzoniella* (GIUSTI & BODON 1984: 161, fig. 2 *A. finalina*), however, in the Hydrobiidae in general, as in the Bythinellidae, the gonopore opens close to the anus as illustrated by the references below. In other words, in the Hydrobiidae and the Bythinellidae the complex formed by the albumen and capsule glands is on the whole larger than in the Moitessieriidae. This difference has not yet got sufficient attention.

Moitessieriidae: *Moitessieria* (BODON & GIUSTI 1991: 15, fig. 9B *M. massoti*); *Palacanthilhiopsis* (GIRARDI 2009a: 99, fig. Ab *P. carolinae*); *Paladilhia* (BODON & GIUSTI 1991: 18, fig. 12L *P. pleurotoma*); *Sorholia* (BODON & GIUSTI 1991: 18, fig. 12F *S. lescherae*); *Spiralix* (BODON & GIUSTI 1991: 15, fig. 9L *Sp. rayi*). Hydrobiidae: *Fissuria* (BODON et al. 2001: 194, fig. 243 *F. raehlei*); *Hauffenia* (BODON et al. 2001: 151, fig. 167 *H. wagneri*); *Heraultiella* (BODON et al. 2001: 208, fig. 292 *H. exilis*); *Islamia* (BODON et al. 2001: 197, fig. 260 *I. minuta*); *Mercuria* (GIUSTI et al. 1995: 133, fig. 69 *M. cf. similis*); *Pseudamnicola* (GIUSTI et al. 1995: 139, fig. 85 *P. moussoni*); *Ventrosia* (DAVIS et al. 1982: 164, fig. 11C *V. truncata*).

Bythinellidae: *Bythinella* (GIUSTI & PEZZOLI 1977: 48, fig. 1D *B. schmidtii*).

(4) **Shell.** In the Moitessieriidae the shell is often provided with a characteristic spiral microsculpture.

BOSNIDILHIA N. GEN.

The Moitessieriidae are known from Spain, France, Italy and Greece. Up to now the following 11 genera of the Moitessieriidae have been described: *Baldufa* Alba, Taruella, Prats, Guillén et Corbella, 2010, *Clameia* Boeters et Gittenberger, 1990, *Corseria* Boeters et Falkner, 2009, *Henrigirardia* Boeters et Falkner, 2003, *Moitessieria* Bourguignat, 1863, *Palacanthilhiopsis* Bernasoni, 1988, *Paladilhia* Bourguignat, 1865, *Palaospeum* Boeters, 1999, *Sardopaladilhia* Manganelli, Bodon, Cianfanelli, Talenti et Giusti, 1998, *Sorholia* Boeters et Falkner, 2009 and *Spiralix* Boeters, 1972. Remarkably, except for Greece, Moitessieriidae have not been previously recorded from the Balkans. The discovery of *Bosnidilhia vrelloana* n. gen. n. sp. fills this gap. Perhaps already SCHÜTT (1970: 308) dealt with species of the Moitessieriidae within the mentioned area, becoming aware of spiral microsculpture characteristic of representatives of this family, but he regarded these species as members of *Paladilhia*, i.e. *Bythiospeum*.

The discovery of *Bosnidilhia* n. gen. as a distinct genus has expanded our understanding of the structure of female genitalia of the Moitessieriidae. At least three types of the structure can be distinguished: one without receptaculum (*Corseria*, *Moitessieria*, *Sorholia* and *Spiralix*), another with the receptaculum branching off the renal oviduct close to the bursa pedunculus (*Palaospeum*), and a third one with the receptaculum

carried by the bursa (*Bosnidilhia* n. gen., *Clameia*, *Palacanthilhiopsis*, *Paladilhia* and *Sardopaladilhia*).

In their appearance the shells of *Bosnidilhia vrelloana* n. gen. n. sp. are similar to those of species of other genera, represented between Italy and Greece, though these genera belong to the Hydrobiidae: *Bythiospeum* Bourguignat, 1882, *Lanzaia* Brusina, 1906, *Plagigeyeria* Tomlin, 1930 and *Saxurinator* Schütt, 1960. However, whereas in the Hydrobiidae the gonopericardial duct is present and the intestine surrounds the style sac closely, in the Moitessieriidae the duct is absent and the intestine runs toward the mantle cavity wall before surrounding the style sac. Furthermore, whereas females of *Bosnidilhia* n. gen. have no distal receptaculum (RS1), in females of species of the above-mentioned four genera the distal receptaculum is present (*Bythiospeum heldii* – BOETERS 2002: 27, fig. 8; *Lanzaia vjetrenicae* – BOLE 1970: 103, fig. 7A2; *Lanzaia bosniaca* – RADOMAN 1983: 99, fig. 54; *Plagigeyeria montenegrina* – BOLE 1970: 103, fig. 7C2, and RADOMAN 1983: 99, fig. 55; *Saxurinator sketi* – BOLE 1970: 103, fig. 7B2).

At present *Paladilhia* Pavlovic, 1913 is regarded as a junior synonym of *Bythiospeum* (cf. HAASE 1995). Furthermore, *Iglica* A. J. Wagner, 1928 has not yet been properly redefined. *I. gratulabunda* A. J. Wagner, 1910, the type species of the genus, was described from deposits of the river Mürz in Austria (Steiermark), however it has never been recollected and in all likelihood belongs to *Bythiospeum* (REISCHÜTZ 1988: 69; compare the syntype figured by BOETERS 1971: 173, figs 14a–b).

ISLAMIA RADOMAN, 1973

Species of *Islamia* Radoman, 1973 are distributed from Spain to Greece. They inhabit subterranean waters and sometimes also outflows of springs downstream of their emergence, with the exception of *I. graeca* and *I. trichoniana* which live in lakes. Since 1973 our knowledge of *Islamia* has been remarkably expanded as several new species of *Islamia* have been described, especially from Spain, France and Italy. This improved knowledge has revealed that RADOMAN's approach to distinguishing species of *Islamia* on the basis of the characters of their male copulatory organs is often quite useful. Nevertheless, RADOMAN's (1983: 124) assumption that the male copulatory organ with the basal lamella, as in *I. dmitroviciana* n. sp., is characteristic of the genus, is not true, as demonstrated by the example of *I. ruffoi*.

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