

**A new Hydrobiidae species of the subterranean waters of Friuli  
(NE. Italy) (Gastropoda Prosobranchia)**

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"*Iglica*" *giustii* n. sp. is described from debris of the Isonzo River. The taxonomic position of the new species is discussed in detail, although attribution to the genus *Iglica* is uncertain due to lack of anatomical details. The presence of other stygobiont Hydrobiidae in Isonzo R. debris is also recorded. Some are new or recently reported for Italy: "*Iglica*" *hauffeni* (Brusina, 1886), *Hauffenia* (*Neohoratia*) *subpiscinalis* (Kuščer, 1932) and *Hadziella diminuta* Bole, 1961.

Key words: Gastropoda, Prosobranchia, Hydrobiidae, *Iglica*, taxonomy, stygobiont snails, Italy.

INTRODUCTION

Research on freshwater molluscs, especially stygobiont Hydrobiidae, has been underway for several years in the Friuli area (NE. Italy), for the purpose of revising and defining their distribution and taxonomy. Collections have been made in the sediment of karst cavities and springs, and even in the debris of rivers and streams. Debris not only contains shells of species living in springs and the underground water courses supplying the hydrographic network upstream, but also the remains of molluscs living in the aquifers and interstitial waters of the Friuli plane. Similar researches have been fruitful in the past: Pollonera (1886, 1898) discovered the first stygobiont Hydrobiidae in Friuli in the debris of river beds.

Some of our records have already been published by Pezzoli (1988). Together with these species found in the debris of the lower Isonzo River there were several highly characteristic shells that do not meet the description of known species. These shells constitute a new species close to the genus *Iglica* Wagner, 1927. Unfortunately we were unable to identify the exact site of origin of the shells and to obtain complete specimens of the soft parts. In the absence of more definite anatomical data, we doubtfully place the new entity in the genus *Iglica*. All species usually assigned to this genus have only been described on the basis of shell characters; their anatomical structure is still completely unknown.

A NEW SPECIES

**"*Iglica*" *giustii* n. sp. (figs. 2-3)**

Description. — Shell very small, elongated conical, turreted, sometimes fusiform with slightly obtuse apex, glassy and colourless when fresh (fig. 2). Spire consisting of 5.5-7.0 slightly convex whorls, the last half to three-fifths of the total shell length. Sutures shallow. Aperture pyriform, slightly oblique, clearly detached from the wall of the last

whorl, about one quarter of the total length of the shell. Peristome continuous, flared and very thick; external margin slightly sinuous above. Protoconch surface with fine pitted microsculpture (fig. 3B); teleoconch surface with fine, slightly irregular growth lines, some marking arrests in growth (fig. 3C). Dimensions of the shell: see table 1.

	range	mean $\pm$ $\sigma$	N
shell height (H)	3.47-5.39 mm	4.24 $\pm$ 0.60 mm	12
shell diameter (D)	1.23-1.65 mm	1.43 $\pm$ 0.13 mm	12
height of aperture (h)	1.00-1.36 mm	1.18 $\pm$ 0.12 mm	12
diameter of aperture (d)	0.79-1.18 mm	0.94 $\pm$ 0.12 mm	12
H/D ratio	2.73-3.33	2.97 $\pm$ 0.22	12

Table 1 - Dimensions of the shell of "*Iglica*" *giustii* n. sp.

Operculum. — Unknown.

Anatomical characters. — One of the shells found has traces of the animal in the apical whorls. Pigment specks are visible on the wall of the visceral sac, as in most underground water Hydrobiidae.

Type locality. — Type material sorted from debris of the Isonzo River near Papariano, at the junction with the tributary Torre (Municipality of Fiumicello; Province of Udine); UTM references: 33T UL 77 74.

Type series. — Holotype (fig. 2A). A shell from the type locality, M.M. Giovannelli leg. 19.6.1991; kept in the malacological collection of the Museo Friulano di Storia Naturale in Udine. Fourteen paratypes (figs. 2B-H and 3) from debris of the Isonzo River near Papariano, at the junction with the tributary Torre (Municipality of Fiumicello; Province of Udine), UTM references: 33T UL 77 74, M. Bodon leg. 21.9.1983 (1 shell + 2 juvenile shells); M. Bodon & M.M. Giovannelli leg. 21.7.1989 (1 shell); M.M. Giovannelli leg. 19.6.1991 (7 shells); debris of the Isonzo River 800 m north-east of Giaron, Fiumicello (Municipality of San Canzian d'Isonzo; Province of Gorizia), UTM references: 33T UL 78 72, M. Bodon leg. 31.3.1991 (1 juvenile shell); debris of the Isonzo River, east of Isola Morosini (Municipality of San Canzian d'Isonzo; Province of Gorizia), UTM references: 33T UL 81 69, M. Bodon leg. 31.3.1991 (2 shells). Material kept in the Museo Friulano di Storia Naturale in Udine, in the M. Bodon collection in Genoa, in the M. Sosso collection in Genoa, and in the F. Giusti collection at the Dipartimento di Biologia Evolutiva of the Università di Siena, Italy.

Distribution (fig. 1). — Available specimens of "*Iglica*" *giustii* n. sp. were sorted from debris of the Isonzo River collected in three localities. It was not possible to identify with certainty the area of origin, though it seems to be near the junction of the Torre and the Isonzo Rivers (fig. 1). The Torre River flows underground from Zompitta across the high plane, emerging in several places just before it joins the Isonzo. Investigation of several of these places has so far been negative. The species almost certainly inhabits the aquifers and interstitial waters of the Friuli plane.

Origin of the name. — The new species is dedicated to Prof. Folco Giusti as a token of friendship, and in recognition of his invaluable teaching and our fruitful collaboration.

Remarks. — European Hydrobiidae from subterranean waters having an elongated conical or turreted shell have been assigned to many different genera. Only a few, however, are anatomically well known. The soft parts of many taxa are completely

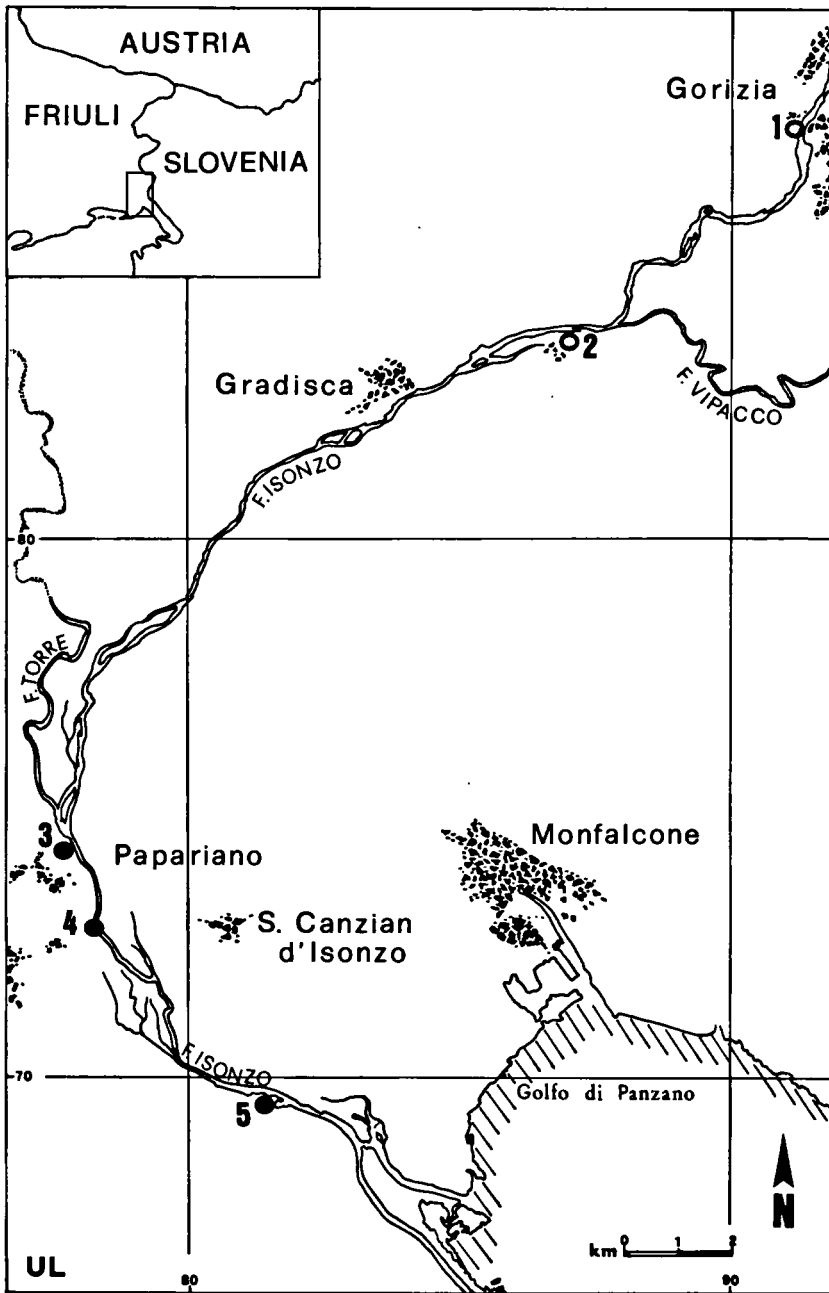


Fig. 1. Map of the study area. The dots indicate the stations in which "*Iglica*" *giustii* n. sp. was collected; the empty circles indicate the other sampling stations.

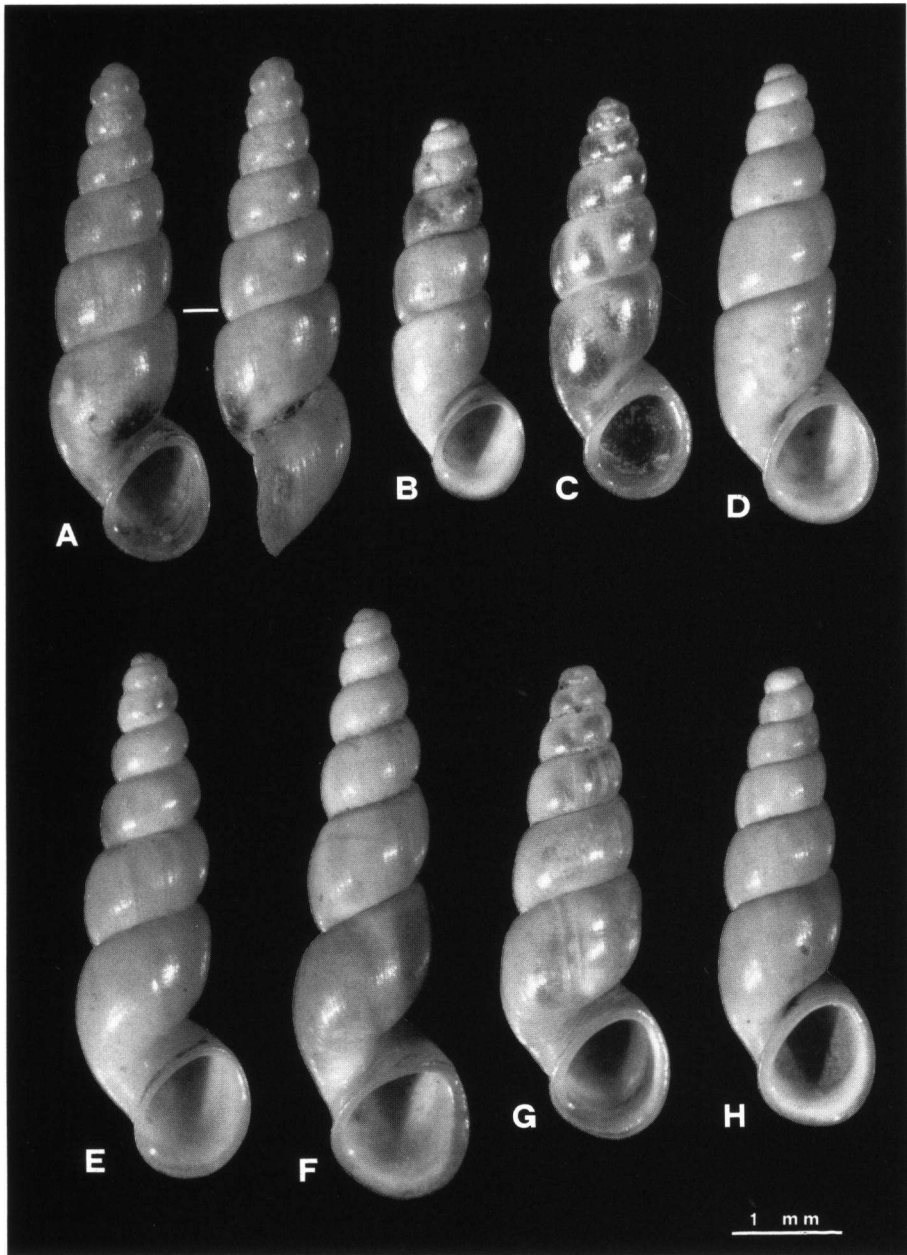


Fig. 2. "*Iglica*" *giustii* n. sp. collected in debris of the Isonzo River near Papariano (Fiumicello, Udine), M.M. Giovannelli leg. 19.6.1991, A: holotype, Museo Friulano di Storia Naturale, Udine; B-H: paratypes in M. Bodon collection, Genoa.

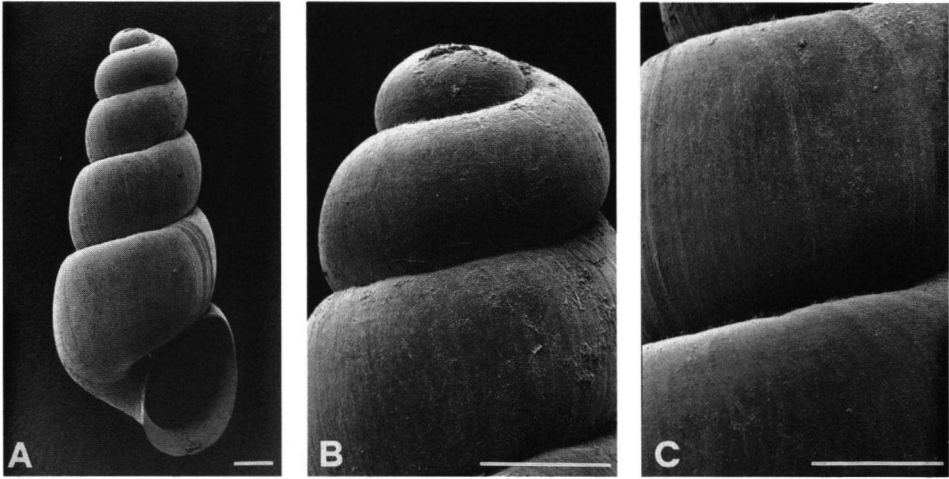


Fig. 3. "*Iglica*" *giustii* n. sp. collected in debris of the Isonzo River near Papariano (Fiumicello, Udine); SEM photographs of a young shell (A) and magnification of the protoconch and first whorls (B) and third and fourth whorls (C); F. Giusti collection, Siena. Note fine pitted microsculpture visible at high magnification on the protoconch, whereas the successive whorls only show fine radial growth lines. Scale bars 200  $\mu$ m.

unknown. This means that supraspecific classification is highly uncertain with inconsistencies between different authors.

If we exclude taxa with species having shells with clear radial or spiral microsculpture, species with elongated conical or turreted shells occur in the following genera: *Anagastina* Radoman, 1978; *Baglivia* Brusina, 1892; *Bythiospeum* Bourguignat, 1882; *Cilgia* Schütt, 1968; *Iglica* Wagner, 1927; *Mervicia* Bole, 1967; *Micromelania* Brusina, 1874; *Phreatica* Velkovrh, 1970, and *Paladilhia* Bourguignat, 1865 (according to the nomenclatural and systematic account of Bole & Velkovrh, 1986).

The genus *Anagastina* Radoman, 1978 (type species: *Anagasta vidrovani* Radoman, 1973), includes several species of Dalmatia and Montenegro (Radoman, 1983; Bole & Velkovrh, 1986), quite different from the one described here by virtue of more convex whorls and a thin peristome.

*Cilgia* Schütt, 1968 (type species: *Sexurinator dalmaticus* Schütt, 1961), contains only the type species, from Dalmatia, with convex angulate whorls.

Also *Mervicia* Bole, 1967 (type species: *Mervicia eximia* Bole, 1967), contains only the type species from Slovenia. It is small, cylindrical with a characteristic aperture having a rectilinear columellar margin, sharply angled above. A species from the Greek islands, *Mervicia kirea* Boeters, 1991, was recently assigned to this genus. It is cylindrical but with a poorly characterized aperture detached from the last whorl, such as to render doubtful its attribution to this genus.

In the genus *Phreatica* Velkovrh, 1970 (type species: *Phreatica bolei* Velkovrh, 1970), the shell is also small and cylindrical with a peristome well introflected near its upper insertion. The genus contains only the type species from Friuli.

*Micromelania* Brusina, 1874 (type species: *Micromelania cerithiopsis* Brusina, 1874), and *Baglivia* Brusina, 1892 (type species: *Baglivia rugosula* Brusina, 1892), were described from

the Balkan Peninsula as Tertiary brackish water species from *Congeria* layers. Classification of recent subterranean aquatic forms in these two genera is highly uncertain. A subterranean aquatic species of Macedonia with a narrow elliptical aperture, *Micromelania relicta* Kuščer, 1936, was assigned to the former by Kuščer (1936). *Baglivia* (?) *karamani* Kuščer, 1936, from Macedonia and *Bythiospeum*? *tellinii* Pollonera, 1886, from Friuli were assigned to the latter (see Bole & Velkovrh, 1986). The second of these species was doubtfully assigned to the genus *Iglica* by Giusti & Pezzoli (1980, 1982) and in the present note (see below). *B.* (?) *karamani* has a rather short spire whereas that of "*Iglica*" *tellinii* is extremely elongated. These two species both have an aperture that is markedly detached from the last whorl, a character typical of the genus *Baglivia*, although in fossil species the shell is generally of a different form (see Brusina, 1892; 1902: pl. 10 figs. 30-50).

*Paladilhia* Bourguignat, 1865 (type species: *Paladilhia pleurotoma* Bourguignat, 1865), includes a few species from France. The type species has an aperture with a peristome having a clear introflexion on the upper margin (see Germain, 1931).

*Bythiospeum* Bourguignat, 1882 (type species: *Paludina pellucida* Seckendorf, 1846), includes many species. The type species is found in Germany. Others living in France, Switzerland and Germany, are anatomically well known and seem to constitute a homogeneous group. The shell is variously elongated, often abbreviated, and the aperture is always juxtaposed to the wall of the last whorl (see Bolling, 1966; Zilch, 1970; Bernasconi, 1972, 1990). Several taxa from northern Italy were recently assigned to *Bythiospeum*. Anatomical data of these species are scarce (Giusti & Pezzoli, 1980, 1982) and they have a shell of variable appearance and form, the exact taxonomical position of which requires further investigation. *Paladilhiaopsis* Pavlović, 1913 (type species: *Paladilhia robiciana* Clessin, 1882) is similar to *Bythiospeum* and is sometimes regarded as synonymous (Giusti & Pezzoli, 1982), sometimes as a subgenus (Bernasconi, 1990) and sometimes as a distinct genus (Bole & Velkovrh, 1986). This taxon includes mostly eastern European species. The type species, however, is characterized by spiral microsculpture of the shell surface (Pezzoli & Giusti, 1976). Many species have been included in this group, especially eastern forms and those from Austria and the Balkans (Reischütz, 1981; Bole & Velkovrh, 1986). They are generally not very elongated (Fuchs, 1925, 1929; Wagner, 1927; Schütt, 1970; Stojaspal, 1978; Bole & Velkovrh, 1987) and are more similar to *Bythiospeum*.

Species with a very elongated shell and sometimes with a peristome just detached from the last whorl have been assigned to *Iglica* Wagner, 1927 (type species: *Vitrella gratulabunda* Wagner, 1910) (Bole & Velkovrh, 1986; Schütt, 1975). They are therefore closer to the new species described here. The anatomy of the type species from Austria has never been described so that the genus is still undefined. Bole (1961) published the anatomy of *Iglica matiasici* Bole, 1961, from Montenegro, a species later assigned by Radoman (1978, 1983) to the genus *Anagastina*, while Boeters (1971) and Pezzoli & Giusti (1980) published the anatomy of *Iglica pezzolii* Boeters, 1971, a species from Piedmont, the generic classification of which is highly controversial (Schütt, 1975; Giusti & Pezzoli, 1982; Pezzoli, 1988; Bole & Velkovrh, 1986). Radoman (1983) published partial anatomical data of *Iglica luxurians* (Kuščer, 1932) from Slovenia. All the species studied anatomically differ substantially in shell characters from the type species. Preliminary anatomical data on several species assigned to the genus *Iglica* suggest that the genus, as understood today, does not represent a natural taxon as it includes forms that are only apparently similar because of their variably elongated shell,

but profoundly different in other important shell and anatomical characters. The assignment of certain species with shells that are only more cylindrical on average, to the subgenus *Rhaphica* Schütt, 1975 (type species: *Iglica bagliviaeformis*, Schütt, 1970), seems quite arbitrary (see Giusti & Pezzoli, 1980). None of these species is known anatomically and to judge from Schütt's drawings, their shell characters are quite varied.

It is evident from the above concise descriptions that the new species described here is close to certain of the species assigned to the genus *Bythiospeum* and those included in the genus *Iglica*. The new species is different from species with elongated conical shells belonging to the fauna of Italian underground waters and assigned to the genus *Bythiospeum* (see Giusti & Pezzoli, 1980, 1982) by virtue of its much larger size. "*Bythiospeum*" *fabrianensis* (Pezzoli, 1969) from the Marches, apparently the closest taxon, has a less elongated shell with a larger, more expanded last whorl (Pezzoli, 1969, figs. 5-7; Giusti & Pezzoli, 1980, fig. 17B).

In the absence of anatomical data, the following analysis indicates that the most likely solution to the problem of the supraspecific taxonomy of the new Friuli species is to propose its inclusion in the genus *Iglica*. Its shell characters (form cylindrical elongated conical, peristome thickened and flared with external margin slightly sinuous near upper insertion) are in substantial agreement with the characters of the type species *I. gratulabunda*, that often also has a peristome just detached from the last whorl. However the much larger size (height of *I. gratulabunda* about 2 mm, new species about 4 mm on average), the thicker peristome, the more detached and more pyriform aperture and the more elongated shell confirm "*I.*" *giustii* n. sp. as a separate species. These characters are distinctive in relation to all the other forms assigned to this genus and known from Friuli and the western Balkans: *I. absoloni* (Wagner, 1914), *I. elongata* Kuščer, 1933, *I. forumjuliana* (Pollonera, 1886) (= *I. gratulabunda edlaueri* Wagner, 1927: see Schütt, 1975; Giusti & Pezzoli, 1980), *I. gracilis* (Clessin, 1882), *I. hauffeni* (Brusina, 1886), *I. langhofferi* Wagner, 1927, *I. luxurians* Kuščer, 1932, *I. bagliviaeformis* Schütt, 1970, *I. bosnica* Schütt, 1975, *I. illyrica* Schütt, 1975; in Bulgaria: *I. acicularis* Angelov, 1959; on the Greek islands: *I. maasseni* Schütt, 1980, *I. sidariensis* Schütt, 1980; in Morocco: *I. seyadi* Backhuys & Boeters, 1974 (see Bole & Velkovrh, 1986; Schütt, 1975, 1980; Backhuys & Boeters, 1974). Finally, the aperture less detached from the last whorl, the markedly thickened peristome and the more conical-flared form of the spire distinguish it from "*Iglica*" *tellinii* (Pollonera, 1886).

#### OTHER STYGOBIONT HYDROBIIIDAE FROM SUBTERRANEAN WATERS OF THE ISONZO PLAIN

Many other stygobiont Hydrobiidae besides the one described above were collected in debris of the Isonzo River (for collection sites see appendix). The lower part of the Isonzo River was found to have more species and a greater abundance of material. Stations 3 and 5 were investigated more extensively.

"*Iglica*" *tellinii* (Pollonera, 1886) (figs. 4 A-C)

The position of this taxon is uncertain as it has never been studied anatomically. It is quite rare but was found in all stations of the lower part of the Isonzo, below the confluence with the Torre (Stations 3, 4, 5). The known distribution includes only the valley of the Natisone River, where the species lives both in the middle part in Italian territory and in the upper part in Slovenian territory (Schütt, 1975; Giusti & Pezzoli, 1980; Pezzoli, 1988). The doubtful record of the springs of Lisert near Monfalcone

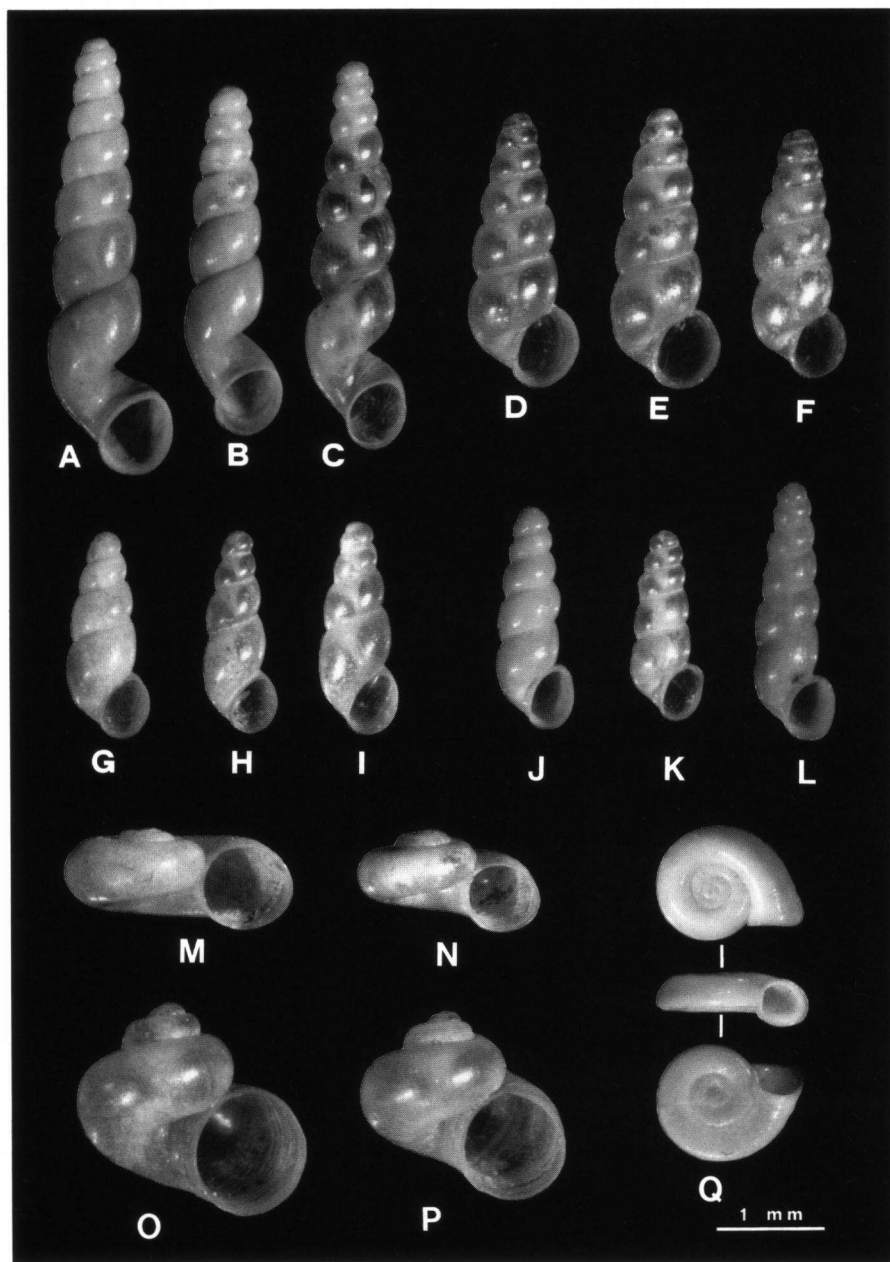


Fig. 4. Other stygobiont Hydrobiidae collected in debris of the Isonzo River near Papariano (Fiumicello, Udine), M. Bodon leg. 21.9.1983 (Q), M.M. Giovannelli leg. 19.6.1991 (D-I, M, N), and east of Isola Morosini (San Canzian d'Isonzo, Gorizia), M. Bodon leg. 31.3.1991 (A-C, J-L, O, P); Museo Friulano di Storia Naturale, Udine. A-C: "*Iglica*" *tellini* (Pollonera, 1886); D-F: "*Iglica*" *forumjuliana* (Pollonera, 1886); G-I: "*Iglica*" *hauffeni* (Brusina, 1886); J-L: *Phreatica bolei* Velkovrh, 1970; M-N: *Hauffenia* (*Hauffenia*) *tellini* (Pollonera, 1898); O-P: *Hauffenia* (*Neohoratia*) *subpiscinalis* (Kuščer, 1932); Q: *Hadziella diminuta* Bole, 1961.



(Station 97 in Pezzoli, 1988) requires confirmation as it is based on a single juvenile shell.

"*Iglica*" *forumjuliana* (Pollonera, 1886) (figs. 4 D-F)

The generic attribution of this species is also uncertain and under revision. Recent anatomical studies (unpublished data) suggest, however, that it is not synonymous with *Lartetia concii* Allegretti, 1944 (see Pezzoli & Giusti, 1980). The distribution of "*I.*" *forumjuliana* includes only the eastern part of Friuli-Venezia Giulia in Italy, extending to southwest Slovenia, Istria and the coast of Croatia (Schütt, 1975). It is abundant in the Isonzo in all stations below Gorizia (Stations 2, 3, 4, 5).

"*Iglica*" *hauffeni* (Brusina, 1886) (figs. 4 G-I)

This species is only known on the basis of its shell characters, so that its position in the genus *Iglica* is hypothetical. It is easily distinguished from other species by virtue of the greater height of its last whorl and its simple peristome, the external margin of which is not sinuous. It was recently reported in Italy (Pezzoli, 1988), where it is known only from small numbers in a station in the lower Natisone valley and in the Isonzo (Stations 2, 3, 4, 5). Distribution includes northwest Slovenia (Schütt, 1975).

*Phreatica bolei* Velkovrh, 1970 (figs. 4 J-L)

This species is endemic to Friuli. It belongs to a monotypic genus defined on anatomical characters. It is distributed in various tributaries of the Isonzo, in the Torre and Cornappo valleys (Velkovrh, 1970; Pezzoli, 1988), in the Iudrio valley and in the Tagliamento plain (unpublished data). In the Isonzo it has only been found in small numbers in Stations 3 and 5.

*Hauffenia* (*Hauffenia*) *tellinii* (Pollonera, 1898) (figs. 4 M-N)

Recently revised (unpublished data), this species is one of the most widespread stygobiont Hydrobiidae in Friuli-Venezia Giulia and is also present in the western sector (Pezzoli, 1988). Many specimens still with the operculum with its characteristic corneous hook have made it possible to confirm its attribution to this species. It was found abundantly in all the stations along the Isonzo.

*Hauffenia* (*Neohoratia*) *subpiscinalis* (Kuščer, 1932) (figs. 4 O-P)

This species was also revised recently (unpublished data) and has been reported in Italian territory only in eastern Friuli and in the Carso (Pezzoli, 1988). A small number of specimens was found in the lower stations of the Isonzo (Stations 3, 4, 5). The report of *Islamia* (?) sp. by Pezzoli (1988) must have been this species in his Stations 99/100 and *H. (H.) tellinii* in his Station 78. Examination of many shells and anatomical studies have enabled certain identification of the former specimens that seemed to resemble species of the genus *Islamia*.

*Hadziella diminuta* Bole, 1961 (fig. 4 Q)

Described by Bole (1961) as a subspecies of *H. ephippiostoma* Kuščer, 1932, it was recently proposed as a species in its own right by Bole & Velkovrh (1986). With respect to *H. anti* Schütt, 1960 (= *H. ephippiostoma* sensu Pezzoli, 1974, 1988; Giusti & Pezzoli, 1980), a species found in various springs in eastern Friuli, the shell of *H. diminuta*, besides being smaller, has an obtuse carina on the basal part of the last whorl, a less tightly winding spire and a horizontally wider aperture. However, anatomical study is required to check the value of the shell characters and to permit a clearer specific diagnosis of the Italian *Hadziella*. *H. diminuta* is known from central northern Slovenia, in interstitial waters of the Sava near Ljubljana and of the Savinja near Celje, and in some thermal springs (Bole & Velkovrh, 1986). In Friuli a few specimens have been found in the Isonzo in Stations 2, 3 and 5.

*Belgrandiella pupula* (Westerlund, 1886) and *Bythinella schmidti* (Küster, 1855) are among the most common creno-stygobionts in thanatocoenoses of the Isonzo. Strict crenobionts include *Sadleriana fluminensis* (Küster, 1852).

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#### APPENDIX

Debris thanatocoenoses of the Isonzo River were investigated in the following sites (fig. 1):

1. Isonzo at Gorizia (Municipality of Gorizia; Province of Gorizia); UTM coordinates: 33T UL 91 87;
2. Isonzo near Peteano, Savogna, downstream from confluence with the Vipacco River (Municipality of Sagrado; Province of Gorizia); UTM coordinates: 33T UL 87 83;
3. Isonzo near Papariano at confluence with the Torre River (Municipality of Fiumicello; Province of Udine); UTM coordinates: 33T UL 77 74;
4. Isonzo 800 m north-east of Giaron, Fiumicello (Municipality of San Canzian d'Isonzo; Province of Gorizia); UTM coordinates: 33T UL 78 72;
5. Isonzo east of Isola Morosini (Municipality of San Canzian d'Isonzo; Province of Gorizia); UTM coordinates: 33T UL 81 69.

#### REFERENCES

- BACKHUYS, W., & H.D. BOETERS, 1974. Zur Kenntnis marokkanischer Binnenmollusken. I. — Arch. Molluskenk. 104: 107-114.
- BERNASCONI, R., 1972. Les Hydrobiidae (Mollusques Gastéropodes) cavernicoles de Suisse et des régions limitrophes. III. Essai de révision des Bythiospeum Bourguignat. — Ann. Spéleol. 27: 761-772.
- , 1990. Revision of the genus *Bythiospeum* (Mollusca Prosobranchia Hydrobiidae) of France, Switzerland and Germany: 1-44. Bern.
- BOETERS, H.D., 1971. *Iglica pezzoli* n. sp. und ein neues Merkmal zur Unterscheidung zwischen *Bythiospeum* und *Paladilhia* (Prosobranchia: Hydrobiidae). — Arch. Molluskenk. 101: 169-173.
- , 1991. *Mervicia kirea* spec. nov. aus Griechenland (Gastropoda Prosobranchia: Hydrobiidae). — Basteria 55: 41-43.
- BOLE, J., 1961. Nove Hidrobide (Gastropoda) iz podzemeljskih voda zahodnega balkana. — Biol. Vestn. 9: 59-69.
- , 1967. Polzi iz freaticnih voda Jugoslavije. — Slovenka Akademija Znanosti in Umetnosti Razned za prirodoslovne in medicinske Vede Oddlek za prirodoslovne vede 10: 111-120.
- & F. VELKOVRH, 1986. Mollusca from continental subterranean aquatic habitats. In L. BOTOSA-NEANU, ed., *Stigofauna mundi. A faunistic, distributional and ecological synthesis of the world fauna inhabiting subterranean waters (including the marine interstitial)*: 177-208. Leiden.
- & —, 1987. Nove vrste podzemeljskih polzev Jugoslavije. — Slovenka Akademija Znanosti in Umetnosti Razned za prirodoslovne in medicinske Vede Oddlek za prirodoslovne vede 28: 69-83.

- BOLLING, W., 1966. Beiträge zur Problem des Genus *Bythiospeum* Bourguinat. (Mollusca-Hydrobiidae). — Ber. Naturf. Ges. Bamberg 40: 21-102.
- BRUSINA, S., 1892. Fauna fossile terziaria di Markuševac in Croatia. — Glasnik hravatskoga naravoslavnoga Druztva 7: 113-120.
- , 1902. Iconographia molluscorum fossilium in tellure tertiaria Hungariae, Croatiae, Slavoniae, Dalmatiae, Bosniae, Herzegovinae et Bulgariae inventorum: I-X, 30 pls. Agram.
- FUCHS, A., 1925. *Lartetia geyeri* nov. spec. — Arch. Molluskenk. 57: 282-284.
- , 1929. Beitrag zur Molluskenfauna Oberösterreichs. — Arch. Molluskenk. 61: 139-142.
- GERMAIN, L., 1931. Mollusques terrestres et fluviatiles. Deuxième partie. Faune de France 22: 478-897, IX-XIV.
- GIUSTI, F., & E. PEZZOLI, 1980. Gasteropodi 2. (Gastropoda: Prosobranchia: Hydrobioidea, Pyrguloidea). — Consiglio Nazionale delle Ricerche. Collana del progetto finalizzato "Promozione della qualità dell'ambiente". Pubblicazione AQ/1/47. Guide per il riconoscimento delle specie animali delle acque interne italiane 8: 1-67.
- & —, 1982. Notes on the small Hydrobioidea in Italian subterranean waters: catalogue, biogeography and some systematic problems. — Malacologia 22: 463-468.
- KUŠČER, L., 1936. Zur Kenntnis der Molluskenfauna von Süderbien und Montenegro, I. Beitrag. — Bull. Soc. sci. Skoplje. 5. Sect. Sci. Nat. 17: 101-104.
- PEZZOLI, E., 1969. Fauna malacologica di alcune sorgenti in provincia di Ancona (Marche). — Natura, Atti Soc. ital. Sci. nat. Mus. civ. Stor. nat. Milano 60: 199-210.
- , 1974. Segnalazione del genere *Hadziella* nelle Prealpi orientali italiane (Gastropoda Prosobranchia Horatiinae). — Natura, Atti Soc. ital. Sci. nat. Mus. civ. Stor. nat. Milano 65: 219-224.
- , 1988. I molluschi crenobionti e stigobionti presenti nell'Italia Settentrionale (Emilia Romagna compresa). Censimento delle stazioni ad oggi segnalate. — Mus. civ. Sci. nat. Brescia Monografie di Natura Bresciana 9: 1-151.
- & F. GIUSTI, 1976. *Lartetia cornucopia* De Stefani e *Lartetia virei* Locard, due specie sinonime dell'Italia centro-settentrionale, da ascrivere al genere *Paladilhopsis* Pavlović (Prosobranchia, Hydrobioidea). In: D. FRANCHINI, ed., Simposio sui molluschi terrestri e dulcicoli dell'Italia Settentrionale (Società Malacologica italiana. Lavori del Simposio tenuto a Mantova nei giorni 10 e 11 maggio 1975): 55-87. Mantova.
- & —, 1980. "*Lartetia*" *conci* Allegretti, 1944 e "*Paludestrina*" *forumjuliana* Pollonera, 1886, due specie sinonime dell'arco prealpino centro-orientale da ascrivere al genere *Paladilhopsis* Pavlović, 1913 ed il problema del genere *Iglica* in Italia (Prosobranchia, Hydrobioidea). — Boll. malacol. 16: 53-78.
- POLLONERA, C., 1886. Note malacologiche. I. Molluschi della Valle del Natisone (Friuli). — Bull. Soc. malacol. ital. 12: 204-223.
- , 1898. Intorno ad alcune conchiglie del Friuli. — Boll. Mus. Zool. Anat. comp. r. Univ. Torino 13 (334): 1-4.
- RADOMAN, P., 1978. Neue Vertreter der Gruppe Hydrobioidea von der Balkanhalbinsel. — Arch. Molluskenk. 109: 27-44.
- , 1983. Hydrobioidea a superfamily of Prosobranchia. I. Systematics. — Serb. Acad. Sci. Arts Monogr. Dep. Sci. 57: 1-256.
- REISCHÜTZ, P.L., 1981. Die rezenten Wasserschneckenarten Österreichs (Moll. Gastropoda). — Mitt. Abt. Zool. Landesmus. Joanneum 10: 127-133.
- , 1983. Beiträge zur Molluskenfauna Niederösterreichs 4. Neue Taxa niederösterreichischer Hydrobioidea (Gastropoda). — Malakol. Abh. Dresden 8: 149-154.
- SCHÜTT, H., 1961. Weitere neue Süßwasser-Höhlenschnecken aus Dalmatien. — Arch. Molluskenk. 90: 139-144.
- , 1970. Neue Formen höhlenbewohnender Hydrobiiden des Balkan und ihre Beziehungen zu *Paladilhopsis* Pavlović 1913. — Arch. Molluskenk. 100: 305-317.
- , 1975. Die Formen der Gattung *Iglica* A.J. Wagner. — Arch. Molluskenk. 106: 1-14.
- , 1980. Zur Kenntnis griechischer Hydrobiiden. — Arch. Molluskenk. 110: 115-149.
- STOJASPAL, F., 1978. Zwei neue Grundwasserschnecken aus dem Bärenloch bei Mixnitz (Steiermark). — Die Höhle 29: 87-90.

- VELKOVRH, F., 1970. Dve novi podzemeljski Hidrobiidi (Gastropoda). — Biol. Vestn. 18: 97-106.
- WAGNER, A., 1927. Studien zur Molluskenfauna der Balkanhalbinsel mit besonderer Berücksichtigung Bulgariens und Thraziens, nebst monographischer Bearbeitung einzelner Gruppen. — Prace zoologiczne Polskiego Panstwowego Muzeum Przyrodniczego 6: 263-399.
- ZILCH, A., 1970. Die Typen und Typoide des Naturmuseums Senckenberg, 45: Mollusca, Hydrobiidae (1): *Bythiospeum* Bourguignat. — Arch. Molluskenk. 100: 319-346.