

Two new species of the genus *Islamia* Radoman, 1973 (Gastropoda : Hydrobiidae) from the north of Spain

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Two new species of the genus *Islamia* are described from the autonomous communities of Cantabria and Asturias (north of Spain). This genus is currently represented in the Iberian Peninsula and the Balearic Islands by eight species and subspecies. The new species are compared with other congeneric species from which they differ in conchological characteristics.

Keywords: *Gastropoda*, *Hydrobiidae*, *Islamia*, new species.

Dues noves espècies del gènere *Islamia* (Gastropoda: Hydrobiidae) per al nord d'Espanya

Es descriuen dues noves espècies del gènere *Islamia* procedents de les comunitats autònomes de Cantàbria i Astúries (nord d'Espanya). Aquest gènere actualment està representat a la península Ibèrica i Balears per vuit espècies i subespècies. Les noves espècies es comparen amb altres espècies congenèriques, de les quals es diferencien per diversos caràcters conquiliològics.

Mots clau: *Gastropoda*, *Hydrobiidae*, *Islamia*, espècie nova.

Introduction

The genus *Islamia* Radoman, 1973 is represented in the Iberian Peninsula and Balearic Islands by eight species and subspecies (Bech, 1990; Boeters, 1988; Boeters & Rolán, 1988; Bertrand et al. 1999; Arconada & Ramos 2006; Boeters & Beckmann, 2007; Arconada & Rolán, 2011), which are distributed across most of this territory: *Islamia azarum* (Boeters & Rolán, 1988) is found in the north; in the northeast *Islamia globulus* (Bofill, 1909), *Islamia lagari* (Altimira, 1960) and *Islamia ateni* (Boeters, 1969); in the center, *Islamia pallida* Arconada & Ramos, 2006; in the south *Islamia henrici henrici* Arconada & Ramos, 2006 and *Islamia henrici giennensis* Arconada & Ramos, 2006; and finally, in the Balearic Islands *Islamia archeducis* Boeters & Beckmann, 2007 is found in Mallorca.

Two new species are here described from two different localities in the northwest of the peninsula, showing a sympatric distribution with *Islamia*

azarum, which has been described up to this date at eight localities around the center of Asturias and the northwestern most tip of Cantabria (Fig. 1).

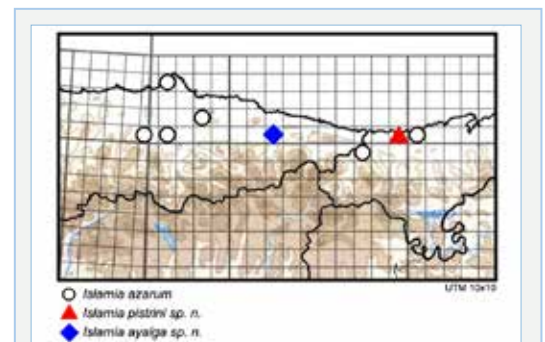


FIGURE 1. Map showing the known distribution of *Islamia azarum*, *Islamia pistrini* sp. n. and *Islamia ayalga* sp. n.

Mapa amb la distribució coneguda d'*Islamia azarum*, *Islamia pistrini* sp. n. i *Islamia ayalga* sp. n.

Material and Methods

The specimens analyzed in the present work were collected from two different karstic springs located in two different autonomous communities, Asturias and Cantabria, during the years 2016 and 2017. Shells were collected via the sieving of sediment taken from stream pools about 0.5 m deep. Despite several thorough samplings at both locations, no live specimens were found, only empty shells.

The sieves used for sorting the sediment were 5 mm, 2 mm, 1 mm and 0.5 mm mesh. Shells were thereafter separated under a stereomicroscope for their determination. They were cleaned with water using a small brush.

Abbreviations

- MZB: Museu de Ciències Naturals de Barcelona
- SEM: Scanning Electron Microscopy
- CJRC: Collection of Jesús Ruiz-Cobo
- CSQS: Collection of Sergio Quiñonero-Salgado
- CAA: Collection of Alvaro Alonso
- s: Shell

Systematics

Family HYDROBIIDAE Stimpson, 1865

Genus *Islamia* Radoman, 1973

Type species: *Islamia valvataeformis* (Möllen-dorff, 1873: 59) = *Horatia servaini* Bour-guignat, 1887 (by original designation)

***Islamia ayalga* sp. n.**

Fig 2, Fig 6B.

	SH	SW	PH	PW
MIN	1.39	1.35	0.78	0.68
MAX	1.56	1.55	1.06	0.81
AV	1.449	1.422	0.851	0.734
SD	0.054	0.056	0.271	0.233

TABLE 1. Measurements of the shell of *Islamia azarum* from Borondes, Asturias (Spain). MIN: minimum. MAX: maximum. AV: average. SD: standard deviation. SH: shell height. SW: shell wide. PH: peristome height. PW: peristome width. n=10

Mesures de la conquilla de *Islamia azarum* de Borondes, Asturias (Espanya) MIN: mínim. MAX: màxim. AV: mitjana. SD: desviació estàndard. SH: altura. SW: diàmetre. PH: altura de l'obertura. PW: amplada de l'obertura. n=10.

Type material

Holotype (Fig. 2) in MZB 2018-0507. Paratypes: 1 s in MZB 2018-0508, 2 s in CJRC, 4 s in CSQS and 2 s in CAA. (Fig. 6B).

Type locality

Cave (spring) of Caldueñín, Caldueñín, Llanes, Asturias (30TUP40), 175 m. (Fig.1 & Fig. 4A-B)

The locality is found in the village of Caldueñín, from which the name of the spring is derived, in the municipality of Llanes, on the north slope of the Sierra del Cuera mountains, near the bottom of a wide valley running parallel to the coastline. Despite the relative proximity of the sea, the mountains have steep slopes. The cave is located in a calcareous formation, directly associated with the karstic system of el Mazuco. In the west side of the cave, at the Vega del Cubo (spring of Hoyu las Bolugas), is located the source of the Bolugas stream, a tributary of the river Llastrias which, after a short surface stretch (about 1.7 Km), ends in the cave of Bolugo. Further east, inside the cave of Caldueñín (short in extension but very wide), the stream appears again on the surface for only a few meters, then disappears again, returning to the surface in the Cueva del Molín, which is the source of the Cortines River.

Etymology

The specific name refers to the Asturian word “ayalga”, a name given to a hidden treasure, or to the finding of a valuable object inside a cave.

	SH	SW	PH	PW
Holotype	1.48	1.44	0.78	0.66
MIN	1.22	1.23	0.71	0.62
MAX	1.52	1.45	0.84	0.71
AV	1.381	1.365	0.781	0.664
SD	0.093	0.077	0.050	0.033

TABLE 2. Measurements of the shell of *Islamia ayalga* sp. n. MIN: minimum. MAX: maximum. AV: average. SD: standard deviation. SH: shell height. SW: shell wide. PH: peristome height. PW: peristome width. n=10

Mesures de la conquilla de *Islamia ayalga* sp. n. MIN: mínim. MAX: màxim. AV: mitjana. SD: desviació estàndard. SH: altura. SW: diàmetre. PH: altura de l'obertura. PW: amplada de l'obertura. n=10

Description

Small shell, of 1.23 to 1.45 mm in diameter and 1.22 to 1.52 mm high, slightly higher than wide, trochiform, dextral, fragile, slightly brilliant and somewhat transparent. Protoconch with little more than one whorl with a nucleus of 160 μm and diameter of 420 μm . The surface is apparently smooth, but under high magnification a very faint microsculpture can be seen, formed by irregularly placed depressions (Fig. 2C-D) alternating with irregular shaped axial humps. Teleoconch of about 2.5 spire whorls, regularly convex and fast growing, showing a deep suture in between them. Smooth surface, but with abundant

orthocline or slightly prosocline growth striae, which are more evident near the suture. Aperture almost circular, not adhered to the previous whorl, and slightly ovoid in the upper part. Peristome continuous and narrow. Umbilicus narrow and slightly deep.

Dimensions

The holotype measures 1.48 mm high and 1.44 mm width. See Table 2 for further measurements.

Habitat

Stygobiotic. No live material was found, the shells were transported from the groundwater to the

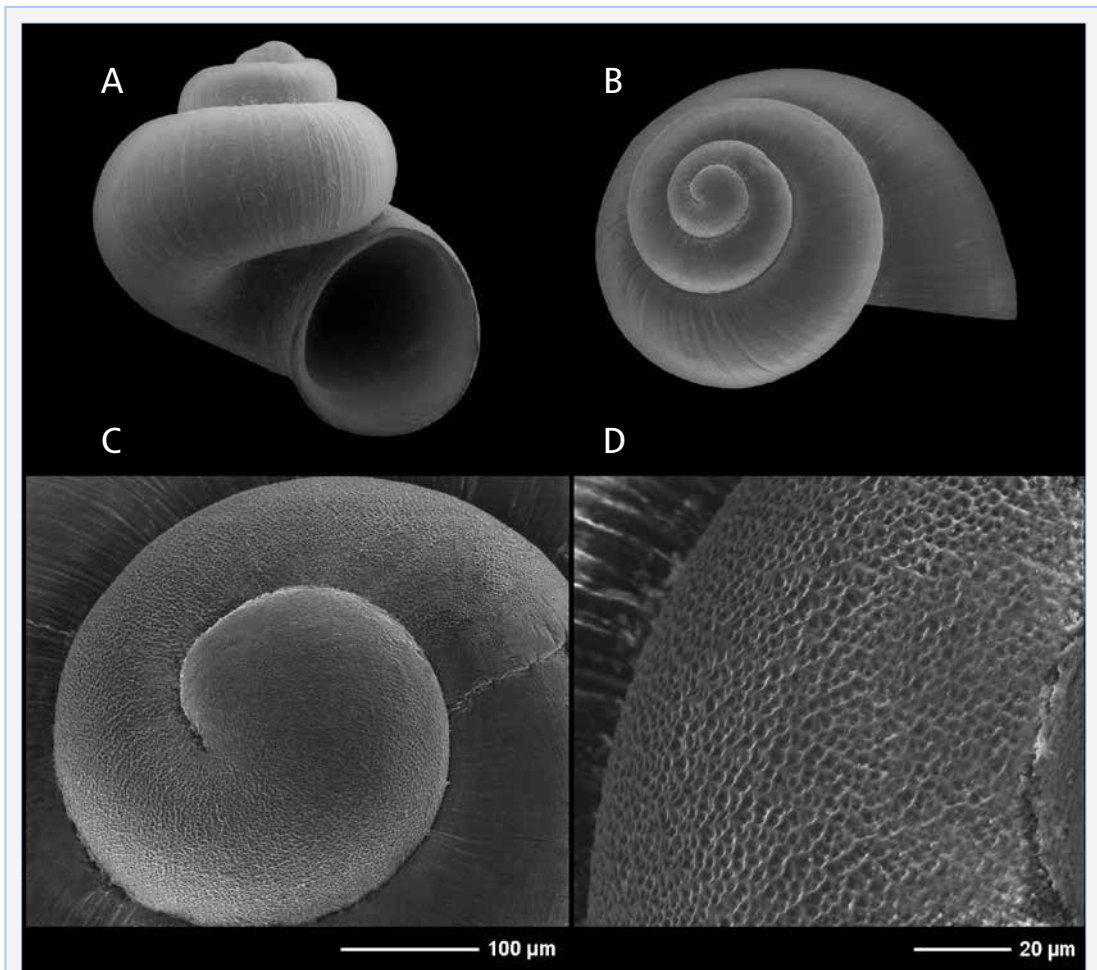


FIGURE 2. *Islamia ayalga* sp. n. Holotype. A-B: shell C-D: protoconch and detail of the microsculpture.

Islamia ayalga sp. n. Holotip. A-B: conquilla. C-D: protoconquilla i detall de la microescultura.

surface by the water current. No other stygobiotic mollusks were found in the sample.

Distribution

Only known from the type locality.

Remarks

This species can be differentiated from other similar species by these characteristics: *Islamia henrici henrici* and *Islamia henrici giennensis* have a much more visible peristome, and a less elevated shell; *Islamia pallida* has a less elevated shell and its aperture is more ovoid and adhered to the last whorl; A similar species in the area is *Islamia azarum*. Since its type locality has disappeared, samples from Borondes (second locality in the original description) where measured for comparison (see Table 1), showing that *azarum* is slightly larger (see Fig. 5), has a more globular shell and the last whorl is adhered to the previous one, the aperture is rounded and the umbilicus is slightly narrower. Furthermore its growth lines are more prosocline. (Fig. 6A).

Islamia pistrini sp. n. (see below) is more elevated and narrower, the umbilicus is narrower, the aperture is ovoid and has an angulation on its upper part; the growth lines are very much prosocline.

Islamia pistrini sp. n.

Fig. 3, Fig 6C.

Type material

Holotype (Fig. 3) in MZB 2018-0509. Paratypes: 2 s in MZB 2018-0510, 4 s in CJRC, 3 s in CSQS and 2 s in CAA (Fig. 6C)

Type locality

Spring of el Molino Viejo de Ruiseñada, Comillas, Cantabria (30TUP90). 25 m. (Fig. 1 & Fig. 4C-D). The name of the spring refers to the existence of the ruins of an old water mill. The spring emerges in the contact zone of the Patrocinio Formation (dendritic layers, with grey marls and sandstones) and the calcareous rocks of the San Esteban Formation, both from the Aptian. Part of the spring is nowadays under a concrete reservoir and canalized, but the water emerges at two different points, forming a

small brook that soon joins the stream of Ruiseñada. Its water emerges at about 12-13° C.

Etymology

The specific name derives from the Latin word for a mill, *pistrinum*, remarking the presence of an old mill that gives name to the type locality.

Description

Small shell, from 1.55 to 2.02 mm in diameter and 1.82 to 2.30 mm high, slightly higher than wide, dextral, and with about 3.5 spiral whorls. Protoconch diameter of 460 µm and 1.1 spire whorls, nucleus of 180 µm. Its surface is covered by microdepressions (Fig. 3D-E) with some irregular lines (Fig 3C). Teleoconch with about 2.2 convex whorls and marked suture, proximal area grooved, smooth surface, and strong prosocline growth striae.

Aperture higher than half of the shell height, slightly ovoid, continuous peristome, more convex and sharper in the external lip. The contact of the aperture and the previous whorl is minimal, showing a slight angle in the merge of the external lip with the upper columella. Aperture slightly thickened and uniformly curved, with everted edge towards the umbilicus, which is narrow and deep.

Dimensions

The holotype measures 1.93 mm high and 1.85 mm wide. See Table 3 for further measurements.

	SH	SW	PH	PW
Holotype	1.93	1.85	1.22	1.06
MIN	1.82	1.55	0.94	0.90
MAX	2.30	2.02	1.26	1.17
AV	1.971	1.762	1.133	1.002
SD	0.140	0.127	0.084	0.072

TABLE 3. Measurements of the shell of *Islamia pistrini* sp. n. MIN: minimum. MAX: maximum. AV: average. SD: standard deviation. SH: shell height. SW: shell wide. PH: peristome height. PW: peristome width. n=12.

Mesures de la conquilla d'*Islamia pistrini* sp. n. MIN: mínim. MAX: màxim. AV: mitjana. SD: desviació estàndard. SH: altura. SW: diàmetre. PH: altura de l'obertura. PW: amplada de l'obertura. n=12.

Habitat

Stygobiotic. No live material was found, the shells were transported from the groundwater to the surface by the water current. No other stygobiotic mollusks were found in the sample.

Distribution

Only known from the type locality.

Remarks

Islamia pistrini sp. n. can be differentiated from all the other members of the genus *Islamia* for its

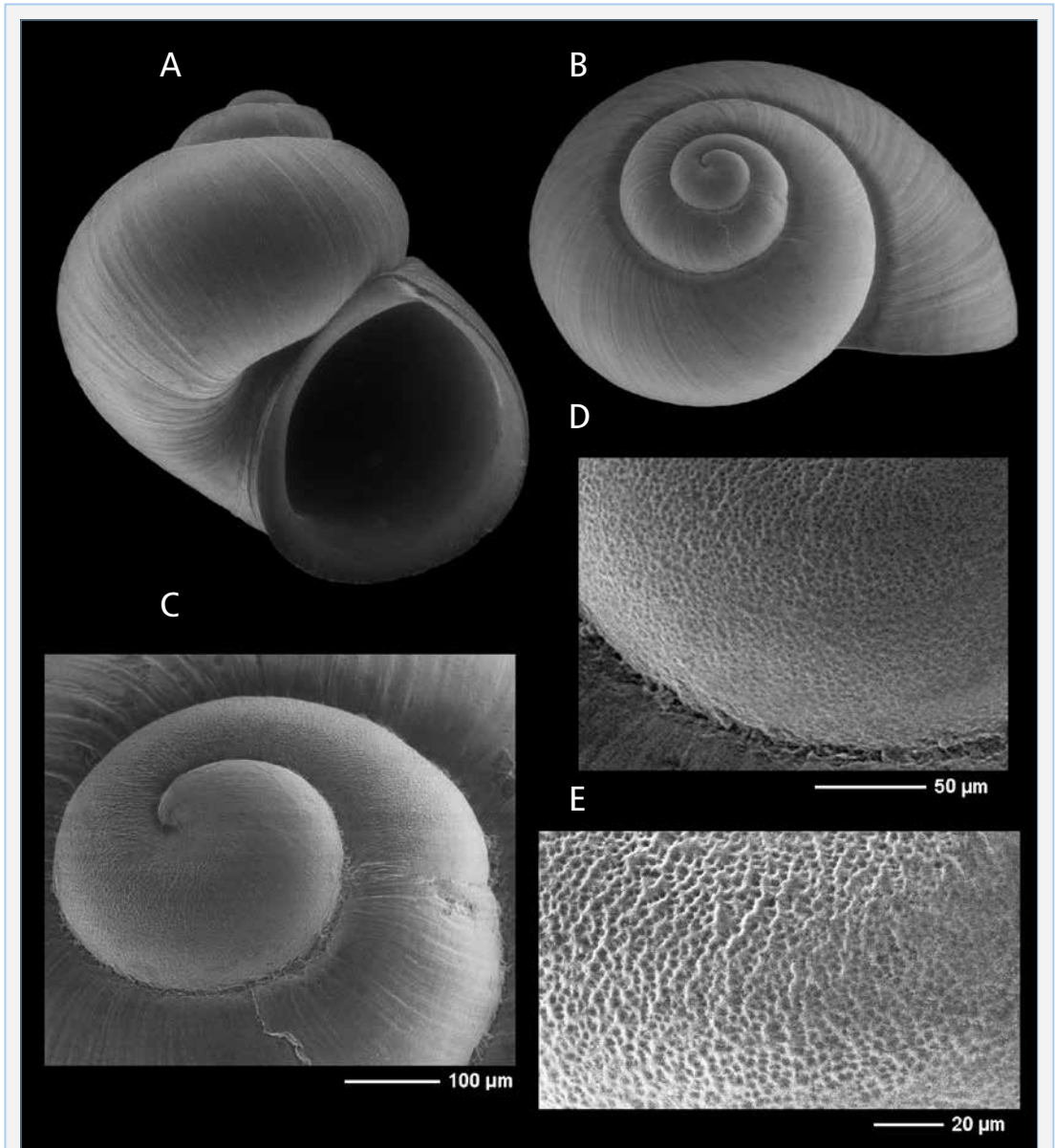


FIGURE 3. *Islamia pistrini* sp. n. Holotype. A-B: shell; C: protoconch and detail; D-E: protoconch and detail of the microsculpture.

Islamia pistrini sp. n. Holotip. A-B: conquilla; C: protoconquilla i detall; D-E: protoconquilla i detall de la microescultura.

conchological traits, particularly a narrow umbilicus ovoid aperture with an angulation on its upper part, with prosocline growth lines, and a shell that is almost as wide as high.

Islamia azarum has a shell which is wider, the umbilicus also being wider, the aperture is rounded and lacking any angulation on its upper part, the surface of contact of the aperture with the previous whorl is smaller and the growth lines are prosocline but less than in *I. pistrini* sp. n.

The nearest species in the area is *Islamia azarum*, which it is smaller (see Fig. 5).

Discussion

The new species described herein are included in the genus *Islamia* because they show clear differences with other similar genera: *Tarraconia* Ramos & Arconada, 2000 has a very distant distribution, and morphologically is characterized by more globular shells, circular aperture reinforced by a clear thickening, and last whorl with an overlapping area with the previous whorl; *Josefus* Arconada & Ramos, 2006 has a flattened shell; *Milesiana* Arconada & Ramos, 2006 has a thickening in the peristome, and also a flattened shape; *Boetersiella* Arconada & Ramos, 2001 shows a thicker inner lip, hiding the umbilicus almost completely; *Chondrobasis* Arconada & Ramos, 2001 has similar conchological traits to *Boetersiella*.



FIGURE 4. A-B: spring cave of Caldueñín, habitat of *Islamia ayalga* sp. n. C-D: spring of El Molino Viejo de Ruseñada, habitat of *Islamia pistrini* sp. n.

A-B: cova brollador de Caldueñín, hàbitat de *Islamia ayalga* sp. n. C-D: brollador del Molino Viejo de Ruseñada, hàbitat de *Islamia pistrini* sp. n.

On the other hand, all the mentioned genera are geographically very distant from the two new species. Only the genus *Islamia*, which also has representation in the south, center and east of the Iberian Peninsula, is located in the north, with two known species, also geographically very distant: *Islamia globulus* is present in Cataluña and Aragón (northeast peninsula), and *Islamia azarum* is present in Cantabria and Asturias, more or less in the same area as *Islamia pistrini* sp. n. and *Islamia ayalga* sp. n. (Fig. 1). Given all these reasons and their conchological similarities, we advocate for their inclusion in this genus.

With these two new species, there are 10 known species of the genus *Islamia* in Spain. The two new species overlap in distribution with *Islamia azarum*, cited in Asturias and Cantabria (Boeters & Rolán, 1988; Arconada & Rolán, 2011; Ríos et al. 2015). A

revision of the published record for this species is suggested, given the close proximity with the type locality of *Islamia pistrini* sp. n.

Regarding the conservation of the species here treated, it may be noted that *Islamia azarum* is already included in the “Red Book” of Spanish invertebrates (Arconada & Rolán, 2011) and considered “vulnerable” by the IUCN (Arconada, 2011).

In contrast, the two new species here described are both known from a single locality. In the case of *Islamia ayalga* sp. n., it is unlikely there will be any damage to the type locality, a well preserved cave with almost no human activity, and it may be present in the subterranean waters of Bolugas river and along the isolated Polje (karstic valley) that extends to the east. No specific conservation actions seem to

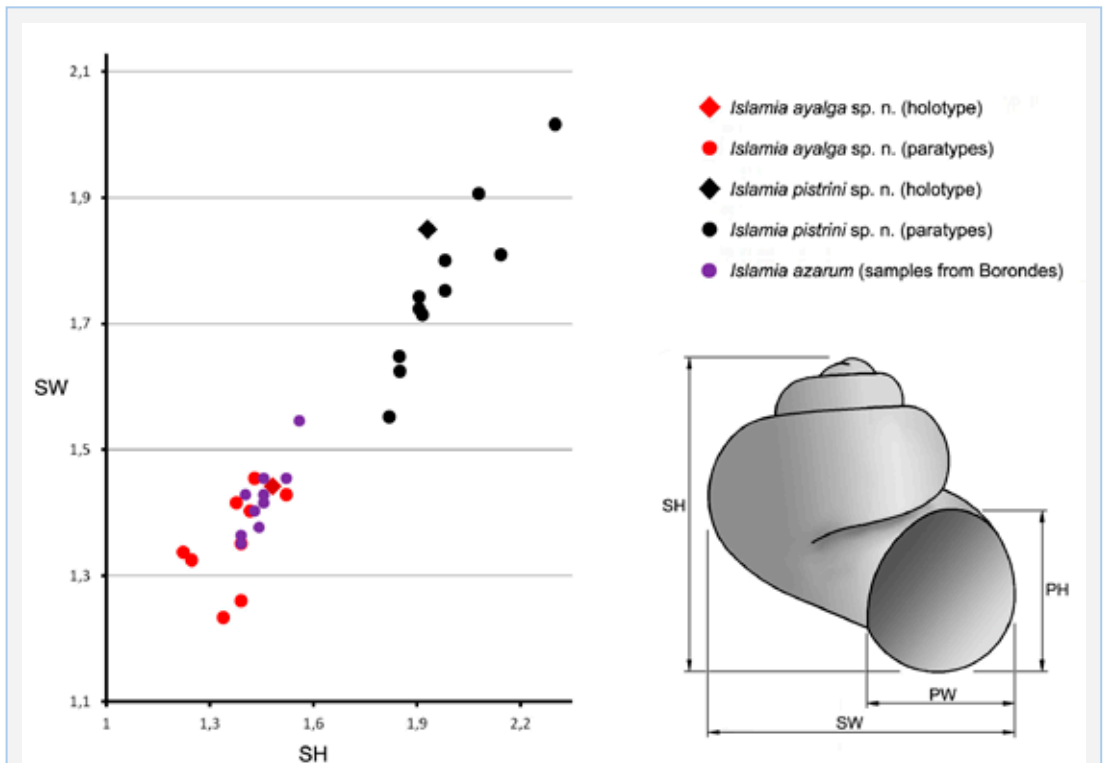


FIGURE 5. Shell dimensions and size comparison between *Islamia azarum*, *Islamia ayalga* sp. n. and *Islamia pistrini* sp. n.; SH: shell height. SW: shell wide. PH: peristome height. PW: peristome width.

Dimensions de la conquilla i comparació de mesures entre *Islamia azarum*, *Islamia ayalga* sp. n. i *Islamia pistrini* sp. n.; SH: altura. SW: diàmetre. PH: altura de l'obertura. PW: amplada de l'obertura.

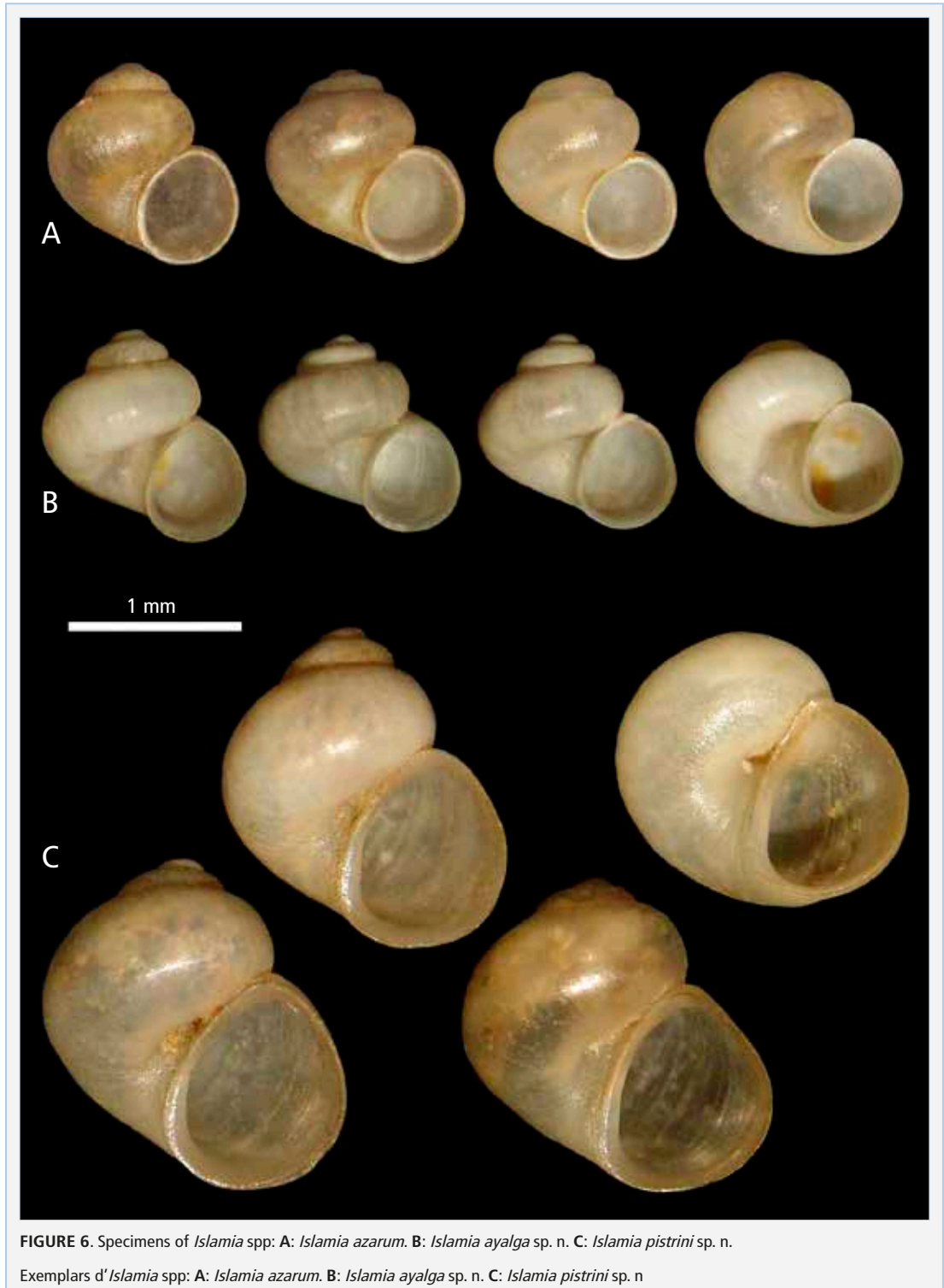


FIGURE 6. Specimens of *Islamia* spp: A: *Islamia azarum*. B: *Islamia ayalga* sp. n. C: *Islamia pistrini* sp. n.

Exemplars d' *Islamia* spp: A: *Islamia azarum*. B: *Islamia ayalga* sp. n. C: *Islamia pistrini* sp. n.

be needed but the species should be protected and included in a Red List to avoid any potential damage to the aquifer, which is the most likely threat. In the case of *Islamia pistrini* sp. n., it is only known from an already altered spring and in a much more populated area. In this case, not only should the species be protected and included in a Red List, but special care should be taken to avoid further alteration of the habitat, the mayor threats being water pollution from farming activities or the nearby limestone quarry and pipeline construction for human use of the water.

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