

Spiralix tuba (Gastropoda: Moitessieriidae) a new species from Spain

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A new species of the genus *Spiralix* is described from the Poble de Benifassà (Spain), which can be conchologically differentiated from the known congeneric species by having a smaller number of whorls and a wider aperture.

Keywords: Gastropoda, Moitessieriidae, *Spiralix*, new species.

Spiralix tuba (Gastropoda: Moitessieriidae) espècie nova d'Espanya

Es descriu una espècie nova del gènere *Spiralix* de la Poble de Benifassà (Espanya), la qual es diferencia concològicament de les altres espècies del gènere conegudes per tenir poques voltes i una obertura ampla.

Mots clau: Gastropoda, Moitessieriidae, *Spiralix*, espècie nova.

The family Moitessieriidae Bourguignat, 1863 includes small sized freshwater gastropods, mainly from stygobiotic habitats. In Spain, it is represented by five genera: *Moitessieria* Bourguignat, 1863, *Palaospeum* Boeters, 2003, *Baldufa* Alba, Tarruella, Prats, Guillén & Corbella, 2010, *Sardopaladilhia* Manganeli, Bodon, Cianfanelli, Talenti & Giusti, 1998, and *Spiralix* Boeters, 1972. It is distinguished from Hydrobiidae Stimpson, 1865 by anatomical characters (Boeters & Gittenberger, 1990).

The genus *Spiralix* is represented in Spain by twelve species and subspecies. In the Levantine area of the Iberian Peninsula, it is represented by *Spiralix gloriæ* (Rolán & Martínez-Ortí, 2003), *S. valenciana valenciana* Boeters, 2003, *S. valenciana castellonica* Boeters, 2003, *S. pequenoensis* Boeters, 2003 and *S. calida* Corbella et al., 2014 (Boeters, 2003; Rolán & Martínez-Ortí, 2003; Corbella et al., 2014).

In the northeast (Basque Country, Castilla and León, Cantabria and Asturias) there are seven described species, all presently included in the subgenus *Burgosia* Boeters, 2003: *Spiralix burgensis* Boeters, 2003, *S. affinitatis* Boeters, 2003, *S. septentrionalis* (Rolán & Ramos, 1995), *S. asturica* Quiñonero-Salgado et al., 2017, *S. clarae* Quiñonero-Salgado et al., 2017, *S. mieraensis* Quiñonero-Salgado et al., 2017 and

S. vetusta Quiñonero-Salgado et al., 2018. (Rolán & Ramos, 1995; Boeters, 2003; Rolán & Arconada, 2003; Quiñonero-Salgado et al., 2017, 2018), whose taxonomy has experienced recent revisions.

In the present work, a new species of the genus *Spiralix* is described for the east of Spain and which can be differentiated from other congeneric species by a series of conchological characters.

Material and methods

Shells of the newly described species were collected in sediment from the font dels Rossegadors, in the municipality of la Poble de Benifassà (Castelló province). After cleaning and drying the sediments, sieves of 2 mm, 1 mm and 0,5 mm mesh size were used for shell sorting. Shells were finally separated under a stereomicroscope for their determination, and thereafter cleaned with water with the help of a small brush. Given its strict stygobiotic habitat and the difficult access, it was very complicated to find living specimens, so only empty shells were used for this study.

Though genitalia study or even DNA analysis had become increasingly common for the description of new species, the collection of live samples of strictly stygobiotic gastropods is extremely rare and a question of luck, so most taxonomic work still rely on drifted

empty shells found at surgences.

Abbreviations: MZB: Museu de Ciències Naturals de Barcelona; ZUPV: colección de Fauna cavernícola (Departamento de Zoología) de la Universidad del País-Vasco-Euskal Herriko Unibertsitatea, Bilbao, Spain; SEM: Scanning Electron Microscopy; CQS: collection Quiñonero-Salgado; CAA: collection Álvaro Alonso; s: shell

Results

Family: Moitessieriidae Bourguignat, 1863

Genus *Spiralix* Boeters, 1972

Type species: *Spiralix rayi* (Locard, 1883) by original designation.

Spiralix tuba sp. n. (Figs. 1 i 2)

Type material: (Fig. 2) Holotype: MZB-20190012. Paratypes: 2s MZB-20190013, 5s ZUPV-5385, 3s CAA, 9s in CQS.

Type locality: font dels Rossegadors (Fig. 4), la Pobla de Benifassà, Castelló, Comunitat Valenciana, Spain (31TBF667059, 450 m). This spring is located near the river Sénia, about 800 m from the Ulldecona reservoir dam.

Etymology: the specific name refers to the Latin word “tuba”, a primitive Roman trumpet whose expanded end (bell) strongly resembles the opening of the new species.

Description: shell of small size, brittle, not quite elevated, with maximum height of 1,77 mm and minimum of 1,46 mm. Diameter from 0,95 to 1,23 mm. It has four spire whorls. Deep sutures. Freshly collected specimens are shiny and translucent. Protoconch with

microsculpture formed by multiple rounded or irregularly ovoidal depressions, showing occasional elevations between them (Fig. 1C-F). The teleoconch microsculpture is formed by spiral striation with irregular, shallow grooves, particularly evident under the suture (Fig. 1G), but fading until not visible when distant from the suture, except near or between growth lines, which are slightly prosocline (Fig. 1H). Last whorl is ascendant towards the aperture. Aperture with ovoidal shape, quite widened, ranging from 0,73 to 0,95 mm in height and 0,69 to 0,96 mm in width. Peristome thick and expanded, especially towards the columella, covering the umbilicus, reduced to a fissure.

Dimensions: See table 1.

Habitat: Stygobiotic.

Distribution: Only known from the type locality (Figs. 4 i 5).

Remarks: It is clearly distinguishable from the other congeneric species by these characters:

Spiralix valenciana castellonica has a taller and narrower shell, higher number of whorls narrower aperture and less expanded lip; *S. pequenoensis*, *S. calida*, and *S. gloriae* also have larger number of whorls and a more subcylindrical shape.

Discussion and conclusions

Spiralix tuba sp. n. is described from the province of Castelló, where four other species of the genus are known: *S. valenciana castellonica*, *S. pequenoensis*, *S. gloriae* and *S. calida*.

The newly described species has close similarities with all the other species of the genus *Spiralix*, all having a conico-cylindrical to subcylindrical shape, a

		SH	SW	BWH	PH	PW
<i>Spiralix tuba</i> n. sp. (n=17)	Holotype	1,56	1,04	1,11	0,81	0,71
	min.	1,46	0,95	1,09	0,73	0,69
	max.	1,77	1,23	1,33	0,95	0,96
	mean	1,61	1,09	1,21	0,85	0,79
	st. dev.	0,079	0,071	0,069	0,059	0,064
<i>S. v. castellonica</i> (n=12)	min.	1,76	0,82	0,82	0,64	0,55
	max.	2,54	2,54	1,37	1,37	2,54
	mean	2,18	0,98	1,22	0,76	0,65
	st. dev.	0,205	0,072	0,082	0,068	0,067

TABLE 1. Measurements of *Spiralix tuba* sp. n. and *S. valenciana castellonica* shells. SH: shell height. SW: shell diameter. BWH: last whorl height. PH: aperture height. PW: aperture width. See also Fig. 3.

Mesures de la conquilla de *Spiralix tuba* sp. n. i *S. valenciana castellonica*. SH: alçada. SW: diàmetre. BWH: alçada de l'última volta. PH: alçada de l'obertura. PW: amplada de l'obertura. Cal veure també la Fig. 3.

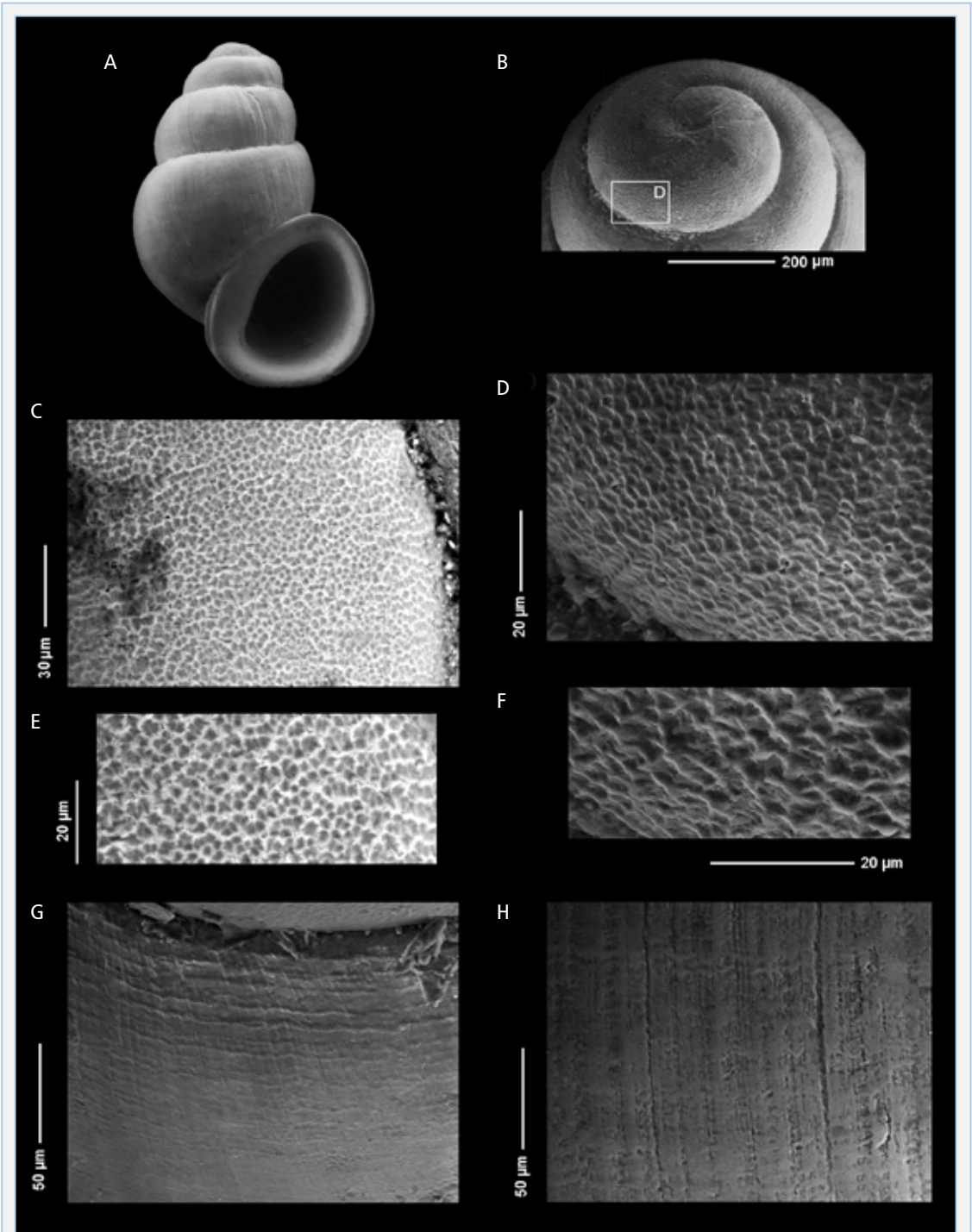


FIGURE 1. Paratype of *Spiralex tuba* sp. n. **A:** Apertural view; **B:** Protoconch; **C-F:** detail of the protoconch microsculpture; **G-H:** detail of the teleoconch microsculpture.

Paratip de *Spiralex tuba* sp. n. **A:** vista apertural; **B:** protoconquilla; **C-F:** detall de la microescultura de la protoconquilla; **G-H:** detall de la microescultura de la teleoconquilla.

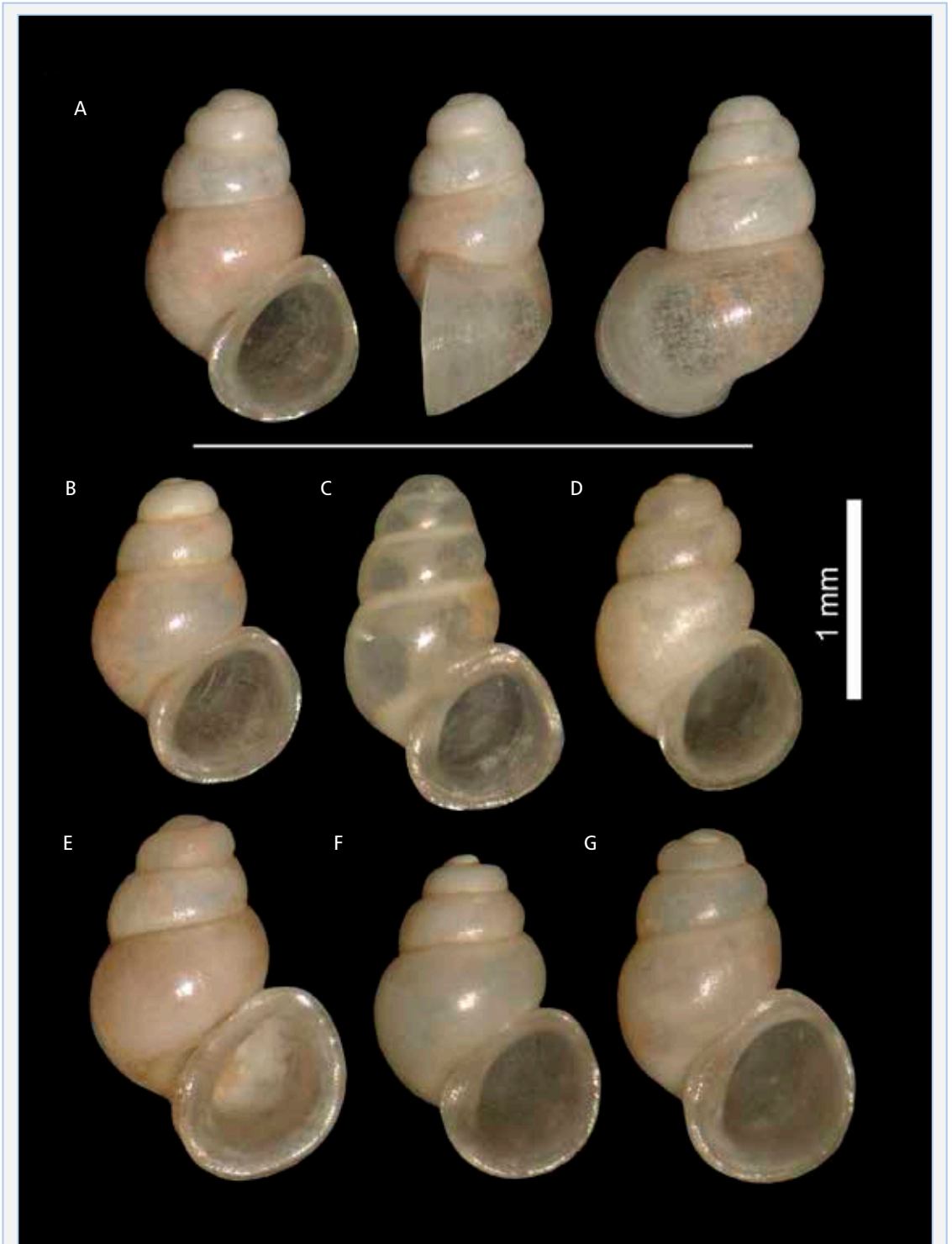


FIGURE 2. A: holotype; B-G: paratypes.

A: holotip; B-G: paratips.

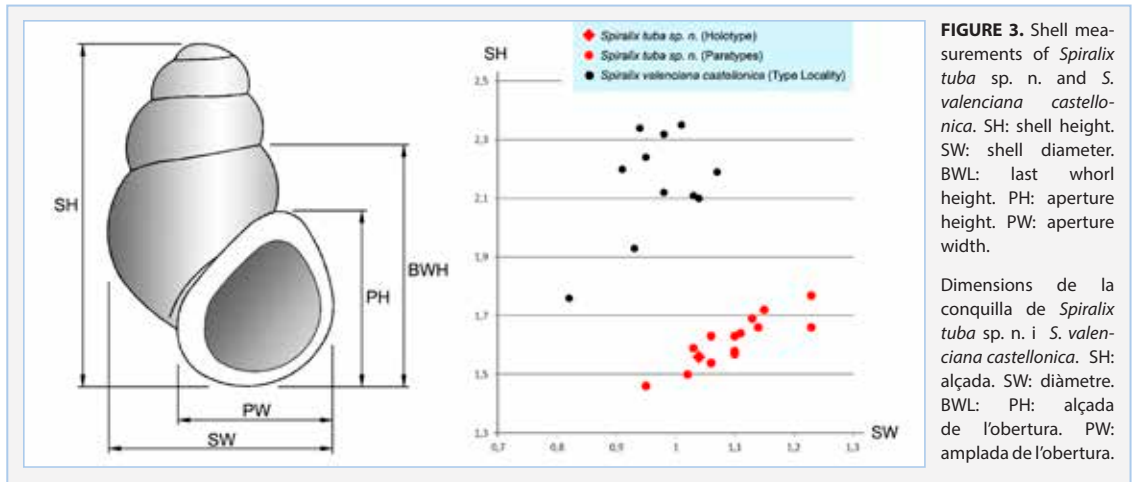


FIGURE 4. Font dels Rossegadors, type locality of *Spiralix tuba* sp. n.

Font dels Rossegadors, localitat tipus de *Spiralix tuba* sp. n.

high whorl number, and clearly thickened peristome. It is included in this genus by the shape and peristome characteristics but it is worth noticing that it also has some differences with all the other species from Spain such a smaller number of whorls. While all *Spiralix* species generally have scarce ornamentation in the teleoconch and a slightly more evident ornamentation in the protoconch, the newly described species has a stronger protoconch ornamentation, similar to that observed in the subgenus *Burgosia* (see Quiñonero-Salgado et al., 2017, 2018), but it lacks the cuneiform irregular marks characteristic of the teleoconch of this subgenus.

It can also be differentiated from representatives of other genera, such as *Palaospeum*, by having a less conical shape and narrower aperture; from *Moitessiera*

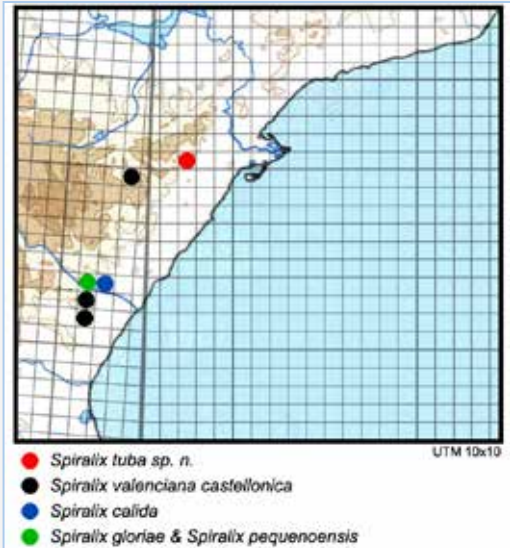


FIGURE 5. Map of the NE of Spain showing the known distribution range of some species of the genus *Spiralix*.

Mapa del NE d'Espanya mostrant el rang de distribució de les espècies del gènere *Spiralix*.

and *Baldufa* by lacking the well-defined spiral ornamentation; *Sardopaladilhia* by not having the elevated spire, continuous and everted peristome and a spiral microsculpture composed of dots and lines.

Regarding its conservation status, since no populations are known other than the type locality, the species should be conservatively protected and included in the Red List of endangered invertebrates of Spain and any damage to the aquifer, including any type of contamination, should be avoided.

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