

A new valvatiform genus of stygobiont snails (Gastropoda: Hydrobiidae) from Parc Natural dels Ports (Tarragona, NE Iberian Peninsula)

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A new genus of stygobiont mollusc of the family Hydrobiidae is described from the Parc Natural dels Ports (Catalonia, NE Iberian Peninsula). The new species is described on the basis of morphological traits of the shell and singularities of its penial anatomy.

This is the second known valvatiform stygobiont described in Catalonia so far, and the first one in its southern part.

Keywords: freshwater, springs, new genus, Parc Natural dels Ports, stygobiont

Un nou gènere valvatiform de caragols estigobionts (Gastropoda: Hydrobiidae) del Parc Natural dels Ports (Tarragona, Catalunya)

L'article descriu un nou gènere de mollusc estigobiont de la família Hydrobiidae pel Parc Natural dels Ports (Catalunya, NE Península Ibèrica). L'espècie es descriu en base a caràcters morfològics de la conquilla i singularitats de l'anatomia del penis.

Es tracta del segon estigobiont valvatiforme conegut descrit a Catalunya, i del primer en la seva part meridional.

Paraules clau: aigua dolça, fonts, nou gènere, Parc Natural dels Ports, estigobi.

Stygobiont snails are an important group of organisms inhabiting groundwater. In the last twenty years, studies have notably increased the number of known species, particularly in Catalonia, with more than 20 species in the genus *Moitessieria* Bourguignat, 1864 (Corbella *et al.*, 2020). Within these organisms, the family Hydrobiidae is the dominant group in many places in Europe (Glöer, 2022), presenting some species with the so called valvatiform shape, as opposed to the more turriculated shape of other species (Quiñonero-Salgado & Rolán, 2017; Glöer, 2022).

Although many Hydrobiidae genera include valvatiform snails in the Iberian Peninsula, only one stygobiont representative has ever been described from Catalonia, *Vilertia galeata* López-Soriano, Quiñonero-Salgado, Alonso, Rolán & Glöer, 2022 in the Fluvià

River basin (López-Soriano *et al.*, 2022). All the other valvatiform snails described from Catalonia are indeed crenobiont, inhabiting superficial waters, such as *Tarraconia rolani* Ramos, Arconada & D. Moreno, 2000, an endemism of the “ullals” freshwater lagoons in the Delta del Ebro and a spring near this zone.

In the present paper, we describe a new genus of valvatiform stygobiont snails from the south of Catalonia, in the Parc Natural dels Ports.

Material and methods

The type locality for the new species was visited twice in 2022 and 2023. To obtain the material, sediments from the area around the spring were collected and later washed with the use of sieves of different mesh size (2.0, 1.0 and 0.25 mm). The filtered sediment

was then washed and shells separated with the help of a brush, and cleaned with tap water.

Animals were dissected after submerging them in 80% ethanol. Shells were carefully broken with the help of a microscope slide. Subsequently, to expose the penis, the mantle was removed with the help of two entomology pins.

Comparative material of *V. galeata* and *Corbellaria celtiberica* Callot-Girardi & Boeters, 2012 was obtained from their respective type localities.

Type specimens were photographed under a trinocular Nexius Zoom NM1903-S stereomicroscope, with a Euromex CMEX-10PRO camera attached. To reveal

their microsculpture, some empty shells were mounted on an aluminium stub for scanning electron microscopy images, obtained with a JEOL JSM-IT510 using low vacuum, 10KV voltage and 30Pa pressure.

Abbreviations: Naturalis: Naturalis Biodiversity Center (Leiden); SEM: Scanning Electron Microscopy.

Results

Systematics

Family HYDROBIIDAE Stimpson, 1865

Genus *Alfahariella* gen. nov.

Type species: *Alfahariella panxampla* sp. nov.

(Figs. 1-4)

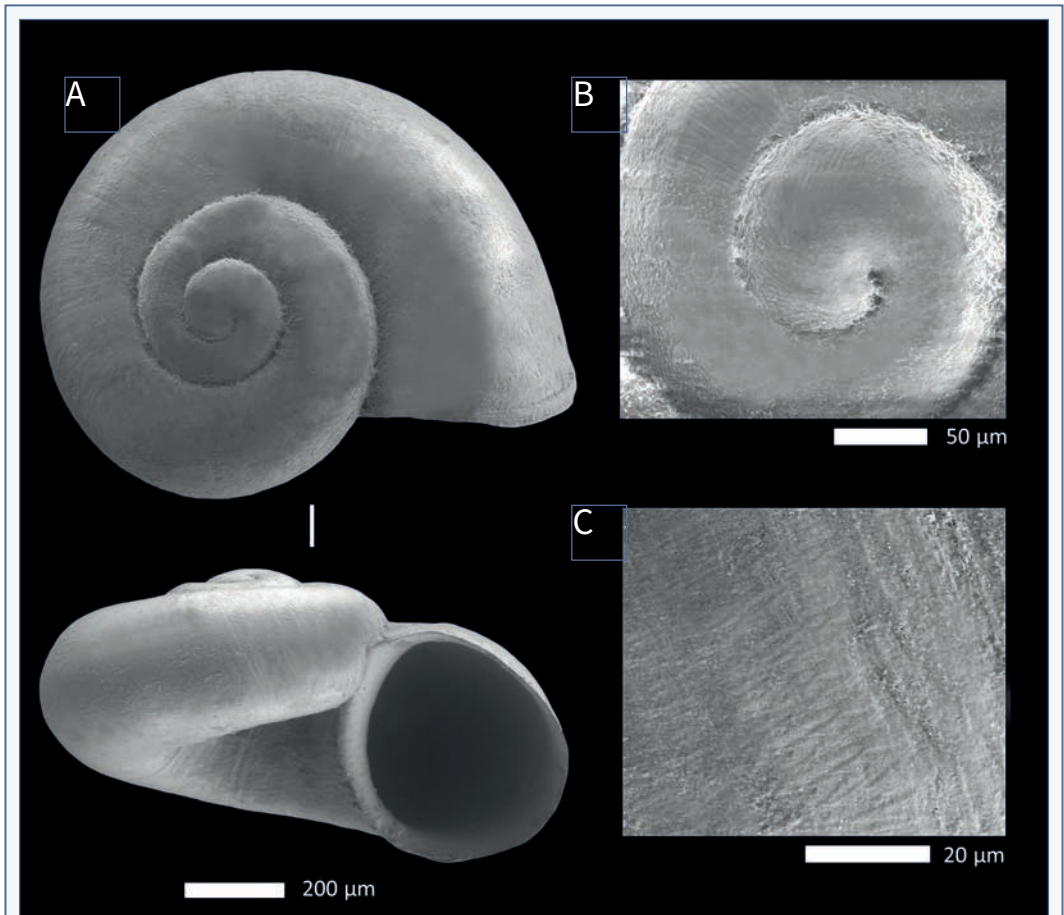


FIGURE 1. SEM images of *Alfahariella panxampla* gen. & sp. nov. from the type locality. **A:** Shell (partype). **B:** Detail of the protoconch. **C:** Detail of the teleoconch microsculpture.

Imatges de microscòpia electrònica d'*Alfahariella panxampla* gen. & sp. nov. de la localitat tipus. **A:** Conquilla (paratip). **B:** Detall de la protoconquilla. **C:** Detall de la microsculptura de la teleoconquilla.



FIGURE 2. Type specimens of *Alfahariella panxampla* gen. & sp. nov. from the type locality. **A:** Different views of the holotype. **B:** Four different paratypes in frontal view. Scale: 1 mm.

Col·lecció tipus de *Alfahariella panxampla* gen. & sp. nov. de la localitat tipus. **A:** Diferents vistes de l'holotip. **B:** Quatre paratips diferents en visió frontal. Escala: 1 mm.

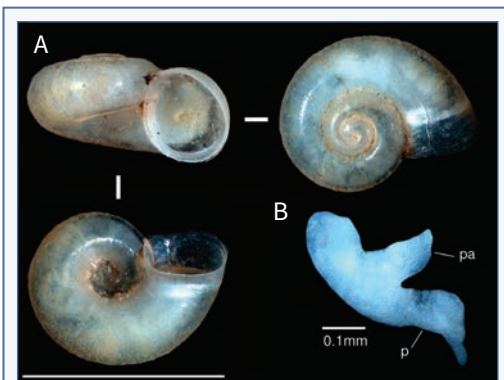


FIGURE 3. A: Live specimen and anatomy of the penis of *Alfahariella panxampla* gen. & sp. nov. p= penis; pa = penial appendix.

A: Exemplar viu i anatomia del penis d'*Alfahariella panxampla* gen. & sp. nov. p= penis; pa = apèndix penial.

Description: The glossy shell is valvatoïd with 3–3.5 rounded whorls. The aperture is nearly circular. The penis has an acute apex with a penial appendix (Figure 3B). The shell is 0.5–1.0 mm in diameter and 0.4–0.6 mm high.

It differs from *Corbellaria* Callot-Girardi & Boeters, 2012 in the first whorl, which is obtuse and generally elevated in *Corbellaria*, while in *Alfahariella* gen. nov. it is not obtuse. Additionally, the umbilicus is much wider in *Corbellaria*.

Corbellaria has a short penial lobe while the newly

described genus has an acute penial appendix. *Vilertia* has a bilobed penis and the aperture has a flanged edge.

From *Salaeniella* Boeters, Quiñonero-Salgado & Ruiz-Cobo, 2019 it differs by the penial appendix, which has the same length as the penis, while in *Alfahariella* gen. nov. the penis is twice as long as the penial appendix. The penial appendix in *Salaeniella* is finger-like, while in *Alfahariella* gen. nov. it is triangular with a broad basis. *Onubiella* Martín-Álvarez, Quiñonero-Salgado, López-Soriano, Raven & Glöer, 2024 has no penial appendix.

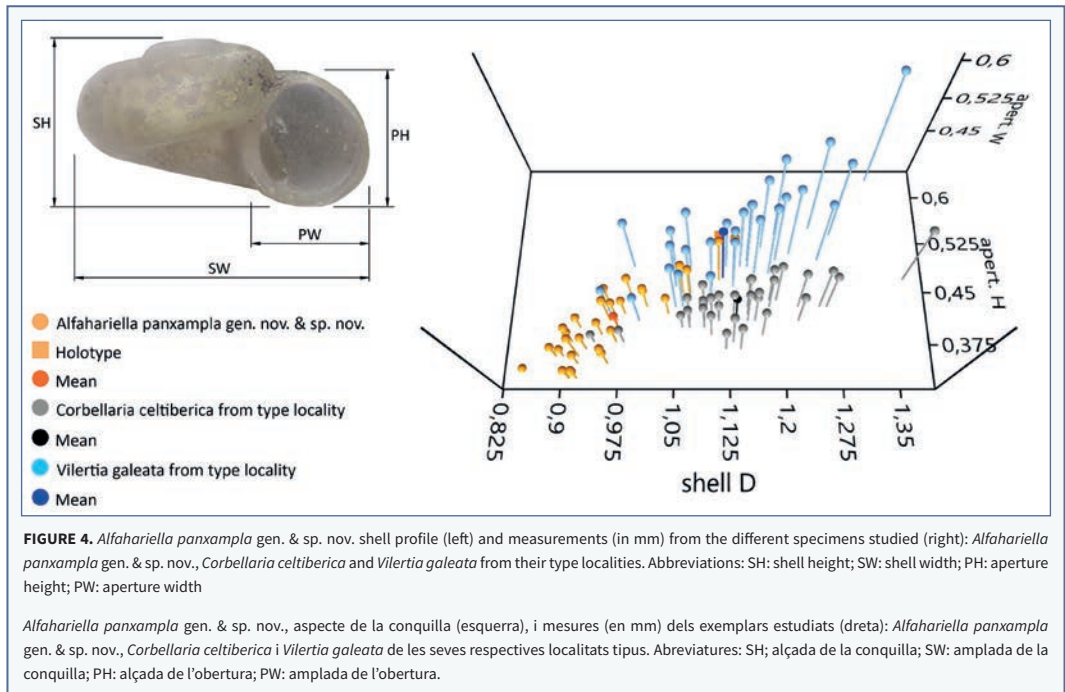
Etymology: The name refers to the Alfara de Carles village (Baix Ebre, Tarragona province, Spain) where the new species was found. The name derives from the Arab Al-Fahar, which means pottery, and hence the adapted name.

Alfahariella panxampla sp. nov.

(Figs. 1-5)

Material: Holotype RMNH.MOL.350856 (Naturalis) (Fig. 2A) Paratypes: RMNH.MOL. 350857 (Naturalis). Other material examined: 30 shells in SQS collection (Fig. 2B).

Type locality: Font Vella (Alfara de Carles, Baix Ebre, Tarragona province, Spain). [31TBF8068627768]. 305 m a.s.l. (Fig. 5A). Alfara de Carles is placed in the center of a block of limestone and dolomite with *Daonella*, of Triassic age, that forms the Serra del Bosc de l'Espina



(Maoa geológico de España, hoja 496, 31-19). It is separated by the Barranc de les Valls from the Monsagre de Pauils, the closest limestone block situated to the North.

Etymology: The species name refers to the wide valvatiform shell, resembling a wide belly (in Catalan, “panxa ampla”). It also refers to a citizen native from Alfara de Carles, Joan Pujol Fontanet “Panxampla” (1857-1883), a so-called bandit of the area of Els Ports (at present, a Natural Park) who was executed by local authorities.

Description: Shell small (about 0.8mm high and 1.2mm wide), translucent, fragile, valvatiform, with deep sutures and low spire. Protoconch about 1.5 convex whorls with a microsculpture formed by very low oval bumps arranged in a curved radial pattern (Fig. 1B). Teleoconch of 1.5 convex whorls with upper third attached to lower half of previous whorl, with very limited overlap. Microsculpture formed by spirally arranged irregular cuneiform marks (Fig. 1C), intersected by somewhat irregular slightly prosocline growth lines Umbilicus wide and deep. Aperture nearly circular, 0.45 mm high and 0.4 mm wide, edge not reflected.

Anatomy: The penis has an acute apex with a penial appendix (Fig. 3B).

		SH	SW	PH	PW
	HOLOTYPE	0.62	1.11	0.49	0.44
<i>Alfahariella panxampla</i> sp.nov. Alfara de Carles, Baix Ebre (Tarragona) (n=31)	min	0.42	0.85	0.33	0.35
	max	0.62	1.13	0.49	0.48
	mean	0.49	0.98	0.40	0.41
	st.dev.	0.054	0.075	0.047	0.032
<i>Corbellaria celtiberica</i> Manubles River hyporheic, Círia (Soria) (n=31)	min	0.41	0.94	0.37	0.37
	max	0.57	1.37	0.47	0.50
	mean	0.48	1.14	0.41	0.43
	st.dev.	0.039	0.081	0.022	0.026
<i>Vilertia galeata</i> Esponellà, Pla de l'Estany (Girona) (n=27)	min	0.51	0.96	0.41	0.43
	max	0.74	1.33	0.63	0.60
	mean	0.64	1.13	0.48	0.51
	st.dev.	0.053	0.089	0.047	0.039

TABLE 1. Measurements (in mm) of *Alfahariella panxampla* gen. & sp. nov. shells in comparison with *Corbellaria celtiberica* and *Vilertia galeata*. SH: shell height; SW: shell width; PH: aperture height; PW: aperture width.

Mesures (en mm) de la conquilla de *Alfahariella panxampla* gen. & sp. nov. en comparació amb *Corbellaria celtiberica* i *Vilertia galeata*. SH; alçada de la conquilla; SW: amplada de la conquilla; PH: alçada de l'obertura; PW: amplada de l'obertura.

Dimensions: See Table 1 and Fig. 4.

Habitat: Stygobitic.

Distribution: Only known from the type locality.

Differentiating characters: See description of the genus.

Discussion

While morphologically the shell of *Alfahariella panxampla* sp. nov. resembles *Spathogyna fezi* Arconada & Ramos, 2002, some subtle differences in relative size of last whorl, umbilicus and peristome can be seen. In addition, the biggest difference with this species is that the new species is anophtalmic, thus revealing a stygobitic way of life, in opposition to the crenobiont *S. fezi*, which inhabits superficial waters (Arconada & Ramos, 2002).

The only other valvatiform stygobiont mollusc presently known from Catalonia is *V. galeata*, which has a bigger shell, a more prominent and sharper peristome, slightly reflected towards the columella. The shape of the new species may resemble *C. celtiberica*, a stygobiont only known from Castilla & León, which is much flatter (Fig. 4). The other only stygobiont valvatiform inhabiting an area close to the new species is *Navalis edetanus* Talaván-Serna, Quiñonero-Salgado, Alonso & Rolán, 2021, which has a very distinctive keel. *Salaeniella valdaligaensis*, from the Cantabrian area, is larger (width to 1.6 mm) and higher, while also having a higher spire.

Anatomical traits suggest the newly described species cannot be included in any of the known valvatiform genera so far described in this territory, unless molecular analyses in the future may contradict morphological and anatomical data.

Alfahariella panxampla sp. nov. is the first stygobiont valvatiform described from the south of Catalonia, and only the second one from the whole Catalan territory. However, these organisms have been studied only superficially, so many new valvatiform species may still hide in the Catalan subterranean waters.

Habitat status and conservation

While the village of the type locality is within a Natural Park, which is a highly protected area, its distribution within the whole subterranean groundwater in the park is unknown. It is likely that the species may have a wide distribution within the epikarstic or

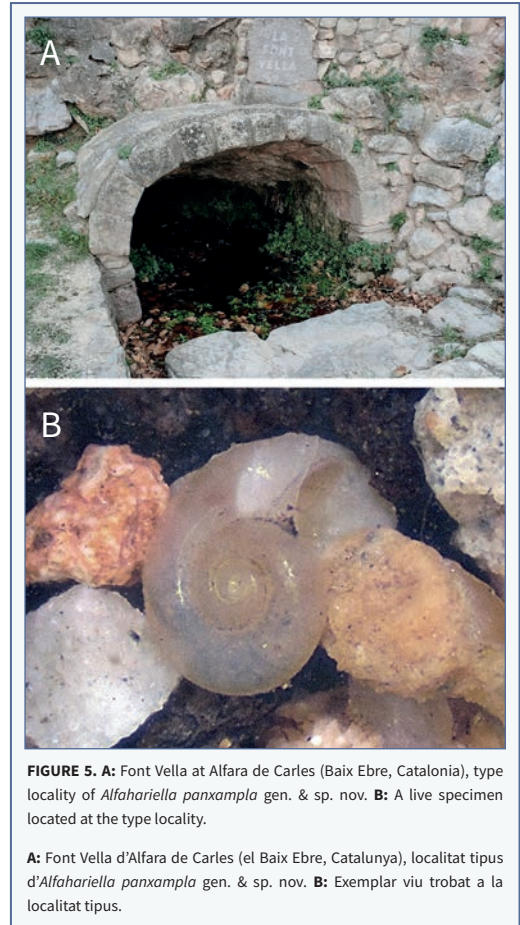


FIGURE 5. A: Font Vella at Alfara de Carles (Baix Ebre, Catalonia), type locality of *Alfahariella panxampla* gen. & sp. nov. **B:** A live specimen located at the type locality.

A: Font Vella d'Alfara de Carles (el Baix Ebre, Catalunya), localitat tipus d'*Alfahariella panxampla* gen. & sp. nov. **B:** Exemplar viu trobat a la localitat tipus.

hyporheic environments around, but severe drought and different water uses, including a fish farm upstream from the type locality, could place the species into one of the risk categories. More research is needed before conclusions can be drawn, so the species should be given some preliminary degree of protection to minimize risks to its status.

Acknowledgements

Bertie Joan van Heuven (Naturalis) supervised usage of the SEM. We acknowledge financial support from the Institutió Catalana d'Història Natural (ICHN), through the "Premi Torras-Foulon 2024".

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