

A new subspecies of *Tarracospeum raveni* (Gastropoda: Moitessieriidae) for Tarragona province (NE Iberian Peninsula)

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A new subspecies of *Tarracospeum raveni* is described from the locality of Vilaverd (la Conca de Barberà, Tarragona province). The new subspecies can be distinguished from the nominate subspecies by subtle but constant differences in its shell, and also from its location in a different river basin, the Francolí River.

Keywords: freshwater, springs, stygobiont, endemism, Tarragona, Francolí River

Una nova subespècie de *Tarracospeum raveni* (Gastropoda: Moitessieriidae) per a la província de Tarragona (nord-est península Ibèrica)

Es descriu una nova subespècie per *Tarracospeum raveni*, a la localitat de Vilaverd (la Conca de Barberà, província de Tarragona). La nova subespècie es distingeix de la subespècie nominal per diferències subtils però constants de la seva conquilla, i es localitza també en una conca fluvial diferent, la de riu Francolí.

Paraules clau: aigua dolça, fonts, estigobis, endemisme, Tarragona, riu Francolí

The family Moitessieriidae Bourguignat, 1863 includes small, stygobitic freshwater gastropods, and is represented in the Iberian Peninsula by six genera. Of these, only three are present in Catalonia: *Moitessieria* Bourguignat, 1863, which includes up to twenty species in this area (Corbella *et al.*, 2020; Glöer, 2022), and two monotypic genera: *Baldufa* Alba, Tarruella, Prats, Guillén & Corbella, 2010, and *Tarracospeum* Quiñonero-Salgado, Ruiz-Jarillo, Alonso & Rolán, 2021.

The last genus was erected to include a single species with clear differences to *Moitessieria*, particularly a cylindrical to subcylindrical shape, and a very prominent external curvature in the aperture, in addition to absent to very faint microsculpture of both protoconch and teleoconch (Quiñonero-Salgado *et al.*, 2021).

In this paper, we describe a new, distinctive population of the genus *Tarracospeum*, which deserves the generation of a new subspecies based on some morphological characters and geographical distance to previously known populations of the nominate subspecies.

Material and methods

The type locality and other localities for the new subspecies were visited in October 2023. Some stones were turned over, and sediment was collected from the spring and later washed using sieves of different mesh size (2.0, 1.0 and 0.25 mm). Once the sediment was dry, the shells were separated under a stereomicroscope using a fine brush and then cleaned with tap water.

Specimens were photographed through a trinocular Nexius Zoom NM1903-S stereomicroscope, with a Euromex CMEX-10PRO camera adapted. An empty shell was mounted on an aluminium stub for scanning electronic microscopy images, obtained without coating in a JEOL JSM-6480 LV using low vacuum, 10KV voltage and 30 Pa pressure, to reveal its microsculpture.

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

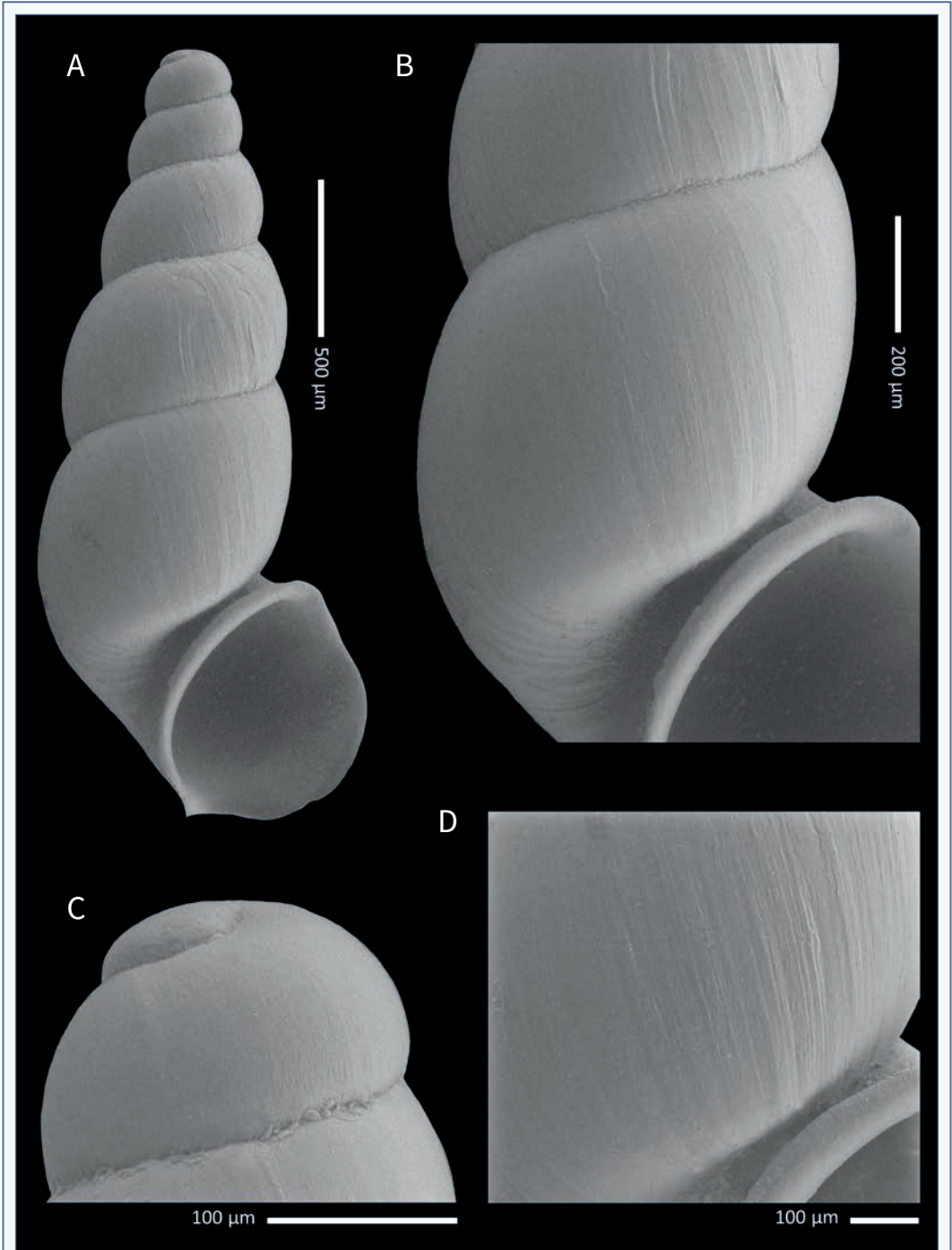


FIGURE 1. SEM pictures of *Tarracospeum raveni incisum* ssp. nov. **A:** Shell; **B:** Teleoconch; **C:** Protoconch; **D:** Detail of teleoconch.

Fotografies de microscòpia electrònica de *Tarracospeum raveni incisum* ssp. nov. **A:** Conquilla; **B:** Teleoconquilla; **C:** Protoconquilla; **D:** Detall de la teleoconquilla.

Results

Systematics

Family Moitessieriidae Bourguignat, 1863

Genus *Tarracospeum* Quiñonero-Salgado,

Ruiz-Jarillo, Alonso & Rolán, 2021

Type species: *Tarracospeum raveni* Quiñonero-

Salgado, Ruiz-Jarillo, Alonso & Rolán, 2021

***Tarracospeum raveni incisum* ssp. nov.**

(Figs. 1-3)

Type locality: Font del Mas, Vilaverd, Tarragona province, 31TCF4726075938. 242 m altitude (Fig. 4).

Other localities: Font de la Ceba, Montblanc, Tarragona province, 31TCF4561183381, 339 m altitude; Font de Llorach, Montblanc, Tarragona province, 31TCF4712080032, 284 m altitude.

Type material: Holotype RMNH.MOL.350852, Naturalis, 12 s in SQS coll. Paratypes: 1 s RMNH.MOL.350853.

Other material examined: 10 shells of *Tarracospeum raveni incisum* from Font de la Ceba and 12 shells from Font de Llorach (Montblanc, Tarragona) (SQS leg.); 20

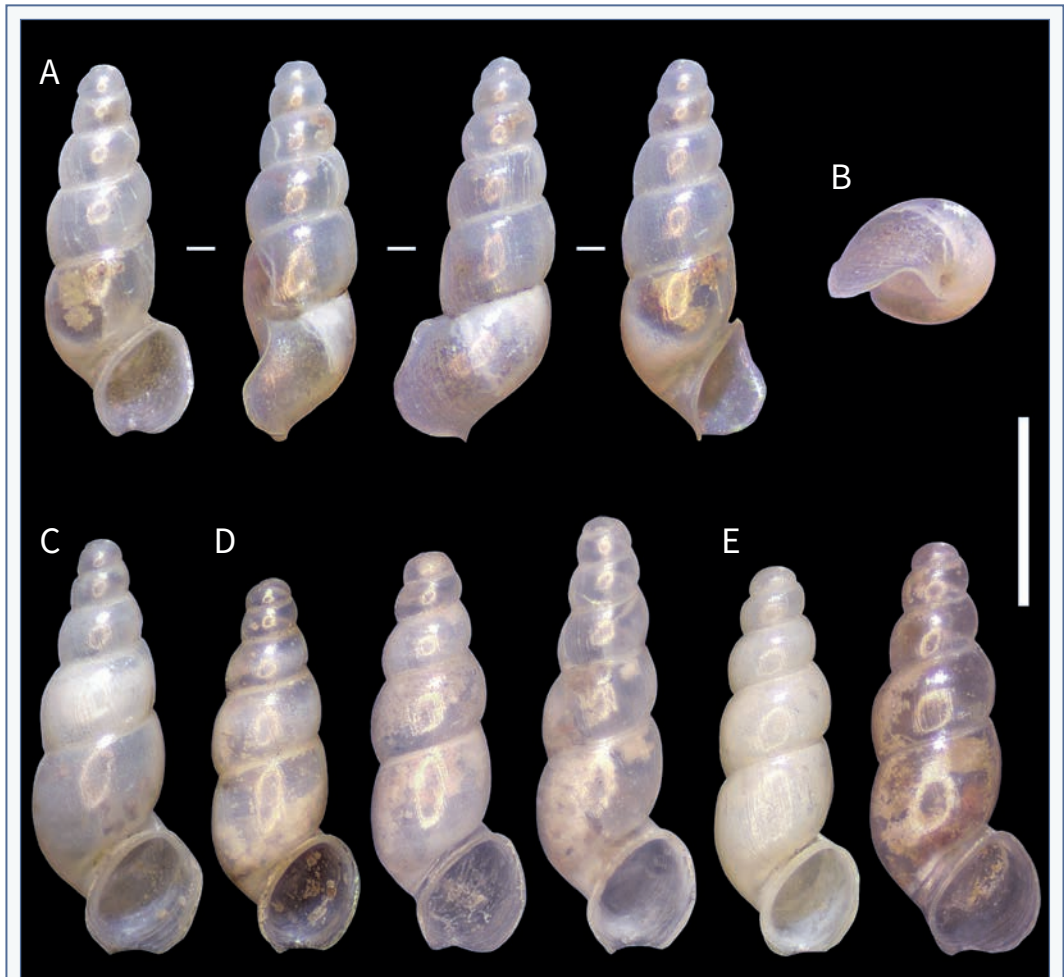


FIGURE 2. Different specimens of *Tarracospeum raveni incisum* ssp. nov. **A:** Holotype; **B:** Detail of the base of the holotype; **C:** Paratype; **D:** Specimens from font de la Ceba (Montblanc); **E:** Specimens from font del Llorach (Montblanc). Scale 1 mm.

Diversos espècimens de *Tarracospeum raveni incisum* ssp. nov. **A:** Holotip; **B:** Detall de la base de l'holotip; **C:** Paratip; **D:** Espècimens de la font de la Ceba (Montblanc); **E:** Espècimens de la font del Llorach (Montblanc).

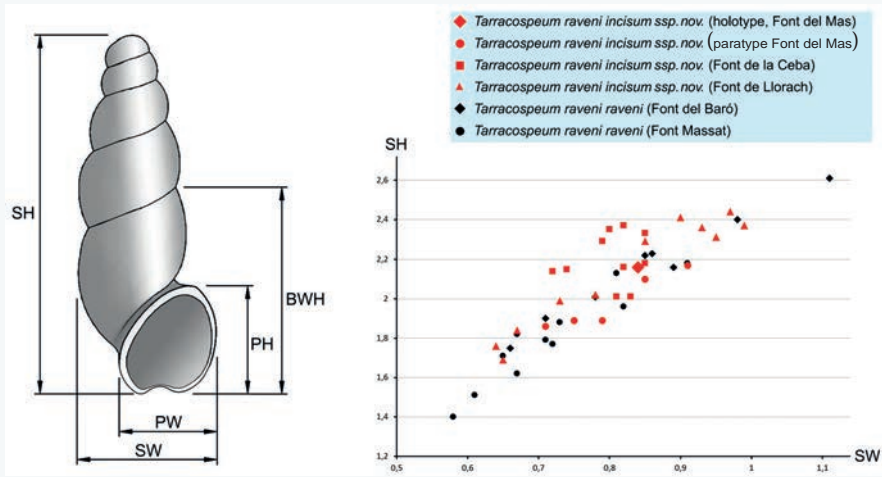


FIGURE 3. *Tarracospeum raveni incisum* ssp. nov. Shell profile (left) and measurements from the different studied specimens, in comparison with *Tarracospeum raveni raveni* (right).

Tarracospeum raveni incisum ssp. nov. Aspecte de la conquilla (esquerra) i mesures dels exemplars estudiats, comparats amb exemplars de *Tarracospeum raveni raveni* (dreta).



FIGURE 4. Font del Mas, Vilaverd (Tarragona), type locality of *Tarracospeum raveni incisum* ssp. nov.

Font del Mas, Vilaverd (Tarragona), localitat tipus de *Tarracospeum raveni incisum* ssp. nov.

shells of *Tarracospeum raveni raveni* from the type locality; Font del Baró (Querol, Tarragona) and Font Massat (Santes Creus, Tarragona) (SQS leg.).

Etymology: *incisum* (Latin = cut, incision, snip), referring to the incision in the base of the peristome.

Description: Small shell, fragile, translucent, with cylindrical to subcylindrical shape, 4 to 6 whorls, slightly convex, 1.69–2.24 mm high and 0.64–0.99 mm wide. Marked sutures, slightly angulated in the last whorls. The microsculpture of the teleoconch shows irregular growth lines (Fig. 1B–D), while the protoconch surface is smooth or with only a faint rugosity (Fig. 1C). Clear separation between protoconch and teleoconch. No umbilicus. Last whorl ascendent

towards the aperture. Aperture showing minimum separation from the penultimate whorl, 0.49–0.74 mm in height and 0.44–0.68 mm in diameter, ovoid in shape, very prominent external curvature; in the upper side a slight angulation is observed, continued in the outer side with a more marked undulation if observed from the external side of the aperture; the base shows a semi-circular incision. Outer lip not thickened, but everted in its whole extension.

Dimensions: See Table 1 and Fig. 3.

Habitat: Stygobitic. Shells were washed out from their habitat, likely after a sudden rise of the subterranean water levels. Most shells had a fresh appearance, given their transparent colour.

Distribution: Known from a spring in Vilaverd (Font del Mas) and two springs at Montblanc (Font de la Ceba and Font del Llorach), all at the Francolí River basin.

Differentiating characters: The main differences between the new subspecies *T. raveni incisum* and the subspecies is the presence of an incision in the lower part of the peristome (Fig. 2).

Although we consider the new taxon as a subspecies, given its geographic separation with the two known populations of the subspecies (from the Gaià River basin), and the presence of constant and distinctive shell characters between them, it cannot be ruled out that it may represent a fully differentiated species. Since the shells of both taxa are quite similar in overall characters, and in the absence of anatomical or genetic data, or any likely intermediate population, we cautiously consider it a subspecies. In any case, this work shows the richness of our groundwater ecosystems, which have been only superficially examined until now.

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		SH	SW	BWH	PH	PW
Font del Mas (ssp <i>incisum</i>) (n=6)	HOLOTYPE	2.16	0.84	1.23	0.69	0.59
	min	1.86	0.71	1.05	0.53	0.47
	max	2.17	0.91	1.25	0.71	0.59
	mean	2.01	0.81	1.17	0.63	0.55
	st.dev.	0.147	0.073	0.085	0.069	0.050
Font de La Ceba (ssp <i>incisum</i>) (n=10)	min	2.01	0.72	1.13	0.58	0.49
	max	2.37	0.85	1.27	0.71	0.59
	mean	2.20	0.80	1.20	0.65	0.55
	st.dev.	0.132	0.043	0.055	0.042	0.029
Font de Llorach (ssp <i>incisum</i>) (n=12)	min	1.69	0.64	0.96	0.50	0.45
	max	2.44	0.99	1.35	0.74	0.68
	mean	2.13	0.82	1.20	0.65	0.57
	st.dev.	0.281	0.135	0.139	0.092	0.077
Font del Baró (ssp <i>raveni</i>) (n=8)	min	1.75	0.66	1.06	0.55	0.50
	max	2.61	1.11	1.51	0.85	0.73
	mean	2.16	0.86	1.26	0.69	0.60
	st.dev.	0.274	0.145	0.139	0.100	0.077
Font Massat (ssp <i>raveni</i>) (n=12)	min	1.40	0.42	0.78	0.35	0.36
	max	2.18	0.91	1.25	0.68	0.62
	mean	1.77	0.69	1.04	0.53	0.49
	st.dev.	0.253	0.127	0.147	0.085	0.074

TABLE 1. Measurements of shells of *Tarracospeum raveni incisum* ssp. nov. and *Tarracospeum raveni raveni* in comparison. SH: shell height; SW: shell width; PH: aperture height; PW: aperture diameter.

Mesures de les conques de *Tarracospeum raveni incisum* ssp. nov. i *Tarracospeum raveni raveni* en comparació. SH; alçada de la conquilla; SW: amplada de la conquilla; PH: alçada de l'obertura; PW: diàmetre de l'obertura.

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