

Tarracospeum raveni, a new genus and a new species of stygobiotic mollusc (Gastropoda: Moitessieriidae) for Spain

Sergio Quiñonero-Salgado¹, Ramon Ruiz-Jarillo¹, Álvaro Alonso² & Emilio Rolán³

1. Associació Catalana de Malacologia, Museu Blau, Plaça Leonardo da Vinci 4-5, 08019 Barcelona, Spain.

2. C/Infiesto 7, 6º J, 33207 Gijón, Asturias, Spain.

3. Museo de Historia Natural de la Universidad de Santiago, Campus Norte, Parque Vista Alegre, 15782 Santiago de Compostela, Spain.

*Autor corresposnal: sergioqs85@hotmail.com

Rebut el 31.01.2021. Acceptat el 22.03.2021

A new genus and a new species of the family Moitessieriidae (Mollusca: Gastropoda) are described for Spain. The main morphological characters are described, which allow for distinguishing the new genus from other known genera.

Keywords: Gastropoda, Moitessieriidae, new genus, new species

***Tarracospeum raveni*, un nou gènere i espècie de la família Moitessieriidae (Mollusca: Gastropoda) per a Espanya**

Es descriu un nou gènere i espècie de la família Moitessieriidae (Mollusca: Gastropoda) per a Espanya. Es descriuen i representen els seus caràcters morfològics, que permeten distingir-lo dels altres gèneres coneguts.

Paraules clau: Gastropoda, Moitessieriidae, nou gènere, nova espècie

The family Moitessieriidae Bourguignat, 1863 includes small freshwater gastropods, mainly from stygobiotic habitats. It is represented in Spain by five genera: *Baldufa* Alba, Tarruella, Prats, Guillén & Corbella, 2010, a monotypic genus only known from Catalonia; *Moitessieria* Bourguignat, 1863, extended through the north and east of the Iberian Peninsula, with a number of known taxa, particularly in Catalonia; *Palaospeum* Boeters, 2003, only present in Aragón and the province of Castelló; *Spiralix* Boeters, 1972, distributed across the north and east of the Iberian Peninsula; and *Sardopaladilhia* Manganelli, Bodon, Cianfanelli, Talenti & Giusti, 1998 only present in the Comunitat Valenciana (Boeters, 2003; Rolán & Martínez-Ortí, 2003; Corbella et al., 2014; Quiñonero-Salgado & Rolán, 2019; Quiñonero-Salgado et al., 2020). It is well distinguished from Hydrobiidae Troschel, 1857 by different anatomical characteristics (Boeters & Gittenberger, 1990).

In this article, a new genus and a new species of *Moitessieriidae* is described, presenting several singular characteristics not present in other genera from this family.

Material and methods

Sediments were collected from two springs in the province of Tarragona. After cleaning and drying, sieves of 2.0, 1.0 and 0.5 mm mesh were used to sort the shells, which were finally separated under a stereomicroscope for their identification, and cleaned with water with the help of a small brush. Given its strict stygobiotic habitat and the difficulty of gaining access, it was very hard to find live specimens, so only empty shells were considered for this study. Localities were visited during 2020. Specimens were photographed with a trinocular stereomicroscope Nexius Zoom NZ 1903-S, with a Euromex CMEX-10PRO camera adapter. Some shells were mounted on aluminium stubs for their examination under an electronic Quanta-200 microscope.

Abbreviations

MZB: Museu de Ciències Naturals de Barcelona, Spain

SEM: Scanning Electron Microscopy

CQS: Collection Quiñonero-Salgado

s: Shell

Results

Systematics

Family Moitessieriidae Bourguignat, 1863

Genus *Tarracospeum* gen. nov.

Type species: *Tarracospeum raveni* sp. n.

Etymology: The name is based on a combination of the prefix *Tarraco* from Roman name for the province of the type locality, and the suffix *speum*, derived from the Greek *Speos* (meaning cave), related to their subterranean habitat.

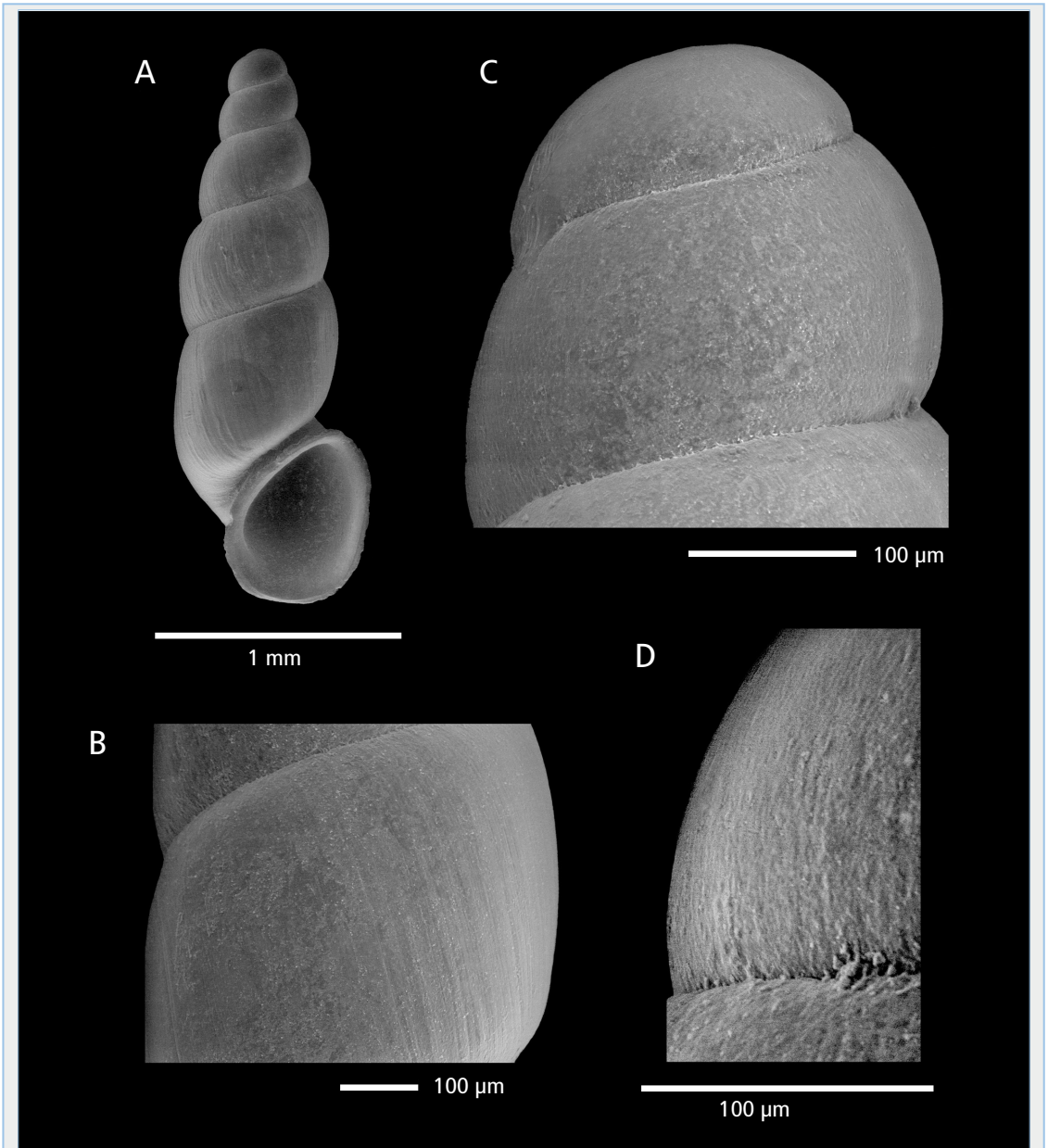


FIGURE 1. SEM photographs of *Tarracospeum raveni* sp. n. from the type locality. **A:** apertural view; **B:** detail of the teleoconch **C, D:** detail of the protoconch and microsculpture

Microfotografies de *Tarracospeum raveni* sp. n. de la localitat tipus. **A:** vista apertural; **B:** detall de la teleoconquilla. **C, D:** detall de la protoconquilla i microescultura.



FIGURE 2. Holotype of *Tarracospeum raveni* sp.n.

Holotip de *Tarracospeum raveni* sp.n.

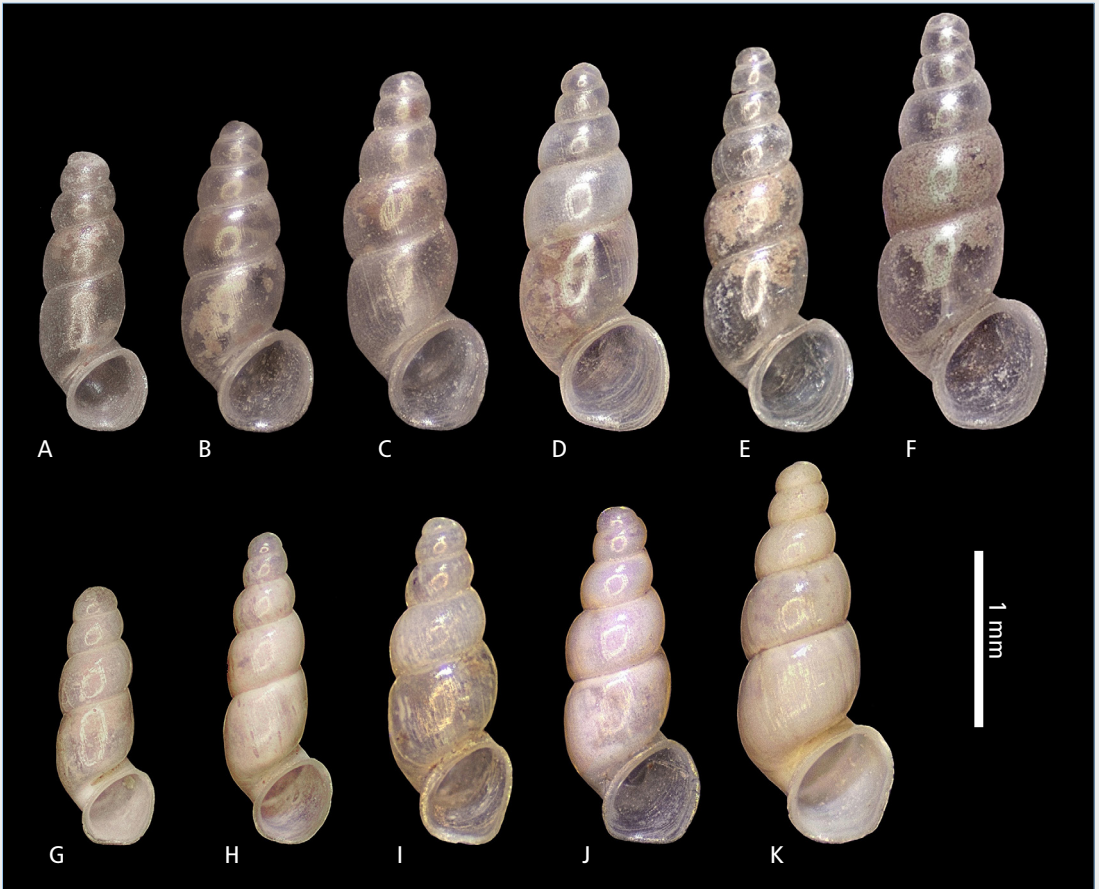


FIGURE 3. Variability of specimens of *Tarracospeum raveni* sp. n. **A-F:** type locality. **G-K:** Font de Massat.

Variabilitat d'exemplars de *Tarracospeum raveni* sp. n. **A-F:** localitat tipus. **G-K:** Font de Massat.

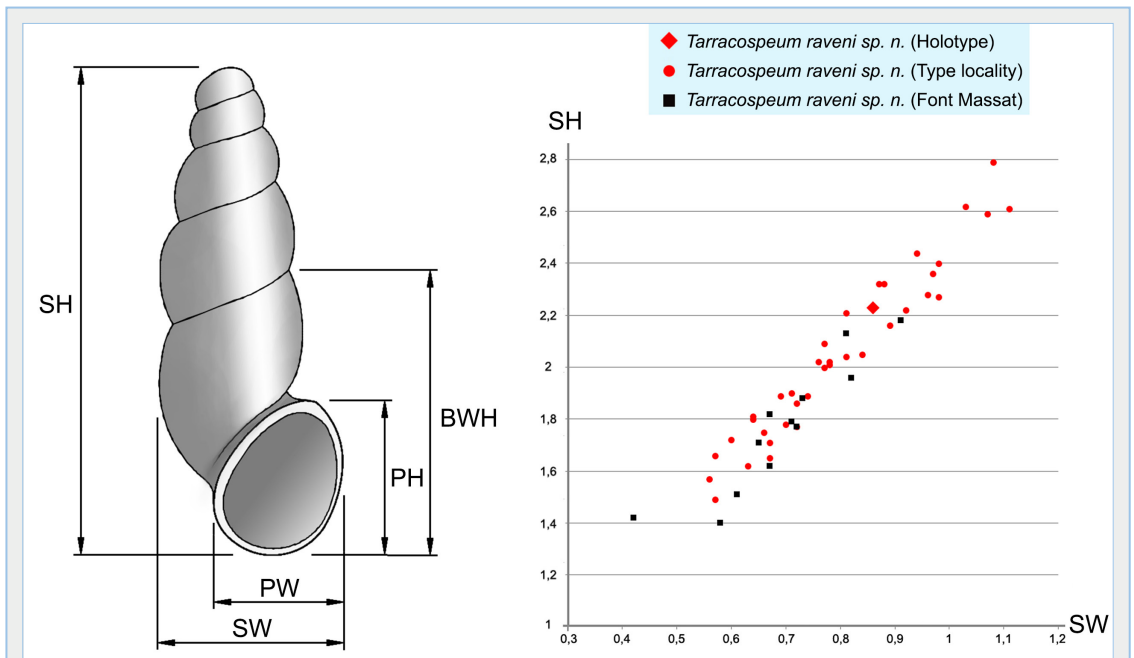


FIGURE 4. Shell measurements of *Tarracospeum raveni* sp. n. SH: shell height. SW: shell diameter. BWH: last whorl height. PH: aperture height. PW: aperture width.

Dimensions de la conquilla de *Tarracospeum raveni* sp. n. SH: alçada. SW: diàmetre. BWH: alçada de l'última volta PH: alçada de l'obertura. PW: amplada de l'obertura.

Diagnosis of the genus: Small shell, subcylindrical in shape, slightly convex whorls, and deep sutures. Aperture with ovoidal shape, showing a separation between last whorl and aperture, ovoid in shape, very prominent external curvature. Umbilicus absent, and very faint or no microsculpture at all.

***Tarracospeum raveni* sp. n.** (Fig. 1, 2 & 3)

Type material: Holotype MZB 2021-0466 (Fig 2.). Paratypes: 3 s in MZB 2021-0467, 10 s in CQS.

Type locality: Font del Baró, Querol, Tarragona [31TCF63948510], 440 m (Fig. 5A).

This spring is located on the lower part of the south-eastern slope of the Ancosa Mountains. The outflow from the spring was contained many years ago, releasing its water into a small artificial pond used to irrigate an abandoned orchard. From a geologic point of view, it is located in an area of Medium Triassic dolomites, limited by areas with marls and clays.

Other material examined: Font Massat, Santes Creus, Tarragona [31TCF63007909] 290 m (Fig. 5B).

This spring is located more than 20 km downstream

from the Font del Baró. It can be found on the right-hand slope of the Gaià River, emerging from a shaded rock face and releasing its water directly onto the slope, before reaching the river. Regarding its geologic context, the area is from Neogene period, from the Miocene, dominated by uncompact clay conglomerates.

Etymology: The species is dedicated to the Dutch malacologist Han Raven, closely linked to Spain, who has spent years studying malacofauna.

Description: Small shell, fragile, translucent, with cylindrical to subcylindrical shape, 4 to 6 whorls, slightly convex. Marked sutures, slightly angulated in last whorls. Shell height in the range of 1.40-2.79 mm. The microsculpture of the teleoconch shows irregular growth lines (Fig. 1B), while protoconch surface is smooth or with only a faint rugosity. (Fig. 1 C,D). There is a clear separation between protoconch and teleoconch. No umbilicus. Last whorl ascendent towards the aperture. Aperture separated from last whorl, of 0.35-0.86 mm high, and 0.36-0.72 mm wide, ovoid in shape, very prominent external curvature; in the upper side it has a little marked angulation, continued in the outer side with a more marked ondulation,



FIGURE 5. A: Font de Baró, type locality of *Tarracospeum raveni* sp.n. B: Font de Massat.

A: Font de Baró, localitat tipus de *Tarracospeum raveni* sp.n. B: Font de Massat.

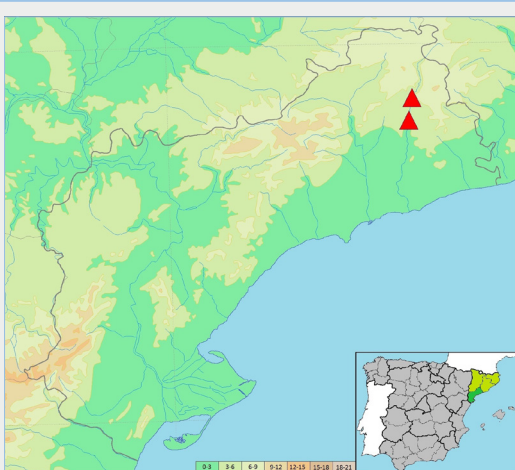


FIGURE 6. Map of Tarragona province showing the known distribution range of *Tarracospeum raveni* sp. n. at the Gaià river basin.

Mapa de la província de Tarragona mostrant el rang de distribució de *Tarracospeum raveni* sp. n. a la conca del riu Gaià.

if observed from the external side of the aperture. The outer lip is not thickened, but it is everted in its whole extension.

Dimensions: See table 1, Fig. 4

Habitat: Stygobiotic.

Distribution: Only known from two springs of the Gaià river basin (Tarragona, province) (Fig. 6).

Differential diagnosis: *Tarracospeum* gen. nov. shows differences with other stygobiotic genera from the Moitessieriidae family, of which only the initial five in the following list are represented in Spain.

Moitessieria Bourguignat, 1863: It presents shells with turruculated-elongated shape, and a marked, spirally arranged sculpture.

Spiralix Boeters, 1972: Species in this genus have no microsculpture at all, or very faint, and are subcylindrical in shape, with the exception of the subgenus *Burgosia*, which, despite also having a small separation between last whorl and aperture, is differentiated by presenting a more marked microsculpture, and generally with ovoidal-conical shape.

Palaospeum Boeters, 2003: Species from this genus are characterized by presenting conical shaped, robust shells, and no separation between last whorl and aperture.

Baldulfa Alba, Tarruella, Prats, Guillén & Corbella, 2010: A monotypic genus, with conical-trochoidal shaped and robust shells, low whorl number, and very marked microsculpture.

Sardopaladilhia Manganeli, Bodon, Cianfanelli, Talenti & Giusti, 1998: Shells in this genus are conical-ovoid, have no separation between last whorl and aperture, and the microsculpture is formed by irregular microperforations, or spirally-arranged lines.

Bythiospeum Bourguignat, 1882: Taxonomy in this genus is very complex, due to the large conchological variability of its species (Bertrand, 2004). On average, they present conical shaped shells, but there are no species described for Spain yet.

Iglica A.J. Wagner, 1928: Another genus not described for Spain, also quite controversial and which needs further revision. The type species has a turruculated shell, with up to five whorls, with a small separation between last whorl and aperture.

Henrigirardia Boeters & Falkner, 2003: Monotypic genus only known from France, characterized by a quite conical shell, wide-open umbilicus, and marked microsculpture, very different from the one present in the new genus here described.

<i>Tarracospeum raveni</i> sp.n.		SH	SW	BWH	PH	PW
Font del baró (n=39) Type locality	Holotype	2.23	0.86	1.28	0.70	0.59
	min	1.49	0.56	0.90	0.45	0.37
	max	2.79	1.11	1.57	0.86	0.73
	mean	2.05	0.80	1.19	0.64	0.54
	st.dev.	0.323	0.151	0.171	0.114	0.099
Font Massat (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 *Tarracospeum raveni* sp. n. shells. SH: shell height. SW: shell diameter. BWH: last whorl height. PH: aperture height. PW: aperture width. See also Fig. 4.

Mesures de la conquilla de *Tarracospeum raveni* sp. n. 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. 4.

Sorholia Boeters & Falkner, 2009: Another monotypic genus only known from France, characterized by a clear separation between last whorl and aperture. Compared to *Tarracospeum* gen. nov, it shows a spiral, very marked microsculpture.

Paladilhia Bourguignat, 1865: Not known from Spain. It has a conical shell (not subcylindrical), and a lip less projected to the front.

Clameia Boeters & Gittenberger, 1990: Monotypic genus only known from Greece. Although it also has a last whorl separated from the aperture, the shell is conical, with inflated whorls, and microsculpture formed by spirally-arranged lines.

Discussion

A new genus of the Moitessieriidae family is described for Spain, raising to six the number of known genera. It has some characteristics that allow for the description of a new genus, with evident differences to other genera in the family, such as a very prominent external curvature in the aperture. Despite showing some shared characteristics with other genera, such as the separation between last whorl and aperture or a faint microsculpture, the combination of the different characteristics is unique in the newly described genus, allowing it to be differentiated from all the others.

The closest genus to *Tarracospeum* gen. nov. could be *Iglica*. However, this is a quite controversial genus, with a revision pending. Only recently Boeters et al. (2019) have showed anatomical traits of the type species, suggesting that the discrimination with *Bythiospeum* should be complemented with genetic analyses. A number of taxa having conchological traits such as an elongated shell, and a separation between

last whorl and aperture, have been attributed to *Iglica* in a doubtful manner, in the absence of anatomical data (Bodon & Giovannelli, 1994; Boeters et al., 2019). Many of those taxa differ indeed from the characters of the type species. In addition, this genus has a Central European range, with the exception of two species in Morocco: "*Iglica*" *soussensis* Ghamizi et al., 1997, and *Iglica seyadi* Backhuys & Boeters, 1974, both described on the basis of conchological characters only, being particularly doubtful the assignation of the first one to the genus *Iglica* (Backhuys & Boeters, 1974; Ghamizi & Boulal, 2017).

The smallest specimens *Tarracospeum raveni* sp.n., by having a more cylindrical shape, may resemble conchologically those of the genus *Guadiella* (Boeters, 2003), of the Hydrobiidae family. However, they can be differentiated because this genus lacks the curvatures and ripples in the aperture, and presents a microsculpture on the protoconch formed by marked polygonal-shaped depressions, similar to stars, or micro-perforations irregularly displayed (Alba et al., 2009; Boeters, 2003; Quiñonero-Salgado et al., 2018).

Tarracospeum raveni sp.n. has only been identified in two springs of the Gaià river basin (Tarragona province). It must be stressed that only a small quantity of good quality material has been found since only those shells brought to the surface after heavy rains are available for collection. Due to the strictly stygobiotic habitat and its difficult access, no live animals were collected. Given its limited distribution and fragility of the habitat, highly vulnerable to damage by contamination or alteration in water levels, the new species should be protected.

References

- Alba, D. M., Tarruella, A., Prats, L., Corbella, J. & Guillén, G. 2009.** Una nova espècie de *Guadiella* Boeters, 2003 (Neotaenioglossa: Rissoidae: Hydrobiidae) de la Font del Racó de la Pastera (Ulldemolins, el Priorat, Catalunya, Espanya). *Spira*, 3 (1-2): 1-12.
- Alba, D. M., Tarruella, A., Prats, L., Guillén, G. & Corbella, J., 2010.** Els moitessieriids (Gastropoda: Moitessieriidae) de Rellinars (el Vallès Occidental, Catalunya, Espanya). *Spira* 3 (3-4): 159-186.
- Backhuys, W. & Boeters, H. D. 1974.** Zur kenntnis marokkanischer binnenmollusken, I. *Archiv für Molluskenkunde*, 104: 107-114.
- Bertrand, A. 2004.** Atlas préliminaire de répartition géographique des mollusques stygobies de la faune de France (Mollusca: Rissoidae: Caenogastropoda). *Documents Malacologiques. Hors série*, 2: 1-81.
- Boeters, H. D. 2003.** Supplementary notes on Moitessieriidae and Hydrobiidae from the Iberian Peninsula (Gastropoda, Caenogastropoda). *Basteria*, 67: 1-41.
- Boeters, H. D. & Gittenberger, E. 1990.** Once more on the Moitessieriidae (Gastropoda Prosobranchia), with the description of *Clameia brooki* gen. et spec. nov. *Basteria*, 54, (1-3): 123-129.
- Boeters, H. D., Reischütz, A., Reischütz, P. & Unruh, M., 2019.** Rediscovery of *Iglica gratulabunda* (A. J. Wagner, 1910) (CAENOGASTROPODA: TRUNCATELLOIDEA). *Folia Malacologica* 27(4): 321–325.
- Bodon, M. & Giovannelli, MM. 1994.** A new Hydrobiidae species of the subterranean waters of Friuli (NE Italy) (Gastropoda: Prosobranchia). *Basteria*, 58: 233-244.
- Corbella, J., Guillén, G., Prats, L., Tarruella, A. & Alba, D. 2014.** *Spiralix calida* sp. nov. (Gastropoda: Moitessieriidae), una nova espècie de gastròpode estigobi de Toga (l'Alt Millars, País Valencià, Espanya). *Spira*, 5: 111-120.
- Ghamizi, M. & Boulal, M. 2017.** New stygobiont snail from froundwater of Marocco (Gastropoda: Moitessieriidae). *Ecologica Montenegrina*, 10: 11-13
- Quiñonero-Salgado, S., Martín Alvarez J.F., López Soriano, J. & Rolán, E. 2018.** A new species of the genus *Guadiella* Boeters, 2003 (Gastropoda: Hydrobiidae) from Spain. *Iberus* 36 (I). 61-65.
- Quiñonero-Salgado, S., Alonso, Á. & Rolán, E. 2019.** A new species of the genus *Moitessieria* Bourguignat, 1863 (Gastropoda: Moitessieriidae) from Catalonia, Spain. *Nemus*, 9: 105-111.
- Quiñonero-Salgado, S., López-Soriano, J., Alonso, Á. & Rolán, E. 2020.** Two new species of the genus *Spiralix* Boeters, 1972 (Gastropoda: Moitessieriidae) from Spain. *Nemus*, 10: 21-29.
- Rolán, E. & Martínez-Ortí, A. 2003.** Nuevas especies de la familia Hydrobiidae (Mollusca: Orthogastropoda) de la Comunidad Valenciana (España). *Iberus*, 21 (1): 191-206.

Acknowledgements. Our thanks to Inés Pazos from the Centro de Apoyo Científico y Tecnológico a la Investigación (CACTI) at Universidad de Vigo for the SEM pictures. To Marco Bodon, Peter Glöer, and Katrin Schniebs for sending us bibliographic works. To Joaquín López-Soriano for the English revision. To Carlos E. Prieto for composing figure 6.