A remarkable new record of the Iberian freshwater mollusc *Corbellaria celtiberica* Callot-Girardi & Boeters, 2012 (Gastropoda: Hydrobiidae) in Spain

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A new, isolated, population of the endemic Iberian hydrobiid *Corbellaria celtiberica* has been located, based on shells at the eastern foothills of the Iberian System (Province of Castellón, Valencian Community, Spain). The shells are biometrically studied and compared with shells from the type locality and with additional data from the literature. The finding of this new population considerably expands the previously known distribution area of the species.

Key words: Hydrobiidae, *Corbellaria celtiberica*, Iberian System, Valencian Community, Spain.

INTRODUCTION

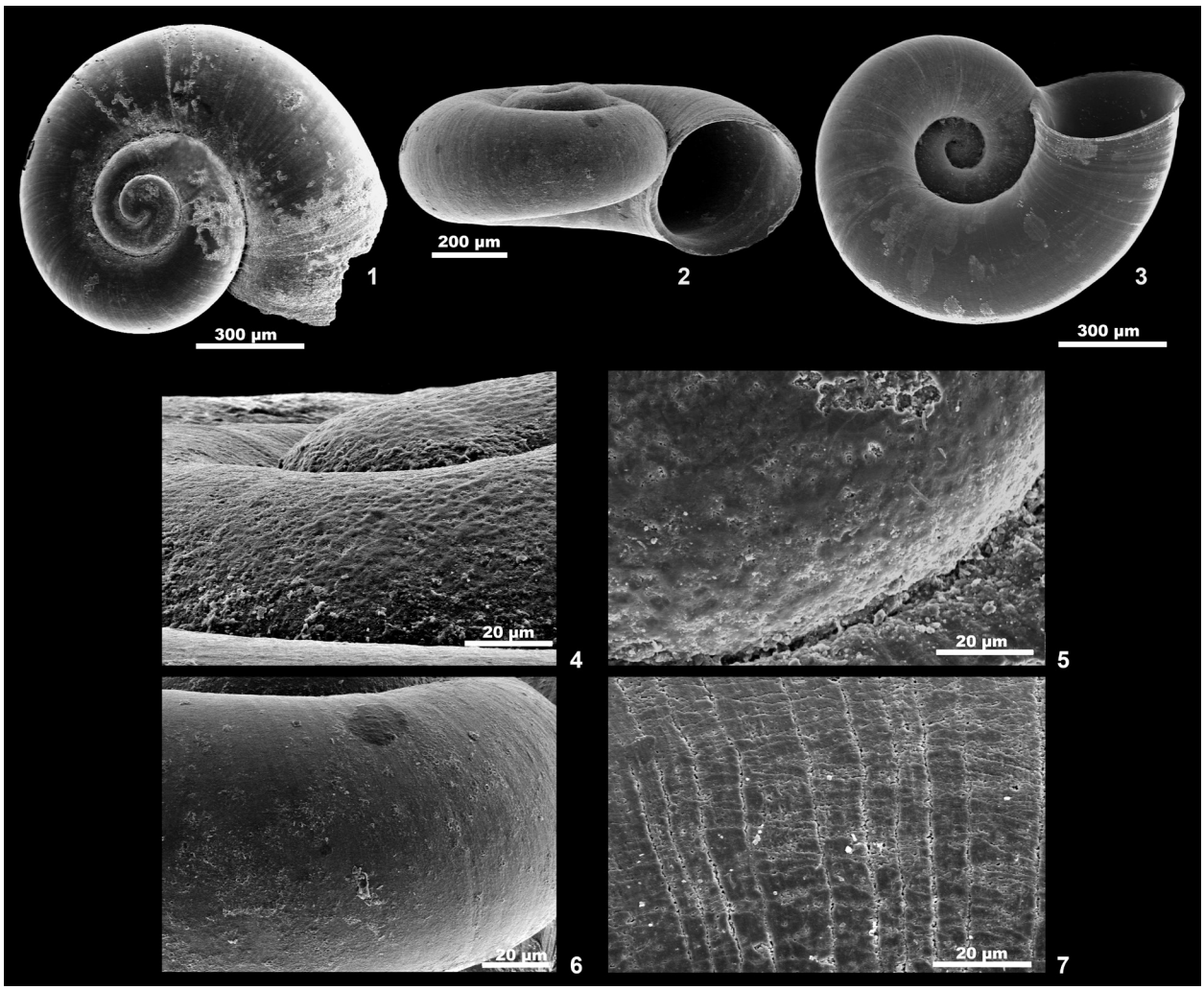
Callot-Girardi & Boeters (2012) described a new genus and species of an Iberian valvatiform stygobiont hydrobiid as *Corbellaria celtiberica*. It is characterized by a valvatiform, planispiral shell shape and its anatomy is characterized by the absence of a ctenidium, the peculiar shape of the intestine, and the female genital apparatus having two seminal receptacles, which is rare in valvatiform genera. The only two previously known populations are from the Vieja spring in Ciria (locus typicus) (Province of Soria, Castilla-León Community, Spain) (UTM: 30TWM8707) at 1,060 m altitude, and the Manubles river, next to "Manantial del Ojo", also in Ciria (UTM: 30TWM8609), at 1,020 m. Callot-Girardi & Girardi (2013) subsequently carried out a biometric study on the shell of *C. celtiberica*.

At the time of the above mentioned studies, researchers of the Museu Valencià d'Història Natural (MVHN) collected malacological material in various sources and springs in the north of the Province of Castellón (Valencian Community). One of the collected taxa seems, according to the conchological characteristics of the specimens, to correspond to *C. celtiberica*. Unfortunately, none of the specimens of our taxon were collected alive, thus prohibiting anatomical investigations. To confirm species identity, a biometrical study was conducted based on (1) the conchological data provided by Callot-Girardi & Boeters (2012) and Callot-Girardi & Girardi (2013), (2) data from the shells collected by us in the new Valencian location, and (3) new data from several topotypes of *C. celtiberica*. An updated map of the distribution of *C. celtiberica* in Spain is given.

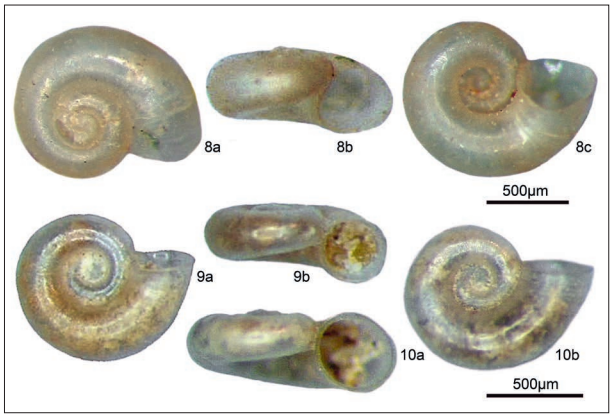
MATERIAL AND METHODS

Corbellaria celtiberica has been collected in the Font dels Rossegadors in La Pobla de Benifassà (Castellón, Valencian Community) (UTM: 31TBF6606, 430 m). The sample, collected on August 4th 2012, is constituted by five shells, and is deposited in the MVHN (Alginet, Spain) with the code MVHN-110714ER07 (Figs 1-8). Two specimens of the type locality, Vieja spring in Ciria (Prov. Soria), are studied and figured (Figs 9-10), which also are deposited in the MVHN, with the code MVHN-220420YT01.

A biometrical study was carried out based on the previous conchological data and the new measurements obtained during this work, taking into account that for the specimens that are partially broken some characters could not be tabulated (Tables 1-2). The majority of the shells are figured; some were photographed with a digital camera attached to a Leica M80 stereo-microscope (Figs 8-10), others with a Scanning Electron Microscope Hitachi S4100, with the usual gold-palladium metallic cover (Figs 1-7).



Figs 1-7. Shells of *C. celtiberica* from the "Comunidad Valenciana" SEM photos. **1-3.** Three specimens of the Rossegadors spring (La Pobla de Benifassà, Castellón, Spain), MVHN-110714ER07. **4.** Protoconch. **5.** Microsculpture of the protoconch. **6.** Sculpture of the last whorl of the teleoconch. **7.** Sculpture of the teleoconch, ventral view.



Figs 8-10. Shell of *C. celtiberica*. **8.** Rossegadors spring (La Pobla de Benifassà, Castellón, Spain), MVHN–110714ER07. **9-10.** Vieja spring (Soria, Castilla-León, Spain), MVHN-220420YT01.

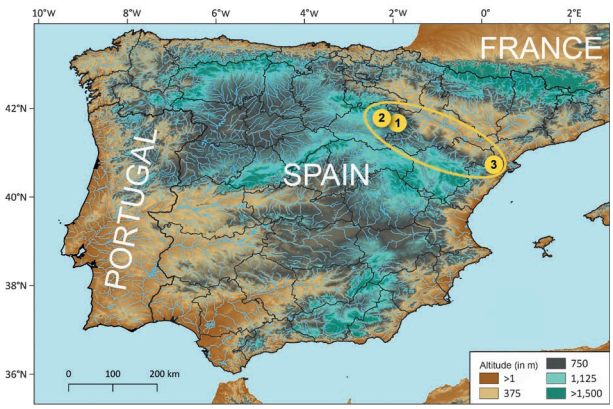


Fig. 11. Geographical distribution map of *C. celtiberica* in the Iberian Peninsula. 1 = Vieja spring (locus typicus), Ciria (Soria, Spain); 2 = Manubles river, next to "Manantial del Ojo" (Ciria, Soria, Spain); 3 = Rossegadors spring (La Pobla de Benifassà, Castellón, Spain).

	loc	n	H	D	H/D	Du	Du/D	Hap	Dap
Callot–Girardi & Boeters (2012)	l.t	30	μ=0.44	μ=1.19	μ=0.37	–	–	–	–
Callot–Girardi & Girardi (2013)	l.t	1	0.421	1.339	0.314	–	–	0.469	0.423
Callot–Girardi & Girardi (2013)	l.t	1	0.498	1.287	0.387	–	–	0.498	0.473
This work (Fig. 9)	l.t	1	0.454	1.069	0.424	0.408	0.381	0.414	0.376
This work (Fig. 10)	l.t	1	0.401	1.037	0.386	0.390	0.376	0.390	0.355
This work (Fig. 8)	PB	1	0.555	1.170	0.474	0.327	0.279	0.456	0.451
This work (Fig. 3)	PB	1	0.426	1.067	0.399	0.360	0.337	0.461	0.414
This work (Fig. 2)	PB	1	0.478	1.091	0.438	0.401	0.367	0.415	0.438
This work (Fig. 1)	PB	1	0.554	–	–	0.335	–	0.442	–
This work	PB	1	0.442	–	–	0.322	–	0.419	0.401
Pobla de Benifassà data	PB	5	μ=0.491	μ=1.109(1)	μ=0.437(1)	μ=0.363	μ=0.327(1)	μ=0.439	μ=0.426(2)
C. celtiberica total data	–	39	μ=0.447	μ=1.183(3)	μ=0.376(3)	μ=0.363(4)	μ=0.348(5)	μ=0.44(6)	μ=0.41(7)

Table 1. Measurements (in mm) obtained from *C. celtiberica* of La Pobla de Benifassà (PB), including the data published by Callot-Girardi & Boeters (2012) and Callot-Girardi & Girardi (2013) from the type locality (l.t.). D = diameter; Dap = diameter aperture; Du = diameter umbilicus; H = height; Hap = height aperture; n = number of specimens; (1) mean based on 3 specimens; (2) idem, on n=4; (3) idem, on n=37; (4) idem, on n=7; (5) idem, on n=5; (6) idem, on n=9; (7) idem, on n=8.

	n	μH	σH	μD	σD	μH/D	σH/D	μDo	σDu	μDu/D	σDu/D	μHab	σHap	μDap	σDap
Callot-Girardi & Boeters (2012)	30	0.44	0.03	1.19	0.07	0.37	0.02	–	–	–	–	–	–	–	–
Callot-Girardi & Girardi (2013) (+)	2	0.459	0.05	1.313	0.03	0.350	0.05	–	–	–	–	0.483	0.02	0.488	0.03
This work (locus typicus)	2	0.427	0.03	1.053	0.02	0.405	0.02	0.399	0.01	0.378	0.003	0.402	0.01	0.365	0.01
This work (La Pobla de Benifassà)	5	0.491	0.06	1.109(1)	0.05(1)	0.437(1)	0.03(1)	0.363	0.03	0.327(1)	0.04(1)	0.439	0.02	0.426(2)	0.02(2)

Table 2. Summary of the measurements (in mm) of the *C. celtiberica* shells. σ = standard deviation; μ = mean; (+) = the means in this line as calculated by us from the measures provided by Callot-Girardi & Girardi (2013) of two specimens; (1) mean based on 3 specimens; (2) mean based on 4 specimens. For other abbreviations see Table 1.

RESULTS

The conchological data obtained from the Rossegadors spring sample (Figs 1-8) indicates that the specimens are within the range of variability shown by Callot-Girardi & Boeters (2012) and Callot-Girardi & Girardi (2013) for *C. celtiberica*. The Rossegadors spring sample could been compared to two topotypes (Figs 9-10), confirming that the Rossegadors specimens belong to this species.

The shell of *C. celtiberica* is characterized by having a dextral, valvatiform, planorbid, discoidal shape, with up to 2-2½ whorls, a broad and deep umbilicus, and with a rounded and reflected aperture, which is projecting downwards and slightly inclined (Callot-Girardi & Boeters, 2012) (Figs 1-10). The surface of the protoconch is malleated, as is typical of valvatiform hydrobiids (Figs 4-5) (Robles, 1985; García-Flor & Robles, 1991; Bodon et al., 2001). The surface of the teleoconch presents a sculpture of fine radial pinpoint lines, being much more patent and elongated in the umbilical area; very faint and short spiral lines are present (Figs 6-7).

Regarding the dimensions of the collected shells, the mean height is μ=0.491 mm and the mean diameter is μ=1.109 mm, which is very similar to those indicated by Callot-Girardi & Boeters (2012) for the type locality population (Tables 1-2). They are also similar to the means of the two studied topotypes, μ=0.427 mm in mean height and μ=1.053 in mean diameter (Figs 9-10; Table 2). The largest specimen of the new population measures 0.555 mm in height and 1.17 mm in diameter, while Callot-Girardi & Boeters (2012) and Callot-Girardi & Girardi (2013) indicated a maximum size of up to 0.5 mm in height and up to 1.339 mm in diameter (Table 1). As for the mean of the height/diameter ratio (μH/D) obtained for the new population, it is μ=0.437 mm (n=3), while for Callot-Girardi & Boeters (2012) it is μ=0.37 mm (n=30), and the total mean for the species μ=0.376 mm (n=37) (Tables 1-2). Regarding the average dimensions of the aperture obtained for the species considering all the avail-

able data, they are μ=0.44 mm (n=9) for height, and μ=0.41 mm (n=8) for diameter (Tables 1-2). The new population presents aperture dimensions are similar to those indicated by Callot-Girardi & Girardi (2013) (Table 2), although the topotypes studied by us are somewhat smaller (Table 2). Finally, the mean height obtained for the *C. celtiberica* shell considering all the available data is μ=0.447 (n=39) with an average diameter of μ=1.183 (n=37) (Table 1). A conchological character that for the first time is studied for *C. celtiberica* is the size of the umbilicus, and its relation to the total diameter of the shell. The mean umbilicus diameter obtained is μ=0.363 mm (n=7) and corresponds to 27-37% of the total diameter of the shell (Tables 1-2).

This new locality is located on the right bank of the final section of the Ebro river basin, approximately 215 km away from the two previously known localities in Soria, which are also in the Ebro basin, but on its right bank (Fig. 11). This finding considerably expands the distribution area previously provided by Callot-Girardi & Boeters (2012), extending through the Iberian System to the southeast (Fig. 11), so it seems likely that new intermediate populations will be discovered in the near future.

CONCLUSIONS

The conchological study of the sample from the Rossegadors spring (Castellón, Spain), allows us to assign it to *C. celtiberica* Callot-Girardi & Boeters, 2012. This is the third locality known so far for this species in the Iberian Peninsula, substantially increasing its known geographical distribution in Spain. This fact is of major importance on the management of its conservation. In addition, this new locality of *C. celtiberica* allows us to increase the list of freshwater species of the rich continental malacological biodiversity of the Valencian Community, which is described by Martínez-Ortí & Robles (2003). In addition, a new species was recently described from the Rossegadros spring, namely *Spiralix tuba* Quiñonero-Salgado, Suárez & Rolan, 2019.

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