

***Navalis perforatus* a new genus and new species (Gastropoda, Hydrobiidae) from Spain**

Sergio Quiñonero-Salgado¹ & Emilio Rolán²

1Associació Catalana de Malacologia, Museu Blau, Plaça Leonardo da Vinci 4-5, 08019 Barcelona, Spain. sergioqs85@hotmail.com

2.Museo de Historia Natural, Parque Vista Alegre, Campus norte, Universidad de Santiago, 15782 Santiago de Compostela, Spain

A new species of the family Hydrobiidae (Mollusca, Gastropoda) is described, being the type species of a new genus. Its morphological characteristics are described and figured. It is also pointed out that according to bibliography, some of these characteristics have not been found in any other species, such as the presence of a prominent and strong basal keel.

Key words: Gastropoda; Hydrobiidae; new genus; new species.

***Navalis perforatus* un gènere nou i espècie nova (Gastropoda, Hydrobiidae) d'Espanya**

Es descriu una espècie nova de la família Hydrobiidae (Mollusca, Gastropoda), que és l'espècie tipus d'un gènere nou. Es descriuen i representen els seus caràcters morfològics, ressaltant la presència d'una prominent i forta quilla a la base.

Mots clau: Gastropoda; Hydrobiidae; gènere nou, espècie nova.

Introduction

The valvatiform freshwater snails are a group of non-phylogenetically related species characterized by shells with a very depressed spire, in opposition to the trochiform shells, which have a much more elevated spire. The valvatiform species belonging to the family Hydrobiidae are characterized by having shells of a small size, some of them with a high endemism, especially those with stygobiotic habitat (Bodon, Manganelli & Giusti, 1986; Boeters, 1988; Bodon, Manganelli & Giusti, 2001; Boeters & Falkner, 2003; Arconada & Ramos, 2005; Callot-Girardi & Boeters, 2012; Callot-Girardi & Girardi, 2013; Boeters, Gloer & Pesic, 2014).

In Spain, they are distributed through the South-Central and East of the peninsula and the Balearic Islands (Boeters, 1988; Ramos et al. 2000; Arconada & Ramos, 2001, 2002, 2005; Arconada, Delicado & Ramos, 2007; Boeters & Beckmann, 2007; Callot-Girardi & Boeters, 2012).

During the samplings carried out by the first author in the town of Segorbe (province of Castelló), shells

of a species with very unique characteristics were found, which are described in this work and which deserve consideration as a new species and new genus.

Material and methods

The material studied comes from the sorting of sediments collected from two springs in the town of Segorbe (Castelló) during the period 2008-2009. The sediments were obtained from the bottom of the Fuente del Hambre and the Manantial de los Gallos. They were later dried, sorted with a metallic mesh and then examined under stereomicroscope for the separation and identification of the shells. The shells were later mounted on aluminum stubs for studying with an electron microscope Quanta 200.

Abbreviations

- MZB: Museu de Ciències Naturals de Barcelona
- MNCN: Museo Nacional de Ciencias Naturales, Madrid

- MNHN: Museum Nationale d'Histoire Naturelle, Paris
- MHNS: Museo de Historia Natural, Santiago de Compostela
- UPV/EHU-FC: Colección de Fauna Cavernícola (Departamento de Zoología) de la Universidad del País Vasco-Euskal Herriko Unibertsitatea, Bilbao, Spain.
- CSQS: Collection Sergi Quiñonero-Salgado
- s: shell

Systematics

Family HYDROBIIDAE Stimpson, 1865

Genus *Navalis* gen. nov.

Type species: *Navalis perforatus* sp. nov.

Description

The most evident characteristic of this genus and that which differentiates this new species from other known valvatiform species, is the very prominent periumbilical keel, which surrounds the infundibulum and raises the edge, while leaving it not elevated dorsally, with a low spire. The prominence of this keel slightly raises the height of the shells, making them less planispiral in shape.

Etymology

The specific name derives from a Latin word (*navalis*, e) which means “naval, from the ship” alluding the presence of a very prominent basal keel, such as that found on a sailing vessel.

Remarks

The genera most closely related to *Navalis* gen. nov., both morphologically and taxonomically, belong to the Hydrobiidae family. However, some of them have a more trochiform shell and less flattened spire, such as *Horatia* Bourguignat, 1887, the first established genus for hydrobiid snails with valvatiform shell. More recently described genera are *Tarraconia* Ramos et Arconada 2000, *Boetersiella* Arconada et Ramos, 2001, and *Chondrobasis* Ramos et Arconada, 2001, also with a more elevated spire. The same applies for *Islamia* Radoman, 1973. All of these genera lack a basal keel.

In opposition, the genera *Neohoratia* Schütt, 1961, *Milesiana* Arconada et Ramos, 2006, and *Josefus* Arconada et Ramos, 2006 have a less prominent spire, but all of them have a section of their spire whorls which is completely circular, and in their umbilicus the anterior whorls can be seen without any infundibular edge or keel. Some other genera include species with a flattened or much more flattened spire, such as *Hauffenia* Pollonera, 1898, *Hadziella* Kuscer, 1932, and *Corbellaria* Callot-Girardi et Boeters, 2012, all of them lacking the projecting keel in the base.

Navalis perforatus sp. nov.

(Figure 1A-F; 2A-D)

Type material

Holotype in MZB (2016-3466). Paratypes: 2 s, MNCN (15.05 / 60179); 1 s, MNHN (IM -2000-33173); 1 s, MHNS (100624); 2 s, UPV/EHU-FC (4728); 2s, CSQS.

Type locality

Fuente del Hambre, Segorbe, Castelló, Comunitat Valenciana, Spain [30SYK11], 306 m.

Other examined material: Manantial de los Gallos, Segorbe, Castelló, Comunitat Valenciana, Spain [30SYK11], 359 m.

Etymology

The specific name alludes to the deep umbilicus present in this species.

Description

The shell is depressed, almost valvatiform, with little elevated spire, translucent and with little trochiform appearance due to a very developed last whorl. Protoconch with about one whorl and about 270 µm in diameter. The protoconch has a very fine microsculpture formed by irregular axial elevations aligned spirally in three badly defined bands, and among them there are numerous circular depressions. Teleoconch with a little more than two whorls not quickly growing, and with a shallow suture. In apertural view, the shell shows a strong, very prominent and angular basal keel, bordering a wide and deep umbilical infundibulum with almost flat walls. No microsculpture except for growth lines. The aperture is round inside but with a thin peristome and presents two angles: a superior applied to

the short space which contacts with the previous whorl, and another angle on the base, at the end of the periumbilical prominent cord. The peristome is fine and is slightly oblique in its inner part between the two angles and very convex on the outer one.

Dimensions

The holotype is 1.06 mm in diameter and 0.81 mm in height.

Habitat

Stygobiotic, all the shells were collected from sediments at the opening of the springs.

Distribution

Only known from two springs, fuente del Hambre (Type locality) and manantial de los Gallos in the type locality.

Discussion

We have not found in any of the examined literature any valvatiform species that presents such a strong and prominent basal keel.

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n=9	DM	H	H/D
Min	0.890	0.520	0.578
Mx	1.060	0.810	0.764
Av	0.938	0.642	0.683
SD	0.072	0.094	0.061
Coef. var.	0.077	0.146	0.090

TABLE 1. Dimensions of *Navalis perforatus* gen. nov., sp. nov. from type locality. Min: minimum. Mx: maximum. AV: medium. SD: standard deviation. Coef. var.: Variance coefficient. DM: diameter. H: height. n=9.

TAULA 1. Dimensions de *Navalis perforatus* gen. nov. sp. nov. de la localitat tipus. Min: mínim. Mx: màxim. AV: mitjana. SD: desviació estàndar. Coef. var.: Coeficient variació. DM: diàmetre. H: alçada. n=9.

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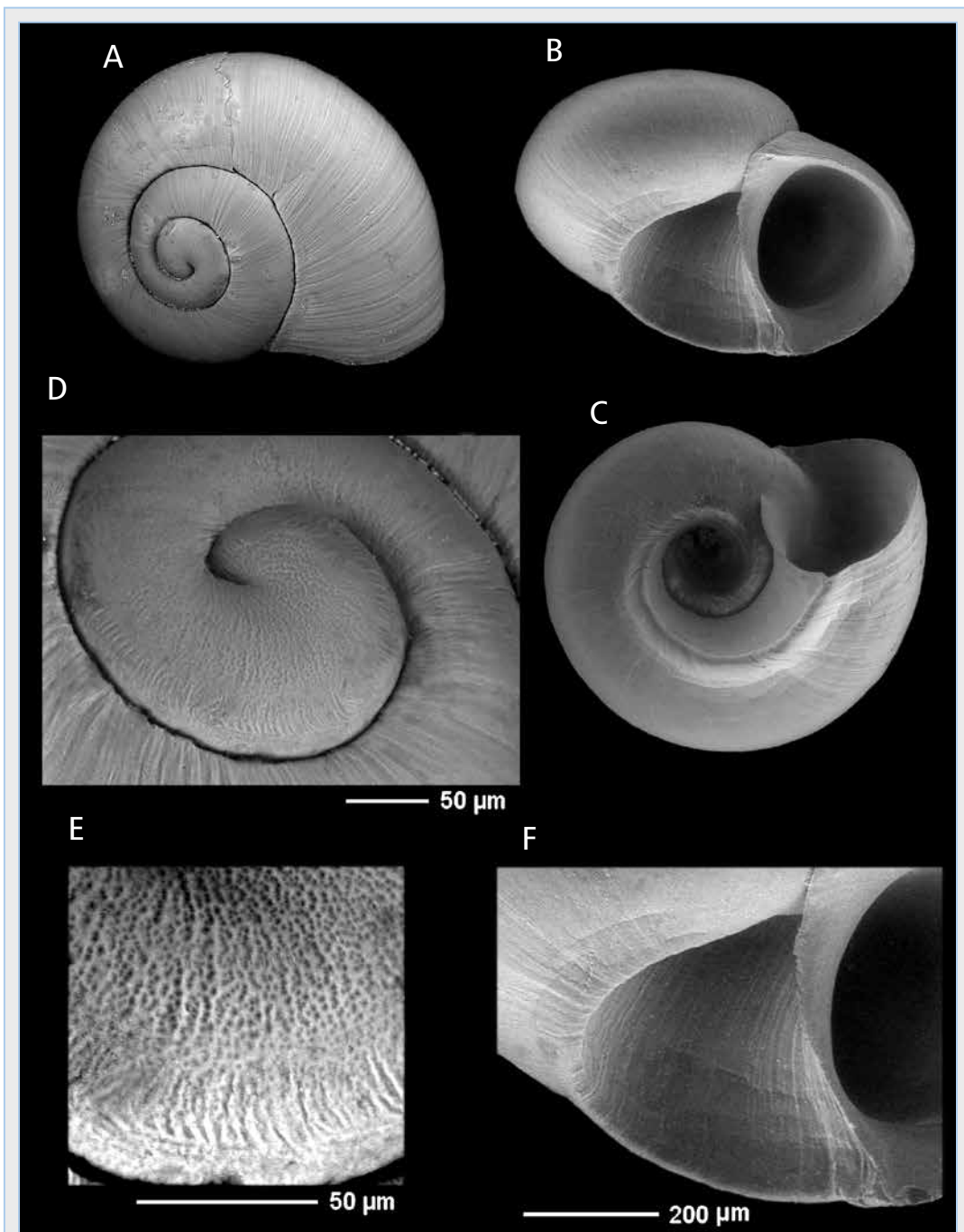


FIGURE 1. A-F: *Navalis perforatus* gen. nov. sp. nov. A: holotype, 1.06 mm (MZB); B-C: paratypes, 1.0, 1.09 mm (MNCN); D: protoconch of the holotype; E: detail of the microsculpture; F: detail of the base and the keel.

FIGURA 1. A-F: *Navalis perforatus* gen. nov. sp. nov. A: holotip, 1.06 mm (MZB); B-C: paratips, 1.0, 1.09 mm (MNCN); D: protoconquilla de l'holotip; E: detall de la microescultura; F: detall de la base i de la quilla.

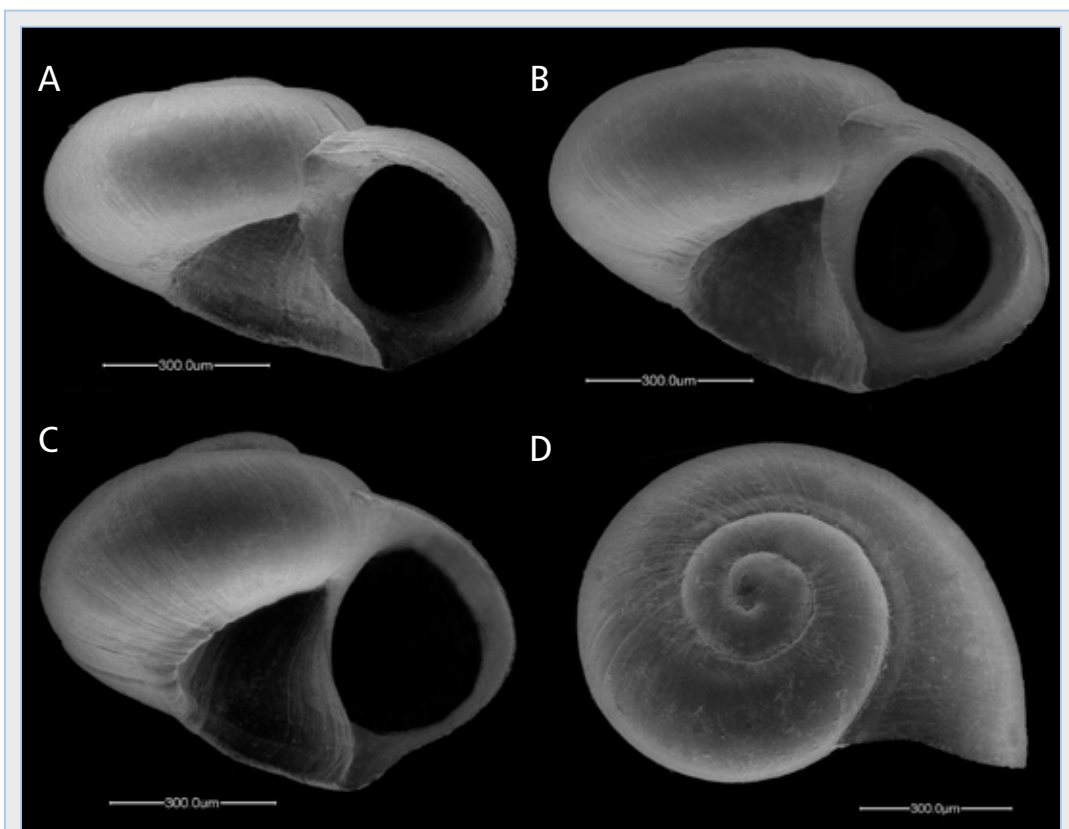


FIGURE 2. A-D: *Navalis perforatus* gen. nov. sp. nov. A-D: UPV/EHU-FC (4728); C-D: CSQS

FIGURA 2. A-D: *Navalis perforatus* gen. nov. sp. nov. A-D: UPV/EHU-FC (4728); C-D: CSQS



FIGURE 3. A: Fuente del Hambre (Type locality); B: Manantial de Los Gallos.

FIGURA 3. A: font del Hambre (Localitat tipus); B: brollador de los Gallos.