

IFRANIA BAHHOUENSIS SP. N. A NEW VALVATIFORM SNAIL (GASTROPODA, HYDROBIIDAE) FROM MOROCCO

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The genus *Ifrania* Glöer, Mabrouki et Taybi 2020 (Hydrobiidae) was recently described from Morocco; its type species is *Ifrania zerroukansis* Glöer, Mabrouki et Taybi, 2020 found in the Middle Atlas massif, geographically isolated and known for its other endemic molluscs. *Ifrania bahhouensis* sp. n. is a new valvatiform hydrobiid gastropod from Morocco; it can be distinguished from *I. zerroukansis* by the morphology of the shell and anatomical criteria. The new species was found in the northern part of Morocco, in the Sebou River basin. The aim of this paper is to describe the new springsnail species.

Key words: springsnail, narrow-ranged, endemic, Sebou River.

INTRODUCTION

The prosobranch mollusc family Hydrobiidae Stimpson, 1865 was long considered to be one of the largest gastropod families with more than 400 recent genera assigned. It turned out that the Hydrobiidae s. l. (hydrobiid-like taxa in terms of anatomical/morphological features) is made up now by several separate families next to Hydrobiidae s. s., based on molecular evidence (WILKE *et al.* 2013). The true hydrobiids are highly variable morphologically and anatomically, characterized by a closed ventral wall of the female capsule gland. Many species have pigmented coiled oviduct and/or glandular fields on the penis, which are not seen in other hydrobioid families (WILKE *et al.* 2013, GLÖER 2019).

The family Hydrobiidae *sensu stricto* (commonly known as springsnails) has received considerable attention in terms of species discoveries recently in Morocco, and it is represented by 17 genera (GLÖER *et al.* 2020a, b, BOULAAS-SAFEER *et al.* 2021, MABROUKI *et al.* 2020, 2021a, 2022, TAYBI *et al.* 2021a), among which, those who have valvatiform shape. The valvatiform snails are small species characterized typically by their tiny shells (1.0–1.5 mm) similar in shape to members of the genus *Valvata* Müller, 1773, a member of the Valvatidae family.

Most valvatiform species of the gastropod family Hydrobiidae are narrow-range in the Palaearctic (DELICADO *et al.* 2019). They are represented in Morocco by 7 species and 6 genera, as follows: *Rifiya* Ghamizi, 2020, *Islamia* Radoman, 1973, *Pikasia* Taybi, Glöer et Mabrouki, 2021, *Idresiella* Mabrouki, Glöer et Taybi, 2022, *Fessia* Glöer, Mabrouki et Taybi, 2020 and *Ifrania* Glöer, Mabrouki et Taybi, 2020. The latter genus was represented by the single species *Ifrania zerroukansis* Glöer, Mabrouki et Taybi, 2020, endemic to Lake Zerrouka, located in Ifran province. Recent field surveys conducted on the northern part of Morocco have led to the discovery of a new *Ifrania* species, the aim of this paper is to describe it.

MATERIAL AND METHODS

Sampling. Field surveys were conducted from 2014 (still ongoing), in which several localities were prospected along the northern part of Morocco, including the Atlas Mountains, Sebou and Moulouya River basins. Most of these sampling sites were visited several times. Our goal was to document maximum macroinvertebrate biodiversity in the different microhabitats prospected at each sampling site. The samples of benthic fauna were collected by a kick net and clamps. The samples have been fixed in 75% ethanol.

The dissections and measurements of the genital organs and the shells were carried out using a stereomicroscope (Leica M205C) with a digital camera (Leica DMC5400). The type material is stored in the Zoological Museum of Hamburg (ZMH).

TAXONOMY

Phylum: Mollusca Cuvier, 1795

Class: Gastropoda Cuvier, 1795

Superorder: Caenogastropoda Cox, 1960

Superfamily: Truncatelloidea Gray, 1840

Family: Hydrobiidae Stimpson, 1865

Genus: *Ifrania* Glöer, Mabrouki et Taybi, 2020

Type species: *Ifrania zerroukansis* Glöer, Mabrouki et Taybi, 2020

The valvatoid shell in *Ifrania* has a very small spire. The body whorl is very prominent and the last whorl is descendent. The first whorls are slightly convex with a clear suture. The aperture is nearly circular, and the umbilicus is wide, not covered by the last whorl. The penis is cylindrical, long and slender.

***Ifrania bahhouensis* Mabrouki, Glöer et Taybi, sp. n.** (Figs 1–6)

<https://zoobank.org/urn:lsid:zoobank.org:act:C31964E2-394C-4F92-B8B1-9D09E8CF2797>

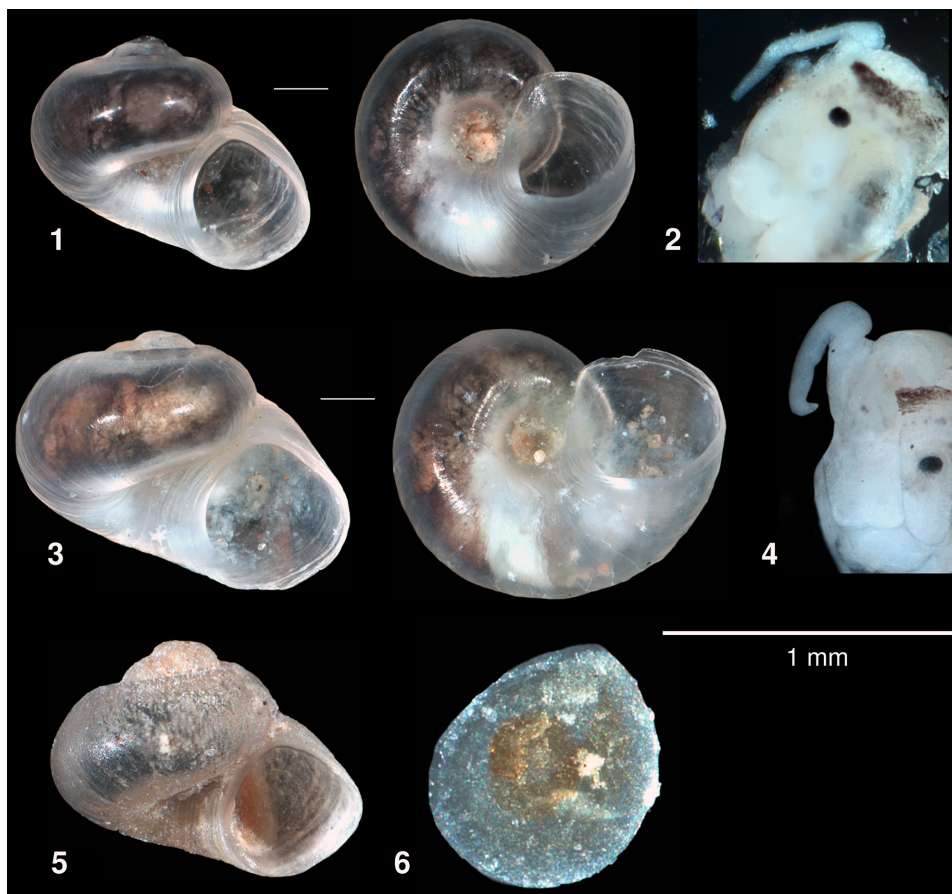
Type materials. Holotype ZMH 140917, 0.84 mm high, 1.07 mm broad, 3 paratypes ZMH 140918 from spring 1, 4 paratypes Paratype ZMH 140919 from spring 2

Type locality. Spring 1, 07/03/21 and 24/10/21, 33°55'12.4"N 4°40'20.7"W, Zaouiat Sidi Ben Aïssa, Fez-Boulemane region. Spring 2, 24/10/21, 33°53'07.0"N 4°41'24.9»W, Zaouiat Sidi Ben Aïssa, Fez-Boulemane region.

Description. Shell. The valvatiform translucent shell is conical with a small spire and a prominent body whorl. The surface is smooth and glossy (Figs 1, 3, 5). The 3.5 whorls are convex with a triangular rounded aperture. The peristome is sharp, the umbilicus is deep and open, not covered by the aperture. The shell is 0.84–0.91 mm high and 1.07–1.19 mm broad (see Table 1).

Animal. The mantle is black with a white border. Eye spots are pigmented. The penis is long and slender with an acute penis tip (Figs 2, 4).

Operculum. The translucent, colourless operculum (with a slightly orange nucleus) is ovate with a rounded angle at the top (Fig. 6). There is no peg.



Figs 1–6. *Ifrania bahhouensis* sp. n.: 1 = holotype; 3, 5 = paratypes; 5 = dried shell; 2–4 = penis in situ; 6 = operculum

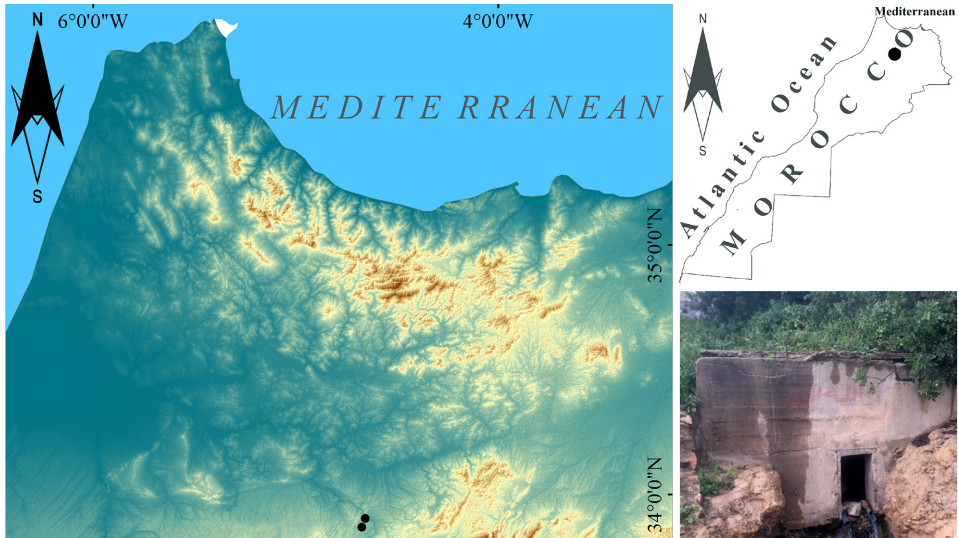
Table 1. The shell measurements of *Ifrania bahhouensis* sp. n.

	Min	Max	Mean	SD
Shell height (SH)	0.79	0.88	0.84	0.05
Aperture height (ah)	0.41	0.46	0.44	0.03
Spire height (sh)	0.38	0.42	0.4	0.02
Shell width (SW)	1.07	1.17	1.11	0.05
Aperture width (aw)	0.43	0.48	0.45	0.03

Differential diagnosis. The new species is little similar to *Ifrania zerroukensis* from Ifran province, but *I. zerroukensis* is much larger (1.1 mm high and 1.5 mm in diameter), and the penis in *I. zerroukensis* is longer, widened at the basis and tapered at the distal end with a pointed penis tip. In addition, *I. zerroukensis* has yellowish ovate and slightly concave operculum with an orange nucleus, *Ifrania bahhouensis* sp. n. has translucent, colourless operculum, ovate with rounded angle at the top.

Etymology. The species was named after Prof. Bahhou Jamila (University Sidi Mohamed Ben Abdellah), in recognition for the many years of teaching generations at Dhar El Mahraz Faculty of Sciences of Fez and for her scientific works carried out on the aquatic ecosystems of Morocco and particularly those of Sebou River basin.

Habitat. The new species was found in two springs located at a place named Zaouiat Sidi Ben Aïssa, Fez-Boulemane region. One of them is a rheocrenous natural spring, the bottom consists of stones, pebbles and sand, the

**Fig. 7.** The sampling sites and habitat of *Ifrania bahhouensis* sp. n.

banks are natural, with dense tree-lined vegetation and weak sunlight. The second spring is partially modified (Fig. 7), located in a rural environment, it is subjected to strong anthropogenic pressure: washing of linen, pumping of water for irrigation and domestic use, the vegetation of the banks is very heterogeneous and highly disturbed. Both springs are located in Sebou River basin at the edge of Barrage Allal El Fassi reservoir at 419 m altitude.

DISCUSSION

Morocco is situated at the extreme north-west of Africa, on the Atlantic and the Mediterranean and has an area of 710.850 km². It is divided into a Mountainous area (Atlas and the Rif), the Atlantic area (plateau and plains) and a vast arid area composed of plateaus and small mountains (eastern and Saharan area). This has resulted in a high diversity of ecoregions related to Mediterranean-type climates, promoting great biodiversity while at the same time offering significant socioeconomic benefits (USAID/Morocco 2008, CHILLASSE *et al.* 2001, TAYBI *et al.* 2020, EL MORABIT *et al.* 2022).

Knowledge of the valvatiform Hydrobiidae fauna of Morocco has advanced significantly in recent years, with many new species added recently, including genera new to science (GLÖER *et al.* 2020*a, b*, MABROUKI *et al.* 2021*b*, TAYBI *et al.* 2021*b*). Considering the high number of Hydrobiidae that occurs in adjacent areas (e.g., ~60 hydrobiid species listed in 18 genera are known from the Iberian Peninsula of which 11 genera are valvatiform (DELICADO *et al.* 2019), the number of springsnail species known to occur in Morocco will probably increase with further intensified studies and collecting expeditions, which are an urgent need.

Unfortunately, due to the great pressure on natural ecosystems, especially aquatic ones, many species will probably have disappeared before being recorded or even described. These wetlands present many socio-economic and biodiversity issues associated with multiple ecosystem services such as the provision of drinking and irrigation water, natural resources as well as hydrological regulation. In addition to climate change, they experience significant anthropogenic pressures, summed up in agriculture intensification, solid and liquid pollution, and unsuitable developments. Justifying, therefore, the implementation of conservation measures and adaptive management strategies to protect the autochthonous fauna and its natural habitats. Finally, we suggest the inclusion of all the crenobiotic valvatiform species of Morocco in the IUCN Redlist.

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Acknowledgements – We are grateful to the two anonymous reviewers for valuable comments.

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Revised version submitted June 17, 2022; accepted July 12, 2022; published October 28, 2022

