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## A new genus and two new species (Gastropoda, Hydrobiidae) from Morocco

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### Abstract

From 2014 to 2019 at more than 100 localities freshwater molluscs were collected along the basin of Moulouya River and Oriental Region of Morocco. These samples revealed two new hydrobiid species which are described here. One new species of *Islamia* and one species of a new genus. Photos of the holotypes are presented in addition to the penis morphology of the new genus and a map of the sampling area with the type localities.

**Key words:** Morocco, Gastropoda, Hydrobiidae, new species.

### Introduction

Only a few hydrobiid genera are known from Morocco, most of these also occur in Europe. These are *Hydrobia* W. Hartmann, 1821, *Ecrobia* Stimpson, 1865, *Peringia* Paladilhe, 1874, *Heideella* Backhuys & Boeters, 1974, *Mercuria* Boeters, 1971, and *Pseudamnicola* Paulucci 1878. If the genus *Iglica* A.J.Wagner, 1927 occurs in Morocco must be questioned. The description of *Iglica seyadi* Backhuys & Boeters, 1974 has been done by the shells only and the shell looks very different to other *Iglica* spp. from the Balkans. Recently *Iglica soussensis* Ghamizi & Boulal 2016 has been described from Morocco, unfortunately the authors overlooked the description of *Sorholia* Boeters & Falkner, 2009, described from the Pyrenees, to which this species possibly belongs. Also recently the genus *Atebbania* Ghamizi, Bodon & Giusti 1999 has been described from Tiznit, Morocco.

In 2017 Khalloufi et al. described the genus *Bullaregia* with the type species *Bullaregia tunisiensis* Khalloufi, Béjaoui & Delicado 2017 from Tunisia. A similar looking species has been found by Taybi AF & Mabrouki Y in Morocco, the shells and anatomy are different from *Bullaregia*, so it will be described here as a new genus. In addition a new species of *Islamia* has been found and is described below as new for science.

For instance, in the neighbouring country Algeria we know 15 *Pseudamnicola* spp. and 5 *Mercuria* spp. Summarized we can say that the hydrobiids of Morocco are not well studied yet and ongoing investigations will reveal more new genera and species.

**Table 1** The list of the hitherto known hydrobiid species of Morocco.

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<i>Attebania bernasconii</i> Ghamizi et al., 1999
<i>Belgrandia wiwanensis</i> Ghamizi (1998)*
<i>Giustia bodoni</i> Ghamizi, 1998
<i>Giustia costata</i> Ghamizi, 1998
<i>Giustia gofasi</i> Ghamizi, 1998
<i>Giustia janai</i> Ghamizi, 1998
<i>Giustia mellalensis</i> Ghamizi, 1998
<i>Giustia midarensis</i> Ghamizi, 1998
<i>Giustia saidai</i> Ghamizi, 1998
<i>Heideella andreae</i> Backhuys & Boeters, 1974
<i>Heideella knidirii</i> Ghamizi, 1998
<i>Heideella salahi</i> Ghamizi (1998)*
<i>Horatia aghbalensis</i> Ghamizi (1998)*
<i>Horatia haasei</i> Ghamizi (1998)*
<i>Hydrobia gracilis</i> Morelet, 1880
<i>Hydrobia recta</i> (Mousson, 1874)
<i>Iglica soussensis</i> Ghamizi, 1998
<i>Iglica seyadi</i> Backhuys & Boeters 1974
<i>Pseudamnicola leprevieri</i> (Pallary, 1926)
<i>Pseudamnicola pallaryi</i> Ghamizi, Vala & Bouka, 1997
<i>Mercuria targouasensis</i> Glöer, Boeters & Walther 2015
<i>Mercuria tingitana</i> Glöer, Boeters & Walther 2015
<i>Mercuria bakeri</i> Glöer, Boeters & Walther 2015

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\*These species have been described by Ghamizi 1998 in his PhD dissertation as nomina nuda (van Damme & Ghamizi 2010).

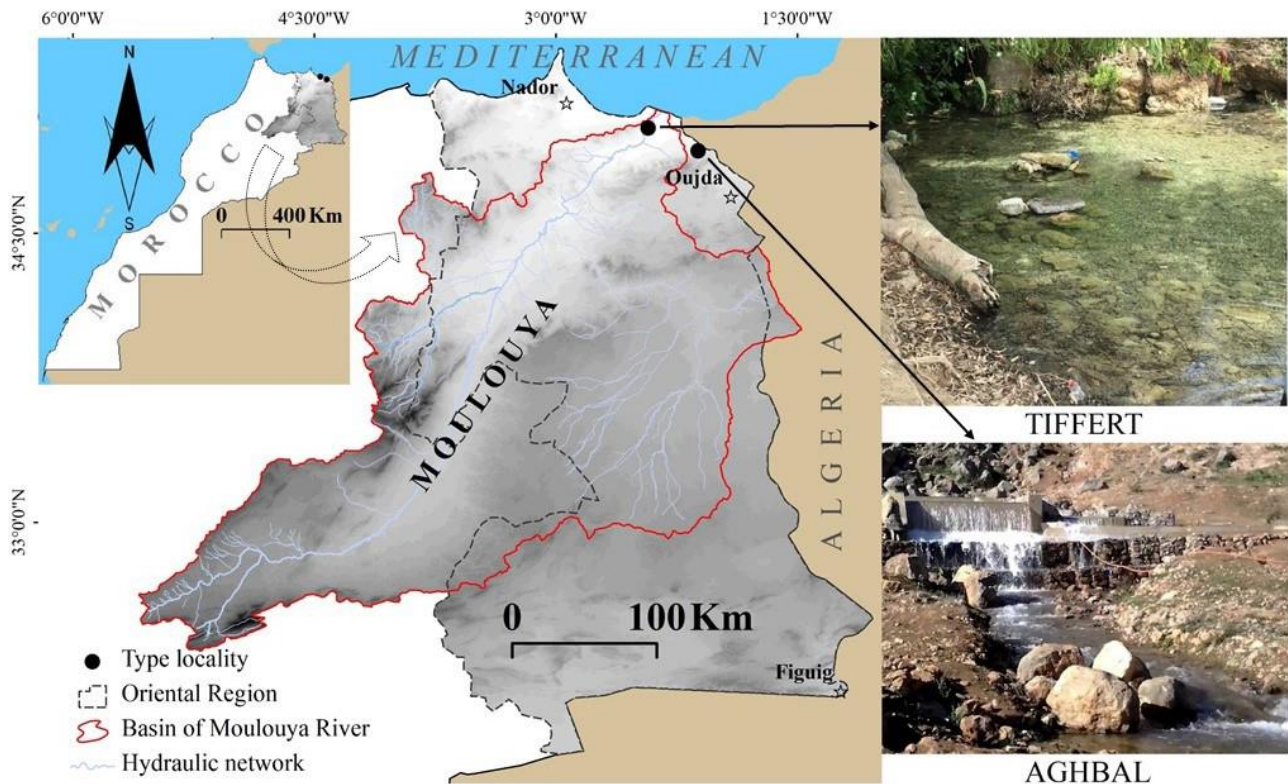
## Material and methods

**Sampling.** Field surveys were conducted from 2014 to 2019, in which more than 100 localities were collected along the basin of Moulouya River and Oriental Region of Morocco. 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% ethanole.

The dissections and measurements of the genital organs and the shells were carried out using a stereo microscope (ZEISS); the photographs were made with a digital camera system (Leica R8). The type material is stored in the Zoological Museum of Hamburg (ZMH).

## Study Area

Morocco is currently divided into 12 regions, including the Oriental Region (Fig. 1), which occupies almost all the eastern side of the country and covers an area of 90,127 km<sup>2</sup> (see Taybi et al. 2017 for details). The Oriental Region includes the wilaya of Oujda (Oujda-Angad prefecture) and the provinces of Berkane, Driouch, Figuig, Guercif, Jerada, Nador and Taourirt. The watershed of the Moulouya (Fig. 1), which includes nearly 43,412 km<sup>2</sup> of eastern Morocco, covers much of the Oriental Region. With a length of 600 km, the Moulouya is the largest Moroccan river flowing into the Mediterranean. The main tributaries are the Oued Ansegmir, Oued Melloulou, Oued Za and Oued Msoun, all permanent. Other tributaries are intermittent (3–5 flashfloods on average per year) (Taybi et al., 2016; Mabrouki et al., 2019).



**Figure 1.** Location of the Oriental Region of Morocco and the basin of Moulouya River with the type localities.

## Results

The first new species is a valvatoid hydrobiid snail, possibly a member of the genus *Islamia*, which also inhabits Northern Spain (Asturias and Catalonia). Unfortunately only a few empty shells could be found that it was not possible to study the anatomy.

As hydrobiid species are characterized by the penis morphology in combination with the shell shape (Szarowska 2006), the second species which has been found could be assigned to a new genus.

### Genus *Islamia* Radoman, 1973

Type species: *Hydrobia valvataeformis* Möllendorf, 1873.

The shell is valvatiform with a roundish-ovoid aperture and a sharp outer lip. Species of the genus occur in the Balkan Peninsula, Turkey (Radoman 1983), Italy (Cossigniani 1995), France (Falkner et al. 2002) and Spain (Bank & Neubert 2018). The species of *Islamia* are usually endemic to their type locality. Thus we daresay that the *Islamia* from Morocco is a new species.

### *Islamia tiffertiensis* n. sp.

**Material examined:** 4 empty shells from type locality.

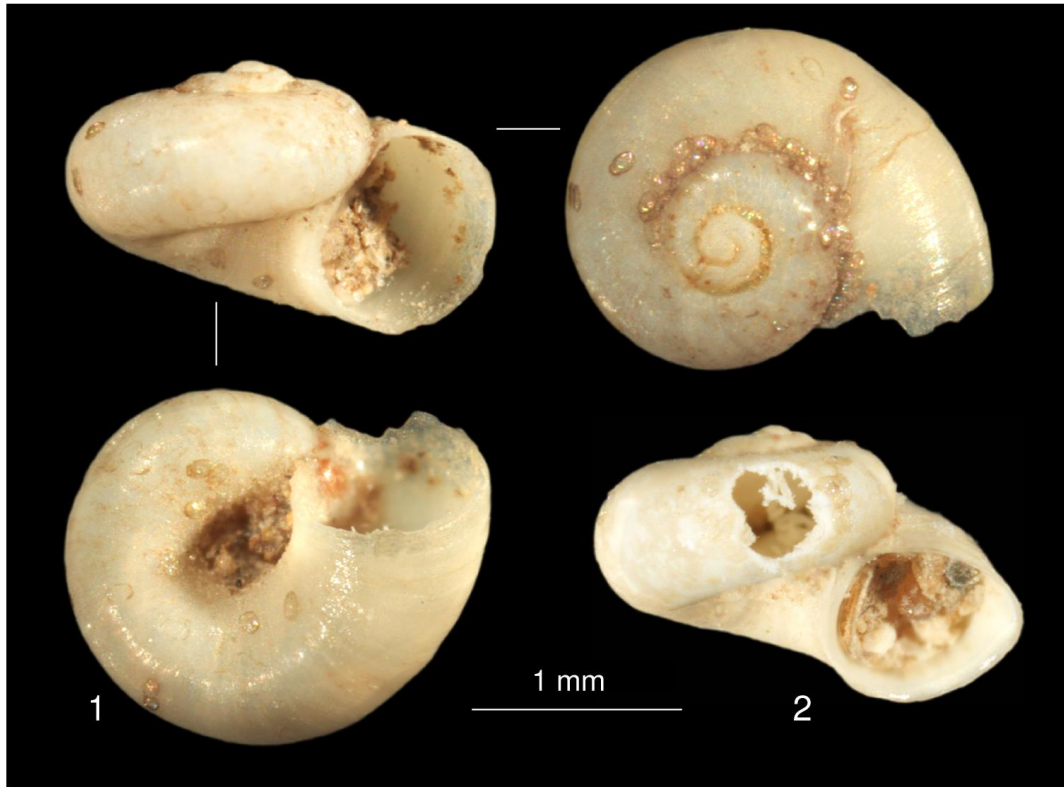
**Holotype:** empty shell, 0.8 mm high and 1.3 mm broad, from type locality, ZMH 140648.

**Paratypes:** 3 empty shells from type locality, ZMH 140649

**Locus typicus:** Tifert, 35° 2' 16.800" N 2° 25' 36.000" W, 29.10.2019 leg.

**Habitat:** Tiffert is a rheocenous spring (flows directly on the ground) located at an altitude of 7 m, and flows into a large basin before joining the Moulouya River at about 50m. The banks are natural, with a dense tree-lined vegetation on the banks and weak sunlight. The grain size of the bottom consists of blocks, stones, pebbles and a lot of plant debris. Located in a rural environment, it is subjected to strong anthropic pressure: washing of linen, pumping of water for irrigation and domestic use.

**Etymology:** named after the sampling site.



**Figure 2** The shell of holotype (1) and paratype (2) of *Islamia tifertiensis* n. sp.

**Description:** The light corneous glossy shell is valvatoid, conical with a very short spire and a very prominent inflated body whorl. The 3.5 whorls are fast growing, the apex is blunt. The aperture is nearly circular, at the top attached to the shell wall over a short distance with a rounded angle. The umbilicus is wide, not covered by the last whorl. The shell is 0.8 mm high and 1.3 mm broad.

**Associated species:** *Aghbalia aghbalensis* n. gen. n. sp.

**Distribution:** only known from type locality.

### Genus *Aghbalia* n. gen.

**Type species:** *Aghbalia aghbalensis* n. gen. n. sp.

**Diagnosis:** Characteristic is the reddish-brown shell with the aperture which border is sinuated from lateral view. In addition the penis has two penial appendices.

*Aghbalia aghbalensis* n. gen. n. sp.

**Material examined:** 1 holotype, 54 paratypes in ethanol, from type locality; 35 in ethanol from locality (2), 2 x penis in ethanol.

**Holotype:** shell 1.9 mm high and 0.9 mm broad from type locality, dried, ZMH 140650.

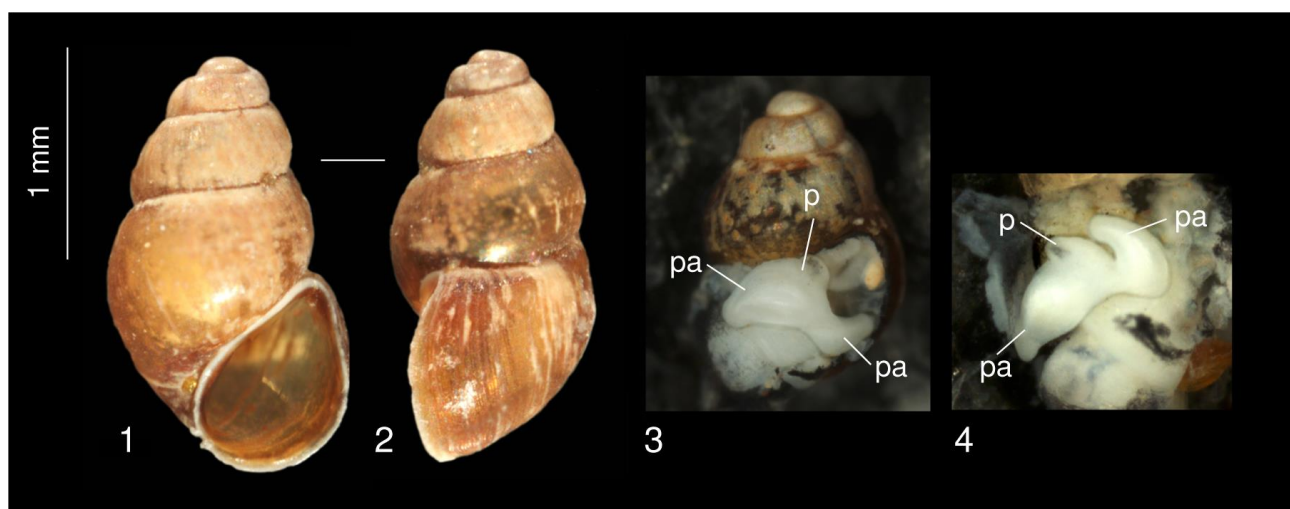
**Paratypes:** 34 paratypes in ethanol from type locality, ZMH 140651, 35 in ethanol from locality (2), ZMH 140655, 10 in ethanol from type locality in coll. Glöer and 10 specimens in coll. Mabrouki.

**Locus typicus:** (1) Aghbal, 34° 55' 14.000" N 2° 6' 52.500" W, 29.10.2019 leg., (2) Tifert, 35° 2' 16.800" N 2° 25' 36.000" W, 29.10.2019 leg.

**Habitat:** located in the Oued Aghbal River basin at an altitude of 292 m, the Aghbal locality is a fully developed Rheocenous spring, water is routed through concrete pipes to a small retention basin before being redistributed again for domestic and agricultural purposes. Generally, in Eastern Morocco, Springs are highly influenced and subjected to a great anthropic pressure considering the scarcity of fresh water (Mabrouki et al., 2017b).

**Etymology:** named after the type locality.





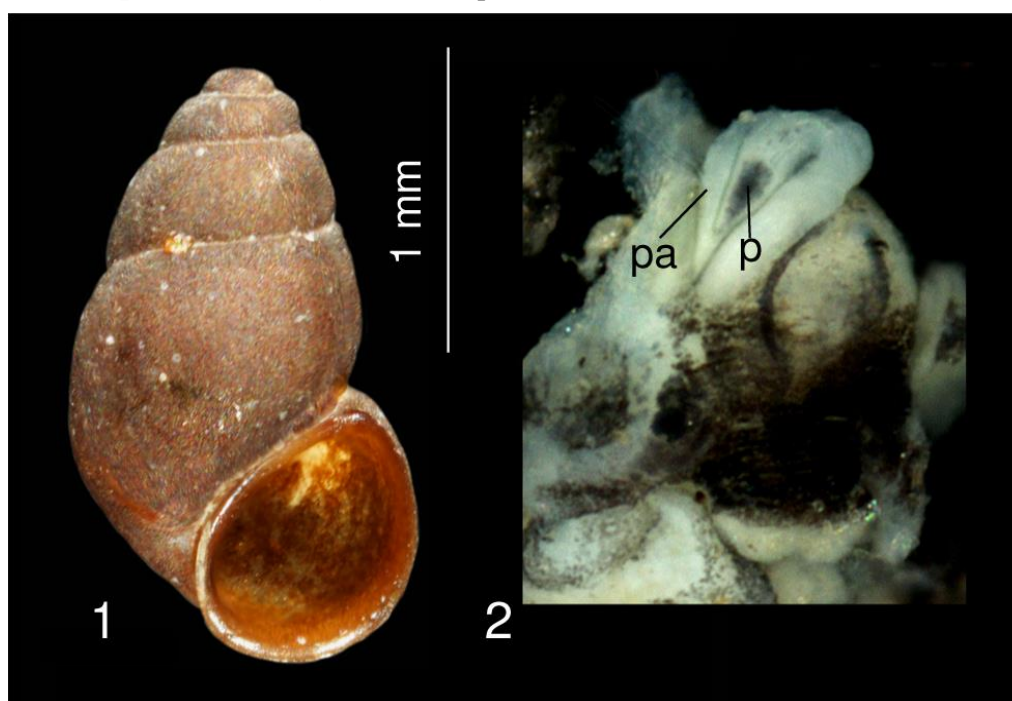
**Figure 3.** *Aghbalia aghbalensis* n. gen. n. sp., 1: holotype, 2-3: penis.

**Description:** The reddish brown shell is ovate with 3.5-4 slightly convex whorls which are separated by a weak suture. The aperture is ovate, tapered at the top. The peristome is sharp, from lateral view sinuated. The umbilicus is closed. The shell is 1.9 mm high and 0.9 mm broad.

**Male copulatory organ:** The penis (part with the dark spot) has two large appendices.

**Differential diagnosis:** The similar looking species from Tunisia, described as *Bullaregia tunisiensis* Khalloufi, Béjaoui & Delicado 2017, has a straight border of the aperture from lateral view. The penis is long and slim and has only one penial appendix.

**Associated species:** *Islamia tifertiensis* n. sp.



**Figure 4.** *Bullaregia tunisiensis*, Tunisia. p = penis, pa = penial appendix.

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