

## ***Idrisiella bourkaizensis* gen. et sp.n., a new valvatoid snail (Gastropoda: Hydrobiidae) from Morocco**

**Youness Mabrouki<sup>1</sup>, Peter Glöer<sup>2</sup>, Abdelkhaleq Fouzi Taybi<sup>3</sup>**

<sup>1</sup> Université Sidi Mohamed Ben Abdellah, Faculté des Sciences de Dhar El Mehraz, Laboratoire de Biotechnologie, Conservation et Valorisation des Ressources Naturelles, Fes, Morocco. e-mail: younes\_mab@hotmail.fr

ORCID ID: <https://orcid.org/0000-0002-7336-8717>

<sup>2</sup> Schulstr. 3, D-25491 Hetlingen, Germany; e-mail: gloeer@malaco.de

ORCID ID: <https://orcid.org/0000-0001-6995-3641>

<sup>3</sup> Université Mohammed Premier, Faculté Pluridisciplinaire de Nador, Équipe de Recherche en Biologie et Biotechnologie Appliquées. Morocco. E-mail: taybiaf@gmail.com / a.taybi@ump.ac.ma  
ORCID ID: <http://orcid.org/0000-0001-9652-5407>

**ABSTRACT.** *Idrisiella bourkaizensis* gen. et sp.n. is a new valvatiform hydrobiid gastropod from Morocco; it can be distinguished by the morphology of the shell and anatomical criteria. The new genus and species was found in the northern part of Morocco, in the border of the Middle Atlas massif, which is a geographical barrier known for its other endemic molluscs, and a place of high interest for the crenobiotic malacofauna.

How to cite this article: Mabrouki Y., Glöer P., Taybi A.F. 2022. *Idrisiella bourkaizensis* gen. et sp.n., a new valvatoid snail (Gastropoda: Hydrobiidae) from Morocco // Invert. Zool. Vol.19. No.1. P.18–23. doi: 10.15298/invertzool.19.1.03

**KEY WORDS:** Middle Atlas, micro-endemic, crenobiotic, new taxa.

## ***Idrisiella bourkaizensis* gen. et sp.n., новый моллюск-катушка (Gastropoda: Hydrobiidae) из Марокко**

**Ю. Мабруки<sup>1</sup>, П. Глёр<sup>2</sup>, А.Ф. Тайби<sup>3</sup>**

<sup>1</sup> Université Sidi Mohamed Ben Abdellah, Faculté des Sciences de Dhar El Mehraz, Laboratoire de Biotechnologie, Conservation et Valorisation des Ressources Naturelles, Fes, Morocco. e-mail: younes\_mab@hotmail.fr

<sup>2</sup> Schulstr. 3, D-25491 Hetlingen, Germany; e-mail: gloeer@malaco.de

<sup>3</sup> Université Mohammed Premier, Faculté Pluridisciplinaire de Nador, Équipe de Recherche en Biologie et Biotechnologie Appliquées. Morocco. E-mail: taybiaf@gmail.com ; a.taybi@ump.ac.ma

**РЕЗЮМЕ.** Описан *Idrisiella bourkaizensis* gen. et sp.n. — новый моллюск-катушка из Марокко, отличающийся по морфологии раковины и анатомическим критериям. Новый род и вид найдены в северной части Марокко, в интересном для кренобиотической малакофауны локалитете и на границе горного массива Средний Атлас, который является географическим барьером для других эндемичных моллюсков.

Как цитировать эту статью: Mabrouki Y., Glöer P., Taybi A.F. 2022. *Idrisiella bourkaizensis* gen. et sp.n., a new valvatoid snail (Gastropoda: Hydrobiidae) from Morocco // Invert. Zool. Vol.19. No.1. P.18–23. doi: 10.15298/invertzool.19.1.03

**КЛЮЧЕВЫЕ СЛОВА:** Средний Атлас, микро-эндемик, кренобиотик, новые таксоны.

## Introduction

Hydrobiidae family (or Hydrobiids) is spread worldwide; it is one of the largest and the most diverse gastropod families among freshwater molluscs throughout the Mediterranean region (Cuttelod *et al.*, 2011; Gloër, 2019). Hydrobiidae species are dioecious gill-breathing snails, characterised, in general, by their small size together with a smooth shell and a horny operculum, most species are obvious crenophiles, typically found in river sources and springs, but they can also live in brackish habitats (Oscoz *et al.*, 2011).

This family contains a few genera in freshwater known commonly as springsnails; they are small species characterized typically by their tiny shells (1.0–1.5 mm) with depressed valvatoid form. Indeed, valvatoid or valvatiform is an old term used to group the small freshwater Hydrobiidae that have relatively low-spired shells similar in shape to members of the genus *Valvata* Müller, 1773, a member of Valvatidae family. The species of this group are highly endemic and phylogenetically not related (Radea *et al.*, 2018). At least, about 37 valvatiform genera have been described so far in Europe (Boeters *et al.*, 2019; Delicado *et al.*, 2019).

To date, six valvatiform hydrobiid species live in the freshwater habitats of Morocco, and five of them, namely *Ifrania zerroukansis* Glöer, Mabrouki et Taybi, 2020, *Fessia aouintii* Glöer, Mabrouki et Taybi, 2020, *Pikasia smenensis* Taybi, Glöer and Mabrouki, 2021, *Islamia tiferitensis* Glöer, Mabrouki et Taybi, 2020 and *I. karawiyiensis* Mabrouki, Glöer et Taybi, 2021, are crenobiotic, narrow-ranged species and endemic to their type localities (Glöer *et al.*, 2020a,b; Mabrouki *et al.*, 2021a; Taybi *et al.*, 2021a). In this paper, we aim to describe a new valvatiform genus and species found recently in northwestern Morocco.

## Material and methods

New field surveys were conducted through the northern part of the country, exactly in the border of the Middle Atlas massif, a mountain

range stretching over some 350 km, located between the Rif and the High Atlas, covering a total area of 2.3 million hectares, or 18% of the altimountain domain of this country. The samples of benthic fauna (including gastropods) 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 stereo microscope (Leica M205C); Photos are made with a Leica M205C Microscope with a digital camera Leica DMC5400. The type material is stored in the Zoological Museum of Hamburg (ZMH).

## Results

The shell structure and anatomical characters of specimens collected from the Middle Atlas border in northern Morocco (Fig. 6) are different from the other valvatoid Hydrobiidae Moroccan species (usually endemic to their type localities), which make it possible to be assigned to a new genus. It should be stated that hydrobiid species are characterized by the penis morphology in combination with the shell shape (Szarowska, 2006).

Phylum Mollusca Cuvier, 1795

Class Gastropoda Cuvier, 1795

Superorder Caenogastropoda Cox, 1960

Superfamily Truncatelloidea Gray, 1840

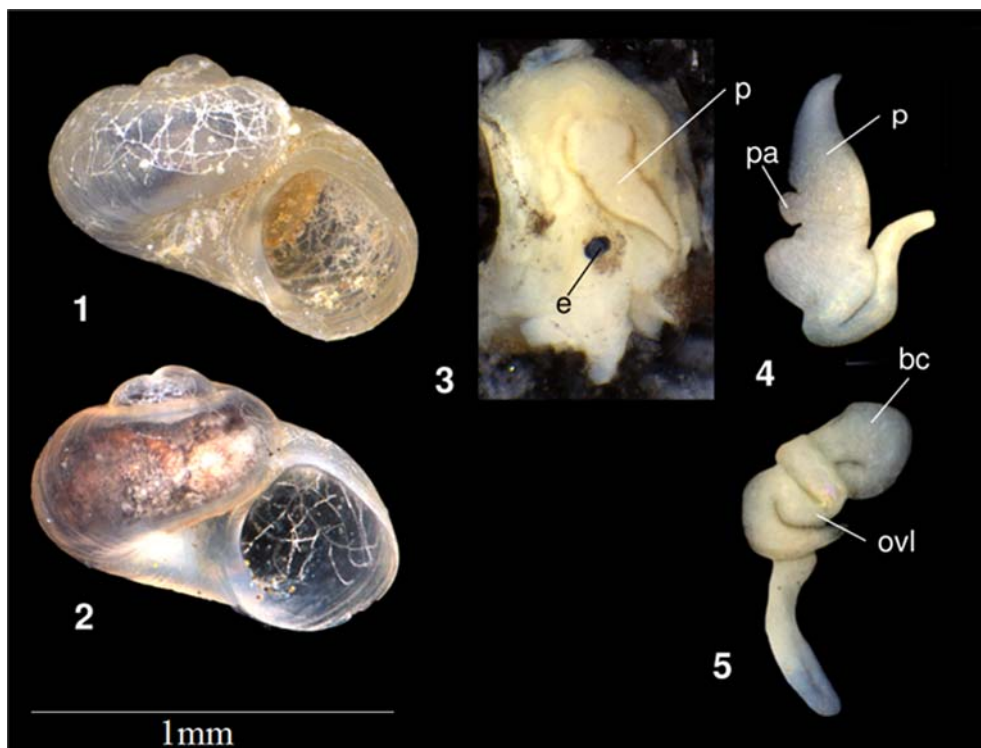
Family Hydrobiidae Stimpson, 1865

*Idrisiella* gen.n.

TYPE SPECIES: *Idrisiella bourkaizensis* sp.n. (see description below).

DESCRIPTION: The new taxa is clearly distinguished by the following combination of characters: the translucent shell is valvatoid with a wide-open umbilicus. The triangular penis has a bulbous basis, with a small outgrowth on the left side (Fig. 4). Shell shape and penis morphology define the new genus.

DIFFERENTIAL DIAGNOSIS: The new genus can be distinguished from its Moroccan congeners by its triangular penis. *Pikasia smenensis* Taybi, Glöer et Mabrouki, 2021 (endem-



Figs 1–5. *Idrisiella bourkaizensis* gen. et sp. n. 1 — holotype, 2 — paratype, 3 — penis in situ, 4 — penis, 5 — female sex tract.

Abbreviations: bc — bursa copulatrix, e — eye, ovl — oviductula loop, p — penis, pa — penial appendix.

Рис. 1–5. *Idrisiella bourkaizensis* gen. et sp. n. 1 — голотип, 2 — паратип, 3 — пенис in situ, 4 — пенис, 5 — женский половой канал.

Сокращения: bc — bursa copulatrix, e — глаз, ovl — петля овидуктулы, p — пенис, pa — вырост пениса.

ic to Ain Chqef and Smen springs) is with a simple penis, broad and elongate flat with an acute penis tip, the distal part of the penis with an elongated triangular blackish spot. *Ifrania zerroukansis* Glöer, Mabrouki et Taybi, 2020 (endemic to Lake Zerrouka) has long and slender cylindric penis, widened at the basis and tapered at the distal end with a pointed penis tip. *Fessia aountii* Glöer, Mabrouki et Taybi, 2020 (endemic to Aouinat El Hajjaj spring) has small and flat penis with a broad basis and tapered at the distal end. *Rifia yacoubii* Ghamizi, 2020 (subterranean) has a penis with two small non-glandular lobes and without stylet. From the other *Islamia* species, the new genus can be distinguished by the penis which is bilobed in *Islamia*.

ETYMOLOGY: The new genus *Idrisiella* is named after the medina of Fez which was the capital founded by the Idrisid dynasty between 789 and 808 of our era. Listed since 1981 as a UNESCO World Heritage Site, Fez was indeed, until 1912, the capital of the Kingdom of Morocco.

*Idrisiella bourkaizensis* sp. n.

Figs 1–5.

**Holotype:** ZMH 140901, from Ain Bourkaiz, Moulay Yacoub province, (33°55'13.8"N 5°05'18.0"W), shell measurements: Shell height (SH) = 0.8 mm; aperture height (ah) = 0.55 mm; spire height (sh) = 0.3 mm; shell width (SW) = 1.0 mm; aperture width (aw) = 0.5 mm.

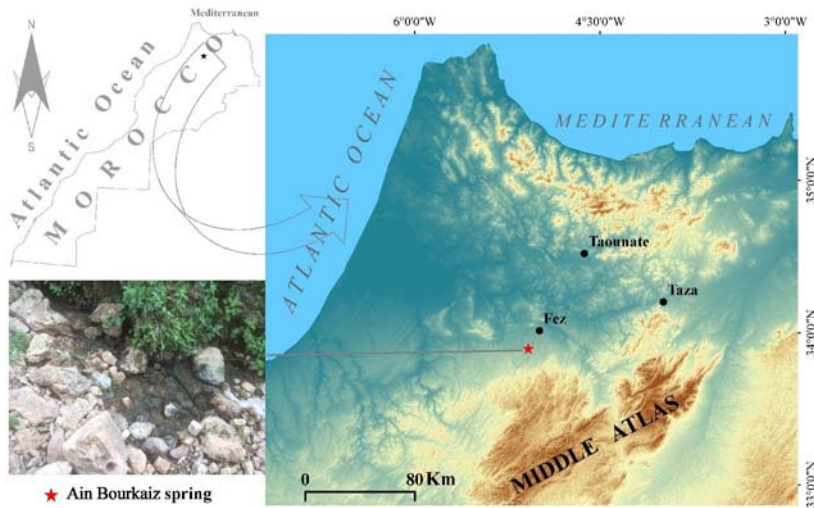


Fig. 6. The sampling site and habitat of *Idrisiella bourkaizensis* gen. et sp.n.  
 Рис. 6. Место сбора и биотоп *Idrisiella bourkaizensis* gen. et sp.n.

**Paratypes:** 5 specimens ZMH 140902, from Ain Bourkaiz, Moulay Yacoub province, (33°55' 13.8"N 5°05'18.0"W)

**Description:** The valvatoid shell is translucent with 3.5–4 fast growing whorls (Fig. 1). The apex is small and blunt. The aperture is ovate with a sharp peristome. The umbilicus is wide and open. The shell is 0.8 mm high and 1mm broad.

**General appearance:** The mantle is black. The tentacles are long and white, dark around the eyes. The operculum is reddish brown. Dark eyespots are visible (Fig. 3).

**Anatomy:** The penis has a bulbous basis; the penis itself is flat and triangular with a small outgrowth on the left side (Fig. 4). The female sex tract has a J-shaped bursa copulatrix and a coiled oviduct (Fig. 5). A receptaculum could not be found.

**Etymology:** The specific name *bourkaizensis* refers to the type locality Ain Bourkaiz spring.

**Habitat:** Ain Bourkaiz is a large spring located at Moulay Yacoub province, about 14 km west of the city of Fez at an altitude of 540 m. A big part of the spring is arranged to supply drinking water. However, other small sources not reached by the arrangement still flowing

naturally and feed the Bourkaiz River, where the new taxa can be found (Fig. 6). The water flows through a stony bottom before entering a large swamp.

*Idrisiella bourkaizensis* gen. et sp.n. was found with different invertebrate aquatic species: *Melanopsis premorsa* (Linnaeus, 1758) s.l., *Theodoxus fluviatilis* (Linnaeus, 1758) (Mollusca); *Dugesia gonocephala* (Girard, 1850) s.l. (Tricladia); *Limnatis nilotica* (Savigny, 1822) (Hirudinea); *Gammarus maroccanus* Fadil et Dakki, 2001 (Amphipoda); *Potamon algeriense* (Herbst, 1785) s.l. (Decapoda); *Calopteryx haemorrhoidalis* (Vander Linden, 1825) (Odonata, larvae); *Tinodes* sp., *Hydropsyche* sp. (Trichoptera, larvae); *Baetis* sp. (Ephemeroptera, larvae).

## Discussion

*Idrisiella bourkaizensis* gen. et sp.n. can be distinguished from the other Moroccan valvatoid and crenobiotic species by the morphology of the shell and its unique penis shape, the only one that is triangular. Our findings raise the known biodiversity of the valvatiform snails to seven species and the number of genera of Hydrobiidae *sensu stricto* in Morocco to 15

(Boulaassafer *et al.*, 2021; Taybi *et al.*, 2021a). Considering the fact that each dedicated collecting expedition resulted in the discovery of as yet unrecorded species in Morocco or to science (Mabrouki *et al.*, 2020, 2021b; Taybi *et al.*, 2021a,b), there is little doubt that the number of species of Hydrobiids known to occur in Morocco will increase with further prospections, which is an urgent need.

Freshwater ecosystems are under extensive pressure from anthropogenic threats worldwide (Darwall *et al.*, 2018). Many species of freshwater molluscs are threatened with extinction in the Palearctic due to chemical and physical pollution, modification of natural systems by through damming and water abstraction, with threat levels higher in lotic than lentic systems, in addition to invasive and problematic species (Böhm *et al.*, 2021), Morocco's aquatic ecosystems are no exception (Mabrouki *et al.*, 2019; Taybi *et al.*, 2020a, b).

The region where the new taxa have been discovered has continental climate with an average rainfall favourable to the development of agricultural activities, which is manifested by an immense anthropogenic pressure by the pumping of underground and surface water, without forgetting water pollution and the drying up of springs by climate change effects. Bearing all these in mind, strict protection for these fragile and vulnerable ecosystems is highly recommended; we suggest the inclusion of these species, as all the crenobiotic valvatiform species of Morocco in the IUCN (2001) red-list.

#### Compliance with ethical standards

CONFLICTS OF INTEREST: The authors declare that they have no conflicts of interest.

**Acknowledgements.** We thank editor and reviewers, whose helpful comments improved the present paper.

## References

- Boeters H.D., Quiñonero-Salgado S., Ruiz-Cobo J. 2019. A new genus for a new valvatiform hydrobiid from northwestern Spain (Gastropoda: Caenogastropoda: Hydrobiidae) // *Folia Malacol.* Vol.27. No.2. P.101–105. DOI: 10.12657/folmal.027.009
- Böhm M., Dewhurst-Richman N.I., Seddon M. *et al.* 2021. The conservation status of the world's freshwater molluscs // *Hydrobiologia.* Vol.848. P.3231–3254. <https://doi.org/10.1007/s10750-020-04385-w>
- Boulaassafer K., Ghamizi M., Machordom A., Albrecht C., Delicado D. 2021. Hidden species diversity of *Corrosella* Boeters, 1970 (Caenogastropoda: Truncatelloidea) in the Moroccan Atlas reveals the ancient biogeographic link between North Africa and Iberia // *Org. Divers. Evol.* DOI: 10.1007/s13127-021-00490-3152
- Cuttelod A., Seddon M., Neubert E. 2011. European Red List of Non-marine Molluscs. Luxembourg: Publications Office of the European Union. 98 pp.
- Darwall W., Bremerich V., DeWever A. *et al.* 2019. The Alliance for Freshwater Life: a global call to unite efforts for freshwater biodiversity science and conservation // *Aquat. Conserv.* Vol.28. P.1015–1022.
- Delicado D., Arconada B., Aguado A., Ramos M.A. 2019. Multilocus phylogeny, species delimitation and biogeography of Iberian valvatiform springsnails (Caenogastropoda: Hydrobiidae), with the description of a new genus // *Zool. J. Linnean Soc.* Vol.186. P.892–914.
- Glöer P. 2019. The freshwater gastropods of the West Palearctis. Vol. I. Fresh- and brackish waters except spring and subterranean snails. Identification Key, Anatomy, Ecology, Distribution. Hetlingen, Germany. 399 p.
- Glöer P., Mabrouki Y., Taybi A.F. 2020a. A new genus and two new species (Gastropoda, Hydrobiidae) from Morocco // *Ecol. Montenegrina.* Vol.28. P.1–6. Doi: 10.37828/em.2020.28.1
- Glöer P., Mabrouki Y., Taybi A.F. 2020b. Two new valvatoid genera (Gastropoda, Hydrobiidae) from Morocco // *Ecol. Montenegrina.* Vol.30. P.124–128. Doi: 10.37828/em.2020.30.12
- International Union for Conservation of Nature 2001. IUCN Red List Categories and Criteria. Version 3.1. Gland and Cambridge, UK: IUCN Species Survival Commission. IUCN. 38 pp.
- Mabrouki Y., Taybi A.F., El Alami M., Berrahou A. 2019. Biotypology of stream macroinvertebrates from North African and semi arid catchment: Oued Za (Morocco) // *Knowl. Manag. Aquat. Ecosyst.* Vol.420. Art.17. DOI: 10.1051/kmae/2019009
- Mabrouki Y., Taybi A.F., Glöer P. 2020. New additions to gastropod fauna (Gastropoda: Hydrobiidae, Lymnaeidae) of Morocco // *Ecol. Montenegrina.* Vol.31. P.40–44. DOI: 10.37828/em.2020.31.8
- Mabrouki Y., Glöer P., Taybi A.F. 2021a. Two new species of the genera *Islamia* and *Mercuria* (Gastropoda, Hydrobiidae) from Morocco // *Ecol. Montenegrina.* Vol.39. P.76–80. Doi: 10.37828/em.2021.39.8
- Mabrouki Y., Glöer P., Taybi A.F. 2021b. Further records of freshwater Gastropods (Mollusca: Hydrobiidae, Lymnaeidae, Planorbidae) from Morocco // *Bonn. Zool. Bull.* Vol.70. No.2. P.273–279. Doi: 10.20363/BZB-2021.70.2.273

- Oscoz J., Galicia D., Miranda R. 2011. Identification Guide of Freshwater Macroinvertebrates of Spain. Germany: Springer Science & Business Media. 153 pp.
- Radea C., Lampri P.N., Bakolitsas K., Parmakelis A. 2021. A new hydrobiid species (Caenogastropoda, Truncatelloidea) from insular Greece // *Zoosyst. Evol.* Vol.97. No.1. P.111–119. DOI 10.3897/zse.97.60254
- Szarowska M. 2006. Molecular phylogeny, systematics and orphological character evolution in the Balkan Rissooidea (Caenogastropoda) // *Folia Malacol.* Vol.14. No.3. P.99–168.
- Taybi A.F., Glöer P., Mabrouki Y. 2021a. Description of a new valvatoïd *Pikasia smenensis* n. gen. n. sp. (Gastropoda, Hydrobiidae) from Morocco // *Anim. Biodivers. Conserv.* Vol.44. No.2. P.317–320. Doi: 10.32800/abc.2021.44.0317
- Taybi A.F., Mabrouki Y., Berrahou A., Dakki A., Millán A. 2020a. Longitudinal distribution of macroinvertebrate in a very wet North African basin: Oued Melloulou (Morocco) // *Ann. Limnol.* Vol.56. No.17. P.1–11, Doi: 10.1051/limn/2020016
- Taybi A.F., Mabrouki Y., Glöer P. 2021. First record of the New Zealand mudsnail *Potamopyrgus antipodarum* (J.E. Gray, 1843) (Tateidae, Mollusca) in Africa // *Graellsia.* Vol.77. No.2. Art.e140. DOI: 10.3989/graeellsia.2021.v77.303
- Taybi A.F., Mabrouki Y., Legssyer B., Berrahou A. 2020b. Spatiotemporal typology of the physico-chemical parameters of a large North African River: The Moulouya and its main tributaries (Morocco) // *Afr. J. Aquat. Sci.* Vol.45. No.4. P.1–11. DOI: 10.2989/16085914.2020.1727832

*Responsible editor K.G. Mikhailov*