

New additions to the freshwater gastropod fauna (Gastropoda: Hydrobiidae, Lymnaeidae) of Morocco

YOUNESS MABROUKI¹, ABDELKHALEQ FOUZI TAYBI² & PETER GLÖER³

¹ Sidi Mohamed Ben Abdellah University, Faculty of Sciences Dhar El Mehraz, Biotechnology, Conservation and Valorisation of Natural Resources laboratory, Fez, Morocco. E-mail: younes_mab@hotmail.fr

² Sidi Mohamed Ben Abdellah University, Faculty of Sciences Dhar El Mehraz, Biotechnology, Conservation and Valorisation of Natural Resources laboratory, Fez, Morocco. E-mail: taybiaf@gmail.com

³ Schulstr. 3, D-25491 Hetlingen, Germany. E-mail: gloeer@malaco.de

Corresponding author: Peter Glöer

Received 29 April 2020 | Accepted by V. Pešić: 15 May 2020 | Published online 22 May 2020.

Abstract

In this paper, we provide new additions to the freshwater gastropod fauna of Morocco. *Pseudamnicola luteola* (Küster, 1852) and the recently described *Mercuria gauthieri* Glöer, Bouzid & Boeters, 2010 are recorded for the first time in the country and the presence of *Ecrobia vitrea* (Risso 1826) as well as *Radix labiata* (Rossmässler, 1835) are confirmed. Photos of the species are presented, in addition to the map of their distribution area with the habitat descriptions.

Key words: Endemic species, distribution, Mud snails, Pond snails, new records.

Introduction

In Morocco, the Lymnaeidae family is represented only by the following four species: *Galba truncatula* (O. F. Müller, 1774); *Radix labiata* (as *Lymnaea peregra* (Müller, 1774)); *L. stagnalis* (Linnaeus, 1758) and *Stagnicola palustris* (Müller, 1774). While the Hydrobiidae family, relatively diverse, is represented by the following genera: *Hydrobia* Hartmann, 1821; *Ecrobia* Stimpson, 1865; *Peringia* Paladilhe, 1874; *Heideella* Backhuys & Boeters, 1974; *Atebbania* Ghamizi, Bodon & Giusti, 1999; *Iglica* Wagner, 1927; *Mercuria* Boeters, 1971; *Pseudamnicola* Paulucci, 1878; *Islamia* Radoman, 1973; the recently described *Aghbalia* Glöer, Mabrouki & Taybi, 2020; *Ifrania* Glöer, Mabrouki & Taybi, 2020 and *Fessia* Glöer, Mabrouki & Taybi, 2020 (Glöer *et al.* 2020a, b). In the neighbouring countries as Algeria, *Pseudamnicola* and *Mercuria* are represented by 15 and 5 species respectively (Glöer 2019; Glöer *et al.* 2015). While in Morocco we know only three *Pseudamnicola* spp and five *Mercuria* spp for sure, these are: *P. dupotetiana* (Forbes, 1838); *P. leprevieri* (Pallary, 1926); *P. pallaryi* Ghamizi, Vala & Bouka, 1997; *M. targouasensis* Glöer, Boeters & Walther, 2015; *M. tingitana* Glöer, Boeters & Walther, 2015; *M. bakeri* Glöer, Boeters & Walther, 2015; *M. tensiftensis* Boulaassaf, Ghamizi & Delicado, 2018 and *M. midarensis* Boulaassaf, Ghamizi & Delicado, 2018.

While the extreme lumping of the European Malacofauna, the revision of the taxonomy of the Maghrebian fauna still needs to start (García *et al.* 2010), especially in Morocco, where gaps remain and knowledge on the occurrence of freshwater species from several rather inaccessible regions is still poor and some 'blank areas' persist. To fill this gap, several field surveys were conducted from 2014 (ongoing), in the aim to increase knowledge of the freshwater Malacofauna of Morocco.

Materials and Methods

Sampling. Field surveys were conducted from 2014 (ongoing), in which several localities were prospected through Morocco (for more details, see: Glöer *et al.* 2020a, b; Taybi *et al.* 2017), with a special interest to the oriental region and the Middle Atlas (fig. 1). These areas include a multitude of Ramsar Sites and many sites of biological and ecological interest, known as "SIBE". 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 stereo microscope (ZEISS); the photographs were made with a digital camera system (Leica R8). The map was made using ArcGIS software.

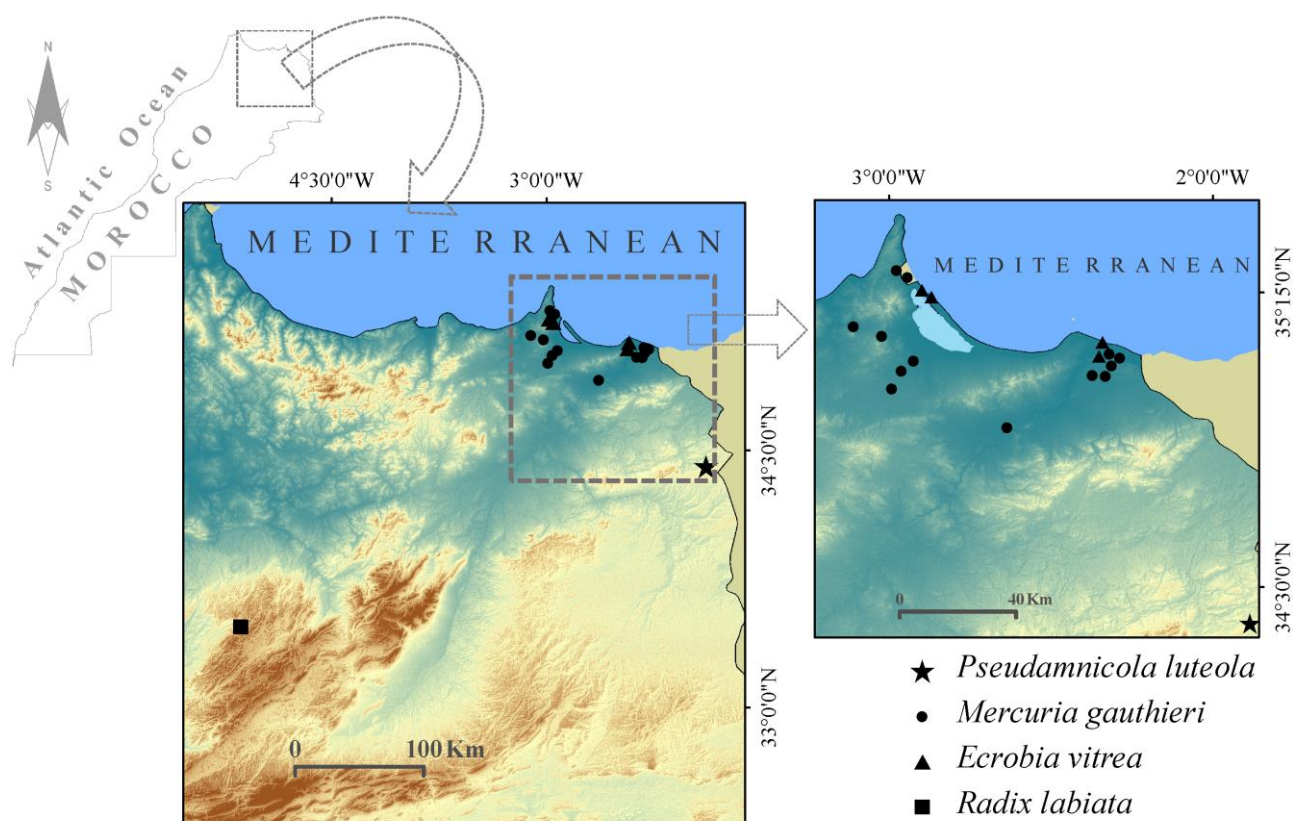
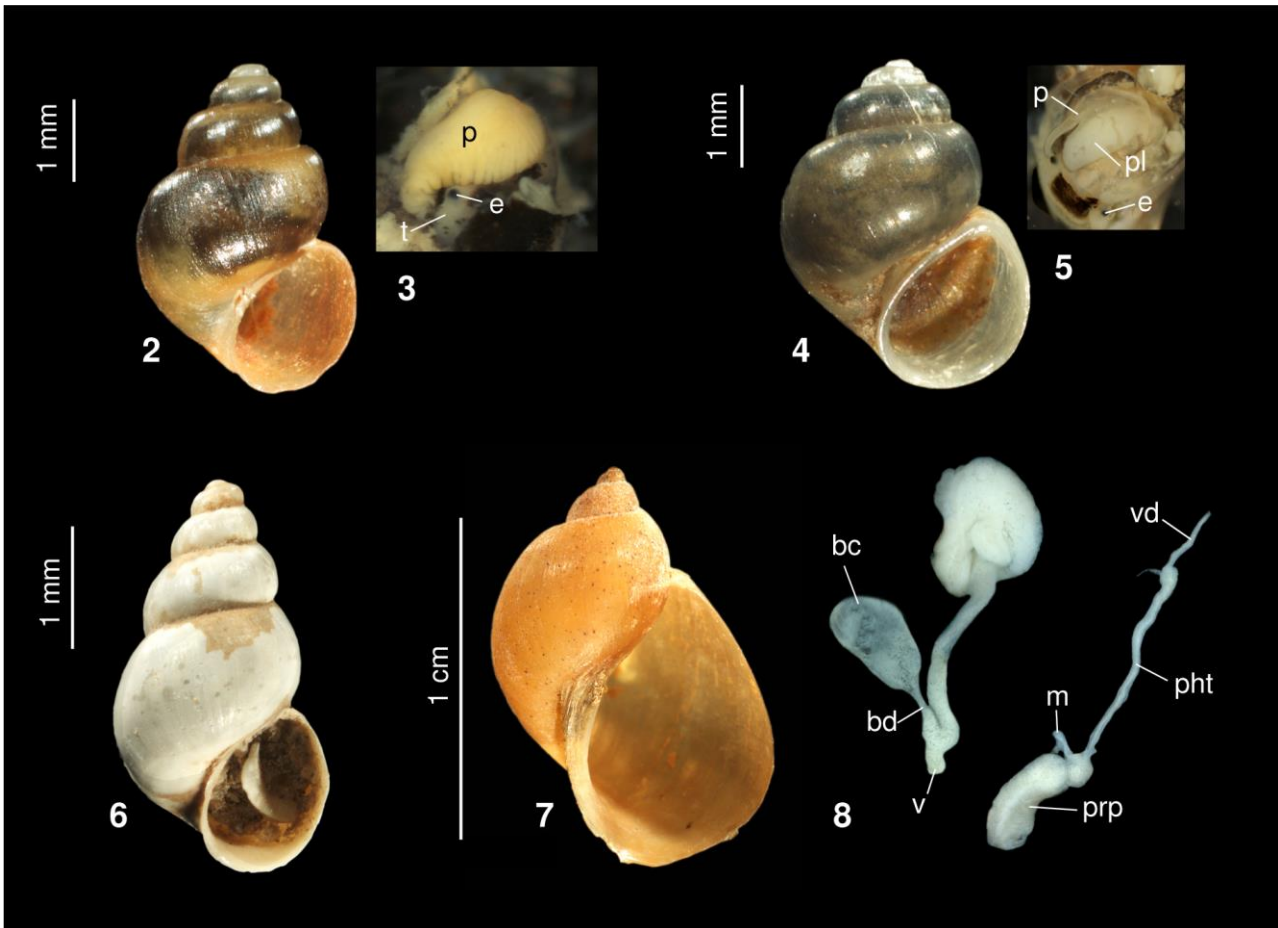


Figure 1. Distribution range of the found species in Morocco.

Results

Pseudamnicola luteola (Küster, 1852) and the recently described *Mercuria gauthieri* Glöer, Bouzid & Boeters, 2010 are recorded for the first time in Morocco. In addition, the presence of *Ecrobia vitrea* (Risso, 1826) and *Radix labiata* (Rossmässler, 1835), are confirmed in the country.

Family Hydrobiidae Troschel, 1857



Figures. 2-8. **2:** Shell of *Pseudamnicola luteola*, **3:** penis *in situ* of *P. luteola*, **4:** shell of *Mercuria gauthieri*, **5:** penis *in situ* of *M. gauthieri*, **6:** shell of *Ecrobia vitrea*, **7:** shell of *Radix labiata*, **8:** female and male copulatory organ. Abbreviations: bc: bursa copulatrix, bd: bursa duct, e: eye, m: muscle, p: penis, pht: phallotheca, pl: penial lap, prp: preputium, vd: vas deferens, t: tentacle, v: vagina.

***Pseudamnicola luteola* (Küster, 1852) (fig. 2)**

Distribution: Maghrebian species, previously known only from Algeria, where its range covers the eastern, central and western Tellian zone, the central Hauts Plateaux and the northern edge of the Sahara (Glöer 2019; Glöer *et al.* 2010). We record it for the first time in Morocco, where we found it at Jbel Sidi Moussa, southwest Touissit (fig. 1).

Sampling site: Jbel Sidi Moussa (34°24'26.000" N 1°53'7.000" W).

Habitat: The species was found in springs or in the remaining waters of a semi-temporary stream, usually between rocks or among aquatic vegetation (fig. 9).

Associated species: *Physella acuta* (Draparnaud, 1805) and *Ancylus fluviatilis* (Müller, 1774).

***Mercuria gauthieri* Glöer, Bouzid & Boeters, 2010 (fig. 4)**

Distribution: This recently described species was previously known only from Algeria, where it was confined to the westernmost part of the Algerian coast (Glöer 2019; Glöer *et al.* 2010). We reported for the first time in Morocco, where it is confined to the easternmost of the country. Indeed, the species was found in the catchment area of the Nador lagoon, the massif mountain of Gourougou and the wetland of the Moulouya River mouth at Saidia (fig. 1).

Sampling site: Zebda spring (35°03'55.1" N 2°21'16.2" W); affluent of Zebda spring (35°05'28.5" N 2°21'02.7" W); Azouagh River at Zegangan (35°8'20.688" N 3°1'24.247" W); Selouan River at Sidi Ali

(35°4'36.700" N 2°55'29.100" W); Selouan River at La'azib (35°3'6.199" N 2°57'46.598" W); Moulouya River at Safsaf (34°54'27.530" N 2°38'8.860" W); Mariouari River (35°18'21.600" N 2°58'38.900" W); Chebbak spring (35°05'18.2" N 2°21'04.0" W); Rio de Oro River (35°17.2483' N, 2°56.6283' W); Izerouan River (35°9.8333' N, 3°6.6' W); Oujej River at Aroui (35°0.3634' N, 2°59.5133' W); Cherarba Ponds at Saidia (35°6.3116' N, 2°20.75' W).

Habitat: The species can be found in a wide range of habitats and in different physicochemical conditions of the water. It was collected from natural and artificial watercourses of low altitudes, sometimes highly charged with organic matter as Selouan River (fig. 10), high altitude springs and finally from slightly brackish ponds alongside of the Mediterranean coast.

Associated species: *Physella acuta*, *Ancylus fluviatilis*, *Lymnaea truncatula* and *Planorbarius metidjensis* (Forbes, 1838).

Ecrobia vitrea (Risso, 1826) (fig. 6)

Distribution: West Mediterranean species, its distribution in Europe ranges from the Iberian Peninsula to Malta, Italy and Albania (de Jong *et al.* 2014; Glöer 2019). Although its occurrence in North Africa seems obvious, but there no clear evidence on its presence in Morocco, hence we record it for the first time in the north-eastern part of the country (fig. 1).

Sampling site: Marchica lagoon at Bokana (35°14'17.246" N 2°53'55.892" W); Chebbak spring (35°05'18.2" N 2°21'04.0" W); Moulouya River mouth at Saidia (35°7'22.739" N 2°20'28.356" W).

Habitat: This Mediterranean mud snail is a typical inhabitant of brackish waters. In the studied area, it was found in slightly brackish water systems near the Mediterranean coast, such as the River mouth and backwaters of the Moulouya at Saidia (fig. 11), and even in ponds on the dune ridge of Nador lagoon.

Associated species: *Mercuria gauthieri* and marine gastropods.



Figures. 9-12. 9: Habitat of *Pseudamnicola luteola* at Jbel Sidi Moussa, 10: habitat of *Mercuria gauthieri* at La'azib, 11: habitat of *Ecrobia vitrea* at Saidia wetland, 12: Habitat of *Radix labiata* at Ras El Ma.

Family Lymnaeidae Lamarck, 1799***Radix labiata* (Rossmässler, 1835) (fig. 7)**

Distribution: Palearctic species, widely distributed through Europe (Glöer 2019). It was recently reported from northern Spain (Schniebs *et al.* 2013; Salgado *et al.* 2016); we confirm its presence in Morocco. To our knowledge the presence of *R. labiata* in Morocco was documented based only on shell morphological criteria. As for many Lymnaeidae members, the identification is not always easy and anatomical (genitalia) or molecular analyses would be the best tools for the right determination (Bargues *et al.* 2001; Schniebs *et al.* 2013). The species identified anatomically (fig. 8) was collected at Ras El Ma in the Middle Atlas massif (fig. 1), which is the new confirmed southern limit of its range in the Palearctic.

Sampling site: Ras El Ma at Ifran (33°28'32.6" N 5°08'11.9" W).

Habitat: This pond snail is found in different habitats influenced by ground water, including still or slow-running freshwater bodies, marshes and ponds, and shallow waters of high-mountain lakes, often among algae and macrophytes (fig. 12).

Associated species: *Physella acuta*.

References

- Bargues, M.D., Vigo, M., Horák, P., Dvorak, J., Patzner, R.A., Pointier, J.P., Jackiewicz, M., Meier-Brook, C. & Mas-Coma, S. (2001) European Lymnaeidae (Mollusca: Gastropoda), intermediate hosts of trematodiasis, based on nuclear ribosomal DNA ITS-2 sequences. *Infection, Genetics and Evolution*, 1: 85–107.
- de Jong, Y., Verbeek, M., Michelsen, V., Bjørn, P., Los, W., Steeman, F., Bailly, N., Basire, C., Chylarecki, P., Stloukal, E., Hagedorn, G., Tobias Wetzels, F., Glöckler, F., Kroupa, A., Korb, G., Hoffmann, A., Häuser, C., Kohlbecker, A., Müller, A., Güntsch, A., Stoev, P. & Penev, L. (2014) Fauna Europaea - all European animal species on the web. *Biodiversity Data Journal*, 2: e4034. doi: 10.3897/BDJ.2.e4034. (visited: 27/04/2020).
- García, N., Cuttelod, A. & Abdul Malak, D. (eds.) (2010) *The Status and Distribution of Freshwater Biodiversity in Northern Africa*. IUCN. Gland, Switzerland, Cambridge, UK, and Malaga, Spain. xiii+141 pp.
- Glöer, P. (2019) *The freshwater gastropods of the West Palaearctis Volume I Fresh- and brackish waters except spring and subterranean snails. Identification Key, Anatomy, Ecology, Distribution*. Hetling. Germany 399 pp.
- Glöer, P., Bouzid, S. & Boeters, H.D. (2010) Revision of the genera *Pseudamnicola* Paulucci 1878 and *Mercuria* Boeters 1971 from Algeria with particular emphasis on museum collections (Gastropoda: Prosobranchia: Hydrobiidae). *Archiv für Molluskenkunde*, 139 (1):1–22.
- Glöer, P., Boeters, H.D. & Walther, F. (2015) Species of the genus *Mercuria* Boeters, 1971 (Caenogastropoda: Truncatelloidea: Hydrobiidae) from the European Mediterranean region, Morocco and Madeira, with descriptions of new species. *Folia Malacologica*, 23(4): 279–291.
- Glöer, P., Mabrouki, Y. & Taybi, A.F. (2020a) A new genus and two new species (Gastropoda, Hydrobiidae) from Morocco. *Ecologica Montenegrina*, 28: 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. *Ecologica Montenegrina*, 30: 124–128. doi:10.37828/em.2020.30.12.
- Salgado, S.Q., Soriano, J.L. & Glöer, P. (2016) First report of *Radix labiata* (Rossmässler, 1835) (Gastropoda: Lymnaeidae) in Aragon (NE Spain). *Spira*, 6: 85–86.
- Schniebs, K., Glöer, P., Vinarski, M.V. & Hundsdoerfer, A.K. (2013) Intraspecific morphological and genetic variability in the European freshwater snail *Radix labiata* (Rossmässler, 1835) (Gastropoda: Basommatophora: Lymnaeidae). *Contributions to Zoology*, 82: 55–68.
- Taybi, A.F., Mabrouki, Y., Ghamizi, M. & Berrahou, A. (2017) The freshwater malacological composition of Moulouya's watershed and Oriental Morocco. *Journal of Materials and Environmental Science*, 8(4): 1401–1416.