

Mollusca (terrestrial and marine Gastropods et Bivalvia) from Morocco

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Abstract. Fifteen samples with molluscs are collected from various habitats and regions of Morocco, located in the seashore zone, as well as the central and the eastern parts of the country. We recorded 21 terrestrial and 15 marine species of molluscs. New localities and new species for the fauna of Morocco and the African continent are reported for the first time.

Key words: Mollusca, Morocco, new location and species.

Introduction

There isn't a lot available data about the malacofauna of Morocco. Most of the reports concern separate species from the western and northern parts of the country. Gittenberger & Ripken (1987), published for the first time summarized data about the systematics and distribution of the genus *Theba* (Risso, 1826). Shafee (1989) reports on breeding individuals from the species *Perna picta* Pallary, 1900 in the west coast of Morocco, near Rabat. Mortaji et al. (2011), report on the presence of *Stramonita haemastoma* (Linnaeus, 1767) in different regions of the Atlantic and the Mediterranean coast of Morocco as an indicator species for tributyltin (TBT) – organic compound which is widely used in paint preventing the growth of periphyton on the hulls of ships. *Cermea virgata* (Da Costa, 1778) is reported as a pest and invasive species in the whole Mediterranean region in the paper of Michigan State University's invasive species factsheets (http://www.ipm.msu.edu/uploads/files/Forecasting_invasion_risks/vineyardSnail.pdf).

During the current study, we collected fifteen samples with molluscs from various habitats and regions of Morocco, located in the seashore zone, as well as the central and the eastern parts of the country (fig. 1). Among the studied habitats are marine shores, riparian, semi-deserts and deserts, which differ greatly with their environmental conditions. The aim of the study is to obtain new data about the distribution and species composition of the malacofauna of Morocco. We recorded 21 terrestrial and 15 marine species of molluscs. Some of the registered species are perhaps introduced for Morocco. Part of the material remained unidentified, due to lack of quantitative and qualitative comparative material.

Material and Methods

The whole material is collected by Georgi Gerdzhikov in the period 25.03-4.04.2010. For this purpose, various habitats from the seashore and inland parts of Morocco are

surveyed. The localities of the collected material are displayed on the map of Morocco (fig. 1). The number of samples in the text corresponds to the numbers on the map. The molluscs are identified to species and families, they are described and mapped. Most of the species are identified conchiologically using catalogs and data from publications. The material is deposited in the personal collection of A. Irikov.

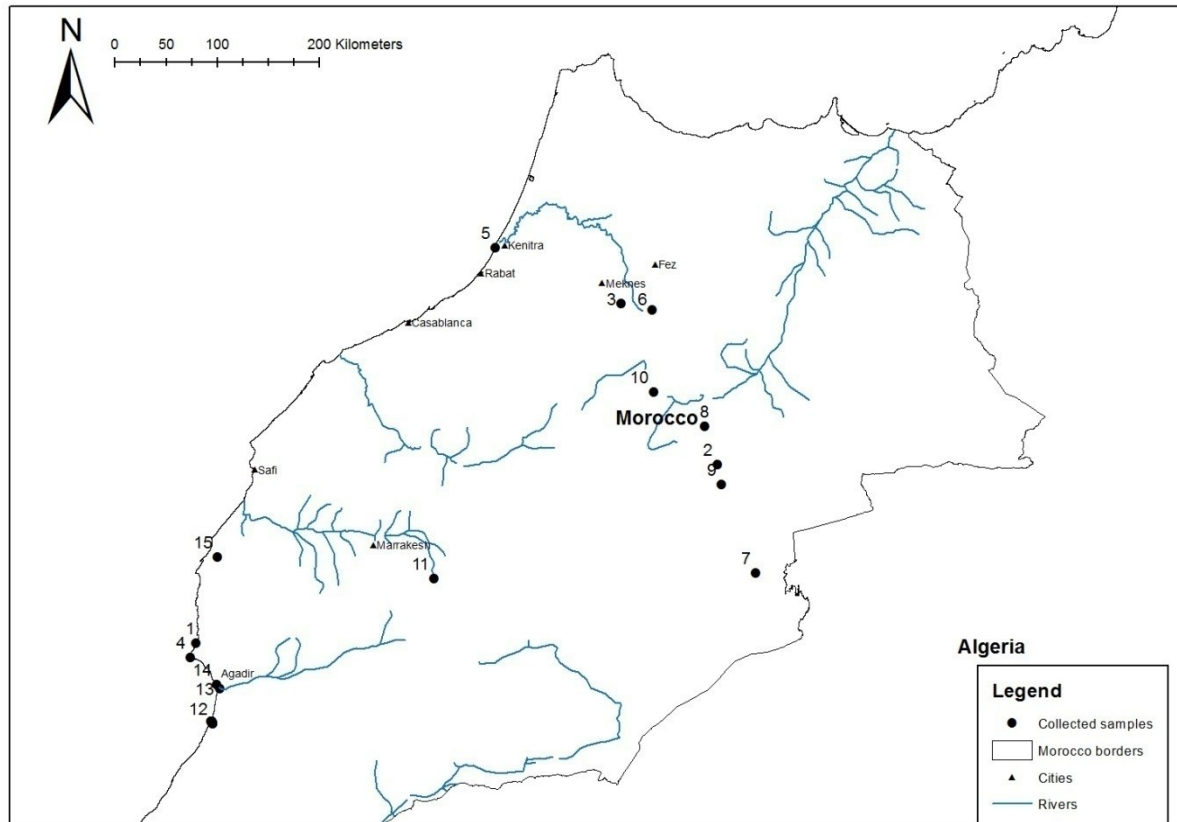


Figure 1. Localities of the collected samples on the territory of Morocco.

Results

In the current study, we identified 36 species from 21 families - 21 terrestrial and 15 marine species.

TERRESTRIAL GASTROPODA

Family Helicidae Rafinesque, 1815

1. *Tingitana tingitana* (Paladihe, 1875) – this species was found near to El Hajeb (sample 3), Central-Northern Morocco. The shells are collected from agricultural land, bordered with a small rock complex at about 1.5 km north from the town.

2. *Cepaea vindobonensis* (Ferussac, 1821) - this species was found near to El Hajeb (sample 3), Central-Northern Morocco. The shells are collected from agricultural land, bordered with a small rock complex at about 1.5 km north from the town.

The species probably has wider distribution in Morocco, but until now we did not find data about specific localities. **New to the fauna of Morocco.**

3. *Cernuella virgata* ssp. (Da Costa, 1778) – this species is registered at two localities – near El Hajeb (sample 3), Central-Northern Morocco. The shells are collected from agricultural land, bordered with a small rock complex at about 1.5 km north from the town.; along the shores of Lake Dayet Aoua, in the Central Atlas mountains (sample 6).

The distribution of the species includes the whole Mediterranean, Atlantic shore of Europe and the Black sea. The material from Morocco is a well-distinguished variety from the European forms. Having in mind the great variability of the shells and the lack of anatomical description of the studied animals, we restrain ourselves from describing new local subspecies.

4. *Otala punctata* (Müller, 1774) - this species was found near to El Hajeb (sample 3), Central-Northern Morocco. The shells are collected from agricultural land, bordered with a small rock complex at about 1.5 km north from the town.

There are no specific localities of this species so far and its distribution in Morocco remains unknown. It is possible that this species is introduced to Morocco, as it was in Italy, Algeria and Tunisia. **Relatively accepted as New to the fauna of Morocco, possibly introduced.**

5. *Theba subdentata meridionalis* Sacchi, 1955 - the species is found nearby to estuary of Oued Massa River (sample 12); Cape Rhir (sample 4); Lake Lac de Sidi Boughaba (sample 5); Oued Sous River, near to estuary (sample 13); High way on 15 km Northeast from Essaouira city (sample 15).

6. *Otala lactea* (Müller, 1774) - species is collected in different places: on 3,5 km north from Tamri village, on a coastal rock (sample 1); Ziz River valley near to Rich town (sample 2); in borders of Lake Lac de Sidi Boughaba (sample 5); Oued Sous River, near to estuary (sample 13); High way on 15 km Northeast from Essaouira city (sample 15).

7. *Theba arinagae* Gittenberg & Ripken (1987) - the species is found on different places main to coastal areas: nearby to estuary of Oued Massa River (sample 12); on 3,5 km north from Tamri village, on a coastal rock (sample 1); on the beach of Cape Rhir (sample 4).

This species was described based on found fossil shells in sand dunes on the Canary Islands by Gittenberg & Ripken (1987). In the current study, for the first time, non-fossil shells are found on the territory of Morocco and the African continent. This fact is rather surprising, having in mind that most island species are endemic in nature. **New to the fauna of Morocco and African continent.**

8. *Theba andalusica* Gittenberg & Ripken, 1987 - species is collected in semi desert areas between Arfoud town and Merzouga village (sample 7). **New to the fauna of Morocco.**

9. *Theba subdentata helicella* (Wood, 1828) - this subspecies was found in three places: on 3,5 km north from Tamri town on a coastal rock (sample 1); on a beach on Cape Rhir (sample 4); and in a High Atlas Mountain in Tizi n'Tichka pass from Marrakech to the city Ouarzazate (sample 11).

10. *Theba subdentata dehnei* (Rossmässler, 1846) - this subspecies was found on 3,5 km north from Tamri town on a coastal rock (sample 1).

11. *Xerophila emmae* (Pallary, 1901) - this species is collected in Ziz River valley near to Rich town (sample 2); and on 20 km north from Errachidia city (sample 9).

12. *Xerophila aderoualensis* Pallary, 1923 - the species is found at semi desert areas on a 15 km NW from Zeida town (sample 10).

13. *Xerotracha apiciana* Lamarck, 1822 - the species is found at semi desert areas on a 15 km NW from Zeida town (sample 10).

Family Parmacellidae Cuvier, 1804

14. *Parmacella valencienni* (Webb & Van Beneden, 1836) - this species was found near to El Hajeb (sample 3), Central-Northern Morocco. The shells are collected from agricultural land, bordered with a small rock complex at about 1.5 km north from the town.

The species' distribution probably has fragmentary "island"-like pattern. It is possible that this species is introduced in Morocco. **New to the fauna of Morocco, possibly introduced.**

Family Ferrussaciidae Bourgoignat, 1883

15. *Rumina decolata* (Linnaeus, 1758) – this species is common in Morocco. It was found in very different habitats and places – near to El Hajeb (sample 3), Central-Northern Morocco. The shells are collected from agricultural land, bordered with a small rock complex at about 1.5 km north from the town.; on 3,5 km north from Tamri town on a coastal rock (sample 1); Lake Lac de Sidi Boughaba (sample 5); Oued Sous River, near to estuary (sample 13); in rocky terrain between Midelt town and Rich town (sample 8).

16. *Rumina saharica* (Pallary, 1901) – the species is found in semi desert areas between Arfoud town and Merzouga town; In High Atlas Mountains in Tizi n'Tichka pass from Marrakech to the city Ouarzazate (sample 11); Oued Sous River, near to estuary (sample 13).

17. *Ferussacia moreleti* (Pallary, 1898) – the species is found on Oued Sous River, near the estuary (sample 13).

Family Hygromiidae Tryon, 1866

18. *Xerophyla aderoualensis* (Pallary, 1898) – the species is found in semi desert areas between Arfoud town and Merzouga town (sample 7); Lake Lac de Sidi Boughaba (sample 5); in rocky terrain between Midelt town and Rich town (sample 8).

Family Pomatiidae Newton, 1891

19. *Leonia mamillaris compacta* (Pallary, 1927) – species was found on a beach of Cape Rhir (sample 4).

Family Cochlicellidae Schileyko, 1972

20. *Cochlicella acuta* (O.F. Müller, 1774) – species was collected in borders of Lake Lac de Sidi Boughaba (sample 5); Oued Sous River, near the estuary (sample 13).

21. *Cochlicella barbara* (Linnaeus, 1758) – the species is found in rocky terrains between Midelt town and Rich town (sample 8); Oued Sous River, near to estuary (sample 5), in boarders of Lake Lac de Sidi Boughaba (sample 13).

MARINE BIVALVIA AND GASTROPODA

Family Mytilidae Lamarck, 1819

22. *Perna picta mauritanica* Pallary, 1900 = *P. perna* (Linnaeus, 1758) – species was found in estuary of Oued Massa River (sample 12); on a beach of Cape Rhir (sample 4).

It is considered, that the species is spread at Moorish province, but there is no data about specific localities and its distribution in Morocco remains unknown.

Family Semelidae Stoliczka, 1819

23. *Scrobicularia plana* (Da Costa, 1778) – species was found in estuary of Oued Massa River (sample 12).

Family Cardiidae Lamarck, 1809

24. *Cerastoderma glaucum* (Poiret, 1789) = (*C. glaucum* Brugière, 1789) – the species is found in estuary of Oued Massa River (sample 12); Oued Sous River, near to estuary (sample №13); Central Beach in Agadir city (sample 14).

Family Muricidae Da Costa, 1776

25. *Stramonita haemastoma haemastoma* (Linnaeus, 1767) = (*S. haemastoma* Linnaeus, 1767) – it was found in estuary of Oued Massa River (sample 12); on 3,5 km north from Tamri town on a coastal rock (sample 1); on the beach of Cape Rhir (sample 4).

Family Patellidae Rafinesque C.S., 1815

26. *Cymbula nigra* Da Costa 1771 = [*Cymbula nigra* (Da Costa, 1771)] – the species is found on 3,5 km north from Tamri town on a coastal rock (sample 1); on the beach of Cape Rhir (sample 4); Central Beach in Agadir city (sample 14).

Family Trochidae Rafanisque C.S., 1815

27. *Osilinus lineatus* Da Costa, 1778 = [(*Phorcus lineatus* Da Costa, 1778)] – species was found on the beach of Cape Rhir (sample 4).

Family Cerithidae Fleming C.A., 1822

28. *Sepiolo atlantica* Orbigny 1839 - species was found on the beach of Cape Rhir (sample 4).

Family Ellobiidae Adams, 1855

29. *Myosotella myosotis* Monterosato, 1906 = (*M. myosotis* Draparnaud, 1906) – the species is found at Oued Sous River, near to estuary (sample 13).

Family Arcidae Lamarck, 1809

30. *Anadara inaequivalvis* Bruguiere, 1789 = [(*A. inaequivalves* Bruguiere, 1789)] – the species is found at Central Beach in Agadir city (sample 14).

It is considered, that in some areas the species is moved passively and is probably invasive in some parts. **Possibly introduced species.**

Family Veneridae Rafinesque, 1815

31. *Chamelea gallina* Linnaeus, 1758 = [(*Chamelea gallina* Linnaeus, 1758)] – the species is found at Central Beach in Agadir city (sample 14).

Family Mactridae Lamarck, 1809

32. *Spisula subtruncata* (Da Costa, 1778) – the species is found at Central Beach in Agadir city (sample 14).

Family Donacidae Fleming, 1828

33. *Donax trunculus* (Linnaeus, 1758) = (*Donax trunculus* Linnaeus, 1758) – the species is found at Central Beach in Agadir city (sample 14).

Family Solenidae Lamarck, 1809

34. *Solen marginatus* Pulteney, 1799 – the species is found at Central Beach in Agadir city (sample 14).

Family Cerithiidae Fleming C.A., 1822

35. *Bittium reticulatum* (Da Costa, 1778) – the species is found at Central Beach in Agadir city (sample 14).

Family Anomiidae Rafinesque, 1815

36. *Anomia ephippium* Linnaeus, 1758 – the species is found at Central Beach in Agadir city (sample 14).

Discussion

During the current study, a new data about the molluscs of Morocco was obtained. We registered new localities of previously reported species, registered 5 new species for the fauna of Morocco, from which 1 is new for the African continent. The fact that we recorded new species for the country speaks that it is not studied well in this regard. The presence of many specific habitats suggests that there are maybe species with local distribution. In our opinion, future studies are needed to research the biodiversity of molluscs, as well as the registering of introduced and invasive species.

References

- Gittenberger, E., & Ripken, Th. E. J. (1987) The Genus *Theba* (Mollusca: Gastropoda: Helicidae) systematics and distribution. *Zoologische verhandelingen*, 241: 3-59.
- Michigan State University's invasive species factsheets. Available at: http://www.ipm.msu.edu/uploads/files/Forecasting_invasion_risks/vineyardSnail.pdf.
- Mortaji, H. El, Elkhiti, N., Benhra, A., Haimeur, B. El, Bouhallaoui, M., Benbrahim, S., Kabine, M. & Ramdani, M. (2011) Imposex in *Stramonita haemastoma* (Gastropoda & Muricidae) along the Atlantic and Mediterranean coast of Morocco. *Bulletin de l'Institut Scientifique*, Rabat, section Sciences de la Vie, 33 (1): 13-18.
- Shafee, S. M. (1989). Reproduction of *Perena picta* (Mollusca: Bivalvia) from the Atlantic coast of Morocco. *Marine Ecology Progress Series*. 53: 235-245.