

## A SHORT STUDY ON THE TERRESTRIAL GASTROPODA FAUNA OF AMOULIANI ISLAND (NORTHERN AEGEAN, GREECE)

Dilian Georgiev<sup>1</sup>, Ulrich E. Schneppat<sup>2</sup>, Ivaylo Dedov<sup>3</sup>

<sup>1</sup> Department of Ecology and Environmental Conservation, University of Plovdiv, Tzar Assen Street 24, BG-4000 Plovdiv, Bulgaria, email: diliangeorgiev@abv.bg

<sup>2</sup> Sennereiweg 8, CH-7074 Churwalden-Malix, Switzerland, email: ulrich.schneppat@gmail.com

<sup>3</sup> Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 2 Gagarin Street, 1113 Sofia, Bulgaria; email: idedov@gmail.com

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### Abstract

Amouliani is a small island in the northeast part of the gulf of Agion Oros near the Chalkidiki Peninsula in the northwestern Thracian Sea, with a total surface of about 7.13 km<sup>2</sup>. During a short stay, between 23.06.2016 and 25.06.2016 on the island, a total of 22 species of terrestrial snails and slugs were found. All are first records to this island. It is evident that for such a small territory the terrestrial snail fauna is comparatively rich, and needs future detailed studies.

**Keywords:** North Greece, Aegean Sea, small island, Gastropoda, terrestrial, diversity.

### Introduction

Amouliani/Ammouliani (Αμουλιανή/ Αμμουλιανή) is a small inhabited island, with 540-560 residents (ELSTAT 2009-2010) in the northeast part of the gulf of Agion Oros/Kolpos Agiou Orous in the northwestern Thracian Sea, which is part of the Aegean Sea. It is located in close proximity to the nearby mainland, 2.5-3.2 km west of the eastern projection of Chalkidiki/Halkidiki Peninsula, Agion Oros. It stretches for about 6 x 3.5 km, covering a total area of 7.13 km<sup>2</sup>. The basement rocks belong to the Serbo-Macedonian Massif and are different types of Granites, Gneisses, Plagioclase and three very little lenses of Marble, only in the northwest of the island. The surface sediments are sandy soils (Plougarlis & Tranos, 2014). The highest elevation is 78 m a. s. l. Before 1922 the island was dependency of Vatopedi Monastery of Mount Athos and have been used for agriculture production (olives, figs, wine, grazing goats and sheep). No permanent settlements were built and only few people were working on the island. After 1922 (Greco-Turkish War of 1919-1922), refugees from several Asia Minor islands settled here and population did grow rapidly. Today the main business on the island is tourism. The whole island landscape and vegetation is imprinted by agriculture since historical times. In the north many olive orchards, pastures and fields, in the south much is olive

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**Fig. 1.** Location map of the investigated area, the Amouliani Island.

**Fig. 2.** Position of the localities surveyed on Amouliani Island (locality numbers correspond with those in Table 1).



**Fig. 3.** Habitat views of some of the surveyed localities: A - Near a yard, detritus of *Olea europaea* and *Pinus spec.* trees (nr. 6), B - Under stones in maquis and rocks (nr. 13), C - Sea deposits at the larger eastern beach (nr. 11), D - SW bank of the lagoon with *Phragmites australis* (nr. 7).

orchards, macchia and phrygana. Few and small isolated areas have a less degraded vegetation. In the center a little brackish lagoon is situated, which was used as a saltpan in historical times, around which a little fringe of reeds is surviving.

The terrestrial Gastropods of this island were never studied before, in addition to the fact that the malacofauna of Chalkidiki Peninsula in general is poorly known (Maassen 1984, Reischütz 1988,

Neubert 2014, Reischütz & Reischütz 2014, Riedel 1992, Subai & Neubert 2014). Noteworthy exception is the area around Mount Athos from where 56 species have been reported (Reischütz & Reischütz 2014). In this short paper we provide the very first data on terrestrial snails of Amouliani Island.

### Material and Methods

The field study was carried out only for three days during a short stay, between 23.06.2016 and 25.06.2016 on Amouliani Island (Tab. 1, Fig. 1, 2, 3) by the first author. Snails were collected by sieving the detritus, searching under stones or found dead on the road. After collection, specimens were then stored in ethanol, processed and deposited in the collection of D. Georgiev. Only the specimens from the species *Bulgarica vetusta* (Rossmässler, 1836) and *Limax* cf. *conemenosi* Boettger, 1882 are kept in the collections of I. Dedov and U. E. Schneppat, respectively. Site coordinates were taken with a GPS. All species were identified based on shell or external body morphology (slugs), and only one *Monacha* specimen was dissected under a binocular microscope.

**Table 1.** Localities on Amouliani Island where samples were taken (altitude in m a.s.l.).

No	Date	Locality	Coordinates	Alt.
1	23.6.2016	Amouliani village, in grass near a yard	N 40°19'54.2" E 23°55'13.5"	7
2	23.6.2016	Yard of the hotel Liani Ammos	N 40°19'14.5" E 23°55'13.4"	0
3	23.6.2016	At the base of a concrete wall among grass	N 40°19'16.6" E 23°55'14.2"	19
4	23.6.2016	Among artificial materials near road	N 40°19'15.5" E 23°55'18.5"	7
5	23.6.2016	Sand and grass at beach	N 40°18'59.0" E 23°56'14.7"	4
6	24.6.2016	Near a yard, detritus of <i>Olea europaea</i> and <i>Pinus</i> spec. trees	N 40°19'05.8" E 23°55'14.0"	13
7	24.6.2016	SW bank of the lagoon among <i>Phragmites australis</i>	N 40°19'11.3" E 23°55'2.4"	0
8	24.6.2016	Maquis and rocks near road, among moss	N 40°19'39.3" E 23°53'46.5"	8
9	24.6.2016	Detritus of <i>Ulmus</i> sp. near well	N 40°19'42.3" E 23°53'50.6"	15
10	24.6.2016	Under stone near a yard in Amouliani village	N 40°19'59.8" E 23°55'16.5"	-
11	24.6.2016	Sea deposits at the larger eastern beach	N 40°19'7.5" E 23°55'23.2"	0
12	25.6.2016	Abandoned <i>Olea europaea</i> plantation	N 40°19'10.2" E 23°55'12.8"	20
13	24.6.2016	Under stones in maquis and rocks	N 40°19'02.6" E 23°55'07.4"	19

### Results and discussion

A total of 22 species were collected (Table 2). Identification down to species level was done only when that was possible. All are first records to this island. It is evident that for such a small territory the terrestrial snail fauna is surprisingly rich. Additional species should be expected, especially slugs (Milacidae, Agriolimacidae, Limacidae), if the research was conducted for longer period and preferably during the wet seasons. Species collected belong to the following 12 families (arranged in alphabetical order): Clausiliidae 2, Cochlicellidae 1, Enidae 1, Helicidae 4, Helicodontidae 1, Hygromiidae 5, Lauriidae 1, Limacidae 1, Oxychilidae 1, Pristilomatidae 2, Punctidae 2, Vertiginidae 1. It is necessary to mention that large part of the island, in its north and south, still remain unexplored after the investigations reported here. Habitats in elevation 20-70 m a. s. l. still remain without any sampling too.

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**Table 2.** Species found on Amouliani Island during the present study.

No	Species	Locality
1	<i>Bulgarica vetusta</i> (Rossmässler, 1836)	13
2	<i>Bulgarica denticulata</i> (Olivier, 1801)	6
3	<i>Chondrula macedonica</i> A. J. Wagner, 1914	4
4	<i>Cochlicella acuta</i> (O. F. Müller, 1774)	7, 11
5	<i>Cornu aspersum</i> (O. F. Müller, 1774)	1
6	<i>Eobania vermiculata</i> (O. F. Müller, 1774)	1, 4, 5, 6, 7
7	<i>Helix pelagonesica</i> (Rolle, 1898)	12
8	<i>Lauria cylindracea</i> (Da Costa, 1778)	8
9	<i>Limax</i> cf. <i>conemenosi</i> O. Boettger, 1882	8
10	<i>Lindholmiola lens</i> (A. Férussac, 1832)*	11
11	<i>Monacha cartusiana</i> (O. F. Müller)	3
-	<i>Monacha</i> sp.	6, 9, 13
12	<i>Oxychilus (Mediterranea) hydatinus</i> (Rossmässler, 1838)	3
13	<i>Paralaoma servilis</i> (Shuttleworth, 1852)	6
14	<i>Punctum pygmaeum</i> (Draparnaud, 1801)	8
15	<i>Theba pisana</i> (O. F. Müller, 1774)	7
16	<i>Trochoidea</i> cf. <i>pyramidata</i> (Draparnaud, 1805)	4, 7
17	<i>Truncatellina cylindrica</i> (A. Férussac, 1807)	6
18	<i>Vitrea botterii</i> (L. Pfeiffer, 1853)	6, 8, 9
19	<i>Vitrea contracta</i> (Westerlund, 1871)	6
20	<i>Xerocrassa</i> sp. *	11
21	<i>Xeropicta</i> cf. <i>krynickyi</i> (Krynicky, 1833)	2, 3, 4, 7
22	<i>Xerotricha conspurcata</i> (Draparnaud, 1801)	1, 3, 4, 6, 7
	*Sea deposits only	

### Notes on the species:

1. *Bulgarica vetusta*, a species with a very scattered distribution on the Balkans and northwards up to SE Germany. It is debated whether the species is in fact part of a potentially variable species complex and in need of further research (Welter-Schultes 2012, p. 353). Up to now it was not known from the whole Chalkidiki area. This is the first insular record of the species within the Greek territory.

2. *Bulgarica denticulata*, known from the SE Balkans and W Asia Minor, also known from the Chalkidiki area. A species which is in need of further research for its remarkable intraspecific variability (Welter-Schultes 2012, p. 351).

3. *Chondrula macedonica*, known from a huge area in the S Balkans, including the Chalkidiki area (Welter-Schultes 2012, p. 175).

4. *Cochlicella acuta*, a widely distributed Mediterranean species.

5. *Cornu aspersum*, a widely distributed W European and Mediterranean species.

6. *Eobania vermiculata*, a widely distributed Mediterranean species.

7. *Helix pelagonesica*, a rather uncommon species with very scattered distribution in N Greece only, including the Chalkidiki area. The knowledge on this species in general is very limited (Neubert,

E. 2014, p. 113-116).

8. *Lauria cylindracea*, a widely distributed Mediterranean species.
9. *Limax* cf. *conemenosi*, the single specimen found could not be determined down to species level with certainty, because of being too young and found dead and shrunken on the road. The species is known from the southern Balkans but not mentioned for the Chalkidiki area by Wiktor (2001).
10. *Lindholmiola lens*, a species known from a very wide range in Greece and also in W Asia Minor, but only scarcely reported from the Chalkidiki area. Up to now not clearly reported from SE Chalkidiki (Subai & Neubert 2014, p. 5-33). Reischütz & Reischütz 2014 report their findings from 7 sites around Mount Athos only as *Lindholmiola* cf. *lens*.
11. *Monacha cartusiana*, this species seems to be widely distributed in coastal Greece, one specimen was identified by dissection, having the diagnostic characters of the species: short vagina and presence of a vaginal sac (Pieńkowska et al., 2015). Some empty shells of unidentifiable specimens of this genus were collected, one of them resembling *M. cartusiana*, others could not be identified down to species level. For a reliable identification the genital anatomy has to be studied.
12. *Oxychilus (Mediterranea) hydatinus*, a widely distributed eastern Mediterranean species.
13. *Paralaoma servilis*, known from a very wide range on all the Mediterranean coasts and elsewhere (Welter-Schultes 2012, p. 203).
14. *Punctum pygmaeum*, well known from almost all Europe (Welter-Schultes 2012, p. 202).
15. *Theba pisana*, a widely distributed Mediterranean species.
16. *Trochoidea* cf. *pyramidata*, well known exclusively from coastal habitats all around the Balkan Peninsula and Asia Minor and elsewhere in the Mediterranean (Welter-Schultes 2012, p. 516) but species identification needs future validation based on genital anatomy.
17. *Truncatellina cylindrica*, the species of the genus with the widest distribution in Europe (Welter-Schultes 2012, p. 123).
18. *Vitrea botterii*, a species rarely reported from Greece, not known from the Chalkidiki area (Welter-Schultes 2012, p. 359).
19. *Vitrea contracta*, a species known from a very wide range in Europe and also Asia Minor (Welter-Schultes 2012, p. 359).
20. *Xerocrassa* sp., one eroded shell was collected in the sea deposits of Amouliani. It can be supposed that it belongs to the most widely distributed species in Greece, *X. cretica* (Férussac, 1821), but this needs future validation based on genital anatomy.
21. *Xeropicta* cf. *krynickii* is widely distributed along the coastal and some inland areas of the Balkans (Reischütz, 1988; Welter-Schultes 2012, p. 571). It was reported from the area around Mount Athos (Reischütz & Reischütz, 2014). Our record needs future validation based on genital anatomy.
22. *Xerotricha conspurcata*, a species well known from Mediterranean coastal and inland habitats and also from same biotopes in W. Asia Minor (Welter-Schultes 2012, p. 575).

The less expected species in this series are *Bulgarica vetusta*, *Helix pelagonesica*, *Lindholmiola lens* and *Vitrea botterii*, with the records of *B. vetusta* and *V. botterii* enlarging the known distribution areas of those species markedly. All the species found in the course of this investigation are first records for Amouliani Island. The records of the rare and seldom collected *Helix pelagonesica* on an island as small as Amouliani is very astonishing. The presence of *L. lens* in the sea deposits (Locality nr 11) might be the result of drifting by from elsewhere, but also may have occurred from a nearby coastal habitat of the island.

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## Literature

- ELSTAT (Hellenic Statistical Authority) 2009-2010. Available from: <http://www.statistics.gr/en/home> [accessed 11 February 2018]
- Maassen, W. J. M. 1984. Enkele vindplaatsen van in Noord Griekenland.- *De Kreukel* 20 (2): 23-34.
- Neubert, E. 2014. Revision of *Helix* Linnaeus, 1758 in its eastern Mediterranean distribution area, and reassignment of *Helix godetiana* Kobelt, 1878 to *Maltzanella* Hesse, 1917 (Gastropoda, Pulmonata, Helicidae). - *Contributions to Natural History* 26: 1-200.
- Pieńkowska, J., Manganelli, G., Giusti, F. & Lesicki, A. 2015. *Monacha claustralis* (Rossmässler 1834) new to Polish and Czech malacofauna (Gastropoda: Pulmonata: Hygromiidae). - *Journal of Conchology* 42(1): 79-93.
- Plougarlis, A. & Tranos, M. 2014. Geology of Ammouliani Island (Northern Greece) - implications for the tectono-magmatic evolution of the Serbo-Macedonian Massif. - *Journal of Maps* 11(4): 552-560.
- Reischütz, P. 1988. Beiträge zur Molluskenfauna Thrakiens und Ostmakedoniens, II. - *Annalen des Naturhistorischen Museums in Wien* 90B: 341-356.
- Reischütz, P. & Reischütz, A. 2014. Helleniká pantoía, 35. Ein Beitrag zur Kenntnis der Molluskenfauna des Agion Oros (Chalkidike, Griechenland). - *Nachrichtenblatt der Ersten Vorarlberger Malakologischen Gesellschaft* 21: 67-76.
- Riedel, A., 1992. Fauna Graeciae V: The Zonitidae (sensu lato) (Gastropoda, Pulmonata) of Greece. Hellenic Zoological Society, Athens.
- Subai, P. & Neubert, E. 2014. Revision of the genus *Lindholmiola* Hesse, 1931 (Gastropoda: Pulmonata: Helicodontidae). - *Contributions to Natural History* 23: 1-94.
- Welter-Schultes, F. W. 2012. European non-marine molluscs, a guide for species identification. - pp. A1-A3, 1-679, Q1-Q78. Göttingen. Planet Poster Editions.
- Welter-Schultes, F. W. & Williams, M. R. (1999): History, island area and habitat availability determine land snail species richness of Aegean islands. - *Journal of Biogeography* 26 (2): 239-249.
- Wiktor, A. 2001. Fauna Graeciae. VIII: The slugs of Greece (Arionidae, Milacidae, Limacidae, Agriolimacidae - Gastropoda, Stylommatophora). Natural History Museum of Crete & Hellenic Zoological Society, Heraklion.