



Mollusc Fauna (Mollusca: Gastropoda and Bivalvia) of the Belchishko Blato Wetland, Republic of North Macedonia

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Abstract: Twenty terrestrial gastropod species are reported from the Belchishko Blato wetland, which is proposed to be declared as a nature park in the Republic of North Macedonia. *Vertigo moulinsiana* (Dupuy, 1849) (Desmoulin's whorl snail), which is a species listed in the European Habitats Directive, is recorded for the first time in this country. *Columella edentula* (Draparnaud, 1805) is registered in its second locality for the country. Four freshwater gastropod species were found for the first time for this wetland area.

Key words: Natura 2000, *Vertigo moulinsiana*, new localities, protected species, Western Balkans, wetland.

Introduction

The Belchishko Blato Wetland (Fig. 1) is a remnant of the former Desaret Lake, which flooded the Debarca Valley in the Pliocene. With the retreat of the Desaret Lake along the Sateska River, numerous endemic species of plants and animals continued to live in the waters of the wetland. Belchishko Blato is one of the largest preserved aquatic habitats in the Republic of North Macedonia, with an area of about 1.2 km². It is characterised by a high habitat diversity and is an important refugium for diverse groups of organisms (MICEVSKI & MICEVSKI 2007, TALEVSKI et al. 2007, STOJANOV et al. 2010, TRAJANOVSKI et al. 2023). It is proposed for protection as a nature

park in accordance with the legislation of the Republic of North Macedonia. It is also recognised as an Emerald Site and overlaps the Important Plant Area Ilinska Planina (BOGNER et al. 2022).

According to TRAJANOVSKI et al. (2023), it is less known whether this wetland represents a significant habitat for the invertebrate fauna due to the insufficient studies of invertebrates in the region. Information for invertebrate fauna can be found in the works by MICEVSKI & MICEVSKI (2007) for butterflies and by TRAJANOVSKI et al. (2023) for macroinvertebrates. The only species of freshwater molluscs known for the region until now are the snails *Ancylus fluviatilis* Müller, 1774, *Anisus vorticulus* (Troschel, 1834), *Horatia novoseleensis* Radoman, 1966, *Lym-*

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Fig. 1. Belchishko Blato Wetland, June 2023.



Fig. 3. *Vertigo moulinsiana* (Dupuy, 1849), a specimen from Belchishko Blato Wetland.

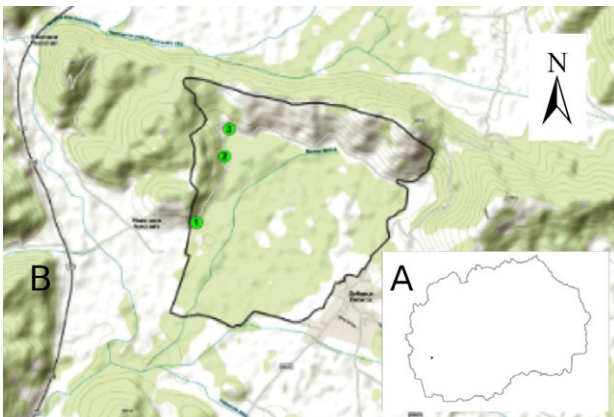


Fig. 2. Collecting sites in Belchishko Blato Wetland. A. Map of North Macedonia with an indicated location of the Belchishko Blato Wetland. B. Belchishko Blato Wetland with borders as proposed to be declared as a protected area (nature park) and the sampling localities.

naea stagnalis Linnaeus, 1758, *Orientalina curta kicavica* Radoman, 1973, *Planorbis planorbarius* Linnaeus, 1758 and the mussel *Sphaerium corneum* Linnaeus, 1758 (TRAJANOVSKI et al. 2023).

In order to provide additional information needed as a prerequisite for grounding the conservation status of the Belchishko Blato Wetland, we carried out a survey in June 2023. In this article,

we report 20 species of terrestrial gastropods and four species of freshwater gastropods from this wetland.

Materials and Methods

The survey was carried out in the region of Belchishko Blato Wetland, North Macedonia, on 23.06.2023. The specimens were collected by soil sampling in three places around the wetland (Fig. 2):

1. Coll. No. 10974 – dry meadows and riparian vegetation near the wetland, N 41.310283 E 20.8125633, leg. I. Dedov & S. Kutanovski;
2. Coll. No. 10975 – wet floodland forest of *Alnus glutinosa*, N 41.3159783 E 20.8158200, leg. I. Dedov & S. Kutanovski;
3. Coll. No. 10976 – riparian vegetation near wetland, N 41.3183650 E 20.8163483, leg. I. Dedov & S. Kutanovski.

Following DEDOV & ANTONOVA (2015), suitable habitats were selected after the analysis of the terrain, from which soil was collected in canvas bags. The resulting sample was immersed in a standard bucket filled about 2/3 with water. With a suitable strainer (fine raster), the fractions floating on the surface of the water were taken and put on rectangular plexiglass plate. The content was trans-

Table 1. The gastropod fauna of Belchishko Blato Wetland. The “Collection Number” corresponds to the number of localities in the Materials and Methods section.

№	Species	Collection Number/ number of specimens	Catalogue Nos.
Terrestrial species			
1	<i>Acanthinula aculeata</i> (O. F. Müller, 1774)	Coll.No.10975/19	BG-IBER-INV-000031304
2	<i>Alinda</i> cf. <i>biplicata</i> (Montagu, 1803)	Coll.No.10975/3	BG-IBER-INV-000031305
3	<i>Carychium minimum</i> O. F. Müller, 1774	Coll.No.10974/185 Coll.No.10975/43 Coll.No.10975/7	BG-IBER-INV-000031715 BG-IBER-INV-000031306 BG-IBER-INV-000031732
4	<i>Chondrula</i> cf. <i>tridens</i> (O. F. Müller, 1774)	Coll.No.10974/1	BG-IBER-INV-000031716
5	<i>Cochlicopa lubrica</i> (O. F. Müller, 1774)	Coll.No.10974/7 Coll.No.10975/17 Coll.No.10976/2	BG-IBER-INV-000031717 BG-IBER-INV-000031307 BG-IBER-INV-000031733
6	<i>Cochlicopa lubricella</i> (Porro, 1838)	Coll.No.10974/14	BG-IBER-INV-000031718
7	<i>Columella edentula</i> (Draparnaud, 1805)	Coll.No.10975/1	BG-IBER-INV-000031308
8	<i>Daudebardia rufa</i> (Draparnaud, 1805)	Coll.No.10975/2	BG-IBER-INV-000031309
9	<i>Euconulus alderi</i> (J. E. Gray, 1840)	Coll.No.10974/36	BG-IBER-INV-000031719
10	<i>Monacha</i> cf. <i>claustralis</i> (Rossmässler, 1834)	Coll.No.10974/2	BG-IBER-INV-000031720
11	<i>Monacha</i> cf. <i>frequens</i> (Mousson, 1859)	Coll.No.10974/2	BG-IBER-INV-000031721
12	<i>Punctum pygmaeum</i> (Draparnaud, 1801)	Coll.No.10974/31 Coll.No.10975/9	BG-IBER-INV-000031722 BG-IBER-INV-000031310
13	Succineidae (cf. <i>Oxyloma sarsii</i> (Esmark, 1886))	Coll.No.10974/49 Coll. No.10976/3	BG-IBER-INV-000031723 BG-IBER-INV-000031734
14	<i>Truncatellina</i> cf. <i>claustralis</i> (Gredler, 1856)	Coll.No.10974/1	BG-IBER-INV-000031724
15	<i>Truncatellina rothi</i> (Reinhardt, 1916)	Coll.No.10974/10	BG-IBER-INV-000031725
16	<i>Vallonia enniensis</i> Gredler, 1856	Coll.No.10974/94 Coll.No.10976/2	BG-IBER-INV-000031726 BG-IBER-INV-000031735
17	<i>Vertigo antivertigo</i> (Draparnaud, 1801)	Coll.No.10974/20 Coll.No.10975/1 Coll.No.10976/4	BG-IBER-INV-000031727 BG-IBER-INV-000031311 BG-IBER-INV-000031736
18	<i>Vertigo moulinsiana</i> (Dupuy, 1849)	Coll.No.10974/58 Coll.No.10976/1	BG-IBER-INV-000031728 BG-IBER-INV-000031737
19	<i>Vertigo pygmaea</i> (Draparnaud, 1801)	Coll.No.10974/59	BG-IBER-INV-000031729
20	<i>Zonitoides nitidus</i> (O. F. Müller, 1774)	Coll.No.10974/28 Coll.No.10975/5 Coll.No.10976/10	BG-IBER-INV-000031731 BG-IBER-INV-000031312 BG-IBER-INV-000031738
Freshwater species			
21	<i>Aplexa hypnorum</i> (Linnaeus, 1758)	Coll.No.10976/2	not catalogued
22	<i>Galba truncatula</i> (O. F. Müller, 1774)	Coll.No.10974/1	not catalogued
23	<i>Gyraulus laevis</i> (Alder, 1838)	Coll.No.10976/11	not catalogued
24	<i>Stagnicola</i> sp.	Coll.No.10976/3	not catalogued
25	<i>Sphaerium corneum</i> Linnaeus, 1758	Coll.No.10974/57 Coll. No.10975/14 Coll.No.10976/30	not catalogued

ferred in a thin sock and allowed to dry. In laboratory, each sample was sieved through a system of sieves of different mesh size and the specimens of the target species were separated and counted.

The specimens are deposited in the Malacological Collection of the Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Science, Sofia.

Results

Totally, 25 mollusc species were collected for the area (Table 1). All the 20 species of terrestrial gastropods are recorded for the first time in this area. One of them, *Vertigo moulinsiana* (Dupuy, 1849) (Fig. 3), is recorded for the malacofauna of North Macedonia for the first time. In addition, four freshwater gastro-

pod taxa were registered from this wetland for the first time: *Aplexa hypnorum* (Linnaeus, 1758), the amphibious *Galba truncatula* (O. F. Müller, 1774), *Gyraulus laevis* (Alder, 1838) and *Stagnicola* sp.

Discussion

The occurrence of terrestrial gastropods in the area of Belchishko Blato is explained by several factors: carbonate substrate, presence of a large area covered with water, large areas with hydrophilic vegetation, humidified forests surrounded by sunny and dry open spaces such as wet meadows and ruderal habitats. Thus, the dry places (Site 1, sample Coll. No. 10974), where the soil was collected in dry areas around and in slightly wet points at the beginning of the wetland, termophilous and drought-resistant species were collected: *Chondrula* cf. *tridens*, *Cochlicopa lubricella* and species of the genera *Monacha* and *Truncatellina*. In the humid forests (sample Coll. No. 10975) around the swamp, there were a number of typical forest species: *Acanthinula aculeata*, *Alinda* cf. *biplicata*, *Daudebardia rufa* and *Punctum pygmaeum*, as well as the calciphile *Columella edentula*, which inhabits high humidity habitats, both forests and open terrains. Similar characteristics have been observed at the locality where *C. edentula* has been reported for North Macedonia (DEDOV 2019), i.e. a humid beech forest on a carbonate substrate around the sources of the Babuna River in Jakupica Mountain.

Around the wetland, there are a number of species that can be considered as indicators of high humidity: *Carychium minimum*, *Euconulus alderi*, *Valonia enniensis*, *Vertigo antivertigo*, *V. moulinsiana* and *Zonitoides nitidus* (compare WELTER-SCHULTES 2012). *Vertigo moulinsiana* is reported for the first time in North Macedonia; however, its record had not been unexpected. The type of the habitat, i.e. a wetland on a carbonate substrate, is typical for this species and fully corresponds to the knowledge for its ecology (SEDDON 1997, MOORKENS & KILLEEN 2011). Following the report of *Vertigo angustior* for the Mariovo region (DEDOV et al. 2023), *V. moulinsiana* is the second species of the genus *Vertigo* included in the European Union Habitats Directive (COUNCIL OF THE EUROPEAN COMMUNITIES 1992) occurring in North Macedonia.

The present article is a step in the study of the gastropod fauna in and around the Belchishko Blato wetland. In our opinion, further species are likely to be found in and around this wetland. Nevertheless, the present study gives sufficient reason to characterise the studied site as an important habitat for conservation of diverse gastropod community.

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References

- BOGNER D., ZOROSKI GJ., KOLEVSKI G. & HRISTOVSKA I. 2022. Valorization study of Belčishko Blato - Nature Park. Project: Preservation of Belčishko Blato, with the involvement of the Municipality of Debrca and the local stakeholders. Critical Ecosystems Partnership Fund (CEPF). 105 p.
- COUNCIL OF THE EUROPEAN COMMUNITIES 1992. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive 92/43/EEC). Official Journal of the European Communities 35: 7–50.
- DEDOV I. 2019. Two terrestrial gastropod species new to the fauna of the Republic of North Macedonia. Acta Musei Macedonici Scientiarum Naturalium 22: 35–38.
- DEDOV I. K. & ANTONOVA V. 2015. Methodology for monitoring of small terrestrial snails, Stylommatophora (1). Executive Environment Agency. Project “Field studies for species distribution / assessment of the coincidence of species and habitats for the territory of the whole country – Phase I”, Contract № 2601/30 July 2013, 17 p. (In Bulgarian) http://eea.government.bg/bg/bio/opos/activities-results/Stylommatophora1_Metodika_monitoring.pdf
- DEDOV I., HRISTOVSKI S. & MITEV T. 2023. The first finding of a Habitats Directive species *Vertigo angustior* Jeffreys, 1830 (Mollusca: Gastropoda: Vertiginidae) from the Republic of North Macedonia. Historia Naturalis Bulgarica 45 (4): 97–101.
- MICEVSKI B. & MICEVSKI N. 2007. Contribution to the knowledge of butterfly fauna of Macedonia: Belchishko Blato. Biologica Macedonica (Skopje) 59–60: 95–99.
- MOORKENS E. A. & KILLEEN I. J. 2011. Monitoring and condition assessment of populations of *Vertigo geyeri*, *Vertigo angustior* and *Vertigo moulinsiana* in Ireland. Irish Wildlife Manuals, No. 55. National Parks and Wildlife Service, Department of Arts, Heritage and Gaeltacht, Dublin, Ireland: 136 p.
- SEDDON M. B. 1997. Distribution of *Vertigo moulinsiana* (Dupuy, 1849) in Europe. In: DRAKE C. M. (Ed.): *Vertigo moulinsiana*: Surveys and studies commissioned in 1995-96. English Nature Research Reports 217: 56–68.
- STOJANOV A., IVANOV G., MELOVSKI D., HRISTOVSKI S. & VELEVSKI M. 2010. Population status of the brown bear (*Ursus arctos*) in the Republic of Macedonia. In: “Development of the National Ecological Network in R. Macedonia (MAK-NEN)”, Project report. MES, Skopje, Republic of Macedonia.
- TALEVSKI T., TALEVSKA M., NAUMOSKI T., NOVEVESCA V. & LOKOSKA L. 2007. Preliminary investigations of the wetlands in the Debrca region and proposing measures for their protection as parts of nature of special interest. Skopje, Final report: 1–47.
- TRAJANOVSKI S., ZDRAVESKI K., TRAJANOVSKA S., BUDZAKOSKA GJORESKA B., ZOROSKI G. & TRICHKOVA T. 2023. Macroinvertebrate fauna of Belchishko Wetland, Republic of North Macedonia: diversity and conservation status Acta Zoologica Bulgarica 75(1): 133–144. <https://www.acta-zoologica-bulgarica.eu/2023/002679.pdf>
- WELTER-SCHULTES F. W. 2012. European non-marine molluscs, a guide for species identification: Bestimmungsbuch für europäische Land-und Süßwassermollusken. Planet Poster Editions 674 p.

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