

Freshwater molluscs (Mollusca: Gastropoda and Bivalvia) from the Srebarna Lake, Northeastern Bulgaria

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Introduction

The two large classes of the phylum Mollusca, Gastropoda and Bivalvia, are significant elements of the invertebrate fauna of the freshwater basins. However, no detailed investigations on their diversity in the Srebarna Lake have been carried out so far. Some data on the freshwater molluscs of Srebarna were presented by DRENSKY (1946-1947) who reported the snails *Lymnaea stagnalis*, *Radix auricularia*, *Planorbarius corneus* and *Viviparus viviparus*, and the bivalve *Unio tumidus* from the lake.

The Srebarna Lake was designated as a Monument of World Cultural and Natural Heritage (1983), an UNESCO biosphere reserve (1977), a Ramsar site (1975) and an Important Bird Area (1990) (STOYNEVA & MICHEV, 1998). It is therefore essential to increase our knowledge on all aspects of this group. The Molluscs of the two classes are presented there by numerous species. Some of them form populations with high density. They play an important role in the biological processes of the lake, e.g.:

1. Molluscs are consumers of higher water vegetation, microperiphyton, detritus and seston.
2. They are a significant step of food chains in the energy transmission from lower to higher levels.
3. Both as larvae (veligers of *Dreissena polymorpha*) and as juveniles (all the other species), molluscs are an essential element of the food basis of juvenile fishes and of some aquatic birds.
4. All the bivalves and some gastropods filtrate water in the course of their feeding and breathing, and are a major factor for its ventilation.
5. The great variation of the shells in shape and in size can be used as an indication for the hydrological changes in the lake.

Materials and methods

The present study is based on specimens collected by Dr V. Vasilev, Mr N. Mikhov and Mr M. Marinov (following my request and instructions) in the period of 1991-1992. The molluscs were collected from various places in the lake; the benthos under the lake mirror, the surrounding reed beds and numerous smaller water bodies in it.

Results

The following 41 taxa (29 gastropods and 12 bivalves) of freshwater molluscs were recorded in the Srebarna Lake. For one of them, *Pisidium pseudosphaerium* Schlesch, this is the first record for the fauna of Bulgaria. The same 41 species have been published as a list by ANGELOV (1998a; 1998b).

Class GASTROPODA

Subclass P R O S O B R A N C H I A

Order MESOGASTROPODA

Family Viviparidae

Viviparus contectus (Millet, 1813). General distribution: mainly East-European. In Srebarna: frequent.

Viviparus acerosus (Bourguignat, 1862). General distribution: South-European, mainly middle and lower Danube. In Srebarna: frequent.

Viviparus viviparus (Linnaeus, 1758). General distribution: European, mainly Central- and East-European. In Srebarna: reported by DRENSKY (1946-1947), not confirmed by the present study.

Family Valvatidae

Valvata cristata (O. F. Mueller, 1774). General distribution: Palaearctic. In Srebarna: very rare.

Valvata piscinalis (O. F. Mueller, 1774). General distribution: Palaearctic. In Srebarna: relatively frequent.

Family Bithyniidae

Bithynia tentaculata (Linnaeus, 1758). General distribution: Palaearctic, mainly European. In Srebarna: frequent.

Subclass E U T H Y N E U R A

Order BASOMMATOPHORA

Family Acroloxidae

Acroloxus lacustris (Linnaeus, 1758). General distribution: Euro-Siberian. In Srebarna: very frequent.

Family **Lymnaeidae**

Lymnaea stagnalis (Linnaeus, 1758), including *L. stagnalis* f. *minor* Kobelt. General distribution: Holarctic. In Srebarna: frequent.

Stagnicola palustris (O. F. Mueller, 1774). General distribution: Holarctic. In Srebarna: rare.

Stagnicola corvus (Gmelin, 1791). General distribution: Palaearctic. In Srebarna: very rare.

Galba truncatula (O. F. Mueller, 1774). General distribution: Holarctic. In Srebarna: relatively frequent in the shallow parts.

Radix auricularia (Linnaeus, 1758), including *R. auricularia* f. *lagotis* (Schrank, 1803). General distribution: Palaearctic. In Srebarna: frequent.

Radix peregra (O. F. Mueller, 1774). General distribution: Palaearctic. In Srebarna: frequent.

Radix ovata (Draparnaud, 1801). General distribution: Palaearctic. In Srebarna: frequent.

Family **Planorbidae**

Planorbis planorbis (Linnaeus, 1758). General distribution: Holarctic, mainly European. In Srebarna: very frequent.

Planorbis carinatus O. F. Mueller, 1774. General distribution: European. In Srebarna: very rare.

Anisus vortex (Linnaeus, 1758). General distribution: European. In Srebarna: rare.

Anisus vorticulus (Troschel, 1834). General distribution: Central- and East-European. In Srebarna: rare.

Anisus septemgyratus (Rossmassler, 1835). General distribution: East-European. In Srebarna: rare.

Anisus leucostomus (Millet, 1813). General distribution: Palaearctic. In Srebarna: rare.

Anisus spirorbis (Linnaeus, 1758). General distribution: Palaearctic (mainly European and West-Asian). In Srebarna: rare.

Gyraulus albus (O. F. Mueller, 1774). General distribution: Holarctic. In Srebarna: very frequent to abundant.

Gyraulus laevis (Alder, 1838). General distribution: Holarctic. In Srebarna: very frequent.

Gyraulus crista (Linnaeus, 1758), including *G. crista* f. *cristatus* (Draparnaud, 1805) and *G. crista* f. *nautilus* (Linnaeus, 1758). General distribution: Holarctic, mainly European. In Srebarna: very frequent to abundant.

Hippeutis complanatus (Linnaeus, 1758). General distribution: Palaearctic, mainly West-European. In Srebarna: very rare.

Segmentina nitida (O. F. Mueller, 1774). General distribution: Palaearctic. In Srebarna: relatively rare.

Planorbarius corneus (Linnaeus, 1758). General distribution: European. In Srebarna: very frequent.

Family **Physidae**

Physa fontinalis (Linnaeus, 1758). General distribution: Holarctic. In Srebarna: very rare.

Physella acuta (Draparnaud, 1805). General distribution: European, mainly Mediterranean. In Srebarna: abundant.

Class **BIVALVIA**

Order **EULAMELLIBRANCHIATA**

Suborder **SCHIZODONTA**

Family **Unionidae**

Unio pictorum (Linnaeus, 1758). General distribution: European, mainly Central - European. In Srebarna: only subfossil (probably extinct after 1960).

Unio tumidus Philipsson, 1788. General distribution: European. In Srebarna: only subfossil (probably extinct after 1960).

Unio crassus Retzius, 1783. General distribution: Central-European. In Srebarna: only subfossil (probably extinct after 1960).

Anodonta cygnaea (Linnaeus, 1758). General distribution: European. In Srebarna: only subfossil (probably extinct after 1960).

Anodonta anatina (Linnaeus, 1758). General distribution: European. In Srebarna: only subfossil (probably extinct after 1960).

Pseudanodonta complanata (Rossmassler, 1835). General distribution: North-European. In Srebarna: only subfossil (probably extinct after 1960).

Suborder **HETERODONTA**

Family **Dreissenidae**

Dreissena polymorpha (Pallas, 1771). General distribution: originally Ponto-Caspian, recently European. In Srebarna: abundant in reed beds.

Family **Sphaeriidae**

Sphaerium corneum (Linnaeus, 1758). General distribution: Palaearctic. In Srebarna: only subfossil (probably extinct after 1960).

Musculium lacustre (O. F. Mueller, 1774). General distribution: Palaearctic. In Srebarna: rare.

Pisidium pseudosphaerium Schlesch, 1947. General distribution: Euro-Siberian. In Srebarna: rare.

Pisidium casertanum (Poli, 1791). General distribution: Palaearctic. In Srebarna: very frequent.

Pisidium personatum Malm, 1855. General distribution: Euro-Siberian. In Srebarna: frequent.

Discussion

As seen from the above-presented list, the mollusc fauna of the Srebarna Lake is very rich. However, it is possible that there are more taxa in the lake and that the recorded 41 species are about 90-95% of the molluscs occurring in it.

The species composition of the freshwater molluscs in the Srebarna Lake includes exclusively mesoecological species, which are typical for stagnant waters (lakes, large marshes, shallow waters along river banks, etc.).

The previous studies on the mollusc fauna of the large freshwater lakes in Bulgaria included the investigations made by PETERBOK (1941) on the Varna Lake (11 freshwater mollusc species) and on the Gebedzhe Lake (9 species) before their connection with the Black Sea and the subsequent transformation into basins with high salinity, as well as by ANGELOV (1956) on the former Rabisha Lake (17 species). In comparison to those lakes, Srebarna has the richest species composition of molluscs. Its 41 mollusc species represent about 75% of all the species recorded in stagnant freshwaters in Bulgaria. One of the possible reasons for the exclusive diversity of molluscs in Srebarna is the presence of abundant avian populations in the reserve. There are many observations that eggs, juveniles and adult molluscs become fastened on the legs or feathers of birds. This might be at least one of the mechanisms for the colonization of Srebarna by many mollusc species.

As a whole, the species recorded in the lake have mostly wide geographical range: 8 Holarctic, 15 Palaearctic, 3 Euro-Siberian and 14 European species. The only exception is *Dreissena polymorpha*, a species of Ponto-Caspian origin which has recently expanded its geographical range and is now widespread in Europe.

The list of molluscs in Srebarna includes 12 bivalve species. However, none of the 6 species of the family Unionidae has been recorded as extant in the course of the present study; they were found and identified on the basis of subfossil whole shells or fragments only. The species of this family are very sensitive to the oxygen content. The most probable reason for the extinction of the living unionids from Srebarna is the dyke-building in 1948-1949 which interrupted the connection between the lake and the Danube. The changes in the lake ecosystem during the next decade resulted into the formation of thick detritus sediments (STOYNEVA & MICHEV, 1998) and, subsequently, to the destruction of the typical benthic communities.

In conclusion, owing to its exclusive diversity of freshwater molluscs, the Srebarna Lake is a unique limnic basin for this country. Its value is additionally increased in the light of the general impoverishment of the freshwater fauna of Bulgaria resulting from the pollution of the surface waters, the transformation of

wetlands into arable lands and the overexploitation of large natural springs. Therefore, the Srebarna Lake is an invaluable natural reservoir producing molluscs which can eventually be introduced into other basins where the conditions are improving or in the numerous lowland dams in Bulgaria where the spontaneous colonization of molluscs takes many years.

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Сладководни мекотели (Mollusca: Gastropoda u Bivalvia) от езерото Сребърна

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(Резюме)

През периода 1991-1992 в езерото Сребърна (Североизточна България) бяха установени 41 таксона сладководни мекотели (29 охлюва и 12 миди), което го определя като сладководният басейн с най-голямо разнообразие на мекотели в България. Това разнообразие представлява 75% от видовете, съобщени за стоящите води в страната. *Pisidium pseudosphaericum* Schlesch се публикува за първи път за фауната на България. Шестте вида от сем. Unionidae са съобщавани само въз основа на субфосилни черупки. Тяхното измиране се обяснява с разрушаването на бентосните съобщества след прекъсването на връзката между езерото и река Дунав.