



MOLLUSCS ON CHARACEAE IN AN OLIGOTROPHIC HAŃCZA LAKE (NE POLAND)

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ABSTRACT: In the littoral of an oligotrophic Hańcza Lake molluscs were the second most abundant group (next to *Asellus aquaticus* (L.)) of invertebrate macrofauna on Characeae (17%–34% total abundance). Thirteen taxa were found, with a distinct dominance of *Dreissena polymorpha* (Pall.); in some sites the proportion of *Valvata cristata* O. F. Müll. or the genus *Pisidium* was considerable. A rare relict *Marstoniopsis scholtzi* (Schm.) was sporadic.

KEY WORDS: Mollusca, littoral, Characeae, oligotrophy, *Dreissena polymorpha*, *Marstoniopsis scholtzi*

INTRODUCTION

In low-trophy lakes Characeae are the dominant component of submerged macrophytes. They provide a very good substratum for invertebrate macrofauna; occurring in large patches and being present in the littoral throughout the year, they are habitable even when plants of annual overground shoots die off (PEREYRA-RAMOS 1981, RZĘDKOWSKA 1987, OZIMEK 1997). Their significance for settling of larvae of *Dreissena polymorpha* (LEWANDOWSKI 1982) is especially great, and they harbour the zebra mussel in large numbers (PEREYRA-RAMOS 1981), compared with other species of submerged macrophytes (LEWANDOWSKI & OZIMEK 1997).

With increasing trophy, a disappearance of Characeae takes place (LACHAVANNE 1985,

KOWALCZEWSKI & OZIMEK 1993). The Hańcza Lake is one of the very few remaining large lakes in north-eastern Poland where these plants occur in abundance. Because of its specificity and unique character, since 1963 the Hańcza Lake has been under a partial nature reserve protection (RAKOWSKI 1989); it has been also placed on the world's list of protected lakes (LUTHER & RZÓSKA 1971). In spite of this it was intensely studied only with respect to morphometry and water chemistry, whereas its fauna, including molluscs, is very poorly known.

The objective of this study was a preliminary estimate of the species composition and density of malacofauna inhabiting Characeae in the littoral of the Hańcza Lake.

STUDY AREA AND METHODS

The Hańcza Lake is located in the Nemen river catchment area, in a lake district called Pojezierze Wschodniosuwalskie – a part of a larger Lithuanian Lakeland. It is the deepest lake of the Central European Lowlands (maximum depth 108.5 m, mean depth 38.7 m, surface area 311.4 ha), and of the low-

est trophy (oligo- or α -mesotrophic, HILLBRICHT-ILKOWSKA & WIŚNIEWSKI 1994) of our lowland lakes, with I class water quality (CYDZIK et al. 1995). It is characterized by a stony littoral (litholittoral), rarely found in lowland lakes, almost along its whole shoreline. Over a considerable part of the shore tightly

packed boulders form a layer over 2 m thick (RÜHLE 1932); the boulders are usually covered by a thick crust of algae, or overgrown with dense underwater meadows of Characeae which clearly dominate among submerged macrophytes. Emerged macrophytes are the reed (*Phragmites australis* (Cav.) Trin. ex Steudel) occurring in places; among macrophytes of floating leaves, the yellow water-lily (*Nuphar luteum* (L.) Sm.) is found sporadically.

Samples of Characeae were collected at the beginning of September 1997 in the littoral of the Hańcza Lake, in four sites spaced evenly around the lake (Fig. 1), five in each site, from the depth of ca. 0.5–1.0 m. The fresh weight of the samples ranged from 90 to 212 g. The samples were washed on a benthos sieve of 1 mm mesh size and sorted macroscopically. Molluscs were sorted out, snails were identified according to PIECHOCKI'S (1979) key; species of the subgenus *Radix* were determined based on the colouration of mantle and sole (JACKIEWICZ 1993, 1998). Only a small specimen of the subgenus *Galba* has remained unidentified, while the pill clams (Sphaeriidae) were determined only to the generic level.

RESULTS

A total of 2,679 mollusc specimens were collected in the Hańcza Lake. They constituted an important component of invertebrate macrofauna, being in most cases the second most abundant (next to *Asellus aquaticus* (L.) which formed from 31% to 66% at particular sites), or even dominant group. Depending on the site (Table 1), molluscs constituted on an average from 17% to 34% total abundance of invertebrate macrofauna, and in some samples their proportion was as high as 50%. The average density of molluscs in particular sites (Table 2) ranged from 73 to 139 individuals per 100 g fresh weight of plants, at a relatively low variability range.

Representatives of 13 mollusc taxa were found in the Hańcza Lake (Table 3). *Dreissena polymorpha* (Pallas) had the highest frequency, being present in all the samples; it was followed by *Bithynia tentaculata* (Linnaeus); members of the genus *Pisidium* were fairly frequent. The frequency of occurrence of the remaining molluscs was clearly lower; the least frequent, i.e. found only in one sample each (a single specimen in each case), were *Gyraulus albus* (O. F. Müller) and *Lymnaea* (*Galba*) sp.

The dominance structure was very clear in all the sites (Fig. 2). The distinct dominant of all the sites, *D. polymorpha*, constituted from 67% to 93% abundance of all molluscs. In site I, *Valvata cristata* O. F. Müller formed 27% total abundance, and in site II – clams of the genus *Pisidium* – 20%. The remaining dominance values did not exceed 5%, and in many cases the percentage of particular species did not reach even 1% total abundance.

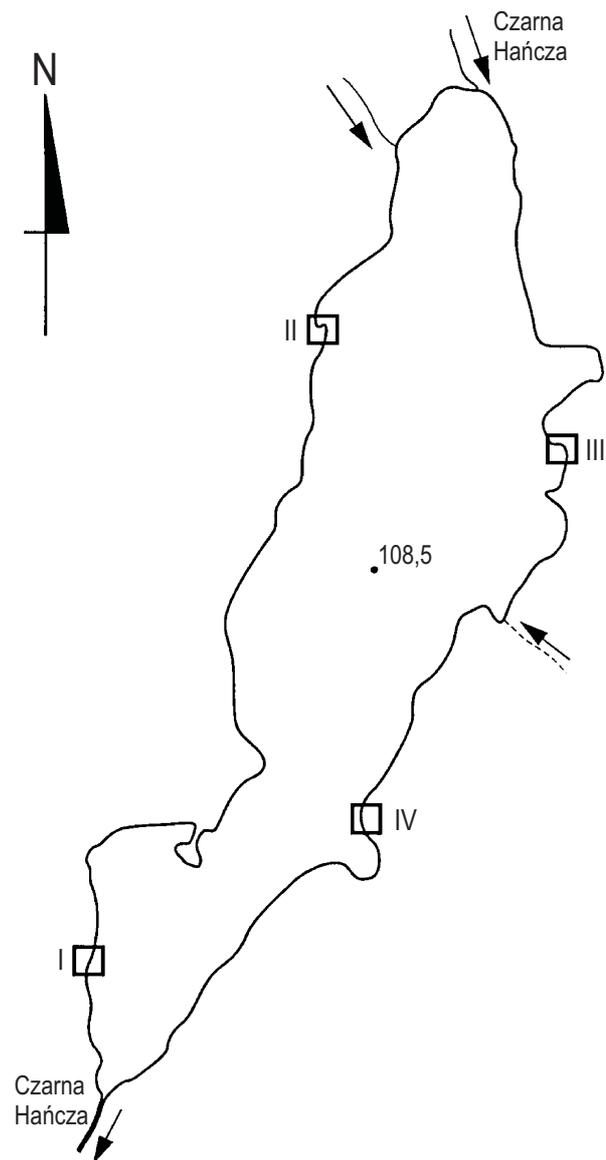


Fig. 1. Location of sampling sites in Hańcza Lake

Table 1. Proportion of molluscs in the abundance of invertebrate macrofauna of Characeae in the littoral of Hańcza Lake

No of sampling site	Percentage of molluscs	
	mean	range
I	21	10–31
II	31	21–46
III	17	13–20
IV	34	19–50

Table 2. Density of molluscs on Characeae in the littoral of Hańcza Lake

No of sampling site	Density (indiv. $\times 100 \text{ g}^{-1}$)	
	mean	range
I	73	49–131
II	153	83–321
III	85	65–112
IV	139	71–214

Table 3. Frequency of particular mollusc taxa on Characeae in the littoral of Hańcza Lake

No	Taxon	Frequency (%)
1	<i>Dreissena polymorpha</i> (Pall.)	100
2	<i>Bithynia tentaculata</i> (L.)	90
3	<i>Pisidium</i> sp.	75
4	<i>Physa fontinalis</i> (L.)	40
5	<i>Valvata cristata</i> O.F. Müll.	35
6	<i>Anisus contortus</i> (L.)	30
7	<i>Lymnaea (Radix) peregra</i> (O.F. Müll.)	15
8	<i>Armiger crista</i> (L.)	15
9	<i>Planorbis carinatus</i> O.F. Müll.	10
10	<i>Sphaerium</i> sp.	10
11	<i>Marstoniopsis scholtzi</i> (Schm.)	10
12	<i>Cyraululus albus</i> (O.F. Müll.)	5
13	<i>Lymnaea (Galba)</i> sp.	5

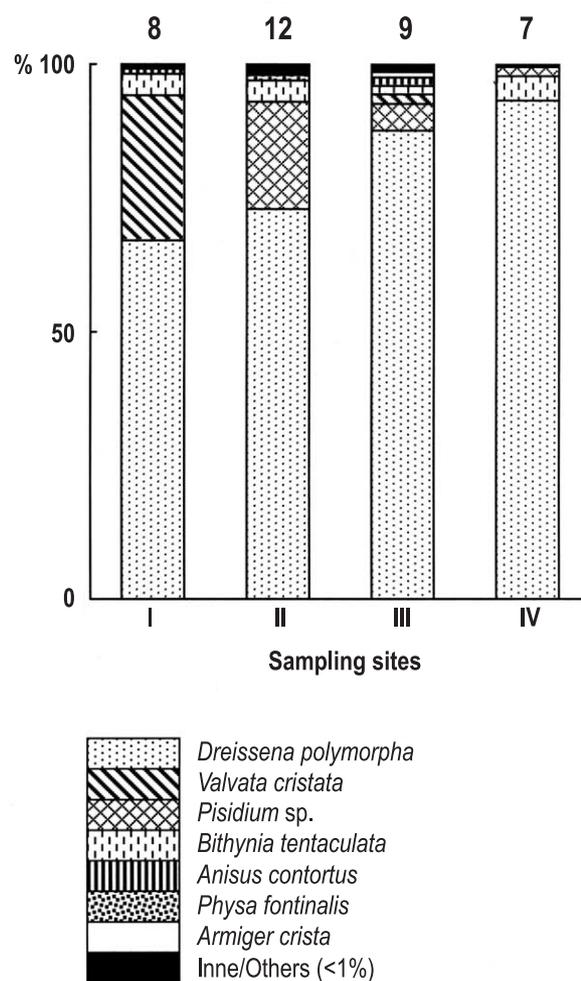


Fig. 2. Dominance structure of molluscs on Characeae in the littoral of Hańcza Lake (number of taxa given in upper row). Sampling sites as in Fig. 1.

DISCUSSION

Previous data on the malacofauna of the Hańcza Lake are very scanty. POLIŃSKI (1917, 1922) listed only four mollusc species from that lake, and KOŁODZIEJCZYK (1994), during his qualitative studies on the littoral of lakes and rivers of the Suwalski Landscape Park, found there members of 10 taxa. Among the snails recorded by him, at present only *Viviparus contectus* (Millet), a bottom-dweller, only loosely associated with vegetation, was not re-found during the present study. Newly recorded mollusc species (Table 3) are *Anisus contortus* (Linnaeus), *Armiger crista* (Linnaeus) and *Marstoniopsis scholtzi* (Schmidt). The latter species, small and usually occurring at low abundance, was regarded as a glacial relict (POLIŃSKI 1917, 1922) or a North-European species (FALNIOWSKI 1987). In the waters of the Suwalski Landscape Park it was previously recorded (only empty shells) from the lakes Wodziłki, Kamendul and

Przechodnie (KOŁODZIEJCZYK 1994). In the nearest vicinity it was sporadically found in the lakes Wigry (POLIŃSKI 1917, 1922, LEWANDOWSKI 1992, KOŁODZIEJCZYK in press), Krzywe (POLIŃSKI 1917, 1922), Pierty (LEWANDOWSKI 1992) and Białe Wigierskie (LEWANDOWSKI 1992, KOŁODZIEJCZYK 1996). FALNIOWSKI (1987) lists this species for "Suwałki lakes", not mentioning any exact localities.

The pattern of occurrence of molluscs on Characeae in the Hańcza Lake departs in several respects from what is observed in some low-trophy lakes. The abundance very clearly exceeds the values reported, in the same month, for the lakes Majcz Wielki (PEREYRA-RAMOS 1981) and Białe Wigierskie (KOŁODZIEJCZYK 1996). The low proportion (Fig. 2) of *Bithynia tentaculata* which constitutes a considerable percentage of the malacofauna of both these lakes and dominates in a mesotrophic lake Garbaś

Duży (lake district Pojezierze Elckie), where it constituted 84% malacofauna on Characeae (own, unpublished results), is also atypical. The disappearance of this species is usually associated with increasing eutrophication (PIECZYŃSKA et al. in press). Such a high proportion of *Dreissena polymorpha* (Fig. 2) as in the Hańcza Lake, is also observed in the lake Majcz Wielki, while its proportion is low in the lakes Białe Wigierskie and (especially) Garbaś Duży (only 5%). The high percentage of molluscs in the macrofauna (Table 3) is rather typical of low-trophy lakes; similar is the case of the low percentage of members of the subgenus *Radix* (PIECZYŃSKA et al. in press).

The studies presented in this paper have provided a preliminary characteristics of the malacofauna on

Characeae in the Hańcza Lake. The lake is a reservoir of the lowest trophy, hence it can be regarded as a reference point during studies in other water bodies. Further, more extensive studies on the malacofauna of various zones of this lake will follow.

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