Contribution to the knowledge of algae from the wetlands of Poleski National Park (east Poland)

Příspěvek k poznání řas Poleského Národního parku

Alena Kočárková[1], Petr Hekera[2] & Martin Rulík[2]

[1]*SmVaK – inženýring s.r.o., Varenská 51, CZ – 702 00 Ostrava*
[2]*Department of Ecology, Faculty of Science, Palacký University, CZ-783 71 Olomouc – Holice*

Abstract

The research of algae of Polesie National Park in east Poland was carried out in July 1999. Wide spectrum of habitats was studied, including peatbogs, artificial bog lakes (”torfianki”), lakes, small pools and fishponds. The studies were focused especially on Euglenophyta; 23 species of this group were found.

Introduction

Polesie National Park is located within the Leczna - Wlodawa Lakeland District which is the southern part of the Lublin-Polesie region in east Poland (between 51°19´32´´ and 51°29´57´´ N; 23° 02´26´´ and 23°21´17´´ E) . This area lies within the river-basin of the Visla in altitude up to 190 m. The park was declared in 1990. Its surface area is 14 041.96 ha. The objective of the park was to protect a terrain that is unique on the scale of the European continent as it constitutes a miniature tundra or forest tundra farthest south west in Europe (SOLTYS 1995).

Typical habitats are peatbogs, heathlands and moist meadows or marshes; wetlands constitute about 75% of this area. Except wetland habitats, the occurrence of dry sandy habitats with psamophilous vegetation characterises this park. Due to the occurrence of such different habitats, the flora and fauna consist of the elements of boreal, atlantic and central or south European species.

Very interesting and specific habitats are ”torfianki” (from Polish) – water basins (pits) created by humans during the mining of sphagnum peat (artificial bog lakes). ”Torfianki” were created at different times; they can be found in different stage of succession, and their character depends on the type of subsoil - whether it has calcic character or not. Wetlands can be subdivided into two types in relation to the character of subsoil: acid wetlands (peatbogs and ”torfianki”) with pH in range of 3.8 – 5.6 and carbonate peatbogs with pH in range of 7.4 – 7.7 (KOSTKAN et al. 1999).

Phytoplankton of Poleski National Park was studied by WOJCIECHOWSKA & KRUPA (1986, 1992) and WOJCIECHOWSKI et al. (1991). No special studies on Euglenophyta have been published from this area yet.

Studied material of algae was collected during field works conducted by the author during an expedition of the staff and students of the Department of Ecology, Palacký University in Olomouc (Czech Republic) to Polesie National Park on 12. - 18. July 1999.

Material and Methods

Water samples from free water, benthos, and periphytic algae were collected using standard methods (HINDÁK 1978); dissolved oxygen, conductivity, pH, and water temperature were measured in situ using mobile instruments (oximeter OXI 96, pH 90 WTW, conductometer WTW). The qualitative and quantitative analysis of phytoplankton was carried out in laboratory, mainly from samples fixed by formalin (HINDÁK 1978). Concentrations of PO_4^{-3}, NO_3^-, NO_2^- a NH_4^+ were determined by spectrophotometric methods (HEKERA 1998).

Sites descriptions:

”Torfianki” No. 1 and No. 2 – water basins (pits) created by humans during the mining of sphagnum peat near lake Moszne; maximum diameter 40 m.

Lake Łukie – eutrophic lake overgrown by macrophytes (dominated by *Stratiodes aloides* L.); 150 ha; average depth 1.8 m, maximum depth 6.5 m.

Lake Moszne – dystrophic lake minimally overgrown by macrophytes; 17 ha; depth up to 1 m.

Pond system Pieszowolski in northern area of Poleski National Park:

Fishpond No. 1 – fishpond Duża Zośka

Fishpond No. 2 – fishpond Mała Zośka

Fishpond No. 3 – fishpond Głęboki

Small shallow pools adjacent to fishponds

Results

Tab. 1 summarises the values of basic physical and chemical parameters of water measured at all sites.

Phytoplankton of ”torfianki” was relatively poor. We frequently found only the species of *Euglena*, *Menoidium* (”torfianka” No. 1), small species of Chlorophyceae, and Cyanophyceae (”torfianka” No. 2).

The occurrence of genera *Cosmarium*, *Pediastrum*, *Scenedesmus*, *Trachelomonas*, *Cryptomonas*, *Menoidium*, *Euglena* and *Oedogonium* in natural periphyton characterised phytoplankton of lake Łukie. In phytoplankton of lake Moszne, genera *Scenedesmus*, *Peridinium*, *Staurastrum*, *Cosmarium* were

frequent; in periphyton, filamentous Cyanophyta, pennate Bacillariophycae, and also *Spirogyra* and *Oedogonium* often appeared.

The fishponds varied in the number of species of blue-green algae and algae; the following genera were found: *Scenedesmus*, *Cosmarium*, *Trachelomonas*, *Closterium*, *Phacus*, *Lepocinclis*, *Staurastrum*, *Oocystis*, *Chlamydomonas*, *Merismopedia*, *Pediastrum*, *Euglena*, *Mougeotia*, *Spirogyra*, *Oedogonium,* together with many species of pennate and centric Bacillariophycae.

The study was focussed on Euglenophyta. Tab. 2. shows all found species of Euglenophyta with remarks to their occurrence. *Trachelomonas volvocinopsis*, *Lepocinclis stenii*, *Phacus pleuronectes*, *Phacus pyrum* belong to the most frequently found species.

Table 1: Values of conductivity, pH, and dissolved oxygen in depth of 40 cm and concentration of PO_4^{-3}, NO_3^-, NO_2^- a NH_4^+

Locality	**Conductivity** ***μS. cm*** $^{-1}$	**pH**	**Dissolved oxygen** ***mg.l*** $^{-1}$	NH_4^+ ***mg.l*** $^{-1}$	NO_2^- ***mg.l*** $^{-1}$	NO_3^- ***mg.l*** $^{-1}$	PO_4^{3-} ***mg.l*** $^{-1}$
Lake Łukie	270	7.73	7.7	1.05	0.022	0.04	0.25
Lake Moszne	220	6.97	7.1	1.33	0.013	0.02	0.07
"Torfianka" No. 1	90	4.32	-	13.27	0.054	<0.01	0.31
"Torfianka" No. 2	84	4.7	-	7.76	0.037	<0.01	0.06
Fishpond No. 1	179	7.16	8.8	1.86	0.024	<0.01	0.99
Fishpond No. 2	167	6.84	21.3	2.90	0.026	<0.01	1.05
Fishpond No. 3	165	8.41	10.1	1.99	0.018	<0.01	1.01

Phytoplankton was less numerous in "torfianki". In "torfianka" No. 2, no Euglenophyta were found. The lakes have rich algal flora, but Euglenophyta were represented sporadically. On the contrary, fishponds and small pools adjacent to the fishponds show high quality and quantity of Euglenophyta, as well as other groups of algae.

Trachelomonas bituricensis Wurtz, 1947 (Fig 1.) was reported from fishponds in France (STARMACH 1983). This species occurred at low abundance in benthos of fishpond No. 3 in the depth of 1 m. The following physical and chemical parameters were measured at this depth: pH – 7.28, temperature – 20.6 °C, oxygen – 2.6 $mg.l^{-1}$, conductivity 162 $\mu S.cm^{-1}$.

Table 2: List of Euglenophyta found in Poleski National Park

Species	Localities
Menoidium sp.	L, T1
Euglena acus Ehrenberg 1830	L
Euglena sp.	M, T1, P0, P1, P3
Lepocinclis ovum (Ehrenberg) Minkewicz 1898	P3
Lepocinclis steinii Lemmerman 1904	P0, P3
Phacus lismorensis Playfair 1921	P3
Phacus longicauda (Ehranberg) Dujardin 1841	P0, P1
Phacus monilatus Stokes in Lemmermann 1910	P0, P3
Phacus orbicularis Hűbner 1886	P3
Phacus parvulus Klebs 1883	P3
Phacus pleuronectes (Ehrenberg) Dujardin 1841	P1, P3
Phacus pyrum (Ehrenberg) Stein 1878	P3
Trachelomonas armata (Ehrenberg) Stein 1878	P3
Trachelomonas bacilifera Playfair 1915	P0
Trachelomonas bituricensis Wurtz 1947	P3
Trachelomonas cervicula Stokes emend. Swirenko 1927	P3
Trachelomonas curta Da Cuncha 1913	P0, P1
Trachelomonas hispida (Perty) Stein 1878	P0
Trachelomonas intermedia Dangeard 1901	P1, P3
Trachelomonas oblonga Lemmerman 1899	P3
Trachelomonas planctonica Swirenko 1914	P3
Trachelomonas volvocina Ehrenberg 1833	P1, P3
Trachelomonas volvocinopsis Swirenko 1914	L, P0, P2, P1

Localities: L - Lake Łukie, M - Lake Moszne, T1 - ”torfianka” No.1, P0 - small pools adjacent to fishponds, P1 - fishpond No. 1, P2 - fishpond No. 2, P3 - fishpond No. 3

Summary

The results show differences among the types of studied water reservoirs – fishponds, lakes, pools, and ”torfianki”.

Fishpond No. 3. had the highest diversity of Euglenophyta, in particular in benthos; representatives of genus *Trachelomonas* and/or *Phacus* occurred in free water near water macrophytes. The total number of Euglenophyta species in this fishpond was 16; rare species *Trachelomonas bituricensis* was found in benthos.

Altogether, 23 species of Euglenphyta were found.

Acknowledgements

I would like to thank the administration of Polesie National Park for the permission of the field work, **Doc. Konrad Wołowski** (Institute of Botany, Kraków) for the help with the determination of some species, and **Dr. Petr Hekera** (Palacký University, Olomouc) for providing data on some physical and chemical parameters.

References

HINDÁK, F. (ed.) (1978): Sladkovodné riasy. – SPN Bratislava, 724 pp.

HEKERA, P. (1998): Základní fyzikálně-chemické parametry vod a jejich měření, pp.11-27 – In: POULÍČKOVÁ et al.: Ochrana horských a podhorských toků. – Metodika ČSOP č. 18, Vlašim, 126 pp.

KOSTKAN, V. et al. (1999): Poleski Park Narodowy. - Živa 47 (1): 41-42

SOLTYS, M. (1995): Polesie National Park. - Parki nar. Rez. przyr. 14, 1(monogr.): 69-71.

STARMACH, K. (1983): Euglenophyta-Eugleniny. – Flora Slodkowodna Polski 3, P.W.N., Warszawa, 594 pp.

WOJCIECHOWSKA, W. & KRUPA, D. (1986): Dwuletnie zmiany biomasy grup taksonomicznych fitoplanktonu w a-mezotroficznym jeziorze. – Ann. UMCS s. C. 41(9): 115-123.

WOJCIECHOWSKA, W. & KRUPA, D. (1992): Many years' and seasonal changes in phytoplankton of lakes of Polesie National Park and its protection zone. – Ekologia Polska 40: 38-45.

WOJCIECHOWSKI, I., CZERNAŚ, K., KRUPA, D. & GALEK, J. (1991): Aktywność zbiorowisk glonów w przybrežnej strefie jeziora Piasecznego jako wyraz hamowania dopływu substancji pokarmowych z lądu do jeziora. – Studia Ośrodka Dokumentacji Fizjograficznej, PAN, Kraków. T. 19: 401-414.

Fig. 1. *Trachelomonas bituricensis*