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## METAZOAN PARASITES OF FISH FROM THE ŁEBSKO LAGOON (CENTRAL COAST, POLAND)

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### Abstract

Throughout 3 years, a total of 721 various fish species, from the Łebsko Lagoon were examined. The most abundant groups of parasites were Digenea and Crustacea. Metacercariae of *Posthodiplostomum cuticola* (Nordmann, 1832) were found only in Cyprinidae (highest prevalence in rudd – 62.5%, and mean intensity in roach 12.71 indiv.). Metacercariae of *Diplostomum* spp. and *Tylodelphys clavata* (Nordmann, 1832), and also copepods *Ergasilus sieboldi* Nordmann, 1832 occurred in majority of examined fish species. The highest infection with *Diplostomum* spp. was noted in rudd (prev. 50.0%, int. 11.25 indiv.). *T. clavata* occurred with highest prevalence in pike (46.15%) and mean intensity amounted to 54.7 indiv. in perch. *E. sieboldi* was reported mostly from zander with typical for this fish *Achtheres percarum* (Nordmann, 1832) (prev. 75.0% and 92.86%; int. 6.0 indiv. and 10.92 indiv. respectively). Also nematode *Anguillicola crassus* (Kuwahara, Niimi and Hagaki, 1974) was noted with high prevalence 76.47% in eel. The remaining parasites species were noted less frequently.

**Key words:** parasites, fish, Łebsko Lagoon

### INTRODUCTION

The Łebsko Lagoon (locally known as a coastal lake) is located on the Central Coast of Poland within the Słowiński National Park. In 1977 the Park was recognised by UNESCO as a part of the World Network of Biosphere Reserves. With an area of 7 142 ha, the Łebsko Lagoon is the largest coastal lake in Poland. The lagoon is a shallow body of water (max. depth 6.3 m, average 1.6 m), surrounded by reeds and sedges, which provide good shelter for a rich variety of migratory and breeding water birds (Kotlarz and Kotlarz 2006). The lagoon and water-muddy areas of the Słowiński National Park are taken into protection in accordance with the Ramsar Convention and Natura 2000. This brackish water reservoir is separated from the Baltic Sea by a narrow stripe of land (Mierzeja Łebska) and is connected with the sea by the Łeba River (Burchardt 2005). The lagoon is situated 30 cm above the sea

level, and inflows of seawater occur when the winds blow from the north and north-west. After inflow salinity could increased to 3 ‰ (Sobocki 2001).

Many fish species, both freshwater and marine, are found here. The following are commercially caught in Łebsko: carp bream *Abramis brama* L., roach *Rutilus rutilus* L., European perch *Perca fluviatilis* L., European eel *Anguilla anguilla* L., zander *Sander lucioperca* L., northern pike *Esox lucius* L. and various salmonids. Rarely tench *Tinca tinca* L., crucian carp *Carasius carasius* L., German carp *Carasius gibelio* (Bloch, 1783), rudd *Scardinius erythrophthalmus* L., white bream *Blicca bjoerkna* L. and ide *Leuciscus idus* L. are caught. The predominant fish species are representatives of the family Cyprinidae (roach and carp bream) and Percidae (European perch).

Parasitological surveys of fishes from the coastal lakes in the Central Coast of Poland have not been frequent. In recent years, only few papers were published (Morozińska-Gogol 1999, Morozińska-Gogol and Bachowska 2002/03, Kędra and Sikora 2003, Morozińska-Gogol 2005).

The current study focuses on the most abundant metazoan parasites of fish from the Łebsko Lagoon, the largest coastal lake within the Słowiński National Park.

## MATERIALS AND METHODS

The samples were taken from November 2000 to December 2003, from the Łebsko Lagoon. The fishes were purchased from commercial fishermen. Totally, 721 fish, from the following species: 139 carp bream *Abramis brama*, 219 roach *Rutilus rutilus*, 11 German carp *Carassius gibelio*, 16 rudd *Scardinius erythrophthalmus*, 244 European perch *Perca fluviatilis*, 51 European eel *Anguilla anguilla*, 28 zander *Sander lucioperca* and 13 northern pike *Esox lucius* were examined. All fishes were weighed and measured, and their sex was determined.

Fish were subsequently examined for ectoparasites and endoparasites under a dissecting microscope. The examination included the skin, fins, gills, eyes (lens and vitreous humour), body cavity and visceral organs (stomach, intestine, liver, swim bladder and gonads).

Parasites recovered were fixed and preserved using methods commonly applied for particular groups (Bylund et al. 1980). Identification of parasites was aided by taxonomic keys (Bauer 1987, Pojmańska 1991, Niewiadomska 2003, Grabda-Kazubska and Okulewicz 2005). The prevalence and mean intensity were calculated following Pojmańska (1993).

## RESULTS

Parasites representing 6 higher taxa: Monogenea, Digenea, Cestoda, Nematoda, Acanthocephala and Crustacea were recovered from fishes. The most abundant group was Digenea – nearly 78% of collected material (Fig. 1).

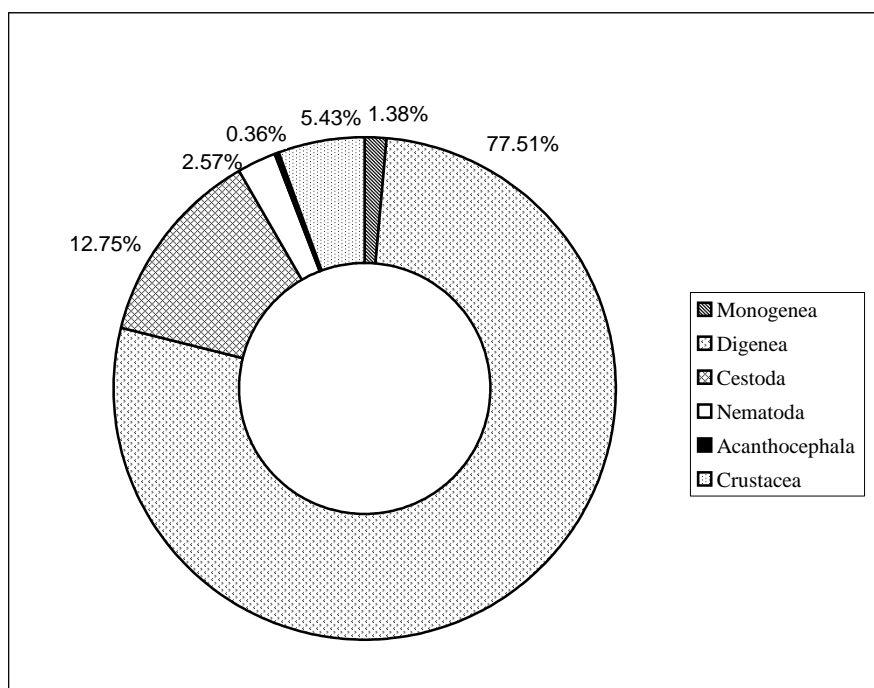


Fig. 1. Participation of particular groups of parasites in/on fishes from the Łebsko Lagoon

Metacercariae of *Posthodiplostomum cuticola* (Nordmann, 1832) were found only in Cyprinidae (highest prevalence in rudd – 62.5%, and highest mean intensity in roach – 12.7 indiv.). *P. cuticola* were found in the skin and fins, and rarely on gills, in body cavity and muscles – visible as black spots.

Metacercariae of *Diplostomum* spp. and *Tylodelphys clavata* (Nordmann, 1832) and also copepods *Ergasilus sieboldi* (Nordmann, 1832) occurred in majority of examined fish species (Tab.1). The highest parameters of infection with *Diplostomum* spp. was noted in rudd (prev. 50.0%, int. 11.3 indiv.). *T. clavata* occurred with highest prevalence of infection in pike (46.2%) and highest mean intensity amounted to 54.7 indiv. in perch. *E. sieboldi* was reported mostly from zander with, typical for this fish species, copepods *Achtheres percarum* (Nordmann, 1832) (prev. 75.0% and 92.9%, and int. 6.0 indiv. and 10.92 indiv. respectively).

Some species of parasites infected only one species of host. The swimbladder nematode *Anguillicola crassus* (Kuwahara, Niimi and Hagaki, 1974) was found only in European eel, with high prevalence 76.5%.

The infection parameters for others species of parasites were distinctly low and were not analysed in this study. A full list of parasites and parameters of infection for each fish species will be published in detail in separate papers.

Table 1  
 Predominant parasites of fish from the Lebsko Lagoon (Poland) and parameters of infection [Prev. – prevalence (%), Int. – mean intensity (indiv.)]

	<i>Rutilus rutilus</i>		<i>Abramis bryama</i>		<i>Carassius auratus gibelio</i>		<i>Scardinus erythrophthalmus</i>		<i>Perca fluviatilis</i>		<i>Sander lucioperca</i>		<i>Erox lucius</i>		<i>Anguilla anguilla</i>		
	Prev.	Int.	Prev.	Int.	Prev.	Int.	Prev.	Int.	Prev.	Int.	Prev.	Int.	Prev.	Int.	Prev.	Int.	
<i>Diplozoön paradoxum</i>	1.83	4.25	23.74	4.58			12.50	2.50									
<i>Diplozoön</i> spp.	18.72	9.76	6.47	3.67	18.18	1.50	50.0	11.25	5.33	5.85			15.38	1.50	1.96	1.00	
<i>Posthodiplostomum cuticola</i>	42.01	12.71	20.14	10.11	9.09	3.00	62.50	4.40									
<i>Tylolephus clavata</i>	40.18	51.43	1.44	2.50			18.75	9.67	20.49	54.70			46.15	29.17			
<i>Apareimon gracilis</i>									10.25	4.48							
<i>Caryophyllaeus laticeps</i>	0.46	2.00	23.74	6.85													
<i>Tranosphorus nodulosus</i>									9.84	2.46			23.08	2.00			
<i>Anguillicola crassus</i>															76.47	4.67	
<i>Camallanus lacustris</i>									4.51	1.64			15.38	1.50			
<i>Camallanus truncatus</i>												53.57	7.13				
<i>Hysterothylacium aduncum</i>									2.46	1.67	3.57	1.00					
<i>Acanthocephalus anguillae</i>	2.67	2.74															
<i>Pomphorhynchus laevis</i>									4.10	2.90							
<i>Ergasilus sieboldi</i>	0.91	3.50	28.06	3.95			6.25	1.00	4.10	3.70	75.00	6.00	46.15	4.83	7.84	10.25	
<i>Achthya percarum</i>											92.86	10.92					

## DISCUSSION

Digenea, the most abundant group of parasites, was detected in many species of fish from the Gulf of Gdańsk (Rokicki 1975, Rolbiecki et al. 1999, Rolbiecki 2003), the Vistula Lagoon (Rolbiecki et al. 1999, Rolbiecki 2003), coastal lake Kopań (Morozińska-Gogol 1999), and also in roach from the Łebsko (Morozińska-Gogol and Bachowska 2002/03) and in perch from the Baltic Sea and coastal lake Resko (Wierzbicka et al. 2005).

Rolbiecki et al. (1999) noted the highest level of infection with *Diplostomum* in bream (Gulf of Gdańsk 25.5%, Vistula Lagoon 84.3%) and roach (Gulf of Gdańsk 23.5%, Vistula Lagoon 8.3%). Morozińska-Gogol and Bachowska (2002/03) found 55.9% roach infected with these metacercariae in the Łebsko Lagoon. The genus *Diplostomum* are widely dispersed in many fish species from freshwater and brackish water.

Metacercariae of *T. clavata* mostly infected Percidae, mainly perch (Kennedy and Burrough 1977, Pojmańska et al. 1980). Many times high level of infection with *T. clavata* was reported also in cyprinids (Kozicka 1959, Burrough 1978, Pojmańska et al. 1980, Holland and Kennedy 1997). Also these metacercariae generally were found in the vitreous humour of the fish from the Gulf of Gdańsk and the Vistula Lagoon (Rolbiecki et al. 1999). *T. clavata* were noted predominantly in roach (Gulf of Gdańsk 52.9%, Vistula Lagoon 69.9%) and perch (Vistula Lagoon 53.0%). In Łebsko only 17.4% of roach in 1999 were infected with *T. clavata* (Morozińska-Gogol and Bachowska 2002/03) but at present surveys prevalence increase to 40.2%.

*P. cuticola* occurred in cyprinids from the Vistula Lagoon (Rolbiecki et al. 1999, Rolbiecki 2003). The most infected was roach 26.5%. Similarly, Kozicka (1958, 1963), Kennedy (1974), Holland and Kennedy (1997) and Ondrackova et al. (2002) observed these metacercariae mostly in cyprinids.

*A. anguillae* was reported from the family Cyprinidae, but also Percidae, Salmonidae and others (Grabda 1971, Kennedy 1974, Holland and Kennedy 1997). This freshwater fish acanthocephalan is widely distributed throughout the western Palearctic (Kennedy et al. 1989). It was also found in the Baltic Sea (Valtonen and Crompton 1990, Valtonen et al. 2001). Probably fish infected themselves with *A. anguillae* during active feeding on *Asellus aquaticus* from spring to autumn.

*Pomphorhynchus laevis* (Müller, 1776) is a typical parasite of flounder in the southern Baltic Sea (Ziółkowska et al. 2000). In Łebsko was noted in flatfish migrated from the sea and also in perch. The fish acquire *P. laevis* infection either by feeding on gammarid intermediate hosts or by feeding on small fish (paratenic host). Some small fish species and also young specimens of larger species become only paratenic hosts of *P. laevis* (Moravec 2004). In the South Baltic, young flounders, no older than one year, were infected by *P. laevis* (Ziółkowska et al. 2000). Also ingested as adults within their definitive host some acanthocephalans survive and parasitise the predator. Kennedy (1999) reported that post-cyclic transmission is possible in *P. laevis* and could be potentially important in nature. Flounders occurred in the Łeb-

sko Lagoon by whole year (Sobocki 2001) and could be a reservoir of parasites like gammarid. Also perch can be infected during migration between Łebsko and the Baltic Sea.

Very interesting is fact, that *A. crassus* in Łebsko, like in another coastal lakes Bukowo and Kopań from the Central Coast, occurred only in their final host – European eel, and first of all in smaller specimens. In the Vistula Lagoon, this nematode was noted also in paratenic hosts – freshwater fishes like zander, European perch, ruffe (*Gymnocephalus cernuus*), carp bream, ziega (*Pelecus cultratus*), and roach (Rolbiecki 2002).

## CONCLUSION

The parasite fauna of fishes from the coastal lake Łebsko from the Central Coast is not very rich but very similar with parasite fauna from the Gulf of Gdańsk and the Vistula Lagoon. Digenea is the most abundant group in the coastal zone of Poland.

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PASOŻYTY (METAZOA) RYB Z JEZIORA ŁĘBSKO  
(WYBRZEŻE ŚRODKOWE, POLSKA)

**Streszczenie**

W ciągu trzech lat (2000-2003) przebadano ryby z jeziora przymorskiego Łębsko. Łącznie zbadano 721 ryb z różnych gatunków. Stwierdzono obecność Monogenea, Digenea, Cestoda, Nematoda, Acanthocephala i Crustacea. Najliczniej występowały Digenea, które stanowiły prawie 78% zebranego materiału (Fig. 1). U ryb karpioyatych dominowały metacerkarie *P. cuticola*, lokujące się w tkance podskórnej, głównie u wzdregi i płoci (odpowiednio 62,5% i 42%). Metacerkarie *Diplostomum* sp., *T. clavata* oraz skorupiaki *E. sieboldi* występowały u większości zbadanych gatunków ryb. Skorupiak *Achtcheres percarum*, znany z występowania u okonia i sandacza, w Łębsku został stwierdzony jedynie u sandacza. Pełne listy pasożytów wraz ze wskaźnikami zarażenia, zostaną przedstawione w kolejnych pracach, poświęconych poszczególnym gatunkom ryb.