

**PARASITES OF ROACH *RUTILUS RUTILUS* (L.)
FROM THE LAKE ŁĘBSKO**

Jolanta Morozińska-Gogol, Agnieszka Bachowska

*Department of Ecology and Protection of the Sea,
Pomeranian Pedagogical University
Arciszewskiego St. 22b, 76-200 Słupsk, Poland***Abstract**

A total of 270 roach (*Rutilus rutilus* L.) were caught in the Lebsko Lagoon (locally known as a coastal lake). Seven species (taxa) of parasites were recorded: *Myxobolus* sp., *Pleistophora* sp., *Diplostomum* spp., *Posthodiplostomum cuticola*, *Tylodelphys clavata*, *Acanthocephalus anguillae* and *Piscicola geometra*. Digenea was the predominant group of parasites. The highest prevalence of infection (66.3%) was observed in the case of *P. cuticola* and a little lower for *Diplostomum* spp. (55.9%). The highest mean intensity of infection was noted for *T. clavata* (46.7 ind.). Infection by remaining parasites was distinctly lower. The difference in prevalence of infection males and females of the roach was observed only in the case of *Pleistophora* sp. (males 11.5% and females 4.3%).

Key words: parasites, roach, Łębsko

INTRODUCTION

The Łębsko Lagoon (locally known as a coastal lake) is located in the middle coast of Poland. It is a part of the Słowiński National Park. Considering the area it is the largest coastal lake in Poland (7142 ha). Łębsko is a shallow body of water (max. depth 6.3m). This reservoir is separated from the Baltic Sea by a narrow stripe of land (Mierzeja Łębska) and connected with the sea by the Łeba River (Przybyła 1997).

The following fish species are commercially caught in Lake Łębsko: bream *Abramis brama* (L.), roach *Rutilus rutilus* (L.), perch *Perca fluviatilis* (L.), eel *Anguilla anguilla* (L.), zander, *Sander lucioperca* (L.), pike *Esox lucius* (L.) and various salmonids. The predominant fish species are representatives of the family Cyprinidae: bream and roach.

Parasites of fish from the coastal lakes have not been studied extensively. In recent years, only two short communications on this subject were published (Kędra 1998, Morozińska-Gogol 1999).

The aim of the present work was to study parasites of roach from Lake Łebsko and the parameters of infection (prevalence and mean intensity of infection). Also changes in the infection level in relation to the sex of fish have been described.

MATERIAL AND METHODS

The samples consisting of 30 fish were taken monthly from April to December 1999 from the Łebsko Lagoon. Totally, 270 roach *Rutilus rutilus* (L.) were examined. All roach were weighed and measured, and their sex was determined.

The 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 and gonads).

Parasites recovered were fixed and preserved using methods commonly accepted for particular groups (Bylund *et al.* 1980). Identification of parasites was aided by taxonomic keys (Bauer 1984, 1985, 1987; Gibson 1996; Pojmańska 1991) and some original papers.

Mean intensity and prevalence of infection were calculated for all parasites. Infection with parasites of males and females was compared.

RESULTS

In this study 7 species (taxa) of parasites were recorded. Parasites infecting roach included: Myxozoa (*Myxobolus* sp.), Microsporidia (*Pleistophora* sp.), Digenea (*Diplostomum* spp., *Postdiplostomum cuticola* (Nordmann 1832)), and *Tylodelphys clavata* (Nordmann 1832), Acanthocephala (*Acanthocephalus anguillae* Müller, 1780), and Hirudinea (*Piscicola geometra* (Linnaeus, 1758)). Only 17.04 % fish caught in Łebsko during this survey were not infected with parasites.

Spores of *Myxobolus* sp. were found in the gills. The xenomas of *Pleistophora* sp. were observed in the gonads, especially of males. Metacercariae of *Diplostomum* spp. and *T. clavata* were found in the eyes. The former occurred in the lens and the latter in the vitreous humour. Metacercariae of *P. cuticola* were found in the skin and fins, rarely on the gills and in the body cavity. *A. anguillae* were collected from the intestine. *P. geometra* was found as attached on the skin.

The most of parasites were found throughout the entire time of investigations. The highest level of infection was observed for Digenea. *P. cuticola* and *Diplostomum* spp. occurred with highest prevalence of infection (66.3% and 55.9% respectively). The highest mean intensity was noted for *T. clavata* and amounted to 46.7 specimens. The infection parameters for others species of parasites were distinctly low (Table 1).

The analysis of monthly data showed seasonal fluctuation of parasites incidence. Generally the highest levels of infection with parasites were observed in spring and summer (*Pleistophora* sp., *Diplostomum* spp., *T. clavata*). One species, *A. anguillae* was found from summer to autumn. *P. cuticola* was noted with prevalence

exceeding 50 % by whole time of investigations, with highest mean intensity in December (Table 1).

Table 1

Prevalence [%] and mean intensity [indiv.] of parasitic infection of roach from the coastal Lake Łebsko.

Month	<i>Myxobolus</i> sp.		<i>Pleistophora</i> sp.		<i>Diplostomum</i> spp.		<i>Posthodiplostomum cuticola</i>		<i>Tyloodelphys clavata</i>		<i>Acanthocephalus anguillae</i>		<i>Piscicola geometra</i>	
	Prevalence (%)	Mean intensity	Prevalence (%)	Mean intensity	Prevalence (%)	Mean intensity	Prevalence (%)	Mean intensity	Prevalence (%)	Mean intensity	Prevalence (%)	Mean intensity	Prevalence (%)	Mean intensity
IV	16.7	1.0	10.0	1.7	33.3	24.6	80.0	11.2	6.7	42.0				
V	6.7	1.5	13.3	1.0	66.7	18.0	76.7	6.5	6.7	17.5				
VI	6.7	2.0	10.0	2.0	63.3	10.7	83.3	12.6	43.3	30.7				
VII	3.3	2.0	16.7	1.4	70.0	20.4	70.0	3.1	33.3	73.4	3.3	3.0		
VIII	6.7	1.5	3.3	2.0	60.0	18.1	50.0	4.7			6.7	3.0		
IX	10.0	2.3	6.7	1.5	56.7	13.5	70.0	9.0	33.3	46.5	3.3	4.0		
X	3.3	1.0	6.7	1.0	56.7	11.5	56.7	9.8	6.7	27.0	3.3	1.0	3.3	1.0
XI			3.3	1.0	50.0	13.2	46.7	5.8	26.7	16.2	6.7	2.5		
XII					46.7	12.4	63.3	14.8						
Total	5.9	1.6	7.8	1.4	55.9	15.7	66.3	8.9	17.4	46.7	2.6	2.7	0.4	1.00

The difference in the prevalence of infection in males and females of the roach was observed only in the case of one parasite - *Pleistophora* sp. This species occurred with highest prevalence in (11.5%) of males and only in 4.3% of females.

Very interesting was fact that in 1999 Monogenea and Copepoda were not found. In the next years *Ergasilus sieboldi* (Nordmann, 1832) like some specimens of Monogenea were collected (Morozińska-Gogol – unpublished data).

DISCUSSION

The most abundant group of parasites was Digenea. The same group of parasites was detected in many species of fish from the Gulf of Gdańsk and the Vistula Lagoon (Rolbiecki et al. 1999) and in bream from the Łebsko (Kędra 1998).

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%). Kędra (1998) found 100% bream infected with *D. spathaceum* in the Łebsko. According to the literature, the genus *Diplostomum* (especially *D. spathaceum*) are widely dispersed in freshwater (Leno and Holloway 1986, 1989), brackishwater (Cichowlas 1961; Dartnall 1973) and also cultured fish (Whyte et al. 1988). These metacercariae were known from 50 (Niewiadomska 1996) to 125 species of fish (Höglund 1991; McKeown and Irwin 1995).

Metacercariae of *T. clavata* mostly infected percid fish, mainly perch (Kennedy and Burrough 1977; Pojmańska et al. 1980). Many times high level of infection

with *T. clavata* were reported also in cyprinids (Kozicka 1959; Burrough 1978; Pójmańska 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 50% of bream were infected with *T. clavata* (Kędra 1998).

P. cuticola occurred in cyprinids from the Vistula Lagoon (Rolbiecki et al. 1999). The most infected were roach (26.5%). Kędra (1998) observed a similar value with 25 % bream infected in Łebsko. Similarly, Kozicka (1958, 1963), Kennedy (1974), Holland and Kennedy (1997) and Ondrackova et al. (2002) observed these metacercariae mostly in cyprinids.

In roach caught in the Włocławek Dam Reservoir by Waluga and Własow (1988), like in the Łebsko and also in the Gulf of Gdańsk and the Vistula Lagoon, Digenea occurred with highest prevalence. In this reservoir also *Pleistophora* sp. was noted with high prevalence. In this reservoir also *Pleistophora* sp. was noted with high prevalence 79.4 – 91.7 % while in our own findings this parasite infected 7.78 % of the fish. Waluga nad Własow (1988) noted also *Myxobolus* (*M. mulleri*) generally with prevalence 10 % and in a single case of 71.4 %. In Łebsko these parasites were found most often with lower prevalence.

A. anguillae were 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 the fish infected themselves *A. anguillae* during active feeding on *Asellus aquaticus* from spring to autumn.

REFERENCES

- Bauer, O.N. 1984. Guide of Parasites in freshwater fishes of the USSR Fauna. Nauka, Leningrad, T. I (*in Russian*).
- Bauer, O.N. 1985. Guide of Parasites in freshwater fishes of the USSR Fauna. Nauka, Leningrad, T. II (*in Russian*).
- Bauer, O.N. 1987. Guide of Parasites in freshwater fishes of the USSR Fauna. Nauka, Leningrad, T. III (*in Russian*).
- Burrough, R.J. 1978. The population biology of two species of eye-fluke, *Diplostomum* *spathaceum* and *Tylodelphys clavata* in roach and rudd. *J. Fish Biol.* 13:19-32
- Bylund, G., Fagerholm, H.-P., Calenius, G., Wikgren, B.-J., Wikström, M. 1980. Parasites of fish in Finland. II. Methods for studying parasite fauna in fish. *Acta Acad. Abo.*, ser. B. 40(2): 1-23.
- Cichowlas, Z. 1961. The life cycle of *Diplostomum spathaceum* (Rud., 1819) in brackish waters of the Baltic Sea. *Acta Parasitol. Polon.* 9: 33-46.
- Dartnall, H.J.G. 1973. Parasites of the nine-spined stickleback *Pungitus pungitus* (L.). *J. Fish Biol.* 5: 505-509.

- Gibson, D.I. 1996. Trematoda. In: Margolis L., Kabata Z. (Eds.) Guide to the parasites of fishes of Canada. Part IV. *Can. Spec. Publ. Fish. Aquat. Sci.*, 124.
- Grabda, J. 1971. Kolcogłowy. Katalog fauny Polski, cz. X. PWN Warszawa.
- Holland, C.V., Kennedy, C.R. 1997. A checklist of parasitic helminth and crustacean species recorded in freshwater fish from Ireland. *Biol. Environ.* 97B: 225-243.
- Höglund, J. 1991. Ultrastructural observations and radiometric assay on cercarial penetration and migration of the digenean *Diplostomum spathaceum* in the rainbow trout *Oncorhynchus mykiss*. *Parasitol. Res.* 77: 283-289.
- Kennedy, C.R. 1974. A checklist of British and Irish freshwater fish parasites with notes on their distribution. *J. Fish Biol.* 6: 613-644.
- Kennedy, C.R., Burrough, R.J. 1977. The population biology of two species of eye-fluke *Diplostomum gasterostei* and *Tylodelphys clavata* in perch. *J. Fish Biol.* 11: 619-633.
- Kennedy, C.R., Bates, R.M., Brown, A.F. 1989. Discontinuous distributions of the fish acanthocephalans *Pomphorhynchus laevis* and *Acanthocephalus anguillae* in Britain and Ireland: an hypothesis. *J. Fish Biol.* 34:607-619.
- Kędra, A. H. 1998. Pasożyty leszcza *Abramis brama* L. z Jeziora Łebsko. Raport. Instytut Parazytologii PAN, Warszawa.
- Kozicka, J. 1958. Diseases of fishes of Drużno Lake. Parasitofauna of the biocenosis of Drużno Lake – part VII. *Acta Parasitol. Pol.* 6:393-432.
- Kozicka, J. 1959. Parasites of fishes of Drużno Lake. *Acta Parasitol. Pol.* 7: 1-72.
- Kozicka, J. 1963. Attempt of fishery-parasitologic estimation of the lakes of Węgorzewo establishment. *Acta Parasitol. Pol.* 9: 113-131.
- Leno, G.H., Holloway, H.L., JR. 1986. The culture of *Diplostomum spathaceum* metacercariae on the chick chorioallantois. *J. Parasitol.* 72(4): 555-558.
- Leno, G.H., Holloway, H.L., JR. 1989. The occurrence of *Diplostomum spathaceum* metacercariae in the freshwater drum, *Aplodinotus grunniens*. *Can. J. Zool.* 67: 2853-2856.
- McKeown, C.A., Irwin, S.W.B. 1995. The life cycle of three *Diplostomum* species maintained in the laboratory. *Int. J. Parasitol.* 25: 897-906.
- Morozińska-Gogol, J. 1999. Parasites of fish from the coastal Lake Kopań. *Baltic Coastal Zone* 3: 113-115.
- Niewiadomska, K. 1996. The genus *Diplostomum* - taxonomy, morphology and biology. Review article. *Acta Parasitol.* 41(2): 55-66.
- Ondrackova, M., Jurajda, P., Gelnar, M. 2002. The distribution of *Posthodiplostomum cuticola* metacercariae in young-of-the-year cyprinid fishes. *J. Fish Biol.* 60:1355-1357.
- Pojmańska, T. 1991. Pasożyty ryb Polski. Tasiemce - Cestoda. Klucze do oznaczania. Warszawa PAN, Instytut Parazytologii im. W. Stefańskiego.
- Pojmańska, T., Grabda-Kazubska, B., Kazubski, S.L., Machalska, J., Niewiadomska, K. 1980. Parasite fauna of five fish species from the Konin lakes complex, artificially heated with thermal effluents, and from Gopło Lake. *Acta Parasitol. Pol.* 27: 319-357.
- Przybyła, J. 1997. Raport o stanie środowiska województwa śląskiego w latach 1995-1996. Biblioteka Monitoringu Środowiska, Śląsk.

- Rolbiecki, L., Rokicki, J., Morozińska-Gogol, J., Chibani, M. 1999. Larval stages of helminths in fish from the Vistula Lagoon and the Gulf of Gdańsk in relation to bird occurrence. *Bull. Sea Fish. Inst.* 2: 51-60.
- Valtonen, E.T., Crompton, D.W.T. 1990. Acanthocephala in fish from the Bothnian Bay, Finland. *J. Zool. Lond.* 220:619-639.
- Valtonen, E.T., Pulkkinen, K., Poulin, R., Julkunen, M. 2001. The structure of parasite component in brackish water fishes of the northeastern Baltic Sea. *Parasitology* 122: 471-481.
- Whyte, S. K., Secombes, C. J., Chappell, L. H. 1991. Studies on the infectivity of *Diplostomum spathaceum* in rainbow trout (*Oncorhynchus mykiss*). *J. Helminthol.* 65: 169-178.

STRESZCZENIE

Co miesiąc, od kwietnia do grudnia 1999 roku, analizie ichtiologicznej i parazytologicznej poddawano po 30 płoci (*Rutilus rutilus* L.). Łącznie przebadano 270 osobników z przymorskiego jeziora Łebsko. Stwierdzono następujące pasożyty: *Myxobolus* sp., *Pleistophora* sp., *Diplostomum* spp., *Posthodiplostomum cuticola*, *Tylodelphys clavata*, *Acanthocephalus anguillae* and *Piscicola geometra*. Uzyskane wyniki wskazują, że dominującą grupą pasożytów płoci z Łebska są przywry. Metacerkarie *P. cuticola* zarażały 66.3% ryb, przy średniej intensywności 8.9. Przywry obserwowano w skórze, tkance podskórnej, na płetwach, rzadziej na skrzelach i w jamie ciała. Ekstensywność wynoszącą 55.9 %, odnotowano w przypadku drugiej przywry *D. spathaceum*. Metacerkarie tego gatunku stwierdzano w soczewce oka płoci ze średnią intensywnością 15.7 osobn. Najwyższą intensywność zarażenia zaobserwowano w przypadku kolejnej przywry *T. clavata*, której metacerkarie stwierdzano w ciałku szklistym oka ze średnią intensywnością 46.7 osobnika. Wskaźniki opisujące zarażenie pozostałymi gatunkami pasożytów są znacznie niższe. Różnice w zarażeniu samców i samic zaobserwowano w przypadku *Pleistophora* sp. Zarażeniu tym pasożytem częściej ulegały samce (11.5%) niż samice (4.3%).