DOI 10.2478/s11687-007-0036-2

HELMINTHOLOGIA, 44, 4: 222 – 225, 2007

Research Note

Parasites of carp bream, *Abramis brama*, from Lake Jamno, Poland

E. DZIKA, A. KUSZTAŁA, M. KUSZTAŁA

Department of Zoology, Faculty of Biology, Warmia and Mazury University, Oczapowskiego 5, 10-957 Olsztyn, Poland, E-mail: *e.dzika@uwm.edu.pl*

Summary

A total of 40 carp bream, *Abramis brama* (L.) from Lake Jamno were examined for their parasites in May 2002. Lake Jamno is a brackish-water coastal lagoon, strongly eutrophied and polluted by communal and industrial sewage from the city of Koszalin. The survey yielded 15 parasite species, representing different systematic groups, including 7 monogeneans *Dactylogyrus auriculatus*, *D. falcatus*, *D. wunderi*, *D. zandti*, *Gyrodactylus elegans*, *Gyrodactylus* sp., *Diplozoon paradoxum*; 4 digeneans (at the stage of metacercaria) *Diplostomum* sp., *Tylodelphys clavata, Ichthyocotylurus platycephalus, I. variegatus*; 1 cestode *Caryophyllaeus laticeps*; 2 crustaceans *Ergasilus sieboldi, Argulus foliaceus*; and 1 hirudinean *Caspiobdella fadejewi*. Monogeneans constituted the most abundant parasite group, accounting for 61.5 % of all parasite individuals collected. They were followed by the cestodes (20.7 %), digenean flukes (16 %), crustaceans (0.7 %), and leeches (0.2 %).

Key words: *Abramis brama*; parasites; coastal lagoon; Lake Jamno; Poland

Introduction

A series of the lagoons (coastal lakes) is scattered along the entire stretch of the southern Baltic Sea. One of the largest lagoons is Lake Jamno (Fig. 1). It is situated 9 km north of the city of Koszalin (Kondracki, 1994). The lake is relatively shallow and filled with brackish water. The main sources of pollution are the Dzierżęcinka River, which flowing through the City of Koszalin, collects municipal and industrial sewage as well as storm runoff (Zdanowski *et al*., 1979). It is a hypertrophied, polymictic lake, at the stage of declining (Chojnacki & Orlon, 1996).
Lake Jamno shows a great species diversity of benthic organisms. The principal elements of zoobenthic biomass were three dominant taxa: Gastropoda, Chironomidae, and Oligochaeta (Chojnacki & Orlon, 1996).
The lake attracts a rich community of aquatic birds (coot, grebes, seagulls), offering them convenient nesting grounds (Górski *et al*., 1991; Tomiałojć & Stawarczyk, 2003). There has only been one published record of the fish parasites of Lake Jamno, describing a mass infection of local carp bream with *Tracheliastes maculatus* (Grabda & Grabda, 1957). The presently reported study was intended to fill the gap in the knowledge on the fish parasites in the coastal lagoons of the southern Baltic Sea, although it is only a pilot study, carried out on 40 bream only.

Fig.1. Location of Lake Jamno

Material and Methods

A total of 40 carp bream, *Abramis brama* (L.) was studied. The fish were collected and necropsied in May 2002. They weighted 257.7 – 631.0 g (449.9 g on average) and measured (TL) 27.5 – 38.0 cm (33.4 cm on average). The parasites recovered from the fish were mounted on microscope slides, following methods commonly accepted in parasitology. Taxonomic keys of Gusev (1985), Bauer (1987),

Pojmańska (1991), and Niewiadomska (2003) were used for parasite identification.
Selected parasites were measured and photographed under a compound microscope (Olympus), equipped with a phase contract. The images were analysed using Multiscan software. Based on their prevalence, the parasites were divided into four groups: dominant (≥ 50 %), common (10 % – 50 %), rare (4 % – 10 %), and sporadically occurring (≤ 4%) (Pojmańska *et al*., 1980).

Results

The presently reported survey yielded 15 parasite species, representing different taxonomic groups: Monogenea (7), Digenea (4), Cestoda (1), Crustacea (2), and Hirudinea (1). The largest group of bream parasites in Lake Jamno were monogeneans (61.5 %), followed by cestodes (20.7 %), and digeneans (16.9 %), while crustaceans (0.7 %) and leeches (0.2 %) constituted the smallest fraction of the parasites collected (Table 1).
The class Monogenea was represented by specialist species carp bream, namely: *Dactylogyrus auriculatus, D. falcatus, D. wunderi*, and *D. zandti*. All of the above species were dominant, showing the highest prevalence (57 % – 75 %), whereas *Gyrodactylus elegans* was rare, with a total of only 4 specimens found. In addition, a single *Gyrodactylus* sp. was found, but its identification up to the species level was not possible. *Diplozoon paradoxum* was a common component of bream's parasite fauna. Among 20 specimens found, four specimens were at the diporpa. Some of them possessed deformed clamps (Fig. 2).
All four species, representing the subclass Digenea, were at the stage of metacercaria. *Diplostomum* sp. and *Ichthyocotylurus platycephalus* occurred commonly, while *Tylodelphys clavata* – rarely and *Ichthyocotylurus variegates* – sporadically. Metacercariae of *Diplostomum* sp. were found in eye lenses of 4 fish, while *Tylodelphys clavata* – in vitreous humour of 3 fish. In all, 83 individuals of *Diplostomum* sp. and 21 individuals of *T. clavata* were recovered. Metacercariae of I. *platycephalus* were found in the heart of 6 bream, while those of *I. variegates* – in one fish.
The highest prevalence (80%) among all species was demonstrated by *Caryophyllaeus laticeps*. Intestines of the fish examined contained a total of 220 specimens of the

Table 1. List of parasite species of carp bream, *Abramis brama*, in Lake Jamno and their infection parameters.

Parasite species	P (%)	Intensity		Abundance	No. of collected parasites
		Range	Mean int.		
Dactylogyrus auriculatus (von Nordmann, 1832)	65	1 – 35	5.73	3.73	149
Dactylogyrus falcatus (Wedl, 1857)	72.5	1 – 32	7.96	5.78	231
Dactylogyrus wunderi Bychowsky, 1931	75	1 – 17	5.93	4.45	178
Dactylogyrus zandti Bychowsky, 1931	57.5	1 – 10	3	1.73	69
Gyrodactylus elegans von Nordmann, 1832	5	1 – 3	2	0.10	4
Gyrodactylus sp. (von Nordmann, 1832)	2.5	0 – 1	1	0.03	1
Diplozoon paradoxum von Nordmann, 1832	22.5	1 – 4	2.2	0.50	20
Diplostomum sp.- mc (von Nordmann, 1832)	10	10 – 42	20.8	2.08	83
Tylodelphys clavata- mc (von Nordmann, 1832)	7.5	5 – 10	7	0.53	21
Ichthyocotylurus platycephalus – mc (Creplin, 1825)	15	4 – 21	12.33	1.85	74
Ichthyocotylurus variegatus – mc (Creplin, 1825)	2.5	0 – 1	1	0.03	1
Caryophyllaeus laticeps (Pallas, 1781)	80	1 – 23	6.87	5.5	220
Argulus foliaceus von Nordmann, 1832	12.5	0 – 1	1	0.13	5
Ergasilus sieboldi Limnaeus, 1758	3.5	0 – 1	1	0.08	3
Caspiobdella fadejewi (Epstein, 1961)	2.5	0 – 2	2	0.05	2

P - prevalence; mean int. - mean intensity; mc - metacercariae

above-mentioned parasite. The majority of them inhabited the anterior portion of the intestine.
Argulus foliaceus was a common skin parasite, infecting 12.5 % of fish, while *Ergasilus sieboldi* and *Caspiobdella fadejewi* sporadically occurred on the gills. The infection parameters of carp bream from Lake Jamno are presented in Table 1.

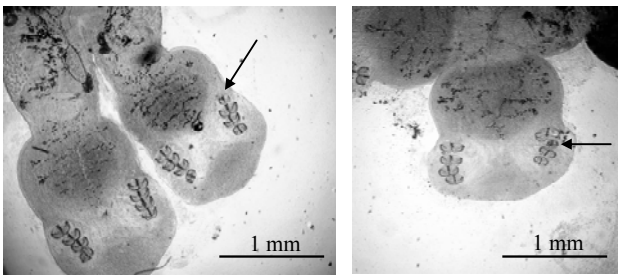

Fig. 2. *Diplozoon paradoxum*. Posterior part of the body (haptor) with deformed clamps

Discussion

The presently observed domination of four monogenean species (*Dactylogyrus auriculatus*, *D. falcatus, D. wunderi*, and *D. zandti*), out of 7 species recovered, as well as the fact of rare occurrences of *Gyrodactylus elegans*, were previously observed in Gosławskie Lake (Pojmańska & Dzika, 1987) and the Vistula River near Warsaw (Reda, 1987). The observed common occurrence of *Diplozoon paradoxum* was consistent with the findings of Pojmańska & Dzika (1987) (Gosławskie Lake) but inconsistent with observations of Rolbiecki (2003) (Vistula River, Vistula Lagoon), who found this species to be a dominant parasite.
Monogeneans, are sensitive, to a direct influence of factors of the external environment, such as temperature (Dzika & Dubas, 1988), water quality, salinity (Prost, 1959), pollution (Koskivaara *et al*., 1991), or oxygen content. The reaction of individual species on these factors may be variable. In the lake surveyed, the most common were representatives of Monogenea (61.5 %). The structure of a parasite community, where monogeneans are a dominant component, indicates a high eutrophication of the body of water. Eutrophication has been a principal factor stimulating their reproductive potential and colonization abilities (Dzika, 2003). The above-mentioned regularity is consistent with the findings of Koskivaara *et al*., (1991) and Koskivaara (1992), who have found the highest density of *Dactylogyrus* parasites in the most eutrophied and polluted Vatia Lake. Koskivaara (1992) was convinced that the increase of the parasite numbers was an outcome of an indirect action of pollutants, which are able to weaken the immune system of fish. One of the symptoms of a weakened immune system can be excessive mucus production (Jara & Chodyniecki, 1999), and the mucus is known to be a food source for many monogeneans (Khan & Kiceniuk, 1988). It is possible that these facts might have influenced the higher prevalence of monogeneans in the polluted Lake Jamno.
The anomalies in the opisthaptor structure, observed in a number if individuals of the genus *Diplozoon*, were previously observed by Dzika (2002) and Šebelová & Koubková (1997), who emphasized that high eutrophication and the pollution might have been responsible for such deformations.
Argulus foliaceus was a rare parasite in Lake Jamno and only sporadic component of bream's parasite fauna in Lake Dąbie (Wierzbicka, 1978) and the Vistula Lagoon (Rolbiecki, 2003). *Ergasilus sieboldi* was found sporadically in Lake Jamno. Similarly, low prevalence and low infection intensities of bream with their parasites were recorded by Reda (1987) in the Vistula River near Warsaw, who suggested that the river pollution might have been the factor affecting the parasite's infective potential.
The main factor influencing the occurrence of *Tylodelphys clavata*, *Diplostomum* sp., *Ichthyocotylurus platycephalus*, and *I. variegates* is the availability of their intermediate- and definitive hosts (Pojmańska *et al*., 1980). Taking this into account, it is evident that the above-mentioned species have potentially good conditions for completion of their life cycles in Lake Jamno. Their low prevalence, as stated presently, can be explained by possible pollution sensitivity of their intermediate hosts. This phenomenon was earlier observed by Sulgostowska (1988), who observed elimination of some cestodes, acanthocephalans, and digeneans from flounder, *Platichthys flesus*, affected by water pollution, caused by sewage from coastal agglomerations or delivered by the waters of the Vistula River. Similarly, Valtonen and Koskivaara (1987, 1989) and (Koskivaara *et al*., 1991), studying effects of toxic effects of toxic effluents from a paper-mill on parasite faunas of fishes in a number of lakes in central Finland, observed a decline or a total lack of adult intestinal flukes. A high prevalence of *Caryophyllaeus laticeps*, found in Lake Jamno, can be associated with an abundant oligochaete population in that lake (Chojnacki & Orlon, 1996).
The only representative of Hirudinea was *Caspiobdella fadejewi*, found in a single carp bream. It is a facultative parasite of many cyprinid fishes, infecting them on the beginning of April and May, attaching to their gills. The timing of the life cycle of this leech coincides with changes in the water temperature. This leech has hitherto been found in rivers and its first record from the gills of a roach from Wulpińskie Lake (Bielecki & Dzika, 2000). The presently described finding constitutes its first record from a brackish-water, polluted lagoon.
Considering the specific character of Lake Jamno (brackish-water, polluted) it would be interesting to carry out further parasitological surveys on other fish species inhabiting this body of water.

References

BAUER, O. N. (1987): *Identification key of the parasites of freshwater fishes of the USSR fauna. Vol. 3. Parasitic Metazoa.* Izdateľstvo Nauka, Leningrad (In Russian.)
BIELECKI, A., DZIKA, E. (2000): Leeches (Hirudinea: Pis-

cicolidae and Glossiphonidae) parasitic on fishes in lakes Ukiel, Warniak and Wulpińskie. *Wiad. Parazytol*., 46: 123 – 127 (In Polish)
CHOJNACKI, J. C., ORLON, A. (1996): The state of aquatic biocoenoses of the Koszalin Coastal Lakeland and the Parsęta River within 1994/1995. *Zeszyty Naukowe Wydziału Budownictwa i Inżynierii Środowiska, Politechnika Koszalińska*, 10: 7 – 29 (In Polish)
DZIKA, E. (2002): Deformations of the attachment organ in Diplozoidae (Palombi, 1949) (Monogenea). *Wiad. Parazytol*., 48: 69 – 77
DZIKA, E. (2003): Parasites of roach, *Rutilus rutilus* (L.), in lakes of the Masuria Lakeland as indicator of the quality of aquatic environment. *Wydawnictwo UWM Olsztyn*, (In Polish)
DZIKA, E., DUBAS, J. W. (1988): The relation between water temperature and the infection intensity of parasites of the genus *Dactylogyrus* infecting bream. *Wiad. Parazytol*., 34: 37 – 45 (In Polish)
GÓRSKI, W., ANTCZAK, J., PAJKERT, W., ZIÓŁKOWSKI, M. (1991): Nesting avifauna of coastal lakes on the Słowiński Coast within 1976 – 1988. In: Górski W. (ed.), *Lęgowiska ptaków wodnych i błotnych oraz ich ochrona w środkowej części Pomorza, WSP Słupsk,* 38 pp. (In Polish)
GRABDA, E., GRABDA, J. (1957): Tracheliastosis in the common bream *Abramis brama* L. in the Lake Jamno. *Zool. Pol*., 8: 325–334
GUSEV, A. V. (1985): *Identification key of the parasites of freshwater fishes of the USSR fauna. Vol. 2. Parasitic Metazoa.* Izdateľstvo Nauka, Leningrad (In Russian)
JARA, Z., CHODYNIECKI, A. (1999): *Ichthyopatology*. Wydawnictwo Akademia Rolnicza, Wrocław (In Polish)
KHAN, R. A., KICENIUK, J. (1988): Effect of petroleum aromatic hydrocarbons on monogeneids parasitizing Atlantic cod, *Gadus morruha* L. *Bull. Environ. Contam. Toxicol*., 41: 94 – 100
KONDRACKI, J. (1994): *Geography of Poland. Physical-Geographical Meso-regions*. PWN, Warszawa (In Polish)
KOSKIVAARA, M., VALTONEN, E. T., PROST, M. (1991): Dactylogyrids on the gills of roach in central Finland: features of infection and species composition. *Int. J. Parasit*., 21: 565 – 572
KOSKIVAARA, M. (1992): Environmental factors affecting Monogeneans parasitic on freshwater fishes. *Parasitol. Today*, 8: 339 – 341
NIEWIADOMSKA, M. (2003): *Fish parasites of Poland. Identification key. Flukes, Digenea.* PTP Warszawa (In Polish)
PROST, M. (1959): Investigations on water salinity effect on Monogenoidea fauna of fishes. *Acta Parasitol. Pol*., 7: 615 – 630 (In Polish)
POJMAŃSKA, T., GRABDA-KAZUBSKA, B., KAZUBSKI, S. L., MACHALSKA, J., NIEWIADOMSKA, K. (1980): Parasite fauna of five species from Konin lakes complex, artificially heated with thermal effluents, and from Gopło lake. *Acta Parasitol. Pol*., 27: 319 – 357
POJMAŃSKA, T., DZIKA, E. (1987): Parasites of bream *Abramis brama* (L.) from the lake Gosławskie (Poland) affected by long-term thermal pollution. *Acta Parasitol. Pol*., 32: 139 – 161
POJMAŃSKA, T. (1991): *Fish parasites of Poland. Identification key. Tapeworms, Cestoda*. IP PAN Warszawa (In Polish)
REDA, E. S. A. (1987): An analysis of parasite fauna of bream, *Abramis brama* (L.), in Vistula near Warszawa in relation to the character of fish habitat. I. Review of parasite species. *Acta Parasitol. Pol*., 32: 309 – 326
ROLBIECKI, L. (2003): Diversity of the parasite fauna of cyprynid (Cyprinidae) and percid (Percidae) fishes in the Vistula Lagoon, Poland. *Wiad. Parazytol*., 46: 125 – 164
ŠEBELOVÁ, Š., KOUBKOVÁ, B. (1997): Representatives of Monogenea family Diplozoidae (Palombi, 1949) as potential bioindicators of enviormental disturbances. *The 3th International Symposium on Monogenea*, Brno 25 – 30 August 1997, p. 41
SULGOSTOWSKA, T. (1988): Changes in the parasite fauna of the flounder *Platichthys flesus* dependent on the degree of pollution of the south-western Baltic Sea. *Wiad. Parazytol*., 34: 591 – 594
TOMIAŁOJĆ, L., STAWARCZYK, T. (2003): *Avifauna of Poland. Distribution, numbers and changes.* Volumes I and II PT PP „pro Natura". Wrocław
VALTONEN, E.T., KOSKIVAARA, M. (1987): The effect of environmental stress on trematodes of perch and roach in central Finland. In: *Actual Problems in Fish Parasitology, 2nd International Symposium of Ichthyoparasitology*, Tihany, Hungary, p. 103
VALTONEN, E.T., KOSKIVAARA, M. (1989): Effects of effluent from a paper and pulp mill on parasites of the roach in central Finland. *Soviet-Finnish Symposium of Fish Parasites of North-Western Europe*, Petrozavodsk, USSR, pp. 163 – 168
WIERZBICKA, J. (1978): Cestoda, Nematoda, Acanthocephala, Hirudinea and Crustacea from *Abramis brama*, *A. ballerus* and *Blicca bjoercna* from Dąbie lake Poland. *Acta Parasitol. Pol*., 25: 293 – 305
ZDANOWSKI, B., BNIŃSKA, M., CIBOROWSKA-LESZCZYŃSKA, J., KARABIN, A., SPODNIEWSKA, I. (1979): Limnological characteristic of the current state of polluted lake Jamno. *Roczniki Nauk Rolniczych* H, 99: 225 – 248

RECEIVED APRIL 12, 2007

ACCEPTED JULY 19, 2007