

Original papers

Preliminary analysis of ectoparasites of the sturgeon *Acipenser oxyrinchus oxyrinchus* (Mitchill, 1815) originating from different water habitats

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ABSTRACT. The purpose of this study has been to carry out a preliminary parasitological analysis of sturgeon specimens in the context of the presence of external parasites, and to determine their possible influence on the health of the fish. The examination of external parasites was performed on specimens of *A. oxyrinchus oxyrinchus* captured from an open system pond (the Fish Farm in Kuźniczka, Poland) and from the St John River (Canada), in the spring and summer of 2008. Mucus collected from the skin surface of the pectoral fin and around the gills of *A. oxyrinchus oxyrinchus* individuals was fixed in 30% ethyl alcohol. The preparations were examined under a microscope. In total, 227 specimens of parasites were isolated from the skin of *A. oxyrinchus oxyrinchus*. The parasites belonged to three taxa: Protozoa, Monogenea and Crustacea. The degree of parasitic infestation by particular parasites in the analyzed samples ranged from 27.2 to 100%, and the value of the mean infestation varied from 1 to 13.6. Among the determined parasites, *Trichodina* sp. were characterized by the highest parasitological parameters. The other determined protozoan, i.e. *Apiosoma* sp., was found on the skin of half the examined individuals of *A. oxyrinchus* captured from the flow-through pond. Several individuals of the monogenetic fluke *Gyrodactylus* sp. were found on the skin of *A. oxyrinchus oxyrinchus* originating from the pond. *Ergasilus sieboldi* was identified in the samples obtained from both water habitats. Three individuals of the crustacean *Argulus coregoni* were observed on the skin of fish captured in the St John River.

Key words: ectoparasites, *Acipenser oxyrinchus oxyrinchus*, Poland, St John River

Introduction

Contemporary fish culture characterized by high fish density and considerable production intensity creates ideal conditions for the infestation and development of pathogenic agents, including ectoparasites [1]. Artificially reared sturgeon sterlets and fish fry usually experience an increasing pathogenic pressure exerted by exponentially rising counts of ectoparasites. Such mass infestations can result in a worse condition and survival rate of fish, causing economic losses [1]. Under natural conditions, sturgeon are not typically threatened by parasites. Nevertheless, analysis of parasitic fauna can be interesting for a number of reasons. Some intensive research on Eurasian sturgeon shows that they are unique animals among fish, with a clearly

differentiated set of parasites characteristic for this fish species [2]. Identification of various threats to the present range of the occurrence of sturgeon is important because of the growing interest in the intensive aquaculture of this fish, presently introduced in many countries, including Poland [3].

The aim of this study has been to verify the preliminary parasitological assessment of analyzed sturgeon individuals in terms of external parasites and to determine their possible effect on the fish's health.

Materials and Methods

In Poland, specimens of *A. oxyrinchus oxyrinchus* were obtained from a flow-through pond in the Kuźniczka Fish Farm, fed water from the Bukówka

River (a tributary of the Drawa). Individual fish were caught in June 2008. In Canada, specimens of *A. oxyrinchus oxyrinchus* were captured from St John River in July 2008. The total length of the individuals of *A. oxyrinchus oxyrinchus* ranged from 130 to 178 cm, and the body weight of the analyzed fish was within 11–74 kg. Altogether, 22 individuals from both aquatic habitats were examined.

Mucus collected from the skin surface on pectoral fins and around gills of *A. oxyrinchus oxyrinchus* individuals was fixed in 30% ethyl alcohol. The preparations were observed under an Olympus CX41 microscope. The keys by Bychowski [4], Fryer [5] and Bauer [6] were used for identification of parasites. Because of the applied preservation method, difficulties were encountered while determining the diagnostic features in half of the observed parasites. Parasitological indices, that is prevalence, intensity of infestation and relative density, were derived according to the definition formulated by Busch et al. [7]. The statistical analysis of the results consisted of calculating the arithmetic mean and range (max/min) in an Excel 2010 package.

Results

In total, 227 parasites were isolated from the samples obtained from the skin of *A. oxyrinchus oxyrinchus* individuals. The parasites belonged to three taxa: Protozoa, Monogenea and Crustacea. The infection intensity for each of the isolated parasites was within 27.2% and 100%, and the relative density value ranged from 1 to 13.6. The parasitological indices assigned to the identified parasites found on the sturgeon from a flow-through pond (Kuźniczka Fish farm, Poland) and a river (the

St John River, Canada) are contained in Table 1.

Discussion

Among the determined parasites, the highest parasitological indices were assigned to *Trichodina* sp. Another determined protozoan, i.e. *Apiosoma* sp., was found on half the skin samples from the individuals of *A. oxyrinchus oxyrinchus* captured in the flow-through pond. According to Baska [8], the degree of infestation with the mentioned protozoa in most cases is not very high and the losses they cause are small. These protozoa are characteristic for the skin of young sturgeon [9], and typically appear together on the skin of diseased and emaciated fish, whose body surface is covered with accumulated light grey or greyish opaque mucus. The maximum intensity of the infection with *Trichodina* sp. was 58 specimens. Mass appearance of *Trichodina* sp. on the skin of weak fish may cause skin irritation but will not lead to any serious internal damage to the host [10]. It should be added that the sturgeon possesses a very effective barrier to microorganisms and pathogens, such as a thick skin covered with bony scales as well as intensively secreted mucus [11].

A few individuals of the monogenetic fluke *Gyrodactylus* sp. were found on the skin of *A. oxyrinchus oxyrinchus* fish from the pond. In aquaculture, younger life stages of fish, i.e. hatched sturgeon, were found to carry another fluke, namely *Dactylogyrus* sp. and its developmental stages, and the intensity of infestation ranged from a few to one individual (own observations, the Department of Ichthyology). According to Grabda [12], large numbers of flukes on fish skin can cause the fish growth retardation, emaciation of the body or skin damage and secondary bacterial infection.

Table 1. Values of parasitological indices assigned to determined parasites collected from the skin surface of individuals of *A. oxyrinchus oxyrinchus* captured in a flow-through pond (Kuźniczka Fish Farm, Poland) and from a river (the St John River, Canada)

Site of sampling	Parasites		No.	Prevalence %	Intensity		Relative density
					Mean	Range	
Kuźniczka Fish Farm N=11	Protozoa	<i>Trichodina</i> sp.	204	100	13.6	2–58	13.6
		<i>Apiosoma</i> sp.	7	45.4	1.4	1–5	0.6
	Monogenea	<i>Gyrodactylus</i> sp.	3	27.2	1.0	0–1	0.3
St John River N=11	Crustacea	<i>Ergasilus sieboldi</i>	7	63.3	6.42	3–18	4.1
					2.0	1–2	0.3
		<i>Argulus coregoni</i>	3	18.1	1.5	1–2	0.3

There is little information available about parasitic crustaceans found in aquacultures of sturgeon fish species [9]. *Ergasilus sieboldi*, which appears on different fish species and is a well-known strongly pathogenic parasite to cultured fish [9], was observed on the analyzed skin samples of sturgeon from both water environments. The infestation rate and its intensity increase proportionally to the age and size of fish [13]. Several infections with this species which caused mass deaths of fish have been documented across the world, e.g. Shimura [14], Gault et al. [15], Hakalahti and Valtonen [16]. Another crustacean, *Argulus coregoni*, was detected on the skin of fish caught in the St John River in Canada. This is a specialized species, which is mainly found on salmonids [14]. Some earlier studies [17] on sturgeon living in the St John River detected another crustacean species, i.e. *Argulus foliaceus*, whose number exceeded 15 individuals per fish, causing undesirable changes in particular blood parameters of each fish. In general, individual crustacean species can appear sporadically on skin of sturgeon fish [18], where they are easily spotted, but according to Bauer et al. [9] single specimens do not cause any deterioration of the fish's health.

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