

Epizootic Risk of Trematodiasis in Aqueous Dwellers of the North-West Region of the Russian Federation



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Abstract: The article is devoted to studying the situation with opisthorchiasis in populations of freshwater fish in the coastal zone of the Gulf of Finland to identify the possible epizootic and epidemic hazards.

Keywords: fish opisthorchiasis, opisthorchiasis, shellfish of genus *Bithynia*.

I. INTRODUCTION

In recent years, the Russian Federation has increased the role of fish and fish products in the formation of the food balance in the country [1, 2]. The advantageous geographical position of Russia contributes to this: the access to many seas and three oceans, and the presence of large and small rivers and lakes with fish stock. However, a disadvantage of wild commercial fish is its infestation with parasites, certain types of which are very dangerous to the health of humans and animals [3]. Such zoonotic diseases include opisthorchiasis. Carp infestation with metacercariae of trematodes of the

family Opisthorchidae Lass, 1899 in various freshwater bodies of Russia presents a potential risk of the increased incidence rate of these parasitoses among the population of the Russian Federation [4-6]. Works of many researchers [4, 7, 8,] were devoted to studying the danger of trematodiasis to humans and animals, including those in the populations of their additional hosts - freshwater fish; however, it should be noted that the issues of the epizootic situation with opisthorchiasis in fish in the waters of the North-West region of the Russian Federation remains insufficiently studied.

The article is devoted to studying the rate of freshwater commercial fish infestation with opisthorchiasis in the Eastern part of the Gulf of Finland to determine the epizootic situation with opisthorchiasis in the studied area.

The research was aimed at studying the epizootic peculiarities of trematodiasis in freshwater fish in the waters of the North-West of Russia.

II. PROPOSED METHODOLOGY

A. General Description

The study was performed in 2016 – 2018 in Saint-Petersburg at the premises of the Laboratory of Fish Diseases of the FSBSI National Research Institute of Lake and River Fisheries (GosNIORH) n.a. L. S. Berg together with the Laboratory of Veterinary-Sanitary Inspection (LVSI) in Vyborg and the Department of Epizootology, Parasitology and Veterinary-Sanitary Examination of the FSBEI HE Nizhny Novgorod State Agricultural Academy.

B. Algorithm

The objects of the research were fish (30 specimens of bream (*Abramis brama*, Linnaeus, 1758) and 20 specimens of roach (*Rutilus rutilus*, Linnaeus, 1758), as well as shellfish of genus *Bithynia*. The fish were caught in the Vyborg Bay of the Gulf of Finland of the Baltic Sea in the spring and the summer of the year 2016. Shellfish were caught with dip nets in the coastal zone of the stations in the Vyborg Bay.

The fish were measured and subjected to complete autopsy (by K. I. Skryabin). All found metacercariae were identified using the Determiner of Parasites in Freshwater Fish of the USSR (the USSR Academy of Sciences Publishers, 1962). Metacercariae viability was identified by mechanical (by pressing on the glass), or chemical action (using a few drops of the reagent (0.5 % trypsin in saline solution) warmed up to 36 °C). In the absence of motor activity, the larvae were considered dead.

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III. RESULT ANALYSIS

The rate of intermediate hosts – shellfish of genus *Bithynia* – infestation with opisthorchid flukes was studied. Of 60 gastropods caught in the area of three stations of the Vyborg Bay, 15 (25 %) belonged to species *Bithynia leachi* (Sheppard, 1823). Further, 11 cercariae were identified in the 15 univalved shellfish. During the identification of the

cercariae, 36.4 % were identified as cercariae of genus *Opisthorchis* (species *Opisthorchis felineus*), and 63.6 % – as cercariae of genus *Metorchis* (Figure 1).

Due to detecting an infestation of the population of intermediate hosts (*Bithynia leachi* shellfish) by zoonotic species of trematodes, it was found that parasitic systems of opisthorchiasis were functioning in the studied waters.

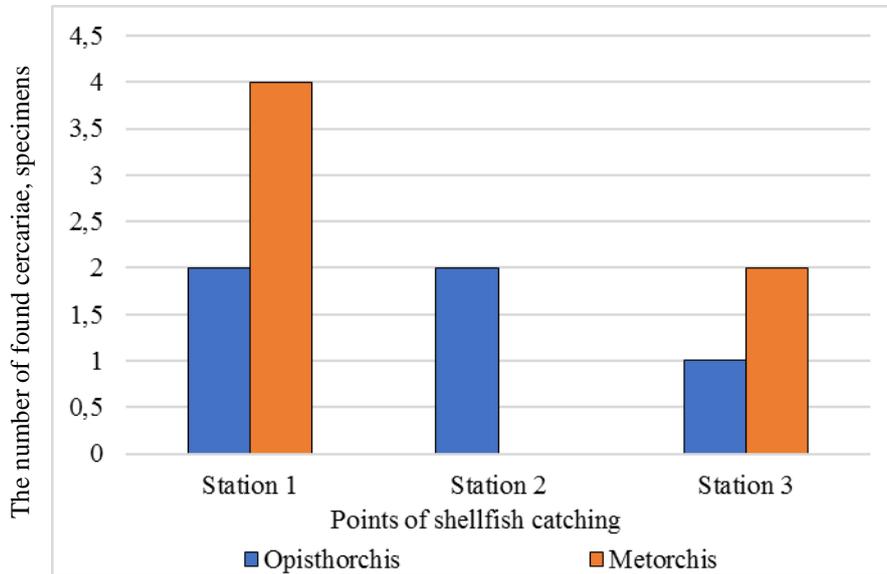


Fig. 1: Linear graphical model of shellfish infestation by the cercariae of opisthorchid flukes in the coastal zone of the Gulf of Vyborg (the Gulf of Finland).

The presence of metacercariae in the additional hosts of trematodes (bream (30 specimens) and roach (20 specimens)) was studied. Fish size in the sample ranged from 7 to 18 cm. Only the metacercariae of the trematodes that belonged to family Opisthorchidae Lass, 1899 were counted with the determination of their viability.

Studying the rate of fish contamination with metacercariae of opisthorchid flukes showed that the highest prevalence was observed in roach (85 %). The rate of bream infestation amounted to 30 % of the total quantity of the caught fish population. It should be noted that the largest number of metacercariae detected in both fish species belonged to the genus *Metorchis* (Table 1).

Table 1: The expert assessment of the rate of the studied fish infestation with metacercariae of opisthorchid flukes in the Vyborg Bay

N	Fish species	The number of found cercariae	Genus <i>Metorchis</i>	<i>Opisthorchis felineus</i>
1	bream	16	16	0
	Total		100 %	
2	roach	34	24	10
	Total		71 %	29 %

Roach infestation by metacercariae of genus *Metorchis* was 65 % of the total number of fish, by *Opisthorchis felineus* – 20 %, respectively, in 15 %, the disease was not found. The highest degree of infestation by trematodes was observed in the fish caught in the coastal area (50 %) (Station 1), while in the open waters, only 20 % of the caught fish were infected by the metacercariae of opisthorchid flukes.

In determining the viability of trematode larvae, it was found that 93 % of the larvae of *Opisthorchis felineus* and 88 % of the larvae of genus *Metorchis* were active, and the

remaining 7 % and 12 %, respectively, were dead and posed no threat for their definitive hosts.

IV. CONCLUSION

Analysis of the studies’ results has shown that in the Gulf of Finland (the area of the Vyborg Bay) of the Baltic Sea, parasitic systems of opisthorchiasis and metorchosis are functioning, which create the epizootic and epidemic risk.

The presented data of the parasitologic monitoring and expert assessment of the fishery industry products are important components of the anti-epizootic biological safety in forming a complex of measures aimed at protecting the health of people and wildlife in the studied region.

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