

PARASITE FAUNA OF OHRID BLEAK (*ALBURNUS SCORANZA*, BONAPARTE, 1845) FROM OHRID LAKE (MACEDONIA)

Dijana BLAZHEKOVIKJ - DIMOVSKA^{1*}, Stojmir STOJANOVSKI²

¹University "St. Kliment Ohridski", Faculty of Biotechnical Sciences, Bitola, Macedonia

²Hydrobiological Institute, Ohrid, Macedonia

*Corresponding author e-mail: dijana.blazekovic@uklo.edu.mk

ABSTRACT

Ohrid Lake is the largest and most important natural lake in Macedonia, the oldest in Europe, and from a biological point of view, the most important stagnant water ecosystem on the continent. Ohrid bleak (*Alburnus scoranza*, Bonaparte, 1845) is numerous in the basin of the Neretva River, especially in the Ohrid and Skadar Lakes, in which it has a prominent economic importance. The scales of this fish are used to make the famous Ohrid pearl. The purpose of this study was to determine the presence of the parasite fauna in Ohrid bleak (*Alburnus scoranza*, Bonaparte, 1845) collected from Ohrid Lake. Fish material from seven (7) specimens of Ohrid bleak sampled from the Ohrid Lake, were subjected to routine identification, dissection, and observation, as well as, examined for parasitological investigations. Cleaned parasites were separated, put in appropriate fixatives, and prepared for determination using techniques of staining and clearing. The parasite specimens were identified using the reference keys of parasite determination. Common statistical analyses by calculation of prevalence and mean intensity of parasite species were used.

The parasitological examination showed that 4 out of 7 examined fish specimens (57.14%) are infected with parasites. Four parasite species were identified, as follow: one monogenean (*Dactylogyrus* sp.) on the gills, one protozoan (*Ichthyophthirius multifiliis*) on the gills, one nematode (*Raphidascaris acus*) in the intestine and one cestode (*Caryophyllaeus* sp.) in the intestine. The most prevalent parasite species was *Ichthyophthirius multifiliis* (73.30%), while the highest intensity of infestation was recorded with *Dactylogyrus* sp. (5.43).

The presence of parasites is detrimental to fish populations and can result in high mortality, weight loss, and reduced fertility in both aquaculture and open-water fish, especially in waters contaminated by industrial and urban pollutants. Poor water quality and lack of nutrients can cause the emergence of parasitic diseases. Parasites in the waters where they are present cause a decrease in the number of both juvenile and adult categories of fish, thus directly affecting the fish stock in a country.

Keywords: parasite fauna, Ohrid Lake, *Alburnus scoranza*, prevalence, water.

INTRODUCTION

According to Marcogliese (2004), fish parasites are good indicators of the quality status of aquatic ecosystems, as well as, indicators of pollution in aquatic habitats. They can be adapted to the specific conditions of both their aquatic environment and their hosts (Pietrock *et al.* 2001). Galli *et al.* (2001) considered that there are characteristic differences in ectoparasite and endoparasite populations inhabiting lakes that harbor different trophic levels, and as a result ectoparasite density increased proportionally with the eutrophication level while endoparasites were restricted to unpolluted lakes. Since fish parasites have a considerable effect on the ecosystem, it is very important to be studied. Parasites cause invasive fish diseases that often occur in different seasons. This is because pathogens and fish are influenced by external (location, climate, physicochemical water properties,

husbandry skills, etc.) and internal (growth and physiological status) factors. Invasive pathogens may be specific to certain fish species.

Diagnosis of diseases is the first step towards effective treatment and care has to be taken when setting it up. The fish must be alive or freshly dead, and the body has to be kept moist. Dissected organs should be preserved as completely as possible. Dissecting instruments should be kept clean to avoid inter-contamination of pathogens between organs for microscopic observation. Specimens are fixed for further identification if pathogens or clinical signs are suspected. If certain complications are detected during the diagnosis, the primary and secondary diseases should be diagnosed and appropriate treatments should be carried out separately or simultaneously. Diagnostic methods include examination of the aquatic environment and examination of the fish with the naked eye and microscopically.

The purpose of this study was to determine the presence of the parasite fauna in Ohrid bleak (*Alburnus scoranza*, Bonaparte, 1845) collected from Ohrid Lake.

MATERIAL AND METHODS

Ohrid bleak is a small freshwater fish belonging to the Cyprinidae family. The Ohrid bleak has an elongated and laterally flattened body, covered with thin, shiny silvery (nacreous) scales, which fall off easily. Between the base of the abdominal fins and the anal opening, there is a ridge, which is not covered with scales. A dark brown line runs along the sides of the body. The mouth is terminal. The eyes are relatively large. It has long and thick branchiostegins.

The fish is a typical planktonophage, and a large number of planktonic forms are found in its diet. It reaches sexual maturity in the third year of life, at a body length of 7 - 8 cm. It spawns in portions, in spring and summer (from the second half of May to the middle of August), in the shallow littoral, in hidden places with a sandy bottom, and rarely on gravel or sand, at depths from 0.5 - 2 m.



Figure 1. Ohrid bleak (*Alburnus scoranza*, Bonaparte, 1845) (original photo)

The fish material of seven (7) specimens of Ohrid blake was collected from Ohrid Lake. The fish samples were placed in plastic tanks with water and immediately transferred to the Laboratory for Fish Diseases at the Hydrobiological Institute - Ohrid.

After the dissection, the gill filaments, eyes, fins, intestines, and skin were observed under a stereomicroscope "Zeiss Stemi 305" and a microscope "Zeiss Primovert".

The body cavity of the fish was opened with scissors. The parasites were placed in small Petri dishes and cleaned of mucus and blood. The separated parasites were placed in fixatives - 4% formalin or 70% ethyl alcohol, and then they were illuminated with lactophenol, as well as, fixed with Canada balsam.

Determination of parasite species was done by observing the characteristic organ under a microscope and a stereomicroscope. Reference keys were used to determine the parasites. Parasites found were identified using reference parasitological keys of Bauer (1985, 1987).

RESULTS AND DISCUSSION

During our research, seven (7) samples of Ohrid bleak were examined, with an average length of 10.50 cm and an average weight of 9.93 g (Table 1), and the following parasite species were determined: *Dactylogyrus sp.* on gills; *Ichthyophthirius multifiliis* on gills; *Caryophyllaeus sp.* in the intestine and *Raphidascaris acus* in the intestine. Not a single parasite was found on the fins, as well as, on the eyes and skin. (Table 2).

Table 1. Total number of examined fish species of Ohrid bleak (*Alburnus scoranza*)

Number of samples examined	Ohrid bleak (<i>Alburnus scoranza</i>)	
	Length (cm)	Weight (g)
1	11.80	14.90
2	10.80	10.25
3	10.80	10.55
4	9.00	6.50
5	10.30	8.25
6	10.50	10.10
7	10.30	8.95
Average value	10.50	9.93

Table 2. Determined parasites species in Ohrid bleak (*Alburnus scoranza*)

Examined organs	Ohrid bleak (<i>Alburnus scoranza</i>)	
	Parasite species	Number of parasites identified
Fins	/	/
Gills	<i>Dactylogyrus sp.</i>	2
	<i>Ichthyophthirius multifiliis</i>	> 15
Intestine	<i>Raphidascaris acus</i>	1
	<i>Caryophyllaeus sp.</i>	2
Eyes	/	/

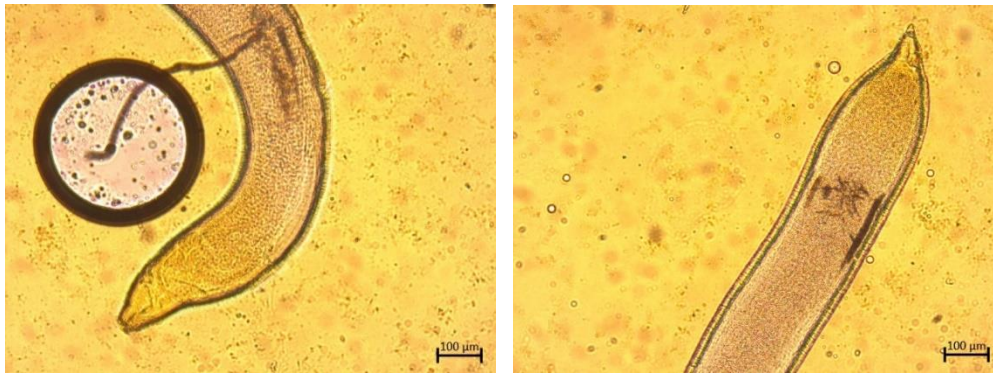


Fig.2. *Raphidascaris acus* in intestines of Ohrid bleak (*Alburnus scoranza*) (left - anterior part; right - posterior part) (original photo)



Fig.3. *Caryophyllaeus* sp. in intestines of Ohrid bleak (*Alburnus scoranza*) (original photo)



Fig.4. *Ichthyophthirius multifiliis* on gills of Ohrid bleak (*Alburnus scoranza*) (original photo)

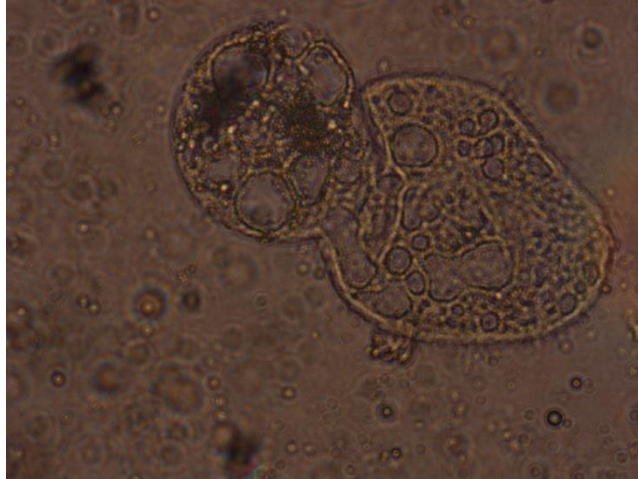


Fig.5. *Ichthyophthirius multifiliis* (tomit) on gills of Ohrid bleak (*Alburnus scoranza*) (original photo)

Dactylogyrus is a genus of monogenean trematodes and belongs to the Dactylogyridae family. Monogeneans are small parasitic worms that are mainly found on the skin or gills of fish. Fish of the Cyprinidae family infected with species of the genus *Dactylogyrus* may exhibit symptoms that include inflamed gills, excessive mucous secretions, and rapid respiration. Infected fish become lethargic, swim near the surface of the water, and their appetite decreases. In severe infections, *Dactylogyrus* parasites can cause gills chemoragia and metaplasia, which can lead to secondary bacterial infections and death.

The representatives of the genus *Caryophyllaeus* are worms belonging to the family Caryophyllaeidae. Species of this genus are widespread in Europe and North America. These species, as adult forms reach a length of about 3-5 cm and contain only one set of female and male sex organs. These worms live attached to the intestines of cyprinid fish. The 75- μ m-sized eggs are passed through the feces of their hosts. During this period they already contain a miracidium larva, which is swallowed by the transitional hosts. Inside these transitional hosts, the so-called proceroid larva develops within 1 - 4 months (depending on external temperatures).

Ichthyophthirius multifiliis is a large, ciliated protozoan that causes "Ich" or "white spot disease". This disease is a major problem for freshwater aquariums and commercial fish producers worldwide. Most species of freshwater fish are considered susceptible, and the parasite has been identified in many parts of the world, in both farmed and wild fish. These parasites cause characteristic white spots that are often seen on the skin and fins of infected fish. The disease is highly contagious and spreads rapidly from one fish to another without the need for additional hosts (direct life cycle). Although considered a "warm water" disease, outbreaks often occur when there are variations in water temperature, especially in the spring when water temperatures rise. While most protozoa reproduce by simple division (one parasite "splits" into two), a single Ich organism can multiply into hundreds of new parasites in one generation, so early detection and treatment of this parasite is critical. This parasite cannot survive unless live fish are present. It can cause mass mortality in fish in a short period and if left untreated, can result in 100% mortality. Prevention is always preferable to the treatment of ichthyophthyrriasis. Preventing the introduction of this parasite is one of the most important reasons why all incoming fish should be quarantined. Transport and handling can cause newly arrived fish that may be asymptomatic carriers (those without obvious clinical signs) to serve as a source of infection for other fish with which they may come into contact. For this reason, a minimum 30-day quarantine period is recommended for new fish.

Raphidascaris acus is a widespread parasitic nematode and has a wide list of fish hosts. According to some studies from North America, *Perca pauescens* and *Esox lucius* are the key fish species required for the transmission of *R. acus*, but the extent of their distribution is not well known.

CONCLUSION

Parasites are present and important components in an ecosystem through their diverse effects on host population dynamics, community interactions, and biocenosis structure.

In defining the relationship between parasites and the host - fish, it is often difficult to conclude that the parasites caused the disease - parasitism, or it is only a question of the presence of parasites on the fish that do not necessarily threaten the health of the host. When in fish there is a disturbance of the basic physiological parameters, pronounced clinical symptoms, pathomorphological changes of the tissues and organs, and deaths, then we claim that we have diagnosed a parasitic disease. Parasites in fish are also present in open waters as one of the usual links in the biological chain of balance, where the causative agents of diseases are considered an integral part of the ecological system. Seven (7) specimens of Ohrid bleak (*Alburnus scoranza*) from Ohrid Lake, with an average length of 10.50 cm and an average weight of 9.93 g, were examined, and the following parasites species were determined: *Dactylogyrus* sp. on gills; *Ichthyophthirius multifiliis* on gills; *Caryophyllaeus* sp. in intestines and *Raphidascaris acus* in intestines. When studying parasites, it is necessary to identify the parasite species, and their development cycle, study the clinical picture and pathomorphological changes that cause parasitic diseases, as well as basic ichthyopathological doctrines for finding the most appropriate ways to heal the disease.

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