

AHI EVRAN

*International Conference
on Scientific Research
Kırşehir Ahi Evran University*



*“Know how to forgive
when you are strong and superior
be gentle when you are angry and
be generous enough to give to others
even when you are in need”*

Ahi Evran

FULL TEXTS BOOK

VOLUME-3

EDITORS:

Prof. Dr. Ahmet KAZANKAYA/ Assist. Prof. Dr. Mevlude Alev ATES/Dr. Kahraman IPEKDAL

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**AHI EVRAN
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November 30 - December 1-2, 2021
Kırşehir Ahi Evran University

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Kırşehir Ahi Evran University

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Kırşehir Ahi Evran University
&
Institute of Economic Development and Social Researches



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Assist. Prof. Dr. Mevlude ALEV ATES
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01.12.2021

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	Mahesh Kumar	Independent Researcher, Ayodhyadham
	Shalini Mishra	UG Student, SPSP PG College, Ayodhyadham, India
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	Ahmed Zaazaa	An-Najah National University, P.O. Box 7, Nablus, Palestine
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	Stojmir Stojanovski	Hidrobiological Institute, 6000 Ohrid, N. Macedonia
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	Farhan Saeed	Government College University, Faisalaabd, Pakistan.
	Muhammad Afzaal	Government College University, Faisalaabd, Pakistan.
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	OLALEKAN O. A	Ladoke Akintola University of Science and Technology, Ogbomosho, Nigeria

PARASITE FAUNA OF FISH FROM RESERVOIR STREZHEVO (N. MACEDONIA)

Dijana Blazhekovikj - Dimovska¹

¹ University “St. Kliment Ohridski”, Faculty of Biotechnical Sciences, Bitola, N. Macedonia

¹ORCID ID: <https://orcid.org/0000-0001-5912-9093>

Stojmir Stojanovski²

² Hidrobiological Institute, Ohrid, N. Macedonia

²ORCID ID: <https://orcid.org/0000-0003-4704-4820>

Lidija Velkova - Jordanoska²

² Hidrobiological Institute, Ohrid, N. Macedonia

Blagoja Trajchevski²

² Hidrobiological Institute, Ohrid, N. Macedonia

Aleksandar Vangelovski³

³PE Strezhevo, Bitola, N. Macedonia

ABSTRACT

This study aimed to determine the presence of parasite fauna, as well as, prevalence and mean intensity of parasite species in fish from one of the largest reservoirs in N. Macedonia. Reservoir Strezhevo is an artificial lake located on the middle course of the Shemnica river. Strezhevo is of exceptional importance for the Pelagonia region because it provides the necessary quantities of water for irrigation of a part of Pelagonia, the necessary quantities of unprocessed water for the needs of the inhabitants of the city of Bitola and the surrounding area, raw water for part of the industry, etc. The clean and cold water in the reservoirs provides favorable conditions for the existence of various fish species, such as rainbow trout, common carp, etc.

Fish specimens were obtained by net and fish species were determined according to the key of Kottelat and Freyhof (2007). The fish were placed in plastic tanks with water obtained from the collection sites and transferred to the Department of fish diseases at Hydrobiological Institute - Ohrid (N. Macedonia). Only fresh fishes were subjected to routine identification, dissection, and observation methods. Cleaned parasites were separated and put in certain fixatives, prepared for determination with determined techniques of staining and clearing (Vasiljkov, 1983; Gussev, 1983). Parasite identification was performed by morphometric analysis, using the keys of Bauer (1985) and Gussev (1983), based on the character of the copulatory organ, the haptor sclerites like anchors, bars, and hooks. Classical epidemiological variables (prevalence and mean intensity) were calculated according to Bush et al. (1997).

During the parasitological investigations of the fish from Reservoir Strezhevo (N. Macedonia), 4 species of parasites have been identified, which in addition have great importance in the fish pathology. In this study, the following parasite species were established: the monogenean trematodes *Dactylogyrus extensus* and *D. minutus* in *Cyprinus carpio*, the nematode *Raphidascaris acus* in *Alburnus thessalicus*, and the crustacean *Ergasilus sieboldi* in *Alburnus thessalicus* and *Squalius vardarensis*.

Keywords: fish, reservoir, parasites, trematodes, nematodes, crustacean

INTRODUCTION

Parasites can cause very great damage, even mass fish kills, mostly on fish fry. Moreover, it reduces their market value and feed activity, weight loss, reduced fecundity, pathological changes and mortality. Parasites are also regarded as a sensitive indicator of environmental health, i.e. data of their prevalence and intensity of infestation, as well as knowledge of the biology of parasites, can indicate the health of the environment (Dušek et al., 1998; Overstreet, 1997).

Reservoir Strezhevo is located at an altitude of 737.5 m and has an area of 4.3 km². The dam was built in the Strezhevo Valley in 1982. The water in the Reservoir Strezhevo is provided by the accumulation of water from the watershed of the river Shemnica over the dam and the waters taken with the alimentary channel. The alimentary channel enables water capture from Baba Mountain watercourses (rivers: Kishevka, Graeshka, Ostreshka, Zlokukjanska, Stara, Kinderka and Dragor).

The water from the reservoir is used for water supply to the city of Bitola and the surrounding settlements, to the REK Bitola mining and energy plant, and provides the opportunity to irrigate 20.360 ha of fertile land in the Bitola Valley. The water in the lake is usually of the I and II category, and it can be extremely rare to reach the IV class.

As a result of the shoreline and fluctuating water levels in the Reservoir Strezhevo, there is no significant development of macrophytic vegetation that would be significant for the fish population. Phytoplankton analysis shows that the water in the reservoir is alpha mezosaprobic, with a mean saprobic index of 2.01, corresponding to class II water. Quantitatively and qualitatively, the representation of bottom fauna in the reservoir is poor.

In the water of the Reservoir Strezhevo, there are 24 species of fish from 9 families. The Cyprinidae family includes 13 species: *Alburnoides bipunctatus*, *Alburnus thessalicus*, *Barbus balcanicus*, *Carassius carassius*, *Carassius gibelio*, *Chondrostoma vardarensis*, *Cyprinus carpio*, *Hypophthalmichthys molitrix*, *H. nobilis*, *Rutilus rutilus*, *Scardinius erythrophthalmus*, *Squalius vardarensis* and *Tinca tinca*.

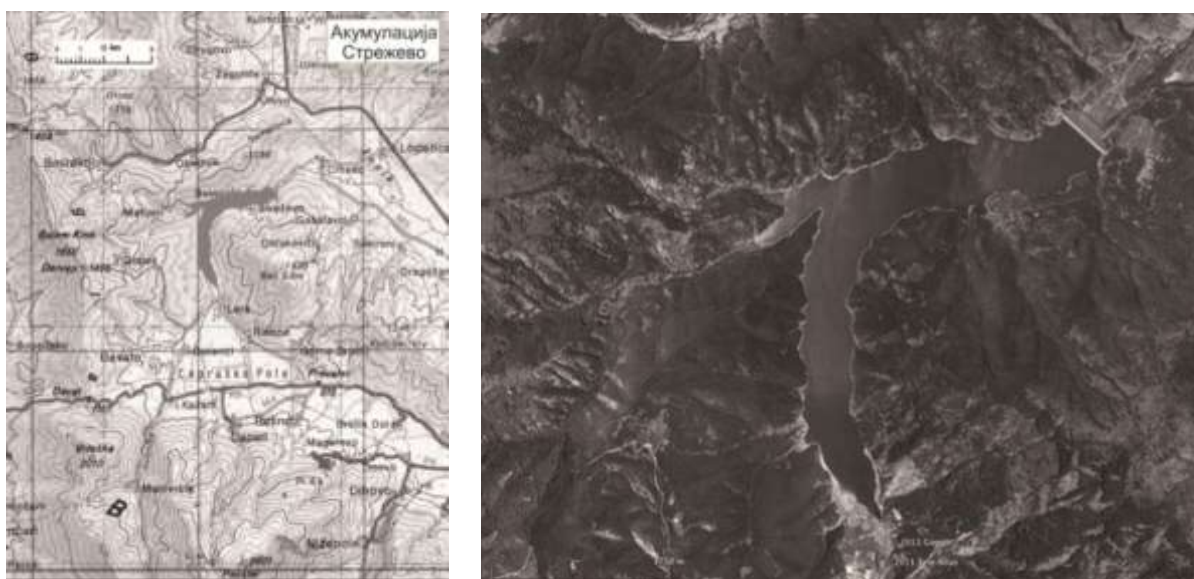


Fig.1. Geographic map and satellite view of the Reservoir Strezhevo

MATERIAL AND METHODS

Fish material was sampled over two years, from two localities on Reservoir Strezhevo: inflow of River Shemnica in the reservoir and near the dam. Fish species were determined according to the key of Kottelat and Freyhof (2007). Fish samples of 7 fish species, including *Cyprinus carpio*, *Carassius gibelio*, *Alburnus thessalicus*, *Squalius vardarensis*, *Rutilus rutilus*, *Lepomis gibbosus* and *Perca fluviatilis* from the Strezhevo reservoir were examined for parasitological investigations.

The fish were placed in plastic tanks with water obtained from the collection sites and transferred to the Department of fish diseases at Hydrobiological Institute - Ohrid (N. Macedonia).

Only fresh fishes were subjected to routine identification, dissection, and observation methods. Cleaned parasites were separated and put in certain fixatives, prepared for determination with determined techniques of staining and clearing (Vasiljkov, 1983; Gussev, 1983; Stojanovski, 1997, 2003).

Parasite identification was performed by morphometric analysis, using the keys of Bauer (1985, 1987) and Gussev (1983), based on the character of the copulatory organ, the haptor sclerites like anchors, bars, and hooks. Classical epidemiological variables (prevalence and mean intensity) were calculated according to Bush et al. (1997).

RESULT AND DISCUSSION

During the parasitological examinations of the fish from the Reservoir Strezhevo, a total of 86 fish samples were examined, from which parasite infestation was determined in 33 fish, with a total prevalence of 38.37 % and mean intensity of 4.0.

Four species of parasites have been identified, as follows: the monogenean trematodes *Dactylogyrus extensus* and *D. minutus* in *Cyprinus carpio*, the nematode *Raphidascaris acus* in *Alburnus thessalicus*, and the crustacean *Ergasilus sieboldi* in *Alburnus thessalicus* and *Squalius vardarensis*.

Based on the total number of fish examined (86), the highest prevalence is confirmed with *Ergasilus sieboldi* (12.79%) and the highest mean intensity as well (5.44). (Table 1).

Tab.1. Total prevalence and mean intensity with determined parasites in Reservoir Strezhevo

Fish & Parasite species		Number of examined fish	Number of infected fish	Prevalence (%)	Mean intensity
<i>Cyprinus carpio</i>	<i>Dactylogyrus extensus</i>	23	11	47.83	4.18
	<i>Dactylogyrus minutus</i>		10	43.48	4.90
In total – <i>Cyprinus carpio</i>		23	18	78.26	5.28
<i>Alburnus thessalicus</i>	<i>Raphidascaris acus</i>	11	5	45.45	1.60
	<i>Ergasilus sieboldi</i>		6	54.55	3.67

In total - <i>Alburnus thessalicus</i>		11	10	90.91	2.73
<i>Squalius vardarensis</i>	<i>Ergasilus sieboldi</i>	12	5	41.67	1.40
<i>Carassius gibelio</i>		8	0	0	0
<i>Rutilus rutilus</i>		9	0	0	0
<i>Lepomis gibbosus</i>		13	0	0	0
<i>Perca fluviatilis</i>		10	0	0	0
TOTALLY INFESTED		86	33	38.37	4.0

By fish species, the highest prevalence is determined in *Alburnus thessalicus* (90.91%), followed by *Cyprinus carpio* (78.26%) and *Squalius vardarensis* (41.67%).

The highest mean intensity is determined in *Cyprinus carpio* (5.28), followed by *Alburnus thessalicus* (2.73) and *Squalius vardarensis* (1.40).

D. extensus is found on the gills of *Cyprinus carpio*. It is previously described in *Cyprinus carpio* from cyprinid fish ponds Bukri, Dolneni, Zhelezara, as well as in Mladost and Gradche reservoirs in N. Macedonia (Blazhekovikj - Dimovska & Stojanovski, 2021). It is also found in *Cyprinus carpio* from Ohrid and Prespa Lakes (Stojanovski, 2003).

D. minutus is found on the gills of *Cyprinus carpio*. It is previously described in *Cyprinus carpio* from Bukri and Dolneni fish ponds, as well as Mladost, Globochica and Gradche reservoirs (Blazhekovikj-Dimovska & Stojanovski, 2021). It is also found in *Cyprinus carpio* from Lake Dojran (Stojanovski, 2003).

Raphidascaris acus is found in the body cavity of *Alburnus thessalicus*. During previous researches, the larvae of *Raphidascaris acus* is found in the body cavity of *Barbus rebeli*, *Rutilus ohridanus*, *Alburnus sqoranza* and *Anguilla anguilla*, and adult forms of this parasite have been found in the intestines of *Squalius squalus* and *Anguilla anguilla* from Lake Ohrid (Stojanovski, 1997).

Ergasilus sieboldi is found on the gills of *Alburnus thessalicus* and *Squalius squalus* This copepod is previously identified on the gills of *Alburnus scoranza* from Lake Ohrid (Stojanovski, 2003). All parasites found represent new findings for the fish parasite fauna of Reservoir Strezhevo. In addition, all established parasites have great importance in fish pathology.



Fig. 2. *Dactylogyrus extensus*: adhesive disk (original) x 252 (left), copulatory organ (original) x 288 (right)

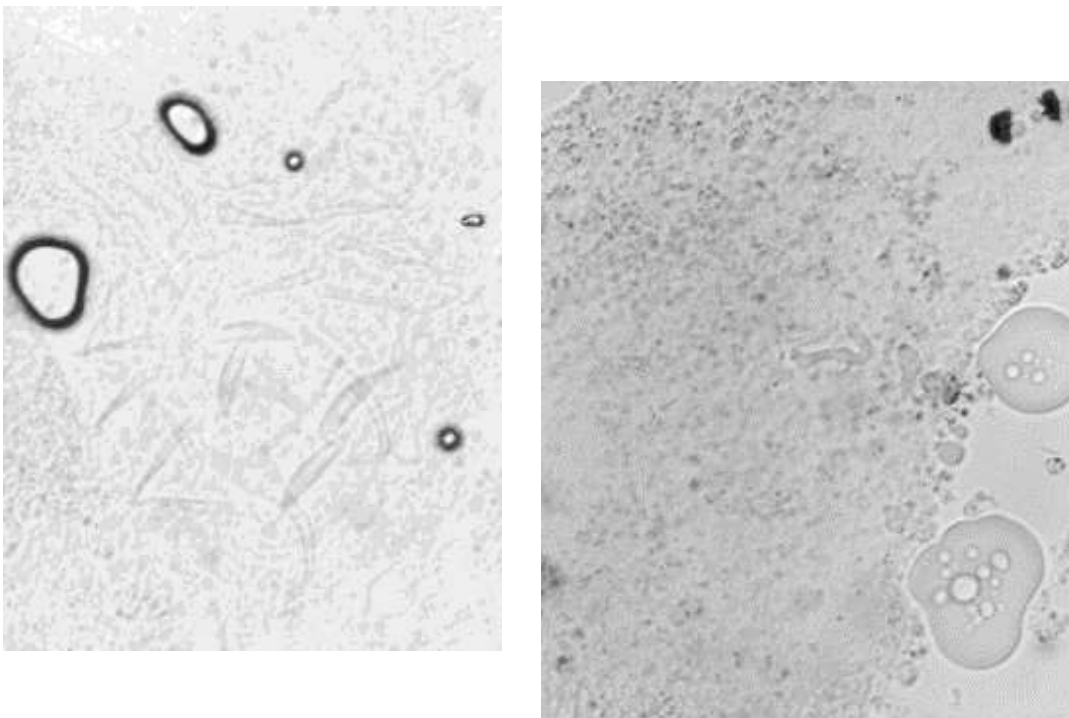


Fig. 3. *Dactylogyrus minutus*: adhesive disk (original) x 300 (left), copulatory organ (original) x 300 (right)



Fig. 4. *Ergasilus sieboldi*: whole parasite – left (original), hooks – right (original)

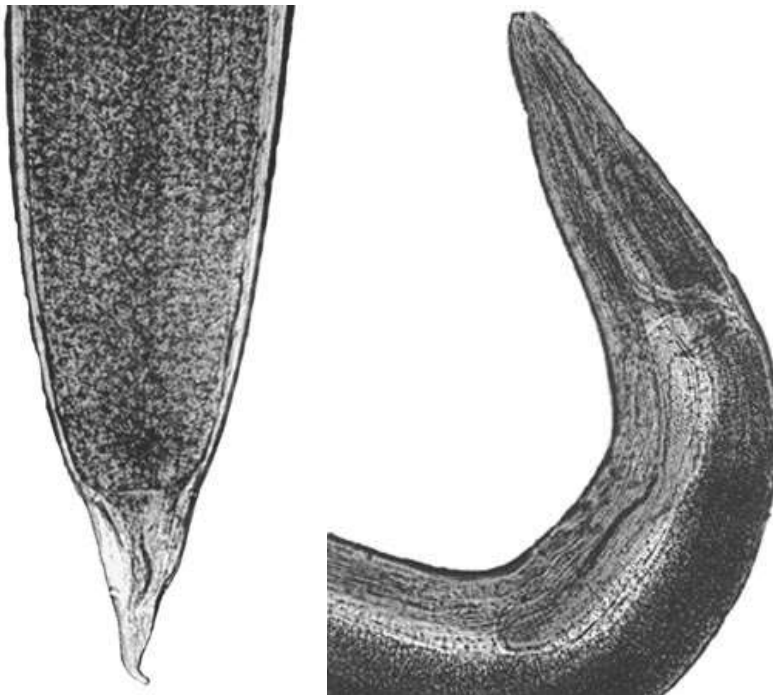


Fig.5. *Raphidascaaris acus*: posterior part – left (original), anterior part – right (original)

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