

## DISTRIBUTION OF *POSTHODIPLOSTOMUM CUTICOLA* (DIGENEA) METACERCARIAE IN CYPRINIDS OF THE MODRAC RESERVOIR

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### DISTRIBUCIJA *POSTHODIPLOSTOMUM CUTICOLA* (DIGENEA) METACERCARIAE KOD CIPRINIDA AKUMULACIJE MODRAC

#### **Abstract**

During the ichthyofaunistic research of the Modrac reservoir near Tuzla in Bosnia and Herzegovina, there were registered 22 fish species and one natural hybrid (*Rutilus rutilus* x *Abramis brama*), which are classified into seven families of fish. The total sample is dominated by representatives of cyprinid species. For a large number of individuals of certain species of fish caught, it was noticed the presence of a large number of parasites *Metacercaria Posthodiplostomum cuticola* (Nordmann, 1832). *Metacercariae* were present in all parts of the body. The presence of parasites was registered in Bream (*Abramis brama*), Roach (*Rutilus rutilus*) and Sunbleak (*Alburnus alburnus*). The largest number of *metacercariae* was present in roach, and the least in sunbleak.

**Key words:** *Posthodiplostomum cuticola*, *Ciprinidae*, *Modrac*

#### **INTRODUCTION**

Fish and fish products in many countries occupy an enviable position in the human diet. Thus, in Bosnia and Herzegovina from year to year increases consumption of fish. Until now, fishing in Bosnia and Herzegovina had only sporting character, while a very small part of it belonged to industrial. The Modrac hydro-reservoir is one of the largest water facilities of this kind in B&H. Water basin at the profile of Modrac dam amounts to 1189 km<sup>2</sup> in total. In this water basin there are many rural settlements, which greatly burden the reservoir with various wastes, mostly with public utility wastewaters. In or-

der to provide water quality in Lake Modrac, it is necessary in a quality manner to stop the entry of sewage and wastewaters into the river basins of rivers Spreča and Turija, and into the hydro-reservoir itself. This can be achieved by construction of sewage networks in populated locations. It is also necessary to prohibit the use of vessels that use liquid fuel. In this hydro-reservoir the water quality is currently in a very critical condition as a result of multi-year devastation of the area as a whole.

Socio-economic development of Tuzla region and the spatial distribution of water resources have caused that already in the seventies of the last century there began consideration about a common regional approach to solving the problem of drinking water. As a solution to this problem, there was built facility for purification of water from the Modrac reservoir and its use for drinking.

In the postwar period, it was noted that the number of precious species of fish constantly decreased. Among the negative effects that lead to a reduction in the number of these fish are fish diseases. Among the causes of fish diseases that can lead to morbidity and mortality, in addition to viruses, bacteria, mycorrhizae, the most important role is played by parasitic diseases. For these reasons, parasitological researches are important and justified because they give insight into the prevalence status of parasites in economically important fish as well.

## MATERIALS AND METHODS

In the aim of determining the current state of fish diversity in the Modrac reservoir, during the year 2006, there have been carried out ichthyological surveys. Simultaneously, surveys were conducted on the presence of the parasite *Posthodiplostomum cuticula* as a typical ectoparasite which is very common in fish populations. Ichthyological surveys of the Modrac aquatic reservoir were conducted in the period from February through November 2006, that is during the four seasons: spring, summer, autumn and winter. The sample was obtained by combined standing triple fishing nets of the type gillnet, length 30 meters and with mesh sizes 10-30 mm. At the same time there were used „barukude“ of 50 meters in length and a 50 mm mesh size. In the littoral part of the reservoir fishing was carried out from a boat using a power generating set for electro-fishing of the type “ELT 61 II” and “Honda”, strength of 2 kV and manual nets.

After catching and taking morphometric data there followed determination of the presence of cysts of the mentioned parasite in the sample examined, and their counting. The presence of *Metacercaria* manifests as black stains on the body and can be easily noticed.

## RESULTS AND DISCUSSION

During the surveys on fish diversity in the Modrac aquatic reservoir there was a total of 1104 individuals of different species of fish caught, which are classified into seven families of fish. After the determination of fish we registered a high diversity of species expressed through the presence of 22 fish species and one natural hybrid - *Rutilus rutilus x Abramis brama* (Adrović, 2007).

Looking at the overall sample, it is evident that *Posthodiplostomum cuticula* appears in the following three fish species: *Abramis brama*, *Rutilus rutilus*, *Alburnus alburnus*. (Table 1). Its presence was the biggest in bream. Bream was represented with 216 samples (19.56%). Of the total number of caught specimens, the parasite was present in 16

specimens (0.74%) of roach (*Rutilus rutilus*), which participates in the sample with 345 individuals, which is 31.25% of the total catch. Of the total number of roach individuals caught, the parasite was present in 106 individuals (0.31%). The parasite was least present in Sunbleak (*Alburnus alburnus*), where in the sample of 174 (15.76%) individuals registered in the catch, the parasite was present in three specimens (0.017%).

We also tested the number of cysts present in some individuals of those fish species in which was confirmed their presence.

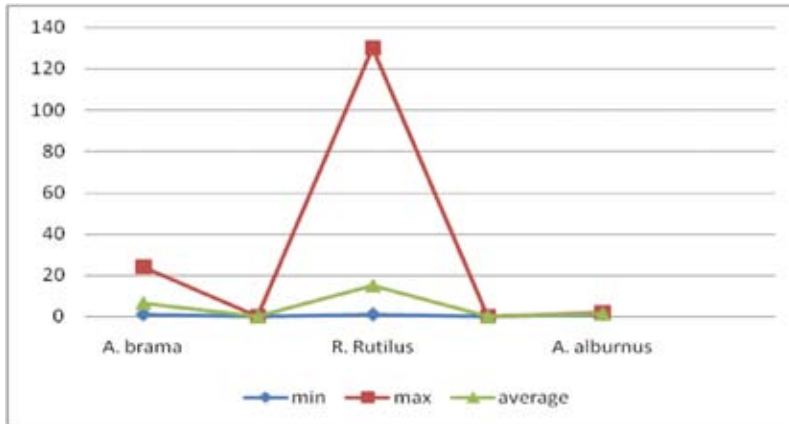
**Table 1.** Diversity of ichthyofauna in the Modrac reservoir and the presence of parasites in individual fish species

Family	Fish species	N	%	Number and % of individuals with cysts	
<i>Esocidae</i>	<i>Esox lucius</i>	47	4,26	-	-
	<i>Abramis brama</i>	216	19,56	16	0,74
	<i>Rutilus rutilus</i>	345	31,25	106	0,31
	<b>Hybrid</b>	96	8,70	-	-
	<i>Aspius aspius</i>	2	0,18	-	-
	<i>Alburnus alburnus</i>	174	0,18	3	-
	<i>Alburnus alburnus</i>	21	15,76	-	0,017
	<i>Tinca tinca</i>	17	1,90	-	-
	<i>Scardin. erythrophthalmus</i>	3	1,54	-	-
<i>Cyprinidae</i>	<i>Carassius carassius</i>	1	0,27	-	-
	<i>Carassius gibelio</i>	15	0,09	-	-
	<i>Leuciscus cephalus</i>	7	0,09	-	-
	<i>Leuciscus cephalus</i>	4	1,37	-	-
	<i>Gobio gobio</i>	1	0,63	-	-
	<i>Barbus petenyi</i>	1	0,36	-	-
	<i>Cyprinus carpio</i>	1	0,09	-	-
	<i>Rhodeus amarus</i>	1	0,09	-	-
<i>Cobitidae</i>	<i>Cobitis elongata</i>	6	0,55	-	-
	<i>Cobitis elongato.</i>	4	0,36	-	-
<i>Ameiuridae</i>	<i>Ameiurus nebulosus</i>	9	0,81	-	-
<i>Siluridae</i>	<i>Silurus glanis</i>	1	0,09	-	-
	<i>Perca fluviatilis</i>	89	8,06	-	-
<i>Percidae</i>	<i>Sander lucioperca</i>	17	1,54	-	-
	<i>Gymnocephalus cernuus</i>	1	0,09	-	-
<i>Centrarchidae</i>	<i>Lepomis gibbosus</i>	27	2,45	-	-
Total		1104	100,00	10,82	

The number of cysts in the  $\bar{x}$  species *Abramis brama* ranged between 1 and 24, and the average value was  $\bar{x} = 6,55$ . In roach, the number of cysts ranged from 2 to 130 cysts per one individual, and the average value was  $\bar{x} = 14,98$ . In Sunbleak (*Alburnus Alburnus*) was least number of cysts, only one to two cysts. (Figure 1).

During the research it was observed that Metacercaria of parasites were present at all parts of the body. A similar case is found in the work of Rolbiecki (2004), who examined the distribution and number of Metacercaria of *Posthodiplostomum cuticula* in

some parts of the body and fins of cyprinid fishes in Poland. It can also be concluded that the parasite is present in fish of all age categories and that its presence significantly affects the conditional state of fish. We could not see any particular regularity in the distribution of *Metacercaria* on the body, neither that it, perhaps, prefers certain parts of the body, or some fins. Therefore, in a future analysis this problem should be given greater attention.



**Figure 1.** The range of variation and average values of parasite cysts numbers on the body of fish examined

The presence of *Metacercaria* of this parasite we found in the research of Marković (2004) and Jurišić et al. (2007), conducted on fish in the Međuvršje reservoir. In part of the collected fish sample, there was registered the presence of *Posthodiplostomum cuticula* in the following species: *Abramis brama*, *Rutilus rutilus*, *Squalius cephalus*, *Alburnus alburnus* and *Cyprinus carpio* and *Chondrostoma nasus*. The aforementioned researches state that the highest degree of infection show individuals of Nase and Chub, and as reasons for development of the parasite are given good thermal conditions of reservoirs, richly developed macrophyte flora, the presence of transitional hosts and numerous population of the final host - Gray Heron *Ardea cinerea*. Having in mind the relatively small spatial distance between the two surveyed reservoirs, it can be concluded that very similar ecological conditions prevail in the Modrac reservoir, which may be given as the reason for presence of the aforementioned parasite. It is noticeable that in the two investigated hydro-systems the same parasite infected different species of fish. Therefore, it remains a dilemma, whether this parasite prefers certain types of fish or its presence in certain species of fish is determined by some other environmental factors.



**Figure 2.** Infected roach from the Modrac reservoir

Similar studies of parasites in fish from the Modrac reservoir (Skenderović et al., 2005) included testing on the presence of endoparasite *Trianophorus nodulosus*, where it was noted that the mentioned endoparasite was present only in the species *Esox lucius*. Shukerova (2004), in *Carassius gibelio* in the area of Bulgaria, identified the presence of two trematodes and two nematodes characteristic for this species. According to Rukavina (1959), the harmful activity of *Cestoda*, *Cyathocephalus truncates* on more strongly attacked trout manifests in a reduced vitality and a significant negative impact on the fullness and weight of fish.

All these studies point to the need to give the study of fish parasites a greater attention.

## CONCLUSION

Ichthyofaunistic surveys of the Modrac reservoir show a relatively high diversity of species which is characteristic for hydro-systems that are very loaded with different pollutant materials and exposed to severe pollution. Environmental conditions prevailing in such hydro-systems are favorable for successful existence and development of fish ectoparasites, among which is frequent *Posthodiplostomum cuticula*. This parasite, although present in only three fish species (bream, roach and sunbleak), is a relatively large threat to the successful maintenance of populations of the surveyed species, particularly roach. Metacercariae of parasites are present in all parts of the body and in fish of all age categories, but there can not be determined the regularity of their distribution on the body or a stronger manifestation in some parts of the body. Modrac is characterized by adverse environmental conditions, and that is a prerequisite for the successful existence of the investigated parasite. In the future, researches on this parasite and other parasites as well, should be given greater attention.

## REFERENCES

*Adrović, A.* (2007): Biodiverzitet i ekološke osobenosti ihtiopopulacija hidroakumulacije Modrac. Doktorska disertacija. Prirodno – matematički fakultet Univerziteta u Tuzli.

*Jurišić, Ivana, Marković, G., Delić, Gorica* (2007): Struktura fitoplanktonskih, makrofitskih i zajednica riba reke Morave (Dunavski sliv, Srbija). Zbornik radova PMF - Tuzla, 3, 85 – 96.

*Marković, G.* (2004): The effect of the infestation by the fluke *Posthodiplostomum cuticula* on the Međuvrške reservoir ichthyofauna. International Assoc. Danube Res. Novi Sad, 35 (543 – 548).

*Rolbiecki, L.* (2004): Distribution of *Posthodiplostomum cuticula* (Nordmann, 1832) (Digenea; Diplostomidae) metacercariae in Cyprinids of the Vistula Lagoon, Poland. Archives of Polish Fisheries. Vol. 12, Fasc. 1. 93 – 98.

*Rukavina, J., Delić, S.* (1959): *Cyathocephalus truncates* kod riba u nekim vodama Bosne i Hercegovine. Veterinaria 3 – 4. Sarajevo.

*Skenderović, I. Škrijelj, R. Adrović, A.* (2005): Zastupljenost *Trianophorus nodulosus* (Pallas, 1781) kod štuke (*Esox lucius*, Linnaeus, 1758) iz jezera Modrac. Zbornik radova PMF - Tuzla, 2, 127 – 133.

*Shukerova, S.* (2004): Helminth fauna of the Prussian carp, *Carassius gibelio* (Bloch, 1782), from the Srebrna biosphere reserve. Trakia journal of Sciences. Vol. 3, No. 6 (36 - 40).