INTESTINE PARASITES OF BREAM *ABRAMIS BRAMA* (LINNAEUS, 1758) OF THE DANUBE IN BELGRADE AREA

VESNA ĐIKANOVIĆ [1], DUNJA JAKOVČEV-TODOROVIĆ [1], VERA NIKOLIĆ [2], PREDRAG CAKIĆ [1]

[1] Institute for Biological Research "Siniša Stanković", University of Belgrade, Despota Stefana Blvd 142, 11060 Belgrade, Serbia, [2] Faculty of Biology, Studentski trg 16, University of Belgrade, 11000 Belgrade, Serbia

PARAZITI CREVNOG TRAKTA DEVERIKE *ABRAMIS BRAMA* (LINNAEUS, 1758) DUNAVA U BEOGRADSKOM DELU TOKA

Abstrakt

Izučavanje parazitofaune riba prirodnih voda od izuzetnog je značaja, ne samo u naučnom pogledu, već i za njihov uspešan intenzivan način gajenja u akvakulturi. U radu su predstavljeni rezultati istraživanja crevnih parazitskih vrsta deverike *Abramis brama* L. 1758. Primerci riba su sakupljeni tokom perida 2007–2009 na dva lokaliteta uzorkovanja duž toka reke Dunav koji protiče kroz beogradski region. Ukupno je pregledano 177 jedinki deverike različite starosti (2^+ to 6^+). Prtisustvo crevnih parazitskih vrsta identifikovano je kod 97 pregledanih primeraka deverike, sa intenzitetom infekcije u rasponu 1–165, predstavljajući 54.80% od ukupnog broja sakupljenih i pregledanih primeraka riba. U inficiranim jedinkama deverike utvrđeno je prisustvo 27 taksona endoparazita (helminta) iz četiri klase: jedanaest vrsta pantljičara (Cestoda), pet vrsta i jedan takson metilja (Trematoda), dve vrste klase Nematoda i osam vrsta Acanthocephala. Sprovedena istraživanja su pokazala da je inficiranost deverike Dunava u beogradskom regionu značajna, s obzirom na brojnost i raznovrsnost identifikovanih crevnih parazita. Buduća istraživanja su neophodna da bi se utvrdila uloga crevnih parazita u regulisanju brojnosti populacija deverike Dunava.

Ključne reči: *Deverika, Abramis brama L. 1758, crevni paraziti, beogradski region, Dunav*

INTRODUCTION

The middle course of the Danube runs through the territory of Serbia or along its border. The Serbian stretch of the Danube, which is 588 km long (20.6% of total length), begins at the border with Hungary (rkm 1433) and ends at the mouth of the Timok River, at the border with Bulgaria (rkm 845). With its main tributaries, the Danube represents the most significant Serbian water resource (Babic-Mladenovic et al., 2010). In the Belgrade region, the Danube is constantly subjected to heavy loading with matter of mainly organic origin.

The bream *Abramis brama* Linnaeus 1758 is a benthopelagic, potamodromous fish, member of the carp family (Cyprinidae), growing up to 82.0cm and to 6.0kg. Living at the muddy and sandy bottom of still and slow-running rivers, as well as brackish waters. Feed on insects, particularly chironomids, small crustaceans, mollusks and plants. Larger specimens may feed on small fish. The juveniles feed on zooplankton. The area of it`s distribution extends in Europe and Asia, also present in rivers belonging to the basins of the North, Baltic, Black, Caspian and Aral seas (http://www.fishbase.org). In Serbia, bream *Abramis brama* lives in open waters of the drainage system of the Danube River, i.e. in surface waters in Vojvodina area/region, as well as in the main course of the Velika Morava River (Simonović, 2006). The bream was the subject of many ichthyological studies in Serbia (Janković, 1965; Marković, 1962; Simonović, 2006) contributed to the recognition of the ecology of this fish species and its populations in the Serbian part of the Danube River.

In the present paper the results of a parasitological survey of the intestinal helminth fauna of *Abramis brama L. 1758* the Belgrade region of the Danube River are reported.

MATERIAL AND METHODS

The breams were collected during the period 2007–2009 along the course of the Danube River through the Belgrade Region, by nets of different size of mesh (32 – 50 mm). Samples were taken from two sampling sites, Zemun (1.171,5 rkm; 44° 50′ 21"N 20° 24′ 02"E) and Visnjica (1.162 rkm; 44° 49′ 51″N, 20° 32′ 52″E).

The total length, weight, sex and age were recorded for each fish specimen on both sampling sites. Fishes were transported to the laboratory and immediately examined for parasites. During the parasitological examination, the intestines were cut open and examined under stereomicroscope. Parasites found were bleached, prepared and fixed for species identification and subsequent storage. Parasites were identified using identification keys (Bauer, 1987; Kakacheva-Avramova, 1977; Lom and Dykova, 1989; Moravec, 1994). Statistical non-parametric analysis, Mann-Whitney U test (comparing two independent groups) and Kruskal-Wallis ANOVA and Median test (comparing multiple independent groups) were used to determine the significant differences comparing the number of parasites per individual in regard to sampling locality, apropos Fulton's body conditional factor (CF) and values of parasitic number per locality and months of sampling (statistical significant differences on level possibility of 5%).

RESULTS AND DISCCUSSION

A total of 177 fish specimens of different age (2^+ to 6^+) were examined at two sampling sites in the Belgrade area of the Danube River. By the examination of bream`s intestine a total of 27 endoparasites belonging to 4 classes were found in 97 bream specimens, which was 54.80% of all captured bream specimens. The number of parasites per individual was varied in range from 1 up to 165. The highest value was found in bream caught on locality Visnjica, in May 2009, infected with parasitic species *Caryophyllaeus laticeps* Pallas 1781 (Cestoda). Number of examined breams in Zemun locality was 54 and in Visnjica locality 123, while number of infected specimens was 19 and 78, respectively (Table 1).

Table 1 Number of examined breams, average values of length and weight, as well as number of infected breams, intensity of infestation and parasitic species on sampling sites, per months

Locality	Number of examined breams	Average value of length (cm)	Average value of weight (g)	Number of infected breams	Infestation intensity	Parasitic species
ZEMUN						
November 2007	1	25.9	200	/	/	
December 2007	4	22.6±2.093	162±34.05	/	/	
January 2008	5	25.52±5.359	240.6±131.4	/	/	
February 2008	3	20.87±2.285	116.7±13.87	1	0-2	*Apophallus müehlingi* Jagerskiold 1899 *Sphaerostomum bramae* Müller 1776
March 2008	1	21	143	/	/	
April 2008	5	23.2±2.332	172±58.08	3	3-7	*Allocreadium* sp. Looss 1900 *Sphaerostomum sp*. Rudolphi 1809 *Acanthocephalus sp*. Koelreuter 1771 Trematoda juv.spp
Jun 2008	3	24.43±4.244	258.3±87.8	1	0-6	*Caryophyllaeides fennica* Schneider 1902 *Triaenophorus sp.* Rudolphi 1793 *Acanthocephalus sp.* Koelreuter 1771
July 2008	1	19	225	/	/	
September 2008	3	22.83±2.15	210±78.58	2	1-3	*Pomphorhynchus sp*. Monticelli 1905 *Caryophyllaeus sp*. Gmelin 1790
October 2008	2	26.55±2.475	262.5±123.7	1	0-1	*Acanthocephalus sp.* Koelreuter 1771
December 2008	1	25	200	/	/	
January 2009	3	24.2±1.572	170±34.64	2	0-1	*Ligula intestinalis* Linnaeus 1758
February 2009	4	24.38±3.097	181.3±51.54	2	1-2	*Caryophyllaeus laticeps* Pallas 1781
March 2009	2	24.35±0.495	201.7±27.54	/	/	
April 2009	1	27	230	1	3	*Caryophyllaeus brachycollis* Janiszewska 1951 *Caryophyllaeus laticeps* Pallas 1781
May 2009	4	22.43±0.995	181.3±23.94	3	2-6	*Caryophyllaeus laticeps* Pallas 1781 *Caryophyllaeus sp.* Gmelin 1790
Jun 2009	2	22.7±0.141	150±35.36	1	0-3	*Pomphorhynchus laevis* Zoega in Müller 1776 *Metechinorhynchus sp*. Petrochenko 1956
July 2009	2	21.45±0.354	117.5±10.61	1	0-7	*Pomphorhynchus laevis* Zoega in Müller 1776 *Metechinorhynchus sp*. Petrochenko 1956
September 2009	4	24.02±1.307	162.5±32.27	1	0-2	*Pomphorhynchus laevis* Zoega in Müller 1776 *Acanthocephalus anguillae* Müller 1780
November 2009	3	25.5±1.48	193.3±40.41	/	/	
VISNJICA						
December 2007	1	35.2	610	/	/	
January 2008	1	28.5	255	/	/	
February 2008	7	32.06±3.25	437.86±163.86	5	1-17	*Caryophyllaeides fennica* Schneider 1902 *Caryophyllaeus brachycollis* Janiszewska 1951 *Caryophyllaeus laticeps* Pallas 1781 *Caryophyllaeus sp.* Gmelin 1790 *Triaenophorus nodulosus* Pallas 1781

March 2008	10	35.89±5.05	600±228.51	7	1-17	*Hysterothylacium bidentatum* Linstow 1899 *Rhabdochona* sp. Railliet 1916 *Sphaerostomum bramae* Müller 1776 *Allocreadium isoporum* Looss 1894 *Allocreadium sp.* Looss 1900 *Caryophyllaeides fennica* Schneider 1902 *Caryophyllaeus sp.* Gmelin 1790
April 2008	6	30.95±1.97	379.17±90.41	2	4-25	*Triaenophorus sp.* Rudolphi 1793 *Caryophyllaeus sp.* Gmelin 1790 *Acanthocephalus sp.* Koelreuter 1771
Jun 2008	8	33.61±1.88	500±63.13	6	1-21	*Proteocephalus torulosus* Batsch 1786 *Ligula intestinalis* Linnaeus 1758 *Caryophyllaeus sp.* Gmelin 1790 *Triaenophorus sp.* Rudolphi 1793 *Acanthocephalus lucii* Müller 1776 *Acanthocephalus sp.* Koelreuter 1771 *Echinorhynchus sp.* Zoega in Müller 1776 *Pomphorhynchus laevis* Zoega in Müller 1776
July 2008	9	33.48±1.56	499.44±40.34	5	1-4	*Caryophyllaeus sp.* Gmelin 1790 *Acanthocephalus sp.* Koelreuter 1771 *Pomphorhynchus sp*. Monticelli 1905 *Echinorhynchus sp.* Zoega in Müller 1776
September 2008	13	33.48±3.22	546.92±149.07	9	1-7	*Caryophyllaeides fennica* Schneider 1902 *Triaenophorus sp.* Rudolphi 1793 *Pomphorhynchus laevis* Zoega in Müller 1776 *Pomphorhynchus sp*. Monticelli 1905 *Acanthocephalus sp.* Koelreuter 1771 *Echinorhynchus cinctulus* Porta 1905
October 2008	13	31.08±1.45	416.15±47.965	10	1-11	*Pomphorhynchus laevis* Zoega in Müller 1776 *Pomphorhynchus sp*. Monticelli 1905 *Acanthocephalus* sp. Koelreuter 1771 *Echinorhynchus sp.* Zoega in Müller 1776
November 2008	9	30.06±0.752	360.56±49.96	3	1-10	*Ligula intestinalis* Linnaeus 1758 *Proteocephalus torulosus* Batsch 1786
December 2008	7	30.44±1.434	370±50.415	3	1-3	*Caryophyllaeides fennica* Schneider 1902 *Caryophyllaeus brachycollis* Janiszewska 1951
February 2009	6	34.32±2.499	520±78.486	3	1-2	*Caryophyllaeus sp.* Gmelin 1790 *Pomphorhynchus sp*. Monticelli 1905
May 2009	8	34.95±1.92	601.25±104.565	6	2-165	*Caryophyllaeides fennica* Schneider 1902 *Caryophyllaeus laticeps* Pallas 1781 *Caryophyllaeus brachycollis* Janiszewska 1951 *Proteocephalus sp*. Weinland 1858 *Pomphorhynchus laevis* Zoega in Müller 1776
Jun 2009	5	28.18±0.766	325±17.68	4	2-11	*Caryophyllaeus laticeps* Pallas 1781 *Caryophyllaeides fennica* Schneider 1902 *Proteocephalus sp.* Weinland 1858 *Diphyllobothrium sp.* Cobbold 1858
July 2009	13	32.43±1.73	506.15±83.52	10	1-22	*Caryophyllaeides fennica* Schneider 1902 *Caryophyllaeus laticeps* Pallas 1781 *Caryophyllaeus fimbriceps* Annenkova-Khlopina 1919 *Pomphorhynchus laevis* Zoega in Müller 1776 *Metechinorhynchus sp*. Petrochenko 1956
September 2009	7	33.16±1.46	495±88.46	4	2-7	*Caryophyllaeides fennica* Schneider 1902 *Caryophyllaeus laticeps* Pallas 1781 *Caryophyllaeus fimbriceps* Annenkova-Khlopina 1919 *Pomphorhynchus laevis* Zoega in Müller 1776

Breams from the Danube river in Belgrade region contained, in their intestines, numerous and diverse helminth representatives belonging to four classess – Cestoda (11 species), Trematoda (5 species, one taxa), Nematoda (2 species) and Acanthocephala (8 species).

According to results of Mann-Whitney U test when independent group (variable) was the locality of sampling in regard to number of parasites per individual, significant

statistical differences has been found (p=0.000504). Non-parametric Kruskal-Wallis ANOVA and Median test shows that there are dependence of number of parasites and Fulton's body conditional factor (CF) in regard to sampling months (Fig. 1).

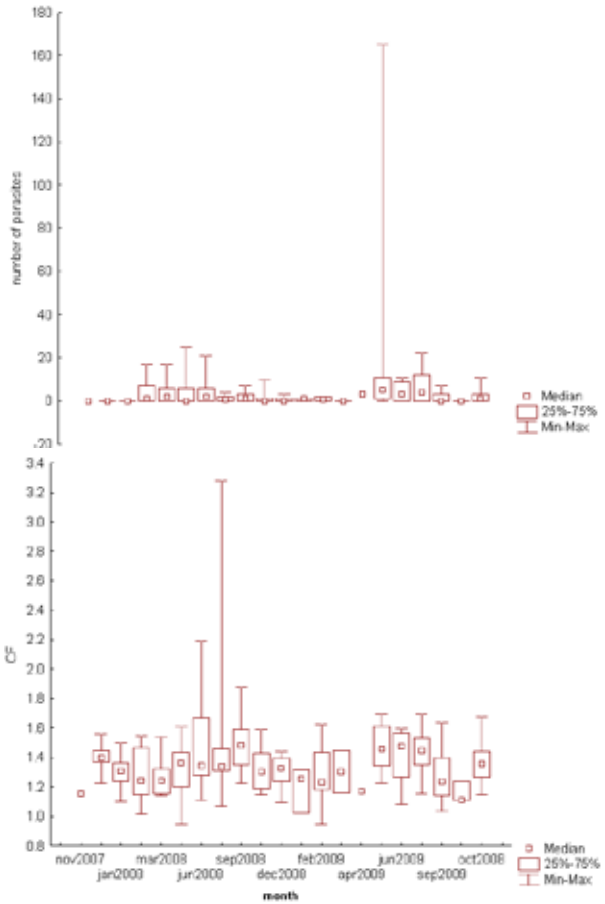

Figure 1. Correlation between the number of parasites and CF per months/locality

Within ichthyoparasitological surveys of surface waters in Serbia (Djanić, 1979; Kiškarolj and Tafro, 1988; Cakić, 2002; Cakić et al., 2001, 2007) there is no data for parasitofauna of bream. The main purpose of this study is to present the results of helminth fauna on *Abramis brama* L. along the Danube River in Belgrade region, as a contribution to their better knowledge.

CONCLUSIONS

Presented results show that the degree of bream parasite infestation is notable and contribute to the knowledge of bream`s intestinal parasites distrubution. By further investigations is needed to determine the role of endoparasites in regulation of bream`s population density.

ACKNOWLEDGEMENTS

This work is supported by Ministry of Education and Science, Republic of Serbia, Project No. TR 037009 and OI 173045.

REFERENCES

Babić-Mladenović, M., Bartoš Divac, V., Kolarov, V. (2010): Natural characteristics of the Danube River in Serbia, pp. 59-79. In**:** Paunović, M., Simonović, P., Simić, V. & S. Simić (eds.). Danube through Serbia – Joint Danube Survey 2. Directorate for Water Management, Belgrade.

Bauer, O.N. (1987): The guide for identification of parasites of freshwater**.** Fish fauna of SSSR, Tom III, Akademiya Nauk SSSR. Zoologicheskij Institut, Leningrad

Cakić, P., Stojanovski, S., Kataranovski, D., Fišter, S. (2001)**:** The first finding of the nematode *Philometroides cyprini* (Ishii, 1931) on *Carassius auratus Gibelio* from the Danube River, Yugoslavia, Proceedings of the Scientific Meeting Tissue Helminthoses of Men and Animals, Belgrade, 65-70.

Cakic, P., Paunovic,M., Stojanovic, B., Djikanovic, V., Kulisic, Z. (2007): Metagonimus yokogawai a new parasitic Trematoda species in ichtyoparasitofauna of the Serbia. Acta Veterinaria 57, 5-6, 537-543.

Djanic, S. (1979)**:** Nematodi i akantocefali ciprinidnih riba Dunava i sistema Dunav-Tisa-Dunav Zapadne Bačke. Biosistematika 5, 1, 57-60.

Janković, D. (1965): Geografsko-ekološka rasprostranjenost riba u jugoslovenskom delu Dunava. Zbornik radova, 8(1): 1-26, Beograd.

Kakacheva-Avramova, D. (1977): Studies on helminths of fish in the Bulgarian section of the Danube River. Helminthologia 3, 20-45. (In Bulgarian)

Kiskarolj, M., Tafro, A. (1988)**:** Prilog poznavanju helmintofaune nekih riba jednog dela Dunava, Veterinaria 37, (2-3), 211-221.

Lom, J. and Dykova, L. (1989)**:** Protozoa parasites of economically important fish species. Fisheries society of the Czech Republic, 102 pp., Prague.

Marković, T. (1962): Ribolovne vode Srbije. Turistička štampa, Beograd.

Moravec F. (1994)**:** Parasitic nematodes of freshwater fishes of Europe, 172-173, 195-198, 377-380, 396-399, Kluwer Acad. Publ.

Simonović, P. (2006): Ribe Srbije. II izdanje. NNK International, Biološki fakultet & Zavod za zaštitu prirode Srbije, Beograd. http://www.fishbase.org