

OCCURRENCE OF *Chilodonella hexasticha* (Ciliophora, Protista) ON FARMED RAINBOW TROUT (*Oncorhynchus mykiss*) THROUGHOUT THE SEASON

NIKOLIĆ VERA, SIMONOVIĆ PD and MARIĆ SP

Faculty of Biology, Belgrade

(Received 21. March 2005)

*An examination of rainbow trout *Oncorhynchus mykiss* for ectoparasites, on three not so distant fish farms with independent water supply in Eastern Serbia from March to November 1998, resulted in finding three ciliate (*Chilodonella hexasticha*, *Ichthyophthirius multifiliis*, *Apiosoma piscicola* var. *minor*), one trematode (*Gyrodactylus* sp.) and one mould (*Saprolegnia* sp.) species, making a total of five parasite species. The *Chilodonella hexasticha* was recorded only on one of the farms, being in the highest extensity in May. This appeared to be the most prominent occurrence in the independent pattern of infestation dynamics of other parasites (*Apiosoma*, *Gyrodactylus*, *Saprolegnia*) recorded on that fish farm, as derived by Correspondence Analysis. The Friedman ANOVA test revealed a significant difference in extensity of occurrence of different parasites through the season, due to the significantly greater infestation with *Gyrodactylus* and significantly lower extensity of infestation with *Saprolegnia*.*

*Key words: rainbow trout, ectoparasites, *Chilodonella hexasticha*, seasonal dynamic*

INTRODUCTION

Up to now, investigations of ectobionts, including parasitic organisms, were not accomplished on the rainbow trout *Oncorhynchus mykiss* reared in Serbia. Reports on the topic from European trout-rearing farms (Mo 1994; Moravec & Scholz 1994; Rintamäki *et al.* 1994; Rintamäki-Kinnunen & Valtonen 1996, 1997; Buchmann & Uldal 1997) and those out of Europe (e.g., Butcher 1947; Urawa 1992) give a solid basis for introducing the field of fish parasitology. This investigation was undertaken in order to find out if ectoparasites are present in farm-reared rainbow trout in Serbia, as well as to trace their occurrence throughout the year. In considering the results of this survey, all kind of ectobionts present on rainbow trout were considered parasites, since such is the kind of their inter-relationship with the carrier (Urawa & Jamao 1992).

MATERIAL AND METHODS

Skin samples from live rainbow trout yearlings (25 individuals per each monthly sampling, a total of 225 individuals in a year) were taken, and examined under the microscope (400 times magnification). From the obtained data, the average intensity (from a number of individuals on 10 visual fields) and extensity (i.e., the prevalence) of infestation were calculated and further analysed.

RESULTS AND DISCUSSION

During the nine month (March – November 1998) survey of three closely distanced fish farms, situated in eastern Serbia, in the area of Homolje (Figure 1), a total of 5 ectobiont species was recorded. Three of them were ciliates (*Chilodonella hexasticha*, *Ichthyophthirius multifiliis* and *Apiosoma piscicola* var. *minor*), one was a trematode (*Gyrodactylus* sp.) and the last one was a mould (*Saprolegnia* sp.).

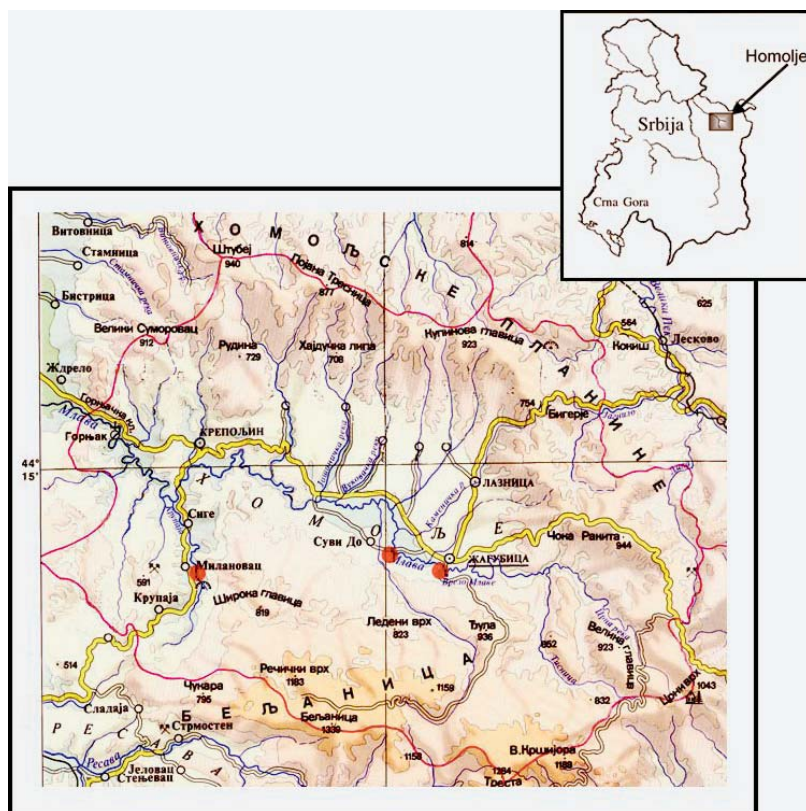


Figure 1.

This report deals with the results derived from the samples taken from one of the fish farms, the one from the area of Belosavac situated 5 km from Zagubica. In fact, that was the only fish farm where *Chilodonella hexasticha* was found. The farm obtains water directly from a spring, which supplies as well the water-works of the Zagubica town. The quality of water at the Belosavac fish farm was quite satisfactory (Table 1) with stable levels of physical and chemical parameters on all three seasonal samplings (spring, summer, autumn). According to the fish farm management report, neither any medication nor treatment was previously applied, nor any alteration in the feed occurred throughout the whole period of investigation.

Table 1. Physical and chemical parameters of the water from the Belosavac fish farm

Parameter (unit)	May	August	November
Temperature (°C)	10.0	9.5	9.0
Conductivity (S m ⁻¹)	427	660	404
pH	7.51	7.24	7.43
Cl ⁻ (mg L ⁻¹)	6.9	7.0	8.4
NO ₃ (mg L ⁻¹)	1.4	1.3	0.9
KMnO ₄ expenditure (mg L ⁻¹)	2.1	1.2	1.8

The Correspondence Analysis of the average intensity of infestation (Figure 2) revealed that the most prominent pattern of occurrence of parasites through the

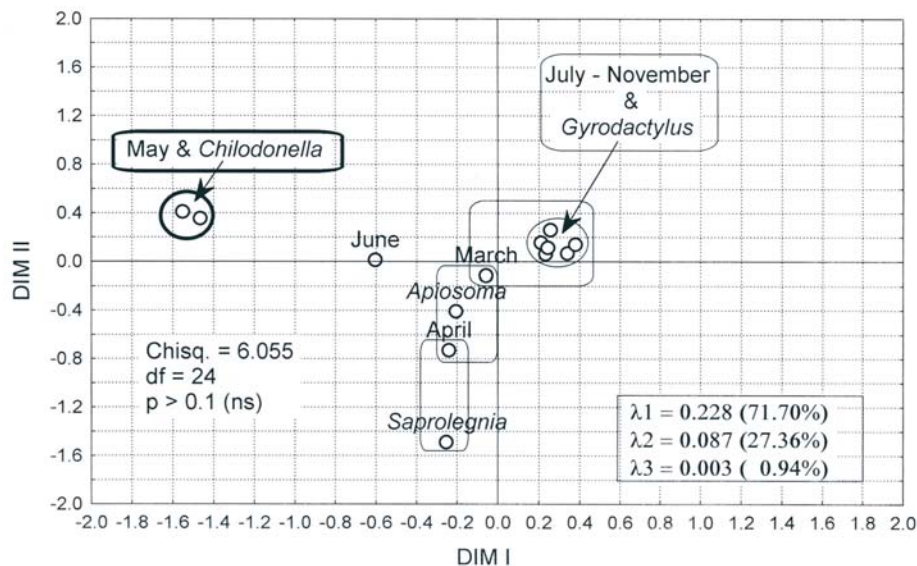


Figure 2.

year was the appearance of *Chilodonella hexasticha* in May, when it occurred with the greatest average intensity (Figure 3). The occurrence of other parasites appeared to be far less prominent in the independent overall pattern of infestation through the year ($\chi^2=6.055$, $df=24$, $p>0.1$).

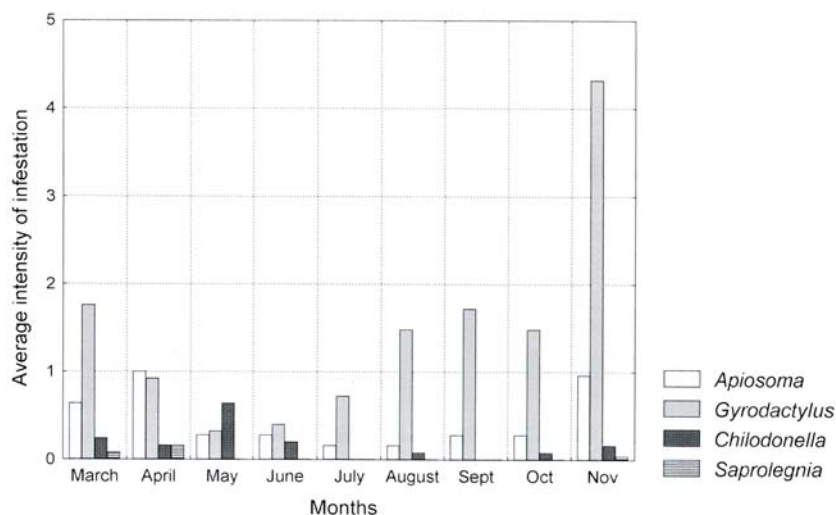


Figure 3.

On analysis of prevalence of rainbow trout infestation with particular parasites (Table 2) by Friedman ANOVA test, it appeared that *Chilodonella hexasticha* occurrence was significantly variable throughout the year ($F = 3.237$, $df = 8$, $p<0.01$), mainly due to the significant difference in the prevalence of the ciliate between May and July - September period (Scheffe test, $p<0.05$).

Table 2. Prevalence of parasites occurring on rainbow trout from the Belosavac fish farm.

	<i>Apiosoma</i>	<i>Gyrodactylus</i>	<i>Chilodonella</i>	<i>Saprolegnia</i>
March	0.36	0.6	0.16	0.08
April	0.44	0.48	0.12	0.16
May	0.16	0.24	0.28	0
June	0.2	0.28	0.12	0
July	0.08	0.28	0	0
August	0.08	0.36	0.08	0
September	0.2	0.52	0	0
October	0.16	0.56	0.08	0
November	0.4	0.56	0.08	0.04

On comparing the prevalence of *Chilodonella hexasticha* with the prevalence of that parasite found in joint infections with other parasites (either *Apiosoma piscicola* var. *minor*, *Gyrodactylus* or both of them) occurring on the same fish, independence in the infestation pattern was found, thus there was no difference in prevalence ($\chi^2 = 4.651$, $df = 40$, $p > 0.1$), i.e., that prevalence of the *Chilodonella hexasticha* was neither favoured, nor suppressed in mutual infections by other parasites occurring on the same rainbow trout.

During the period of investigation, no prominent pathogenic effects of ectoparasites were noticed on the farmed rainbow trout. That is in accordance with the relatively low pathogenicity of *Apiosoma* spp., postulated by Heckmann *et al.* (1987) and Rintamäki-Kinnunen & Valtonen (1997), though being somewhat peculiar considering a relatively high prevalence of the *Gyrodactylus* sp. throughout the whole period of investigation. That contributes to reports Buchmann *et al.*, 1995 on the yet insufficient knowledge about effects of *Gyrodactylus* spp. on farmed rainbow trout.

Chilodonella hexasticha is most common in farmed rainbow trout in Serbia. This parasite was previously recorded on Eurasian perch *Perca fluviatilis* L. in the Lake Vlasina (Nikolic & Simonovic 1996), being then the only one in the spring season, and with the greatest average intensity (2.00), but with the smallest prevalence (3.13%) of infestation compared to the one found in farmed rainbow trout. This is confirmed by the wide range of different hosts (Needham & Wootten 1978) on which this species can parasitize.

Rintamäki-Kinnunen & Valtonen (1997) reported on the occurrence of *Chilodonella hexasticha* on salmon and brown trout farms, however, in contrast to our finding, they found the greatest prevalence in the second half of the year, i.e., from June to December. The prevalence of *Chilodonella hexasticha* Rintamäki-Kinnunen & Valtonen (1997) reported for both fingerlings and yearlings of rainbow trout was less compared to our results (Table 2). We studied only rainbow trout yearlings, which they reported to be less susceptible to *Chilodonella hexasticha* in comparison to fingerlings. It should be noted, however, that no medication treatment was conducted on the fish farm we carried on our research, and this might explain the greater values obtained for *Chilodonella* occurrence. Our findings that *Chilodonella hexasticha* is concurrent to other parasitic species (e.g., with *Apiosoma piscicola* var. *minor*, with *Gyrodactylus* sp., and with both of them) is in accordance to Rintamäki-Kinnunen and Valtonen (1977). However, the type of infestation (sole vs. mutual) revealed insignificant occurrence for the examined rainbow trout, thus implying that the occurrence of any of them should not favour additional or subsequent infestation, and that mutual occurrence of several parasites does not increase their harmful effects, considering the lack of pathogenic effects on rainbow trout.

There are yet no sufficient data to infer on what caused the highest appearance (considering both the average intensity and prevalence of infestation) of *Chilodonella hexasticha* in May. Thus, it can not be stated on the one observed season whether the highest values recorded for several physical and chemical parameters of water (e.g., temperature, pH value, concentration of nitrites and $KMnO_4$ expenditure) recorded in that month are related with the

maximum in *Chilodonella* occurrence. Rintamäki-Kinnunen & Valtonen (1997) did not have enough infested fish to determine which of the variables they used influenced the infestation with the parasite.

Address for correspondence:
Dr Vera Nikolić
Institute of Zoology, Faculty of Biology,
University of Belgrade, Studentski trg 16,
11000 Belgrade,
Serbia & Montenegro

REFERENCES

1. Buchmann K, Uldal A, Lyholt CK, 1995, Parasite Infections in Danish Trout Farms, *Acta vet scand*, 36, 283-98.
2. Butcher AD, 1947, Ichthyophthiriasis in Australian trout hatchery, *Progressive Fish Culturist*, 9, 21-6.
3. Heckmann RA, Kimball AK, Short JA, 1987, Parasites of mottled sculpin *Cottus bairdi* Girard, from five locations in Utah and Wasatch counties, *Utah Great Basin Naturalist*, 47, 1, 13-21.
4. Mo TA, 1994, Status of *Gyrodactylus salaris* problems and research. In: Pike AW, Lewis JW (Eds), Parasitic diseases of fish, Samara Publishers Tresaith, Dyfed, UK, 43-56.
5. Moravec F, Scholtz T, 1994, Observations on the development of *Syncuaria squamata* (Nematoda, Acuariidae) a parasite of cormorants, the intermediar paratenic host, *Fol parasitol*, 41, 3, 183-92.
6. Needham T, Wooten R, 1978, The parasitology of teleosts, In: Fish pathology, ed. Roberts R, Bailliere Tindal London, 144-82.
7. Nikolić V, Simonović P, 1996, Occurrence of parasitic ciliates (*Protozoa*) on perch (*Perca fluviatilis*) in Lake Vlasinsko, *Ann Zool Fennici*, 33, 707-10.
8. Rintamäki P, Torpstrom H, Bloigu A, 1994, *Chilodonella* ssp. at four fish farms in northern Finland, *J Eukariot Microbiol*, 41, 6, 602-7.
9. Rintamäki-Kinnunen P, Valtonen ET, 1996, Finnish salmon resistant to *Gyrodactylus salaris*: a long term study on fish farms, *Int J Parasitol*, 26, 7, 723-32.
10. Rintamäki-Kinnunen P, Valtonen ET, 1997, Epizootiology of Protozoans in Farmed Salmonids at Northern Latitudes, *Int J Parasitol*, 27, 1, 89-99.
11. Urawa S, 1992, Host range and geographical distribution of the ectoparasite protozoans on hatchery-reared salmonids, *Scientific Reports of the Hokkaido Salmon Hatchery*, 46, 175-203.
12. Urawa S, Yamao S, 1992, Scanning electron microscopy and pathogenicity of *Chilodonella piscicola* (Ciliophora) on juvenile salmonids, *J Aquac Anim Health*, 4, 188-97.

PRISUSTVO *Chilodonella hexasticha* (Ciliophora, Protista) NA GAJENIM DUŽIČASTIM PASTRMKAMA *Oncorhynchus mykiss* TOKOM SEZONE

NIKOLIĆ VERA, SIMONOVIĆ PD i MARIĆ PS

SADRŽAJ

Ispitivanja ektoparazita dužičaste pastrmke na tri ribnjaka sa zasebnim izvorima napajanja u istočnoj Srbiji tokom 1998. godine, u periodu od marta no no-

vembra ukazala su na prisustvo 3 vrste cilijata (*Chilodonella hexasticha*, *Ichthyophthirius multifiliis*, *Apiosoma piscicola* var. *minor*), jedne trematode (*Gyrodactylus* sp.) i gljivica (*Saprolegnia*), što čini ukupno pet taksona. *Chilodonella hexasticha* je konstatovana samo na jednom ribnjaku sa najvećim ekstenzitetom infekcije u maju. Korespondentnom analizom je dokazano da je infekcija ovim parazitom nezavisna od infekcije ostalim parazitskim vrstama (*Apiosoma*, *Gyrodactylus*, *Saprolegnia*). Fridmanov ANOVA test pokazuje značajnu razliku u ekstenzitetu infekcije tokom sezone, sa značajno većom infestacijom metiljem *Gyrodactylus* sp. i najmanjim ekstenzitetom infekcije gljivicom *Saprolegnia* sp.