WIADOMOŚCI PARAZYTOLOGICZNE
T. 50 (3) 2004: 595–600

THE PARASITE FAUNA OF BROWN TROUT *SALMO TRUTTA*, WHITE FISH *COREGONUS LAVARETUS*, AND GRAYLING *THYMALLUS THYMALLUS* FROM WATER BODIES OF NORTH KARELIA (RUSSIA)

Y.Y. BARSKAYA AND E.P. IESHKO

Institute of Biology, Karelian Research Center, RAS, Petrozavodsk, 185610 Karelia, Russia

ABSTRACT. The data on parasite fauna of brown trout *Salmo trutta*, whitefish *Coregonus lavaretus*, and grayling *Thymallus thymallus* from lake-river system Paanajarvi-Olanga (White Sea basin) are presented. As lake-river systems on this area remain in natural conditions, without any anthropogenic pressure, the parasite fauna of Salmonidae in these water bodies had not been changed and has an archetypal status.

Key words: *Coregonus lavaretus*, Karelia, parasite fauna, *Salmo trutta*, *Thymalus thymalus*.

INTRODUCTION

Paanajarvi-Olanga system is situated at the North Karelia (Russia) in the territory of National Park Paanajarvi, which borders on Finland and Murmansk region. This lake-river system belongs to the Basin of the Kovda River – one of the largest rivers of the White Sea basin. Paanajarvi-Olanga is characterized by the presence of water bodies where Salmonidae found to be a basis of ichthyocenosis.

Being an oligotrophic lake, Paanajarvi is closer to the ultraoligotrophic status than other water bodies of Karelia. Therefore, Paanajarvi can be regarded as a model of a periglacial lake where the parasite fauna of Salmonids had formed.

MATERIAL AND METHODS

The object of research were parr aged 3+ and adult fish of brown trout, white fish, grayling from Paanajarvi lake. The material was collected and treated following the generally accepted technique (Bykhovskaya-Pavlovskaya 1985). Fifty specimens from each locality were studied.

Describing the structure of parasite fauna we used two following terms: „core of parasite fauna" and „crossing sector of parasite fauna". „The core of parasite fauna" is formed by the species presented in each host species under study. „Crossing sector of parasite fauna" is founded by the species, which occur in parasite fauna at least two hosts.

Two parameters of infection were analysed: prevalence and abundance (as defined by Margolis et al. 1982).

RESULT AND DISCUSSION

Analysing the infection of brown trout parr, white fish, and grayling fry (Table 1) we can trace the first stages of formation of the salmonid parasite fauna.

Table 1. The parasite fauna of parr of Salmonidae fish: prevalence – (%)/abundance

Species of parasite	Brown trout	White fish	Grayling
Hexamita truttae	–	–	27/+
Chloromyxum schurovi	13/+	–	–
Capriniana piscium	47/0.07	–	–
Apiosoma campanulatum	–	–	27/0.004
A. megamicronucleatum	7/0.002	–	–
Trichodina pediculus	7/0.003	–	–
Trichodinella epizootica	–	13/0.015	7/0.0006
Scyphidia sp.	–	–	7/0.001
Tetraonchus borealis	–	–	50/2.0
Discocotyle sagittata	–	67/7.0	7/0.1
Triaenophorus crassus	–	–	7/0.3
Proteocephalus longicollis	–	93/10.0	–
Crepidostomum farionis	20/0.5	13/0.2	27/0.7
C. metoecus	7/0.1	–	–
Ichthyocotylurus erraticus	7/0.1	64/6.0	7/0.1
Diplostomum spathaceum	7/0.06	–	7/0.1
D. volvens	73/2.1	27/3.0	27/0.3
D. pseudobaueri	7/0.1	–	–
Raphidascaris acus l.	–	13/1.5	60/1.8
Rhabdochona denudata	–	–	7/0.1
Cystidicoloides tennuissima	67/2.0	7/0.1	100/75.0
Capillaria salvelini	33/0.8	–	7/0.1
Echinorinchus salmonis	13/0.8	–	20/0.3
Salmincola coregonorum	–	13/0.3	–
S. extumenscen	–	13/0.1	–
S. thymalli	–	–	20/0.3
No. of parasite species	13	10	17
No. of fish studied	15	15	15

The core of their parasite fauna is formed by the following species: *Crepidostomum farionis*, *Ichthyocotylurus erraticus*, *Diplostomum volvens*, and *Cystidicoloides tennuissima* (Fig. 1)

It is necessary to take into consideration that these three salmonid fishes feed mostly on benthic organism. This fact determines a specific composition of the core including the species whose development goes on with the participation of bottom

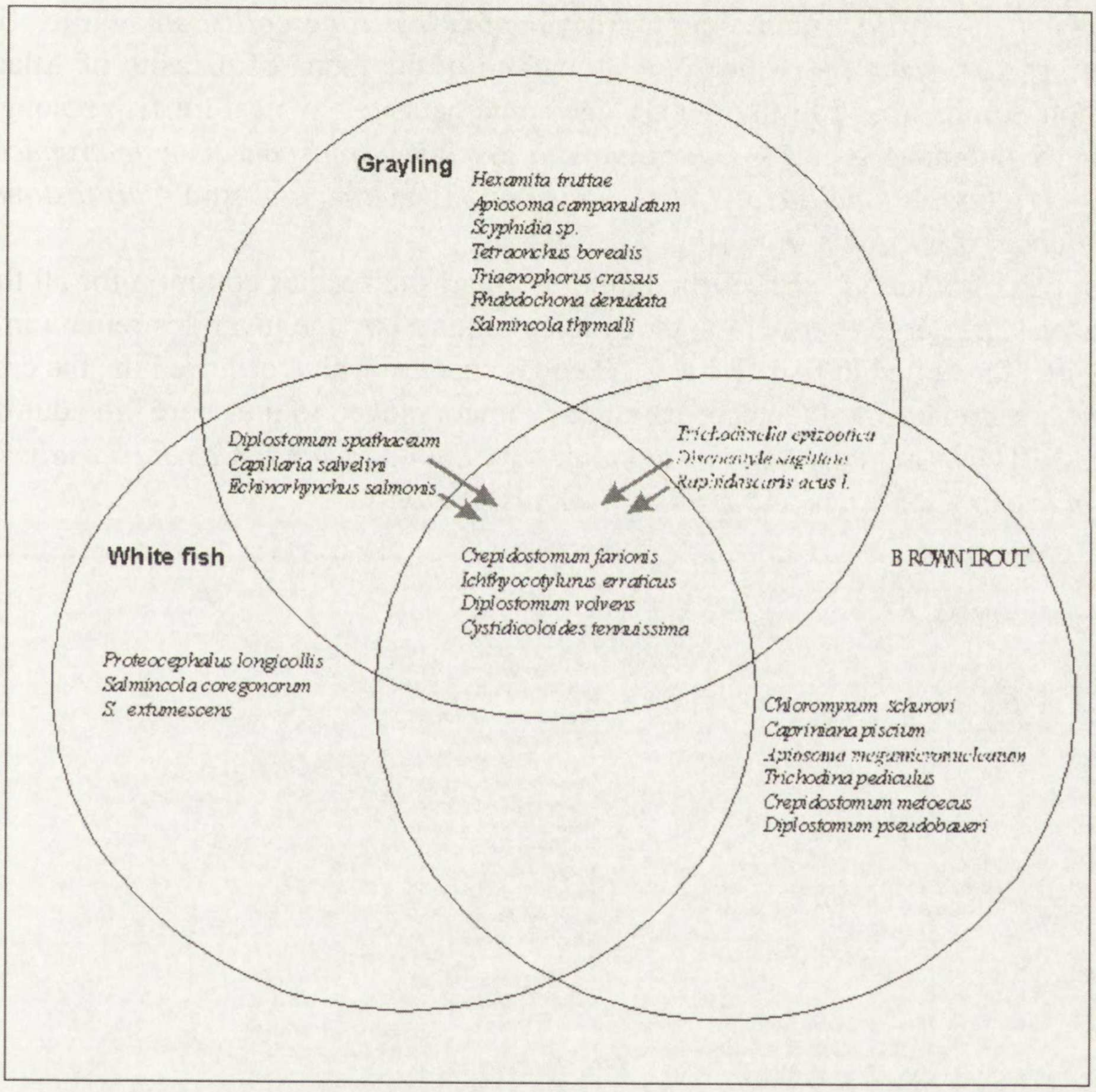

Fig. 1. Formation of Salmonidae parr parasite fauna from lake-river system Paanajrvi-Olanga

invertebrates. The species which are the basis of the parasite fauna of Salmonidae belong to boreal–foothills and arctic freshwater complexes. Only *D. volvens* is widely specific.

The species, observed in two hosts, are located in the crossing sectors of parasite fauna (Fig. 1). The parasites common for white fish and grayling are typical species for Salmonidae (*Capillaria salvelini*, *Echinorhynchus salmonis*) and non-specific digenean *D. spathaceum*.

Common for white fish and grayling parr were: the infusoria *Trichodinella epizootica*, the typical monogeneans of Salmonidae – *Discocotyle sagittata* and widely spread nematode *Rhaphidascaris acus*.

There are also some species, which were found in parr of only one host species, determining the specific elements of parasite fauna of each host under study. These are: *Hexamitta truttae*, *Apiosoma campanulatum*, *Scyphidia* sp., *Tetraonchus borealis*, *Rhabdochona demidata*, and *Salmincola thymalli* in grailing; *Salmincola core-*

gonorum, *S. extumescens*, and *Proteocephalus longicollis* in white fish; *Chloromyxum schurovi* (which is also marked in the fauna of parasite of Atlantic Salmon (Shulman and Ieshko 2003), and some parasites, typical for fish belonging to the Salmonidae group – *Caprinianiana piscium*, *Apiosoma megamicronucleatum*, *Trichodina pellucidus Crepidostomum metoecus*, and *Diplostomum pseudobaueri* in brown trout (Fig. 1).

In fish of older age classes the number of parasite species common for all three hosts was greater. Nevertheless, the species acquired by the juveniles remain in the parasite fauna of adult fish (Table 2). Besides species, which occurred in „the crossing sector of parasitic fauna" of parr, some others moved to the „core" in adult fish (Fig. 2). These are: *Discocotyle sagittata*, *Cystidicola farionis*, *Capillaria salvelini*, *Rhapidascaris acus* (l.), and *Echinorhynchus salmonis*.

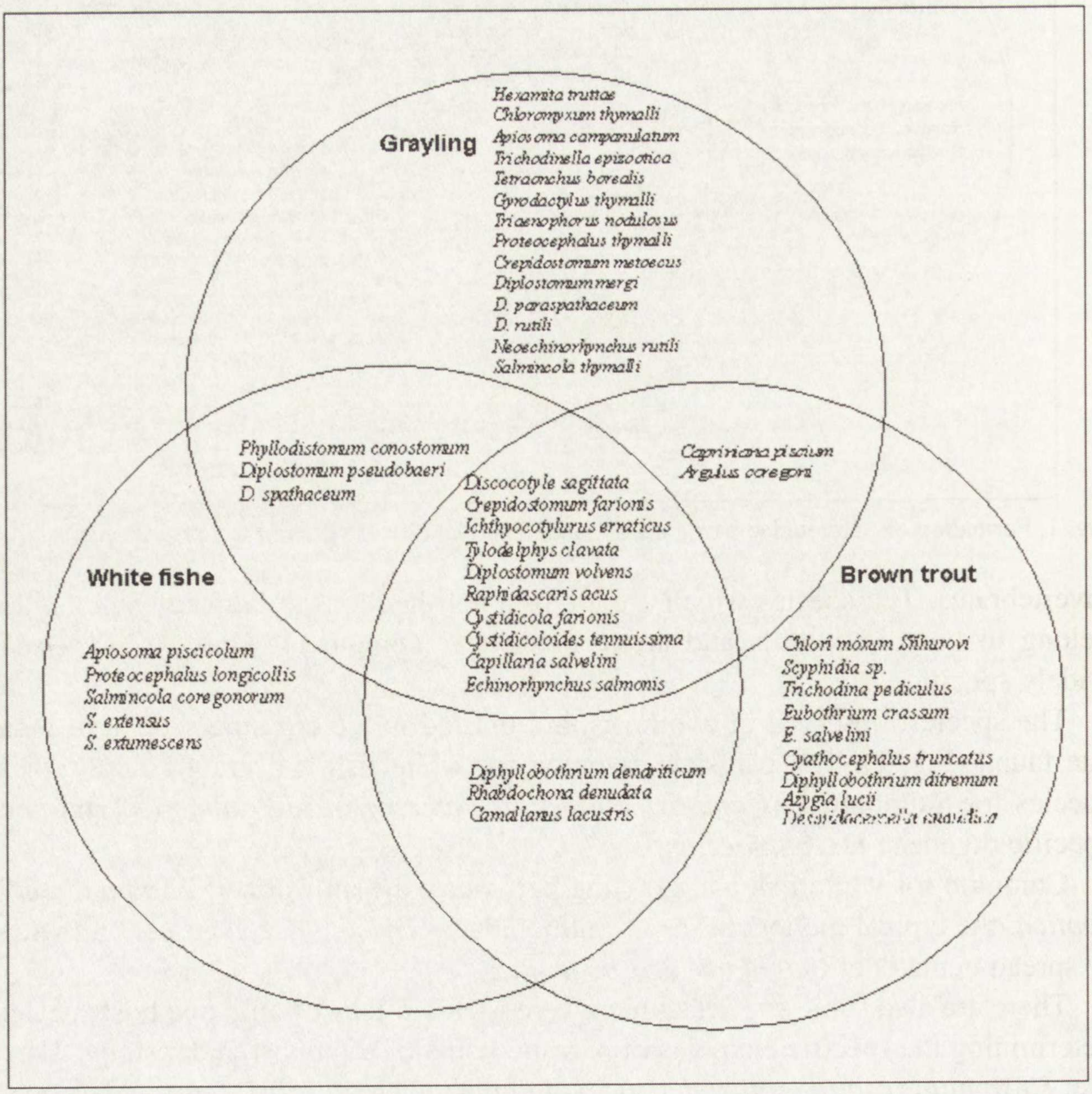

Fig. 2. Formation of parasite fauna of Salmonidae adults parasite fauna from lake-river system Paanajrvi-Olanga

Table 2. The parasite fauna of adult Salmonidae fish: prevalence (%)/abundance

Species of parasite	Brown trout	White fish	Grayling
Hexamita truttae	–	–	61/+
Chloromyxum schurovi	47/+	–	–
Ch. thymalli			5/+
Capriniana piscium	20/0.26	–	44/35.3
Scyphidia sp.	20/0.001	–	–
Apiosoma campanulatum	–	–	6/0.3
A. piscicolum	–	30/0.11	–
Trichodina pediculus	13/0.8	–	–
Trichodinella epizootica	–	–	27/0.3
Tetraonchus borealis	–	–	61/17.0
Gyrodactylus thymalli	–	–	16/1.4
Discocotyle sagittata	20/0.5	25/0.7	61/5.7
Triaenophorus nodulosus	–	–	6/0.1
Eubothrium crassum	33/6.3	–	–
E. salvelini	47/14.2	–	–
Cyathocephalus truncatus	7/0.1	–	–
Diphyllobotrium dendriticum	7/0.1	19/0.1	–
D. ditremum	7/0.1	–	–
Proteocephalus longicollis	–	56/38.4	–
P. thymalli	–	–	33/0.8
Phyllodistomum conostomum	–	19/1.5	11/0.1
Azygia lucii	13/0.3	–	–
Crepidostomum farionis	20/4.6	6/0.1	39/62
C. metoecus	–	–	11/109
Ichthyocotylurus erraticus	20/0.5	63/159	6/0.5
Tylodelphys clavata	7/0.1	63/38.0	17/1.1
Diplostomum mergi	–	–	5/0.1
D. paraspathaceum	–	–	5/0.1
D. pseudobaeri	–	25/0.6	33/1.2
D. rutili	–	–	11/0.1
D. spathaceum	–	25/0.4	17/0.1
D. volvens	33/0.6	88/6.1	11/0.1
Rhaphidascaris acus	53/1.9	–	–
R. acus l.	–	88/41	61/11.6
Rhabdochona denudata	7/0.1	6/0.1	–
Cystidicola farionis	33/1.5	63/7.0	61/30.5
Cystidicoloides tennuissima	47/1.9	38/2.0	100/321
Desmidocercella numidica	13/0.1	–	–
Camallanus lacustris	13/01	6/1.6	–
Capillaria salvelini	40/3.5	38/5.0	28/0.3
Neoechinorhynchus rutili	–	–	11/0.2
Echinorhynchus salmonis	53/3.9	38/16.0	80/8.2
Salmincola coregonorum	–	13/0.3	–
S. extensus	–	6/0.1	–
S. extumescens	–	13/0.1	–
S. thymalli	–	–	66/6.2
Argulus coregoni	13/0.1	–	6/0.3
No. of parasite species	24	21	29
No. of fish studied	15	16	18

In general the core is formed by the species, whose development is connected with benthic organisms; except is nematode *R. acus*, which can be received by fish as a result of preying on both other fish and some invertebrates: Chironomidae and Oligocheta. There are differences in quantity of these species in the parasite fauna of white fish, brown trout and grayling. The grayling is higher infected by nematode *Cystidicoloides tennuissima* than other fish. The same was observed in parr. Our study (Table 2) and the study of the parasite fauna of European grayling in water bodies of European North showed that it is the main definitive host of this parasite. And only in the water bodies, where grayling is absent or not numerous, other species of Salmonidae fish play role of the main host, supporting the size of this parasite population (Dorovskih 1996).

Ichthyocotylurus erraticus is the dominating species in the parasite fauna of white fish both the parr and adults. Besides, the parasite fauna of this host is characterized by high level of abundance of the species, developing *via* bottom invertebrates.

In the parasite fauna of brown trout many species show high level of prevalence and abundance. It is impossible to determine the dominating species.

Phyllodistomum conostomum, *D. pseudobaeri*, and *D. spathaceum*, which are included into parasite fauna of white fish and grayling are connected with benthic organisms. However, in fish parasite fauna studied in other water bodies of the system, these species have been also found in brown trout (Barskaya et al. 2001); similar *Capriniana piscium* and *Argulus coregoni*, discovered in grayling and brown trout, can be also found in white fish.

The similarity in ecology of brown trout and white fish, being manifested, among other, by the presence of zooplankton in their diet, is emphasized by the presence of the common species *Diphyllobothrium dendriticum* in parasite fauna of those fish.

Therefore, the relationships between parasites and their common hosts, established in juveniles, persist in the fish of older age groups, beside new ones, characteristic for adult fish only.

This study has been supported by the Nordic Council of Ministry and the programme „Biologicalresources „of Fundamental Research of Biological Department, RAS.

REFERENCES

Barskaya Y.Y., Ieshko E.P., Shulman B.S. 2001. Parasite fauna of the brown trout parr (*Salmo trutta* L.) from some water bodies of the Paanajarvi National Park. «Oulanka Reports», Oulanka Biological Station University of Oulu, Finland 25: 33-37.

Bykhovskaya-Pavlovskaya I.E. 1985. [The parasites of fish. The research methods]. Izd.: Nauka. (in Russian).

Dorovskih G.N. 1996. *Cystidicoloides tennuissima* (Nematoda: Ascarophididae) parasiting the population of there own hosts in the river Mezen basin condition. *Parazitologiya* 30: 357-363. (in

Russian)
Margolis, L., Esch, G.W., Holmes, J.C., Kuris A.M., Schad, G. 1982. The use of ecological terms in parasitology. *Journal of Parasitology* 68: 131-133.
Shulman B.S., Ieshko E.P. 2003. *Chloromyxum schurovi* sp. n. – new myxosporidian species (Myxosporea: Sphaerosporidae) from Salmonid fishes (Salmonidae). *Parazitologiya* 37: 245-247. (in Russian)

Zaakceptowano do druku 14 czerwca 2004