Acta Biol. Univ. Daugavp. 14 (2) 2014
ISSN 1407 - 8953

PARASITOFAUNA OF *PERCCOTTUS GLENII* DYBOWSKI, 1877 (OSTEICHTHYES, ODONTOBUTIDAE) IN WATER BODIES OF THE SOUTHERN PART OF LATGALE (LATVIA)

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Kirjušina M., Lazdāne M., Zolovs M. 2014. Parasitofauna of *Perccottus glenii* Dybowski, 1877 (Osteichthyes, Odontobutidae) in water bodies of the Southern part of Latgale (Latvia). *Acta Biol. Univ. Daugavp., 14 (2): 137 – 143.*

Amur sleeper P*erccottus glenii* were collected from four water bodies of the southern part of Latgale (Latvia): district of Daugavpils – pond of Birkineļi, Lake Gubišče, pond of Līksna and district of Līvāni – pond of Jersika. In total, 19 fishes of 51 investigated were infected with parasites from four systematic groups: Protista - *Trichodina* spp., Trematoda – *Ichtyocotylurus platycephalus*, Monogenoidea – *Ancyrocephalus cruciatus*, *Gyrodactylus perccott*i and Mollusca – glochidia.

Monogenea *G. perccotti* is specific for Amur sleeper, and for the first time was detected in water bodies of Latvia. Also monogenea *A. cruciatus*, which is specific for gills of loaches *Misgurnus fossils*, was found in a single specimen of Amur sleeper.

Key words: *Perccottus glenii*, parasitofauna, native range, ponds, Latvia.

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INTRODUCTION

The biology of Amur sleeper *Perccottus glenii* (Fig. 1) (body characteristics, inhabited niches, diet etc.) is well described. Sleeper has a diversified feeding that depends on the its age. Fry of Amur sleeper feed with plankton, fingerling with benthos organisms, while adult fishes become predatory and feed with tadpoles of amphibians and other fishes (Bogutskaya & Naseka 2002, Litvinov & O'Gorman 1996, Koščo et al. 2008, Reshetnikov 2003). Thus, Amur sleeper is appropriate host to investigate changes of parasitofauna, considering feeding behavior.

Native range of Amur sleeper is the Far East of Russia, north-east of China and north of North Korea. However, Amur sleeper gradually spread from east to west (obtained range – Slovenia, Ukraine, Latvia etc.). The spread of sleeper contributed by waterfowl with attached fish eggs and anglers. The populations of fishes distributed in Daugavpils', Bauska', Cēsis', Rīga' and Valmiera' districts of Latvia. It's possible that sleepers were introduced in water bodies of Latvia by aquarists (Bogutskaya & Naseka 2002, Berg 1949, Plikšs & Aleksejevs 1998, Pupiņa & Pupiņš 2012).

Parasitofauna of Amur sleeper is intensively investigated in native distribution range (Sokolov et al. 2012a, Sokolov et al. 2012b, Sokolov et al. 2011a, Sokolov & Zhukov 2014). Parasites of Amur sleeper are not studied in Latvia due to low economic importance (Kirjušina & Vismanis 2007).

The aim of study was to investigate parasitofauna of Amur sleeper in some water bodies of the southern part of Latgale (Latvia), since Amur sleeper is an invasive fish species. Therefore it competes with local fishes and occupies their ecological niche, as well as may introduce new parasite species, which could be pathogenic for local fishes (Litvinov & O'Gorman 1996). We expect, that Amur sleepers, in water bodies of Latvia, were introduced with parasite species from native range.

MATERIALS AND METHODS

Materials

During the study, 51 specimens of Amur sleeper were investigated from September 30th to November 10th 2013 and on 5th November 2014. Fishes were trapped by rod from 4 water bodies: pond of Birkineļi (55°47'16.2"N 26°25'52.6"E), Lake Gubišče (55°53'10.8"N 26° 33'37.2"E), pond of Līksna (55°59'14.6"N 26°23'54.7"E) (district of Daugavpils) and pond of Jersika (56°14'08.5"N 26°11'31.6"E) (district of Līvāni).

Amur sleepers were transported to the laboratory, alive, in plastic containers (50 × 50 cm). All fishes were measured, weighed and sex was determined. All investigated fishes (43 females and 8 males) were measured in length, ranging between 7 and 17 cm (average 9.6 cm), and weight, 3.1 – 78 g (average 15.4 g). Examined fishes were divided into three groups of weight to investigate parasitofauna considering feeding behavior.

Methods

The study was carried out in laboratory of Parasitology and Histology (Daugavpils University), by full parasitological investigation according to Bykhovskaya – Pavlovskaya (1985). Before examination fishes were euthanized by spinal cord dislocation (ASIH, AFS, AIFRB 1987).

Parasites were detected in fish organs and tissues using stereomicroscope Nikon SMZ 800. All parasites were counted, except protozoans. Parasites were photographed with microscope Nikon eclipse 90i for accurate determination of parasite species. Morphological features were used for parasites identification until genus or species level, by Key of the parasites of freshwater fishes in fauna of the USSR (Gussev

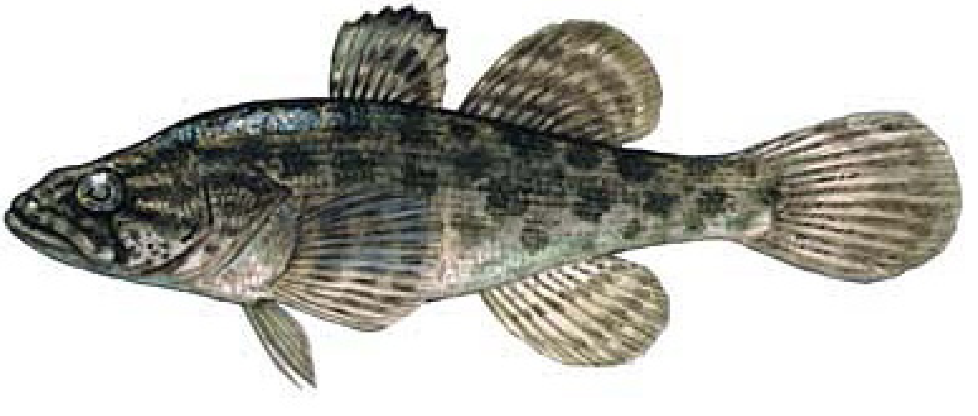

Fig. 1. Amur sleeper *Perccottus glenii* Dybowski, 1877 (Plikšs & Aleksejevs 1998).

et al. 1985, Bauer et al. 1987) and Sudarikov et al. (2002).

Statistical processing of obtained data

The prevalence (P, %), intensity of invasion (I) and abundance (A) were calculated (Bush et al. 1997).

RESULTS

In total, 37.3% of all examined fishes were infected. We recorded three parasite species, untill species level, and unidentified parasites from four systematic groups: Protista (species of ciliates), Trematoda (one species), Monogenea (two species) and Mollusca (one species). Four Amur sleepers (21.1%), out of all examined, were infected by two parasite species, while others fishes only by one. The recorded parasite species are *Trichodina* spp. (Fig. 3), *Ichtyocotylurus platycephalus* (Creplin, 1825) Odening, 1969, *Ancyrocephalus cruciatus* (Wedl, 1857) Lühe, 1909 (Fig. 2), *Gyrodactylus perccotti* Ergens et Yukhimenko, 1973 and glochidia.

In the present study prevalence and intensity of invasion were relatively low for all parasite species. Metazoan parasite species prevalence ranged from 2 up to 3.9%, intensity of invasion 1 – 6 and abundance 0.04 – 0.1. The prevalence of *Trichodina* spp. was relatively high - 33.3%.

We revealed that Amur sleeper in water bodies of the southern part of Latgale (Latvia) harbor parasites with direct life cycle, except *I. platycephalus*. Infection process, by trematode *I. platycephalus,* occurs with free-swimming cercariae that actively penetrate host's body and encyst as metacercariae in serosa membranous. Invasion intensity of *I. platycephalus* was one parasite per fish, with prevalence of 3.9% and abundance composes of 0.04. Monogenea *G. perccotti* has the same parasitological indices as previously mentioned parasite species. In addition, *A. cruciatus* had relatively low prevalence (2%), while intensity (6) and abundance (0.1) were the highest. During investigation, we found only one glochidia specimen (P = 2%; I = 1; A = 0.02).

Diversity of parasite species markedly varies between water bodies where the greatest number of species found in pond of Līksna (the

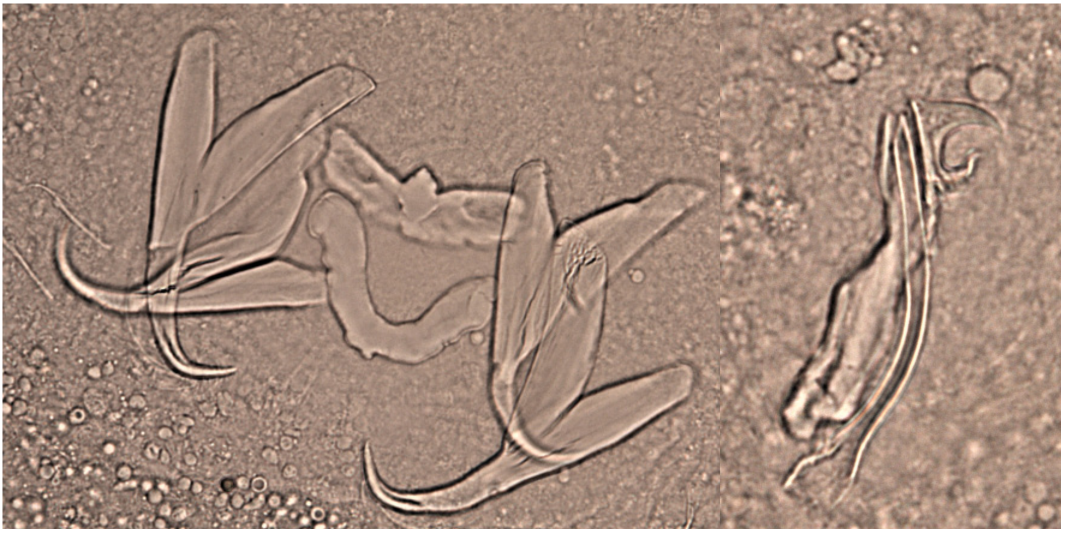

Fig. 2. The attachment apparatus and copulatory organ of *Ancyrocephalus cruciatus* from Amur sleeper (pond of Jersika) with 600x magnification, Nikon eclipse 90i (original photo).

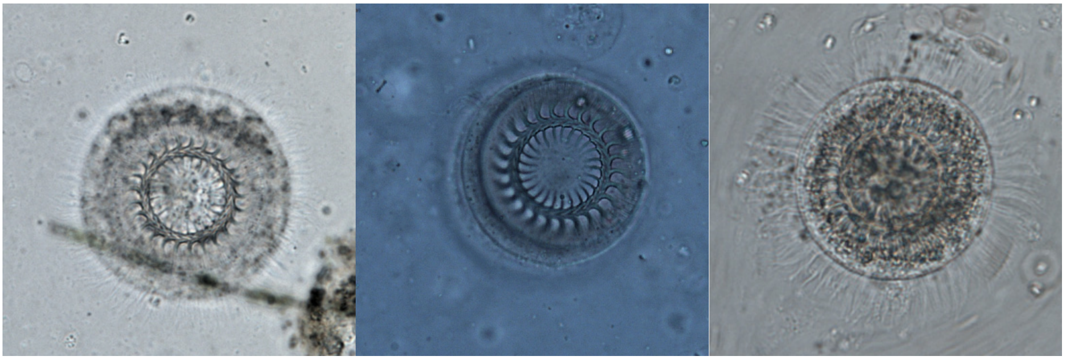

Fig. 3. *Trichodina* spp. from Amur sleeper gills (pond of Līksna) with 600x magnification, Nikon eclipse 90i (original foto).

smallest pond of all investigated): *Trichodina* spp., *I. platycephalus* and *G. perccotti* where the highest prevalence detected for trichodinids (60.7%). Trematoda *I. platycephalus* shows the same indices as *G. percotti* (P = 7.1%, I = 1, A = 0.07). Monogenea *G. perccotti* is highly host-specific parasite for Amur sleeper. Only single fish harbor one glochidia specimen, in Lake Gubišče (P = 11.1%, I = 1, A = 0.1). Also, we found six *A. cruciatus* monogeneans on a single fish, in pond of Jersika. Mentioned parasite is specific for loache *Misgurnus fossils* and previously recorded only in Lake Višķu (Latvia) (Kirjušina & Vismanis 2007). During the examination of 13 fishes from pond of Birkineļi, no parasite species were detected.

The obtained data of fish weight structure shows, that Amur sleeper juveniles have the greatest diversity of parasite species (n = 4) rather than adult fishes.

DISCUSSION

The main results suggest that Amur sleepers in water bodies of the southern part of Latgale (Latvia) are infected by parasites with direct life cycle. The higher prevalence had ciliates that could be dependent on size of pond. The water temperature may rise up with ambient temperature that increases primary biomass production by single cell organisms. Furthermore, the small size of Līksna pond could promote this process. Primary trichodinids feeds with small algae and bacteria. Therefore, the prevalence of ciliates could serve as eutrophication indicator of water bodies (Palm & Dobberstein 1999). Majority of *Trichodina* species have a wide host range (Sokolov & Protasova 2014). According to Sokolov & Moshu (2013) relatively high diversity of *Trichodina* species found in water bodies of Moldova where prevalence reached 93.3%. Sokolov et al. (2011a) revealed that Amur sleeper harbor parasites with direct life cycle more frequently, in comparison with other fish species that had parasites with indirect life cycle what coincide with our investigation results.

Monogeneans *G. perccotti* was introduced in Europe (Poland) along with Amur sleeper from the Far East (Ondračková et al. 2012). Sokolov et al. (2011b) recorded specific parasites (monogenea *G. perccotti* and cestode *Nippotaenia mogurdnae*) in river basin of Irtysh (Russia) that usually co-occur together. Košuthová et al. (2004) and Mierzejewska et al. (2010) reported that fish is introduced to Europe (Slovakia and Poland) with cestode *N. mogurndae*. Cestode *N. mogurdnae* registered in all water bodies of Irtysh basin with the highest prevalence 100% and maximal intensity 182 parasites per fish. The authors indicate that the ability of *N. mogurdnae* to occupy new territories is affected by widespread of the intermediate host *Mesocyclops leuckarti* (Claus, 1857) (Sokolov et al. 2011b). Although, occurrence of mentioned copepods *M. leuckarti* are described in territory of the southern part of

Latvia (Lakes Riča and Sita), we did not recorded *N. mogurndae* in the present investigation (Vezhnavets & Škute 2012). Probably, these copepods are not presented in the studied water bodies.

The ability of examined fish to survive in extreme environmental conditions, for example, in water bodies with very low oxygen levels, as well as in dry and frozen water bodies may affect total amount of parasites (Kottelat & Freyhof 2007). Pond is a biotope where water condition changes rapidly that influence fluctuations of parasite number and diversity of species.

Also, we didn't found *Diplostomum* spp. metacercariae that occurs throughout the world and infect many host species. Shigin (1980) suggest that Amur sleepers are not susceptible to invasions of eye fluke *Diplostomum* spp. cercariae.

CONCLUSIONS

Summarizing data of Amur sleeper parasitofauna, we conclude that the diversity of parasite species and the total number of parasites, in water bodies of the southern part of Latgale (Latvia), consists at least of five parasite species. For the first time, in water bodies of Latvia, monogenea *G. perccotti* is recorded. Furthermore, monogenea *A. cruciatus* was found on gills of single fish specimen, though parasite is specific for *Misgurnus fossils*.

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Received: 05.11.2014.
Accepted: 30.11.2014.