

Parasites of the Introduced Chinese Sleeper *Perccottus glenii* (Actinopterygii: Odontobutidae) at the Northern Border of the Host Habitat

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Abstract—Water bodies in the city of Mirny (Arkhangelsk oblast, Russia) and its environs are the northernmost sites where the introduced Chinese sleeper is registered. The first data on the Chinese sleeper parasite fauna in this region are obtained; *Trichodina mutabilis*, *Goussia* sp., *Spiroucleus* sp., and larvae of Nematoda gen. sp. are found.

Keywords: *Perccottus glenii*, *Trichodina mutabilis*, *Goussia*, *Spiroucleus*, parasites, invader, habitat border, Arkhangelsk oblast

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INTRODUCTION

The Chinese sleeper *Perccottus glenii* Dybowski, 1877 is a freshwater fish of the family Odontobutidae with a wide habitat in Eurasia. From the perspective of history and zoogeography, the habitat of this species consists of two parts: native and nonnative (Reshetnikov, 2009). The native part includes the south of the Russian Far East, Northeast China, and North Korea (Nikol'skii, 1956; *Fauna Sinica...*, 2008). The nonnative part is much larger than the native one and covers Central and Eastern Europe, as well as the northern part of Asia from the Urals to the Upper Amur River basin (Reshetnikov, 2009). The nonnative part colonization by *P. glenii* was influenced by numerous, either random or intentional, introductions of this species and its further self-spread. European Russia is the northernmost territory into which it has penetrated. Here, the northern habitat border of *P. glenii* runs along the line St. Petersburg–Mirny–Syktyvkar (Reshetnikov, 2009). In addition, water bodies in the city of Mirny (Arkhangelsk oblast, Russia) and its environs are the northernmost sites where *P. glenii* has been registered, in both native and nonnative parts of its habitat. *P. glenii* was first recorded in this region during the early 2000s (Novoselov, 2003; Shlyapkin and Tikhonov, 2003). The researchers found this fish in Lake Plestsy, which is located on the territory of Mirny. It is assumed that *P. glenii* was introduced to the lake by either game fishermen or aquarists in the middle 1990s (Shlyapkin and Tikhonov, 2003). To date, *P. glenii* is known from several water bodies near Mirny. There are published data on morphology, diet, age structure, and sex ratio of *P. glenii* in Lake Plestsy

(Novoselov et al., 2005; Plyusnina, 2005; Kas'yanov and Gorshkova, 2012). The aim of this publication is to study the parasite fauna of the introduced *P. glenii* in its northernmost habitat.

MATERIALS AND METHODS

The material was collected on June 6, 2013, from a stagnant water body (62°44'57.94" N, 40°4'37.96" E) near the resort village of Maloe Konevo, which is located ~13 km to the west of Mirny (Arkhangelsk, Russia). A survey of local people showed that this water body is inhabited by *P. glenii* and the Prussian carp *Carassius gibelio* (Bloch, 1772); the latter species has become rare and was not caught in 2013.

A total of 17 specimens (TL 85–180 mm, median 105 mm) of *P. glenii* were investigated by complete parasitological dissection. All groups of parasites, except for coccidia, were fixed and stained using the standard methods (Bykhovskaya-Pavlovskaya, 1985). Coccidia were studied with the help of temporary vital preparations under an AXIO Imager AI microscope equipped with Nomarski differential interference contrast optics. The standard parameters of host infection were used: prevalence with sampling error (for all groups) and invasion intensity (for metazoan parasites only).

RESULTS AND DISCUSSION

P. glenii in the studied water body was found to carry *Trichodina mutabilis* Kazubski et Migala, 1968 and three other parasites, as yet not identified to spe-

cies. The latter are *Goussia* sp., *Spiroucleus* sp., and a larva of *Nematoda* gen. sp. (see table). *Goussia* sp. sampled during this study had oval bivalve sporocysts ($6-8 \times 5 \mu\text{m}$) with wormlike sporozoites and a fine-grained residual body. To identify species belonging of these parasites, additional materials are needed. It is not possible to reliably identify species of the genus *Spiroucleus* Lavier, 1936 on the basis of light microscopy. The recorded nematode larva was not identified to species because of the poor state of the material.

It is known that the parasite fauna of fish is depleted near their habitat borders (Dogel', 1958). This fact was revealed by the example of host species in the native fauna. From the perspective of parasitology, nonnative hosts turn out to exist under conditions different than those influencing native hosts. They are determined by a significant role of randomness during the formation of parasite fauna in introduced species (skid and naturalization of specific species, presence in the recipient water bodies species of fish of closely related to introduced—as probabilistic events), as well as by the frequently observed absolute isolation of introduced populations in the habitat area colonized by them. What is more, in contrast to species of the native fauna, habitat borders of introduced species are often determined by the time which passed from the moment of their introduction, rather than by geographical and ecological factors. In these cases, the introduced species at the habitat borders may exist under conditions favorable to it. In this connection, particularly parasitic fauna host-invader dwelling in with the borders of their distribution, require clarification.

This is the first report on parasites of the introduced *P. glenii* at the northern border of its habitat. The geographical latitude (62° N) for which the discussed data were obtained is 7° higher than that of the northern border of the native habitat of this species (Reshetnikov, 2009). In the studied water body, the parasite fauna of *P. glenii* had a low species richness. Nevertheless, it is comparable to that found in *P. glenii* in some water bodies located in the temperate zone of European Russia (Sokolov et al., 2012) and more southern regions of Eastern Europe (Kvach et al., 2013). *T. mutabilis* found in *P. glenii* in this study was also earlier registered in this fish many times in other regions of its nonnative part of the habitat (Sokolov et al., 2013). This parasite has no strict confinement to certain systematic group of fishes. Nonidentified species of the genera *Goussia* Labbé, 1896 and *Spiroucleus* are also known to infest the introduced *P. glenii* (Molnár, 2009; Sokolov and Moshu, 2013; our unpublished data). Species reliably attributed to the specific parasite *P. glenii*, were not noted, however, this conclusion is conditional, because a hostal *Goussia* sp. and *Spiroucleus* sp. is not known. It is not clear whether all of the above parasitic organisms attributed to native fauna surveyed the water or bring rotan from the reservoir(s) donor. However, the main result of conducted research is not challenged—on the north the bound-

Parasites of the Chinese sleeper *P. glenii* in a water body in Maloe Konevo (Arkhangelsk oblast), $n = 17$ specimens

Parasites	Site	Prevalence, invasion intensity
<i>Goussia</i> sp.	Intestine	$5.9 \pm 5.7\%$, —
<i>Spiroucleus</i> sp.	Intestine	$23.5 \pm 10.3\%$, —
<i>Trichodina mutabilis</i>	Gills	$41.2 \pm 11.9\%$, —
Nematoda gen. sp.	Intestine	$5.9 \pm 5.7\%$, 1 specimen

ary of its distribution rotan does not remain intact in respect of parasites.

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