



First record of the invasive Caucasian dwarf goby – *Knipowitschia caucasica* (Berg, 1916) – in Serbia

Az invazív kaukázusi törpegéb – *Knipowitschia caucasica* (Berg, 1916) – első észlelése Szerbiában

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Abstract

The original distribution of Caucasian dwarf goby (*Knipowitschia caucasica*) is the marine and brackish water habitat types of coastal areas, but also common in the lower, estuarine reaches of rivers. The first record of the species in the Carpathian Basin was in the Hungarian section of the River Szamos in 2009. The Caucasian dwarf goby had become a species of mass occurrence in the Lake Tisza reservoir located at the middle section of the River Tisza in 2013. The fast downward spread had been detected, so it was occurred from the the lower section of the River Tisza at the Serbian border. We collected the first specimens in the Serbian river sections at Senta and Kanjiža in March 2015. As a result of our collection at the Vojvodinan reach of the River Tisza can be stated that a new invasive goby species had naturalized in Serbia and its further spreading can be expected.

Kivonat

A kaukázusi törpegéb (*Knipowitschia caucasica*) eredetileg a tengerek partközeli vizeiben és a betorkolló folyók alsó szakaszain él. Ezt a fajt a Kárpát-medencében először Magyarországon mutatták ki 2009-ben a Szamosban, majd 2013-ban tömegesen elszaporodott a Tisza középső szakaszán lévő Tisza-tó víztározóban. Innen gyorsan terjedt lefelé, 2015 elején már a Tisza alsó szakaszán, a szerb-magyar határnál is előkerült. Szerbiában 2015 márciusában Zentánál és Magyarkanizsánál gyűjtöttük az első példányokat. A Tisza vajdasági szakaszán folytatott gyűjtéseink eredményeként megállapítható, hogy egy új invazív gébfaj honosodott meg Szerbiában, amelynek további terjedése várható.

Introduction

One of the characteristic processes in the fish faunistics has been the spreading of Ponto-Caspian gobies in Europe in the last few decades (Harka & Bíró 2007, Halasi-Kovács & Antal 2011). This paper, regarding the appearance of Caucasian dwarf goby (*Knipowitschia caucasica*), represents a unique type of spreading of a goby species. This species appeared in Serbia not from the lower reaches of the Danube, but from the upper part of the Tisa River.

Miller et al. (2004) stated that Caucasian dwarf goby is indigenous in the Caspian, Black, Azov and Aegean Seas and also the marine and brackish waters of the Greek coasts. It also occurs in estuarine freshwaters falling into the seas mentioned above. The species has been also described from the eastern coast of the Adriatic Sea (Kovačić & Pallaoro 2003), wherefrom only the Adriatic dwarf goby (*Knipowitschia panizzae*) had been recorded previously. The difficulties of the differentiation between these two species are discussed by Ahnelt et al. (1995), Kovačić & Pallaoro (2003) and Harka & Halasi-Kovács (2014).

Caucasian dwarf goby also appeared in rivers far from coastal regions (Gabrielyan 2001). Also there were specimen caught in Ukraine both in the River Dnieper near

Zaporizhia, 380 kilometers from the delta in 2007, and in the Severskiy, Donets river drainage in 2009, 1000 kilometers from delta in the Azov Sea (Shandikov et al. 2009).

The first specimen of *K. caucasica* was recorded in the Carpathian basin in 2009, from the Hungarian section of the River Szamos, near the Romanian border (Halasi-Kovács et al. 2011). Its persistence population was observed in the reservoir of Lake Tisza (middle section of the River Tisa) at Tiszafüred (Harka et al. 2012, Papp et al. 2014). The result of the systematic monitoring of this species in the River Tisa system in 2014 indicated that the Caucasian dwarf goby has not evolved stable populations neither in the River Tisa, nor in its tributaries upstream from Lake Tisza (e.g. Szamos, Eger, Laskó, Zagyva). As a result of this the upstream spreading of the Caucasian dwarf goby is very slow, while downstream spreading is extremely rapid, with a minimum of 85 kilometers per year. Until March of 2015 it has even reached the Hungarian-Serbian border (Harka et al. 2015) and its presence is continuous on this 233 km section of the River Tisa.

Material and methods

Based on Hungarian studies it was possible to assume that Caucasian dwarf goby is also present in the Serbian section of the River Tisa. To confirm this, a shallow, sandy bank of the river, near Senta and Kanjiža, were explored on 22nd March 2015. The first sampling site was located at the 123.5 rkm on the left bank of the River Tisa (N45°55'53.5" E020°05'48.9"), with the sampling length of 132 m. The second sampling site was located near Kanjiža, at 149 rkm (N46°04'09.7" E020°03'58.5") on the right bank, with the sampling length of 52 m. The water was not deeper than one meter at both sampling sites. Samples were collected using a 1x1 meter net with mesh size of 5x5 mm.

Two specimens of *K. caucasica* were sampled on each location, four in total. The fish were transported alive to the Laboratory for Hydrobiology at the Department of Biology and Ecology in Novi Sad. After measuring and photographing procedures, fish were fixated in 96% ethanol. Standard (SL) and total (TL) length of fish were measured up to 0.01 mm accuracy, and weight (W) up to 0.1 g accuracy on a laboratory measuring scale.

The Hungarian experience was used for the identification of species and the distinction from the monkey goby juveniles. Taking into consideration that the colors of Caucasian dwarf goby and monkey goby juveniles are quite similar, it is important to mention the characteristics that can help during quick field identification. If Monkey goby is observed laterally, below its median body line rectangle stripes can be observed, while the Caucasian dwarf goby has vertical irregular stripes on its median body line. If observed dorsally, juveniles of monkey goby have 5-7 stripes between dorsal and caudal fin, in shape of the letter X (actually those are 4-4 dots with pale stripes between them). On the other hand, Caucasian dwarf goby has one longitudinal stripe (Harka et al. 2015).

Results and discussion

Among the four Caucasian dwarf goby specimens one female and three males were counted. Their total length ranged between 32.1 mm and 34.2 mm, while their standard length ranged from 26.8 mm to 29.5 mm. The weight of the fish was 0.3 g.

The collected living specimens can be described as follows. The body sides are covered with scales from the base of the pectoral fin to the origin of the caudal fin however the back of the head and the dorsal side are naked approximately to the end of the first third part of the base of the second dorsal fin. The pale gray ground colour has a yellowish nuance in the head region and a greenish nuance beneath the dorsal fins. The back is dappled with dark grey netlike markings, while the body sides are ornamented with various sized dark spots of indistinct outlines. These spots are more pronounced in the males appearing as short transversal stripes tapering in their upper and lower end (*Fig. 1.*), but the dark pigmentation is more pronounced on the conserved specimens than on the live ones.



Fig. 1. *Knipowitschia caucasica* (♂, total length 32.5 mm) sampled in the Serbian section of the River Tisa (Photo: Sándor Sipos)

At the end of the first dorsal fin of the males there is a dark spot, sometimes showing yellowish or bluish colouring. There are dark transversal stripes on the dorsal fins visible also on living specimens. Their number is mainly 3-4 on the first dorsal fin, while it varies 3 to 5 on the second one. There can be identified at least five transversal rows of spots on the caudal fin. The pectoral fin, the pelvic disc and anal fin are weakly pigmented on the males but not pigmented on the females. The ventral side of the males is gray from the top of the lower jaw to the first membrane of the pelvic disc, while in females only the top part of the lower jaw is pigmented. In living females when full of eggs the pectoral region and part of the ventral region show orange colouring but it disappears during conservation. The posterior edge of the operculum in the side of the throat is of silver colouring on both sexes. Generally this spot on males is larger and also the region of the pectoral fins may show similar glistening.

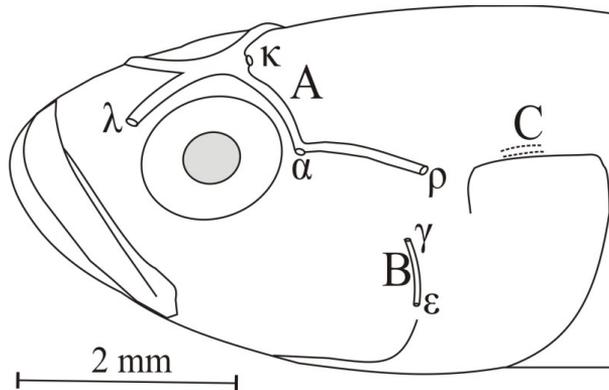


Fig. 2. Cephalic sensory canals

The lateral line system and sensory pores on the head is considered as important taxonomical features of the gobies. The anterior oculoscapular canals (Fig. 2A: *canalis oculoscapularis anterior* with λ , κ , α and ρ pores), and the preopercular canals (Fig. 2B: *canalis preopercularis* with γ and ϵ pores) were in accordance to the Fig. 2. The posterior oculoscapular canal is present as furrow on each four sampled specimens, without any visible pores. On these locations dark pigmentation dots are absent (Fig. 2C: furrow in place/instead of *canalis oculoscapularis posterior*).

Basic meristic parameters are shown in *Table 1*, according to Harka et al. (2013).

Table 1. The meristic features by Harka et al. (2013)

Meristic features	Minimum	Maximum	Mean	St. deviation
Number of first dorsal fin rays (D1)	6	7	6.1	0.3162
Number of second dorsal fin rays (D2)	8	10	8.9	0.5676
Number of anal fin rays (A)	8	9	8.7	0.4830
Number of pectoral fin rays (P)	14	15	14.8	0.4216
Scales in lateral series (LL)	32	36	33.1	1.2867
Scales in transverse series (TR)	7	9	7.7	0.6749

Based on the collected data in the section of the Tisa at Vojvodina it can be concluded that a new invasive representative of Gobiidae family has been acclimated in Serbia, and its further spreading can surely be expected.

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