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Preliminary information about the occurrence of Prussian carp *Carassius gibelio* (Bloch 1782) in mountainous Lake Devdoraki (Caucasus, Georgia)

Tatia Kuljanishvili¹, Bella Japoshvili², Levan Mumladze³ & Lukáš Kalous¹

¹*Czech University of Life Sciences Prague, Department of Zoology and Fisheries, Kamýcká 129, Praha 6, 165 00; e-mail: kuljanishvili@af.czu.cz*

²*Ilia State University, Institute of Zoology, 3 Giorgi Tsereteli str., Tbilisi 0162, Georgia*

³*Ilia State University, Institute of Ecology, 3/5 K. Cholokashvili str., Tbilisi 0162, Georgia*

Abstract

In this conference communication, we briefly inform about the finding of non-native fish species morphologically identified as Prussian carp (*Carassius gibelio*) in Devdoraki Lake in the world biodiversity hotspot of the Caucasus Mountains. Additional analyses of the material are in process.

Key words: *Carassius gibelio*, lake Devdoraki, Caucasus, Georgia

1. Introduction

Spreading of non-native species is considered as one of the main drivers of biodiversity loss (Keller et al., 2011). One of the most successful fish invaders are from the species complex of the genus *Carassius* (Jarocki 1822) usually sorted into the species Prussian carp *Carassius gibelio* (Bloch 1782) (Kottelat & Freyhof, 2007) but the situation seems to be much more complicated (Liu et al., 2017; Rylková et al., 2013).

This species complex is invasive in many places in Europe (Ribeiro et al., 2015; Rylková et al., 2013) but recently also in North America, where it is spreading fast and affecting the native biota in the lake ecosystems (Ruppert et al., 2017).

Prussian carp was found in Georgia in various water bodies (Japoshvili et al., 2013; Japoshvili et al., 2017), but the distribution did not include Caucasian Mountains because until now, the occurrence of the *Carassius* in the area was not known and even not expected.

In this paper, we present the finding of fish from *Carassius* complex morphologically identified as Prussian carp (*Carassius gibelio*) in Devdoraki Lake (Caucasus, Georgia).

2. Materials and methods

During the touristic trip to the lake Devdoraki on 27th April 2017, afternoon, we found more than 100 fish with the size from 7 cm to 20 cm, fish appeared as they are freshly out of the water (some still alive) Figure 1. Devdoraki Lake is situated 42.722616, 44.623018, 1505 m a.s.l. with well-developed vegetation (Fig. 2).



Figure 1. Fish in the grass nearby Devdoraki Lake



Figure 2. Lake Devdoraki (Caucasus, Georgia)

We collected six freshly dead individuals and transported them to the laboratory of the Department of Hydrobiology and Ichthyology of the Institute of Zoology of Ilia State University in Tbilisi and we stored them in 70% alcohol.

Fish identification followed characters given in Berg (1949), Kottelat and Freyhof (2007). We measured total length and analyzed the following characters: number of spiny and branched fin rays in dorsal fin (DF), with attention to the serration of the last spiny fin ray in DF and number of spiny and branched fin rays in anal fin (AF); number of gill rakers; number of scales in lateral line and the color of the peritoneum. We identified sex according to the presence of testes or ovaries

3. Results and Discussion

All six individuals were morphologically identified as *Carassius gibelio*, details of the morphological analyses are given in the table. 1

We identified fish found on the bank of the lake Devdoraki morphologically as Prussian carp (*Carassius gibelio*), which was reported from Georgia for the first time by Japoshvili et al. (2013). Analyzed individuals showed following characteristics: 3 spiny and 17 branched rays in dorsal fin; 2 spiny and 6 branched rays in anal fin; 44-49 gill rakers; 30-31 scales in lateral line; peritoneum - black; dorsal fin with strongly serrated last spiny ray. All analyzed specimens were females. We are aware that more detailed study is

necessary for identification of the species and this short contribution should be considered as preliminary information.

Devdoraki Lake is a small, isolated lake, which is very close to the confluence of the Amali and the Terek Rivers. The presence of *C. gibelio* in the lake is most likely connected to human activities such as recreational fishing as it was reported in other literature (e.g. Corn et al., 2001).

Table 1. Morphological characters of *Carassius gibelio* from Devdoraki Lake

Specimen	Berg, 1949	1	2	3	4	5	6
TL	-	124	117	93	102	99	94
Number of spiny fin rays in DF	III-IV	III	III	III	III	III	III
Number of branched fin rays in DF	15-19	17	17	17	17	17	17
Number of spiny fin rays in AF	II-III	II	II	II	II	II	II
Number of branched fin rays in AF	5-6	6	6	6	6	6	6
Gill rakers	39-50	49	48	44	45	45	46
Lateral line scales	28-33	30	31	30	30	30	30
Peritoneum black	YES	YES	YES	YES	YES	YES	YES
Last spiny ray of DF is strongly serrated	YES	YES	YES	YES	YES	YES	YES
Sex	-	F	F	F	F	F	F

We do not know why the fish were in the grass outside the lake. However, we speculate that it could be the result of flash flood since we observed outflow from the lake. It is possible that fish were flushed out by the flood wave caused by the melting snow from the mountain over the lake. During our visit, water runoff from the lake was low and fish could not swim and remained in the grass. However, in case of more intensive flooding, fish could be easily flushed into the Terek River and spread further, in the water bodies of the Northern Caucasus. This incidental finding brings the interesting documentation of the appearance of Prussian carp in the Caucasus Mountains. This fish is highly adaptable, which has made this specie highly invasive (Copp et al., 2009). We assume that it may become a successful invader in sensitive mountainous

ecosystems with negative effects on aquatic environment especially benthic fauna in the Caucasian biodiversity hotspot.

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