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First record and morphological characteristics of the Balkan golden loach *Sabanejewia balcanica* (Cobitidae) in Montenegro

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Abstract

Background and Purpose: *In June 2005 the Balkan golden loach* Sabanejewia balcanica *(Karaman, 1922) was found for the first time in Montenegro in the Lim river.*

Materials and Methods: *Nine specimens were measured morphometrically and meristically. Seventeen morphometric characters were measured to the nearest 0.1 mm with callipers and four meristic characters were counted.*

Results: *The habitats in which these specimens have been found belong to the barbell zone with clear water and gravel bottom (large stones, gravel and sand), and rarely below the roots of woody plants. In this locality, beside Balkan golden loach, 9 more species were found.*

Conclusions: *This study is a contribution to dispersion and more detailed knowledge of morphological characteristics of Balkan golden loach.*

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INTRODUCTION

In Montenegro, five species of two genera (*Cobitis* and *Misgurnus*) of the family Cobitidae have been recorded, but there are no detailed data of their distribution, ecology and biology. Until now, the species of the genus *Sabanejewia* have not been recorded in Montenegro. According to papers known so far concerning ichthyofauna of Montenegro (*1, 2),* and also according to listings of by river watershed (*3, 4, 5, 6),* Balkan golden loach had not been recorded in the territory of Montenegro.

This paper presents the first record and therefore the first study on the morphometric and meristic characteristics of the Balkan golden loaches in Montenegro and represents the contribution to the distribution of representatives of the family Cobitidae and more detailed knowledge of the morphological characteristics of the Balkan golden loach. In earlier literature, this species was classified under the name *Sabanejewia aurata,* but it is now recognized as *Sabanejewia balcanica. S. aurata* is restricted to Iran and possibly adjacent areas, but does not occur in European waters (*7*).

Balkan golden loach is globally listed as data deficient (DD) on the IUCN Red List *(8)*. It is on the red list of some countries, such as Czech Republic *(9)* and surrounding countries, such as Croatia, Slovenia, etc. Further investigation should be directed to collecting additional data about distribution and habitat characteristics of Balcan golden loach in

Montenegro as a crucial prerequisite for planning regional conservation strategy for this species and other representatives of the family Cobitidae in Montenegro.

MATERIAL AND METHODS

In June 2005 two specimens of the Balkan golden loach were caught in locality Njegnjevo (the Lim river), downstream the city of Bijelo Polje, and next year in October seven specimens were captured (Figure1). Material was collected using a 2.5 kW electro fisher, fixed in 75% alcohol and determined according to Maitland *(10)*. Systematic status was determined according to Kotellat and Freyhof *(11)*.

Sex and maturity of all nine specimens were determined. The preserved specimens are now kept in the ichthyological collection at the University of Montenegro, The Faculty of Science, Department of Biology in Podgorica.

All specimens were measured morphometrically and meristically. Seventeen morphometric characteristics were measured to the nearest 0.1 mm with callipers and four meristic characters were counted. Morphometric characteristics that were used are: total length (Tl), standard length (Sl), maximum body depth (H), minimum body depth (h), head depth (at nape) (hc), length of head (lc), horizontal diameter of eye (Oh), predorsal distance (pD), postdorsal distance (poD), preventral distance (pV), length of caudal peduncle (lpc), length of dorsal fin (lD), depth of dorsal fin (hD), length of anal fin (lA), depth of anal fin (hA), length of ventral fin (lV), length of pectoral fin (lP). The abbreviations were used according to Holčik *(12)*. All morphometric ratios are presented by mean value, standard error and min.-max. value (Table 1).

Meristic characteristics were: count of the number of hard and soft rays in dorsal, ventral, pectoral and anal fins in each specimen (Table 2). The last two branched dorsal and anal fin rays were counted as one.

Study area and habitat

The Lim river basin lies in the northern part of Montenegro. Hydrographically, the Lim is the most important Montenegrin river. It is formed from the outflowing waters from the Plavsko Lake, at the altitude of 908 m. The Lim belongs to the Black Sea drainage basin, and the largest part of its course is situated on the territory of Montenegro. Total length of its course to mouth to the Drina is 197.0 km, as many as 123.0 km being on the territory of Montenegro.

Total decline of the course is around 40%, but in the upper part, nearby Berane (altitude of 670 m) it is much steeper (8–10 m/km) than in the lower one (2–4 m/km). Owing to this difference in the decline, the average velocity of water in the upper part is also significantly greater (to 2 m/s). The highest water levels, i.e. flow rates occur in May, then in April, whereas the lowest ones occur by the end of summer (August and September) *(13)*. Downstream the depression of Berane the Lim river has a significantly wider riverbed (at places even over 100 meters), and rapids occur more rarely. In this part large pebbles are predominant in the substrate, and at places there is also sand, both of which are exploited. Upstream there are rapids and whirls and water flows over the predominantly rocky karstic substrate, and pebbles are present in the substrate only at some places. Temperature during the summer reaches the values of even 19°C, pH is from 7.5 to 9.2, and the concentration of O_2 from 8.5 to 11.0, and saturation mainly exceeds 100% (Mijović, pers. comm.). Periphyton is mainly expressed, but more abundantly in the lower part of the course.

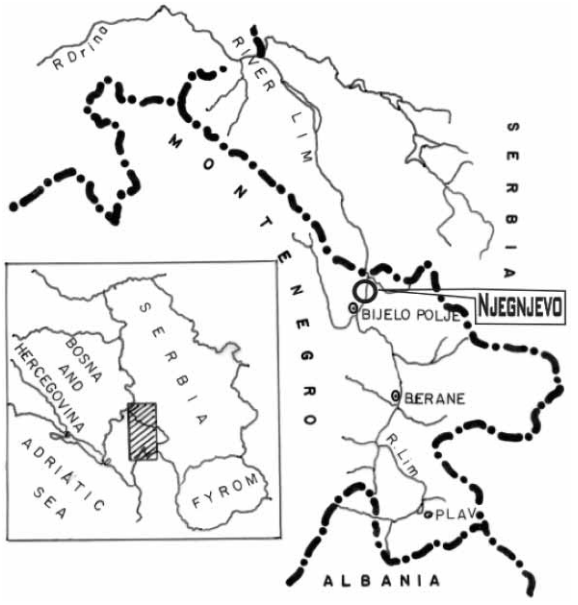

Figure 1. *Geographical location of the Lim river and position of the locality Njegnjevo.*

RESULTS AND DISCUSSION

Morphological characteristics

The Balkan golden loach has an elongated and slender body (Figure 2). According to Kottelat and Freyhof *(11)* it can reach 90 mm. The specimens from the Lim river were up to 80.3 Sl (or 91.9 Tl). Along the flank there is midlateral row of 9–11 blotches and 9–12 dorsal blotches. Space between blotches of midlateral row is bright without pigments. According to Kottelat and Freyhof *(11)* the number of blotches in midlateral row is 10–17 and 12–17 dorsal blotches.

Dorsal origin precisely above or slightly in front of pelvic origin. The maximum body depth (H) is 11.82–15.82% Sl and the minimum body depth is 8.04–9.88% Sl. The value of the maximum body depth corresponds to the values obtained from population of the Balkan golden loach from Slovenija 12.0–16.4 *(14)* and 12–18% *(11)*. The depth of dorsal fin is equal or slightly shorter than the length of pectoral fin; the depth of dorsal fin is about 3.0 times in postdorsal distance; maximum body depth is equal or slightly shorter than the length of pectoral fin

Figure 2. *The Balkan golden loach* Sabanejewia balcanica *from the Lim river (Montenegro).*

and the depth of dorsal fin; the length of head is equal to or slightly longer than the length of caudal peduncle; the eye diameter was 2.8–3 times in minimum body depth; the depth of caudal peduncle about 2.0 times its length of caudal peduncle. The depth of dorsal fin and predorsal distance corespond to the values of population from the Laborec river *(15),* while the values of Tl, H, lA i LD are lower and the value of h is higher for the specimens from the Lim river.

The ratios of individual morphometric measurements of the Balkan golden loach in the Lim river (Montenegro). The number of specimens (n), standard error (S.E.), minimum-maximum values (min –max). standard deviation (St.Dev.)

According to meristic characteristics (Table 2), this population is similar to those obtained by Grupče and

TABLE 1

The ratios of individual morphometric measurements of the Balkan golden loach *Sabanejewia balcanica* in the Lim river (Montenegro). The number of specimens (n), standard error (S.E.), minimum-maximum values (min–max). standard deviation (St.Dev.).

Characters	n	Mean	Min-Max	St.Dev.	S.E.
Tl	9	85.4	80.7–91.6	3.7	1.2
Sl	9	74.4	70.4–80.3	2.9	0.9
% Sl in Tl	9	87.1	85.2–89.1	1.0	0.4
% of H in Sl	9	14.5	11.8–15.8	1.2	0.4
h	9	8.9	8.0–9.8	0.7	0.2
hc	9	12.5	11.2–13.3	0.7	0.2
lc	9	19.2	18.4–20.2	0.6	0.2
Oh	9	3.2	2.8–3.6	0.2	0.9
pD	9	48.4	47.2–49.7	0.8	0.2
poD	9	43.3	38.9–45.5	1.9	0.6
pV	9	48.4	42.9–51.4	2.5	0.8
lpc	9	18.2	16.2–21.2	1.5	0.5
lD	9	8.4	7.1–10.5	1.2	0.4
hD	9	14.4	12.6–15.6	0.9	0.3
lA	9	7.1	6.3–8.0	0.6	0.2
hA	9	13.2	12.1–14.8	0.9	0.3
lP	9	14.3	13.3–15.4	0.8	0.3
lV	9	12.3	10.7–13.6	0.9	0.3

TABLE 2

The number of hard and soft fin rays in specimens of *S. balcanica* from the Lim river (Montenegro).

Species	n	Dorsalia	Pectoralia	Ventralia	Analia
Sabanejewia balcanica	9	I–II/6–7	I/7–8	II/6	I–II/6

Dimovski *(16)*, Vasilijeva and Ráb *(15)* and Šumer and Povž *(14)*.

The number of hard and soft fin rays in specimens of the Balkan golden loach from the Lim river (Montegro).

Distribution

The Balkan golden loach inhabits tributaries of the Danube river and the Aegean sea watershed *(17)*. In many European countries, this species was found in local ichthyofauna such as in rivers in Serbia *(18),* Slovenia *(19)*, Croatia *(20, 21),* Bulgaria *(22),* Romania *(23)*, etc. Typical locality (*locus typicus*) of the Balkan golden loach is in the Vardar basin (7).

During ichthyological studies lasting several seasons (exploitations) of water currents in the Lim Basin in Montenegro, sixteen species of five families (including lampreys) were recorded. For the first time on locality Njegnjevo, downstream the town of Bijelo Polje, the Balkan golden loach was recorded. The localities where the Balcan golden loach *S. balcanica* was observed belong to the barbell zone, characterized by a high level of dissolved oxygen, small flow rate and low water rate. Water quality is beta-mesosaprobic *(24)* and gravel bottom with small fragments of sand (larger stones, gravel and sand). Also, the substrate in this part of the river is completely covered with periphyton. In this area, the width of the river riches its maximum, and water depth is up to 1.5 m.

In the locality where the Balkan golden loach was recorded, Cobitis elongata was also found. Sympatric occurrence of these two species in the same localities was also recorded in the lower parts of some rivers in Croatia *(20)*. Also, in this locality the following fish species occur: *Barbus balcanicus, Chondrostoma nasus, Leuciscus cephalus, Alburnus alburnus, Alburnoides bipunctatus, Telestes agassii, Gobio gobio, C. elongata, Barbatula barbatula*. Occurrence of particular species in this locality is given in Table 3. From family Cobitidae, in this locality *C. elongata* is present in the highest percentage and the Balkan golden loach in the lowest percentage. In the Salmonide brooks that belong to the typical salmonide region, the Balkan golden loach was not found. Pebble exploitation was present in particular parts of this area and there was no Balkan golden loach recorded.

Structure of fish community on the locality Njegnjevo.

The most probable reason why Balkan golden loach was not recorded in this area up to now is insufficient study of the watershed of the Lim in Montenegro. Considering the fact that this species was found nearby the

TABLE 3

Structure of fish community in the locality Njegnjevo.

Species	Presence (in %)
Barbus balcanicus	26,25%
Chondrostoma nasus	2.31%
Leuciscus cephalus	21.39%
Alburnus alburnus	0.58%
Alburnoides bipunctatus	4.04%
Telestes agasizi	6.93%
Gobio gobio	0.87%
Cobitis elongata	23.70%
Sabanejewia balcanica	3.47%
Barbatula barbatula	10.36%

area where intensive gravel and pebble exploitation takes place, our opinion that it is necessary to stop this activity, in order to preserve the habitat of this species. However, future investigations will provide more detailed data about biology, ecology, distribution and endangerment status of this species in Montenegro, as well as other representatives of the family Cobitidae.

REFERENCES

1. DRECUN Đ 1962 Rasprostranjenje i popis slatkovodnih riba Crne Gore (Distribution and list of freshwater fishes of Montenegro). *Hydrobiologia Montenegrina 2(1):* 1–8
2. TALER Z 1953 Rasprostranjenje i popis slatkovodnih riba Jugoslavije (Distribution and check list of freshwater fishes of Yugoslavia). *In*: Glasnik Prirodnjačkog muzeja Srpske zemlje, Serija B, Knjiga 5–6, str. 425–455 (in Serbian)
3. KNEŽEVIĆ B, MARIĆ D 1989 Ichtyofauna des Flussgebietes Piva vor und der Errichtung des Stausees »Piva«. *Ichthyos* 7: 7–14
4. KRIVOKAPIĆ M, MARIĆ D 1993 Fishes of the Tara River. *Ichthyologia 25(1):* 41–49
5. KRIVOKAPIĆ M, MARIĆ D 1997 Stanje faune riba u slivu Skadarskog jezera (Condition of fish fauna in Skadar Lake watershed). *In:* Zbornik radova »Prirodne vrijednosti i zaštita Skadarskog jezera«. *CANU 44:* 215–223 (in Serbocroatian)
6. MARIĆ D 1995 Endemic Fish Species in Montenegro. *Biol Conservation 72:* 187–194
7. KOTTELAT M 1997 European freshwater fishes. *Biologia (Bratislava) 52 (Suppl.5):* 271
8. IUCN 2007 Red List of Threatened Species. IUCN Species Survival Commission.
9. LUSK S, HANEL L, LUSKOVÁ V 2004 Red list of the ichthyofauna of the Czech Republic: Development and present status. *Folia Zool 53 (2):* 215–226
10. MAITLAND S P 2000 Hamlyn guide to Freshwater Fish of Britain and Europe. Hamlyn, Octopus Publishing Group Limited, London, p 256
11. KOTTELAT M, FREYHOF J 2007 Handbook of European freshwater fishes. Kottelat, Cornol, Switzerland and Freyhof, Berlin, Germany, p 646
12. HOLČIK J 1989 List of symbols and abbreviations. *In*: The freshwater fishes of Europe (*ed*), General introduction to fishes – Acipenseriformes 1/II. Aula Wiesbaden.
13. HRVAČEVIĆ S 2004 Resursi površinskih voda Crne Gore (Resourse of surface water in Montenegro). Elektroprivreda Crne Gore, A D Nikšić, p 331 (in Serbocroatian, German summary)
14. ŠUMER S, POVŽ M 2000 Morphometric and meristic characters of the genera *Cobitis* and *Sabanejewia* (Cobitidae) in Slovenia. *Folia Zool 49 (Suppl 1):* 235–240
15. VASILEVA E D, RÁB P 1992 Zolotistaja šipovka *Sabanejewia aurata* (Cobitidae) reki Laborec (Golden loach *Sabanejewia aurata* in the Laborec river). *Vaprosy Ihtiologii 32:* 176–181 (in Russian).
16. GRUPČE R, DIMOVSKI A 1976 Morfološka karakteristika na pretstavitelite od rodot *Cobitis* (Pisces, Cobitidae) vo Makedonia (Morphological characters of the genera *Cobitis* in Macedonia). *Acta Musei Macedonici*, Scientarium Naturalium, Tom XV, 2 (127) (in Macedonian, with a summary in English)
17. VUKOVIĆ T, IVANOVIĆ B 1971 Slatkovodne ribe Jugoslavije (Freshwater fishes of Yugoslavia). Zemaljski muzej Bosne i Hercegovine, Sarajevo, str. 268 (in Serbocroatian)
18. SIMONOVIĆ P 2002 Ribe Srbije (The fishes of Serbia). NNK International, Zavod za zaštitu prirode Srbije, Biološki Fakultet Univerziteta u Beogradu, p 247 (in Serbian)
19. POVŽ M, ŠUMER S 2000 Present status of the species of the genera *Misgurnus, Cobitis* and *Sabanejewia* in Slovenia. *Folia Zool 49 (Suppl 1):* 107–112
20. DELIĆ A, BUČAR M, KUČINIĆ M, MRAKOVČIĆ M 2003 New data about distribution of *Sabanejewia balcanica* (Karaman, 1922) (Cobitidae) in Croatia. *Folia biol (Kraków) 51 (Suppl):* 39–42
21. MRAKOVČIĆ M, SCHNEIDER D, MUSTAFIĆ P, KEROVEC M 2000 Status of genus *Cobitis* and related species in Croatia. *Folia Zool 49 (Suppl 1):* 113–116
22. PEHLIVANOV L 2000 Ichthyofauna of the East Rhodopes (South Bulgaria): Composition and Distribution. *Acta zool bulg 52 (3):* 45–53
23. BANARESCU P 1964 Pisces-Osteichthyes (Pesti ganoizi si ososi). *In*: Fauna Republicii populare Romanie 13, Bucuresti, p 969
24. MARIĆ D, PAVLOVIĆ V 2006 First records and description of *Cobitis elongata* HECKL & KNER 1858 (Cobitidae) in Montenegro. *Nat Montenegrina 5:* 109–115