

Systematic position and vulnerability of *Sabanejewia balcanica* in the Balkan area

Sistematsko mjesto i ranjivost vrste *Sabanejewia balcanica* na području Balkana

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ABSTRACT

Sabanejewia balcanica is a fish species that belongs to *Cobitidae* family and it is the endemic of the Balkan Peninsula. It is present in the tributaries of the Danube and Aegean waters. Systematics of this species has experienced certain changes that are related to the systemic instability of the entire *Cobitidae* family, so there has been a change in the name of the genus of this species. The genus *Sabanejewia* was separated from the genus *Cobitis* in the last century, but this name was generally used much later. According to data of the IUCN Red List of Threatened Species, this species is still not endangered, but is assigned a status of least concern (LC). *Sabanejewia balcanica* is in the Annex II of the Habitats Directive and Annex III of the Bern Convention which basically require the protection of this species and its habitats. In the proposal to create a red list of fauna of the Federation of Bosnia and Herzegovina, has been concluded that there is not enough information on the population characteristics of this species. The aim of this article is to present data on exploration of *Sabanejewia balcanica* in the Balkan area as well as Bosnia and Herzegovina, thereby contributing to the determination of its status of vulnerability and protection of its natural habitats.

Key words: *Sabanejewia*, fish, Balkan, *balcanica*

INTRODUCTION - Uvod

Sabanejewia balcanica (Karaman, 1922) or Balkan golden loach is a fish species which belongs to family *Cobitidae* Swainson, 1838 and it inhabits the Balkan area. According to Mrakovčić et al. (2006) this species inhabits eastern and southeastern Europe, from Bosnia and Herzegovina, Croatia and Romania to Poland, Ukraine and Russia. It could be said that this species occurs in the Danube and Aegean waters (Kottelat & Freyhof, 2007). It inhabits medium to upper flows of rivers and streams,

lives individually and is active at night. During the day, it is buried in the rocks and gravel.

The systematics of the species suffered the certain changes related to systemic instability of the entire family *Cobitidae*, which is the reason why there was a change in the name of this species' genus. The genus *Sabanejewia* Vladykov, 1929 is separated from the genus *Cobitis*.

According to the data of the IUCN Red List of Endangered Species, this species is still not endangered, but is assi-

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gned a status of least concern (LC). *Sabanejewia balcanica* is in the Annex II of the Habitats Directive and Annex III of the Bern Convention which basically require the protection of this species and its habitats. In the proposal to create a red list of fauna for the Federation of Bosnia and Herzegovina, has been concluded that there is not enough information on the population characteristics of this species, while in other Balkan countries, its conservation status has been differently characterized.

MATERIAL AND METHODS – Materijal i metode

The available literature data and the original results of years of research of this species that could be used to complement the knowledge of this species were collected and presented in the paper for the purposes of this study, with special emphasis on the area of Bosnia and Herzegovina

RESULTS AND DISCUSSION – Rezultati i diskusija

Systematics of genus *Sabanejewia*

According to the available data, several species and subspecies belong to the genus *Sabanejewia* which have been described by different authors on the basis of morphometric characteristics (Nalbant, 1957; Karaman, 1963; Vasil'eva & Vasil'ev, 1988; Witkowski, 1994; Economidis & Nalbant, 1996 etc.). Kottelat (1997) considers *Sabanejewia balcanica* (Karaman, 1922), *S. bulgarica* (Drensky, 1928), *S. larvata* (Filippi, 1859) and *S. romanica* (Băcescu, 1943) valid species of this genus in Europe, including the former USSR countries. The use of karyology and genetic methods has contributed to progress in the systematics of this genus (Vasil'eva & Ráb, 1992; Perdices et al., 2003). Based on this analysis, it can be concluded that within the genus *Sabanejewia* there are six evolution lines: *Sabanejewia larvata*, *S. romanica*, *S. aurata/S. caucasia*, *S. kubanica*, *S. baltica* and Danubian-Balkan complex which branch into six sub-lines.

- I - *S. vallahica/S. balcanica* from Romania
- II - *S. balcanica/S. doiranica* from western Greece
- III - *S. bulgarica/S. balcanica/S. montana* from the middle part of Danube basin
- IV - *S. radnensis/S. balcanica* from the Mureş basin
- V - *S. thrakical/S. balcanica* from Greece
- VI - *S. balcanica* from the Mur basin

The systematics of the genus *Sabanejewia* has experienced certain changes related to the systemic instability of the entire Cobitidae family. The genus *Sabanejewia*

was separated from the genus *Cobitis* by Vladykov (1929), but this genus generally started to be used after revalidation by Nalbant (1963). History of the taxonomy of Balkan golden loach dates from 1839 when Eichwald (1839) first described this group of fish as *Cobitis caspia*. Filippi (1859) described the species *Acanthopis larvata* in northern Italy, and in 1865 *Acanthopis aurata* in northern Iran, which were later classified in Linnae's genus *Cobitis* as *Cobitis larvata* and *Cobitis aurata*. Another loach from Black Sea basin named *Cobitis aralensis* was described by Kessler (1877). Then, Berg (1906) described *Cobitis caucasica* from the western Caucasus. Karaman (1922) described European species *Cobitis aurata* as *Cobitis balcanica* (from the Vardar River basin in Macedonia). Vladykov (1925) described *Cobitis montana* (from the river Tisa), and Drensky (1928) described *C. bulgarica* (from the lower Danube). Vladykov (1929) included the species *Cobitis caspia*, *Cobitis caucasica* and *Cobitis larvata* into the new genus *Sabanejewia* which was not accepted as subgenus until 1970. This author considered the species *Cobitis aurata* and *Cobitis balcanica* as separate species, and species *Cobitis montana* only as a synonym of *Cobitis balcanica*. Vladykov (1931) concluded that species *Cobitis bulgarica* is also synonym of species *Cobitis balcanica*. Berg (1949) considered that species *Cobitis aralensis* is a subspecies of *Cobitis aurata*, and that *Cobitis balcanica* is their synonym. Băcescu (1943) firstly thought that *Cobitis balcanica* is a subspecies of species *Cobitis aurata*, at the same time describing *Cobitis caspia romanica* as a new subspecies, and concluded that *Cobitis bulgarica* is a separate species. Bănărescu (1948) first conducted extensive research of *Cobitis (Sabanejewia) aurata balcanica* and *Cobitis (Sabanejewia) bulgarica*, and based on that concluded that *Cobitis bulgarica* is also a subspecies of species *Cobitis aurata*. Oliva, Balon & Frank (1952) discussed the validity of the statement that *Cobitis bulgarica* is a subspecies of *Cobitis (Sabanejewia) aurata* putting them into subspecies variation *Cobitis (Sabanejewia) aurata balcanica*. Nalbant (1957) described *Cobitis aurata vallahica* in the streams of southeastern Romania. Bănărescu & Müller (1960) promote subspecies *Cobitis caspia romanica* to full species status *Cobitis (Sabanejewia) romanica*. Bănărescu (1953, 1954, 1964) integrated names *Cobitis balcanica* and *Cobitis bulgarica*, but the name *Cobitis bulgarica* was reserved as an adequate name for the subspecies. Furthermore, Bănărescu, Müller & Nalbant (1960) discussed separate the species *Cobitis radnensis* as a separated subspecies *Cobitis (Sabanejewia) aurata*. Nalbant (1963) considered *Sabanejewia* as a valid name, which was accepted by the majority of authors. Bănărescu (1964, 1966) does an extensive revision of the genus, according to which all the Romanian population belongs to one type of *Cobitis (Sabanejewia) aurata*

with four subspecies. Karaman (1963) describes the new subspecies *C. (S.) aurata bosniaca* from the river Vrbas. A comprehensive review for some of the Romanian population (Bănărescu, Nalbant & Chelmu, 1972) led to the same conclusions set forth in the preceding studies that all the analysed populations or subspecies belong to the species *Sabanejewia aurata*.

Vasil'eva & Vasil'ev (1988) described the new species named *Sabanejewia aurata cubanica* of the pool Kuban river in Russia. Furthermore, these authors concluded that *Sabanejewia bulgarica* is a separate species, and that *Sabanejewia balcanica*, *S. vallahica* and *S. radnensis* are subspecies within the species *Sabanejewia aurata*. Vasil'eva & Ráb (1992) concluded that the karyotype of the subspecies *Sabanejewia aurata balcanica* from the Danube basin is different from *Sabanejewia aurata aurata* and *Sabanejewia aurata cubanica* in Russia, which led to Kottelat (1997) formulating a hypothesis that subspecies *Sabanejewia aurata balcanica* and *Sabanejewia aurata aurata* are different species which was confirmed by the molecular analyses (Boron, 2000). Witkowski (1994) described the new subspecies named *Sabanejewia aurata baltica* from Poland, and Kottelat (1997) questioned its validity and classified it as a synonym of *Sabanejewia balcanica*. Economidis & Nalbant (1996) described the two new subspecies from Greece named *Sabanejewia aurata thrakica* and *Sabanejewia aurata doiranica*. Ludwig et al. (2001) presented the relationship of the Romanian subspecies based on the molecular analysis, where the heterogeneous nature of the subspecies *S. balcanica balcanica* was determined. Perdices et al. (2003) present the molecular analysis based on mtDNA of the most European species and the subspecies of *Sabanejewia*.

The review of the research of *Sabanejewia balcanica* in the Balkans

At the beginning of this century, there was intensive research of this species in the Balkans, which resulted in holding three international conferences on a species from the family Cobitidae (Brno 1999; Olsztyn 2002 and Šibenik 2006).

Sabanejewia balcanica was intensively investigated in Croatia. Delić et al. (2003a) presented the morphometric and meristic characteristics of Balkan golden loach from waters of central Croatia. Delić et al. (2003b) investigated to the distribution of this species in Croatia. Zanella et al. (2008) deal with the age structure and growth of this species. Mičetić et al. (2008) investigated their ecological characteristics. The largest contribution to the understanding of the phylogenetic characterization of this species was given by Buj et al. (2008).

Šumer & Povž (2000) analyzed the morphometric and meristic characteristics of the genus *Sabanejewia* from the waters of Slovenia. The same authors deal with the status of this species and their distribution in the waters of Slovenia (Povž & Šumer, 2000).

It is known that *Sabanejewia balcanica* is one of three species from the family Cobitidae which is present in the waters of Slovakia (Koščo et al., 2008). Pekárik et al. (2008) investigated the communities and affinity for the habitats of the species from the family Cobitidae in the area from Slovakia.

The complex considerations of the taxonomic status of Balkan golden loach in Romania and Moldova was conducted by Iftime (2002). Bănărescu (1948, 1953, 1954, 1964, 1966) made a large contribution to the understanding of this species and its a systematic position.

Marešová et al. (2011) investigated the genetic diversity of the species *Sabanejewia balcanica* in the western Balkans. The taxonomy and genetic diversity of this species was also analyzed in the waters of the Czech Republic (Bartoňová et al., 2008). Perdices et al., (2003) conducted the reconstruction of the historical biogeography of genus *Sabanejewia*, based on mRNA analysis. Bohlen (2000) conducted the analysis of the molecular relationship between a subspecies in Romania.

Economidis & Nalbant (1996) conducted the study on the species from the genus *Cobitis* and *Sabanejewia* in Greece where six new species (subspecies) were described, including *Sabanejewia aurata thrakica* and *Sabanejewia aurata doiranica*.

It is known that in the waters of Montenegro within the family Cobitidae there are five species from two genus, but their exact distribution, ecology and biology are not known. Marić & Milošević (2010) were first to scientifically describe species *Sabanejewia balcanica* in this part of the Balkans. The presence of this species was confirmed in the waters of Lithuania by Audrius (2003) and in the waters of Austria by Ratschan et al. (2011).

The data on the morphology, ecology and biology of *Sabanejewia balcanica* in Bosnia and Herzegovina are quite scarce and discontinuous. Bajrić (2017) deals with the specific research of this species. For the first time the hematological characteristics of this species (Bajrić et al., 2018b) and its ecological and systematic characteristics were pointed out (Bajrić et al., 2018a). Particularly interesting population of this species is one from the river Suturlija which is described as subspecies by Karaman (1963). The subsequent studies showed that this population does not differ from the others based on the meristic characteristics (Bajrić et al. 2018a).

Distribution of *Sabanejewia balcanica* in Bosnia and Herzegovina

The presence of this species in the waters of Bosnia and Herzegovina has been noticed in several rivers and brooks of the Black Sea basin: Gostelja, Oskova, Turija, Brka, Suturlija, Suha, Tinja and the river Trebačka (Bajrić et al., 2018 b). Also, the presence of this species in the river Gostelja was noted by Adrović (2002), in the river Suturlija by Golub et al. (2016), in the river Tinja by Dejić (2006), and in the river Vrbas by Radević (2001).

In addition to the above research studies dealing with the specific issues of this species, *Sabanejewia balcanica* is mentioned in some fish basics (Muhamedagić et al., 2012), where this species is registered within the ichthyopopulations in the following rivers and localities: the river Krivaja (localities Maoča, Krivaja, Skroze), the river Bosna (localities Modrinje, the town Kakanj, Vranduk, Donja Golubinja, Ulišnjak, the town Maglaj), the river Liješnica (localities Brankovići, Liješnica), the river Rujnica (localities Dolac), the river Usora (localities Matuzići, Rastoke).

The vulnerability of *Sabanejewia balcanica* in the Balkans

According to the data of the IUCN Red List of Threatened Species, this species is still not endangered, but is

assigned a status of least concern (LC). However, it has been variously described in the different countries of the Balkans.

It is cited in the red book of freshwater fish of Croatia (Mrakovčić et al. 2006) that this species is sensitive and is internationally protected by the Berne Convention and the European directive on the protection of its habitats.

Witkowski, Kotusz & Przybylski (2009) indicated the degree of vulnerability of fish in Poland, according to which *Sabanejewia balcanica* has been listed as endangered since 1999, and since 2009 it has been treated as sensitive and protected.

Mrakovčić et al. (2006) think that this species in Croatia is considered vulnerable (VU), although its global conservation status is at the level of least concern species (LC).

The fishes from family Cobitidae in Slovenia were inadequately explored, thus were classified as data deficient (DD) in the red list for a long time period. There was not enough data on their biology to talk about the extent of their vulnerability (Povž, 1996; Povž & Šumer, 2000). However, in the recent publications *Sabanejewia balcanica* belongs to a category of endangered fish in Slovenia (Povž, Gregori & Gregori, 2015).

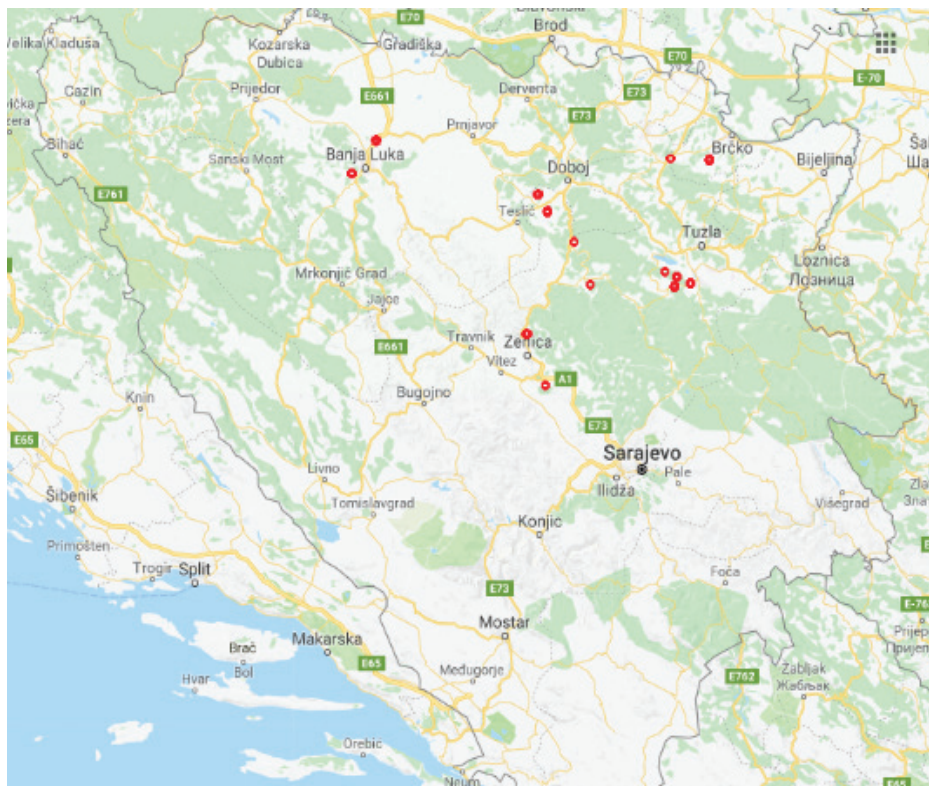


Figure 1. Distribution of *Sabanejewia balcanica* in Bosnia and Herzegovina marked with red circle (Google maps)

Slika 1. Distribucija *Sabanejewia balcanica* u Bosni i Hercegovini obilježena crvenim krugovima (Google maps)

Table I. Vulnerability of *Sabanejewia balcanica* in the Balkans
Tabela I. Ranjivost *Sabanejewia balcanica* na Balkanu

Country	Category of vulnerability	Reference
Croatia	Vulnerable (VU)	Mrakovčić et al. (2006)
Poland	Endangered (EN) Vulnerable (VU)	Witkowski et al. (2009)
Slovenia	Data deficient (DD) Endangered (EN)	Povž & Šumer (2000); Povž, Gregori & Gregori (2015)
Slovakia	Endangered (EN)	Hensel & Mužik (2001)
The Czech Republic	Endangered (EN)	Lusk, Hanel & Lusková (2004)
Bosnia and Herzegovina	Data deficient (DD)	Škrijelj et al. (2013)

Sabanejewia balcanica in Slovakia is protected by national laws (Koščo et al., 2008) and it has the status of the threatened species in the Red List of the country (Hensel & Mužik, 2001). This species has the same status in the waters of the Czech Republic (Lusk, Hanel & Lusková, 2004).

In the proposal for making the Red List of fauna for the Federation of Bosnia and Herzegovina, it was concluded that there is not enough data on the population characteristics of this species (Škrijelj et al. 2013).

CONCLUSION - Zaključak

We believe that river partitions, dam construction, water pollution, eutrophication, and impact on the strength and graveliness of river bottoms have a great impact on the population *Sabanejewia balcanica*. Certainly, the anthropogenic influence is decisive in this situation, so that a person directly and indirectly contaminates the upper parts of rivers, streams and reconstructs river flows and in that way affects the water speed, its physical and chemical characteristics, which can certainly threaten the existence of the populations of this species. Given that this species is included in Annex II of the Habitats Directive and Annex III of the Bern Convention which basically require the protection of this species and its habitats, it would require protecting the areas where it has been confirmed as much as possible. The first step would be marking the site, and introducing the local people to this species because many people, due to *Sabanejewia balcanica* lifestyle, do not know that these fish live in their environment. Finally, it is necessary to act in accordance with legal regulations that would be carried out directly by fishing associations, cantonal and state institutions.

REFERENCES - Literatura

- Adrović, A. (2002). Populacije riba rijeke Gostelje. *Magistarski rad*. Prirodno-matematički fakultet. Univerzitet u Sarajevu.
- Audrius, S. (2003). Golden loach (*Sabanejewia aurata* (de Filippi, 1865))-a new freshwater fish species in Lithuania. *Acta Zoologica Lituonica*. Sep2003, Vol. 13 Issue 3, p279
- Băcescu, M. (1943). Deux Poissons nouveaux pour la faune de la Roumanie. *Cobitis aurata balcanica* Karaman et *Cobitis caspia romanica* n. ssp. *Bulletin de la Section Scientifique de l'Academie Roumaine*, 26 (2), 133-141
- Bajrić, A. (2017). Ekološko morfološke i fiziološke odlike balkanskog zlatnog vijuna (*Sabanejewia balcanica* Karaman, 1922) iz sliva rijeke Save. *Doktorska disertacija*. Univerzitet "Džemal Bijedić" u Mostaru.
- Bajrić, A., Adrović, A., Hajdarević, E., Skenderović, I., Tanović, E. (2018a). Body pigmentation and meristic characteristics of Balkan golden loach (*Sabanejewia balcanica*) from the water catchment area of the river Sava. *Croatian Journal of Fisheries*, 76, 72-79.
- Bajrić, A., Adrović, A., Hajdarević, E., Skenderović, I., Tanović, E., Marković, G. (2018b). Karakteristike krvnih ćelija *Sabanejewia balcanica* (Cobitidae) iz nekih tekućica slivnog područja rijeke Save. *XXIII savjetovanje o biotehnologiji sa međunarodnim učesćem Univerzitet u Kragujevcu, Agronomski fakultet u Čačku*. *Zbornik radova*, 215-221.
- Bănărescu, P. (1948). Formes de transition entre *Cobitis balcanica* et *Cobitis bulgarica*. *Cahiers de Recherche du Cercle zoologique de Cluj*, 8-15.

- Bănărescu, P. (1953). Contribution a l'étude de la faune ichthyologique d'eau douce de la R. P. Roumaine. *Studii si Cercetări Stiintifice, Cluj*, 4 (3-4), 153- 184.
- Bănărescu, P. (1954). Note complementaire sur les poissons des alentours de la ville de Timișoara. *Studii și Cercetări Stiintifice*, 5 (1-2), 367-385.
- Bănărescu, P. (1964). *Pisces - Osteichthyes*. Fauna R. P. R., 13. 1-962. București.
- Bănărescu, P. (1966). Intraspecific Variation, Subspeciation and Speciation in Roumanian Fresh-Water Fishes. *Zeitschrift für Zoologie, Systematik und Evolutionforschung*, 4 (3-4), 378-396
- Bănărescu, P., & Müller, G. (1960). Peștii Ardealului și răspândirea lor. *St. cerc. biol. de (Cluj)*, 10 (2), 335-366.
- Bănărescu, P., Müller G., & Nalbant T. (1960). New Contributions to the study of the Freshwater Fish Fauna of the Roumanian People's Republic. *Comunicăți Zoologice, Societatea de Științe ale Naturii. - Geografie*, 1, 111 – 126.
- Bănărescu, P., Nalbant, T., & Chelmu, S. (1972). Revision and geographical variation of *Sabanejewia aurata* in Romania and the origin of *S. bulgarica* and *S. romanica* (Pisces, Cobitidae). *Annotationes Zoologicae et Botanicae, Bratislava*, 75, 1-49.
- Bartoňová, E., Papoušek, I., Lusková, V., Koščo, J., Lusk, S., Halačka, K., Švátora, M., Vetešník, L. (2008). Genetic diversity of *Sabanejewia balcanica* (Osteichthyes, Cobitidae) in the waters of the Czech Republic and Slovakia. *Folia Zool*, 57, 60–70.
- Berg, A. S. (1906). Beschreibung einiger kaukasischer Fische. *Izvestia Imperatorskikh Akademii Nauk, St. Petersburg*, 5, 35-39.
- Berg, L. S. (1949). Freshwater fishes of the USSR and adjacent countries. *Akad. Nauk. SSSR, Moscow, II*, 469–925.
- Bohlen, J. (2000). Similarities and differences in the reproductive biology of loaches (Cobitis and Sabanejewia) under laboratory conditions. *Folia zoologica*, 49 (Suppl, 1), 179- 186.
- Boron, A. (2000). Cytogenetic characterization of the loaches of the genera Sabanejewia, Misgurnus and Barbatula (Pisces, Cobitidae). *Folia zoologica*, 49 (Suppl, 1), 37-44.
- Buj, I., Podnar, M., Mrakovčić, M., Čaleta, M., Mustafić, P., Zanella, D., Marčić, Z. (2008). Morphological and genetic diversity of *Sabanejewia balcanica* in Croatia. *Folia Zool*, – 57 (1–2), 100–110.
- Delić, A., Bučar, M., Kučinić, M., Mrakovčić, M. (2003a). New Data about Distribution of *Sabanejewia balcanica* (Karaman, 1922) (Cobitidae) in Croatia. *Folia biologica (Krakow)*, vol 51. Supplement, 39-42.
- Delić, A., Kučinić, M., Bučar, M., Lazar, B., Mrakovčić, M. (2003b). Morphometric and Meristic Characteristics of the Goldside Loach *Sabanejewia balcanica* (Cobitidae) in Central Croatia. *Folia biologica (Krakow)*, vol 51. Supplement, 33-38.
- Deljić, S. (2006). Ihtiofauna gornjeg toka rijeke Tinje. *Diplomski rad*. Prirodno-matematički fakultet, Univerziteta u Tuzli, Tuzla.
- Drensky, P. (1928). Die Fische der Familie Cobitidae in Bulgarien. *Bulletin de l'Institut Royal de Histoire. Naturelle, Sophia*, 1, 156- 181.
- Economidis, P. S., & Nalbant, T. T. (1996). A study of the loaches of the genera Cobitis and Sabanejewia (Pisces, Cobitidae) of Greece with description of six new taxa. *Trav. Mus. Natl. Hist. nat "Grigore Antipa"* 36, 295-347.
- Filippi, F. (1859). Nouvelle espece de poissons d'eau douce du Piemont. *Revue et Magasin de Zoologie Pure et Appliquée*, 2, 50-51.
- Golub, D., Marić, Ž., Šukalo, G., Cvijić, S., Dekić, R. (2016). Morfološke karakteristike *Cobitis elongatoides* i *Sabanejewia balcanica* (Cobitidae) iz rijeke Suturlije. *Zbornik radova III Simpozijuma biologa i ekologa Republike Srpske (SBERS 2016)* Prirodno-matematički fakultet, Univerziteta u Banjoj Luci, Skup 7 (2), 139-148.
- Hensel, K., & Mužik, V. (2001). Červený (ekosozologický) zoznam mihúl' (Petromyzontes) a rýb (Osteichthyes) Slovenska [Red (ecosozological) list of lampreys (Petromyzontes) and fishes (Osteichthyes) of Slovakia]. In: Baláž D., Marhold K. & Urban P. (eds), Červený zoznam rastlín a živočíchov Slovenska. *Ochrana prírody 20, Suppl*, 143–145.
- Iftime, A. (2002). Considerations over the taxonomical status of the Balkan golden loach (*Sabanejewia balcanica*) (Pisces, Ostaryophysi, Cobitidae) in Romania and Republic of Moldova. *Trav. Mus. Hist. Nat. "Grigore Antipa"* 44, 335–355.
- Karaman, M. (1963). Eine neue Unterart des Steinpeitzigers, *Cobitis aurata bosniaca* n. ssp. (Cobitidae, Pisces) aus Jugoslawien. *Internationale Revue der Gesamten Hydrobiologie* 48 (4), 629.
- Karaman, S. (1922). Über eine neue Cobitis-Art aus Jugoslawien, *Cobitis balcanica* n. sp. *Glasnik Kroatishes. Naturwissenschaftliches Gesellschaft, Zagreb*, 34, 1-4.

- Kessler, K. (1877). *Ryby vodjašeiesja i vstreeajušeiesja v Aralo-kaspijsko-pontiéeskoj ichtiologičeskoj oblasti*. 1-360. St. Petersburg.
- Koščo, J., Lusk, S., Pekárik, L., Košuthová, L., Lusková, V., Košuth, P. (2008). The occurrence and status of species of the genera *Cobitis*, *Sabanejewia*, and *Misgurnus* in Slovakia. *Folia Zool.* – 57(1–2), 26–34.
- Kottelat, M. & Freyhof, J. (2007). *Handbook of European Freshwater Fishes*. Kottelat, Cornol, Switzerland. Freyhof, Berlin, Germany.
- Kottelat, M. (1997). European freshwater fishes. *Biologia Bratislava* 52, Suppl. 5. 1–271.
- Ludwig, A., Bohlen, J., Wolter, C., Pitra, C. (2001). Phylogenetic relationships and historical biogeography of spined loaches (Cobitidae, *Cobitis* and *Sabanejewia*) as indicated by variability of mitochondrial DNA. *Zoological Journal of the Linnean Society*. Volume 131, Issue 3, 381–392.
- 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.
- Marešová, E., Delić, A., Kostov, V., Marić, S., Mendel, J., Šanda, R. (2011). Genetic diversity of *Sabanejewia balcanica* (Actinopterygii, Cobitidae) in the western Balkans and comparison with other regions. *Folia Zool.*-60 (4), 335-342.
- Marić, D., & Milošević, D. (2010). First record and morphological characteristics of the Balkan golden loach *Sabanejewia balcanica* (Cobitidae) in Montenegro. *Periodicum Biologorum*, Vol. 112 No.2, 149-152.
- Mičetić, V., Bučar, M., Ivković, M., Piria, M., Krulik, I., Mihoci, I., Delić, A., Kučinić, M. (2008). Feeding ecology of *Sabanejewia balcanica* and *Cobitis elongata* in Croatia. *Folia Zool.* – 57(1–2), 181–190.
- Mrakovčić, M., Brigić, A., Buj, I., Čaleta, M., Mustafić, P., Zanella, D. (2006). *Crvena knjiga slatkovodnih riba Hrvatske*. Ministarstvo kulture, Državni zavod za zaštitu prirode. Republika Hrvatska.
- Muhamedagić, S., Hamzić, A., Trožić-Borovac, S., Đug, S., Drešković, N., Karahmet, E., Habibović, E. (2012). *Ribarska osnova za područje Zeničko-Dobojskog kantona*. Poljoprivredno-prehrambeni fakultet Univerziteta u Sarajevu. Sarajevo.
- Nalbant, T.T. (1957). *Cobitis aurata vallahica*, eine neue Unterart des Balkan – Steinpeitzigers (Pisces, Cobitidae). *Senckenbergica Biologica* 38 (3–4), 209–212.
- Nalbant, T.T. (1963). A study of the genera of Botiinae and Cobitinae (Pisces, Ostaryophysi, Cobitidae). *Trav. Mus. Hist. Nat. "Grigore Antipa"* 4, 343–379.
- Oliva, O., Balon, E., & Frank, S. (1952). K systematika našieh sykavku, *Cobitis* (L.). *Vestnik Eskoslovenske zoologičke spoleenosti*, 4 (3-4), 27 1-299
- Pekárik, L., Koščo, J., Košuthová, L., Košuth, P. (2008). Coenological and habitat affinities of *Cobitis elongatoides*, *Sabanejewia balcanica* and *Misgurnus fossilis* in Slovakia. *Folia Zool.* – 57 (1–2), 172–180.
- Perdices, A., Doadrio, I., Economidis, P.S., Bohlen, J., Banarescu, P. (2003). Pleistocene effect on the European freshwater fish fauna. Double origin of the cobitid genus *Sabanejewia* in the Danube basin (Osteichthyes, Cobitidae). *Mol. Phylogenet. Evol.* 26, 289–299.
- Povž, M. (1996). Red data list of freshwater lampreys (Cyclostomata) and fish (Pisces) in Slovenia. In: Kirchhofer A., & Hefti D. (eds). *Conservation of endangered freshwater fish in Europe*. Birkhäuser Verlag. Basel, 63-72.
- Povž, M., & Šumer, S. (2000). Present status and distribution of the species of the genera *Misgurnus*, *Cobitis* i *Sabanejewia* in Slovenia. *Folia Zool.*-49 (Suppl. 1), 107-112
- Povž, M., Gregori, A., & Gregori, M. (2015). *Sladkovodne Ribe in Piškuriji v Sloveniji*. Zavod Umbra, Ljubljana.
- Radević, M. (2001). Diverzitet ihtiofaune srednjeg i donjeg toka rijeke Vrbas. "Savremena poljoprivreda" Vol. 50, 3-4, 365-369. Novi Sad.
- Ratschan, C., Gumpinger, C., Schauer, M., Wanzenböck, J., Zauner, G. (2011). Artenschutzprojekt Kleinfische und Neunaugen in Oberösterreich Teil 2. Balkan-Goldsteinbeißer (*Sabanejewia balcanica* Karaman, 1922). *Österreichs Fischerei Jahrgang 64/2011*, 174–188.
- Škrijelj, R., Lelo, S., Drešković, N., Sofradžija, A., Trožić-Borovac, S., Korjenić, E., Lukić-Bilela, L., Mitrašinović-Brulić, M., Kotrošan, D., Šljuka, S., Gajević, M., Karačić, J. (2013). *Crvena lista faune Federacije Bosne i Hercegovine*. Knjiga 3. Federalno ministarstvo okoliša i turizma.
- 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.
- Vasil'eva, E., & Ráb, P. (1992). The spined loach, *Sabanejewia aurata* (Cobitidae) from the River Laborets. *Voprosy Ikhtologii*, 32, 176- 181.

Vasil'eva, E.D., & Vasil'ev, V.P. (1988). Studies in infraspecific structure of *Sabanejewia aurata* (Cobitidae) with the description of a new subspecies, *S. aurata kubanica* subsp. nov. *Vopr. Ikhtiol.* 28, 192–212.

Vladykov, V. (1925). Über eine neue Cobitis aus der Tschechoslovakei. *Cobitis Montana* n. sp. *Zoologisches Jahrbuch, Systematik*, 50, 320–337.

Vladykov, V. (1929). Sur un nouveau genre de Cobitides, *Sabanejewia*. *Bulletin du Museum National d'Histoire Naturelle* 1 (2), 85–90.

Vladykov, V. (1931). Les poissons de la Russie Sous-Carpathique. *Memoires de la Societé Zoologique de France*, 29, 217–373.

Witkowski, A. (1994). Morphological characteristics of *Sabanejewia aurata* (De Filippi, 1865) from the Odra River basin, with description of a new subspecies (Teleostei. Cypriniformes. Cobitidae). *Zool. Abhandl. Staatl. Mus. Tierkd. Dresden* 48, 23–51.

Witkowski, A., Kotusz, J., & Przybylski, M. (2009). Stopień zagrożenia słodkowodnej ichtiofauny Polski. Czerwona lista minogów i ryb – stan 2009 The degree of threat to the freshwater ichthyofauna of Poland. *Red list of fishes and lampreys – situation in 2009* *Chrońmy Przyr. Ojcz.* 65 (1), 33–52.

Zanella, D., Mrakovčić, M., Mustafić, P., Čaleta, M., Buj, I., Marčić, Z., Zrnčić, Z., Razlog-Grlica, J. (2008). Age and growth of *Sabanejewia balcanica* in the Rijeka River, central Croatia. *Folia Zool.* – 57(1–2), 162–167 ●

SAŽETAK

Sabanejewia balcanica je vrsta ribe koja pripada porodici *Cobitidae* i endem je Balkanskog poluostrva. Prisutan je u pritokama Dunava i egejskih voda. Sistematika ove vrste doživjela je određene promjene koje su povezane sa sistemskom nestabilnošću cijele porodice *Cobitidae*, pa je došlo i do promjene imena roda ove vrste. Rod *Sabanejewia* odvojen je od roda *Cobitis* u prošlom stoljeću, ali ovaj se naziv uglavnom koristio mnogo kasnije. Prema podacima IUCN-ove crvene liste ugroženih vrsta, ova vrsta još uvijek nije ugrožena, ali joj je dodijeljen status najmanje zabrinutosti (LC). *Sabanejewia balcanica* nalazi se u Aneksu II Direktive o staništima i Aneksu III Bernske konvencije koji u osnovi zahtijevaju zaštitu ove vrste i njenih staništa. U prijedlogu za izradu crvene liste faune Federacije Bosne i Hercegovine, zaključeno je da nema dovoljno podataka o karakteristikama populacije ove vrste. Cilj ovog članka je predstaviti podatke o istraživanju *Sabanejewia balcanica* na području Balkana, kao i Bosne i Hercegovine, doprinoseći time utvrđivanju njenog statusa ugroženosti i zaštiti prirodnih staništa.