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**ENDEMIC AMPHIPOD *NIPHARGUS ILIDZENSIS* SHÄFFERNA 1922,
(CRUSTACEA: AMPHIPODA) WITHIN THE PROTECTED AREA OF
CANTON SARAJEVO**

**Endemični rakušac *Niphargus ilidzensis* Shäfferna 1922, (Crustacea:
Amphipoda) u okviru zaštićenog područja Kantona Sarajevo**

Trožić-Borovac Sadbera¹, Bašić Lara¹, Dubravka Hafner², Aldijana Mušović¹

Abstract

The paper is the result of a research into the composition of benthos of the hydro-system within the protected area of Vrelo Bosne (water source of River Bosna) and the wider region during 2009 - 2010 period. The aim of the paper is to establish the state of the populations of the endemic species of amphipod *Niphargus illidzensis* S., get an overview of the underlying ecological conditions within the habitats, conduct a morpho-metrical analysis of the specimens and designate the new habitats of this species. By analysing the basic physical/chemical and biological (phytobenthos and macrozoobenthos) parameters a high-quality level of water inside the habitats of this endemic species of amphipods was established: the water source of River Bosna (four), stream Stojčevac and the water source in the area of Blažuj. The highest number of specimen was recorded in stream Stojčevac where the longest specimen was also noted – 22 mm. The source in the area of Blažuj (potable water bottling plant Dijamant) is the new habitat for this species which was previously only noted in the area of Avala and Topčider near Belgrade. The paper presents a comprehensive overview of the ecology and the current state of this endemic species after its repeated description dating from 1974.

Key words: biodiversity, protect area, new habitat, species, water quality

INTRODUCTION - Uvod

The Amphipod order (LATREILLE, 1816) includes about 9100 species of amphipods (macroscopic) which mostly live in the sea, a great number of species (around 1000) live in fresh water and several of the species are semi terrestrial (KARAMAN, 1993, VADER, 2005). They are widely spread in geographical terms. Their habitats include: underground and surface waters and brackish waters near the sea

¹ Faculty of Natural Sciences and Mathematics

² Faculty of Natural Sciences, Mathematics and Education University of Mostar

line. Only species from a single family populates the land (KARAMAN, 1974, ŽGANEC, 2009).

The biggest number of species and species of the Amphipods are described within the Gammaroidea superfamily with family *Niphargidea* being the most numerous and its most significant *Niphargus* genus whose species can be found in the fresh waters of caves and water-wells in the Balkans with many of the species being endemic for this region. The dominant habitats of the total 9100 species of Amphipods described (VADER, 2005, a, b), which are classified into 100 families, are marine habitats, and many can be found in fresh and brackish waters. Only a single family populates the land. The *Niphargus* genus is the largest genus of the shrimp family Niphargidae (Crustacea, Amphipoda, Gammaridea) and fresh water Amphipods in general. It contains more than 319 described species and species of which only 5% populate the surface waters (ŽGANEC, 2009). Most of the species are endemic. According to the data obtained from the north of the Iberian Peninsula to Iran, the *Niphargus* genus representatives are spread throughout Europe. (FIŠER et al. 2006). They mostly inhabit all types of ground waters, different types of cave waters including ground streams and lakes, wells and sources as well as mineral and thermal waters making species of this genus an important segment of the European underground biological diversity.

The species of genus *Niphargus* are almost always blind and mostly white in colour which explains the origin of their name (Greek. *nipharges* – as white as snow). They demonstrate an exceptional diversity in morphological terms that results for the variability of the body parts. There are huge variations in their body lengths starting from the smallest species measuring only 2 mm and reaching species with bodies up to 3.5 cm long.

They live on floral and animal detritus and are considered as saprophytes and play a significant role in the breakdown of the allochthonous material. It was established that some species are also predators for some invertebrates including juvenile specimen of niphargides. A total of 22 genera of the *Niphargus* (Addendum 1) has been established so far on the territory of Bosnia and Herzegovina (KARAMAN, 1974, TROŽIĆ-BOROVAC et al. 2010)

Research Area

The wider area of the city of Sarajevo is generally a mountainous area with 78% of the territory being a mountainous region above 700 meters of altitude, 13% of the territory is hilly-mountainous region with an altitude of 550-700 meters and only 9% of the area is lowland-hilly region up to 300 meters of altitude.

The hydrological backbone of the whole area (more than 80%) is the valley of River Bosna and the valleys of its major tributaries: Zujevina, Željeznica, Miljacka, Vogošća, Ljubina, Misoča and Stavnja. A high level of biological diversity, pronounced endemic and relict features indicate to the fact that the mountainous areas

are real endemic centres where the process of endemogenesis are taking place even nowadays.

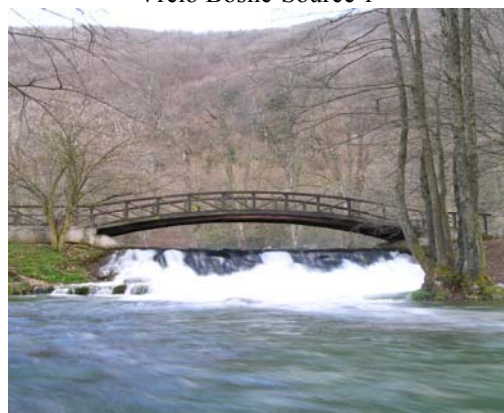
The research locations (four sources) are located in the area of Ilidža at 492 meters of altitude (figure 1). The depth of the water ranged between 15 to 30 cm, the sediments were rocky with dominantly larger stones mixed with phytalife and grit. The water is clear and odourless. (GPS: 43°49'05"N, 18°16'09" E). The water floor is overgrown dominantly by moss *Fontinalis antipyretica*. The geological composition of the terrain with a karst hydro-geological system includes the carbonate sediments of Triassic and flych of the Upper Cretaceous. A major part of Mount Igman is found in the hinterland of Vrelo Bosne and thus represents the main reservoir of ground waters that flow out into the source. At Vrelo Bosne itself there is the vegetation of the black alder *Alnetum glutinosae*, which develops on the alluvial-carbonate land (fluvisol) of the hydrogen mould and forms the water protection zones along the relevant watercourse.



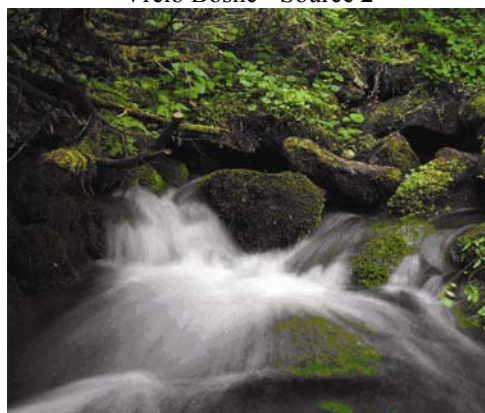
Vrelo Bosne-Source 1



Vrelo Bosne - Source 2



Vrelo Bosne - Source 3



Vrelo Bosne - Source 4

Figure 1. Research areas on Vrelo Bosne
Slika 1. Ljalaliteti istraživanja na Vrelo Bosne

The source of Stojčevac stream is located on the right side of Vrelo Bosne at an altitude of 500 m above sea level. (Figure 2). The stream is about 100 m long, the width of the stream is about 1.5 m at its source and its depth is measured at about 40 cm. The nature of the stream's floor depends on the water flow rate. At the source, the floor is rocky, sandy while at the stream's mouth the floor is sludgy. The colour of the water at the stream's source is affected by the colour of the floor and is mostly clear (transparency characteristic for clear waters). The stream originates from ground waters that flow down from the plateaus of Mounts Igman and Bjelašnica. The ground waters originate from the slope waters that are filtrated through the limestone network of cracks and canals and form streams and rivers. The following floral species can be found on the area of Stojčevac: *Alnus glutinosa*, *Salix caprea*, *Salix alba*, *Tilia sp.*, *Hedera helix*, *Rosa canina*, *Sambucus nigra*, *Fraxinus excelsior*, *Rubus sp* and others. (GPS: 44°57'04" N, 17°42'15"E). The source in the area of Blažuj is located under the source of potable water for the bottling plant Dijamant, GPS: 43°50'28"N, 18°15'29"E. The shore is controlled by stones. The water depth ranged from 10 to 15 cm. The sediment is densely overgrown by moss *Fontinalis antipyretica*. (Figure.2).



Figure 2. Stojčevac stream and the source in Blažuj
Slika 2. Potok Stojčevac i izvor u Blažuju

The aim of this paper is to emphasise for the first time the ecological conditions in which the endemic amphipod species *Niphargus ilidzensis* lives including its morphometric characteristics. The new habitat of this endemic species has been specifically pointed out which, together with its stated habitat (the Natural Monument) represents a unique area of Canton Sarajevo.

MATERIALS AND WORK METHODS - *Materijal i metode rada*

In order to establish the presence of the amphipod *Niphargus ilidzensis* the sampling of the zoobenthos was conducted on three location in the 2009-2010 period:

1. Vrelo Bosne (water source of River Bosna – four sources)

2. Stream Stojčevac (Stojčevac area)

3. Source in the area of Blažuj.

In order to examine the general ecological conditions of habitat for the species in matter, the measurements of some physical and chemical water parameters were conducted: water temperature, oxygen amounts and water pH. Multi set 340-i was applied for the measurement. Several hydro-morphological parameters were also analysed at the three locations: the sediment, the width of the water bed, the depth of the water and the review of the costal vegetation. The “kick sampling” relevant methodology was used for the sampling of macrozoobenthos. A net with a wooden handle (2m long) with a metal 25 x 25 cm. frame was tied to its end including a net with openings of 0.5 mm in diameter. The collected samples were transferred into wide-neck opodeldocks which was followed by the placing of labels onto each of the samples that included the data on the sampling location and date. The samples were then taken to the Laboratories for Hydro-Biology of the Department of Biology at the Faculty of Natural Sciences and Mathematics in Sarajevo where further processing of the collected material was performed.

In the lab, the collected material was transferred into riddles with 0.5 mm openings and rinsed with water. Using a binocular magnifier, the invertebrates were separated from the samples. After the separation, the material was fixed with a 70% ethyl alcohol.

The determination was conducted with the use of the determination keys for certain groups of macro-invertebrates: WARINGER AND GRAF (1997), ELIOT & MANN (1979.), AUBERT (1959.), CONSIGLIO (1980), WALLACE & PHILIPSON (1990), SANSONI (1992.), HYNES (1977), NILSSON, (1950), NILSSON. (1979), STUDEMANN et all. (1992), BARNFEIND (2001), GLEDHILL et all (2001)

After the determination (identification) of the researched species *N. Ilidzensi* the length of their bodies was then examined – the measurements from the top of the telzone to the top of the rostrum were presented in mm. The measurements were conducted in the way that the body of the shrimp was adhered to the measuring device and the measurements were read.

The sampling of the phytobenthos was performed by removing the algae from the sediment (with a scalpel and a brush) up to 5 m of the watercourse or at the very source. The samples were fixed on the site with a 4% formaldehyde and further analysis was conducted in the Lab of the Faculty of Natural Sciences and Mathematics in Sarajevo. Larger samples of the simple plants were extracted and making permanent preparations was conducted with the use of standard methodology. The specimens were mainly identified up to the level of species.

The quality of water (the Saprobic index) was calculated using the following formula according to the composition of the phytobenthos and macro-invertebrates:

$$S = \frac{\sum_{i=1}^n (S_i \cdot h_i)}{\sum_{i=1}^n h_i}$$

where the S_i is the saprobic value of the species in the sample; h_i – the relative abundance (frequency) of the species and S – the Saprobic index. The relative abundance is calculated according to PANTEL-BUCK (1955).

In assessing the water quality, the quality of the saprobic index and class ratings are determined according to LIEBMANN (1962) and are presented in Table 1:

Table 1. Values of the saprobic index and relevant water quality categories

Tabela 1. Vrijednosti saprobnog indeksa i kategorije kvaliteta vode

Saprobic level	Saprobic index (SI)	Class ratings	Level of organic pollution to the watercourse
Oligosaprobic	1,00 - 1,50	I	Unpolluted to slightly polluted water
Oligo to β - mezzosaprobic	1,51 - 1,80	I-II	Slightly polluted
β - mezzosaprobic	1,81 - 2,30	II	Moderately
β to α - mezzosaprobic	2,31 - 2,70	II-III	Medium
α - mezzosaprobic	2,71 - 3,20	III	Medium to heavy
α to polysaprobic	3,21 - 3,50	III-IV	Polluted
Polysaprobic	3,51 – 4,00	IV	Very polluted

The results of the phytobenthos and macro-invertebrates are presented in the tables by locations. The saprobic values of the taxons are presented according to WEGEL (1983).

The length of amphipod specimens *Niphargus ilidzensis* (figure 1) from various locations was measured and this was presented both in the table and in a diagram. The mean value is calculated using the following formula:

$$\bar{X} = \frac{\sum X}{N}$$

\bar{X} - mean value; $\sum x$ -sum of all measurements; N -total number of measurements

The following paper was used to identify the species: KARAMAN, G., 1973 (1974): Contribution to the knowledge of the Amphipoda. Two subterranean *Niphargus* species from Yugoslavia, *N. stankoi*, n. sp. and *N. ilidzensis* Schaferna (fam. Gammaridae). Glas. Republ. Zavoda Zast. Prirode- Prirodnjačkog muzeja Titograd, 6, 35-57.

The images of the specimens of the amphipod, gnatopod and telzone were presented using a microscope OLYMPUS BX 41 DP12 (Figures 3 and 4).

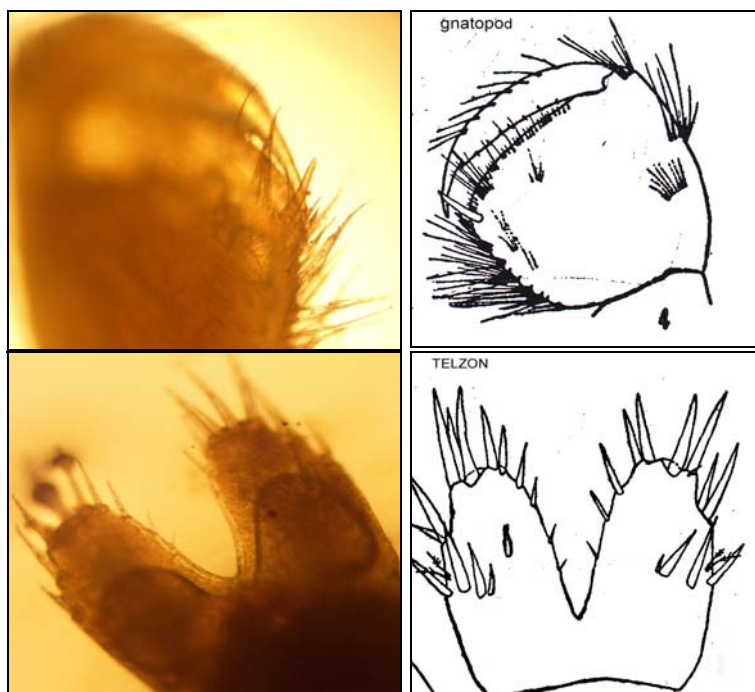


Figure 3. Picture of a gnatopod and a telzone (original snapshot of the scheme)
Slika 3. Izgled gnatopoda i telzona (original i šema)



Figure 4. *Niphargus ilidzensis* species from the stream in Stojčevac (a) and source in Blažuj (b)
Slika 4. Vrsta *Niphargus ilidzensis* iz potoka Stojčevac (a) i izvora u Blažuju (b)

WORK RESULTS – Rezultati rada

The basic ecological conditions were reviewed at the three locations where the presence of the analysed genus *Niphargus* was established: the physical and chemical parameters of the water, the sediment, the width of the water bed, the depth, overview of the costal vegetation and the composition of the benthos. The obtained results were presented by locations which was followed by the presentation of the general information on the analysed species of amphipods.

On the grounds of the water temperature values, it is clear that these are cold stream ecosystems (Table 2). The water temperature at the research location during sampling ranged between 8.2°C to 10°C. The measured pH water value at the researched locations ranged between 7.4 and 7.9. During the research period, high values of dissolved oxygen were noted at all three locations (from 10.02 - 11.5).

Table 2. Physical/Chemical parameter values of water at the research locations in the period of 2009-2010.

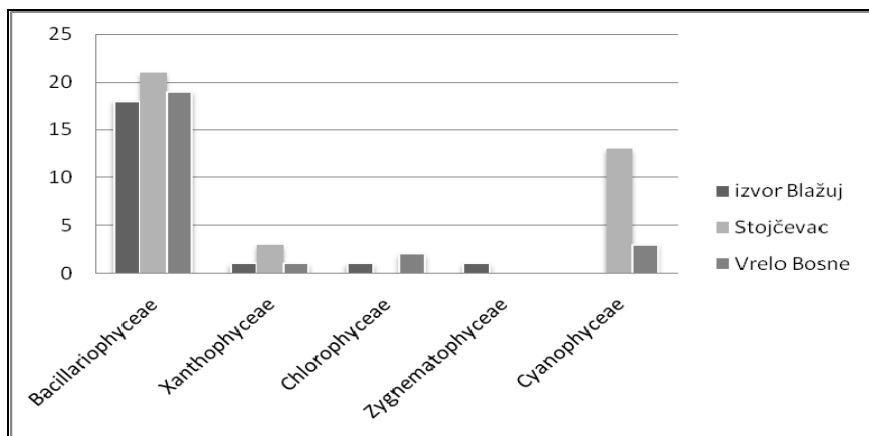
Tabela 2. Vrijednosti fizičko/hemijskih parametra vode na istraživanim lokalitetima u period 2009-2010. god.

Location	Temperature(°C)	pH	O ₂ mg /l
Source Blažuj	10	7,4	10,02
Source Stojčevac	9	7,8	11,5
Source Vrelo Bosne	8,2	7,9	10,50

The diversity of microphytes at the locations of water sources of Blažuj, Stojčevac and Vrelo Bosne in the period from 2009-2010 was generally very high for the sources (graph 1). The diversity of microphytes in source Blažuj was high and included a total of 21 taxa: 18 Bacillariophytes, one Xanthophyceae, one Chlorophyceae and one Zygnematophyceae.

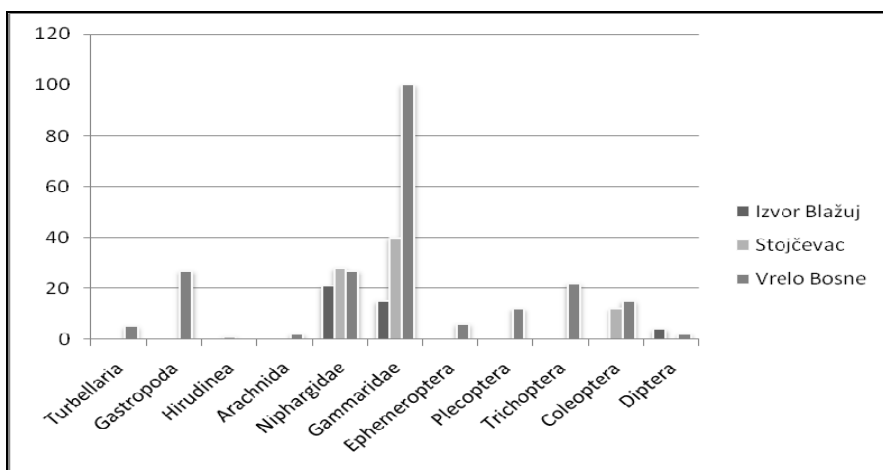
The phytobenthos sample at the source Stojčevac included a total of 37 species: 21 Bacillariophytes, three Xanthophyceae, 13 Cyanophyceae. A total of 25 taxa were established at the Vrelo Bosne sources of which 19 included Bacillariophytes, one Xanthophyceae, two Chlorophyceae and three Cyanophyceae. The dominant species present at the sources were the diatoms Bacillariophytae.

In the composition of the macrozoobenthos found at the researched locations, a total of 26 taxa were established with the dominance of water insects in their preimaginal stage (graph 2). The highest diversity was found in the samples at Vrelo Bosne (19 taxa) and the lowest diversity was in water source Blažuj (three taxa). A total of 4 taxa were noted in the location of Stojčevac. All three locations of research are dominated by oligosaprobic indicators.



Graph 1. Qualitative and quantitative composition of the phytobenthos at the researched locations, 2009-2010

Grafikon 1. Kvalitativno-kvantitativni sastav fitobentosa na istraživanim lokalitetima, 2009-2010. god.



Graph 2. Qualitative and quantitative composition of the macrozoobenthos at the researched locations, 2009-2010

Grafikon 2. Kvalitativno-kvantitativni sastav makrozoobentosa na istraživanim lokalitetima, 2009-2010. god.

Water quality

The calculated values of the saprobic index for the qualitative and quantitative composition of the phytobenthos and the macrozoobenthos at the researched locations indicate that the water belongs to the oligosaprobic (clean) category or quality class I (Table 3).

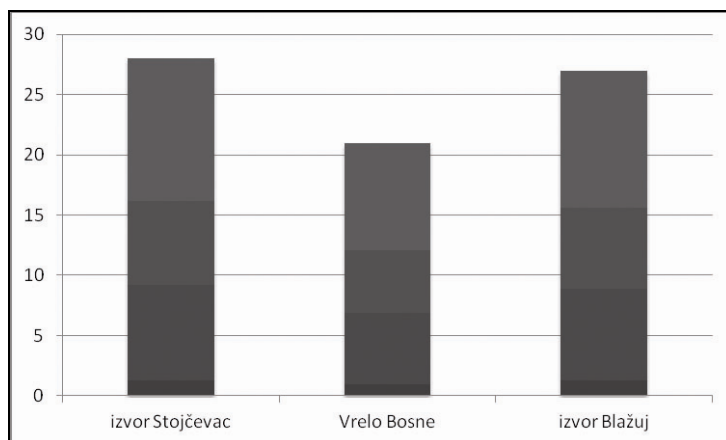
Table 3. Quality of water at the researched locations according to the values of the saprobic index calculated for the qualitative and quantitative composition of the benthos at the researched locations, 2009-2010 period

Tabela 3. Kvalitet vode na istraživanim lokalitetima prema vrijednostima saprobnog indeksa izračunat za kvalitativno-kvantitativni sastav bentosa na istraživanim lokalitetima, od 2009 do 2010. godine

Locations	Saprobic index			Category	Quality
	Phytobenthos	Zoobenthos	Together		
source Blažuj	1.2	1.57	1.38	oligosaprobic	I
Stojčevac	1.10	1.45	1.27	oligosaprobic	I
Vrelo Bosne	1.4	1.40	1.4	oligosaprobic	I

General morphological characteristics of the species *Niphargus ilidzensis* Schaferna, 1922 in the area of Canton Sarajevo

A total of 76 specimens of *N. ilidzensis* were identified and analysed at the three locations: stream Stojčevac, Vrelo Bosne (four sources), source in Blažuj. Of this number 28 specimens were found in the Stojčevac stream, 21 specimens on Vrelo Bosne and 27 specimens at the source in Blažuj (graph 3).



Graph 4. Number of amphipod specimens of *Niphargus ilidzensis* at the researched locations, 2009-2010.

Grafikon 4. Broj jedinki rakušca Niphargus ilidzensis na istraživanim lokalitetima, 2009-2010. godina

The data on the lengths of all Schaferna, 1922 specimens from the analysed material in all three locations was recorded.

Of the total number of sampled specimens at the listed locations, the shortest amphipod *Niphargus ilidzensis* in the Stojčevac stream was measured at 6 mm while the longest was 22 mm. On Vrelo Bosne, the shortest specimen was 6 mm and the

longest one 18 mm while at the location in Blažuj, the shortest amphipod was measured at 7 mm and the longest one at 16 mm. Taking the mean value for the three locations, the data indicates that the lowest mean value is registered on Vrelo Bosne (10.19 mm) while the highest one was at the location of Stojčevac (13.67 mm) (Table 4).

The longest specimen found at all three locations was registered at the source of Stojčevac stream and was measured at 22 mm. The smallest specimens measuring only 6 mm were also identified at this location and at the location of Vrelo Bosne.

Table 6. The length of the specimen *Niphargus ilidzensis* Schaferna, 1922 sampled in the zoobenthos of the following sources: stream Stojčevac, Vrelo Bosne and Blažuj, 2009-2010.

Tabela 6. Dužina jedinki *Niphargus ilidzensis* Schaferna, 1922 uzorkovanih u zoobentosu izvorišta: potoka Stojčevac, Vrela Bosne i Blažuj, 2009-2010.

Length in mm	Number of specimens of the listed length		
	Locations		
	Stojčevac	Vrelo Bosne	Blažuj
22	5		
21	3		
18		3	
16			3
15	4		
14			4
13	3		
12	2	4	4
10		4	6
9	3		
8	6	6	
7			10
6	2	4	
Total number	28	21	27
Mean value	13.67	10.19	10.44

DISCUSSION - *Diskusija*

On the basis of research findings on the diversity of macro-invertebrates of zoobenthos on three locations (source Blažuj, Vrelo Bosne - 4 sources and stream Stojčevac) the presence of an endemic species *Niphargus ilidzensis* Schaferna, 1922 was established. The highest density of this species was registered on the Stojčevac stream (28 specimens). Comparing the ecological conditions that are dominant on all three surveyed locations, we can note that the conditions on stream Stojčevac are closest to the optimal within the ecological valence of the analysed species. On the

basis of an analysis of the number and the length of *N. Ilidzensis* specimens, we can note a slight diversity caused by the types of sediment in the watercourse – in average the specimens are more numerous and larger in size on the rocky surface (overgrown by flora) and smaller in number when they are found in fine sediments.

The distribution of the *Niphargus ilidzensis*: source of river Bosna in the vicinity of Sarajevo (KARAMAN, S. 1932, 1950; KARAMAN, G. 1962), Belgrade areas of Topčider and Avala (KARAMAN, S. 1932, 1950a). When the samples originating from the source of river Bosna were compared to the ones from Avala, there was an indication that they completely match and thus belong to the typical form of inhabitants of cold sources and nearby streams. The fact that the same form is found unaltered in two sources which are 200 km apart proves that the form is very stable. Earlier researches reiterate that the length of a male specimen was measured at 20 mm (KARAMAN, 1974) while at Stojčevac location five 22-mm specimens and three 21-mm specimens were registered.

The *Niphargus ilidzensis* species inhabits a small area in the Sarajevo region while the *Niphargus elegans* it was established that it inhabits an area of 38 000 km² and *N.valachicus* (DOBREANU & MANOLOCHE, 1939) an area of 540 000 km². Earlier findings indicated that the species of genus *Niphargus* (and other amphipods) are linked to the cold stream conditions and several findings indicated their competitiveness with the species from the *Gammarus* genera (FIŠER at. all. 2006). Due to the same modus of feeding, a large number of specimens of one genus initiate a reduced number of the specimens of the other genus. Despite having a feature of being an underground species, it is a well known fact that the species *Niphargus ilidzensis* prefers open watercourses which was confirmed in this paper and indicates to a reduced number of specimens in the Vrelo Bosne region where there is a high presence of the *Gammarus bosniacus* species.

The spread of the species onto the area of Blažuj indicates to a well-known feature of amphipods that due to their short life span, the rapid growth ability, early sexual maturation, high reproductive potential (fecundity) and the care for their breed they have managed to adapt successfully to a large number of aquatic habitats in Europe.

CONCLUSION - Zaključak

The endemic species of amphipod *Niphargus ilidzensis* exists successfully on the protected area of Vrelo Bosne and during research a relatively high number of the specimens were registered. The general ecological conditions presented through the physical/chemical parameters of the water, the composition of the phytobenthos and macrozoobenthos indicate to the clear or oligosaprobic water. A new habitat of the species was identified outside the protected area yet within the hydro-resources of the upper course of river Bosna basin. One of the morphometric parameters of the surveyed specimen was analysed for the first time and the paper includes an original

overview of the structure of telzone and gnatopode. This approach of getting acquainted with the conditions of the population and the general characteristics of the species should be applied on other species as well not only on fauna in the area of Canton Sarajevo but in the whole of Bosnia and Herzegovina.

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Sažetak

Rad je rezultat terenskih istraživanja u periodu 2009-2010. godine u izvorima na prostoru zaštićenog područja Vrela Bosne i izvoru Blažuj. Uzorkovanje je izvršeno metodologijom za uzorkovanje bentosa, a izvršena je analiza sastava fitobentosa i makrozoobentosa. Uzorci su sa terena u svježem stanju preneseni u laboratorij na Prirodno-matematičkom fakultetu Odsjek za biologiju gdje je izvršena separacija vrsta i fiksacija u 70% etil-alkoholu. Uzorci fitobentosa su pripremljeni za daljnu obradu, pravljenja trajnih preparata za determinaciju dijatomeja. Jedinke vrste *Niphargus illidzensis* Schäferna 1922 su konzervirane u zbirci za ahordate. Izvršeno je mjerenje jedinki i disekcija gnatopoda, telzona koji su zatim fotografisani mikroskopom OLYMPUS BX 41 DP12. Determinacija jedinki rakušca izvršena je prema radu: KARAMAN, G., 1973 (1974): Contribution to the knowledge of the Amphipoda. Two subterranean *Niphargus* species from Yugoslavia, *N. stankoi*, n. sp. and *N. ilidzensis* Schaferna (fam. Gammaridae). Glas. Republ. Zavoda Zast. Prirode-Prirodnjačkog muzeja Titograd, 6, 35-57.

Rezultati analize sastava bentosa na sva tri istraživana vodna ekosistema ukazuju na čiste ili oligosaprobne vode, sa stabilnim i niskim vrijednostima temperature. Najveći broj jedinki konstatovan je u uzorcima makrozoobentosa potoka Stojčevac gdje su izmjerene najveće jedinke mužjaka (22 mm). Prema dosadašnjim podacima sa područja vrela Bosne izmjerene su jedinke mužjaka od 20 mm, a ova vrsta je nađena i kod Beograda (Topčider i Avala). Pored uvjeta u kojima obitava vrsta, morfometrijskih mjerenja glavni naglasak u radu dat je novom habitatu u kom je konstatovana ova endemična vrsta rakušaca familije Niphargidae. Izvor na području Blažuja je izvan granica zaštićenog područja ali je podzemnim vodama blisko vezan za naznačeno područje. Ovo su prvi podaci o ovoj endemičnoj vrsti sa područja na kojem je prvi put opisana, nakon dužeg vremena. U radu je iznijet po prvi put potpuni popis vrsta roda *Niphargus* sa područja Bosne i Hercegovine koji je rezultat istraživanja do 2012. godine (22 vrste).

Addendum 1- A list of the *Niphargus* genus species in the fauna of Bosnia and Herzegovina

Prilog 1. Popis vrsta roda *Niphargus* u fauni Bosne i Hercegovine

<i>Niphargus balcanicus</i> Absolon 1927	<i>Niphargus colombatovici</i> Karaman S.1950
<i>Niphargus borkanus</i> Karaman S.1960	<i>Niphargus bosniacus</i> Karaman S.1943
<i>Niphargus boskovici</i> Karaman S.1952	<i>Niphargus trullipes</i> Sket 1958
<i>Niphargus cvijici</i> Karaman S.1950	<i>Niphargus kusceri</i> Karaman S.1950
<i>Niphargus factor</i> Sket & Karaman G. 1990	<i>Niphargus vjeternicensis</i> Karaman S.1932
<i>Niphargus hercegovinensis</i> Karaman S.1950	<i>Niphargus bilecanus</i> Karaman S.1953
<i>Niphargus ilidzensis</i> Schäferna 1922	<i>Niphargus zavalanus</i> Karaman S.1950
<i>Niphargus longydactylus</i> Ruffo 1937	<i>Niphargus dabarensis</i> Fišer, Trontelj&Sket 2006
<i>Niphargus lunaris</i> Karaman G.1985	<i>Niphargus polymorphus</i> Fišer, Trontelj&Sket 2006
<i>Niphargus multipennatus</i> Sket 1956	<i>Niphargus dolichopus</i> Fišer, Trontelj&Sket 2006
<i>Niphargus serbicus</i> Karaman S.1960	<i>Niphargus dalmatinus</i> Schäferna 1922