

# Molluscs (Gastropoda and Bivalvia) of the upper Neretva River

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**Abstract.** During a survey taking place from 29.6.2022–2.7.2022 in Bosnia and Herzegovina in the river-floodplain system of the upper Neretva River around Ulog, 51 species of molluscs were found at 12 sampling sites. Besides manual sampling in the water bodies, the main sampling technique consisted of sieving of river deposits, to maximise the coverage of species diversity. The majority of the species were terrestrial gastropods (45 out of 51), most of them common species of forests and moist areas, but also of grassland. In the Neretva River itself and in adjacent waterbodies, six species of freshwater molluscs were found. Among them, at least three species of spring snails of the taxonomically challenging genera *Belgrandiella*, *Bythinella*, and *Paladilhioopsis* were found, the latter one only in river deposits. Future research should focus on truncatelloidean snails in the groundwater system of the upper course of the Neretva River. Furthermore, a broader investigation of the mollusc fauna of Bosnia and Herzegovina would help to clarify taxonomically unresolved questions of species of the Balkan region and possibly reveal species new for science.

Key words: Mollusca, Bosnia and Herzegovina, Neretva River, spring snails, Truncatelloidea, Balkan region

**Izvleček. Mehkušci (polži in školjke) zgornjega toka Neretve** – Med raziskavo, ki je potekala od 24.6. do 2.7. 2022 v Bosni in Hercegovini v rečno-poplavnem sistemu gornje Neretve v okolici Uloga, smo na 12 lokacijah našli 51 vrst mehkušcev. Poleg ročnega vzorčenja v vodnih telesih je bila glavna tehnika vzorčenja sejanje rečnih nanosov, kar je razkrilo največjo vrstno raznolikost. Največ vrst je bilo kopenskih polžev (45 od 51), večinoma pogostih vrst v gozdovih in vlažnih območjih, a tudi traviščih. V sami reki Neretvi in v sosednjih vodnih telesih smo našli šest vrst sladkovodnih mehkušcev. Med njimi so bile najdene vsaj tri vrste izvirskih polžev taksonomsko zahtevnih rodov *Belgrandiella*, *Bythinella* in *Paladilhioopsis*, slednji le v rečnih nanosih. Prihodnje raziskave bi se morale osredotočiti na polže iz naddružine Truncatelloidea v podzemnem vodnem sistemu zgornjega toka reke Neretve. Poleg tega bi širša raziskava favne mehkušcev Bosne in Hercegovine pripomogla k razjasnitvi taksonomskih vprašanj vrst balkanske regije in morda razkrila nove vrste za znanost.

Cljučne besede: Mollusca, Bosna in Hercegovina, reka Neretva, izvirski polži, Truncatelloidea, Balkan



**Apstrakt. Mekušci (Gastropoda i Bivalvia) gornjeg toka rijeke Neretve** – Prilikom istraživanja koje je obavljeno od 24.6. – 2. 7. 2022. godine u Bosni i Hercegovini u riječno-plavnom sistemu rijeke gornje Neretve oko Uloga, na 12 mjesta uzorkovanja pronađena je 51 vrsta mekušaca. Osim ručnog uzorkovanja u vodnim tijelima, glavna tehnika uzorkovanja se sastojala od prosijavanja riječnih naslaga, što je rezultiralo maksimalnom raznovrsnošću vrsta. Većina vrsta su bili kopneni puževi (45 od 51), većinom uobičajene vrste šuma i vlažnih područja, ali i travnjaka. U samoj rijeci Neretvi i u susjednim vodnim tijelima pronađeno je šest vrsta slatkovodnih mekušaca. Među njima su pronađene najmanje tri vrste izvorskih puževa taksonomski zahtjevnih rodova *Belgrandiella*, *Bythinella* i *Paladilhopsis*, drugi navedeni samo u riječnim nanosima. Buduća istraživanja bi se trebala fokusirati na puževe superfamilije Truncatelloidea u sistemu podzemnih voda gornjeg toka rijeke Neretve. Nadalje, šire istraživanje faune mekušaca Bosne i Hercegovine pomoglo bi da se razjasne taksonomski neriješena pitanja vrsta balkanskog regiona i eventualno otkriju vrste koje su nove za nauku.

Gljučne riječi: mekušac, Bosna i Hercegovina, rijeka Neretva, izvorski puževi, Truncatelloidea, Balkan

## Introduction

First overviews on the mollusc fauna of Bosnia and Herzegovina were given by Jaeckel et al. (1958), Radoman (1983), and Mulaomerović & Glöer (2022). Welter-Schultes (2012) provided indicative distribution maps and Bank & Neubert (2017) gave country lists of European non-marine snails (except spring snails) and mussels. For Gastropoda, Karaman (2006) reported the number of taxa of Bosnia and Herzegovina as 331 (135 genera in 47 families). Dedov et al. (2021) provided a dataset of all Gastropod species described for Bosnia and Herzegovina. Central and Northern Bosnia as well as northern Herzegovina are especially poorly researched (Mulaomerović & Glöer 2022). Yet, several new species were described from this area during the last years (e.g., Glöer & Grego 2015; Grego & Glöer 2019; Grego 2020). A general overview on aquatic Gastropoda is given by Glöer (2019) and Glöer (2022a, 2022b). For Bivalvia only general information, provided by Welter-Schultes (2012), is presently available.

Here we report on a survey of the mollusc fauna during the Neretva Science Week 2022, which was part of the »Scientists for Balkan Rivers« project within the »Save the Blue Heart of Europe« campaign.

## Materials and methods

Sampling took place at 12 localities between 29.6.2022 and 2.7.2022 (Tab. 1). Except for three springs located in the adjacent forests (localities No. 2, 3, 8; Tab. 1), the remaining sampling sites were in the water bodies themselves or close to the riverside.

Molluscs (living and/or their empty shells) were sampled by three techniques (see also Duda et al. 2018): (1) manual sampling in the water bodies as well as accompanying riverside areas was applied for larger species (>1 cm) and empty shells. (2) Dry sieving was applied to river deposits. This is a good method to detect small species and to survey malacologically unexplored landscapes (Čiliak & Šteffek 2011). For this task, soil or river deposits were gathered (altogether

~ 20 litres), sieved with 3.0 mm and 0.5 mm mesh width and examined for mollusc shells. (3) Furthermore, wet sieving (Horsák 2003) was used to extract wet empty shells and living snails from moist substrate, e.g., the bottom of springs. For this task, the material collected from wet places and water bodies was washed in a sieve with 0.5 mm mesh width to remove detritus and plants. By this technique, snails – living animals and water-filled empty shells remain at the bottom of the sieve, while other particles float to the top. Living molluscs collected were immediately preserved in 96% alcohol.

**Table 1.** Sampling sites. Elevation in meters above sea level.

**Tabela 1.** Mesta vzorčenja. Nadmorska višina v metrih nad morsko gladino.

**Tabela 1.** Mjesta uzorkovanja. Nadmorska visina u metrima iznad nivoa mora.

Nr.	Locality name	N	E	Elevation	Date
1	Neretva-Krupac Confluence	43°19.732'	18°25.533'	779	29.6.2022
2	Krupica spring 1	43°19.835'	18°25.712'	805	29.6.2022
3	Krupica spring 2	43°19.821'	18°25.681'	802	29.6.2022
4	Krupac side arm	43°19.781'	18°25.629'	791	29.6.2022
5	Neretva locality 2	43°19.640'	18°25.692'	786	29.6.2022
6	Cerova locality 2	43°22.564'	18°21.536'	708	30.6.2022
7	Cerova Old Wooden Bridge	43°22.776'	18°21.316'	710	30.6.2022
8	Nedavic spring	43°27.494'	18°19.399'	668	1.7.2022
9	Nedavic canyon	43°27.610'	18°19.306'	626	1.7.2022
10	Ulogski Bug	43°24.291'	18°19.456'	674	1.7.2022
11	Ulog swimming beach	43°25.450'	18°18.479'	639	1.7.2022
12	Prijestov bridge	43°28.940'	18°13.605'	419	2.7.2022

## Results and discussion

In the present survey, the majority of snails detected were land gastropods. In total, 51 species could be detected in the samples of the 12 localities, among them 45 land gastropod species, five water snail species and one mussel species. Species numbers range from 1 to 28 per locality. The data are summarised in Tab. 2.

In the upper Neretva River, species diversity of aquatic molluscs was low, besides the snail species *Galba truncatula* and *Ancylus recurves*, one pea clam species (tiny freshwater mussels) was found: *Euglesa casertana*. The springs in the wooded areas accompanying the river system harbored representatives of three families of spring snails (genera *Paladilhopsis*, *Belgrandiella*, *Bythinella*), which could not be identified at species level (Figs 1, 2, 3). They should be identified by experts for this group, of which only a few exist in the world. Spring snail specimens assigned to these genera were also found in the deposits collected in the river. Of the aquatic molluscs – five species were encountered in the water bodies themselves (*Belgrandiella* sp., *Bythinella* sp., *Euglesa casertana*, *Ancylus recurvus*, *Galba truncatula*), yet only the latter two of them were found alive. One species - *Paladilhopsis* sp. – is stygobiotic and was only found in river deposits.

**Table 2.** Taxa of molluscs collected at sampling sites 1-12. e = empty shells, l = living animals. Numbers refer to localities in Tab. 1.

**Tabela 2.** Taksoni mehkužcev, zbrani na lokacijah 1-12. e = prazne lupine, l = žive živali. Številke se nanašajo na lokalitete v Tab. 1.

**Табела 2.** Таксони мекушца прикупљени на мјестима узorkовања 1-12. e = празне шкољке, l = живе. Бројеви markiraju lokalitete kao u Tab. 1.

Family/species	1	2	3	4	5	6	7	8	9	10	11	12
<b>Cochlostomatidae</b>												
<i>Cochlostoma scalariniforme</i> (A.J. Wagner, 1906)								e				
<b>Pomatiidae</b>												
<i>Pomatias elegans</i> (O. F. Müller, 1774)									e			e
<b>Hydrobiidae</b>												
<i>Belgrandiella</i> sp.		e										e
<b>Moitessieriidae</b>												
<i>Paladilhopsia</i> sp.									e			e
<b>Bythinellidae</b>												
<i>Bythinella</i> sp.	e	l	l	e	e			l	e			e
<b>Lymnaeidae</b>												
<i>Galba truncatula</i> (O. F. Müller, 1774)	e			e								e
<b>Planorbidae</b>												
<i>Ancylus recurvus</i> E. von Martens, 1873		l										e
<b>Ellobiidae</b>												
<i>Carychium minimum</i> O. F. Müller, 1774				e					e			e
<i>Carychium tridentatum</i> (Risso, 1826)									e			e
<b>Cochlicopidae</b>												
<i>Cochlicopa lubricella</i> (Porro, 1838)					e							
<b>Orculidae</b>												
<i>Sphyradium doliolum</i> (Bruguiere, 1792)				e		e	e	e	e			e
<b>Valloniidae</b>												
<i>Acanthinula aculeata</i> (O. F. Müller, 1774)	e				e		e	e	e			e
<i>Vallonia costata</i> (O. F. Müller, 1774)												e
<i>Vallonia pulchella</i> (O. F. Müller, 1774)					e		e	e	e			e
<b>Pupilliidae</b>												
<i>Pupilla muscorum</i> (Linnaeus, 1758)								e				
<b>Vertingidae</b>												
<i>Vertigo pusilla</i> O. F. Müller, 1774								e	e			e
<i>Vertigo pygmaea</i> (Draparnaud, 1801)												e
<b>Truncatellinidae</b>												
<i>Columella edentula</i> (Draparnaud, 1805)								e				e
<i>Truncatellina cylindrica</i> (J.B. Ferrussac, 1807)								e	e			

<b>Family/species</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>Enidae</b>												
<i>Merdigera obscura</i> (O. F. Müller, 1774)					e		e				e	
<i>Zebrina detrita</i> (O. F. Müller, 1774)										e		
<b>Clausiliidae</b>												
<i>Herilla zieglerei</i> cf. <i>limana</i> O. Boetger, 1909									e			
<i>Cochlodina laminata</i> (Montagu, 1803)					e	e	e		e		e	e
<i>Macrogastera ventricosa</i> (Draparnaud, 1801)						e	e				e	
<i>Alinda biplicata</i> (Montagu, 1803)											e	
<i>Strigillarica vetusta</i> (Rossmässler, 1836)						e	e				e	e
<i>Clausiliidae</i> sp. juv					e	e			e			
<b>Punctidae</b>												
<i>Punctum pygmaeum</i> (Draparnaud, 1801)								e	e			
<b>Helicodiscidae</b>												
<i>Lucilla singleyana</i> (Pilsbry, 1889)				e								
<b>Discidae</b>												
<i>Discus perspectivus</i> (M. Mühlfeld, 1816)						e	e		e	e	e	
<b>Gastrodontidae</b>												
<i>Aegopinella minor</i> (Stabile 1864)									e			e
<i>Perpolita hammonis</i> (Strøm, 1765)		e										
<b>Pristilomatidae</b>												
<i>Vitrea contracta</i> (Westerlund, 1871)							e					
<i>Vitrea illyrica</i> (A. J. Wagner, 1907)							e					
<i>Vitrea</i> sp.									e		e	
<b>Oxychilidae</b>												
<i>Daudebardia brevipes</i> (Draparnaud, 1805)					e							
<i>Daudebardia rufa</i> (Draparnaud, 1805)					e						e	
<b>Zonitidae</b>												
<i>Aegopsis verticillus</i> (A. Ferrussac, 1819)			e		e						e	
<b>Limacidae</b>												
<i>Limax cinereoniger</i> Wolf, 1803												
<i>Limacoidea</i> sp.												
<b>Euconulidae</b>												
<i>Euconulus fulvus</i> (O. F. Müller, 1774)							e			e		
<i>Euconulus praticola</i> (Reinhard, 1883)									e			

<b>Family/species</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>Geomitrididae</b>												
<i>Cernuella</i> cf. <i>cisalpina</i> (Rossmässler, 1837)								e			e	e
<i>Xerolenta obvia</i> (Menke, 1828)	e						e	e			e	
<b>Hygromiidae</b>												
<i>Monachoides incarnatus</i> (O. F. Müller, 1774)							e	e		e	e	e
<i>Monacha claustralis</i> (Menke, 1828)					e							
<i>Monacha frequens</i> (Mousson, 1859)	e		e		l	e	e			e	e	
<b>Helicidae</b>												
<i>Dinarica pouzolzi</i> (Deshayes, 1832)	e		e							e		
<i>Caucasotachea vindobonensis</i> (C. Pfeiffer, 1828)	e						e	e		e		e
<i>Helix secernenda</i> Rossmässler, 1847	e											
<b>Sphaeridae</b>												
<i>Euglesa casertana</i> (Poli, 1791)					l			e				
<b>Number of taxa - empty shells</b>	<b>8</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>11</b>	<b>10</b>	<b>23</b>	<b>0</b>	<b>19</b>	<b>6</b>	<b>26</b>	<b>8</b>
<b>Number of taxa - living</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>

Concerning land gastropods, a higher number of species could be found at rocks at the riverside and in accompanying forests as well as in the river deposits collected. In general, the land gastropods detected in the investigated area resemble the typical species known from this area, represented by forest-dwelling species (e.g., *Sphyradium doliolum*, *Discus perspectivus*), with some of them found outside the springs, as well as species typical for open landscape (e.g., *Pupilla muscorum*, *Xerolenta obvia*).

Some species could not be identified with certainty. Concerning *Cernuella* cf. *cisalpina*, which was detected at three sites by empty shells only, it is yet not clear if it is a separate species or part of an unresolved taxon complex with *Cernuella virgata* (Duda et al. 2022). Of *Vitrea* sp. only juvenile empty shells were found, and of *Limacoidea* sp. only one juvenile living specimen.

Regarding the trucatelloid species, future research must be conducted, if *Bythinella* sp. and *Belgrandiella* sp. found in our survey could represent *Belgrandiella goranii* and *Bythinella buranii* recently described by Mulaomerovic & Glöer (2022) or whether they represent different species. Regarding *Paladilhopsis*, we follow current research (Hofman et al. 2018) and assume that this genus is more likely to occur in Bosnia and Herzegovina than the morphologically similar genus *Iglica* (the latter listed in Glöer (2022a) for this area). Furthermore, it is still unclear, whether the collected empty shells could represent one of the described species within this genus in the region (*P. solida* Kuščer, 1933 or *P. arion* Rysiewska & Osokowski, 2021), but most likely due to the different shell morphology it could instead belong to a new taxon. To clarify this question, more intense research would be required to assess the distribution ranges of the neighboring species with greater detail. Molecular genetic methods may help to differentiate the genera, although it should be mentioned that even current genetic methods may not lead to satisfying conclusions in all species of Truncatelloidea (Richling et al. 2017; Schubert et al. 2023).



**Figure 1.** Empty shell of *Paladilhiopsis* sp. from locality 9 (Nedavic canyon). Scale bar = 1 mm.

**Slika 1.** Prazna lupina *Paladilhiopsis* sp. iz lokalitete 9 (kanjon Nedavič). Merilce = 1 mm.

**Slkika 1.** Prazna ljuska *Paladilhiopsis* sp. sa lokaliteta 9 (kanjon Nedavič). Skala = 1 mm.



**Figure 2.** Empty shell of *Belgrandiella* sp. from locality 11 (Ulog swimming beach). Scale bar = 0.5 mm.

**Slika 2.** Prazna lupina *Belgrandiella* sp. iz lokalitete 11 (kopališče Ulog). Merilce = 0,5 mm.

**Slkika 2.** Prazna ljuska *Belgrandiella* sp. sa lokaliteta 11 (plaža Ulog). Skala = 0,5 mm.



**Figure 3.** Empty shell of *Bythinella* sp. from locality 3 (Krupica spring 2). Scale bar = 1 mm.

**Slika 3.** Prazna lupina *Bythinella* sp. iz lokalitete 3 (izvir Krupice 2). merilce = 1 mm.

**Slika 3.** Prazna ljuska *Bythinella* sp. sa lokaliteta 3 (vrela Krupca 2). Skala = 1 mm.

A rock-dwelling species, found alive on rocks at one site (locality No. 9, Nedavic canyon), was tentatively assigned to *Herilla bosniensis* (see also Knook et al. 2022) and deserves some comments (Fig. 4). Inspection of the collected specimens by Zoltan Fehér (Budapest, Hungary) showed that they in fact belong to *Herilla ziegleri*, most likely the subspecies *H. z. limana*. Several species of this genus were reported to occur in Bosnia (*H. bosniensis* (Vest, 1867); *H. ziegleri* (Küster, 1845); *H. pavlovici* (A.J.Wagner, 1914); *H. Illyrica* (Möllendorff, 1899); *H. jabucica* H. Nordsieck, 1971; *H. durmitoris* (Boettger, 1909)), yet almost no reference sequences were published in NCBI GenBank or BOLD database. The DNA barcoding sequence of the mitochondrial cytochrome c oxidase subunit 1 gene (CO1; data not shown) generated in the present study was compared with a single CO1 sequence of the genus *Herilla* available in GenBank (*Herilla ziegleri dacica*) and the p distance was 20.1%. This was in the same range as the distance to several other genera e.g., *Albinaria*, *Sericata*, *Inchoatia*, with p distances of around 19% (accessed on 22.1.2023). This genus deserves further investigation, including DNA sequence analyses of the various taxa over their distribution ranges. Presently, we consider snails of this population unidentified at subspecies level and we refer to it as *Herilla ziegleri* cf. *limana*. The BOLD Accession number of the CO1 sequence of this snail is ALNHM509-23.



**Figure 4.** Living specimen of *Herilla zieglerei* cf. *limana* on a rock in Nedavic canyon (locality 9).

**Slika 4.** Živi primerek *Herilla zieglerei* cf. *limana* na skali v kanjonu Nedavic (lokaliteta 9).

**Slika 4.** Živi primjerak *Herilla zieglerei* cf. *limana* na stijeni u kanjonu Nedavic (lokalitet 9).

## Conclusions

Compared to the species diversity of land gastropods, the aquatic epigean mollusc fauna appears poor, yet this is typical for cool upper parts of rivers with fast-running water (Beran 2021). The occurrence of truncatelloid taxa (genera *Belgrandiella*, *Bythinella*, *Palhadilhiopsis*) detected alive in three springs raise interest for a thorough investigation of the crenobiont habitats (springs) of the area, including molecular genetic analyses. Given the high endemism of crenobiotic snails and their poor documentation in the Balkan region to date, a high number of unknown species may be expected. It is very likely that the spring snail species found during the Neretva Science Week 2022 represent endemics of Bosnia and Herzegovina. This is also true for some of the land gastropods. For most genera and species groups, comprehensive studies are needed to assess intra- and interspecific variation throughout the Balkan region and to detect possible cryptic species. The species diversity detected in the present survey in the surroundings of the upper Neretva underlines the high value of the region for biodiversity. The

need for protection of the upper Neretva is counteracted by the imminent anthropogenic threats, specifically the construction of hydropower plants and the accompanying draining infrastructure, as well as groundwater pollution and overexploitation.

## Povzetek

Med raziskavo, ki je potekala od 24. do 26. junija 2022 v Bosni in Hercegovini v rečno-poplavnem sistemu zgornjega toka reke Neretve okoli Uloga, je bilo na 12 lokacijah najdenih 51 vrst mehkužcev. Da bi kar najbolj zajeli vrstno pestrost območja, smo uporabili dve tehniki: ročno vzorčenje v vodnih telesih in sejanje rečnih nanosov. Večina polžev, odkritih v tej raziskavi, so bili kopenski polži. Skupaj je bilo v vzorcih z 12 lokacij mogoče zaslediti 51 vrst, med njimi 45 vrst kopenskih polžev, pet vrst vodnih polžev in eno vrsto školjk. Število vrst se giblje od 1 do 28 na lokacijo. Pri kopenskih polžih je večje število vrst mogoče najti na skalah ob reki in v obvodnih gozdovih ter v zbranih rečnih nanosih. Na splošno so kopenski polži, odkriti na raziskanem območju, podobni tipičnim vrstam, znanih s tega območja, ki jih predstavljajo gozdne vrste (npr. *Sphyradium doliolum*, *Discus perspectivus*), nekatere izmed njih najdemo v bližini izvirov, pa tudi vrste, značilne za odprte pokrajine (npr. *Pupilla muscorum*, *Xerolenta obvia*) ali skalovje (*Herilla zieglerei* cf. *limana*).

V sami reki Neretvi in v sosednjih vodnih telesih je bila vrstna pestrost vodnih mehkužcev majhna. Poleg polžev *Galba truncatula* in *Ancylus recurvus* je bila najdena ena vrsta školjk *Euglesa casertana* (družina Sphaeriidae: drobne sladkovodne školjke). V izviri v gozdnatih območjih, ki spremljajo rečni sistem, so bili zabeleženi predstavniki treh družin izvirskih polžev (rodovi *Paladilhopsis*, *Belgrandiella*, *Bythinella*), ki pa jih ni bilo mogoče prepoznati do ravni vrste (Sl. 1., 2., 3). Izvirski primerki polžev, ki pripadajo tem rodovom, so bili najdeni tudi v usedlinah, zbranih v reki. Ena vrsta - *Paladilhopsis* sp. – je stigobiont (tj. živi v podtalnici) in je bil najden samo v rečnih nanosih. Vrstna pestrost mehkužcev, ki smo jih našli med raziskovanjem gornje Neretve in okolice, podpira izjemno vrednost regije z vidika biotske raznovrstnosti. Prihodnje raziskave bi se morale osredotočiti na polže iz naddružine Truncatelloidea v podzemnem vodnem sistemu zgornjega toka reke Neretve. Poleg tega bi širša raziskava favne mehkužcev Bosne in Hercegovine pripomogla k razjasnitvi taksonomskih vprašanj o vrstah balkanske regije in morda razkrila nove vrste za znanost. To je pomembno z naravovarstvenega vidika, saj je regija močno antropogeno ogrožena, na primer gradnja hidroelektrarn in spremljajoče odvodne infrastrukture ter onesnaževanje in prekomerno izkoriščanje podzemne vode.

## Sažetak

Prilikom istraživanja koje je obavljeno od 24. – 26. 6. 2022. godine u Bosni i Hercegovini u riječno-plavnom sistemu gornjeg toka rijeke Neretve oko Uloga, na 12 mjesta uzorkovanja pronađena je 51 vrsta mekušaca. Osim ručnog uzorkovanja u vodnim tijelima, glavna tehnika uzorkovanja se sastojala od prosijavanja riječnih nanosa, što je rezultiralo maksimalnim uspjehom u otkrivanju raznovrstnosti vrsta. Većina puževa otkrivenih u ovom istraživanju bili su kopneni puževi. Ukupno je u uzorcima sa 12 lokaliteta otkrivena 51 vrsta, među kojima: 45 vrsta kopnenih puževa, pet vrsta vodenih puževa i jedna vrsta dagnji. Broj vrsta se kreće od 1 do 28 po lokalitetu. Što se tiče kopnenih puževa, veći broj vrsta može se naći na stijenama uz obalu rijeke i u okolnim šumama, kao i u sakupljenim riječnim naslagama. Uopšteno, kopneni puževi otkriveni na istraživanom području podsjećaju na tipične vrste poznate sa ovog područja, predstavljene vrstama koje žive u šumi (npr. *Sphyradium doliolum*, *Discus perspectivus*), neki od njih pronađeni u blizini izvora, kao i one tipične za otvorene pejzaže (npr. *Pupilla muscorum*, *Xerolenta obvia*) ili stijene (*Herilla zieglerei* cf. *limana*).

U samoj rijeci Neretvi i u susjednim vodnim tijelima diverzitet vrsta vodenih mekušaca je bio nizak. Pored puževa *Galba truncatula* i *Ancylus recurvus*, pronađena je i jedna vrsta školjkaša, *Euglesa casertana* (porodica Sphaeriidae: male slatkovodne školjke). Izvori u šumovitim predjelima koji prate riječni sistem bili su utočište predstavnika tri porodice izvorskih puževa (rodovi *Paladilhioopsis*, *Belgrandiella*, *Bythinella*), koji nisu mogli biti identifikovani na nivou vrste (sl. 1., 2., 3.). U naslagama sakupljenim u rijeci pronađeni su i primjerci izvorskih puževa koji pripadaju ovim rodovima. Jedna vrsta - *Paladilhioopsis* sp. – je stigobiont (tj. živi u podzemnim vodama) i pronađena je samo u riječnim naslagama. Raznolikost vrsta otkrivena u ovom istraživanju u okolini gornjeg toka Neretve naglašava visoku vrijednost biodiverziteta regije. Buduća istraživanja bi se trebala fokusirati na puževe superfamilije Truncatelloidea u sistemu podzemnih voda gornjeg toka rijeke Neretve. Takođe, šire istraživanje faune mekušaca Bosne i Hercegovine pomoglo bi da se razjasne taksonomski neriješena pitanja vrsta balkanskog regiona i eventualno otkriju vrste koje su nove za nauku. Ovo je važno sa stanovišta očuvanja budućih da je regija pod velikim antropogenim uticajem zbog izgradnje hidroelektrana i prateće infrastrukture za odvodnjavanje, kao i zagađenjem i prekomjernom eksploatacijom podzemnih voda.

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