

LET'S BE FRIENDLY TO BATS TOGETHER



Slovak Bat Conservation Society



Mammal Conservation Group Of BirdLife Hungary



Center for Karst and Speleology



Green Federation GAJA



REGIONAL SYMPOSIUM
“CONSERVATION STATUS OF BATS
IN THE CENTRAL EUROPE AND WESTERN BALKAN”
Sarajevo, 31. 5. – 1. 6. 2018.

PROGRAM AND BOOK OF ABSTRACT

BAT RINGING – FIRST TRAINING
Bijambare, 2. – 3. 6. 2018.

Regional Symposium
31 May - 1 June 2018
Sarajevo
“Conservation Status of
Bats in the Central Europe
and Western Balkan”

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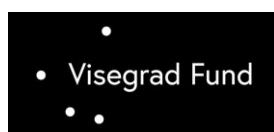
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PROGRAM

Thursday, 31. 5. 2018.

14:00-14:15 **Opening the symposium**

Introduction

14:15-14:30 Jasminko Mulaomerović: **Interest for bats in Bosnia and Herzegovina from the beginning of the 20th century to the First regional symposium on bats in 2018**

A) Bats distribution session

14:30-14:45 Milan Paunović, Ivana Budinski, Branko Karapandža, Branka Pejić: **Rajkova pećina cave – the most important hibernaculum of Lesser horseshoe bat *Rhinolophus hipposideros* in Serbia**

14:45-15:00 Milan Paunović, Ivana Budinski, Branko Karapandža, Branka Pejić: **Ranjena pećina cave – A new important roost site of Mehely's horseshoe bat *Rhinolophus mehelyi* in Serbia**

15:00-15:15 Grzegorz Apoznański, Tomasz Kokurewicz, Aleksander Rachwald, Marina Đurović, Aneta Zapart, Marta Szurlej: **New records of *Barbastella barbastellus* and other bat species in Montenegro**

15:15-16:00 Marcel Uhrin, Martin Ceľuch, Gabriela Bencúříková, Jaroslav Brndiar, Ervín Hapl, Milan Hrivňák, Mária Jarošíková, Peter Laboš, Denisa Lóbbová, Ladislav Naďo, Ján Rys, Ján Svetlík, Michal Šara, Romana Uhrinová, Peter Kanúch: **Greater noctule, *Nyctalus lasiopterus*: news from Slovakia**

16:00-16:30 **Coffee break**

16:30-16:45 Primož Presetnik, Heliana Dundarova, Wolfgang Fiedler, Fitore Gashi, Liridon Hoxha, Eva Pavlović, Philippe Théou: **A start of systematic bat survey of Kosovo?**

16:45-17:00 Jasmin Pašić: **Study of bat fauna within protected area of National Park Kozara**

17:00- 17:15 Simone Milanolo: **New data on bats presence and activity on the south, west and north slopes regions of mount Velež (Podvelež, Poljice and Pločno areas), Bosnia and Herzegovina**

17:15-17:30 Maja Hodžić, Neira Babić, Ajna Logo, Melisa Nicević, Zehra Alibašić, Ivana Dočkal, Šejla Goletić, Adi Edi Kaloper: **Results of bat fauna survey on the VII Internacional biology camp “Rujište 2017”**

17:30-19:00 **Visit to the Zemaljski muzej, Sarajevo**

Friday, 1.-6. 2018

B) Bats ecology session

09:30-09:45 Aja Zamolo, Primož Presetnik, Hubert Potočnik: **First study of foraging patterns and habitat use of the Greater mouse-eared bat (*Myotis myotis*) in Slovenia**

09:45-10:00 Henry Schofield, Daniela Hamidović, Anita Glover, Boris Krstinić, Damjan Krstinić and Dina Rnjak Kovac, Marija Crnčević: **Radio-tracking reveals the roosting and foraging behaviour of *Plecotus kolombatovici* on Lokrum Island, Dubrovnik**

10:00-10:15 Branka Pejić, Ivana Budinski, Branko Karapandža, Milan Paunović: **More than 60 years of ringing *Miniopterus schreibersii* (Kuhl, 1817) in D Serbia: Movements and longevity data**

C) Bats conservation session

10:15-10:30 Ivana Budinski, Branka Pejić, Branko Karapandža, Milan Paunović: **Bat rescue and rehabilitation in Serbia in 2017**

10:30-10:45 Hrivňak Milan, Lobbová Denisa, Celuch Martin, Bačkor Peter, Hapl Ervín, Filo Juraj, Kováč Matúš, Pavlíková Jana, Radim Tomáš: **Conservation of bats in prefab buildings in Slovakia**

10:45-11:15 **Coffee break**

11:15-11:30 Sándor A. Boldogh: **Research and protection of bats in Hungary – an overview**

11:30-11:45 Ivana Dočkal, Šejla Goletić, Aida Bahtijarević, Selma Durgut, Selma Dizdarević: **Istraživanje nivoa svijesti građana o važnosti šišmiša za okoliš**

11:45-12:00 Jasminko Mulaomerović: **Bat research in Bijambare protected area – an overview**

12:00-12:45

D) Poster session

Philippe Théou: **Bat research in Albania : an overview for the future**

Denisa Lobbová, Romana Uhrinová, Marcel Uhrin, Ervín Hapl, Ján Rys, Michal Šarax, Peter Laboš, Dominika Csepányiová, Mária Jarošíková, Gabriela Benčuríková: **Bats of abandoned mining works of Slovakia**

Miralem Husanović: **Schreibers Bent-Winged Bat (*Miniopterus Schreibersii*) in Drežnica**

Vida Zrnčić, Ivana Šimić, Ivana Lojkić, Anđela Čukušić, Tomislav Bedeković: **What do we know about rabies of Croatian bat fauna - Active rabies surveillance in selected roosts**

Sándor A. Boldogh: **Overheating of artificial roosts: a new, climate change-induced bat conservation challenge in Central Europe – the latest results**

Jasminko Mulaomerović: **An interesting case of dental abnormality in Greater mouse-eared bats (*Myotis myotis*)**

Jasminko Mulaomerović: **Distribution of some species of bats in the light of new data**

Jasminko Mulaomerović: **Preconception that continues - an example of a bat**

12:45-13:30 **Discussion and closing of Symposium**

13.30-15:00 **Lunch**

16:00 **Sightseeing - visit Trebević mountain by cable car**

NEW RECORDS OF *BARBASTELLA BARBASTELLUS* AND OTHER BAT SPECIES IN MONTENEGRO

Grzegorz Apoznański¹, Tomasz Kokurewicz¹, Aleksander Rachwald², Marina Đurović³,
Aneta Zapart⁴, Marta Szurlej⁵

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Despite of growing interest in Montenegrin nature, currently available data, regarding species composition and distribution of bats is yet to be completed. According to Presetnik et al. (2014) only 33% of the 10×10 km UTM squares covering Montenegro contain at least one bat record. As bats present a large variety of habitat preferences depending on species, supplementation of such knowledge is urgently needed, especially that lack of it is likely to hamper undertaken conservation efforts. The aim of our study was to investigate bat fauna in places which have not been previously surveyed. In August of 2014 simultaneous recordings with full spectrum detectors and mist netting sessions were carried out on 9 different sites scattered around Montenegro. A total of 303 bats flight passes were recorded and identified as follows: *Barbastella barbastellus*, *Eptesicus serotinus*, *Hypsugo savii*, *Myotis myotis/blythii*, *Myotis mystacinus/brandtii*, *Miniopterus schreibersii*, *Nyctalus leisleri*, and *Pipistrellus* and *Myotis spp.* Mist netting resulted in capture of 63 bats representing following 14 species: *Hypsugo savii*, *Myotis aurascens*, *Myotis capaccinii*, *Myotis daubentonii*, *Myotis emarginatus*, *Myotis mystacinus*, *Miniopterus schreibersii*, *Nyctalus noctula*, *Plecotus macrobullaris*, *Pipistrellus nathusii*, *Pipistrellus pipistrellus*, *Rhinolophus euryale*, *Rhinolophus hipposideros*, *Vespertilio murinus*. On 20 of July 2015, additional mist netting was carried out in Durmitor National park resulting in capture of 5 individuals of western barbastelle (*Barbastella barbastellus*), two males and three females among which one was lactating. This last observation is especially important as the western barbastelle is currently considered as one of the rarest bat species in Western Europe and is mentioned in Annex II of EU habitat Directive (92/43/EEC), also in Montenegro although expected, up till date was recorded only once. Additionally three breeding colonies were found, two of *Rhinolopus hipposideros* (Cave near dobrilovina monastery and barn in Durmitor N.P.) and one of *Rhinolophus Eurale* (Cave near Risan). We hope that our observations will prove useful in preparation of Montenegrin bats distribution map and hopefully be beneficial for Montenegrin bats conservation in the years to come.

RESEARCH AND PROTECTION OF BATS IN HUNGARY – AN OVERVIEW

Sándor A. Boldogh

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The bat fauna of Hungary is very rich, 28 species have been confirmed from the country so far. Many of the roosts and colonies have of international importance. Several research programs focus on this unique mammal group from basic researches to following of effects of conservation interventions. While the nationwide research projects (e.g. general state assessment of given species, following trends of populations) are generally initiated and coordinated by the ministry with responsibility for nature conservation, the others in smaller scales are organized and carried out by national park directorates and different research institutes (e.g. Natural History Museum, universities, NGOs). Conservation activities are fundamentally linked to national park directorates, but NGO-s are also active in this task.

All bats are protected in Hungary by law. Active managements with conservation purposes regularly affect the most important underground shelters, as well as the largest colonies in buildings.

Education and raising public awareness about bats is also becoming more and more intensive in the country.

The presentation provides an overview about the structure and working of the bat protection organization system in Hungary, the working methods and the most important results.

OVERHEATING OF ARTIFICIAL ROOSTS: A NEW, CLIMATE CHANGE-INDUCED BAT CONSERVATION CHALLENGE IN CENTRAL EUROPE – THE LATEST RESULTS

Sándor A. Boldogh

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Temperature during bats' parturition time has very important effects on the survival and development of young bats. Because the microclimate in buildings generally meets bats' requirements during summer more than the microclimate in underground sites, many species often roost in buildings to breed in Central Europe. In addition, suitable natural roosts such as caves are intensively decreasing in number, which is also promoting the change in roosting habits.

During the last 1-2 decades heat waves and extreme temperatures have occurred more and more frequently during the breeding season in Hungary. In order to assess the effect of these very hot temperatures on house-dwelling bat populations, we examined important colonies in buildings between 2010 and 2017 in North-eastern Hungary. We measured the temperature and humidity inside the roosts, evaluated the characteristics of microclimatic changes and investigated the reactions of bats. We also examined the effects of different solutions to reduce the temperature in the shelters.

The microclimate data collected in maternity roosts show that the air temperature may far exceed (max. 47.5 °C) the heat tolerance of bats (40-42 °C). The high temperature clearly disturbed the bats, as they moved to the cooler parts of the roosts as well as experience mass mortality in pups and sudden removals.

These results show that periods with extreme high temperature – especially in the early postnatal period when suckling bats are poikilothermic and do not thermoregulate – may be very dangerous for bats in several roosts in Hungary. Consequently, metal roof covered buildings may work as ecological traps, whereby otherwise good conditions can suddenly become intolerable and even fatal to young bats.

Considering recent studies, Central Europe is quite sensitive to global climate change. According to our results, the predicted warming may have serious negative effects on house-dwelling bats in Hungary, as well as in Central Europe. Thus, the overheating effects in buildings could have serious implications for the conservation of bat colonies. Technical adaptations against overheating generally appear difficult to implement, hence the most suitable solution would be to provide alternative shelters for bats in the same roost or elsewhere.

BAT RESCUE AND REHABILITATION IN SERBIA IN 2017

Ivana Budinski^{1*}, Branka Pejić¹, Branko Karapandža², Milan Paunović³

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In last few years bat experts with permits for bat handling and research from Institute for biological research “Siniša Stanković”, Natural History Museum in Belgrade and Wildlife Conservation Society “Mustela” have been involved in bat rescue and rehabilitation in Serbia. Our main activities are advising people what to do if they find a bat, taking care of juvenile and injured animals, and educating general public about bats. People usually called us when bat(s) were found grounded or in their home. A smaller percent of issues were solved by phone conversation, while majority of cases included bat expert going to field, picking up the animal and taking it for rehabilitation. In 2017 we received a total of 97 animals belonging to 4 bat species: *Nyctalus noctula* (74), *Pipistrellus kuhlii* (19), *Hypsugo savii* (2) and *Vespertilio murinus* (2). Majority of animals were from the territory of Belgrade. 9 received animals were juveniles (7 *P. kuhlii* and 2 *H. savii*), 5 were injured adults (3 *P. kuhlii* and 2 *N. noctula*), while rest of bats were healthy adults that were dehydrated and/or underweight. 90 percent of animals (88 out of 97) were successfully released. Unreleasable animals were used for bat popularization during International bat night and lectures in schools and similar events. All the work was done on the voluntary basis and with no fundings whatsoever for mealworms, medicaments or veterinarian services. There is an initiative for forming an official Center for bat rescue and rehabilitation, establishing the network of volunteers and provide funding for our future activities.

QUESTIONNAIRE: THE EVALUATION OF CITIZEN'S AWARENESS ON IMPORTANCE OF BATS FOR THE ENVIRONMENT

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Several attempts to protect the bat colonies have been reported in Bosnia and Herzegovina, but the human factor played a major role in the failure to enforce it. Human negligence and insufficient knowledge of the occurrence of bats in households is potentially one of the main factors of the vulnerability of these significant species, although so far no such research has been carried out in Bosnia and Herzegovina, because all the recent studies were based on caves. Loss of habitats due to logging, editing of caves for tourist visits, loss of their hunting sites, use of pesticides, harassment of colonies, wind farms, drainage and water pollution, construction of highways, hydroelectric power plants, wind power plants and the like are just some of the reasons that endanger the survival of the bats.

The most recent available literature indicates that the territory of Bosnia and Herzegovina is home to 29 species of bats, all of which are potentially endangered. However, concerning the lack of data, it is unknown whether these species are truly endangered. With the purpose of collecting recent data regarding the awareness of citizens about bats, their role, importance and the biology on the territory of Sarajevo and its surrounding areas, a questionnaire has been carried out. A questionnaire was filled out by 181 persons, and the knowledge of the participants varied with the complexity of the question. The participating individuals were mostly people in their twenties. The questionnaire itself consisted of 16 questions, four of which were about the protection of nature and the environment, six questions concerning the biology of bats, and six concerning the protection of bats and their usefulness to man. The results indicated that 34,24% participants believe that bats are useful to humans, 15,48% participants claim humans have no use of bats, and 50,28% participants were unsure whether bats are useful to humans or not. Furthermore, 79,60% participants claimed that bats should be protected, and 65,42% of these participants suggested „education with the goal of raising the awareness“ as a method of protection.

There are numerous ways that can help to increase awareness of citizens about conservation and protection of bats and their colony in nature or in their own household. One of the possible solutions is introducing S.O.S.-BATS that would enable citizens to contact professionals, that would help them in solving problems with bats and their colonies. S.O.S.-BATS already exists in countries of European Union, such as France, and countries of Balkan region and has already been shown to be effective. Based on the results of the conducted survey of citizens in Sarajevo and surrounding areas, that showed a necessity for raising awareness, along with introducing S.O.S.-BATS, it is necessary to take other less demanding, but effective measures such as handing out the fliers, posters, presentations, social networks.

RESULTS OF BAT FAUNA SURVEY ON VII. INTERNACIONALNI BIOLOGY CAMP “RUJIŠTE 2017”

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The VII. International Biological Camp “Rujište 2017” was held from 27. July 2017 to 3. August 2017, organized by the Association of Biology Students in Bosnia and Herzegovina. The camp took place approximately at 1.000 m a.s.l., at Rujište, located north of the city of Mostar in Herzegovina (Bosnia and Herzegovina). During this camp, the bat research group mist-netted on three ponds (at Donje Zijemlje, Gornje Zijemlje and near the mountain hut Rujište) and made one 1,5 km long transect survey with a bat detector, from mountain hut Rujište towards the village Gornje Zijemlje. The following species or groups of species representing 13 separate species were identified: *Myotis blythii oxygnathus*, *M. bechsteinii*, *M. nattereri*, *M. mystacinus*, *Nyctalus noctula*, *Pipistrellus pipistrellus*, *P. kuhlii*, *Hypsugo savii*, *Eptesicus serotinus*, *Vespertilio murinus*, *Plecotus macrobullaris*, *Barbastella barbastellus* and *P. pygmaeus* / *Miniopterus schreibersii*. As the most important finding we can point out *M. bechsteinii*, which is the fourth finding and is also the southernmost site of this species for Bosnia and Herzegovina.

CONSERVATION OF BATS IN PREFAB BUILDINGS IN SLOVAKIA

Milan Hrivňak¹, Denisa Lobbová¹, Martin Ceľuch¹, Peter Bačkor¹, Ervín Hapl¹,
Juraj Filo¹, Matúš Kováč¹, Jana Pavlíková¹, Tomáš Radim¹

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The buildings in the EU are being rapidly renovated and insulated according to national legislations to achieve lower consumption of fuels and energy. The bats occur mainly in ventilation shafts, attics and in crevices between panels of prefabricated blocks of flats. Covering of roost entrances during insulation process resulted in loss of roosting opportunities in urban areas and often caused even physical threat for the individuals. To take appropriate actions, protect existing and create new shelters for bats was the aim of the LIFE+ project „*Protection of Common Swift (*Apus apus*) and bats in buildings in Slovakia*“. The project was implemented in the period 2012 – 2015 and was awarded CEEweb Award for excellence in biodiversity protection in 2014. Thanks to this project the national directive was accepted to guide concrete steps in protection of animals in buildings. Since then, the regional nature conservation authorities have to give their standpoint before the approval of building permission. The team of experts were established to hold meetings with respective authorities and supervise insulation works in the field. This activities last to this date. Members of Slovak Bat Conservation Society implement conservation measures on about 200 buildings in Slovakia every year. This report presents the best field practices and methodologies concerning this issue.

SCHREIBERS BENT-WINGED BAT (*MINIOPTERUS SCHREIBERSII*) IN DREŽNICA

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On the summer school of mountaineering organized 23rd September 2017 by Mountain Federation of FB&H the presence of Schreibers Bent-winged bat (*Miniopterus schreibersii*) was found in Donja Drežnica. The bat was recorded in the climber center "Vrt ciklama" (Garden of Cyclamens) of the Extreme sports club „Scorpio“, in the the crack of the rock between the directions of "Pupi" and "Kaminčić-grebenčić ", the part of the Mastan. Although the Climbers in the Climbing Center have frequently noticed the presence of the bat (oral communication), so far it has not been deteremined what species of bat it is.

In Bosnia and Herzegovina Schreibers Bent-winged bats for their shelters most often choose natural caves and pits, artificial tunnels, abandoned houses, privately-owned houses and attic of churches. After this finding it can be said that in Bosnia and Herzegovina the first habitat where Schreibers Bent-winged bats live in cracks of natural rocks was founded in Donja Drežnica.

BATS OF ABANDONED MINING WORKS OF SLOVAKIA

Denisa Lobbová¹, Romana Uhrinová¹, Marcel Uhrin¹, Ervín Hapl¹, Ján Rys¹, Michal Šara Michal¹, Michal Laboš¹, Dominika Csepányiová¹, Mária Jarošíková¹, Gabriela Benčuríková¹

¹Slovak Bat Conservation Society (SON), Andraščíkova 618/1, SK - 085 01 Bardejov

Considering the rich history of mining in the Revúcka vrchovina Mts. and the previously available faunistic data, the presence of yet undiscovered roosts and species was assumed. During a survey of the area in 2012 – 2014, altogether 248 new mining sites were traced and 16 species of bats were recorded to roost there. *Miniopterus schreibersii*, *Rhinolophus hipposideros*, and *Barbastella barbastellus* were dominant species and the latter two along with *Rhinolophus ferrumequinum* represented the most widespread species. Three wintering aggregations of *M. schreibersii* composed of 3500 – 5000 individuals each, and a wintering colony of *R. hipposideros* composed of ca. 630 bats belong to the most significant results of the study. The existence of maternity colonies of *M. schreibersii* and *R. euryale* was also confirmed in underground spaces in the region. The newly discovered occurrence sites of *M. schreibersii* and *R. euryale* that shift the known margins of the species distribution ranges are of high importance. The survey was supported by two small grants programme of Global Environment Facility – GEF, and Convention on Migratory Species of Wild Animals – CMS. The most important point was the acquisition of cooperation with Rudné bane state company which are responsible for the remediation of old mining works. Altogether six openings were secured with respect to bat colonies occurrence in the way new in Slovakia. The Visegrad grant "Let's Be Friendly to Bats Together" directly builds on these activities and their results with focus on the Volovské vrchy Mts. which represent another less explored mining area by chiropterologists.

NEW DATA ON BATS PRESENCE AND ACTIVITY ON THE SOUTH, WEST AND NORTH SLOPES REGIONS OF MOUNT VELEŽ (PODVELEŽ, POLJICE AND PLOČNO AREAS), BOSNIA AND HERZEGOVINA

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In this work, the results of a 14 months (from March 2017 to April 2018) bat monitoring scheme are presented. The investigated areas encompass three sub regions located approximatively on the South (Podvelež), West (Poljice) and North (Pločno) sides of the Velež Mountain (East of Mostar city, Bosnia and Herzegovina). Monitoring with bat detector have been conducted monthly at several fixed locations allowing in addition to identification of species the quantification of the activity in terms of passes per hour. In addition to echolocation researches, captures with mist nets have been performed at different sites and investigation of potential roost sites in known and new caves have been performed. Overall, 18 species have been detected plus another 5 species potentially present but detected only as part of a phonetic group.

Species	Bat Detector	Mist netting	Roost site inspection
<i>Rhinolophus hipposideros</i>	X	X	X
<i>Rhinolophus ferrumequinum</i>	X		X
<i>Rhinolophus euryale</i>			X
<i>Rhinolophus blasii</i>	X		X
<i>Myotis myotis</i>	=		
<i>Myotis blythii oxygnathus</i>	=	X	X
<i>Myotis bechsteinii</i>	=		
<i>Myotis nattereri</i>	=	X	
<i>Myotis emarginatus</i>	=	X	
<i>Myotis mystacinus</i>	=	X	
<i>Myotis brandtii</i>	=		
<i>Pipistrellus pipistrellus</i>	X		
<i>Pipistrellus pygmaeus</i>	X		
<i>Pipistrellus kuhlii</i>	X	X	
<i>Pipistrellus nathusii</i>	=		
<i>Hypsugo savii</i>	X	X	
<i>Eptesicus serotinus</i>	X	X	
<i>Nyctalus noctula</i>	X		

<i>Nyctalus leisleri</i>	=	X	
<i>Vespertilio murinus</i>	=		
<i>Plecotus auritus</i>		X	
<i>Miniopterus schreibersii</i>	X	X	X
<i>Tadarida teniotis</i>	X		

X – Identified, = Detected as phonetic group

AN INTERESTING CASE OF DENTAL ABNORMALITY IN GREATER MOUSE-EARED BATS (*MYOTIS MYOTIS*)

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Although there are a large number of bats researchers in the world, and thus published papers on various aspects of the bats biology, it is interesting how little articles deals with tooth anomalies. C. López-Aguirre (2014), on the occasion of the research of dental anomaly at *Artibeus lituratus*, conducted bibliographic research of articles in international indexed journals for the period from 1964 to 2014 using the ISI Web of Knowledge database and Scopus databases. Worldwide works for "Life Sciences" were taken into account with keywords: bats, chiropra, atavism, polydonta, oligodonty, teeth, anomalies and formulas. He only found 17 articles. That is why I think it is interesting to report any new tooth abnormalities.

Dental abnormalities started to interest me after I discovered the occurrence of oligodonty in a Greater mouse-eared bat *Myotis myotis* on the basis of the skull found in the Šuplja stijena cave near town Srebrenik in Bosnia (Mulaomerović 2017). It was the first such case in the South-western Balkans and it is really interesting that such a case, given the relative number of bats worker and the number of bats in the region, has not been discovered earlier. It should be emphasized here that the *Myotis* group of all bats is most prone to dental anomalies (López-Aguirre 2014), but also that in European species of bats, dental anomalies were observed in the following species: *Rhinolophus hipposideros*, *R. ferrumequinum*, *Myotis myotis*, *M. bechsteini*, *M. dasycneme*, *M. nattereri*, *M. mystacinus/brandti* and *Myotis sp.* (Wołoszyn 1992 according to Lanza et al., 2008).

With this work, I want to point to the dental anomaly in the Greater mouse-eared bats (*Myotis myotis*), which is manifested in a nebulous premolar set. The skull I've founded in the last visit to the Srednja Bijambarska pećina cave on May 8, 2018. Ms. Irela Babić who works as a tourist guid in the cave helped me in collecting. On that occasion, 28 skulls, 14 mandibulas, 15 radiuses and 23 humerus were collected. On one of skull an anomaly has been noted. It is interesting to note that so far in the Srednja Bijambarska pećina cave all remains of the bones of the Greater mouse-eared bats were collected. The number of bat species recorded by the Srednja Bijambarska pećina cave at the different ages of the year is 11: *Rhinolophus ferrumequinum*, *R. hipposideros*, *Myotis myotis*, *M. oxygnathus*, *M. mystacinus*, *M. dasycneme*, *M. brandtii*, *Plecotus auritus*, *P. macrobullaris*, *Barbastella barbastellus*, and *Eptesicus serotinus*.

The teeth arrangement of premolars P1 and P2 in relation to the canin (C) in all the skulls that I have in my collection is at a certain angle of about 145 degrees. In total, I've reviewed 54 skulls of the Greater mouse-eared bats (*Myotis myotis*) and the Lesser mouse-eared bats (*Myotis blythii*). At the skull, which is the word here, the angle is about zero degrees, ie., the canin and the premolars are arranged along the mandible axis. In an accessible literature, I have not found this kind of abnormality.

This case also shows that the existing collections of osteological remains in museum collections should be reviewed carefully for possible new cases of dental abnormalities.

INTEREST FOR BATS IN BOSNIA AND HERZEGOVINA FROM THE BEGINNING OF THE 20TH CENTURY TO THE FIRST REGIONAL SYMPOSIUM ON BATS IN 2018

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The first text mentioning the bat in Bosnia and Herzegovina is a Turkish-Bosnian dictionary known as *Potur-Shahidi* from the late 18th century, and here is mentioned only as an interesting historical fact. The first published articles about bats in the scientific literature are two list of bats in the National Museum's collection published by Stjepan Bolkay in year 1924 and 1926. After the Second World War, bats collect, sometimes unreasonably, the Custodians of the National Museum from unidentified excitement, since they never published anything about these species. In the 1960's, bats were investigated by Obrad Ivanovic from Tuzla who, under the activity of the Speleological Club "Bosna", explores caves and records bats. He is first started with ringing of bats, in first time with the rings of its own production. He later co-operates with Đ. Mirić from the Natural History Museum in Belgrade.

In year 2001 Branko Karapandža from Serbia came to a caving camp on Vitorog mountain when Jasmin Pašić started working with him. One year later, Branko Karapandža studied bats in the Cave of Mišarica near Banja Luka. In year 2002, after the involvement of Bosnia and Herzegovina in the work of the Advisory committee of the EUROBATS agreement, we met with several young researchers from Slovenia, Croatia, Macedonia and Serbia. There is more and more information on the bats of Bosnia and Herzegovina. And more and more information comes from speleological societies, mostly just about caves as habitats.

The critical mass of data collected for the first bats atlas in Bosnia and Herzegovina was published in 2008 as an internal edition of Speleological society „Speleo Dodo“ from Sarajevo in a modest number, but there were numerous shortcomings such as a milestone for future research. By incorporating Primož Presetnik from Slovenia into our joint research, especially winter monitoring, and the involvement of younger ones, who get the first practical knowledge on camps in Slovenia, bats research in B&H gains significant momentum. We are launching ourselves and together with winter monitoring, each year increasing the number of inspected caves.

Thanks to the different projects, we also procure the first mistnets and bat detectors that expand our field of research. Our student Maja Hodžić resides in the specialization for eholocation in France. Together with our colleagues from Slovakia, Hungary and Poland, we started our the first international project whose symposium is part of.

At the same time, with the intensification of bats' research, we are also working to raise awareness of the importance of bats for nature and humankind, and within that pressure on the government authorities that Bosnia and Herzegovina join the European agreement for protection of bats. Finally in 2018 the Presidency of Bosnia and Herzegovina has issued a Decision on the signing of this Agreement.

DISTRIBUTION OF SOME SPECIES OF BATS IN BOSNIA AND HERZEGOVINA IN THE LIGHT OF NEW DATA

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In the recent years, the winter bats monitoring in Bosnia and Herzegovina has been carried out, as well as year-round research for different purposes. Therefore, the number of data of bat spreading has been significantly increased. In that light, the poster will show new spreadsheets for the species *Myotis brandtii*, *M. capaccinii*, *Plecotus macrobullaris* and *Tadarida teniotis* in relation to the current maps for these species in book Dietz C. & A. Kiefer, 2014. *Die Fledermäuse Europas. Kennen, bestimmen, schützen*. Stuttgart: Kosmos Verlag, 400 p.

BAT RESEARCH IN BIJAMBARE PROTECTED AREA – AN OVERVIEW

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Bats of the Bijambarske pećine caves are first mentioned in two bats lists in the collection of the Zemaljski muzej (National Museum) in Sarajevo published by Stjepan Bolkaý in 1924 and 1926. From then until the middle of the 1980s there was no information about the bats from the Bijambarske pećine caves. From that time, there are several animals of *Myotis mystacinus* and *M. myotis* in the collection of the Hungarian National Museum.

Since 2006, the interest of local cave researchers has begun for bats in the Bijambarske pećine caves, and from the winter of 2012/2013 the Bijambarske pećine caves are included in the standard winter bats monitoring. The Bijambare Protected Area Administration commissioned the annual bats monitoring 2015/2016 and then 2017/2018 year.

In the Bijambarske pećine caves (Gornja, Srednja and Donja Bijambarska pećina caves, Ledenica, Đurićina pećina cave and Ledenjača) a total of 12 bat species were registered, of which the most interest aroused by the discovery *Plecotis macrobullaris* and *Myotis dasicneme*.

PRECONCEPTION THAT CONTINUES - AN EXAMPLE OF A BAT

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During the lecture on bats in primary and secondary schools (including the Medical School in Sarajevo), in several cases I heard from students unbelievable prejudices about bats such as hair thinning, attacking on people in white clothes, dangerous animals that bite people and so on, regardless the fact that they have never experienced any contact with bats. It is clear that most of these prejudices among young people are the result of films about Dracula or yellow press, and recently internet portals. It is interesting that these prejudices give their space and serious newspapers such as the daily "Oslobodjenje" or contemporary music authors. An article titled from "Oslobodjenje" about the practice of capturing and killing a bat in the Cave of Mišarica near Banja Luka has been featured on the poster, from a young man who wants to find the right girl and it represents a safe recipe. There are also several pieces of lyrics from songs that talk about bats in a negative context that are more of a medieval witch than of serious musicians.

STUDY OF BAT FAUNA WITHIN PROTECTED AREA OF NATIONAL PARK KOZARA

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The conservation status of bats in Bosnia and Herzegovina is unknown. State government does not enforce any specific legislation for protection of bats and their habitats. Bats are listed in the “Red List of Protected Fauna” but without conservation or vulnerability assessment. Studies of bat fauna like this will be used to fill the legislation gaps but also in scientific purposes. This is even more important considering the activities that will need to happen soon in order to create Natura 2000 network in B&H. This project, which started in June 2016, is focused on one of the protected areas in Bosnia and Herzegovina, National Park Kozara. Previously, there was no official research of bat fauna in this area. In the first year we were focused on the inventory of species and defining the “zero state” of bat fauna within the area of National Park Kozara. We provided a first assessing database, list of species and roosting and nursery sites. During following years, plan is to establish systematic monitoring of bat species within National Park. In the last year of the foreseen 5 years project we plan to create management plan for each species which will be registered during the research. Management plans will be presented to the management and employees of National Park, for proper, sustainable management of each bat species.

RAJKOVA PEĆINA CAVE – THE MOST IMPORTANT HIBERNACULUM OF LESSER HORSESHOE BAT *RHINOLOPHUS HIPPOSIDEROS* IN SERBIA

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Rajkova Pećina cave is one of 62 important bat roost sites in Serbia. It is located near the town of Majdanpek in eastern Serbia. The complex cave with underground flow, about 2.300 m long, is legally protected as natural monument. It is located near the town of Majdanpek in eastern Serbia. Rich with beautiful ornaments, the cave was recently adapted for tourist visits. 6 bat species have been recorded so far – *Rhinolophus ferrumequinum*, *Rh. hipposideros*, *Myotis bechsteinii*, *M. nattereri*, *M. blythii* and *Plecotus auritus*.

During the short survey visit on 4 February 2017, the largest number of Lesser horseshoe bats *Rhinolophus hipposideros* (Bechstein, 1800) in a single roost site in Serbia ever has been recorded. At least 323 individuals of this species were unequally scattered throughout the cave. Previous largest number of hibernating Lesser horseshoe bats in Serbia was also recorded in Rajkova Pećina cave – 124 individuals, on 4 December 2010.

The research was conducted with the financial support of the Ministry of environmental protection of Serbia, project title “Monitoring of bat populations and roosts in Serbia”, project number 401-00-200/2016-17.

RANJENA PEĆINA CAVE – A NEW IMPORTANT ROOST SITE OF MEHELJ'S HORSESHOE BAT *RHINOLOPHUS MEHELJI* IN SERBIA

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Mehely's horseshoe bat, *Rhinolophus mehelyi* Matschie, 1901, has a discontinuous Mediterranean distribution. It is considered the rarest and the most threatened bat species in Serbia. On the Balkan Peninsula it is a regular faunal element, but it was not found in Macedonia, Montenegro, Bosnia and Herzegovina, and Croatia (where previous findings have been disproved as mistakes in identification). Population in Romania has been in rapid decrease for the last 70 years, while Bulgarian one it is considered as stable and numerous in optimal cave roosts and habitats. It is highly gregarious species, forming small to medium-sized nursery, transitory and hibernation colonies, together with other medium-sized horseshoe bats. Optimal habitats are karstic arid areas. Until recently, population in Serbia was estimated to about 200 individuals, with a decreasing population trend, and the species has been assessed as vulnerable in Serbia. It was recorded at 3 localities in eastern Serbia only.

Mixed hibernation colony counting around 3.000 bats of all 3 medium-sized European rhinolophid species has been discovered on 28 October 2016 in the Ranjena Pećina cave (Vratarnica village area) in eastern Serbia. The cave has a pit type entrance followed by few chambers in different horizons, and the colony was located in the second chamber. Dominant species within colony was *Rhinolophus euryale* with more than 2300 individuals, while rest of the colony counted around 400 specimens of *Rh. mehelyi* and less than 300 *Rh. blasii*. During the next survey visit on 4 February 2017, bats were found in the second chamber in a half of previous number, while the rest of them have moved deeper into the cave. In the first chamber of the cave 2 individuals of *Rhinolophus ferrumequinum* and a single individual of *Rh. hipposideros* have also been recorded.

This record significantly contributes to the knowledge on this rare and vulnerable species in Serbia and its subpopulation(s) on the Balkan Peninsula. Monitoring of the colony, the search for summer roosts, its conservation and protection are necessary activities and important task for our future work. The research was conducted with the financial support of the Ministry of environmental protection of Serbia, project title "Monitoring of bat populations and roosts in Serbia", project number 401-00-200/2016-17.

MORE THAN 60 YEARS OF RINGING *MINIOPTERUS SCHREIBERSII* (KUHLE, 1817) IN SERBIA: MOVEMENTS AND LONGEVITY DATA

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Schreiber's Bent-winged bat, *Miniopterus schreibersii* (Kuhl, 1817), has a Mediterranean distribution and is one of the most common cave-dwelling bat species in Serbia. It is highly gregarious, forming large nursery and huge hibernation colonies, comprising of few hundred to several tens of thousands of individuals (extreme up to 80000). It is considered to be a regional vagrant, commuting on average 40-100 km between summer and winter roosts, and philopatric to their nursery roosts. Population in Serbia is estimated at least about 150000 individuals, has a stable population trend and has been recorded on more than 75 sites. *M. schreibersii* has been ringed regularly in Serbia since 1955. During this 60 years period, we gathered some interesting data on the migration patterns, distances crossed and life expectancy in this species. A total of 2982 animals were ringed and 154 of them were recaptured. The oldest animal recaptured has carried its ring for more than 11 years, and few others for eight years at the moment. The longest movement recorded was 216 km, between Petrovaradin fortress (Novi Sad) and Puhovac village (Aleksandrovac) within only four days. Eleven more recaptures were over 100 km. We had five trans-boundary recaptures: two from Bulgaria (Ravanička pećina – Vidin, 110 km; Vernjikica cave – Vidin, 75.2 km); two from Bosnia and Herzegovina (Petrovaradin fortress – Dardagani quarry, Zvornik, 110 km) and one from Romania (Vršac quarry – mine shaft near Sasca Montana, 43.8 km). Ringing program in Serbia will be continued and we expect to gather more interesting data on movements and roost utilization of this and other bat species in the future.

A START OF SYSTEMATIC BAT SURVEY OF KOSOVO?

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Considerate rise of knowledge of bats distribution and their important habitats has been made in the past decade in Montenegro, Albania and Macedonia, therefore bat fauna of Kosovo is now the least known in the region. Last overview (Paunović 2016) has listed only 14 bat species on 10 sites, based on observations preceding 1996. During the last two years, several bat research in Kosovo started independently, bringing valuable recent information on bat species present and on some important bat cave roosts and other habitats. Although at least 30 bat species are expected to inhabit Kosovo, 20 bat species are recorded so far: *Rhinolophus hipposideros*, *R. ferrumequinum*, *R. euryale*, *R. blasii*, *Myotis myotis*, *M. blythii oxygnathus*, *M. nattereri**, *M. emarginatus*, *M. mystacinus* s. lat., *M. capaccinii*, *M. daubentonii*, *Nyctalus noctula**, *Pipistrellus pipistrellus*, *P. pygmaeus**, *P. kuhlii**, *Eptesicus serotinus*, *Plecotus auritus*, *Pl. austriacus**, *Miniopterus schreibersii*, *Tadarida teniotis** (* – new species for the Kosovo found in last two years). The basic mapping of bats distribution was also accompanied by education of local biologist, as only they can provide long-term sustainable bat research and protection of bats and their habitats.

RADIO-TRACKING REVEALS THE ROOSTING AND FORAGING BEHAVIOUR OF *PLECOTUS KOLOMBATOVICI* ON LOKRUM ISLAND, DUBROVNIK

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Plecotus kolombatovici is restricted to islands and the coastal strip along the western Adriatic from northern Croatia down to the Greece. It was identified as a separate species in 2001, consequently, little is known of its roosting and foraging ecology; information that is critical to the conservation of this species. The presence of *P. kolombatovici* on Lokrum island was confirmed by HBSD in the summer 2016 during surveys of the island to inform a management plan for the conservation of bats around the historical buildings on the island. This discovery led to a radio-telemetry study of the species to determine the roosting areas in the buildings and provide wider advice on protecting this species on the island.

Seven female were caught in mist-nets on Lokrum in June 2017 and fitted with 0.38g radio-transmitters. The bats were radio-tracked for six nights, and data were collected on their foraging locations, activity patterns and the roosts. The bats foraged in the native woodlands on the island as well as in non-native woodland in the Botanical gardens. There was considerable overlap in the core foraging areas of the tagged bats and the location of their principal foraging areas was strongly associated with the location of their day roosts. Day roosting was recorded in the historical buildings on the island but also in sea caves and trees.

GREATER NOCTULE, *NYCTALUS LASIOPTERUS*: NEWS FROM SLOVAKIA

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Greater noctule is rare bat species of Europe with enigmatic biology, the main part of knowledge comes from the studies of Mediterranean populations. Since 2005 small population of the species is observed in central part of Slovakia (within years 2005–2007 14 individuals were mist-netted in Veporské vrchy Mts., Muránska planina Mts.). In 2015 it was confirmed by acoustic monitoring and in 2017 a larger survey took place with the aim to confirm species occurrence and to find roosts with the help of radio-tracking. Seven individuals were mist-netted in this area, from which two adult females and two juvenile males were tagged with radio collars and their roosts were located. All eight tree roosts (in Trembling poplar, *Populus tremula*, typically in the state of decay) were situated at the edge of old (protection) forest and clearing or young forest. Frequent roost switching was recorded (only in one case bats have returned to previously known roost) while roosts were used by tracked individuals in range of 1–11 days. Size of the minimum convex polygon which covers roosting was about 1.9 km², distance between particular roosts was 0.1–2.8 km, distance from the foraging area /drinking of water was 3.3–5.9 km. The largest recorded bat colony that emerged from the roost during the evening was 12 individuals (min 2). This is the first information about the roost types of this species in Slovakia, whereas exclusivity of the selected type of tree roost is likely the reflection of high quality and diversity of vegetation. The results suggest strong potential of the Greater noctule as an umbrella species of nature conservation in forest ecosystem.

BAT RESEARCH IN ALBANIA : AN OVERVIEW FOR THE FUTURE

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Beginning in 2011, with the support of the University of Tirana, the Ministry of Environment and local NGOs, several projects have been implemented at the local and national level to increase awareness on bats. In order to manage increasing amounts of new data a national database was designed, with the aim of supporting the country for reporting to the different conventions and preparing potential integration of Albanian sites in the Natura 2000 network in the future.

All data collected during these projects is strongly improving knowledge on bat populations in Albania and South-Western Balkans. Also, thanks to the monitoring in place since 2011, we can observe the fluctuation of some species populations and propose concrete conservation actions to avoid destruction and disturbance. However, findings are not depicting the entirety of bats distribution in the country. Many species are still very much under-studied and more than half of the country is not covered yet by data.

Considering the rapid degradation and destruction of species habitats it is very a priority to consolidate existing research and conservation actions as well as targeting additional areas of potential high interest.

FIRST STUDY OF FORAGING PATTERNS AND HABITAT USE OF THE GREATER MOUSE-EARED BAT (*MYOTIS MYOTIS*) IN SLOVENIA

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In Slovenia greater mouse-eared bat (*Myotis myotis*) is endangered mainly due to the destruction of the roosts, however other potential factors of conservation concern are poorly known. Radiotelemetry is well established method to investigate bat's foraging habitats, however beside one night study on *Plecotus auritus*, no other study of this type existed in Slovenia. Therefore we investigated foraging habitat preferences of *Myotis myotis* from a maternity roost in a church in Spodnja Polskava (NE Slovenia) in May and June 2014. By using radiotelemetry and considering different land uses in the vicinity of the roost we managed to determine that the choice of foraging habitats was selective.

Differences between the expected and used habitats near the roost were significant, which points to selective use of foraging habitats. Our results supported the hypothesis that bats in will favour deciduous woodlands with little undergrowth, but not to the extent as it was observed in some previously conducted studies in regions north of the Alps. Land use categories that were most frequent among the foraging grounds were forest (40,0 %), followed by arable fields (35,9 %) and permanent meadows (13,8 %). In 67 % of feeding grounds, forest was the main habitat type, in nine occasions it covered more that 50 % of the surface. We used obtained results also as a basis to propose the guidelines for managing the roost and the surrounding habitats. Apart from gaining new knowledge on crucial but often neglected factors that might influence population trends, we also gained important field and analysis experience which will prove valuable in further studies of this kind.

WHAT DO WE KNOW ABOUT RABIES OF CROATIAN BAT FAUNA - ACTIVE RABIES SURVEILLANCE IN SELECTED ROOSTS

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Rabies, the oldest known zoonotic disease, is infecting all mammals. It is caused by viruses belonging to genus *Lyssavirus*, and has the higher mortality rate than any other infectious disease. It is also the first known bat-associated infection in humans. Data on EBLV presence and its distribution in Croatia are scarce, inconsistent and not up to date. In 2016 started a three year national project of active bat rabies surveillance in selected roosts. The main goal was to determine the presence and potential distribution of rabies in bats in Croatia and to provide data for further risk assessment.

Between 2016 and 2017, a total of 276 bats from seven species (*Eptesicus serotinus*, *Myotis blythii*, *M. emarginatus*, *M. myotis*, *M. nattereri*, *Miniopterus schreibersii*, *Rhinolophus ferrumequinum*) were captured at seven locations. Locations were selected for their significance since they are internationally important underground sites for bats in Croatia or well known maternity colonies in overground sites. None of the selected colonies had a history of bat rabies known to this date. From each bat two oropharyngeal swabs were taken, as well as blood samples from the uropatagial vein when possible. First results from this period are presented, as well as the future actions.

BAT RINGING - FIRST TRAINING
Bijambare, 2. – 3. 6. 2018.

MARKIRANJE SLEPIH MIŠEVA

Ivana Budinski

U nekim sferama istraživanja slepih miševa, često je neophodno (korisno) razlikovati različite individue slepih miševa. Markiranjem životinja se mogu dobiti podaci o kretanja jedinki između različitih skloništa, priverženosti skloništu, populacionoj dinamici, socijalnom ponašanju, o dugovečnosti životinja i vremenu reprodukcije. Slepri miševi se mogu obeležavati kratkotrajnim i dugotrajnim markerima.

Kratkotrajno markiranje – za potrebe nekih projekata je dovoljno razlikovanje individua u kraćem vremenskom periodu. Neke od metoda obeležavanja koje se koriste za to su:

- Sečenje krzna – sa leđa životinje je moguće iseći do pramena dlake, i različitim kombinacijama se pojedinačne jedinke mogu razlikovati (dlaka izraste za 3-5 nedelja)
- Sečenje noktiju – obeležavanje npr. juvenilnih jedinki koje su još uvek premale za obeležavanje prstenovima
- Upotreba reflektujućih plastičnih traka koje se zalepe na krzno
- Radio-telemetrija – između lopatica slepog miša se zakači radio odašiljač (koji ne sme da bude teži nego 5% mase životinje na koju se stavlja)

Dugotrajno markiranje – za praćenje migracije i dugovečnosti je neophodno obeležiti životinje dugotrajnijim markerima, od kojih se najčešće koriste sledeći:

- Metalni prstenovi – od legure aluminijuma, stavljaju se na podlakticu
- Plastični prstenov različitih boja, do 3 prstena (kombinovanje boja) se stavljaju na podlakticu slepih miševa, i tu mogu ostati do godinu dana.
- Mikročipovi – mikročip se ubacuje ispod kože slepog miša, i može se očitati sa distance od 15 cm

Markiranje slepih miševa metalnim prstenovima

Početak sistematičnog prstenovanja slepih miševa u Evropi je počelo 1932 godine u Nemačkoj.

Ovaj način markiranja se koristi da bi se dobili odgovori na sledeća pitanja:

1. Da li i koliko daleko slepi miševi migriraju?
2. Da li postoji priverženost skloništu?
3. Koliku starost mogu da dožive, i kakva je starosna struktura u kolonijama slepih miševa?

Standardna procedura prstenovanja slepih miševa uključuje postavljanje laganog metalnog prstena na podlakticu slepog miša. Prstenovi se prave od legure aluminijuma, i u velikom broju zemalja se koriste prstenovi proizvođača Porzana Ltd. Dostupni su u nekoliko različitih veličina, a veličina prstena koja se koristi zavisi od veličine (vrste) slepog miša. Preporučene veličine prstenova su date od strane EUROBATS-a.

Prstenovi imaju zaobljene ivice da ne bi oštetili podlakticu ili letnu membranu, i pažljivo se zatvaraju oko podlaktice slepog miša. Jako je bitno da prostor između ivica prstena bude dovoljno velik da se ne ošteti letna membrana, i da prsten može slobodno da klizi po podlaktici. Sa druge strane, prsten ne treba da bude stavljen previše labavo da ne bi spao, ili da se u njega ne bi zaglavile kosti prstiju. Prema konvenciji, mužjacima se prstenovi stavljaju na desnu, a ženka na levu podlakticu. Na svakom prstenu postoji jedinstveni broj i oznaka centra za markiranje.



Slika 1. Ženka *Miniopterus schreibersii* sa prstenom na levom krilu

Prilikom prstenovanja slepih miševa je neophodno zapisati sledeće podatke: broj prstena, vrsta, pol, starost, datum i mesto prstenovanja, kao i ime i prezime koja je prstenovala životinju. Ti podaci se deponuju u bazama centara za markiranje životinja. Prilikom ponovnog hvatanja markirane životinje se zapisuju isti podaci, kao i fizičko stanje životinje i prstena. Ukoliko se primeti da je prsten izazvao povredu, neophodno je taj prsten skinuti (eventualno je moguće postavljanje novog prstena na drugo krilo).

Slepi miševi su mnogo osetljivi na prstenovanje u poređenju sa pticama jer je prsten u kontaktu sa mekim tkivima, i ako prilikom markiranja prsten nije dobro postavljen (npr. bude previše stegnut) može izazvati povrede. Isto tako, slepi miševi prepoznaju prsten kao strano telo i često mogu da ga grizu. U prošlosti je u nekim državama zbog upotrebe neadekvatnih prstenova i nestručnog postavljanja istih na podlaktice slepih miševa napravljena velika šteta, te je u nekima od njih potpuno prekinuto markiranje slepih miševa prstenovima. Takođe, primećeno je da su neke vrste osetljivije na prstenovanje i podložnije povredama od drugih (npr. *Rhinolophus hipposideros*), zbog čega se ne preporučuje njihovo prstenovanje.

Pre početka projekta koji uključuje prstenovanje slepih miševa, neophodno je dobro razmotriti ciljeve i zapitati se koliko životinja treba markirati da bi se dobili željeni podaci, da li će dobijeni rezultati biti vredniji od broja potencijalno izgubljenih životinja i koliko dugo sam projekat prstenovanja treba da traje. Upotrebom metalnih prstenova su dobijeni jako značajni podaci o migracijama slepih miševa, da neke vrste (npr. *Pipistrellus nathusii*) mogu da migriraju preko 2000 km između letnjih i zimskih skloništa. Isto tako su dobijeni podaci o životnom veku slepih miševa, i da neke vrste mogu da žive i preko 40 godina.

Slepi miševi su strogo zaštićene životinje kako međunarodnim zakonima, tako i nacionalnim zakonima u mnogim državama, i za njihovo hvatanje i markiranje su neophodne dozvole nadležnih institucija, a isto tako treba pratiti i preporuke međunarodnih zakona vezanih za dobrobit i zaštitu divljih životinja. Takođe neophodna je obučenosť za hvatanje i utreniranost za markiranje slepih miševa da bi se uznemiravanje i potencijalne povrede životinja svele na minimum.

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"Zaštićeni pejzaž Bijambare" – speleološka komponenta

Jasminko Mulaomerović, Simone Milanolo

Uvod (položaj, geologija, hidrologija)

Područje Bijambara (koje je 2003. godine proglašeno zaštićenim pejzažom) nalazi se oko 40 km sjeverno od Sarajeva, Bosna i Hercegovina. Ovo područje obuhvata 370 ha, a prosječna nadmorska visina iznosi 950 m. Iako je zaštita ovog područja izvedena prvenstveno na osnovu istraživanja biljnih zajednica (Redžić *et al.*, 2001) Srednja Bijambarska pećina je jedna od glavnih atrakcija ovog područja, i radovi usmjereni na njeno uređenje za posjete turista počeli su sredinom XX stoljeća.

Pejzaž karakteriše crnogorična šuma uz povremenu pojavu alpskih pašnjaka, ali su se na aluviju i riječnim sedimentima na dnu doline stvorile male bare i jezera. Samo ime "Bijambare" podjeća na zemljište pokriveno manjim i većim barama, ili zemljište koje se stalno ili povremeno plavi.

Sve pećine nastale su na mjestu kontakta između nepropusnih stijena i masivnih krečnjaka (Srednji Trijas – Anizik). Analiza uzorka stijene iz pećine Ledenjača pokazala je da je u sastavu stijene preko 99% udio karbonata, dok je ostatak uglavnom glina. Na mikroskopu, na ovom uzorku mogu se vidjeti male linije žuto-crvenkaste boje (Milanolo *et al.*, 2007).

Hidrologija ovog područja nikada nije na pravilan način istražena. Za vodu koja se nakuplja na području Bijambara, zajedno sa alogenim vodotocima iz potoka Brodić i Bjelila, smatra se da izvire na vrelu Orije. Međutim, niti jedna naučna studija koja bi potvrdila ovu tezu nije pronađena u literaturi.

Historija istraživanja

Teško je reći kada su započela prva speleološka istraživanja Bijambarskih pećina. Najstariji potpisi u unutrašnjosti pećine ukazuju na kraj 19-og stoljeća, kada su brojni strani radnici iz Austrougarske monarhije došli u Bosnu i Hercegovinu i učestvovali u eksploataciji šumskih resursa i ruda, te izgradnji cesti i željeznice. Nakon njih su uslijedili mnogi članovi prvih bosanskohercegovačkih planinarskih klubova kao što su: "Prijatelji prirode", "Kosmos" i HPD Bjelašnica, koji su ostavili svoje potpise u ovoj pećini, kao i u mnogim drugim pećinama u bližoj okolini Sarajeva. Nažalost, ovi prvi istraživači nisu ostavili nikakve pisane dokumente, crteže ili fotografije.

Prve popularne tekstove o Bijambarama donose poznati bosanski planinari Vejsil Čurčić (1940) i Eugen Kurmičić (1944) u planinarskoj periodici, ali u vrlo nesretno vrijeme – godine 2. svjetskog rata. Prva ozbiljnija nastojanja da se kompleks Bijambara valorizira na pravi način potiču iz sredine pedesetih godina 20. stoljeća u okviru rada Republičkog zavoda za zaštitu spomenika kulture i prirodnih rijetkosti Bosne i Hercegovine (Ržehak, 1958; Baučić & Ržehak, 1959). U okviru tih nastojanja i H. Pašić (1963) pravi prva ozbiljnija meteorološka ispitivanja jedne pećine kod nas.

I za naučne krugove Bijambarske pećine postaju interesantne vrlo rano. Tako se tvrdokrilci *Antroherpon stenocefalum* i *Pholeunopsis ganglbaueri* iz Srednje bijambarske pećine pojavljuju u evropskoj naučnoj literaturi već 1901 godine, (Apfelbeck, 1901). Kasnije se u nekim okolnim pećinama (npr. Banja pećina kod Očevja) nalaze nove podvrste antroherpona, pa Jeanel (1930) revidira ovu vrstu i opisuje je kao *Antroherpon stenocefalum stenocefalum*. Nažalost, biospeleološka istraživanja su tu i završila. Mnogo kasnije, nastavljajući se na zacrtani koncept stručne valorizacije ovog prostora, Mirko Malez vrši prva značajna speleološka istraživanja Gornje, Donje i Srednje Bijambarske pećine sa iskopavanjima u svrhu paleontoloških i arheoloških istraživanja (Malez, 1968).

Speleološki objekti

Na razmatranom području je prije 2006. godine bilo poznato i u speleološkom katastru zabilježeno postojanje šest pećina (Mulaomerović *et al.*, 2006). Međutim, u literaturi je dovoljno informacija objavljeno samo za Gornju i Srednju pećinu (uglavnom u spomenutom radu M. Maleza) dok je za druge objekte bilo moguće naći samo ime i nekoliko drugih podataka.

Kako bi se definirao popis speleoloških objekata na ovom području, i napravila adekvatna dokumentacija za njihovu zaštitu i valorizaciju, izvršena su sistematska istraživanja.

Identifikovano je osam objekata, među kojima je jedan potpuno nov (i trenutno nema ni broj ni ime u katastru). Sažetak osnovnih podataka dat je u sljedećoj tabeli:

Naziv	Broj u katastru	Dužina (m)	Dubina (m)	Koordinate G.K.	Visina (m)
Srednja (Glavna) B.	1379	533	-24	6540707 E 4883506 N	959
Ledenjača	2200	323	-51	6540971 E 4882977 N	935
Donja B.	1377	148	+6 /- 11	6540660 E 4883422 N	930
Đuričina	1634	142	-28	6541072 E 4882846 N	950
Gornja B.	1378	112	+10	6540759 E 4883460 N	980
Dimšina	3040	108	-30	6541028 E 4882845 N	935
Ledenica	2163	41	-18	6541083 E 4882784 N	940
Nova pećina	-	28	-12	6541160 E 4882947 N	980

Srednja (Glavna) Bijambarska pećina

Ovo je najduža pećina na ovom području i uređena je za turističke posjete (staze i rasvjeta). Iako je detaljno istražena, u prošlosti urađena studija (Malez, 1968) obuhvatila je samo glavni hodnik, izuzimajući na taj način mnoge detalje o malim bočnim hodnicima. Treba napomenuti da se više od pola ove pećine trenutno nalazi izvan granica zaštićenog područja, te stoga njena zaštita nije u potpunosti zagarantovana.

Srednja Bijambarska pećina je morfološki jednostavna i sastoji se od ulaznog dijela i tri duge dvorane koje su međusobno povezane. Iako ova podjela na 4 dvorane potječe još od starih vremena, sa morfološkog stanovišta je dosta proizvoljna.

Ustvari, prve tri dvorane su dio jedinstvenog kanala koji se pruža u smjeru sjeverozapada, sve dok se ne sastavi sa drugim hodnikom koji se pruža iz pravca zapada. Nakon uskog prolaza, koji je djelomično povećan putem uklanjanja sedimenata tokom ranijih uređenja u turističke svrhe, pećina odjednom postaje široka. Ovaj dio (četvrta dvorana) je zbog svoje akustičnosti nazvan „Muzička dvorana“, a vjerovatno je nastala spajanjem različitih kanala (većina njih sa kružnim presjekom) čiji se ostaci još uvijek mogu vidjeti na plafonu dvorane.

Dužina dvorana kreće se od 30 do 80 metara, a njihova širina je od 18 do preko 30 metara. Njihova visina doseže u Muzičkoj dvorani preko 12 metara. Cijela pećina je prekrivena debelim slojem pećinske ilovače po kojoj su se istaložili različiti pećinski ukrasi, bigrene kade, stalagmiti i kalcitne prevlake.

Potrebno je pomenuti i tri lateralna hodnika: prvi, koji se djelimično koristi za turističke posjete, proteže se prema zapadu, prije uskog prolaza koji vodi do „Muzičke dvorane“. Zadnji dio je ispresijecan malim prolazima unutar kamenih blokova, i skoro da dotiče površinu ispod doline koja se vidi na topografskoj karti. Nažalost, površina iznad pećine nije sigurna zbog prisutva mina, te stoga nije moguće provoditi bilo kakva istraživanja na terenu. Međutim, postoji mogućnost da ovaj dio pećine ima ulogu privremenog ponora tokom velikih padavina. Tokom jedne posjete kada su bile velike kiše, u ovom kanalu bio je mali vodopad.

Drugi lateralni hodnik je prirodni nastavak pećine nakon „Muzičke dvorane“. Na svom kraju je zatvoren stijenama i vjerovatno je blizu površine na drugoj strani planine. To je potvrđeno i prisustvom troglofilnih insekata koji su tipični za ulaze u pećinu. Obzirom da je ovaj kanal na većoj nadmorskoj visini nego tlo u dvorani, to je, također, i toplije mjesto unutar pećine, gdje je temperatura blizu 7°C.

Treći hodnik je serija reliktnih prolaza koji se protežu iznad Muzičke dvorane. Istraživanje ovog prostora još nije završeno, ali zahtijeva opremu sa vještačko penjanje.

Pećina se pruža duž vertikalne pukotine. To je vjerovatno bio geološki element koji je uzrokovao nastanak ove pećine. Pećina je u prošlosti služila kao ponor, drugim riječima kao odvod za vodu koja se akumulirala unutar šireg područja Bijambara.

Morfološki detalji kao što su fasete, su zbog turbulentne erozije-korozije vode, potpuno sakrivene ispod kalcitnog sloja i tragovi su vidljivi samo na zidovima prije uskog prolaza koji vodi do „Muzičke dvorane“. Obzirom da je strmija strana prema ulazu u pećinu, na njima se može vidjeti smjer kretanja vode prema Muzičkoj dvorani.

Danas u pećini nema vode (jer ponire u Donjoj pećini), već se samo stvore mala jezera tokom kišnih perioda. Voda koja kapa sa stropova se sakuplja i odvodi u dva udubljenja: jedan u glavnom kanalu (koja ponekad postaje malo jezero) i drugi u uskom prolazu koji povezuje „Muzičku dvoranu“ sa glavnim kanalom. U blizini ovog zadnjeg mjesta poniranja nalazi se mali (ali stalni) izvor vode.

Osim po veličini Srednja Bijambarska pećina se izdvaja i po bogatstvu sigastih tvorevina i pećinskih ukrasa. Većina ih je izlučena duž zidova, a u zadnjoj dvorani i na tlu i po stropu. Neki od njih su vrlo reprezentativni kao orguljasta zavjesa koja je izlučena u kupolastom udubljenju. Stepnaste kamenice iz sjeverozapadnog dijela zadnje dvorane su jedinstven sigasti morfološki ukras u našim pećinama. Pored brojnih vrlo lijepih stalagmita treba spomenuti i pizolite ili pećinske bisere koji se formiraju kristalizacijom oko nekog kamenčića. Ono što je još jedna od karakteristika Srednje Bijambarske pećine je veliko bogatstvo stalaktita na stropu. Ponekad oni stvaraju različite forme zahvaljujući gustom spletu pukotina. Boje sigastih tvorevina variraju, od mliječno bijele, preko sive i crne (zahvaljujući manganovim oksidima) do crvenkastosmeđih nastalih zahvaljujući otopljenim željeznim oksidima u vodama koje su se procjeđivale.

Velike dvorane, bogatstvo sigastih ukrasa, neposredna okolica kao i dobar prometni položaj na komunikaciji Sarajevo-Tuzla bili su i osnovni motivi da se Srednja bijambarska pećina valorizira i kao turistički objekt u sklopu jednog rekreacionog centra. Radovi su započeti krajem šezdesetih godina 20. stoljeća i sa prekidima traju do danas sa različitim intenzitetom i kvalitetom. Pećina je proglašena spomenikom prirode 2003. godine.

Ledenjača

Ova pećina se prvi put pominje 1984. godine (Speleološko Društvo "Bosansko-Hercegovački Krš", 1984). U tom istom radu data je karta galerija koje povezuju ulaze. Dužina koja je tada istražena iznosila je otprilike 70 m.

Cijelokupno istraživanje do zadnjeg sifona izveli su italijanski speleolzi tokom perioda 2002-2003, što je povećalo dužinu istraženog prostora na 323 m (Milanolo *et al.*, 2007).

Pećina se nalazi na kraju male udoline koja predstavlja stari tok potoka Bijelila. Pećina je obično suha (barem u gornjem dijelu), ali može imati ulogu privremenog ponora tokom jako kišnih perioda godine. Postoje 4 ulaza na dva nivoa. Pećina se može podijeliti na tri različita dijela:

Gornji kanal: Kanal koji ima otprilike zaobljeni dio (stari freatski nivo) i povezuje 3 ulaza. Na mnogim mjestima ovaj kanal ima vezu sa nižim kanalom i sa glavnim predvorjem.

Glavni ulazni dio: Ulaz je privremeno aktivni ponor. Samo nekoliko metara nakon ulaza nalazi se soba koja je u gornjem dijelu povezana putem sigaste kore sa gornjim kanalom. Silaženjem niz stijene moguće je doći do nižeg kanala.

Niži kanal: Ovaj kanal nalazi se samo nekoliko metara niže od ulaza i do njega se može doći sa tog mjesta ili direktno iz gornjeg kanala. Ovaj dio pećine je vjerovatno hidrološki aktivan tokom dugih kišnih perioda, jer se mogu vidjeti komadići drveta koji su se nataložili čak nekoliko metara od poda. Morfologija pokazuje alternativne i kompozitne oblike između tipično freatskih i vadoznih dijelova.

Nakon nižeg kanala može se jasno vidjeti geološka uslovljenost smjera 18°N pećine. Od ovog mjesta meander nakon nekoliko jama dolazi do sifona gdje pećina završava. Zadnji dio je obično presiječen malom količinom vode koja teče čak i za vrijeme suhih perioda. Nema značajnih naslaga osim sigaste kore na ulaznom dijelu i nekoliko kamenica na zadnjem meandru.

U ovoj pećini nikada nije bilo jake cirkulacija zraka, te je stoga vjerovatnoća povezivanja sa velikim sistemom hodnika vjerovatno mala. Tokom zime i proljeća, moguće je prisustvo leda barem do nižeg kanala. To svjedoči da tokom hladnih perioda postoji uvlačenje zraka sa ulaza, te je stoga pećina vjerovatno povezana sa nekim drugim ulazom na većoj visini. Brojne male kanale potrebno je bolje istražiti.

Donja Bijambarska pećina

Ova pećina je aktivni ponor potoka Brodić i njeni morfološki oblici podsjećaju na tipičnu evoluciju u uvjetima otvorenog kanala. Meandri uglavnom sa fasetama na zidovima su najdominantniji tip kanala. Osim ulazne prostorije ostatak pećine je dosta uzak. U staroj literaturi ova pećina spominje se kao „Pećina kod starog mlina“. Od spomenute gradnje, očuvan je samo dio kamenog zida koji je korišten kao brana.

Idući od vodotoka, meander postaje previše uzak za prolaz ljudi već nakon manje od 20 m. Međutim, odmah nakon drugog hodnika, mali prolaz sa lijeve strane vodotoka vodi do sljedećeg dijela pećine. Kada se siđe dalje nekoliko metara, opet se naiđe na mali vodotok (koji je vjerovatno dio velikog). Nakon još 15 metara aktivnog meandra, ovaj kanal nestaje ispred malog jezera (1 sifon). Ovaj vodotok sastavlja se sa jezerom sa desne strane (dok ostatak vode ulazi u pećinu).

Sa desne strane, nakon 10 m, kanal je povezan sa predvorjem putem prozora na visini od 3-4 m od poda. Nakon ovog kanala, sa lijeve strane je potrebno koristi konopac kako bi se prešlo preko 10 m duboke jame.

Na njenom dnu, voda ističe iz malog sifona (kao što je prikazano na karti pećine, ovo je druga strana prvog sifona) i protiče manjim ravnim kanalom dok njeno napredovanje nije ponovo zaustavljeno (drugi sifon).

Čini se da je nepoznati dio pećinskog hodnika dovoljno širok da proguta vodotok potoka Brodić, čak i za vrijeme velikih padavina. Međutim, pronađeni su komadi drveta udaljeni 3-4 m od nivoa tla koji potvrđuju skoro potpuno plavljenje ulazne dvorane. Pored toga, brzina vode je dovoljno velika da spriječi taloženje sedimenata, koje bi vremenom zatvorilo prolaze.

Tokom zime, u pećini su prisutni stalagmiti i stalaktiti od leda, najmanje sve do prvog sifona.

Đuričina pećina

Tokom projekta, na osnovu dostupnog opisa (Ržehak, 1958.) otkriveno je da pećina koja je trenutno označena turističkom oznakom kao Đuričina, ustvari nije Đuričina pećina. Prava Đuričina pećina je locirana nekih 60 m sjeveroistočno i nije u sklopu označene turističke staze. Objekat koji je trenutno označen kao Đuričina pećina nije naveden u literaturi. Glavni ulaz je na širokom i strmom udubljenju terena. U prvom dijelu tlo pokrivaju drveće i trava, dok je u nižem djelu još uvijek vidljivo originalno urušeno kamenje. Na dnu ponora smješten je pravi ulaz u pećinu. Nakon nekoliko metara, pećina vodi do sjeverozapadne-jugoistočne pukotine na kojoj se nastavlja preostali dio pećine. Ovaj dio je velika dvorana koja se proteže uzduž pukotine sa širokim otvorom na površini stropa pećine. Drugim riječima, prvi dio pećine se može smatrati i prirodnim širokim mostom.

Na desnoj strani, pećina slijedi nepravilne stijene sve dok prolaz ne postane veoma uzak i konačno potpuno zatvoren razrušenim komadima stijena. Na lijevoj strani, dvorana je dosta

duža i nastavlja u obliku malog hodnika koji završava malom dvoranom. U ovom dijelu mogu se vidjeti male kalcitne sigaste kore.

Najinteresantniji dio za daljnja istraživanja je mali hodnik koji počinje u glavnoj dvorani i vodi jugozapadno paralelno do ulaza u pećinu. Ovaj mali silazni kanal je vjerovatno povezan sa Dimšinom pećinom koja je udaljena samo nekoliko metara (što, čini se, potvrđuje i zračna struja u ovom dijelu pećine). Na njenom dnu, pod je u potpunosti prekriven sa finim sedimentima koji sprječavaju daljnje istraživanje. Međutim, na samom vrhu vertikale vidljiv je mali hodnik koji je još uvijek neistražen.

Zbog same morfologije ove pećine, snijeg koji pada kroz otvor na plafonu se nakuplja tokom zime, a drveće i zidovi ga štite od sunca. Pored toga, u pećini se vjerovatno nakuplja hladni zrak koji omogućava stabilnu termalnu stratifikaciju. Iz ovih razloga, led i snijeg traju sve do kasnog proljeća i ranog ljeta, a ponekad i tokom cijele godine.

Iako u pećini nema tekuće vode, iz jedne šupljine promjera 20 cm na sjeveroistočnom zidu moguće je čuti zvuk tekuće vode. Ovo bi moglo potvrditi prisutnost nepotopljenih prolaza nakon sifona u Dimšinoj pećini.

Ova pećina je bila uvrštena u prirodne spomenike još pedesetih godina 20. st.

Gornja Bijambarska pećina

Ova pećina je značajno arheološko nalazište i dobro je opisana u djelu Meleza (1968). U istom djelu predstavljeni su morfologija pećine, arheološka nalazišta i sedimentna stratigrafija. Od tada, nisu provedena daljnja istraživanja, pa vjerujemo da su rezultati koji su predstavljeni u tom djelu još uvijek aktuelni.

Na morfologiju pećine uveliko je utjecalo njeno rasčlanjivanje. Iz ovog razloga teško je istražiti originalnu funkciju hodnika. Široka ulazna dvorana je skoro suha i bogato osvijetljena sa ulaza na J-Z strani, pa je prema tome bila idealna kao prehistorijsko sklonište. Dva hodnika se pojedinačno prostiru u pravcu S-Z i S-I. Prvi nakon skoro 20m naglo skreće u desno u pravcu S-I i završava u puno malih kanala koji su ponegdje međusobno povezani vezama stvorenim od ostataka koji su međusobno cementirani. Slijedeći drugi hodnik potrebno je uspeti se po kamenju da bi se došlo do gornje široke prostorije. I na ovaj dio pećine je uveliko uticao fenomen razgradnje.

Ova pećina je u potpunosti hidrološki relikv i, prema tome, nema traga vode. Veći dio tla je pokriven sedimentima. Nema bitnih speleoloških ili pećinskih elemenata koje bi trebalo opisati. Međutim, sloj sigaste kore na desnom kanalu je vjerovatno veoma star i mogao bi se koristiti za određivanje starosti pećine i dobivanje informacija o pekleklima u regionu.

Dimšina pećina

Ova pećina je aktivan ponor potoka Bijelila. Međutim, ulaz u pećinu je nekoliko metara iznad nivoa vode i uglavnom je suh. Deset metara od ulaza u pećinu vertikalno okno dubine 6 m vodi do aktivnog dijela pećine. Voda dolazi sa lijeve strane kroz uski sifon - jezero. Vodotok protiče između kamenja i, u zavisnosti od hidroloških uslova, može se razdvojiti na nekoliko dijelova. Od nastanka pećine, mali hodnici (većinom kružnog presjeka) su jasno vidljivi na stropu glavnog kanala. Nakon glavnog hodnika nalazi se nagli zaokret od 90 stepeni u pravcu S-I. Nakon 4-5 m, uski prolaz, koji je skoro zagrađen deblima od stabala (promjera 50-60 cm) i velikom kamionskom gumom, vodi do malog otvora (2m). Slijedeći dio pećine karakteriše labirint malih međusobno povezanih hodnika, najmanji uglavnom imaju okrugli

presjek, dok glavni i oni aktivni su očito pretrpjeli režimske izmjene otvorenog kanala. Na zidovima se nalazi mnoštvo faseta.

Voda protiče kroz mali prolaz koji je tokom istraživanja bio djelimično potopljen. Tokom ranijih istraživanja spelolozi su istražili taj prolaz koji vodi do malog vodopada, a zatim do sifona.

Iako je nivo vode zaustavio daljnje istraživanje, moguće je doći drugim putem do posljednjeg sifona. Nekoliko metara prije potopljenog prolaza, moguće je uspeti se u mali hodnik. Ovaj put vodi do gornjeg nivoa pećine koji je pun kanala većinom neistraženih (vjerovatno je da veliki broj ovih kanala / otvora završava ponovo u nižem nivou). Najveći kanal nakon 10 m vodi do sifona odozgo.

Tokom dva dana (oba sa visokom vanjskom temperaturom) uočen je osjetan vjetar sa gornjeg nivoa pećine. Osim toga, iz mape ovog područja jasno se vidi da se Đuričina i Dimšina pećina djelimično prepliću.

U istom periodu (proljeće-ljeto), hodnik Đuričine pećine koji se proteže preko Dimšine je interesantan i po vjetru.

Gotovo je sigurno da su ove dvije pećine povezane, pa tako se hladni zrak iz Đuričine spušta u Dimšinu pećinu.

Ledenica

Ova pećina je trenutno pogrešno označena kao Đuričina. To je strma uvala koja zadržava snijeg veći dio godine. Na kraju silaznog kanala nalazi se potok koji je povezan sa malim ponorom smještenim u jezeru koji formira potok Bijelila. Prolaz je u oba pravca previše mali za daljnje istraživanje. U smjeru S-Z kanal se proteže još nekoliko metara. U ovom dijelu pećine tokom zime formiraju se ledeni stalagmiti i stalaktiti. Jedan zid je lijepo ukrašen sa finim nanosom blata.

Nova 1

Ova nova pećina je pozicionirana odmah iznad Đuričine pećine i uprkos očekivanom prolazu do srednjeg dijela podzemnog sistema, rezultirala je skromnim dimenzijama.

Pećina se uglavnom sastoji od silaznog hodnika koji završava malim proširenjem. Nekoliko metara ispred istog, na istočnoj strani, postoji još jedan silazni kanal koji vodi do donjih dijelova pećine. Nema bitnih elemenata koji bi se mogli naglasiti.

Morfološka istraživanja i postanak pećina

Specifična istraživanja nisu provedena u ovoj oblasti. Međutim, potrebno je naglasiti nekoliko pitanja koja se zasnivaju na osnovnim observacijama podzemnih morfologija, a one mogu biti osnova za daljnja istraživanja.

U svom djelu Malez (1968) predlaže jednostavnu šemu postanka zasnovanu na progresivnom snižavanju nivoa poniranja potoka Brodić. Na osnovu ove hipoteze Gornja i Srednja pećina predstavljaju stare ponore koji su danas izgubili svoju hidrološku funkciju. Isti zaključak se može primjeniti i na potok Bijelila gdje su pećine Dimšina i Lednjača (privremeno) još uvijek aktivne, dok je Đuričina bila stara podzemna tačka poniranja.

Međutim, Dimšina, Ledenjača i Donja Bijambarska pećina održavaju morfologije koje se mogu pripisati freatskim uslovima. Prema tome, moguće je da sadašnja podzemna mreža hodnika koji presijecaju (a vjerovatno je na njih i utjecala) staru postojeću mrežu kanala podzemnih voda koji su nastali kada je nivo poniranja bio na višoj razini. Može se reći da formacija Bijambarskih pećina, u odsustvu specifične studije, datira iz srednjeg pleistocena.

Veći broj istraživanja bi mogao dovesti do boljeg razumijevanja nastanka Bijambarskog pejzaža.

Palaentologija i arheologija pećina

Gornja pećina je najstarija pećina u Bijambarskoj oblasti. To nije veliki speleološki objekat niti ima lijepu dekoraciju koja Srednju pećinu čini posebno atraktivnom. Međutim, u svom tlu ona skriva najznačajnije podatke o staroj fauni i ljudskoj prahistoriji.

Ulaz u pećinu širine 16 i visine 12 metara, kao i jugozapdna orijentacija nudi odlične uslove za boravište prahistorijskih ljudi. Lijevi hodnik, kao i ulazna dvorana je ispunjena sedimentima, dok u desnom hodniku tlo je sastavljeno od stijena na kojima su se tokom vremena natolžile sigaste tvorevine.

Testna sonda (Malez, 1968) iskopana na ulazu lijevog hodnika pokazuje različite sedimentne slojeve nataložene tokom pleistocena (od prije 1.8 miliona godina do 10000 godina) i skorašnje holocenske taložine (od prije 10000 do danas)

Najstariji sedimenti su predstavljeni pijescima naplavljenim u toplom dijelu Wirm II-III interstadijala. Iznad njih se nalazi relativno debeli sloj ilovače sa kamenjem koji jasno ukazuje na kraj toplog perioda i početak zahlađenja. Slojevi nastali u doba snažnog Wirm III zahlađenja predstavljeni su sa različitim ilovačama i sitnim oštrobriđnim kamenjem. U njemu su nađeni brojni ostaci kvartarne faune, ali i kameno oruđe prethistorijskih stanovnika ovih krajeva. Preko ovog sloja naplavljen je crvekastosmeđa ilovača u periodu koji je poznat kao atlantik. Posljednji sloj je humusna zemlja koja sadrži ostatke keramike iz bronzanog doba i kosti recentnih životinja.

Nalazi iz sloja istaloženog u vrijeme posljednjeg ledenog doba pokazuju da je pećinu koristio čovjek koji je pripadao kulturi epigravetiana. Lepeza kamenih oruđa kreće se od raznih vrsta nožića, strugala, grebala, ubadača, šiljaka do retuširanih lamela. Sve su alatke izrađene iz fino zrnatih stijena: jaspisa, kalcedona i rožnaca.

Od faune na osnovu ostataka kostiju određene su dvije vrste zajednica: jedna stepska predstavljena stepskom zviždarom, slijepim kućetom, krticom, hrčkom, vodenom voluharicom, i druga, zajednica visokogorskih i šumskih pejzaža sa oštrom kontinentalnom klimom, predstavljena pećinskim medvjedom, kozorogom, divokozom, lasicom i sjevernim bijelim zecom.

Zaključak

U Bijambarskoj zaštićenoj zoni, geološka, biološka i morfološka raznolikost se odražava u bogatoj biološkoj raznovrsnosti i u širokoj lepezi pejzaža, kako iznad tako i ispod površine zemlje. U relativno malom prostoru postoje veliki potencijali za daljnja proučavanja u različitim naučnim oblastima koja predstavljajući nova saznanja trebaju postati instrumentima za valorizaciju i zaštitu ovog prostora.

Ovaj rad predstavlja opći pregled prethodnih istraživanja i prezentaciju rezultata dobivenih tokom skorašnjih speleoloških istraživanja, a ima za cilj osiguravanje osnove za više specijalizirana istraživanja fokusirana na različite aspekte.

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Slika 1. Muzička dvorana u Srednjoj Bijambarskoj pećini (Foto: S. Milanolo)



Slika 2. *Barbastella barbastellus* u Srednjoj Bijambarskoj pećini (Foto: S. Milanolo)



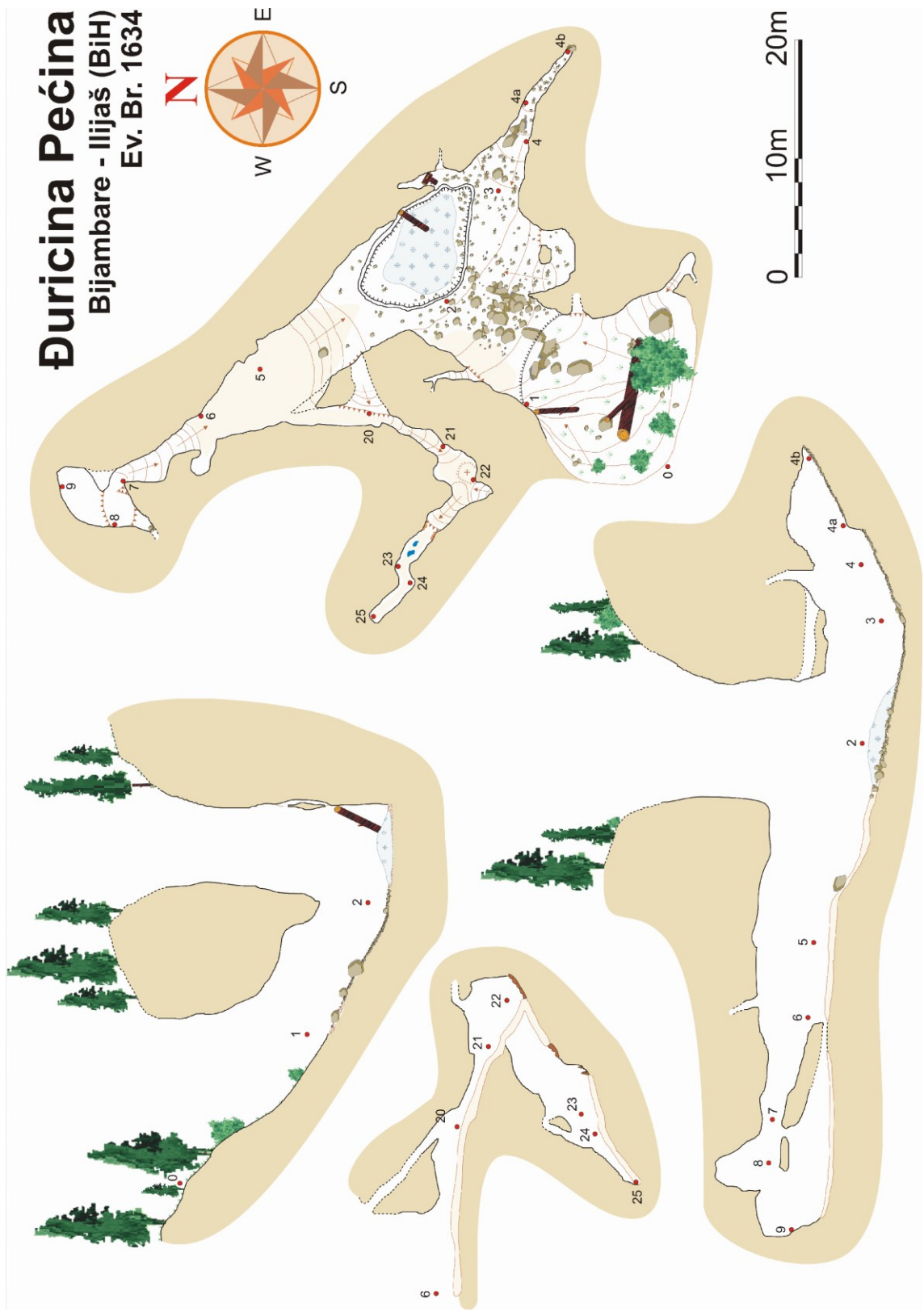
Slika 3. Plan, profil i karakteristični presjeci Srednje Bijambarske pećine

Ledenjaca Pećina

Bijambare - Ilijaš (BiH)
Ev. Br. 2200

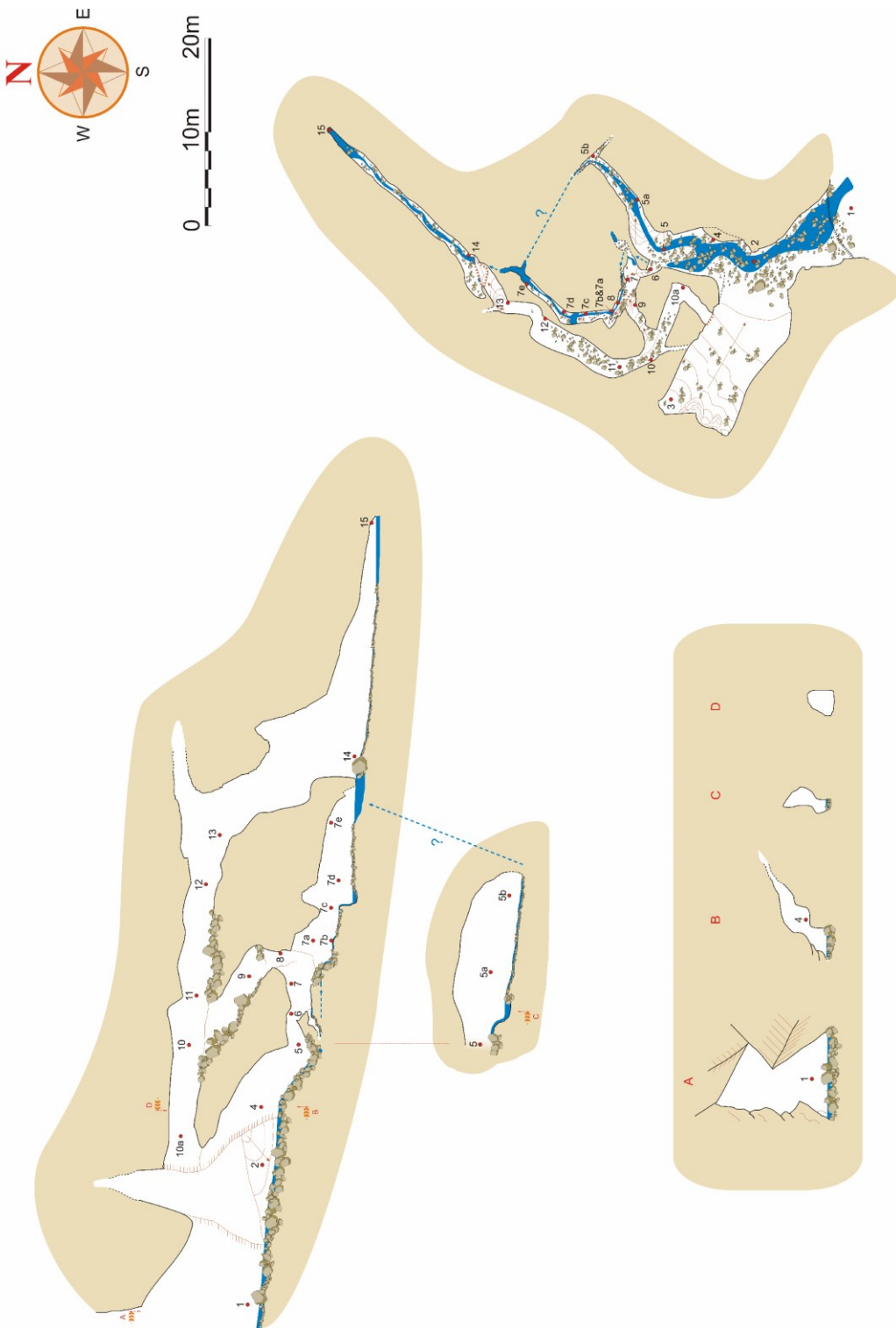


Slika 4. Plan, profil i karakteristični presjeci Ledenjače



Slika 5. Plan, profil i karakteristični presjeci Đuričine pećine

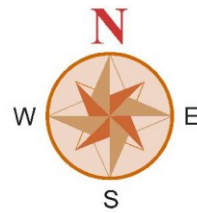
Donja Bijambarska Pećina
 Bijambare - Ilijaš (BiH)
 Ev. Br. 1377



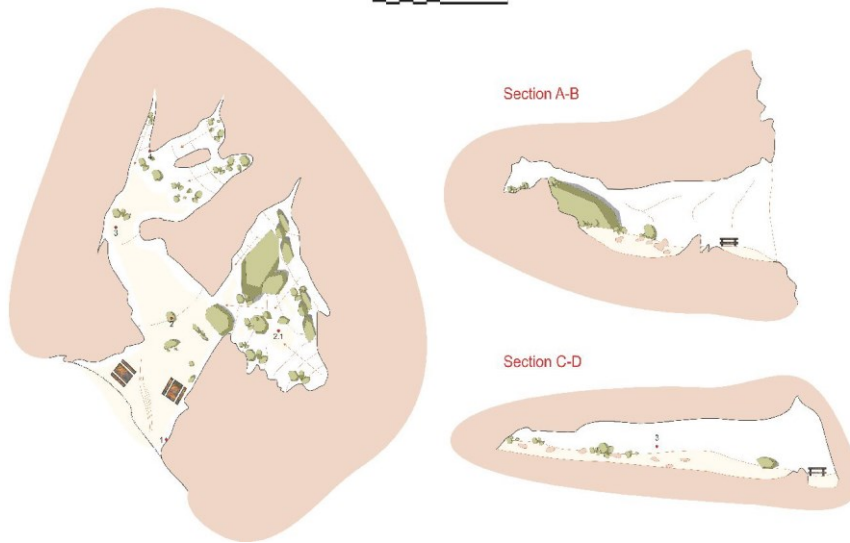
Slika 6. Plan, profil i karakteristični presjeci Donje Bijambarske pećine

Gornja Bijambarska Pećina

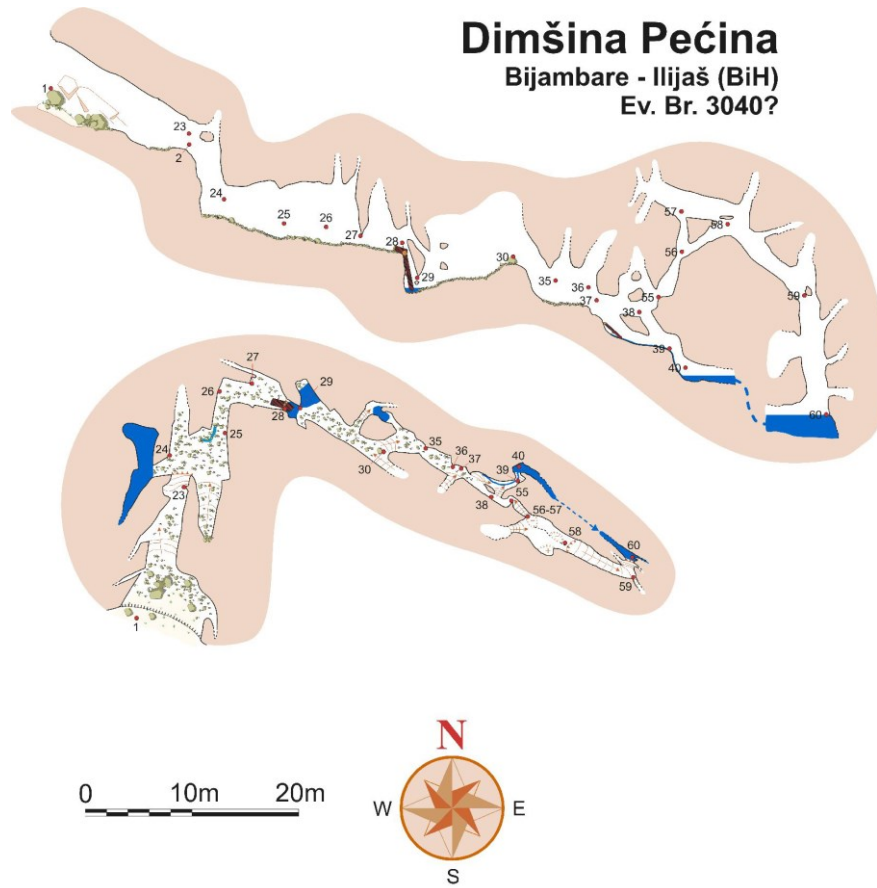
Bijambare - Ilijaš (BiH)
Ev. Br. 1378



0 10m 20m



Slika 7. Plan i profili Gornje Bijambarske pećine



Slika 8. Plan i profil Dimšine pećine

BILJEŠKE

BILJEŠKE