



ORIGINAL RESEARCH PAPER

A COMPREHENSIVE VALORIZATION OF MEGARA CAVE (Bjelašnica Mt., BiH) REGARDING THE PRESERVATION AND PROTECTION

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Key words:

Megara cave,
biospeleology,
paleontology,
valorization,
cave management.

SYNOPSIS

Megara cave is situated in western part of Bjelašnica mountain system, in area of Preslica massive, above Lanište plateau. Biospeleological investigation of the cave started in the second half of the 19th century, when custodian of the National Museum of Bosnia and Herzegovina, Victor Apfelbeck, described the first cave coleopteran in Bosnia and Herzegovina, *Leptoderus pygmaeus* Apfelbeck, 1889, recently known as *Anthroherpon pygmaeum pygmaeum* (Apfelbeck, 1889) (Perraeu, 2000). Megara, as a type locality for five animal taxa, a habitat for minimally 30 cave dwellers taxa and an important paleontological finding place of the cave bear (*Ursus spelaeus* Rosenmüller, 1794) remains, has exceptional natural and historical importance. The comprehensive approaches to the value assessment have included, beside a speleological, also a complex microclimatological, ecological, biological, paleontological and geological considerations as well as knowledge of the economic/touristic potential of this cave. The valorization, requested by the Municipality of Hadžići, also included exchanging experience related to the cave management between experts, regional and local authorities, in order to develop a comprehensive approach to ensuring cave safety and conservation.

Ključne riječi:

Megara,
biospeleologija,
paleontologija,
valorizacija,
upravljanje špiljom.

SINOPSIS

**VALORIZACIJA PEĆINE MEGARE
S CILJEM OČUVANJA I ZAŠTITE**

Pećina Megara smještena je na zapadnom dijelu planinskog sustava Bjelašnice, masivu Preslice iznad zaravni Lanište. Biospeleološka istraživanja Megare započela su u drugoj polovici 19. stoljeća kada kustos Zemaljskog muzeja u Sarajevu, Victor Apfelbeck, opisuje prvog špiljskog kornjaša na teritoriju Bosne i Hercegovine, *Leptoderus pygmaeus* Apfelbeck, 1889., danas aktualnog imena *Anthroherpon pygmaeum pygmaeum* (Apfelbeck, 1889) (Perraeu, 2000). Megara kao tipski lokalitet za pet animalnih taksa, stanište najmanje 30 vrsta životinja, jedne entomofagne gljive te važno paleontološko nalazište ostataka pećinskog medvjeda (*Ursus spelaeus* Rosenmüller, 1794) posjeduje iznimnu prirodnu i povijesnu vrijednost. Stoga su istraživanja uz speleološku, obuhvatila mikroklimatsku, ekološku, biološku, paleontološku i geološku komponentu te procjenu ekonomskog i turističkog potencijala ove pećine. Valorizacija ovoga iznimnog speleološkog objekta, u okviru projekta Općine Hadžići, doprinos je korisnoj razmjeni iskustava između stručnjaka, vladinih tijela i lokalne zajednice usmjerenih na upravljanje speleološkim objektima s ciljem očuvanja i zaštite.

INTRODUCTION

Megara cave (x = 4841127; y = 6507210; z = 1324; UTM BP14) is situated in western part of Bjelašnica mountain system, in area of Preslica massive, below the peak Orlovac and above Lanište plateau. Megara cave was formed at the base of the cliff made by Upper Triassic limestone. Geomorphological simple, the cave is constituted of one main channel which genesis was conditioned by an expressed tectonic crack. However, an abundance of smaller cracks, mostly faults, diaclasses, leptoclasses and diastromes was noticed along the cave (Malez & Slišković, 1989).

Morphologically, the cave is composed of two halls, Fiala and Final hall connected with the channels, with the total length of 277 meters (Fig.1). Megara was famous by a great concentration of variety forms of speleothemes such as stalactites, stalagmites, columns, curtains and draperies. Unfortunately, it has undergone the extreme devastation particularly in Final hall, due to illegal excavation of the cave bear skeletal remains. The age of the flowstone from Fiala and Final halls was estimated around 3734 ± 113 and 4303 ± 100 years before present, respectively, using a radioactive carbon (^{14}C) analysis (Malez, 1980).

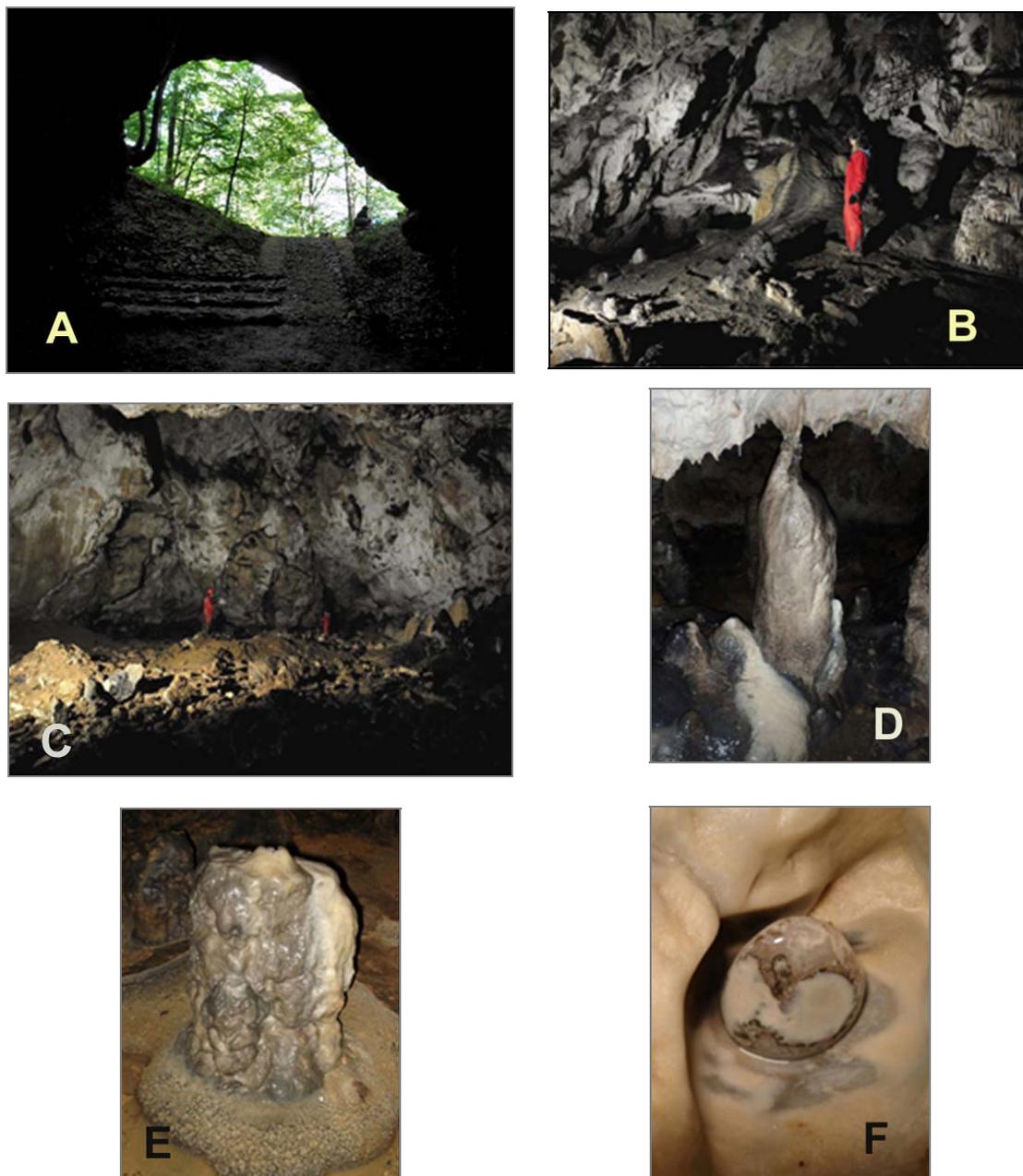


Figure 1: The entrance of Megara cave (A); The Fiala hall (B), The Final hall (C), A column (D), A stalactite (E), A pisolite (F).

The name of the cave originated from Turkish word *mağara* (*the cave, the hole*), however, a plenty of synonyms were known: *Megara-pećina u Preslici-planini* (Kotar Konjički) (Apfelbeck, 1889); *Megara, Mijatova pećina ili Kuhinja (Fiala, 1892)*; *Hajdučka špilja na Ivan planini u Hercegovini* (*Insurgentenhöhle im Ivangebirge der Herzegowina*) (Absolon, 1900); *Ivan planina, Südbosnien* (Reitter, 1906); *Pećina Kuvija kod Preslice planine* (Truhelka, 1907); *Jeskyna Megara* (Absolon, 1913);

Špilja Kuvija kod Laništa (Popović, 1935); Megara pećina auf Preslica planina (Wolf, 1935); Mijatova pećina, Megara ili Kuvija (Ćurčić, 1940); Megara pećina (Absolon, 1943); Megara pećina kod Opančaka, Preslica planina (Buturović, 1951); Kuvija na Hranisavi (Fukarek, 1954); Kuvija na Hranisavi (Fukarek & Ržehak, 1956); Mijatova pećina (Anđelić, 1957); Kuvija na Hranisavi (Ržehak, 1966); Megara pećina montis Opančak (Preslica planina) (Pretner, 1968); Pećina Megara, Kuvija ili Mijatova (Malez, 1971); Kuvija ili Megara (Žalica, 1972); Megara, Lanište, montagne Bjelašnica, Bosnie (Deeleman, 1978); Kuvija-Mijatova-Megara (Kapel, 1980); Pećina Megara, Bjelašnica (Nikolić, 1981); Spilja Megara na Bjelašnici (Malez, 1980; Malez & Slišković, 1988); Megara na Bjelašnici (Basler & Mulaomerović, 1986); Megara na Ivanu (Čović, 1988); Spilja Megara, Kuvija ili Mijatova (Malez & Slišković, 1989; Malez, 1990); Una grotta imprecisata ad una quota di 1300 m nel massicio Preslica planina (Giachino & Guerguiev, 1995); Megara pećina a Opančak sur le mont Preslica (Perreau, 2000); and Megara (also known as Kuvija) (Mulaomerović & Osmanković, 2010).

In the 17th century, as Megara was a rescue of a heroic outlaw (hajduk) in Bosnian and Herzegovinian folklore, Mijat Tomić (died 1656), it was named “Mijatova cave” or “Hajdučka cave”, after him.

The first description of Megara, published by F. Fiala (Fiala, 1892), represents one of the first depicted speleological objects in Bosnia and Herzegovina, while detailed description was given 80 years later by M. Malez (Malez, 1971; 1990) who also created the first topographic map of this cave in 1970 (Malez & Slišković, 1989). In the same year, on 8th of September 1970, Megara was officially protected in the Register as Kuvija-Mijatova-Megara (Kapel, 1980).

The first photograph of Megara was taken by Franjo Fiala in 1892. It has been considered as the oldest photo of some speleological object in Bosnia and Herzegovina (Malez & Lenardić-Fabić, 1988) and the negative is archived in the National Museum of Bosnia and Herzegovina.

The paleontological studies of Megara dating back to the late 19th century. The first collecting of the cave bear skeletal remains was performed by the curator of the National Museum in Sarajevo, Victor Apfelbeck who also described the first cave coleopteran in Bosnia and Herzegovina, *Leptoderus pygmaeus* Apfelbeck, 1889, recently known as *Anthroherpon pygmaeum pygmaeum* (Apfelbeck, 1889) (Perraeu, 2000). Based on Apfelbeck's data, F. Fiala excavated the first paleontological probe, in addition to the bones collecting from the surface (Fiala, 1892). Famous archaeologist and paleontologist, discoverer of Neanderthal man finding site in Krapina (Croatia), Dragutin Gorjanović Kramberger visited the cave in the early 20th century (Truhelka, 1907; Malez & Slišković 1984). Finally, the comprehensive paleontological investigation was performed by Mirko Malez from the Institute for Quaternary Paleontology and Geology of Croatian (Yugoslav) Academy of Arts and Sciences who excavated three probes and noted Megara as a richest cave bear

finding site in Bosnia and Herzegovina (Malez, 1971; Malez et al., 1979; Malez, 1980; Malez & Slišković 1984; 1989). Holland arachnologist Christa Deeleman-Reinhold, with her family and a famous Slovenian biospeleologist Egon Pretner, collected the cave animals and performed the first microclimate measurements (Deeleman-Reinhold, 1978).

This study was focused on comprehensive multidisciplinary investigations with the aim of establishing of adequate monitoring and protection status of the cave natural values. Inclusion of Megara in the touristic offer demands modern scientific methods but also a touristic valorization (number and structure of visitors, incomes, seasonality, etc.), connection with the local area, modes of protection and orientation towards sustainable development of Municipality of Hadžići.

SUBJECT AND METHOD OF RESEARCH

The latest comprehensive investigations of Megara were performed in September 2011 and June 2013 by Faculty of Science (University of Sarajevo), Croatian Biospeleological Society and Biospeleological Society in Bosnia and Herzegovina upon request of Municipality Hadžići, as part of the project “The Valorization of Megara” supported by SeeNet (Translocal net for cooperation between Italy and Southeastern Europe) and Piemonte Region (Italy).

Measurements for the cave map were performed using a compass and clinometer (Suunto) with a centimetre precision of 0.5° by a Measure Tape 50 Meter graduated on decimetres, while measuring points of survey line and height of the channels were measured by laser distance Leica DISTO DXT with the centimetre precision. The survey was performed in scale M1: 200, the survey line was processed by Compass (ver.5.10.1.23.163) while the detailed 3D image was performed using CaveX (ver.5.13.5.30). Further processing was created in CorelDRAW X5 (ver. 15.0.0.486) in scale M1: 200 (the survey and the cave map were performed by Damir Basara).

The studies were focused on the current situation assessment of the type locality, definition of the cave habitats according to NATURA 2000, Pal. Class. and Croatian National Habitat Classification (CNHC) (NKS, 2009; Gottstein, 2010), collecting and identification of cave fauna, the microclimate measurements and



Figure 2: The detailed cave map of Megara (performed by Damir Basara).

paleontological valorization. The precise topographic map, created during the research, was prerequisite for the placement of cobbled touristic trail and an adequate illumination along the cave.

The collected cave fauna was documented by macrophotography using Canon EOS 400D and Olympus Mju Tough 6010. The microclimate measurements from the selected localities were performed using a prick type thermometer TESTO 1, CO₂ measuring instrument Telaire 7001, the illumination measuring device Luxmeter PCE-172, PCE Group and combined higo-thermo-anemometer Kestrel 3000.

Paleontological valorization was carried out differently than planned. In fact, paleontological probe that was supposed to bind to any of the existing probes in the cave was not excavated due to extreme destruction level in Final hall. Although we had information about the devastation a current condition was significantly worse than expected. Flowstone that covered the floor was broken on almost complete hall area and sediment was dug in some places to a depth of more than a meter. In some places, the sediment was thrown onto piles, while in the largest part of the hall flowstone, rock fragments and soft sediment were mixed into a chaotic mass that contains fragmented bones of cave bears. With such amount of scattered bones, unearthed probe is no longer made sense and it was decided just to collect visible skeletal remains from surface. The aims of skeletal remains collecting included: the collection of findings in one place, determination of present species, perceive into the preservation status quantifying the amount of material, approximate determination of the age and the number of individuals as well as a consideration of the possible opportunities for touristic presentation of skeletal remains.

RESULTS AND DISCUSION

THE PHYSICAL CHARACTERISTICS OF MEGARA

During this study, the detailed cave map of Megara cave was created. The length of the cave is 277 meters (an actual dimension) with the layout length of 243 meters and depth of 10,5 meters.

The measurements of the physical parameters were performed on 24th of September 2011 and 17th of June 2013. Interestingly, the first known measurements in Megara were performed by Christa Deeleman on 7th of August 1973 considering the air temperature of 4,6°C (in the major part of the cave) and 5,0°C in Final Hall. On 24th of September 2011, the air temperature measured at two locations in the cave showed 5,6°C (outside air temperature was 13,2°C), the water temperature was 5,4°C, CO₂ concentration was in range of 569 – 1077 ppm (outside the cave was in range of 350-500 ppm) and 100% of relative humidity (Ozimec et al., 2011).

On 17th of June 2013, the climate measurements were performed at eleven points in the cave, from the entrance to the end of Final hall, according the same points at the cave map. The result has shown in Tab. 1.

Table 1: The physical parameters in Megara measured on 17th of June 2013.

Point	L (lx)	Ta (°C)	Tg (°C)	Tw (°C)	CO ₂ (ppm)	rH (%)	AF (m/sc)
T3	0	8,4	5,7	-	512/?	80	0
T4	0	5,5	5,4	-	512/7,5	100	0
T5	0	5,1	5,4	-	528/5,7	100	0
T6	0	4,8	5,0	-	537/ 4,8	100	0
T7	0	4,6	4,8	4,7*	533/4,8	100	0
T10	0	4,6	4,7	-	550/4,6	100	0
T14	0	4,6	4,9	-	675/4,2	100	0
T17	0	5,4	5,4	-	769/4,6	100	0
T18	0	5,8	5,6	-	880/4,7	100	0
T19	0	5,7	5,6	5,6	02/5,2	100	0
T20	0	7,7,?	5,6	-	1038/5,5	95?	0

The legend: (L) Illumination, (Ta) air temperature, (Tw) ground temperature (Tg) water temperature, (CO₂) CO₂ concentration in ppm/°C, rH (relative humidity %), (AF) the air flow (m/sc).

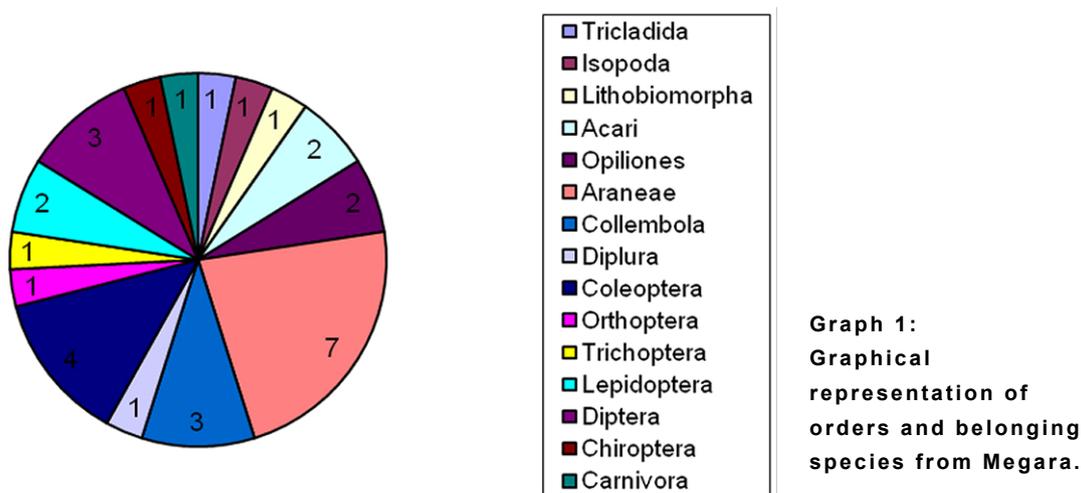
* The water pond where the *Dendrocoellum* sp. (Tricladida) were found.

Megara represents an Terrestrial cave habitat (according to Gottstein, 2010: Pal, Class. 65.1, 65.22, 65.3, 65.411, 65.42, 65.5, 65.6, 65.71, 65.74; NKS H.1.1.) which includes a few habitat type attributes: At the entrance (illuminated) part of cave – described as Hollows and entrance cave zones (according to Gottstein, 2010: Pal, Class. 65.6; NKS H.1.1.1.) were noticed: Lepidoptera: *Triphosa dubitata* (Linnaeus, 1758); *Scoliopteryx libatryx* Linnaeus, 1758; Araneae: *Meta menardi* Latreille, 1804; *Troglohyphantes* sp.; Opiliones: *Nelima troglodytes* Roewer, 1910; Diptera (Tipulidae) *Limonia nubeculosa* Meigen, 1804; Orthoptera: *Troglophilus* sp.; Trichoptera: *Stenophylax* sp. on 24th of September 2011 and Diptera: *Tephrochlamys* sp.; Fam. Mycetophilidae, Gen/sp. on 17th of June 2013. In the central parts of cave, with a features described as Dry fossil caves (according to Gottstein, 2010: Pal, Class. 65.7; NKS H.1.1.1.) the skeletal remains of cave bear were found. The Final hall, with a stabile microclimate conditions, shows a features of the Caves of the moderate conditions with troglobites (according to Gottstein, 2010: Pal, Class. 65.4; NKS H.1.1.1.). On 24th of September 2011 were found: Isopoda: *Alpioniscus* sp.; Acari: Rhagidia sp.; Aranea (Dysderidae): *Rhode stalitoides* Deeleman-Reinhold, 1978; Coleoptera: *Apholeuonus longicollis pretneri* Giachino & Guerguiev, 1995 Colembola: *Verhoeffiella cavicola* (Absolon, 1900); *Onychiurus* sp. In addition, on 17th of June 2013 were found

Diplura: ?*Plusiocampa (Stygiocampa)* sp., Tricladida: ?*Dendrocoellum* sp. and Ascomycota (Ascomycetes): *Cordiceps* sp. nov.

THE CAVE DWELLERS OF MEGARA

According to present biospeleological studies of Megara, one species of fungi (Fungi) and 31 animal species (Animalia) within 15 orders were determined. The checklist of the orders including the species number and ratio was shown in Tab. 2 and Graph 1. Macro photographs of selected taxa were shown in fig. 3.



Ecologically, the founded species belong to four categories: troglobites /stylobites (14), troglaphiles/styglaphiles (2); subtroglyphiles/substyglaphiles (13) and troglaxenes/parasits (2). Out of 31 species recorded in Megara, terrestrial fauna dominates, while only one species is aquatic (Tricladida: ?*Dendrocoelum* sp.). Five species are endemic to Bjelašnica Mt., four are endems of Bosnia and Herzegovina and one is endemic to Dinarides, while six species are with unclear endemic status until detailed taxonomic analysis.

Megara cave is type locality for five animal taxa, troglobites and endemic to Bjelašnica Mt., as follows: *Rhode stalitoides* Deeleman, 1977, *Verhoeffiella cavicola* (Absolon, 1900), *Anthroherpon pygmaeum pygmaeum* (Apfelbeck, 1889), *Apholeuonus longicollis sequensi* (Reitter, 1906) and *Apholeuonus l. pretneri* Giachino & Guerguiev, 1995. The taxonomic status of two subspecies of *Apholeuonus longicollis* should be elucidated using morphological and molecular genetics analyses.



Figure 3: Macro photographs of the selected cave dwellers taxa from Megara (Photo: Roman Ozimec).

Table 2. The checklist of the cave dwellers of Megara.

The abbreviations: Endemism: (e) endem of Dinarides; (E) endem of Bosnia and Herzegovina; (EB) endem of Bjelašnica Mt.; Ecology: (Tb) troglobites; (Sb) stygobites, (Tf) trogliphiles; (sTf) subtroglophiles; (Tx) troglonexes; (Ed) edaphic species; (Par) parasits.

Regnum: Fungi		Endemism	Ecology
ASCOMYCOTA (ASCOMYCETES)			
<i>Cordiceps</i> sp.		E	Tb
Regnum: Animalia			
TRICLADIDA			
? <i>Dendrocoelum</i> sp.		?	Sb
ISOPODA			
<i>Alpioniscus absoloni assimilis</i> Strouhal, 1939		EB	Tb
LITHOBIOMORPHA			
<i>Lithobius</i> sp.			? Tf
ACARI			
<i>Parasitus loricatus</i> (Wankel, 1861)			Ed
<i>Rhagidia</i> sp.		?	Tb
ARANEAE			
<i>Rhode stalitoides</i> Deeleman, 1977	loc. typ.	EB	Tb
<i>Meta menardi</i> (Latreille, 1804)			sTf
<i>Fageiella patellata</i> (Kulczynsky, 1913)		e	Tb
<i>Centromerus</i> sp.			sTf
<i>Lepthyphantes leprosus</i> (Ohlert, 1865)			sTf
<i>Lepthyphantes centromeroides</i> Kulczynsky, 1914			sTf
<i>Troglohyphantes fugax</i> (Kulczynsky, 1914)		E	Tb
OPILIONES			
<i>Amilenus aurantiacus</i> (Simon, 1881)			Tx
<i>Nelima troglodytes</i> Roewer, 1910			sTf
COLLEMBOLA			
<i>Verhoeffiella cavicola</i> (Absolon, 1900)	loc. typ.	EB	Tb
Fam. Onychiuridae, Gen/sp.		?	Tb
Gen/sp.		?	Tb
DIPLURA			
? <i>Plusiocampa</i> (<i>Stygiocampa</i>) sp.		?	Tb

COLEOPTERA			
<i>Aphaenopsis apfelbecki</i> (Ganglbauer 1891)		E	Tb
<i>Proleonhardella matzenaueri matzenaueri</i> (Apfelbeck, 1907)		E	Tb
<i>Anthroherpon pygmaeum pygmaeum</i> (Apfelbeck, 1889)	loc. typ.	EB	Tb
<i>Apholeuonus longicollis sequensi</i> (Reitter, 1906)	loc.typ.	EB	Tb ¹
<i>Apholeuonus longicollis pretneri</i> Giachino & Guerguiev, 1995	loc. typ.	EB	Tb ¹
¹ Annotation: The taxonomic status of the last two taxa should be elucidated using morphological and molecular genetic analyses.			
ORTHOPTERA			
<i>Troglophilus</i> sp.		e	Tf
DIPTERA			
Fam. Mycetophilidae, Gen/sp.			sTf
<i>?Tephrochlamys</i> sp.			sTf
<i>Limonia</i> sp.			sTf
TRICHOPTERA			
<i>Stenophylax</i> sp.			sTf
LEPIDOPTERA			
<i>Triphosa dubitata</i> (Linnaeus, 1758)			sTf
<i>Scoliopteryx libatryx</i> Linnaeus, 1758			sTf
CHIROPTERA			
Gen/sp. ?			sTf
CARNIVORA			
<i>Martes foina</i> (Erxleben, 1777)			sTf

THE PALEONTOLOGICAL FINDINGS

The findings of mostly fragmented bones, lead to the conclusion that the vandals collected only well preserved bones while they left broken ones. The collected material was placed on the flowstone in the southern part of the Final hall in two piles: the first one contains complete or nearly complete bones and teeth, and other one with fragmentary remains. Taxonomic and anatomical determination of bones and teeth was performed on all collected material with exception of about twenty small fragments. Finally, 645 bones and teeth were collected and determined. The majority of skeletal remains belong to cave bear, except two skeletal elements (almost the entire thoracic vertebra and scapular fragment) of some large herbivore, probably a red deer (*Cervus elaphus* Linnaeus, 1758). Regarding the absence of stratigraphy in devastated Final hall, age of these findings remains uncertain. Although most of the bones are not complete, a small number of complete or nearly complete skeletal elements were collected: atlas, epistropheus, cervical, thoracic

and lumbar vertebrae, radius, ulna, femur, patella, tibia, fibula, astragalus, phalanx I, phalanx II, phalanx III as well as about ten isolated teeth and some teeth preserved in the fragments of a few maxillas and mandibles (Tab. 3).

Table 3: The list of the mostly fragmented skeletal remains founded in Megara cave.

Names of bones	No.	Names of bones	No.
The skull (<i>cranium</i>)	16	The humerus (<i>humerus</i>)	89
The mandible (<i>mandibula</i>)	26	The radial bone (<i>radius</i>)	48
The izolated teeth (<i>dentes</i>)	10	The elbow bone (<i>ulna</i>)	69
The first cervical vertebra (<i>atlas</i>)	5	The thigh bone (<i>femur</i>)	98
The second cervical vertebra (<i>epistropheus</i>)	2	The shinbone (<i>tibia</i>)	54
Cervical veretebra (<i>vertebra cervicalis</i>)	5	The calf bone (<i>fibula</i>)	6
Thoracal vertebra (<i>vertebra thoracica</i>)	24	The kneecap (<i>patella</i>)	1
Lumbar vertebra (<i>vertebra lumbalis</i>)	31	The heel bone (<i>calcaneus</i>)	2
The sacrum (<i>os sacrum</i>)	1	The talus bone (<i>astragalus</i>)	1
The hip bone (<i>os coxa</i>)	31	The metacarpals and metatarsals bones (<i>metapodium</i>)	21
The breastbone (<i>os sternum</i>)	1	The distal phalanx (<i>phalanx I</i>)	3
The penis bone (<i>os penis; baculum</i>)	2	The middle phalanx (<i>phalanx II</i>)	1
The rib (<i>costa</i>)	68	The proximal phalanx (<i>phalanx III</i>)	1
The shoulder blade (<i>scapula</i>)	24		

Age determination was done regarding to the degree of epiphyseal ossification, size of the bones and teeth wear. Young bears of different ages, adults and old bears were determinated while foetal and neonatal remains were not found.

Due to somewhat difficult working conditions in the cave, a very rough estimation of the number of individuals was possible. Therefore, the determination of left or right body side for paired bones or fragments merging were avoided. According to the quite fragmented 98 the thigh bones or 89 humeri, the number of individuals was estimated to at least 30, but the equal number of individuals was confirmed using a better preserved 69 elbow bones. Finally, including twelve complete left elbow bones, excavated in Megara (Malez & Slišković 1989), the minimal number of individuals certainly exceeding 40. Considering the size of the cave and the unexcavated surface, Megara was used as a lair of hundreds of cave bears over a long period of time.

The proposal for restoring, as an integral part of touristic cave management, includes the minor procedures in Fiala hall but more demanding interventions in extremely devastated Final hall. The bottom of Fiala hall is slightly devastated and two probes excavated by M. Malez collapsed and lost their proper form. The idea was to restore the probes and mark their borders with the wedges and stretched red rope. The collapsed sediment should be excavated to the bed rock or sterile layer (and removed from the cave) while the boundary surfaces should be vertical in order to emphasize the stratigraphic relationships. However, Final hall demands almost complete reconstruction since approximately 470m² of 630m² was devastated. Therefore, the recommendation is that broken flowstone should be disposed in pits and soft fine-grained sediment should be spread at the surface of the whole devastated area.

During a particular period of time, the interior will be restored by natural processes activity (creating a patina on the sediment, and later creating a new speleothemes). The skeletal remains, excavated through proposed restoration should be collected.

The material collected during this research has already been exposed on the surface without any signs of further decay. Anyway, after washing the skeletal remains, which will be used for the presentation, a need of consolidation with the liquid adhesive should be checked.

The collected bones and teeth can be exhibited inside or outside of the cave. Furthermore, assembling a complete skeleton of cave bear in horizontal position on the ground or the demanding way of setting up the skeleton in a standing position, using a wire construction, would be effective. In any case, selecting some of the available possibilities of the cave bear skeletal remains presentation as well as the placement of educational boards inside the cave would significantly enrich the tourist offer.

CONCLUSION

Megara cave, as a type locality for five troglobites endemic to Bjelašnica Mt. and well known paleontological finding site of cave bear, deserves a special protection status. Further activities should be related on promotion of Megara and its wider area thought continued multidisciplinary investigations. Evaluation of natural values of Bjelašnica Mt., a permanent education and motivating youth in research projects as well as inclusion the "caving" in the tourist offer of Municipality of Hadžići in an integrated touristic package would help the development of ethno-tourism, cultural heritage and adventure tourism.

The most significant future activity, however, should be focused on carefully planned, effective protection and conservation of the cave, its geomorphologic,

paleontological and biological features. At least, the duty of karst scientists should be the providing information to public, especially local communities, about the scientific value of Bosnian and Herzegovinian underground heritage, so communicating science begins extremely important in preservation of the natural treasures, such as Megara cave in Bjelašnica Mt.

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