International Symposium "Man and Karst 2025" & ALCADI 2025 in memory of Andrej Mihevc, geographer, speleologist, and karstologist: Programme, Excursion and Abstracts
Bihać, June 23-25, 2025

Međunarodni simpozij „Čovjek i krš 2025“ & ALCADI 2025 u spomen na Andreja Mihevca, geografa, speleologa i karstologa: program, ekskurzija i sažeci
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Monday / Ponedjeljak, 23. 6. 2025.

8:00-9:00: Registration of participants / Registracija učesnika

9:00-9:30: Opening Speeches / Uvodna obraćanja

9:30-11:00: Presentations / Prezentacije

Uroš Stepišnik, Sašo Stefanovski, Klemen Cof: **Evolution of Blind Valleys in Ponor-Type Contact Karst: Deepening the Scientific Legacy of Andrej Mihevc**

Nadja Zupan Hajna & Pavel Bosák: **How Old Is the Karst of the NW Dinarides? Evidences from Cave Sediments**

Aurel Perşoiu: **Future Drying of Karst Aquifers Due to Reduced Winter Recharge**

Kristina Krklec, David Domínguez-Villar, Dražen Perica: **Impact of Lichens in Rock Weathering**

Franci Gabrovšek: **The Climate Underground**

11:00-11:30 Coffee break / Pauza za kafu

11:30-13.00: Presentations / Prezentacije

Stein-Erik Lauritzen: **Man and Karst in Norway - a review**

Neven Bočić: **Contact Karst of the Plitvice Lakes NP (Croatia) / Kontaktni krš NP Plitvičkih jezera (Hrvatska)**

Rosario Ruggieri: **Karst Geomorphology and Caves of Cyrenaica (NE Libya)**

Paul Griffiths, Carolyn Ramsey: **Karst Conservation on Canada's Pacific Coast: Progress and Challenges**

Besim Gurda: **The Megara Speleological Complex – From Exploration to Protection /**

Speleološki kompleks Megara – od istraživanja do zaštite

13:00-15:00 Lunch time / Ručak

15:00-16:30: Presentation / Prezentacije

Josip Rubinić, Maja Radišić, Tamara Crnko: **Hidrologija Pazinčice - povijest istraživanja, priče i saznanja**

Ivo Lučić: **Karst pits mass graves, too deep a problem for current societies in the Dinaric Karst / Krške jame masovne grobnice, predubok problem za aktualna društva na Dinarskom kršu**

Amina Agić: **Hidden in Plain Sight: Uncovering the Diversity and Distribution of Bat-paraziting Ticks Collected from Caves of Bosnia and Herzegovina / Skriveno pred očima: Razotkrivanje raznolikosti i rasprostranjenosti krpelja koji parazitiraju na šišmišima prikupljenih u pećinama Bosne i Hercegovine**

Marina Magdić, Tihana Oštrina, Slaven Vuković, Hrvoje Cvitanović: **Speleon - Centre of Subterranean Heritage / Speleon – Centar podzemne baštine**

Anne-Kathrin Godec, Ivo Lučić: **Krasopis, an attempt at a transdisciplinary meeting on karst (Tribalj, Croatia) / Krasopis, pokušaj transdisciplinarnog susreta o kršu (Tribalj, Croatia)**

16:30-17:30: Museum Visit / Posjeta muzeju

19:00: Joint dinner /Zajednička večera

Tuesday / Utorak, 24. 6. 2025.

9:00-11:30: Presentations / Prezentacije

Maurizio Tavangnutti: **The First Investigations Into the Underground Course of the Timavo River Originated in the Ancient County of Gorizia**

Primož Presetnik: **Gustav Joseph – a somewhat forgotten researcher of the cave life of Carniola in the second half of the 19th century about bats / Gustav Joseph – malo zaboravljeni istraživač pećinskog života Kranjske u drugoj polovini 19. stoljeća o šišmišima**

Alessio Fabbricatore, Roberto Ferrari, Gernot Rabeder: **Pećina Megara/ Megara Cave as a Locus Typicus: Biospeleological and Paleontological Investigations in the Bjelašnica.**

Jasminko Mulaomerović: **Rock Art in Bosnia and Herzegovina – a review / Crteži na stijenama u Bosni i Hercegovini – pregled**

Maurizio Tavagnutti: **Proceedings of the 10th International symposium on history "ALCADI 2020" : Into the Heart of the Earth: The History of Speleology across the Centuries**

11:00-11:30 Coffee break / Pauza za kafu

11-30-12:30: Poster presentation / Poster prezentacije

Ahmed Džaferagić: **Istraživanja krša na području zapadne Bosne i Hercegovine do Prvog svjetskog rata**

Ahmed Džaferagić: **Prostorni raspored krša u Bosni i Hercegovini: osvrt na dosadašnje kartografske prikaze**

Mirnes Hasanspahić: **Springs along the Krivaja River / Izvori uz rijeku Krivaju**

Mirnes Hasanspahić, Jasminko Mulaomerović: **Cisterns built next to Austro-Hungarian military facilities in Podveležje near Mostar / Zidane čatrnje uz austrougarske vojne objekte na Podveležju kod Mostara**

Jasminko Mulaomerović: **A New Interpretation of the Drawings in the Village of Žlijeb near Višegrad / Nova interpretacija crteža u selu Žlijeb kod Višegrada**

Jasminko Mulaomerović, Ognjen Matović: **The First Organised Visit by a Local Association to a Cave in Bosnia and Herzegovina / Prva organizirana posjeta jednog domaćeg udruženja pećini u Bosni i Hercegovini:**

Jasminko Mulaomerović: **Is Vjetrenica Just a Cave? / Da li je Vjetrenica samo pećina?**

Jasminko Mulaomerović: **The Olm *Proteus anguinus* in North Macedonia? / Čovječja ribica *Proteus anguinus* u Sjevernoj Makedoniji?**

12:30-13:00 Closing remarks and closing of the symposium / Završna obraćanja i zatvaranje simpozija

Wednesday / Srijeda, 25. 6. 2025.

8:00: Excursion - Una River and caves around Sanski Most / Rijeka Una i pećine oko Sanskog Mosta

Excursion: Old Towns of Bosanska Krajina

1. BIHAĆ

During the Middle Ages, Bihać was a royal town with its own suburb. It lies on an islet of the River Una. The name *Bihać*, in its various forms: *Bišće*, *Bijać*, *Bihak*, *Bihag*, etc. denotes royal property. The island on which the town of Bihać was built was known in the Middle Ages as the Island of St. Ladislaus. The town had its own castellans, judges, captains, and parish priests (plovans). The main military and commercial road passed through Bihać (*via exercitualis*). On several occasions, Bihać served as the capital of the Kingdom of Croatia, which had a polycentric system of capital towns. Croatian assemblies were occasionally held there.

Foreign merchants (*hospites*) came to Bihać in the 13th century, initially on a temporary basis, and later as permanent residents. They were granted trading privileges. Notably, King Ladislaus bestowed special privileges upon them in 1279. The town is first mentioned in 1260, then again in 1262 and 1266. It is not excluded that the town existed even earlier. The first recorded mention is associated with the construction of a tower and a defensive house undertaken by the Cistercian abbot of Topusko. Among monastic orders, the Dominicans were the first to settle in Bihać, followed later by the Franciscans.

In 1592, the Ottomans conquered Bihać after more than a century of resistance. Bihać then became the seat of a *sanjak* (Ottoman administrative district). Approximately ten years after Bosnia and Herzegovina was annexed by the Austro-Hungarian Monarchy, around 1888, the walls of the old town of Bihać were demolished and new buildings and streets were constructed. The town gates were opened, and Bihać was settled by inhabitants from the neighbouring regions of Lika.

2. SOKOLAC

The town of Sokolac is situated on the left bank of the River Una, on a hill of Mount Debeljača, approximately four kilometres south-southeast (upstream) from the centre of Bihać. On the site of the fortress, there existed a prehistoric hillfort during the Bronze Age, with dimensions of 670 × 170 metres. Traces of prehistoric pottery indicate that it may date to the 10th–9th century BCE, coinciding with the period of stilt-house settlements along the Una River in the nearby settlement of Ripač. At that time, the Una region was inhabited by members of the Illyrian tribe, the Japodes.

Sokolac is first mentioned in 1380, when a private charter written in Glagolitic script was issued there. In medieval documents, the fortress is most commonly referred to by three names: *Sokol*, *Zokol*, and *Sokolatz*. The most notable commander of the town was Petar Keglević, the captain of Bihać. Sokolac fell to the Ottomans in 1592, at the same time as Bihać. It remained within the Bihać *sanjak* until 1711 and was later part of the Bihać *kapetanija* (captaincy). The fortress was abandoned after 1878.

The present-day structure, triangular in shape, consists of the remains of a medieval and Ottoman-era fortress. On top of the ramparts, one can observe remnants of densely arranged parapets, each featuring a small loophole at its centre. At the entrance to the town stands a three-storey *Kapikula* with machicolations at the top. The main tower has a diameter of 10 metres and a height of 16 metres. The fortress has been declared a national monument.

3. RIPAČ

The old town of Ripač was located on the site of the present-day settlement of Ripač, at the point where the Una River exits its canyon, approximately 9 kilometres southeast (upstream) of Bihać. The present-day settlement extends across both banks of the Una River, including the areas of Velika and Mala Otoka, river islands (or river islets). Remains of old structures and prehistoric artefacts have been found at the site. Additionally, a Muslim cemetery is located there, featuring a large number of *nišan* tombstones bearing inscriptions.

Approximately 250 metres above Velika and Mala Otoka, on the right bank of the Una River, lies the locality known as Gradina. This site was a centre of cultural development for the Illyrian tribe of the Japodes during the Iron Age. Here, the Japodes achieved various cultural advancements, ranging from the intensified development of figurative art to the construction of stilt-house settlements.

The discovery of ancient movable material, including six Roman coins dating from the 2nd to the 4th century, and the remains of an ancient wall scattered across Velika Otoka, indicate that at least one building from the Roman period once stood on the island. On Velika Otoka, there is a square structure known as the Kula, which is likely a remnant of the medieval town of Ripač, known from historical sources dating to the 15th century. The town is first mentioned in written records in 1408, when Ripač was the main settlement of the Hum parish (*župa*). The town of Ripač was last mentioned in historical records in 1697.

4. OSTROŽAC

The town of Ostrožac, from which a well-preserved fortress remains today, was originally a hillfort from the Early Iron Age, later a medieval fortification, and eventually an Ottoman town. The fortress is situated on a prominent elevation above the left bank of the Una River and the settlement of the same name, located 12 kilometres upstream from Bihać. The fortress has an irregular circular shape, featuring a *kapikula* (gate tower) and a circular keep with an adjacent well. It has undergone several modifications over time.

It is first mentioned in a charter from 1330 issued by King Charles Robert to Radoslav Babović. From 1286 to 1552, the town was under the control of the Babonić noble family. A municipality and a confraternity dedicated to Saint Catherine were based in Ostrožac. The municipality possessed its own seal, engraved with a tower, a crescent moon, and a star, and is mentioned as early as 1403. The town frequently changed hands, especially during the 15th century. The Ottomans captured it in 1577. From the 17th century onwards, Ostrožac served as the seat of the Ostrožac *kapetanija* (military-administrative district).

The Ottomans extended the fortress in the southern section around the year 1700. The northern, medieval part of the town came to be known as the "commoners' quarter," while the southern part was referred to as the "nobles' quarter." Due to opposition to the reforms of Sultan Mahmud II, the last captain from the Beširević family line, Murad-bey Beširević, was exiled in 1837. His grandson, Mehmed-bey Beširević, later sold the dilapidated town of Ostrožac to Isabella von Berks, née Adamović-Čepinski, the wife of the then head of the Bihać district (*Veliki župan*), Dr Lothar von Berks. She left a distinctive mark on the complex.

During the Second World War, Ostrožac served for a time as the headquarters of the Supreme Command of the National Liberation Army (NLA/NOR). From 1967 until 1992, the courtyard of the fortress hosted the Ostrožac Sculpture Colony.

5. KRUPA

The town of Krupa dates back to the 13th century. It was constructed on an elevated area of a river island. Its remnants are visible in the centre of the present-day town of Krupa, located approximately 35 kilometres downstream along the Una River.

Historically, the area of Krupa and its surroundings was a peripheral territory of the Celtic-Illyrian tribe of the Japodes, who were conquered by the Romans in 35 BCE. At the site known as Gromila in the village of Ljusina, foundations of Roman buildings and various artefacts have been unearthed. During the Roman era, the region around the middle Una was part of the Roman province of Dalmatia.

In the Middle Ages, the old town of Krupa featured three towers. The area was inhabited by Croats and formed part of the Kingdom of Croatia, and later, the County and Diocese of Zagreb. It was ruled by the noble Blagajski (Babonić) family. In 1361, King Louis I granted the town of Krupa to the heirs of Prince Stjepan Babonić. Later, in 1396, King Sigismund granted Krupa to the Bosnian Ban Vukac. The town subsequently passed through the hands of various noble families until it came into the possession of Ivaniš Korvin in 1490, who then granted it to his daughter Jelisaveta in 1498. In 1509, Krupa was placed under royal administration with royal officials at its head. In 1521, Ban Ivan Karlović incorporated Krupa into his estates. The travel writer Benedikt Kuripešić stayed in Krupa in 1530. Based on a treaty, the Zrinski noble family occupied Krupa in 1531. The Ottomans captured it in 1565 during the campaign on Vienna led by Kara Mustafa Pasha Sokolović. The last Croatian commander of Krupa was Duke Matijaš Bakić.

6. OTOKA

The town of Otoka was situated along the Una River, approximately 45 kilometres downstream from Bihać, at the location of the present-day town bearing the same name. Otoka on the Una is first mentioned in 1264 and belonged to the Babonić-Blagajski noble family. In 1370, Prince Pavle Blagajski granted the town to his brother Dionizije. In 1418, Otoka was formally declared a royal town, although its actual rulers remained the Babonić family. The town hosted a Franciscan monastery, and the broader administrative region fell under the jurisdiction of the Diocese of Zagreb. The Ottomans first captured Otoka in 1565, burning it down along with the monastery. Subsequently, the town became part of the Krupa Captaincy. It was abandoned in 1838. Remnants of the town walls can be found on the Town Islet (*Gradska ada*). A bridge was constructed in 1865, at the same time as the road connecting Novi Grad - Bosanska Otoka - Bosanska Krupa.

Excursion: Cave around Sanski Most

1. OKO (EYE PIT)

Situated on the western edge of the Lušci Polje karst polje, Eye Pit (Jama Oko) is a karstic spring funnel (estavelle) that, during periods of high water levels, gives rise to the intermittent river Jezernica. The pit has steep vertical sides, reaching a depth of 35 metres, with a surface width of approximately 25 metres. It typically fills with water in spring and autumn, while at other times of the year, flow is activated after 8–10 consecutive days of rainfall. Prior to the discharge of water, the site is characterised by distinctive gurgling and rumbling sounds, indicating subterranean water movement.

2. FAJTOVAČKA CAVE

This cave is located near the village of Fajtovci, on the right bank of the Bliha River. A trail leading from the unpaved road guides visitors to the cave entrance. If Primož is with us, than we are safe! The cave was formed through the collapse of the ceiling and consists of a single large chamber approximately 40 metres in length, 25 metres in width, and 30 metres in height. An entrance passage of 30 metres in length leads to the main chamber.

3. DABARSKA CAVE

Dabarska Cave is located above the spring of the Dabar River, a left tributary of the Sana, approximately 6 km southwest of Sanski Most. The water level at the spring, positioned beneath a vertical rock face on the side of the valley, was originally about 3 metres below the entrance to the cave. In the previous century, a dam roughly 2 metres high was constructed in front of the spring to collect water and supply a now-abandoned mill, thereby raising the water level. Dabarska Cave is 630 metres long and periodically serves as a resurgence during high water events (e.g. in 2014). The cave entrance is approximately 10 metres wide and 15 metres high. Beyond the entrance, the cave opens into a chamber up to 20 metres wide and 70 metres in length. Further along, it veers southwest, narrows, and branches into several smaller tunnels. During high water levels, water flows out of the cave; under low water conditions, only a few siphon lakes and pools of trapped water remain within, while water emerges from the riverbed in front of the cave entrance.

4. HRUSTOVAČA CAVE

Hrustovača Cave is situated approximately 12 km in a straight line from the town of Sanski Most, and about 1 km from the village of Hrustovo. From the village, there is an additional 700 metres of road, followed by a pedestrian path leading to the cave. The broader surrounding area is composed of Triassic and Cretaceous limestones. The cave itself comprises a narrow passage and a wider channel rich in speleothems, for which the site is particularly known. The cave floor is generally flat. Hrustovača Cave is recognised as both an archaeological site (dating to the Bronze Age) and a palaeontological site (remains of a cave bear). It is the only cave in Bosnia and Herzegovina recommended for visitation in Pojman's tourist guide published in 1909.

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Prepared by: Ivo Lučić, Jasminko Mulaomerović and Amina Agić

Ekskurzija: Stari gradovi Bosanske krajine

1. BIHAĆ

Bihać je u srednjem vijeku bio kraljevski grad sa svojim podgrađem. Leži na jednom otočiću rijeke Une. Riječ *Bihać* u različitim svojim oblicima - *Bišće, Bijać, Bihak, Bihag*… - označava kraljevsko dobro. Otok na kojem je sagrađen grad Bihać zvao se u Srednjem vijeku Otok sv. Ladislava. Grad je imao svoje kastelane, sudije, kapetane i vlastite župnike (plovane). Glavna vojna i trgovačka cesta vodila je preko Bihaća (*via exercitualis*). Bihać je u više navrata bio stolnim gradom Kraljevine Hrvatske, koja je imala policentrični sustav stolnih gradova. U njemu su se ponekad održavali hrvatski sabori.

Strani trgovci, (*hospites*), dolazili su u XIII. vijeku u Bihać najprije privremeno, a kasnije i stalno. Dobivali su trgovačke privilegije. Tako im je naročite povlastice podijelio kralj Ladislav 1279. godine. Grad se spominje prvi put 1260. godine, zatim 1262. i 1266. Nije isključeno da je grad nastao i prije toga. Prvo spominjanje vezano je gradnju tornja i kuće za obranu koje je poduzeo topličkі opat ciscertita. Od redovnika najprije su se u Bihać naselili dominikanci pa iza njih franjevci.

Godine 1592. osmanlije zauzimaju Bihać, nakon više od stotinu godina odupiranja. Bihać je postao sjedište sandžaka. Deset godina nakon što Austro-Ugarska Monarhija uzima Bosnu i Hercegovinu, oko 1888. godine, ruše se zidine starog bihaćkog grada i dižu se nove građevine i ulice. Gradska vrata se otvaraju i Bihać naseljavaju stanovnici iz susjednih ličkih krajeva.

2. SOKOLAC

Grad Sokolac nalazi na lijevoj obali Une, na jednom brijegu brda Debeljača, četiri kilometra južno-jugoistočno (uzvodno) od središta Bihaća. Na mjestu tvrđave još u brončano doba postojala je prahistorijska gradina dimenzija 670 x 170 metara. Tragovi prahistorijske keramike kažu da je moglo biti od 10. do 9. vijeka p. n. e., što se podudara s vremenom postojanja sojenica na Uni u obližnjem naselju Ripač. U to vrijeme područje Une naseljavali su pripadnici ilirskog plemena Japodi.

Sokolac se prvi put spominje 1380. godine, kad je u njemu izdata povelja glagoljicom privatnog karaktera. U srednjovjekovnim se dokumentima tvrđava najčešće spominje pod tri naziva: Sokol, Zokol i Sokolatz. Kao najznačajniji zapovjednik grada istakao se bihaćki kapetan Petar Keglević. Sokolac je pao pod Turke kad

i Bihać, 1592. godine. Bio je u Bihaćkom sandžaku do 1711., a kasnije u sastavu Bihaćke kapetanije. Napušten je poslije 1878. godine.

Današnji grad, koji ima oblik trokuta, predstavlja ostatke srednjovjekovne i osmanske utvrde. Na vrhu bedema vide se ostaci gusto poredanih grudobrana, svaki sa malom puškarnicom u sredini. Na ulazu u grad se nalazi trospratna Kapikula s mašikulama na vrhu. Promjer Glavne kule iznosi 10, a visina 16 metara. Tvrđava je proglašena nacionalnim spomenikom.

3. RIPAČ

Stari grad Ripač se nalazio na mjestu današnjeg naselja Ripač, na izlazu Une iz kanjona, oko 9 kilometara jugoistočno (uzvodno) od Bihaća. Današnje naselje se prostire na obje obale rijeke Une i na Velikoj i Maloj otoci, tj. riječnim adama. Na tom mjestu se danas nalaze ostaci starih građevina i nađeni su prehistorijski predmeti. Također, ondje se nalazi muslimansko groblje s velikim brojem nišana s natpisima.

Oko 250 metara iznad Velike i Male otoke, na desnoj obali Une, nalazi se lokalitet Gradina. Ondje je bio centar razvoja kulture ilirskog plemena Japodi u željeznom dobu. Japodi su ovdje ostvarili različita kulturna dostignuća počevši od intenzivnijeg razvoja figuralike pa do pravljenja sojeničkih naselja.

Antički pokretni materijal, među kojima i šest rimskih novčića koji potječu od 2. do 4. stoljeća, razasut po Velikoj otoci, kao i dio antičkog zida, pokazuju da je na otoku postojala barem jedna zgrada iz doba Rimljana. Na Velikoj otoci postoji kvadratna zgrada Kula, koja je vjerojatno ostatak srednjovjekovnog grada Ripač, poznatog iz historijskih izvora 15. stoljeća. U pisanim izvorima ovaj grad se spominje od 1408. godine, kada je Ripač bio glavno mjesto Humske župe. Grad Ripač se 1697. godine posljednji put spominje u historijskim dokumentima.

4. OSTROŽAC

Grad Ostrožac, od kojeg je do danas ostala dobro očuvana tvrđava, bio je gradina starijeg željeznog doba, srednjovjekovna tvrđava i turski grad. Tvrđava je smještena na dominantnom uzvišenju iznad lijeve obale rijeke Une i istoimenog naselja, 12 kilometara uzvodno od Bihaća. Tvrđava je nepravilnog kružnog oblika sa kapikulom i kružnom branič-kulom uz koji se nalazi bunar. Više je puta prepravljana.

Spominje se 1330. godine u povelji kralja Karla Roberta koju je izdao Radoslavu Baboviću. Grad su od 1286-1552. godine držali knezovi Babonići. U Ostrošcu je bila općina i bratstvo sv. Katarine. Općina je imala svoj pečat u kojem je bila urezana kula, mjesec i zvijezda. Spominje se 1403. godine. Grad je prelazio iz ruke u ruku više puta, naročito u XV. vijeku. Turci su ga zauzeli 1577. godine. Od 17. stoljeća u njemu je sjedište Ostrožačke kapetanije.

Osmanlije dograđuju tvrđavu u južnom dijelu oko 1700. godine. Sjeverni srednjovjekovni dio grada prozvao se narodnim, a južni dio grada gospodskim. Zbog protivljenju reformama sultana Mahmuda II. godine 1837. prognan je posljednji ostrožački kapetan iz loze Beširevića, Murad-beg Beširević. Njegov unuk, Mehmed-beg Beširević, ruševan je ostrožački grad prodao Isabelli von Berks rođenoj Adamović-Čepinski, supruzi tadašnjeg načelnika Bihaćkog okruga (Veliki župan) dr. Lothara von Berksa. Ona je ostavila prepoznatljiv pečat na ovom kompleksu.

Za vrijeme Drugog svjetskog rata, Ostrožac je jedno vrijeme bio sjedište vrhovnog štaba NOR-a. Od 1967. do 1992. godine u dvorištu utvrde je djelovala kolonija skulptura Ostrošca.

5. KRUPA

Grad Krupa potiče iz XIII vijeka. Bio je podignut na jednoj uzvisini riječnog otoka. Ostaci mu se vide u središtu današnjeg grada Krupe, oko 35 kilometara nizvodno na Uni.

Inače, područje Krupe i okoline bilo je periferna teritorija keltsko-ilirskog plemena Japoda koje su Rimljani pokorili 35. godine prije nove ere. Na mjestu Gromila u selu Ljusina otkopani su temelji rimskih zgrada i razni predmeti. U periodu rimske vlasti područje oko srednje Une pripadalo je rimskoj provinciji Dalmaciji.

Stari grad Krupa u srednjem je vijeku imao tri kule. Prostor naseljavaju Hrvati i nalazi se u sastavu Hrvatskog Kraljevstva, a kasnije je i dio Zagrebačke županije i biskupije. Njim su vladali knezovi Blagajski (Babonići). Kralj Ludvig I. je darovao grad Krupu nasljednicima kneza Stjepana Babonića 1361. godine. Kralj Sigismund je Krupu darovao bosanskom banu Vukcu 1396. Poslije toga su se u Krupi mijenjali razni gospodari, dok nije došla u ruke Ivaniša Korvina 1490. godine. On je Krupu darovao kćeri Jelisaveti 1498. godine. Godine 1509 je zavedena kraljevska uprava u Krupi s kraljevim ljudima na čelu. Ban Ivan Karlović je pridružio Krupu svojim posjedima 1521. godine. U Krupi je otsjeo putopisac Kuripešić 1530. godine. Na

osnovu ugovora knezovi Zrinski su zauzeli Krupu 1531 godine. Turci su je osvojili 1565. prilikom osmanskog pohoda na Beč koji je vodio Kara-Mustafa paša Sokolović. Posljednji hrvatski kapetan bio je vojvoda Matijaš Bakić.

6. OTOKA

Grad Otoka ležao je na rijeci Uni, 45 km nizvodno od Bihaća, na mjestu današnjeg istoimenog grada. Otoka na Uni se prvi put spominje 1264. i pripada knezovima Babonićima-Blagajskim. Knez Pavle Blagajski je 1370. darovao grad bratu Dioniziju. Grad je 1418. formalno postao kraljevskim gradom a njegovi stvarni gospodari su i dalje bili Babonići. Otoka je imala franjevački samostan a administrativno šire područje je pripadalo Zagrebačkoj biskupiji. Turci su zauzeli prvi put Otoku i spalili je zajedno sa samostanom 1565 godine. Bila je u sastavu Krupske kapetanije. Grad je napušten 1838. Ostaci zida od grada nalaze se na Gradskoj adi. Most je izgrađen 1865. kada i cesta Novi Grad - Bosanska Otoka - Bosanska Krupa.

Ekskurzija: Pećine oko Sanskog Mosta

1. JAMA OKO

Smještena je na zapadnom obodu Lušci polja. Jama Oko je izvorišni lijevak vrela koji za visokih vodostaja formira povremenu rijeku Jezernicu. Strane jame su vertikalne sa dubinom od 35 m, a na vrhu je jama široka 25 m. Jama Oko se puni vodom u proljeće i jesen, u ostalo doba godine „proradi" nakon 8-10 kišovitih dana. Prije nego što se izvorišni lijevak napuni vodom javlja se grgoljanje i tutnjava.

2. FAJTOVAČKA PEĆINA

Pećina se nalazi u okolini sela Fajtovci, na desnoj strani rijeke Blihe. Valja ćemo naći stazu koja sa makadamske ceste vodi do ulaza. Ako sa nama bude Primož onda smo sigurni! Pećina je nastala urušavanjem stropa i čini je jedna velika dvorana dužine 40 m, širine oko 25 i visine oko 30 m. Do dvorane vodi ulazni kanal dužine 30 m.

3. DABARSKA PEĆINA

Dabarska pećina leži iznad izvora rijeke Dabar, lijeve pritoke Sane, oko 6 km jugozapadno od Sanskog Mosta. Nivo vode u izvoru, koji se nalazi ispod okomite stijene u bočnoj strani doline, izvorno je bio oko 3 m niži od ulaza u Dabarsku pećinu. Ispred njega je u prošlom stoljeću izgrađena brana visoka oko 2 m za hvatanje vode i napajanje sada napuštenog mlina, podižući nivo vode u izvoru. Dabarska pećina duga je 630 m i povremeno je izvor visoke vode (npr. 2014. godine). Ulaz u pećinu je širok oko 10 m i visok 15 m. Iza ulaza, pećina se širi u dvoranu širine do 20 m i duljine 70 m. Dalje skreće prema jugozapadu, sužava se i grana u nekoliko manjih tunela. Kada je vodostaj visok, voda teče iz pećine, kada je vodostaj nizak, u pećini postoji samo nekoliko sifonskih jezera i jezera zarobljene vode, a voda izvire iz korita rijeke ispred ispred pećine.

4, HRUSTOVAČKA PEĆINA

Pećina se nalazi na oko 12 km vazdušne linije od Sanskog Mosta, a oko 1 km od sela Hrustovo. Od sela do pećine ima još oko 700 metara puta, a onda nastavlja pješačka staza do pećine. Širu okolinu pećine čine trijaski i kredni krečnjaci. Po

obliku pećinu čini jedan uski kanal i jedan široki kanal bogat pećinskim ukrasima po kome je pećina i poznata. Dno pećine je uglavnom ravno. Pećina je poznata kao arheološko (bronzano doba) i paleontološko nalazište (pećinski medvjedi). Jedina je pećina u Bosni i Hercegovini koju Pojmanov turistički vodič iz 1909. godine preporučuje za posjetu.

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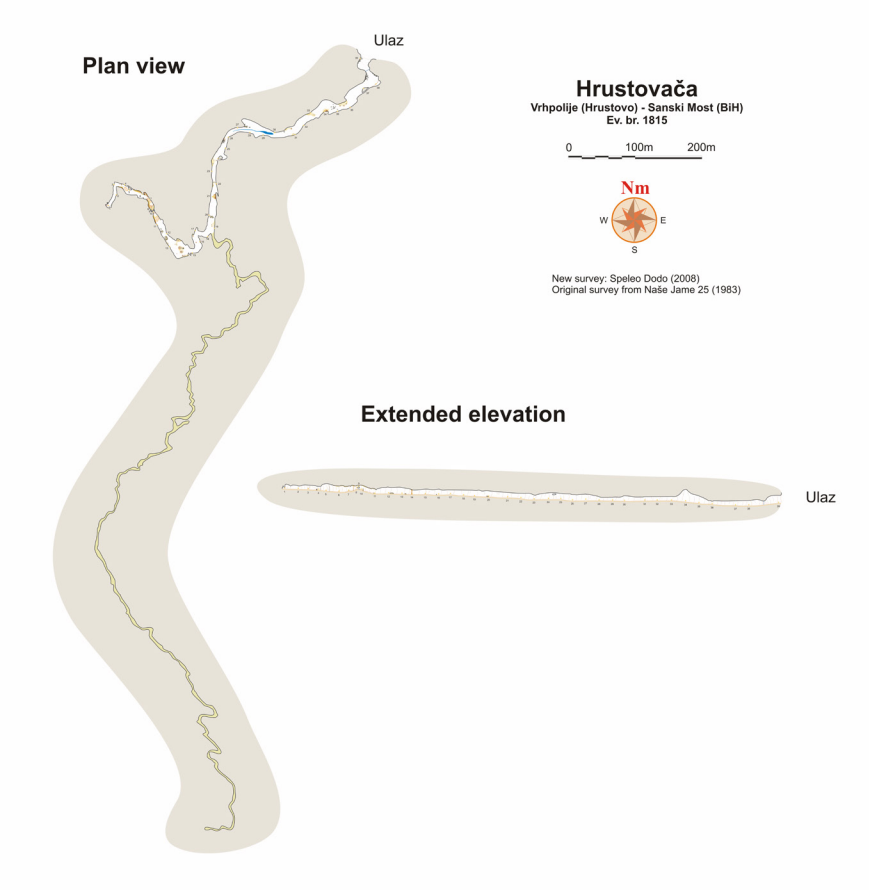
Priredili: Ivo Lučić, Jasminko Mulaomerović i Amina Agić

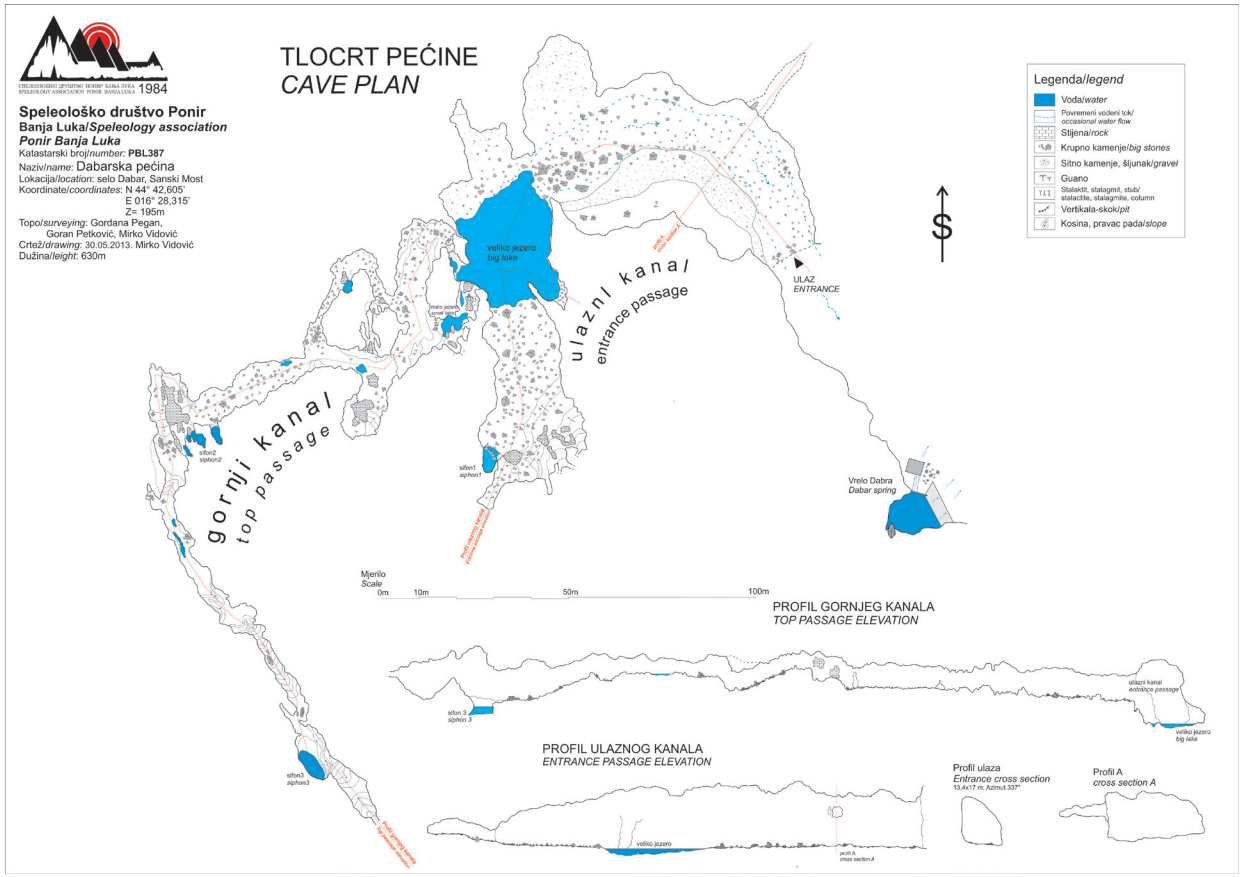
Old towns / Stari gradovi



Caves / pećine




Plan view
Ulaz
Hrustovača
Vrhpolije (Hrustovo) - Sanski Most (BiH)
Ev. br. 1815
0
100m
200m
Nm
W
E
S
New survey: Speleo Dodo (2008)
Original survey from Naše Jame 25 (1983)
Extended elevation
Ulaz


1984
Speleološko društvo Ponir
Banja Luka/Speleology association
Ponir Banja Luka
Katastarski broj/number: PBL387
Naziv/name: Dabarska pećina
Lokacija/location: selo Dabar, Sanski Most
Koordinate/coordinates: N 44° 42,605'
E 016° 28,315'
Z= 195m
Topo/surveying: Gordana Pegan,
Goran Petković, Mirko Vidović
Crtež/drawing: 30.05.2013. Mirko Vidović
Dužina/leight: 630m
TLOCRT PEĆINE
CAVE PLAN
Legenda/legend
Voda/water
Povremeni vodeni tok/
occasional water flow
Stijena/rock
Krupno kamenje/big stones
Sitno kamenje, šljunak/gravel
Guano
Stalakit, stalagmit, stub/
stalactite, stalagmite, column
Vertikala-skok/pit
Kosina, pravac pada/slope
veliko jezero
big lake
ulazni kanal
entrance passage
gornji kanal
top passage
ULAZ
ENTRANCE
Vrelo Dabra
Dabar spring
sifon1
siphon1
sifon2
siphon2
sifon3
siphon3
Mjerilo
Scale
0m
10m
50m
100m
PROFIL GORNJEG KANALA
TOP PASSAGE ELEVATION
PROFIL ULAZNOG KANALA
ENTRANCE PASSAGE ELEVATION
Profil ulaza
Entrance cross section
Profil A
cross section A

Abstracts / Sažeci

Hidden in Plain Sight: Uncovering the Diversity and Distribution of Bat-paraziting Ticks Collected from Caves of Bosnia and Herzegovina

Amina Agić

Center for karst and speleology, Sarajevo, Bosnia and Herzegovina, E-mail: amina.agic88@gmail.com

Caves are commonly recognized for their paleontological value and as habitats for bats, yet among the diverse subterranean fauna exists a less conspicuous, but ecologically and epidemiologically significant group, ticks. Small and often overlooked, these ectoparasites play a significant role in cave ecosystems and may act as vectors of zoonotic pathogens. Despite their importance, research on these ectoparasites in Bosnia and Herzegovina has been largely neglected for decades, particularly those associated with bats.

This study aims to shed light on the diversity and distribution of bat-associated ticks in selected cave habitats in Bosina and Herzegovina, collected during the winter bat monitoring in 2024. Preliminary findings reveal notable diversity at both morphological and molecular levels, highlighting the need for updated and integrative taxonomic approaches. Given their role as potential vectors of zoonotic pathogens, studying these ticks is essential for understanding host-parasite dynamics and anticipating emerging health risks.

This study highlights the need to address long-standing research gaps and underscores the ecological and epidemiological importance of a group that has remained overlooked, both in scientific research and within their subterranean habitats.

Skriveno pred očima: Razotkrivanje raznolikosti i rasprostranjenosti krpelja koji parazitiraju na šišmišima prikupljenih u pećinama Bosne i Hercegovine

Amina Agić

Centar za krš i speleologiju, Sarajevo, Bosna i Hercegovina, E-mail: amina.agic88@gmail.com

Pećine se najčešće prepoznaju po svom paleontološkom značaju i kao staništa šišmiša, no među raznolikom podzemnom faunom nalazi se i jedna manje upadljiva, ali ekološki i epidemiološki značajna grupa - krpelji. Mali i često zanemareni, ovi ektoparaziti imaju važnu ulogu u pećinskim ekosistemima i mogu djelovati kao vektori zoonotskih patogena. Uprkos njihovom značaju, istraživanja krpelja u Bosni i Hercegovini, a naročito onih koji parazitiraju šišmiše, već su decenijama u velikoj mjeri zapostavljena.

Cilj ove studije je da osvijetli raznolikost i prisustvo krpelja vezanih za šišmiše u odabranim pećinama Bosne i Hercegovine, prikupljenih tokom zimskog monitoringa šišmiša 2024. godine. Preliminarni rezultati pokazuju značajne razlike kako na morfološkom, tako i na molekularnom nivou, što ukazuje na potrebu za savremenim i integrisanim pristupima u njihovoj taksonomiji. S obzirom na njihovu ulogu u prenosu bolesti, proučavanje ovih krpelja je važno za bolje razumijevanje odnosa između domaćina i parazita i za predviđanje zdravstvenih rizika.

Ova studija naglašava koliko je važno da se popune dugogodišnje praznine u istraživanjima i podsjeća na ekološku i epidemiološku važnost jedne grupe koja je dugo ostala u sjeni - kako u nauci, tako i u podzemnim staništima.

Contact karst of the Plitvice Lakes NP (Croatia)

Neven Bočić

Department of Geography, Faculty of Science and Mathematics, University of Zagreb,
E-mail: nbocic@gmail.com

Contact karst encompasses the specific development of karst relief and hydrography at the contact of rocks that are differently susceptible to karstification. Most often, contact karst develops at the contact of impermeable rocks on which a surface drainage network is developed and karstified limestones into whose underground such surface water sinks. In addition to the lithological properties of the rocks in contact, the development and nature of contact karst is influenced by the type of geological contact. In this research, the contact karst in the area of the Plitvice Lakes National Park in Croatia was analysed. The Park is a world-famous Dinaric karst site, and it is best known for its tufa barriers and the resulting karst lakes and waterfalls. However, other karst geomorphological phenomena of this area were less well known until now. In the framework of the research, the contacts of non or poorly karstified dolomites with well-karstified limestones were detected. Various morphological and hydrographic phenomena were recorded, such as a series of ponors, karstified and dry valleys, active and eroded alluvial fans, etc. This research helped us to better understand the morphogenesis of karst in the wider area of the Park.

Kontaktni krš NP Plitvičkih jezera (Hrvatska)

Neven Bočić

Geografski odsjek, Prirodoslovno-matematički fakultet, Sveučilište u Zagrebu, E-mail: nbocic@gmail.com

Kontaktni krš obuhvaća specifični razvoj krškog reljefa i hidrografije na dodiru stijena različito podložnih okršavanju. Najčešće se kontaktni krš razvija na dodiru nepropusnih stijena na kojima je razvijena površinska drenažna mreža i okršenih vapnenaca u koju takva površinska voda ponire. Osim litoloških značajki stijena koje su u kontaktu na razvoj i prirodu kontaktnog krša utjecaj ima tip geološkog kontakta. U ovom istraživanju analiziran je kontaktni krš na području Nacionalnog parka Plitvička jezera u Hrvatskoj. Park je svjetski poznati dinarski krški lokalitet, a najpoznatije je po sedrenim barijerama i njima uvjetovanim krškim jezerima i vodopadima. Međutim, ostale krške geomorfološke pojave ovog područja do sad su bile slabije poznate. U okviru istraživanja utvrđeni su kontakti neokršenih i slabo okršenih dolomita s dobro okršenim vapnencima. Zabilježene su različite morfološke i hidrografske pojave poput niza ponora, okršenih i suhih dolina, aktivnih i erodiranih plavinskih lepeza i sl. Istraživanje je pomoglo u razumijevanju morfogeneze krša na širem području Parka.

Istraživanja krša na području zapadne Bosne i Hercegovine do Prvog svjetskog rata

Ahmed Džaferagić

Prirodno-matematički fakultet Univerziteta u Sarajevu, Odsjek za geografiju, E-mail: ahmed.dzaferagic@pmf.unsa.ba

U radu se daje prikaz istraživanja krša na području zapadne Bosne i Hercegovine, približno između tokova rijeka Une na zapadu i Vrbasa na istoku, u vremenskom periodu približno od polovine 19. stoljeća do početka Prvog svjetskog rata. Kako je u stručnoj i znanstvenoj javnosti malo poznato o istraživanjima u tom području, a posebno u tom periodu, nastoji se ukazati na vrijednost prvih radova i istraživača krša. Među njima se posebno ističu Friedrich Katzer i Alfred Grund koji su svoja svjetski poznata djela i teorije o podzemnim vodama i oblikovanju krša razradili, pored ostalog, na temelju zapažanja u ovom području. Uz njih još je nekoliko znanstvenika i inženjera koji su svojim radovima dali veliki doprinos u poznavanju ovog područja, poput Ivana Turine, Đure Pilara, Filipa Ballifa, Jovana Cvijića, itd. Osim prikaza i osvrta na dosadašnja istraživanja, svrha i cilj ovog rada je potaknuti interesovanje znanstvenika, stručnjaka i šire javnosti za krš ovog područja. Metodologija, s obzirom na karakter rada, uključuje analizu i usporedbu različitih izvora poput znanstvenih i stručnih članaka, knjiga i karata od kojih su mnogi dugo bili ograničeno ili potpuno nedostupni.

Prostorni raspored krša u Bosni i Hercegovini: osvrt na dosadašnje kartografske prikaze

Ahmed Džaferagić

Prirodno-matematički fakultet Univerziteta u Sarajevu, Odsjek za geografiju, E-mail: ahmed.dzaferagic@pmf.unsa.ba

Područje Bosne i Hercegovine u znanstvenoj i stručnoj javnosti poznato je po relativno velikoj zastupljenosti krša, raznovrsnosti krških reljefnih oblika i specifičnoj hidrografiji. Uprkos tome i činjenici da je dugo predmetom istraživanja znanstvenika, neka od osnovnih pitanja poput onog o prostornom rasporedu krša, nisu jasno i jednoznačno rješena. Kartografskih prikaza i proračuna površinskog udjela krša tokom prošlosti bilo je relativno mnogo. No, oni se razlikuju u detaljnosti, a i većina proračuna o udjelu krša na teritoriju Bosne i Hercegovine je okvirna te jako varira, praktično od 1/5 do 2/3. Čini se da je to odraz kriterija koji su korišteni pri izdvajanju krša, kao i samog shvatanja pojma krš. U ovom radu se hronološki iznose podaci o kartografskom prikazivanju krša, uz kritički osvrt na kvalitet prikaza, izbor kriterija i njihovu namjenu. S obzirom na kvalitet prikaza daju se preporuke za korištenje karata koje mogu poslužiti u znanstvenim istraživanjima do izrade nove, detaljnije, karte. Glavni cilj rada je, osim pregleda dosadašnjih shvatanja, potaknuti raspravu i probuditi interesovanje znanstvenika za izradu kvalitetnije karte i rješavanje pitanja prostornog rasporeda i udjela krša u navedenom području.

Krasopis, an attempt at a transdisciplinary meeting on karst (Tribalj, Croatia)

Anne-Kathrin Godec, Ivo Lučić

Association Krasopis, Tribalj, Croatia, E-mail: akgodec@gmail.com, ivolucic13@gmail.com

The paper presents the regular annual karst festival "Krasopis", which has been held three times so far at the Balatura Hotel in Tribalj near Crikvenica in Croatia, which hotel is the sponsor of Krasopis. A festival that has a scientific, artistic and activist dimension. The main agenda of Krasopis is holistic karstology - a karstology that seeks to encompass most scientific studies of karst - and a nature writing approach. The conference seeks to achieve a high degree of interdisciplinary by discussing a selected topic through different scientific disciplines, but also through professional and artistic experiences. For example, some topics such as landscapes or animals on karst are discussed by naturalists, social and humanistic researchers, curators, educators, activists, artists and the so on. The idea is to encourage a more holistic view of karst and expand knowledge about karst not only between different professions but also outside of karst professions.

Krasopis, pokušaj transdisciplinarnog susreta o kršu (Tribalj, Croatia)

Anne-Kathrin Godec, Ivo Lučić

Udruga Krasopis, Tribalj. Hrvatska, E-mail: akgodec@gmail.com, ivolucic13@gmail.com

U radu se predstavlja redoviti godišnji festival krša „Krasopis“, koji je do sada održan tri puta u hotelu Balatura u Triblju kod Crikvenice u Hrvatskoj, koji je hotel i sponzor Krasopisa. Krasopis koja ima znanstvenu, umjetničku i aktivističku dimenziju. Glavna agenda Krasopisa je holistička karstologija – karstologija koja nastoji obuhvatiti većinu znanstvenih bavljenja kršem - i nature writing pristup. Skup nastoji postići visok stupanj interdisciplinarnosti, tako što unutar jedne odabrane teme govori kroz različite znanstvene discipline, ali i kroz stručna i umjetnička iskustva. Primjerice, o nekim temama kao što su krajolici ili životinje na kršu, govore prirodoslovci, društveno-humanisitički istraživači, kustosi, pedagozi, aktivisti, umjetnici i slični. Ideja je da potakne što cjelovitije sagledavanje krša i proširuje znanje o kršu ne samo između različitih struka nego i izvan krških struka.

Karst Conservation on Canada's Pacific Coast: Progress and Challenges

Paul Griffiths, Carolyn Ramsey

E-mail: pgriff@shaw.ca (P.G.), clramsey@shaw.ca (C. R.)

Karst ecosystems on Canada's Pacific Coast support groundwater systems, old-growth forests, and surface and subsurface biodiversity and habitats. These ecologically and hydrologically important landscapes remain vulnerable to degradation, particularly from industrial forestry practices. We review the trajectory of karst conservation in the Province of British Columbia (BC), tracing policy evolution from an early limited recognition of caves to comprehensive karst management frameworks embedded in forestry legislation and policy. Drawing on historical records, policy analysis, and field observations, we highlight achievements such as the occasional integration of karst into provincial land use planning and the establishment of inventory and vulnerability assessment protocols. We also identify persistent gaps and shortcomings, including limited compliance and enforcement actions, conceptual oversimplifications, and an overreliance on self-regulation. We conclude with a call for legislative reform, enhanced capacity, and meaningful inclusion of Indigenous knowledge. Our findings may have broad implications for rethinking karst conservation in other regions facing similar ecological and regulatory challenges.

The Megara Speleological Complex – From Exploration to Protection

Besim Gurda

Sports and Scientific Research Club Atom, Pinkasa Bandta bb, Zavidovići, E-mail: besimgurda@hotmail.com

The Megara speleological complex is located on Mount Ozren, in the northern part of Bosnia and Herzegovina. The highest peak of Ozren, Ostravica, reaches an altitude of 918 meters. Ozren is a geologically diverse mountain massif that extends across the territory of several municipalities and towns, while the explored limestone area is situated within the boundaries of the Municipality of Maglaj.

The limestone surface on Ozren covers only 1 km², but despite its limited size, five speleological sites with a total length of over 3000 meters have been discovered and explored in this area. The most significant among them, due to its size, hydrological function, and richness of natural phenomena, is Mokra Megara. In addition to it, Suha Megara, Veliki ponor, Mali ponor, and Poljska jama have also been explored.

The idea of systematically researching and protecting the Megara speleological complex was initiated in 2021, based on earlier speleological research conducted in the 1980s, as well as on the former protected status that Mokra and Suha Megara held under the previous state system.

In addition to speleological studies, biospeleological and chiropterological research was also carried out. The isolation of this area has contributed to the development of a unique and significant subterranean fauna. Particularly noteworthy is the discovery of a new spider species, *Porhomma ozrenense*, symbolically named after Mount Ozren, as well as the rediscovery of the species *Duvalius maglajensis*, an endemic beetle of the Ozren caves, which had not been recorded for more than a century.

The results of chiropterological research indicate that the Megara speleological complex is one of the most important bat habitats in Bosnia and Herzegovina. A total of 19 bat species have been recorded in these caves and their surrounding area. Of particular importance is the finding from Mokra Megara, where the

largest known colony of the greater horseshoe bat (*Rhinolophus ferrumequinum*) in Bosnia and Herzegovina, consisting of over 1,000 individuals, was recorded during winter monitoring.

The conducted research has served as the foundation for initiating the procedure to protect this area under the category of natural monument. Based on the results obtained so far, it can rightfully be stated that this is one of the most significant speleological complexes in Bosnia and Herzegovina. An expert study for its formal protection is currently in progress, and the official designation of the protected area is expected by the end of the current year.

Speleološki kompleks Megara – od istraživanja do zaštite

Besim Gurda

Sportski i naučno-istraživački klub Atom, Pinkasa Bandta bb, Zavidovići, besimgurda@hotmail.com

Speleološki kompleks Megara smješten je na planini Ozren, u sjevernom dijelu Bosne i Hercegovine. Najviši vrh Ozrena, Ostravica, doseže nadmorsku visinu od 918 metara. Ozren predstavlja geološki raznolik planinski masiv koji se prostire na teritoriji više općina i gradova, dok se istraživano krečnjačko područje nalazi unutar granica općine Maglaj.

Krečnjačka površ na Ozrenu zauzima svega 1 km², ali uprkos ograničenoj površini, na tom prostoru pronađeno je i istraženo pet speleoloških objekata ukupne dužine preko 3000 metara. Najznačajniji među njima, s obzirom na veličinu, hidrološku funkciju i bogatstvo prirodnih fenomena, jeste Mokra Megara. Uz nju su istraženi i Suha Megara, Veliki ponor, Mali ponor te Poljska jama.

Ideja o sistematskom istraživanju i zaštiti speleološkog kompleksa Megara započela je 2021. godine, oslanjajući se na ranija speleološka istraživanja provedena 1980-ih godina, kao i na tadašnji status zaštite koji su Mokra i Suha Megara imale u okviru bivše države.

Pored speleoloških, provedena su i biospeleološka te hiropterološka istraživanja. Izoliranost ovog područja doprinijela je razvoju specifične i značajne podzemne faune. Posebno se ističe otkriće nove vrste pauka *Porhomma ozrenense*, simbolično nazvane po planini Ozren, te ponovni nalaz vrste *Duvalius maglajensis*, endema ozrenskih pećina, koja nije bila zabilježena više od jednog stoljeća.

Rezultati hiropteroloških istraživanja ukazuju na to da speleološki kompleks Megara predstavlja jedno od najvažnijih staništa za šišmiše u Bosni i Hercegovini. U ovim pećinama i njihovom širem okruženju registrovano je ukupno 19 vrsta šišmiša. Posebnu važnost ima nalaz iz Mokre Megare, gdje je tokom zimskog monitoringa registrovana do sada najveća poznata kolonija velikog potkovastog šišmiša (*Rhinolophus ferrumequinum*) u Bosni i Hercegovini, s više od 1000 jedinki.

Provedena istraživanja poslužila su kao temelj za pokretanje procedure zaštite ovoga područja u kategoriji spomenika prirode. Na osnovu dosadašnjih rezultata, s pravom se može tvrditi da je riječ o jednom od najznačajnijih speleoloških kompleksa u Bosni i Hercegovini. Trenutno je u toku izrada stručnog obrazloženja za formalnu zaštitu, a zvanično proglašenje zaštićenog područja očekuje se do kraja tekuće godine.

Pećina Megara / Megara Cave as a *Locus Typicus*: Biospeleological and Paleontological Investigations in the Bjelašnica

Alessio Fabbricatore[1], Roberto Ferrari[1], Gernot Rabeder[2]

[1]Independent researcher, Gorizia, Italy, E-mail: alex.stor@libero.it
[1]Independent researcher, Gorizia, Italy
[2]Institut für Paläontologie UNI Wien

Pećina Megara (also known by the toponyms: *Kuvija*, *Kuhija*, *Grotta Megara, Špilja Megara, Mijatina pećina, Mijatova pećina,* etc.; Cadastre No. 2,358; 43.71599° N, 18.08632° E; 1304 m a.s.l., WGS84) is located within the Lanište Nature Park, on the Preslica Massif, in the western Bjelašnica Mountains (Dinaric Alps), southwest of Sarajevo. The cave developed in Upper Jurassic limestone and is morphologically characterized by a single main gallery (approx. 200 m long; only a few meters deep).

Scientific interest in the site began in 1889, when entomologist Viktor Apfelbeck investigated its cave fauna, focusing on Coleoptera. During his research, he also collected numerous bear osteological remains.

Reports by Franjo Fiala (1892, 1893) confirmed the presence of *Ursus spelaeus* Rosenmüller.

L. C. Moser (1899) also referred to excavations conducted at *Pećina Megara* during his 1893 travels in Bosnia and Herzegovina. An unpublished bear mandibula is preserved at the Naturhistorisches Museum in Vienna (NHM Wien), labeled: "*Megara, Herzegov., August 1893.*" The mandibula retains the following teeth: one canine (C), one fourth premolar (p4), and three molars (m1, m2, m3).

From a biospeleological standpoint, *Pećina Megara* is considered a *locus typicus,* with five endemic troglobitic taxa identified to date, underscoring its importance for subterranean biodiversity in the Bjelašnica region.

The cave was included in the region's first tourist guidebook, published in 1913.

Based on analysis of the mandibula at NHM Wien, Fiala's original descriptions (1892/1893), and morphometric data from M. Malez (1988) and L. Lukić-Bilela et

al. (2009), the bear remains from *Pećina Megara* can plausibly be attributed to the nominal species *Ursus ingressus*.

Given its paleontological relevance, further studies — including radiocarbon dating and ancient DNA analysis — are needed to refine the taxonomic and chronological context of the fossil material.

Springs along the Krivaja River

Mirnes Hasanspahić

Center for Karst and Speleology, Branilaca Sarajeva 3, Sarajevo, E-mail: info@centarzakrs.ba

The area along the upper course of the Krivaja River and its tributaries is rich in water sources, especially thermo-mineral springs.

In geological terms, it is a Jurassic area (''Diabase-chert formation"), or rather the Bosnian Ophiolitic zone and the Middle and Upper Triassic (dolomites and limestones). Given the type of soil through which it flows, karst and thermo-mineral springs occur in this area. Krivaja originates in the town of Olovo from the two rivers Stupčanica and Bioštica. All three have their own canyon section, as well as two of its smaller tributaries, Orlja and Očevlja. Only one thermo-mineral spring is used for health and recreational purposes, some are used in the traditional way for bathing, and some are not used at all.

Izvori uz rijeku Krivaju

Mirnes Hasanspahić

Centar za krš i speleologiju, Branilaca Sarajeva 3, Sarajevo, E-mail: info@centarzakrs.ba

Područje uz gornji tok rijeke Krivaje i njene pritoke bogato je izvorima vode, posebno termo-minerlanim izvorima.

U geološkom smislu to je predio jure ("dijabaz-rožnjačka formacija"), odosno ofiolitna zona Bosne i srednji i gornji trijas (dolomiti i krečnjaci). S obzirom na vrstu tla kroz koje teče na tom području javljaju se kraška i termo-mineralna vrela. Krivaja nastaje u gradu Olovo od dvije rijeke Stupčanice i Bioštice. Sve tri imaju svoj kanjonski dio, kao i dvije njene manje pritoke Orlja i Očevlja. Samo jedan termo-mineralni izvor je iskorišten u zdrastvene i rekreacijske srvhe, neki se koriste na tradicionalan način za kupanje, a neki se uopće ne koriste.

Cisterns built next to Austro-Hungarian military facilities in Podveležje near Mostar

Mirnes Hasanspahić, Jasminko Mulaomerović

Center for Karst and Speleology, Branilaca Sarajeva 3, Sarajevo, E-mail: info@centarzakrs.ba

In the karst region of Podveležje, east of the city of Mostar, below Mount Velež, remnants of military architecture built during the Austro-Hungarian rule in Bosnia and Herzegovina can be found. A military defense system consisting of numerous large and small stone fortifications with accompanying logistical structures was established in the hilly areas east and west of Mostar. Of particular interest was the rainwater collection system, as this is a karst waterless area. Stone reservoirs for collecting rainwater (cisterns) were built next to all larger buildings.

Zidane čatrnje uz austrougarske vojne objekte na Podveležju kod Mostara

Mirnes Hasanspahić, Jasminko Mulaomerović

Center for Karst and Speleology, Branilaca Sarajeva 3, Sarajevo, E-mail: info@centarzakrs.ba

U kraškom predjelu Podveležja, istočno od grada Mostara, ispod planine Velež, nalaze se ostaci vojnog graditeljstva izgrađenog u vrijeme austrougarske vladavine u Bosni i Hercegovini. Na brdovitim predjelima istočno i zapadno od Mostara uspostavljen je vojni sistem odbrane kojeg je činilo mnoštvo većih i manjih kamenih utvrda sa pratećim logističkim objektima. Posebno nam je bio interesantan sistem prikupljanja kišnice s obzirom na to da se ovdje radi o kraškom bezvodnom području. Uz sve veće objekte građeni su kameni rezervoari za prikupljanje kišnice (čatrnje).

Impact of lichens in rock weathering

Kristina Krklec[1], David Domínguez-Villar[1], Dražen Perica[2]

[1]University of Salamanca, Faculty of Sciences, Department of Geology, Plaza de los Caídos S/N, 37008 Salamanca, Spain, E-mail: kristina.krklec@yahoo.com
[2]Geography Department, University of Zadar, Franje Tuđmana 24 i, 23000 Zadar, Croatia, E-mail: dperica2001@yahoo.com

Lichens are composite organisms - an association between a fungus (mycobiont) and one or more photosynthetic partners, generally green algae or cyanobacteria (photobiont). They colonize various substrates, including rock surfaces, both in their natural state and when used as building stones, affecting their weathering. Rock weathering by lichens action involves both physical and chemical processes. Physical weathering is a result of hyphae penetration and thallus expansion and contraction, while chemical processes (apart from formation of carbonic acid) include formation of so-called "lichen acids" which dissolve rock substrate. Furthermore, their ability to absorb and retain water, allows prolonged action of these processes.

We studied denudation and karst landscape development in a location in the North Dalmatian Plain (Croatia), a carbonate erosive surface located in the Dinaric karst region. Although being composed of two different carbonate lithologies (having different weathering styles), there is no evident lithological impact on the topography of study site. Characterization of rock surfaces by optical and scanning electron microscopy (SEM) revealed that lichens affected the limestone surfaces up to a depth of several millimetres and increased the porosity of rock, affecting rock weathering. Additionally, temperature and moisture cycles at the study site caused rock shattering at micro-scale, contributing to further increase of rock weathering.

Man and Karst in Norway - a review

Stein-Erik Lauritzen

Department of Earth Science, University of Bergen, Norway, E-mail: Stein.Lauritzen@uib.no

Norway has >> 2000 karst caves and an unknown, even larger number of caves of other types (marine abrasion, deep weathering, tectonic fissure and talus). A few large marine caves have been known since the Viking ages, mentioned in their Sagas. Naturalist scholars described caves as early as 1752 (*Pontoppidan*). Later, several priests did make notes and descriptions of natural and cultural history in their respective parishes, like *Hans Strøm* (1784). The teacher and geologist *Karl Pettersen* from Tromsø made the first proper map and description of a karst cave in 1875. A 44-volume series describing "*Norway's land and People*" was published between 1885- 1921. Several volumes had separate chapters on "caves and underground rivers". After 1900, a number of geologically well-written texts appeared with cave maps, descriptions and speleogenetic hypotheses. The main, and now classic contribution was from the geologist *Gunnar Horn* (1935, 1947). This was a major scientific milestone, proposing glacier ice- contact speleogenesis as a geomorphic agent. Later works by *Jean Corbel* (1957) and numerous, mainly British caving groups (1965- 2010), explored, mapped and reported the now major group of significant caves in the country. Scientific research under "*The Karst research Project in Norway*" (1975 – 1995), ran by the Late biology professor *Eivind Østbye*, and the author, produced numerous new data on individual caves, chronology, biology and speleogenesis. From a position as professor of speleology and quaternary geology at Bergen University, I have supervised numerous cave and speleogenetic studies on the Master and PhD level.

Contemporary with the abovementioned explorations, cave tourism developed. Tourist caves were established quite early (Grønligrotta, Løvstadgrotta), the former is still in use, being the only organised tourist cave with electric lighting. After 1980 adventure tourism began using cave trips in their programs, and since 2000 television adventure and nature challenge shows have performed stunts in most of the large caves in the country. Vulnerable cave sites have also been exploited by filmmakers as "cheap" locations instead of "expensive" studio sets.

The *Norwegian Speleological Society* (NGF) was founded in 1980, having around 200 members. In addition, a few local caving clubs exists. Activity has varied through the decades. Most of the people arranging adventure trips or TV shows are not members of NGF, nor have the activities revealed much awareness of cave vulnerability and conservation. Several cave and karst sites have been widely promoted by local and regional tourist agencies, also without any evaluation of vulnerability, causing many localities to go viral on the net and in turn suffering unwanted and uncontrollable destruction. Caves in Norway are per date defined as "*red-listed*", i.e. the nature type is recognised as vulnerable and threatened by travel and excessive visiting. However, the status has little significance with respect to protection. A handful of caves are protected by law in Rana municipality, and was gated in the 1960'ies (the gates are now being replenished). Caves within National Parks and Nature Preserves are automatically protected. In the destructive case of "marmorslottet" (Marble Castle) in Rana, this had proven insufficient for protection.

The main obstacle is the relation to **"*Allemannsretten*"** *(literally "everyman's right")* is a legal principle in Norway that grants everyone the right to access and enjoy uncultivated land, such as forests, mountains, and coastal areas, for recreation and travel. This includes the right to walk, cycle, ski, and camp for short periods, provided that you do not disturb wildlife, damage the environment, or interfere with the privacy of landowners. The latter duty is often ignored. The right is enshrined in the Norwegian Outdoor Recreation Act.

The nature conservation agencies on the national and local scales are working towards a better management of Norway's caves, so there is hope for the future.

Karst pits mass graves, too deep a problem for current societies in the Dinaric Karst

Ivo Lučić

Zagreb – Ravno, E-mail: ivolucic13@gmail.com

Andrej Mihevc (1952-2024) said that he had a problem with being simultaneously interested in too many different areas of karstology, from the origin and development of caves to sediments, archaeology, animals, climate and the use of caves to the impact of humans on them. Mass grave pits, or sacrificial speleology, was one of Andrej Mihevc's deep preoccupations, both privately and professionally. He encountered mass grave pits early on and they accompanied him until his death. When Slovenia gained independence, he analyzed the cadastre of the Speleological Association of Slovenia for a symposium and made a list of 86 caves with human remains. Since 2007, he has been a member of the Commission of the Government of the Republic of Slovenia for resolving the issue of hidden graves. "When all these people are buried, we will defeat injustice," he believed. Mass grave pits are an unfortunate human practice that goes back deep into history, but during and immediately after World War II they became a severe social and political trauma. Their specificity is that they connect mass murders with the underground, known in mythology as the Underworld (Hillman 2013). Analytical psychology establishes an analogy between what is hidden deep underground and what is hidden deep in the human subconscious. This gives this indescribable dishonor with pits mass graves the possibility to hide its roots for a long time, thus making solutions difficult. For this paper, the author analyzed historical practices in parts of the Dinaric Karst that were motivated by the desire to investigate these tragedies, to exhume the bodies from the pits and to give them a dignified burial. It was concluded that the victims of the mass grave pits were collateral victims of the political conflicts that were fought over that topic, equally where exhumations and burials were carried out and where they were not. The victims rarely received the peace they deserved, which is in line with the remarks about the irrational depth of this topic.

Krške jame masovne grobnice, predubok problem za aktualna društva na Dinarskom kršu

Ivo Lučić

Zagreb – Ravno, E-mail: ivolucic13@gmail.com

Andrej Mihevc (1952-2024) je za sebe kazao da je imao problem što ga je istodobno zanimalo previše različnih smjerova karstologije, od nastanka i razvoja pećina, do sedimenata, arheologije, životinja, klime i upotrebe pećina do utjecaja čovjeka na njih. Jame masovne grobnice, odnosno žrtvoslovna speleologija, bila je jedna od dubokih preokupacija Andreja Mihevca, i na privatnom i na stručnom planu. Rano se susreo s jamama masovnim grobnicama i one su ga pratile sve do smrti. Kad je Slovenija stekla neovisnost za jedan je simpozij analizirao katastar Speleološkog saveza Slovenije i napravio popis od 86 špilja s ostacima ljudi. Od 2007. je postao član Komisije Vlade Republike Slovenije za rješavanje pitanja skrivenih grobova. „Kad se svi ti ljudi pokopaju, pobijedit ćemo nepravdu", smatrao je. Krške jame masovne grobnice je nesretna ljudska praksa koja seže duboko u povijest, ali su tokom i neposredno nakon Drugog svjetskog rata postale teška društvena i politička trauma. Njihova specifičnost je u tome što masovna umorstva povezuje s podzemljem, u mitologiji poznatim kao Donji svijet (Hillman 2013). Analitička psihologija uspostavlja analogiju između onoga što je skriveno duboko u podzemlju i onoga što je duboko skriveno u ljudskoj podsvijesti. To ovom neopisivom beščašću s jamama masovnim grobnicama daje mogućnost da dugo skriva svoje korijene, pa tako i otežava rješenja. Za ovaj rad autor je analizirao povijesne prakse u dijelovima Dinarskog krša koje su motivirane željom da se te tragedije istraže, da se tijela iz jama ekshumiraju i dostojno sahrane. Došlo se do zaključka da su žrtve jama masovnih grobnica bile kolateralne žrtve političkih sukoba koji su vođeni oko te teme, jednako i tamo gdje su se ekshumacije i pokopi obavljeni i gdje nisu. Žrtve su malo gdje dobile zasluženo smirenje, što je u skladu s napomenama o iracionalnoj dubini ove teme.

Speleon – Centre of Subterranean Heritage

Marina Magdić, Tihana Oštrina, Slaven Vuković, Hrvoje Cvitanović

Javna ustanova Baraćeve špilje, Nova Kršlja 47A, Rakovica, Croatia,
E-mail: marinamagdic@baraceve-spilje.hr, ravnatelj@baraceve-spilje.hr,
cuvarprirode@baraceve-spilje.hr, depo@baraceve-spilje.hr

When opened to the public 21 years ago, no one assumed what sorts of secrets lie in the Barać Caves near the town of Rakovica. The data gathered by the first explorers (prof. Mijo Kišpatić) suggested that a man roamed these caves during the prehistory period. Caves had also been visited by many Ice Age animals, coming here to hibernate, grow offsprings, or simply to peacefully eat prey. Today we know that the Barać Caves hide a large number of Pleistocene fauna fossiled bones, as well as at least 48,000-year-old traces of modern humans, and Neanderthals.

The first scientific research is launched in 2013 when valuable archaeological and paleontological findings have been discovered. A year before, the project called Plitvice Valleys (*Plitvičke doline*) had kicked off, with a part of it exploring the Barać Caves and its heritage. The idea was to establish a small museum named The House of Caves. However, later research resulted in much greater archaeological and paleontological findings, so the initial idea became „too tight".

That is how the idea of the Speleon Centre came to life. The implementation began in 2016, after an EU grant had been approved, and it was opened to the public in January 2023. With 850 m^2 (out of 1.200 m2 in total) being available for public and exhibitions, the Centre strives to present all of the research so far conducted in the Rakovica Municipality and the Barać Caves Protected Landscape area.

Speleon – Centar podzemne baštine

Marina Magdić, Tihana Oštrina, Slaven Vuković, Hrvoje Cvitanović

Javna ustanova Baraćeve špilje, Nova Kršlja 47A, Rakovica, Hrvatska,
E-mail: marinamagdic@baraceve-spilje.hr, ravnatelj@baraceve-spilje.hr,
cuvarprirode@baraceve-spilje.hr, depo@baraceve-spilje.hr

Prije 21 godinu, kada su Baraćeve špilje otvorene za turističke posjete nije se niti dalo naslutiti kakve sve tajne skrivaju u svojoj unutrašnjosti. Podaci starih istraživača još od 19 stoljeća (dr. sc. Mijo Kišpatić) govorili su nam da je čovjek posjećivao ove špilje još u stara prapovijesna vremena. Osim čovjeka istu su još u ledenom dobu posjećivale i životinje koje su tu boravile radi hibernacije, podizanja mladih te kako bi na miru pojele svoj plijen. Danas znamo da Baraćeve špilje kriju veliki broj fosilnih kostiju pleistocenske faune kao i ostatke djelovanja čovjeka i čovjekovog pretka Neandertalca starije od 48.000 godina.

Prva znanstvena sustavna istraživanja pokrenuta su 2013. godine kada kreću arheološka i paleontološka istraživanja koja su nam otkrila vrijedne nalaze.n odinu dana prije tih istraživanja pokreće se projekt Plitvičke doline gdje je jedan dio bio posvećen Baraćevim špiljama i dosadašnjim nalazima u njoj. Ideja je bila da se otvori maleni muzej tzv. Kuća špilja gdje bi sve pronađeno bilo i prezentirano. Već spomenuta novija istraživanja otkrila su nam bogatstvo arheoloških i paleontoloških nalaza, te smo s njima nadišli ideju malog muzeja i krenuli u realizaciju nečeg većeg, a to je bio današnji Speleon.

Sve je krenulo u realizaciju kada smo dobili sredstva iz EU, 2016. godine, a danas, 9 godina kasnije imamo Speleon – Centar podzemne baštine smješten nedaleko Baraćevih špilja, koji je svoja vrata posjetiteljima otvorio u siječnju 2023. godine, Riječ je o centru koji je prije svega osmišljen da na svojih 850 četvornih metara izložbenog prostora od ukupno 1200, prezentira dosadašnja znanstvena istraživanja na području općine Rakovica i Značajnog krajobraza Baraćeve špilje.

Rock Art in Bosnia and Herzegovina – a review

Jasminko Mulaomerović

Center for Karst and Speleology, Sarajevo, E-mail: jasminko@centazakrs.ba

Following the first description of rock art at the end of the nineteenth century, there was virtually no interest in this subject in Bosnia and Herzegovina. Even the discovery of a large composition of engravings at the entrance to Ledenjača Cave near Miljevina failed to elicit significant attention from either archaeologists or art historians. Only the engraving on a stone within the semi-cave of Badanj near Stolac, and somewhat later the engravings at the entrance to Djevojačka Cave near Kladanj, prompted the archaeologist Đuro Basler to systematise existing knowledge and to attempt to determine their cultural provenance and period of creation. Since that time (1980), further discoveries have been made, which will be presented here (in addition to those already mentioned: Stijena pod pismom, the cave at Kadinom Selo, Kozlogradske Rocks, "Potpis" in the Bijela River, Dahna Cave, and Vjetrenica Cave).

This presentation is a recollection of conversations with my friend Andrej concerning the discovery of drawings in Bestažovca Cave.

Crteži na stijenama u Bosni i Hercegovini – pregled

Jasminko Mulaomerović

Centar za krš i speleologiju, Sarajevo, E-mail: jasminko@centazakrs.ba

Nakon prvog opisa umjetnosti na stijeni krajem 19. stoljeća za ovu temu gotovo da i nijem bilo interesa u Bosni i Hercegovini. Čak i nalaz velike kompozicije gravura na ulazu u pećinu Ledenjaču kod Miljevine nije pobudio veće zanimanje kod arheologa ili historičara umjetnosti. Tek je gravura na kamenu u polupećini Badanj kod Stoca, a nešto kasnije i gravure na ulazu u Djevojačku pećinu kod Kladnja potaklo arheologa Đuru Baslera da sistematizira dotadašnja saznanja i pokuša dati odgovore na njihovo kulturno porijeklo i vrijeme nastanka. Od tada (1980. godina) je došlo do novih otkrića koja će ovdje biti prikazana (osim pomenutih još Stijena pod pismom, pećina u Kadinom selu, Kozlogradske stijene, Potpis u Bijeloj rijeci, pećina Dahna, Vjetrenica).

Prezenzacija je sjećanje na razgovore sa prijateljem Andrejem o otkriću crteža u pećini Bestažovca.

A New Interpretation of the Drawings in the Village of Žlijeb near Višegrad

Jasminko Mulaomerović

Center for Karst and Speleology, Sarajevo, E-mail: jasminko@centazakrs.ba

The rock drawings near the village of Žlijeb, close to Višegrad (Eastern Bosnia), were first noticed as early as the late 19th century. They were briefly mentioned by Đorđe Stratimirović in a very short text, without any serious attempt at interpretation, although he did note one word in which he confidently identified the Cyrillic letter "F." Archaeologist Đuro Basler associated the depictions of simplified human figures and horsemen with the Migration Period; the horsemen reminded him of figures seen on stećak tombstones. Nevertheless, he also concluded, based on the presence of the Cyrillic letter "F," that the drawings could not predate the Middle Ages.

However, a detailed analysis of the word containing the letter "F" reveals that it is written in Arabic script, with the meaning "Allah," which places the origin and cultural affiliation of these drawings in a completely different context. In my opinion, these are ritual drawings made by a group of Sufis, members of a now-unknown dervish order, who belonged to the first Ottoman tribes that moved westward long before the "official" Ottoman conquest in the Balkan Peninsula.

Nova interpretacija crteža u selu Žlijeb kod Višegrada

Jasminko Mulaomerović

Centar za krš i speleologiju, Sarajevo, E-mail: jasminko@centazakrs.ba

Crteži na stijeni nedaleko od sela Žlijeb kod Višegrada (Istočna Bosna) uočeni su još krajem 19. stoljeća. O njima je u vrlo kratkom tekstu izvijestio Đorđe Stratimirović, bez ozbiljnijeg pokušaja bilo kakvog objašnjenja, ali navodi jednu riječ u kojoj prepoznaje sigurno ćirilično slovo „F". Prikaz pojednostavljenih ljudskih figura i konjanika arheolog Đuro Basler povezuje sa seobom naroda; konjanici su mu bliži prikazima sa stećaka. Ipak, i on na osnovu ćiriličnog slova „F" smatra da crteži ne datiraju prije srednjeg vijeka.

Međutim, detaljno istraživanje riječi koja sadrži slovo „F" pokazuje da je ona napisana arapskim pismom, sa značenjem „Allah", što porijeklo i kulturnu pripadnost ovih crteža stavlja u potpuno drugačiji kontekst. Po mom mišljenju, riječ je o crtežima koje je, u obredne svrhe, iscrtala neka grupa sufija, nama za sada nepoznatog derviškog reda, a koji su pripadali prvim osmanskim plemenima koja su krenula ka zapadu mnogo prije „zvaničnog" osmanskih osvajanja na Balkanskog poluotoku.

The First Organised Visit by a Local Association to a Cave in Bosnia and Herzegovina

Jasminko Mulaomerović, Ognjen Matović

Center for Karst and Speleology, Sarajevo, E-mail: jasminko@centazakrs.ba, matovicognjen90@gmail.com

Following the assignment of Bosnia and Herzegovina to Austro-Hungarian administration at the Berlin Congress in 1878, the first citizens' associations were established, modelled on those in neighbouring countries. Initially, choral societies were formed, serving both entertainment and religious purposes. The first was founded in 1887, followed by others in 1889 and 1894. In that same year, 1887, the first philanthropic organisation was established under the name *Kreutzer Savings Society of Orthodox Serb Women in Sarajevo*.

The association *Pobratimstvo* ("Brotherhood") was founded in 1893 as the second local society, officially named *Pobratimstvo, the Brotherhood of Sober Serbs in Foča*. An attempt in 1894 to establish the first national sporting organisation, the Serbian Gymnastics Society "Fočanski soko/*Foča's falcon*", with residnece in Foča, was rejected by the authorities due to its perceived "ultra-Serbian" leanings. Clearly, some younger members of *Pobratimstvo* were inclined toward physical activity. This is evidenced by an inscription in Ledenjača Cave near Miljevina (Foča Municipality), discovered during winter bat monitoring a few years ago. The name of the association and the date of the visit: *Pobratimstvo 25/4/1901*, are carved in Cyrillic script. This inscription is the earliest known evidence of an organised speleological activity conducted by local inhabitants in Bosnia and Herzegovina. Further exploration of caves in the Foča area may yet uncover more traces of the society's activities.

Ledenjača Cave is also known for its engraved prehistoric drawings located at the entrance.

Prva organizirana posjeta jednog domaćeg udruženja pećini u Bosni i Hercegovini

Jasminko Mulaomerović, Ognjen Matović

Centar za krš i speleologiju, Sarajevo, E-mail: jasminko@centazakrs.ba, matovicognjen90@gmail.com

Nakon što je na Berlinskom kongresu 1878. godine upravljanje Bosnom i Hercegovinom pripalo Austro-Ugarskom carstvu osnivaju se prva udruženja građana po uzoru na susjedne zemlje. Prva se osnivaju pjevačka društva koja su imala ulogu na zabavama i u crkvama. Prvo je osnovano 1887, zatim 1889, pa 1894. godine. 1887. godine osniva se prvo filantropsko društvo „Krajcarsko štedovno društvo pravoslavnih Srpkinja u Sarajevu".

Društvo „Pobratimstvo" je osnovano 1893. godine kao drugo domaće udruženje pod punim nazivom „Pobratimstvo, družina trezvenih Srba u Foči". Pokušaj osnivanja prve nacionalne sportske organizacije, Srpske gimnastičke družine "Fočanski soko", sa sjedištem u Foči, 1894. godine odbijen je zbog „ultrasrpskih" tendencija. Očito je da je i u udruženju „Pobratimstvo" bilo mlađih članova kojima nisu bile odbojne fizičke aktivnosti. To dokazuje natpis u pećini Ledenjači kod Miljevine (opština Foča) koji smo pronašli tokom zimskog monitoringa šišmiša prije nekoliko godina. Ćiriličnim slovima je napisan naziv udruženja i datum posjete: Pobratimstvo 25/4/1901. To je dokaz prve organizirarane speleološke aktivnosti domaćih ljudi u Bosni i Hercegovini. Detaljnija istraživanja pećina oko Foče možda će nam pružiti još koji dokaz o aktivnostima ovog udruženja.

Pećina Ledenjača je inače poznata po ugraviranim predhistorijskim crtežima na ulazu.

Is Vjetrenica Just a Cave?

Jasminko Mulaomerović

Center for Karst and Speleology, Sarajevo, E-mail: jasminko@centazakrs.ba

Today, Vjetrenica is known both locally and internationally merely as a cave. However, archaeological finds and documents from the Dubrovnik Archives suggest that in the past it represented much more, owing to the natural phenomenon of wind that blows into and out of the cave.

During research conducted for the purpose of supplying water for the railway, Josip Vavrović discovered traces of a hearth deep inside the cave, at point 8 on his map. There, cooking and baking took place, and numerous food remains were found, indicating that the location was frequently visited. Vavrović also noted that in front of the cave entrance, remnants of old stone foundations were discernible, suggesting that the entire entrance had once been enclosed by a structure. He further reported: "It is clear that one reached the cave entrance through the courtyard of that building." It is unfortunate that the author did not provide any drawings of these foundations. Excavations in front of the cave and among the ruins yielded Roman coins, as well as a Dubrovnik dinar from the year 1666.

Documents from the Dubrovnik Archives mention Vjetrenica as a settlement or estate in the first half of the 15th century. A blacksmith from Vjetrenica, for instance, purchased an anchor from the men of a Dubrovnik nobleman, and other residents are also recorded. Later, Vjetrenica (referred to as *Veternizam*) is mentioned as a meeting place for distinguished noblemen from Dubrovnik and Herzegovina. This implies that the location offered enough comfort and prestige to host such esteemed guests with their entourages. Clearly, during both Roman times and the medieval period, Vjetrenica was more than just a cave.

Da li je Vjetrenica samo pećina?

Jasminko Mulaomerović

Centar za krš i speleologiju, Sarajevo, E-mail: jasminko@centazakrs.ba

Danas se Vjetrenica u svijetu i kod nas poznata samo kao pećina. Da je u prošlosti bila više od toga zbog prirodnog fenomena, vjetra koji puše u i iz pećine, upućuju arheološki nalazi i dokrmenti Dubrovačkog arhiva.

Prilikom istraživanja Vjetrenice za potrebe snabdijevanja vodom željeznice Josip Vavrović je otkrio u njenoj unitrašnjosti, kod tačke 8 (na njegovom planu) zgarište gdje se kuhalo i peklo, mnoštvo ostataka ostataka od jela što pokazuje da se to mjesto „najradiojeje pohađalo". Vavrović također navodi da se pred ulazom u pećinu raspoznaju stari zidani temelji „pa se čini da je cije li ulaz bio okružen nekom zgradom". Dalje u svom izvještaju navodi: „Vidi se da se do ulaza u pećinu dolazilo iz dvorišta te zgrade". Prava je šteta da autor nije donio crteže tih temelja. Prekopavanje pred ulazom i među ruševinama temellja nađeni su rimaski novci, a također i jedan dubrovački dinar iz 1666 godine.

U spisima Dubrovačkog arhiva vjetrenica se smpominje kao naseljeno mjesto ili posjed u prvoj polovici 15. stoljeća. Neki kovač iz Vjetrenice kupio je jedno sidro od ljudi dubrovačkog vlastelina, a pominju se jopš neki stanovnici. I kasnije se Vjetrenica (Veternizam) spominje kao mjesto susreta uglednih dubrovačkih i hercegovačkih velikaša. To pokazuje da je mjesto pružalo dovoljno luksuza da primi ugledne goste sa pratnjom. Očito da je u rimsko doba kao i u srednjem vijelu Vjetrenica bila više od pećine.

The Olm *Proteus anguinus* in North Macedonia?

Jasminko Mulaomerović

Center for Karst and Speleology, Sarajevo, E-mail: jasminko@centazakrs.ba

Biologists would claim it is impossible, but I believe I may have found it: in the small village of Mavrovo, beside Lake Mavrovo. In summer, the area is nearly deserted, while in winter it teems with skiers, as evidenced by the numerous hotels and rental houses.

During an excursion through North Macedonia last year, I visited this location because of a tourist cave, which unfortunately was closed to visitors at the time. The lake level was low enough to allow access to the remains of a church (built in 1856) that had been submerged following the construction of a dam. On two panels of the iconostasis, iconographic scenes are depicted. One features a bird eating grapes beside a palm leaf, a characteristic symbolic representation of the Eucharist. The other bears a similar motif, but includes the image of a creature with only two legs, gill-like (wavy) lines behind its head, and an elongated tail. Similar depictions appear on *stećci*, medieval tombstones, such as those found at the Boljuni necropolis near Stolac. These seemingly fantastical creatures are in fact simplified representations of the olm (*Proteus anguinus*), one of which is also depicted on a *stećak* from the aforementioned necropolis, next to an image of the three-headed dog Cerberus guarding the entrance to the underworld. Notably, this is accompanied by the toponym "Jama" - a part of the Hutovo Blato wetlands where olms were known to appear in the spring known as Babino oko.

Čovječja ribica *Proteus anguinus* u Sjevernoj Makedoniji?

Jasminko Mulaomerović

Centar za krš i speleologiju, Sarajevo, E-mail: jasminko@centazakrs.ba

Biolozi će reći da je to nemoguće, ali ja mislim da sam ga ipak pronašao: u malom selu Mavrovo, pored Mavrovskog jezera. Ljeti je to mjesto skoro pa pusto, zimi vrvi od skijaša o čemu govore brojni hoteli i kuće za iznajmljivanje.

Prošle godine sam tokom ekskurzije po Sjevernoj Makedoniji posjetio i ovo mjesto zbog jedne turističke pećine, koja je na žalost bila zatvorena za posjetioce. Nivo vode jezera bio je dovoljno nizak da se mogu obići ostaci crkve (sagrađena 1856.) koja je potopljena nakon izgradnje brane. Na dvije ploče oltarne pregrade prikazane su ikonografske scene. Jedna prikazuje pticu koja jede grožđe sa palminim listom. To je karakterističan simboličan prikaz euharistije. Na drugoj je sličan motiv sa dodatkom prikaza jedne životinje koja ima samo dvije noge, nešto kao škrge (valovite linije) iza glave i izduženi rep. Slični prikazi se nalaze i na stećcoma, srednjevjekovnim nadgrobnim spomenicima na nekropoli Boljuni kod Stoca. Te naizgled fantastične životine samo su pojednostavljen prikaz čovječije ribice kakva je prikazana na jednom stećku sa pomenute negropole uz koji se još nalazi i prikaz psa kerbera koji čuva ulaz na drugi svijet, ali i naziv toponima „Jama“ – dio Hutova blata gdje su se pojavljivale čovječje ribice u vrelu Babino oko.

Future drying of karst aquifers due to reduced winter recharge

Aurel Perşoiu[1, 2]

[1]Emil Racoviță Institute of Speleology, Romanian Academy, Cluj-Napoca, Romania,
E-mail: aurel.persoiu@gmail.com
[2]Stable Isotope Laboratory, Ștefan cel Mare University, Suceava, Romania

Karst aquifers provide drinking water for about 25% of the population worldwide and are also important sources of water for irrigation, animal husbandry and industry. Stable isotope data from karst aquifers in SE Europe indicate their preferential recharge by snowmelt in spring, as well as rapid transit of summer storm water. Our data suggests that short and intense precipitation events do not significantly contribute to the effective recharge of shallow aquifers, while secondary (and tertiary) porosity controlling flow through the unsaturated zone, are rapidly removing water from the rock. As virtually all climate models predict the intensification of the global hydrologic cycle, leading to more extreme rain events, as well as a reduction of winter snow cover, it results that karstic aquifers are prone to continuous depletion, leading to water shortages that could prove catastrophic for communities relying on them for their water needs.

Gustav Joseph – a somewhat forgotten researcher of the cave life of Carniola in the second half of the 19th century about bats

Primož Presetnik

Centre for Cartography of fauna and flora, Tacenska cesta 20, Ljubljana-Šentvid, Slovenija,
E-mail: primoz.presetnik@ckff.si

Gustav Joseph (1828~1891) was born in what is now western Poland, where he completed his medical studies in Breslau (now Wrocław) in 1851 and also where he continued his medical practice. He first visited Carniola and its Postonjska jama cave in 1853, on his way to Venice. But true turning point, was his excursion of several weeks in 1964, as the caves of Carniola became the focus of his research and publications in the following decades. I am currently aware of over 60 of his publications, of which a good half relate, at least in part, to the underground fauna of Carniola. His best known and most comprehensive works are the reviews of 1881 (Erfahrungen im wissenschaftlichen Sammeln und Beobachten der den Krainer Tropfsteingrotten eigenen Arthropoden) and 1882 (Systematisches Verzeichniss der in den Tropfstein-Grotten von Krain einheimischen Arthropoden nebst Diagnosen der vom Verfasser entdeckten und bisher noch nicht beschriebenen Arten). In them he explains the methods of collecting cave material and, after a quick survey, mentions some 50 Carniola caves. After a similarly incomplete survey, he described some 80 taxa of cave organisms. Among others, he is the author of descriptions of two genera and at least 19 currently valid species. Almost 30 taxa have been synonymised with the names of earlier animal describers, and for many descriptions it is doubtful to which species they actually refer. However, the purpose of this paper is not to evaluate his taxonomic work, but to highlight what we can learn about bats in the caves he visited from his works. He mentions bats in about 20 caves, either as direct observations or as references to their guano and/or parasites. The research is still ongoing and the result will be presented at the conference.

Gustav Joseph – malo zaboravljeni istraživač pećinske faune Kranjske u drugoj polovini 19. stoleča o šišmišima

Primož Presetnik

Center za kartografijo favne in flore, Tacenska cesta 20, Ljubljana-Šentvid, Slovenija,
E-mail: primoz.presetnik@ckff.si

Gustav Joseph (1828~1891) je rođen na području današnje zapadne Poljske, gdje je završio studije medicine u Breslau (sada Wrocław) 1851. godine i gdje je nastavio svoju medicinsku praksu. Prvi put je posjetio Kranjsku i njenu Postonjsku jamu 1853. godine, na putu za Veneciju. Ali prava prekretnica bila je njegova ekskurzuja od nekoliko nedelja 1964. godine, kada su pećine Kranjske postale fokus njegovih istraživanja i publikacija u narednim decenijama. Trenutno sam upoznat sa preko 60 njegovih publikacija, od kojih se dobra polovina, barem djelimično, odnosi na podzemnu faunu Kranjske. Njegova najpoznatija i najopsežnija djela su pregledi iz 1881. godine („Iskustva u naučnom sakupljanju i posmatranju zglavkara porijeklom iz kranjskih stalaktitskih pećina“) i 1882. godine („Sistematski spisak zglavkara poreklom iz kranjskih stalaktitskih pećina, uključujući dijagnoze vrsta koje je autor otkrio, ali još nisu opisane“). U njima on objašnjava metode sakupljanja pećinskog materijala i, nakon brzog pregleda, pominje oko 50 kranjskih pećina. Nakon sličnog nepotpunog pregleda, opisao je oko 80 taksona pećinskih organizama. Između ostalog, autor je opisa dva roda i najmanje 19 trenutno važećih vrsta. Skoro 30 taksona je sinonimizovano imenima ranijih opisivača životinja, a za mnoge opise je sumnjivo na koje vrste se zapravo odnose. Međutim, svrha ovog rada nije da procjeni njegov taksonomski rad, već da istakne ono što možemo da saznamo o šišmišima u pećinama koje je posjetio iz njegovih radova. On pominje šišmiše u oko 20 pećina, bilo kao direktna zapažanja ili kao reference na njihov guano i/ili parazite. Istraživanje je još uvijek u toku i rezultati će biti predstavljeni na konferenciji.

Hidrologija Pazinčice – povijest istraživanja, priče i saznanja

Josip Rubinić[1], Maja Radišić[2], Tamara Crnko[3]

[1]GEO_5 d.o.o. Carera 59, Rovinj, Hrvatska, E-mail: rubinic.josip@gmail.com
[2]MaLu, obrt za znanstvene, stučne i ostale djelatnosti, Pomerio 11, Rijeka, Hrvatska, E-mail: maja8radisic@gmail.com
[3]Fakultet zdravstvenih studija, Sveučilište u Rijeci, Viktora cara Emina 5, Rijeka, E-mail: Tamara.crnko@uniri.hr

U radu će biti prezentirana osnovna saznanja o vodama Pazinčice i njenom ponoru vezano kroz dugu povijest istraživanja ovoga krškog fenomena. I koliko god su za tumačenje mehanizma funkcioniranja ove vodne pojave važne činjenice i dobivena saznanja iz tih istraživanja koja se provode počev od kraja 19 stoljeća, kad je 1893. istraživanja Pazinske jame započeo otac suvremene speleologije Alfred Martela, za dobivanje novih saznanja o tom fenomenu gotovo jednako važne su bile i priče i pretpostavke o tom hidrološkom sustavu koje nalazimo u knjigama Alberta Fortisa (1774) i Julesa Vernea (1885) koji su svojim pretpostavkama i fikcijama zainteresirali i poticali istraživače da ispituju različite mogućnosti veza podzemnih voda. U tom povijesnom kontekstu istraživanja i saznanja o tom prostoru, posebno mjesto ima i dvoje vrlo različitih istraživača s područja Pazinčice – publicistice Nevije Feresini i speleologa i kako je sam volio isticati anarhista Draga Opašića Billya.

Rad sadrži i osnovne rezultate najnovijih hidroloških istraživanja u okviru projekta Istraživanje dinamike protjecanja voda u slivu Pazinčice i s njime povezanim vodnim resursima krškog vodonosnika središnje Istre koji su, na temelju rezultata monitoringa postavljenog na Pazinčici prije ponora, u njenom ponoru/ Pazinskoj jami, dvama susjednim jamama Kobiljak i Bregi te na izvorima u slivu rijeke Raše, upotpunili dio mozaika vezanog uz istraživani prostor, ali nadamo se ne i zatvorili prostor za nove fikcije koje vode znatiželjne na nova promišljanja i istraživanja, i neka buduća dodatna saznanja.

Karst Geomorphology and caves of Cyrenaica (NE Libya)

Rosario Ruggieri

Hyblean Center of Speleo-Hydrogeological Research, Ragusa, Italy, info@cirs-ragusa.org

A campaign of investigations has started in 2007 aiming at studying the karst geomorphologies and caves of the Jabal Al Akhdar (Green Mountains). Such a campaign is within a research agreement stipulated between the Department of Earth Sciences, Faculty of Science of the University of Benghazi, Libya and the Hyblean Center of Speleo-hydrogeological Research of Ragusa, Italy. Among the objectives of the project there are: that more general concerning the formulation of a speleological model consistent with the geodynamic evolution and climate changes taken place in the tethyan-mediterranean region from the end of the Cretaceous; those with application fall-outs into the local socio-economic framework addressing the finding out and protection of new water resources, the mapping of man altered areas, potentially at risk of instability and/or sinking because of the presence of karst voids, and the institution of Karst Geosites and Geopark of a particular scientific, environmental or aesthetic value. The campaign of geospeleological investigations carried out in the 2007/2008/2009 years and most recently in 2022, 2023 and 2024 years on a updated Memorandum of Understanding, has concerned the karst area of the coastal belt of Benghazi and Sousa and the plateau of El Marj, Al Bayda, Derna and Tobruk. The study of a series of large collapse dolines, connected with the network of conducts draining the groundwater along the coast, was started in the area of Benghazi. Still in the same area, the Lethe karst system with a large underground lake, which was the subject of a tourist fruition during the Italian colonial period, is of particular interest, even historic. In the coastal area of Sousa a significant karst outcrop, surveyed and documented, is the, Brag Notta karst system constituted by a collapse doline and two large neighbouring doline-lake connected hydrologically by a recent tectonic structure draining the brackish ground water sometimes towards the sea, sometimes towards the hinterland, depending on the tidal excursions. In raised areas of El Beida and El Marj plateau a very interesting geomorphologic and hydrogeologic study shows some big dolines and dip swallow-holes, inserted in the context of a typical cockpit relief, while in the plateau of Derna the exploration of a complex labyrinthine cave has allowed also

the discovery of paleontologic and archaeological finds. Speleological explorations and geological investigations of the above mentioned karst areas are still being carried out.

Cyclical Evolution of Blind Valleys in Ponor-Type Contact Karst: Deepening the Scientific Legacy of Andrej Mihevc

Uroš Stepišnik[1], Sašo Stefanovski[1], Klemen Cof[2]

[1]Department of Geography, Faculty of Arts, University of Ljubljana, Aškerčeva cesta 2, SI-1000 Ljubljana, Slovenia, E-mail: uros.stepisnik@gmail.com, Saso.Stefanovski@ff.uni-lj.si
[2]Anton Melik Geographical Institute, Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU), Gosposka ulica 13, SI-1000 Ljubljana, Slovenia

Contact karst representsa subtype of the karst geomorphic system that develops at an active hydrological intersection between fluvial and karst geomorphologic systems (Mihevc, 1991a; Mihevc, 1994). Two types of hydrological settings are distinguished: ponor-type contact karst and spring-type contact karst (Mihevc, 1991b). In ponor-type settings, allogenic streams originating from non-karstic bedrock cross onto carbonate terrain. These streams carry large volumes of water and substantial amounts of sediment, which is partly deposited at the contact and partly transported into the karst aquifer, where paragenesis generates extensive near-surface horizontal cave systems in the epiphreatic zone. Characteristic landforms include contact-karst alluvial fans, ponor valleys, ponor heads and blind valleys. Surface denudation can eventually transform horizontal caves into long unroofed caves.

Research on ponor-type contact karst was decisively shaped by dr. Andrej Mihevc, whose detailed field work linked blind valleys to the paragenetic cave systems in their catchments (Kranjc & Mihevc, 1988; Mihevc, 1991a; Mihevc, 1994; Mihevc, 1996; Mihevc & Zupan Hajna, 1996; Mihevc, 2001; Mihevc, 2007; Zupan Hajna et al., 2008; Bočić, Pahernik & Mihevc, 2015; Švara, Mihevc & Zupan Hajna, 2023). His pioneering insights remain the foundation of present-day morphogenetic studies and continue to inspire new lines of research.

Within a modern morphodynamic framework (Stepišnik, 2020; Stepišnik, 2024), contact karst is interpreted as a variety of *shallow karst*, in which the vadose zone is absent, and the surface intersects the epiphreatic or even the phreatic zone (Gams, Kunaver & Radinja, 1973; Stepišnik, 2017; Stepišnik, 2020; Stepišnik & Gostinčar,

2020). Periodic flooding or permanent surface flow occur where the groundwater table rises above the terrain.

Blind valleys are therefore regarded as allogenic canyons that end abruptly at the karst margin. Some exhibit extensive flat alluvial floors, whereas others remain distinctly narrow. To explain this difference, we analysed two Slovenian blind valleys – Odolina and Mejame – where runoff from Eocene flysch reaches Palaeocene and Cretaceous limestone. Odolina possesses an alluvial floor that is ~350 m wide and extends almost 1 km into the karst, whereas Mejame is ~50 m wide and ~600 m long. Four electrical-resistivity-tomography (ERT) profiles were surveyed; three in Odolina and one in Mejame.

In both valleys, the alluvium reaches a thickness of several tens of metres, contradicting the traditional model that considers only lateral corrosion and erosion of valley sides. Instead, blind valleys evolve mainly through the **epigenetic incision** of the stream into bedrock, followed by phases of intense aggradation and renewed erosion. Epigenetic incision is a process where a river cuts down into the valley only after the previous flat valley floor has already been formed. When the protective layer of sediment is eroded away the allogenic stream erodes into fresh carbonate bedrock that was not exposed before. As the river deepens, its channel can migrate sideways, eroding bedrock rather than old sediment fill.

In Odolina, at least two incision phases are evident. ERT sections reveal twin palaeocanyons on the eastern and western sides, now buried beneath thick alluvium, while the present channel is cutting an bedrock ridge below the sediment that is positioned between them. These cyclical processes of deepening and infilling explain the morphological diversity of blind valleys and the uneven development of broad valley floors.

The new evidence contradicts earlier genetic models and demonstrates that blind valleys undergo repeated epigenetic incision and sedimentary aggradation. Because incision positions migrate laterally, successive palaeocanyons appear as sub-parallel features in the valley cross-section. Although this contribution marks only the beginning of a detailed morphogenetic reconstruction of blind valleys, it represents a significant advance for speleogenetic studies, where denudational and aggradational cycles are more dynamic than previously assumed. These results advance karst geomorphology and build on the work of dr. Andrej Mihevc, whose studies of contact karst and blind valleys remain a key reference.

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The first investigations into the underground course of the Timavo River originated in the ancient County of Gorizia

Maurizio Tavagnutti

Centro Ricerche Carsiche "C. Seppenhofer", Gorizia, Italy, E-mail: mauriziotavagnutti@gmail.com

Precisely determining the origins of speleological activity in the area of the Classical Karst is a complex challenge, perhaps even an impossible one. However, the available sources provide a rough approximation, indicating that the systematic study of underground environments began in the ancient County of Gorizia, which at the time encompas sed a vast area. Retracing the historical events linked to this particular discipline within the geographical sciences is not merely an exercise in reconstruction but rather a fascinating journey through scientific insights and pioneering discoveries.

It was precisely during the deepening of my research into the history of speleology in the Isontino that my interest in history grew, leading me to uncover previously unknown details. These elements support the hypothesis that a true school dedicated to the study of karst phenomena emerged in the Gorizia region.

In the past, cave exploration - more than speleology in the modern sense - was far from unfamiliar to the people of Gorizia. Between the late 19th and early 20th centuries, some of them left behind valuable written accounts of their underground excursions, revealing a curiosity and research methodology worthy of attention.

The earliest written records of structured speleological activity in the Gorizia area date back to the second half of the 19th century, yet traces of sporadic explorations in the region's karst caves emerge from much earlier times. Specia lized literature has traditionally identified the Classical Karst, located around the city of Trieste, as the cradle of spe leology. However, in light of new discoveries, this perspective appears incomplete when examined in depth.

My research has indeed highlighted how, between the 16th and 18th centuries, the ancient County of Gorizia was Giovanni Fortunato Bianchini (1719-1779) home to renowned scholars of karst phenomena. Delving into the history of this branch of

geographical sciences reveals numerous authors who, over the centuries, dedicated themselves to understanding karst processes, particularly in the quest to trace the myste rious underground path of the Timavo River.

It was discovered that some scholars and independent researchers of the time had devo ted considerable attention to studying and exploring a mysterious underground river, believed to traverse the entire Karst region. This river was thought to submerge near the village of San Canziano (now Škocjan in Slovenian) under the name Recca (now Reka in Slovenian) before resurfacing in Duino as the Timavo.

This is a story with ancient roots, and among its key figures was Father Pietro Imperati from Duino, who, between the 1500s and 1600s, had already hypothesized the under ground continuity between the Recca River and the Timavo. He was followed by Gio vanni Fortunato Bianchini, who lived in the first half of the 18th century and wrote a fasci nating treatise on the Timavo titled "Osservazioni intorno al fiume Timavo" (Observations on the Timavo River) in 1753 for Guidobaldo Cobenzl, Count of Gorizia.

Another distinguished figure from Gorizia, born under the reign of Francis I and a career military officer, was the noble Carlo Catinelli (Karl von Catinelli), born in Gorizia in 1780. Catinelli was an active member of the Agricultural Society of Gorizia, as well as those of Carniola and Styria. As part of his activities, he authored numerous treatises, among which the "Trattato geografico-idrologico sull'Isonzo" (Geographical-Hydrological Treatise on the Isonzo) and "Memoria sulle celebrità del Timavo" (Memoir on the Eminent Figures of the Timavo) are particularly notable. Despite his military zeal, he never neglected his inte rest in the natural environment, especially the mysteries of the Timavo. In fact, he wrote a significant work in German, in two volumes, titled "Über die Identität des alten und des heutigen Timavo Flusses" (On the Identity of the Ancient and Present-Day Timavo River). Finally, in 1884, Carl von Czörnig (Carl von Czoernig-Czernhausen), during a conference Carlo Catinelli (Karl von Catinelli) (1780 – 1869) held in Paris, undoubtedly interpreting and endorsing the hypotheses of earlier scholars, recalled the existence of a vast water basin located in the middle stretch of the Isonzo River. According to his interpretation, its waters, flowing through caves at the base of the Karst south of Gorizia, contributed to the underground course of the Timavo.



Giovanni Fortunato Bianchini (1719-1779)



Carlo Catinelli (Karl von Catinelli) (1780 – 1869)

Proceedings of the 10th INTERNATIONAL SYMPOSIUM ON HISTORY "ALCADI 2020" Into the Heart of the Earth: The History of Speleology across the Centuries

Maurizio Tavagnutti

Centro Ricerche Carsiche "C. Seppenhofer", Gorizia, Italy,
E-mail: mauriziotavagnutti@gmail.com

With great enthusiasm, we announce the publication of the proceedings of the prestigious 10th INTERNATIONAL SYMPOSIUM ON HISTORY "ALCADI 2020", an internationally significant event that provided an extraordinary opportunity for discussion and in-depth exploration of the history of speleology.

Originally scheduled for 2020, the symposium had to be postponed for a year due to the global health crisis caused by the COVID-19 pandemic. Despite the challenges, the spirit of research and the passion for speleology prevailed, and finally, on September 3rd, 4th, and 5th, 2021, the city of Gorizia welcomed researchers and historians from across Europe to celebrate knowledge and the discovery of the depths of the Earth.

This volume brings together 24 contributions, the result of extensive studies conducted by experts from Italy, France, Poland, Austria, Germany, and Bosnia-Herzegovina, all united by the desire to explore the historical roots of this fascinating and complex discipline. Each paper represents a fundamental piece in understanding the evolution of speleology, from the first exploratory expeditions to the most advanced underground investigation techniques.

Through the pages of this book, readers will embark on an extraordinary journey through ancient myths and modern achievements, reliving the adventures of pioneers who dared to challenge the darkness and depths, armed with sheer courage and insatiable curiosity. The volume illustrates the technical transformations that revolutionized speleological exploration and the discoveries that have expanded our understanding of the subterranean world, forming an invaluable body of knowledge for future generations.

However, this volume is not just a historical account: it is a critical reflection on the cultural and scientific evolution of speleology, its impact on the perception of the underground world, and the future challenges facing explorers and researchers. A must-read for anyone fascinated by the depths of the Earth and the relentless pursuit of knowledge that has always driven humanity to push beyond its limits.

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PROCEEDINGS OF THE

10th INTERNATIONAL SYMPOSIUM ON HISTORY OF SPELEOLOGY AND KARSTOLOGY IN ALPS, CARPATHIANS AND DINARIDES





GORIZIA (Italy)
September 3rd - 4th - 5th, 2021

How Old Is the Karst of the NW Dinarides? Evidences from Cave Sediments

Nadja Zupan Hajna[1], Pavel Bosák[2]

[1]Karst Research Institute, Postojna, Slovenia, E-mail: zupan@zrc-sazu.si
[2]Institute of Geology of the Czech Academy of Sciences, Praha, Czech Republic, E-mail: bosak@gli.cas.cz

Understanding the age and evolution of karst in the NW Dinarides has long been a subject of discussion, limited by the scarcity of directly datable cave sediments. Recent advances in chronostratigraphy—based on multi-proxy datasets including paleomagnetic records, U/Th dating, tephrochronology, and micromammal assemblages—have improved our understanding of the temporal framework of karst development.

This contribution presents latest results from several cave sites in southwestern Slovenia, including the Račiška Pečina section, unroofed caves above Škocjanske Jame, and a clay-rich deposit containing Miocene tephra, redeposited in Grofova Jama. The combined data indicate a complex karstification and speleogenesis beginning at least in the Early Miocene. Weathered remains of Oligocene/Miocene volcanic ash, preserved as cave fill, provide chronological markers that constrain the minimum age of parts of the karst landscape and help clarify its evolution.

Additional biostratigraphic evidence supports an early onset of karstification. Small mammal assemblages from Račiška Pečina indicate ages from the Pliocene to Early Pleistocene. The discovery of a ±2 Ma old subterranean gastropod, likely the genus *Zospeum* sp., represents one of the oldest known records of obligate cave fauna in this part of Europe.

The findings provide robust evidence that parts of the karst system in the NW Dinarides formed significantly earlier than previously assumed, already at the Oligocene/Miocene transition or even earlier. This has implications for understanding the timing and processes of karst evolution, refining speleogenetic models, and interpreting the origin and persistence of subterranean fauna in the Dinaric Karst.

Commemorative postmark / Prigodni poštanski žig

On the occasion of the symposium, the JP BH Pošta approved the use of a commemorative postmark at post office 77101 Bihać on 23 June 2025.

Povodom održavanja simpozija JP BH pošta je odobrila upotrebu prigodnog poštanskog žiga u pošti 77101 Bihać na dan 23. 6. 2025.



Travel map / Mapa puta

