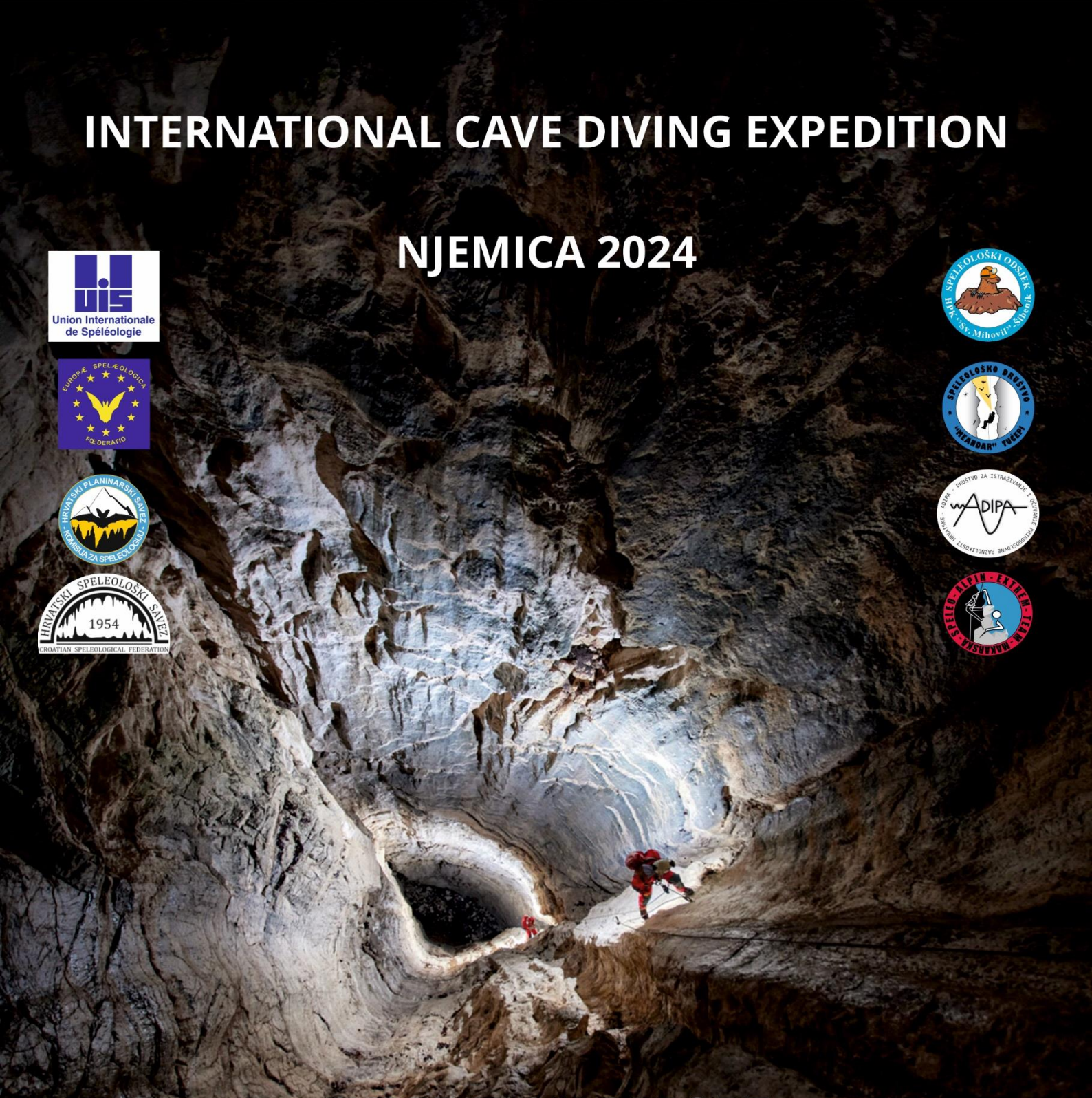
INTERNATIONAL CAVE DIVING EXPEDITION

NJEMICA 2024



EXPEDITION REPORT

Expedition leader: Jure Saric, Instructor of speleology
Expedition leader: Pasko Viskovic, Speleologist

In Zagreb, November 5th 2024

Photo: Dinko Stopic

Content

Summary

International cave diving expedition Njemica 2024 was organised by Caving department of CMC St. Michael from Šibenik and Caving society Meandar from Tučepi and the Public Institution "Biokovo Nature Park", GeoPark Biokovo-Imotska jezera (Croatia). The co-organizers of the expedition are The Speleological Commission of the Croatian Mountaineering Association, Croatian Speleological Federation, The Union Internationale de Spéléologie and SAC Ekstrem from Makarska. The leader of biospeleological research is the Society for Research and Conservation of Croatian Natural Diversity ADIPA.

This Euro Speleo Project is sponsored by Fédération Spéléologique Européenne, Aventure Verticale and Scurion.

Expedition was held in period from August 4th to August 15th. During the 12 days of the expedition, over 60 cavers from eight countries of the world — Croatia, Bosnia and Herzegovina, Montenegro, Bulgaria, France, England, Uruguay, and Germany, gathered with the aim of reaching a depth of more than 1,000 meters, which would make cave Njemica join the elite group of five Croatian pits deeper than one thousand meters.

Despite not reaching the magical limit of 1,000 meters, the Njemica cave remains the deepest cave in Biokovo, a mountain that still wisely hides all it's secrets. New depth of Njemica is -982 meters.

Introduction

For the past 30 years, Croatian speleologists have been conducting demanding cave and cave diving research in deep pits, which places Croatian speleology at the very top of world speleology. The exploration of speleological objects requires exceptional dedication to the task and mission - to go as deep and as far as possible into the most hidden corners of the Empire of the Black Continent.

Aproximatly 70% of croatian territory is covered by karst with more than 10.000 known caves. Regions like Velebit and Biokovo are homes to some of the deepest caves in Croatia. North part of Velebit is well know for it's deep vertical pits with no or little horizontal parts, and it's south part for complex system which is in top 60 longest caves in the world. Cave system Crnopac, or Jamski sustav Crnopac is longest cave in Croatia with more than 63 kilometers lenght and 830 meters depth.

Picture 1 shows map of Croatian karst
Source: hr.izzi.digital

Biokovo is the second highest mounatin range in Croatia, located along the Dalmatian coast of Adriatic between Cetina and Neretva rivers. It's highest peak is Sveti Jure, or Saint George at 1762 meters above sea level. The 196 km^2 of Biokovo area is protected as a nature park with over 1,500 plant and animal species, which some are endemic. Mountain it's self has more than 400 known caves, with five cave deaper than 500 meters. Notable caves 're cave Njemica (-982 m), Mokre noge (-831 m), Amfora (-788 m), Vilimova jama (-589 m), Stara škola (-576 m). Until exploring first croatian caves deaper than 1.000 meters Bikovo was home of the deepest cave in Croatia, cave Stara škola or Old school cave (-576 m).

Picture 2 shows mountain Biokovo (red circle)
Source: hr.wikipedia.org/wiki/Biokovo

Cave Njemica was descovered in 2017 by the mebers of Caving and Alpine club Ekstrem from Makarska where the exploration stopped due to restriction on -90 meter depth. Two years after in 2019 with widening of several restriction cave opened and was explored to the depth of -555 meters. Year later in 2020 it became the deepest cave in mountain Biokovo. When cave diver Branko Jalzic took a -35 meter dive in downstream sump lake at the bottom of the pit, reaching

full depth of -971 meters. After Branko's dive cavers took a break for few years until the members of Caving department of CMC St. Michael from Šibenik and Caving society Meandar from Tučepi took over the helm and started a race with goal of reaching depth of 1.000 meters.

Picture 3 shows caving team reaching old bottom at -863 meters depth
Source: Marin Glusevic

Picture 4 shows caving and cave diver Branko Jalzic (yellow) reaching downstream lake -934 meter deep
Source: Caving and alpine club Ekstrem Makarska

Expedition

International cave diving expedition Njemica 2024 was organised by Caving department of CMC St. Michael from Šibenik and Caving society Meandar from Tučepi and the Public Institution "Biokovo Nature Park", GeoPark Biokovo-Imotska jezera (Croatia). The co-organizers of the expedition are The Speleological Commission of the Croatian Mountaineering Association, Croatian Speleological Federation, The Union Internationale de Spéléologie, Fédération Spéléologique Européenne and SAC Ekstrem from Makarska. The leader of biospeleological research is the Society for Research and Conservation of Croatian Natural Diversity ADIPA.

Expedtion can be devided in two main parts. Part of pre-expedtion where expedition leaders formed diving team, transport team and base camp team. In the first part cave was needed to be equiped with ropes, anchor points, hot spots – bivouacs, enough stored food and transport more than 250 kilogram of diving equipment at the depth of -934 meters. Second part of expedition started when diving team entered the pit and lasted till the last part of the equipment was transported at the surface.

Picture 5 shows expedition poster
Source: Jure Saric

Pre-expedition

Mixed caving group of 15 croatian cavers from Tučepi, Šibenik, Omiš, Zagreb, Zadar and Karlovac went to cave Njemica to prepare cave for upcoming expedition. During the weekend of 19th till 21th of July most of the diving equipment was transported at -600 meters, and some at -934 meters. All bivouacs were equiped with sleeping bags, pads, food and needs for normal underground life.

Picture 6 shows prepared diving and sampling equipment for Njemica 2024
Source: Petra Kovac-Konrad

Picture 7 shows part of pre-expedition team from left to right Dinko Stopic, Dario Mrkonjic, Jure Saric, Petra Kovac-Konrad, Pepera Slavica, Mario Gveric, Luka Zarkovic and Marko Batovanja
Source: Dinko Stopic

During the expeditions most usual problem is comunication with surface which in this case was solved by using two independent system – CaveLink and regular wired one, in case of bad weather so that cavers inside can be alarmed and informed.

Picture 8 shows entrance in the Big chamber at – 400 meters depth
Source: Dinko Stopic

Expedition

Just couple days before main part of expedition everything was under a big question mark. Raging fire in Biokovo mountain forced evacuations and devastated natural landscapes where more than 300 firefighters tried to stop huge natural catastrophy. Around 400 hectares of scrubland, low vegetation and pine forest have been burnt in the area. Expedition was postponed by one day and cavers got premison to launch expedition.

Picture 9 shows devastated Biokovo's nature by raging fire
Source: Ivo Cagalj, PIXSELL

During the 12 days of the expedition, over 60 cavers from eight countries of the world — Croatia, Bosnia and Herzegovina, Montenegro, Bulgaria, France, England, Uruguay, and Germany, gathered with the aim of reaching a depth of more than 1,000 meters, which would make cave Njemica join the elite group of five Croatian pits deeper than one thousand meters.

During the first days transport teams took rest of the diving equipment at the third bivaouc at -934 meter depth. Pasko Viskovic second expedition leader, and Zoran Zrna led the transport teams from -600 meters to -934 meters where they transported the rest of the equipment and prepared the place for the diving team arrival.

Picture 10 shows part of transport team for transporting from -400 m to -934 m
Source: Petra Kovac-Konrad

Picture 11 shows first bivouac at -400 m in Big chamber
Source: Dinko Stopic

On the third day diving team lead by experienced cave diver and mountain rescuer dr.sc. Petra Kovac-Konrad best known for a lifetime explore of Proteus habitat, teamed by Frédéric Swierczinsky known for it's own impresive cave diving career, including breaking a world cave diving record diving at depth of -308 meter in the Font Estramar, and Jonathan Gabris who's best known for connecting cave Tounj with cave spring Tounjcica.

All three of them were equiped with lastest diving gear which ulocks full potential of cave diving explorations. Using CCR[1] divers don't create bubles that cause collapsing of silt, which leads to creating cloud through one can not see. Also CCR technology uses less breathing gas what causes less diving equipment to transport through the cave.

Picture 12 shows diving and support team from right to left Jonathan Gabris, Frédéric Swierczinsky, Frederic Aragon, Petra Kovac-Konrad and Jure Saric – expedition leader
Source: Josip Tezak

[1] CCR – Closed cuircut rebreather is a breathing apparatus that absorbs the carbon dioxide of a user's exhaled breath to permit the rebreathing (recycling) of the substantially unused oxygen content, and unused inert content when present, of each breath.

Picture 13 shows transport on the lower parts of the cave, from left to right Dino Grozic, Pasko Viskovic and Zoran Zrna
Source: Petra Kovac-Konrad

After one day of traveling and preparing equipment diving team was ready for push dive. Frédéric's mission was to do an push dive and lay safe line as good it can get so that Petra and Jonathan can do sampling and survey in most relaxing manner, and to push the cave as deep it can get. All divers prepared gear for -150 meter deep dive.

Unfortunatley Frédéric reached the bottom of the downstream sump lake at -48 meters which made Njemica cave's new depth of -982 meters, just 18 meters shorther for the first 1.000 meter deep cave that's not located on Velebit mountain.

Petra and Jonathan discusted with Frédéric about the morphology of the downstream sump where they were given last instructions before descending and collecting the samples of sediment and water.

Picture 14 shows diving equipment prepared for push dive
Source: Petra Kovac-Konrad

Picture 15 shows Fred preparing for the push dive
Source: Jure Saric

Picture 16 shows Petra and Jonathan preparing for sampling and survey dive
Source: Jure Saric

Picture 17 shows Frédéric waiting for Petra and Jonathan to finish the survey and sampling dive
Source: Jure Saric

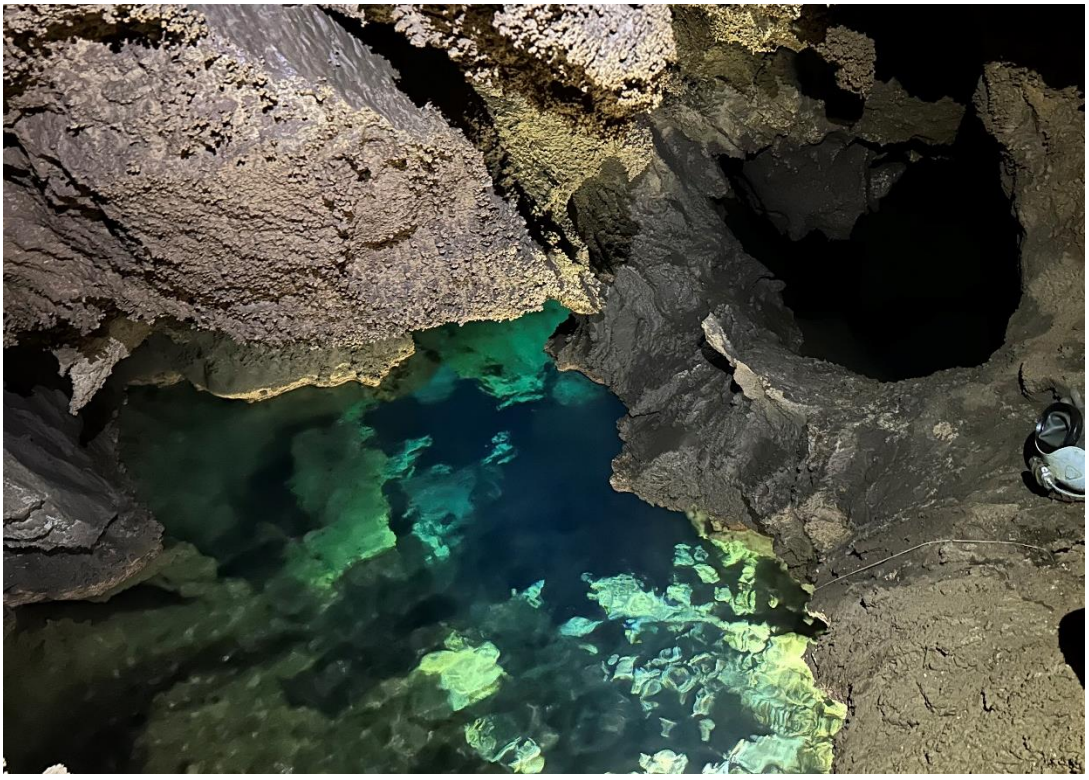
Picture 18 shows casual amosphere between the dives in bivouac – 934 m
Source: Jure Saric

On the fifth day while Petra and Jonathan did more sampling and exploring upstream sump which end up in narrow gap with no possibility to tie a safe line, after Petra's and Jonathan's dive Frédéric and Frédéric packed and prepared all of Frédéric's diving gear and went from -934 meters to bivouac at -400 meters. At the same time transport team arrived from bivouac at -600 meters collecting the prepared equipment and start to ascend to -600 meters.

The third transport team entered the pit and waited Frédéric and Frédéric in bivouac -400 m. While teams were ascending Petra and Jonthan with help of Jure prepared and transport some of the equipment to the upper parts of the cave so that cavers don't have to go all a way down to the lowest bivouac.

Most critacal part was over and hardest part of taking out more than 250 kilograms heavy equipment was about to begin.

Picture 19 shows Petra taking measurements and sampling of the water
Source: Jure Saric



Picture 20 shows upstream sump before the dive
Source: Jure Saric

Picture 21 shows upstream sump after the dive
Source: Jure Saric

Picture 22 shows transporting the equipment to the surface
Source: Petra Kovac-Konrad

Results

Biospeleological – *mag. sc. biol. et oecol. Roman Ozimec*

Collected material, nine true cave species – five troglobionts and four stygobionts. Along with representatives of macrofauna, the endemic beetles Speoplanes giganteus and Radziella styx and the springtail Verhoeffiella sp. A very interesting earthworm is highlighted, which shows troglobiont characteristics, as well as parasitic mites found on specimens of the subterranean species Speoplanes giganteus, for which there are no recorded findings so far.

Picture 23 shows species Speoplanes giganteus
Source: Roman Ozimec Collection

Picture 24 shows parasitic mites on the species Speoplanes giganteus
Source: Roman Ozimec Collection

From the stygobiont, a rich population of the cave amphipod species Typhlogammarus sp. has been established, on which parasitic Temnocephalidae were found, very likely new species for science. In the collected sediment, no snails of the class Gastropoda were found, only a few shells of bivalves (Ostracoda), and one specimen of a tiny, likely ribbon worm (Nemertina).

Picture 25 shows Oligocheta
Source: Roman Ozimec Collection

In the upper parts of the cave, troglophile species were found, including the harvestman Nelima troglodytes and the cave cricket Troglophilus cavicola, a silverfish from the genus Machilis, as well as a juvenile specimen of a scorpion from the genus Euscorpius.

Picture 26 shows species Typhlogammarus
Source: Roman Ozimec Collection

The collected fauna is missing representatives from numerous groups of cave fauna of Biokovo, which certainly come in Germany: Isopoda, Chilopoda, Diplopoda, Araneae, Pseudoscorpiones, Coleoptera: Carabidae etc. In future research, it is necessary to plan a more systematic collection of material, as we already have some exceptional and new findings for the cave fauna of Biokovo in this case.

Caving and future exploration

During the 12 day of expedition diving team managed to survey 90 meters submerged part of downstream sump reaching new deepest point of -982 meters.

Most of the earlier exploration was held during the winter and spring time with no or very little air circulation at the bottom of the cave. During the expedition in summer time caver felt significant air flow which can lead to unexplored parts and reaching the magical -1.000 meters dream.

Water and sediment samples for the scientific projects

Samples were sent to the croatian Ruder Boskovic Institute where they're being processed, after which we'll get the results.

Conclusion

„Success is not final, failure is not fatal: it is the courage to continue that counts.“
- Winston Churchil

Caving society was always different then the rest of people who enjoy outdoor activities. There're not so many activities where completly strangers work for each other with their full potential to reach the common goal of exploring the unseen. More than 60 people participated during the 12 days of expedition, more than 40 of them're cavers. Some of them spent 8 to 10 days underground and climbed over 4.000 meters transporting 250 kilograms of diving equipment.

That kind of feel to see incredible power of what can cavers do for purpose of exploration. Most valuable frendships were created in bivouacs an -934 meters, -600 meters and -400 meters where caver share one last bite of cholate or sip of warm tea.

Expeditions come and go but frendships created in such enviroment stay forever.

Sources

Internet

1. www.n1info.hr/english/news
2. www.hr.izzi.digital
3. www.hr.wikipedia.org/wiki/Biokovo
4. www.hrcak.srce.hr/253088

Paper

1. Expedition logbook

List of pictures

Apendix

Apendix 1. List of all participants

N	Name and surname	N	Name and surname	N	Name and surname
1	Frederic Swierczynski	22	Rita Vukovic	43	Anamarija Paradinovic
2	Frederic Aragon	23	Josip Medic	44	Nini Legovic
3	Bruno Gaidan	24	Jure Saric	45	Silvio Legovic
4	Petra Kovac-Konrad	25	Tonci Viskovic	46	Branko Jalzic
5	Ana Gace	26	Marin Gojak	47	Gordan Bedinic
6	Matea Vucko	27	Aleksandar Kovacevic	48	Josip Dadic
7	Pasko Viskovic	28	Matteo Zausnig	49	Dario Mrkonjic
8	Stipe Saric	29	Olga Jerkovic	50	Karlo Kovacic
9	Zoran Zrna	30	Jonathan Gabris	51	Marko Batovanja
10	Marko Studen	31	Barbara Domitrovic	52	Luka Zarkovic
11	Tomislav Flajpan	32	Davorin Turkovic	53	Ante Perinic
12	Tsvetan Kosturkov	33	Dino Grozic	54	Roman Ozimec
13	Teo Barisic	34	Zeljko Medurecan	55	Darko Jelecki
14	Aida Barisic	35	Mirjana Roscic	56	Piero Antic
15	Ana Mijic	36	Marija Glucina	57	Jurica Jagetic
16	Hrvoje Petricevic	37	Ivan Katicic	58	Josip Tezak
17	Leonardo Grubelic	38	Ino Vela	59	Alvaro Aguilera
18	Mario Gveric	39	Ksenija Protrka	60	Romhold Maik
19	Mirna Mihelcic	40	Slavo Jaksa	61	Zeljko Mihic
20	Robert Dasovic	41	Vid Ozic-Bebek	62	Dinko Stopic
21	Pepera Slavica	42	Davor Cvitanic	63	Dragan Juric

Apendix 2. Cave survey