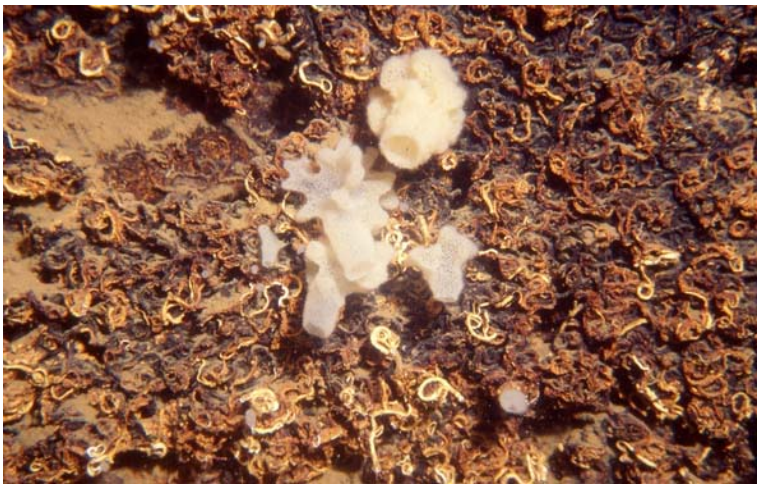
“Conservation of *Eunapius subterraneus*, the only subterranean freshwater sponge in the world”



Annual Report 2003/2004

for The Rufford Maurice Laing Foundation
The Rufford Small Grant 2003

author and the project leader
Jana Bedek

Croatian Biospeleological Society

May, 2005

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1. PROJECT DESCRIPTION

ORIGIN OF THE PROJECT

Eunapius subterraneus, the only subterranean freshwater sponge in the world, lives in the Ogulin karst area (Croatia), one of the world's top ten endangered karst ecosystems, according to Karst Waters Institute, USA (http://www.karstwaters.org/TopTen3/topten3.htm). Two subspecies from three different populations have been described, *E. s. subterraneus* Sket et Velikonja, 1984 and *E. s. mollisparspanis* Sket et Velikonja, 1984. The species has been recorded only in 8 underground sites since 1984. Cave diving in extreme conditions is the only possible way to find and map new localities and to conduct more thorough research. Statuses of the populations and of the habitat are unknown because of the lack of data. The habitat itself is endangered through water pollution, sewage and waste dumping, water extraction for the Gojak Hydroelectric Power Plant, the construction of highways and oil pipelines, Tounj Quarry (above one of the localities), etc. It is vital to map all sources of potential and existing water pollution because karst groundwater has limited water purification ability. Clean karst groundwater is not important just for groundwater fauna but is also a very important source of drinking water, and provides the bases for the sustainable development of the area. All these facts highlight the necessity for research and conservation of the whole region, which is true hotspot of endemism and groundwater biodiversity. Among all other species there lives *Proteus anguinus*, one of the species which needs strict protection according to "Directive 92-43-CEE Faune-Flore-Habitat" in the EC (Annexes 2, 4). Although the whole Croatian underground fauna is legally protected, the active conservation is still vague and without a real government strategy. No state strategy on groundwater tracing exists, and it is highly unlikely that one will be drawn up in the near future.

GOALS

The first goal of the project is to evaluate this habitat and its existing threats, the endangerment and vulnerability of populations of *Eunapius*. Treating *Eunapius* as an "umbrella species" we will achieve the main goal, which is the protection of the whole groundwater fauna of the area. The second and even more important goal is conservation through raising the level of public awareness.

OBJECTIVES

Research

Habitat evaluation will be made through a freshwater subterranean fauna checklist for underground objects individually and for the whole area. We will visit all possible underground sites with cave divers and speleologists from the local area, we will collect data on underground species found and samples for water quality analysis.

In cooperation with local communities, stakeholders and local NGO's we will try to find sources of pollution, especially pits with illegal waste dumping, sources of chemical toilet waste, etc. We will gather information about industry which physically impacts the karst, like power plants, quarries, roads etc. In order to identify future possible sources of endangerment local authorities, state and local stakeholders will provide us with

information about landscape development plan. "Croatian Waters" will provide us with an evaluation of the water quality of the region. All findings will be photographed and mapped, so it will be possible to define hot spots of groundwater biodiversity. The high level of biodiversity of groundwater fauna is not only important at a scientific level, it also indicates good water quality. Comparing the available hydrological maps with the fauna map we will be able to make spatial connections between populations and causes of endangerment.

Conservation

Local level: Education based

We will produce educational leaflets about problems with drinking water and how garbage and other sorts of pollution affect the water quality ("everything you dump in the karst you will eventually drink") and distribute them. Also a questionnaire will be made for the local population about the present awareness concerning subterranean fauna, the karst area, and drinking water problem. We will give lectures in local schools, speleological societies, at the Faculty of Science. Media organizations will be informed about our activities and results.

Because of the more and more frequent theft and sale of biospeleological fauna by foreign explorers (breaking several Croatian laws and International conventions, like CITES), we will contact local police and inform them about such activities.

State level: Research based

Though Ogulin is classified as one of the world's top ten endangered karst ecosystems, governmental organizations have not made any progress considering exploration, inventory and conservation of that area. It is very important to highlight the problem of non-existing strategies of active conservation of underground fauna and groundwater conservation. We think that this year, especially since the UN proclaimed the year 2003 the International Year of Freshwater (http://www.wateryear2003.org/ev.php?URL_ID=1456&URL_DO=DO_TOPIC&URL_SECTION=201), it is very important to start to deal with groundwater conservation problems. Although this research is at a local level, it has the importance at a global level. The results will be scientifically and popularly published, and sent to The Ministry of Environmental Protection and Physical Planning, "Croatian Waters", "Croatian Roads", "Croatian Electricity Company", local authorities, etc., so it could be in use for future management of the area. We will officially propose the most important locality to be protected at the state level, taking into account the high biodiversity and endangerment level.

DURATION OF THE PROJECT:

The project is expected to last at least 4 years. It consists of two overlapping parts:

- scientific research on species and habitats
- conservation via education, popularization, legal protection of habitats and long-term monitoring

SCIENTIFIC RESEARCH:

- **FUNDAMENTAL BIOLOGY OF THE SPECIES**: taxonomy, biology, chemical analysis etc.
- **HABITATS RESEARCH**: physical and chemical analyses of water and sediments, microclimate parameters of terrestrial part of habitats, subterranean fauna check list, sources of endangerments of species and its habitats.

CONSERVATION:

- **LEGAL PROTECTION**

We will propose to the Government to protect whole area as Biospeleological reservation (sort of Special reservation). For that purpose it is necessary to establish such a kind of reservation, which is, in land of classical karst like Croatia, of high importance.
It will include legal protection of caves and all underground. It will also have impact on every species that inhabits karst rivers and caves, most of which are endemic and in need of protection. We will also make an effort in limiting karst water alterations for industrial purposes.

- **LONG TERM MONITORING PLAN**

Based on project results we will propose long term monitoring plan to the Government to insure continuity of the population conservation and its protection.

- **EDUCATIONAL PROGRAMS**

Lectures and workshops will be held throughout the project duration in kindergartens, schools, and speleological societies and most important to the local communities. Promotional materials will be distributed during the lectures (T-shirts, leaflets, stickers, etc.). The research will be covered by daily and weekly newspapers, as well as periodicals. Local and national radio networks will be included. We shall make an annual report on the research progress, and by the end of fundamental research activities a popular publication will be made and presented at several exhibitions on this species.

PROJECT TEAM:

Due to the complexity of the project, a multidisciplinary team was gathered.

Jana Bedek, BSc (biology) – project leader; *co-ordination and full engagement in all activities*
Dr. Nikola Tvrtkoviĺ , BSc (biology) **–** Curator at the Croatian Natural History Museum (CNHM); *scientific evaluation of results, effective protection of the species*

Dr. Sanja Gottstein Matoļec, BSc (bilogy) – senior assistant at the Faculty of Science in Zagreb, Laboratory for Animal Ecology; *laboratory work on the chemical and ecological water evaluation*
Mr.sc. Roman Ozimec, BSc (agronomy) – president of Croatian Biospelological Socity; *laboratory work on fauna taxonomy, fieldwork*
Branko Jalžiĺĺĺĺĺ – technician at the CNHM, speleology Instructor, cave diver; *biospeleological fieldwork*
Ivica Ļukušiĺĺĺĺĺ – diver instructor, speleologist, cave diver; *fieldwork*
Dr. Sandra Ronļeviĺĺĺĺĺ , BSc (chemistry) – senior assistant at the Faculty of Science, Laboratory of Analytical Chemistry; *laboratory work on chemical water and sponge evaluation*
Lovorka Pitareviĺĺĺĺĺ , BSc (chemistry) – assistant at the Faculty of Science, Laboratory of Analytical Chemistry; *laboratory work on chemical water and sponge evaluation*
Helena Bilandžija, biology student – *fieldwork, laboratory work on sponge taxonomy; education*
Dr. Ivana Grubeliĺĺĺĺĺ , BSc (biology) – Chef of laboratory in Institute of Oceanography and Fisheries in Split - *laboratory work on sponge taxonomy:*
Dr. Ivanļica Krulik, BSc (biology) - senior assistant at the Faculty of Science in Zagreb, Laboratory for Animal Ecology; *laboratory work on on sponge taxonomy;*
Alan Kovaļeviĺĺĺĺĺ – cave diver, underwater camera – *fieldwork, underwater filming*
Marko Lukiĺĺĺĺĺ , biology student – *fieldwork, technical support, education*
Martina Pavlek, biology student – *fieldwork, technical support, education*
Hrvoje Cvitanoviĺĺĺĺĺ – speleologist; *fieldwork, technical support*
Damir Basara – speleologist; *fieldwork, technical support*

IN COOPERATION WITH

- ü CNHM, projects
- ü FSc
  - ↓ Department of Zoology
  - ↓ Department of Chemistry
- ü Institute of Oceanography and Fisheries in Split
- ü Gojak Hydroelectric Power Plant
- ü Catholic Committee "MI"
- ü Speleological Department of the Mountaineering club "Velebit"
- ü Speleological Department of the Mountaineering club "Željezniļar"
- ü Spelological Society Ursus spelaeus
- ü Spelological Society Karlovac
- ü "Dinaric Alps" Society for exploration and filming of karst phenomenon's (DDISKF)

2. REPORT FOR 2003/04 PROJECT ACTIVITIES

2.1. OUTLINE

FIELD RESEARCH ACTIVITIES:

We made **18 fieldwork research days** throughout the year, including:
sponge sampling: to collect the sponge it was necessary to dive inside caves and springs (11 times x 2 divers); it was necessary for taxonomy and elementary chemical analysis
water sampling: for physical and chemical analyses, elementary chemical analysis of water and water sediment
*water measurements**: pH, temperature***
sampling other fauna
microclimate measurements: temperature and air humidity
exploring sources of endangerment
exploring new potential locations

Dates:
31 January 2004 – 1 February 2004
5 February 2004
30 March 2004
29 June 2004 – 3 July 2004
9 July 2004 – 11 July 2004
25 August 2004 – 29 August 2004
12 September 2004

LABORATORY WORK ACTIVITIES:

Laboratory work has not been finished yet, and a lot of work is still left to be done, especially after our new findings. In short, laboratory work encompassed:

ü **Sponge**
↓ Isolating and conservation at 96 of ethanol. Material has been partially preserved in deep freeze for future DNA analysis.
↓ Making spicules (support structure) and gemmules (asexual reproductive grow buds) slides
↓ Making spicules and gemmules photos
↓ Scientific material processing

ü **Fauna**
↓ All collected material was divided into different taxonomic groups, properly ranked, labelled and conserved
↓ Most of the collected material was identified, depending on available experts for each group

↓ Collected material is a part of CBS collection at the CNHM

ü **Basic physical water analysis**
↓ pH
↓ Water conductivity
↓ Water salinity

ü **Basic chemical water analysis**
↓ Oxygen (including oxygen saturation)
↓ Nitrates
↓ Nitrites
↓ Phosphates
↓ Ammonium

ü **Analytical chemical analysis**
↓ Elemental analyses of the sponge, water and sediments (the resuts of those analyses has been presented at 19th Croatian Meeting of Chemists and Chemical Engineers, April 2005)

CONSERVATION AND EDUCATION ACTIVITIES:

Several different types of activities have been performed. In the beginning we were invited to make an educational television show for the Croatian National Television (HRT) for the weekly programme "Trenutak spoznaje" ("The Moment of Cognition"), which covers reports about science, nature exploration and conservation. Several primary and high school teachers asked for the copy of the show for educational purposes. The copy of the show is attached to this report.

Throughout the year we have delivered several lectures, all of them covering project presentations:

↓ 7 April 2004 at Speleological Department of the Mountaineering club "Velebit" in Zagreb about biospeleology
↓ 19 April 2004 at KIC (Cultural Information Centre) in Zagreb with subject "Croatian Karst Underground – Significant Ecotourist Potential" together with Damir LackoviĆ , Silvio LegoviĆ , Vlado BožiĆ and Daniela HamidoviĆ
↓ 12 November 2004 in Ogulin about Ogulin Cave Sponge and the project
↓ 19 – 21 November 2004 at The Fifth Croatian Speleological Meeting "Ozalj 2004" about Ogulin Cave Sponge and the project
↓ 9 December 2004 in Samobor about "Speleological Expedition Risnjak 2004" together with Nenad Buzjak and Vatroslav JakoboviĆ
↓ 13 April 2005 at Speleological Department of the Mountaineering club "Velebit" in Zagreb about biospeleology

We prepared and distributed a leaflet for presentations and educational activities in both Croatian and English versions.

To celebrate the *Planet Earth Day* on 22 April 2004 we gave a lecture and organized small exhibition and a role play at the library "Savski gaj" in Zagreb. The event was covered by the Croatian Radio. Children who participated in the role play were primary school children, age 9 to 10. To them we distributed educational leaflets, certificates and printed one exhibition photo.

A questionnaire was made about the present awareness concerning the subterranean fauna, the karst area, and drinking water problem for the local population in the town of Ogulin. The same day I was invited to the local Radio station to present the project and all its aspects and problems.

In cooperation with colleagues from the Faculty of Science, Department of Chemistry we made a poster presentation for the "19th Croatian Meeting of Chemists and Chemical Engineers". The board asked us to give an oral presentation, which we did with subject: "Metal Content Identification in the Sponge *Eunapius subterraneus*, Water and Sediment Samples". Authors were Sanda Ronį eviĺ , Lovorka Pitareviĺ , Jana Bedek and Helena Bilandžija, and lecture was held by Lovorka Pitareviĺ 25th April 2005. http://www.hdki.hr/19_Skup_2005/index_19.htm

Two articles were written on that subject:

1. Subterranea croatica, speleological magazine, No. 3, December 2004, "Ogulin Cave Sponge – a Unique Croatian Subterranean Fauna Representative" ("Ogulinska špiljska spužvica – jedinstveni predstavnik hrvatske podzemne faune"), pp. 44–49, author: J. Bedek

2. Meridijani, national monthly magazine, forthcoming publication, June 2005, "Ogulin Cave Sponge" ("Ogulinska špiljska spužvica"), authors: J. Bedek and H. Bilandžija

We are preparing two more articles: a review paper for the local Mudruš's Proceedings and a scientific paper for the scientific journal of the Croatian Natural History Museum "Natura croatica".

MEDIA COVERAGE:

The media coverage has been extensive. In short, the project has been covered 15 times in daily newspapers and periodicals, I have been interviewed 3 times by different Croatian radio stations, and we have made an educational television show for the Croatian National Television (HRT) for the weekly programme "Trenutak spoznaje" ("The Moment of Cognition").

2.2. COMPREHENSIVE REPORT
(chronological)

NEWS

I was interviewed about the donation by a journalist from "Vjesnik", the national daily newspapers and one of the most distributed newspapers in Croatia. The article was published on Sunday, 30 November 2003 p. 40 entitled "A Unique Freshwater Sponge in Pits of Gorski Kotar" ("Jedinstvena slatkovodna spužva u jamama Gorskog Kotara").

The text and photos from the article "A Unique Freshwater Sponge in Pits of Gorski Kotar" from "Vjesnik" were posted on the speleological web-site "Croatian Speleoserver" ("Hrvatski speloposlužitelj").
http://public.srce.hr/speleo/znanost/eunapius/eunapius.html

The information about the donation was elaborated by Roman Ozimec in a form of a short article which was published by Ivo Luį ií on 30 November 2003 in HINA – Hrvatska izvještajna novinska agencija (Croatian News Agency) entitled "Croatian Biospeleologists Save Endemic Sponge" ("Hrvatski biospeleolozi spašavaju endemiį nu spužvu"). HINA is a news agency that informs the media about events. This article was recognized and published by three different types of media:

1. - WEB news with an article entitled "Saving Endemic Sponge" ("Spašavanje endemiį ne spužve").
   http://www.iskon.hr/znanost/page/2003/11/30/0014006.html

2. - Local newspapers from the town of Rijeka, distributed in several different counties, all in the vicinity of Ogulin area. The article was published in the TV Guide, p. 64 entitled "Croatian Biospeleologists Save Endemic Sponge" ("Hrvatski biospeleolozi spašavaju endemiį nu spužvu").

3. - Teletext sites of the Croatian National Radio and TV Company (HRT)

Roman Ozimec wrote a short article "Saving the Only Freshwater Subterranean Sponge in the World" ("Spašavanje jedine slatkovodne podzemne spužve na svijetu") for Meridijani, No. 81, p. 6, published on 7 January

2004; it is a magazine for geography and history, which has a wide distribution in both elementary and high-schools.

THE FIRST FIELDWORK

Dates*:*	31 January 2004 – 1 February 2004
Team members*:*	Branko Jalžić, Ivica Ļukušić, Helena Bilandžija, Marko Lukić, Martina Pavlek, Tatjana Bakran Petriccioli and Jana Bedek
Tasks*:*	To collect sponges and water for analysis from four known sponge habitats: Zala Cave, Tounjļica Cave, Gojak and ņula – Medvedica Cave System.

31 January 2004

Photo 1. Ogulin area in winter; *photo by I. Ļukušić*

Photo 2. Team members (from the left: Tatjana Bakran Petriccioli, Martina Pavlek, Ivica Ļukušiĺ , Jana Bedek and Marko Lukiĺ); *photo by B. Jalžiĺ*

We set off from Zagreb on Saturday morning by Croatian Natural History Museum van, thanks to Dr. Nikola Tvrtkoviĺ . We decided to do the first fieldwork in winter because of the low water level, regardless of very difficult working conditions due to low temperature. We reached the first site, Zala Cave, on Saturday morning.

ZALA CAVE (ŠPILJA ZALA)

Although the Ogulin Cave sponge was found in Zala Cave, it is not its type locality. It was found on 17th December 1977 (Photo 3.), but not verified by scientists as a new species. Five years later it was found again and finally properly described in 1984.

Photo 3. Archive photo – Search for animals (Tonĺ i RaĽa found a sponge a few minutes after this photo was taken); *photo by B. Jalžiĺ , 17th December 1977*

Photo 4. In front of Zala Cave (Branko Jalžiĺ); *photo by J. Bedek*

Photo 5. Preparing for Zala Cave (Marko Lukiĺ and Branko Jalžiĺ); *photo by J. Bedek*

In this cave it was not necessary to dive to collect the sponge, but Helena and I went into water to collect the sponge in diving suits.

Photo 6. Preparing to enter Zala Cave (Helena Bilandžija); *photo by J. Bedek*

Photo 7. Problems with undressing diving suit (Martina Pavlek and Jana Bedek); *photo by H. Bilandžija*

We found and collected only small sponge specimens, collected water and other fauna for analysis, and measured all microclimate parameters.

Photo 8. Collecting water samples (Jana Bedek); *photo by M. Lukiľ*

Photo 9. Searching for the sponge (Helena Bilandžija); *photo by B. Jalžiľ*

In the afternoon we went into Tounjļ ica Cave.

TOUNJĻ ICA CAVE (ŠPILJA TOUNJĻ ICA)

Tounjļ ica Cave is a type locality for the Ogulin Cave sponge, *Eunapius subterraneus subterraneus* Sket *et* Velikonja, 1984, and four additional snail species. This cave is not only biologically, but also hydrologically, geologically, etc. important. In Tounjļ ica Cave it was necessary to dive to collect the sponge, so our divers had to change outdoors in winter, at approximately -5ºC.

Photo 10. Changing clothes in the snow (Ivica Ļ ukušiľ); *photo by J. Bedek*

Photo 11. Carrying equipment to the Cave; *photo by A. Belaniľ*

Photo 12. Entrance to Tounjļ ica Cave; *photo by A. Belaníć*

Photo 13. Ice stalactite at the Cave entrance (Branko Jalžić and Ivica Ļ ukušić); *photo by J. Bedek*

Photo 14. Ice stalagmite at the Cave entrance; *photo by: J. Bedek*

Photo 15. Preparing Ariadna's thread (Anita BelaniĆ and Marko LukiĆ); *photo by J. Bedek*

Photo 16. Preparing for diving (Branko JalžiĆ); *photo by J. Bedek*

Photo 17. Plunge (Branko JalžiĹ and Ivica Ļ ukušiĹ); *photo by J. Bedek*

Photo 18. Ogulin Cave sponge from Tounjļ ica Cave; *photo by I. Ļ ukušiĹ*

During the dive the rest of the team was collecting water and other fauna for analysis, and measuring all microclimate parameters.

Photo 19. Sponge samples (Tatjana Bakran Petriccioli and Anita BelaniĹ); *photo by J. Bedek*

Photo 20. Sponge samples; *photo by J. Bedek*

Photo 21. Divers in the snow (Ivica Ļukušiĺ); *photo by J. Bedek*

Photo 22. Diving equipment (Ivica Ļukušiĺ); *photo by J. Bedek*

In the evening we finally went to sleep. We had excellent accommodation at the Gojak Hydroelectric Power Plant.

1 February 2004

Early in the morning we went to Gojak Cave Spring at the Gojak Hydroelectric Power Plant.

GOJAK CAVE SPRING (IZVOR ŠPILJA GOJAK)

Photo 23. Air view of the Gojak Hydroelectric Power Plant; *http://www.hep.hr/proizvodnja/osnovni/hidroelektrane/zapad/gojak.html*

Photo 24. At the Gojak Hydroelectric Power Plant; *photo by J. Bedek*

Photo 25. Carrying the equipment (from the front: Helena Bilandžija, Martina Pavlek, Branko JalžiĹ , Ivica Ļ ukušiĺ); *photo by J. Bedek*

Photo 26. Plunge into Gojak (Branko Jalžiĺ and Ivica Ļ ukušiĺ); *photo by J. Bedek*

Photo 27. Plunge (Branko Jalžiĺ and Ivica Ļ ukušiĺ); *photo by J. Bedek*

Photo 28. Diving (Branko JalžiĆ); *photo by I. Ļ ukušiĆ*

Photo 29. Ogulin Cave sponge from Gojak; *photo by I. Ļ ukušiĆ*

Photo 30. Measuring sponge (Branko Jalžić); *photo by I. Ļ ukušić*

Photo 31. Ogulin Cave sponge with major damage; *photo by I. Ļ ukušić*

Photo 32. Trout (*Salmo sp.*); *photo by I. Ļ ukušić*

Photo 33. Minnow (*Phoxinellus sp.*); *photo by I. Ļ ukušić*

Photo 34. Low level of water pushes the sponge up and it ends up in the air; *photo by I. Ļ ukušić*

Photo 35. Piles of pollution on the sponge; *photo by I. Ļ ukušiĺ*

Photo 36. Ogulin Cave sponge from Gojak; *photo by I. Ļ ukušiĺ*

The divers spent several hours in the cave, because there are two siphons on the way to the place with sponges, and in-between there is a lot of walking through cave channels, which is not an easy task in diving suits and with all equipment.
Their findings were disturbing, because there were a lot of damaged sponges (Photo 31.), including a lot of garbage and waste on them (Photo 35.). This wasn't the case when Branko saw them last time, so it must be owing to the pollution coming from the rivers Dobra and Ogulin.

Photo 37. Collecting plankton samples (Jana Bedek); *photo by M. LukiĹ*

Photo 38. Collecting water samples (Ivica Ļukušiĺ and Jana Bedek); *photo by M. LukiĹ*

Photo 39. Sponge samples; *photo by M. LukiĹ*

Photo 40. Keeping warm (Helena Bilandžija); *photo by M. LukiĹ*

Afterwards, we went to Ogulin to see the water-gate on the river Dobra. This water-gate was built in 1959 for the purposes of the Gojak Hydroelectric Power Plant. There were a lot of hydro geological changes in the whole area due to the construction of artificial lakes needed for the Power Plant. It had an irreversible impact on the underground fauna.

Photo 41. The water-gate on the river Dobra in Ogulin; *photo by J. Bedek*

In the afternoon we entered the ņula – Medvedica Cave System.

ŅULA - MEDVEDICA CAVE SYSTEM (ŅULA - MEDVEDICA SUSTAV)

The ņula – Medvedica Cave System is the longest cave in Croatia. It has more than 16 km of channels. Unfortunately, it is a big waste dumping ground of the town of Ogulin. It has three different entrances, all of them buried under garbage.

Photo 42. The entrance to Medvedica Cave, one of the entrances to ņula – Medvedica Cave System (Martina Pavlek and Ivica Ļukušić); *photo by J. Bedek*

Photo 43. Layers of garbage above heads at the entrance to Medvedica Cave (Helena Bilandžija and Jana Bedek); *photo by M. Lukić*

Photo 44. On garbage at the entrance to Medvedica Cave (Jana Bedek); *photo by M. Lukić*

The level of water was rising rapidly so it was very turbid, and we couldn't find the sponge. Hence, we collected water for analysis, terrestrial fauna, and measured microclimate parameters.

Every field trip was followed by laboratory work, sometimes longer and harder. All water was analyzed the day after the fieldtrip. Basic physical and chemical analyze was done at Biology Department by Sanja Gottstein Matoļec, Helena Bilandžija and Jana Bedek at the Faculty of Science in Zagreb. Analytical chemical analyses of sponge, water and sediments was done at Chemistry Department by Sandra Ronļeviĺ and Lovorka Pitareviĺ also at the Faculty of Science in Zagreb.

Photo 45. Water analysis (Helena Bilandžija and Sanja Gottstein Matoļec); *photo by J. Bedek*

THE SECOND FIELDWORK

Dates:	5 February 2004
Team members*:*	Branko Jalžiĺ, Ivica Ļukušiĺ
Tasks*:*	To find the river Bistrac springs, dive in them and look for the sponge

The river Bistrac has several springs. One of them is a periodical spring from Zala Cave, one of the findings of the sponge. Two additional springs were found. One of them was too shallow to dive in. Divers went diving in another spring, but the level of water was very high, and it was impossible to go further and look for the sponge.

Photo 46. The river Bistrac (Martina Pavlek); *photo by J. Bedek 31st January 2004*

THE THIRD FIELDWORK

Date*:*	30 March 2004
Team members*:*	Branko JalžiĆ, Roman Ozimec, Alan KovaĻeviĆ, Helena Bilandžija, Hrvoje CvitanoviĆ, Luka Tanfoglio and Jana Bedek
Tasks*:*	To make an educational television film-report for the Croatian National Television (HRT) for the weekly programme "Trenutak spoznaje" ("The Moment of Cognition"), which covers reports on science, nature exploration and conservation.

The television show was filmed in one of the sponge localities, TounjĻica Cave. This locality was chosen because of the relatively easy access close to the diving area. A few of us (Roman Ozimec, Branko JalžiĆ, Helena Bilandžija and Jana Bedek) were interviewed for the show. We talked about the project, problems in the karst area and water pollution, all sorts of sources of endangerment in the area, etc. The following was filmed for the show: diving, collecting materials, measuring microclimate parameters, a part of the area, together with Tounj quarry, but most interesting were underwater videos of sponges, diving and sponge collecting made by Alan KovaĻeviĆ the same day. The show was hosted by Silvana Kolovrat.

Photo 47. Entrance to Tounjļ ica Cave; *photo by J. Bedek*

The level of water in Tounjļ ica Cave was very high because of snow melting, and we were afraid that it would be impossible to dive, because of high streams and water turbidity. Fortunately, that was not the case, and the show and videos were great.

Photo 48. Filming the cave entrance; *photo by J. Bedek*

INTERVIEWS:

Jana Bedek	about the project, its origin, problems, goals and major plan how to achieve them
Roman Ozimec	about the Croatian Biospelological Society, biospelology in Croatia, all issues concerning subterranean fauna
Branko JalžiĺÍ	about the history of sponge research and cave diving as a type of underground research
Helena Bilandžija	about the sponge, its life, its structure, biology and ecology

Photo 49. Interviewing Branko JalžiĺÍ ; *photo by J. Bedek*

Photo 50. Interviewing Branko JalžiĺÍ ; *photo by J. Bedek*

Photo 51. High water level in Tounjļ ica Cave (Luka Tanfoglio); *photo by H. Cvitanoviĺ*

Photo 52. Preparing to dive (Alan Kovaļ eviĺ with underwater camera and Branko Jalžiĺ); *photo by H. Cvitanoviĺ*

Photo 53. Sponge sampling (Branko Jalžiĺ); *filmed by A. Kovaļ eviĺ , photo by J. Bedek*

Photo 54. Shooting the event (Hrvoje Cvitanoviĺ); *photo by H. Bilandžija*

Photo 55. Cave diving (Branko JalžiĺĆ); *photo by H. Bilandžija*

Photo 56. Great amount of water flowing out of Tounjļ ica Cave (Helena Bilandžija); *photo by H. CvitanoviĺĆ*

LECTURE

Venue:	Speleological Department of the Mountaineering club "Velebit"
Date:	7 April 2004
Given by:	Jana Bedek
Subject:	Biospeleology

I was asked to give a lecture on biospelology at the 34th Zagreb's School of Speleology (34. Zagrebaļ ka speleološka škola). Within this multimedia presentation I made a short presentation of the project, including its origin, problems, etc. There were 25 people who participated in and finished the school.

Photo 57. One of the educational slides: subterranean crabs; *author J. Bedek*

BROADCASTING

On 8th April 2004 the Croatian National Television, HRT1, broadcast the previously filmed, 5'36" long show in the weekly programme "Trenutak spoznaje" ("The Moment of Cognition"), which covers reports on science, nature exploration and conservation. The show got great reviews, and was presented for educational purposes

in several primary and high schools. The rest of the filmed material will be used in other educational television programs.

LECTURE

Venue:	KIC (Cultural Information Centre), Zagreb
Date:	19 April 2004
Given by:	**Damir LackoviĆ** , Croatian Natural History Museum **Silvio LegoviĆ** , Baredine Pit **Vlado BožiĆ** , Speleological Department HPD «Željezniļ ar» **Daniela HamidoviĆ** , Croatian Natural History Museum **Jana Bedek**, Croatian Biospeleological Society
Subject:	"Croatian Karst Underground – Significant Ecotourist Potential"

Damir LackoviĆ , Silvio LegoviĆ , Vlado BožiĆ , Daniela HamidoviĆ and I gave an open lecture with multimedia presentation: “Croatian Karst Underground – Significant Ecotourist Potential” to celebrate the *Planet Earth Day* in KIC (Cultural Information Centre) in Zagreb.
http://www.kic.hr/tribine_pr.asp

We talked about problems and solutions in tourist caves. I talked about alternative ideas for tourist presentations on the example of Ogulin Cave sponge and two caves around Dubrovnik with multimedia presentation, including a short film.

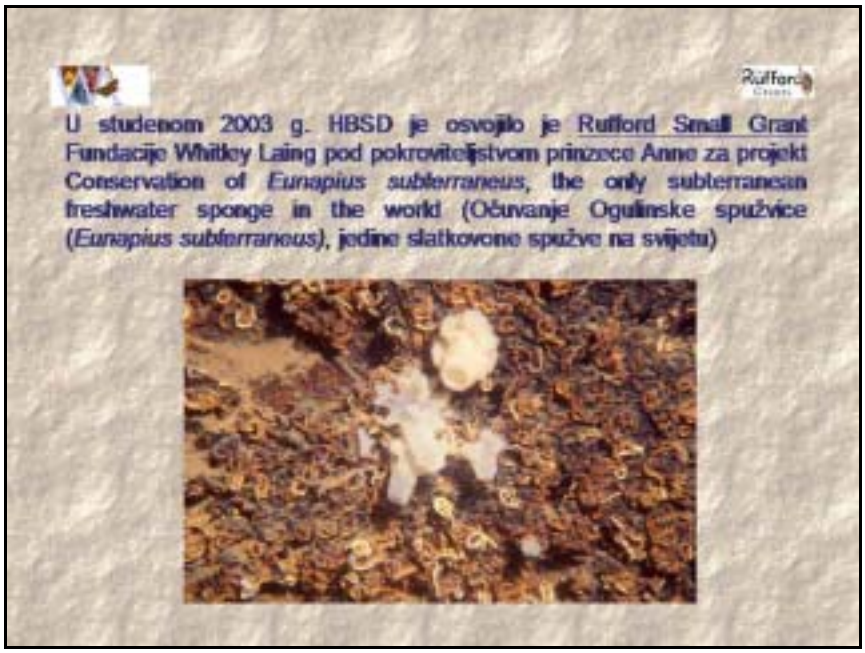


Photo 58. One of the educational slides: about the project; *author J. Bedek*

- WEB news covered the open lecture with an article "Croatian Karst Underground" (Krško podzemlje Hrvatske), http://www.iskon.org/znanost/page/2004/04/19/0165006.html

NEWS

On the *Planet Earth Day*, 22 April 2004, a big article entitled "World Phenomenon More Important to Foreigners than to Us" ("Svjetski fenomen važniji strancima nego nama") was published in the national daily newspaper "Veļernji list" pp. 28–29. This newspaper is the most popular and widely distributed in Croatia, but also in foreign countries with Croatian residents.

ROLE PLAY WORKSHOP

Name:	**DAN PLANETA (pod) ZEMLJE** **MALI ZA VELIKE ĻUVARE PODZEMLJA** **PLANET (under) EARTH DAY** **SMALL TO BIG UNDERGROUND PROTECTORS**
Venue:	Library "Savski gaj", Zagreb
Date:	22 April 2004, Planet Earth Day
Children:	4th grade of Primary School "Savski gaj" in Zagreb
Team:	Helena Bilandžija, Marko LukiĹ, Daniela HamidoviĹ and Jana Bedek together with library staff
Task:	↓ Educational role play ↓ Underground fauna and bats exhibition ↓ Educational leaflet for children ↓ Two separate lectures on bats (Daniela HamidoviĹ) and other underground fauna (Jana Bedek) ↓ Interviews for the Croatian Radio

The main idea of the role play workshop was to present the underground world and its beauty, together with its vulnerability and threats to children. We prepared a small exhibition composed of a few real stalactites (thanks to Damir LackoviĹ, the curator at the Natural History Museum), 27 cave and subterranean animal photos, accompanying educational text and several different posters. One photo (of the olm, *Proteus anguinus*)

was printed out for all children. The library staff had decorated the library with dozens of small bats flying through the air.

Photo 59. Preparing the exhibition; *photo by M. Lukiĺ*

Photo 60. Stalactites at the exhibition; *photo by M. Lukiĺ*

Photo 61. Accompanying text; *photo by M. Lukiĺ*

Photo 62. Photo for the exhibition; *photo by M. Lukiĺ*

The role play was organized with a bunch of kids who were representing underground animals (library staff had made costumes for them) in their natural environment – cave (dark library room). Their task was to try to find food (they had no eyes) and avoid garbage. Three kids were speleologists, and their tasks were to make photos, collect garbage, listen to bats with the bat detector, and measure the temperature.

Photo 63. Food…

Photo 64. …and garbage for children; *photos by M. Lukiĺ*

Photo 65. Greeting children (Jana Bedek); *photo by H. Bilandžija*

Photo 66. Putting on costumes (Daniela Hamidiviĺ and library staff); *photo by H. Bilandžija*

Photo 67. Dressing up as a bat; *photo by H. Bilandžija*

Photo 68. Speleologists with equipment; *photo by H. Bilandžija*

Photo 69. Playing; *photo by H. Bilandžija*

Photo 70. Playing; *photo by H. Bilandžija*

Photo 71. Children obtaining their certificates (Jana Bedek); *photo by H. Bilandžija*

Photo 72. Certificate; *author I. Kiš*

After the role play Daniela HamidoviĺÍ and I gave two short lectures. I talked about caves and pits, underground fauna with multimedia presentation, speleology and pit climbing techniques showing them everything with real equipment on a small rope, and finally about the Ogulin Cave sponge. We brought a living sponge for children to see.
Daniela talked about bats, their importance, biology, way of living, connections to caves and problems.

Photo 73. Lecture (Jana Bedek); *photo by H. Bilandžija*

Photo 74. Showing climbing techniques (Jana Bedek); *photo by H. Bilandžija*

Photo 75. One of the educational slides: Olm; *author J. Bedek*

Photo 76. Lecture on the Ogulin Cave sponge with a living sponge (Jana Bedek); *photo by H. Bilandžija*

Photo 77. Lecture (Daniela Hamidoviĺ); *photo by H. Bilandžija*

Photo 78. First of the educational slides; *author D. Hamidoviĺ*

We prepared an educational leaflet for the role play with all important information and problems. The whole event was filmed by Marko Lukiĺ , and photographed by Helena Bilandžija and Marko Lukiĺ for educational purposes.

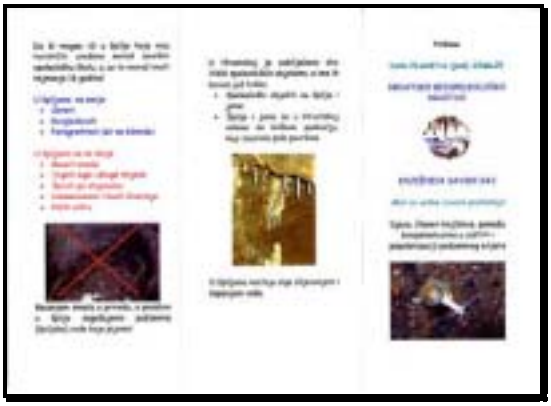


Photo 79. Educational leaflet; *authors J. Bedek and D. HamidoviĹ*

Photo 80. Filming the event (Marko LukiĹ); *photo by H. Bilandžija*

Sandra Florijan from the Croatian Radio recorded the lectures and interviewed the children, Daniela HamidoviĹ and me for the *Planet Earth Day* programme, which was broadcast later the same day.

Photo 81. Interviewing children; *photo by H. Bilandžija*

Photo 82. Interviewing Daniela HamidoviĹ and Jana Bedek (Sandra Florijan) ; *photo by H. Bilandžija*

Photo 83. Photo after role play (children, teacher, Jana Bedek and Daniela Hamidoviĺ); *photo by H. Bilandžija*

BROADCASTING

The Croatian Radio broadcast the event on 22 April 2004 as a part of the *Planet Earth Day* programmein a radio children show "Eko eko". The programme was hosted by Sandra Florijan and children, Daniela Hamidoviĺ and I were interviewed.

NEWS

On 3 June 2004 the local edition of the national daily newspaper "Veļ ernji list" from the town of Karlovac, p. 19, published a small article "A Unique Subterranean Animal" ("Podzemni biološki unikat"). The newspaper is distributed in the County of Karlovac, which covers a part of Ogulin area.

On 5 June 2004 the local daily newspaper "Karlovaļ ki list" from the town of Karlovac, p. 14 published a small article "A Systematic Research of the Endangered Freshwater Sponge Begins" ("Poļ inje

sustavno istraživanje ugrožene slatkovodne spužve"). The newspaper is distributed in the County of Karlovac, which covers a part of Ogulin area.

On 10 June 2004 the local weekly newspaper "Karlovaļ ki tjednik", No. 23/04, from the town of Karlovac published a small article "The Only One in the World" ("Jedina u svijetu"). The newspaper is distributed in the County of Karlovac, which covers a part of Ogulin area.

THE FOURTH FIELDWORK

Dates*:*	29 June 2004 – 3 July 2004
Cooperation:	"Dinaric Alps Rare Habitats and Species Conservation Project Croatia", financed by the Royal Dutch Society for Nature Conservation – financing transport and accommodation
Team members*:*	Branko Jalžił , Roman Ozimec, Sanja Gottstein Matoļ ec, Jos Notenboom, Hrvoje Cvitanovił and Jana Bedek
Tasks*:*	To evaluate speleological sites as potential habitats for *Eunapius* in wide Ogulin area, explore their terrestrial and water fauna especially by setting traps, making microclimate parameters, hydro geological connections and identifying potential threats.

Photo 84. Klek, cliffs above Ogulin; *photo by J. Bedek*

29 June 2004

We came to Ogulin area early in the morning and went to Siniļ iĺ 's Cave.

SINIĻ IĹ 'S CAVE (SINIĻ IĹ A ŠPILJA)

Photo 85. Entrance to Siniļ iĺ 's Cave (Jos Notenboom); *photo by J. Bedek*

Siniļ iĺ 's Cave is very important because it is a type locality for one subterranean subspecies of crustaceans (*Niphargus orcinus redenseki* Sket, 1959).
In Siniļ iĺ 's Cave we collected water and terrestrial fauna, samples of soil for snails, measured microclimate parameters, and set the traps for water animals. We saw a small colony of bats (*Rhinolophus sp.*), and informed the experts about it.

Photo 86. Collecting material in Siniļ iĺ 's Cave (Jos Notenboom and Branko Jalžiĺ); *photo by J. Bedek*

MARKAR'S CAVE (MARKAROVA ŠPILJA)

In Markar's Cave we set the traps for water animals, collected water and terrestrial fauna, samples of soil for snails, and measured microclimate parameters. We saw two olm (*Proteus anguinus*) specimens.

OBAJDINI'S CAVE (OBAJDINOVA ŠPILJA)

In Obajdini's Cave we set the traps for water animals, and measured microclimate parameters.

Afterwards we went to Jasenak, where we slept in private accommodation.

30 June 2004

In the morning we went to Drežniļ ko polje, trying to find Komarac's Pit (Mosquito Pit) and Crno Vrelo Spring (Black Spring), which we couldn't. We found two other springs and an unexplored cave. Later on we realized that instead of going upwards Polje, we went downwards. So we explored those three sites as much as we could and proceeded upwards. After Drežniļ ko polje we went to Krakar polje and visited a few springs:

(STUDENAC) SPRING (IZVOR STUDENAC)

We collected water fauna, samples of soil for snails, and measured microclimate parameters. People told us that this spring is used for drinking water, and that the temperature is low all year long. Unfortunately, it was impossible to dive in it.

Photo 87. Collecting material with a net in Studenac Spring (Branko Jalžiĺ); *photo by J. Bedek*

VIDOVIĹ'S (STUDENAC) SPRING (IZVOR VIDOVIĹA STUDENAC)

We collected water fauna, samples of soil for snails, and measured microclimate parameters. Since the water temperature is 3ºC higher than Studenac Spring, and it is 100 meters away, it is likely that the water from these springs has a completely different source. The water from this spring is not used for drinking. This spring was not diving-friendly either.

Photo 88. Collecting material with a net in Studenac Spring (Branko JalžiĺĹ); *photo by J. Bedek*

VIDOVIĹ'S CAVE (VIDOVIĹA ŠPILJA)

This cave was a very nice surprise for us, because we were the first to discover it. We explored its 200 meters approximately, bit we didn't reach its end. It has a potential because of the strong wind at the entrance. We have to organize a small expedition to explore this cave properly, and its connections with the surface. It also requires diving. In VidoviĹ 's Cave we set the traps for water animals, collected water and terrestrial fauna, samples of soil for snails, and measured microclimate parameters.

Photo 89. The entrance to Vidoviĺ 's Cave (Jos Notenboom and Branko Jalžiĺ); *photo by J. Bedek*

Photo 90. Trichoptera in copulation; *photo by J. Bedek*

KOMARAC'S PIT (KOMARĻEVA JAMA)

In Komarac's Pit (Mosquito's Pit) we set the traps for water animals, collected water and terrestrial fauna, and measured microclimate parameters. We saw 6 olm (*Proteus anguinus*) specimens.

Photo 91. Olm (*Proteus anguinus*) from Komarac's Pit; *photo by B. Jalžiĺ*

CAVE ABOVE CRNO VRELO SPRING (ŠPILJA IZNAD CRNOG VRELA)

In Cave above Crno Vrelo Spring (Cave above Black Spring) we set the traps for water animals, collected water and terrestrial fauna, and measured microclimate parameters.

Photo 92. Entrance to Cave above Crno Vrelo Spring; *photo by J. Bedek*

CRNO VRELO SPRING (CRNO VRELO)

In Crno Vrelo Spring (Black Spring) we found a very large amount of green algae, which indicates pollution. The water probably comes from the inhabited Krakar Polje. We collected water fauna, samples of soil for snails, and measured microclimate parameters.

Photo 93. Crno Vrelo Spring with green algae; *photo by B. Jalžił*

VELIKO VRELO SPRING (VELIKO VRELO)

Veliko Vrelo Spring (Big Spring) is used as drinking water for the entire Krakar Polje. In Veliko Vrelo Spring we set the traps for water animals, collected water fauna, and measured microclimate parameters

PERIODICAL SPRING IN KRAKAR POLJE (PERIODIĻKI IZVOR U KRAKARU)

This spring is also used as a source of drinking water. We didn't set the traps because we did not want to pollute the water. We measured microclimate parameters. This spring could be good for diving.

Photo 94. Periodical Spring in Krakar Polje (Jos Notenboom looking at the spring and two villagers from Krakar Polje); *photo by: J. Bedek*

MIJO'S SPRING (MIJINO VRELO)

We again didn't set the traps because it would pollute the water, which is also used as a source of drinking water. We measured microclimate parameters.

Photo 95. Mijo's Spring; *photo by J. Bedek*

This day finally ended. We slept in a village Obajdini near Jezerane, at an old woman's (Marija Obajdini's) place, on the hay.

1 July 2004

Early in the morning we went to Ogulin. We spent a whole day in caves and springs around Ogulin.

RUPEĻICA SPRING AND PERCIPACE (RUPEĻICA IZVOR I PONOR)

In a village Ivanci near Ogulin there is small karst field with a spring and a precipice. The entire field hasn't got more than 50m. It is a school example of the karst field. Branko has already dived in both of them and hasn't found the sponge, but there are a lot of very important species living there, such as the olm and a lot of endemic crustaceans. Unfortunately, the pit above this field is used as a waste dumping ground.
At both of these sites we set the traps for water animals, collected water fauna, and measured microclimate parameters.

BISTRAC SPRING (IZVOR BISTRAC)

We set the traps for water animals and measured the temperature. This spring is good for diving.

Photo 96. Setting the traps in Bistrac Spring (Roman Ozimec and Jos Notenboom); *photo by J. Bedek*

ZAGORSKA PEĹ CAVE (ZAGORSKA PEĹ)

Zagorska Peĺ Cave (Zagorje Cave) is a 490 m long cave, with very interesting biospelelogical findings, such as the olm. It is a type locality for two endemic species.

Photo 97. The entrance to Zagorska Peĺ Cave (Roman Ozimec); *photo by J. Bedek*

Inside the cave we set the traps for water animals, collected water and terrestrial fauna, and measured microclimate parameters. We found a few interesting animals such as *Machaerites*, a very small troglobitic species of Coleoptera and *Monolistra*, a crustacean stygobitic species from the Dinaric Alps endemic genus.

Photo 98. Setting the water traps (Jos Notenboom); *photo by J. Bedek*

VITUNJĻ ICA'S SPRING (IZVOR VITUNJĻ ICE)

In Vitunjļ ica's Spring we set the traps for water animals, collected water fauna, and measured microclimate parameters. We found very interesting animals, but unfortunately, the spring is not good for diving.

Photo 99. At Vitunjļ ica's Spring (Jos Notenboom, Branko Jalžiĺ and Sanja Gottstein Matoļ ec); *photo by J. Bedek*

Photo 100. Collecting water animals at Vitunjļica's Spring (Roman Ozimec and Branko Jalžić); *photo by J. Bedek*

CAVE NEAR TURKOVIĆI (ŠPILJA KOD TURKOVIĆA)

Inside the cave we found a few interesting animals such as *Monolistra*, the crustacean stygobitic species from the Dinaric Alps endemic genus. We didn't set the traps because it was impractical, but we collected water and terrestrial fauna, and measured microclimate parameters.

Photo 101. The entrance to Cave near Turkovići (Sanja Gottstein Matoļec); *photo by J. Bedek*

Photo 102. Collecting water animals (Jos Notenboom); *photo by J. Bedek*

This was the last site we visited, and afterwards we went to sleep in a village Ivanci near Ogulin at a Hunting house.

2 July 2004

PEĹINIK CAVE (ŠPILJA PEĹINIK)

It is not easy to access the cave. It is more rock climbing than hiking. So when we finally reached the entrance, we didn't set the traps, but we only collected what we could find, soil samples for snails, and measured microclimate parameters. This cave is a type locality for the endemic coleopteran.

Photo 103. View towards the canyon with Peĺ inik Cave (to the right); *photo by J. Bedek*

Photo 104. The entrance to Peĺ inik Cave (Branko JalžiĺÍ and Roman Ozimec); *photo by J. Bedek*

CAVE UNDER MAĻKOVA DRAGA (ŠPILJA POD MAĻKOVOM DRAGOM)

This cave is almost totally flooded with water, so we went inside in diving suits. It is necessary to dive inside of it. Inside the cave we set the traps for water animals, collected water and terrestrial fauna, and measured microclimate parameters. We found *Troglocaris*, a very rare crustacean species.

In the late afternoon we went to Bjelsko to find Luška Cave. We met Bogomir, a person who owns the land with the cave. He was very polite and took us to the cave. Unfortunately, it was not easy to go there because we had to pass through a hunting area, which was locked, but he took care of it. That day we didn't have any more time, so we didn't go inside the cave, but went to sleep in Ivanci.

3 July 2004

Early in the morning we went to Bjelsko, and then to Debeli Lug Polje. In the afternoon we tried to find Cave under Zimzel, but we failed. Instead, we went to a village Potok Musulinski at the foothill of Klek (photo 84.) to find Košarice Spring (Baskets Spring). We found several springs, and believed one of them to be the one we came to look for.

LUŠKA CAVE (LUŠKA ŠPILJA)

Luška Cave is known in literature but we discovered new, still unknown channels. This cave is also a type locality for a coleopteran endemic species. We didn't know that this cave had a vertical part, so we did not have any ropes, and unfortunately, we couldn't reach the main stream. But in the upper parts of the cave we found small occasional lakes with stygobitic animals. We collected water and terrestrial animals, and measured microclimate parameters.

Photo 105. Polje Debeli Lug towards the entrance of Luška Cave; *photo by J. Bedek*

Photo 106. One of the 5 entrances to Luška Cave (Roman Ozimec and Branko Jalžić); *photo by J. Bedek*

Photo 107. Searching for terrestrial fauna (Branko Jalžiĺ); *photo by J. Bedek*

Photo 108. Cave beetle (*Typhlotrechus sp.*); *photo by R. Ozimec*

KOŠARICE SOURCES (IZVORI KOŠARICE)

There are at least 6 springs in a 100m wide area, one with a small cave which we believe to be the one. Unfortunately, they are not diving-friendly. In each of them we collected water fauna, and measured the temperature.

Photo 109. Košarice Source (Jos Notenboom and Sanja Gottstein Matoļ ec); *photo by J. Bedek*

Photo 110. Collecting water fauna (Jos Notenboom); *photo by J. Bedek*

The field work was completed after all collected data had been written into field diaries, which we had to do every night.

Photo 111. Writing the field diaries (Sanja Gottstein Matoļ ec, Jos Notenboom, Roman Ozimec, Jana Bedek and Hrvoje Cvitanoviĺ); *photo by B. Jalžiĺ*

THE FIFTH FIELDWORK

Dates*:*	9 July 2004 – 11 July 2004
Cooperation:	"Dinaric Alps Rare Habitats and Species Conservation Project Croatia", financed by the Royal Dutch Society for Nature Conservation – financing transport and accommodation
Team members*:*	Hrvoje Cvitanoviĺ , Helena Bilandžija and Jana Bedek
Task*:*	To collect all traps

In three days we had to collect all traps, preserve and label material, and finish the work from the last fieldtrip. The visited sites were:

Cave under Maļ kova Draga
Vitunjļ ica's Spring
Bistrac Spring
Zagorska Peĺ Cave
Rupeļ ica Spring and Precipice
Veliko Vrelo Spring
Cave above Crno Vrelo Spring
Komarac's Pit
Vidoviĺ 's Cave
Markar's Cave
Obajdini's Cave
Siniļ iĺ 's Cave

We found very interesting material in the traps, which we sent to experts for identification. One of the most interesting findings is a minnow (*Phoxinellus sp.*). The species of that genus are on the red list as critically endangered or endangered.

Photo 112. The entrance to Cave under Maļ kova Draga (Hrvoje CvitanoviĺÍ and Helena Bilandžija); *photo by J. Bedek*

Photo 113. Olm (*Proteus anguinus*) in Komarac's Pit; *photo by J. Bedek*

Photo 114. Inside Komarac's Pit (Jana Bedek); *photo by H. CvitanoviĺÍ*

The fieldwork was followed by laboratory work. We spent several weeks isolating and identifying the material.

Photo 115. Isolating the material (Marko LukiĹ); *photo by J. Bedek*

Photo 116. Part of the material; *photo by M. LukiĹ*

Photo 117. Isolated material; *photo by J. Bedek*

NEWS

KAmeleon

On 13 July 2004 Hrvoje CvitanoviĹ wrote an article "Invaluable Biodiverse Treasure Nearby Karlovac" ("Neprocjenjivo bogatstvo životne raznolikosti nadomak Karlovca") for the local monthly magazine "Kameleon" from the town of Karlovac, No. 21, p. 17. The newspaper is distributed in the County of Karlovac, which covers a part of Ogulin area.

THE SIXTH FIELDWORK

Dates*:*	25 August 2004 – 29 August 2004
Cooperation:	Project "Karst Ecosystem Conservation", financed by the World Bank – lending diving equipment and underwater digital camera
Team members*:*	Branko Jalžić, Ivica Ļukušić, Helena Bilandžija, Marko Lukić, Hrvoje Cvitanović, Martina Pavlek, Damir Basara and Jana Bedek (Roman Ozimec came the last day)
Tasks*:*	To collect sponges and water for analysis from five known sponge habitats: Sinjac Spring, Mandelaja Cave, Rudnice VI Cave, Obajdini's Cave and ņula – Medvedica System. To dive into previously found speleological sites as potential sites for Eunapius. To explore terrestrial and water fauna, microclimate parameters, hydro geological connections, and potential threats for every visited site.

25 August 2004

Early in the morning we met in the town of Plaški. The first day we planned to dive inside Sinjac Spring, and visit Sopot Cave and a precipice in Ļrnaļko polje.

SINJAC SPRING (IZVOR SINJAC)

On 11th May 2004 a team from the Speleological club DDISKF from Zagreb was diving in Sinjac Spring. Two of their members, Slobodan Meniļanin and Hrvoje Cvitanović, who is also a member of the Croatian Biospelological Society and the project team, found the cave sponge. This was a sensational finding, a new sponge habitat. It is interesting because it is distant from the already known habitat.

Photo 118. Diving in Sinjac Source; *D: Zandomenigo*

Thanks to the information provided by the DDISKF team we went there trying to find it ourselves. Hrvoje was with us again, but he couldn't dive that day. He did though explain the exact diving location, and there were no problems. During the diving the rest of the team collected water for analysis, and measured the surface temperature.

Photo 119. Sinjac Spring; *photo by M. Lukiľ*

Photo 120. Diving in Sinjac Spring (Branko Jalžiľ and Ivica Ļukišiľ); *photo by M. Lukiľ*

Photo 121. Sponge specimen from Sinjac Spring (Jana Bedek); *photo by M. Lukiľ*

Photo 122. Diving suite cleaning (Ivica Ļukušiĺ); *photo by M. Lukiĺ*

After the preliminary scientific results we believe that there is a high possibility for the Source Sinjac's sponge to be a new species. This information should not be published before it has been scientifically verified.

SOPOT CAVE (ŠPILJA SOPOT)

Inside Sopot Cave we collected water and terrestrial fauna, and measured microclimate parameters. Unfortunatelly we didn't have enough time to dive in Sopot Cave, so we left it for some other time.

Photo 123. The entrance to Sopot Cave (Hrvoje Cvitanoviĺ); *D: Zandomenigo*

PRECIPICE IN Ļ RNAĻ KO POLJE (PONOR NA Ļ RNAĻ KOM POLJU)

There was a fisherman who once found a trout with an olm in the gastric system, so he brought it to us. Unfortunately, we found several car remains inside, too. In this season the precipice is dry, and we should visit it some other time.

Photo 124. Ļ rnaļ ko polje (Ivica Ļ ukušiĺ); *photo by M. Lukiĺ*

Photo 125. Precipice in Ļ rnaļ ko polje (Branko Jalžiĺ); *photo by M. Lukiĺ*

Photo 126. Precipice in Ļ rnaļ ko polje; *photo by M. Lukiĺ*

In the evening we went to sleep in Obajdini at the same old woman's place, but this time not on the hay, but in tents in her backyard.

26 August 2004

In the morning there was a great storm, so we couldn't go diving inside Obajdini's Cave. So we packed and went to Vrelo Spring. However, it was very muddy because of the rain (Photos 127. and 128.) and impossible to dive. Hence we left Lika region and went

to Ogulin region. There we went diving inside Zagorska Mrežnica Spring and Bistrac Spring, which we had visited on our previous field trip.

(VRELO) SPRING (VRELO IZVOR)

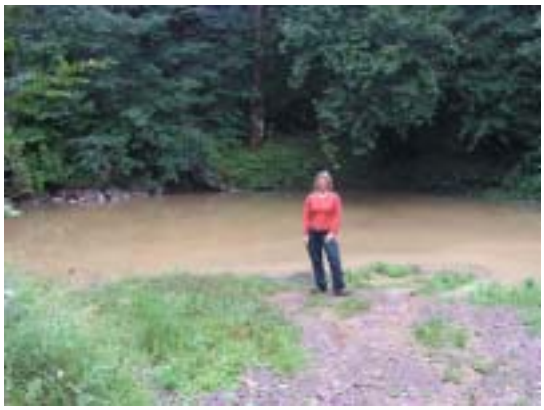


Photo 127. Vrelo Spring (Jana Bedek); *photo by M. Lukiĺ*

Photo 128. Cave at Vrelo Spring (Ivica Ļukušiĺ); *photo by J. Bedek*

ZAGORSKA MREŽNICA SPRING (IZVOR ZAGORSKE MREŽNICE)

Zagorska Mrežnica Spring is used as a source of drinking water by "Water-supply and sewerage Ogulin" ("Vodovod i kanalizacija Ogulin"). The authorization for diving in the spring gave us director Paušiĺ Zdravko.
The spring was a great surprise because the channels were much bigger than we had expected. Unfortunately, the sponge was not found, but a lot of other interesting animals were. We found the olm, which makes this spring a new finding site for this species. The olm is marked as a vunerable species on the Croatian red list, and according to "Directive 92-43-CEE Faune-Flore-Habitat" for the EC species (Annexes 2, 4) needs strict protection.

Photo 129. Diving into Zagorska Mrežnica Spring (Branko JalžiĹ and Ivica Ļukušiĺ); *photo by H. Cvitanoviĺ*

Photo 130. Diving inside Zagorska Mrežnica Spring; *photo by H. Cvitanoviĺ*

Photo 131. Trout (*Salmo sp.*); *photo by I. Ļ ukušiĺ*

Photo 132. Glavoļ ; *photo by I. Ļ ukušiĺ*

Photo 133. Deer remains; *photo by I. Ļ ukušiĺ*

Photo 134. Diving inside Zagorska Mrežnica Spring (Branko Jalžiĺ); *photo by I. Ļ ukušiĺ*

BISTRAC SPRING (IZVOR BISTRACA)

Unfortunately, Bistrac Spring is too shallow for divers. It is about 11 meters deep. The turbidity of water is also very high. We didn't find the sponge. The only interesting finding was *Marifugia cavatica*, a cave tube-worm, a Tertiary relict species.

Photo 135. Bistrac Spring (Branko JalžiĆ and Ivica Ļ ukušiĆ); *photo by M. LukiĆ*

Photo 136. Diving into Bistrac Spring (Branko JalžiĆ and Ivica Ļ ukušiĆ); *photo by M. LukiĆ*

In the evening we went to sleep in the Hunting house in Ivanci, where we spent the rest of the fieldwork.

27 August 2004

That day we planned to visit Dretulja Spring, Suvaļ a Spring, Grbina peĺ Cave, Rudnice VI Cave and Rebiĺ ka Cave to see where it would be possible to dive. We heard that day that there was no need to visit Suvaļ a Spring, because it was impossible to dive, so we gave up that spring, but visited all others sites.

DRETULJA SPRING (IZVOR DRETULJE)

We couldn't dive in Dretulja Spring, although we had been informed differently. This spring is also used for drinking water by "Water-supply and sewerage Ogulin", and we again got the permission from the director Paušiĺ Zdravko.

We measured the temperature, collected samples of soil for snails and water animals.

Photo 137. Dretulja Spring (Helena Bilandžija); *photo by J. Bedek*

Photo 138. Sampling soil for snails (Branko Jalžić); *photo by J. Bedek*

Photo 139. Water; *photo by J. Bedek*

GRBINA PEĆ CAVE (GRBINA PEĆ)

Grbina peĆ Cave we couldn't find for some time, and finally, when we were about to give up, Damir found it. The rest of us went to other caves, and left him and Marko behind. They collected water and terrestrial fauna, and measured microclimate parameters, and came to the conclusion that it was necessary to dive. But that day we didn't have enough time.

RUDNICA VI CAVE (RUDNICA ŠPILJA VI)

Rudnica VI Cave is a known sponge habitat, or precisely it is a type locality of the subspecies *Eunapius subterraneus mollisparspanis.*

Photo 140. At the entrance to Rudnica VI Cave (Branko Jalžić, Martina Pavlek and Helena Bilandžija); *photo by I. Ļukušić*

Photo 141. Diving in Rudnica VI Cave (Branko Jalžić); *photo by I. Ļukušić*

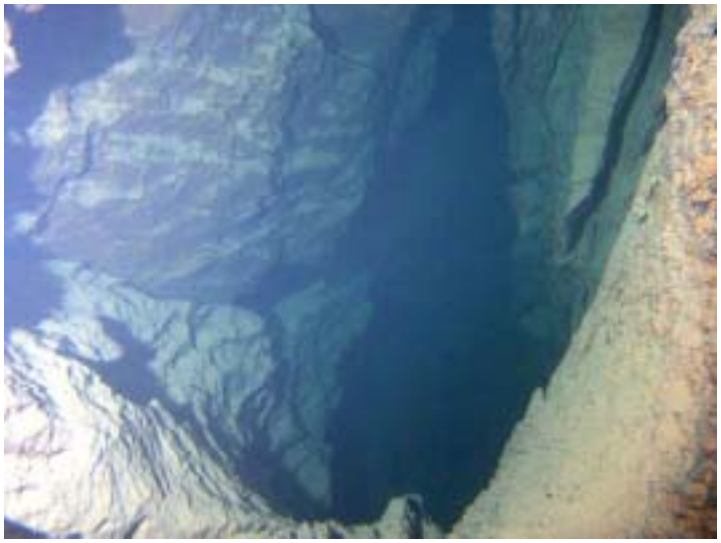


Photo 142. Underwater channels in Rudnica VI Cave; *photo by I. Ļ ukušiĺ*

Photo 143. Ogulin Cave sponge colony in Rudnica VI Cave; *photo by I. Ļ ukušiĺ*

Photo 144. Cave pill-bug (*Monolistra sp.*); *photo by I. Ļ ukušiĺ*

REBIĹ KA CAVE (REBIĹ KA ŠPILJA)

Only Hrvoje and I went to Rebiĺ ka Cave. We collected water and terrestrial fauna, measured microclimate parameters, and decided that it was necessary to dive inside. But some other time.

Photo 145. The entrance to Rebiĺ ka Cave (Jana Bedek); *photo by H. Cvitanoviĺ*

Photo 146. Searching for terrestrial fauna (Jana Bedek); *photo by H. Cvitanoviĺ*

Photo 147. The entrance to Rebiĺ ka Cave (from the inside); *photo by H. Cvitanoviĺ*

28 August 2004

The plan for that day was to dive inside Mandelaja Cave, which was a little bit difficult to organize. It has a 40 m deep first vertical, and up towards the water 20 more meters of the rope, so the transport of all diving equipment was not easy. Hence, that day only Mandelaja Cave was booked. When we got out, we realized that we had only a few hours left, so we went to the ņula – Medvedica Cave System.

MANDELAJA CAVE (ŠPILJA MANDELAJA)

Mandelaja Cave is a known sponge habitat, and we had to collect the sponge, water for analysis and other animals. We also measured microclimate parameters.

Photo 148. Inside Mandelaja Cave (Martina Pavlek); *photo by H. Cvitanović*

Photo 149. Climbing down the rope (Helena Bilandžija); *photo by H. Cvitanović*

Photo 150. Changing into a diving suit inside Mandelaja Cave; *photo by H. Cvitanović*

ŋULA – MEDVEDICA CAVE SYSTEM (ŋULA – MEDVEDICA SUSTAV)

Unfortunately, again we didn't find the sponge. Maybe the population was gone, because of the pollution, or we didn't get to the right site. We didn't jump to any conclusions, and have to come again to the cave.

29 August 2004

The tasks for that day were to dive inside Obajdini's Cave, to find Rokinka Cave and search for the sponge in the river Dobra. We couldn't find Rokinka Cave, but the rest of the plan was accomplished.

OBAJDINI'S CAVE (OBAJDINOVA ŠPILJA)

There are three different underwater channels in Obajdini's Cave. Unfortunately, the divers went into the wrong one. When they got back, the turbidity of the water was very high and it was impossible to find the sponge. So we had to go again.

THE RIVER DOBRA (RIJEKA DOBRA)

There is a very slim possibility that the Ogulin Cave sponge lives in rivers, and we had to make sure it didn't. For that purpose we went to the river Dobra and searched for sponges. None was found.

Photo 151. Old mill at the river Dobra (Marko LukiĺŚ, Helena Bilandžija, Mario JeliĺŚ); *photo by: J. Bedek*

Photo 152. Dressing for the search in the river Dobra (Marko LukiĹ); *photo by J. Bedek*

All collected water was analyzed again at two departments (of Biology and Chemistry) at the Faculty of Science in Zagreb.

BROADCASTING

Darko BakšiĹ and I were interviewed by journalist from Croatian Radio in September 2004. We talked about speleological expedition "Velebita 2004" and its results. My task was to talk about biospelological results from expedition. I was also asked about this project and I presented it in short.

THE SEVENTH FIELDWORK

Dates*:*	12 September 2004
Team members*:*	Branko JalžiĹ and Ivica Ļukušiĺ
Task*:*	To dive inside Obajdini's Cave and collect the sponge

OBAJDINI'S CAVE (OBAJDINOVA ŠPILJA)

The third attempt to dive and collect the sponge in Obajdini's Cave was finally successful.

From all known habitats of Ogulin Cave Sponge we didn't visit Cave in the Quarry Tounj. In a few last years activities in the quarry were very high and they impacted the cave very much. In fact one of two entrances is buried completely, and there is lot of changes inside. So there is great risk to go in the cave, and we believe that is also great risk to dig the stone above such a big cave. All those information's are from cavers from Speleological Society Velebit, who gave us following photographs.

Photo 153. Entrance of the Cave in the Quarry Tounj (2002); *photo by: D. Paar*

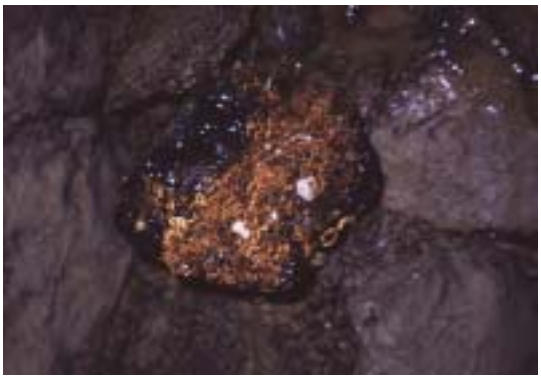


Photo 154. Sponge in the Cave in the Quarry Tounj (2002); *photo by: D. BakšiĹ*

Photo 155. Stalagmite in the Cave in the Quarry Tounj (2002); *photo by: D. Paar*

NEWS

In October 2004 Ivica Ļukušiĺ wrote an article "Cave Diving Research in Ogulin Area" ("Speleoronilaļka istraživanja u ogulinskom kraju") about cave diving exploration in the project for the magazine "Extreme", No. 3, pp. 91-92, which covers extreme sport themes.

QUESTIONNAIRE

Venue:	Ogulin
Date:	27 October 2004
Team:	Helena Bilandžija, Marko Lukiĺ , Martina Pavlek and Jana Bedek
Subject:	Karst, karst underground, subterranean Croatian fauna and Ogulin Cave sponge

Photo 156. Surveying (Marko Lukiĺ); *photo by J. Bedek*

Photo 157. Surveying (Helena Bilandžija and Martina Pavlek); *photo by J. Bedek*

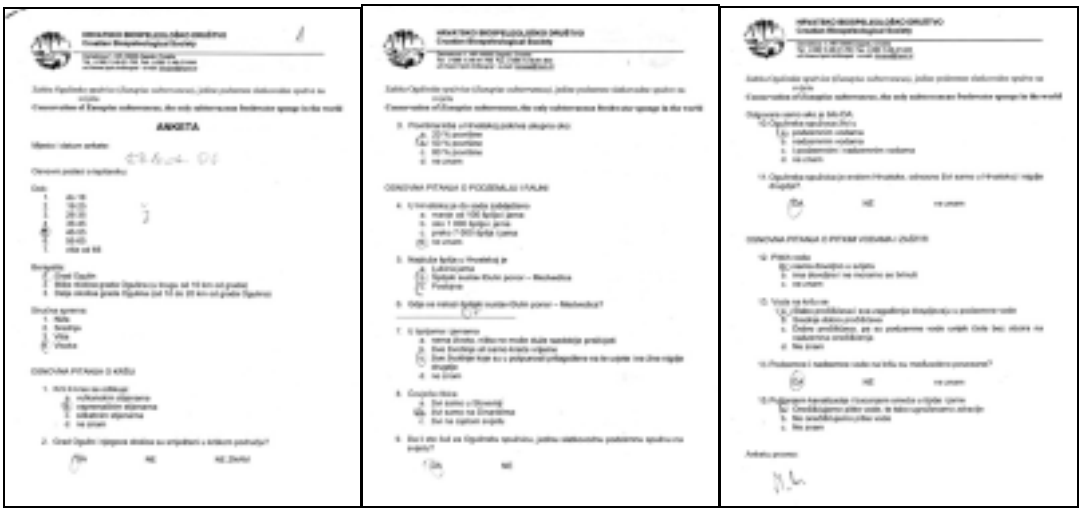


Photo 158. A questionnaire sample; *prepared by J. Bedek*

BROADCASTING

The same day (27th October 2004) when the questionnaire was done, I was interviewed live by the Radio Ogulin.

NEWS

On 3rd November 2004 the local daily newspaper "Karlovaḷ ki list" (p. 8) from the town of Karlovac published another article "The Ogulin Sponge Phenomenon to be Illuminated" ("Kreĺ e rasvjetljavanje fenomena Ogulinske spužvice") about the end of the project. The newspaper is distributed in the County of Karlovac, which covers a part of Ogulin area.

On 6th November 2004 the local monthly magazine "Ogulinski list" from the town of Ogulin, No. 102, p. 10 published an article about the project "Let's save 'the Ogulin sponge'" ("Spasimo 'Ogulinsku spužvicu'"). The newspaper is distributed in a wide Ogulin area.

LECTURE

Venue:	Ogulin
Date:	12th November 2004
Held by:	Jana Bedek
Subject:	"Ogulin Cave Sponge (*Eunapius subterraneus*), the Only Subterranean Freshwater Sponge in the World"

There were about 50 people who participated in the open lecture with multimedia presentation, including the representatives of the local authorities of the town of Ogulin, the tourist organization of the town of Ogulin, several biology teachers, etc. I talked about all important issues, and presented some of the results of the questionnaire, made two weeks before that. After the lecture there was a great interest in the subject. We had prepared an educational leaflet for the lecture. The leaflet was distributed in local schools and kindergartens, but also in the whole country during speleological schools, together with speleological magazines, etc.

Photo 159. Information poster about the lecture, distributed in a wide Ogulin area

Photo 160. Giving the lecture (Jana Bedek); *photo by M. Lukiĺ*

Photo 161. Audience; *photo by M. Lukiĺ*

Photo 162. First of the educational slides; *author J. Bedek*

Photo 163. Educational leaflet; *author: J. Bedek*

LECTURE

Event:	The Fifth Croatian Speleological Meeting "Ozalj 2004"
Date:	19 – 21 November 2004
Given by:	Jana Bedek
Subject:	"Ogulin Cave Sponge (*Eunapius subterraneus*), the Only Subterranean Freshwater Sponge in the World"

Program predavanja i projekcija, subota 20.11.2004.

Vrijeme	Predavači	Tema
10:00 – 11:00	Vatroslav Jakobović	Istraživanja Risnjaka u 2004. godini
	Alen Kapidžić	Speleološka ekspedicija «Paleš 2004»
	Jadran Lindić, Goran Puđa	Speleološka ekspedicija «Brač 2004»
11:00 – 12:00	Darko Štefanac	Špilja Gradusa
	Ivo Lučić	Vjetrenica – pred Listom svjetske baštine
	Dalibor Reš	Jama Grojnica, Čičarija
12:00 – 13:00	Darko Bakšić	Speleološka istraživanja jama Muništabe u 2004. godini
	Darko Bakšić, Tihana Boban	Jamski sustav Velebita
	Darko Bakšić	B.A.S.E jump u jami Mamet
13:00 – 14:00	Dalibor Paar	Špilja u kamenolomu Debeljača, Lovinac
	Neven Koraić, Dinko Gomes	«SKOL» u 2004. godini
	Jana Bedek	Ogulinska špiljska spužvica (*Eunapius subterraneus*), jedina slatkovodna spužva na svijetu
14:00 – 15:00	Grgo Puljas	Istraživanja speleoloških objekata sjeverozapadnih padina PP Biokovo u svrhu upotpunjavanja katastra speleoloških objekata
	Željko Bačurin	Ponor Crnog vrela – nova istraživanja
	Vladimir Bočić	U špiljama Korčule
15:00 – 16:00	Mladen Garašić	Neke zanimljive koverne uz naše prometnice
	Neven Bočić	Špilje Moravskog luka u Češkoj
	Roman Ozimec	Špiljski tražitelji (Pseudoscorpiones) Hrvatske
16:00 – 17:00	Vladimir Lindić	Špilje i izvori Cetine
	Damir Basara	Speleološki objekti okolice grada Kladnja, Bosna i Hercegovina
	Zoran Brajković, Radenko Sioković	Istraživanja Zelene pećine u Pazinskoj jami
17:00 – 18:00	Aleš Stražar	Predstavitev Jamarske reševalne službe Slovenije
	Boris Watz	Vježba speleospašavanja u špiljskom sustavu Đula - Medvjedica
18:00 – 19:00	Antonino Torre	Grotte senza confini (Špilje bez granica)
	Teo Barišić	Od Ozlja do Ozlja (including Kita Gačešina)
	Aleš Stražar	Brezno 151 - drugi sistem Mokička peč

Photo 164. Programme

Photo 165. One of the educational slides (waste dumping); *author J. Bedek*

NEWS

Speleological magazine, "Subterranea croatica" No. 3, December 2004, published twice a year, distributed all over the country and abroad.

1. I wrote a long article "Ogulin Cave Sponge – a Unique Croatian Subterranean Fauna Representative" ("Ogulinska špiljska spužvica – jedinstveni predstavnik hrvatske podzemne faune") that covers all important issues and events in the project (pp. 44–49).

2. Branko Jalžić wrote an article about Mandelaja Pit "Aquatorium – A New Channel in Mandelaja Pit Nearby Oštarije" ("Aquatorium – novi kanal u Jami Mandelaja kod Oštarija"), one of the sponge localities (pp. 40–43).

Web-site for aquaculture published an article about the project and all important issues "Ogulin Cave Sponge Conservation Project" ("Projekt zaštite ogulinske špiljske spužvice") on 12th December 2004.
http://akvarij.net/default.asp?id=43&ACT=5&content=215&mnu=43

LECTURE

Venue:	Samobor
Date:	9 December 2004
Given by:	**Vatroslav JakoboviÍ** , Speleological Society Samobor **Nenad Buzjak,** Speleological Society Samobor **Jana Bedek**, Croatian Biospelological Society
Subject:	"Speleological Expedition Risnjak 2004"

I was invited to give a biospelological lecture on the presentation of the Speleological expedition Risnjak 2004. In this multimedia presentation I talked about the project, among other topics.

Photo 166. Information leaflet

Photo 167. One of the educational slides (snails); *author J. Bedek*

LABORATORY WORK

Several different parts of the laboratory work have been done throughout the year, such as the isolation and identification of biological material, water analysis, etc. The scientific research of the sponge was done by Helena Bilandžija during winter 2005. She has been preparing the graduation thesis with the results from this project.

Photo 168. Biology department at Faculty of Science in Zagreb; http://zg.biol.pmf.hr/

The first part, isolating and preserving of the material was done at the Department of Biology, Faculty of Science in Zagreb with the assistance of Dr. Tatjana Bakran Petriccioli. The material was preserved at 96 of ethanol. The material was partially preserved in deep freeze for future DNA analysis.

Photo 169. Institute of Oceanography and Fisheries in Split; http://www.izor.hr/

The second part, making spicules and gemmules slides, was done at the Institute of Oceanography and Fisheries in Split. The technical part of slide-making was done with the assistance of the Institute's staff, under the supervision of Prof. Dr. Ivana Grubelić .

Photo 170. In laboratory of the Institute of Oceanography and Fisheries in Split (Dr. Ivana Grubelić and Helena Bilandžija behind); *photo by: I. Cvitković*

Photo 171. Slides; *photo by M. Lukić*

The third part, making photos and scientific material processing was done again at the Faculty of Science in Zagreb. All work was mentored by Prof. Dr. Mladen Kerovec with the staff assistance, Ivanļica Krulik, MSc, Dr. Goran Klobuļar and, of course, Dr. Sanja Gottstein Matoļec.

Photo 172. At microscope (Helena Bilandžija); *photo by J. Bedek*

Photo 173. Shooting the slide (Helena Bilandžija); *photo by J. Bedek*

Photo 174. Gemmules at leyers of *Marifugia*; *photo by: I. Cvitkovií*

Photo 175. Spicules measured by Olympus computer programme; *photo by: A. Žuljevií*

NEWS

On 10th April 2005 a web site was placed on the "Croatian Speleoserver" ("Hrvatski speloposlužitelj") with a list of 10 most endangered speleological sites in Croatia. From 10 localities the first is the ņula – Medvedica Cave System and the second Cave in Tounj Quarry, which are two known sponge habitats. The list is growing every day with the assistance of speleologists from the whole country, but those two localities remain in the first two places.

http://pubwww.srce.hr/speleo/zastitaprirode/index.html

LECTURE

Venue:	Speleological Department of the Mountaineering club "Velebit"
Date:	13 April 2005
Given by:	Jana Bedek
Subject:	Biospeleology

I was asked to give a biospeleological lecture in the 35th Zagreb's School of Speleology (35. Zagrebaļ ka speleološka škola). In this multimedia presentation I made a short presentation of the project, including its origin, problems, etc. There were 20 people who participated in and finished the school.

Photo 176. One of the educational slides (leaches); *author J. Bedek*

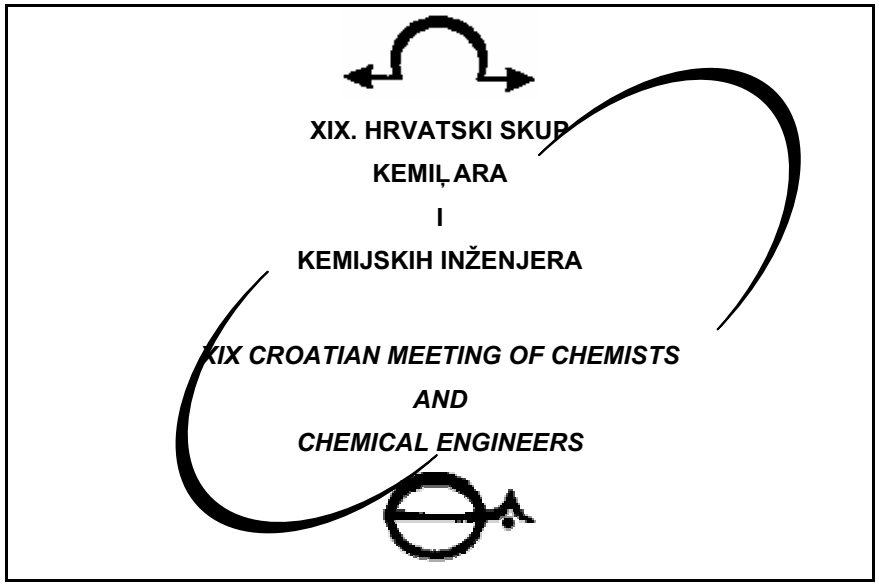
NEWS

I wrote a short article on the end of the project "Ogulin Cave Sponge Conservation" ("Oį uvanje ogulinske špiljske spužvice") for the local annual magazine "KolišĹ e" of "St. George" Parish from Zagorje, No. 6, pp. 53–54, an area near the town of Ogulin. The article was published on 23 April 2005.

LECTURE

Event:	"19th Croatian Meeting of Chemists and Chemical Engineers" in Opatija
Date:	24 – 27 April 2005
Given by:	Sanda Ronį eviĹ , Lovorka PitareviĹ , Jana Bedek, Helena Bilandžija
Subject:	"Metal Content Identification in the Sponge *Eunapius subterraneus*, Water and Sediment Samples"

The "Croatian Society of Chemical Engineers" ("Hrvatsko društvo kemijskih inžinjera") organized the 19th Croatian Meeting of Chemists and Chemical Engineers. We applied a poster presentation entitled "Metal Content Determination in the Sponge *Eunapius subterraneus*, Water and Sediment Samples". But the Meeting Committee asked us to give a lecture, which was delivered by Lovorka PitareviĹ on 25th April 2005.
http://www.hdki.hr/19_Skup_2005/index_19.htm



11.30-12.15	*Moderatori: D. Škare, R. Žanetić* Po P4: Jiří Matoušek: CHEMICAL DISARMAMENT: CURRENT PROBLEMS IN IMPLEMENTING THE CHEMICAL WEAPONS CONVENTION
12.15-14.45	12.15-12.30 Danko Škare – IZDAVAČKA DJELATNOST/PUBLISHING Stanka – Break
14.45-15.00	*Moderator: A. Gojmerac Ivšić* Usm E2: Predrag Novak, Predrag Tepeš, Ines Fistrić, Igor Bratoš, Vesna Gabelica: LC-NMR- I LC-MS-METODE U KARAKTERIZACIJI NEPOZNATOG ONEČIŠĆENJA 5-AMINOSALICILNE KISELINE LC-NMR AND LC-MS METHODS FOR CHARACTERIZATION OF UNKNOWN IMPURITY IN 5-AMINOSALICYLIC ACID
15.00-15.15	Usm. E1: Mario Cindrić, Ana Škrlin, Tina Čepo: KARAKTERIZACIJA GLIKOPROTEINA I *N*-GLIKANA TEKUĆINSKOM KROMATOGRAFIJOM I SPEKTROMETRIJOM MASA CHARACTERISATION OF GLYCOPROTEINS AND *N*-GLYCANS BY LIQUID CHROMATOGRAPHY AND MASS SPECTROMETRY
15.15-15.30	Usm E3: Štefica Cerjan-Stefanović, Tomislav Bolanča, Melita Regelja, Stjepan Leaković, Ankica Krmelić, Branka Zrinščak, Šime Ukić: PRAĆENJE KVALITETE OTPADNIH VODA INDUSTRIJE GNOJIVA UPOTREBOM IONSKE KROMATOGRAFIJE MONITORING OF FERTILIZER INDUSTRY WASTEWATER QUALITY BY USING ION CHROMATOGRAPHY
15.30-15.45	Usm E4: Anita Šporec, Ivica Cepanec, Vinka Drušković, Anamarija Bartolinčić, Vladimir Vinković: KIRALNO PREPOZNAVANJE η-AMINOALKOHOLA POLISAHARIDNIM KIRALNIM NEPOKRETNIM FAZAMA CHIRAL RECOGNITION OF η-AMINO ALCOHOLS BY POLYSACHARIDE CHIRAL STATIONARY PHASES
15.45-16.00	Usm K1: Sanda Rončević, Lovorka Pitarević, Jana Bedek, Helena Bilandžija: ODREĐIVANJE SADRŽAJA METALA U UZORCIMA SPUŽVE *EUNAPIUS SUBTERRANEUS*, VODE I SEDIMENTA DETERMINATION OF METAL CONTENT IN SPONGE *EUNAPIUS SUBTERRANEUS*, WATER AND SEDIMENT SAMPLES

Photo 177. Programme

NEWS

Helena Bilandžija and I wrote an article "Ogulin Cave Sponge" ("Ogulinska špiljska spužvica") for "Meridijani", No. 96, June 2005, the magazine for geography and history, which has a wide distribution in both elementary and high schools.

3. RESEARCH REPORT

(Summary)

We made 18 fieldwork research days throughout the year, including:

- ü *sponge sampling: to collect the sponge it was necessary to dive inside caves and springs (11 times x 2 divers); it was necessary for taxonomy and elementary chemical analysis*
- ü *water sampling: for physical and chemical analyses, elementary chemical analysis of water and water sediment*
- ü *water measurements**: pH, temperature***
- ü *sampling other fauna*
- ü *microclimate measurements: temperature and air humidity*
- ü *exploring sources of endangerment*
- ü *exploring new potential locations*

Fieldworks encloses **45** visited different speleological sites, but some of them have been visited several times, so total number of research events is **61**:

31 January 2004 – 1 February 2004, altogether 4 visited sites, 2 diving:
Zala Cave

- ↓ Tounjļ ica Cave, diving
- ↓ Gojak Cave Spring, diving
- ↓ ņula - Medvedica Cave System

5 February 2004, altogether 2 visited sites, 1 diving:

- ↓ *Two springs of river Bistrac, one diving*

30 March 2004, 1 visited diving site:

- ↓ Tounjļ ica Cave, diving

29 June 2004 – 3 July 2004, altogether 27 visited sites:

- ↓ Siniļ iĺ 's Cave
- ↓ Markar's Cave
- ↓ Obajdini's Cave
- ↓ Studenac Spring
- ↓ Vidoviĺ 's Studenac Spring
- ↓ Vidoviĺ 's Cave
- ↓ Komarac's Pit
- ↓ Cave above Crno Vrelo Spring
- ↓ Crno Vrelo Spring
- ↓ Veliko Vrelo Spring
- ↓ Periodical Spring in Krakar Polje
- ↓ Mijo's Spring
- ↓ Rupeļ ica Spring
- ↓ Rupeļ ica Percipace
- ↓ Bistrac Spring

- Zagorska PeĺCave
- Vitunjļica's Spring
- Cave near TurkoviĺI
- PeĺInik Cave
- Cave under Maļkova Draga
- Luška Cave
- Košarice Sources (6 of them)

9 July 2004 – 11 July 2004, altogether 12 visited sites:

- Cave under Maļkova Draga
- Vitunjļica's Spring
- Bistrac Spring
- Zagorska PeĺCave
- Rupeļica Spring and Precipice
- Veliko Vrelo Spring
- Cave above Crno Vrelo Spring
- Komarac's Pit
- VidoviĺI 's Cave
- Markar's Cave
- Obajdini's Cave
- SiniļiĺI 's Cave

25 August 2004 – 29 August 2004, altogether 14 visited sites, 6 diving:

- Sinjac Spring, diving
- Sopot Cave
- Precipice in Ļrnaļko polje
- Vrelo Spring
- Zagorska Mrežnica Spring, diving
- Bistrac Spring, diving
- Dretulja Spring
- Grbina peĺCave
- Rudnica VI Cave, diving
- RebiĺI ka Cave
- Mandelaja Cave, diving
- ņula - Medvedica Cave System
- Obajdini's Cave, diving
- river Dobra

12 September 2004, 1 visited diving site:

- Obajdini's Cave

THERE IS GREAT AMOUNT OF SOURCES OF ENDANGEREMENT, MORE THAN WE EXPECTED!
TO EXPLORE SPONGE LIVING AREA IT IS NECCESARRY TO SEARCH FOR MORE SPELEOLOGICAL SITES AND DIVE INTO!

Laboratory work includes:

- **Sponge**
  - Isolating and conservation at 96 of ethanol. Material has been partially preserved in deep freeze for future DNA analysis.
  - Making spicules (support structure) and gemmules (asexual reproductive grow buds) slides
  - Making spicules and gemmules photos
  - Scientific material processing

THE RESULTS SHOW US THAT THERE IS MORE THAN ONE SPECIES, MEANING THAT WE HAVE DISCOVERE NEW SPECIES! (This information should not be published before it has been scientifically verified.)

- **Fauna**
  - All collected material was divided into different taxonomic groups, properly ranked, labeled and conserved
  - Most of the collected material was identified, depending on available experts for each group
  - Collected material is a part of CBS collection at the CNHM

EXTREMLY HIGH BIODIVERSITY ON GLOBAL LEVEL, SPECIALY IN WATER HABITATS! SPECIES ON IUCN LIST, RED LIST, FROM DIRECTIVE FAUNE-FLORE-HABITAT LIST IN THE EC AND ENDEMIC SPECIES!

- **Basic physical water analysis**
  - pH
  - Water conductivity
  - Water salinity

- **Basic chemical water analysis**
  - Oxygen (including oxygen saturation)
  - Nitrates
  - Nitrites
  - Phosphates
  - Ammonium

- **Analytical chemical analysis**
  - Elemental analyses of the sponge, water and sediments (the results of those analyses has been presented at 19th Croatian Meeting of Chemists and Chemical Engineers, April 2005)

ONLY ONE WATER SAMPLING FROM EACH SPONGE HABITAT GAVE INSUFFICIENT DATA FOR ANY RELIABLE CONCLUSION!

4. CONSERVATION AND EDUCATION REPORT

(Summary)

We were invited to make an **educational television show** for the Croatian National Television (HRT) for the weekly programme "Trenutak spoznaje" ("The Moment of Cognition"), which covers reports about science, nature exploration and conservation. **Several primary and high school** teachers asked for the copy of the show for educational purposes. The copy of the show is attached to this report.

Throughout the year we have delivered several **lectures**, all of them covering project presentations:

- 7 April 2004 at Speleological Department of the Mountaineering club "Velebit" in Zagreb about biospeleology
  25 participants
- 19 April 2004 at KIC (Cultural Information Centre) in Zagreb with subject "Croatian Karst Underground – Significant Ecotourist Potential" together with Damir LackoviĆ , Silvio LegoviĆ , Vlado BožiĆ and Daniela HamidoviĆ
  Around 50 participants
- 12 November 2004 in Ogulin about Ogulin Cave Sponge and the project
  About 50 people including the representatives of the local authorities of the town of Ogulin, the tourist organization of the town of Ogulin, several biology teachers, etc
- 19 – 21 November 2004 at The Fifth Croatian Speleological Meeting "Ozalj 2004" about Ogulin Cave Sponge and the project
  Around 70 participants, mainly speleologists
- 9 December 2004 in Samobor about "Speleological Expedition Risnjak 2004" together with Nenad Buzjak and Vatroslav JakoboviĆ
  Around 50 participants
- 13 April 2005 at Speleological Department of the Mountaineering club "Velebit" in Zagreb about biospeleology
  20 participants

We prepared and distributed an **educational leaflet** for presentations and educational activities in both Croatian and English versions.

To celebrate the *Planet Earth Day* on 22 April 2004 we organized a **role play** at the library "Savski gaj" in Zagreb including:

- Educational role play
- Underground fauna and bats exhibition
- Educational leaflet for children
- Two separate lectures on bats (Daniela HamidoviĆ) and other underground fauna (Jana Bedek)
- Interviews for the Croatian Radio

The event was covered by the Croatian Radio. Children who participated in the role play were primary school children, age 9 to 10. To them we distributed educational leaflets, certificates and printed one exhibition photo.

A **questionnaire** was made with topics: karst, karst underground, subterranean Croatian fauna and Ogulin Cave sponge. The same day I was invited to the local Radio station to present the project and all its aspects and problems.

In cooperation with colleagues from the Faculty of Science, Department of Chemistry we made a poster presentation for the **"19th Croatian Meeting of Chemists and Chemical Engineers"**. The board asked us to give an **oral presentation**, which we did with subject: "Metal Content Identification in the Sponge *Eunapius subterraneus*, Water and Sediment Samples". Authors were Sanda Ronį eviĺ , Lovorka Pitareviĺ , Jana Bedek and Helena Bilandžija, and lecture was held by Lovorka Pitareviĺ 25th April 2005. http://www.hdki.hr/19_Skup_2005/index_19.htm

Few **articles** are placed on **web** as permanent sites:

- Croatian Speleoserver: "A Unique Freshwater Sponge in Pits of Gorski Kotar" ("Jedinstvena slatkovodna spužva u jamama Gorskog Kotara"), http://public.srce.hr/speleo/znanost/eunapius/eunapius.html
- Iskon Portal: "Saving Endemic Sponge" ("Spašavanje endemiį ne spužve"), http://www.iskon.hr/znanost/page/2003/11/30/0014006.html
- Iskon Portal: "Croatian Karst Underground" ("Krško podzemlje Hrvatske"), http://www.iskon.org/znanost/page/2004/04/19/0165006.html
- Akvarij: "Ogulin Cave Sponge Conservation Project" ("Projekt zaštite ogulinske špiljske spužvice"), http://akvarij.net/default.asp?id=43&ACT=5&content=215&mnu=43

Two **articles** were written on that subject:

- Subterranea croatica, speleological magazine, No. 3, December 2004, "Ogulin Cave Sponge – a Unique Croatian Subterranean Fauna Representative" ("Ogulinska špiljska spužvica – jedinstveni predstavnik hrvatske podzemne faune"), pp. 44–49, author: J. Bedek
- Meridijani, national monthly magazine, forthcoming publication, June 2005, "Ogulin Cave Sponge" ("Ogulinska špiljska spužvica"), authors: J. Bedek and H. Bilandžija

We are preparing two more articles: a review paper for the local Modruš's Proceedings and a scientific paper for the scientific journal of the Croatian Natural History Museum "Natura croatica".

5. MEDIA REPORT

(Summary)

The media coverage has been extensive. In short, the project has been covered 16 times in daily newspapers and periodicals, 4 times in different web sites, I have been interviewed 3 times by different Croatian radio stations, and we have made an educational television show for the Croatian National Television (HRT) for the weekly programme "Trenutak spoznaje" ("The Moment of Cognition").

Hina News Line - Croatian News Agency

30 November 2003 "Croatian Biospeleologists Save Endemic Sponge" ("Hrvatski biospeleolozi spašavaju endemiļ nu spužvu")

DAILY NEWSPAPERS:

VJESNIK HRVATSKI POLITIČKI DNEVNIK, national newspapers

30 November 2003 "A Unique Freshwater Sponge in Pits of Gorski Kotar" ("Jedinstvena slatkovodna spužva u jamama Gorskog Kotara"), p. 40.

NOVI LIST, local newspapers in weekly TV guide

05 Decemer 2003 "Croatian Biospeleologists Save Endemic Sponge" ("Hrvatski biospeleolozi spašavaju endemiļ nu spužvu"), p. 64

Večernji list, national newspapers

22 April 2004 *Planet Earth Day*: "World Phenomenon More Important to Foreigners than to Us" ("Svjetski fenomen važniji strancima nego nama"), pp. 28–29.

03 June 2004 "A Unique Subterranean Animal" ("Podzemni biološki unikat"), p. 19

Karlovački list, local newspapers

05 June 2004 "A Systematic Research of the Endangered Freshwater Sponge Begins" ("Poļ inje sustavno istraživanje ugrožene slatkovodne spužve"), p. 14

03 November 2004 "The Ogulin Sponge Phenomenon to be Illuminated" ("Kreĺ e rasvjetljavanje fenomena Ogulinske spužvice"), p. 8

WEEKLY NEWSPAPERS:

, local newspapers, No. 23/04

10 June 2004 "The Only One in the World" ("Jedina u svijetu")

MONTHLY MAGAZINE AND OTHERS:

, national monthly magazine

January 2004 "Saving the Only Freshwater Subterranean Sponge in the World" ("Spašavanje jedine slatkovodne podzemne spužve na svijetu"), No. 81, pp. 6 – 7

June 2005 "Ogulin Cave Sponge" ("Ogulinska špiljska spužvica")

, local monthly magazine, No. 21

13 July 2004 "Invaluable Biodiverse Treasure Nearby Karlovac" ("Neprocjenjivo bogatstvo životne raznolikosti nadomak Karlovca"), p. 17

, national monthly magazine, No. 3

October 2004 "Cave Diving Research in Ogulin Area" ("Speleoronilaļ ka istraživanja u ogulinskom kraju"), pp. 91 – 92

, local monthly magazine, No. 102

06 November 2004 "Let's save 'the Ogulin sponge'" ("Spasimo 'Ogulinsku spužvicu'"), p. 10

, speleological magazine, No. 3

December 2004 "Ogulin Cave Sponge – a Unique Croatian Subterranean Fauna Representative" ("Ogulinska špiljska spužvica – jedinstveni predstavnik hrvatske podzemne faune"), pp. 44–49

"Aquatorium – A New Channel in Mandelaja Pit nearby Oštarije" ("Aquatorium – novi kanal u Jami Mandelaja kod Oštarija"), pp. 40–43

KOLISCE, local magazine, No. 6

23 April 2005 "Ogulin Cave Sponge Conservation" ("Oį uvanje ogulinske špiljske spužvice"), pp. 53–54

WEB NEWS:

"A Unique Freshwater Sponge in Pits of Gorski Kotar" ("Jedinstvena slatkovodna spužva u jamama Gorskog Kotara"),
http://public.srce.hr/speleo/znanost/eunapius/eunapius.html

iskonportal

"Saving Endemic Sponge" ("Spašavanje endemiį ne spužve"),
http://www.iskon.hr/znanost/page/2003/11/30/0014006.html

"Croatian Karst Underground" ("Krško podzemlje Hrvatske"),
http://www.iskon.org/znanost/page/2004/04/19/0165006.html

akvarij.net

"Ogulin Cave Sponge Conservation Project" ("Projekt zaštite ogulinske špiljske spužvice"), http://akvarij.net/default.asp?id=43&ACT=5&content=215&mnu=43

BROADCASTING:

HRT teletext, Teletext sites from Croatian National Radio TV Company (HRT)

November 2003 News about getting donation

HRT, Croatian National Television

8 April 2004 5'36" long show in the weekly programme "The Moment of Cognition" ("Trenutak spoznaje ")

HR1, Croatian radio, first programme

22 April 2004 children, Daniela HamidoviĺÍ and I were interviewed for Radio children show "Eko eko" in *Planet Earth Day* programme

HR2, Croatian radio, second programme
September 2004 Darko BakšiĺÍ and I were interviewed

RADIO OGULIN, local Radio station

27 October 2004 I was live interviewed

6. FINANCIAL REPORT

PROJECT PART	UNIT	DATE	AMOUNT IN KN	AMOUNT IN GBP
Requirements	Diving gloves and socks	29.01.2004.	915,00	85,51
Requirements	Chemical requirements	29.01.2004.	1468,88	137,28
Requirements	Batteries	31.01.2004.	338,08	31,60
Requirements	Batteries	07.02.2004.	52,98	4,95
Requirements	Batteries	08.02.2004.	156,10	14,59
Requirements	Batteries	22.04.200.	35,34	3,30
Requirements	Batteries	18.06.2004.	33,88	3,17
Requirements	Chemical requirements	18.06.2004.	2500,00	233,64
Requirements	Batteries	25.08.2004.	128,00	11,96
Requirements	Batteries	25.08.2004.	92,81	8,67
Requirements	Batteries	25.08.2004.	57,86	5,41
Requirements	Chemical requirements	24.03.2005.	2500,00	233,64
Leaflet	Design	10.11.2004.	300,00	28,04
Leaflet	Printing	12.11.2004.	1586,00	148,22
Leaflet	Translate	20.11.2004.	470,00	43,93
Leaflet	Printing	22.11.2004.	1586,00	148,22
Role play	Counterparts wages	22.04.2004.	680,00	63,55
Questionnaire	Counterparts wages	27.10.2004.	680,00	63,55
Questionnaire	Fuel and travel expenses	27.10.2004.	350,00	32,71
Questionnaire	Food	27.10.2004.	340,00	31,78
Photo	Developing slides	16.08.2004.	217,80	20,36
Photo	Film	25.08.2004.	18,41	1,72
Photo	Film	07.10.2004.	176,00	16,45
Photo	Developing slides	26.10.2004.	66,00	6,17
Photo	Developing slides	03.11.2004.	22,00	2,06
Photo	Developing slides	17.11.2004.	22,00	2,06
Photo	Scanning and developing photos	19.11.2004.	144,20	13,48
Photo	Plastic slides	25.11.2005.	108,00	10,09
Fieldwork	Counterparts wages	31.01.2004.	2210,00	206,54
Fieldwork	Fuel and travel expenses	31.01. - 01.02.2004.	860,00	80,37
Fieldwork	Food	31.01. - 01.02.2004.	1150,00	107,48
Fieldwork	Counterparts wages	05.02.2004.	340,00	31,78
Fieldwork	Fuel and travel expenses	05.02.2004.	365,00	34,11
Fieldwork	Food	05.02.2004.	180,00	16,82
Fieldwork	Counterparts wages	30.03.2004.	1190,00	111,21
Fieldwork	Fuel and travel expenses	30.03.2004.	450,00	42,06
Fieldwork	Food	30.03.2004.	750,00	70,09
Fieldwork	Counterparts wages	29.06.- 03.07.2004.	5100,00	476,64
Fieldwork	Food	29.06.- 03.07.2004.	3160,00	295,33
Fieldwork	Counterparts wages	09.-11.07.2004.	1530,00	142,99

Fieldwork	Food	09.-11.07.2004.	1080,00	100,93
Fieldwork	Counterparts wages	25.-29.08.2004.	6970,00	651,40
Fieldwork	Fuel and travel expenses	25.-29.08.2004.	3620,00	338,32
Fieldwork	Food	25.-29.08.2004.	5340,00	499,07
Fieldwork	Sleeping cost	30.08.2004.	1764,00	164,86
Fieldwork	Counterparts wages	12.09.2004.	340,00	31,78
Fieldwork	Fuel and travel expenses	12.09.2004.	450,00	42,06
Fieldwork	Food	12.09.2004.	170,00	15,89
Report	Spell check	18.05.2004.	500,00	46,73
TOTAL AMOUNT			**52564,34**	**4912,56**

7. PROJECT PLAN 2005/2006

For the second part of 2005 and beginning 2006 (altogether 12 months) we plan several different parts of the project. We are applying for Second Rufford Small Grant and funding from different Croatian companies to accomplish that plan. In short:

1. We applied in March at Ministry of Environmental Protection and Physical Planning for approximately 3500 GBP for project with main goals: Resolving a big problem of garbage and waste dumping in Ogulin area through raising public awareness, education and communication with local community and authorities. We will try to convince local authorities to organize proper garbage and waste dumping and local mountaineering and ecological groups to organize cleaning at least the biggest dumping.
2. Together with Catholic Committee "MI" from Ogulin we are planning an exhibition with subject: "Ogulin underground – speleojungle". We are still seeking for funding from Ogulin Tourist organization and Power Plant Gojak.
3. For the main research of Ogulin Cave sponge, we will apply for Second Rufford Small Grant, and we have in plan numerous activities. On scientific level we have to explore new species we found, scientifically describe it and connect with foreign experts for DNA analyses. We are also planning to explore in details living conditions for at least one population. On conservation levels we are planning to improve our communication with Croatia Government and big Croatian companies. Also we are planning education actions such as celebration of Planet Earth Day etc.