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NEWS

HYPOGEA 2015

International Congress of Speleology in Artificial Caves - Italy, Rome, March 11/17, 2015 The main object of the congress is to exchange the experience acquired at the international and national level in the field of speleological and speleo-underwater research in artificial hypogea (works of anthropogenic origin and of archaeological-historical interest), the promotion of the underground historical and cultural heritage, its safeguard and exploitation.

The international thematic sessions, which are the main topic of the congress, will deal with the speleological studies undertaken in the international field during the course of shared archaeological missions (Archaeology), the definition of international standards thanks to the adoption of cartographic symbols (Cartography), the adoption of a sharable world web site (UIS) connected to the “Register of Artificial Caverns” and the comparison between typologies of artificial cavities which have been extensively studied (Typology). The sessions will also provide the possibility of an initial analysis of the legislation presently active in different countries (Legislation) and of enlarging at an international level important Italian projects on artificial cavities, such as the Map of Ancient Aqueducts (Documentation).

During the Congress, guided tours to hypogaea and archaeological sites of special interest in Rome will be organised and three excursions of great interest: Alban Hills, Sabina Underground and Narni Underground.

English is the official language of the congress.

Themes:
Underground World of Archaeological and Anthropological Interest
- Artificial Caverns
- Underground Cities and Cliff-Dwellings
- Archaeological Hypogea
- Caves of Anthropic Use
- Underground Hydraulic Structures of Ancient World
- Research Practices and Documentation
- and more....

Preliminary program:

Wednesday, March 11, 2015
Rome (Italy) Consiglio Nazionale Delle Ricerche - Sala Marconi - Piazzale Aldo Moro, 7
- 9.00-10.00: Arrival and registration of participants
- 10.00: Opening Ceremony
- The Historical Roman Group gives his welcome to the participants
- Welcome coffee
- 11.00-13.00 Session 1
- Lunch
- 15.30-17.00 Session 2
- Coffee break
- 17.00-18.30 Session 2

Thursday, March 12, 2015
Rome (Italy) Consiglio Nazionale Delle Ricerche - Sala Marconi - Piazzale Aldo Moro, 7
- 9.00-11.00 Session 3
- Coffee break
- 11.20-13.00 Session 3
- Lunch
- 15.30-17.00 Session 4
- Coffee break
- 17.00-18.30 Session 4
Friday, March 13, 2015
Rome (Italy) Consiglio Nazionale Delle Ricerche - Sala Marconi - Piazzale Aldo Moro, 7
- 9.00-11.00 Session 5
- Coffee break
- 11.20-13.00 Session 5
- Lunch
- 15.30-17.00 Session 6
- Coffee break
- 17.20-18.50 Session 7
- 20.00 International Congress closure

Saturday, March 14, 2015
Rome (Italy) Comune Di Roma - Sala del Carroccio (pending confirmation) - Piazza del Campidoglio, 1
- 10:00 - 13:00: Round table between Speleologists, experts and Organisations responsible for the environment, history and cultural heritage in Italy to discuss the standards, valorisation and risks of artificial cavities. The round table will be held in Italian language.
- Lunch
- 15:00 - 18:30: Guided tours to hypogea and archaeological sites of special interest in Rome. (The program is being updated according to the access permits)
- 20.30 Social Dinner: Roman cooking in old and modern times: dinner in a typical Roman “Tavern”. (The social dinner and the tours must be booked in advance (at the time of registration)

Following the closure of the congress, excursions will take place as indicated in a dedicated program.

Sunday, March 15, 2015
Alban Hills: the hypogea and the Grand Tour places.

Monday, March 16, 2015
The Sabina Underground: catacombs and Roman aqueducts

Tuesday, March 17, 2015
Narni Underground: the cells of the Inquisition and the aqueduct “Formina”

List of presentation see: http://files.spazioweb.it/aruba28428/file/list-papers-postersseptember2014.pdf

NEW SINKHOLES CAUSED BY ARTIFICIAL CAVITIES IN SOUTHERN ITALY (M. PARISE)

Following the information on the Italian chronological catalogue of sinkholes (PARISE & VENNARI, 2013) by the Institute of Research for the Hydrogeological Protection, with the National Research Council of Italy (CNR-IRPI), presented in the previous issue of the Newsletter, we would like to update the interested readers with other events of sinkholes related to artificial cavities in southern Italy.

The continuous occurrence of these phenomena highlights the need of thorough studies dedicated to the topic, especially in terms of civil defense issues, and aimed at safeguarding people, as well as the public and private properties.

At Marsala, Sicily, on November, 21 2013, a large sinkhole (Fig. 1) opened catastrophically at the outskirts of town, luckily without producing any victims (VATTANO et al., 2014). It was the last in a quite long series of sinkhole events caused by calcarenite quarries, that were used in the past to extract the building materials and later were completely abandoned. The Marsala sinkholes are currently being analyzed by means of 2D and 3D numerical codes, in the attempt to forecast the likely evolution of underground instabilities, until they reach the ground surface to produce a sinkhole (VATTANO et al., 2013; LOLLINO et al., 2015).
At Ginosa, Apulia, on January 21, 2014, several artificial cavities collapsed, causing the complete destruction of some buildings and of a long stretch of one of the main ways to access the historical part of town. The collapse occurred after two heavy floods that hit the area, respectively, in October 2013 and in December 2013. The floods induced several instability problems in the area, as it was shown by a survey performed just a few days before the January collapse (Fig. 2). Following this event, about 60 families were evacuated, and CNR-IRPI was committed by the Department of Civil defense to carry out a detailed analysis about the instability conditions in the other artificial cavities in the area. In less than three months, about 100 artificial cavities have been found, mapped and surveyed, and their preliminary stability conditions evaluated. From this study, it appears the huge amount of artificial cavities below the historical parts of many towns in Italy, and the risk they might pose to the public safety.

Figure 1. The sinkhole of November 21, 2013, at Marsala (Sicily).

Figure 2. Open cracks in a pillar within one of the artificial caves that caused the collapse of January 21, 2014 at Ginosa (Apulia). Photo taken 4 days before the collapse.
At Altamura, Apulia, where since many years there is a long history of sinkhole events related to underground quarries in an area of recent urban expansion (Pepe et al., 2013, 2015), other sinkholes have been registered in December 2013 and (the latest) at the beginning of March 2015 (Fig. 3). The Municipality of Altamura is carefully monitoring the situation, through a dedicated register of artificial cavities, which development has been surveyed by the local cavers (so far, over 30 km of underground passages have been mapped).

Figure 3. One of the two sinkholes opened at the Altamura outskirts in the first days of March 2015.

Updating of the catalogue (as in March 2015) shows a total number of 890 sinkholes, for which there is availability of a temporal reference. More than half of the sinkholes in the catalogue (precisely, 58%) have an anthropogenic origin, whilst a quarter of the entries are due to natural caves, and for the remaining cases no clear origin of their formation has been found so far. The catalogue was also mentioned in an article on Nature (Witze A., 2013).

References


**PROJECT: ROCK-CUT SANCTUARIES IN THE EASTERN RHODOPE MOUNTAINS: THE GLOUHITE KAMANI CULT COMPLEX AND SURROUNDING REGION**

Southeastern Bulgaria is rich in archaeological sites where the natural rock of the terrain has been shaped by human agency into distinctive formations, apparently for purposes of religious cults. Such human alterations of the natural environment include the carving of niches, steps, platforms, channels for water, and unusual designs that appear to have symbolic value. Many of these rock-cut monuments are located in isolated settings that are difficult to access, that coupled with their unusual character, suggest that the monuments formed part of cult shrines and perhaps sites of pilgrimage. The creation and use of these rock-cut shrines can probably be ascribed to the Thracians, the ethnic group that was dominant in southeastern Europe during the later second and first millennia BCE.

With LiDAR an accurate record of surface anomalies over a larger area can be obtained and the identification and nature of these anomalies can be checked by survey coverage on foot. This will increase our knowledge not only of rock-cut features in the larger region, but also of settlements and transportation routes, enabling a broader regional picture of the cult sites to be obtained. Currently the extremely dense forest cover, rugged terrain, and lack of roads in this area combine to make surveys that rely only on exploration on foot extremely slow and often inaccurate. An airborne LiDAR scan, despite its high initial cost, will yield more accurate results, saving time and money in the long run. This survey will produce a detailed map of archaeological features in the region and help clarify the role of these rock-cut features in ritual usage at Gluhite Kamani and neighboring areas.

The goal of the project is to conduct two seasons of field survey in spring and fall 2015. The project will be under the joint direction of Dr. Nehrizov of the Bulgarian National Archaeological Institute and Museum and Professor Lynn E. Roller of the University of California, Davis. Annual reports will continue to be published in Bulgarian and American archaeological journals and there will be a final joint publication of the project at its conclusion.

Year: 2014  
Amount: $32,500  
Project proposal PI: Lynn Roller, University of California, Davis, Georgi Nekhrizov, National Institute of Archaeology with Museum, BAS  
Info: http://arcsofia.org/node/491

**SESSION “ENGINEERING PROBLEMS IN KARST” AT THE XII CONGRESS OF THE INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY (IAEG)**

On the occasion of the XII Congress of the International Association of Engineering Geology (IAEG), held from September 15 to 19, 2014, in Turin (Italy) the session 5.7 was dedicated to “Engineering problems in karst”. The session, convened by MARIO PARISE (Italy), DAMIEN CLOSSON (Belgium), FRANCISCO GUTIERREZ (Spain) and ZORAN STEVANOVIC (Serbia), received 32 contributions, resulting as one of the most popular in the congress. Artificial cavities were dealt with in 10 out of the 32 presented contributions. The papers in most of the cases were addressed at the analysis of underground mines and quarries: this was the case, for instance, of underground mines in loess under the town of Odessa, Ukraine, posing a serious risk to the above buildings and...
infrastructures (Dragomyretska et al., 2015). In Italy, the case studies were: the sinkholes produced by underground quarries at Marsala (Sicily), analyzed through 2D and 3D numerical models addressed to evaluating the propagation of instabilities from the quarries up to the ground surface (Lollino et al., 2015); the case of a gypsum quarry in northern Italy, where water inrush produced a series of instabilities that resulted in the catastrophic opening of a large sinkhole, likely without victims (Vigna & Marchionatti, 2015); and the hazards related to the diffuse presence of complex systems of mines in Sardinia, in the province of Carbonia Iglesias (Mureddu & Corda, 2015). Further, the use of geophysical methods to detect the presence of underground voids through integrated techniques (from seismic reflection to ground penetrating radar, to electrical resistivity tomography, to cross-hole ERT and seismic measurements) is applied in two papers dealing with calcarenite quarries in different sectors of Apulia region, southern Italy (Margiotta et al., 2015; Pepe et al., 2015).

Even though not entirely dedicated to artificial cavities, other papers discussed in some ways the engineering problems related to presence of man-made caves, with particular regard to the related hazards (Heath & Constantinou, 2015; Khomenko et al., 2015; Lei et al., 2015; Parise et al., 2015).

Apart from the specific session on karst, contributions dealing with artificial caves have been presented also in other sessions. Among these, we recall here the work by Caso et al., on the instability processes in the island of Ventotene, where the presence of caves excavated by man in the tuff rocks also played a significant role in the development of the rock failures.

The Congress Proceedings have been published as a series of 8 books by Springer. The contributions belonging to the session “Engineering problems in karst” are included in volume 5.

Articles dealing with artificial cavities:


CONFERENCES

UK - NAMHO CONFERENCE 2015

Nenthead Mines is hosting the UK mining history conference in 2015. Offers of lectures, walks, underground trips and so on are welcome.

The themes of the Conference are:

1. Mining and Quarrying Industries of the North Pennines and adjacent areas
2. The relationship between the UK Mining and Quarrying industry and War

Dates: 22 to 25 May 2015
Contact: admin(at)nentheadmines.com.
http://www.nentheadmines.com/2014/12/02/namho-conference-2015/

UK - SUBTERRANEAN BRITANNICA - SPRING MEETING 2015

Programme

- 09:30 – 10:00 Registration and refreshments
- 10:00 – 10:25 Welcome, followed by Annual General Meeting
- 10:25 – 11:30 Mining in Southern Spain. Robert Vernon describes the challenges of working underground in the Linares mining area
- 11:30 – 11:45 Comfort break
- 11:45 – 12:45 Cold War Missile sites in the UK. Roger Thomas of English Heritage launches his latest research on Bloodhound and other missile sites in Britain
- 12:45 – 13:45 Lunch break
- 14:45 – 15:15 Afternoon break
- 15:15 – 16:15 The timeless tunnels of the Western Front. David Hedges chronicles the adaption and use of souterrains in the Great War.
- 16:15 – 17:00 Members’ contributions. Members are invited to give a short presentation on their recent discoveries or activities. Video and computer projection facilities will be available

When: April 18th, 2015 9:30 AM to 5:00 PM
Location:
Lecture Theatre 1.31, Imperial College London
Royal School of Mines
Prince Consort Road
LONDON, SW7 2BP
United Kingdom
Info: https://my.subbrit.org.uk/civicrm/event/info?reset=1&id=19

GERMANY - DER ERDSTALL
The yearly meeting of the German association Der Erdstall will take place in Strahfeld close to Roding from 25 to 27 September 2015
Information: info@erdstall.de
www.erdstall.de

FRANCE – SFES CONGRESS

The annual meeting of the French Society for Souterrains Studies will take place in Saint-Bonnet-le-Courreau (Loire) from 2 to 4 October 2015
More information on www.souterrains.eu

GB - GOING UNDERGROUND: THE ARCHAEOLOGY OF SOUTERRAINS IN SCOTLAND, IRELAND, CORNWALL AND BRITTANY.
The session aims to synthesise the current research on souterrains across Atlantic Europe. Papers are invited to present research into souterrains of Scotland, Ireland, Cornwall and Brittany. Topics such as form, function and date are up for debate. What were the reasons behind their construction? Was it a response to similar social conditions? What are the similarities and differences between each of the geographical areas. Are there similar structures elsewhere in Europe and is this really an Atlantic phenomenon? It is over 50 years since the publication of FT Wainwright book on the Souterrains of Southern Pictland and appropriate that these old questions are revisited. It would also be useful to discuss how these sites can be recorded and excavated to modern standards and interpreted to a 21st century audience.

Contacts:
Mr. Derek Alexander, The National Trust for Scotland
dalexander@nts.org.uk
Mr. Richard Strachan, Historic Scotland
Niall Roycroft, NRA Ireland and County Meath Council
PUBLICATIONS

KAYSERI UNDERGROUND STRUCTURES INVENTORY FIRST PRELIMINARY REPORT

By OBRUK Cave Research Group

Although the region known as “Cappadocia” is located in the Nevşehir-Urgup-Goreme triangle of Anatolia (Turkey), the capital of that region in ancient times was the antique Caesarea city which is known as Kayseri today. Kayseri, located 75 km east of the present Cappadocia, had been affected by the intensive volcanic activities which began 10 million years ago. That eruption phase, which continued even until historical times, piled up thick tuff around Kayseri. As the same in Nevşehir-Urgup-Goreme, in antique Caesarea this volcanic tuff was dug by the local people and houses, churches and underground cities were dug into those rocks.

Almost all the underground cities in Anatolia are very unique to antique Cappadocia region, which includes the provinces of Nevşehir, Aksaray and Kayseri. These defensive settlements dug into soft tuff rocks contain long tunnels and living areas protected by mill stone doors to defend the local people in case of attack. Approximately 200 underground cities have been found in Anatolia so far, 90 % of them in Cappadocia. The academic articles about these structures are very limited and only a few inventory works had been done. Different from the known touristic places of Cappadocia, the rock dwellings and underground cities of Kayseri had not been explored and surveyed. Nevertheless, underground structures of that region have such an architectural quality to compete with the dwellings in other parts of Cappadocia.

We have started to explore and inventory the underground settlements and rock dwellings around Kayseri according to a protocol we have signed with Kayseri Municipality and CEKUL Trust in January 2014.

Within the following nine months, eight underground cities and three underground structures with uncertain usage were found, explored and surveyed in the region. The underground cities of Kayseri can be examined in three different groups:

- Those having unclear use: In spite of mill stone doors and very long tunnels, Ali Dagi (Ali Mountain) and Ali Saip Pasha underground cities have very few living areas. So, it is likely
that these underground structures were either temporary hiding places or escape tunnels rather than underground cities. Due to its diverse architecture, Swallow Valley Underground City can also be included in this group.

- Small and re-used underground cities: The underground cities around Kayseri (namely, Belagasi no.1 and 2, Otedere Valley no.1 and 2, Catalin and Penzikli) were smaller compared to the known major Cappadocian examples. From the structural point, it can be thought that all those underground cities were built to protect a small village for a short term raid rather than protecting a large population. Also, at least some of those underground structures of Kayseri were dug towards steep walls and connected to windowed, large rooms opening to the valleys. It is also quite interesting that some tunnels of the underground cities end suddenly without connecting to any chamber or room. Those half-dug tunnels give us the idea that the effort was ended as the threat of raid was diminished. Similarly, the big windowed rooms built on rock walls prove that the structures were later changed and turned into appropriate areas for daily living.

- Classic Cappadocian Style: To the southwest, closer to Nevsehir Region, underground cities become similar to the known Cappadocian style, excavated in flat areas within several layers. Doganli and Guzeloz underground cities are such examples.

The book (in Turkish) is available online on:
http://issuu.com/obruk/docs/raport1b.compressed/1?e=1889589/9234883

2014 CONFERENCE “SPELEOLOGY And SPELESTOLOGY”

In November 2014, the Vth International Scientific Correspondence Conference “Speleology and Spelestology” has been held. For those unfamiliar with the term, Speleology is the word generally used in the countries of the former USSR to indicate Artificial Caves.

The Conference was organized by the Ukrainian Institute of Speleology and Karstology and by the Russian Society of Speleological Researches, under the patronage of the UIS Commission on Karst Hydrogeology and Speleogenesis, the UIS Commission on Artificial Caves, and the IGU Commission on Karst (C12-23).

The 2014 Conference was dedicated to the centenary of Alexandr Vladimirovich Ryumin’s birth. Ryumin was the discoverer of the Upper Paleolithic paintings in the Shulgan-Tash (Kopova) Cave, in the southern Ural Mountains.

The Conference proceedings have been printed as a volume of 342 pages (ISBN 978-5-98452-116-1), and are partly available at the official page of the Conference, at the website address: http://pro-speleo.ru/index/0-29.

There, it is possible to download the pdf of the previous four conferences, held in 2010, 2011, 2012, and 2013. The pdf include only the cover of the proceedings, and the table of contents. For those interested to the proceedings, the contacts are as follow:

Gunko Alexey (the executive secretary): prospeleo@mail.ru
Dolotov Yurii: dolotov@yandex.ru

The complete reference of the 2014 volume is as follows:
CLIFF SETTLEMENTS, SHELTERS AND REFUGE CAVES IN THE GALIL</br>EE

By Yinon Shivtiel (Lecturer Safed College)

Shivtiel [Y.], Cliff Settlements, Shelters and Refuge Caves in the Galilee, in Bar [S.], In the Hill-Country, and in the Shephelah, and in the Arabah (Joshua 12, 8) - Studies and Researches Presented to Adam Zertal in the Thirtieth Anniversary of the Manasseh Hill-Country Survey, Ariel Publishing House, Jerusalem 2008, pp. 223-235

Summary

The existence of intricate systems of interconnected refuge caves in the Judean Desert has been known for a long time, and has been the subject of many publications. These systems were attributed by researchers to the period of the Bar Kokhba rebellion. One of the researchers suggested in his article that over 20 similar systems existed in the Galilee. The purpose of this article is to show that the cave systems in the Galilee served not only as places of refuge, but also as escape routes for local villagers. The common denominator of these systems was their complexity, as compared with cliff-top caves, as they are currently accessible only by rappelling. It would appear that the inhabitants of many cliff-top Galilean villages prepared escape routes and refuge caves to serve in times of need. They descended into these natural caves by ropes, and enlarged and adapted them for survival in times of danger.
By Yinon Shivtiel, Boaz Zissu, And Hanan Eshel

Shivtiel [Y.], Zissu [B.], and Eshel [H.], The Distribution of Coins of the Jewish War against Rome in Galilee and Phoenicia, in The Israel Numismatic Journal, Vol. 17, Jerusalem, 2010, pp. 77-87

Abstract: The paucity of coins found in Galilee that were minted in Jerusalem during the Jewish War shows that there were only limited ties between Jerusalem and Galilee in the first and second years of the revolt. This conclusion suggests that Josephus may not have received much assistance from the aristocratic establishment of Jerusalem during the months that he was active as commander of the region.

VERSTECKT IN HÖHLEN UND SCHLUCHTEN – REBELLEN UND ZELOTEN AM SEE GENNESARET

By Yinon Shivtiel


AHLAT 2009 - TERZA CAMPAGNA DI INDAGINI SULLLE STRUTTURE RUPESTRI - THIRD CAMPAIGN OF SURVEYS ON THE UNDERGROUND STRUCTURES

edited by Roberto Bixio, Andrea De Pascale and Nakış Karamağaralı.

Authors: Andrea Bixio, Roberto Bixio, Andrea De Pascale, Alessandro Malfred. In English and Italian. 190 pages, 170 photos and 60 maps of the surface sites and underground structures.

In the volume BAR, British Archaeological Reports, International Series 2688, 2014 Publisher: ARCHAEOPRESS, Oxford – www.archaepress.com Order online and catalogue: www.hadrianbooks.co.uk

Abstract:

The Ka.Y.A. project began in Ahlat (Lake Van, East Turkey) in 2007, by Centro Studi Sotterranei / Centre for Underground Studies of Genoa (Italy), in the main project ‘Eski Ahlat Şehri Kazisi’ (The Ahlat ancient city excavation) directed from 2005 to 2010 by Dr. Prof. Nakış Karamağaralı (Gazi University, Ankara). Ka.Y.A. project aims to identify and study the rock-cut sites around Ahlat, as completion of major archaeological excavations in the ancient city located on
the northern shores of the salt Lake Van. Ahlat region is a huge area, at an altitude between 1,700 and 2,500 m, and wedged between massive volcanic systems of 3,000 and 4,000 m. During four years of research (2007-2010) the archaeo-speleologist team documented 395 rock-cut sites and underground structures most of which date back to medieval and post-medieval times, relating to different cultures and religions: Armenian, Seljuk, Ilkhanid, Kara Koyunlu, Ak Koyunlu and Ottoman. The results of the first survey campaign were completed in 2007 and published as BAR S2293 (2011), the second campaign 2008 is available as BAR S2560 (2013). These volumes are now supplemented by the new discoveries occurred during the third season in 2009, with the hope to publish as soon as possible the results of the last mission completed in 2010.

Centre for Underground Studies of Genoa, since 1991, carried out in different regions of Turkey many explorations on the rock-cut and underground structures scattered throughout the territory, surveying and documenting buildings excavated in the subsoil, used for worship (churches, temples and tombs), for service and production activities (dining halls, stables, cellars, dovecotes, apiaries, mines, etc.), for defence (underground shelters), for water control and supply (catchment, drainage and transport tunnels).

GEOTECHNICAL AND GEOENVIRONMENTAL CHARACTERISTICS OF MAN-MADE UNDERGROUND STRUCTURES IN CAPPADOCIA, TURKEY

By Ömer Aydan, Resat Ulusay

Aydan [O.], Ulusay [R.], Geotechnical and geoenvironmental characteristics of man-made underground structures in Cappadocia, Turkey, in Engineering Geology 69 (2003) , p. 245–272

Abstract:

Underground cities and semi-underground settlements, most of which are 1500 years at least, exist in the Cappadocia Region of Turkey. These man-made rock structures are carved in soft tuffs and the best examples of long-term performance of manmade structures in the field of rock engineering. The tuffs also have good thermal isolation properties to be used as housing and storage of foods. In this article, the authors are only concerned with physical and short-term mechanical characteristics due to the wide-spectrum of the theme and the in situ characterization of the Cappadocia tuffs, and the results of investigations are presented. In addition, a critical overview on possible engineering geological problems at Cappadocia with mechanical aspects of historical and modern rock structures and their implications in rock engineering is made. From the experimental results in the field, it is evident that the engineering characteristics of these rocks do not show significant changes in vertical and horizontal directions. However, they are prone to atmospheric conditions. In addition, temperature and humidity measurements at different floors of the underground cities and various parts of semi-underground settlements indicated that variations in climatic conditions of the openings are very small when compared to those outside the ground surface.

SOK MEDEDELING – MAY 2014

SOK Mededeling is the journal of our Dutch colleagues. This issue includes the following articles:
- De gebroeders Eijssen van Sint Pieter par Jacques Konings
- De wording van een icoon. “Hij die zijn naam voor eeuwig verbond aan de Sint-Pietersberg”: Ir. David Cornelis van Schaïk par Lucie Bastiaens
- Diverse mergeexploitanten in een groot deel van de St. Pietersberg in de 16e eeuw - (Deel 2) par Peter Jennekens et Rob Habets
- Mergel met goud betaald! par Piet Kelderman

More information: [http://www.sok.nl/frontoffice/sok_med_60.html#punt](http://www.sok.nl/frontoffice/sok_med_60.html#punt)
SUBTERRANEA

The number 169 of the french journal Subterranea (edited by the Société Française d’Etude des Souterrains – French Society for SOuterrains Studies) includes the proceedings of the 2013 SFES congress. Topics discussed are the following:
- Editorial – D Montagne
- Les Souterrains de Vendée – J. et L. Triolet
- Différents aspects du refuge souterrain dans le Cambrésis – H.Dewerdt et F. Willman
- Les souterrains de Saint-Bonnet le Courreau – E. Clavier
- Tunnel warfare par l’armée chinoise – J et L. Triolet
- Une tarière à creuser les conduits verticaux près de Lunel – JF Garnier et S. Bapel
- La mention d’un clusel et d’une fossa en 1430 à Pech-Auriol- JF Garnier et H. Bouillac
- Le puits de l’église de Saint-Quentin de Chalais – M. Maurice
- Conches-sur-Ouches : une villegruyère – A. Robillard
- La règle de 26 – S. Avrilleau
- Chefs d’oeuvre en péril – S. Avrilleau
- Remerciements

RESEARCH AND PRESERVATION OF ANCIENT MINING AREAS
Proceedings of the 9th International Symposium on archaeological Mining History – Trento, Italy – 2014

SPELUNCA – TWO INTERESTING ARTICLES
- Les puits et qanâts de Dûmat al-Jandal (Arabie saoudite) par Matthieu THOMAS, Olivier TESTA et Paul COURBON dans Spelunca N°129 (1st trimester 2013)

ARSITE N°46 – 1ST SEMESTRE 2014

Extract from the table of content of this French publication specialised in landscape architecture:
- Matera - Capitale Européenne de la Culture ?
- Laos : Les Grottes de Pak Ou, ou pagode aux 1000 bouddhas
- Myanmar: La pagode inachevée de Mingun
- Montenegro: monastère orthodoxe de Ostrog
- Machemont (FR): carrières de pierre de Montigny
- Vallée du Tarn: troglodytes
- Oratoires de Savoie
- Roucas Blanc à Marseille
- Fort Saint-Jean à Lyon

More information: arsite@free.fr
Publication is available on http://issuu.com/fujak/docs/arsite_46_4cc486066bf51c
VINGT MILLE LIEUX SOUS PARIS

Authors : Basile Cenet - Ed du tresor – 2013

Abstract (in French) :

Depuis de nombreuses années, Basile se consacre à l’exploration des catacombes de Paris et autres sous-sols de la capitale dont les réseaux souterrains et les stations de métro désaffectées n’ont plus de secrets pour lui. Il est capable de percer des tunnels sur 50 mètres pour relier deux galeries, sait comment accéder aux anciens bunkers parisiens et a déjà construit un bar-cinéma souterrain pour y projeter des films avec ses amis... Visitez un Paris inédit et découvrez ses trésors cachés en compagnie d’un surprenant aventurier urbain ! – 304 pages; 21 cm.

GROTTE ET ROCHERS, LIEUX DE CULTE ET DE SAINTETÉ DANS LE MIDI

Book under the direction of Chantal de Saint Priest d’Urgel

Abstract (in French) 

La grotte et le rocher constituent des lieux de prédilection pour le culte et la sainteté dans l’histoire de toutes les religions. Le rocher correspond à une connotation d’appui, d’adossement qui sécurise ou permet de soutenir l’effort d’une élévation. La grotte, elle, sécurise en tant qu’abri, que refuge. La plus renommée est la grotte de Lourdes - mais elles abondent également dans le midi.
Editions L’Harmattan, 2014
OPERA IPOGEA – 1 – APRIL 2014

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Abstracts :

Underground mosques in Sicily
Three Sicilian underground Mosques are known. These architectures can be reduced to types, first one based on hypostyle hall is well represented by the Mosque of Rometta in the area of Messina, the second one, well represented in the Mosque of Sperlinga in the area of Etna and in the Mosque of Mineo in the Hyblaean Mountains, is based on a basic prayer hall. For other rupestian constructions, a margin of error persist due to the drastic transformation into Christian churches in accordance with a practice spread after the Christian recapture of the Isle.

Cave mosques in western Gebel Nafusa (Lybia)
During the last studies pursued in the Libyan Gebel Nafusa, conceived by Wadi Adrar Foundation, several architectural types such as fortified granaries, marabouts, oilpresses, mosques were investigated. In this paper we will examine in detail the cave mosques of the different micro-regions trying to describe the history, the geometrical characteristics and the technical aspects, embodying an understanding of geography, culture and religion as determinants of habitat and settlement. In the final conclusions will be described some historical elements such as the architectural types, use of gypsum mortar, the features of the decorations and their symbolic meaning, the inscriptions giving the author’s name and the date of construction or restorations.

The underground mosque of Sultan Seyyid
Since 1991, the Centro Studi Sotterranei (Underground Studies Centre) is carrying out spelaeo-archaeological researches on the territory of Turkey and in 2007 a new series of systematic exploring campaigns started in south-eastern region, in Ahlat (district of Bitlis) called project KA.YA (Kaya Yerle imleri Ahlat, project on Rocky Settlements of Ahlat), under the patronage of the Italian Spelaeological Society. Here the Italian mission is developing its own research as an integral part of the larger project ‘The Ahlat Ancient City Excavation’, carried out by Gazi Universitesi of Ankara, licensed by the Turkish Ministry of Culture and under the control of the Directorate of Cultural Heritage.

The city of Ahlat is located a few hundred kilometres from the border with Iraq, Iran and Armenia, on the north-western shores of Lake Van, a salt basin, ten times bigger than Lake Garda, situated at an altitude of 1,646 meters above sea level. The area is forty kilometres from the valley of the Murat nehri, the most important tributary of the Euphrates (Firat nehri) to the north, and as many from Botan çayı, one of the main tributaries of the Tigris (Dicle nehri), south-west. The development of rock and underground works, as an alternative or in addition to structures built in high, has been favoured here by the geological nature of the region. In particular, we found evidences about works of Christian worship (at least four monasteries), Buddhist (a temple dating back to Mongol) and Muslim (a mescit, a small mosque) that we will discuss in this work. The mescit of Sultan Seyyid is probably related to some burials, object of special veneration and still a place of pilgrimage for the fame of the founder, whose name has been lost, and attributed with
thaumaturgical powers owing to his illustrious origins. It is said that in 1071, during the Battle of Malazgirt, the ‘cave’ was used as a hospital (hastane), or better, hospice to treat, in a broad sense (therefore, spiritually too), without distinction both Byzantine and Seljuk soldiers and those who came here to meet the revered founder. For this reason the site is considered the symbol of benevolence and mercy of Islam.

**Rupestrian Mosques of Cappadocia**

Cappadocia is a historic region of Anatolia, situated in the area that is now central Turkey, and which includes parts of the provinces of Cesarea, Aksaray, Niğde and Nevşehir. The region is characterized by its unique geological formation and by its historical and cultural heritage. The national park of Göreme and the cave sites of Cappadocia were in fact declared world heritage sites by UNESCO in 1985. Among the different Cappadocian architectural types, rupestrian mosques play an emblematic role. Mosques were in fact the centre of the spiritual and social life of the city especially during the Seljuq dynasty. They were often used as schools for students of any age and as places of refuge for the inhabitants in case of danger. In this article we analyze the historical and formal aspects of some rupestrian mosques describing the general characteristics of each example.

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- L'insediamento medievale di Belmonte (Roma) Carlo Germani, Carla Galeazzi, Tullio Dobosz, Sandro Galeazzi
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- Le cave di tufo, le cantine e le cisterne ipogee di Comiziano (Napoli) Carlo Ebanista
- Halys deviation tunnel and Cliff dwellings of Sarihidir (Cappadocia, Turkey) Eric Gilli, Ali Yamac, Ezgi Tok
- St. Mercurios underground city of Saratli (Aksaray - Turkey) Ali Yamac, Betül Fılıkçi, Ezgi Tok
- The Bell-Shaped Quarries of the Judean Foothills (Israel) Boaz Zissu, Amos Kloner

**Abstracts:**

**Artificial cavities in Belmonte settlement (Castelnuovo di Porto, Rome, Italy)**
The settlement of Belmonte (Castelnuovo di Porto, Rome) is still well preserved and full of charm. It is located in a dominant position at the confluence of the Brooks of Costa Frigida and of S. Antonino, upon a narrow and long plateau over which rises a ruined medieval tower. The almost vertical, terraced hillside is covered by a thick brushwood, inside which many Early Medieval caves are found, together with a system of much older hydraulic tunnels (likely Etruscan-Faliscan) intended to control water circulation. One of these tunnels shows an anomalous concretion deposit, under study by the Department of Earth Sciences at Bologna University. After a brief review of the main historic, geographic and geologic features of the territory, we describe in detail the artificial hypogea explored and surveyed by the Center for Underground Researches Egeria between 2001 and 2011.

**Note on the walls of North Tower in Urbino**
At the beginning of the 20th century a modern aqueduct was built in Urbino and a big collecting tank was built exactly where the northern tower of the ancient defensive city wall was standing: by the opinion of many scholars the tank caused the destruction of the ramparts. This opinion was and is still based on the newspapers of those days, but thanks to the hard work of research carried on, underground and in the archives, by the Speleologic Group of Urbino, this part of the city wall and the tower have been proved are still standing buried under our feet.
Tuff’s quarries, underground cellars and tanks (Comiziano, Napoli – Italy)

In the municipal area of Comiziano (province of Naples), where the tuff is still extract, there are several underground cellars and water reserves of uncertain date. The classification and the graphic relief of 14 cavities, which are located between the capital city and the village of Gallo, have identified four types related to the production of wine and two to the water supply. The analysis of written sources allows assigning, at least in part, the excavation of the cellars and tanks between the 17th and 19th centuries, when the local aristocracy built some dwellings for residential and productive purposes. The extraction of the tuff, however, is well documented in the Neapolitan area at least since the Late Middle Ages. To the northeast of Gallo and Cumignano lies the village of Tufino, whose name is attributable to the Latin word tofus by Ambrogio Leone, which in 1514 reported the existence of quarries that supplied the building materials for the close town of Nola.

Halys deviation tunnel and cliff dwellings of Sarihidir (Cappadocia – Turkey)

The region known as Cappadocia and located today in the borders of four provinces, has witnessed continuous settlement from prehistoric times up to now. Tuffaceous rocks spewing out of the active volcanoes in the late Pliocene and Pleistocene period in the region were used for many different purposes such as houses, barns, churches, etc. There are even underground cities for shelter and defence. Yet, one of the most interesting underground artificial caves of the region is, without any doubt, the tunnel, which is supposed to be used to divert Kizilirmak River (antique name Halys), located in Sarihidir Village near Avanos. The aim of digging the tunnel should have been to build a ford or a shallow point in order to cross the main stream of Halys. The age of the tunnel is unknown but a text from Herodotus reports the use of a deviation of Halys by Croesus’ army in 550 BC to attack the city of Pteria, in the Persian kingdom of Cyrus. The conception is attributed to Thales. Its location helps to precise the geography of the road network in the Antiquity. During the exploration of the whole area, 16 different dwellings located above the deviation tunnel were also explored and surveyed. Three of these dwellings were natural caves which were partly fitted out and inhabited. Among the remaining 13 artificial dwellings, a large caravanserai (or a guarding post), several cisterns and graves are important items to mention.

St. Mercurius underground city of Saratli (Aksaray-Turkey)

The region of Cappadocia, located within in the borders of four provinces today, has witnessed continuous settlement up to now. Tuffaceous rocks spewing out of the active volcanoes in the late Pliocene and Pleistocene period in the region were used for many different purposes such as houses, barns, churches, and caves carved out by locals. However, the most interesting of these underground dwellings are underground cities. There are about 200 underground cities that have been discovered in the region up to now. These underground cities, which were probably established for defensive purposes, were built as dwelling spaces connected to each other by the long halls protected by stone doors. There are two underground cities in Saratli Village, in Aksaray near the provincial border. Kırkgoz Underground City has been opened to tourism and with a total 640 m² surface area, may be considered as a small dwelling. The St. Mercurius Underground City,
The Bell-Shaped Quarries of the Judean Foothills, Israel

The paper focuses on bell-shaped underground quarries, which were rock-cut in the soft limestone of the Judean Foothills during the Late Roman, Byzantine and Early Islamic periods. These large and imposing artificial caves, typical to this region, located south-west of Jerusalem, were first described by scholars and explorers who visited the area in the 19th century, and were extremely impressed by the caves. They suggested various theories regarding their function: cistern, granaries, dwellings, stables and underground churches. The phenomenon was discussed in a pioneering study, undertaken more than fifty years ago by Y. Ben-Arieh (1962) who explained the function of the subterranean caves as quarries, for the extraction of the local soft chalk. Scholars estimate that the total number of bell-shaped caves around Beth Govrin, where the region’s biggest quarries operated, is over 800. Others estimate their total number in the region as being c. 3000. The aim of this paper is to present and describe the phenomenon according to new archaeological and speleological surveys. The current study focuses, among other issues, on the method of quarrying and on a re-examination of the chronology of the phenomenon, the carving methods, Christian and Muslim graffiti and inscriptions, and finally, the use and reuse of the caves.

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The Proceedings have been published. A digital copy of the Proceedings will be placed on the Karst Information Portal www.karstportal.org, a UIS sponsored project, for free download.

Abstracts

The man-made underground cavities of North-West Russia
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In this article we consider the largest, interesting and meaningful man-made underground structures of North-Western Russia, which are located on the territory of Leningrad and Pskov Regions and the Republic of Karelia. These are: Sablinskaya, Stareladozhsky man-made caves, Petrovskaya underground quarry, cult caves Svyataya (“The Saint cave”) and Dolozhskaya, Taitsky sluice-way (Leningrad Region), underground complex of the Pskovo-Pechersky Dormition Monastery (Pskov Region), mine workings of Ruskeala and Rogoselga fields (Republic of Karelia). This review does not include fortifications and modern existing fields.

Gold mines of the 18th century: past and present
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In Ouro Preto, the gold extraction was started in alluviums and terraces, later interesting slopes rock masses, through underground mining. This mining left its marks, which are visible in the surroundings and inside the city. The discovery of gold in 1711 boosted the socio-economic life in Brazil, especially in Minas Gerais State, creating a new center of production and consumption. However, the fast population growth generated serious supply crisis in which the miners could not find food to buy. From the second half of the 17th century, with the gold decline, the Portuguese Royal Family came to Brazil, and a policy of attention to the mines was started, sending a specialist to observe the mistakes of the miners and to study and implement methods which could increase the production again. At first, the exploration was limited to the alluvial deposits, looking for the auriferous gravel. As the time passed, associated to the impoverishment of the alluvial deposits, the exploration of other kinds of deposits began, and new extraction techniques appeared, in which the workers opened galleries and tunnels following the layers with gold in all directions. At the slightest sign of impoverishment of these layers, the miners abandoned that workplace and opened another mine. This lack of technical knowledge accounted for the existence of several mines with
varied extensions. The total number of mines opened during the gold cycle in Ouro Preto is not known, with some estimates ranging from 1,000 to 2,000 mine openings. Nowadays, many mines have inaccessible and/or hidden entrances. Some are still used as touristic attraction and/or as source of water collection for urban supply. The Sociedade Excursionista e Espeleológica (SEE; Excursion and Speleological Society) develops projects together with the Federal University of Ouro Preto (UFOP) and the local communities. The projects include hikes and visits to the places with remains of mining activities, aiming to locate and identify these remains, besides raising awareness of the local population about the importance of their preservation and also intending to recover some of the history of a time which was essential for the development of the country.

The Sugano mines of Orvieto (Italy): aluminium from volcanic fire
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¹Club Speleologico Proteo, Vicenza – ²Archaeologist, Gruppo Archeologico Alfina, Castelgiorgio

A speleo-minerary research discovered two mines in the Orvieto district, in Central Italy, where was extracted a leucite rich ore, a mineral formerly used to obtain alumina, an intermediate in the aluminium industry. The mining works started in the early 30s, and reached the peak in the mid-thirties till 1937, when the economic conditions imposed the abandonment of the exploitation. For the processing of this specific mineral G.A. Blanc developed an acid treatment. Blanc was an Italian scientist known to the scientific community for his studies in ethnology, but almost unknown for his important researches in the mining industry and radioactive elements, in fact he was for two years a collaborator of the Curies in their laboratory in Paris. Here is given a short description of the site and the mineral, and a few aspects of the alumina extraction are represented with the process registered by Blanc. Eventually, the results of a series of radioactivity measures of the leucitic ore, a phonolitic tephra, are presented. Some aspects have dealt with a short text demands here, and will be developed in a further research text.

Workshops and survey results in the Chrima CINP project (EU programme culture 2007–2013)
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The activities carried out under the project activity of Chrima-cinp, an acronym standing for “Cultural Rupestrian Heritage in circum Mediterranean Area. Common Identity-New Perspective” is described in this paper. It has been financed with funds from the Culture Programme 2007–2013, Budget 2010, Strand 1.1 Multi-annual cooperation projects, Strand 1.2.1 – Cooperation measures. The project responds to the unitary purpose of the invitation Culture 2007–2013: contribute to enhancement of a cultural area shared by Europeans, the development of cooperation between the creators, operators, and cultural institutions of the countries participating in the Programme. The activities have promoted a new interest in the rediscovery of the rupestrian villages that characterize many countries of Europe and of the Mediterranean, populated until the last century, memory of layers tangible and intangible of great interest that is likely to be permanently compromised or destroyed. The project increased the exchange of information between the various Mediterranean countries by producing monographic studies on different sites, publishing new studies of little-known areas, and contributing with new materials at the scientific deepening of topics and at the dissemination of information. The report summarizes the experiences of the workshops carried out in some centers chosen as the site of the work, (Massafra in Italy, Saumur in France, Santorini in Greece and Ortahisar in Turkey). The work summarizes the major activities in the area with drawings and photographs that illustrate the differences and similarities of rupestrian settlements of each region under study.

The Augustean aqueduct in the Phlegraean fields (Naples, Southern Italy)
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Romans built the 96 km long Campanian Augustean Aqueduct to bring fresh water from Southern Italy mountain springs to the densely populated areas of Puteoli and Baiae in the Phlegraean Fields. In the XVI and XIX centuries the ancient aqueduct was investigated in order to restore it to bring water to Naples, with no result. The section after Naples was never seriously investigated. From 2010 we are performing researches about underground hydraulic systems in the Phlegraean Fields. The paper reports about several findings in the area. Up to now, only few hundred meters of aqueduct are documented, out of more than 22 km. However, the little information gained already contributes to the comprehension of a very important ancient settlement area.
Nero’s Oven: ten surveys are not enough
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¹Via Vignati 18, I-20161, Milano, Italy – ²Via Cisterna dell’Olio 5, I-80134, Napoli, Italy

Nero’s Oven is an artificial cave placed in the Municipality of Bacoli (Naples, Southern Italy). A small network of passages leads to an underground pool of hot water. The passages were dug in Roman times as a sweater: hot steam was used to cure several ailments. The place was highly renowned also in medieval to modern times; wealthy foreigners in the “Grand Tour” to Rome and Naples were shown the passages and the hot water. The first printed survey of a cave (1546) is a rough plan sketch of Nero’s Oven passages. Subsequently, several researchers tried to cope with the internal temperature and steam to produce a graphic representation of the cave. The paper reports about the ten known surveys produced between 1546 and 2000 and the information they provide to modern speleological and archaeological research. Some information about the present state of the cave are presented. A modern cave survey has not been produced yet, since the outer rooms are used as a private dwelling.

Research prospects of old mine workings in the Ural mountains
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Mine development in the Ural Mountains (Russia) started 4–3 thousand years B.C. In the XVII–XVIIIth centuries commercial mining began. A lot of mines and adits have been retained till now. These mining old relics are of great interest not only for speleologist, but also for historians, biologists and geologists. On the Western and Eastern slopes of the Urals – copper, iron, gold, asbest, sulphur pyrite, alabaster, coal were extracted. The depth of some excavations reached 300 m and the area of some mine fields – reached 500 km². The total number of developed underground mines of the Urals at the beginning of the XIXth century exceeded 15–20 thousand. Speleologists are only at the very beginning of investigation of this rich region in artificial caves.

Kungsträdgården, a granitic subway station in Stockholm: its ecosystem and speleothems
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At a depth of 30 m, Kungsträdgårdens subway station is the deepest station in Stockholm. It is also one of the few with easily accessible walls that are not covered in concrete, but where the Stockholm granite is exposed. On the granite wall a simple but complete and unique ecosystem has developed since the station was constructed in the mid-1970’s. The constant artificial light is a unique energy source in this subsurface environment and enables the occurrence of microbial communities dependent on photosynthesis with the primary producers being cyanobacteria, several species of diatoms as well as the bryophyte Eucladium verticillatum, not known from other locations in Stockholm. Top predator is the spider Lessertia dentichelis, with its only known population in Sweden. Closely associated with the ecosystem are secondary mineral precipitations forming flowstone, coralloids and small stalactites. The most common mineral is calcium carbonate, but there are also sodium sulfate depositions. A significant proportion of the mineralisations has been mediated by the present microorganisms, especially fungi. Characteristic for the microbial communities on the granite wall is that they appear to give rise to local geochemical conditions that influence microbial diversity, mineral precipitation and mineral dissolution, such as diatom ooze with calcium carbonates or a fungal – cyanobacterial community that might be responsible for speleothem formation.

Unfinished railway tunnel and bunker at Godovič
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To enable better supply of the front line during the First World War, the military command started to build a standardgauge railway line from the main line at Logatec. The project began in April 1917 but in October the front line was pushed far to the west. The railway was no longer needed, so all
work stopped and most structures remained unfinished. After the war, the new border between Italy and Yugoslavia passed close to the unfinished tunnel. Part of the tunnel was transformed into a bunker, one of many within the system of fortifications known as the Alpine Wall. After the Second World War the border moved away and both tunnel and bunker were forgotten and overgrown by forest. Apart from its unusual history, the structure is notable because work on it was halted in mid-construction, with the result that all stages of construction of the tunnel are well preserved.

Recognition of instability features in artificial cavities
Mario Parise
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Instability features may be observed in underground settings, including both natural and artificial caves. Recognition, mapping and documentation of such elements is of crucial importance to understand the likely evolution of the caves in terms of instability, and to evaluate the possibility of a direct involvement of the built-up areas above. Many towns and important communication routes are located in Italy above caves, which makes knowledge of the instability conditions an absolute priority for civil protection issues and land management. The role of cavers in the identification of instability features has been rarely taken into account, and always considered as a minor, often unnecessary, element in the stability assessment. Nevertheless, cavers are the only “eyes” underground, and have the opportunity to document what is really occurring. The present article aims at pointing out this crucial role of cavers, and illustrates some of the most common instability features in underground settings, both related to already occurred failures and to incipient signs of deformations. The issue is dealt with focusing on artificial caves, since these have been in the last decades at the origin of several problems in many towns and rural areas of southern Italy.

Classification of artificial cavities: a first contribution by the UIS commission
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The article represents a contribution by the Commission on Artificial Caves of the Union Internationale de Speleologie (UIS) aimed at defining a general classification of artificial caves. The amount and variety of cavities realized underground by man is extremely high, and cover with variable peculiarities many areas of the world. Nevertheless, it is important to perform an attempt in classifying such great variety, through a classification comprising at least the main categories of observed situations. Starting from the work carried out in past years by the Italian Speleological Society, it is here presented a classification of artificial cavities based upon time and modality of realization, and organized through a typological tree where seven main categories are defined, each one of them in turn subdivided into sub-types. We hope that, referring in the next future to this classification, it will be possible to better organize and describe the works and researches on artificial caves, and compare the situations present in different areas of the world.

An overview of the geological and morphological constraints in the excavation of artificial cavities
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1 Geologist, Campania Speleological Federation, Naples, Italy – 2 National Research Council, IRPI, Via Amendola 122-I

The habit of man to excavate artificial cavities began a very long time ago. Man’s efforts were initially moved by the need to have a safe place to live, to control the surrounding territory, to collect and transport water, to exploit the natural resources. For all these purposes, he had to face a number of geological and morphological constraints that, depending on site characteristics, guided, favored or complicated the excavation. Therefore, all the phases in the “life” of an artificial cavity, from the original idea, to planning and realization, up to its later evolution and possible conservation, depend in some ways on geology and morphology. Lithology of hosting rock is the first aspect to consider: the rock mass must allow hand excavation but, at the same time, it should present physical-mechanical characteristics such to support the newlyformed cavity. The geological and structural setting, including the main faults and the discontinuity systems in the rock mass, have to be particularly taken into account. Choice of the site where to locate an artificial cavity is also dictated by morphology, the morphological factors being, in turn, strictly related to land management and control. When safety reasons were considered to be the main priority, for instance, those sites that apparently were extremely difficult to excavate and to settle in were
chosen. Morphology is also strictly related to slope instability. Several rock settlements situated at the borders of deep valleys and ravines are directly involved in mass movements, due to natural evolution of the slopes and to open cracks produced by the tensional release in the unsupported rock mass. Inside the artificial cavities, in turn, problems of instability may be observed. Locally, these may become so significant to compromise the overall stability of the structure. Slope instability processes deserve a greater attention from cavers and scientists, since their effects might be extremely dangerous for people visiting and working in artificial cavities, and for the cultural heritage therein contained as well. Availability of water resources is a further factor that controlled during historical times the choice of sites for settlements and towns. As a consequence, the hydrogeology plays a crucial role for artificial cavities, and particularly for those works intended to collect and transport water to settlers and inhabitants. Aqueducts, tunnels, fountains are, for the reasons above, very important to study in the context of the geological and hydrogeological setting, considering at the same time the social and historical aspects of the community that designed and realized them. The present contribution is an attempt in categorizing the aforementioned factors that play a role in the realization of artificial cavities. The topic is very wide, covering several interrelated disciplines and field of research, and should deserve to be treated with much greater detail and thoroughness. Our goal is therefore to stimulate with this article cavers and interested scientists in carrying out studies about the crucial role that geology and morphology have in the development of artificial cavities.

The ancient mines of Usseglio (Torino, Italy) multi-year programme of recording, study, preservation and cultural development of the archaeological mining heritage in an Alpine valley
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The programme started in 2001 and developed a large set of operations in order to create a geotopographic and historicalenvironmental database, to rebuild the chronology (relative and absolute) of mining works in the Punta Corna complex (high Arnàs and Servìn valleys) and the extractive activities’ effects on the Usseglio economy and more broadly on Lanzo Valleys economy. The main part of the operations has been conducted directly by the Civic Alpine Museum staff, but in some aspects (such as deciphering medieval documents, mineralogy, petrography, GNSS surveys, aerial photography, restoration of the steel archaeo-mining finds, and so on), a strict co-operation with university teachers and other specialists or qualified technical figures was requested and realized. This open and multi-disciplinary approach will guarantee, also into the future, the best exploration and knowledge of this enormous heritage. According to the experience of the senior archaeologists (responsible to the Civic Alpine Museum), a group of underground experts – mining engineers and speleologists specialized in artificial cavities – will carry out explorations and surveys, to collect precious information connected to the external records.

Safe caves: the distinctive features of hideout complexes in the galilee in the early roman period and parallels in the Judean Lowlands (Shephelah)
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Two types of subterranean chambers found in the Galilee – natural caves at the tops of cliffs ("cliffside shelters") and rock-cut "hideout complexes" – shed light on Jewish defense methods there in the Hellenistic and Early Roman periods. The plans of 65 caves that may have served as hideout complexes are sketched, presented, and compared with hideout complexes in Judea. The subterranean complexes are divided into six categories:
2. Elaborate hideout complexes, hewn with great care and attractively finished and smoothed.
3. Hideout complexes hewn out of rock-cut subterranean chambers that had been used as storage facilities for agricultural products, cisterns, olive presses, or ritual baths.
4. Hideout complexes hewn out of burial caves.
5. Escape crawlways. These are rare, but Josephus describes one used during the siege of Jotapata during the Great Revolt to bring in goods and news.
6. **Subterranean cavities that should not be identified as hideout complexes.** This category includes cavities that some scholars have thought were hideouts but in my opinion are not because they lack the features of hideouts.

**Artificial cavities of Gaziantep (Southeastern Turkey)**
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After the Hagia Sophia and Topkapi Palace of Istanbul (Turkey) underground structures project that we carried out in 2008–2009 as OBRUK Cave Research Group, we began to prepare “Gaziantep Underground Structures Inventory” offered us by Gaziantep Municipality and CEKUL Foundation in November 2011. The aim of this project was to research, document, survey and making an inventory of the entire underground structure heritage which is within the borders of Gaziantep city and disappearing day by day because of the new constructions. It has been long known that Gaziantep, possessing a continuous inhabitation since 3000 BC, has hundreds of underground structures which were carved in sandy limestone. Some of those underground structures were used as storage facilities or cisterns, while some others are as yam ateliers today. Furthermore, despite forming a huge and complex system, underground water structures whose small part can be researched due to destructions are another important phase of that project. This study will provide an assessment of the underground structures, aimed at protecting this cultural heritage. Additionally, it is known that some of the caves dug mostly in soft limestone may collapse. This inventory study will be a reference for the future for preventing such potential hazards. The abovementioned project is basically aimed at detecting, measuring, mapping and studying all underground structures in the old settlement area of Gaziantep, with an Autocad program. Thereby, the relation between all the underground and aboveground structures would not be lost. As a result of the studies carried up to date, 48 artificial caves and water structures have been explored and mapped. The project is planned to be completed by the end of 2013.

**Subterranean “bell-shaped” quarries in the Judean foothills, Israel**
Boaz Zissu
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The paper focuses on bell-shaped underground quarries, which were rock-cut in the soft limestone of the Judean Foothills during the Late Roman, Byzantine and especially the Early Islamic periods. These large and imposing artificial caves, typical to this region, located south-west of Jerusalem, were first described by scholars and explorers who visited the area in the 19th century. They were extremely impressed by the caves and suggested various theories regarding their function: cistern, granaries, dwellings, stables and underground churches. The phenomenon was discussed in a pioneering study, undertaken more than fifty years ago by Y. Ben-Arieh (1962) who explained the function of the subterranean caves as quarries, used for the extraction of the local chalky limestone. In the largest cave-clusters, around Beth Govrin, where the region’s biggest quarries operated, scholars estimate that their total number is over 800. Others estimate their total number in the region as being about 3,000. The aim of this paper is to present and describe the phenomenon according to new archaeological and speleological surveys. The current study focuses, among other issues, on the method of quarrying and on a re-examination of the chronology of the phenomenon, the carving methods, and the use and reuse of the caves.

The ethno-cultural features of man-made caves carved in the neogene pyroclastic formation within the Armenian highland and neighboring areas
Smbat Davtyan
Armenian Speleological Centre

Pyroclastic rocks of the Neogene Period with numerous dugout cave dwellings are widely spread in the Armenian Highland, Iranian and Anatolian plateaus. There are different types of structures in the cave dwellings (rooms for living, churches, monasteries, tombs, household and auxiliary structures, underground paths), which have been created in the Middle Ages by Armenians, Georgians, Byzantines. The same type of rock-cave culture had been developed in the same geological unit by different ethnic formations located hundreds of kilometers far from each other.

**Underground mines in Moscow City**
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Within the modern administrative boundaries of Moscow, there is a significant quantity of abandoned underground mines which were the source of a relatively wide complex of natural resources: mainly limestones and subordinately sandstones, clays, and phosphorites. For that territory, the summary of the underground mines is provided, in accordance with the zoning scheme of speleology in artificial cavities (spelestology).

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