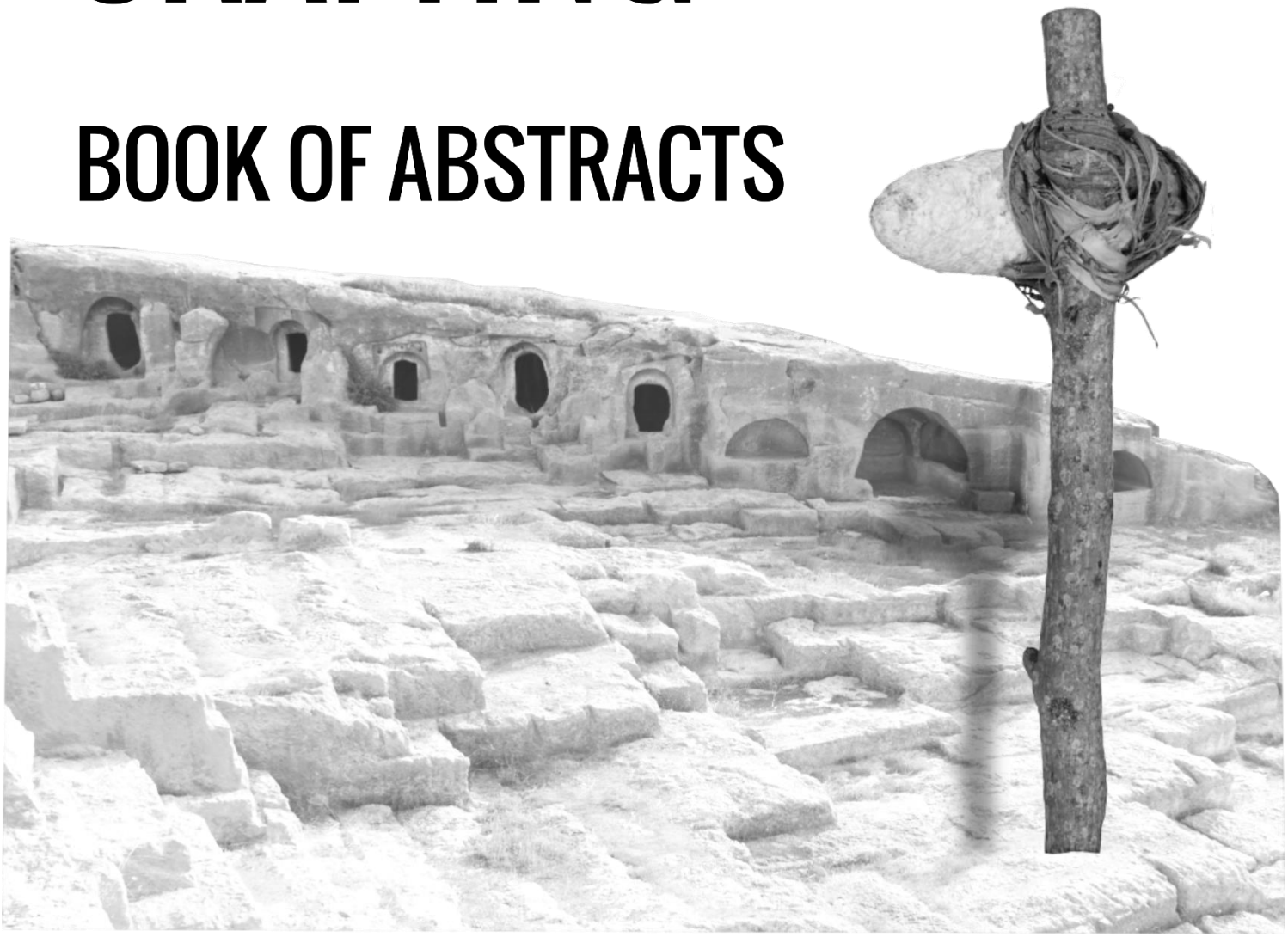
FROM QUARRIES TO ROCK-CUT SITES

ECHOES OF STONE CRAFTING

Online conference
25-26 March 2021

BOOK OF ABSTRACTS



THE CONFERENCE AIMS AT CARRYING ON THE INTERNATIONAL DEBATE ON THE ARCHAEOLOGICAL INVESTIGATION OF ROCK-CUT SPACES AND STONE QUARRIES, CONSIDERED AS ASPECTS OF THE SAME MINING PHENOMENON: PLACES IN WHICH SPECIFIC EMPIRICAL AND HANDCRAFTED KNOWLEDGE RELATED TO STONE WORKING IS EXPRESSED AND CONVEYED.

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CONFERENCE PROGRAMME

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KEYNOTE 1

The Historical and Archaeological Study of the Site of Lalibela and its Challenges

Marie-Laure **DERAT** – Centre National pour la Recherche Scientifique, UMR Orient et Méditerranée

The site of Lalibela, a complex of 11 rock-hewn churches carved into scoriaceous basalt, has long been perceived as a unique project carried out in a single movement, and the site has been considered the capital of the Christian kingdom of Ethiopia between the 11th and 13th centuries. Given the symbolic importance of this site for Ethiopian history, resuming its study in an attempt to re-contextualize it historically was therefore a necessity, but also a task fraught with many difficulties. Few texts bear witness to the site's history, especially during the most ancient periods, and many archaeological traces have been erased during phases of improvement and restoration work, both taking place until very recently. The research project on Lalibela, which involves a team of historians, archaeologists, liturgists, stonemasons etc., is an attempt to multiply approaches to reconstruct the history of this complex and understand its evolution. The presentation will seek to expose these readings and the dialogue between them, making up the team's initial results after ten years of research.

Among the questions we have tried to answer, the first is that of chronology: are the spaces all contemporary, or did they undergo successive transformations? Beyond a relative chronology of excavations and developments, how can we place in time the various interventions at the site, and how can we link events recorded in the texts with developments at the site? The whole issue of crossing disciplinary boundaries and cross-match approaches underlies these questions.

Work carried out at Lalibela since 2009 has highlighted the site's multi-phased nature and has underscored the implementation of new projects that collide with previous ones and sometimes attempt to restore unity to the whole. They have also emphasized the very strong constraints exerted by the rock material, which have forced the resumption of improvements, resizing, and evacuation to ensure maintenance at a site that was continuously occupied. The study of the rock monuments themselves, based on the analysis of traces of tool (through the reading of anomalies and superimpositions on the walls, in courtyards, on facades, and of architectural choices made) is key to writing the site's history; yet extracting oneself from these rock monuments and taking an interest in the sizeable deposits of waste and the history of excavated material is also a way to begin research on the links between the monuments and daily occupation, and to try to return some life to the society underlying these rock-hewing practices.

Beta Marqorewos, church on the site of Lalibela. Remains of pillars supporting a completely collapsed rock-cut arch.

Qualifications of Craftsmen who Dug Souterrains in France (10th-16th Centuries) – Preliminary Results

Luc **STEVENS** – Société française d'étude des souterrains

In France, more than thousand man-made caves known as *souterrains* were dug between the 10th and 16th centuries to allow members of a community to live temporarily underground. They are composed of various galleries, from which living spaces of one or more rooms project; these are intended to be settled by members of the community. We therefore find in these *souterrains* both utility structures (water wells, springs, ventilation pipes, granaries, niches, stone benches) and defensive amenities (wooden doors, narrow passages, loopholes and trap wells).

Very little is known about the men and women who contributed to digging *souterrains* in France. Differences in their degree of sophistication suggest that the craftsmen who created refuges under peasant settlements were not the same as those who were constructing under fortresses. In addition, an analysis of the plans of the *souterrains* shows that many of them have similar designs, replicated either locally or on a larger scale. Such repetition at the regional level seems to indicate a transmission of know-how among workers, or at least some norms or standards of design.

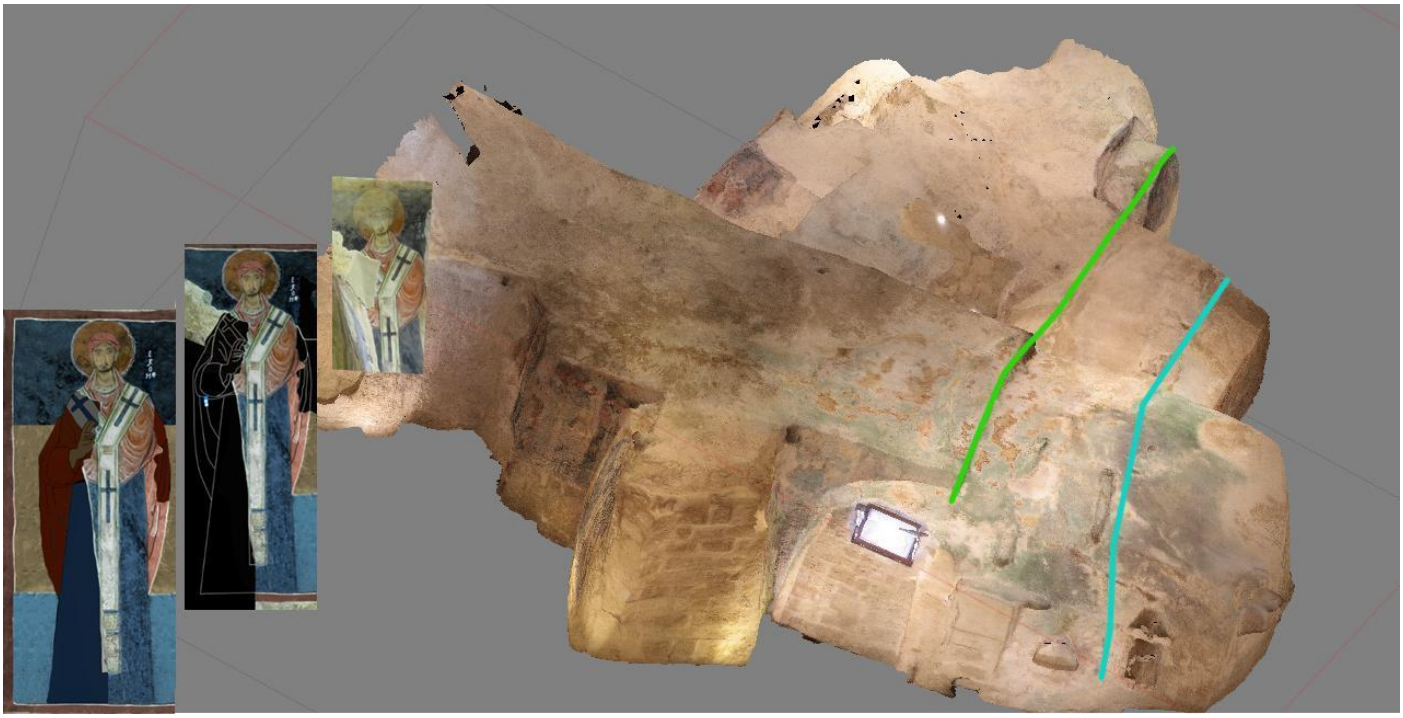
The literature relevant to these *souterrains* and, in particular, to their excavation and hewing does not provide many details on the tools used to dig, and generally refers to implements used by quarrymen. The use of quarrying tools (mainly the pickaxe and the *polka*) and techniques is demonstrated by tool marks found on the walls, which are comparable to those found in quarries. Some recent findings, however, let one imagine that tools used to dig *souterrains* may have been made according to patterns different from traditional quarrying tools. One should also ask whether the use of tools different from those used in quarries could be related to the different qualifications of workers. However, we have not found evidence allowing us confirming such a hypothesis.

Tool marks in the souterrain of Cardonnet (Lot-et-Garonne) © L. Stevens

The Vertical Stratigraphy in Rock-cut Complexes: The Case of the Church of S. Giovanni in Monterrone in Matera.

Francesca **SOGLIANI** – Università degli Studi della Basilicata.
Brunella **GARGIULO** – Università degli Studi della Basilicata

This paper describes the first results of a project that integrates the vertical stratigraphic analysis of rock cavities with VR technologies used for virtual restoration. The case study chosen is one of the symbolic places of the city of Matera, the church of S. Giovanni in Monterrone, built between the 11th and 12th centuries in the Rione Sassi, at the top of the cliff that stands in the centre of the Sasso Caveoso. A fundamental prerequisite for the virtual restoration of a monument was the analysis of its constitutive elements, the stratigraphic succession of anthropic actions of architectural or artistic nature (from signs of workmanship and quarrying to the frescoes), and their stratigraphic relationship with the walls. To obtain a diachronic rendering of the building using 3D models, it was necessary to map all anthropic activities and try to develop interpretative models based exclusively on the stratigraphic relationships between the elements and on the creation of a repository of protocols, also to be applied on other rock complexes. The stratigraphic reading of the masonry walls in rock-cut domestic settlements can rely on a tradition of studies. Although recent, these studies are already attempting to understand "negative" architecture as the result of coherent planning and as an expression of culture and knowledge consolidated over time. The forms of rock-cut settlement are now considered a complex architectural expression; they are the result of technical and artistic knowledge, and of the needs of those who created them. Their study must therefore follow a multidisciplinary approach connecting them to the landscape, the roads, productive activities and everything that relates to material culture. The careful and systematic reading of anthropogenic evidence, namely incisions, signs, cuts, indentations (even if in the negative), are therefore essential to be able to ascertain the intended use of these cavities, which were intended not only for hermit settlement and, more generally, as sacred spaces, but were also the expression of real living forms.



Giovanni in Monterrone church, Matera. Photogrammetry, 3d reconstruction and virtual restoration © Darhem project

Being Left-handed and Ambidextrous in Rock-hewn Church Worksites Over Time: Methodological Reflections

Anaïs **LAMESA** – Centre français des études éthiopiennes

The main aim of this paper is to challenge my methodology. Combining archaeology, anthropology, and history, I study the rock-hewn worksites of Medieval rock-cut churches, i.e. churches dug directly into the rock. By reading tool marks (traceology), analysing texts and carrying out field surveys in Ethiopia, I was able to formulate hypotheses on the status of amateur stonemasons and the organization of teams of workers. But can this reflective process be taken further? Can the place of left-handed stone workers at a rock-hewn worksite in Medieval times be reconstructed? What are the limits of such an approach? Can this question even be asked?

Carving with the left hand is a fundamental technical and economic issue at rock-hewn worksites. Thanks to the study of tool marks, it is possible to confirm the presence of stonemasons using their left hand to carve the bedrock and transform it into a church in Medieval times.

However, being left-handed in Ethiopia is currently perceived negatively. Eating and giving an object with the left hand are considered coarse behaviour, which refers to codified social relationships rooted in religious and pseudo-scientific knowledge. Visiting rock-cut church worksites in Ethiopia allowed me to appreciate a paradox: the left-handed worker is both encouraged in his practice of stonecutting with his left hand and constrained in his social relations.
Applying the method defined above, the relevance of this apparent paradox will be discussed for the Medieval period.

Stoneworker in action, Church of Miḥilä Abunä Samu'el Hatsät, Ethiopia © A. Lamesa

The Technique of Extracting Building Stone by "*Stone-walling and Back-filling*" in Paris: An Innovation of the Late Middle Ages

Jean-Pierre **GÉLY** –Laboratoire de Médiévistique occidentale de Paris (CNRS/Paris 1)
Marc **VIRÉ** – Laboratoire de Médiévistique occidentale de Paris (CNRS/Paris 1)

Paris stone was quarried at the gates of the city, in underground quarries where limestone beds are quite thick. These quarries were accessible by numerous shafts, which appear on old city maps. This material was therefore quite expensive to extract. In contrast, Oise stone was easy to obtain, because the bedrock was very thick and efficient river transport on the Oise and Seine rivers was available. Although transported by boat over a distance of 120 kilometers, Oise stone competed with Paris stone.

That said, from the 15th century onwards, the trade in building stone in Paris gradually became a competitive market. This is why Parisians changed their 'room and pillar' method of extraction and adopted 'stone-walling and back-filling' in the first half of the 16th century. This new extraction technique made it possible to collect from underground quarries all of the best quality hard stone, known as liais and cliquart. To mine stone meant for construction, the quarry roof was supported by quarry cuttings and small pillars hewn by human muscle: these are known as "arm pillars". This technique had another economic advantage: it allowed Parisian quarrymen to mainly produce hard stone blocks of liais and cliquart, which were of great commercial value. Production was thus maximized with this new extraction technique, which enabled the exploitation of 100% of the limestone mass.

This remarkable specialization was an adaptation to an increasingly competitive stone market, but was also a consequence of new practices in stone building, which abided by the rules of construction of Renaissance architects.

Stone-walling and back-filling extraction in underground quarry at Bazemont (Yvelines) © J.-P. Gély

Stonework on the Mvanda Site in Haut-Nyong (East Cameroon): Lithic Remains and Rock Transformation Techniques

Fernando **LINGUE ENGAMBA** – Université de Ngaoundéré

For several centuries, a particular carving technique was applied to stone in order to manufacture objects, weapons and tools. Traces of this activity found at the site of Mvanda in the Haut-Nyong district in East Cameroon reflect endogenous know-how adapted to both a rocky environment and the needs of the population. According to analyses and to the archaeological methods applied, the remains have contributed much unpublished information on the regional past, relevant to the environment and to knowledge in stonecutting techniques. The site of Mvanda possesses true archaeological potential, and much there remains to be explored and mined. A preliminary analysis of available material data is the main focus of this introductory study.

View of the Mvanda cave © F. Ligue Engamba

First Reflections on the Structural Analysis of Rock-hewn Caves in Lalibela's Landscape, Ethiopia (First Results of the Surveys)

Manon **ROUTHIAU** – TRACES, University of Toulouse (UMR 5608) and CNRS – Orient and Mediterranean (UMR 8167)

The Lalibela area is mainly known for the rock-hewn churches located at the eponymous site and in the surrounding mountains. Several other rupestrian structures, potentially meant for settlement, have nevertheless also been identified by recent work carried out by a Franco-Ethiopian team led by M.-L. Derat and C. Bosc-Tiessé (CNRS). These cavities (also known as *wāšā*), revealed by a number of surveys in the field, generated a PhD research that began in October 2019, whose aim is to understand and interpret these rupestrian remains in Lalibela's landscape. Barely mentioned in the literature, the sites are only known thanks to extensive data acquisition work in the field. Located on the Ethiopian highlands, they benefit from a lithological and geomorphological environment that was favourable to settlement construction.
This paper aims to share initial thoughts and open a dialogue on the issue of these rock-hewn spaces in northern Ethiopia. In addition to carrying out a spatial analysis of these sites, a structural approach is also attempted to enable a better understanding of the sites themselves, but also to grasp implementation techniques and detail the various tools used. The aim of these initial thoughts is to highlight the common points and constraints of the sites in their respective environments. A focus on the 'anthropization' of techniques and their approach and understanding will be proposed at the end of this paper. The intervention will also allow opening a dialogue on methodology and difficulties encountered in the study of these structures.

Gannata Māryām, site n°2 © M. Routhiau

THEORETICAL AND METHODOLOGICAL CHALLENGES IN THE ARCHAEOLOGY OF QUARRIES

The Millstone Quarry of Piédrola (Alcázar de San Juan, Spain)

Víctor Manuel **LÓPEZ-MENCHERO BENDICHO** – University of Castilla-La Mancha
Ángel Javier **CÁRDENAS MARTÍN-BUITRAGO** – University of Castilla-La Mancha
Ángel **MARCHANTE ORTEGA** – University of Castilla-La Mancha
Jorge **ONRUBIA PINTADO** – University of Castilla-La Mancha

In 2013, at the archaeological site of Piédrola (Alcázar de San Juan, Castilla-La Mancha, Spain), a research group from the University of Castilla-La Mancha began fieldwork focusing on the documentation of a large Medieval and post-Medieval millstone quarry site extending over more than 15 hectares. Research at this site focused on combining various documentation techniques, which included intensive survey, ground and aerial photogrammetry, drone flights, petrographic and geochemical characterization of rock outcrops using X-ray fluorescence (XRF) and archaeological excavation. All these data were integrated into a Geographic Information System (GIS) that made possible the generation of a catalogue of standardized files that includes all the characteristics, measurements, appearance and location of each of the 160 millstones found during survey work.
In addition, various extraction systems were documented, these varying according to the characteristics of the bedrock and the chronology of use in each area of the quarry. These systems range from direct extractive methods through the carving of grinding millstones directly on the bedrock, to indirect extraction through the cutting of large quadrangular blocks on long rectilinear fronts on which, once extracted, the circular pieces were carved. The main documented extraction method is the indirect one. Quadrangular blocks were extracted from the bedrock by using iron wedges inserted in previously-made wedge pits, to be separated later by means of large levers. This method made it possible to produce monolithic millstones, the disadvantage being that a huge amount of *débitage* and carving waste was produced. Moreover, particularly during the first phase of exploitation of the outcrops, direct extraction was used; circular grooves in the rock that deepen and separate at the base were carved, the end-product being a circular slab, to be refined in later phases of work.

Uncovered pot and wedges © A.J. Cárdenas Martín-Buitrago

What to Expect When You're Documenting and Excavating a Roman Quarry – Monte Del Vescovo, Istria, Croatia

Katarina **ŠPREM** – Juraj Dobrila University of Pula

The Istrian peninsula, in the westernmost part of Croatia, has much high-quality limestone of Jurassic, Cretaceous and Paleogene age. This limestone was used for various purposes in Antiquity, and several Roman quarry sites are known, located mostly on the southern and western coastline. One of these quarries is Monte del Vescovo, which was documented and excavated in 2020. Roman quarries can be recognized by analysing traces of tools left on quarry walls, as well as *pašarini* (an expression in Croatian dialect describing channels used to detach a stone block of desired dimensions). We will present the process of surveying and discovering the quarry, as well as subsequent documentation, excavation, and interpretation of its use by analysing traces of tools.

Monte del Vescovo quarry © K. Šprem

When Quarry Waste Explains Tool Marks

Daniel **MORLEGHEM** – UMR 7324 Citeres-LAT

The study of quarries is often limited to the observation of clear and accessible faces and ceilings. Extraction and cutting waste, which represent up to 70 % of the volume of exploited rock, is rarely excavated, the undertaking being a tedious one because the results are perceived as very poor (redundancy of technical data, no or few artefacts, etc.). However, their meticulous excavation and analysis has not only brought to light new faces and floors, but has also provided valuable information on the organization of work inside the quarry, for instance on the management of quarry waste or the spatial distribution of activities and flows.
The recent comprehensive excavation of the early Medieval quarry for sarcophagi at Pied Griffé (Saint-Pierre-de-Maillé, France) has thus highlighted the importance and impact of waste management on the quarry's development, and sometimes even on the implementation of extraction techniques and methods. The stratigraphic reading of the waste deposit, cross-analysed with that of the faces, has in many cases made it possible, particularly in the absence of contact or overlap between the block scars, to establish with a measure of confidence the relative chronology of extraction. Several storage strategies were identified: simple rear or side dumping, depositing behind retaining walls, reuse of materials to construct ramps, etc. The presence of waste at the base of the working face sometimes forced quarrymen to dig sloping notches in the ground (depending on the slope of the waste), resulting in a characteristic convex detachment surface. The location and construction method of dry-stone walls is evidence of long-term planning, with storage of the blocks later reused, and of the arrangement of a well-cleared work area located at the foot of the face.

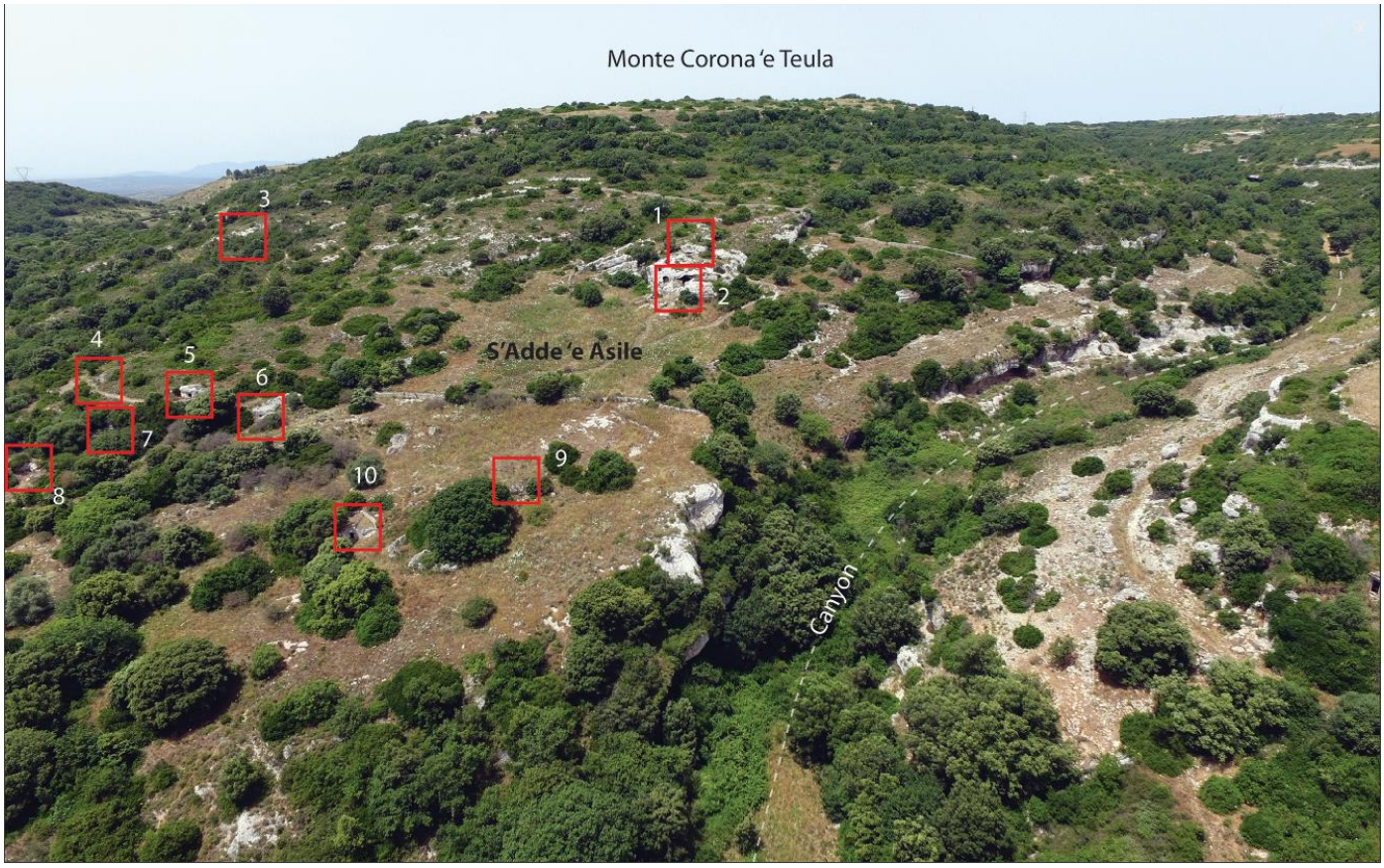
General view of the F.23 and F.29 walls and extraction embankments inside the quarry of Pied Griffé © D. Morleghem

KEYNOTE 2

How do Rock-cut Architectures Relate With their Environment? The Example of Prehistoric Rock-cut Tombs in Ossi, Sardinia (Italy)

Guillaume **ROBIN** – University of Edinburgh

Unlike material-built architectures, rock-cut architectures rely on the availability and suitability of natural outcropping rock faces in the landscape. This natural determinism imposes a direct, intimate relationship between rock-cut spaces and their physical environment. However, is it possible to identify cultural motivations which, beyond natural factors, influenced the locational choices of the architectures in the past, and their orientation in the landscape? This keynote will discuss the example of prehistoric rock-cut tombs in the island of Sardinia (Italy). These underground chambered tombs were used for collective burials between the Middle Neolithic up to the Middle Bronze Age (c. 4400 to 1300 BC). They often present complex architectural layouts, with multiple chambers, as well as wall paintings and carved motifs. Based on recent fieldwork carried out in Ossi (northwest Sardinia), this presentation will discuss the topographic and visual relationships between rock-cut tombs and settlements, and how they may reflect social interactions between the living and the dead in prehistoric Sardinia.



Aerial view of the rock-cut tomb cemetery of S'Adde 'e Asile in Ossi, Sardinia. Drone photograph © G. Robin

CARVED SITES AND CARVED LANDSCAPES

Know-how and Technical Environment: Rethinking through Technical Study the Emergence of Rock-cut Tombs in the Neolithic Mediterranean

Marie-Elise **PORQUEDDU** – Universidad Autónoma Madrid

Rock-cut tombs are a widespread type of funerary architecture in the Mediterranean during the Neolithic period. They appeared as early as the 5th millennium BC, in southern Italy and Sardinia, before developing throughout the western Mediterranean during the 4th and 3rd millennia BC. The history of studies on rock-cut tombs is marked by different theories concerning the appearance and diffusion of this architecture, which was for a long time seen through the prism of trans-cultural diffusionism and interventionism. The indigenous and local appearance of rock-cut tombs in various regions of the Mediterranean is today commonly accepted as fact.

This paper is part of research perspectives on carving techniques, know-how and the *chaîne opératoire* of rock-cut tombs, an aspect rarely addressed in studies on these categories of underground architecture. The comparative study of the *chaîne opératoire* of carving allows us to review the diffusion and emergence of these structures, not only via architecture and material culture, but also through the prism of the human knowledge involved in their creation. Human groups who were responsible for carving these rock-cut tombs shared specific know-how, the acquisition of which can be perceived as originating not only from external contacts, but also from other spheres of the life of these communities (notably, the economic field, with the extraction of raw materials). The issues addressed in this paper relate to the interdependence between the economic and the funerary worlds, as well as to the implementation of technical environments, and ultimately allow us to question the emergence of specific types of funerary architecture, such as rock-cut tombs.

Museddu Necropolis © M. Bailly

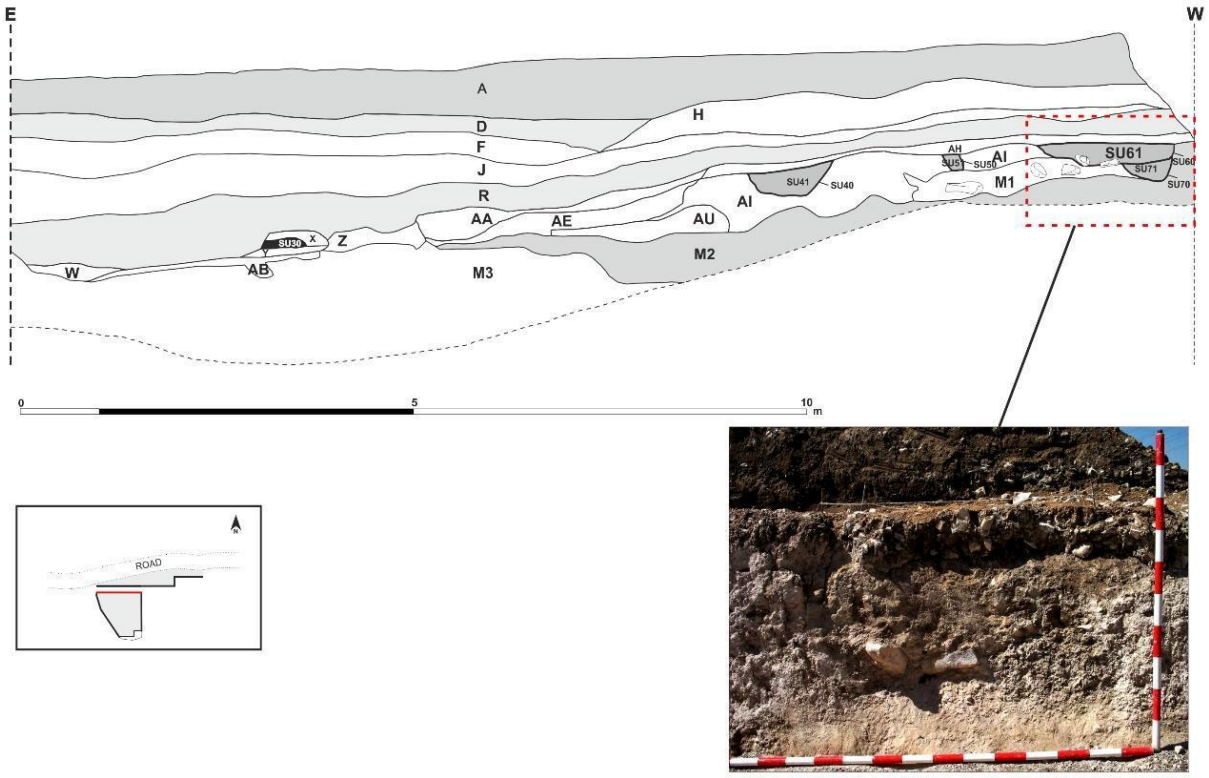
Middle Palaeolithic Flint Extraction at Casa Montero (Madrid, Spain)

Nuria **CASTAÑEDA** – Universidad Autónoma Madrid
Susana **CONSUEGRA** – History Institute, Spanish National Research Council (CSIC)
Javier **BAENA** – Universidad Autónoma Madrid
Pedro **DÍAZ-DEL-RÍO** – History Institute, Spanish National Research Council (CSIC)

Casa Montero is a well-known Early Neolithic flint mine (c. 5300 cal. BCE), located in the centre of the Iberian Peninsula. With over 3700 documented shafts, it is the earliest evidence of deep mining in the western Mediterranean. The first on-site documented evidence of human activity, however, dates from the Middle Palaeolithic, and results were obtained by open-area excavation of the deep and stratified north-eastern sector. Despite the fact that the region has one of the most extensive and abundant siliceous formations in the Iberian Peninsula, the quarrying and gathering of flint nodules from the Palaeolithic era were not documented until very recently.

At Casa Montero, the excavation allowed the recovery of an exceptionally well-preserved layer containing the remains of flint industry associated with several combustion structures. In parallel, but stratigraphically unrelated, was a layer providing the earliest evidence of flint extraction and exploitation on what was once the surface of Casa Montero (Fig 1). The sequence suggests that it was possibly the erosion of a stream that exposed the flint nodules and made them accessible.

This paper describes the archaeological evidence for Middle Palaeolithic flint extraction and explores probable reasons why this location rich in flint remained unexploited until the Early Neolithic.



Casa Montero Pleistocene site 1 (CMP1) profile number 8 (E-W) stratigraphic sequence. Geological strata are named with letters, anthropical levels are stratigraphic units (SU) with numbers. SU 60 and 70 are excavations for flint nodules. Drawing © N. Castañeda; photograph © M. Capote.

A Study of Quartzite Quarries in Egypt

Daniela **GALAZZO** – Université Paris-Sorbonne

Sedimentary quartzite is a sandstone made up of grains of sand well cemented by quartz during the process of transformation into silicates. It is characterized by its texture: it is one of the hardest rocks worked by the ancient Egyptians. The main extraction sites were : the Gebel el-Ahmar, in the north-eastern suburb of Cairo; Gebel Tingar and Gebel Goulab, west of Elephantine Island, in Aswan; Wadi Abou Aggag, on the east bank of the Nile, a little north of Aswan.
Although these quarries began to be exploited as early as the Old Kingdom (2592-2118 BCE), they were mainly active between the New Kingdom (1539-1076 BCE) and the Roman period (30 BCE-395 CE). These quarries (for instance Gebel el-Ahmar) are today under threat because of urban expansion and modern extractions developing on their margins.
According to their use in Antiquity, the quarries can be divided into four main categories: those for prehistoric tools, for utility stones, for ornamental stones and, finally, for building materials.
We can simplify the description of the process from the extraction of the rock to the manufacturing of its final product, by mentioning three main stages:
1) Extraction from the bed of rock resulting in a more or less rough stone block;
2) Reduction of the stone block into a rough state, from which the final object is to be shaped;
3) Transformation of the blank into a semi-finished and then finished product.
Stone tools, particularly hammers ("pounders"), were used for the extraction of hard stones like quartzite.
The choice of the extraction site depends on several variables: a good quality of stone to be extracted; steep walls to be used as a “mass front” for the exploitation of usable rock beds; a location near the destination site and close to the Nile, in order to reduce problems of transportation.

Top: Slipway (quarry road) in the silicified sandstone quarry on Gebel Goulab (New Kingdom)
Insert : another slipway in the same quarry © Harrell, J. A. and P. Storemyr. 2009. Ancient Egyptian quarries – an illustrated overview. In N. Abu Jaber, E. G. Bloxam, P. Degryse and T. Heldal (eds.), QuarryScapes: Ancient Stone Quarry Landscapes in the Eastern Mediterranean, p. 28. Norwegian Geological Survey of Norway, Special Publication no. 12

Stone Extraction in Northwest Arabia, from the Iron Age to the Early 20th Century. New Insights from Dadan (Saudi Arabia)

Thierry **GRÉGOR** – Université de Poitiers
Jérôme **ROHMER** – Centre national pour la recherche scientifique, UMR Orient et Méditerranée
A. **ALSUHAIBANI** – Royal Commission for AlUla

The Iron Age site of Dadan in north-west Arabia lies in the valley of al-'Ula, at the heart of the Hejaz range. During the first millennium BCE, it was a major political centre, as well as an important trade hub on the 'incense road' linking South Arabia with Egypt, the Levant and Mesopotamia. Since 2019, a new Saudi-French archaeological project, combining excavations and field survey, has been exploring this site. As part of this project, a study of quarrying and stonecutting techniques began in February/March 2020.
The site includes a large tell *c.* 8 ha in surface, located at the foot of a sandstone massif forming a spectacular 100 to 200 m high cliff. Both the cliff and the massif's interior revealed many traces of extraction spanning more than 3 millennia, from the Iron Age to the early 20th century (as shown by traces of extraction using explosives). A wide array of extraction techniques were recognized (conch, vertical, underground, extensive), and many spectacular rock-cut features were recorded.
The study, undertaken in 2020, deals with extraction on several scales and from different perspectives. A detailed analysis of visible extraction traces made it possible to draw comparisons between the various sites/quarries, and investigate their relative or absolute chronology. By comparing the quarries with excavated architectural remains, it was also possible to shed light on the whole work process, from the extraction of stones to their use in construction – and even their reuse, either at the site itself or in the neighbouring Islamic "old town" of al-'Ula.

Site of Dadan next to the oasis, excavation site and quarries © Dadan Archaeological Project

The Hand, the Mind, and the Stone: Technical Tendencies and the Development of Collective Know-how in Stone Extraction Procedures

Claudia **SCIUTO** – Università di Pisa

Since it was first introduced by Mauss and Leroi-Gourhan, the theorization of technical tendencies was conceived as an empirical bridge between the development of human cultural trends and the environment. The accurate categorization of the material marks left by consistent gestures has become particularly useful in the study of quarry fronts, as shown by J.-C. Bessac, whose pioneering work supplied researchers with a broad vocabulary for recognising and interpreting the operational sequence (*chaîne opératoire*) followed by quarrymen. Traces of stone-working left on the rocky surface contribute information on the various scales of stone craftsmanship: from the specific process needed for detaching a single block to the general organization of labour at the site. Moreover, tool marks can show how the specialization of extraction procedures may also be driven by the nature of the stone itself. As Tim Ingold has pointed out, the agency of the rock itself should be questioned when reconstructing the *chaîne opératoire* required for creating stone blocks (Ingold 2013. *Making Anthropology, Archaeology, Art and Architecture*).
The interpretation of tool marks should be considered while reconstructing the hands and minds of quarrymen and the affordances of the stone (Gosden and Malafouris. 2015. *Process Archaeology (P-Arch)*). Broader theoretical thought on the cognitive development and transmission of techniques can be applied to the material evidence of different quarrying strategies, the construction of specific 'taskscapes', and the crystallization of assignments in the socio-cultural context. Examples will be drawn from case studies in the north western sector of Tuscany, Italy, with reference to Roman quarry sites and ethnographic evidence from the marble quarrying district near Carrara.

Sandstone quarries, Calafuria, Italy © C. Sciuto

Underground and Open-pit Quarries in Polignano a Mare (Italy): A Preliminary Investigation

Germano **GERMANÒ** – Università degli Studi di Bari

Quarry sites are of fundamental importance in understanding historical, geographical and environmental context, and as such are of great value to archaeological research. All over Apulian territory in southern Italy, many sites stand out in the landscape, all showing a characteristic stepped shape. Their study has often been neglected, despite the fact that they are of great multidisciplinary interest. This preliminary study examines the unpublished case of one of the largest known quarries, near Polignano a Mare, a few metres from the sea; its transformation not only affected the rock faces but also resulted in the excavation of immense hypogeal spaces, which have pierced the rocky vein for hundreds of metres, creating suggestive environments whose anthropic occupation should also be clarified: in addition to providing construction material, the quarry may have been a shelter during the war.

The investigation aims to understand its establishment and use, the reasons behind the choice of this site and its extension, and the identification of general metrological data. On the surface, marks left on the ground by the passage of carts, perhaps for the transport of extracted material, have also shed light on the entire production cycle, from extraction to transport.

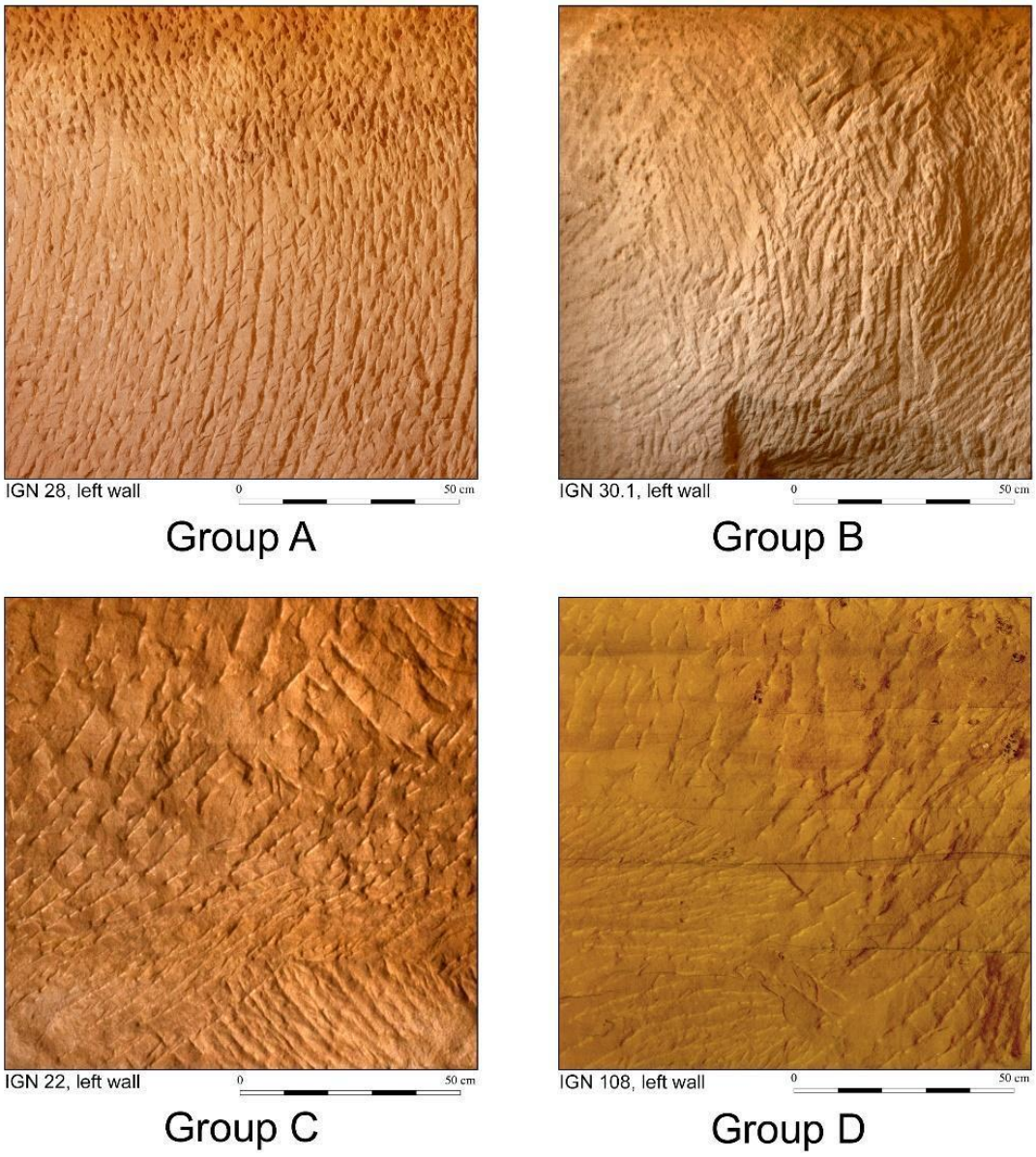
Cava of Pozzo Vivo © G. Germanò

ROCK-CUT SITES AND QUARRIES: CRAFTS AND SOCIETIES

The Alleged Pre-Nabataean Chambers at Hegra

Paul **PEIGNOT** – Université Paris-Panthéon Sorbonne

The ancient Arabian cities of Hegra and Dadan are two urban sites located near each other in the Saudi region of the Hejaz, in the west part of the country. These two archaeological sites are well-known for their necropolises, made by digging and carving the cliffs located near residential areas. The majority of the remains of Hegra are Nabataean, but the site also includes Lihyanite and Roman inscriptions. Dadan's remains are supposed to be Lihyanite only. In early 2020, the issue of the date of a particular category of tombs from Hegra, which was still pending, was tackled by comparing the stone-cutting techniques used in the tombs at Hegra with those at Dadan. This study, which includes a systematic photogrammetric survey, revealed four main different cutting techniques. One of those was used at both Dadan and at Hegra; this fact suggests that these tombs at Hegra are likely to be earlier than the other tombs at the same site. It is difficult to be more precise for the moment, and the inner structures of Hegra's tombs are still different from those of Dadan.



Ortho-photographs illustrating the cutting techniques of each group © P. Peignot

Theorising Ancient Quarries: How Far Have We Come?

Christopher J. **LYES** –Jesus College, School of Archaeology, University of Oxford

> There is a damaging and self-defeating assumption that theory is necessarily the elite language of the socially and culturally privileged . . . the Olympian realms of what is mistakenly labelled 'pure theory' are assumed to be eternally insulated from the historical exigencies and tragedies of the wretched of the earth.
>
> (Bhabha, HK. 1994, *The Location of Culture*)

Theoretical discourses are well-established within academic archaeology, yet less so within the study of marble and other stones in antiquity. For those who practice a theoretically-integrated form of archaeology there is a danger that we may see ourselves as the sole 'creators and practitioners of theory?' By what right do we proclaim ourselves so? Do insights such as Bhabha's, clue us in to what might be the chief pitfall, and cause of stagnation, of all theoretical discourse—its perceived ´elitism?

Can, then, a case be made that theoretical approaches have failed to develop a vertical integration with those who practice primarily in the field? An echo, perhaps, of CW Mills' distinction between grand theory and abstract empiricism, where the first ignores real-world problems in favour of abstract theoretical models, and the second focuses exclusively on method and data?

This paper will explore these questions through the lens of a single sub-discipline— the study of the quarrying and use of marble and other stones in antiquity. We will consider the state of this field, exploring where academic interest is being targeted and how far theory has penetrated. We shall also ask ourselves whether we need to work harder to integrate with those working at the quarry-face to avoid the prevalence of small-scale studies that remain isolated from their larger context. Subsequently, we will explore how, in this specific field, we might begin to make this transition and whether this approach can be extrapolated to other fields of archaeological enquiry.

"This is how they did it!" The owner of the Fossacava Roman Quarry at Carrara demonstrating the Roman trench cut technique

The Evolution of Negative Architectures: Two Cases from Orte (VT, Italy)

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Elisabetta **DE MINICIS** – Università degli Studi della Tuscia
Matteo **ZAGAROLA** – Università degli Studi della Tuscia
Letizia **TESSICINI** – Università degli Studi della Tuscia

Orte is a city that has been occupied continuously, resulting in an overlap of settlement phases over a historically and archaeologically documented period of more than 300 years. As in most centres of Southern Etruria, the soil's peculiar volcanic formation has facilitated the exploitation of the tuffaceous bank in the construction of numerous examples of "negative architecture", with various uses. Inside the cliff that houses the town, in fact, water channel systems, houses and productive structures were carved and built, creating what can be defined as a "city under the city". Similar situations were identified on the plateaux next to the town, where human presence is documented as from the protohistoric era. This paper analyses the evolution of two rock complexes, one urban and the other rural. The first is a rupestrian dovecote connected to the ancient city's aqueduct, while the other, located on the San Bernardino hill, is a portion of the Etruscan necropolis of same name. These environments had similar 'second lives', i.e. moments in Medieval and post-Medieval times when the caves were used as a quarry front to meet the city's building requirements. The interventions that modified these structures' use can be read in the negative stratigraphies, as well as in the traces of excavation that nowadays allow scholars to reappraise the different life stages of the complexes.

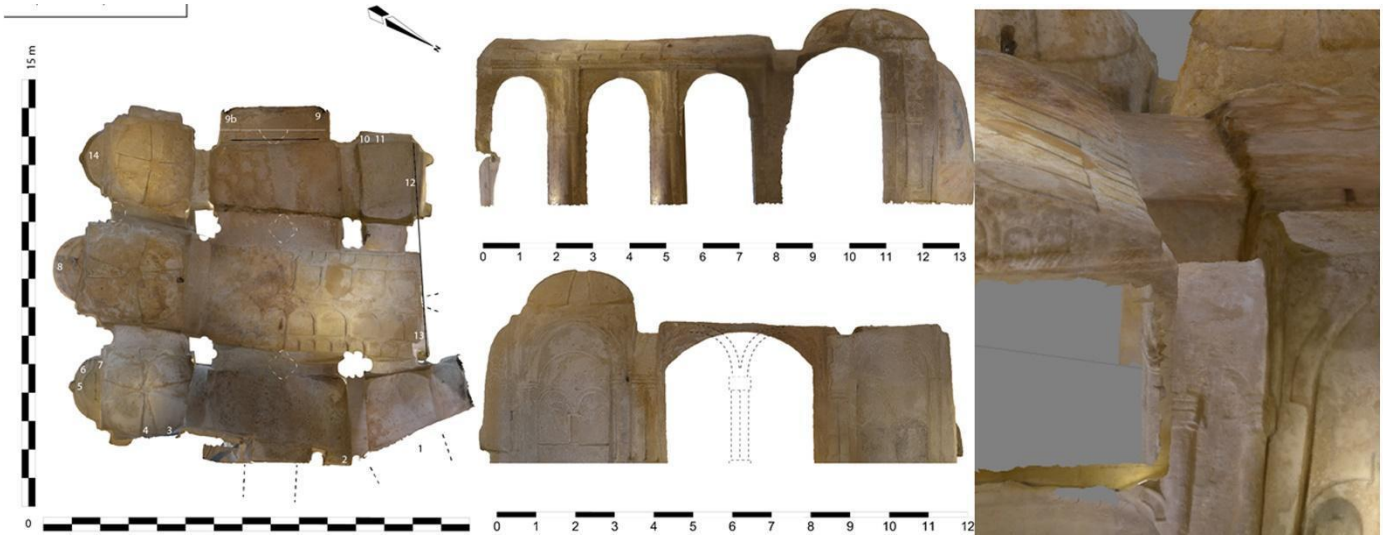
Quarry of Orte © G. Pastura

KEYNOTE 3

The DARHEM Project - Digital Atlas of Rupestrian Heritage of Matera

Francesca **SOGLIANI** – Università degli Studi della Basilicata

The peculiar settlement of rupestrian Matera and its surrounding area are now well dated to a period between the early and the late Middle Ages. Continuous use of rock-cut sites, with various re-occupation phases in the same locations right up to the modern age, has been studied mainly with a focus on spaces intended for worship, for instance churches and monastic complexes. Most recent research has dealt with the analysis of so-called "negative architecture" in a broader perspective encompassing the different forms and functions of rock-cut settlements, and applying a complex interpretative key, meant to better define and refine typologies and chronologies. The Darhem/Digital Atlas of Rupestrian Heritage of Matera project (CHORA Project - Laboratories of Archeology in Basilicata, Dir. F. Sogliani) is meant to investigate rock-cut churches, with the assistance of innovative methodologies for documentation and analysis. In this contribution, we wish to focus on the rich repertoire of architectural decoration which, whether or not associated with the frescoes, serves to outline the liturgical spaces in rock-cut churches. Crosses, pilasters, mouldings, capitals, and elements of the iconostasis, all represent the stonecutting craftsmen's intention to reproduce the bi-dimensional internal decoration of churches, and constitute the most significant evidence of the simulation and imitation of activities carried out by more or less specialized craftsmen. They are also the trace of technological knowledge, references to decorative models, and reflect the use of specialized tools. The study of this repertoire, through a comprehensive initial recording of the evidence (which, so far, has never been carried out in the area), is part of a broader analysis of influences of culture and taste as reflected in architectural decoration. It is also a component of the study of the association of sculptural and pictorial iconography in rock-cut churches, and is relevant to an analysis of the division of liturgical spaces under the influence of the Byzantine Orthodox and/or Latin churches. The comprehensive recording of evidence can also reflect the theoretical and empirical skills and knowledge of stonecutting craftsmen, as well as provide information on building sites of rupestrian churches and on the patronage that made their construction possible.



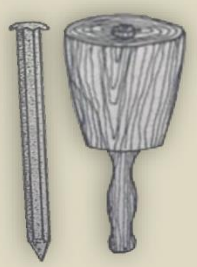
Church of Madonna delle Virtù, Matera © Darhem project

FROM QUARRIES TO ROCK-CUT SITES

ECHOES OF STONE CRAFTING

ONLINE CONFERENCE 25-26 March 2021

The conference aims at carrying on the international debate on the archaeological investigation of ROCK-CUT SPACES and STONE QUARRIES, considered as aspects of the same mining phenomenon: places in which specific empirical and handcrafted knowledge related to stone working is expressed and conveyed. The conference envisages a diachronic approach and therefore all case studies are welcome, without chronological limits.



ABSTRACTS SHOULD BE SENT IN ENGLISH TO
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DEADLINE JANUARY 15th, 2021

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