

2006



INCO-CT-2005-015416- Project QuarryScapes

Proceedings to the first QuarryScapes symposium October 15 - 17 2006 Antalya, Turkey



Extended abstract collection

Edited by: Patrick Degryse

Quarry Scapes

Conservation of Ancient Stone Quarry Landscapes in the Eastern Mediterranean

Table of Contents

Table of Contents	1
Introduction	3
N. Abu-Jaber, Z. Al Saad, M. Al Quhad Landscape, geology and lithology of the Northern Al Jafr basin, Jordan	5
P. Degryse, E. Bloxam, T. Heldal, P. Storemyr and M. Waelkens Quarries in the landscape - A survey of the area of Sagalassos (SW Turkey)	7
T.. Heldal, E. Bloxam, P. Degryse, A. Kelany and P. Storemyr Old Kingdom gypsum quarries at Umm es-Sawan, Northern Faiyum Quarry Landscape, Egypt	11
N. Amin and A. Shawarby GIS and other technical tools as instruments for improved site protection and management - A national quarry map of Egypt.	15
E. Caner-Saltık, T. Yaşar, T. Topal, A. Tavukçuoğlu, G. Akoğlu, A. Güney & E. Caner-Özler Ancient andesite quarries of Ankara	17
A. Tavukçuoğlu, E. Caner-Saltık, T. Yaşar, T. Topal, G. Akoğlu, A. Güney & E. Caner-Özler Ancient tuff quarries in Aksaray	19
S. Sülüner The Citadel of Ankara: a review of its history and building materials	21
A. Kelany New department of ancient quarries and mines in the Supreme Council of Antiquities (Egypt)	23
H. Rakha Outline of Management concept - Stakeholders mapping and analysis	25
E. Bloxam From complex data to simple transmission: modelling the significance of ancient quarry landscapes	27
P. Storemyr Reflections on conservation and promotion of ancient quarries and quarry landscapes	31
Keywords	37
List of authors	39

Introduction

One year ago, after the “green light” of the European Commission was given, the QuarryScapes project took off. Its aims were well described in the abstract:

“The cultural heritage of the Eastern Mediterranean is predominantly made from stone, and throughout antiquity thousands of smaller and larger quarries were opened. The archaeological record in the quarries comprises rare evidence of stone extraction sites, roads, harbours, settlements, ceramics and inscriptions, which collectively constitute an ‘ancient quarry landscape’. Such landscapes are of crucial importance, not only to our understanding of the lives of the non-elite, but of the political and ideological ambitions of an elite that drove resource exploitation to such heights. Yet, as heritage sites of such enormous historical importance these have largely gone unrecognised, mainly due to poor documentation, which has consequently led to their current indiscriminate destruction from actions such as modern development and quarrying.

The QuarryScapes project will enhance cultural heritage management of ancient quarry landscapes through the development of methodology and conservation models that can be effectively implemented in a range of cultural contexts. ‘Quarryscapes’ will develop scientific and practical methodologies for documentation, characterisation and conservation of ancient quarry landscapes, raise awareness of the significance and vulnerability of such sites and contribute to legal protection measures and sustainable management of ancient quarry landscapes. Through case studies in Egypt, Jordan and Turkey, the project will address development of theoretical and practical methods pertaining to the major steps in the

process of conservation: from recognition, investigation and assessment of significance, to understanding the risks, developing sound conservation and monitoring concepts, and suggesting mechanisms for sustainable management. QuarryScapes will also organise open workshops and disseminate project results through the development of practical guidelines for conservation of ancient quarry landscapes”.

In this respect, all work presented and discussed in this volume, is the result of the financial support of the EU FP6 STREP-INCO programme, under contract no. 015416, which is greatly acknowledged.

Now, after the first year of operation, the time has come for the first open workshop. The aim of the symposium, and of these proceedings, is threefold. Firstly, results from ongoing research within the different work packages of the project are presented. Secondly, the further course of events within the project is discussed. Thirdly, and most importantly, the (already initiated) discussion on measures and guidelines for conservation is opened up. Therefore, in the articles as well as in the presentations, the work on ancient quarry landscapes performed within the QuarryScapes project is “problematisized”. The themes discussed not only comprise the mere description of quarry landscapes, but also the technology and models for research, the administration and concepts of management and reflections and suggestions on conservation and promotion. For only through a thorough discussion and presentation of our research we can come to our final goal: Conservation of Ancient Stone Quarry Landscapes...

Landscape, geology and lithology of the Northern Al Jafr basin, Jordan

Nizar Abu-Jaber¹, Ziad Al Saad² & Mohammad Al Qudah¹

1. Department of Earth and Environmental Sciences, Yarmouk University, Irbid 21163, Jordan, abujaber@yu.edu.jo

2. Faculty of Archaeology and Anthropology, Yarmouk University, Irbid 21163, Jordan, zalsaad@yu.edu.jo

Abstract

Dozens of mining sites have been documented at the northern rim of Al Jafr basin in southern Jordan (Quintero et al., 2002). These sites largely consist of Chalcolithic age quarries for flint tools. Apparent stone working sites and lightly paved roads have also been observed.

The Al Jafr basin is a large internal basin in the southern desert of Jordan. Rainfall is less than 100 mm per year, and therefore the vegetative cover is minimal (Fig. 1). The northern rim of the basin consists of steep cliffs exposing Upper Cretaceous marine sedimentary outcrops. The landscape creates a stunning visual effect.



Fig. 1: Location map

The northern rim of the basin is about 160 km long, with cliffs about 10 m high. The stratigraphy of the region is composed of Late Cretaceous formations defined locally as being from the Amman, Um Rijam and Muwaqar Chalk Marl formations of the Belqa Group. The oldest formation is the Campanian Amman formation, which consists of bedded 70 m of silicified limestone units interbedded with minor beds of limestone and phosphorite. The formation does not crop out in the study area, although wadi alluvium contains

numerous cobbles and boulders containing chert derived from this formation. Overlying the Amman is the Campanian Al Hisa phosphorite formation. The formation is dominated by marine sedimentary apatite beds, with interbedded limestone and silicified phosphate layers.

The Muwaqar Chalk Marl formation (Maastrichtian-Paleocene), which is the oldest outcrop at the escarpment itself, consists of over 135 m of green marl with minor horizons of white chalky limestone. The formations contain minor horizons containing chert and limestone nodular concretions reaching 1.5 meters (Moumani, 2005).

The Um Rijam Chert Limestone Formation (Eocene) is about 80 m thick in the study area. It consists of interbedded chalky limestone, limestone, and chert beds. Horizons of chert concretions are also found in horizons of marly limestone (Moumani, 2005).

The chert beds are on the order of 10-20 cm thick that range in color from light cream to dark reddish brown. The limestone beds contain 20 to 30 cm nodules reaching up to with color ranges similar to those in the bedded chert.

Textural and chemical analyses using Scanning Electron Microscopy have been used to differentiate between the various possible stratigraphic sources of chert. The Um Rijam chert (both beds and nodules) seems to contain barite specs and inclusions almost exclusively, whereas the Muwaqar Chalk Marl and Um Rijam sources seem to be richest in apatite inclusions. Variations in texture between the various sources have also been noted. Preliminary results suggest that the nodular chert from the Muwaqar and Um Rijam formations are generally fine grained and devoid of fossil textures (Fig. 2), in contrast to the bedded chert from the Um Rijam formation, which is coarser grained and commonly has residual sedimentary textures and fossil inclusions (Fig. 3).

Recent archaeological works lead to the the discovery of an enormous industry for the production of cortical flake blanks in the al-Jafr Basin. The industry is believed to have supplied the blanks for production of fan scrapers (tabular scrapers, cortical flake knives, etc.) perhaps as early as the Chalcolithic and during the Early Bronze Age. The 79 recorded sites include large quarries over 12 ha in area, and three trench mines. The sites also document a significant industry devoted to the production of large percussion blades. These sites constitute a major long-sought production center for the fan scraper industry in the southern Levant.

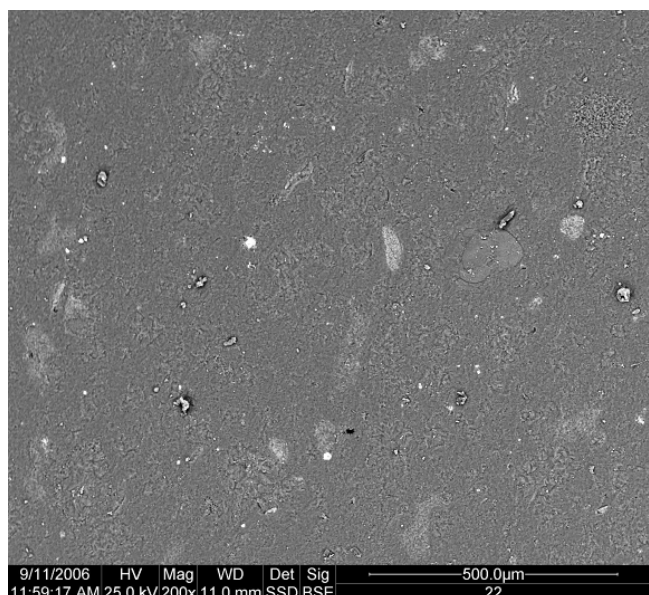


Fig. 2: Scanning Electron Micrograph of a nodular chert sample from the Muwaqar Chalk marl formation.

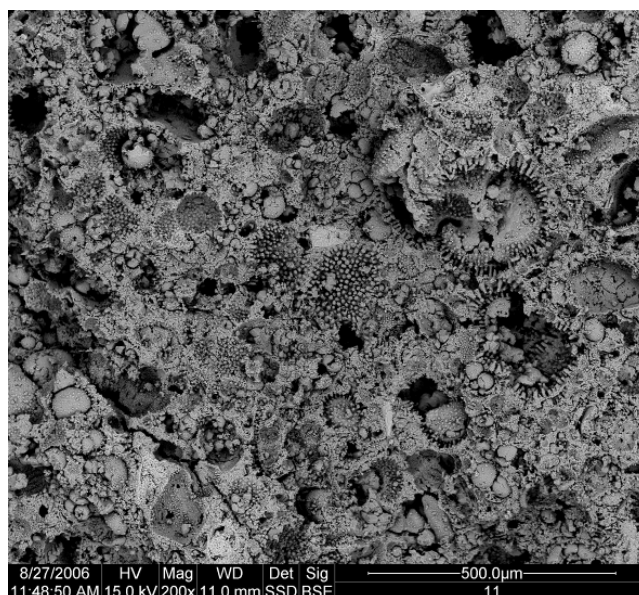


Fig. 3: Scanning Electron Micrograph of a bedded chert sample from the Um Rijam formation.

REFERENCES

- MOUMANI, K.A. 2005. *The geology of Wadi Al Bahia area map sheet No. 3251-III*. Bulletin 60, Geology Directorate, Natural Resources Authority, Amman, Jordan.
- QUINTERO, L.A., WILKE, P.J. & ROLLEFSON, G.O. 2002. From Flint Mine to Fan Scraper: The Late Prehistoric Jafr Industrial Complex. *Bulletin of the American Schools of Oriental Research*, 327: 17-48.

Quarries in the landscape A survey of the area of Sagalassos (SW Turkey)

P. Degryse¹, E. Bloxam², T. Haldal³, P. Storemyr³ & M. Waelkens^{1,4}

1. Centre for Archaeological Sciences, Section Geology, Katholieke Universiteit Leuven, Celestijnenlaan 200E, B-3001 Leuven, Belgium,
patrick.degryse@geo.kuleuven.be

2. Institute of Archaeology, University College London, 31-34 Gordon Square, WC1H 0PY London, UK, e.bloxam@ucl.ac.uk

3. NGU, Leiv Erikssonsv. 39, NO-7040 Trondheim, Norway, tom.haldal@ngu.no

4. Sagalassos Archaeological Research Project, Katholieke Universiteit Leuven, M. Theresiastraat 21, B-3000 Leuven, Belgium,
marc.waelkens@arts.kuleuven.be

Introduction

Pisidia has always been an area of magnificent white limestones which were not only extensively used in the local architecture, but were also exported towards the Pamphylian plain (Ward-Perkins, 1980; Greenhalgh, 1987; Waelkens *et al.*, 2002). The existence of quarries in the neighbourhood of Sagalassos had already been attested, but a detailed study was never executed. The Sagalassos Archaeological Research Project, represents an interdisciplinary project to document the site whereby geologists have accompanied archaeologists in the field. The main aim of the quarry survey carried out at Sagalassos (SW Turkey) was to explore the possibilities of integrating the quarries related to the ancient city. During an extensive survey of the territory of the city during 1994 and 1995 the remains of two large quarries were recorded (Waelkens *et al.*, 1997 a and b). A more detailed survey of the quarries on the site and in the immediate neighbourhood of the city has been carried out since 1998 (Degryse *et al.*, 2003).

Although the Sagalassos Project has provided extensive knowledge of the architectural heritage and use of stone in Sagalassos, QuarryScapes will take this research further by undertaking an in-depth study of the ancient quarry landscape surrounding the town by establishing its relationship with the various periods of construction. The work will focus on both the geographical dimension as well as the development of quarrying through time and the chronological link between stone extraction and construction periods. It will also explore the unique opportunity of the area to view the quarry landscape as the "larger Sagalassos landscape", adding new dimensions to the quarry landscape itself and to the ancient town of Sagalassos.

The important research questions are to characterize the quarries according to the significance of the individual quarries and their role in the development of the city, the recognition of workshops and other quarry related features, a more detailed investigation of the geological features of the individual quarries and quarry groups and questioning the quarry organisation and the relationship between volumes quarried and volumes used, besides the general aims and questions formulated within QuarryScapes towards conservation and protection of the quarry sites.

Natural building stones at Sagalassos

Throughout the history of the city, locally exploited beige and pink good quality limestone remained the most important building stone. Both high quality white limestone from the territory of the city and several marble types imported from Dokimeion, represent a smaller (but important) fraction of the total amount of building stones used (Waelkens *et al.*, 2002; Degryse *et al.*, 2003). For wall revetments and pavement slabs, large quantities of Docimian marble (both white and pavanazetto) and coloured varieties from elsewhere (cipollino, Proconnesian real porphyry) were imported, likely as slabs (Waelkens *et al.*, 2003). The beige and pink limestone, used at Sagalassos throughout the history of the city, can be found in the local geological substrate, the Lycian nappes, showing a rapid alternation of facies types over short distances. Different types of limestone can often be found close together in one and the same location (Mucchez *et al.*, in press). From petrographic and geochemical evidence, it is clear that the limestone (bioclastic pack to wackestone) from the Lycian nappe near monumental Sagalassos can be found in buildings from the late Hellenistic throughout the Julio-Claudian and Hadrianic to Severan period. In late Hellenistic times, however, also an exclusive limestone (radiolarian mudstone) was used.

Quarries and quarry groups

Survey already carried out resulted in a preliminary characterization of quarries which can act as a basis for more detailed work (Loots, 2001). With new work within QuarryScapes, the quarries in the territory of Sagalassos can be grouped according to their location (local or regional), their geology (and hence the provenance of the stone used), morphology (topographical features) and production evidence (quarry marks, extraction sites, partially worked objects, spoil heaps etc.).

On-site quarries

Eastern quarries

East of the city, evidence of quarrying is found in the Eastern Necropolis. Little remains of quarry faces. The presence of limestone chips and fragments, interpreted as quarry spoil heaps, suggest quite significant quarrying. It is likely to link these quarries to the nearby necropolis, but they may also have supplied building stone to the city. On the basis of the size and distribution of the spoil heaps, the likely estimate of extracted volumes could be in thousands rather than hundreds of cubic meters, thus exceeding the use of stone in the Necropolis.

Southern quarries

Two quarries and a number of minor extraction sites have been identified near the southern Necropolis. The quarries display few quarry faces and are highly irregular. It is difficult to estimate extraction volumes in the quarry, which could range between a few hundred and one thousand m³. Scattered quarry marks suggest that blocks bordered by natural fractures also were extracted. Quarrying likely targeted sarcophagi and tentatively the southern quarries could have supplied raw material for most of the area.

Northern/Western quarries

These include quarries around the northern Necropolis and just north of the stadium. Around the northern necropolis, extraction traces can be observed, but most of the quarry is probably covered by scree deposits, making volume estimates speculative. However, given that marks are seen over a distance of nearly one hundred metres, it is probable that this quarry was a significant source for building stone to the city. Shallow quarries with numerous small extraction sites may also have been the source for the few sarcophagi in the necropolis.

North of the stadium two quarries and some minor extraction sites are observed. Quarry marks there indicate that not only were natural fractures used as primary block boundaries, but the direction of the existing channels changes frequently in order to maximize the block yield. Volume estimates are difficult, but it is likely that a gross magnitude of volume close to 1000 m³ was extracted in the latter area.

Central quarries

Two, possibly three, quarries exist in the central area of the town. In the eastern part, one possibly major quarry is situated by the domestic area. Frequent step like extraction traces, carved walls, combined with the fact that the quarry continues deep below the present soil surface and that the total length of the corner-shaped quarry face is nearly 90 metres, indicate that this could have been a major stone source.

The keyword for the quarrying of limestone in the city area seems to be *proximity*; in the immediate vicinity of important stone consuming activities, being construction or funerary use, there are quarries, which in size (at least from an optimistic view) fit the volumes required.

Local quarries

These include quarries located from 1 to less than 10 km from the city centre.

The Ağlasun Dağları Quarry is situated close to the summit of Ağlasun Dağları mountain range, and is situated in a pinkish variety of limestone. The pink colour of the stone was probably the reason for undertaking quarrying at such high altitude instead of using more readily available sources. The quarry shows signs of extracting blocks along natural fractures, and thus the quarry displays few worked quarry faces. Due to overburden it is difficult to estimate extracted volumes. However, the lack of large spoil heaps indicates that the quarried volumes did not exceed one thousand cubic metres of usable blocks.

The Sarıkaya Quarry is located 3-4 km southwest of Sagalassos in the lower part of a steep cliff. Although clear evidence of stepped block extraction can be seen, weathering and rock falls have largely destroyed the quarry face, so that the actual size of the quarry is difficult to determine. Based on the observations of extraction marks, and by extrapolating the natural cliff, it is likely that the extracted volume defined a wedge shaped body providing an estimated maximum of 3000 m³ gross extracted rock, enough to provide several large building projects. The Sarıkaya quarry shows outcrops of white-beige limestone and red nodular limestone. The stone type quarried is unique to the quarry as it can be microscopically classified as a radiolarian mudstone. This type of stone seems to have been used only in late Hellenistic buildings (Bouleterion, Doric Temple; Degryse *et al.*, in press a) at Sagalassos. Radiolarian mudstones are not found in quarries elsewhere on the territory and were no longer used in buildings from the Julio-Claudian period onwards. This indicates that the quarry may have been one of the main suppliers of building stones during the late Hellenistic period. Sagalassos red slip ware sherds found in front of the main quarry face, date from the early imperial period and may constitute a *terminus ante quem* for the exploitation of the quarry.

Travertine quarries are located near the village of Yeşilbaşköy. Travertine is applied in the 2nd Century AD theatre and in the 5-6th Century AD domestic areas. Based on petrographical and geochemical evidence (Schroyen *et al.*, 2000; Degryse *et al.*, in press b), there are reasons to believe that the limited travertine deposit at Yeşilbaşköy was the source for Sagalassos, as well as supplying raw material for buildings in the immediate vicinity of the quarry. Remains of quarry faces are still seen, indicating quite significant extraction of travertine. Wherever these observed quarries represent the actual extraction site in antiquity is, however, not clear.

Other quarries not identified during the survey are quarries of volcanic tuff and diorite. Based on petrographical and geochemical evidence it can be proven that these building stones at Sagalassos come from the region of Gölçük (Viaene *et al.*, 1997; Degryse *et al.*, 2003), but no ancient quarries can be identified there due to on going modern quarrying activity and intense weathering.

Regional Quarries

The Yarışlı quarry is the possible ancient source of a crystalline white limestone, extensively quarried in the hills southwest of the plain of Burdur under the commercial name "White Antique" – illustrating the assumed connection to quarrying of the same stone in Antiquity. The aesthetical "marble-like" appearance, the white colour and the technical quality were important reasons for exploiting such a relatively remote source of stone for Sagalassos (Waelkens *et al.*, 2002 and 2003). It remains unclear whether the stone had a wider use in Antiquity. During the survey, disputable traces that may represent weathered quarry marks were found in the quarry. There might be other remains of ancient quarries in the region, but the intensive presence of modern quarrying as well as the size of the potential source area make a survey for ancient exploitation time consuming and difficult.

Stone from remote sources

The presence of a variety of stone types imported from remote sources (i.e. Dokimeion, Aphrodisias, Cippolino Verde), particularly applied in prestige contexts, implies that Sagalassos was also part of a stone-trading network.

Discussion

For the QuarryScapes project, Sagalassos is an important case study concerning the use of predominantly local stone for large building activities in Antiquity. The selective exploitation of usable local stone in a natural landscape differs significantly from other case studies in the project, which can contain huge ancient "industrial" quarry landscapes, which significantly reshaped the natural landscape. Thus, at Sagalassos, we are confronted not with a "quarry landscape" but with "quarries in the landscape". Also, the obvious relation between quarrying and nearby use of the stone in a monumental city provides excellent opportunities for the promotion of the significance of this quarry landscape to the wider public. The importance of the quarries can easily be seen when presented as an integral part of the extended "town landscape" of antique Sagalassos. Concerning risk assessment, significant threats to the quarry landscape are not present in this work package. Apart from vandalism and natural weathering, the quarries near monumental Sagalassos are not at risk. Quarries situated further away from the monumental centre (here termed local to regional quarries), are at risk through disturbance by farming (e.g. Sarıkaya and Yeşilbaşköy) or by modern exploitation (e.g. Yarışlı). However, it needs to be determined whether these "quarries in the landscape" of a more limited extent and, though speculative, perhaps of a lesser regional importance, away from the "town landscape", might be of a more limited significance rather than unique "quarry landscapes". It may therefore be questioned whether preservation of such quarries not integrated in the "town landscape" is a priority. Conversely, and perhaps more importantly, it needs to be stated that the use of more distant quarries in itself is a very important issue to be raised. The

"why" of going about the trouble of getting a stone from a distant source in every case needs to be studied in depth and connected to the importance and hence conservation and preservation of the site. When the quarries of the Sagalassos area are seen as an integral part of the monumental town, their conservation and protection become evident and their significance can be clearly demonstrated to the public. This is especially true for the quarries here defined as on-site and local quarries. For instance, the significance of the Sarıkaya and Ağlasun Dağları quarries is inseparably connected to the monumental city of Sagalassos. The quarries mentioned are providers of unique stone types for several building projects in the city throughout several periods of construction. In the case of regional quarries (e.g. Yarışlı) this connection to the consumer is obscured. Conversely, in the case of very significant stone extraction in terms of distance of transport or number of occurrences throughout the (known) world (e.g. stone from remote sources at Sagalassos), such quarry sites become of unique socio-economic importance in itself. This, however, is not the subject of the work here discussed, and will be treated elsewhere within the QuarryScapes project.

Acknowledgements

The research was supported through the QuarryScapes project (contract no. 015416 of EU FP6 STREP-INCO programme) and by the Belgian Programme on Interuniversity Poles of Attraction (IUAP V and VI) initiated by the Belgian State, Prime Minister's Office, Science Policy Programming. The text also presents the results of a Concerted Action of the Flemish Government (GOA02 and GOA07) and a project of the Fund for Scientific Research-Flanders (Belgium) (FWO G.0421.06).

REFERENCES

- DEGRYSE, P., MUCHEZ, PH., LOOTS, L., VANDEPUT, L. & WAELEKENS, M. 2003. The building stones of Roman Sagalassos (SW Turkey): Facies analysis and provenance. *Facies* **48**, 9-22.
- DEGRYSE, P., MUCHEZ, PH. & WAELEKENS, M. in press a. Geology and archaeology of late Hellenistic limestone quarries at Sagalassos (SW Turkey). *MARMORA*.
- DEGRYSE, P., MUCHEZ, PH., VIAENE, W., QUINIF, Y. & WAELEKENS, M. in press b. Depositional environment and climatic implications of Holocene travertines in the valley of Basköy (SW Turkey). In: Waelkens, M. & Poblome, J. (Eds.) *Sagalassos VI. Acta Archaeologica Lovaniensia Monographiae*. Universitaire Pers, Leuven.
- GREENHALGH, J. 1987. *Roman Pisidia. A Study of Development and Change*. Unpublished Ph.D. Thesis, Newcastle upon Tyne.
- KÖSE, V. 2005. *Nekropolen und Grabdenkmäler von Sagalassos in Pisidien in hellenistischer und Zeit*. Studies in Eastern Mediterranean Archaeology VII. Brepols, Turnhout.
- LOOTS, L. 2001. *The building materials and building techniques at Sagalassos, Turkey*. Unpublished Ph.D. Thesis, Katholieke Universiteit Leuven.
- MUCHEZ, PH., LENS, S., DEGRYSE, P., CALLEBAUT, K., DEDEREN, M., HERTOGEN, J., JOACHIMSKI, M., KEPPENS, E., OTTENBURGS, R., SCHROYEN, K. & WAELEKENS, M. in press. Petrography, mineralogy and geochemistry of the rocks in the area of the archaeological site of Sagalassos. In: Waelkens, M. & Poblome, J. (Eds) *Sagalassos VI. Acta Archaeologica Lovaniensia Monographiae*. Universitaire Pers, Leuven.
- SCHROYEN, K., VERMOERE, M., DEGRYSE, P., LIBRECHT, I., MUCHEZ, PH., VIAENE, W., SMETS, E., PAULISSEN, E., KEPPENS,

- E. & WAEKENS, M. 2000. Preliminary study of travertine deposits in the vicinity of Sagalassos: petrography, geochemistry, geomorphology and palynology. In: Waelkens, M. & Loots, L. (Eds.) *Sagalassos V. Acta Archaeologica Lovaniensia Monographiae 11*. Universitaire Pers, Leuven, 755-780.
- VIAENE, W., WAEKENS, M., OTTENBURGS, R. & CALLEBAUT, K. 1997. An archaeometric study of mortars used at Sagalassos. In: Waelkens, M. & Poblome, J. (Eds.) *Sagalassos IV. Acta Archaeologica Lovaniensia Monographiae 9*. Universitaire Pers, Leuven, 405-422.
- WAEKENS, M., MUCHEZ, PH., LOOTS, L., DEGRYSE, P., MOENS, L. and DE PAEPE, P. 2002. Marble and the marble trade at Sagalassos (Turkey). In: Herrmann Jr., J.J., Herz, N. & Newman, R. (Eds.) *Asmosia V. Interdisciplinary Studies on Ancient Stone., Proceedings of the Fifth International Conference*, 370-380.
- WAEKENS, M., DEGRYSE, P., VANDEPUT, L., LOOTS, L. & MUCHEZ, PH. 2003. Polychromy in classical architecture. A case study: Sagalassos (Pisidia). In: Lazzarini, L. (Ed.) *Asmosia VI. Interdisciplinary Studies on Ancient Stone. Proceedings of the Sixth International Conference*, 517-530.
- WAEKENS, M. & THE SAGALASSOS TEAM. 1997.a Interdisciplinarity in classical archaeology. A case study: the Sagalassos Archaeological Research Project (Southwest Turkey). In: Waelkens, M. & Poblome, J. (Eds.) *Sagalassos IV. Acta Archaeologica Lovaniensia Monographiae 9*. Universitaire Pers, Leuven, 225-252.
- WAEKENS, M., E. PAULISSEN, H. VAN HAVERBEKE, ÖZTÜRK, B. DE CUPERE, H.A. EKINCI, P-M. VERMEERSCH, J. POBLOME & R. DEGEEST. 1997b. The 1994 and 1995 Surveys on the Territory of Sagalassos. In: Waelkens, M. & Poblome, J. (Eds.) *Sagalassos IV. Acta Archaeologica Lovaniensia Monographiae 9*. Universitaire Pers, Leuven, 11-102.
- WARD-PERKINS, J.B. 1980. Nicomedia and the marble trade. *Papers of the British School at Rome* **48**, 23-69.

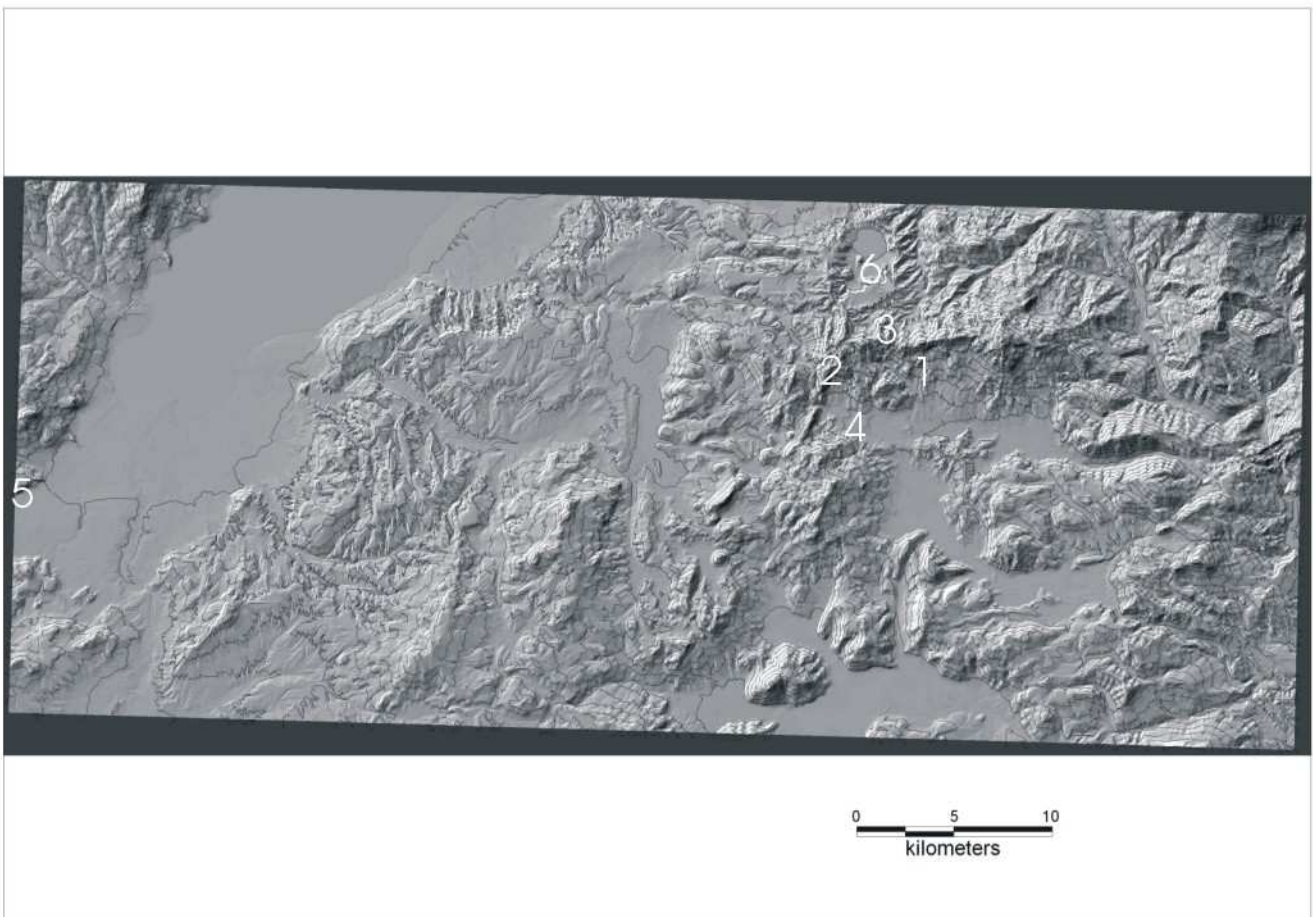


Fig. 1. On-site to regional quarries in and near the territory of Sagalassos - 1: Sagalassos, 2: Sarıkaya, 3: Ağlasun Dağları, 4: Yeşilbaşköy, 5: Yarıslı, 6: Gölçük.

Old Kingdom gypsum quarries at Umm es-Sawan, Northern Faiyum Quarry Landscape, Egypt

T. Heldal¹, E. Bloxam², P. Degryse³, P. Storemyr¹ & A. Kelany⁴

1. NGU, Leiv Erikssonsv. 39, NO-7040 Trondheim, Norway, tom.heldal@ngu.no

2. Institute of Archaeology, University College London, 31-34 Gordon Square, London, UK, WC1H 0PY, tcrnegb@ucl.ac.uk

3. Center for Archaeological Sciences, section Geology, Katholieke Universiteit Leuven, Celestijnenlaan 200E, B-3001 Leuven, Belgium, patrick.degryse@geo.kuleuven.be

4. SCA /Supreme County of Antiquities) Aswan, Egypt, adelkelany@hotmail.com

Introduction

The Umm es-Sawan gypsum quarries are situated in the Northern Faiyum Desert, approximately 20 km northeast of Lake Qarun and 40 km southwest of the Giza Plateau. The quarries belong to the Northern Faiyum quarry landscape, and are the target of Quarryscapes studies within Work Packages 5, 6 and 7. The environs of Umm es-Sawan have not been surveyed since the work of Caton-Thompson and Gardner in the mid 1920's as published in two volumes titled *The Desert Faiyum* (1934). The present survey was carried out in March 2006, and the aims were to put the archaeological infrastructure on the map, make fresh observations and interpretations and provide the geological background to the gypsum quarrying. The mapping was carried out using Quickbird satellite image combined with GPS.

Geology and quarries

The gypsum deposits of Umm es-Sawan occur within the upper part of the Eocene Qasr el Sagha Formation (Dir Abu Lifa Member; Bown & Kraus, 1988), see Fig. 1. These successions, which are predominantly near-shore shallow marine, range from mudstone and shale to highly bioturbated sandstone. In the lower part of the exposed area two distinct fossiliferous beds are found (*Carolia* sp bed and *Ostrea Elegenus* / *Multicostata* bed). The uppermost part of the member consists of a characteristic bed of "golden", gypsiferous sandstone containing abundant sea mammal fossils (Serinia). The successions of the Dir Abu Lifa Member is thinning out towards northwest, against an angular unconformity developed on the base of the overlying successions. On the irregular surface of the unconformity channels of silicified gravel conglomerates and logs of fossil wood are found. It is likely that this surface represents the base of the overlying Gebel Qatrani Formation (Bown & Kraus, 1988), in which case implies a significant thinning of the upper part of the Qasr el Sagha Formation between the temple of Qasr el Sagha and Umm es-Sawan.

Gypsum occurs predominantly in two distinct beds, of which the lower one is by far the richest and thus most heavily exploited. Within the gypsum beds, there are two types (or

generations) of gypsum: vein-type, impure gypsum (contains some calcite and barite), and horizontally laminated, pure gypsum. The gypsum veins are essentially steeply inclined and may measure up to 50 cm in thickness, and from above their distribution resembles a honey-comb pattern. These veins seem to have been the most important target for the production of vessels. The laminated gypsum can only be collected in thin flakes, which are too small for vessels. However, piles of such gypsum suggest that it was collected and applied for something, perhaps gypsum mortar. The quarries are predominantly shallow, and in several places it is difficult to separate the quarries from natural weathered surfaces. Since the quarrying mainly targeted the thick and massive veins of gypsum, which can have a somewhat non-systematic distribution, there are no clear quarry walls but instead irregular pits of varying size scattered on the outcrops of the main gypsum deposits. Hence, despite the quarries giving a non-systematic impression on the surface, it seems clear that all the gypsum deposits in the area were subject to systematic prospecting and trial quarrying in order to locate the best quality deposits.

Blocks of gypsum were moved from the quarries to a number of workshops (Fig. 2), mainly situated above the quarries, where the shaping of the vessels took place. These comprise three mounds designated A, B, and C by Caton-Thompson and Gardner who excavated them in the mid 1920's. The mounds consist of a matrix of gypsum debris from working of the stone into circular and cylinder shaped objects destined to be vessels. Two smaller mounds, also documented but not excavated by Caton-Thompson and Gardner, were subject of closer description and planning during the March 2006 survey. These mounds generally comprised chert cobbles, some shaped into picks, gypsum debris, fragments of non-local stones, fossilised wood chips and pottery. Near the workshops along the escarpment are several natural shelters, of which some were clearly used by the quarrymen.

Caton-Thompson & Gardner (1934) recorded approximately 250 'hut' circles located on top of a plateau in the layer of silicified gravel conglomerate, see Fig. 1, 700 metres south-east of the main gypsum quarries. They interpreted these as representing an area of settlement for the gypsum quarry workers. This previously described area of 'hut' circles was surveyed in 2006 and can be more accurately

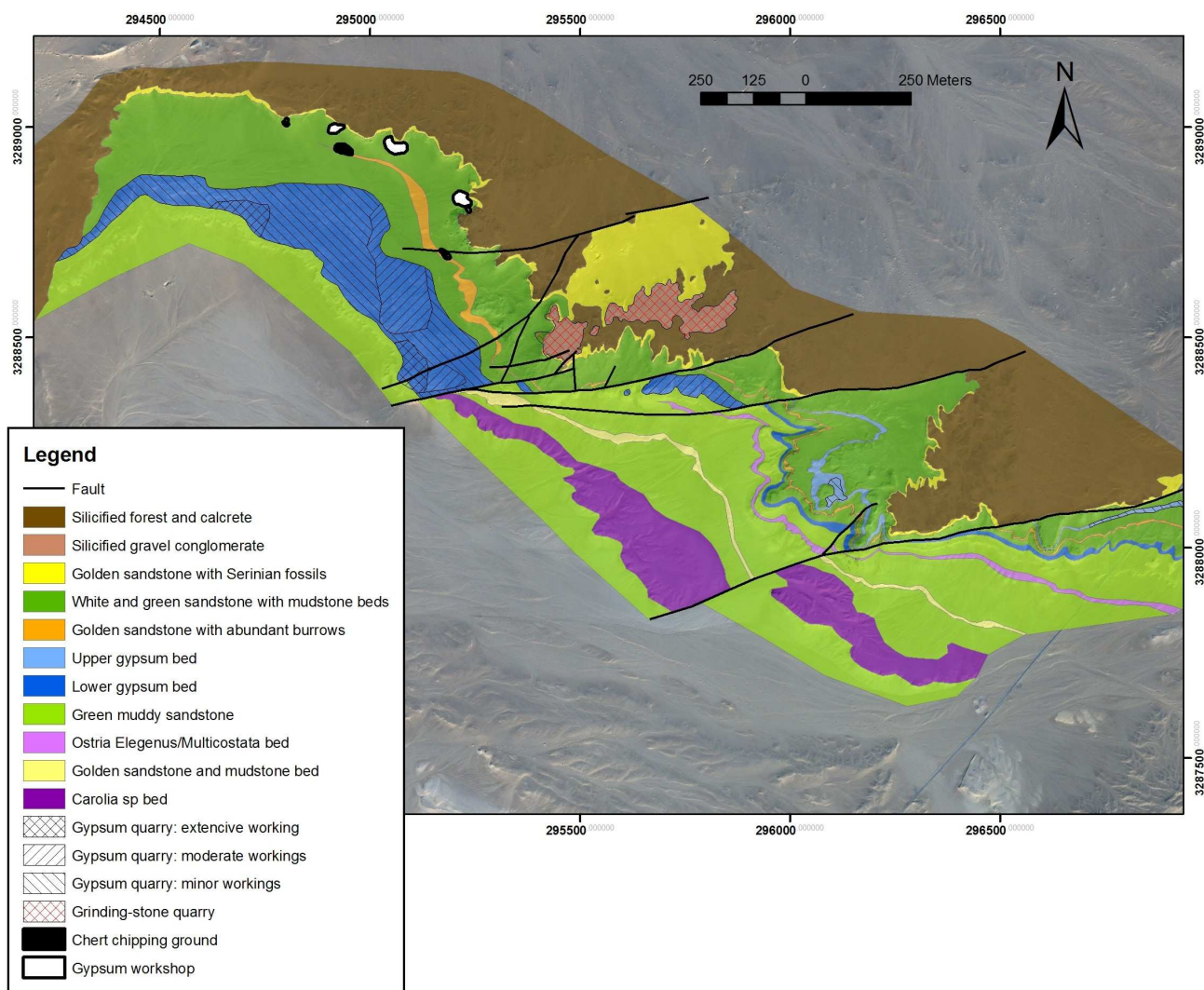


Fig. 1: Map of geology, quarries and workshops in the Umm es Sawan gypsum quarries



Fig. 2: Shallow gypsum quarries and workshop mound (background, see arrow)

visualised as a series of shallow sand-filled depressions surrounded by pieces of worked stone (Fig. 3). It was possible to identify within the waste fragments of grinding stones and bases, diagnostically similar to those found at the Gebel Gulab silicified sandstone quarries on the West Bank at Aswan (Heldal *et al.*, 2005). Planning and spot clearing to provide a better description, was undertaken at one of the sand-filled depressions – this work confirmed that this area

was not a settlement but a quarry, mainly for the production of grinding stones.

Quarrying technique and tools

Within the quarries and nearby areas, the ground is scattered with several types of stone tools (Fig. 4). These include stone hammers (pounders) of different sizes and types. Most frequently observed are rounded cobbles of chert. These are not found in natural occurrences in the quarry area, and are assumed to have been brought to the place either from bedrock deposits in more distant parts of the Gebel Qatrani Formation or (more likely) from concentrated alluvial deposits of chert cobbles in the east of the Faiyum (the Faiyum-Nile divide; Sandford & Arkell, 1929). In addition to use of the cobbles as natural hammers, chert cobbles have also been worked to finer tools for cutting and carving gypsum, such as crescent drills (Caton-Thompson & Gardner, 1934). Several such chert chipping floors are found in the area, close to some of the workshops. Other stone hammers from local and semi-local sources include the silicified gravel conglomerate, basalt (nearest source is approximately 4 km to the north) and a characteristic silicified sandstone, which is believed to come from a small

quarry discovered during the survey, 4 km to the northwest. Rod-shaped pieces of silicified wood are abundant in the gypsum quarries, and collection places as well as small quarries of silicified wood are found in the vicinity. Thus, silicified wood seems to have been used in the quarrying, probably as chisels and wedges.



Fig. 3: Grinding stone quarries

One of the most significant features about the Umm es Sawan quarries is the occurrence of rocks from Upper Egypt. Several pieces of Chephren Gneiss, which have their origin in the Abu Simbel area, are found. Some of these seem to represent tool fragments, particularly those found in the grinding stone quarries, whilst some larger fragments bear similarity with vessel blanks found in Chephren's Quarry (Bloxam, 2003). In either case, their presence links the vessel production at Umm es Sawan with similar production from the same period (3rd-4th Dynasties) in Chephren's Quarry, more than 1,000 kilometres to the south. Fragments of granodiorite pounders are also found at the site, probably originating in the Aswan area.

Dating the gypsum quarrying

Pottery found at the site indicates a strong presence during the Old Kingdom (especially 3rd to 4th Dynasty) (el-Senussi, 2006). This group of pottery dominates in most of the quarries, as well as in the vessel workshops, suggesting the peak of vessel production during the early to middle Old Kingdom. Another group of pottery is from the Roman Period, indicating also a late phase of production. This could fit observations of stockpiles of gypsum blocks in some of the quarries – it seems that these blocks were collected to transport them to places other than the nearby workshops. Small amounts of pottery associated with the grinding stone quarries, suggests the same chronology of activity – a peak in the Old Kingdom and to a lesser extent in the Roman Period.

Discussion

Revisiting the Umm es-Sawan gypsum quarries has added new information about the site, which as a result, requires there to be some revision made of Caton-Thompson &

Gardner's (1934) earlier interpretations.

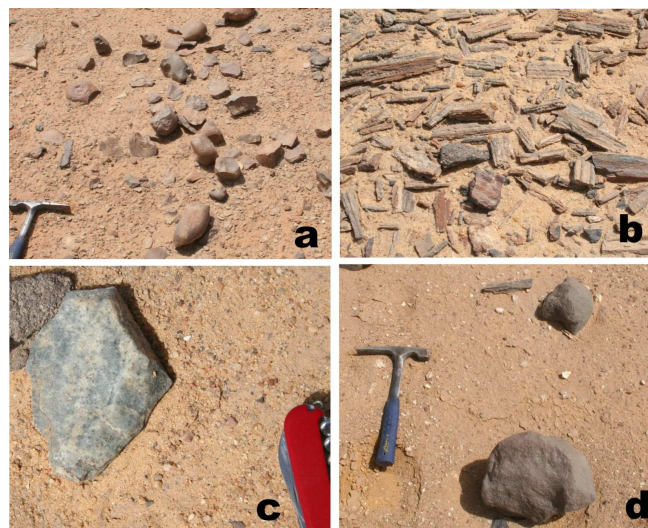


Fig. 4: Stone tools. a) partly worked chert cobbles, b) collected pile of silicified wood, c) piece of Chephren Gneiss, and d) basalt pounders

Firstly, their so called "hut area" is in fact an area with numerous shallow grinding stone quarries. This has major implications for the interpretation of the social organisation of the quarrying, in that it is unlikely that large amounts of people participated in the work simultaneously. The pottery evidence suggests that grinding stone quarrying was simultaneous with the gypsum quarrying, and may even have been related. Furthermore, a re-interpretation of quarrying techniques highlights the likely use of stone hammers and silicified wood to extract the gypsum. Of particular interest is the presence of rocks from Upper Egypt, linking the site with Chephren's Quarry (as previously suggested – Bloxam, 2003). There is also a clear connection with the Widan el Faras basalt quarries further to the west, partly regarding pottery (Bloxam & Storemyr, 2002; el Senusi, 2006), but also geographically: the same gypsum beds are found just above the Qasr el Sagha Temple, literally beneath the ancient basalt quarry road, and several small gypsum workings comparable with the ones at Umm es Sawan are found in the area. Some are described by Caton-Thompson & Gardner (1934), others were observed during the 2006 field season. These gypsum deposits are of poorer quality than Umm es Sawan, yet it is tempting to suggest that the establishment of the latter as the main production site resulted from a more or less systematic search along the whole length of the gypsum deposits in the Qasr el Sagha Formation, from Widan el Faras in the west to Umm es Sawan in the east.

Thus, Umm es Sawan clearly demonstrates a strong link between Old Kingdom production sites in different parts of Egypt. As previously hypothesised by Bloxam (2003), the significance of non-local stone tools at Umm es-Sawan might imply trading between specialists of prized stone tools, or alternatively, the Northern Faiyum was a centre where such people resided and from where they were deployed. Closer scrutiny of the data surveyed at Umm es-Sawan should add significantly in developing further hypotheses into the social context of stone quarrying during the Old Kingdom.

The survey at Umm es Sawan has also raised some important questions regarding the methodology of such a survey. How can such a site be delineated? The gypsum beds stretch at least 25 km to the southeast, and there are important, related quarries (stone tools) several kilometres from the quarry site. Furthermore, there are indications of road systems passing close to the quarry areas (including wells etc., the so-called Dashur road by Caton-Thompson & Gardner, 1934). Do they have a connection to the quarrying? Finally, one of the really impressive features about Umm es Sawan is the wonderful interaction between geology and archaeology: both are spectacular and easily understandable.

Acknowledgements

We gratefully acknowledge the help and assistance from the SCA in providing us with the opportunity to carry out this work, as partners in the EU-funded QuarryScapes project (contract 015416. Special thanks to Ahmed Abdel Al, Director of SCA Faiyum and Magdy el-Ghandour, director of foreign missions, SCA Cairo for their assistance in all aspects of this survey. Geologist Gebely Abdul Maksoud from the Lake Qarun Protectorate Administration helped us identify the fossils. We extend much appreciation to our inspector Mohamed Hamed Mohamed, who was a great companion in the field and helped enormously to make the survey a success. Thanks also to our four trainees from SCA and EAIS for all there help during the survey of Widan el-Faras.

REFERENCES

- BLOXAM, E. G. 2003. The Organisation, Transportation and Logistics of Hard Stone Quarrying in the Egyptian Old Kingdom: A Comparative Study. PhD dissertation, Institute of Archaeology, University College London.
- BLOXAM, E. G. & STOREMYR, P. 2002. Old Kingdom Basalt Quarrying Activities at Widan el-Faras, Northern Faiyum Desert. *Journal of Egyptian Archaeology* **88**, 23-36.
- BOWN, T. M. & KRAUS, M. J. 1988. *Geology and paleoenvironment of the Oligocene Jebel Qatrani Formation and adjacent rocks, Fayum Depression, Egypt*. U.S. Geological Survey Professional Paper **1452**, 60 pp.
- CATON-THOMPSON, G & GARDNER, E. W. 1934. *The Desert Fayum. Vols I and II*. The Royal Anthropological Institute, London.
- EL-SENUSSI, A. 2006. *Pottery sherds collected from Umm El-Sawan, season 2006*. Unpublished field report.
- HELDAL, T., BLOXAM, E., STOREMYR, P. & KELANY, A. 2005. The Geology and Archaeology of the Ancient Silicified Sandstone Quarries at Gebel Gulab and Gebel Tingar, Aswan, Egypt. *Marmora. International Journal for Archaeology, History and Archaeometry of Marbles and Stones* **1**, 11-35.
- SANDFORD, K.S. & ARKELL, W.J. 1929. *Paleolithic Man and the Nile-Faiyum Divide*. The University of Chicago Press, Chicago.

GIS and other technical tools as instruments for improved site protection and management – A national quarry map of Egypt

N. Amin & A. Shawarby

EAIS, Cairo, Egypt

Introduction

There is a great need to develop and increase the capacity of the Egyptian authorities to identify, assess, choose, formulate, implement and administer site management planning at heritage sites. The project introduces training and preparation of selected staff members to take a leading role within the Supreme Council of Antiquities in planning and implementing sound and effective Site Management Plans.

A participatory on-the-job training in three phases, tailored to historic site management is presented (already conducted in the rehabilitated house of Howard Carter in Luxor). It consists of two introductory courses (Understanding General Concepts of Site Management; and Conducting Site assessments) and a comprehensive course in design, preparation and setting for implementation of a Comprehensive Site Management and Marketing Plan (SMP), piloted on the site of Madinet Habou in Western Thebes.

The strategy applied also shows ways to

- use the contents and methodology of the Luxor training as a foundation for locally generated, Arabic language guidelines and manuals on site management applicable to any heritage site, including the ancient quarry landscapes,
- set collaboration with key governmental bodies in order to assure the plan's integration as part of activities and projects ongoing and anticipated for the West Bank of Luxor,
- exploit the training program as an integral part of a sustained capacity building and institutional development activity and not a dead-end exercise,

- stimulate and encourage active and win-win partnership between SCA and foreign archaeological missions,
- facilitate the creation of a Pilot Site Management Center,
- prepare to become facilitators of positive change in site management.

National Quarry Map

Using the geographic locations provided by James Harrell, the EAIS GIS unit has created individual datasets for 162 quarry sites in Egypt and Sudan listed in this work. Based on the location of the sites, ID codes were assigned to the datasets according to the EAIS standards. These ID codes will be used later to link the datasets with other information in the EAIS database.

The digital quarry map will be searchable by stone and quarry type and the period of use of the quarries. The Archaeology Unit has created datasheets for all of the Harrell's sites. In addition to the information provided by Harrell (rough dating, type of quarry and stone, GPS-points and geological formation), archaeological and historical data will be added to the datasheets in 2006 and 2007. The datasheet will be translated into Arabic and entered into the EAIS database.

The database, currently designed to store the data of SCA's registered and unregistered heritage sites dating from Prehistory to the 19th century, is being modified to accommodate additional information related to the quarry sites.

Most of the quarry sites covered remain unregistered by the SCA, but the EAIS Legal unit is working on confirming the legal status of larger sites and will assist in drawing up proposals for the registration of selected quarries. The feasibility of site-visits for risk assessment to a number of quarries will be studied.

Ancient Andesite Quarries of Ankara

E. N. Caner-Saltık, T. Yaşar, T. Topal, A. Tavukçuoğlu, G. Akoğlu, A. Güney & E. Caner-Özler

1. Middle East Technical University, Ankara

Abstract

The continuous use of andesite in Ankara since Roman times can be followed through the monumental structures in the city. Andesite objects from the Hittite period (4000-1200 BC) show even earlier exploitation of andesite in Ankara.

Ancient andesite sources in the Hüseyingazi hills, in lower and higher levels of Aktepe (Citadel Hill) and Hıdırlık Hill were supposed to be the probable ancient quarries of Ankara, although they have no signs related to ancient quarrying techniques, apart from the impressions related to the extraction of big blocks. The new andesite quarries in Çubuk and Gölbaşı were excluded due to their much finer textures in comparison to the andesites used in the monuments.

Samples from the probable quarry sites and from the Roman stone elements taken from the Citadel of Ankara were

analyzed and compared with each other by using several analytical techniques.

The analyses include colorimetric determination by CIELAB color standards, petrographic and image analysis of thin sections, XRD, and the determination of physical and mechanical properties wherever possible. IR thermographic analysis is planned to be used to examine the abundant andesite use at the Citadel walls from Roman period onwards. The first trials of differential IR thermographic analysis seemed to be a promising technique to detect and verify andesite types in a wider scale. It seemed possible to analyze large surfaces non-destructively by using that technique.

The results were discussed on the possibility of Hüseyingazi, Aktepe and Hıdırlıktepe hills as ancient andesite quarries. Specifications and conservation of those ancient quarries are expected to be discussed in the meeting.

Ancient Tuff Quarries in Aksaray

A. Tavukçuoğlu, E. N. Caner-Saltık, T. Yaşar, T. Topal, G. Akoğlu, A. Güney & E. Caner-Özler

1. Middle East Technical University, Ankara

Abstract

Ağzıkarahan is an important monument located near Aksaray (Central Anatolia). It was built in 13th Century during the Selçuk period. Examinations of original and replaced stone blocks on the monument and field trips around the region have led us to study some quarries in relation to Ağzıkarahan. It was observed that the ancient quarry of Saratlı which is about 7 km to the southeast of the monument, is a likely source. Another possible source is Mamasın quarry, a bit further away from Saratlı. Few tool marks and impressions related to the extraction of big blocks were observed in the Saratlı quarry. Four quarry sites exist next to each other there. A new Saratlı quarry was started close (around 500 m) to the old quarry.

Large stone blocks were used in Ağzıkarahan, the largest being 160 cm x 56 cm x 49 cm. Small-sized deteriorated stone samples in the form of scales were taken from the monument. Large-sized samples from the old and new quarries of Saratlı and Mamasın were also taken for analysis.

The cooling joints existing in the ancient quarry of Saratlı were investigated for their dip directions/dip amounts (attitude) and joint spacings.

Samples from the ancient and new Saratlı and Mamasın quarries as well as small-sized samples from the monument were analysed by using several analytical techniques. The analyses included colorimetric determinations using CIELAB color standards, petrographic and image analysis of thin sections, XRD, and the determination of physical and mechanical properties.

The preliminary results have shown that the welded tuffs of the monument were quite similar to the tuffs of the Saratlı ancient quarry in terms of their petrographic and mineralogical characteristics. However, the Mamasın welded tuffs differed from them. The Saratlı ancient quarry is within the settlement area of Saratlı village, but not yet inhabited. Its registration as an old quarry related to Ağzıkarahan could be an important added historical attraction, and may help its protection.

The Citadel of Ankara: A review of its history and building materials

S. Sülüner

1. Materials Conservation Laboratory, Department of Architecture, METU, Ankara

Abstract

The research focuses on the Citadel of Ankara and its environs with regards to its history and its construction materials. The citadel testifies the perpetual eminence of the city at different stages of the history from Hittites to present. Monumental buildings were constructed in Roman Ankara being the capital of the province of Galatia and a junction

connecting the frontiers. Stone materials from the antique buildings were reused in the construction of the Citadel during Byzantine and Turkish periods. Among others, andesite is the most widely used stone material at the citadel. This is due to its abundance both at the site and around the region. Therefore, the citadel is a key for further studies to discover the provenance of andesite as well as the stone workmanship, some of which are presented in the study.

New department of ancient quarries and mines in the Supreme Council of Antiquities (Egypt)

Adel Kelany

Supreme Council of Antiquities, Aswan, Egypt, adelkelany@hotmail.com

Egypt's heritage is to a large extent made from stone. Monumental stone architecture originated in Ancient Egypt and prevailed for more than 3000 years, taking advantage of the rich deposits of building and ornamental stone in the country. Stone was also used for tools and utensils since the Palaeolithic and throughout the Pharaonic period. Hundreds of deposits of metallic ore and gemstone were also utilised since the Predynastic period. Hence, archaeological traces of ancient quarries and mines can be found virtually everywhere in present Egypt; along the whole stretch of the Nile from the apex of the Delta to Wadi Halfa, but also in the surrounding desert areas, and in particular in the Eastern Desert.

With the current population increase and consequently the very rapid urban, industrial and agricultural development, many of Egypt's ancient quarries and mines are severely threatened. Modern quarrying is in this respect one of the main risk factors. But also vandalism, theft and to some extent tourist pressure constitute important risks to such cultural heritage sites and landscapes. In addition, natural phenomena such as weathering and catastrophic events like flash floods may be significant.

Until recently it has been difficult to achieve the necessary public interest in order to prevent or mitigate destruction of Egypt's ancient quarries and mines. With the current QuarryScapes effort, which is partially based on several other investigations of quarries and mines over the last 10-20 years, it has now been possible to increase the interest and several conservation initiatives have been taken.

One of the most important initiatives has recently been taken by the Supreme Council of Antiquities (SCA). In June 2006 it established a new department to study, document and protect ancient quarries and mines. The department is based in Aswan, one of the main quarrying centres in the ancient world. However, the department will work in close cooperation with regional SCA offices throughout Egypt.

The new department has been started with a small team of professionals, but will be growing in the years to come, both in terms of staff and cooperation with external projects and institutions.

The main aims and strategies of the new department are:

- Training of inspectors to enable them to take care of field work and administration related to protection of ancient quarries and mines.
- Development of a database covering all ancient quarries and mines in Egypt. This database is underway within the context of QuarryScapes and the work undertaken within this project by the Egyptian Antiquities Information System (EAIS).
- Development of a new system to enable efficient cooperation with modern extraction companies. Such companies may aid the heritage authorities both with regard to protection and monitoring. The philosophy is to work *with* such companies and not against them.
- Promotion and public awareness, and in particular development of selected ancient quarries and mines for visitors and tourism.
- Development of a geoarchaeology museum in Aswan, particularly focusing on ancient quarries and mines. The museum will be attached to the famous existing museum at the site of the Unfinished Obelisk.
- Development of a website for the new department.

At the moment work on establishing and training the team is going on, especially with regard to the most essential part of the exercise, namely efficient field work.

Although a good start has been made, it is to be expected that it will take a few years for the department to become fully operative and efficient and also for various authorities and private companies to really understand the significance of ancient quarries and mines and the aims of the new department.

Outline of Management concept - Stakeholders mapping and analysis

H. Rakha¹ & E. Cocke²

1. North South Consultants Exchange, 27 Yahia Ibrahim St., Apt. 4, Zamalek, Cairo, Egypt, hagar@nsce-inter.com
2. Egyptian Antiquities Information System, Supreme Council of Antiquities, 3 El Adel Abu Bakr St. Zamalek, Cairo, Egypt, abydos76@yahoo.com

Introduction

The entire landscape of the Fayoum depression encompasses millennia of human activity, with remains from the predynastic to the Coptic and Islamic periods. It is famous for its Graeco-Roman and early Christian settlements, the large numbers of papyrus found here and of course the Fayoum portraits, early Roman period mummy portraits showing a blend of Ancient Egyptian and Classical influences. Along the fertile shores of Lake Moeris some of the first agricultural communities in the world developed, and the remains of these villages are key sites in the archaeology of early Egypt. The natural landscape is equally important, with fossilised remains of fauna and flora showing the evolution of early mammals and sea creatures.



Fig. 1. Gebel Qatrani basalt quarries. September 14th, 2006

The Widan el-Faras area lies in the northern part of the Fayoum depression and represents an important part of the history of the Fayoum, and of ancient Egypt. The basalt quarries themselves, the oldest paved road in the world, several smaller flint and limestone extraction sites and habitation sites together form an industrial quarry landscape of great importance (Cocke, 2006)

In this context, North South Consultants Exchange has been keen to get involved in the QuarryScapes project in order to exploit its long experience in cultural heritage activities and specifically in the Fayoum area.

Methodology

By the end of the project, NSCE will have developed a management concept to serve as guidelines for managing the

ancient quarry sites. The management guidelines will be based on a conceptual framework. It will consider the specific nature of Fayoum site, but will also explore applicability to other sites.

In order to ensure an integrated approach in developing the management concept, NSCE work package covers a number of activities such as stakeholders coordination, fresh field survey, literature review, value assessment, risk analysis, and developing a sustainability network to ensure conservation of the site and implementation of the management concept after the end of the project.

The preliminary stakeholders are the Supreme Council of Antiquities, the Egyptian Environmental Affairs Agency, the UNESCO and the private mining companies. Other stakeholders include tourism companies, the Ministry of Agriculture and Land Reclamation, the Ministry of Planning and the Governorates.

NSCE Work Package

Work Package 6 of North South Consultants Exchange is concerned with the Widan el Faras ancient basalt quarry landscape in the Northern Fayoum Desert, Egypt.

Mobilization of the project activities started with a field investigation of the management of the unfinished obelisk in Aswan as an example of a managed quarry site.

As November 2005 marked the official start of the project, NSCE launched its activities with conducting a literature review and also worked on designing some awareness and dissemination materials for the Basalt Quarries of Gebel Qatrani.

The first stakeholders' workshop is planned to take place before the end of 2006. The objective of the workshop is to gather the different stakeholders that have interest in the site and to share with them the concept of the management guidelines. This will help in verifying the management concept on a participatory basis so as to integrate all relevant ideas and practices.

NSCE participated in the 1st field school in Aswan in November 2005. The objective of the field school was to introduce important information on non-intrusive registration methods and to shed the light on the environmental and cultural aspects of the ancient quarries as well as the risks they face.



Fig. 2. The 1st field school participants in the Unfinished Obelisk managed quarry site, Aswan, November 2005

Dissemination Activities

In March 2006, NSCE published an article¹ at Al Ahram Weekly (a widespread English-speaking weekly newspaper) titled "Fayoum's ancient quarry under threat". The article displayed the historical significance of the site and drew the attention to the risks that the site is currently facing.

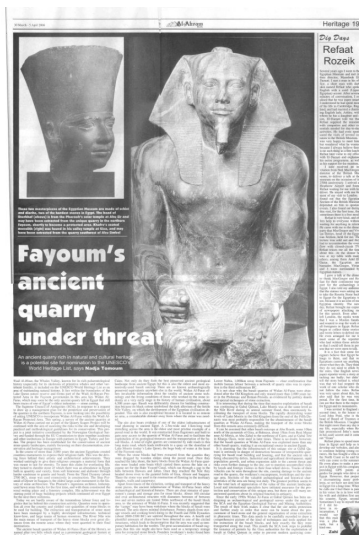


Fig. 3. Scanned Copy of the published article at Al Ahram Newspaper on March 30th, 2006

In August 2006, NSCE submitted a proposal to the Dutch Embassy to fund immediate protection measure for the ancient paved road at the quarries feet. In this context, NSCE has organized a field visit to the site to the Dutch Ambassador, Deputy Head of Mission, and Cultural Attaché in September 2006. The objective of the visit was to introduce the site to the group and to help fund raising activities for protection of the site and its buffer zone. The visit was very successful and helped the visitors gain an understanding of the historical importance of the site.

¹ The article was written by Dr. Nadja Tomoum, Egyptologist at the Supreme Council of Antiquities.

Negotiations are made in the embassy now and a decision will be out soon.



Fig. 4. Field visit with the Dutch Embassy Group to Gebel Qatrani basalt quarries, September 14th, 2006

NSCE produced the first brochure, which introduces the project objectives, partners and the site to the reader. A series of thematic brochures will soon be developed so as to maximize the dissemination opportunity as much as possible.

REFERENCES

COCKE, E. 2006. *Gebel Qatrani Basalt Quarries, Literature Review*. Unpublished report.

From complex data to simple transmission: modelling the significance of ancient quarry landscapes

*E. Bloxam*¹

1. Institute of Archaeology, University College London, 31-34 Gordon Square, London, UK. WC1H 0PY e.bloxam@ucl.ac.uk

Introduction

“Isolated academic interest alone will be insufficient justification for expending public funds to protect local cultural resources... there has to be a link between this and a locally credible outcome or benefit. Until this is made, the long-term preservation aspect of Cultural Resource Management is unfinished.” (McManamon and Hatton, 2000: 13).

In Storemyr’s paper (this volume) ‘Reflections on Conservation and Promotion of Ancient Quarries and Quarry Landscapes’ he introduces (variations of) the model of ‘geoparks’ as a framework through which ancient quarry landscapes might be presented to the public. He looks not only at this concept, but also how thematic itineraries can be the ‘hook’ for presenting ‘largely incomprehensible features’ to a wide audience. Within this framework he draws attention to ‘Bibemus’ (Aix en-Provence) as an example of how quarries can be imaginatively re-defined and appeal to a viewing public with diverse interests. Bibemus achieves this by on the one hand satisfying the interests of those who want to see the technical and scientific aspects of quarrying in the past, and on the other, to the art-historian who wants to relive Cezanne’s walks through this landscape and stand where he stood when he created his paintings. Bibemus is a triumph of the imagination to those who created it, as it appeals to the ‘Western’ appetite for landscapes in several ways; it satisfies our views on landscape as being something that can be represented in paintings, and yet also provides this intriguing historical backdrop as a ‘lived’ landscape, a place of past human activity associated with the construction of the nearby city of Aix en-Provence. It has it all.

Yet, how feasible is it to transport such a ‘Western’ concept of landscape, or the geopark, across to the Eastern Mediterranean, in particular to Egypt? Moreover, as the opening quote clearly expresses, how do we develop models that have relevance and form an engagement on local, national and international levels. Essentially, we have to consider ways in which we can navigate our way through the complexities and outwardly incomprehensible nature of the archaeological record of ancient quarries to draw out their significance and value across a wide range of interests, often competing. As several commentators have concluded, we cannot underestimate the importance of local and national involvement and support if such landscapes are to stand any chance of being preserved in the long term (McManamon and Hatton, 2000: 10). In effect we have to utilise broad definitions, think of language and, most elusively, explore

the elements of these sites that form the link between those living in it and/or exploiting it today, with the past. This perhaps presents us with one of the most challenging aspect of the QuarryScapes project: how do we draw up a regime of significance and values that can embrace multiple local and national interests and yet deliver an appealing range of ‘viewing’ experiences across cultures.



Fig. 1: Chephren’s Quarry, near Abu Simbel, Lower Nubia, Egypt



Fig. 2: Gebel Gulab quarries (foreground); Nubian villages (background) West Bank Aswan, Egypt

In essence, how do we transform our databases, maps and scientific analyses of quarry data into something we can communicate to a diverse public. For this purpose the most fragile, invisible and seemingly most incomprehensible

quarry landscapes have been selected as case studies: Chephren's Quarry, Lower Nubia and Gebel Gulab, West Bank Aswan (Fig. 1, Fig. 2)

Chephren's Quarry

To archaeologists and geologists studying stone procurement in antiquity, the significance of Chephren's Quarry lies in the unsurpassed achievements in quarrying and transporting blocks of hard stone over 1000 km to the pyramid fields at Giza 5000 years ago. To pursue this end, the archaeological record presents a snapshot of how this was achieved through roughed-out object blanks, tools, loading ramps to facilitate transport of the stone, camps for the quarrymen and wells for water supply. The end product of these activities, most conspicuously the Khafre statues, are some of the finest achievements in stone crafting known in antiquity (Bloxam, 2005; Bloxam, 2003; Storemyr *et al.*, 2002; Harrell & Brown, 1994; Engelbach, 1938). Today, outside of those interested academics and professionals, Chephren's Quarry is largely invisible -situated in a remote, hyper-arid desert landscape where present human interaction is now associated with the building of canals as part of the Tushka Hydrological Project. Its aims are to 'make the desert green'. It would seem that stone procurement 5,000 years ago and canal building today, have little in common. Yet, they do have one important thread that connects them, both projects are inextricably linked to the local environment and climatic conditions of their time. We understand from the archaeological evidence that quarrying, transporting of stone and subsistence of the labour force was only possible due to favourable climatic conditions, namely the presence of water (Bloxam, 2003). The shallow wells suggest that drinking water was close to the surface and water to transport stone may have been possible through the Wadi Tushka to the Nile (Bloxam *et al.*, in press; Shaw & Bloxam, 1999). The few written sources, the Khufu Stele in particular, describes this landscape as being quite fertile, even an oasis where wine may have been produced called, the 'Place of Catching Birds' and 'Place-of-the Fisher' (Rowe, 1938: 394-5). The current Tushka Project is rather ironically trying to re-create these conditions, by trying to bring the water back. Yet in the process the developers (and national government) perhaps unknowingly, are destroying the evidence of a past that utilised and lived in the environment they are artificially trying to re-create today.

The Tushka Project is here to stay, so perhaps the message to get across is that as much as the canals are part of a necessary modern intervention in the landscape, there is added value associated with the integration and preservation of the evidence that it *was* a lived-in environment 5000 years ago. There could be much national political cachet and value attached to taking such a perspective, particularly linking the legacy of pharaonic royal power to achieve outcomes in this landscape as having significant reverberations into the present day. The 'geopark' concept could then enable us to bring the deep past and present together under an environmental theme – internationally this is one of the burning issues of the day. Moreover the controlling of water resources can often be seen as a principle thread in shaping

landscapes (McGlade, 1999). Although the end aims of stone quarrying 5000 years ago and canal building today differ, the imprint they have left on the landscape importantly reminds us, failed or otherwise, of the political, technological and ideological ambitions of their time.

Gebel Gulab

If the key theme at Chephren's Quarry is 'environment', then perhaps we can consider 'identities' as a means to model the complexity of the archaeological record at Gebel Gulab. This approach could be two-fold: nationally and locally the cultural embeddedness of the landscape at the cross-roads of two cultures (Nubian and Egyptian); internationally, as a journey to find hidden identities from a deep past.

Gebel Gulab visually cannot match or compete, on a superficial level, with the remains of elite quarrying visible in the Aswan Granite Quarries. From an academic and historical point of view, Gebel Gulab has an unsurpassed richness and diversity in its archaeological remains, situated in the production of locally consumed (and perhaps exported) grinding stones (Heldal *et al.*, 2005; Bloxam & Storemyr, 2005). Moreover, that it represents a 'lived' landscape spanning at least 15000 years, as evident from Palaeolithic rock inscriptions to modern graffiti. These traces that people left may be linked, in antiquity, to the production of grinding stones but also suggest the consistent human intervention in this landscape, with a strong Nubian influence.

Aswan, from antiquity to today, has always been on the cross-roads of two cultures – Nubian and Egyptian. Nubian and Egyptian identities co-exist in modern Aswan, as mediated through different languages and dwellings, with Nubian conurbations largely situated on the peripheries of the Gebel Gulab quarries. A distinct Nubian identity remains on the West Bank, even to the point where small artisan quarrying is specifically linked to local use of the stone for building their houses (Fig. 3).



Fig. 3: Artisan quarrying today at Gebel Gulab, Aswan

There is a social embeddedness in this landscape, given the evidence of a Nubian presence to at least 6000 years ago, such as Nubian A-Group burials and rock inscriptions, that modern Nubians are probably quite unaware of. Ethnicities

and identities are sensitive issues requiring a greater input at a local level in how to proceed, yet, it seems an imperative to find ways to communicate the ‘connectedness’ that present Nubian populations have to the cultural heritage on which they reside. Pride in the longevity of Nubian habitation in the area might be the fundamental ‘hook’ and how extraordinarily this ethnic identity has remained, through the ebb and flow of population movements and displacements, situated on the West Bank in Aswan.

The landscape of Gebel Gulab and its environs speak for itself in that it presents to the ‘Western’ eye, everyone’s idea of what a desert and river vista should look like. Yet, it has always been the paradox that what they are actually seeing is an industrial landscape, shaped and modified by quarrying and quarry infrastructure over thousands of years. Within the Bibemus model, perhaps there is the opportunity to devise a thematic concept in which tourists make a ‘journey of discovery’ to find hidden identities, places and routes that have been made through this landscape, as exemplified through the inscriptional record. Moreover, to see the diversity of ancient quarry landscapes, when compared with the ‘Obelisk’ quarry. On a national level, there is surely something value added here for authorities and tourist agencies to include in a tourist itinerary to Aswan other than the temple of Philae. Moreover, the Gebel Gulab quarry landscape provides a unique insight into a present-past of which almost nothing has equivalence in Egypt.

From an Egyptian perspective, it seems that if we are to have any hope in preserving these landscapes then we have to be drawing out from our databases and maps significance and values that have meaning and relevance across cultures and interests. The question in this paper has been: is the Bibemus model a valid and transportable framework through which we can all work? Moreover, can it work to the extent in which the all important financing of such ideas can be extrapolated from various agencies, with some commitment at a local level to aid in the preservation of such landscapes? If we are to realise the objectives of the ‘QuarryScapes’ project it would seem that we need to begin with having such dialogues first between ourselves.

REFERENCES

- BLOXAM, E. G. 2005. The Organisation and Mobilisation of Old Kingdom Quarry Labour Forces at Chephren’s Quarry (Gebel el-Asr) Lower Nubia. In: Cooke, A. & Simpson, F. (Eds.) *Current Research in Egyptology II*. Archaeopress, Oxford, 11-19.
- BLOXAM, E. G. & STOREMYR, P. 2005. The Quarries of Gebel Gulab and Gebel Tingar, Aswan. *Egyptian Archaeology* **26**, 37-40.
- BLOXAM, E. G., STOREMYR, P., & HELDAL, T. In press. Hard Stone Quarrying in the Egyptian Old Kingdom (3rd Millennium BC): Rethinking the Social Organisation. Paper presented at ASMOSIA VII: the Seventh International Conference on Interdisciplinary Studies on Ancient Stone, Thassos, Greece.
- ENGELBACH, R. 1938. The Quarries of the Western Nubian Desert and the Ancient Road to Tushka. *Annales du Service des Antiquités de l’Egypt* **38**, 369-390.
- HARRELL, J. A. & BROWN, V. M. 1994. Chephren’s Quarry in the Nubian Desert of Egypt. *Nubica* **3/1**, 43-57.
- HELDAL, T., BLOXAM, E., STOREMYR, P. & KELANY, A. 2005. The Geology and Archaeology of the Ancient Silicified Sandstone Quarries at Gebel Gulab and Gebel Tingar, Aswan. *Marmora: International Journal for Archaeology, History and Archaeometry of Marbles and Stones* **1**, 11-35.
- MCGLADE, J. 1999. Evolution of cultural landscapes. In: Ucko, P. J. and Layton, R. (Eds) *The Archaeology and Anthropology of Landscape: shaping your landscape*. Routledge, London, 458-482.
- MCNAMANON, F. P. & HATTON, A. 2000. *Cultural Resource Management in Contemporary Society: Perspectives on managing and presenting the past*. Routledge, London.
- ROWE, A. 1938. Provisional notes on the OK inscriptions from the diorite quarries. *Annales du Service des Antiquités de l’Egypt* **38**, 391-396.
- SHAW, I. M. E. & BLOXAM, E. G. 1999. Survey and Excavation at the Ancient Pharaonic Gneiss Quarrying Site of Gebel el-Asr, Lower Nubia. *Sudan and Nubia* **3**, 13-20.
- STOREMYR, P., BLOXAM, E. G., HELDAL, T. & SALEM, A. 2002. Survey at Chephren’s Quarry, Gebel el-Asr, Lower Nubia. 2002. *Sudan & Nubia* **6**, 25-9.

Reflections on Conservation and Promotion of Ancient Quarries and Quarry Landscapes

Per Storemyr

Geological Survey of Norway, N-7491 Trondheim, per.storemyr@ngu.no

Introduction

As evidence of past production, most ancient quarries and quarry landscapes are difficult to protect, difficult to manage and difficult to present to a lay audience, hence the almost complete lack of ancient quarries on the World Heritage List.¹ Though quarries may cover vast areas and be of immense archaeological significance, they are rarely "monumental" and thus largely incomprehensible without special knowledge and/or special guidance by well-informed persons. In essence, there are few examples of ancient quarry conservation and presentation projects which may be regarded as successful. This stands in contrast to protection and conservation of mines: as an example, in the German-speaking part of Europe 220 "visitor mines" are listed.² Seven historic mining areas are also found on the World Heritage List.³ This does not imply that quarries are less important than mines, but probably that mines might present more "exciting" places for a lay audience. Visiting a deep mine conjures up a rather more exciting prospect than perusing practically invisible surface quarries or a quarry face that looks like a natural cliff.

Within a general framework comprising the whole conservation process, this paper intends to briefly describe current promotion regimes as applied to ancient quarries, with examples from Egypt, Norway, Switzerland, France and Italy.⁴ The paper is by no means meant to be exhaustive; it merely aims at a preliminary search for positive models that might apply to the promotion of ancient quarries in general and QuarryScapes work in the Eastern Mediterranean in particular.⁵

The conservation process

Simplified, conservation of cultural resources, including ancient quarries, is a three-step process:

- *Legal protection*: official listing of the resource
- *Physical preservation* or "primary" management: dealing with the risks, making sure that the resource is kept intact⁶
- *Promotion and use* or "secondary" management: enhancement and visitor management, linking the resource to other resources

It is important to recognise that these steps are rarely linear but feed into each other in multiple ways. For example: in quarries it is very typical that *ad-hoc* research and local promotion are carried out just by interested individuals working on a voluntary basis. Hence, official listing may result from such work identifying new risks facing the quarry. Later, archaeological, ethnological and geological research, as well as preservation may take more professional forms and the quarry presented to a wider audience.

Due to current legislation, *legal protection* mostly take place in two ways; either the quarry can be listed as a traditional, "single" archaeological site or it can be included within an archaeological ensemble. Legal protection follows national legislation and international conventions, normally undertaken by national cultural heritage authorities, according to professional criteria of significance, value and age.

Physical preservation of the resource implies dealing with the man-made (e.g. urban, industrial and agricultural development, modern quarrying, vandalism, theft, tourist pressure) and natural risks (e.g. weathering, catastrophic events like flash floods), in order to keep the resource intact. This is primarily the duty of the cultural heritage authorities, usually in cooperation with environmental and (urban) planning authorities and other relevant professional institutions.

Promotion and use of the resource is a diverse task. First of all, it is dependent on the actual setting of the quarry or quarry landscape. This might be within a mainly natural landscape (meaning very little transformed by humans), an ancient cultural landscape or a living cultural landscape (including urban- or cityscapes), which might or might not be protected as such. The landscape might be remote or close to towns and cities. Within such various settings, ancient quarries are typically presented to the public as single archaeological sites, as part of archaeological ensembles, as compact outdoor museums, within nature reserves, within modern quarries with long traditions, or, *rarely*, as part of larger Geoparks and thematic itineraries.

Ancient quarries as archaeological sites and ensembles

In Norway, as in many European countries, old quarries are automatically protected as archaeological sites because of their age.⁷ Many such quarries may be a focus for research;

few are excavated and may experience a short period of public interest during such investigations, later to be forgotten as the archaeologists have left and local initiatives fade out. Still, some may remain as small, but solid landmarks for a mainly local audience. Although the landscape surrounding the quarries until recently rarely has been considered, the quarries are at least legally protected and considered in land-use planning.

But there are exceptions to this general scheme, exemplified by the Hyllestad millstone quarries in Western Norway.⁸ This is a large quarry landscape (about 30 km²) with a history of export of millstones, situated in a spectacular fjord landscape – a sparsely populated, rather remote place where strong local interest is about to turn the quarries into an economic development factor. All sorts of activities are related to the quarries; typically arts and crafts for both adults and children, and the quarries are actively used in promoting the area for tourism; the quarries are one of the main points of interest in the commune.

At the other extreme are the gigantic limestone quarries at the pyramid fields from Giza to Dashur in Egypt, including quarries on the East Bank of the Nile (e.g. Tura and Mokattam). Many of these are also protected as being part of the Pyramid World Heritage Site – but hardly anybody of the millions of Egyptian and international visitors knows the quarries are there, let alone understand their significance. Completely overshadowed by the pyramids both physically and economically, there is no essential need to promote the quarries to visitors. This is an important lesson; insofar that one cannot expect to obtain any great interest for the less visible parts of a famous or grand site without targeted marketing to a select audience in order to make the quarries more visible than they actually are in the *minds* of people.⁹

Ancient quarries as compact outdoor museums

Some ancient quarry sites such as Hyllestad have small visitor's centres and trails attached, sometimes staffed, that could be considered outdoor museums. In Aswan, the famous Unfinished Obelisk Quarry represents a compact outdoor quarry museum and is perhaps the most visited quarry in the world. However, the museum is very traditional in the sense that it does not consider the broader, unique, 15-20.000 year old Aswan quarry landscape. It focuses mainly on the New Kingdom obelisk itself. The same arguments as for the pyramid sites might also apply to Aswan (the "invisible" quarry landscape is overshadowed by the "monumental", unfinished obelisk). Again, as for the pyramid quarries, if there is a wish to promote the quarry landscape, one probably has to think in terms of targeted development for specific groups of visitors.

Ancient quarries within modern quarries

Like Aswan, many ancient quarries feature a long history of extraction and were active until recently or even until today. In Aswan the recent history and current exploitation of granite and sandstone are not part of what people experience on a visit to the obelisk museum. In contrast, the historic,

recent and current exploitation of another famous quarry landscape, Carrara in Italy, is integrated to a coherent whole in the "Marble Museum" in the city, from where guided or individual tours to the truly spectacular modern and remaining ancient quarries can be made,¹⁰ and also to active ateliers and other quarry and stone related attractions.

Whereas in Aswan modern quarrying commenced only 100 years ago after a break of 1000-2000 years, Carrara has had a more or less continuous exploitation since the Roman period, thus the historic quarrying tradition is still very much alive. In Norway, it is also not difficult to promote old or more recent quarries with more or less unbroken quarrying traditions until today to local and non-local visitors. Local interest and initiatives are usually very much connected to the stories grandfather and grandmother told about the work in the quarries and life in a quarrying community. In Aswan it is much more difficult for local people to construct the link between Pharaonic, Roman and modern quarrying, a situation that needs to be addressed within the QuarryScapes project.

Ancient quarries within nature reserves

Carrara is part of and also partially promoted through the Alpi Apuane nature reserve.¹¹ Nature reserves often cover vast expanses of land and might be ideal "containers" for large ancient quarry landscapes. Within a nature reserve, the quarries *may* enjoy stronger legal protection than outside and physical preservation will sometimes be secured. *Parco Marmite dei Giganti* in the outskirts of Chiavenna is another Italian example of integration of natural phenomena and ancient quarries.¹² It features the largest ancient soapstone quarry area in Europe (active from before the Roman period until about 1850) within a nature reserve focusing on geological phenomena. A private soapstone workshop, as well as a public outdoor and indoor museum situated by the large Roman "Caurga" quarry is attached to the reserve, which features various sign-posted trails. We are not familiar with the annual number of visitors to the reserve, but upon visiting, one gets the impression of a protected area rooted in the local community – important for Chiavenna from a tourist perspective.

Nature parks are of great importance in Italy, covering 10% of the country's area and including a great variety of nature and culture themes and activities.¹³ Nature reserves in Egypt also cover some 10% of country, a figure that might be almost doubled in the years to come.¹⁴ Mainly located in rather remote desert areas, the reserves feature quite a few quarry landscapes, for instance Sikait in the Wadi Gemal Protectorate in the Eastern Desert in SE-Egypt. As an ancient emerald extraction area, Sikait should rather be characterised as a mining landscape, but since its general layout is very similar to the great Roman quarrying areas in other parts of the Eastern Desert, it is included here as an example. Although various physical conservation activities have been carried out by foreign expeditions, it is uncertain whether Sikait enjoys legal protection as an archaeological site, but its preservation is at least reasonably well secured as part of the nature reserve. Like most sites in the Eastern Desert, the area is still too remote to attract many visitors,

but one might foresee a future of larger interest, as the nearby Red Sea region is now being heavily developed for tourism.

Contrary to the Chiavenna example above, Sikait and the many other archaeological sites in Wadi Gemal are not part of any official promotion – natural phenomena are seemingly considered the "main thing" of the reserve. Integration of natural and cultural heritage has also until recently been difficult in another Egyptian nature reserve, Lake Qarun in Northern Faiyum, in which the unique Widan el-Faras Old Kingdom basalt quarries (and many other archaeological sites) are located. It seems clear that both natural and cultural heritage would greatly benefit from a better integration, meaning that an intimate collaboration between cultural heritage and environmental authorities ought to be developed. As a result of the current proposal to include the Northern Faiyum on the World Heritage List, and partially on initiative from QuarryScapes,¹⁵ the situation might improve here and the Northern Faiyum could become a model for other Egyptian nature reserves.

Ancient quarries as part of Geoparks

A "Geopark" is a recent concept and in a sense it takes nature reserves a step further by integrating, coordinating and promoting various natural (mainly geologic) and cultural sites and landscapes within a larger area.¹⁶ In Europe there is a network of national geoparks and international conferences are kept regularly.¹⁷ An UNESCO initiative in its preparatory phase has launched the concept of UNESCO Geoparks. Citing from their website, such a Geopark:¹⁸

- Is a territory encompassing one or more sites of scientific importance, not only for geological reasons but also by virtue of its archaeological, ecological or cultural value;
- Will have a management plan designed to foster socio-economic development that is sustainable (most likely to be based on geotourism);
- Will demonstrate methods for conserving and enhancing geological heritage and provide means for teaching geoscientific disciplines and broader environmental issues;
- Will be proposed by public authorities, local communities and private interests acting together;
- Will be part of a global network which will demonstrate and share best practices with respect to Earth heritage conservation and its integration into sustainable development strategies.

In other words: Geoparks are the "inorganic" counterparts to UNESCO Biosphere reserves.¹⁹ Like in nature reserves, a site located in a Geopark does of course not "automatically" become legally protected and physically preserved. For archaeological sites integrated into a Geopark, these issues will still be the responsibility of the relevant authorities. However, a Geopark may work as a vehicle for promoting the site, both in terms of preservation and presentation to the public. Moreover, a Geopark might aid the public understanding of the importance of landscape, both natural

and cultural. Thus it appears highly relevant to ancient quarry landscapes, which often cover very large tracts of land – and rightly can be regarded as both natural (the geologic resource) and cultural (the exploitation process).

The Swiss "Geopark Sarganserland-Walensee-Glarnerland" mainly focuses on the origin of the Alps (the main Alpine overthrust), although several ancient and modern quarries and mines are included, for instance the famous "Landesplattenberg" underground slate quarries with several hundred years of history.²⁰ These quarries also feature various types of fossils and are managed as an individual entity, but also promoted through the Geopark. It is unknown to us whether the status as a member of the Geopark has made any difference with regard to promotion. Generally, this issue should be investigated further within QuarryScapes in order to obtain solid data on the benefits of Geoparks for ancient quarries and quarry landscapes.

In many landscapes with important ancient quarries there will be no geological phenomena to justify the development of a Geopark. For such areas the Geopark *concept* might still be interesting, but then rather as "thematic parks" coordinating and promoting ancient quarries and other natural and cultural resources.²¹

Ancient quarries as part of thematic itineraries

Independent of the various frameworks of legal protection, physical preservation and promotion, it is usually the quality of the on-site, practical presentation and visitor management that will determine whether people want to come back to a site. An ancient quarry to which one definitely wishes to return is Bibemus, situated on the outskirts of Aix-en-Provence in Southern France. Bibemus delivered yellowish molasse sandstone for Aix and other places from the Roman period until the late 19th century and is found within a local nature reserve. The quarries are situated on a forested plateau and feature an impressive "labyrinth" of quarry faces, pits and quarry roads. For professionals the quarries are striking and incredibly interesting; for the lay person they might perhaps be exciting like mines often are. What makes these quarries special today is the fact that the world-famous painter Paul Cézanne had an atelier here and used the quarries extensively as motifs for his paintings. This aspect is what has been taken advantage of in the promotion of the quarries.

For the 2006 centennial of the death of Cézanne, the quarries have been developed for tourism as part of a Cézanne thematic itinerary in Aix, also including two other sites (his studio and the Jas de Bouffan estate).²² The trail through the quarries include a small visitor's centre within a Roman underground quarry and a 1 h walk along quarry roads, to impressive quarry faces and to points where the landscape can be admired. However, the most important elements of the trail are small platforms, from where there are views to the quarry motifs Cézanne painted; and on the platforms are inserted small copies of the actual paintings. As the visitor's centre, the trail and the platforms are made in a subtle way with minimal disturbance of the quarry landscape. Judging from the public interest in 2006, when most guided tours

were fully booked, the concept must be regarded a great success.²³

Clearly, this success is based on narrative – a story of Cézanne in his beloved quarry. It would have been impossible to achieve the same public interest without the famous painter. A similar concept has been developed in the Wold Heritage City of Berne in Switzerland, where the Ostermundigen sandstone quarries, which supplied the city from the Middle Ages onwards, are part of an itinerary following in the footsteps of the painter Paul Klee.²⁴

Despite the fact that most quarries were not used as backdrops for famous paintings, we believe that the concept of thematic itineraries and narrative might greatly enhance the understanding of a place, which at first glance is rather incomprehensible to lay people. Finding *the* theme attached to the quarries, using it as a "hook" for presenting it, might give added value and a focus for lay people; it may aid in bringing messages of the significance and value of such places across. The underground labyrinth of limestone quarries below Paris is an example where narrative has been used in the presentation.²⁵ The quarries are part of the city's catacombs, which naturally become a main point of interest for lay people.

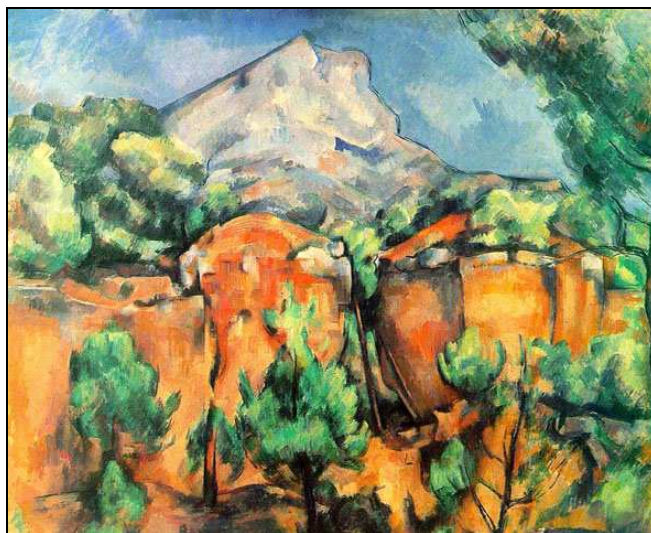
For QuarryScapes case studies,²⁶ a possible thematic itinerary/narrative could be following the stone from quarry to monument. This concept ought to have some potential for the Widan el-Faras quarries in Faiyum (Egypt): Starting at the pyramid fields where the basalt was used, one could follow the stone from the extraction place, along the desert and river transportation route and back to the pyramids. Simultaneously, the visitors would get familiar with the important archaeological and environmental history of the Faiyum region and Faiyum as a living oasis. At Greco-Roman Sagalassos (Turkey), the main narrative would naturally be linking the local and regional quarries to the buildings in the city.²⁷

Concluding remarks

Quarries and quarry landscapes, like the Unfinished Obelisk in Aswan and Carrara in Italy, literally promote themselves due to monumentality or spectacular landscape. In most other cases promotion is much more difficult. All quarries cannot be promoted for visitors, but the more people learn about quarries, the easier it is to protect them. Thus, to a large extent, legal protection and physical preservation is dependent on promotion.

In this paper, we hope to have presented a range of examples that may be a starting point for both more general and more specific discussions on conservation and promotion of quarries. Each quarry has its special history (and special story) and its particular setting in the landscape. How to preserve and promote must take advantage of these factors. The sheer diversity of ancient quarries makes it difficult to find any general "promotion rules". However, it would seem that promotion must be rooted in the local community; strong local interest is probably the most important factor of success. Also, very clear ideas of what one wishes to present for whom – and within which framework and context – are vital.

Although we believe that variations of the Geopark and thematic itinerary concepts are especially worthwhile discussing for future work on promotion of ancient quarries, the examples in this paper are mainly from a European context and seen with European eyes. How the concepts presented might apply in an Eastern Mediterranean socio-cultural and political context will be a matter of much debate.²⁸



The Bibemus quarries in Aix-en-Provence (Southern France), as seen through the eyes of Paul Cézanne in c. 1897²⁹ and a camera lens today.

Acknowledgements

The author wants to thank Elizabeth Bloxam, Tom Haldal and Adel Kelany for many discussions about conservation and promotion of quarry landscapes. This work was supported by the QuarryScapes project (contract no. 015416 of the EU 6th framework programme, specific targeted research project).

¹ For an introduction and definition of quarry landscapes, see the website of QuarryScapes (www.quarryscapes.no). See also Storemyr, P. & Haldal, T. In press. Ancient Stone Quarries: Vulnerable Archaeological Sites Threatened by Modern Development. *Proceedings of the 7th international conference of the Association for the Study of Marble and Other Stones in Antiquity (ASMOSIA)*, Thassos, Greece, 15-20 September 2003 and Haldal, T., Bloxam, E., Storemyr, P. In press. Unravelling

ancient stone quarry landscapes in the Eastern Mediterranean: the QuarryScapes project. *Proceedings of the Broadening Horizons Congress*, Ghent, February 2006. Abstract online at: <http://www.broadeninghorizons.ugent.be/indexUK.htm>, full paper will be published by Cambridge Scholars Press. The only site that is listed by virtue of its qualities as a "quarry" on the World Heritage List is the Neolithic flint "mines" at Spiennes in Belgium (<http://whc.unesco.org>). However, a few other sites on the list include quarries, such as the pyramid fields in Egypt.

² Germany, Austria and Switzerland (including also a few with German websites from other countries, see www.roscheiderhof.de/icom/besucherbergwerke.php5?Art=Land.

³ <http://whc.unesco.org>

⁴ All the areas mentioned have been visited by the author as a (very!) interested tourist between 2000 and 2006.

⁵ See further discussion in Bloxam, E. (this volume).

⁶ In some cases conservation ends here; there might be no opportunity or wish to present the resource to the public.

⁷ In Norway all cultural heritage resources older than 1537 are automatically protected (www.riksantikvaren.no). This of course does not mean that physical preservation automatically will take place. Many ancient quarries in Norway have been destroyed because people – and the authorities – did not know of their existence or significance. See also Storemyr, P. & Heldal, T. In press, *op.cit.*

⁸ www.kvernstein.no

⁹ Similar arguments will apply to the promotion of the local and regional quarries used for building the Greco-Roman Sagalassos in Turkey. This is a QuarryScapes case study, see Degryse *et al.* (this volume).

¹⁰ www.vacanzeinversilia.com/eng/museodelmarmo.html,

<http://giove.cnuce.cnr.it/Museoeng.html>

¹¹ www.parcapuane.toscana.it,

www.parks.it/parco.alpi.apuane/Eindex.html

¹² Chiavenna is in the Italian Alps, see

www.parks.it/riserva.marmite.dei.giganti/par.html

¹³ www.parks.it

¹⁴ Egypt State of the Environment Report 2004, www.eaaa.gov.eg/English/info/report_soe2005.asp

¹⁵ See brief description of the Faiyum quarry landscape at www.quarryscapes.no and forthcoming reports about the Faiyum that will be available from this website.

¹⁶ See Megerle, H. (Ed.) *Geotourismus. Innovative Ansätze zur touristischen Inwertsetzung und nachhaltigen Regionalentwicklung. Geographie in Wissenschaft und Praxis 1*. Marc Oliver Kersting – Wissenschaftlicher Verlag, 254 p. Short introduction also at <http://de.wikipedia.org/wiki/Geopark>

¹⁷ www.europeangeoparks.org

¹⁸ www.unesco.org/science/earthsciences/geoparks/geoparks.htm

¹⁹ www.unesco.org/mab/index.shtml. There are also similarities between Geoparks and the concept of "Ecomuseum", see <http://en.wikipedia.org/wiki/Ecomuseum>

²⁰ www.geopark.ch, www.plattenberg.ch

²¹ Such a park would have similarities to a nature reserve (as the Italian examples mentioned above) or a promoted archaeological ensemble, but have a stronger focus on one or more themes (see further discussion in Bloxam *et al.* (this volume).

²² www.aixenprovencetourism.com/uk/aix-visite-cezanne-2006.htm

²³ The quarries can at the moment only be visited as part of guided tours.

²⁴ This public itinerary is linked to the new Paul Klee Centre, www.paulkleezentrum.ch. For the quarries, follow the links to "Surrounding area" and "Wege zu Klee".

²⁵ http://en.wikipedia.org/wiki/Catacombs_of_Paris

²⁶ See description at www.quarryscapes.no

²⁷ See Degryse *et al.* (this volume).

²⁸ See further discussion in Bloxam, E. (this volume).

²⁹ "Le Mont Sainte-Victoire vu de la carrière Bibemus", Baltimore Museum of Art, picture from: www.artchive.com/artchive/C/cezanne/mtsv_bib.jpg.html

Keywords

Al Jafr	5	Jordan	5
Aksaray	19	NSCE	25
Ankara	17, 21	Old Kingdom	11, 27
Byzantine	21	Petrography	5, 11
Chephren's Quarry	27	Public awareness	25, 31
Chert	5	Roman	7, 17, 21
Concept guidelines	15, 25	Sagalassos	7
EAIS	15	SCA	23
Egypt	11, 15, 23, 25, 27	Selçuk	19
Faiyum/Fayoum	11, 25	Site significance	15, 25, 31
Gebel Gulab	27	Site Management	15, 25, 31
Geochemistry	7	Stakeholders	25, 31
Geology	5, 7, 11, 17, 19, 21	Stone provenance	5, 7, 11
Geoparks	31	Supreme Council of Antiquities	23
GIS	15	Tools	5, 11
Gypsum	11	Turkey	7, 17, 19, 21
Hittite	17, 21	Umm-es-Sawan	11

List of Authors

Abu-Jaber, N.	5
Akoğlu, G.	17, 19
Al Qudah, M.	5
Al Saad, Z.	5
Amin, N.	15
Bloxam, E.	7, 11, 27
Caner-Özler, E.	17, 19
Caner-Saltık, E.	17, 19
Cocke, E.	25
Degryse, P.	7, 11
Güney, A.	17, 19
Heldal, T.	7, 11
Kelany, A.	11, 23
Rakha, H.	25
Shawarby, A.	15
Storemyr, P.	7, 11, 31
Sülüner, S.	21
Tavukçuoğlu, A.	17, 19
Topal, T.	17, 19
Waelkens, M.	7
Yaşar, T.	17, 19

