

**Bread for the People:
The Archaeology
of Mills and Milling**

Proceedings of a colloquium held in the
British School at Rome 4th - 7th November 2009

Edited by

David Williams

David Peacock

BAR International Series 2274

2011

Published by

Archaeopress
Publishers of British Archaeological Reports
Gordon House
276 Banbury Road
Oxford OX2 7ED
England
bar@archaeopress.com
www.archaeopress.com

BAR S2274
Southampton University Archaeology Monographs no 3

Bread for the People: The Archaeology of Mills and Milling. Proceedings of a colloquium held in the British School at Rome 4th - 7th November 2009

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ISBN 978 1 4073 0848 7

Printed in England by

All BAR titles are available from:

Hadrian Books Ltd
122 Banbury Road
Oxford
OX2 7BP
England
www.hadrianbooks.co.uk

The current BAR catalogue with details of all titles in print, prices and means of payment is available free from Hadrian Books or may be downloaded from www.archaeopress.com

Visualising the Invisible: re-discovering the ancient grinding stone quarries of the Aswan West Bank, Egypt

Elizabeth Bloxam

Introduction

As this volume of papers demonstrates, many important advances have been made in the study of European millstone quarries, particularly in terms of enhancing our understanding of how major transitions in food production impacted on millstone production over time. By comparison, our understanding of the procurement and distribution of grinding stones (millstones) in ancient Egypt lags significantly behind, such studies being a low research priority in preference to stone procurement for ‘elite’ objects and royal monuments. Questions relating to the interplay between procurement of high-quality hard

stones for ornamental purposes, as well as for domestic utilitarian use, tend to be overlooked. As a consequence, studies of ancient quarries rarely investigated or even recognised the extent to which prestige stone sources had long histories of appropriation, often associated with a primary utilitarian use of the resource for the processing of food.

Covering a 12 kilometre stretch of hyperarid desert from the Wadi Kubbaniya in the north to the old Aswan Dam in the south, the large deposits of silicified sandstone (often termed ‘quartzite’) that span the Aswan West Bank, were first noted as a place of *only* pharaonic period quarrying (3rd – 1st millennium BC) for ornamental objects by De

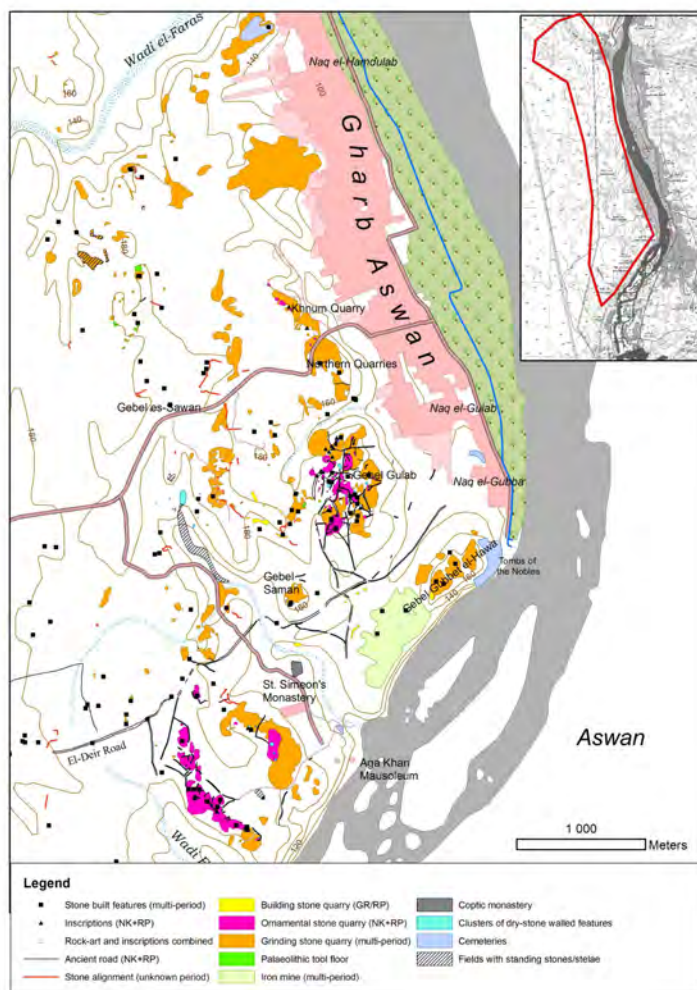


Figure 1. Map of the Aswan West Bank showing major areas of grinding stone and ornamental stone quarries surveyed during the ‘QuarryScapes’ project. Inset map shows the full extent of the quarry landscape from Wadi Kubbaniya in the north to the Old Aswan Dam in the south. Map produced by Tom Heldal and Per Storemyr.



Figure 2. View towards the Aswan West Bank ancient quarry landscape; centre foreground Elephantine Island; background left the ornamental and grinding stone quarries at Gebel Gulab.

Morgan (*et al.* 1894, 125-7) in the late 19th century. Even into the 1960s and 1980s, research of the quarries only recognised the Aswan West Bank as a place of essentially New Kingdom (1550-1069 BC) and Roman Period (30 BC – AD 395) ornamental quarries, centred on two main gebels (hills) at Gebel Gulab and Gebel Tingar (Habachi 1960; Klemm and Klemm 1993, 289-303; 2008, 219-31) (Fig. 1). Easily visible by large amounts of quarry waste that cascades down the sides of the gebels and ramps constructed to transport the stone down to the Nile, the Aswan West Bank was established as a major source of ‘quartzite’ for royal and elite ornamental objects. These quarries being second only to that of Gebel Ahmar, 800 kilometres north near Cairo.

During the ‘QuarryScapes’ project (2005-2008), a multi-disciplinary team of researchers returned to the Aswan West Bank quarries with the objective of building on this earlier work by undertaking a more thorough investigation

of the ornamental stone quarries and to characterise all the material culture associated with them (Bloxam *et al.* 2007). During these investigations it became clear that ornamental stone quarrying was a minor activity in comparison to 16,000 years of grinding stone production, from the Late Palaeolithic (18,400 – 18,100 BP) into the early Roman period (30 BC). This discovery has led to a complete revision of how we visualise archaeologically grinding stone quarries and their implications to understanding the early history and longevity of quarrying along the Aswan West Bank. Findings from this research are discussed below.

The silicified sandstone of the Aswan West Bank: a brief history of consumption

The properties of silicified sandstone (quartzite) in terms of hardness, durability, abrasion and aesthetics were all qualities that made this one of Egypt’s most sought-after

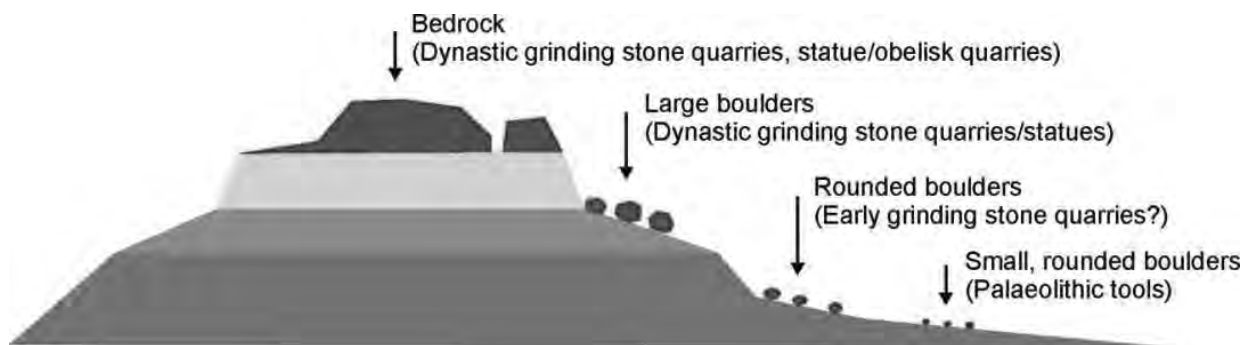


Figure 3. Schematic cross-section of a typical Aswan West Bank gebel (hill) showing the distribution of silicified sandstone (top layer and boulders) and areas of exploitation through time. Produced by Tom Heldal.



Figure 4. Saddle quern (silicified sandstone) found in Old Kingdom settlement levels on Elephantine Island.



Figure 5. Head of Nefertiti in the gold variety of silicified sandstone (quartzite), Egyptian Museum, Cairo.

stones in antiquity. In simplified terms, silicified sandstone is sandstone that has been cemented with silica, this giving the stone its hardness, extra abrasive qualities as well as its ‘glittering’ appearance (Heldal *et al.* 2007, 51-67; Bloxam 2007, 5-6; Heldal 2009, 134). The most durable and harder of the silicified sandstones are the brightest in colour and so the pure gold/yellow and purple varieties were the most sought-after for ornamental objects. As these hardest varieties cap the sandstone and mudstone gebels, this is where we find almost all of the ornamental stone quarries, together with their networks of roads (Bloxam *et al.* 2007; Heldal and Storemyr 2007, 102-22) (Figs. 1 and 2). Weathering of these caps has caused blocks to also fall down the sides of the gebels and it is these loose blocks that were utilised by the earliest Lower Palaeolithic tool makers and later grinding stone producers (Heldal 2009, 136-42) (Fig. 3).

The Aswan West Bank still provides us with a relatively well-preserved window into several episodes of quarrying for a range of products, covering a time depth from the Lower Palaeolithic into the Roman period. The key



Figure 6. Foreground: part of the Late Palaeolithic grinding stone quarries/workshop between low gebels of silicified sandstone. Background: the Wadi Kubbaniya.

properties of silicified sandstone such as durability and hardness made this the resource of choice for mobile groups of hunters in the Lower Palaeolithic. Evidence of Acheulean tool making industries for producing hand-axes and cleavers were located in several places and so establishing a time-depth to the first exploitation of the resource to at least 350,000 years ago with *Homo erectus/Homo ergaster* (Bloxam *et al.* 2007; Heldal and Storemyr 2007, 72-77, 132-34; Bloxam and Moloney 2009). The stone’s abrasive properties were clearly recognised by some of the earliest semi-permanent settlers in the Nile Valley for the grinding of early cultigens from at least the Late Palaeolithic, 18,400 – 18,100 BP (Wendorf and Schild 1989; Roubet 1989). Its use for grinding continuing into the early Roman period (30 BC) (Fig. 4).

Aesthetically, the stone’s ‘glittering’ properties and its spectrum of colours from gold to purple were recognised by early elites, when cut and polished, as providing a beautiful medium for ornamental objects (Fig. 5). By the 3rd millennium BC (Old Kingdom, 4th Dynasty 2613 BC) silicified sandstone became one of Egypt’s most sought-after stones for prestige royal objects and became symbolically associated with the rise of the solar gods (Quirke 2001, 76; Bloxam *et al.* 2007, 38-9, 42-3). This connection peaked during the early New Kingdom (mid 18th Dynasty 1390 BC) when there was a re-focussing of religious ideas to solarise the major cults of Egypt (Kozloff *et al.* 1992, 76, 110). Hence, the New Kingdom forms the longest and most intensive period of ornamental stone production, particularly between the reign of Amenhotep III and Seti I (1390 – 1279 BC). Its appeal for ornamental products gradually declined by the end of the New Kingdom, with sporadic consumption occurring into the Roman period.

Although today the non-silicified sandstone deposits are mainly used to build nearby Nubian houses, it is important to recognise that human exploitation of the Aswan West Bank’s stone resources has been an almost

continuous activity since the Lower Palaeolithic. Even during the resources' consumption for ornamental objects by the pharaonic era (3rd millennium BC), its use for grinding stones was always maintained into the early Roman period. Perhaps these earliest uses of the stone in Prehistory and its key role in the processing of food may have remained integral to the stone's name in antiquity, as written sources and hieroglyphs inscribed on some New Kingdom silicified sandstone objects refer to the stone as *inr n bnwt* - the primary meaning of *bnwt* being 'millstone' (Harris 1961, 75-6; Bloxam *et al.* 2007, 38-9).

Unravelling the history of grinding stone production along the Aswan West Bank

Late Palaeolithic (18,400 - 18,100 BP)

Although the discovery of extensive grinding stone production along the Aswan West Bank was made during the 'QuarryScapes' project in 2005, the Late Palaeolithic (18,400 and 18,100 BP) precursor to this 'industry' had been identified 20 years previously (1980s) in the Wadi Kubbaniya (Roubet 1989, 589-608 in Wendorf and Schild 1989) (Fig. 1). Situated in the northernmost reaches of the Aswan West Bank, the grinding stone quarries or 'workshops' are located at the nearest source of silicified sandstone between a series of low-rise gebels, 200 metres north of the Late Palaeolithic settlements (Site E-82-1, Roubet 1989) (Fig. 6). Here, the stone occurs as loose boulders that were split to make thick slabs and then trimmed by re-touching with locally sourced hammerstones. Final shaping occurring in the settlements (*op. cit.*).

Representing one of the first occurrences of grinding stones in the Nile Valley, the procurement and use of these objects is directly related to fundamental changes in subsistence

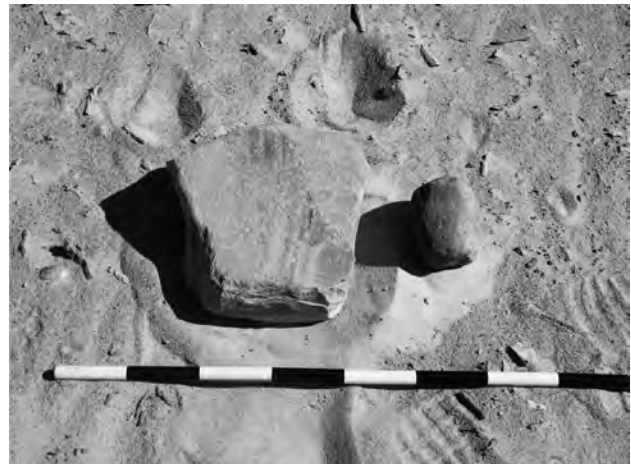


Figure 7. Left: base silicified sandstone grinding stone with smooth concave surface; right: hand-held rubber (silicified sandstone) used for grinding. Late Palaeolithic settlement, Wadi Kubbaniya.

patterns during the Late Palaeolithic. Such changes have been related to a broadening of subsistence from just hunting of large mammals, to include a range of local (wild) floral resources such as wheat, barley and wetland nut-grass tubers that clearly required grinding (Wendorf and Schild 1989, 820-1). The grinding stones occur in both the settlement and quarries in a variety of shapes: oval/suboval, rectangular, triangular and other irregular shapes, which were primarily used as base-stones (site E-78-3, *op. cit.*). A small roughly squared hand-pebble of silicified sandstone or other locally sourced hard stone was then used to grind the material, causing many of the base-stones to have a smooth concave surface (Fig. 7). This is when the 'oval' or boat-shaped grinding stone emerges as probably the precursor to the later 'saddle quern' (Banks 1980, 241; Roubet 1989, 427-73). Even though this discovery was extremely important, these researchers did not realise that grinding stone production in the Wadi Kubbaniya was just



Figure 8. Predynastic grinding stone quarry represented by a sand-filled depression (marked with the scale) and surrounded with workings. Gebel es Sawan.

the ‘tip of the iceberg’ to an ‘industry’ that spanned 16,000 years and covered an area of almost 60 square kilometres.

Predynastic (4th millennium BC)

The grinding stone quarries discovered by Roubet (1989) in the Wadi Kubbania more or less set the standard in terms of how these objects were produced for several thousand years, into the Predynastic (4th millennium BC). Although by the Predynastic the centre of grinding stone production moves south-west and becomes concentrated at Gebel es-Sawan (Bloxam 2007, 9-10; Heldal and Storemyr 2007) (Fig. 1). ‘Quarries’ may be a rather over-stated term for these scattered areas of working loose silicified sandstone boulders, which are consequently some of the most difficult sites to visualise. These workings, or quarries, usually occur as small pits or sand-filled depressions surrounded by small amounts of waste, broken tools and oval shaped grinding stones (Fig. 8). Using similar production techniques as found in the Wadi Kubbania, a boulder measuring about one metre across was first worked by peeling the weathered exterior by hammering with locally sourced tools to produce a squared ‘core’. This was then split along the sandstone bedding planes into one or a few rough-outs (Heldal and Storemyr 2007, 86-7). Similar to the Wadi Kubbania quarries, final shaping of the grinding stone would have occurred in the settlements.

Dating these quarries more accurately is difficult because unlike the Wadi Kubbania, there are no known settlements in the area that can be directly connected with them. There is also an absence of datable organic material in the quarries and ceramics are negligible. A Predynastic date is proposed from indirect evidence related to technology of production, grinding stone shape and from the amount of weathering (Heldal and Storemyr 2007, 97-102). In essence, we see a refining of the boat-shaped or oval form by the Predynastic, given their occurrence in settlement contexts at Hierakonpolis dating to the Naqada period (4th millennium BC) (Fairservis 1972, 11-12, Fig. 6; Hoffman 1972, 52). Although their provenance is unknown, this shape remains a well standardised form, which into the dynastic period became the ‘rider’ for the saddle quern (Heldal and Storemyr 2007, 100-2). In several instances as discussed below, rock art typical of the Predynastic is closely associated with these quarries. We can also observe that exploitation of loose and more accessible boulders in these ‘low intensity’ quarries did not significantly change until the dynastic period, when there is a transition to bedrock quarrying.

Dynastic to Early Roman Period (3rd millennium BC – 30 BC)

Production of grinding stones by exploiting massive bedrock and dividing of much larger blocks, rather than

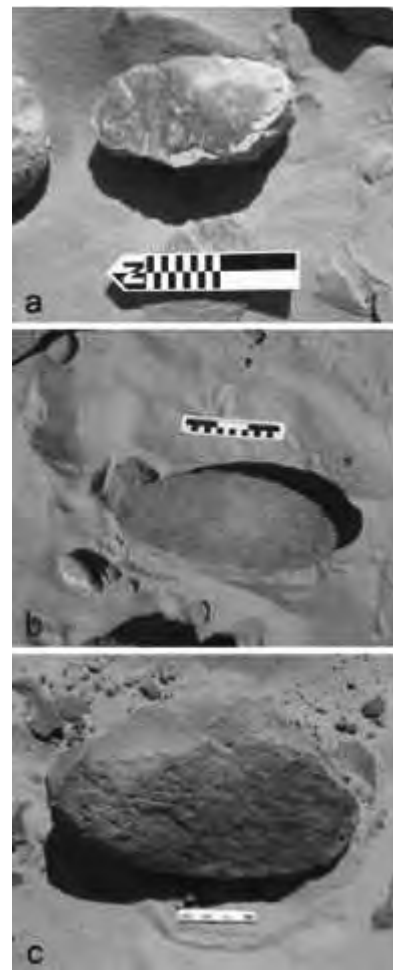


Figure 9. Grinding stone rough-outs: (a) Late Palaeolithic; (b) New Kingdom; (c) Ptolemaic – early Roman period.

just the more accessible loose boulders, certainly occurred during the dynastic period (3rd millennium BC onwards). Determining exactly when this came about is difficult, although we can suggest this might be connected with the onset of silicified sandstone quarrying for prestige ‘royal’ objects that began by the Early Dynastic (*c.* 3000 BC). As ornamental quarrying for large objects intensified by the 4th Dynasty (2613 BC) and required sound, massive and good quality silicified sandstone, we can observe a shift in the location of quarrying onto the large gebels of Gebel Gulab and Gebel Tingar, one kilometre west of the Nile (Fig. 1).

The use of fire-setting to extract large blocks from massive bedrock was a feature of large-scale ornamental quarrying, a technique that was also used in grinding stone production, certainly by the dynastic period (Heldal *et al.* 2005; Heldal and Storemyr 2007, 102-16; Heldal 2009, 136-42). Given that bedrock quarrying probably required better quality tools, a much larger proportion of non-local stone tools appear in the quarries, these probably brought across from the East Bank granite quarries (Heldal and Storemyr 2007, 98; Heldal 2009, 141). Yet, despite the changes in method of primary extraction, secondary shaping and trimming of



Figure 10. Foreground: part excavated grinding stone quarry into bedrock; background: spoil heaps associated with other bedrock grinding stone quarries. Gebel Gulab.



Figure 11. Broken rough-outs of granite rotary querns (Roman Period) found in the East Bank Aswan granite quarries. .

the flakes with pounders into the traditional ‘oval’ shaped rough-outs transformed little from its earliest antecedents in the Late Palaeolithic (Heldal and Storemyr 2007, 98; Bloxam 2009, 172-5). Hence producing a diagnostically similar object over several thousand years (Fig. 9).

Bedrock quarrying heralded a significant change in terms of the size of grinding stone quarries, which at Gebel Gulab are deeper and so much more visible than those of the Predynastic. The landscape surrounding these

quarries is dominated by large spoil heaps in amongst which numerous oval grinding stone rough-outs occur, often broken (Fig. 10). Although remembering that we see this landscape now as a ‘totality’ of grinding stone procurement spanning hundreds of years, nevertheless, the impression is of a considerable intensity in production by the pharaonic era. This increasing demand probably being related to the establishment of permanent settlements in Aswan and Elephantine Island. Silicified sandstone ‘saddle querns’ with the oval rider are known in these settlements since the Old Kingdom, but whether production exceeded local demand into wider networks of distribution remains uncertain, as discussed below.

Distribution and cessation of grinding stone production on the Aswan West Bank

Many important questions remain as to the extent to which grinding stones from the Aswan West Bank were distributed and traded to other places in Egypt. As opposed to research of millstone distribution across Europe, that can be more easily assessed through provenance studies (Carelli and Kresten 1997; Hansen 1997; Baug 2002; Belmont 2006; Grenne *et al.* 2008; Peacock and Cutler 2009), the numerous occurrence of silicified sandstone in Egypt hinders this task quite considerably. However, a petrological study of several grinding stones found in Predynastic settlements dating to Naqada I and II (3500 BC) at Hu-Semaneh in Upper Egypt were found to be imported from sources upwards of 150 km away from the Wadi Hammamat and Aswan regions (Mahmound and Bard 1993, 244-5). Even though local limestone was available these good quality grinding stones, produced from a range of igneous and metamorphic rocks, were clearly valued items that may have been incorporated into extensive long-distance trade and exchange networks by the Predynastic (*op. cit.*). Thus, we cannot discount distribution of Aswan West Bank grinding stones to other settlements in Egypt, such networks utilising the strategic location of the area not only via its proximity to the Nile, but also as the embarkation point of several desert routes into Nubia and the Western Desert oases (Goedicke 1981; Jaritz 1981; Storemyr 2007, 173-8; Storemyr *et al.* in press).

It is difficult to know exactly when the Aswan West Bank ceased to be at the centre of grinding stone production in the region. Evidence from the settlement excavations at Elephantine Island has revealed saddle querns with the typical oval-shaped riders from the Aswan West Bank in contexts from the Old Kingdom into the Ptolemaic Period (Fig. 4). With the advent of the rotary quern by the Roman Period, rough-outs of which can be seen in the East Bank granite quarries, it seems as if this transition led to the eventual phasing out of the silicified sandstone saddle quern and so their production on the Aswan West Bank (Fig. 11).



Figure 12. Typical shelter showing low-level dry-stone walls butted up against a rock outcrop, inside fragments of pottery. Gebel Gulab.

Who were the grinding stone quarriers?

In the absence of written records, determining the social context of grinding stone production in terms of labour force size and organisation can only be hypothesised through aspects of the social infrastructure in the quarries such as settlements, ceramics and other elements of material culture. Given the long time depth over which quarrying occurred, some periods are more represented by such evidence than others, as summarised below.

Settlements

Settlements directly associated with grinding stone quarries, apart from the direct association between the Late Palaeolithic semi-permanent settlements in the Wadi Kubbania, remain unknown. From the Predynastic onwards, the only features found in the quarries that could be termed temporary dwellings are small enclosures, often made up of three to four courses of dry-stone walls, usually butted up against a rock outcrop (Bloxam and Kelany 2007, 194-9) (Fig. 12). These occur most numerous on Gebel Gulab and Gebel Tingar, thus connecting them with both ornamental and grinding stone quarrying. Pottery is usually associated with these features and in many instances later re-use in the Roman Period means that predominantly New Kingdom pottery is discarded around the outside, with the later pottery found inside (Bloxam and Kelany 2007, 203-6; El-Senussi 2007, 254-75).

The function of these scattered shelters is difficult to determine, but given the ceramics associated with these places are minimal, and with a notable absence of cooking vessels and bread moulds, we can suggest that these were

not dwelling places for any length of time (Bloxam and Kelany 2007, 194-9). It seems feasible to suggest that from the Early Dynastic onwards, the quarry workers travelled to the quarries on a daily basis from the permanent settlements at Elephantine Island and Aswan. Although given the little ceramic evidence and size/occurrence of the shelters, numbers involved in grinding stone quarrying were probably limited to small (less than 50?) local groups (Bloxam and Kelany 2007, 222-3; Bloxam 2007, 12-15).

Whether numbers of quarry workers and the social organisation of production changed during periods of ornamental quarrying, particularly in the New Kingdom, is difficult to determine from the archaeological record. Although if such short-lived periods (in the New Kingdom 80 years) required larger numbers of people (into hundreds) and higher levels of social organisation, this is not attested in the quarries (Bloxam and Kelany 2007, 223-4). So perhaps we can argue that the social infrastructure we see today is related to grinding stone production more than anything else.

The inscribed landscape

Although the settlement and ceramic record is scant, inscribing of the landscape by successive generations of quarriers is the one continuous link that connects people with the Aswan West Bank landscape and its strategic resources (Bloxam 2007, 7-11; Bloxam 2009, 172-5). Studies of prehistoric quarries in European and Australian contexts have stressed the importance of ancestry and social networks being linked with the exploitation of key resources (McBryde 1997; Edmonds 1999; Cooney 1999; Bradley 2000). As meeting places and where social



Figure 13. Rock art of Nubian A-group man (4th millennium BC) found close to Predynastic grinding stone quarries. Gebel es Sawan.

relations were reinforced, the role that quarrying played in this has only recently been recognised (Taçon 1991; Fullager and Head 1999; Boivin 2004; Bloxam and Heldal 2007; Bloxam 2009). Hence, these markers of presence by the inscribing of the landscape and its connection with grinding stone quarrying along the Aswan West Bank is beginning to emerge. This tradition may be related to the earliest grinding stone quarrying in the Wadi Kubbania, where there is evidence of highly patinated roughly pecked forms that may represent the earliest examples of this activity. Sound may also have been important, given the strategic placing of a stone slab on top of an in-situ outcrop that acts as a drum, emitting the sound directly into the grinding stone quarries.

Hundreds of previously undocumented panels of rock art were recorded during the 'QuarryScapes' survey (Bloxam *et al.* 2007; Storemyr 2007). Panels consisting of geometric designs, animals and people dating from at least the 5th millennium BC are often found close to grinding stone quarries (Storemyr 2007, 164-9; Bloxam 2007, 8-10; Storemyr 2008; Bloxam 2009, 173-4). In some instances, the representations of people are typical of Nubian A-group (4th millennium BC) and C-group (2nd millennium BC) (Fig. 13). As the Aswan West Bank lies on the cultural crossroads between Egypt and Nubia, then a Nubian ethnicity to the early quarry workers should not be ruled out. Recent excavations of a Predynastic settlement and burials at Nag el-Fugani, approximately 2 kilometres south-east of the Wadi Kubbania in the Nile floodplain, attest to a strong Nubian presence in the area (Gatto and Giuliani 2007; Gatto 2009). This Nubian identity may persist into the later Meroitic representations of the late 1st millennium BC attested at Nag el-Fugani (Bloxam and Kelany 2007, 212-4). Moreover, a Demotic inscription on

an early Roman period *ostrakon* from Aswan describes the 'stone carriers' as 'people from Syene', 'people from the cataract' and most interesting is that the 60 names listed are all of Nubian *not* Egyptian origin (Rachel Mairs, pers. comm. 2007). Today, the Aswan West Bank still remains the domain of Nubians and one may speculate whether an ancestry to the earliest stone workers of the Palaeolithic can be traced.

In essence, we can hypothesise that traditions such as inscribing of the landscape and its link with early grinding stone production was also about linking local groups, through kinship ties, with the landscape as central in its socialisation over time (Bloxam 2009, 172-5; in press). Even into the pharaonic era inscribing of the landscape continues and notably retains a local flavour with depictions of local gods such as Khnum and Satet. Graffiti figures of people (in 'dynastic' style) and depictions of animals such as the baboon, which has antecedents to solar worship since the Predynastic (Pinch 2004, 113-4), were recorded in several New Kingdom quarries (Bloxam and Kelany 2007, 207-15).

Cross-culturally in prehistoric European and Australian contexts, inscribing of the landscape is attributed to the special place that exploitation of strategic resources played in linking past generations of quarryers with the present through ancestry (Taçon 1994; Bradley 2000). As well as quarries being nodes of social interaction, they may also be where transmission of technologies were passed down between local groups. Such practices could explain why we see little diagnostic or technological change in the production of grinding stones over a period of 16,000 years across the Aswan West Bank. Given that ornamental quarrying was only a minor activity, less than

11% within this long history of grinding stone production, then it is highly probable that quarrying for large objects was undertaken by the same groups who had an intimate knowledge of the resource and skill in how to extract it, transmitted over many generations (Bloxam in press).

Conclusion

Re-discovering the grinding stone quarries of the Aswan West Bank has been a major development in how we understand the exploitation of a key resource that had previously only been connected with ornamental quarrying in the pharaonic period. As the first survey undertaken of a grinding stone quarry landscape, this work has provided an important foundation for how we research ancient quarries in Egypt. In particular, the need to see ancient quarry landscapes in a broader perspective outside of procurement for just ornamental objects. Recognising that most strategic resources appropriated by elites usually have prehistoric origins, has important implications for future research of quarries that also needs to be looking for procurement of utilitarian objects.

This research of the Aswan West Bank and its transformation by quarrying for grinding stones can now be seen as having important implications in how we relate transitions in the processing of food, since the Late Palaeolithic, with the procurement of silicified sandstone. We have been able to trace how little grinding stone production changed over a period of 16,000 years, suggesting that technological transmission made have emerged through successive generations of local skilled kin groups who had an intimate knowledge of the resource. Even with the advent of ornamental quarrying by the 3rd millennium BC and quarrying into bedrock, this did not significantly change methods of secondary production. The end to this longevity of grinding stone production for saddle querns only seems to have occurred with the transition to the rotary quern, probably by the early Roman period.

Outcomes from this research of the Aswan West Bank grinding stone quarries can also give us a useful comparative context for current studies of Norwegian millstone quarries. Of particular interest in the study of Norwegian millstone landscapes, is exploring the extent to which exploitation of a resource for utilitarian objects may also make it desirable for other objects, in particular the ornamental that can often run side-by-side. Arguably, the original use of the resource and its importance in early food production may be an important symbolic factor in why it was a sought-after stone by 'elites'. Certainly there is a case to be argued in terms of silicified sandstone consumption in Egypt. Hence, cross-cultural comparison can be an important analytical tool in terms of how we fill data gaps, access the micro-level social context and develop strategies in the investigation of ancient quarries. In particular, how we go about articulating the significance and value of

these difficult, hard-to-see, non-monumental landscapes in terms of their historical importance in understanding the social, political and economic transformations that were linked with the production of food.

Acknowledgments

I would like to thank the Supreme Council of Antiquities (SCA) in providing us with the opportunity to carry out this work in Egypt, as partners in the EU-funded 'QuarryScapes project' co-ordinated by the Geological Survey of Norway (NGU). Special thanks to Zahi Hawass and the Permanent Committee of the SCA, Mohamed el-Biely, Director of SCA Aswan, Mohi ed-Din Mustapha, Assistant Director of SCA Aswan and Magdy el-Ghandour, Director of Foreign Missions, SCA Cairo. Thanks are also extended to those colleagues who made enormous contributions during fieldwork in Egypt and whose work is integral to this paper: Tom Heldal, Per Storemyr and Reidulf Bøe (NGU); Adel Kelany (SCA documentation centre Aswan); Patrick Degryse (KUL Leuven) and Ashraf el-Senussi (SCA). To the Sixth Framework Programme (FP6) of the European Union for giving financial support to the project and also to the Leverhulme Trust for funding some aspects of the Egypt fieldwork. Thanks also to my colleagues involved in the 'Norwegian Millstone Landscape' project (funded by the Norwegian Research Council): Gurli Meyer, Tor Grenne, Tom Heldal, Irene Baug, Torbjørn Løland, Øystein Jansen and Tim Anderson.

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