

SUDAN & NUBIA

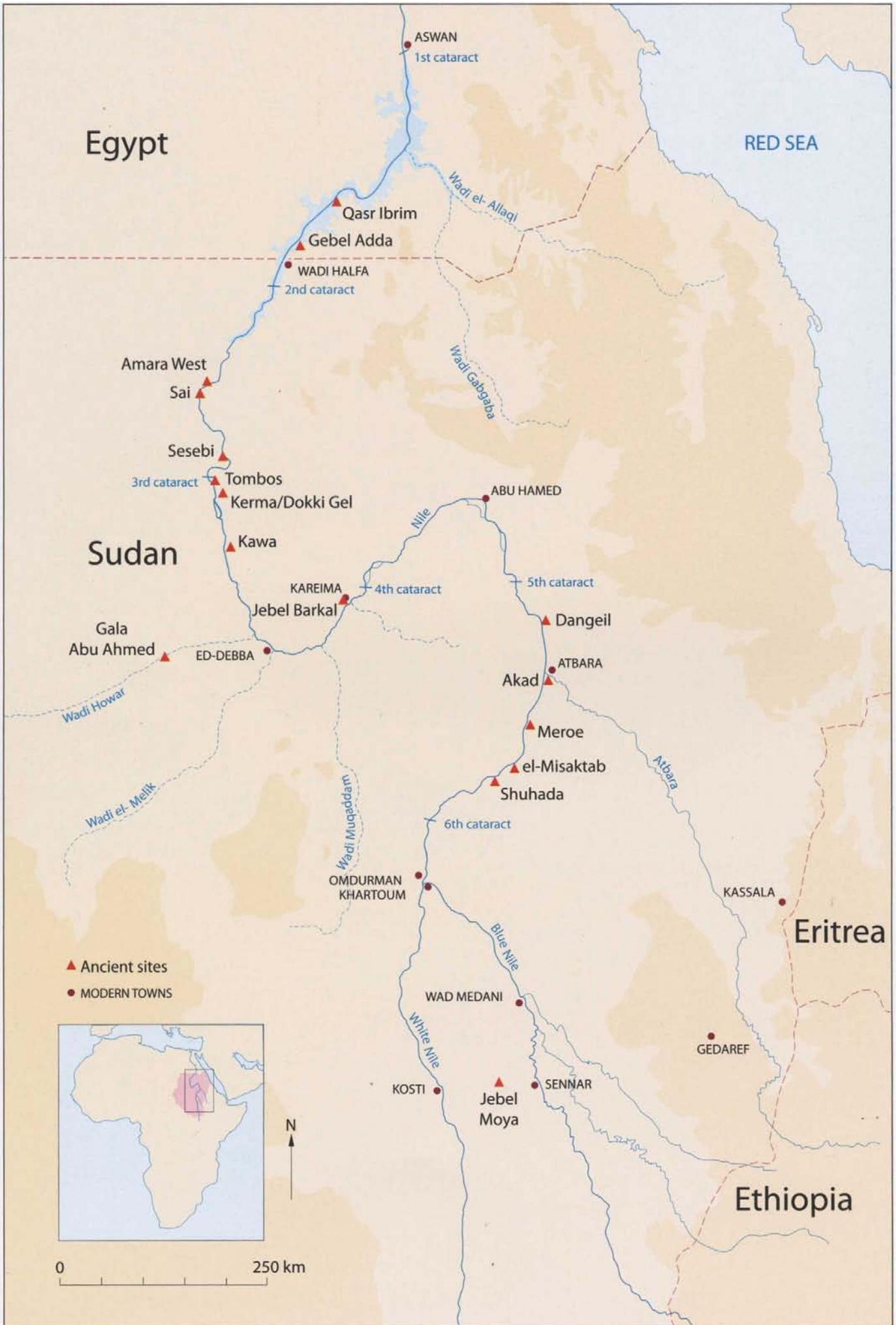
The Sudan Archaeological Research Society



Bulletin No. 13

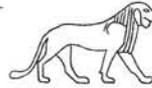
2009





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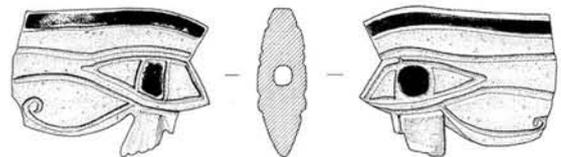
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Contents

Reports

<i>Talatat</i> Architecture at Jebel Barkal: Report of the NCAM Mission 2008-2009 <i>Timothy Kendall</i>	2	Gebel Adda 1963 and Meroitic stela G19 <i>Reinhard Huber and David N. Edwards</i>	100
The New Kingdom Town on Sai Island (Northern Sudan) <i>Florence Doyen</i>	17	Akad Rescue Project Season 2008 <i>Mohamed Faroug Abdelrahman</i>	103
The British Museum epigraphic survey at Tombos: the stela of Usersatet and Hekaemsasen <i>Vivian Davies</i>	21	Shuhada Rescue Archaeological Project (SRAP) and el-Misaktab in the Shendi region <i>Mohamed Faroug Abdelrahman, Ahmed Sokary and Murtada Bushara</i>	107
A name with three (?) orthographies: The case of the 'king's son, overseer of southern foreign lands, Penre' <i>Tamás A. Bács</i>	30	Districts, towns and other locations of medieval Nubia and Egypt, mentioned in the Coptic and Old Nubian texts from Qasr Ibrim <i>Joost L. Hagen</i>	114
Fieldwork at Sesebi, 2009 <i>Kate Spence, Pamela Rose, Judith Bunbury, Alan Clapham, Pieter Collet, Graham Smith and Nicholas Soderberg</i>	38		
Cemeteries and a late Ramesside suburb at Amara West <i>Neal Spencer</i>	47	Towards an archaeology of social organisation at Jebel Moya, 5 th – 1 st millennium BC <i>Michael Brass</i>	120
Petroglyphs under the sand – A preliminary report on the field season 2008/09 at the fortress Gala Abu Ahmed <i>Friederike Jesse and Robin Peters</i>	62		
Houses and Pyramids at Kawa, excavations 2008-9 <i>Derek A. Welsby</i>	72	Miscellaneous	126
What are these doing here above the Fifth Cataract?!! Napatan royal statues at Dangeil <i>Julie R. Anderson and Salah eldin Mohamed Ahmed</i>	78		
Petrography of Pottery from Meroe, Sudan <i>Robert B. J. Mason and Krzysztof Grzymski</i>	87		
The Meroitic Necropolises of Sai Island. First Season at the Meroitic Cemetery 8-B-5.A <i>Vincent Francigny</i>	92		
First report on ceramic material from Meroitic Cemetery 8-B-5.A <i>Romain David</i>	97		



Front cover: The head of a Kushite king, excavated in 2008, from the Amun temple at Dangeil. It has been tentatively identified as Aspelta (593-568 BC) based upon comparisons with statues of this king discovered at Jebel Barkal and Dokki Gel-Kerma. (Photo © J. R. Anderson, Berber-Abidiya Archaeological Project).



Fieldwork at Sesebi, 2009

*Kate Spence, Pamela Rose, Judith Bunbury,
Alan Clapham, Pieter Collet, Graham Smith
and Nicholas Soderberg*

Introduction

A team from the University of Cambridge worked at Sesebi in January 2009. The intention was to undertake a topographical survey of the main town site alongside a geological survey of the region, and to undertake trial soundings to investigate the potential for further excavation in and around the town. We are most grateful to the National Corporation for Antiquities and Museums for permission to work at the site, and to Miss Abeer Rahman who accompanied us and contributed immeasurably toward the success of the project. Kate Spence and Pamela Rose made a preliminary visit to the site in 2008, funded by the British Academy. The 2009 season was funded by the Egypt Exploration Society, the McDonald Institute for Archaeological Research, and the Thomas Mulvey Fund, Cambridge University.

Sesebi is situated in Sudan between the Second and Third Cataracts, on the west bank opposite the town of Delgo. A large New Kingdom temple-town was constructed at Sesebi during the reign of Akhenaten. Foundation deposits dating to early in his reign were excavated under the corners of the enclosure wall and the main temple, while the north temple is architecturally closely comparable with religious structures at Amarna dating to later in his reign. The site was excavated between 1936 and 1938 by the Egypt Exploration Society under the direction of A. M. Blackman and H. W. Fairman and was published in preliminary reports (Blackman 1937; Fairman 1938). A final report on the excavations was never completed but original excavation records are held in the archives of the EES. The excavation of the site was considered complete when the EES team under Fairman moved on to the Ramesside temple-town at Amara West. However, no purpose for Sesebi's foundation or existence was established and no account was made of its relationship with the surrounding landscape.

The decision was taken to re-examine the site for a number of reasons. Firstly, to attempt to establish its purpose; secondly, to investigate the landscape setting of the town; thirdly, to look at the ethnicity and lifestyle of the inhabitants of the town through consideration of the houses and burials at the site in addition to its setting; and fourthly, to undertake a close comparison of the architecture and material culture of this colonial settlement with that of the contemporary royal centre at Amarna itself. Following a preliminary visit to the site in January 2008 by Kate Spence and Pamela Rose, a larger team returned in January 2009 to undertake topographical and geological surveys of the area and to undertake trial excavations.

Overview of preliminary results

Our most important results to date relate to establishing the purpose of the site during the late 18th Dynasty and identification of earlier activity.

Site purpose

During our preliminary visit in 2008, we noted a number of features which suggested that the site might have been associated with mineral extraction; these preliminary observations were followed up during the 2009 season as part of a geological survey by Judith Bunbury and Graham Smith.

Lying around the south part of the site and on the spoil heaps, particularly those deriving from the residential parts of the town, are a significant number of whole and broken striated hard-stone grindstones (Plate 1). The majority of these are made from local greenschist deriving from the southern slopes of Jebel Egri to the north of the site, although some are made of granite from unknown sources. The grindstones all feature oval depressions made by rubbing, and have linear grooves cut into the surface of the grinding area; these are often very worn and visible only at the edges of the grinding surface. Many of the grindstones have been reused many times, showing different areas of rubbing; some have been used on both sides and some have multiple grinding areas on the same face. The grindstones parallel examples found in association with New Kingdom gold-mining activities in the eastern deserts of Egypt and Nubia (Klemm and Klemm 1994, taf. 31b; Klemm *et al.* 2002, pl. 118). Hard-stone pounders are also found in significant numbers on the spoil heaps around the residential areas.

Some of the spoil heaps in the southern part of the town also show a significant concentration of crushed quartz. As the town is built on an alluvial plain this is unlikely to be a natural deposit. The crushed quartz in association with the striated grindstones strongly suggests that mineral extraction was an important activity on the site.

Between the town and Jebel Egri (the mountain lying about 2km to the north of the site) are extensive areas of pitting along the edges of a large *wadi* emerging from the mountainous region to the north (Colour plate XVI). Much of the



Plate 1. Triple greenschist striated grindstone from the town.

pitting is difficult to date as there is little cultural material in association with it, but it is likely to be associated with the collection of quartz pebbles or other mineral deposits washed down from the mountains to the north during the summer rains. There is also evidence of quarrying in the mountainous region to the north of Jebel Egri but we have not yet been able to visit these areas and their date is uncertain.¹

We, therefore, propose that the primary reason underlying construction of the site, at least during its main phase of occupation from the late 18th Dynasty to the early Ramesside period, was the extraction of mineral deposits. Examination of the geology of the region by Judith Bunbury and Graham Smith, as well as knowledge of Egyptian activity in Nubia at this time, suggests that the most likely focus of the extraction was gold.

The site lies at the southern end of the Nubian stretch of the Nile associated with gold mining, and ancient mines of unspecified date are known to the north and south of the site, although the major focus of archaeological study has been on east bank sites (Klemm *et al.* 2002, fig. 4). D. Klemm *et al.* (2002, 218) report that gold production in the Eastern Desert is largely restricted to the period from Tuthmose III to Akhenaten, and suggest that after this period no pharaonic gold mining activity was found in the Eastern Desert south of Wadi Allaqi. It seems possible that the great interest shown in the Abri-Delgo reach during the period from Amenhotep III to the early Ramesside period was associated in part with a shift in gold extraction from the region of the Eastern Desert — presumably becoming less productive after several generations of exploiting easily available deposits — to the west bank of the Nile at Sesebi and north to sites such as Soleb. Infrastructure may already have existed at these sites as a result of military activity along the Nile at the beginning of the 18th Dynasty.

History of the site

The site clearly has a more complex and longer history than was appreciated at the time of the original excavations. We now have ceramic evidence for activity in the very early 18th Dynasty as well as in the mid-18th Dynasty (see ceramic report by Pamela Rose below). Evidence suggestive of mid-18th Dynasty activity at the site, including seal impressions of Tuthmose IV, is mentioned in diary entries for the 1937 excavation held by the Egypt Exploration Society (see also Blackman 1937, 149).

In addition, there is a number of architectural features which appear to be earlier than the temple and town built by Akhenaten. The socle of the main temple contains numerous reused but unfinished column drums; these must derive from a monumental stone structure predating Akhenaten's reign (Plate 2). Outside the north-east corner of the enclosure wall a series of mud-brick walls have been uncovered (Area

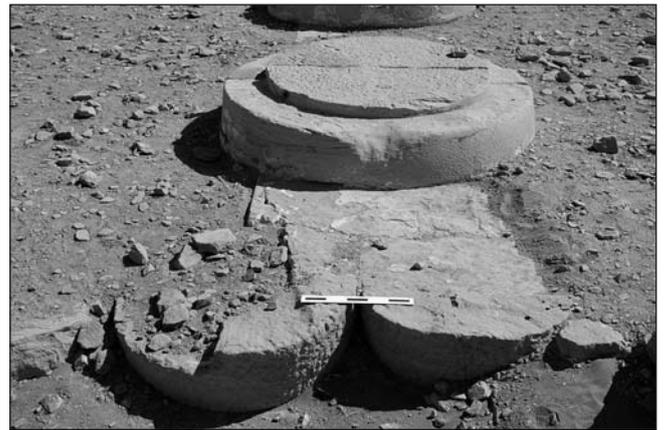


Plate 2. Reused column drums in the temple platform.

1) that appear to predate the main town enclosure wall, and which bear no apparent spatial relationship to it (Figure 1). Approximately in the centre of the east side of the town is a ditch enclosing a roughly square space which seems likely to be the foundation trench of an earlier enclosure wall. There is no apparent spatial relationship between this feature and Area 1.

The site seems to have been abandoned in the early Rameside period, but there is evidence of Napatan activity in the town itself as well as in the cemetery.

The site is situated in a landscape which has evidence of long-term human activity. An outcrop just under a kilometre west-north-west of the town is associated with Mesolithic as well as Christian pottery. Numerous rock-carvings are also reported in the region north of Jebel Egri. Following the Napatan period, activity in the region seems to have shifted from the town at Sesebi to the area of Jebel Sese about a kilometre to the north, where occupation dates from the Meroitic period through the Medieval and Ottoman periods up to the present day.

Survey

Topographical survey of the town site²

Central to our work this year was the production of a topographical survey map of the town. The survey covered the town and its immediate environs, including the small *wadi* to the north and associated mounds of stone chippings. Figure 1 overlays the plan of the town produced during the 1930s excavations on the topographical survey of the town, with details added from the 2009 trial excavations. The survey has revealed significant details of the construction of the site, as well as information on taphonomic processes.

The site has been considerably damaged by water run off following annual summer rains. Particularly badly affected are the east wall of the town and the northern part of the site east of the main temple: almost the entire approach to the main temple has been washed away. A large mound remains under the north temple and the enclosure wall seems to run over

¹ We are grateful to David Edwards for pointing this evidence out to us (personal communication). The quarrying activity is visible on Google Earth.

² Pieter Collet assisted by Alan Clapham

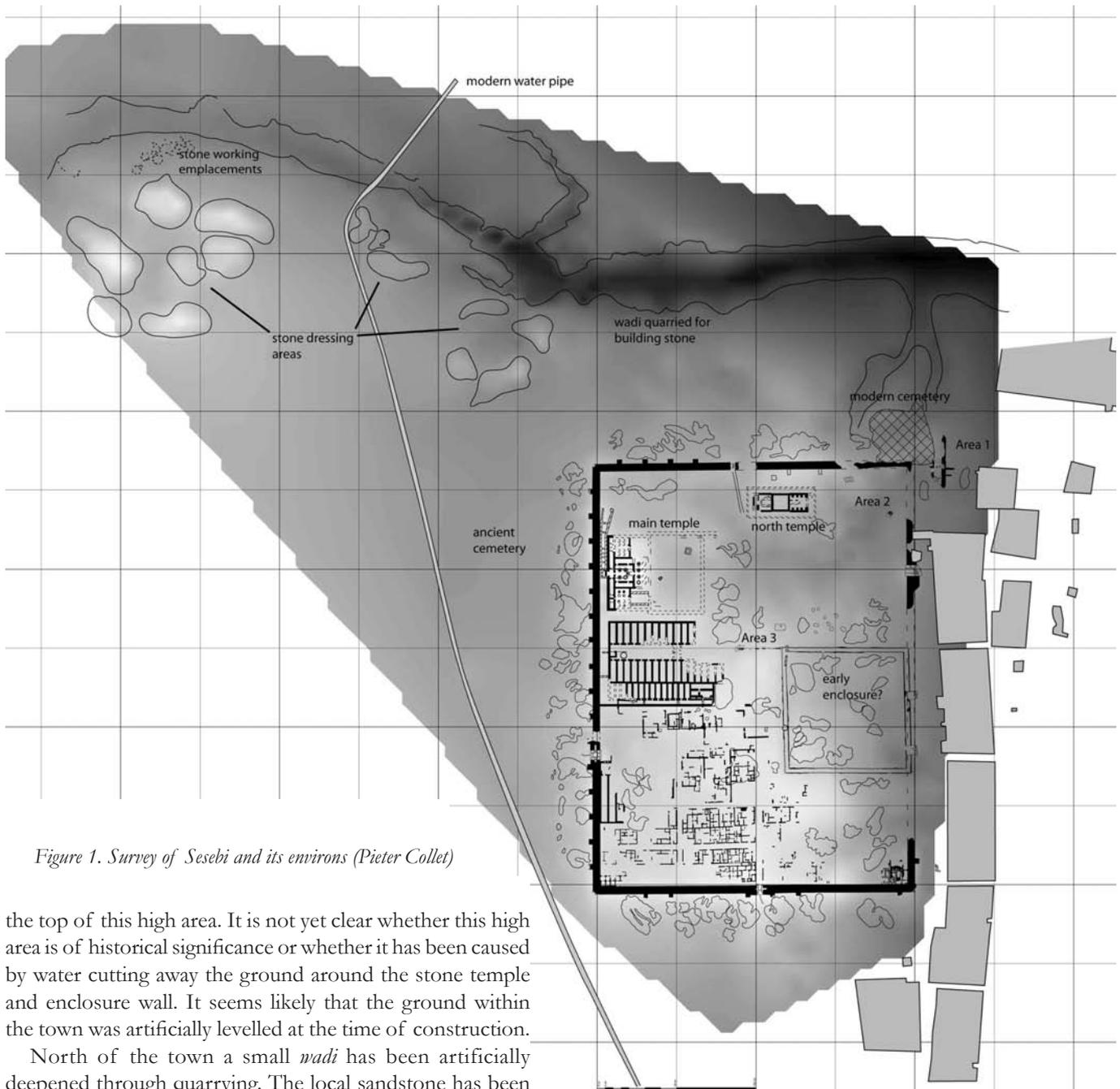


Figure 1. Survey of Sesebi and its environs (Pieter Collet)

the top of this high area. It is not yet clear whether this high area is of historical significance or whether it has been caused by water cutting away the ground around the stone temple and enclosure wall. It seems likely that the ground within the town was artificially levelled at the time of construction.

North of the town a small *wadi* has been artificially deepened through quarrying. The local sandstone has been removed for construction of the stone features of the site: primarily the temples, but also the town gateways and fittings such as door surrounds and crypt covers within the houses. Mounds of stone chipping associated with the dressing of the blocks extracted from the quarry can be seen north west of the town; associated with these are a number of emplacements for workmen.

Trial excavations

*Extra-mural features north-east of town wall*³

Two major walls running approximately north–south which were not marked on the 1930s excavation plan were identified outside the north-east corner of the town's enclosure wall

³ Alan Clapham and Nick Soderberg

(Area 1; Plate 3). The walls are each over 2.5m thick and are just under 5m apart. The easternmost of these walls is built on rough-stone foundations and continues well beyond the north wall of the town; two narrower walls abut it to the east. The walls are founded at a lower level than the base of the town's enclosure wall. The relationship between the two major walls in Area 1 is as yet unclear, but ceramics removed from a section dug between them dates to the mid-18th Dynasty. Investigation of this area is at a very preliminary stage and will continue next year.

*Central drain*⁴

On the 1930s excavation plan of the town a tank and drain

⁴ Kate Spence, Pamela Rose and Abeer Rahman



Plate 3. Preliminary investigation of mud-brick walls in Area 1.

are marked east of the magazine blocks and south of the main temple. The feature was examined to establish whether it could have been used for gold-washing (a process of separating gold from its original quartz matrix after crushing using water).

The remains of the tank base measure approximately 1.35 x 3.05m, including the rim (Area 3). The Nubian sandstone slabs from which it is constructed are badly weathered and cracked. Over approximately half of the surface area the slabs have been destroyed or removed leaving only the plaster and chipping foundation. The section of drain immediately adjacent to the tank has been robbed out for over 7m to the east.



Plate 4. Drain for the magazine area after partial cleaning.

The drain is constructed from segments of shallow channel and slabs cut from local Nubian sandstone (Plate 4). The base of the channel is only roughly finished and retains marks left by the chisels with which it was cut. The sections of channel are joined with white plaster. The channel is approximately 200mm wide over most of its length and varies in depth between about 110 and 180mm. The channel was originally covered with pairs of slabs to make a pented roof. This cover is still preserved for nearly 8m where the ground is highest, suggesting that the drain was originally covered for the whole of its length. A preserved roofing slab found collapsed into the drain had a circular hole, perhaps to facilitate removal. The drain slopes gradually downwards toward the east and appears to open into the north-west corner of the square trench which dominates the eastern part of the site.

The investigation suggests that this feature is very unlikely to be associated with gold-washing. The structure is too shallow, and the cover would have prevented the recovery of quartz and mineral from the channel for re-washing while the rough base of the covered channel would have caused fine particles to accumulate (cf. Klemm *et al.* 2002, 217 and pl. 121). The roofed sections of drain are completely blocked with fine silt suggesting that this was an elaborate drainage system intended to remove rainwater and debris from an area to the east of the temple magazines that had already been completely destroyed at the time of the 1930s excavations.

*Feature near the north-east gate*⁵

A stone feature inside the north-east gate of the town was cleaned (Area 2). This feature is marked on the 1930s plan, but is at a lower level than any other structure on the site and has a different orientation to that of the New Kingdom town. Following cleaning of the upper parts of the structure it became apparent that it was a stone-lined burial, with additional large stones lying west of the hollow feature. The blocks used in construction appear to be reused and a number of them have rounded hollows on their upper sides where stone has been ground out in association with earlier ritual activity.

Although no stratigraphic links can be made to other structures, it seems likely that this feature actually post-dates the main occupation phases of the site, its low level resulting from its being cut into a natural channel scoured out by rainwater run-off. The feature was not fully excavated as we lacked time and resources for dealing with skeletal remains. An analogous structure is marked on the 1930s plan of the site inside the denuded outer walls of the main temple.

Preliminary observations on the ceramics⁶

The pottery so far recorded from Sesebi has come from surface collections made in and around the fortress, and from the

⁵ Pamela Rose

⁶ Pamela Rose



limited excavations carried out in the 2009 season, which have not yet penetrated stratified deposits. The following remarks are based on observation only, and there has as yet been only a limited opportunity for more detailed study.

Most of the pottery noted within the fortress, and on the extensive spoil heaps lying outside the walls, could be dated to the late 18th Dynasty, as is to be expected from inscriptional evidence. Siltwares were far more common than marl clay wares, but the latter were better preserved and more easily identifiable as they represent types well known throughout Egypt. Thus the marl wares showed characteristic types of this period, including fragments of Marl D amphorae, one-handed mugs, and pilgrim flasks. Upper Egyptian marls (mainly Marl A4) included decorated jars and carinated bowls. Siltwares were mainly open forms, and included large numbers of simple-rimmed flat-based bowls. All-over red slipping of these vessels, by far the most common surface treatment at Amarna (Rose 2007), was less common at Sesebi than the use of red rim bands on an otherwise uncoated surface. In this the assemblage has more in common with contemporary assemblages in Thebes than of those further to the north. Fragments of low ring stands were also a common feature on the surface. A few sherds of imported Canaanite amphorae were noted and also of amphorae originating in the western oases.

In the north-east corner of the site was an area in which fragments of bread cones occurred both on the surface inside the town, on the spoil heaps immediately outside the wall to the north and in the excavations in this area. Some of these had pointed bases, others were slightly more rounded; none had the protruding knob seen on many Amarna examples. The localisation of bread cones here, to the east of the temple, may suggest the presence of temple bakeries somewhere in this area.

No blue painted pottery was noted, and all the examples of decoration that were found were executed in black, or black and red. The former occurred in the form of horizontal bands on red-slipped closed form siltware vessels, and as horizontal bands, sometimes with overlying dots, on large carinated siltware bowls. On small jars of Marls A2 and A4 black decoration consisted of rim ticks and groups of vertical stripes. Red and black decoration was less common and was found only on cream-slipped siltware closed forms. These styles originate earlier in the 18th Dynasty, although vessels may have remained in circulation into the reign of Amenhotep III; however, other evidence, including fragments of rounded amphora bases of a coarse form of Marl D, and the use of carinated bowls with very small ring bases and an internal pattern burnish, suggest the possibility of an earlier date in the 18th Dynasty.

Of even earlier date is material on the surface outside the town wall in the north-east corner, and similar types were found amongst the pottery from the nearby excavations. This pottery appears to be of very early 18th Dynasty date and incorporates types known from, for example, from the site of Ballas (Bour-

riau 1990). Amongst the material are a number of sherds from Kerma beakers (Plate 5), as well as handmade siltware sherds with prominent basketry impressions on the exterior. These are mainly in open bowl forms. No definitely Ramesside pottery has yet been identified.

Finally, scattered over the surface of the town and the spoil heaps outside it was a number of sherds of Napatan (probably 25th Dynasty) date. These include upper Egyptian marl clay jars with complex rims and shallowly ribbed bodies, and bowls of the same material as well as handmade cups and bowls with red rim bands. It is also possible that the pointed-based bread cones noted above could also be of this date. One particular concentration of Napatan pottery was noted near the centre of the town, but no structural remains could be seen in the area to indicate its origin. A further cluster was noted in the cemetery to the west of the town, spread around one of the excavated New Kingdom burial pits and presumably deriving from the later reuse of the grave. The pottery here included similar handmade wares to those noted in the fortress, as well as wheel-made and handmade siltware bowls, and a particular form of marl clay bottle known from other Napatan cemeteries such as Missiminia (Plate 6; Vila 1980, 160, Type III-2A).

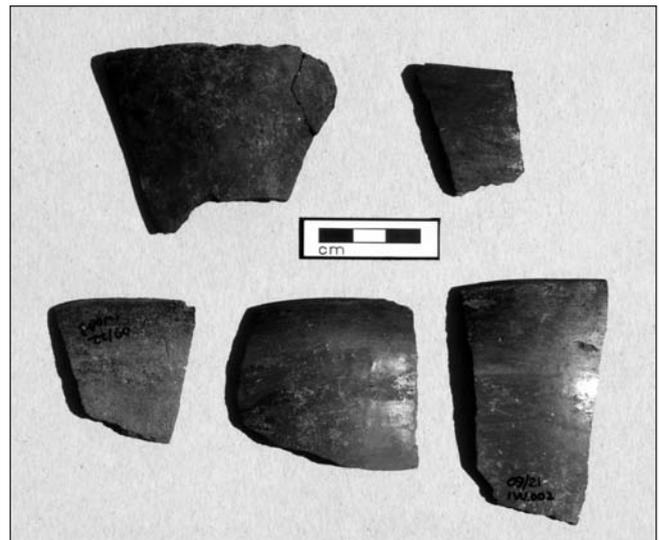


Plate 5. Kerma beaker ware and handmade siltware sherds.

Preliminary observation on the temples⁷

There are two temples on the site, the main temple and a smaller north temple. Both were constructed during the reign of Akhenaten. An intact foundation deposit found in the 1930s suggests that the main temple was constructed very early in the reign of Akhenaten, before he changed his name from Amenhotep, while the north temple closely parallels architecture at Amarna. Although the temples were not an intended focus of work at the site, plans of the structures were checked against the standing remains and additional observations were made.

⁷ Kate Spence



Plate 6. Napatan marl clay bottle.

Examination of the main temple which is constructed on a raised socle showed that the temple platform included a large number of reused column drums, most of which seem never to have been dressed (Plate 2). Given that this temple was constructed very early in the reign of Akhenaten, this suggests that a significant stone temple structure must have been under construction at the site before the beginning of Akhenaten's reign. This conclusion ties in closely with the ceramic evidence suggesting significant earlier activity at the site. It was also established that the published detailed plan of the temple (Blackman 1937, pl. 14) is inaccurate in many details. Akhenaten's decoration of the columns post-dates the change to Amarna-style art (although the architecture itself does not) and represents the king worshipping the sun disk in panels on the inner sides of the columns. The temple was later redecorated under Seti I who cut more extensive decoration on the columns.

The north temple seems never to have been planned in detail. During our visit to the site we uncovered a pile of very fragmentary decorated pieces which seem to derive from this structure (Plate 7). Despite their small size these give significant details of the form and decoration of the structure. They show clearly that the structure, originally constructed under Akhenaten, was redecorated under Seti I. Again, the decoration seems to have been more extensive during the rebuilding period than it was under Akhenaten.

Significant evidence for the construction of the temples survives as there is a close link between the quarrying and stone-dressing operation at the *wadi* north of the town and the temple structures. In some cases the colouring and texture of the stone allows a block to be linked to a particular part of the quarry. In addition a construction ramp, built on layers of chippings and debris, is still in place between the main temple and the enclosure wall. This ramp appears to lead to

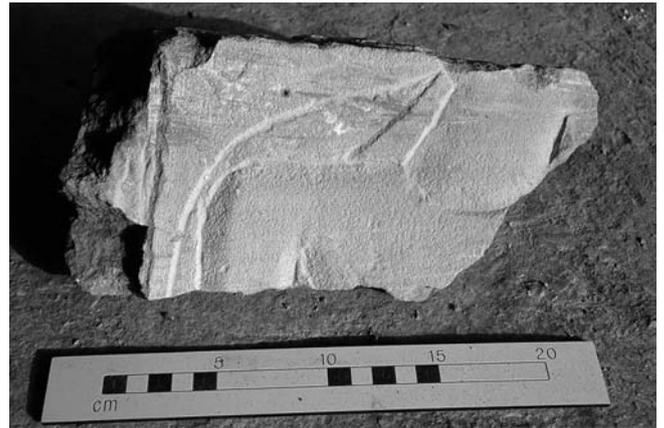


Plate 7. Fragment of relief from the north temple.

the sanctuary, a later addition to the temple, suggesting that it may date to the reign of Seti I when the temple was adapted.

It thus appears that a significant amount of additional information can be derived from these structures and, given their importance for understanding the role of the site and the architecture of the Amarna and post-Amarna periods, we aim to re-record these structures in future seasons.

Geological Survey⁸

Introduction

We conducted a preliminary investigation of the geology of the area and geo-archaeological features of the hinterland of the Sesebi and Jebel Sese sites (Colour plate XV). From this, we give an overview of the geological processes that have shaped the landscape, the description of mines and pits of various dates in the area, a summary of Nile movements and a review of activity in the high desert to the north west of Sudla.

Geological history

The oldest rocks exposed in the area surrounding the site at Sesebi are Palaeozoic basement lithologies that have been metamorphosed to greenschist facies. These include metabasites and metagabbros. The vivid green colour of these rocks suggests a pre-metamorphic magmatic/volcanic origin (ashes, gabbros etc.). Whilst much of the exposed greenschist is well-foliated, breaking into long, sword-like fragments, there are also areas where hydrothermal fluid activity has severely weakened the rock, resulting in fissile, crumbly material. Some patches of indurated greenschist occur, that are less prone to fragmenting and form larger, more coherent blocks. Hornfelsed basalt (black, hard with brown olivine crystals) was also observed in a small (~ 40m diameter) outcrop in the desert to the north west of Sesebi.

Quartz and pegmatite (in this case, coarse-grained quartz and orthoclase feldspar (pink-orange in colour)) veins cut through the basement rocks. These veins range in thickness from several millimetres up to several metres, and are believed

⁸ Judith Bunbury and Graham Smith



to have originated from late-stage, highly evolved (silica-rich) magmas in the underlying granite body. The quartz veins are often permeated with green, brown and black streaks, which appear to be mostly iron and manganese-rich, with haematite clearly identifiable in larger patches. Carnelian is also associated with quartz veining, though it was not observed in outcrop.

Overlying the veined basement rocks are cross-bedded sandstones. These are mostly near-white in colour with red streaks, but also include orange units. The colour variations are presumably associated with later hydrothermal activity. Weaker lenses of finer-grained, silty material and conglomerate (rounded pebbles in a fine-grained matrix) occur within the sandstones, as do harder, indurated areas, which are believed to be a result of thermal alteration and hydrothermal activity associated with later basaltic intrusions. Iron-rich nodules are abundant in the sandstones, and are clearly visible in the quarries to the north west of Sesebi. These nodules are commonly angular, concentrically-layered concretions, but botryoidal forms are also seen. Where the sandstones are exposed at the surface, they regularly show strong columnar jointing associated with rapid drying. In cross-section, these columns are polygonal in shape and vary in width from 10mm to hundreds of millimetres.

The basement greenschists and sandstones are overlain by a layer a metre or so thick of Nile alluvium that lies above the level of the current flood-plain. This broad basin that stretches southwards and inland from Jebel Egri is a relict of a time when the Nile water levels were considerably higher but this period of the Nile's development is still poorly understood (Woodward *et al.* 2007).

The cross-bedded sandstones are cut by basalt intrusions, such as the plugs exposed at Jebel Sese and Jebel Delgo. As with the sandstones, columnar jointing is also present in the basalts and this should, therefore, not be considered diagnostic of either lithology without additional evidence. The Jebel Sese basalt is black in colour, and contains white phenocrysts of plagioclase feldspar and white amygdales (filled vesicles), probably of calcite. The intense heat associated with the intrusion of the basaltic plugs (which themselves are several hundred metres in diameter) caused alteration of surrounding rocks, including local hardening and some re-crystallisation of sandstones.

Nile movements

Until the construction of the Merowe Dam in 2008, the Nile in this area was divided into two strands around the island of *Gezirat Bojboj*. However, the toponyms of the cultivation to the west of *Gezirat Bojboj* suggest that they were former islands. The area is divided into two areas known as *Gezirat Urju* to the west and *Gezirat Shibani*, which lies between *Gezirat Bojboj* and *Gezirat Urju*. Until the construction of the Dam the topography (including curvature of the channel, grain size distribution in the channel and asymmetry of the channel) suggest that the minor channel to the west of *Gezirat Bojboj*

was migrating westwards and cutting into the silty sediments of the other former islands. A depression around 1m deep adjacent to the desert edge on the west of the valley is typical of an in-filled abandoned channel and another drop of around 1.2m at N 20° 6' 20", E 30° 32' 50" along which a line of byres has been constructed, may represent another. Therefore, it seems likely that, at a former time, a channel of the Nile lay close to the town of Sesebi and it is noted that a wide track travels from the desert edge to the line of byres around N 20° 6' 34", E 30° 32' 45" on a bearing that intersects the eastern gateway of the town. It is possible that this track represents a connection from the desert edge to the Nile that was required when the Nile moved eastwards. This proposal could be tested by augering.

Quarrying in the desert

It is evident from Google Earth satellite images and on the ground that there has been a number of phases of pitting of the desert pavement and an area of destruction of the *wadi* floor around N 20° 7' 35", E 30° 32'. In addition to this, there is an area of extraction of sandstone blocks immediately to the north of the temple site.

Sandstone extraction (building stone)

The sandstones in the area are of variable colour ranging from purple-black through red and white with red bands to white. Between the sandstone layers are disturbed layers of soft sediment, conglomerates and beds containing rip-up clasts, and within them are frequent iron-rich nodules and silica-rich nodules. In places, for example near Jebel Sese, the sandstone has become indurated during intrusion of volcanic material. The sandstones are strongly cross-bedded, sometimes white with red-orange bands and are similar to the stone used in the temple of Sesebi. Many of the blocks in the temple are placed with the cross-bedding upside down although blocks placed 'quarrywise' are generally thought to be more resistant to weathering.

Broadly speaking the quarry is in three benches, here called West, Middle and East. The East bench has orange-banded, cross-bedded sandstone, the Middle Bench a thick bed of white sandstone (Plate 8) and the West Bench contains smaller blocks of cross-bedded sandstone. In each case there is a westward incline out of the *wadi*, along the bedding planes at the top of which is an area of tip heaps. The avenues through the tip heaps generally loop around to a path towards the north-east corner of the temple enclosure. We have estimated the volume of stone excavated from the quarry as around 2200m³.

Early pitting

North of Sesebi are extensive areas of pitting into the desert pavement (i.e. stones accumulated as material is blown away). Most of the pitting is around the foot of Jebel Egri (Colour plate XVI). Within these areas there are a number of low walls (\leq 1m) the largest of which is at N 20° 7' 53", E 30° 32' 39". Within the areas of pitting there are also groups of

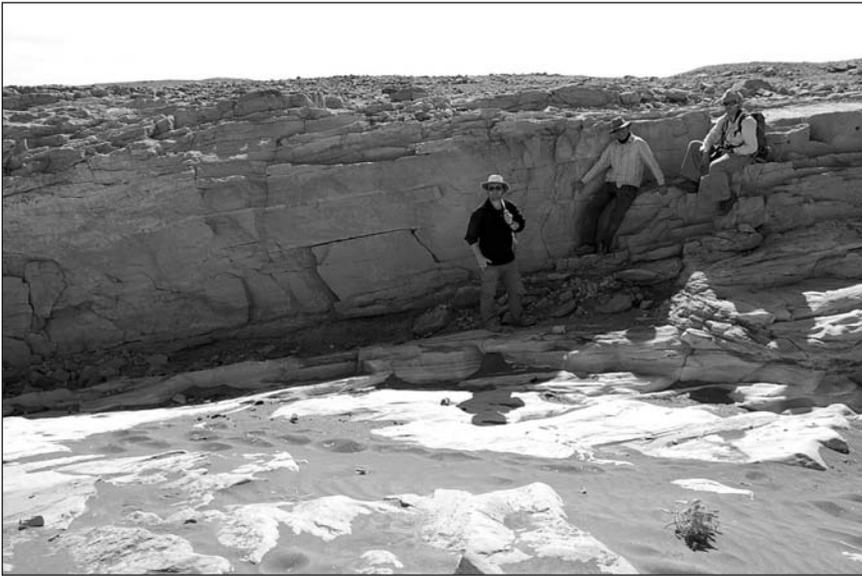


Plate 8. Sandstone quarry in the wadi immediately north of Sesebi.

large pounders (two-handed) and accumulations of chipped, vein-quartz. A few sherds were found in the area most of which were very coarse as well as a few Meroitic and Christian sherds. The area exploited in this way is around 150m by 770m and is unlikely to exceed 1m in depth although this can only be determined by excavation. We note that a similar pattern of pitting occurs in the high *jebel* around N 20° 13' 47", E 30° 28' 47" but that this area could not be reached using the transport available to this expedition. In this case the area pitted is around 180m by 360m and, therefore, less extensive than the pitting closer to Sesebi.

Wadi extraction

We noted an area of *wadi* floor destruction around N 20° 7' 35", E 30° 32' the area being approximately 50 x 300m in extent with a depth of around 1m of material removed. Pounding stones taken from the *wadi* cobbles are abundant over the whole of the area. The area is particularly interesting as the target of the extraction is clear. The excavation



Plate 9. Quartz vein in green schist.

focuses on quartz veins in the green schists and also granite pegmatite (coarse-grained) veins where they occur (Plate 9). There are ribs of schist that do not have quartz veins in them left standing proud of the *wadi* floor. Taking this area as an analogue, we infer that the target of the pitting around Jebel Egri is also vein quartz that is present already broken up in the desert pavement. The disturbed patterns of the drainage in this area may suggest that some mineral extraction by streaming (damming of seasonal rains followed by release to separate ore) was used.

Later pitting (building material)

The pattern of early pitting of the desert pavement is overlain by a series of 'green' pits that have been used for the extraction of very weathered green schist; this is still being used for the characteristic green plaster of the

houses of the villages in Sudla. In addition to these there are a few pits where lintel stones have been excavated from the schist of the type used in the recent but ruined building at N 20° 7' 52", E 30° 32' 46".

Grindstones and pounders

Grindstones found at the temple are generally made from the green schist encountered locally but one grindstone of basalt of the type found at Jebel Sese and granite examples were also seen. Pounders are of very varied lithology and are made from *wadi* cobbles upon which peck marks are visible as well as from the remains of worn grindstones and include sandstone, basalt and a variety of rocks metamorphosed to green schist grade.

Purpose of the extraction

Given that the target of the pitting over a wide area in the vicinity appears to be vein quartz, and given the investment in crushing it, both at source and its subsequent grinding exclusively at the Sesebi site, we are led to the conclusion that the target of the extraction was a valuable ore mineral with gold being the principal candidate. Pieces of chipped carnelian are also found in the workings but given the prevalence of this stone in Egypt we conclude that carnelian was a by-product of the main mining activity. In addition to this evidence, the production of carnelian goods does not require grinding of the material.

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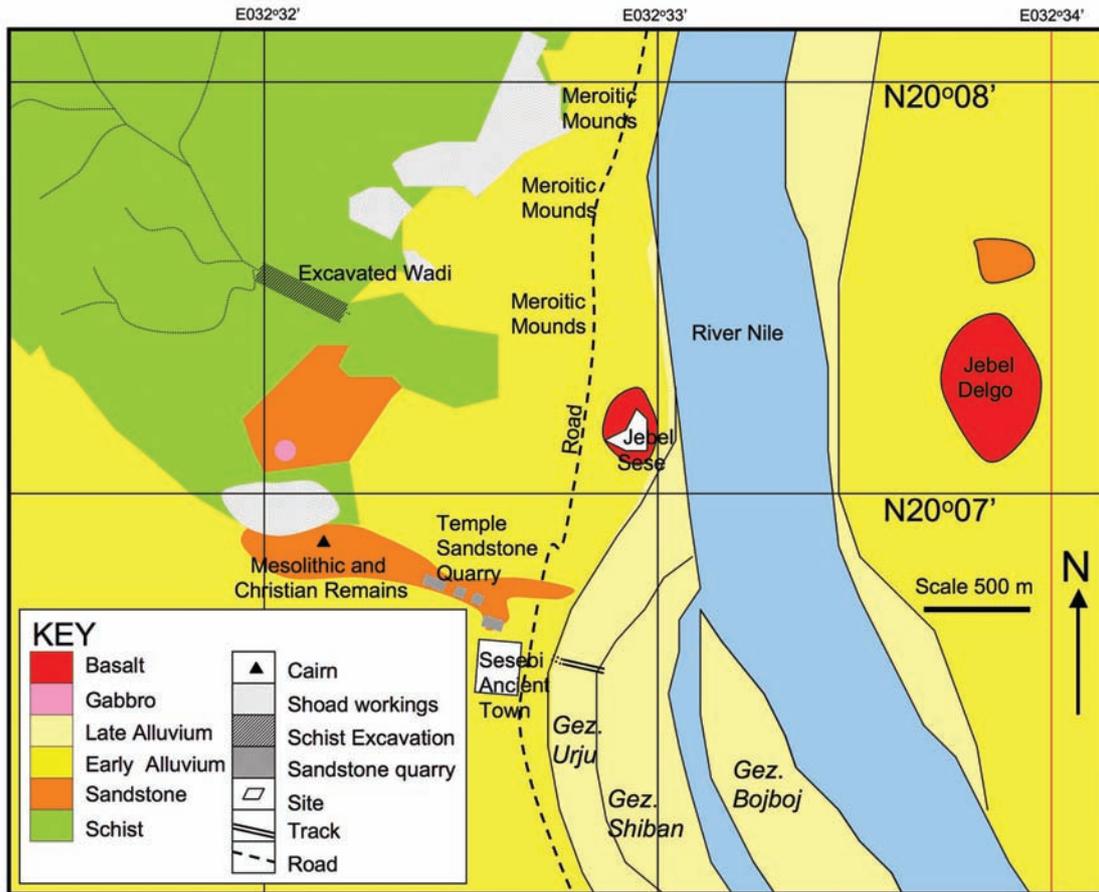
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Colour plate XV. Sesebi. Geological survey of Sesebi and surrounding region.



Colour plate XVI. Sesebi. Pitting along wadi deposits north of Jebel Sese which is visible top right.