

# SUDAN & NUBIA

The Sudan Archaeological Research Society



*Bulletin No. 2*

1998

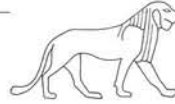






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*Front Cover:* Ceramic statue of the goddess Beset from Kawa.

## Introduction

*Vivian Davies*

Members will note that this second issue of *Sudan & Nubia* is already considerably larger than the first, a clear signal, I am pleased to say, both of our Society's commitment to fieldwork and of the growing interest in Middle Nile archaeology in general. With the four-year programme of survey in the Northern Dongola Reach completed, we began last season a significant new project at Kawa (see Derek Welsby below), a major Pharaonic and Kushite cult-centre and one of the most important archaeological sites in the Sudanese Nile Valley, now threatened by modern development. At the same time our interest in the hydrological research on the Nile palaeochannels in the Dongola Reach continues (Mark Macklin and Jamie Woodward), and we have also supported archaeological survey both in the Bayuda desert in advance of the building of a new road (Michael Mallinson, Laurence Smith and Dorian Fuller) and at the site of Kurgus, the point where the Egyptians appear to have marked the southern boundary of their empire in the New Kingdom (Vivian Davies and Isabella Welsby Sjöström).

Among our guest contributors, two of our Sudanese colleagues report on valuable rescue projects, one on a site affected by the building of the Shendi-Atbara road (Abdel Rahman Ali Mohamed), the other in the area of the Fourth Cataract, where a new dam is being planned (Mahmoud el-Tayeb). Also under threat is the site of Soniyat in the Debba Bend, now very plausibly identified by a Polish expedition as the 'Tergedum' mentioned in Book II of Pliny's *Natural History* (Bogdan Zurawski). Rescue is also very much the theme of the Egypt Exploration Society's latest excavations at Qasr Ibrim, the last remaining site in Egyptian Nubia, where an unexpected rise in the level of Lake Nasser/Lake Nubia is damaging strata previously thought to be safe, necessitating urgent work on those areas (Pamela Rose and David Edwards). Fortunately there is no such threat to the Wadi Howar, a long dried-up tributary of the Nile, evocatively known as 'the Yellow Nile', where a German research project is producing fascinating new data on changes in environment and shifts in settlement patterns (Birgit Keding). A different kind of research, on the records of an important early traveller, is represented in our final paper (John Ruffle). Lord Prudhoe, its main subject, will be familiar to many of our readers for his association with the two great lion sculptures from Gebel Barkal, which now grace the Egyptian Sculpture Gallery of the British Museum.



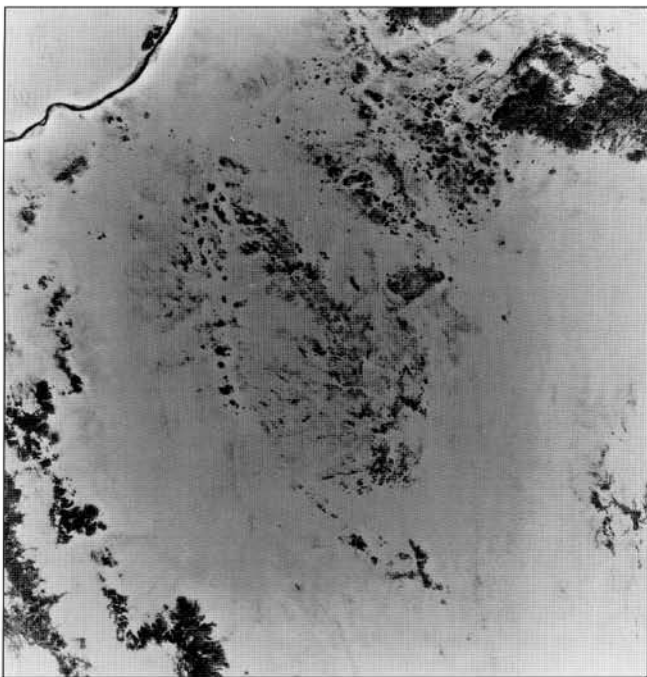


# SARS Survey from Omdurman to Gabolab 1997

## *The survey*

*Michael Mallinson*

The purpose of this project was to carry out a rescue survey of sites endangered by the new Shariyat Shamal-artery of the North Road that is under construction in the Wadi Muqqadam (see Mallinson 1997, 30–3)(Plate I). It follows an earlier SARS survey carried out in 1993 of the road between Meroe and Atbara of similar length and roughly parallel to this route (Mallinson *et al.* 1996), which allows a good comparison of this wadi with a similar stretch of the Nile Valley. In our earlier investigation we discovered that the modern road engineers working for STIPE, the consultants for the Sudanese National Board of Roads and Bridges, follow the gravels just above the flood plain when designing the road route, and that these levels have historically been also the most desirable for settlement and cemetery sites. We had expected to discover some sites from the aerial photographs lent to us by STIPE, who also provided the vehicles that allowed us to carry out our work in this difficult terrain. Even so we had not expected the density of sites that were uncovered, 192 sites in 300 km of road bed, the majority lining the sides of the Wadi Muqqadam, which we surveyed for 120 km (Colour Plate XXXIV). This density did not indicate a population of nomads of the kind that currently occupy the wadi, but permanent settlement over a long historical period.



*Plate 1. Aerial photograph of the northern part of the survey area.*

The initial interpretation of the survey material will be based on comparison of the sites with those surveyed in 1993 by SARS, and the subsequent 1994 and 1995 excavation seasons of these sites. The visual recognition of a site's date and provenance can in some instances be quite easily verified for one of its periods of occupation, but the experience from the excavations has indicated that the presence of Early Christian *kom* (mound) graves may well cover an earlier Post-Meroitic or Meroitic level and make such initial observations only indicative. The preliminary evidence is, therefore, reviewed in terms of preliminary structural evidence, supported where possible by the 'Pottery and Small Finds Report' of Laurence Smith (see below). The work of Dorian Fuller is still only in its initial stages, as dating of the phytoliths samples and other aspects of his work cannot be afforded by SARS at the moment. This lack of funding is also responsible for the outline level of the project report to date. The full publication of the 192 sites, of the site plans and photographic record must await the final publication.

The structural studies were carried out using the new SARS Geodolite 600, and the data were down loaded directly onto a PC laptop. These data were then processed using Geosite 2 software and exported into MiniCad7. The drawings could then be printed out to allow details of the sites to be recorded on the survey plans.

The identification of site locations was based on three sources.

1. Maps: the old 1:250,000 series maps first made in the 1930s and updated through to the 1970s are marked with a few indicative site locations; these at best give a suggestion as to possible sites. As unfortunately they are the only current maps that cover the entire area, they were used to outline the main road line. A more recent series of maps published in the 1980s funded by UNDP at a 1:100,000 scale covers the area of the road between Omdurman and the road builders bench mark (BM) No. 125 about 192 km from Omdurman. These maps also contain a very limited amount of archaeological references, but can at least be used to map the terrain accurately, identify wells, and record the road's future route. Finally, the road maps of the STIPE engineers, which are at a scale of 1:2,000, are marked with a limited number of features such as wells and structures, some of which can be identified on foot as archaeological remains. These maps only extend 200m either side of the road line, but contain useful information on levels and the local terrain make-up and sections. As they also contain the proposed road bed and bridges, they indicate where sites will be destroyed and where they are more likely to be damaged. It was on the basis of this information that the rescue work was initiated at the sites excavated previously in 1994 and 1995.

2. Aerial Photographs: the requirements of the STIPE engineers for accurate terrain information required the use



of 1:4,000 and 8,000 scale aerial photographs to prepare their maps on uncharted territory. These photographs were made available to us, and when used in conjunction with foot survey proved very useful in identifying areas where work would be necessary. The majority of the 20 sites identified from the aerial photographs proved to be of archaeological significance. The sites that could be identified from the air include tumuli, box graves, huts and wells. Some of the latter were modern, but are still useful as an indication of the presence of a good water supply which often is still associated with ancient sites.

3. Foot survey: the survey was carried out using vehicles to carry out a preliminary site analysis on the journey northwards. This preliminary record was then used to programme the working days on the return trip south. A set number of days was allowed for each key area, working from a base camp that was moved four times. The survey team was divided into two and the survey point set up either on or close to known markers. In the previous survey these had been the actual bench marks (BM) but on the Bayuda Survey these proved less well located and frequent, and instead arbitrary base stations were set up and known stations were surveyed in as part of the general survey. The base station grid was oriented onto magnetic north. These known marks included the kerb setting-out points which were also marked on the STIPE maps. The two survey teams worked along the road line and covered all visible sites within 1km of the road line, or in a location such as a rocky outcrop that might be utilised as a quarry. The range of sites that can be identified in this manner is limited and undoubtedly a number of sites may be missed. The survey represents possibly an 90% identification of visible structures, and considerably less of below ground sites that might be marked by pottery scatters.

The road is now substantially complete to 40% of its length up to BM 100 and areas of grading have been commenced from BM 115 to BM 135. The remaining 140 km are likely to take two to three years to complete. The areas where the grading is finished have uncovered at their edges a large number of sites which are otherwise invisible. This has tended to concentrate our early material in these areas. The threat to sites after completion of the road, though, is clearly evident as the whole modern settlement pattern of the region is changing. The rest-houses previously concentrated near the old route down the wadi bed are moving back to the higher gravels, and the nomadic population are taking advantage of the increased traffic to move their encampments closer to the road. The new deep borehole wells have also indicated the presence of water, and the beginning of exploitation of the fertile wadi floor has begun with a number of government schemes around Tamtam, which are set to grow. The risk to the scientific community of losing the sites identified is very great particularly adjacent to the exist-

ing settlements. A number of key sites, although in some cases not directly threatened by the road, should be investigated before they are destroyed by associated development. This is particularly important where studies are based on organic remains which will be affected by changing local climatic and ground-water conditions resulting from large-scale agricultural development.

The data gathered at this preliminary stage has given us some indication of an outline history of the occupation of the Wadi Muqaddam region. Its history is clearly parallel to the two regions of the Nile Valley which it connects, but despite this it does have a distinctive character, perhaps due to both its isolation and its dependency on trade. The absence of occupation in a given period may well be a factor in the survival of earlier traditions in remote areas long after the Nile Valley cultures were influenced by external changes. Sudden transformations in the Wadi Muqaddam came about only when the surrounding cultures become strong or stable enough to establish their presence in the area in the interest of reopening the old trade routes. Despite the region's dependence on trade, it did thrive through all the historic periods and the evidence points to a settled population. These populations reacted to cultural changes in a similar way to the Nile Valley populations. It would seem false to see the Bayuda as a barren trade route but perhaps better to envisage it as the central province between successive areas of influence, that provided an essential link used for trade. The importance of the route along the Wadi Muqaddam owed much to its unique geography which made it habitable when other routes had become more inaccessible due to climatic change.

For this preliminary report I will briefly review a list of the sites we identified which give evidence of the history of the Wadi Muqaddam.

**Palaeolithic:** occupation of this period in the Wadi Muqaddam was revealed in the survey at BM 69, where a cache of Acheulean stone age tools at the meeting of two wadis was found. They showed the presence of man living in what must then have been a part of the fertile Nile Valley plains. These tools have a form found throughout the period and link life in the wadi to similar sites in Khor Abu Anga in Khartoum and the recent discoveries at Dongola.

**Mesolithic/Neolithic:** the continued settled occupation and fertility of the valley are shown by the number of Mesolithic/Neolithic sites discovered on the gravel beds close to the Wadi Muqaddam stream bed. Two large sites, at BM115 and BM 61, and one smaller at BM 84, showed the presence of settled communities manufacturing the characteristic pottery, flints and grind stones, and flint tools. The presence of large quantities of mollusc and fresh water snails and fish bones amongst the remains indicates the continued high levels of water in the Wadi Muqaddam in this period. If the White Nile had followed this eastern course it may





have still been flowing in flood season. At the end of the Neolithic, a major climatic change seems to have started to cause desiccation in the area and the White Nile's major course joined with that of the Blue Nile closer to Khartoum. The wadi must still have remained fertile supporting seasonal crops and animal husbandry.

**Historic:** the third and second millennia material may be indistinguishable from the end of the Mesolithic, but with the start of historic contacts with the larger riverine civilisations further north at Kerma, Lower Nubia and Egypt, Wadi Muqqadam started to become a trade route for these areas. The early form of this trade may have been no more than raiding from the north for food and slaves. Harkhuf, governor of Elephantine in the Old Kingdom, left an inscription in his tomb in Elephantine which describes his visit to a southern chieftain who is away raiding his neighbours to the south when he calls.

The first evidence for trade further north is the presence of Napatan pottery and the chance find in 1920 of a Napatan faience amulet now in the Khartoum Museum (SNR 1920). The development of this trade route may well be linked to when the capital moved from Napata to Meroe in the first millennium. Evidence for this is clearly shown in the Wadi Muqqadam by the presence of Meroitic tumuli at a number of sites along the Wadi, BM 90 and 61. This showed a settled population with clear links to the Meroitic riverine civilisations. The pottery found around these sites further substantiates this. The significance of the Meroitic period may be further emphasised by Tim Kendall's discovery at the mouth of the wadi of a site with small shrines, which he considers to have been a trade control point between Jebel Barkal and Wadi Muqqadam (Mallinson 1997, 30, pl. 2, colour plate XIV).

The importance of this route must have increased towards the end of the Meroitic period, as the Post-Meroitic remains far outnumber the earlier period. They show a large settled population trading with similar regions along the Nile Valley and show the valley as still being inhabited by a reasonably sized population. The increased dryness seems to have enhanced the importance of wells in the region and the tumuli sites seem to be linked to the meeting of wadis and the wells dug there.

**Medieval:** the creation of the large medieval kingdoms of the Nile seems to have resulted in the blossoming of life in the Wadi Muqqadam despite this dryness. Trade throughout the period is evidenced in the large number of Christian pottery types discovered in the survey, with possible Dongola ware, Aswani ware and other varieties being found scattered amongst the Christian tumuli. The late survival of this trade is shown by the presence of Box graves throughout the valley, which are a later development of the earlier Christian Kom grave type.

**Late medieval:** by the end of the medieval period trade routes were beginning to be developed which by-passed the Nile valley for political and religious reasons with the increase of Islam and the Red Sea trade routes. This change was more catastrophic than the increased dryness in the wadi, and the Islamic Period sites are very few and mostly more recent. Without trade to support the increasingly hard life in the valley, settlement became impossible. The other Nile had dried up completely, and the Wadi Muqqadam joined the Bayuda Desert.

**Modern:** its most recent history has seen the beginning of a reversal of this process; with the arrival of the motor lorry and the new road, the route is again prosperous and modern mechanised pumps make cultivation in the fertile soil of the Old Nile Valley so much richer. The survey carried out by SARS has allowed an insight into the history of this valley before it is covered over by the encroachments of the modern world.

It can be seen that the history of the Wadi Muqqadam follows broadly that of the Nile. Our survey has discovered a comparable number of sites to the equivalent stretch of road we surveyed in 1993, which follows the river between Meroe and Atbara, comprising similar periods and densities. It seems possible this is because the wadi begins as a major tributary or even as the original White Nile bed and develops over time to become a major trade route through the Bayuda Desert as the climate becomes dryer (Colour Plate XXXV). This trade route is itself replaced by the later medieval routes along the Red Sea coast and following political changes along the Nile Valley. Perhaps the final modern phase will see the development of new routes which serve to improve internal trade and also open up the possibility of new life through irrigation of the old fertile wadi floor.

This initial investigation needs to be supplemented by further studies. It is highly desirable to undertake a further rescue survey along the Nile from Gannetti to Kareima, the last leg of the new road. This would give us further comparative material to complete the picture of the two sides of the Bayuda and the linking route, all surveyed using similar modern methodology. At the same time we would hope to carry out rescue excavations at BM 61, as well as more detailed transects across the Bayuda at various locations so that the material for the wadi can be compared across its width. This should assist in assessing the density of occupation in the wadi. The next stage of survey would also allow us to complete the examination of the entrance of the wadi at the Kareima end. This is where Tim Kendall identified the group of Napatan shrines and buildings, which he considers to be a customs post. The concession of the Gannetti-Kareima route includes the river banks and islands adjacent to the left bank. The studies of these would also allow a transect of sites along the Nile to be completed. An anthropological study should be made in conjunction with these



final seasons to allow modern patterns of occupation to be studied. An initial survey of the populations of the Wadi Muqaddam has suggested strong links between the peoples settled along the Nile and those along the adjacent stretch of the Wadi Muqaddam even when separated by large areas of desert. The northern populations relate to the river around Ed Debba, the middle populations to that at Shendi, and the southern to the south and west of Khartoum.

The writing up of the work of this first season will be completed in conjunction with that from the projected further field seasons to give a representation of the history of this area. This will provide as full an image as possible, within the constraints of our limited resources, of both settlement and trade on the borders and across this region of the Middle Nile.

## *Pottery and small finds*

*Laurence M. V. Smith*

### Introduction

The collection and study of the pottery from the Omdurman-Gabolab Survey had two main objectives. The first objective was to use the pottery for the general dating of the sites. Since the fieldwork was confined to ground survey, it was not expected that samples suitable for radiometric dating would be recovered from more than a few of the sites encountered. Hence, examination of the pottery has been of importance for providing evidence complementary to the style of the surface remains of structures for assigning sites to their general time periods. Such initial dating can be refined subsequently by radiometric dates where these are available.

The second main objective was to assess further the cultural and geographical links of the sites discovered within the temporal periods to which they may be assigned. This is of particular interest in the Bayuda region, since it could provide an indication of the periods during which the route across the Bayuda from the junction of the Niles to near the southern end of the present-day Dongola Reach has been of significance in movement north and south through Upper Nubia, as it is today.

Whilst the study of the material from surface collections made during the survey is still in progress it is intended, in this paper, to present the main examples of finds. Those that have been assigned to their most probable date or period will be considered first, followed by some of those for which the period cannot, as yet, be assigned so closely. The classes of artefacts recovered in the surface collections include both pottery, forming by far the most numerous category, and small finds, which occurred in relatively small numbers. The main types of small find comprised stone artefacts and beads, mainly of eggshell or of faience.

In general, the amount of surface material encountered on the sites along the line of the Omdurman-Gabolab road was sparse. Collections were made in transects over one site where sufficient surface artefacts were present to warrant such a method of collection; otherwise, samples were taken from roughly circular areas of about 2–3m diameter, selected so as to give an approximately even coverage of the area of the site. In a number of sites, material was not evenly distributed over the surface, but tended to be present in concentrations. In this case, material was sampled from such concentrations and was located by reference to the closest Survey Point, or by relation to the structure in the vicinity of which the material lay.



## The ceramics and finds

The earliest period for which artefactual evidence has been recovered is the Acheulean. This occurs in the form of 12 handaxes from Site 69.2. Nine are of a pointed variety (see Plate 2), whilst the rest are ovate. All appear to have been made of ferricrete sandstone. The majority exhibited a considerable degree of weathering, since the margins of the flake scars were generally rounded rather than sharp. These handaxes indicate the use of the region of the Wadi Muqaddam during the Lower Palaeolithic and add to the number of findspots of such artefacts within the Sudan.

Subsequent periods identified in the examination of the material all comprise those for which pottery represents the major artefact type present in the surface collections. In general, the ceramics encountered on the Gabolab Survey were more fragmentary and, overall, appeared to exhibit a greater degree of weathering than the surface material found in the previous survey undertaken along the line of the 'Challenge Road' from Geili to Atbara (Smith 1996). The largest sherds comprised a substantial portion of the profile of a bowl from Site 107.1, and the base of a closed vessel from Site 97.1. Consequently, in the study of the great majority of the ceramics, classification of the material could

often only be based on a small number of criteria; in a number of cases, only fabric and form, or fabric and incised decoration were present. For those sites where pottery formed the only surface material encountered, such ceramics could often only allow a dating to a broad time period.

The earliest ceramics to be considered comprise material at present assigned to the Mesolithic period. The pottery occurs most commonly in three fabric types: two similar to those also encountered on the Begrawiya-Atbara Survey, characterised by a dense texture and a very low occurrence of vegetable temper fabrics (OGF2.16 and 2.17) and one with a much more porous texture containing abundant, often very coarse, vegetable temper (OGF1.11). The largest samples of ceramics considered to date to the Mesolithic came from sites 115.1 and 61.3. The sherds from the former site were the best preserved, since the collection was made from an ancient surface revealed by grading, so that the material had not been subjected to much weathering. The pottery from 61.3, in contrast, is likely to have been brought to the surface by the digging of graves dating particularly to the Meroitic period and has, in consequence, suffered considerable erosion. Hence, the ceramics providing the clearest evidence of the forms and decorations of this class of material were those from 115.1.

The most characteristic decoration types are the Wavy Line and Dotted Wavy Line styles, although these motifs only occur in relatively small numbers of sherds. Such a decoration type is similar to that of the Early Khartoum Mesolithic as seen at the Khartoum site itself (Arkel 1949, pl. 60, 61, 72) and at Shaqadud (Caneva and Marks 1990, pl. IV, 1, 3, 5).

Further characteristic decorative motifs, as exemplified from Site 115.1, are dotted undulating lines, composed of closely-spaced comb impressions, and several varieties of rocker-stamp decoration. A common type of the latter comprises closely-packed zigzags, composed of square or rectangular impressions, forming a reticulated pattern over the vessel surface. Further decoration types include packed zigzags forming lines meeting at an oblique angle, which is similar to D92 in the classification of ceramics from the Begrawiya-Atbara Survey (Smith 1996, 182, pl. 15, 2)

A number of rim sherds were recovered, which could mainly be assigned to various forms of moderately or strongly inturned bowl or jar. Most rim cross-sections are conical and approximately symmetrical on the interior and exterior. In some cases the rims are flattened on the interior, forming a facet at a more or less oblique angle to the horizontal (Fig. 1a and b).

The dating of this part of the material from 115.1 to the Mesolithic is based mainly on the presence of the Wavy Line and Dotted Wavy Line motifs, and the lack, in the sample taken, of decoration types characteristic of the Khartoum-type Neolithic, such as the 'fish-scale' pattern of Arkel (1953, 73, pl. 32, 7) in plain-edged rocker-stamp,

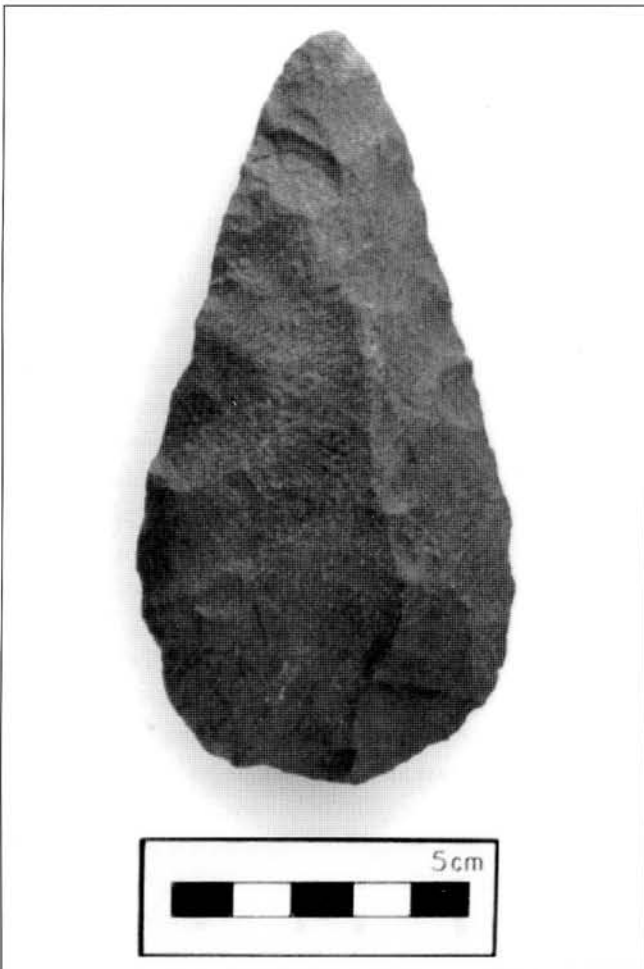


Plate 2. Pointed handaxe from Site 69.2.



decoration with elements comprising 'vees' (Arkell 1953, 71–72, pl. 30, 1, 2, pl. 32, 1), and overlapping panels composed of semi-circular incised or dotted lines as at El Gharba (Lecoite 1987, fig. 6a,b)

Regarding other artefact types, the sites 115.1 and 61.3 yielded two of the main collections of grindstones. These are made of grey sandstone(?). They exhibit two main shapes, one being a flat oval, with an approximately rectangular cross-section and the other more rounded in plan, with a virtually circular cross-section. Site 61.3 also yielded some examples of stone disks with roughly hemi-spherical impressions in the centre of each face. These are similar to artefacts from the site in the Wadi Kenger, studied by Caneva, who identified them as unfinished stone rings. These provide additional confirmatory evidence for the dating of 61.3 and, given the similarities in the fabrics of the ceramics here and at 115.1, for the dating of the early occupation at the latter site, since the stone rings are one of the artefacts considered to occur usually in a Mesolithic context (Caneva and Gautier 1994, 76).

However, from the available sample, it does not appear that Site 115.1 is a purely Mesolithic assemblage. There is one decorative motif (D38) on certain of the sherds in the vegetable-tempered fabric which is similar to some varieties of rockerstamp with evenly spaced dots from Geili, dated to the Neolithic period (Caneva 1988a, fig. 8), which may be equivalent in date to the 'Pre-Kerma' further north. Some body sherds are in a fabric completely different from the material assigned to the Mesolithic, being relatively dense in texture, and of a greenish-buff to pink or a dark grey to pinkish fired colour. Some of these sherds appear to be slipped and are wheelmade. They seem more similar to ceramics of the Meroitic or Christian periods than the prehistoric, although the sherds are not sufficiently diagnostic to indicate a more specific period. A number of rather badly eroded sherds exhibit abundant vegetable temper; this is finer than that in Fabric OGF1.11 and is similar to material from the protohistoric and historic periods. Finally, there are a few examples that may be assigned a generally 'Medieval' date, having a rim cross-section thickened on the interior, with a flattened, somewhat convex top, and a slight lip at the junction of the rim top and the interior wall. These sherds have a series of flattened 'X'-shaped incised motifs on the top of the rim. Such a rim form and decoration are known from Medieval period ceramics further north (I. Welsby Sjöström, pers. comm. 1998).

In the Survey area, there appears to be little evidence for the Neolithic of 'Khartoum'-type; virtually no clearly diagnostic sherds of this period were recovered. A small proportion out of the total assemblage exhibited a fabric similar to that of ceramics collected on the Begrawiya-Atbara Survey, which could be assigned a Neolithic date. However, such sherds from the Bayuda were generally very eroded, so that it was difficult to distinguish any decoration character-

istic of this period. Some sherds appeared to have the remains of rocker-stamp decoration similar to decorations D43, D43.1 and D43.2 a characteristic of Group 7a in the Begrawiya-Atbara classification, assigned to the Neolithic (Smith 1996 190-191) but the design on the Bayuda specimens is not clear enough to be certain of this. Only one site, 74.2, had evidence in the form of quite large rim sherds, classed as preliminary form 1:26 (Fig. 1c), which are from moderately inturned bowls or jars, having a somewhat 'club-shaped' cross-section. These are comparable in cross-section to Type G from Shaheinab (Arkell 1953, pl. 36) and to the cross-sections of examples of bowls from the Neolithic of Geili (Caneva 1988a, fig. 4, 9).

At the present stage of the research, there is relatively little surface material collected on the survey that can clearly be assigned to the period from the later Neolithic through to the Napatan. Currently, the main sample of ceramics considered to be of Napatan date comes from Site 57.2. This comprises material in Fabric OGF1.17, generally with reddish outer zones. Characteristic forms include, for example, Preliminary form 1:32, a jar rim, moderately outflaring, with a rounded rim profile (Fig. 1d). Body sherds include wheelmade examples with relatively thick walls, and moderate degree of curvature, coming from vessels of some size, c. 24–26cm in diameter.

Other specimens of Napatan ceramics are represented only by a small number of eroded body sherds. These form one example of ceramics from the survey which is sufficiently distinctive in fabric alone to allow a date to be assigned on the basis of material in such poor condition. These are sherds in Fabric OGF2:20, most being from site 113.2. The fabric is of a light orange-brown fired colour, and quite fine texture, characterised by fine voids representing vegetable temper and rare black iron oxide fragments. It is probable that the sherds would originally have had a light greenish-buff exterior zone, and some a flat type of ribbing. The fabric, which can be identified as a marl clay, is sufficiently similar to material recovered from the Begrawiya-Atbara Survey, classed as Group 11 in Fabric F4:2. The sherds from the latter survey were identified as coming from amphorae of Egyptian origin, manufactured during the XXVth-XXXth Dynasties (P. J. Rose, pers. comm. 1997). Therefore, the Begrawiya-Atbara Survey Group 11 material, and hence the Gabolab sherds, can be dated essentially to the Napatan Period.

Subsequent to the Napatan-period material, there are the ceramics assignable to the Meroitic Period. Sites of this date are clearly present along the line of the Road, although the proportion of sherds clearly identifiable as being Meroitic is still not large. The most diagnostic material consists of sherds of 'footed stands' or 'offering tables'. Such sherds have so far been identified from two sites, 171.3 and 59.3, the clearest examples being from the former site. The sherds consist of rim fragments from very shallow, straight-



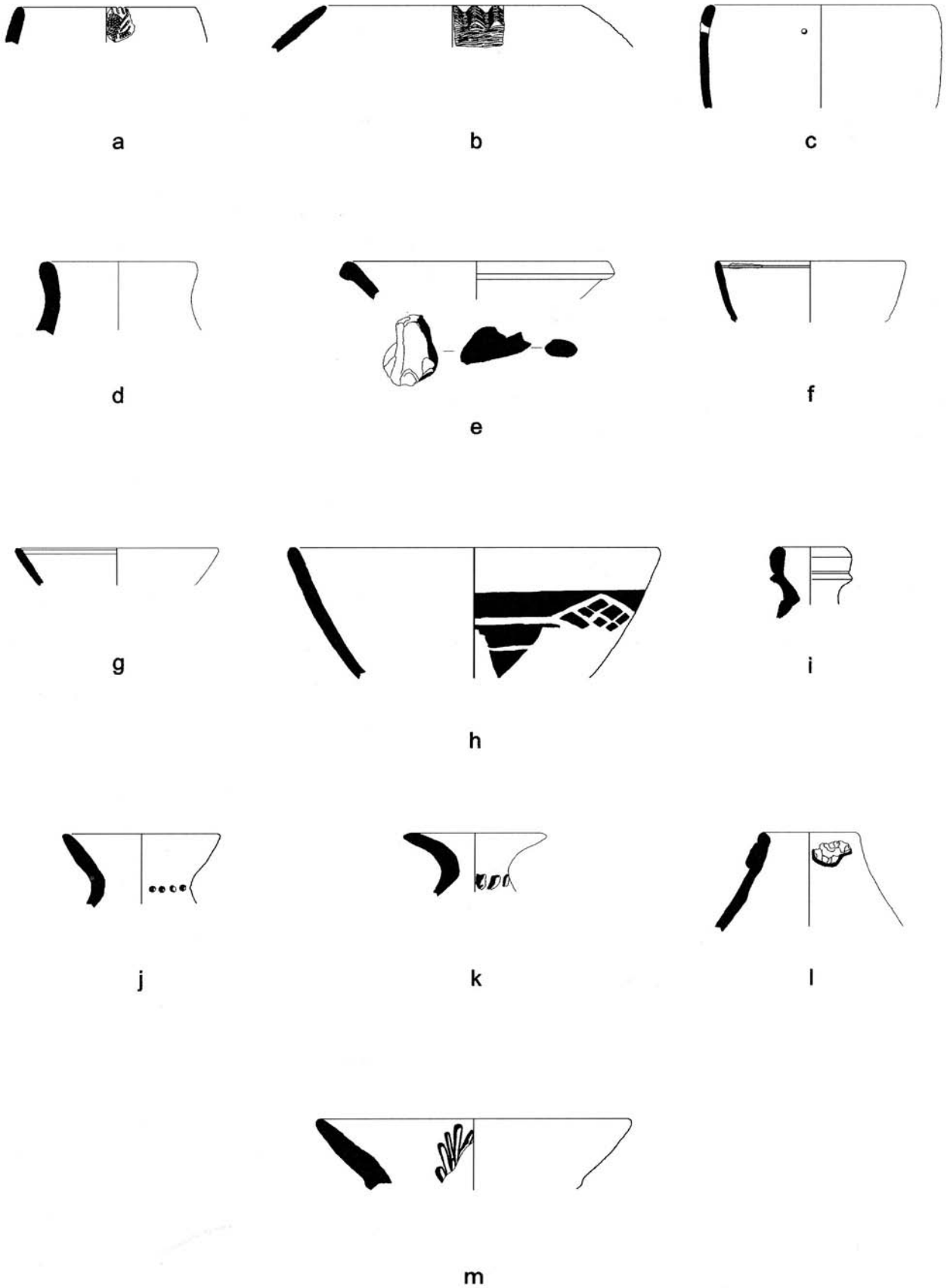


Figure 1. Examples of ceramics from the main periods, recovered from surface collections. Scale 1:4, except 1h, at 1:2.



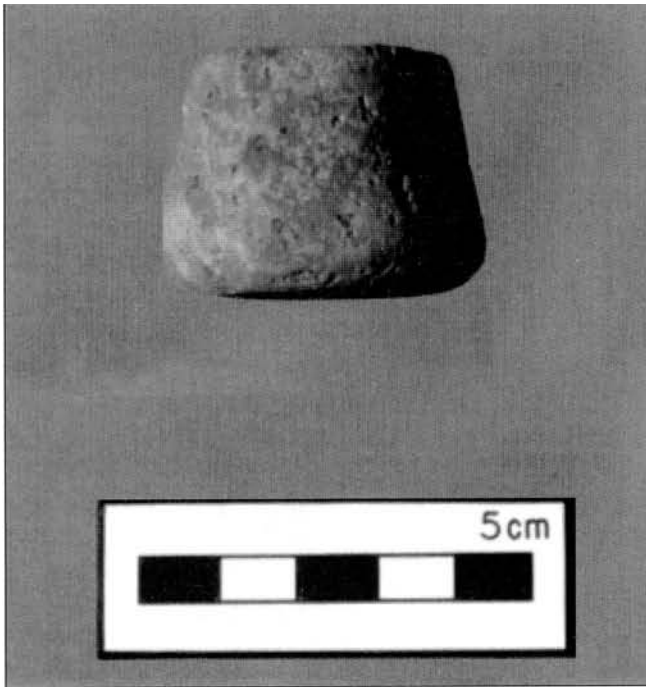


Plate 3. *Thumb-ring.*

sided, bowl-like forms, some of which exhibit depressions where handles were attached on the exterior, portions of the handle-attachment and portions of the handles themselves (Fig. 1e). Although no examples were found of the rim sherds with handles still attached, the finding of the pieces in close proximity indicates that they were probably associated with each other. The form of the vessel from which they came is probably similar to one type (6:1) encountered on the Begrawiya-Atbara Survey although in the latter case the vessel was wheelmade (Smith 1996, fig. 5) and may be closest to the forms of offering table from the West Cemetery at Meroe illustrated by Dunham (1963, fig. C, 27, 28).

The pottery of the Meroitic period illustrates the second objective of the study of the ceramics from the survey, viz. the study of contact with other areas. Evidence so far identified comprises only a small quantity of sherds. However, this material, in Fabric OGF4.2, is likely to be either an example of an Aswani fabric (cf. Adams 1986 525–546), or a specimen of a version of the Meroitic finewares, Family M, or Type F (Adams 1986 435–436; Shinnie and Bradley 1980, 154–155). This would represent a pinkish-fired variant of the fineware fabric, which appears to be characteristic of the Lower Nubian production of these wares (cf. Smith 1997, 87). In either case, the sherd attests to the movement of some ceramics, at least, into or through the Bayuda during the Meroitic period.

The Meroitic is the most likely period to which one of the unique small finds may be assigned. The find is a thumb-ring of andesite (J. Bunbury, pers. comm, 1998). This was recovered from Site 59.3, from which a few of the probable Meroitic 'offering-table' sherds were also recov-

ered. In form, the thumb-ring is straight-sided, and has proportions of height to maximum diameter of about 1:1 (Plate 3). In general form, it is closest to Hayes Type II, considered to be an archer's loose, rather than ring or mace-head. According to her chronology, the range for this Type is c. 100 BC – c. A.D 200 (Hayes 1973, 114–116, fig. 4). It has some similarities to thumb-rings with a wide distribution within Sudan. It is similar, for example, to a straight-sided specimen from pit 20 in Faras site 195. This pit is not dated specifically, although the cemetery is mainly of 'X-Group' date (Säve-Söderbergh 1981, 65–66, pl. 95,1). A further specimen, of similar profile and proportions of height to maximum diameter, of brown sandstone, was recently recovered from the shaft fill of an early Christian tumulus at Hamur al Abbasiya (excavated by Mahmoud el-Tayeb), during the Southern Dongola Reach Survey (J. Phillips, pers. comm., 1998).<sup>1</sup>

The next period for which material has, so far, been clearly identified is the early Christian. Ceramics from this period include a ribbed sherd with a polished red slip, which is possibly a product of the kilns in the vicinity of Old Dongola<sup>2</sup>. There are a few sherds of thin-walled bowls. One, Preliminary Form 2:3, is in Fabric OGF2.1. This specimen is eroded at the rim, but sufficient remains to indicate that it probably had a slightly asymmetric conical profile in its original state. The Fabric is a second example of material that is similar to products known from the Old Dongola area. A second example is of similar form, but has traces of a white slip on the interior; the exterior is eroded and exhibits spurious polish on a reddish-brown surface (Fig. 1f and g). This is considered to be of early Christian date, but is not clearly assignable to a source area. The third example remains one of the most closely-dated and well-provenanced pieces recovered on the survey. This, from site 171.7, is a bowl of Preliminary Form 2:2, decorated on the exterior with a white diamond-shaped motif on a dark brown band (see Fig. 1h). It has been identified as dating to from the second half of the 6th century to the first half of the 7th century and as a product of the Old Dongola kilns. This piece thus clearly indicates the presence of sites dating to the earliest part of the Christian period, and shows that ceramics were transported into the Bayuda region from further north at this time.

Material currently dated to the 'later' Christian period in general is present in the surface collections. One unique specimen is the neck and rim of a small amphora or pilgrim-flask (Fig. 1i). The rim is similar in form to some of the table amphorae of Aswani fabric recovered from Gabati (Smith n.d.). Whilst there are some parallels with amphorae

<sup>1</sup> I am indebted to Dr. B. Zurawski of the Polish Centre for Mediterranean Archaeology, Director of the Southern Dongola Reach Survey, for permission to cite this unpublished material.

<sup>2</sup> Information on the identification of the early Christian period sherds was kindly supplied by Dr. K. Pluskota.





from Elephantine, particularly forms K610 and K760 which are not closely-dated (Gempeler 1992, 184, 199, pls 116, 11, pl. 28, 3), the fabric of the Gabolab Survey example is not close to that of Aswani products so that it is most likely to be a Nubian-made vessel. Although no specimen of an identical form has yet been found, reasonably close parallels have been noted with types of pilgrim flask from Christian-period contexts in Nubia, such as at Ghazali Type L2, having a relatively tall neck (Shinnie and Chittick 1961, fig. 17). Forms with moderately prominent cordons, similarly narrow interior apertures and similar external profiles are known from Old Dongola (J. Phillips, pers. comm., 1998) and from Soba, Type 18E (Welsby and Daniels 1991, fig. 88).

Forms occurring more often in the collections comprise jars with outflaring rim, such as Preliminary Form 1:22 (Fig. 1j and k). Whilst insufficient generally remains of the profile to be certain of the full form of the Gabolab examples, the portions remaining of the majority of the forms do not seem to be sufficiently outflared to be from 'beer-jars' of the type classed at Soba as Class A (Welsby and Daniels 1991, 165–166). Rather, these can be more closely paralleled by some of the jars at Soba, being similar to Types such as 51L or 53L (Welsby and Daniels 1991, fig. 99). Such parallels indicate the presence of sites most probably datable generally to the Christian period.

Further material can, at the present stage of the research, be dated only broadly to the general 'later' Christian to Islamic Period. This includes inturned jars, such as those from Site 117, which have rough plastic decoration, or rudimentary lugs, in the form of irregular flattened blobs of clay applied to the exterior (Fig. 11). Material from Site 50.4 includes sherds of vessels of large size, including body sherds of thick-walled jars or amphorae, and of outflaring rims. The former may be from vessels such as *zirs*, although the associated rim sherds do not appear similar to current *zir* forms. The outflared rim, Preliminary Form 4:1 (see Fig. 1m), is the only sherd so far identified that has some similarities to those of the 'braziers', found on the Begrawiya-Atbara Survey, considered characteristic of the latest Christian period to the Islamic period (Smith 1996, 186, fig. 4), but insufficient remains of the vessel to be certain. Such an identification would indicate a date for this material of 13th–16th centuries but a later date cannot, as yet, be excluded.

Several classes of the ceramics and of the small finds cannot, at present, be assigned to a closely-delimited time-period. For example, sherds from 185.2 appeared to be similar, in form and in the presence of rim decoration, to material assigned to the 'Terminal Christian-Islamic' period on the Begrawiya-Atbara Survey, where such material could often occur in the surface collections from the same sites as the 'braziers' as at Site 155.2 (Mallinson *et al.*, 1996, 87). However, sherds similar to the Gabolab Survey examples

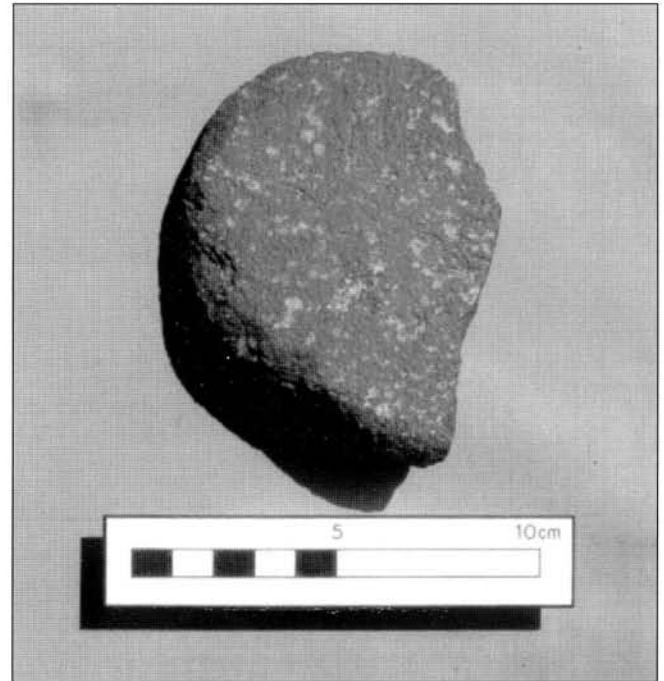


Plate 4. Grindstone, Site 33.2.

have also been noted in a surface context associated with stone artefacts of Neolithic type, in the region of Old Dongola (K. Pluskota, pers. comm., 1998).

Similarly, the one sherd recovered from a vessel made in a marl clay is too eroded to indicate the form, surface treatment or any decoration, and can, therefore, only be identified on the basis of fabric. This would be consistent with an Egyptian provenance, but its date is not certain. It is most likely to date to the Late Period, but could be from the Middle Kingdom (J. D. Bourriau, pers. comm., 1998). Given that Egyptian control over Nubia did not extend far to the south during the Middle Kingdom, a Late Period date is more probable. However, it is still possible that the sherd represents material traded, perhaps in small quantities, into the more southerly areas of Upper Nubia during this period.

In the case of the majority of the groundstone artefacts obtained from the surface collections (Plate 4), apart from the stone rings, a close date cannot easily be assigned. This is particularly so for the grindstones, which have retained similar forms over long periods. It is apparent that those from 115.1 are likely to be of Mesolithic date, according to the ceramics associated with them on the exposed surface. Grindstones have been recovered from the present-day surfaces of sites dated to subsequent periods ranging up to the Post-Meroitic or Christian Period. However, in most cases, it can only be assumed that the grindstones can be dated to the same period(s) as indicated by the surface ceramics and surface remains of the structures at a particular site.

Regarding the remaining artefacts, viz. the beads, essentially only two types were encountered on the survey.



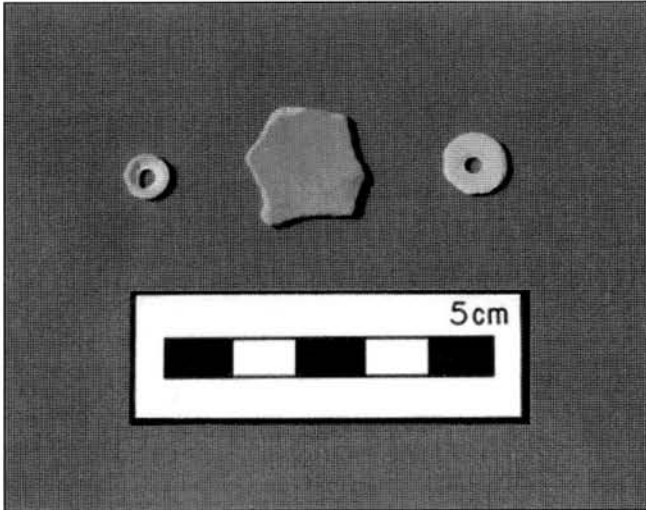


Plate 5. Examples of ostrich eggshell beads.

The majority are either disk beads *c.* 7–10mm in diameter or short barrel beads of 5.5mm diameter and made of eggshell, probably ostrich eggshell (Plate 5). Only one example was recovered of a different form, this being a cylindrical bead of greenish-blue faience, from Site 171.4. In general, the beads are not closely datable. Most of the eggshell beads appear to correspond to the ‘disk shape with cylindrical perforation’ of Caneva; only one, from site 179.1, is nearer a ring shape with a conical perforation. This corresponds to Caneva’s distinction between the Meroitic and the prehistoric (Neolithic) beads at Geili. Four beads from site 208.1 are nearer to a ring-shape than a disk-shape but still seem to have a cylindrical perforation, and are similar to Meroitic examples illustrated from Geili (Caneva 1988b, 167, 199, fig. 25, b). The cylindrical faience bead can be paralleled by two, slightly larger, beads of the same form and material, recovered from the fill of a Post-Meroitic tumulus at Gabati\* (Smith, n.d.) This date may, therefore, be taken as a *terminus post quem* for the Gabolab example.

### Conclusions

A summary of the presence or absence of ceramics currently assigned to the various chronological periods is given in Table 1. From this, it can be seen that sites can be dated, according to the surface artefactual evidence, to five main

periods, viz. the prehistoric (Khartoum Mesolithic and possibly Neolithic), Napatan, Meroitic, Christian and later Medieval. This tends to confirm that the route surveyed across the Bayuda from the junction of the Niles to near the southern end of the present-day Dongola Reach has been of significance in movement north and south through Upper Nubia over a long period. The presence of the probable habitation sites, such as 115.1 for the earliest periods, together with the large number of tumuli in sites associated with material of the protohistoric and historic periods further indicates that this route, substantially coincident with the Wadi Muqaddam, has been of importance for settlement, as well as travel, over a considerable period of time.

It can also be seen from Table 1 that there are three main chronological periods for which no clear ceramic evidence has been identified so far. The first of these periods is that equivalent to the ‘Late Neolithic’ of Shaqadud (Robertson 1991), to which the ‘third Millennium’ material recovered on the Begrawiya-Atbara Survey is stylistically similar (Smith 1996, 189–190). The second period is that of the Egyptian New Kingdom, from which time material might have been expected, given the extent of Egyptian influence in the riverine areas to the north and north-east, whilst the third period is the Post-Meroitic.

The apparent lack of ‘third Millennium’ ceramics may be due to the eroded nature of much of the material, particularly that considered to date to the ‘Khartoum Neolithic’. It is possible that the conditions leading to the erosion of the small amount of ceramics of the latter period could have extended into the period of the ‘Late Neolithic’. The alternative hypothesis would be that the small amount of ‘Khartoum Neolithic’ material does indicate a decline in settlement in the area at this period, which continued into the period of the third to earlier second Millennium.

It is less likely that the absence of ceramics clearly of New Kingdom date could be ascribed solely to preservation conditions, given that the most characteristic pottery should be identifiable through fabric, being of Egyptian marl clays, even if eroded. This could indicate that ceramics of this period all conformed to local traditions in terms of style and were made of locally-obtained raw materials, thus rendering them difficult to recognise. Alternatively, it could reflect ‘sampling error’ since the amount of Egyptian New

Palaeolithic	Mesolithic	Neolithic	Late Neolithic/ IIIrd Millennium	Egyptian Middle Kingdom
*	*	(?)		(?)
Egyptian New Kingdom	Egyptian Late Period (?)	Napatan *	Meroitic *	Post-Meroitic
Early Christian *	Christian *	Islamic *		

Table 1. Presence and absence of material assigned to the different chronological periods.





Kingdom imports to the south of the Kurgus region seems to have been small, if the number of specimens found in the Begrawiya-Atbara stretch of the Nile Valley is taken as a guide. If the lack of New Kingdom material in the sample of surface material collected truly represents the situation in this whole region of the Bayuda, it could be hypothesised that Egyptian New Kingdom interests did not extend far enough south from the Dongola Reach towards the junction of the Blue and White Niles to lead to any significant use of the Wadi Muqaddam route, but that a combination of the desert and riverine routes along to Kurgus were employed, or the route involving the Bayuda Road, lying northeast of the Wadi Muqaddam, to the area of Meroe, where New Kingdom sherds have been found (Smith 1996, 176–7).

The apparent lack of ceramics datable stylistically to the Post-Meroitic period and the relatively small proportion of identifiable Meroitic ceramics, despite the evidence for the sites with structural remains of Meroitic and Post-Meroitic date, may be paralleled by the situation encountered on the Begrawiya-Atbara Survey. In the latter case, Meroitic material falling within the traditions of the painted wares appeared virtually absent from the surface collections (Smith 1993, 26). Similarly, clearly identifiable material of the Post-Meroitic period was virtually lacking from the surface collections, a situation encountered by researchers in the Shendi region, for instance (Smith 1996, 195–196; P. Lenoble, pers. comm., 1995). However, during the test excavation season, considerable numbers of Meroitic painted sherds and substantially complete Post-Meroitic vessels were recovered, particularly from the site of Gabati, which indicated that the region was linked to a greater extent than had been thought into the more widespread production and distribution of wares during the Meroitic period and that settlement did continue through the Post-Meroitic period (Smith 1994, 32).

It is evident, therefore, that there is considerable scope for further research. The questions of the attribution of the material assigned only to very broad periods will be addressed in the preparation of the report for final publication of the 1997 survey. The questions regarding the apparent absence of artefactual material from certain periods, and the different hypotheses that can be put forward in explanation, will form the basis for further survey and test excavations within this hitherto relatively little studied area.

#### Acknowledgements

I am grateful to the following for advice and help in the study of the pottery and finds: Dr. P. J. Rose, Dr. J. Phillips, Dr. D. A. Welsby, Ms. I. Welsby Sjöström, Dr. K. Pluskota, Ms. J. D. Bourriau, Dr. D. N. Edwards and Dr. B. Zurawski.

## *Palaeoecology of the Wadi Muqaddam: a preliminary report on the significance of the plant and animal remains*

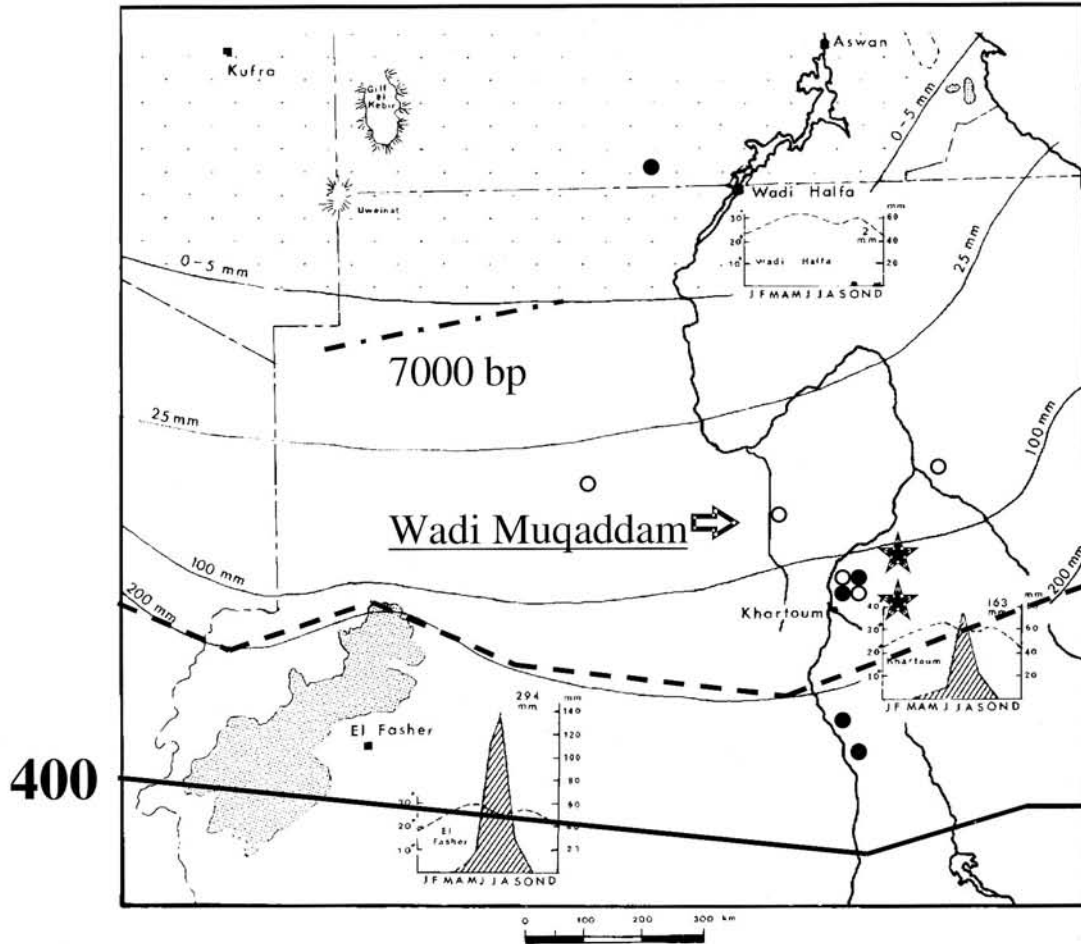
*Dorian Q Fuller*

Today, Wadi Muqaddam is a sparse strip of green running through the Bayuda desert (Colour Plate XXXVI). Away from the wadi bed, vegetation is almost non-existent except for the occasional Seyal tree (*Acacia tortilis*) and the odd cluster of other resilient desert plants. The wadi itself, which gathers water from a wide catchment area, has a low diversity flora, consisting of a half dozen tree/shrub species that line the main drainage line of the wadi and several widely dispersed ground cover herbs and grasses. Life is very much constrained by the fact that the region averages less than one centimetre of rain per year. This statistic is, however, slightly misleading because an important feature of the long term climate is variability. Some years have a few torrential storms and higher rainfall. At such times the landscape may be much greener and it is even possible to grow some crops. Indeed, some inhabitants of Wadi Muqaddam we encountered during our survey keep seed heads of sorghum for planting when such storms arrive. The human population is nevertheless sparse, with those who do not depend on the commerce, brought today by passing trucks and in the past by camel, leading a semi-nomadic pastoral life with herds of camel, sheep and goat. Houses cluster at various points along the wadi where there are deep wells which support this way of life.

For archaeologists, this situation, since it is known that the climate has changed relatively little in the past 5000 years, raises immediate questions: how old is this way of life? Was the environment and consequently the economy different at any time in the past? Palaeoecological evidence to answer these questions consists of the remains of recognisable plant and animal species, which allow us to infer the environmental conditions in the past.

Archaeological survey and exploration in advance of a road necessarily focus on the recognition, recording and mapping of burial monuments, settlement occupations and other artefact clusters. It provides only a partial view of the wider archaeological landscape, focussing as it does on a haphazard transect. Such work does not tend to yield large quantities of organic remains, in the way systematic sampling as part of site excavation often does. Nevertheless pilot samples can help to formulate hypotheses about the past environments and their exploitation by humans. These preliminary interpretations can then guide the planning and execution of future research. During the course of this sur-





- Early Holocene *Limicolaria* snails (requires ca. 400mm rain ). Approximate modern day northern limit indicated by solid line labelled 400.
- Approximate present day northern limit of thornsavannah zone in which wild *Sorghum* and *Pennisetum* occur.
- · - · - · same limit reconstructed from charcoal (Neumann 1993)
- Archaeobotanical evidence for *Sorghum* sp. ★ *Pennisetum* sp.

Figure 2. Paleo-Environmental evidence from the Northern Sudan, ca. 7000-5500 BC. Distribution of ancient finds of selected indicator snails and plant species for early Holocene are indicated. Note that the *Limicolaria* finds from the Wadi Muqaddam are undated. The base map indicates isohyets of average, modern annual rainfall. Three representative annual climate schedules are inset, showing rainfall (in mm) per month (hatched area) and average daily temperature (dashed lines).

vey three forms of palaeo-environmental evidence were recovered: animal bones and shell from surface collections, plant impressions in pottery, and sediment samples from small test excavations. On the basis of a preliminary study of some of this material, it is now possible to discuss the place of the Wadi Muqaddam within larger patterns of ecological

and cultural change in this region of the Republic of the Sudan.

The archaeological material recorded by the Omdurman-Gabolab Survey fell into three broad periods, the Lower Palaeolithic, the Mesolithic/Neolithic, and what might broadly be termed the 'historic' ranging from the Kushite to the Christian and Early Islamic periods. No





palaeoecological evidence was associated with the Lower Palaeolithic artefacts, so that period will not concern us further below. The bulk of the animal remains and pottery with plant impressions come from the Mesolithic/Neolithic, and these will form the bulk of this report. However, the largest number of archaeological sites comes from the historic group of periods, and the potential contribution of archaeobotany to these periods will be briefly discussed before turning to the Mesolithic/Neolithic material.

The wetter early Holocene (c. 7000–5500 BC).

Pottery comparable to the 'Khartoum Mesolithic' of the main Nile valley was found at half a dozen localities (see Smith above) and at two of them it was recovered from large concentrations together with bones and mollusc shells. These two sites are likely to represent intensive or long term occupations. This is a particularly interesting period because it represents the phase immediately prior to the beginning of agriculture. It is not yet clear when and where and how agriculture in this region began. Were sorghum and pearl millet brought under cultivation at one or several places in the sub-saharan savannahs and under what social and environmental conditions did these 'grasses' become 'grains'? Through what process were these two crops selected from the host of edible wild grasses of Sudanic Africa? Randi Haaland (1992; 1995) has argued for linkage between pottery and the emergence of a gendered division of labour in which grain-based cooking in female-made ceramics promoted cultivation. On the other hand, David Edwards (1996) has discussed the historical importance of sorghum for both bread and beer, the consumption of which in more recent times has been connected with labour mobilisation and male power networks. Both of these positions highlight the importance of understanding the origins of sorghum use, cultivation and its preparation for consumption and its relationship to social changes and environmental constraints in the development of Sudanese agriculture. Are these developments connected to environmental change or interregional contact or are they purely local developments? In order to answer questions like these it will be necessary to have a detailed understanding of both archaeology and environment. While data is now available from the Shendi reach of the Nile valley, from a part of the Atbara valley, and the Wadi Howar, it is still needed from a wider range of geographical areas such as the Wadi Muqaddam.

The evidence from our survey can be related to that from elsewhere in the Sudan, the western desert of Egypt, and northeastern Africa. In general it is clear that before 4000 BC there was more rainfall than today (Muzzolini 1993; Grove 1993). This is connected to a stronger Indian Ocean monsoon system, which led to an increase in the moist air masses that move westwards over East Africa in the summer. One important line of evidence for this comes from lake levels in East Africa and the Chad Basin, where

the sediments from ancient shorelines higher than those of today have been collected and radiocarbon dated; these higher levels indicate periods of increased rainfall, with the highest levels reached between c. 7500 and 6500 BC (Haynes *et al.* 1989; Grove 1993). Within the Sudan it is fairly straight forward to reconstruct palaeo-environmental conditions in general terms since the vegetation zones are closely linked to the latitudinal bands of rainfall (Wickens 1976; 1982). Former shifts have left isolated pockets of southern Sudanese plant species in the western Sudan on the Jebel Marra massif (Wickens 1976) and the western desert of Egypt (Neuman 1993). During drier periods without vegetation to hold down sand, dunes formed and moved across the landscape (Warren 1970). It was during a dry period such as the late pleistocene or a brief mid-Holocene dry period, perhaps c. 5500–4500 BC, when sand dunes like those in southern Kordofan or the Qoz abu Dulu just east of the source of the Wadi Muqaddam may have formed. It is still unclear if the mid-Holocene dry phase drove people to an increased reliance on grain foods. The subsequent 'Neolithic Wet Phase' was wetter than at present but not as wet as the previous 'Mesolithic Wet Phase' and it was followed by aridification and stabilisation on a more modern climate between 2500 and 1000 BC.

During wetter periods, flora and fauna shifted northwards (Fig. 2). One useful marker is the land snail species *Limicolaria cailliaudi* (syn. *L. flammata*). It was found at two localities in the Wadi Muqaddam (Plate 6), in one case from the spoil heap left by mechanised digging below the modern surface by the road construction crew, and in the other case collected from the surface approximately 80m east of tumulus 54.1. Although neither was found with clear cultural associations and they are difficult to date (radiocarbon dating is planned), this species indicates higher rainfall at some time in the past. This species is associated with acacia-tall grass plains (Tothill 1948; Williams *et al.* 1982; Haynes and Mead 1987; El Mahi 1988) and generally



Plate 6. Subfossil land snails, *Limicolaria cailliaudi*, from Wadi Muqaddam surface near tumulus at site 54.1.





Plate 7. Remains of aquatic snails *Pila wernei*, including shells and opercula, from Wadi Muqaddam road site 115.1, locus 16.

occurs south of the rainfall isohyet of 400mm, the region of Kosti and Sennar on the Blue Nile (Rzoska 1976, 41), although there is limited evidence to suggest that this species can persist much further north at least in the river valley (Peters 1991). This species has been found at the Neolithic site of Esh Shaheinab near Khartoum, numerous Khartoum Mesolithic sites (Gautier 1986; El Mahi 1988; Peters 1991), and at early Holocene localities in the Wadi Howar (Pachur and Kropelin 1987), north-western Sudan (Haynes and Mead 1987) and the northern Blue Nile (Lario *et al.* 1997).

Of particular interest from a cultural-historical point of view is the low rainfall thorn savannah, which extends north of where this snail normally occurs, in which wild Sorghum and Pearl millet species occur (Stemler 1980). The finds of these species and other associated savannah grasses from the Khartoum area and Butana (Magid 1989; 1991; Stemler 1990) occur as far north as Nabta Playa in southern Egypt (Wasylikowa *et al.* 1993; Wasylokowa and Kubiak-Martens 1995). Lake sediments from desert playas in western Egypt and the north-western Sudan have in some cases been sampled for pollen, diatoms, and trace element indicators of past water levels (Ritchie *et al.* 1989; Haynes *et al.* 1989). Wood charcoal from archaeological sites in the eastern Sahara (Neuman 1993) agree in indicating a northward shift in vegetation belts during the early Holocene and mid-Holocene wet phases (indicated in Fig. 2), requiring an increase of 150 to 200 mm in rainfall. This testifies to a northward shift in rain belts, which clearly would have provided economic opportunities for pre-Neolithic populations who exploited wild grains. However, understanding the impact of general climatic shifts on local human populations requires evidence of resource exploitation from individual sites.

### Mesolithic economy and local environment.

Although Mesolithic or Neolithic pottery types were located at a dozen sites along the east side of the Wadi Muqaddam between benchmarks 117 and 61, only two localities yielded concentrations of sherds and other material in sufficient quantity to suggest actual long-term occupation sites. These two localities, sites 115.1 and 61.3, produced the most spectacular range of surface material recovered during the expedition. Site 115.1, a low tell, had unfortunately been largely destroyed before we arrived. Although a level roadbed had been made through the site, the exposed material included large quantities of pottery, lithics, grindstones, mammal bones and mollusc shell; from these we gathered numerous samples. Site 61.3, at the end of the tarmac as it stood in October 1997, holds more promise for future work as it appears to be a low, largely intact tell, on a rocky ridge immediately west of the main wadi bed (Colour Plate XXXVII). Sampling was possible here because much later (perhaps Meroitic) tumuli were dug into and through parts of it. The surfaces of and around these tumuli were littered with material brought up by Meroitic grave-diggers. Here too was found a range of mammal and mollusc remains in addition to artefacts.

The vast majority of the mollusc remains came from a single species of semi-aquatic snail, *Pila wernei* (Plate 7), recognisable by its large shells and characteristic opercula. This snail, which preys upon other snails, requires at least semi-permanent water; today it is found in lakes, such as Lake Chad, and rivers, especially the White Nile (Gardiner 1932; Pachur and Kropelin 1987; Peters 1991; Brown 1994). However, it is also capable of aestivating (hibernating through the dry season) thanks in part to its thick, corneous operculum (Arkell 1945; Peters 1991; Brown 1994). This species is often found on archaeological sites of the Mesolithic and Neolithic Sudan (Gautier 1986; Peters 1991; 1993; El Mahi 1988; Haaland 1995) and later periods further south (Gautier and Van Neer 1997). It is likely to have been used as food, a practice for which there is ample ethnographic evidence from the Sudan (Gautier 1986; Peters 1991; Gautier and Van Neer 1997). This interpretation is supported in the case of the Wadi



Plate 8. Fragments of bivalve shells, probably from *Tilapia sp.*, from Wadi Muqaddam road site 61.3.





Muqaddam sites by the fact that these snails were not found with other species with which they would be associated in natural communities and thus must have been concentrated through human action. In addition, at both sites a few fragments of large bivalves (probably river mussels, family Unionidae) were found (Plate 8).

Sites 115.1 and 61.3 were also littered with bones. Large mammal bone fragments were collected, but have yet to be studied and identified. Small bones are inevitably

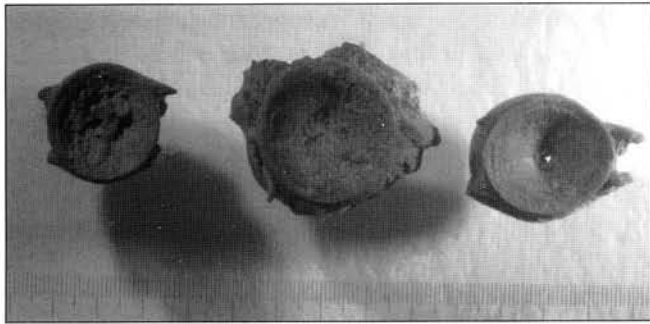


Plate 9. Fish vertebrae, from Wadi Muqaddam road site 115.1, locus 1.

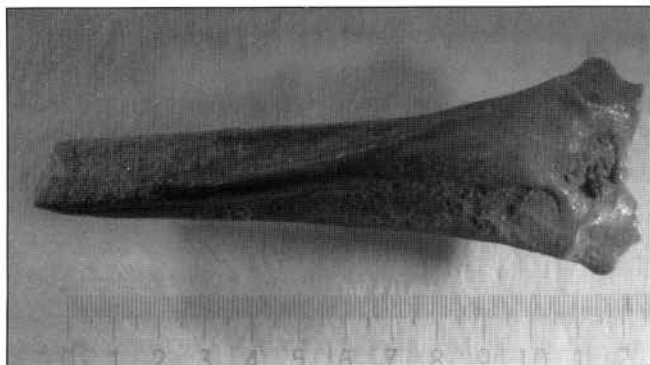


Plate 10. Fish dorsal fin ray bone, probably from *Tilapia* sp., from Wadi Muqaddam road site 115.1, locus 1.

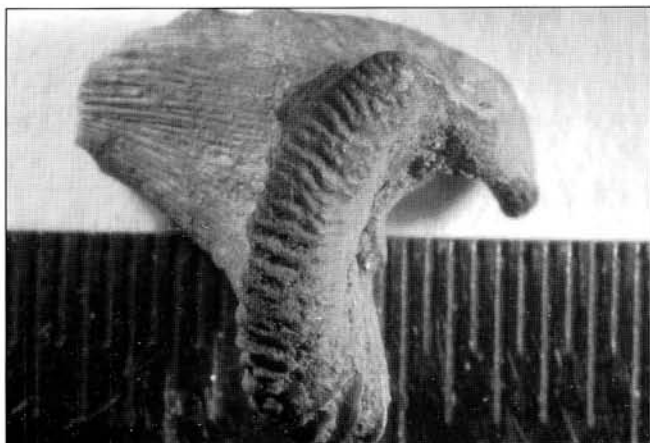


Plate 11. Fragment of proximal end of pectoral spine from catfish (cf. *Siluridae*) from Wadi Muqaddam road site 115.1, locus 1.

missed in surface hand collections, but two 0.5 litre soil samples from site 115.1 at points where there were concentrations of fragmented shells were wet sieved through 1mm mesh and revealed numerous small bone fragments. These include a number of fish bones (Plates 9–11). The more specific identification of these fish will prove very significant for understanding the diet and organisation of the Wadi Muqaddam Mesolithic. Studies on fish assemblages of this period in Egypt, such as at Wadi Kubaniya and the Khartoum Mesolithic sites, indicate a heavy reliance on fish from the flood-pains of rivers and which often can survive seasonally in shallow or even negligible water bodies (Van Neer 1989; El Mahi 1988; Gautier and Van Neer 1989; Gautier 1986; Haaland 1995). These fish could have been captured by harpooning or clubbing, especially when restricted to dry season pools. Amongst these floodplain fish species are *Tilapia* spp., represented in our collection by a fragment of a dorsal fin bone (Plate 10). While these fish lack the auxiliary breathing organs of some floodplain fish, the haemoglobin in their blood has an enhanced affinity for oxygen, allowing for survival in shallow pools (Van Neer 1989; Gautier and Van Neer 1989). Another important fish remain is a fragmentary pectoral spine such as that found in catfish, families Clariidae and Siluridae (Plate 11). Unfortunately no skull fragments which are useful for distinguishing these species were recovered. Distinguishing the family and genus of catfish is important for environmental reconstruction since each has very different requirements and tolerances: *Synodontis* sp. live almost exclusively in the open waters of the Nile's main channel while *Clarias* sp. frequents floodplains and has auxiliary breathing organs that allow it to aestivate in wet burrows (Van Neer 1989; Gautier and Van Neer 1989). Once the fish have been more specifically identified, it should be possible to determine if the environment included highly-reduced, dry season water pools or whether there are any deeper water, fully riverine species present, such as *Synodontis*. More complete material, collected through excavation, may be necessary for such a study.

The evidence raises questions not only of environmental reconstruction but also of cultural history. The presence of fish and fishing has a certain significance, since a fish-based economy seems to be a characteristic shared widely across the Sahel-Sahara during the early Holocene, the so-called 'aqualithic' adaptation (Sutton 1977), although other non-fishing, hunter-gatherer groups also existed at this time such as in the Butana (Marks and Mohammed-Ali 1991). Indeed it may be among these latter groups, who lacked the security of a resource base like fish, where the increasing dependence on grass seeds led to cultivation. Randi Haaland (1992) has brought together evidence from historical linguistics, modern ethnography and archaeology to argue that in the Neolithic period Cushitic speaking pastoralists introduced livestock into the Central Sudan bring-



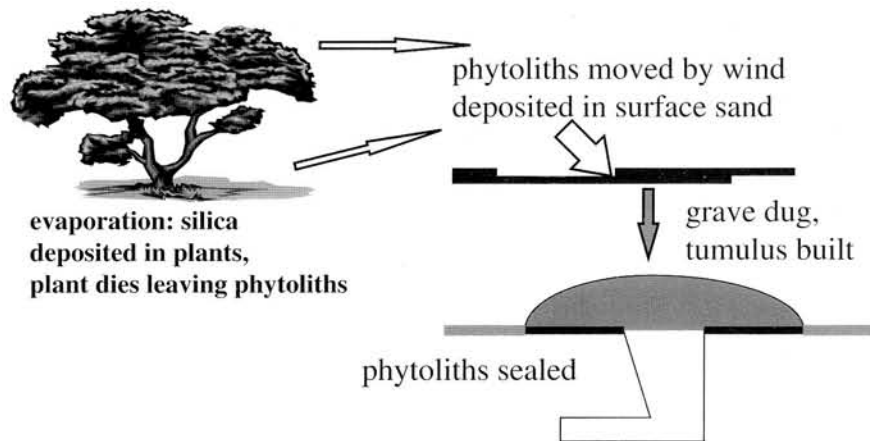


Figure 3. Generalised model for the deposition and preservation of ancient phytoliths in paleo-land surfaces sealed under burial mounds.

ing with them a cultural tradition of fish taboo. This she contrasts with the preceding Mesolithic cultures who were using fish; these groups she connects to the Nilo-Saharan language family. The combination of archaeological, linguistic and palaeo-environmental evidence will ultimately allow a more complete understanding of the human story of the Middle Nile Basin.

Additional information about environments and human economy will come from the examination of plant impressions in potsherds. The process of making latex casts of these impressions (Magid 1989; Stemler 1990) has begun. Much study is still required before any species can be identified with certainty, but the largest quantity of impressions comes from grass blades and stems which will not be identifiable more precisely. However, there are also impressions from the inflorescences and spikelets, which should be identifiable. Identification is often made difficult by the low resolution of features due to the coarseness of the ceramic fabric. Preliminary examination of 30 sherds suggests the presence of grass genera in the tribes Paniceae and Andropogonae, which include genera, such as *Brachiaria*, *Sorghum*, *Digitaria* and *Eleusine*, that occur further south in the savannahs.

On the basis of the current evidence we can begin to reconstruct aspects of the environment at the same time as raising more questions for research. The snails, river mussels and fish indicate water, at least for much of the year. If fish species other than the resilient *Tilapia* spp, *Clarias* spp. and *Protopterus* are identified, then substantial year round water bodies could be indicated. But the questions remain as to whether the wadi was permanently flowing as a river or whether it was perhaps seasonal, drying back to a series of pools during the dry season. The latter case would imply that it was merely a much wetter wadi, tributary to the main Nile, and provided an environment similar to that reconstructed for the Wadi Howar for the early Holocene (cf.

Pachur and Kropelin 1987 and Keding above). One difficulty with this comparison, however, is that the Wadi Muqaddam does not have its source in a large upland area, as the Wadi Howar does in the Jebel Marra massif. On the other hand if we recognise a more permanent flow of water, then it may be necessary to envisage a more significant difference in the past: was the Wadi Muqaddam a former course of the White Nile?

Since geomorphological work has not been carried out in the Wadi Muqaddam, the hypothesis that the wadi may have once been the actual channel of the White Nile deserves to be developed for raising questions to address in future work in the wadi. As the most recent geological map of the Central Sudan indicates, the wadi follows a strip of alluvial sediment which cuts through the Nubian sandstone formation, connecting the alluvial valley of the White Nile south of Khartoum and the main Nile near modern Ganetti/Gabolab (see Mallinson 1997, fig. 3). This raises the strong possibility that sometime in the past water flowed through this passage, but no secure dating is available as to when, whether during the earlier Holocene or the much earlier Pleistocene. Today the wadi's southern stretch is separated from the White Nile by the Qoz Abu Dulu sand dunes. Most of the road under construction follows this alluvial deposit because it provides a ready source of gravels which can be used to build up the road bed. These gravels, themselves alluvially transported, indicate much higher energy flow regimes, perhaps like that of a river, sometime in the past. On the other hand we observed green silts below the modern surface in some of the road diggings which might indicate ponding or stagnant water in some part of the wadi. The single find site of Lower Palaeolithic implements was associated with the gravels, although given that it was a surface collection it is unclear whether the gravels actually date to the Middle Pleistocene. The alluvial clays of the White Nile valley thought to be of Holocene age extend





west from the valley in the area of modern Naima (cf. Williams *et al.* 1982, 124, fig. 7.7). While there are alluvial deposits in the hollows between dunes of the Qoz Abu Dulu sands, indicating high flood levels after the dunes were in place (Adamson *et al.* 1982), it is plausible that these are from the Neolithic Wet Phase with Early Holocene alluvium beneath these dunes. The higher water levels of the Blue Nile at this time in the past is accompanied by evidence that the current White Nile must have cut through old bank terraces of the Blue Nile in order to join it at Khartoum. This implies that these rivers did not merge near modern Khartoum and indeed it has frequently been hypothesized that the White Nile formed a lake at this time (Whiteman 1971, 112 ff.; Wickens 1982; Adamson *et al.* 1982; Williams *et al.* 1982). Is it possible that this lake gave rise to a more northerly river reach through what is today the Wadi Muqaddam? Is the absence of evidence for periods from the Neolithic to the Kushite a result of the shift to modern Nile drainage during the Neolithic? Taken together these pieces of evidence indicate the need for further study, especially of the geomorphology of the Wadi Muqaddam valley and the sedimentological analysis of sediments in the valley together with their absolute dating through thermoluminescence. The presence of wells in the wadi may provide a starting point for such a study along the lines of that carried out on the palaeochannels in the Dongola Reach by Macklin and Woodward (1997 and above).

### Kushite Resettlement

After a hiatus of perhaps three millennia there is evidence for human activity in the wadi again in the first millennium BC. The thousands of burial mounds seen in our survey, including six quite extensive cemeteries, suggest higher concentrations of population than is found along the line of the wadi today. The later first millennium BC and the first millennium AD was an era which saw important changes in the Sudan as the deserts opened up through the development of camel caravan trade and camel-herding pastoralism (Trigger 1969; 1985). It may indeed be significant that there are no recognisable remains from the Wadi Muqaddam survey which can be dated before the Kushite era (800 BC – AD 350), the period from which comes the first evidence for camels in this part of the world (Rowley-Conwy 1988), suggesting that this region, away from the river, may have been largely uninhabitable between the fifth and first millennia BC. Still the apparent population of this period, as estimated from the burial mounds, indicates a population larger than that of the camel pastoralists who live in the wadi today. This raises the question of what circumstances permitted this. Was the wadi environment so different that it could support larger animal herds and thus a greater population? Has the carrying capacity actually decreased and, if so, is it due to a drop in rainfall or the results of human impact through, for example, overgrazing? The evidence of

population in the wadi during the last two millennia does not in itself indicate a different environment. Is it possible that the numerous large cemeteries were a product of the political and economic situation?

### Landscapes under tumuli: the potential of phytoliths for palaeoecology in arid lands

Sources for the evidence necessary to address these questions are rare in the semi-arid central Sudan. Natural basins, such as old lake beds, where cores might be taken for examining ancient pollen and other microfossils, exist in the western Sudan (e.g. Wadi Howar, see Pachur and Kropelin 1987; Haynes *et al.* 1989; Ritchie *et al.* 1989) but have not yet been located in the Bayuda. While some settlement sites were found, these appear to have been semi-permanent occupations, where due to the combination of brief occupation episodes and continuous wind erosion little stratified deposit has accumulated from which organic evidence might have been retrieved. However, there is one possible source of evidence on the past environment which could come from the numerous tumuli themselves, namely phytoliths.

Phytoliths are microscopic silica bodies produced by plants. They form through the evaporation of water, which causes silica to accumulate inside the epidermal cells of plants. Consequently the silica takes on the form of individual cells. Since silica is a glass it does not bio-degrade, although it can be destroyed by physical abrasion (Piperno 1988; Pearsall 1989). The extraction of phytoliths from archaeological settlements is increasingly being used to examine ancient human plant use (for a pilot study in Egypt, see Rosen 1996). Phytoliths are also deposited in natural environments. After plants decay, phytoliths are deposited in the soil or moved by wind. In principle then they are deposited constantly in the surface soil or sand. If this surface sand is buried and sealed, then it should preserve phytoliths from the period up to when it was buried. When a grave was dug and a tumulus erected over it, the mound sealed the ancient surface around the grave (Fig. 3). In consequence, regardless of the accumulation or erosion which takes place on the land surface as a whole, each burial mound preserves a small patch of the ancient landscape (for a similar discussion, see Caneva 1993). Palaeo-surface samples were collected during the course of the Omdurman-Gabolab Survey through small trenches dug into the edge of tumuli. By choosing tumuli of different types (in terms of construction) it may be possible to obtain samples of different ages. Although it is as yet difficult to date the tumuli of the Wadi Muqaddam with any certainty, plausible suggestions can be made on the basis of surface finds as well as comparison with better dated tumuli in the Nile valley (Mallinson *et al.* 1996).

The ten samples collected will allow a pilot study to assess the potential of this form of evidence for future work



in the Wadi Muqaddam or similar regions. The preparation and examination of sediment samples, ancient and modern, collected on the survey have yet to be carried out and although there are potential problems such as low concentrations of phytoliths or heavily damaged assemblages due to the abrasion of wind transport (as encountered at Wadi Kubbaniya, Kaplan 1989), this line of evidence may be one of the only available to us for understanding the environment of arid regions. Although it is rarely possible to identify individual plant species from which phytoliths come, except when multi-cellular phytoliths are preserved (Rosen 1992), it is often possible to assign them to larger taxonomic groupings (Piperno 1988; Pearsall 1989). In addition it is possible to compare ancient phytolith assemblages with those from modern topsoils collected from different environments (Powers-Jones *et al.* 1989). Then even if the source of individual phytoliths is unknown, they can be compared in terms of ecological suites. For this reason comparative samples were collected from the surface in the modern Wadi Muqaddam and Wadi Hassan (just south of the Nile near Gabolab).

## Conclusion

The discussion of our preliminary survey data brings some new evidence in line with the environmental patterns reconstructed for elsewhere in the Sahara and Republic of the Sudan. This information should be seen as an indication of the potential for future work in the Wadi Muqaddam in the form of excavations and more localised, problem-oriented surveys. At a conceptual level the information emerging from the Wadi Muqaddam clearly indicates that the prehistory of the northern Sudan cannot be understood simply in terms of developments along the Nile valley. In the Early Holocene a story is emerging of cultural developments in several parallel valleys, the Atbara valley, the Nile Valley, the Wadi Muqaddam (or Nile-Muqaddam reach?), the Wadi Howar, and presumably also the as yet unexplored Wadi el Milk. While it is impossible to confirm such a hypothesis, further well dated finds spread over a larger geographic area at an increasing number of sites, like those in the Wadi Muqaddam, will be able to help rule out some reconstructions and facilitate a refined understanding of the human story in the Sudan.

## Acknowledgements

I would like to thank John Stewart for consultation on the preliminary identification of the small bone material. In some of the arguments put forward in this paper I have benefited from discussions with Chris Stevens and Jennifer Heathcote. I am grateful for suggestions made by John Alexander and David Edwards, who read an earlier draft of this paper.

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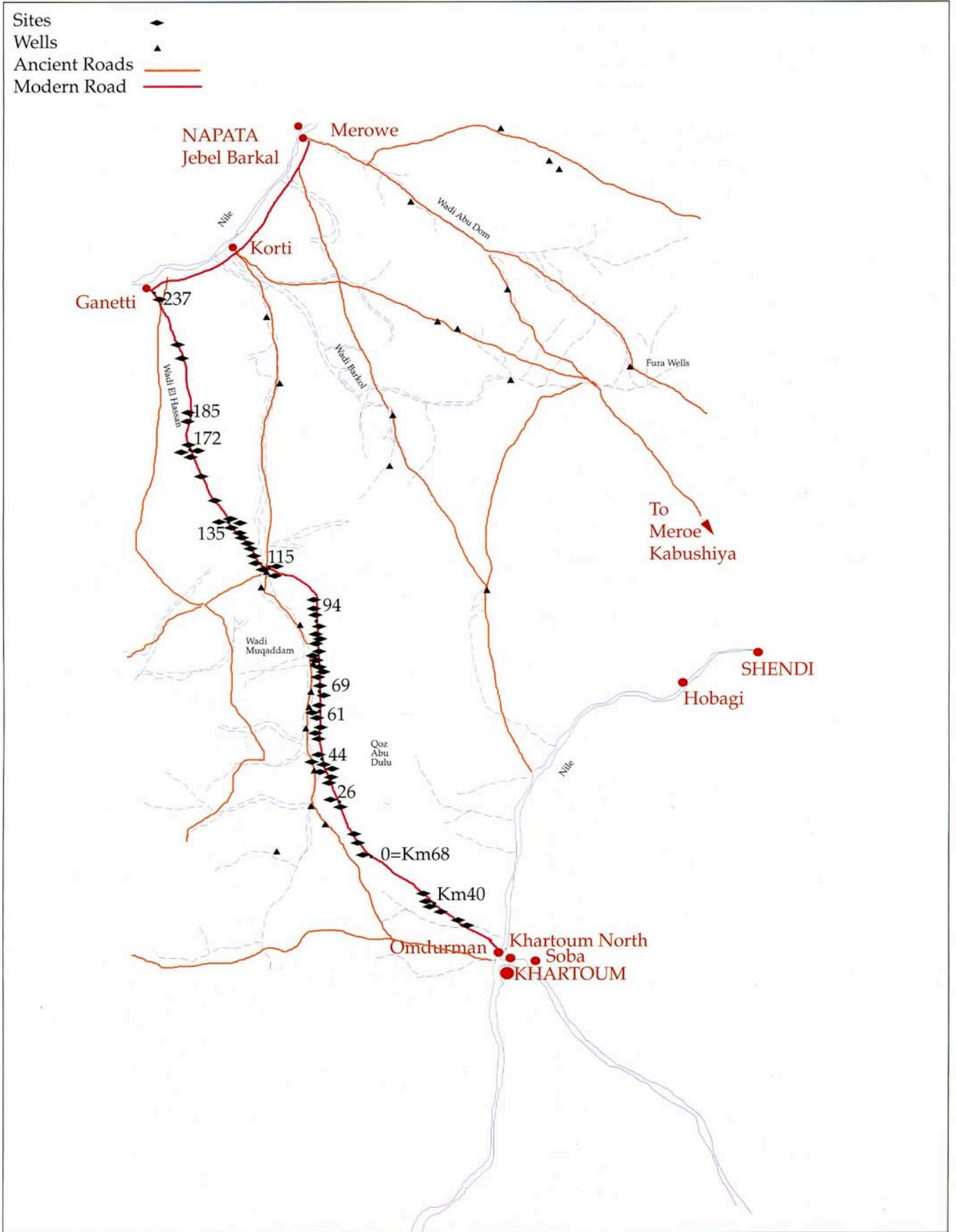


Plate XXXIV. The Omdurman to Gabolab survey.



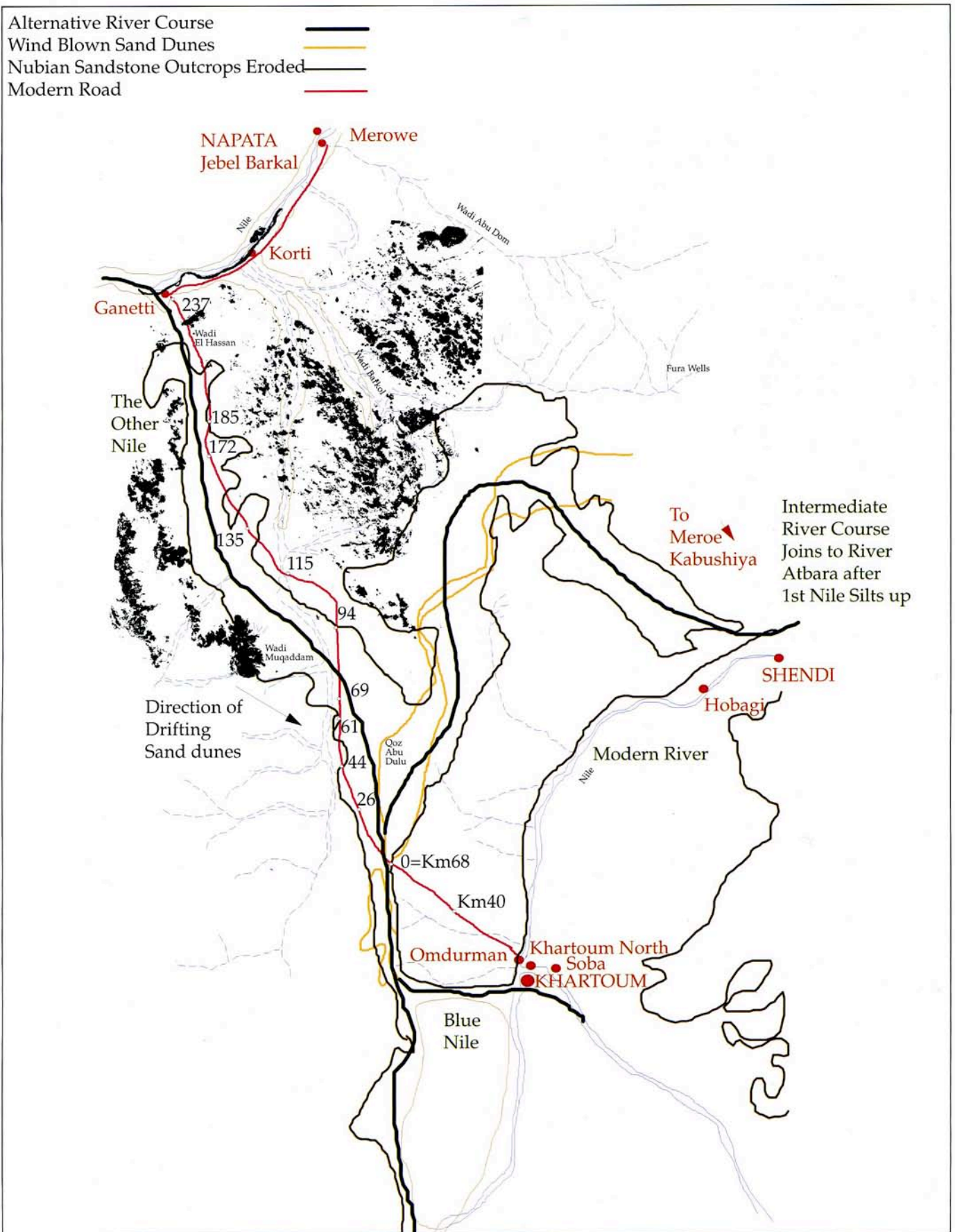


Plate XXXV. The Omdurman to Gabolab survey, geological plan.





*Plate XXXVI. Modern pastoralist settlement in the Wadi Muqqadam.*



*Plate XXXVII. The Wadi Muqqadam road site 61.3, a Meroitic(?) tumulus cemetery overlying Mesolithic/Neolithic occupation. Note the vegetated main wadi in the background.*