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The Mesolithic/Neolithic of the Blue Nile (east bank): chronological seriation and settlement patterns

Introduction

In 1992 and 1993 the Spanish Archaeological Mission in the Sudan continued the work of surveying the east bank of the Blue Nile between Khartoum North and Eseilat-Um Dawan (40 km). An area following the alluvial plain and terraces parallel to the main river and both banks of the Wadi Soba was covered for a distance of 25 km from the Nile. The two campaigns follow the previous excavation of the Neolithic site of Haj Yusif (Fernández et al. 1989) and the first investigation of this area in 1990 (Menéndez et al. in press).

The first phase of the research project, the survey of prehistoric sites, the analysis of the distribution of surface artefacts and test diggings at the most important sites, is now considered complete. Found were a total of 22 Mesolithic sites on the Nile and Wadi Soba, four Neolithic sites on the Nile (including the final phases of this period), and an important Neolithic settlement in the Wadi Soba (Fig. 1). Also Palaeolithic (Earlier and Middle Palaeolithic) workshops in the desert area and on the Nile were found (Menéndez et al. in press).

At the most important Mesolithic sites, the surface analysis has provided certain microspatial information concerning different functional activities. Small test-excavations have made it possible to select sites with sufficient depth of deposit for larger-scale excavation. The quantitative surface data and test-pit data have been analysed statistically, resulting in a tentative chronological seriation (for the most important sites) covering the whole of the Mesolithic period. Using surface analysis and test excavations it has been possible to select sites with sufficient deposits belonging to different Mesolithic phases, the excavation of which, in future campaigns, will be the next stage of our research in the area.

Surface data

In the 1992 campaign, a significant sample of material was collected in a non-systematic way. Also the exact location of sites was plotted with the inestimable help of a detection apparatus linked to the GPS satellites system. In the

1993 campaign a systematic strategy for collecting surface materials was adopted at the most important sites by sampling one-metre diameter circles at regular 20-metre intervals. All the surface artefacts from these circles were counted and classified according to type.

Of the 22 Mesolithic sites discovered, ten had a very low density of surface artefacts, so they were not analysed further. MG, apparently an important site, could not be analysed due to the presence of several Islamic tombs at one end of the tell. Eleven sites only were therefore investigated in greater depth, of which 9 were excavated using 1x1 m test-pits. At two others sites (KH and UM2) excavation was not necessary because quarrying work being carried out there permitted the deposits to be examined. Six sites (K1, K2, SM1, SM3, SM4 and AM) are of sufficient stratigraphic depth for higher quality information to be extracted in future excavations. The rest display a similar pattern of erosion: the original mound has been partially or totally demolished, scattering the material horizontally until it occupies an area considerably larger than the original site. The fact that the sites on the banks of the Wadi Soba have suffered far more erosion than those of the Nile is perhaps due to the fact that their occupation was more sporadic.

Comparing the percentages of the various types of pottery decoration (Wavy-Line=WL, Dotted-Wavy-Line=DWL, Rocker, spaced and packed=RK, and Alternately Pivoting Stamp=APS; Caneva 1983: 164-183; 1988: 83-110) resulting from non-systematic collections, systematic collections and test-pits, it can be seen that each of the three methods produce a similar general picture of the six sites, with very high coefficients of correlation (r = .864, .871, .976). However, significant differences exist in cases where the pottery types are not very abundant. Percentages here obviously fluctuate to a greater extent because they are less likely to be found and are more dependent on the random nature of the sampling.

The most striking and puzzling case occurred in Al Mahalab (AM), where no DWL fragments were collected from the surface, but test-excavations produced 10%. This probably reflects different degrees of erosion as AM is one of the less eroded sites, with a deposit depth of nearly one metre. But even at this site the correlation of systematic vs. non-systematic surface data and test-pit data is fairly high (i.e. 81%, 88% and 93%), as in the other sites (always above 90%). SM4, whose correlation is virtually nil is an exception, perhaps explained by the presence of a tumulus from the historic period and a modern irrigation canal which must have disturbed and altered the original arrangement of the remains.

The main objective of the systematic surface sampling was to check the consistency of a spatial distribution model of the remains, in relation to possible areas of functional activity in Mesolithic settlements. The quantitative data from the units sampled at each site was processed using multivariate analysis (Principal Component Analysis), with surprising and encouraging results. If the surface materials had been mixed in a random fashion, either as a result of ero-

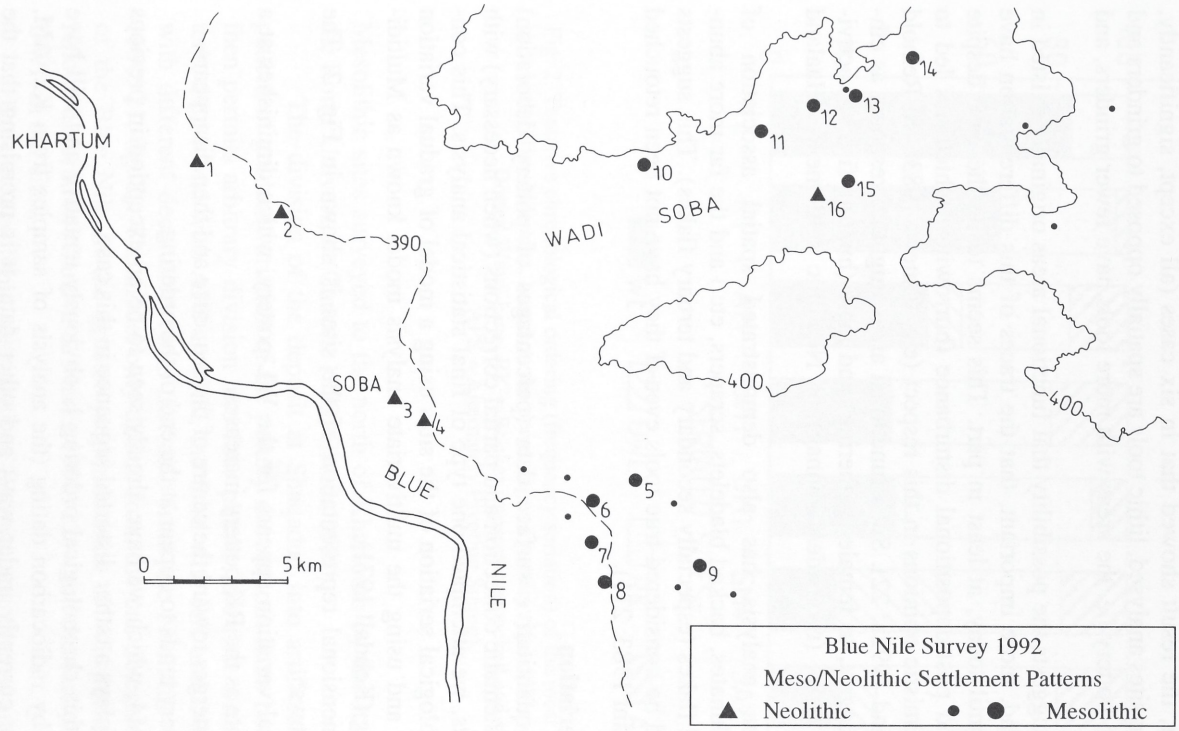

Fig. 1. Mesolithic and Neolithic sites discovered or investigated by the Spanish Archaeological Mission in the Blue Nile area (1989-1993): 1. Haj Yusif 2. Umm Dom 3.4. Soba 5. Sheikh Mustafa 1 (SM1) 6. Sheikh Mustafa 3 (SM3) 7. Sheikh Mustafa 4 (SM4) 8. Khalifa Ali Farm (KH) 9. Al Karnus 1 and 2 (K1, K2) 10. Arrehana 11. Al Mahalab (AM) 12. Umm Maishera 1 (UM1) 13. Umm Maishera 2 (UM2) 14. Magarbah (MG) 15. Sheikh el Amin 2 (SA2) 16. Sheikh el Amin 1 (SA1).

sion and dragging, or if it reflected the original position after successive changes and overlaying due to different uses of the settlement ('palimpsest effect'), it would be logical to expect an equally random result within each site and/or models. However, the result showed that in six cases (all except, significantly, SM4) of the seven sites analysed, lithic tools are spatially opposed to grinders and sometimes also to pottery i.e. the areas with more tools have fewer grinders, and vice versa.

This fact suggests the possibility that functional areas originally existed in the settlements and, more important, that the traces of this differentiation have been preserved until today, at least in part. This seems to be the case despite heavy erosion and post-depositional disturbance (burrowing) which has led to consistently pessimistic opinions in this respect (e.g. Caneva 1983: 18; Reinold 1986: 121; Haaland 1992a: 22). Such functional areas might correspond, as ethnographic data suggest, to female (gathering) and male (hunting-fishing) activities in different types (riverside/savannah) of Neolithic settlements (Haaland 1987a: 211-3).

Multivariate analysis has also demonstrated spatial association of retouched tools (lunates, backed bladelets, scrapers, etc.) and the far more abundant unretouched flakes (especially secondary and tertiary flakes). This suggests that flakes should be considered true tools even if they have not been retouched (Caneva & Zarattini 1983: 211).

Chronological seriation

With the quantitative surface data (percentages of pottery decoration) obtained from systematic collection and partial corrections (when necessary) with data from test-pits, we attempted one type of final statistical analysis. This consisted of a chronological seriation of the sites using a model of gradual variation of pottery types, and using the multivariate analysis model known as Multidimensional Scaling (Kendall 1971).

A two-dimensional representation of the sites is shown in Fig. 2. The results are as follows:

1. A fairly gradual variation appears for the WL-pottery, which diminishes at a constant rate as the RK pottery increases.
2. APS pottery emerges toward the centre of the sequence and then disappears.
3. The DWL-pottery tends to appear at the end of the ordering.

Note how site SM4, which we have already seen to be an exception in previous analyses, also displays a rather distorted sequence in this case.

Although this chronological ordering is obviously tentative and will have to be confirmed by radiocarbon dating (the analysis of samples from K2, AM, SM1 and KH are currently under way) and other data, it is promising that the pottery variation model coincides with what is known in the only stratified site in central Sudan for this period, the Shaqadud cave (Caneva & Marks 1990). Also our model is consistent with the model deduced from the analysis of the

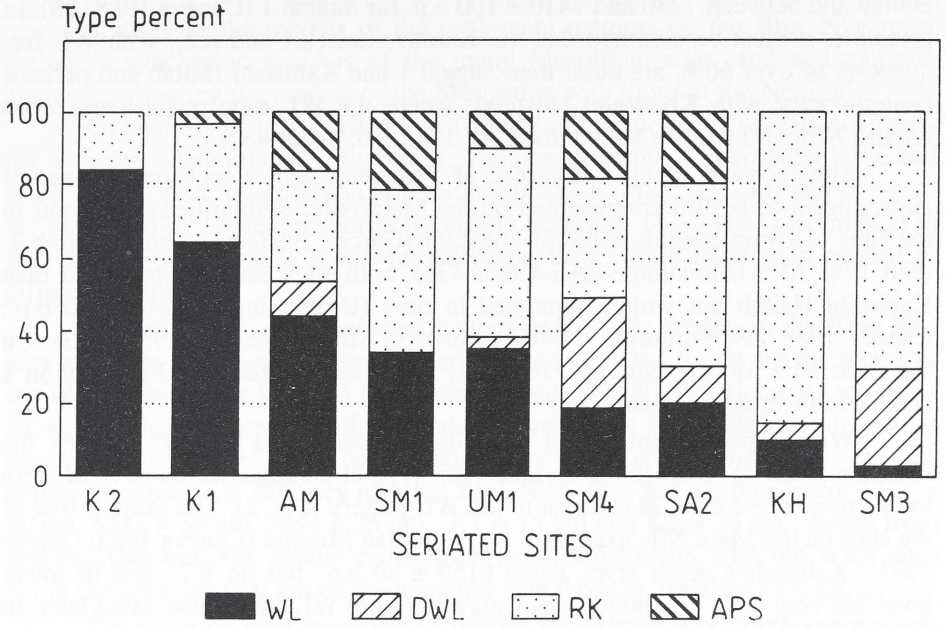

Fig. 2. Tentative chronological ordering (frequency seriation) of the most important Mesolithic sites in the Blue Nile area, based on the percentage of pottery types (WL = Wavy Line; DWL = Dotted Wavy Line; RK = Rocker impression, packed and spaced; APS = Alternately Pivoting Stamp).

Mesolithic sites surveyed to the north of Khartoum by the Italian Mission from the Rome University (Caneva 1988; Garcea 1991).

The division of the deposit at Shaqadud into artificial levels displays a pattern of gradual variation of the pottery decorations from bottom to top, which then permits arbitrary division into four phases: the first with WL-and RK pottery, the second with APS and RK, the third with RK and DWL, and the fourth with different decorative types that date from the Neolithic (Caneva & Marks 1990: 21, fig. 2). The model only differs from the one detected in the Mesolithic of the Blue Nile in the greater preponderance of WL-pottery - a specifically Nilotic decoration (Caneva & Marks 1990: 22) - and the earlier appearance of the DWL in our sites.

For the Mesolithic sites north of Khartoum, surveyed and excavated by the Italian team, the model is similar, although in general the WL-pottery is rather less abundant than on the Blue Nile, except Saggai 1 and Kabbashi Haitab, which have a similar distribution of about 50% (Caneva 1983: 187; Garcea 1991: 66).

Significantly, radiocarbon dates are also similar, 7450 ± 90 b.p. for Kabbashi Haitab and between 7230 and 7410 ± 100 b.p. for Saggai 1 (Caneva 1988: 28). In principle, it must be assumed that the Karnus sites (K1 and K2), with WL frequencies of over 60%, are older than Saggai 1 and Kabbashi Haitab and perhaps contemporary with Khartoum Hospital, where the WL type pottery makes up around 70% of the total (Mohammed-Ali 1982: 76; 1985: 437).

Sites corresponding to Phase 2 of Shaqadud with a high percentages of APS, appear to be little represented on the Main Nile. Similarities only occur in the sites of Umm Singid, with 13% of APS (Garcea 1991: 62), and Sorourab 1, with 17% APS (Mohammed-Ali 1985: 438), both sites being more recent than Kabbashi Haitab but widely separated in time (Umm Singid: 7240 ± 90 b.p.; Caneva 1988: 28; Sorourab 1: 6407 ± 80 b.p.; Mohammed-Ali 1982: 173). On the Blue Nile, on the contrary, relatively high percentages of APS occur in a considerable number of sites (Fig. 2).

With respect to phase 3 of Shaqadud, characterised by DWL-pottery, the situation is not as clear. In our seriation this type of ceramic occurs in what seem to be more recent sites, in contrast to the WL-pottery (Fig. 2). The same is true of the sites on the Main Nile excavated by the Italian Mission (Caneva 1988; Garcea 1991): Kabbashi's upper level, dated 6150 ± 80 b.p., has no WL- and its lower level has very little WL-pottery. El Qala'a has little WL and is also dated later, to 6620 ± 90 b.p.

DWL-pottery however also appears in older sites, as in the case of Al Mahalab (AM, Fig. 2), Kabbashi Haitab (approx. 7%). In Awlad el Iman, despite the existence of very little WL-pottery, a C14 dating gives a very early date, 7750 ± 90 b.p. However this site could have been disturbed (Garcea 1991: 54). To these must be added Khartoum Hospital, certainly of an early date, with 7% of DWL (Mohammed-Ali 1982: 76-7; 1985: 437) and perhaps Sorourab 2, with two surprisingly early datings (9370-9339 ± 110). The presence of DWL is cited, although in the report only WL-pottery is mentioned in the dated levels. The complete analyses and report will have to be awaited for further details (Khabir 1987: 378).

DWL ware sites of a very early date appear also a in different area, but one which is still Nilotic, namely in the Mesolithic sites around Atbara. Here, although the WL type appears before the DWL (Haaland 1987b: 49-50), the latter is dated very early in Aneibis, between 8000 and 7500 b.p. (Haaland 1992a).

The presence of early DWL-pottery on the Nile brings the river data somewhat closer to those of the Sahara, where the most ancient sites have RK and DWL-pottery dated around 9300 b.p. (Roset 1987). If the presence of DWL on the Nile is taken as evidence of contacts with nomadic Saharan peoples (Caneva 1988: 368-9), the possibility that these contacts already existed from the beginning of the Mesolithic cannot be ruled out.

Patterns of settlement

A study of the models of the settlement patterns on the Blue Nile must include a synchronic analysis of the many Mesolithic sites, and a diachronic analysis comparing the models of the Mesolithic with those of the Neolithic.

An analysis of the distribution of Mesolithic settlements reveals a surprising abundance and relative importance. The phenomenon of alternating large and small sites is also found on the Nile proper (Caneva 1988: 337-43) and is possibly explained by longer or shorter periods occupation. These sites are situated in very similar areas and it seems unlikely that they would have been eroded to different degrees.

In contrast with the appearent pattern on the Nile proper, in the Blue Nile area an entire system of settlements seem to have existed following the banks of the Wadi Soba for, at least, 25 kilometres inland. The Wadi settlements are smaller and, with the exception of Al Mahalab where the archaeological deposit is nearly one metre deep, have been almost entirely eroded. On the other hand, the depths of deposits of the sites near the Blue Nile vary, but are preserved: SM1 = 40 cm, SM3 = 30 cm, SM4 = 25 cm ; K1 = 15 cm and K2 = 35 cm (values from test-excavations). The spatial distribution itself is different, with the Wadi sites being farther apart (2.9 km on the average) than those on the river (1.6 km).

The seriation seen previously suggests the existence of contemporary settlement in the Wadi and on the river, and the analysis of the cultural remains provides some indications of functional differences between the settlements in the two areas. In the first place, an analysis of the total frequencies of the various types of artefact found on the surface and in the test-pits (Principal Component Analysis and Correspondence Analysis) demonstrates a clear separation between the Wadi and river sites.

The first (Arrehana and Al Mahalab) have far fewer grinders and pottery, in Arrehana only four decorated sherds were found: two WL, one RK and one APS. In the case of lithic tools there is a rather greater variety in the Wadi sites, with a larger proportion of retouched flakes, end scrapers, notches, denticulates, burins and truncations. On the other hand, the Nile sites have far more pottery and grinders, and a proportionally greater number of lunates, cores and unretouched flakes.

In settlements near the river, grinders would be related with vegetal processing (Haaland 1987a: 80-1) and pottery with the preparation of vegetables and fish (Caneva 1983: 263; Haaland 1992b: 48). Although we have not yet found any remains, harpoons, nets and boats can also be used in deep waters (Peters 1991; Haaland 1992b: Fig 3), so that fishing would have been possible throughout the year and not just in the wet season. Evidence for hunting is provided by lunates (Haaland 1987a: 73-6). This all suggests permanent rather than seasonal occupation sites, with a broad spectrum of subsistence economy, which is also indicated by the data from the Saggai 1 excavation (Caneva 1983: 265). In

contrast, the Wadi sites offer a different image of functional specialization, perhaps exclusively hunting (some of the most abundant lithic tools are associated with the treatment of skins; Haaland 1987a: 69-73), carried out by small groups during the rainy season (Clark 1984: 116).

In the following, Neolithic, phase, the occupation model is radically different. As can be seen in the Italian survey on the Main Nile, the number of sites diminishes abruptly, more so than one would expect for the shorter duration of the Neolithic (the percentages of sites of the various periods - Mesolithic, Early and Late Neolithic - are identical in our survey and the Italian one: Caneva 1988: 334). Apart from the probable reduction in population that this implies, the distribution of sites is also different: now the population moves away from the river and the main site (Sheikh el Amin) is in Wadi Soba, almost 20 kilometres away. Along the watercourse where the bulk of the settlements had previously been concentrated, only two small eroded sites are found (Haj Yusif and Umm Dom), and their position at the mouth of the Wadi Soba, where there is no Mesolithic site, suggests that the Wadi flowed at a lower level in the Neolithic than previously.

The Sheikh el Amin site (SA1) has surface remains occupying some 60,000 m^2, which, if this distribution is confirmed in the sub-soil, would make it the largest known prehistoric settlement in Central Sudan. The test-pit excavated in the highest part revealed a deposit depth of 1.30 metres. Until this site is excavated, the model deduced from the data available is reminiscent of that advanced some time ago by Krzyzaniak (1978) and Haaland (1987a, b), and it is possible that SA1 was a large stable settlement (base site) on the alluvial plain, occupied throughout the year and mainly used for cultivating crops, like Kadero, and the sites of Haj Yusif and Umm Dom were temporary winter settlements, used for fishing and herding in the dry season, like Zakiab. Nevertheless, there are differences that advice caution for the moment: the great distance that separates SA1 from the riverside sites (20 km), the possibility that the sites are not contemporaneous (the SA1 test-digging demonstrated abundant sherds of black-topped pottery, virtually absent from Haj Yusif), and the fact that the cultural remains at Haj Yusif (few microliths, many grinders and gouges) do not coincide with what would be expected in the second type of site (Fernández et al. 1989).

Finally, the two Soba sites, ascribed to the late Neolithic (Menéndez et al. forthcoming), consist only of a few fragments of pottery and occasional grinders over very small areas (less than 20 m) that recall the pottery of Rabak to the south of the Khartoum area, dated around 4500 b.p. (Haaland 1987b: 57) and some motifs of the el Kenger, around 5300 b.p. (Caneva 1988: 336). The Soba and el Kenger sites demonstrate that the Middle Nile around Khartoum was not entirely without human occupation between 5000 and 2500 b.p., regardless of the origin of these pastoral groups (Haaland 1992: 55).

Conclusions

To sum up, the Spanish Mission's survey on the Blue Nile has brought to light settlement patterns in the Mesolithic (Early Khartoum Complex) and Neolithic (Shaheinab Complex) that are similar in part to those recorded by the Italian Mission in the Saggai-Geili area. However, there are differences worthy of attention in the Mesolithic, the investigation of which could help to provide an answer to certain unresolved problems: indications of functional distinctions at a microspatial level within the sites, and at a macrospatial level seasonal movements between the river and the desert area along the Wadi Soba.

In both cases information on social organisation during the Mesolithic period, previously undiscovered from other sites, has been obtained. The seriation of the sites, which still needs to be confirmed by absolute chronology, will perhaps permit the evolution of that organisation to be studied, together with variations in climate and those of an economic nature, by means of open-area excavation of early (K2-K1) middle (SM1, AM?) and late (SM3) sites belonging to the period.

Our work in the future could thus help to explain the mechanisms of transition to the Neolithic in the area, and evaluate the relative influence on them of climatic changes, the arrival of pastoral groups from the Sahara (Hassan 1987) and the increasing complexity of social relationships within the group as a result of the prolonged period of sedentism that preceded this important change in the Middle Nile (Caneva 1985).

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