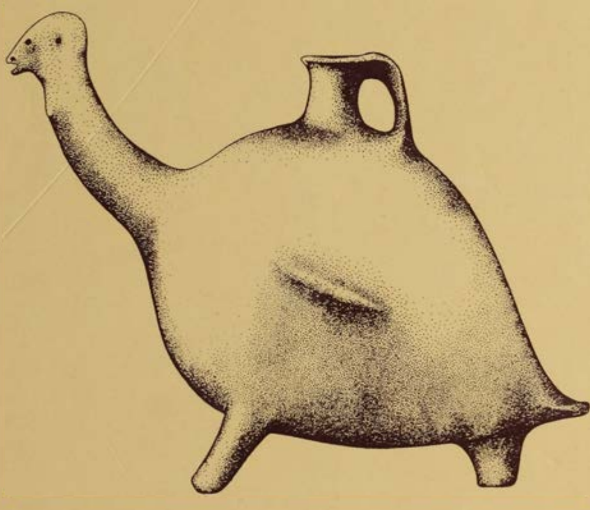
Poznań Archaeological Museum

# Interregional Contacts in the Later Prehistory of Northeastern Africa



Poznań 1996

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# Interregional Contacts in the Later Prehistory of Northeastern Africa

edited by

Lech Krzyżaniak
Karla Kroeper and
Michał Kobusiewicz

Poznań 1996

Proceedings of the International Symposium organized by the Archaeological Commission of the Polish Academy of Sciences, Poznań Branch, and the Poznań Archaeological Museum for the International Commission of the Later Prehistory of Northeastern Africa
Dymaczewo near Poznań, 8th - 12th September, 1992

Cover:
Vessel in the shape of a guinea-fowl found in grave 2275 (Dynasty I) in Minshat Abu Omar (Northeastern Nile Delta - Egypt), imported from Canaan (courtesy of the Munich East Delta Project).

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# Table of Contents

## IV. The Nile Delta and the Egyptian Nile Valley



## V. The Sinai

## VI. The Sudan



## VII. The Horn of Africa



## VIII. Varia

# From the Organizers and Editors

These are the Proceedings of the 4th Dymaczewo symposium, being printed a short time before our 5th meeting which is to take place in 1997.

Certainly few of us present at the 1st Dymaczewo symposium in 1980 expected such a long continuous series of meetings of scholars working in the field of later prehistoric archaeology of Northeastern Africa! We are happy that the tradition of these periodical meetings has survived the test of time and that our symposia have become an internationally recognized academic event. We have been delighted to host a large number of scholars from Europe, North America and Asia but we are not satisfied with the still small number of colleagues participating from African countries. Frankly, this has been a weak point in all of our symposia and is of course due to finances.

We are grateful to all of our colleagues and friends who participated in the 1992 symposium and who have sent their contributions to this volume. Words of thanks to all of you who have patiently been waiting for the publication of these Proceedings.

Lech Krzyżaniak    Karla Kroeper    Michał Kobusiewicz

December 1996

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Andrea Manzo

# Social complexity and cultural contacts in Northeastern Africa between 3000 and 1000 B.C.: a provisional model

It cannot be doubt that there were contacts and communication in the Neolithic Northeastern Africa. Some stylistic and technological similarities in ceramic production allow us to point out contacts between the Western Desert and the Nile Valley (Hassan 1986; Caneva 1991a, b; Caneva & Marks 1990). These contacts may be explained by the environmental stresses of the IV millennium B.C. A linguistic interpretation was recently proposed (Caneva 1991b; Marks 1991; Haaland 1991). However, the linguistic interpretation of archaeological data is always a debatable general problem (see Renfrew 1987). In a similar way North-South riverine communications were also distinguished.

Sometimes we cannot know if the diffusion of technological elements was North-South or South-North oriented: e.g. the black topped ware is suppose to have diffused from South to North (Arkell 1975; Adams 1978; Trigger 1983) whereas the rippled ware may have diffused from North to South (Krzyzaniak 1977: 164-167).

The Eastern Desert was also involved in these contacts, as suggested by Red Sea shells found in many Neolithic sites in the Valley and the hinterlands (Lower Nubia: Nordström 1972; Egypt: Vandier 1952; Neolithic Kadada: Geus 1984b, Gautier 1986; Neolithic Kadero: Krzyzaniak 1991). Moreover, Badarian (Tutundzic 1989) and Naqadian (Trigger 1987) interest in the routes to the Red Sea as the, probably Pre- and Protodynastic, graffiti in the Wadi Hammamat (Emery 1961) suggest, show that the coastal route may have been very ancient. Chemical and physical analysis of the archaeological materials may point to specific contacts that a stylistic study only could not find. For example some vessels found at Kadada were made in the Wad Ben Naga region (De Paepe 1986); the rhyolite found at Kadero and Rabak was imported from the VI cataract (Krzyzaniak 1991; Haaland 1989); the black flint found at Shaqadud was imported from the Valley (Marks 1989); the porphyrite used in making the maceheads of the Butana Group was imported from the Eastern Desert (Marks & Sadr

1988; Marks 1991); the obsidian used in Egypt was usually imported from Ethiopia (Lucas 1964; Renfrew et al. 1966, 1968).

These contacts began at least in the IV millennium B.C. and were favoured by ecological and environmental stress and new modes of adaptation or by the lack of important raw materials, for example obsidian. This was the case with the contacts between the Western Desert and Nile Valley and the links between Eastern Desert and Southern Atbai.[1] However, materials obtained in such a way may have had a social and ideological meaning as well. Sea shells, ryolithe, amazonite and malachite were usually used in producing specific kind of objects, for example the funerary goods found at Kadero (Krzyzaniak 1991), the mace-heads of the Butana Group in Southern Atbai (Marks & Sadr 1988; Marks 1991), the necklaces and mace-heads found at Kadada and the mace-head from Geili (Geus 1984; Gautier 1986; Caneva this volume). The most important persons in an age- or sex- hierarchy or, in the more complex societies, the chiefs or kings, have to control the relationships between their group and others so that foreign goods were probably used as symbols of their rank.[2]

These relationships involved southern groups characterized by the same or similar degree of social complexity. But we may pose the following question: what kind of feedback did the rise of the state in Egypt cause? We will consider this question further, after outlining the archaeological evidence of relationships and social complexity in the region during the III and II millennium B.C. (Fig. 1).

The examination of the funerary assemblages suggests a gradually increasing social complexity in the A-Group culture (Nordström 1972; Smith 1991). The funerary goods included luxurious and imported Egyptian goods (Adams 1977; Nordström 1972). The ceramic production of the Pre-Kerma culture (Bonnet 1988, 1990, 1991a; Privati 1988) is characterized by some similarities with the A-Group pottery. However, there are no imported Egyptian goods. The rise of social complexity in Upper Nubia is suggested by the Late Neolithic evidence from Kadruka (Reinold 1991).

The C-Group culture (Adams 1977; Bonnet 1986a; Bietak 1968; Trigger 1976) is characterized by an increasing presence of Egyptian imported goods. The funerary goods, settlement patterns and architecture clearly show the rise of a complex society (Sauneron 1965; Trigger 1965).

The settlement patterns and the hierarchy in cemeteries or funerary goods (Gratien 1978) make evident the rise of a complex society in the Kerma culture. The seals are administrative devices (Bonnet 1991a; Gratien 1991). In 2300-2200 B.C. the site of Kerma was a true capital city with monumental buildings, a royal cemetery and a life style we could term urban (Bonnet 1986b; [ed.] 1990; 1991a;

[1] Trade in antiquity and its features were examined by Chang (1975), Johnson (1975), Lamberg-Karlowsky (1975) and Polanyi (1957, 1975).

[2] The role played by the chief in socio-cultural contacts was discussed by Claessen and Skalnik (1978), by Service (1975) and Polanyi (1968). Liverani (1990) stressed that the diplomatic and commercial role of the Near-Eastern kings of the 2nd millennium B.C. was based on the same anthropological background.

| B.C. | Egypt | Nubia Lower | Nubia Upper | Western Desert | Western Desert | Eastern Desert | Southern Atbai | Butana | Middle Nile | Gezira |
|---|---|---|---|---|---|---|---|---|---|---|
| | Predynastic | A-Group | Pre Kerma | Laqiya ceramic group | | ? | Butana Group | Late Neolithic | Kadada Late Neolithic | Late Neolithic |
| 3000 | Proto Dynastic | | | | | | | | | |
| | | ? | | Nubian elements | Nubian elements | | | | | |
| | Old Kingdom | Buhen | ? | | | | | | | |
| 2500 | | | | | | | Gash Group | Shagadud Sequence | | Rebak Seq. |
| 2000 | 1st Interm. period | | Kerma | | | | | | | |
| | Middle Kingom | C Group | | ? | Leiter band Keramik | Pan Graves | | | | Jebel Moya cultural tradition |
| | 2nd Interm. Period | | | | | | | | | |
| 1500 | New Kingdom | Egyptian | | | | ? | Jebel Mokram Group | | ? | ? |
| 1000 | 3rd Interm. Period | ? | | | | | | | | |
| | Late Period | Napata | | | | | | Napata | | |

Fig. 1. The cultural sequence.

Bonnet 1991b; the rise of cities: Liverani 1986; Childe 1951). Many elements suggest relationships with the C-Group and Egypt (Gratien 1978; Reisner 1923). However according to Bonnet (1991b), the lack of Egyptian objects during some cultural phases shows that Kerma may have had hostile relations with Egypt. Egyptian military activity caused the fall of Kerma in 1450 B.C. (Bonnet 1986b; 1991b; Bonnet [ed.] 1990).

In 3500 B.C. the Butana Group settled in the southeastern Sudan. The sites of this culture are considered temporary camps but three main sites were occupied at least seasonally for a long time. The pottery evidence shows some technical similarities with the A-Group and there are imported goods (Marks & Sadr 1988; Marks 1991; Sadr 1988).

The Gash Group, dated between 2500 and 1500 B.C. is characterized by a complex and hierarchic settlement pattern. Tokens found at Mahal Teglinos and a similar cultural evolution suggest the rise of complex society. Moreover, there is evidence of contacts not only with the Kerma culture, the C-Group, and the Pan-Grave culture but also with southern Arabia and Ethiopia. Some sherds of imported Egyptian wares have been found at Mahal Teglinos (Fattovich et al. 1987; Sadr 1986, 1988; Fattovich 1989b, 1991; Fattovich et al. unpublished; Capuano et al. in press; Manzo 1991).

The Jebel Mokram Group, dated between 1500 and 500 B.C. (Fattovich 1989a; Fattovich & Marks 1989), has a very dispersed and not very structured settlement pattern (Sadr 1986, 1988). The ceramic material shows very strong relationships with the Pan-Grave culture of the Eastern Desert. There is however no evidence of contacts with the Nile Valley (Sadr 1987, 1990; Manzo 1991; Marks 1991).

The only post-Neolithic data from the Middle Nile Valley are a few atypical sherds found at Kadada (Geus 1984; Reinold 1987) and a tumulus at Jebel Makbor (Lenoble 1987; Privati 1987). A new system of adaptation may have supported a pastoral exploitation of the hinterland (Haaland 1989). In the Butana the sherds dated to the III-II millennium B.C. found at Shaqadud and at surrounding sites show links with the Gash Group (Marks et al. 1985). In the III-II millennium B.C., the situation is not very different at Rabak, Gezira, where the Jebel Moya Tradition is characterized by many Gash Group elements (Haaland 1987, 1989; Clark 1973; Manzo 1991).

After the end of the Laqiya Tradition, the Wadi Shaw and the Wadi Howar had different cultural assemblages which were also characterized by the presence of Nubian-like evidence (Kuper 1989; Schuck 1989; Richter 1989; Bonnet 1991a; Edwards & Hope 1989).

A final point is that the Pan-Grave people, perhaps settled in the Eastern Desert, had contacts with Egypt (Bietak 1966), Upper and Lower Nubia (Sadr 1991) from 1800 to 1400 B.C., and with the Southeastern Sudan (Sadr 1988), beginning ca. 1500 B.C. Several Pan-Grave, C-Group and Kerma elements have been found in the Wadi Gabgaba and Allaqi (Castiglioni et al. in press)

Fig. 2 and 3 show the relationship of the different regions between 3000 and 2800 B.C. and between 2500 and 1500 B.C., as well as the evidence of social complexity as suggested by the presence of: luxury goods, a hierarchy of funerary goods, a hierarchy of grave types and settlements, administrative devices (i. e. tokens or seals), and monumental architecture. It is not possible to suggest a specific model for the situation between 2800 and 2500 B.C. because of our scanty knowledge of the transition from Pre-Kerma to Early Kerma.[3] After the Egyptian occupation of Upper Nubia in 1500 B.C. there is no evidence of contacts between the new Egyptian province and the southeastern Sudan. It seems likely that contacts between Egyptians and southern resource areas, in particular Erythrea and northeastern Ethiopia, by-passing the southeastern Sudan, were established. Anyway there is not enough archaeological evidence suggesting a more specific model[4].

It was stated above that the chief played a very important role in the relationships between social groups and imported goods symbolized his rank. Moreover, there is generally a direct link between import of luxury foreign goods and the management of internal agricultural surplus (Earle 1991a; Kristiansen 1991; Polanyi 1975). In Egypt the pharaoh played this role, and the court may have confirmed its supremacy by using imported goods. The court may have had a monopoly of distribution of these goods (Earle 1991b; Krzyzaniak 1977: 166). The monopolistic character of Egyptian trade and contacts with other human groups makes evident this aspect. The Egyptian attitude towards southern people was characterized by the need to maintain relationships, increase contacts and by the need to have direct access to the resource areas. These needs led to Egyptian southern military expansion, to the A-Group's demise, to the Egyptian occupation of Lower Nubia between 2100 and 1800 B.C., and to the conquest of Upper Nubia in 1450 B.C. The rise of the state in Egypt increased the demand for luxury goods (Trigger 1976; 1983; 1984; 1987). In general, we suggest that a wide-ranging trade network, created by increasing Egyptian demand, was superimposed on the existing interregional relationships (on this subject see also: Hassan 1977; Beale 1973; Polanyi 1975).

Lower and Upper Nubian cultures were affected by increasing interaction within a socially complex culture, and by increasing military stress. The Nubian societies, characterized by some social hierarchies since Late Neolithic times, had eminent persons who may have controlled part of the long-distance economic relations, for example with the Egyptians (Fig. 4). The growth of such contacts may have caused augmented distributive control by eminent persons and, finally, strenghtened their position. We cannot exclude the possibility that Egyptians

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[3] According to Reinold (pers. com.), the cultural passage between Pre-Kerma and Kerma culture "est la". However, the transitional sites, dated between 2800 and 2500 B.C., have not yet been found.

[4] The idea (Sadr 1991) that during the period of the Jebel Mokram Group culture the Southeastern Sudan kept its previous commercial role is not likely. On the contrary, the archaeological data suggest a new situation (see Manzo 1991).

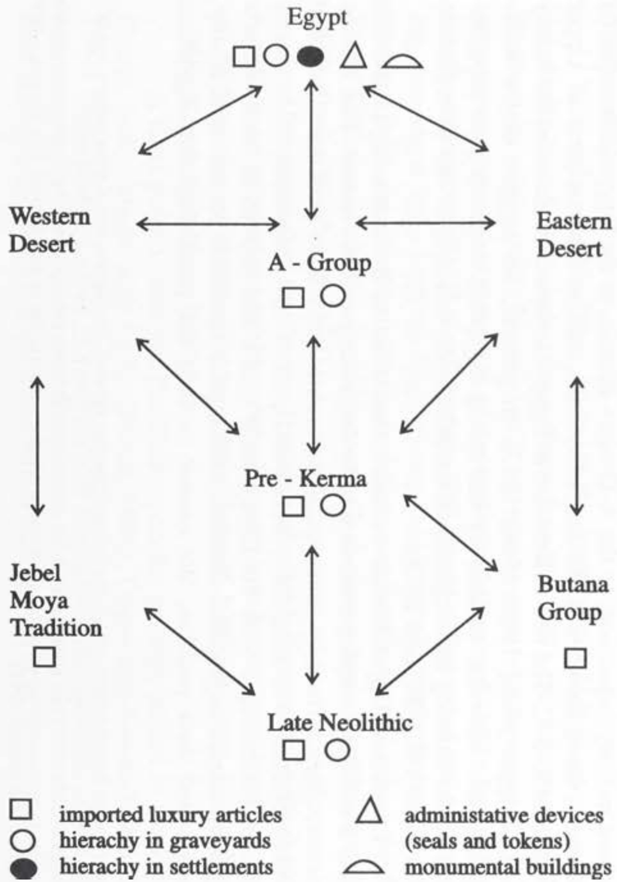


Fig. 2. Social complexity and cultural contacts, 3500-2800 B. C.

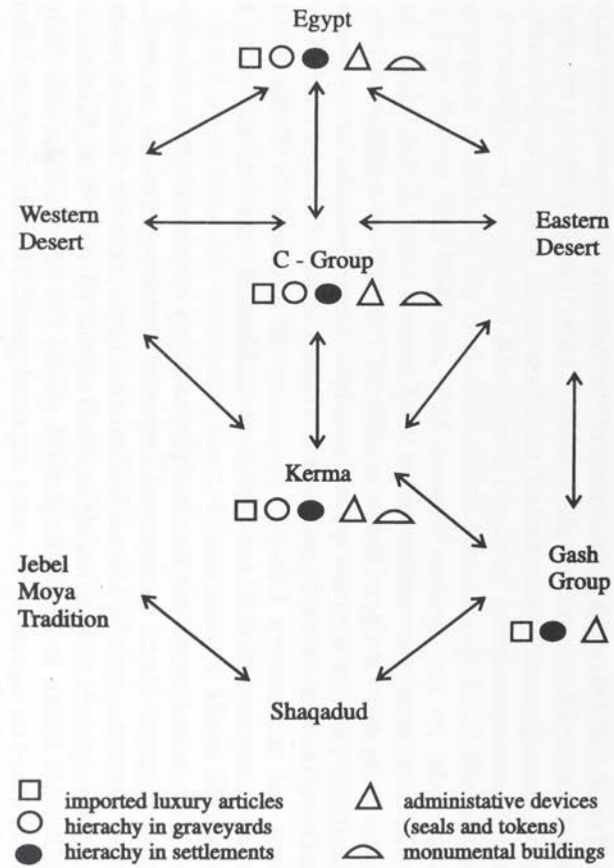


Fig. 3. Social complexity and cultural contacts, 2500-1500 B.C.

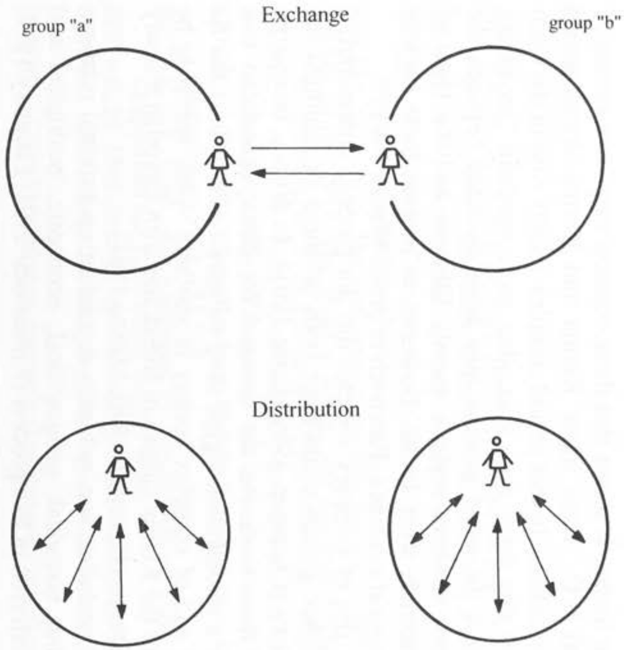


Fig. 4. Exchange of goods between two groups and its feedback.

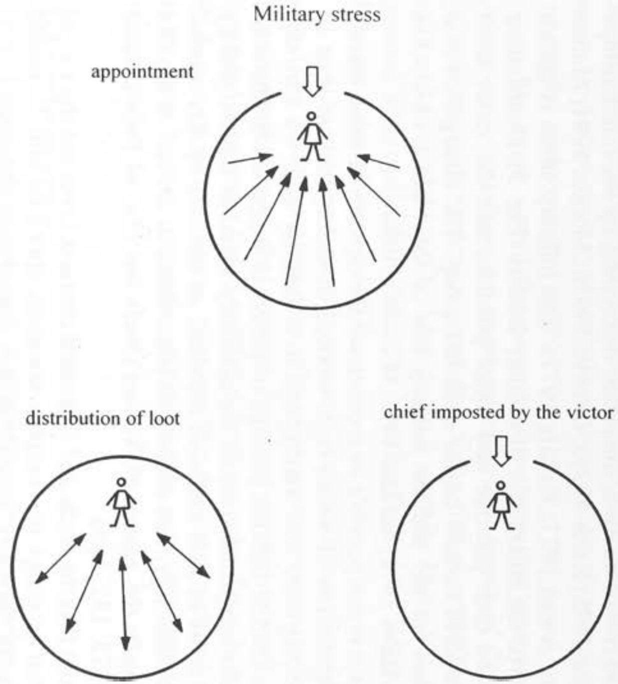


Fig. 5. Military stress and ist feedback.

would contribute to the rise of an elite, interested in keeping up the relationships (Renfrew 1975; Service 1975; Earle 1991a; Caneva 1991b; Morkot 1991; Manzo 1991; medieval Sudan: Awad 1977; Bathily 1977). The military stress (Caneiro 1970) may have favoured the emergence of military leaders (Fig. 5). Distributing loot may have increased their prestige and social position, and the victor must have imposed some kind of control on the defeated group. The emergence of a military rank in Nubian society and the military role of the Nubian chiefs has already been stated (Manzo 1991; Sackho 1991; O'Connor 1991).

At this moment it is not possible to reconstruct the devices of these hierarchy and how the transmission of social rank worked. It seems that, at least in some societies, the social rank was transmitted in a familiar and, we can say, "dynastic" way. Some kind of familiar passage of power is suggested by the concentration of rich tombs in special areas of the cemetery found at Kadero and by the presence in these areas of rich tombs of children, as stressed by Krzyźaniak (1991). Moreover, the older Egyptian execration texts, dated to the end of the Old Kingdom, record not only the names of Nubian chiefs but also of their parents (Abu Bakr & Osing 1973: 112, 116).

There is no doubt that the trade and increased contacts favoured the rise of "secondary states", that is states or complex societies appeared and increased because of contacts with "primary states", in this case Egypt (Renfrew 1975; Webb 1975). Here we consider Egypt as a "primary state"; however, the Mesopotamian influence, dated to the beginning of the I Dynasty, cannot be forgot, as stressed by Emery (1961), Trigger (1983; 1984) and Krzyzaniak (1977).

The same situation was repeated between Nubia and the southern Sudan, in particular southeastern Sudan. It seems that these contacts may have increased between 2500 and 1500 B.C., when many Kerma and Kerma-like elements appear in the Gash Group culture. In that period complex society rose in the Gash Delta. So it seems likely that there were also other more southern "secondary complex societes". In fact the same process may have operated between the Southern Sudan and more southern regions, mainly Ethiopia and the Horn of Africa where luxury materials were found. However, at present these regions offer very little archaeological evidence (Fattovich in press; Manzo 1991).

Nevertheless, the rise of complex societes did not proceed continuously. The relationships with other groups could have both favoured or inhibited the growth of complex society (Chapman 1989; Earle 1991). In Nubia, increasing social complexity may have increased the demand for luxury goods so that Nubian cultures became a middleman. Egypt used military force against the A-Group and Kerma. The end of complex society in southern Atbai seems to be connected with the end of the Kerma culture in Nubia and with Egyptian military activities in the Eastern Desert (Fattovich 1990; Manzo 1991).

Moreover, social evolution was not only dependant on external relationships (Connah 1987) but historical, geographical, economic, ecological and demographic factors interferred in this process (Kristiansen 1991; Flannery 1972;

Webb 1975; Champion 1989). For example, the Western Desert was crossed by many important tracks; nevertheless, there are no elements suggesting the rise of a complex society in that region.

The main aim of this paper was to stress that new data from Northeastern Africa may contribute to reconstructing the history of Northeastern Africa as regards the anthropological problem of the rise of complex societies and to the utility of economic and anthropological models. The African contribution to the general anthropological debate is usually limited to Egyptian and, sometimes, Ethiopian data (Connah 1987).

I do hope new quantitative and statistical data concerning imported materials from archaeological sites of the region may suggest more specific trends in the development of the cultures involved in the network. A similar study of imported materials, found at Mahal Teglinos near Kassala by the Mission led by R. Fattovich, is in progress. It seems that the stratigraphical and statistic distribution of the "exotic" materials might give us very interesting historic and cultural suggestions.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

Andrew B. Smith

# The Near Eastern connection II: cultural contacts with the Nile Delta and the Sahara

**Abstract**

The differences in burial patterns between Upper Egypt and the Nile Delta in early pre-dynastic times have been noted from the earliest work done in the region. This has been interpreted as indicating completely different religious and ceremonial beliefs. It is suggested here that this is an indication of the structural differences between non-hierarchical and ranked societies, and what we can see in the 4th millennium B.C. are important distinctions in social organisation between the two areas. This has ramifications for political and cultural associations between the Levant and North Africa during the crucial period of introduction of domestic animals into Africa.

In my earlier paper on the connections between southwest Asia and North Africa (Smith 1989), I looked at the ecological possibilities for the transfer of domestic stock from one region to the other. The model I used was based on environmental conditions around 7000 B.P. being favourable for adequate pastures to facilitate stock movement. Specifically this period was chosen in contrast to the earlier period when ceramic microlithic industries were to be found in the Sahara, ca. 9000 B.P. The earlier period is rejected as a food-producing era on several grounds, but most importantly because small stock were not introduced into North Africa until ca. 7000 B.P., presumably from the Near East. Similarities in burial patterns and material culture between the Levant, the Nile Delta and the Sahara are described and interpreted as segmentary pastoral societies. Added evidence of ameliorated environmental conditions are suggested as facilitating entry of domestic stock into North Africa when a grassland niche was opening up.

## Introduction

In the development of hierarchical societies "there is not a continuum of complexity from the least to the most complex society. Instead there are major discontinuities between various societies arranged along the scale. That is, there are observable, measurable differences between the structure, organisation, and behavioural repertoire of states, ranked societies, and egalitarian societies" (Peebles & Kus 1977: 427). What this means is that a threshold is crossed once a society is structured hierarchically which has implications about how people see the world. For Godelier (1978: 767), "The monopoly of the means ... of reproduction of the universe and of life must have preceeded the monopoly of the visible means of production". If this is true, then the conditions of social complexity would tend to be in place before they could be seen visually, therefore, archaeologically.

One of the easiest ways to identify ranking in societies is through mortuary practices (Peebles & Kus 1977: 431). A principle stated by Saxe (1970) and elaborated upon by Goldstein (1981) is that "to the degree that corporate group rights to use and/or control crucial but restricted resources are attained and/or legitimized by means of lineal descent from the dead (i.e. lineal ties to ancestors), such groups will maintain formal disposal areas for the exclusive disposal of their dead, and conversely" (Saxe 1970: 119). Thus cemeteries, or recognisable burial areas separate from other functions, can be seen. Since individuals within these societies exercise regulation and control, there is ranking within the social groups, which is potentially recognisable where energy expenditure in mortuary practices is not primarily ordered on the basis of age and sex, but on the genealogy of individuals (Peebles & Kus 1977: 431). Both young and old with status will be buried with symbols of their position within the society, although not necessarily with the same kinds of goods.

Formal disposal of the dead is often part of ritual behaviour where propitiation ceremonies are necessary to ask the dead to intervene on the behalf of the living. Hierarchically structured societies, like the Nuba, use burial rites to prevent mishap to the community (Nadel 1947: 190). While ancestral shrines might have taken precedence over graves in Alur society (Southall 1953), nonetheless the elaborate burials of chiefs (including the burial alive of a member of a subordinate clan with the body) underscore the visual symbols of this chiefdom.

In contrast to hierarchical societies, segmentary structures of pastoral societies rely on communal use of resources and there is no attachment to small parcels of land, therefore there is less reliance on ancestral claims to land, or to ask them to intervene on behalf of the living. The visible signs of this, is a lack of formal disposal of the dead. Among East African pastoralists the range of variation in treating the body after death extends from leaving the corpse in the bush for hyenas to eat, to actual burial. Among the Maasai, traditionally a body was laid in the bush to be eaten, but today, under missionary influence, the body is laid on a hide on its right side with the head pointing north or south (Spencer 1988: 240). The Nandi practise both systems: for young babies and old people a grave is dug, but for older children and adults their corpses are laid out in the bush (Huntingford 1953: 146-7). The Samburu take their dead out into the bush, laying the corpse on its right side with arms and legs slightly bent on top of a hide (Spencer 1973: 107). In contrast, the Rendille dig a grave a metre deep and lay the corpse fully flexed on its right side (Huntingford 1953: 59). The Nuer also bury their dead, again fully flexed on the right side and laid on a hide with no grave goods (Evans-Pritchard 1956: 145). Information on the Turkana suggests there are different burials depending on where a person dies. The head of a nuclear family should be buried in the central kraal of his homestead, but if he is far away from it when he dies he will be buried in the bush. A wife who is a mother will be buried under her day hut, which is then pulled down. All others are either buried outside the homestead, or just left in the bush (Gulliver 1951: 227).

The point of all this detail is to show that burial among pastoralists (when it occurs) is not an elaborate affair, and few, if any, grave goods accompany the dead. If the body is buried it happens in or close to the settlement.

**The archaeology of death in North Africa and the Levant**

Applying these principles to the Upper Nile Valley, we find at Badari the dead were located in cemeteries with graves up to 160 cm deep, wrapped in either mats or skins. More important, perhaps, was the "beginnings of marked differences in wealth as evidenced by the quality and number of exotic prestige goods found in Badarian graves" (Hoffman 1980: 143-4). These grave goods included not only finely made pottery, but bead necklaces, human figurines, amulets, copper tools and armaments. We can suggest that such symbolism reflected the world view of the Badarians as a ranked society that looked towards enabling the dead to exist in an extension of this world. This would have meant ranked societies existed in the Upper Nile region before El-Omari times, as suggested by Hassan (1988: 159), probably by the beginning of the 4th millennium B.C., even before Badarian times (Fekri Hassan, pers. comm.). The problem, of course, is that we know little about the immediate precursors of the Badarian (assuming Brunton's Tasian industry did not exist). The only site in the valley filling the hiatus of 6000-5200 B.C. is that of El Tarif which has a ceramic industry, but with no indication of food production, underlying Naqada levels dated to ca. 5300 B.C. The excavators suggest that the Tarifian cultural material is similar to the lower levels at Badari (Hemamieh) but stress the differences between the Tarifian and Naqada materials (Ginter & Kozlowski 1984: 255, 256). It is interesting to note that the Tarifian ceramics were made on a moving base, which can be interpreted as meaning contact with relatively sophisticated pottery makers. If Hassan (1988: 142-3) is correct any occupation in the hiatus lies under Nile silts from inundation when rains up-river increased 5400-3800 B.C. after a period of low flood waters.

Cemeteries continued to increase in formality during Predynastic times in Upper Egypt, resulting in the huge burial sites at places such as Naqada where Petrie worked out his famous seriation of pottery styles. Within later dynastic times there are indications of an original belief that the ancestors lived in the cemetery on the edge of the desert where "they lived a carefree existence on the model of that on earth" (Rundle-Clark 1959: 31, 233; Breasted 1912: 51).

How did this occur in Predynastic Upper Egyptian society? The formulation of social ideas may be predicated partially on economics, but probably, in the case of the agricultural societies of Upper Egypt, on control over the limited resources of the Nile floodplain. Control over the resources would have meant inheritable rights transformed from ancestral benevolence. The world order would have to be structured accordingly. Cemeteries became structural elements in Badarian identity about who controlled the resources among the living, and appropriately 'sending off' the dead was presumably legitimizing the status of the family.

**The Levant and the Nile Delta**

In contrast to the Upper Nile Valley burials along the Israeli coast, although not plentiful, indicate the dead were interred within the settlement underneath floors, with no grave goods (Yeivin & Olami 1979). At Qatif, an infant was buried in a jar within the settlement (Epstein 1984). This is somewhat different from the general model of earlier Natufian burials which tended to be in cemeteries outside the settlement, although the pattern of the flexed skeleton in a shallow pit without grave goods or decoration (Belfer-Cohen & Hovers 1992) is what we see in North Africa. Simple graves were the norm for the settlement at Merimde (Junker 1933). As Debono & Mortensen (1990: 76) say about the Merimde phase IV and V burials (the majority recovered): "... the dead were buried separately or in pits with domestic debris as at El Omari" close to the living area. However, there are differences in the positions of the bodies. At Merimde "the orientation of the dead is mostly head to the southeast facing east, lying on the right side ... several had mats, but in general there were no grave goods". At El Omari many of the graves contained a single pot, and the bodies were laid on either right or left sides, sometimes with stones placed under the head, or against the back. El Omari is later in time than Merimde, so might be showing an increasing influence of the burial patterns found further south, although none of the graves indicated social inequalities.

The lack of cemeteries from the southern Levant suggest that there was less need to establish ancestral legitimacy ca. 6500-6000 B.P. The same pattern is to be found in the later Deltaic sites after 6000 B.P., suggesting that social organisation was much less hierarchical than in Predynastic Upper Egypt. In fact we may be dealing with non-hierarchical societies, e.g. nomadic segmentary lineages, and that the burial patterns we later see in the Sahara are an extension of this. At Adrar Bous in Niger, for example, flexed burials were isolated, with only a single bead around the neck, ca. 5000 B.P., a practise that continued once pastoralists moved south to the Sahel at Karkarichikat ca. 4000-3300 B.P. (Smith 1974).

## Other cultural evidence for contact

An elaboration on some of the cultural evidence for contacts between the Levant and North Africa that were offered before (Smith 1984; 1989) will be given here. Several sites on the Israeli and Gaza coastal strip were occupied during the 6th millennium B.C. These include Nizzanim, Ashqelon, Ziqim and Giv'at Haparsa (Yeivin & Olami 1979) and Qatif (Epstein 1984). These are described as Pottery Neolithic sites (although Ashqelon did not produce any ceramics). The sites are large and have hearths, pits and a flaked stone industry. Even though a couple of the inland sites (Teluliot Batashi and Lod) produced pottery and stone tools similar to these coastal sites, the writers make a point that there are considerable differences with the sites in Upper Galilee. Further north, at Byblos, there are flaking similarities, but the authors are of the opinion that the most significant parallels are with the contemporary. This contention is based on the appearance of a 'fishtail' tool (Yeivin & Olami 1979: 131, fig. 13: 9; see also Caton-Thompson & Gardner 1934: Pls. XI, 25, XLVIII, 12-13), but this is probably from the later Merimde levels. I would suggest the flaked and polished axes from the Levantine sites (Yeivin & Olami 1979: fig 15: 3-4; Epstein 1984: fig. 4: 14) found at Merimde (Junker 1928: Tafel IV, 43-45, 47, 49; Eiwanger 1988: Tafel 37, 730-1, 749-50), as well as in the Sahara at Adrar Bous (Smith 1974) and in the Fezzan and Hamada el Homra (Smith 1974; 1984) are more important indicators of earlier contact. These are part of a large tool category which includes axes and adzes (or gouges) found at the confluence of the Blue and White Nile in the Sudan (Arkell 1949; 1953: plate 14). They show lateral polish found in the Fayum (Caton-Thompson & Gardner 1934), but not in the Egyptian oases, e.g. Dakhleh (McDonald 1982; in press) or Kharga (Caton-Thompson 1952).

Since the previous writing new environmental data have been produced that support ameliorated conditions in the period 7000-6500 B.P. in the eastern Mediterranean. Goodfriend (1991), from his analysis of snails from the Negev, has shown that during this period $^{18}O$ levels in the snails were significantly depleted. This is interpreted as reflecting large amounts of rainfall (Rindsberger et al. 1983), and supports the previous work (Goodfriend 1990) on $^{13}C$ values in snails which indicated a 20 km southward shift of rainfall isohyets ca. 6500-3000 B.P. The entire eastern Mediterranean would have been affected, offering conditions favourable to the expansion of pastoralist activities from the Levant into North Africa.

## Conclusions

On the basis of available data, the cultural connection between the Levant and North Africa ca. 7000-6500 B.P. would be a tenable hypothesis. Material culture items, although by no means identical, are sufficiently similar to suggest contact. The main thrust was across the Delta to the Fayum, then on to Cyrenaica and the Fezzan, and later across the Sahara taking advantage of the grassland niche which had opened up with ameliorating conditions.

More important from a sociological perspective is the contrast in burial patterns between the Upper Nile Valley and the Delta/Levant. These are suggested here as indicators of differences in social organisation, and the lack of cemeteries in the Levant, Delta and the Sahara are clues to the spread of non-hierarchical societies at a time when Upper Egypt was becoming hierarchically structured and had a different economic emphasis, probably based on sedentary agriculture. Early Merimde society reflected the non-hierarchical social structure already in place among the seasonal occupiers of the Fayum. Later contact between the central Sahara and the Nile Valley south of the Nubian Desert completed the occupation of the Sahara by pastoralists.

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Interregional Contacts in the Later Prehistory
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# The archaeology of Jebel Gharbi (Northwest Libya) and the Libyan sequence

The Jebel Gharbi, also known as Jebel Nefusa, is a vast crescent-shaped area ranging from the coast near Leptis Magna eastwards, to Nalut. It lies on the boundary between two morphological elements (Fig. 1): the southern portion of the Gefara coastal plain to the north, and the Tripolitanian Plateau to the south. The coast is nowadays ca. 100 km away.

The Jebel Gharbi represents the most northern and highest part of the Plateau (max. height: 750 m) and is characterized on the northern side by a steep escarpment, up to 300-350 m in height. The Jebel is cut by a network of deep wadis draining towards the Gefara plain. In the course of the last forty years the area has been sporadically explored through a few surveys (Fabbri & Winorath-Scott 1965; del Fabbro 1968; Mràzek & Svoboda 1986). The only stratigraphic sequence was identified in the Tarhuna (Neuville 1956; Jelinek 1982) and in the Wadi Ghan regions (Mc Burney 1947; Mc Burney & Hey 1955; Hey 1962).

Research by the Joint Libyan-Italian Archaeological Mission started in 1989 and continued in 1990, including both geo-archaeological surveys and test excavations [1]. The aim of the project is to reconstruct the palaeoenvironment and the archaeological sequence of the Jebel Gharbi region, in order to understand the correlation between natural resources and human settlement during the Pleistocene and the Holocene. In both seasons the exploration was concentrated on the Jado (Wadi Ain Zarga, Hosha Ginnauin) and the Gharian (Wadi Ghan) areas, situated respectively in the central-western and the central-eastern portion of the Jebel Gharbi, at a distance of approximately 100 km one from the other (Barich & Anag 1989; Barich et al. 1990; Barich et al. in press).

[1] The Archaeological Mission in the Jebel Gharbi is part of a Libyan-Italian Joint Project between the University of Rome "La Sapienza" and the General Director of Antiquities of Libya. Barbara E. Barich and Giuma El Anag are the co-directors. The 1989 and 1990 campaigns were held with the participation of: C.Capezza, C.Conati Barbaro, C.Giraudi, B.Marcolongo, E.Barich, F.Lugli, S.Sassi El Hais, I.Salah El Azabi, S.Ali Hattab, M.Abu Gela, T.Abd Innabi. The drawings in this paper are by G.Carboni, University of Rome "La Sapienza".

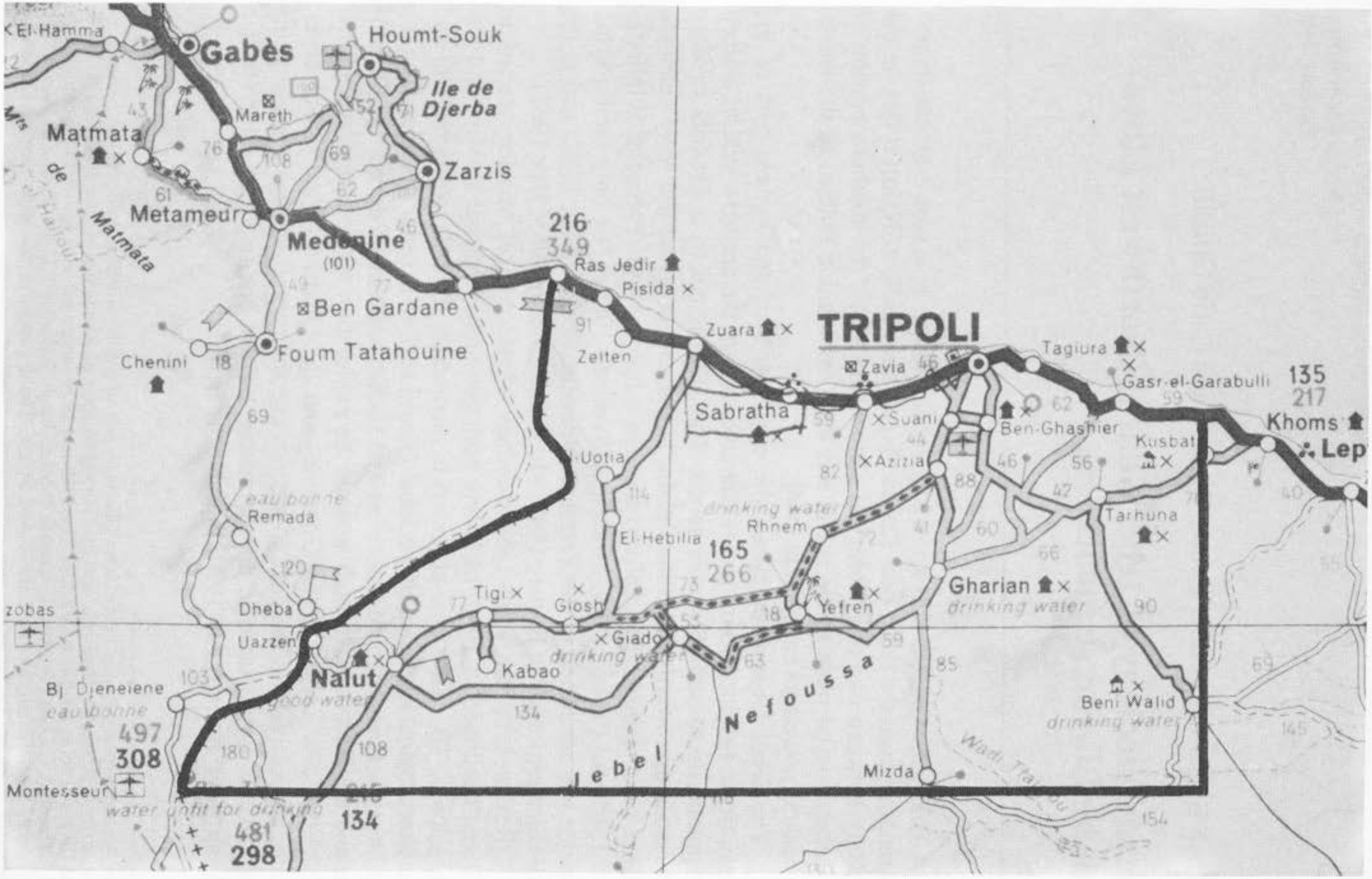


Fig. 1. Map of Tripolitania showing the Jebel Gharbi area.

**The Jado area**

This area consists morphologically of three main features: Plateau, deep-cut valleys and alluvial floor valleys. For two thirds of their length the deep-cut valleys are devoid of any fluvial sediments, but in their terminal stretch and in the link with the Gefara plain they show a series of terraces. Colluvial, debris and landslide deposits often occur on the valley slopes and on the escarpment bordering the plateau. The sequence of Pleistocene deposits found on the Plateau indicates that the recent sedimentation of the area is due mainly to eolian activity.

The Plateau is covered by silts of aeolian origin containing calcareous concretions which have been deposited in at least three episodes. The sediments have undergone three pedogenetic phases. Today the Plateau vegetation is of a steppe type.

**The Ain Zarga valley**

The Ain Zarga river is the major watercourse of the Jado region. It flows in an east-west direction, reaching the Gefara plain near the village of Hosha Ginnauin. The river bed is deeply cut into a limestone formation. Along its course on both flanks, there are many rock shelters at different heights above the wadi bed.

Most of the tributary valleys are now filled with landslide and colluvial fine deposits. The stratigraphy of these valleys shows a sequence of silty deposits containing Aterian artifacts (AZ3)[2] and with Epipalaeolithic materials on its surface. The silty deposits lie on a palaeosol containing Middle Palaeolithic artifacts of Levallois tradition (AZ2). Beneath the palaeosol there is a silty formation (AZ1). This stratigraphy could be interpreted as colluvia of silts of aeolian origin, while the palaeosols are an indication for a good development of plant cover and for morphological stability.

Archaeological surveys have been conducted along the whole course of the Wadi Ain Zarga. Both sides of the river appear to be rich in archaeological sites. Nevertheless the section closer to the headwater (Ras el Wadi) seems to be the most preserved area. Here some open-air sites were identified, ranging from Middle Palaeolithic, to Epipalaeolithic times. The lithic materials collected in site SJ-90-12[3] consist of artifacts both of Levallois and Aterian tradition (Fig. 2: 2, 4). Site SJ-90-13 is characterized by Epipalaleolithic artifacts associated with some hearth remains. The collection was undertaken on a area of 36 sqm covered by a grid of 2x2 m, which is clearly the exposed surface of an *in situ* anthropic deposit. The presence of backed bladelets, which represent the most common tool class, of segments, piquants trièdres and of the frequent use of the Ouchtata retouch (Fig. 3), allows for the placement of the assemblage in an Ibero-maurusian facies (Eastern Oranian or Eastern Iberomaurusian) also attested in

[2] This type of code, as well as the others in the text, refers to the geomorphological study by C.Giraudi.
[3] This type of code refers to the Mission Archive for archaeological sites.

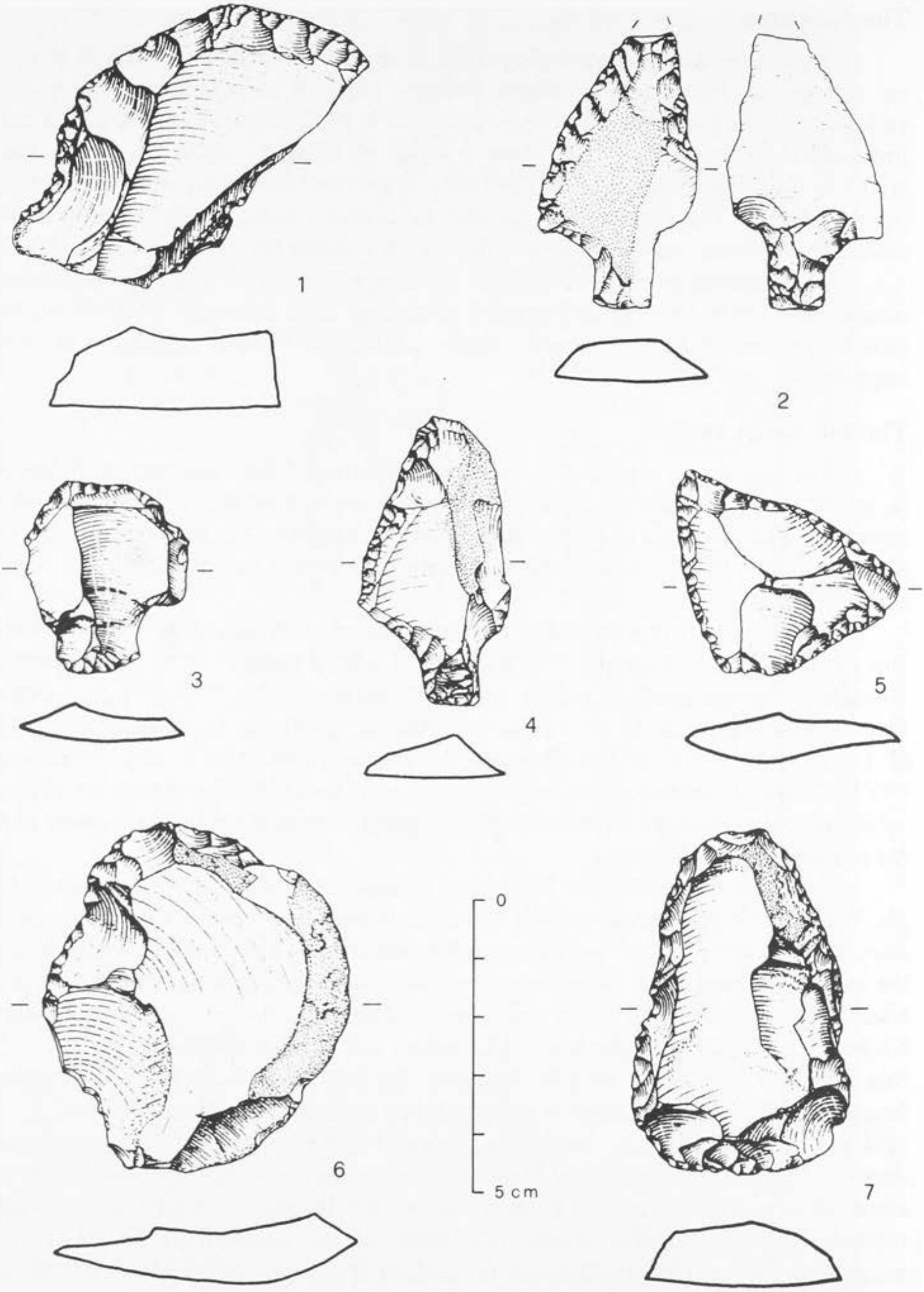


Fig. 2. Jebel Gharbi (Libya): Middle Palaeolithic artifacts from Jado and Garian areas: 1, 7 end-scrapers; 2, 4 Aterian points; 3, 5, 6 side-scrapers.

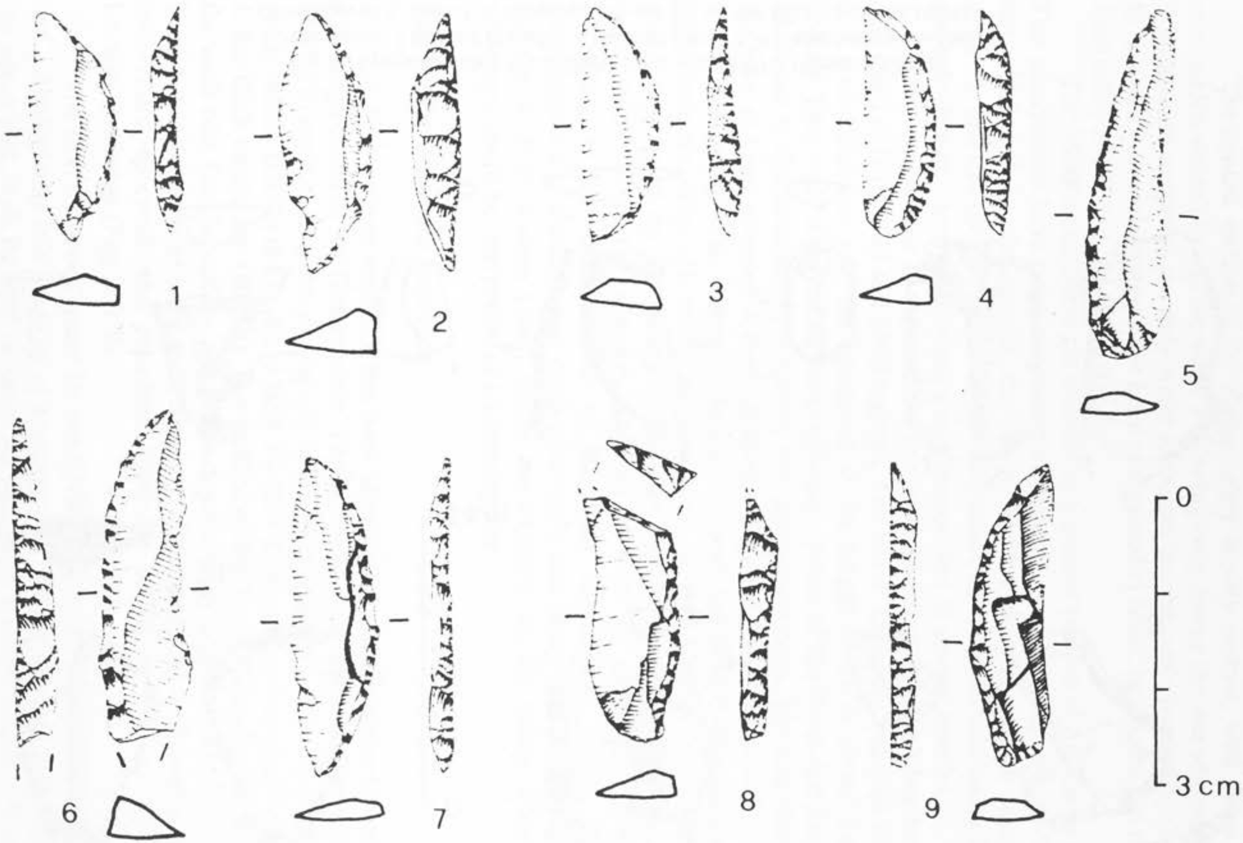


Fig. 3. Epipalaeolithic artifacts from site SJ-90-13 in the Ain Zarga valley: 1, 4: segments; 5 bladelet with Ouchtata retouch; 6, 7, 9: backed bladelets; 8 truncated backed bladelet.

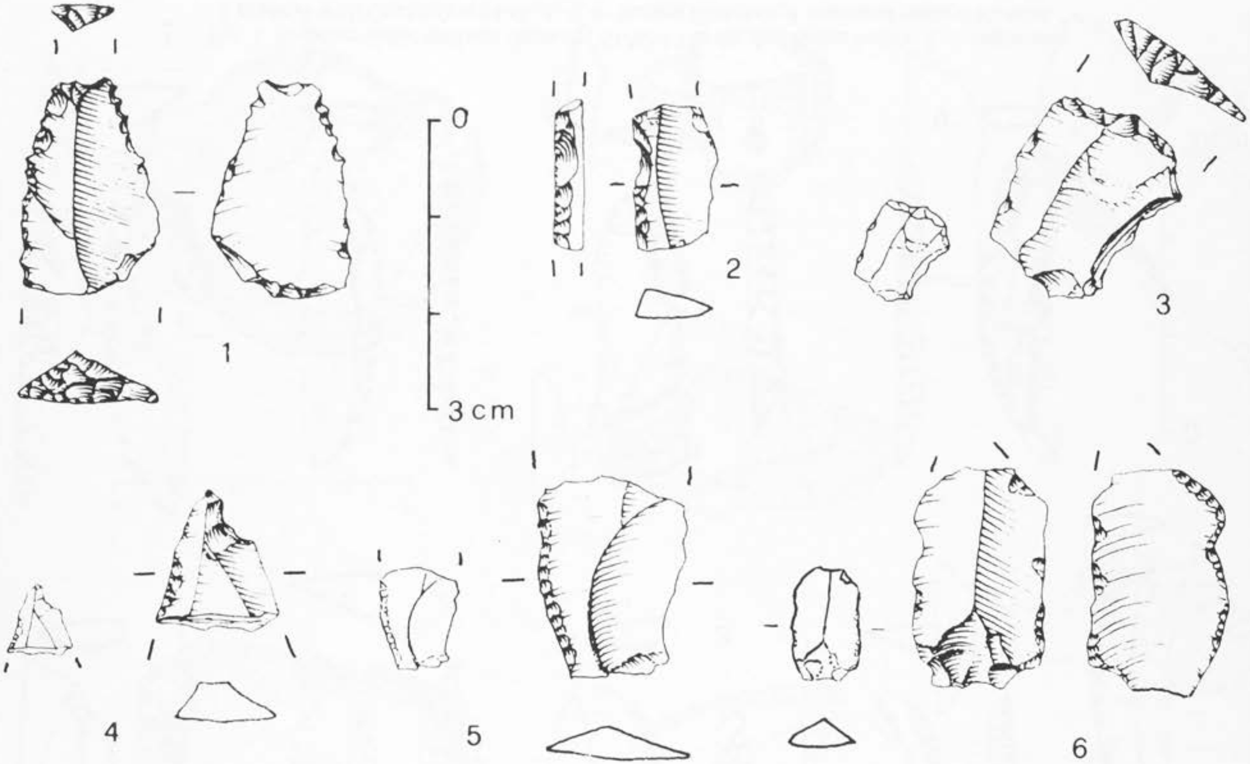


Fig. 4. Epipalaeolithic (?) artifacts from site SJ-89-2 (Umm el Grib):
1, 3 truncations; 2 backed bladelet; 4 notched piece; 5, 6 retouched micro-flakes
(drawings of 1, 2 are 1:1; drawings 3-6 are 1:1 on the left, 2:1 on the right).

two other important sites of Libya: Haua Fteah (McBurney 1967) and Hagfet-et-Tera (Petrocchi 1940; Montet-White 1958-61).

The central section of the Zarga valley is very narrow, with steep slopes and sudden waterfalls. As the water is flowing only during the wet season, mainly from autumn to spring, the only water resources are the pools formed by the falls. In this area two rockshelters have been recognized at Masr, below the old town of Jado (sites SJ-90-19A, SJ-90-19B).

The Masr rockshelters are situated in a narrow portion of the Zarga valley. Test excavations have been conducted in both of them, but only site SJ-90-19B has revealed an *in situ* deposit, the one of SJ-90-19A being almost completely deflated. The stratigraphy of site SJ-90-19B shows an alternation of sandy levels and ashy lenses, clearly indicating a superimposition of several hearths.

We can include in this section one more rockshelter, which has been test excavated in both 1989 and 1990 seasons. The site of Umm el Grib (site SJ-89-2) is a rockshelter cut into the limestone at the height of 25 m above the wadi bottom. This wadi is part of the wide tributary system of the Wadi Ain Zarga and its course is characterized by a narrow bed and steep slopes. The test excavation at Umm el Grib revealed a thick anthropic deposit, with a sequence of sandy levels, containing lithic industry, charcoals, faunal and botanical evidences. The lithic industry (Fig. 4) could be compared to the Marble Arch and Sirte complexes found by McBurney (McBurney 1947). The main difference with those industries is the absence at Umm el Grib of microburin technique. According to the characteristics of the lithic assemblage, which shows a preponderance of débitage and cores over tools, and because of the proximity of the site to flint sources (chert lenses are exposed on the valley slopes), the settlement could be interpreted as a knapping site.

## The Hosha Ginnauin sequence

A four terraces sequence has been identified in the Ginnauin area near the Ain Zarga outlet in the Gefara plain. The oldest of these terraces (Terrace I: site SJ-90-16) consists of a chaotic deposit of boulders, cobbles and pebbles in a silty-sandy matrix (HG1a in Fig. 5), at least 10-12m thick, with a limestone crust up to 1. 5m thick on the top (HG1b). The surface of this terrace lies about 15m above the wadi bed. On the surface and in the deposit many artifacts have been found. Two Acheulian bifaces were collected, together with other implements such as hachereaux, spheroids and polieders. They are associated to later artifacts of Levallois tradition (Fig. 2: 3, 6).

The next terrace (Terrace II: site SJ-90-15/1) lies 7 to 8 m above the wadi bed. Lithologically it is made up of a sequence of alluvial deposits represented, in the upper part, both by beds of stratified gravels in a sandy matrix, and by pebbles and boulders in a sandy-silty structureless matrix (HG2b). In the lower part the deposits are mainly silty but thay have layers of fine gravel, also of alluvial

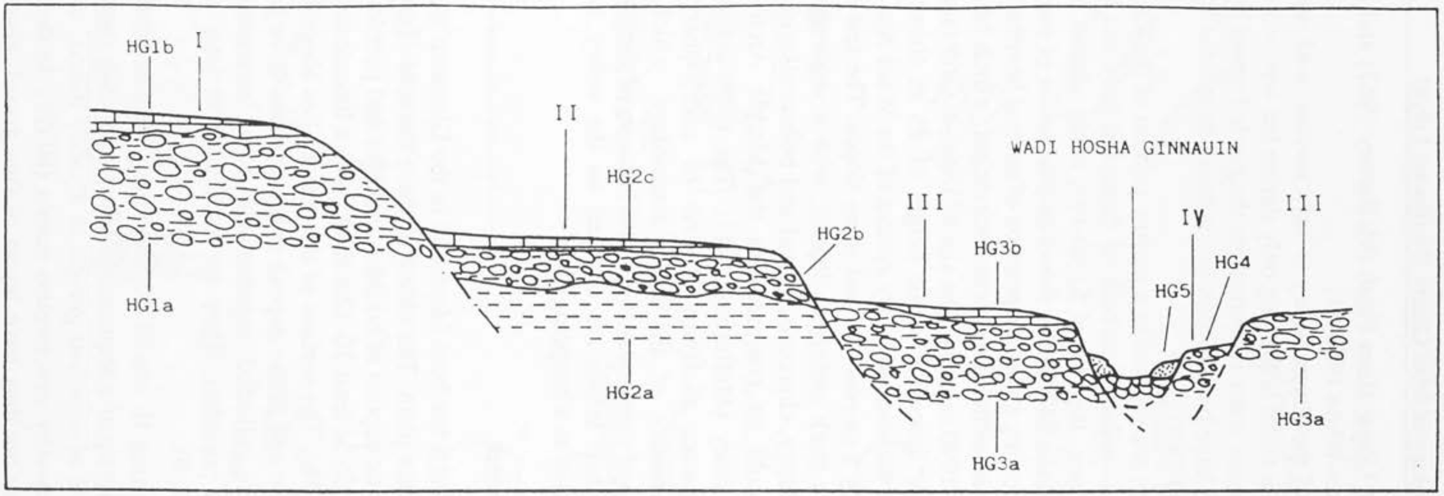


Fig. 5. Geomorphological stratigraphy at Hosha Ginnauin.
HG1b, HG2c, HG3b: limestone crust; HG1a, HG2b, HG3a, HG4: coarse alluvial deposits (pebbles, cobbles, boulders); HG2a: fine alluvial deposit; HG5: eolian sand deposit.

origin (HG2a). The surface of Terrace II has a limestone crust (HG2c) whose thickness may be more than 0. 5m. On this surface Middle Palaeolithic artifacts of Levallois tradition are present (Fig. 2: 5, 7).

Terrace III (site SJ-90-15/2) lies at about 4 to 5 m above the wadi bed. It consists of a chaotic deposit of boulders, cobbles and pebbles in a silty-sandy matrix similar to the Terrace I deposit (HG3). On the terrace surface there is a discontinuous limestone crust with a maximum thickness of 30-40 cm (HG3b). Middle Palaeolithic artifacts of Levallois tradition are present inside the deposit associated with a few cores for blades (site SJ-90-15/3).

A number of later terrace remnants, lying 1.5 to 2 m above the wadi bed, form terrace IV. It consists of a deposit of pebbles and boulders in a sandy-silty matrix with a chaothic structure (HG4), which does not contain any archaeological evidence.

**The Garian area**

Investigations in this area have been focused on the upper and lower valleys of Wadi Ghan, the major river of the region. During the 40's and 50's the area was surveyed by McBurney and Hey (McBurney 1947; Hey 1962), who outlined a geo-archaeological sequence, which is still a reference point for the archaeological framing of the Jebel.

From the geological point of view the Garian area is more complex than the Jado one. Clear remains of volcanic activity of the Upper Pleistocene age have been observed. Endogenic factors, as volcanism and tectonics, could have affected the environmental development, together with climatic factors.

In the upper part of the Wadi Ghan valley three terraces have been recognized, the last two also recognized by Hey (1962). The older terrace (Fig. 6a) can be interpreted as an erosion surface of lava-flow covering alluvial deposits. We found Middle Palaeolithic artifacts of Levallois tradition inside the alluvial deposit (Fig. 2:1). The second terrace (Fig. 6b) consists of silts, probably the result of the aeolian silts of the Plateau, which rest on a deposit of alluvial origin (mudflow) also containing Middle Palaeolithic artifacts[4]. On the silty terrace of Wadi Ghan a younger industry is superimposed over the mid-Palaeolithic horizon. It was defined as "late facies of the Upper Capsian" by McBurney (McBurney & Hey 1955: 272) who later on revised this definition proposing its attribution to the same Oranian sphere as Haua Fteah and Hagfet-et-Tera.

The third terrace (Fig. 6b) consists of gravels intercalated with sandy-silty beds of alluvial origin. According to Hey (1962) the terrace could be dated from after the 4th century A.D.

[4] This is actually the "higher terrace" of Hey (1962). Hey reported the presence, inside the mudflow deposit of Aterian artifacts, which we have not found yet.

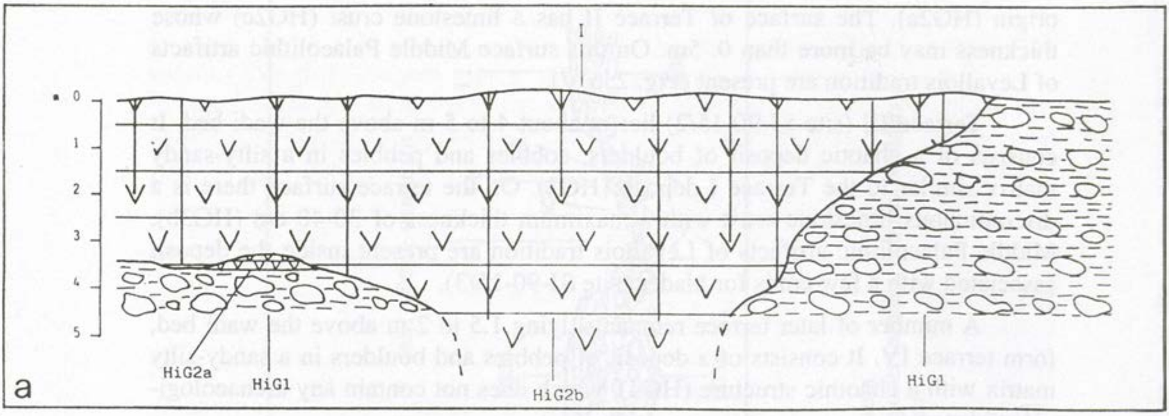


Fig. 6a. Terrace I in the Upper Wadi Ghan valley:
HiG2b: lava; HiG2a: volcanic ash; HiG1: alluvial deposits.

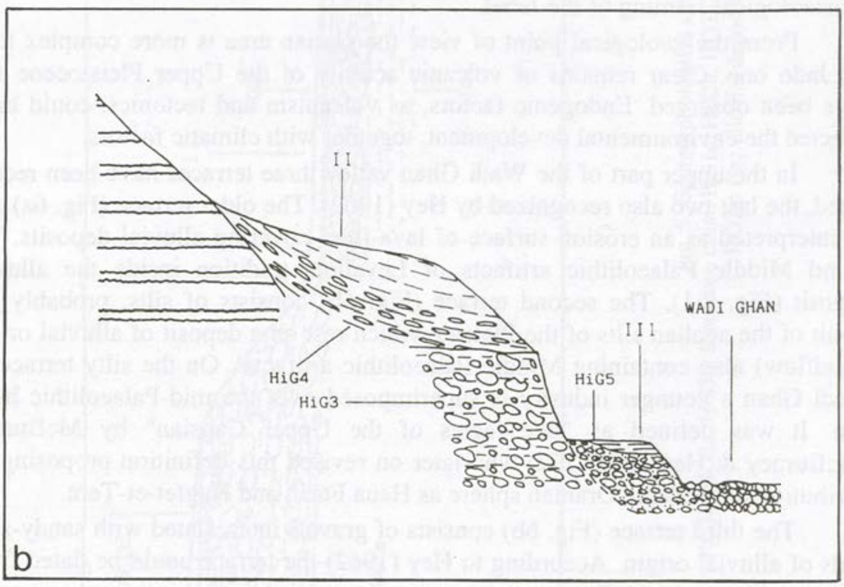


Fig. 6b. Terraces II and III in the Upper Wadi Ghan valley:
HiG4: silts of aeolian origin
HiG3: alluvial deposit (mudflow)
HiG5: alluvial deposit.

Again three terraces have been detected in the lower Wadi Ghan valley. The first one consists of a complex sequence of alluvial and colluvial deposits and lava flows covered by a limestone crust. Middle Palaeolithic artifacts were collected on its surface. The other two terraces are made up of alluvial deposits.

The correlation between the sequences of both parts of the Wadi Ghan valley cannot be demonstrated yet, as well as the correspondence between the terraces and climatic changes. This is mainly due to the already mentioned late Pleistocene volcanic and tectonic activity.

**Discussion**

The two first seasons in the Jebel Gharbi have provided a remarkable amount of geomorphological and archaeological evidences, which allow us to sketch a palaeoenvironmental and archaeological reconstruction of this region.

According to the geomorphological observations, different climatic phases have been recognized during Upper Pleistocene and Holocene times. An older phase, dated to the Upper Pleistocene, was characterized by an arid climate, with rare precipitations of great intensity (mudflow, debris flow: HiG1, HiG3, HiG3a; colluvia: AZ1). It is followed by a humid episode with fairly regular rainfall as soils development (AZ2) and watercourse erosion (terracing of surface 3 at Hosha) testify.

A single phase, with extremely arid climate covers the final part of the Upper Pleistocene (soil deflation on crust HG3b; colluviation: AZ3, HiG4; gelifraction: HiG4). This could be related to the post-Aterian phase dated in the North Africa from about 30 000 to 15 000 B.P. In fact, Epi-Palaeolithic artifacts were found only in the deposits attributed to the final part of this phase. This HiG4: silts of aeolian origin; HiG3: alluvial deposit (mudflow); HiG5: alluvial deposit could mean that the area was not always favourable to human settlement and that it was occupied again when the climate became less arid.

The transition to the Holocene is marked by a climatic amelioration as indicated by a relatively wet phase with regular rainfall (development of soils: AZ3a; river erosion [surface of second terrace of Upper Wadi Ghan]). This should correspond to the phase of the re-occupation of the area, attested by the sites of Ain Zarga headwater. Absolute dating of the site SJ-90-13 could confirm a possible chronology of 14 000-13 000 B.P.

The archaeological sequence detected in Jebel Gharbi will be able to fill the gap of evidence existing between the Eastern and the Western regions of North Africa Until now this role has been played by the Haua Fteah cave, which however presents some peculiar aspects. Here the Aterian seems to be replaced by the Mousterian which lasted until the first appearance of an Upper Paleolithic industry called Dabban (40 000 B.P.). On the contrary, the Jebel Gharbi sequence shows a clear continuity from the Levallois tradition to the Aterian, often found in stratigraphice succession.

As far as the Late Pleistocene and Early Holocene are concerned, the Ain Zarga and Wadi Ghan evidences could confirm the revision of the Libyco-Capsian horizon suggested by Close (1986). A sensible difference in types and incidence of types between the Capsian and the coeval Libyan industries (namely the layer X at Haua Fteah) has been pointed out: therefore it would seem more appropriate to include that layer in the the cultural context of the Iberomaurusian sensu lato. At the end of Pleistocene this cultural sphere spread over the North Africa, from the Nile Valley to the Western regions, in connection with the first appearance of the mechtoide human type. According to Close "there seems, throughout much of the Late Palaeolithic and Epipalaeolithic of North Africa, to be a basic, Iberomaurusian-like substratum, which first appears across the whole North Africa within a very short period of time" (Close 1986: 175).

Moreover, the considerable distance from the coast (ca. 100 km) of the Jebel Gharbi could confirm Mc Burney's hypothesis of a gradual migration towards the inner regions of Iberomaurusian groups otherwise well adapted to the coastal environment. The medium height zones seem to be the most prefered inhabitation areas, such as the Atlas and, according to the new evidence, the Jebel Gharbi. The Plateau region was a rich environment suitable for the exploitation of a wide range of resources, such as game, plants and raw materials[5]. Evidently, the subsistence and technological model adopted by the Final Pleistocene-Early Holocene groups should have been a successful one, as it lasted for such a long time. Starting from this promising evidence, the future investigations of the region will focus on the first appearance of early food production, which likely seems to have been developed as a local process.

At the end of the first research cycle that we have reported here, we can conclude that the Jebel Gharbi region can allow for a reconstruction of the whole prehistoric sequence from the Lower Palaeolithic to the Neolithic. In a wider perspective, we can also assume that the future research will support an idea of both spatial and temporal continuity in the sequence of North African prehistory, until now inhibited by inadequate investigations.

[5] In the Jebel are present two main formations containing chert, namely the Nalut one (mainly exploited by Middle Palaeolithic groups) and the Wadi Thamat one (very likely preferred by Epipalaeolithic and Neolithic groups).

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

Jean-Loïc Le Quellec

# Cultural areas and interregional relations: the case of the Egyptian and Libyan theriomorphs

A good many publications draw up thematic catalogues of Saharan engravings - compiling on the same plates several figures from different sites but of similar subject matter (the "cultural features") - and finally produce a sort of motif-index of rupestrian art, as the folklorists from the Aarne and Thompson school are doing for oral literature. Whatever the vocabulary favoured, geographical or cultural, the spatial distribution of each cultural feature allows the definition of "areas" and "provinces" or "civilizations" and "cultures" e.g. - the "Hunters' Culture" (Huard & Leclant 1980; contra Muzzolini 1991, 1992). Chronological considerations may be added to elaborate the notion of "age-area", after which one may consider elucidating the relations between various cultural areas: kinship, borrowings, sequences and the like. Those specific modes of investigation were first theorized by the ethno-anthropologists of the Vienna Circle (Wiener Kreis) and, going by the name of "Culture Cycles Theory", were popularized by L. Frobenius at the beginning of the century (Frobenius 1933). That "Kulturkreislehre" did not take long to give rise to ethnocentric views and attitudes justifying its lasting disrepute and its firm rejection by most contemporary scholars.

Nevertheless, it may be asked whether that rejection may not result in some measure from a recent fashion of thought (Clottes 1992), and the French ethnologist P. Erny argues for an improvement and a good use of the method. Some interesting improvements were lately brought into play by J. Poirier, who proposed to distinguish the "cycles" i.e. superstructures representing certain social patterns, from the "circles" i.e. their realization *hic et nunc* in this or that particular geographical and historical environment (Erny 1992).

Actually, the notion of "cultural area" proved to be very useful in various spheres of social sciences, especially dialectology, but it seems possible to adapt it to other spheres, and to apply it to our engravings, under certain conditions. The dialectologists use to make maps with grammatical, lexical and phonological "isoglosses". Those isoglottal lines, drawn between places which differ for each feature of language, "sometimes agree, sometimes run somewhat parallel with one another, but fairly often cross one another, in the most distracting manner" (Jespersen 1925: III, 41). So, the more elaborated the definition of a linguistic area is, the vaguer its boundaries are, since it is separated from other areas by a bundle of isographs that rarely coincide. In a word, one ought to avoid defining, or comparing, cultural areas solely with detached elements: it is desirable to attach the greatest importance to associations of two or more features.

It is expected that such a method would be productive for the study of several cultural features identifiable among the Saharan engravings. The mapping of the graphic themes should allow us to delineate areas limited by lines that could be called "isothemes". The theme of the theriomorphs associated to rhinocerotes seems a good one to illustrate the application of this approach.

**The "Theriomorph - and - Rhinoceros" theme**

In central Sahara, it is often difficult to distinguish between masked figures and mythical theriomorphs or even deities (Le Quellec 1992: 483-504). Nevertheless, the second hypothesis sometimes seems the only one fit to explain Fezzanese engravings as, for example, theriomorphs with canine head, carrying big game under their arms or on their shoulders, and striding along without any sign of exertion which cannot be considered as giving evidence about really acted scenes. Among the recorded examples, the following may not be unworthy of notice:

- at I-n-Habeter, two theriomorphs whose heads evoke lycaons are facing each other, and one of them offers an antelope to the other, holding it up with only one hand grasping the neck of the animal, a feat which could not have been carried out by ordinary human beings; each of them is associated with a rhinoceros (Frobenius: pl. LVI);
- at Tel-Isaghen, there is a group of three other theriomorphs with canine heads, and one of them is grasping a big indeterminable quadruped, using the same grip (Graziosi 1970: fig. 176);
- an the same site, a canine-headed theriomorph is shouldering an auroch whose horns show that it is an adult (Graziosi 1970: fig. 175);
- in the Wâdi Iser, another theriomorph with a lycaon head is running along, carrying an auroch on his shoulders (van Albada 1992b: 24).

At I-n-Habeter, the figures of a famous engraving have often been interpreted as walking "mythological beings" or "mythical figures" with jackal heads, and flourishing their *poniards*. One of them is dragging a dead rhinoceros he holds with only one hand, which is impossible even to the most vigorous hunter (Frobenius 1937: pl. LIV). According to P. Huard and J. Leclant, "they are hunting divinities, in a high place like I-n-Habeter, where initiations, rites and cults are expected to have been performed" (Huard & Leclant 1980: 455) and J. Jelinek insists that they "are not masked men, but human-like beings with jackal heads" (Jelinek 1984: 143). This interpretation is corroborated by a composition

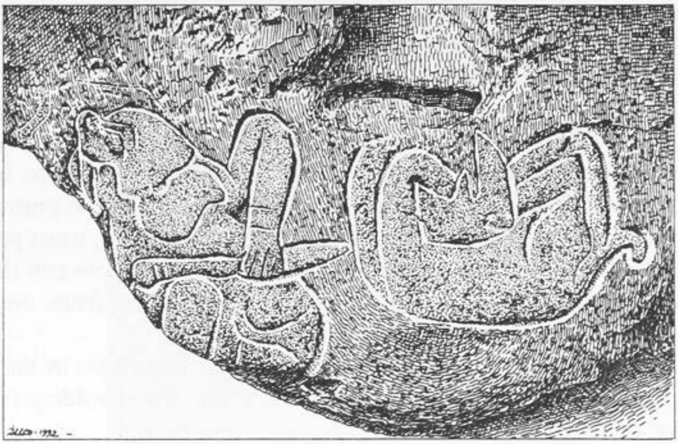

Fig. 1. Mythological figure brandishing a *poniard* toward a dead rhinoceros. El-Awen, Messak Settafet (after a photo by Y. Gauthier).

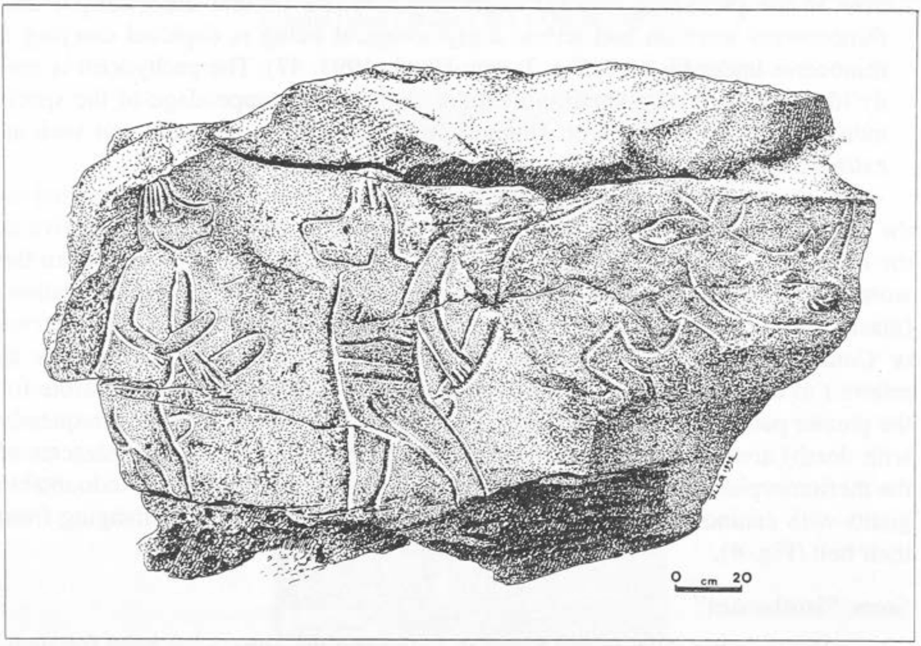


Fig. 2. Rhinoceros followed by two canine-headed theriomorphs. Wâdi Teknîwen, Messak Settafet ( after Gauthier & Le Quellec 1992).

engraved in a cave at el-Aurer (Le Quellec & Gauthier 1993; Lutz 1992: fig. 9). It represents a mythical theriomorph brandishing a *poniard* - a type of weapon which is slipped in the belt of the theriomorph carrying an auroch at Tel-Isaghen (Graziosi 1970: fig. 175), and also used by another one, about to sacrifice an auroch mastered with only one hand (van Albada 1992b: 29). The mythological being of the el-Aurer cave turns his head toward a dead rhinoceros lying on its back like the pachyderm of I-n-Habeter, but here the legs of the animal are bent in a non-natural manner (wrenched articulations) and its head, most probably cut off, is placed on its abdomen (Fig. 1). A mythical relation between rhinocerotes and theriomorphs with canine heads may be also inferred from the following scenes:

- two theriomorphs with lycaon heads are facing a rhinoceros in the Wâdi I-n-Hagalas, and one of them is carrying an auroch on his shoulders (van Albada 1992a: fig. 4, no. 23; 1992b: 27);
- a rhinoceros of the Wâdi Teknîwen is followed by two other canine theriomorphs engraved on the other side of a dihedron (Fig. 2); it is uneasy to identify the objects they are brandishing: imagining they were weapons, it would imply the two theriomorphs looking at one another are taking counsel as to how to attack the pachyderm; but those objects could also be simple sticks to be musically clapped during a dance or a ritual, for instance;
- close to the preceding, another engraving confirms us that theriomorphs and rhinocerotes were on bad terms: a mythological being is depicted carrying a rhinoceros under his arm (Fig. 3; van Albada 1993: 47). The pachyderm is easily identifiable, with a small tail similar to the caudal appendage of the specimen in the cave of el-Aurer. Unquestionably no man could carry out such an extraordinary performance.

It seems that those engravings result from graphic operations executed on the "animality-humanity" schemes by other means, but with the same objective as the myth that also acts by organization and arrangements of symbols, but in the womb of language. Rather than search for technological or ritual indications (masks, hunter's dance) and for attestations of this or that species (*Lycaon pictus* or *Canis aurea* ?), it seems more advisable to consider the theriomorphs as referred to a mythological context, whose coded system is quite inaccessible for the greater part, but whose relations with the hunter's traditions (and consequently with death) are henceforth undeniable. Moreover, the mythological character of the theriomorphs is well illustrated by some engravings of apparently redoubtable giants with canine heads, who are wearing rhinocerotes' *protomes* hanging from their belt (Fig. 4).

## Some "isothemes"

The possible relationship between Egypt and the Sahara has been frequently questioned especially as regards some themes occurring in the Saharan themes, such as "ornamented" rams and bovids, or theriomorphs with jackal heads.

Fig. 3. Mythological theriomorph carrying a rhinoceros under his arm. Wâdi Teknîwen, Messak Settafet (after Gauthier & Le Quellec 1992).

Fig. 4. Canine-headed mythological theriomorph, with protomes hanging from his belt. Messak Mellet (after Gauthier & Le Quellec 1992).

The hypothesis of ancient contacts between the two areas involves the existence of a cultural "cycle" ("ovids with spheroids" for instance) showing itself in a Saharan "circle" on the one hand, and in an Egyptian one on the other. The questioned hypothesis compels us to wonder if the two manifestations belong to the same cycle, or if they could not be "Secondärkulturen" born of an Egypto-Saharan "Primakultur". The multiplicity of ornamented rams in sub-Saharan Africa (Le Quellec 1992) and the recent advances of the applications of glottochronology to African languages (Behrens 1984; Ehret 1984, 1988; Jungraithmayr 1988) also lead to induce an Afro-Asiatic "Primakultur".

Concerning our mythological beings, the hypothetical relationship between Saharan and Egyptian theriomorphs is frequently evoked in literature (e.g.: Camps 1974: 258, 1978: 306; Castiglioni & Negro 1986: 209, 317-319), which is a way of supposing that a particular cultural "cycle" could be defined by the sole presence of those beings. The existence of mythical theriomorphs is well attested in both areas, but the isotheme "Theriomorph-Rhinoceros" only appears in a specific zone of the Fezzanese area, especially in the Messak. Furthermore, it is noteworthy that the Egyptian pantheon does not have a place for animals lately introduced in the Nile valley, such as horses, nor does it include the big game animals (such as elephants, giraffes and rhinoceroces) which had already begun to disappear during the Predynastic times and whose fate is particularly interesting for the present discussion (Meeks 1986). Further research will have to examine some closely related isothemes on the one hand, such as "Theriomorph-Elephant" or any other association involving theriomorphs; and on the other hand the case of masked men or figures related to rhinocerotes, because they could belong to the same mythological world. Two examples are illustrative of those new directions of investigation:

- for an interesting case of human being wearing a rhinoceros mask at el-Awen, see A. & A. Castiglioni & G. Negro (1986: n° 80);
- there are also enigmatical scenes such as the famous rhinoceros-headed man ejaculating in the eye of a rhino in the Wâdi Djerât (Lhote 1976: n° 1565-1566), but we do not know if they are to be interpreted as descriptive representations involving masked people during real ritual ceremonies, or if they were illustrating a mythical text, an oral sacred literature whose bearers vanished away for ever.

A better understanding of the scenes associating theriomorphs and rhinocerotes may be possible if one notices that, more often than not, the pachyderm is in a weak and ridiculous situation. It lays twice on its back, and once its legs are broken. In one case, it looks as if it had been decapitated, which should not be surprising, as the protome of another one is hanging from the belt of a mythical giant, whereas the trophy of a bovid is hanging on the other side (Fig. 3). Theriomorphs with rhinocerotes always have dominion over the animal by their stature, their attitude or their weapons, and all the scenes imply a connotation of chase or death. The violent cynegetic activities of these giants attacking rhinocerotes are well emphasized by the graphic hybridization between men and lycaons. This animal (*Lycao pictus*, Temminck) is indeed a redoubtable roving carnivore, and the East Africans use to say "it is the death roaming the plain" (Huot 1992: 22). Now the characters permitting to recognize it (large round ears, "molossoid" snout) are not always observable, and it is unprofitable to identify it at all costs on the engravings in question, in so far as they are the traces of invisible divinities, materialized among the rocks by the artists who were once telling their chronicle in the Messak.

It is noticeable that myths of the Dog-Man are widely known since the Antiquity (Lecouteux 1981; White & Doniger 1991) and some of them are still alive. For instance, when I was living in Fezzân, I was told the following legend by an old man of Brâk, on May, 8th, 1979:

> "In Sudan, (some Libyans say in southern Libya, around Gatrûn), there is an area called Barr el-Kelb ("the Dog-Region") irrigated by the Wâdi el-Kelb ("the Dog-River"). Dogs are living on one side of the river, men on the other side. All along the Wâdi, a particular kind of thorn-bush (called "są°adên") grows: men can make their way through it, but dogs cannot. Once upon a time, a woman passed through the bushes, and went to live with one dog. They tended the cows together for a long time and, one day, the dog possessed her ("yâkel min fommha wa ya°rifha"). Although she washed herself after the intercourse, the woman became pregnant and gave birth to a son, the first dog-man of a new race, to which the ancestor of the Mandâra (a Libyan tribe supposed to have emigrated from the south long ago, "zamân bukkol") belongs.
>
> People say that is the reason why the Mandâra have no Adam's apple, and why other tribes, like the Mgârha for instance, are reluctant to give their daughters to Mandâra boys in marriage, saying: "we are ashamed" (°indna °ayb)."

As they are men-like figures related to death, the engraved theriomorphs with canine heads inevitably evoke the Egyptian Anubis presiding over the tomb and mummification, as well as other cynocephalous Egyptian death-divinities like Wepwawet (Wp-w3-wt: "He who opens the roads") or Khenti-Amentiu ("He who Presides over the Western Ones") (Bianchi 1984). But there is no need to postulate a cultural area "Mythological Cynocephalous Beings related to Death" (Bonnet et al. 1989) including the Saharan and Egyptian evidences, because the concept of the canid as a psychopomp is a phenomenon too widely distributed to be circumscribed to the sole Saharo-Egyptian zone: it is not only attested in all the Indo-European cultures (de Gubernatis 1874: 17-41; Henkel 1973; Lurker 1983; Prieur 1988: 135) and among the American Indians (Neumann 1975; Soustelle 1940: 54), but also in sub-Saharan Africa, particularly among the Serer (Duprire 1985), Ewe, Bena Kanioka, Korongo (Abrahamsson 1951), Nuba (Nadel 1947: 268), Bantu, Azande, Dogon, Minyanka, etc (Frank 1965; Jespers 1983). Consequently, it seems likely that the much more significant association "Theriomorph-Rhinoceros" defines a specific Fezzanese area, without any direct relation with Northeastern Africa.

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Interregional Contacts in the Later Prehistory
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# Anthracological studies in the Northeastern Sahara: methodology and preliminary results from the Nabta Playa

## Introduction

This paper is concerned with the study of charcoal from prehistoric sites in the Eastern Sahara. It deals specifically with charcoal from the Early and Middle Neolithic sites in the Nabta Playa. These sites are of special interest because they provide the earliest evidence for a Saharan exploitation of plants (an African plant-food complex). The sites have also been linked to the beginnings of pastoralism in the region (Wendorf et al. 1990; 1991; 1992; Wasylikowa & Kubiak-Martens 1993 [Table 1]).

Generally speaking charcoal is one of the most common plant material recovered during archaeological excavations (Dimbleby 1978) and although its importance for radiocarbon dating has been appreciated during the last couple of decades, the realisation of its importance as regards palaeoenvironmental as well as cultural implications have lagged behind. In this paper three main aspects of archaeoanthracology are considered: the retrieval of charcoal on the site, the sampling of charcoal in the laboratory and finally the identification of charcoal with preliminary palaeoenvironmental interpretation of the taxa presence and abundance.

## The retrieval of charcoals or on site sorting

From Nabta there were two types of samples:

1. Hand-picked samples: hand-picked by the archaeologists in the field from particularly rich sediments where charcoal was visible during the excavation process. The charcoal was brought to the laboratory tent in film capsules, it needed little sorting and contained practically only charcoal.
2. Bulk samples: which have supplied most of the charcoal (and the plant remains); in this case the entire sediment of each feature was brought to the laboratory tent in labelled plastic bags.

| | No. of samples where taxon occurs |
|---|---|
| **TREES** | |
| *Ziziphus sp.* | 51 |
| **GRASSES** | |
| *Sub-family Panicoideae, tribe Paniceae* | |
| Echinochloa type | 18 |
| Digitaria type | 3 |
| Urochloa/Brachiaria type | 5 |
| Panicum type | 21 |
| Setaria type | 12 |
| *Sub-family Panicoideae, tribe Andropogoneae* | |
| *Sorghum bicolor* (L.) Moench subsp. *arundinaceum* (Desv.) de Wet et Harlan | 30 |
| **OTHER HERBS OR SHRUBLETS** | |
| *Cyperues/Fuirena* type | 5 |
| *Scirpus/Schoenoplectus* type | 5 |
| *Rumex* type | 1 |
| *Cucurbitaceae* | 23 |
| *Arnebia* type | 25 |
| **UNIDENTIFIED** | |
| *Leguminosae*, several types | frequent |
| *Cruciferae* ?, one type | frequent |
| *Chenopodiaceae* ? | 2 |
| *Malvaceae* ? | 1 |
| *Capparidaceae* ? | frequent |
| Tubers (unidentified parenchymatous tissues) | |
| Several unidentified fruits and seeds | |

Table 1. Plant taxa identified in the 1990 collection from E-75-6 (after Wendorf et al. 1991).

Sorting was carried out as follows:

a. The bulk sample was emptied into a plastic bucket, carefully and thoroughly mixed.
b. A known volume (e.g. 250 ml) was taken at a time from one bucket.
c. This volume was sieved through a standard 1 mm sieve; the remaining sediment was resieved through a 0.5 mm sieve for smaller plant macro-remains.
d. Charcoal fragments and plant macro-remains larger than 1 mm were picked out.
e. This procedure was repeated till half of the bucket was empty.
f. The remaining half was refilled into plastic bags and reburied for later processing.
g. Samples of special interest were entirely sorted.

This systematic and intensive sorting procedure has enabled us to recover all charcoal and plant macro-remains often overlooked at other prehistoric sites in the region. The remains were precisely localised and the volume of the sediment was recorded to permit qualitative as well as quantitative analyses.

### Sub-sampling of charcoals

This thorough sorting procedure left us with a large quantity of charcoal and back in the laboratory it became necessary to device a sub-sampling technique suitable for charcoal from Nabta, but which could also be applied to charcoal from other prehistoric sites in the Sahara.

The large quantity of charcoal in addition to the large number of samples recovered from each site has allowed us some experimenting with the samples. The experiments were carried out in order to determine the minimal representative size which is the smallest size category necessary for examination in order to find all taxa present in a sample, as well as the minimum representative subsample which is the minimum number of charcoal fragments to be examined per sample in order to meet all taxa present in the sample.

Accordingly, charcoal from sites E-77-7, E-91-1 and E-75-8 were sieved through a series of 5 mm to 1 mm standard sieves, each size category was separated and examined. However, after examining several samples only charcoals belonging to the size category of more than or equal to 2.5 mm were considered, since smaller fragments proved to be time-consuming and rarely reliably identifiable. The results of the experiments, briefly mentioned in this paper showed that the minimal size category was $\geq$ 2.5 mm and that 20% of each size category needed to be examined in order to meet all taxa present in the sample.

### Analysis of charcoals from Nabta

Charcoals from 3 sites were examined:

The Early Neolithic sites E-77-7 which gave a radiocarbon date of 8963 b.p.; E-91-1 of radiocarbon dates 8500-8200 b.p. for area B; 7600-7400 b.p.

for area C. The Middle Neolithic site E-75-8 gave a radiocarbon date of 6870 ± 190 b.p. (Wendorf et al. 1991).

Charcoal was handled in the conventional way, without prior treatment, the charcoal fragments were broken and examined with the aid of a binocular to reveal the transversal, tangential longitudinal and radial longitudinal surfaces. The surfaces were then directly examined under an episcopic microscope (with incident lighting). Identification of charcoals was carried out using reference works on archaeological charcoal (Neumann 1989 a) as well as manuals of wood anatomy or trees and shrubs from the region (Fahn et al. 1986; Jagiella & Kürschner 1987) and confirmed by comparison with charred modern wood from Egypt and the Sudan in the reference collection. The results of the analyses are summarised as follows (Table 2).

| TAXA | N° of samples | % of samples |
|---|---|---|
| **E-91-1 Area B** | | |
| *Acacia raddiana* | 2 | 22 |
| *Acacia ehrenbergiana* | 9 | 10 |
| *Tamarix sp* | 3 | 33 |
| **E-91-1 AREA C** | | |
| *Acacia raddiana* | 1 | 6 |
| *Acacia nilotica* | 3 | 19 |
| *Acacia ehrenbergiana* | 1 | 6 |
| *Tamarix sp.* | 7 | 43 |
| *Ziziphus spina-christi* | 2 | 13 |
| *Capparidaceae* | 1 | 6 |
| **E-75-8** | | |
| *Acacia raddiana* | 4 | 36 |
| *Acacia nilotica* | 9 | 80 |
| *Acacia ehrenbergiana* | 4 | 36 |
| *Tamarix sp.* | 8 | 10 |
| *Capparidaceae* | 2 | 18 |

Table 2.

E-77-7:
20 hand-picked samples and 4 bulks samples from which 626 fragments of charcoal were identified, some of which were in a very good state of preservation; only 1 taxon was present, namely *Tamarix sp.*
E-91-1 area B:

9 hand-picked samples were examined, more than 20% of each sample totalling to 78 fragments. Three taxa were identified: *Tamarix sp., Acacia raddiana* type and *Acacia ehrenbergiana*.

E-91-1 area C:

16 hand-picked samples, more than 20% of each sample were examined, a total of 185 fragments. Six taxa were identified: *Tamarix sp., Acacia raddiana* type, *Acacia ehrenbergiana, Accacia nilotica, Ziziphus sp.* and *Capparidacae cf. Maerua Crassifolia.*

E-75-8:

11 samples, from which a total of 522 fragments were examined. Five taxa were identified: *Tamarix sp., Acacia raddiana* type, *Acacia ehrenbergiana, Acacia nilotica* and a *Capparidaceae cf. Capparis decidua.*

**Palaeo-environmental interpretation of the taxa assemblage**

In order to interpret the presence of the taxa in the charcoals three qualitative approaches as defined by Smart & Hoffman (1989), were combined:

1. The identified taxa grew in the area.
2. The identified taxa indicate the plant communities growing in the area, consistently assume a relative stability of plant community composition through time.
3. The modern preferred habitats of the identified taxa indicate the type of former environments in the area.

**Quantitative interpretation approach**

Quantification in the form of number of fragments of charcoal has been avoided, instead, the presence of a taxon in all or most of the samples was considered as evidence that it was fairly common in the woody vegetation around the site (Godwin & Tansley 1941). However, the small amounts and/or presence in relatively small number of samples will not be used as evidence of relative abundance in the flora (Smart & Hoffman 1989). Two factors determine the unsuitability of charcoal samples for quantitative analysis: firstly, the selection by man (Western 1971; Miller 1985) which means that the amount of wood of a particular species brought to the site does not necessarily represent its relative abundance in the vegetation; secondly, burning and preservation of charcoal on the site, both of which alter the proportions of taxa in the charcoal samples (Smart & Hoffman 1989).

I will next attempt to use the presence and abundance of the taxa, for the reconstruction of the vegetation and in spite of the low number of taxa in the samples it seems plausible to try to suggest a chronology for the development of the vegetation in the Nabta playa.

During the first part of the Early Neolithic period, as interpreted from E-77-7, the remarkable presence of *Tamarix sp.* in the samples indicates an arid environment; the genus can stand drought and high salinity (Kassas 1952; Quezel

1965; Neumann 1987; 1989 a). However it also indicates the proximity of a shallow water table. A comparable situation has been described from the wells' area in the southern part of the western desert in Egypt (Bornkamm 1986) where vegetation is ground-water dependent. In addition it forms monotypic stands around wells; a similar case has been noted from the central Saharan mountains where *Tamarix articulata* grows around open water bodies in almost pure stands (Quezel 1965). This explains perhaps the absence of other taxa in the charcoal samples from this period.

During the next part of the Early Neolithic period between 8500 years and 7400 years b.p. as seen in site E-91-1 areas B and C, the situation changed considerably. The taxa combination, disregarding for a moment the presence of *Acacia nilotica* in the samples, indicates a plant formation belonging to the Acacia desert scrub (Smith 1949) or low-land savannah (Lebon 1965), the steppe of the Sahara-Sahelian zone (Le Houérou 1980) and in any case falls within the semi-desert (*Acacia tortilis - Maerua crassifolia* desert scrub) according to Harrison & Jackson (1958).

These plant formations are characterized by the presence of a variable scatter of scrub bushes up to 2 meters high interspersed with bare areas. The vegetation is described as diffuse (in contrast to desert vegetation which is contracted *sensu* Monod [1954]), very similar to that of desert wadis but evenly spread. *Acacia tortilis (=A. raddiana subsp. tortilis*) could be the only constant feature of the vegetation. There is *Acacia ehrenbergiana, Capparis decidua, Maerua crassifolia, Ziziphus spina-christi* and *Balanites aegyptiaca* on clayey soils, in addition to the perennial grass cover *of Panicum turgidum, Lasiurus, Aristida* and *Cyperus conglomeratus* and a postpluvial annual grass cover. These formations are confined to areas receiving 100-200 mm annual summer rainfall such as are met with at 15° N in the Omdurman semi-desert, Sudan (Kassas 1956).

In such an environment, non-climatic factors such as topography and edaphic factors could play an important role in controlling the amount of available water (Rognon 1980) creating specific microhabitats supplied with a volume of water out of proportion to the average rainfall received by the locality, and thus permitting the area to harbour plant species belonging to other plant formations. This would explain the presence of *Acacia nilotica* in the charcoal samples. *Acacia nilotica* grows among plants of the Acacia tall grass country (Smith 1949) in areas receiving 250-750 mm annual rainfall, in the Sahelo-Saharan, Sahelo-Sudanese and Sudanese zones, often constituting woody bells around permanent or semi-permanent fresh water surfaces (Baumer 1983) or associated with seasonally flooded basins (El Amin 1976; 1990). However, it could also be found in drier areas but confined to well-watered sites with sufficient and permanent water supply, as around or in the middle of more or less permanent ponds (Baumer 1983).

In the Nabta Playa, the depression has acted as a catchment area accumulating rainwater which combined with the artesian ground-water created an aquifer, concentrating huge volumes of water which had fallen over a large area into a permanent lake or several small ones (the oasis effect) allowing the penetration of Sahelian elements such as *Acacia nilotica*.

During the Middle Neolithic as interpreted from E-75-8, the situation has not changed much, the pertinence of the favourable conditions could be recognized in the taxa combination; the high frequency of *Acacia nilotica* in the samples indicates the abundance of the species in the vegetation around the site.

## Conclusion

Charcoal from Nabta provides evidence for the presence of an Acacia semi-desert scrub in the playa during the later part of the Early and during the Middle Neolithic periods (ca. 8500 yrs-6700 yrs b.p.). It is noteworthy to mention that this part of the world belongs nowadays to the "absolute desert" (White 1986). This reconstruction of the vegetation fits in and complements the reconstruction of the vegetation in the region during the period of 10000 - 6500 yrs b.p. (Haynes 1987; Ritchie & Haynes 1987; Neumann 1989 b, 1991) confirming the northward shift of the sparsely wooded desert savanna by four degrees (450 km). In other regions, similar migrations of more southerly vegetation types have been indicated e.g.: in the Sahel (Lézine 1989).

On the other hand, the results of charcoal analysis from Nabta show the importance of the role of non-climatic factors in creating specific microhabitats harbouring species from even more southerly plant formations.

Finally, the individuality of archaeobotanical material from each site is emphasized by the analysis of charcoals from Nabta and emphasises the necessity of intensive sampling of each site as well as the extensive study of material from several sites.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

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# Farafra Oasis between the Sahara and the Nile

In these last years research was continued at Farafra Oasis by the archaeological Mission of the University of Rome "La Sapienza", which has been running regular field-campaigns since 1987. The first research cycle, in the 1987-1991 period, was aimed towards a general geo-archaeological assessment of the region. Currently more in-depth studies are being done.

The Mission combines a territorial survey in a range of about 100 km with traditional excavation. The first type of research was necessary for an adequate understanding of territorial exploitation and of settlement patterns achieved by prehistoric groups. For the same reason a strong emphasis was put on the paleoenvironmental and paleoclimatic reconstruction, giving evidence of a humid and arid phase alternation inside the depression, which affected both the concentration and dispersion of human groups. These objectives have already been illustrated in previous publications (Barich & Hassan 1987; 1990; Barich 1991).

From a general point of view, our research is oriented towards reconstructing the type of economic process that was undertaken locally, and how food production (proto-agriculture) could eventually replace the Late Palaeolithic hunting-gathering practices. Regarding this aspects Farafra does not seem to be much different from other Western Desert centres. The most recent research indicates a diffuse sedentary process inside the Oases, with a following migration flow towards the Nile valley, in the arid phase of the Late Holocene (Barich et al. 1992; McDonald 1991a). Currently the Mission's research is focusing on specific areas of the Farafra depression to define the region's role in the pastoral movements which largely spread through the Sahara in the Middle/Late Holocene, and whose direction was mostly the Nile Valley.

As previously mentioned, the Mission is operating in a geo-archaeological perspective which calls for a strong emphasis on climatic and paleoenvironmental reconstruction. One suggestion by F. Hassan (Barich & Hassan 1987), is based

| Laboratory and sample number | Site | Material & amount (gr. ) | Conventional Ages $T_{1/2}$ 5568±30 | $T_{1/2}$ 5730±40 | Calibrated (95% confidence) |
|---|---|---|---|---|---|
| R-2006 | RJH | ostrich-shell (16.4) | 5580 ± 110 B.P. | 5530 ± 110 | 4430-3890 B.C. |
| R-1895 | FA IV | ostrich-shell (39.5) | 6670 ± 95 B.P. | 6860 ± 100 | 5885-5285 B.C. |
| R-1901 | BAH 5d | ostrich-shell (48) | 6730 ± 60 B.P. | 6930 ± 60 | 5925-5335 B.C. |
| R-1894 | FA II | ostrich-shell (45.7) | 6950 ± 60 B.P. | 7150 ± 60 | 6195-5435 B.C. |
| R-1909 | AD XIIIb | ostrich-shell (14.3) | 7000 ± 410 B.P. | 7210 ± 420 | 6525-5330 B.C. |
| R-1902 | BAH 2c1 | charcoal (16) | 8080 ± 60 B.P. | 8310 ± 70 | 7200-6700 B.C. |
| R-1983 | AR exc | charcoal (8.2) | 9650 ± 190 B.P. | 9930 ± 200 | 9050-8250 B.C. |

Table 1. Farafra Oasis (Western Desert, Egypt).
Radiocarbon dates from different areas of the depression (after Alessio et al. 1992).

on the general framework offered by Western Desert oases and was confirmed by radiocarbon dates from various areas of the depression (Table 1)[1].

The most recent research has provided opportunities for defining such a sequence more thoroughly. The sedimentological analyses of the playas (Mahmoud 1990) indicate abundant rainfall conditions during the Early and Middle Holocene. During these humid phases, which followed each other at intervals of 100-200 years, water reserves formed in various places of the depression developing small lacustrine basins ("minioases") which represented a real mirage for ancient human groups and fauna. Today, we find the fossil vestiges (yardangs) incorporating remains of the ancient settlements of such basins. Working on such an ample range within the depression brought about the detection of various inhabitation nuclei: Qasr Farafra, Ain e-Raml, Abu Kasseb, Rajih, Ain Dalla. Since 1988 a systematic investigation of the Bahr Playa basin/depression along the road leading to Ain Dalla has been underway, which has revealed the great importance of this inhabitation nucleus. It is here, where our most current investigations are being concentrated (Fig. 1).

Bahr Playa is a dry valley located in the northern section of El Quss Abu Said, a rectangular mesa bounded by a steep escarpment cut into the Farafra limestone. It represents the highest flat-topped surface in the region. The area,

[1] Carried out by Prof. G. Belluomini of the CNR and the Department of Earth Sciences of the University of Rome "La Sapienza" (see Alessio et al. 1992).

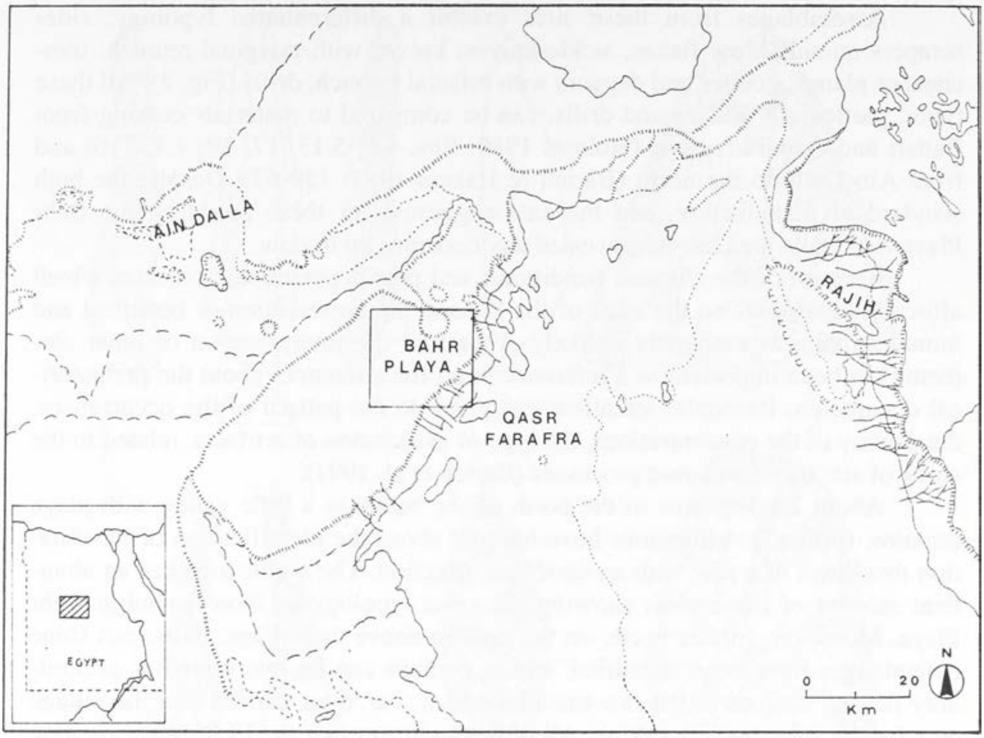


Fig. 1. Location of El Bahr basin within the Farafra.

which extends about 1 km over one of the plateau pediments, represents an ideal sample for carrying out a territorial-type investigation, evaluating the interconnections, both in horizontal and vertical dimensions, among the assemblages: true archaeological layers brought to light by the post-depositional processes of the playas. A general reconnaissance of the basin allowed for defining five occupation areas indicated by various concentrations of tools, interpreted as workshop areas, fireplaces, possible foundations of dwellings, stone artifact "assemblages". The beginning of the inhabitation sequence can surely be dated to the Early Holocene, chronologically indicated by the date in the ninth millennium (8080±60: R-1902). The remains belonging to this phase are included in the lower layer of the playa in direct contact with the bedrock (e.g. workshop 2A; concentration 5E). Site 2A yielded over one thousand debitage products showing a definite Epi-Palaeolithic blade and bladelet technology. The C 14 dating from charcoals collected in situ, currently underway, could confirm this attribution.

The most intense occupation phase at Bahr Playa can be placed in the Mid-Holocene (date 6730±60: R-1901) and has been documented by the majority of the concentrations picked up until now (sites: 2B, 2G, 3A, 4C, 5E).

Assemblages from these sites exhibit a differentiated typology: side-scrapers on side-blow flakes; sickle-knives; knives with marginal retouch; tranchets or planes; gouges and daggers with bifacial retouch, drills (Fig. 2). All these types, particularly planes and drills, can be compared to materials coming from Badari and Qattara regions (Holmes 1989: figs. 4.9; 5.13, 17, 19; 7.13, 16) and from Ain Dalla to the north (Barich & Hassan 1987: 159-67). Despite the high standard of manufacture, and the date suggested for these products, the Bahr Playa/Ain Dalla area has not revealed any ceramics up to now.

Because of the climatic conditions, and post-depositional processes which affected these areas on the edge of the Sahara, the preservation of botanical and faunal remains is extremely unlikely. Therefore the interpretation of other elements has been important as a reference point for inferences about the prehistorical occupation. Particular attention was given to the pattern of the occurrences, the density of the concentrations, the type of association of artifacts, related to the study of site transformation processes (Barich et al. 1991).

About 2 kilometres to the north of the basin, in a little valley with playa remains, further investigations have brought about the identification of inhabitation dwellings in a row with an east/west direction. The whole area has an abundant amount of lithic tools showing the same typology as those found at Bahr Playa. Moreover, further north, on the plateau above the village, numerous stone assemblages have been identified, which perhaps can be interpreted as preliminary flaking stations of the raw-material which was, then, carried into the village area for the subsequent working. All of this indicates that the El Bahr region took on progressive importance as a "strategic" occupation nucleus in the interior of the Farafra depression. However, such phenomenon is to be evaluated in a more general perspective, in the framework of the transformation of occupational model of the entire region.

The various patterning of remains thereof inside the depression, interpreted on the archaeological ground - that is, in terms of behaviour - shows a modification of human tendencies, with a progressive trend towards sedentarization. A progressive process of settlement stabilization can be reconstructed, with a major, prolonged stability on the territory which allowed for the transformation of the economic model from procurement strategies (hunting integrated by early domestication experiences) to proto-agricultural forms, in the areas favoured by the presence of spontaneous wild plants.

In defining the regional framework it is fundamental to recognize the transformation undergone by the precipitation regime which conditioned the peopling of the area. About 10,000 years ago there was a humid phase, of irregular and violent rains, whose duration can be estimated to about 8,600 years B.P. During this phase the human groups moved along a rather extended circuit, reaching the various oases of the Western Desert without excluding excursions towards the Saharan plains. Such movements, in search of wildlife and pastures for the first herds were determined, in fact, by the extreme variability of the pre-

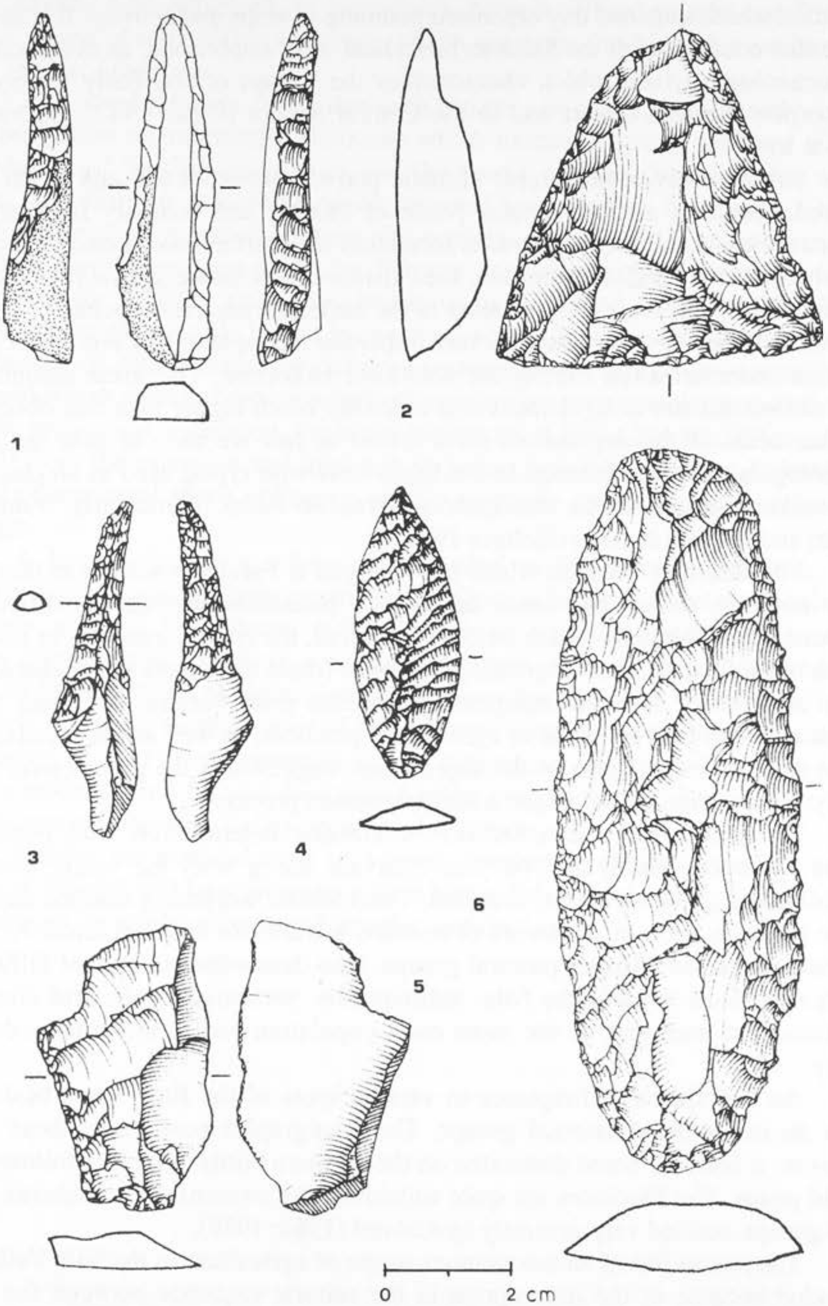


Fig. 2. Farafra Oasis. Stone artifacts from El Bahr basin.
1, 3: drills; 2: tranchet-axe; 4: arrow-head; 5: side-scraper; 6: plane.

cipitation which impeded any organised planning of stops and activity. It is in this phase that contacts with the Saharan hinterland were established, as evidenced in the technological base which characterizes the groups of the Early Holocene, both in the Western Desert and in the Central Sahara (Close 1987; McDonald 1991 a, b).

Subsequently, a favourable climatic period between 8,600 and 7,000 B.P. occured, featuring a more regular phase of rainfall and certainly favouring a major settlement stability with nuclei formation with differentiated characters. On the whole, in the Farafra depression, the existence of at least eight subregions can be suggested ("minioases") in relation to the easier accumulation points of drainage water. Bahr Playa represents a very important example of this process of progressive sedentarization during the Mid-Late Holocene. The great amount of tools collected there is significative, in a density much higher than that observed in other areas of the depression. As a matter of fact we have to note the high technological standard reached in the lithic tools with types, used as sickles and for working wood, which anticipate predynastic items, particularly from the Badari and Nagada regions (Holmes 1989).

The resulting situation which has emerged at Farafra is similar to those of other northern oases. The stone technology resembles the one identified by McDonald for Dakhleh - facies Bashendi. Overall, the typical tranchets or planes, blades or knife-saws, and all grinding materials found there have many characteristics in common with the equipment recovered from Farafra. All these tools which act as an indirect proof of agricultural practices, as well as the localization of the sites in central spots of the depressions, suggest that the groups were sedentary at that point, or had begun a sedentarization process.

Between 7,000 and 6,000 B.P. a climatic deterioration with peaks of aridity at approximately 50/100 year intervals, along with the yearly average rainfall being generally lower, occurred. This climatic worsening resulted directly in the intensification of a network of contacts towards the external areas. At first the oases attracted Saharan pastoral groups, who determined the initial diffusion of their products towards the Nile. Subsequently, pressured by the arid climatic conditions, at least part of the same oasis population had to move towards the valley.

An abundance of fireplaces in various spots of the Bahr Playa basin reveals an intrusion of external groups. The stratigraphic position of these fireplaces is, at least for some dislocated on the northern border, one that follows the humid phase. The fireplaces are quite suitable to the customs of the Saharan pastoral groups, studied very precisely by Gabriel (1984; 1989).

The possibility of an autonomous origin of agriculture in the Nile Valley is excluded because of the interruption in the cultural sequence between the Pre-Neolithic settlements (which date previously to 7,100 B.P.) and the Neolithic ones. The latter appear suddenly in the Fayum immediately after 6,500 B.P., while the period between 6,500 and 5,000 bears witness to flourishing neolithic sites, already well organised, as Hemamieh, Nagada, Hierakonpolis and Badari. Hence, a gap of over 500 years exists, which separates Pre-Neolithic settlements from the Neolithic ones.

It is noted (Hassan 1988) that such a time gap corresponds exactly to the arid oscillation of the middle Holocene which exerted a strong pressure on the equilibrium of the Saharan groups and the oases, pushing them towards water zones. Therefore, it is understandably deemed important to have access to as much information as possible about the western region. And it is important to note that the aknowledgment of the Saharan contributions to the neolithization process of the Valley, which had begun to be discussed in the 1970's (Hays 1975), was made possible by the increase of work in the Western Desert, by the comparison of data gathered by different research teams and by the construction of a grid which arranged the principal information on the chronology, the climate and the prehistoric vegetation. From the sequences of Siwa, Baharia, Kharga, but overall from the extensive and thorough sequence brought to light at Dakhleh, a model of territorial space utilization analogous to the one recognized at Farafra emerges.

A large reliance on wild plants, parallel to the pastoral activities, has recently been brought to light regarding the Central Saharan peoples (Schultz & Adamou in press; Wasylikowa 1993). Moreover, according to the most recent results (Wasylikowa in press), a similar economic status is also attributable to Early Holocene groups at Nabta since the ninth millennium B.P.[2] Therefore, from the Early Holocene there is proof of an economic pattern associating gathering to processing of wild plants generally spread throughout the Central Saharan belt. Such a model should be well established when groups started moving more frequently towards the Nile Valley urged by dessication.

Besides the establishment of a more detailed chronology our future research at Farafra will be concerned with a better definition of the economic pattern through the study of botanical samples and the fauna.

[2] These results do not confirm the presence of barley and wheat previously recognised (see Close 1992: 165-166).

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Rudolph Kuper

# Between the Oases and the Nile - Djara: Rohlfs' Cave in the Western Desert

That part of Egypt west of the Nile Valley traditionally referred to as the "Libyan Desert", can be divided into two main regions: The "Libyan Desert" *sensu strictu,* which covers most of the Eastern Sahara and stretches from the Cyrenaica in the north down to Wadi Howar in Sudan, and the so called "Libyan Plateau" or "Limestone Plateau" between the Egyptian oases and the Nile, which on most maps also is called "Western Desert". In spite of the fact that this vast area lies relatively close to the Nile Valley it has until now not attracted the same attention from scientific expeditions. From the early days of Bagnold, Clayton, Almasy and Frobenius up to Wendorf and our own B. O. S. project such remote areas like the Gilf Kebir or the Great Sand Sea have been preferred. 120 years ago, however, it was part of the exploration work of the first (and for another hundred years the only) interdisciplinary expedition carried out in this part of Egypt. The expedition was headed by Gerhard Rohlfs, who provided a general description of the results in his famous book "Drei Monate in der libyschen Wüste" (Rohlfs 1875).

The main objective of this unique enterprise and the reason it was financially supported by the Khedive Ismail of Egypt, was to reach Kufra in Libya and particularly to find a solution to the so called "Bahr-bela-ma problem", the idea of a supposed former Nile bed in the Western Desert. It was hoped that there land could be reclaimed which even at that time was seen as a possible solution for the over-population of the Nile Valley. With regard to the chronological relationship between the two river beds, during a session of the "Institut égyptien" directed by Mariette Bey, the members of the expedition were also asked to pay special attention to "des instruments de silex fabriqués de main d'homme" as indications of a formerly moister climate (Mariette Bey 1873: 174).

The extensive logistic preparations for the journey included 500 iron water cases made in Germany and transported to Egypt. The expedition left Assiut on December 18th, 1873 with one hundred camels and reached Farafra 12 days later. In the account of this route Rohlfs mentions that on Christmas Evening, 1873 they set up camp near a place called "Djara", which he describes as a spacious dripstone cave with beautiful stalactites. No further details are given and later generations might not have taken this report seriously since for almost 120 years (in contrast to the other results of the expedition) the cave seems to have fallen again into oblivion.

Rohlfs' team was comprised of 10 members from Germany, whose names can be found on a column of the Roman temple of Deir el Hagar in Dakhla oasis: 1. Gerhard Rohlfs, who was a doctor, 2. Georg Zittel, Professor of Geology, 3. Wilhelm Jordan, a geographer, 4. Paul Ascherson, a botanist, 5. Philipp Remele, a photographer, to whom we owe the earliest pictures of the Western Desert, - and each had a German servant.

Following a short stay in Farafra, the expedition moved to El Kasr in Dakhla oasis, where the inhabitants offered them a spacious house to serve as the base for their further march to the West. Indeed the original plan to reach Kufra had to be abandoned. The expedition advanced 150 km into the Great Sand Sea but the giant dunes became larger the further west they went and finally impassable for the heavy loaded camels. Plans had to be changed and the expedition followed a route parallel to the longitudinal dunes northward to Siwa, which was reached two weeks later. From there they returned to Dakhla and then via Kharga to Cairo. At the place where Rohlfs was forced to change the goal of the expedition the group experienced two days of continuous rainfall, from February 2 - 4, 1874. In a cairn erected at their camp they left a message naming the site "Regenfeld" (rainfield), a name still indicated on today's maps.

Although they failed to reach Kufra, the scientific results of the expedition were of great importance for all represented disciplines. The first geological map of Egypt, published by Zittel, was for nearly a hundred years the basis of the geology of Egypt (Zittel 1880); the first botanical descriptions of the area were published (Ascherson 1874); a large number of climatological observations and measurements were documented; and a photogrammetric view of El Kasr taken by Jordan and Réméle was one of the earliest applications of this method (Jordan 1876).

Only archaeology seems to have played a minor role. It was not until 1989 that Dr. Carlo Bergmann, who treks hundreds of kilometres through the desert each winter with his camels, re-discovered the dripstone cave marked by Rohlfs on his route to Farafra. He not only fully confirmed Rohlfs´ description, but also made reports of rock art in the cave and rich prehistoric remains in its immediate surroundings. In fact, this could already be inferred from Rohlfs' map, where we find the word "Feuersteinsplitter" (stone splinters) close to the name "Djara".

As a consequence of Carlo Bergmann's publications the archaeological context of this location was threatened to be soon endangered by tourists attracted to the site. In order to see what could be done to salvage this unique natural and cultural resource a small group of geographers and archaeologists from Berlin, Cologne and Cairo visited the site together with Carlo Bergmann in November

1990. Approaching the site from the north we found the broad camel route that Rohlfs used when he started out from the Nile Valley and followed it westward to the cave, whose entrance lies in the centre of a featureless, flat depression. Sliding down into the narrow opening on a flat sand slope we encountered after a few metres a great stalagmite densely covered with rock engravings, which partly overlap and are executed in different techniques (Fig. 1). They depict mainly animals like ostriches, Addax antelope and other bovids, some of which obviously represent goats (Fig. 2).

From here one slides another ten metres down into a great hall that extends over approximately 50 metres. Impressive stalactites hang from the roof while the floor is covered with plain sand. The depth of this sand layer is clearly the most important question, since it can be assumed that a cavern of this type could have served for thousands of years as a sediment trap for microfossils as well as for human debris. There was clear evidence of water that had quite recently been standing on the sand, which would have made this site even more attractive to prehistoric settlers, whose traces indeed can be found in the cave's immediate surroundings.

There the surface is scattered with thousands of lithic artefacts, mainly concentrated in an area of 300 to 100 metres immediately north of the entrance. The site seems to be widely deflated. There are no visible stone structures, but a number of "Steinplätze" (hearths) and larger areas indicating intensive working of flint. The material used was tabular flint as well as flint nodules that can be found close to the site. As documented by many primary forms and several cores, a fine blade technology was in use. Contrary to this no geometric microliths and only a few backed elements have been detected. Judging from a rough estimate the tool kit is dominated by large, bifacial pieces made by a fine pressure flaking technique, that produced parallel ripples, and an additional sharpening of the edges (Fig. 4: 4. 5). The spectrum also comprises elongated forms with nearly parallel edges as well as pieces whose shape suggests the term „knife". These seem to be made of tabular flint and some of them are only partially retouched. Another group consists of smaller bifacial pieces of oval shape, while also side blow flakes occur (Fig. 3: 12) and side- and round scrapers are well represented (Fig. 3: 11; 4: 2). Common items at the site are planes or tranchets, made from thick flakes, the ventral side always without retouch (Fig. 4: 3). The smaller artefacts include carefully worked arrowheads of different sizes and shapes (Fig. 3: 1-9), most of which are worked bifacially. They comprise leaf-shaped points, sometimes with serrated edges, and stemmed pieces of different type, but no hollow based forms could be observed. Perforators seem to be well represented by the *meche de foret* type (Fig. 3: 10).

In comparison with other sites, for example in the Great Sand Sea, grinding material is relatively scarce. Complete milling stones are missing - they may have been taken and reused by caravans which passed by - while some handstones represent the circular type known from the oases and Sand Sea sites.

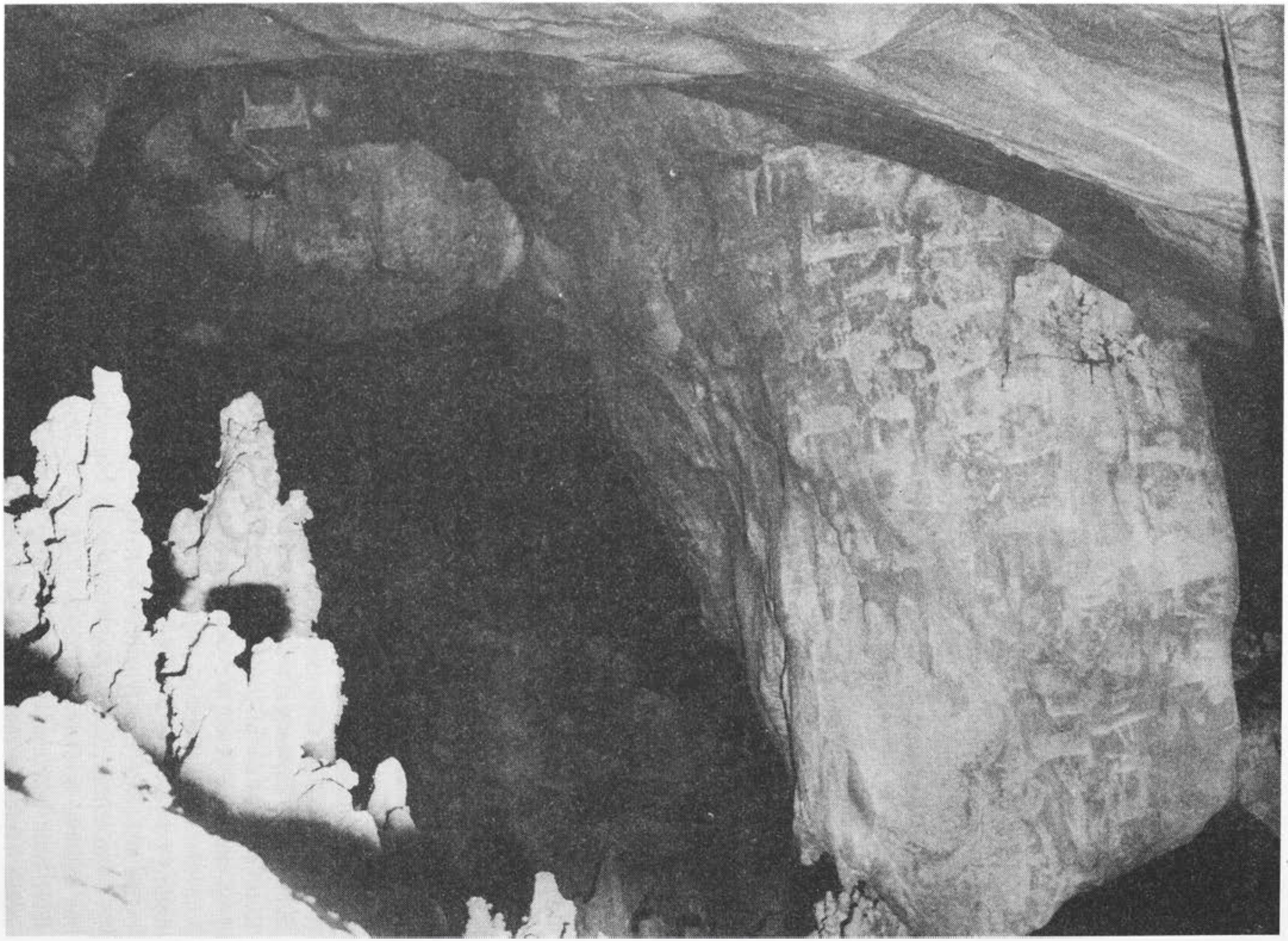

Fig. 1. Djara cave. Stalagmite with rock engravings near the entrance.


Fig. 2. Djara cave. Section of the rock engravings.

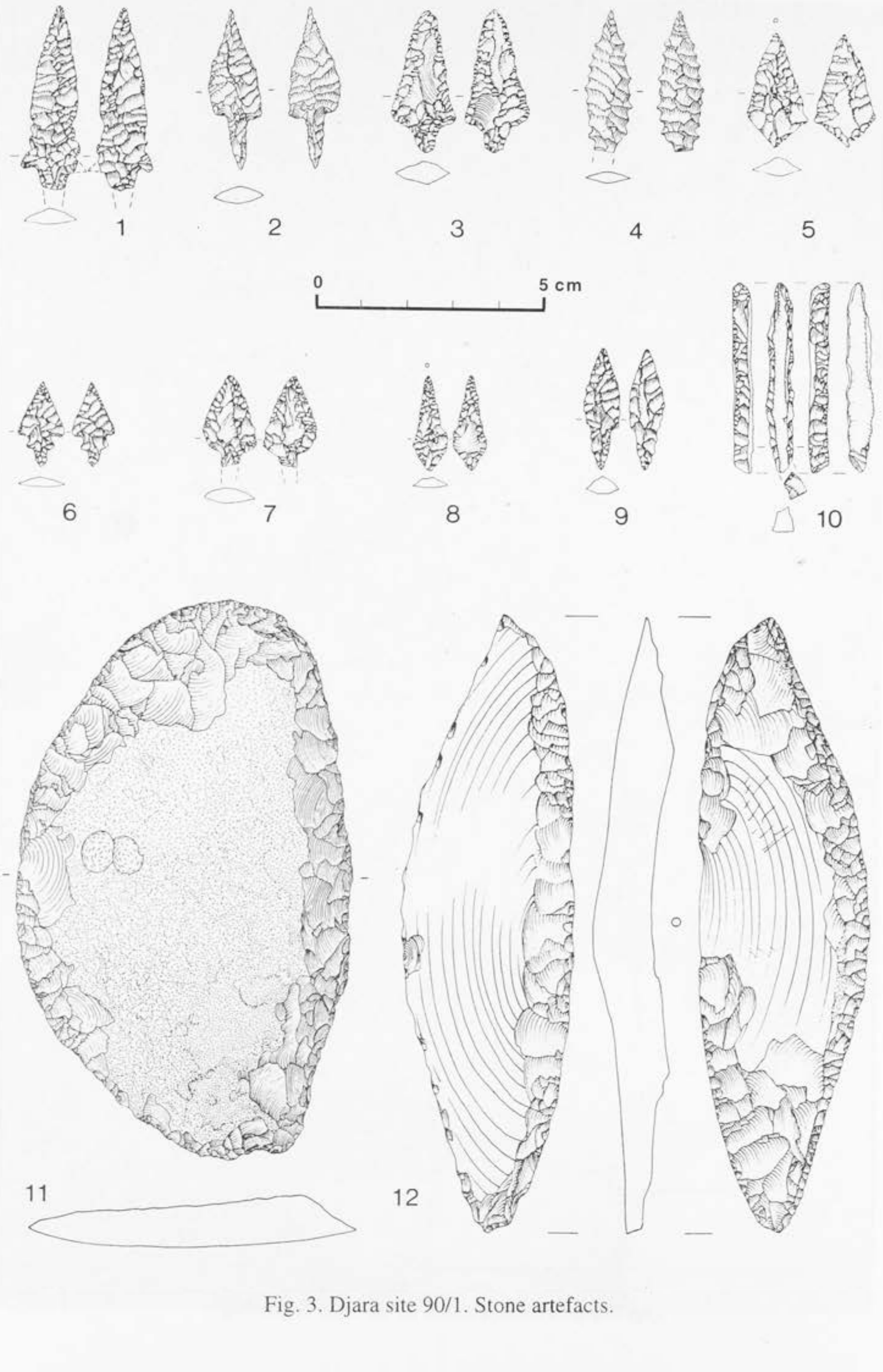


Fig. 3. Djara site 90/1. Stone artefacts.

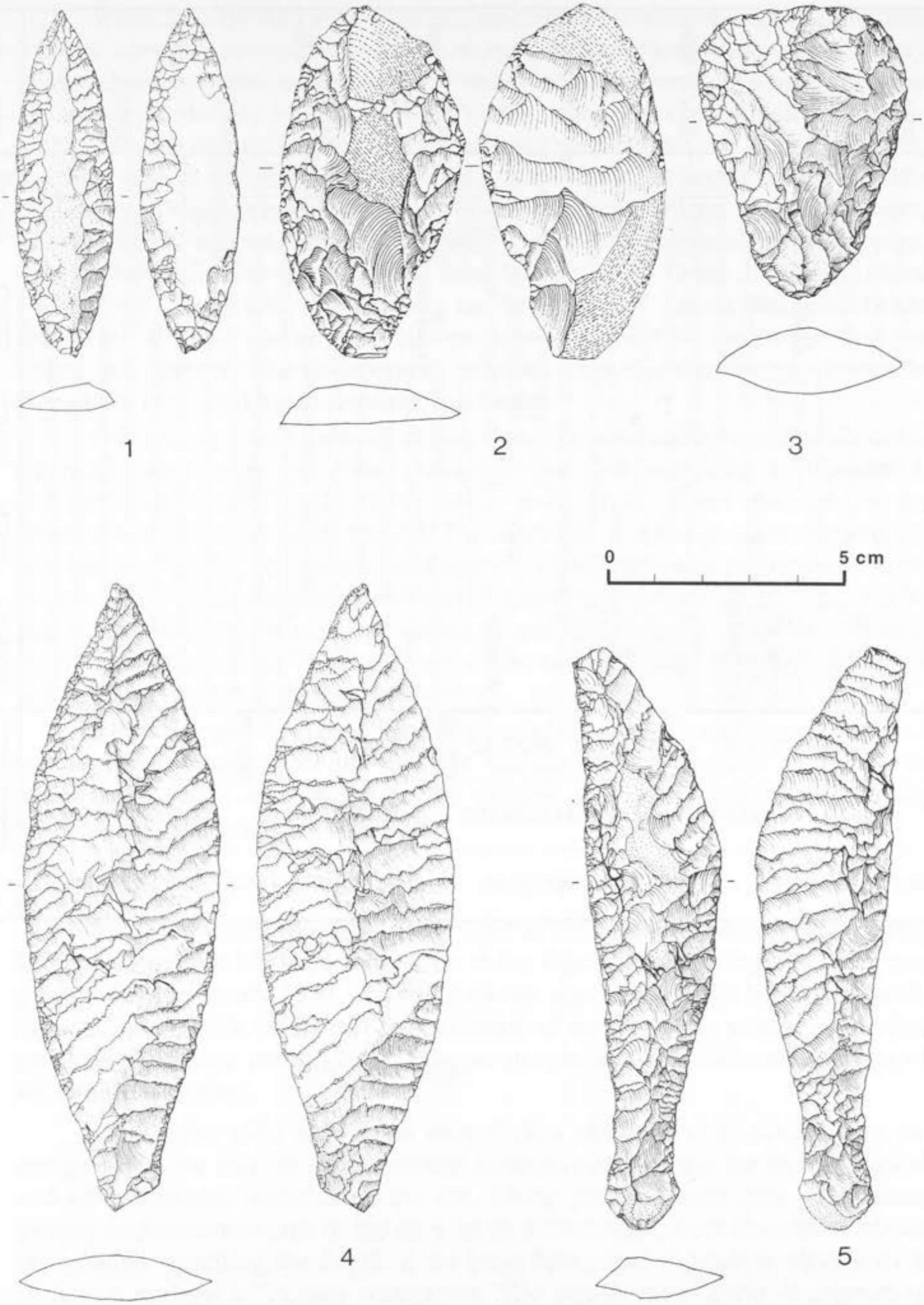


Fig 4. Djara site 90/1. Stone artefacts.

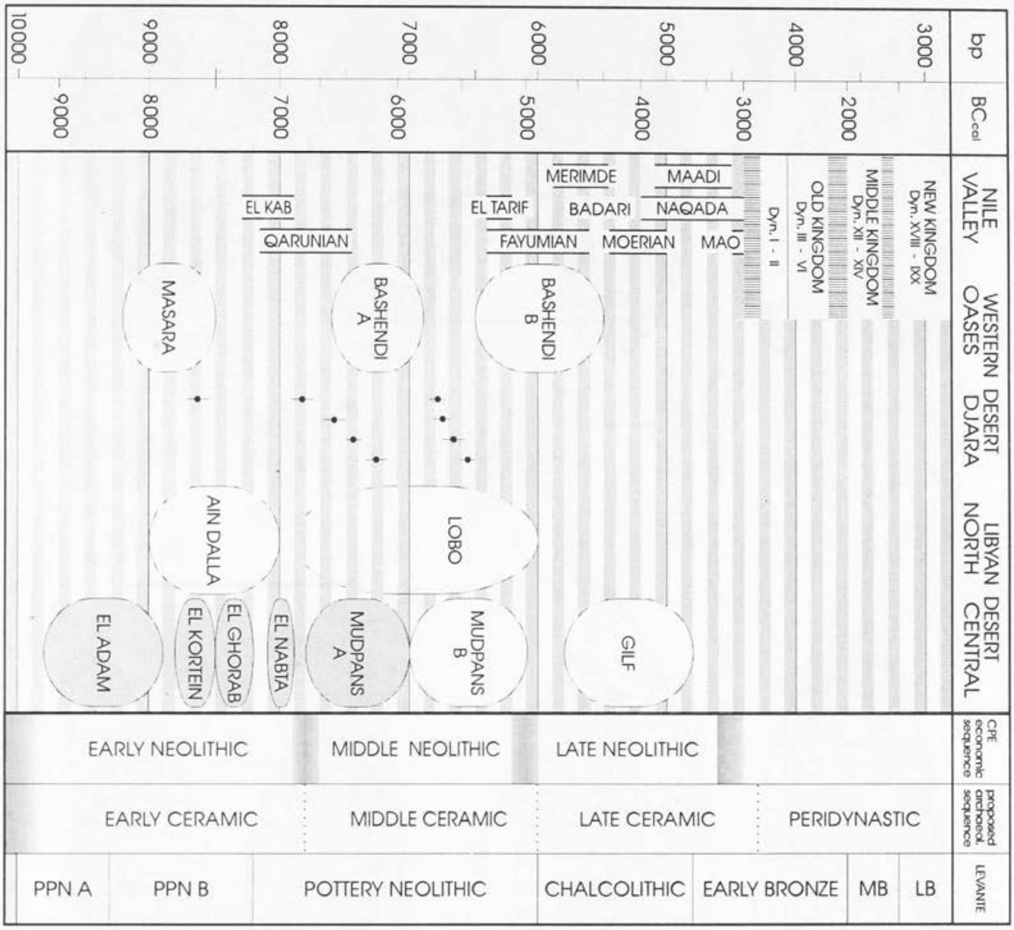


Fig. 5. Radiocarbon dates from Djara site 90/1-1 and 90/1-2 within the Holocene cultural sequence of Western Egypt (for details see: Kuper 1995).

When looking for parallels to this assemblage it must be kept in mind that it might comprise several occupations, despite the fact that at first glance it may give a relatively uniform impression. With regard to the carefully worked bifacial pieces one needs only look to the Nile Valley, where for example the main sites of the Badarian culture lie only 200 km east of Djara. Within our B. O. S. project, the Sitra area as well as the eastern Great Sand Sea have produced comparable inventories. The Sitra material consists of large, bifacial foliates as well as tanged and leaf-shaped arrowheads (Cziesla 1989: Fig. 1). Geographically and typologically closer is the site of Lobo, near Abu Minqar in the Great Sand Sea (Klees 1989: Fig. 1, 2, 4). Here not only are the large foliates, knives and arrowheads found, but also the planes are well-represented. It must be mentioned that the scarce, but characteristic undecorated ceramics from this site strongly resemble the pottery from the Fayum Neolithic settlements.

Other comparable material comes from the surroundings of Dakhla oasis where recently two closely related artefact groups have been defined: Beshendi A and Beshendi B (McDonald 1991). Many traits of the Djara material can be detected within the Beshendi context. The Beshendi A material, dated between 7, 600 and 6, 900 bp, of foliates, leaf-shaped arrowheads and perforators corresponds to the Djara material as does the material of Beshendi B (6, 500 -5, 500 bp), particularly the planes, the tanged arrowheads and the side blow flakes. Recent research near the Farafra oasis has also revealed some corresponding artefact material (Barich and Hassan 1990).

With this specific composition of its artefact spectrum and its geographical position between the oases and the Nile, the site of Djara appears to be able to make an essential contribution to the cultural and chronological relationship between the Sahara and the Nile Valley.

## Addendum

Since the above report was presented at the 1992 Dymaczewo conference additional research has been carried out at the Djara site including two small test excavations in January 1993. In 1996 a survey was made of the larger surroundings of Djara which confirmed the existence of several other similar sites, thus promising to future investigators a deeper insight into the settlement pattern of the period concerned.

During the 1993 expedition only 6 days of work were available to us, during which we tried to clarify several questions concerning the archaeological and environmental potential of the site. Using ground penetrating radar some geophysical measurements of the cave bottom were carried out in order to obtain information regarding the depth of the sand filling and a possible stratification including remains of human occupation. The signals were quite disappointing since they indicated a homogeneous structure of the entire sediment. This was verified by the results of drilling six bore holes of up to six metres in depth using a simple auger which only showed sterile sand. Therefore little hope exists of finding archaeological remains in the lower regions of the cave.

Efforts have been made to clear the base of the stalagmite near the entrance of the sand which covers some of the engravings - unfortunately due to continually falling sand with little success. Some new pictures were revealed, like the well designed figure of a goat (Fig. 1, lower right side), but the copy made of the main panel had to be left uncompleted at the bottom.

Outside the cave the surface scatter of artefacts has been surveyed and the more significant pieces were marked and mapped by means of an electronic tachymeter and then collected in order to protect them from possible looting by subsequent visitors. Two test excavations have been carried out - one immediately south of the cave entrance and the other some hundred metres further south within an artefact concentration characterized by bladelet technology. The latter (site 90/1-2) provided some radiocarbon dates around 7,500 bp (6,400 BC), while the oldest feature of the place, a hearth ("Steinplatz") which lies close by, dated about 8,600 bp (7,600 BC) (Fig. 5). The sondage carried out near the cave (site 90/1-1), despite measuring only 2x6 metres, uncovered two fire places lying close together and extending about 20 centimetres below the surface. Both of the fire places contained several flint artefacts, including four bifacial retouched pieces: three arrowheads (Fig. 3: 3, 6, 8) and one side scraper (Fig. 4: 2). Associated charcoal samples date this assemblage between 6,500 and 6,800 bp (about 5600 BC), i.e. some hundred years earlier than the first appearance of the bifacial technology at the sites of Fayum and Merimde. [1]

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

Mary M. A. McDonald

# Relations between Dakhleh Oasis and the Nile Valley in the Mid-Holocene: a discussion

A number of shared traits, notably several artifact types and technological features, point to contact with Nile Valley Neolithic and Predynastic sites by mid-Holocene groups in Dakhleh Oasis, which lies 250 km to the west of the river, in the Egyptian Western Desert. This paper will list the major traits shared by the two areas, and examine the mid-Holocene "Bashendi" sequence within which these traits appear in Dakhleh. Two points are stressed concerning the evidence for contact. One of them is the wide geographical range, from Khartoum to the Delta, of the Nile Valley sites in question. The other is that the shared traits appear in some cases millennia earlier in Dakhleh Oasis than they do within the Nile Valley. It is suggested that the onset of a drying trend at the end of the seventh millennium, detectable in the palaeoenvironmental and archaeological record, may have played a role in the transmission of these traits to the Nile Valley about 6000 bp.

Mid-Holocene Dakhleh, together with other Western Desert localities, shares with Nile Valley sites such general Neolithic traits as the use of pottery and grindstones, as well as domesticated cattle and small stock (McDonald 1991a). As for that other Neolithic trait, a settled life, Dakhleh witnessed episodes of sedentization as early as the ninth millennium (McDonald 1991b), as did Nabta Playa to the south (Wendorf et al. 1984: 422). Concerning artifacts, in both areas, the Nile Valley and the Western Desert, chipped stone industries are macrolithic and predominantly flake-based, although tabular raw material also is used, and the bifacial technique is employed to produce a variety of tools. Tool types and classes shared by the two areas include concave- or hollow-based arrowheads, bifacially-worked knives, planes or tranchets, scrapers made on side-blow flakes, and a variety of notches, denticulates and retouched pieces. Other categories of shared artifacts include polished stone axes or celts (cf. Eiwanger 1988: taf. 58, 59; Petrie 1920: pl. XXVII; Shiner 1968: fig. 46t), beads made of amazonite or green microcline, also reported for Fayum A, the Post-Shamarkian in Nubia, and the Khartoum Neolithic (Arkell & Ucko 1965; Schild et al. 1968), stone lip-plugs (cf. Arkell 1953), and shell bracelets and shell pendants (cf. Petrie 1920: pl. XXXI; Baumgartel 1960: 77). In addition, Dakhleh has produced clusters of stone circles which may be akin to the flimsy structures found at Merimde in the Delta and on Predynastic sites in Upper Egypt (Hassan 1988).

Two points might be stressed concerning these parallels between Dakhleh and Nile Valley sites. One concerns the broad geographical range of the Nile Valley sites in question. There are, as might be expected, a number of parallels with Neolithic and Predynastic sites in Upper Egypt at roughly the same latitude as Dakhleh, as well as with others to the north, in the Delta and the Fayum. In addition, though, there are a surprising number of parallels with sites in Nubia, and even in the Khartoum area, some 1200 km south of Dakhleh. In the latter case, shared traits include axes, bracelets, shell pendants, stone labrets, and beads of amazonite and agate. The chipped stone industries, while generally different, share planes (Arkell [1953: 28] calls them "combined end- and side-scrapers"), crescents, and an emphasis on the use of quartz (McDonald 1992).

The second point is that these shared traits appear for the most part somewhat earlier in Dakhleh Oasis than they do along the Nile. Predynastic dates from Upper Egypt all fall within the sixth millennium bp or later, the earliest being c. 5800 bp (Hassan 1985). In the Khartoum area, Esh Shaheinab, the Neolithic type site, has yielded a series of sixth millennium dates starting c. 5700 bp, while the earliest Neolithic date from the area so far, c. 6000 bp, comes from Rabak, to the south of Khartoum (Haaland 1987). Only the Fayum Oasis, to the west of the Nile below the Delta, has yielded earlier Neolithic dates of around 6500 bp (Kozlowski & Ginter 1989; Wenke et al. 1988).

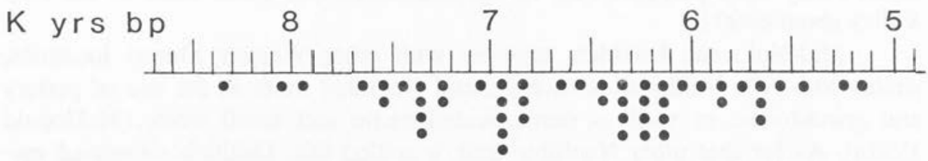


Fig. 1. Distribution by century of 50 radiocarbon dates for the Bashendi cultural unit in Dakhleh Oasis. Dates are uncalibrated but those on eggshell are adjusted for isotopic fractionation.

In Dakhleh Oasis, on the other hand, some of these shared traits can be dated at least a millennium earlier than even the early dates from the Fayum. In Dakhleh, the traits occur on sites of the mid-Holocene "Bashendi" cultural unit, which spans over two millennia starting before 7500 bp (Fig. 1). The Bashendi is divisible into two phases on the basis of site location, subsistence, age, and the traits shared with the Nile Valley.

Bashendi phase A sites (Fig. 2) yield hollow-based arrowheads and a variety of other points, large and small, including tanged, winged, side-notched and bipointed varieties. Also found are larger bifacial items including knives, lip-plugs and similar items carved in barite, and drills used in the manufacture of ostrich eggshell beads. Most phase A sites in Southeastern Dakhleh consist of extensive scatters of hearths and artifacts eroding out of basin floor silts. As for dating, 17 radiocarbon dates fall mostly between 7600 the 6900 bp, and average about 7250 bp. Sites of another sort, groups of stone circles, probable structures, are located on a low ridge to the east of the basin floor sites. The largest of these sites, consisting of at least 200 structures, has yielded a series of dates placing it at the very end of the Bashendi A range, c. 6900 bp. Faunal material from Bashendi A sites, including gazelle, hartebeest, hare, fox, and three sizes of bird, is so far all wild.

Bashendi phase B sites (Fig. 2) yield some arrowheads, but no hollow-based points were recovered, and points in general are much less varied in size and shape than those of phase A. The phase B assemblage includes planes or tranchets, side-blow flakes, often in exotic raw material, crescents, polished axes, amazonite beads, small palettes in ironstone or limestone, and groundstone toggles. Pierced shell pendants, bracelets of conch shell, and worked quartz pebbles and crystals, are found as well. Faunal remains from phase B sites show a heavy reliance on herded cattle and goats. Most phase B sites in Southeastern Dakhleh consist of hearth mounds on the basin edges above the level of the playa silts. Two dozen radiocarbon dates (Fig. 1) indicate that phase B sites are younger than those of phase A, and suggest a span for them of over a millennium starting about 6500 bp. Over half of the dates fall before 6000 bp.

The disparity seen here in the dates between the two regions in question, Dakhleh and Nile Valley, with Dakhleh apparently having priority, suggests that the Western Desert may have been the source, certainly the immediate source, of many of these artifact types, and perhaps also of some of the new subsistence practices and dwelling types. Although at least some of these traits would, as we have seen, already have had a long history in the oasis, it was only around 6000 bp or so, if the dates from Upper Egypt and points south are taken at face value, that they penetrated the Nile Valley.

A partial explanation for this delayed acceptance might lie in an environmental change occurring in the Eastern Sahara at this time (Hassan 1986a). Both palaeoenvironmental and archaeological evidence point to the start of a drying trend, or perhaps an episode of desertification, which interrupted the relatively moist mid-Holocene at the end of the seventh millennium. Thus Bahariya Oasis, 300 km north of Dakhleh, Nabta Playa in Southern Egypt, Selima Oasis in the northern Sudan, and the Oyo Depression to the southwest of Selima, all show signs of deflated playa deposits or lowered lake levels between c. 6300 and 5800 bp (Hassan 1986b; Wendorf & Schild 1980: 96; Ritchie et al. 1985). The drying trend may in fact have been more severe in the Egyptian Western Desert than in

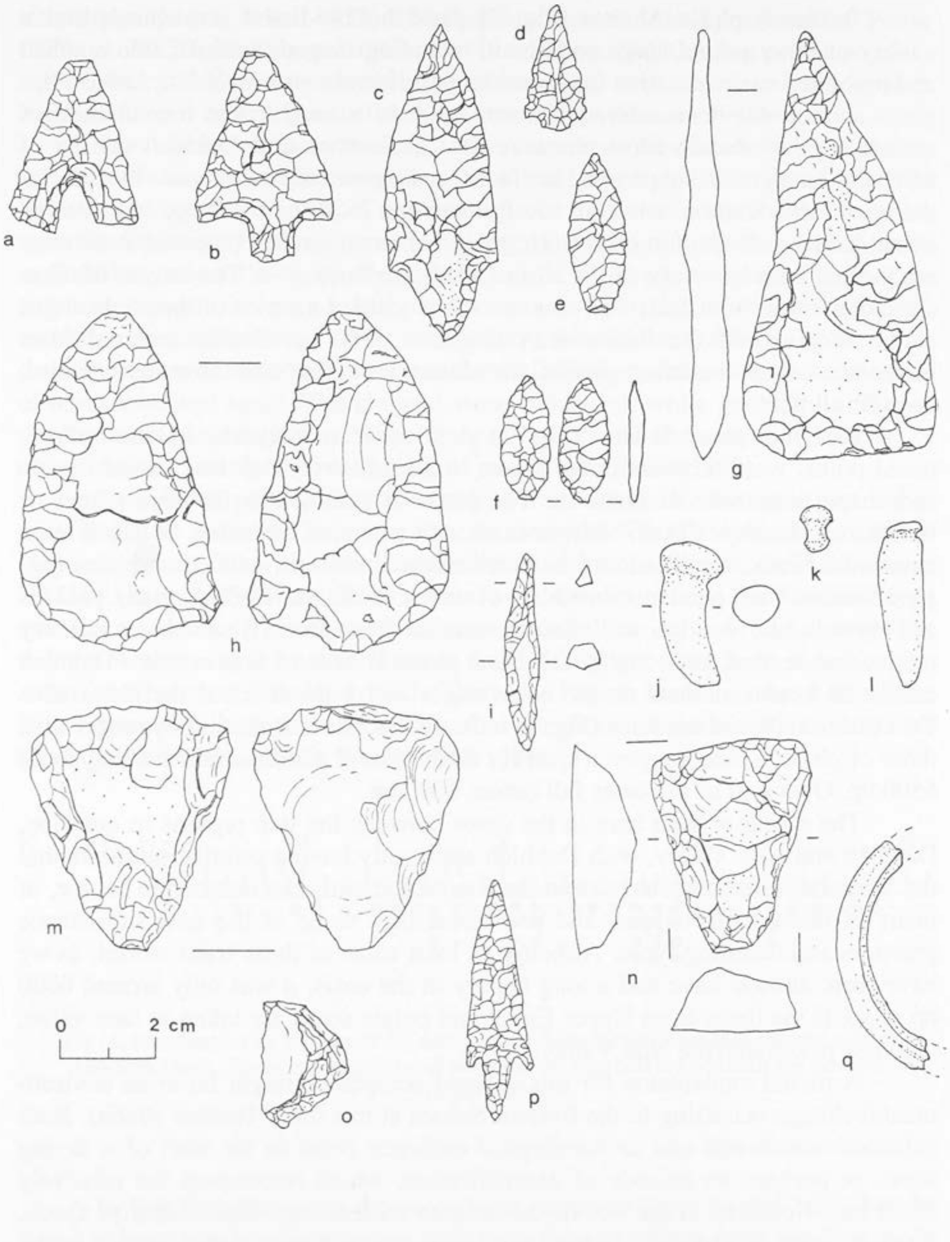


Fig. 2. Dakhleh Bashendi phase A (a-l) and phase B (m-q) artifacts: a-f, arrowheads; g, knife; h, bifacial item; j-l, labrets; m, n, planes; o, crescent; p, arrowhead; q, shell bracelet fragment.

the Sudan (Neumann 1989: 114, 145; S. Kröpelin reports [pers. comm., September 1992] seeing no evidence for increased aridity from numerous sections in the Sudan).

The dry phase is reflected in the archaeological record by gaps or dips occurring c. 6000 bp in radiocarbon curves for several suites of dates from the Western Desert. One list of 37 dates, published by the Combined Prehistoric Expedition, largely for the Nabta-Kiseiba area (Wendorf et al. 1984, fig. 2.33), shows a break before 6000 bp, and only two dates for all of the next millennium. Another suite of 145 dates from sites scattered the width of the desert north to south, shows a dramatic break at 6000 bp, with the only two dates for the next 200 years coming from the relatively well-watered Gilf Kebir in Southwestern Egypt (Kuper 1989, Table 1 and Fig. 2). A similar dip at 6000 bp appears in the list of 50 Bashendi dates from Dakhleh (Fig. 1). This evidence suggests, perhaps not outright depopulation of the Western Desert, but an at least temporarily reduced population largely confined to such well-watered localities as the Gilf Kebir and Dakhleh Oasis. The surplus population, presumably pastoral nomads, some of whom would normally have aggregated in Dakhleh Oasis, may have been forced by the drought to gravitate towards various points in the still relatively lush Nile Valley, bringing with them their herding practices, artifacts and technology.

The indigenes of the Nile Valley, meanwhile, did not face as dramatic a change as those in the desert, but by the mid-Holocene they too were adjusting to a gradual environmental deterioration (McDonald 1992). Through the early Holocene, the Nile river flow had been strong and continuous, with much reduced seasonal fluctuations, and stable channels both on the main Nile and its tributaries from the then better-watered desert (Adamson et al. 1980). These were the conditions in which, for example, the Khartoum area "Mesolithic" hunter-gatherers flourished for millennia, exploiting riverine resources together with plants and animals from the grasslands beside the river, while living in relatively permanent settlements (Caneva & Marks 1990). By the mid-Holocene, however, as Northeastern Africa began to dry out, the modern regime of the Nile was becoming established, putting in jeopardy the long-established "Mesolithic" adaptation. The switch to the Neolithic in the Nile Valley may then have occurred when the pressures created by an influx of refugees from the Sahara, combined with the slow deterioration of the local environment, forced or induced the people of the river valley to add herding and related technologies to their traditional extractive economy.

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of Northeastern Africa
Poznań 1996

Romuald Schild, Halina Królik, Fred Wendorf and Angela E. Close

# Architecture of Early Neolithic huts at Nabta Playa

## Introduction

In the 1974-1977 and 1990-1992 seasons the Combined Prehistoric Expedition conducted extensive archaeological excavations in the South-Western Desert of Egypt. Several Early and Middle Neolithic sites were excavated or tested in the Nabta Playa and other playa basins in the area (compare Wendorf & Schild 1980; Banks 1984).

Nabta Playa is a very large deflation basin measuring around 100 square km with a catchment area of over 1000 square km. Site E-75-6, located in the very centre of the Nabta Playa, is one of the most interesting in the area[1].

The site is stratified. It contains at least two archaeological levels of which the lower one is buried in the upper part of a phytogenic, fossil dune. The upper level is located on the dune and is partially covered by playa silts. The features of the upper level cut through a stabilisation zone, a thin hardened surface that formed as a combination of pedo- and anthropogenic phenomena. The upper level is the most interesting. It contains three rows of hut foundations with accompanying bell-shaped pits and two shaft wells (Fig. 1).

The site yielded rich archaeological materials. Over fifteen radiocarbon age estimates placed the upper occupations of Site E-75-6 around 8000 conventional radiocarbon years B.P. (Haas & Haynes 1980). Location in the centre of Nabta Playa as well as the presence of the shaft wells indicated that the site was occupied during the dry season, in the winter.

The site contained a rich fauna assemblage, composed mostly of hare and a small gazelle. Remains of a large bovid, probable cattle, were also indicated. Rare, well-fired pottery with herring-bone design was found embedded in the features. Because of several individual attributes, the lithic assemblage in the upper level was classified as the Early Neolithic of el Nabta type (Wendorf & Schild 1984: 413).

Site E-75-6 also produced extremely well preserved macro-floral remains. The cultural features yielded exceptionally rich charcoal samples suggesting presence of

[1] The excavations in the early seasons were directed by Michał Kobusiewicz, Herbert Mosca, Thomas Ryan and Hanna Więckowska.

carbonised seeds and fruits. Indeed, various plant remains as well as two well-preserved grains of barley were reported from Site 6 at Nabta Playa (Hadidi 1980: 347). Because of the unique conservation of the botanical material, the Combined Prehistoric Expedition returned to the site in the 1990-1992 seasons (compare Wendorf et al. 1992; Wasylikowa et al. 1993; this volume).

## Excavations in the 1990-1992 seasons

The work during the three consecutive field seasons at Site E-75-6 concentrated in the south-eastern part of the locality where four cuts and eight test trenches have been opened (Fig. 1). It is the area where the main Neolithic level is covered by a relatively thin playa seal. There was a large (100 square m) cut placed in the southern part of the site, where the playa cover is relatively thick, but it did not yield any archaeological material. The work concentrated on two cuts (I/90 and I/91) which produced the most interesting results.

Removal of the thin playa silts in the two cuts disclosed a very complex picture rich in various archaeological features (Fig. 2). Among them were four huts and a part of a hut excavated in the 1975 season, 12 pits, one deep water well and at least two open air hearths. The general stratigraphy of the cuts was similar to that known from previous excavations. A much better preservation of the features permitted construction of a local, relative stratigraphy.

Two types of huts are evident: the elongated structures and the round ones. The former measure around 7 meters along the longer, west-east axis. The round huts, on the other hand, are ca. 4 m in diameter (Fig. 2). The relative stratigraphy suggests that the round huts are most probably slightly younger in each pair; however, no stratigraphic relationship has been established between the two long huts. The radiocarbon age estimates, on macro-floral remains, place both types of huts in the same time span, almost exactly at 8000 conventional radiocarbon years B.P. (Fig. 3, 4). It is suggested that the estimates run on individual seeds and fruits (Oxa) better reflect the age than conventional dates measured on charcoal samples (Gd). Frequent use of fossil wood in the Neolithic, as well as today, must have resulted in greater ages of certain samples

After removal of playa silts and patches of rewashed, grey laminated cultural layer, the huts appear as grey to dark grey features. In the cross-section they have the form of shallow basins cut into the stabilisation zone and the topmost part of the dune. They have a maximal depth of 30 cm and show several regular, small pits hanging from the bottom (Fig. 5). All the huts are sealed with a thin (up to 1 cm) lens of playa sandy silt with snails (*Bulinus truncatus*).

## Details of architecture and use

The basins are filled with grey and dark grey sand of the cultural layer. The colour of the sand is controlled by the amount of charcoal powder included in the sediment. There are also patches of a reddish brown silt rich in charcoal pieces, flecks and powder that are deposited at various levels of the fill. The patches of the reddish brown silt that are close to the floor of a house, always show deep red oxidised, a result of intensive, but spatially limited fire zones placed on the sand floor. These red zones indicate that the patches of the reddish brown silt are in fact hearths. The placement of hearths is not always the same. In Feature 1/90 there are roughly aligned along the long axis. In Features 2/90 and 1/91, in the round houses, they are placed near the south edge. In the elongated house of 3/90 the hearths are in the centre and near the south eastern edge (Fig. 6, 7).

All of the houses contain dozens of potholes which are small, shallow circular pits with rounded bases. The pits are obviously designed to hold containers, e.g., gourds, sacks, baskets and pots. Often, the potholes intersect each other. They are placed at various levels of the fill, but the most numerous are cut into the sandy floor (Fig. 6-7). Some of the potholes are touching the hearths or are placed inside them. These are also filled with the reddish brown fill that is rich in charcoal. The fill of these pits is always the richest in charred macro-remains of eatable plants indicating that cooking containers were placed in the holes associated with hearths.

The association of rich in plant macro-remains potholes with reddish brown stains define the latter as cooking hearths. The small fire in these hearths was build around container. A very similar method of cooking is practised today by the Bedouins (Fig. 8).

Of the four huts the best preserved is the long hut of feature 1/90 (Fig. 6). Beside the grey fill, reddish brown cooking hearths and potholes it also shows some other structures. The central part is occupied by a deeper sub-basin in which all of the cooking hearths are deposited as well as most of the potholes. The fill of the sub-basin is darker than the surrounding one and contains more charcoal. The central sub-basin is almost 4.5 m. long. Its floor is irregular showing three niches placed alongside. The general deep is to the central axis. It is likely that the niches represent sleeping units. The fill of the shallow part of the house is lighter in colour than that in the sub-basin. Also, the floor of this part shows a few potholes; however, it is in this area that most of the postholes are located. Some of the postholes intersect each other. A few other postholes occur within the deeper sub-basin, although very close to its edge.

## Reconstruction of the huts

Details of the architecture and use of the huts permit a fairly probable reconstruction (Fig 9, 10). It appears that the huts were roofed most, possibly by sticking Tamarisk branches into the sand around the slightly sunk house basin. The top parts of the branches were probably tied together and covered by animal skins. Sand piling on the outside walls of the construction is probable, but not evident. The area immediately adjacent to the walls is only a few centimetres below the floor of the site.

Intersection of potholes and postholes as well as the placement of the holes and hearths at various levels of the same hut, all indicate that the huts were repetitively repaired and inhabited. The length of the use is unknown and beyond radiocarbon method. Also, it cannot be excluded that the form of a hut reflects the number of its inhabitants rather than cultural and/or chronological differences.

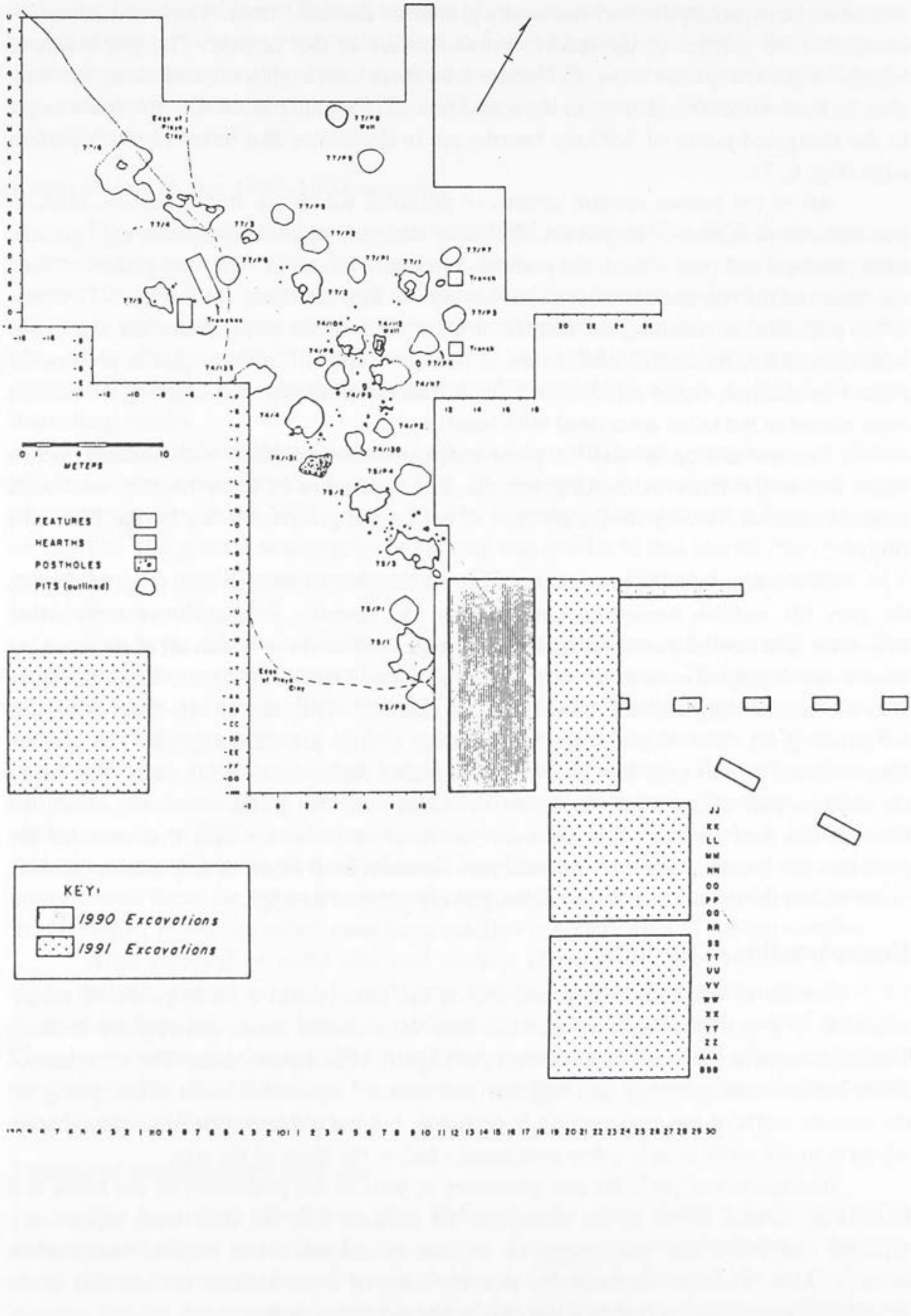


Fig. 1. General map of Site E-75-6.

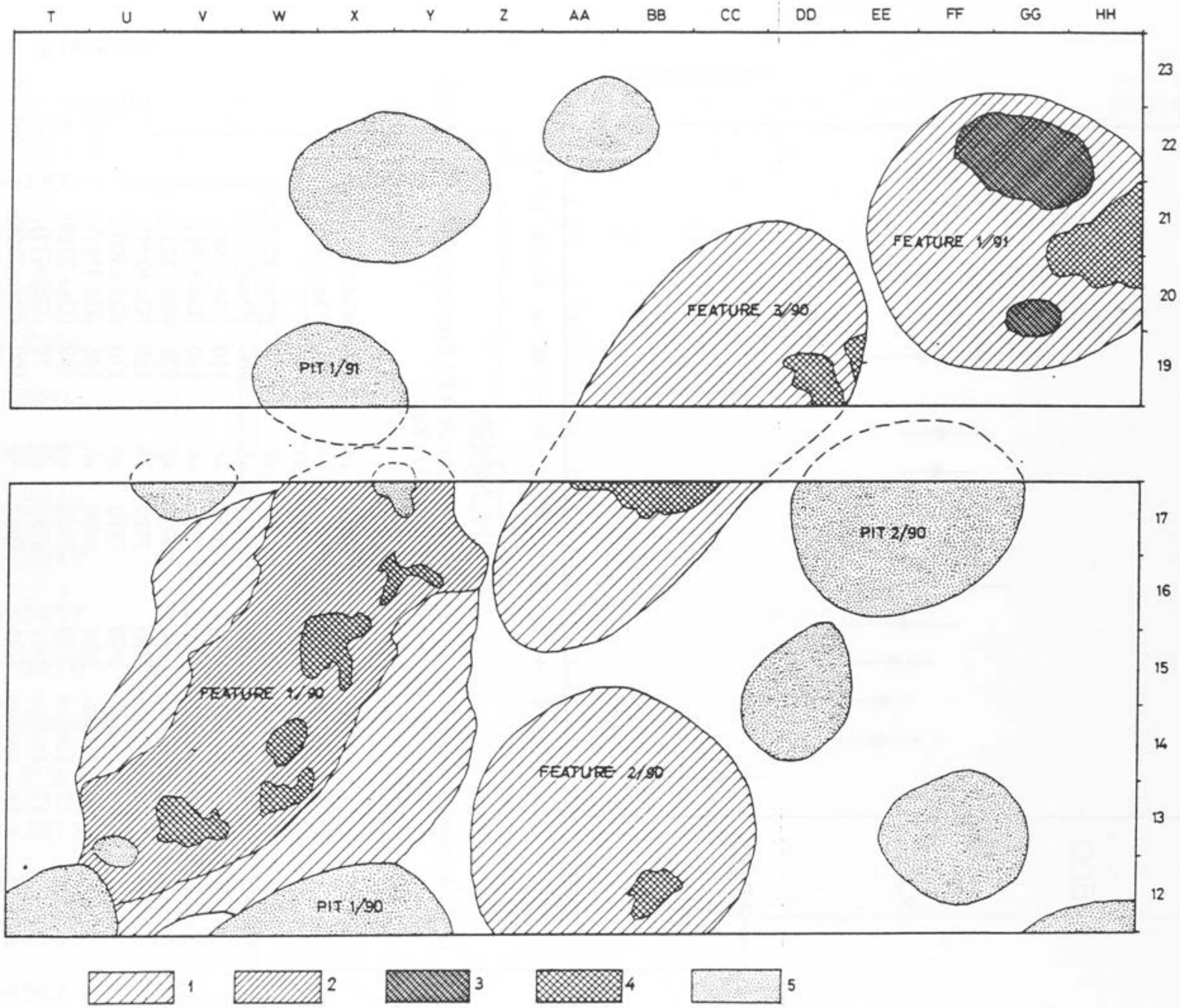


Fig. 2. Map of cut I/90 and I/91. Key: 1. Grey sand; 2. Dark grey sand; 3. Dark grey hearth; 4. Reddish brown silt, cooking hearths.

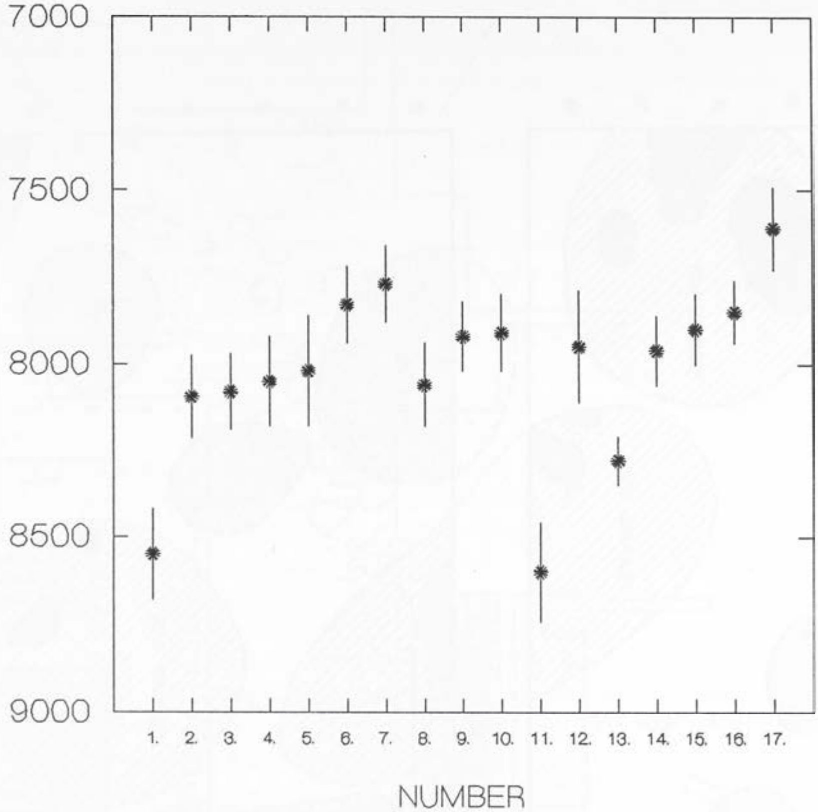


Fig. 3. Radiocarbon age estimates (in conventional years B.P.) from huts in cut I/90 and I/91, graph by Systat 5.0. Key:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | Feature | 1/90 | - | 8550 | +/- | 130 | (Gd-6254); |
| 2. | Feature | 1/90 | - | 8095 | +/- | 120 | (Oxa-3215); |
| 3. | Feature | 1/90 | - | 8080 | +/- | 110 | |
| 4. | Feature | 1/90 | - | 8050 | +/- | 130 | (Oxa-3218); |
| 5. | Feature | 1/90 | - | 8020 | +/- | 160 | (Oxa-3217); |
| 6. | Feature | 1/90 | - | 7830 | +/- | 110 | (Gd-6498); |
| 7. | Feature | 1/90 | - | 7770 | +/- | 110 | (Gd-6257); |
| 8. | Feature | 2/90 | - | 8060 | +/- | 120 | (Oxa-3222); |
| 9. | Feature | 2/90 | - | 7920 | +/- | 110 | (Gd-6258); |
| 10. | Feature | 2/90 | - | 7910 | +/- | 110 | (Gd-6500); |
| 11. | Feature | 3/90 | - | 8600 | +/- | 140 | (Gd-4587); |
| 12. | Feature | 3/90 | - | 7950 | +/- | 160 | (Oxa-3219); |
| 13. | Feature | 1/91 | - | 8280 | +/- | 70 | (Gd-5971); |
| 14. | Feature | 1/91 | - | 7960 | +/- | 100 | (Oxa-3216); |
| 15. | Feature | 1/91 | - | 7900 | +/- | 100 | (Oxa-3221); |
| 16. | Feature | 1/91 | - | 7850 | +/- | 90 | (Gd-6506); |
| 17. | Feature | 1/91 | - | 7610 | +/- | 120 | (Gd-6507). |


Fig. 4. Nearest neighbour clustering of radiocarbon age estimates from the huts in cuts I/90 and I/91 (Euclidean distance, single linkage); Systat 5.0.

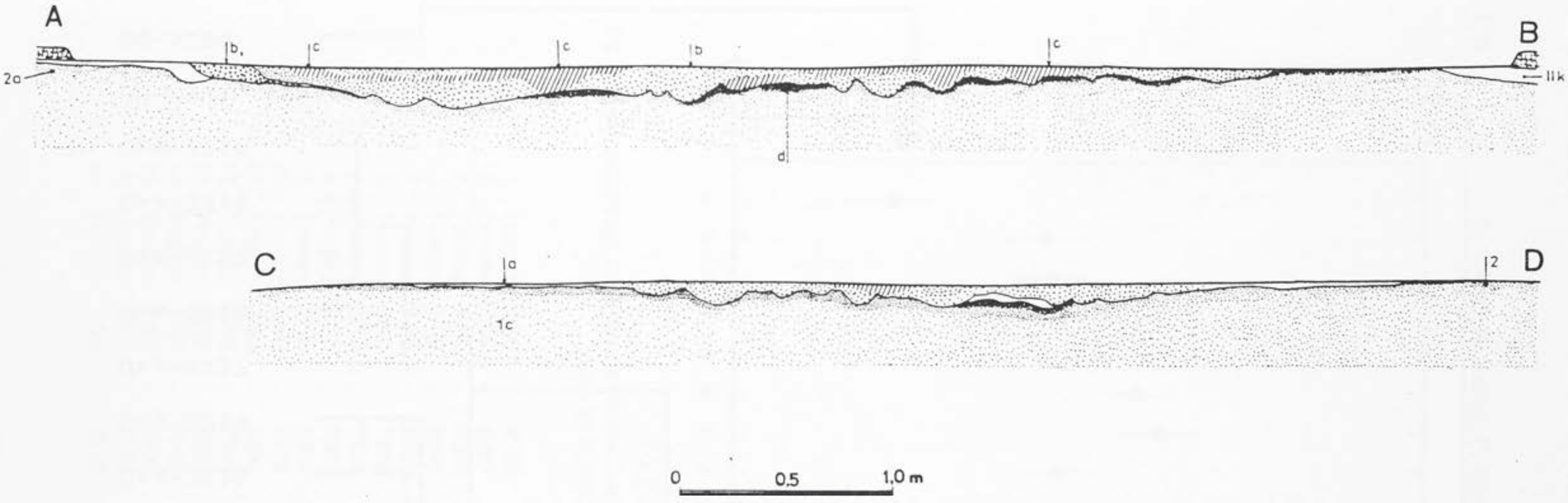


Fig. 5. Cross-section of Feature 1/90.

Key:
1c. Non stratified, yellow, mottled dune sand;
2 and 2a. Light reddish brown, silty sand, Stabilisation Zone;
IIk. Light grey, ashy sand with charcoal (part of Feature 1/75), immediately overlain by dune sand dumped during excavation of Pit 1/90;
a. Grey sand;
b. Dark grey sand;
b1. Slightly darker Deposit b;
c. Reddish brown silt, cooking hearths;
d. Red, burned sand; in the eastern end remnant of a thin, blue silt sill.

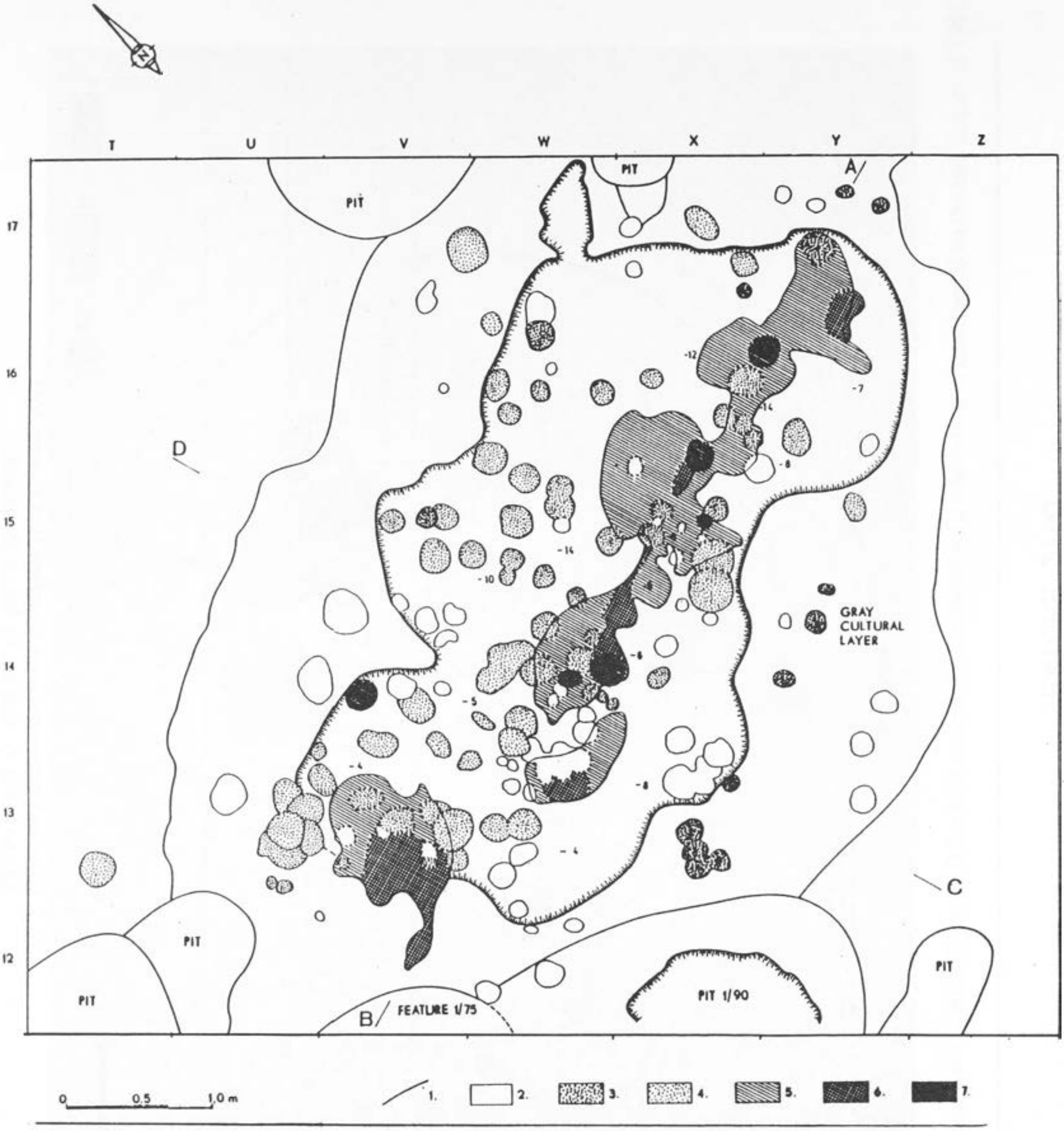


Fig. 6. Floor and micro-structures (combined) of Feature 1/90, internal sub-basin shown by hachures, depth of the sub-basin shown by digits. Key:

1. Outlines of anthropogenic structures;
2. Unexcavated potholes;
3. Postholes;
4. Potholes filled with grey sand;
5. Reddish brown silt, cooking hearth;
6. Red, burned sand;
7. Potholes filled with reddish brown sand, cooking potholes.

Drafting by Marek Puszkarski.

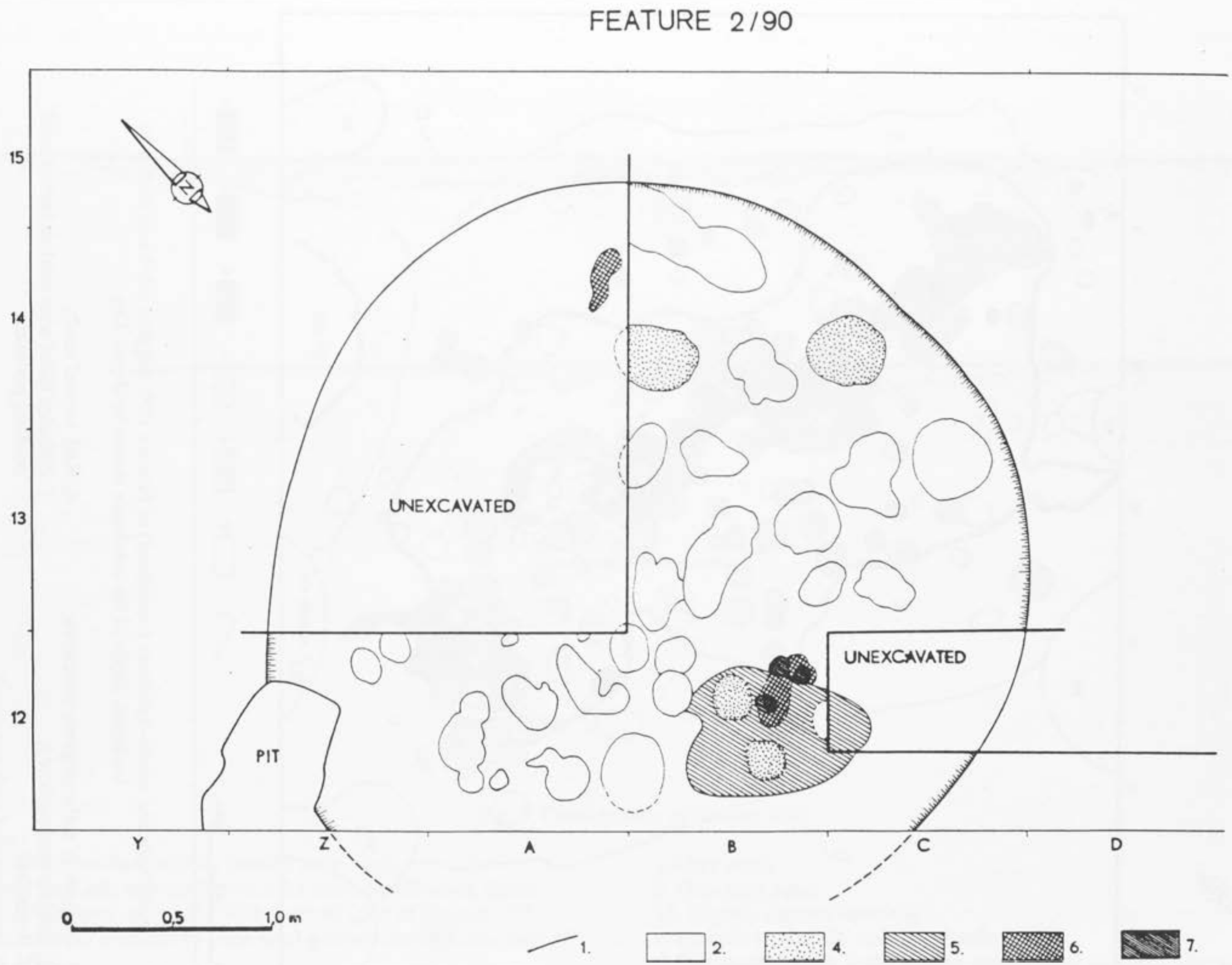


Fig. 7. Floor and micro-structures (combined) of Feature 2/90.
Key as in Fig. 6.: drafting by Marek Puszkarski.

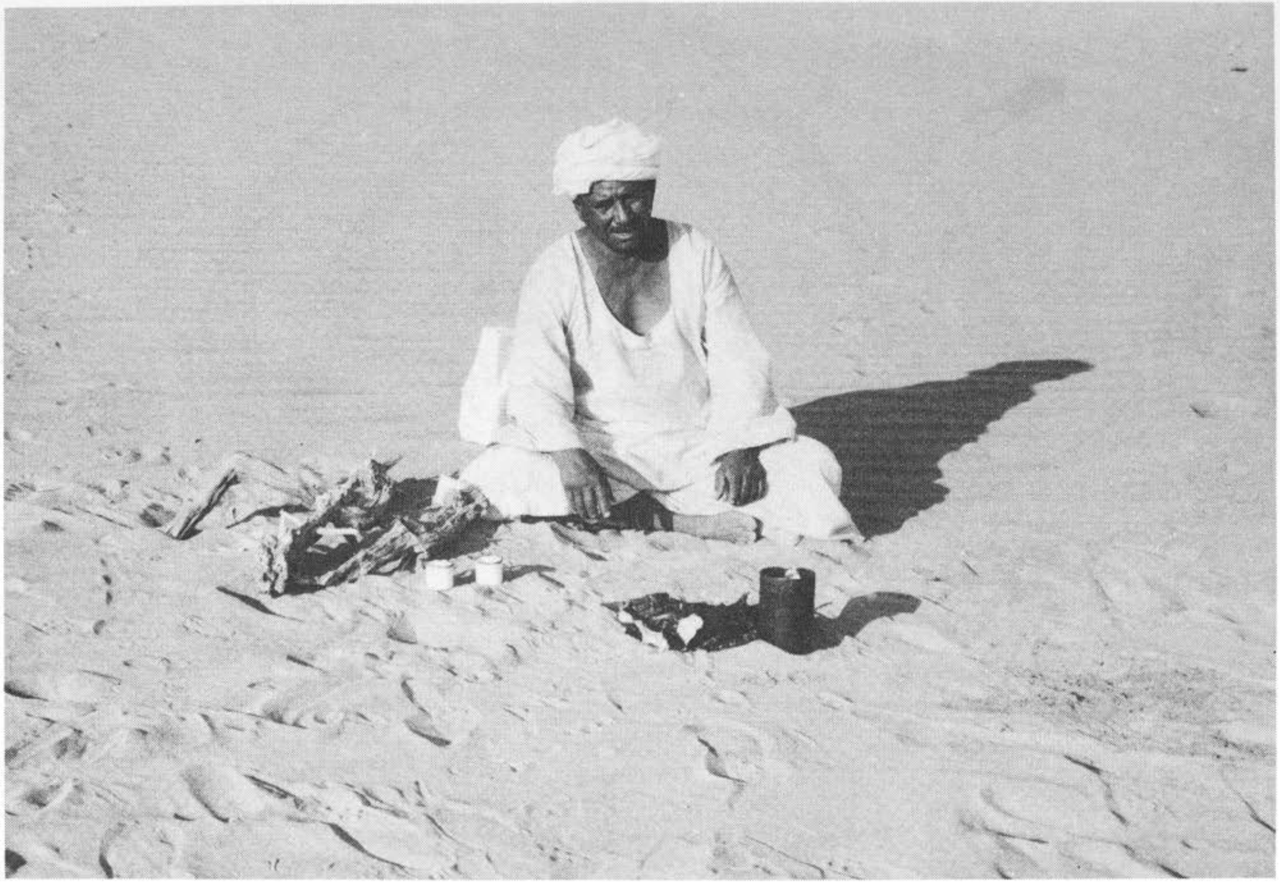

Fig. 8. Aid Mariif boiling water in a tin. Note small fire built against the container and a small stack of fossil wood on the left. Season of 1991.

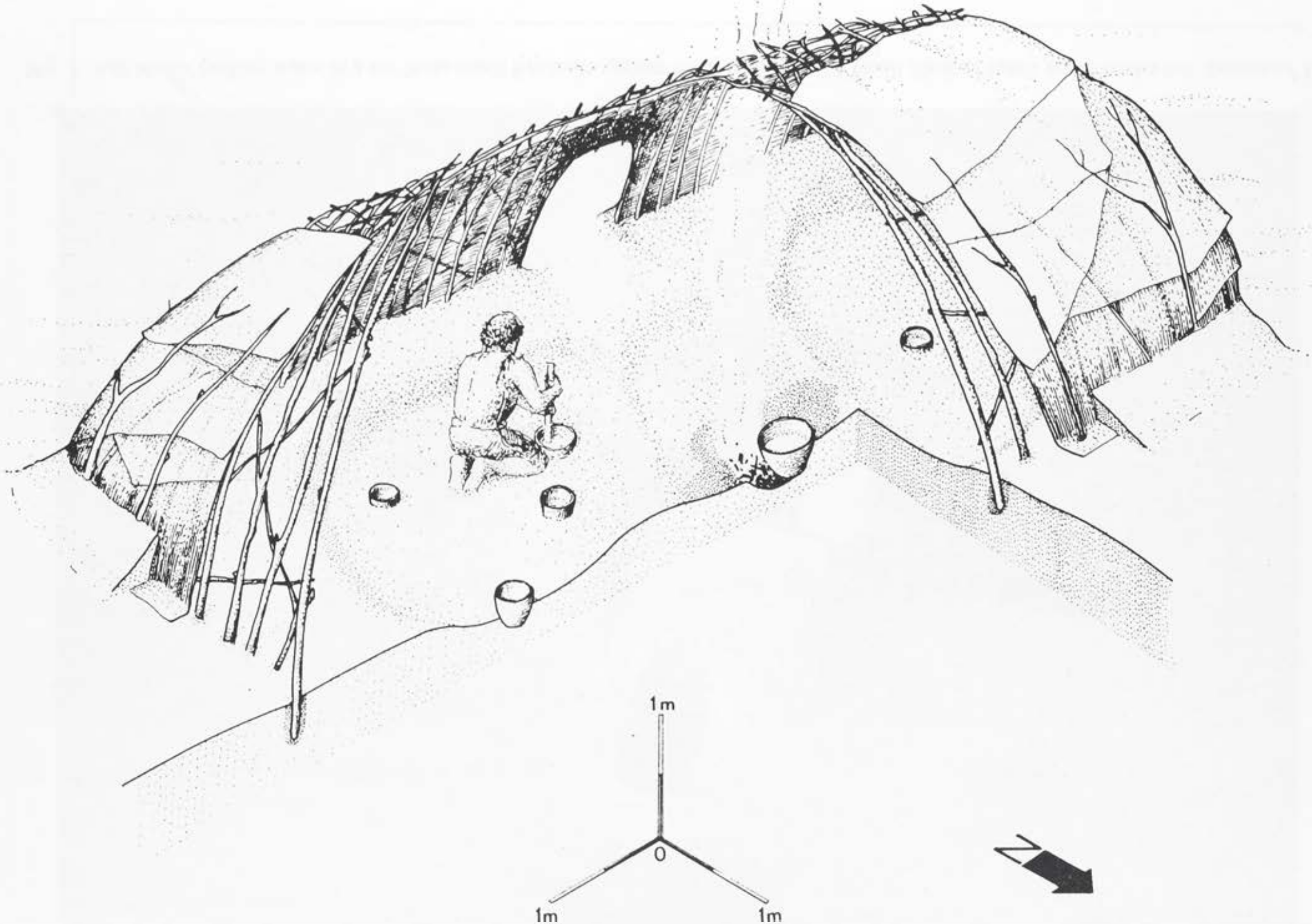


Fig. 9. Reconstruction of the long hut (artist: Marek Puszkarski, 1992).

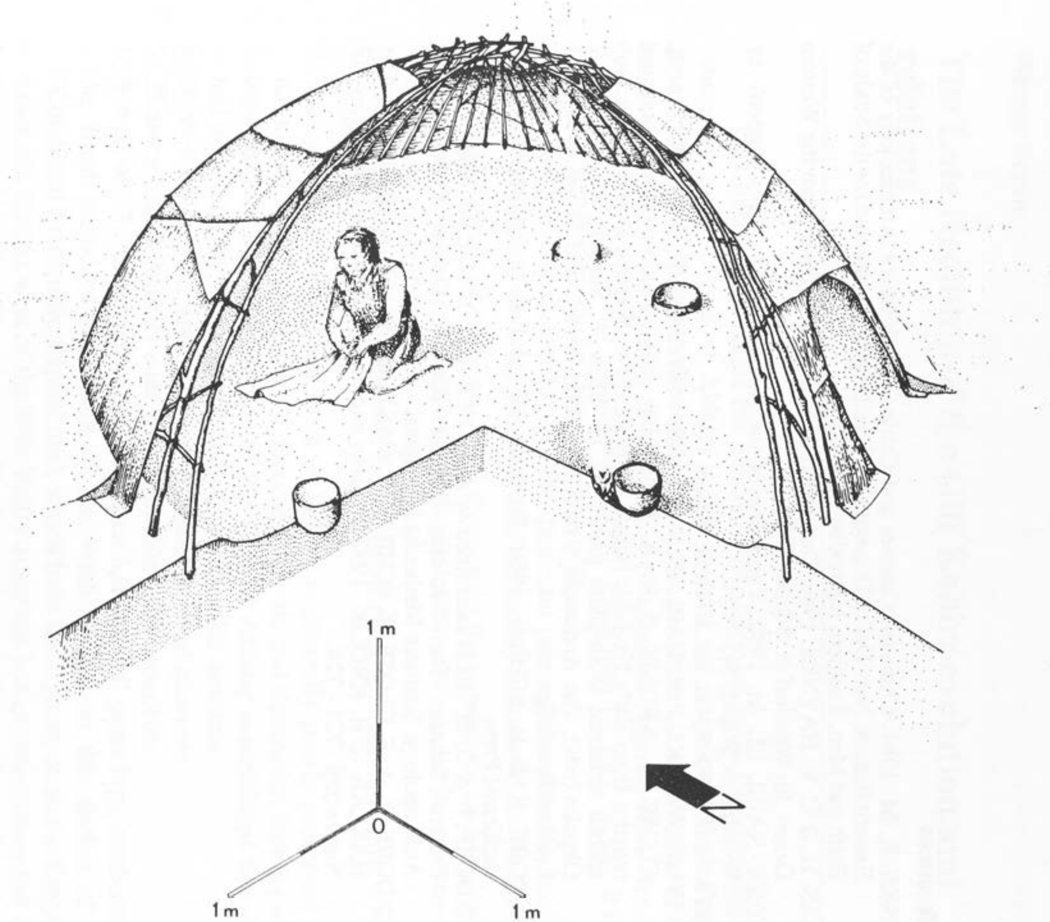

Fig. 10. Reconstruction of the round hut (artist: Marek Puszkarski, 1992).

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Interregional Contacts in the Later Prehistory
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Poznań 1996

Werner Schön

# The Late Neolithic of the Gilf Kebir: evolution and relations

This overview contains the results of my doctoral thesis "Archäologische Ausgrabungen im Wadi el Akhdar - Ein Beitrag zur holozänen Besiedlungsgeschichte des Gilf Kebir (Südwest Ägypten)" presented at University of Cologne in 1990. In the context of this study, I examined material from Wadi el Akhdar in the Gilf Kebir, Southwest Egypt, excavated as part of the B.O.S. ("Besiedlungsgeschichte der Ostsahara") project.

The following factors express the important preconditions for the analysis of the archaeological material and have thus essentially influenced its results:

1. A single method of study was used throughout the campaign, enveloping the selection of the sites, collection, techniques of excavation and the documentation of the material as well as its analysis.
2. The analysed material originated from a small geographically enclosed area of about 3 km².
3. The ceramic material from Wadi el Akhdar is generally poorly preserved and not numerous. The variation in decorative motifs and decoration techniques is very narrow. The classification of the Wadi el Akhdar assemblages therefore had to be done by means of the analysis of the lithic artifacts.
4. 90-99% of the lithic artifacts were produced of local quartzite.
5. 25 assemblages from 21 sites were available for comparison.
6. A total of 23 $^{14}$C-dates clustered between 6,000-5,000 years b.p., establishing the focal period of settlement of the Wadi. Based on the studies of the "Combined Prehistoric Expedition", which have been going on in the Egyptian oases and deserts west of the Nile Valley since the sixties, these dates fall into the period established as the Late Neolithic. A nomadic, cattle-herding subsistence economy is very likely for this period, while plant cultivation may not have been practised at all (Gautier 1987).
7. Botanical and sediment analyses have shown that relatively homogenous climatic conditions, and thus living conditions, prevailed during the main period of settlement.

The main settlement phase of Wadi el Akhdar lasted, based on the $^{14}$C-dates, from ca. 5,500-5,000 b.p. Due to considerable erosion and to chance on site discovery, a few observations point to a limited earlier and later use of the Wadi. Therefore, Wadi el Akhdar should not be seen as a primarily Late Neolithic settlement area. The predominance of Late Neolithic finds is rather the effect of the surficial preservation of these sites. Certainly not all the settlements belonging to this main phase have been discovered, but even taking this into consideration, the number of settlements is not big enough to suggest a permanent occupation of Wadi el Akhdar. The relatively low density of sites in Wadi el Akhdar demonstrates that conditions hospitable to settlement occurred only sporadically. This assumption is further supported by research in palaeobotany and geomorphology.

The excavated finds do not in themselves provide much information regarding the subsistence strategy of the inhabitants of Wadi el Akhdar. The presence of grinding implements, however, suggests that plants - most likely various wild-grasses - were being processed as food. Except for a single cattle bone from site 80/14, no remains of domesticated animals were uncovered.

The only indication of cattle-herding is provided by a rock-engraving that is unfortunately undatable. A number of roughly pecked-out figures have been worked into the relatively flat surface of an 80 x 50 x 30 cm quartzite block. The largest of the figures is a long-horned cattle. Its pointed oval-shaped body is represented in profile, while the C-formed horns are seen from above, causing the head to appear in front of the horns. This peculiar style of cattle representation is, as far as I know only to be found in western Libya until now (Ziegert 1967). Nevertheless, finds from contemporaneous sites in the Sahara make the existence of a cattle-raising economy very probable. Wadi el Akhdar offered an optimal setting for such a subsistence base. After sporadic rainfall, ephemeral water sources were probably available over longer periods of time. On the more sandy sediments of the Wadi herbaceous and bush vegetation were also available to man and animals alike.

The early phase of the Late Neolithic, represented by three assemblages is defined by the presence of numerous microliths in form of segments and a high percentage of microburins and regular bladelets (Schön 1989). Until now this kind of assemblage has only been found in Wadi el Akhdar.

The 14 assemblages of the subsequent main settlement phase are characterised by a high proportion of continuously retouched and denticulated pieces (Fig. 1). The only chronological trend evident in these assemblages is the ever-decreasing number of tools produced from large blades. The assemblages could be chronologically sorted according to the technological traits of the debitage. $^{14}$C-dated assemblages showed a recognizable tendency towards the production of artifacts through the use of an increasingly simpler and rougher knapping technique over time.

The pottery can be generally described as thin-walled and hard-fired. A common decorative motif occurs in the form of bands running under the rim.

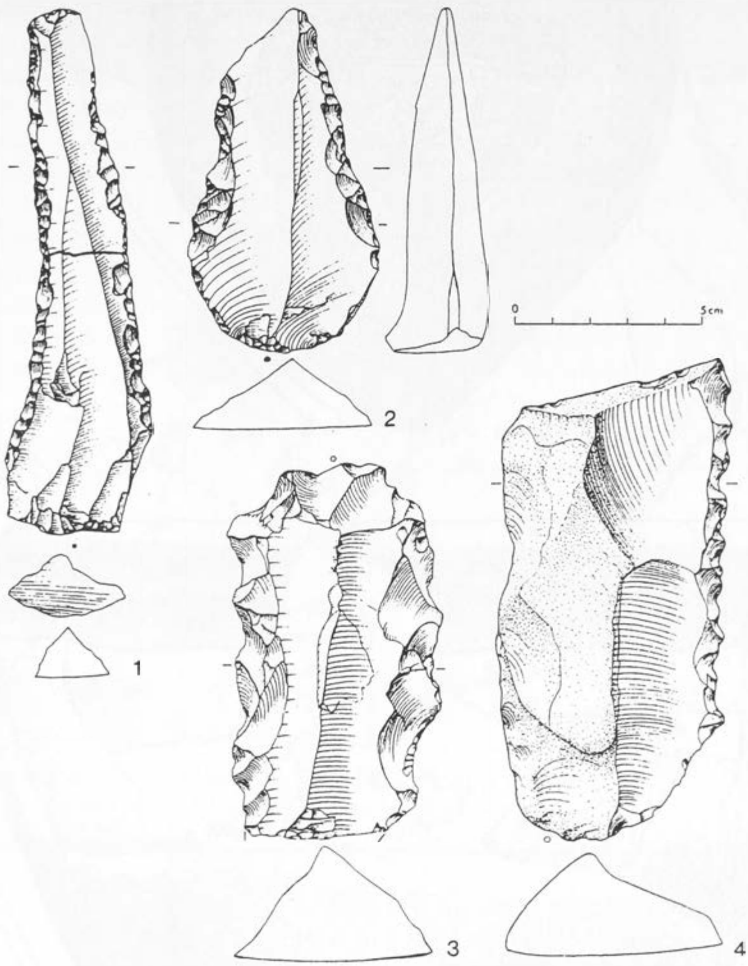


Fig. 1. Characteristic large retouched blades and flakes from different Late Neolithic sites in Wadi el Akhdar.

Comb-impressions are also very prevalent. They are used to produce slanting parallel rows as well as single or double herring-bone bands. Uniform parallel grooves across the surface occur, but are very rare. Other decorative motifs, such as impressions and incisions are also uncommon. Only three vessels were able to be restored so far as to display pointed bases (Fig. 2).

The youngest phase of the Late Neolithic in Wadi el Akhdar is represented by two assemblages which are characterized by acute-angled triangles and trapezes as well as the lack of blades or bladelets.

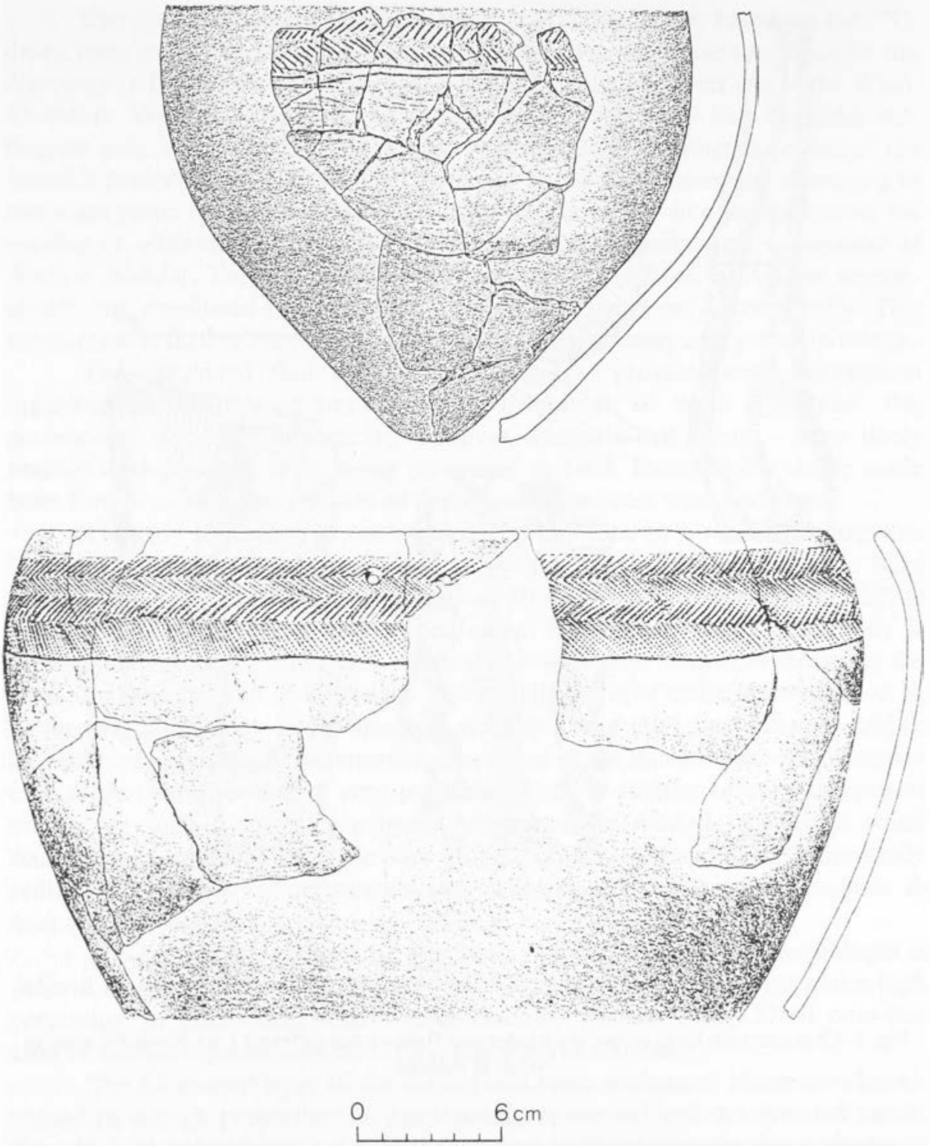


Fig. 2. Typical Late Neolithic ceramic with herring bone pattern from Wadi el Akhdar:
1. Reconstructed vessel with pointed base from site 81/2.
2. Reconstructed vessel from site 80/11 (possibly also with pointed base).

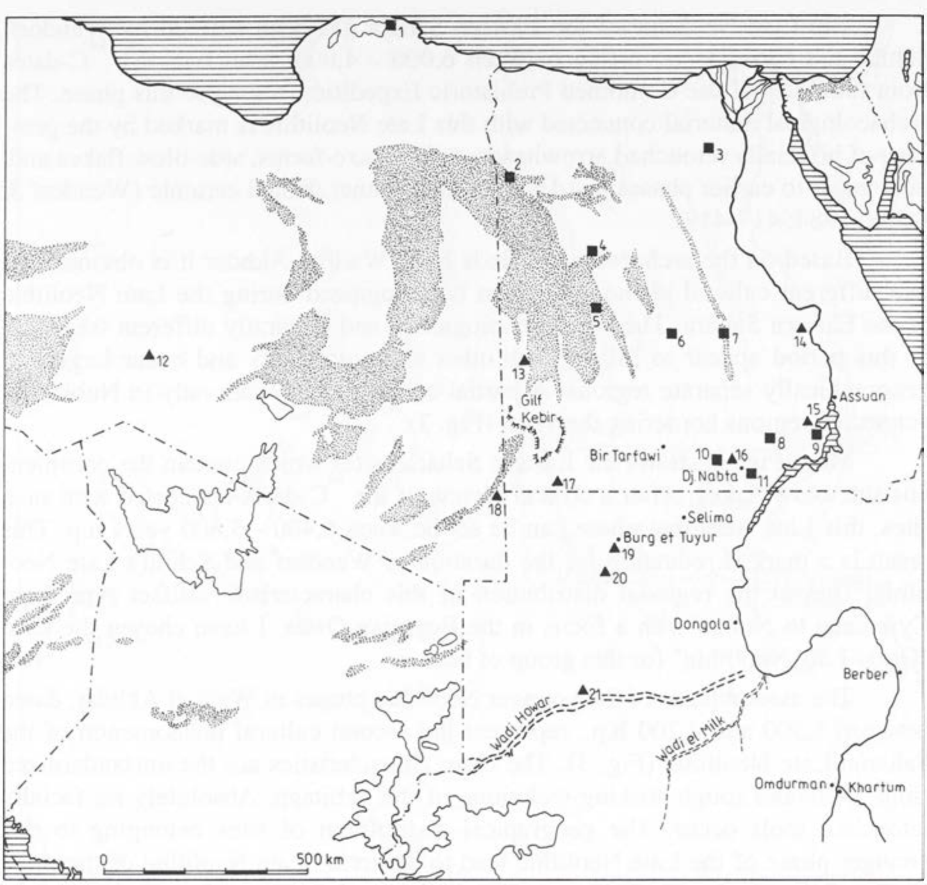


Fig. 3. Plot of discussed Late Neolithic sites in Northeast Africa.
1-11. Sites of the "Oasis Late Neolithic",
12-21. Sites of the "Late Neolithic of the Inner Eastern Sahara (LNIES)".
Regions/Sites: 1 Cyrenaica; 2 Siwa Region; 3 Fayum; 4 Ain Dalla Region; 5 Eastern Great Sand Sea; 6 Dakhleh Oasis; 7 Kharga Oasis; 8 Dungul Region; 9 Nubian Nile Valley; 10 Bir Kiseiba Area; 11 Nabta Playa; 12 Western Libya; 13 Western Great Sand Sea; 14 El Tarif, Upper Egypt (unsecure); 15 Nubian Nile Valley; 16 Bir Kiseiba Area; 17 Gebel Kamil; 18 Gebel Auenat; 19 Burg et Tuyur; 20 Wadi Shaw/Wadi Sahal; 21 Wadi Howar (uncertain).

The Late Neolithic of the Eastern Sahara has been defined by Wendorf, Schild and Close as occurring between 6,000 - 4,600 years b.p. Six $^{14}$C-dates from four sites of the Combined Prehistoric Expedition belong to this phase. The archaeological material connected with this Late Neolithic is marked by the presence of bifacially retouched arrowheads, various axe-forms, side-blow flakes and, in contrast to earlier phases, harder fired and thinner walled ceramic (Wendorf & Schild 1984: 417-419).

Based on the archaeological finds from Wadi el Akhdar it is obvious that two different cultural phenomena must be recognized during the Late Neolithic of the Eastern Sahara. The two technologically and culturally different traditions of this period appear to follow each other chronologically and occur largely in geographically separate regions. A partial overlapping occurs only in Nubia and connected regions bordering the West (Fig. 3).

Map (Fig. 3) shows the Eastern Saharan sites which contain the conspicuous side-blow flakes. After a critical review of the $^{14}$C-dates connected with such sites, this Late Neolithic phase can be set between 6,400 - 5,800 years b.p. This result is a marked reduction for the duration of Wendorf and Schild's Late Neolithic. Due to the regional distribution of this characteristic artifact type from Cyrenaika to Nubia, with a focus in the Egyptian Oasis, I have chosen the term "Oasis-Late Neolithic" for this group of sites.

The assemblages of the younger Neolithic phases in Wadi el Akhdar, dated between 5,500 and 4,200 b.p., represent the second cultural phenomenon of the Saharan Late Neolithic (Fig. 3). The main characteristics are the unstandardized stone tools and rough striking-technique of the debitage. Absolutely no facially retouched tools occur. The geograpical distribution of sites belonging to this younger phase of the Late Neolithic lead to the term "Late Neolithic of the inner Eastern Sahara".

The origins of the settlers in the Gilf Kebir is unclear. A weak connection to the West is indicated by the pottery, with elements comparable to the *Neolitiqué de tradition Capsienne* of the Maghreb, and by the rock engraving which displays a representational style identical to examples found in Libya. On the other hand, general similarities to stone tools and possibly pottery of the Nubian Abkan are also worthy of mention.

The main settlement phase of Wadi el Akhdar ended about 5,000 b.p., while it continued in Wadi Bakht to the northeast of Gilf Kebir until about 4,800 b.p. In northern Sudan, in Wadi Shaw and Wadi Sahal, there are two clusters of dates - a first one between 5,200 and 4,400 b.p. and a second one after a gap between 4,000 and 3,400 b.p. These dates overlap with those of the Gilf Kebir, which can also be seen in the archaeological material. For example, it has been shown that A-Group assemblages dated to about 4,400 b.p. (Schuck 1988) can be compared to those of the late main settlement phase of Wadi el Akhdar. This leads to the following hypothesis (Fig. 4):

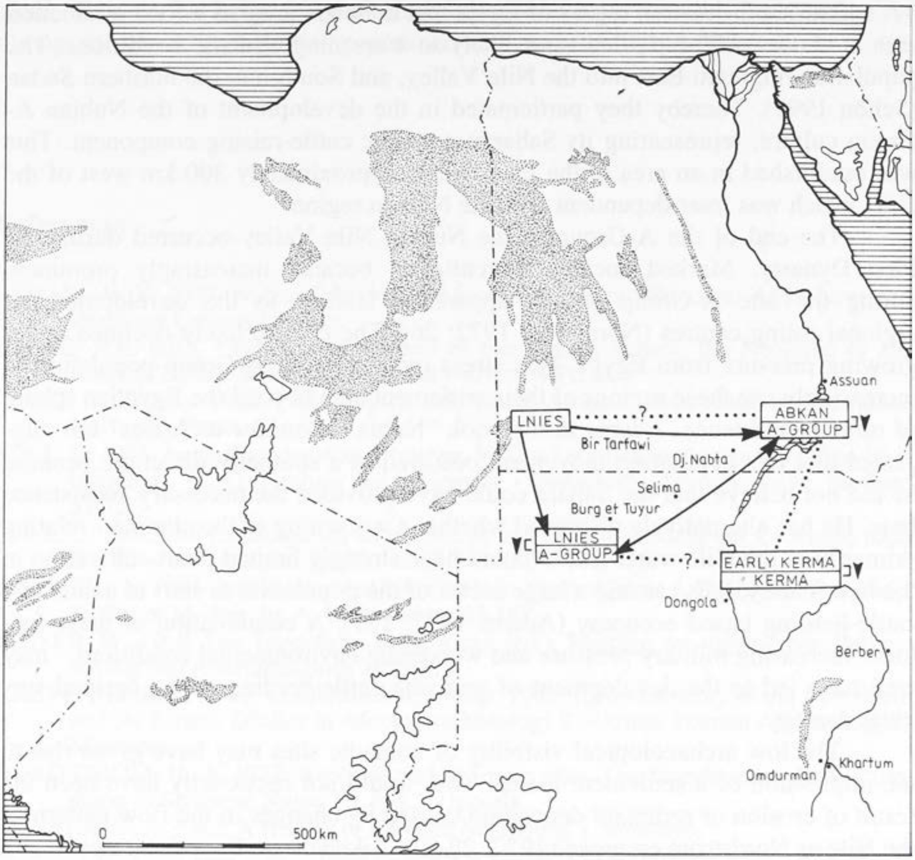


Fig. 4. Relations between the "Late Neolithic of the Inner Eastern Sahara (LNIES)" and cultural groups in Northern Sudan and the Nubian Nile Valley.

The south-western region of Egypt had to be given up as a food production area at about 4,800 b.p., due most likely to worsening climatic conditions. The population migrated East into the Nile Valley, and South into the northern Sudan (Schön 1991). Thereby they participated in the development of the Nubian A-Group culture, representing its Saharan nomadic cattle-raising component. This was established in an area in the East Sahara approximately 300 km west of the Nile, which was inter-dependent with the Nubian region.

The end of the A-Group in the Nubian Nile Valley occurred during the First Dynasty. Marked social differentiation became increasingly prominent during the late A-Group period, apparently leading to the development of regional ruling centres (Nordström 1972: 26). The culture likely declined under growing pressure from Egypt. This stress motivated the A-Group population to increasingly use these regions of their settlement area beyond the Egyptian sphere of military influence. Adams in his book "Nubia - Corridor to Africa" has suggested that this population movement occurred in a southerly direction, because he did not believe that the Sahara could have provided the necessary subsistence base. He has alternatively discussed whether a worsening of the climate - relating primarily to the Nile water level - could have strongly limited plant cultivation in the Nile Valley, thus causing a large sector of the population to shift to a nomadic cattle-herding based economy (Adams 1977: 135). A combination of these factors - increasing military pressure and worsening environmental conditions - may well have led to the development of nomadic cattle-herding as the optimal survival strategy.

The low archaeological visibility of nomadic sites may have given rise to the impression of a settlement hiatus. That would not necessarily have been the result of erosion or sediment deposition caused by changes in the flow pattern of the Nile as Nordström assumed (1972: 28-32). Likewise an Egyptian colonisation or extended military occupation of Nubia may not have been possible during the Old Kingdom. As it is likely that only an extended settlement on a large scale would have been seen as a potential threat in Egypt, the episodic use of the Nubian Nile Valley by a nomadic population would have remained possible. During this postulated settlement hiatus of the Nubian Nile Valley, pottery of the 5th Dynasty appears in Wadi Shaw (Northern Sudan, B.O.S.-site 82/52; Reisner 1942: Fig. 79; Kaiser 1969). The stone tools from the assemblage of site 82/52 do not differ from those of other sites in the region that belong chronologically as well as technologically to the tradition of the Late Neolithic of the Inner Eastern Sahara.

During the period of political weakening at the end of the Old Kingdom, and possibly further due to climatic change, nomadic groups from northern Sudan permanently returned to the Nile Valley. This event is recorded in the travel report of Herchuf and can be dated to the 6th Dynasty, ca. 2,300 B.C. (Edel 1955; 1967). This new population, whose archaeological remains are described as the C-Group and more to the south as the Kerma Culture, may well be the descendants of the earlier emigrants out of the valley who have been described as the A-Group; thereby a "prehistoric" population steps into the light of history.

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Fred Wendorf, Romuald Schild and Nieves Zedeno

# A Late Neolithic megalith complex in the Eastern Sahara: a preliminary report

## Introduction

This is a preliminary report on a Late Neolithic megalith complex found at Nabta Playa, about 100 km west of Abu Simbel (Fig. 1). Although megaliths are known elsewhere in Africa (see Lynch and Robbins 1978; Camps 1953), this is the first known in Egypt.

The Eastern Sahara was hyperarid during the later part of the Upper Pleistocene, but shortly before 11000 B.P. rains came again as a result of a northward shift of the southern (monsoon) rainfall belts (Wendorf et al. 1984). Even with this rainfall, the area was still semi-arid, with perhaps <100 mm of rain a year (Neumann 1989), but that was sufficient for temporary ponds or playas to form in the larger basins, for grasses to grow on the plateaus, and for grasses, shrubs, tamarisk and acacia trees to develop along ephemeral stream courses and the lower, sandy margins of the seasonally flooded basins. The limited rainfall and vegetation restricted the fauna to small gazelles and hares. The climate was also unstable; during the Early Holocene there were three brief, but significant, intervals of aridity that seriously impacted human settlement in the area (Wendorf et al. 1984: 9-40).

People moved into the desert around 9500 B.P. At first, they were only small groups who visited the larger basins, but use of the desert soon became more intense and involved larger groups. Although there were contacts between those groups living along the Nile and those living in the Sahara, the cultural developments in the Sahara were distinctly different. The causes of these differences are not well understood, but some can be traced to influences from Sahelian Africa, while others may relate to stresses inherent in an unstable and marginal environment and the social discipline required to adapt to those stresses.

The Early Holocene sites in the Western Desert contain stone artifacts similar to those in contemporary sites near Wadi Halfa. They also have rare sherds of well-made pottery, decorated with impressed and incised designs in a style that is found across the southern Sahara from Khartoum to Mali between 9000 and 8000 B.P. The vessels are small, and their rarity was originally taken to indicate that they were made elsewhere, but analysis of the clays shows that they were locally made at least at Bir Kiseiba and Nabta (Zedeno, mss.).

In addition to the hare and gazelle, even the earliest desert sites also have rare bones of cattle, thought to be domestic. These early Saharan cattle seem to have been used primarily for milk and blood, and thus served as a reliable and renewable food resource that permitted life in the unstable desert environment (Close & Wendorf 1992).

The Saharan cattle herders were also intensive gatherers of plant foods. Recent excavations at a site dating 8000 B.P. have yielded rich assemblages of edible plant remains that include several kinds of legumes, fruits, tubers and grasses, including millets and sorghum. Today, these plants live in the Sahelian zone and their presence in southern Egypt indicates that the northern limit of the Sahel was at least 300 km farther north than it is today. The plants are all morphologically wild, but preliminary investigation by infrared spectroscopy of the lipids in the sorghum grains suggest the possibility of some cultivation (Wendorf et al. 1992; Wasylikowa et al. in press).

We have previously believed that the earliest cattle herders used the desert only after the summer rains, and that they returned to the Nile in late winter when the desert dried up. This was assumed because we had found no wells that were definitely associated with the earlier sites and without wells, the desert would be seasonably uninhabitable. However, the discovery that the pottery, which is unknown in the Valley, was locally made makes it likely that the people occupied the desert year-round.

We have classified the Holocene occupation in the Eastern Sahara into three stages: Early Neolithic (9500-7900 B.P.), Middle Neolithic (7700-6500 B.P.) and Late Neolithic (6500-5000 B.P.). By 8500 B.P., during the Early Neolithic, they were building oval huts, some of which were slab-lined, and digging bell-shaped pits about 1.0 m deep and 0.7 m in diameter. Around 8000 B.P., they dug large, deep wells and had long oval, brush-or mat-covered huts with shallow, saucer-shaped floors with several burned areas which probably resulted from reuse over several years. Sometimes the houses were arranged in straight lines. Most houses have adjacent storage pits.

Slightly later, the huts became round, smaller (3-4 m in diameter), and usually have one or more burned areas near the center. Some of these round houses were very shallow, with saucer-shaped floors, but others were 30-40 cm deep and occasionally were slab-lined. Burned clay impressions indicate that the upper parts of the walls were wattle-and-daub. Large bell-shaped storage pits occur in almost all sites.

Some of the later desert sites (7000-6000 B.P.) are very large and have deep trash accumulations, but it is difficult to tell how many houses were occupied at any one time. Around 7000 B.P., domestic sheep or goat, introduced

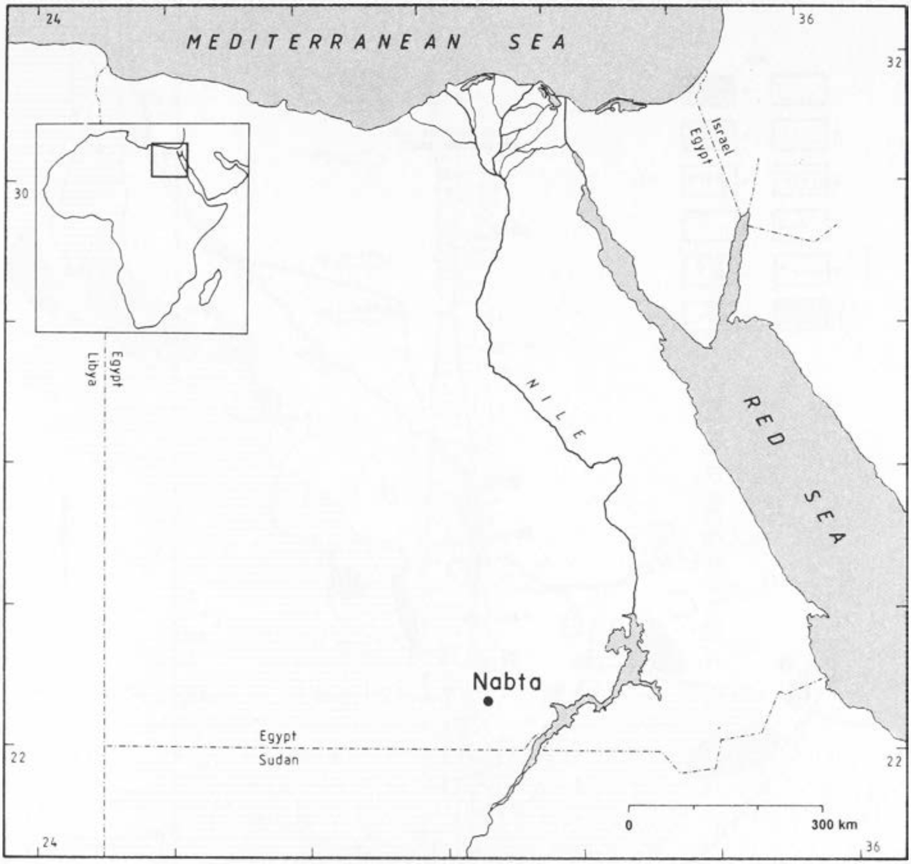


Fig. 1. Map of Egypt showing location of Nabta Playa.

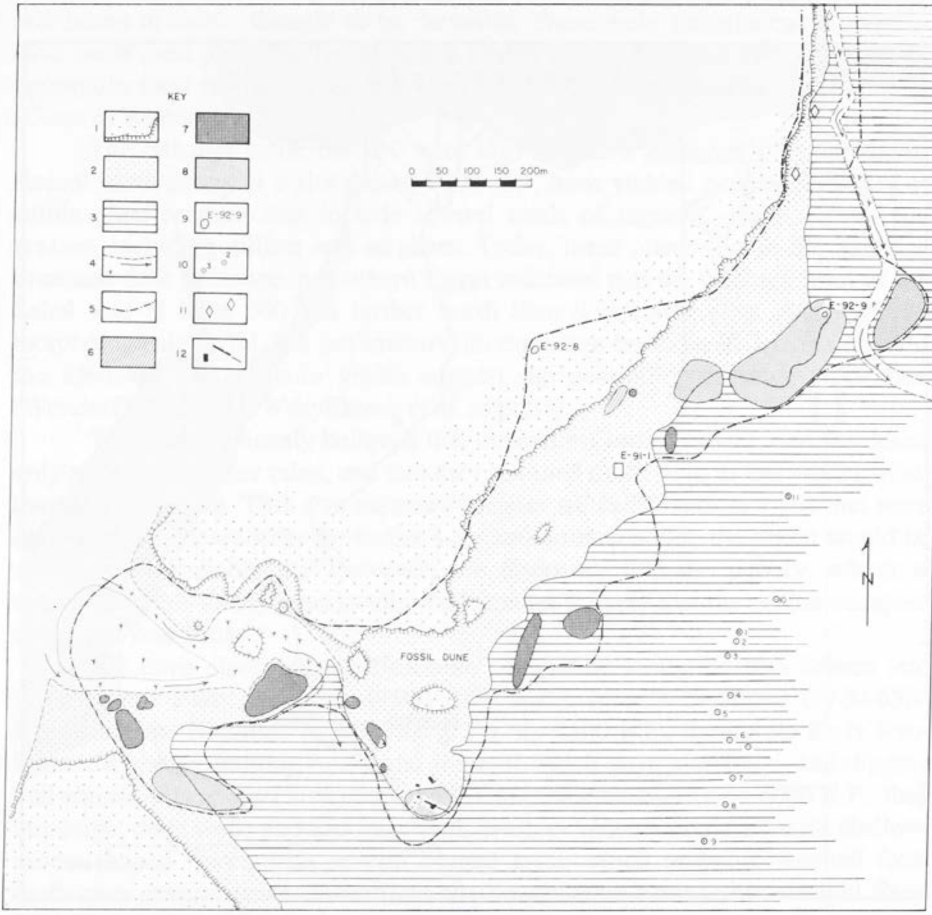


Fig. 2. Map of Site E-75-8. 1, Nubian sandstone; 2, sandsheet; 3, playa silts; 4, modern wadi; 5, limit of site; 6, Early Neolithic hearths; 7, Middle Neolithic hearths; 8, Late Neolithic hearths; 9, unexcavated site; 10, megalith; 11, slab-covered tumuli; 12, excavated areas. Slab-lined circle is designated E-92-9.

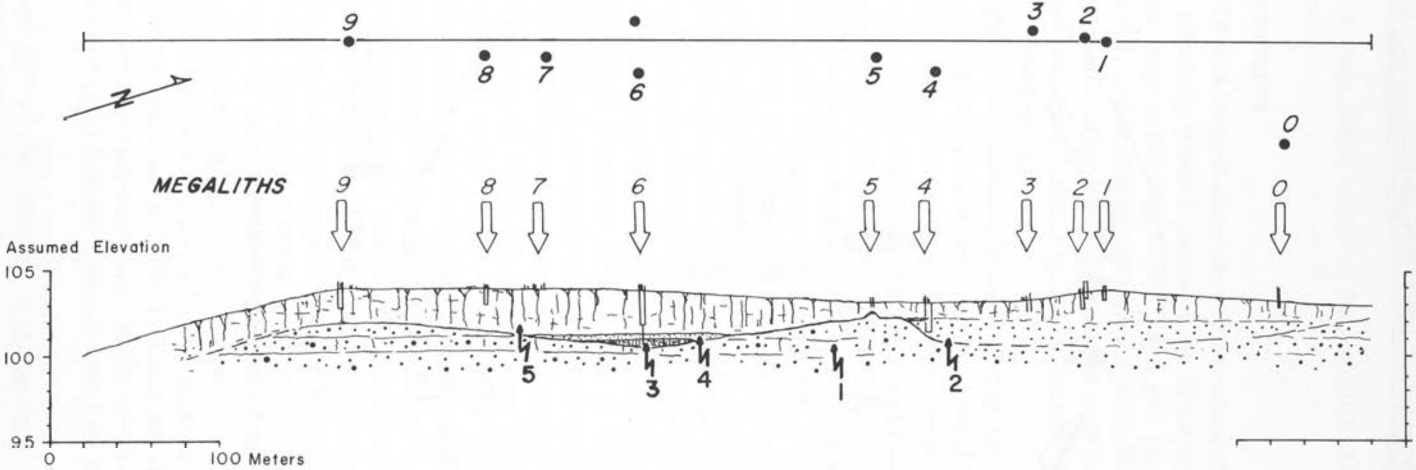


Fig. 3. Plan and profile of Megalithic alignment.

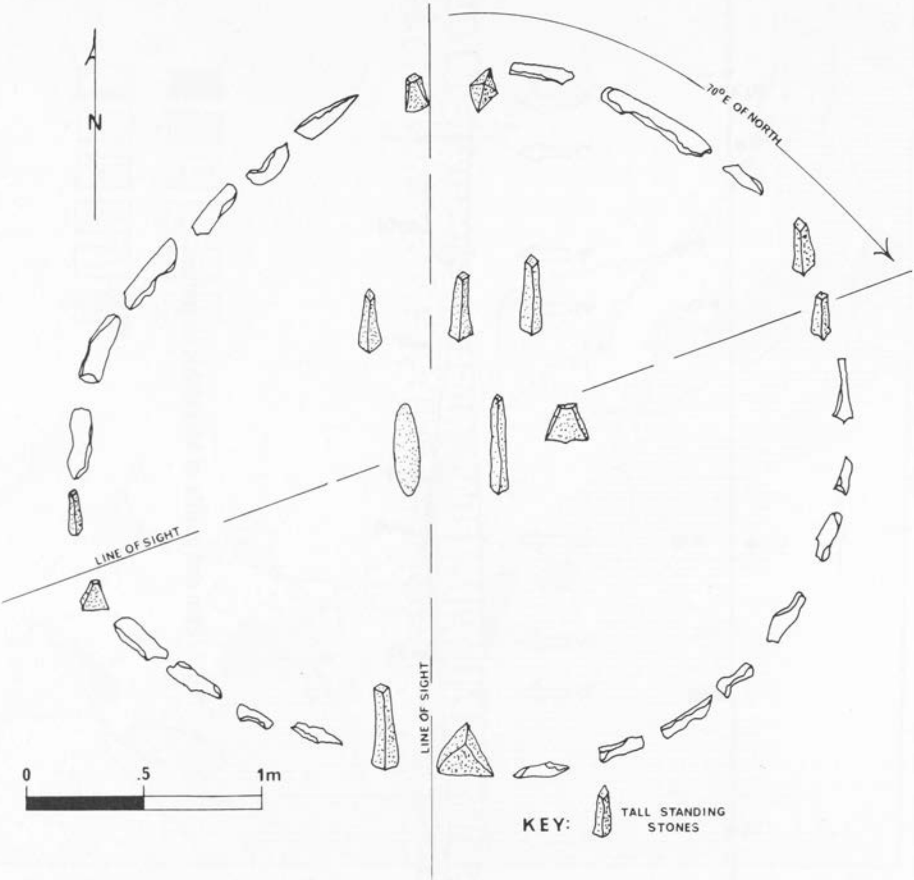


Fig. 4. Plan of slab-lined circle.

from southwest Asia, were added to the livestock. Ground and polished stone axes also appear.

**The megalith complex**

Site E-75-8 is located along the northwestern margin of Nabta Playa, one of the largest internally drained basins in the Western Desert of Egypt. The site occupies a dune ridge at the edge of the playa, just above the high-water level of the playa lake. It is one of largest sites known in the Western Desert, with a thick and continuous scatter of archaeological debris over an area of about 1500 m in length and up to 400 m in width (Fig. 2). In the central part of the site the debris has a depth of more than 2 m.

This locality was intensively used during the latter part of the Middle Neolithic and throughout most of the Late Neolithic (from ca 7000 to 5500 B.P.). They were cattle pastoralists and they also made some use of domestic sheep. The numerous grinding stones suggest that gathering of plants was also important, but food plants have not as yet been recovered from this locality. Site E-75-8 has been interpreted as a place where scattered groups repeatedly gathered, probably during the wet season, and presumably for social purposes. The size of the site and its location above the highest reaches of the flood supports this suggestion. The social purposes of such a gathering are, of course, unknown, but they may have included betrothals and marriages, trade and religious or ritual activities. This may also explain the relative abundance of cattle remains at this site, which recalls the practice among many modern cattle pastoralists of slaughtering cattle to celebrate significant occasions (Wendorf et al. 1985). Further testing of this aggregation hypothesis is now under study (Thanhouser, mss.).

The megalith complex has three parts. The first is located out in the playa along the eastern edge of Site E-75-8. It consists of a series of nine large (2 x 3 m) stones imbedded in the playa. A few of the stones were still upright, but others had fallen over, and some had broken into large blocks. These stones formed an almost north-south line, 500 m long (Fig. 3). The stratigraphic position of the stone within the upper part of the playa sediments suggests that it is probably a Late Neolithic feature, and probably dates around 6000 B.P.

The second part of the complex is about 500 m beyond the northern end of the alignment and consists of a circle of upright slabs, almost 4 m in diameter (Fig. 4). Four pairs of slabs around the periphery of the circle are larger than the others, and each of the larger pairs is set close together with a narrow slot between them. The slots between two of these pairs are aligned north-south; the slots in the other two pairs are at N 70° E. There are also six large upright slabs, arranged in two parallel east-west lines, in the center of the circle. Around the circle are >20 stone filled hearths, together with Late Neolithic pottery and lithic artifacts.

The third part of the complex is in the same N-S alignment and some 300 m beyond the small stone circle. It consists of two mounds or tumuli covered with slabs. There are >30 stone-filled hearths around the tumuli. Pits have been excavated at each of the nine stones in the megalith alignment to confirm that they were imbedded in the playa sediments, and not bedrock as we had originally assumed. In some instances, these stones rested on >2 m of playa sediments. None of the other features have been excavated.

## Conclusions

This megalith complex is significant because it may indicate the emerging combination of religious phenomena with leaders who could organize the construction of small-scale public architecture. If it has been correctly dated, the construction of this megalith complex may anticipate the arise of social complexity in Upper Egypt.

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Interregional Contacts in the Later Prehistory
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Barbara Adams

# Imports and imitations in Predynastic funerary contexts at Hierakonpolis

**Abstract**

This paper presents the archaeological evidence for a limited number of imported objects and possible local imitations of foreign material into the Hierakonpolis region of Upper Egypt in the late 4th millennium B.C. The evidence is derived both from a re-examination of the cemetery investigations of previous excavators (Green, Garstang, de Morgan and Lansing), as well as from the excavations undertaken by the American expedition under the directorship of the late Michael Hoffman in the wadi cemetery (Locality 6). The significance of extra-regional contact, the evidence for which has been supplemented by excavations at the Locality 29A desert edge settlement site, is also discussed.

**Cemeteries**

Relatively few of the imported objects depicted in the early publications and manuscripts concerning Hierakonpolis (Quibell & Green 1902; Garstang 1907; de Morgan 1912; Lansing 1935; Adams 1974 a, b; Adams 1987) have been re-located. These objects, particularly the pottery, have figured in discussions of foreign influences (Kroeper 1989), but the fact that they no longer seem to exist means that much of their value has been lost to modern scrutiny and analysis. No doubt the early excavators, who were not noted for their assiduous publication of these cemeteries, also overlooked other imports, which is perhaps still a potential risk today even with our scrupulous attention to detail.

One or two basalt vases with pedestals, which have not been found in a museum collection, were recorded by Green from the Naqada II (Gerzean) "painted tomb" cemetery (situated at the east edge of the present concession near the dune wadi and now obliterated by land reclamation), without context or associated objects (Quibell & Green 1902: pl. LXIV), so their relative date can not be ascertained. The footed basalt jars seems to have had a Lower Egyptian origin in Naqada I-II (Rizkana & Seeher 1988: type 1), without the Mesopotamian influence suggested earlier by Baumgartel (1955: 107). The evolved lug-handled, barrel shaped basalt vase with basering appears in Lower and Upper Egypt in late Naqada I (Rizkana & Seeher 1984: 237-252); fragments of this type have been found in association with Naqada I-II graves at Locality 6 during the recent excavations. Kaiser thinks that the basalt used in Upper Egypt came from Lower Egypt, where there is a quarry NW of the Fayum (Kaiser 1956: 100, note 1), but Needler assumed that it came from Aswan (1984: 241, cat. no. 117).

Various black "fancy" types of pottery are also noted in the early reports and these may originally have been influenced by Lower Egyptian types (Quibell & Green 1902: pl. LXIV); fragments of a globular black jar similar to type 5b from Maadi (Rizkana & Seeher 1987: pl. XVIII, ware 1a) were found in association with the Naqada I-II graves at Locality 6. The well-known wavy-ledge handled jars from Palestine, which initiated the development of wavy-handled jars in Egypt, are only represented by one unlocated example from a funerary context (Quibell & Green 1902: pl. LXIX, 3). A high-looped handle cup is also depicted (Quibell & Green 1902: pl. LXIX, 2) which is a Palestinian type (Dothan 1953: 132-7) known to have been copied in Egypt (Brunton & Caton-Thompson 1928: pl. XLVI, 12, XLVII, 2, UC. 9613; Brunton 1937: pl. XXXIV, 19; both from settlement areas). If they had been located both of these would have provided interesting samples for fabric analysis. The spouted vases, which were influenced by Palestinian types, but certainly produced in Egypt, were represented in three graves in the "painted tomb" cemetery (nos. 141, 602, 98), which Green's manuscript record shows also had some graves with Naqada III types (Adams 1974b). The vase from tomb 98 made in a local ware with a polished orange coating is in the Petrie Museum of Egyptian Archaeology (Adams 1974a: cat. no. 283, UC. 15098).

John Garstang undertook excavations in 1905 on behalf of the University of Liverpool in the Predynastic desert edge cemetery which stretches from the mouth of the great wadi northwest under and beyond the so-called mud brick Fort (Garstang 1907). An analysis of his work (Adams 1987), which was concentrated in the area enclosed by the Fort, revealed that the cemetery dates to Naqada II-III and its use shifted in time from the wadi (southeast) side to the north-west. No imported pottery was noted in Garstang's manuscript record, but there were various graves with classic W-class pottery and one grave (141) contained a spouted jar (L71G) with other pottery types of Naqada IIIa2-IIIb, such as net-painted and plain cylinders jars in a rectangular grave.

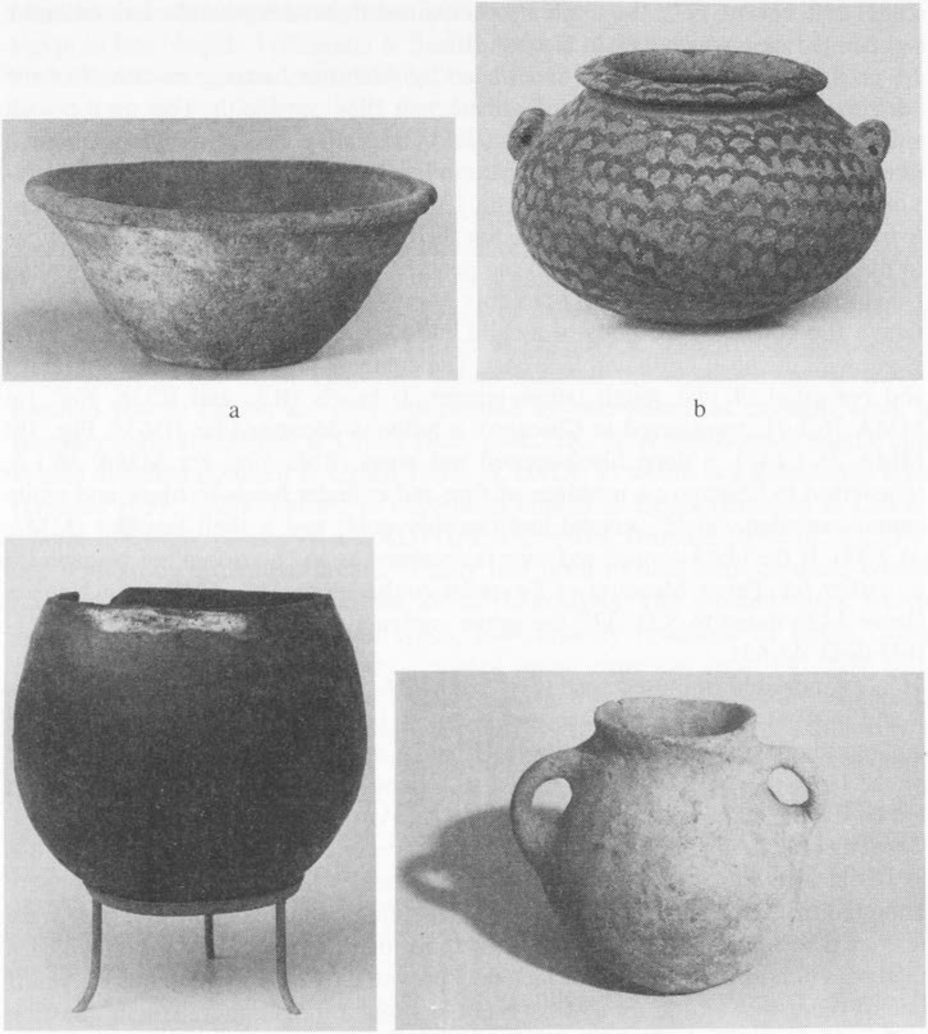
Subsequent excavation by Henri de Morgan at Hierakonpolis on behalf of the Brooklyn Museum took place in 1906-7 in the same cemetery. He dug a few graves between the Fort and the Kom el-Ahmar, a red mound of burnt brick and pottery from which the site took its Arabic name, now identified as an industrial complex (Geller 1989; 1992). This investigation seems to have produced only one example of a foreign import, an N-class painted pottery bowl of Nubian origin dating to the terminal A-Group from a grave north-east of the Fort (Needler

1984: 230, cat. no. 97); the tomb also contained three wavy-handled vases and a net-painted vase which date to Naqada III.

Further excavation was undertaken by Ambrose Lansing on behalf of the Metropolitan Museum in the same cemetery in 1934 outside the Fort on the wadi side in the "bench between the Fort and the valley bed". Most of "about a hundred" excavated graves seem to date to late Naqada II judging by the illustrations in the preliminary report (Lansing 1935), as the excavation remains unpublished (Diana Craig-Patch, in press), but there are some Naqada III pottery types in the museum's collection. Due to the generosity of the Curator of the Egyptian Department, Dorothea Arnold, I am able to present the record of one grave here. Grave 106 contained the body of a child buried in a crouched position in an oval grave with the head north and face east. The contents of the grave were not lavish and consisted of two rough (straw-tempered) bowls (R3c and R33b, Fig. 1a: MMA 36.1.71, transferred to Chicago); a bulbous decorated jar (D63a, Fig. 1b: MMA 36.1.143); a deep black-topped red bowl (B6E, Fig. 1c: MMA 36.1.8, transferred to Chicago); a necklace of ring and cylinder beads in black and white stone, carnelian, "slate", crystal and possibly gold; and a shell bracelet (MMA 35.7.37). If the black-topped red vase is accepted as an "heirloom" of Naqada IIa or earlier (cf. Petrie Museum of Egyptian Archaeology UC. 4245 from Naqada Grave 1426 dated to S.D. 37), the grave contents can be dated to Naqada IId1-IId2 (S.D. 42-63).

A possibly imported vase (Fig. 1d: MMA 36.1.78, H: 9.5, D: 5.5 cm) was found in front of the child's face and seems to be one of the small, two-handled jars (amphoriskoi) of Kenyon's Proto-Urban A and B (Kenyon & Holland 1982: pl. 12.1) of the type found in graves at Jericho (Kenyon 1960: fig. 15.1 from tomb A9460) and elsewhere in Palestine (Ai, Azor) during Early Bronze Age I. Ben-Tor (1992) says that these small pottery vessels were manufactured for use as burial gifts and, apart from isolated occurrences in Egypt, where they were imported by merchants and buried with them, and possibly Asia Minor, they were restricted to Palestine. It is tempting to think that here we have the grave of a merchant's child with one or two nice pots provided by his Egyptian hosts, even if one of them was a little used! I have not examined the amphoriskos in question and no analysis has yet been undertaken, but to judge from the colour slides provided, the fabric does not seem to be Egyptian. In Petrie's corpus (Petrie 1921) the shape equates to F85b, which he found at Naqada (Petrie & Quibell 1895: pl. XXVII). There is only one grave from Naqada (472) in Baumgartel's (1970) register of the graves which contained a pot of this shape and this is now in the Ashmolean Museum, Oxford (Ashmolean 95.677). Joan Crowfoot-Payne (1993 cat. no. 430) identifies this juglet as a red polished Nile silt ware (P79), so it is not an imported piece; the shape was obviously copied in Egypt.

The recent and continuing controlled excavation and research at Hierakonpolis directed by the late Michael Allen Hoffman has produced further examples of extra-regional imports and foreign influences both from the settlement and



a b c d

Fig. 1. Hierakonpolis pottery from Grave 106 excavated by Lansing in 1934.
a. R33b, MMA 36.1.71
b. D63a, MMA 36.143 (now in Chicago)
c. B6E, MMA 36.1.8.(now in Chicago)
d. "F85b", MMA 36.1.78; Rogers Fund 1936,
Courtesy of the Metropolitan Museum of Art, New York.

cemetery areas. Between 1979-85, the Hierakonpolis expedition undertook excavations in the large cemetery (L: 400 m), Locality 6, in the Wadi Abul Suffian (great wadi), over 2 km from the desert edge (Hoffman 1982). The cemetery had been found and summarily investigated by Green and then Garstang, robbed either before or after him, and then gone over by Lansing (Quibell & Green 1902; Garstang 1907; Lansing 1935). At the up wadi, south-west end a large rectangular tomb, no. 2 (L: 6.5, W: 2.1, D: 3.50 m), cut into the sandstone bedrock, was located by previous investigators and re-cleared by the expedition in 1979-80; pottery sherd gleanings suggest a Naqada III date, but there was much admixture from the earlier surrounding graves. Adjacent to Tomb 2 on the north-west side a number of these smaller rectangular graves were excavated in 1980. Tombs 3-9, although disturbed, contained a quantity of reconstructible pottery which enable them to be dated to Naqada Ic-IIa, the Amratian-Gerzean transitional phase. One of the vessels from Tomb 3 is a straw tempered, brown coated, vertically burnished jar with shape parallels among Nubian types (Reisner 1910: pl. 60a, 19); part of a similarly burnished black jar came from Tomb 6.

At the north-east end of the cemetery three large, mud brick lined, rectangular tombs have been excavated. The largest, Tomb 1 (L: 6.5, W: 3.5 m), also robbed in ancient and modern times, was cleared in 1979. Once again, the pottery recovered from this tomb did not represent the whole original repertoire, but there were enough types to indicate a Naqada III (Protodynastic) - transitional Dynasty I date. There was one stand with circular perforations cut out of its base, and these and other fancy stands and incense burners with cut-out and impressed designs were perhaps ultimately derived from prototypes which are known from the Ghassulian culture of Palestine, or even from as far as Uruk (Amiran 1969: 23-25, 47-8).

In 1982 and 1985 two more tombs were excavated in the north-east of the cemetery. Tomb 10 (L: 4.70, W: 1.90 m), which is adjacent to Tomb 1, was thoroughly robbed and, as in Tombs 1 and 2, only fragmentary pottery vessels were recovered, mixed with some earlier Predynastic sherds; these included cut-out and impressed stands in straw tempered ware. This limited sample again suggests a Naqada III (Protodynastic) date.

Excavation of the third tomb, no. 11 (L: 5.0, W: 2.40 m), produced the greatest number of artifacts from both in and around the looted crater, although in a fragmentary condition, and a considerable amount of pottery reconstruction has now taken place (Fig. 2). One or two of the types from these tombs, especially Tomb 1, such as the streak-burnished, orange-slipped bowls and dishes, the black-topped orange "hes" jars, the "granary" jars and the large cylinders or stands are known in Dynasty I. The original absence of certain other types which have been taken as chronological markers associated with Narmer, such as the degenerated wavy-line, cord-patterned cylinder type (W71), can not be assumed from such a pillaged context. The same observation can be made for large storage vessels of the type that sometimes have *serekhs* or potmarks on them (Kaiser &

Dreyer 1982: Abb. 14; Kroeper 1986/7; van den Brink 1988: figs. 12-15; van den Brink 1992); a sherd with the edge of a *serekh* was found in association with Tomb 11. In addition a mud sealing was found in Tomb 10 with the same sign group which appears on "Weinkruge" vessels from the Delta, Abu Roash, Saqqara and Abydos, dated to the time of Den (van den Brink 1992: 1). It is most likely that these tombs pre-date Hor-Aha and perhaps even Narmer, and that Tomb 11 (S.D. 74-81) and Tomb 10 (S.D. 73-81) pre-date Tomb 1 (S.D. 77-81).

There are some particularly interesting examples among the reconstructed pots from Tomb 11, which may have a bearing on international links. These include the thin walled, tall, late forms of wavy-handled jars (Petrie 1953: pl. VIII, 44f), which have a sandy pink fabric coated with a vertically streak-burnished cream slip. Eliezer Oren reported finding similar jars in his north Sinai survey, with and without wavy handles, and in his opinion they were locally made there, but of hybrid Egyptian/Canaanite manufacture (Oren 1989). Unfortunately, a small jug which has a thickening adjacent to the hole in the body wall indicating that a handle was once attached there, could not be completely restored. From the suggested reconstruction, the nearest parallels that can be located in the Palestinian repertoire seem to be the two juglets from the Proto-Urban (=Early Bronze Age I) burial caves at Azor (Ben-Tor 1975: pls. 9-10, fig. 6, 20-21). The fabric of the Hierakonpolis example is the compact pink of Hk ware type 5A (i.e. crushed calcium carbonate tempered Nile silt), but the surface is covered with an unusual red wash and there are external manufacturing marks above the base. Although not a Palestinian pot, it is almost certainly a copy of one.

Before leaving the discussion of pottery from Tomb 11, it is worth noting two anthropomorphic artifacts. The first is a pottery sculpture on a straw tempered Nile silt vessel of hand-supported, bulbous breasts beneath a crude ledge handle copying a Palestinian type. Although "breast-pots" are not unknown in later assemblages, nothing similar is known from the Predynastic. The only other anthropomorphic representation which came from the fill of Tomb 11 is a pottery figurine, broken below the hips. The figure wears a penis sheath curled back to the waist, reminiscent of figures from the Main Deposit (Quibell 1900: pl. XII, 5 & 6), with a bird-like head and a double bagged head-dress with its hands tied behind its back in the classic prisoner mode. These figures could perhaps be construed as satirical comments on the politics of the time.

The other artifacts recovered from the excavation and sieving of Tomb 11 are also rich. The extra-regional raw materials represented were gold, garnet and turquoise, mostly in the form of beads. Both gold and garnet occur in the Eastern Desert and it is possible that gold was imported from the A-Group; a gold mining region leads off the Wadi Alaqi in Lower Nubia. The chief source of turquoise was the Sinai peninsula, where garnet can also be mined. Lapis lazuli beads, a fine lapis shell and two lapis fly amulets were sieved from the tomb. Lapis lazuli is assumed to have come from Badakshan in the north-east corner of Afghanistan (Lucas & Harris 1962), and it does not occur in Western Asia; therefore any

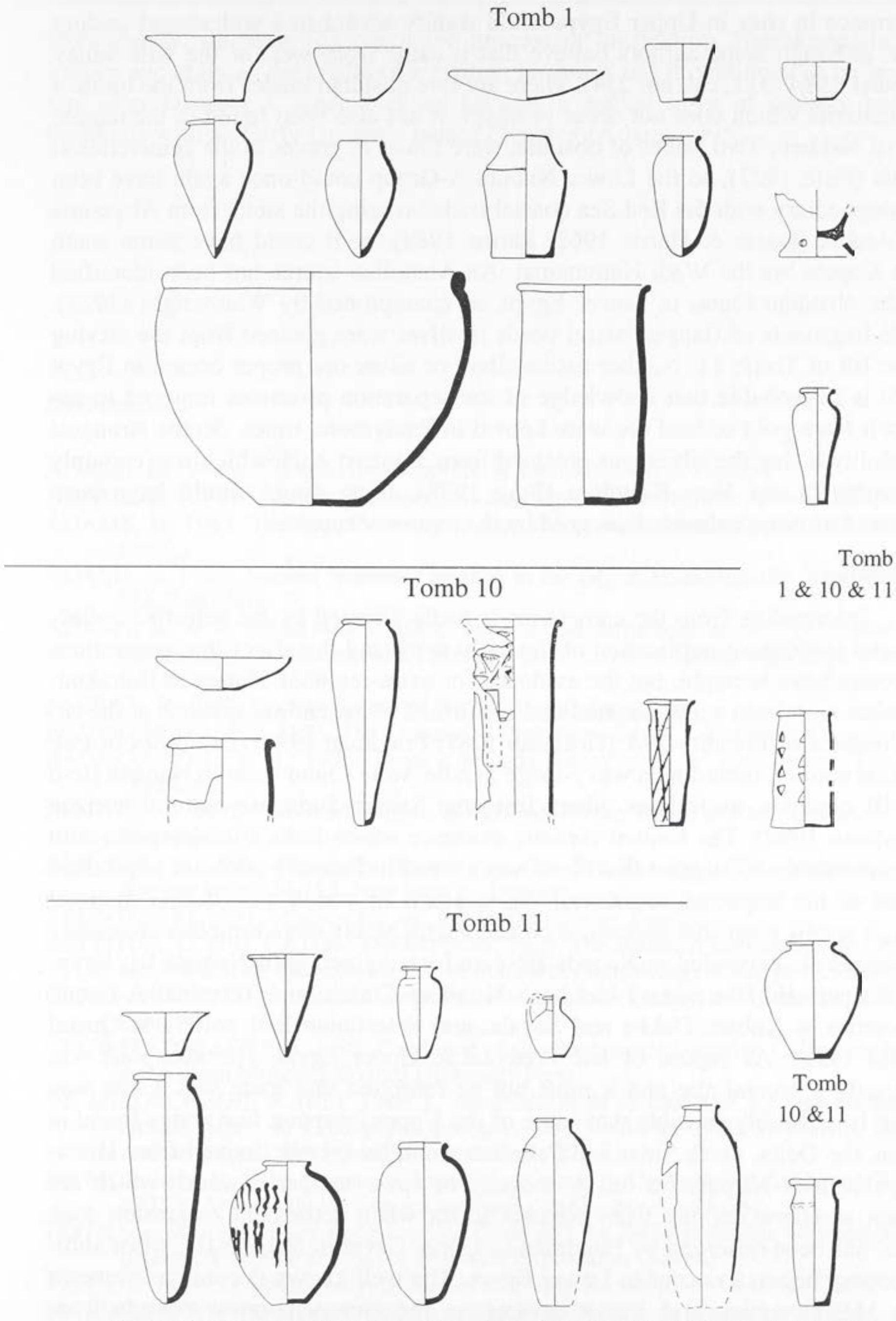



Fig. 2. Hierakonpolis. Sketch of pottery types from Locality 6, Tombs 1, 10 and 11.

occurrence in sites in Upper Egypt could signify access to a widespread trading route, although some authors believe that it came from west of the Nile valley (Needler 1984: 311, cat. no. 234). There are five obsidian blades from the tomb, a raw material which does not occur in Egypt; it has also been found in the temple area of Nekhen. Two flakes of obsidian were found in graves in the cemeteries at Seyala (Firth 1927), so the Lower Nubian A-Group could once again have been an intermediary with the Red Sea coastal trade bringing the stone from Abyssinia and Arabia (Lucas & Harris 1962; Zarins 1989), or it could have come south from Koptos via the Wadi Hammamat. An Anatolian source has been identified for the obsidian found in Lower Egypt, as championed by Wainwright (1927). Small fragments of flanged barrel beads in silver were gleaned from the sieving of the fill of Tomb 11. Neither native silver or silver ore proper occurs in Egypt and it is improbable that knowledge of the separation processes required to extract it from gold or lead ore were known in Predynastic times. So the strongest possibility is that the silver was obtained from Western Asia, which was certainly its source in the New Kingdom (Prag 1978). It no doubt would have been esteemed as more valuable than gold by the tomb's occupant.

**Discussion**

Information from the cemeteries is badly affected by the selective collection and inadequate publication of the early work and the effect that generations of looters have wrought, but the evidence for extra-regional contact at Hierakonpolis has now been supplemented and confirmed by recent excavations at the ritual complex of Locality 29A (Hoffman 1987; Friedman 1990). Examples of Palestinian pottery, including a wavy-ledge handle, were found there in Naqada IIc-d and III contexts, as well as others from the Saharo-Sudanese cultural horizon (Friedman 1992). The limited ceramic evidence which links Hierakonpolis with Palestine seems to suggest that there was a trend in funerary contexts to produce copies of the imported containers, the originals of which were found in ritual sites. It seems clear that reciprocal contacts with Nubia were established as early as Naqada Ic, expanded in Naqada IIb-c and maintained until Naqada III. Egyptian Naqada IId-IIIa pottery has been found in Classic and Terminal A-Group cemeteries at Kuban, Dakka and Seyala, and Palestinian EBI pottery at Qustul (Smith 1992). As capital of late Predynastic Upper Egypt, Hierakonpolis was obviously a pivotal site and it must not be forgotten that trade was a two way affair. It is entirely possible that some of the Upper Egyptian fine wares found in Nubia, the Delta, north Sinai and Palestine could have been derived from Hierakonpolis from Naqada IIa on. A ubiquity of straw tempered wares, which are known at Hierakonpolis from Naqada Ic-IIa when settlement expansion took place, has been observed by Friedman in Upper Egypt in Naqada IIc, when similar pottery begins to occur in Lower Egypt. The well-known decorative elements with Mesopotamian and Susan devices on the commemorative objects from Nekhen, often carved onto Nubian ivory, which had an influence on kingship iconography, illustrate the continued process of unification. Hierakonpolis was known anciently as the cradle of Egyptian kingship and it continued to be important after Dynasty I, when Nekhen became a walled town of densely packed buildings with an Early Dynastic palace complex (Adams 1995).

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Interregional Contacts in the Later Prehistory
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# The Predynastic site of Halfiah Gibli, Upper Egypt, and interconnections within the Nagada network

In 1898-99 Sir Flinders Petrie excavated a number of cemeteries in the Hu-Semaineh region of Upper Egypt, dating from the Predynastic to the Graeco-Roman period (Petrie 1901). Following a 1989 reconnaissance survey for Predynastic settlements in the vicinity of Petrie's excavated Predynastic cemeteries, two Predynastic settlements, HG at Halfiah Gibli and SH at Semaineh were located (Bard 1989). These sites were the focus of excavations in 1991.

## Site SH

Site SH was thought to be a late Predynastic settlement because of the Nagada III grave goods excavated here by Petrie. One calibrated radiocarbon date of ca. 3780-3530 B.C. (OxA-2184) was obtained on a charcoal sample from a test pit (Bard 1991: 130). Ceramics collected on the surface at SH in 1989 were of Predynastic wares with some Old Kingdom sherds. Excavations at SH, however, revealed a site with a great mixture of ceramics, predominantly dating to the Old Kingdom, but mixed with a few Predynastic and New Kingdom sherds. No evidence of domestic structures was found at SH, and the site is deflated, without stratified deposits above the paleosol, and part of the site had been disturbed by recent activities of a farmer. At the north end of the site was an Old Kingdom mastaba where fragments of mud-brick are still visible. A calibrated radiocarbon date of ca. 2860-2460 B.C. (OxA-2185) obtained from a charcoal sample from this feature would place it firmly in the Old Kingdom (Bard 1991: 130). Because of the predominantly Old Kingdom component at this site, excavations were discontinued here.

## Site HG

The main focus of excavations during the 1991 fieldwork was at Site HG. Nine units were excavated, mainly in areas not previously cultivated. No evidence of houses or any kind of residential structures was found, and it is presumed that cultivation in the 1950s and 1960s on the main spur destroyed any such features.

Excavations at HG were undertaken in areas that had not been previously cultivated, i.e., to the north and east margins of the main spur, and on a small spur to the east of the main village site. Unit 1 was excavated in a low-lying depression to the southeast of the main spur, where cultural material, consisting of sherds, lithics, and much charcoal, had washed down from the main settlement.

Ceramics consisted of an assemblage expected of a Predynastic settlement: large quantities of chaff-tempered ware (Rough class) intermixed with smaller quantities of polished red, black, and Black-topped red classes. Sherds of Predynastic bread molds were also identified by the ceramicist, Dr. Sally Swain. These ceramics probably date to late Nagada I and early Nagada II, but with the possibility that there may be a small later (mid-Nagada II) component. Three unusual ceramic items were found in Unit 1:

1) a pot-stand, consisting of a pinched ring of clay, tapered at the top,
2) a loop handle of Nile mud-clay, imitating imported (Palestinian) wares,
3) a large, globular ceramic bead, unpolished, 3.2 cm long and 3.2 cm in diameter.

Lithic tools from Unit 1 consisted of sickle blades (some with polish), some bifacial tools, flakes, and grinding stone fragments. No projectile points or other hunting/fishing tools were found, and there were relatively few scrapers. The stone tools, then, were those of an agricultural village. Numerous grinders and grinding stone fragments were also found on the surface of HG.

Paleobotanical evidence from Unit 1 also confirmed the agricultural subsistence base. Evidence was found for the major Predynastic (and Dynastic) cereal crops, emmer wheat and barley, in the form of carbonized grains and segments of cereal heads, as identified by the project's paleobotanist, Dr. Wilma Wetterstrom. On the northeast of the main spur at HG, two 2 x 2 m test units (2 and 3) were excavated, both with few cultural remains. Excavations continued in Unit 3 when the remains of durum wheat (*Triticum durum*) were recovered there through flotation, along with the remains of emmer wheat and 6-row barley. Further evidence of *durum* wheat, consisting of fragments of the stem and the cereal head, was subsequently recovered from this unit.

This was an unusual discovery because *durum* wheat has not been reported from Upper Egyptian Predynastic sites before, and it is only questionably known for this period from the site of Merimda in Lower Egypt (Zohary & Hopf 1988: 189). Subsequent to the Predynastic, the cultivation of *durum* wheat is not known in Egypt until Graeco-Roman times.

Although the samples of durum wheat were collected in a stratum in which Predynastic sherds were found, the remote possibility that the *durum* wheat remains may have been intrusive nonetheless needs to be addressed. The samples, though very small, are being sent to the Oxford radiocarbon laboratory, where they can hopefully be dated by accelerator dating.

To the east of the spur on which the main Predynastic settlement at HG is located is a smaller spur separated by a small wadi in which the washed material of Unit 1 was excavated. Predynastic sherds were found above, embedded in, and beneath the surface of soft calcium carbonate clasts. Mixed with the calcium carbonate clasts was a hardened ash-rich silt that had been cemented by water, probably natural rainfall during the period of site occupation.

Throughout the two excavation units (5 & 7) in this area were numerous pits with much wood charcoal and ash. Burned and firecracked rocks and cobbles were also found, as well as a number of heat-treated flakes and tools of chert. Abundant lithic debris from all stages of manufacture was also excavated, and it is thought that this was an industrial area for chert working (by heat treating). Considerably fewer sherds were excavated in these units than in Unit 1, although one unusual rim sherd of a White crosslined bowl (Nagada Ic) was found in Unit 5. Lithics have yet to be analyzed, and will be shipped back to Boston for analysis in 1993.

Paleobotanical evidence from Units 5 and 7 also suggests an industrial area. Unit 7 contained abundant remains of wood charcoal and very little other botanical remains. Other evidence from Units 5 and 7 also suggests stone working. A carnelian bead (Unit 5) and an unfinished agate bead (Unit 7) were recovered through flotation. An unworked green stone, identified as green felspar, was found in Unit 5. Green felspar was used for beads beginning in Predynastic times (Lucas and Harris 1989: 394).

Also in Unit 7 was a small ground stone palette of hard sandstone, slightly trapezoidal in shape with rounded corners. Its size (6.0 x 4.1 cm) suggests domestic use, as it is not of the larger, more elaborate types found in elite Predynastic burials. An end fragment of a large rhomboid slate palette (late Nagada I, early Nagada II) was also excavated in Unit 7, as was a polishing stone. No ground stone maceheads or chipped chert "lances," such as Petrie found in the nearby Cemetery B (Petrie 1901: 33-34), were excavated in Unit 5 or 7.

Beneath the levels with Predynastic artifacts in Unit 1, at level 7, an *in situ* semi-circular hearth was excavated with no associated sherds or lithics. A fragment of a mandible (tentatively identified as a small herbivore, such as a gazelle) was found between two hearth stones. This hearth is thus earlier than the levels with Nagadan sherds, and may be Epi-paleolithic.

## Evidence for trade and exchange

A preliminary analysis of the material found at HG suggests a widespread exchange network in which even a relatively small farming village (ca. 3 ha.) was engaged. Agate is found locally in wadi deposits, but the green felspar and carnelian come from the Eastern Desert (Lucas & Harris 1989: 387, 391, 394). Two very small lumps of copper were recovered through flotation (Units 1 and 3), and the nearest copper mines are also in the Eastern Desert (Lucas & Harris 1989:

210). A (pierced?) cowrie shell from the Red Sea was also found in the stone tool workshop.

Grinding stones collected on the surface of HG consisted of igneous rocks (rhyolite, porphyry, basalt, granite) and metamorphic rocks (marble, quartzite). Marble is found in the Eastern Desert, and the red and grey granites come from Aswan (Lucas & Harris 1989: 58, 414). The other igneous and metamorphic rocks are found near Aswan, as well as in the Eastern Desert (Lucas & Harris 1989: 61, 63, 416). Fekri Hassan (personal communication) has suggested that prehistoric Beduins living in the Eastern Desert would have known the sources of various hard stones and minerals, but the grinding stones from Aswan suggest exchange within an Upper Egyptian network.

Complex economic interaction is also suggested by another artifact excavated in Unit 1 at HG: a fragment of a mud-sealing. The sealing was created when a mud lump was impressed over three loops of string tied around a jar (or some kind of container). The existence of such a sealing suggests the exchange of valued goods in a regional or long-distance, and probably not local, exchange network. Such economic evidence from the settlement at HG would also correlate with grave goods excavated by Petrie in sometimes exotic materials, such as lapis lazuli and gold, from the nearby Cemetery B (Petrie 1901: 34).

Although the 1991 excavations at HG and SH did not uncover the remains of any domestic structures, a corpus of pottery from a Predynastic settlement, quite unlike that from Predynastic burials, is being prepared, and will be extremely useful for Predynastic settlement studies. No "Hard Orange Ware", as identified at Hierakonpolis, was excavated at HG, and Dr. Swain thought that such a ware at Hierakonpolis was a substitute for the preferable marl wares, only available farther north where the marl clays are found.

Coring was conducted at several locations along the floodplain by Dr. Eberhard Zangger. But coring on the floodplain near HG and SH revealed a sequence of intercalated river sand and floodplain alluvium with a total lack of sherds or other indications of human activity. It is likely that there was a large Predynastic site in the Hu region located on high ground of the floodplain closer to the river, but the alluviation here has been too deep to locate it.

Although much cultural material at the settlements of HG and SH had been disturbed, it was important to conduct these excavations because such settlements have been ignored by earlier archaeologists working in Egypt. As industrial and agricultural development increases in Egypt, such settlements are being destroyed, including evidence for the economic base which supported the rise of complex society and the early state in Egypt.

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# Expressions of social status: a statistical approach to the Late Predynastic/Early Dynastic cemeteries of Kafr Tarkhan

## Introduction

This paper summarises some of the results obtained from preliminary analyses of mortuary data from the Late Predynastic/Early Dynastic cemeteries excavated by Petrie (1913; 1914) at Kafr Tarkhan. The analysis is a continuation of previous work on these cemeteries (Ellis 1992) and is part of a longer term research programme into the social and ideological changes that took place during this important period of increasing socio-economic and political complexity in Egypt.

This paper will not concentrate on those formal, stylistic, technical or material aspects of the artefactual assemblage, although of course they are important aspects of the material cultural evidence in assessing interregional and international networks of socio-economic and political interaction. This is evident in assessing the nature and degree of 'the control of crucial but restricted resources' by corporate groups, as noted by Saxe (1970: 119) and others.[1] Broad quantitative and qualitative patterns within the mortuary data which might have meaningful socio-economic, political or religious correlates in the society of Late Predynastic/Early Dynastic Kafr Tarkhan will be investigated.

## Background

The site of Kafr Tarkhan (Fig. 1) lies approximately 37 miles south of Cairo on the west bank of the Nile and comprises burials dating from Late Predynastic to Roman times (Petrie 1914: 1). The Late Predynastic/Early Dynastic burials are dispersed over a wide area of the low desert, running north/south in a

[1] Here I understand 'crucial but restricted resources' also refer to prestige or exotic goods, which though not subsistence resources as referred to by Saxe (which has caused some confusion and debate [Morris 1991: 156] ) are highly important aspects in processes involving increasing social inequalities and their legitimacy (Hastorf 1990: 154).

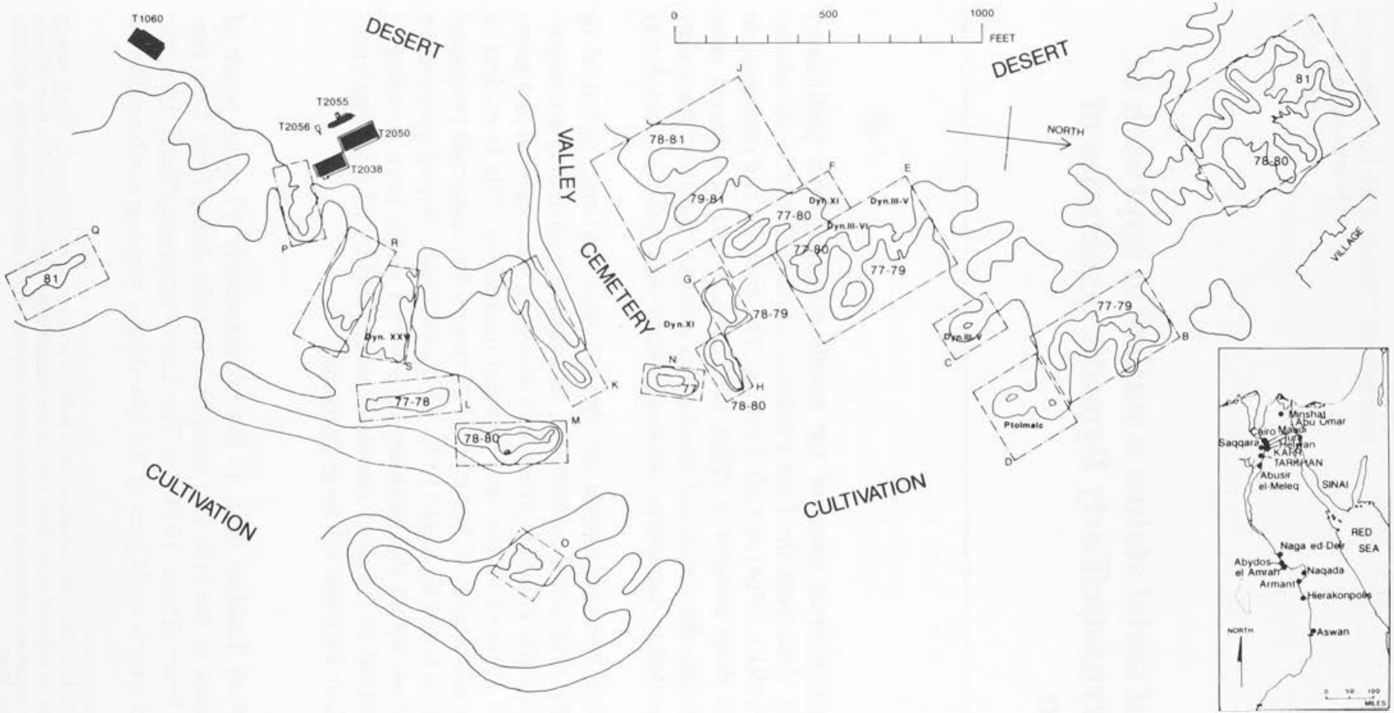


Fig. 1. Map of the Late Predynastic/Early Dynastic cemeteries of Kafr Tarkhan (Egypt inset).

relatively narrow strip. The whole area can be divided into two distinct spatial units defined by the local topography, namely the 'valley' cemetery and the 'hill' cemeteries. These were the cemetery areas recognised by Petrie in his investigations.

The 'valley' cemetery comprised 1054 burials which Petrie mapped on his cemetery plan (Petrie 1914: pl. XLVI). Petrie dated these graves to S.D. 77-81. In Kaiser's system they date to Naqada IIIa2-IIIc3 (Kaiser 1990: 289). The 'valley' graves include seven small mastabas[2] dated to S.D. 77-78 (Naqada IIIa2-IIIc1) at the western end of the cemetery (Petrie 1914: 2-3, pl. XII-XIV). The 305 burials of the 'hill' cemeteries date to S.D. 77-82 (Petrie 1913: 3), or Naqada IIIa2-IIIc3 (Kaiser 1990: 289). Occurring in isolation at the southern end of the cemeteries were four large ("great") mastabas dated to S.D. 80-81 (Naqada IIIc2-IIIc3). These structures include features such as mudbrick 'palace' facade superstructures, multiple-roomed substructures, enclosure walls and a few subsidiary burials (Petrie 1913: 13-20, pl. XV-XX; 1914: 3-9, pl. XV-XIX). From previous plots of burials for each sequence date (Ellis 1992) it has been noted that the 'valley' cemetery virtually went out of use in S.D. 79 (Naqada IIIc2; see Fig. 2), just at the same time as the 'hill' cemeteries expanded, indicating a spatio-temporal shift in the use of the Kafr Tarkhan 'mortuary space'.

Of the 1054 'valley' burials, 672 (63.8%) were statistically analysed (Ellis 1992) as they were listed in the published grave registers (Petrie 1914: pl. XXXII-XLIII) and mapped. Of the 305 recorded 'hill' burials, 303 (99.3%) were utilised as they were in the published grave registers (Petrie 1913: pl. LX-LXVII). Unfortunately, due to rainstorms many of the on-site grave numbers were lost before all but a small proportion of the grave positions could be properly recorded (Petrie 1913: 29).

Consequently a 'full' inter-cemetery 'macro-scale' (Clarke 1979) spatial analysis of the cemeteries could not be undertaken. Only 32% of 'hill' burials have their contents and position recorded (Petrie 1913: pl. XLVII-LXIX). Of the utilised 'valley' cemetery burials, 555 (82.6%) had known or recorded classes of sex/age while only 93 (30.7%) of the utilised 'hill' burials had known or recorded sex/age. This places limitations on the ability to discern statistically significant mortuary spatio-temporal patterning related to sex/age classes within or between any of the 'hill' cemeteries.[3]

[2] It has been stated in previous work on the Kafr Tarkhan cemeteries that there were six small mastabas in the west of the 'valley' cemetery (Ellis 1992: 254). There were in fact seven recorded, as utilised in this study and also shown on the cemetery plan (Ellis 1992: 256, Fig. 12). The error arose in the identification of small mastaba T.1231, as this was not numbered on Petrie's original cemetery plan (Petrie 1914: pl.XLVI).

[3] In a relatively recent study into the sex/age identification of 155 Predynastic/Dynastic skulls excavated by Guy Brunton at Qau, between 1924 and 1926, it was found that significant sex/age determinations by the original excavators were incorrect (Mann 1989). Of 108 utilised (because grave numbers indicated the original sex/age classification), 22 (20.3%) were incorrectly sexed and 5 (4.6%) were identified as child burials when they were in fact adult. If these percentage inconsistencies were present in the Kafr Tarkhan records it would greatly lessen, or even negate, the apparent artefactual and architectural

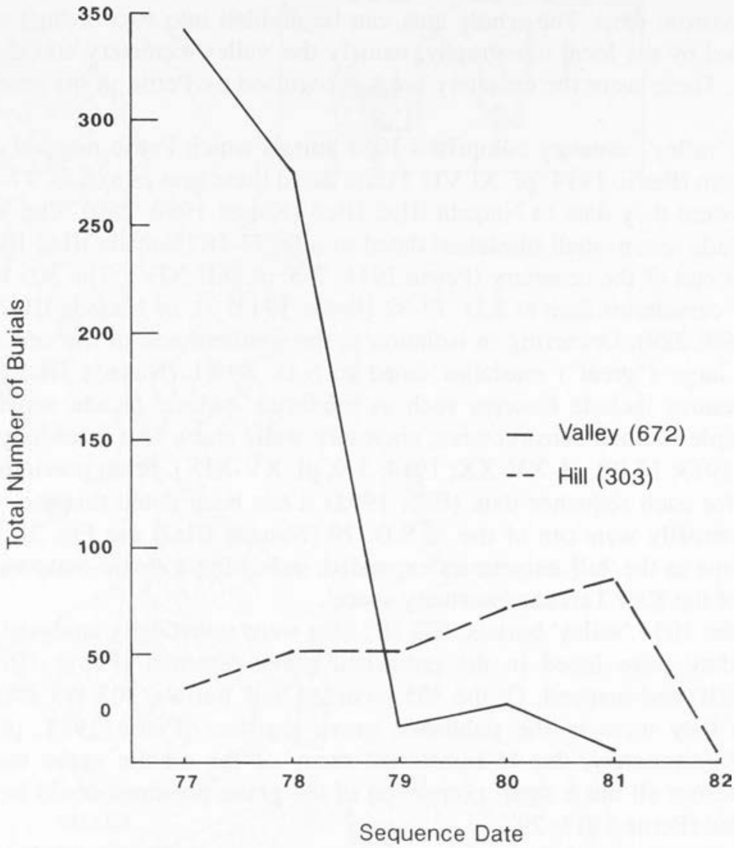


Fig. 2. Total burials for each sequence date.

I will now discuss the quantitative and qualitative artefactual information from the cemeteries, and then consider those aspects of the mortuary data not directly related to burial goods i.e. grave volume, tomb construction, etc.

These are treated separately in this paper, but they are not to be understood as independent aspects, but as some of the interdependent and multidimensional features of equal importance in analysing mortuary practices.

## Quantitative attributes of assemblages

The 'hill' cemeteries contain not only the most artefacts but also have the highest mean number of artefacts for each respective sequence date (Fig. 3), as concluded by Petrie (1914: 22, 52). It can be seen that there are no long-term

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differences in burial practices between males and females. Petrie does not discuss the criterion utilised by himself, or his colleagues, in the assessment of sex/age categories for each burial at Kafr Tarkhan.

| | SD 77 | SD 78 | SD 79 | SD 80 | SD 81 | SD 82 |
|---|---|---|---|---|---|---|
| hill | 8.63 | 10.88 | 8.38 | 8.47* | 13.58 | 7.20 |
| valley | 4.66 | 5.24 | 3.94 | 5.32 | 4.14 | N/A |

* SD 80 without T 1060 (122 artefacts). SD 80 with T 1060 mean = 10.29

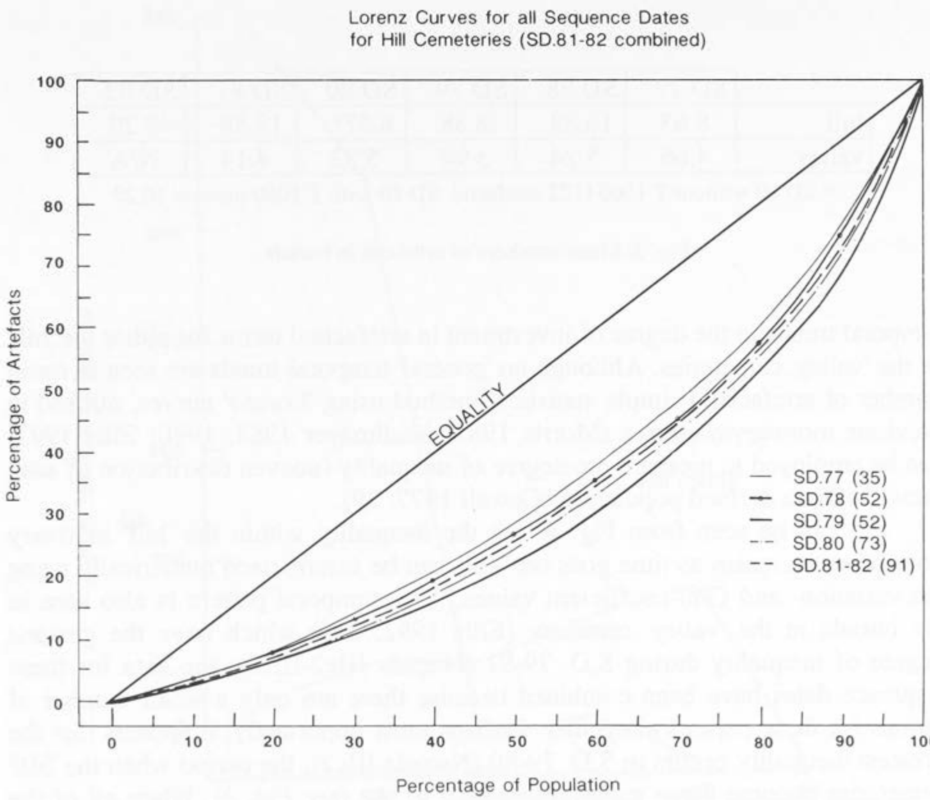
Fig. 3. Mean numbers of artefacts in burials.

temporal trends in the degree of investment in artefactual terms for either the 'hill' or the 'valley' cemeteries. Although no 'general' temporal trends are seen in mean number of artefacts, a simple statistical method using 'Lorenz' curves, utilised in previous mortuary analyses (Morris 1987; Seidlmayer 1988, 1990; Ellis 1992) can be employed to measure the degree of inequality (uneven distribution of artefacts) within a defined population (Cowell 1977: 29).

It can be seen from Fig. 4 that the inequality within the 'hill' mortuary population increases as time goes on. This can be summarised numerically using the variation- and Gini-coefficient values.[4] This temporal pattern is also seen in the burials in the 'valley' cemetery (Ellis 1992: 246) which have the greatest degree of inequality during S.D. 79-81 (Naqada IIIc2-IIIc3); the data for these sequence dates have been combined because there are only a small number of burials for these periods altogether. Perhaps most importantly, it appears that the greatest inequality occurs in S.D. 79-80 (Naqada IIIc2), the period when the 'hill' cemeteries become those most prominently in use (see Fig. 2). When all of the 'hill' artefact data are compared with the 'valley' data (Fig. 5) it can be clearly seen that there is a marked difference in the degree of inequality in the burials between these two topographical areas. This is borne out by the calcuiated variation and Gini coefficient values for these curves.

There is a general pattern for inequality in burials (with respect to artefacts) in both 'hill' and 'valley' to become more marked the closer one gets to S.D. 79, the time of Aha-Menes (Petrie 1913: 3). The greatest inequality in the 'valley' cemetery occurs in the western part of the cemetery where the seven small mastabas were located (Ellis 1992). The greatest degree of inequality occurs in the 'hill' cemeteries, both as a whole and when compared to the 'valley' cemetery for each respective sequence date.

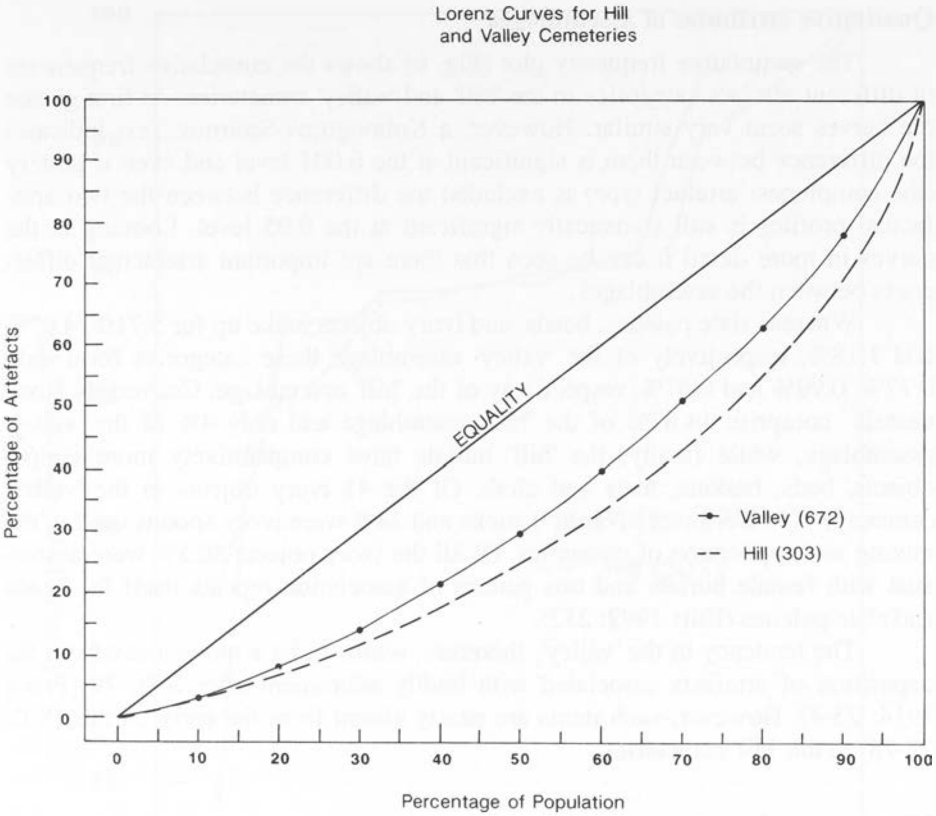
[4] The Gini coefficient quantifies the degree of inequality illustrated by a Lorenz curve. If the area under the 'equality' line is given a value of 1, then the area between the 'equality' line and each respective Lorenz curve is given as a proportion of the total area under the 'equality' line, e.g. a Gini coefficient value of 0.3568 means 35.68% of the total area below the 'equality' line occurs above that specific Lorenz curve.
The variation coefficient is a method of numerically describing the degree of dispersion around a mean value, whilst negating the effects of larger means which tend to produce larger standard deviations. Dividing the mean by the standard deviation it is possible to obtain a standardised numerically derived measure of dispersion (Shennan 1988: 43-44).




Variation and Gini Coefficients

| | SD77 | SD78 | SD79 | SD80 | SD81-82 |
|---|---|---|---|---|---|
| Variation Coeff. | 0.6694 | 0.7270 | 0.9177 | 1.3936 | 0.7800 |
| Gini Coeff | 0.3303 | 0.3420 | 0.4099 | 0.3825 | 0.3608 |

Fig. 4. Lorenz curves for all sequence dates for hill cemeteries.




Variation and Gini Coefficients
for Hill and Valley Cemeteries

| | Hill | Valley |
|---|---|---|
| Variation Coeff | 0.9675 | 0.5796 |
| Gini Coeff | 0.3738 | 0.2888 |

Fig. 5. Lorenz curves for hill and valley cemeteries.

## Qualitative attributes of assemblages

The cumulative frequency plot (Fig. 6) shows the cumulative frequencies of different artefact categories in the 'hill' and 'valley' cemeteries. At first glance the curves seem very similar. However, a Kolmogorov-Smirnov Test indicates the difference between them is significant at the 0.001 level and even if pottery (the commonest artefact type) is excluded the difference between the two artefactual profiles is still statistically significant at the 0.05 level. Looking at the curves in more detail it can be seen that there are important artefactual differences between the assemblages.

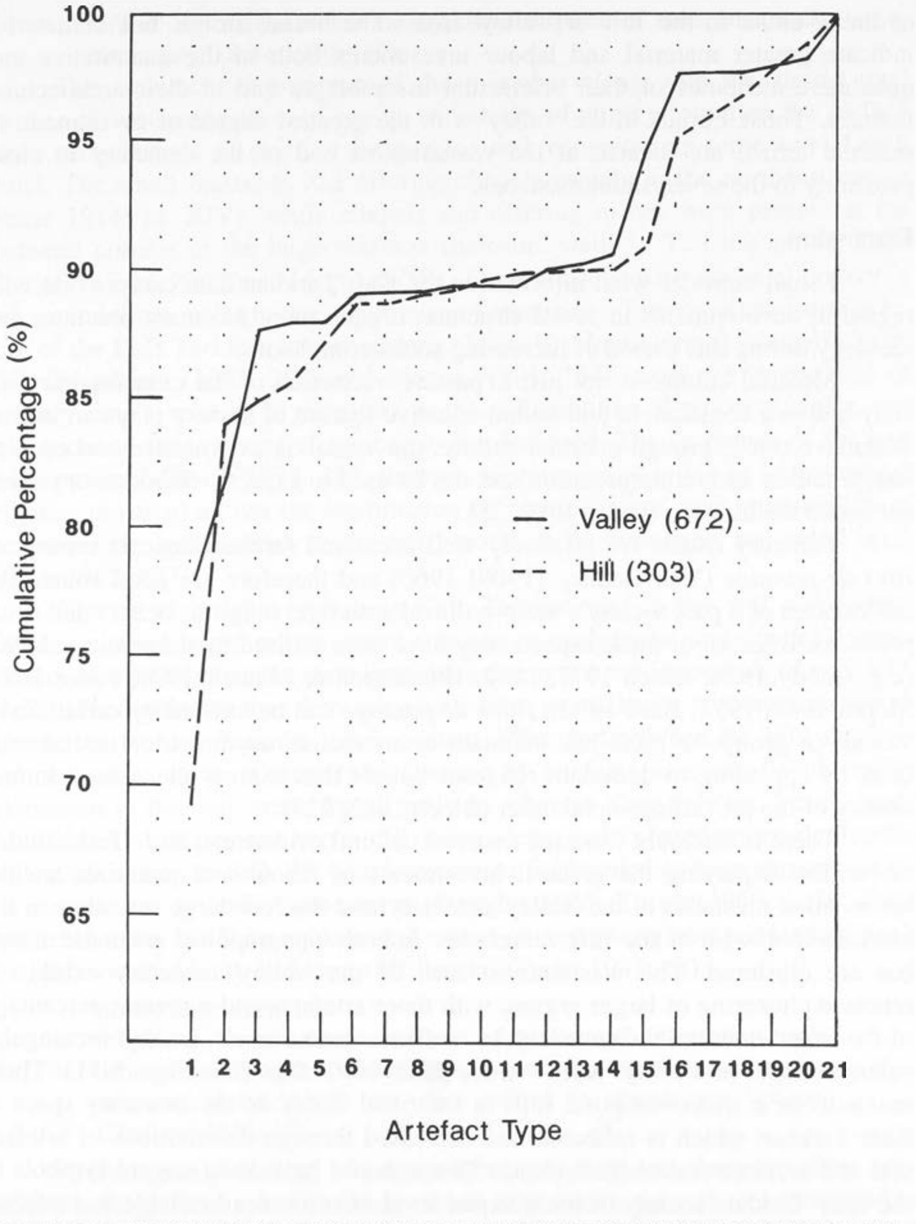
Whereas slate palettes, beads, and ivory objects make up for 5.71%, 4.07% and 1.18%, respectively of the 'valley' assemblage these categories form only 0.77%, 0.99% and 0.67%, respectively of the 'hill' assemblage. Conversely stone vessels comprise 14.82% of the 'hill' assemblage and only 4% of the 'valley' assemblage, while finally, the 'hill' burials have comparatively more copper objects, beds, baskets, mats and cloth. Of the 41 ivory objects in the 'valley' cemetery, 70% were ivory ("kohl") sticks and 24% were ivory spoons used in the mixing and application of cosmetics. Of all the ivory objects 80.5% were associated with female burials and this pattern of association repeats itself for beads and slate palettes (Ellis 1992: 252).

The tendency in the 'valley', therefore, seems to be a move away from the deposition of artefacts associated with bodily adornment after S.D. 79 (Petrie 1914: 23-4). However, such items are nearly absent from the early burials (S.D. 77-78) in the 'hill' cemeteries.

## Mortuary architecture

Grave size has been used by a number of scholars as an indicator of social status (Binford 1972; Tainter 1973, 1978; Adams 1987; Bard 1988, 1989; Seidlmayer 1988, 1990) since it represents the degree of material and labour resources invested within each burial, recoverable in the archaeological record. The mean grave volumes for both the 'hill' and 'valley' cemeteries were plotted. Although there is quite a large difference between the 'hill' and the 'valley' burials for each respective sequence date, no discernible temporal trends are seen. On average, the 'hill' burials have a mean grave volume 1.5 - 2.5 times larger than the 'valley' graves for any given sequence date.

Moving onto the construction of the graves the 'valley' cemetery had only 12 'roofed' and 3 'lined' graves whereas the 'hill' cemeteries contained 20 'roofed' and 24 'lined' burials (four of which are lined with wood). Significantly, of the three burials in the 'valley' cemetery that were lined (with mudbrick), two were small mastabas (T. 740, T. 852) and the last T. 1113 (which was the only tomb in the 'valley' to be mudbrick 'roofed' and 'lined') was less than seven metres from the east side of the small mastaba T. 1231, both dated to S.D. 77 (Naqada IIIa2). There was no discernible temporal trend in tomb construction regarding roofing




| | | | | |
|---|---|---|---|---|
| 1. pottery | 5. flint objects | 9. ivory armlets | 13. copper armlets | 17. beds |
| 2. stone vessels | 6. ivory objects | 10. flint armlets | 14. shell armlets | 18. baskets |
| 3. slate palettes | 7. horn objects | 11. slate armlets | 15. beads | 19. mats |
| 4. copper objects | 8. wooden objects | 12. horn armlets | 16. coffins | 20. cloth |
| | | | | 21. other |

Fig. 6. Cumulative frequency plot of artefact types in hill and valley cemeteries.

or lining either in the 'hill' or 'valley' areas. The burials in the 'hill' cemeteries indicate greater material and labour investments both in the quantitative and qualitative attributes of their artefactual assemblages and in their architectural features. Those burials in the 'valley' with the greatest degree of investment, in material terms, are located at the westernmost end of the cemetery in close proximity to the seven small mastabas.

**Discussion**

I shall consider what information the Kafr Tarkhan data can provide with regard to developments in social structure, organisation, mortuary practices and ideology during this period of increasing social complexity.

Material culture is not just a 'passive' reflection of the contemporary society but as a constitutive and communicative feature of society plays an 'active' discursive role. Through material culture, the 'social' is externalised and open to interpretation and reinterpretation and can be used to express, elaborate or engender social distinctions (Pader 1982: 35).

Funerary rituals are relatively well preserved (archaeological) records of *rites de passage* (Van Gennep [1909] 1960) and therefore are good sources of information of a past society's socio-political structure, religious beliefs and ritual practices. Because of these aspects they have been utilised by numerous scholars (e.g. Goody 1976; Bloch 1977, 1982; Huntington & Metcalf 1979; Pader 1982; Morris 1987, 1991; Bard 1992). *Rites de passage* can be utilised by certain individuals or groups to establish, maintain or 'naturalise' asymmetrical social relations by appealing to dominant religious beliefs that express the natural immutability of the prevailing social order (Bloch 1982: 227).

There is no doubt from the material cultural evidence at Kafr Tarkhan that the tombs displaying the greatest investments of labour and materials are the seven small mastabas in the 'valley' cemetery and the four large mastabas in the extreme southwest of the 'hill' cemeteries. In both topographical areas the mastabas are clustered. The westernmost area of the 'valley' cemetery exhibits a repeated clustering of larger graves, with more artefacts and a greater percentage of the 'rarer' items in the cemetery i.e. coffins, stone vessels, incised rectangular palettes, beads and ivory "kohl" sticks (Ellis 1992: 251-253, Figs. 8-11). There seems to be a spatio-temporal shift in the ritual 'focus' of the mortuary space at Kafr Tarkhan which is reflected and expressed through distributions of artefactual and architectural characteristics. These would have been cogent symbols to the Kafr Tarkhan society of the unequal level of resources available to sectional interests within the population (Ucko 1969; Chapman & Randsborg 1981; Goldstein 1981; Pader 1982). This aspect of mortuary patterning is best described by Saxe's Hypothesis No. 8, in his seminal work on mortuary practices.

> "To the degree that corporate group rights to use and/or control crucial but restricted resources are attained and/or legitimised by means of lineal descent from the dead, such groups will maintain

> formal disposal areas for the exclusive disposal of their dead and conversely" (Saxe 1970: 119).

The architectural evidence of the mastabas along with the almost total absence of superimposition of graves and stacks of pottery found on the surface above many burials, all point to the marking and recognition in some way of each burial. The small mastabas had offering chapels usually at the northeast corner (Petrie 1914: pl. XIV), while chapels and offering niches were present at the southeast corners of the large mastaba enclosure walls of T. 1060 and T. 2038 (Petrie 1913: pl. XV(2); 1914: pl. XVIII). These chapels, with stacks of pottery in and around them, point to the importance of mortuary offerings in the ritual practices of the Kafr Tarkhan society. Goody (1976: 9), Huntington & Metcalf (1979: 117), Woodburn (1982: 206) and Morris (1991: 154) stress the importance of funerary rituals, relating to ancestors, in the redistribution of property, rights, and obligations to those owing allegiance to the deceased. The "presence of the past in the present" (Bloch 1977: 287) through ancestor worship (as an 'instrumental' religious practice) allows the legitimation or 'naturalisation', and immutability of the prevailing social order of the 'real' world to be expressed and acted upon (Bloch 1982: 227).

The focus in later periods at Kafr Tarkhan was in the 'hill' cemeteries. These contained larger graves, more artefacts in each burial and greater degrees of inequality in mortuary investments, even during the earlier periods of use (S.D. 77-78). This indicates that there may have been two discrete corporate groups in competition at Kafr Tarkhan. An important difference between the 'hill' and 'valley' cemeteries is the almost total absence of artefacts associated with bodily adornment in the 'hill' areas for all periods, whereas slate palettes, beads, ivory "kohl" sticks and spoons were still being deposited in predominantly female 'valley' burials up to S.D. 79. Much important fieldwork has been carried out on the importance of bodily adornment (Douglas 1966; Turner 1969, 1979; Faris 1972; Strathern 1981) as a "potential means of expressing and reinforcing one's sex role, social identity and group affiliation" (Pader 1982: 18).

> Bodily adornment .....
> in general, forms an important part of the flow of information-establishing, modifying and commenting on social categories, such as age, sex, and status, which are also defined in speech and actions" (Strathern 1981: 15).

Unfortunately the loss of information in the 'hill' area does not allow conclusive sex/age results, but obviously some important aspect of society related to women, through bodily adornment, is being expressed. Bloch has outlined a very basic social pattern from the study of ethnographic material, whereby the quantity of ritual related to communication between individuals varies according to the degree of instituted hierarchy within a particular society. This communication through ritual is specifically to do with male relationships with, and male control of, women (Bloch 1977: 289).

## Conclusions

What seems apparent in the spatio-temporal patterning in the Kafr Tarkhan mortuary data is a shift in the ritual focus of discrete areas of the 'mortuary space' as a medium of social expressions and aspirations, possibly between two corporate groups within the society. A spatial shift in the focus of rituals and worship relating to the past and continuing social order may represent a shift in sectional interests. The strength of the patterning within the material and in space would seem to negate the possibility of coincidental distributions between the 'hill' and 'valley' areas. Through ritual practices related to mortuary investments, burial location and offerings to the ancestors, increasing social distinctions were made manifest and open to social discourse. Through material culture, ritual practices involved in burial could be seen as cogent symbols of the 'natural' immutability of the prevailing asymmetrical social order. The increase in the degree of mortuary ritual investments reflecting the greater degree of institutionalised hierarchy within the society coming, significantly, at the supposed period of the Unification of Egypt in the reign of Aha-Menes. Perhaps as Hassan (1988) has outlined, women had an important role within Predynastic Egyptian society and what is seen at Kafr Tarkhan may be an indication of the increasingly important way both women and ancestors were used in ritual concepts of rebirth and fertility to legitimise the secular authority of specific groups.

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Interregional Contacts in the Later Prehistory
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# Raw material procurement in the Tarifian and in the Naqada Culture: a case study from the Nile Valley in Upper Egypt

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## Introduction

One aspect of investigations into lithic inventories of Predynastic Egypt is the question of lithic raw material procurement and processing. The discussion of the issue is particularly difficult as the basic raw material used in chipping techniques, viz. flint, was widespread in this section of the Nile Valley in Upper Egypt.

Investigations into the differentiation of flints have been limited so far to the Theban Gebel where considerable variability of both macro- and microscopic characteristics, also mineralogical and geochemical differentiation of flints have been established in the vertical cross-section of limestone rocks of the Theban Gebel (Ginter et al. 1985: 17). Simultaneously, excavations were conducted by the authors of this paper on the multilayer sites located at the foot of the Gebel i.e.: El Tarif and Armant. This has enabled us to evaluate types of local raw materials which were used, and the place and method of their processing within the area of the settlement. In addition, the importance of specialized workshops, located always in the vicinity of extraction points, for supplying the settlement with raw material, has been evaluated (Fig. 1).

Because the territorial range of the survey conducted near the raw material deposits was relatively limited the question of mesolocal raw materials has presented more problems. Identification of areas of deposits of these raw materials was difficult, sometimes impossible. A similar situation was found also in the region north of Western Thebes as far as Hemamieh where the imported Theban raw materials occur as mesolocal accompanied by other raw material whose provenance has not been determined.

We have not established, in the explored area, the presence of extralocal flints from deposits located at a distance of more than a hundred kilometres. In all likelihood absence of extralocal materials is connected with the abundance of

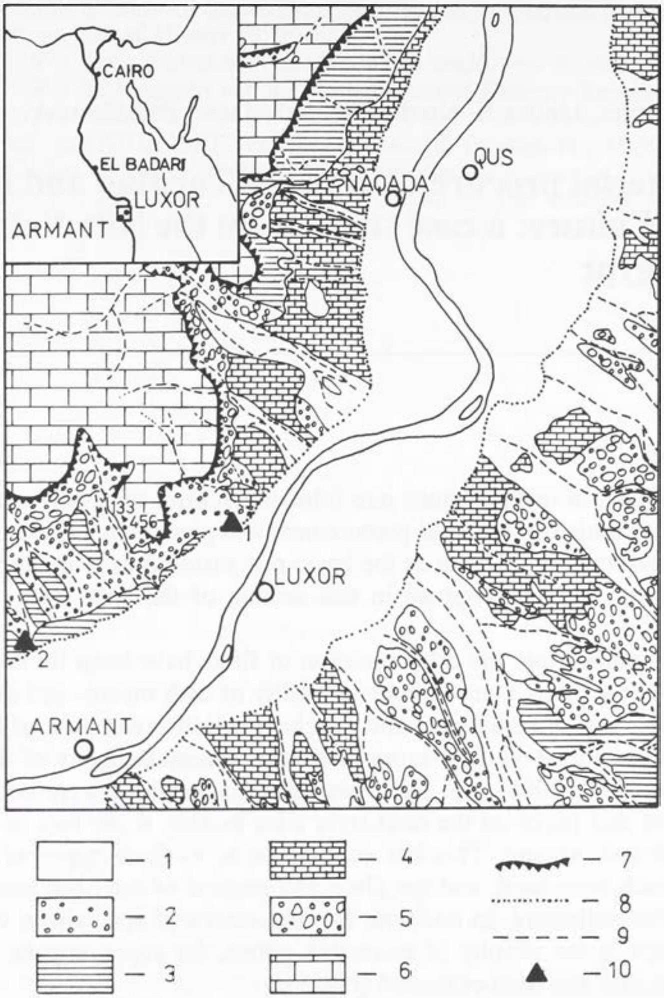


Fig. 1. Map of the surveyed area. Numbered sites: 1 El Tarif, 2 Armant MA 21/83.

1 Floodplain,
2 younger pediment,
3 Neo-Nile silts,
4 Dendara-Qena formations,
5 Pliocene formation,
6 Theban Limestones,
7 cliff,
8 limit between low desert area and cultivation zone,
9 wadi beds,
10 multilayer Predynastic sites.

local flints and imports from nearby deposits. On the other hand, we have recorded some extralocal raw materials other than flint, which were not worked, as a rule, by chipping technique.

Although the present work is based only on selected and incomplete results of investigations, it is nevertheless the first attempt at describing the system of raw materials procurement in the cultures of Predynastic Upper Egypt. In terms of chronology the present paper covers the period of development of the Tarifian (5th mill. B.C.) and the Naqada culture (4th and 4/3rd mill. B.C.). We have compared two taxonomic units focusing our attention in particular on the differences within the sequence of the development of the Naqadian layers in the site of Armant (MA 21/83), and the differences between synchronous sites of the Naqada culture viz. between the site of El Tarif and the younger phase of the site MA 21/83.

**Major groups of raw materials and their provenance**

The western bank of the Nile in the region of Thebes is built of sedimentary rocks containing numerous flint nodules. This is in contrast with the Eastern Desert which is built from igneous, metamorphic and detric rocks which do not contain flint. The most complete cross-section of limestone rocks is found in the Theban Gebel itself where over 30 levels of occurrence of flint nodules have been identified. Naturally, only some of these flints had properties which answered the requirements of prehistoric man. Among the types with high fissibility three groups, macroscopically distinguishable, should be mentioned: grey flint referred to as "Theban", grey-pink flint, and green flint.

Grey flint is present in several levels of Theban limestones from the floor to the top part. Grey-pink and green flints are contained primarily in the middle part of the sequence of Theban limestones, in the neighbourhood of structural platforms above the column weathering series (Fig. 2). All the flint types, also those with poor fissibility, occur as well in secondary deposits viz.:

1. in gravitational fans and scree sheets at the foot of the cliff, and on structural platforms,
2. in the pediments and wadi beds carrying material from the hills to the Nile Valley.

Our investigations have confirmed that all the types of deposits were used as the source of raw material.

The types of flints enumerated above are easily distinguishable on the basis of their macroscopic features such as, first of all, colour. It should be pointed out, however, that mineralogical examination of these flints reveals fairly close proportions of chalcedony (87-93%), quartz (5.6-10.2%), carbonates (1.1-1.4%) and opaque minerals (invariably 0.1%). Grain fractions are also similar. Grey-pink flint is an exception as it does not contain the fraction bigger than 10µ which influences the quality of this type of raw material. Differences between the above-mentioned raw materials become apparent only in geochemical characterization. Thus, green flint differs considerably from grey flint in respect of the content of minerals such as Na, K, Mn, Ni, Cu, Pb and Cr. Grey-pink flint, on the other hand, differs from the latter type in respect of the content of Na and Mn.

In the Predynastic series under investigation all the enumerated macroscopic types are represented both by specimens derived from primary deposits or

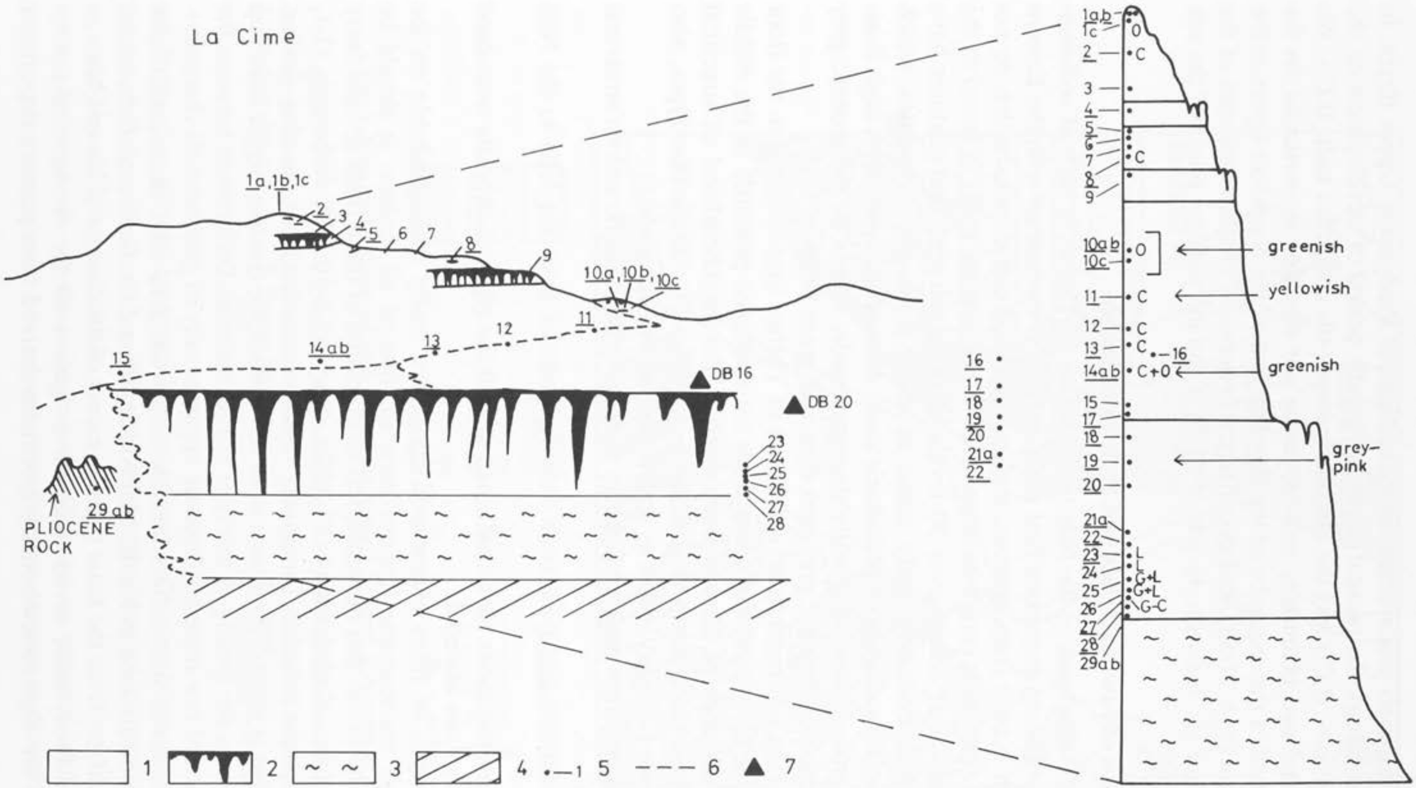


Fig. 2. Flint outcrops in the profile of the Theban Gebel:
1 - Theban Limestone, 2 - Theban limestone beds with culumn weathering, 3 - Esna shales, 4 - scree at the foot of the hill, 5 - sampling spots and numbers indicating flint samples, 6 - paths.

gravitational fans as well as from alluvial deposits. The latter have cortex which is river-worked in varying degree or patinated surfaces without cortex.

In the archaeological sites in the investigated region we have distinguished several types of raw materials which have no analogues in the local Theban limestones. This is first of all black flint, opaque, almost matt, present in the form of spherical nodules. In the investigated area these flints are found only as small chunks (which are unsuited for processing) in the Qena sands. This indicates that deposits of this raw material are located in the areas to the south. At the same time we know that a similar raw material is found in Palaeolithic sites in the region of Esna. To the same group of flints belong as well transparent pink flints with opaque, light intercalations, and opaque grey flints with slightly glossy surfaces. Possibly, these flints come from limestones north of the investigated region. However, the precise location of their deposits is not known, nor the location of deposits of several other types found e.g. on the sites in the region of Hemamieh.

Besides flint the investigated sites contained as well metamorphic and igneous rocks. Rocks like this are not known in the Nile Valley or in the adjacent part of the Western Desert. These are rocks such as rhyolite-porphiry, kerato-phyre-trachyte, diabase and fine-crystalline red granite. These rocks occur in the region of Wadi Hammamat where identical diabases are abundant and where metamorphic rocks of the type of serpentine and trachyte have been identified. Therefore, the enumerated rocks all come from the Eastern Desert and the state of preservation of primary surfaces indicates that they were collected from alluvial sediments in that region.

Some of the sedimentary rocks found on the investigated sites also come from the Eastern Desert. This is, for example, breccia antica whose quarries were exploited in the region of Wadi Hammamat in the Pharaonic period. The data concerning the provenance of metamorphic shales and nummulithic limestones are less precise.

## The Tarifian

Our characterization of raw materials of the Tarifian is based on the data from the site in El Tarif (Ginter et al. 1979a: 19). The general structure of the series of more than two thousand artefacts is dominated by the grey "Theban" flint which accounts for 81.9% of raw materials. It is interesting that the local green flint is present only in trace quantities amounting to only 0.2% whereas flints which are probably mesolocal viz.: greyish (6.2%), black (4.6%) and pink (1.0%) occur in significant proportions (Fig. 3).

The general structure of major groups of artefacts made in grey "Theban" flint shows that the whole of the cycle of technological operations was carried out in the area of the settlement. This is confirmed by the fairly high ratio of cores and the high index of flakes. Wholly cortical specimens are represented (more than 5%) as well as partially cortical (more than 43%). The proportion of flakes

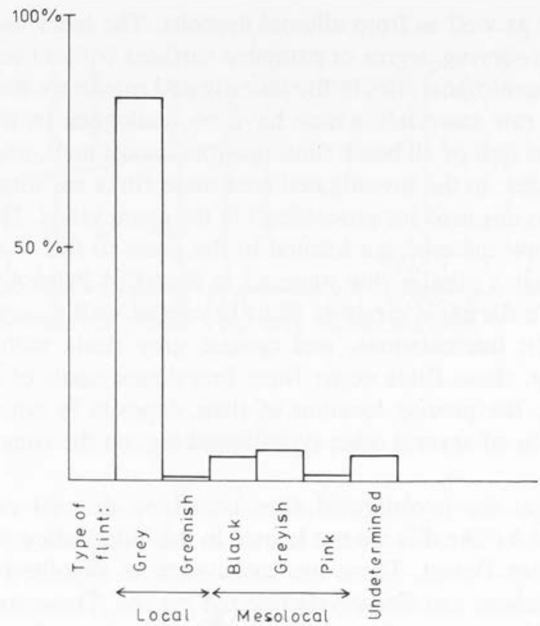


Fig. 3. El Tarif. General quantitative structure of flint types used in the Tarifian layer.

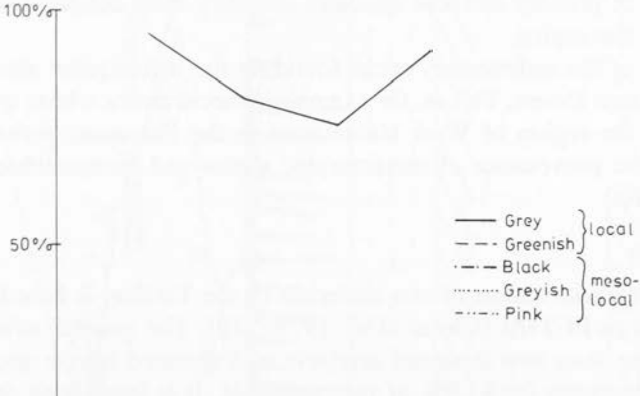


Fig. 4. El Tarif. quantitative structure of flint types in the major technological groups in the Tarifian layer.

without cortex is smaller than of the two groups mentioned above (about 24%). The high ratio of tools is unequivocally indicative of the importance of domestic activities in the area of the site, supplemented by some local lithic production.

As we have already said the local green flint is present only in trace quantities and is represented by only two retouched tools out of 337 retouched implements on the site. There are no cores, flakes or blades made in this raw material.

The structure of major groups made in mesolocal materials is different than that of grey "Theban" flint. In the case of greyish and black flint the ratio of cores and tools shows distinct predominance of tools which suggest that blanks or ready tools were brought to the site. The role of local production in the case of these raw materials is much smaller than in the case of grey "Theban" flint (Fig. 4). If in the case of grey flint there are on average 2.5 blades per one core, in the case of mesolocal flints there are on average 16 blades per one core. The quantitative structure of pink flint has been left out since artefacts made in this material are very few.

The scatter-pattern of finds on the site of El-Tarif has been analysed only for a relatively small part of the site systematically excavated (Ginter et al. 1979b: 92-93) and small clusters of finds also around hearths have been revealed. This type of scatter-pattern of finds approximates patterns known on the sites of the Late Palaeolithic rather than typical Neolithic sites. The fairly proportional distribution of particular groups of artefacts, also of accompanying ceramic fragments, seems to rule out the existence of differentiated areas of activity including separate zones of lithic production. An analogous situation has been recorded on the Tarifian site MA 2/83 where, too, lithic finds and ceramics occurred in small concentrations of which one was associated with a preserved hearth similar to the hearth discovered in El-Tarif (Ginter et al. 1985: 27).

The described types of scatter-pattern together with the general level of technology evidence that local production of lithic artefacts had a incidental character and was not specialized. The presence of imported raw materials, represented by an incomplete production cycle, can be accounted for by the mobility of Tarifian population groups in the whole region under investigation. Imported raw materials constituted a stock of material brought to the site at the moment when the camp was being set up.

### The Naqada culture

The fullest sequence of the development of this unit has been provided by the sites in the vicinity of Armant, notably by the systematically explored site MA 21/83 and partially by site MA 21A/83 (Ginter & Kozłowski [eds] in press). The sequence of these settlements does not, however, cover the whole period of younger Predynastic cultures in the area under discussion as the youngest phases distinguished by Kaiser (1957) in the cemeteries of Armant, are not represented.

Throughout sequence MA 21/83 artefacts produced by chipping technique are made exclusively in local flints primarily from the middle levels of theTheban

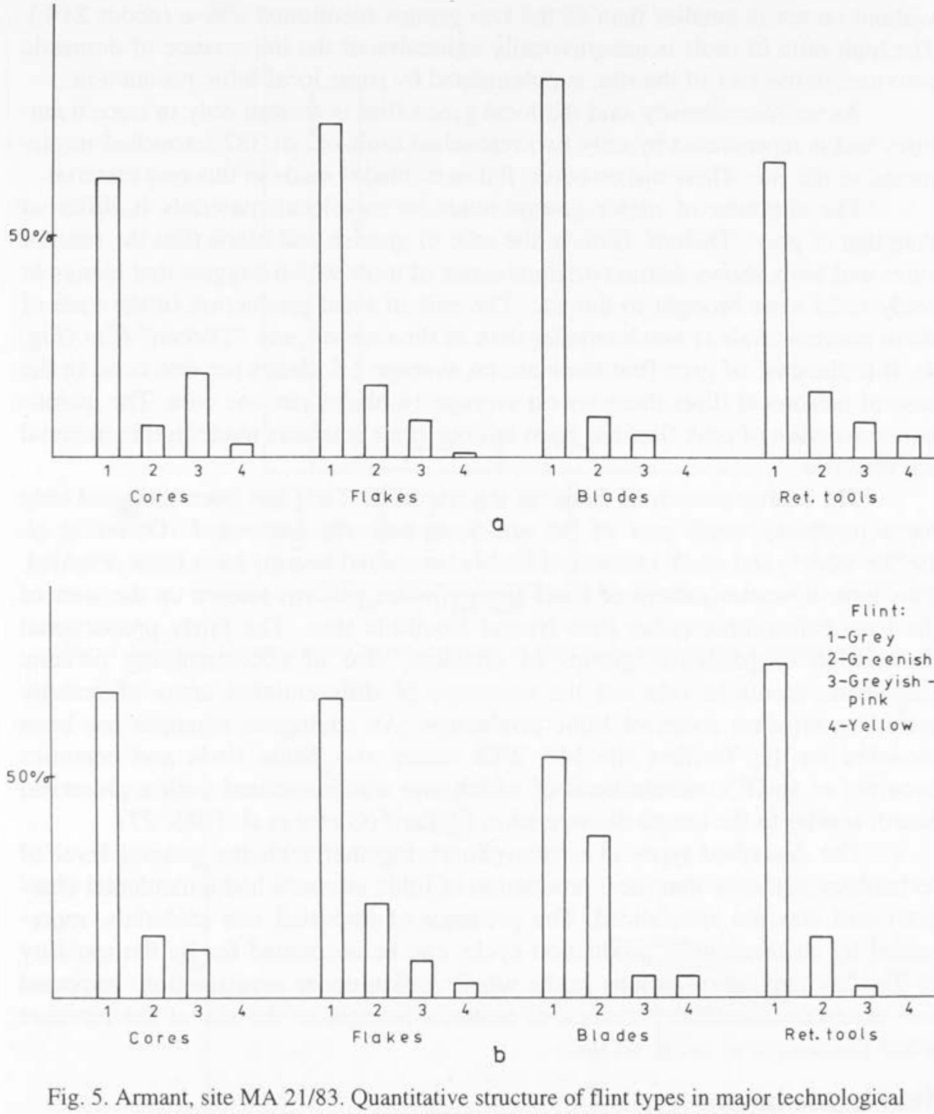


Fig. 5. Armant, site MA 21/83. Quantitative structure of flint types in major technological groups: a - older and middle phase, b - late phase of the settlement.

Gebel. The same raw materials were also collected from pediments and alluvia in the region of the Low Desert. The local flints include grey, grey-pink, greenish and yellow flint.

In all the chronological phases and all investigated sections of the site grey flint predominates. The proportion of particular raw materials within major technological groups has been shown in diagrams in Fig. 5.

The proportion of particular raw materials in major technological groups in the older and middle phases is similar. The dominant grey flint (on average 70% in each group) is followed by: greenish (7-16%), grey-pink flint (5-15%) and yellow flint (0-5%). The only exception is the bigger proportion of grey-pink flint in the group of cores (19%). This consistency of the raw material structure of flakes, blades and tools is yet another argument in support of the thesis about the existence of the complete cycle of production and exploitation of artefacts *in situ*.

In the younger phase the general structure of raw materials is similar but the proportion of grey flint is slightly smaller than 70%. Some changes take place, however, in frequencies first of all of green flint viz.: its participation in the blade group is very high (36%) approximating that of grey flint (54%). In the flake group too the proportion of green flint is increased (21%). This can be interpreted as evidence that ready blades were brought to the site from workshop situated most probably in the immediate vicinity of deposits. The higher ratio of flakes in green flint, on the other hand, can be accounted for by production of bifacial tools, mainly axes, on the site and their rejuvenation.

A characteristic feature of the site at Armant is the absence of mesolocal flints. An exception is the only tool made in black flint, analogous to that from El-Tarif, found in the lower layer of site MA 21A/83. Several tools made in brown flint, found on the same site (0.88% i.e. 5 specimens out of 571 tools in this group of artefacts) may also represent mesolocal raw materials which have not been identified in the local Theban limestones. The question of extralocal raw materials will be discussed later in this work.

A different raw material structure is represented by assemblages from Naqadian layers on the site of El-Tarif. These layers are contemporaneous (radiocarbon dates) with the younger phase of settlement MA 21/83 at Armant. In the Naqadian layers too a distinct predominance of grey "Theban" flint has been recorded whose ratio is as high as 70%. Another local raw material, green flint accounts for only 2%. Mesolocal raw materials viz.: greyish flint (7.5%), black (9.0%) and pink (2.4%) together make up a significant proportion of raw materials (Fig. 6). In comparison to the frequency of the most important raw materials in the Tarifian layer on the same site a marked drop in the ratio of grey "Theban" flint is noteworthy. The ratio of green flint is ten times as high, and the proportion of mesolocal flints is almost twice as high. Significant differences are observed as well when Naqadian layers from El-Tarif are compared with Naqadian layers from Armant. On the latter site mesolocal flints are practically absent and the ratios of grey "Theban" flint and green flint are closer.

The importance of major artefact groups made in local flints cannot be explained exclusively by local production since the ratio of cores to ready tools is 1:8, whereas that of cores to retouched tools and blanks is 1:15. Let us remember that in the Tarifian layer on the same site the ratio of cores to tools in the case of local raw materials is about 1:5 whereas the ratio of cores to tools and blanks is

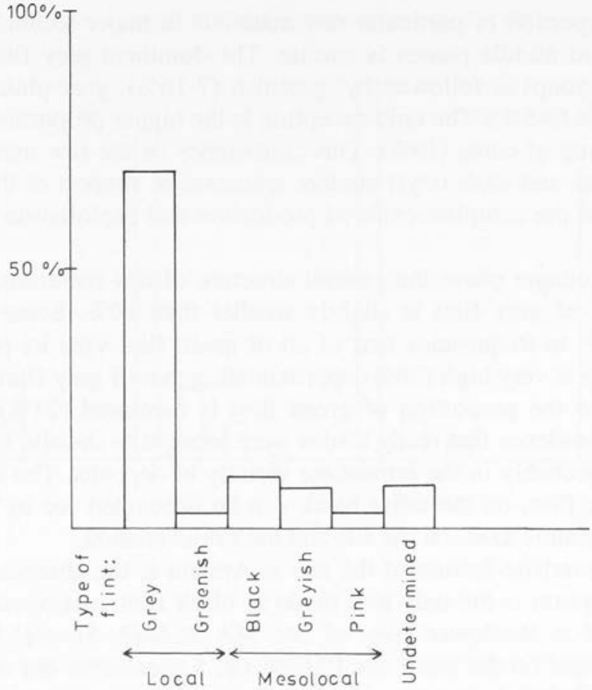


Fig. 6. El Tarif. General quantitative structure of flint types used in the Naqada layer.

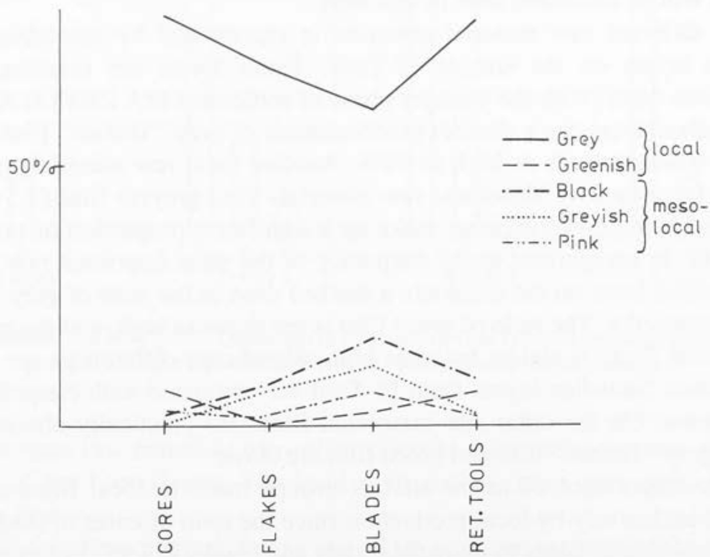


Fig. 7. El Tarif. Quantitative structure of flint types in major technological groups in the Naqada layer.

1:7. These differences, independently of the more flake character of the Tarifian, reflect smaller importance of local treatment in the full sequence of production in the Naqada culture. This is confirmed by the distinctly lower ratio of cortical flakes (wholly cortical or with more than 50% of cortical surface) in the Naqada culture.

In the case of mesolocal raw materials in the Naqadian layer the role of local treatment is even less conspicuous. The ratio of cores to retouched tools is 1:23, cores to tools and blanks is 1:65. This indicates that only a very small part of mesolocal raw materials reached the site as unworked or decorticated nodules. The bulk of these materials was brought as blanks or tools.

When Naqadian assemblages from El-Tarif are compared with the chronologically corresponding younger phase of site MA 21/83 at Armant a general similarity can be noticed of the frequency of major groups of artefacts made in local raw materials. The ratio of cores is 2.3% in El-Tarif, in the north part of site MA 21/83 - 2.5%, in the southern part of the same site - 1.9%. The ratio of flakes at El-Tarif is 68.1%, and in the two parts of site MA 21/83 it is 73. 7 and 73.6% respectively. Blades in El-Tarif amount to 14.8%, on site MA 21/83 they are 11.8 and 12.4% respectively. The ratio of tools is higher in El-Tarif i.e. 18.6% than on site MA 21/83 where it is 8.4 and 5.6% (Fig. 7). The proportionate importance of the full operational chain in local production is therefore similar on these sites. The main difference is that on the sites near Armant mesolocal raw materials are absent.

The importance of raw materials from the Theban Gebel clearly goes beyond the territories closest to the Gebel in the Nile Valley or along the edges of the Valley. In the sequence of the site of Hemamieh an interesting phenomenon can be observed viz. the appearance of grey and green Theban flint starting from the level between 4.6 ft to 5 ft which corresponds with the maximum intensity of occurrence of red polished and black topped ceramics. In the level between 4 ft and 3.6 ft Theban flints constitute less than one third of all artefacts to gradually disappear in the part of the sequence containing white-painted ceramics.

As far as the issue of local treatment of flint in settlements is concerned interesting data were provided by the analysis of spatial scatter pattern of artefacts on site MA 21/83 at Armant. In the older and middle phases of this settlement a marked spatial variability of indices of major artefact groups can be observed. In the older phase the northern sector of MA 21/83 shows a low ratio of cores (2.3%) but a high proportion of blade blanks (14.6%) and tools. The southern sector, on the other hand, has a much higher ratio of cores (9.9%) and a lower ratio of blanks (9.6%). In the middle phase the situation is similar (Fig. 8). Thus, the early phases of the reduction sequence seem to have concentrated in the southern sector of the site. This situation is reflected in the bigger proportion of wholly cortical flakes, as much as 8% in the early phase, and bigger proportion of waste flakes which automatically makes the index of blades lower in this sector. Production activities consisted not only of preliminary treatment of cores for

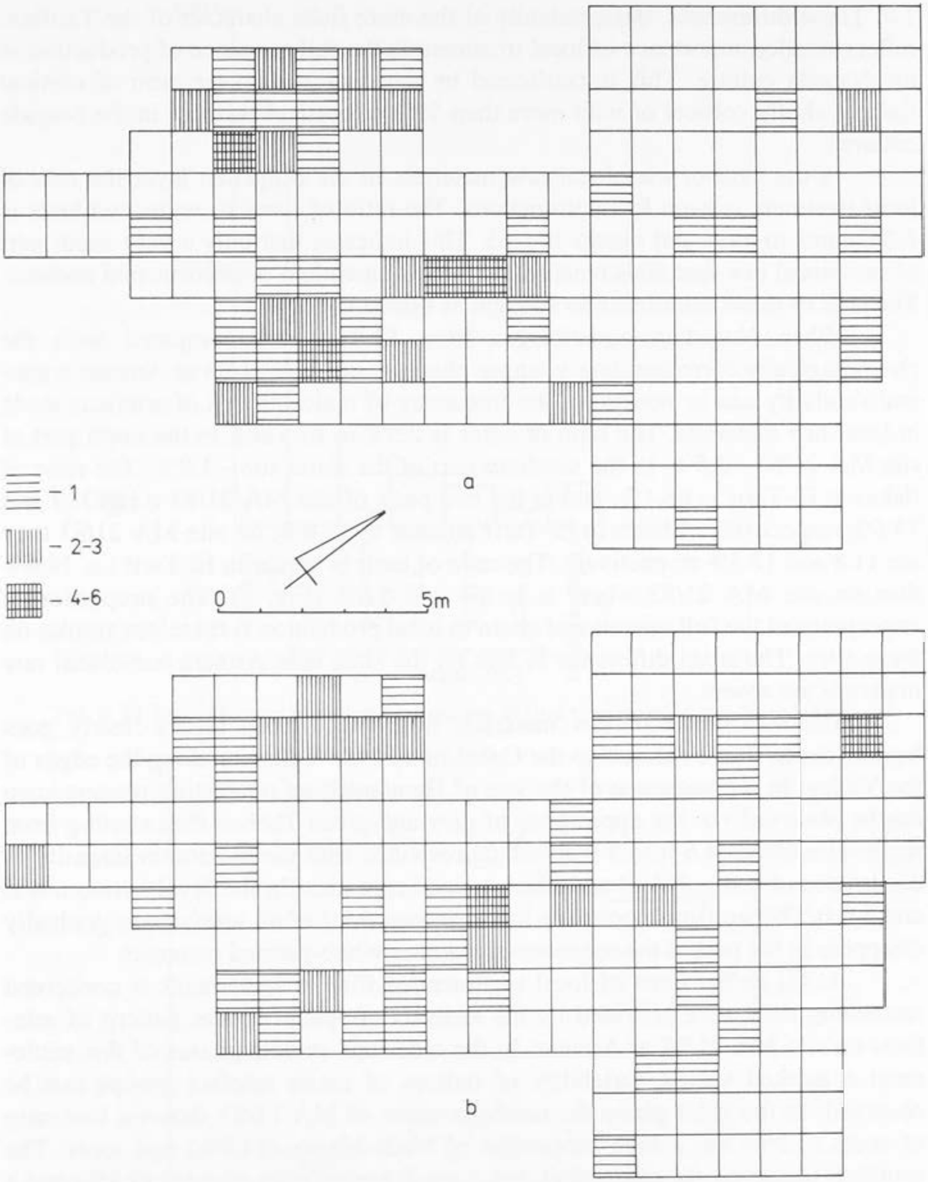


Fig. 8. Armant, site MA 21/83. Distribution of cores in the excavated area: a - older and middle phase, b - late phase of the settlement.

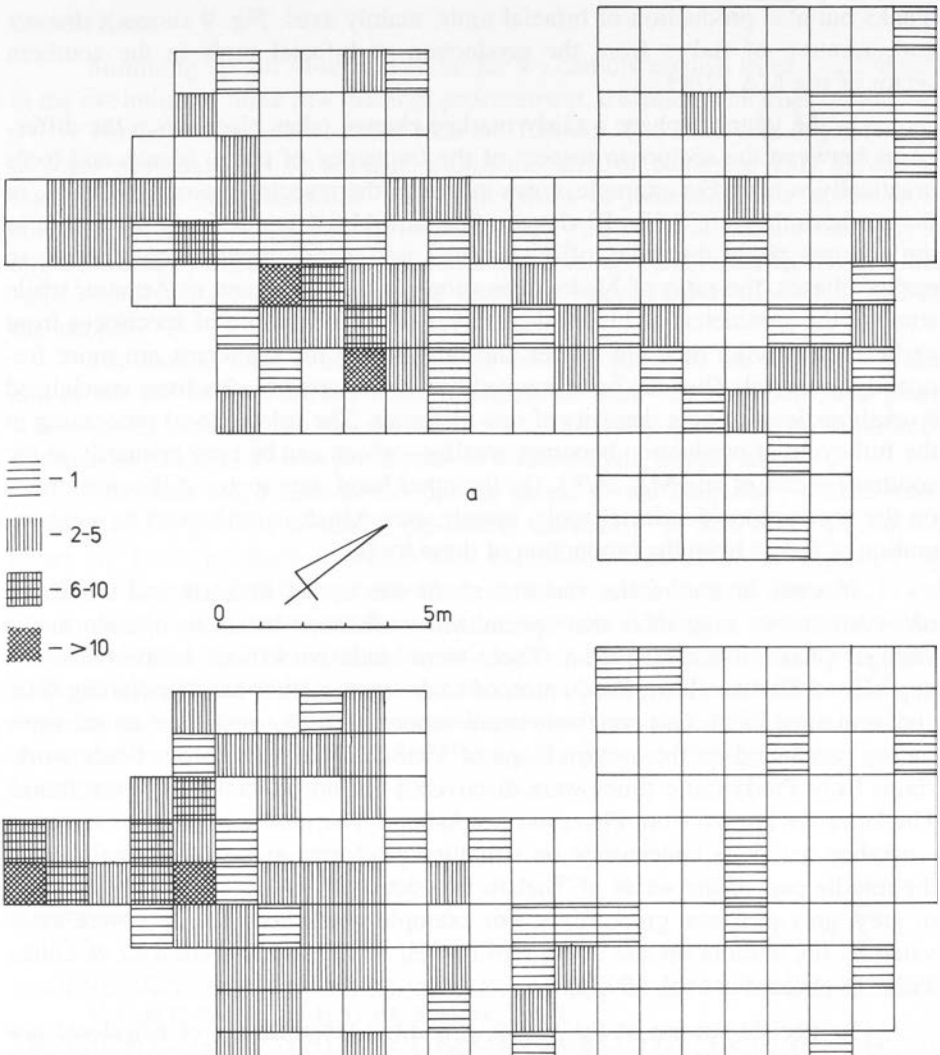


Fig. 9. Armant, site MA 21/83. Distribution of flakes from bifacially worked tools (preparation and rejuvenation): a - older and middle phase, b - late phase of the settlement.

blanks but also production of bifacial tools, mainly axes. Fig. 9 shows a distinct concentration of flakes from the production of bifacial tools in the southern sector of site MA 21/83.

In the younger phase a fairly marked change takes place when the differences between the sectors in respect of the frequency of cores, blanks and tools practically vanish. For example, cores in the southern sector account for 1.9%, in the northern they are 2.5%. Blades are 12.4 and 11.8% respectively. Although in the younger phase the index of blades does not change much in comparison to earlier phases, the ratio of blade cores drops in the settlement at Armant, while some of the parameters of blades themselves differ from those of specimens from earlier phases viz.: they are longer and thicker and the platforms are more frequently prepared. This can be accounted for by imported blades from specialized workshops located near deposits of raw materials. The role of local processing in the full cycle of production becomes smaller - which can be seen primarily in the southern sector of site MA 21/83. On the other hand, this sector still concentrates on the production of bifacial tools, mainly axes which is evidenced by agglomeration of flakes from the production of these tools.

In view of our earlier remarks about the site of El-Tarif and the above observations we may infer that specialized workshops began to operate in the younger phase of the Naqadian. There were blade workshops located near the deposits of Theban flints. Production of tools, on the other hand, including bifacial, remained local. Our conclusions are supported by the results of an intensive survey conducted on the eastern slope of Theban Gebel. Numerous blade workshops from Predynastic times were discovered but no bifacial tools were found. The latter are known from Pharaonic workshops. The most conspicuous traces of workshop activities concentrate on structural platforms and gravitational fans in the middle part of the series of Theban limestones i.e. in the areas of occurrence of grey, grey-pink and green flints. For example, workshops like this were excavated by the authors on site 20 and 16 at Deir el Bahari (Drobniewicz & Ginter 1976; Drobniewicz et al. 1977).

A specific feature of the site at Armant is the presence of extralocal raw materials while at the same time mesolocal raw materials occur in only very small amounts. Extralocal materials were used to produce hammerstones and grinders. For this purpose igneous and metamorphic rocks, unavailable on the Western Desert were particularly suitable. These raw materials occur besides as flakes: partly from the production of hammerstones and grinders, and partly detached accidentally when the tool was being used. Igneous and metamorphic rocks are present in very small amount and mainly in the younger phase. As we have mentioned in the Introduction they originate from the territory of the Eastern Desert, notably from the region of Wadi Hammamat. Together with the presence of shells from the Red Sea coasts they bear witness to contacts with the territories situated between the Nile Valley and the Red Sea.

## Conclusions

Summing up our observations so far we can distinguish three basic stages in the evolution of lithic raw material procurement, treatment and distribution.

The first stage is associated with the Tarifian. The full cycle of processing of local raw materials took place within the area of camps, evenly spread in multifunctional concentrations. The participation of mesolocal raw materials is conspicuous but they are not represented in the full cycle of production. This is not explained by the presence of specialized workshops, but rather by the fact that stock of materials was brought in the course of migrations of the inhabitants of the camps.

The second stage is connected with the early phase of the Naqadian at the end of the 4th millennium B.C. The treatment of local raw materials took place within settlements in their specialized sectors. The full sequence of production of blanks took place as well as production of bifacial tools, mainly axes.

The third stage falls at the middle phase of the Naqadian, before mass appearance of painted ceramics (so-called Gerzean). At that time specialized zones of lithic production within the settlements vanish to be replaced by specialized workshops located outside settlements, close to local deposits. Local raw materials are supplemented with either mesolocal flints or extralocal rocks. Mesolocal flints were brought mostly as blanks, notably blade blanks, or as ready tools. In all likelihood they were produced in specialized workshops. Bifacial tools continued to be made in specialized zones in the settlements which is evidenced by the scatter pattern of artefacts in the younger phase in the settlement at Armant.

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## Conclusions

Summing up our observations so far we can distinguish three basic stages in the evolution of lithic raw material procurement, treatment and distribution.

The first stage is associated with the Tasian. The full cycle of processing of local raw materials took place within the area of camps, evenly spread in multifunctional concentrations. The participation of extraneous raw materials is conspicuous, but they are not represented in the full cycle of production. This is not explained by the presence of specialized workshops, but rather by the fact that stock of material was brought in the course of migrations of the inhabitants of the camps.

The second stage is connected with the early phase of the Naqada, in the end of the 4th millennium B.C. The treatment of extraneous materials took place within settlements in their specialized sectors. The full sequence of production of blanks took place as well as production of bifacial tools, mainly axes.

The third stage falls at the middle phase of the Naqada, before the mass appearance of painted ceramics (so-called Gerzean). At that time specialized zones of lithic production within the settlements vanish to be replaced by specialized workshops placed outside settlements, close to local deposits. Local raw materials are supplemented with either specialized flints or extraneous rocks. Macrolithic tools were brought in as blanks, and also blades of specialty bifacial tools that were produced in specialized workshops. Bifacial tools continued to be made in specialized zones in the settlements, which is [illegible] the [illegible] production activity in the [illegible].

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
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# Recent investigations in the Badarian region (Middle Egypt)

## Introduction

There is now a substantial quantity of data for the Predynastic of Lower Egypt, and as we endeavour to comprehend the relations between the northern and southern parts of the country, the Predynastic of the Badari region assumes particular importance. It represents the last known Upper Egyptian cultural area before reaching the cultural domain of the north, even though it lies some 250 km south of the Fayum.

Our knowledge of Predynastic developments in the Badari region is still largely based on the work of Brunton & Caton-Thompson (1928; Brunton 1937; 1948). Between 1922 and 1931, Brunton explored the area between the villages of el Etmanieh and el Ghoreib (see Fig. 1), a distance of approximately 35 km, while in 1924 and 1925, Caton-Thompson conducted her stratigraphically controlled excavation at North Spur Hemamieh. Brunton had divided his 35 km stretch of low desert into three sectors: Badari, Mostagedda and Matmar. However, these may be all considered as part of the Badari region, more appropriately defined as the area between (and including) the two large wadis, Qau Bay and Wadi el Asyuti.

Brunton & Caton-Thompson found evidence for a Predynastic culture that preceded the other periods (Amratian, Gerzean and Semainian) then known. This was the Badarian, which they documented using some of the best recording procedures of their time. However, by modern standards, their data are far from adequate, and, in particular, Brunton, who was responsible for recording most of the Predynastic material from the Badari region, paid even less attention to the finds of the subsequent Predynastic periods. Since the Amratian and later Predynastic "cultures" were well known from sites in other parts of Upper Egypt, he made the erroneous assumption there was nothing really new to be learned from studying these "cultures" in the Badari area.

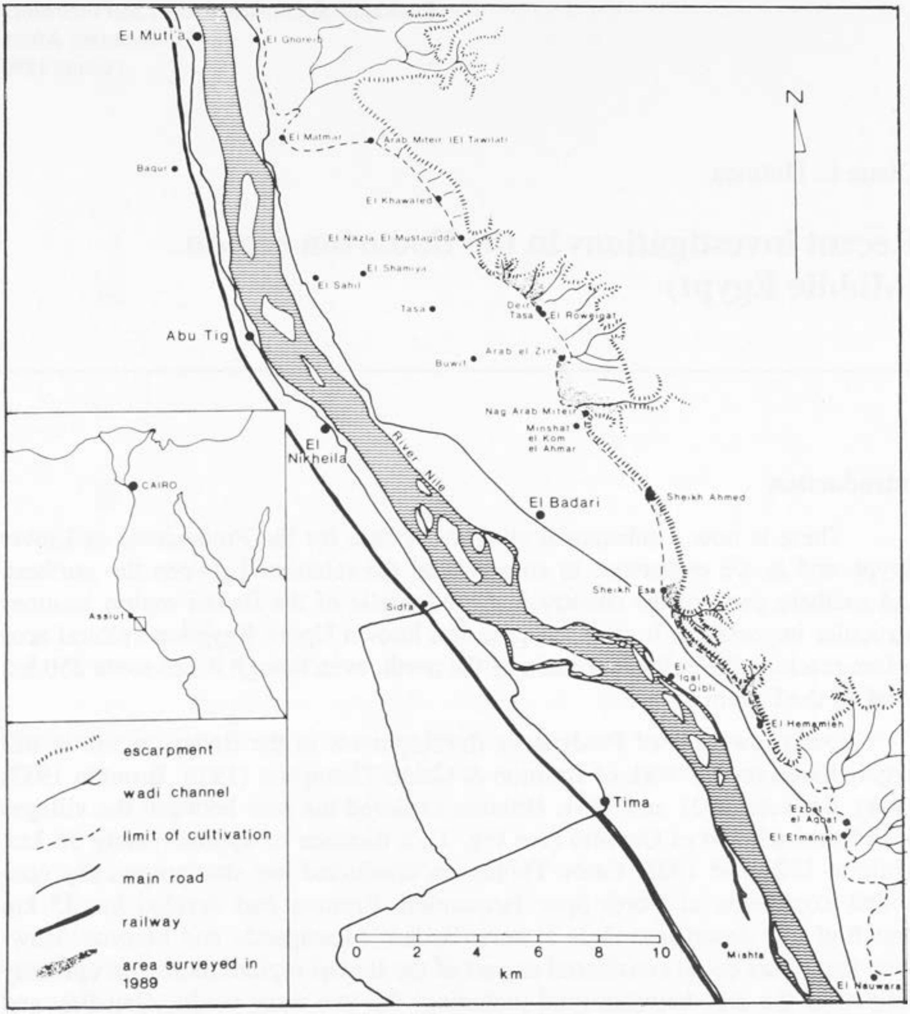


Fig. 1. Map of the Badari region.

Recent analysis of the collections of lithic artifacts from Brunton & Caton-Thompson's excavations that are now housed in the Petrie Museum at University College London, led to the provisional conclusion that the Badarian was an early Predynastic tradition restricted to the Badari area, as well as to the identification of a subsequent regional lithic tradition, termed the Mostagedda industry (Holmes 1988; 1989). The dating of this later industry was uncertain, though it was concluded that it must be, in part, Gerzean, even if it extended back to the Amratian as well. Much of the material studied came from settlement localities that Brunton had considered primarily Amratian.

Clearly, Brunton & Caton-Thompson's investigations left much unanswered and the analysis of their collections only raised more questions. Only two radiocarbon dates existed for the Badari area. Both were for Badarian contexts, and calibration yielded a weighted average of 4080±160 B.C. and a range of ca. 4400-3800 B.C. (Hassan 1984). As potentially the oldest Predynastic tradition in Upper Egypt, a full understanding of the Badarian could be expected to throw light on the establishment of farming communities in the Nile Valley. Thus, with these various considerations in mind, the "Prehistory of Badari Project" was initiated. So far, two seasons of fieldwork have been undertaken, the first in February-March 1989, and the second in July-August 1992. Both have been short seasons devoted to field survey, and test excavation. It is hoped that further fieldwork can be carried out concentrating on excavation and involving larger field crews.

**Aims and results of the field-survey**

A Cultural Resources Management (CRM) approach was adopted for the field survey. The principal aims were, to relocate sites of all periods (including historic) that had been recorded by Brunton and others who have worked in the region, to record any additional sites that might be encountered, to identify Predynastic localities suitable for surface sampling and/or excavation, and to assess the impact of modern land-use activities on site preservation.

In 1989, four segments of low desert amounting to around 10 km were visited between the modern village of el Hemamieh and the gebel promontory just to the north of Deir Tasa (see Fig. 1). These segments contained a total of 42 sites, of which 32 yielded Predynastic remains, while the total included for sites (one Predynastic and three historic) that apparently had not been previously recorded. In 1992, the entire low desert between Gebel el Haridi (the southern limit of Qau Bay) and el Matmar, a distance of more than 40 km, was field-walked. Regrettably time limitations prevented a continuation of the reconnaissance into the Wadi el Asyuti. Nevertheless, well over a hundred sites were visited including several more that have not been documented before.

The Predynastic occurrences in the region date predominantly to two phases: the Badarian and Gerzean. A few sites have recognizable Protodynastic remains. However, no localities have yielded ceramics suggestive of an exclusively Amratian component. Badarian sites are readily recognizable from their organic-tempered fine Nile silt and fine untempered Nile silt wares (the Predynastic wares encountered in the Badari region are described in Holmes & Friedman n. d.). Some of the latter show the characteristic Badarian rippled decoration. Carinated vessel forms also occur. Gerzean localities, on the other hand, are easily identified on the basis of their straw-tempered pottery and occasional Decorated sherds. Items that Brunton would have regarded as "Tasian" occur very rarely, and always at localities which otherwise yield recognizable Badarian finds. Thus, Brunton's case for an even earlier "Tasian" culture preceding the Badarian can not be supported on the basis of the recent field observations.

Brunton had considered the majority of the post-Badarian Predynastic settlement sites that had yielded the lithic artifacts assigned to the Mostagedda industry by the writer, to be primarily Amratian (Brunton & Caton-Thompson 1928: 43-48). However, whereas Brunton relied largely on the very rare whole pots that he found to date his sites, modern archaeologists rely chiefly on the commonplace potsherds, and for the localities in question, these latter are predominantly of Gerzean type. Only very few sherds occur which might imply an Amratian component as well.

**Systematic surface sampling**

During the 1992 season, two localities with Gerzean habitation remains were selected for surface sampling: BD-36 and BD-51. Rather than simply collecting the artifacts seen lying literally on the surface of these sites, the surface deposits were scraped off and screened. This allowed very small items to be recovered and avoided the problem of surface objects being obscured by a very thin dust layer, or by limestone scree.

BD-36 is one of Brunton's "3000-series" of sites between Sheikh 'Esa and Sheikh Ahmed, but unfortunately it has not been possible to establish precisely which one. It may correspond to Brunton's locality 3000/10, but Brunton's map (Brunton & Caton-Thompson 1928: pl. II) does not quite match the actual topography. Most of the low desert in the Badari region between Qau Bay and Wadi el Asyuti is very narrow and is dissected into many "spurs" by small wadis and gullies. There is a small village at the edge of the cultivation immediately to the north of BD-36, and recent activity may well have altered the size and shape of some of the adjacent spurs, thus preventing Brunton's spur sequence to be followed. Nonetheless, BD-36 was untouched by the modern village activities, and showed only some old disturbance due to Brunton's probing and perhaps some grave plundering as well. There were indications of a few Dynastic burials, otherwise there appeared to be evidence of only Gerzean use. Two 5x5 m squares were marked out for systematic surface scraping: one near the tip of the spur, and the second where the spur sloped down into a gully. Both units produced an abundance of straw-tempered ware ceramics, typical of the Gerzean, as well as smaller quantities of Nile silt and marl wares. A marl ware sherd with a painted spiral (i. e. a piece of typical Decorated ware) was found just outside one of the 5x5 m collection areas. The lithic artifacts collected consist mainly of small-sized debitage (i. e. flakes, flake fragments and shatter that would pass through a 20 mm mesh). There is a total of 11 tools, 4 of which are made on reasonably regular blades and bladelets.

BD-51 is a newly discovered site near Nag'Arab Miteir. It is a large site with extensive Predynastic occupation deposits which was reused as a cemetery during Graeco-Roman times. A 5x10 m area was marked out for surface scraping in an area, which though disturbed by later burials, showed a concentration of Predynastic ceramics. The main ware represented, as at BD-36, is the Gerzean straw-tempered fabric. Nile silt and marl wares are also present. In addition, the collection includes five fine Nile silt sherds, two of which have slipped and polished rippled surfaces. These suggest that the site may have a Badarian component as well. The lithic collection comprises 175 pieces in addition to a large quantity of small-sized debitage. There are 25 tools which include two endscrapers, a burin, five notches, a truncation, two broken blade tools with alternate backing retouch, and two unusually small bifacial crescent drills.

**Test excavations at Hamamieh**

During the 1989 season, two test pits (TP1 and TP2) were excavated at Caton-Thompson's site, North Spur Hemamieh, which is located about 2.5 km north of the modern village of el Hemamieh. Caton-Thompson excavated nearly all of the main area of the site. However, it is clear that she did not touch the area upslope of her excavation unit "strip H", the edge of which is still discernible. The two test pits were thus placed in this undisturbed area. TP1 was a 1x3 m unit positioned approximately 40 cm upslope from the edge of strip H. At a depth of about 45 cm, part of a circular mud feature having a maximum diameter of 148 cm, was uncovered. For reasons too lengthy to explain here (but fully discussed in Holmes & Friedman n. d.), the feature in TP1 represents roughly a third of Caton-Thompson's hut circle no. 268. She must have excavated about half of the circle in her strip H and interpolated the rest of the circle in her excavation plan (Brunton & Caton-Thompson 1928: pl. LXIII). There was absolutely no sign of disturbance in TP1 and consistent pottery sequence was obtained. The mud circle was build on a hard layer of "breccia" which occurred at a depth of 70-75 cm below surface. This "breccia" layer is the hard cemented limestone gravel deposit that Caton-Thompson found underlying the bulk of the cultural deposits at Hemamieh. TP2 was a 1x1 m unit placed approximately 5.7 m north of TP1 and about 4 m from the edge of Caton-Thompson's strip H.

The stratigraphy observed in both test pits corresponds to that reported by Caton-Thompson with brown and ashy cultural deposits sandwiched between a surface limestone scree deposit and the "breccia" layer, although whereas the depth of deposits in her excavations was mostly in the region of 1.8 m, the deposits in TP1 and TP2 were only about 70-75 cm thick (to the top of the "breccia",

| | | |
|---|---|---|
| TP1: Level | | |
| 1 | | (only two undatable sherds recovered) |
| 2 | | Late Gerzean |
| 3 | | Late Gerzean |
| 4 | | Early Gerzean |
| 5 | internal | transitional Amratian-Gerzean |
| 6 | & | Amratian |
| 7 | external | transitional Badarian-Amratian |
| 8 | Note: "internal" and "external" refer to whether the deposit is from inside or outside the mud circle. | Badarian or transitional Badarian-Amratian |
| TP2: Level | | |
| 1 | | Gerzean (but sherds somewhat mixed) |
| 2 | | (undated; no ceramics found) |
| 3 | | Early Gerzean ? |
| 4 | | Amratian |
| 5 | | transitional Badarian-Amratian |
| 6 | | Badarian |
| 7 | | Badarian |
| 8 | | (undated; "breccia" layer, no ceramics found) |
| 9 | | (undated; no ceramics found) |

Table 1. Hemamieh. Suggested dating of the levels in TP1 and TP2, based on ceramic data.

because of their peripheral location). Traces of cultural deposits together with a few lithic artifacts were found beneath the "breccia" in TP2.

Although the sherd samples from the test pits are not very large (127 sherds from TP1 and 184 from TP1 and 184 from TP2, 311 sherds altogether; Caton-Thompson herself used only 439 sherds deemed to be of chronological value to date the levels of the whole site), they suggest a continuous sequence spanning from the Badarian to the Gerzean (see Table 1). There is a gradual change in the ceramic composition from one period to the other. The identification of an Amratian level is not clear-cut; there are no distinctive elements to distinguish it. Rather the designation Amratian has been applied where all, or practically all, of the Badarian ceramic wares (organic-tempered and fine Nile silt) in the sequence have phased out, and before any characteristic Gerzean form appear. Thus the ceramics from the tentatively identified Amratian horizon consist predominantly of straw-tempered and Nile silt wares, some of which have been slipped and polished.

The two test pits yielded only small numbers of lithic artifacts: 51 from TP1 and 131 from TP2. The majority of the pieces consist of debris (chips and chunks), and between them, two pits produced only 7 tools: a bifacial sickle, an irregular glossy bladelet tool, a retouched flake from TP1, a burin, sidescraper, retouched piece, and a miscellaneous bifacial tool from TP2. The sickle is apparently the only complete bifacial specimen from Hemamieh. Caton-Thompson remarked that she did not find any (Brunton & Caton-Thompson 1928: 75), although there is a broken bifacial sickle (UC10525) from her excavations in the Petrie Museum.

Only very limited faunal remains (analyzed by Brewer) were recovered. The most notable genera present are the fish, *Clarias* and *Synodontis*, and a *Conus* shell which probably came from the Red Sea. The plant remains (analyzed by Nabil el Hadidi, Wafaa Amer and Nahed Mourad Waley) include domestic wheat (*Triticum* sp.) from the Badarian and subsequent levels, and barley (*Hordeum* sp.) from a transitional Badarian-Amratian level.

Charcoal was fairly abundant and four samples were submitted for radiocarbon dating. The dates obtained are shown in Table 2 together with their calibrated ranges computed using Stuiver & Reimer's (1986; 1987) program, CALIB (which, for the period 2500-5210 B.C. uses the data of Pearson et al. 1986). The two dates for the Badarian levels in TP2 yield a calibrated age range of ca. 4400-4000 B.C. The most probable calendrical age range (at the 95.4% confidence level) for the sample from TP1 level 6 internal, tentatively assigned to the Amratian based on its ceramic data, is 3827-3620 B.C., which is consistent with radiocarbon dates obtained for level 4 of TP1 and gives a most probable calendrical age range of 3700-3494 B.C. (at the 95.4% confidence level). The pottery from this level suggests an early Gerzean attribution.

**Test excavations at locality 3400**

Site 3400 is Brunton's designation for a Badarian settlement located about 0.5 km north of Deir Tasa. In 1989, it appeared to be essentially undisturbed, and was noted as the most promising Badarian locality visited that season. In 1992, it was found that half of the site had been cut away and converted into fields. Thus, it was considered imperative that at least a test excavation was carried out before any more of the site was destroyed. Consequently, a 2x4 m test pit (TP1) was opened.

TP1 was divided into two squares, A and B. The excavation revealed an *in situ* trash pit which was traced over eight 10 cm levels in square B. (Only the very edge of the feature occurred in square A, an to save time, only four 10 cm

| Sample provenance | Lab No. | C-14 age BP± 1 σ | Calibrated age ranges at 68.3% confidence level (with relative contribution to the 68.3% probability distribution) | Calibrated age ranges at 95.4% confidence level (with relative contribution to the 95.4% probability distribution) |
|---|---|---|---|---|
| TP1 Level 4 | Beta-35822 | 4790±60 | 3671-3667 (0.02)<br>3648-3511 (0.94)<br>3394-3388 (0.03) | 3700-3494 (0.87)<br>3474-3451 (0.02)<br>3431-3378 (0.11) |
| TP1 Level 6 internal | Beta-35823 | 4940±80 | 3902-3883 (0.08)<br>3812-3791 (0.09)<br>3790-3645 (0.83) | 3958-3837 (0.23)<br>3827-3620 (0.72)<br>3574-3533 (0.05) |
| TP2 Level 6 | Beta-35824 | 5300±60 | 4231-4191 (0.24)<br>4165-4040 (0.76) | 4327-4281 (0.06)<br>4247-3997 (0.94) |
| TP2 Level 7 | Beta-35825 | 5440±60 | 4354-4239 (1. 00) | 4456-4417 (0.05)<br>4404-4220 (0.82)<br>4201-4145 (0.11)<br>4111-4090 (0.01) |

Table 2. Radiocarbon dates from Hemamieh.

levels were dug there). TP1 yielded pure Badarian ceramic and lithic assemblages. The pottery consists predominantly of an organic-tempered ware having mostly brown wet-smoothed or lightly burnished surfaces. There is also a small amount of Badarian fine Nile silt ware, some of which has the characteristic Badarian rippled decoration. In addition, the excavation yielded two black-incised sherds which may pertain to so called "Tasian" beaker vessels. The lithic assemblage comprises mainly small-sized debitage and flakes. The few tools include endscrapers, notches, denticulates, irregular truncations, and a small bifacial triangle.

Botanical and faunal remains were also recovered from the test excavation, but they have yet to be analyzed. The animal bones include a fairly large number of fish vertebrae.

**Modern destructions of sites**

Modern land-use activities are having an extremely damaging impact on the archaeology of the region, and it is very noticeable that the use of the low desert has intensified since 1989. Huge areas are being reclaimed for agriculture, and many villages are spilling on to the low desert. Modern cemeteries too are expanding considerably. In order to assess this modern cemeteries encroachment systematically, two images acquired by the French satellite, SPOT, have been image processed and digitized; one scene was taken on December 6, 1987 and other on November 23, 1991. Both are multispectral scenes having a spatial resolution of 20 m. While the analysis of this satellite data is not yet complete, a comparison of the two images does reveal substantial differences. New fields, irrigation canals, roads, and expanding village areas show up quite clearly, and the digitized data will be used to provide quantitative information concerning the spread of these developments into the low desert.

To give a provisional idea of the rate of destruction of archaeological localities in the Badari region, the 42 sites first visited in 1989 may be considered. During that season, 5 (12%) sites were found to be completely destroyed by modern activities, while just three years later, in 1992, the total of destroyed sites had risen to 14 (33%) with a good many more showing severe damage. At this rate, there will soon be no archaeological sites left except for the rock tombs and quarries in the limestone escarpment.

## Concluding remarks

The recent investigations have shown that the Badari region still has a large number of Badarian and later Predynastic sites worthy of further work (the area also has abundant Roman remains which deserve to be properly documented). The ceramic and lithic samples so far studied provide important new data to supplement the information obtained from the selective collections made by Brunton and Caton-Thompson. The new radiocarbon dates confirm that the Badarian is a tradition extending back to more than 4000 B.C. - a key date, for there are very few localities in Upper Egypt representing food-producing communities rather than hunter-gatherers that are older. The principle such sites outside the Badari region occur in the Gourna-Armant area where one locality (MA 21/83) has an early occupation phase dated to more than 5100 B.P. (or > 4050-3950 cal. B.C.), and a hearth at another (MA 6/83) has been dated to 5560±80 B.P. (Ginter et al. 1987; 1988). The excavators assign these sites to their "Nagadian" culture.

There is a paucity of Amratian material in the Badari region which raises the question of whether the Badarian tradition continued locally into the Amratian time period, a suggestion also made by Kaiser (1956; 1985). However, it is possible that after ca. 4000 B.C. the Badarian developed into an "evolved" Badarian which incorporated some Amratian elements. The later Predynastic sites have been found to be predominantly Gerzean. It is the settlement sites of this phase which yielded the lithic artifacts assigned to the Mostagedda industry, and the recent fieldwork confirms that it is an industry characterized by regular blade and bladelet technologies in contrast to the earlier flake-based Badarian industry.

However, sites are disappearing very rapidly as the local people reclaim large tracts of low desert for agriculture and extend their villages. If a thorough understanding of Predynastic developments in the region is to be achieved, further fieldwork must be carried out as soon as possible. The current unprecedented expansion of land-use activities means that the majority of archaeological sites will have been destroyed within 4-5 years.

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Interregional Contacts in the Later Prehistory
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# Lithic assemblages from Hierakonpolis and interregional relations in Predynastic Egypt

## Introduction

In 1984 when I presented my paper on "Inter-regional variability in Egyptian Predynastic lithic assemblages" at the second Dymaczewo symposium (Holmes 1989a), the notion of regional variability in Upper Egyptian Predynastic material culture still seemed rather novel. Now it appears to be an established aspect of the Predynastic of Upper Egypt. Nevertheless, there remains an enormous amount of work to do in order to see the details of what aspects of material culture vary over time and space.

During the later Predynastic, for example, it is evident that the regional distinctions appear to diminish. Ceramic data in particular indicate a much greater degree of homogeneity during the later Predynastic to the extent that pottery assemblages from both Upper and Lower Egypt appear essentially similar. By the start of Dynastic history, all regional variations seem to have been ironed out; the material culture had become unified (cf. Adams & Friedman 1992; Köhler this volume).

Aside from establishing what variability exists during the Predynastic, there is the question of how to interpret it. For example, in 1987 I suggested the variability that I found among lithic assemblages might reflect different Predynastic kingdoms or other socio-political units (Holmes 1987a: 416). Two years later, Kemp (1989: 34) published a map which looks almost as if it was based on the regional variation found by Finkenstaedt, Friedman and myself from our analyses of artifactual remains (Finkenstaedt 1980; Adams & Friedman 1992; Friedman 1990; in preparation; Holmes 1987a; 1989a; 1989b). However, Kemp did not use any of our data. Rather, he placed the Predynastic chiefdoms or proto-states around the presumed regional capitals of Hierakonpolis, Nagada and This.

Hierakonpolis is situated on the west bank of the Nile, about 17 km north of modern Edfu. Modern excavations of Predynastic sites in the area were directed by Michael Hoffman until his untimely death in 1990. The Hierakonpolis

Expedition is now continuing under the joint directorship of James Mills and Walter Fairservis.

In this contribution, I briefly review the Predynastic lithic industry of Hierakonpolis and assess the significance of certain aspects of this tradition in relation to the Predynastic lithic industries of other areas in Egypt.

**Predynastic sites at Hierakonpolis and samples studied**

I have examined the lithic artifacts from five Amratian localities and from one Gerzean site as well as from Protodynastic contexts though I shall not discuss these latter here.

The lithic data I am presenting come from localities HK-11C, HK-14, HK-24A, HK-25D, HK-29, and HK-29A. In the case of localities HK-11C, HK-14, and HK-29, my analyses represent re-examinations of part or all of assemblages that were originally studied by Harlan, Hoffman, and McHugh. This was so all of the Hierakonpolis lithic data could be more easily compared.

HK-11C and HK-14 are habitation sites in the Wadi Abul Suffian. HK-14 is the older of the two dating to ca. 3625 BC (calibrated); HK-11C is Late Amratian and dates to ca. 3550 BC (calibrated dates provided by Hassan 1984). I have re-examined the small assemblage from HK-14 that Michael Hoffman (1970: 121-127, 140-141; 1972) reported, while for HK-11C I have looked at the sample from unit ON-6E (cf. Harlan 1980: 58-71; 1982).

HK-29 is situated in the low desert about 400 metres from the edge of the modern cultivation. It is similar in age to HK-11C and consists of a house with associated outbuildings and fenced enclosures as well as a pottery kiln (Hoffman 1980; 1982: 7-14). McHugh (1982) originally looked at the lithic artifacts from the 10x10 m square (-17L13) containing the house, and Hoffman examined the material from the adjacent square (-10L10) which included the kiln, though he did not publish his results. I have since re-studied both samples.

Probably very Late Amratian in date are the two localities, HK-24A and HK-25D, situated close to the edge of the cultivation at the mouth of the Wadi Abul Suffian (Geller 1989). Excavations at HK-24A revealed four large vessels encrusted on their inner surfaces with a vitreous black residue which has been identified as being the result of beer making. Grains and fragments of emmer wheat were also recovered suggesting that it was a wheat-based beer that was being brewed. At HK-25D, roughly 100 metres away, a raised platform-like surface with circular basins was uncovered which is likely to have served as an oven for baking the loaves used in brewing the beer at HK-24A. The lithic samples I have analyzed come from square 360 L420 unit 2 at HK-24A, a 5x5 m square which included most of the area with the beer making vessels, and from squares 502.5 L387.5, 502.5 L390, 505 L387.5 and 505 L390 (each 2.5x2.5 m) at HK-25D which covered the platform structure.

HK-29A is a large and very rich site in the low desert (Hoffman 1987). Approximately 600 $m^2$ of the site were excavated in 1985-86, uncovering a large, parabolic-shaped, mud-plastered floor over 32 metres long and various associated walls and rectangular buildings. This unusual architectural agglomeration together with its rich and varied artifact assemblage is interpreted as a temple-workshop complex whose main period of use was during the Gerzean (Nagada IIb-d; Friedman pers. comm.). I have sorted and analyzed about half of the lithic assemblage recovered from this site (Holmes 1987b; 1992a).

**The Hierakonpolis industry**

The data for the Amratian sites provide a basic characterization of the Hierakonpolis industry (see Tables 1 and 2). The HK- 29 data in Table 1 represent my data for square -17L13 only, the overall composition data for HK-29 square -10L10 is not included since the lithic categories were not recorded with quite the same degree of refinement as for the other Hierakonpolis localities. The square 10L10 data can be found in Holmes (1989a; 1989b: 291). The dominant blank technology consisted of the production of simple hard hammer struck flakes. Blades and bladelets were also manufactured; both apparently produced as part of the same reduction process. Other technologies represented in the Hierakonpolis industry are the manufacture of bifacial tools and bladelets of heat-treated flint.

Flakes struck from cores constitute the main type of debitage blank in all the Amratian assemblages. These flakes account for between 74.5 and 85.9% of all blanks (i.e. flakes, biface thinning flakes, blades, and bladelets). Non-heat-treated blades and bladelets form between 11.1 and 15.8% of the blanks. The balance is made up of small quantities of biface thinning debitage which varies from 5.2 to 7.5%, though there are none in the small HK-14 assemblage, while heat-treated blades and bladelets account for between 0.3 and 4.2% of the blanks.

The unheat-treated blade-bladelet blanks of the Amratian at Hierakonpolis are of moderate regularity and the blades in the continuum tend to be small. This particular blade-bladelet technology is quite different from the regular blade technology that was to appear with the Gerzean.

Tools form between 4.9 and 11.0% of the Amratian assemblages overall. The main two classes are burins and retouched pieces. In the assemblages with 35 or more tools where percentages have been calculated, burins form 35 to 39% of the tools while retouched pieces account for between 21 and 30% of the tools. The next most important tool classes are endscrapers and notches. Other categories of tools that are generally present in small numbers are perforators, backed pieces, glossy bladelet tools, and bifacial tools. The latter consist mainly of relatively thick and irregular miscellaneous pieces as well as a few fragments of thinner, more skilfully retouched tools. The broken bifacial tool from HK-25D is a fragment of a bifacial knife, possibly of a comma-shaped specimen.

There are a number of truncations from HK-11C and HK-29 but they do not occur at the other Amratian sites. There are several microdrills from HK-29 and a single example from HK-24A. HK-29, in fact, has the highest proportion

| lithic categories | localities | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | HK-14 | | HK-11C | | HK-29 | | HK-24A | | HK-25D | | HK-29A* |
| | n | % | n | % | n | % | n | % | n | % | % |
| **flakes** | | | | | | | | | | | |
| primary | 15 | 7.0 | 103 | 8.7 | 189 | 6.9 | 42 | 5.9 | 12 | 6.6 | 0.9 |
| secondary & tertiary | 107 | 50.0 | 445 | 37.4 | 967 | 35.1 | 250 | 35.2 | 51 | 27.9 | 5.7 |
| total flakes | 122 | 57.0 | 548 | 46.1 | 1156 | 41.9 | 292 | 41.1 | 63 | 34.4 | 6.6 |
| **blades** | | | | | | | | | | | |
| primary | 2 | 0.9 | 9 | 0.8 | 18 | 0.7 | 5 | 0.7 | 1 | 0.5 | 0.2 |
| secondary & tertiary | 14 | 6.5 | 102 | 8.6 | 100 | 3.6 | 21 | 3.0 | 4 | 2.2 | 4.6 |
| total blades | 16 | 7.5 | 111 | 9.3 | 118 | 4.3 | 26 | 3.7 | 5 | 2.7 | 4.8** |
| **bladelets** | | | | | | | | | | | |
| primary | 0 | 0.0 | 0 | 0.0 | 8 | & | 1 | 0.1 | 0 | 0.0 | - |
| secondary & tertiary | 4 | 1.9 | 22 | 1.8 | 128 | 4.6 | 13 | 1.8 | 5 | 2.7 | - |
| total bladelets | 4 | 1.9 | 22 | 1.8 | 136 | 4.9 | 14 | 2.0 | 5 | 2.7 | - |
| **biface thinning debitage** | | | | | | | | | | | |
| primary flakes | 0 | 0.0 | 3 | 0.3 | 3 | 0.1 | 0 | 0.0 | 0 | 0.0 | 1.8 |
| secondary & tertiary flakes | 0 | 0.0 | 52 | 4.4 | 76 | 2.9 | 20 | 2.8 | 4 | 2.2 | 13.6 |
| total biface thinning | 0 | 0.0 | 55 | 4.6 | 79 | 2.9 | 20 | 2.8 | 4 | 2.2 | 15.4 |
| chips | 39 | 18.2 | 249 | 20.9 | 777 | 28.2 | 256 | 36.0 | 84 | 45.9 | 67.4 |
| chunks | 8 | 3.7 | 50 | 4.2 | 144 | 5.2 | 58 | 8.2 | 9 | 4.9 | 1.2 |
| total debris | 47 | 22.0 | 299 | 25.1 | 921 | 33.4 | 314 | 44.2 | 93 | 50.8 | 68.6 |
| cores | 4 | 1.9 | 8 | 0.7 | 30 | 1.1 | 3 | 0.4 | 2 | 1.1 | 0.2 |
| core remnants | 4 | 1.9 | 4 | 0.3 | 14 | 0.5 | 0 | 0.0 | 0 | 0.0 | 0.1 |
| core rejuvenation pieces | 1 | 0.5 | 0 | 0.0 | 20 | 0.7 | 1 | 0.1 | 0 | 0.0 | 0.1 |
| worked pebbles | 0 | 0.0 | 0 | 0.0 | 6 | 0.2 | 0 | 0.0 | 0 | 0.0 | 0.0 |
| burin spalls | 0 | 0.0 | 12 | 1.0 | 38 | 1.4 | 6 | 0.8 | 2 | 1.1 | 0.5 |
| tools | 16 | 7.5 | 131 | 11.0 | 240 | 8.7 | 35 | 4.9 | 9 | 4.9 | 3.6 |
| **totals** | **214** | **100.0** | **1190** | **100.1** | **2758** | **100.2** | **711** | **99.9** | **183** | **100.00** | **99.9** |

Table 1. Overall lithic composition data for Predynastic sites in the Hierakonpolis region.

* Percentages only are given for HK-29A as the analysis is not yet complete. However, these percentages are based on a over 54000 lithic items and so are not expected to alter significantly upon completion of the analysis.

** At the moment the blade and bladelet data for HK-29A are combined.

| tool category | localities | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | HK-14 | HK-11C | | HK-29-10L10 | | HK-29-17L13 | | HK-24A | | HK-25D | HK-29A* |
| | n | n | % | n | % | n | % | n | % | n | % |
| endscrapers | 1 | 6 | 5.0 | 23 | 5.6 | 24 | 11.0 | 1 | 2.9 | 0 | 4.6 |
| circular scrapers | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.4 |
| burins | 3 | 47 | 39.2 | 145 | 35.1 | 77 | 35.3 | 12 | 35.3 | 0 | 24.5 |
| notches | 3 | 13 | 10.8 | 20 | 4.8 | 8 | 3.7 | 6 | 17.6 | 1 | 3.7 |
| denticulates | 0 | 3 | 2.5 | 13 | 3.1 | 7 | 3.2 | 0 | 0.0 | 0 | 1.1 |
| perforators | 1 | 0 | 0.0 | 10 | 2.4 | 8 | 3.7 | 2 | 5.9 | 0 | 1.0 |
| microdrills | 0 | 0 | 0.0 | 8 | 1.9 | 3 | 1.4 | 1 | 2.9 | 0 | 34.3 |
| awls | 0 | 0 | 0.0 | 0 | 0.0 | 3 | 1.4 | 0 | 0.0 | 0 | 0.0 |
| truncations | 0 | 6 | 5.0 | 19 | 4.6 | 9 | 4.1 | 0 | 0.0 | 0 | 5.3 |
| backed pieces | 0 | 2 | 1.7 | 6 | 1.5 | 4 | 1.8 | 0 | 0.0 | 1 | 1.9 |
| sickle blades | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.2 |
| glossy bladelet tools | 0 | 1 | 0.8 | 0 | 0.0 | 14 | 6.4 | 0 | 0.0 | 1 | 4.5 |
| sidescrapers | 0 | 0 | 0.0 | 5 | 1.2 | 6 | 2.8 | 0 | 0.0 | 0 | 1.5 |
| scaled pieces | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.1 |
| transverse arrowheads | 0 | 0 | 0.0 | 4 | 1.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.6 |
| retouchted pieces | 8 | 36 | 30.0 | 118 | 28.6 | 46 | 21.1 | 9 | 26.5 | 4 | 12.8 |
| non-bifacial miscellaneous | 0 | 3 | 2.5 | 7 | 1.7 | 2 | 0.9 | 2 | 5.9 | 0 | 1.1 |
| worked tabular slabs | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.3 |
| projectile point roughouts | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.2 |
| stemmed & barbed points | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.2 |
| projectile point fragments | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.1 |
| other fine bifacial tool fragments | 0 | 2 | 1.7 | 3 | 0.7 | 0 | 0.0 | 0 | 0.0 | 1 | 1.1 |
| winged drills | 0 | 0 | 0.0 | 14 | 3.4 | 1 | 0.5 | 0 | 0.0 | 0 | 0.0 |
| crescent drills | 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.1 |
| bifacial drill/awl bit fragments | 0 | 0 | 0.0 | 0 | 0.0 | 3 | 1.4 | 0 | 0.0 | 0 | 0.0 |
| miscellaneous bifacial | 0 | 1 | 0.8 | 18 | 4.4 | 3 | 1.4 | 1 | 2.9 | 0 | 0.3 |
| total bifacial tools | 0 | 3 | 2.5 | 35 | 8.5 | 7 | 3.2 | 1 | 2.9 | 1 | 1.9 |
| unidentifieable broken tools | 0 | 11 | - | 55 | - | 22 | - | 1 | . | 1 | - |
| **total** | **16** | **131** | **100.0** | **468** | **100.0** | **240** | **100.1** | **35** | **99.9** | **9** | **99.9** |

Table 2. Tool class frequency data for Predynastic sites in the Hierakonpolis region.

Note: the tool percentages are calculated excluding unidentifiable broken tools;
* Percentages only are given for HK-29A as the analysis is not yet complete. Nevertheless, these percentages are based on a total of 1921 tools.

and variety of perforating and drilling-type implements. In addition to perforators and microdrills, it has produced several winged drills (from square -10L10), and a few large awl-like tools which are not standardized enough to term *grand perçoirs* such as occur in the Nagada region (cf. Holmes 1989b: 220, 222, 229); nor are all of these HK-29 awls flaked entirely on both sides. In addition, there are three large drill tip fragments with bifacial retouch which probably come from such large irregular awls.

Another distinctive class of tool yielded by square -10L10 at HK-29 is the transverse arrowhead. Two other classes of tool are known from occasional surface finds at Late Amratian sites. These are fishtails and crescent drills.

While the Amratian lithic assemblages from Hierakonpolis have a very similar composition to each other, the assemblage from the Gerzean locality of HK-29A contrasts markedly in its proportions of the major technological categories reflecting its very specialized workshop character. The assemblage consists predominantly of the flakes and chips resulting from bifacial tool manufacture. Other distinctive technologies represented in the assemblage are the production of regular blades and bladelets of ordinary, unheat-treated flint, production of bladelets of a slightly coarse grey variety of flint which were converted into microdrills, and the manufacture of bladelets of heat-treated flint, many of which were retouched into micro-endscrapers and other heat-treated bladelet tools. Nevertheless, these technologies all exist in the Hierakonpolis area by the Late Amratian even though they were not practised on the same scale as at HK-29A; indeed the coarse grey bladelet technology is only just barely represented at HK-29.

However, it is the tools that indicate that the HK-29A assemblage, despite being very specialized, represents a continuation of the Hierakonpolis lithic industry. Aside from microdrills, the most important tool categories are burins and retouched pieces just as at the Amratian sites, and endscrapers, notches, truncations and glossy bladelet tools are the next most abundant classes. The only new elements in the assemblage seem to be circular scrapers, and stemmed and barbed projectile points. All the other classes are known from earlier contexts (a crescent was found on the surface at HK-29 and several sickle blades were found in unit ON-OE at HK-11C).

## Interregional relations

Since the HK-29 assemblage is fairly representative of the Hierakonpolis industry, the comparison I made with the Nagada and Mostagedda industries several years ago still stands. The Hierakonpolis industry is distinct and shows marked differences compared with any other Predynastic lithic industry. Nevertheless, there are some points of similarity and it is these which I wish to discuss now, for while the differences imply interregional variability, the similarities suggest interregional contacts.

The most prevalent feature shared by lithic assemblages throughout the Egyptian Nile Valley from the Gerzean onwards is a regular blade technology along with a standard set of tool classes made on its products. Once this technology had been adopted, some groups chose to make many of their ordinary tools on the regular blades, but certainly in Upper Egypt at least, there is also a set of "new" tool classes produced on the blades. These comprise sickle blades, various blade knives, regular truncations, and alternately backed pieces. My general category of blade knives corresponds to K. Schmidt's Hamamija knives type A, while his Hamamija type B knives correspond to my endscraper knives. His Badari knives correspond to my truncation knives and we both recognize the category of "el-Omari knife" (Schmidt this volume).

These tool categories, as well as other tools made on blades, seem particularly common in the Mostagedda industry of the Badari region (Holmes 1988; 1989b; 1992b). The Mostagedda industry is the northernmost Predynastic lithic tradition so far recognized in Upper Egypt. New data corroborate my suspicion that the industry is primarily, or entirely Gerzean in date (Holmes & Friedman 1989; n.d.; Holmes 1992b). As Schmidt (1993) has also observed, the Mostagedda industry seems to show some relationship with the industry of the earlier Maadi Culture of Lower Egypt (cf. Rizkana & Seeher 1988). Both are characterized by the presence of well developed blade and bladelet technologies, and it seems likely that these technologies were adopted by the Mostagedda flintknappers from their northern counterparts. However, the twisting characteristic of the blades and bladelets of the Maadi industry is not prevalent in Mostagedda industry. In addition, they may have obtained the notion of making certain tool classes from the Maadi Culture, most notably circular scrapers and micro-endscrapers, and possibly sickle blades and alternately backed pieces as well.

A very distinctive aspect of the Mostagedda industry is the presence of a heat-treated bladelet technology and a class of tool made on the resultant bladelets, which I have called, for want of a better term, "glossy bladelet tools". My initial recognition of this category was based on my study of the Badari region flint collections in the Petrie Museum of Egyptian Archaeology at University College London. These glossy bladelet tools have very small, neat retouch which was applied variously to the distal end and/or part or all of the lateral margins. Many of them are, in fact, micro-endscrapers and are similar to the micro-endscrapers from Maadi (Rizkana & Seeher 1988: 27-28, pl. 33) as well as from the southern Levant (Gilead 1984).

Although heat treatment had not been previously noted at Maadi, given the presence of small regular bladelet cores, bladelets and micro-endscrapers all resembling equivalent Upper Egyptian forms that do show definite indications of thermal alteration, I suspected that the Maadi pieces had been similarly treated. I was thus very grateful to have the opportunity at the end of "The Nile Delta in Transition" seminar in Cairo in 1990 to go to the Maadi Museum and stores and look at some of the Maadi material for myself. While I did not have time to examine every micro-endscraper, I did see a good many of the bladelets and bladelet cores. My verdict was that they had been heat-treated, and I collected some flint nodules from the area to heat experimentally. The results were consistent with the notion that Maadi bladelet cores were indeed heat-treated (Holmes 1992b).

The Maadi Culture may well have provided Upper Egypt as a whole with the knowledge of regular blade and heat-treated bladelet manufacture, either through direct contact, or via an intermediary as represented by the Mostagedda industry. Moreover, this blade technology may ultimately derive from the Levant.

Although certain technologies and some tool classes may have been shared throughout the Egyptian Nile Valley, regional differences still emerge at a detailed attribute level. Mostagedda sickle blades, for example, are not the same as those from elsewhere in Upper Egypt (personal observations), or from Maadi (cf. Holmes 1992b). Locally made products still retain a local character.

Nevertheless, some elaborate tools must have been transported from production centres. A ripple-flaked knife from, say, Armant will be similar to a speciment from El-Gerzeh. Rhomboidal knives and fishtails are other specialized forms that would have been made in just a few places and then distributed along the Nile Valley.

I have referred to the regular blade technology and various other lithic features that occur throughout Upper Egypt, and to a certain extent in Lower Egypt, as Gerzean developments. However, the rhomboidal knives and some of the fishtails are Amratian, and sickle blades made on regular blades are known from a Late Amratian site at Hierakonpolis (HK-11C). The bifacial tools are craft items that were in demand as prestige items to be placed in graves, and are indicative of interregional exchange which was undoubtedly taking place by the end of the Amratian. The Hierakonpolis sickle blades, on the other hand, may represent the beginning of the interregional contact resulting in the adoption of the regular blade technology and standard set of blade tools as well as other items constituting a homogenizing trend.

## Summary

The Hierakonpolis industry is a distinct regional tradition. During the Amratian it shows only limited indications of interregional exchange in the form of elaborate tools such as fishtails. By the Gerzean, the Hierakonpolis industry, as well as other regional industries, shows more marked evidence of interregional contact as well as exchange. Regular blade heat-treated bladelet technologies were adopted, which possibly derive from the Lower Egyptian Maadi industry. Certain tools made on the products of these technologies occur throughout Upper Egypt. Specifically, these tools comprise sickle blades, blade knives, regular truncations, alternately backed pieces, and micro-endscrapers, the latter being produced on the heat-treated bladelets.

Nevertheless, despite this homogenizing trend, these tool classes do not appear to be identical from area to area. regional differences are still apparent at an attribute level. These probably reflect the fact that local flint-workers were

responsible for the manufacture of all day-to-day flint artifacts. The similarities, on the other hand, are indicative of the substantive socio-economic and presumably political developments that were to lead to the emergence of the single cultural and political entity that we know as ancient Egyptian civilization.

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# Analysis of Naqada Predynastic crania: a brief report

This paper examines the affinity of southern Predynastic crania from earlier Naqada levels, in the context of Nile Valley human variability. Naqada I (3900 B.C.) and II (3600 B.C.) cultures succeeded Badari (4400-4000 B.C.) in southern Egypt, and preceded the Dynasty O and I periods (Williams 1986; Hassan 1988). Some earlier workers (e.g. Petrie 1920) viewed a portion of the Naqada I-II culture continuum as having been fundamentally an import from the Middle East or delta as noted in Hoffman (1988) and Holmes (1989), but there is little to support this view. Naqada culture primarily derived from Badari which was firmly rooted and integrated in the ecology of the southern Nile and its native fauna and flora, as reflected in hieroglyphs, symbolism, religion and funerary architecture; all of these items have their origins in the southern Proto- and Predynastic cultures which in turn derive from a Saharo-Sudano Nilotic African base (Williams 1986; Hassan 1988; Hoffman 1988). Indirect Near Eastern influence is seen in some of the domesticates (Hassan 1988), which are also found in Neolithic Europe. Archaeology does not suggest major migration or population replacement from the Near East.

Currently, major continuity between Badari, Naqada I, Naqada II, and Dynastic cultures is stressed (Hoffman 1988; Hassan 1988), although there was an increase in trade with the Middle East in later periods (Hassan 1988). Internal exogamy is postulated (Hassan 1988). Given the cultural continuity in a fundamental sense, the crania of earlier Naqada periods are examined against the variability of Badari skulls for evidence of biological change.

**Previous studies**

Previous work was often concerned with the "race" of the creators of Naqada cultures and ancient Egyptian in general. Either the homogeneity of remains was under question or Naqada membership in a particular "race" was at issue. This literature cannot be avoided in any representative review. Modern workers usually work from an inductive perspective utilizing real populations or their equivalent, instead of a deductive reductionist racial identity approach. This theoretical perspective acknowledges primarily the validity of the local population. Consequently efforts are directed towards establishing population affinity and not racial identities as conceived by earlier workers. It is curious, misleading and unfortunate that the old racial terms are still (mis) used, although the race concept has fallen into disrepute. The "no-race" school has failed to develop new terminology. Serious workers also utilize archaeological and linguistic data to place their results into a context of the most likely probabilities, since all similarity does not mean close relatedness in a genealogical sense. The interest is in real relationships. Morphological or morphotypological studies and comments on the morphology of Naqada crania are not consistent in their conclusions. They have been described as "Negroid-Caucasoid" hybrids and/or a composite "Caucasoid" and "Negroid" population (Fawcett & Lee 1902; Myers 1902; Morant 1925; Falkenburger 1947; Nutter 1958), or as "Mediterranean", ultimately not of "Black" or "White" origin in close reading of Sergi's (1901) views. Smith (1909) with Derry (1910) noted that late Predynastic (Naqada) crania morphologically resembled A-group Nubian remains, and that earlier Predynastic (Naqada) crania resembled those of "Middle" (C-group) Nubians. The Naqada crania have been interpreted as non-"Caucasian" indigenous tropical Africans, but non-"Negro" (Giuffrida-Ruggeri 1915; 1916; 1922) and designated Ethiopian or Erythraen (Giuffrida-Ruggeri 1922); however descriptions in Giuffrida-Ruggeri's work would generally be designated "Negroid", although not as extreme as forest belt groups. It should be understood that there is a range of indigenous Saharo-tropical African or just biological African variation, fully predicted at molecular and morphological levels by an evolutionary perspective. Narrow noses and faces do not usually indicate a migration of, or admixture with Europeans or "Euripides" (see Hiernaux 1975). The Late Pleistocene subfossil record clearly suggest that these characteristics or trends (called Elongated African by Hiernaux, 1975) arose as independent microevolutionary adaptations. The basic concept of "real African" cannot be restricted to the "Negro" (here called Broad trend) phenotype any more than "real European" is or can be restricted to "Nordic" or "East Baltic" phenotypes or that of the Caucasus mountains. That this is done is a product of recent social history, not scientific considerations. African biohistory has produced a range of phenotypes, and while there has been admixture there is no theoretical reason why the major portion of continent wide variation is not due to *in situ* differentiation.

Coon (1939) described Naqada crania as "Caucasoid" and less "Negroid" than the earlier Badari group. Stoessiger (1927) thought Naqada period crania to be more homogeneous then the Badari. Naqada crania have been interpreted by a rigid typological analysis to be trihybrid in origin, of the "Black", "Yellow" and "White" varieties, with the latter predominating (Wiercinski 1966, 1973). Strouhal (1971) questions the "Yellow" element. The morphology which may have prompted this conclusion may be related to the transverse flatness of the face (strictly across the malars). This is seen in many African peoples, but especially stereotyped Khoisan speakers. Coon (1965) noted that some earlier workers believed that populations with Khoisan-like morphology were the original inhabitants of northern Africa. Taken as a whole, morphological descriptions suggest variability, and essentially Elongated African trend characteristics. Criticisms of morphological work include its frequent use of rigid typologies rooted in nineteenth and early twentieth century ideas and perceptions, which limited understanding and acceptance of the range of natural variation in given geographical areas. A tautological positivism is usually at work in these approaches.

Metric analyses of Naqada crania also have a long history. The first major study found that Naqada I, II and III crania, lumped together, formed a homogeneous series, a "race", by metric analyses (Fawcet & Lee 1902). This homogeneity was questioned by Myers (1902) who initially used a morphological approach. There is no necessary contradiction since aspects of morphology are not always easily described by metric variables. Myers saw the series as primarily a mixture (composite) of two "races" ("Mediterranean" and "Negroid"). Pearson (1905) denied this on statistical grounds (based on metrics), but stated that the series may have been a *Blumischung*, a population of hybrid origin (versus a mixture of distinct "races").

Studies using the discredited Coefficient of Racial Likeness (C.R.L.), placed all of the Naqada crania with the "Upper Egyptian type" (Morant 1925; Batrawi 1946). The $D^2$ values of Mahalanobis showed a combined series (Naqada I/II and other non-specific Naqada period remains) to be more similar to Tigrean and Nubian groups than to those from northern late dynastic Egypt (Mukherjee et al. 1955). A multiple discriminant function analysis designed to ascertain African "Negro" influence found Naqada crania to have a greater similarity to the dynastic northern (Gizeh) and a southern, artificially constructed, Abydos series when compared to a Kenyan series, although Naqada crania show definite "Negroid" tendencies (Crichton 1966). Crichton suggested that he may used the wrong "Negro" group, and that a "Nubian" series would have been more appropriate, thus disavowing a typological notion of African. The race paradigm is non-evolutionary and comes from a biased anthropology. A Naqada I cranial series, called "Negroid", was found to be nearly identical to one from Badari, using the Penrose statistic (Nutter 1958). Group mean values for the combined Naqada series in recent work suggest that its greatest affinities collectively are with southern Egyptians and Nubians, and other more southerly Africans (Hillson 1978). Hillson discovered that Egyptian series divide into northern and southern trends using more acceptable methods. Criticisms of these studies include use of the C.R.L. (Morant 1925; Batrawi 1946), inadequate or inappropriate comparison groups (Crichton 1966) and the use of too many variables (Crichton 1966). Multiple cluster analyses using the Penrose distance statistic show a combined Naqada series to group with Nubians and more southerly Africans before linking with the late dynastic northern Gizeh series (see Brauer 1976). No separate "Egyptian" cluster is seen in Brauer's (1976) work, which is what would be predicted by a grouping paradigm which viewed the Egyptians as totally unsimilar and unrelated to more southerly Africans; nor is there a "geographical" cluster consisting of only northern Nile Valley series. The metric pattern mapped by distinct Naqada crania is clearly different from that of the distinct core of late Gizeh and Near Eastern crania (see the territorial map in Keita 1988).

Distal/proximal limb ratios are known to have climatic correlations, which reflect adaptation in accordance with Allen's rule. Naqada values broadly place them with people of tropical African origin or descent (Warren 1897; Trinkaus 1981; Robins & Shute 1986). This is significant given that the northern Nile Valley is not in "tropical Africa" or southern India. They were not cold adapted immigrants.

Non-metric studies (Berry et al. 1967; Berry & Berry 1972) have shown the Naqada of all periods to usually be more related to other Egyptian series, although inexplicable inconsistencies in their data are present. For example, greatest relationships are often not between known geographically and diachronically successive series. This could suggest gene flow in intervening periods, other population processes or problems with the method. Early Naqada crania were found to be more similar to various temporally and geographically removed dynastic Egyptian groups than to late Naqada! The early Naqada series was also more similar to a Kerma (Kushite) and central Sudanese series than to the late Naqada series, although these were not the closest relationships. In another study a greater similarity for several Egyptian periods was noted to central Nile Valley Sudanese (upper Nubians) than to Palestinian or Byzantine groups (Berry & Berry 1972), though greatest similarity was to North Indians; this latter relationship can be discounted as being spurious since there is little supporting data in language, archaeology or history unless a radical diffusionist perspective is entertained. (A West African series was also suggested to have the same genetic origin as the Indian series! West Africans and Indians probably do not have a recent common ancestry). In summary, data from physical anthropology, archaeology and linguistics do not suggest a primary origin external to Africa for the early Nile Valley peoples.

## Material

The Naqada group (from Naqada and Ballas) used here consists of 53 randomly chosen male, non-deformed, adult crania. The selection process was guided by the condition (completeness) of the crania, in order to avoid extensive estimation and modelled on the selection procedure described by Howells (1973). The crania were sexed morphologically using the standard criteria. The Naqada crania tend to fit the previous descriptions, in that they resemble "Middle Nubian" (C-group) crania more than those of later northern Egyptians. The Naqada crania grossly fit well into the range of variation observed in, and described for "neolithic" Saharan, Nubian, Kushite, Somali and other African crania. From a morphological perspective, Peloponesian and Byzantine (Aegean) crania are notably less similar to the Naqada. Occasionally large and fairly rugged platyrrhine crania were observed, somewhat reminiscent of Epipaleolithic Nile Valley remains.

The crania are part of the collection of the Duckworth Laboratory at Cambridge University, Cambridge, England. They span the Naqada periods. This study follows the practice of using these crania as one series, as is usually done in metric studies (cf. Fawcett & Lee 1902; Mukherjee et al. 1955; Crichton 1966; Brauer 1976; Hillson 1978). This facilitates comparison, although theoretically problematic, since the time period is nearly 1000 years.

The comparative series of most importance are as follows: late dynastic northerners (Gizeh), Ninth Dynasty northerners (Sedment), Badari southern Predynastic crania, southern Dynasty I, and the Kerma (Sudanese) series. The discriminant space is given a broad analytical context by the additional use of series of equatorial Africans (Gaboon and Teita) and northwestern Europeans (Romano-British, Poundbury). A series from the Maghreb provides further comparative material. More complete descriptions are in Keita (1988).

## Methods

The population affinity (not "racial" identity) is evaluated using a multivariate technique. Multiple canonical discriminant functions are used to evaluate the crania as series and unknowns as previously done (Keita 1988). An average value, the centroid score, allows for comparison of the series. The unknown analyses permit the study of the degree of overlap of the series under study with other series' patterns. The Badari series analyzed in this manner is presented for comparison. The crania from Badari are viewed as having the baseline morphometric pattern in upper Egypt, because of their temporal priority. Thus diachronic change, if any, in the Predynastic period is ascertainable. The comparison series are viewed as denoting southern and northern populational trends. There are always two southern Egyptian and northern Egyptian series with which crania can be classify.

Thirteen metric variables are used in the primary analysis. These are nasal height, nasal width, cheek height, upper facial height, bimaxillary breadth, bizygomatic breadth, maximum cranial length, biauricular breadth, basibregma height, basinasion lenght, horizontal circumference, minimum frontal breadth and maximum cranial length. They were taken by the investigator. An evaluation using the seven variables from Mukherjee et al. (1955) is carried out to achieve an independent comparison. The variables have been biologically justified in previous work (Keita 1988). The interest is in biologically legitimate discrimination in this modified phenetic approach to affinity. Discrimination for its own sake is not the goal. The goal is to examine trends, not establish a discriminant function to, in effect, create artificial "racial" types.

## Results

The unknown analyses show a change from Badari to Naqada periods. The Badari crania classify into upper Egyptian-southern series at a rate 90-100%; the Naqada series distributes across the north-south boundary more evenly, with 61-64% classifying into southern series (Tables 1, 2).

Centroid scores suggest a Naqada similarity to Kerma Kushites (Sudanese) (Tables 3, 4). When an ancient Levantie series is included the Naqada value is little affected (Table 5) although this Middle Eastern series has some crania with affinities to early southern upper Egyptians and Nubians (Keita 1988), probably reflecting their real presence to some degree as attested to by archaeological and historical sources (see review in Keita 1988). When the crania with these and northern European affinities were eliminated the remaining Lachish crania as a group had a centroid value of 1.3 on Function I.

## Discussion

The change observed from Badari to Naqada periods probably reflects increased migration or gene flow via exogamy in the Naqada periods as postulated by Hassan (1988). This probably represents exchange between local groups along the Nile corridor and not with the Near East, although trade increased with the latter at this time. However unknown selection pressures may be responsible for a trend towards a northern pattern.

The change from Badari to Naqada times probably reflects the breakdown of the isolation of southern Egypt from the north, and increasing social complexity before the First Dynasty. Increasing genetic variation is a corollary of increasing social complexity. Wildung (1984) presents evidence in support of some northern Delta groups participating in Naqada II, III, and Dynasty I culture; this suggests a socio-cultural basis for north-south migration or genetic exchange, given this early cultural and perhaps political unity. Perhaps there was no military conquest, as was traditionally taught, only the gradual incorporation of the north into southern culture. It is clear that Naqada material and "symbolic" culture replace the "Predynastic" culture of the north (Bard 1992). The Badari-Naqada continuum formed the cultural core of later Egyptian civilization.

Further research is suggested by this and previous work. Diachronic studies of contemporaneous early to late series from the south and north would be of interest to examine the issue of biological convergence. Affinity studies, using metric and non-metric traits, of Naqada, A-Group Nubian, northern Neolithic/Predynastic and insular early Near Eastern series would be of interest, since they overlap in time and perhaps space, especially in the case of late Naqada and A-Group cultures (Williams 1986; Hoffman 1988; Hassan 1988; Holmes 1989). There is no reason to automatically presume a lack of biogenetic similarity or totally separate biogenetic origin suggested by terms like "Nubian" and "Egyptian". Populations in these regions probably had complex interrelationships

Table 1. Unknown analyses of southern Predynastic series by period, in percent. 13 and 7 variables as indicated.

| | | Gabon Gaboon | Kenya Teita | Sudan Kerma | Southern Egypt Badari | Southern Egypt Naqada | Southern Egypt Abydos | Northern Egypt Sedment | Northern Egypt Giza | Algeria Carthage Maghreb | Roman Britain |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Badari | 13 | 9 | 9 | 32 | -- | 36 | 4 | 0 | 0 | 9 | 0 |
| 4400-3900 BC | 7 | 14 | 14 | 32 | -- | 32 | 9 | 0 | 0 | 0 | 0 |
| Naqada 3900- | 13 | 4 | 6 | 15 | 26 | -- | 13 | 2 | 15 | 17 | 2 |
| 3300 BC | 7 | 6 | 6 | 19 | 21 | -- | 9 | 11 | 15 | 13 | 0 |

Table 2. Summary values of unknown alalyes, in percent. 13 and 7 variables as indicated.

| | | overall Southern | distant Southern | Southern Egyptian | Northern Egyptian | non-Egyptian Northerners | | overall Northerners |
|---|---|---|---|---|---|---|---|---|
| | | | | | | costal Maghreb | distant Northern | |
| BADARI | 13 | 90 | 50 | 40 | 0 | 9 | 0 | 9 |
| 4400-3900 BC | 7 | 100 | 60 | 41 | 0 | 0 | 0 | 0 |
| NAQADA | 13 | 64 | 25 | 39 | 17 | 17 | 2 | 36 |
| 3900-3300 BC | 7 | 61 | 31 | 30 | 28 | 13 | 0 | 41 |

Table 3. Centroid scores. 13 variables.

| | FUNCTION | | |
|---|---|---|---|
| | I | II | III |
| | | | |
| Naqada | -.40 | -.18 | -.46 |
| Kerma | -.52 | -.40 | -.14 |
| Badari | -1.45 | -.14 | -.48 |
| Abydos | .19 | -.42 | -.66 |
| Maghreb | .58 | .23 | .004 |
| "E" series (Gizeh) | .76 | .06 | .36 |
| Teita | -1.63 | -1.35 | .96 |
| Gaboon | -1.52 | 1.25 | .86 |
| Romano-British | 2.15 | -.18 | .89 |
| Sedment | .22 | 1.57 | -.50 |

Table 4. Centroid scores. 7 variables.

| | FUNCTION | | |
|---|---|---|---|
| | I | II | III |
| Naqada | -.50 | -.09 | -.21 |
| Kerma | -.60 | -.27 | .22 |
| Badari | -1.33 | -.19 | -.33 |
| Abydos | .07 | -.40 | -.30 |
| Maghreb | .50 | .08 | -.42 |
| "E" series (Gizeh) | .81 | -.13 | -.18 |
| Teita | -1.64 | -1.13 | .38 |
| Gaboon | -1.16 | 1.34 | .61 |
| Romano-British | 2.04 | -.17 | .64 |
| Sedment | .44 | 1.35 | -.58 |

Table 5. Centroid scores when Lachish, an ancient Palestinian series, is included.

| | FUNCTION | | |
|---|---|---|---|
| | I | II | III |
| Naqada | -.44 | -.12 | -.49 |
| Lachish | .53 | .26 | -.30 |
| Kerma | -.60 | -.39 | -.18 |
| Badari | -1.50 | -.06 | -.51 |
| Gaboon | -1.56 | 1.14 | 1.01 |
| Teita | -1.77 | -1.46 | .81 |
| Maghreb | .53 | .18 | .12 |
| "E" series (Gizeh) | .69 | .04 | -.29 |
| Sedment | .22 | 1.59 | -.24 |
| Abydos | .11 | -.37 | -.67 |
| Romano-British | 2.05 | -.40 | .93 |

in the later Pleistocene/early Holocene. Ancient Saharo-Nilotic and other populations perhaps shared biological traits which reflect a shared biohistory in a hot dry environment.

## Conclusions

The southern Egyptian population diversified from the Badari through Naqada periods. This parallels a well documented increase in social complexity in southern Egypt. The diversification is possibly secondary to northerners being integrated into the Naqada culture, being attracted to the locale of emerging centralization. Alternatively the diversification may be the result of unknown microevolutionary pressures.

## Addendum

Naqada II, a combined Badari/Naqada I, and Naqada III cranial series have been studied as distinct groups using an appropriate number of variables in relation to sample size, cluster analysis, canonical variates an $D^2$ of Mahalanobis. This study is an improvement over those using crania from the whole of Naqada. The results confirm that there was diversification over time. However the Naqada III series was more similar to earlier and more southern material than to Dynasty I. The comparative material included Bronze Age Italian and recent Greek series, as well as Kerma Kushites and recent Somali. None of the southern Predynastic Egyptian series (or Dynasty I) were similar to the Italian or Greek series which always clustered together and apart from Egyptians, Kushites and Somali series. There is no suggestion that Naqada II or III was initiated by peoples with a craniometric pattern common to the southern European series used. This research was carried out at Oxford University in 1994 with the collaboration of A. J. Boyce.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

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# Evidence for interregional contacts between Late Prehistoric Lower and Upper Egypt: a view from Buto

## Introduction

The main ideas for the development of the late prehistoric cultures in Egypt were essentially worked out by Werner Kaiser in the last thirty years (Kaiser 1956; 1957; 1985; 1990). As a result we learned that the rise of the archaic Egyptian culture was built on two different traditions: Lower and Upper Egypt. These developed in two different ways in prehistory and came together when the Upper Egyptian Naqada culture expanded to the north and this led to the unification of Egypt.

These ideas were for a long time *argumenta ex silentio* since archaeological records had not provided sufficient material until the last ten years, when the archaeology of the Nile Delta began to evolve.

## The evidence from Tell el-Fara´in - Buto

In Tell el-Fara´in/Buto - a site in the western Nile Delta - the main interest of the excavation project by the German Institute of Archaeology was to shed light on the point in history when Upper Egypt (Naqada culture) met and incorporated Lower Egypt by conquering it.

The stratigraphy of the last excavations in 1989 provides a very tight sequence and show the evolution of the Late Predynastic material of a Lower Egyptian tradition (namely Buto/Maadi culture) into those of an Early Dynastic unified Egypt of Naqadian traditions. There is a transitional layer "IIIa " present in Buto in which the ceramic provide evidence for a slowly evolving acculturation from the one to the other cultural tradition with both features appearing side by side. The evidence, we thought, would show that the acculturation should have taken place in a later stage of the Naqada culture, namely IId2, speaking in Upper Egyptian chronological terms according to Kaiser.

At Buto two layers - I and II - (to be compared with Naqada IIb-d), were found followed by a transitional IIIa (Naqada IId2) and then by Early Dynastic layers of a unified Egyptian culture (starting in Naqada IIIa). The stratigraphical sequence shows no hiatus between Layer I and II nor between Layer II and IIIa but instead a gradual change of the artefactual assemblage.

The acculturation can be characterized in more detail by going down through the strata. The uppermost part of Layer III contained mudbrick architecture with a well evolved ceramic industry in the tradition of Naqada IIIa. Further below the mudbrick architecture ends, but in this stratum the material culture is still of Upper Egyptian tradition recognizable by typical ceramic features and includes as well Lower Egyptian traditions indicated by some typical ceramic features and wattle/daub architecture. Between Stratum IIIa and Stratum II there was no hiatus but a kind of change to be observed in the material culture. Layer II apparently possessed exclusively Lower Egyptian features with some imports from Upper Egypt (Köhler 1992).

Lower Egyptian features in Layer II can be described by ceramics with impressed decoration (von der Way 1991), small ovoid vessels with cylindrical necks (see Fig. 4 below) and in Layer I by intense and close connections to the type site Maadi with e.g. pedestal and black polished vessels (Rizkana & Seeher 1987: pl. 1-12). The pottery of these layers is simply manufactured: the clay fabric contains big amounts of organic and anorganic temper e.g. straw, chaff, dung and sand. It is hand-built and fired in uncontrolled and mainly reducing atmosphere indicated by dark grey and brownish colours with firing spots. Most of the ceramics are rough faced or burnished and show rectangular hollows deriving from organic inclusions (chaff or straw) which have burnt out by firing. Also to be mentioned is a very distinct fabric (Fibrous ware) tempered with extremely fine organic and curling fibres, an obviously typical ware for the Delta (Köhler 1992: 16f.).

## The evidence from Upper Egypt

The Upper Egyptian pottery tradition was mainly determined by cemetery material which provides very fine ceramics like "Black-topped", "Red polished" and later marl-clay wares. These wares were produced under much more elaborate production conditions and were often taken to demonstrate the cultural difference of Upper and Lower Egypt. Taking a closer look we can see analogies between the Lower and Upper Egyptian Predynastic cultures which are actually well known, but obviously underestimated and which have to be explained.

The typical impressed decorations on ceramic of the Buto layer II is also characteristic for Upper Egyptian settlement sites of the Naqada IIc period (Adams & Friedman 1992). They are very common in domestic purpose ceramics such as the "Rough-Ware" and other coarse wares (Fig. 1-3). Also the small ovoid vessels with cylindrical neck are quite common at cemetery sites and are a so called typical features of the Buto/Maadi culture (Fig. 4-6). The paralells are still few until now, but they do exist and we have to explain them.

As regards the impressed decorations it has been suggested that they were imports or influenced by Western Desert groups migrating into the Nile Valley (von der Way 1991; Caneva 1992). It could also be possible that this decoration is present in Upper Egypt as a link between the Nubian-Sudanese Neolithic cultures and Lower Egypt and that it is not a normal feature in Upper Egypt since it occurs so rarely (von der Way 1991). While this may be true we must remember that settlement sites in Upper Egypt are badly recorded compared to cemetery sites and we only have little evidence yet and also that of all ceramic in Buto there is only a portion of less than 1% impressed decoration present.

Recent investigations at Upper Egyptian settlement sites showed that this decoration has to be considered a typical settlement feature which can be found in nearly all Naqada II settlements (Adams & Friedmann 1992).

**Consequences**

Will it be necessary to redate the Naqada expansion and assume that the Naqada culture was present in the Delta earlier than we thought before, i.e. during or before Naqada IIc ? This would imply a more or less sudden change in the stratigraphical sequence, material culture or settlement pattern between Layer I and II for which there is so far no evidence. Or will it be necessary to reconsider the definition of the Lower and Upper Egyptian cultures and the processes and contacts in the later prehistory of Egypt? (Holmes 1992).

The question is whether we are dealing with an ethnic and territorial expansion of Predynastic Upper Egyptian groups which created early centres like Hierakonpolis and Naqada - or whether these groups maintained a long distance trade with other regions, like the Delta, which resulted in early contacts and influences. We know of intensive contacts in the Neolithic Period readable in the lithic assemblages (Eiwanger 1983, 1987).

In the Chalcolithic period, i.e. the fourth millennium B.C., there is evidences for close connections between the north and the south, indicated by lithic and ceramic industries. Most of the contacts for the lithics in terms of technology and typology have been detected by D. Holmes (1989).

In the well recorded early settlement site of Hierakonpolis, many features of the Naqada IIb-d settlement material are comparable to Buto I and II and the latest stages of Maadi (Adams & Fridman 1992. [Fig. 1-5]).

It is clear that there were connections and influences in both directions, not only from south to north, indicated by e.g. stone vessels which were produced in Maadi and exported to the Naqada region where they form typical cemetery offerings of the Naqada I and II period (Rizkana & Seeher 1988: 63; Seeher 1990: 141). The Naqada II "rough ware" seems to be influenced by the North where it was produced already in Neolithic times. It cannot be decided yet which part of Egypt was responsible for the development of the Naqada II "Decorated ware" with dark-on-light painting. In Maadi as in Naqada it obviously appeared in an early stage of Naqada II on the interior and exterior of simple open bowls

(Rizkana & Seeher 1987: pl. 42-47; Crowfoot-Payne 1992: 188). These examples can give evidence for intense contacts and cultural exchange between the two parts of Egypt already in the early stages of the Predynastic period.

Another question is also whether we are really dealing with two different cultures or with several different styles. One has to face the fact that also in the area of Upper Egypt the Naqada culture has many differences, local traditions and styles (Kemp 1982; Hassan 1988; Mortensen 1992). They have often been ignored since this region was always seen in the tradition of one homogenous Naqada culture. As a matter of fact there are no two identical cemeteries even in the same area! Further north of the nucleus area of Naqada, we find gradually more and more differences.

Also underestimated has been the role of the Badari region which could have served as a link between Upper Egypt and the Delta since not only the wares but also the shapes of the pots are comparable to the Maadi assemblage (Holmes 1992; Köhler in prep). The recent research of D. Holmes in this region will be of great value in this aspect. If we knew more about Middle Egypt we could observe this change better, but all we have until now is the evidence from the region between south of the Faiyum up to the Mediterranean coast.

Different ecological conditions, craft specialization and economical factors might have been the reason for some very distinct local peculiarities in utilitarian objects such as the Lower Egyptian "Fibrous ware", the early development of the straw tempered wares in the north and the imports of Naqadan "Decorated", "Wavy-handled" and "Late" ware to the Delta. This may be, for example, the result of different pottery production methods, namely simple household production in the Delta and household or workshop industry in Upper Egypt where the climatic condition was much better for the development of a specialized pottery industry than in the Delta. Here the archaeological evidence gives reason to speak of a simple manufacturing methods indicated by firing conditions (uncontrolled bonfire without intentional addition of oxygen) and large amounts of temper, which have a positive effect on the drying and firing behaviour of pottery (Arnold 1985: 62ff.).

The pottery production of Buto did not evolve or change before the Late Naqada II/Early Naqada III. Cemetery sites like Minshat Abu Omar apparently give no further evidence for a separate pottery production in the Delta since mainly simple "Rough wares" and marl clay imports of the "classical" Naqada wares (Kroeper & Wildung 1985; Kroeper 1986/87; Kroeper 1988) were found. It seems that the more humid environment of the Delta was responsible for the lack of low tempered fine wares like "Black-topped" vessels or others. In Maadi these Upper Egyptian fine wares were imported and imitated in the local pottery tradition with a high degree of organic temper and a simple technology (Rizkana & Seeher pl. 68f.).

In Upper Egypt the contemporaneous settlements also provide straw tempered wares which were probably produced locally in the vicinity of the habitation area and which are comparable to those of Lower Egyptian settlement sites. But in addition to these also fine wares were produced by specialized potters, perhaps of workshops of the cemeteries (Allen et al. 1982; Geller 1985).

In Upper Egypt the climatic conditions were much more favourable for a specialized pottery industry in Naqada I and Early Naqada II with a full time craft specialization in the Later Naqada II. The fine Nile and marl clay wares need more specialized knowledge of firing conditions, since they are less porous than the straw tempered wares. As an open bonfire reaches its firing temperature very quickly, fine wares could be prepared for firing by heat treatment, e.g. by putting the pots into direct sunlight or over an open fire before firing so that little water remained in the clay (Rice 1987: 15). Fine wares could be fired more easily in kilns where the walls had an insulating effect and let the temperature rise more slowly and under more controlled conditions. Some of the fine wares give evidence for an oxidizing firing atmosphere and temperature up to 1000°C.

These industries probably produced not only the pottery for the nearby settlements and cemeteries but also for the already established regional market in the area and for an interregional exchange system. The products for the trade were the "Decorated", "Wavy-handled" and "Late" wares, which contained commodities for a developed exchange system.

As we can see there were two different pottery production stages in Lower and Upper Egypt responsible for the definition of two different cultures. The overlap in Late Naqada II could be explained by migrating people on the one hand, but also by economical demands of the specialized workshops in Upper Egypt to expand their market, mainly through pottery.

**Conclusion**

The classical scheme of the development of Egypt in the later prehistory divides Egypt into two main cultural centres: the Naqada culture of Upper Egypt and the Buto/Maadi-culture of Lower Egypt. At a later stage the Naqada culture expanded to the north establishing trading posts, conquering settlements and towns in the Delta. This expansion was seen as the basis for the unification of Egypt (Kaiser 1990). It seems that especially the ancient Egyptian term "unification of the two lands" seduced us to think of the existence of two different cultural areas which had to be unified by a warlike power such as the people of the Naqada culture.

The aim of this contribution is to show that we cannot really speak of two fully different cultural areas faced with the fact that it might be rather a matter of style, ecological conditions and economical demands which caused the difference between north and south in the time of Naqada II. The connection between the two parts of Egypt was probably much closer than we dared to think before.

We know of contacts between Upper and Lower Egypt already in the Neolithic period. The links seem to get more and more intense during the Chalcolithic period where we can see analogous developments in north and south: Upper

Egypt's Naqada culture developed its second stage while Lower Egypt changed into a later stage of the Buto/Maadi culture (Buto Layer I and II). At this time both regions have nearly the same utilitarian pottery and lithics.

The next change took place in both areas at the end of the fourth millennium B.C., when Naqada evolved into its third stage - a process which is still open to questions ! For Lower Egypt we thought that the changes were due to an increasing cultural and ethnic Naqadan influence and the use of the Naqadian material culture. It is now evident that the material culture was "unified" long before the political system of Egypt. I believe that both parts of Egypt grew together by trade and cultural exchange which made trading posts or conquests unnecessary. This came much later.

It should be studied whether there ever existed an ethnic territorial expansion during the Late Predynastic Naqada expansion. This may be only an egyptological idea based on archaic kingship evidence projected on Prehistoric events.

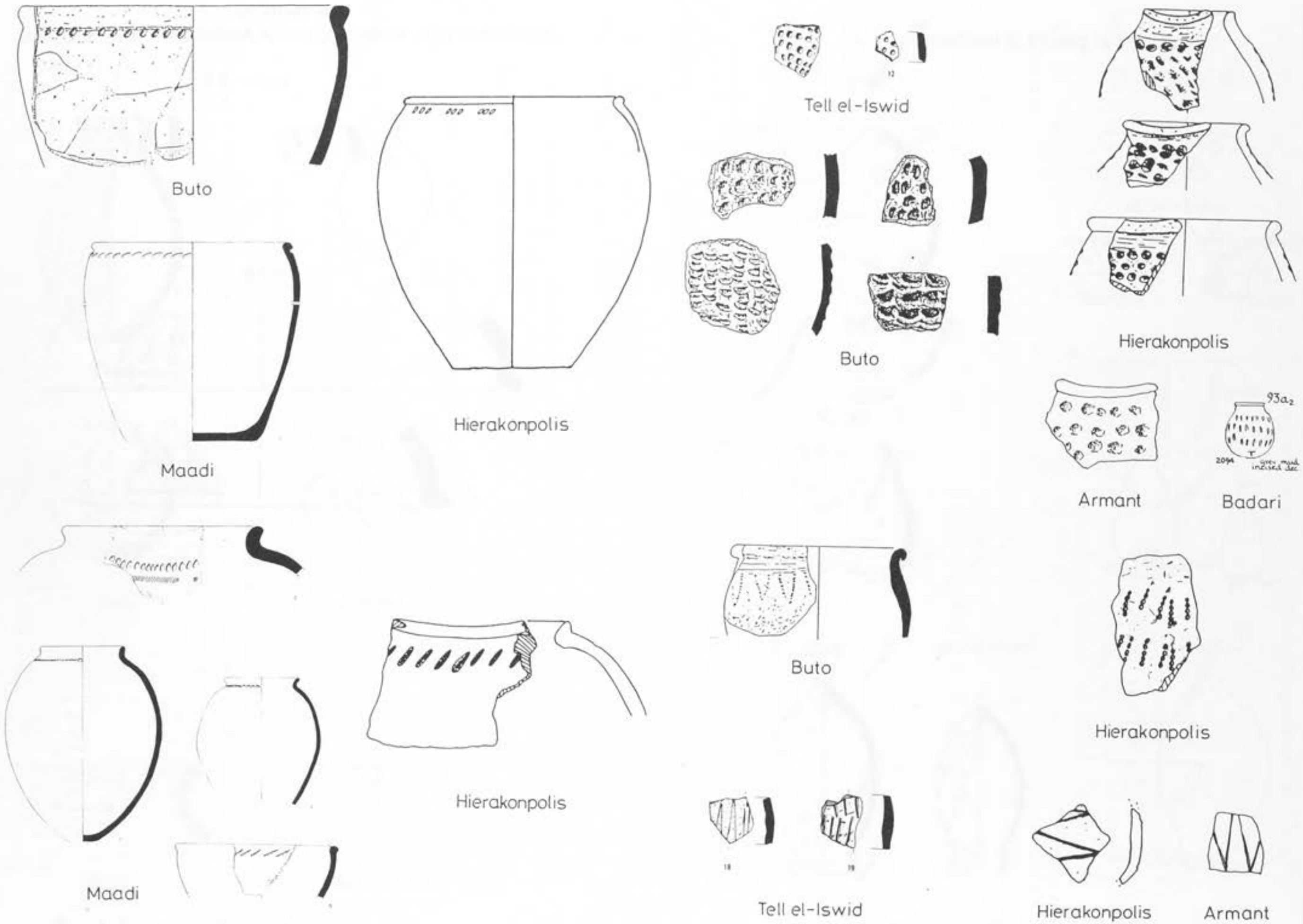


Fig. 1. Selection of impressed decorated vessel fragments from various sites.

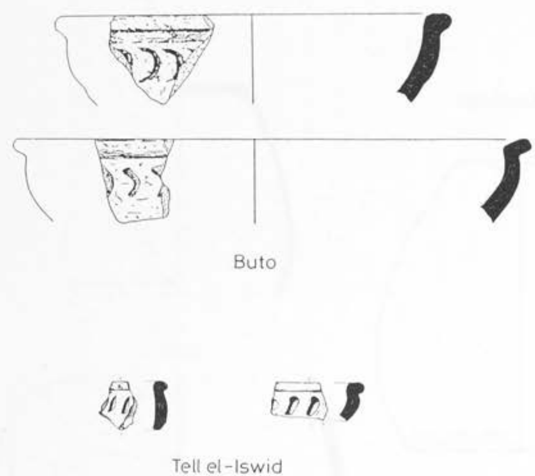


Fig. 2. Selection of coarse vessel fragments with impressed decoration.

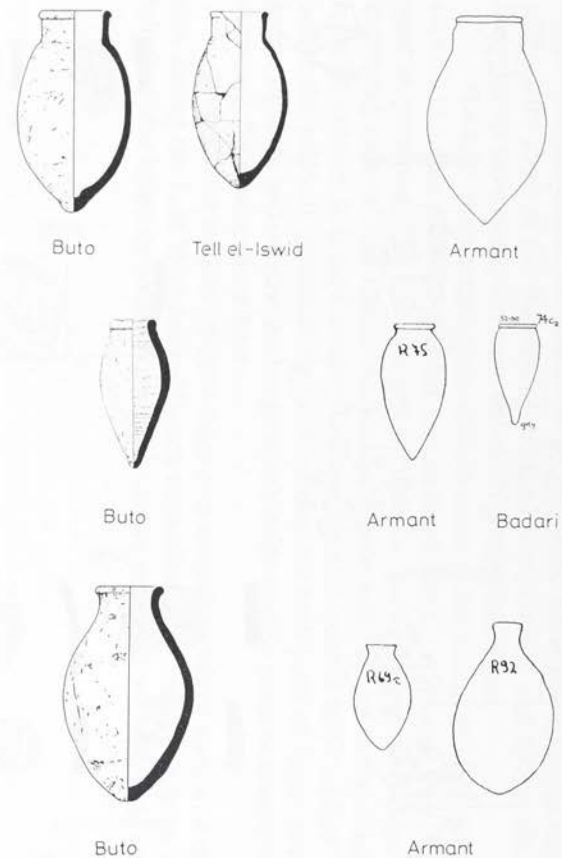


Fig. 3. Selection of closed vessel shapes.

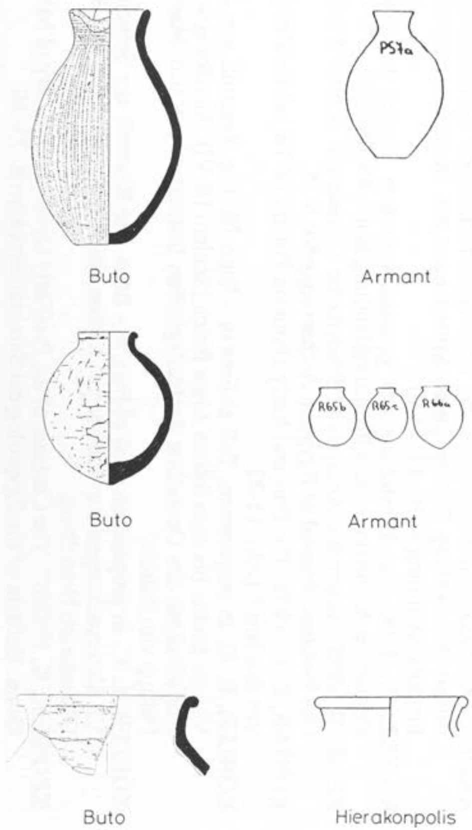


Fig. 4. Selection of closed vessel shapes.

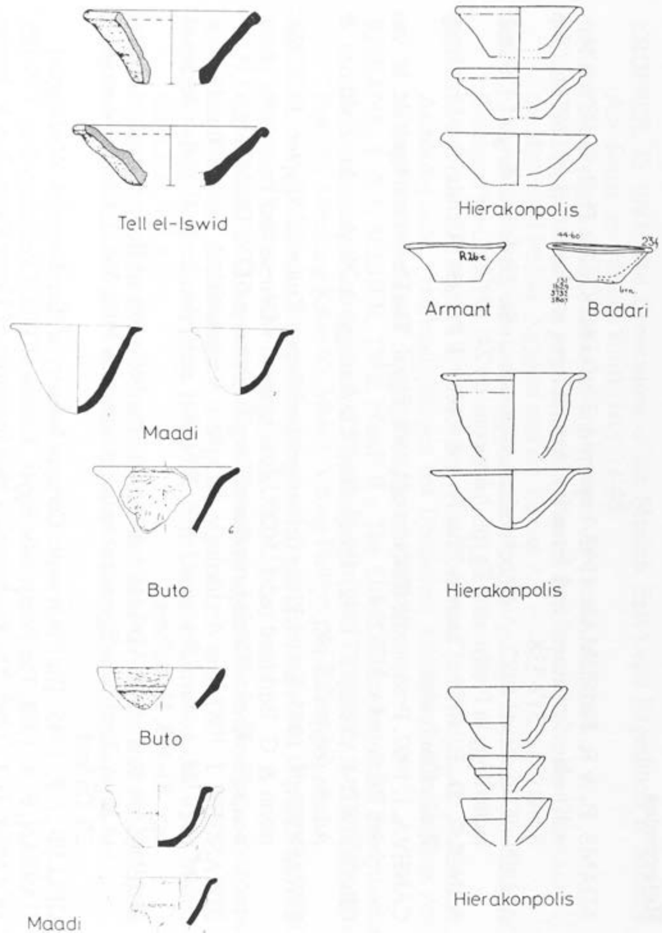


Fig. 5. Selection of open vessel shapes.

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# Human biological variation at Nagada: an analysis of dental morphological traits

**Abstract**

Cemetery T at Nagada has been postulated as being the internment site of a Predynastic royal or ruling elite due to its small, localized area and the richness of its burial goods. In order to examine possible biological differentiation between the individuals buried in cemetery T and those buried in other, possibly lower status, cemeteries at Nagada, non-metric dental morphological data were analyzed using the Mean Measure of Divergence statistic. Results indicate that cemetery T shows some biological distinction from both Cemetery B and the Great cemetery separately and from a pooled sample of all three cemeteries. The size of the difference supports the archaeological interpretation that Cemetery T represents a ruling or elite segment (or lineage) of the local population at Nagada, rather than a ruling or elite immigrant population.

## Introduction

The Upper Egyptian site of Nagada was excavated by Petrie in 1895 and, along with nearby Ballas, served as the basis for his pottery sequence dating system. Nagada therefore has become the standard typological reference for the Predynastic era. The site includes at least four cemeteries, which are commonly designated B, G, T, and the Great cemetery (Davis 1983). Cemetery T often has been seen as an elite cemetery because of its small size and the richness of the material culture found in its burials. Petrie attributed the burials to the wealthy citizens of Nagada (Petrie & Quibell 1896), while Hoffman (1979) proposed a comparative connection between cemetery T and the royal tombs of First Dynasty Abydos. Alternatively, Davis suggested that, although cemetery T might represent the burials of a special status group, the material culture included no evidence of a royal elite. Cemetery B, for example, is similarly small, localized and contains some rich deposits, making it equivalently likely as a status differentiated burial ground (Davis 1983: 27).

That cemetery T may be an elite cemetery raises the possibility that the individuals buried there may be biologically distinct from the general population; a ruling elite may consist of a family lineage, or may have come from outside the local population. The purpose of this study, therefore, is to employ biological data, namely non-metrical morphological traits of the teeth, to address the question of whether any degree of biological differentiation can be detected among skeletal samples obtained from cemeteries B, T, and the Great cemetery.

Biological differentiation often results when geographic barriers separate populations, but cultural factors, such as religious affiliation, linguistic group, and social structure, also tend to isolate human groups into regional and local breeding populations, which can lead to the divergence of these groups in genetic and phenotypic features. The resulting variability can be used to solve questions about the biocultural history of human groups. Populations that share similar morphogenetic attributes, for example, are interpreted as being more closely related than are populations that exhibit numerous differences.

Biological distance studies of Egyptian skeletal populations began in the 1960s, with the development of a method for assessing genetically controlled non-metric traits of the cranium (Berry & Berry 1967), and for using these to evaluate the relationships of prehistoric populations (Berry et al. 1967). Prior to this time, most studies were based on measurements of the cranium and adopted a racial typological approach for interpretation. Although more sophisticated statistical measures have improved the interpretive possibilities from metric data (Keita 1990; 1992), many researchers are reluctant to rely on such data since cranial shape has been shown to be affected by non-genetic variables, such as chewing stresses associated with diet (Carlson 1976; Carlson & Van Gerven 1979; Van Gerven 1982; Van Gerven et al. 1976). Certain properties of dental morphological traits make them ideally suited for biological distance analyses; i.e., they are usually independent of each other as well as independent of age and sex, there is a high genetic component in occurrence and expression, and the amount of intergroup variation in trait frequencies is high (Irish & Turner 1990).

Teeth also are often better preserved than are bones and are rarely altered by postmortem diagenesis, so data can be obtained from incomplete, fragmentary or distorted remains that are unsuitable for study by other methods. The best known dental morphology studies are those of ancient and modern Asian and American populations, from which the manner and timing of the peopling of the Americas from Asia has been modelled (Turner 1983; 1986a, b). The advantage of using dental morphology traits as opposed to serological or other genetic traits is that data can be obtained easily from ancestral populations, i.e., skeletal remains. DNA analysis of preserved soft tissues, bone, and teeth is an exciting development in the study of genetic relationships, but the current costs of analyses prevent their widespread application to skeletal populations at present; for the time being they will be most useful in examining the familial relationships among a few individuals whose proposed affinity derives from historical allusions or their burial as a group.

The most common dental morphological traits take the form of accessory ridges, tubercles and cusps that can be seen macroscopically on the surfaces of the tooth crowns. Some characteristics of tooth roots also are important for biological distance analyses and usually are manifested as variations in root number; these may be difficult to score without the benefit of radiographs if the tooth is held fast in its socket, as multi-rooted premolar and molar teeth tend to be, and thus are less widely discussed in the dental anthropological literature.

Certain crown and root traits, such as incisor shovelling and the expression of Carabelli's cusp, vary so widely in their frequencies in some geographically separated populations that they have proved to be useful in the forensic investigation of an individual's ethnic ancestry. Not all populations are so strongly divergent, however, and distance statistics are used to estimate the relative similarities among less divergent groups; it is generally agreed that appropriately selected dental traits can discriminate among tribal groups, for example.

There are four evolutionary forces that may be invoked in explaining the variation in dental morphology among different populations: mutation, natural selection, gene flow, and genetic drift. Mutation usually cannot explain the differences in the major morphological features of the teeth because these features have long evolutionary histories, extending back to hominid, or perhaps even hominoid, ancestors. An exception is a rare and very distinctive trait, termed the Uto-Aztecan premolar, which occurs only among Indians of the New World and may reflect a specific mutation that occurred after the peopling of the Americas from Asia. Natural selection explanations for dental morphological traits propose that certain traits enhance the size and shape and hence the masticatory efficiency of teeth that are subjected to high levels of attrition and use as "tools". Shovel-shaped incisors, for example, have been cited as an example of morphological variation that might have been selected for in populations in which the anterior teeth were subjected to unusual functional stress. Such selective pressures have not been demonstrated, however, and the morphological variants used in this analysis are assumed to be adaptively neutral. Gene flow often is referred to alternately as migration. Rates of gene flow that have been calculated from dental trait frequencies have been shown in many cases to be close to those obtained from gene frequencies such as blood group data, and consistent with known history. Genetic drift, the accumulation of random genetic changes in small populations, probably has played a significant role in human dental differentiation as a result of both colonization events and cultural definitions of appropriate mates within subgroups of a population.

## Material and methods

Skeletal samples from Cemeteries B and T and the Great Cemetery were examined at the Department of Biological Anthropology at Cambridge University: 38 skulls from Cemetery B, 26 skulls from Cemetery T, and 67 skulls from the Great Cemetery. Forty-three morphological traits of the permanent dentition were scored by Lovell in accordance with the criteria set out by Turner and colleagues (1991). The data collection took place over a period of one month. Intraobserver variation was assessed by repeated scoring of 25 tooth-trait combinations in a randomly selected subsample of 20 individuals. All available teeth were scored individually, but only the antimere showing the highest degree of trait expression was used in the analysis, according to the individual count method of Scott (1980). Unfortunately, many of these tooth-trait combinations had to be eliminated from the present study due to the small samples of observable teeth within the cranial samples for each cemetery; premortem tooth loss due to periodontal disease or infectious abscessing, severe tooth wear, and postmortem tooth loss and breakage are the causes of the small samples of teeth. As well, any tooth trait combination that was wholly unobservable in any of the cemetery samples was necessarily ignored. Thus, the final data set for statistical analysis was reduced to 11 morphological traits, scored as 24 tooth-trait combinations. Since anterior teeth, i.e., the incisors and canines, are most easily lost or broken in the burial environment, it is not surprising that these 11 traits are all found on the posterior molar and premolar teeth. Table 1 lists the traits analyzed, sample frequencies for each cemetery, and the pooled sample frequencies. Any expression of a trait was scored as presence of the trait except for the following: Cusp # (all) presence = 5 or greater; Root # (UPM1) presence = 2 or greater; Root # (UM3) presence = 3 or greater; Hypocone (UM3 & UM2) presence= 3-5; Hypocone (UM1) presence=5; Metacone (all) presence= 5. The reason for scoring in this fashion was to avoid the use of traits which have constant frequencies (i.e., are expressed to some degree) in all groups being compared: rather than dropping them from the analysis, those traits were dichotomized by scoring only full expressions of the trait as present.

Chi-squared statistics were calculated to evaluate sex differences in trait frequencies, and since none of the traits were found to have any significant degree of heterogeneity the sexes were pooled for further analysis. Traits then were arcsine transformed using the Freeman and Tukey transformation recommended by Green & Suchey (1976) for small sample sizes. Comparisons were made among the three samples using the multivariate Mean Measure of Divergence (MMD) statistic (Berry & Berry 1967; Sjøvold 1973; Green & Suchey 1976), and the variance and standard deviations were calculated according to the mathematical method of Sjøvold (1973).

Standardized distances were then calculated by dividing the raw MMD score by its standard deviation, since standardized distances are most appropriate for evaluating and comparing relative distances among samples of different sizes (Sofaer et al. 1986). Multidimensional scaling is often used in dental morphological analyses to better visualize the distance relationships, but is not necessary in this study since only three samples are being compared.

| Traits* | Cemetery B | Great Cemetery | Cemetery T | Pooled |
|---|---|---|---|---|
| Protostylid LM3 | 2/7 | 10/28 | 0/3 | 12/38 |
| Protostylid LM2 | 6/16 | 17/32 | 4/7 | 27/55 |
| Protostylid LM1 | 3/12 | 11/24 | 1/4 | 15/40 |
| Cusp 5 UM3 | 3/9 | 21/35 | 1/7 | 25/51 |
| Cusp 5 UM2 | 4/18 | 6/38 | 5/14 | 15/70 |
| Cusp 5 UM1 | 1/13 | 8/33 | 1/9 | 10/55 |
| Carabelli's Cusp UM3 | 1/10 | 7/31 | 1/5 | 9/46 |
| Carabelli's Cusp UM2 | 3/16 | 10/36 | 1/11 | 14/63 |
| Carabelli's Cusp UM1 | 2/11 | 6/29 | 3/10 | 11/50 |
| Third Molar Absence UM3 | 0/22 | 2/49 | 3/17 | 5/88 |
| Third Molar Absence LM3 | 2/20 | 4/46 | 2/13 | 8/89 |
| Root Number UPM1 | 9/14 | 24/29 | 8/15 | 41/58 |
| Root Number UM3 | 8/10 | 6/18 | 2/8 | 16/36 |
| Cusp Number LM3 | 1/6 | 14/26 | 2/3 | 17/35 |
| Cusp Number LM2 | 0/15 | 4/31 | 2/7 | 6/53 |
| Cusp Number LM1 | 6/9 | 17/25 | 4/5 | 27/39 |
| Accessory Cusp UPM2 | 1/8 | 6/16 | 0/5 | 7/29 |
| Accessory Cusp UPM1 | 1/7 | 2/13 | 0/3 | 3/23 |
| Hypocone UM3 | 5/6 | 23/32 | 4/4 | 32/42 |
| Hypocone UM2 | 15/15 | 32/37 | 10/14 | 57/66 |
| Hypocone UM1 | 3/14 | 4/37 | 0/11 | 7/62 |
| Y-Groove LM2 | 6/14 | 9/26 | 0/7 | 15/47 |
| Metacone UM1 | 7/16 | 25/37 | 3/11 | 35/64 |
| Metacone UM2 | 16/19 | 33/44 | 11/14 | 60/77 |

Table 1. ~ Frequenciesof nonmetric dental draits for the Nagada cemeteries

~ Frequencies are given as the number of expressions of the trait over the number of observable teeth.
* The tooth for which the trait is scored is reported according to standard procedures: the first letter, L or U, indicates whether the tooth is in the upper or lower jaw; the tooth type follows, indicated by M for molar and PM for premolar; the numerical suffix indicates the position of the tooth relative to others of the same type. Thus, LM3 refers to the lower 3rd molar, while UPM2 designates an upper 2nd premolar.

## Results

The MMD distances were calculated using all 24 tooth-trait combinations. The distances, their standard deviations, and the corresponding standardized distances are presented in Table 2.

| Cemeteries: | B-Great | B-T | T-Great |
|---|---|---|---|
| MMD: | 0.0276 | 0.0870 | 0.0778 |
| SD: | 0.0365 | 0.0714 | 0.0555 |
| Standardized MMD: | 0.754 | 1.2183 | 1.4017 |

Table 2. Between cemetery distances using 24 traits

Sjøvold (1973) suggests that a standardized MMD greater than 2.0 denotes a significant difference at the alpha = .05 level. A negative distance is interpretable as a Chi-squared variable not exceeding its expectation and thus signifies no distinction between the samples (Sjøvold 1973). It can be seen that when all 24 traits are used, cemetery T is somewhat differentiated from the other two cemeteries, though not significantly so. When distances are calculated from each cemetery to the pooled sample (Table 3), however, cemetery T demonstrates a

| Cemeteries: | B-Pooled | Great-Pooled | T-Pooled |
|---|---|---|---|
| MMD: | -0.0242 | -0.1319 | 0.1156 |
| SD: | 0.0326 | 0.0527 | 0.0169 |
| Standardized MMD: | -0.7430 | -2.5019 | * 6.8436 |

* indicates significance at alpha = .05

Table 3. Cemetery to pooled distances using 24 traits

significant departure from the pooled sample, while cemetery B and the Great cemetery show no distinction from the pooled sample.

Since many of the 24 traits have very low sample sizes, with a greater likelihood of sampling error, distances were recalculated using only those 10 traits with sample sizes greater than 10 individuals in each cemetery, in order to retain a reasonable number of traits in the data set. The resulting distances are shown in Tables 4 and 5 for the between cemetery distances and the cemetery distances to the pooled sample, respectively. As both sample size and the number of traits affect the variance, the reduction of traits to increase sample sizes has had little effect on the standard deviations. The between cemetery distances in Table 4 now show an even stronger pattern of divergence, reinforcing the obser-

| Cemeteries: | B-Great | B-T | T-Great |
|---|---|---|---|
| MMD: | 0.0054 | 0.0840 | 0.0992 |
| SD: | 0.039 | 0.0619 | 0.0462 |
| Standardized MMD: | 0.1365 | 1.3563 | 2.1454* |

* indicates significance at alpha = .05

Table 4. Between cemetery distances using 10 traits

| Cemeteries: | B-Pooled | Great-Pooled | T-Pooled |
|---|---|---|---|
| MMD: | -0.0223 | -0.1356 | 0.0743 |
| SD: | 0.0345 | 0.0851 | 0.0188 |
| Standardized MMD: | -0.6461 | -1.5936 | 3.9483* |

* indicates significance at alpha = .05

Table 5. Cemetery to pooled distances using 10 traits

vation that cemetery T is distinct from the other cemeteries, and significantly so from the Great cemetery. The distances to the pooled sample still indicate no distinction between the Great cemetery or cemetery B from the pooled sample, while cemetery T is still significantly different from the pooled sample. In terms of the distances to the pooled sample, it is unsurprising that the Great cemetery should show no distinction because its higher sample sizes contributed more to the pooled sample in both the 24 trait and the 10 trait analysis. In the 10 trait analysis, however, cemetery B contributes little more than cemetery T to the pooled sample, and yet still shows no distinction from the pooled sample. Cemetery T does show significant differences from both the Great cemetery and the pooled sample in the 10 trait analysis, though much of the distance to the pooled sample must still be interpreted in terms of its distance to the Great cemetery, given the weight of the Great cemetery in the pooled sample.

With regard to the robustness of the MMD statistic, its properties and significance levels apply to "moderate" and "large" samples (Sjøvold 1973). Monte Carlo simulations of various sample sizes drawn from a single parent population, however, indicate that this statistic is quite robust in terms of type I errors under smaller sample sizes and when sample sizes fluctuate between traits within samples (Johnson, in prep.).

## Discussion

Although morphological features of the dentitions from the individuals buried in Cemetery T differ significantly from those of Cemetery B and the Great Cemetery in more instances than would be expected by chance alone, the question of the nature of the biological relationships among the people buried in these cemeteries remains. The hypothesis that cemetery T represented an elite or even royal burial ground (Hoffman 1979) is supported over the argument that it merely represents a special status group of some kind (Davis 1983). Cemetery B, in contrast, is much closer to the Great cemetery in affinity than it is to cemetery T and was shown to be not distinct from a pooling of all three samples; it therefore may represent, as Davis (1983) suggested, a status differentiated group which is not biologically distinct from the population using the Great cemetery. Alternatively, cemetery B may reflect a biological intermediary group between the two populations, or segments of the populations interred in the other two cemeteries.

Another possible explanation of the biological distinction among the cemeteries is that it represents temporal variation. Hoffman (1979) suggested that cemetery T was constructed and used in the Late Gerzean (Nagada III) period, while Davis (1983) concluded that cemetery T was used contemporaneously with the Great cemetery throughout the entire Gerzean period and not just the Late Gerzean period. The possibility exists, therefore, that the distinctions found among cemetery T, cemetery B, and the Great cemetery are the result of microevolutionary changes over some temporal span, rather than a contemporaneous distinction of an elite group from the general population. The proposed rate of dental microevolution is conservative, however: roughly 0.01 MMD[raw] per 1000 years based on 28 traits, remaining stable even when only 10 traits are used (Turner 1986a).

While the raw distance from cemetery B to the Great cemetery is well below 0.01 (Table 4), the distances between cemetery T and both of the other two cemeteries is well in excess of this distance, suggesting microevolution over a period of some eight to nine thousand years if indeed the occupants of cemetery T were at one time derived from the same population that is now represented in the other cemeteries. This is an untenable hypothesis given the time period in question, and the idea of cemetery T representing a different, i.e. immigrant, population seems equally unlikely based on the similarity of goods, if not richness, between the cemeteries. Thus, some effect other than local population microevolution or in-migration must be called upon to interpret the magnitude of these distances in terms of Turner's rate of dental microevolution.

Perhaps the most likely explanation for the magnitude of the distances between cemetery T and the other cemeteries is that of inbreeding within a segment or class of a population. Ruling or elite classes or lineages may have preferential, within group, marriage rules. Thus, genetic drift would affect the genetic structure of the group and could account for the greater than expected distance between this group and the general population.

## Conclusions

Results of this analysis of dental non-metric traits indicate that cemetery T shows some biological distinction from both Cemetery B and the Great cemetery separately and from a pooled sample of all three cemeteries. The size of the difference supports the archaeological interpretation that Cemetery T represents a ruling or elite segment (or lineage) of the local population at Nagada, rather than an ruling or elite immigrant population. As demonstrated here, the analysis of morphological variations of human teeth provides a powerful tool for assessing the nature of human biocultural history, and the addition of new data for other Predynastic and archaic populations (Lovell, in prep.) will help us decipher the biological history of the people of the ancient Nile Valley and Delta.

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# The Predynastic site of Adaima (Upper Egypt)

## Introduction

The site of Adaima is situated on the west bank of the Nile, about 8 km south of Esna and approximately 25 km from Hierakonpolis to which some comparison can be made. It includes very plundered cemetery and a settlement appearing as a large area with artefacts scattered all over the surface, extending about 1 km along the cultivated land. The extend of the total site is about 40 ha (settlement: 35 ha, cemeteries: 5 ha).

The site was discovered at the beginning of the century by H. de Morgan, who excavated a part of the settlement and some of the plundered tombs; most of the associated finds are now in the Brooklyn Museum (Needler 1984). The next excavation took place in 1973 by F. Debono who, working for the French Institute of Archaeology in Cairo, excavated 30 badly plundered tombs in the area of the cemetery which is nowadays completely destroyed.

In 1986 and 1987, we found the site in more or less the same state it had been in 1973, with the traces of Debono's excavation still visible. In 1988 however, a large part of the cemeteries had been completely destroyed by the modern extension of the cultivated land and the remains of the site were threatened with complete extinction. To rescue the remaining site the present excavation was planned within the activities of the French Institute and the works was commenced in 1989.

At first a selective surface collection allowed us to gain a great deal of information, such as local cultures and their extension (Midant-Reynes et al. 1990), which excavation revealed only after several campaigns. The application of this method to the site of Adaima showed that the settlement followed a complex development, shifting from the desert to the valley during the Nagada period up to Dynasty I. Excavation were undertaken in the settlement in order:

- to test the result of the surface collection;
- to verify the presence of *in situ* structures (hearths, postholes, pottery).

Concerning the cemeteries, the goal was to test the existence of undisturbed tombs in the preserved area.

**The settlement**

The settlement includes two parts geomorphologicaly distinct on each side of a small wadi which crosses the site in a westerly direction. At the northern side, gravel and silt terraces crop out with innumerable traces of the *sebakh*-diggers. At the southern side, a thick level of sand slopes down slightly southward.

Excavations in the northern part revealed, beside the numerous *sebakh*-diggings, occupation features dug into the gravel terrace: trenches and holes smeared with Nile mud were observed. The trenches, perpendicular or parallel to each other, were located in 3 areas which were associated with 73 mudholes. The diameter of these mudholes varied from 13 to 145 cm, and averaged about 45 cm; they varied from 2 to 19 cm in depth, averaging about 8 cm. The trenches are probably remains of reed fences plastered with mud and occasionally reinforced with wooden posts, as found at other Predynastic sites, especially in Hierakonpolis (Hoffman 1982).

More enigmatic are the mudholes, which could be interpreted in some cases as postholes, but most of them are too large and rather not deep enough for these. Botanical material was recovered by flotation from the filling of these holes. Among the seeds, *Triticum monococcum* and *Hordeum sativum* have been identified (de Vartavan 1992). It may be hypothesized that these holes could have been used as mortars cut in the hard gravel terrace. The absence of big grindstones among the surface material and the presence of an elongated rod-shaped granit hammerstone in one of these holes argue for this possibility.

Based on the sherds found in the filling of the trenches and the holes, these, structures can be dated from the end of Nagada I to the middle of Nagada II. This stands in contrast to the very mixed surface material found, but also here the material never extends beyond Dynasty I.

The excavation in the southern part of the site revealed features such as hearths, postholes, storage jars found in situ, and granit grindslab. A newborn child skeleton associated with a small pot and a Nile shell (*Etheria elliptica*), probably used as a spoon, was also discovered. The existence of an undisturbed domestic area is of special interest and our aim is now to uncover a sufficiently large area to learn something about these units of Predynastic settlement. Two C14 samples from the hearths resulted in the following dates: Ly 5208: 3763-3531 cal. B.C. and Ly 5207: 3307-2923 cal. B.C.

**The cemetery**

Turning now to the cemetery, 120 graves have been excavated so far. Seventeen out of these were intact. Some others were completely destroyed, the great majority had been disturbed during the Predynastic times allowing little observations to be made about the skeletons and the funerary offerings.

As regards mortuary practices (Crubezy 1992), two kinds of burials can be distinguished: simple single burials (82 graves) and multiple burials (21 graves).

Nothing can be said about 17 of them. The simple graves included burials with offerings (of up to 30 vessels for one tomb) and the burials without goods (two undisturbed graves).

The multiple burials included double burials of which two out of seventeen were intact, burials with three bodies (three cases, all disturbed) and also graves with five bodies occurred (one disturbed); in one case five bodies were found in a big hearth which was constructed and used long before the burial and in which months or years later they were placed. This tomb had been badly plundered, giving the impression of ashes mixed with broken human bones. One cannot help wondering whether such pictures could be responsible for the theory on "cannibalism" in Predynastic times. A few cases of infectious illness have been identified by the anthropologists which will be soon published.

Based on the ceramics, the cemetery appears to have been used without interruption from Nagada Ic to IIIb which corresponds to the date obtained from the Adaima ceramics now in the Brooklyn Museum. Nothing has so far given hints that the site might have existed before Nagada Ic. However, the continuation of the cemeteries till the 1st Dynasty is attested by the surface collection of sherds dating to this period (Petrie type 50 and 76).

Detailed analyses of the lithic manufacture and the ceramics have been undertaken with a double aim,:

- the typochronological approach: analyses of the material coming from a well dated context;
- the technological approach: raw material provenance and fabrication variations.

**Conclusion**

The multi-component character of Adaima, with its functionally specific activity areas and its domestic units give it a special importance as a site to collect data on Egyptian prehistory, palaeo-environnement and subsistence strategy. The site includes cemeteries and a settlement which cover the same period and allow comparisons. Eventhough partially disturbed, the two areas offer information of special relevance to those interested in town patterning, daily life and mortuary practices. The stone industry and the ceramic will permit comparison with other sites in Egypt and beyond.

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Interregional Contacts in the Later Prehistory
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# Late Predynastic - Early Dynastic cemetery of Beni Amir (Eastern Delta)

The cemetery at Beni Amir occupies a small area of about three feddans. Thirty six tombs were excavated besides which some finds were made by the native residents of the area which also date, as do the graves, to the Late Predynastic-Early Dynastic period. The tombs of this period were found only in the high parts of the western area of the tell; they were found at a higher level than the surrounding farmlands and as a second stratum (stratum B) under the Roman stratum (stratum A; see the same author, this volume).

Most tomb types of this cemetery show little differences from those at other cemeteries of the same period especially in Lower Egypt. It is clear that the tomb types are in line with the main features of Late Predynastic-Early Dynastic tombs in Egypt.

The tombs found were mainly pit graves and tombs of one, two, three, eight or nine compartments built with mud-bricks. The superstructures were not found, probably because of their exposure to weathering and surface denudation. It is possible that they were mostly grave-mounds or small two-niched mastabas of mud-bricks (Reisner 1936: 237 ff.; Montet 1938: pl. 8; Mackramallah 1940: 8, fig. 11; Vandier 1952: 690 ff.). According to the types of the pottery found in the tombs (same author, this volume), the cemetery of Beni Amir was dated to Naqada II/III - Early Dynastic period. This indicates that it was contemporaneous with the cemetery of Minshat Abu Omar.

## 1. Simple pit graves

This type consists of a pit in the sand just large enough for the body and a few funerary objects, mostly vessels. These graves were not roofed, since no remains of wooden beams or any other material for roofing was found. Most probably, after the interment, it was filled with earth. The skeleton is in a contracted position. Many examples of this class were found. This type of small grave is the poorest and earliest form to appear in Egypt. It was the prevailing type of the Predynastic period and it continued down to the latest times for the poor burials (Spencer 1982: 217; Engelbach 1961: 244). This class is of the same type described by Reisner (1936: 42ff.) and Klasens (1957: 66, pl. XII.2; 1959: 42; 1960: 72).

Similar grave-forms were found in many Protodynastic sites in the Delta such as Tell Basta (Bakr 1982: 156), Kufur Nigm (Leclant 1964: 341; 1985: 344f; 1986: 244ff.; 1987: 302f.), Tell el-Rub'a (Hansen 1965: 31ff.; 1967: 16), Tell Fara'on (Kamel 1985: 328f.; Mostafa 1988: 73ff.), Minshat Abu Omar (Wildung 1981: 26ff.; Kroeper & Wildung 1985: 28f.), Tura (Junker 1912: 11f.) and Abu-Roash; also the Protodynastic sites of Upper Egypt especially in El-Kab, Naqadah and Ballas, Naga-ed-Der, El-Amrah, Abydos, Tarkhan (Reisner 1936: 42ff.). Graves of those later sites were in many cases roofed with wood.

## 2. Brick tomb with one compartment

### 2.1. Oval brick tomb

The grave is an oval pit in the sand just large enough for one interment and a few pots, lined with mud-bricks, mostly without roof; it was filled up with earth after the interment and sometimes covered with a layer of mud-bricks (Fig. 6, 8-B). Six examples of this class were found. They range from about 1.50 x 0.94 x 0.43 m to 2.0 x 1.40 x 0.10 m (length/width/depth). The body was laid in a contracted position. Sometimes only remains of bones were found. This type of graves developed from the small oval grave of the Predynastic Period which was afterwards lined with mud-bricks. Such a type was found in Masaeed in Upper Egypt (Reisner 1936: 372).

### 2.2. Rectangular brick tomb

This type is a small rectangular pit lined with mud-bricks (Fig. 8A). It was filled with earth and covered with a layer of mud-bricks after the interment. Eight examples were found. They range from 2.25 x 0.85 x 0.28 m to 0.80 x 0.43 x 0.18 m (length/width/depth). The body was laid in a contracted position. In one case the head pointed to the west, in another to the south, in a third to the east and in two other cases to the north. In one case only remains of bones and eight rough pottery vessels were found.

This type of grave developed from the simple open-pit grave and continued throughout all periods. It is the commonest type already known in the Protodynastic period (Badawy 1954: 38). This type is sometimes called massive grave, or mud-brick coffin in tombs of later periods (Spencer 1982: 218; Moneim 1989). Many examples of this type were found in most of the archaic necropolis: at El-Kab, Naqada and Ballas, Abydos, El-Amrah, Naga-ed-Der, El- Ahaiwah, Tarkhan, Saqqara, Tura, Zawiyet-el-Aryan (Reisner 1936: 45-49) and Abu-Roash (Klasens 1957: 67), and also in the Delta at Wardan (Larsen 1956: 3-11), Kufur Nigm (Leclant 1985: 344f; 1986: 244f.; 1987: 302f.), Tell Fara'on (Mostafa 1988: 73f.) and Tell Hassan Dawud (Mohammed Salim El-Hangory 1992).

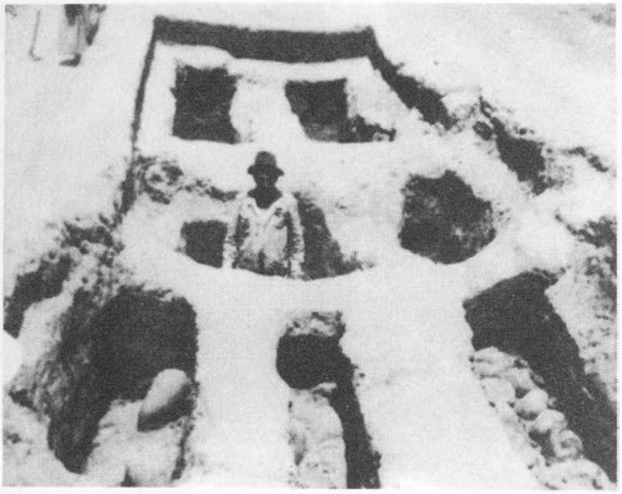

Fig. 1.

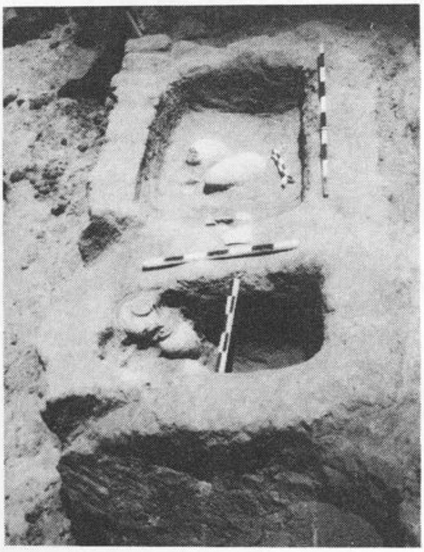

Fig. 2.

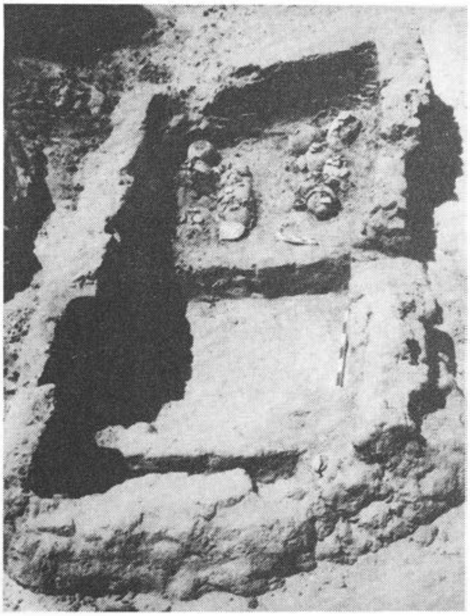

Fig. 3.

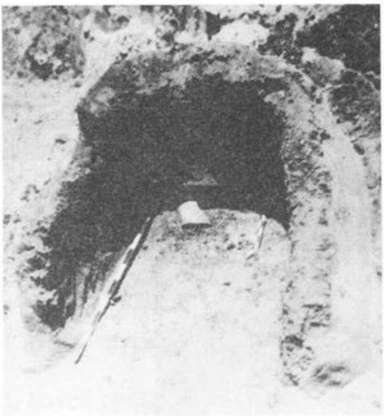

Fig. 4.

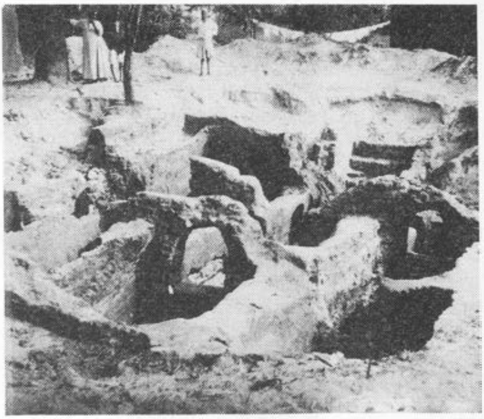

Fig. 5.

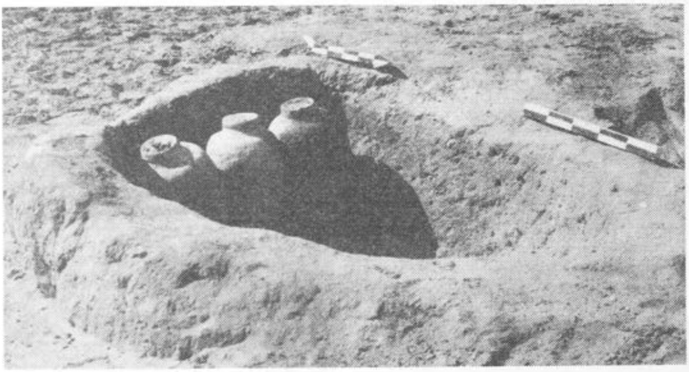

Fig. 6.

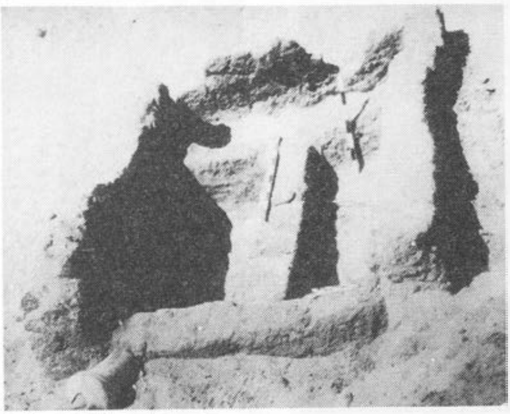

Fig. 7.

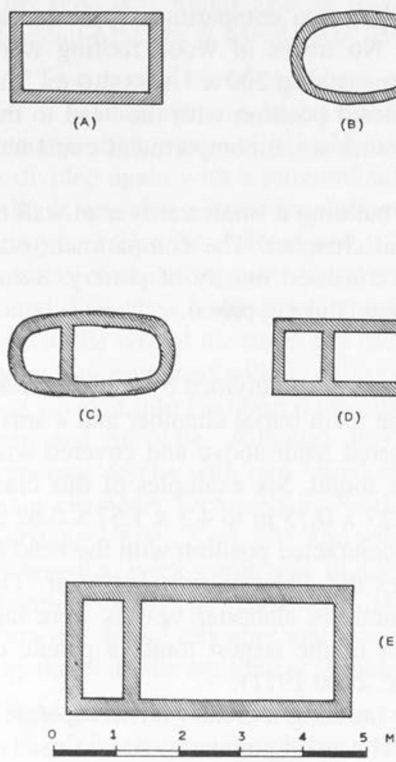


Fig. 8.

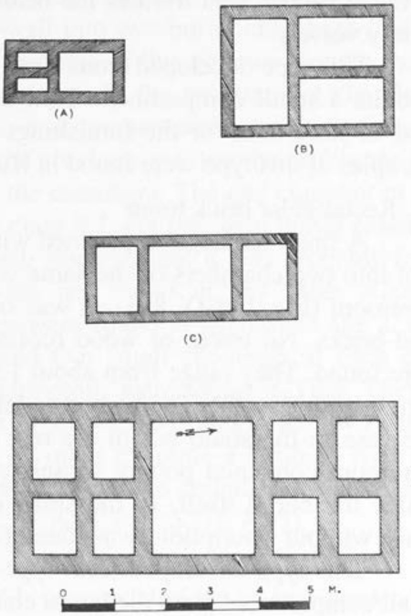


Fig. 9.

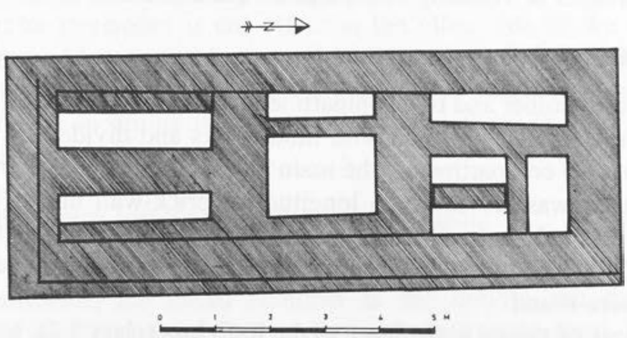

Fig. 10

## 3. Brick tomb with two compartments

3.1 Rectangular brick tomb with rounded corners

This type is a small rectangular pit with round corners lined with mud-bricks and divided by a cross-wall of brick into two compartments: the burial chamber and a small storeroom (Fig. 8-C). No traces of wood roofing were found. One example of this class was found, measuring 200 x 1.84 x 1.0 m. The main chamber contains a skeleton in a contracted position with the head to the north-east and a flint besides the head. The other small compartment contained pottery vessels.

This type developed from class 2.1 by building a small transversal wall to separate a small compartment from the burial chamber. The compartment was used as storeroom for the furnishings which consisted mostly of pottery. Some examples of this type were found in Kufur Nigm (Bakr in press).

3.2. Rectangular brick tomb

A small rectangular pit lined with mud-brick and divided by a cross brick-wall into two chambers of the same width, the main burial chamber and a small storeroom (Fig 2, 8-D, 8-E). It was only entered from above and covered with mud-bricks. No traces of wood roofing were found. Six examples of this class were found. They range from about 1.97 x 1.27 x 0,75 m to 4.3 x 1.57 x 0.62 m (length/width/depth). The body was laid in a contracted position with the head in one case to the south but in the rest of cases the direction was not clear. The storeroom contained pottery vessels and sometimes alabaster vessels were laid beside the burial itself. In the small chamber of the largest tomb, a palette of schist without inscriptions was found (Reg. Nr. 2700 1971).

This type developed from type 2.2 by building a cross-wall to separate a small compartment from the burial chamber. The small compartment was used as a storeroom as in type 3.1 for the furniture which was principally pottery. Examples of this type of the tombs are few in number. It has been found at El-Amra (Randall-Maciver & Mace 1902: 28, fig. 35), Naga-ed-Der (Reisner 1908: 27ff.) and Tura (Junker 1912: 18, fig. 20), and also in the Delta at Kufur Nigm, Minshat Abu Omar (Kroeper & Wildung 1985) and El-Qatta (Leclant 1953: 98).

## 4. Brick tomb with three compartments

4.1 Main burial chamber and two compartments at one end

It is a rectangular pit lined with mud-bricks and divided by a transversal brick-wall into two compartments; the main burial chamber and a one-end chamber and the latter was divided by a longitudinal brick-wall into two storerooms (Fig. 9-A). It was only entered from above. One example of this type was found, measuring 2.20 x 1.17 m, and 0.60 m in depth. In the burial chamber only skeleton remains were found.

This class of tombs is the same as the last class (class 3.2), but here comes the longitudinal brick-wall which divides the end chamber into two small storerooms, probably due to the wish for depositing special equipment in each storeroom. It is a type described by Reisner (1936: 49ff.), by Klasens at Abu Roash (type 11; 1975: 67; 1958: 35) and Junker at Turah (type II; 1912: 19, fig. 15). This type was found also at Naga-ed-Der (Reisner 1908: 35, 69), El-Amrah (Randall-Maciver & Mace 1902: 29 pl. 4) and Helwan (Saad: 1947: pl. 7).

4.2. Two parallel burial chambers, compartment at one end

A small rectangular pit lined with mud-bricks and divided by a cross-wall into two chambers; a big chamber and a one-end chamber, then the big chamber is divided again with a longitudinal brick-wall into two burial chambers (Fig. 7, 9-B). It was also entered from above. One example of this type was found, measuring L. 3.21 x W. 2.46 m and 0.70 m in depth. In the two parallel chambers, remains of skeletons were found and in the end compartment some vessels were found. This class is the same in outline as the previous one, but the difference lies here in the size of the tomb and the use of the chambers. The end chamber or the storeroom remained without division as in class 3.2, but the main burial chamber was divided into two burial chambers which suggests that it was probably for a man and his wife. Although this type was not found in any other Archaic cemetery, tombs with two burial chambers were found at Mahasnah (M 2, two main chambers separated by brick wall and two small chambers at each end; Garstang 1903: 28, pl. 33), and some double-tombs were found in Tura. There a rectangular brick-tomb was divided by a cross-wall of bricks into two burial chambers, each one contained a skeleton. In other example a tomb of type I at Tura (i.e. burial chamber and storeroom) a skeleton was found in the storeroom together with the equipment (Junker 1912: 20, Abb. 24, 25, Tf. XVI).

4.3. Main burial chamber and one compartment at each end

It is a rectangular pit lined with mud-bricks and divided by two cross-walls into three chambers, which have the same width as the tomb (i.e. the burial chamber in the middle and two end storerooms Fig. 3, 9-C). Two examples of this type were found, the size ranges from 3.5 x 1.67 x 0.49 m and 3.92 x 1.58 x 0.85 m. In the burial chamber, remains of bones were found and in the two storerooms, broken pottery and alabaster vessels were found.

The extra storeroom is cut off from the other side of the main chamber (burial chamber). Most probably it was added because of the fact that there was a large amount of funeral equipment. At the same time it has the same development idea of class 4.1 concerning the need for two storerooms to separate the funeral equipment according to their kinds.

## 5. Rectangular brick tomb with eight compartments

A big rectangular brick tomb built in a very large pit. The tomb consists of eight compartments, the burial chamber in the middle and the other seven compartments are storerooms, four to the north, two to the south and one to the west (Fig. 1, 10). It was built of thick brick-walls (1.4 m - 0.8 m). No entrances were found which suggests that it was entered from above. No wooden remains or such materials for roofing were found, but according to the remains of the tomb-building it is clear that every chamber was roofed by brick vault, then some brick layers were built above all the vaults so that the tomb would look like a mastaba. No superstructure was found. One example of this type was found. Its size was about 11 (N-S) x 3.85 (E-W) x 2.0 m in depth.

The inner measurements and contents were:

Room 1: L. 280 x W. 70 x D. 180 cm; five broken pottery vessels and alabaster fragments of vessels were found.

Room 2: L. 280 x W. 55 x D. 200 cm; fragments of pottery and alabaster vessels were found.

Room 3: L. 200 x W. 50 x D. 163 cm; fragments of pottery vessels were found.

Room 4: Burial chamber: L. 200 x W. 150 D. x D. 168 cm; only remains of bones were found.

Room 5: L. 250 x W. 55 x D. 163 cm; it was full with broken rough pottery vessels.

Room 6: L. 137 x W. 55 cm; five pottery vessels.

Room 7: L. 137 x W. 50 cm; four pottery vessels.

Room 8: L. 70 x W. 145 x D. 90 cm; some rough pottery vessels.

This tomb is the only one of this type and the biggest one found in the Delta from the Protodynastic period. It probably belonged to the ruler of the settlement. This tomb followed the same main-line of the Protodynastic large tombs in that the substructure included the burial chamber in the middle surrounded by the storerooms which contain the funeral equipment. At other sites at the beginning of the First Dynasty, the royal and the private tombs of the courtiers and the nobles consisted of a group of compartments built of mud-bricks in a great open pit with wooden roof where the middle large chamber was assigned for the interment while the others for the valuable funereal equipment (see Emery 1963: 130ff.; Badawy 1954: 37 ff.; Vandier 1952: 644 ff.). The tomb of Beni Amir differed in its construction and its multiple storerooms of the substructure from the other private tombs of the same period at the other sites.

Apart from the size of the tomb of Beni Amir which occupies an area of about 42.35 sq. m, it is comparable with the royal tombs at Abydos of type RT I-2 described by Reisner (i.e. great wooden chamber divided into rooms and surrounded by mud-brick compartments; Reisner 1936: 7, 21ff.), according to the number of the chambers, such as the tomb of Zer where the space of the four sides between the lining wall and the wooden burial chamber was divided by cross-walls into about 21 irregular compartments, and the tomb of Zet which is similar to Zer but the 19 compartments of which were only on three sides of the burial chamber (Petrie 1901: 8-10; pl. 40-41), and also the tomb of type RT I-3 (double wall with compartments between the two, at higher level than main chamber; described by Reisner (1936) such as the tomb of Merneith where the wooden burial chamber is surrounded by eight long narrow compartments.

The brick vaults were used in the tomb of Beni Amir for roofing the main burial chamber and the storerooms as a substitution of wood which was commonly used in the tombs of this period (Emery 1963). The simple arch of one stretcher ring of bricks (type d1, Spencer 1979: 123) was in common use from the First Dynasty down to the Coptic period. The use of vaults for roofing was known from the First Dynasty where it occurs in the small mastabas 2039 and 2040 at Tarkhan (Petrie 1914: 5) and in the subsidiary graves of the tomb 3500 at Saqqara (Emery 1958: 102, pl. 116, 120), other examples also occur in some tombs at Bêit Khallaf and Reqâqnah (Garstang 1904: 21ff., pl. 4, 14; Garstang 1903: 11ff., pl. 17, 18, 25).

**6. Rectangular brick tomb with nine compartments**

A big rectangular brick tomb in a large pit. The tomb consists of nine compartments, the burial chamber in the middle and the other eight compartments are storerooms, four compartments at each end of the burial chamber (Fig. 4, 5, 9-D). No entrances were found which suggests that it was entered from above. Remains of brick arches of one or half brick thickness above some chambers were found (Fig. 4, 5) which suggests that each chamber was roofed by an arch. No superstructure was found. One example of this type was found. The size is about l. 7.7 m x W. 2.3 m x D. 0. 50 m to 0. 67 m. The burial chamber is ca. L. 2.3 m x W. 1.9 m and the other small compartments to the north and to the south of the burial chamber are l. 1.05 m x W. 0.8 m in size. Remains of bones were found in the north rooms, and cylindrical alabaster vessel and some alabaster and schist plates were found in the south east room of the south group.

This tomb is the only one of this type found from the Protodynastic period. It probably belonged to an important person. This type of tomb is unique, but comparable with type IB (2) described by Reisner such as the big tombs of Naga-ed-Der 1533, 1532, 1506, 1621 and 1608 which consist of two paired chambers at each end of the burial chamber (Reisner 1908, 35ff.), and also the tombs of Abu Roash (Klasens 1958, 35 fig. 10, 12, 62; 1961, 110, pl. 21). The difference between the tomb of Beni Amir and the others is that two more compartments have been placed at each end of the tomb of Beni Amir. Also the tomb of Beni Amer is bigger than those of Naga-ed-Der. It covers 17.71 $m^2$, while the tombs of Naga-ed-Der range from about 6.7 m2 to 13.3 $m^2$ (Reisner 1908: I, 28, 29, 33, 34, 35.; 1936: 35-37, 50f.).

Concerning the use of brick vaults for roofing the chambers of the tomb, it was noticed from the remains of the tomb that two types of vaults were used. One of them is composed of inclined rings, each ring is half a brick in thickness; this vault is of form d1 described by Spencer (1973: 10, 11, 123, pl. 18). It was used in the First Dynasty in the tomb 3500 at Saqqara (Emery 1958: 102, pl. 116). The second form of vault is composed of rings, each of one brick in thickness. This is form a1 as described by Spencer (1973: pl. 17).

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# Late Predynastic - Early Dynastic mound of Beni Amir (Eastern Delta)

Beni Amir is one of the small villages of the markaz Zagazig, Sharqia province located 8 km northeast of Zagazig and 6.5 km northwest of Saft el-Hinna (Fig. 1). It lies, surrounded by farmlands and some country estates, to the east of Beni Amir canal and to the south of el-Arin drain-channel. About 700 meters to the north west of Beni Amir village there is a Muslim and Christian cemetery.

## Tell Beni Amir

Tell Beni Amir is a Late Predynastic-Early Dynastic period site in the Eastern Delta (Kessler 1982: 404; Bietak 1975: 99; Kamel 1985: 51). The tell occupies an area of about eight and a half feddans and is situated directly to the south-west of Beni Amir village and to the south of Ezbet el- Sheikh el-Saiyid Abu Hashem. The Beni Amir canal splits the tell into two parts. The eastern part is enclosed by the wall of the Beni Amir playground, is about five and a half feddans in extend and lies on the same level as the surrounding farmland (Fig. 2). The western part is about three feddans large and 1-2.5 m in height above the level of the surrounding farmlands (Fig. 3, 4).

## Discovery of the Tell

In the past the tell area was sometimes used as a cemetery for the Muslimpopulation. The tell was unknown to Egyptologists as an archaeological site until 1967, when one of the residents of the area accidentally found some pottery and alabaster vessels. Some of these may have been sold to different museums in Europe and the USA (Fischer 1958: 65ff.; Müller 1966: 5ff.; 1975: 180ff.). The inspector of the Sharqia province M. A. Mohsen investigated this discovery and inspected the find place and the objects themselves. Seventeen alabaster and pottery vessels date to the Late Predynastic period including four cylindrical ceramic jars with a wavy handles comparable to Naqada II-III ware (Kaiser 1957). After the inspection of the site it was put under the control and supervision of the Egyptian Antiquities Organization.

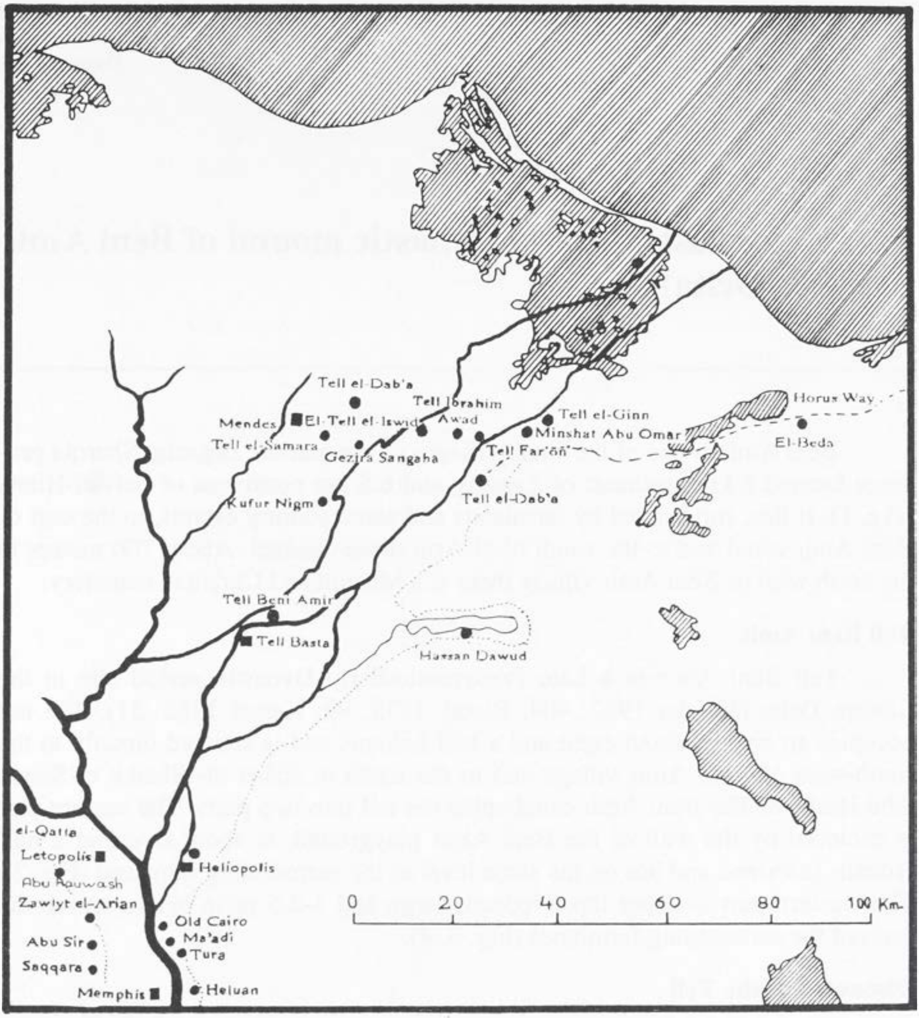



Fig. 1. Late Pre-/Early Dynastic sites in the Eastern Delta.


Fig. 2. Tell Beni Amir.

Fig. 3. View of Tell Beni Amir.

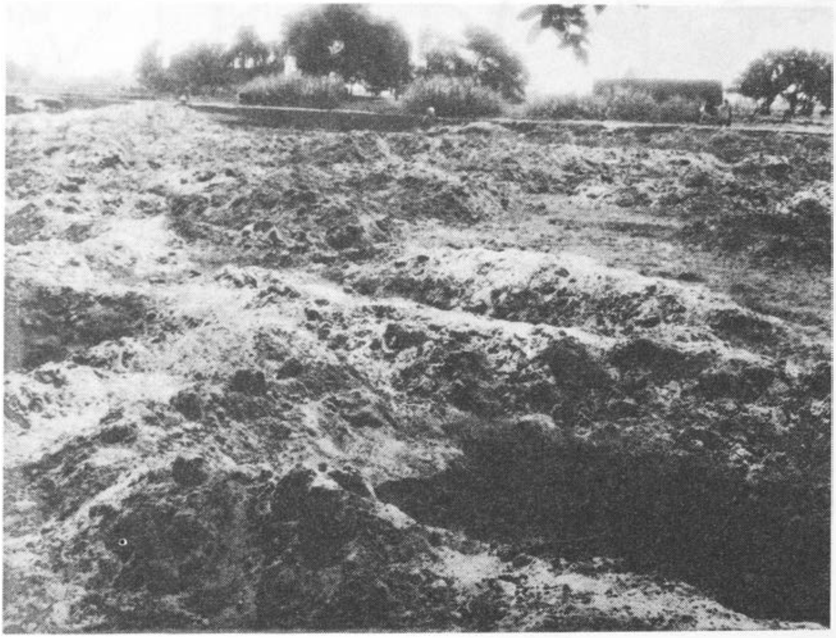


Fig. 4. View of Tell Beni Amir.

**Excavations of the Tell**

In 1967 (from 21/6/1967 to 23/7/1967) the E.A.O. started sondages in Beni Amir; the work was carried out by M. el-Mussalami, the inspector of Sharqia province, and concentrated on the north part of the tell, to the west of the Beni Amir canal. In the beginning sondages of longitudinal and transversal trenches were made in the low parts of the hill but as Protodynastic tombs appeared only on the higher parts of the tell, work was continued there with systematic excavations. During this season pottery slipper-coffins, cylindrical coffins and burials without coffins, as well as pottery vessels of the Roman period, were found. The excavation was continued from 26/11/1967 to 30/1/1968 at which time the work concentrated on the eastern part of the tell. In this season 148 tombs of the Roman period and seventeen tombs well as 124 objects (pottery and alabaster vessels as well as palettes) were found dated to the Late Predynastic-Early Dynastic period (Krzyźaniak 1989: Fig. 6 and 7).

In 1971 the excavation work continued from 22/5/1971 to 27/6/1971 in the southern and the western parts of the same tell (Leclant 1973: 395). The excavation was carried out by M. el-Mussalami. More objects and tombs of Roman and Late Predynastic-Early Dynastic period were found: two tombs of the Late Predynastic-Early Dynastic period contained vessels of pottery, alabaster and schist as well as flint tools. Dating to the Roman period where three burials in the sand and possibly a brick build well; finds included a bottle of glass as well as faience beads and a steatite scarab with the cartouche of Tuthmosis III. Twenty-four objects were found and are now stored at the Antiquities Organization's magazine in Tell Basta.

In 1974 the excavation work was resumed from 31/8/1974 to 21/9/1974, carried out by Mohammed Abd el-Hagg Ragab (1992). The work concentrated on the part of the tell which lies to the east of the Beni Amir canal (the Beni Amir playground). Sondages were made on about two feddans up to 2 m in depth. Beads and bracelets of coloured glass and corroded copper mixed with remains of human bones, single tombs as well as tombs with double burial chambers built of fired bricks were found. All finds of this season date to the Roman period.

In 1975 the excavation work was resumed by M. Abd el-Hagg Ragab in order to complete the sondages in the rest of the eastern part of the tell (Leclant 1976: 278, 279). Roman tombs of different types were found as follows:

(1) individual and collective burials,

(2) one-chamber, vaulted tombs built of fired bricks for one or more burials,

(3) two-chamber, vaulted tombs built of burnt bricks for two or more burials.

Twenty-six objects were found during this excavation, they are in the magazine of the Antiquities Organization at Tell Basta (Reg. Nos. 3170-3195). During this excavation some Protodynastic pottery and alabaster vessels were also found by one of the natives when taking earth from the land near the place of the first season's excavations, to the west of the Beni Amir canal. These finds are also kept at the magazine at Tell Basta.

## Stratigraphy

The excavation of 8.5 feddans in Beni Amir with a maximum depth of about two meters down to the virgin soil or to the ground water level has mainly revealed two layers of two distinct periods. The Roman cemetery was in the upper layer and the Late Predynastic-Early Dynastic cemetery was in the lower layer. Occasionally however, the tombs of the two cemeteries were found intermingled because the depth of the Roman period tombs sometimes reach the level of the Late Predynastic-Early Dynastic period or even deeper. This is not unusual since it can be found at other excavation sites such as Kufur Nigm. There some burials of the Protodynastic period were found disturbed by the Roman burials, and sometimes the Roman burials were found at the same level as the Protodynastic burials or deeper.

The site of Beni Amer was abandoned directly after the Early Dynastic period and there is little evidence of any occupation on the site until the Roman period. It is worth mentioning that this applies to many other Late Predynastic and Early Dynastic sites in the Eastern Delta e.g., Minshat Abu Omar (Kroeper & Wildung 1985), Kufur Nigm (Bakr 1988), Tell Hassan Dawud (Mohammed Salim el-Hangary 1992), Tell el-Dab'a-Markaz el-Simbillawin (pers. communication by H. A Yossef) and many other sites (van den Brink 1989: 5f.). This could be due to the high flood level of the Nile, which was higher during the Late Predynastic and Early Dynastic because of an East African subpluvial. According to Butzer (1959a: 60-63, fig 1; 1975: 1043-1052, fig 1, 2; 1959b: 66-68) between 4000 and 3000 B.C. the marine transgression on the Delta coast was more than +3 m, from 3000 to 2000 B.C. the sea level and the Nile flood sank from +3 m to -2 m. Toward 1000 B.C. the sea level increased to +2 m but in the Ptolemaic times sank again to -2.6 m (Ball 1939: 66f.). For this reason sites of this period can be found in the Delta on relatively high geostratigraphic positions, on so-called turtlebacks (e.g. Kufur Nigm 8 m, Tell el- Ginn 6 m, Minshat Abu Omar 6 m, Gezira Sangaha 12 m (Bietak 1975: 61), while the Later Dynastic sites in the Eastern Delta lie on a lower level. The Old Kingdom mastabas at Mendes lie nearly at the present level of ground water and the foundation of the Ka-Temple of Pepi I at Tell Basta lies below the present level of ground water. The present level of the ground water is at the level of the Middle Kingdom stratum and the foundation of the 12 Dyn. temple at Ezbet Rushdi el-Soghira lies below the todays ground water level (Bietak 1975: 61).

## Stratum B (the lower layer)

In the lower layer of the Late Predynastic-Early Dynastic period about thirty six tombs of different types were found (see 2nd article this volume).

The tombs were open pit graves and tombs of one, two, three, eight or nine compartments, built of mud-bricks and including pottery, alabaster, schist, porphyric rock, and breccia vessels.

The pottery shapes of this period consisted of small bag-shaped jars with cylindrical necks and pointed bases (Fig. 5, 19, 29-IX). This type of jars is comparable to those found at Tell Fara'in/Buto layer II (von der Way 1986: 197, Abb. 3 a), el-Tell el-Iswid (south) phase A (van den Brink 1989: 67, fig. 9, nr. 1) and also at Minshat Abu Omar grave group 1 (Kroeper 1988: 10: 14) which are dated to Naqada IIc-IId1 (Kaiser 1957: 72, Tafel 23 type P93d).

Another type of jar found is a slender ovoid wavy handled jar with a flat base (W-ware Fig. 11, 13, 14, 15, 30-XIII). This type is dated to Naqada IId2-IIIa2, and is comparable to those found at Minshat Abu Omar (Wildung 1981: 15f., 28, figs. 11, 22, 14, 16; Kroeper 1984: 8). This stratum began at the time of Naqada IIc in the Late Predynastic period and continued to the Early Dynastic period.

**Stratum A (the upper layer)**

This stratum contained remains of a well built of burnt bricks which indicates a Roman settlement, and also more than 200 tombs as well as numerous pottery vessels, glass bottles, faience, carnelian and bronze beads, bracelets of bronze and coloured glass, and a steatite scarab - all mostly found as funeral equipment in the tombs.

The types of the tombs were as follows:

(1) simple sand burials,
(2) mud-brick coffins build of two to four courses of bricks,
(3) plain as well as slipper pottery coffins,
(4) a small tomb of mud-bricks containing a limestone coffin,
(5) one-chamber vaulted tombs built of burnt bricks for one or more burials,
(6) two-chamber vaulted tomb built of burnt bricks for two or more burials.

**The location of the settlement and its importance**

It is noticeable that all the finds of Beni Amir were restricted to tombs and funeral equipment both in the Roman and the Late Predynastic-Early Dynastic stratum. This poses the question concerning the location of the settlements for both periods. The whole area of Tell Beni Amir of about eight and a half feddans underwent sondages and excavations without any traces of settlement being found. There are some possible suggestions about the location of the settlements: it may be either in the farmland in the vicinity, under the Beni Amir village or under the country estates at the west side of the Beni Amir canal. Most probably the Roman settlement was in the neighbourhood of the two wells - one found at the end of the tell near Ezbet Abu Hashem and the second one, constructed of limestone, located near Ezbet el-Chandur.

Undoubtedly the size of the Late Predynastic-Early Dynastic cemetery, the number of the tombs and types mostly built of mud-brick reflects the importance of the older settlement, and indicates its social and economic position, particularly as one of the tombs is regarded as the largest tomb (11 m long and 3.85 m wide) found in Eastern Delta from this period (see second article by the same author, this volume Fig. 1, 10.)

The types of the pottery which were found in the Late Predynastic-Early Dynastic tombs of Beni Amir suggest that the settlement was established at the time of Naqada IIc and continued to the Early Dynastic period.

Tell of Beni Amir evolved in the Late Predynastic period in one of the vital positions in the Eastern Delta between the Pelusiac and the Tanitic branches of the Nile, in the area where the two branches are closest (Fig. 4). In this position, it must have been quite manageable to get into contact with other contemporary settlements which developed on the two Nile branches, i.e. Tell Tanis, Gezira Sangaha, Tell Farkha and Kufur Nigm on the Tanitic branch and Tell el-Ginn, Minshat Abu Omar, Tell Fara'on, Tell Ibrahim Awad, Tell el-Dab'a and Tell Basta on the Pelusiac branch (Fig. 1; [Bietak 1975: 99, 106, fig. 12]). It also lies at the W-end of Wadi el-Tumilat, on the road to Sinai peninsula and its copper and turquoise mines. In 1972-1982, during a survey of northern Sinai between the Suez Canal and the Gaza Strip, about 250 settlement sites represented by material culture of the Early Bronze I-II or late Predynastic and the Early Archaic period were recorded by an expedition from Ben Gurion University (Oren 1989: 389ff.) in the area which correspond to the projected east-west movements of the people concerned.

**The Pottery**

The pottery of Beni Amir can be classified into the following types:

1. Tall jars with roll rim, tapering body and rounded base, red-brown ware. Two examples (Reg. nos. 61/1967, 66/1967); height from 70 to 80 cm, rim diameter 10 to 10.5 cm (Fig. 27-I). This type of jars is known as wine jars which date to the 1st Dynasty (Emery 1949: 149, fig. 80; Emery 1963, Type A3). Such type was also found in other Early Dynastic tombs in Eastern Delta at Kufur Nigm (Bakr 1988), Hassan Dawud, Tell el-Dab'a (Markas el-Simbil-lawin) and Minshat Abu Omar (in Group IV tombs; Kroeper 1988: 9f., fig. 6).
2. Tall jar with roll rim, bulbous body and rounded base, red-brown ware. One example (Reg. no. 3203/1974), height 50 cm, rim diameter 11.5 cm (Fig. 12, 27-II). This type of jar is dated to the 1st Dynasty probably used for storing food of a cereal character (Emery 1963: 210, class A4].
3. Jar with bulbous body, external rim, low neck and flat base. Five examples (Reg. nos. 3196-3200/1974), height from 17 to 20 cm, rim diameter 7 to 8 cm (Fig. 22, 27-III). This type is similar to type E-7 at Abu Roash (Klasens 1958: 36f., fig. 13; 1959: 43ff., fig. 3).
4. Jar with bulbous body, low neck and rough blunt pointed base, rough red-brown ware. Four examples (Reg. no. 83, 122, 125, 179/1968), height 26.5 cm, rim diameter 9.5 cm (Fig. 20, 27-IV).
5. Semi-spherical jar with low neck, external rim and rounded base, rough red-brown ware (Reg. no. 64/1967), height 26.5 cm, rim diameter 9.5 cm.

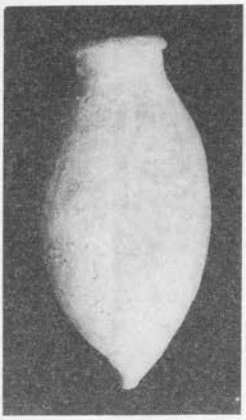
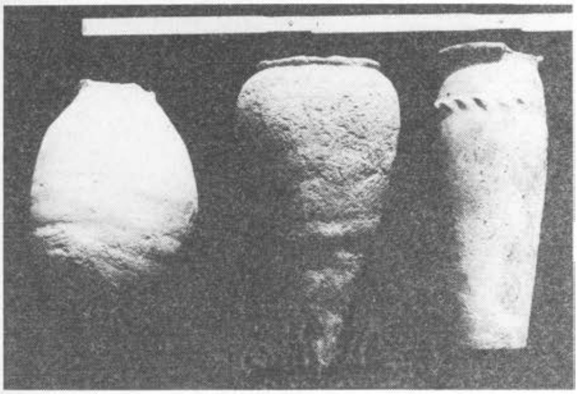


Fig. 5.



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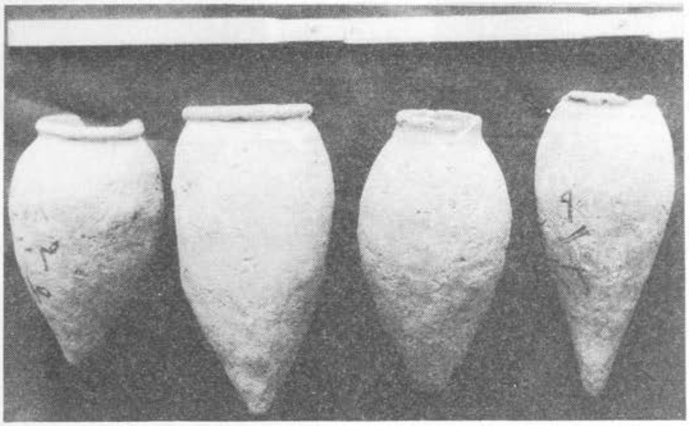

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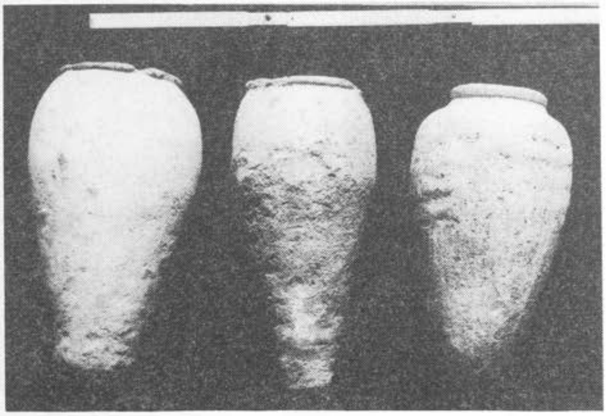

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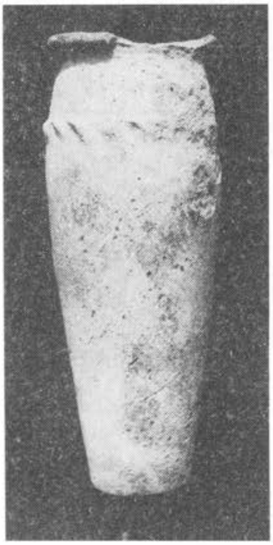


Fig. 9.

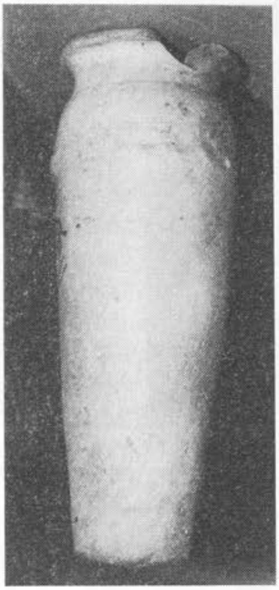
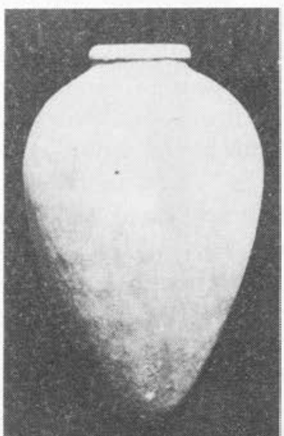


Fig. 10.

Fig. 11.



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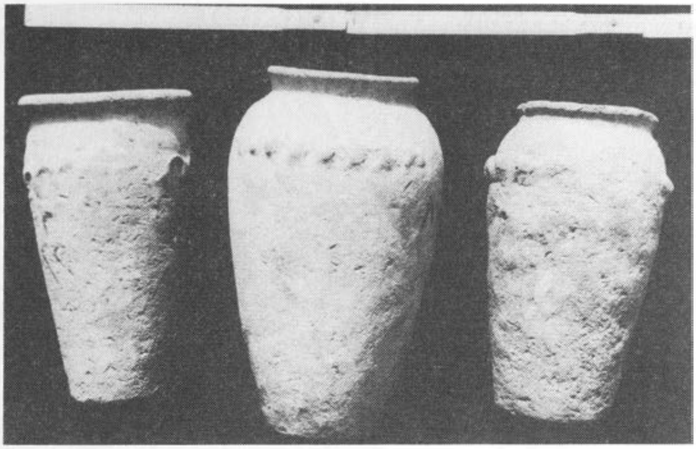


Fig. 13.

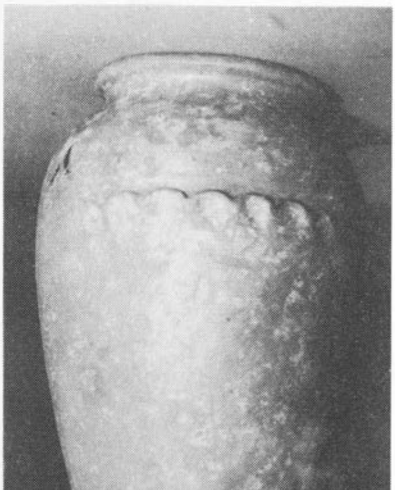


Fig. 14.

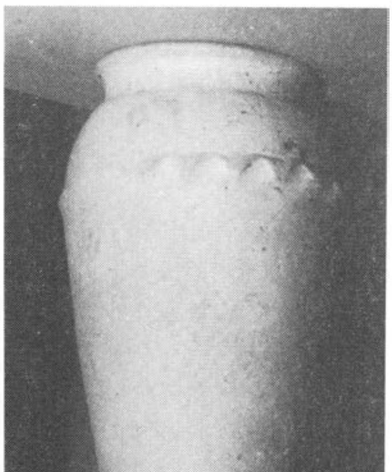


Fig. 15.

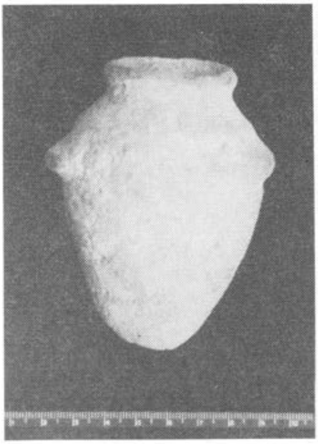


Fig. 16.

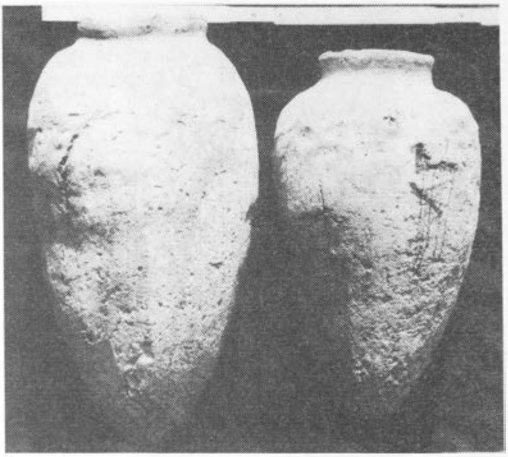


Fig. 17.

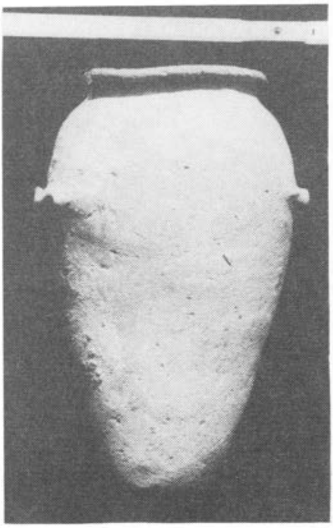


Fig. 18.

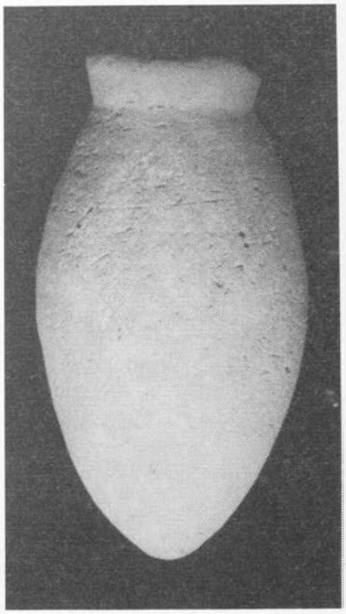


Fig. 19.

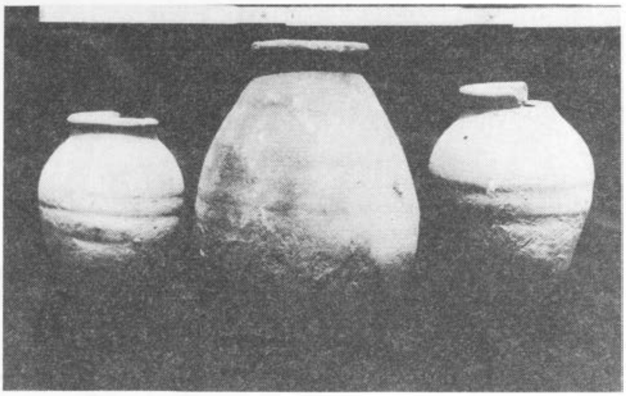
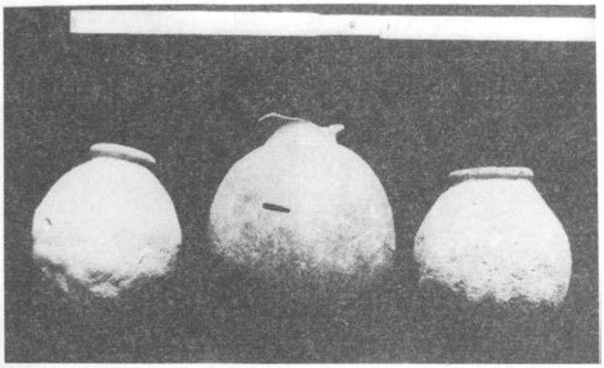


Fig. 20.



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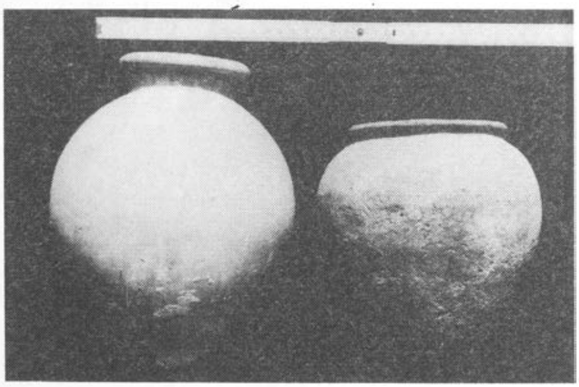

Fig. 22.

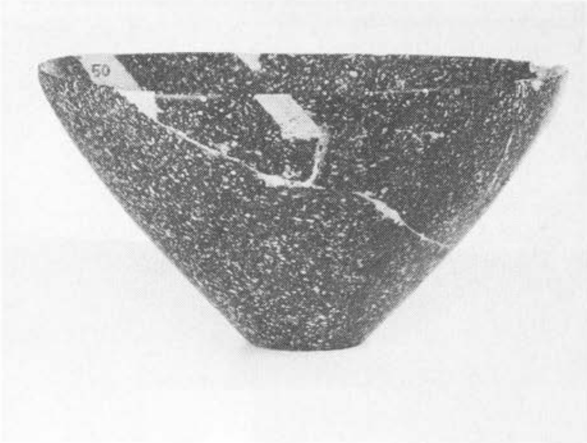

Fig. 23.

Fig. 24.

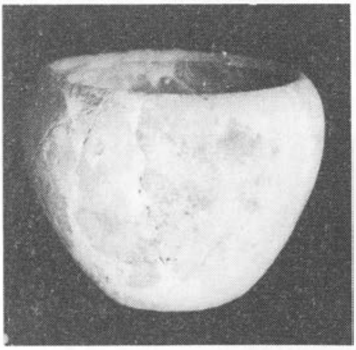

Fig. 25.

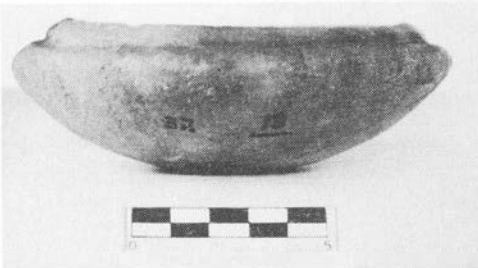

Fig. 26.

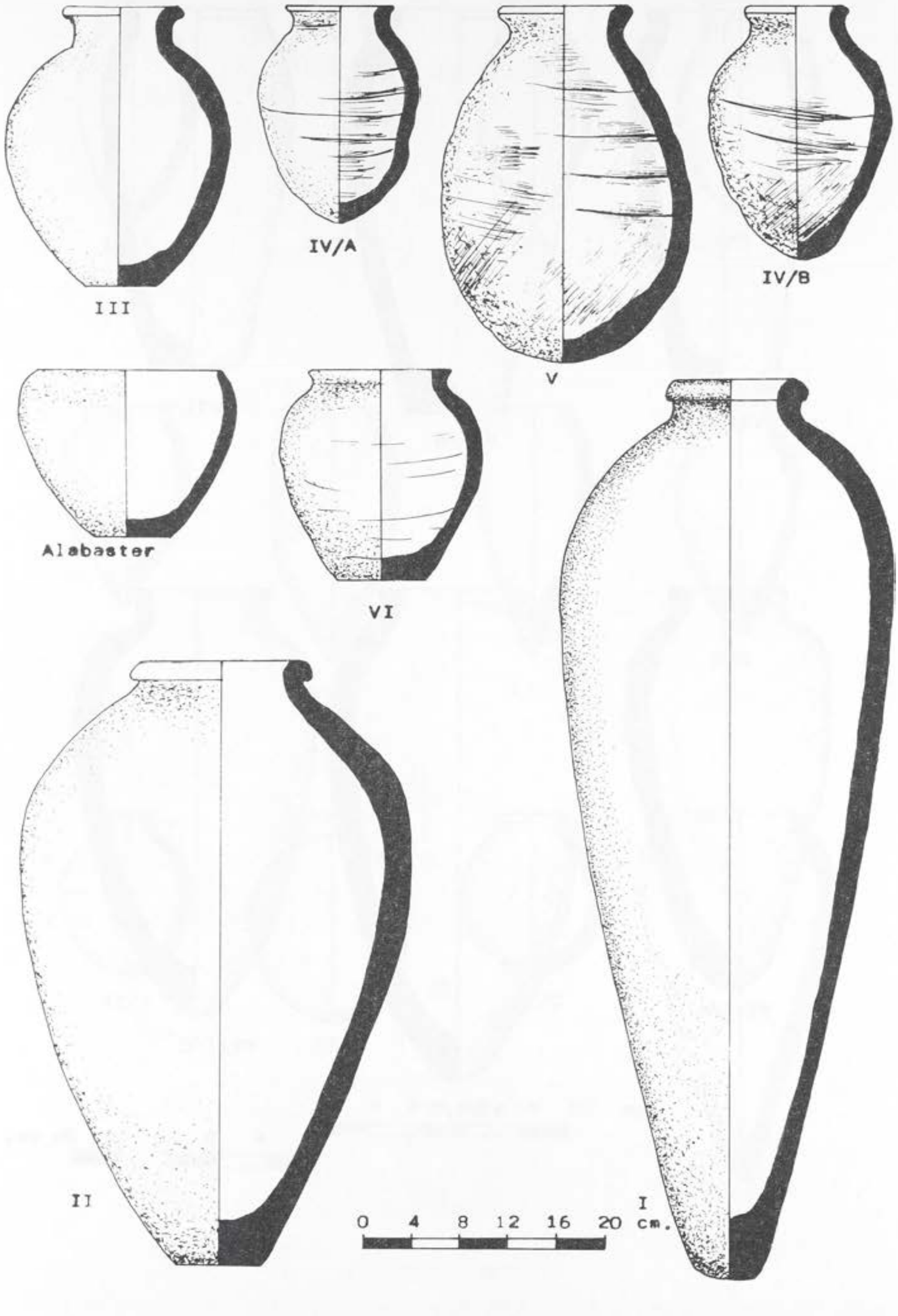


Fig. 27.

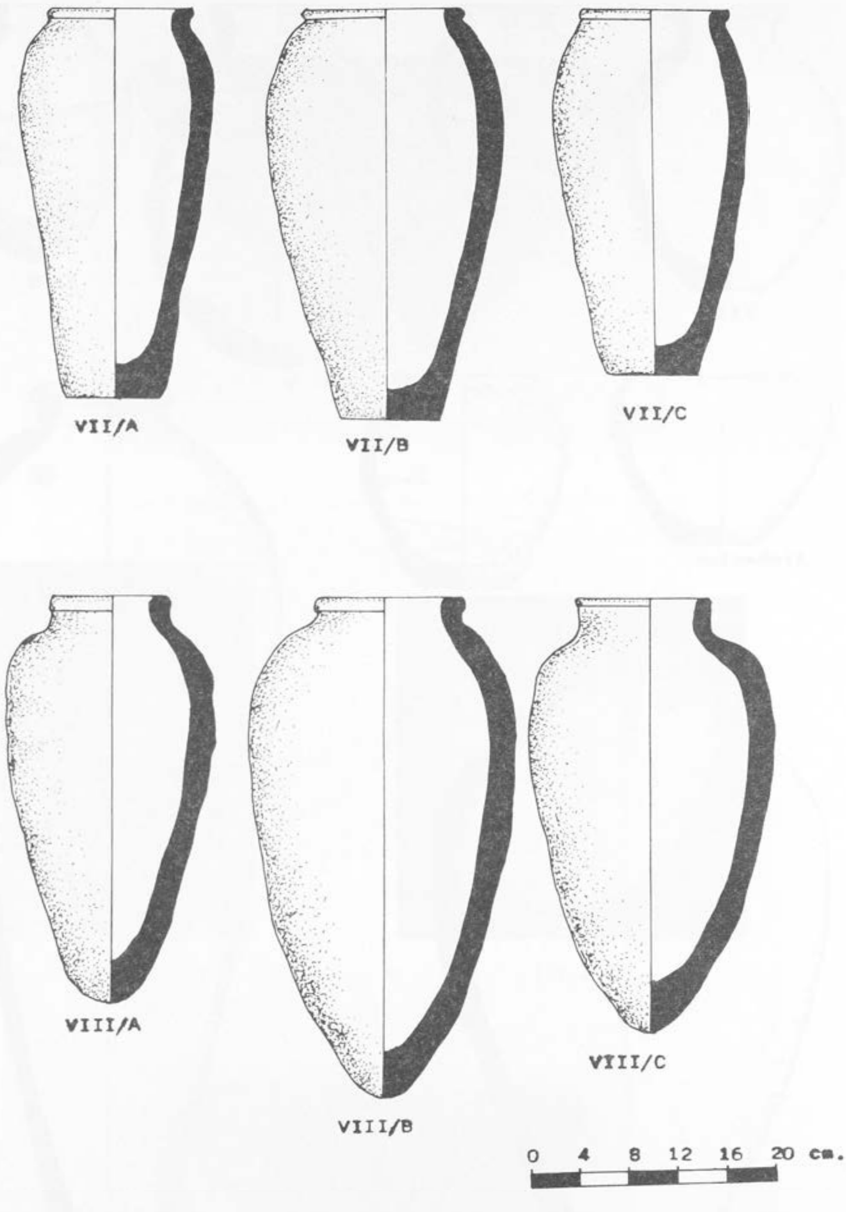


Fig. 28.

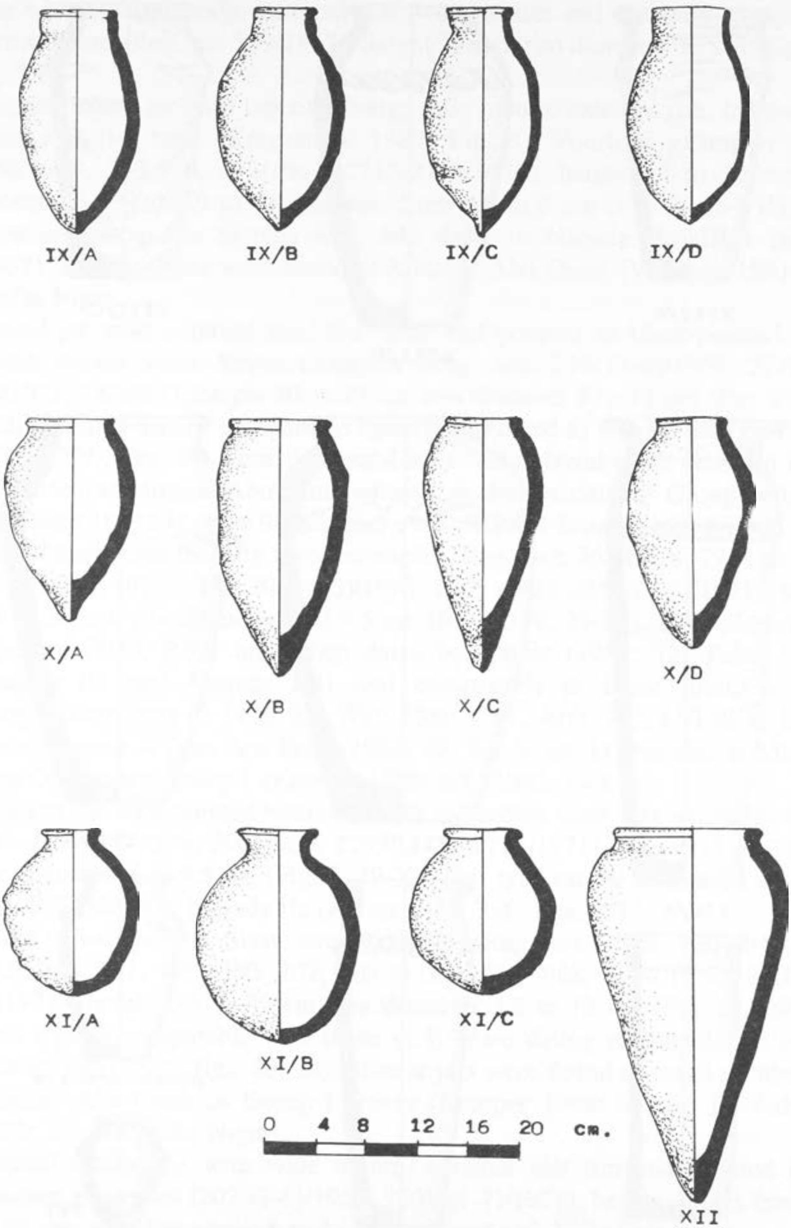


Fig. 29.

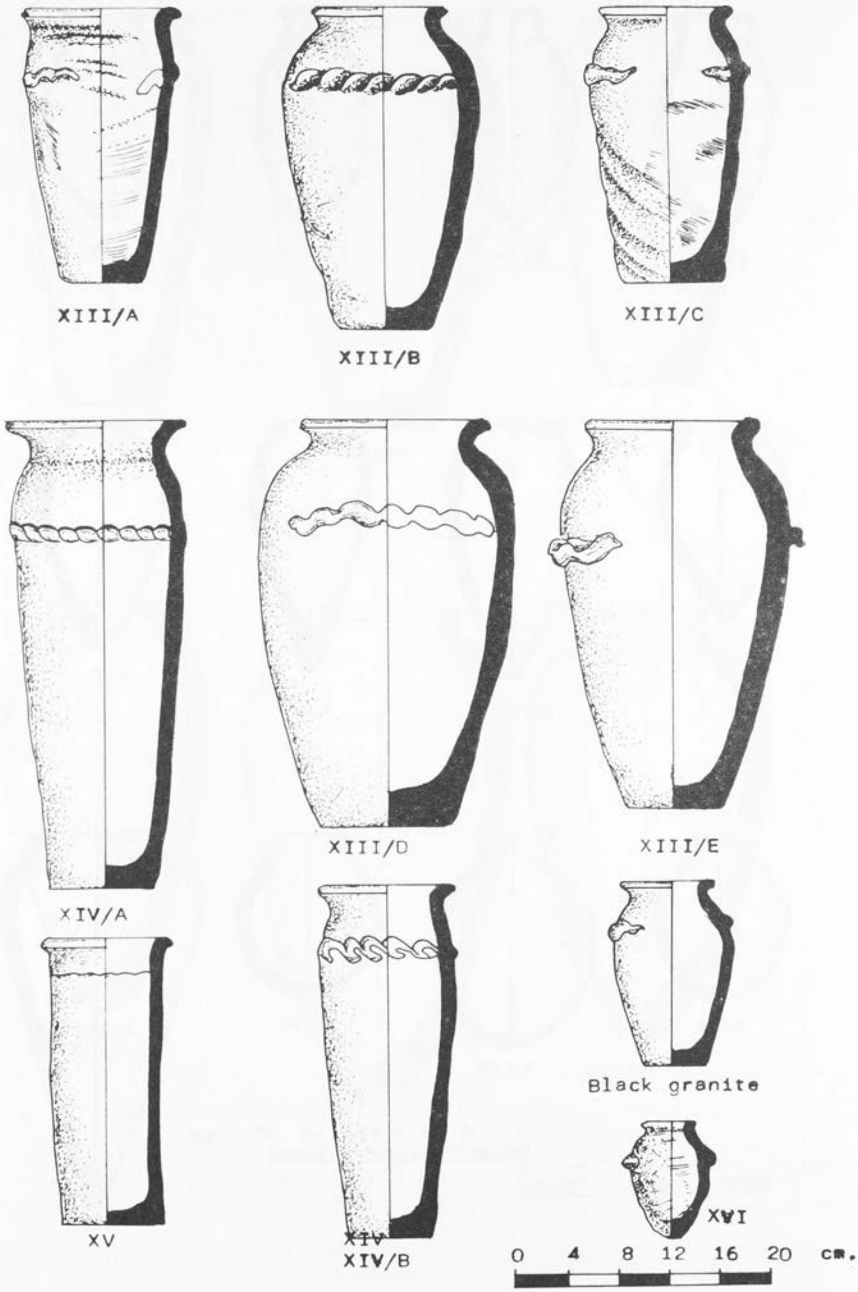
XIII/A
XIII/B
XIII/C
XIV/A
XIII/D
XIII/E
XV
XIV
XIV/B
Black granite
XVI
0 4 8 12 16 20 cm.

Fig. 30.

6. Jar with bulbous body, external rim, wide mouth and flat base, rough red-brown ware (Reg. no. 159/1967), height 17 cm, rim diameter 10 cm (Fig. 22, 27-VI).
7. Barrel-shaped jar with tapering body, wide mouth, external rim, high shoulders and flat base (Krzyzaniak 1989: Fig. 5). Fourteen examples (159-166/1968, 169-170, 173/1967, 2712-2714/1971), height 17 to 32 cm, the mouth diam. from 9 to 13 cm, base from 4.5 to 9 cm (Fig. 8, 28-VII). This type is comparable to type R84, 84d dated to Naqada IId1-IIIa1 (Kaiser 1957). Similar types were found at Minshat Abu Omar (Wildung 1981) and Kufur Nigm.
8. Ovoid jar with external rim, low neck and pointed or blunt-pointed base, rough brown ware. Seven examples (Reg. nos. 210 (1-4)/1968, 2710 (1-2)/1971, 74/1967), height 30 to 40 cm, rim diameter 8 to 11 cm (Fig. 17, 28-VIII). Similar jars of comparable type (L38a) dated to Naqada IIIb by Kaiser (1957: 72f., figs. 24) were also found at el Tell el-Iswid south (van den Brink 1989: 66), at Minshat Abu Omar where it is characteristic of Group IV tombs (Wildung 1981: 31 (type 9); Kroeper 1988: 9f., fig. 2) and Kufur Nigm.
9. Bag-shaped vessels. Fifty three examples (Reg. nos. 76 (1-12), 77, 158, 167, 184 (1-11), 197 (1-15), 208 (1-5)/1968, 2705 (1-2), 2715 (1-5)/1971), height 10 to 24 cm, rim diameter 4 to 9.5 cm (Fig. 5, 19, 29-IX). Examples of this type are P93d, R69c and R66p dated by Kaiser (1957: 72, Tafel 23) to Naqada IIc and Naqada IId1 and comparable to those found at Tell Fara'in/Buto layer II (von der Way 1986: 197, Abb. 3a), el-Tell el-Eswid (south) phase A (van den Brink 1989: 67, fig. 9, nr. 1) and also at Minshat Abu Omar grave group 1 (Kroeper 1988: 8ff.; 1985: 14.).
10. Bulbous jar with pointed bottom, rough red-brown ware. Six examples (Reg. nos. 197/1967, 179, 203/1968, 2705 (1-2), 2706/1971), height 17 to 21 cm, rim diameter 5 to 9.5 cm (Fig. 7, 29-X). This type can be compared with the type R-75 dated to Naqada IIc (Kaiser 1957: 72f., figs. 23).
11. Small ball-shaped jar. Sixty seven examples (Reg. nos. 64, 67, 72 (1-15), 102, 122/1967, 181, 199, 200, 202, 209 (1-33), 212/1968, 2704 (1-3), 2709 (1-9)/1971), height 6.5 to 25 cm, rim diameter 3.5 to 13 cm (Fig. 21, 29-XI). This type is comparable with those of R-Ware dating to Naqada IId1-IIIa1 (Kaiser 1957: 72f., figs. 23, 24). Similar jars were found in small numbers at Minshat Abu Omar in Group I graves (Kroeper 1988: 8f., fig 1.; Wildung 1981: 30) and Kufur Nigm.
12. Conical-shaped jar with wide mouth, external roll rim and pointed base. Thirteen examples (207 (1-6)/1968, 2708 (1-7)/1971), height ranges from 21 to 28 cm, rim diameter 8.5 to 10.5 cm (Fig. 6, 29-XII). This type is comparable with type R76h dated to Naqada IId2 and is similar to type 12 at Minshat Abu Omar (Wildung 1981: fig. 22).
13. Slender oval wavy handles jar with wide mouth, high shoulders and flat base (Krzyźaniak 1989: Fig. 5). Fifteen examples (Reg. nos. 157, 185-191/1968,

2702, 2703, 2711/1971 and Hirriyet Razna Museum nos. 65, 66, 68, 69), height 19.0 to 30.5 cm, rim diameter 7.2 to 11 cm, base 5.8 to 6.5 cm (Fig. 11, 13, 14, 15, 30-XIII). This type of jars is comparable with type W43b, W41 and W47g dated to. It dates to Naqada IId2 and Naqada IIIa1 (Kaiser 1957: 72f., figs. 23, 24). Similar examples were found at Minshat Abu Omar, Group I graves, (Kroeper 1984: 8f.fig.1).

14. Cylindrical jar with tapering body, thickened externally rim and wavy decoration raised on the shoulder, red-brown ware and buff ware. Two examples (Reg. nos. 121/1967, 2702/1971), height 29.5 to 30.5 cm, rim diameter 11 to 15.5 cm (Fig. 9, 10, 30-XIV). This type is comparable with type W51a. It dates to Naqada IIIa2 (Kaiser 1957: 72f., fig. 24;). Similar jar of this type was found at Minshat Abu Omar (Wildung 1981: fig. 22).
15. Cylindrical jar with thickened external rim, flat base and cord decoration under the rim, red-brown ware and buff ware. Eight pieces (Reg. nos. 1734-1737/1967, 62, 71/1967, 121, 140/1968, 3201, 3202/1974), height 15.5 to 30.5 cm, rim diameter 9.5 to 15.5 cm (Fig. 30-XV). This type is known since Naqada IIIb, and was used as a container for cheese. It was found in great quantities in the tombs of the first half of 1st Dynasty (Emery 1963: 212).
16. Small oval jar with low neck, blunt pointed base and raised handles like the wavy handles. Rough red-brown ware. One example (Reg. no. 193/1968), height 9 cm, rim diameter 4 cm (Fig. 16, 30-XVI).

**The stone vessels**

The stone jars can be divided into the following types:

1. Cylindrical alabaster jar with external rim and flat base. Six examples (alabaster: Reg. nos. 91/1967, 222/1968, 2720/1971, 3205, 3206/1974; slate reg. no. 10/1967) with heights ranging from 7 to 23 cm, rim diameter from 4.5 to 13 cm.
2. Slender cylindrical jar with sharp external rim. Rope band decoration. The sides are concave and the base flat with sharp edges. Twenty one examples (Hirriyet Razna Museum nos. 1, 2, 4, 5, 6, 7, 10, 27, 28 and the magazine of Tell Basta,. (alabaster: Reg nos. 3-6, 8, 9, 22-27/24.6.1967), height 8 to 40 cm, rim diameter 6 to 16.2 cm.
3. Barrel shaped shoulder jar with external rim and flat base. Five examples (alabaster: Reg. nos. 7, 14, 15, 20/1967, 139/1968), height 6.2 to 25.5 cm, rim diameter 2.7 to 6 cm.
4. Barrel-shaped shoulder jar with external rim, two side handles and flat base, (alabaster: Reg. no. 3207/1974), height 10 cm, rim diameter 6 cm.
5. Barrel-shaped shoulder jar with external rim, raised wavy handles and flat base. One example (Hirriyet Razna Museum no. 61, black granite), height 10 cm, rim diameter 4.5 cm (Fig. 24, 30).
6. Deep bowl with a sharp rim, straight sides expanding to a contracted mouth and flat base with sharp edges. Six examples (Reg. nos. 57, 58, 87, 88, 89,

90/1967 alabaster), height 10.5 to 21.5 cm, rim diameter 16.5 to 34 cm (Fig. 25, 27).

7. Bowl with straight sides, flaring mouth and flat base. Two examples (Hirriyet Razna Museum nos. 50, 53, porphyric rock), height 4.2 to 12 cm, rim diameter 9 to 22.3 cm (Fig. 24).
8. Bowl with a convex sides and flat base. Seven examples (Reg. nos. 1731, 18, 44, 55, 56/1967, 223, 224/1968 alabaster), height 1.8 to 7 cm, rim diameter 4.5 to 36 cm.
9. Oval lug-handled jar with external rim and flat base. One example (Reg. no. 2701/1971 porphyric rock), max. height 14 cm and max. mouth diam. 6.5 cm.
10. Squat jar with wide mouth, high rounded shoulders and convex sides contracting to a flat base with rounded edges. Two examples (Hirriyet Razna Museum nos. 35, 37), height ranges from 2.5 to 4.5 cm, rim diameter ranges from 9 cm to 12.5 cm (Fig. 26).
11. Wide plate. Eight examples (Hirriyet Razna Museum nos. 55, 56, 57, 58, 64 and magazine of Tell Basta, Reg. nos. 82, 83/1967 schist and 225/1967 breccia), heights of which range from 3.5 to 12.5 cm, the rim diameter ranges from 17 to 60 cm.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

Mohamed Ibrahim Bakr, Mohamed Adel Abd el-Moneim and Mahmoud Omar M. Selim

# Protodynastic excavations at Tell Hassan Dawud (Eastern Delta)

Tell Hassan Dawud is situated to the south of Ezbet Hassan Dawud and of el-Qasaseen village in the Markaz el-Tell el-Kebir. It lies in Ismailia province, about 10 km east of el-Tell el-Kebir, and 40 km west of Ismailia city. The tell has a sandy structure and occupies an area of about a hundred and fifty-seven feddans and its height ranges from about 1.5 m to 3.5 m above the level of the surrounding lands.

The tell was put under the control and supervision of the Egyptian Antiquities Organization in 1977 by the Inspectorate of the Canal Zone, who had found potsherds dating to the Graeco-Roman period. In 1988 the EAO made sondages at the tell. Some mud brick buildings which belong to the Graeco-Roman period were found. In 1989, excavation work was resumed and many graves containing pottery, alabaster and schist vessels and palettes dating to the Protodynastic period were found for the first time. From 1989 to 1992 the EAO continued excavations (Leclant & Clerc 1993; el-Hagary 1992) at the tell, recognizing the importance of the site in the Protodynastic period, especially in reference to its location on the road of the Wadi el Tumilat.

The excavations have mainly revealed two distinct cemeteries of two periods i.e. the Graeco-Roman period and the Protodynastic period, besides the remains of a Graeco-Roman settlement.

The importance of this tell lies in the fact that its antiquities throw some light on the evolution of the tell located on one of the main and vital roads to the Sinai from the Eastern Delta (i.e. Wadi el-Tumilat). It probably served as a link between the cultures of the contemporary settlements which developed on the Nile branches of the Delta and those of the Sinai. The finds of this tell may contribute in solving some problems relating to this period.

From 1989 to 1992, one hundred and ninety-three tombs of the Protodynastic period were found in an area of about one feddan. The tombs are in line with the main features of other Protodynastic tombs. They were mostly small, rounded, oval or rectangular pits in the ground. The depths of the tombs range from 20 cm to 250 cm, and some tombs were built of mud bricks or mud. The superstructures of the tombs were not found in any case.

Copper harpoons, axes or daggers were found in some tombs. Large quantities of different types of pottery and stone jars were found. Many jars with pot marks also occured. These are similar to others found in the Delta and Upper Egypt. One tall jar had the mark of the *serekh* containing the name of Narmer engraved on the upper part of the vessel.

The presence of the name Narmer here has a special importance as it was found before at other sites of the Delta such as Minshat Abu Omar and Kufur Nigm and also at el-Beda.

The bodies position was mostly contracted, placed on the left or the right side with the head to the north, to the south, to the east or to the west.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
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Klaus Schmidt
(with an Addendum by Ernst Pernicka)

# Lower and Upper Egypt in the Chalcolithic Period. Evidence of the lithic industries: a view from Buto

Today the lithics of the Buto-Maadi culture are known by several articles (Rizkana & Seeher 1985; Schmidt 1986, 1989a, 1992, 1993) and a monograph of Rizkana & Seeher (1988; Schmidt in press). So there is no need to repeat details of the Buto-Maadi lithic industry which in general is a twisted blade and bladelet industry. It is represented in the early stage at Maadi, the later stage occure at Buto in layer I and II, at el-Tell el-Iswid in phase A and probably in Tell el-Farkha (Salvatori & Usai 1991) and in the Moerien sites of the Fayum (Ginter & Kozlowski 1986). At another site, Tell Ibrahim Awad, a Chalcolithic layer was only touched on by excavation; it is relatively certain that this layer could also contain Buto-Maadi material.

At the beginning of Buto layer III and Iswid phase B a deep break can been observed in the lithics, which marks the end of the chalcolithic tradition. After that a non-twisted blade industry with truncated rectangles as a main tool class exists. This change has so far been interpreted as the result of the expansion of the southern Naqada culture to the north.

New investigations on Upper Egyptian lithics have completely changed the picture of a lithic industry dominated by fishtails, bifacial knives and other "beautiful" objects (Holmes 1988, 1989, 1992a & b). The lithics of Upper Egypt were mainly based on flake and blade industries, the bifacials occurring only seldom, as a highlight in an otherwise relative modest inventory. There is not a specific Upper Egyptian industry but various regional traditions. The aim of this report will be to show that beside these regional traditions there are also certain traits which are observable all along the Egyptian Nile Valley, in Upper and in Lower Egypt. The question will be how this phenomenon fits into the existing picture of the development of Lower and Upper Egypt towards a homogenous culture. Unfortunately there is one serious problem in comparing both regions: the difficulty to date exactly the assemblages studied, especially in Upper Egypt, where only rough datings, mostly differentiating between the Amratian and the

Gerzean period, dominate. This makes it more difficult to understand, for example, the development of a distinct tool type.

### The twisted bladelet industry

The twisted bladelet industry is, as mentioned above, one of the characteristic features of the Buto-Maadi culture. The Mostagedda industry of Northern Upper Egypt originally had not been characterized by this twist-pattern, but by another speciality of the "twisted" industry, namely the heat treatment of the cores and the resulting glossy bladelets (Holmes 1988, 1989). This heat treatment, at first not recognized at Maadi and Buto, is now also verified for this Lower Egyptian industry (Holmes 1992b: 313, postscript reports only on the Maadi industry). It should be added that nearly all the twisted bladelets of Buto and el-Tell el-Iswid are in fact "glossy".

The twist-pattern on the other hand does not seem to be so prevalent in the Mostagedda industry as in Lower Egypt, but certainly it is also existing (cf. Holmes, this volume). So, an important aspect of the primary production at the Mostagedda and Buto-Maadi sites is quite the same. Regarding the tools, the Mostagedda industry is also similar to Buto-Maadi. The differences outlined by Holmes (1992b: 311) are mainly due to comparing the Mostagedda industry to the site of Maadi alone, which does not represent the whole lifespan of this industry but only the earliest part of the Buto-Maadi culture. The settlement of Maadi is only in part contemporaneous with the post-Badarian sites of the Badari region. It is also partly contemporaneous with the Badarian culture itself. If we compare Buto layer I and II and Iswid phase A with Mostagedda, e.g. the careful shaping of tools highlighted by the blade knives (for truncated rectangles and sickles see below), some of the pronounced differences do not exist. The Mostagedda industry can therefore be seen as a southern counterpart of the developed of the Buto-Maadi industry, which in its early phase seems to be older and ancestral to it.

The existence of a "glossy bladelet" industry in southern Upper Egypt had been unknown until now. Today this characteristic industry has been recognized to form also a certain part of Late Amratian and Gerzean lithic assemblages of the Hierakonpolis region. At site HK-29-17L13 (Late Amratian) glossy bladelet tools are listed with 6,4%, at Gerzean HK-29A with 4,5% of the tools (Holmes, this volume). The amount of the percentages and the diminution in time corresponds well with Buto: in layer Ia there are 5, 4% glossy bladelet tools, in Ib - 4, 9%, IIa - 3, 6%, IIb - 2, 3% and IIIa 1,5%. Looking in detail we can also find some hints for this special industry in the Naqada region (Holmes 1989: 278). So we can conclude that the twisted and heat treated bladelets of Lower Egypt became during the Chalcolithic times a common Egyptian trait. Later, at the end of the Chalcolithic, they disappear quickly, both in Lower and in Upper Egypt.

### The blade knives

An important tool class of the period under consideration are the blade knives, which are mainly based on a twisted primary production. Holmes (1989) separated 3 groups: "truncation knives", "blade knives" and "other blade knives". This division is well accepted but the terms seem to be a little too general, especially the last two. Therefore a modified terminology is suggested, not using morphological data but type sites (or regions). The "blade knives" have already been called "blade knives of Hemamija type" (Schmidt 1989a: 85). Instead of truncation knives the term "blade knives of Badarian type" is proposed (cf. fig.1). So only the group of "other blade knives" is left without special name until now.

The Hemamija knives are of the typical Gerzean type. The main characteristics are the form of the back which is straight and the cutting edge which is normally convex, the tip often bent upwards. The handle is usually rounded. The retouching pattern of "Seitenbezogenheit" (Schmidt 1992: 32), which means that distinct retouches are always at the same position of the blade, is almost always present. Within the Hemamija knives a wide range of quality is visible. They can be divided in two variants: variant A being the highly standardized one and variant B the more irregular one. The two variants should represent the ability of the craftsman, more or less professional, but it seems to be clear that variant B is starting earlier than A. At Buto there are 51 stratified pieces, all concentrated in layer II; variant A is represented two times, the others are of variant B type. But there is no variant A at Maadi, where variant B can be found in certain numbers within the group of endscrapers on blades (Rizkana & Seeher 1988: 27).

At Hemamija 6 of 8 pieces are stratified, one from Badarian level, one from Amratian and 4 from the so called "upper levels", which should be Gerzean (Holmes 1989: 75). In the Badarian region there are 10 pieces, all from the Mostagedda industry (Holmes 1989: 154). In the Naqada and Hierakonpolis collections studied by Holmes the blade knives are missing, but there are several pieces known from the Gerzean cemeteries of that region (Holmes 1989: 278). So the Hemamija knives are a tool type with its roots in the early phase of the Buto-Maadi culture and known in Gerzean times from Lower to Upper Egypt.

The analysis of the Badari knives, which seem to belong to the beginning of the Mostagedda industry, shows no sharp differences compared with the Hemamija knives. The main differences are the outlines of the back and the cutting edge, but among the Hemamija knives of variant B there are intermediate forms. Interesting is the observation of a beginning of "Seitenbezogenheit" in the Badari knives too. At Hemamija there are 10 examples, 8 from Badarian/Amratian transition, 1 from Amratian/Gerzean transition and 1 from Gerzean (Holmes 1989: 68). The relation between basal and terminal truncation is 7:3. From the Badarian region there are again 10 pieces, all from "Predynastic" sites (Holmes 1989: 145). The relation is 7:2, one piece is not determinable. It is the marked tendency towards a standardized pattern with the tip at the basal, the handle at the terminal part of the blade, which is highly developed in the group of Hemamija knives. The chronological situation, with all its uncertainties, supports a parallel dating of Badari and early Hemamija B knives. The Badari knives

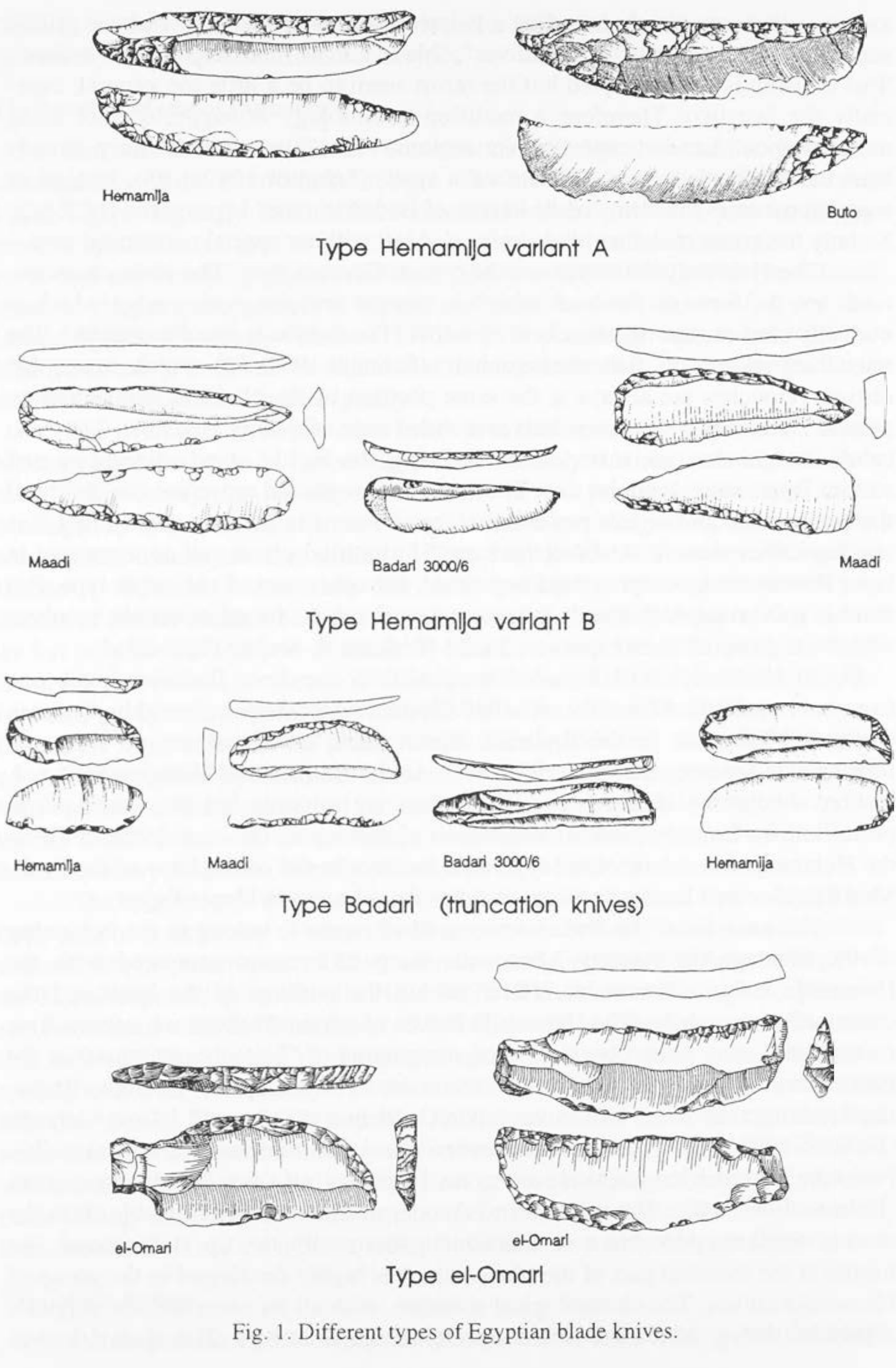


Fig. 1. Different types of Egyptian blade knives.

should be a counterpart of the early Hemamija knives of Lower Egypt. This view is supported by Maadi, where we have Hemamija knives variant B, and also some pieces which are very close to the Badari knives (Rizkana & Seeher 1988: pl. 34, 3.4; 35, 4: 37, 9). And there is no Hemamija variant A at Maadi.

In this context we should look also to another type of blade knives known from the Late Neolithic settlement of el-Omari (Debono & Mortensen 1990: 47). These pieces are formed by convex backing, their cutting edge is straight, forming with the back a beak-like tip similar to the tips of the Badari knives. A special feature is the separated handle. Consequently these knives should be called knives of el-Omari type. So we can state that as early as in Late Neolithic we have in Lower Egypt blade knives which seem to be related to the Hemamija knives. These are chronologically later and of a more elaborated form. In the early Chalcolithic there are related forms of blade knives in both Lower and in Northern Upper Egypt, but certainly not yet in the south. There we have little proof for the existence of Badari knives or any blade knives before the Gerzean period. From the Nagada and Hierakonpolis region there are only 2 fragmented pieces, which could have been truncation knives (Holmes 1989: 226). It is quite clear that the blade knife technology reached this region with the developed stage of the Hemamija knives. In Gerzean times they form a standardized and common tool type all over Egypt. At the end of the Chalcolithic they disappear suddenly.

**Truncated rectangles, sickles**

The almost entire absence of sickle implements is another item of the Buto-Maadi industry. The numerous appearance of sickle implements is connected with the truncated rectangles, which appear in certain numbers suddenly with Buto layer III and Iswid phase B (Schmidt 1989a: 91; 1989b: 301; 1992: 33). Looking to Predynastic Upper Egypt the situation is at first not very clear. Truncated rectangles are existing but not common in Predynastic assemblages. In the Naqada region they are missing with the exception of some pieces from South Town, dated to the Gerzean. At the Amratian sites of Hierakonpolis there are almost no sickles and no rectangles (Holmes 1989: 201, 292), maybe with some exceptions at HK-11C (Holmes, this volume). At Gerzean HK-29A there is little change, sickles have a portion of 0,2%.

Only in the Predynastic sites of the Badari region, in the Mostagedda industry, sickles are numerous (Holmes 1989: 148). They include rectangles of the (small) type of Buto III/Iswid B, but also bitruncated blades of larger dimensions, which should be regarded as a different type, and simple truncated blades of ogival form. They are accompanied by the glossy bladelet industry. This would be the earliest occurrence of (small) truncated rectangles in Egypt. But there are some doubts if this type is represented during the whole lifespan of the Mostagedda industry or if it occurs, similar to the situation at Buto, only at the end of this time. The other two types occur sporadically also in Lower Egypt (Schmidt 1989a: fig.19, 4-5; 20, 9). A detailed analysis of Egyptian sickle types is missing until now, but these pieces could represent sickle types of the time before Buto III. This question can not be answered until now because of the uncertain lifespan of the Badari sites. But the hypothesis of a chronological sequence of a Gerzean phase without rectangles and a later phase with rectangles is supported by an observation in Tarif. The 1979 published assemblage of series B (Ginter et al. 1979: 54), which is dated "Nagadian", contained many rectangles, mostly used as sickles blades. The new investigation in Tarif yielded a "Nagadian" assemblage without rectangles. And at Armant Huzayyin (1937: 219, 221) had already recognized the late dating of these tools.

To summarize the situation in Upper Egypt, it is obvious that the rectangles are little or not at all known in the Amratian times. It is supposed to be the same in Gerzean, but exact datings are missing until now. The rectangles seem to be introduced to Upper Egypt at the end of the Gerzean. If we accept this view, the situation in Upper Egypt corresponds again very closely with Lower Egypt, where rectangles appear as late as Buto III and Iswid phase B. From this time onwards they are the basic form of the Egyptian sickle implement until the end of the Old Kingdom.

In accordance with Ginter et al. (1979: 69) the rectangles should be regarded as an Near Eastern element. In Palestine rectangles are starting as early as the Neolithic. They are represented in the Late Neolithic Wadi Rabbah phase (Gopher-Orelle 1989), in the Qatifian and the Early Chalcolithic Besor Phase, which is pre-Ghassulian (Gilead 1990). In this phase they appear together with twisted bladelets. Both types continue during the Ghassulian. According to the general view the rectangles are replaced by the Canaanean blades in Palestine in EBA I. Rectangles in EBA layers are determined as intrusive or "Egyptian import" (cf. Tel `Erani, Rosen 1988). This is somehow curious: the rectangles would disappear in Palestine before they start in certain numbers in Egypt. But in fact the replacement is not very sudden nor complete. First, the Canaanean technology, which seems to be produced by professionals (cf. the hoard of Canaanean blade cores from Hassek Höyük, Behm-Blancke 1992), could not replace all the non-Canaanean blade industries in Palestine (cf. Rosen 1989: 215 tab.2). Especially in southern Palestine, the Canaanean industry is of little importance. And second, the EBA I Period in Palestine is divided into 4 stages with a span from Naqada IIb to the beginning of 1st Dynasty. At the time of the appearance of the rectangles in certain numbers in Egypt - at Buto IIIa and Naqada IId2, which corresponds with the beginning of "EBA Ib middle" in Palestine - the rectangles are predominant in southern Palestine and not the Canaanean blades. So it seems quite sure that the Egyptian rectangles are of Palestinian origin. The rectangles of Tel `Erani on the other hand indeed could be Egyptian. They belong to "EBA Ib late", the time of the Protodynastic Egyptian presence in south Palestine, when the rectangles are an Egyptian type and the Canaanean industry becomes dominating in Palestine.

## Conclusions

The three groups mentioned: the twisted bladelet industry, the blade knives and the truncated rectangles, show strong similarities in their development in Lower and Upper Egypt. Other groups could be added, such as burins, bifacials or arrowheads. It seems obvious that in early Chacolithic times we have several regional traditions, but also some traits, which are common all over Egypt. During the Chalcolithic, at a time before the supposed expansion of the Naqada Culture into the Delta, the development of a larger uniformity can be observed, which seems to have its starting point in the North of Egypt.

At the time of Nagada IId1/2 there is a deep change within the lithics of Buto and el-Tell el-Iswid, which at first had been explained by the expansion of the Naqada culture. But now we can see that the situation in Upper Egypt is very similar. After the spread of the Lower Egyptian blade technology to the South during the Chalcolithic we have a similar change in lithic materials all over Egypt at the end of the Chalcolithic period. So we found in the lithics of Buto and Iswid not an expanding Naqada Culture but a common Egyptian event. But what exactly was this event?

The relative rapid change in the lithic assemblages seems to reflect the existence of social and political structures before the time of Naqada IId2, which enabled new ideas to spread quickly. It is not surprising that in the field of ceramics very similar observations have been made (cf. Adams & Friedman 1992: 327; Köhler this volume). The source of this new ideas could be within Egypt itself or the long discussed Eastern elements arriving in Egypt from Naqada IIc onwards (cf. Moorey 1990). With the rectangles also in the crude field of the lithics we can see the importance of Near Eastern influence at the dawn of the Protodynastic Age.

## Addendum

In Schmidt 1989a: 91 footnote 78 there had been the announcement that the analysis of an obsidian knife would be published by Pernicka in 1992, but in fact did not appear. Therefore this analysis and a short comment are given below.

E. Pernicka

## Analyse eines prädynastischen Obsidianmessers aus Unterägypten

Die Analyse eines bifazial flächenretuschierten Obsidianmessers von el-Tell el-Iswid im nordöstlichen Nildelta (Schmidt 1989a: Fig. 15, 11) mittels instrumenteller Neutronenaktivierung (zur Methode siehe Pernicka 1992) ist in Tabelle 1 zusammengefaßt. Es handelt sich um eine sogenannte alkalische Obsidiansorte, die durch ein Molverhältnis von (Na + K) / Al > 1 definiert ist, aber im allgemeinen auch ein deutlich verschiedenes Spurenelementmuster im Vergleich zu den im östlichen Mittelmeerraum viel häufigeren kalkalkalischen Obsidianvorkommen (z.B. mehr Eisen und Zirkonium, weniger Barium) aufweist. Im östlichen Mittelmeerraum sind bisher nur zwei alkalische Obsidianvorkommen bekannt, nämlich Nemrut Dag und Bingöl, beide in der Nähe des Van-Sees gelegen. Zum Vergleich ist das Spurenelementmuster beider Vorkommen, im selben Labor und mit der selben Methode bestimmt, angeführt. Vom Nemrut Dag standen drei Obsidianproben von Prof. J. Keller, Universität Freiburg und sechs Proben von Dr. G. Schneider, Freie Universität Berlin zur Verfügung. Beide Gebiete umfassen mehrere verschiedene Obsidianflüsse, die unterschiedliche Zusammensetzung aufweisen (Blackman 1984; Cauvin et al. 1986). Deshalb ist die angegebene Streubreite für beide Gebiete sicher nicht repräsentativ. Dennoch zeigt ein Vergleich, daß Nemrut Dag das wahrscheinlichere Ursprungsgebiet im Vergleich zu Bingöl ist (Bingöl B kann aufgrund der völlig verschiedenen Zusammensetzung ausgeschieden werden), weil Bingöl A einen relativ engen Streubereich aufweist (Cauvin et al. 1986) und einige Elemente im Messer am Rand oder außerhalb dieses Streubereichs liegen.

Es sei aber darauf hingewiesen werden, daß praktisch alle ostafrikanischen Obsidianvorkommen einschließlich der von Südarabien und dem Tibestigebirge alkalisch sind und deshalb ähnliche Elementmuster wie Nemrut Dag und Bingöl A haben können. Die Emissionsspektralanalysen von Cann und Renfrew (1964) sind zu wenig genau, um zu entscheiden, ob eine Differenzierung möglich ist. Nur die Vorkommen von Kenya scheiden wohl wegen ihres deutlich höheren Bariumgehaltes als Ursprungsgebiet aus. Aufgrund der wesentlich umfangreicheren Untersuchungen mittels Röntgenfluoreszenzanalyse von Francaviglia (1990) lassen sich auch die Obsidianvorkommen im Jemen und die von Tibesti ausschließen. Von den noch unvollständig erforschten äthiopischen Vorkommen sind zwei in der Provinz Choa (Aulito und Koka-See) den anatolischen ähnlich. Ob sie als Ausgangsmaterial für das Messer von el-Tell el-Iswid in Frage kommen, kann derzeit wegen der unterschiedlichen Analysemethoden nicht beurteilt werden.

| | | Messer el-Tell el-Iswid | Nemrut Dag | Bingöl A |
|---|---|---|---|---|
| Na | [%] | 4,18 | 3,64 - 4,77 | 4,09 - 4,26 |
| K | [%] | 3,08 | 3,56 - 3,77 | 3,34 - 3,70 |
| Sc | [ppm] | 0,27 | 0,51 - 0,76 | 0,14 - 0,16 |
| Cr | [ppm] | 5,67 | 5,28 - 8,58 | 4,49 - 8,21 |
| Fe | [%] | 3,10 | 1,52 - 4,98 | 2,87 - 3,07 |
| Co | [ppm] | 0,33 | 0,20 - 0,26 | 0,16 - 0,57 |
| As | [ppm] | 31,5 | 17,3 - 26,0 | 38,3 - 45,8 |
| Rb | [ppm] | 230 | 185 - 236 | 207 - 234 |
| Zr | [ppm] | 840 | 510 - 1095 | 760 - 887 |
| Sb | [ppm] | 1,62 | 1,25 - 1,29 | 1,98 - 2,67 |
| Cs | [ppm] | 15,6 | 11,1 - 14,7 | 15,3 - 16,8 |
| Ba | [ppm] | 184 | 54 - 75 | 58 - 80 |
| La | [ppm] | 92,9 | 66 - 113 | 89,9 - 93,1 |
| Ce | [ppm] | 200 | 141 - 242 | 182 - 207 |
| Sm | [ppm] | 20,0 | 14,1 - 25,9 | 19,2 - 20,9 |
| Eu | [ppm] | 0,67 | 0,30 - 1,62 | 0,74 - 0,82 |
| Tb | [ppm] | 3,21 | 2,47 - 4,14 | 3,04 - 3,93 |
| Yb | [ppm] | 13,2 | 10,9 - 16,3 | 13,1 - 14,5 |
| Lu | [ppm] | 1,05 | 1,52 - 2,26 | 1,79 - 1,98 |
| Hf | [ppm] | 26,1 | 16,7 - 30,8 | 24,9 - 30,0 |
| Ta | [ppm] | 4,73 | 4,66 - 5,91 | 4,50 - 5,28 |
| Th | [ppm] | 30,2 | 25,3 - 33,6 | 31,4 - 32,9 |
| U | [ppm] | 5,49 | 9,00 - 11,5 | 11,4 - 13,1 |

Table 1. Spurenelementmuster des prädynatischen Obsidianmessers von el-Tell el-Iswid und von alkalischen Obsidianvorkommen im Gebiet des Van-Sees.

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# Local crop production *versus* import of cereals in the Predynastic period in the Nile Delta

"Was there any crop production in the Nile Delta during the Predynastic period?" This question I have been asked frequently by archaeologists working in the Nile Delta. So far no sickle blades have been found in Predynastic sites in the Nile Delta (Tell el-Fara`in-Buto [Schmidt 1986; 1987; 1988; 1989a; 1992a], Tell Ibrahim Awad [Schmidt 1992a; 1992b] and el-Tell el-Iswid [Schmidt 1989b; 1992a]), the only exception being one with silica gloss in the "Urschicht" of Merimde (Eiwanger 1984: 47, T46 I.879; 1988: 37). Furthermore, the environmental concept of the Nile Delta has been that of an uninhabitable thicket for a long time (cf. Baumgartel 1947: 3ff; Krzyzaniak 1977: 137). Therefore it has been inferred that a fully developed type of agriculture with crop production and life-stock raising was not practised during the Predynastic period; that herding was the economic basis of the settlements; that crop production only arrived in Early Dynastic times.

Meanwhile the previous environmental concept of the Nile Delta has been revised (Bietak 1975; Butzer 1976) but the lack of sickle blades poses two questions: did the people obtain their cereals in the Predynastic period from outside the Nile Delta or did they grow them locally but harvested them without sickles, e.g. by reaping ears only or by reaping ears and straw, or by uprooting? Eiwanger (1988: 37) concludes from the rare occurrence of sickle blades in the "Urschicht" of Merimde that the harvesting methods must have been a different one.

To answer these questions, soil samples from Predynastic and Early Dynastic layers were taken at Tell el-Fara`in-Buto (Table 1 & 3; for a detailed report, Thanheiser forthcoming) and at Tell Ibrahim Awad (Table 2 & 4; preliminary report, Thanheiser 1992a) and processed by the usual water flotation technique (Greig 1989: 34ff.). The contents of jars of the Early Dynastic cemetery at Minshat Abu Omar were also sampled. As the sample composition is rather unusual the results of the analysis are not included here but will be published in the final excavation report (Thanheiser forthcoming b; preliminary report Thanheiser 1992b).

The plant remains from Buto and Tell Ibrahim Awad were identified and classified according to their mode of arrival at the site and, for crops and segetal weeds (i. e. weeds associated with field crops), the crop processing stage which they might represent.

For the classification in respect of crop processing stages ethnographic models were applied. Here the basic rational is the fact that there is a limited range of ways to grow, harvest and process crops. Ethnographic studies of archaic agrarian systems indicate that each step in the operation of crop management, harvesting and processing will result in a distinct composition of products and by-products. Samples of charred plant remains often exhibit a composition closely similar to that observed in archaic agriculture. By reference to the ethnographic models archaeological plant remains can be assigned to certain steps in the crop processing sequence. For more details on ethnographic models and their application in archaeobotany see e.g. Hillman (1981; 1984a; 1984b; 1985) and Jones (1984).

Four groups of plant remains could be distinguished in Buto and Tell Ibrahim Awad:

a) grain and chaff of field-crops grown for human consumption or as animal fodder;
b) weeds associated with the field-crops;
c) plants which might have been collected for food or medicine;
d) others (garden plants, fuel, etc.).

Crops and segetal weeds usually arrive together on site. But for matters of convenience and because of the fact that they outnumber all other plants they are grouped separately. On the other hand garden plants, fuel etc. are brought to the site for different purposes and arrive separately. But the number of recovered taxa and items is so small that they were summarised in one group.

In both sites the majority of plant remains comes from field-crops (emmer wheat, barley, lentil, vetch and in Buto also some flax) and segetal weeds. No striking difference in sample composition could be found neither for the two sites nor for the two periods concerned.

Only minor changes through time were observed. The proportion of cereal grains in each sample is smaller in Early Dynastic layers than in the Predynastic ones. This might be an indication that a more thorough way of crop processing where less of the end-product was lost, was applied in the Early Dynastic period. A decline of plants which might have been collected (e.g. *Malva* sp., *Plantago* sp.) can be observed. Garden plants (grape and fig) only occur in Early Dynastic layers, with the exception of one fig nutlett and one grape pip in Layer II in Buto. Some samples from Early Dynastic layers contain high amounts of fodder plants (*Trifolium*-type, *Lolium*-type, *Phalaris* sp., *Cyperus* sp.) but hardly anything else. This might be an indication for the intensification of cattle breeding in the Early Dynastic period.

Most of the weed seeds/fruits are smaller than the cereal grains. This indicates that the samples represent waste from fine sieving, a by-product usually found on sites where cereals are grown and processed.

The weeds present in the samples all belong to the usual weed assemblage of winter crops in northern Egypt. No weeds typical for the Levant or for Upper Egypt are present. Therefore the import of cereals from these two areas is very unlikely. Furthermore the results from both periods compare well with results from Tell el-Dab`a (Thanheiser 1987) where undoubtedly a highly developed type of agriculture was practised.

Taking into account all facts (the same sample composition in both periods with cereals and segetal weeds being dominant, with waste from fine sieving, without foreign weeds) the import of cereals from Upper Egypt or the Levant during the Predynastic period is unlikely.

Could the cereals have been harvested then by different methods? Whenever cereals are harvested some of the weeds associated with them will inevitably be harvested as well. Which weeds will be harvested depends on their growth habit (twining, free-standing) and height in relation to their host crop and on the harvesting method.

The weeds present in the samples were grouped according to their growth habit and height. Here again no difference in the two sets of samples could be detected. All weeds are free-standing and most of them flower at medium, some at low height. Therefore it is likely that in both periods the cereals were harvested by the same method - in my opinion with sickles and cut just above the ground. The presence of seeds of rather low growing weeds like *Crypsis* sp. prove that. Why there are no sickle blades in Predynastic layers remains unresolved (discussed by von der Way 1993: 7ff.).

## Conclusion

There is no significant difference in sample composition between the Predynastic and the Early Dynastic period. Minor differences are the decline of the percentage of cereal grains, the decline of plants which might have been collected for food or medicine, the appearance of garden plants and samples which contain hardly anything else but fodder plants in the Early Dynastic period. Therefore, agriculture seems to have been practised during the Predynastic period but has become more diversified during the Early Dynastic period.

Table. 1. Plant remains from Tell el-Fara`in - Buto (Summary).

| **Phase** | **Pre-Dynastic** | | **Early Dynastic** | |
|---|---|---|---|---|
| **Layer** | **I** | **II** | **III** | **IV** |
| **No. of Samples** | **13** | **11** | **6** | **19** |
| **Amount of Soil Sampled (Liter)** | **263** | **265** | **273** | **218** |
| **No. of Recovered Items** | **3329** | **4155** | **2996** | **11793** |
| *Triticum dicoccum* s.f | 170 | 452 | 47 | 179 |
| *Triticum dicoccum* s.f. term. | 6 | - | 1 | 12 |
| *Triticum dicoccum* | 21 | 75 | 14 | 42 |
| *Triticum dicoccum* t.g. | 5 | 1 | 2 | 8 |
| *Triticum dicoccum/durum* | 2 | 1 | 2 | 2 |
| *Triticum sp.* r.f. | 20 | 35 | 3 | 2 |
| *Triticum sp.* g.b. | 559 | 862 | 406 | 1023 |
| *Triticum sp.* | 33 | 70 | 24 | 65 |
| *Triticum sp.* t.g. | 1 | 3 | - | 2 |
| *Hordeum vulgare ssp. distichum* r.f. | 52 | 11 | - | - |
| *Hordeum vulgare ssp. vulgare* r.f. | 6 | - | - | - |
| *Hordeum vulgare* s/h | 4 | 7 | 10 | 18 |
| *Hordeum vulgare* s/h t.g. | 1 | - | 2 | 13 |
| *Hordeum vulgare* s/? | 69 | 22 | 19 | 39 |
| *Hordeum vulgare* s/? t.g. | 3 | - | - | 12 |
| *Hordeum vulgare* a/h | - | 1 | - | 2 |
| *Hordeum vulgare* a/h t.g. | - | - | - | 15 |
| *Hordeum vulgare* a/? | 1 | 5 | - | - |
| *Hordeum vulgare* a/? t.g. | - | 1 | - | - |
| *Hordeum vulgare* ?/h | 2 | 3 | 3 | 8 |
| *Hordeum vulgare* ?/h t.g. | - | - | - | 3 |
| *Hordeum vulgare* indet. r.f. | 27 | 9 | - | - |
| *Hordeum vulgare* indet. | 26 | 57 | 25 | 80 |
| *Hordeum vulgare* indet. t.g. | 1 | 2 | - | 12 |
| Cereals indet. r.f. | 1 | 23 | 16 | 13 |
| Cereals indet. | 310 | 296 | 78 | 177 |
| Cereals indet. t.g. | - | - | - | 11 |
| Cereals indet. embryo | 8 | 35 | 28 | 172 |
| | | | | |
| *Vicia ervilia* | - | 1 | - | - |
| *Lens culinaris* | 13 | 7 | - | 4 |
| *Lathyrus sativus* | 13 | 23 | - | 4 |
| *Pisum sativum* | 6 | 9 | - | 2 |
| *Vicieae* indet. | 27 | 103 | 1 | 112 |
| | | | | |
| *Linum usitatissimum* | - | - | 4 | - |
| | | | | |
| *Ficus carica* | - | 1 | 33 | 81 |
| *Vitis vinifera* | - | 1 | 7 | 59 |
| | | | | |
| *Silene sp.* | - | - | - | 3 |
| *Chenopodium album* | 139 | 57 | 20 | 3 |
| *Chenopodium murale* | 70 | 42 | 13 | 5 |
| *Chenopodium sp.* | 148 | 75 | 77 | 11 |
| *Suaeda sp.* | 33 | 8 | 33 | 69 |
| *Amaranthus sp.* | - | - | 13 | 11 |
| *Polygonum persicaria* | - | 1 | - | 1 |
| *Polygonum/Rumex sp.* | 57 | 33 | - | 38 |
| *Rumex simpliciflorus* | 7 | - | - | - |

Table 1. (continued

| | | | | |
|---|---|---|---|---|
| *Rumex dentatus* | 69 | 90 | - | - |
| *Rumex sp.* | 130 | 85 | 30 | 326 |
| *Atriplex sp.* | - | - | - | 2 |
| *Lagonychium farctum* | - | - | - | 3 |
| *Trifolium*-type | 114 | 55 | 80 | 2252 |
| *Scorpiurus sp.* | 5 | - | - | 3 |
| *Vicieae* indet. | 100 | 78 | 51 | 190 |
| *Medicago sp.* | - | - | - | 6 |
| *Fabaceae* indet. | 35 | 21 | 3 | 73 |
| *Geranium sp.* | - | - | - | 1 |
| *Apiaceae* indet. | 14 | - | - | - |
| *Brassica sp.* | 2 | - | - | - |
| *Raphanus sp.* pod | 8 | - | - | - |
| *Sinapis sp.* | - | - | - | 1 |
| *Erucaria sp.* | - | - | - | 10 |
| *Malva sp.* | 43 | 49 | 52 | 37 |
| *Lamiaceae* indet. | 2 | 1 | - | - |
| *Senecio sp.* | 2 | - | - | - |
| *Cotula*-type head | 5 | - | - | - |
| *Pulicaria sp.* | - | 2 | - | - |
| *Matricaria*-type head | 2 | - | - | - |
| *Sonchus*-type head | 4 | - | - | - |
| *Asteraceae* indet. head | - | - | - | 12 |
| *Asteraceae* indet. | - | - | - | 80 |
| | | | | |
| *Bellevalia sp.* | - | 1 | - | - |
| *Muscari sp.* | - | - | - | 16 |
| *Hyacinthaceae* indet. | 14 | 10 | 6 | 83 |
| *Cyperus sp.* | 63 | 24 | 14 | 177 |
| *Eleocharis sp.* | 2 | 4 | - | - |
| *Schoenoplectus triqueter/litoralis* | 1 | 1 | 1 | 19 |
| *Scirpus sp.* | 10 | - | 9 | 2 |
| *Carex sp.* | 10 | 3 | 2 | 30 |
| *Cyperaceae* indet. | 5 | 38 | 18 | 77 |
| *Lolium temulentum* | - | 8 | 1 | 1 |
| *Lolium sp.* | 6 | 54 | 122 | 123 |
| *Lolium*-type | 252 | 335 | 1155 | 1733 |
| *Bromus sp.* | 11 | 52 | 8 | 15 |
| *Agropyron sp.* | 11 | - | - | - |
| *Phalaris sp.* | 107 | 88 | 127 | 3375 |
| *Crypsis sp.* | 9 | - | 1 | 3 |
| *Poaceae* indet. culm | 12 | 26 | 7 | 4 |
| *Poaceae* indet. node | 15 | 9 | 1 | - |
| *Poaceae* indet. r.f. | 1 | - | 3 | 3 |
| *Poaceae* indet. awn | 8 | 75 | 10 | 6 |
| *Poaceae* indet. | 348 | 615 | 386 | 713 |
| INDET. | 68 | 99 | 28 | 104 |

Abbreviations:

| | |
|---|---|
| a | symmetric |
| g.b | glume base |
| h | hulled |
| r.f. | rhachis fragment |
| s | symmetric |
| s.f. | spikelet fork |
| s.f.term. | terminal spikelet fork |
| t.g. | tail grain |

Table 2. Plant remains from Tell Ibrahim Awad (Summary).

| Phase | Pre-dynastic | Early Dynastic |
|---|---|---|
| **No. of Samples** | **7** | **17** |
| **Amount of Soil Sampled (Liter)** | **150** | **300** |
| **No. of Recovered Items** | **1263** | **6471** |
| *Triticum dicoccum* s.f | 14 | 50 |
| *Triticum dicoccum* s.f. term. | 1 | 7 |
| *Triticum dicoccum* | 6 | 20 |
| *Triticum dicoccum* t.g. | 11 | 46 |
| *Triticum* sp. g.b. | 51 | 72 |
| *Triticum* sp. | 23 | 51 |
| *Triticum* sp. t.g. | 3 | - |
| *Hordeum vulgare* s/h | 5 | 35 |
| *Hordeum vulgare* s/h t.g. | 1 | 12 |
| *Hordeum vulgare* s/? | 4 | 14 |
| *Hordeum vulgare* s/? t.g. | 9 | 1 |
| *Hordeum vulgare* a/h | - | 2 |
| *Hordeum vulgare* a/h t.g. | 1 | 1 |
| *Hordeum vulgare* a/? | - | 1 |
| *Hordeum vulgare* a/? t.g. | - | 2 |
| *Hordeum vulgare* ?/h | - | 15 |
| *Hordeum vulgare* ?/h t.g. | 1 | 1 |
| *Hordeum vulgare* a/n | - | 1 |
| *Hordeum vulgare* indet. | 15 | 26 |
| cereals indet. r.f. | 8 | 16 |
| cereals indet. | 142 | 284 |
| cereals indet. embryo | 5 | 25 |
| | | |
| *Vicia ervilia* | 1 | - |
| *Lens culinaris* | 2 | 2 |
| *Lathyrus sativus* | - | 2 |
| *Vicieae* indet. | 14 | 43 |
| | | |
| *Ficus sp.* | - | 2 |
| *Vitis vinifera* | - | 1 |
| | | |
| *Silene sp.* | - | 3 |
| *Chenopodium murale* | - | 2 |
| *Polygonum persicaria* | 9 | 5 |
| *Polygonum/Rumex sp.* | 35 | 113 |
| *Rumex sp.* | 163 | 793 |
| *Trifolium*-type | 13 | 70 |
| *Vicieae* indet. | - | 7 |
| *Fabaceae* indet. | - | 16 |
| *Apium* cf. *graveolens* | - | 1 |
| *Apiaceae* indet. | - | 1 |
| *Brassica/Sinapis sp.* | - | 14 |

Table 2. (continued).

| | | |
|---|---|---|
| cf. *Sisymbrium sp.* | 1 | - |
| *Malva sp.* | 9 | 11 |
| *Solanum nigrum* | - | 3 |
| *Lithospermum sp.* | - | 1 |
| *Plantago sp.* | 5 | 7 |
| *Lamiaceae* indet. | - | 1 |
| *Matricaria sp.* | 1 | - |
| *Asteraceae* indet. | 1 | 1 |
| | | |
| *Hyacinthaceae* indet. | 14 | 130 |
| *Cyperus sp.* | 167 | 344 |
| *Schoenoplectus sp.* | 6 | 8 |
| *Carex sp.* | 3 | 14 |
| *Cyperaceae* indet. | 3 | 14 |
| *Lolium*-type | 285 | 2922 |
| *Bromus diandrus* | 1 | 2 |
| *Phalaris sp.* | 54 | 300 |
| *Crypsis sp.* | 15 | 1 |
| *Poaceae* indet. culm | - | 7 |
| *Poaceae* indet. node | - | 1 |
| *Poaceae* indet. r.f. | - | 1 |
| *Poaceae* indet. awn | 6 | 32 |
| *Poaceae* indet. | 104 | 854 |
| | | |
| INDET. | 32 | 60 |

Abbreviations:

| | |
|---|---|
| a | asymmetric |
| g.b. | glume base |
| h | hulled |
| n | naked |
| r.f. | rhachis fragment |
| s | symmetric |
| s.f. | spikelet fork |
| s.f.term. | terminal spikelet fork |
| t.g. | tail grain |

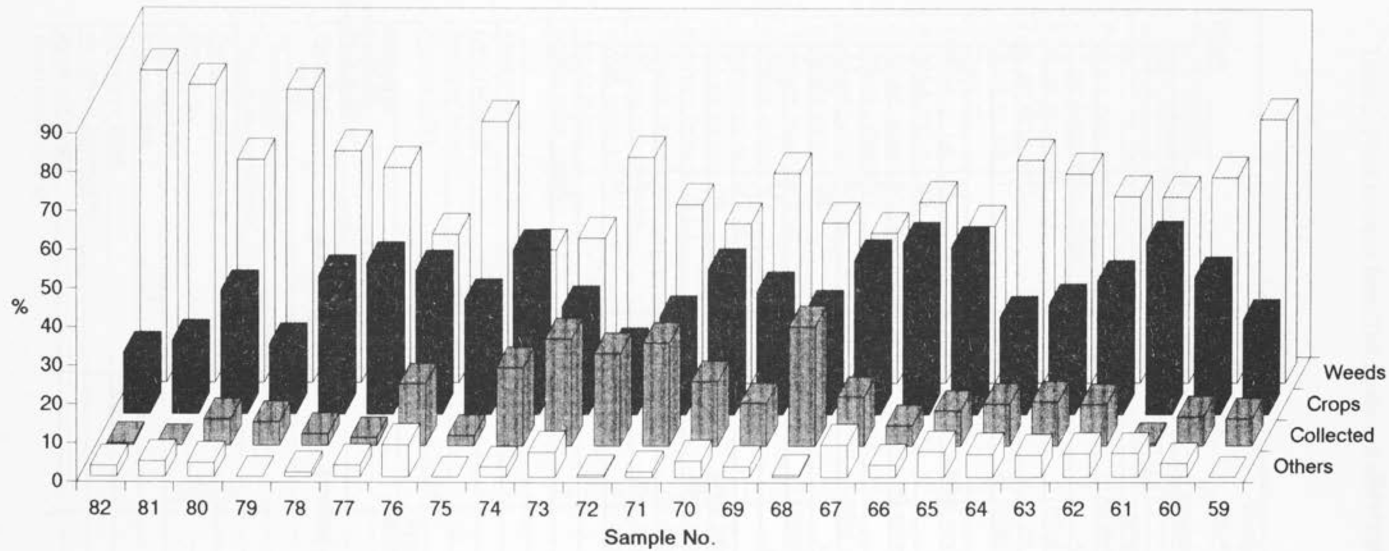


Table 3. Composition of Predynastic plant remains from Tell el-Far'in - Buto.

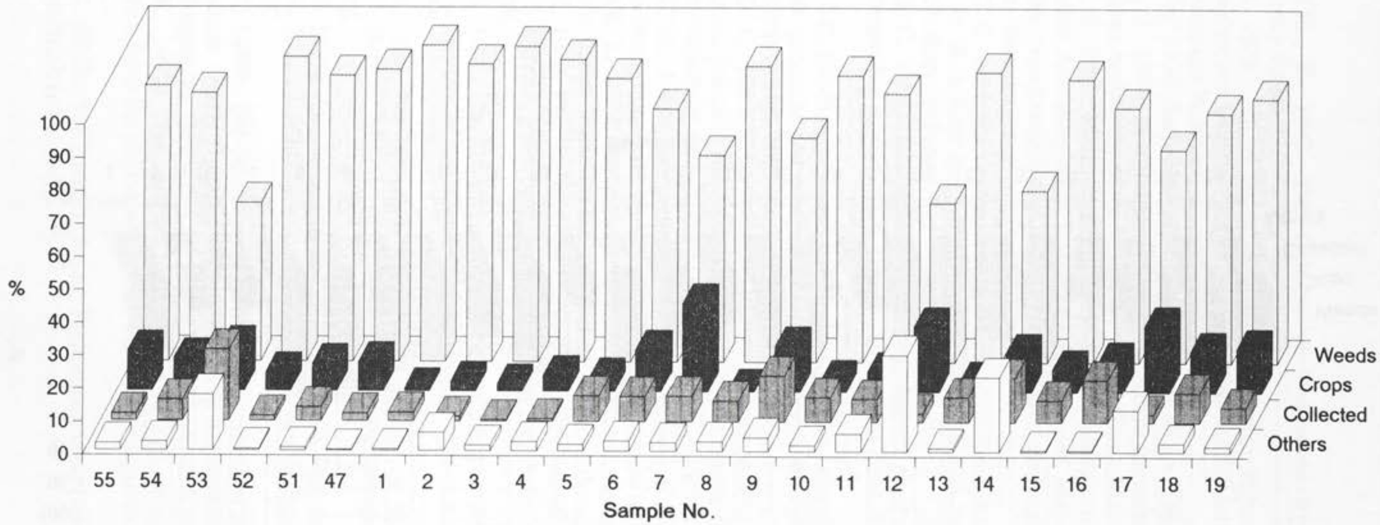


Table 3 (continuation). Composition of Predynastic plant remains from Tell el-Far'in - Buto.

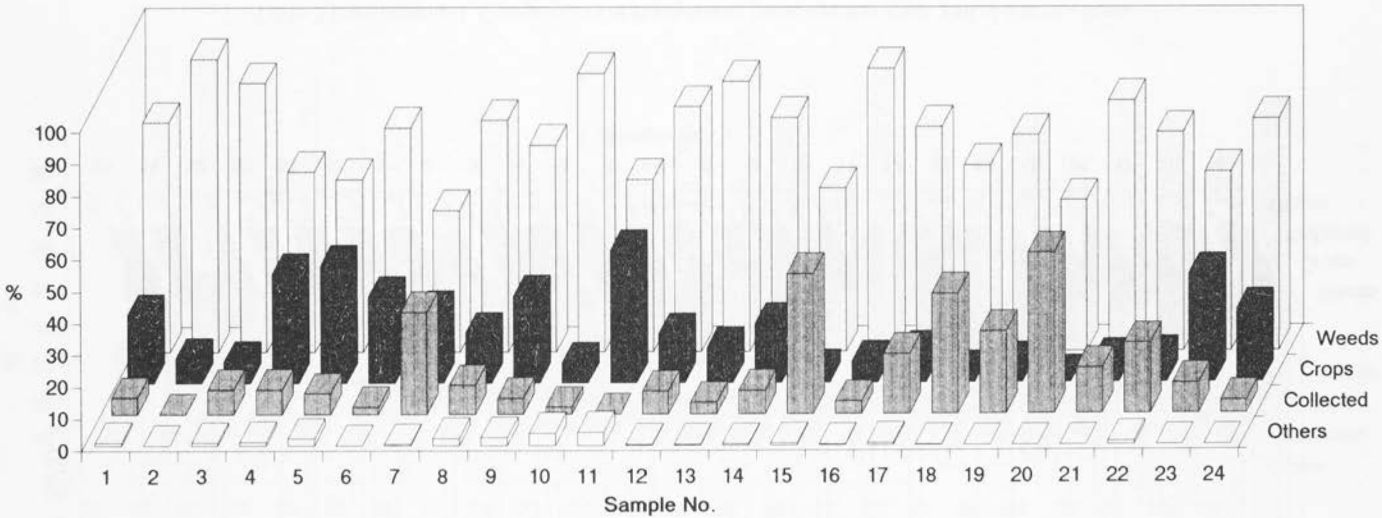


Table 4. Composition of Predynastic plant remains from Tell Ibrahim Awad.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

Isabella Caneva

# Survey in Northwestern Sinai

Prehistoric research in Sinai has been intensified in recent years, particularly concentrated on the Early Bronze Age exploitation of the copper mines in the eastern and southern part of the region. Northern Sinai has received much less attention, even though this is supposed to have been the natural land-bridge between the Nile Valley and the Levant throughout history. However, surveys carried out in the seventies by Bar Yosef and Phillips (1977) and by Oren (1973; 1989) revealed in north-eastern Sinai pre-pottery remains followed by a more intensive Chalcolithic and EBA I occupation (Oren & Gilead 1981), which seemed to extend also westward, into the eastern Nile delta.

Systematic archaeological and geomorphological research in north-west Sinai was resumed by the Franco-Egyptian archaeological mission of Tell el Herr in 1990, under the pressure of the government program for agricultural development of the Mediterranean coast between el Qantara and el Arish (Valbelle et. al. 1992; Marcolongo 1992; Caneva 1992). The area most threatened by heavy surface modifications includes the easternmost part of the Nile delta, with the Pelusiac branch and the corresponding lagoons (Fig. 1), though the surrounding regions will also probably be influenced by the new urban development. The fact that recent geomorphological and archaeological investigations in the Delta suggests that a considerable amount of the sediments has been deposited very recently in the fan of the Nile branches and in the surrounding areas, means that only deep soundings into the silt layer would expose Neolithic and Early Predynastic remains in this region, assuming that these coastal areas were inhabited during those periods. The Mediterranean coast was therefore excluded from the prehistoric surface investigation in the region, and research concentrated on the sand dunes south of the lagoons.

The whole region was previously included in the wide area between the Suez canal and Gaza which was extensively explored by a team from Ben Gurion University of the Negev during the seventies (Oren 1973). Large portions of this area, however, were left unexplored, probably due to the presence of military installations. In particular some unexplored areas were concentrated around zone H

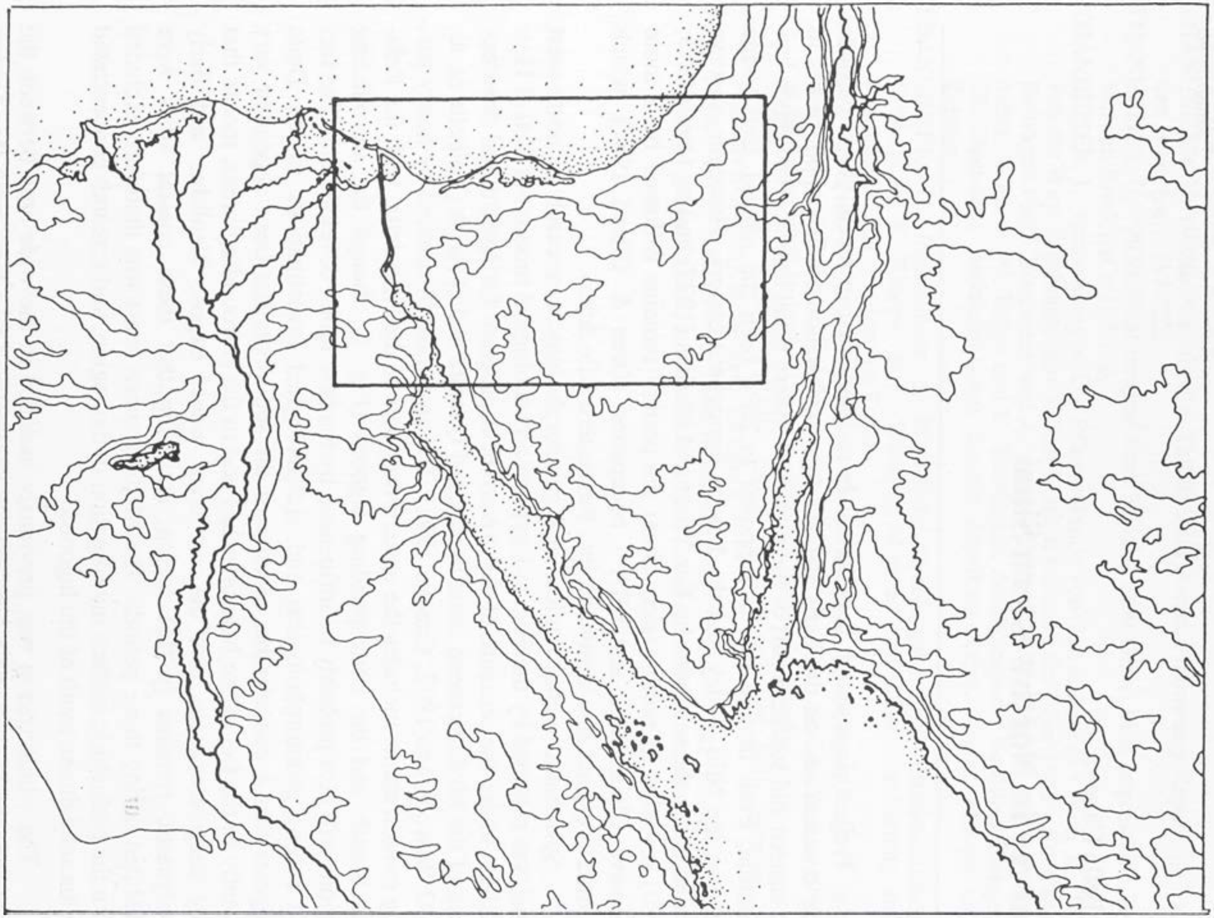
Fig. 1. The Delta and the Sinai with the research area marked in Fig. 2

and east of zone T of the Israeli network. Our first intervention was made in the proximity of zone H (Fig. 2), in which no Predynastic sites were recorded by the Israeli expedition. This area, however, had provided at the beginning of the century one of the richest Protodynastic findings, probably remnants of grave goods, which included a number of complete jars, but whose context was never found (Clédat 1914).

In the first phase, an area of about 20 square km was explored, including area H, east of the main road connecting the coast with the southern hinterland. The landscape here consists of active sand dune structures which, with the exception of the small depressions between the dunes which contain either scattered wild bushes or planted palm trees, have almost no vegetation whatsoever. The region is now only seasonally inhabited by Beduins who go there from the new villages along the coast, where they are now settling, during transhumance or when dealing with the cultivation of the date palms. The dunes are huge barriers of fine sand, up to 20 m high and more than 100 m long, which follow each other in an endless undulation of the surface with a north-west south-east orientation.

The use of a car in this morphological situation was difficult and dangerous. The use of a camel was a great improvement, but most of the survey was carried out by walking into the dunes from different points of the main east-west and north-south roads, which served as important reference points.

Potsherds were found scattered almost everywhere, especially in the flat interdune spaces, but only in a few cases were concentrations of archaeological materials consistent enough to suggest the presence of a more or less permanent village. The dispersion of the objects in most cases would be more indicative of a traditionally mobile frequentation of this territory, following the needs of either a pastoral or a trade or a military model of occupation.

The poor preservation of the pottery, which in all cases was exposed on the surface of the sites which lack any archaeological deposits deeper than 2 or 3 cm, made the cultural attribution of these remains a very difficult task. The majority of the findings consisted of a red burnished pottery that could be dated to the Greek-Roman period. Byzantine and Early Islamic sites were also frequent and were the only ones that abundance and variety in the findings on the surface, including metal and glass objects. This might reflect the existence of a certain kind of stable settlement which probably represents the first permanent occupation of the territory. These periods are well documented by more impressive urban sites and monuments along the coast. Strangely enough, pottery belonging to the Egyptian dynastic periods was totally absent, in spite of the massive presence of dynastic settlements and fortified cities only a few km apart on the coast. This would suggest that the occupation of the desert hinterland in the course of history depended on military or economic strategies which changed through time. Predynastic sites were also absent in this area. A feature common to all the periods represented was that the remains of occupation were always found in the flat interdune valleys, suggesting that this occupation model offered

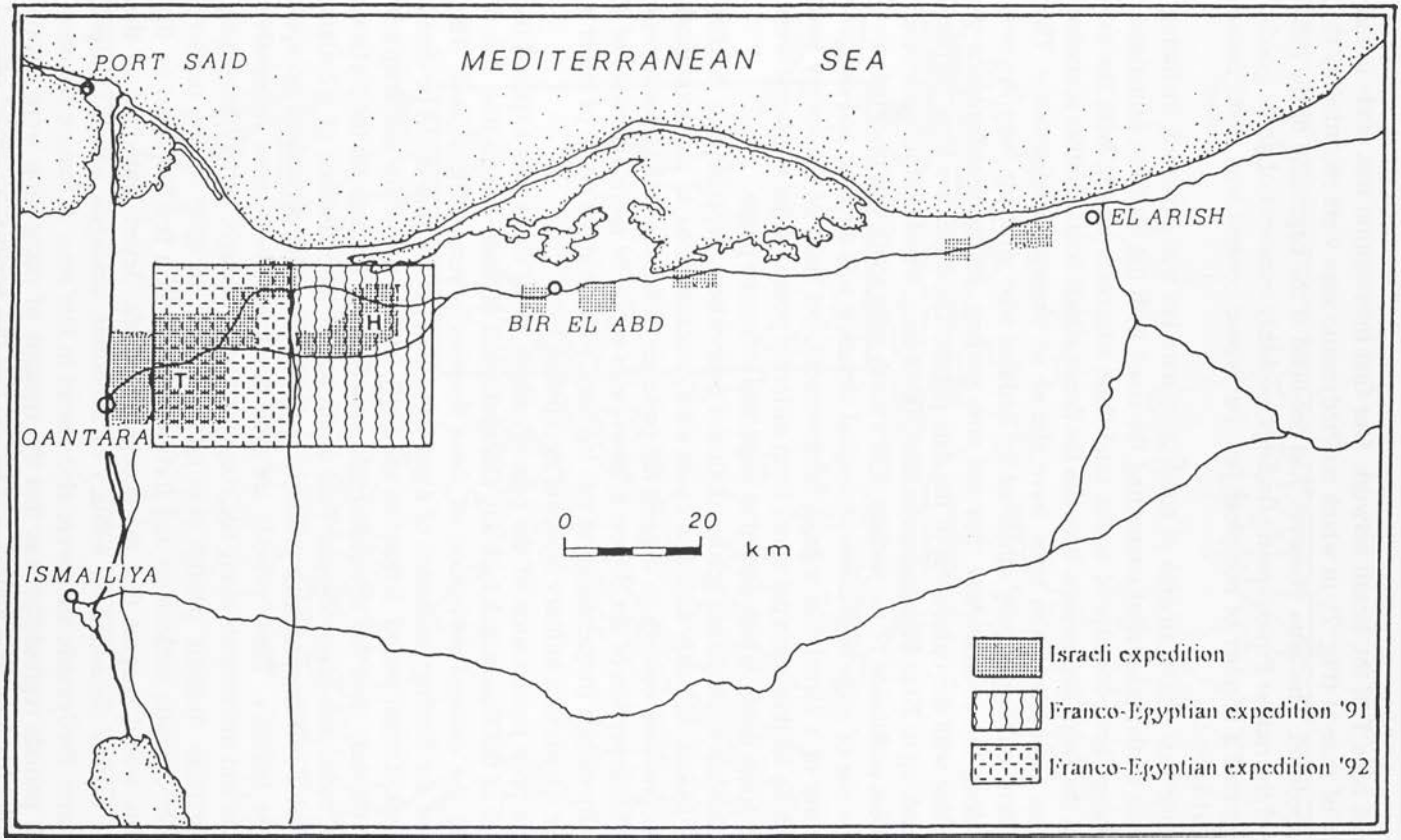


Fig. 2. The research area in the Northwestern Sinai.

advantages that were shared by all these people through the ages, such as the water reservoir and shelter against the prevailing winds. These advantages also seem to be important today for the cultivation of the date palms, which are usually planted in the depression along the north-eastern slope of the dunes, even if sometimes the trees are gradually buried by the displacement of sand.

These observations also suggest that the general morphology of the dunes has not radically changed during the last two millennia. In this perspective, it seemed likely that the total absence of prehistoric sites in the area explored in 1991 was to be ascribed to an occupation model established in a different geomorphological situation which might have been hidden later by the more recent dune structures. The geomorphological analysis, in fact, revealed that fossil dune formations oriented orthogonally to the active ones were still exposed west of zone H. This area, labelled zone T, was partially explored by the Israeli expedition, which reported the existence there of predynastic remains. It is in the spaces between zone T and zone H, and partially in the zone T itself, that our research concentrated in 1992.

Twelve new sites were found, all located in the interdune depressions, with the same location as in the other areas. The sites, however, were better preserved owing to the fact that the valleys are facing a different orientation, which means that the dunes present their profile and not their face to the wind. Instead of being slowly buried, the interdune valleys were deflated by constant wind action. Consequently, not only was a higher concentration of archaeological materials visible, but traces of older dune formations also appeared beneath, bearing what appeared to be the earliest pottery found in the region. A provisional attribution to the Ptolemaic, Byzantine and Islamic periods was made for the materials collected on the surface. Once again, Egyptian Predynastic or Palestinian Early Bronze Age materials were not found even on the oldest dune systems or in the sites already explored by the Israeli expedition.

## Conclusion

The results of the new exploration in this region can be summarised as follows:

1. The hinterland of the western Mediterranean coast of Sinai includes areas characterised by different geomorphological formations. These differences, which now affect the visibility of the sites, might also have influenced the choice of human settlements in the past.
2. The formation of the new dune system probably dates back to the beginning of this era, since no earlier archaeological materials were found between these dunes, which were probably slightly displaced through the following two millennia. Only the Islamic sites appeared still to be *in situ*, whereas the earlier remains were more widely scattered on the sandy surface.
3. The human occupation of this region seems to have always been of a seasonal type. It was never concentrated in permanent villages, whose structural remains

and habitation debris would, despite the erosion, still be visible; this is the case with both the Islamic sites in this area and the large Predynastic sites at the edge of the desert, such as Maadi.

4. Unlike the coastal regions, which were scattered with important Pharaonic sites, this area appears to have been extensively occupied only from the Ptolemaic period onward. As for the Predynastic period, no sites seem to have existed in this territory despite the evidence of cultural and economic contacts between the Nile valley and southern Palestine in the 4th millennium B.C. provided by the archaeological documentation in both areas. These contacts are related to the explosion of foreign trade relations which characterise the beginning of urbanisation in these areas, as they do throughout the Near East. However, the nature of these relation and the routes and intermediaries of the trade network established between the two areas are still a subject for speculation.

It is possible that part of the rough undatable pottery found during our survey belongs to that period, having been produced by local people. The local cultures, which might have played an important role in the relations between Egypt and Palestine, have never been defined. Pastoral groups, usually difficult to define archaeologically, may have inhabited the desert in a more consistent way than they do at present and may well have had a role in the transport of goods through this harsh territory, as well as in its military occupation during the Pharaonic period.

At any rate, materials belonging to either the Egyptian Predynastic or the EBA of Palestine were not found here in their diagnostic form as they were east of our concession area. The presence of a local contemporary culture, with different pottery, is possible, but its definition does not help in the reconstruction of the external expansion of the emerging urban societies in Egypt and Palestine. The picture of the overland route between the two areas should therefore now take this gap into account.

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Interregional Contacts in the Later Prehistory
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Ram Gophna

# Observations on the earliest phase of relations between Egypt and Canaan during the Early Bronze Age

Fieldwork carried out in southern Israel and Egypt during recent years has enabled a reassessment of the relations between Egypt and Canaan during the Early Bronze Age. In the wake of this fieldwork, several articles attempting a synthesis of the new data have been published, the most recent by Ben-Tor (1991) and Ward (1991). However, these syntheses focus mainly on the relations between the two regions during the late Early Bronze I and Early Bronze II, that is during Naqada IIc-d, Naqada III and the First and Second Dynasty periods. Unfortunately this has led to the almost complete neglect of the question of how and why these relations began already in the earliest phase of the Early Bronze I (Naqada IIb-c; Amiran & Gophna 1992). How did it happen that the Lower Egyptian Maadians, inferior in their material culture to the contemporary Upper Egyptian Naqadians, were the ones to initiate and lay the foundations for long-term mutual relations with southern Canaan, which lasted some 300 years? (Amiran & Gophna 1992). The investigation of six sites in southern Israel, all dating to the earliest phase of the Early Bronze Age I, combined with the long-awaited publication of the excavations at Maadi, Lower Egypt (Rizkana & Seeher 1987; 1988; 1989; 1990), permits one to speculate on the earliest beginnings of the relations between southern Canaan and Lower Egypt (Fig. 1).

The impressive range of Canaanean finds unearthed at Maadi, mostly pottery containers (probably for olive oil), flints, copper implements and lumps of asphalt, pointing to substantial trade relations between Lower Egypt and southern Canaan during Naqada IIb-c, along with the discovery of Egyptian finds at several southern Canaan sites (see below), induced Rizkana and Seeher to characterize these relations as a mechanism of trade between Lower Egypt and Canaan and to interpret the function and character of the site known as Site H, in southern Canaan (Macdonald 1932) accordingly:

"The assumed trade route along the eastern fringe of the Delta bears a very important implication: much of the Palestinian merchandise found at Maadi might well have been conveyed there by Egyptian intermediaries who had obtained this

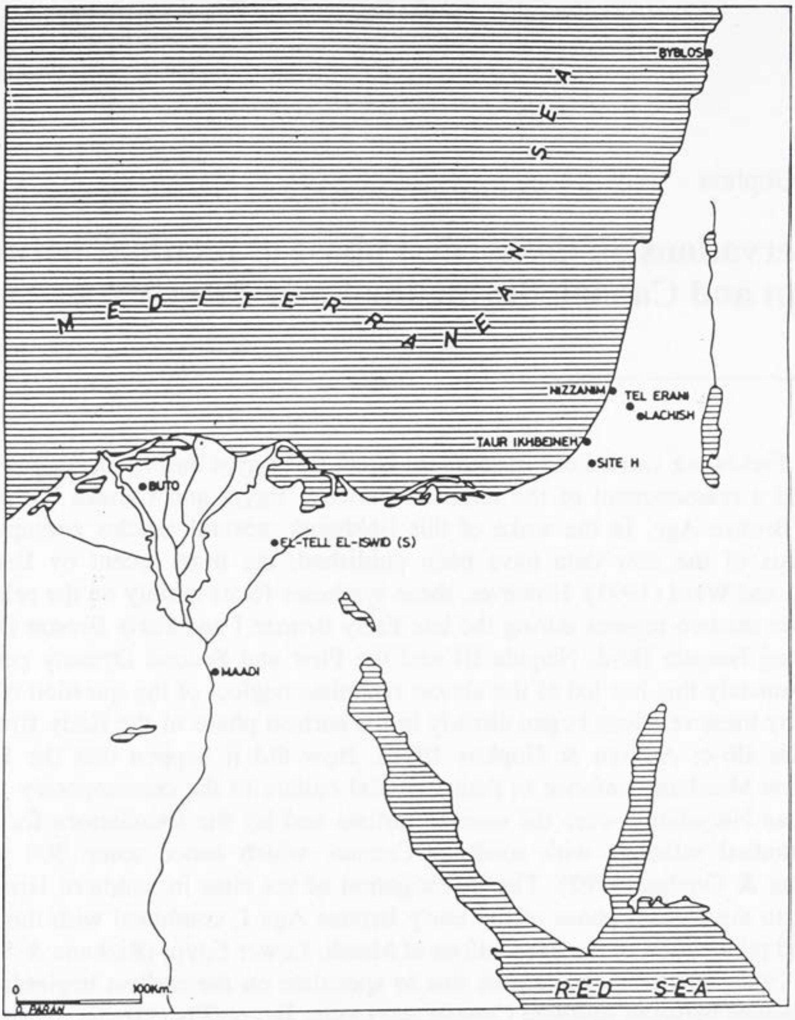


Fig. 1. Early Bronze 1a sites in southern Canaan and contemporary sites in Lower Egypt.

material from easterners somewhere at the eastern Delta. At the eastern edge of the Delta there must have been a province of (direct and probably also constant and intensive contact and exchange between Egyptians and Palestinians). Probably merchants from both groups were involved in the trade, and so exchanged elements of their culture."

"The fact that copper from Fenan has recently been identified at Site H adds to the significance of the Egyptian finds (at Site H). The site may have been a 'caravansary' for the copper trade to Lower Egypt, and in the excavation report (of Site H) it is mentioned that large quantities of copper ... lay at all levels" (Rizkana & Seeher 1989: 79).

Clarification of the circumstances in which the relations between the two countries evolved, seen from the Canaanean perspective, and analysis of the finds from the six early EB I sites in southern Israel mentioned above, allows us to sketch out another scenario for the earliest relations between Lower Egypt and southern Canaan during the Early Bronze Age. Two of these sites, Site H (Macdonald 1932) and Lachish Northwest Settlement (Tufnell 1958), were excavated in the thirties, while the other four, Tell 'Erani (Kempinski & Gilead 1991), Taur Ikhbeineh (Oren & Yekutieli 1992), Tel Halif (Seger et al. 1990: 2-9) and Nizzanim (Wolff 1991: 503) were investigated quite recently.

The pottery from the six EB I sites mentioned above indicates a distinctive, highly egyptianized, regional variant of early EB I culture, traces of which were found in southern Canaan from Nahal Lachish in the north to Nahal Besor (Wadi Ghazzeh) in the south (Gophna 1992).

The collapse of the Chalcolithic-Ghassulian culture and the total abandonment of its settlement system in southern Canaan, sometime around 3600-3500 B.C. (Gilead 1988: Table 1; Fig. 2), created a void that was filled by the infiltration of Lower Egyptian groups which had gradually expanded into northern Sinai, and eventually settled in southern Canaan. This kind of ethnic diffusion could not have happened during the Chalcolithic, before the latest phases of the Maadi-Buto culture of Lower Egypt. The archaeological data from Israel so far, indicates that relations between the two countries during the Chalcolithic were only sporadic (Levy 1992: 353).

Contrary to the assumption that the trade between the two countries during this period (Early Bronze I) was carried on by "Egyptian intermediaries who had obtained (the commodities) from easterners somewhere at the eastern Delta", or that "merchants from both groups (i.e., from Egypt and from Canaan) were involved in the trade, and so exchanged elements of their culture" (Rizkana & Seeher 1989: 79), I would like to suggest that these merchants were part of the Egyptianized population that had become established at these above-mentioned sites in southern Canaan, as a result of the influx of Lower Egyptian groups into that region. This population was responsible for the creation of a hybrid culture - the result of the interaction of two distinct cultural groups - of a somewhat different character from the EB culture prevalent in the rest of the country (Gophna 1992: 391-392). It would appear that this hybrid culture formed the basis for the ongoing process of Egyptian infiltration and colonization till the end of the Early Bronze Age I, that is during Naqada IIc-d - Naqada III and the beginning of the First Dynasty period. However, in the latter period (middle and late EB I), the trade relations between the two countries not only intensified but also encompassed Upper Egypt as well. Moreover, this was the period when the formation of a united Egyptian polity was taking place and the trade relations between Egypt and Canaan appear to have been in the nature of an organized state-sponsored trade network. This may be inferred from the nature of the finds at sites in southern Israel (Tell 'Erani, En Besor, Tel Maahaz, Arad and others) (Gophna 1992: 392). I suggest that the earliest phase of the expansion of Lower Egyptian groups into southern Canaan during the Early Bronze Age I was motivated not only by the quest for basic raw materials and processed goods (asphalt, copper, timber and olive oil), but also by the desire to settle new lands. This development took place before the great expansion of the Upper Egyptian Naqada IIc-d culture into the Delta.

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Interregional Contacts in the Later Prehistory
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# Post-Shaheinab Neolithic remains at Geili

The final reflections on the results of years of excavations do certainly provide conclusions, but they often give rise to so many doubts and new questions as to encourage researchers to start the excavation again rather than to abandon the site. This is what happened at Geili after the publication of what was supposed to be the final report on the excavation of the site (Caneva 1988).

Geili is a village located along the road between Khartoum and Shendi, 47 km north of Khartoum, not far from the present course of the Nile. The archaeological site covers an area of about 160x180 m, which is now almost entirely included in the modern village. It was excavated by the Italian Mission during six campaigns between 1972 and 1981. The site showed the superimposition of several millennia of human occupation, from the Early Neolithic settlement of 5500 years ago through the Early Meroitic, Late Meroitic, Christian and Islamic cemeteries, up to the present century. Each of these cultural contexts at Geili was heavily disturbed by the subsequent ones, since the newcomers were not settling on the top of the earlier deposits but were digging graves into them. After the excavations ended, the detailed analysis of the innumerable typological characteristics of the graves and of their fragile stratigraphic connections gradually led to the formulation of hypotheses which had not previously been considered. There appeared, therefore, to be no alternative to the resumption of the excavation to test the new ideas in the field.

The new excavation, which started in 1991, confirmed the general statements on the characteristics of the site: first, the geological genesis of the Nile silt bar where the Neolithic groups settled after the westward shift of the Nile; second, the non-stratification of the Early Neolithic archaeological deposits and, finally, the shallowness of these deposits, whose sediments were repeatedly redistributed on the surface and deflated by the wind after the digging of each tomb during the five millennia which followed.

It is unlikely that more information can be obtained for the early settlement, owing to the heavy disturbance caused to the Neolithic site by the establishment of the later cemetery. The latter evidence, however, required the confirmation of some statements, especially as regards the analysis of human bones, which needed to be applied to a larger population sample for the different periods represented. Moreover, the typology of the grave shaft and goods in each group, in the absence of comparable documentation for the Khartoum region, needed to be characterised more systematically. Finally, the reconstruction and interpretation of the cultural sequence represented at Geili needed to be confirmed by new data.

As already observed in the past (Caneva 1988), it was the most elevated part of the site, on the north-western quarter, that was found to be the richest in prehistoric remains, from both Early and Late Neolithic times. It was therefore here that the new field research was undertaken (Fig. 1).

About 50 new tombs were located, most of which were Meroitic graves from different periods. As expected, the Late Neolithic graves, the earliest in the cemetery, were very few (only nine or ten) and were preserved only in the small spaces which were left untouched between subsequently dug graves. However, the high frequency of these graves in proportion to the surface area, together with the number of human bone fragments which were found scattered both on the surface of the site and in the filling of the later graves, point to a high density of early burials being dispersed through time. This hypothesis is now supported by the finding of at least one case of superimposition of two Late Neolithic graves, something that had never been encountered before, although it was frequently found in the intensively used contemporary cemeteries excavated elsewhere, such as Kadada and Ghaba, in the Shendi province. This superimposition might suggest a long lasting Neolithic use of this cemetery, but it might also testify to an intentional association of the two graves as family burials, as already suggested for the contemporary cemetery at Kadada (Reinold 1982).

In the Late Neolithic graves at Geili, both bones and shafts are usually in extremely poor condition, not only because they are the oldest ones, but also because they are at such a shallow depth that any small amount of digging or even tramping on the surface affects them. Their present depth never exceeds 25-30 cm, as a result of a long lasting wind deflation, which seems to have removed about 80 cm of the original soil sediment. This particularly marked surface deflation was very probably due to the frequent digging of graves which, by continuously renewing the presence of soft soil on the surface, always prevented in this site the formation of the gravel cap which has instead protected most of the desert sites in this region from wind erosion.

Most of the still preserved Neolithic graves have been disturbed or mutilated by the digging of later pits (Fig. 2). In most cases, therefore, no trace of grave goods was left. However, Late Neolithic pottery and other objects were often found in the filling of the Meroitic or Christian graves, suggesting that the Neolithic burials were not as poor as they now appear to be.

The general scarcity of grave goods makes it difficult to attribute many of the graves in this cemetery to their respective cultural and chronological contexts.

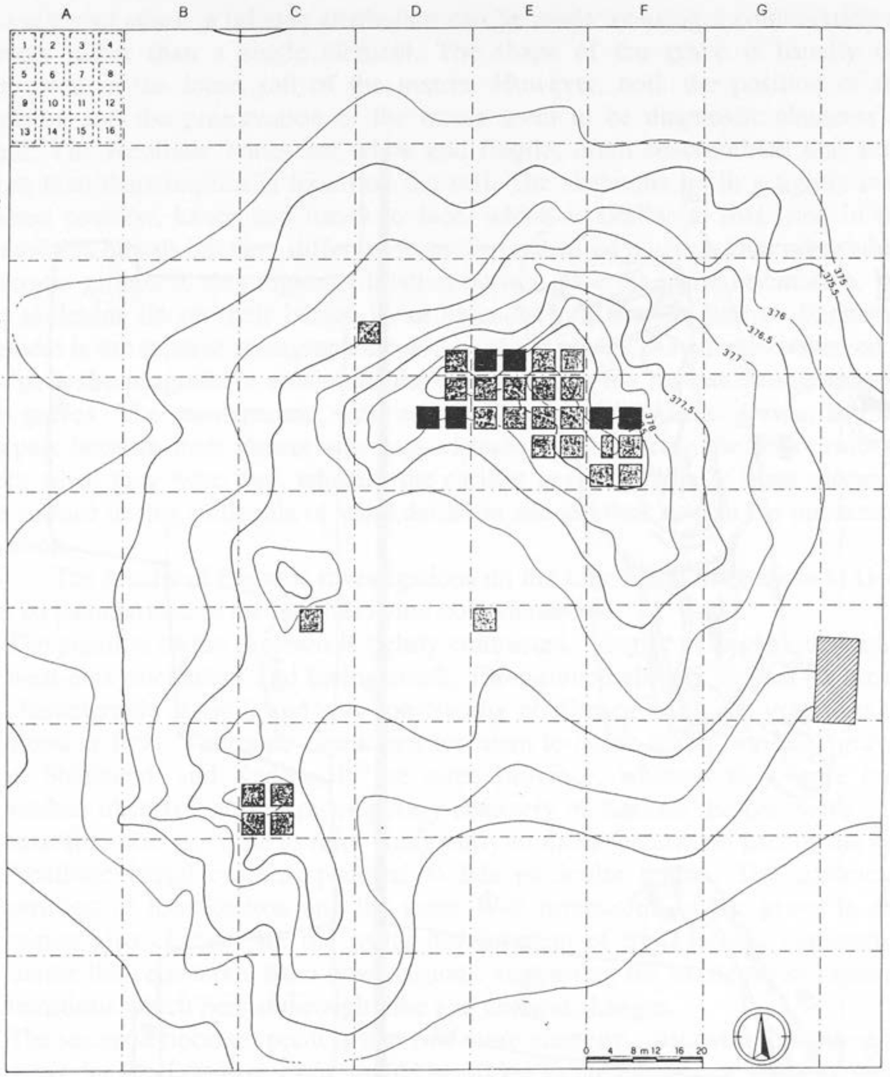


Fig. 1. Geili. Older (gray squares) and recent excavations (dark squares).

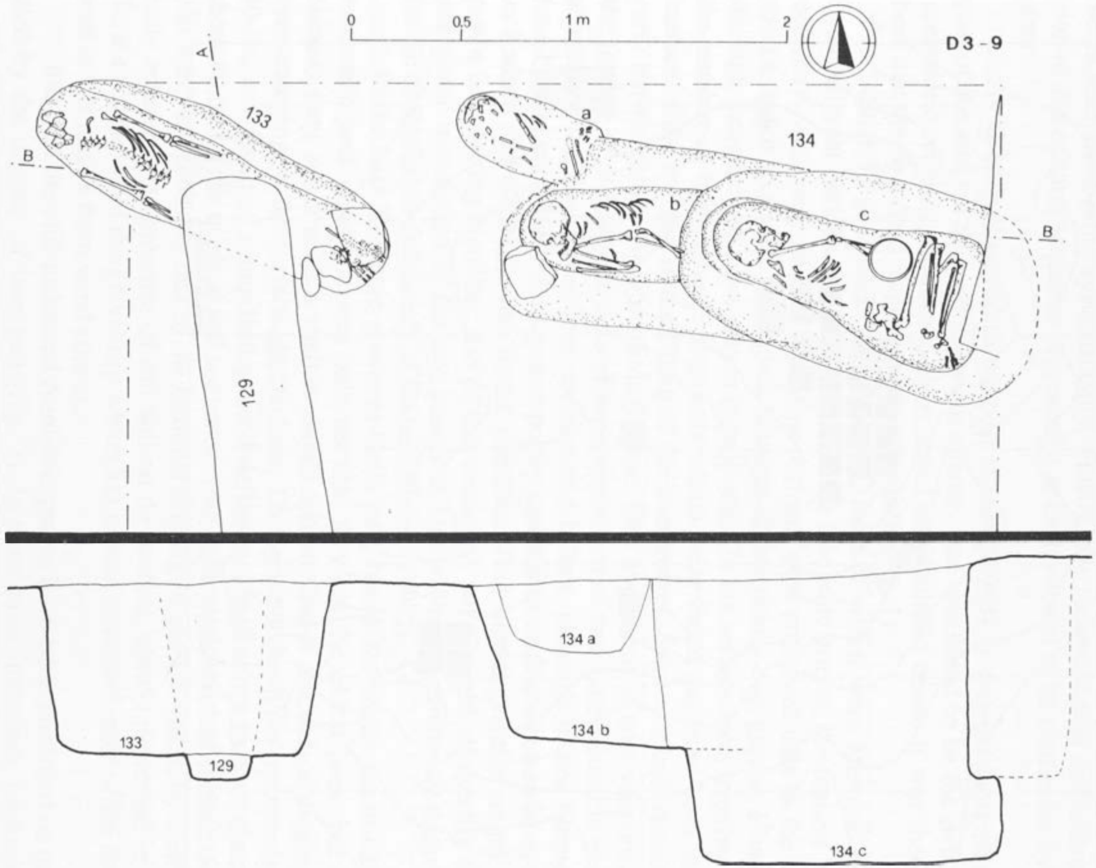


Fig. 2. Geili. Superimposition of graves from different periods.

In such a situation, a reliable attribution can be made by using a combination of factors rather than a single element. The shape of the grave is usually not preserved in the loose soil of the matrix. However, both the position of the skeleton and the preservation of the bones seem to be diagnostic elements at Geili. The Neolithic bones are white and fragile, often so crumbled that little more than their imprint is found on the soil. The skeletons lie in a tightly contracted position, knees and hands to face, which is similar to that used in the Mesolithic burials but very different from the contracted position later adopted by Meroitic groups in this region. Christian burials have the same orientation, but the skeletons lie on their backs, in an extended position. A further diagnostic element is the relative stratigraphic position of the graves. As already observed in the past, the progressive erosion of the site results in the inverse stratigraphy of the graves. The most recent, such as the Christian or Islamic graves, are the deepest because their matrix was kept virtually intact during the few centuries from when they were dug, whereas the earliest graves gradually came closer to the surface during millennia of wind deflation and are thus now in the uppermost position.

The results of the new investigations on the Late Neolithic burials at Geili can be summarised in the two following considerations:

1) The position of the skeleton is tightly contracted, lying on its right side with a west-east orientation and facing south. This seemed already to be a recurring characteristic at Geili and was consistently confirmed in all the graves excavated in 1991. The same characteristics seem to occur in the Neolithic graves at Shaheinab and Kadero, in the same province, whereas they were only seldom observed at the contemporary cemetery of Kadada, farther north. It is therefore now possible to refer confidently to these features as part of the late Neolithic burial customs peculiar to this particular region. The contracted position of the skeleton and the same W-E orientation of the grave in this region also characterise the entire development of the Meroitic cemeteries, unlike the cemeteries from other regions, suggesting the existence of regional traditions which persist through time and cultural changes.
2) The second important point is that two more elements, discovered in the same grave for the first time ever, should be added to the number of archaeological objects with similarities to those of Kadada: a large-size grey stone disk mace head and some malachite fragments which were held in the hands of the deceased. Malachite fragments were found in several tombs at Kadada, in the same context and often held in the same way as at Geili, in the hands of the deceased.

The disk mace head is the first of this size found at Geili, where only small ones were known. It is, in this shape and size, a common type at Kadada (Reinold 1982). Other comparisons with grave goods from the Kadada cemetery were already observed in the stone palettes, in some of the clay figurines, in the beads and in the pottery, particularly in one plate decorated with a composition of plain and incised bands, both outside and inside, which was found to be identical in the two sites.

The Geili Late Neolithic group was contemporary and probably had (trade?) links with that of Kadada, but it belonged to a local population which consistently maintained regional traditions in its funerary practices. This evidence would suggest the existence of different groups which inhabited different regions and kept their own traditions, although they exchanged items with their neighbours and shared broadly common cultural traits.

In conclusion, the new findings emphasize the previously observed dichotomy between the more traditional and regionally characterised funerary rites, and funerary offerings, which are usually more standardised and are therefore comparable over a larger area. This dichotomy, which can already be observed in the scanty remains of the Neolithic cemetery, is even more evident in the Early Meroitic and Late Meroitic graves and is possibly the most interesting discovery made at this site.

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Interregional Contacts in the Later Prehistory
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# Cultural development in the final hunting-gathering horizons of the Middle and Upper Nile Valley

## Introduction

"Is it unreasonable to suggest that in the Wavy Line Culture we have a Mesolithic culture, almost the first true Mesolithic to come to light in the Nile Valley?" This question was posed by Arkell (1949: 111) when he first defined the cultural context of Early Khartoum.

It has now been established that the term "Wavy Line Culture" can define only the earlier phase of the final hunting-gathering horizons. Arkell himself (1972: 221) recognized that the late horizon of Early Khartoum was characterized by unburnished dotted-wavy line ware and not by wavy line incisions. A stratigraphic sequence of the two phases is now well known at Shaqadud (Marks et al. 1985; Caneva & Marks 1990) as well as at Islang 1 (Mohammed-Ali 1982), El Qoz (Mohammed-Ali 1985) and Kabbashi (Caneva 1989).

As the diffusion of pottery decorations is certainly more likely to have been due to movements of ideas rather than to migrations of entire groups of people, the term of "Horizon-Style" is to be preferred to that of "Culture Area", as suggested by Hays (1976).

More appropriately the term "Mesolithic" rather than "Wavy Line Culture", has been used to identify the final hunting-gathering horizons in the Middle and Upper Nile Valley. However, this definition has never been applied to other African prehistoric contexts, except for the Sudanese one. The term was, in fact, created to define the final European hunting-gathering cultures, which generally had neither a production of pottery, nor semi-permanent settlements. Consequently, the term "Mesolithic" was rejected by several scholars, particularly the French speaking ones, who worked in the near-by Sahara desert (cf. among others Hugot 1980: 625).

Thus, "Early Khartoum" seems to be the most appropriate term, as it can clearly substantiate a particular horizon limited to a specific area, but extended enough to define a characteristic cultural context. Whether Khartoum is the original area of diffusion now seems doubtful, as the Atbara region revealed a consistent quantity of dates earlier than those from the Khartoum area (Haaland & Magid 1992).

## Early Khartoum evidence

The research on the Early Khartoum sites comprised within the concession area of the Italian Mission for Prehistoric Research in the Sudan of the University of Rome "La Sapienza" was extended to a study on the distribution of Early Khartoum materials over a larger territory (Fig. 1).

The combination of study of the materials at the Khartoum National Museum with on-site fieldwork, which included the excavation of archaeological deposits and analyses of the material culture, offered information at different levels. The former provided more general data on the composition of the cultural material of a given horizon and its horizontal distribution over a wide area; the latter offered more detailed study samples from a more concentrated area with stratified contexts.

The materials from the National Museum are from surface collections probably made rather randomly, with the means available in the 1940's and 50's. Nevertheless, they come from a large territory, included between the Khartoum area and the Egyptian border to the north.

On the other hand, the materials from the excavations of the Italian Mission result from stratigraphic sondages; the debris was sieved through a 2x2 mm mesh and all lithic, ceramic and organic materials were collected.

## Geographic distribution

The study carried out at the National Museum in Khartoum included the classification of the lithic and ceramic assemblages collected by some of the then officers of the Sudan Antiquities Service, such as A. J. Arkell and O. G. S. Crawford. The purpose of the study was to define the cultural features common to the different sites and to consider the geographic extent of the Early Khartoum facies in the Middle and Upper Nile Valley.

All the collections were considered and 16 different assemblages were identified (Table 1). They were attributed to the Early Khartoum horizon according to the combination of at least two of the following features:

1. definition given by the collectors and noted on the cards in the files of the National Museum;
2. occurrence of wavy line and dotted-wavy line pottery;
3. occurrence of unburnished impressed pottery;
4. occurrence of microlithic industry.

Eight sites were already included in Arkell's list (1949: 116), even though their materials had never been described before (on Tab. 1 they are marked with an asterisk). As for the geographic distribution, all sites are included between Jebel Delgo (4742), north of Dongola and the Khartoum area to the south and

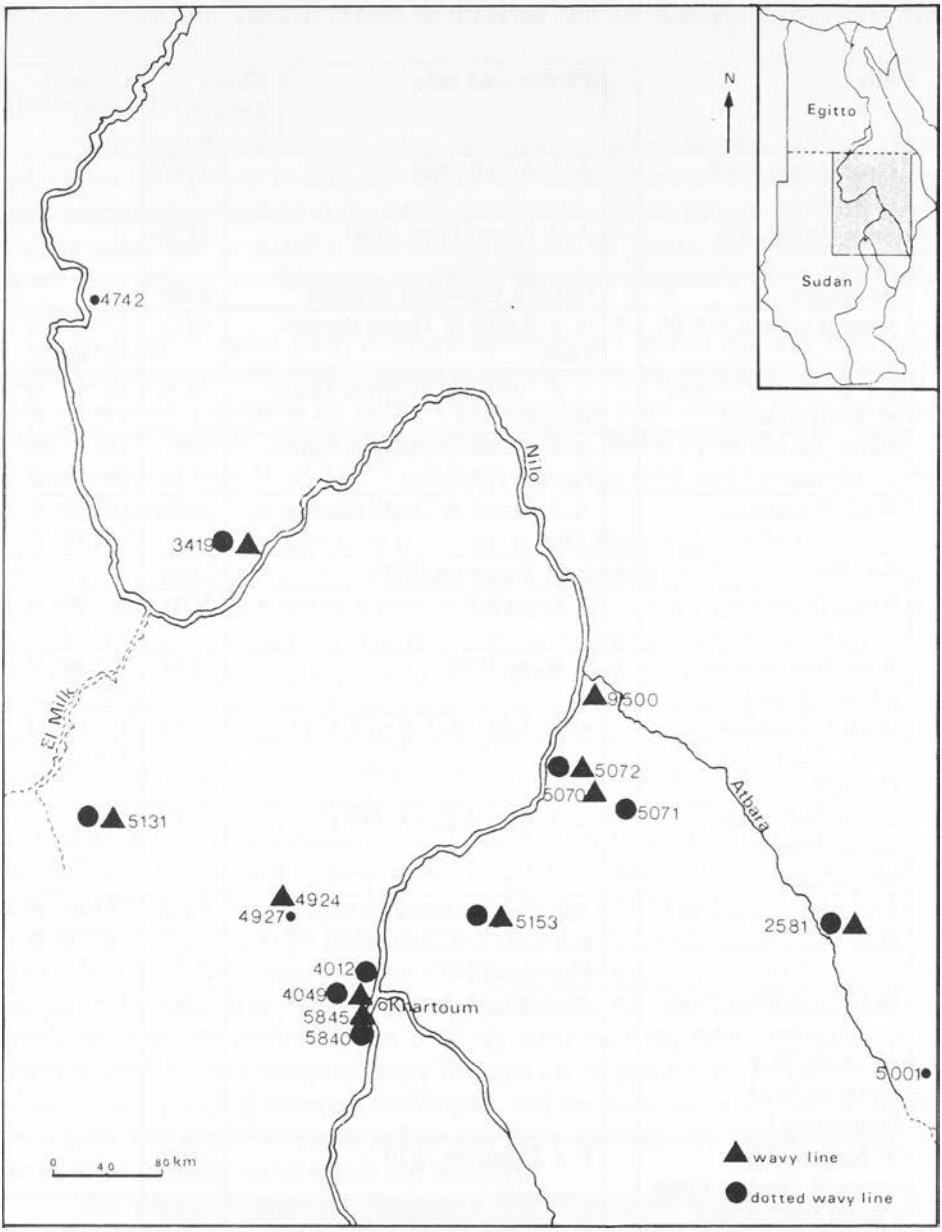


Fig. 1. Distribution of wavy line and dotted-wavy line pottery.

| Site | | Finder and date | Khart. Antiqu. Cat. Nr. | Co-ordinates |
|---|---|---|---|---|
| Jebel Delgo, N of Dongola | | A. J. Arkell 1944 | 4742 | |
| Jebel Barkal, SW slopes | * | A. J. Arkell 1939, 1944 | 3419 | |
| Ed Damer | | O. G. S. Crawford 1952/53 | 9500 | |
| Mutmir village, NNW | * | A. J. Arkell & Thabit Hassan 1946 | 5072 | 17° 07' N 33° 42' E |
| Ku' es Sereih, N bank of Wadi Hawad | * | A. J. Arkell, P. Hogg & Thabit Hassan 1946 | 5070 | 16° 47' N 33° 56' E |
| Basam 1km N of temple site | * | A. J. Arkell, P. Hogg & Thabit Hassan 1946 | 5071 | 16° 42' N 33° 53' E |
| Wadi Mastrouka | | A. J. Arkell & Thabit Hassan 1946 | 5153 | 16° 18' N 33° 19' E |
| Goz Regeb | * | E. R. Branston 1916 | 2581 | |
| Habib Damer | | R. G. , 1945 | 5001 | 15° 06' N 36° 24' E |
| Wadi Um Tundub (Umm Tumud) | * | P. Hogg 1946 | 5131 | 16° 44' N 32° 46' E |
| Wadi Mugaddam, W bank, N of Gabra Guscara | | A. J. Arkell & J. Smith 1944 | 4924 | 16° 08' N 31° 48' E |
| Gabra Sad (Gabrat Sa'id), Wadi Mugaddam | * | A. J. Arkell & J. Smith 1944 | 4927 | |
| Khudjeir, W bank of Nile N of Omdurman | | Abdallah Mohmed 1942; G. Brunton, A. J. Arkel & A. Mohamed 1943 | 4012 | 15° 41' N 32° 30' E |
| W bank of White Nile, S of Omdurman bridge (N of old M. I. barracks, N of Omdurman) | * | Abdallah Mohmed, 1942 | 4049 | |
| W bank of Nile, opposite Gordon's tree | | P. J. Sandison 1950 | 5840 | |
| Qubba Fiki Mohed Nur | | A. J. Arkell & Sadik el Nur 1950 | 5845 | |

Table 1. Early Khartoum sites.
(* = sites published by Arkell 1949)

between Wadi Um Tundub (5131) to the west and the Kassala Province to the east.

**Material culture**

With regards to the material culture, pottery seems to offer more reliable indications than lithics. In fact, it is likely that the production of microlithic tools had never really ceased until the Meroitic times (Lenoble, pers. comm.). It must also be noted that in Arkell's map (1949: Fig. 8), he shows the "distribution of Wavy Line pottery", as this was considered the most diagnostic feature of Early Khartoum.

In order to make some comparisons, Figure 1 shows the distribution of wavy line pottery (indicated by triangles), together with the distribution of dotted-wavy line ware (indicated by dots). The wavy line ware occurs from the west bank of the White Nile, south of Omdurman bridge (4049) up to the Jebel Barkal to the north and from Wadi Um Tundub (5131) to the west and to the east along the Atbara river (Goz Regeb: 2581).

In total, the wavy line ware is present at 10 different sites, whereas the dotted-wavy line pottery occurs in 9 assemblages, distributed within the same boundaries. However, only 6 out of 9 sites containing dotted-wavy line pottery also include wavy line ware (Tab. 2). The three sites with dotted-wavy line and no wavy line need to be considered separately. As two of them did not reveal any lithics, the most interesting assemblage is that from the site 1 km north of the Basa temple (5071). Here, the occurrence of rhyolite makes up almost one third of the total of raw materials, reducing the frequency of quartz to only 72% (Tab. 3).

A similar change towards types of raw materials other than quartz was noticed at the site of Kabbashi-A, with dotted-wavy line, dated to the end of the 7th millennium b.p. and corresponding to a later phase of the Early Khartoum horizon (Caneva 1989; Garcea in press c). On the other hand, the lithic tool-kit from Basa seems still to be linked to the earlier traditions of Early Khartoum, as shown by a high frequency of lunates, with rare perforators, notched flakes and a simple endscraper (Tab. 4). On the whole, the assemblage from Basa shows a combination of the earlier aspects of Early Khartoum together with some later features, such as the absence of wavy line and undecorated pottery, the reduction of alternately pivoting stamped decorations and the decrease in the use of quartz among the raw materials employed for the lithic industry (cf. Garcea in press b, for detailed frequencies of lithics and pottery).

The 1991 field season at the site of Geili Sharq, 1.1 km to the west of the well-known cemetery of Geili, confirmed the evidence of a transition from an early to a late Early Khartoum horizon, already noticed at El Qala'a (Garcea in press a). In fact, the two sites share with Basa some new features of the later phase of Early Khartoum, such as a decrease in the importance of undecorated pottery and alternately pivoting stamped decorations, together with a lower frequency of perforators and the appearance of endscrapers and notched flakes.

Thus, the composition of these assemblages seems to conform with a date of 6600 years b.p. for El Qala'a as compared to the one of 6100 b.p. for Kabbashi-A.

## Conclusions

In conclusion, the study of assemblages from a number of distant localities, even far away from each other, can provide information that could not be available within a restricted territory, such as a permanent concession area. Thus, it was possible to examine the diffusion of the Early Khartoum horizon over the wide region of the Middle and Upper Nile Valley.

Moreover, it is possible to consider the distribution of characteristic cultural elements such as, for example, wavy line and dotted-wavy line pottery. Different aspects of the Early Khartoum horizon were also identified, noticing the geographic differences, chronological developments and cultural changes. As for the location of the sites, their constant distribution in the vicinity of water courses confirmed that Early Khartoum hunting-fishing-gathering populations depended on riverine resources and a subsistence strategy based on a broad-spectrum extractive economy.

Ultimately, the research at Geili Sharq added some more information on the long-lasting Early Khartoum context. It is now clear that provided the same condition of preservation that is found under Late Meroitic tumuli, the thickness of the deposits can vary considerably, going from 160 cm at Kabbashi Haitah in the southern part of the concession area, to only 15/20 cm at Geili Sharq in the northern part of the research area. Such evidence could suggest a settlement system, with sites holding different functions, some of them being used more permanently than others.

## Acknowledgements

This research was made possible thanks to a contribution from the Italo-African Institute. I am most grateful to the Director of the National Board for Antiquities and Museums, Prof. Ali Mohammed El Hakim, for allowing me to work in the store-room of the National Museum in Khartoum.

| SITE | 4742 | 3419 | 9500 | 5072 | 5070 | 5071 | 5153 | 2581 | 5001 | 5131 | 4924 | 4012 | 4049 | 5840 | 5848 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % | % | % | % | % | % | % |
| rocker: zigzags | 100 | 68.3 | 92.8 | 54.4 | 66.0 | 70.6 | 44.7 | 30.0 | 50.0 | 44.4 | 81.0 | 54.5 | 36.5 | 76.2 | 71.4 |
| rocker: dotted-w. l. | 0 | 7.3 | 0 | 3.5 | 0 | 11.8 | 14.5 | 5.0 | 0 | 16.7 | 0 | 39.4 | 4.8 | 14.3 | 0 |
| altern. pivot. | 0 | 2.4 | 2.6 | 12.3 | 10.0 | 5.9 | 28.9 | 0.0 | 0 | 0 | 0 | 0 | 3.7 | 0 | 8.6 |
| wavy-line | 0 | 4.9 | 3.1 | 26.3 | 15.0 | 0 | 5.3 | 62.5 | 0 | 5.6 | 4.8 | 0 | 38.6 | 0 | 8.6 |
| parall. incis. | 0 | 0 | 0 | 1.8 | 3.0 | 11.8 | 0 | 0.0 | 0 | 0 | 9.5 | 0 | 3.7 | 0 | 8.6 |
| undecorated | 0 | 2.4 | 1.5 | 1.8 | 6.0 | 0 | 5.3 | 0.0 | 16.7 | 5.6 | 4.8 | 6.1 | 2.6 | 0 | 0 |
| unclassifiable | 0 | 7.3 | 0 | 0 | 0 | 0 | 0 | 2.5 | 0 | 0 | 0 | 0 | 2.1 | 0 | 0 |
| intrusives | 0 | 7.3 | 0 | 0 | 0 | 0 | 1.3 | 0.0 | 16.7 | 22.2 | 0 | 0 | 7.9 | 9.5 | 2.9 |
| simple impres. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 16.7 | 5.6 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 100 | 99.9 | 100 | 100.1 | 100 | 100.1 | 100 | 100 | 100.1 | 100.1 | 100.1 | 100 | 99.9 | 100 | 100 |

Table 2. Frequencies of pottery.

| SITE | 4742 | 3419 | 5072 | 5070 | 5071 | 5153 | 5001 | 5131 | 4924 | 4927 | 4049 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % | % | % |
| quartz | 50.7 | 16.7 | 53.3 | 94.1 | 72.0 | 90.2 | 26.9 | 100 | 21.1 | 92.3 | 97.6 |
| basalt | 1.4 | 3.3 | 6.7 | 0 | 0 | 0 | 6.5 | 0 | 36.8 | 0 | 0 |
| rhyolite | 45.1 | 38.3 | 40.0 | 5.9 | 28.0 | 7.3 | 0 | 0 | 15.8 | 0 | 2.4 |
| chert | 1.4 | 33.3 | 0 | 0 | 0 | 0 | 65.6 | 0 | 10.5 | 0 | 0 |
| petrified wood | 1.4 | 8.3 | 0 | 0 | 0 | 2.4 | 1.1 | 0 | 15.8 | 7.7 | 0 |
| TOTAL | 100 | 99.9 | 100 | 100 | 100 | 99.9 | 100.1 | 100 | 100 | 100 | 100 |

Table 3. Frequencies of raw materials.

| SITE | 4742 | 3419 | 5072 | 5070 | 5071 | 5153 | 5001 | 5131 | 4924 | 4927 | 4049 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | % | % | % |
| simple endscraper | 10. 7 | 0 | 6. 7 | 0 | 5. 0 | 0. 0 | 23. 5 | 0 | 20. 0 | 0 | 0 |
| simp. endscr. / retouched fl. | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| simple notched endscraper | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| simp. endscr. /retouched bl. | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| circular endscraper | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| perforator | 14. 3 | 11. 1 | 13. 3 | 0 | 10. 0 | 0. 0 | 5. 9 | 0 | 0 | 43. 8 | 0 |
| notched perforator | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| double backed perforator | 0 | 11. 1 | 0 | 0 | 0 | 25. 0 | 0 | 0 | 0 | 0 | 0 |
| backed flake | 7. 1 | 0 | 0 | 0 | 0 | 0. 0 | 5. 9 | 0 | 0 | 0 | 0 |
| partially backed flake | 0 | 11. 1 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| partially backed blade | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 15. 0 |
| backed bladelet | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| backed badelets/ rounded base | 0 | 11. 1 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| notched flake | 50. 0 | 0 | 40. 0 | 45. 5 | 10. 0 | 0. 0 | 41. 2 | 0 | 20. 0 | 18. 8 | 35. 0 |
| denticulated flake | 10. 7 | 11. 1 | 13. 3 | 9. 1 | 0 | 25. 0 | 0 | 0 | 20. 0 | 6. 3 | 11. 7 |
| denticulated blade | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| lunate | 0 | 44. 4 | 20. 0 | 45. 5 | 75. 0 | 50. 0 | 5. 9 | 100 | 0 | 25. 0 | 38. 3 |
| triangle | 0 | 0 | 6. 7 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 6. 3 | 0 |
| continously retouched tool | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 20. 0 | 0 | 0 |
| sidescraper | 0 | 0 | 0 | 0 | 0 | 0. 0 | 5. 9 | 0 | 0 | 0 | 0 |
| arrow-head | 0 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 20. 0 | 0 | 0 |
| uncompleted arrow-head | 0 | 0 | 0 | 0 | 0 | 0. 0 | 5. 9 | 0 | 0 | 0 | 0 |
| fragments | 7. 1 | 0 | 0 | 0 | 0 | 0. 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 100 | 99. 9 | 100 | 100. 1 | 100 | 100 | 100. 1 | 100 | 100 | 100. 2 | 100 |

Table 4. Frequencies of retouched tools.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
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# Contacts between the Nubian "A-Groups" and Predynastic Egypt

Evidence of the sites related to the so-called A-Group culture can be found between Wadi Kubbaniya and Melik en Nassir (Nordström 1972). According to the latest calculations the origins of this culture date back to 3700 B.C., coinciding with the Amratian/Nagada I phase in Egypt. Its end occurred when the Egyptian Protodynastic era came into being, that is to say ca. 3150 B.C. (Williams 1986).

A study that we are carrying out, on the material coming from Nubian sites related to the A-Group, underlines the close contacts between Lower Nubia and Upper Egypt during the 4th millennium B.C.

At first, this analysis was based on pottery, which, once examined, provided interesting information. Firstly, the traditional Egyptian pottery was separated from the Nubian one, and this division has proved that the distribution was heterogeneous in the area taken into account. In fact the proportion of the Egyptian pottery in the area between the First Cataract and Mediq is far grater than that in the area from Mediq to Melik en-Nassir.

The Egyptian pottery is different from the Nubian one both in shape and temper. In the northern part of Lower Nubia the most frequent shapes are vessels of Petrie's "B (black-topped)" class, typical of the Nagada I phase, and wavy-handled jars, "D (decorated) ware" and "L (late)-ware", while in southern Lower Nubia only jars of "L" class are common. Unusual pottery shapes, for example in cemetery L of Qustul, occur seldom. Some examples from Qustul are the vessels with long, undulating neck (24a, b, of Petrie's "F-fancy-class") and specimens of pedestals, e.g. L 5A, the surface of which is decorated with three snakes in relief, climbing upwards (Williams 1986). In most cases the matrix is made of a type of clay which fires to a hard pink surface colour.

In order to give a fuller picture of the type of contact which exited between Egypt and Nubia we have examined the remaining materials of larger cemeteries: Cem. 7 Shellal (Reisner 1910); Cem. 17 Khor Bahan (Reisner 1910); Cem. 76 Gerf Hussein (Firth 1912); Cem. 79 Gerf Hussein (Firth 1912); Cem. 137 Sayala

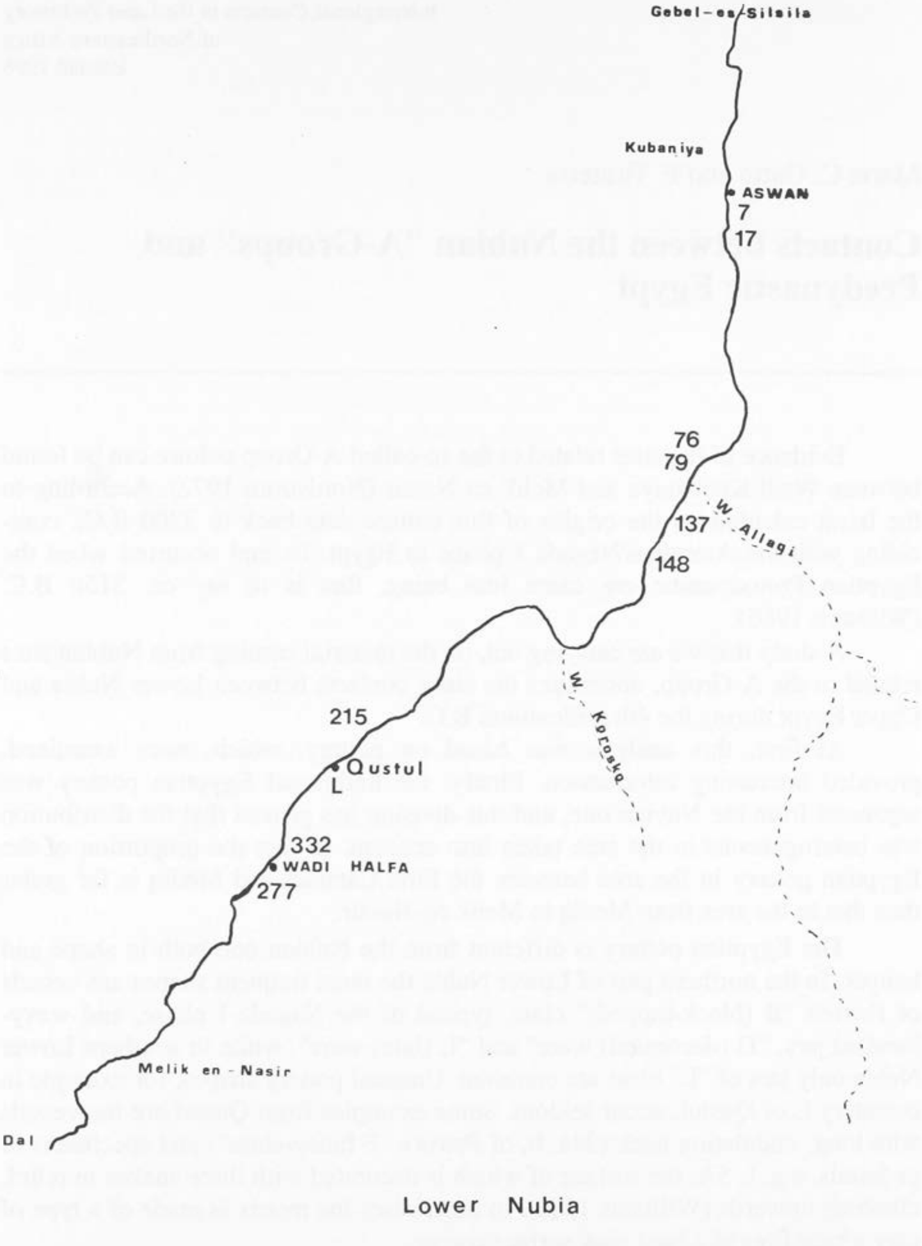


Fig. 1. Nubian A-Group sites in Lower Nubia.
7 Shellal. 17 Khor Bahan. 76 Gerf Hussein. 79 Gerf Hussein. 137 Sayala. 148 Mediq.
215 Abu Simbel. L Qustul. 332 Ashkeit. 277 Halfa Degheim.

(Firth 1927); Cem. 148 Mediq (Firth 1927); Cem. 215 Abu Simbel (Emery & Kirwan 1935); Cem. L Qustul (Williams 1986); Cem. 332 Ashkeit (Nordström 1972); Cem. 277 Halfa Degheim (Nordström 1972).

Interestingly, eight of the ten cemeteries are located north of Qustul (including the latter) and only 2 south of it (Fig. 1). All these cemeteries are similar, apart from their dimensions, because they are located in strategic areas along the Nile: Shellal and Khor Bahan are near the First Cataract, which bordered on Egypt during the Old Kingdom; Gerf Hussein, Sayala and Mediq near the mouth of Wadi Allaqi, the area of gold mining; Ashkeit and Halfa Dagheim are located in the area of the Second Cataract near the border between Egypt and Kerma, where the fortresses of Mirghissa and Buhen where built during the Middle Kingdom; Abu Simbel and Qustul were supposedly located in a place in the valley where the access to the Western Desert and therefore the Oasis was easier.

Concerning non-ceramic materials, a difference can be observed between north and south. For example, the palettes found in cemeteries in the north can be compared to those of the Predynastic of Egypt, whereas those coming from cemeteries in the south are simpler and have a different typology.

Golden maces and amulets of precious stones making use of Egyptian-inspired iconography (heads of falcon, scorpion, elephant etc.) are frequently found in the northern area, whereas south of Qustul they are unusual. In the area excavated by Scandinavian Joint Expedition the most frequent materials found are mortars, grinding stones, pestles, pebbles, awls, leather, cattle skin, wood, ochre and resins.

Even in this case Qustul stands as an exception. Besides the large amount of stone vases, fayence vases, traditional Syro-Palestinian and Sudanese pottery, metal, ivory objects (including parts of toys also found in Egypt) and models of bread, we should emphasize the epigraphic and artistic features of this site. Most characteristic are the incense burners (L 24 1) depicting a procession of boats in front of a *serekh*.

On the grounds of the difference of material between those two areas, one might assume that there was a difference in the socio-economic level as well. North of Qustul trade with the Upper Egypt probably played a major role in the economy and therefore in the social structure of the local population. South of Qustul on the other hand, the prevalence of materials associated with an agro-pastoral economy reveals a different socio-economic situation, much closer to the Sudanese area and with less trade with Upper Egypt.

In this framework, the Cemetery L of Qustul has an anomalous position, since the quantity of traditional Egyptian material is greater than that of neighbouring cemeteries and its typology is unusual compared to that of other Nubian cemeteries. According to Williams, the iconographic elements, typical of the Pharaonic period, which occur at that site might suggests that monarchs existed earlier than "pharaohs" both in Nubia and Egypt, that is to say earlier than King Scorpion (Williams 1986, 1987).

Williams' theory is based on the fact that in Egypt rare evidence of the Pharaonic symbolism related to the Predynastic period is of a more recent phase, that that found at Qustul.

We can assume, therefore, that both in Upper Egypt and Lower Nubia the cultural situation was homogeneous, consisting of power centres in contact with each others, above all for trade purposes. At a certain time, the situation reversed in favour of Upper Egypt, a region with greater advantages than Nubia (i.e. proximity to the Mediterranean area, more favourable geo-climatic situation), which facilitate and led to the unification and the creation of the pharaonic state.

The difference between the two Nubian areas, whose population was made up of groups sharing the same cultural horizon, though without a common socio-economic evolution, might indicate that the term A-Group, in our opinion, should be changed to "A-Groups".

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Interregional Contacts in the Later Prehistory
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# The Mesolithic/Neolithic of the Blue Nile (east bank): chronological seriation and settlement patterns

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## 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-

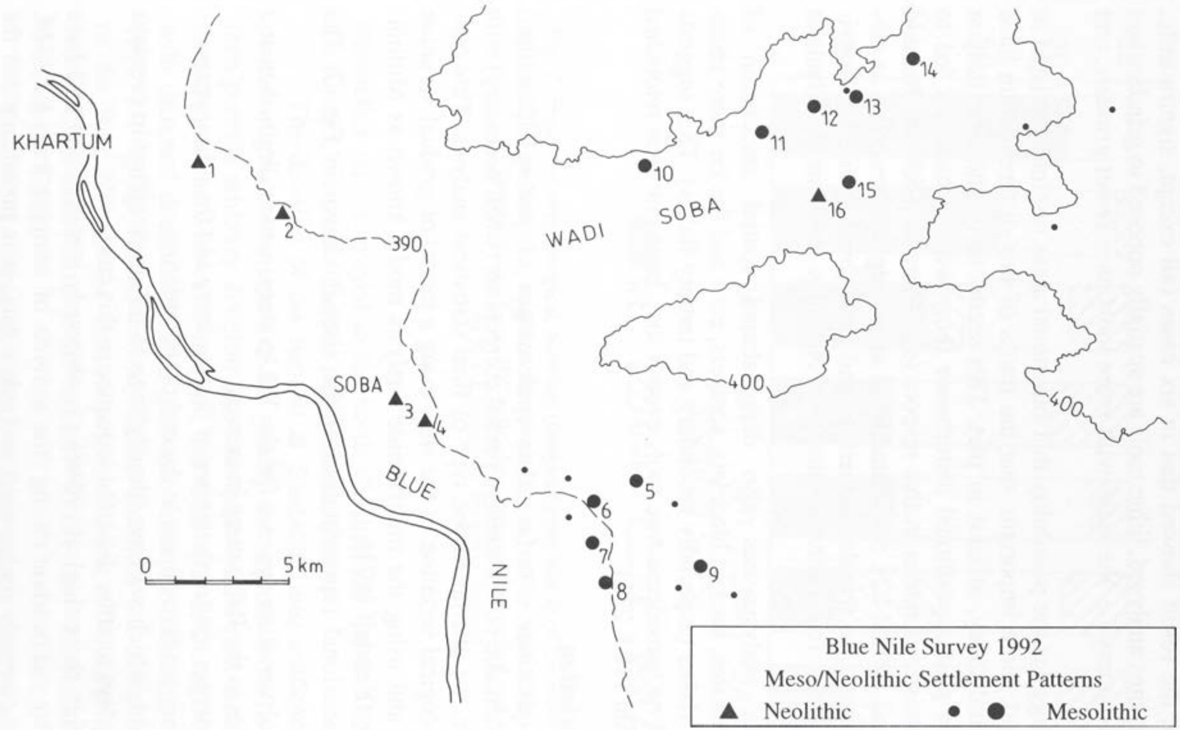


Fig. 1. Mesolithic and Neolithic sites discovered or investigated by the Spanish Archaeological Mission in the Blue Nile area (1989-1993): 1. Haj Yusif 2. Umm Dom 3.4. Soba 5. Sheikh Mustafa 1 (SM1) 6. Sheikh Mustafa 3 (SM3) 7. Sheikh Mustafa 4 (SM4) 8. Khalifa Ali Farm (KH) 9. Al Karnus 1 and 2 (K1, 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

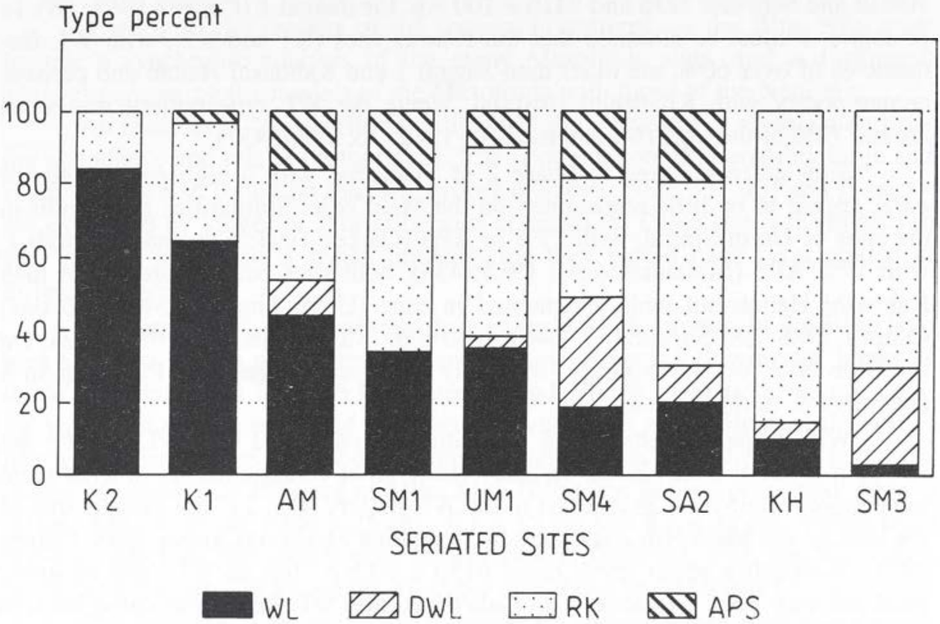


Fig. 2. Tentative chronological ordering (frequency seriation) of the most important Mesolithic sites in the Blue Nile area, based on the percentage of pottery types (WL = Wavy Line; DWL = Dotted Wavy Line; RK = Rocker impression, packed and spaced; APS = Alternately Pivoting Stamp).

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).

**Acknowledgement**

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Interregional Contacts in the Later Prehistory
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Poznań 1996

Michał Kobusiewicz

# Technology, goals and efficiency of quartz exploitation in the Khartoum Neolithic: the case of Kadero

Quartz, as a raw material for tool production, undoubtedly played an enormously important role in the late prehistory of the Middle Nile region. It dominates the lithic assemblages of this area. The wealth of quartz material happens here to be so intense, and the readability of artefacts produced of this raw material so difficult, that it simply generates subconscious reluctance to take in hand the problems of quartz technology. At the first moment quartz material on these sites seem to be a mass of pebbles thoughtlessly crushed without any leading conception and visible final goal.

The detailed analysis of quartz artefacts based on enormously rich material from the Khartoum Neolithic permanent dwelling at Kadero, found during several seasons of field excavations, permits to throw some light on the technology of quartz elaboration, its desired final effects and efficiency. Considerations concerning this subject will be in essence the content of this paper.

The site of Kadero is situated on the eastern bank of the Nile some 20 km north of Khartoum, and about 8 km east of the present day river channel (Fig. 1). The technological and typological analysis of lithic artefacts was accomplished on the base of a rich sample of stone implements derived from an area of 25 square meters described as Area Id. The complete description of lithic materials from Kadero will be published soon in the general monograph being prepared.

The environment of Kadero was a source of quartz material. Quartz pebbles, rarely larger than 4 cm in diameter, water worn from Nubian Sandstone or provided by basement rocks, occur in abundance on the local gravel banks. Quartz has conchoidal fracture and the hardness of 7 on the Mohs scale. It occurs in two types, snow white and light gray. The light grey one, consisting mostly of $SiO_2$ silica, contains an admixture of graphite (personal communication J. Skoczylas). It occurs as nodules of similar shape and size and in terms of utilisation has been treated identically to the white variant of quartz.

Among seven main types of rock serving as raw materials in Kadero, quartz was of particular importance considering all lithics (excluding sandstone).

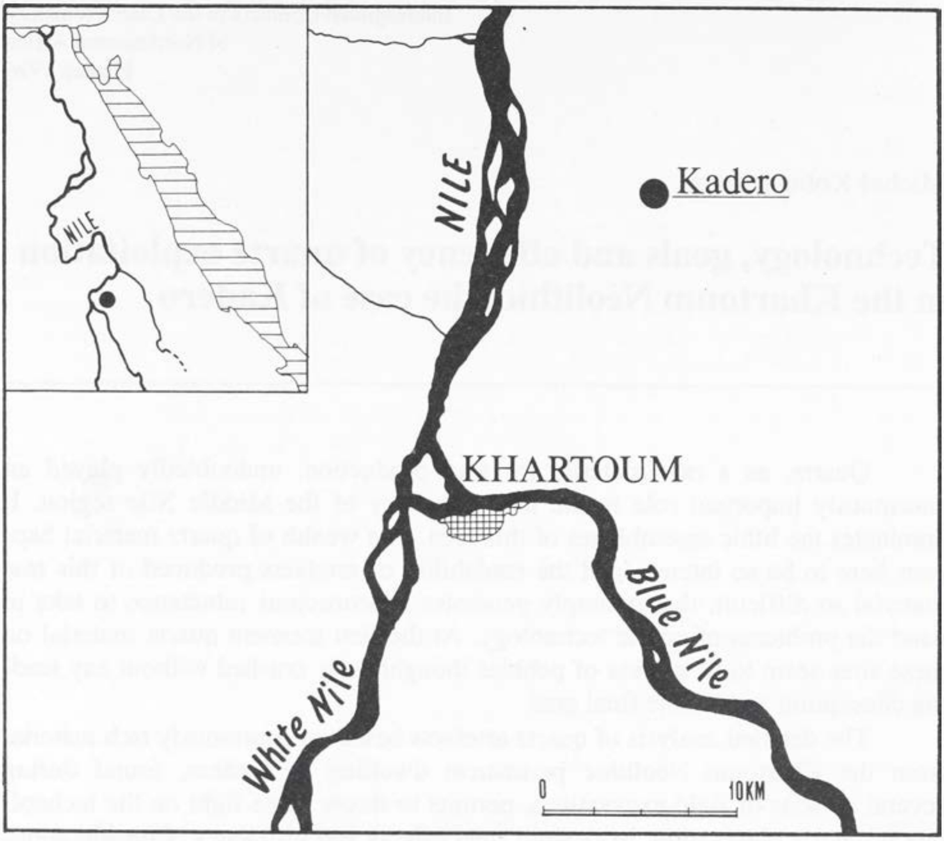


Fig. 1. Location of Kadero.

It constitutes 88.71% of the total in respect of numbers, and 77.20% of the total in weight. The quartz cores constitute 98.25% of all cores. All of them were made of small, more or less spherical or egg-shaped pebbles. The surface of the pebbles is smooth, somewhat dull. The size of the core left at the site is very small. The main dimensions are: length 16.63 mm (range 9 mm-30 mm), width 15.68 mm (range 9 mm-22 mm) and thickness 9,09 mm (range 5 mm-22 mm). All without exception were used for flaking. None of them carry the slightest trace of preparation and no striking platforms had been prepared. The blanks were produced by striking off first cortex flake and then continuing striking near the emerging edge. The strokes had not been necessarily directed near the preceding striking point, but at the most convenient spot on the surface depending on the way the core and its striking surface has been shaped after striking off the previous flake.

Judging from the find of a complete kit of tools for knapping stones discovered in grave No. 66 in Kadero (see below), quartz hammers were also used. A worked pebble was processed by resting it on a hard supporting stand in the way typical for the scalling (*ecaille*) technique. The lump, however, was turned round during processing, so that two distinct scalling poles were not formed. If the striking surface was spoiled, the core was usually discarded, or sometimes a second striking surface was formed (scarcely 4%) and the core processing started once more from the other suitable end of the worked pebble.

The quartz cores under discussion here cannot be classified into any of the types known and often described in lithic assemblages in which the cores are classified in terms of the striking directions and number of striking platforms. The type of quartz cores discussed here, so typical for the late prehistory in the Middle Nile region, I propose to call "pebble cores". The eventual aim of pebble core elaboration was to obtain half-circle flakes with natural curved backing.

The Kadero technology of working some of the quartz cores seems to be similarly to some extent to that of the Early Khartoum site Saggai 1, situated 20 km north of Kadero and described by Caneva and Zarratini (1983) and refered to by them as "discoidal cores". These seem to be present in great numbers at Saggai 1. But beside the discoidal cores the authors also noted a kind of single platform core intended only for crescent flake production obtained by fairly sophisticated technology in the special preparation of a striking surface. Maybe the sort of quartz at Saggai which, according to both authors "seems to be quite good", permitted the employment of such a technology; perhaps the pebbles were split methodically in half in order to exploit them as single platform cores, as it was observed at Geili (Caneva 1988). Anyway, in the case of Kadero, the stones are too small and the material itself too difficult to permit any kind of core preparation and to anticipate the shape of a succeeding flake. The correct crescent-shape flakes came into being now and then, to some extent haphazardly, during the elaboration process. Their desired shape was determined by the natural form of the worked nodule and not because it had been consciously created.

During the processing of pebble cores the following type of debitage was produced (Fig. 2):

1. Primary flakes: first or nearly first flakes struck from a raw lump surface. More than a half of the surface, sometimes the whole surface, is covered by the natural, mat, smooth surface, typical for quartz gravel (an equivalent of cortex known from flint nodules). These pieces stand out from other types of quartz debitage in terms of surface area and thickness.
2. Secondary flakes: specimens struck at a latter stage than those just described. Less than a half of their surface is a natural one. They are slightly smaller and thinner than primary flakes.
3. Tertiary flakes: struck third in succession. Their surface bear no traces of the natural pebble surface.

   They have been divided into three subtypes:

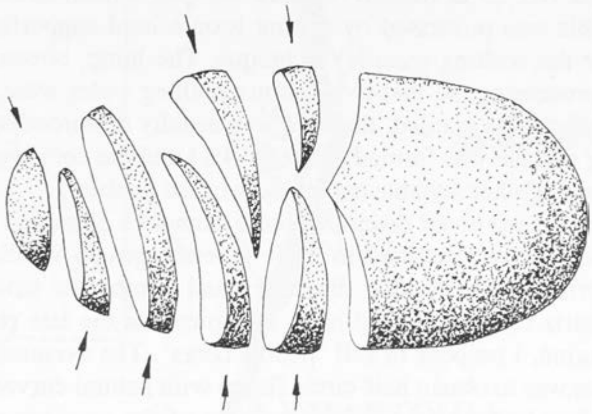

Fig. 2. "Slicing" technology: schematic representation of flakes obtained from pebble cores.

a) ordinary tertiary flakes: specimens of varied unintentional random shapes and proportions;
b) quality tertiary flakes: flat, regular flakes shaped of irregular sector of circle or sometimes simply circular;
c) crescent-shaped flakes: blanks in the shape of a regular segment of a circle. Production of this type of implement was the main goal of quartz pebble processing.

These three types of tertiary flakes are nearly identical in terms of proportions. Crescent shaped flakes are slightly bigger in size. Yet in general, all types of quartz debitage mentioned above are homogenous in both size and proportions. This undoubtedly resulted from the fact that highly homogenous cores have been used in their production. Since, as it had been mentioned above, quartz cores had not been prepared at all, platforms are, as a rule, of the cortex type. Usually the flakes have very extensive cortex platforms. The cortex of the quality tertiary and crescent-shaped flakes often covers as much as two thirds of the flake circumference and sometimes even more. There are cases when "cortex" platform covers the whole circumference of the flake which gives the flake the appearance of a slice of bread, one might say "cut off" from the core. Such extensive platforms may be identified as such only from the point of view of a platform definition accepted in descriptions of flint technology (Fig. 3). An extensive striking platform may stretch left and right of the striking point. If the flake was of crescent shape, such an extensive platform formed a naturally curved backing. This kind of flake with naturally arched back and sharp opposite edge was undoubt-

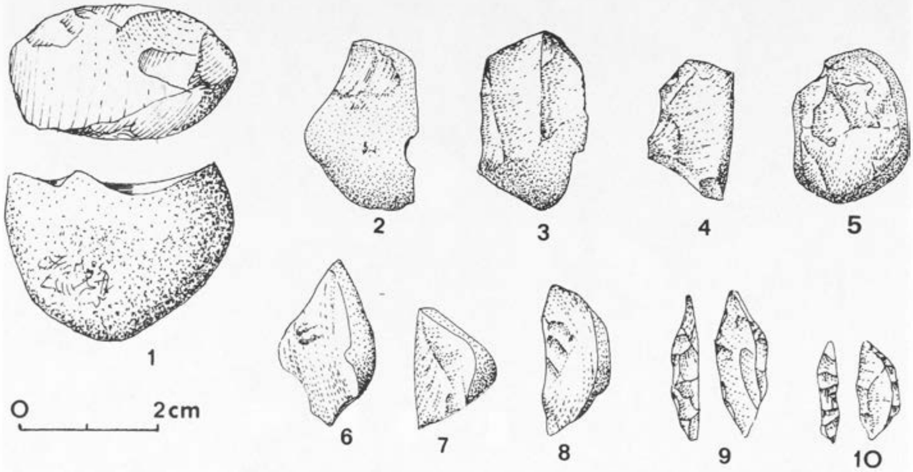


Fig. 3. Kadero.
1. pebble core of quarz; 2. primary flake; 3. secondary flake; 4. ordinary tertiary flake; 5-6. quality tertiary flakes; 7-8. crescent-shaped flakes; 9-10. retouched crescents.

edly the final goal in quartz pebble processing. A number of findings revealed that the backs had been additionally retouched either on the whole surface or partially.

The segment is practically the only type of geometric microliths used by the populations of the Early Khartoum and Khartoum Neolithic culture. Other types occur very rarely. These segments therefore performed all functions which elsewhere were performed by numerous other types of microliths. In the Khartoum Neolithic the segments as described above, were also used in great quantities as armatures for composite tools.

In some graves in the cemetery at Kadero, a small dense concentration of segments appeared, mostly of quartz, some also of chert. The number of segments in such concentrations varies from several to over a dozen. They may have been the heads of arrows the shafts of which were not preserved. In grave 114 (Krzyzaniak 1991) two finds of segments appeared, about a dozen each, lined up in a straight row (Fig. 4). Traces of resin were still present on some of the specimens. Thanks to information by J. Reinold we can interpret this find as the remains of a straight knife composed of a row of segments mounted in the groove of a bone handle. Such tools were found intact by J. Reinold in Kadruka, a site situated some 350 km NNW from Kadero.

All segments mentioned above have at least partially retouched backs. It is highly possible that the same function might have been played by regular unre-

Fig. 4. Kadero grave 114: quarzite segments lined up in a row.

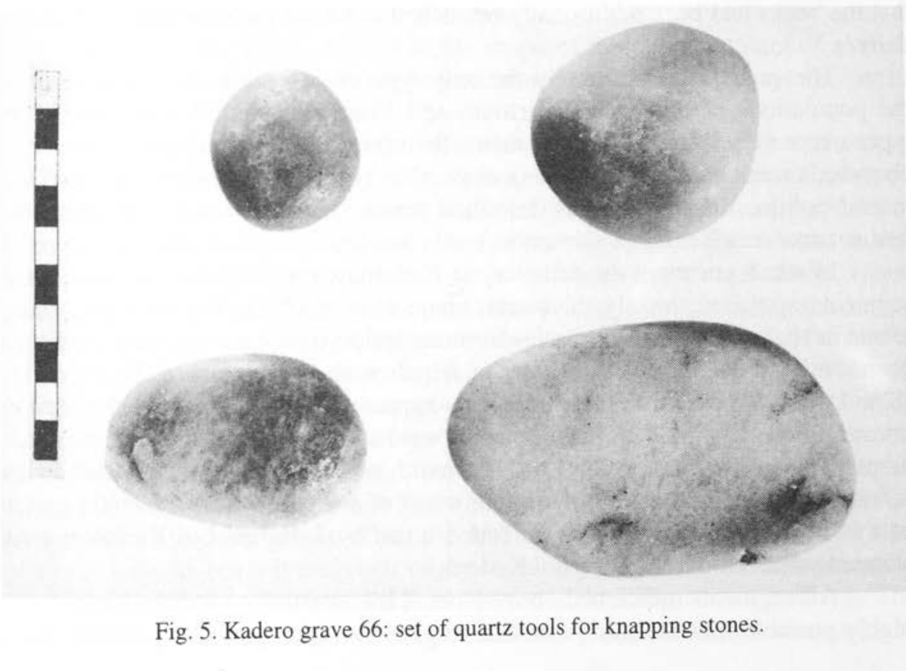

Fig. 5. Kadero grave 66: set of quartz tools for knapping stones.

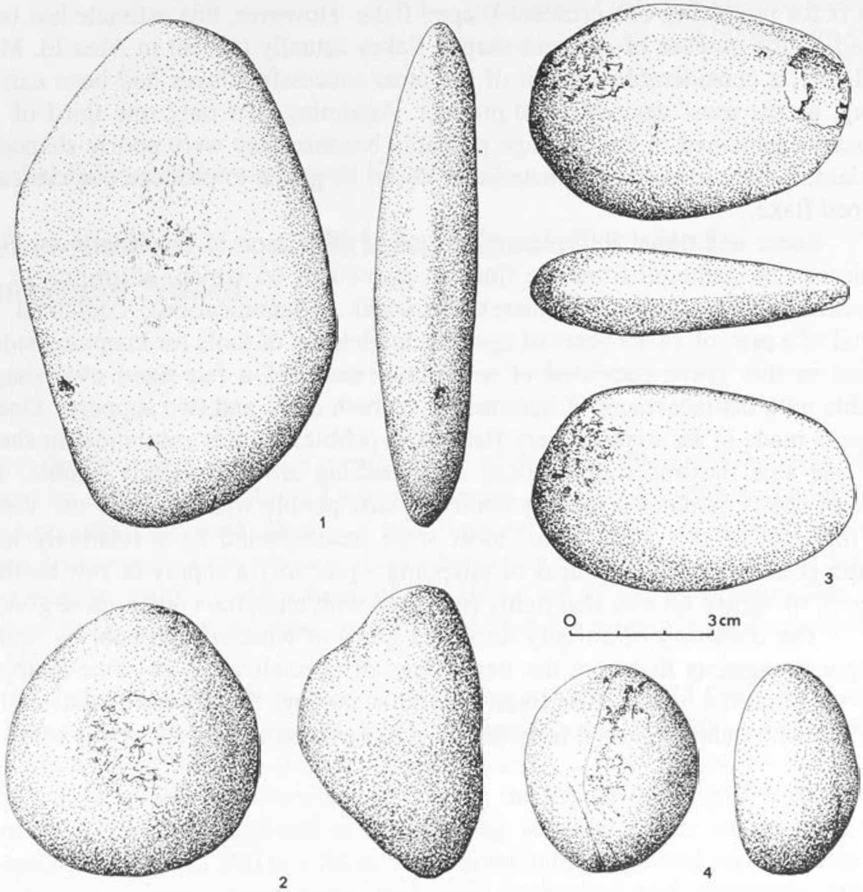


Fig. 6. Kadero grave 66. Tool-kit of quarz for knapping stones:
1. flat support; 2. conical support; 3. hammerstone; 4. quarz pebble.

touched crescent-shaped flakes with natural back. These, however, are difficult to recognize because of the lack of retouch.

By examining a large amount of material I succeeded in estimating the knappers efficiency of quartz use in Kadero. The measurements revealed that five to six debitage pieces were obtained from one quartz pebble core. Out of these 1.7 pieces were quality or crescent-shaped tertiary flakes. On the other hand, in order to obtain one crescent-shaped flake, as many as 3.24 cores had to be processed. With this efficiency the number of crescent-shaped flakes produced from 2118 pebble cores found over the Area Id could have run to 654 specimens. This required using ca. 19.162 kg of quartz pebbles, which means 29.3 grams of quartz for producing one crescent-shaped flake. However, this estimate has been based on the number of crescent-shaped flakes actually present in Area Id. Most probably, a considerable amount of the most successful flakes had been carried away, as the most desirable end-product. Assuming that only one third of the crescents remained in the debitage probably because they were poorly shaped or mislaid, it still required core material of about 10 grams to produce one crescent-shaped flake.

Some additional information on quartz utilization in the Khartoum Neolithic can be gathered from the finds in grave No. 66 which, according to the physical anthropologist Kaczmarek (personal communication), contained the burial of a man of 18-25 years of age. A complete set of tools for knapping stones found in this grave consisted of a hammer made of a fair-sized oval shaped pebble with distinct traces of hammering on both ends, and two supports. One of these is made of an atypical, very flat quartz pebble, roughly romboidal in shape. On one side the traces of bruising and crushing are also clearly visible. The second one is made of a roughly conical quartz pebble with traces of use visible on the base of the cone. These tools were accompanied by a relatively large quartz pebble bearing no traces of knapping - probably a supply of raw material (Fig. 5, 6). Grave 66 was also richly furnished with numerous other grave goods.

The discovery of a richly furnished grave of what was probably a "quartz knapper" suggests that here the beginnings of specialization in stone-knapping can be observed in the Khartoum Neolithic culture. In any case, the skill of dealing with quartz material fully deserved to be taken along to the next world.

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Interregional Contacts in the Later Prehistory
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# Jebel Kobkabba: a Middle Palaeolithic site in Sudanese Nubia

In December 1993 we surveyed part of the Letti Plain and the edge of the desert on behalf of the Royal Ontario Museum Expedition to the Sudan directed by Krzysztof Grzymski. During a four days survey numerous Palaeolithic sites were discovered on the jebels and hills bordering the desert along the village of El Ghaddar, on the eastern bank of the Nile. One of the most promising sites named by us Jebel Kobkabba, was than selected for future detailed examination in 1994.

Jebel Kobkabba is located ca. 1600 m north of the Old Dongola Mosque, ca. 2500 m south-south-east of Jebel El Ghaddar and ca. 1600 m west of the modern bank of the Nile (Fig. 1). The jebel itself is made up of, as many other jebels in this area, ferrocrete sandstone. On the top of the jebel the outcrop of ferrocrete sandstone bedrock is visible. The artefacts cover an irregular oval shaped surface of ca 100 m x 50 m. After completing a general surface collection of the site, a one square meter grid was established and systematic surface collections of artefacts was undertaken from three separate areas located on the top of the jebel along its longer axes. These areas marked A, B and C covered respectively 12 $m^2$, 16 $m^2$ and 6 $m^2$ surface. In areas A and B two stratigraphic test-trenches of one square meter each were dug down to the bedrock.

Test trenches 1 excavated in squares 2a and 3a of Area A revealed the following stratigraphy (Fig. 2):

Surface: covered by dense concentration of rocks and more or less worn artefacts.
Subsurface (marked as A(s)) was divided into:

1. Upper layer: ca. 18 cm thick; gray, slightly yellowish (Munsell 7.5 YR-6/6), fine grained silty sand mixed with crushed pieces of ferrocrete sandstone and numerous artefacts.
2. Lower layer: ca 23 cm thick; reddish-brown (Munsell 2,5 YR-4/6), fine grained silty sand mixed with pieces of crushed ferrocrete sandstone and numerous artefacts.

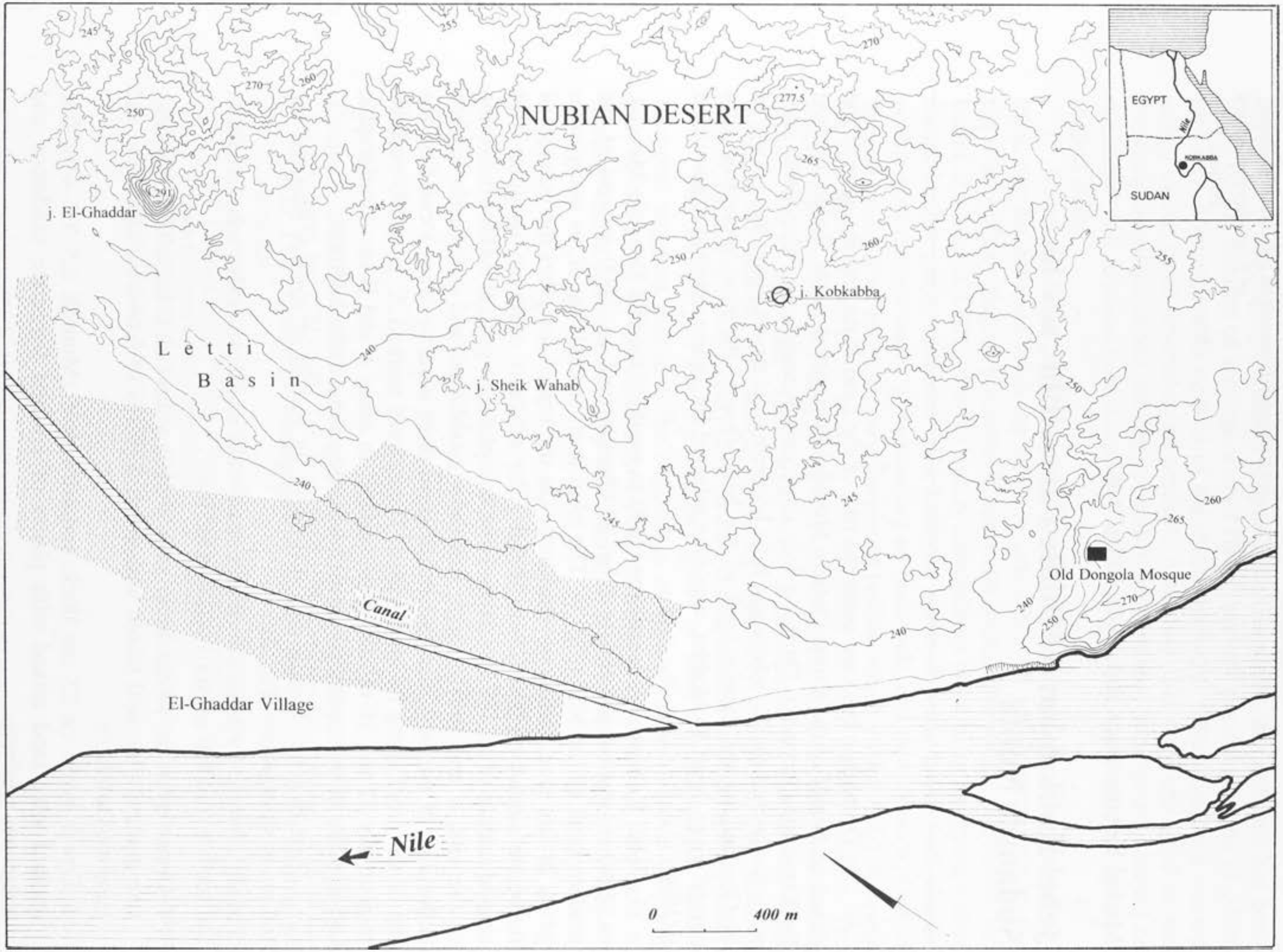


Fig. 1. Jebel Kobkabba. Location of the site (map after E. Karwowska).

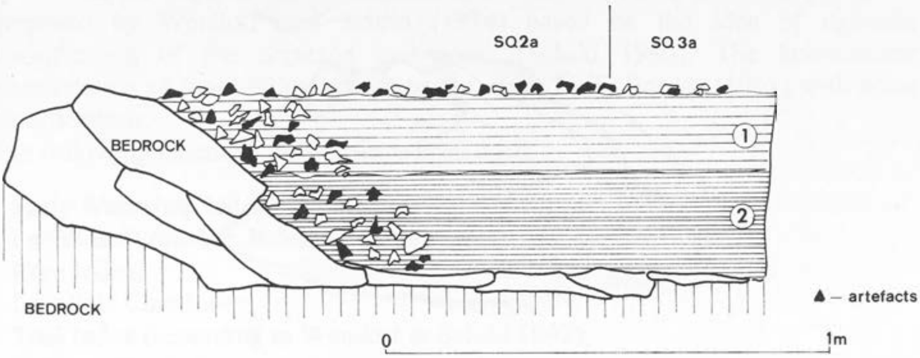


Fig. 2. Jebel Kobkabba. Stratigraphy of test trench 1 (1-upper layer; 2-lower layer).

The lower and upper layer differ only in coloration, probably reflecting content of iron oxides. The artefacts found subsurface are less worn, sometimes they look almost fresh.

Bedrock: blocks of ferrocrete sandstone.

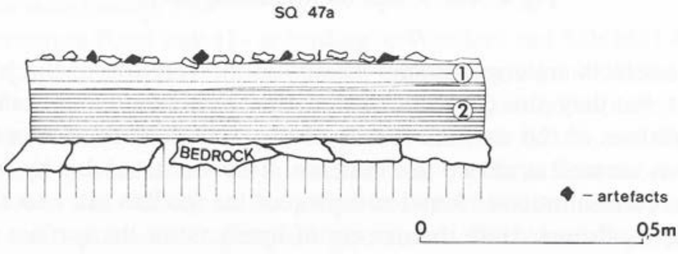


Fig. 3. Jebel Kobkabba. Stratigraphy of test trench 2 (1-upper layer; 2-lower layer).

In test trench 2 excavated in square 47a, scarce artefacts occur only at the surface. Below lies a ca 20 cm thick subsurface layer of fine grained silty sands mixed with a few crushed pieces of ferrocrete sandstone, containing no artefacts. The upper 8 cm of this layer is of yellowish gray colour (7,5 YR-6/6), whereas the lower 12 cm is reddish brown (2.5 YR-4/6; [Fig. 3]).

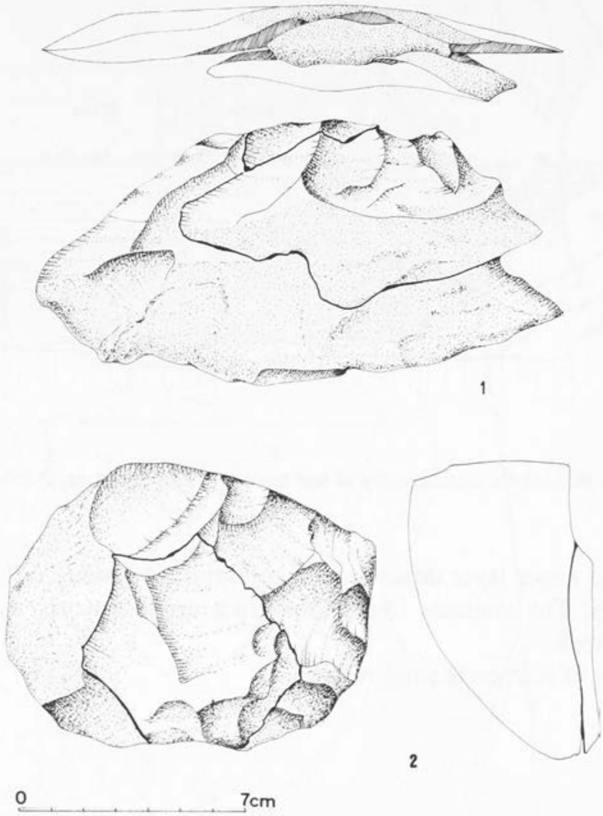


Fig. 4. Jebel Kobkabba. Articulating pieces.

The artefacts are concentrated mainly on the very top of the jebel, at the western part, but they also cover the slopes. Based on a thorough examination of the whole surface of the site, the results of regular collections taken from three separate areas, as well as of two test-trenches, it can be stated that by far the most dense lithics concentration is found at the top of the modern hill near the outcrop of ferrocrete sandstone. Here the density of artefacts on the surface (excluding chips and chunks) is approximately 100 pieces per square meter (Area A), whereas further down the hill the density diminishes to no more than several artefacts per square meter (Area B and C). This difference is even more striking if we consider the wealth of artefacts in 40 cm of the subsurface layer in Area A at the sandstone outcrop, and the total lack of subsurface material elsewhere. All artefacts found on the surface are rolled and worn but the degree of wear differs. At least some material is still found more or less *in situ* as shown by combinations of articulating pieces found very close to each other. One of these is composed of three articulating flakes (Fig. 4: 1), another of core and flake (Fig. 4: 2).

## Methods

The description of the material was made according to the procedure proposed by Wendorf and Schild (1974) based on the idea of dynamic classification of the debitage and cores (Schild 1980). The taxonomical classification of tools follows the type list made by F. Bordes (1961) with some modifications.

The following technical indices have been used:

Early Workshop Index,
Levallois Workshop Index,
Core Index,
Levallois Core Index,
Tool Index (according to Wendorf & Schild 1992);
IL (Levallois Index)
I-lame (Blade Index, according to Bordes 1953a);
IGL (Index of Levallois Group, according to Wendorf & Schild 1974).

For description of tool group structure we applied several typological indices formulated by Bordes (1953; 1953a):

IL-ty (Levallois Typological Index),
IR (Side-scraper Index),
IC (Charentien Index),
IB (Biface Index),
I - Levallois Group,
II - Mousterian Group,
III - Upper Palaeolithic Index,
IV - Denticulate Group.
IMp (Mousterian Point Index) - according to Wendorf and Schild (1974).

To facilitate comparisons we present the typological indices the same way as Wendorf and Schild (1974) in three sets: large (complete count), essential (without Levallois unretouched pieces and retouched flakes and blades), and retouched tools (without Levallois unretouched pieces). Because of time and labor limitations we did not collect chips and chunks from all excavated units except in a one square meter sample from area A. Therefore chips, chunks and undetermined pieces are excluded from the percentage and indices calculations.

## Description of materials

A total of 735 artefacts was systematically collected. All are made of ferrocrete sandstone. Table 1 presents stone material for all separately excavated units, according to the classification based on dynamic typology. Table 2 demonstrates the general structure of Levallois debitage and retouched tools. Measured attributes of debitage and tool categories, rich enough for statistics, are shown on Tables 3 and 4. Analyzing the general structure of the assemblage it is apparent (Table 1) that there is an obvious difference in the frequency of primary pieces in areas considered. These are much more numerous at the south-eastern part of the site (Areas B and C) than in the north-western part (Area A and A [s]). Therefore, a technological analysis was made, additionally, for groups of units (Table 5). Statistical data for areas A/A(s) combined is presented in Table 6 (debitage) and Table 7 (tools); areas B/C combined in Table 8 (debitage). The number of tools from areas B and C was too small for statistical calculations. Technical indices are presented for both parts of the site, as well as for the whole assemblage in Table 9. Typological indices (Table 10) were calculated for the whole of the assemblage only, because of limited amount of tools from areas B and C. A selection of cores, retouched tools and debitage is illustrated in Figures 5-10.

**Discussion**

The results of technological and typological analysis presented above indicate that the Jebel Kobkabba assemblage belongs to the Middle Palaeolithic of the Nile Valley. The closest analogies which permit us to place our site within the cultural and chronological system of the Northeastern African tradition, are the rich sites from the Wadi Halfa area near the 2nd Cataract described as Nubian Mousterian. The presence of a few bifaces relates Jebel Kobkabba more closely to the Nubian Mousterian B (Marks 1968).

The research at Jebel Kobkabba does not reveal new evidence as regards the chronology of the Nubian Middle Palaeolithic. Typologically old elements, such as chopper and chopping tool, as well as Upper Palaeolithic types such as end-scraper and burin suggest a very long lasting occupation of the site. This is confirmed by the occurrence of artefacts in both reddish-brown and yellowish-gray layers connected with moist and semi-dry climatic periods respectively. It is possible that the lower (oldest) layer is dated to one of the local moist oscillations of the last Interglacial (Wendorf & Schild 1992).

It seems that the site was visited many times by hundreds of generations attracted by the outcrop of good quality ferrocrete sandstone. The outcropping rock was the heart of the site. Here the overwhelming majority of artefacts was accumulated. The abundance of artefacts deposited by thousands of years of activity makes it impossible to recognize the eventual subconcentrations or activity areas. Only the striking preponderance of primary pieces in the south-eastern part of the site (areas B and C), if compared to the north-western part (Area A), suggest that some activity areas may have existed.

In the south-eastern part of the site two outlines of very primitive stone structures built of large cobbles occur on the surface. One is of a semi-circular and the second of an oval shape, both of ca. 1.5 m - 2 m in diameter (Fig. 11).

They are accompanied by smaller concentrations of flat stones ca 50 cm-60 cm in diameter. Similar features constructed of stones are known from some Lower and Middle Palaeolithic African sites, e.g. the Acheulean site Arkin 8

(Chmielewski 1968: 112), site 6 of Nubian Mousterian B in the 2nd Cataract area (Marks 1968: 261), site Toshkei 8-A-2, located ca. 30 km south of the 2nd Cataract on the western bank of the Nile (Vila 1978: 47), or the more distant South African site of Orangia (Sampson 1968). The preservation of such features from Middle Palaeolithic times at Jebel Kobkabba seems possible, because articulating pieces of stone artefacts have been found near them *in situ*.

Beside the concentration of Middle Palaeolithic sites in the Wadi Halfa Area (Guichard & Guichard 1968; Chmielewski 1968; Marks 1968), occupation traces of a similar character are known from a few sites located on the western bank of the Nile, ca. 30 km south of the 2nd Cataract (Vila 1978). Also, not far from Jebel Kobkabba, again on the western bank, between Korti and Debba, similar occupations were discovered (Heinzelin 1967-1968; Marks et al. 1967-1968). These however are characterized by the exploitation of a variety of different raw materials, in contrast to Jebel Kobkabba where only ferrocrete sandstone was used.

Site of Jebel Kobkabba, so rich in archaeological material, is not an exception in the El Ghaddar area. Similar, strikingly rich sites covered by millions of stone artefacts are present here, proving how attractive this part of Nubia was for human life in the Middle Palaeolithic times.

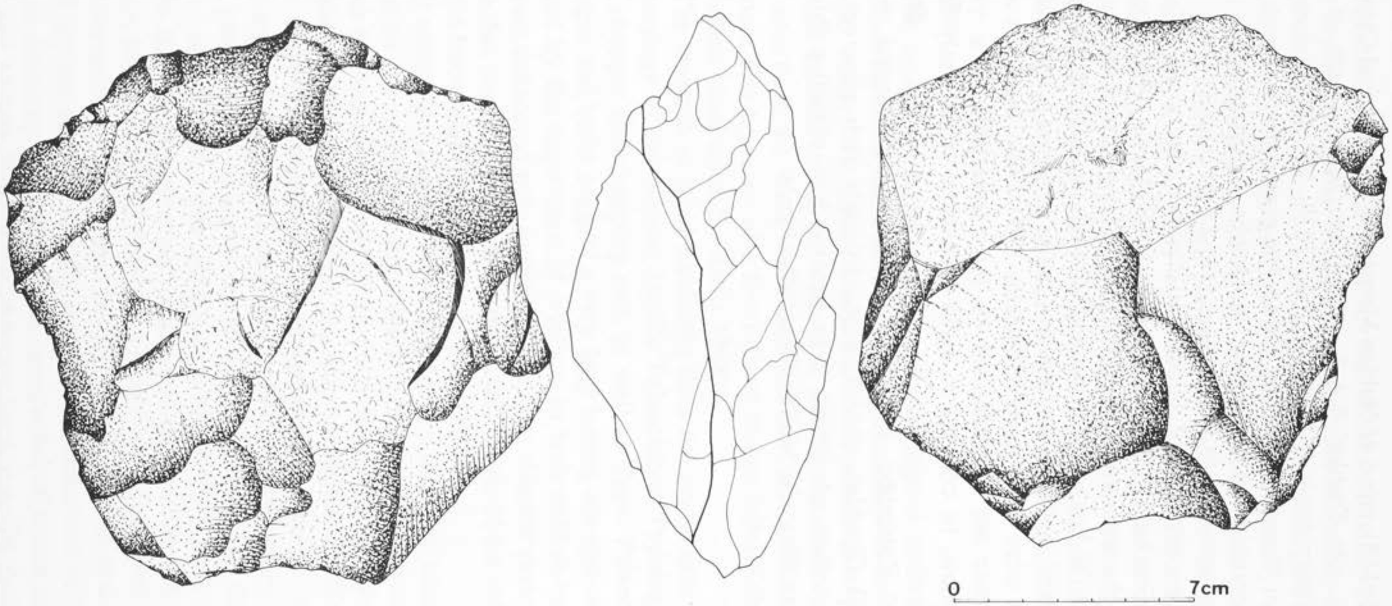


Fig. 5. Jebel Kobkabba. Unworked Levallois core.

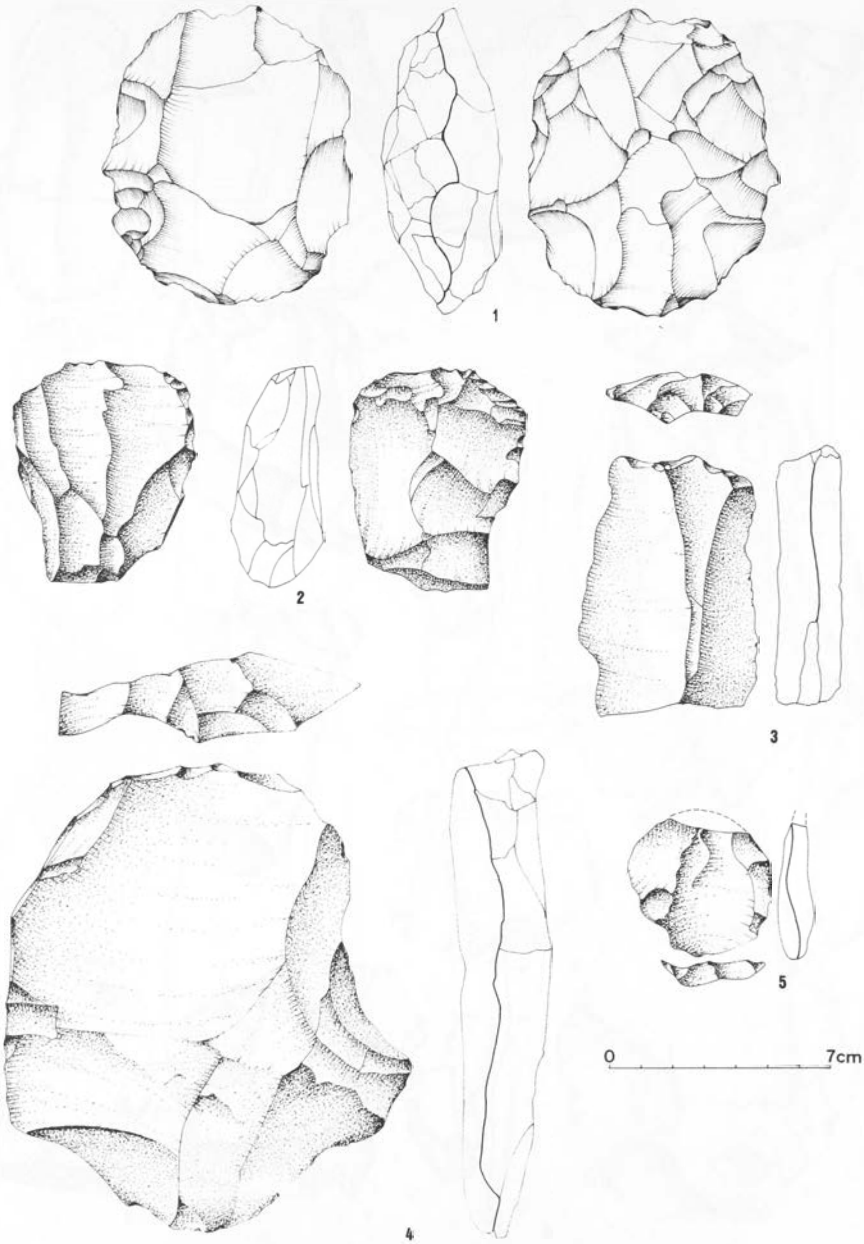


Fig. 6. Jebel Kobkabba: 1. Levallois single platform core for flakes; 2. Levallois single platform. core for blades; 3. Levallois blade from single platform core; 4. Levallois flake from early stage of core exploitation; 5. Levallois flake from single platform core.

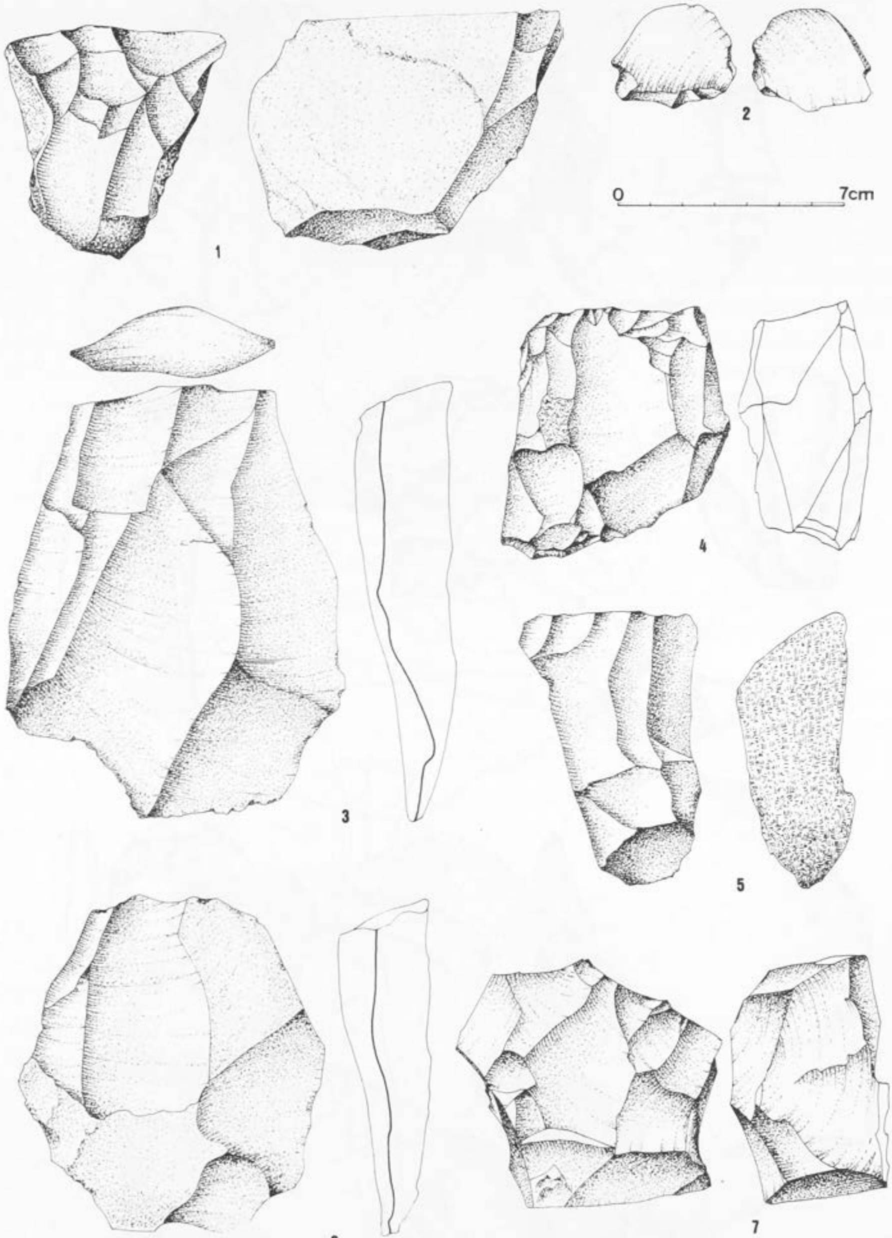


Fig. 7. Jebel Kobkabba: 1. single platform core for flakes; 2. core tablet; 3. flake from single platform core; 4. opposed platform core for flakes; 5 single platform core for blades; 6. flake from opposed platform core; 7. change orientation core for flakes.

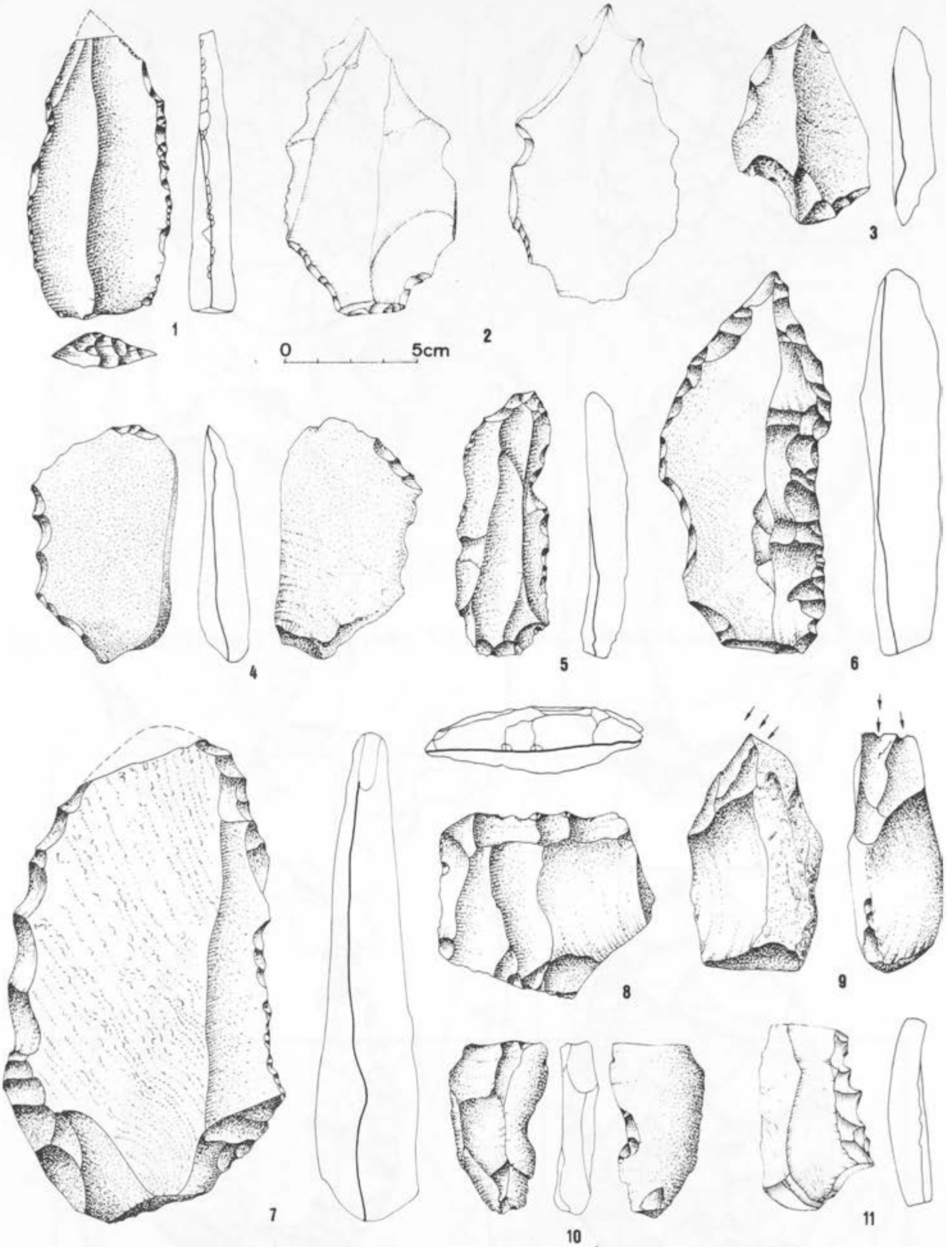


Fig. 8. Jebel Kobkabba: 1-2. Levallois points; 3. Mousterian-like point; 4. side-scraper inversely retouched; 5. retouched and notched blade; 6. convergent side-scraper; 7. side-scraper simple convex; 8. transverse side-scraper; 9. nuclei-form burin; 10. notched blade; 11. denticulated blade.

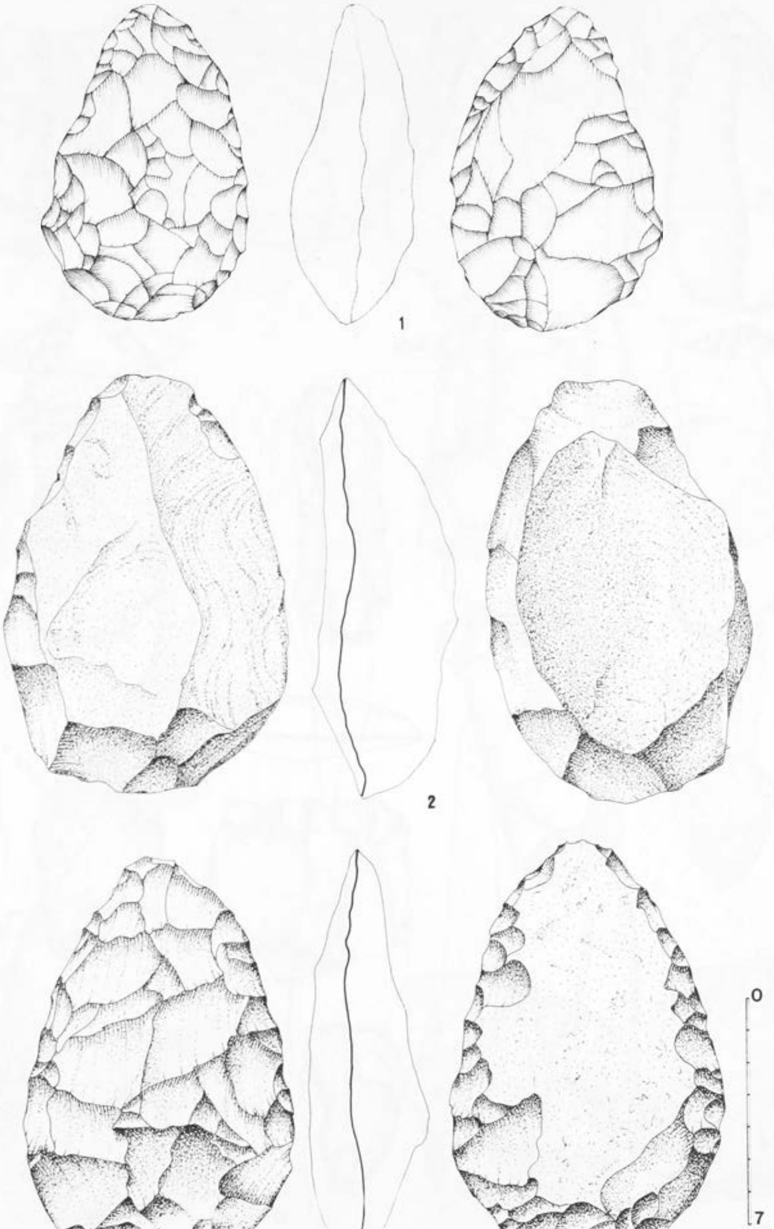


Fig. 9. Jebel Kobkabba. Handaxes.

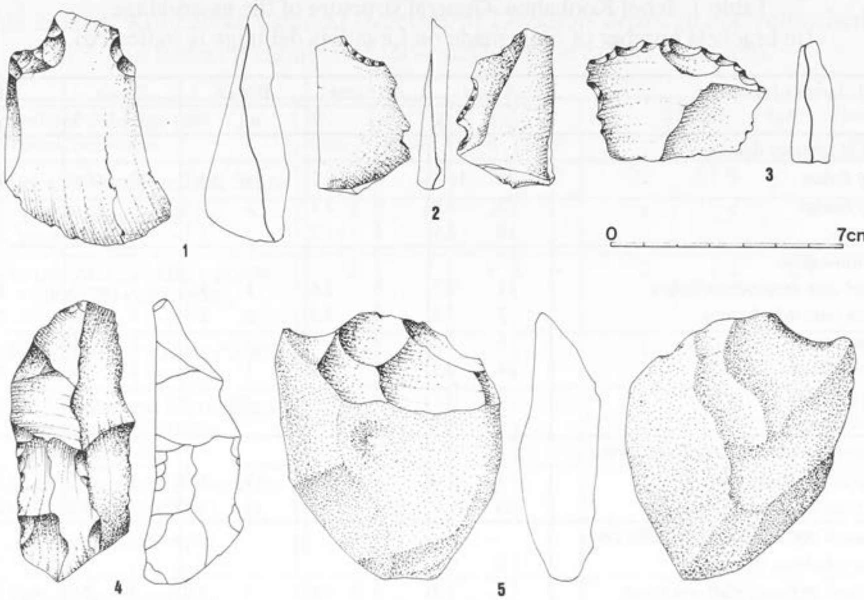


Fig. 10. Jebel Kobkabba: 1. notched flake; 2-3. denticulated flakes; 4. *lames à crête*; 5. chopper.

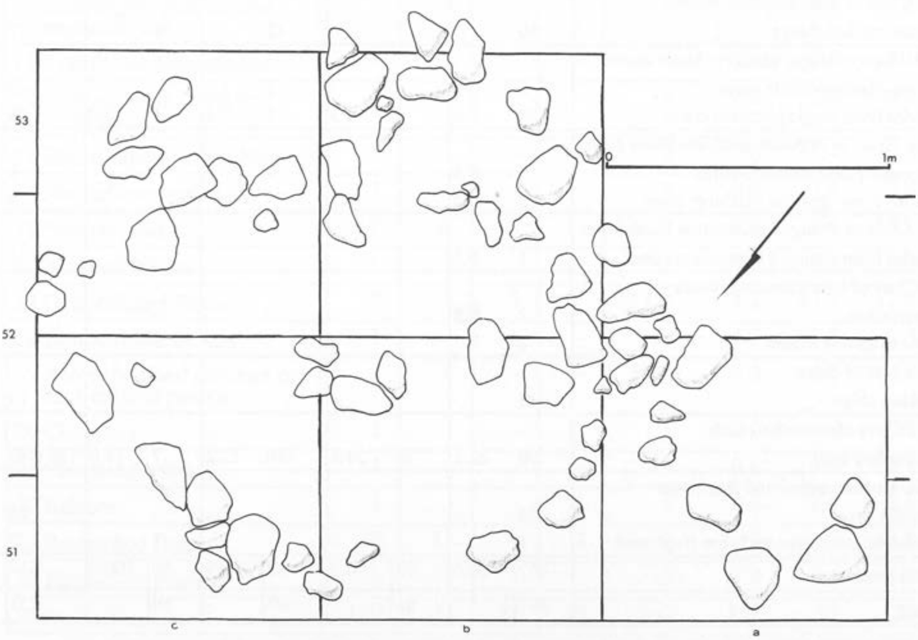


Fig. 11. Jebel Kobkabba. Semi-circular feature of stone cobbles.

Table 1. Jebel Kobkabba. General structure of the assamblage (in brackets number of tools made on Levallois debitage is indicated).

| | General classes of debitage | A area | | A(s) area | | B area | | C area | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | n. | % | n. | % | n. | % | n. | % | n. | % |
| | I. Class of primary flaking | | | | | | | | | | |
| 1 | Primary flakes | 66 | 16.7 | 8 | 10.2 | 44 | 53.7 | 20 | 40.0 | 140 | 22.6 |
| 2 | Primary blades | 12 | 2.9 | 6 | 7.7 | 3 | 0.0 | - | - | 21 | 3.4 |
| 3 | Initial cores | 10 | 2.5 | 1 | 1.3 | 3 | 3.7 | - | - | 14 | 2.6 |
| | II. Levallois class | | | | | | | | | | |
| 4 | Levallois core preparation flakes | 11 | 2.7 | 2 | 2.6 | 1 | 1.2 | - | - | 14 | 2.6 |
| 5 | Levallois unstrucked cores | 5 | 1.2 | 3 | 3.8 | 2 | 2.4 | 1 | 2.0 | 11 | 1.7 |
| 6 | Levallois cores | 6 | 1.5 | - | - | - | - | 1 | 2.0 | 7 | 1.1 |
| 7 | Levallois flakes | 24 | 5.9 | 2 | 2.6 | 1 | 1.2 | 2 | 4.0 | 29 | 4.7 |
| 8 | Levallois blades | 3 | 0.7 | 1 | 1.3 | - | - | - | - | 4 | 0.6 |
| 9 | Levallois points | 3 | 0.7 | - | - | - | - | - | - | 3 | 0.5 |
| | III. Class of single platform flake cores | | | | | | | | | | |
| 10 | Single platform flake cores | 4 | 1.0 | 4 | 5.1 | 1 | 1.2 | 1 | 2.0 | 10 | 1.6 |
| 11 | Flakes from single platform cores | 85 | 20.9 | 14 | 17.9 | 11 | 13.4 | 7 | 14.0 | 117 | 18.9 |
| | IV. Class of opposite platform flake cores | | | | | | | | | | |
| 12 | Opposite platform flake cores | 2 | 0.5 | - | - | - | - | - | - | 2 | 0.3 |
| 13 | Flakes from opposite platform cores | 5 | 1.2 | 2 | 2.6 | 1 | 1.2 | 2 | 4.0 | 10 | 1.6 |
| | V. Class of changed orientation flake cores | | | | | | | | | | |
| 14 | Changed orientation flake cores | 5 | 1.2 | 2 | 2.6 | - | - | 1 | 2.0 | 8 | 1.3 |
| 15 | Flakes from changed orientation cores | 40 | 9.8 | 12 | 15.3 | 2 | 2.4 | 7 | 14.0 | 61 | 9.8 |
| | VI. Class of undetermined flakes | | | | | | | | | | |
| 16 | Undetermined flakes | 50 | - | 7 | - | 12 | - | 8 | - | 77 | - |
| | VII. Class of single platform blade cores | | | | | | | | | | |
| 17 | Single platform blade cores | 2 | 0.5 | - | - | 1 | 1.2 | - | - | 3 | 0.5 |
| 18 | Blades from single platform cores | 24 | 5.9 | 1 | 1.3 | 2 | 2.4 | 1 | 2.0 | 28 | 4.5 |
| | VIII. Class of opposite platform blade cores | | | | | | | | | | |
| 19 | Opposite platform blade cores | 1 | 0.3 | - | - | - | - | - | - | 1 | 0.1 |
| 20 | Blades from opposite platform cores | 2 | 0.5 | 1 | 1.3 | - | - | - | - | 3 | 0.5 |
| | IX. Class of changed orientation blade cores | | | | | | | | | | |
| 21 | Blades from changed orientation cores | 1 | 0.3 | - | - | - | - | - | - | 1 | 0.1 |
| | X. Class of core trimming pieces | | | | | | | | | | |
| 22 | Core tablets | 2 | 0.5 | - | - | - | - | - | - | 2 | 0.3 |
| 23 | Core trimming blades | 2 | 0.5 | - | - | - | - | - | - | 2 | 0.3 |
| | XI. Class of chips | | | | | | | | | | |
| 24 | Flaking chips | 13 | - | - | - | - | - | - | - | 13 | - |
| | XII. Class of retouched tools | | | | | | | | | | |
| 25 | Retouched tools | 90 | 22.1 | 19 | 24.4 | 10 | 12.2 | 7 | 14.0 | 126 (14) | 20.4 |
| | XIII. Undetermined and fragments | | | | | | | | | | |
| 26 | Chunks | 26 | - | - | - | - | - | - | - | 26 | - |
| 27 | Undetermined cores and core fragments | 1 | - | - | - | - | - | 1 | - | 2 | - |
| | Total (restricted * | 407 | 100.0 | 78 | 100.0 | 82 | 99.9 | 50 | 100.0 | 617 | 100.0 |
| | Total | 497 | - | 85 | - | 94 | - | 59 | - | 735 | |

*Counted without undetermined pieces, chips and chunks

Table 2. Jebel Kobkabba. General structure of Levallois debitage and retouched tools (in brackets number of tools made on Levallois debitage).

| Levallois debitage and retouched tools | A area | A (s) area | B area | C area | n. | large | ess. | rect. tools |
|---|---|---|---|---|---|---|---|---|
| 1 Levallois unretouched flakes | 24 | 2 | 1 | 2 | 29 | 17.9 | - | - |
| 2 Levallois unretouched blades | 3 | 1 | - | - | 4 | 2.5 | - | - |
| 3 Retouched Levallois points with distal converging retouch | 2 | - | - | - | 2 | 1.2 | 2.8 | 1.5 |
| 4 Retouched Levallois points, other | 1 | - | - | - | 1 | 0.6 | 1.4 | 0.8 |
| 5 Mousterian and Mousterian-like points with large unaltered base | 1 | - | - | - | 1 | 0.6 | 1.4 | 0.8 |
| 6 Mousterian and Mousterian-like points, other | 1 | - | - | - | 1 | 0.6 | 1.4 | 0.8 |
| 7 Side-scrapers, simple straight | 2 | - | - | - | 2 | 1.2 | 2.8 | 1.5 |
| 8 Side-scrapers, simple convex | 4 | - | - | - | 4 | 2.5 | 5.5 | 3.1 |
| 9 Convergent side-scrapers, symmetric | 3 | - | - | - | 3 | 1.9 | 4.2 | 2.3 |
| 10 Convergent side-scrapers, angled-*déjeté* | 1 | 1 | - | - | 2 | 1.2 | 2.8 | 1.5 |
| 11 Transverse side-scrapers | 4 | - | - | - | 4 | 2.5 | 5.5 | 3.1 |
| 12 Side-scrapers, inversely retouched | 1 | - | - | - | 1 | 0.6 | 1.4 | 0.8 |
| 13 End-scrapers on blades | 1 | - | - | | 1 | 0.6 | 1.4 | 0.8 |
| 14 Nucleiform burins | 1 | - | - | | 1 | 0.6 | 1.4 | 0.8 |
| 15 Notched flakes | 9 | 2- | 2 | | 13 (1) | 8.0 | 18.0 | 10.1 |
| 16 Notched blades | 1 | - | - | | -1 | 0.6 | 1.4 | 0.8 |
| 17 Denticulated flakes | 15 | 1 | 5 | | 23 (5) | 14.2 | 31.9 | 17.8 |
| 18 Denticulated blades | 1 | - | 1 | - | 2 | 1.2 | 2.8 | 1.5 |
| 19 Retouched and notched or denticulated pieces | 3 | 4 | - | - | 7 (2) | 4.3 | 9.7 | 5.4 |
| 20 Choppers | 1 | - | - | | 1 | 0.6 | 1.4 | 0.8 |
| 21 Chopping-tools | 1 | - | - | | 1 | 0.6 | 1.4 | 0.8 |
| 22 Bifaces | 1 | - | - | 1 | 1 | 0.6 | 1.4 | 0.8 |
| 23 Retouched flakes | 36 | 11 | 4 | 3 | 54 (3) | 33.3 | - | 41.9 |
| 24 Retouched blades | 3 | - | - | - | 3 | 1.9 | - | 2.3 |
| Base | 120 | 22 | 11 | 9 | 162 | 162 | 72 | 129 |

Table 3. Jebel Kobkabba. Measured attributes of selected debitage categories.

| Debitage categories | | n | min | max | Sx | x | s | s² | Mode Range | No. in mode |
|---|---|---|---|---|---|---|---|---|---|---|
| Primary flakes | L | 118 | 14 | 183 | 6712 | 56.88 | 28.44 | 808.63 | 41-45 | 16 |
| | W | 135 | 22 | 227 | 7168 | 53.10 | 28.27 | 799.27 | 41-45 | 22 |
| | T | 140 | 1 | 87 | 2823 | 20.16 | 12.72 | 161.89 | 15-16 | 22 |
| | ◁ | 77 | 41 | 100 | 5598 | 72.70 | 15.96 | 254.70 | 76-80 | 17 |
| Primary blades | L | 14 | 53 | 213 | 1268 | 90.57 | 37.56 | 1410.67 | 76-80 | 2 |
| | | | | | | | | | 81-85 | 2 |
| | | | | | | | | | 91-95 | 2 |
| | | | | | | | | | 106-110 | 2 |
| | W | 21 | 20 | 78 | 798 | 38.00 | 14.76 | 218.00 | 26-30 | 5 |
| | T | 21 | 11 | 51 | 448 | 21.33 | 9.45 | 89.37 | 13-14 | 4 |
| Initial cores | L | 14 | 40 | 149 | 1014 | 72.43 | 29.91 | 894.82 | 46-50 | 3 |
| | W | 14 | 41 | 159 | 1230 | 87.86 | 28.08 | 788.55 | 91-95 | 3 |
| | T | 14 | 34 | 165 | 1088 | 77.71 | 35.03 | 1227.20 | 34-35 | 2 |
| | | | | | | | | | 61-65 | 2 |
| | | | | | | | | | 81-85 | 2 |
| | | | | | | | | | 111-115 | 2 |
| | ∅ | 13 | 54 | 93 | 985 | 75.77 | 12.94 | 111.05 | 81-90 | 6 |
| Levallois cores preparation flakes | L | 13 | 30 | 111 | 717 | 55.15 | 22.97 | 527.51 | 36-40 | 3 |
| | W | 14 | 28 | 76 | 641 | 45.79 | 14.04 | 197.03 | 36-40 | 3 |
| | T | 14 | 8 | 26 | 223 | 15.93 | 5.61 | 31.49 | 22-23 | 3 |
| | ∅ | 14 | 45 | 88 | 973 | 69.50 | 10.27 | 105.53 | 61-65 | 5 |
| Levallois cores | L | 15 | 46 | 134 | 1370 | 91.33 | 23.23 | 539.42 | 66-70 | 2 |
| | | | | | | | | | 76-80 | 2 |
| | | | | | | | | | 86-90 | 2 |
| | | | | | | | | | 111-115 | 2 |
| | W | 18 | 55 | 107 | 1365 | 75.83 | 14.91 | 222.25 | 56-60 | 3 |
| | | | | | | | | | 71-75 | 3 |
| | | | | | | | | | 76-80 | 3 |
| | T | 18 | 16 | 61 | 636 | 35.33 | 11.15 | 124.22 | 36-40 | 5 |
| | ◁ | 15 | 58 | 90 | 1087 | 72.47 | 11.13 | 123.98 | 61-70 | 5 |
| Levallois flakes | L | 24 | 32 | 107 | 1467 | 61.13 | 18.95 | 358.94 | 36-40 | 4 |
| | | | | | | | | | 51-55 | 4 |
| | W | 26 | 23 | 107 | 1365 | 52.50 | 15.40 | 237.02 | 56-60 | 6 |
| | T | 29 | 9 | 28 | 476 | 16.41 | 5.27 | 27.76 | 15-16 | 5 |
| | ◁ | 27 | 56 | 94 | 1977 | 73.22 | 8.14 | 66.25 | 71-75 | 9 |
| Single platform cores | L | 10 | 35 | 97 | 671 | 67.10 | 18.71 | 349.89 | 56-60 | 2 |
| | | | | | | | | | 71-75 | 2 |
| | | | | | | | | | 96-97 | 2 |
| | W | 10 | 30 | 83 | 637 | 63.70 | 15.61 | 243.81 | 56-60 | 2 |
| | | | | | | | | | 81-83 | 2 |
| | T | 10 | 35 | 139 | 732 | 73.20 | 31.08 | 966.16 | 61-65 | 3 |
| | ◁ | 10 | 60 | 87 | 740 | 74.00 | 9.22 | 85.00 | 60-69 | 4 |
| Flakes from single platform cores | L | 89 | 30 | 115 | 4765 | 53.54 | 16.57 | 274.47 | 46-50 | 16 |
| | W | 112 | 26 | 111 | 5202 | 46.45 | 16.32 | 266.41 | 36-40 | 17 |
| | | | | | | | | | 41-45 | 17 |
| | | | | | | | | | 46-50 | 17 |
| | T | 117 | 6 | 35 | 1924 | 16.44 | 5.86 | 34.37 | 13-14 | 17 |
| | ◁ | 86 | 46 | 96 | 6234 | 72.49 | 10.73 | 115.13 | 66-70 | 16 |
| Flakes from opposite platform cores | L | 7 | 43 | 82 | 440 | 62.86 | 15.74 | 247.84 | 43-45 | 2 |
| | W | 10 | 34 | 103 | 545 | 54.50 | 19.82 | 392.85 | 34-35 | 2 |
| | | | | | | | | | 36-40 | 2 |
| | T | 10 | 1 | 53 | 200 | 20.00 | 13.28 | 176.40 | 10-11 | 2 |
| | | | | | | | | | 27-28 | 2 |
| | ◁ | 8 | 58 | 90 | 614 | 76.75 | 10.19 | 103.94 | 81-85 | 2 |
| | | | | | | | | | 86-90 | 2 |
| Changed orientation flake cores | L | 8 | 58 | 95 | 583 | 72.88 | 11.31 | 127.86 | 61-65 | 2 |
| | W | 8 | 47 | 133 | 646 | 80.75 | 29.00 | 840.94 | 56-60 | 2 |
| | T | 8 | 37 | 112 | 492 | 61.50 | 24.64 | 607.25 | 41-45 | 2 |
| | | | | | | | | | 46-50 | 2 |
| | ◁ | 9 | 61 | 89 | 673 | 74.78 | 10.11 | 102.17 | 61-70 | 4 |
| Flakes from changed orientation cores | L | 50 | 32 | 153 | 3302 | 66.04 | 25.54 | 652.52 | 56-60 | 8 |
| | W | 60 | 28 | 178 | 3480 | 58.00 | 24.64 | 607.07 | 41-49 | 9 |
| | | | | | | | | | 51-55 | 9 |
| | T | 61 | 7 | 56 | 1340 | 21.97 | 9.87 | 97.51 | 13-14 | 11 |
| | ◁ | 36 | 52 | 105 | 2806 | 77.94 | 10.75 | 115.66 | 81-85 | 9 |
| Blades from single platform cores | L | 10 | 43 | 107 | 688 | 68.80 | 18.12 | 328.36 | 61-65 | 3 |
| | W | 28 | 19 | 55 | 855 | 40.61 | 8.50 | 72.32 | 26-30 | 9 |
| | T | 28 | 7 | 29 | 389 | 13.89 | 5.90 | 34.81 | 13-14 | 9 |
| | ◁ | 11 | 67 | 95 | 882 | 80.18 | 8.57 | 73.42 | 81-85 | 3 |

Table 4. Jebel Kobkabba. Measured attributes of selected tool categories.

| Tool category | | n. | min | max | Sx | x | s | s² | Mode Range | No. in mode |
|---|---|---|---|---|---|---|---|---|---|---|
| Notched flakes | L | 9 | 33 | 81 | 559 | 62.11 | 15.76 | 248.32 | 71-75 | 2 |
| | W | 13 | 28 | 95 | 645 | 49.62 | 18.36 | 337.16 | 35-40 | 3 |
| | T | 13 | 10 | 27 | 253 | 19.46 | 4.63 | 21.48 | 19-20 | 3 |
| | | | | | | | | | 21-22 | 3 |
| | ∢ | 7 | 63 | 96 | 529 | 75.57 | 9.94 | 98.82 | 71-75 | 3 |
| Denticulated flakes | L | 14 | 38 | 104 | 861 | 61.50 | 19.43 | 377.68 | 46-50 | 3 |
| | W | 21 | 26 | 84 | 1026 | 48.86 | 16.58 | 274.79 | 26-30 | 3 |
| | | | | | | | | | 41-45 | 3 |
| | | | | | | | | | 46-50 | 3 |
| | T | 23 | 8 | 25 | 348 | 15.13 | 5.30 | 28.11 | 13-14 | 5 |
| | ∢ | 10 | 50 | 92 | 710 | 71.00 | 13.04 | 170.00 | 61-65 | 4 |
| Retouched flakes | L | 37 | 21 | 121 | 2293 | 61.97 | 22.27 | 496.08 | 61-65 | 7 |
| | W | 51 | 23 | 126 | 2586 | 58.55 | 23.40 | 547.46 | 56-60 | 10 |
| | T | 54 | 3 | 56 | 1146 | 21.22 | 11.24 | 126.40 | 19-20 | 7 |
| | ∢ | 25 | 37 | 90 | 1873 | 74.92 | 13.15 | 172.87 | 86-90 | 7 |

Table 5. Jebel Kobkabba. General structure of assamblages from areas A/A(s) and B/C (in brackets number of tools made on Levallois debitage is indicated).

| | General classes of debitage | A/A(s) area n. | % | B/C area n. | % | Total n. | % |
|---|---|---|---|---|---|---|---|
| | I. Class of primary flaking | | | | | | |
| 1 | Primary flakes | 76 | 15.7 | 64 | 48.5 | 140 | 22.6 |
| 2 | Primary blades | 18 | 3.7 | 3 | 2.3 | 21 | 3.4 |
| 3 | Initial cores | 11 | 2.3 | 3 | 2.3 | 14 | 2.6 |
| | II. Levallois class | | | | | | |
| 4 | Levallois core preparation flakes | 13 | 2.7 | 1 | 0.7 | 14 | 2.6 |
| 5 | Levallois unstrucked cores | 8 | 1.7 | 3 | 2.3 | 11 | 1.7 |
| 6 | Levallois cores | 6 | 1.2 | 1 | 0.7 | 7 | 1.1 |
| 7 | Levallois flakes | 26 | 5.4 | 3 | 2.3 | 29 | 4.7 |
| 8 | Levallois blades | 4 | 0.8 | - | - | 4 | 0.6 |
| 9 | Levallois points | 3 | 0.6 | - | - | 3 | 0.5 |
| | III. Class of single platform flake cores | | | | | | |
| 10 | Single platform flake cores | 8 | 1.6 | 2 | 1.5 | 10 | 1.6 |
| 11 | Flakes from single platform cores | 99 | 20.4 | 18 | 13.6 | 117 | 18.9 |
| | IV. Class of opposite platform flake cores | | | | | | |
| 12 | Opposite platform flake cores | 2 | 0.4 | - | - | 2 | 0.3 |
| 13 | Flakes from opposite platform cores | 7 | 1.4 | 3 | 2.3 | 10 | 1.6 |
| | V. Class of changed orientation flake cores | | | | | | |
| 14 | Changed orientation flake cores | 7 | 1.4 | 1 | 0.7 | 8 | 1.3 |
| 15 | Flakes from changed oriéntation cores | 52 | 10.7 | 9 | 6.8 | 61 | 9.8 |
| | VI. Class of undetermined flakes | | | | | | |
| 16 | Undetermined flakes | 57 | - | 20 | - | 77 | - |
| | VII. Class of single platform blade cores | | | | | | |
| 17 | Single platform blade cores | 2 | 0.4 | 1 | 0.7 | 3 | 0.5 |
| 18 | Blades from single platform cores | 25 | 5.2 | 3 | 2.3 | 28 | 4.5 |
| | VIII. Class of opposite platform blade cores | | | | | | |
| 19 | Opposite platform blade cores | 1 | 0.2 | - | - | 1 | 0.1 |
| 20 | Blades from opposite platform cores | 3 | 0.6 | - | - | 3 | 0.5 |
| | IX. Class of changed orientation blade cores | | | | | | |
| 21 | Blades from changed orientation cores | 1 | 0.2 | - | - | 1 | 0.1 |
| | X. Class of core trimming pieces | | | | | | |
| 22 | Core tablets | 2 | 0.4 | - | - | 2 | 0.3 |
| 23 | Core trimming blades | 2 | 0.4 | - | - | 2 | 0.3 |
| | XI. Class of chips | | | | | | |
| 24 | Flaking chips | 13 | - | - | - | 13 | - |
| | XII. Class of retouched tools | | | | | | |
| 25 | Retouched tools | 109 (11) | 22.5 | 17 (3) | 12.9 | 126 (14) | 20.4 |
| | XIII. Undetermined and fragments | | | | | | |
| 26 | Chunks | 26 | - | - | - | 26 | - |
| 27 | Undetermined cores and core fragments | 1 | - | 1 | - | 2 | - |
| | Total (restricted) [1] | 485 | 99.9 | 132 | 99.9 | 617 | 100.0 |
| | Total | 582 | - | 153 | - | 735 | - |

[1] Counted without undetermined pieces, chips and chunks

Table 6. Jebel Kobkabba. Area A/A(s). Measured attributes of selected categories of debitage.

| Debitage categories | | n. | min | max | Sx | x | s | s² | Mode Range | No. in mode |
|---|---|---|---|---|---|---|---|---|---|---|
| Primary flakes | L | 66 | 14 | 183 | 4129 | 62.56 | 33.22 | 1103.64 | 41-45 | 10 |
| | W | 72 | 22 | 227 | 4154 | 57.69 | 34.99 | 1224.35 | 31-35 | 10 |
| | T | 76 | 1 | 87 | 1675 | 22.04 | 15.30 | 234.01 | 15-16 | 14 |
| | ∢ | 51 | 45 | 100 | 3876 | 76.00 | 14.39 | 207.21 | 76-80 | 11 |
| Primary blades | L | 12 | 53 | 219 | 1102 | 91.83 | 40.42 | 1633.97 | 56-60 | 3 |
| | W | 18 | 20 | 78 | 688 | 38.22 | 15.22 | 231.73 | 21-25 | 3 |
| | | | | | | | | | 26-30 | 3 |
| | | | | | | | | | 31-35 | 3 |
| | | | | | | | | | 41-45 | 3 |
| | T | 18 | 11 | 51 | 384 | 21.33 | 9.91 | 98.22 | 11-12 | 3 |
| | | | | | | | | | 13-14 | 3 |
| Initial cores | L | 11 | 40 | 120 | 770 | 70.00 | 20.04 | 485.82 | 71-75 | 2 |
| | W | 11 | 60 | 159 | 1014 | 92.18 | 27.89 | 777.60 | 76-80 | 2 |
| | T | 11 | 34 | 165 | 838 | 76.18 | 37.02 | 1370.15 | 31-35 | 2 |
| | | | | | | | | | 65-70 | 2 |
| | ∢ | 10 | 54 | 93 | 768 | 76.80 | 13.70 | 187.76 | 81-90 | 5 |
| Levallois cores preparation flakes | L | 12 | 30 | 111 | 681 | 56.75 | 23.20 | 538.35 | 36-40 | 2 |
| | | | | | | | | | 51-55 | 2 |
| | W | 13 | 28 | 76 | 601 | 46.23 | 14.47 | 209.41 | 26-30 | 2 |
| | | | | | | | | | 31-35 | 2 |
| | | | | | | | | | 36-40 | 2 |
| | | | | | | | | | 46-50 | 2 |
| | T | 13 | 8 | 26 | 213 | 16.38 | 5.57 | 31.01 | 22-23 | 3 |
| | ∢ | 13 | 45 | 88 | 901 | 69.31 | 10.64 | 113.14 | 61-65 | 5 |
| Levallois cores | L | 13 | 46 | 134 | 1188 | 91.38 | 23.10 | 533.78 | 76-80 | 2 |
| | | | | | | | | | 86-90 | 2 |
| | W | 14 | 55 | 102 | 1041 | 74.36 | 13.74 | 188.66 | 71-75 | 3 |
| | T | 14 | 16 | 61 | 482 | 34.43 | 12.43 | 154.53 | 26-30 | 4 |
| | ∢ | 12 | 58 | 90 | 890 | 74.17 | 11.48 | 131.81 | 56-60 | 3 |
| | | | | | | | | | 66-70 | 3 |
| | | | | | | | | | 86-90 | 3 |
| Levallois flakes | L | 22 | 32 | 107 | 1339 | 60.86 | 19.62 | 384.54 | 36-40 | 4 |
| | | | | | | | | | 51-55 | 4 |
| | W | 23 | 23 | 107 | 1211 | 52.65 | 16.15 | 260.66 | 46-50 | 5 |
| | | | | | | | | | 56-60 | 5 |
| | T | 26 | 9 | 28 | 414 | 15.92 | 5.05 | 25.46 | 9-10 | 4 |
| | | | | | | | | | 11-12 | 4 |
| | | | | | | | | | 15-16 | 4 |
| | | | | | | | | | 19-20 | 4 |
| | ∢ | 24 | 56 | 86 | 1749 | 72.88 | 7.24 | 52.44 | 71-75 | 9 |
| Single platform cores | L | 8 | 47 | 97 | 562 | 70.25 | 17.11 | 292.69 | 56-60 | 2 |
| | | | | | | | | | 96-97 | 2 |
| | W | 8 | 30 | 83 | 512 | 64.00 | 17.36 | 301.25 | 81-83 | 2 |
| | T | 8 | 35 | 139 | 624 | 78.00 | 32.87 | 1080.25 | 61-65 | 2 |
| | ∢ | 8 | 60 | 87 | 598 | 74.75 | 9.86 | 97.19 | 81-87 | 3 |
| Flakes from single platform cores | L | 75 | 30 | 115 | 4109 | 54.79 | 17.09 | 292.01 | 46-50 | 14 |
| | W | 94 | 26 | 111 | 4482 | 47.68 | 16.79 | 281.88 | 46-50 | 16 |
| | T | 99 | 6 | 35 | 1634 | 16.51 | 5.87 | 34.51 | 13-14 | 16 |
| | ∢ | 75 | 46 | 93 | 5403 | 72.04 | 10.26 | 105.27 | 66-70 | 16 |
| Flakes from opposite platform cores | L | 6 | 43 | 82 | 365 | 60.83 | 16.14 | 260.47 | 43-45 | 2 |
| | W | 7 | 34 | 103 | 403 | 57.57 | 22.07 | 487.10 | 35-40 | 2 |
| | T | 7 | 1 | 53 | 142 | 20.29 | 15.28 | 233.35 | 16-20 | 2 |
| | ∢ | 6 | 56 | 90 | 451 | 75.17 | 11.33 | 128.47 | 86-90 | 2 |
| Changed orientation flake cores | L | 7 | 58 | 95 | 502 | 71.71 | 11.63 | 135.35 | 61-65 | 2 |
| | W | 7 | 47 | 133 | 525 | 75.00 | 26.39 | 696.57 | 56-60 | 2 |
| | T | 7 | 37 | 112 | 418 | 59.71 | 25.86 | 668.49 | 41-45 | 2 |
| | | | | | | | | | 46-50 | 2 |
| | _ | 8 | 61 | 89 | 584 | 73.00 | 9.30 | 86.50 | 61-70 | 4 |
| Flakes from changed orientation cores | L | 42 | 32 | 153 | 2759 | 65.69 | 25.18 | 633.79 | 41-45 | 6 |
| | | | | | | | | | 61-65 | 6 |
| | W | 51 | 32 | 178 | 2950 | 57.84 | 25.02 | 625.95 | 41-45 | 8 |
| | T | 52 | 9 | 56 | 1133 | 21.79 | 9.87 | 97.40 | 13-14 | 11 |
| | ∢ | 31 | 52 | 105 | 2461 | 77.94 | 11.26 | 126.90 | 81-85 | 7 |
| Blades from single platform cores | L | 8 | 43 | 107 | 557 | 69.63 | 20.14 | 405.48 | 61-65 | 2 |
| | W | 25 | 19 | 55 | 773 | 30.92 | 8.90 | 79.27 | 26-30 | 7 |
| | | | | | | | | | 31-35 | 7 |
| | T | 25 | 7 | 29 | 354 | 14.16 | 6.16 | 37.89 | 13-14 | 7 |
| | ∢ | 9 | 67 | 90 | 710 | 78.89 | 7.91 | 62.54 | 67-70 | 2 |
| | | | | | | | | | 71-75 | 2 |
| | | | | | | | | | 81-85 | 2 |

Table 7. Jebel Kobkabba. Area A/A(s). Measured attributes of selected retouched tool categories.

| Tool category | | n. | min | max | Sx | x | s | $s^2$ | Mode Range | Number in mode |
|---|---|---|---|---|---|---|---|---|---|---|
| Notched flakes | L | 7 | 42 | 81 | 466 | 66.57 | 13.33 | 177.67 | 71-75 | 2 |
| | W | 11 | 28 | 95 | 546 | 49.64 | 19.95 | 398.05 | 31-35 | 2 |
| | | | | | | | | | 36-40 | 2 |
| | | | | | | | | | 41-45 | 2 |
| | T | 11 | 10 | 27 | 214 | 19.45 | 5.00 | 24.98 | 19-20 | 3 |
| | ∢ | 7 | 63 | 96 | 529 | 75.57 | 9.94 | 98.82 | 71-75 | 3 |
| Denticulated flakes | L | 11 | 43 | 104 | 696 | 63.27 | 20.52 | 421.11 | 46-50 | 3 |
| | W | 14 | 30 | 84 | 769 | 54.93 | 16.57 | 274.49 | 50-54 | 3 |
| | T | 16 | 8 | 25 | 261 | 16.31 | 5.53 | 30.84 | 12-13 | 4 |
| | ∢ | 7 | 62 | 92 | 512 | 73.14 | 11.15 | 124.41 | 62-65 | 3 |
| Retouched flakes | L | 33 | 21 | 121 | 2032 | 61.58 | 22.99 | 528.73 | 61-65 | 6 |
| | W | 45 | 23 | 126 | 2721 | 60.47 | 23.92 | 572.16 | 56-60 | 8 |
| | T | 47 | 3 | 56 | 1034 | 22.00 | 11.68 | 236.38 | 17-18 | 6 |
| | | | | | | | | | 21-22 | 6 |
| | ∢ | 21 | 37 | 90 | 1543 | 13.63 | 13.63 | 185.77 | 86-90 | 5 |

Table 8. Jebel Kobkabba. Areas B/C. Measured attributes of selected debitage categories.

| Debitage categories | | n. | min | max | Sx | x | s | $s^2$ | Mode Range | Number in mode |
|---|---|---|---|---|---|---|---|---|---|---|
| Primary flakes | L | 52 | 27 | 123 | 2583 | 49.47 | 18.47 | 341.30 | 51-55 | 8 |
| | W | 63 | 23 | 103 | 3014 | 47.84 | 16.18 | 261.69 | 41-45 | 17 |
| | T | 64 | 8 | 47 | 1148 | 17.94 | 8.19 | 67.12 | 13-14 | 12 |
| | ∢ | 26 | 41 | 94 | 1722 | 66.23 | 16.87 | 284.64 | 76-80 | 6 |
| Flakes from single platform cores | L | 14 | 32 | 65 | 656 | 46.86 | 11.29 | 127.55 | 36-40 | 4 |
| | W | 18 | 27 | 70 | 720 | 40.00 | 11.67 | 136.11 | 27-30 | 5 |
| | T | 18 | 8 | 31 | 290 | 16.11 | 5.78 | 33.43 | 19-20 | 4 |
| | ∢ | 11 | 49 | 96 | 831 | 75.55 | 13.10 | 171.70 | 76-80 | 4 |
| Flakes from changed orientation cores | L | 8 | 39 | 128 | 543 | 67.88 | 27.33 | 746.86 | 56-60 | 3 |
| | W | 9 | 28 | 111 | 530 | 58.89 | 22.34 | 499.21 | 46-50 | 2 |
| | | | | | | | | | 51-55 | 2 |
| | T | 9 | 7 | 39 | 207 | 23.00 | 9.84 | 96.89 | 31-32 | 2 |

Table 9. Jebel Kobkabba. Technical indices.

| Index | A/A(s) area | B/C area | Total |
|---|---|---|---|
| Early Workshop Index | 19.71 | 44.44 | 24.71 |
| Levallois Workshop Index | 2.39 | 0.65 | 2.01 |
| Core Index | 8.83 | 7.84 | 8.62 |
| Levallois Core Index | 29.17 | 33.33 | 30.00 |
| Tool Index | 33.52 | 13.73 | 29.17 |
| Levallois Index (IL) | 11.98 | 3.22 | 10.98 |
| Blade Index (Ilam) | 13.28 | 4.89 | 11.22 |
| Levallois Group Index (IGL) | 14.64 | 8.33 | 13.29 |

Table 10. Jebel Kobkabba. Typological indices.

| Indices Tools | large | ess. | ret. tools |
|---|---|---|---|
| Levallois Typological Index (ILty) | 20.37 | 00.00 | 00.00 |
| Side-scraper Index (IR) | 9.88 | 22.22 | 12.40 |
| Charentian Index (IC) | 4.94 | 11.11 | 6.20 |
| Biface Index (IB) | 0.62 | 1.39 | 0.78 |
| I - Lavallois Group | 20.37 | 00.00 | 00.00 |
| II - Moustarian Group | 11.11 | 25.00 | 13.95 |
| III - Upper Palaeolithic Group | 1.23 | 2.78 | 1.55 |
| IV - Denticulate Group | 15.43 | 34.72 | 19.38 |
| IMp - Mousterian and Mousterian-like Points Index | 1.23 | 2.78 | 1.55 |

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
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Mahmoud el-Tayeb Mahmoud

# Neolithic sites on the White Nile

The aim of this paper is not to present an analytic study of the subject as much as to throw some light on a long forgotten area of the White Nile by using it as an example for the threat facing archaeological sites in the Sudan.

One of the most dangerous problems causing great damage to the antiquities is the lack of co-ordination between various governmental administrations and departments for the protection of the national heritage. The best example of this problem could be the El-Dueim-Rabak road, built by the German company "Strabag" between 1982 and 1984. Numerous sites along the road were used as quarries for the soil needed to build the pavement. Among the most badly affected by such activity is the site of El-Kawa. Information concerning these loses came to the Antiquity Service from the soil engineer of the company. Mr. Horace Cook brought to the Antiquity Service office a good deal of archaeological material collected by him from El-Kawa and other sites along the road. The material consisted of pottery sherds, lithic tools, and even a complete bowl, most probably of a Post-Meroitic origin.

Due to the information gained from Mr. Cook and others, the Service decided to inspect the area. This inspection was conducted by Patrice Lenoble from the French Unit, and myself, from May 2nd to 6th in 1984. The inspection included sites on both sides of the White Nile beginning at El-Kawa, as well as Aba Island and Kenana area.

Despite its archaeological richness, the White Nile has received very little attention. The work of Arkell in Kosti (Arkell 1950: 24-40) was followed by a few operations by Marshall and Abd El-Rahman Adam at Ushara south of Omdurman (Marshall & Adam 1953: 40-46), Crawford at Geteina (Crawford 1953a: 1-29; 1953b) and more recently the excavation at Shabona in the early 70's by D. Clark (1989: 389-410). Further to the south, Else Kleppe worked in the area of Malakal in 1976. Randy Haaland and Ali Tigani were in Rabak and Gebel Tomat in 1983. Since 1972 several inspections were carried out by Khidir Adam Eisa, F. Geus, Salah Omer, Gamal M. Idris and Abd Alla El Nazir. Most of this work was based on sporadic finds, and was limited to the eastern bank of the river.

**El Kawa**

El-Kawa lies some 250 kilometres south of Khartoum on the right bank of the White Nile. This area geologically is part of the clay terrace of the eastern bank. On this terrace twelve sites related to various periods from Neolithic to Funj were registered around the town. All were mapped by two measured bearings standing on the opposite bank. Some sites were large mounds, obviously settlements, in many cases with cemeteries connected to them at the lowest levels.

Qoz Farrah, "The Borrow Pit" forming one of the major soil sources needed for building the road pavement, was a large mound located just a few kilometres east of El-Kawa. Undoubtedly it had been the highest mound in the area, extending for more than one kilometre long and almost two metres high. The thickness of the deposit and the variety and richness of its artifacts, point to a lengthy settlement. Enormous quantities of pottery sherds covered the entire mound. They were composed of various fabrics and very rich in decoration, mainly dotted lines, incised finger nails, dots and other geometric patterns.

The decoration of El-Kawa pottery resembles that of the C-Group and Pre-Kerma, as well as Kassala pottery. Beside the pottery sherds numerous animal, fish bones and molluscs could be found in most of El-Kawa's twelve sites. A common feature is a distinguishable red ware so far unknown outside the White Nile area, except at Kassala.

**Aba Island**

Aba, the largest island on the White Nile and the private property of the El-Mahdi's family, is nearly if not totally closed to officials. It was visited for the first time by the Antiquities Service when a school teacher from Hilat El-Rahmanyiah informed the Service about finding a human skeleton associated with a quantity of ostrich egg-shell beads, while preparing to install water-pipes in his house.

Hilat El-Rahmanyiah is situated on a slope of a huge ancient mound. The walls of the recent houses contain many pottery sherds, fragments of bones and snail shells. In some trenches dug along the streets for newly introduced main water-pipes partial skeletons and fragments of human bones could be seen in clear greyish archaeological layer. Here also it seems that the cemetery is located at a lower level than the settlement. The pottery found at the site is very similar to the brushed ware of El-Kawa.

**Fengoga**

The site of Fengoga lies on the left side of the Kenana Sugar Company road, about three kilometres south of the junction with the Sennar - Rabak asphalt. The site bears the name of the recent village on it; is a large low mound - the only one to be seen in this area on the black clay of the Gezira. The density of the pottery sherds and the existence of human bones, point to a large settlement in association with a cemetery. The pottery is recognizably similar to those of El-Kawa sites.

### West Bank

Unlike the Gezira, the west side of the White Nile is composed of an alluvial mud strip extending along the river. To the west is a low sandy ridge, part of the Umm Ruwaba Series that consist of accumulation of unconsolidated sands and gravels. Along the road between Kosti and El-Dueim, several sites were checked. The most remarkable are at Qoz Kubi and Rawdat.

The archaeological mounds of El-Mukhtar are located on sand dunes like all minor ones. All of these sites yield eroded pottery sherds of a red ware, decorated in rocker and incised dot techniques. Shells, but not human or animal bones were observed on the surface. Only two sites were registered in direct connection with the river bank; a site at Quli, just north of Kosti and another at El-Kireda, west of El-Kawa. This second site seems to be an extension to site nos. 5, 9 and 10 near Hilat Saeed (see F. Geus 1984) as the pottery appear to be the same on both sides of the river.

The last point in our inspection was Umm Jer Island, from which a school teacher brought some fossiled bones. Unfortunately we failed to find the teacher and in consequence the site he found.

### Conclusion

The White Nile area was without doubt a major cultural zone from early prehistoric times. El-Geteina, El-Dueim and El-Kawa obviously can be identified as important cultural centres requiring more attention.

Although the eastern bank of the river is relatively well known, the west bank yields more archaeological sites of great interest and quite probably earlier date. Noteworthy is, that no wavy-line decorated nor wheel made pottery was observed on both sides of the river in the inspected area.

Dating the sites mentioned above would be very difficult without proper excavation and further study of the archaeological materials. Nevertheless, due to the collected materials, their classification and comparison with Pre-Kerma and Kassala pottery, a late Neolithic date would be quite a reasonable assumption.

The White Nile region remains an unstudied area. A great deal of archaeological data has been lost forever through different activities undertaken by indifferent authorities and the damage continues at a rapid rate. Such an area which could be a significant key to better understanding of unsolved problems in the history of the Sudan, deserves serious treatment.

### Acknowledgements

The material mentioned above in this paper had been examined by Ch. Bonnet, I. Caneva and R. Fattovitch, in 1984. The relative date suggested in the conclusion was due to discussions held with the above named experts. The text was proof read by Dr. Jacqueline Phillips.

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Interregional Contacts in the Later Prehistory
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# New light on Mesolithic resource scheduling and site inhabitation in Central Sudan

## Introduction

Early Holocene hunter-gatherers in the Central Sudanese Nile Valley are generally considered to represent mobile groups, inhabiting base camps near the Nile during the dry season and dispersing in the hinterlands at the onset of the rains, returning to the river when the waters started receding (e.g. Arkell 1949). Thus Clark (1989), referring to the Mesolithic settlement of Shabona, states: "There is every reason to suppose that the pattern of occupation was similar to that seen among ethnic groups such as the Nilotic peoples on the Upper Nile to the south. These groups occupy country that the evidence suggests is comparable to that of Shabona at the time it was occupied in the early 6th millennium B.C." The seasonal nature of the site was deduced from the "shallow nature of the site and variable weathering patterns on the bone" and the fact that "the site would almost certainly have been subject to some degree of annual flooding". However, archaeological research by Caneva (1983) at Saggai and by Haaland (1992) at the confluence of the Nile and the Atbara and further to the north strongly suggests that the Mesolithic riparian communities of the Central Sudanese Nile Valley had a much more settled lifestyle than hitherto accepted.

The question of human groups seasonality inhabiting the Nile Valley is also addressed by Marks and Mohammed-Ali (1991: 254-5) when discussing Shaqadud in the late prehistory of the Central Sudan. Located about 50 km to the east of the Nile (Fig. 1), this site was considered a possible refuge for Mesolithic human groups coming from the Nile Valley during the rains. According to Marks and Mohammed-Ali (1991), however, archaeological evidence does not support this view, " ... it seems more likely that the Mesolithic occupants of Shaqadud were basically steppe-adapted, and used to the steppe's raw material resources, its plants, and its animals. Shaqadud's proximity to the Nile Valley does not seem to have acted as a magnet on these folk. They did not go to the Nile to get 'desirable' raw materials, and they did not seem to have traded for them either".


Fig. 1. Map of the Central Sudan with the location of the sites mentioned in the text. Inset shows region relative to the Sudan.

Conceivably, a more coherent picture of how Central Sudanese Mesolithic hunter-gatherers ordered their lives throughout the year in response to the availability of plants and animals might come from palaeobotanical and archaeozoological research. In the case of archaeozoology, detailed studies about the exploitation of riverine vertebrates, i.e. mammals and reptiles that live near the river, are available (e.g. Gautier 1983, 1989; Peters 1986, 1989). However, these studies only deal with one aspect of Mesolithic subsistence, since at all sites a large part, if not the bulk of the faunal remains pertain to fishes. Because fish bones from excavations prior to 1989 have never been analysed in detail (Peters 1991), it is clear that any conclusion with respect to resource scheduling in space and time made so far is a priori based on an incomplete set of data. Unfortunately, most of the faunal material of the older excavations (Khartoum Hospital, Shabona) is not available anymore for detailed analysis, but extensive faunal samples were recently recovered by members of the Atbara Research Project (directed by R. Haaland and A.-A. Magid) during excavations at three Khartoum Mesolithic sites: Abu Darbein, El Damer and Aneibis (Fig. 1).

**The faunas**

The faunal remains reported here were obtained from three sites situated between the 5th and the 6th Nile cataract (Fig. 1). The sites are located on gravel ridges representing old river terraces. They are bordered by an alluvial plain towards the river (Nile/Atbara) and by a desert plateau away from the river. According to A. A. Magid and A. Al-Nadi (in litt.) large floodplains must have been present near El Damer and Aneibis, whereas at Abu Darbein the alluvial plain was considerably more narrow. The $^{14}C$ dates available for Abu Darbein range between 8640 ±120 to 8330 ± 100 bp (Haaland & Magid 1992). At El Damer, faunal samples were taken from two areas. The dates for the two areas are broadly contemporaneous and fall essentially between 8040 ± 120 and 7780 ± 110 bp. At Aneibis, the archaeofauna has been collected in area 4, which was inhabited mainly between 7890 ± 100 and 7570 ± 60 years bp.

It lies out of the scope of this paper to present detailed inventories of the archaeofaunas from the three sites - these will be published elsewhere (Peters in press), but a short overview of the animal species found might be useful. Five groups of animals are present, i.e. molluscs, fish, reptiles, birds and mammals. As to the molluscs, the freshwater snail *Pila* and the land snail *Limicolaria* form the bulk of the material. The rest of the shells mainly pertain to freshwater bivalves of the genera *Aspatharia*, *Mutela* and *Etheria*. The ichthyofauna is very rich, with at least 20 species in each of the samples. The genera *Polypterus, Protopterus, Mormyrus, Mormyrops, Gymnarchus, Distichodus, Citharinus, Barbus, Labeo, Clarias, Bagrus, Synodontis, Lates* as well as tilapias were caught by the site inhabitants. Reptilian remains include monitor (*Varanus niloticus*), crocodile (*Crocodylus niloticus*), rock python (*Python sebae*) and at least three freshwater turtles (*Trionyx, Pelomedusa, Pelusios*). The avifauna exhibits a riverine (darter, heron, stork, pochard) and a terrestrial component (ostrich, common quail, francolin, Arabian bustard). Over 35 species of mammals are present, including grivet (*Cercopithecus aethiops*), patas (*Erythrocebus patas*), porcupine (*Hystrix cristata*), cane rat (*Thryonomys swinderianus*), at least 10 species of carnivores, African elephant (*Loxodonta africana*), black rhinoceros (*Diceros bicornis*), hippopotamus (*Hippopotamus amphibius*), warthog (*Phacochoerus aethiopicus*), Salt's dikdik (*Madoqua saltiana*), oribi (*Ourebia ourebi*), bohor reedbuck

(*Redunca redunca*), kob (*Kobus kob*), red-fronted gazelle (*Gazella rufifrons*), barbary sheep (*Ammotragus lervia*), topi (*Damaliscus lunatus*), roan antelope (*Hippotragus equinus*) and African buffalo (*Syncerus caffer*).

## Resource scheduling and site inhabitation

### Biological data

On the basis of the habitat preferences of the different species it is possible to distinguish within the Central Sudanese Mesolithic faunas an aquatic, a riverine and a non-riverine component. Thus fish, crocodiles and Nile soft-shell can be considered aquatic species, whereas for example *Pila*, Nile monitor, rock python, guineafowl, cane rat, hippopotamus, oribi, reedbuck, kob, topi and buffalo prefer habitats adjacent to a river, hence riverine species. Aquatic and riverine species form the bulk of the material, implying that most Mesolithic fishing, gathering and hunting activities were confined to this part of the ecosystem. However, in each of the archaeofaunas we also find evidence for species that are independent of surface water and adapted to arid environments, e.g. dorcas gazelle, red-fronted gazelle, barbary sheep and Salt's dikdik. Sahelian living conditions prevailed outside the Nile and Atbara river valleys during the first half of the Holocene (Wickens 1982; Peters 1989, 1992), and the presence of theses ungulates suggests that the north-western Butana and the western Atbai (Fig. 1) respectively formed part of the Mesolithic site catchments.

When, where and how animals can be captured is primarily determined by the biology of the species and only secondarily by the available equipment (e.g. Seitz 1977: 66; von Brandt 1984: 32). In many fluviatile systems in Africa, the horizontal and vertical distribution of (semi)aquatic and riverine animals is related to the annual hydrological cycle of rivers and lakes. Consequently, a good knowledge of the topography of the waterbody and its surroundings, and of its behaviour in relation to, for example, rainfall patterns are necessary to maximize the exploitation of the animals frequenting this particular environment.

Traditional procurement of freshwater resources in sub-Saharan Africa is a function of the fluctuations of the water level. The arrival of the floodwaters causes a temporal expansion of the water area adjacent to a river or a lake. During the following dry period most of the floodplain is drained, leaving a network of depression pools, lagoons and swamps, some of which persist until the next flood (Welcomme 1979: 94). At the beginning of this cycle, many aquatic species undertake lateral migrations into these shallow flooded areas to feed and reproduce, both adults and new-borns benefiting from the mass of food and shelter available (e.g. Daget 1954: 21-23). As the plain dries out, most animals migrate back to the major water body, but part of the community remains in the standing waters. As is still the case in Africa, a good deal of fishing will take place at the beginning of the flooding. However, by far the most productive time for mollusc and fish procurement is when the waters are receding and at low waters in the dry season (e.g. Boulenger 1901: XXV; Sundström 1972: 17; Stewart 1989: 70, with references).

Collecting fresh *Pila, Lanistes, Aspatharia* and perhaps *Limicolaria* in a drying out foodplain does not pose particular problems. *Pila* and *Lanistes* will aestivate when their habitats, smaller waterbodies and papyrus swamps, are drying out, while *Aspatharia* are known to survive low river stands by burying themselves in the mud (van Damme 1984: 8,68). *Limicolaria* are partial to well-drained areas and clay-pans along the river (Crowley & Pain 1970) and may have been harvested there. At the edge of the river, empty *Mutela*, *Etheria* and *Aspatharia* shells could be collected all year round.

Fish species such as *Clarias, Barbus, Labeo*, tilapias, mormyrids and many other species undertake spawning runs when the floodwaters arrive (e.g. Gautier & van Neer 1989: 141-2, with references). For *Lates, Bagrus, Synodontis* and *Hydrocinus* detailed information on their spawning behaviour is lacking for the (Central Sudanese) Nile and the (lower) Atbara, but observations made elsewhere confirm that they lay their eggs in less deep parts of the main river or in smaller streams that are well-aerated (e.g. Daget 1954: 121, 245, 357). If adult *Lates, Bagrus, Synodontis* and *Hydrocinus* visit the alluvial plain at all, their stay is of short duration and limited to the deeper parts, i.e. in floodplain channels. When the waters recede adult fish migrate back towards the main waterbody before the juveniles (Gautier & van Neer 1989: 141, 144, with references). The extent and depth of the residual pools will determine which species are able to survive. At first, the number of species present may still be considerable. Molloy (1956: 58-59) notes that in the Southern Sudan, Nile perch (*Lates*), tilapias and a dozen other species were caught in a khor (= seasonal gully) that was drying out in a string of pools. Gradually, when pools become shallower and increasingly more deoxygenated because of evaporation, the species composition will change in favour of fish with a high affinity for dissolved oxygen (*Tilapia, Barbus*) or of fish that can breath atmospheric oxygen (*Clarias;* [Gautier & van Neer 1982]).

Aquatic reptiles are not trapped in residual pools since the animals can easily migrate over land. Being carnivorous, however, *Varanus, Trionyx, Crocodylus* and *Python* are attracted by the concentration of fish and this habit certainly makes them vulnerable to human predation, not the least because they interfere with human fish harvesting. In the present day Nile and Atbara, turtles and monitor are mainly captured with nets, as are python, which are known to swim well (Sweeney 1961: 46-47).

Herons, storks and the African darter are riverine species, feeding on fish and other aquatic organisms. As in reptiles, these species will frequent the alluvial plain in search of food and may therefore have been killed. Birds of the genera *Numida, Coturnix, Francolinus* and *Otis* are all adapted to arid environments, but a critical habitat feature appears to be the availability of surface water, especially in the dry season (Urban et al. 1986).

The temporary expansion of a waterbody also initiates a shift in dispersal patterns within the mammalian fauna. With the onset of the rains, certain species will leave the river valley and travel considerable distances or cover large areas in search of food. Other herbivores, however, have much smaller home ranges (*sensu* Jewell 1966), and might essentially be encountered in the same area throughout the year. Some of the frequently hunted ungulates at Abu Darbein, El Damer and Aneibis belong to the latter type. Topi, for example, may move onto the perimeter grasslands as soon as the plain is inundated. Later on they concentrate on the remaining patches of dry ground at the edge of the floodplain (Vesey-Fitzgerald 1960). Bohor reedbuck frequent the channels on the floodplain and stay there during the rains, resorting to areas of shallower flooding. For reasons of food and/or availability of surface water, it is likely that a number of other plant eating species were also met all year round in the early Holocene Nile and Atbara valleys, e.g. cane rat, hippopotamus, warthog, oribi and kob. With the onset of the dry season, game density at the confluence of the Nile and the Atbara can be expected to increase gradually, free water becoming rare in the arid hinterland. Towards the end of the dry season, many herbivore species will make (daily) excursions to and from points with surface water, following certain trails. This is the case in African buffalo, hippopotamus, zebra and kob. These animals are essentially drinkers and will also spend time foraging on the riverine pastures of the open plains. Other ungulates such as topi, bohor reedbuck and eland appear to be shaders by preference and will generally feed on green pasture in the vicinity of trees where they have no access to surface water (Vesey-Fitzgerald 1960).

Although game can be obtained all year round, the foregoing suggests that hunting may be of varying importance throughout the year. Because hunting success generally is related to game density, two periods of intensive hunting can a priori be postulated on the basis of the biological data, namely towards the end of the dry season, when game starts to concentrate in the river valleys, and at high water, when ungulates are packed on the narrow strip between alluvial plain and the arid hinterland. For sub-Saharan Africa there is ample ethnological information on game stalking during the dry season. Descriptions of hunting near waterbodies when flooding is at its maximum are also available in literature. For example in the Bangweulu swamps, the big lechwe (*Kobus leche*) drives take place in April and May when the high water following the rains has packed the lechwe on the southern plains (Brelsford 1946: 129). The game is driven into the water and killed with spears.

## Archaeozoological data

The foregoing biological data demonstrate when and where food animals can be most easily obtained by riparian communities. On the basis of the composition of the faunas and size or age distribution within the different animal groups, we will try to evaluate Central Sudanese Mesolithic animal exploitation in terms of season and place of capture.

To separate fish species with a prolonged stay on the alluvial plain from those that frequent the alluvial plain for a short period of the year or do not enter it at all, van Neer (1989) proposed the terms "floodplain dwellers" and "open water forms". If the ratio of "floodplain dwellers" (*Protopterus, Polypterus, Gymnarchus, Barbus, Labeo, Clarias* and *tilapias*) to "open water forms" (*Hydrocinus, Bagrus, Synodontis, Lates*) is considered, fishing at Abu Darbein focused on the river, whereas at El Damer I and II the floodplain witnessed an intensive exploitation. This is in agreement with the extent of the Early Holocene floodplain near the two sites, i.e. narrow at Abu Darbein, wide at El Damer. At Aneibis there must have been at least a 2 km wide floodplain between the site and the Nile, yet about 60% of the fish taken are open water forms (Peters 1991; 1993; in press). It could be argued that Aneibis represents some kind of dry season (fishing) camp, but its distance from the Nile makes this unlikely: traditionally temporary dry season fishing camps are located very close to the edge of the river (e.g. Sundström 1972: 40).

The size distribution of fish species can be used to deduce more precise information on season and place of capture. Unfortunately, as pointed out by Gautier and van Neer (1989: 143), growth rates of fish are very dependant on local circumstances, and from the size distribution of the fish remains alone it is not always easy or even possible to distinguish among mature animals that came to spawn on the alluvial plain, sexually immature fish that came to the floodplain only to feed, and juveniles that hatched at the beginning of the flood season. An overview of the literature on growth rates of *Clarias* and Tilapiini in different bodies of water in sub-Saharan Adrica is given by these authors. For the other major fish groups, almost no such data exist for Nilotic populations. For the Niger river, however, data on size of fingerlings and somewhat older individuals are available (Daget 1954). If applicable to our Mesolithic finds, the smallest size class proposed for each group would almost exclusively consist of individuals that are less than one year old.

As said, floodplain fishing was not practised on a large scale at Abu Darbein, and this may account for the absence of fingerlings or juvenile individuals in the ichthyofauna. Although the Atbara river must have been the principal fishing ground, the numerical importance of large Cyprinids and *Clarias* indicate that people also exploited the backwaters for spawning individuals at the beginning of the rainy season.

Fish procurement on the alluvial plain was a major activity at El Damer I. Given the size distribution of the fish, floodplain exploitation witnessed several stages, with spawning individuals (*Barbus, Labeo, Clarias*) taken at the floods. Fishing in the receding waters is perhaps illustrated by the presence of fingerlings of *Synodontis* and *Lates* in the samples. Fish were also captured in the residual ponds, as can be deduced from the number of small Clariids (20 to 50 cm TL), small Cyprinids (20-40 cm TL) and other species, likely to represent sexually immature fish that came to the floodplain only to feed. Fishing in the main Nile was practised after the waters receded, the economic important species now being *Synodontis, Bagrus* and *Lates*. Some *Protopterus* may have been dug out from their burrows in the mud after the floodplain dried out.

The ichthyofauna of El Damer II reflects a comparable situation as described for El Damer I, be it that for the first time very large Nile perch (*Lates niloticus*; > 140 cm) occur in the samples. Such creatures are confined to the deepest parts of fluvial systems and the exploitation thereof may imply progress in fishing technology (Peters 1991, in press).

Despite an extensive floodplain, which may have been exploited the way the site inhabitants of El Damer did, there is evidence that fishing in the river provided most of the fish at Aneibis. Perhaps floodplain topography altogether differed at the two places, or the flooding phase was shorter, making floodplain procurement less profitable at Aneibis. Judging from the size distribution of the open water forms *Bagrus* and *Lates*, a more intensive exploitation of the deeper facies of the Nile can be considered another alternative to explain the difference observed.

Reptiles have the potential for continual growth throughout their lives, and a comparison between growth rates in recent populations and bone size in fossil assemblages may provide information about age, and hence place and season of capture. Though we noted the presence of infantiles, juveniles and adults among the aquatic reptiles, the comparative collection available did not allow for a more precise evaluation.

Growth rates in bird bones are of limited use to evaluate the season of capture since epiphysional fusion in long bones occurs at an early stage of life, leaving almost no possibility to estimate the age of the animal macroscopically after the skeleton has reached maturity. Fortunately, many birds species undertake annual migrations and their appearance in the faunal record will inform us about the season of capture. Two such species are noted among the bird remains from El Damer II, namely the common quail (*Coturnix coturnix*) and the corncrake (*Crex crex*). These Palaearctic birds visit North Africa during winter and will frequent the Nile Valley from November to March (Urban et al. 1986).

In mammals, size of long bones and the state of fusion of the epiphyses can be used to age individuals. Unfortunately the fragmentation of the Mesolithic bone material made such an analysis impossible. However, age determination by means of tooth eruption and replacement and attrition of permanent teeth may provide a clue on hunting behaviour in the past (e.g. Klein 1978; Davis 1980). Fossil samples from the Atbara sites turned out too small to be meaningful, except at El Damer II, where a fair number of upper and lower jaws of oribi (MNI = 43) and alcelaphines (MNI = 15) were found. For alcelaphines such as tsessebe (Huntley 1973) and Lichtenstein's hartebeest (Mitchell 1965), the approximate ages at which different teeth erupt are available, and it can be reasonably assumed that they compare well with those of their North African relatives. For oribi, we could not find published information, but conceivably its eruption scheme would be broadly comparable to that in bovid species of like size and longevity, such as dorcas gazelle (Davis 1980) or Thomson's gazelle (Robinette & Archer 1971). The resulting age distributions for the fossil specimens are given in Fig. 2.

Topi, hartebeest and oribi are seasonal breeders, most offspring being born towards the end of the dry season or after the rains have started (Haltenorth et al. 1979: 47, 72; Smithers 1983: 619, 640). Since the length of the reproductive season decreases with increasing latitude, mainly as a result of differing rainfall and primary productivity (cf. Happold 1987: 304-5), it is to be expected that lambing and calving in Central Sudanese Mesolithic bovid populations was rather restricted in time, perhaps from March to May. If we plot this information against the age distributions obtained, it becomes visible that game stalking must have been a year round activity at El Damer II, a good deal of animals being hunted during the rainy season. Conceivably, this was also the case elsewhere along the Nile and the lower Atbara.

## Mesolithic site inhabitation in relation to resource scheduling

As shown, the animal biomass in a riverine environment is related to the annual hydrological cycle of the river, implying a careful scheduling in time and space to maximize the exploitation of these resources. Based on the fauna of El Damer II, the following sequence of food harvesting can be proposed (Fig. 3):

1. With the beginning of the rains or the arrival of the floodwaters, spawning fish are captured in considerable numbers;
2 The alluvial plain being increasingly flooded, fishing becomes difficult because the waters are too turbulent and the fish well dispersed. However, hunting conditions improve as part of the terrestrial fauna will concentrate on the narrow strip between floodplain edge and arid hinterland;
3. As soon as the waters start to recede, fishing on the alluvial plain becomes a major activity;
4. With the increasing exposure of the floodplain, fishing activities will gradually shift towards the main Nile and Atbara. *Pila* snails can now be harvested and lungfish dug out of their burrows. Fowling and hunting will be intensified because the animals start to concentrate along the river;
5. Towards the end of the dry season, people still continue to fish in the main river, but hunting will provide most of the meat since game densities are high and ungulate movements along trails to water points fairly predictable.

Thus at El Damer II a year round exploitation of the catchment can be postulated. Consequently, its occupants must have been far more sedentary than accepted up to now for Mesolithic populations living along the Central Sudanese Nile and the lower Atbara. However, as pointed out by Gautier (1983: 107), site permanence does not exclude resource scheduling by restricted groups abandoning the settlement in certain periods for activities at appreciable distance from the base camp. At El Damer and elsewhere, such excursions are illustrated by the

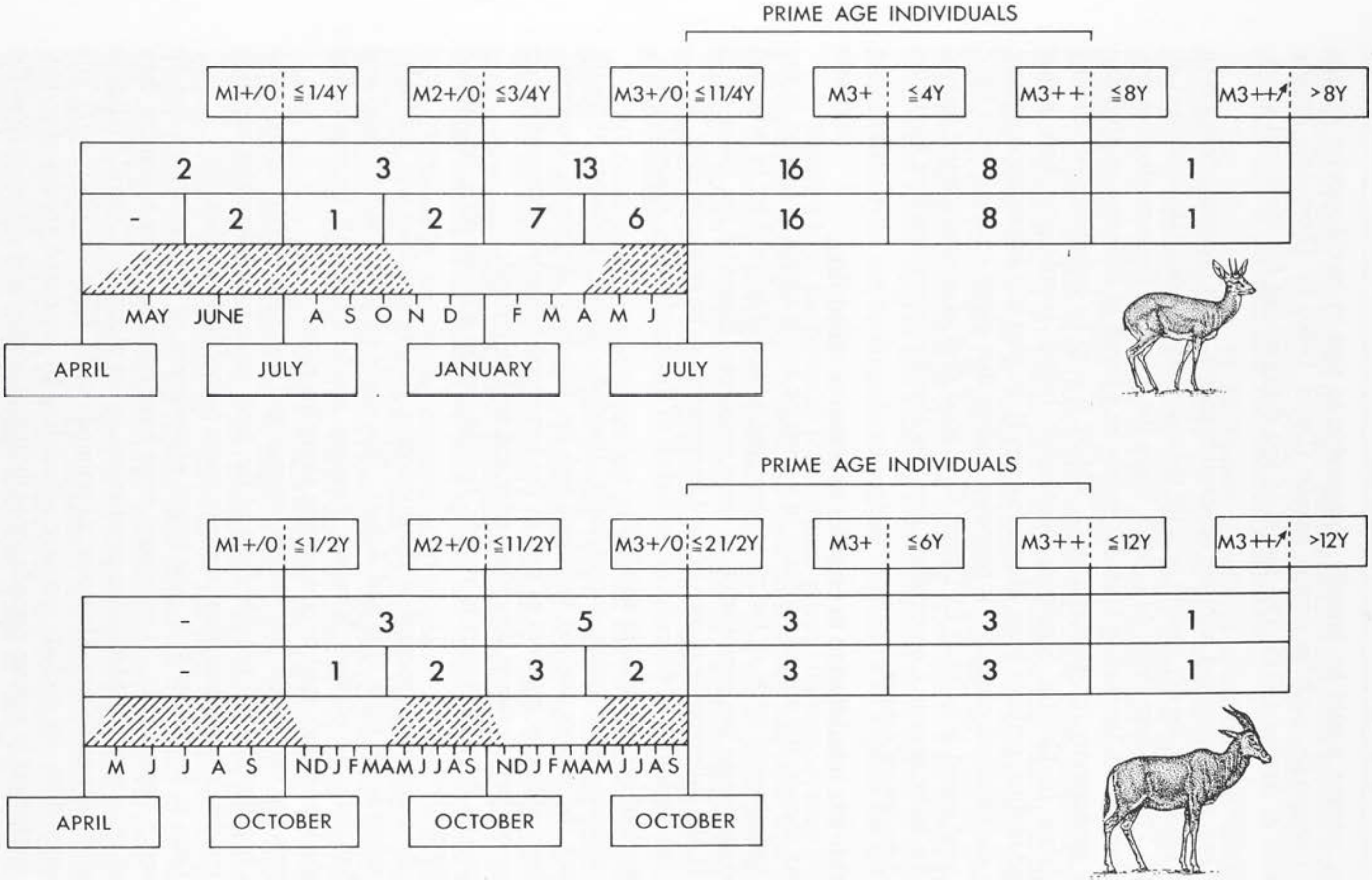


Fig. 2. The number of individuals in the oribi and alcelaphine dental samples from El Damer II according to age class. Age of eruption here is taken to be the age when a tooth starts to exhibit wear on the occlusal surface. Subclasses separate individuals with poor and advanced tooth wear. Dental data are plotted against the (hypothetical) annual rainfall pattern in order to evaluate Mesolithic hunting behaviour in terms of seasonality. For additional discussion, see the text.

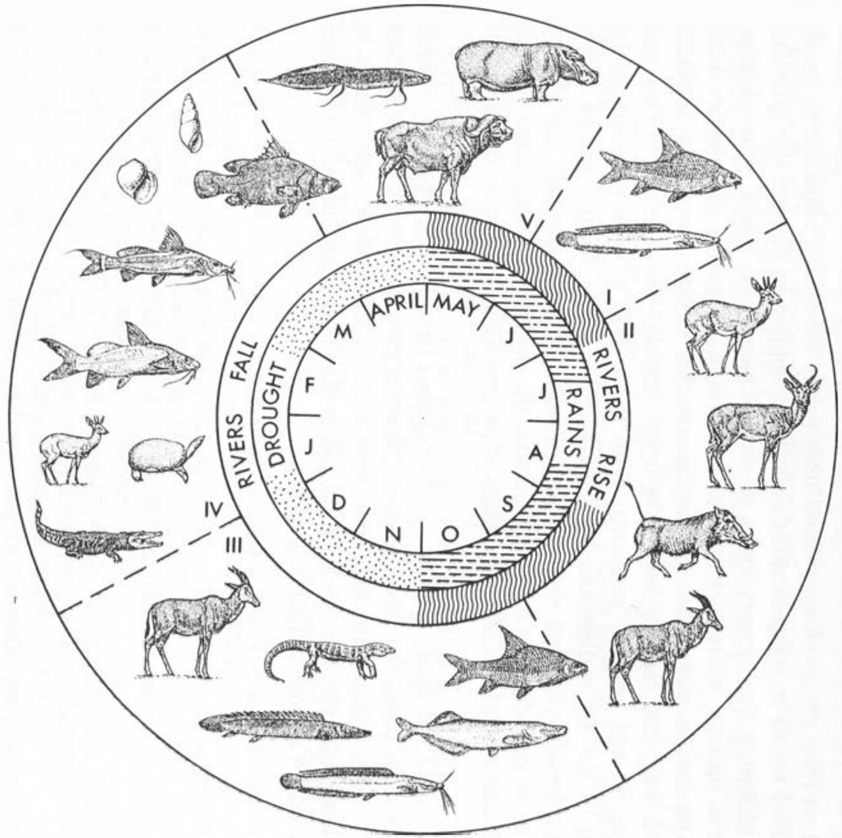


Fig. 3. A model for Mesolithic animal exploitation along the Central Sudanese Nile and the lower Atbara. Five stages are distinguished and roughly illustrated. Species depicted include *Clarias, Barbus* (Stage I); *Ourebia, Phacochoerus, Redunca, Damaliscus* (Stage II); *Clarias, Mormyrops, Polypterus, Barbus, Damaliscus, Varanus* (Stage III); *Crocodylus, Trionyx, Ourebia, Synodontis, Bagrus, Limicolaria, Lates, Pila* (Stage IV); *Protopterus, Hippopotamus, Syncerus* (Stage V). For additional discussion, see the text.

presence in the faunal record of non-riverine mammals adapted to arid environments, for example dorcas gazelle and barbary sheep.

A settled life style can also be postulated for the other riparian human groups inhabiting the Nile environment, such as the inhabitants of Aneibis, Abu Darbein, or those living above the 6th Cataract, but larger faunal samples are necessary to confirm this.

**Concluding remarks**

Apart from the molluscs, which simply may have been collected by hand, a diversified set of techniques must have been applied to capture the different species inhabiting the various kinds of environments. No doubt, non-selective gear such as baskets, weirs, (throwing) nets, lines, traps, snares and pits provided the site inhabitants with most of the fish, reptiles and mammals. In addition, selective fishing and hunting may have been practised with the aid of bow and arrow, spears, and perhaps harpoons. With the arrival of rafts or boats at the beginning of the 8th millennium bp (Peters 1991; 1993), fishing gained a new dimension: besides the fact that the deeper parts of the main Nile and Atbara could now be included in the site catchment, the presence of boats also enabled the fishermen to exploit fishing grounds at an appreciable distance of the settlement.

All in all, the analysis of the archaeofaunas from Abu Darbein, El Damer and Aneibis illustrates that Mesolithic subsistence clearly went beyond the level of opportunism. Unquestionably, this new strategy enabled human groups to exploit the animal resources on a regular rather than on a seasonal basis, which in turn allowed for a more settled way of life.

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Interregional Contacts in the Later Prehistory
of Northeastern Africa
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# The Afro-Arabian circuit: contacts between the Horn of Africa and Southern Arabia in the 3rd - 2nd millennia B.C.

The occurrence of contacts between the populations of the Horn of Africa and Southern Arabia in proto-historical times has intrigued scholars since the very beginning of Ethiopian studies because of its relevance for the origins of the Ethio-Semitic speaking peoples (e.g. Ludolf 1682). This problem has been investigated mainly by historians and linguists (Brandt & Fattovich 1990). They stressed the indisputable relationship between the Ethiopian-Semitic languages and South Arabic (Ullendorff 1955; Moscati 1960; Hetzron 1972; Garbini 1984), usually explaining it through movements of people from Arabia to Ethiopia in late prehistoric and/or early historic times (Glaser 1895; Conti-Rossini 1928; Ullendorff 1973). Various hypotheses have been suggested so far:

a. migration of whole tribes from SW Arabia to the Tigrean plateau (Tigrai and Eritrea) in late prehistoric times (Ludolf 1682; Glaser 1895);
b. Sabean colonization of the plateau in the early 1st millennium B.C. (Bent 1893);
c. progressive South Arabian expansion along the coast and onto the plateau in late prehistoric times and successive Sabean colonization of the plateau in early historical times (Conti-Rossini 1928; Ricci 1984);
d. emergence of an Afro-Arabian linguistic *koinè* in late prehistoric and early historical times (Marrassini 1985; Avanzini 1989).

Most linguists agree that Proto-Ethiopian originated through contact between one group of South Semites, which settled on the Tigrean plateau, and local Cushitic populations (Ullendorff 1955; Hetzron 1972). According to Garbini (1984: 153ff.) different South Semitic peoples were involved in this process. A few scholars have emphasized a possible diffusion of the Semitic languages from Ethiopia to the Near East since Late Palaeolithic times (see Hudson 1977; 1978), but this hypothesis is not supported by any concrete evidence.

The existence of strong ancient links between the opposite regions of the southern Red Sea is also suggested by Ethiopian and Arab sources. A late prehistoric South Arabian migration into Ethiopia is mentioned by some Ethiopian sources. According to Gabra-Mariam (1987), for example, three tribes (Saba, Abal and Ofir) came to Ethiopia from Yemen. Initially they settled in the Tigrai as traders subject to the local king, then they separated, occupying respectively the Tigrai (Saba), Adal (Abal) and Wigadin (Ofir). Other sources stress, on the contrary, a movement from Ethiopia to Yemen (see Giyorghis 1987).

The Arab sources, in turn, point to the emergence of a multi-ethnic society along the coastal region of the Hijjaz, Yemen and Hadramawt, from Jedda to Mukalla, and the opposite African coast in pre-Islamic times (Norris 1978). Late prehistoric contacts between the two regions might be inferred, as well, from the use of a very archaic type of camel saddle with South Arabian origin in Somalia and Socotra. It might suggest that the camel was introduced into the Horn from Southern Arabia in quite early times, perhaps between 2500 and 1500 B.C. (Bulliet 1975). Finally, the existence of a very ancient interchange circuit connecting the Horn to the southern Arabian Peninsula and India is suggested by the African, mainly Ethiopian, origin of many Indian plant cultivars (Possehl in press; Mehra in press; Saraswat 1991). This is confirmed by the discovery of domestic sorghum with African origin in an assemblage dated to the mid 3rd millennium B.C. at Hili, Abu Dhabi Emirate (Cleziou & Costantini 1980).

The archaeological evidence of contacts between the Horn and Southern Arabia before the 1st millennium B.C. is still quite scarce. Until a few years ago it was supported only by some similarities in the rock art of both regions (Cervicek 1979). In the 1980's fresh data was provided by the investigations carried out along the Saudi and Yemeni Tihama and northern Yemeni plateau by the Saudi-American Comprehensive Archaeological Survey and the Italian Archaeological Mission to Northern Yemen (Zarins et al. 1981; Zarins & Zahrani 1985; Zarins & Albadr 1986; de Maigret et al. 1984; de Maigret 1990; Tosi 1986) and in the Eastern Sudan by the Italian Archaeological Mission to the Sudan Kassala (Fattovich 1991).

The preliminary results of these investigations, combined with a review of the previously collected data, confirm that contacts and most likely exchanges between the peoples of the Horn, including the northern Ethio-Sudanese lowlands, and Southern Arabia started in the 7th millennium B.C. and were firmly established in the 3rd-2nd millennia B.C. (Fattovich in press).

At present it seems that an interregional trade of obsidian, in the form of raw material and artefacts, from the Horn to Arabia as far as the coastal regions of the Indian Ocean and possibly the Persian Gulf arose in the 7th millennium B.C. In the early 2nd millennium B.C. this trade pattern included Eastern Sudan, as far as Erkowit in the southern Red Sea Hills and Aqiq on the coast, the Eritrean Sahel, the Red Sea islands and the Arabian Tihama. Two or three major obsidian sources in Eritrea and/or Djibuti were probably exploited at this time. It apparently declined in the 1st millennium B.C. (Zarins 1988; see also Francaviglia 1990). The occurrence of a 'Wilton' like industry at Dahlak Kebir confirms the skill of the African peoples to cross the Red Sea in Early to Middle Holocene times (Blanc 1955).

Another pattern of interaction seems to be stressed by the rock art evidence. It suggests the progressive spread of a typical style, representing bovines with the body rendered in profile and the head and horns from the front, over Western Arabia and Northeastern Africa during the middle Holocene (ca. 5000-1000 B.C.). This style is known as 'Jubba Style' in northern Saudi Arabia (Zarins 1982), 'Dahthamani Style' in Central Arabia (Anati 1972) and 'Ethiopian-Arabian Style' in the Horn (Cervicek 1971; 1979). It most likely appeared in northern Saudi Arabia in the mid 5th millennium B.C. Then, around the mid 3rd millennium B.C., it spread to the southern Hidjaz (Saudi Arabia), northern Harerge (Ethiopia) and, along the Rift Valley, Southern Ethiopia. In the 2nd/early 1st millennium B.C. it occurred at Jebel Qara (Central Arabia) and in Eastern Ethiopia, Northern Somalia and Eritrea, from where it spread northwards to Nubia, southern Upper Egypt and the Sahara (see Graziosi 1964; Cervicek 1971, 1979; Clark 1972; Anati 1972; Joussaume 1981; Zarins 1982; Brandt & Carder 1987; Jung 1991). Contacts between the peoples of Eastern Ethiopia and Southwestern Arabia might also be suggested by the dolmens discovered near Harar and Dire Dawa (northern Harerge) and dated back to the late 2nd millennium B.C. (Azais & Chambard 1931; Joussaume 1980). They are comparable to some dolmens discovered at Mosna' in southern Yemen (Benardelli and Parrinello 1970), but the link between these monuments is still uncertain.

Between ca. 2500 and 1500 B.C. the people living along the northern Ethio-Sudanese lowlands were also included in a network of contacts with the southern ones of Ethiopia and South Arabia (Fattovich 1993). This is suggested by the Gash Group evidence (ca. 2700-1400 B.C.) collected mainly at Mahal Teglinos, Kassala (Fattovich 1989 a, b). Pottery with decorations comparable to the Gash Group have been recorded at Erkowit in the southern Red Sea Hills, Gobedra near Aksum in the western Tigrai, Lake Besaka in the Afar, and Asa Koma near Djibuti (Phillipson 1977; Callow & Wahida 1981; Brandt 1982; Joussaume et al. 1988). In turn, obisidian flakes with Ethiopian origin (Francaviglia, pers. comm.) have been collected in the Late Gash Group level (ca. 1800-1500 B.C.) at Mahal Teglinos (Fattovich et. al. 1988). The Gash Group pottery from Mahal Teglinos shows also some general similarities in the decorative patterns and techniques to the Early Bronze Age (ca. 2900-1800 B.C.) in northern Yemen. In particular, some sherds from the Middle and Classic Gash Group levels (ca. 2300-1800 B.C.) are directly comparable to contemporary specimens from Wadi Yana'im, Ar-Raqlah and Wadi Rahmah in Yemen (see Fattovich 1991 b; de Maigret 1990).

Contacts with Southern Arabia are confirmed, as well, by the occurrence of similar sherds in sites culturally linked to the Gash Group and dated to ca.

2000-1500 B.C., near Agordat in the Barka Valley (western Eritrea) and at a site going back to ca. 1500 B.C., at Subr near Aden (Southern Yemen; Arkell 1954; Lankaster-Harding 1964). At present, there is no safe evidence of contacts between the peoples of the Ethio-Sudanese lowlands and the southern ones after the mid 2nd millennium B.C. Only in the 1st millennium B.C. the Gash Delta was included in the area of influence of the peoples living on the western Tigrean plateau (Fattovich et al. 1988).

In the second half of the 2nd millennium B.C. the Afro-Arabian circuit was strengthened by the development of a new cultural complex (Tihama Cultural Complex) along the African and Arabian coasts of the southern Red Sea and the Gulf of Aden. The main sites are Adulis near the Gulf of Zula in Eritrea, Sihi in the Saudi Tihama, Wadi Urq' in the Yemeni Tihama, and Subr near Aden (Paribeni 1907; Doe 1965; 1971; Zarins et al. 1981; Zarins & Zahrani 1985; Zarins & Albadr 1986; Tosi 1986). They represent regional variants of this complex, sharing enough features to be ascribed to the same basic cultural tradition. In particular, the pottery from Sihi is quite similar to the one from Subr. This complex can be dated to ca. 1500-1200 B.C. on the basis of some radiocarbon dates from Sihi (Zarins & Albadr 1986). The pottery from these sites shows many affinities with the Kerma and C-Group pottery from Nubia, suggesting a possible early influence from the African hinterland (Zarins & Zahrani 1985; Zarins & Al-Badr 1986). Moreover, the lithic industry from Sihi is comparable to the Gash Group one at Kassala (Zarins pers. com.), suggesting a possible African background to this complex.

Direct contacts with the peoples living along the Ethio-Sudanese lowlands are suggested by some sherds decorated with burnished linear motifs, comparable to Terminal Gash Group specimens (ca. 1500-1400 B.C.), from sites near Wadi Urq' in the Yemeni Tihama (Fattovich et al. 1988). In the late 2nd/early 1st millennium B.C. the eastern Tigrean plateau was partly included in the cultural area of this coastal complex. In fact, the pottery from the lower strata at Matara (central Eritrea) contains fragments of big jars comparable to types from Subr (see Anfray 1966; Fattovich 1980). Some Arabian features can be also remarked in the so-called Ona Group A with red pottery, a cultural unit recorded on the Hamasien plateau (Eritrea) and provisionally dated back to the second half of the 2nd millennium B.C. (Fattovich 1988). It is identified by polished red slipped ware, often decorated with rim and shoulder-bands, polished axes and small chipped stone bull heads (Tringali 1967; 1969; 1978; 1981; 1984).

The origins of this culture are still uncertain. The pottery seems to belong to an indigenous tradition, being not directly comparable to the one from the neighbouring regions. The polished axes are similar to the Late Gash Group (ca. 1800-1500 B.C.) and Jebel Mokram Group (ca. 1500/1400-1000/900 B.C.) in the lowlands. The stone bullheads, on the contrary, could be ascribed to Arabian traditions, as bovine bucrania are a common motif in the rock art of Central Arabia (Cervicek 1979). Some fragments of big storage vessels with everted rim, comparable to Late Gash Group and Jebel Mokram specimens, from Sembel Cuscet near Asmara point to contacts with the peoples of the lowlands. Moreover, indirect Egyptian evidence might suggest that this population was able to sail along the Red Sea. In fact, a boat from Punt carrying pots with a long neck similar to Ona Group A vessels is represented on the walls of a Theban tomb most likely going back to the time of Amenophis II, ca. 1425-1401 B.C. (Davies 1935: 46-49).

Engravings of bucrania comparable to the stone ones from the Ona have been also recorded in many localities of the plateau, as far as the eastern Tigrai, suggesting that this population spread over a quite wide area (Mordini 1947). Finally, some rock sculptures discovered at the Daarò Caulòs cave near Asmara and most likely going back to the 2nd/early 1st millennium B.C. might be ascribed to an Afro-arabian cultural tradition. They represent human figures with big hands and long hair, showing some similarities to the Arabian rock art. They might confirm contacts between the Hamasien and the Arabian populations. At the same time, these figures remind some decorative motifs on the late prehistoric pottery from Adulis, suggesting contacts with the coastal peoples (Conti-Rossini 1928, Fig. 81, 82; Fattovich 1983; Trintgali 1990).

The following picture of the contacts between the Horn of Africa and Southern Arabia in the Early to Middle Holocene emerges from this evidence:

1. An Afro-Arabian interchange circuit, initially characterized by the circulation of obsidian, arose in the Early Holocene;
2. It was strengthened by more intense contacts between the cattle breeders living in Central Arabia and Eastern Ethiopia in the 3rd-2nd millennia B.C.
3. It involved the peoples occupying the northern Ethio-Sudanese lowlands in the late 3rd to mid 2nd millennia B.C.
4. The population became marginal in the circuit by the mid 2nd millennium B.C.
5. The peoples living along the coastal regions of the southern Red Sea played a crucial role in it in the second half of the 2nd millennium B.C.;
6. The people settled on the Hamasien plateau acted as intermediaries between the western lowlands and the coast in the late 2nd millennium B.C.

The present evidence does not support the hypothesis of migrations from Arabia to Africa in late prehistoric times. On the contrary, it suggests that Afro-Arabian cultures developed in both regions as a consequence of a strong and continuous interaction among the local populations.

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Interregional Contacts in the Later Prehistory
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# Experiments in grinding cereals

At the last Dymaczewo symposium in 1988, the author reported the results of observing the wear-use on stone tools for processing cereals from Asia with a metallographic microscope. The author identified wear on stone tools for processing cereals; however, its origin was not clarified. Therefore, some experiments of grinding cereals were carried out.

The stones used in the experiments were made of basalt and the cereal ground was wheat. A grinding-slab, a handstone, a pestle and a shallow mortar were made by flaking and pecking. As my technique of flaking and pecking is very poor, I was not able to make large-sized stone tools. Using these self-made tools, two ways of processing cereals were tried:

grinding - back and forth motion with a grinding-slab and handstone,
husking - up and down motion with a pestle and a mortar.

Pounding with a pestle and a mortar is not efficient, therefore this part of the experiment was not continued, although if the mortar was deeper, more efficient pounding could be carried out.

The results of the grinding was recorded after 200 motions, 500 motions, 1000 motions and 2000 motions. Macro- and micro-photographs were taken by means of a camera for macro-photography and a metallographic microscope. The metallographic microscope used in the experiments was the same instrument which was used in the previous experiment reported in 1988.

Husking with a pestle and a mortar is fairly effective. A handful of wheat ears were put on a depression of a mortar (Fig. 1a). They were completely husked by seven to ten strokes of a pestle without damage (Fig. 1b). Fragments of husks, straws and so on were easily removed by wind (Fig. 2a).

Grinding with a grinding-slab and a handstone is not so effective as husking. Because of the smallness of the tools, only a small amount of seeds can be placed on the grinding-slab and seeds are scattered over its edge without grinding. If a rim of a grinding-slab is higher than a grinding surface like an open-quern of the Levant, or a grinding-slab and a handstone are larger than experimental tools like a saddle quern, grinding cereals with stone tools becomes easier.

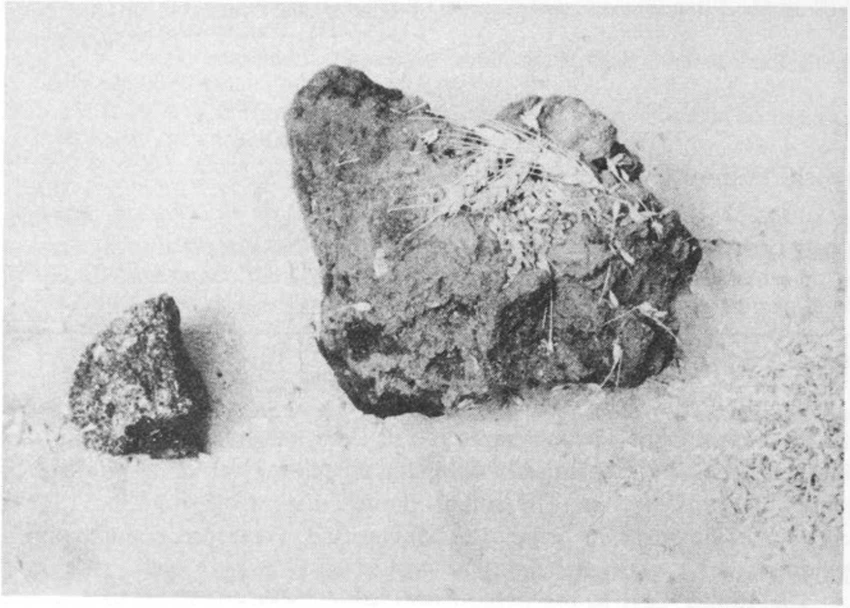

Fig. 1a. An experimental mortar and pestle with wheat ears.

Fig. 1b. Husked wheat by an experimental mortar and pestle.

The resulting experimental flour is not fine but very rough. It includes a lot of tiny fragments of basalt. It is necessary to remove them when processing the flour further.

The surfaces of grinding tools become smoother and smoother. After 500 back and forth motions, it is clearly seen that the surface of a grinding-slab and a handstone became smooth. After 2000 back and forth motions, the surface became much smoother and polished in appearance (Fig. 2b). On the other hand, the surfaces of husking tools remain little changed. After 500 up and down motions, no change is seen on the surfaces of a pestle and a mortar. Even after 2000 up and down motions, little change is observed by the naked eye. Surface changes can be recognized early, by microscopic observation, on grinding tools. On a pecking surface, no signs of use are seen and on a flaking surface, signs of use are also not observed. Even after 200 back and forth motions, weak lustrous gloss and striations parallel to the moving direction can be observed on smoothing surfaces of grinding tools. After 500 back and forth motions, lustrous gloss becomes stronger and abrading striations parallel to the moving direction appear. After 1000 back and forth motions, lustrous gloss becomes more bright and on some parts of the grinding surfaces lustrous gloss becomes dim. After 2000 back and forth motions, all aspects described above are seen clearer and clearer.

The same phenomena are seen on the archaeological specimens from Asia. On the surface of an upper stone of a saddle quern from Ubaid layer of Telul-eth-Thalathat in northern Iraq, lustrous gloss and striations are seen. The lustrous gloss of this specimen is not clear but dim and brightness decreases. The same features are seen on the surfaces of most saddle querns from Telul-eth-Thalathat in northern Iraq and are also seen on the surface of an experimental specimen after 2000 back and forth motions.

Lustrous gloss is thought to originate from plant silica in Gramineae, as sickle-gloss is sometimes found on the surfaces of sickle-blades. Striations are thought to come from abrasions between an upper stone and a lower stone. Abrasions between an upper stone and a lower stone are assumed to be the main reason why lustrous gloss becomes dim. The aspects of wear on archaeological specimens are the same as those on the experimental specimens. Therefore, saddle querns are thought to have been used for grinding cereals.

Surface change on husking tools can hardly be noted with metallographic observation. After 200 up and down motions, no change can be observed. After 500 up and down motions, very weak sporadic lustrous gloss can be detected only near the summit of the microtopography of the surfaces. After 1000 up and down motions, lustrous gloss becomes fairly strong, but sporadic. After 2000 up and down motions, sporadic lustrous gloss is clearly seen only near the summit by microtopography of the surface. In the valley of the microtopography of the surface, no trace of wear are seen. Lustrous gloss appears only at the contact point of the surface with the husking materials. This lustrous gloss is thought to originate from plant silica in Gramineae.

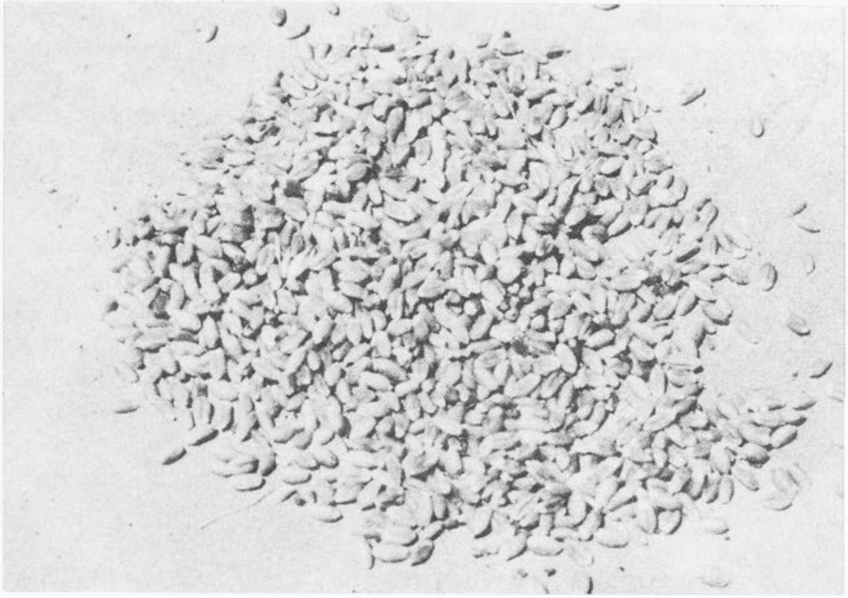

Fig. 2a. Wheat seeds after wind blowing.

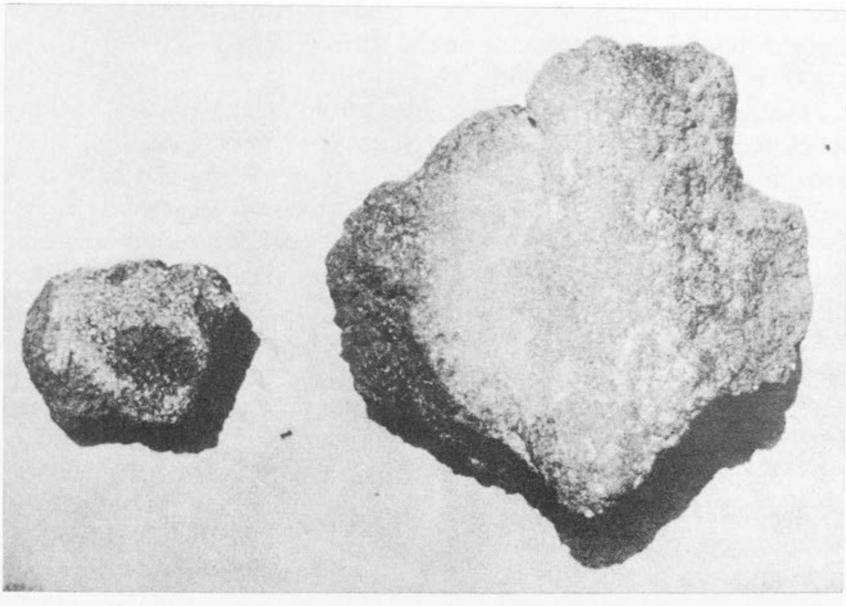

Fig. 2b. Experimental flour by a grinding-slab and a handstone.

On the surface of a handstone from the Neolithic layer of Tall-i-Mushuki in southern Iran, sporadic lustrous gloss is also seen. It is only found on the summit of microtopography of the surface. In the valley or the foothill of the microtopography of the surface, no traces of wear are detected.

The use-wear on this archaeological specimen resembles that on an experimental pestles: the features of wear and gloss, the position where traces of wear are seen and so on. These stone tools are thought to have been used for processing cereals. As stated before, these small experiments show that saddle querns were used for grinding cereals and that handstones, pestles and mortars, at least a part of them, were used for processing cereals.

From the prehistoric sites of Africa, many stone tools which are thought to be used for processing cereals have been found. Microscopic studies of them may clarify their way of use. On the basis of this study, the subsistence systems of the prehistoric societies in Africa can be assumed with firm evidence.

On the surface of a handstone from the Neolithic layer of Tall-i-Mushki in southern Iran, sporadic abrasions [illegible] is only found on the summit of microtopography of the surface. In the valley or the foothill of the microtopography of the surface, no trace of wear polish was detected.

The [illegible] on the archaeological specimens [illegible] that an experimental [illegible] of wear polish [illegible] the grindstone, whose traces of wear [illegible] those [illegible] been used for processing [illegible] that saddle querns were [illegible] at least [illegible].

From the [illegible] are thought to be used for [illegible] may clarify [illegible] of the [illegible].



Fig. 7a. Wheat seeds after wind blowing.



Fig. 7b. Experimental flour by a grinding slab and a handstone.

Interregional Contacts in the Later Prehistory
of Northeastern Africa
Poznań 1996

Stan Hendrickx

# Considerations on the "Analytical Bibliography of the Prehistory and the Early Dynastic Period of Egypt and Northern Sudan"

## A growing tendency towards independence from the egyptological world

The increasing success of the international symposia on the later prehistory of northeastern Africa, which are held every four years since 1980 at Dymaczewo near Poznan (Krzyzaniak & Kobusiewicz 1984, 1989; Krzyźaniak et al. 1993), is only one indication for the growing interest in this period of the human past. At the same time, a notable increase can be observed with regard to field activity at prehistoric, Predynastic and Early Dynastic sites in Egypt and Sudan. This is of course a fortunate development but, as a consequence, the number of publications dealing with this topic, increased strongly since the middle of the seventies. In the "Analytical Bibliography ..." (Hendrickx 1993[1]), 416 entries were made for the five years from 1971 until 1975. This augmented to 918, more than the double, for the five years between 1986 and 1990. At the same time, the number of authors involved increased as well, since quite a large number of young scholars became interested in the matter. This implies that the number of publications is very likely to rise even more in the near future.

Another phenomenon is that more and more articles appear in new journals or are published in journals which are not always commonly known to people dealing with the prehistory of Egypt and Sudan. This is especially the case for a number of themes, for which a great interest exists in present day archaeology. One might mention, among others, lithic technology and social anthropology. For many years, articles on the prehistory and Early Dynastic period of Egypt were primarily published in egyptological journals. The tradition survives, the most important of these journals being the "Annales du Service des Antiquités de l'Egypte", the

[1] At the Poznan symposium, the author presented the database for this bibliography and asked for comments and additions. The publication having appeared since, publishing the paper presented became quite meaningless. Therefore, only a number of considerations regarding the importance of bibliographical work for the prehistory and Early Dynastic period of Egypt and Northern Sudan, as well as some clarifications on the "Analytical Bibliography ..." itself, are presented here.

"Journal of the Society for the Study of Egyptian Antiquities" and especially the "Mitteilungen des Deutschen Archäologischen Instituts Abteilung Kairo". These journals, however, restrict themselves mainly to the Late Predynastic and, especially, the Early Dynastic period. The Palaeolithic period is presently almost completely omitted from the egyptological literature. This evolution is of course in the first place due to the growing specialisation of scholars, the majority of them no longer being egyptologists interested in prehistory but prehistorians which happen to work in Egypt. Another important reason, however, is the appearance, mainly during the last ten years, of specialised journals, such as "Archéologie du Nil Moyen", "Archéo-Nil" or "Sahara". A particular problem is raised by journals dealing mainly with regions adjacent to the Nile valley, but also including, sometimes very important contributions on Egyptian and Sudanese prehistory. One might mention for the Near East "Eretz Israel", the "Journal of Near Eastern Studies", "Paléorient" and for African archaeology the "African Archaeological Review" and "Nyame Akuma". These journals tend to be absent from egyptological or prehistorical libraries.

There seems to be a tendency for egyptologists and prehistorians working in Egypt to get less and less frequently in touch with each other. For a number of countries, especially the United States of America, this is of course a result of the structure of the universities. The departments of prehistory and anthropology generally belong to the science faculties while egyptology mainly belongs to the faculty of humanities. As a result interdisciplinary contacts tend to become scarce. This is also illustrated by the organization of other symposia on the Prehistory and Early Dynastic period of Egypt than those at Poznan. For the last years one has to mention: "The Beginnings of Egyptian Civilization", London, British Museum, 27-28 July 1987; "The Nile Delta in Transition: 4th-3rd Millennium B.C.", Cairo, the Netherlands Institute of Archaeology and Arabic Studies, 21-24 October 1990 (van den Brink 1992); "The Rise of Complex Society and the Early State in Egypt", Boston University, 25 April 1991. On the other hand, the prehistoric section at the last session of the "International Congress of Egyptology", held at Torino, 1st-8th September 1991, attracted only a limited number of participants, most of them being egyptologists and none of them dealt with a subject reaching back before the 4th millennium.

Also with regard to the general public, the Egyptian prehistory and the Early Dynastic period have, on several occasions, been presented separately from the Dynastic period. However, nearly all of the large exhibitions concerning Egypt, of which so many were organised these last years, started chronologically with Predynastic objects. The first important exhibition which dealt only with the Prehistoric and Early Dynastic period was organised already in 1973 in Paris, under the title "L'Egypte avant les pyramides" (de Cenival 1973). In more recent years, the public could see "The First Egyptians", in Columbia and other U.S.A. locations, 1988-1990 (Hoffman et al. 1988) and "L'Egypte des millénaires obscurs", Marseille, 1990 (Marseille 1990).

Finally, the separated paths which egyptology and Egyptian prehistory tend to take are illustrated by the way field archaeology is organised. In the past, excavations on Predynastic and Early Dynastic sites were almost exclusively carried out by egyptologists. Even those scholars who only occupied themselves with Egyptian prehistory, generally worked within the framework of egyptological organizations. This was for instance the case for G. Caton-Thompson and E. W. Gardner, who first worked for the British School of Archaeology in Egypt and afterwards for the Royal Anthropological Institute, and K. S. Sandford and A. J. Arkell, working on behalf of the Oriental Instute of the University of Chicago. In the more recent past for example, the activities of F. Wendorf (1968) and A. E. Marks (1970) in Nubia during the sixties, were part of the Nubia campaign organised by egyptologists. Even the work of a purely prehistoric expedition, such as the "Belgian Middle Egypt Prehistoric Project", dealing almost exclusively with the Palaeolithic period, only became possible after the participation of P. M. Vermeersch, its director, at the excavations at Elkab (Vermeersch 1978), directed by Belgian egyptologists. Presently, however, both the "Combined Prehistoric Expedition", directed by F. Wendorf (Kobusiewicz 1987) and the "Belgian Middle Egypt Prehistoric Project" are completely independent from the egyptological world. This is also the case for the very important "Besiedlungsgeschichte der Ost-Sahara" project (Kuper 1989). Publications concerning these projects appear largely outside the traditional egyptological literature.

Still, excavations at Predynastic and Early Dynastic sites often continue to be organised by egyptological organizations. This is for instance the case for the work of G. Dreyer at Umm el Qaab (Deutsches Archäologisches Institut Abteilung Kairo), A. J. Mills at Dakhla Oasis (Society for the Study of Egyptian Antiquities and Royal Ontario Museum), B. Midant-Reynes at el-Adaïma (Institut Français d'Archéologie Orientale), D. Wildung and K. Kroeper at Minshat Abu Omar (Ostdelta Expedition) and L. Krzyzaniak at Kadero (Polish Center of Archaeology in Cairo and Archaeological Museum Poznan). And even those expeditions which are independent, such as the one to Hierakonpolis headed by the late M. Hofman, sometimes have strong connections with the egyptological world. Progress reports as well as final publications of these excavations are mainly appearing in egyptological journals and series.

## "Language barrier", toponyms and editorial principles

As a result of this, it becomes more and more difficult for each scholar to keep his/her bibliographical references up to date and even to have a general view on the periods contiguous to the one(s) of his/her primary interest. This is reflected in some striking observations which can be made from recent literature.

A first observation is the fact that among prehistorians dealing with Egypt and Sudan, publications cited are mostly of Anglo-Saxon origin, which is far less the case for the egyptological literature where German (Wörterbuch der Ägyptologie; Lexikon der Ägyptologie) and French (publications of the Institut Français d'Archéologie Orientale) are indispensable. This implies that the Palaeolithic period is mainly treated in English, while French and especially German still remain important for the Predynastic and even more for the Early Dynastic period. Besides the three languages mentioned, publications can occasionally be written in for other languages, for example Italian, Spanish, Dutch, Polish, Russian or Hebrew. This is the case mainly for articles which adress themselves to a "national" audience. In most cases the same subject will also be treated by another article in an "international" language. However, some exceptions exist. The, at the time, very important book on Predynastic an Early Dynastic art by Asselberghs (1960), was written in Dutch, fortunately with an extensive English summary. More recently, a number of preliminary reports on Egyptian objects found in Early Bronze Age sites of southern Palestine, were published in Hebrew (cf. Brandl 1992).

The fact that the "language barrier" still exists can be illustrated by numerous publications. An obvious example is the essential work by W. Kaiser (1957, 1959-1964, 1985, 1990), which is written exclusively in German and which despite its importance, is not yet commonly acknowledged. Only a few years ago, a general book on the Egyptian prehistory and history up to the end of the Old Kingdom (Rice 1990) was written without a single reference to Kaiser's work. For the Palaeolithic period, publications in French may cause a problem. For instance the Elkabian, the only excavated Epipalaeolithic industry in Upper Egypt, was published in French, as a separate volume in a primarily egyptological series (Vermeersch 1978). It took about ten years before this basic publication became well known in literature.

A second observation concerns the lack of uniformity in terminology and spelling. No generally accepted terminology exists for the chronology and the material cultures of the Predynastic and Early Dynastic period. This has been stressed by several authors, most recently by B. Mortensen (1991: 11-18), and therefore, does not have to be repeated here. A similar situation can be found for the Palaeolithic, Epipalaeolithic and Early Neolithic periods. However, one has to admit that this is not merely a matter of agreement upon terminology, but also a question of interpreting the basic archaeological information. Far easier to solve is the inconsistency in the spelling of toponyms. This does not necessarily mean that Arab names should be transcribed in a similar way for different languages, but at least the variation in spelling of the same name within one language should be avoided, since this obviously will cause problems for consulting indexes etc.

A final observation can be made on a rather polemical problem. Although it is extremely delicate to judge the "quality" of a publication, certain responsibilities should be placed with the editors of journals, anthologies and series. It seems obvious that authors should be withdrawn from publishing the same article, be it in a slightly modified way, more than once. Still this happens, be it fortunately not often. One can also occasionally find publications lacking references and far more often with incomplete or erroneous references. As for the contents of publications, the more the literature increases, the more serious omissions and errors become possible. On rare occasions one might wish the editors would have protected the author against him- or herself. Despite the fact that several examples could be given, the situation certainly is not dramatic. On the contrary, most of the publications keep up with the general standards of history writing.

**The "Analytical Bibliography of the Prehistory and the Early Dynastic Period of Egypt and Northern Sudan".**

All in all, it is obvious that the need for a bibliographical resource system made itself felt more and more during the last decade. Bibliographical work was already undertaken fifty years ago by C. Bachatly (1942), who, at that time, gathered about 500 titles. Far more important, however, is the work presented by K. Weeks (1985). This contains 2515 entries, which, contrarily to the title, also deal with northern Sudan and the Early Dynastic period. For some specific subjects, separate bibliographies have been published. This was the case for rock-art (Davis 1979) and the relations between Egypt and Palestine during the Late Predynastic and Early Dynastic Period (Brandl 1992).

The "Analytical Bibliography of the Prehistory and the Early Dynastic Period of Egypt and Northern Sudan" differs from the previous bibliographies by the fact that it is indexed. The 6000 entries include all kinds of publications, monographs and articles as well as small notices, with the notable exception of reviews. Dissertations and unpublished reports are also not included since they are not generally available. The absence of reviews may be regretted, but a large number of those published before 1985 can be found in Weeks (1985). On the other hand, one may question the inclusion of small notices. For example, those presented every year by Leclant and Clèrc in "Orientalia" on the recent excavations in Egypt and Sudan ("Fouilles et travaux en Egypte et au Soudan"), are included as separate entries for every site discussed by Clèrc and Leclant. Small notes, however, can be of great importance, since in more than one case they are the only reference ever published for certain excavations or accidental finds. Still, one has to admit that the way in which certain authors repeat preliminary excavation reports in slightly altered forms in several journals, does not add much to our knowledge. However, it would always remain arbitrary to decide which reference should be included and which should not. Therefore it is preferred to leave the appreciation, as much as possible, to the reader.

Nevertheless, some restrictions had to be made. Books which present a general view of, for instance, Egyptian history or art, are only included when the author deals more or less extensively with the Predynastic and Early Dynastic periods. It is obvious that the decision of withholding some works and rejecting others is arbitrary to some extent. Furthermore, it is impossible, and in most cases not of great interest, to include books and articles which are primarily dealing with the archaeology and history of regions other than Egypt, but which make some comparisons or references to Egyptian prehistory. Consequently, this kind of publications was left aside, with the exception of a number of important works relating mainly to the Near East.

Some explanation might be requested for the fact that the upper chronological limit was placed at the end of the 2nd Dynasty and not at the beginning of the Ist Dynasty. Since the dynastic culture evolved without interruption out of the Naqada culture, and since therefore also the material culture does not show any marked change, it can be very difficult, if not impossible, in a number of cases, to decide whether a certain find still belongs to the Late Predynastic or already to the Early Dynastic period. This is especially true since inscribed material from the 1st Dynasty is very scarce or completely absent at most sites. It was among others the uniformity of the material culture of the Late Predynastic and the Early Dynastic period which lead W. Kaiser to extend his relative chronology of the Naqada period into the 1st Dynasty (Kaiser 1990: Abb. 1). The difference between the 2nd and the 3rd. Dynasty, on the other hand, is easier to be made. Of course, there is no radical change in culture, but clear indications are given by the shift of the royal burial place from Abydos to Memphis and by a number of archaeological "guide types". Among these, the disappearance of the Wavy Handle jars and the appearance of Meidum-bowls and new types of bread moulds (Jacquet-Gordon 1981) are especially noteworthy.

The lower chronological limit was placed at the beginning of the Palaeolithic period. Reports and studies regarding the tertiary fauna and flora, for which the Fayum is an important source of information, fall beyond the scope since they represent a completely different branch of science.

From the geographical point of view, the bibliography deals with all sites situated within the present territory of Egypt. However, exception is made for the area of Gebel Uweinat, as far as rock art is concerned. This is because of the fact that the rock art of Gebel Uweinat has to be studied in relation to the Saharan rock art, which would mean the inclusion of another field of research, published mainly outside the journals and series frequently occurring in this bibliography. On the other hand, although outside Egypt, a number of sites in southern Palestine were integrated because of their great importance for the Early Dynastic period. For the Sudan, all sites are incorporated up to the latitude of Khartoum, with the exception of those situated on the Atbara. This is a somewhat arbitrary decision, which was mainly made for practical reasons, the problem being that there is no clear geographical or cultural borderline which might be used.

Two indexes are added to the "Analytical Bibliography ...", one on subjects and a site index. A third one, on chronology, had been planed but had to be abandoned, because assignments to a certain period, especially for the Palaeolithic period, are frequently subject to a change of interpretation (e.g. Vermeersch 1992). Also the lack of uniformity in terminology mentioned above proved to be a serious handicap. A particular problem is raised by the rock art. The determination of chronological periods for rock-art is still a highly debatable subject. It is often impossible to determine the chronological position of rock-drawings, especially as different chronological periods seem to be represented at the majority of the sites.

The geographical index, which consists of over 500 sites, probably is the most interesting of the two indexes. For every site, references were gathered relating to both the excavations and objects originating from this place, as well as to discussions regarding the site itself or finds from it. But, in establishing the list of sites, a number of problems occurred. In the first place, it was not always possible to define the exact location of sites. This is especially the case for older excavation reports or small notes, which contain insufficient details. A well known example are the flint artifacts which were collected at the end of last century and during the first decades of this century by several persons near Helwan, in the Fayum, on the western bank at Luxor or in the oases. In more recent times, the opposite became a problem. Sites within a limited area receive different identifications, normally by numbering them. This is of course absolutely correct from the archaeological point of view, but in this way the sites can not be included into a geographic index, since this would make the index incoherent. Therefore, a number of sites had to be grouped according to villages in the neighbourhood of which they are situated. Thus, the numerous sites discovered in Nubia during the Nubia Campaign were grouped according to the administrative sections existing before the flooding of Nubia.

The oases cause a problem of their own. The older publications only rarely specify the location of a site within an oasis. This is of course especially problematic for large oases such as Dakhla or Kharga. Even if a more detailed location is given, there is a strong tendency towards naming only the oasis itself when finds or facts are discussed in more recent publications. If the different sites within one oasis should be taken into account, the redaction of the geographical index would have become far more laborious than it already was. Therefore, no difference is made between the sites occuring in one oasis, not even for the Fayum.

Besides the geographical index, a thematic index was made. This kind of index will of course always be incomplete and reflects the personal interests of the one who defined the subjects included. It is almost impossible to deal with subjects of general historical, economical or social interest such as agriculture, demography or social stratification. Therefore, it was decided to include only those subjects which can be defined in a very restricted sense. This is of course the case for classes of archaeological objects such as decorated pottery, stone vessels, ivories or decorated palettes and maces. However, excavation reports and catalogues of museums and exhibitions were not used for the indexes of objects since such publications tend to include all or most of the categories of objects. Other subjects which proved to be appropriate for thematical indexation are for instance archaeozoology, archaeobotany, physical anthropology, rock-art and architecture.

The main problem of bibliographical publications is of course the fact that they are already outdated at the moment of their appearance. Regular additions and yearly information regarding newly appearing titles are therefore indispensable. As far as the prehistory and Early Dynastic period of Egypt and Northern Sudan are concerned, they are included in several bibliographical lists. The most important series of references are to be found in "The Annual Egyptological Bibliography" and the "Preliminary Egyptological Bibliography", "le Bulletin signalétique" sections "Préhistoire et Protohistoire" and "Art et archéologie, Proche-Orient, Asie, Amérique" and the yearly appearing "Bibliographie annuelle générale" in "Paléorient". However, none of these will or can claim to be exhaustive.

Since it was anyhow the intention to continue the database serving for the "Analytical Bibliography ...", an agreement was made with "Archéo-Nil". The redaction of this journal accepted to publish every year an additional list of references. In order to make this possible, authors are requested to send their publication lists, off-prints and additions to the "Analytical Bibliography ..." to the following address:

Musées Royaux d'Art et d'Histoire
Section égyptienne / Stan Hendrickx
Parc du Cinquentenaire 10
B-1040 BRUXELLES
Belgique / Belgium

All off-prints send will be kept in the library of the Egyptian Department of the "Musées Royaux d'Art et d'Histoire" at Brussels.

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Interregional Contacts in the Later Prehistory
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Eric Huysecom

# Iron Age terracotta pestles in the Sahel area: an ethnoarchaeological approch

## 1. Introduction

Archaeologists who apply themselves to the task of interpreting ancient African remains always run into the same fundamental problem: that of the sources. Indeed, African history written by Africans themselves is post-colonial, whereas history preceding this period, written by "foreign" Arab or Western observers, is more often than not scanty and too frequently partial. As for oral traditions, they rarely instruct us on the direct understanding of archaeological remains and what's more generally deal with relatively recent archaeological periods. On the other hand, linguistics and particularly population genetics are helping to shed light on the understanding of African past, especially where population movements are concerned.

This lack of a "domain of reference" (such as historical sources, for instance) prompts the archaeologist to confront the past with the present, be it conscious or not. Resorting to ethnoarchaeology, archaeologists can take the liberty of projecting observations made on present-day populations with ancestral traditions into interpretations of ancient remains, especially on a continent of long-lasting traditions. Such a procedure is possible thanks to "regularities" expressed as general rules which depend on environmental or behavioural constraints that one can find between two groups of individuals - such as between two villages or two populations or even between a contemporary human group and a past one. Nevertheless, it is necessary to distinguish "general" regularities from "restricted" regularities. "General" regularities allow, for instance, identification of the technique used to assemble pottery by examining traces left by tools - whatever the culture or region. "Restricted" regularities can only be applied within a precise geographical or social context, such as the identification of an ethnic group from a particular type of pottery (Huysecom 1992).

We have been studying pottery manufactured by women potters in the Inland Niger Delta since 1989, within the "Mission ethnoarchéologique suisse en

Afrique de l'Ouest" (MESAO), carried out by the University of Geneva with the "Human Sciences Institute" and the "National Museum" in Bamako (Gallay & Huysecom 1989; 1991; Gallay et al. forthcoming). Such a study demonstrates that their ware presents certain "regularities" which can be explained thanks to examination of the mechanisms by which they are generated.

In this paper, our wish is to illustrate the possibilities ethno-archaeology offers in the clarification of an archaeological problem, taking as an example clay pestles. A first attempt at such an approach was carried out in 1992 (Huysecom 1991-1992). Since then, field-work has been done on another two occasions in Burkina Faso and Mali, thus bringing in additional information and allowing us to complete our study.

## 2. "Archaeological" tools

### 2. 1. Description

Terracotta instruments of a general truncated cone shape or even cylindrical have been found on a number of occasions on excavations or surveys. To make understanding easier, these instruments will be termed "terracotta pestles" of which there seem to exist two types.

Type I

Type 1 has the shape of a truncated cone. The small extremity, for prehension, is either cylindrical (Fig. 1: 5), shaped as a "cabochon" (Fig. 1: 1, 2) or as a truncated cone (Fig. 1: 6, 11). The top of this extremity is rounded (Fig. 1: 1, 6) or flattened (Fig. 1: 11, 13). All these tools have convex bases. A very particular discovery was a pestle found in Kebir Bosa, which has been incised and impressed with intertwining grooves (Fig. 1: 12). According to Fr. Treinen-Claustre, the bases can also be decorated with "small cavities, subcircular alveoles or irregular ovals arranged hasardously or in parallel rows" (Treinen-Claustre 1982: 123). These features are of great interest; they have left their blueprint on the inside of a certain number of vases found in association (see 2.3).

The thirteen published specimens have a mean height of 80 mm (ranging from 42 to 164 mm), have a maximum diameter at the base of 80 mm (ranging from 48 to 112 mm) and a maximum diameter at the top of 40 mm (ranging from 18 to 72 mm). Hence, their dimensions vary, the biggest being 164 mm in height. We also calculated two indexes: A, which is the diameter of the top divided by that of the base, multiplied by 100 and B, the diameter of the base divided by the height, multiplied by 100. The mean indexes A and B for type 1 is 49 (ranging from 29 to 84) and 108 (ranging from 68 to 155) respectively. This implies that the top is generally twice as narrow as the base; the diameter of the base is about the same size as the height.

Type II

Type II is cylindrical and rather thick-set. Its edge can be straight (Fig. 2: 1), slightly concave (Fig. 2: 8) or convex (Fig. 2: 10). Certain shapes are almost

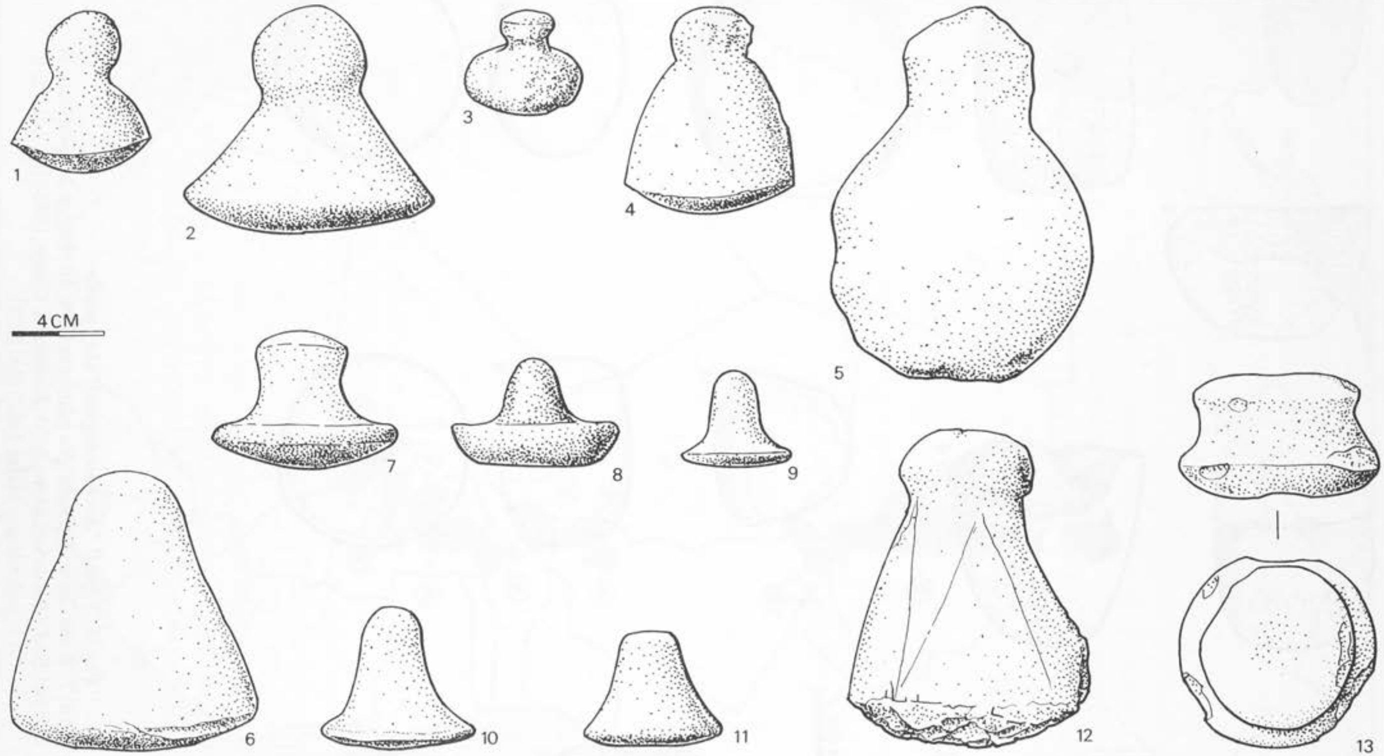



Fig. 1. Type I "Archaeological" clay pestles.
1: Toungour; 2, 12: Kebir Bosa; 3, 10, 11: Makari; 4, 5, 6: Maledinga; 7: Tegef N'Agar 74; 8, 9: Daima II ; 13: Kaïn Ouro Koro (after: 1: Huard et al. 1963, fig. 2; 2, 12: Treinen-Claustre 1982, fig. 15; 3, 10, 11: Lebeuf 1962, fig. 20, 35; 4, 5: Huard & Bacquié 1963, fig. 2; 6: Treinen-Claustre 1982: 128; 7: Grébénart 1985, fig. 187; 8, 9: Connah 1981, fig. 7.5; 13: MESAO documentation).

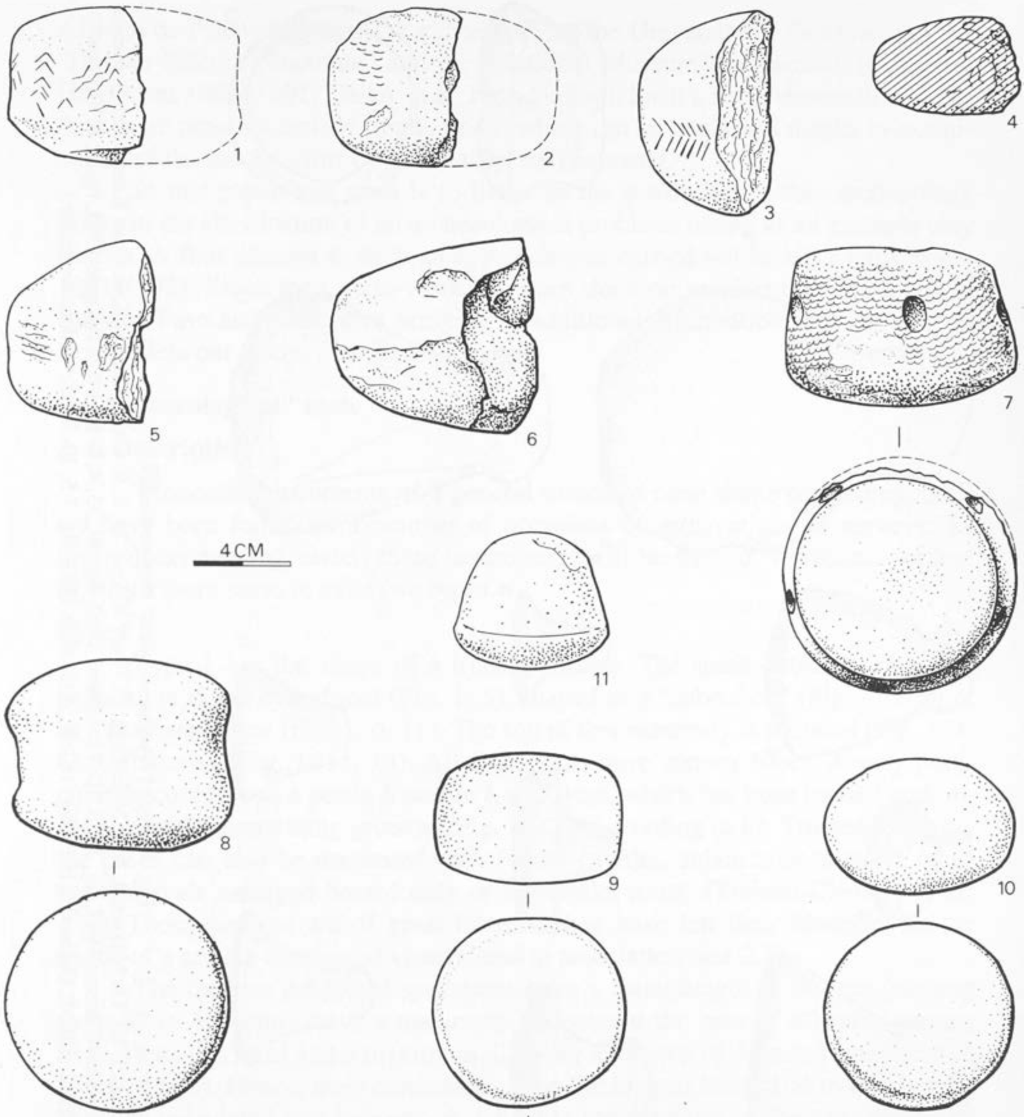



Fig. 2. Type II "Archaeological" clay pestles.
1-6: Kaïn Ouro Koro; 7: Kaïn Ouro; 8: Pégué-Na platform G; 9, 10: Pégué-Na platform W; 11: Tou (after: 1-7: MESAO documentation; 8-10: Bedaux & Lange 1983, fig. 14/1-2, 4; 11: Schweeger-Hefel 1969, fig. 5/24).

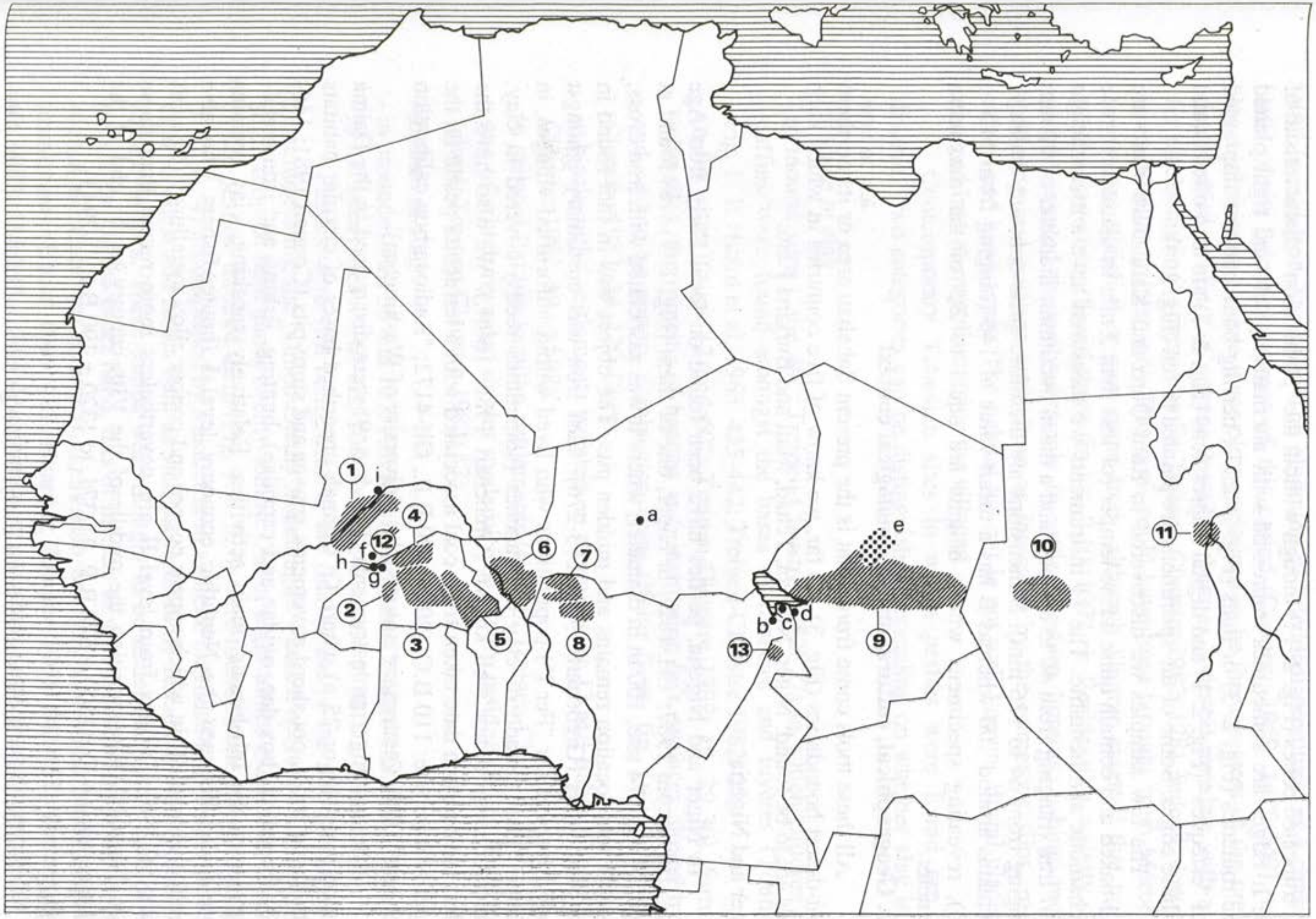



Fig. 3. Map of the distribution of clay pestles.
a. Area where the use of pestles was observed. 1: Inland Niger Delta (Fulani, Northern Somono, Northern Bambara, Songhaï); 2: Lyela; 3: Mossi; 4: Kurumba; 5: Gulmance; 6: Djerma; 7: Adarawa and Zorumawa; 8: Zamfarawa; 9: Haddad from Tchad; 10: Tama and other Darfur potters; 11: Omdurman potters from Darfur; 12: Sarnyéré Dogon; 13: Potters from the Northern Cameroons. b. Archaeological sites where pestles were found. a: Tegef N'Agar 74; b: Daima; c: Makari; d: Goulfei; e: "Haddadian tradition" sites; f: Pégué-Na; g: Kaïn Ouro and Kaïn Ouro Koro; h: Tou; i: El Oualadji.

like truncated cones (Fig. 2: 11) though without the "prehension" characteristic of type I. Edges are sometimes impressed with alternatively left and right plaited fibre roulettes (Fig. 2: 3) or mats (Fig. 2: 2, 7); herring-bone patterns impressed with "estèques" (Fig. 2: 1) and digital impressions (Fig. 2: 7) are also often found on these edges. Some of the specimens are painted in red (Fig. 2: 4).

The few samples we discovered in Kaïn Ouro and Kaïn Ouro Koro are well-baked and contain quite a fine temper (of less than 2 mm in diameter) made of chamotte and hematite. The 11 instruments we measured have a mean height of 67 mm (ranging from 40 to 88 mm) and a mean maximum diameter of 90 mm (ranging from 64 to 126 mm). Dimensions are therefore quite constant. Index A fluctuates around 100 whereas B has a mean value of 146 (ranging from 110 to 210), revealing specimens whose heights are equal to 2/3 of the maximum diameter.

### 2. 2. Geographical, cultural and chronological context

All these tools come from what is the present Sahelian area or its northern semi-desert boundaries (Fig. 3). So far, we know of five countries in which such tools are to be found: Niger, Nigeria, Tchad, Mali and Burkina Faso.

Niger and Nigeria

In Niger and Nigeria, pestles have been found on local Early Iron Age sites (Huysecom 1987: 181-182). In Niger, one of them (Fig. 1: 7) was found at Tegef N'Agar 74 site, 100 m in diameter, where it was associated with iron dross, possible tent location remains and midden pits. The object was in fact found in one of the pits (Grébenart 1985: 263-276). Cast iron was customary amongst Early Iron Age (or "Fer I") populations who lived within unfortified villages, in circular houses made of clay or branches (sometimes reeds) covered in clay. Their economy is not well known (Grébenart 1988: 160ff.). We also have the oldest radiocarbon date taken from coal associated with a terracotta pestle on the Tegef N'Agar site: 110 B.C. (2090 ± 90 B.P., Gif-4172; "Radiocarbon calibration program" 1986, Quaternary isotope lab., University of Washington).

The two Nigerian instruments (Fig. 1: 8, 9) were discovered in the Daima mound (ca. 4 ha or 25 a) where G. Connah unearthed bases of circular habitats with banco walls, pot sherd pavements, graves and store-pits (Connah 1981: 146-163). Breeding (bovidae, ovidae and capridae), hunting, fishing and iron metallurgy were the inhabitants' main activities. Relatively speaking, clay remains were found between the Neolithic economy level I (hunter-fishers who also breed) and level III in which appear copper and copper alloy metallurgy (Connah 1981: 99-196). Datings from level II are nevertheless more recent than those from Tegef N'Agar, spanning the middle of the VIth century to the end of the VIIth century A.D. (1500 ± 670 B.P., I-2371, to 1320 ± 190 B.P., I-2943).

Tchad

Pestles seem to be absent from Early Iron Age sites in Tchad but are plentiful in mid-Iron Age sites. The blooming of "Haddadian culture" is a characteristic of the "classical" phase of this period (Coppens 1969: 1420-142); today, local inhabitants believe these old populations to be the ancestors of the present-day Haddads while Y. Coppens describes them as "oriental invaders with a bent for blacksmithing" (quoted by Fr. Treinen-Claustre 1982: 178). Indeed, they practised metallurgy intensely. This craft could have been brought from Méroé, the town from which they may come from, although Shinnie asserted that no clay pestles have been found there (in litt. 9.10. 1992 -). Besides this activity, these people devoted themselves mainly to cattle breeding, hunting, fishing, mollusc gathering and perhaps agriculture as indicated by the numerous silos, milling stones and handstones. The habitat lay-out is not well known. Burial places are grouped into necropolis outside the villages.

Contemporary Tchadian sites in which pestles were found are very diverse. Two categories can be distinguished depending on whether slag is present or not.

Presence of slag

- in mound sites ("site 49": Treinen-Claustre 1982: 27) in which children's jar-coffins were found amongst the bases of furnaces and tuyères (Toungour, Fig. 1: 1; Huard et al. 1963: 435-442; Treinen-Claustre 1982: 23);
- in flat sites ("sites 12 and 60": Treinen-Claustre 1982: 19, 29-30), furnished with silos, the remains of hearths and, interesting fact, surfaces altered by fire and said to be pottery combustion areas (Kebir Bosa, fig. 1: 2, 12: Treinen-Claustre 1982: 24, 120-124);
- in blacksmiths' settlements isolated on mounds (site 13 and Bahali IV: Treinen-Claustre 1982: 19 and 32);
- in isolated flat blacksmiths' settlements (site 60: Treinen-Claustre 1982: 29-30), one of which revealed circles made of iron bloom residue placed horizontally (site 4: Treinen-Claustre 1982: 17).

Absence of slag

- in mounds (sites 55 and 107: Am Kouzi, Treinen-Claustre 1982: 26, 28 and 38);
- in flat sites (sites 47, 65 and 108: Treinen-Claustre 1982: 27, 30 and 38).

Pestles were still being used in the final phase of the mid-Iron Age. The most interesting site is undoubtedly Maledinga's where a necropolis, situated on a slight mound, held about twenty tombs. Out of eight tombs excavated, seven enclosed pestles; three of them (Fig. 1: 4, 5, 6) were found in one exceptional grave (t. 2, fig. 4) accompanied by a skeleton in a lateral extended position, arms folded onto its chest and knees bent as well as particularly remarkable perforated terracotta cylinders. These tombs were thought to be male, due to the lack of stone necklaces. On the other hand, it is of interest to note that the only tomb in which such a necklace was found (t. 1) is also the only one which didn't yield any instruments (Huard 1969: 192; Huard & Bacquié 1963: 442-451; Treinen-Claustre 1982: 110-114, 123). Assigning a sex to these tombs seems unreliable and,

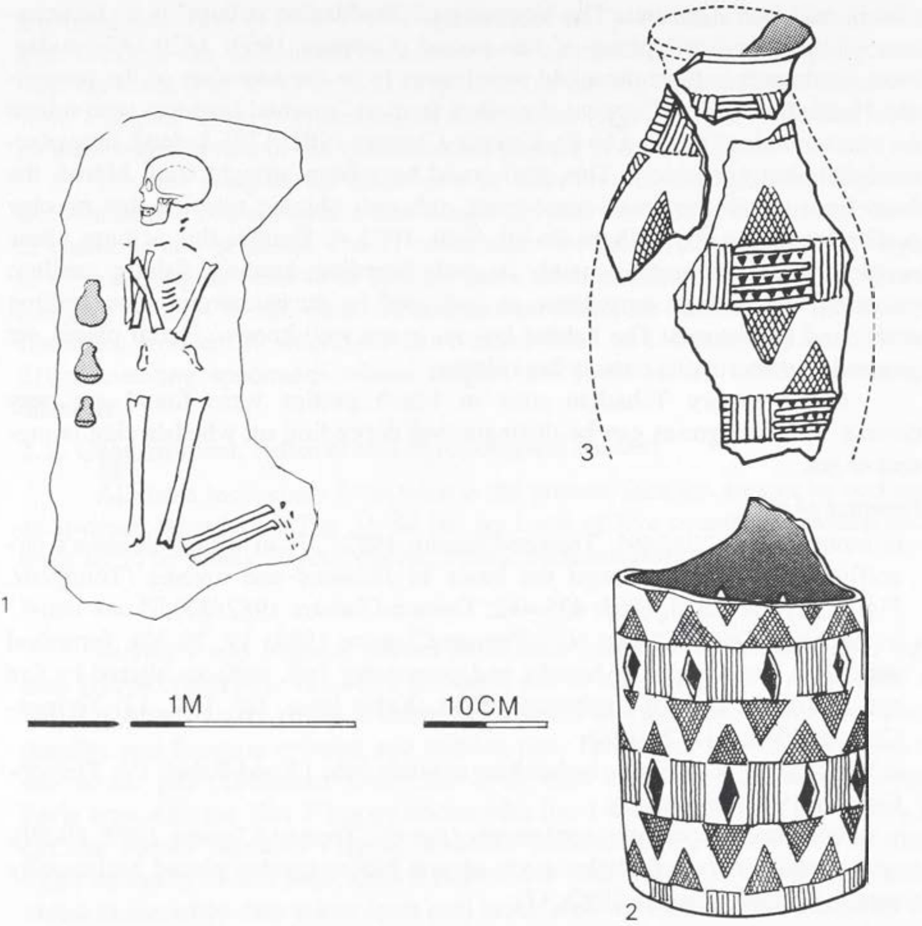



Fig. 4. Maledinga tomb 2 (after Huard, Bacquié & Scheibling 1963, fig. 1, 2).

though the carrying of stone necklaces is related to the absence of pestles, one could also conceive that men of the Tchadian Iron Age wore such ornaments in the other world, whereas women potters were buried with their instruments. Coal associated with pestles from three sites of the Tchadian mid-Iron Age, Bahali IV, Kebir Bosa and site 4, revealed six datings. They span the middle of the Vth and the end of the IXth centuries A.D. (from 1580 ± 100 B.P., Gif-4194, to 1170 ± 90 B.P., Gif-4199) and seem to be contemporary with those from level II in Daima, Nigeria.

Finally and still in Tchad but to the south of the lake, these instruments have been found in Goulfei and Makari (Fig. 1: 3, 10, 11), two sites occupied during the Late Iron Age and the historical period (during the "Sao II" phase, typified by urn burials, and at the time of the Kanuri and then the Kotoko (Wulsin 1932, fig. 269; Huard et al. 1963: 440; Lebeuf 1962: 27, 30, 44-45, 47-48, 63). In Makari, the site is a town of ten distinct quarters, amongst which the blacksmiths', surrounded by a defensive wall. The Sao are believed to have occupied this region progressively. Oral tradition says that black fishermen belonging to the "Sao II" phase came from the East, bringing with them the ritual of urn burials and other innovations such as the spinning and weaving of cotton (Lebeuf 1962: 126-127). Later, the arrival of the Kanuri, builders of fortified cities, coincided with the introduction of Islam. They were followed much later by the present inhabitants of the region, the Kotoko - fishermen who indulged in the "big commerce" of their prey.

Relatively speaking, the stratigraphy of sector III in Makari has shown that pestles were posterior to the phase "Sao II" typified by ground burials (Lebeuf 1962: 27). History and oral tradition situate "Sao II" typified by burial urns, between the Xth/XIth centuries and the XVIth century A.D., when the Kanuri came to settle. The Kanuri-Kotoko phase of Makari spans the end of the XVIth century to 1875 when the town was last abandoned.

Mali

Clay pestles seem to be found within two distinct contexts in Mali, in the Inland Niger Delta (El Oualadji) and on the Dogon cliff (Pégué-Na.).

In El Oualadji, one of these objects was dug out of a burial mound with chamber. This chamber, 13 to 15 m in length, 6 to 8 m large and 2.75 to 3 m in height, was surrounded by a stockade of Palmyra Palm, 2 to 3 m thick. A near-ellipsoidal dome, made out of wooden beams covered in straw, topped the chamber. One got access through a vertical pit of 0.80 m in diameter, situated at the western extremity of the chamber and which joined the top of the mound. The mound itself was about 65 m in diameter at its base and 12 m in height (preserved). Two skeletons lay on a bed of interwoven branches in the chamber. Besides ash containing animal remains and what is probably the cylindrical type clay pestle, excavators discovered a lot of other material. Bracelets and iron or copper rings, iron dagger blades, iron spear- and arrow-heads, copper, stone or glass beads, terracotta animal figurines, bone awls and needles, undamaged vases amongst which a big jar and a few sherds (Desplagnes 1907: 57-66; Desplagnes 1951: 1159-1173; Mauny 1961: 95-97; Lebeuf and Pâques 1970: 23-49). This pre-Islamic tomb is unfortunately badly dated. Though ancient descriptions, from El Bekri in particular (El Bekri 1913, 1: 330; 5: 219-220) can help to compare El Oualadji burial traditions with the ways and customs of Sudanese chiefs during the Xth and XIth centuries, certain archaeological elements hint a more recent date, such as some glass beads close to what is termed the "Venice" type.

In Pégué-Na, three cylindrical type II clay pestles were found on two platforms (G and W) on the Bandiagara cliffs. In both cases, they were associated with pottery amongst which entire vases. An iron peg was discovered on platform W. These shelters belong to an ancient Tellem settlement - phase 2 or 3, corresponding to the end of the XIIth century to the XVIth century A.D. (the oldest dating: 895 ± 95 B.P., Gx-0470; Bedaux 1972: 129-130 and 137; Bedaux & Lange 1983: 14, 17, 25-26; Bolland 1991: 16-36).

Burkina Faso

Findings made in the West of Burkina Faso seem to be related to those of the Bandiagara cliffs.

Three kilometres from the village Tou, two slightly truncated pestles were found during an "excavation" in a small mound surrounded by six small rounded hillocks which formed a sort of circle of about 20 m in diameter. A very brief description of a 0.50 m stratigraphy has been done but the location of the pestles has not been given. They were found with pounding material, polished stone adzes, a ceramic cup, a few iron objects such as spear- and arrow-heads, coiled bracelets and rings. Excavating conditions were very bad but it seems to be an ancient place of worship used until recently by the forefathers of current Dogon villagers (Schweeger-Hefel 1969: 111-125).

Twenty km to the North of Tou, we were lucky to find 12 clay pestles in Kaïn Ouro Koro, an abandoned village. This site built on a large sandy dune stringer stands out thanks to a group of hillocks made of sherds and laterite gravel. These are situated next to refuse heaps full of iron dross and next to the bases of low furnaces for processing iron ore. Ten of these pestles belong to the cylindrical type II form and 2, to the truncated type I form. Furthermore, 10 of the clay pestles are in the slag zone or near the bases of the low furnaces; the other two were picked up on the edge of the settlement. All were found with numerous sherds. We also found a few iron or quartz beads and an iron arrow-head.

After questioning the leading citizens, blacksmiths and village chiefs of Kaïn and Kaïn Ouro, we found out that Kaïn Ouro Koro was in fact the primitive site of what is now Kaïn. Kaïn was founded by a Tellem-Kurumba by the name of Kaïn, after the reign of King Kanka Moussa (1307-1332). Incidentally, ethnic groups of this region believe the ancient Tellem to be the ancestors of the present Kurumba, stressing the fact that the latter used to live on the Seno plain and the cliffs of Bandiagara. Tellem means "the ancient" in a number of tongues in West Burkina Faso. After having founded Kaïn, Aléoué Guindo, a Dogon of a Dogon father and a Tellem mother, is said to have come from Koro - situated in the Seno plain - to settle in the region. This resulted in a war between the Dogon and the Tellem-Kurumba. After the latter's defeat, the Dogon stayed up to the XIXth century leaving shortly before the arrival of the French, around 1891. The Dogon moved a few kilometres down the road to found what is now known as the village of Kaïn. In 1970, part of the population, which had turned to Islam, seceded. They came to live near Kaïn Ouro Koro and founded what is presently the village of Kaïn Ouro. Such briefly recounted facts are very precious for the understanding of the peopling of this region. Furthermore, they allow us to attribute our pestles to the Tellem-Kurumba or Dogon people of the XIVth to the XIXth century. A number of these objects were discovered just outside Kaïn Ouro village, out of an archaeological context. Indeed, present day women potters use pestles picked up from ancient sites.

### 2. 3. Accompanying pottery

In the following paragraphs, we will attempt to draw the principal characteristics of pottery found with the clay pestles mentioned above.

Painted "Haddadian" pottery has to be dealt with separately. It is thought to be one of the most outstanding successes of prehistoric sub-saharan Africa. These are narrow-based truncated goblets (Fig. 5: 7) and bowls, generally hemispherical in shape (Fig. 5: 6). They are painted in black with a red slip. Geometrical, or more rarely, figurative features frequently cover the whole of the body. They are never impressed. Sizes vary from 8 to 16 cm in height, 12 to 30 cm in maximum diameter and 0.4 to 0.8 cm in thickness. On studying the traces, one can see that this painted "Haddadian" pottery is made from fine coils wedged one on top of the other from the inside (Treinen-Claustre 1982: 95).

The more common pottery associated with pestles from Niger, Nigeria and Tchad all have hemispherical bases (Fig. 5: 1, 2, 3). Feet are absent and flat bases very rare. Some exceptional forms are found; the most surprising are perforated cylinders of the kind found in the Maledinga graves (Fig. 4: 2). Sizes vary from 10 to 40 cm in height and 10 to 50 cm in maximum diameter. The sides are thin, 0.3 to 1.5 cm - depending on the size of the recipient. The clay - when described - is generally well-kneaded, homogenous, prepared with a fine temper well spread into the bulk. Incised lines (Fig. 5: 1, 11; Tegef N'Agar, Daima and Toungour), rare comb impressions (Fig. 5: 2; Daima), very rare raised relief decoration (Fig. 5: 3, Daima) and twisted string roulette very slightly impressed (Fig. 5: 1, 3, in the different regions) can be observed on decorated vases. Decoration with a string roulette is usually limited to the upper part of the body (Fig. 5: 4, 8) but can exceptionally cover the bottom or even the whole of it (Fig. 12:1,3; Tegef N'Agar and Daima).

Traces have also been observed on the surface and inside the vases. Those visible on the outside are mat prints (Fig. 5: 2, 8, 9, 10). Such marks generally cover only the lower part of the body but can, on rare occasions, cover the whole of it as in the case of bowls. Small impressed cavities can sometimes be seen on the inside of vases (Fig. 5: 9; common pottery of the mid-Iron Age in Tchad). These impressions are made by clay pestles whose "active" surfaces are decorated (see **3.1.**). Such traces seem to be limited to the lower half of the body.

Pottery found with clay pestles more to the West, in Mali and Burkina Faso, generally have different shapes. In Pégué-Na, Tou and Kaïn Ouro Koro, very characteristic cups with feet are found (tripods or quadripods, Fig. 6: 1, 5), frequently decorated with a knotted strip roulette or twisted string roulette. Bedaux took much interest in this type of vase and reflects that it is widespread in

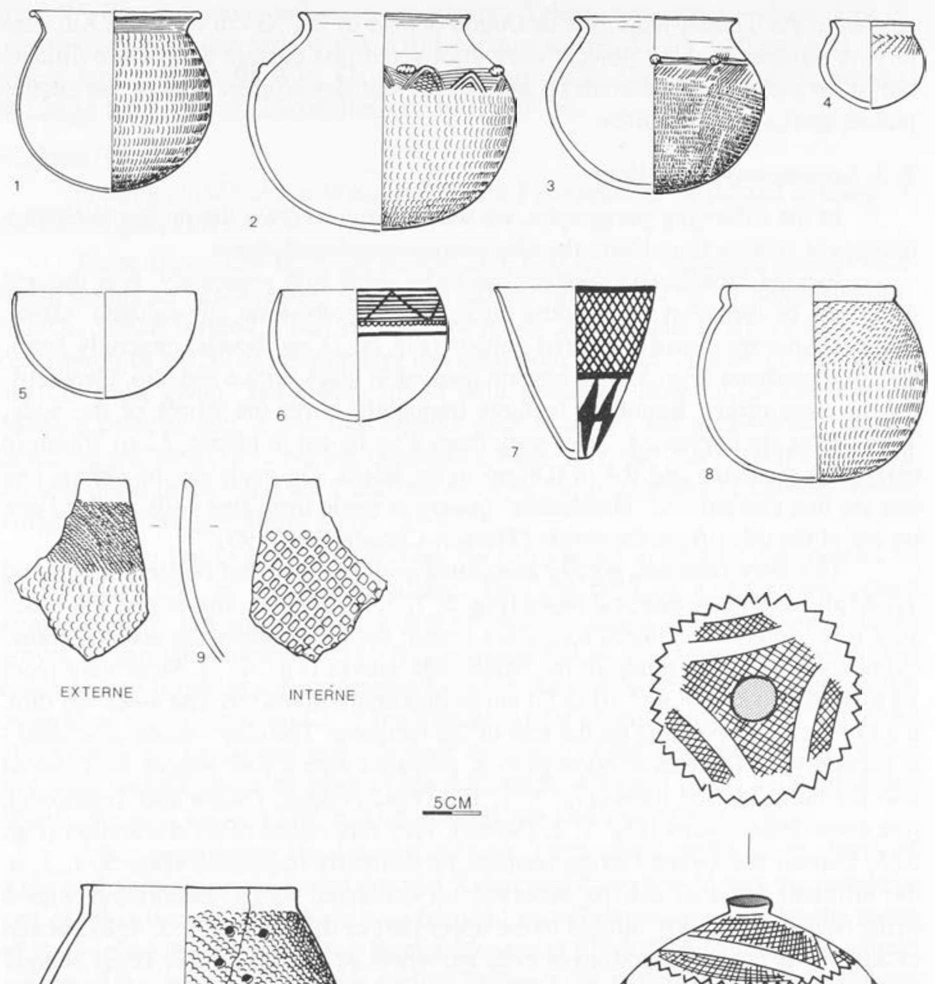



Fig. 5. Pottery associated with the "archaeological" clay pestles from Niger, Nigeria and Tchad. 1: Tegef N'Agar 74; 2-4: Daima II; 5-9: Kebir Bosa; 10: "site 13"; 11: Toungour (after: 1: Grébénart 1985, fig. 187; 2-4: Connah 1981, fig. 7.5, 7.6; 5-10: Treinen-Claustre 1982, fig. 1ff.; 11: Huard and Bacquié 1963, fig. 2).

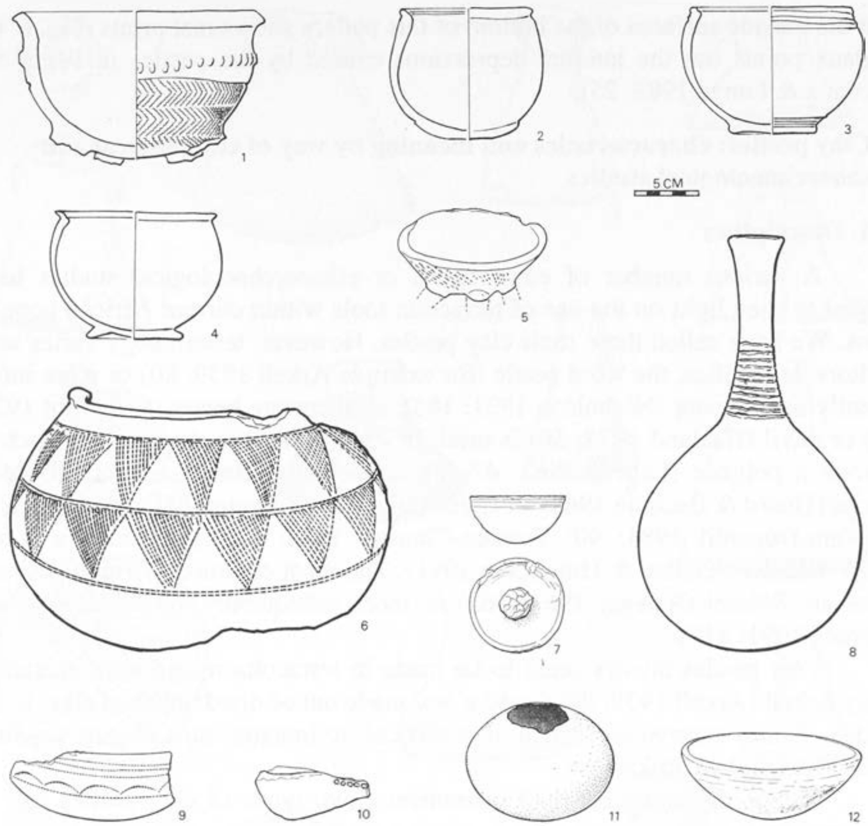



Fig. 6. Pottery associated with "archaeological" clay pestles from Mali and Burkina Faso. 1-3: Pégué-Na platform G; 4: Pégué-Na platform W; 5: Tou; 6-12: El Oualadji (after: 1-4: Bedaux 1982, fig. 3, 4, 10, 12; 5: Schweeger-Hefel 1969, fig. 5; 6-12: Lebeuf & Pâques 1970, fig. 24, 25, 27-32).

the whole of the Niger valley (Bedaux 1980: 247-258; Bedaux & Lange 1983: 19-24). These cups are found with small hemispherical vases to which a ring-shaped foot has been added (Fig. 6: 2, 4); the lip is often grooved. In Kaïn Ouro Koro, pottery is abundant. The most represented forms are big jars with an external lip. Decoration is done with twisted string roulettes, alternatively left and right plaited roulettes, wooden roulettes, incisions and mat impressions. The presence of cups with feet in El Oualadji is questionable; it seems that none were found in the grave. Pottery, customarily covered with a bright red coating, has a rounded base (Fig. 6: 6-12). Decorations can consist of impressions done with a twisted string roulette (Fig. 6: 6), grooves (Fig. 6: 8) or impressions done with a comb combined with a twisted string roulette (Fig. 6: 9). It is interesting to note that the outside surfaces of the bottom of this pottery shows mat prints (Fig. 6: 6). Bedaux points out the internal depressions caused by the pestles in Pégué-Na (Bedaux & Lange 1983: 25).

### 3. Clay pestles: characteristics and meaning by way of ethnological and ethnoarchaeological studies

### 3. 1. Description

A various number of ethnological or ethnoarchaeological studies have helped to shed light on the use of terracotta tools within current African populations. We have called these tools clay pestles. However, terminology varies with authors. In English, the word pestle (for example Arkell 1939: 80) or more infrequently hand-beater (Nicholson 1931: 188), earthenware beater (Crowfoot 1924: 21) or anvil (Haaland 1978: 50) is used. In French, we use designations such as lissoirs à poignée (Lebeuf 1962: 47-48), cabochons (Huard et al. 1963: 440), pilons (Huard & Bacquié 1963: 444), tampons (Le Rouvreur 1989: 382; Gallay & Sauvain-Dugerdil 1981: 90; Treinen-Claustre 1982: 120f.), percuteurs (Llaty 1990: 106-107; Gallay & Huysecom 1991). The most common German designations are Stössel (Krieger 1961: 363) or more infrequently Tonschlegel (Geis-Tronich 1991: 414).

Clay pestles always seem to be made in terracotta mixed with chamotte. Only Arkell (Arkell 1939: 80) found a few made out of dried unbaked clay, in the Sudan. This is surprising. Indeed, it is difficult to imagine such objects resisting occasional violent strikes.

As for the archaeological instruments, two types of clay pestles can be distinguished.

Type I

Type I (Fig. 7, 8) is massive and looks like a truncated cone. Its section is always carefully circular. The small upper part - for prehension - is swollen into the shape of a cabochon (Fig. 7: 1, 2, 3); however, it can also simply be cylindrical (Fig. 7: 11; Fig.: 8: 3, 5) or even narrowed down to resemble a slight truncated cone (Fig. 7: 6, 8). The top is either rounded (Fig. 7: 1, 3, 13) or flattened (Fig. 7: 7, 9) and can be slightly cup-shaped (Fig. 7: 6, 8, 12). The base is always spherical, a large majority convex (Fig. 7: 1, 2, 3), some exceptionally concave (Fig. 7: 4, 5).

Sizes vary. However, we only have precise data from Mali, the Inland Niger Delta (42 items measured by MESAO), Dogon Sarnyéré (2 instruments drawn by Gallay & Sauvain-Dugerdil 1981: Fig. 3) and North of Burkina Faso (4 pestles described by Llaty 1990: 106 and 2 others measured during MESAO). The mean dimensions of the pestles found in the Inland Niger Delta are the following: total height, 91 mm (ranging from 45 to 136 mm), maximum diameter of the base, 90 mm (ranging from 44 to 130 mm), maximum diameter of the upper part, 51 mm (ranging from 24 to 76 mm). The four pestles measured by

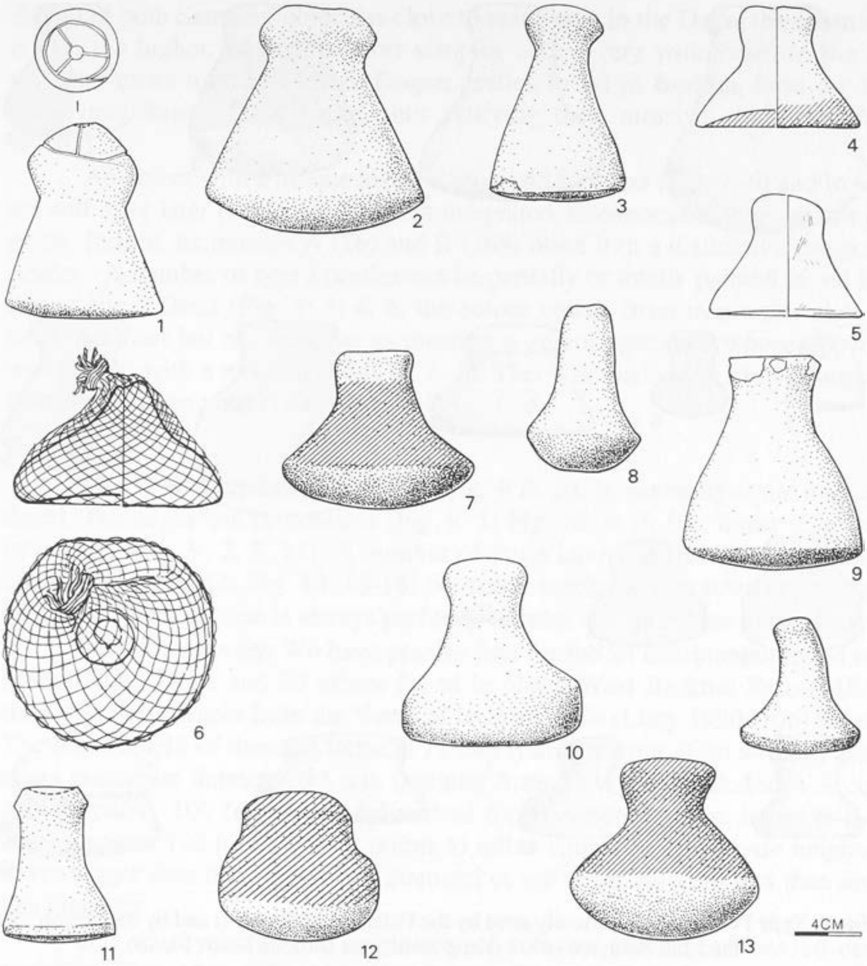



Fig. 7. Type I clay pestles currently used in the Inland Niger Delta area (Northern Bambara: 1-6; Northern Somono: 7-13).

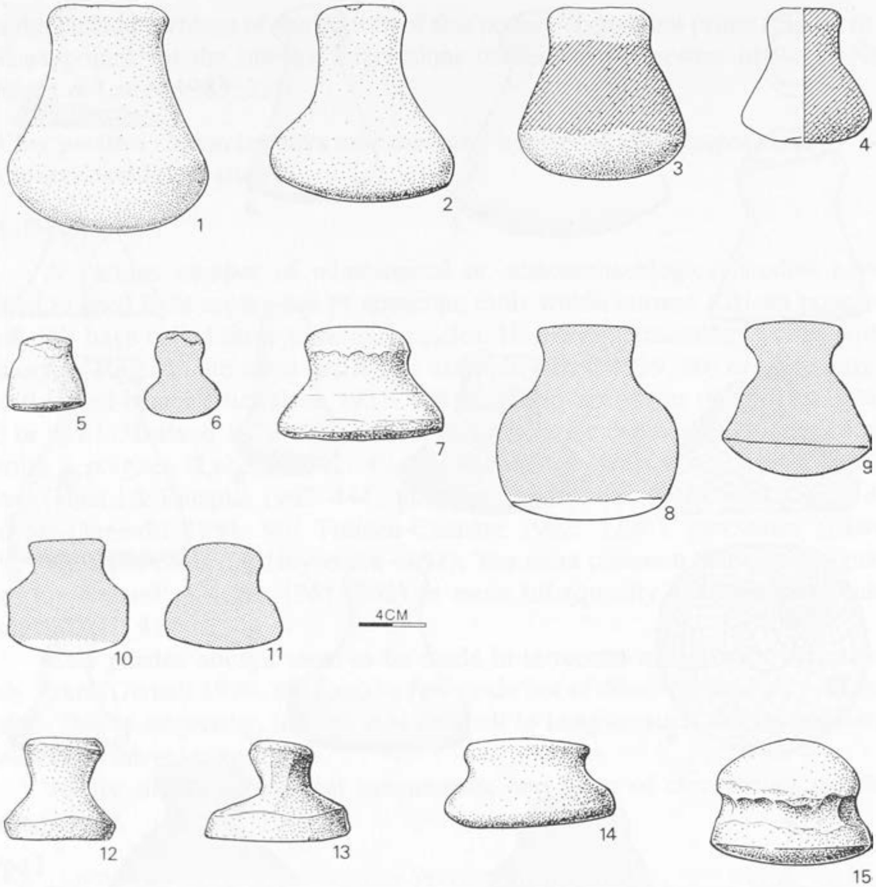



Fig. 8. Type I clay pestles currently used by the Fulani in Mali (1-11) and by the Dogon from the Mali Sarnyéré (12, 13) and Northwest Burkina Faso (14, 15).

Llaty in Burkina Faso have mean dimensions close to those of the Delta (respectively 108, 94 and 43 mm), the Dogon objects from Sarnyéré are smaller (respectively 60, 76 and 38 mm). The Dogon pestles we measured in Burkina Faso seem squatter than those from the Inland Niger Delta (respectively 64, 100 and 75 mm). The mean value of index A is 58 (ranging from 34 to 77), indicating pestles which have bases twice as large as their tops. The mean value of index B is 100 (ranging from 69 to 146), showing that these samples are generally massive, held within a cube and that their height is about equal to the diameter of their base. In Burkina Faso, the mean indexes described by Llaty are relatively close to those observed in the Delta: A=45 (values ranging from 44 to 46) and B=90 (values ranging from 73 to 110). On the other hand, though the mean index

A (51) of both Sarnyéré objects is close to that found in the Delta, the mean index B (127) is higher, indicating short samples with a very wide base. In the same way, the mean indexes of both Dogon pestles found in Burkina Faso are much taller than those of the Delta, thus ratifying their massive character (A=70; B=163).

An object with a unique history, form and function (Fig. 7: 6) and to which we will refer later (3.3.), has not been integrated, intentionally, into the last paragraph. Indeed, its indexes A (16) and B (168) place it in a distinctive category of pestles. A number of type I pestles can be partially or totally painted in red in the Inland Niger Delta (Fig. 8: 3, 4, 6, the colour comes from iron-oxide clay dilution). And last but not least, let us mention a unique specimen whose upper part was incised with a wooden rod (Fig. 7: 1). This was made by F. Serri-Tangara, a Bambara woman potter in the North of Saraféré.

Type II

The second type of clay pestle (Fig. 9 & 10) is generally squat and cylindrical. The edges can be concave (Fig. 9: 1; Fig. 10: 8, 9, 10), linear (Fig. 10: 5) or convex (Fig. 9: 2, 3, 11). A number of them have profiles close to truncated cones (Fig. 9: 13-14; Fig. 10: 15-16) but never reach the characteristic silhouette of Type I. Their section is always perfectly circular and their base always convex.

Dimensions vary. We have precise data for the 23 instruments found in the Inland Niger Delta and 30 others found in North-West Burkina Faso (MESAO mission). One sample from the North of Burkina Faso (Llaty 1990: 106) is added. The mean height of these 54 items is 71 mm (ranging from 46 to 94 mm) and the mean maximum diameter, 91 mm (ranging from 59 to 123 mm). Index A equals approximately 100 (due to its cylindrical form), whereas mean index B is 132 (ranging from 102 to 200). This points to rather squat objects, whose heights are never bigger than their maximum diameter or are never equal to less than half of this diameter.

One must mention the originality of some of the decorations on certain type II pestles. Mats (Fig. 10: 4) or fingers (Fig. 10: 2, 3, 8) are used to leave impressions on some edges. The upper parts are sometimes decorated with incisions or impressions left by fingers or a rounded rod (Fig. 9: 9-16). Women potters of the Inland Niger Delta told us that these marks were in fact signatures which allowed them to recognise their instruments. Pestles are often painted in red (Fig. 9: 1, 2, 4) or sometimes striped red (Fig. 9: 11).

At this point, a number of rules and trends can be stated, especially with regard to the shape (concave or convex) of the bottom of pestles. This depends on the technology used and will be described in chapter **3.3**. (R8, R9 and T2).

Other slight variations do not seem to be related to precise type I populations or functions. For instance, F. Nyafo-Samasséku, a Northern Somono woman potter from Kobassa, makes clay pestles with "cabochon", cylindrical or truncated tops indifferently. Likewise, cup-shaped tops are made by Northern

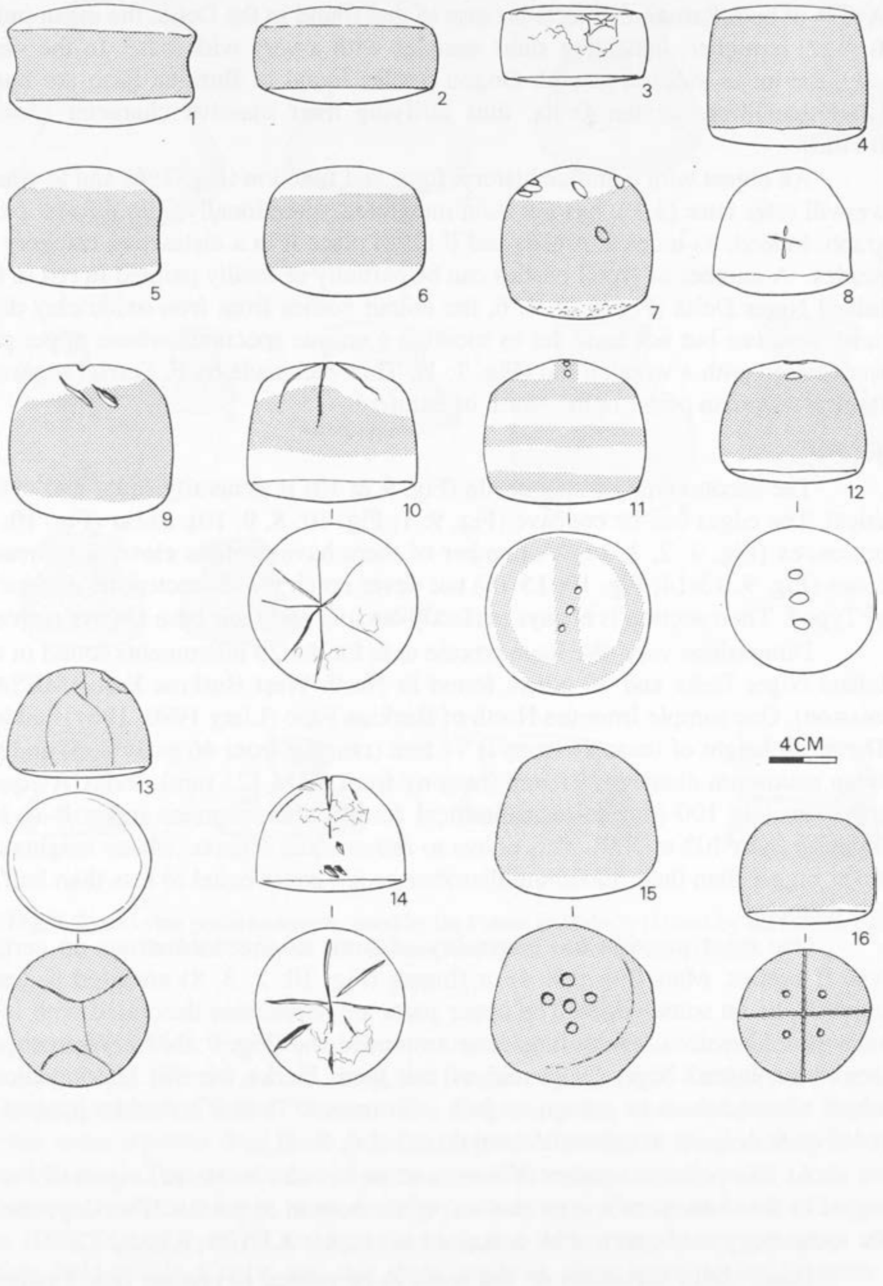



Fig. 9. Type II clay pestles currently used by the Fulani from the Inland Niger Delta.

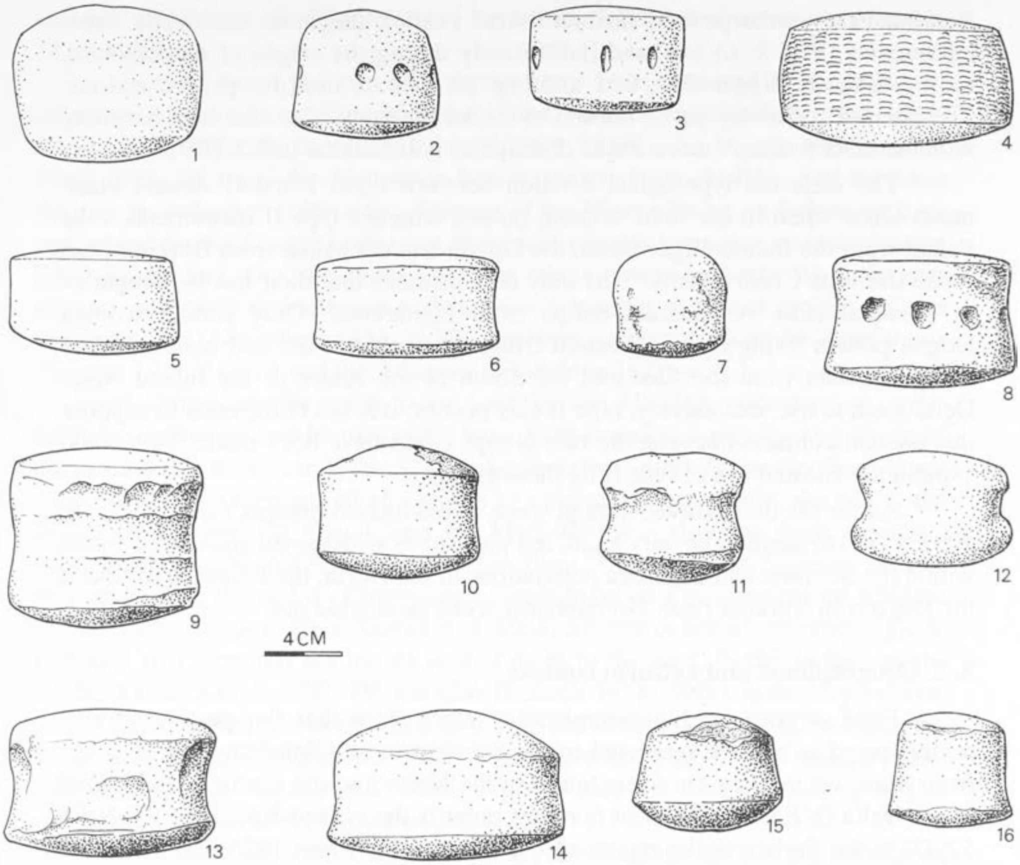



Fig. 10. Type II clay pestles currently used by the Dogon from the North-west fringe of Burkina Faso.

Somono craftswomen (F. Nyafo-Samasséku), Northern Bambara (F. Serri-Tangara) and the Fulani (T. Boccum-Sango).

Some of the measurements mentioned above show the diversity of sizes. No conclusion can be drawn showing some kind of relationship between the size of a pestle and a population. Take for instance the 19 pestles made by F. Kayentao-Gadiaka, a woman potter from Ngourema, which show great diversity almost spanning both extremes. In fact, it will be shown in chapter **3.3**. that these variations are due to the different stages in the making pottery. A potter can use instruments of a different size by changing his or her movements, depending on the desired size of the recipient. A survey of women potters - in particular, K. Konaré-Konaré from Saraféré and F. Kéwé-Kéwé from Kakania-Bozo in Mali, and Y. Niangali-Bamadjo and Y. Niangali-Anguiba from Kaïn-Ouro in

Burkina Faso - who possess different sized pestles, taught us that while small instruments (Fig. 8: 6) are used indifferently during the stages of manufacture, those which are bigger (Fig. 8: 1 and Fig. 10: 14) are used for precise actions. The diameter of a clay pestle chosen to model the body of a vase is in harmony with the latter's size. A more ample description will be done in **3.3**. (R9).

The clear-cut typological division between types I and II doesn't make much sense when in the field. Indeed, potters who use type II instruments - the Fulani from the Inland Niger Delta, the Dogon and the Mossi from Burkina Faso - also use type I instruments! This only demonstrates that their use is thought of as identical (like A. Gadiaka-Sango from Ngouréma). Only certain women Dogon potters living on the Western fringe of Burkina Faso and certain Fulani women potters from the East and the South of the centre of the Inland Niger Delta seem to use, exclusively, type II clay pestles. It is not outrageous to suppose that ancient contacts between the two groups could have been made. This could explain the unusual use of type II by these groups.

As for the decorations, though some of the incised designs (such as Fig. 9: 10, 13, 14, 16) seem to be very local, red painting is widespread and can be found within the Somono and Bambara populations of the North, the Fulani in Mali and the Dogons in Burkina Faso. No regularities can be singled out.

### 3. 2. Geographical and cultural context

Field surveys and bibliographical research show that clay pestles are currently spread in an area restricted to the Sahelian or sub-Sahelian zone (Fig. 3); from Mali, where they are to be found in the North and the centre of the Inland Niger Delta (MESAO, the most northern point is the village Koubi, 14 24' N / 4 52' O) to the Sudan, in the region of Omdurman (Crowfoot 1924: 21; 15 39' N/ 32 25' E). Although surveys in the Southern part of the Inland Niger Delta and the savana (Mali, Northern Guinea and South-West Burkina Faso) revealed a total absence of this tool south of the Sahelian/sub-Sahelian border - at least in Western Africa. Such a widespread use of clay pestles in the Sahel zone implies that they are used by different populations (Drost 1967; Baumann 1979).

Thus, we found them amongst four populations in the Inland Niger Delta: the Fulani, the Northern Bambara, the Northern Somono and the Songaï. The Fulani are mainly cattle breeders, more or less sedentary since the beginning of the XIXth century. The Northern Bambara are essentially sedentary agriculturers, live in areas sheltered from floods and good for sowing cereal (Pâques 1954). The Somono and the Songaï fish and grow rice; they are generally sedentary but sometimes travel quite far (more than 100 km) to other fishing grounds.

In Sarnyéré, pestles are used by the Dogons who live in a Fulani ethnical "isolate" and cultivate millet and sorghum (Gallay & Sauvain-Dugerdil 1981: 37ff.). More to the South, the Dogons who live on the North-West fringe of Burkina Faso also use clay pestles. Being mainly cultivators, they keep close contact with the Fulani, the Kurumba and the Mossi (MESAO observations; Griaule 1938: 3-39).

North of Burkina Faso, clay pestles have been observed in a number of sedentary cereal-cultivator populations in the Fulani neighbourhood: the Lyela (Schott 1986: 9ff.), the Kurumba (Stössel 1986: 245ff.), the Mossi (MESAO and Llaty 1990: 2ff.) and the Gulmance (Geis-Tronich 1991: 414ff.). Not far from this region, sedentary cultivators - Djerma of the Niger - living on Fulani territory and related to the Songhaï, also use these instruments (personal communication Klaus Schneider). The same goes for a few ethnic groups in North-West Nigeria, who are sedentary agriculturers and farmers belonging to Fulani groups such as the Zorumawa (Nicholson 1931: 187ff.), or Hausa groups such as the Zamfarawa (Krieger 1961: 362ff.) and the Adarawa (Nicholson 1929: 45ff.).

In Tchad, pestles seem to be used by the Haddad, sedentary or semi-nomadic craftsmen and hunters, who have been breeders since the beginning of the century (Le Rouvreur 1989: 377ff.). More to the South, in the Northern Cameroon, different sedentary ethnic groups of cultivators - the Hide, the Mafa, the Mabas, the Sukur, the Cuvok and the Mofu-Gudur - also use them (personal communication, Nicholas David and his film "Demeure des Esprits: pots et personnes dans le nord du Cameroun", Department of Communication Medias, University of Calgary, 1991; David et al. 1988; Sterner & David forthcoming). A. J. Arkell also mentions the use of pestles more to the East, in the Sudan, by the Darfur Tama (Arkell 1939: 79; see also Haaland 1978: 49ff.), sedentary cultivators of millet, beans and corn. They also keep small herds close to the village, the whole year round (Le Rouvreur 1989: 152ff.). Potters from Darfur seem to have emigrated towards Omdurman, which explains why one finds pestles up to this region of the Nile valley (Crowfoot 1924: 21).

In all observed cases, clay pestles are used exlusively for the making of ceramic recipients. Furthermore, this craft is usually done by the women (Northern Bambara, Northern Somono, Fulani, Songhaï, Djerma, Dogon from Burkina Faso, Kurumba, Mossi, Zorumawa, Haddad, Tama, Omdurman and in the North of the Cameroon), on rare occasions by the men (Dogon Sarnyéré, Zamfarawa) or by both (Gulmance, Lyela, Adarawa).

As a rule, blacksmiths' wives are potters and use pestles as is the case for the Songhaï, Haddad and Sudanese Tama blacksmiths, the Mossi saaba, the Bambara numu of the North, the Dogon djémé from Burkina Faso, the Kurumba ayarba, the Somono kugukaïgu of the North, the few Fulani wayluBé and Northern Cameroon populations.

Women potters can also be weavers (the Songhaï weavers, the Fulani maabuuBé and the occasional Haddad weavers), coopers (the few Fulani lawBé and perhaps some Haddad) and, exceptionally, cobblers (a few Fulani sakkeeBé and Haddad cobblers). When this craftsmanship is done by men, either independently or with the women, potters do not belong to what is called "casted" groups but their main activity is agriculture. Potters who use clay pestles and who are from an environment in which this kind of work is exclusive to women belong to "casted" social groups whereas men potters accompanied or not by women belong to what the Africans call "noble" social groups.

Sites in which pestles were used are sedentary habitats, either villages or towns. Pottery can be made in the courtyard (Kirchamba), the entrance-hall (Sindegué), a room used as a specialised workshop (Korienzé), occasionally in one of the rooms (Babi), exceptionally in a lane opposite the house (Bango) or even in a specialised area outside the agglomeration, seen only once in Nemgéné. It seems therefore that the use of clay pestles is limited to sedentary settlements. Yet let us not jump to hasty conclusions, A. Le Rouvreur implied that such an activity took place on encampments ("... à l'abri d'une natte qui prolonge le toit de la hutte ou de la tente"; Le Rouvreur 1989: 382).

As a consequence of geographical scattering, a few regularities emerge:

R1: If in the presence of clay pestles, then the population belongs to the Sahelian or sub-Sahelian area. Three regularities (R2, R3 and R4) emerge from a socio-economical study of clay pestle users:

R2: If in the presence of clay pestles, then these are tools used in the making of pottery.

R3: If in the presence of clay pestles within a blacksmith's, a weaver's, a cobbler's or a cooper's surrounding, then one is in a "casted" social group where pottery is exclusive to women.

R4: If in the presence of clay pestles used by men, then one is in a social group termed "noble".

Examples such as the Gulmance, the Lyela and the Adarawa force us to weaken affirmations we would be tempted to postulate, despite their exceptional character. We therefore present here a trend, that is to say a statement which cannot be considered as a regularity because one or more counter-examples are known, even though most of the observations converge. We then have to postulate a trend, and not a regularity, despite the exceptional character of examples from the Gulmance, the Lyela and the Adarawa. Indeed, though observations tend to converge, at least one counter-example is known: T1: If in the presence of clay pestles, then one is most probably in a group where there is a sexual differentiation in activities.

As for the relationship between clay pestles and habitat, we have never found clay pestles outside workshops. This is sometimes because of some kind of "taboo". The following regularity can be stated:

R5: If in the presence of clay pestles, then one is close to a potter's workshop. Before we infer a regularity which links these instruments to sedentarism, we are awaiting details from Tchad. In the meantime, we can state the following "restricted" rule:

R6: If in the presence of clay pestles within a habitat in Mali, Niger, Burkina Faso, Nigeria, the Northern Cameroons or the Sudan, then it is a permanent habitat.

On the other hand, it seems impossible to establish any kind of relationship between the presence of a clay pestle and the spot where it is used; this seems to depend on the time of day or the potter's mood. Finally, surveys led in a number of countries allow us to postulate the following "restricted" rule:

R7: If in the presence of clay pestles in Mali, Niger, Tchad, the Northern Cameroons and the Sudan, then one is in a habitat where one or more of the following trades are plied: blacksmith, weaver, cooper or cobbler.

### 3. 3. Technological context

As we have just mentioned, clay pestles are used exclusively in the making of pottery. Surveys lead within the "Mission ethnoarchéologique suisse en Afrique de l'ouest", (MESAO) revealed a number of distinct techniques (Huysecom & Mayor in press). We found that clay pestles were used for only two of these techniques, termed "pounding in a concave shape" technique and "casting on a convex shape" technique.

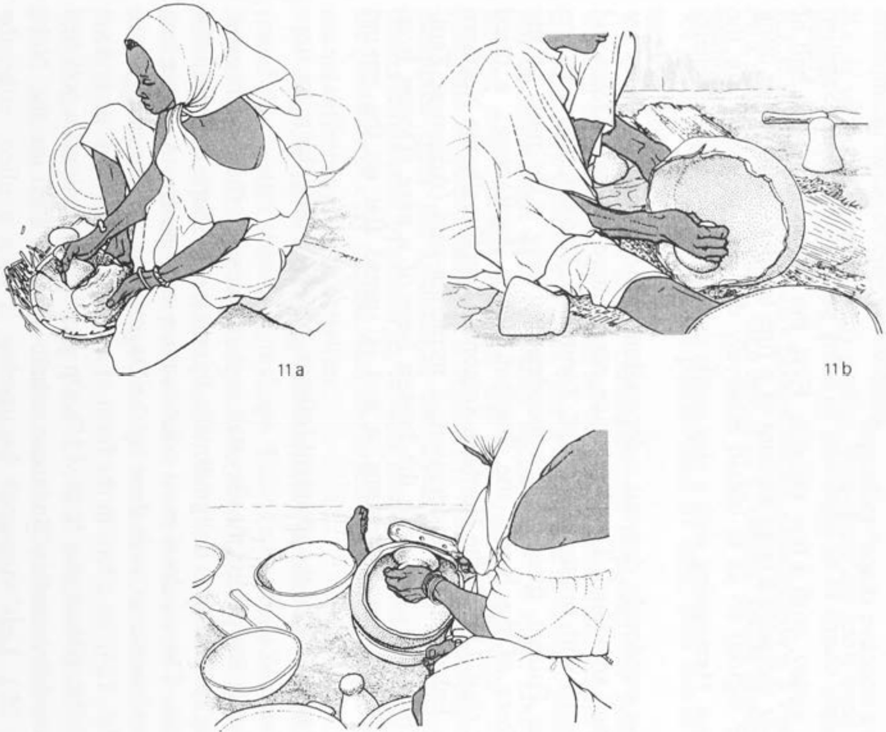
The "pounding in a concave shape" technique

This technique seems to be particular to many populations of the Sahelian area and the Nile valley, with a few variants. First, the potter prepares a ball of clay in which he or she adds a large amount of a fine temper (chamotte or dung depending on the region) so as to obtain relatively dry clay necessary for the pounding technique. Hammering with a clay pestle can improve the homogeneity of the clay ball.

Potters have previously dug out a depression in the ground. Its sides are neatly equalised and smoothed. The depression can be used as such (Mossi and Kurumba) or covered with matting (Songhaï, Zorumawa, Haddad, Tama and on rare occasions the Fulani), fitted with a wooden cast (Fig. 13b; most of the Fulani, the Bambara of the North, the Songhaï, a few Zamfarawa), a dried unbaked clay cast (Fig. 13c; all the Northern Somono, exceptionally the Northern Bambara and the Fulani), on rare occasions a terracotta cast (Adarawa, Zamfarawa, Fulani, Gulmance) and even the broken base of a vase (Dogon from Burkina Faso). On very rare occasions, a mat is spread flat on the ground (Fulani).

The actual assembly of the recipient follows, of which only the main steps are described.

Once the potter has placed the clay ball in the depression (bare depression, cast or mat), she or he hammers it vigourously, thinning it to shape the bottom of the vase (Fig. 11a). This is done most often with a clay pestle. A potter can exceptionally use a handstone, as is done by the Dogon from the Sanga region in Mali (Bedaux 1986: 124), or a tool in the form of a "household bread" as is done by the Egyptian Fellah (Blackman 1948: 125). On very rare occasions, a polished wood pestle is used by certain Sudanese ethnic groups, such as the Nuba (Crowfoot 1924: 20). Less vigourous hammering is then applied, either by



11 a 11 b 11 c

Fig. 11. Potters using the "pounding in a concave shape" technique.
a. hammering of the clay ball, on a wooden cast, with the big extremity of the pestle (beginning of the assembly).
b. hammering of the vase's body, on an unbaked clay cast, with a pestle.
c. pestle used as an anvil while the top of the body is hammered with a. wooden palette

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Fig. 12. Potter using the "casting in a convex shape" technique by hammering a clay cake on upside down pottery.

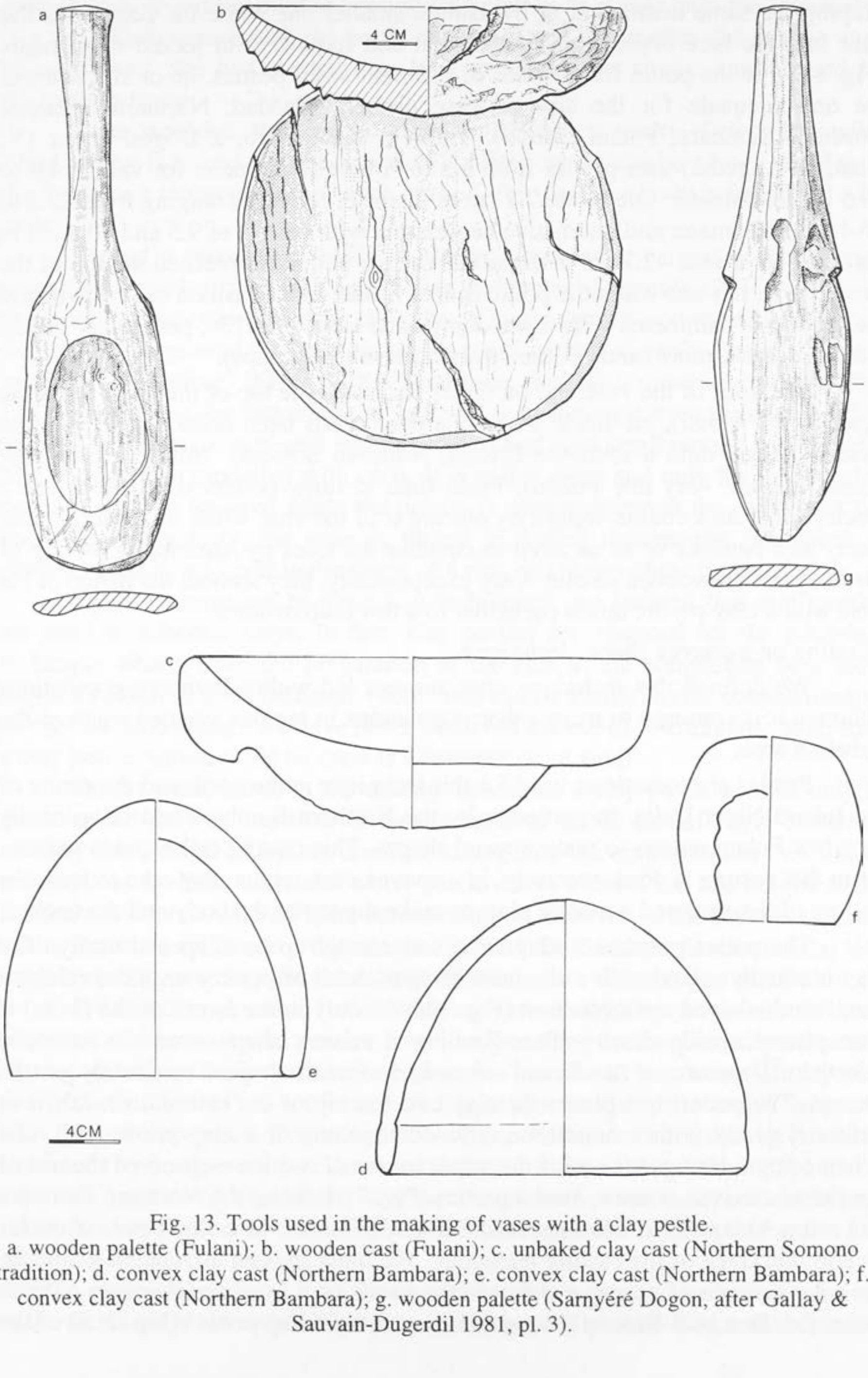


Fig. 13. Tools used in the making of vases with a clay pestle.
a. wooden palette (Fulani); b. wooden cast (Fulani); c. unbaked clay cast (Northern Somono tradition); d. convex clay cast (Northern Bambara); e. convex clay cast (Northern Bambara); f. convex clay cast (Northern Bambara); g. wooden palette (Sarnyéré Dogon, after Gallay & Sauvain-Dugerdil 1981, pl. 3).

keeping the same instrument or by using a smaller one while the potter tilts the vase into the bare depression, cast or mat and turns it with jerked movements (Fig. 11b). If the potter has a series of different-sized pestles, he or she will use the one adequate for the size of vase desired (Haddad, Northern Somono, Northern Bambara, Fulani, Mossi). Thus, in Kaïn Ouro, a Dogon potter (Y. Niangali-Anguiba) uses pestles from 6.3 to 7.4 cm in diameter for vases 14.8 to 19.5 cm in diameter, one pestle 7.7 cm in diameter for vases ranging from 25.2 to 26.4 cm in diameter and alternative hammering with pestles of 9.5 and 10.4 cm in diameter for a vase 42.7 cm in diameter. Once a potter has reached the top of the vase's body, in some cases the pestle is held inside, in the fashion of an anvil, and the outside is hammered with a wooden palette (Fig. 11c; 13a; particulary Fulani women potters, more rarely potters from other ethnic groups).

The neck of the vase and on fewer occasions the top of the body (as is the case for the Mossi), are made with coils once it has been dried. Sometimes the vase is placed onto a tournette (Mossi, Northern Somono, Northern Bambara, some Songhaï, very few Fulani). From time to time, potters continue to use a pestle, either as a counterweight by placing it in the vase while its turning, more rarely as a hammer or as an anvil to equalise the sides by hammering the top of the body with a wooden palette. Very exceptionally, they smooth the inside of the vase with a clay pestle; this is particular to a few craftswomen.

"Casting on a convex shape" technique

We defined this technique after surveys led within Bambara populations although it is common to many other populations in regions situated south of the Sahelian area.

Pestles are sometimes used for this technique in the north and the centre of the Inland Niger Delta, in particular by the Northern Bambara and occasionally by a few Fulani potters to make special shapes. This casting technique is particular in that casting is done, precisely, in a convex cast, with a clay cake to form the bottom of the vase and a mobile plate to make the top of the body and the neck.

The potter prepares a clay cake soft enough to be shapened easily. The clay is usually mixed with a chamotte temper. A bit of pottery or, more rarely, a small vault-shaped terracotta cast (Fig. 13d-f; f only in the North of the Delta) is then placed upside down - thus forming a convex shape - onto a tournette (Northern Bambara or the Fulani - mainly for small shapes) or directly on the ground. The potter then places the clay cake on top of the cast and models it or strikes it gently with a handstone, a wooden palette or a clay pestle (Fig. 12). When using a clay pestle and if the vases are small, we have observed the use of very characteristic concave-based pestles (Fig. 7: 4, 5) by the Northern Bambara and a few Fulani from Sénoussa and Saraféré. The use of a clay pestle is exclusive to this stage of the casting technique. We must also signal what seems to be the sole example of a unique object in the hands of a Northern Bambara woman potter (M. Dembélé-Balo of Bounga). It is a sort of "clay pestle" (Fig. 7: 6) of the potter's own invention, used to decorate the bottom of a vase with the impression of a net. When questioned, the potter explained that her mother did not use such an instrument. She had created it in 1987 to replace flat stones usually used for the same purpose.

Once moulded, the vase is taken out of its cast to dry. Dried, the unfinished pottery is turned upright on a mobile plate - which can be a large sherd as in the South or a tournette in the North of the Delta - and the body is fashioned with coils.

During a mission in Mali, A. Gallay observed a variant of the casting technique typical of the Sarnyéré (Gallay & Sauvain-Dugerdil 1981: 86-91). To begin with, the potter places a clay cake on upside down pottery which itself is directly on the ground (as before) or on a small mound of earth. The clay is then moulded by "patting" it first with a handstone, then with a wooden palette (Fig. 13g) thus shaping the bottom of the vase. After removing it from the cast, it is left to dry. Once dried, it is placed the right way round on a small mound of dry earth. The body is then modelled with coils. It is at this stage and only here that a clay pestle is used as an anvil while the palette is used to hammer the outside of the body. Simultaneously, the vase is turned in jerked movements. The neck is shaped by applying a coil in the shape of a ring on the top of the body.

Upon examination of these two techniques, we realised that clay pestles are used in different ways. In fact, clay pestles are essential for the pounding technique where, from the preparation of the clay to the completion of a vase, they are in turn used as hammers (both ends can be used), anvils, counterweights or even for smoothing. We have never observed the use of instruments, other than a clay pestle, which could be used as a hammer or an anvil.

On the other hand, in the casting technique, a clay pestle is used only in one step and only as one kind of tool (a hammer in the Inland Niger Delta, an anvil by the Sarnyéré Dogon). Besides, taking into the consideration the casting technique as a whole, the use of a clay pestle seems exceptional and unique to the Bambara in contact with a Fulani surrounding or, likewise, to the Fulani in a zone where Bambara influence predominates. Indeed, the Southern Bambara who live outside such a zone only use handstones as hammers - which is just as effective.

We can thus be led to believe that concave-based clay pestles are the consequence of convex-based pestles from the pounding technique, adapted to the casting technique. In fact, we will see that the "Bambara" borrowing of clay pestles from the "Fulani" is confirmed by linguistics. Probably the same happened with Sarnyéré potters, a Dogon isolate within a Fulani environment, as has been confirmed by designs on their ceramic (Gallay & Sauvain-Dugerdil 1981: 140).

A number of regularities can be drawn from what has been described. From the observation of the use of different forms and sizes of pestles, the following two rules can be stated:

R8: If a clay pestle has the profile of a concave base, then this instrument is used in the technique which consists of shaping the base of pottery on a convex mould.

R9: If a clay pestle with a convex base has large dimensions, then this instrument is used for the initial hollowing out of the clay or during different steps in the making of big vases.
In the future, it would be useful if the border between big and small instruments were defined, using for instance "the size of a clay pestle related to the size of the vase it is used for" combined with the vernacular used for each recipient (big vase, normal vase, small vase).
Furthermore, the following trends can be stated thanks to the exceptional use of some convex-based instruments during the casting technique:
T2: If a clay pestle presents the profile of a convex base, then this instrument is most probably used either as a hammer for the shaping of the base and the body of the pottery - by hammering on a concave surface - or as an anvil held inside the vase while the top of the body is being hammered.
Other trends can be stated but they cannot be considered as "regularities" because of a "counter-example" of the technique used by the Bambara and the Sarnyéré Dogon.
T3: If in the presence of clay pestles, then one is probably confronted with pottery made with the "pounding in a concave shape" technique.
T4: If in the presence of clay pestles, then one is most probably very close to depressions in the ground, used to make pottery.
Considering what has been said above, it seems apposite to state the following trend:
T5: If in the presence of clay pestles, then one is most probably in a social group situated within Fulani influence.

In the meantime, we do not know where the "pounding in a concave shape" technique originated; currently, this technique seems to be very frequently associated with the area covered by the Fulani.

### 3. 4. Associated ceramics

Since clay pestles are a characteristic of the pounding technique, we present here the ceramic forms obtained by it.

The recipients generally have simple forms with hemi-spherical bases (Fig. 14-15). They are sometimes finished off with feet (Fig. 14: 8; 15: 6), when potters use a mobile plate which is generally a tournette. Some pottery with a very particular role or meaning is also sometimes found - such as stools, hearths, oil lamps or recipients for a wedding trousseau.

Dimensions can be quite large, up to 45 cm high and 52 cm in maximum diameter. A survey led by A. Mayor on a sample of 573 vases from the Delta, made by the pounding technique gave a mean index "height multiplied by the maximum diameter and divided by two" of 24.78 (with values ranging from 8.5 to 47.4; Mayor 1991).

In return, the sides are always relatively thin, from 3 to 12 mm thin, depending on the size of the vase, with a mean value of 6.7 mm (measurement

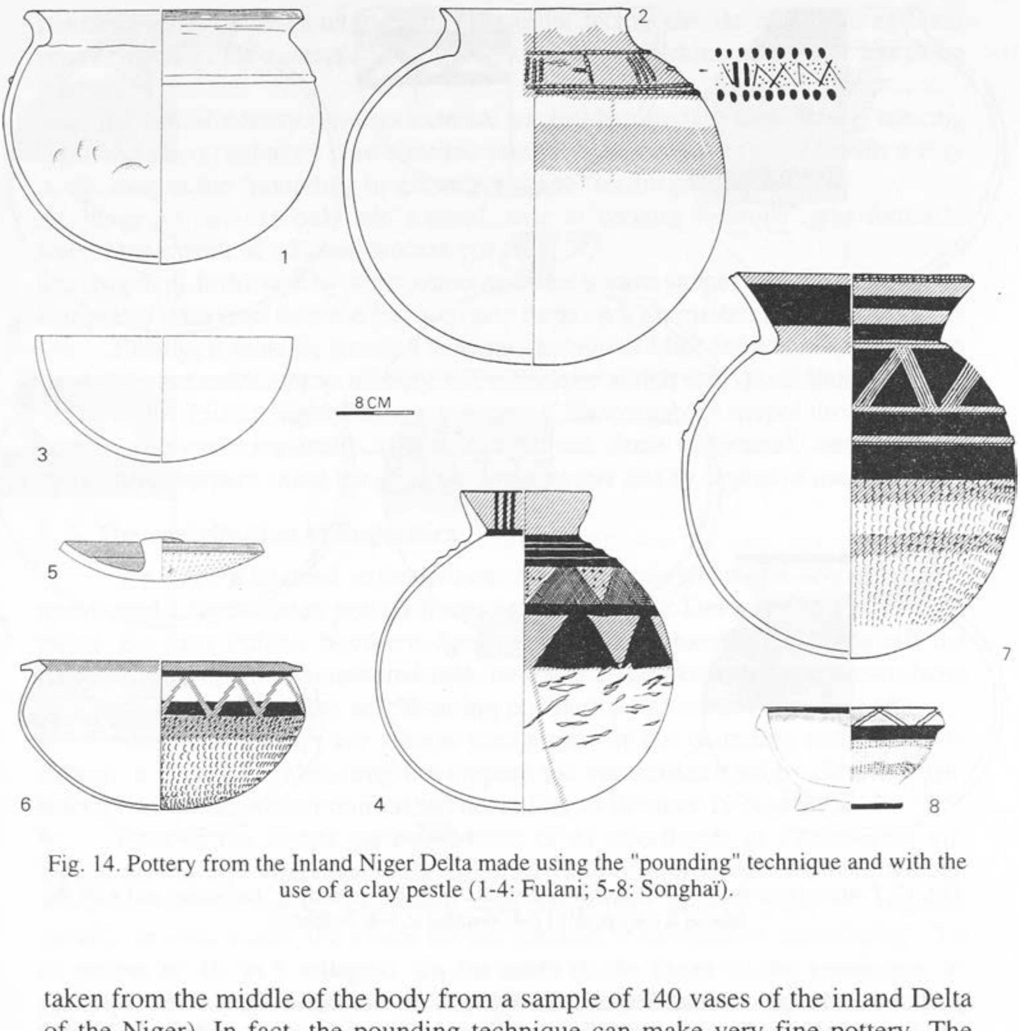


Fig. 14. Pottery from the Inland Niger Delta made using the "pounding" technique and with the use of a clay pestle (1-4: Fulani; 5-8: Songhaï).

taken from the middle of the body from a sample of 140 vases of the inland Delta of the Niger). In fact, the pounding technique can make very fine pottery. The slimness of the sides and very dry clay generally do not allow decoration other than paint. Infrequently, necks or the bases of necks are impressed with a string roulette or a impressed flange. On very exceptional occasions, bodies can be slightly impressed with a string or plaited roulette (Northern Somono), or even with a spring (previously a plaited roulette) rolled on a thin layer of barbotine (Mossi). Such very dry clay needs special preparation; a large amount of very finely sieved temper is used - the grains are rarely more than 2 mm in diameter.

This pounding technique is readily identifiable on potsherds. Indeed, besides the flaky texture of the clay, wooden moulds or mats leave a number of embossed traces on the outside of the base and the body, which in the case of wooden or terracotta moulds are negative imprints of faults or fissures. Clay

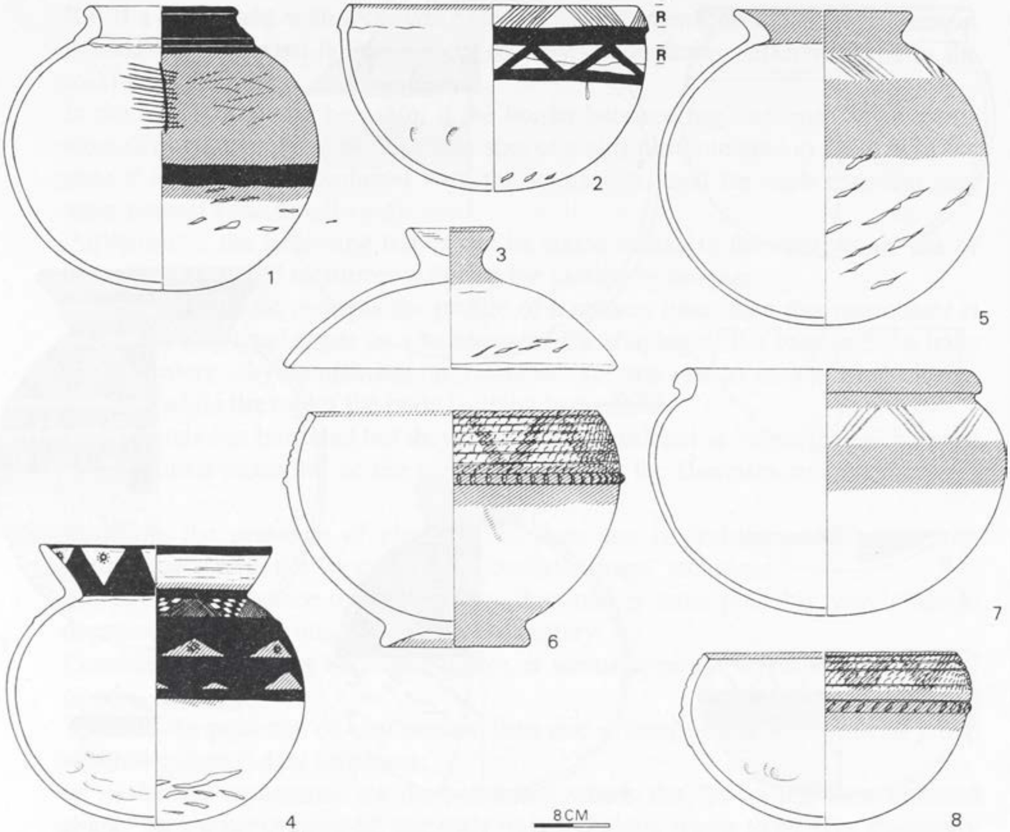


Fig. 15. Pottery from the Inland Niger Delta made using the "pounding" technique and with the use of a clay pestle (1-4: Bambara; 5-8: Somono).

pestles, on the other hand, leave hollow marks on the inside. However, if pottery has been fashioned on a new mould, then outside traces may not be left. In this case, only marks left by a clay pestle found inside the vase can identify the pounding technique. What's more, some vases made with the pounding technique and which have been set on moulds in good shape or carefully smoothed, are sometimes completely void of any significant trace. Only the thickness and the type of clay used, can then reveal the technique which was used.

The following two regularities can be noted from what has been said above. The first is "general":

R10: If pottery presents traces of concentric depressions on its inside (such as is the case for the vases represented in Fig. 14-15), then it has been fashioned with a clay pestle using the "pounding in a concave shape" technique. Unfortunately, a lack of detailed studies on the traces of manufacture left on the surface of African pottery does not enable us to claim that other techniques do not leave external prints (matting, for example). For this reason, the following regularity has to be "restricted":

R11: In Mali, if pottery presents external traces identified as those left by matting or a wooden or unbaked clay concave mould, then it was fashioned with a clay pestle used in the "pounding in a concave shape" technique.

At this point, we can only add a trend since a "counter example" was found in Babi, in the work of a Fulani woman potter:

T6: If pottery fashioned by the "pounding in a concave shape" technique has been completed with feet, then the last step was done on a tournette.

Finally, it must be stressed that our surveys in Mali show that typology on its own is not sufficient to identify the technique which was used. Indeed, in the whole of the Inland Niger Delta, a number of "fashionable" shapes are copied by potters who use completely different techniques. Such fashionable shapes could be perfume-burners, what are called "doctor" water jars or copies of metal ovens.

### 3. 5. The contribution of linguistics

We were interested to know how the pounding technique originated and questioned a few women potters from the Inland Niger Delta who use this technique. Be they Fulani, Northern Somono, Northern Bambara or Songhaï, the craftswomen invariably answered that the tradition had been brought down from their ancestors and that the neighbouring population had simply copied them.

Since clay pestles are a basic component of the pounding technique, we thought it would be interesting to compare the vernacular used by different potters (the terms have been transcribed according to Brauner 1974: 16ff.).

Most of the Fulani potters (29 out of 41 questioned in 17 different villages), belonging to the maabuuBé, sakeeBé, wayluBé or lawBé "castes", use the word dunyèrè sometimes associated with the epithet mawdo (big) or pommeri (small). In some cases, the words are accentuated in the middle, hence dung-yèrè (8 potters of 41, in 5 villages). To the north of the Delta, it can sometimes be pronounced dunyarè (3 potters of 41, in 3 villages). Only one Fulani potter from Sindégué in the centre of the Delta pronounced it dunge. Although it seems to have the same root as the other pronounciations, we have not found other examples. These designations are typically Fulani. R. Leger was kind enough to confirm this. He broke the word into dunya (world, ground, earth) and re (object) and according to him, it could mean "instrument which makes from earth".

The Northern Bambara use dunyarè mainly (6 potters out of 9 questioned in 8 different villages) which is equivalent to the Northern Fulani version. Only one potter used dunyèrè - the preferred designation of the Fulani from the Delta. A slightly different one is dunungè which seems to have developed within the western border of the Northern Bambara territory, for example in Mayel Borgou and Fanabougou. Dunyarè and dunyèrè have indeed been borrowed from the Fulani and neither sound like nor mean anything in Bambara. As for Dunungè, though it sounds Bambara, it has no meaning in this language. It is probably a local adaptation of dungè, used by the Sindegué Fulani potter. We are therefore forced to note that the Northern Bambara do not have their own designation to describe the tool used in this technique. Though the Northern Bambara generally seem to have learnt this technique from the Fulani North of the Delta, some "western" families towards Mayel Borgou seem to have learnt it from Fulani potters in the Sindegué region - both regions are joined by the Niger river. Surveys should be lead for cross-examination and confirmation.

Songhaï potters use dunyarè, a variant of the "Northern" Fulani vernacular term (2 potters of 6 questioned in 6 villages). Nevertheless, there is a tendency to replace the prefix dun by din (dinyarè: 1/6; dinyèrè: 2/6). This is closer to the Songhaï pronounciation but has no meaning in their language. Though observations are few, it seems plausible to say that the Songhaï acquired this technique from the Fulani, North of the Delta where these two populations are in constant contact. One Songhaï woman potter from Banga used the word dundunyè; we have not been able to croos-examine this and it was impossible to determine whether it had a particular meaning in Songhaï. All we can say is that it has the same root as the Fulani one and that it is reminiscent of dunungè used by the "Western" Bambara from the North.

Finally, the Northern Somono, who also use the pounding technique, call a pestle a dundébé (2 potters of 4 questioned in 4 different villages), a dunébè (1/4) or a dunabé (1/4). A very brief survey showed that such a designation does indeed sound "bozo" (Somono language) but has no meaning. This has to be confirmed. Nevertheless, these designations also have the same root as the Fulani dun and it seems probable that the Somono also borrowed this term and technique from the Fulani potters. It seems, therefore, that in the Inland Niger Delta, the "pounding in a concave shape" technique is indeed of Fulani origin and has been borrowed by neighbouring populations.

We have little data from other regions where this technique is used. In Nigeria, the Zamfarawa use dundunge (Krieger 1961: 363) which is close to dundunyè and dunugè, used by some Songhaï and some Bambara from the Inland Niger Delta, respectively. In the Sudan, A. J. Arkell mentions that Tama populations use the vernacular duggaga (Arkell 1939: 90). According to R. Leger, duggaga and the Fulani dunyarè have the same origin. This could point to a common technological origin.

On the other hand, other ethnic groups use different designations, such as mudagg used by the Omdurman potters (Crowfoot 1924: 21) or lungbali by the Gulmance (Geis-Tronich 1991: 414). The Mossi from the Western part of Burkina Faso use tibugo (from tibu, meaning to tap softly), sometimes pronounced tibga (Llaty 1990: 106) and has become tibgu for their neighbours, the Kurumba (Stössel 1986: 246). The Dogons from the Western fringe of Burkina Faso use the word tumo í (literally "small stone") sometimes preceded by legu (literally "small stone in earth") and often used in a periphrasis such as nya danga í ma tumo í ("small stone to make little pots for cooking tô"). Tumo í is also used by the Sarnyéré Dogon in a deformed way: tuoí (Gallay & Sauvain-Dugerdil 1981: 90). This should be studied in depth and analysis systematically carried out to understand the meaning and origin of such diverse designations.

Let us mention one last example of a Bambara woman potter who had been given a clay pestle by a Northern Somono colleague. This event is further described in **3.6**. Not knowing the pestle's original designation, the Bambara potter baptised it da gosilan (literally "which hits pottery"). Such a periphrase is interesting and shows how difficult it is to create a new word in one's own language, in order to describe an object outside one's own culture. In the same way, the Bambara potter from Bounga who had invented a special concave-shaped pestle to decorate her pottery, named it da bumbunan ("which moulds pottery").

In the present state of research, we can postulate that the "pounding in a concave shape" technique used by Fulani castes from the Inland Niger Delta and a number of other groups in close contact with the Fulani, possibly travelled thanks to the displacement of Fulani themselves or by craftsmen who accompanied them in their displacements. This strengthens our trend, T5, relating clay pestles to the Fulani sphere of influence. As for the Sarnyéré Dogon, the instruments they use have most probably been borrowed from the Fulani tradition and their designation rebaptised into local dialect. Presently, we still have to solve the case of the Mossi, the Burkina Faso Dogon, the Kurumba, the Gulmance and the Omdurman potters.

### 3. 6. The causes of diffusion

Now that the ethnographical and ethnoarchaeological data have been described, it is interesting to understand the spreading of the use of clay pestles. We do not wish to present here a theoretical study of the different kinds of diffusion; instead, we will illustrate two kinds by describing explicit examples we observed.

Our first example is situated in the centre of the Inland Niger Delta, in Siratinti. In this village, the potter M. Konaté-Kumaré, both a blacksmith's (numu) daughter and widow, uses two completely different techniques depending on the desired form: the "casting on a concave shape and convex shape technique". Her ware is sold to the outside in a regional market in Djenné, 8 km from Siratinti. Around 1960, she met a Northern Somono colleague who gave her the kind of clay pestle she used in the pounding technique. Eversince, M. Konaté-Kumaré has been using this instrument in the casting on a concave shape technique. She first fashions the clay carefully in a ceramic cast placed on the ground. Whereas this is usually done with fingers, she uses a clay pestle. She then places the clay-coated cast onto a tournette and then proceeds in the traditional way. Unacquainted with the Somono vernacular for clay pestle, she baptised hers da gosilan (see **3.5.**).

Here then is an example of diffusion between two women potters from two distinct regions, belonging to two different ethnic groups using two divergent modelling techniques. Nevertheless, this is a very restricted type of diffusion since only the tool was handed over but neither the name, nor the technique for which it was conceived, nor even its function. Indeed, its initial use was as a hammer or an anvil to pound dry and dense clay. Here, it is used as a "mixer" to fashion soft clay, without hitting it. This sole example only shows that such a diffusion has small chances of being of durable consequence. 70 year-old M. Konaté-Kumaré has never made copies of this tool and his daughters do not use it ("too unconventional" for them?).

Two complementary examples illustrate the second type of diffusion. Again in the centre of the Inland Niger Delta in the village of Kobassa, women potters from a Southern Somono blacksmith's caste (kugukaïgu) once made pottery only using the "casting on a concave shape" technique. Around 1935, F. Nyafo-Samasséku, a Northern Somono woman potter, herself a blacksmith's daughter, came to the village to marry. She is from Wandiaka, a village 100 km North of Kobassa, where she learnt the pounding and casting techniques, as is the custom for the Northern Somono.

F. Nyafo-Samasséku brought with her three clay pestles. With them she fashioned pottery she called wagniakwalu ("Wandiaka vase") common north of the Delta but unusual in Kobassa. This kind of pottery became successful amongst the Fulani in the surrounding areas and other Kobassa potters came and borrowed these pestles they then called dunabé (a contraction of the Northern dundebè) and learnt the pounding technique.

Today, a number of Somono potters from Kobassa also occasionally make pottery usually termed mabwekwalu ("Fulani weaver vase") of "Fulani tradition" which they sell exclusively to the Fulani, in markets (Djenné in particular), encampments, neighbouring villages or at their home. This was confirmed by one of our surveys in Hogel Kortji, one of the Fulani hamlets situated 5 km from Kobassa. A large number of these kind of vases were used (39% of the pottery) despite outrageous costs (5 to 10 times more expensive than a Somono vase of the same size, according to our informant). Hence, as a result of exogamy, we are faced with the diffusion of technology between a number of potters of the same ethnic group but from different regions, where one group masters an additional technology unknown to the other. The transfer is total. Indeed, not only the object, its name, its initial function and accompanying technique are passed on to the other women, but also specific shapes typical of the technique and which are spread in the neighbouring population. This diffusion is nevertheless restricted. In truth, these three pestles have for the one never been copied. Diffusion is thus done only by "borrowing" material. On the other hand, the resulting shapes are not used by the producers but only made for a small "expatriated" part of the population (in the concrete case of the Fulani).

The following and last example is the same kind of diffusion but has a totally different impact.

North of the Inland Niger Delta two neighbouring villages can be found separated by a wide ditch: Kakania-Bozo, populated by the Bozo and the Northern Somono, and Kakania-Peul, populated by the Fulani, mainly. Beforehand, the Somono potters from Kakania-Bozo only used the "casting on a concave shape" technique. Fishing was plentiful and Somono fishermen preferred to store the fish oil in the dense and waterproof-sided Fulani vases made with the pounding technique. Consequently, they went to buy a great number of these vases from a Fulani potter, established in Kakania-Peul and who practised the pounding technique using a clay pestle on a wooden cast. D. Kéwé-Bilakoro, equally a Northern Somono potter, came to Kakania-Bozo to marry around 1940. She came from Bango, a village 47 km to the North-East, where she learnt both the pounding and the casting technique. Her arrival seems to coincide with the beginning of the economical recession; fishing was less plentiful due to unfavourable climatic conditions. Accordingly, the Somono made less use of the Fulani vases for storing fish oil; they probably also had less money to buy them. Thereafter, potters from Kakania-Bozo sought the help of D. Kéwé-Bilakoro to introduce them to the pounding technique and indirectly to the use of clay pestles they called dundebè, as in Bango. Today, the pounding technique is widely used by the Somono potters of the village and production abundant within all compounds (a Somono compound, in which a count was done, produced 42% of Somono pottery assembled using the pounding technique). This is the same kind of diffusion as that found in Kobassa. However, the passing on of technology in Kakania-Bozo was more successful; clay pestles thrived and what's more production was adopted by the potters themselves. It is very probable that the Fulani vases' reputation of impermeability has a lot to do with it. Note that it needed the arrival of a potter from a fairly remote village but from the same ethnic group to spread a technology. Before, Somono potters never thought of copying the Fulani potter on the other side of the ditch, only 50 m away.

We thus conclude that different events have caused the diffusion of the use of clay pestles and indirectly the diffusion of associated technology, in particular contacts made at the market and the custom of exogamy. As such, transfer of technology is not assured of success. A number of factors play a part, namely ethnical compatibility, the existence of a potential market, different economical pressures or the acceptance of new products by the producing families.

## 4. The meaning of "archaeological" instruments and interpreting them

The following chapter is divided into two. To begin with, we will draw up a list of archaeological data. Then we will draw analogies between past and present cultural materials to interpret archaeological remains using the regularities and trends previously defined.

Instruments of interest were discovered on Sahelian sites in Mali, Burkina Faso, Niger, Nigeria and Tchad. Apparently unknown in Neolithic times, the oldest known pestle appeared in Niger at the end of the Ist millennium B.C. and was used by those populations who introduced iron technology to this part of Africa. Then from the V to the IX century A.D., these instruments were frequently used by populations of the Nigerian and Tchadian Sahel, especially by the people of "Haddadian traditions" who may have come from Méroé - where instruments of this kind are not to be found! All these populations were familiar with cattle breeding, hunting, fishing, probably agriculture and, above all, intensive iron metallurgy. These terracotta instruments were sometimes decorated on their base with embossed designs. They were found either in blacksmiths' workshops or in habitats, sometimes raised in the shape of mounds. Houses were circular, tents or banco houses close to pits used as silos or midden. Iron smelting was done in most villages. Tombs can be found inside habitats or gathered in a necropolis outside the village. It seems that those who used these instruments were occasionally buried with them; they did not wear stone necklaces and their tombs were grouped in a same place within the necropolis. These objects were used in Tchad by the Sao during the X/XI centuries and towards the end of the XVI century and then by the Kanuri-Kotoko from the end of the XVI century onwards. They belonged to the urban phases of these periods and have lasted up until now, within a framework of fishermen and breeders who also have a cotton industry.

It seems that it was at this period that clay pestles were also first introduced into the Niger valley. Thus present in El Oualadji possibly around the X and XI centuries, a rather peculiar form of pestle - type II - was used by Tellem-Kurumba populations from the end of the XII century. Following this episode, their use became widespread within the Sahelian region in Mali, Burkina Faso and Niger.

The fineness of the sides and the hemispherical bases of accompanying pottery must be stressed; feet were apparently unknown of.

Traces on the surface of the pottery hint that two assembly techniques were used at the same time. A technique using coils, as for the beautiful "Haddadian" painted ceramics, and a second technique which combines the use of pestles and matting. Both of these instruments left clearly identifiable traces on the inside and the outside of pottery. We compared these instruments with current clay pestles, in an attempt to identify and interpret them. Both types show the same shapes, proportions and silhouettes. This is substantiated by the similarity of the mean indexes A and B. However, average dimensions of type I archaeological objects are slightly smaller than current ones.

A certain number of present-day peculiarities are not found on ancient tools. None of the bases were concave and the tops were not cupped. On the other hand, the ancient type, whose active surface left a network of characteristic prints on the inside of vases, seems to be completely out of use nowadays. Considering that these past and present instruments not only come from the same geoclimatic environment but also from populations who were at a same techno-economical level, we can compare these archaeological objects with current clay pestles.

Previously stated regularities and trends complete our interpretation. Convex-based clay pestles found on archaeological sites were indeed only used for the making of pottery (R2), most probably using the "pounding in a concave shape" technique (T3). In all likelihood, they were used as hammers, pounding the vase's base and body into shape or as anvils which were held inside the vase whilst the top of the body was being hammered (T2). Some of the big-sized pestles, measuring up to 164 mm in height, were used for the initial pounding of the clay lump or during different assembly steps in the making of large vases (R9). We can even specify that these pestles belonged to populations related to the Sahelian or sub-Sahelian area (R1) and, what is more, probably to the Fulani sphere of influence (T5). There is probably sexual differentiation in craftsmanship (T1); most of these instruments found on sites where iron was crafted were used by women belonging to a "casted" social group (R3).

In permanent habitats, at least in Niger and Nigeria (cf. R6), where clay pestles were found, the chances of finding, at least in Niger and Tchad, blacksmiths', cobblers', weavers' and coopers' workshops, are high (R7). Potters' workshops must have been nearby (R5). They are probably discernable thanks to depressions in the ground, which were originally used to support pottery (T4). We have thus been able to give prehistoric pestles a social and technical meaning by resorting to ethnoarchaeology. Without this stratagem, archaeology alone could not have generated such an interpretation.

## 5. Conclusion

In this paper, we hope to have shown the importance of ethnoarchaeology - the science where a research worker actually interprets archaeological facts - in dealing with African prehistory, particularly during its last phase.

We thus believe that archaeologists should be aware, henceforth, of the problems which exist in trying to interpret ancient remains, so as to give ethnoarchaeologists the possibility of solving them, as long as the characteristic long-lasting traditions are still preserved in African cultures.

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# Aegypto-Aegean relations up to the 2nd millennium B.C.

There is considerable evidence for Late Bronze Age relations with Egypt, through Egyptian written and pictorial records, and cross-cultural artefacts and influences. Indeed, this evidence has been the material basis for Aegean relative and absolute chronology for over a century. Virtually no Early and Middle Bronze Age evidence exists, however, with the notable exception of the island of Crete and its Minoan civilization. Some recent studies of the general subject of Aegypto-Aegean cross-cultural influences include Lambrou-Phillipson (1990), Cline (1991) and Phillips (1991), each with different emphases. Chronological aspects are discussed at length by Warren and Hankey (1989), on which the accompanying relative chronological chart (Fig. 1) is based. All have extensive bibliographies.

Middle Minoan (MM) evidence is less substantial than later, but it remains clear and reasonably strong. Evidence prior to the 2nd millennium B.C. is far more sparse and less precisely dated, yet it indicates Early Minoan (EM) Crete and Egypt were aware of one another and in at least limited contact before the construction of the first Minoan palaces roughly around 1900 B.C. On Crete, this change (and other indicators) distinguish the transition between the MM IA and IB periods; in Egyptian terms, it is around the mid-Twelfth Dynasty. This paper reviews aspects of Aegypto-Aegean contact during the 'pre-palatial' period (EM-MM IA), the evidence for which has been strengthened through recent research and excavation work.

The earliest direct evidence for Aegypto-Minoan cross-cultural contact are two imported objects. The first is an obsidian bowl or beaker rim fragment of Egyptian origin and Early Dynastic date (Warren 1981: 633-635, Fig. 5, Pl. 205b, left), and the other a worked hippopotamus canine (Krzyszkowska 1984: 123-125, Pl. XIII a), both recently excavated in Early Minoan IIA domestic levels at Knossos (generally equivalent to the Third-Fourth Dynasties in Egypt). Obsidian sources can be traced through signature analysis, and the stone itself was most commonly imported from elsewhere onto Crete, especially from the island of

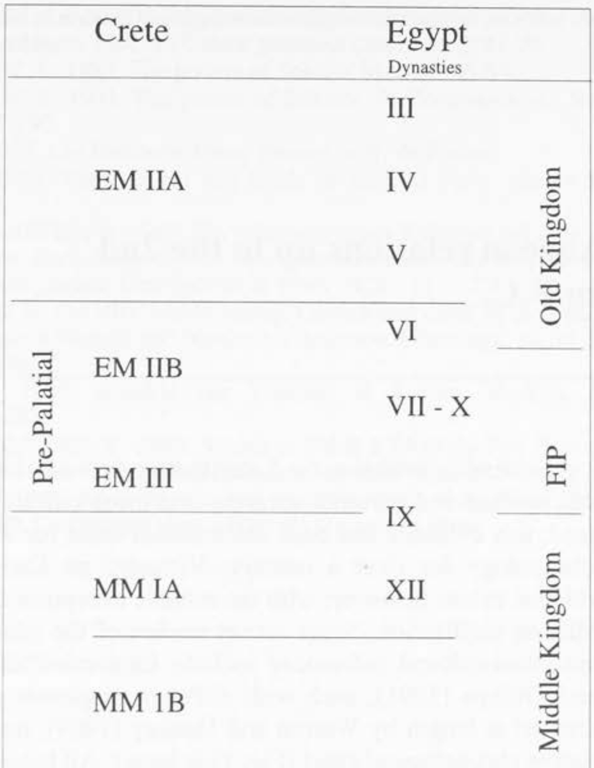


Fig. 1. Relative chronolgical chart for Pre-palatial Crete and Egypt.

Melos (Renfrew et al. 1965: 237-239; Warren 1981: 630). The vessel material is entirely unlike any other found on Crete, and best relates to that employed in Egypt. The canine almost certainly came from Egypt, where hippopotamus ivory was commonly worked and not from the Near East where it was rarely exploited until much later (Krzyszkowska 1988: 229; Hughes-Brock 1992: 25).

A number of Minoan objects (chiefly seals and pendants) also have recently been re-identified as hippopotamus ivory imported as raw material, presumably also from Egypt. Elephant ivory, whether the African or West Asian varieties, apparently was unknown as a material in the Aegean until the late Middle Bronze Age, and was quite rare in the Levant before ca. 2000 B.C. Elephants themselves cannot be documented in the Levant before that time (Winter 1985: 339ff.; Krzyszkowska 1988: 227-229; Hughes-Brock 1992: 25, Fig. 5, a Minoan product, is carved from hippopotamus ivory).

Additionally, a number of EM II objects on Crete have certain 'egyptianizing' features. One of the most obvious is the design on a Minoan seal from a tomb on Mochlos in north-eastern Crete (Fig. 2). Two crouching baboon-like apes are depicted back-to-back (Platon 1969: #473).

No apes of any description are native to Crete (or the Aegean), but were well-known in Egypt where they were depicted in just such a crouching pose, as amulets and figurines of the god Thoth in zoomorphic form, from the beginning of the Dynastic period (Adams 1974: 24-29, #128-144, Pl. 18-23; Brunton 1928: 19, Pl. XCIV.14). The crouching monkey also is known as a filler ornament on Old Syrian and Old Babylonian seals, and appears as an Anatolian image as well, but these are later in date and probably also developed from the Egyptian image (Mellink 1987: 65-68.). The back-to-back arrangement, however, is unknown in Egypt and must be of Minoan innovation. It is the earliest of many such depictions of this animal found on Crete.

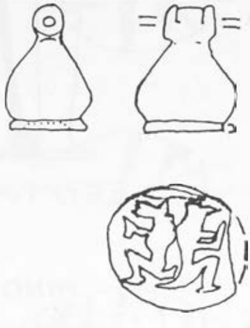

Fig. 2. EM II seal from Mochlos.

Also possibly as early as EM II is the apparent Minoan imitation of two Egyptian stone vessel forms. The Minoan 'miniature amphora' shape, which first appeared in EM II, has been cited as an imitation of the Egyptian Early Dynastic 'shoulder jar.' Although no Egyptian import has been found on the island, a considerable number of 'imitations' have been recovered from EM II Mochlos tombs and tombs of later date elsewhere, especially the Mesara Plain area of south-central Crete (Warren 1969: 72-73, Type 28; a few others of similar form have since been recovered). To my mind, however, its derivative origin is questionable. The other form, the cylindrical jar with everted rim and base, might also have appeared as early as EM II, although the contexts of both imports and imitations are too wide-ranging to be sure. Egyptian imports have been found at Knossos (Warren 1969: 111, Type 43 F; 1981: 633-634, Fig. 4, Pl. 206 a-b), and imitations at Mochlos and in various Mesara tombs, none demonstrably earlier than EM II (Fig. 3) in context (Warren 1969: 75-76, Type 30 D). Both Minoan forms are found only in miniature scale, unlike the oversize to miniature vessels recovered in Egypt itself. Other Egyptian stone vessel forms, not locally imitated, recently have been recovered or identified from Knossos in EM III-MM IA contexts (Warren 1969: 109-110, Type 43.A5, A10, C1;. 1981: 633, Fig. 3, Pl. 205.b). There is also a pyxis from Hagia Triadha (Warren 1969: 111-112, Type 43. G4).

In EM III, the Mesara Plain area seems to become extremely important for eastern communication. Unfortunately, almost all EM-MM I Mesara sites are communal tombs in use for centuries, and close dating parameters are rare. However, their contents included a not insignificant number of imported and imitative objects, indicating Minoan contact with Egypt expanded in EM III / MM IA.

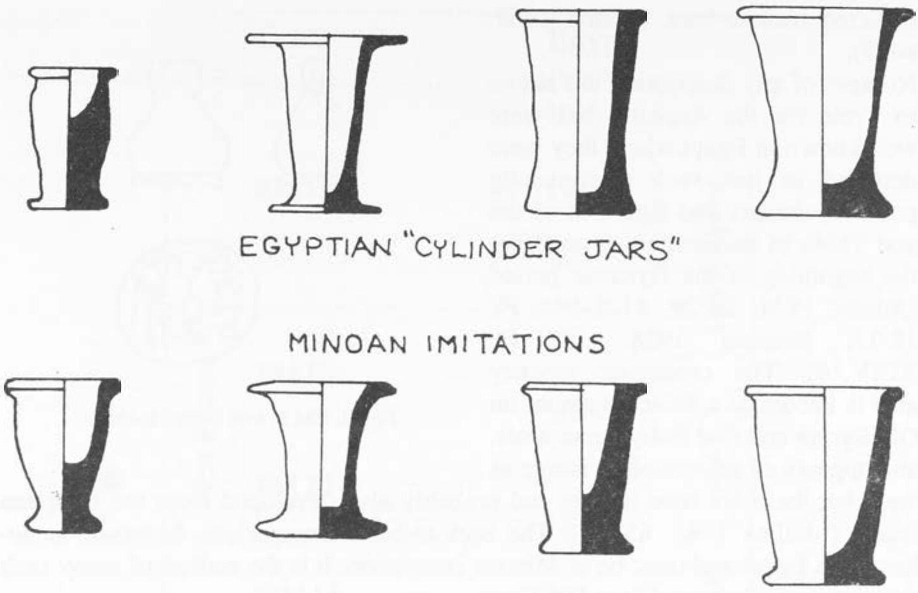


Fig. 3. Egyptian 'cylinder jars' from egypt and Minoan imitations from Crete.

Amongst the most common are scarab seals, both imported and local imitations. While not always clearly distinguished, their ultimately Egyptian origin is without doubt. Scarab beetles are found on Crete, but the native variety has a prominent 'horn' that is never depicted on Minoan scarab seals, nor on Egyptian seals; the imitations clearly copy the Egyptian type, but can usually be identified by their face designs and some technical differences (Fig. 4). Furthermore, the earliest appearance of the scarab seal is demonstrably later than in Egypt, for the earliest imports are not the earliest Egyptian scarab form. None are datable to Ward's 'Period 1' (late Dynasty VI-early Dynasty IX/X; Ward 1978: 16, Fig. 3). The earliest stylistic date of Egyptian scarabs found on Crete are not earlier than sometime in the First Intermediate Period. However, stamp seals were already in use by the late EM I on Crete (and elsewhere) - earlier than their use in Egypt - and theriomorphic seals are typical of EM III / MM IA (Weingarten 1986: 279-280). While evidence for sphragistic use is not extensive, it does exist. The seals themselves do have both a carved form and separate face design, a combination not found in Egypt until the late Old Kingdom; until that time, the cylinder seal was employed in Egypt. On the popularity of theriomorphic seal shapes in EM III / MM IA, see Yule (1981: 91-100, 104). The scarab form was merely adopted into an already existing Minoan figural repertoire.

Five imported Egyptian scarab seals were found in closely datable MM IA tomb contexts at Lebena in the Mesara and Gournes and Archanes near Knossos

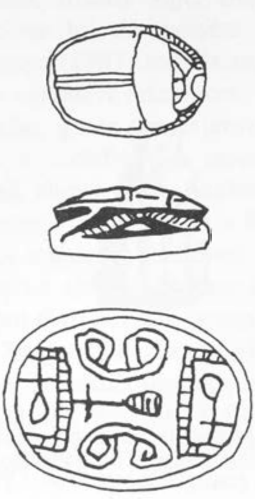

Fig. 4a. Imported Egyptian scarabseal, from Lebena.

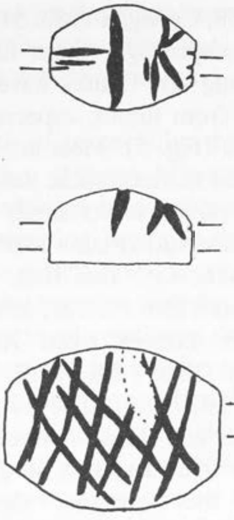

Fig. 4b. Imitative Minoan carnelian scarab seal, from Pezoules kephales.

(Platon 1969: #180, 201, 204, 395, 405). Others with more wide-ranging contexts probably were interred earlier (Platon 1969: #267, 434). Imitative Minoan scarab seals of EM III and later date also are found in similar contexts (Platon 1969: #154, 332, 402; Davaras 1986: 14 #5, Fig. 3, Pl. 20στ-ι). Others are more wide-ranging in date, and might be later interments. Before the end of MM IA, however, some were wholly non-Egyptian in character, the Minoan artisans having developed their own peculiarities of style (Platon 1967: 194, Pl. 172; 1969: #154). Several are made of carnelian and amethyst, stones not indigenous to Crete and imported as raw material, possibly from Egypt like the hippopotamus ivory of which some other imitations are carved.

Other imported goods include ostrich eggshells, large fragments of which have been recovered from religious contexts at EM III Palaikastro on the eastern coast and MM IA Knossos (Sakellarakis 1990: 289-290, Figs. 22-23). Ostriches were unknown in the Levant but hunted wild in the Egyptian desert; the eggs were considered a luxury. Some beads found in an EM III / MM IA tomb at Pezoules Kephales on the eastern coast must also have been imported from Egypt, if their identification as blue frit ('Egyptian blue') is correct (Pomerance 1973: 22 n. 6). The use (and possibly production) of faience was introduced to Crete by EM IIA, either from the Levant or Egypt. Faience beads have been found in several EM III Mesara tombs, and in EM IIA Mochlos also a bowl, unfortunately not preserved. The beads might be either imported or locally made, but have been found in 3rd millennium B.C. contexts only at Mochlos and in the Mesara. It has long been assumed that the bowl was imported either from Egypt, Syria or elsewhere in the Near East (Foster

1979: 56-58; Cadogan 1983: 512).

A surprisingly large number of crouching ape figures have been recovered from tombs, especially in the Mesara (Fig. 5). Most are three-dimensional theriomorphic seals and pendants, carved either singly or as back-to-back pairs (Platon 1969: #20, 21, 249, 416, 435, 436; Betts 1980: #31; Zervos 1956: Pl. 199, left, 203, centre left, bottom right; Xenaki-Sakellariou 1958: 1 #2, Pl. I.2, XV.2; Branigan 1970: 69). They are still baboon-like and clearly derived from the Thoth figurines. Just as clearly, however, they are not Egyptian products. The ape, like the scarab beetle, was consciously adopted into an already existing Minoan figural repertoire. Also like the scarab beetle, the derived imitation acquired local variations, including a more pointed face and large pointed ears.

Fig. 5. Minoan theriomorphic seal in the form of an ape, from Platanos.

So far, only material found on Crete has been mentioned. Presuming that some form of reciprocal traffic in goods must have occurred, let us also consider the Minoan material found in 3rd millennium B.C. Egypt. Surprisingly, there isn't any. Datable Minoan objects found in Egypt are no earlier than MM IB in style (beyond the scope of this paper). In keeping with the conference theme of 'prehistory,' there is also a complete dearth of Egyptian textual evidence for contact between Egypt and the Aegean before the 2nd millennium B.C. Despite the lack of finds, something must have been conveyed from Crete to Egypt. We can only assume such goods have not survived in the archaeological record, or have not been recognised as Minoan. Such commodities as olive and other oils, unguents and perfumes, medicines, aromatic herbs and spices, wine, honey, 'exotic' foodstuffs, resins, hides, multicoloured woven cloths like wool, dyestuffs and other raw materials, and possibly oak and cyprus wood are potential non-surviving goods exported from Crete. Some are illustrated in later tomb paintings of the early- to mid-Eighteenth Dynasty, being brought to the tomb owner by 'tribute-bearers' identified as from 'Keftiu' and the 'islands in the midst of the Great Green.' Contemporary texts also mention 'Keftiu magic,' 'Keftiu paste' and 'Keftiu beans,' 'Keftiu' being identified as the ancient Egyptian name for Crete. There is, however, no trace of any such goods in 3rd millennium B.C. Egypt, where conditions for the archaeological survival of many normally perishable goods are virtually ideal. For an extensive discussion of non-surviving goods possibly imported and exported in the Bronze Age, see Knapp (1991: 21-68) and, for textiles, Barber (1991: 311-357). Evidence for trade in such items is virtually limited to the Late Bronze Age, and all items mentioned in the main text are mere speculations by the present author based on this later evidence. See also Wachsmann (1987) for discussion of 'Keftiu' and the Egyptian tomb paintings. All have extensive references.

Also, given the extensive scientific research of (especially) the past two decades, it is difficult to assume the non-recognition of many Minoan products suggested above in the archaeological record. Problems in accounting for the total absence of evidence in Egypt persist. Non-surviving Egyptian goods, such as oils or unguents contained in the stone vessels, spices, linen, ostrich feathers and papyrus, also might have been imported to Crete together with the recovered goods, but their absence is explicable through the survival conditions there.

The goods conveyed likely were not all imported directly between Egypt and Crete but rather through one or more middlemen. We have only a single Near Eastern object from EM II Crete, a silver cylinder seal found in a clearly EM II tomb at Mochlos, imported from Early Bronze II-III provincial Syria/Palestine (Pini 1982; Warren & Hankey 1989: 127). Egypt was in direct contact with Syro-Palestine by the beginning of the Dynastic period, especially with Byblos which is well-known for its imported Egyptian finds (Saghieh 1983: 104-106; Ward 1971: 49-69). The silver seal suggests the Minoans also were in contact with the Levantine coast by EM II, and therefore presumably also Cyprus.

Evidence for EM III / MM IA contact with Cyprus and the Levant is far more substantial. Traditional pointers include an EM III / MM IA bridge-spouted jar found in an Early Cypriote IIIB / Middle Cypriote I tomb at Lapithos in north-western Cyprus (Catling & Karageorghis 1960: 108-110; Warren & Hankey 1989: 115) and an Early Cypriote IIIB amphora recently identified from an MM IA context at Knossos (Catling & MacGillivray 1983). These two cross-cultural imports ensure the contemporaneity of MM IA and ECyp IIIB / MCyp I.

Recent specialized research also has identified cross-cultural imported finds and imitative features of certain Early Bronze III-Middle Bronze I daggers and tools from Cyprus, Crete and Syria. Specific imports include a Syrian dagger found in a tomb at Koumassa (in the Mesara) not in use after MM IA and a Cretan scraper of EM III-MM IA date from an MB I Byblite context (Catling & Karageorghis 1960: 110-111; Branigan 1966: 125-126; 1967: 119-121; 1970: 186-187). Crete lacks virtually all metal resources; raw metal, including gold, silver, and the copper and tin for bronze, had to be imported even for the earliest metal objects made. Recent lead isotope analysis has confirmed the presence of specifically Cypriote copper in EM bronze tools and weapons (Stos-Gale & MacDonald 1991: 249-287 passim). This was but one of many copper sources identified in these tools and weapons.

Nevertheless, it must also be pointed out that no Egyptian and virtually no Syro-Palestinian goods have been identified from contexts on Cyprus until the late Middle Bronze Age. Earlier Cypriote relative chronology is based almost entirely on Cypriote finds in the Levant and Egypt. Presumably, again, the Cypriotes must have received goods from these areas in exchange for objects they exported. The imported goods too have either not survived or not been recognised in the archaeological record, a situation similar to the the lack of Minoan goods in Egypt at this time and just as problematic.

Nonetheless, Egypt and Crete were in at least indirect contact with each other and with the Levant, especially Byblos, in the 3rd millennium B.C. The exact nature of that contact, however, has always been speculative. Active trading has long been presumed, if only because the most likely alternative (diplomatic exchange) is inconsistant with the types of Egyptian objects recovered on Crete. Yet these objects generally would be considered 'luxury' or 'exotic' imports, i.e. small and easily portable yet intriguing and expensive commodities of clearly non-local character that would be favoured for long-distance trade. A sea route between Crete and Egypt via Cyprus and the Levant has long been accepted on the basis of known finds, and supported by the distribution of the earliest contexts. The north-east coast of Crete is the island's logical port for any ships travelling to and from that direction. Presumably Cypriote and Byblite ships also plied this route, among others, although Egyptian ships were unlikely ever to have ventured far from sight of land. Materials and objects from these cultures would also have been conveyed in both directions.

Vercoutter and Schachermeyr both pointed out long ago that wind and current also favour a counter-clockwise sea route directly from southern Crete to the Libyan coast of Cyrenaica and then east to Egypt, returning to Crete via Syria and Cyprus (Schachermeyr 1952-1953: 81-83; Vercoutter 1954; 1956: 417-422; Kemp & Merrillees 1980: 268-286; they also publish a wind and current map, Fig. 78). Their theory is supported by the predominence of cross-cultural material in EM III-MM IA tombs of the Mesara, this route's natural point of departure from Crete. Its basic objection has long been the complete dearth of Minoan goods in Cyrenaica, despite over three decades of systematic excavation there (Vickers & Reynolds 1971-1972: 28-29). There is a similar dearth of evidence for Marmarica, situated between Cyrenaica and Egypt. The earliest evidence is from Marsa Matruh, where a few sherds of Late Minoan date have been recovered from disturbed contexts (White 1987: 12). However, since Minoan goods have not been found in Egypt either, it is highly unlikely we would recover similar goods left en route in Cyrenaica. Recently, a possible seasonal direct reverse route from Egypt to Crete also has been postulated.

The distribution of finds indicates north-eastern Crete was in contact with Egypt from early EM II, and the Mesara area from EM III / MM IA (see Figs. 6-7), probably following the discovery of the anti-clockwise route. The other route, via Cyprus and the Levant, was known by EM II and continued in use by north-east Crete. The division almost certainly was not so absolute and the routes so limited as these statements suggest. Much overlap must have existed. The Minoans almost certainly were active participants in this early contact, if only due to the quantity of


Fig. 6. Map showing Egyptian imports and influences on sites of EM II Crete.

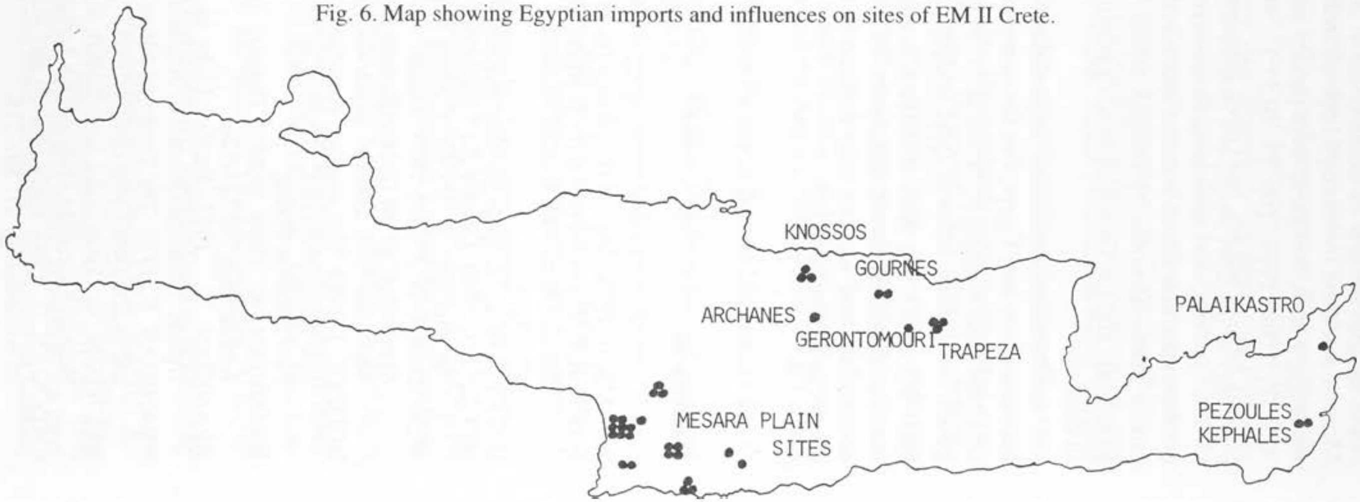


Fig. 7. Map showing Egyptian imports and influences on sites of EM III/MM IA Crete.

imported objects and their adoption of certain images. The earliest evidence for Minoan maritime technology appears in EM III / MM IA, the date of a stamp seal depicting a ship, complete with rudder and mast (Platon 1969: #287b; Betts 1973: 325-327; Yule 1981: 166, Pl. 28.51.1). We know Crete was in direct contact with several Aegean islands, the Greek mainland and Anatolia much earlier (Renfrew et al. 1965 passim) and such long distance travel would imply a knowledge of sails. It is surprising that Crete was not more actively in contact with the Balkan cultures farther north, as noted by Bouzek (1985: 22, 27). Unlike the Greek and Anatolian mainlands and the Greek islands, its relationships were pointedly more southeastern in direction.

The actual number of cross-cultural objects found do not reflect steady trade between Crete and Egypt, but the comparatively large number of Egyptian imports on Crete does suggest a certain effort at maintaining ties. The number and types of goods we cannot recover (and undoubtably others we have not yet considered) probably were the main reason for Aegypto-Minoan contact, however it was accomplished. While we can never be certain of its extent, evidence continues to accumulate and we can only assume it was greater than our present knowledge allows us to represent it.

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Interregional Contacts in the Later Prehistory
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Purushottam Singh

# The origin and dispersal of millet cultivation in India

Millet is a group name of cereals known as coarse grains. They comprise plants belonging to different genera and species with widely varying habits and characters. Millets are warm-weather cereals with small grains and include six genera, i.e. *Panicum miliaceum* - Indian millet (Chesna, Sawan) and *Panicum miliare* - Little fox - tailed millet, *Echinochloa* - Barnyard millet, *Pennisetum typhoies* - Pearl millet, *Paspalum scrobiculatum* L. - Kodo millet, *Eleusine coracana* - *Ragi* (African millet), *Sorghum vulgare* - Great millet (Jowar).

Archaeobotanical studies of plant and grain remains obtained from archaeological sites during the past two decades have resulted in an almost continuous history of millet cultivation in India. Various types of millets have been reported from the pre-Harappan culture at Rohira, the Late Harappan culture at Hulas in western Uttar Pradesh, in the same context at several sites in Guarajat (Rangpur, Surkodta, Rojdi) and in the Neolithic levels at Hallur (Karnataka), besides Pirak in Pakistan. These grains were grown in the Chalcolitihic culture at Ahar (south-eastern Rajasthan) and at Paunar in northern Maharasthra. The evidence from these sites is as follows:

Evidence for the cultivation of jowar millet (*Sorghum vulgare* L.) at Rohira has been obtained from Period IA (pre-Harappan, ca. 2300-2000 B.C.) along with that of barley, wheat, lentil and horse gram (IAR, 1983-84:188).

The Late Harappan crops at Hulas (district Saharanpur) comprised barley and several varieties of wheat and pulses. A single subglobos seed with vaguely rugose ornamentation was provisionally identified as ragi (*Eleusine coracana*) (IAR, 1982-83:149).

The Late Harappan sites of Guajarat-Surkotda, Rangpur and Rojdi have furnished evidence in recent years of millet cultivation. At Surkotda two lumps of charred masses have yielded as many as 574 carbonized seeds, an overwhelming majority of which are of wild plant species. Of these, 40 seeds, earlier referred to ragi (*Eleusine coracana*) were found to belong to that of *Setaria* spp. (Vishnu Mittra & R. Savithri 1982:214). Further research on this charred mass confirmed the occurrence of *Eleusine coracana* and *Setaria italica* (IAR 1974-75:78). The later grain is of considerable interest as it has been discovered for the first time in such an early context.

The plant remains from Rangpur were identified as rice husk (*Oryza sp.*) and charred remains of bajra or pearl millet (*Pennisetum*). Along with other cereals, Rojdi has yielded evidence of two large millets i.e., *Sorghum bicolor* and *Pennisetum typhoideum* (Possehl 1986: 195-236). The type site of Banas culture in south-eastern Rajasthan is Ahar. Evidence for the cultivation of pearl millet (*Pennisetum typhoideum*) and jowar (*Sorghum vulgare* L.) have been obtained from Period I. However, there is some controversy regarding the stratigraphic position of these samples as these came from a disturbed area (Vishnu Mittre 1969).

A large number of Jorwe culture sites have been found from various parts of Maharashtra (Deccan) except the Konkan. Of these, Inamgaon and Diamabad have provided evidence regarding agricultural practices of these people. Jowar (*Sorghum vulgare*) was introduced at Inamgaon after the end of the early Jorwe period (IAR, 1972-73: 68). Grains of kondo millet (*Paspalum scrobiculatun* Linn.) and finger millet (*Eleusine coracana* Linn.) have also been reported from this site (IAR, 1977-78: 92). Evidence for the cultivation of ragi (*Eleusine coracana*) comes at Diamabad from the Malwa and Jorwa culture levels. In the Jorwa levels grain of Ragi (*Eleusine coracana*), Kodon millet (*Paspalum scrobiculatum* Linn.) and foxtail millet (*Setaria italica* L.) were found (Vishnu Mittre et al. 1986: 588-623).

Among the Neolithic cultures of South India two sites located in Karnataka have furnished evidence of cultivation of millet. These are Hallur and Tekkakota. The earliest report of a millet in India is the presence of *Eleusine coracana* at the former site dating to approximately 2300 B.C. (Vishnu Mittre 1971). In the recent excavations of Oriyo Timbo in the Shavnager district of Gujarat state, 77% of seeds were found to be millets comprising *Panicum, Setaria* spp. (foxtail millet) and *Eleusine coracana* (finger millet or ragi). The site has been dated to the first half of second millennium B.C. and the excavators believe that it was a seasonal encampment occupied every year during the months of March to July.

## Diffusion of millet cultivation

Ragi or Finger millet *Eleusina coracana* is originally an African millet and was transported to India in the pre-Aryan times (Mehra 1963). In a recent study Harlan (1971) thinks that the area of probable domestication of *Eleusine coracana* was in the highlands from Ethiopia to Uganda; for *Sorghum bicolor* in a wide zone in the broad leaved savannah belt that stretches from lake Chad to eastern central Sudan (evidence from Kadero). He thinks that pearl millet (*Pennisetum americanum*) was domesticated in the dry savannah from Sudan to Senegal (Harlan 1971: 471). It will be interesting to enquire whether this millet reached Indian penninsula by land or by some other route, perhaps sea, particularly in the light of the evidence of the headrests which suggest probable contacts with Egypt (Nagaraja Rao 1970: 141-148). Their integration into the Indian subsistence seems to have taken place towards the closing centuries of the third millennium B.C. Once in India, its cultivation caught up in the southern millet region comprising the Jhansi division in southern Uttar Pradesh, central Madhya Pradesh, western Andhra Pradesh, western Tamil Nadu, eastern Maharashtra and parts of Karnataka. The rainfall in this region is 50 to 100 millimeters and the soil is partly black cotton and partly lateritic. This country exported this cereal to other lands in the early historical times. We are told that the Romans sought an Indian millet grown in Pliny's days (first century A.D.) which had a huge yield capacity produced approximately 1,65 liters of grain (Sidebotham 1986: 21). Today the millets form an essential item in the dietary system of the poorer sections of the society and are a valuable source of fodder to the cattle.

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# Archaeometric analysis of copper swords from Kerma (Nubia)

**Abstract**

One hundred thirty swords were found by George A. Reisner on his Harvard-Boston Expedition to the Sudan from 1913 to 1916. The date of these swords ranges between 2040 - 1674 B.C. The form, microstructure, and chemical composition of two of these swords are described, and the technology of their production and their possible sources are discussed.

**Introduction**

After surveying Lower Nubia in 1907 and 1908, George A. Reisner excavated at Kerma in Nubia, Sudan from 1913 to 1916. He believed he was excavating remains of a Middle Kingdom Egyptian (2040-1674 B.C.) colony at Kerma. Reisner called Kerma a "military colony" (Reisner 1923). However, when its essentially non-military nature was acknowledged, Kerma was described as an Egyptian trading post which was established under the protection of the King of Kush (Säve-Söderbergh 1960, 1963). Hintze (1964) suggested that subsequently it was not Egyptian, but rather part of the palace of the King of Kush. It was possible that Egyptian artisans were employed there late in the Second Intermediate Period (1800-1570 B.C.). This theory explained the heavy Egyptian influence seen in the design and techniques of manufacture using many materials, including metals, ceramics, and stones, and it caused Reisner to interpret the site as Egyptian, although no Egyptian graves were found.

Reisner found numerous copper and/or bronze objects at Kerma. They included weapons, tools, vessels, inlays, bracelets, rings, toilet implements, and other articles (Reisner 1923). Daggers and knives were commonly found in graves. A total of one hundred thirty copper daggers were found at Kerma. They are distinct local variants of standard Egyptian ones (Trigger 1976). Two of these daggers are the objects of analysis in this paper.

Most of the classes of bronze and/or copper objects from Kerma are Egyptian in form and technique. The number of ivory handles imply an abundant supply, the source for which could only have been the Sudan. This fact led Reisner to the conclusion that at least the handles of the daggers were fitted at Kerma. This indicated that copper was worked in Kerma. But the place in which the blades were manufactured was in question. At first Reisner suggested the blades were imported from Egypt and assembled in Kerma workshops. But when it became clear that in the region of the Third Cataract, copper oxide beds, which had certainly been worked in ancient times, and other copper beds in Sudan, which certainly would have been found in the quest for gold, existed, Reisner concluded that copper was easily obtained at Kerma. Therefore, the blades could also have been forged there by Egyptian artisans. The development of the other crafts and the discovery of custom-made personal objects at Kerma support this view.

The abundance of ivory at the site caused Adams (1975) to suggest that Kerma was the major collection point for raw materials from the south, some of which may have been sent north from there to be traded with Egyptians. The handles on the blades would have been made of this ivory. If Kerma was, indeed, a collection point for goods, it does remain possible that the blades were imported from the north. Copper was known in Egypt by the fifth millennium B.C.. Copper objects first occurred in Nubia at Khor Bahan in the fourth millennium B.C.. Copper was mined by Egyptians at Abu Seyal by ca 1950 B.C. The Nubians were producing it extensively at Kerma (ca 1750 B.C.) after the decline of the Egyptian Middle Kingdom (van der Merwe 1980). Statues of Middle Kingdom Egyptian kings were probably either booty that Kushites carried off from Egyptian sites in Lower Nubia (Säve-Söderbergh 1941) or traded objects (O'Connor 1974). Kushites admired the Egyptian culture; therefore, they manufactured imitations of Egyptian objects such as jewellery, furniture, architecture, and weapons. Trigger (1976) has suggested that "the development of greater social complexity at Kerma led to the acquisition of a veneer of Egyptian material culture by the Kerma elite". It is probable the sources of the copper are in Sudan. It is now certain that smelting was practiced in Kerma since copper or bronze workshops, and furnaces, have been found (Bonnet 1982).

Though fortified by massive walls and dry ditches, the town resembles a large agricultural settlement with mostly modest domestic architecture rather than an Egyptian style fort or an Egyptian Middle Kingdom style workers' village. Strong hierarchy is revealed in the cemetery by differing proportions and values of grave goods. The urban organization and the size of some tombs led Bonnet (1992) to suggest that Kerma may be seen as the capital of the kingdom, so the town was a part of the economic and political centre. Numerous seal impressions found by Bonnet support exchange with Egyptian sources which involved an administrative apparatus.

After fifteen years of excavation by Charles Bonnet, his data and his work has considerably enriched knowledge of the site, but there is certainly much that still remains to be analysed, and there is doubtless much left to be discovered.

The daggers found at Kerma were thought to be the only metal weapons which would be suitable for warfare. Many of the daggers have lengths far greater than the Egyptian daggers. Some might even be called swords rather than daggers. The long ivory butt may be typical of the sword-butt, as distinguished from the dagger-butt, and may be a modification of a well known Egyptian type of the Middle Kingdom (Reisner 1923). This modification might be due to ease in handling and the abundance of ivory. However, the daggers were assumed to be bronze. Bronze had been discovered in the Middle East, and its use was spreading around the Mediterranean basin by the third millennium (van der Merwe 1980).

The purpose of this paper is to report the archaeometric analysis of two of the daggers found, and thus to address the standing hypotheses about them and to add to the information known about the technology and practices in their time. A comparison of the rivets, which certainly were made at Kerma, and the blades, whose provenance is in question, will be made. The usefulness of these daggers as weapons will be discussed.

## Description of the copper swords

The two swords came from a collection of swords found by George A. Reisner during his Harvard-Boston Expedition to the Sudan, 1913 to 1916. Although neither compositional nor metallographic analyses were made at the time, Reisner reported the artifacts in his 1923 site report as possibly imported blades with ivory handles attached in Nubia.

The longer of the two swords (Harvard Peabody Museum - B1301) has a blade of length 36.6 cm, width 1.7 cm at the midpoint, and thickness 0.49 cm at the midpoint (Fig. 1). Its ivory handle has maximum length 14.9 cm, maximum width 6.1 cm, and maximum thickness 1.28 cm. The handle was attached with nine copper rivets - three through the ivory and six through the blade surrounded by wood. The blade was encased in a leather sheath of which only a small fragment has survived.

The shorter sword (Harvard Peabody Museum - B1302) has a blade of length 21.7 cm, width 1.3 cm at the midpoint, and thickness 0.47 cm at the midpoint (Fig. 1). Its ivory handle has maximum length 9.9 cm, maximum width 4.7 cm, and maximum thickness 0.16 cm. The handle was attached with five copper rivets, three through the ivory, and possibly two through the blade that are now missing. The blade was encased in a woven textile sheath of which only a small fragment was preserved.

## Microstructure and chemical composition

Small rectangular samples were sawed from the blades near the thick sections at the handles, and from the ends near the points of each sword. A rivet was removed from each handle. The rivets were sawed to examine one flattened top, a cross-section of the shank, and a section cut along the axis of the shank. The


Fig. 1. The swords which were sampled for study.

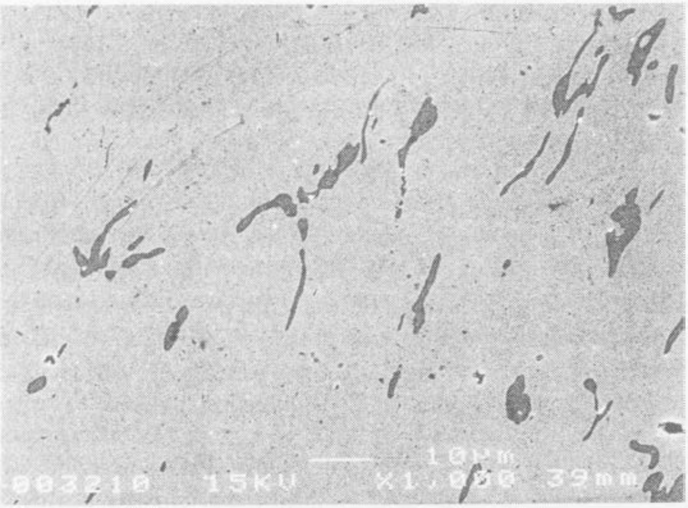



Fig. 2. Scanning electron micrograph using back scattered electrons, showing the non-metallic $Cu_2S$ inclusion as darker than the metallic copper matrix.

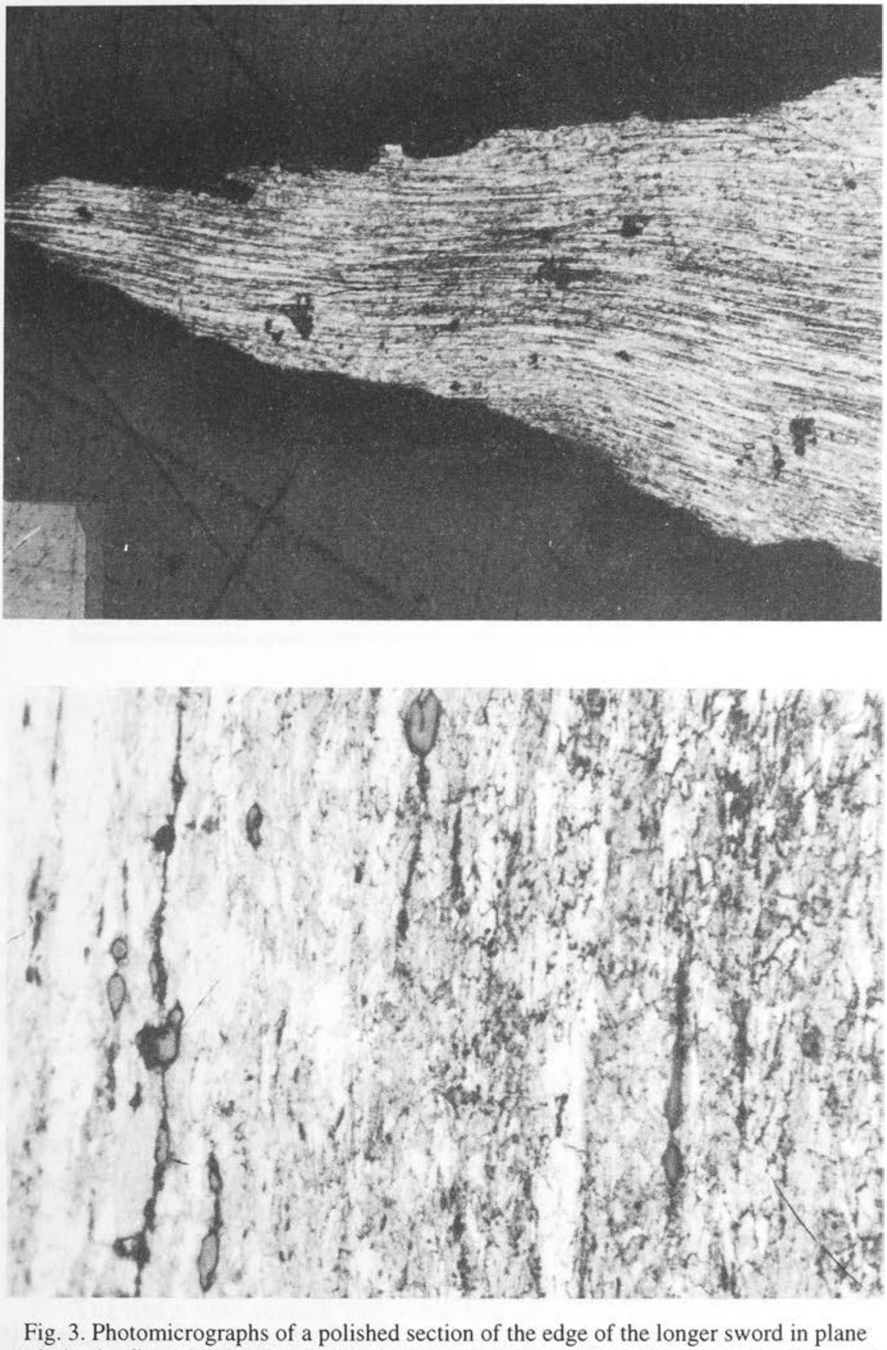


Fig. 3. Photomicrographs of a polished section of the edge of the longer sword in plane polarized reflected light (top) is at 50x, and (bottom) is at 500x. They show the deformed crystals which occur at the ends and edges of the blades.

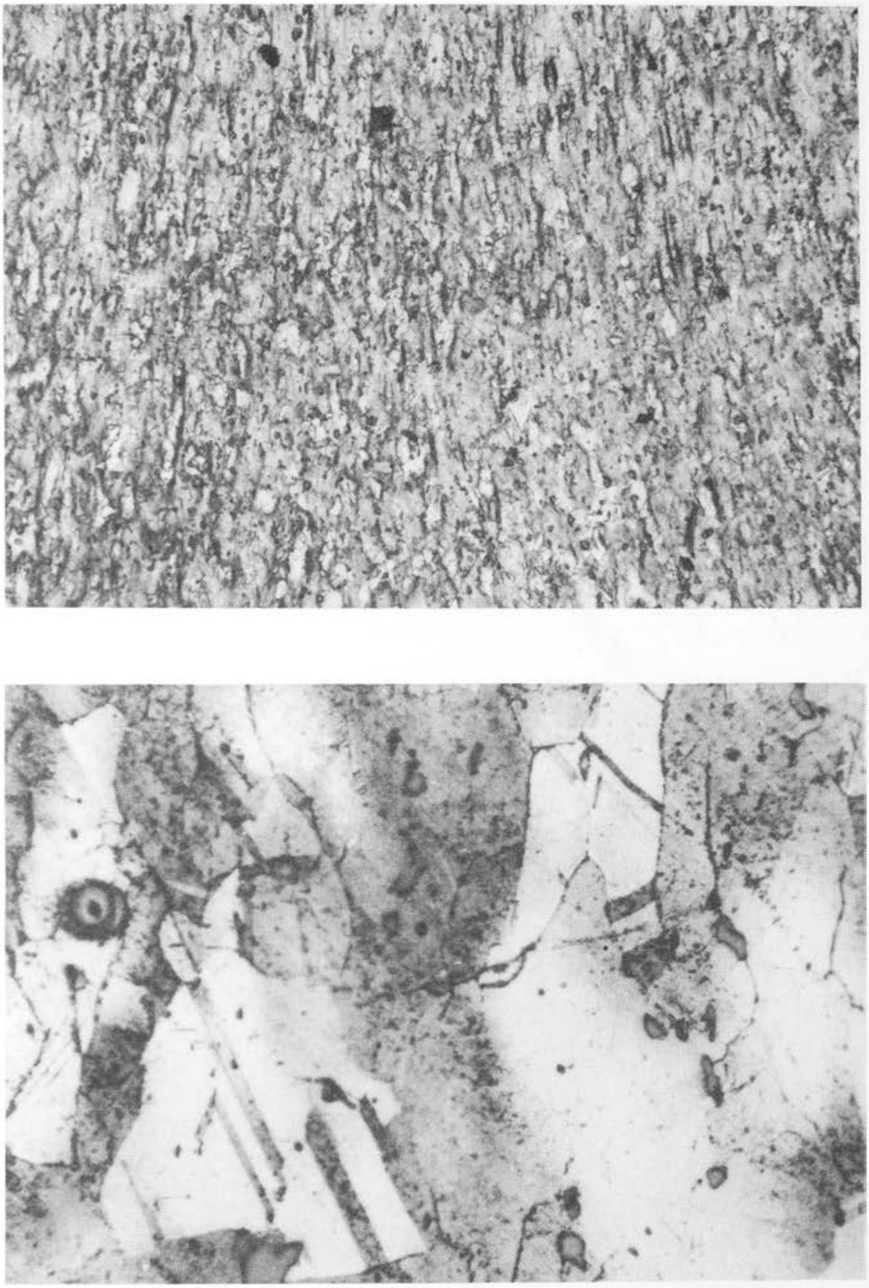


Figure 4. Photomicrographs of a polished section of the center region of the longer sword in plane polarized reflected light (top) is at 50x, and (bottom) is at 500x. They show the annealed crystals which are typical of the center of the blades.

**TABLE A (i)**

| SAMPLE | ↕ | ↔ |
|---|---|---|
| Long Rivet (LR) | 112.9 | 108.2 |
| Long Blade Thick (LT) | 101.8 | 99.64 |
| Long Blade End (LE) | 124.2 | 126.4 |
| Short Rivet (SR) | 104.5 | 99.66 |
| Short Blade Thick (ST) | 84.41 | 82.39 |
| Short Blade End (SE) | 111.3 | 110.6 |

Vickers Diamond Pyramid Microhardness (HV). Mean values of ten tests at 200 grams for 30 seconds in Table A (i).
The ends of both blades have a trend of increasing hardness toward the edge. Hardness of single points at the end edge of each are given in Table A (ii).

**TABLE A (ii)**

| SAMPLE | ↕ | ↔ |
|---|---|---|
| End of long blade | 175.3 | 173.8 |
| End of short blade | 144.3 | 146.0 |

samples were mounted in epoxy and polished for metallographic examination. The samples were studied in reflected polarized light from 50x to 1550x.

Two phases were noted optically and confirmed using Backscattered Electron Microscopy (Fig. 2). The matrix is copper metal. The copper grains are severely deformed near the edge and tip of the blade indicating cold working with no final annealing (Fig. 3). The same is true of the flattened ends of the rivets. Toward the centre of the blades and rivets annealing twins are found (Fig. 4). The blades and rivets were clearly worked to near their final shape, annealed, then cold worked at the edges. There is no evidence of the original casting. Darker parts which contain higher concentration of arsenic are seen lined up horizontally at edges and patchily toward the centre where the crystals are also deformed. The metal is very hard, with increasing Vickers diamond pyramid microhardness (HV) from 88.60 to 175.3 in the longer sword and from 84.37 to 146.0 in the shorter sword. Mean values of 10 tests at 200 g load for 30 seconds are given in Table A. Typical hardness range for work-hardened copper with 0 to 2.0 % As is 120 to 140 (Tylecote 1986).

The rivets both contain very clean copper. In the longer sword's rivet, there are non-metallic inclusions (with areas of less than 60 microns$^2$) of copper sulfide that contain selenium and tellurium. The rivet of the shorter sword contained no visible non-metallic inclusions.

**TABLE B (i)**

| | S | Fe | Cu | Zn | As | Ag | Sn | Sb | Pb | tot % |
|---|---|---|---|---|---|---|---|---|---|---|
| ST | nd | nd | 98.96 | nd | 0.55 | nd | 0.06 | 0.05 | nd | 99.62 |
| STi | 19.14 | 0.04 | 77.54 | nd | nd | nd | nd | nd | 0.35 | 97.07 |
| SE | nd | 0.01 | 98.29 | nd | 0.54 | nd | 0.05 | 0.05 | nd | 98.94 |
| SEi | 19.29 | nd | 76.88 | nd | nd | nd | nd | nd | 0.31 | 96.48 |
| SR | nd | 0.04 | 98.61 | nd | 0.82 | nd | nd | nd | nd | 99.47 |
| LT | nd | 0.41 | 97.46 | nd | 1.52 | nd | nd | nd | nd | 99.38 |
| LTi | 20.98 | 2.14 | 74.62 | 0.01 | 0.11 | nd | nd | nd | nd | 97.86 |
| LE | nd | 0.39 | 96.82 | nd | 1.50 | nd | nd | nd | nd | 98.71 |
| LEi | 20.10 | 3.07 | 74.48 | nd | 0.19 | nd | nd | nd | 0.11 | 97.96 |
| LR | nd | nd | 99.42 | nd | 0.20 | 0.04 | nd | nd | nd | 99.66 |

Electron microprobe analyses (weight percent) of the copper matrix (labeled as in Table A) and non-metallic inclusions (labeled with i's following the sample label) of each sample. See the text for details of the experiment and descriptions of the inclusions and copper matrix. Concentrations lower than the detection limits are marked as nd (no detection) in the tables.

**Table B (ii)**

| | S | Fe | Cu | As | Se | Ag | Te | tot % |
|---|---|---|---|---|---|---|---|---|
| LR | nd | 0.02 | 99.26 | 1.21 | nd | nd | nd | 100.49 |
| LRi | 14.08 | 0.06 | 73.78 | 0.03 | 7.30 | nd | 3.33 | 98.58 |

The copper metal of both blades is densely crowded with non-metallic inclusions of $Cu_2S$ which appear as small rounded gray areas in plane-polarized light. The inclusions are isotropic. As the microscope stage is rotated under cross-polarized reflected light, the colour is maintained. Most of the inclusions are elongated in the direction of working. This is also true of the flattened copper crystals. A typical inclusion area is 4.5 microns$^2$. Very small, round white specs seen at 1550x or higher magnification proved to be particles of lead.

The relative abundance of the two major phases was estimated by point counting (1000 points each blade with 0.05 mm increment). The composition by volume is 86.4% metallic copper and 13.6% non-metallic copper (I) sulfide for the longer sword, and 88.8% metallic copper and 11.2% non-metallic copper (I) sulfide for the shorter sword.

The composition of the inclusions was investigated by electron microprobe at 15 keV accelerating potential, 25 nA beam current, and point spot mode (ca. 1 æ radius). Pure element standards were used for Fe, Cu, Ag, Sn, and Sb, pure GaAs for As, $Cu_2S$ for S, ZnS for Zn, and PbS for Pb. The analyses are given in Table B. The composition of the metal matrix was also examined. (The lower

**Table C (i)**

| Sample | LR (long rivet) | LB (long blade) | SR (short rivet) | SB (short blade) |
|---|---|---|---|---|
| V | 5825 | 8116 | 3331 | 7257 |
| Cr | 115 | 326 | 66 | 205 |
| Fe | 2898 | 5597 | 1268 | 2734 |
| Mn | 19 | 45 | 12 | 30 |
| Ni | 1060 | 1876 | 1631 | 283 |
| Co | 51 | 550 | 320 | 40 |
| Zn | 931 | 3945 | 838 | 1928 |
| As | 3900 | 17974 | 1 | 11363 |
| Se | 1254 | 1724 | 739 | 1929 |
| Ag | 262 | 137 | 253 | 307 |
| Cd | 004 | 14 | 4 | 7 |
| Sn | 130 | 796 | 391 | 63 |
| Sb | 138 | 235 | 379 | 126 |
| Ba | 15 | 67 | 753 | 30 |
| Hg | 215 | 283 | 142 | 295 |
| Pb | 91 | 625 | 750 | 237 |

Inductively-coupled plasma quadrupole mass spectrometry (ICP-MS) results of trace element concentrations in ppm (parts per million). Two runs per sample were measured. See the text for details of the experiment. Types of groups are summarized in Table C (ii).

**Table C (ii)**
Minor Elemental Principal Impurities (all containing >0.1%)

| type | definition | sample | % V | % Fe | % As |
|---|---|---|---|---|---|
| A | V > As > Fe | LR | 0.5825 | 0.2898 | 0.3900 |
| B | As > V > Fe | LB | 0.8116 | 0.5597 | 1.7974 |
| B | As > V > Fe | SB | 0.3331 | 0.1268 | 0.6001 |
| B | As > V > Fe | SR | 0.7257 | 0.2734 | 1.1363 |

**Table D (i)**

| sample | $^{206}Pb/^{204}Pb$ | $^{206}Pb/^{207}Pb$ | $^{208}Pb/^{207}Pb$ |
|---|---|---|---|
| LR | 18.35 | 1.194 | 2.477 |
| LB | 18.26 | 1.187 | 2.473 |
| SR | 16.08 | 1.194 | 2.501 |
| SB | 18.84 | 1.197 | 2.476 |

ICP-MS results of stable lead isotope ratios. The mean of ten tests per sample are shown. See text for details of the experiment. Tables D (ii) a and b show the results plotted in the standard way.

limits of detection for elements being analysed under the operating conditions are 0.01-0.07% by weight.) The inclusions proved to be $Cu_2S$. It should be noted that the lead values reported are unreliable, because the lead is not uniformly dispersed throughout the copper matrix.

Small portions (about 13 mg) of each blade and a rivet from each sword were dissolved in 10 ml $HNO_3$ (trace element grade) and 10 ml HCl, and then were appropriately diluted and spiked with In for an internal standard, in order to detect trace element concentrations and stable lead isotopes on an Inductively-coupled Plasma Quadrupole Mass Spectrometer (ICP-MS). The trace element results (mean of two runs each) are reported in Table C. The stable lead isotope results (mean of ten runs each) are reported in Table D (Table D (ii) a and b show the results plotted in the standart way). The lead isotopes show a possible common source for the copper in the longer sword blade and its rivet.

## Discussion of smelting technology

Pure copper melts at 1150°C. An open camp-fire produces a maximum temperature of 700°C (Tylecote 1986). So a method to produce a higher temperature had to be used, such as inserting a pair of bellows in such a position in the ordinary camp-fire to raise the temperature in at least a portion. Bellows are seen in an Egyptian drawing of a bronze casting or smithing fire dated 1450 B.C. (Coghan 1951). Suitable skins for making such bellows were readily obtainable. A very early introduction of this technique is probable.

Pure copper carbonate (malachite) requires a temperature of 700-800°C for reduction, but the correct $CO/CO_2$ ratio is also needed. If the ratio is not high enough, only CuO and no metal will be produced. With sufficient air, charcoal will burn to carbon monoxide:

$2\,C + O_2 - 2\,CO$

and malachite will be reduced to copper:

$CO + CuCO_3 - 2\,CO_2 + Cu$

Table D (ii)a Stable Lead Isotopes

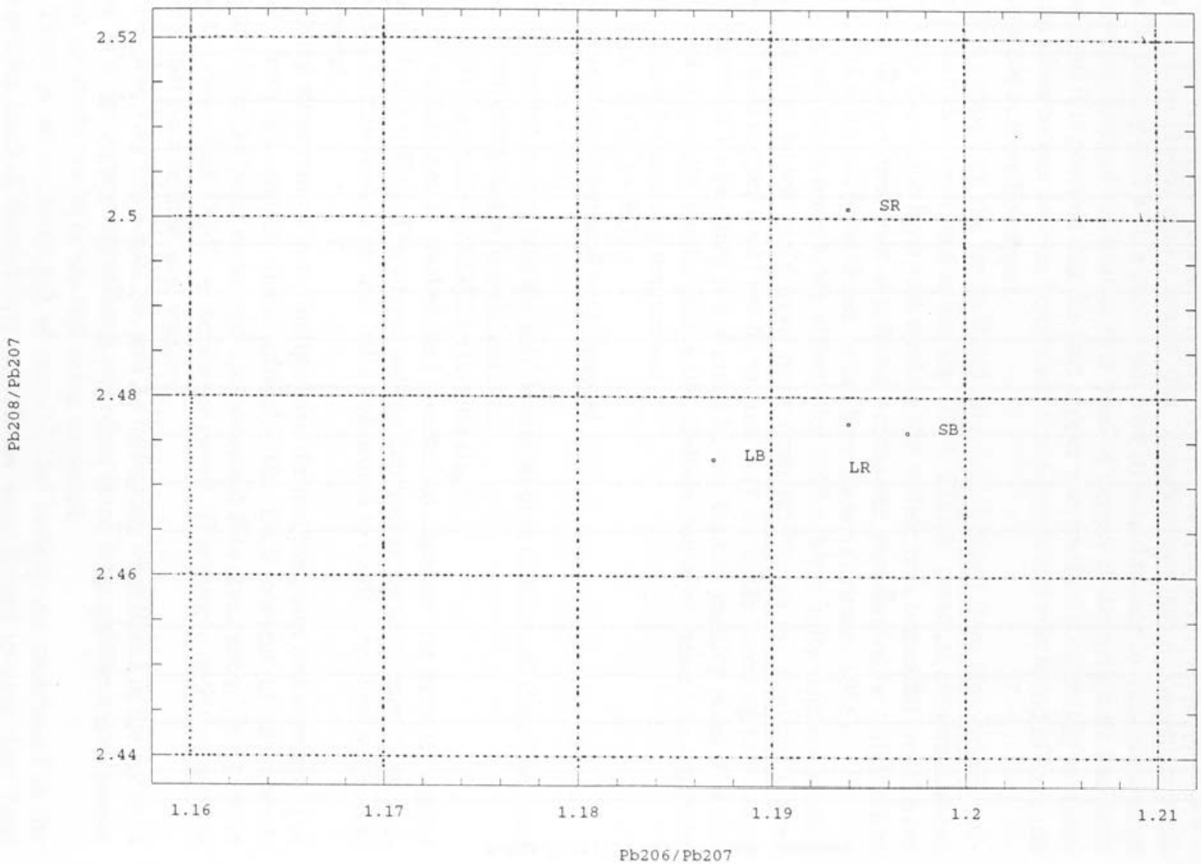
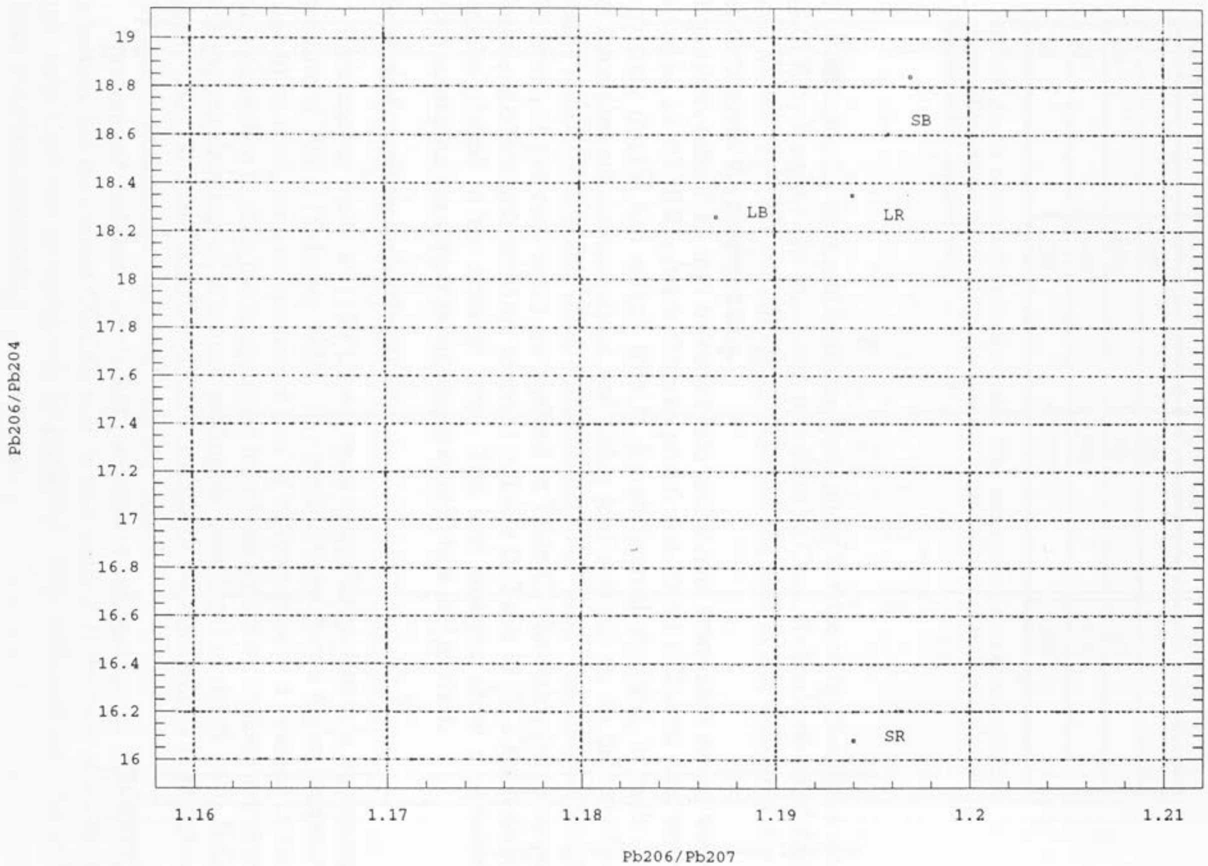


Table D (ii)b Stable Lead Isotopes



However, if there is too much air, carbon monoxide will burn to carbon dioxide:
$2\ CO + O_2 - 2\ CO_2$.
This would leave an insufficient amount of CO to reduce the $CuCO_3$ (malachite).

Coghlan (1940) demonstrated that malachite put into a covered crucible (i.e. a flat pottery dish with a porous pot over it) would reduce to a copper sponge after several hours of red heat or to a bead of copper if the malachite had been ground first. It is possible that the first copper was smelted accidentally in a pottery kiln when copper ore was being used as a pigment and was found to have run down the pot as metallic copper.

In a copper ore site the oxidized ores, which result from atmospheric oxidation of sulfides, are found at the top (D. J. Killick, personal communication, 1992). After that oxide layer was used up, the sulfide ores beneath it would have been used. Copper ores, such as sulfates, carbonates, pure oxides, or sulfides, like chalcocite ($Cu_2S$), can be oxidized, as has been shown (Tylecote 1986).

Copper has a remarkable affinity for sulfur. Most early coppers contain traces of sulfur, which could have come from sulfates in the oxidized copper ores. The liquid copper could not be run out very far in the smelting procedures used, because its temperature is not much higher than its melting point. For this reason copper usually smelts into prills. Sulfide could be heated to oxide by roasting below the smelting temperature:
$Cu_2S + 2\ O_2 - 2\ CuO + SO_2$
then the cupric oxide reduced with charcoal:
$CuO + CO - Cu + CO_2$.
The other possibility is to heat the sulfide ores to give sulfide and slag. The silica gangue is then combined with oxidized iron:
$2\ FeO + SiO_2$ (gangue) - $2\ FeOSiO_2$ (fayalite slag).

The sulfide ore is washed and smelted to separate the gangue, copper sulfide, and iron sulfide. The copper sulfide that undergoes no change in the previous steps is then broken up into balls and heated to oxide, and then reduced to copper metal.

Using temperatures just slightly above the melting point makes removal of all $Cu_2S$ from the copper metal difficult. The $Cu_2S$ content of the swords (calculated from the point count and compositional data given above) is 11.2% in the shorter sword and 13.6% in the longer sword. This clearly indicates that the copper has not been refined after smelting.

Because very few $Cu_2S$, Se, and Te inclusions were found in the rivets, it indicates that the copper was refined, reused, or came from a different ore source in which the oxide ore layer was still being exploited.

There is no evidence left of any original casting. As mentioned in the metallography section, these rivets and blades were forged to near their final shape, then cold worked.

## Conclusions

Provenance

As stated, the lead isotopes show a possible common source for the copper in the long sword blade and its rivet. If the sources are the same, it would require accepting that the rivets had been refined while the blade had not. This does not seem reasonable. The two pieces also fit into the same subgroup of minor element concentrations. If the two are from the same source, there are only three reasonable scenarios. One, the rivets were made by a different smelter who took greater care and extra time in his work. But then he should be making blades, not rivets. Two, the rivets were reworked left-over material. Three, which seems most likely, all four pieces came from different copper sources, probably in Nubia. The two with similar lead isotope ratios and trace element concentrations could come from different outcrops of the same ore vein. It also seems unlikely that the blade and the rivet came from the same copper source because there is Se and Te in the inclusions of the rivet, but not in the inclusions of the blade. Much lead isotope work remains to be done on all the small copper sites that would have been found when looking for gold, remains to be done. When it is completed, these, and possibly other lead isotope analyses of this site, may be compared to locate exact sources.

Function

The final step of cold hammering only the edges and end produced the hardest blade that could be made with copper. As copper hardens, it also becomes more brittle. The fact that the centres of the blades contain annealed crystals does provide some additional stability (i.e. to keep the blade intact when force is applied). These blades indeed took a lot of effort to make and were the best blades that could be made with only copper at hand. However, by the third millennium, bronze was being exploited in the Middle East and around the Mediterranean basin (van der Merwe 1980). Bronze weapons are a good deal harder and sturdier than copper. Since the swords studied are all copper, it could indicate either that they were ceremonial in use (all were found in graves) or that Nubians had no access to tin. However, it seems unlikely that they had no access to tin, since trade was certainly taking place at this time. In addition, the handle-blade connection looks particularly susceptible to breaking if force were applied in any direction. All of the evidence, therefore, indicates a ceremonial use, or as suggested by Mahmoud El-Tayeb (personal communication, 1992), they may in life have been worn decoratively.

## Appendix

Samples were drilled out of the center of each ivory handle. Carbon and nitrogen stable isotopes were to be measured on the Light Isotope Prism Mass Spectrometer. No collagen was preserved, so no measurements could be made. Apatite was then prepared; but only one sample survived preparation and only a small sample of $CO_2$ was obtained, because the ivory was very contaminated. No reliable value could be obtained.

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