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DID MIDDLE STONE AGE MODERNS OF SUB-SAHARAN AFRICAN DESCENT TRIGGER AN UPPER PALEOLITHIC REVOLUTION IN THE LOWER NILE VALLEY?

ABSTRACT: In this paper, the Middle Paleolithic and the transition to the Upper Paleolithic in the Lower Nile Valley are described. It is argued that the Middle Paleolithic or, more appropriately, Middle Stone Age of this region starts with the arrival of new populations from sub-Saharan Africa, as evidenced by the nature of the Early to Middle Stone Age transition in stratified sites. Throughout the late Middle Pleistocene technological change occurs leading to the establishment of the Nubian Complex by the onset of the Upper Pleistocene. After a period of significant population expansion during the Last Interglacial, the arid conditions of Stage 4 have forced technological adaptation and contraction of population groups into the Nile Valley. In this context, the initial Upper Paleolithic emerges. The paper ends with an interpretation of the causes of the transition and of the impact of this event in adjacent regions.

KEYWORDS: Lower Nile Valley – Middle Stone Age – Upper Paleolithic transition – Sangoan – Nubian complex – Taramsan

INTRODUCTION

In the eyes of the European Paleolithic archaeologist, classifications of the Upper Pleistocene archaeological record of the Lower Nile Valley must look like a bewildering array of taxonomic entities. As far as it is sustained by reliable relative or absolute chronologies, its diachronic development is not at all concordant with the European or southwest Asian sequences. Apparently lacking a classic Middle to Upper Paleolithic transition (Marks 1987), it seems to do justice to Huzzayyin's (1941) and Caton-Thompson's (1946) idea of Egypt's splendid isolation in those times (Wendorf 1968). In Upper and Lower Egypt, early Upper Paleolithic sites are absent except for a few isolated occurrences (Vermeersch 2000, 2002). In the Late Paleolithic, from around 20 ka onwards, a number of archaeological cultures relying to an important extent on Middle Paleolithic-like reduction strategies are present. In Nubia, a late technological transition appears in the form of a gradual shift from Levallois flake to microblade strategies (Marks 1968d, Vermeersch 1992).

This pattern of change is much more reminiscent of the African Middle to Late Stone Age transition than of the northern Old World developments. Indeed, from an African perspective this transition is less radical in terms of behavioural processes than the Early to Middle Stone Age transition. A general consensus is emerging that the latter is linked with important biological, behavioural and historic events (Clark *et al.* 2003, Henshilwood, Marean, 2003, Lahr, Foley, 2001, McBrearty 2003, McBrearty, Brooks 2000, White *et al.* 2003, Van Peer *et al.* 2003).

How then could this region be the core-area of an Upper Paleolithic Revolution (Bar-Yosef 2000, 2003) that ultimately led to the installation of an archaeological pattern so different in West Asia and Europe? In this paper, my intention is to review the later Middle Paleolithic from the

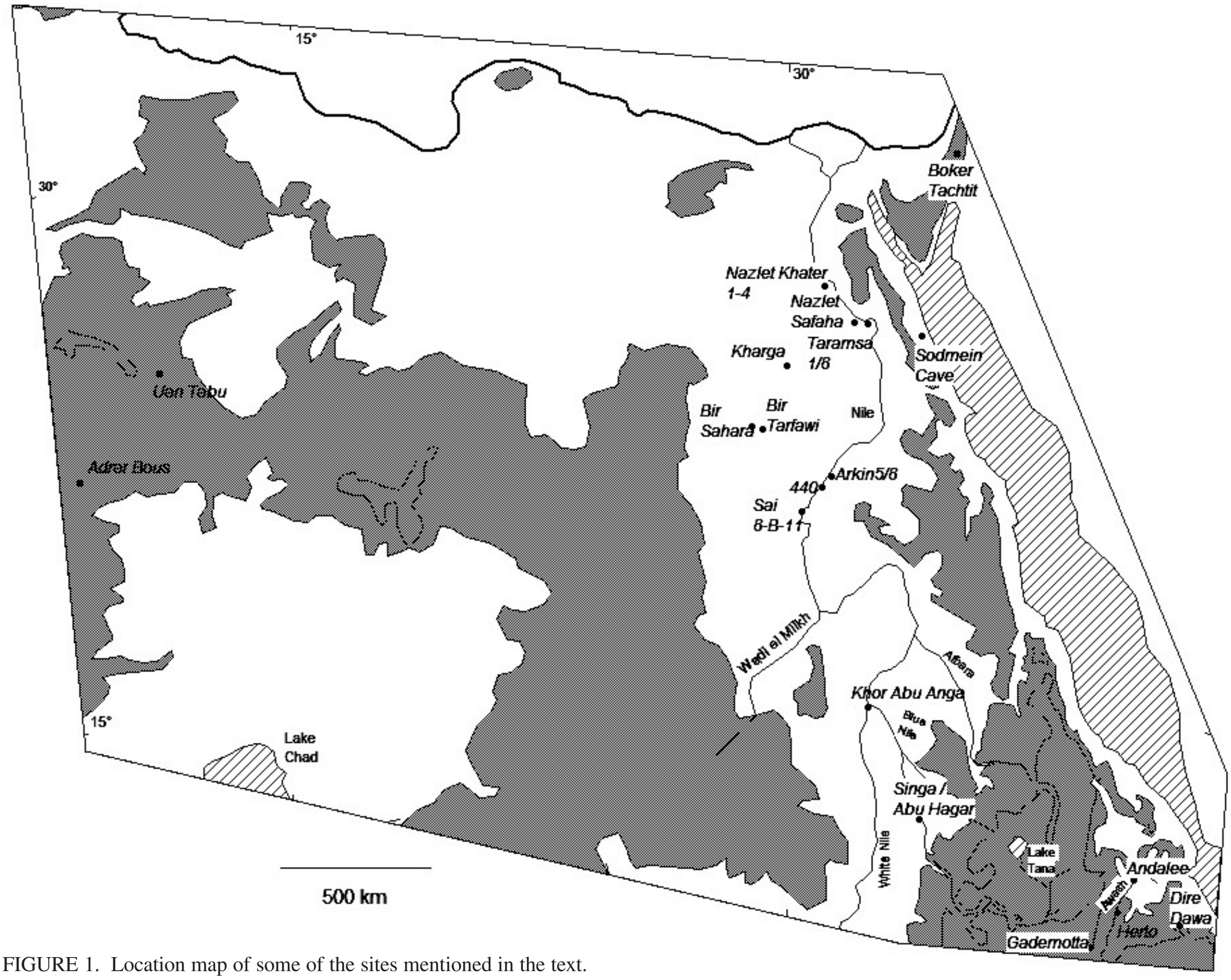

FIGURE 1. Location map of some of the sites mentioned in the text.

Lower Nile Valley and the present evidence for the transition to the Upper Paleolithic, within a broad regional perspective. Before that I will outline the late Middle Paleolithic antecedents, that take us back to that Early to Middle Stone Age transition in the late Middle Pleistocene.

In discussing the role of the Upper Pleistocene Lower Nile Valley in the emergence and dispersal of modern lifeways and modern humans, two remarks should be made. First, Egypt is in Africa, physiographically linked to the tropics by the modern neo-Nile at least since late Middle Pleistocene times (Said 1990: 490) and this is obvious in the archaeological record since that period indeed. The earliest Middle Paleolithic or rather Middle Stone Age industries of northeast Africa are the same that were made in sub-Saharan Africa (Van Peer *et al.* 2003). The unwarranted separation of Egypt from its heartland has been an artefact of research traditions, fuelled perhaps by Egyptocentric ideas emanating from Pharaonic archaeology and anthropology. Yet, Egypt is also a gateway out of Africa east through Sinai and there is no natural barier that might prevent human groups from covering the short distance into the Levantine region.

Secondly, the epistemological relationship between the evolutionary origins of anatomically modern humans and archaeological research needs to be addressed once more, at the risk of overdose (Henshilwood, Marean 2003 for a recent account). Archaeological data have been brought into the debate on the assumption that those modern humans, and only them, can be equated with modern behaviour. Judging from the amount of literature spent at the issue over the last years, it seems difficult to reach agreement on what exactly constitutes modern behaviour and how it could be unequivocally distinguished from "archaic" behaviours in the Paleolithic archaeological record. Further, it is by no means established that such archaeologically reflected features of modernity are the prerogative and even the ultimate apomorphic character of one biological species (Zilhao 2001). Yet, the use of archaeological data for taxonomic and phylogenetic purposes is not uncommon among proponents of alternative models of recent human evolution (Wolpoff, Caspari 1996, Lahr, Foley 2001, Klein 2000). While behavioural capacities must be imposed by biological make-up to some extent, it seems unlikely that archaeologically visible, isolated traits of behaviour are a straightforward means to distinguish the closely related species or populations within the last 0.5 million years.

The composition of a universally valid "trait-list" to identify modern humans (Henshilwood, Marean 2003) ignores the extreme cultural variation within contemporary modern humans (Zilhao 2001). Modern behaviour, if meant to be a feature shared by all members of *Homo sapiens*, should receive a more sound archaeological definition (McBrearty, Brooks 2000). In my opinion, if at all, it is in the complexity of socio-economic systems that universal modernity might be more apparent. This involves such features as group size and social structure, the existence of labour division and economic specialisation, and of functionally diversified settlement systems. Furthermore, it would have to be established first that this type of behaviour is never documented in archaeological records left by members of other species, assuming that the latter can be well defined by paleoanthropologists. However, this law-like association of a species and its specific behaviour needs to be built on independent evidence, i.e. human fossils and/or genetic data, of the makers of the archaeological record. As this does simply not exist, at least not in sufficient quantity, circularity would seem to remain the rule.

In view of the problems inherent in the present conception of much Paleolithic research, I concur with others who advocate re-direction (Henshilwood, Marean 2003 and comments therein; Pettitt 1999). In particular, archaeology's ties with history (Hodder 1986) should be re-acknowledged. The archaeological record is not only a reflection of behaviours but of historical processes as well, set in motion by societies even of the Paleolithic past (Gamble 1999). If interpreted properly, it can be used to describe processes of cultural change and population dynamics within particular regions and environmental settings. Evolutionary models of recent human evolution should be framed into the historic processes that they imply, even if only within the limitations of the chronological resolution generally available for the Paleolithic. Such historic models can be tested with archaeological data. The account that follows below is conceived along such lines.

Returning to Africa, the present genetic evidence is generally interpreted as indicating that the origin of *Homo sapiens* was an African event of the later Middle Pleistocene (Eswaran 2002 for a recent account). In the archaeological record, there is evidence of the emergence of behavioural analogues to the European Upper Paleolithic (McBrearty, Brooks 2000). Furthermore, at least the Middle and Lower Nile Valley show an archaeological pattern, concordant with the historic deployment of this evolutionary event, as I will argue below. Hence, from an African perspective, the MP/UP transition in Europe allegedly separating an ancient from a modern world, might not seem much more than a belated footnote in history, even if it is intertwined with the extinction or disappearance by assimilation of the Neandertals. As G. Isaac (1977) once pointed out, the accident of Western Europe's priority in the development of prehistory, turned a historical event of population and culture contact into a process of evolutionary significance. The incidental synchronicity of biological and cultural change forged the belief that both were united in the same underlying principle of evolutionary change. The arrival of new populations in Europe with a particular culture became a *pars pro toto* for the evolution of a new hominid species and its specific behaviour. However, while technological change of sometimes Upper Paleolithic appearance has occurred throughout the late Middle and Upper Pleistocene Old World, it would be unjust to downgrade the significance of the Upper Paleolithic accordingly. For its emergence set in motion a strongly accelerated, lasting pattern of cultural change. What, then, made the transition to the Upper Paleolithic special?

THE ARRIVAL OF MODERN POPULATIONS IN NORTHEAST AFRICA

The Early to Middle Stone Age transition in this part of the world takes place around 200 ka ago according to new data from site Sai 8-B-11 in the Middle Nile Valley (Van Peer *et al.* 2003). Acheulean sites in the region show a non-African, regional feature in their typological composition in the almost complete absence of cleavers (Schild, Wendorf 1981). The record takes on a definite African appearance with the onset of the Middle Stone Age. Its earliest assemblages found at sites in Nubia such as Khor Abu Anga (Arkell 1949), Abu Hagar (Lacaille 1951); Sai 8-B-11 (Van Peer *et al.* 2003) and Arkin 8 (Chmielewski 1968) are Sangoan as exemplified by the dominance of regular core-axes among the *façonnage* tools. According to the evidence from the Blue Nile sites of Singa and Abu Hagar, this Sangoan would have been made by archaic *Homo sapiens* or *Homo helmei* (Stringer *et al.* 1985, McBrearty, Brooks 2000). An association of anatomically modern fossils and a lithic assemblage is reported from Herto (Clark *et al.* 2003, White *et al.* 2003) in Ethiopia. Although it has Middle Stone Age features, the assemblage is attributed to the late Acheulean based on the presence of handaxes. However, it was mostly collected at the surface and is likely to be of hybrid composition as a result of palimpsest formation. According to the stratified evidence from Sai 8-B-11, the Sangoan of this region does not comprise handaxes but it was deposited alongside with Acheulean debris at the same land surfaces. Stratigraphically, therefore, such occupations cannot be separated from each other giving the false impression that they result from the same occupational event. A similar problem of mixing seems apparent at site Arkin 8.

Large behavioural differences between the components of the Sai 8-B-11 palimpsests indicate that they are the result of the immigration of a new population, from the southern Nile basin. This is in line with observations at some other sites where both late Acheulean and Sangoan assemblages were recorded in stratigraphic context, e.g. at Nsongezi in Uganda (Cole 1967). At Sai 8-B-11 the newcomers exploited and processed pigment minerals and a range of vegetal materials. For such activities, they disposed of manufactured grinding equipment and complex, hafted core-axes (Rots, Van Peer, submitted). The emergence of composite tool-technology had been linked with the onset of the Middle Stone Age (Barham 2001) and at Sai 8-B-11 there is empirical evidence supporting this. The Sangoan occupants at Sai applied red and yellow pigments on a small chert pebble, perhaps as a test of their quality. Their settlement system, according to the dynamic pattern apparent in the lithic economy, was complex and consisted of functionally differentiated sites including raw material workshops, maintenance and repair sites, and foraging locales (Rots, Van Peer, submitted, Van Peer *et al.* 2003, in press, b). Evidence of hunting technology is absent at such Sangoan sites which are associated with valley bottoms. This, however, may also fit the idea of spatial functional differentiation. Sites from the same time range in the Ethiopian highlands such as Gademotta, dated at 235 ka (Wendorf, Schild 1974, McBrearty, Brooks 2000) contain a range of points including bifacial foliates.

By the onset of OIS6, early MSA populations are established in the Middle and Lower Nile Valley. At Sai 8-B-11 sands above the Sangoan levels are dated at 182 $\pm$ 20 ka (Van Peer *et al.* 2003). During the next 50 ka the heavy-duty, Sangoan part of the lithic technology disappears and is replaced by bifacial foliates. Flake production strategies, mostly non-Levallois, are supplemented with blade reductions as evidenced by the presence of true prismatic blade cores in now fully Lupemban assemblages. This technological change seems attested for the whole distribution of the Sangoan/Lupemban complex, e.g. both at Sai 8-B-11 in the Middle Nile Valley and at Kalambo Falls in northern Zambia (Clark 2001). It may correspond to an increased emphasis on hunting as a means of subsistence under particular conditions of OIS6. At 8-B-11, the Lupemban is overlain by sands dated at 152$\pm$10 ka.

THE LOWER NILE VALLEY DURING EARLY UPPER PLEISTOCENE

The widely distributed Lupemban technology of the last Middle Pleistocene gives way to a regionally distinct facies in the Lower Nile Valley by the onset of the Upper Pleistocene. This is the early Nubian Complex (Van Peer 1998) of which the lithic technology is characterized by the presence of a Levallois reduction strategy mainly for point production. J. and G. Guichard (1968) defined two so-called Nubian Levallois methods, but there is little reason to view them as discrete typological, let alone technological groups. Bifacial foliates continue to be used, but their morphologies may now differ from the classic Lupemban lanceolate forms, for example at site BT-14, Grey Phase 1 in Bir Tarafawi correlated with Stage 5e (Wendorf *et al.* 1993: 566). At site Sai 8-B-11 a technologically transitional level seems to be intercalated between the Lupemban and early Nubian Complex levels (Van Peer *et al.* in press, b) but this needs to be substantiated in future fieldwork.

The ancient Sangoan tradition of sub-surface digging for various raw materials is maintained and accentuated. There is now evidence of elaborate extraction pits for lithic raw materials, for example at Arkin 5 (Chmielewski 1968), at Taramsa 1 (Vermeersch *et al.* 1997) and at Taramsa 8 (Van Peer *et al.* in press, a). These Nile Valley sites are all workshops located on pediments or Nile terraces and except for site 440 (Shiner 1968, Wendorf, Schild 1992), other components of the settlement system have not been found here. At 440, faunal remains are well documented and there is evidence of deep-water fishing. An exceptional lanceolate from Taramsa 8, found broken in two parts among its production flakes, shows marks of hafting. It indicates that complex tools were produced at the workshops, probably to be exported to locations of similar type as Site 440 (Van Peer *et al.* in press, a).

The Last Interglacial here is a period of significant local precipitation causing savanna-environments with permanent lakes in the eastern Sahara (Wendorf *et al.* 1993). Naturally, early Nubian Complex groups have dispersed into the territories adjacent to the Nile. At Bir Tarfawi and Bir Sahara in southwest Egypt, a number of stratified sites were found in successive lake deposits spanning most of OIS5. Due to their exceptional preservation conditions, they are able to show other aspects of the Nubian Complex settlement system. Meat procurement activities have been inferred for sites associated with dry lakebeds, and plant processing with beach locations. Workshops at a few km from the Tarfawi depression have also been identified (Wendorf, Schild 1992). East of the Nile, a hunting stand was found at the Sodmein Cave in the Red Sea Mountains (Van Peer 2001b). Here, the early Nubian Complex level contains a large dug-out firepit with stone-built slopes and large mammal remains in it. Burned cherts from within the fill produced a TL-age of 115 ka (Mercier *et al.* 1999).

As far as stratigraphic and absolute chronological evidence is available, it would seem that there is limited evidence of occupation during the subsequent stages of OIS5 except in the Eastern Sahara. For example, in the Sodmein sequence a thick sterile layer separates early and late Nubian Complex levels. At Sai 8-B-11, deflation started the erosion of the interglacial floodplain exposing early Nubian Complex material at the surface. The next period of human occupation here appears not to have occurred until the terminal Pleistocene.

Only towards the end of OIS5, there are new sites with late Nubian Complex assemblages in which bifacial foliates are now absent. Only points elaborated on mostly Nubian Levallois blanks are now documented, for instance at site E-87-3 from the Green Lake phase at Bir Tarfawi (Hill 1993). At Valley workshops such as Nazlet Khater 1 and 3 (Vermeersch 2002) and Taramsa 1 (Vermeersch *et al.* 1997), the proportions of different technological categories clearly reveal sophisticated spatial dynamics for lithic products. Nubian Levallois cores and their production waste occur in large numbers whereas Nubian points are rare. Conversely, there are too many Levallois flakes for the small amount of flake cores present (Van Peer 1998). This indicates that points were produced with a specific purpose in mind and these cores are truly waste materials. Levallois flake cores, on the other hand, were often prepared for export to serve probably as little stocks of raw material at other locations, such as the Khormusan sites in Nubia may be (Marks 1968a). They are associated with Nilotic deposits and beyond the reach of radiocarbon dating (Wendorf, Schild 1992). Faunal and fish remains are found here as well as hearth-pits. Given their size, these sites may have been occupied by large groups and perhaps represent residential camps within the Nile floodplain.

In terms of interregional relationships, the Egyptian record still looks African even though there are some typological similarities with the Levantine Middle Paleolithic, notably the presence of truncated-facetted pieces (Bar-Yosef 2000). Only more systematic comparative analysis may reveal if such superficial resemblances are behaviourally and historically meaningful.

THE ONSET OF HYPER-ARIDITY IN OIS4

With Stage 4 a long period of hyper-aridity sets in Northeast Africa (Wendorf *et al.* 1993). The last Pleistocene lakes of the Sahara disappear and, surely, the conditions for humans in those regions must have become very hard. Unsurprisingly, this climatic deterioration provoked technological changes. The tanged tools of the Aterian make their appearance and the production of bifacial foliate points is resumed. The old blank production strategies, however, the Nubian Levallois method in particular, remain in vogue. This continuity is well exemplified in the oldest securely dated Aterian site up to now, Uan Tabu in southwestern Lybia (Garcea 2001). Aeolian sand unit IV contains an Aterian assemblage with classical tanged points elaborated on Nubian blanks and is OSL-dated to 61$\pm$10 ka. *Contra* the orthodox belief that the Aterian is uniquely a local northwest African development (Debénath 1996, Wengler 1993), I consider it an adaptive response that originated independently in the eastern Sahara. The Aterian may well be a techno-complex that comprises the archaeological remains of northern African populations adapting to their more arid environments with convergent technological means. However, in the present chronological evidence an east-west gradient would also seem to emerge. This suggests that, in close relation to the mid-altitude fringes of the Saharan mountains, the Aterian subsistence system spread into the west and reached the Maghreb where it may have persisted up until around 25 ka (Van Peer 2001a). The emergence of tangs and foliates very likely represents a change in hunting strategies perhaps as a response to the presence of a new faunal spectrum. Barbary sheep in particular appears to be quite frequent in Aterian bone assemblages (Garcea 2001).

At Kharga Oasis, the result of a parallel adaptive response seems to be documented in the form of the Khargan industry (Caton-Thompson 1952). It is undated and its stratigraphic relationship with the Aterian is not entirely clear, as they occur in different parts of the topography. Khargan sites, as Caton-Thompson notes, never occur in the base of the Kharga Depression while Aterian sites are present here around fossil springs. The Levalloiso-Khargan, however, which seems transitional between the Nubian Complex and the Khargan, is stratified below the Aterian. It seems safe to assume that the Aterian and the Khargan are roughly contemporaneous, as suggested by Caton-Thompson (1952) herself. The latter industry contains perforators, truncated flakes and non-geometric, microlithic forms as well as truncated-facetted pieces, which are reminiscent of the Nubian Complex. The enigmatic Sebilian industry (Marks 1968b) of the Nile Valley presents obvious similarities with the Khargan in the presence of numerous truncated flakes. The dating of Sebilian sites, however, is controversial (Vermeersch 1992).

In the Nile Valley other types of technological change are attested. Generally, the Nubian point lithic technology disappears or is transformed into a new production system. The Lower Nile Valley Complex (LNVC) encompasses a number of industries with only flake Levallois reductions such as the K-group (Van Peer 1991a), the Denticulate Mousterian (Marks 1968c), the Safahan (Van Peer *et al.* 2002) and the Halfan (Marks 1968d). Its distribution appears to be limited to Upper Egypt and Nubia. In an earlier paper, I considered this complex at least in its early phase as contemporaneous with the late Nubian Complex of the end of OIS5 (Van Peer 1998). This was based on the assumption that K-group site Nazlet Khater 2 with an infinite radiocarbon date of >35700 BP, was reworked during the same geomorphological event as Nubian Complex sites Nazlet Khater 1 and 3 and on the rejection of some Halfan radiocarbon dates indicating an age of at most 25 ka for the oldest Halfan sites (For a discussion of this issue see Paulissen, Vermeersch 1987, Vermeersch 1992, Wendorf, Schild 1976). Taking into account the present evidence, this seems to be wrong. Numerous extensive refittings at Nazlet Khater 2 suggest that at least part of the site is in primary context and post-dates the reworked gravels it is dug into (Vermeersch 2002). An OSL-date of 59.8$\pm$6.6 BP underneath one of the artefact concentrations at Nazlet Safaha 2 places the exploitation activities in OIS4 at the earliest (Stokes, Bailey 2002). While the relative chronology and correlation of Nilotic floodplain deposits and sites based on elevation only is much more complex than once thought (Wendorf, Schild 1976), it is nevertheless clear that the Halfan dates and the stratigraphy are concordant. Stratigraphically the oldest Halfan site 6B32 is contained within silts of the Late Paleolithic Valley Filling episode or with a slightly earlier alluviation separated from the former by a period of Nile incision (Schild *et al.* 1992: 91).

The lithic production system of LNVC-industries is based on the Levallois concept in its classical form, supplemented by single and opposed platform reduction either of blades or microblades. While Nubian Levallois points are not produced anymore, the Nubian method of core preparation is employed in the so-called Safahan method (Van Peer 1991b). Here, the last step of the preparation sequence of a Levallois surface consists in removing a Nubian central ridge by an axial blow from the distal striking platform of the core. The Levallois flake that is subsequently struck from the main striking platfrom will characteristically show a double-pointed tip.

A parallel but different avenue of technological change is attested in the Taramsan industry (Vermeersch *et al.* 1997). At the workshop of Taramsa 1 in the Valley, there is evidence of intensive activity. In fact, it would seem that most of the exploitation pits and ditches are from this phase of occupation[1]. A burial pit containing a modern human skeleton, estimated to be around 55 ka old based on an average of OSL-dates (Vermeersch *et al.* 1998), was found in one of those pits. The lithic production strategies now are designed to produce elongated blanks, often true blades. Numerous refitted sequences show that such blade reductions are applications of an adapted Levallois concept (Van Peer 1992; in press) whereby the production capacity of the cores is significantly increased. This transitional industry encompasses a variety of reduction types, ranging between orthodox Nubian Levallois reductions and continuous blade-producing cores. It appears first in the lithic assemblage of Sector 91/03 at Taramsa 1. OSL-dates for various exploitation pits with Taramsan assemblages are still being finalised (Stokes pers. comm.), but the earliest representation of this transitional technology is definitely in Stage 4 (Stokes pers. comm.). The Taramsan pinpoints the origin of an Upper Paleolithic technology from its Middle Paleolithic or, more appropriate, Middle Stone Age base.

In the southern Levant, the Emiran level I at Boker Tachtit has transitional features leading to a fully Upper Paleolithic Ahmarian technology in level IV of that same site. The beginning of this transitional sequence is usually placed around 47 ka, but it may be slightly prior to 50 ka (Marks 2003). A Levantine late Middle Paleolithic antecedent for the Emiran is presently unknown (Marks 2003). As a consequence, some have proposed that the stimulus for this process of change came from outside, the Nile Valley in particular (Bar-Yosef 2000, 2003, Tostevin 2003 *contra* Marks 2003). The Taramsan and Emiran reduction systems, both studied by means of completely refitted sequences, have in common that they each represent an adaptation of the classic Levallois surface exploitation to volume exploitation. Both types of reductions start out as Levallois core preparations which are subsequently turned into cores with continuous blade-production from opposed striking platforms (Marks 1983, Van Peer 1992, Volkman 1983). The exact technical ways to achieve this, however, are different. In the Taramsan, the change consists in enlarging the available exploitation volume by creating an extremely domed upper core surface. In the Emiran, a crested blade is struck from one of the sides of a prepared flat core and the subsequent debitage of blades is continued from this side. The exploitation surface of the core, in other words, is rotated 90°. The Taramsan technology appears to conserve in its volumetric organisation a more Levallois-like character. Crested blades, for instance, are far less common. The production sequence of an Emiran core usually ends with a morphological Levallois point. This is not the case in the earliest Taramsan although incidental pointed blade forms are produced in the course of a reduction. However, the latest evidence indicates that in later Taramsan assemblages points are again produced intentionally (Van Peer, in press). On the basis of this technological evidence, the introduction of the initial stimulus for change in the Levant from the Nile Valley cannot be refuted. Nor can it be done on chronological grounds as the transition at Taramsa is certainly older than at Boker Tachtit.

A detailed analysis of the artefact distributions in and around the Taramsan extraction ditch of sector 91/04 and of the completely refitted reduction sequences mentioned above, has provided surprising insights in the social organisation of the activities (Van Peer 2001b, in press). First, the *chaîne opératoire* that chert nodules exploited in this ditch went through is partitioned in a number of spatial clusters. After exploitation, chert nodules were piled up against the ditch walls. Before being moved to an area of reduction, they must have received a first evaluation of their quality. This is clear from fully refitted reductions where the first large cortical flake is almost systematically missing. In peripheral reduction zones situated both within the extraction ditch and on its edges, nodules went through intensive testing and, eventually, preparation for full reduction. Also, initially rejected volumes were seemingly recycled here and reduced anyway. Adjacent to one of these flaking areas, a cache of cores was found. Prepared cores and the best raw nodules were taken to areas of full Levallois or Taramsan reduction within the extraction ditch. Selected blanks ended up in adjacent zones where they were retouched; cores as well were sometimes brought over here to enter their final reduction phase.

In principle, there is no reason to partition a supposedly simple acquisition stage in the overall *chaîne opératoire* into this number of substages. For instance, at the older workshop of Taramsa 8 mentioned above, the production and hafting of a foliate point seems to have been performed by one individual (Van Peer *et al.* in press, a). Here at Taramsa 1, the only explanation for the observed spatial pattern seems to be that a number of individuals co-operated in a simultaneous activity event. This idea of labour division receives additional weight from the technical analysis of 27 completely refitted sequences from an area of full reduction in sector 91/04. I determined the precise order of the preparation flakes in conjunction with their distribution over the core's periphery. The comparison of

[1] These later exploitation features, however, have destroyed older evidence and, therefore, it is difficult to compare extraction amplitudes over time.

these spatial sequences for the whole sample revealed the existence of four discrete but internally consistent pattern groups[2]. The cores of each group, in other words, were reduced in almost exactly the same sequence order. The only way to interpret this seems to be that these are the productions of individual artisans who had developed their own technical styles through experience, much like the specialists of the European Magdalenian (Pigeot 1990). These Taramsan specialists were the ones who carried out the most responsible task in the *chaîne opératoire*: the reduction of the best quality nodules. Thus, a socio-economic system based on a sophisticated form of labour division involving task specialists is documented here. One might speculate that the social composition of the group that came out to this site was governed by task specialization, not by kinship. Apparently, it was a highly organized society that started experimenting with alternative lithic production systems, a process that would result in fully Upper Paleolithic blade technology as evidenced in more recent exploitation pits at the same site. Why did they start this experiment?

DEMOGRAPHIC PROCESSES

When the Sahara dried up, the decrease of subsistence resources could obviously not be resolved by technological change and social adaptation alone. Human groups living in the Eastern Sahara must surely have migrated into the Nile Valley. This is all the more likely since their settlement system was deployed over vast territories (Van Peer 2001b). At the Aterian site of Adrar Bous, for instance, silicified vitric tuff has been introduced from 280 km distance (Clark 1993). For some groups, the Valley must have formed part of their range, at least indirectly through inter-group contacts. Demographic contraction is also empirically sustained by evidence from both regions. Except for Aterian occurrences in the mountainous areas, there are no OIS4/3 sites in the Central and Eastern Sahara. On the contrary, there is increased activity in the Valley. While caution needs to be exerted in the extrapolation of population densities and of economic intensification, the workshops do provide indications of extraordinary amplitudes of production activities in this period. For Nazlet Safaha 1, the number of extracted chert pebbles of sufficient quality for reduction has been estimated at 190,000 (Van Peer *et al.* 2002). Accounting for a reliable selection ratio of 1 to 10, the total number of extracted nodules at this same site amounts to 1,900,000. A similar excercise for the Taramsan phase at the Taramsa 1 workshop suggests around 3,000,000 pebbles (Van Peer 1998) as a conservative estimate. Knowing that in the Valley stretch between Luxor and Qena numerous other workshops from this period are present (Vermeersch, Paulissen 1997), we can safely assume that the total number of dug-out chert volumes would easily run over 100 million and perhaps much more, for this small region alone.

The Nile was not at all the competent present river. It was an extremely seasonal, braided river with shallow channels due to reduced amounts of headwater discharge (Schild, Wendorf 1986: 31). As the local climate was hyperarid, periods of droughts or highly reduced availability of water must have occurred. Groups coming in from the western desert may not have found a much more prosperous environment here. It is quite likely that population influx was also from the east. Territorial contraction in Europe led to the presence of Neandertal groups in the Near East (Bar-Yosef 1988, Hublin 2000). The other, modern population is absent at this time and they may have moved into Northeast Africa as a consequence perhaps of this Neandertal shift. If so, the latter added significantly to the emergence of a "classical" stress condition of population contraction and concentration in an already marginal environment. This situation naturally sollicits adaptive technological change. The Taramsan transitional lithic technology represents an experiment to use raw material in a more efficient, productive way by changing the volumetric organisation of the cores. This implied the reduction of blank width and, thus, the production of elongated end forms (Van Peer 1992). Certainly in the case of the Taramsan, I am inclined to consider blade morphology a consequence of technological intensification rather than viewing blade reduction strategies as technical adaptations to achieve for some reason desired blades.

This mechanism of adaptive change is not the only one, as described before and it is not new either. Blade technologies have emerged at different times and places throughout the Middle Paleolithic/MSA. Neither are regular microlithic tool forms, bifacial foliates and even tanged tools technological means that appear for the first time. Any of them had been developed in Africa in earlier times. In fact they are all documented in the late Middle Pleistocene Lupemban industry (Barham 2000, 2001, Clark 2001, McBrearty, Brooks 2000). Nor is the Nile Valley the only region where such processes were at work (McBrearty, Brooks 2000). However, the concentration of groups and demographic pressure at an unprecedented scale may have constituted an additional, new trigger for change here. Social competition may have arisen among these highly organized groups enhancing the emergence of ethnic consciousness and social boundaries (Newell *et al.* 1990, Wobst 1974), and adding a social-strategic dimension to the motivations of material production. Under this interpretation, the Lower Nile Valley during OIS4 can be conceived as a region where social experiments took place whereby an adaptive response in origin became subordinated to social drivers for change.

At the present time, this is not much more than a hypothesis since the later archaeological outcome of this period of change is largely unknown. Sites from the period

[2] Not all reductions have been assigned to these four groups. For a full account of this research see Van Peer, in press.

between 50 and 30 ka are quite rare as sediments, both Nilotic and local, are basically absent. Numerous surface concentrations cannot be dated. The existence of social territories, for instance, cannot possibly be inferred from the present archaeological data. Only in association with sediments from the Late Paleolithic Alluvation (Schild *et al.* 1992), quantities of Late Paleolithic sites are found again from about 20 ka onwards. For this period at least, a number of penecontemporaneous archaeological groups with stylistic differences have been identified in Upper Egypt and Nubia (Close 1980). The lithic technologies of these southern groups are flake and microblade strategies and, in this respect, they are the result of a non-classic Middle to Upper Paleolithic transition. Apparently, the alternative pathways of change mentioned above seem to have provoked equally lasting effects and resulted in new lifeways just as well.

One site hints at the persistence of the Taramsan blade technology in an early Upper Paleolithic context. The blade assemblage from the site of Nazlet Khater 4 in Middle Egypt evokes some Taramsan features (Vermeersch *et al.* 2002). In underground mine shafts, chert pebbles were exploited here in a period between 40 to 35 ka ago. The use of bifacial axes as exploitation tools is also reminiscent of the Taramsan. One axe was found as a burial gift in one of the two burials that are associated with the mine of Nazlet Khater 4. This may be the individual's personal item and an indication of social status or economic specialization. It testifies to the acknowledgement of individuality and to the existence of social/economic distinction in this society. Was there, in this respect, a qualitative difference with other contemporaneous societies? Is it their particular social structure that made these blade-producing groups successful, expansive and influential in processes of change in the Near East?

CONCLUSION

The scenario laid out here describes how early Upper Paleolithic technologies and a way of life might have first originated in the Lower Nile Valley. It does not offer an explanation of why this local event has become a global phenomenon of the northern latitudes of the Old World. Its chronological priority does not make it automatically fit to be the unique ancestral event to the general Middle to Upper Paleolithic transition. In fact, it makes a general explanation more difficult: there is no obvious reason why groups living in a different social and environmental context would adopt an outcome of a particular socio-historical trajectory from another region.

A single origin hypothesis for the Upper Paleolithic might only seem to stand a chance when it is provided with an evolutionary flavour. If in the process of the Lower Nile Valley an adaptive advantage for all human societies regardless of their condition were selected, this Upper Paleolithic behavioural phenotype would be bound to spread into other regions. As far as the historic development of such a dispersal is concerned, the present evidence indicates that it has entered the Near East, where an only slightly later transition is documented, soon after the events in the Lower Nile Valley. Migration as the vehicle of dispersal, for instance by groups who were outcompeted in the Nile Valley, seems unlikely. Not only would one wonder what their adaptive advantage might be, but the Levantine transitions at Boker Tachtit and Ksar Akil are examples of gradual internal change (Marks 2003). Under the single origin hypothesis, therefore, they would have been invoked by the assimilation of an advantageous novelty. But if migration is not involved and if indeed the Neandertals were the only population in the region at this time, the latter explanation would seem to open up an interpretative *terra incognita*. For it would imply that it were Neandertals who adopted the Upper Paleolithic advantage and passed it on, in their turn, to modern groups who then created the Aurignacian (Zilhao, d'Errico 1999)[3]. An evolutionary-grounded single origin hypothesis would also require an answer to further questions. What exactly constitutes the advantageous Upper Paleolithic genotype? Why did it set in motion the directional pattern of accelerated change of the Upper Paleolithic? Why would, in the technological domain, one particular expression, i.e. blade technologies, have to be the dominant correlate of change?

A radically alternative view would be to consider the emergence of Upper Paleolithic lifeways as local contingencies whereby adaptive responses converge in equifinal archaeological reflections. There is no doubt that the relatively uniform appearance of the Middle to Upper Paleolithic transition is to some extent imposed by the coarse analytical resolution of our present data. The Northeast African situation indicates that there are several avenues of technological change. One of the useful goals of future research would be to investigate if there is a pattern in the selection of technological change mechanisms. But even if such would appear to be the case, it is still likely that our archaeological patterns are formal uniformizations of very different events, especially if we can only rely on technological data. Then, there is no point in looking for a unified explanation for the emergence of the Upper Paleolithic.

However, there is a middle way between evolution and contingency, and that is history. The Lower Nile Valley suggests that this is the trajectory to look for. Here, the origin of new lifestyles including the Upper Paleolithic one, may have been a consequence of a process of social intensification among already highly organized groups who were under demographic and economic stress. The global advantage selected in this event may be entirely confined

[3] This problem is not exclusive for the single origin hypothesis. Even if the Near Eastern origin of the Upper Paleolithic is an independent, convergent phenomenon, the Neandertals may remain involved.

to the socio-cultural domain and its subsequent dispersal among other groups a predictable feature of the newly emerged social structure. An interpretation of Upper Paleolithic origins in social terms does not downgrade them to historical contingencies of minor importance. On the contrary, it underscores their significance as they may, in that quality, mark the beginning of the modern, historic world. Nor does it refute a single origin. If, however, the latter has happened, it should be called a revolution, born out of the interactions between complex human societies and affecting other parts of the Old World through the mechanisms of history.

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