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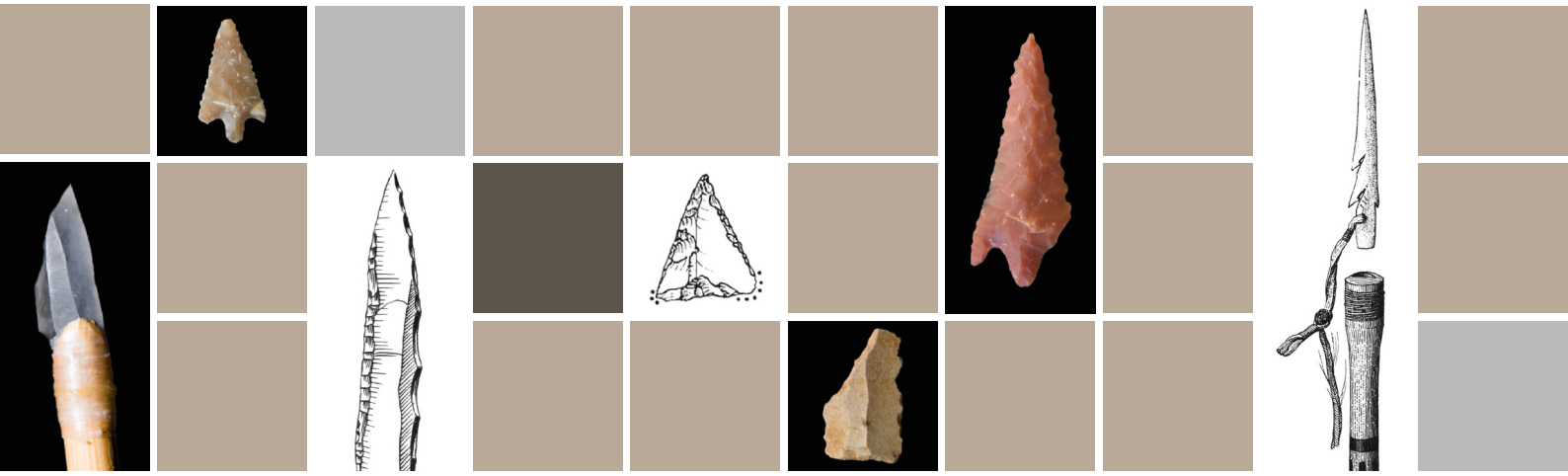
PROJECTILE WEAPON ELEMENTS
FROM THE UPPER PALAEOLITHIC TO THE NEOLITHIC

Proceedings of session C83



PALETHNOLOGY
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SUMMARY

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Part 2, diachronic prospects :

LUNATE MICROLITHS IN THE HOLOCENE INDUSTRIES OF NUBIA : MULTIFUNCTIONAL TOOLS, SICKLE BLADES OR WEAPON ELEMENTS ?

Mathieu HONEGGER

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Abstract

In Nubia, lunates (circle segments) are one of the most characteristic tools from the beginning of the Holocene to the end of proto-history, or even later. According to some interpretations, they are generally considered as being arrowhead or sickle blades. Taking into account archaeological examples, very diverse in their context and dating, the present article tries to summarize our knowledge on the question of their function. While previous studies have essentially taken into account the existence of traces or organic residues (gloss or polish, hafting glue, handle or shaft) and less often the context of discovery (tips driven into human bones or embedded in skeletons), they have not, on the other hand, considered the question of impact fractures and the dimensions of lunates. By collecting all these observations, it is possible to differentiate small sized lunates having mainly been used as projectile tips or barbs and bigger pieces meant to fit knives for cutting vegetal materials or sickles. We can however not exclude other uses for some of the lunates, as it is possible that pieces of medium dimensions could have had a functioned as arrowheads or sickle blades. Finally, we can observe a tendency through time toward a reduction in size of the lunates and a greater standardization of the pieces intended to be used as projectiles.

Key-words : lunates, Nubia, Epipaleolithic, Mesolithic, Neolithic, Kerma, Middle Kingdom, arrowhead, sickle blades, knife for cutting vegetal materials, impact traces

Nubia is a vast region that extends from the first to the sixth Nile waterfalls, straddling the limit between southern Egypt and northern Sudan (fig. 1). Although its prehistory is still poorly known, it is possible to follow the main steps of the evolution of society and its material production since at least the 10th millennium BC. One of the most striking aspects of the Holocene chipped stone industry is the relative monotony of its tools, characterized by prevailing backed pieces, and in particular lunates. The latter are of varied dimensions and their function has been diversely interpreted: often considered as sickle blades, they have sometimes been assimilated to arrowheads or barbs and more rarely to tools meant for other uses, such as borers or burins. What we would like to discuss here is the function of these backed pieces, presenting examples from different archaeological contexts, as well site function (settlement or necropolis) and chronology (10th to 2nd millennium BC). Not pretending to provide conclusive solutions, this outline will allow some clarification as to the use of lunates in the Nile Valley region.

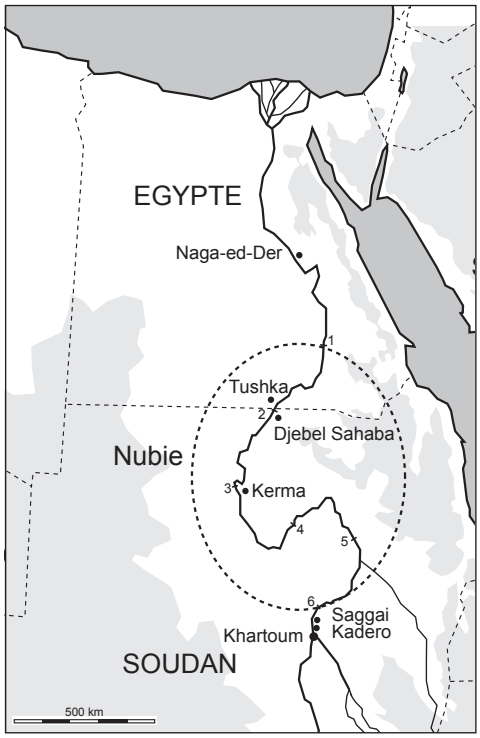

fig. 1 : Map of the Nile Valley, locating the six waterfalls and all the sites mentioned in the text.

Cultural and chronological context

Our knowledge of the recent prehistory of Nubia is still incomplete due to the small amount of archaeological research on the subject and the unequal geographical dispersion of studies. The best known sectors are located, on the one hand, in Khartoum area (Central Sudan) where the pioneering works of A. J. Arkell, at the end of the 1940's, contributed to a renewal of research (Arkell, 1949) and, on the other hand, between the first and second waterfall where the building of the high Assouan Dam was, in the sixties, at the origin of many archaeological digs (cf. Wendorf, 1968). Between those two areas, the remaining part of Nubia was long neglected and only recently (Honegger, 2002) has a clearer image been restored, mainly as a result of excavations in the Kerma region (3rd waterfall).

The first evidence of the existence of Holocene occupations goes back to the 10th millennium BC, a little before the increasing humidity of the climate allowed populations to settle in the desert areas (Kupper and Kröpelin, 2006). Depending on the authors and regions, archaeological cultures of this period are qualified as Epipaleolithic or Mesolithic. They are characterized by human groups in the process of becoming sedentary and who exercise a predation economy based, among others, on the Nile river resources, and who start producing ceramic objects as early as the end of the 9th millennium (fig. 2). On this cultural substratum, the components of a Neolithic economy appear between the 8th and 5th millennium BC. The probably local domestication of bovines was replaced by innovations coming from the Near-East, such as the breeding of caprinae, later followed by the cultivation of barley and wheat. During the 4th millennium the proto-historic cultivations appeared, more or less subject to the influence of the emerging Egyptian Kingdom. In the region of the 3rd waterfall, the Pre-Kerma culture announces the emergence of the Kerma Kingdom (2500 to1500 BC) that stood up to Egypt until the colonisation of Upper Nubia by the Pharaohs of the 18th dynasty.

The examples chosen to illustrate the question of lunates mainly include the periods presented above: Epipaleolithic-Mesolithic, Neolithic, Kerma and

Egypt's Middle Kingdom. To this diversity of contexts is opposed the monotony of the tool, whose dimensions represent the main factor of variability.

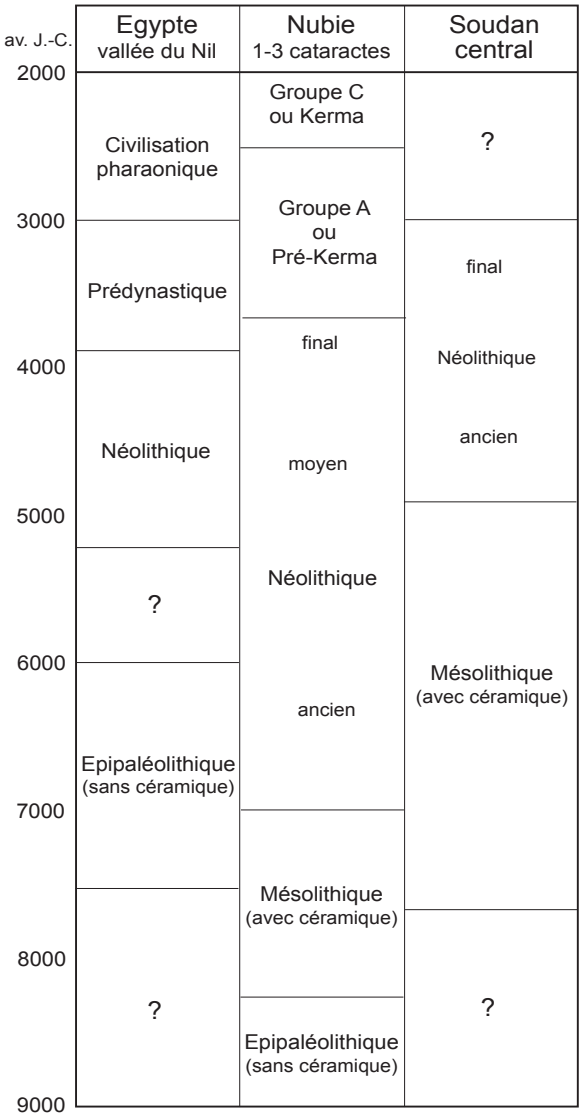

fig. 2 : Chronology of pre- and proto-historic occupations in Nubia and central Sudan, compared with the Egyptian chronology.

Djebel Sahaba Epipaleolithic (12th to 10th millennium BC)

Djebel Sahaba is a famous cemetery located in northern Sudan and dating back to the end of the Paleolithic or to the Epipaleolithic. Containing 59 burials, it would seem to be the oldest archaeological testimony of a violent conflictual situation between human groups (Wendorf, 1968, p. 954-995, Guilaine and Zammit, 2001, p. 103-113). Grouping men, women and children, the cemetery yielded 116 flint artifacts in association with 24 burial-places. Considered as weapon tips at the origin of the death of human beings, these flakes retouched or not, were sometimes founddirectly embedded in the bones of the skeletons. The other artefacts were embedded between the bones or found inside the skulls. From a typological point of view, the retouched pieces were for the greater part truncated or backed pieces (fig. 3), including a few geometrics and only one not very characteristic lunate. But burins, tips and scrapers were also found, without forgetting that many unretouched flakes must also have had the function of weapon tips.

The dating of the cemetery is mostly based on typological comparisons of lithic industry, linking it to the beginning of the Qadan period (12,000 – 10,000 BC), a culture characterized by a flake industry including lunates as one of its most significant tools.

Since few lunates were found in the tombs, the author assumes that this tool must not have been used as weapon tip, unless the Djebel Sahaba is dated at the very beginning of the Qadan period, when lunates were rather rare!

Without arguing about this exceptional site, the question of its dating remains open today and recent attempts to directly date the skeleton bones have unfortunately given no results. The lithic artefacts found in the tombs must be re-examined, focusing on possible impact traces. Anyhow, this assemblage does not solve the question of the function of the lunates, as it contains very few of them. It does provide, however, an assemblage of weapon tips with different morphologies and stockier dimensions than those noted in other contexts (cf. infra and fig. 15).

El-Barga Mesolithic (8th millennium BC)

In the Mesolithic, lunates are the generally dominant tool (Haaland and Magid, 1995, p. 61-64). For example, at the site Saggai, north of Khartoum, they represent around 40 % of the tools (Caneva, 1983, p. 209-233). Their dimensions are rather varied, but they are globally greater than those of the Neolithic lunates. Their function has already been discussed many times and opinions diverge according to the author. Some are inclined to think that these tools are weapon tips, on

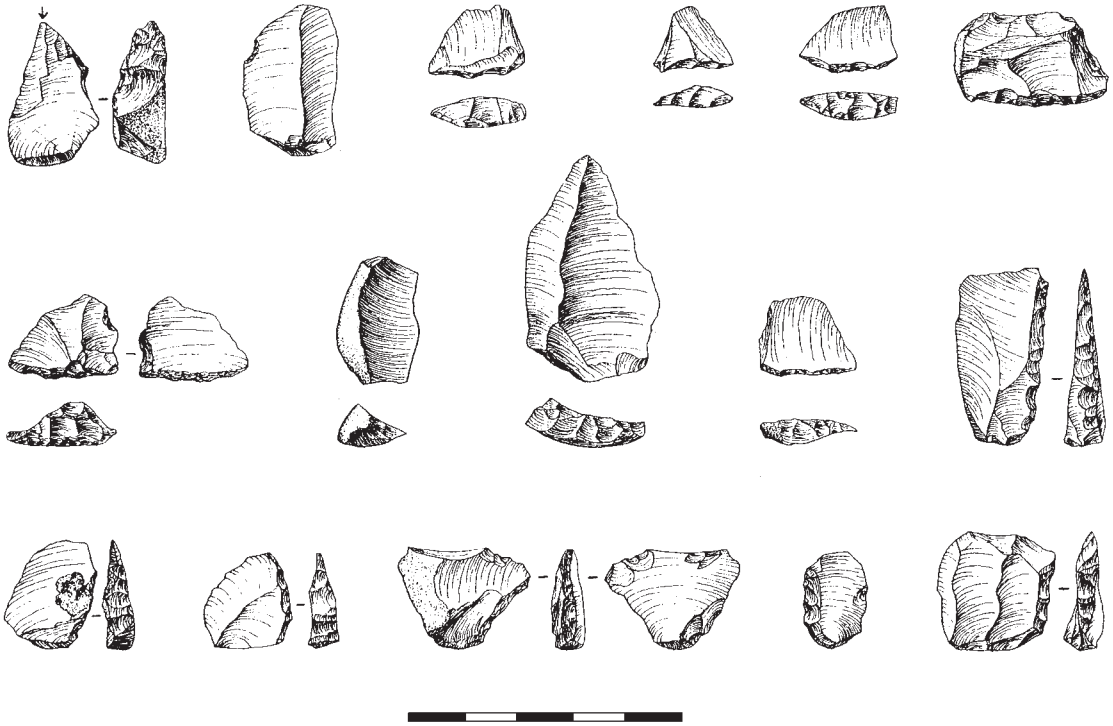

fig. 3 : Djebel Sahaba: example of backed pieces found in burials and considered as weapon tips (from Wendorf 1968, fig. 31, p. 984). Scale: 2/3.

the basis of electronic microscope observations made on Mesolithic and Neolithic assemblages, which did not detect traces linked to cutting vegetal materials (Haaland and Magid, 1995, p. 63). We must admit, however, that the lithic assemblages from desert areas are not well adapted to microwear analysis due to the significant action of aeolian erosion. In other contexts, gloss traces or indications of sickle hafting have been observed, however, either for older periods, like at Tushka around 10,000 BC (Wendorf and Schild 1976) or for the Neolithic (cf. *infra*).

Though microwear analysis or contextual arguments are often referred to during debates, most studied do not take into account the variation in size of the lunates within the same assemblage, nor do they attempt to detect possible impact traces, which would corroborate their function as projectile tips. We have tried toaddress this question by studying the lithic industry in a Mesolithic deposit in the region of Kerma. The site, called El-Barga, is located 15 kilometres east of the Nile River at the top of a hill. It yielded the remains of a partially buried hut, dug more than 50 centimetres into the bedrock (Honegger, 2004, 2006). Five radiocarbon dates place the occupation between 7500 and 7100 BC. Graves dating from slightly later are spread around the structure and a Neolithic cemetery lays some ten or so meters to the South.

The hut yielded a chipped stone industry, as well as grinding material, ceramic artefacts, several bone tools, molluscs and many bone remains, namely vertebras and fish bones. The chipped stone industry is mostly made with local flint (chert) found in the form of cobbles in the nearby alluvial terraces. Artefacts representing all stages of the lithic reduction sequence for flakes and short bladelets are present at the site: cortical flakes, splinters, preparation flakes, cores with one or two striking platforms, discoïdal cores and main products. There are 119 tools, a third of which are made of flakes and bladelets with more or less regular removals on the sides. Small or large size lunates represent 31 % of the products, followed by backed pieces, scrapers and borers (fig. 4 and 5).

A comparison of the lunate dimensions easily allows them to be separated into two groups: on the one hand, large pieces (width above 9 mm and length above 30 mm) and on the other, smaller ones with

widths between 5 and 8 mm and lengths varying from 16 to 27 mm (fig. 6). On other Mesolithic sites, such as Saggai, lunate dimensions are in about the same range than at El-Barga, but it is more difficult to distinguish between the two groups since the transition between small and large pieces is more progressive (Caneva 1983, p. 226-228). A binocular observation of the impact traces has been performed on the assemblage. Lacking an experimental reference base that corresponds to our lunates, we used general data from experiments aimed at recognizing the types of impacts damage observed on arrowheads (cf. Honegger, 2001, p. 124-125) and in particular those of B. Gassin (Gassin, 1991, 1996). Lipped-fractures, step fractures and sometimes bipolar and burin removals have been identified. As for what is called a simple fracture, obtained by bending without any secondary removal, it cannot be attributed to any impact linked to a use as projectile tip.

Moreover, although the position in which the lunates were hafted on the possible arrow shafts is not clearly known, the fact that the small lunates, when they were incomplete, generally displayed one or two fractured ends, leads us to suppose that one of the latter must have been used as a piercing end. Concerning the large lunates, they often present mesial fractures obtained by simple bending.

A comparison of the fractures shows a notable difference between the two metric categories (fig. 7). The small lunates show 19% of fractures that can be attributed to a projectile impact, while the large ones have none. Part of the small lunates must indeed have been used as projectile tips, though we cannot know if all of them were intended for this use. It is in fact possible that some of them were used for another purpose, closer to the supposed function of the larger lunates. The latter were obviously intended for a different function, probably as elements for knives used to cut vegetal materials, considering that the Sudanese Mesolithic is characterized by the intensive collection of wild gramineae (cf. Haaland et Magid, 1995).

Neolithic in Nubia (5th millennium BC) and old Kerma (end of the 3rd millennium BC)

During the Neolithic, lunates were less represented in lithic industries than during the previous periods. In the six assemblages from the sites located north of Khartoum, their proportion varies between 1.4 and 13.1% (Haaland, 1987, p. 74-76). If we refer to the measures taken on the lunates of one of the sites, Kadero, their dimensions are slightly smaller than that of their Mesolithic equivalent, in particular in length (Haaland, 1987, p. 122-124, cf. fig. 15). It is again possible to oppose rather small lunates to larger ones. Again, opinions on their function diverge, alternating between arrowhead and sickle element.

We were able to directly observe only a limited number of lunates from the Kerma region. Excavations there have in fact yielded a small number of samples covering the Neolithic and later periods. Our approach was therefore not the same as that used for the whole of the El-Barga site. Here, only a few examples are presented in order to illustrate the function of the large size lunates. Given that the cultivation of barley and wheat was introduced in Nubia around the 5th millennium, one can expect to find lithic elements fitting sickles.

Not far from the city of Kerma, a Neolithic habitat that was occupied several times between 4700 and 4300 BC was excavated (Honegger, 2006). The lithic industry in the leached layers of this site was rather poor, but it still yielded some large lunates, with traces of gloss on the sharp edge (fig. 8). Inmore recent period, corresponding to the beginning of the Kerma civilisation, two tombs dating to 2300 BC, were found in the vast Eastern necropolis of the eponymous site (Bonnet 2000) and yielded large lunates with some gloss and remains of hafting glue (fig. 9). The glue was mainly located in the proximo-lateral part, indicating that the back of the lunate was not completely inserted into the handle in order to offer a sharp edge parallel to the axis of the sickle. An example still inserted in a fragment of handle suggests that the lithic piece was mounted obliquely.

Thanks to the many Neolithic necropolises excavated in Sudan, we have some complementary information on the use of lunates at that time. At Kadruka, about 15

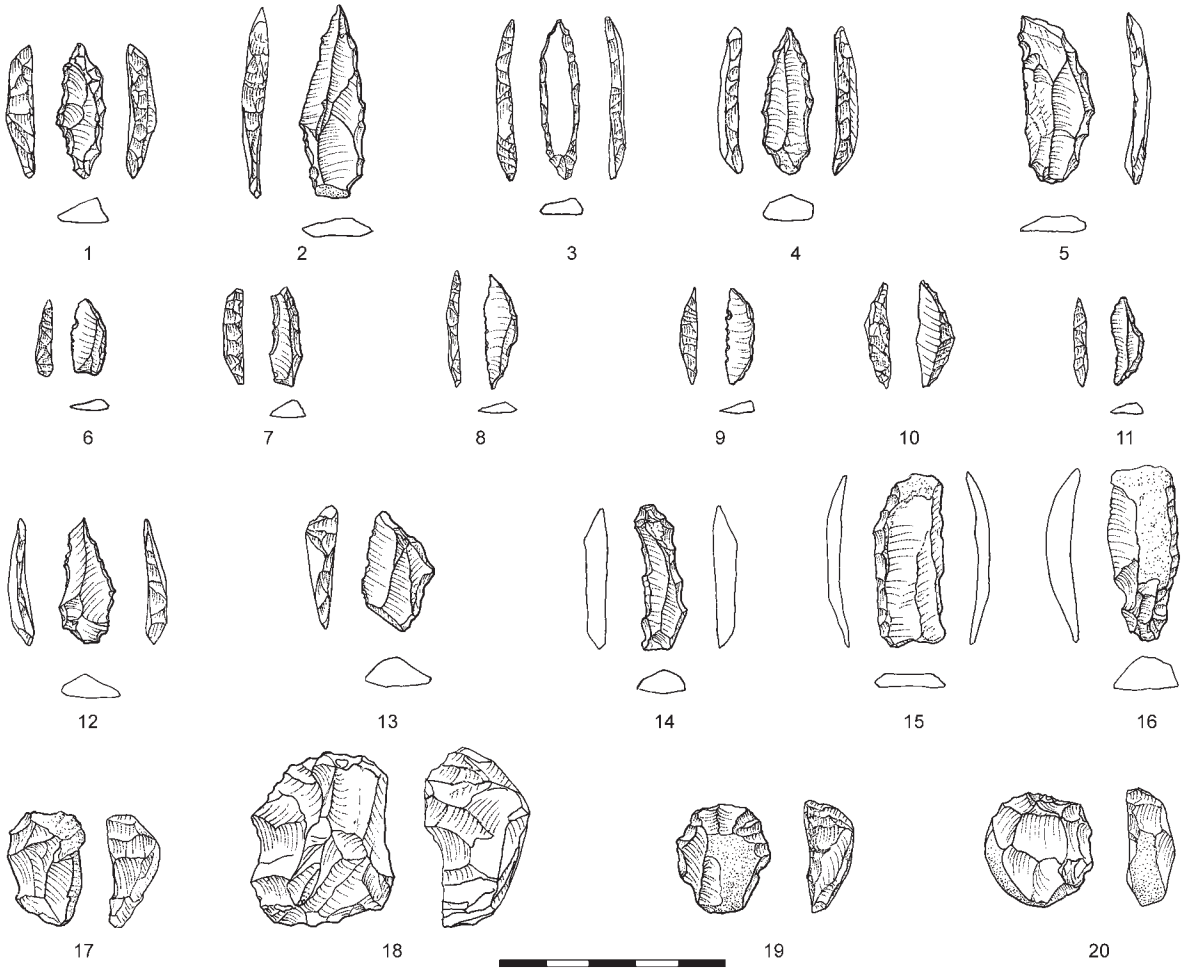

fig. 4 : El-Barga chipped stone industry: borers (1-4), large lunate (5), small lunates (6-11), backed pieces (12-16), scrapers (17-20). Scale: 2/3 (drawing by M. Berti).

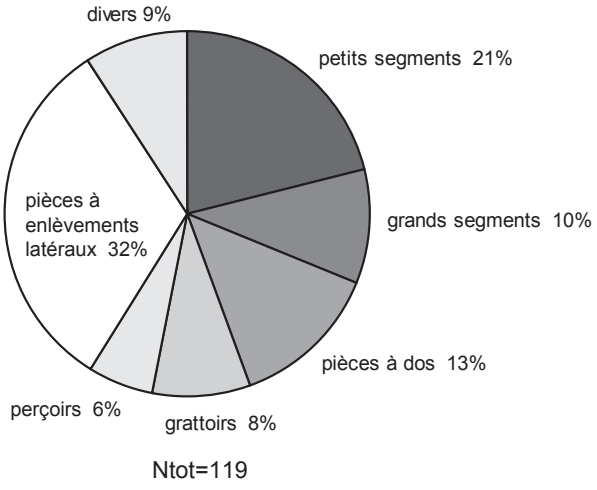

fig. 5 : El-Barga: proportion of the different types of tools of the chipped stone industry.

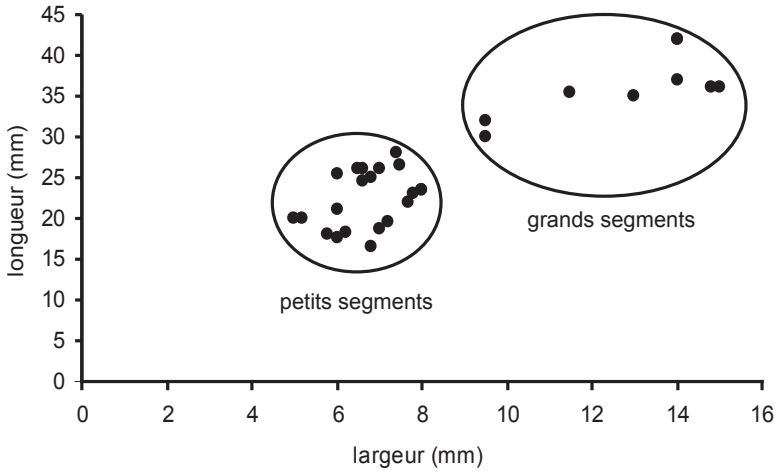

fig. 6 : El-Barga: width/length correlation diagram of whole or slightly fragmented lunates.

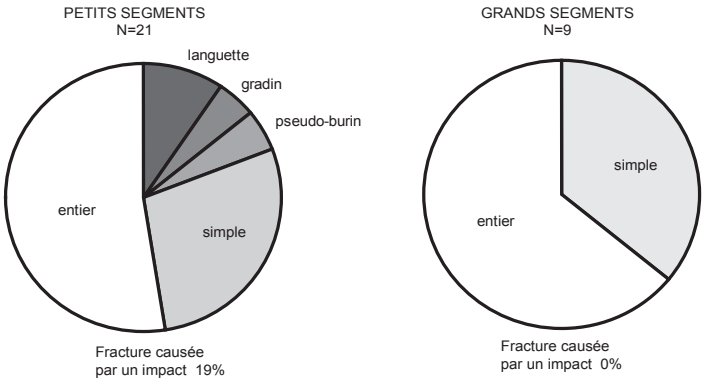

fig. 7 : El-Barga: proportion of the different types of fractures observed on the small and large lunates.

kms south of Kerma, several cemeteries dating back to between 4700 and 4000 BC have been studied over the last two decades (Reinold, 2000). Some burials yielded lunates still inserted in a bone handle (Reinold, 1994). At Kadero, not far from Khartoum, several alignments of 4 to 11 lunates have been discovered in the tombs. Still bearing remains of hafting glue, they have also been interpreted as elements of harvesting knifes, the handles of which might have disappeared (Kobusiewicz, 1996).

An example of a sickle found in the Kadruka tomb indicates that Neolithic lunates were inserted so that their sharp edge would be parallel to the edge of the handle (fig. 10, right). The examples found in the two burials belonging to the Kerma civilisation indicate a different type of hafting, the lunates probably being mounted obliquely (fig. 10, left).

We can therefore be sure that lunates used as plant knives blades in fact existed, but it is possible that other tools may have filled that function as well, such as flakes or backed blades. As for the small Neolithic lunates they could partly correspond to arrowheads, as is regularly suggested in the literature.

Middle Kerma (beginning of the 2nd millennium BC) and Egyptian Middle Kingdom

In the large Kerma eastern necropolis, a burial dating to around 1900 BC has yielded an assemblage of 36 cornelian lunates, carefully grouped east of the interred individual (fig. 11). The tomb, looted during Antiquity, must have been that of a rather high-ranking figure. He was found lying on a wooden bed with a servant interred beside him (*mort d'accompagnement*). Many other objects were found in the tomb: razors and tweezers near the main subject, as well as many potteries, meat products and sacrificed sheep. The lunates suggested the presence of a quiver and bow, as observed in other burials of the same civilisation.

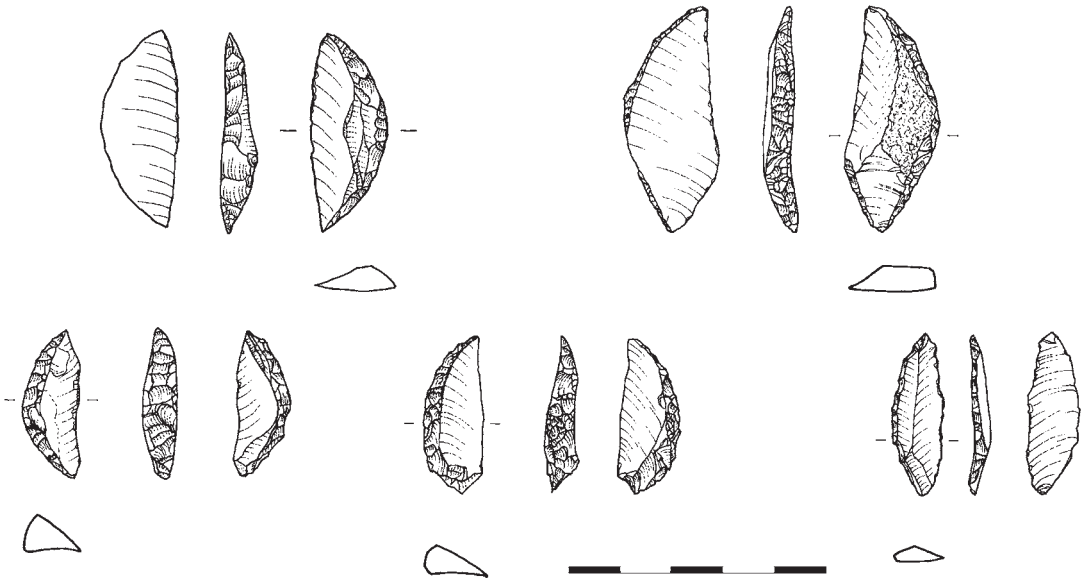

fig. 8 : Large lunates found in a Neolithic settlement site at the location of the Eastern Kerma necropolis (towards 4500 BC). Traces of gloss have been observed on the edge of some of them. Scale: 2/3 (drawing by M. Berti).

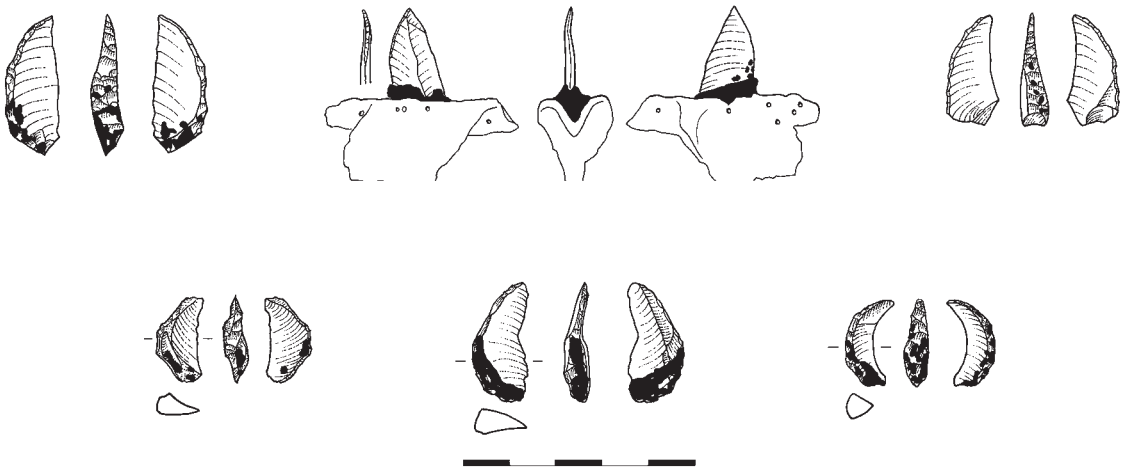

fig. 9 : Large lunates found in two Old Kerma burials in the Eastern necropolis (towards 2300 BC.). Some hafting glue can still be seen on the proximal part and on the back of the piece. A weapon tip is still inserted in a fragment of a wooden handle. Scale: 2/3 (drawing by M. Berti).

They must have been fit on arrow shafts which, like the bow, were not preserved.

The lunates were made from chalcedony flakes. The back was formed by direct, sometimes alternating (crossed), retouch. Their size was notably smaller than the previous examples and their dimensions were remarkably standardized. Their width varied between 3 and 5,2 mm ;while the length ranged from 7,9 to 12,7 mm (fig. 12). Fractures caused by an impact were observed on about 47 % of those 36 pieces (fig. 13). Lipped-fractures, step fractures and above all burin-like fractures generally affected one of the ends of the piece. It would be interesting at some point to draw up the detailed typology of their location and morphology, while conducting an experimental procedure. It is rather difficult to determine the manner in which the lunates were hafted. Many fractures follow the longitudinal axis of the piece, which suggests that one of the ends might have been active. But the burin-like fractures developing along one of the edges could be compatible with a transverse hafting, in the way a transverse arrowhead would be.

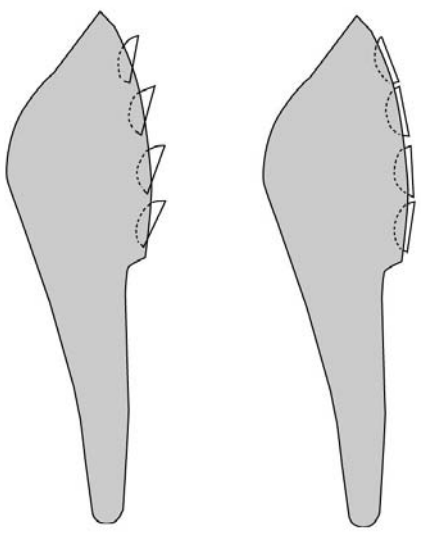

fig. 10 : Proposition of reconstitution of sickles with two different insertion methods for the microliths, in accordance with the observations made at Kadruka (Reinold 1994) and at Kerma.

The study conducted by Clark and al. (1974) on the basis of ancient Egyptian bows and arrows provides significant information on lunate hafting methods. The studied pieces come partly from the Naga-ed-Der tombs, dating from the 6th to 12th dynasty, which is a period globally contemporary with the example of the Middle Kerma. An assemblage of 108 more or less fragmented arrows was studied, among which points fitted with flint or chalcedony lunates largely dominated (84 pieces). It is to be noted that these are not the only types of projectile tips known in Egypt or Nubia. Indeed, a great number of them were made of flint, mostly using bifacial retouch, of bone, ivory, wood or even metal for the latest periods. In the classification proposed by Clark *et al*., five types can be differentiated among the transverse arrowheads, four of them made of lunates (fig. 14). If the ends of the studied arrows were always equipped with a transversely hafted lunate, so as to present their sharp edge, it may happen that the edges of the shaft would be fitted with barbs inserted differently. No other hafting method has ever been recorded, which leads us to assume that it is indeed the dominant process, at least for periods contemporary to or after the Egyptian Kingdom. However, this does not mean that the lunates from the Mesolithic or Neolithic might not have been inserted differently on the arrow shafts.

The dimensions of some of the lunates belonging to Naga-Ed-Der have been estimated from the prints left in the hafting glue of some of the shafts (Clark et al. 1974, p. 334). They provide values slightly lower than those of the lunates found in the Middle Kerma burials, but their size is also rather standard (fig. 15).

Discussion

Comparing lunates from very different contexts or periods revealed some information on their function, even if the exercise may have been somewhat risky: it was possibly rather simplistic due to the limited number of examples, which cannot perfectly represent the diversity of the technical and cultural choices of a period lasting several millennia over a vast territory. It is nonetheless possible to draw some conclusions and present a certain number of hypotheses, which can be verified by analysing other assemblages.

Determinations of the function of lunates by different authors has until now been based on the existence of organic traces or remains (gloss or polish, hafting

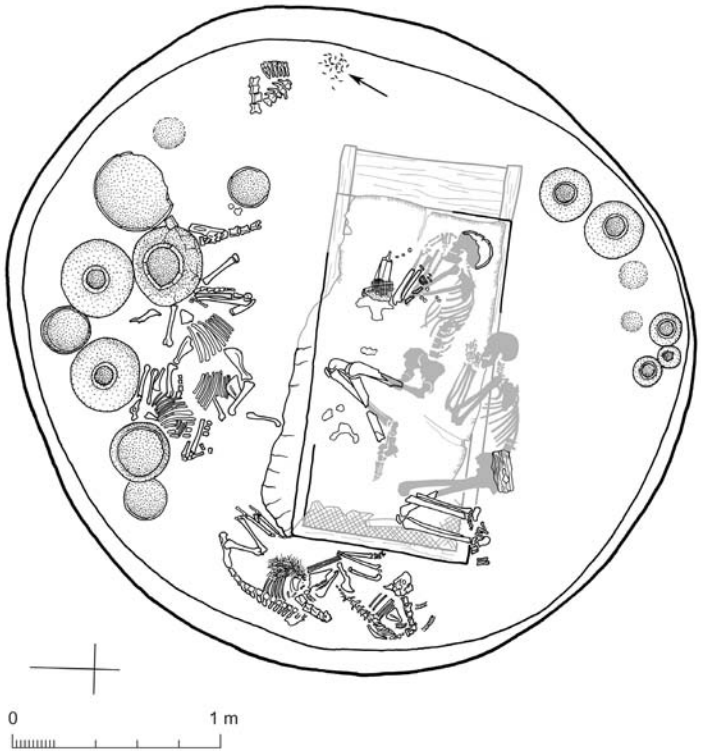

fig. 11 : Wealthy tomb of Middle Kerma with a main individual and a servant interred with him (mort d'accompagnement) laying on a bed (the greyed parts have been reconstituted), two sacrificed sheep, meat products, pots and copper objects (Kerma Eastern necropolis, tomb 222, towards 1900 BC). The place where the 36 cornelian lunates were found is indicated by an arrow (drawing by M. Berti).

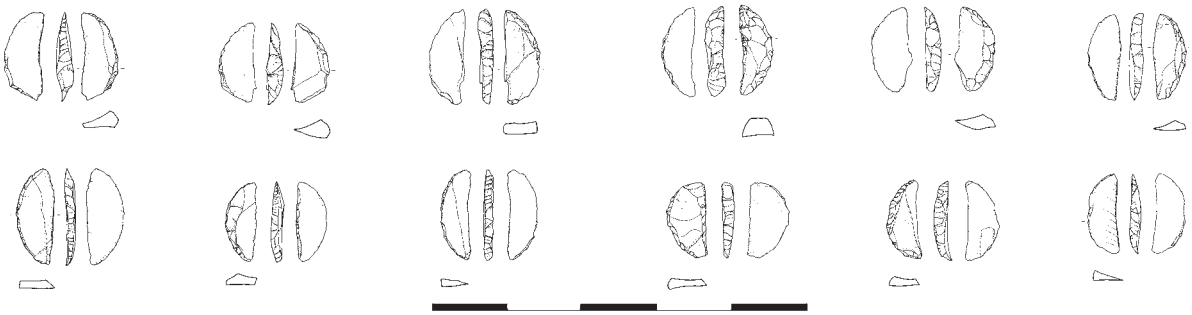

fig. 12 : Middle Kerma lunates (tomb 222). Scale: 1/1 (drawing by M. Berti).

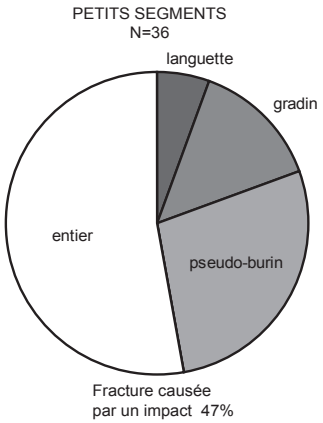

fig. 13 : Proportion of the different types of fractures observed on lunates in the Middle Kerma tomb 222.

glue, handle or shaft), and more rarely on the context of discovery (Djebel Sahaba). The dimensions of the pieces had never been seriously taken into account and the impact fractures had never, to our knowledge, been subject to identification. By combining all these approaches and by comparing very different archaeological situations, it has been possible to draw main trends, which can be summarised on a diagram showing the width and length of the lunates, as well as their function (fig.15). This global view allows us to distinguish two main groups of lunates. On the one hand, the large lunates which must have been sickle or plant knife elements, and on the other, the smaller ones, which are identified as arrowheads. The two groups sometimes overlap in cases in which lunates could have had one function or the other. In the general picture, which seems after all rather simple, the unretouched or retouched flakes of Djebel Sahaba clearly stand out from the all the other pieces because of their metrics. We are dealing here with Epipaleolithic *armatures* (i.e. weapon or sickle elements) which seem to have been submitted to another tradition and cannot be part of our study on lunates. Finally, it is not excluded that some lunates might have had functions other than that of *armature* – burin, borer, incising tool – as shown by the Egyptian example of naturally curved backed bladelets, fixed at the end of a short shaft and probably having been used as an incising instrument (Clark *et al*. 1974, p. 373). Only microwear analysis can reveal the possible functional diversity of some lunates.

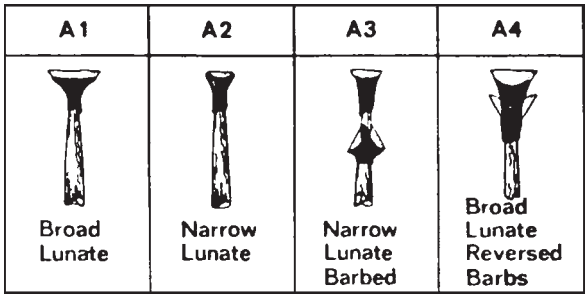

fig. 14 : Outline representing lunates hafted as arrowheads or barbs, the way they were found at Naga Ed-Der, 6e-12e dynasties, 2320-1760 BC. (after Clark et al. 1974, fig. 9, p. 362).

It is generally admitted that the lunate dimensions become smaller through time, from Mesolithic to historical times. This tendency seems to be confirmed by our observations, but needs to be qualified. Indeed, while the El-Barga

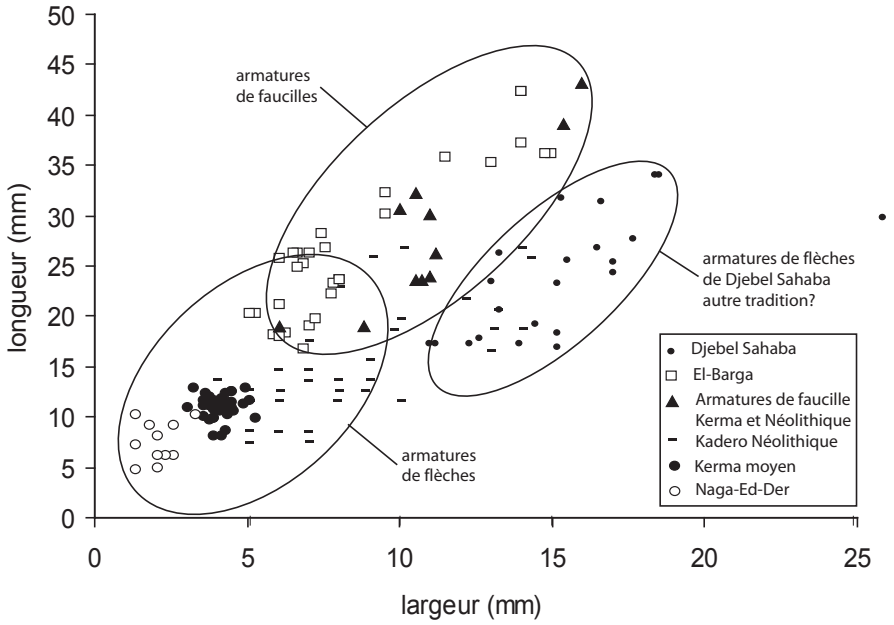

fig. 15 : Width/length correlation diagram of the lunates described in the present article. The smallest pieces were used as arrowheads, while the biggest tended to be used as sickle elements. Some metric overlapping exists between these two functional categories and some of the pieces, such as the ones found at El-Barga, might have been used for one function or the other. Finally, the backed pieces of Djebel Sahaba are usually wider and indicate a different tradition, although one cannot exclude that some of the pieces were not used as weapon tips.

Mesolithic assemblages record dimensions bigger than the Kadero Neolithic ones, the few examples of large lunates used for sickles (Neolithic and Kerma) have dimensions which are still rather large. On the other hand, the *armatures* belonging to Middle Kerma and Naga-Ed-Der have very small and highly standardized dimensions when compared with the previous examples. It is probable that during the recent periods, the tools met much more detailed standards as for function and hafting methods.

Finally, it can be noted that the use of lunates, notably as arrowheads, present an exceptional longevity in the North-East of Africa, compared with other regions (Clark et al. 1974, p. 374). This is particularly true in Nubia, where many such *armatures* can be found dating back to the Meroïtic period – that is between 400 BC and 400 AC.

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