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# 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 $SiO2$ 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).

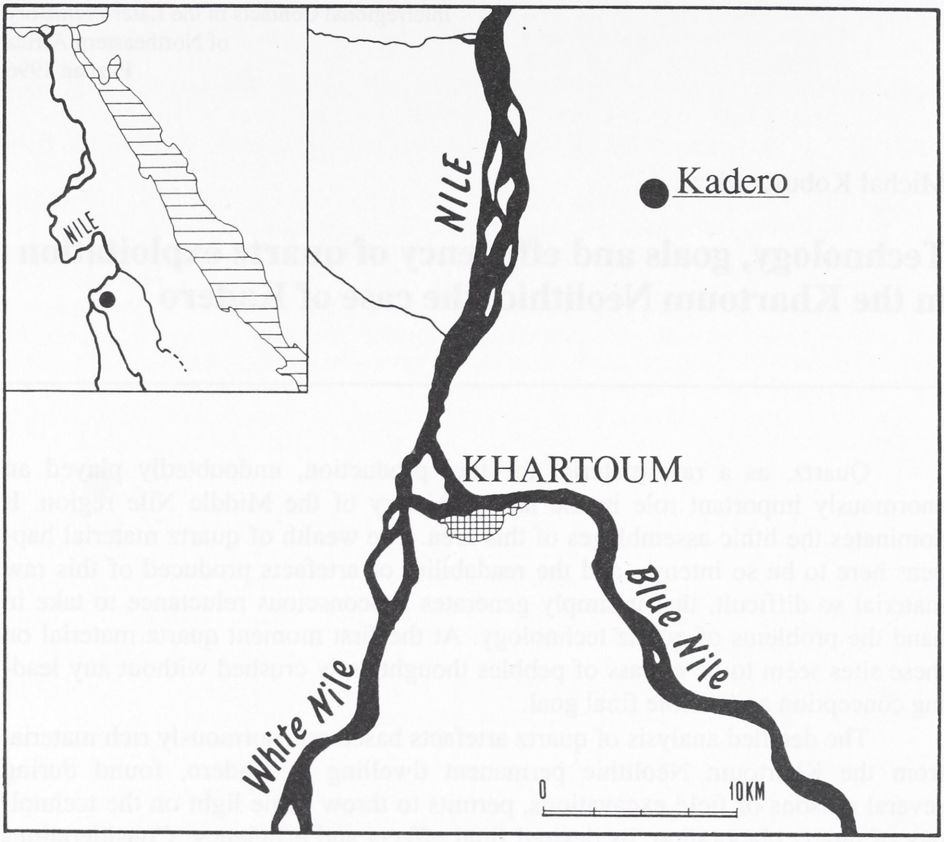


Fig. 1. Location of Kadero.

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:

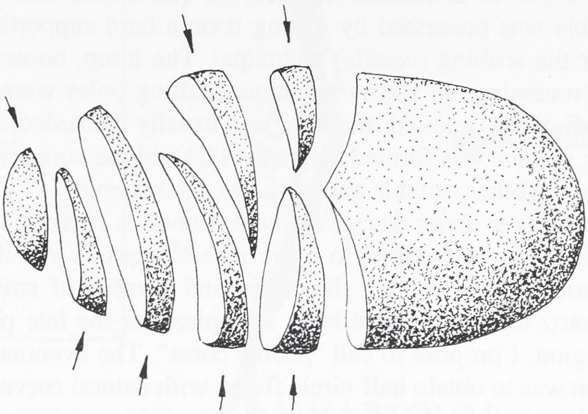

Fig. 2. "Slicing" technology: schematic representation of flakes obtained from pebble cores.

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-

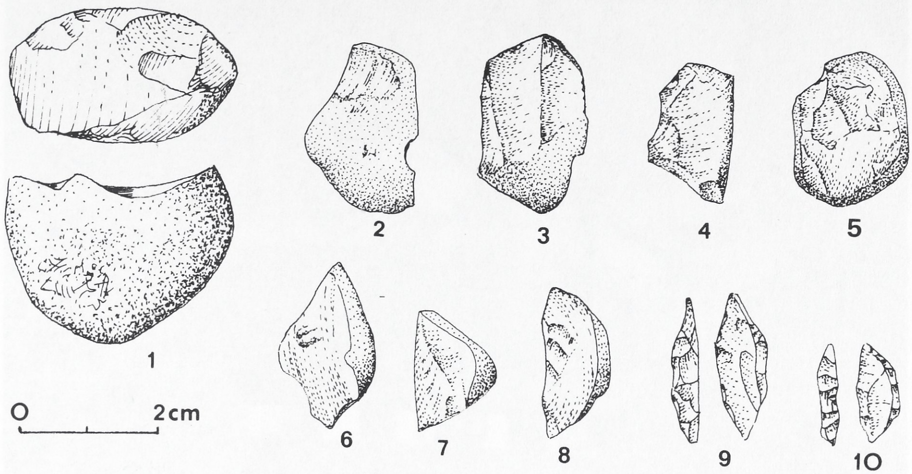


Fig. 3. Kadero.
1. pebble core of quarz; 2. primary flake; 3. secondary flake; 4. ordinary tertiary flake; 5-6. quality tertiary flakes; 7-8. crescent-shaped flakes; 9-10. retouched crescents.

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.

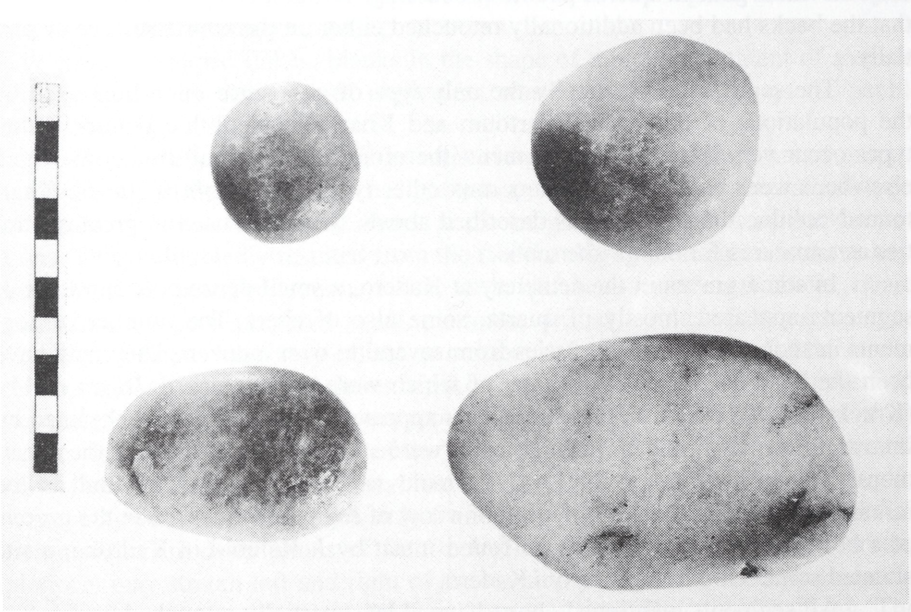

Fig. 5. Kadero grave 66: set of quartz tools for knapping stones.

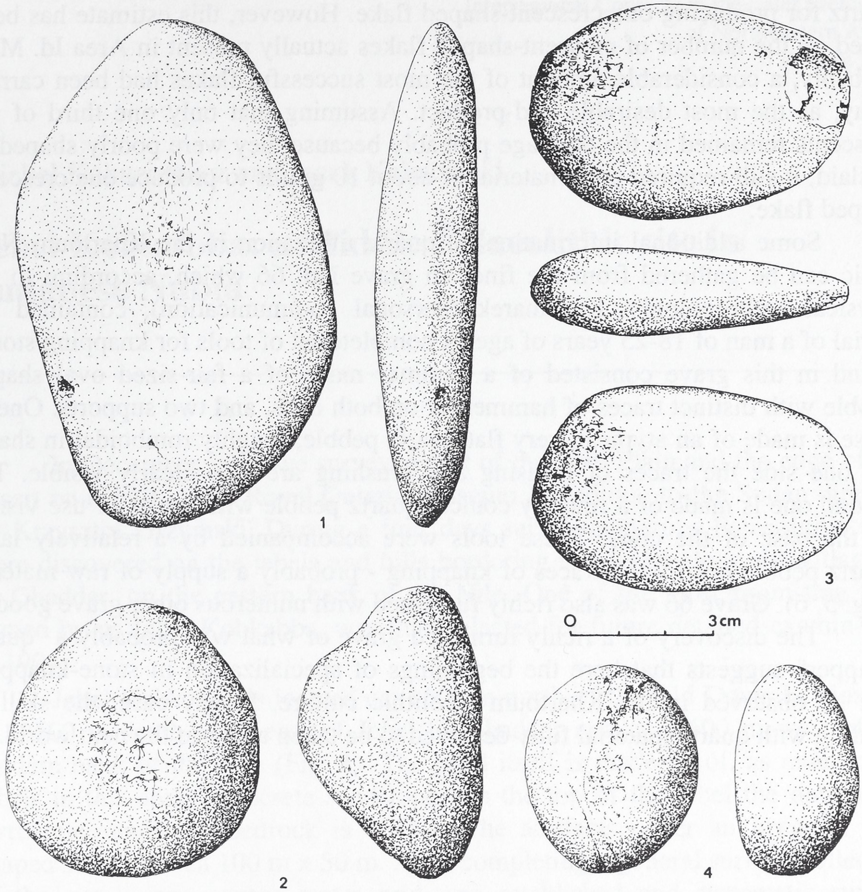


Fig. 6. Kadero grave 66. Tool-kit of quarz for knapping stones:
1. flat support; 2. conical support; 3. hammerstone; 4. quarz pebble.

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.

## References

Caneva, I. 1988. The cultural equipment of the Early Neolithic occupants of Geili. In: I. Caneva (ed.), El Geili. The History of a Middle Nile Environment 7000 B.C. - A.D. 1500. Cambridge Monographs in African Archaeology. BAR International Series 424.

Caneva, I., & A. Zarattini. 1983. Microlithism and functionality in the Saggai 1 industry. In I. Caneva (ed.), Pottery using gatherers and hunters at Saggai (Sudan): preconditions for food production. Origini 12: 209-233.

Krzyzaniak, L. 1991. Early farming in the Middle Nile Basin: recent discoveries at Kadero (Central Sudan). Antiquity 65: 515-532.