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Front cover. Block 1000.0049 from Naga (photograph courtesy Karla Kroper).
Above. Pottery jar with decoration of sorghum heads from BMC 60, Berber (photograph courtesy Mahmoud Suliman Bashir).

Early Neolithic gouges from north-western Butana: new light on contacts between the Nile and its hinterlands

Ladislav Varadzin, Katarína Kapustka and Lenka Varadzinová

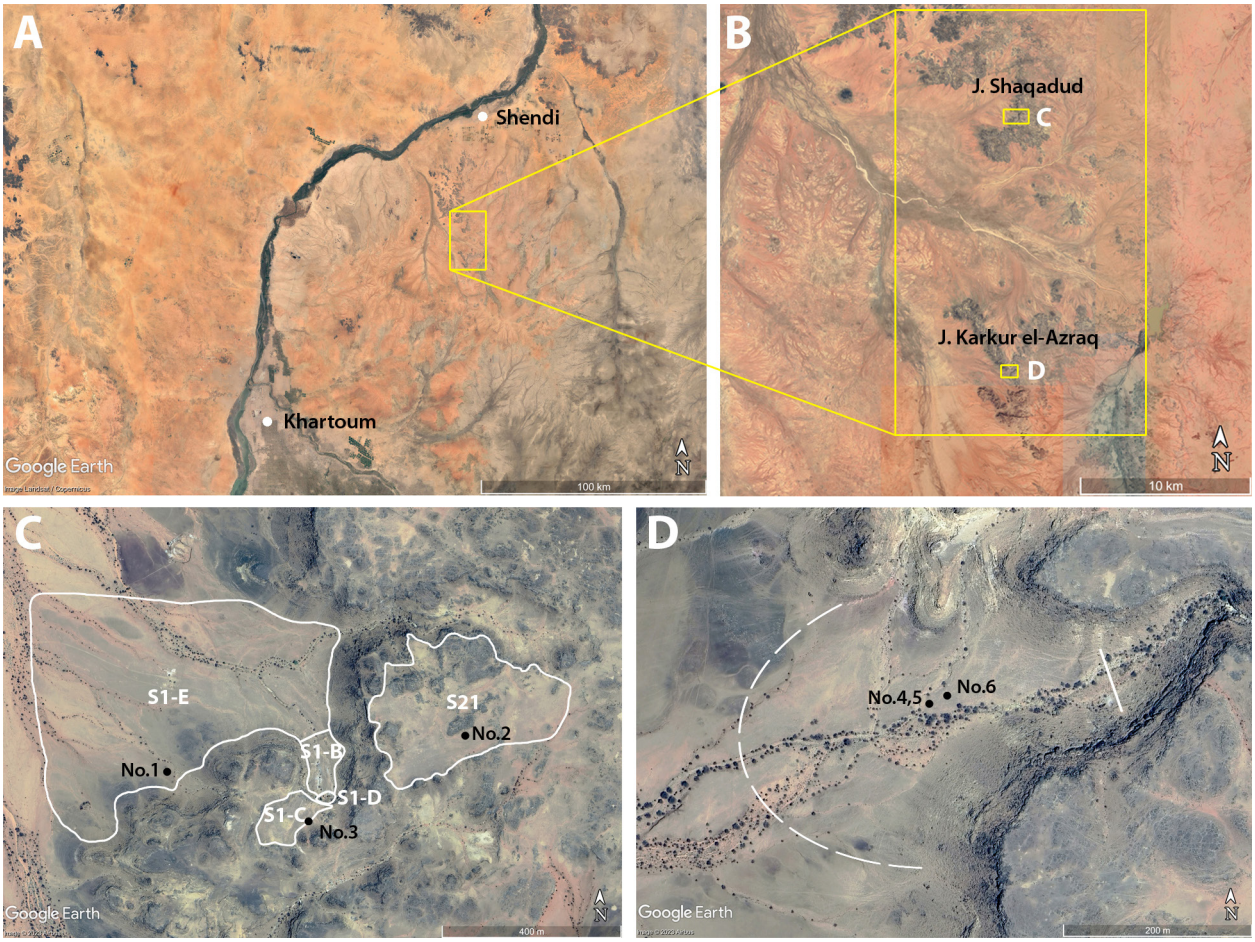

Figure 1. Locations of gouges found in Jebel Shaqadud and Jebel Karkur el-Azraq: A – central Sudan and north-western Butana, with an inset for fig. B; B – detail with Jebel Shaqadud and Jebel Karkur el-Azraq with insets for figs. C and D; C – Shaqadud site complex with marked locations of the individual sites (in white) and the finds of gouges (in black); D – Shatib el-Bir (Site K1) with marked locations of the finds of gouges (in black). The find numbers correspond to the numbers under which the finds are described in the text. Background Google Earth.

Introduction

Here we present finds of Early Neolithic gouges in Jebel Shaqadud and Jebel Karkur el-Azraq, two of the many smaller sandstone mountains that dot north-western Butana (also known as Keraba) (Figure 1). These mountains are located *c.* 45km (Shaqadud) and *c.* 56km (Karkur el-Azraq) to the south-east of the Nile. The strikingly numerous and deeply stratified archaeological remains in Jebel Shaqadud, discovered by K.-H. Otto (1963) and intensively explored in 1981-1983 by the members of the Butana Archaeological Project (Marks and Abbas Mohammed-Ali 1991), constitute important evidence in the Sahel of non-aquatic cultural adaptations during the early and mid-Holocene. In 2021, investigation of this area was resumed by the Shaqadud Archaeological Project (Varadzin *et al.* 2022), which aims to examine the strategies and lifeways of prehistoric inhabitants of hinterland regions in the Eastern Sahel and to ascertain whether and in what way they differed from lifeways close to permanent bodies of water. This new investigation has focused both on Jebel Shaqadud and its broader surroundings.

Varadzin *et al.* 2023 [http://doi.org/10.32028/SN27pp207-213].

Among other things, the findings have pointed to a dynamic development of connectivity between the groups that occupied Shaqadud in prehistory: while during the Mesolithic (*c*. 9000-5000BC) and Early Neolithic (*c*. 4900-3800BC) these groups occurred at the eastern periphery of the cultural complexes of central Sudan (Early Khartoum and Shaheinab cultures), known particularly in the Nile Valley, during the third millennium BC they were already within the western margin of what is referred to as the eastern Sudanese cultural tradition known in the Southern Atbai and eastern Sudan (Marks *et al.* 1985). The fact that local prehistoric groups were situated on the margins (at least as it currently appears) of different cultural orbits raises an important question regarding the intensity and nature of their connectivity in both directions. As far as the intensity of their contacts with the Nile Valley during the Mesolithic and Early Neolithic is concerned, Marks and Abbas Mohammed-Ali (1991, 255) reached a sceptical conclusion: 'The minute quantities of Nilotic materials [in Shaqadud], from agate to shell, document some contact but very, very little.' The recently discovered gouges described below as the very first finds of its kind in north-western Butana cast a new light on this question. Gouges are knapped lithic axe-like artefacts associated with the Early Neolithic period (4900-3800BC) in central Sudan. They were usually made of rhyolite from geographically constrained outcrops in the region, and were used both polished and unpolished, with the percentage of polish highly variable. Dimensions vary, but whole pieces, which were not repaired, are usually 100-120mm long, 40mm wide and 20mm thick (Kapustka *et al.* 2019).

Description of the gouges

All the pieces presented below are surface finds collected in the scope of a systematic surface survey of three different areas within the Shaqadud site complex in 2023 (no. 1-3) and during the first prospection of a previously unknown large settlement site called Shatib el-Bir identified in 2022 in Jebel Karkur el-Azraq to the south of Jebel Shaqadud (see Figure 1: C, D). The finds were localised using GPS or referenced to a specific part of the site. Their documentation and macroscopic assessment was performed in the field and completed using photographs.

No. 1 (find no. SH-1195) (Figure 2: 1)

Site S1-E in Jebel Shaqadud. Max. dimensions: 49x38x15mm. It is a well-preserved middle part of a gouge with no visible weathering or patina. It was made of middle- to high-quality rhyolite that contained a large defect of *c*. 10mm in diameter visible on one of the edges. Its production could not be examined due to only partial preservation and polish covering the original manufacturing traces. There are no visible traces of repair other than the polish. One side had almost a 100% high-quality polish. The gouge broke during use, at a place where the raw material was heterogeneous. The piece itself and the negatives show a high degree of regularity suggesting a skilled knapper.

No. 2 (find no. SH-1313) (Figure 2: 2)

Site S21 in Jebel Shaqadud. Max. dimensions: 63x53x25mm. It is a well-preserved back part of a gouge made of high-quality rhyolite with no visible defects. On one side, there are possible traces of weathering or remains of the cortex of the original raw material. The piece bears traces suggesting façonnage from a piece of rock. Its cutting edge was reworked after the piece had broken. One side was almost 100% covered by a high-quality polish that completely covered the surface of the fragment. The blade is rather straight and was reworked in not a very regular manner. Small chunks had splintered off the cutting edge during its use. The piece itself and the negatives show an average level of regularity that may indicate a less skilled knapper or secondary reshaping. The back is pointed and not as regular as the best examples of professional production.

Figure 2. Gouges from the Shaqadud site complex (no. 1–3) and Jebel Karkur el-Azraq (no. 4–6). 1 – Site S1-E (SH-1195); 2 – Site S21 (SH-1313); 3 – Site S1-C (SH-2240); 4 – Shatib el-Bir (KA-0001a); 5 – Shatib el-Bir (KA-0001b); 6 – Shatib el-Bir (KA-0002).

No. 3 (find no. SH-2240) (Figure 2: 3)
Site S1-C in Jebel Shaqadud. Max. dimensions: 43x41x20mm. It is a well-preserved middle part of a gouge with no visible weathering or patina. It was made of high-quality rhyolite with no visible defects. Its production could not be examined due to partial preservation and a high percentage of polish covering the original manufacturing traces. It seems that the broken edge of the piece was reworked to a kind of blade, but this reworking could be from a later period. One side was polished to almost 100% by a high-quality polish. The blade is rather straight and regular. Small chunks had splintered off the blade during use. The high degree of regularity suggests a skilled knapper.

No. 4 (find no. KA-0001a) (Figure 2: 4)
Shatib el-Bir (Site K1) in Jebel Karkur el-Azraq. Max. dimensions: 41x30x15mm. It is a well-preserved back part of a gouge with no visible weathering or patina. It was made of high-quality rhyolite with no visible defects. The method of production is difficult to describe, but visible traces suggest shaping from a larger flake. The cutting edge was reworked at the point of fracture. There are no remains of polish. The piece probably broke during use. The piece itself and the negatives indicate a high degree of regularity and possibly a skilled knapper.

No. 5 (find no. KA-0001b) (Figure 2: 5)
Shatib el-Bir (Site K1) in Jebel Karkur el-Azraq. Max. dimensions: 44x38x20mm. It is a well-preserved part of a gouge with a cutting edge with no visible weathering or patina. It was made of high-quality rhyolite with no visible defects. Its production could not be examined due to reworking of the piece.

The rather curved cutting edge was reworked in quite a regular manner after breakage of the piece, and it was sharpened repeatedly. Both sides were polished to 25-50% by a high-quality polish. Small chunks had splintered off the cutting edge during use or sharpening. A high level of regularity suggests a skilled knapper.

No. 6 (find no. KA-0002) (Figure 2: 6)
Shatib el-Bir (Site K1) in Jebel Karkur el-Azraq. Max. dimensions: 54x40x17mm. It is a well-preserved back part of a gouge with no visible weathering or patina. It was made of high-quality rhyolite with no visible defects. Its production could not be examined due to reworking of the piece. Its cutting edge and back part were reworked. Both sides were polished to more than 75%. The blade, of a rather straight shape, was not quite regularly reworked. The piece probably broke during use. The well-organised method of knapping may indicate a skilled knapper. The back is rounded and not quite regular. Lateral edges are straight and parallel.

Summary

The present collection consists of six fragments of six different gouges. Three were found at sites S1-C, S1-E and S21 that form part of the main site complex at Jebel Shaqadud. The remaining three pieces come from the large prehistoric site of Shatib el-Bir in Jebel Karkur el-Azraq. The fragments include three basal (back) parts (no. 2, 4, 6), two middle parts (no. 1, 3) and one working edge (no. 5). The pieces were probably abandoned when no longer suitable for use or reworking. The dimensions of the pieces are rather small, with max. length 63mm and min. length 41mm (average 49mm); max. width 53mm and min. width 30mm (average 40mm); and max. thickness 25mm and min. thickness 15mm (average 18.7mm). All the pieces show quite a high degree of regularity and technical skill, but the original production traces were partially covered by reworking. They were made of fine-grained red and grey-brown rhyolite, an igneous rock that could always have intrusions of phenocrysts and could contain larger heterogeneities that would complicate its knapping. If unnoticed, the heterogeneities could cause breaking of the piece during use. This rhyolite is extremely hard, which makes knapping quite a difficult task. Thus, the production of regular pieces must have required a high degree of technical skill. The regularity of the pieces results in part from their reworking, but the overall shape is at least partly due to the primary production. For these reasons we can conclude that they were produced by skilled artisans. The later reworking is barely visible due to the high percentage of good-quality polish covering most of the surfaces. The polish seems to be connected with reworking, because it helped to get rid of heterogeneous spots in the raw material and led to better reworking. There is no clear cortex present on the pieces, which is usual for this type of artefact and for finds further away from outcrops of the raw material from which they were made (Kapustka *et al.* 2019). There were attempts at reworking the cutting edges (no. 3, 5) and the backs (no. 2, 4, 6), but they were abandoned, probably because the fragments were too small or not suitable to obtain the desired final shape. On no. 1 there is a well-visible step ridge fracture, which occurred during use of the gouge in a high-speed action. Of interest is the reworking of piece no. 3, where it seems there was an attempt at reshaping it into a completely different tool, but this was abandoned.

Discussion

With their morphology, metrics, raw materials and technology, the six gouges documented in Shaqadud and Karkur el-Azraq range among gouges characteristic of the Shaheinab culture in central Sudan (Arkell 1953; Kapustka *et al.* 2019). This culture is dated in the Nile Valley to *c.* 4900-3800BC (Krzyżaniak 1995). In Shaqadud, Shaheinab elements on pottery were recorded in contexts dated to 5970±290 bp (5480-4252 cal BC) and 5584±74 bp (4599-4264 cal BC) (dates after Marks 1991b, Tab. 4-1; recalibrated using Calib 8.20 and

IntCal20). The local gouges may date to these periods as well.

Currently, these gouges represent the furthest east of the Nile that such items have been found (Figure 3). All embody mastery of this technology. They were made of rhyolite, a raw material exotic in both Shaqadud and Karkur el-Azraq. It may come from Jebel Sabaloka at the Sixth Nile Cataract or from Jebel Qeili in Butana, with both these regions constituting the only sources of rhyolite known to date in central Sudan (Whiteman 1971) (Figure 3). However, we have no information concerning exploitation of rhyolite for the manufacture of gouges in J. Qeili. For now, the only sites with confirmed exploitation of rhyolites and manufacture of gouges are in the western part of Sabaloka, *c.* 80km from our Butana sites (Kapustka *et al.* 2019). The rhyolites used for the gouges from Shaqadud and Karkur el-Azraq do not differ macroscopically from those from Sabaloka, which are practically identical to the rhyolites on gouges from the sites of Tabya Hassaniya upstream of the Sabaloka gorge, and Esh Shaheinab, Kadero I, and Sheikh el-Amin further up the valleys of the Main and Blue Niles (pers. ob.).

The manufacture of gouges is demanding as to the quantity of used raw material, and the production areas for gouges are characterised by numerous surface concentrations of rhyolite flakes (Kapustka *et al.* 2019). Given the minute quantity of rhyolite debitage in Shaqadud both on the surface of the terrain (our research) and in the archaeological deposits (Marks 1991a), local primary production of gouges does not seem probable. Instead, it can be assumed that half-finished or finished products were transported to this region from the same areas as was the case with other locations along the Nile in central Sudan away from the rhyolite outcrops (Kapustka *et al.* 2019).

The gouges found in Shaqadud and Karkur el-Azraq have characteristic fractures resulting from use (cf. Kapustka *et al.* 2019) that may have eventually led to their discard. These fractures indicate that the gouges were used there and that they had a practical function (Arkell (1953) thought they had been used for cutting and working of wood, whereas Haaland (1981) believed they had been used for tilling the soil for cultivation). All the pieces were reworked. In comparison, the quantity of reworked gouges in Sabaloka, the area of their primary production, is substantially smaller (25.3%; Kapustka *et al.* 2019) compared to other sites, suggesting that the investment into maintenance of the gouges and probably also the value of the rhyolites increased with the increasing distance from the rhyolite outcrops (Kapustka *et al.* 2019). The morphometric properties (particularly the proportion and variance of width and thickness) of the present collection are most reminiscent of the collection from Tabya Hassaniya *c.* 6km to the south of Sabaloka (Kapustka *et al.* 2019). As far as the quantity of polished and reworked pieces is concerned, the collection resembles that from Sheikh el-Amin on the lower Blue Nile *c.* 80km from Sabaloka (Fernández *et al.* 2003; Kapustka *et al.* 2019). The average length of finds in Shaqadud and Karkur el-Azraq (49mm) is only slightly larger than at Sheikh el-Amin (45mm). While even larger, perhaps still reworkable pieces may have been discarded in Shaqadud and Karkur el-Azraq, the reworking of gouges in Sheikh el-Amin reached the limit of usability of these tools (Kapustka *et al.* 2019). This may be due to the presence of more skilled knappers at the latter site and probably the need to exploit the pieces more efficiently with an increasing distance from the source of the quality raw material. In comparison with Sheikh el-Amin, the Butana finds show a somewhat lesser degree of polishing that was apparently linked to reworking of the gouges (Kapustka *et al.* 2019).

In Marks and Abbas Mohammad-Ali's opinion, the negligible quantity of any Nilotic materials in Shaqadud shows very little contact with the Nile Valley (Marks and Abbas Mohammed-Ali 1991, 254). However, the high technological level of the gouges from Shaqadud and Karkur el-Azraq, which would be impossible to attain without systematic training (Kapustka *et al.* 2019), indicates a (personal) interaction between the inhabitants of north-western Butana and the Nile Valley, which could either have the form of transmission of knowledge, or (more likely) exchange of finished artefacts. This shows that during

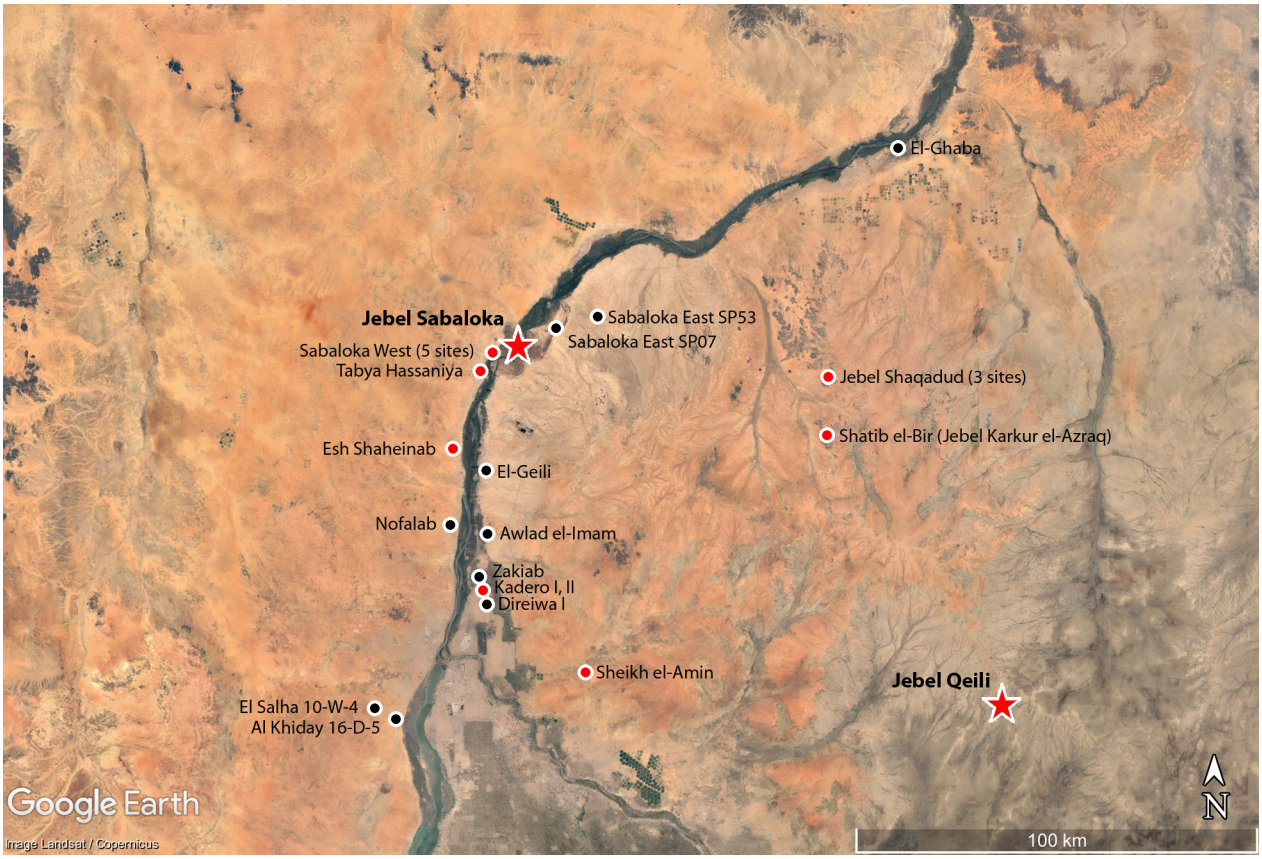

Figure 3. Sites with reported finds of gouges of the Shaheinab type and location of the outcrops of rhyolite. Red dots – gouges known by the authors from autopsy; black dots – other finds of gouges; stars – rhyolite outcrops (after Whiteman 1971). Al Khiday 16-D-5 (Salvatori and Usai 2003–2008); Awlad el-Imam (Caneva *et al.* 1993, 223); El-Geili (Caneva 1988); El Salha 10-W-4 (Usai and Salvatori 2006); Esh Shaheinab (Arkell 1953); El Ghaba (Lecointe 1987); Jebel Shaqadud (this study); Kadero I (Kobusiewicz 2011; Kapustka and Winiarska-Kabacińska 2020); Kadero II (Haaland 1981); Nofalab (El-Sayed El-Anwar 1981); Sabaloka East SP07 (Ahmed Hamid Nassr and Modather Abdallah Jadain 2019); Sabaloka East SP53 (Ahmed Hamid Nassr and Modather Abdallah Jadain 2019); Sabaloka West – Donkey, Fox Hill, Grove, Lake Basin, and Rhyolite (Kapustka *et al.* 2019); Shatib el-Bir (this study); Sheikh el-Amin (Fernández *et al.* 2003); Tabya Hassaniya (Kapustka *et al.* 2019); Umm Direiwa I (Haaland 1981); Zakiab (Haaland 1981). Background Google Earth.

the Early Neolithic in central Sudan social networks extended not only along the Nile, as indicated by the distribution of most finds of the gouges in central Sudan (Figure 3), but to a certain extent also transversally, in the direction of non-aquatic hinterlands over a distance of at least 50km.

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