

SUDAN & NUBIA

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Front cover. Stone slab A3 used as a paving slab in Temple 4, Qasr Ibrim, showing Taharqa and Amun (photograph courtesy of F. Aldsworth).

Above. Frontal scan of lion head, Naga (Kroeper and Perzlmeier 2022, fig. 21, © Naga Project, 3-D scans by TrigonArt BauerPraus GbR).

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Excavations at the prehistoric site of Fox Hill in the western part of Jebel Sabaloka (2017–2018)

Lenka Varadinová, Ladislav Varadzin, Isabelle Crevecoeur, Katarína Kapustka and Jon-Paul McCool



Figure 1. Map of the research area in the western part of Jebel Sabaloka; white line - limits of the research area, white circles - early and middle Holocene sites (background: ESRI Base Map – World Imagery Source, Digital Globe, updated by L. Varadinová).

Introduction

The prehistoric landscape in the western part of Jebel Sabaloka in the area of the 6th Nile Cataract features 32 sites of early and mid-Holocene dating. Most of the sites occupy elevated positions on granite outcrops that dot the north-western and south-western periphery of the mountain (Figure 1). The research carried out in this region by the Charles University Sabaloka Expedition since 2009 has included archaeological reconnaissance (2009, 2011–2012), repeated detailed surface surveys (2011–2012, 2019), excavation of test pits at selected locations (2011–2012, 2019), and larger-scale excavation at two major prehistoric sites (Suková and Varadzin 2012; Varadzinová *et al.* 2021). In 2014 and 2015, investigation focused on the site of Sphinx (SBK.W-60) in the north-western foothill zone of the mountain with preserved evidence of intensive use of the site by hunter-fisher-gatherers of the Early Khartoum culture (or Khartoum Mesolithic) for settlement and, for a certain period, also as a burial ground (e.g. Varadzinová and Varadzin 2017). In 2017 and 2018, two field campaigns were dedicated to further exploration of the site of Fox Hill (SBK.W-20), situated c. 4km to the south-west of Sphinx, where previous research identified the remains of occupation during the Early Khartoum culture and Early (or Shaheinab) Neolithic (Suková and Varadzin 2012). Here we report on the main findings and field observations made during the later two field campaigns.¹ They confirm its exceptional significance for the study of cultural processes and strategies of Sub-Saharan populations in the context of climatic and environmental changes in Northeast Africa from the late Pleistocene to mid-Holocene.²

The site and aims of the field research in 2017 and 2018

Fox Hill is situated at an equal distance of 1.2km to the west of the Nile and south-west of the mountain. It occupies a large, oval granite outcrop with 16 naturally defined platforms and terraces (Terraces 1–16) that are situated c. 2–29m above the surrounding terrain (Figure 2A). The terraces and platforms (11,648m² in total) are delimited by exposed bedrock and boulders, and vary in size, ease of access, and quantity and character of occupation remains. The highest surface densities of prehistoric remains were recorded on Terraces 1 (1,756m²) and 3 (1,669m²). In 2011 and 2012, altogether nine trenches were excavated on Terrace 1, bringing to light up to c. 1.5-metre-thick stratigraphies, including settlement deposits (Suková and Varadzin 2012, 122–123, pl. 6, fig. 3; Suková *et al.* 2014, 150, fig. 2). On Terrace 3, situated c. 7m higher than the former terrace, two trenches measuring 4.5m² in total were excavated, revealing settlement deposits and, in Trench 3, human burials cut within these deposits (Suková and Varadzin 2012, 123–124, pl. 7; Suková *et al.* 2014, 150–151). Previous fieldwork showed marked spatial differences in the occurrence of settlement debris, human burials, and other archaeological features, as well as differences in the character of sediments across Terraces 1 and 3. These facts could indicate different functions of and formation processes on both terraces, which seems to be crucial for the understanding of the past occupation of the entire area. These previous findings formed the basis for renewed field research at this complex site.

¹In 2017, the field season lasted from 25th October until 26th November. The research team consisted of K. Kapustka (lithics specialist), Klára Paclíková (finds registrar), L. Varadzin (excavation director), L. Varadzinová (research director), Sayda Ahmed Adam (NCAM representative), and four trainees – Maydulin Osman and Ehssan Hashim (NCAM), Altayeb Abdallah and Mohamed el-Tahir Suleyman (University of Al Neelain), and Ammar Awad Mohamed and Ezz Aldein Abdelrahim (University of Khartoum). In 2018, the season lasted from 20th February until 25th March. The fieldwork was performed by I. Crevecoeur (physical anthropologist), K. Kapustka (lithics specialist), J.-P. McCool (geoarchaeologist), Zdeňka Šůvová (archaeozoologist), L. Varadzin (excavation director), L. Varadzinová (research director), Balsam Abdelhamed and Sayda Ahmed Adam (NCAM representatives), and six trainees – Altayeb Abdallah, Hajir Fadlallah Marhoum, and Rowida Rasheda Abdelqadar (University of Al Neelain), Bushara Abdallah Adam (University of Shendi), Ammar Awad Mohamed (University of Khartoum), and Safaa Musa Eisa (University of Bahri). During both campaigns, the logistics were arranged by Tumbus Tourism Co. Ltd., with Abbas Sherom and Aladin Ahmed Altayeb engaged as drivers and Shaheen Abdel Rahman Shaheen as a cook.

²Some of the findings included in this report were already presented in Czech in Varadzinová *et al.* (2018; 2019).

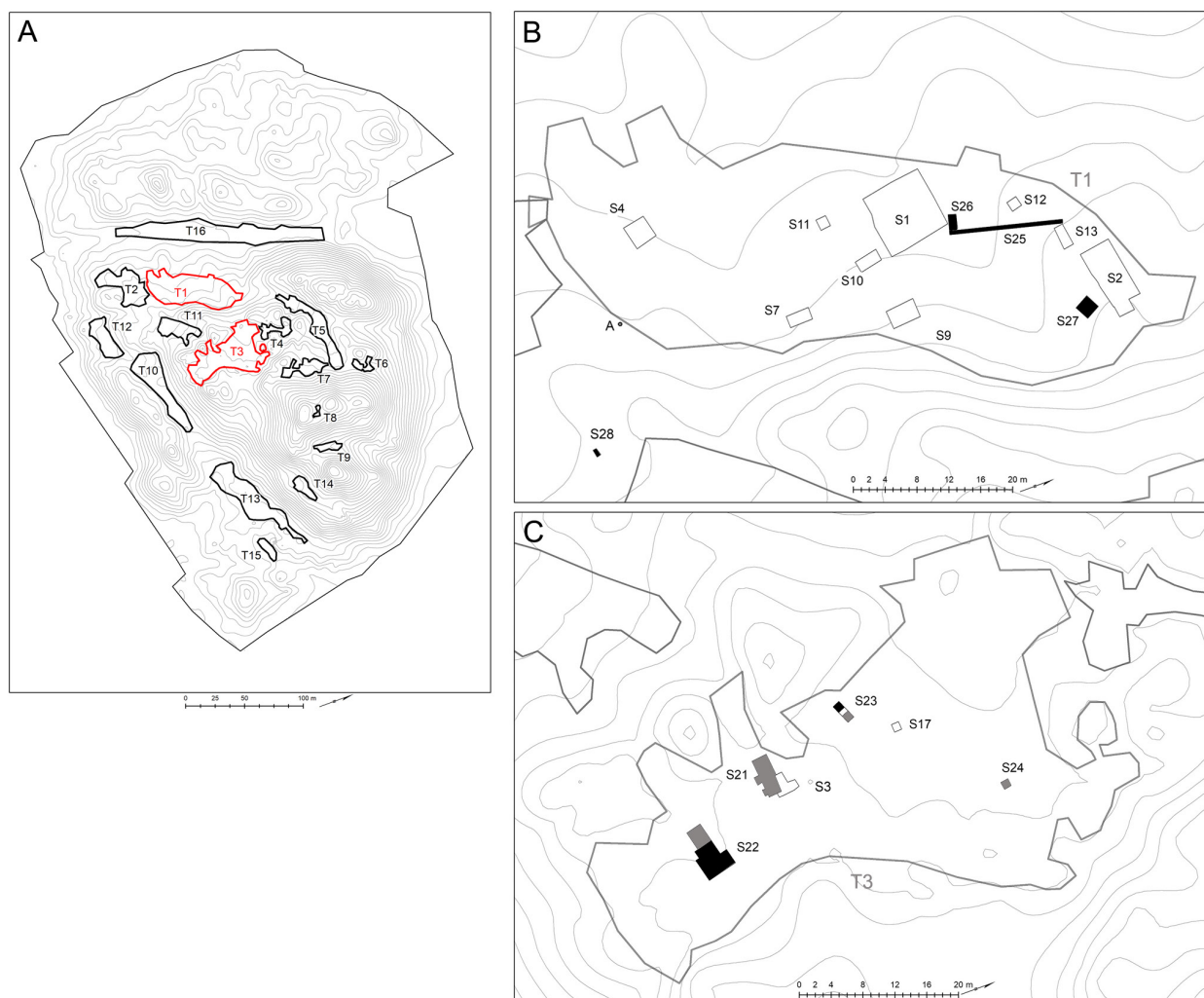


Figure 2. Fox Hill (SBK.W-20). A: Granite outcrop with 16 terraces and platforms (T1–T16).

B: Terrace 1 (T1), trenches (S) excavated in 2018 shown in black. A - location of a series of micro-soundings.

C: Terrace 3 (T3), trenches (S) excavated in 2017 shown in grey and those in 2018 in black (adapted after Suková and Varadzin 2012, fig. 1; and Varadzinová *et al.* 2019, fig. 3).

Three aims were set for the research at Fox Hill in 2017 and 2018: 1) to ascertain the size and dating of the *burial ground* detected on Terrace 3, to investigate its relation to the settlement stratigraphy, and to secure bioarchaeological material for comparison with the assemblage excavated previously at the site of Sphinx; 2) to explore cultural stratigraphies and to determine the character of local occupation and the material culture developmental sequence; and 3) to explore in detail the differing deposits detected previously on Terrace 1 to clarify the formation and character of the stratigraphies in this part of the site.³

Excavated trenches, methods, and progress of exploration

Eight trenches measuring 46.1m² in total were explored at Fox Hill in 2017 and 2018 (Figure 2B and 2C). They were divided in squares measuring 1x1m or sectors measuring 0.5/0.6x2m. Ascertained human remains in primary contexts were designated as *burials* (B.X), redeposited human remains as *loose bones*

³ During the two field campaigns, we also engaged in further surface survey aimed at documentation of other occurrences of drilled holes in rock walls, newly interpreted as remains of lightly built structures (in 2017; see Varadzin *et al.* 2017); detailed surface survey of lithics at selected sites aimed at uncovering spatio-temporal patterns in production, consumption and discard of this industry in prehistory (in 2017 and 2018); and palaeoenvironmental survey aimed at identifying late Pleistocene and early Holocene sediments that could provide ecological information for areas located both close to and beyond the reach of the Nile (in 2018). The findings relating to these other tasks have been (e.g. Kapustka *et al.* 2019) or will be reported in other publications.

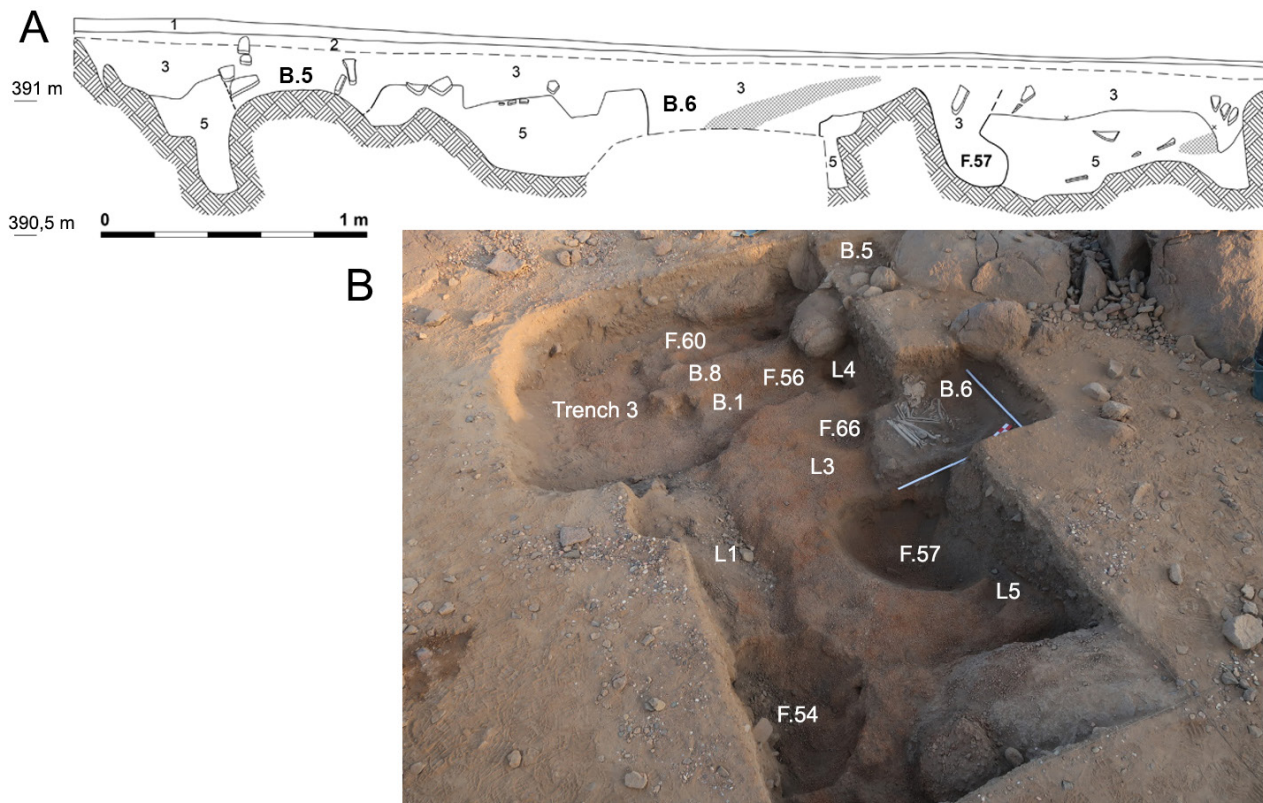


Figure 3. Trench 21. A: Southern profile prior to extension of the trench by Sectors 21K and 21L to excavate Burials B.5 and B.6. Stratigraphic units (SU): 1 – beige surface colluvium, laminated in its lower section, numerous finds and pebbles; 2 – light grey with a tinge of brown, moderate to high induration (based on excavation difficulty), occasional concentrations of lithics; 3 – grey, slight to moderate induration, occasional concentrations of lithics; = possibly disturbed strata with Mesolithic and Neolithic finds; 5 – grey with a tinge of Bordeaux, silty, granite grus (>50%), moderate induration, fewer artefacts than in stratigraphic layer 3; = Mesolithic layer.

B: Situation at the level of the geological background, after completion of excavation of the main squares with features (F) and loci (L) and commencement of uncovering of Burials B.6 and B.5; view from northwest (L. Varadzin).

(LBX), other archaeological features as *features* (F.X), distinct clusters of lithics as *clusters* (Cluster X), and patches of sediment at the level of bedrock with distinctive finds, some of which may constitute relics of pits, as *loci* (LX).⁴

On Terrace 3, Trench 21 (11.1m²) was delimited in the southern part of the terrace right next to our former Trench 3 that contained human burials. The excavation (completed in 2017) brought to light further human burials and redeposited human remains as well as settlement layers and features (Figure 3). The excavation of Trench 22 (18.5m²), delimited 11m to the south of Trench 21, began in 2017 and was completed in 2018, yielding human burials within settlement deposits, frequent finds of redeposited human remains, and other archaeological features (Figure 4). Trench 23 (2m²) was subsequently delimited c. 13m to the north of Trench 21, with Square 23B excavated in 2017 (Figure 5) and Square 23A in 2018. Both squares yielded settlement stratigraphies down to 0.65m below the surface, but with no finds of human remains. A similar result was obtained in Trench 24 (1m²), delimited in 2017 c. 30m to the north-east of Trench 21, in the area of rather scarce presence of surface finds near the north-eastern edge of the

⁴ The numbers assigned to features and human burials followed the sequence introduced in 2011, starting with F.54 with features and B.5 with human burials in 2017. With loci, clusters, and loose bones, which constitute more temporary find categories, on the other hand, a new sequence was introduced in each field campaign.



Figure 4. Trench 22. Central part and southern extension under excavation in 2018 (L. Varadzin).

terrace (Figure 6). All trenches on Terrace 3 were excavated down to bedrock.

On Terrace 1, we first excavated a geological transect measuring 14m in length and 0.5m in width, designated as Trench 25. It extended downslope from previous Trench 13 (north-northeast) towards previous Trench 1 (south-southwest) (Figure 7). The aim of this trench was to elucidate the differences in the character of sediments identified previously in Trenches 1 and 2. The transect was divided into seven sectors (25A-25G) each measuring 2m in length. In the lower levels of the transect, the sediments were very hard and had to be dug using a pick and trowel. Where possible, the sectors were excavated down to bedrock or to a depth of 1.2m below surface. The material excavated in Trench 25 was not sieved; only random finds were collected during excavation. After excavation, Sectors 25F and 25G were subjected to detailed sedimentological study and sampling.

At the southern edge of Trench 25, we delimited Trench 26 (2m²) aimed at detailed archaeological exploration of the deposits ascertained in Trench 25, with dry-sieving of all excavated soil and systematic collection of all finds. The excavation of this trench was very demanding due to the marked hardness of the sediments, which, especially in the lower levels of the trench, were so indurated they were reminiscent of concrete. For this reason, the excavation was discontinued at a depth of 0.6m from the surface in Square 26A and progressed thereafter only in Square 26B where works were stopped at a depth of 1.2m, i.e. c. 0.1m above the bedrock (Figure 8). Later on, Trench 27 (4m²) was opened for the purposes of a more detailed exploration of the archaeological deposit characteristic of the more elevated parts of Terrace 1, ascertained previously in Trench 2 (Figure 9). Of the four squares in this trench, Squares 27A and 27C were excavated down to bedrock (depth 0.5m; Figure 9B) with the excavation in Squares 27B and 27D discontinued c. 0.15m below present-day surface (Figure 9A).

The last trench we excavated was test Trench 28 (0.5m²) delimited to the south of Terrace 1 (between Terraces 1 and 11) (Figure 2B). The trench was supplemented by an alignment of four micro-soundings

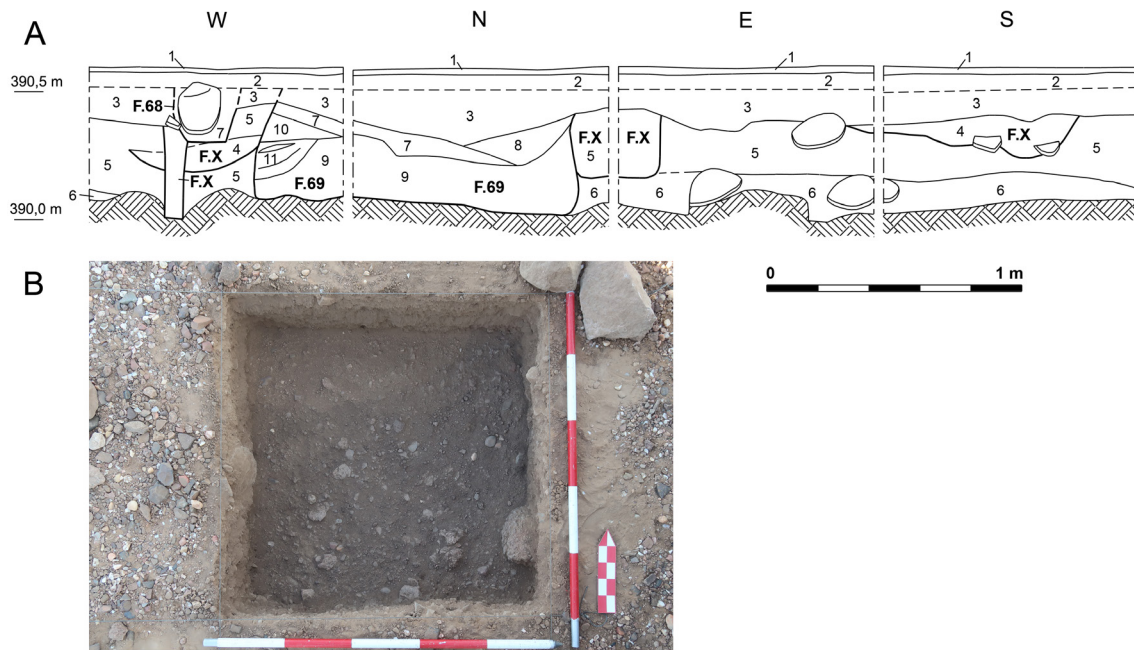


Figure 5. Trench 23, Square 23B. A: Drawn documentation of the profiles with layers and sunken features of presumably settlement function. Stratigraphic units (SU): 1 – beige surface colluvium, laminated in its lower section, numerous finds and pebbles; 2 – light grey with a tinge of brown; 3 – grey-brown, silty, granite grus (15–60%) distributed unevenly; = possibly disturbed strata with Mesolithic and Neolithic finds; 4 – dark grey-brown, silty, larger quantity of granite grus and gravel, slight induration, numerous lithics; 5 – dark grey-brown, larger quantity of granite grus and gravel, a few small rocks, heavy induration, few lithics; = Mesolithic layer; 6 – dark grey-brown with a tinge of red, large quantity of granite grus, a few small rocks, very heavy induration; = possible Mesolithic layer; 7 – light grey-brown with a large quantity of granite grus; = fill of Feature F.68; 9 – dark grey-brown, heavy induration, larger quantity of lithics; 8, 10, 11, and Features F.X – stratigraphic units and features identified only during elaboration of documentation.

B: Square 23B during excavation in 2017; Feature F.69 is visible in the northern part of the trench within the photograph (L. Varadzin).



Figure 6. Trench 24. A: Location of the trench at the north-eastern edge of Terrace 3, view from northeast.

B: The trench in the course of excavation (L. Varadzin).



Figure 7. Terrace 1 from the northwest. View of the geological transect Trench 25. To the right, Trench 26 adjoins at a right angle (L. Varadzin).



Figure 8. Trench 26 during the excavation of Square 26B, with horizontal levelling of sediments on the profile, carbonate concretions on the surface of the excavated level, and Trench 25 extending to the north (L. Varadzin).



Figure 9. Trench 27. A: The trench in the course of excavation. B: Squares 27A and 27C at the level of bedrock (L. Varadzin).

excavated between this trench and the southern edge of Terrace 1 (Figure 2B: point 'A' and around it) with the attempt to delimit the extent of the deposits identified in the lower part of Trenches 1, 25 and 26.

The method of excavation in individual trenches was chosen based on the research questions and the character of deposits explored. Trench 25 was excavated over several days in a single mechanical unit. During excavation, only random finds were collected directly from the deposits; they were registered by sector, position within sector, and depth below the surface. In addition, one or more buckets of soil from the levels near the bottom of the trench were dry-sieved and/or flotated and sorted for artefacts and ecofacts. Excavation in a single mechanical unit was employed also in the case of test Trench 28. In all the remaining trenches excavated in 2017 and 2018, work progressed in squares 1 x 1m or smaller sectors (1 x 0.5m, or 0.5 x 0.5m) involving excavation in 0.05m-thick spits and/or by stratigraphic units. All the soil excavated in these trenches was dry-sieved using a 4mm mesh, with artefacts and ecofacts retained for further study. Lithic finds were collected only from selected sectors and contexts (see below). Uncovered levels, finds, and find situations were described, photographed, and drawn to scale and/or sketched. The positions and heights were recorded by means of Leica TCR 303 total station or a levelling machine. Selected situations were documented by means of 3D photogrammetry.

In 2018, excavation of human remains involved precise and reliable reconstructions of interment sequences assessed following an archaeoethnology approach (Boulestin and Duday 2006; Duday 2009). The method is based on the biological principles of body decomposition and the interaction between this process and the environment of deposition. It relies on the identification of each bone, their anatomical connections and of the position of their faces in addition to their relationship with burial structures and associated artefacts through successive spits. These successive recordings are made by trained anthropologists who can then provide information on the nature of the deposition (primary or secondary; single, double, or multiple; in empty or filled space, etc.) which allow the discussion of mortuary practices and past human behaviour towards death by understanding the management and treatment of the deceased (Parker Pearson 1999; Duday 2009).

For the study of lithics from the excavated trenches during both field campaigns, two sampling

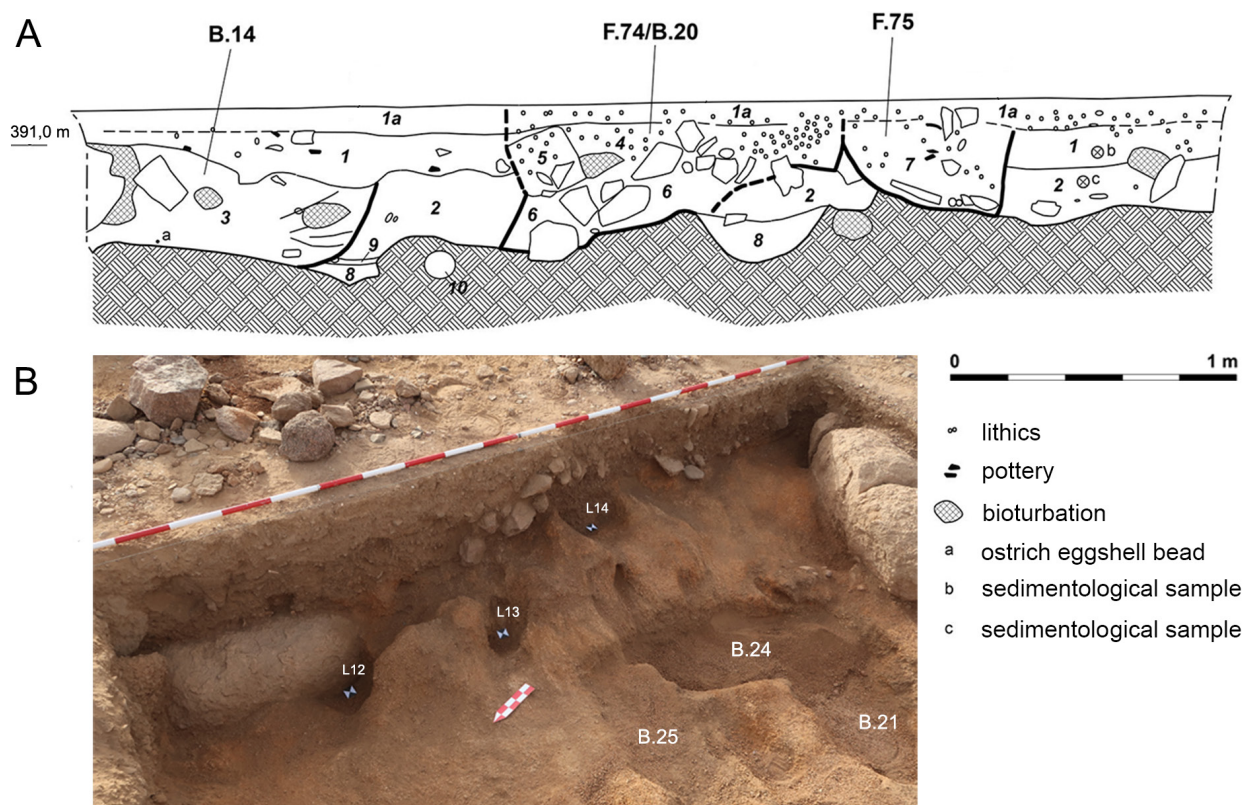


Figure 10. Trench 22. A: Eastern profile of the trench with marked burials (B), features (F) and the following stratigraphic units (SU): 1a – beige surface colluvium, laminated in its lower section, numerous finds and pebbles; 1 – light brown-grey, silty, granite grus (40%) distributed unevenly, moderate to heavy induration; 2 – dark grey-brown, silty, granite grus and gravel (80–90%) distributed unevenly, slight to moderate induration; 3 – dark brown-grey, silty, granite grus (50%) distributed unevenly, lenses of laminated silty layers, slight to moderate induration; = fill of Burial B.14, redeposited SU?; 4 – as SU1, but larger quantity of lithics (30–40%) and heavy induration; 5 – as SU4, but slightly darker and less indurated; 6 – darker grey-brown, silty, granite grus (30%) distributed unevenly, slight to moderate induration; = fill of Burial B.20 which is possibly redeposited SU2; 7 – dark grey-brown, silty, granite grus (80–90%) and jumbled small and large pebbles, slightly indurated; = fill of Feature F.75 is possibly redeposited SU2; 8 – granite grus (saprolite) with dark grey silt, light to moderate induration; 9 – granite grus (saprolite); 10 – secondary fill of a cavity.

B: Eastern part of the trench after completion of excavation in 2018, with marked burials (B) and loci (L) (L. Varadzin).

strategies were employed reflecting the large quantities and marked variability of the excavated assemblages, depending on their context. The first strategy worked with a total sample obtained from selected features or layers of particular interest. The second strategy involved one half, one third, or one quarter of the total weight of the lithics from each spit set apart for study randomly, but always with a view to capturing statistically representative qualitative and quantitative changes in the lithics both vertically and horizontally.

Main findings and field observations

Settlement and stratigraphies on Terrace 3

All soils and sediments across Fox Hill are preserved in local depressions and minor topographic undulations in the heavily jointed granite bedrock, which readily forms boulders. While the granite exposed above the surface is hardened by desert varnish, the areas with soil cover undergo granular disintegration with the separation of crystalline rock along crystal faces or small aggregates of several

crystals. In Sector 21K/B.6 (see Figures 3 and 11), the basal material of the 0.6m deep profile is composed predominantly of this crystalline granitic grus derived from weathering of the underlying bedrock and surface exposures slightly upslope. The texture is overall coarse with grus and rock fragments common throughout and the proportion of silt progressively increasing closer to the surface as a result of aeolian input. While not reflected as a textural change, there is a clear shift in soil colour at approximately 0.25m below the surface from a 7.5 YR 4/3 Brown to a 5 YR 3/2 Dark Reddish Brown based on moist soil colour using the 2009 Revision of the Munsell Soil-Color System. All sediments contain carbonates as tested using dilute hydrochloric acid with very fine carbonate rhizoliths present in the degraded granite at the base of the profile showing root extensions into weathered bedrock. The deposit indicates the predominant influence of granite derived parent material with admixture of fine aeolian silt, while the profile below 0.25m likely formed in a slightly wetter environment, which promoted greater soil rubification.

Elsewhere in Trenches 21 and 22 (Figures 3 and 10), the stratigraphic situation was similar, with the upper parts of the deposit consisting of an undifferentiated layer about 0.2m to 0.4m in thickness that contained considerable quantities of settlement debris. The first traces of burial pits usually began to appear in the lower parts of the excavated deposit and became more visible with the increasing depth from the surface. Both the fills of the burial pits and the deposits into which they had been cut continued to contain considerable amounts of settlement debris down to the level of bedrock. Whereas the lower part of the deposit seemed to contain only artefacts attributable to the Early Khartoum culture (= Mesolithic layer), the upper deposits contained both Early Khartoum and Early Neolithic material (Figures 3 and 10A). Thus, it is obvious that the burial ground was established on Terrace 3 only after the place had been used for some time as a settlement by Early Khartoum hunter-gatherers, with the area reoccupied again after some time by Early Khartoum (Mesolithic) or Early Neolithic settlement.

More importantly, in some of the local depressions and minor topographic undulations in the heavily jointed granite bedrock in the lowermost sections of Trenches 21 and 22, we identified remains of a coarse-grained deposit that contained mostly lithics and only smaller amounts of other finds, but no pottery. In Sectors 21K/B.6 (Figure 11) and 22T, this deposit formed a sequence of alternating layers of numerous finds of lithics and colluvial granite grus layers up to 0.2m thick. In other parts of both trenches only small deposits of remnant sediment with similar lithic finds were found trapped in bedrock cavities; these remains were mostly registered as loci (L1/2017, L3/2017–L5/2017 in Trench 21, and L1/2018–L14/2018 in Trench 22; Figures 3 and 10B). In all these cases, this lowermost deposit was resting directly on the bedrock and was sealed from above by an Early Khartoum occupation layer (Figure 11). These remains are interpreted to be a colluvium formed during an extremely dry climate, possibly predating the Early Khartoum culture.

Trenches 23 and 24 in the central and northern parts of the terrace lacked both burials and such early layers, but they seemed to preserve the sequence of Early Khartoum material in lower deposits and mixed Early Khartoum (Mesolithic) and Neolithic material in upper deposits. In Trench 23B, the stratigraphic picture was more complex with the presence of three layers and five sunken features (Figure 5), with an additional feature (F.88) registered in the adjacent Square 23A.

In total, at least 39 settlement features of diverse shapes and sizes were registered in 2017 and 2018 on Terrace 3 (Figure 12). Some of them were found in a stratigraphic relation to one another or to burials, and the stratigraphic situation of many of them suggests a dating to the Early Khartoum culture or Early Neolithic. Outstanding among them are Features F.54 and F.57 in the western part of Trench 21, which had a diameter of c. 1m and straight walls and bowl-like bottoms partly dug into the granite bedrock (Figure 3); they may have functioned as storage pits. At least three features (F.68, F.84, F.95) most likely constitute remains of smaller pits with vertical walls and flat bottoms, in two cases with upstanding granite stones; they may be interpreted as post-holes (see F.68 on Figure 5).

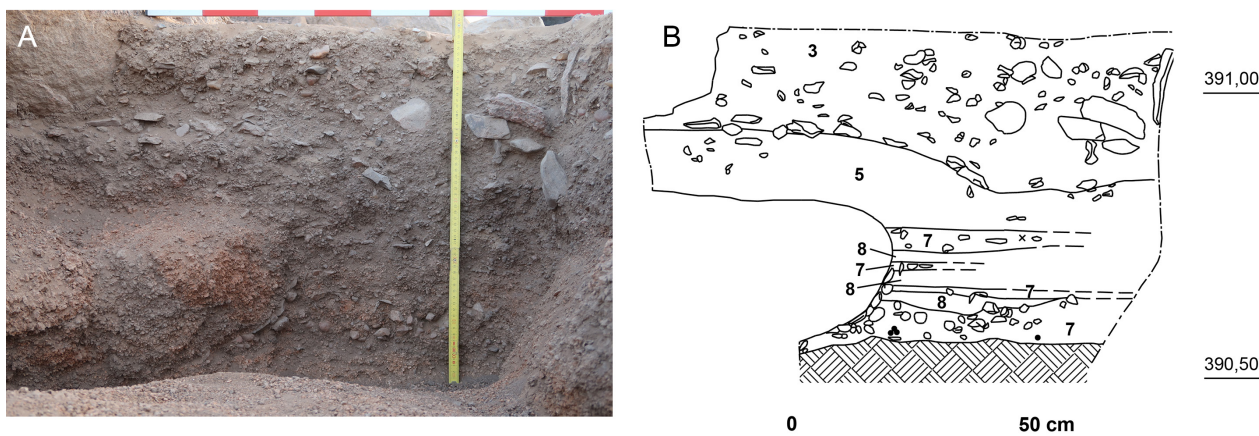


Figure 11. Trench 21. Southern profile behind the back of Burial B.6 in Sector 21K/B.6, photo and drawing. Stratigraphic units (SU): 3 – grey, slight to moderate induration, occasional concentrations of lithics; = possibly disturbed strata with Mesolithic and Neolithic finds; 5 – grey and slightly dark red, silty, granite grus (>50%), moderately indurated, fewer artefacts than in SU3; 7 – dark brown-grey, silty, granite grus (50–60%), numerous lithics along a horizontal line; 8 – colluvial granite grus (saprolite); cross – fragment of a shell; black dots – charcoal (L. Varadzin).

Layers and features uncovered on Terrace 3 yielded large amounts of artefacts and ecofacts of apparently Early Khartoum and, to a lesser extent, Early Neolithic attribution. The registered find categories included lithics, ground stone artefacts, pottery, bone artefacts, decorative items in clay, bone, shell, and ostrich eggshell, as well as food or production waste in the form of animal bones and teeth, mollusc shells, unworked fragments of ostrich eggshell, mica, and pigments. Charcoal was surprisingly rare. Conspicuous differences between individual trenches were noted in the presence or abundance of some find categories. Trenches 23 and 24, for instance, entirely lacked worked bone, shell and ostrich eggshell, and contained nearly no molluscs with only small quantities of animal bones relative to other trenches on the terrace. Differences in representation of certain find categories were also clear between the extensive Trenches 21 and 22. These cases may indicate zonation of past settlement activities on this terrace.

Among the large quantities of lithics processed during the two field campaigns, two assemblages are of special interest. The first one derives from Feature F.70, a relatively shallow pit c. 0.6m in diameter found above burials in the western part of Trench 22 (Figure 13). Its fill consisted of a pebble concentration weighing over 8kg. At least one third of all the unworked pebbles were burnt. In addition, there were many pieces which were tried once or twice but were not further utilised due to their insufficient quality. Quartz is a raw material difficult to knap, and it is possible that this feature is a result of an attempt to improve its qualities by heat treatment, with the uncovered pit containing discarded pebbles that were not used at all or were only tested and recognised as not good enough. The proportions of the lithics from F.70 differ considerably from all the other layers and features.

The second lithic assemblage derives from the stratigraphically earliest layers in Trenches 21 and 22 (see Figure 11). It shows an advanced degree of patination and eolisation with a higher representation of the quartz vein as compared to the assemblages studied elsewhere on Fox Hill and other Mesolithic and/ or Neolithic sites in the area (e.g. Kapustka 2017; Kapustka *et al.* 2019). The lithic assemblage is dominated by flakes, but tiny bladelets and cores measuring c. 10mm used for their production are also present. Analysis of the collection is still in progress, with two key issues to be addressed: dating of the layers and finding lithic analogies from other areas. For the time being, the stratigraphic situation and the character of the lithics make Late Stone Age (late Pleistocene) dating of the assemblage most probable.

Trench	Terrace	Year	Total area (m ²)	Max. depth (m)	Squares (1m ²) and sectors (~0.5-2m ²)	Burials (B) and loose bones (LB)	Non-funerary features (F), loci (L), and clusters
21	3	2017	11.1	0.75	Squares A-J, Sectors K-L	B.1, B.5, B.6, B.8, LB1+LB4/2017	F.54-F.61, F.64, F.66-F.67, L1-L5/2017, Cluster 1/2017
22	3	2017, 2018	18.5	0.75	Squares A-L, O-S, Sectors M-N, T	B.7, B.9-B.27, LB2-LB3, LB5-LB16/2017, LB1-LB6/2018	F.62-F.63, F.65, F.70, F.77-F.84, F.89, F.90, F.95, L1-L14/2018, Cluster 1/2018
23	3	2017, 2018	2.0	0.65	Squares A and B		F.68, F.69, F.88, and three features identified during documentation of sections of Square 23B (see Figure 5)
24	3	2017	1.0	0.35			
25	1	2018	7.0	1.20	Sectors A-G		F.91, F.94
26	1	2018	2.0	1.20	Squares A and B		
27	1	2018	4.0	0.50	Squares A-D		F.92, F.93
28	Between 1 and 11	2018	0.5	0.35			

Figure 12. Overview of the trenches and finds of the 2017 and 2018 field campaigns at Fox Hill.

Settlement and stratigraphies on Terrace 1

Of a different character are the findings obtained in Trenches 25 and 26 on Terrace 1, situated c. 7m below Terrace 3. With a maximum depth of approximately 0.95m in Sectors 25F and 25G studied in detail from a geoarchaeological point of view (Figure 14), the parent material for the soil still consisted predominantly of a coarse fraction derived from the local granite bedrock with a non-local fine fraction. There were only minor colour changes across the profile from 7.5 YR 3/2 Dark Brown in the upper 0.65m to 10 YR 4/2 Dark Grayish Brown (moist colours) in the lower 0.25m. Carbonates were consistently present across all depths with a possible increase in content at depth based on more vigorous field reactions. Iron and manganese staining could be seen in the lower depths in the western portion of the profile. Despite the lack of a strong colour change, there was a noticeable shift in structure and consistency at a depth of 0.65m below the modern surface at the sampled profile. The boundary was sharp and relatively level across much of the profile with lower material having much greater cohesion and density while the upper 0.7m of the profile had far less structure and a higher fraction of stones and pebbles (see also Figure 8). This increase in coarse stones was not uniform, but distributed across two zones, one in the upper 0.1m caused by modern erosion and deflation and a second similar accumulation at 0.45-0.6m (Figure 14). That this increase directly overlies the noted change in structure and consistency suggests that this is an earlier period of surface erosion that occurred in the past with later resumption of accumulation under slightly different environmental conditions.

In Trench 27 situated in the uppermost part of Terrace 1, on the other hand, the surface colluvium was found to be covering a fine-textured, loose grey layer with a high concentration of artefacts and ecofacts (Figure 9A). This grey layer rested on a soil type formed on the local weathered bedrock; the

latter showed pedogenic development and reached a depth of c. 0.5m where it rested directly on the solid granite bedrock (Figure 9B). As compared with the deposits in Trenches 25 and 26 situated at lower elevations, the lowermost part of the soil type in Trench 27 had less carbonate accumulation compared to Trenches 25 and 26 (Figure 8). The grey layer, known already from Trench 2 of 2011 and 2012 (Suková and Varadzin 2012), did not constitute the latest stratigraphic unit, as it was cut by two circular settlement features – probably storage pits (F.92, F.93; see Figure 9A).

The find categories obtained from Trench 27 included lithics, ground stone artefacts, both Mesolithic and Neolithic pottery, animal bones, molluscs, pigments, and single fragments of worked bone and ostrich eggshell. In diversity and quantity of finds, this trench differed markedly from the limited spectrum and small quantities of movable finds obtained from Trenches 25 and 26; the latter two trenches, on the other hand, yielded comparatively large quantities of larger pieces of charcoal (otherwise quite unusual in prehistoric contexts in Jebel Sabaloka) and well-preserved riverine molluscs. The differences in the spectrum and quantities of finds in different parts of Terrace 1 suggest different occupation histories that may be related to distinct formation and transformations of the lower and upper sections of this terrace.

Burial ground on Terrace 3⁵

Dedicated excavation focusing on burials uncovered new finds of human remains in Trenches 21 and 22 in the southern part of the terrace. By contrast, Trenches 23 and 24 in the central and northern parts yielded no finds of human bones.

Altogether, 23 units were designated in the field as *burials* (B) corresponding mostly to primary inhumations (B.5–B.27). Further 21 units were designated as *loose bones* (LB), with this broad category covering as diverse situations as loose redeposited bones (e.g. LB9/2017), articulated but incomplete human remains (e.g. LB15/2017), but also disarticulated remains of an apparently complete individual (LB12/2017; see Figure 15B).

Trench 21 (11.1m²) contained three new burials in addition to B.1, part of which was registered already in adjacent Trench 3 in 2011, and two groups of loose bones (Figure 12). The human remains were loosely distributed in the eastern and southern parts of the trench (Figure 3). The western half, on the other hand, contained no human remains. The burials were of three adults and one immature individual (B.8), all deposited with their lower limbs in flexed or hyperflexed positions. Shells of bivalves were found *in situ* in contact with B.5 and B.6 (see Varadzinová and Varadzin 2020, fig. 4e), with the former individual associated also with a well-preserved large fragment of a vessel decorated with Dotted Wavy Line motif (see Varadzinová and Varadzin 2020, fig. 4a, c). With three of the burials, smaller and larger cobbles of unworked granite, combined with ground stone artefacts and/or larger pieces of lithics, were found placed directly on the bones and/or above the burials on an intermediary layer of sediment (see Varadzinová and Varadzin 2020, fig. 4a, d; and B.5 on Figure 3A).

Trench 22 (18.5m²) differed from the former trench by the large number of human remains found within its area (Figure 12). As many as 20 burials and 19 groups of loose bones were distributed across most of this trench (apart from Squares 22Q–22S and Sector 22T). Furthermore, by contrast to Trench 21, there was a significant variation even between individual sectors of the larger trench. In the western part, Squares 22A–22B first yielded one primary inhumation (B.9) placed onto the bedrock, lying on the back with its lower limbs flexed and arms extended along the body, and small pieces of granite placed over or along one side of the burial (Figure 15A). Parts of other human remains were registered close to the bedrock along the western and northern sections of the two squares (B.10, B.11, and LB3/2017 and

⁵ The general characteristics of the burial ground at Fox Hill have been presented in Varadzinová and Varadzin (2020) and in Varadzinová *et al.* (2022).



Figure 13. Trench 22 in the course of excavation of Squares 22O–22P (L. Varadzin).



Figure 14. Trench 25. A: Western profile in Sectors 25F and 25G after collection of geoarchaeological samples. B: Coarse size fraction for Trench 25 profile. Samples were collected every 50mm and sieved using 2mm mesh. Peaks in coarse sizes at 0–0.1m and 0.45–0.60m (J.-P. McCool).



Figure 15. Trench 22, western part. A: Burial B.9 in Squares 22A–22B.

B: Primary inhumations and redeposited bones in Squares 22A–22B and 22M–22P; dashed line – western limit of the initial boundary of Trench 22 in Squares 22A and 22B before extension to the west (L. Varadzin).

LB7/2017) and within the southern section of Square 22B (LB2/2017). Subsequent extension of the trench to the west by Sectors 22M–22N and Squares 22O–22P to uncover these remains (see Figure 13) brought to light a most complex situation with densely packed primary and secondary deposits (B.7, B.11–B.13, B.16 and B.17, and LB5/2017–LB12/2017 and LB14/2017–LB16/2017) forming a nearly continuous zone of human remains across the excavated area (Figure 15B). Many of the burials and loose bones registered in these squares still extended beyond the limits of the excavated area (Figure 15B; see also Varadzinová and Varadzin 2020, fig. 2b). Use of granite to cover human remains was noted with several deposits in this trench (e.g. B.12; Figure 15B).

In the eastern part of the trench (Squares 22G–22L), six burials and seven groups of loose bones (LB13/2017, and LB1/2018–LB6/2018) were registered (see Varadzinová *et al.* 2019, fig. 8a–c; Varadzinová and Varadzin 2020, fig. 2a). In the case of two burials – B.14 deposited with the face to the ground and B.20 in an extended position, a greater part of the deposits was situated beyond the eastern limit of the trench and has remained largely unexcavated. Five burials (B.20, B.21, B.23–B.25) and one group of loose bones (LB5/2018) were densely covered by stones piled within the burial pits (Features F.71–F.76) that constitute one of the most distinctive features of the burial activities at the site (Figure 16). These piles consisted of small- to medium-sized pieces of granite and occasional larger pieces of lithics (mostly cores) and upper or lower grinders and were found to rest directly on the human remains. With the other two burials, a stone cover was not present (infant B.15), or its presence cannot be assessed due to the location of most of the deposit (B.14) beyond the excavated area.

One set of structures in this sector studied in detail in 2018 offers finer insights into the funerary practices of the Fox Hill population. The assemblage is composed of three burials with clear pit delimitations and chronology (Figure 16). The pit of B.24 cuts B.21, and while B.25 seems posterior to both depositions, it is also the least preserved (see also Varadzinová *et al.* 2019, fig. 8c). The individuals were placed on their back, with the lower limbs in flexed, or hyperflexed position, either on the right or the left side of

the body (Figure 17). Constraint effects are visible and clearly related to the shape of the burial pit. For instance, the cranium of B.21 is showing up with its superior side, held in that position by the western part of the pit wall (strict anatomical connections were found between the cranium, the atlas, and the axis, the latter two showing up in cranial view). Similar wall or constraint effects are visible on B.24 at the level of the shoulder girdle with the constriction of the humeri and the vertical alignment of the clavicles.

Several observations support primary deposition of an individual in a burial as some labile articulations are preserved (e.g. at the level of the feet or hands), and some movements of body parts suggest a decomposition in a partly empty space. For instance, the right elbow of B.21 is disarticulated with anatomical inconsistencies between showing up faces of the proximal and distal part of the right ulna and radius, in addition to breakage and fragmentation of the distal part of the right humerus. The right elbow was directly underneath a large stone that was part of the stone pile covering of the body. The same kind of observations were made for B.24 whose lower limb long bones position, along the eastern part of the pit limit, are clearly related to the breaking and crushing of dry bones (cf. Villa and Mahieu 1991) by falling/pressuring blocks. Clear angulations are visible between the original long bone position and the crushed parts (Figure 18). In addition, the presence of some remains of meso-fauna at the bottom of B.21 deposit and within the volume of the body could reflect the intrusion of small animals in the deposit. Finally, the cutting of B.21 pit for the deposition of B.24 must have happened sometime after the sediment filled the spaces to explain the absence of movement of the remaining parts of B.21 lower limbs and their relatively small displacement.

These observations imply several steps in the decomposition and burying process with this assemblage.

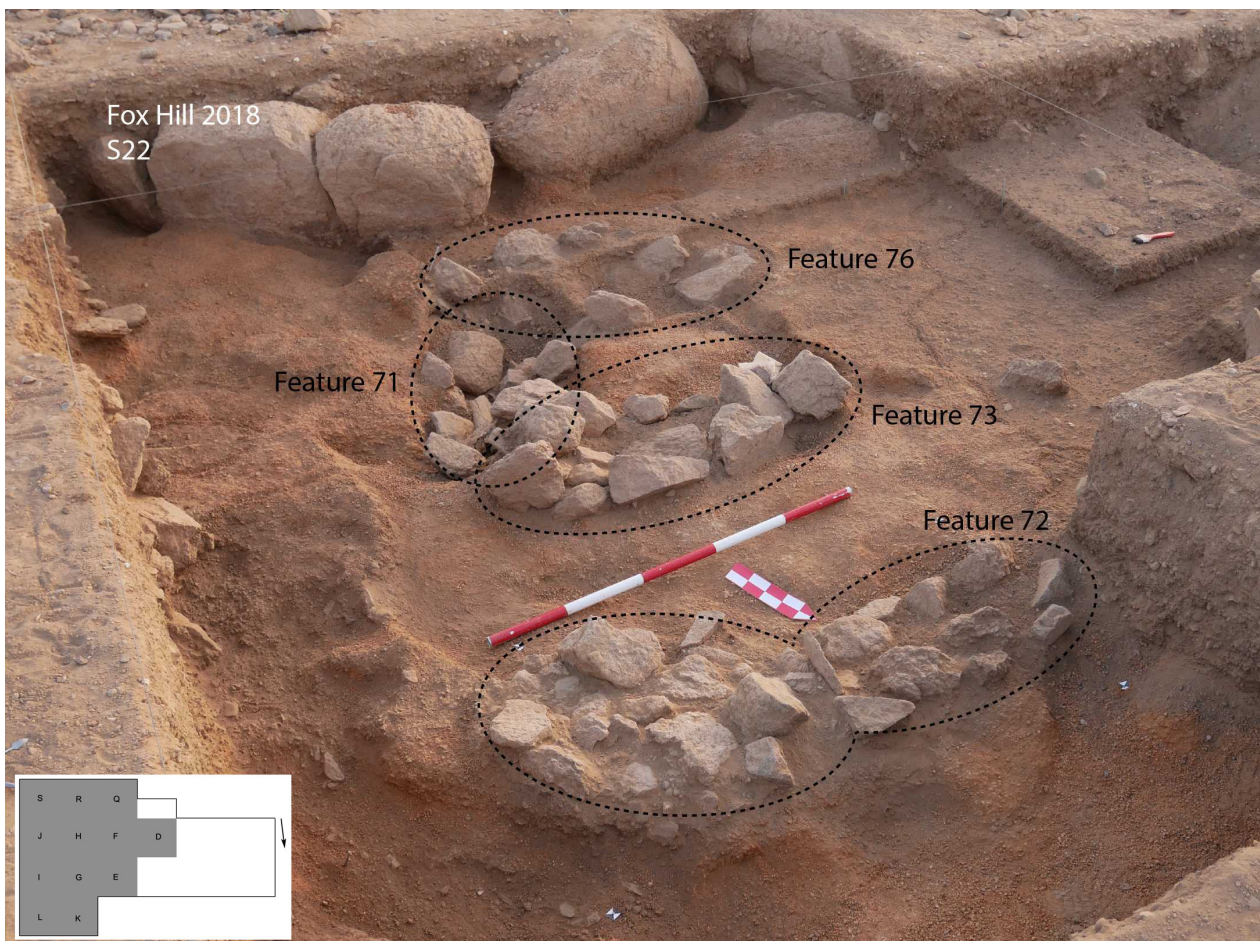


Figure 16. Trench 22, eastern part. Burial assemblage including B.21, B.24 and B.25 illustrating the block covering of each burial and the related features' names (F.76, F.71 and F.73, respectively) (I. Crevecoeur).

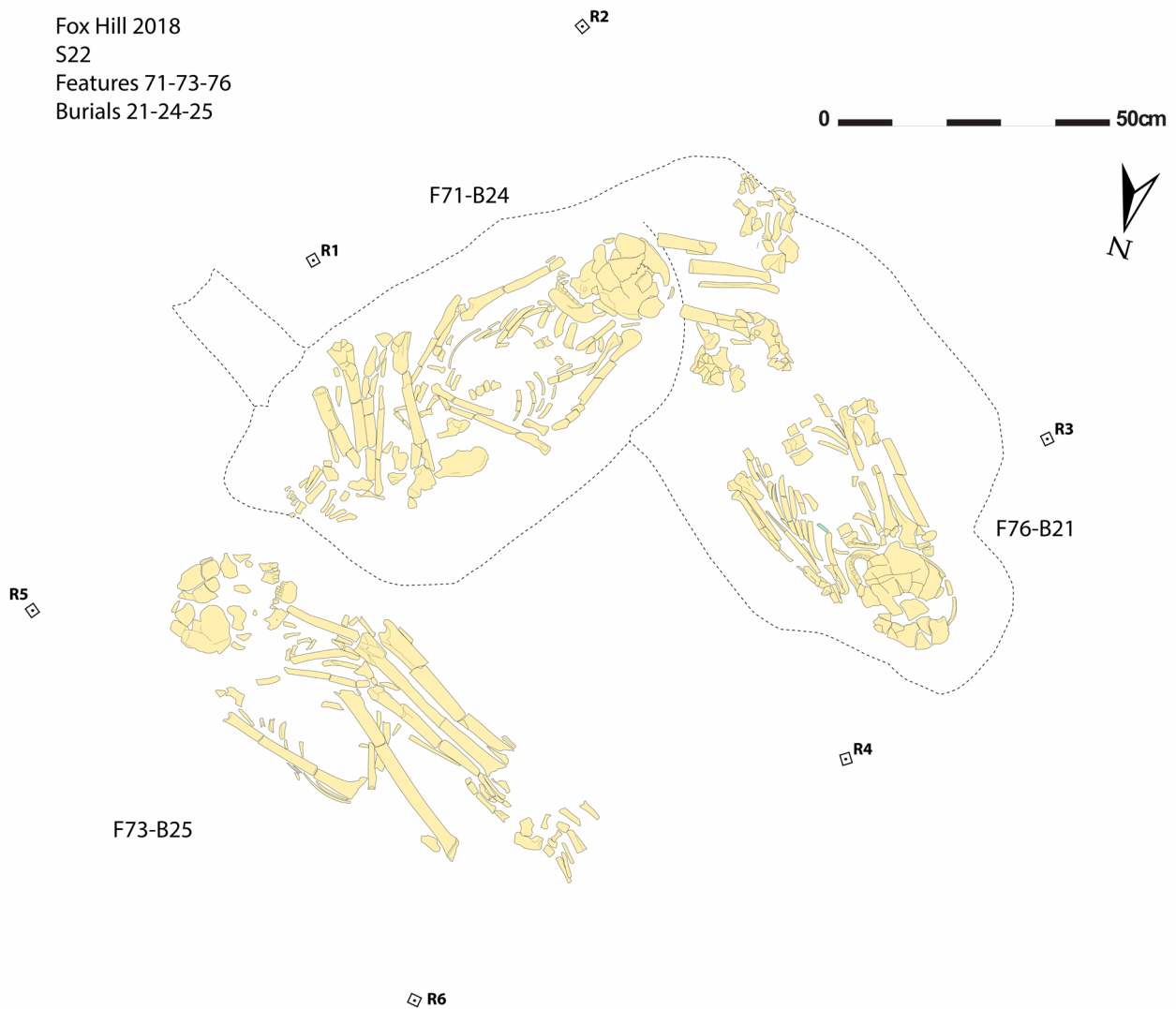


Figure 17. Trench 22, eastern part. Synthetic drawings of the human remains found in Burials B.21, B.24 and B.25. R1–R6 are the reference points; dashed line - visible limits of the pits; yellow - human bones. Associated artefacts not represented on the drawing (I. Crevecoeur).

First, the body was probably deposited in a pit wrapped or covered by a perishable material upon which associated artefacts – in the case of B.24 a large piece of red ochre sandstone, several lithics, one upper grinder, and several bones of a large wild mammal (determined as an older individual of *Hippopotamus amphibius* by Z. Sůvová) – were placed. The deposit was then covered by piled stones. After the decomposition of the soft tissues, but before the sediment infilling of the pit, some movements were still possible inside and outside the volume of the body. Then, the perishable cover or container disappeared allowing for downward movements and pressures of the blocks and artefacts on the skeleton, which led to the fracturing, crushing and subsequent displacement of some bones, and progressive sealing of the deposit by the sediment.

In Squares 22C–22F in the central part of the trench, five burials were uncovered in 2018. Two infant burials (B.18 and B.19) were unearthed in the upper section of the loose deposit, with the outlines of the burial pits discernible by the distinct character of their fills. Fourteen beads of red and green stones – quartz and possibly malachite – were found associated with B.19 (Varadinová *et al.* 2019, fig. 8d, f; Varadinová and Varadin 2020, fig. 4f, g). These finds are of importance from a chronological point of view as in their character these beads fall likely within the Neolithic (cf. e.g. Arkell 1953, pl. 41, 1–4) and



Figure 18. Trench 22, eastern part. Picture of the human remains from Burial B.24 illustrating the fracturing and the crushing of the lower limbs at the level of the knees along the wall pit (I. Crevecoeur).

thus constitute the first clear signal for burial activity at this site also during the Neolithic. The infant burials superimposed but did not interfere with another assemblage of three well-preserved individuals B.22, B.26 and B.27 that were studied in detail in 2018 (Figure 19; see also Varadzinová *et al.* 2019, fig. 8e; Varadzinová and Varadzin 2020, fig. 4h). Stone blocks were present in the filling of their pits but were not of the same size and density as seen in the burials in the eastern part of the trench. The skeleton B.22 was the only one from this complex with larger stone blocks placed on top of the deposit. In addition, a very fine, grey silty sediment was present close to the human bones and observed in B.26 and B.27, which allowed the delimitation of the pit burial structure.

The three individuals were positioned differently. Individual B.22 was lying on its abdomen with the upper limbs underneath, in a flexed position with the hands positioned under the cranium. The cranium is showing up in superior view. Its position is clearly constrained to the right in relation to the orientation of the cervical vertebrae and the rest of the body. The body is hypercontracted, with the lower limbs in hyperflexed position on the right side. Wall effects are visible in the cranium and feet area, and the left patella was found on edge. Strict anatomical connections have also been preserved

in various places. These observations could imply that the body was buried in a perishable container within the pit that may have been filled with sediments before the positioning of the stones that do not seem to have moved downward.

This burial (B.22) is posterior to the deposits of B.26 and B.27 but it did not perturb these burials. B.26 was lying on its abdomen, on the right side, slightly flexed, with the upper limbs in hyperflexed position toward the facial part of the skull. The lower limb was in flexed position and the knees and the proximal parts of the tibiae and fibulae of B.26 were directly in contact with B.27. Even if some crushing of the lateral part of the left ribs of B.27 is visible, the deposition of B.26 does not seem to have caused further disruption of the position of the upper left limb of B.27. It is likely that this is a primary deposit in a pit with a cover or a container that delayed the infilling and supported some rocks. For instance, movements are observable in relation to the compression of the left side of the thoracic cage, the dislocation of the left shoulder articulation and the reorientation of the left scapula perpendicular to the left ribs. With the preservation of the strict anatomical connection of the left elbow, this would suggest that the large stone on top of the articulation moved downward along the pit border and slowly compressed the remains of skeleton B.26 in this area. This could only happen if the void space was still present.

Fox Hill 2018
S22
Features 87a & 87b
Burials 22-26-27

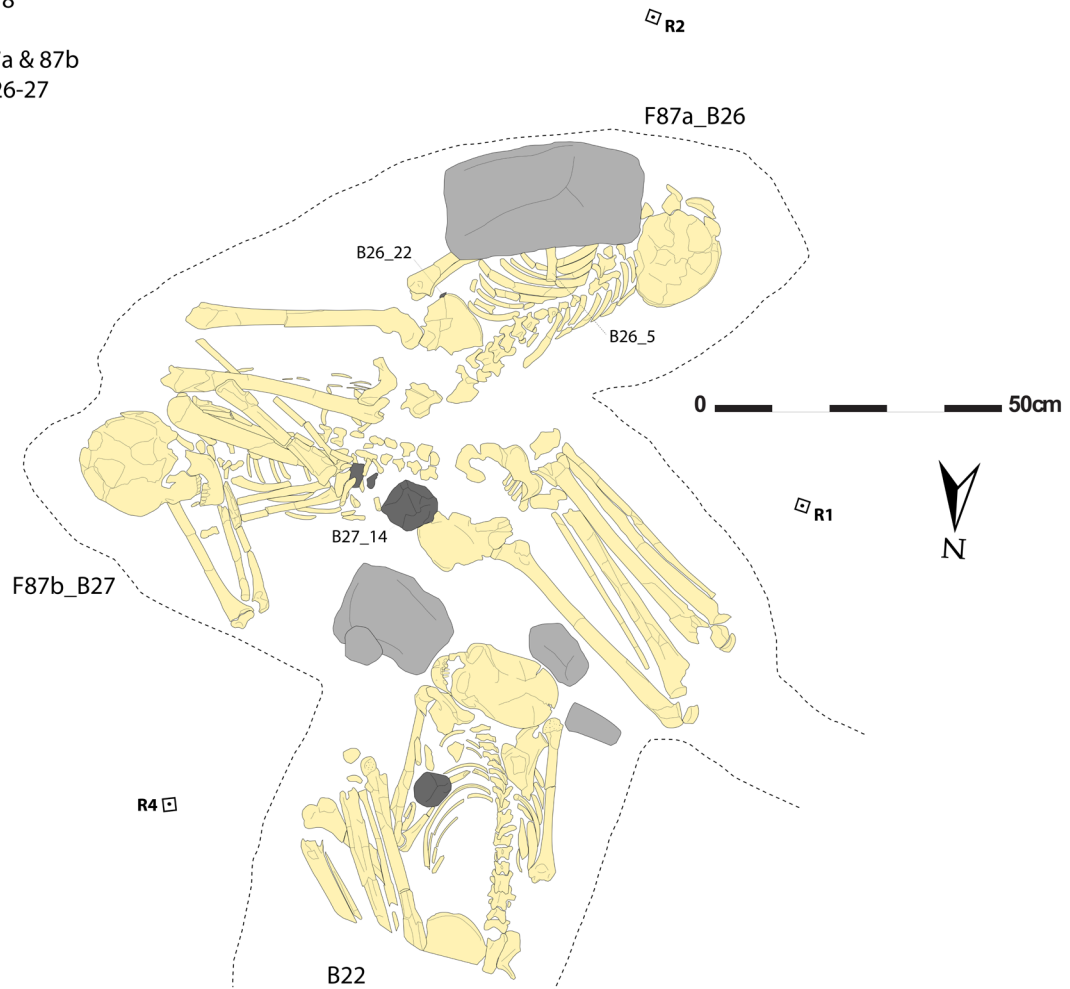


Figure 19. Trench 22, central part. The first layer of the successive drawings of Burials B.22, B.26 and B.27. R1–R4 are the reference points; dashed line - visible limits of the pits; grey - stone blocks; dark grey - lithic artefacts; yellow - human bones (I. Crevecoeur).

The individual B.27 was lying on its back. The left upper limb is flexed across the chest, with the hand positioned on the right side of the cranium. Both upper limbs are in loose anatomical connection. The body is slightly flexed on the right with the lower limbs in hyperflexed and constrained position. This is well illustrated by the position of both feet, the left one showing a forced position under the left coxal bone (Figure 20). Two different observations support decomposition in an empty space, and possible evidence of paradoxical dislocation that would imply a natural mummification event (Maureille and Sellier 1996).

First, the orientation of the cranium on its right side is the result of subsequent movements after the decomposition of the cervical vertebrae ligament and should not be seen as the actual position of the head at the time of deposition, as a 90° rotation between the orientations of two cervical vertebrae has been recorded in the field (Duday 2009). Most of the vertebrae are showing up in anterior view, while the upper cervical vertebrae, still attached to the neurocranium, are in lateral position. Post-depositional movement of the head is only possible if the body was not surrounded by sediments.

Second, the anatomical connections and the position of the bones from the right foot raise questions. While labile articulations, like the ones of foot phalanges, should be the first to disappear and persistent articulations, like the tarsal ones, should be amongst the latest to decompose, we can observe in Figure

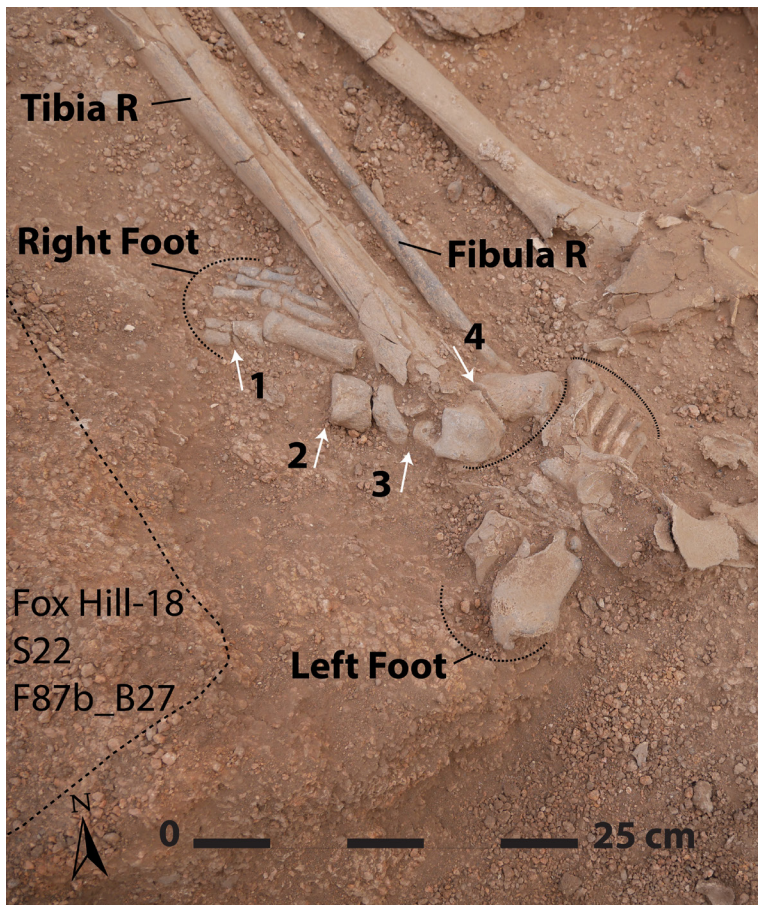


Figure 20. Trench 22, central part. Commented picture at the level of the right and left foot of Burial B.27 exposed after the removal of the left lower limb; dashed line – visible limits of the pits; white arrows show breakage of the foot bone (no. 1) or anatomical blocks (no. 2 and 3), and strict connection (no. 4) (I. Crevecoeur).

sense of successive depositions in the same space (Duday 2009).

Summary and conclusion

The field research at Fox Hill reported here completed tasks commenced or planned in previous phases of the project and closes one phase of data collection required for well-founded evaluation of the character and dating of the occupation of this site. Of the many findings gathered in the reported two seasons, we can emphasise the following as particularly significant.

1. Terrace 3 seems to have constituted the most important occupation area at this site during the Early Khartoum culture. It was used for both settlement and burial activities, with the latter confined to the southern part of the terrace. Detailed study of the stratigraphic relations between uncovered layers and funerary and non-funerary features, together with analyses and dating of the finds derived from their fills, will be crucial for the understanding of the character and relative chronology of both activity types at this site. In addition, the fact that intact settlement stratigraphies were detected here places Fox Hill among the few sites in central Sudan where it is possible to build a local chronology of artefacts based on stratigraphic sequence.

2. On the other hand, on the lower Terrace 1, only the uppermost section appears to have been used for settlement during the Early Khartoum culture, with the lower-lying reaches of the terrace showing

20 that the distal part of the right foot is in strict anatomical connection, while the tarsal part is broken in several segments (no. 2–3 in Figure 20). The talus and the calcaneum are in strict anatomical connection (no. 4) but dislocated from the tibia and fibula. Finally, the first proximal phalanx (PP1) is broken *in situ* (no. 1). The latter situation could be explained by natural mummification of the right foot in an empty space. Post-depositional processes would have produced pressure by the left lower limb covering the right foot, causing the fracturing of the PP1 and of the foot articulations at several levels, displacing them in blocks before a delayed sealing by the sediments.

The evidence here does not support a multiple deposit, but rather the succession of three primary individual burials in close vicinity. Although the close relationship between B.26 and B.27 questions the definition of individual deposits, further evidence is needed to discuss the possibility of ‘sparks’ of collective behaviours in the

evidence for distinct, largely natural deposit formation processes.

3. Our research has confirmed the existence of a large, prehistoric burial ground on Terrace 3 at Fox Hill. While many of the burials uncovered here share general characteristics with the Early Khartoum burial ground explored previously at Sphinx (see Varadzinová and Varadzin 2017; Varadzinová *et al.* 2022), there are several features that are clearly different (see Varadzinová and Varadzin 2020). These similarities and differences bring to the fore the question of interaction between the groups buried at both sites, in particular their chronological, social, and biological relations. Of significance will also be the study of behavioural variability within local communities, which is suggested at Fox Hill by the occurrence of very diverse types of burials and treatment of the dead in the comparatively small area of the southern part of Terrace 3 (see Varadzinová and Varadzin 2020).

4. If the existence of further Neolithic burials, so far suggested by the finds from B.19, is attested at Fox Hill, it will make it possible to address several major questions of this region's prehistory, such as the biological affinity of populations of late hunter-gatherers and early herders in central Sudan and their responses to changes in subsistence and environment.

5. The discovery of patches of reworked deposits overlaid by Early Khartoum occupation and containing redeposited lithics of possibly late Pleistocene character is of extraordinary significance for Jebel Sabaloka and for central Sudan and deserves further investigation.

The field research has confirmed that this site not only stands out in the prehistoric occupation of the entire western part of Jebel Sabaloka but may potentially become an exceptionally important source of data for addressing questions of supra-regional significance, including the question of impact of the Nile on early and mid-Holocene occupation in central Sudan and the question of biological or cultural diffusion in Sudan at the transition between the Mesolithic and the Neolithic (Varadzinová *et al.* 2022).

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