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## Sudan, Prehistory of

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### Introduction

The Republic of Sudan, northeast Africa, is bordered by Egypt, Libya, Chad, the Central African Republic, South Sudan, Ethiopia, and Eritrea. To the east there is the Red Sea. With an area of 1,886,068 square kilometers, it is the third largest country in Africa. The country is marked by diversity in terms of environment, archaeology, and ways of living. The most well-known archaeological remains and periods are the pyramids from the Kingdom of Kerma (2500–1500 BC), the rise of the Kingdom of Kush (c. 785 BC–AD 350), the later Christian kingdoms of Nobatia, Makuria, and Alodia and the Funj Sultanate in central and eastern Sudan. Sudan's complex history has seen Mahdi, Ottoman, British, and Islamist rule and is now a secular state. While the present population is estimated to be 70% Arab, there is a diverse range of groups, languages, and dialects.

The environment is a combination of flat plains broken by several mountain ranges. The 853 km coastline borders the Red Sea. Vital to life are the Blue and White Nile, which meet in Khartoum to form the Nile, flowing northwards through Egypt to the Mediterranean Sea. The present climate is generally arid, becoming somewhat wetter toward the south. The dry Nubian and Bayuda deserts were once home to a number of people. Desertification and soil erosion have been problematic across time. Diversity in ways of living and changing climatic conditions can be traced as far as the Palaeolithic.

### Definition and Historical Background

The prehistory of the modern state of Sudan is currently a patchwork of terminologies, both in terms of time periods and localized tool industries (see Garcea 2020). Prehistory is here defined from the earliest remains to the pre-Kerma period (in Nubia), and c. 3000 BC in central Sudan and elsewhere. The end point is somewhat arbitrary, as is the discipline of prehistory more broadly. As such, this focuses on pre-state societies while recognizing that boundaries are often blurred. Palaeolithic terminology is a mixture of European and African terms. This problem is endemic to the African continent and has been the subject of much debate. Clark et al. (1966), for example, suggested that the term Levallois should only be used to describe the method of flake production and that the "Neolithic" should be used with the greatest care. Equally, Posnansky (1982) highlighted the vastness of sub-Saharan Africa and how archaeology grew as an appendage of European archaeology. This resulted in


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numerous problems, including the Stone Age being seen via the lens of the European Palaeolithic. The appearance of new tool types caused consternation and resulted in a number of site-specific terminologies in African archaeology (e.g., Sangoan and Capsian). More problematically, the Eurocentric point of view was at odds with the climate setting across the continent. More recently, Scerri (2019) has shown how tool nomenclature is at odds with populations and that nomenclature is reflective of research history, rather than a methodical and consistent study of assemblages. As such, the terms Acheulean and Levallois are used here strictly to denote *techniques*, whereas the Three Age system is used only in the broadest sense. Furthermore, many of the terminologies used by Palaeolithic scholars in the Sudan are either regionally specific or, like Nubian Complex, have come under question for their utility. At the outset, it is noted that concepts like Mesolithic and Neolithic are insufficient in both European and African archaeology.

There are added problems in this scenario. For a long time, Sudanese archaeology focused on Nubia and was largely seen through an Egyptian lens. Sudanese prehistory owes its framework largely to Anthony John Arkell, a British archaeologist and colonial administrator, and the International Rescue Nubian Campaign (a joint Egyptian-Sudanese request to protect sites after the building of the Aswan High Dam was proposed in 1954). The influence of this project continues to be reflected in fieldwork centered around the Nile north of Khartoum. Indeed, the missions that venture into the eastern Sudan and wadis outside of the Nile valley remain the exception. This problem is felt by a number of archaeologists (for a full discussion on these gaps see the December 2020 issue of *Azania*).

## Key Issues and Current Debates

### Early Hominids, Palaeolithic

The spread of hominids in Sudan remains the most understudied area, with the only anatomical remains being the Singa skull. Found in 1924 in a riverbed near the house of the Funj province governor W.R.G. Bond, the skull dates to 131–151 ka (U-series, McDermott et al. 1996). Its initial discovery resulted in debates about relations with "Bushmen" in southern Africa. Found embedded in a limestone concretion in the Blue Nile, the skull has been subjected to a number of cleaning attempts. The face below the orbits is missing. Scant evidence points to an ancestor of modern humans. The skull was found with a number of fossilized animals and tools, including some from nearby Abu Hugar (25 miles away). While skeletal evidence remains lacking, more recent work has shed more light on Pleistocene environments. The Middle Atbara Badlands yielded a thick deposit that stretches from Khashm el Girba to Halfa al Jadida. Abbate et al. (2010) divide this into two synthems (stratigraphic units): (a) the Butana Bridge Synthem (BBS) and (b) the Khashm el Girba Synthem (KGS). The BBS is 10 m thick and has vertebrate remains and a number of Acheulean artifacts. It was deposited from the late Early to early Middle Pleistocene. The BBS is made of three stacked intervals. The top of interval (i) yielded a skull of *Elephas recki recki* and some postcranial remains, the maxillary bone of *Hippopotamus* cf. *gorgops*, fragments of *Girafidae indet*., and a few remains of *Bovidae* (indet.) and a carapace of *Testudines* (indet.). Interval (ii) is very rich in lithics, mainly chert.

After this there is a gap of c. 100,000 years followed by 40 m thick KGS fluvial deposits. These contain vertebrate remains and late Acheulean to Middle Stone Age artifacts. Divided into 3, KGS 1 is a time of meandering rivers, dating to the MIS7 wet period, whereas KGS2 and 3 show episodes of increasing rainfall (MIS 5.3, 5.5) following by arid conditions (MIS 4). KGS 1 has a number of fossil fragments of *reki reki*, an equus tooth fragment, remains of *Hippopotamus amphibius*, *Crocodylus niloticus*, and a large sized *Testudines* (indet.). A number of KGS 1 sites on the Atbara plain (009, 019, 021, 022) have yielded numerous lithics. KGS 2 and 3 contain evidence of mollusk patch reefs dating to the late Middle to the Late Pleistocene. KGS2 fauna include Nilotic crocodile, *Reki reki,* hippopotamus, *Phacochoerus*, *Giraffa carmelopardalis*,

*Nyala*, *Syncerus antiquus*, *Taurotragus*, and some bovids. KGS3 has yielded scanty remains of hippopotamus, a large sized gazelle, and some Bovidae, alongside some small quartz flakes and flint blades (Abbate et al. 2010).

More promising data come from the Atbara plain, which is 200 km wide and 400 km long and bounded by the el Awad hills to the west and the Red Sea hills to the east. Atbara 047, on the left bank, has yielded a number of mollusk shells. It also has a palaeosurface with traces of tree trunks in life positions and 12 unretouched flakes. Site AT 006 yielded the partial skeleton of *Syncerus antiquus* and small chert and quartzite flakes with frequent small blade components. The KGS is overlain by a thin alluvial and colluvial sand containing Late Stone Age artifacts.

In short, the BBS activity has been linked to the late Acheulean, and the KGS1 to the Levallois. Calendric dates are few, with the BBS faunal assemblage dated to the Early Pleistocene. Abbate et al. (2010) have associated these activities with the presence of *Homo erectus/ergaster* and the spread of *Homo sapiens sapiens*. Geographically, this is plausible as the Nile corridor was a major thoroughfare. However, there remains a lack of anatomical evidence that can be correlated with lithic assemblages. As Scerri (2019) notes, this remains a major problem with tool type nomenclatures, which do not necessarily correlate with human species. That said, the Atbara river (originating in the Ethiopian highlands) is part of a dynamic region that served as an important corridor between East Africa and the Mediterranean, and this region is ripe for further study, as discussed by Masojć et al. (2019) with reference to the eastern desert.

The Western Periphery of the Red Sea (WPRS) is an ideal corridor between East Africa and SW Asia, in terms of geography and habitat. The Danakil Depression has a rich fossil record, but there is a significant lack of data from Eritrea and Sudan. In a survey of the Agig coastal zone and the Khor Baraka basin Beyin et al. (2019) examined the possible route to the WPRS via Danakil, uncovering a number of Stone Age sites. This reveals that hominins exploited diverse landscape, produced good quality raw materials for tools, and made use of coastal niche aquatic resources.

The majority of Palaeolithic sites were identified via lithic scatters, with a number of sites lost as a result of the evolution of the Nile. The earliest known sites date to the Late Acheulean and are generally located close to ancient terraces or on top or on the slopes of jebels (mountains). Arkell (1949b) examined a number of sites and referred to the Palaeolithic as the Stone Age, although its dates do not necessarily work in tandem with the SA elsewhere. Khor Abu Anga yielded numerous artifacts in situ, which Arkell (1949b) compares with the Chelles-Acheul culture and some earlier material. The site included a number of Acheulean hand axes (for a reassessment see Carlson 2015). Stone tools, mostly Acheuelean, were also identified in a number of sites between the Second and Sixth Cataracts. More secure information comes from al-Jamrab, providing a well-documented and well-dated sequence Middle Stone Age sequence in a location far from the Nile River (Spinapolice et al. 2018). This region may have been a key "marginal" wetland.

The Middle Palaeolithic (Middle Stone Age) of the Central Sudan has been subdivided by van Peer (1991) into (a) the Early Middle Palaeolithic/Nubian Middle Stone Age, (b) the Middle Palaeolithic (Nubian Mousterian and Denticulate Mousterian), and (c) the Late Palaeolithic (Khormusan). The first is characterized by Nubian Levallois technology, which has two types of cores. The Middle Palaeolithic is defined by a number of scrapers, denticulates, and notches. A number of sites are known in the Second and Fourth Cataract. In the Sudan the Late Palaeolithic Khormusan appears to be confined to the banks of the Khor Musa. The Khormusan industry, dated to c. 40 kya (Wendorf et al. 1979), uses different raw materials for tools, although these are still seen via the lens of the Levallois. A number of Khormusan sites have yielded abundant faunal remains, especially *Bos primigenus* and fish.

The Upper Palaeolithic (Late Stone Age) is mainly known from the Second Cataract region. The main lithic industries are Halfan, Ballanan, and Qadan. A number of smaller industries such

as Sebilian (found at Kom Ombo, Egyptian Nubia) and Gemaian are very poorly defined (Usai 2019). The Halfan industry (type site Wadi Halfa, Second Cataract, c. 19,500–17,500 BC) is characterized by small flint, agate, or fossil wood pebbles. Site 443 has also yielded fireplaces with a base made out of pebbles. This included a number of ostrich shell beads, fragments of hematite originating from Batn el-Hajar, and remains of *Bos primigenus*, antelope, gazelle, hippopotamus, and fish (Vermeersch 1992). The Sebilian is characterized by macrolithisim. This remains undated, except for an association with Nilotic sediments (Usai 2019). However, Osypiński et al. (2016) posit that it remains in use as late as 16 kya, at least in the Affad region (southern Dongola reach). The Ballanan and Qadan industries share common traits in their reduction technology. While the former seems to favor blades and the latter flakes, the distinction rests on a small number of sites. Indeed, the only sites associated with the Qadan are mortuary, including the cemetery at Jebel Sahaba (Wendorf 1968a).

The terminology can be overwhelming. The ESA (Acheulean) is followed by the MSA (Sangoan) and the LSA (Lupemban-like, with the Lupemban being a Central African industry from c. 400 ka). Some of the best information comes from Saï Island, particularly site 8-B-11. Here there is a clear transition from the Early to Middle Stone Age (Van Peer 1991), with the earliest phases dating to as early as c. 220 ka (Van Peer et al. 2003). There is the exploitation and processing of pigment minerals. This site is particularly important as there are stratified deposits from the late Middle to the early upper Pleistocene. There is repeated Middle Pleistocene occupation along the banks of a small gully. The sediments date to 220–150 ka and tools have been labeled as Acheulean followed by the Sangoan. The sequence is truncated by Nile flood plain silts in which three occupation levels with Lupemban-like Nubian complex assemblages are stratified. The gully fill is overlain by black Nilotic silts with two in situ occupation levels. Here, the lithics are thin bifacial foliates and the blanks derive from the Levallois, Nubian, and discoidal reduction strategies. The black silt assemblages are similar to those associated with eastern Saharan OIS5 palaeolakes and others from the lower Nile valley. The excavators thus conclude that the site 8-B-11 finds belong to the early Upper Pleistocene Nubian complex.

Underneath there are the following deposits. The lowermost level contains late Acheulean industry with large lanceolate hand axes. OSL of overlying aeolian sands gives a maximum age of 223 +/− 10 ka. Above this are three occupation levels with Sangoan lithics, divided into three relative phases. The lower phase occurs in a fine gravel deposit associated with a new fluvial phase. Here there are no handaxes, flakes, are rare and there are blanks from discoidal and globular cores. The presence of hammerstones, grinding stones, core-axes, and dense concentration of red and yellow ochre lumps, together with a worked Nubian sandstone slab, attest to numerous activities. The slab has a number of steep flake negatives, perhaps showing that flakes are not so rare after all. The top of the stone was flattened by pecking using a larger stone. Also in this level are chert pebbles with ochre particles on one face. One example has a thick wear polish and another has streaks of red and yellow pigment applied to one of its faces. Other sandstone slabs are found in the middle level, alongside quartz core axes of Khor Abu Anga type and imported quartzite cobbles with wear facets that had phytoliths and starch granules. Crucially, this level has the only known sequence of hand axe production, in the shape of two lanceolate handaxes made of chert and ferrocrete sandstone. These raw materials are practically absent in the mature Sangoan. However, one axe has been labeled Sangoan, and another Acheulean, which highlights the issue of rigid typological applications at this critical juncture in human evolution where technologies were evolving and where technologies typical of preceding and succeeding periods are often found together (Van Peer et al. 2003).

The Middle Palaeolithic has been subdivided by van Peer (1991) into (1) Early Middle Palaeolithic/Nubian MSA, (2) Middle Paleaolithic (Nubian Mousterian and Denticulate Mousterian), and (3) Late Palaeolithic (Khormusan). Here you can see the reliance on

stone tool types which do not always correlate with the broader way of living. For example, the first phase is set within the Levallois technology, but the stone tools have different characteristics and are thus termed Nubian Levallois on the basis of two types of cores. More problematically, this type is claimed to stretch to Yemen and Oman, and thus taken as an indication of dispersal. More broadly, the overwhelming focus on tool technology has overlooked the agency of people involved and how they adapt to different environments. Furthermore, most of these tools are found in the Second and Fourth Catarct and Bayuda regions (Wendorf 1968b). The association between tools and human activity is not always clear. For example, at Site 440, only one tool was found in a stratified context. It was associated with a faunal assemblage. In central Sudan, sites of this period are only known from sporadic findings, and these tend to be largely unpublished (Usai 2019). The Khormusan industry type site is Site 1017 on the bank of the Khor Musa, and the chronology was revised following excavations at Site 34 D and ANW-3, which dates the Khormusan to c. 40,000 ka. The assignation is based on different raw materials worked into Levallois cores that are smaller than Classic and Nubian Levallois. Still, it remains difficult to relate this to human activity beyond tool making. Some sites do have abundant faunal assemblages that include Bos primigenus and fish, but the tools are only associated with features only found in the Second Cataract. These are connected with the use of fire and bone tools. Middle Palaeolithic sites in Sudanese Nubia are concentrated along the Nile Valley, and this period is better documented in Egyptian Nubia.

The Upper (Late) Palaeolithic is mainly known from the Second Cataract region. Again, it is described in terms of lithic industries, namely (1) Halfan, (2) Ballanan, and (3) Qadan, with a number of poorly dated subdivisions such as the Sebilian (Kom Ombo, Egyptian Nubia, very poorly dated) and the Gemaian (an industry that has remained undefined since the 1960s). The Halfan is broadly dated 19,500–17,500 BC. At Site 443 the tools are found associated with fireplaces with a base made out of pebbles. Also found are unfinished ostrich egg shell beads, fragments of hematite from Bath el-Hajar, remains of wild cattle, antelope, gazelle, hippopotamus, and fish. The small flint, agate, and pebble tools make way for macrolithism in the Sebilian. The lack of dating makes this difficult, but Osypiński et al. (2016) postulate a prolonged use as late as 16,000 years ago in the Affad region (southern Dongola). The Ballanan and Qadan are difficult to acknowledge as "industries" in any meaningful way, particularly since they both adopt reduction techniques and a focus on microliths. Still, "Qadan" tools are associated with a number of burials at Jebel Sahaba.

The predominance of stone tools is also seen in the Bayuda Desert (Masojć 2010), where in an area of 40,000 $km^2$ the vast majority of remains are stone tools. Most sites are badly eroded, with site BP 177 (Goat Mountain) being a welcome exception yielding over 15,000 stone artifacts dating to the Middle Palaeolithic. However, they remain decontextualized from the broader pattern of human activity. Similar problems are found at El Salha in central Sudan. Here, the oldest occupation is at Jebel Baroka, in the Wadi Baroka floodplain. The finding of Palaeolithic and other prehistoric remains is particularly important as this area is normally known for post Meroitic remains. Traces of late Pleistocene settlement activity are found at Affad 23, Southern Dongola Reach via postholes and pits (Osypiński et al. 2016). These indicate temporary shelters and the exploitation of a wide range of riverine resources and hunting. Occupation levels broadly correlate with the abrupt return of the African monsoon system (c. 15 kya) and the associated replenishment of the Nile from the overflowing Ugandan lakes. An OSL date of 15.9 +/− 1.75 kya from an occupation deposit dates the time when the dessicated flood channels were reactivated, creating and nourishing adjacent wetlands. Similarly, an OSL date of 15.3 +/− 1.68 kya dates an abrupt drop in human activity.

The Levallois style tools point to meat processing. This 16,000-year-old site in the Middle Nile Valley also illustrates issues with stone tool terminology; here people preferred Levallois as opposed to Epipalaeolithic microliths, and these kinds of technological choices offer scope for

further research, especially when one takes into account the highly organized camp configuration. The structures are neatly organized, with clusters of faunal material that include an articulated kobus. The tools were used for skinning, filleting, and stretching hides. More interestingly, the stone quality was tested by primary core flaking and traces of this activity are found across the site. The processing of blanks and production of retouched blades was confined to specific zones, which do not overlap cut features of hearths. So while this camp was occupied seasonally, there was a focus on localized activities in separate zones. The wetland adapted fauna provided a diverse range of meat that included kobus antelope, redbuck, dik-dok, and African buffalo. Fishing was confined to floodplain pools at the beginning and end of the high water season. Localized patches of baked sediment are fairly shallow and the excavators (reasonably) link these to the smoking of meat. This would have offered food security in the longer term (Masojć 2010).

### Mesolithic

Traditionally, the Holocene cultures have been geographically divided into Lower Nubia (from the First Cataract in southern Egypt to just below the Second Cataract in northern Sudan), Upper Nubia (until the Fifth Cataract), Central Sudan (until around Khartoum), and the Gezira Plain. There are few extensively excavated and well-dated sites attributable to the Mesolithic in the Sudan, which begins in the late ninth millennium BC. The transition to Neolithic food-producing economies starts at different times. There is a two-century hiatus in occupation in Lower Nubia from c. 5500, said to be the result of increasing aridity but which may instead be reflective of the limited number of excavations in the region. The subsequent phase from 5300 BC onwards is linked with the advent of Neolithic food producing economies. At Saï Island (Second Cataract), the end of the Khartoum Variant (c. 4800 BC) overlapped with the Abkan (c. 5300), which is the earliest local food-producing phase. In Upper Nubia, the transition is bracketed to the early sixth millennium BC with the first domesticated cattle known from the Kerma region, while it occurs in the early fifth millennium BC in the Central Sudan. In the adjacent Wadi Howar and Laqiya regions, it is bracketed between the mid-eighth and early fifth millennium BC and the fifth millennium BC, respectively.

With the early African Humid Period, humid climatic conditions are recorded in the Sudan north of the Khartoum area from c. 8300 BC. The resulting mosaic of local and regional habitats corresponded to the geological settings of the Nile River and its tributaries. At this time, the Central Sudan supported wooded savannah vegetation while the southern Gezira had swamps and northern Dongola extensive alluvial planes and terraces with a mix of open desert savannah and fresh water (riverine) habitats.

Unfortunately, there has been no systematic excavation of Mesolithic sites in Upper Nubia outside of the region of Kerma in the northern Dongola Reach (Upper Nubia). This region has the earliest evidence for Holocene occupation in northern Sudan, although a possible earlier settlement (c. 8600 BC) may have been found in the Amara West area just north of Saï Island with the caveat of an unproven association between the two pottery sherds and the dated fireplaces (Garcea et al. 2016). The occupation of Wadi el-Arab began c. 8300 and continued until c. 5400 BC (Honegger 2005, 2014). The inhabitants were pottery-producing hunter-foragers living in semi-permanent settlements. Habitation structures have been excavated which were dug into the sediment, while hearths, pits, and a few burial remnants have also been detected. There is a Mesolithic cemetery with c. 50 individuals. A cattle skull was deposited on top of a child's body in a grave around to around 5750 BC; the grave is part of the earliest known Neolithic cemetery in the Sudan.

The nearby site of El-Barga is dated to 8300–6300 BC. Its Mesolithic occupation remains stretch over several hundred meters. There are thick continuous stratigraphic sequences with habitation remains. There is a habitation structure with a semi-underground floor dating to between 7500 and 7000 BC. It is

just less than 5 m in diameter, with a depth of a little over 50 cm, and the walls almost vertical on the east side. The settlement also has some of the earliest Holocene burials in the Sudan, dating to 7800–7000 BC. Up to 16 burials are attributable to the Mesolithic (Honegger 2004). The graves are dug into the bedrock and contain a single individual whose orientation and position vary. One grave was dug at the edge of the hut; although it was large, the body was contracted as if it was wrapped in a bag made of perishable materials. Only one grave had an offering, a bivalve, which was dated to 7000–6800 BC. There is a single child and the rest are believed to be adults. The ceramics in association with the hut have affinities to the Khartoum Variant complex, which is distinguished from the Central Sudan's Khartoum Mesolithic (Early Khartoum) first described by A. J. Arkell (1949a) from the site of Khartoum Hospital and which covers Lower Nubia and much of Upper Nubia. Equally important is the evidence for domestic cattle (bucranium) at el-Barga around 5750 BC (Linseele 2013) which is the earliest known domesticated animal in the Sudan. The introduction of domesticated animals signaled the end of the Mesolithic in this region, with domesticated sheep or goat remains on Boni Island dated to 5700 BC.

In Lower Nubia, the earliest well-excavated settlement is known from Saï Island from ca. 7600 BC (Garcea and Hildebrand 2009). The ceramics are assigned to the Khartoum Variant complex (D'Ercole 2017). Links have been made between decoration techniques at Saï Island and the Kerma region. Habitation remains and thick stratigraphic sequences at Saï Island have been interpreted as indications of sedentary or semi-sedentary occupation, with exploitation of Nilotic resources. From Saï Island, the temper of the Khartoum Variant pottery comprised coarse quartz, K-feldspar, and metamorphic inclusions in large quantities. There are almost no instances of organic inclusions, and the finishing techniques were similar throughout the Early Khartoum: burnishing was uncommon and firing occurred in temperatures of up to 800 °C.

A limited number of open-air sites around Wadi Halfa, Abka and the Batn-el-Hagar areas are suggestive of mobile groups also occupying the landscape. The lithics in the Second Cataract area fall under the broad term of the Shamarkian microlithic industry. By the sixth millennium BC, there were harpoons with barbed bone heads at Catfish Cave (Second Cataract) indicating specialized fishing activities (Vermeersch et al. 2015). Links have been made between the lithic and ceramic assemblages from Lower Nubia and Nabta Playa in the Egyptian Western Desert (Gatto 2006; Usai 2005). In general, however, the lithic complex associated with the Khartoum Variant is poorly defined at a broad regional level, with similarities such as notched and denticulated pieces with continuous retouch in common with the Shamarkian. Usai (2005) has hypothesized that perhaps the Khartoum Variant lithic complex is an advanced phase of the Shamarkian.

In the Central Sudan, frequent Blue Nile flooding and the presence of swamp-like conditions on the floodplains would have hampered large-scale occupation prior to the eighth millennium BC. While Sorourab 2 is claimed to have the earliest pottery at c. 8700 BC, post-depositional disturbances have affected this and most of the known sites and were not adequately accounted for by the excavators (Salvatori et al. 2011). The notable exceptions are Al Khiday, just south of Omdurman along the banks of the White Nile, and Sabaloka, north of Khartoum at the Sixth Cataract. Further south, renewed excavations at Jebel Moya are unearthing the first in-situ Mesolithic finds in the southern Gezira Plain from the late sixth millennium BC. The earliest Holocene occupations are contemporary with the more northerly Khartoum Variant. In the upper Atbai, Abu Darbein dates to the eighth millennium BC. The ceramic décor techniques are different and Gatto (2006) attributes them to the Early Khartoum. The Early Khartoum stretched from Al Khiday up into the Dongola Reach below Kerma, the adjacent Laqiya and Wadi Howar regions, the northern Atbai, and into the northern Butana. In the southern Dongola region, Hays (1971) adopted the term "Karmakol" for the Early Khartoum-related material remains in the southern Dongola. The Mesolithic in the Atbai and Butana is poorly known. In the southern Gezira, the earliest ceramics from

Jebel Moya show some decoration affinities with the Early Khartoum but a larger assemblage is required to make any definitive determinations about how far south the Early Khartoum complex spread (Brass and Vella Gregory in press).

North of Khartoum, apart from a Mesolithic phase dating from the mid-seventh millennium to mid-sixth millennium BC at El-Qoz and Kabbashi, the most comprehensive and systemic Mesolithic excavations are being undertaken by the Charles University Sabaloka Expedition at Jebel Sabaloka, a small volcanic mountain (Suková and Cilek 2012). To date, c. 30 sites have been recorded which attest to low mobility and high occupational density with long-term occupation. There are also large burial grounds. The surrounding ecology was exploited year-round with scheduled fishing exploitation. Numerous grinders indicate plant processing. In the western portion of Jebel Sabaloka is the site called Sphinx which has an almost continuous occupational sequence spanning approximately 3200 years until around 5000 BC (Garcea et al. 2020). The lipid residue analysis of the earliest Early Khartoum pottery from Sphinx show that wild animals – ruminant and nonruminant – products were processed. The stable carbon isotope readings derived from the fatty acids of the residue also shed light on environmental conditions: C3 plants were being consumed by the wild animals, reinforcing the geological reconstructions of a humid environment in the Central Sudan at this time. One sherd showed evidence for plant processing and it came from the fill of a Mesolithic burial.

South of Khartoum, three Mesolithic phases have been documented at Al Khiday: (1) Early Mesolithic (c. 7000–6750 BC), (2) Middle Mesolithic (c. 6750–6200 BC), and (3) Late Mesolithic in the late sixth millennium BC. The coherent stratigraphic contexts at Al Khiday permitted the first undisputable determinations of the evolution of pottery assemblages in the Central Sudan (Salvatori 2012). Parallels have been drawn between the appearance of long dotted wavy lined pottery and the more northerly Laqiya area, but the type of dotted wavy line pottery present between the two areas is short wave; whether this similarity is indicative of interregional contact requires further investigation.

An undefined pre-Mesolithic occupancy of the area has been recognized at Al Khiday site 16-D-4, which is a multiphase cemetery with a Middle Mesolithic settlement. A total of 190 graves have been found at this site from the Pre-Mesolithic, Neolithic, and Classic-Late Meroitic (Usai and Salvatori 2019). The Pre-Mesolithic burials are among the earliest known in the Sudan. However, their precise Early Holocene date is unknown due to the lack of collagen in the bone. There are 90 Pre-Mesolithic individuals in total who were interred prone and elongated in ellipsoidal graves. They had no accompanying burial goods. Their graves were several centuries before later Mesolithic settlement fireplace pits dated to ca. 6700 BC and 12 of the graves were cut by the fireplace pits. Finally, their oxygen isotope readings indicate a wetter environment than in later Mesolithic and Neolithic times and other isotope readings indicate their diet comprised $C^4$ plants, which also points toward an environment with increased rainfall.

Also at Al Khiday, Site 16-D-5, dated c. 7000–6400 BC, has a detailed and well-preserved stratigraphic sequence encompassing living floors and structural remains (walls), fireplaces, and dumping pits. The dumping pits contain freshwater shells, pottery, grinding stones, faunal remains, and lithics. The artifacts include harpoons, bone tools, ivory bracelets, and grinding stones sometimes with ochre stains. Site 10-W-4 dates to the mid-sixth millennium BC, and stone artifacts and pottery are scattered over an area of 2.1 hectares. Similar to El-Barga and Wadi el-Arab, remains of two subterranean huts have been excavated. The presence of more huts has been detected. Fish remains have been found at both sites; site 16-D-5's studied fauna is predominantly fish but other freshwater taxa include crocodiles and turtles. At Site-16-D-4B, there is the earliest evidence for fish salting with salt found on the fish bones. Apart from Catfish Cave at the Second Cataract and Al Khiday, further evidence for fishing in the Mesolithic of the Sudan comes from El Mahalab (6500–5850 BC), Sheikh Mustafa (c. 6800 BC), and other sites

where fish remains have also been found (Linseele and Zerboni 2018). The game species composition is similar at both sites with high diversity: animals such as antelope, carnivores, giraffe, rhino, and warthog indicate a much wetter environment than in modern times.

Further south at Jebel Moya, excavations during the 2019 field season have gone down through the Neolithic layers and are into the Late Mesolithic (Brass et al. 2020). Future field seasons will continue exploring the extent of the Mesolithic occupation. The pottery from the excavated Mesolithic layers are currently attributable to the late sixth millennium BC. There are some resemblances to Late Mesolithic décor from sherds at Al Khiday and elsewhere in the Central Sudan. A dried mud wall was found in the latest Mesolithic layer, but more data is needed to flesh out the nature and timing of the first in-situ Mesolithic remains and artifacts from the southern Gezira.

## Neolithic

The environmental conditions began to change around 5300 BC, particularly in northern Sudan with a decrease in humidity levels. Rainfall decreased and the climate started its trajectory toward its modern aridity. In Upper Nubia, there appears to be a hiatus in occupation between 5500 and 5300 BC in the Kerma area. This was possibly due to decrease Nilotic levels. There is no such hiatus at Sai Island at the Second Cataract in Lower Nubia where seasonal wet conditions existed until c. 4300 BC and where peoples of the new Akban complex overlapped with the end of the Khartoum Variant complex. The environmental changes were less noticeable at first in the Central Sudan. The faunal remains from esh-Shaheinab (4800–4500 BC) indicate a wet environment with a rainfall of over 400 mm per annum: buffalo, giraffe, and hippopotamus, among others, together with botanical *Celtis integrifolia* seeds and *Limicolaria caillaudi* gastropods. However, the rainfall reached more modern-like proportions (100–200 mm per annum) at Khartoum at c. 3500 BC (Sadig 2010), while the flow of the White Nile at this time was reduced (Williams 2019).

The Neolithic is bracketed as beginning between 6000 and 5900 BC in Upper and Lower Nubia, and at the beginning of the fifth millennium BC in Central Sudan. In northern Sudan, its end is bracketed at c. 3500 BC with the advent of the pre-Kerma period. In the Central Sudan, it is c. 3000 BC (Sadig 2010). While the end of the Mesolithic is also assigned in the southern Gezira to the end of the fifth millennium BC or the early fourth millennium BC, the transition from the Neolithic is currently bracketed to the mid-second millennium BC at Jebel Moya (Brass et al. 2019). Similarly, there is a different socioeconomic trajectory in the Eastern Sudan (Manzo 2012).

In Lower Nubia, the majority of the Abkan sites, like their Khartoum Variant predecessors, were surface locales suffering from erosion and deflation. However, they shifted from hills to the alluvial plane, wadi entrances, or wadi terraces. Sites with similar technologies and stylistic compositions have been found in the Egyptian Western Desert (Nelson and Associates 2002), in the Laqiya region and as far south for ceramics as the Kerma region (Honegger 2014) and Korti near the Fourth Cataract (Gatto 2002). The best excavated Akban site remains Saï Island. The advent of the Abkan also saw a change in ceramic production, which is reflective of a herding component in the communities, and in its usage as it was no longer used predominantly for more sedentary storage purposes (D'Ercole 2017). The development of the Abkan ceramic tradition in Lower Nubia follows a similar pattern to Nabta Playa, Laqiya, and Wadi Shaw. Unlike during the Mesolithic, the Laqiya region has no similar decoration to any pottery from Al Khiday. Comparable Abkan ceramics have been found in the Kerma region to the south.

The first domesticated cattle remains are found in the Upper Nubian El-Barga cemetery (Kerma) dated to c. 5750 BC. The cemetery is dated to 6000–5500 BC. Subsequently, there was an extensive habitation settlement dating to between 5000 and 4000 BC (Honegger 2014), which included evidence for livestock in the form of enclosures and faunal remains, including evidence for fishing. The pottery from the settlement phase has affinities with the Abkan, inclusive of

black-topped and ripples wares. There are no affinities with the contemporary Central Sudanese esh-Shaheinab complex. The neighboring Wadi Howar, however, developed its own pottery traditions, while some ceramics from the contemporary site of R12 (south of Kerma in the northern Dongola Reach) has similarities to Central Sudanese sherds (Salvatori and Usai 2008), and analysis of the first phase of El Ghaba (mid-sixth millennium BC, Central Sudan) (Salvatori et al. 2016) burials shows affinities to the contemporary Middle Neolithic of Upper Nubia. The faunal remains and animal products present in the graves at R12 reiterates the increasing importance of domestic livestock in Upper Nubia, but as one component of a broad-spectrum incorporating foraging and hunting of a variety of wild animals. Subsequently, the increasing aridity affected the settlement patterns and arguably population density as no new sites are yet known post-4000 BC until the Pre-Kerma period. This hinders our understanding of the transformational processes between the Middle Neolithic and the Pre-Kerma periods.

Apart from the habitation remains in the Kerma region, the next set of evidence for social structure comes from the cemetery at R12. The excavators note that it is likely that the full range of social behaviors, status, and wealth distribution was not represented in the burial treatment for different age groups. In a cautionary note for mortuary studies in the Sudan, they concluded that "social status seems to be well mirrored by grave goods more in terms of quantity than quality" for those burials where wealth appears to be represented (Salvatori and Usai 2008: 135).

In the Central Sudan, post-depositional disturbances are a huge issue in systematically excavating and reconstructing Neolithic sites. The Neolithic occupation of Haj Yusif, for example, is dated to between 4400 and 3800 BC but its strata are only up to 20 cm in depth. Esh-Shaheinab, 50 km upstream from Khartoum on the west bank of the Nile, fared better with a depth of up to 70 cm. Dated to c. 4800–4500 BC, Esh-Shaheinab's economy was oriented around forager-hunter-fishing with an element of herding. Its faunal assemblage was dominated by wild animals and aquatic exploitation. Domesticated animals (sheep and goats, no conclusively identified cattle) account for 2% of the faunal assemblage.

Cattle are known from Umm Direiwa, dated to c. 5050–4790 BC (Haaland 1987). The pottery raw materials differ from the preceding Mesolithic and comprise of local alluvial sediment, which resulted in a more standardized temper due to similarities in the chemical composition over large distances. These early Neolithic locales are said to semi-permanent settlements (Haaland 1987). Critically, domestic animals were but one component of the faunal assemblages and wild cereals were exploited, rendering any designation of these communities as pastoral inaccurate (Salvatori and Usai 2019). At Shaqadud, at the start of the Butana Plain and oriented to the savannah rather than to the Nile, the focus remained on wild resource exploitation.

At Kadero slightly north of Khartoum, the settlement started c. 4800 and ended by c. 3700 BC (Chlodnicki et al. 2011). Its cemetery spanned c. 4450–3900 BC. If there were older graves, they disappeared through erosion. There is a burial (number 243) which indicates there was limited use of the cemetery a millennium later; it is dated to 2876–2628 BC, which corresponds to dates from Nofalab 2. There are clusters of burials with rich graves goods, spanning adults of both sexes and children. However, there is no convincing evidence for stratification beyond transient elites. While others have argued for social stratification, this is based on outdated approaches to mortuary theory and does not address questions of stratification (Brass 2016).

There is a hiatus in occupation of the Central Sudan post-3000 BC, marked by the abandonment of Kadada's cemetery, of up to two thousand years. This hiatus could be down to alluvial plain development and a lack of extensive surveys and systemic excavations outside of Al Khiday and Sabaloka, and the later first millennium BC remains in and around Meroe.

The first domesticated cereals appear in Upper Nubia and shortly afterwards in Central Sudan (Madella et al. 2014; Out et al. 2016). Near Eastern (winter rainfall) cereals wheat and barley are

known from the Middle Neolithic phase at R12 in Upper Nubia dating to c. 5300–5100 BC and the mid-fifth millennium BC, from 5620 to 5480 and 4730 to 4540 BC at El Ghaba (Central Sudan) and barley ears from the mid-fourth millennium BC at Kadruka I (Upper Nubia). These occurrences are all in cemeteries and therefore the domesticated cereals found might be the result of special and/or deliberate deposition. The finds particularly from R12 and El Ghaba are challenging the entrenched view that regular crop cultivation occurred in Upper Nubia from only 2700 BC onwards. They also challenge the established view that the Sudanese Neolithic evolved into a specialized pastoralized economy before the introduction of domesticated crops. These two winter rainfall cereals were present in the Central Sudan by at least the second half of the fifth millennium BC. Whether they arrived as a package with domesticated animals or whether there was variability in the spread and uptake of each is a question requiring more rigorous excavations and comprehensive analysis. The settlement data from Upper Nubia and the Central Sudan remains too scarce to draw conclusions about whether mobile, semipermanent or seasonal patterns predominated. Moreover, Sadig (2010) with the pot burials at es-Sour, and Salvatori and Usai (2019) have highlighted the wide variability of funerary ideology in Upper Nubia and the Central Sudan, which also argues against over-generalizing socioeconomic ideologies and identities.

The situation is being made more complicated by the emerging evidence on the domestication of the summer rainfall crop *Sorghum bicolor* (Winchell et al. 2017; Barron et al. 2020; Beldados et al. 2018). The boundary between suitability for cultivating summer and winter rainfall crops lies roughly along the longitude from Khartoum. The first evidence for domesticated sorghum, the oldest in the world, comes from the site of KG23 nearby Kassala in Eastern Sudan. The Southern Atbai was divided into several contemporary cultural groups: sixth to fifth millennia BC (Amm Adam), fifth to fourth millennia BC (Malawiya), fourth to third millennia BC (Butana), and third to second millennia BC (Gash). The site KG23 by Khasm el Girba falls within the Butana Group. The Butana peoples lived in large semi-sedentary settlements averaging 6–12 hectares and the resulting middens can reach up to 2 m in depth; definitive evidence for inherent social ranking is lacking. They exploited wild resources and had limited domesticated cattle, sheep, and goats. A total of 63 Khordhag Plain type ceramic sherds were analyzed for sorghum impressions, while silicone casts of 117 surface impressions samples have been examined by microCT scanning. It was determined that cultivation of domesticated and wild sorghum was well established by 3500 BC, and is likely to have started in the early Malawiya. Later sorghum impressions from Mahal Teglinos (Kassala) show that the domestication process was still under way by c. 1850 BC. Finally, pearl millet, whose earliest domesticated varieties have been found in southeastern Mali between 2500 and 2000 BC and likely domesticated around Lake Chad, was present in Kassala alongside the sorghum. The presence of Broomcorn millet, domesticated in China, at Ukma by c. 1700 BC further illustrates the importance of the participation of Eastern Sudan in the Red Sea and Arabian Peninsula trade.

Domesticated sorghum is not known from this time in the Central Sudan, although wild sorghum and other savannah grasses were sometimes used in ceramic temper (Sadig 2010). However, the second oldest sorghum assemblage dated to between c. 2500 and 2100 BC comes from Jebel Moya in the southern Gezira Plain c. 350 km south-west of KG23. This assemblage is more along the evolutionary path to domestication than Mahal Teglinos (Brass et al. 2019). The socioeconomic implications of the spread of early domesticated sorghum in the Eastern Sahel is as yet unknown. However, like the earlier Butana middens, the Neolithic deposit at Jebel Moya is thick at c. 70 cm, contains domesticated animal remains (cattle and sheep/goat), and burial activity starts at least as far back as the third millennium BC. While there are a few ceramic sherds from Jebel Moya which show potential connections with the Central Sudan, the winter rainfall zone of the Eastern Sahel appears to contain a number of cultures which were not exclusively connected with their contemporaries in the

Nilotic Central Sudan. Many more excavations are required to better understand these trade networks and zones of interaction.

## Burial Customs

Palaeolithic burial customs remain vastly understudied. Site 117 at Jebel Sahaba, 3 km north of Wadi Halfa is one of the few burial sites and is unlikely to be typical at a national level. Excavated by Fred Wendorf, there is tantalizing information about a number of injuries made by stone weapons. The exact associations are not always clear from the report, but it does include injuries inflicted to children. These burials were mostly covered by slabs (Wendorf 1968a). Mesolithic burials are largely known from the Kerma region. Only one Mesolithic cemetery is known from Lower Nubia: Wadi Halfa. In Upper Nubia, Mesolithic and Neolithic burials are known at El Barga, Wadi el Arab, Kadruka, and R12 (Dongola). It is worth noting that Upper Nubia covers a vast area, from the Fifth to above the Second Catarct. Between the Fifth and Sixth Catarcts, Neolithic burials are known at Kadero, Ghaba, Geili, Kadada, Sphinx, and nearby areas. Below the Sixth Cataract, the largest burial sites are Jebel Moya and Al Khiday.

Mesolithic burials at El-Barga consist of graves dug into the bed rock. These are single burials with no particular orientation or position. Only one grave had goods. By contrast, the Neolithic graves contain a number of pots, stone tools, lip blugs, necklaces made from different beads, and shells from the Nile and the Red Sea. Bracelets are made from lower hippopotamus canines. Flat pebbles are sometimes placed near the abdomen – two such examples made from hematite were covered with red pigment. Shells are sometimes perforated. A burial of a six-year-old contained Nile shell, ostrich beads, two quartzite palettes near the body, the two giraffe bone bevels, and a long axe blade, with an unsharpened cutting edge. Other burials had rare objects that include hematite and a spherical pebble of polished carnelian (Honegger 2004). Neolithic graves are sometimes surrounded by stones or covered with sandstone slabs. The majority are immature individuals and women – although there are issues of preservation and erosion (Crevecoeur 2012). In general, bodies are contracted and the orientation varies, with some found in a hyper-contracted position. Honneger surmises that these might have been bound and placed in a bag or similar. Such burials tend to be devoid of artifacts. However, where present, burial goods are lavish and this includes child burials.

This shift to richer burials is one of the broader features of the Neolithic, although the general rise in grave goods must be grounded against a relatively small number of excavated cemeteries. The existing data indicates that there were multiple cultures in the Early Neolithic. The subsequent period covered by what Salvatori and Usai (2008) term Middle Neolithic A has been interpreted by Reinold (2001) as evidence of a consolidation period for many groups in Upper Nubia in the first half of the fifth millennium. Broadly speaking, there is a mixed economy of domesticated cereals and animals supplemented by hunting and foraging, but the data are overwhelmingly from Kadruka. In the Middle Neolithic B, pottery traditions are regionalized and burials assume a more regional character. For example, at R12 there is a preference for vegetal pillows, but these are not present in the Multaga area graves (Usai and Salvatori 2019).

The Central Sudan is also marked by variability. At Al Khiday 2, the pre-Mesolithic burials were all prone, in contrast to El-Barga, and lived at a time of greater rainfall than during the Neolithic and Meroitic periods (Usai et al. 2010). Neolithic cemeteries are known at Kadero, Ghaba, Kadada, es-Sour, and al-Khiday 4, among others. Settlements are known at Geili, the middens at Kadero, Sheikh el-Amin, Haj Yusuf, and al-Khiday 6 and other areas. A number of these sites have suffered post depositional disturbance. One of the best excavated is the Ghaba cemetery. Here, bucrania are not as popular as they are in Upper Nubia and disappear by c. 4650 BC. The tradition was never adopted at Kadero and al-Khiday. Pot burials are known at Khor Shambat and es-Sour (Jórdeczka et al. 2020; Sadig 2010). At Khor Shambat they include

fetuses and/or newborns buried with a large number of goods (4350–4100 cal BC). These remains are carefully placed on broken vessels and then covered with other large sherds. Their assignation as fetuses is difficult to evaluate, in that the remains are highly eroded (Jórdeczka et al. 2020). However, it is apparent that these are either late term fatalities or stillbirths. They provide some of the most compelling burial rituals involving the very young. The very specific burial practices and the placement of necklaces and other ornaments offers rare insight into people's lives. It reveals that the very young are considered part of the social group, and they were loved and mourned. In many ways, this site offers the most human glimpse of the Neolithic.

## International Perspectives and Future Directions

Currently, the prehistory of the Sudan has an unequal relationship with broader perspectives. The predominance of outdated European terminology presents a number of difficulties, compounded by a very uneven spread of research. The overwhelming focus on later periods has resulted in a neglect of prehistoric studies, which would benefit from a broader engagement. The available data is unevenly spread and, for the Mesolithic and Neolithic, there is a disproportionate emphasis on cemeteries due to issues of the survival of sites on the alluvial plain. For all the periods under discussion, projects such as the Aswan Dam and the Fourth Cataract Dam have resulted in large areas being flooded and the materials now stored in different museums around the world have either not been fully described or are in need of re-examination. However, more recent work has shown very promising regional variations and ways of living.

The range of terms used to describe Palaeolithic tool industries obscures the diverse range of materials employed by people. For example, the Nubian Palaeolithic includes quartzite or silicified wood (site 400, Wadi Halfa), a vast area from the Egyptian border to the Third Cataract at Firka with an equally large number of sites and lithic scatters and so forth. These tools need to be re-assessed in terms of the human context, with a terminology that reflects human action rather than nods to the European Palaeolithic. Equally, the numerous regional subdivisions are more focused on terminology as an end in itself, rather than a focus on human behavior. The labyrinth of terminologies sometimes is useful in showing variation, for example the presence of Denticulate Mousterian which is confined to the Wadi Halfa region. Other assignations refer to short periods (e.g., the Gemaian industry, 15,500–13,000 BC, restricted to the vicinity of Khor Musa; or the Ballanan industry known only for a short period near Ballana in Egypt and possibly at Halfa and Kom). The focus on naming industries obscures the fragmentary nature of data, which in turn needs to be evaluated from a broader point of view. The predominance of camp sites is a strong indicator of a mobile lifestyle. Work at Affad 23 clearly demonstrates the need to adopt a broader regional approach to mobility. Equally, 8-B-11 (Saï Island) indicates that the patterns of mobility vary significantly. The WPRS is a region that has the potential of elucidating the spread of hominins.

There is a shift in how archaeology is conducted between the Palaeolithic and the subsequent Mesolithic and Neolithic periods. Settlements and cemeteries arise, but the problems of preservation due to erosion and development activities remain. For the Mesolithic in Upper and Lower Nubia, the emphasis is on Saï Island and the Kerma region. Perhaps to foreground future surveys and identification of new possible stratigraphically coherent sites, there needs to be broader academic support and engagement with archival archaeological research. Some 60 years have passed now from the Aswan Dam rescue campaigns and new perspectives, new methodologies, and indeed new ways of identifying and interpreting cultural remains can be brought to bear. The same is true for the Neolithic of Upper and Lower Nubia, where really the few major systematic excavations have again been in the northern Dongola region. It is R12 which has provided the clearest, systematic evidence for social structure and socioeconomic patterns in

the Middle Neolithic. Sudan north of the Fifth Cataract is a vast area, but the focus outside of the Swiss mission in the Kerma area unfortunately remains primarily upon activities shortly preceding and subsequent to the rise of the Kerma state in 2500 BC.

In the Central Sudan, the picture is not much clearer. Al Khiday is the best excavated of the known Mesolithic sites. While fragments of information can be gathered from other Mesolithic sites, including in the Atbai, it is at Al Khiday where site formation processes have been best elucidated. Here too are some of the best examples of pre-Mesolithic and Neolithic burials, and subsistence behaviors, while future excavations at Jebel Moya will shed light on the timing and nature of the early occupations of the southern Gezira. For the Neolithic, the issues of depositional erosion and coherence of the deposits was highlighted above. Unfortunately, the preponderance of excavated cemeteries has skewed all attempts at interpreting the social structure of the living and many of such attempts have grounded themselves in outdated processual models. There remain unresolved questions over how the landscape was utilized for settlements.

Recent work looking at the question of the subsistence strategies has shown that the use of categorizing communities and time periods as primarily pastoralist or agriculturalist is counterproductive: cattle formed but one component of the socioeconomic strategies pursued. Today, there are settled communities engaging primarily in agriculture, while segments of their population are herders, and other communities who focus mainly on different forms and types of herding. This is not to project such strategies and social formations back into the past, but instead to highlight that current archaeological data suggests the Neolithic economies were heavily mixed. Adding to this variability was the introduction of winter rainfall crops wheat and barley, while sorghum was domesticated in the southern Atbai north of Kassala. The cultivation of domesticated sorghum quickly spread and is present at Jebel Moya by the mid-late third millennium BC. The nature of trade and interregional connections between the Central Sudan, the Butana, and the southern Atbai have yet to be investigated. While the artifact and faunal remains at Shaqadud on the edge of the Butana suggest an orientation away from the Nile, this does not mean the peoples ignored each other. They may very well have interacted in ways which are not currently recognized in the known extant material culture.

Aside from the focus on select regions to the exclusion of others, Sudanese archaeology is also beset by the status of neighboring Egypt. Egyptology remains largely divorced from African archaeology and by extension, the Nubian question lies in a limbo between Egypt and the rest of Africa. While highly productive and insightful in their own right, analysis of sites and material culture in Sudan north of the Fifth Cataract has tended to operate in juxtaposition to Egyptian and early state activities in the region. This has resulted in both an overwhelming focus on Nubia (which also remains divorced from African archaeology), and far less attention being paid to prehistory and the non-Nubian areas of Sudan.

In a country the size of Sudan, it is important to focus on the regional patterns. One should not expect a single Palaeolithic, Mesolithic, or Neolithic tradition. It is clear that regionalization is due to both environment and human agency. The latter remains vastly underexplored. Sudan's complex political history has severely affected research and the Sudanese voice remains underrepresented in archaeology. A number of missions have sought to redress this balance and it is hoped that this will continue. Furthermore, archaeology would benefit from a systematic program of ethnographic research, led by Sudanese voices. It is clear that the old trope of the Sudanese not being interested in pre-Islamic archaeology is a western construction. Indeed, once archaeological missions actively engaged in outreach, they benefited from the Sudanese perspective.

For prehistory, issues over how agropastoralists use the landscape could yield insights to be adapted for Neolithic settlements and economies. People must be placed foremost in the studies and not consigned to be hidden behind broad descriptive terms. More broadly, the re-assessment of Sudanese archaeology needs to be grounded in decolonization.

## References


Abbate, E., A. Albanelli, A. Awad, P. Billi, P. Bruni, M. Delfino, M.P. Ferretti, et al. 2010. Pleistocene environments and human presence in the middle Atbara Valley (Khashm El Girba, eastern Sudan). *Palaeogeography, Palaeoclimatology, Palaeoecology* 292 (1): 12–34. https://doi.org/10.1016/j.palaeo.2010.03.022.

Arkell, A.J. 1949a. *Early Khartoum*. Oxford: Oxford University Press.

Arkell, A.J. 1949b. *The old stone age in the Anglo-Egyptian Sudan*, Sudan antiquities service occasional papers, no 1. Khartoum: Sudan Antiquities Service.

Barron, A., D.Q. Fuller, C. Stevens, L. Champion, F. Winchell, and T. Denham. 2020. Snapshots in time: MicroCT scanning of pottery Sherds determines early domestication of Sorghum (*Sorghum bicolor*) in east Africa. *Journal of Archaeological Science* 123: 105259. https://doi.org/10.1016/j.jas.2020.105259.

Beldados, A., A. Manzo, C. Murphy, C. Stevens, and D.Q. Fuller. 2018. Evidence of Sorghum cultivation and possible pearl millet in the second millennium BCE at Kassala, Eastern Sudan. In *Plants and people, progress in African archaeobotany*, ed. C. D'Andrea, R. Fornaciari, A. Hoehn, and A.A.M. Mercuri, 503–528. New York: Springer.

Beyin, A., P.R. Chauhan, and A. Nassr. 2019. Reconnaissance of prehistoric sites in the Red Sea Coastal Region of the Sudan, NE Africa. *Journal of Field Archaeology* 44 (3): 147–164. https://doi.org/10.1080/00934690.2019.1580099.

Brass, M. 2016. *Reinterpreting Chronology and Society at the Mortuary Complex of Jebel Moya (Sudan)*, Cambridge Monographs in African Archaeology 92. Oxford: Archaeopress.

Brass, M. and Vella Gregory, I. in press. The chronological and social implications of the pottery from Jebel Moya (south-central Sudan). *Journal of Archaeological Science Reports* 35: 102677. https://doi.org/10.1016/j.jasrep.2020.102677.

Brass, M., D.Q. Fuller, K. MacDonald, C. Stevens, A. Adam, I. Kozieradzka-Ogunmakin, R. Abdallah, et al. 2019. New findings on the significance of Jebel Moya in the eastern Sahel. *Azania (Archaeological Research in Africa)* 54 (4): 425–444.

Brass, M., A. Adam, I. Vella Gregory, R. Abdallah, O. Alawad, A. Abdalla, I. Kozieradzka-Ogunmakin, et al. 2020. The second season of excavations at Jebel Moya (south-central Sudan). *Libyan Studies* 51: 126–140.

Carlson, R. 2015. *Khor Abu Anga and Magendohli. Stone age sites on the Sudanese Nile*. Oxford: BAR International Series 2768.

Chlodnicki, M., M. Kobusiewicz, and K. Kroeper. 2011. *Kadero: The Lech Krzyżaniak excavations in the Sudan*. Poznan: Poznan Archaeological Museum.

Clark, J.D., G.H. Cole, G.L. Isaac, and M.R. Kleindienst. 1966. Precision and definition in African archaeology. *The South African Archaeological Bulletin* 21 (83): 114–121. https://doi.org/10.2307/3888427.

Crevecoeur, I. 2012. First anthropological insights on the early Holocene funerary assemblages from El-Barga. *Documents de la mission archéologique Suisse au Sudan* 4: 19–28.

D'Ercole, G. 2017. *Ceramic manufacturing techniques and cultural traditions in Nubia from the 8th to the 3rd millennium BC*. Oxford: Archaeopress Access Archaeology.

Garcea, E. 2020. *The prehistory of the Sudan*. Basel: Springer.

Garcea, E., and E. Hildebrand. 2009. Shifting social networks along the Nile: Middle Holocene ceramic assemblages from Sai Island, Sudan. *Journal of Anthropological Archaeology* 28: 304–322.

Garcea, E., H. Wang, and L. Chaix. 2016. High-precision radiocarbon dating application to multi-proxy organic materials from late foraging to early pastoral sites in Upper Nubia, Sudan. *Journal of African Archaeology* 14 (1): 83–98. https://doi.org/10.3213/2191-5784-10282.

Garcea, E., G. D'Ercole, J. Sterba, J. Dunne, K. Manning, T. Gillard, R. Evershed, L. Varadzin, and L. Varadzinova. 2020. Technological variability in foragers' pottery productions at the early Holocene site of Sphinx, western part of Jebel Sabaloka, Sudan. *Quaternary International* 555: 110–125. https://doi.org/10.1016/j.quaint.2020.01.020.

Gatto, M. 2002. Ceramic traditions and cultural territories: The Nubian Group in prehistory. *Sudan and Nubia* 6: 8–19.

Gatto, M. 2006. The Khartoum variant pottery in context: Rethinking the early and middle Holocene cultural sequence. *Archeologie Du Nil Moyen* 10: 57–72.

Haaland, R. 1987. *Socio-economic differentiation in the Neolithic Sudan*. Oxford: British Archaeological Reports.

Hays, T. 1971. *The Sudanese Neolithic: A Critical Analysis*. Unpublished PhD dissertation, Southern Methodist University, Dallas.

Honegger, M. 2004. Settlement and cemeteries of the Mesolithic and early Neolithic at El-Barga (Kerma region). *Sudan and Nubia* 8: 27–32.

Honegger, M. 2005. Kerma et Les Débuts Du Nèolithique Africain. In *Les Fouilles Archéologiques de Kerma (Soudan)*, ed. C. Bonnet and M. Honegger, 239–249. Genava: Chapitre de livre.

Honegger, M. 2014. Recent advances in our understanding of prehistory in northern Sudan. In *The fourth cataract and beyond: Proceedings of the 12th international conference for Nubian studies*, ed. D. Welsby and J. Anderson, 19–30. London: Peeters.

Jórdeczka, M., M. Chłodnicki, I. Sobkowiak-Tabaka, and Ł.M. Stanaszek. 2020. Rebirth in the afterlife: Neolithic pot burials from Khor Shambat, Sudan. *Azania:*

*Archaeological Research in Africa* 55 (1): 44–68. https://doi.org/10.1080/0067270X.2020.1721840.

Linseele, V. 2013. Early stock keeping in Northeastern Africa: Near eastern influences and local developments. In *Neolithisation of Northeastern Africa*, ed. N. Shirai, 97–108. Berlin: Ex Oriente.

Linseele, V and Zerboni, A. 2018. Done with fish? A diachronic study of fishing in the Holocene Nile basin of Sudan. *Quaternary International* 471A: 229–240. https://doi.org/10.1016/j.quaint.2017.04.024.

Madella, M., J.J. García-Granero, A.P. Ryan, W. Out, and D. Usai. 2014. Microbotanical evidence of domestic cereals in Africa 7000 years ago. *PLoS One* 9 (10): e110177. https://doi.org/10.1371/journal.pone.0110177.

Manzo, A. 2012. From the sea to the deserts and back: New research in eastern Sudan. *British Museum Studies in Ancient Egypt and Sudan* 18: 75–106.

Masojć, M. 2010. First note on the discovery of a stratified Palaeolithic site from the Bayuda Desert (N-Sudan) within MAG concession. *Mitteilungen der Sudanärchaologischen Gesellschaft du Berlin* 21: 63–70.

Masojć, M., A. Nassr, J.Y. Kim, J. Krupa-Kurzynowska, Y. Sohn, M. Szmit, J. Kim, H. Choi, M. Wieczorek, and A. Timmermann. 2019. Saharan green corridors and middle Pleistocene dispersals across the eastern Desert, Sudan. *Journal of Human Evolution* 130: 141–150. https://doi.org/10.1016/j.jhevol.2019.01.004.

McDermott, F., C. Stringer, R. Grün, C.T. Williams, V.K. Din, and C.J. Hawkesworth. 1996. New Late-Pleistocene uranium–thorium and ESR dates for the Singa hominid (Sudan). *Journal of Human Evolution* 31 (6): 507–516. https://doi.org/10.1006/jhev.1996.0076.

Nelson, K., and and Associates. 2002. *Holocene settlement of the Egyptian Sahara (volume 2): The pottery of Nabta Playa*. New York: Kluwer Academic/Plenum.

Osypiński, P., M.W. Morley, M. Osypińska, and A.M. Kotarba-Morley. 2016. Affad 23: Settlement structures and Palaeoenvironments in the terminal Pleistocene of the middle Nile Valley, Sudan. *Antiquity* 90 (352): 894–913. https://doi.org/10.15184/aqy.2016.110.

Out, W., P. Ryan, J.J. García-Granero, J. Barastegui, L. Maritan, M. Madella, and D. Usai. 2016. Plant exploitation in Neolithic Sudan: A review in the light of new data from the cemeteries R12 and Ghaba. *Quaternary International* 412: 36–53. https://doi.org/10.1016/j.quaint.2015.12.066.

Posnansky, M. 1982. African archaeology comes of age. *World Archaeology* 13 (3): 345–358. https://doi.org/10.1080/00438243.1982.9979838.

Reinold, J. 2001. Kadruka and the Neolithic in the northern Dongola reach. *Sudan and Nubia* 5: 2–10.

Sadig, A. 2010. *The Neolithic of the middle Nile region: An archaeology of Central Sudan and Nubia*. Kampala: Fountain Publishers.

Salvatori, S. 2012. Disclosing archaeology complexity of the Khartoum Mesolithic: New data at the site and regional level. *African Archaeological Review* 29: 399–472.

Salvatori, S., and D. Usai. 2008. *A neolithic cemetery in the northern Dongola Reach: Excavations at site R12*. Oxford: BAR (International series, 1814).

Salvatori, S., and D. Usai. 2019. The Neolithic and "pastoralism" along the Nile: A dissenting view. *Journal of World Prehistory* 32: 251–285.

Salvatori, S., D. Usai, and A. Zerboni. 2011. Mesolithic site formation and Palaeoenvironmental along the White Nile. *African Archaeological Review* 28: 177–211.

Salvatori, S., D. Usai, and Y. Lecointe. 2016. *Ghaba. An early neolithic cemetery in central Sudan*. Frankfurt: Africa Magna Verlag.

Scerri, E. 2019. Cultural taxonomy for the European upper Palaeolithic: A wide-ranging problem. *Antiquity* 93 (371): 1362–1364. https://doi.org/10.15184/aqy.2019.135.

Spinapolice, E., A. Zerboni, M. Meyer, and D. Usai. 2018. Early human occupation at Al-Jamrab (White Nile region, Central Sudan): A contribution to the understanding of the MSA of eastern Africa. *Journal of African Archaeology* 16 (2): 193–209. https://doi.org/10.1163/21915784-20180010.

Suková, L., and V. Cilek. 2012. The landscape and archaeology of Jebel Sabaloka and the sixth Nile cataract. *Interdisciplinaria Archaeologica Natural Sciences in Archaeology* 3: 189–201.

Usai, D. 2005. Early Holocene seasonal movements between the desert and the Nile Valley: Details from the lithic industry of some Khartoum variant and some Nabta/Kiseiba sites. *Journal of African Archaeology* 3: 103–115.

Usai, D. 2019. The palaeolithic/stone age. In *Handbook of ancient Nubia*, ed. D. Raue, 155–170. Berlin/Boston: De Gruyter. https://doi.org/10.1515/9783110420388-008.

Usai, D., and S. Salvatori. 2019. The Mesolithic period on the White Nile region and the Al-Khiday sites. *Azania: Archaeological Research in Africa* 54 (4): 445–467.

Usai, D., S. Salvatori, P. Iacumin, A. Di Matteo, T. Jakob, and A. Zerboni. 2010. Excavating a unique pre-Mesolithic cemetery in central Sudan. *Antiquity Project Gallery* 84 (323). http://www.antiquity.ac.uk/projgall/usai323/.

Van Peer, P. 1991. Interassemblage variability and Levallois styles: The case of the northern African middle Palaeolithic. *Journal of Anthropological Archaeology* 10 (2): 107–151. https://doi.org/10.1016/0278-4165(91)90017-R.

Van Peer, P., R. Fullagar, S. Stokes, R. Bailey, J. Moeyersons, F. Steenhoudt, A. Geerts, T. Vanderbeken, M. De Dapper, and F. Geus. 2003. The early to middle stone age transition and the emergence of modern human behaviour at site 8-B-11, Sai Island, Sudan'. *Journal of Human Evolution* 45 (2): 187–193. https://doi.org/10.1016/S0047-2484(03)00103-9.

Vermeersch, P.M. 1992. The upper and late Palaeolithic of northern and eastern Africa. In *New light on the northeast African past: Current prehistoric research. Contributions to a symposium, Cologne 1990. Africa Praehistorica 5*, ed. F. Klees and R. Kuper, 99–153. Cologne: Heinrich Barth Institut.

Vermeersch, P.M., V. Linseele, E. Marinova, W. Van Neer, J. Moeyersons, and J. Rethemeyer. 2015. Early and middle Holocene human occupation of the eastern Desert: Sodmein cave. *African Archaeological Review* 32: 465–503. https://doi.org/10.1007/s10437-015-9195-6.

Wendorf, F. 1968a. Site 117: A Nubian final Palaeolithic graveyard near Jebel Sahaba, Sudan. In *The prehistory of Nubia*, ed. F. Wendorf, vol. 2, 954–995. Texas: Southern Methodist University Press.

Wendorf, F., ed. 1968b. *The prehistory of Nubia*. Vol. 1. Texas: Southern Methodist University Press.

Wendorf, F., R. Schild, and H. Haas. 1979. A new radiocarbon chronology for prehistoric sites in Nubia. *Journal of Field Archaeology* 6 (2): 219–223. https://doi.org/10.2307/529365.

Williams, M. 2019. *The Nile Basin: Quaternary geology, geomorphology and prehistoric environments*. Cambridge: Cambridge University Press.

Winchell, F., C. Stevens, C. Murphy, L. Champion, and D.Q. Fuller. 2017. Evidence for Sorghum domestication in fourth millennium BC eastern Sudan: Spikelet morphology from ceramic impressions of the Butana group. *Current Anthropology* 58 (5): 673–683. https://doi.org/10.1086/693898.