Current Perspectives in Sudanese and Nubian Archaeology

A Collection of Papers Presented at the 2018 Sudan Studies Research Conference, Cambridge

Edited by
Rennan Lemos
Samantha Tipper

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Archaeopress Publishing Ltd
Summertown Pavilion
18-24 Middle Way
Summertown
Oxford OX2 7LG
www.archaeopress.com

ISBN 978-1-78969-897-8
ISBN 978-1-78969-898-5 (e-Pdf)

Cover: Pyramids at Meroe, Sudan. Photo by Loretta Kilroe

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Contents

Foreword

The Second Sudan Studies Postgraduate Conference (now Sudan Studies Research Conference) took place at the McDonald Institute for Archaeological Research at the University of Cambridge on the 5th May 2018. The event, organised by Rennan Lemos, at the time a PhD student at the University of Cambridge, and Samantha Tipper, then a PhD student at Durham University, drew young scholars from across the UK and further afield. It was one of the most vibrant and engaging conferences I have attended. There has been renewed interest in Sudanese archaeology over the last twenty years and a proliferation of field projects and publications by established scholars. Against that backdrop, it was impressive to hear the significant contributions of the next generation of researchers and the degree to which the agenda is being refocused. Sudanese and Nubian archaeology are placed centre stage; indigenous agency and practice are highlighted alongside the complex local and long-distance relationships that underlie the varied material culture found across the region. The importance of championing inclusive dialogues, decolonising the field, and using appropriate theoretical frameworks are clear. There remains much work to do, but it is apparent from the papers published here—as well as those presentations that did not make it into the final volume—that the future of the discipline is in safe hands.

Kate Spence

University of Cambridge

Introduction

Sudanese and Nubian Archaeology: Scholarship Past and Present

Rennan Lemos and Samantha Tipper

Current research on Sudanese and Nubian[1] archaeology comprises an increasingly large number of projects. There is a diversity of approaches based on new excavations and museum collections, or revisiting data sets from previously excavated sites presently being undertaken all around the world. This is followed by new interpretations of the role of Nubian and Sudanese populations in various periods of human history, based on interdisciplinary theoretical and methodological perspectives that allow collaborating researchers to rewrite narratives of historical continuity and change.

However, if today new interpretations seeking diversity and complexity are becoming the norm, the history of archaeology in Sudan and Nubia has been marked by colonial discourses and practices that considered ancient local populations as inferior, depending on their northern neighbours in Egypt for innovation and sociocultural change. This introductory essay addresses past, present and possible futures of archaeology in Sudan and Nubian historical writing, favouring postcolonial perspectives, interdisciplinarity, and a necessary epistemological decolonisation. Addressing past inequities in historical and archaeological research in Nubia requires current researchers to actively engage with extant local communities, to develop frameworks of inclusion and to recognise and reflect the continuities and diversity which characterise this special area of the Nile Valley.

Past Interpretations: Inferiority, Dependency and Homogenisation

In the past century, fundamental archaeological works set the basis for our understanding of Nubia's deep history and connections with the Nile valley and Africa more broadly (Arkell 1949; 1953), which has made prehistoric archaeologists in Sudan regularly more open to debates in African Archaeology (e.g., D'Ercole 2017; Garcea 2020). Additionally, groundbreaking publications by anthropologists working in Sudan and Nubia still work as primary resources today (e.g., Trigger 1965; Adams 1977). However, Nubia has been traditionally seen through the lens of Egyptology. James Henry Breasted, George Reisner, Georg Steindorff and other early Egyptologists were responsible for establishing the first broad narratives about the Nubian past. This usually included evolutionist, diffusionist and migration-based perspectives anchored, among other things, on osteoarchaeological observations of skulls from cemeteries found during large-scale surveys and earlier excavations; e.g., the first Archaeological Survey of Nubia (Smith and Jones 1910; Reisner 1910; Firth 1912; 1915; 1927), Reisner's excavations at Kerma (Reisner 1923a/b), or the Egypt Exploration Society's excavations at Sesebi (Blackman 1937). Osteoarchaological analysis in the early times of archaeology in Sudan and

[1] Nubia here is broadly understood as the geographical area between Aswan in Egypt and Khartoum in Sudan.

Nubia was conducted mainly based on skulls (Binder 2019: 106; Tipper 2003). They were measured and classified according to racist paradigms then in vogue that placed populations from Sudan and Nubia at the bottom of evolutionary scales, therefore producing interpretations conveying local residents as racially inferior in comparison to Egypt. This approach produced collections of human skulls kept in various institutions, such as the Duckworth Collection at Cambridge (Shellal and Kerma) or the London Natural History Museum's Sesebi collection, currently used as a basis for modern research exploring more complex aspects of biological data sets (Filer 1992; Buzon 2006; Jakob and Ali 2011; Binder 2019, Power et al. 2019).

Egyptological interpretations of Nubian history and material culture have been traditionally marked by prejudiced, colonial views of Nubian populations. Breasted's account on Nubian history can be used as an example. In 1906–1907, he travelled from Alexandria to Khartoum surveying and copying inscriptions and other records from various historical periods, which formed the basis of his *A History of the Ancient Egyptians,* published in 1908. In this publication, Breasted offered his view of Nubia's history as dependant from ancient Egypt's own history. For example, he assumed that a complex kingdom such as the Napatan, which later grew into an empire, could only result from the ancient Egyptian inventive capacity:

> *"Nubia had now detached itself and a dynasty of kings, probably of Theban origin had arisen at Napata, below the Fourth Cataract. These Egyptian rulers of the new Nubian kingdom now invaded Egypt, and although residing at Napata, maintained their sovereignty in Egypt with varying fortune for two generations"* (Breasted 1908: 22).

The passage above exemplifies how early Egyptology has seen Nubians as incapable of producing history, following a widespread tendency in African historical writing that denied diverse African societies of any inventive capacity (Fauvelle 2020). In order to create a complex social system that would eventually expand over Egypt itself, Nubia would depend on foreign (Egyptian) rulers, as local populations were considered inferior, both racially and culturally. Breasted's ideas were supported by his belief of a "great white race", which spanned from northern Europe to the north of Africa, and produced civilisation (Breasted 1935: 12). On the contrary, according to him, Nubians belonged to a "black race", which inhabited Africa southwards from Lower Nubia (Ambridge 2012: 22). Breasted's views were not unique; they expressed a dominant worldview among archaeologists and anthropologists of the past century that removed Egypt from its African context and created a version of ancient Egypt closer to 'Western civilisation' (cf. Said 1979; Appiah 2016).

In comparison with Egypt, early scholars have traditionally undermined the role of ancient Nubians as producers of cultural development. Ancient Nubian society has been understood as homogenous and monolithic, passively receiving and accepting inputs from ancient Egypt, such as technological improvements of 'corrupt' local ways of doing things. For example, Reisner understood Lower Nubia in the following terms:

> *"I take my picture of the time largely from Lower Nubia as it is to-day, living its isolated, primitive, agricultural life in political security… The largest*

> *centers of population had then, as now, a few Egyptian officials, bullying the local inhabitants and cursing their place of exile"* (Reisner 1923a: 7).

Further examples of Egyptocentric perspectives on local Nubian populations, considered as passive receptacles of Egyptian superior techniques, high literate culture and ultimately civilisation, can be found in the specialised literature. For instance, Bietak (1968: 113) had assumed that C-Group populations of Lower Nubia offered no resistance to the adoption of Egyptian culture, based on a visible transition from burials following local traditions to 'Egyptian' burial customs in the New Kingdom. In his words, once the C-Group met the ancient Egyptians it "completely lost its substance and therefore offered no resistance to the monopolizing Egyptian New Kingdom culture" (Bietak 1987: 122). In general, scholars have considered that the local populations of Lower Nubia were rapidly Egyptianised, while others have suggested a gradual move towards 'civilisation'. For instance, Säve-Söderbergh described the gradual change in building techniques and styles at C-Group settlements towards an "increasing occurrence of mud-bricks, square rooms, and defences imitating Egyptian fortifications" (Säve-Söderbergh 1989: 10). Today, perspectives as such have been proven inadequate, and scholars are increasingly able to identify the coexistence of both Egyptian and local Nubian patterns in settlements and cemeteries throughout Nubia (e.g., Spencer, Binder and Stevens 2017; Spencer 2010; Smith and Buzon 2017).

Early scholarly interpretations of Nubian history based on racist and colonial ideas such as inferiority and dependency were also applied to the material culture excavated at several sites in Sudan and southern Egypt. For instance, when Reisner led the first part of the Archaeological Survey of Nubia, he was unable to identify complexity and diversity in the material culture he found in a cemetery at Shellal. According to him, "the scarabs, amulets and shabtis are identical in form, material and technique with similar objects being found in Egypt in the New Empire" (Reisner 1910: 61). Following Reisner, Steindorff interpreted the material culture from cemetery S/SA at Aniba in an equally homogenising fashion. For example, he believed that

> *"all shabtis found at Aniba were probably made in Egypt and exported to Nubia. […] Many shabtis were mass-produced, as the owners' names were usually left uninscribed, especially within the text of the Book of the Dead; these objects were not made for a specific person, and were sent to Nubia to be sold"* (Steindorff 1937: 75).

It is true that many shabtis from Aniba do not bear the owner's name, but this is especially the case with 18th Dynasty stone shabtis, which were clearly imported from Egypt (Minault-Gout 2012). However, this does not mean that imported 'Egyptian' objects were adopted and handled in the same way throughout Nubia (Lemos 2020). On the contrary, imported shabtis (as well as other object categories) were adapted to fit local demands. This included later decorative patterns added onto imported shabtis to make them follow local demands for foreign objects (Smith and Buzon 2017: 624), which can also be identified in regional preferences in coffin decoration (e.g., Taylor 2017) and alternative roles performed by typically 'Egyptian' objects in local Nubian contexts. Besides, the vast majority of shabtis from Aniba were made of faience and clay, and those usually bear inscriptions naming their owners (Steindorff

1937: 73–85), and sometimes inscriptions almost certainly added by local hands (Steindorff 1937: plate 43, 16).

Early homogenising views of Nubian history and material culture, based on alleged racial inferiority of local populations, find parallels in how the ancient Egyptians themselves approached Nubians, usually depicted in Egyptian tomb walls as prisoners who were treated like commodities that had to be counted, sorted and controlled, as in the Memphite tomb of Horemheb (Martin 1989: plate 92). According to the views professed by early scholars, Nubians probably should have been grateful to the Egyptians for all the benefits they brought with them to the Middle Nile in Antiquity. However, if the ancient Egyptians brought innovation, they also brought violence, destruction, war, kidnapping and subjugation (see Fanon 1967: 48), a topic usually ignored in Egyptology (with exceptions: H. S. Smith 1976: 124–129; Säve-Söderbergh and Troy 1991: 4–6; S. T. Smith 2013: 87–88; Langer 2017: 43; Bestock 2018; Matić 2019). Such an Egyptocentric approach to Nubia would find echoes in modern colonial mind-sets and attitudes in vogue in 20th century, which emphasised infrastructural developments carried out by colonial officials in local contexts as progress towards stability and civilisation. However, colonial projects in local contexts usually aimed for economic exploration of raw resources and markets, rather than local development (e.g., Sheldon 2013: 76).

The Egyptological tradition in Nubian Studies included large-scale surveys and excavations that produced crucial data sets available today to renovated scholarly scrutiny, as well as established the basis for our understanding of Nubian cultural history. For example, following a preliminary survey by Weigall (1907), the excavations at Shellal within first Archaeological Survey of Nubia allowed Reisner to establish the basic cultural sequence for Nubia, which is still used, in its core, to this day (Reisner 1910: 5; 313–356). However, the extent to which Egyptology can understand Nubia's complexity "out of the shadow of Egypt" remains limited (see Smith 2014). Egyptocentric frameworks disregarded ancient Nubians as producers of sociocultural innovation, and earlier excavations' archives express their emphasis on ancient remains over modern Nubian populations, which ended up being disconnected from their original place, both historically and spatially, in the constitution of such archives (Carruthers 2020).

If, on the one hand, the Egyptological tradition in Nubian Studies produced important information and methodological advancements, although used to support homogenising approaches to Nubian dependency to Egypt, on the other hand, at least since the UNESCO Nubian campaign and the publication of Adams' *Nubia: Corridor to Africa* in 1977, Nubiology and Sudanese Archaeology constitute, for some scholars, an independent field with its own methods and aims. Instead of approaching Nubia through the lens of highly ideological textual sources produced by imperialist and xenophobic ancient Egyptians, especially in the Middle and New Kingdoms (Smith 2003), the focus has turned instead towards material culture as the primary resource for interpreting Nubia's complex social structures and historical continuity in the absence of texts produced by Nubians themselves (e.g., Adams 1977: 6; Adams 1987: 286–287; Edwards 1989: 2).

The extent to which further disciplinary boundaries (e.g., Egyptology *versus* Nubiology/Sudanese archaeology *versus* archaeology/anthropology) provide a way "out of the shadow of Egypt" remains open to discussion. Indeed, current scholarship seems to pay little attention to disciplinary boundaries, while focusing on sociocultural diversity in various historical periods and geographical areas in Sudan, including regions traditionally left out of the archaeological mainstream; i.e., areas far removed from the Nile Valley (e.g., Manzo 2017; Brass et al. 2018; Cooper and Vanhulle 2019). One thing seems to unite scholars from diverse backgrounds working with Nubian and Sudanese material in Sudan and elsewhere—a postcolonial attitude towards history and material culture, which

aims to emphasise Nubian agency in complex sociocultural processes that resulted in an independently rich and continuous history.

Present Scholarship: Complexity and Diversity

Today, Sudan is the site of increasingly collaborative archaeological research. These are characterised by a variety of approaches and aims, but an exploration of local cultural diversity seems to be a shared characteristic of most projects (e.g., Spencer, Stevens and Binder eds. 2017; Raue ed. 2019). These include the inputs from foreign and local mind-sets and practical knowledge, and professionals from a huge variety of fields, from the humanities to the hard sciences, as well as a strong focus on community archaeology (Tully 2014; 2015; Tully and Näser 2017; Fushyia 2017). The input from other disciplines has been fundamental to provide a basis from which archaeologists can identify and interpret diversity; e.g., long-distance connections between Nubia and other parts of the world in the New Kingdom or the Meroitic Period, which archaeology alone would not be able to identify (Fulcher, Stacey and Spencer 2020; Spedding 2019). Achieving such results, which depend on extracting and analysing material samples, would not be possible without the collaboration of Sudanese colleagues and authorities.

Whether explicitly discussed or not, an emphasis on Nubian agency and contribution to historical and sociocultural change guides current approaches to Nubian history and archaeology, as well as fieldwork practices. This includes current theoretical discussions on cultural entanglements, creativity and Nubian influences upon Egyptian culture (van Pelt 2013; Buzon, Smith and Simonetti 2016; Spencer, Stevens and Binder 2017), which also guide current approaches to previously or recently excavated material culture (e.g., Weglarz 2017; Kilroe 2019; de Souza 2019; 2020; Miniaci 2019; Lemos 2020). New excavations and surveys are now emphasising variability where past scholars only identified standardisation and acculturation (e.g., Budka 2019). Furthermore, new comparative discussions are pointing towards a more effective integration of the archaeology carried out in the Nile Valley in various periods and other parts of the African continent (e.g., Edwards 2019).

New theoretical discussions and approaches to material culture and excavation are only possible due to a decolonising effort that revisits the discipline's past in order to change its present. In Raue's words, "there was never a lack of theoretical basis in the archaeological investigation of Nubia—but such theories were simply not treated explicitly" (Raue 2019: 8). Therefore, endeavours such as Minor's work on Reisner's legacy consist of important steps forward that explicitly discuss theoretical perspectives applied to Sudanese and Nubian material, while providing us with ways of moving away from deep-rooted, inaccurate and dangerous perspectives that endure imperceptibly in today's scholarship (Minor 2018). Similarly, current community archaeology projects in Sudan, based on the collaboration between archaeologists and local communities, include a variety of inputs—both Western and non-Western—to the interpretation, preservation and communication of archaeological sites and cultural heritage (e.g., Fushyia and Radziwiłko 2019). Further attempts to decolonise Nubian Studies and Sudanese archaeology are necessary if we aim to fully understand Nubia's internal complexity and creative input to broader narratives of human history, as well as to stimulate local socioeconomic development through archaeological practice and heritage preservation (Bradshaw 2018; Fushyia and Radziwiłko 2019).

Moving Forward: Current Archaeological Research

Histories of Sudan and Nubia have been written based on Egyptological ways of understanding and classifying historical continuity and change; e.g., based on 'kingdoms' and 'intermediate periods' (e.g., Morkot 2000: 75). Egyptocentric approaches to Sudan and Nubia should now be avoided. This requires new attempts to rethink the analytical categories and terminology usually deployed by scholars working on Sudan and Nubia's ancient history. This also involves a daily exercise to identify possible hidden theoretical biases that lead us to instinctively think and write about Sudan and Nubia based on ancient Egyptian paradigms, especially common for the New Kingdom and Napatan Period.

Current and future challenges include efforts to further decolonise Nubian Studies in order to allow us to think completely "out of the shadow of Egypt" (Smith 2014), and to emphasise Nubian viewpoints on their own continuous history. This is not a goal that will be achieved in a few years. It requires a continuous collective effort to emphasise the independent character of Nubian Studies and archaeology in Sudan and to discuss archaeology's colonial roots and connections with institutions and projects that further marginalised local communities, whose interests have been historically ignored (Kleinitz and Näser 2013; Näser 2019; Näser and Tully 2019). Current research projects, publications, excavations and surveys in Sudan point towards a brighter future, where sociocultural diversity is explicitly sought, while past prejudiced interpretations are challenged in new historical narratives.

The present volume can be considered as a sample of Nubian Studies' current affairs, at least within a European context. It stems from the 2nd Sudan Studies Postgraduate Conference (now the Sudan Studies Research Conference) held at the McDonald Institute for Archaeological Research, University of Cambridge, on 5th May 2018. The conference was previously held at Durham University (Tipper and Tully eds. 2018). The Cambridge conference gathered over 40 scholars from over 30 institutions in Europe, North America and Sudan. The papers and posters presented at Cambridge convey the diversity of perspectives and methodologies guiding different types of research projects on Sudan and Nubia. They range from new theoretical assessments of Nubian material culture inspired by postcolonial theory to bioarchaeological approaches to social complexity in Sudan in various periods. The present volume includes a selection of the papers delivered in the Cambridge conference, which express the multitude of research projects being carried out at various institutions.

Kilroe's study focuses on pilgrim flasks, a global object category introduced to Nubia through Egyptian imperial expansion and colonisation. The author discusses, based on deposition patterns of these objects in Nubian contexts, how a single object category can be understood and experienced differently across cultural boundaries. Kilroe's paper helps us to go further beyond acculturation/Egyptianisation perspectives on material culture in Nubia, which received and transformed foreign material patterns according to pre-existing complex local cultural backgrounds.

D'Itria's contribution sheds light onto local specificities of Kerma religion based on their use and local production of faience amulets—objects usually (and simplistically) understood as Egyptian influences upon local Nubian beliefs and practices. Focusing on baboon- and ladder-shaped amulets, the author explores their connections with typically Kerman religious beliefs and practices.

Shinn presents an analysis of A-Group glyptic. According to her, early Nubian seals and sealings have never been approached systematically. Shinn's analysis shows that, since the earliest stages of Egypto-Nubian exchanges, local complexity and cultural backgrounds played a crucial role in processes of transformation of foreign objects, resulting in typically Nubian-style glyptic, which differed in comparison with Egyptian-style glyptic.

Moving beyond traditional geographical spans, Rega, Minucci and Capasso present results of recent fieldwork at Mahal Teglinos in Eastern Sudan. The authors focus on a set of Gash Group burials containing macro-lithic tools from the eastern necropolis, and their relationships with the body. They discuss the evidence in the light of ethnographic parallels and gender theory, shedding light onto complex funerary customs in Sudanese prehistory.

Eldai and Babiker's contribution highlights Sudan's input into human population history and diversity, linking east Africa to global narratives of evolutionary history. Their paper explains that the inclusion of data from the Sudanese region into the global genomic repertoire can reveal a major diversity in terms of population history, but also shed light onto adaptation and migration routes from the earliest stages of human history to more recent periods. Because of this, the authors stress the importance of collecting aDNA samples in on-going excavations in Sudan, which will contribute to the development of new narratives on human evolution.

The peer-reviewed contributions grouped in the present volume represent the great variety of research projects currently being carried out on Sudanese and Nubian data sets. Each paper conveys a specific approach to a different set of material. However, the present edited volume can also be seen as a unity, as all papers explore Sudan and Nubia's diversity, complexity and input into broader historical processes as an independent sociocultural entity.

Acknowledgements

The authors are grateful to Julie Anderson (British Museum), Tomomi Fushiya (Polish Centre of Mediterranean Archaeology, University of Warsaw), Robert Vigar (University of Pennsylvania) and Julia Budka (LMU Munich) for their comments on a draft version of this introductory essay.

The 2nd Sudan Studies Research Conference benefited from the funding and support of the Thomas Mulvey Fund, the H. M. Chadwick Fund and the McDonald Institute for Archaeological Research at Cambridge, and the Centre for Academic, Researcher and Organisation Development at the Durham Department of Archaeology. We are also grateful to the following individuals for their support, from the organisation of the conference to the preparation of the final publication: Kate Spence, Hratch Papazian, Kimberly Watt, Bryony Smerdon, Emmanuel Hoi Yat Lam, Shadia Taha, Anna O'Mahony, Emma Jarman, Aaron de Souza, Bruce Williams, and Trish Biers.

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Libations and Luxury: the Use of Pilgrim Flasks in Nubia

Loretta Kilroe

Introduction

Ceramic pilgrim flasks were prevalent across the Eastern Mediterranean during the Late Bronze (c. 1550–1200 BCE) and Early Iron Age (c. 1200–1000 BCE), and were incorporated into Egyptian repertoires during the reign of Thuthmosis III. From here, they quickly appeared across both Egyptian and Nubian cultural contexts in Lower and Upper Nubia. Historically, their appearance in Nubia has been understood as part of the broad phenomenon of the 'Egyptianisation' of local cultures, with Egyptian pottery, architecture and mortuary practices adopted across the Middle Nile Valley during the New Kingdom (c. 1550–1290 BCE). However, the changing synchronic and diachronic usage of this Egyptian-style pottery within a dramatically different value system has been little explored.

This paper discusses part of my Doctoral research on the use of pilgrim flasks in both Egypt and Nubia. I present the different depositional patterns observable in pilgrim flasks between these regions, and suggest how they might inform understandings of the Nubian cultural environment in the New Kingdom. Given the colonial context within Nubia at this time, I review major anthropological models typically applied to such contexts in the literature, and discuss how some can be used effectively for understanding the use of pilgrim flasks in Nubia. In particular, this study seeks to demonstrate how an object category can be categorised differently between two cultural milieus, and how this might present itself in the archaeological record.

Models

When approaching archaeological material in Nubia from the New Kingdom, it is wise to first review some major anthropological models; firstly, 'Egyptianisation', via which Egyptian artefacts found in Nubia, especially pottery, have long been understood; but also the concepts of '*habitus*' and 'entanglement', theoretical models that have been successfully applied to other archaeological contexts in recent years (e.g. Thomas 1991; Webster 2001; Feldman 2014; Eckert 2008; Mata 2017; Wilson 2017), and are valuable for understanding pottery beyond its utilitarian usage.

Historical reconstructions of the socio-cultural environment following the end of the Classic Kerma period have typically approached archaeological data in Nubia through an Egyptological lens. This is partly a reflection of the significant shift towards the use of Egyptian material culture in Nubian cultural contexts after the sack of Kerma under Thuthmosis III (Edwards 2004: 101–102), with a vast adoption of Egyptian ceramics, architecture and grave goods in the Egyptian-controlled regions of Wawat and Kush in Lower and the upper half of Upper Nubia (Williams 1992: 2; Edwards 2004: 107). This corresponded with the appearance of so-termed 'colonial towns' or 'temple towns' across these areas. These settlements were designed according to an Egyptian architectural plan (Kemp 1978: 23–25), originally consisting of storage magazines, barracks and small residential areas with a temple, and contained high levels of Egyptian-style pottery. In House E.13.3-S at Amara West, for example, only 5–

10% of the pottery was Nubian in form and fabric (Spencer 2014: 479–80), even though much of the Nile silt repertoire was locally produced (Spataro et al. 2015: 418).

To deconstruct the motivation behind the widespread adoption of Egyptian material culture, many scholars have applied the concept of 'Egyptianisation', a term now understood to encompass any widespread adoption of Egyptian-style material culture and behavioural practices among non-Egyptian communities (Weglarz 2017: 36). The prevalence of Egyptian objects led many scholars to suggest that these towns were populated by Egyptian immigrants and/or an 'Egyptianised' population (Adams 1977: 229–230; Kemp 1978: 34–35; Grimal 1992: 134; Shaw 2003: 320), reflecting a profound cultural conversion to Egyptian norms (Williams 2017: 319); as well as the desires of local elites to emulate Egyptian practices for social and political gain (Higginbotham 2000; Török 2009: 274), which then filtered down through society. However recent archaeological research has problematised this framework. Although Egyptian administrators were certainly present in some areas (Smith 2003: 137ff), osteoarchaeological analysis at Tombos indicates that these towns were occupied by a mix of Egyptian migrants, indigenous people, and second and third generation settlers from multi-cultural marriages (Smith and Buzon 2014: 432; Spencer 2014: 480); pointing to a biologically mixed population (Buzon 2006) rather than mass immigration. The traditional picture of a mass adoption of Egyptian ceramics is furthermore likely to be an oversimplification (Welsby and Welsby-Sjöström 2007). Sites that retained Nubian material culture through the 18th Dynasty (Save-Söderbergh 1989: 23; Thomas 2014: 65), the persistence of indigenous ceramic technology even in 'Egyptian' contexts (Welsby and Welsby-Sjöström 2007; Smith 2007: 7), and the continued evolution of Nubian finewares (Ruffieux 2010: 25; Thomas 2014: 66) all point to the persistence of Nubian identities across the Nile Valley during the New Kingdom, complicating our understanding of Egyptian colonial occupation and local responses. The evidence rather points to the creation of new identities in the region that combined both Egyptian and Nubian practices, forming a new cultural framework among communities, or a new *habitus* system. The habitus concept was first developed by Bourdieu (1977) and encompasses the individual and community tastes, etiquettes and beliefs that are ingrained to the point of being understood as 'true' or without question. This idiographic concept has proven useful in Egyptological (e.g. Smith 2003; Dann 2009; Hulin 2013; Smith and Buzon 2014; 2017; van Pelt 2013; Weglarz 2017) and broader archaeological (e.g. Webster 2001; Steel 2013; Feldman 2014; Bushnell 2016) research, and I believe is relevant for understanding how the pilgrim flask came to be absorbed into two cultural spaces that had very different approaches to ceramic material.

The presence of vast quantities of Egyptian items on the market will of course have had a significant impact on local value systems. Egyptian material culture appears to have had some association with prestige, with many elite burials prioritising Egyptian funerary architecture and burial goods. The local market was furthermore likely simply flooded with Egyptian material (van Pelt 2013: 540) – wheel-made pottery, for example, can be manufactured at a much faster rate than handmade wares (e.g. Robertson and Hill 2004: 211–215) and may have thus simply outcompeted handmade industries in some areas. This does not necessarily mean that indigenous practices were abandoned: as I discuss in this paper, instead they could have been expressed through this new medium of Egyptian material culture. Culture-contact in Nubia led to striking syncretisms between the two cultural traditions in aspects of material culture, including architecture (Spencer 2010), burial type (Binder 2017), and ceramics (Vincentelli 2006; Pappa 2013: 3; Budka 2017: 440; Raue 2017: 529, figure 5; Rose 2017: figure 1: 6, figure 2). This multiplicity, reflecting responses to the colonisation process by both the indigenous and incoming groups, has been termed 'entanglement' (Dietler 2010: 21; Stockhammer 2012a; 2012b; 2013; van Pelt 2013; Smith and Buzon 2014; 2017; Matić 2017), and this idiographic concept is extremely useful as it takes into account the agency both of the coloniser and the colonised

(van Pelt 2013: 541), exploring how the tension between two opposed habitus systems led to creative approaches to identity and material culture, as seen in these syncretisms (Smith and Buzon 2014: 431).

The use of pilgrim flasks in Nubia needs to be considered within this socio-political complexity, visible in much material culture – but especially pottery. Pottery is key for understanding colonisation, because it reflects the introduction of new social practices and etiquettes in daily life patterns, and how pervasive these were through multiple strata of society (Steel 2013: 41). Assuming that specific object classes were used in the same way across two different habitus systems is flawed. The remainder of this paper will discuss the different depositional patterns visible for pilgrim flasks in Egypt and in Nubia, and will suggest some potential reasons for these differences.

Pilgrim Flask Morphology in Egypt – a Summary

My research identified 980 pilgrim flasks from sites in Egypt, encompassing 18 types in circulation between the New Kingdom (c. 1550–1069 BC) and the Late Period (664–332 BC). Morphology, decoration, and fabric varied chronologically: this is particularly noticeable in the movement of handle position. Handles can be observed to move down the neck over time: 18th Dynasty examples typically bore handles stemming from the rim to the shoulder, but later examples predominantly showed handles stemming from the middle and eventually the base of the neck (Aston 1996). Marl clay was popular in the 18th Dynasty but was gradually overtaken by Nile silt production. Although pilgrim flasks are traditionally thought to bear concentric circle decoration, Egyptian examples were found to be frequently plain and undecorated save for a simple orange or cream slip, in contrast to contemporary Levantine types, upon which painted concentric circle decoration dominated (Amiran 1969: pl.51). Their relative frequency indicates that while not ubiquitous, they were a visual presence in Egyptian life pathways – to offer a comparison, 34 pilgrim flasks were found at Sais, in contrast to 421 bowls (Wilson 2011). They also cluster in certain sites, such as Sais – a large proportion of the flasks here were Levantine imports, and were found in a domestic structure (Wilson 2011), dating from the late New Kingdom to the Third Intermediate Period. Flasks were imported from the Levant, Mycenaean Greece, and Cyprus throughout the New Kingdom, but were in addition locally manufactured from almost their first appearance in Egyptian contexts, with the earliest examples identified in the mid-18th Dynasty tomb of Senneferi at Thebes (Bohleke 2016; Rose 2016). This suggests that they were not just desired because of their contents, but rather because of what the form represented – a specific behavioural practice, which was adopted easily by Egyptian communities. Based on the morphology of the vessel, this is likely to represent the application of oil to the body in a novel way. Juglets were already available, but the shift to using a two-handled vessel necessitates engaging with practices in a different way – likely reflective of a fashion trend spreading across the Eastern Mediterranean at this time as part of Late Bronze Age internationalism (Bushnell 2016: 161). However changing patterns are discernable across their appearance in Egypt – during the Late Period, their use patterns shifted, with 89% of contemporary examples imported from the Western Oases, which were overwhelmingly deposited at Karnak Nord (Jacquet Gordon 2012), pointing to a change in use. The presence of pilgrim flasks at a diverse range of sites – across settlements and cemeteries, in wealthy and poorer contexts – suggests that they were accessible to a broad consumer base and that they were considered relevant to certain Egyptian practices. However, the significant preference for large-sized Oasis flasks in the Late Period indicates that their use changed at the end of the New Kingdom. This demonstrates the growing importance of liquid contents from the Western Oases and suggests a large exchange market with the region, similar to that observed in wine amphorae (Hope et al. 2002). It also hints at wider behavioural and activity changes (for a full discussion of pilgrim flask morphology in Egypt, Kilroe 2019a).

Pilgrim flask morphology in Nubia

Less pilgrim flasks were identified in Nubia overall – a total of 651, dating from the 18th dynasty (c. 1550–1292 BCE) to the Early Napatan period (c. 700–500 BCE), with examples identified as far south as the Fourth Cataract (figure 1). This also encompassed 18 morphological types. However, they are a significant presence in Nubia – at Sai, 43 pilgrim flasks were found in the New Kingdom necropolis, in comparison to 47 bowls (Minault-Gout and Thill 2012). There are also distinct differences between the types found in Egypt and in Nubia. In general, flasks are larger and more globular, with a thinner neck. Although the handle transformations observed in Egypt do occur, there is a continued preference for Marl clay throughout Nubian use of pilgrim flasks and certain types appear specific to each region. These different patterns suggest that, regardless of how we may in the modern-day see these as the 'same vessel', they were perceived and responded to very differently by Egyptian and Nubian communities.

Egyptian-style pottery in Nubia has historically been interpreted through an Egyptian lens; assumed to be used in the same practices and indicating the same lifestyle choices. However, studies in the Levant (Stockhammer 2012b: 93; Hulin 2013) have demonstrated that communities often use 'foreign' pottery in different ways from that intended by the manufacturer. At Beth Shan, an Egyptian garrison occupied during the New Kingdom, Hulin (2013) explored whether sensory expectations and taste can persist even when material culture changes. She noted that the higher presence of decorated Cypriote, Mycenaean, and local pots at Beth Shan than at other contemporary sites may reflect an adaptation of the Egyptian preference for faience and metal bowls over ceramic in the Nile Valley. The Egyptians stationed at the garrison used locally available material (in this case, decorated pottery) to recreate Egyptian practices and tastes. At Megiddo, Stockhammer (2012b: 93) suggested that an unusual vessel inventory in a room between the city gate and the palace (Loud 1948: pl. 63–67) may represent the preparation of a burial by Egyptians living in the area. The repertoire included several Canaanite pots typically used in cultic and funerary contexts, as well as a Canaanite pilgrim flask that he suggested was used in embalming and a large Egyptian neckless jar that was generally restricted to Egyptian contexts in Canaan: an amalgamation of vessels inappropriate in a Canaanite context, but perhaps representing a gathering of items suitable for an Egyptian one – using readily available items. The use of culturally 'alien' items in 'familiar' practices requires their absorption into a relevant classification system. Deposition patterns such as these attest that a society's specific practices and cultural sensibilities may be expressed and retained even when using 'alien' material culture (Warnier 2010; Hulin 2013: 365).

The use of such artefacts in local practices has been termed 'relational entanglement' by Stockhammer (2012b: 90) – whereby select items are appropriated by communities for use in local practices; the item is kept the same, but it has a different meaning/perception. In Nubia, these may have been used in strategic Egyptianisation techniques by elites (Török 2009: 275), indicate exogamous intermarriage across communities (Buzon 2006; Smith and Buzon 2014: 432; Spencer 2014: 480), or simply reflect the mass-production and availability of Egyptian goods (Paul Van Pelt 2013: 540). It is likely that many were used to express Nubian cultural vocabulary where they were perceived as bearing a resemblance to something that was already relevant in the local *habitus* and indigenous world-view, before especially relevant items were slowly altered to better fit into these practices (van Pelt 2013: 539; Stockhammer 2012a: 50–51).

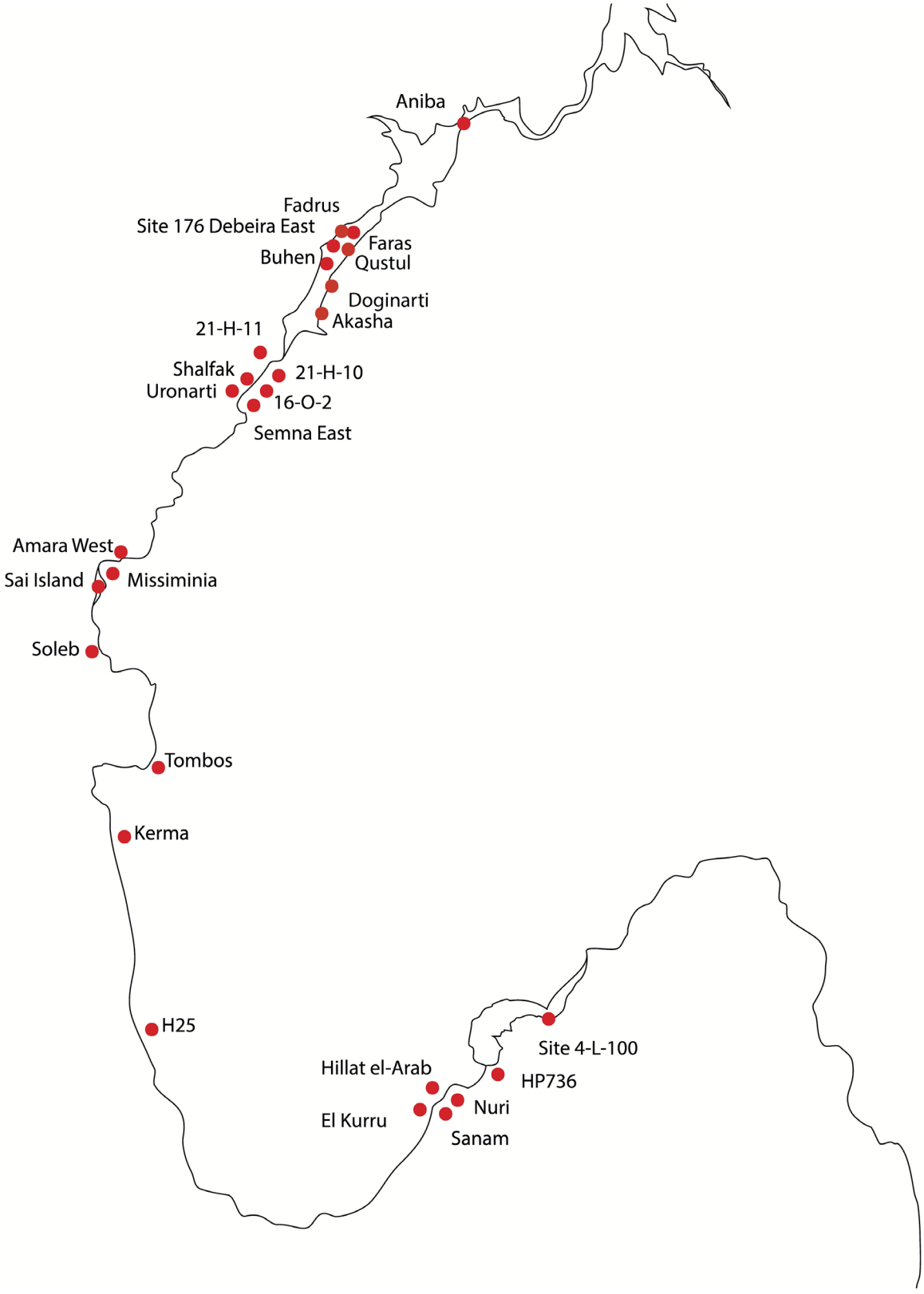

Figure 1: distribution of sites containing pilgrim flasks across Nubia (drawn by the author)

The presence of pilgrim flasks in the indigenous necropolis at Site 176, Debeira East (figure 2) is likely a case of relational entanglement. This cemetery in Lower Nubia displayed a preference for indigenous burial practices – particularly indicated by 105 tumulus burials, a traditional Nubian funerary structure (Säve-Söderbergh 1960; 1989) – but the marl clay fabric of many of the pilgrim flasks indicates that they were undeniably manufactured in Egypt. These were Egyptian items repurposed for use in a Nubian burial context.

Although it has been suggested that this site should be dated to the early Napatan Period (Heidorn 1992: 108–109; 1994: 120; Török 2009: 308–309; Williams 2017: note 34), the funerary contexts in which pilgrim flasks were found – tumuli with offering niches attached to the eastern side – can be dated to the 18th Dynasty. The morphology of the pilgrim flasks themselves supports this conclusion, as they bear multiple parallels with 18th Dynasty flasks, while Napatan pilgrim flasks are morphologically distinct (Kilroe 2019a), supporting the excavator's original analysis (Säve-Söderbergh 1989: 200).

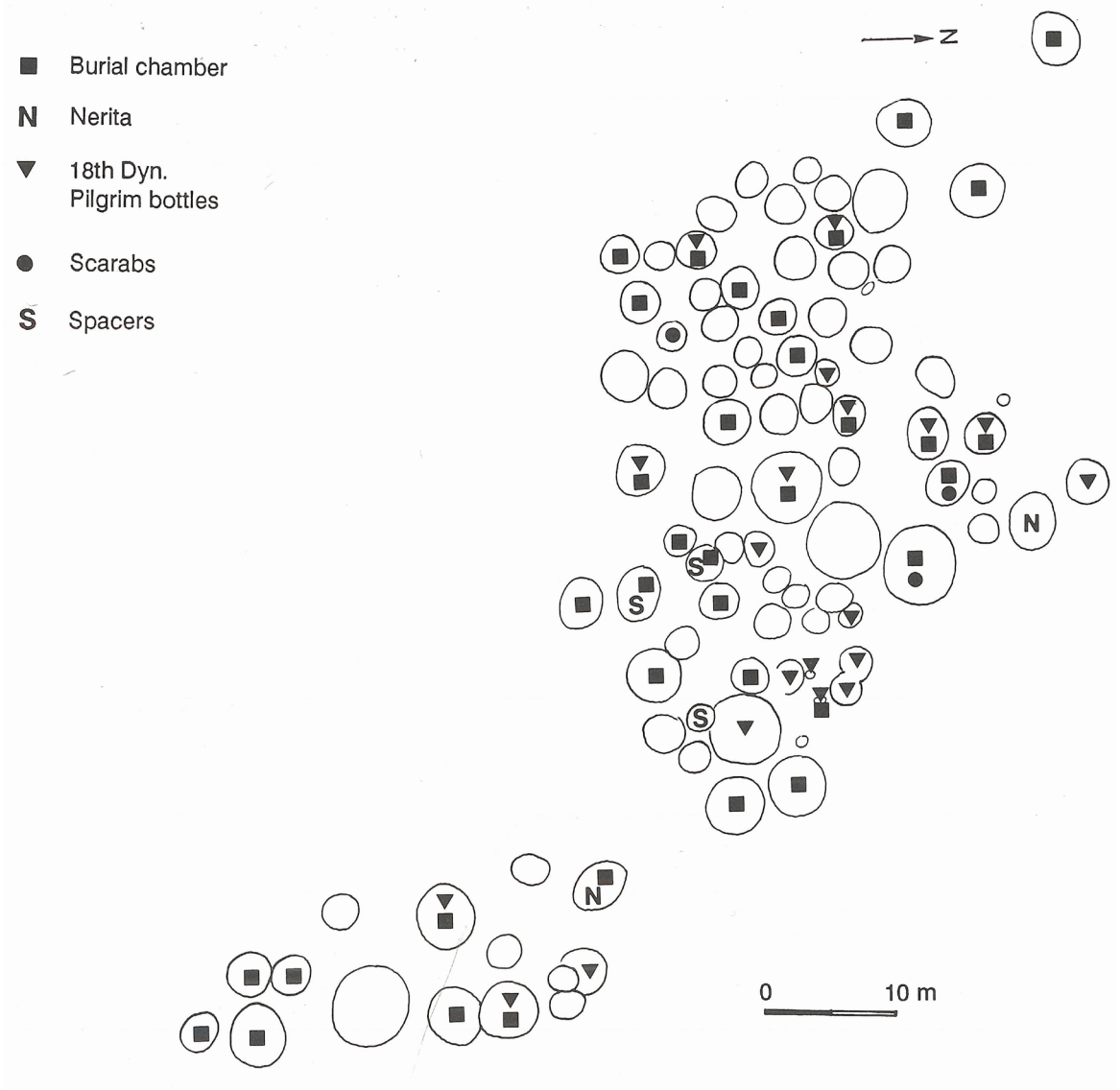

Figure 2: plan of site 176, Debeira East (Säve-Söderbergh 1989: figure 52; reproduced with permission)

Twenty-five flasks were found in this cemetery complex, some deposited in funerary chapels attached to the tumuli structures (Kendall 1999: 19; figure 3). Nearly all were ritually 'killed', with a hole struck through the body of the flask, rendering it unusable (Säve-Söderbergh 1989: 203). The smashing or killing of vessels to make them unusable is known from many cultures and periods around the world (Steffenson 2007: 145), and occurs in both Egyptian and Nubian contexts. In Egypt, one of the most well-known ritual practices is the 'Breaking of the Red Pots', *sḏ dšrw*, a practice in which red vessels were used to represent enemies and smashed (Budka 2014b: 646). This ritual is attested from the Old Kingdom (Sethe 1926: 20) to the Ptolemaic period (Ritner 1993: 144–147; Seiler 2005 170–184; Budka 2014a: 645), and is particularly identifiable in the late Second Intermediate period and New Kingdom (e.g. Ritner 1993: 146; Budka 2014a). Other similarly destructive rituals existed, with 'killing' holes appearing on a multitude of vessels (Budka 2010: 412); e.g. on handleless flasks, bottles, and tall narrow cups in Second Intermediate period burials at Dra' Abu el-Naga, Thebes (Seiler 2005: 180).

Destructive rituals in Nubian contexts are known throughout history and are likely part of an indigenous tradition that dates back to the Kerma period, rather than being related to Egyptian influence (Welsby 1996: 87; Budka 2010: 409). In C-group cemetery deposits, traditional Nubian bowls were often 'killed' with perforation holes and positioned above burials (Steffenson 2007: 145–146). Similar style bowls likely used for funerary feasts were found smashed outside tomb structures at Tombos (Smith 2003: 152–154; Smith and Buzon 2017: 623, figure 13), and the practice was very common in Napatan burial contexts such as at Sanam, el-Kurru, Nuri, and dome graves in the Third Cataract (Budka 2010: 409; 2014b).

The application of this custom to a specific type of imported, Egyptian vessel – which were then placed in traditional tumuli structures – is suggestive of the manipulation of Egyptian material culture flooding into Nubia for traditional practices, and indicates their use in offering ceremonies (Säve-Söderbergh 1989: 203). There is little evidence for application of killing holes to pilgrim flasks in Egypt (cf. Rose 2016: 201-203 for a possible example). The tumuli at Site 176 are, based on the pilgrim flask morphology, contemporary with the mass adoption of Egyptian material culture and practices in Lower Nubia, yet encompassed distinct indigenous mortuary practices. This retention of majority Nubian practices in an area almost exclusively using Egyptian pottery by the later New Kingdom is important and reflects one community's response to the new colonial situation. Its selective use of Egyptian pottery – pilgrim flasks – in the 18th Dynasty is significant and represents the early appropriation of this vessel form into indigenous *habitus* behaviours and etiquettes.

Figure 3: offering place at site 176, Debeira East, containing traditional Nubian bowls and a pilgrim flask (after Säve-Söderbergh 1989b: plate 109:2; reproduced with permission)

This early use of pilgrim flasks in indigenous spaces also occurred in settlement contexts. Site H25 was a rural settlement on the now defunct Alfreda Nile Paleochannel (figure 4) (Thomas 2014: 67). This town has structures dating to the 18th Dynasty and deposits into the Ramesside period, but demonstrates a persistent primary use of indigenous pottery (over 50%), with Egyptian pottery primarily consisting of storage jars and bowls. At least 12 pilgrim flasks have been identified here (Kilroe 2019b). The site is likely a key indigenous node and distribution centre in the region, which could explain the movement of pilgrim flasks further south, such as at Hillat el-Arab (Vincentelli 2006). Their presence at this site demonstrates that flasks were not simply part of an Egyptian enforced cultural package but a component of commodity exchange networks with indigenous groups – they were desired by indigenous groups for a specific reason.

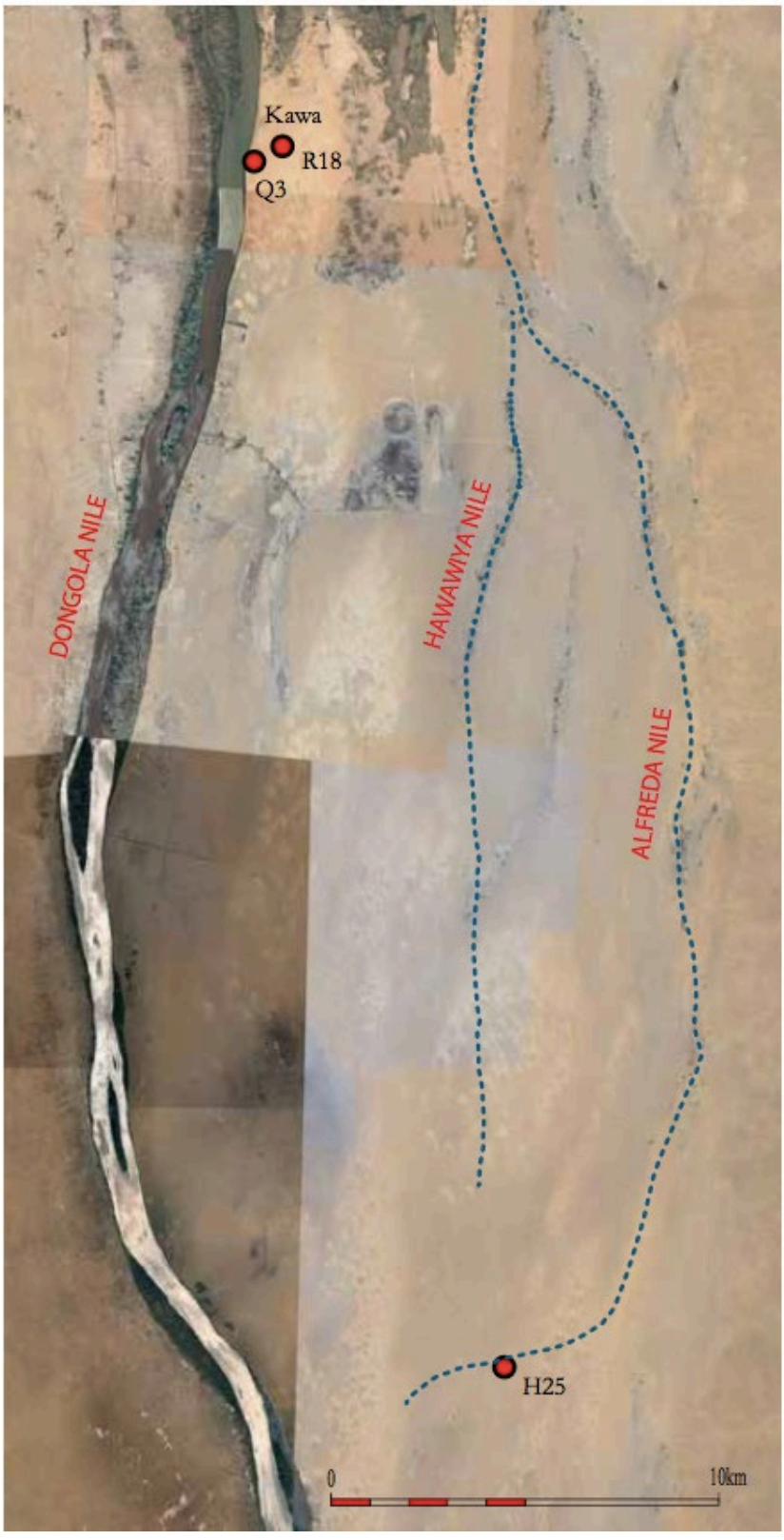

Figure 4: location of site H25 in the Northern Dongola Reach (after Thomas 2014: figure 1; courtesy of the Sudan Archaeological Research Society)

Once absorbed into new value systems, artefacts frequently undergo physical edits to their morphological characteristics. Stockhammer (2012b: 50) terms this 'material entanglement', whereby the amalgamation of traditional and incoming objects results in the creative development of entirely new items, based on earlier models from different cultures. This is easier to identify in the archaeological record than 'relational entanglement'. Although van Pelt (2013: 533) suggests that materially entangled objects are rare in New Kingdom Nubia, growing evidence for Egyptian imitation vessels in Nubia (Amara West: Binder, Spencer and Millet 2010: pl. 14; Spataro et al. 2015: 418; H25: pers. ob.; Sai: Pappa 2013: 36; Budka 2017: 440) suggests that indigenous potters were early in the New Kingdom responding creatively to new forms circulating in the aggregated colonial towns. A further, inverse New Kingdom example has been published at Sesebi (Rose 2017: figure 1:6, 2), where a wheelmade beaker with a flat base and rough burnishing bears similarities to Kerma *Classique* beakers (Rose 2017: 466); and similar examples exist at other points of Egyptian and Nubian history: Egyptian manufactured bowls painted to mimic C-ware have been found at Hierakonpolis (Friedman 2001: figure 2) and Kerma (Dunham 1982: 249, Type CI); and Raue (2017: 529, figure 5) notes 'Medjay imitations' were popular among the majority of Egyptian households in the late 17th-early 18th Dynasties. These represent creative responses by indigenous potters (Pappa 2013: 36) to the new forms being used in these aggregated towns.

My research into the similarities and differences in pilgrim flasks within Nubian contexts identified distinct morphological and decorative characteristics in the region. This is already present in the 18th Dynasty: pilgrim flasks in Nubia tended to be globular rather than lentoid, with thinner necks, likely representing their value as commodity transport jars. One flask type bore a hemispherical, direct rim that extended several centimetres high, similar in shape to an 'egg-cup' (figure 5). Only one example of this type was found in Egypt, in a 25th Dynasty context (Hölscher 1954: pl. 47, U7), whilst 18 examples were deposited in Nubia in contexts ranging from the 18th Dynasty to the early post-New Kingdom period. This suggests that the form was altered based on local community response. Many of these flasks were in marl clay – meaning they were manufactured in Egypt – suggesting the presence of an export market that produced flasks specifically aimed at Nubian sensibilities and practices.

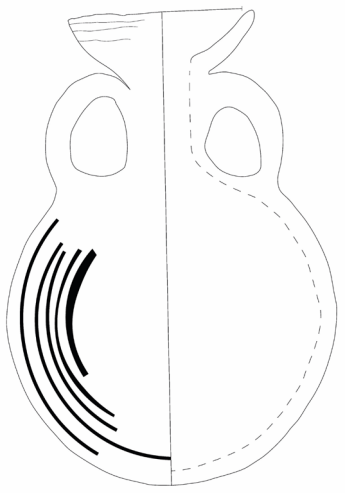

Figure 5: pilgrim flask with an 'egg-cup' rim (C9000). Drawn by the author; courtesy of the Amara West Research Project, British Museum

Evidence for material entanglement increased during the post-New Kingdom and early Napatan periods. Many lentoid pilgrim flasks now have such degraded handles that they are vestigial, and cannot be intended for practical purpose, but rather reflect the memory of earlier flasks and they useful handles. A new pilgrim flask type developed with a tapering base and ribbed body (figure 6). This flask type appeared predominantly at Sanam – indeed, 90% of contemporary pilgrim flasks were identified at this site, in both cemetery and settlement contexts (Griffith 1928; Lohwasser 2010a; 2010b; 2012; Vincentelli 2011; 2018). Only one flask of this type has been found in Egypt, in contrast to the 392 examples in Nubia. The vast majority was produced in marl A4 Variant 2, indicating an intensive trading relationship with southern Egypt, particularly the Theban area (Vincentelli 2018: 181). This strongly suggests the presence of a workshop producing flasks specifically for a Nubian export market. Contemporary pilgrim flasks found in Egypt were similarly concentrated in one location – Karnak Nord (Jaquet Gordon 2012), but in contrast were overwhelmingly produced from oasis clay, with 385 examples. Only one fragment of a pilgrim flask in oasis clay has been identified in Nubia to date, at Sai (Budka, pers. comm.).

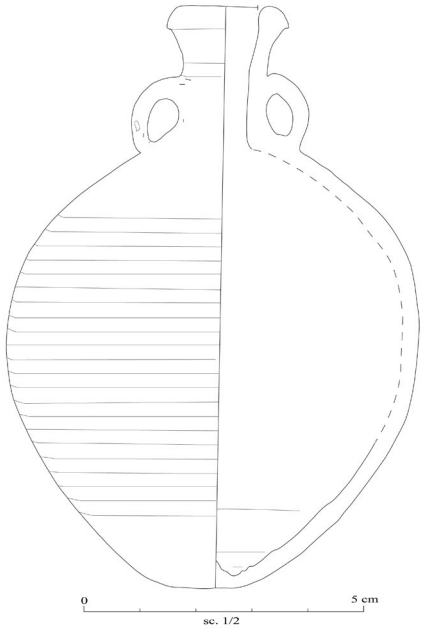

Figure 6: Napatan pilgrim flask from Sanam (Ashmolean Museum acc. no. 1960.931). Drawn by the author; courtesy of the Ashmolean Museum

Use of pilgrim flasks in Egypt and Nubia

The different morphologies and distribution patterns in Nubia suggest that their adoption here reflects distinct materiality practices around the vessel from that in Egypt. As discussed, there is no guarantee that pilgrim flasks, or Egyptian vessels in general, were being used in the way intended by their manufacturers in Nubian cultural contexts (Ferguson 1992; Dann 2009: 142–143; Tsakos 2009: 65; Hulin 2013: 365; Warnier 2016). This likely relates to practices involving its contents.

The basic morphology of pilgrim flasks suggests a liquid content, which along with other juglet and flask type contents, was ‘precious enough to value, use in small amounts and transport in decorative vessels over considerable distances’ (Bushnell 2016: 41). However little solid evidence pointing to their

contents exists. Seven Iron Age examples in the Levant have been demonstrated to contain cinnamaldehyde (cinnamon) (Namdar et al. 2013), probably as an oil infusion. Two globular pilgrim flasks in Cyprus contained animal fats (Tzedakis and Martlew 1999: no. 29–30). One pilgrim flask in Egypt contained a lipid substance (Serpico unpublished analysis). Finally, three flasks in the Tomb of Senneferi at Thebes bore hieratic inscriptions stating that they contained wine for the New or Regnal Year (Bohleke 2016).

I consider it likely that pilgrim flasks in general contained aromatic oils for bodily application (Anderson 1990: 45ff; French 2013: 327; Steel 2013: 133; Bushnell 2016: 41; Schiller 2018: 98), similar to Mycenaean flasks (Leonard 1981: 96; Mountjoy 1993: 72; Stockhammer 2012b: 93; Steel 2013: 134). The morphology of the form fits an oil content, with its small orifice, elongated neck and limited storage capacity, similar to other juglet forms (Bushnell 2016: 41). The strong similarities to later Roman alabastra (Goddio and Berghoff 2016: 56; Verbanck-Piérard et al. 2008: 434–5, no. V.E.2), which bear inscriptions detailing their contents as aromatic perfume, further supports this idea. The link with Canaanite amphorae, with both shipped together from the Levant and produced in similar fabrics, suggests that both were connected with the resin trade, with perfume a hidden aspect of this practice (Serpico 1997: 444). Flasks of course could have contained multiple contents – different oil specialities for a range of social and religious occasions, each considered appropriate for specific usages by the myriad groups using them and perhaps advertising this to the consumer via slight differences in morphology or decoration (Bushnell 2016: 41).

The small size of many pilgrim flasks in the New Kingdom suggests that flasks did not contain significant quantities of commodities like wine amphorae, and I consider it unlikely that there was a large market in pilgrim flask wine given their extremely limited volume capacity. The hieratic dockets on the three examples from the Tomb of Senneferi suggest this was a specialist beverage, perhaps with ritual connotations rather than simply for drinking. This may represent an early response to a foreign form – a relational entanglement of a Levantine-style vessel into Egyptian cultural practices. Later, during the Late Period, the large size of Oasis pilgrim flasks imported in vast quantities may indicate these did contain wine (Hope et al. 2002: 190). However, the flask's swift absorption into Egyptian society and etiquette indicates its contents and the associations of the form were considered suitable for Egyptian lifeways – artefacts that are perceived as relevant are more likely to be accepted quickly. This would fit with perfumed oil, which was a key aspect of Egyptian practice (Foster 1974: 36; Manniche 2006: 48; Byl 2012). The fats (Tzedakis and Martlew 1999: no. 29–30), lipids (Serpico unpublished analysis) and cinnamaldehyde (Namdar et al. 2013) found in other examples support this model, with fats often used as a base for perfume in the ancient world and cinnamon a known favoured perfume in later periods (Goddio 2016: 56; Verbanck-Piérard et al. 2008: 434–5, no. V.E.2; Manniche 2006: 94–97).

In Nubia, there is limited evidence that perfume and other forms of bodily decoration such as makeup were in common use (Walsh in press). As such, pilgrim flasks were unlikely to have been adopted for the same purpose as in Egypt. Deposition patterns suggest that these oils may instead have been involved in libation practices. Libation activities are difficult to identify in the archaeological record prior to the Napatan period; however, deliberately broken vessels outside tombs during the Middle Kerma period suggest the importance of funerary/ancestor rituals including libations (Bonnet 1992: 622) – a practice that continues into the New Kingdom, where remains of broken Nubian pottery bowls outside tombs attest to the continuation of these practices (Smith 2003; Steffenson 2007). The placing of 'killed' bowls above C-group and Pan-Grave burials (Steffenson 2007: figure 5) is related to this practice, and the 'killing' of pilgrim flasks at sites such as Site 176, Debeira East, places them firmly within the context of such offering rituals (Säve-Söderbergh 1989: 203). A sandstone stele found

in SAV1 at Sai depicts libation activities and shows a man offering a libation, using a small rounded or lentoid vessel (Budka 2014a: figure 11). Unfortunately the stele was too eroded to identify the vessel type.

During the Meroitic period, libation rituals became increasingly visible across Nubia. Offering tables depicting deities – usually Anubis and a companion – pouring a milk offering are known from several sites (Abdalla 1982), including Sai (Geus 1996: figure 20) and Meroe (Yellin 1982). Deep bronze and ceramic bowls were sometimes used for libations (Török 2011: 108) and there is evidence that these offerings were subsequently poured onto cloth at Qasr Ibrim (Adams 1997: 264). In addition, small 'perfume bottles' were in circulation that were also used in libations. These were usually ceramic, although glass vases containing solidified perfume were also found at Sai (Geus 1996: 1187). Such vessels could be handleless or have two handles, and had a variety of rim and neck types (Lenoble 1998: figure 1). These flasks are termed aryballoi, or alabastra – but have a strong resemblance to pilgrim flasks and in particular to the Napatan examples with vestigial handles. Libation rituals involving these 'perfume bottles' were intended to transform the deceased into an Osiris figure (Lenoble 1998: 137–138). Many have an attached leather or fabric handle that twists around the wrist (Figure 3), and it is possible that pilgrim flasks were used in this way, making the handles obsolete and perhaps allowing them to later become vestigial. This use can be seen in later Greek images, which show similar vessels being used in this way (figure 7).

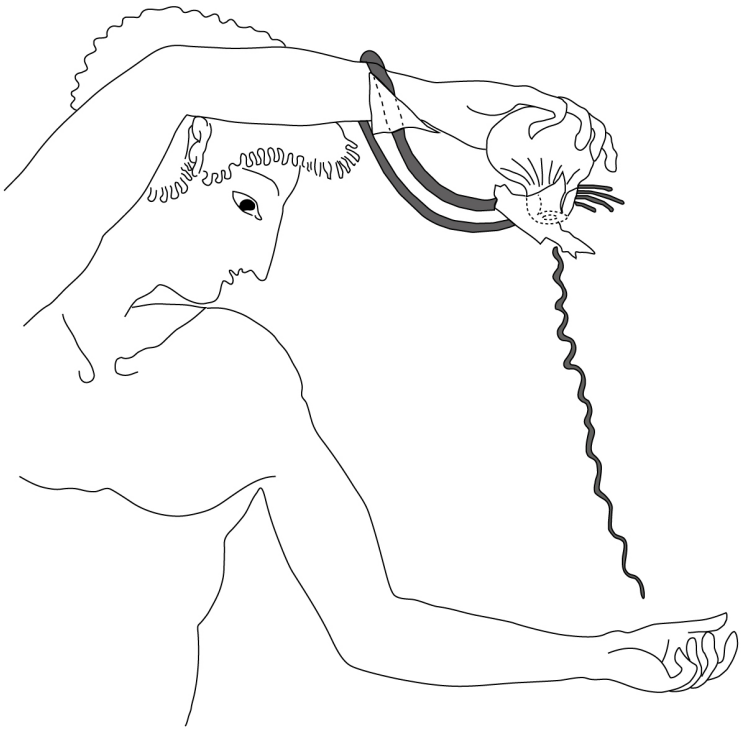

Figure 7: classical Greek image showing a youth pouring oil from a flask for bodily adornment. Berlin, Antikenmuseum Staatliche Museen, Preussischer Kulturbesitz, F 2180 (drawn by author after Lenoble 1998: figure 4)

Conclusion

Research into pilgrim flasks – a form rapidly appropriated in both Egypt and Nubia after its introduction from the Levant – revealed distinct regional practices from as early as the 18th Dynasty, which exacerbated in the Late Period/Napatan period. The appearance of pilgrim flasks in indigenous spaces – such as Debeira East and H25 – suggests that rather than being part of an 'Egyptian package', they were specifically selected by Nubian communities, in all likelihood for their contents. The ability for these contents to be appropriated in local behaviours and tastes indicates that they became relationally entangled – and could be thus appropriated because they bore relevance to traditional *habitus* systems. This increased significantly in the early Napatan period, when the use of pilgrim flasks took on particular importance at the site of Sanam. It is likely that the pilgrim flask was absorbed into Nubian society because it fit indigenous habitus practices and tastes, which may be related to libation practices (Kilroe 2019a). The form ultimately transformed into the perfume bottles found in the Meroitic period, which is likely a Nubian innovation.

Such research demonstrates the potential that Egyptian-style ceramics can hold for understanding local practices, and the colonial experience in Nubia more generally. Appreciating the multiplicity of material culture within social groups, we can reveal the intricacies of daily life that are hidden from official discourse, and begin to access how individuals negotiated their complex networks of people and place through the everyday visual medium of pottery.

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Understanding the Kerma Amulets: the Ladder and Baboon Amulet-Beads

Elena D'Itria

Introduction

Bead, pendant and amulet adornments are one of the most characteristic features of ancient Nubian culture, and the Kerma period is no exception. The urge to decorate the body is a universal human trait ensconced in multiple layers of meaning (Lacovara, Markowitz 2019: 3). At the most elemental level, it serves to beautify the body. In addition, most jewellery in ancient Nubia was imbued with apotropaic powers believed to protect the wearer from harmful forces. Images of deities and powerful animals were thought to provide their wearers with protection, strength, and fertility (Andrews 1994: 8-9). Both men and women at Kerma wore large amounts of jewellery. Frequently they encircled their heads with strands of coloured faïence beads and their necks with multiple necklaces. Their jewellery included pendant necklaces, bracelets and armlets. They also wore anklets around their lower legs and equal numbers of bracelets on their upper arms (Reisner 1923b: 89-133, 254-258, 280-285). All these personal adornments were composed of both beads and also of a variety of faïence amulet-beads. Some iconographies seem to be peculiar to Kerma production and possibly reflect local beliefs.

It should be highlighted here that the research on the Kerma amulets accomplished by the author was the first systematic and articulated study on these objects. This large collection, which has thus far been studied and recorded in very little detail, has never been published until now (D'Itria 2018: 54–55). This paper deals with two specific typologies of amulet-beads found at the site of Kerma, the ladder and the baboon. These schematic faïence amulet-beads were the most common amulets in the Kerma cemetery, but they were an unknown typology in Egypt, and very likely locally made (D'Itria 2018: 59). Some scholars have suggested that the local production of faïence in Kerma was based on the reuse of imported faïence pieces from Egypt, but on the contrary I would demonstrate that several elements support a local production of faïence and not just the re-working of imported objects. The goal of this paper is to demonstrate the potential of the amulet-beads that have allowed us to gain new insights into the religion of the Kerma culture. It will be shown that the ladder and the baboon amulet-beads may be connected with the solar cult, which was probably a crucial element of the Kerma beliefs. It should be noted that, the importance of the sun in the religion of Kerma is also confirmed by several other elements.

The Contribution of Research on Amulets to the Reconstruction of the Religion of the Kerma Culture

G. A. Reisner, director of the Harvard-Boston Expedition, was the first to excavate parts of the site, including the cemetery with the royal tumuli and associated funerary chapels, between 1913 and 1916. Reisner had erroneously interpreted Kerma as an Egyptian settlement. During his fieldwork he discovered Egyptian sculptures in the large southern tumuli and theorized that the site was a Middle Kingdom Egyptian outpost that gradually declined due to the growing influence of the local population (Reisner 1923a-b). However, this theory was later proven incorrect by H. Junker and by T. Säve

Söderbergh (in 1920 and 1941 respectively). Moreover, F. Hintze proved that the site must be the capital of the Nubian kingdom alluded to in Egyptian Second Intermediate Period texts (1964: 83). After the Aswan High Dam Salvage Campaign, new attention was focused on the Kerma culture by the University of Geneva mission under the directorship of C. Bonnet. Beginning in 1973 and continuing to the present day, these new investigations have revealed a remarkable quantity of data from an excavated area measuring more than 30 hectares. In addition to the excavations in the city, the Geneva mission also resumed excavations in the eastern necropolis (Bonnet 1986; 1992; 1997; 2004; Bonnet and Valbelle 2000; Bonnet, Valbelle and Privati 2004; Bonnet and Valbelle 2014).

Contemporary to the Middle Kingdom in Egypt, the centre of power in Upper Nubia was located here at Kerma. This is indicated by the size of the Royal City of Kerma, the earliest known and largest city in Upper Nubia, and the great wealth of the luxury goods found in the town and the burials there (Bonnet and Valbelle 2000; Bonnet, Valbelle and Privati 2004; Bonnet and Valbelle 2014). Thanks to the excavations conducted by the University of Geneva Kerma was identified with the capital city of the kingdom of Kush, mentioned in the Middle Kingdom and early New Kingdom Egyptian sources (Bonnet and Valbelle 2014: 83-84). By the end of the Middle Kingdom and during the Second Intermediate Period, when Egypt was politically decentralized with competing rulers in Lower and Upper Egypt, the resulting power vacuum in the region was filled by the flourishing Kingdom of Kush (2450-1550 BC) (Bonnet and Valbelle 2014).

Despite playing an important role in the history of North-eastern Africa between the mid-3rd and the mid-2nd millennium BC, no written documents produced by the Kerma culture have ever been discovered. Therefore, any attempt at writing a history of the Kingdom of Kush can only rely on the archaeological data (Bonnet 2000: 112). Unfortunately, the study of funerary monuments and religious customs has so far provided scant information on the Nubian pantheon. Excavations have shown that some temples located in the city and in the cemetery of Kerma were used for religious ceremonies and rituals that were probably intended to attract the benevolence of the deities thus ensuring life on earth and in the afterlife. Such a situation renders the study of the amulets essential to understanding ancient Kerma culture. They present an invaluable source of information on the symbols and animals that were believed to have held a protective power (Bonnet 1990: 89; Wenig 1978: 38), and because these objects of personal adornment are closely associated to religious beliefs. They can, therefore, help us to understand some features of contemporary Kerman religion and gain some insights into a still unknown pantheon that could be very complex.

A total number of 1.767 amulets have been studied for the first time by the author. 1.746 of these were collected by G. A. Reisner and are now held in Boston and in Khartoum, and 21 by Ch. Bonnet, which are currently held in the Musée d'Art et d'histoire of Geneva. In his 1923 "Excavations at Kerma" volume (Reisner 1923a-b), Reisner did not include all of the excavated materials, which is especially the case with the amulets. Thanks to the research conducted by the author at the MFA of Boston, at the NMS of Khartoum and at the MAH of Geneva, it was possible to analyse the amulets and personal adornments excavated by Reisner and by the Swiss Archaeological Mission in the Eastern cemetery of Kerma. The new data gleaned from direct examination of these amulets have allowed me to identify all the types of amulets recorded in the capital and to produce a typological and distributive analysis based on the context of origin of the amulets, via the date of the associated materials in their excavated contexts. The study undertaken of the amulets and their iconographies suggest that the nature of the Kerma pantheon, especially in Classic Kerma times, could reflect the multi-ethnic composition of the kingdom of Kush. Given the role of Kerma as an intermediary zone between Egypt and inner Africa (Bonnet 1990: 98), the pantheon may possibly have been composed of Nubian, Egyptian and southern African elements.

The results of this study will be the subject of a forthcoming monograph published by the Harvard Egyptological Series in agreement with the MFA of Boston and enabled by a grant from the Shelby White and Leon Levy Archaeological Program. The volume will be a comprehensive publication of the amulets of the Kerma culture excavated by Reisner, as these have never been published and will thus provide the first insights into their production, development and significance. Moreover, a systematic comparison with the amulets from other Upper and Lower Nubia sites, and those amulets used in Egypt in the period when the Kerma culture flourished will be a central part of this monograph. A comparison of the iconographic features of the amulets with those features found on other classes of material at Kerma will also be provided. The diachronic and synchronic distribution of the amulets at Kerma and in the regions of Upper and Lower Nubia will be outlined along with some general remarks on the religion of Kerma and its development within the framework of the cultural, economic and political interactions with Egypt that characterized all phases of the Kerma culture.

Unfortunately, the jewellery from Kerma is not documented in either textual or figural representations, resulting in the exact meaning of some amulets being poorly understood. We can only offer a mere hypothesis on the significance of the amulets, via comparison with iconographies used in other artistic manifestations of the Kerma culture, and with symbols in Egyptian material culture that in some cases seem to have inspired some types of Kerma amulets. Although a wide variety of amulets were inspired by Egyptian forms, the majority were produced in local workshops, as shown by their different features when compared with the Egyptian types. These iconographic styles were undoubtedly of Nubian production, with some designs that are clearly unique to Kerma, and therefore, the styles possibly reflect local beliefs, as we will see below.

Materials and Technology: the Kerman Faience

While some Kerma amulets were pierced sideways through the upper part and used as pendants, all the amulet-beads, as in the case of the ladder and the baboon types, were pierced lengthwise and appear to have been used on a strand of beads (D'Itria 2018: 59). The amulet-beads were found with a large quantity of small faïence beads, of a blue-glazed, ring-bead variety, although necklaces of large ball beads were also fashionable. These were worn by both sexes in the form of necklaces, bracelets, girdles, and head ornaments, such as circlets (Markowitz, Doxey 2014: 97)

In order to form an object a faïence paste first had to be produced, which would involve the collection and crushing of quartz pebbles or the collection of quartz sand. The sand itself would normally have required some crushing or grinding to render it into a flour-like powder to which crushed natron or plant ash and lime would be added. The lime might come from crushed limestone, or from limestone that had been calcined and then reduced to powder, it might also be naturally present among the quartz sand and so be crushed and added unintentionally with the sand itself. Where plant ash soda was used the coarse material from the "ashing" of the plants would have to be picked or sieved out before crushing the remainder. The materials would then be mixed together, with the resulting paste produced being thixotropic, a character that is subject to changes in viscosity making it difficult to shape and prone to losing detail (Nicholson 2009: 2-3).

A wide range of techniques were used for the shaping of the faïence body material. Where numerous identical pieces were required – as in the case of the amulet-beads- then moulding could be used. A pad of clay was impressed with the shape of the desired object, using an existing object or a metal or a wooden former, or perhaps by carving out the clay to the desired shape. The mould was then fired and could subsequently be used to produce multiple copies of the object in faïence paste. Since the

object was not fired in the mould but rather tipped out of it to dry, the mould could be used many times in quick succession. Eventually the mould, which was porous, would itself soak up some of the paste materials; when efflorescent pastes were being used, the mould would eventually gain an effloresced surface and become useless. At this point it is likely that the mould would be discarded and a new one made (Nicholson 2009: 2-3).

The standardization of the iconographies leads us to believe that all the amulet-beads found in the site of Kerma were made in series with the use of matrices. Although Reisner hypothesized that all the beads and the amulet-beads had been made by hand without the use of any mould, on the base of the study conducted on all the amulets found at Kerma it is likely that the amulet-beads were made by moulding. The existence of several amulet-beads of the same type, such as in the case of the ladder and baboon types, characterized with the same iconography, dimensions and details support the use of moulds in the production of these objects and may thus serve as an example of mass-production.

Reisner believed that Nubian craftsmen were acquainted with two ways of producing the vitreous glaze: applying it to the surface as a slurry, or folding the colorant, in the form of soluble salts, into the body of the ceramic and allowing it to migrate or "effloresce" to the surface during firing (Lacovara, Markowitz 2019: 86). In this second method the materials of the faïence body (paste) are mixed with the colouring material (frequently copper). The mix is prepared wet and can thus be shaped into an object, often by being pressed into a mould. As the object dries, an effloresced "scum" layer develops on the surface of the object. After firing in the kiln, this effloresced coating forms the coloured glaze. Because the ingredients are mixed throughout the body material rather than simply added to the surface of an already-made object, the heating causes them to fuse together and create a substantial glassy phase. The alkali acts as a flux in faïence pastes, allowing the silica to fuse at lower temperatures than would otherwise be possible. Since no glaze is actually added to the finished object, there are no brush marks or finger marks present from this technique (Nicholson 2009: 5-6; Vandiver 1998: 132).

A clearer indication of the technique is that the glaze will be at its thinnest on those parts of the object where air was least able to circulate during drying. The majority of amulet-beads from Kerma have whitish cores covered with a blue-green glaze. There is evidence for the "self-glazing" technique of efflorescence, as demonstrated by the broken sections across some amulet-beads where the interface between the glaze and the underlying body is generally narrow and well defined (Tite et al. 2008: 58-59). Because the faïence paste is thixotropic, even moulded pieces are rarely truly identical, since the material often loses detail as it dries. Moulded pieces may therefore require some re-touching, essentially re-carving of detail, after they are removed from the mould (Nicholson 2009: 2-3).

While it is not known whether there was an indigenous faïence industry during Early Kerma, there is little doubt that artisans of the Classic Kerma period were highly skilled in the manufacture of glazed, not-clay ceramics (Lacovara, Markowitz 2019: 86). Several elements support a local production of faïence during the Classic period and not just the re-working of imported objects. Indeed, from Reisner's excavations at Kerma, there is some evidence to suggest that the site was a centre of faïence production (Nicholson, Peltenburg 2000: 182).

Reisner discovered a series of glazed quartz pebbles which he thought served as supports for the firing of faïence objects and he made reference to the existence of faïence kiln structures (Eccleston 2008: 33). Kilns were not identified with any certainty, the most likely example of which being "too damaged to be drawn" (Reisner 1923b: 135). Nevertheless, their presence cannot be ruled out and the probable existence of kilns and other evidence of manufacture, including the presence of wasters, might be taken to suggest local production. However, analysis has shown that the composition of the vessel fragments found at Kerma, typical of faïences found in Middle Kingdom Egypt, with particularly close

parallels to those found at Lisht by the Metropolitan Museum Expedition, differs on the whole from the large glazed tiles and larger vessels found at the site that do appear to be of Nubian manufacture (Lacovara 1998: 48).

The Kerman craftsmen were working with a mixed assemblage of raw material, since plain and patterned fragments were often used together. This practice appears just before the end of the Classic Kerma period. It is also during this period that local production of faïence blossoms. Faïence tile inlays in the funerary chapel K II are evidence of the emergence of this home-grown industry: analyses of the tiles have shown a distinctly different composition in their glaze and bodies (Lacovara 1998: 49). Analysis of local and imported faïences shows a small overlap in their compositions. Likely explanations include the grinding down and reuse of Egyptian faïences as raw material for local production, and/or the importation from Egypt of the constituent elements (Vandiver 1998: 121-139).

Indeed, it is important to recall that a complete technological study of the faïence beads and amulet-beads from Kerma has never been completed and we currently know very little about the faïence manufacturing techniques during the 3rd-2nd millennium BC in Nubia. Consequently, it has been crucial to have some lab analysis undertaken (SEM/EDS) on the faïence amulet-beads and beads kept in the storerooms of the MFA of Boston. The results of these investigations, conducted by Dr. Richard Newman in the last June -head of scientific research at the MFA of Boston- will provide a detailed account of the chemical composition of the Kerma faïence and of the raw materials used in producing the beads.

Typological Analysis: Ladders

The deceased at Kerma were adorned with all manner of ornaments, including jewellery that was uniquely Kushite in design, construction, and materials, along with Egyptian imports, and adornments that represent a blending of both Egyptian and Nubian influences. Not only were the Kerma elites richly adorned for burial, but so were many of the human and animal sacrifices buried with them (Lacovara, Markowitz 2019: 80). Hundreds of human sacrifices were found in the largest of the tumuli (all thought to be royal tombs) that were excavated by Reisner. After the funerary ceremony, these individuals were laid down and then buried alive. Some of the bodies are in a contracted position with their hands in front of their mouths, as if they were choking on the sand that was covering them. Some were women who wore abundant jewellery, which confirms the idea that many of those sacrificed individuals were high-status members of the royal court, who died in order to accompany their rulers into the afterlife (Markowitz, Doxey 2014: 97). The majority of the amulets and amulet-beads were found inside the tombs but in most cases it is not possible to identify the gender and the age of the deceased individual with which they were associated, because they were often found in the fill of the tombs.

One of the most common amulet-beads found in the Eastern cemetery of Kerma was interpreted by Reisner as the hieroglyphic sign aa (Gardiner Sign List O31), that represents a door (Reisner 1923a: 123). Contrary to Reisner's opinion, I believe that these amulet-beads represent a ladder, characterized by a rectangular shape with horizontal elements that follow each other on the frontward side, while the backside appears to be smooth (D'Itria 2018: 64). The ladder types were found exclusively in the Eastern cemetery of Kerma: 331 of them were discovered in the tumuli of the Classic Period K IV, K X, K XVI, K III, K XV (Reisner 1923a: 123; table 1).

Table 1: amulet-beads representing ladders found in Kerma sites

Accession number	N.	Context	Dimensions	Material	Chronology	Bibliography
NMS 1000	14 ladders	K 338	1.9/1.0 x 0.3/0.3 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1002	14 ladders	K 1600	2.0/0.7 x 0.4/0.3 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1003	14 ladders	K 453	2.0/1.4 x 0.5/0.3 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1004	4 ladders	K 311	2.0/1.1 x 0.4/0.3 x 0.2/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1005	6 ladders	K 1600	2.0/1.5 x 0.4/0.3 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1262	1 ladder	K B	2.4 x 0.4 x 0.3 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1260	3 ladders	K 323	1.8/1.1 x 0.4/0.3 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1269	3 ladders	K 1045	19/1.5 x 0.5/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1268	1 ladder	K 1096	2.0 x 0.5 x 0.3 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA13 4113	8 ladders	K 1038	3.0/0.6 x 0.4/0.2 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA13 4114	9 ladders	K 1031	2.3/0.7 x 0.4/03 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4117	2 ladders	K 1063	0.9/1.0 x 0.3/0.3 x 0.2/0.2 ca	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4118	1 scala	K 1063	0.8 x 0.3 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4127	4 ladders	K 1033	2.6/1.1 x 0.3/0.3 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1510	4 ladders	K X B PA	1.2/0.5 x 0.6/ 0.4 x 0.3/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 5714	8 ladders	K 404	1.8/1.1 x 0.3/0.2 x 0.2/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1546	2 ladders	K III	1.8/0.6 x 0.3/0.2 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923

MFA 14 1050	27 ladders	K 444	2.2/1.1 x 0.6/0.2 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1168	24 ladders	K 1600	1.9/1.0 x 0.4/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1322	16 ladders	K 320	2.3/1.1 x 0.4/0.3 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1335	34 ladders	K XV	1.4/0.6 x 0.2/0.2 x 0.1/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 5776	3 ladders	K 303	1.6/0.7 x 0.4/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1607	84 ladders	K 453	1.9/0.5 x 0.4/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1561	1 ladder	K X B KJ	0.8/0.7 x 0.3/0.3 x 0.2/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4158	1 ladder	K 1064	1.9 x 0.3 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 3 1149	3 ladders	K 1095	2.0/1.9 x 0.4/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 20940	1 ladder	Melik en Nasir	0.6 X 0.1 X 0.1 ca.	*Faïence*	Classic Kerma	Mills, Nordström 1966

The Kerma types are very different from the Egyptian amulets representing staircases, with the latter tending to resemble a right-angled triangle with the steps running up the long hypotenuse. This design is probably a schematic representation of the primordial mound that first arose out of the waters of chaos and upon which all creation began. In Egypt a staircase amulet would thus have offered the wearer the opportunity for rebirth, resurrection and an ascent to heaven (Andrews 1994: 88). However, it should be stressed that the form of the Egyptian amulets representing staircases is exclusive to the Saite Period, a later date than the Kerma ladder amulets.

The ladder amulet-beads were pierced lengthwise and appear to have been used on a strand of beads with other faïence amulet-beads and were thus probably put side by side to form very long necklaces and circlets (figures 1–2). Both men and women at Kerma wore large amounts of jewellery composed of a variety of faïence beads and amulet-beads. They usually encircled their heads with circlets and their neck with necklaces. In other cases, the ladders featured by some very small holes on the frontward and backsides, therefore they probably formed patterns on garments (Reisner 1923a: 99-104, pl. 42,2; figure 3). Kerma people were attired in bead-studded skirts of fine leather and linen, which were often decorated with beadwork (Reisner 1923b: 89-133, 254-258, 280-285). The close relationship between jewellery and clothing, exemplified in Egypt by elaborate bead-net dresses and woven broad collars, was equally strong in Nubia, where garments made of leather, linen, and wool were often decorated with beads arranged in complex patterns (Markovitz, Lacovara 2019: 91).

Figure 1: string of beads and amulet-beads representing ladders, K 1031/5b (MFA 13 4114) Photograph © Museum of Fine Arts, Boston (reproduced with permission)

Figure 2: (left) amulet-bead which shows a ladder, K IV grave 453 (MFA 14 1607, detail) Photograph © Museum of Fine Arts, Boston; (centre) amulet-bead which depicts a ladder, K 1045 (NMS 1269, detail); (right) amulet-bead representing a ladder, K IV grave 444, body A (MFA 14 1050, detail) Photograph © Museum of Fine Arts, Boston (reproduced with permission)

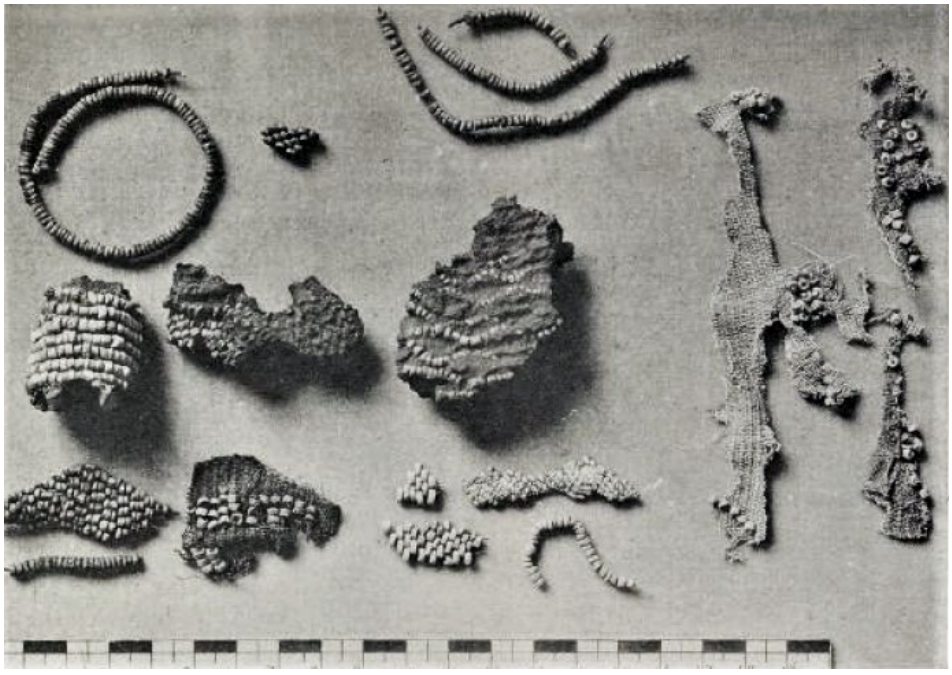

Figure 3: set of small ring-beads, some of them sewn to cloths (Photo A 2168, Reisner 1923a: Pl. 63,1) Photograph © Museum of Fine Arts, Boston (reproduced with permission)

Typological Analysis: Baboons

Other amulet-beads that appear frequently in the Kerma cemetery, but are yet to be found in the Lower Nubian region, are those depicting baboons (table 2; figures 4–5). Reisner identified these amulet-beads with the name Hapi, a dog-faced baboon (Reisner 1923a: 123). Two hundred and nine of them were found in tumuli dating to the Classic period: K IV, K X, K XVI, K III. Three baboon type amulet-beads were also found in the cemetery of Sai, one dated to the Ancient Kerma, one to the Middle Kerma and one to the Classic period. The Ancient Kerma example was found in the fill of a tumulus

with a necklace composed of some beads and a single gold amulet in the form of a human head (Gratien 1986: 71). This baboon is represented in a very schematic way without any detail; it was pierced sideways through the shoulders and it was rough in form (Gratien 1986: 71; S 1369, SKC 3 51-2). The baboon dated to the Middle Kerma was instead pierced lengthwise with the snout the only detail represented, jutting out when compared to the rest of the body (Gratien 1986: 317; SCK 2 24-4). The baboon of the Classic Kerma was part of a necklace composed of sixty-seven blue faïence disc-beads and three carnelian ball-beads found around the neck of a child. The individual was placed on a funerary bed in a contracted position with the head to the east (Gratien 1986: 317). This last amulet-bead is very similar to the others found at the capital, inside the tumulus of the Classic Kerma period. These amulet-beads represented the baboon in a very schematic way, with very little accompanying detail. The animal is crouched on a rectangular base, the snout is merely outlined, short and squared; the body is smooth but without any indication of the lower arms and paws. There were only summary and superficial oblique lines on the sides of the body. All of these amulet-beads were pierced lengthwise and some examples had a circular edge upon the head.

Table 2: amulet-beads representing baboons found in the Kerma sites

Accession number	N.	Context	Dimension	Material	Chronology	Bibliography
MFA 13 5714	4 Baboons	K 404	1.7/1.5 x 0.3/0.2 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4114	3 Baboons	K 1031	1.1/1.0 x 0.3/0.2 x 0.2/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1002	15 Baboons	K 1600	2.2/1.0 x 0.4/0.3 x 0.2/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1004	6 Baboons	K 311	2.0/1.2 x 0.5/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1005	8 Baboons	K 1600	2.0/1.0x 0.4/0.3 x0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1003	10 Baboons	K 453	2.3/1.6 x 0.3/0.2 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1006	2 Baboons	K III A	1.9/1.8 x 0.4/0.3 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1000	5 Baboons	K 308	2.0/1.0 x 0.4/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1252	1 Baboon	-	1.1 x 0.2 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1269	1 Baboon	K 1045	1.7 x 0.4 x 0.3 ca.	*Faïence*	Classic Kerma	Reisner 1923
NMS 1268	1 Baboon	K 1096	1.3 x 0.3 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923

MFA 14 1050	12 Baboons	K 444	2.2/1.1 x 0.5/0.2 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1168	32 Baboons	K 1600 C	2.1/0.6 x 0.4/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4113	1 Baboon	K 1038	1.9 x 0.3 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1510	1 Baboon	K X B PA	1.4 x 0.7 x 0.4 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4127	1 Baboon	K 1033	2.2 x 0.3 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 5743	1 Baboon	K III	2.2 x 0.4 x 0.4 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4117	2 Baboons	K 1063	1.9/1.1 x 0.4/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 20 1747	4 Baboons	K 1604	0.8/0.7 x 0.3/0.2 x 0.1/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 5776	2 Baboons	K 303	0.8/0.7 x 0.3/0.2 x 0.1/0.1	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4125	1 Baboon	K 1024	1.1 x 0.5 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4118	1 Baboon	K 1063	0.8 x 0.4 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1335	20 Baboons	K 1500	1.3/0.9 x 0.3/0.2 x 0.2/0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 4145	1 Baboon	K 1044	0.5 x 0.2 x 0.1 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 13 3978	1 Baboon	K 1063	1.7 x 0.2 x 0.2	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1322	17 Baboons	K 320	2.6/1.0 x 0.3/0.2 x 0.2/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 14 1607	44 Baboons	K 453	1.9/0.4 x 0.5/0.3 x 0.3/0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
MFA 20 1721	1 Baboon	K 400	3.1 x 0.3 x 0.2 ca.	*Faïence*	Classic Kerma	Reisner 1923
S 1369	1 Babbiuno	SKC 3 T. 51	1.0 x 0.6 x 0.3 ca.	*Faïence*	**Ancient Kerma**	Gratien 1986
LILLE SCK 2 24-4	1 Babbiuno	SCK 2 T. 24-4	2.2 x 0.6 x 0.4 ca.	*Faïence*	Classic Kerma	Gratien 1986
L 2290	1 Baboon	SKC 1 T. 12-2	1.2 x 0.8 x 0.4 ca.	*Faïence*	**Middle Kerma**	Gratien 1986
L 942	1 Baboon	M III KT 2	0.8 x 0.45 x 0.2 ca.	*Faïence*	Kerma Classico	Vila 1970

Figure 4: string of beads and amulet-beads representing baboons, K 1063/3 (MFA 13 4117). Photograph © Museum of Fine Arts, Boston (reproduced with permission)

Figure 5: (left) amulet-bead which shows a baboon, K 1604 (NMS 1040, detail); (centre) amulet-bead which depicts a baboon, K 1063/3 (MFA 13 4117, detail) Photograph © Museum of Fine Arts, Boston; (right) amulet-bead representing a baboon, K XVI grave 1600 C4 (MFA 14 1168, detail) Photograph © Museum of Fine Arts, Boston (reproduced with permission)

Both the Middle Kerma and Ancient Kerma period baboon amulet-beads were found in the cemetery of Sai, and although there is one example for each of the two periods, and thanks to this study it can be stressed that in the earliest phase, the baboon was produced in a rough form without any detail because from the Middle Kerma onwards the jutting snout and the lengthwise hole appear. Oblique lines on the side of the body, a short, squared snout and the rectangular base, were what characterized the examples of the Classic Kerma period.

A very particular example of an amulet representing a baboon was found in tumulus K 1400 (Reisner 1923a: 478; MFA 20 1721; figure 6). Differing from the others, the animal is depicted crouched and slightly curved forward; the head, reclined downwards, is well defined with a thin and lengthened snout. Both the sides of the head were characterized by some lines that could indicate the coat and the ears. This is the only example where both the hands are shown on the sides of the snout. On the reverse side there are two holes, probably indicating that it was sewn onto a garment.

Figure 6: amulet of a baboon, K 1400 main pit (MFA 20 1721, detail) Photograph © Museum of Fine Arts, Boston (reproduced with permission)

Although the baboon amulets were also produced in Egypt, it is evident that all the amulet-beads, such as the ladder, were made locally as they undoubtedly appear to be of Nubian production. This conclusion can be further illustrated by the example of the baboons found in the Kerma cemetery that were considerably different from their Egyptian counterparts. Egyptian baboon amulets often depict

the creature squatting with its paws on its knees. In other later examples the figure regularly stands upright, paws by its sides, and supported by its long tail. In well-modelled Egyptian examples, the phallus lies prominently between the feet. It is this creature which is depicted in private tombs, particularly of New Kingdom date, placed under its owner's chair, where it is meant to serve not only as a pictorial record of a family pet but also as symbol of love and sexual fulfilment to be enjoyed in the Afterlife. Although the latter were usually animal manifestations of the god Thoth, they were also associated with the sun. Later examples which have the baboon in the posture of adoration, would have been linked with rebirth (Andrews 1994: 66). The Egyptians seem to have thought that these animals had foreknowledge of the sun's arrival at dawn, which they heralded with screams and paw waving (D'Itria 2018: 65).

The Symbolic Value of the Amulet-Beads

Studying the amulets can help us to understand some aspects of local religious practices, such as the solar cult which was widespread at Kerma (Kendall 1997: 76-77; Bonnet 2000:120). The wide distribution of amulet-beads representing the baboon could be related to the idea that these animals were considered fervent worshipers of the rising sun in the morning. It is highly likely that they had a symbolic value at Kerma and they also could have been considered divine hypostasis, and thus associated with the solar cult. Furthermore, the high number of amulet-beads in the capital's cemetery that represented a ladder, could be associated with the solar cult as it is an ascendant element. In the Classic period, ladders and terraces are the typical central focus of the Kerman chapels (D'Itria 2018: 64).

The three large mud brick buildings at Kerma, K I/Western Deffufa, K II/Eastern Deffufa and the funerary chapel K XI, had stairways leading to roof terraces where religious rites appear to have been performed (figure 7). The heights of these terraces, especially that of the Western Deffufa (nineteen metres), may suggest that these rites involved attempts to communicate with cosmic deities, namely the sun. In the inner room of K II, the large obelisk-like stone, fallen from the north end of the roof, appears to have been the very focus of the rites (Kendall 1997: 76-77).

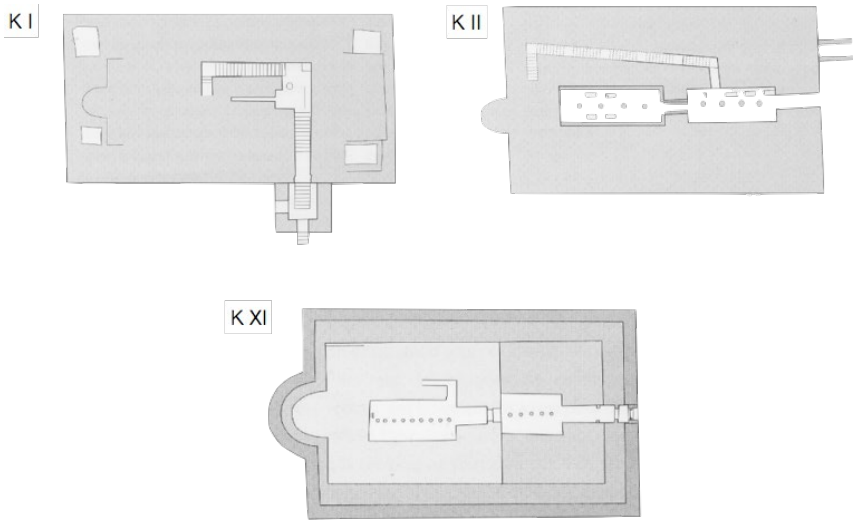

Figure 7: Plan of K I/ Western Deffufa, K II/ Eastern Deffufa and K XI (after Bonnet 2000: 116; reproduced with permission)

An important iconographic element in understanding the symbolic significance of the ladder during the Kerma period is found on two damaged figures climbing ladders painted on the surface of a sandstone plaque (figure 8). This plaque was found by Reisner on the stone emplacement near the northern inner wall, in the sacred focal point of funerary chapel K XI (Reisner 1923a: pl. 18,2; Bonnet 2000: 91). The scene depicts two figures associated with a ladder: the first figure, on the left, has his foot placed on the first two steps of the staircase, which has yellow struts and two black horizontal elements; the second figure is instead shown leaning forward. These figures were distinct from the others shown in the other scenes in the chapel due to their clothing: they wore an animal skin around their waist. The two figures are most likely wearing ritual cloths and the scene could thus represent two priests ascending to the roof, where they would then perform some kind of ritual related to the solar cult. The placement of this scene in this area of the chapel demonstrates that it was important for the funerary cult.

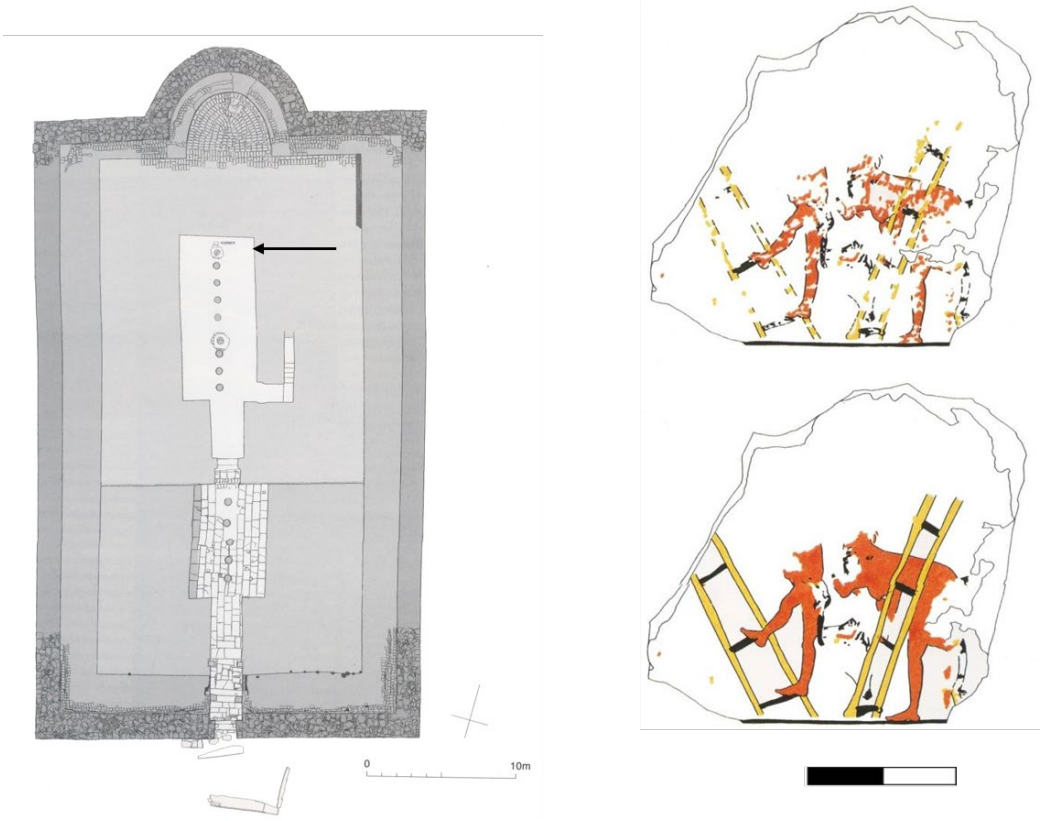

Figure 8: Painted wall decoration of the royal funerary chapel K XI (after Bonnet 2000: 55, 94; reproduced with permission)

During the Classic Kerma period, access to the terrace was a crucial factor in the use of these sacred buildings, and this may suggest that a high number of important cult activities took place there (Manzo 2008: 180-182). The terrace was a feature found in some sacred buildings at Kerma, both in the precinct of the main temple and in the cemetery. The Eastern Deffufa in the cemetery, like the Western Deffufa, is characterized by stairs leading to a terrace, and by a large terrace with a pylon on the southern side. The crucial role of the terrace can be seen in structural changes to building K II. When the internal staircase was no longer available in this building, a new external staircase leading to the terrace abutting the southern wall of the building was added (Bonnet and Valbelle 2000: 126).

Halfway up the staircase of the Western Deffufa, a long and narrow internal room was built within its brickwork that appears to have been the residence of a god, who may also have had solar associations. A sacrificial stone, as well as the remains of either sheep or goats, were found on the stairway landing in front of the internal room of the Western Deffufa. This area seems to have constituted a kind of shrine occupied by a divinity. It is similar to the southern rooms in K XI and K II in which the deceased kings may have been placed before they were buried. The evident relationship between the internal rooms of these two buildings with that found within the Western Deffufa – probably the sancta sanctorum- suggest that the deceased kings in the cemetery must have been closely identified with the deity worshipped in the Western Deffufa or on its roof (Kendall 1997: 77). It is argued here that this deity was the sun and it was with him that all kings were identified after they died. We can therefore imagine that the king deceased wished to ascend to heaven after his death, in the presence of the Sun god, the main divinity of the Kerma pantheon. The evidence discussed here support the hypothesis that the ladder may have acquired a symbolic value in the Kerma religion, due to it becoming the tool used to ascend to the sky and for this reason it may have been represented on several amulet-beads.

The Solar Cult in Ancient Kush

Confirming the importance of the sun in the religion of Kerma, as already suggested by these amulet-beads, are many various other elements of the culture. In Kerman funerary contexts everything had a strict directional arrangement with a particular emphasis on the east. This emphasis is seen in all tombs, the dead were always placed with their heads to the east. Moreover, pottery offerings were left on the eastern sides of the graves. In the royal tombs, the burial chambers of the kings had an east-west axis, as did the sacrificial corridors. These details make it clear that people must have been deeply concerned with the sun and its movements and must have equated the east, sunrise, and the new day with the concepts of resurrection and new life. This could also suggest that they worshipped the sun as a primary deity, and this god possibly also assumed the form of a ram (Kendall 1997: 77).

From the beginning of the Middle period, some graves began to contain goats, which were placed at the southern sides of the grave pits. These animals were probably taken by the dead into their graves as offerings to the Sun god (figure 9). The goats found inside the graves wore a spherical topknot of ostrich feathers on their heads (Bonnet 1990: 90). The inclusion of these animals in the tombs, their peculiar head ornaments, and the red ochre designs sometimes painted on their bodies suggest that they had specific religious or symbolic significance. The spherical ornament possibly represented the Sun disk and this practice could also be connected to more than eighty rock engravings picturing such animals with spheroids on the heads that are recorded in the desert west of the Nile and across the Sahara (Camps 1994: 29–44; Muzzolini 1994: 247-271), and also with a clay C Group statuette representing a goat with a spherical ornament on its head (Wenig 1978: 129; Chaix 1993: 161–164; Kendall 1997: 76).

Such animals had obviously been widely venerated by the peoples of North Africa since remote antiquity, and their meaning among the C-Group and Kerma peoples must have been profound (figure 10). During the Classic period, there is evidence of a ram cult in the Western Deffufa as well as in some tombs. Spherical ornaments sometimes appear on the goats in the tombs, suggesting that the ram was probably associated with the Sun god. If this connection is accepted, then this animal could even have represented the animal hypostasis of the sun (Bonnet and Valbelle 2004: 158–159). Despite their clear cultural significance, the absence of amulets depicting rams in the site of Kerma should also be underlined.

Figure 9: drawing of a Kerma lamb wearing a spherical crown of ostrich feathers by G. Deuber (after Bonnet et al. 1984: 17, figure 17; reproduced with permission), and horn ornament found in the eastern cemetery of Kerma, CE 8 tomb 81 (after Bonnet 1990: 76; reproduced with permission)

Recent research at Kerma suggests that the Egyptians may have incorporated aspects of the indigenous Nubian religion into their own. After the conquest of Nubia, the pharaohs of the New Kingdom established the religion of their supreme god Amun throughout Nubia. In his Nubian temples, however, Amun was increasingly represented as a ram or as a ram-headed man wearing a sun disk on his head. The origin of this "southern" variation of Amun worship was suggested by the discovery of sacrificed lambs, ewes, and rams crowned with spherical objects made of ostrich feathers in Kerman graves, which has led to the suggestion that these animals may have inspired Amun's new form (Bonnet et al. 1984: 5-42; Bonnet 1990: 89-91; Kendall 1997: 76). The result was that the Egyptian Amun assumed ram form in Nubia and that the Nubian god became the Egyptian Amun. As stressed above, this identification of the Sun god with the ram was already well advanced under the Kings of Kerma (Kendall 1997: 78).

Figure 10: (left) ram wearing a disk or spherical crown (after Kendall 1997: 76; reproduced with permission); (right) C-Group statuette of a goat with head ornament from Aniba, ÄMUL 4373 (Steindorff 1935: 123, n.34, plate 73, 34; courtesy of the Ägyptisches Museum Georg Steindorff, Leipzig)

Cultural Fusion of Egyptian and Nubian Elements

During the Classic period other types of amulets that are comparable to Egyptian ones, extending from animals (sphinxes, scarabs, hippopotamuses, hawks, scorpions, and crocodiles) to symbolic or religious objects and deities, including human legs, djed pillars and Taweret, occur in the capital city (D'Itria 2018: 61-66). The amulets and their iconographies may have reflected the new political status of Kerma as a regional power, whose subjects also included Egyptian people living in Lower Nubia. Although Kerma adopted Egyptian iconographies, in most cases Nubian traits are also evident. The forms of these types of amulets changed to become more embedded in local associations. A similar process also seems to emerge with the other figurative representations, such as the decoration of ivory, bone, mica and faïence on funerary beds and caps, where the forms changed in accordance with local iconography. The precise meanings of the Egyptian symbols used at Kerma often remain ambiguous, and it is unclear how much of the original Egyptian significance of these symbols remained.

As is also made evident by the amulets, further Egyptian elements were adopted in the sacred buildings both in the capital city and its cemetery during the Classic period. The presence of a pylon on the southern side of monumental buildings was a characteristic of the Classic Kerma Period, and exemplary are the K I/Western Deffufa, K II/Eastern Deffufa, funerary chapel K XI and the temple located in the harbour district (Manzo 2008: 174-176). The likelihood of sun worship at Kerma is reinforced by the appearance of an Egyptian-style sun disk emblem on two Classic Kerma monuments. One was carved on the granite door lintel of K II, while the other was painted on a wall inside the burial vault of royal tomb K X. The use of a pylon and the winged sun disk on the decoration of the lintels is clearly related to contemporary Egypt. The Kerman ruler chose a motif like the winged sun disk that may have become syncretised with the local solar religious traditions (Minor 2014: 231; see also Kendall 1997: 77-78, his discussion of disc-shaped ostrich feather headpieces found on rams or goats, the sanctity of Deffufa rooftop, and the possibility of a solar aspect of the royal ancestor cult).

It is interesting to note that some traits of the monumental architecture at Kerma can be related to Egypt during the Classic period. We may suggest that the architectural expression of the message the rulers of Kerma wanted to convey now incorporated Egyptian elements (Manzo 2008: 174-176). This may be related to the manifestation of the new international rank of the kings of Kush, the extension of

their political control of Lower Nubia and possibly to the extension of their influence into some parts of the territory of Egypt itself. At that time the kingdom of Kerma also held strong political and economic ties with the Hyksos (D'Itria 2018: 67). Some contemporary inscriptions from the Egyptian fort of Buhen, which was then under the control of Kush, suggest not only that the kings of Kerma could rely on Egyptian specialists for the edification of their monuments, but also that Egyptians were present in Kerma (Valbelle 2004: 176-183).

The use of Egyptian symbols in Kushite royal monuments could also facilitate the incorporation of new Egyptian subjects into the kingdom. Objects with a stylistic or thematic reference to Egypt fall under the definition of Egyptianizing art, demonstrating an incorporation of those Egyptian references into the local artistic dialogue (Minor 2014: 230). Moreover, as shown by the emphasis on solar elements, the iconography of these objects is apparently not accidental but rather they were deliberately chosen from among the foreign and local customs present in Kush. The Egyptian figures were not selected for reproduction but on the basis of Kerman beliefs. The Kerman people only chose those Egyptian elements that appeared appropriate for their incorporation into local cults.

Conclusion

To sum up, the amulet-beads representing ladders and baboons, appear peculiar to Kerma production. These types of amulet-beads may be connected with the solar cult, which was probably a crucial element of the Kerma belief system. As stressed above, the schematic faience amulet-beads were very common in the Kerma cemetery, while in contrast, they appear to be totally unknown in Lower Nubian sites. In the case of the ladder and baboon amulet-beads, these types also seem to be absent from other assemblages and were unknown in Egypt. Therefore, these specific amulets were probably associated with a cult that was rooted in the capital, but not in the other regions, such as Lower Nubia. This region continued to be linked to local traditions, such as those seen on amulets of Egyptian origin depicting Taweret, crocodiles, hawks, hippopotami and scarabs (D'Itria 2018: 67).

Nevertheless, further investigation is required in order to fully incorporate the amulets found in the Kerma cemeteries located in Lower and Upper Nubia and in the Fourth cataract region with those found in the capital city and from other regions due to the possible differences between the typologies. A typological and distributive analysis of the amulets in the different sites of the Kerma culture will be completed with the aim of outlining their diachronic and synchronic distribution in throughout the sites of Upper and Lower Nubia and in the southern region controlled by Kerma during the Classic period.

The results of this research into the amulets and their iconographies confirms that the syncretism between Kerman and Egyptian religion was especially emphasized in Classic Kerma times. During that period some Egyptian iconographies were adopted by Kerma people both for the amulets themselves and for other artistic media, which is perhaps unsurprising within the contemporary framework of a broad network of contacts that characterized this period, and whose subjects also included Egyptian and southern people.

To further identify Kerma products and foreign imports some laboratory analyses were conducted. These investigations have the aim of outlining the technical traditions of the Kerman workshops and the manufacturing techniques and raw materials used. In particular, chemical analysis will reveal the local variations of the amulets' compositions and provide information on both the origins of the raw materials and colourants. The result of the lab-analysis and the reconstruction of the manufacturing process will provide further information on the socio-economic structures present at

contemporary Kerma and the wider context of the faïence workshops located in the city, which will help us to understand their sources of origin and define the circulation networks.

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A-Group Nubian Glyptic: Analysis and Preliminary Results

Siobhan Shinn

In this paper, I report the preliminary results of an analysis I undertook of A-Group Nubian glyptic. I first encountered this culture's glyptic whilst researching for my doctoral dissertation but have only recently been able to return to it. The variation evident in A-Group Nubian glyptic had not been previously discussed in scholarship on early Egyptian or Nubian seals and sealings, and this convinced me a study of the material was necessary; therefore, I analyzed glyptic from seals and sealings excavated in A-Group Nubian contexts in order to determine what, if anything, could be said about it. The results of that analysis are the subject of this paper.

Evidence for the Nubian A-Group has been found at sites from between Kubbaniya, in the north, and Aksha, in the south, as well as at sites in the Eastern Sahara and northern, Upper Egypt (Gait 2011: 1; Edwards 2004: 69, figure 3.10). Those sites with the highest percentages of A-Group material are located between the first and second cataracts, thus suggesting that this region was the centre of A-Group activity (Edwards 2004: 68). It is therefore not surprising the majority of sites at which seals and seal impressions were excavated are also located in this region. Sites where glyptic has been excavated include the following: Kohr Bahan and Siali, located just near the first cataract, Gerf Hussein, Ikkur and Koshtamna, located just near the mouth of the Wadi Allaqi, Toshka West, and Abu Simbel, Ashkeit, Faras, Dabarosa, Qustul, Saras West, and Serra East, located around or just north of the second cataract (figure 1). The significance of several of these sites is well known. Cemetery 17 at Khor Bahan, for example, is the largest and best preserved, Early A-Group cemetery thus far discovered, and Cemetery L at Qustul contains many fine and unique objects that underscore the substantial relationship between the A-Group and Naqada cultures (Gait 2011: 13; Gatto 2000: 108-112; Williams 1986). Outside of this region, A-Group glyptic has only been found at the site of Aksha, which is south of the 2nd cataract and better known for its Ramesside temple (Vercoutter 1966).

The Nubian A-Group is traditionally dated to between early-mid 4th millennium BCE through 2800 BCE (Nördstrom 1972; Gait 2011: 5). This range is based on the few radiocarbon dates obtained from sites excavated by the Scandinavian Joint Expedition (SJE) and from the site of Afyeh, and also on relative dates obtained by comparing Nubian and Egyptian material (Gait 2011: 5). Comparative dating has also made the synchronization of Nubian and Egyptian cultural periods possible (table 1). The cultural framework used in this paper was established by Nordström in 1972; however, it should be noted that several others exist and that I use Nordström's because it has been and continues to be most widely employed in Nubian Archaeology.

Table 1: Relative chronologies of Nubia and Egypt (after Nordström 1996: 19, figure 2)

A-Group Nubia	Predynastic and Early Dynastic Egypt
Early A-Group (?-3400 BCE)	Naqada I (3900-3600 BCE)
Classic A-Group (3400-3100 BCE)	Naqada II (3600-3300 BCE)
Terminal A-Group (3100-2900 BCE)	Naqada III (3300-3000 BCE)
	First Dynasty (3000-2800 BCE)

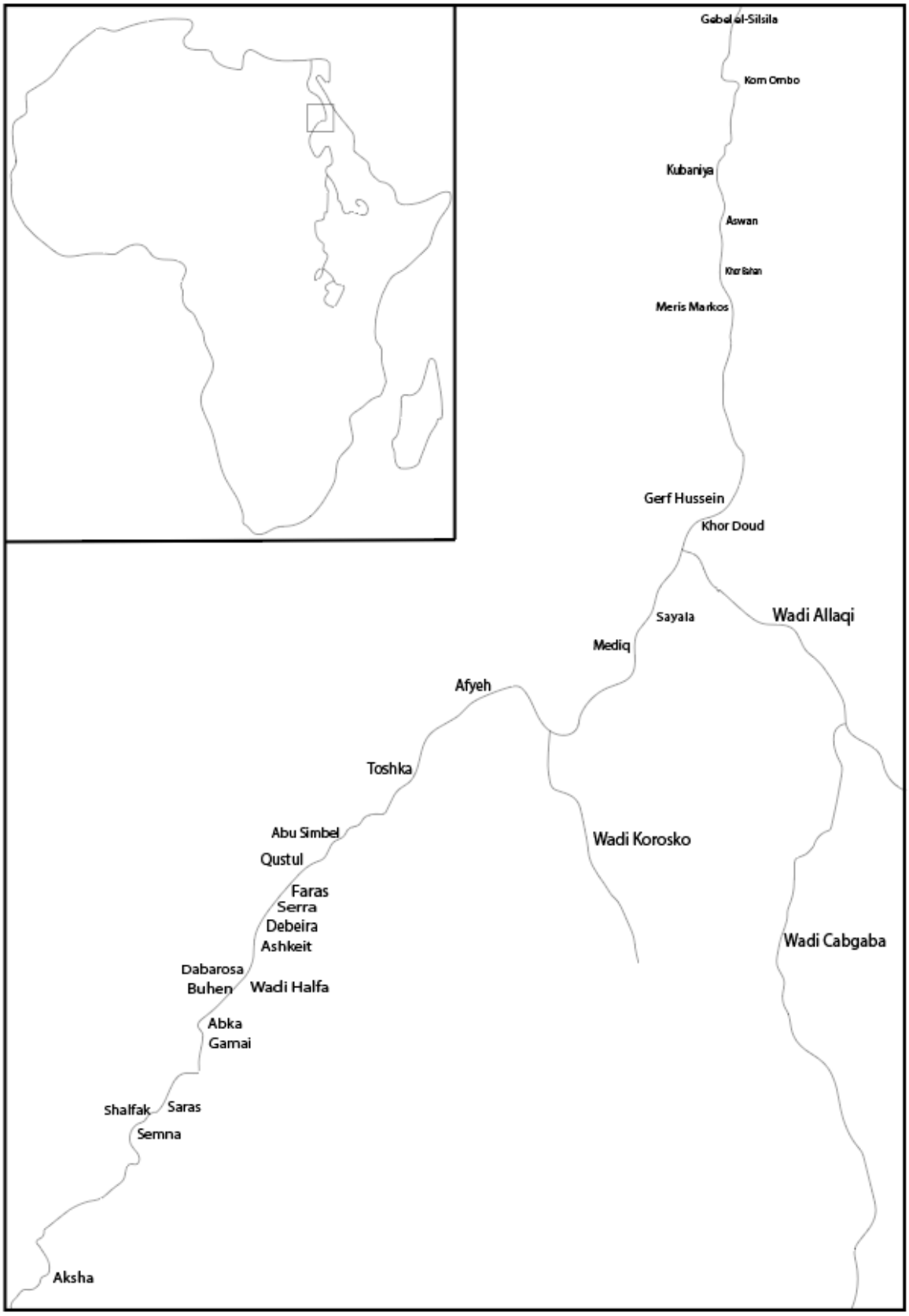

Figure 1: A-Group Sites (drawn by the author after Gait 2011)

Evidence for A-Group culture includes ceramics, lithics, tools, and palettes as well as seals and sealings with glyptic (Gatto 2006: 67, 71). The seals are cylindrical objects (figure 2) with holes pierced through their centres and glyptic engraved intaglio (i.e. in reverse) onto their surfaces. Glyptic are the group of hieroglyphic or graphic symbols (figures 2, 3) engraved onto seals and impressed onto sealings. Sealings are specially prepared bits of clay (figure 3) which are affixed to objects (e.g. bags, boxes, doors, jars, papyrus) and impressed with seals for security purposes. Scholars believe ancient sealers prepared sealing clay, closed an object with a sealing by laying the sealing across the object's opening or over its lid and shoulder, and sealed the sealing by rolling the cylinder onto the sealing (figure 4).

Figure 2: Predynastic cylinder seal with graphic glyptic from Naqada, Petrie Museum UC5374 (photo by the author; courtesy of the Petrie Museum)

Figure 3: Early Dynastic sealing with hieroglyphic glyptic from Abydos, Petrie Museum UC43001 (photo by the author; courtesy of the Petrie Museum)

A-Group glyptic is found on 11 seals and 7 sealings excavated in Lower Nubia. The seals were made using clay (5), ivory (4) and steatite (2). Where each seal was made and used (i.e. in which administrative system it was used) is difficult to determine based on the material alone because seals made from these materials have been excavated in Egypt as well as in Nubia. This also holds true for the sealings because they were all made with clay, and it is nearly impossible to distinguish between Nile clay in Nubia and in Egypt without microscopic analysis.

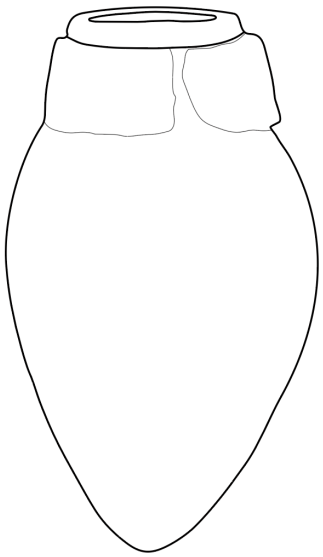

Figure 4: line-drawing of sealing, in situ, on a pot from Giza (drawn by the author after MFA 20.1923)

The majority of Nubian seals and seal impressions were excavated in cemeteries: only 3 were excavated in settlements – all of which were seals. Seals found in settlements are typically interpreted as evidence of administrative activity; however, the paucity of seals generally and the lack of seal impressions from settlement contexts makes this hard to prove for Nubia.

Clearly, these seals and seal impressions did not function in a Nubian administrative system; however, whether they functioned as part of the Egyptian administration or in a different capacity remains to be determined, and I believe the glyptic found on these objects sheds light on this question.

A-Group glyptic can be divided into two styles: Egyptian and Nubian. Egyptian-style, A-Group glyptic is characterized by specific motifs and scene-compositions also found on seals and sealings excavated in Egyptian contexts in Egypt. Examples of shared motifs include the wading bird, seen in the Saras West seal, the Qustul seal and the Abydos seal impression 1 (figure 5), the rosette, seen in the Faras seal and the Abydos impression 2 (figure 6), and the man with stick, seen in the Saras West seal and the Abydos impression 3 (figure 7).

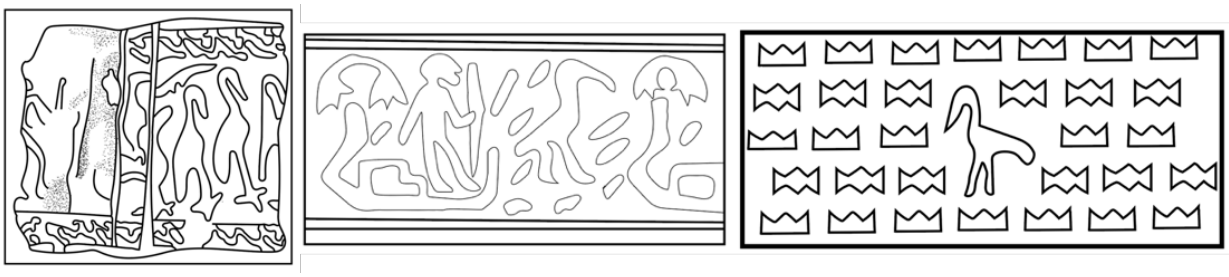

Figure 5: (left) Qustul seal, wading bird (after Williams 1986: 168, 58c); (centre) Saras West seal (after Roy 2011: 369, plate 12b); (right) Abydos seal impression 1 (after Hill 2004: 40, 14b). Drawings by the author

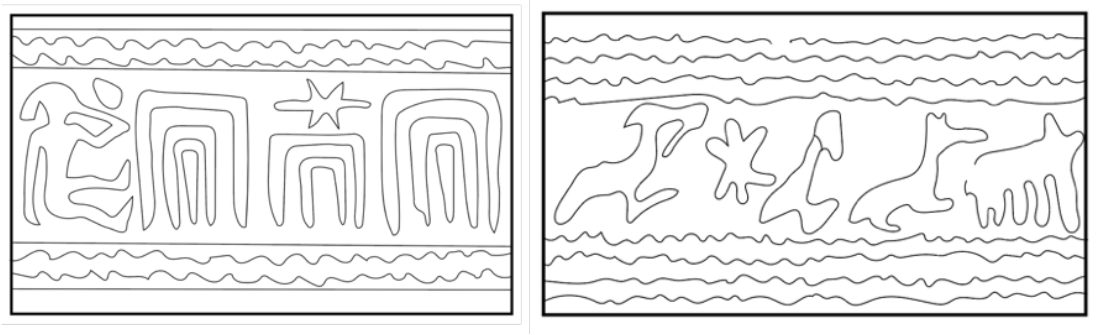

Figure 6: (left) Faras Seal, rosette (after Hill 2004: 64, 27d); (right) Abydos seal impression 2 (after Peet and Loat 1912: 5) (right). Drawings by the authors

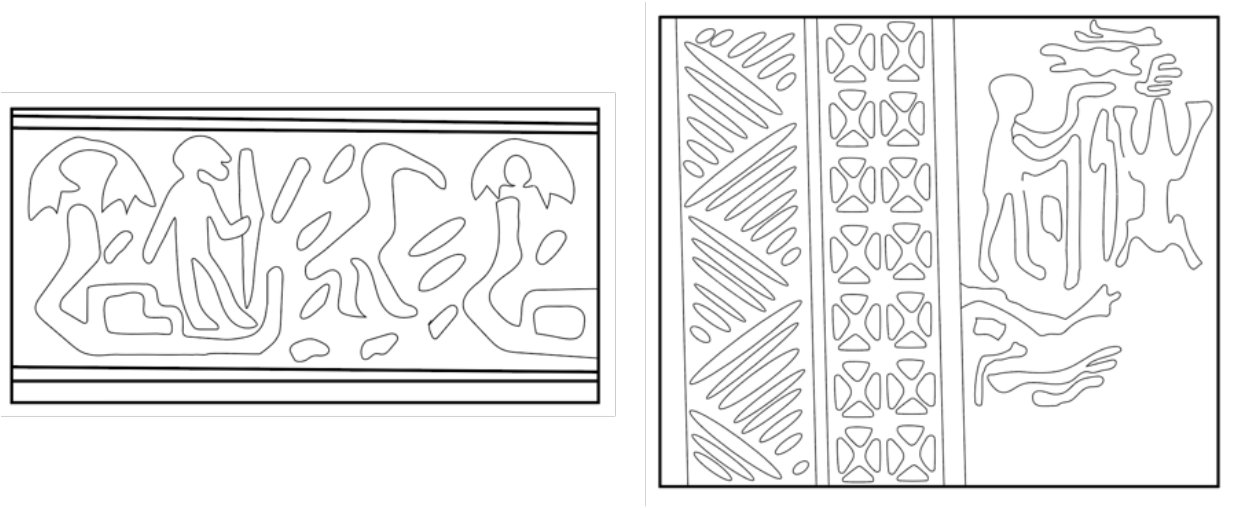

Figure 7: (left) Saras West seal, man with stick (after Roy 2011: 369, plate 12b); (right) Abydos seal impression 3 (after Hill 2004: 42, 16d). Drawings by the author

The only shared type of scene composition is one in which motifs appear in horizontal registers and between borders clearly demarcated by double or fancy lines. Examples of this scene composition are visible on the Fara Seal, Qustul Seal, Saras West Seal and Abydos Seal Impression 2 (figure 8). Motifs and scene compositions shared between Lower Nubia and Egypt demonstrate glyptic uniformity throughout this region of northeast-Africa and suggests these objects were part of the Egyptian administrative system.

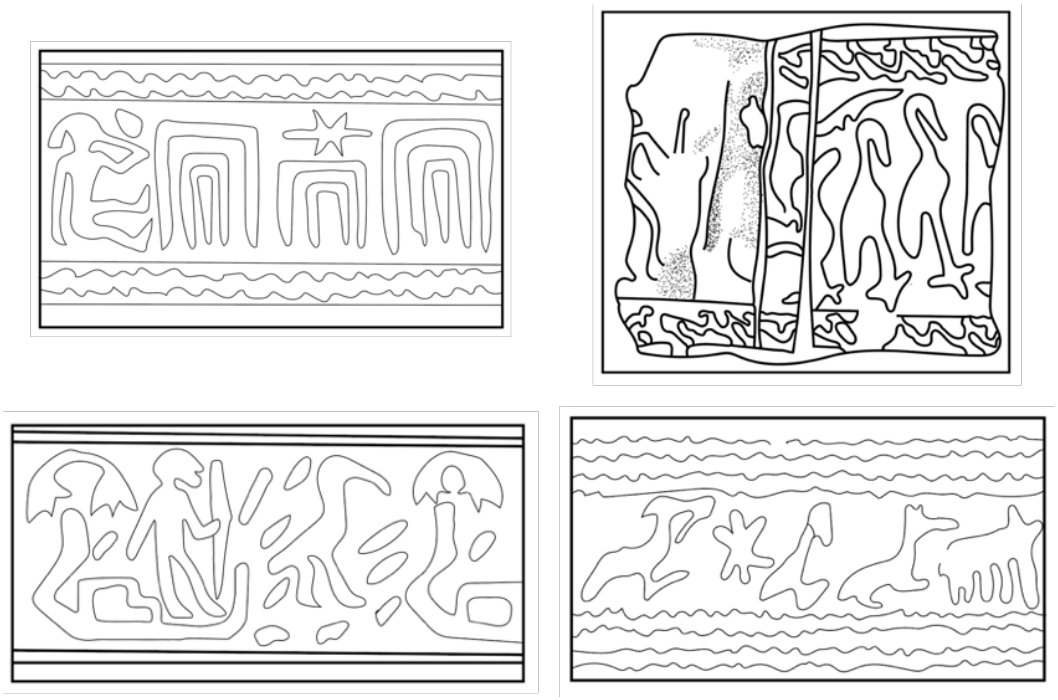

Figure 8: (top left) Faras seal, horizontal borders (after Hill 2004: 64, 27d); (top right) Qustul seal (after Williams 1986: 168, 58c); (bottom left) Saras West seal (after Roy 2011: 369, plate 12b); (bottom left) Abydos seal smpression 2 (after Peet and Loat 1912: 5). Drawings by the author

Nubian-style, A-Group glyptic is characterized by specific scene compositions depicted only on seals and sealings excavated in Lower Nubian contexts. These scene compositions include 1) a unique utilization of humans and 2) a focus on geometric patterns. Only 3 examples of the first type exist: two on seal impressions from Ashkeit and one on a seal from Serra East (figure 9). Three is a relatively small number of examples, but their depictions of humans and the placement of these humans in an animal row and inside doorways makes these 3 glyptic scenes stand out among the thousands discovered in Egypt.

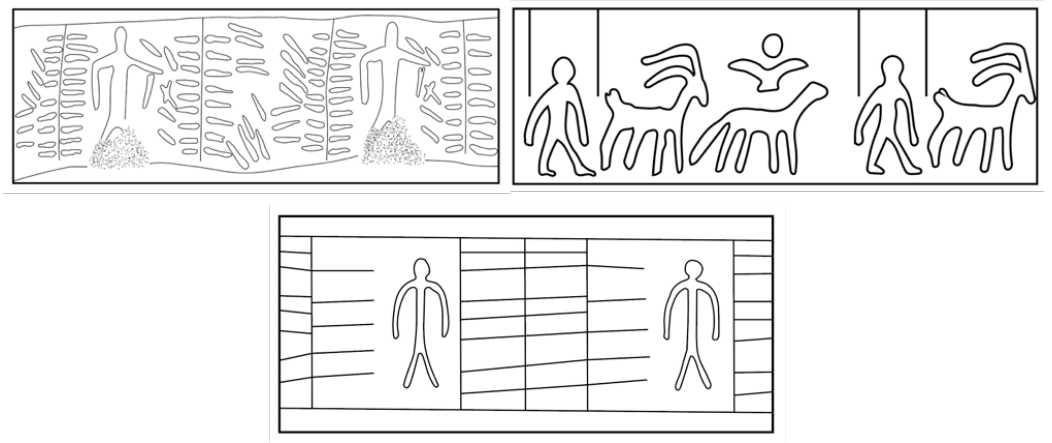

Figure 9: human figures in Nubian-style: (upper left) A-Group glyptic on Serra East seal; (upper right) Ashkeit seal impression 1; (bottom) Ashkeit seal impression 2 (after Sâve-Soderbergh 1964: 27). Drawings by the author

Humans are not rare in Early Egyptian glyptic: rather, they appear in different positions and types of scenes. Humans are most often seen seated before offering tables and surrounded by hieroglyphs or hieroglyphic motifs (figure 10). Exceptions include the upright men in the seal impressions from Abydos, Saras West and En Besor; however, the presentation and posture of these figures is quite different from those seen on the seal impressions from Ashkeit and on the seal from Serra East. The men from both Abydos and Saras West stand upright with walking sticks and are surrounded by geometric motifs and animals; the men from both Saras West and En Besor appear upright and surrounded by downward-facing k3-arms, and all the men appear facing one direction, either left or right. In contrast, the man from Ashkeit is walking alongside animals in a row, and the men from Ashkeit and Serra East are inside doorway and facing forward. The unique placement and posture of these men suggest they were part of a glyptic style distinct from the Egyptian-style of glyptic more commonly used during this period.

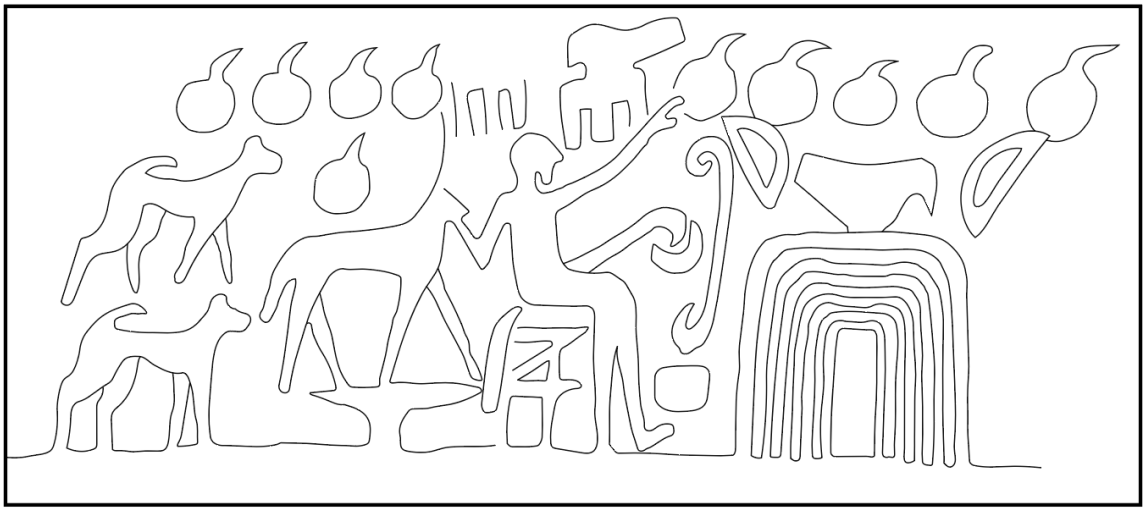

Figure 10: Siali seal impression, seated man in Egyptian-style Nubian glyptic (after Hill 2004: 64, 27a). Drawing by the author

The second type of scene composition in Nubian glyptic is one in which line patterns and geometric designs function as subjects. These motifs act as the focus of the entire glyptic scene rather than as the extraneous filler elements or geometric borders commonly seen in Egyptian-style glyptic (as previously discussed). Complex patterns of lines (figure 11) are most common; however, spirals and zig-zags are also popular. Line-patterns that comprise the entire scene do not appear in Egyptian-style glyptic.

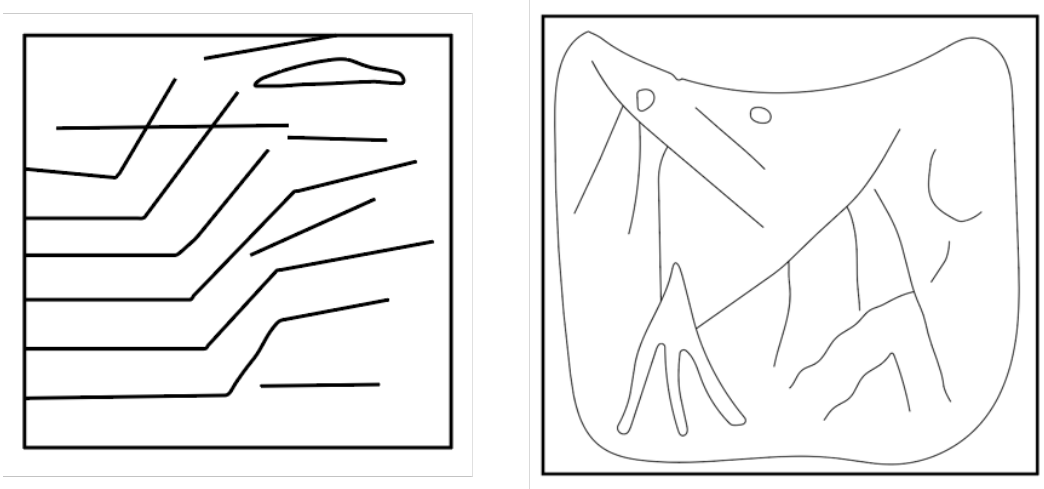

Figure 11: (left) line-patterns on Ikkur seal (after Hill 2004: 66, 29b); (right) Koshtamna seal (after Hill 2004: 66, 29c. Drawings by the author

Clearly, Nubian-style A-Group glyptic did not function as part of the early Egyptian administrative system: its glyptic symbols bear little resemblance to the more common Predynastic Egyptian glyptic. Where, then, did this style of glyptic originate?

A ceramicist colleague recently pointed out the similarity between my glyptic and decoration on pots dated to the Nubia A-Group period (Kilroe, personal communication). My cursory scan of ceramic decoration has led me to several images with designs similar to those on the seals and sealings (figure 11), thus suggesting that this glyptic was Nubian in its origin and also part of a larger, Nubian-style of decorative art. More research is required to elaborate on this hypothesis; however, it appears promising.

Conclusion

It should be clear that two styles of glyptic appear on Nubian seals and sealings: Egyptian-style, which incorporates Egyptian motifs, themes and scene-compositions, and Nubian-style, which utilizes unique motifs, themes and compositions. It should also be clear that Egyptian-style glyptic was used in the early Egyptian sealing system but that Nubian-style glyptic was not used in this, or any other sealing system. How, then, are we to interpret it?

Possibly, Nubians living in Nubia saw and interacted with seals and seal impressions and perhaps also with Egyptian sealers who were responsible for transporting traded goods from Egypt into Nubia. Engaging with these objects, through observation and physical handling, and with Egyptian sealers, through conversation and gesture, led to a profound, understanding of seals and seal impressions that inspired their reproduction. Reproduction took place within a Nubian rather than Egyptian cultural context (evident from the comparison with A-Group Nubian ceramic decoration), and therefore, a new, Nubian-style of glyptic was born. My conclusion is important not only for what it tells us about where these objects were produced and how they were or were not used but also because it underscores the importance of analyzing and interpreting Nubian material culture within a Nubian, rather than Egyptian cultural context. The answers to questions about ancient Nubian culture mostly lie in Nubia itself, and in Nubian material culture, rather than in Egypt or Egyptian material culture and despite our repeated attempts to fit them into an Egyptian framework.

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The Dead and their Tools. A First Approach to the Relationship Between Macro-Lithic Tools and Skeletons from the Necropolis of Mahal Teglinos (Eastern Sudan)

Francesco Michele Rega, Eleonora Minucci and Giusy Capasso

Introduction

Recent archaeological campaigns undertaken by the Italian Archaeological Expedition to the Eastern Sudan (IAEES) of the University of Naples "L'Orientale" and the Associazione Internazionale di Studi sul Mediterraneo e l'Oriente (ISMEO) have led to the discovery of several macro-lithic tools from the western necropolis of the funerary area of Mahal Teglinos (K1). This 10 hectare-sized site lies to the East of Kassala in Eastern Sudan, in a small valley in the northern part of the Jebel Taka complex (figure 1) (for information on the burials excavated between the 1980s and 1990s in other areas of the site see Fattovich, 1993; 1995). Some of these tools were found in close association with the skeletons located in the graves, along with other funerary goods, such as ceramic vessels or personal ornaments (beads, seashells from the Red Sea, ostrich eggs and lip plugs).

The IAEES has identified 85 burials since the 2015 field season. All of the burials are dated to the Gash Group phase (mid-3rd mill. - first part of the 2nd mill. BC) (Manzo, 2016; 2017a; 2017c). During the 2019 field season investigations also focused on sector K1 XIV, where a cemetery related to the Jebel Mokram Group phase (early 2nd mill. - late 2nd/early 1st mill. BCE) was found. In this funerary area a total of 19 tombs - plus one found beyond the limit of the excavation - were excavated inside sector K1 XIV. These graves were all single tombs aside from one double deposition.

The preliminary results of the data analysed so far show that except for five double graves, single burials predominate during the Gash Group phase. Most of the skeletons were laid out in an extended position -supine or lateral- (76% of the cases; N=90) while in other graves the individuals were observed in a contracted position. The East-West orientation prevails, although not exclusively so. Conversely, the skeletons of the Jebel Mokram phase in K1 XIV (N=20) were found mainly in a contracted or highly contracted position, lying on their right (53% of the cases) or on their left side (42% of the cases), with the hands holding the legs or positioned near the face; in some cases it has been argued that ropes were used to bind the bodies because of the very unnatural contracted position observed. No significant associations were observed at either of the two sites between the sex and age of the deceased and their position or orientation.

The Gash Group phase was characterized more by an agropastoral economy than that found in the previous period. The evidence for this is seen in the corresponding material culture, as well as in the faunal (sheep/goats and cattle like Bos primigenius) and paleobotanical remains. These plant remains clearly show the domestication of specific species. These species include Hordeum, Sorghum and Ziziphus, which are found as each macro remains and as impressions on pottery. Sorghum bicolor, Panicum sp., Ziziphus sp. and other plant remains, as well as cattle and sheep/goats are also attested during the Jebel Mokram Group phase, suggesting the continued exploitation of these resources from the Gash Group and into the Jebel Mokram period. However, it has been proposed that during the Jebel

Mokram phase a possible incoming of foreign groups related to the Pan-Grave and Eastern Desert cultures occurred, starting sometime around 1800 BCE (Fattovich, 1991; Gautier, Van Neer, 2006; Beldados et al, 2015; Manzo, 2017a). Strontium isotopic ratio analyses carried out on the skeletal human remains from sector K1 are ongoing and will hopefully test this hypothesis. Furthermore, the beginning of a shift to a more pastoral way of life had possibly already occurred during Jebel Mokram Group period and continued to develop into the following phase (Manzo, 2017a: 48; 54). Macro-lithic tools, especially grinding tools, fit perfectly into this economic model since they are commonly used for processing plants and cereals. Previous studies have already suggested a relation between these artefacts and these cultural phases, as well as with the following period (Fattovich, 1991; Manzo, 2017a; Rega, 2018). However, functional analyses confirming that they were used for food processing have not yet been carried out.

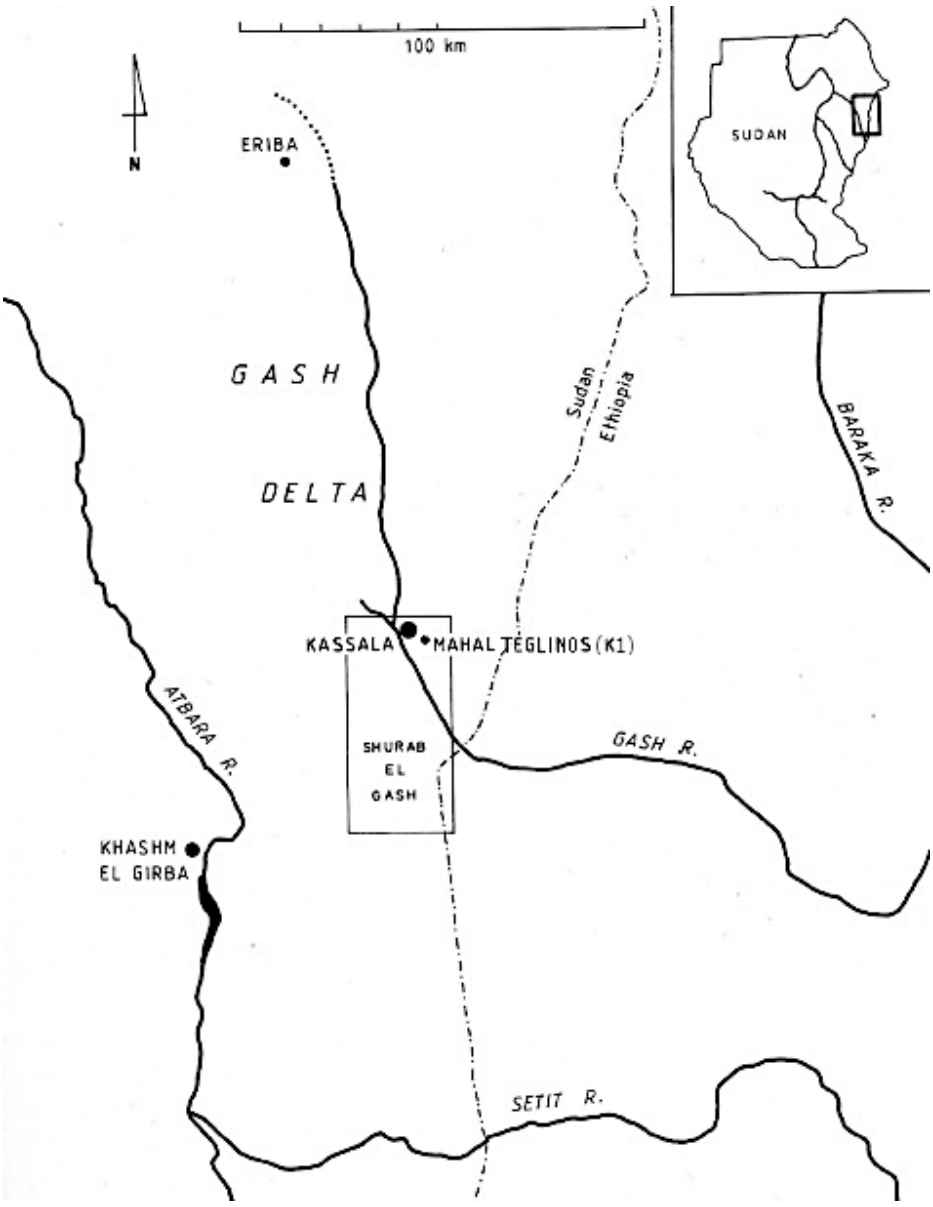


Figure 1: map showing the location of Mahal Teglinos (K1) in the area of Kassala. Courtesy of A. Manzo. Modified by the authors.

The economic changes that occurred during these phases probably influenced the diet and the subsistence activities of these human groups, which may even be visible at the skeletal level. For example, the increasing consumption of carbohydrates may have led to more severe and widespread oral pathologies, while daily and habitual work activities may have led to osteoarthritic changes and enthesopathies on different bones. However, the study of activity markers in archaeological samples should also be interpreted in the light of the archaeological evidence from burials and/or settlements (Cardoso and Lopes, 2002).

By combining an analysis of skeletal and archaeological evidence, this paper is a preliminary approach to this period. The aim is to lay the groundwork for further research that could attempt to answer a series of issues. Amongst these questions is the almost exclusive association of a specific gender or age class with the macro-lithic tools. For example, both the published evidence and current interpretations connect grinding tools with women. It is necessary to discover whether this kind of relation is also observed at Mahal Teglinos, the site forming the case study of this paper. Therefore, the main objectives here are to identify the biological gender/sex of the individuals from the burials, to present the morpho-technological description of the macro-lithic tools found in the necropolis, and to assess the possible relationship between them. Possible preparatory gender implications will be also discussed.

Burials and Macro-Lithic Tools from Mahal Teglinos

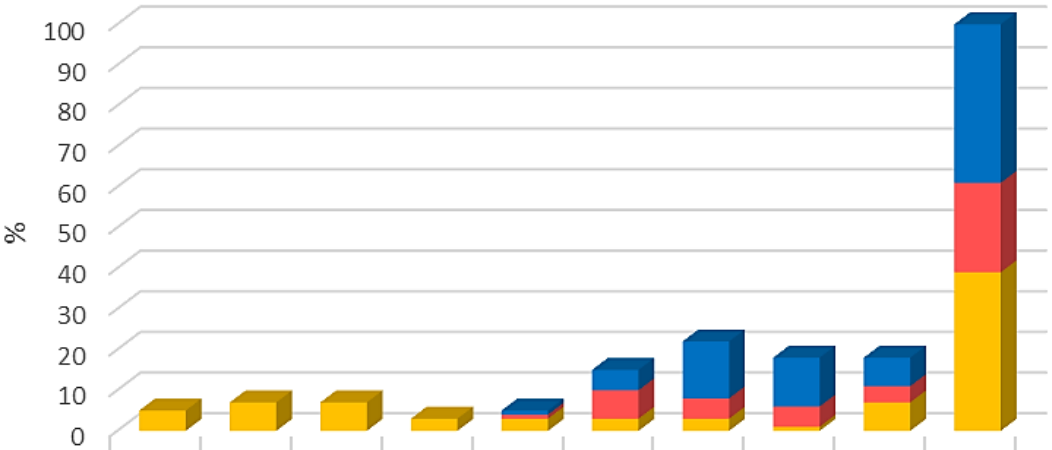
Anthropological Analysis: Context and Methodologies

The osteological sample from the site Mahal Teglinos (K1) includes almost 90 individuals. Anthropological analyses were carried out to determine sex, age-at-death, and health status of all the skeletal remains. However, only the data of the skeletons associated with lithic tools will be presented here. A full report of the anthropological analysis will be published at a later date.

Standard osteological methods were used to estimate sex and age based on morphological features of the skull and pelvis (Buikstra and Ubelaker, 1994; Acsádi and Nemeskéri, 1970). For adult individuals, their age-at-death was estimated using several indicators, including the ossification degrees of cranial sutures (Meindl and Lovejoy, 1985), dental wear stages (Lovejoy, 1985), degenerative changes of the sternal ends of the ribs (Iscan et al, 1984), auricular surface and pubic symphysis degeneration (Buikstra and Ubelaker, 1994; Meindl and Lovejoy, 1985). The age-at-death in subadults was determined by the development and eruption of deciduous and permanent teeth (Al-Qahtani, 2010; Ubelaker, 1989) and the development, fusion, and dimensions of postcranial bones (Schaefer et al, 2009). The individuals were divided into the following age categories: 0-1, 1-5, 5-10, 10-15, 15-20, 20-30, 30-40, 40+ years. The 20+ age category included “generic adult” individuals, with completely fused epiphyses; for them, a more precise age-at-death was impossible to establish due to the lack of reliable diagnostic features.

The paleodemographic reconstruction shows that individuals of all age categories, including infants, were given access to formal burial. At the same time, the dataset is not fully representative of the mortality pattern of an ancient population, due to the unbalanced ratio of sub-adults/adults and men/women (figure 2).

Skeletal paleopathological data were observed following the criteria of Ortner and Putschar (1981) and Ortner (2003). All macroscopically observable pathological lesions were collected per individual. More detailed results will be published in the future due to the fact that the archaeological excavations in the site K1 and the anthropological analyses are still ongoing.



	0-1	1-5	5-10	10-15	15-20	20-30	30-40	40+	20+	Total
M					1	5	14	12	7	39
F					1	7	5	5	4	22
UND.	5	7	7	3	3	3	3	1	7	39

Figure 2: percentage distribution by sex and age-at-death of K1 sample from Gash Group funerary area (K 1 XII-XIII)

Macro-Lithic Tools: Methodology and Preliminary Results

The following description is based on the preliminary results of an ongoing study on the macro-lithic tools from Mahal Teglinos (K1). This research includes also discussions of other areas of the site and possible comparisons with other zones of Eastern Sudan. Indeed, the techno-morphological analysis is not yet complete. Many of the macro-lithic tools are still being processed and classified, and unfortunately not all the samples have been examined. Moreover, the excavations at Mahal Teglinos, including those in the K1 necropolis, remain in progress. Each archaeological campaign brings new material to light which requires further analysis. Nevertheless, the first results of the examination of the tools from the necropolis are presented here (tables 1 and 2). Most of the tools came from K1 trenches XII-XIII, meaning that they have been dated to the Gash Group period; the remaining sample came from K1 trench XIV, which pertains to the Jebel Mokram Group section of the necropolis. However, the Jebel Mokram Group date cannot be confirmed, as most of the tools came either from disturbed layers or are not connected directly with any of the graves. Only a few examples related to a Jebel Mokram Group burial have been identified so far. These will be presented below. Therefore; no interpretation on the development of the tools from the Gash Group to the Jebel Mokram Group (nor their use or roles in the graves with respect to the latter) can be offered at present.

Examination of the traces of shaping and use has been undertaken at both macroscopic level and via the use of magnifying glasses with both a 10x and a 20x lens. However, a selection of these tools has also been examined with a Nikon SMZ 1000 (12x – 120x) in the UMR 8215-Trajectoires laboratory

(Nanterre, France), and with a Nikon SMZ 2-T (1x – 6.3x) in the Centro Interdipartimentale di Servizi di Archeologia (CISA) laboratory (Naples, Italy). The description of the traces of use-wear was made following Adam et al (2009) and their examination contributes to the classification of the tools themselves. A general preliminary petrographic description has also been completed, which takes into consideration how studies on these tools have demonstrated a connection between rock proprieties and the manifestation of wear (Adam et al, 2009; Delgado-Raack et al, 2009).

Table 1: macro-lithic tools found in the Gash Group funerary area (K1 XII-XIII) of Mahal Teglinos

Type	Number
Quern	4
Grinding slab	1
Undetermined lower grinding tool	1
Grinder	9
Undetermined grinding tool	1
Grinding tool	3
Pestle	4
Pestle – Grinder	1
Crusher	3
Crusher – Anvil	2
Anvil	1
Hammerstones	9
Polisher-Abrader	2
Chopping tool	2
Undetermined	8
Total	51

Table 2: macro-lithic tools found in the Jebel Mokram Group funerary area (K1 XIV) of Mahal Teglinos

Type	Number
Quern	2
Undetermined lower grinding tool	2
Grinder	3
Undetermined grinding tool	2
Pestle – Grinder	1
Anvil	3
Hammerstones	4
Burnisher	1
Stone disk	1
Undetermined	3
Total	22

Grinding Implements

Almost 30 grinding implements from both the Gash Group and the Jebel Mokram Group areas of the western necropolis have been examined so far. Among these tools are querns, a grinding slab, fragments or portions of grindstones and grinders, one of which was probably also used as an anvil. The tools are all in granite or granitic rock, mostly white-pink or grey-pink granite. The noun “quern” has been taken from the classifications in Wright (1992: 63-65) and Hamon (2008: 1508). It is used here to indicate elongated rock slabs, shaped or roughly outlined, with oval or slightly oval and concave active

surfaces. On the contrary, "grinding slab" is used for those characterized by a flat surface. A general label "undetermined lower grinding tool" indicates lower ones, the condition of which does not allow us to associate them with a quern or a grinding slab. These lower grinding tools are also named metate (Adam, 2002). Grinders equate to all those tools that, independently of their shape, were used as the upper counterpart of lower tools in grinding activities (Hamon 2008: 1508). These tools are also known as handstone (Wright, 1992), molette (Leroi-Gourhan, 1973; Hamon, 2006) or mano (Adam, 2002).

The querns are not complete or have detachments and signs of breakage. As for the examples from the Gash Group area, while two are characterized by an elongated shape, the other two were probably the broken halves of a large portion of a once complete example. The same may be said for the sample from the Jebel Mokram Group grave. All the examples examined have a concave active surface, which is more or less pronounced, probably according to their use. All the querns are characterized by shaping traces on the sides and on the base, mostly formed by flaking and pecking. This action allowed the creation of rounded edges or rims. Pecking is also visible on the active surface, possibly related to its preparation. Traces of use, such as striations and smoothing, are also visible, which may indicate that the tools were used before being deposited as grave goods.

With regards the grinders, they either have an oval, rounded triangular or semi-oval shape, or are elongated with a loaf-type shape. Most of the grinders are complete or have some detachments, while other examples are either large portions or incomplete. Like the lower grinding tools, these upper grinders are characterized by shaping traces, such as flaking and pecking. They also bear traces of use, like striations, indicating that they were used before being placed inside the graves or in the funerary area in general. As stated above, some of the possible grinders are also characterized by signs of potential multiple usage, either as anvils or abrading or polishing tools. Five tools have been generally identified as possible undetermined grinding tools, but their fragmentary state did not allow an identification with either an upper or a lower part.

Pounding Tools

Among the possible pounding tools collected from the two funerary areas are three pestles, two cylindrical and one conical. They could be classified as two bipolar pestles and one unipolar pestle, following Wright's classification system (1992: 62; 69-70). All three are of white-pink or grey-pink granite. One of them seems to bear very shallow traces of use, but signs of shaping, especially pecking and smoothing, are evident on the sides. In contrast, the other two were characterized by pounding pits and in one case also by small detachments, probably due to sustained use. A further pestle was initially considered to be a possible white-pink granite hammer. It has an elongated form and seems to have been shaped to be handled with one hand, as the ergonomic groove on one side (with a depth of 0,8 cm) suggests. Measuring 17 x 7.5 x 6.6 cm and weighing 1.292 kg, preliminary macroscopic examination did not reveal the presence of evident pits, flaking or breakages on the active surface. Signs of shaping and pecking have been observed on the whole tool, in order to round it and create the aforementioned groove. Smoothing is also clearly observable on the flattened side. The tool has been compared to some hammers found in Egyptian and Sudanese/Nubian Eastern Desert (Klemm and Klemm 2013: 6-7, figure 1.4) mining contexts, including the site at El-Urf (Tawab et al, 1990: 361, figure 12). However, considering the weight and the elongated shape of the tool, it closely resembles some pestles or pestle-grinders from the same necropolis. Therefore, it has been classified here as a pestle. Two other examples belonging to this class of tool were found. However, they have been classified as possible pestle-grinders, as they bear traces of use from both pounding and grinding activities, although in one of the cases these signs are less evident.

Crushers

Crushing tools were also detected in the assemblage. These tools are generally used by combining a percussion and a grinding motion on a slab or anvil, in order to crush and pulverise the material (Hamon, 2006: 30-33; 2008). Three have been identified as crushers, while two others are crusher-anvils. All the crushers are made from the same kind of granite as the grinding and pounding tools. They all feature pits, often concentrated in the middle or located in diverse points on the active surface. In at least two cases, such traces are a possible consequence of passive use or result from a combination of resting, active crushing and pounding actions. As for their shape, they vary from oval to rectangular, often with rounded edges.

Anvils

Small anvils have been found and are considered to be lower passive tools or percuteur passif (Chavaillon, 1979). Two of them have similar dimensions, even though one is more rectangular, and both are made of pink or white-pink granite. One other anvil is circular in form and is probably also made of pink granite. Differing from these examples, the fourth sample is circular, with a diameter of 5,4 cm and made of a possible quarzitic rock. However, all the tools are characterized by a double active surface, located on both faces. Similar tools, that are described as anvils, have been identified in the Seglamen area of Ethiopia, where battering traces in the middle of the flat active face are evident (Phillipson, 2012).

Hammerstones

Thirteen hammerstones from the funerary areas have been listed so far. Such a noun has been adopted here to classify those tools used to fracture other rocks and other kinds of materials (Shea, 2015; Adams, 2011). They are also known by the term percuteur (Chavaillon, 1979; Leuvrey, 1999; Hamon, 2006). The hammerstones are all made from different materials (including quarzitic rocks and granite) and of different shapes with varied distributions of use-wear traces on the surface. One hammerstone is characterized by a rounded or almost spherical shape, with hammering pits all over the surface. Other examples are circular, but flatter, with traces of hammering covering most of the sides and the edges. Other groups include rectangular, almost cylindrical or slightly elongated example, featuring use-wear traces concentrated either on the two tips or the two extremities; a variation of these only have traces of hammering on one extremity. Similar categories can be observed in the typological classification produced by J. M. Leuvrey (1999) for the Final Bronze Age lithic tools from Hauterive-Champréveyres, as Type A, Type B, Type C and Type D respectively.

Polishing, Burnishing and Abrading Tools

Possible polishing, burnishing and abrading tools were found. These objects are also known by the terms abraser and polissoire (Hamon, 2006). A polisher and one abrader came from K1 XII, and a single burnisher from K1 XIV. Made of three different types of materials (possibly mudstone/siltstone, sandstone and granite/gneiss respectively), such tools may have been used both passively or actively, according to the gesture and the type of function (Adam, 2002; Hamon, 2006: 33-34; 55-60). In the case of the three implements discussed here, it is possible to assume that the polisher and the burnisher were used actively, while the abrader was used passively.

Chopping Tools

Only two possible siltstone/mudstone chopping tools have currently been identified. Following the classification and terminology proposed by J.M. Leuvrey (1999), the two objects can be considered a distal sinuous convex chopping tool and a distal flat chopping tool. All the examples examined so far came from the Gash Group necropolis.

Stone Disk

An unusual and intriguing find was collected and analysed during 2019 excavations in K1 XIV. This white granite rounded stone disk is characterized by a cupule on each face. It has an outer diameter of 5 cm and it is 3 cm thick. It could be classified as an "unperforated stone disk", after Wright's classification (1992: 62; 75), yet it seems that the cupules were not the consequence of a drilling action intended to perforate the tool. It could be classified instead as a possible pebble mortar or a disk mortar, like some of the tools classified by Adams (2002: 128-136). Indeed, it is possibly a very small mortar-palette or a container of some sort, but this remains doubtful. Similar objects have been found in other sites of Sudan, such as El-Geili, where they were interpreted as possible stone rings that had been worn out to the point of perforation (Caneva, 1988: 143; 332, figure 5.2).

Undetermined

Eleven samples have been classified as undetermined. Such a category includes all the archaeological finds whose function is still unknown. Indeed, the examination undertaken at macroscopic level was not enough to precisely attribute them to any category of tool, especially due to them being too fragmented and altered.

The Tombs: Skeletons and their Tools

The macro-lithic tools analysed here came from different levels of two areas of the cemetery. Some of them were found in the surface levels, while others in the grave fill or were decontextualized and, therefore, impossible to relate to a specific burial. Moreover, during the excavations undertaken in the 1980s, tools (or tool fragments) were found among the stones of both tumuli and cairns that characterized the funerary areas (Fattovich, 1993). Similar situations have also been observed at other sites, including those in Sudan, such as Al Khiday (Central Sudan), where grinding stones and grinders, both complete and fragmentary, were found on the surface of the site, together with concentrations of stone pebbles, that were interpreted as the remains of possible tumuli (Usai et al, 2014).

Some scholars have suggested that the tools found inside the tumuli or on the surface of the graves were themselves an integral part of the funerary area, placed there in connection with specific rituals or possessing social meanings (Buckley, 1993; Watts, 2014a; 2014b). However, the utilitarian use of the tools to construct the tomb superstructures themselves cannot be excluded. As for Mahal Teglinos, a concise picture of the connection between the tools and the dead or their possible function and meaning in this context cannot be discussed at this stage, although some suggestions have recently been put forward elsewhere (Rega forthcoming). Nevertheless, in at least 5 cases there was a clear relationship between the tools and the burials leading the authors to safely assume that the macro-lithic tools were actually part of the funerary equipment. Another example found in the Jebel Mokram Group

area could be added to these 5 cases. However, considering the incomplete analysis of this area of the necropolis and the plentiful use (or reuse) of tools mixed with stones and rock fragments observed there, an intentional relationship between the deposition of the tools and the dead remains unconfirmed.

K1 XII – Tomb 41 (figure 3). Male. 20+ years. The lack of complete remains did not allow a more precise biological identification. No evidence of osteological pathologies has been observed on the available remains. The body was placed in an extended lateral position, on its left side, with a South-East/North-West orientation, facing South. The funerary equipment discovered in this grave included one of the most interesting finds of the whole area, namely a complete grinding toolkit (table 3), composed of a quern (figure 4), a grinder (figure 5), a crusher (figure 6) and a pestle (figure 7). All the tools are made of white/white-pink granite or microgranite and bear shaping and use traces. They were located to the right of the body, all placed close together and in association with a pot in an upside-down position. This practice of reversed ceramic placement is witnessed at other sites in Sudan, especially Kerma, Adindan and other A and C Group cemeteries, where it has generally been considered to be a way of expressing the idea of death; by reversing the vessel it was rendered no longer useful (Steffensen, 2007). Moreover, the presence of pots inside the grave has been linked by Halaand (1997: 382) to the act of birth, during which the placenta is deposited inside the pot, and to other rites of passage rituals, such as the transition to adulthood and to human life, as pottery is generally an everyday object.

Figure 3: T.41 (K1 XII): the skeleton and the associated grave goods

Table 3: macro-lithic tools from T.41 in K1 XII

Type	Length (cm)	Width (cm)	Thickness (cm)	Diameter (cm)	Weight (g)
Quern	43.0 36.0	26.0 19.0	12.1 5.5		18500.0
Grinder	11.4	9.6 max. 4.3 min.	3.6 max. 2.2 min.		618.0
Crusher	11.9	6.6	5.3		683.0
Pestle	15.8	5.4	4.6		783.0

Figure 4: quern from T.41. in K1 XII

Figure 5: grinder from T.41 in K1 XII

Figure 6: crusher from T.41 in K1 XII

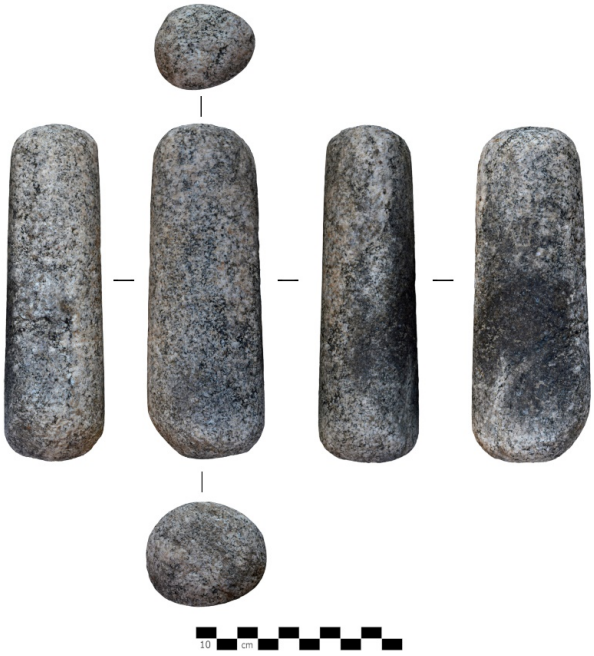


Figure 7: pestle from T.41 in K1 XII

K1 XII – Tomb 59. Male. 30-40 years. Traces of enthesopathies are visible on the clavicles (costoclavicular ligaments) and on the left femur (mild ossification of linea aspera). Reaction bone formation is observable in the centre of the trochlear notch of the right ulna; severe osteophytosis is recorded on the anterior and lateral edges of lumbar vertebral fragmented bodies and on a portion of the left iliac crest; severe osteoarthritis on both patellae and on the distal epiphysis of the right humerus was observed. The body was placed in an extended lateral position, the legs slightly flexed on the left side, with an East/West orientation, facing South. A white-pink grinder was located near the left knee, while a quern was placed on the opposite side, along the right leg. A sandstone abrading tool and a granite-gneiss portion of an undetermined tool also come from the same grave (table 4). Unfortunately, it is not possible to reconstruct the position of these two objects. As discussed above, the abrading tool was possibly used as a lower passive tool. It has some recesses and groves on the sides and different striations on the flat striations, similar to the so-called abraseurs à rainures found in French contexts (Hamon, 2006) or the grooved abraders found in the U.S. or in the Near East (Adam, 2002; Semenov, 2005). However, in K1 sample the grooves and the striations are shallower and flatter.

Table 4: macro-lithic tools from T.59 in K1 XII

Type	Length (cm)	Width (cm)	Thickness (cm)	Diameter (cm)	Weight (g)
Quern	52.0	28.0 10.0	7.2 4.2		16000.0
Grinder	12.0	9.5	7.4		1368.0
Abrader	12.2	7.7 4.8	4.2		538.0
Undetermined	10.8 8.7	11.0 8.5	2.2		568.0

K1 XII – Tomb 60. Female. 40-50 years. Severe osteophytosis is observable on the anterior and lateral edges of cervical and lumbar vertebral fragmented bodies. The skeleton was in an extended supine position, with an East/West orientation, facing South. A possible chopping tool, a hammerstone and a possible polishing tool (all found in association with four pots) came from this grave, but their position in relation to the body of the deceased is unclear (table 5).

Table 5: macro-lithic tools from T.60 in K1 XI

Type	Length (cm)	Width (cm)	Thickness (cm)	Diameter (cm)	Weight (g)
Hammerstone	4.5	5.2	4.6		183.0
Polisher	9.6	3.8	1.1		72.0
Chopping tool	9.2	5.2	4.6		290.0

K1 XIII – Tomb 77 (figure 8). Female. 30-35 years. Traces of cribra orbitalia are present on both orbital roofs. Plaque formation and cribra are located on the anterior portion of right femoral neck. The body was found in an extended supine position, with both hands laid on the pelvis one on top of the other; it had a South/East-North/West orientation. A white granite pestle (table 6), characterized by very shallow use-wear traces, was found near the pelvis and the left hand of the skeleton. This might indicate that it was only used for a very short period or not at all and was created just for the grave. However, this hypothesis remains unsure and cannot be confirmed at this stage.

Figure 8: T.77 (K1 XII): the skeleton and the associated pestle

Table 6: macro-lithic tools from T.77 in K1 XII

Type	Length (cm)	Width (cm)	Thickness (cm)	Diameter (cm)	Weight (g)
Pestle	15.5			5.0	752.0

K1 XIII – Tomb 106. Male. 40-50 years. Traces of osteophytosis are present on the anterior and lateral edges of cervical vertebral fragmented bodies; cribra orbitalia was present on both orbital roofs. The body was laid in an extended supine position with an East/West orientation. A large portion of a granite quern was found in this grave (table 7). This tomb was cut by a later tomb (Tomb 105) of a male individual, with only the cranium present. Unfortunately, the complex stratigraphy between the burials makes it difficult to verify relations between the grinding tools and the individuals. Consequently, it is not possible to accurately determine as to whether the quern was associated with Tomb 106 or with Tomb 105.

Table 7: macro-lithic tools from T.106 in K1 XIII

Type	Length (cm)	Width (cm)	Thickness (cm)	Diameter (cm)	Weight (g)
Quern	24.5	23.5	10.8		10000.0

K1 XIV – Tomb 11. Female. 20+ years. No evidence of any pathologies was observed on the available remains. The skeleton, oriented North-West/South-East and facing South/West, lay on its right side in a highly contracted position, with both arms crossed over on the chest. Two granite grinding tools – a grinder and a lower quern respectively – were found in this deposition. The grinder is oval. The quern has survived in the form of a fragment. This fragment was probably a sizeable portion of a much larger object (figure 16). The tools are both characterized by signs of pecking, smoothing and striations indicating that they were possibly used. Moreover, the quern fragment features a shaped rounded rim on the upper part. Interestingly, this tool was located under the skull and was thus probably used as a kind of pillow. As stated above, this association is still uncertain, especially when considering the widespread use of similar rock pillows in other burials of this cultural phase. Exemplary are the other examples from K1 XIV, and in another case found outside the trench. Nevertheless, the peculiar use of a "quern-pillow" has also been observed elsewhere, for example in some cultures of northern Europe, like the Neolithic Linear Pottery culture (Linearbandkeramik or LBK) (5300-4400 cal BCE) and the Funnel(-neck-)beaker culture (Trichter(-rand-)becherkultur or TRB) (4000-2850 cal BCE) (Graefe et al, 2009: 91). A grindstone with a lateral perforation, which was used as a pillow was found in the Meroitic cemetery in El Geili (Sudan), but the relation with the context is not certain (Caneva 1988: 200). The example from K1 XIV could also be considered a "quern-pillow". However, this may be an exception when compared to the simple rock pillows. Furthermore, the grinder was placed to the West of the bodies, near the tibiae, indicating a possible intentional deposition. Further examples dating to this period, that could be discovered in the future, may add new information to corroborate the hypothesis of the intentional relationship of pillows and querns.

Table 8: macro-lithic tools from T.11 in K1 XIV

Type	Length (cm)	Width (cm)	Thickness (cm)	Diameter (cm)	Weight (g)
Quern	17.0	14.9	7.9 2.2		2391.0
Grinder	11.2	8.7	3.5		555.0

Discussion

As we have thus seen, lithic tools have been found in direct association with both male and female depositions (Tab. 9). These individuals are exclusively adults, buried in an extended position and date to the Gash Group period. Furthermore, when observable, these tools have been detected both in strict contact with the skeletons or nearby the bodies.

Table 9: list of the tombs with their relative tools

N°	Sex	Age	Tools
Tomb 41	Male	20+ years	Quern, grinder, crusher, pestle
Tomb 59	Male	30-40 years	Quern, grinder, abrader, undetermined
Tomb 60	Female	40-50 years	Hammerstone, polisher, chopping tool
Tomb 77	Female	30-35 years	Pestle
Tomb 106	Male	40-50 years	Quern
Tomb 11	Female	20+ years	Quern, grinder

What will be considered here is the presence of the macro-lithic tools in the graves at Mahal Teglinos, especially the grinding implements. In evaluating the possible implications behind this funerary behaviour, several theories have been proposed by scholars, especially Lidström Holmberg (1998; 2004) and Watts (2014a; 2012b). For this purpose, they widely used ethnographic examples from all around the world to offer a parallel to better understand social constructions, ritualistic behaviours and religious beliefs, etc. For this reason, some examples will be discussed below.

The first issue that should be considered is the presence of grinding tools in male graves. This association has been interpreted in the past through a consideration of the relation between the upper and lower grinding tools. Indeed, their interaction and rubbing motion have been linked to the act of sexual intercourse between a man and a woman (Lidström Holmberg, 2004: 226-228; Watts, 2014a: 58). This is especially evident in some rituals observed by anthropologists, such as those practised by the Bemba people in Zambia, in connection with the idea of a new life and therefore to the idea of fertility (Lidström Holmberg, 2004: 226-228; Watts, 2014a: 58). However, such a hypothesis has been proposed in the case of tools used for food production, a function that is not yet been confirmed for the samples from K1. Alternatively, the occurrence of grinding stones in male graves might be explained by the possibility that the grinding tools themselves may have been produced by male individuals. Indeed, the crafting of tools is often considered a “male task”, especially among some traditional contemporary societies, in Africa and elsewhere (Hayden, 1987: 10; Searcy, 2011: 64-65; Hamon and Le Gall, 2013: 117; Nixon-Darcus, 2014: 77-101). Neither of these interpretations can be applied to the context under examination at this stage since no other archaeological data or eventual textual ones are available to support similar suggestions.

Examples of grinding stones in male graves have been observed at other Sudanese contexts. Indeed, at Kadero a quern with signs of pecking, a possible palette or grinder and pottery related to Late Neolithic production were found in grave 202, a child burial, which dates to the 5th millennium BCE. Fragments of a Neolithic grindstone were found inside a Post Meroitic grave of a man aged between 25 and 28 years (Krzyżaniak, 2004; Chłodnicki et al, 2011). At El-Kadada tools with different shapes were found inside both adult and child graves, dating to the 6th and 5th millennium BCE (Reinold, 1982a; 1982b; 1982c). At El-Geili a rectangular quern was found in the Neolithic cemetery in the grave of a child aged 10-15 years old (Caneva, 1988: 171, figure 9.a; 172, 250). Mesolithic grinders were found inside later Meroitic graves at Al Khiday (Usai et al, 2014), which were probably reused. At Gebel Ramlah a grinding stone, together with a palette was found in association with a 6 years old child. A female gender was proposed for this individual merely on the basis of the associated tools, although there were no further elements to confirm such an identification (Irish 2010:7). Implements like mortars, pestles, grinders and especially palettes were found on sites like Abka, Ashkeit, Debeira, Halfa Degheim, Qustul and Serra East, mainly dating to the A Group. They are associated with both male and female adults, as well as with subadults (Nordström, 1972; Williams, 1986; 1989; 1993).

Conventional interpretations have frequently associated grinding tools with women. This close connection is again based on ethnographic parallels, especially examples in America and Africa, although tobacco and ochre grinding are exceptions to this (Haaland, 1978: 57; Lidström Holmberg, 1998; Watt, 2014a: 58). Within the Fur tribe, in the village of Dor (Darfur, Sudan) and the Fipa tribe in Tanzania, grinding tools were crafted and used exclusively by women (Haaland, 1978: 57; Haaland, 1995: 164-167). Similarly, among the Minyanka people of Mali, grinding is a "woman's task" and represents an occasion for the women of the village to bond and form social relations. These relations could be formed both horizontally, between sisters-in-law or wives of one husband and vertically, such as inter-generational ties (Hamon and Le Gall, 2013: 117). The preparation of food among the Bemba in Zimbabwe followed the same scheme of cooperation between mother, daughter, grandmother and granddaughter and so on. It thus includes all the matrilineal line of the family (Richards, 1995: 130, 132). In Ethiopia, among the Mursi people in Maki, grinding tools are usually used by women, and were often crafted by women, as (Robitaille, 2016: 434). In the area of Gulo Makeda (Ethiopia) still today men usually take care of all production stages, from the choice of the raw material used for the crafting of the tools, to the transport of the chosen stones or slabs back to the villages. However, the tools themselves are used by women (Nixon-Darcus, 2014: 77-101).

In contemporary funerary contexts, the relationship between women and grinding implements is exemplified by the Lugbara people (Uganda). This group deposit grindstones in female graves to symbolize their role as mothers, together with beads, alluding to their status as girls and the firestones from the hearth, symbolizing their role as wives (Ucko, 1969: 265; Middleton, 1987: 200). These three elements are not connected with the afterlife, but with the social role of the dead (Ucko, 1969: 265).

The same link between women and saddle querns has been stressed in archaeological excavations of domestic areas all around the world. Scholars often associate a context with firepits, querns, hearths, etc., to a cooking area, frequently considered a woman's responsibility and labour. This theory is also based on iconographic representations, especially figurines. Exemplary are those of the Classic Maya culture (250–900 CE), which depict women grinding, although in a ritual context (Joyce et al, 1993: 261-264, figure 6; Watts, 2014a: 58; Watts, 2014b: 35; Damp, 1984: 580). Of course, statuettes representing women grinding are known also from Egypt, usually considered as servants (Breasted, 1948). Other iconographies are known from wall decorations, such as the one on the west wall of Room II of the Mastaba of Ty (Epron et al, 1939: Pl. LXVI) or models, like one from the tomb of Meketre (Thebe), kept at the Metropolitan Museum of Art of New York (N. 21.2601) and one from the tomb of

Nebhetepres Mentuhotep II (Deir el-Bahari) kept at the British Museum of London (N. EA40915). These representations also include men using those implements, or in alternative pounding tools. However, they mostly depicted scenes of mass food preparations, so not related to domestic food preparation. Then, this is not the appropriate forum to discuss about this topic. In any case, some of them have been used as base for experimentations (Samuel, 1993), or as comparisons for archaeological records, like in Tell el-Amarna (Kemp, 1994; Samuel, 1994). Interestingly, even in these cases, when it comes to reconstruct the use of grinding installations, a woman has been chosen as the subject of a drawing by Kemp (1994: 150, figure 14b), perpetrating the same stereotype. A deeper and wider study on the Egyptian iconography is necessary to evaluate eventual statistics on men and women depicted while grinding. In any case, these assumptions influence the association between grinding or similar activities and women, making this relation appear normative in nature. Indeed, a popular theory is that hearth-centred activities should be related to women. Even where differences across cultures are visible, they have consistently been viewed as tasks essentially undertaken and completed by women, thus connecting them to food preparation and household activities. Therefore, in some cases, women have been associated to the inner part of the house and consequently to the objects around the hearth (Halaand, 1997: 381). These statements might be emphasized by some aspects still observable in modern traditional societies, especially in Africa. For example, among the Northern Beja of the Red Sea Cost and Red Sea Hills in Sudan married women are "obliged" to make household tasks or could take care of small livestock not far from the house, in both cases assisted by young girls (Morton, 1990: 2). Among the Saho-speaking communities in Eritrea, women are generally associated with the inner part of the house (gooxo), opened to the courtyard so that they could always have a look to all the elements of food production, like the hearts and the grinding implements, or to the chickens (Dore and Vergari, 2016: 111-115; 2018).

This link between womanhood and culinary processes has been also applied to hunter-gatherer communities and the beginning of cooking itself. According to Wrangham et al, (1999). the sexual division of labour occurred with our ancestors, probably with Homo erectus, when females needed protection from thieves who wanted to steal cooked food. Therefore, males assumed the role of defenders using their strength to guarantee females their food, but also provided them with meat, and by forming primitive social bonds with other males, they further protected the women (Wrangham, 1999; Wrangham, 2010: 152-155). In contrast, Kuhn and Stiner (2006) believe that this gender division occurred with the advent of Homo sapiens, probably because of the habitats he had to deal with. In support of their theory they further highlight that that no marks to support a sex or age-based division of everyday activities are visible on the skeletal remains of Homo neanderthalensis and of early sapiens (Kuhn and Stiner, 2006).

Ethnographic field research on modern hunter-gather communities further contribute to these theories on the sexual division of labour. Marlowe (2003) reported that, women of the Hadza people (Tanzania) specialized in the gathering of tubers and berries, while men in supplying meat and honey, which have the highest trade value. According to Bird and other scholars, labour division is often related to the social benefits of hunting for men. For example, sharing food within the community and demonstrating skills and physical abilities to impress and attract potential partners (Bird, 1999; Marlowe, 2003; 2007). On the other hand, women choose activities that fit with the responsibilities of child rearing. Such a balance in tasks has been viewed as the foundation principles of these societies, where the partnership between male and female community members guarantees the survival of the group. In the case of the latter, they target predictable resources or undertaking fundamental daily tasks, such as cooking (Wood and Eagly, 2002; Marlowe, 2007). Moreover, depending on the type of plants gathered, the time spent to procure them, and/or the time spent helping other members to hunt, female

tasks can increase exponentially. These additional duties can include basketry, weaving, house building, and activities derived from hunted game, of which leatherworking is exemplary (Waguespack, 2005).

Brightman (1996) also synthesized and analysed all the reasons proposed in the literature that justified the possible sexual division of labour and the eventual exclusion of women from hunting. According to his conclusions, the reasons for such divisions should be examined against the context of each societies' taboos, gender identities and politics. These are all factors that see women either excluded from hunting or limiting them to small game through the use of a net and similar tools. However, evidence for such changes are not always easy to find, especially in societies where no discernible impediments existed to prevent women from access to the hunt and other social roles. Wood and Eagly (2002) have suggested a biosocial model to explain the division of labour, which also takes other models into consideration, such as psychological and social approaches. According to their view, gender roles are the consequence of the different psychological characteristics of the two sexes and the different biological processes that distinguish them. This is especially the case with hormones, yet these biological differences can be combined with social, economic, technological and ecological constructions. However, as clearly expressed by Sørensen (2019: 112; 118-119), gender roles are not static and may undergo several transformations, due to external phenomena, such as economic, demographic or social changes, not to mention war, immigration or epidemics. Therefore, it is impossible to establish that gender roles were always present in early societies. Furthermore, problems arise in outlining how early hunter-gatherers were influenced by these situations and how they changed with the introduction of new lifestyles.

Nevertheless, Marlowe (2007) maintains that these divisions influenced the crafting of tools themselves, thus leading to the creation of gender distinctions. He proposed that the sexual division of labour is connected to the way each tool is made and used. Through a continuing specialization of tool crafting, women and men started to separate the activities connected with them. Women began to choose tools and occupations, such as grinding seeds, crushing nuts, digging for tubers, that could be easily completed alongside the needs of fertility and children care. Such a division may also have affected later agricultural societies, rendering women much more tied to household activities (Halaand, 1997). Indeed, Wood and Eagly (2002: 713) feel that agriculture increased the proportion of women's domestic work. According to their view this was due to the processing of cereal crops and the rise of birth rates, which essentially lowered their social status. In any case, such a process seems to have led to taboos concerning both men and women across many different world cultures, some of which even persist into modern times. For example, among the !Kung population, women are not allowed to touch weapons, while in Guatemala men should not touch a grindstone after it is used by a woman, even though metateros (the craftsmen of metate, or lower grinding tools) are mostly men, who learn from their father or relatives how to produce the tools (Marshall, 1961: 243; Hayden, 1987: 10; Searcy, 2011: 64-65; 93-94; 142).

Anthropologically, reconstruction of the occupations undertaken by ancient populations is complex. Activity-related bone changes and markers of occupational stress (MOS) (Kennedy, 1989; Robb, 1998; Schrader, 2012) occur in various ways on the skeleton. These signs mostly appear as musculoskeletal stress markers (MSM) (Sperduti, 1997; Eshed et al, 2004; Molnar et al, 2011), enthesopathies (Hawkey and Merbs 1995; Mariotti et al, 2004; 2007; Villotte et al, 2010), articular pathologies, such as osteoarthritis (OA) and degenerative joint disease (DJD) (Watkins, 2010; Schrader, 2012), dental attrition (Molnar, 2011), the presence of anatomical variants (i.e. extra-articular facets) (Radi et al, 2013) and stress fractures or trauma (Merbs, 1983; Judd and Roberts, 1999; Judd, 2002).

The link between the actual activity and the skeletal markers is not yet clear (Jurmain et al, 2012; Thomas, 2014). Their aetiology is complex and influenced by other factors, such as age, sex, individual predisposition, trauma, or other pathological conditions. Despite the complex debate surrounding the specific causes of osteoarthritis and biomechanical lesions (Ortner, 2003; Waldron, 2009; Takigawa, 2014), the analysis and interpretation of these bone reactions play an important role in the reconstruction of socio-economic and working life of prehistoric populations.

Intensive working activities, such as cereal grinding and crushing can be cautiously deduced by reconstructing the mechanical forces that induce lesions in skeletons. Exemplary are the degenerative changes in the upper limbs that result from the enlargement of muscle and ligament imprints, the asymmetry of upper limb strength in the case of one-handed grinding tools, osteoarthritis in the hips, knees, ankles and feet when a kneeling position is adopted (Molleson, 1989; 2007). For this reason, the preliminary results discussed in this paper have focused on recording the basilar anthropological and palaeopathological data of the skeletons in association with the lithic tools, and on the description of these instruments.

Final Remarks and Future Perspectives

If we assume that the theories described in this paper can be universally applied to all ancient societies, it is feasible that these divisions probably also occurred in Eastern Sudan during the hunter-gatherer periods. Such divisions might have become more prominent during the agropastoral phase of the Gash Group period and continued into the Jebel Mokram Group. However, none of these gender models can be accurately applied to the context under examination on the basis of current archaeological evidence.

According to Waguespack (2005: 673-674), due to the products of female activities being largely connected with organic materials – leather, sinew, etc. – they are mostly perishable and rarely survive in the archaeological record. However, he stressed there is no reason to assume that women of many cultures were always excluded from knapping activities and/or more general production tasks that involved harder materials. We believe that a similar theory could be applied to men, who were probably not always excluded from the production of perishable materials, nor from the use of hard materials, like grinding tools.

As seen in the example of Gebel Ramlah, grindstones and palettes have been taken as gender markers in cases where clear anthropological data is lacking. Again, this example stresses how often these kinds of tools are automatically associated with womanhood, despite any clear evidence. However, it must be said that the correlation between females and subsistence activities (also those using macro-lithic tools) is implied through various anthropological analyses conducted on toe bones. The evidence of occupational markers on these bones, possibly related to food-producing tasks, is found predominantly on female skeletons, but sometimes even on very young individuals (Molleson, 2007: 19-20; Eshed et al, 2004; Sadvari et al, 2015). Yet such a relationship between markers and grinding activity could not be established in the Mahal Teglinos' case, as similar specific osteoarchaeological analyses have not been conducted. This is largely due to the poor state of preservation of most of the skeletons and the small number of samples, including those not associated with macro-lithic tools. Indeed, the current sample from Mahal Teglinos is insufficient for a proper statistical study (figure 2).

What now seems to be true is that, even though the lithic instruments in K1 were few in number, they were clearly associated with both male and female adult burials; these individuals were possibly the "owners" of these tools. The question of whether these people were the actual users of these tools remains a pertinent one. To fully answer this question a multidisciplinary approach will be necessary, and this is not the space to expand on this further. What can be concluded on the basis of the current evidence, is that those rigid schemes which equate gender and funerary goods and imply a direct relationship between women and specific tools, should not be applied universally to all contexts, and the K1 burials are a valid example of this caveat.

As mentioned above, other kinds of tools were collected from the funerary area that were not necessarily related to food production. These include hammerstones, abrading and polishing tools. Many samples also came from layers that were not directly associated with skeletons. These variants might indicate a more complex system of selecting grave goods, endowing these objects with a specific depositional meaning that extends beyond merely functioning as gender markers. There is scope instead that these objects were deposited to show the variety of possible daily activities afforded by the tools. Indeed, they could be related to craftsmen, indicating the existence of this specific social occupation in contemporary society. The abrader from Tomb 59 and the tools from Tomb 60 might represent such a relation. While a man was buried in the first grave, the second was a female deposition, opening up a wide range of possible gender considerations. Further examples of direct associations with skeletons might clarify the diverse reasons behind each tool's deposition, including those not used for grinding processes. Moreover, further studies on other classes of material, such as knapped tools, are likely to provide new information to complete and hopefully reinforce the scenario presented here.

Nevertheless, the Gash and the Jebel Mokram Group people were probably engaged in activities related directly to a food-producing economy. Grinding tools possibly became part of the daily assemblage as well as a key component of the grave goods. We can suppose that this change in technology associated with the grinding of cereals may be shown in alterations of the skeletal sample. Indeed, associated archaeological finds can further aid the interpretation of MOS and osteoarthritis, while the use of grinding tools also has visible impacts on rates of tooth wear (Buzon, 2012).

All of these issues will hopefully be resolved in the coming years. The skeletal sample will be enlarged, with the aim of carrying out a systematic analysis of oral pathologies and wear patterns of all the detectable MOS. This will be undertaken in order to relate these data to the macro-lithic tools discovered in the burials and, possibly, to uncover whether the individuals in these tombs were the actual users of the tools associated with them. This study could also help to understand if there were some exceptions to normative gender roles, such as in Bronze Age funerary area of Gemeinlebarn F. Here a man with a congenital malformation was buried in a child size burial but in a "female position", according to the coeval funerary practices (Sørensen, 2019: 119-120). Further analyses on the macro-lithic tools, such as residue and micro-use-wear analyses, could also be undertaken. These investigations could provide new data on the possible utilisation of these implements. Furthermore, they might confirm or deny the relationship between grinding tools and food preparation, while also allowing further contributions to this study, including the use of the other category of tools. The final goal of our research is to understand whether the funerary evidence mirrors a real division of labour between the sexes and, if so, what kind of division this was. In this way we hope to be able to detect gender-specific activities in the Gash Group and Jebel Mokram Group periods.

Author Contributions and Acknowledgments

Francesco Michele Rega produced all the sections on the macro-lithic tools and their analysis, while Eleonora Minucci and Giusy Capasso carried out the anthropological analyses. All the authors worked together on the discussion and the remarks sections alongside the interpretations presented in this paper.

The writers would like to express their gratitude to all the members of the IAEES, especially Andrea Manzo the Director of the IAEES mission, to the NCAM (National Corporation for Antiquities and Museums) of Khartoum, to the Regional Ministry of Culture and Tourism of the Kassala State and to the Italian Ministry of Foreign Affairs, through whom our archaeological missions were realised. Many thanks are also due to Alessandra Sperduti (Museo delle Civiltà, Rome) and to Caroline Hamon (CNRS, UMR 8215-Trajectoires. De la sédentarisation à l'État, Paris) for their support and accurate reviews. Finally, we also thank all the members of the UMR 8215-Trajectoires and CISA laboratories, who made their microscopes available for the examination of the objects in the sample. Any errors remain our own.

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Human Population History from an East African Perspective: the Forgotten Land

Hisham M. Eldai and Hiba Babiker

Introduction

East Africa extends over 5.9 million square kilometres, with diverse geography and climates (Mather 2003), which have been host to the earliest examples of human existence (Coppens 1977; Leakey 1969; Liu et al. 2006; McDermott et al. 1996). Due to human interactions, migration and environmental cues over the long history of East Africa, its populations are largely multi-ethnic. However, the intricate genetic legacies precipitated in East African populations by these events remain unexplored.

Evidence supporting the origin of our common ancestors in East Africa and its place as a hub to Out-of-Africa (OoA) dispersals includes fossil remains, archaeological finds and genetic records (Reyes-Centeno et al. 2014; Groucutt et al. 2015; Tishkoff et al. 2009) (figure 1). The Singa (Sudan) and Omo (Ethiopia) hominid remains (figure 2), dated at 130 kya (Pearson 2013) and 200 kya (Wood & Leakey 2011) show that humans settled in East Africa long before the record of their organization into small monarchies and chiefdoms (which only began around 5000 BC) (Stringer 2016; Loeffler 2016; McDermott et al. 1996; McDougall et al. 2005). Remarkably, the Singa hominid is a rare specimen of a population that existed before the appearance of anatomically fully modern *Homo sapiens* (McDermott et al. 1996). Moreover, the dozens of 13-14 kya human skeletons recovered from Jebel Sahaba in northern Sudan "Upper Nubia" are the oldest evidence of early armed attacks ever known, making Jebel Sahaba the oldest battleground and one of the oldest cemeteries (Kelly 2005).

Archaeologically, distinct lithic industries found in Nubian complexes in Arabia, Egypt and the Levant indicate flowing cultural exchange and OoA dispersals along northern and eastern routes (Crassard & Hilbert 2013; Usik et al. 2013; Pagani et al. 2015). Genetic data infer that East Africa sustained a large effective population size (i.e. the actual number of successfully breeding individuals in a population) and had the greatest level of population substructure anywhere in the world. It is where deep branching of Y-chromosome and mtDNA haplogroups originated and dispersed to the rest of the world (Underhill et al. 2000; Semino et al. 2002; Gomes et al. 2010; Cruciani et al. 2007; Rosa & Brehem 2011; Soares et al. 2012; Gonder et al. 2007). However, the genomic record of this anthropologically-crucial region features sparse and low-coverage data for a small subset of geographically discontinuous populations and offers only limited insights for verifying the level of diversity implied by archaeological finds (reviewed in the next section).

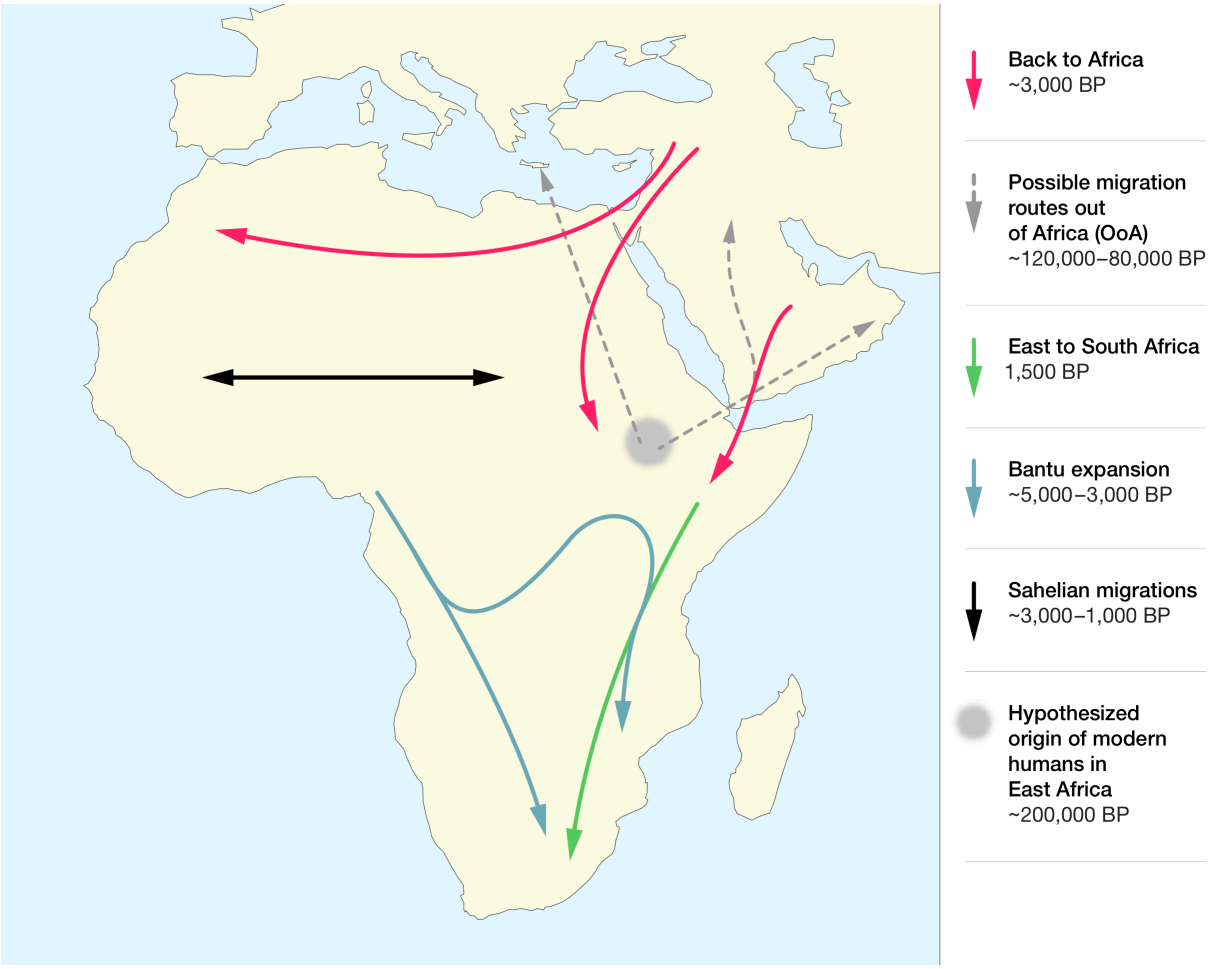


Figure 1: map of Africa. The map is indicative of the area in East Africa where anatomically modern humans are hypothesised to have originated; possible migration routes Out of Africa (OoA); the Bantu Expansion from Central West Africa to South and East Africa; the bidirectional migrations on the Sahel region and the migration back to Africa. Note that these events took place at different points of time (Rose et al. 2011; Walter et al. 2000; Luis et al. 2004; Underhill & Kivisild 2007; Musilová et al. 2011; Kopytoff 1987; Plaza et al. 2004; McDougall et al. 2005; Llorente et al. 2015; Schlebusch & Jakobsson 2018)

The strength of inferences made from a given population depends on the degree of its representation (sample size and genomic coverage) in a dataset, which in turn determines its utility in large-scale comparative population studies (Groucutt et al. 2015; Pemberton et al. 2013; Reyes-Centeno et al. 2016; Gonder et al. 2007). In the case of East Africa, the data limitation has considerable outcomes for our understanding of human history. First, as a result of low genomic coverage, the regional demographic relationships—as explained by simple models of gene flow—do not fully capture its population dynamics (i.e. migration, admixture, structure, and selection) (Pickrell & Reich 2014). Second, overlooking the impact of gene flow and concurrent population interactions from East Africa impedes a full understanding of the early events in human history and abates current inferences on relationships among the world's populations (Gonder et al. 2007; Groucutt et al. 2015; Reyes-Centeno et al. 2016). Therefore, the lack of systematic genomic studies on East African populations and the limitations in current data warrant establishing a representative East African dataset to enhance the region's data record (in sample size, historical and geographical continuity and genomic coverage) and

improve our current ability to evaluate the position of East Africa within the framework of human evolution and migration.

Uncovering African linguistic diversity and genetic relationships between populations of different language families can be advanced through interdisciplinary research. For example, integrating linguistic data with genetic data from modern and ancient populations will likely contribute to decoding long-standing questions in African linguistics, cultural and genetic diversity; and provide hints about ancient and recent population histories (Creanza et al. 2015; Pakendorf 2014; Günther et al. 2015).

This article revisits the available East African genetic records and discusses the importance of the region to our understanding of human history. We find that populations of East Africa are underrepresented in genetic studies, despite their potential to uncover the origin of our species in Africa and the possible routes of dispersal out of Africa. The evident need is for increasing the current data record by systematically sampling contemporary DNA and aDNA from the Sudan region given its archaeological, linguistic and anthropological significance. Having such data will maximise the role of simulation modelling and statistical approaches in providing precise inferences about population structure and divergence in Africa.

The Genomic Record of East Africa and its Limitations

Variation analysis of genetic uniparental markers—mitochondrial DNA (mtDNA) and nonrecombining Y-chromosomal (NRY) markers—in contemporary populations informed early reconstruction of human ancestry. The analyses strongly support a recent African origin of *Homo sapiens*, in terms of Africa being the source of the deepest lineages and harbouring the greatest diversity (Grzybowski & Rogalla 2011; Patterson et al. 2012; Price et al. 2009; Pugach et al. 2011; Sankararaman et al. 2008). However, due to the low genomic coverage of uniparental markers, they cannot reveal complex details of population dynamics. They also suffer from inherent biases in sampling and in their capacity to illustrate gene flow. For example, uniparental markers can reveal ancestral patterns of gene flow, but not bidirectional gene flow relationships (Congiu et al. 2012; Veeramah & Hammer 2014). In contrast, high-resolution whole-genome sequencing (WGS) data would enable answering, more rigorously, questions in large-scale population dynamics studies (Malaspinas et al. 2016; Mallick et al. 2016; Pagani et al. 2016; Veeramah & Hammer 2014). For example, WGS data are amenable to investigating the bidirectional gene flow between diverging populations. Furthermore, aDNA analysis is promising in tracking human diversity and investigating population dynamics, as functions of time and historical events, through comparing ancient genomes to regionally modern ones (Pickrell & Reich 2014).

We surveyed the representation of East African populations in 31 publicly available genomic datasets (table S1). These studies had diverse objectives, but overall the current representation of East African populations does not reflect the complexity of East African population structure and the genomic record for the region is deficient in relation to that of the world. Moreover, notable issues arise in the few datasets that included East Africans. Examples of these are listed in table 1. The Allele Frequency Database (ALFRED) of anthropologically defined populations has 21, 451 and 724 populations from East Africa, continental Africa and the world (row 1, table 1) (Osier et al. 2002). But these alleles do not necessarily overlap, hence they are not comparable to one another since they were sourced from unrelated studies using disparate sets of genes. Another dataset that has been central to studying human diversity is the Human Genome Diversity Panel (HGDP) which genotyped 1,043 individuals from 52 populations. However, only one of the seven African populations in HGDP is from

East Africa (notably, 19 Bantu Kenyans) (Cavalli-Sforza 2005). Therefore, studies incorporating HGDP will either echo such underrepresentation (table 1, row 2); or in attempting to avoid it, they synthesise a dataset sourced from HGDP and several others by pooling only the overlapping markers common to all source datasets and discarding the non-overlapping ones; effectively reducing the genomic coverage of the attendant dataset (table 1, row 3). In the case of East Africa, one such source dataset is from a study by Tishkoff et al. (table 1, row 4). So, while the dataset in the Tishkoff et al. study reports 1327 genomic markers (Tishkoff et al. 2009), the synthesised dataset allows comparing only 645 microsatellites between populations.

Table 1: sampling of East Africa in publicly available datasets. Datasets were considered if they are actively maintained and their metadata lists a population's geographical location and/or ethnic affiliation. Supplementary table 1 provides further details for all studies surveyed in this review

Row	Study	East Africa to Africa (%), East Africa to World (%)	Country Counts (Sudan, Ethiopia, Somalia, Uganda, Kenya, Tanzania, Djibouti, Eritrea)	Publicly available data
1	The Allele Frequency Database (ALFRED) (Osier et al. 2002) a.	13, 1.4	17, 20, 5, 0, 10, 4, 1, 1	Yes
2	Worldwide human relationships inferred from genome-wide patterns of variation(Osier et al. 2002; Li et al. 2008)	14, 2	0, 0, 0, 0, 19, 0, 0, 0	NA
3	Population structure in a comprehensive genomic data set on human microsatellite variation (Pemberton et al. 2013) b.	43, 18	102, 55, 0, 0, 431, 499, 0, 0	Yes
4	The genetic structure and history of Africans and African Americans (Tishkoff et al. 2009) bc.	42, N.A	102, 55, 0, 0, 431, 499, 0, 0	Yes
5	hmtDB: A database of complete mtDNA genomes and coding regions (Rubino et al. 2011) d.	9, 1	44, 118, 65, 3, 62, 49, 0, 0	Yes
6	YHRD: Y Chromosome Haplotype Reference Database for multi-locus haplotypes and Y-SNP profile (Willuweit & Roewer 2015) d.	57, 0.70	64, 278, 201, 118, 272, 162, 54, 161	Yes

7	An integrated map of genetic variation from 1,092 human genomes (1000 Genomes Project Consortium et al. 2012) e.	49.1	0, 0, 0, 0, 98, 0, 0, 0	Yes
8	Northeast African genomic variation shaped by the continuity of indigenous groups and Eurasian migrations (Hollfelder et al. 2017) c.	N.A	221, 0, 0, 0, 0, 0, 0, 0	Yes
9	The African Genome Variation Project shapes medical genetics in Africa (Gurdasani et al. 2015) e.	68, N.A	0, 120, 0, 100, 0, 0, 0, 0	Yes
a=Allele frequency. b=Microsatellites. c=SNPs. d=Indels. e=Parental DNA (mtDNA, Y-Chromosome). f=Whole-Genome Sequencing.				

The region is also underrepresented in WGS and aDNA studies. Out of almost 300 million people living in East African countries, only 120 Ethiopian and 100 Bantu Ugandan genomes were sequenced in the African Genome Variation Project (AGVP) (Gurdasani et al. 2015) (table 1, row 9), another set of 125 Ethiopians was used in a study that aimed to resolve the OoA migration routes (Pagani et al. 2015). The Simons Genome Diversity Project sequenced 300 genomes from 142 diverse populations, including only three Dinka individuals from South Sudan and two individuals each of Maasai, Kenyan Bantu, Luo, Luhya and one Somali from Kenya (Mallick et al. 2016) (Supplementary table 1). In addition, 15 hunter-gatherers (including 10 Tanzanians) were sequenced to study evolutionary variation and adaptation in these communities (Lachance et al. 2012) (Supplementary table 1).

Globally, several large-scale WGS initiatives have sequenced hundreds of genomes (e.g., the >2500 genomes of the Icelandic population project, and the recently published Eurasian dataset) (Gudbjartsson et al. 2015; Kaiser 2015; Pagani et al. 2016). Moreover, Europe presented a more favourable place for harvesting aDNA from human remains than Africa, where DNA decay, accelerated by harsh climate, hindered the recovery of sufficient amounts for sequencing (Fu et al. 2016; Lazaridis et al. 2014; Richards et al. 2016; Günther et al. 2015; Haak et al. 2015). In addition, while interest in aDNA collection from Eurasia is gaining momentum (de Barros Damgaard et al. 2018), the trend does not reverberate for Africa in general and East Africa in particular.

The Genetic Substructure in East Africa

Patterns of genetic diversity in East Africa were influenced by the complex histories of its populations, their geographical locations, and linguistic and cultural diversity (Tishkoff et al. 2009).

Analysis of contemporary populations from Africa based on uniparental and autosomal markers shows evidence of substructure between hunter-gatherers and agriculturalists (Quintana-Murci et al. 2008), populations within and between language families (Gomes et al. 2015; Pagani et al. 2012; Tishkoff et al. 2009) and populations with geographical boundaries (Hollfelder et al. 2017; Tishkoff et al. 2009).

Contemporary Studies in East Africa

Pointing to population substructure and continuity; a recent study has shown that the Nilotic populations of North-East Africa, in particular, those from South Sudan, descended from ancestral populations that originated in East Africa and who were distinct from populations that lived in Ethiopia > 4000 years ago (Hollfelder et al. 2017). Further, the Nilo-Saharan genetic component observed in Western Sudanese populations of the Nuba Mountains suggests population contact in the region south of the Nile River (Dobon et al. 2015). The great Bantu Expansion (~5000-3000 BP, figure 1) that reached East and South Africa has influenced the patterns of genetic variations and linguistic diversity by introducing genetic diversity and replacing languages in the local populations (Patin et al. 2017; Grollemund et al. 2015). However, genetic traces of the Bantu Expansion were not evident in the Sahelian region of South Sudan despite evidence of Bantu languages being spoken in the region (Hammarström et al. n.d.; Hollfelder et al. 2017). These lines of evidence render the Bantu Expansion (routes and times of dispersals) open to deeper investigations.

Genetic research findings emerging from the region point to a complex and dynamic history and population structure across the Sahel and along the Nile Valley (Dobon et al. 2015; Busby et al. 2016; Pagani et al. 2012; Hollfelder et al. 2017). Physical traits such as skin pigmentation show high variability of skin colour in East Africans (Ethiopia, Tanzania, and Botswana) (Crawford et al. 2017). These findings highlight the need to cover more populations in East Africa to increase our understanding of the human population history and evolution of cultural and phenotypic traits.

Ancient DNA Era in East Africa: How Far are We?

Data from whole-genome sequencing (WGS) studies over the past decade have progressively revealed partial aspects of human population history, yet big questions remain open and in need of answers. Lack of research funds and limited logistics in Africa contribute to slowing the pace of research in the region (Kumwenda et al. 2017) relative to Europe where an impressive increase in human population studies is seen for both modern and ancient populations remains from as far back as the pre-Neolithic periods (Hofmanová et al. 2016; Haak et al. 2010). Another challenge is socio-political, where the archaeological wealth of the region (including cemeteries and artefacts) is at risk of erosion under ambitious modernisation projects such as the Meroë dam in Sudan (Emberling 2009). This, in particular, implies that the historical continuity of archaeological sites can never be captured and fully understood despite best efforts by archaeologists to salvage and record them given the limits on excavation seasons; unless a concerted effort to sample aDNA from the cemeteries is carried out in conjunction with the archaeological salvation projects.

Recent advances in optimised aDNA recovery techniques can increase the yield of aDNA extraction from skeletal remains (e.g. Petrous bone) (Pinhasi et al. 2015). Ancient DNA studies have been successful not only in sequencing hominin ancient remains (Neanderthal and Denisovans) (Prüfer et al. 2014; Meyer et al. 2012) but also naturally preserved human remains (Iceman, Saqqaq) (Keller et al. 2012; Rasmussen et al. 2010) and chemically treated ones (Egyptian Mummies) (Schuenemann et al. 2017). The aDNA studies from different geographical locations in Africa reflect how the aDNA technology is being adopted to study the most challenging DNA material (Schuenemann et al. 2017; Schlebusch et al. 2017; van de Loosdrecht et al. 2018; Fregel et al. 2018). These factors, together with the overall reduction in the cost of DNA sequencing, promise to realise the target of including more

underrepresented East African populations in sequencing projects and thus smoothing the geographical bias in sampling DNA from East Africa.

To demonstrate the sort of interesting questions that can arise from studying East African aDNA, consider these two examples. The first, aDNA genome from Ethiopia revealed population continuity in Ethiopia between ancient Mota's genome and contemporary Ethiopian highlanders known as the Ari, who also showed evidence of a Eurasian backflow into the region in the last 3 Kya (Llorente et al. 2015). The back-migration waves from Eurasia and the extent of their traces left in eastern Africa, and further west, remain incompletely surveyed (Llorente et al. 2015; Gurdasani et al. 2015; Haber et al. 2016).

A recent aDNA study of human remains found in eastern and southern Africa highlighted the deep and related ancestry of the East African Hadza to an ancient East African lineage and that they share less ancestry with Bantu populations occupying the same region (Skoglund et al. 2017). Interestingly, the study also pointed to population contact and gene-flow between East and South Africa predating the spread of farming and herding.

Understanding the complex demographic events and migrations in Africa will be a reference to studies of African populations and populations of African descent. In our opinion, aDNA skeletal remains from different sites in Sudan should be considered for new research avenues in Africa.

Importance of East Africa in Human Settlement and Migration

The East African region encompasses Sudan, South Sudan, Eritrea, and Ethiopia. It is an outstanding place to study human diversity. The first humans transited the region in their exodus out of Africa, and many have settled there to form urban centres along the Nile River. The river is thought to have acted as a natural conduit/barrier of gene flow with different ethnicities on different sides of the Blue and White Niles and the several tributaries thereabout (Krings et al. 1999).

The area witnessed the rise and dwindling of ancient kingdoms spanning the East African region. The country of Sudan, specifically, has rich ancient cemeteries the study of which can widen our understanding of population history within and beyond Africa by providing new genetically-informed insights into the interplay between archaeology, anthropology, and linguistics in the region. As the region has been supporting human migration and settlement since antiquity, both modern and aDNA data are needed to better assign population relationships and trace migration turnovers to prehistoric depths.

Inarguably using accurate data to build demographic models of populations truly representative of East Africa will lead to more realistic and comprehensive conclusions about human evolution and migration. This is in contrast with estimating divergence times based on sampled populations that do not best represent those where historically important divergences occurred. For instance, estimating Yoruba-Eurasian divergence time (given the West African location of the Yoruba) may actually indicate an inter-African divergence and complicates estimation by divergence models (Gutenkunst et al. 2009).

On the other hand, the location of the Sudan to the East and at the nexus of migration routes made it a bottleneck and a corridor to settlement and OoA dispersal of anatomically modern humans, their crafts, crops, and animals (Winchell et al. 2017; Beldados et al. 2018; Krings et al. 1999; Gifford-Gonzalez 2017; Kimura et al. 2011). One hallmark of the diversity in this region is population continuity and turnover as evidenced by the succession of overlapping kingdoms that existed there (figure 2), each

leaving an abundance of cemeteries with burying styles reflective of their time periods (Chłodnicki et al. 2010; Chłodnicki et al. 2005; Chłodnicki & Żurawski 2004; Buzon 2014). At times, one location could even host mixed burial styles indicating the coexistence of populations or turnover of burial practice. A great example of this is in Sai Island where different styles of cemeteries can be seen within an area of only ~50 km^2, hailing from different periods of times (Neolithic, Napatan, Kerman, Meroitic, Kushitic, Christian, and Islamic) (Van Peer et al. 2003; Murail et al. 2004; Budka 2017; Eerkens et al. 2018; Francigny 2017). Figure 2 and table 2 list a few examples of such cemeteries to indicate that patterns of continuity are likely well spread over the Sudan region.

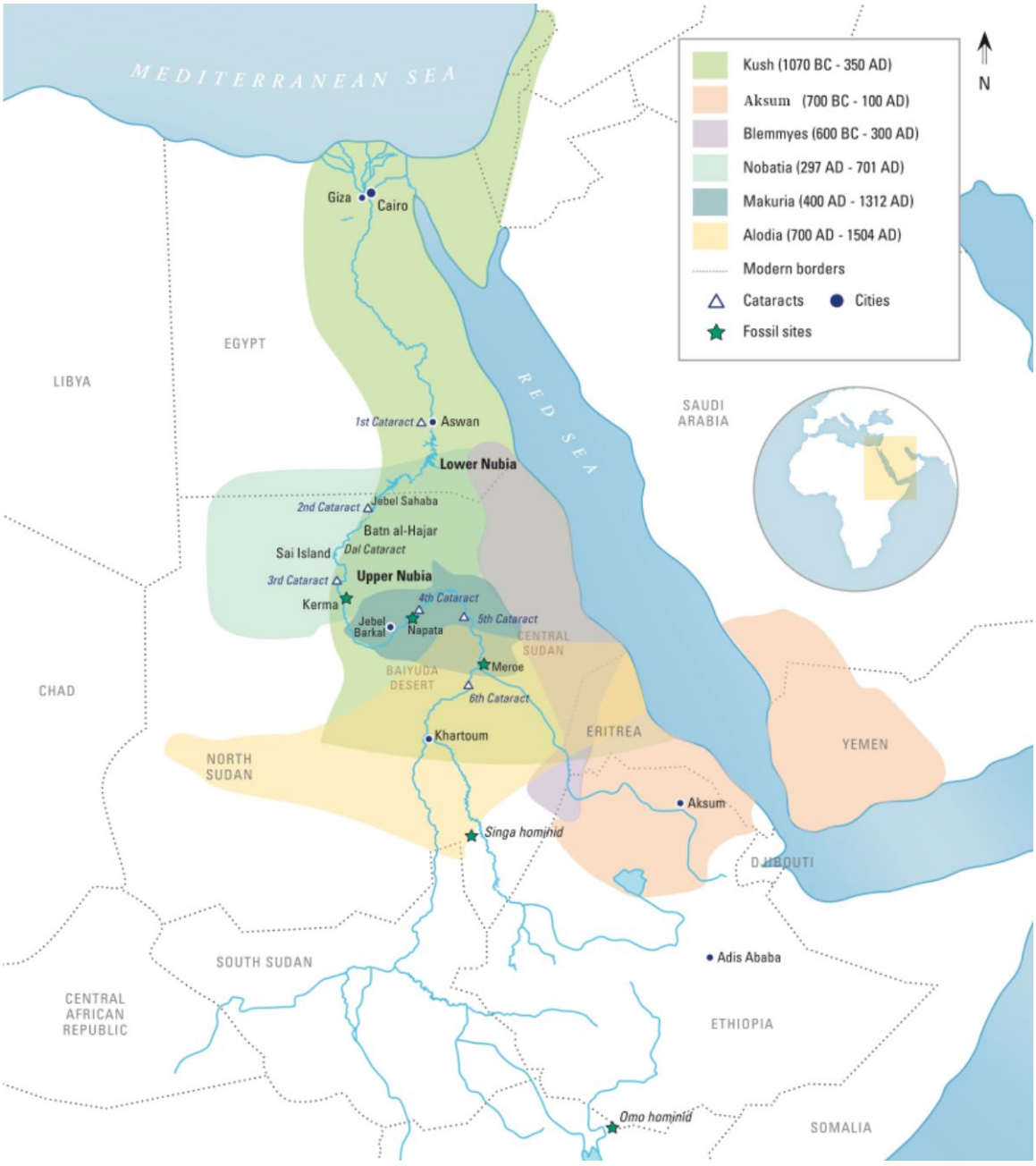


Figure 2: Map of Ancient East African Kingdoms and sites of archaic fossil remains in Sudan and Ethiopia. The region of East Africa witnessed a turnover of successive and contemporary kingdoms throughout history as evidenced by the richness of archaeological sites; making it an interesting place to study population structure and

continuity. The kingdoms of Kerma (2450 BC-1500 BC) and Napata (founded in 1400 BC) were riverine urban centres and powerful city-states. Together with Meroë, they were precursors to (and consecutive capitals of) the Kingdom of Kush. Kush expanded into Egypt, establishing the 25th Dynasty (760 BC–650 BC). It interacted commercially and militarily with the Assyrians in the Levant and the Phoenician coast (Kahn 2006). Aksum (founded in 400 BC) was a city-state and precursor to the Christian Aksum kingdom, which later infringed into Kush. Aksum and Kush were succeeded by Nobatia and Makuria, which eventually expanded over Nobatia

Table 2: List of archaeological sites/cemeteries excavated in Sudan. Sites are from different time periods spanning pre-Kerma, Kerma, Napata, Meroitic and medieval times. More details are shown in figures 2 & 3

Archaeological Site/Cemetery	Cemeteries Spanning Periods	References
Jebel Sahaba	Pre-Kerma 14000–11000	(Antoine et al. 2013)
Tombos	Napatan Nubian 750–660 BC	(Buzon 2014)
Sedeinga	Pre-Kerma, Meroitic and Napatan	(Rilly and Francigny 2011)
Berber Meroitic Cemetery	Meroitic Period (300 BC–350 AD)	(Rilly and Francigny 2011; Bashir and David 2015)
Hagar El-Beida 1	Kerma, Napatan and Late/Post Meroitic (Christian)	(Chłodnicki et al. 2005)
ElSadda	Neolithic, Kerma, Late Meroitic, post-Meroitic, Old Kushitic, Christian	(Osypiński 2010)

The region's inhabitants both generated and absorbed genetic and demographic flows. For example, the movement of ancient mtDNA lineages and linguistic diversity seen in other East African countries indicate southbound migration events originating in Sudan (Gonder et al. 2007). While some of these lineages are almost regionally exclusive, others (e.g. the M1 mtDNA haplogroup) have reached as far as Oceania (Gonder et al. 2007). This lineage was also suggested to have participated in shaping some of the West African mtDNA diversity coinciding with Kushitic migrations westward (Rosa et al. 2004). Unfortunately, mtDNA studies are too few to be considered comprehensive in representing the ancient and recent history of Sudan (Fox & Lalueza Fox 1997; Krings et al. 1999).

From a paternal lineage perspective, Y-chromosome studies point to interesting patterns of gene flow in Sudan and South Sudan that coincide with geographical affinities, languages, and history of the studied populations (Scheinfeldt et al. 2010). The discovery of E-M78* Y haplogroup in southeast Europe is an example of very ancient migratory events (~8500 BC) originating from Sudan (Battaglia et al. 2009; Cruciani et al. 2007). Other local examples include ancient population interactions between Nilo-Saharan and Afro-Asiatic speakers in the region and the possible origin of the Nilo-Saharan language family in eastern Sudan followed by westward and southward migrations to central Africa and southern Sudan (Cavalli-Sforza et al. 1994; Poloni et al. 2009). Studies on other Sahelian African populations reported contrasting patterns between Y-chromosome and mtDNA genome variations, which were shown to be a result of sex-biased migrations and gene flow (Wood et al. 2005; Barbieri et al. 2012; Cruciani et al. 2011). Hence extended investigation of Sahelian populations will uncover the population demographic history across the Sahel and will reveal the various patterns of migration and gene flow.

Evidence for under-sampling in eastern Africa, in particular, from Sudan has been revealed by a recent study where samples from different populations were examined using genome-wide data analysis pointing to population substructure and continuity in the region that had not been reported before (Hollfelder et al. 2017). Such findings highlight a much needed yet tardy progress of research on the

structure of regional indigenous populations such as the admixed modern Nubians and the relatively isolated Nilotes (Hollfelder et al. 2017).

Within the context of human population history, the population structure in the Sudan region lends itself to studying local and global population dynamics, both ancient and recent. The Sudanese populations can thus appropriately represent East Africa in large scale genomic studies. Therefore, an apparent approach to further enhance the current repertoire of genetic data is to systematically sample aDNA and modern DNA from Sudanese cemeteries and contemporary populations and to make that accessible to the scientific community.

The East African Linguistic Diversity Explained through Genetics: aDNA and Modern Data

Linguistic diversity in Africa had been classically categorised into four language families: Afro-Asiatic, Niger-Congo, Nilo-Saharan, and Khoisan (Greenberg 1963). Despite linguists' recent criticism of the accuracy of this classification of African languages (Childs 2012; Güldemann 2016), it is possible to uncover population histories and substructure conforming to this linguistic classification (Pagani et al. 2012; Tishkoff et al. 2009). It is also worth noting that the co-evolution of genes and languages is a complex process that impacts the interpretation of phylogenies to reflect population histories (Pakendorf 2014).

The relationship between genes, phenotypic diversity, and languages is shaped by geography and the demographic histories of the populations (e.g. in East Africa: population size changes and admixture events with populations of both the Sahelian region and Eurasia (Pagani et al. 2012)). Within Africa, different correlations between languages, genetics, and geography are discernible between and within the language families (Krings et al. 1999; Tishkoff et al. 2009).

In the context of the Sudan region, this relationship presents an untapped resource of information pending systematic exploration. The evidence of the linguistic diversity in East Africa pinpoints to the location of Sudan in the overall continental linguistic diversity (Rosa et al. 2004; Poloni et al. 2009; Scheinfeldt et al. 2010; Barbieri et al. 2014; Gonder et al. 2007). Moreover, there are more than 137 languages spoken in Sudan (Hammarström et al. 2018), yet most populations speaking these languages have no representation in genetic datasets whatsoever since most of the previous studies were based on only a few numbers of markers and/or uniparental markers (Krings et al. 1999; Dobon et al. 2015).

It follows, therefore, that it remains inconclusive whether we will see a consistent matching between linguistic boundaries and genetic structure in the region pending integrating evidence from 01) aDNA (to study populations representing the ancient kingdoms in Sudan so as to set concrete linguistic evidence informing population continuity/displacement and past population contacts along the Nile Valley); 02) population-level WGS (to infer population divergences, assign population relationships and historical contacts, and date these events in a similar way to Indo-European studies (Haak et al. 2015); and 03) improved uniparental datasets that sample from more populations in the region. For this quest, Y-chromosomal variation can serve as a linguistic analysis tool provided that good quality chromosomal databases exist (St. Clair 2016).

Systematic adoption of genomic anthropology to decode human population history

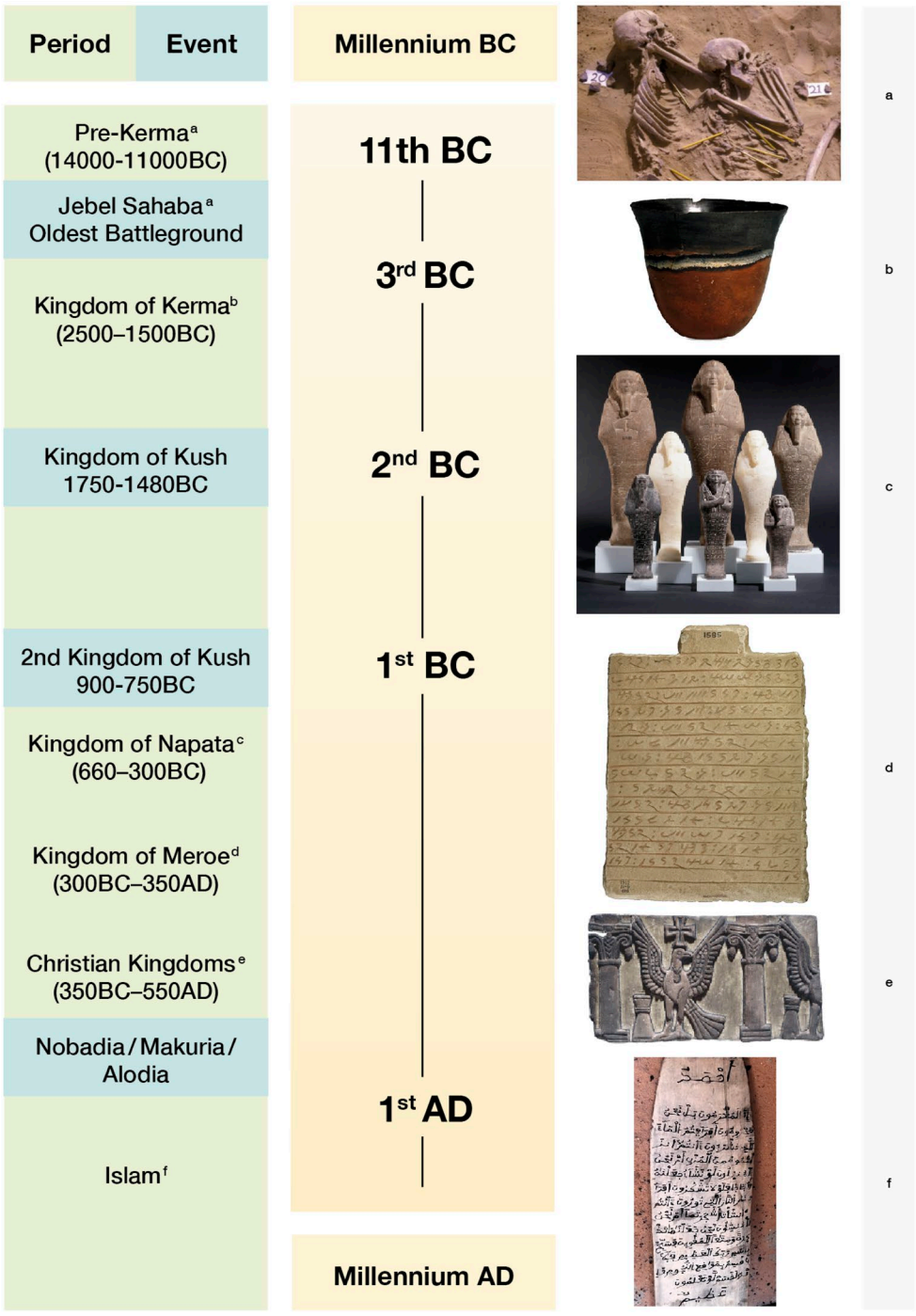
The inadequate inclusion of East African populations in population genomic studies minimises their contributions to the story of human history and to the field of genomic anthropology. Although there is a need for generating high quality East African whole genomes; the priority should be given to systematic sampling to avoid the shortcomings inherent in the current datasets. Specifically, a quantitative enhancement to this record, unless reflective of the diversity in the regional ethnic and linguistic repertoire and unless accounting for population continuity, is insufficient.

A point of emphasis is thus: sampling needs to be anthropologically informed such that the generated datasets would serve to expand our ability to ask more concrete questions regarding, for examples, untangling the relationships between East African populations and the World; solving the gaps in our understanding of human evolutionary history; retracing the migration routes that traversed the region in the OoA exodus and testing population continuity through serial sampling from several periods (figure 3) (Silva et al. 2017).

Comparative population analysis contributes to our knowledge about human genetic diversity and enhances the record of relationships between world populations in the contexts of understanding human migration, settlement, admixture and divergence times. This will allow the re-evaluation of migration models of human dispersal after *plugging-in* the East African component and will reveal the region's position in human evolution and migration through defining the contribution of the region to the population structures of the World. Additionally, it would also help in explaining how the regional population dynamics shaped OoA migration and were shaped by the backflow into Africa. By considering the genomic data in different ancestry models, it will be possible to comprehensively and systematically construct and test various divergence hypotheses to reveal deeper insights into the complex human demography; enabling researchers to systematically answer questions based on well-designed research priors (Hey 2004).

Regional population genetic studies have the potential to resolve/characterise inter-population relationships; patterns of selection and ancestral relationships; the evolutionary triggers that led to the selection of genetic traits along migration routes and bio-medically significant population-specific traits. Specific open questions in this regard include: exploring haplogroup diversity; describing the dynamics of male and female-mediated gene flow; calculating changes in effective population size (Schiffels & Durbin 2014); inferring demographic events and complex population history from genome-wide data (Gutenkunst et al. 2009) and the contributions of geography in shaping these relationships.

Based on all of the above, the question thus arises as to which region could harbour promising leads and hence can realistically represent East Africa in addressing the research opportunities presented thus far (in archaeology, linguistics, and anthropology) through genomics. To answer this question, we suggest 01) establishing an East African "flagship" dataset to bypass the limitations of the currently available datasets in coverage and resolution, and which contains sequence information of both modern and ancient DNAs, to facilitate exploring the broad themes discussed in this review; 02) and that populations from Sudan are well-suited representatives of East Africa in this endeavour.



*a-e © Trustees of the British Museum / *f credit Hiba Babiker

Figure 3: Ancient East African Kingdoms and some representative skeletal remains/artefacts from each, reflecting the cultures of each period. (a) Skeletons excavated in Palaeolithic Cemetery 117 of Jebel Sahaba in Sudanese Nubia. (b) Classical ware pottery beaker from Kerma period. (c) Napatan Red quartzite shabti (figurines) of Taharqo. (d) Meroitic Sandstone stela in the shape of an offering-table; fourteen incised lines of Meroitic text. (e) Christian period and the overlap between the Christian kingdoms. (f) Wood tablet used to teach Quran reading and writing until today. Images of artefacts were obtained from the British Museum's printed material. Representative cemeteries from each period, which can be explored for aDNA studies are detailed in table 2

Conclusion and Future Directions

We have highlighted in this review that the inclusion of the Sudan region in the world genomic repertoire could lead to reconstructing human population history. Key to linking eastern Africa to the global picture is systematic DNA sampling from contemporary and ancient populations within the contexts of archaeology, linguistics, and anthropology. Availability of a flagship East African genomic dataset will promote the design and development of robust simulation modelling that best utilises the data both in spatial and temporal windows, which will allow making precise inferences about population history.

Revealing the true position of the region in the human migration and diversity story is hampered, however, by the limitations in the already sparse genomic data on populations of the Sudan region. Unfortunately, the currently available East African datasets will only yield diminishing insights when compared to what can be gleaned by including data from the latest and more comprehensive high throughput approaches. Echoing datasets across studies will not improve the situation. Hence a challenging task is compounded by the potential for information exhaust out of the current East African datasets. Therefore, a shift toward adopting large genomic datasets, systematically, is warranted. A primary motivation for such a transition is that large genomic datasets can lend themselves to statistical and computational modelling when studying complex demographic histories. This has the potential to refine our understanding of human history and local ancestry through tracing admixture signals and dating these events (Medina et al. 2018; Price et al. 2009; Pugach et al. 2011; Sankararaman et al. 2008); facilitate studying population continuity; reveal OoA and Sahelian migration routes and furthering the depth of questions asked. Indeed, incorporation of more complex genetic models will be crucial to revealing ancient human migrations and population divergences; hence it is relevant to answering longstanding questions about our species' history, evolution and dispersal inside and outside Africa (Scerri et al. 2018).

The few ancient DNA studies from southern, eastern and northern Africa were successful in reconstructing parts of the complex African population structure (Llorente et al. 2015; Schlebusch et al. 2017; Skoglund et al. 2017; van de Loosdrecht et al. 2018). These studies should serve as motivating examples for both archaeological and genetic research. Ancient DNA data spanning the Neolithic and later periods from Europe and the Near East are becoming available for comparative analysis and for tracing back past migration routes. The inclusion of east African aDNA will further clarify the origin of the story of human migration by revealing the times and routes of human dispersals/divergences out of Africa and the extent and regional depth of the migration waves and backflow into Africa.

Equally interesting is that aDNA sampled from the remains of humans that lived in the Sudan region at different points of time will be useful in comparing the structure of early regional inhabitants with those of present populations. Integrating insights from modern and ancient genomes is likely to clarify the environmental impact on migration and adaptation and allow testing such hypotheses as to whether the ancient population was gradually assimilated or replaced at different times in history (i.e., population continuity) (Silva et al. 2017). Moreover, analysis of modern and ancient human genomes specifically from the region will reveal information about the peopling of the region, the genetic affinities underlying ancient—modern population relationships and the impact of ancient populations on modern regional diversity. Therefore, archaeological work in the Sudan region should accommodate for aDNA collection from the field and from contemporary populations in the area. Also, remains found in the region and stored in worldwide museums need to be considered for aDNA sequencing studies (Fletcher et al. 2014).

Interdisciplinary research will play a significant role in the growing interest in human evolutionary history. As an example, subsistence patterns during the last 5000-3200 years in East Africa have been reflected in findings from studies in disciplines including archaeobotany and archaeozoology (Gifford-Gonzalez 1998; Gifford-Gonzalez & Hanotte 2011; Gifford-Gonzalez 2017), confirming that migration routes, population movements and dispersals can be implied from the faunal distributions and diversity. Analysis of ancient material such as animals and plants has proven its merit in connecting East Africa to the Indian Ocean and South Asia and provided a deep look into transitions of life subsistence activities in the area (Crowther et al. 2017).

Interdisciplinary research will allow undertaking more rigorous analysis and integrating additional layers of evidence from linguistics, archaeology, and anthropology through genomics, leading to a better understanding of the cultural and linguistic variation in light of modern and aDNA data (Stoneking & Krause 2011). Success in interdisciplinary research of this nature, however, requires concerted efforts and open collaboration among scientists in the region and the international community. This is crucial for asking questions, transferring knowledge, sharing data and expertise and above all; positioning the geno-anthropological tesserae from the Sudan region in their respective places within the mosaic of human diversity.

Author Contributions and Acknowledgements

H. E. and H. B. designed the survey, collected and analyzed the data and wrote the manuscript. We thank Abbie Hantgan (Langage, Langues et Cultures d'Afrique Noire, Centre National de la Recherche Scientifique, Paris, France) for suggestions on the first draft; Mohamed Saad Abd Allah (National Corporation for Antiquities and Museums, Khartoum, Sudan) for helpful suggestions on figures and we thank Carina Schlebusch (Department of Organismal Biology, Uppsala University, Sweden) for critical review of the manuscript. This work was supported through funds of the Max Planck Society to the Department of Linguistic and Cultural Evolution (H.B.).

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Appendix

The table below presents extended data for the sampling of East Africa in publicly available datasets. Datasets were considered if they are actively maintained and their metadata lists a population geographical location and/or ethnic affiliation.

Study	Source of genetic data	East Africa to World (%)	Country Counts (Sudan, Ethiopia, Somalia, Uganda, Kenya, Tanzania, Djibouti, Eritrea)	Reference	Publicly available data
Ancient human genomes suggest three ancestral populations for present-day Europeans	Genome-wide SNPs, mtDNA	22.8	7, 11, 13, 0, 38, 47, 0, 0	Lazaridis et al. 2014	Yes
Y-Chromosome Variation Among Sudanese: Restricted Gene Flow, Concordance With Language, Geography, and History	Y-chromosome	NA	445, 0, 0, 0, 0, 0, 0, 0	Hassan et al. 2008	Yes
mtDNA analysis of Nile River Valley populations: A genetic corridor or a barrier to migration?	mtDNA	NA	156, 0, 0, 0, 0, 0, 0, 0	Krings M et al. 1999	Yes
Ethiopian Genetic Diversity reveals linguistic stratification and complex influences on the Ethiopian gene pool	Genome-wide SNPs	NA	24, 188, 23, 0, 0, 0, 0, 0	Pagani et al. 2012	NA
Y-chromosome E haplogroups: their distribution and implication to the origin of Afro-Asiatic languages and pastoralism	Y-chromosome	NA	0, 0, 0, 0, 0, 0, 0, 39	Gebremeskel & Ibrahim 2014	NA

Admixture into and within sub-Saharan Africa	Genome-wide SNPs	NA	0, 0, 0, 0, 232, 148, 0, 0	Busby et al. 2016	Yes
Tracing the Route of Modern Humans out of Africa by Using 225 Human Genome Sequences from Ethiopians and Egyptians	Whole-Genome Sequences	NA	0, 125, 0, 0, 0, 0, 0, 0	Pagani et al. 2015	Yes
The Genetics of East African Populations: A Nilo-Saharan Component in the African Genetic Landscape	195,806 SNPs and 718 small INDELs	NA	408, 39, 0, 0, 0, 0, 0, 0	Dobon et al. 2016	Yes
Mitochondrial footprints of human expansions in Africa	mtDNA	NA	0, 0, 27, 0, 61 (Kikuyu 24, Turkana 37), 0, 0, 0	Watson et al. 1997	Yes
mtDNA Variation in East Africa Unravels the History of Afro-Asiatic Groups	mtDNA	NA	0, 167, 0, 0, 285, 0, 0, 0, 0	Boattini et al 2013	NA
The Expansion of mtDNA Haplogroup L3 within and out of Africa	HVS (and whole-mtDNA sequencing)	NA	102 (21), 77 (and 16), 148 (and 20), 0, 0, 0, 0, 0	Soares 2011	Yes
Ethiopian Mitochondrial DNA Heritage: Tracking Gene Flow Across and Around the Gate of Tears	HVS mtDNA	NA	0, 271, 0, 0, 0, 0, 0, 0	Kivisild 2004	Yes

Genetic Evidence for Complexity in Ethnic Differentiation and History in East Africa	mtDNA HVS-I and HVS-II, 4 SNPS related to haplogroups L1, L2, L3, M and N	NA	0, 161, 0, 0, 47, 0, 0, 0	Poloni 2009	Yes
Mitochondrial DNA control region sequences from Nairobi (Kenya): inferring phylogenetic parameters for the establishment of a forensic database	mtDNA	NA	0, 0, 0, 0, 100, 0, 0, 0	Brandstätter 2004	Yes
African Y Chromosome and mtDNA Divergence Provides Insight into the History of Click Languages	mtDNA, Y-Chromosome	NA	0, 0, 0, 0, 0, 100 (mtDNA) and 69 (Y-chromosome), 0, 0	knight 2003	Yes
History of Click-Speaking Populations of Africa Inferred from mtDNA and Y Chromosome Genetic Variation	mtDNA, Y-Chromosome	NA	0, 0, 0, 0, 0, 316 (mtDNA) and 219 (Y-Chromosome), 0, 0	Tishkoff et al. 2007	Yes
Ancient Ethiopian genome reveals extensive Eurasian admixture in Eastern Africa	aDNA Whole-Genome Sequences	NA	0, 1, 0, 0, 0, 0, 0, 0	Llorente et al. 2015	Yes
Reconstructing prehistoric African population structure	aDNA Whole-Genome Sequences	NA	0, 0, 0, 0, 1, 4, 0, 0	Skoglund et al. 2017	Yes

mtDNA analysis in ancient Nubians supports the existence of gene flow between sub-Sahara and North Africa in the Nile valley	mtDNA marker	NA	29, 0, 0, 0, 0, 0, 0, 0	Fox CL. 1997	NA
Loci associated with skin pigmentation identifiers in African populations	Genome-wide SNPs and Whole-Genome Sequencing	NA	0, 571, 0, 0, 0, 0, 476, 0, 0	Crawford et al. 2017	Yes
Evolutionary History and Adaptation from High-Coverage Whole-Genome Sequences of Diverse African Hunter-Gatherers	Whole-Genome Sequencing	NA	0, 0, 0, 0, 0, 0, 10, 0, 0	Lachance et al. 2012	Yes
The Simons Genome Diversity Project: 300 genomes from 142 diverse populations	Whole-Genome Sequencing	4	3, 0, 0, 0, 9, 0, 0, 0	Mallick et al. 2016	Yes

List of Contributors

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Eleonora Minucci (elymin@gmail.com) received her MA in Nubian Antiquity from the Università degli Studi di Napoli "L'Orientale". She specialises in bioarchaeology and anthropology, focusing on the anthropological analysis of human skeletal remains from the Gash Delta Region (Eastern Sudan). Her research aims to provide a general understanding of funerary ideologies and biological characteristics of the cultural groups living in Eastern Sudan between the 4th millennium BC and the 1st millennium AD. Her main research interests include osteological analysis, dental pathology, isotopic analysis, taphonomic archaeology, the interaction between diet and bioarchaeological data, and the prehistory of Egypt and Nubia.

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Hiba Babiker (babiker@shh.mpg.de) is a postdoctoral fellow at Max Planck Institute for the Science of Human History, Jena, Germany. She obtained her PhD in evolutionary genetics from Christian Albrecht University of Kiel with a fellowship of the Max Planck Institute for Evolutionary Biology. Her research focuses on the genetic structure of populations from Northeast and West Africa coupled with fieldwork, laboratory and computational analyses. She is interested in uncovering the links of complex evolutionary histories of genes and languages to modern-day linguistic, cultural, and genetic diversity.

Hisham Eldai (Hisham.Eldai@lincolnuni.ac.nz) is a systems biologist completing his PhD within the Integrated Systems Modelling group (Centre for Advanced Computational Solutions) at Lincoln University, New Zealand. His experience spans the academic, public, private and NGO sectors. He is researching cancer and human genetic diversity as heterogeneous complex systems. He uses graph theory and applied artificial intelligence approaches to build dynamic (and qualitative) simulation and prediction models of the genetic diversity underlying functional networks. His research interests include computational genomics, genomic anthropology, complex systems modelling, applied public policy and human diversity.

Loretta Kilroe (loretta.kilroe@gmail.com) is Project Curator for Sudan and Nubia at the British Museum. She specialises in ceramics and completed her PhD on ancient Egyptian and Sudanese pottery at the University of Oxford. She has worked at multiple sites in Sudan including Amara West, H25 and Kurgus, and is currently engaged in bringing the medieval ceramics at Kurgus to publication.

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Siobhan Shinn (siobhan.shinn@arch.ox.ac.uk) is a DPhil candidate in Archaeology at the University of Oxford. She is researching the social context of administration in Egypt during the Old Kingdom, using communities of practice theory to re-think the relationships structuring sealing practices at both the local and state levels. Siobhan also works as the ceramicist on the Sanam Temple Project in Sudan and co-runs the online network Sudan: Ancient and Modern with Dr Loretta Kilroe.