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# The Holocene Prehistory of Upper Nubia until the Rise of the Kerma Kingdom

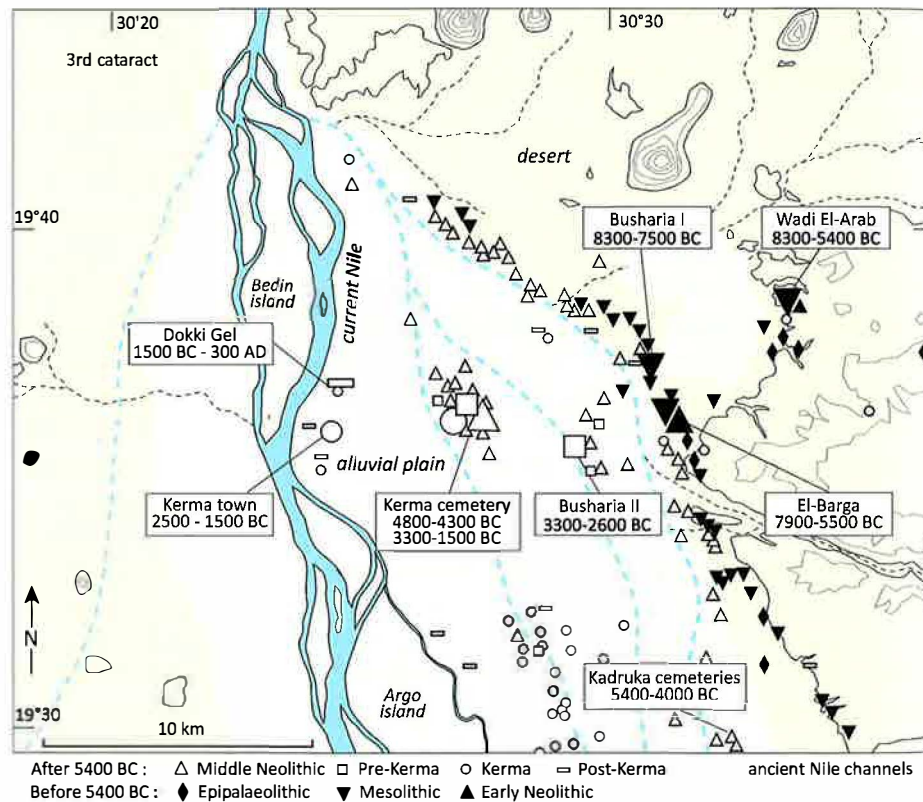
## Introduction

The Holocene prehistory of Upper Nubia has long been poorly known due to the few research projects focused on this period. In comparison, Lower Nubia and the Central Sudan have been much better studied. In Lower Nubia the sequence of Nabta Playa 200 km west of the Nile (WENDORF/SCHILD 2001), complemented by the results of the High Dam campaign of the 1960s (WENDORF 1968), covers all of the Holocene from 8400 BC to historical times (GATTO 2011a). In the south, Central Sudan is rich in sites from the Mesolithic and Neolithic Periods (from 7000 to 3500 BC) even if there is still a chronological gap between the end of the Neolithic and the 2<sup>nd</sup> millennium BC (USAI 2016). Between these two aforementioned regions of the Nile Valley, more than 700 km apart, few studies concentrated on the prehistory of Upper Nubia until recently. This area, particularly its chronological and cultural sequence, remains poorly known even if some research has been or still is ongoing at different sites. Some of the research projects focused on Neolithic cemeteries of the 5<sup>th</sup> millennium that were identified south of the Kerma basin in Kadruka (REINOLD 2001; 2006), in the Northern Dongola Reach (WELSBY 2001; SALVATORI/USAI 2008) or between Debba and Korti (PERESSINOTTO ET AL. 2004). Along the Fourth Cataract, the construction of a new dam between 2004 and 2008 led to the discovery of Mesolithic and Neolithic sites, which are available in preliminary publications for the time being (OSYPIŃSKI 2014). In the north, between the Second and the Third Cataracts, the excavations on Sai Island have revealed evidence of the Mesolithic, Neolithic and Pre-Kerma (GARCEA/HILDEBRAND 2009). Despite these discoveries, the picture is patchy and does not allow for a clear understanding of the cultural dynamics in this part of the valley. For this reason, a programme of surveys and excavations has been conducted since 2000 in the area of Kerma, south of the Third Cataract, in order to build a chronological framework and to follow the evolution of human societies during the Holocene Period from the Mesolithic to the beginning of the Kerma civilisation. It has produced a large volume of new data that substantially modifies our perception of prehistory in Upper Nubia.<sup>1</sup> The obtained results and the exceptional sites that were discovered are less due to the particularity of the region – rich in remains due to its geographical location – than a consequence of long term research.

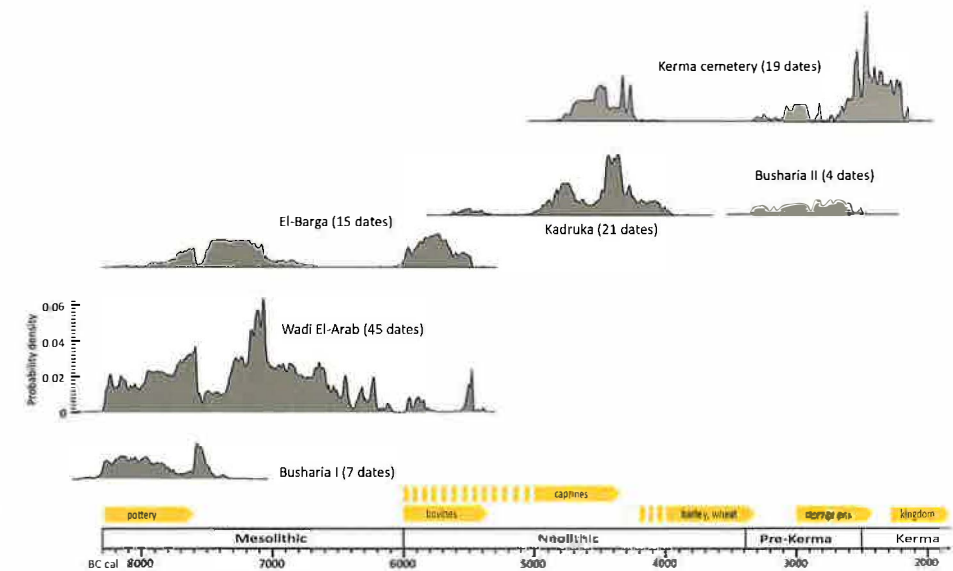
<sup>1</sup> HONEGGER 2004a; 2005; 2014; HONEGGER/WILLIAMS 2015.

## 1 The Kerma Area: Location, Chronology and Environment

The Kerma area is located a few kilometres south of the Third Cataract on the right bank of the Nile. It consists of two main geological units: the Mesozoic Nubian Sandstone plateau lying at least 13 km east of the present-day Nile channel and the late Quaternary Nile alluvial plain situated between the plateau and the Nile. The alluvial plain includes the capital of the Kingdom of Kerma and its vast cemetery, which flourished between 2500 and 1500 BC. It belongs to the Northern Dongola Reach, which is the largest alluvial plain of Upper Nubia. For millennia the area has been densely populated, giving rise to a wealth of archaeological remains, whose number and interesting features were already noted during the surveys undertaken to the south of the region of Kerma (REINOLD 1993; WELSBY 2001).



**Fig. 1:** The Area of Kerma, south of the Third Nile Cataract (Sudan), with the location of the Holocene archaeological sites including the sites discussed in the text. The excavated sites are indicated by larger symbols.



**Fig. 2:**  $C^{14}$  chronology of the human occupation in the Kerma area with the main cultural complexes and the innovations that characterized this evolution. For each site, the sum of the calibrated dates (2s) is represented by a density curve (OxCal v4.2.4; BRONK RAMSEY 2009).

Around Kerma, recent surveys have revealed the presence of 130 sites belonging to the Holocene Period and dated between 8300 BC and the beginning of our era (Fig. 1). A large number of the discovered sites are eroded or partially destroyed by agriculture, but the fragmentary material they have yielded has generally been sufficient to propose reasonably precise dates by means of typological comparisons of the collected pottery, based on previous classifications. In most instances, the sites represent the remains of habitations, campsites or villages. A limited number of cemeteries were also found. The most interesting sites have been excavated and have provided numerous  $C^{14}$  dates on which to establish their chronologies (Fig. 2). This general chronological framework allowed the distinguishing of Holocene hunter-fisher-gatherer-groups, traditionally named Mesolithic in the Sudan; Neolithic pastoral societies who practice small-scale agriculture; the Pre-Kerma Period, which corresponds to a more complex agro-pastoral society; and the Kingdom of Kerma, the first state society in Upper Nubia characterised by a concentration of power, the development of urbanisation and the emergence of institutions.

During the first half of the Holocene, North Africa was subject to important environmental changes with the return of the summer monsoon and its production of a wetter climate, which corresponds to the African Humid Period (AHP). This starts around 9000–8000 BC while the present-day (semi-)arid climate became established around 2500 BC (UsAI 2016). The AHP was punctuated by some arid epi-

sodes whose effects on human populations were more or less important (ZARBONI 2013). In the Kerma area and in the Northern Dongola Reach, recent studies have tried to evaluate the effects of the environmental variations on human occupation, taking into consideration the river flow and floods, phenomena governed by climatic changes (HONEGGER/WILLIAMS 2015; MACKLIN ET AL. 2015).

## 2 From the Mesolithic to the Neolithic Societies

During the first half of the Holocene, the sites are located on the fringes of the alluvial plain, above the Nile flood-waters. Three principal sites, which were occupied by either pottery producing Mesolithic groups of hunter-fisher-gatherers or groups from the beginning of the Neolithic, have been excavated with sequences stretching from 8300 to 5400 BC. The occupation started one or two centuries after that of the Eastern Sahara, which took place after the beginning of the AHP (KUPER/KRÖPELIN 2006). The regular presence of habitation structures and the development of cemeteries allow us to hypothesize that the occupants were sedentary, or at least that they organised their activities around a principal habitation site. One of the excavated sites, Wadi el-Arab, extends over more than three hectares and contains stratified occupation levels (HONEGGER 2012; 2013a). It was occupied for almost three millennia and produced the bases of semi-subterranean habitations, hearths and some ten tombs disseminated within the habitations. A few kilometres to the south-west, the site of El-Barga has yielded the base of a hut dug into the Nubian sandstone dating from 7500 to 7300 BC. Close by lies a Mesolithic cemetery containing approximately 50 tombs dated between 7800 and 6900 BC (HONEGGER 2004b; 2006). A second necropolis, further south, contained some 100 tombs dating from the Early Neolithic between 6000 and 5500 BC. The contrast between the Mesolithic and Neolithic burials is striking and evokes those discovered in the Central Sahara (SERENO ET AL. 2008). The individuals from the earlier burials have a robust morphology (CRÈVECOEUR 2012) and are seldom buried with personal adornments. By contrast, the later ones are more gracile and are accompanied by offerings and personal effects, mostly tools and adornments made of polished stone, which were produced by a new technique in the region (axe blades, beads, labrets and earrings). The pottery presents either surfaces covered in impressed decorations (Sudanese Style) (JESSE 2010), or a burnished surface whose evolution has been traced in the Western Desert and which spread from the north to the south from c. 6500 BC (RIEMER 2007). Finally, a bucranium was deposited on top of a tomb, which must have been from a domesticated bovid, given that the wild aurochs is not present during the Neolithic south of the Second Cataract (LINSEELE 2004). This cemetery provides evidence of the rites practised in the Nubian necropolises from the 5<sup>th</sup> millennium BC onward (CHAIX 2011). Once again, the Initial Neolithic in north-east

Africa does not appear to date from before 6200–6000 BC.<sup>2</sup> This process occurs during a major period of Nile channel and floodplain contraction between 6150 and 5750 BC which coincided with drier conditions (MACKLIN ET AL. 2015). This Mid-Holocene aridification has likely been a critical stimulus for the Neolithisation process in north-east Africa (BARKER 2013).

Starting from 5400 to 5300 BC, most of the sites in the area of Kerma are relocated onto the alluvial plain. This shift occurs at precisely the same time as it does in the Egyptian Western Desert (KUPER/KRÖPELIN 2006), and could be the consequence of regional aridification, but the data collected in the Nile basin (floodplain, lake, delta) indicates higher river flows. This would suggest that local climate change made occupation of the desert plateau regions less viable, even if the Nile river does not seem to be influenced by this dry episode (MACKLIN ET AL. 2015). Beginning in the 5<sup>th</sup> millennium, the populations adopt a pastoral economy based on the breeding of bovines and caprines (CHAIX/HONEGGER 2014); they may have also practised small-scale incipient agriculture (OUT ET AL. 2016). On the plain, the earliest dated sites are represented by a series of villages found either on the surface or in stratigraphic contexts in the Kerma Eastern Cemetery, as well as by some 20 cemeteries at Kadruka and further to the south in the Northern Dongola Reach. These ensembles cover the whole of the 5<sup>th</sup> millennium BC, giving the impression that it was a prosperous period. This period of prosperity lasted for no more than a millennium in Sudan. Not a single site is known in the valley after 4000 BC (SADIG 2013) with the exception of the cemetery at Kadada in Central Sudan, dated c. 3600 BC (REINOLD 2008). At Kerma, this hiatus lasted until at least 3400 BC, but in most of the regions of Upper Nubia, virtually nothing has been found prior to 2700–2600 BC. It would appear that around 4000 BC a prosperous and stable society that had lasted a millennium collapsed. The data on the Nile River dynamics indicates a major period of channel and floodplain contraction at c. 3700–3450 BC, which could explain why dryer conditions would have affected the human population. Nevertheless, we cannot rule out that sedimentary processes may have obliterated some of the sites from this period. This hiatus in occupation during part of the 4<sup>th</sup> millennium is not present in Egypt, where the population prospered under the development of the Predynastic Period. It could be that the arid episode was more marked in Nubia, but it is also possible that agricultural practices were more advanced in Egypt, already incorporating water catchment or irrigation systems, which allowed for a better resistance to shortfalls in precipitation or flooding.

<sup>2</sup> CLOSE 2002; KUPER/RIEMER 2013; LINSEELE ET AL. 2014.

### 3 From the Pre-Kerma to the Kerma Kingdom

Beginning in 3400–3200 BC, traces of settlements are again found on the alluvial plain. These settlements belong to a cultural horizon known as Pre-Kerma and correspond to agro-pastoral populations with affinities with the A-Group from Lower Nubia, whilst also showing precursor affinities with the Kingdom of Kerma. Initial study of the Pre-Kerma pottery has helped to define a Middle Phase c. 3000 BC and a Late Phase between 2900–2600 BC (HONEGGER 2004a). The Early Phase is assumed to begin c. 3500 BC, but is, to date, not documented.

The Middle Pre-Kerma pottery presents affinities with that of the A-Group. Many of the dishes and bowls are often red with black mouths and their surfaces are carefully polished. A fine rippled decoration evokes a decorative technique well attested in the A-Group, but here it is limited to the upper part of the pottery in the black-coloured area (Fig. 3). Some rare pots resemble the egg-shell pottery from the Terminal A-Group. This Middle Phase is only known from two settlements, one found in the middle of the Kerma Eastern Cemetery, the other on the Arduan Island (EDWARD/OSMAN 2011), where some of the pottery was similarly decorated.

The Late Pre-Kerma pottery was somewhat different from that of the preceding period, presenting elements that herald the Early Kerma Period. The most characteristic decoration is composed of combed horizontal impressions and geometric fish-bone motifs similar to those known from the Terminal A-Group. There are also impressed motifs of inverted triangles filled with geometric decorations, as well as a few red vases with black rims impressed with fine decorations below the lip recalling the characteristic Early Kerma decorations (Fig. 3). The comparison of these elements with other complexes has permitted the identification of the Late Pre-Kerma phase over a relatively extensive area, stretching from the Fourth Cataract in the south to Elephantine in the north. The most southerly site is a settlement 30 km south-west of Abu Hamed, close to the village of El-Ginifab (HERBST/SMITH 2014). To the north, the assemblages related to the Pre-Kerma are known in the region of the Third Cataract (EDWARD/OSMAN 2011; HONEGGER/WILLIAMS 2015), at Soleb (SCHIFF-GIORGINI 1971), Abudiya (GEUS 1978) and Sai (GARCEA/HILDEBRAND 2009). Similar pottery has also been found at Second Cataract sites, such as Saras (MILLS 1967–1968), Buhen where it has been placed in a redefined B-Group (GRATIEN 1995), Faras (NORDSTRÖM 1962) and even beyond in the stratigraphy of Elephantine (RAUE 2014–2015). As regards the typology of the pottery, the differences between the Pre-Kerma and A-Group are rather subtle and it is difficult to interpret their significance. Overall, they represent a single cultural horizon, but it could be that the differences observed reflect the existence of several political groups, similar to those described at a later date during the expeditions of Harkhuf under the reign of Pepi II. (TÖRÖK 2009, 69–70).

The continuity between Pre-Kerma and Early Kerma is demonstrated by the recent discovery of an initial phase in the Kerma Eastern Cemetery. Prior to this dis-

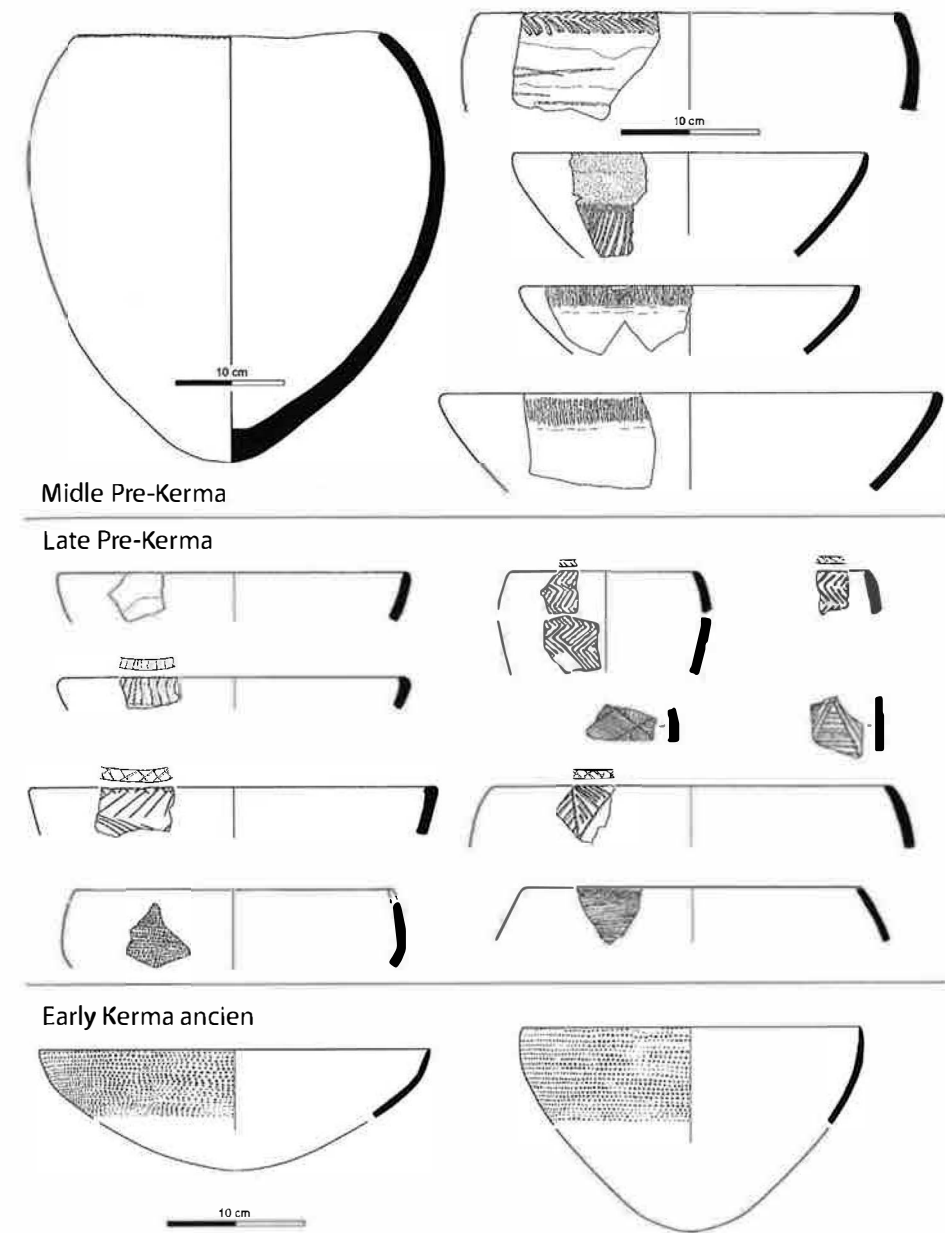


Fig. 3: Pre-Kerma pottery. a. Middle Phase (c. 3000 BC); b. Late Phase (2900–2600 BC); c. Early Kerma ancien Phase (2550–2450 BC).

covery, the earliest known tombs were dated to c. 2500–2400 BC and were assimilated into the Early Kerma Phase (BONNET 2000). To the west of this ensemble, several tens of earlier graves have been discovered and dated between 2550 and 2450 BC

(HONEGGER 2013b). Their pits are a little more rectangular than those from Early Kerma, whilst the ritual is somewhat similar, with the bodies in a flexed position on their right side and heads pointing to the east, laid out on the pelt of a bovine with the ceramics placed on the surface, next to the tumulus. The pottery is, however, different, made up almost exclusively of red vases with black mouths, which are either undecorated or decorated with combed horizontal impressions, similar to those from the Late Pre-Kerma. No red pottery was found with black mouths and fine impressed decoration under the rim, so characteristic of the Early Kerma, just as few examples of C-Group pottery were discovered, although these are regularly found in the Early Kerma assemblages (PRIVATI 1986). This initial phase of the cemetery is interesting since it belongs to the Kerma civilization, whilst being distinguished by a pottery with definite links to the Late Pre-Kerma. There was thus in all probability a degree of continuity of the population in the region to the south of the Third Cataract. The intrusive elements characteristic of the C-Group within the Kerma cemetery shortly after its initial phase continue to evade satisfactory explanation (BONNET 1982; HONEGGER 2010). They could represent the arrival of a new human group from 2500 BC on if we accept the hypothesis that the C-Group, similar to the Kerma population, was an ethnic group (HAFSAAS 2005). The origins of this group, which occupied Lower Nubia from 2500 BC, continues to be unknown, and its presence in the Kerma cultural context could be indicative of contacts between the two groups.

#### 4 The Pre-Kerma Agglomeration and the Beginning of Complexity

The Pre-Kerma is essentially known from settlements that have often been subjected to intense aeolian erosion. The habitations are made of wood and mud, with mud-bricks only appearing towards the end of the Early Kerma Period, shortly before 2000 BC (BONNET 2014). The remains, which are visible as depressions, particularly as regards the storage pits, are therefore not easily identifiable on the surface. On the Island of Arduan, the excavated area only brought to light a few such pits. At Sai there are more archaeological remains (GEUS 2004; GARCEA/HILDEBRAND 2009) and a concentration of about 100 storage pits. A certain number of them, particularly well preserved, were still equipped with the sealing mechanism, which consisted of slabs of shale and silt. Sherds were found in the pits, as well as 17 different varieties of plants and fruits. The most abundant remains consisted of wheat (*Triticum dicoccum*) and barley (*Hordeum vulgare*), which proves that the storage pits were used as granaries. Surfaces around the pits were excavated, but no other structural remains were found. At Sedeinga, some ten storage pits were also excavated, without any evidence for other structures (DELATTRE 2014), whereas above the



Fig. 4: Plan of the Pre-Kerma agglomeration.

Fourth Cataract, the site close to the village of El-Ginifab produced evidence for two occupational phases dated between 3800 BC and 2300 BC. The evidence is in the form of semi-subterranean hearths and the post-holes of circular huts 4 m in diameter, as well as a rectangular building and a palisade (HERBST/SMITH 2014).

The best known settlement is currently a large agglomeration located in the Eastern Cemetery of Kerma, a few kilometres to the east of the ancient town (HONEGGER 2004b; 2007). The settlement has been excavated over a surface of about one and half hectare. It displays a fascinating image of the layout of an agglomeration that can no longer be considered as a simple village and which already bears witness to the densification as well as a complexification processes, characteristic of a proto-urban stage of development (Fig. 4). A total of 285 pits have been excavated and, considering how many must have been destroyed during the digging of the Kerma tombs, one can estimate that there must have been almost 500 of them. With the exception of two pits containing complete jars, the cavities only yielded fragments of objects. They give the impression of having been emptied prior to the abandonment of the site and in any case have not been reused as rubbish dumps. Their function probably involved the storage of cereals, as was the case regarding the pits on Sai Island. Two  $C^{14}$  dates have been obtained: one on charcoal from a pit and the other from the organic temper from one of the jars, which yielded almost synchronous dates around 3000 BC. Several types of buildings were identified,

thanks to the alignments described by the post-holes. The most numerous represent habitation huts, the majority of which have a diameter close to 4 m, and a few others reach 6 m in diameter. On the edge of the area covered by the huts, two rectangular buildings were identified, one of which was rebuilt three times at precisely the same location, confirming the importance of the particular spot. It could have been an administrative building or the seat of power. The other building was erected with particularly large uprights, with an apse on the north side, which evokes the form of temples during the Kerma Period (BONNET 2000). Numerous regular alignments of posts correspond to palisades, and if some of these appear to mark separations inside the habitations, the majority are located on the periphery of the settlement. They trace large oval enclosures, which correspond to cattle pens, like those currently known on the periphery of present-day villages in East Africa, where pastoralism is practised (DENYER 1978). The hoof-prints of bovines identified inside one of these enclosures confirm this interpretation. Finally, the most spectacular remains have been discovered to the north of the excavated area. They consist of an impressive system of fortifications, 8 m wide, made up of at least six parallel rows of palisades, reinforced with earthworks. Although the detailed organization of this structure is hard to understand due to the numerous superimposed reconstruction phases and the more marked erosion in certain sectors, two entrances can be clearly made out. These are 70 m apart, with one being 8 m wide, whilst the second, close to a cluster of habitation huts, is limited to 4 m. The total agglomeration must have covered an extensive area of 5 to 10 ha. The duration of the occupation – such as can be estimated based on the pottery style, the dates and the number of reconstructions – does not appear to have exceeded a century. We can consider that this settlement represents a first evolutionary phase, which would, 500 years later, give birth to the town of Kerma, located 4 km to the west, nearer to the present-day course of the River Nile (see Ch. BONNET). The site might have been abandoned due to the progressive silting up of the Nile channels close-by. Architecturally, the Pre-Kerma agglomeration bears characteristics similar to those south of the Sahara and no similar site has been identified in the Nile Valley, where sites for the period in question have only very partial plans, and thus do not allow for a clear understanding of the general settlement organization (MIDANT-REYNES 2003). As compared to the ancient city of Kerma, the Egyptian influence is not perceptible due to the fact that mud-brick was as yet unknown and quadrangular buildings were rare. Some architectural similarities were, however, present in the ancient town: Storage pits have been found in the oldest levels, wooden palisades were used and huts continued to exist in some quarters (BONNET 2014). The construction of a real defensive structure surrounding the agglomeration during the Pre-Kerma underscores the need for defence and indicates that conflicts could exist between communities established in Upper Nubia. The important number of storage pits, which is regularly mentioned in other settlements, signifies that agriculture was practised more intensively at that time. The large animal corrals inside the protec-

tive structure confirm the importance of pastoralism within these 3<sup>rd</sup> millennium BC societies, which has on numerous occasions been claimed for the A-Group (GATTO 2011b), the C-Group (BANGSGAARD 2014; HAFSAAS 2005) as well as the Kerma civilization (CHAIX ET AL. 2012). This is explicitly expressed in the funerary rituals, but also by the presence of figurines and the representations of bovines, as well as by the supposedly ephemeral nature of their campsite settlements, which leave few identifiable remains.

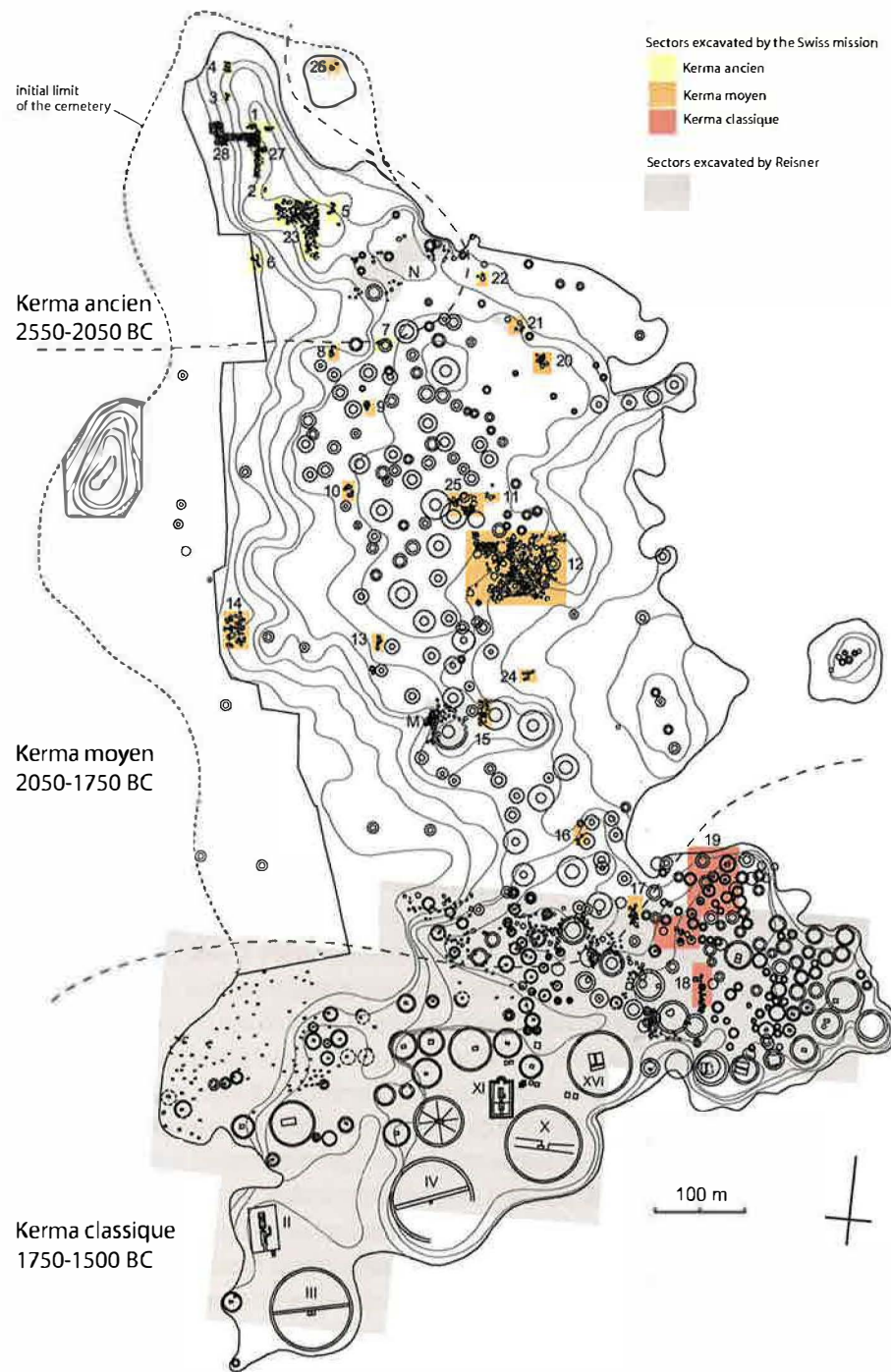
## 5 The First Stages of the Kerma Eastern Cemetery

The Eastern Cemetery of Kerma is the largest known for this kingdom, which extended from the Second to the Fourth Cataract. It is located 4 km east of the ancient city in the direction of the desert. Its exploration was initiated by GEORGE A. REISNER, who between 1913 and 1916 excavated hundreds of graves (REISNER 1923; DUNHAM ET AL. 1982). In 1977, archaeological work at Kerma was resumed by a Swiss team led by Charles Bonnet, who – during more than 30 years – undertook extensive excavations in the ancient city and opened 27 sectors in different areas of the cemetery in order to establish a precise chronology of this civilisation.<sup>3</sup> Since 1998, a new project has been initiated in the oldest sectors of the cemetery to better understand the first stages of development and the emergence of a stratified society (HONEGGER 2013b; HONEGGER/FALLET 2015).

A recent plan of the cemetery, including the tumuli of the largest graves visible on the surface and the main graves excavated by the different teams, gives a general idea of its organisation (Fig. 5). To date, it covers about 70 ha and, according to estimates calculated from completely excavated sectors, comprises approximately 40,000 tombs. Since the time of REISNER, its western part has been partially destroyed by the extension of agriculture. The Eastern Cemetery is one of the few areas of the Kerma alluvial plain that has not been cultivated over the millennia. The sheer number of graves, particularly their stone and earth tumuli, has contributed to the preservation of the area. For this reason, the remains of many Neolithic settlements have been found on the surface or in stratigraphic contexts, covered by silt deposits from ancient Nile floods. In the centre of the cemetery (sector 12), the Pre-Kerma agglomeration covering many hectares was also discovered (see above).

Developed from north to south, the necropolis was exploited during the entire span of the Kerma civilisation. A first detailed chronology of this civilisation was proposed by a study based on the material recovered from the excavations within the cemetery of Sai Island (GRATIEN 1978). This chronology was improved by the work based on the ceramics from the excavations of BONNET in the Eastern Ceme-

<sup>3</sup> BONNET 1992; 2000; EMBERLING 2014.



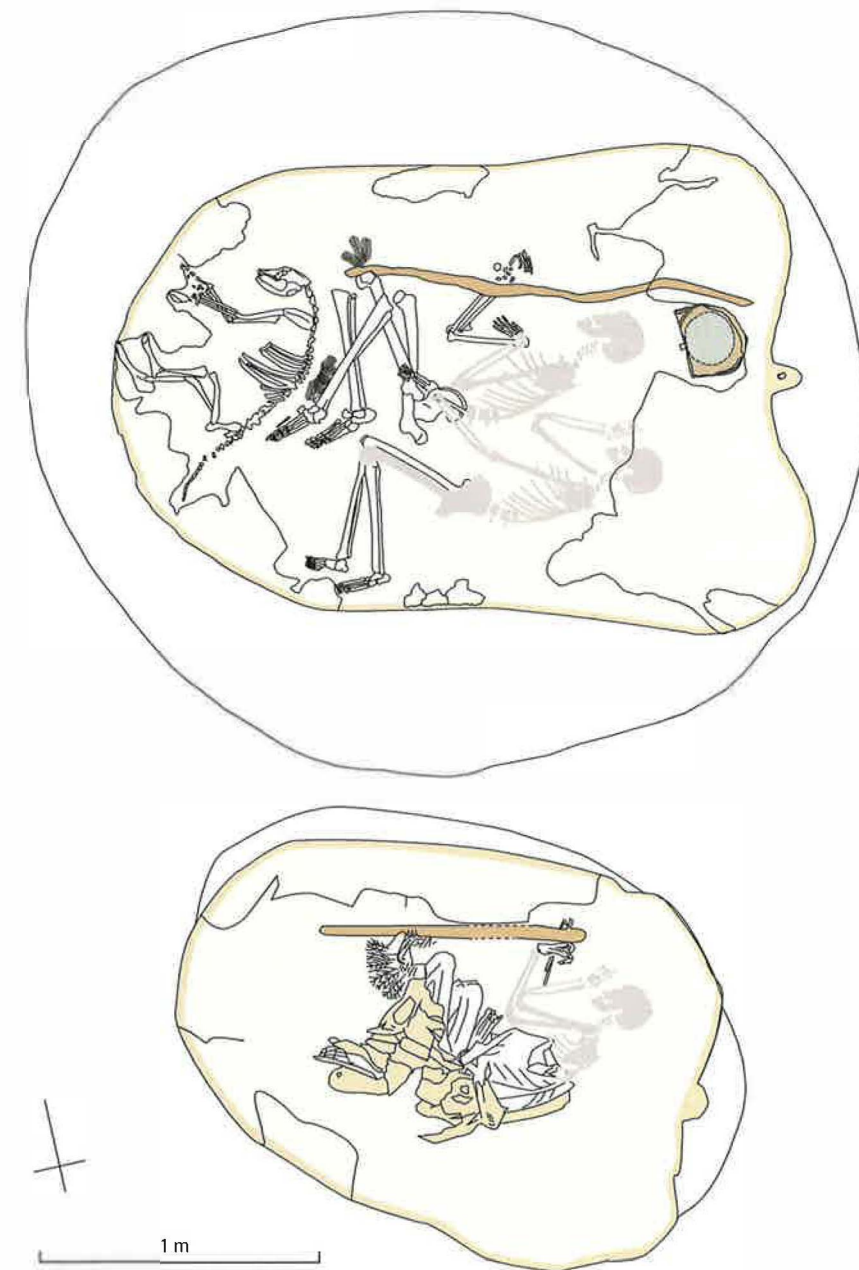
**Fig. 5:** Plan of the eastern cemetery of Kerma with the main graves and tumuli, and the location of the excavated sectors.

tery (PRIVATI 1999). A division of the Kerma civilisation into three periods was proposed: *Kerma ancien* (KA: 2500–2050 BC), *Kerma moyen* (KM: 2050–1750 BC) and *Kerma classique* (KC: 1750–1500 BC). Each period is subdivided into phases: KA I–IV, KM I–VIII and KC I–II. The dating of the phases was established by the associated Egyptian pottery (BOURRIAU 2004). More recently, a series of  $C^{14}$  dates obtained from the oldest part of the necropolis suggest that the first graves were established c. 2550 BC with an initial *Kerma ancien* phase in which pottery shows analogies with the Late Pre-Kerma (see above). The *Kerma ancien* phase I developed between 2500 and 2300 BC, followed by phase II (2300–2100 BC).

The main characteristics of the funerary ritual and its evolution are well known and have been described on numerous occasions (REISNER 1923; BONNET 2000). The graves can attain depths of 2 m, even more for the largest ones. Each grave is covered by a tumulus composed of mud, with black stones and white gravel on top, carefully arranged in circular patterns. Some pottery is placed around the tumuli. Within the tombs, the bodies were in the same flexed position resting on the right side, head toward the east. During the *Kerma ancien*, they are systematically placed on a carefully cut piece of bovine skin and then covered by a second skin. Later, they are installed on a bed. The *Kerma ancien* tombs are circular and small; they generally contain the remains of a single individual. Only at the end of this period do larger burials appear; these are indicative of greater social distinction between individuals. Objects deposited within and around these burials are notably more numerous, as is the presence of animal offering. Pottery and objects imported from Egypt can be found in small proportion during this period (1 to 5%) and will increase later, especially during the *Kerma classique*. Complete caprines and dogs are placed in the graves and bucrania can be deposited in front of the tumuli. During the *Kerma moyen*, several hundreds of them can be found close to the largest graves (CHAIX ET AL. 2014). Within some graves, the bodies of accompanying individuals are interred next to the central burial. Around or sometimes inside the largest tumuli small subsidiary graves were dug. Differences between burials increase during the *Kerma moyen*, and at this time it is not rare to find grave-pits of up to 10–15 m in diameter. This ranking between burials suggests a stratified society, which will culminate at the end of the Kingdom of Kerma. The central inhumations in the largest tumuli are supposed to be the graves of the rulers, the other tumuli could belong to high status individuals or to free men and women (HAFSAAS-TSAKOS 2013). Anthropological studies indicate that the accompanying individuals deposited around the central inhumation and those coming from subsidiary small graves show similarities with the people buried in the other graves (EADES 2003; JUDD/IRISH 2009). They could be part of the Kerma community. In certain instances, a mud-brick chapel was erected on the west side of the tumulus. During the *Kerma classique* Period, pits are generally rectangular. Animal offerings in the graves become less numerous compared to the earlier period. Bucrania are still deposited in front of burials, but are lesser in number. Even in the larger tombs, measuring more than 30 m in diame-

ter, only a few dozen were included. The decrease in the use of oxen in the funerary rituals corroborates the notion of the decline in stock breeding due to the increased aridity, which was noted with the fauna of the city of Kerma (CHAIX 1994). The *Kerma classique* Period can be divided in an Early Phase with tumuli no larger than 40 m and a Late Phase with the largest graves of the cemetery. The three most famous ones were built to a uniform size with tumuli approximately 90 m in diameter (KIII, IV, X). They are composed of a complex internal structure of mud-brick walls, with a corridor accessing a central vaulted chamber. They are assumed to belong to the most powerful rulers of Kerma (KENDALL 1997). It is in these royal graves than the number of subsidiary graves and accompanying individuals increase considerably and can reach many hundreds. The grave goods found in these burials and in some subsidiary ones were particularly elaborate and the proportion of Egyptian imports high. The fine Nubian pottery, some burial beds with ivory inlays representing animals and probably divinities, mica ornaments of leather caps, quartzite statues and others of local production express the richness and the sophistication of the Nubian society. Many other objects were of Egyptian origin, obtained by trade (jars, copper daggers, etc.) or obtained during periodic raids such as was probably the case of the Middle Kingdom statues found in the largest graves. Two monumental funerary chapels (KI, KXI) were erected north-west of the tumuli KIII and KX. They measure about 40 to 50 m in length and are composed of two narrow rooms. Their internal walls were painted with scenes of animals and fleets of ships (BONNET 2000). The Eastern Cemetery was abandoned with the conquest of Kush by the Egyptians during the 18<sup>th</sup> Dynasty.

Systematic excavations have been carried out in recent years in the most ancient sectors of the cemetery. During the *Kerma ancien I*, between 2500 and 2300 BC, the small burials do not contain numerous grave deposits and they give the image of relative equality of treatment in the face of death. Animal sacrifices are not attested and graves with accompanying individuals are exceptional. These first inhumations were less rich in objects of value than the later ones and thus less attractive to the pillagers. About two-thirds of them were still intact or have only been slightly disturbed (HONEGGER/FALLET 2015). The *Kerma ancien II* phase (2300–2100 BC) shows spectacular changes in the funerary rites. The tombs are generally larger, contain more objects and were systematically plundered. Animal sacrifices make their appearance (dogs, caprines), as do bucrania in front of the tumuli. Tombs with multiple burials are also more frequent. All these indices point to the emergence of a first stratification within society, before the appearance of the first large tumuli 20 m in diameters at the end of the *Kerma ancien* and the beginning of the *Kerma moyen* (HAFSAAS-TSAKOS 2013). In sector 23 (*Kerma ancien II*) a total of 27 tombs with bow(s) and/or quivers have been identified, whilst 9 others contained a stick (Fig. 6). The presence of the bow and its attributes (quiver, arrows) clearly evokes the importance of the bowmen in Nubia, particularly in the Kingdom of Kerma. The anthropological study of the skeletal remains shows that these archers are always



**Fig. 6:** Graves of an archer and of a woman with a stick of the *Kerma ancien II* Phase (2300–2100 BC), found in sector 23 of the eastern cemetery of Kerma. The grave of the archer contained two individuals: A young man in central position and a woman placed by his side. A dog, a bow, an ostrich feather fan, and a bronze mirror accompanied the young man. The grave with a wooden stick contained a woman of 20–29 years. Both graves were partially plundered and a part of the skeletons is reconstructed here.

represented by adult males, whilst those with sticks are associated with females. When they were not too heavily plundered, these graves regularly contained an ostrich feather fan that was placed in the hand of the deceased, sea-shell earrings, strings of stone or faience beads, bracelets or rings. More valuable grave goods were represented by bronze mirrors slipped into their leather bag, pendants, necklaces and earrings made of gold. At the feet of the deceased a leather bag has sometimes been found, whilst in the larger tombs one or two sacrificed dogs, or else sheep were present. The references to war, the hunt and pastoralism no doubt bore symbolic value. In Pre-Dynastic Egypt, hunting scenes in iconography usually express the power of the elite (HENDRICKX 2013). Bows, dogs on leads, control of the natural world and their correlation with military triumphs are part of the recurrent themes later found in Pharaonic Egypt. By analogy, it is possible that the references to the hunt or warfare at Kerma carry the same connotations. The *Kerma ancient II* phase is contemporary with the 5<sup>th</sup> Dynasty. It is a period of more intensive interactions with the Egyptians as related in Harkhuf's biography (TÖRÖK 2009, 67–72). The contacts would not have always been peaceful and could have valorised the role of archers. In any case, in the Eastern Cemetery this period shows the emergence of a first elite, which expresses itself in richer tombs in which an important number are endowed with bows and to a lesser extent with sticks. From this time on the Kerma society will evolve rapidly into a more stratified and more complex society.

## Bibliography

- BANGSGAARD, Pernille (2014): Nubian Faunal Practices: Exploring the C-Group “Pastoral Ideal” at Nine Cemeteries. In: ANDERSON, Julie Renee / WELSBY, Derek Anthony (eds.): *The Fourth Cataract and beyond. Proceedings of the 12<sup>th</sup> International Conference for Nubian Studies*. British Museum Publications on Egypt and Sudan 1. Leuven/Paris/Walpole, MA: Peeters, p. 347–355.
- BONNET, Charles (1982): Les fouilles archéologiques de Kerma (Soudan). Rapport préliminaire sur les campagnes de 1980–81 et 1981–88. In: *Genava* n.s. 30, p. 1–42.
- BONNET, Charles (1992): Excavations at the Nubian Royal Town of Kerma 1975–91. In: *Antiquity* 66, p. 611–25.
- BONNET, Charles (2000): *Edifices et rites funéraires à Kerma. Mission archéologique de l'Université de Genève à Kerma (Soudan)*. Paris: Editions Errance.
- BONNET, Charles (2014): *La ville de Kerma. Une capitale nubienne au sud de l'Égypte. Mission archéologique de l'Université de Genève au Soudan*. Lausanne: Favre.
- BOURRIAU, Janine (2004): Egyptian Pottery Found in Kerma Ancien, Kerma Moyen, and Kerma Classique Graves at Kerma. In: KENDALL, Timothy (ed.): *Nubian Studies 1998. Proceedings of the Ninth Conference of the International Society of Nubian Studies, August 21–26, 1998*, Boston, Mass. Boston: Department of African-American Studies. Northeastern University, p. 3–13.
- BRONK RAMSEY, Christopher (2009): Bayesian Analysis of Radiocarbon Dates. In: *Radiocarbon* 51/1, p. 337–360.
- CHAIX, Louis (1994): Nouvelles données de l'archéozoologie au nord du Soudan. In: BERGER, Catherine / CLERC, Gisèle / GRIMAL, Nicolas (eds.): *Hommages à Jean Leclant. Vol. 2: Nubie, Soudan, Éthiopie. Bibliothèque d'Étude 106/2*. Cairo: Institut français d'archéologie orientale, p. 105–110.
- CHAIX, Louis (2011): A Review of the History of Cattle in the Sudan throughout the Holocene. In: JOUSSE, Hélène / LESUR, Joséphine (eds.): *People and Animals in Holocene Africa. Recent Advances in Archaeozoology. Reports in African Archaeology 2*. Frankfurt am Main: Africa Magna, p. 13–26.
- CHAIX, Louis / DUBOSSON, Jérôme / HONEGGER, Matthieu (2012): Bucrania from the Eastern Cemetery at Kerma (Sudan) and the Practice of Cattle Horn Deformation. In: KABACIŃSKI, Jacek / CHŁODNICKI, Marek / KOBUSIEWICZ, Michał (eds.): *Prehistory of Northeastern Africa. New Ideas and Discoveries. Studies in African Archaeology 11*. Poznań: Archaeological Museum, p. 189–212.
- CHAIX, Louis / HONEGGER, Matthieu (2014): New Data on Animal Exploitation from the Mesolithic to the Neolithic Periods in Northern Sudan. In: KERNER, Susanne / DANN, Rachael Jane / BANGSGAARD, Pernille (eds.): *Climate and Ancient Societies*. Copenhagen: Museum Tusulanum Press, p. 197–214.
- CLOSE, Angela E. (2002): Sinai, Sahara, Sahel: The Introduction of Domestic Caprines to Africa. In: JENNERSTRASSE 8 (eds.): *Tides of the Desert – Gezeiten der Wüste. Contributions to the Archaeology and Environmental History of Africa in Honour of Rudolph Kuper. Africa Praehistorica 14*. Cologne: Heinrich-Barth-Institut, p. 459–469.
- CRÈVECOUR, Isabelle (2012): First Anthropological Insights on the Early Holocene Funerary Assemblages from El-Barga, Kerma. In: *Kerma. Documents de la mission archéologique Suisse au Soudan 4*, p. 19–28.
- DELATTRE, Hélène (2014): The Pre-Kerma Site of Sedeinga. In: HONEGGER, Matthieu (ed.): *Abstracts of Papers presented at the 13<sup>th</sup> International Conference for Nubian Studies*. Neuchâtel: Université de Neuchâtel, p. 41–42.

- DUNHAM, Dows / D'AURIA, Sue / REISNER, George Andrew (1982): Excavations at Kerma. Part VI: Subsidiary Nubian Graves excavated by the Late George A. Reisner in 1915–1916, not included in his Excavations at Kerma I–III, IV–V. Boston: Museum of Fine Arts.
- EADES, Suzanne (2003): Étude du déterminisme familial des traits non-métriques dentaires afin d'identifier des groupes d'individus apparentés en contexte funéraire archéologique. Application aux ensembles archéologiques de Kerma (Soudan), d'EN Sency à Vufflens-la-Ville (Vaud, Suisse) et de Chamblandes à Pully (Vaud, Suisse). Genève: Département d'anthropologie et d'écologie (Thèse de doctorat; non publié).
- EDWARDS, David N. / OSMAN, Ali (2011): The Archaeology of a Nubian Frontier. Survey on the Nile Third Cataract, Sudan. Leicester: Mauhaus Publishing.
- EMBERLING, Geoff (2014): Pastoral States: Toward a Comparative Study of Early Kush. In: *Origini. Journal of Prehistory and Protohistory of Ancient Civilizations* 36, p. 125–156.
- GARCEA, Elena A. A. / HILDEBRAND, Elisabeth A. (2009): Shifting Social Networks along the Nile: Middle Holocene Assemblages from Sai Island, Sudan. In: *Journal of Anthropological Archaeology* 28, p. 304–322.
- GATTO, Maria Carmela (2011a): The Relative Chronology of Nubia. In: *Archéo-Nil* 21, p. 81–100.
- GATTO, Maria Carmela (2011b): The Nubian Pastoral Culture as Link between Egypt and Africa: A View from the Archaeological Record. In: ExELL, Karen (ed.): *Egypt in its African Context. Proceedings of the Conference held at the Manchester Museum, University of Manchester, 2–4 October 2009. British Archaeological Reports International Series 2204.* Oxford: British Archaeological Reports, p. 21–29.
- GRATIEN, Brigitte (1978): Les cultures Kerma. Essai de classification. Université de Lille III: Presses Universitaires du Septentrion.
- GRATIEN, Brigitte (1995): La Basse Nubie à l'Ancien Empire: égyptiens et autochtones. In: *Journal of Egyptian Archaeology* 81, p. 43–56.
- GEUS, Francis (1978): La prospection archéologique au sud de Dal: Abudiya (II) (24 janvier–15 mars 1978). In: *Service des Antiquités du Soudan. Section française de recherche archéologique: Rapport Annuel d'Activité 1977–1978.* Khartoum: el-Gurashi Advertising and Printing Corporation, p. 5–21.
- GEUS, Francis (2004): Pre-Kerma Storage Pits on Sai Island. In: KENDALL, Timothy (ed.): *Nubian Studies 1998. Proceedings of the Ninth Conference of the International Society of Nubian Studies, August 21–26, 1998, Boston, Mass.* Boston: Department of African-American Studies. Northeastern University, p. 46–51.
- HAFSAAS, Henriette (2005): Cattle Pastoralists in a Multicultural Setting: The C-Group People in Lower Nubia 2500–1500 BCE. The Lower Jordan River Basin Programme Publications 10. Ramallah/Bergen: Birzeit University.
- HAFSAAS-TSAKOS, Henriette (2013): Edges of Bronze and Expressions of Masculinity: The Emergence of a Warrior Class at Kerma in Sudan. In: *Antiquity* 87, p. 79–91.
- HENDRICKX, Stan (2013): Uniting and Social Complexity in Predynastic Egypt. In: *Bulletin des séances de l'Académie royale des Sciences d'Outre-Mer* 57, p. 237–263.
- HERBST, Georg / SMITH, Stuart Tyson (2014): Pre-Kerma Transition at the Nile Fourth Cataract: First Assessments of a Multi-Component. Stratified Prehistoric Settlement in the UCSB/ASU Salvage Concession. In: ANDERSON, Julie Renee / WELSBY, Derek Anthony (eds.): *The Fourth Cataract and beyond. Proceedings of the 12<sup>th</sup> International Conference for Nubian Studies. British Museum Publications on Egypt and Sudan 1.* Leuven/Paris/Walpole, MA: Peeters, p. 311–320.
- HONEGGER, Matthieu (2004a): The Pre-Kerma: A Cultural Group from Upper Nubia prior to the Kerma Civilisation. In: *Sudan & Nubia. The Sudan Archaeological Research Society Bulletin* 8, p. 38–46.
- HONEGGER, Matthieu (2004b): Settlement and Cemeteries of the Mesolithic and Early Neolithic at El-Barga (Kerma Region). In: *Sudan & Nubia. The Sudan Archaeological Research Society Bulletin* 8, p. 27–32.
- HONEGGER, Matthieu (2005): Kerma et les débuts du Néolithique africain. In: *Genava n.s.* 53, p. 239–249.
- HONEGGER, Matthieu (2006): El-Barga: un site clé pour la compréhension du Mésolithique et du début du Néolithique en Nubie. In: *Revue de Paléobiologie* 10, p. 95–104.
- HONEGGER, Matthieu (2007): Le Pré-Kerma de Haute Nubie. In: *Archéo-Nil* 16, p. 77–84.
- HONEGGER, Matthieu (2010): La Nubie et le Soudan: un bilan des 20 dernières années de recherche sur la Pré- et Protohistoire. In: *Archéo-Nil* 20, p. 76–86.
- HONEGGER, Matthieu (2012): Excavations at Wadi El-Arab and in the Eastern Cemetery of Kerma. In: *Kerma. Documents de la mission archéologique Suisse au Soudan* 4, p. 3–9.
- HONEGGER, Matthieu (2013a): Wadi El-Arab: Seeking out Occupations from the 6<sup>th</sup> Millennium BC. In: *Kerma. Documents de la mission archéologique Suisse au Soudan* 5, p. 11–16.
- HONEGGER, Matthieu (2013b): The Oldest Sectors of the Eastern Cemetery: Neolithic Occupations and the Early Stages of the Kerma Civilisation. In: *Kerma. Documents de la mission archéologique Suisse au Soudan* 5, p. 17–31.
- HONEGGER, Matthieu (2014): Recent Advances in our Understanding of Prehistory in Northern Sudan. In: ANDERSON, Julie Renee / WELSBY, Derek Anthony (eds.): *The Fourth Cataract and beyond. Proceedings of the 12<sup>th</sup> International Conference for Nubian Studies. British Museum Publications on Egypt and Sudan 1.* Leuven/Paris/Walpole, MA: Peeters, p. 19–30.
- HONEGGER, Matthieu / FALLET, Camille (2015): Archers' Tombs of the Kerma ancien. In: *Kerma. Documents de la mission archéologique Suisse au Soudan* 6, p. 16–30.
- HONEGGER, Matthieu / WILLIAMS, Martin (2015): Human Occupations and Environmental Changes in the Nile Valley during the Holocene: The Case of Kerma in Upper Nubia (Northern Sudan). In: *Quaternary Science Reviews* 130, p. 141–154.
- JESSE, Friederike (2010): Early Pottery in Northern Africa: An Overview. In: *Journal of African Archaeology* 8/2, p. 219–238.
- JUDD, Margaret A. / IRISH, Joel D. (2009): Dying to Serve: The Mass Burials at Kerma. In: *Antiquity* 83, p. 709–722.
- KENDALL, Timothy (1997): Kerma and the Kingdom of Kush 2500–1500 BC. The Archaeological Discovery of an Ancient Nubian Empire. Washington DC: National Museum of African Art, Smithsonian Institution.
- KUPER, Rudolph / KRÖPELIN, Stefan (2006): Climate-controlled Holocene Occupation in the Sahara: Motor of Africa's Evolution. In: *Science* 313, p. 803–807.
- KUPER, Rudolph / RIEMER, Heiko (2013): Herders before Pastoralism: Prehistoric Prelude in the Eastern Sahara. In: BOLLIG, Michael / SCHNEGG, Michael / WOTZKA, Hans-Peter (eds.): *Pastoralism in Africa. Past, Present and Future.* New York/Oxford: Berghahn Books, p. 31–65.
- LINSEELE, Veerle (2004): Size and Size Change of the African Aurochs, In: *Journal of African Archaeology* 2/2, p. 165–185.
- LINSEELE, Veerle / VAN NEER, Wim / THYS, Sophie / PHILLIPPS, Rebecca / CAPPERS, René / WENDRICH, Willeke / HOLDAWAY, Simon (2014): New Archaeozoological Data from the Fayum "Neolithic" with a Critical Assessment of the Evidence for early Stock keeping in Egypt. *PLoS ONE* 9(10): e108517 (<http://dx.doi.org/10.1371/journal.pone.0108517>).
- MACKLIN, Mark G. / TOONEN, Willem H. J. / WOODWARD, Jamie C. / WILLIAMS, Martin A. J. / FLAUX, Clément F. / MARRINER, Nick / NICOLL, Kathleen A. / VERSTRAETEN, Gert / SPENCER, Neal / WELSBY, Derek Anthony (2015): A New Model of River Dynamics, Hydroclimatic Change and Human Settlement in the Nile Valley derived from Meta-analysis of the Holocene Fluvial Archive. In: *Quaternary Science Reviews* 130, p. 109–123.
- MIDANT-REYNES, Béatrix (2003): Aux origines de l'Égypte. Du Néolithique à l'émergence de l'Etat. Paris: Fayard.

- MILLS, Anthony J. (1967–1968): The Archaeological Survey from Gemai to Dal: Report on the 1965–1966 Season. In: *Kush* 15, p. 200–210.
- NORDSTRÖM, Hans-Åke (1962): Excavations and Survey in Faras, Argin and Gezira Dabarosa. In: *Kush* 10, p. 34–58.
- OSYPIŃSKI, Piotr (2014): Prehistory of the Fourth Cataract. In: ANDERSON, Julie Renee / WELSBY, Derek Anthony (eds.): *The Fourth Cataract and beyond. Proceedings of the 12<sup>th</sup> International Conference for Nubian Studies. British Museum Publications on Egypt and Sudan 1.* Leuven/Paris/Walpole, MA: Peeters, p. 9–17.
- OUT, Welmoed A. / RYAN, Philippa / GARCÍA-GRANERO, Juan José / BARASTEGUI, Judith / MARITAN, Lara / MADELLA, Marco / USAI, Donatella (2016): Plant Exploitation in Neolithic Sudan: A Review in the Light of New Data from the Cemeteries R12 and Ghaba. In: *Quaternary International* 412, p. 36–53 (<http://dx.doi.org/10.1016/j.quaint.2015.12.066>).
- PERESSINOTTO, David / SCHMITT, Aurore / LECOINTE, Yves / POURIEL, Raphaël / GEUS, Francis (2004): Neolithic Nomads at El Multaga, Upper Nubia, Sudan. In: *Antiquity* 78/299, p. 106–112.
- PRIVATI, Béatrice (1986): Remarques sur les ateliers de potiers de Kerma et sur la céramique du Groupe C. In: *Genava n.s.* 34, p. 23–28.
- PRIVATI, Béatrice (1999): La céramique de la nécropole orientale de Kerma (Soudan): Essai de classification. In: *Cahier de Recherche de l'Institut de Papyrologie et d'Égyptologie de Lille* 20, p. 41–69.
- RAUE, Dietrich (2014–2015): Nubier auf Elephantine und an der Stufenpyramide von Sinki. In: *Mitteilungen des Deutschen Archäologischen Instituts Abteilung Kairo* 70–71, p. 1–12.
- REINOLD, Jacques (1993): S.F.D. A. S. Rapport préliminaire de la campagne 1991–1992 dans la province du Nord. In: *Kush* 16, p. 150–157, 162–164.
- REINOLD, Jacques (2001): Kadruka and the Neolithic in the Northern Dongola Reach. In: *Sudan & Nubia. The Sudan Archaeological Research Society Bulletin* 5, p. 2–10.
- REINOLD, Jacques (2006): Les cimetières préhistoriques au Soudan – coutumes funéraires et systèmes sociaux. In: CANEVA, Isabella / ROCCATI, Alessandro (eds.): *Acta Nubica. Proceedings of the X International Conference of Nubian Studies, Rome 9–14 September 2002.* Rome: Libreria dello Stato, p. 139–162.
- REINOLD, Jacques (2008): La nécropole néolithique d'El-Kadada au Soudan Central. Vol. 1: Les cimetières A et B (NE-36–0/3-V-2 et NE-36–0/3-V-3) du kôm principal. Paris: Editions Recherche sur les Civilisations.
- REISNER, George Andrew (1923): Excavations at Kerma I–III and IV–V. *Harvard African Studies* 5–6. Cambridge, Mass.: Peabody Museum of Harvard University.
- RIEMER, Heiko (2007): Mapping the Movement of Pastro-foragers: The Spread of Desert Glass and other Objects in the Eastern Sahara during the Holocene Humid Phase. In: BUBENZER, Olaf / BOLTEN, Andreas / DARIUS, Frank (eds.): *Atlas of Cultural and Environmental Change in Arid Africa. Africa Praehistorica* 21. Cologne: Heinrich-Barth-Institut, p. 30–33.
- SADIG, Azhari Mustafa (2013): Reconsidering the Meolithic and Neolithic in Sudan. In: SHIRAI, Noriyuki (ed.): *Neolithisation of Northeastern Africa. Studies in Early Near Eastern Production, Subsistence, and Environment* 16. Berlin: ex oriente, p. 23–42.
- SALVATORI, Sandro / USAI, Donatella (eds.) (2008): A Neolithic Cemetery in the Northern Dongola Reach: Excavations at Site R12. *Sudan Archaeological Research Society Publication* 16. *British Archaeological Reports. International Series* 1814. Oxford: Archaeopress.
- SCHIFF-GIORGINI, Michaela (1971): *Soleb. Tome II: Les nécropoles.* Firenze: Sansoni.
- SERENO, Paul C. / GARCEA, Elena A. A. / JOUSSE, Hélène / STOJANOWSKI, Christopher M. / SALIÈGE, Jean-François / MAGA, Abdoulaye / IDE, Oumarou A. / KNUDSON, Kelly J. / MERCURI, Anna Maria / STAFFORD JR., Thomas W. / KAYE, Thomas G. / GIRAUDI, Carlo / MASSAMBA N'SIALA, Isabella / COCCA, Enzo / MOOTS, Hannah M. / DUTHEIL, Didier B. / STIVERS, Jeffrey P. (2008): Lakeside Cemeteries in the Sahara: 5000 Years of Holocene Population and Environmental Change. In: *PLoS ONE* 3(8): e2995 (<http://dx.doi.org/10.1371/journal.pone.0002995>).
- USAI, Donatella (2016): A Picture of Prehistoric Sudan: The Mesolithic and Neolithic Periods. *Oxford Handbooks Online.*
- WELSBY, Derek Anthony (2001): *Life on the Desert Edge. Seven Thousand Years of Settlement in the Northern Dongola Reach, Sudan.* 2 Vols. The Sudan Archaeological Research Society Publication 7. *British Archaeological Reports. International Series* 980. Oxford: BAR Publishing.
- WENDORF, Denver Fred (ed.) (1968): *The Prehistory of Nubia.* 2 Vols. The Fort Burgwin Research Center Publication 5. Southern Methodist University Contributions in Anthropology 2. Dallas: Fort Burgwin Research Center and Southern Methodist University Press.
- WENDORF, Denver Fred / SCHILD, Romuald (eds.) (2001): *Holocene Settlement of the Egyptian Sahara. Vol. 1: The Archaeology of Nabta Playa.* New York: Springer.
- ZERBONI, Andrea (2013): Early Holocene Palaeoclimates in Northern Africa: An Overview. In: SHIRAI, Noriyuki (ed.): *Neolithisation of Northeastern Africa. Studies in Early Near Eastern Production, Subsistence, and Environment* 16. Berlin: ex oriente, p. 65–82.