

K E R M A

2009-2010

SOUDAN

Matthieu Honegger • Charles Bonnet • Philippe Ruffieux • Camille Fallet • Philippe Marti



Institut d'archéologie

Espace Paul Vouga
CH-2068 Hauterive
Switzerland

Scientific Committee : Matthieu Honegger, Charles Bonnet, Louis Chaix,
Nora Ferrero.

Translation : Caroline M. Rocheleau, and Pierre Meyrat for the text of Philippe
Ruffieux.

Layout : Philippe Marti

HONEGGER, M., BONNET, C. & collab. 2010. « Archaeological excavations at Kerma
(Sudan) », *Documents de la mission archéologique suisse au Soudan (2)*, Université de
Neuchâtel.

Cover figure : figurine of a giraffe found in the Kerma cemetery during the 2009-
2010 season. Dimensions : 6x4x2 cm. Photography : Philippe Marti.

The investigations of the Swiss Archaeological Mission started on December 4, 2009 and ended on February 2, 2010. As usual, the mission was organized in two teams. The first conducted by Matthieu Honegger studied one of the oldest sedentary settlements of the area (Mesolithic/Early Neolithic) and followed its program on the beginning of the Kerma civilisation in the eastern cemetery. During the same time, the second team directed by Charles Bonnet excavated the site of Dukki Gel in order to understand the end of the Kerma kingdom and the development of Egyptian colonisation of the area. Mr. Abdelhai Abdelsawi, inspector and director of the Museum of Kerma, monitored the fieldwork.

The team directed by Matthieu Honegger worked in the site of Wadi el-Arab, in the eastern cemetery of Kerma and in the Museum of Kerma. A new excavation house was also built on the NCAM concession in the eastern cemetery. The team was composed of the *rais* Khidir Magbul who lead 20 local workers. Three specialists from Switzerland worked in their respective domain: Marc Bundi (supervision of the construction of the new house), Magali Babey (HeArc Le Locle, design of the Museum showcases) and Daniel Conforti (archaeology and drawing). Six students from the University of Neuchâtel (Lucie Bovet, Camille Fallet, Giovanni Foletti, Bastien Jakob, Philippe Marti, Cécile Wiedmer) and a student from the University of Khartoum (Shahinda Omer) participated in the mission. Three of the Swiss students are writing Masters' theses on a subject linked with Kerma archaeology. Camille Fallet is working on the biological anthropology of the ancient Kerma graves of the eastern cemetery, Bastien Jakob on the technology and typology of the lithic artefacts of Wadi el-Arab and Cecile Widmer on the creation and operating of the Museum of Kerma.

The team led by Charles Bonnet pursued its works at Dukki Gel and conducted restoration projects in the ancient city of Kerma and at Dukki Gel. It was composed of the *rais* Gad Abdallah, Saleh Melieh, Abdelrazek Omer Nuri and Idriss Osman Idriss, who lead 60 local workers. Five specialists from Switzerland worked in their respective domain: Philippe Ruffieux (ceramic studies), Inès Matter-Horisberger (archaeology and drawing), Alain Peillex (archaeology and drawing), Patricia Jehger (drawing) and Jean-Michel Yoyotte (photography). Prof. Dominique Valbelle (University of Paris IV, La Sorbonne) worked on the epigraphic material of Dukki Gel, in view of their forthcoming publication.

The Swiss Mission was supported by Mr. Hassan Hussein, director of the National Corporation of Antiquities and Museums of Sudan (NCAM) and his collaborators, Drs. Salah Eddin Mohamed Ahmed and Abdelrahman Ali. This project is funded by the Swiss National Foundation (project no 101212-122592/1), the University of Neuchâtel and the *Fondation Kerma*, created last year.

The investigations focused on excavations of :

- a new sector in Wadi el-Arab
- ancient Kerma graves in the northern part of the eastern cemetery
- fortifications and temples in Dukki Gel.

The team also worked on the restoration and preservation of the main archaeological sites:

- restoration of the Nubian fortifications of Dukki Gel with mud bricks bastions
- construction of a wall at the top of the western deffufa for visitor security and protection of the monument (figure 1); reconstruction of a chapel with a type of temenos built with bastions
- reinforcement of the embankment protecting the eastern cemetery and topography of the NCAM lot to stop the perpetual problem of the expansion of the adjoining cultivated fields
- construction of a new excavation house close to the eastern cemetery and a house for the new *gaffir* of the eastern cemetery (Khidir Magbul).

Finally, the installation of the Museum of Kerma was continued in 2010:

- Permanent installation of two exhibition cases in the Prehistoric section in January: labels English/Arabic, display of the objects, drawings and images. This is a test for the upcoming installation of twenty other cases that is scheduled for winter 2011-2012
- In March and April 2010, a team blocked all the windows and some unused entrances of the Museum to protect the exhibition area from the dust, so abundant in Sudan.

Figure 1 | The western deffufa with the new wall built at its top.



MESOLITHIC AND EARLY NEOLITHIC HABITATION REMAINS OF WADI EL-ARAB

This site, located near the desert, is one of the most important in Africa for the study of the first sedentary settlements and the progressive adoption of domesticated cattle (Honegger and Bonnet 2009). The area opened last year (sector 611W) was extended this season to a surface of 128 square meters in order to better understand the spatial organisation of the successive settlements identified. Two clearings of 5 to 7 cm were made in levels dated by C14 analysis to 7200-6300 BC.

In the first half of the area opened last year, the presence of a hut was confirmed with foundations dug in the sandy soil at a depth of 30 centimetres. Its shape is more or less circular and its diameter slightly over three meters. It is similar to the habitation structures found a few years ago at el-Barga and dated to 7500-7200 BC. Close to this hut three pits containing more faunal remains and artefacts (mainly lithics and sherds of pottery) were clearly defined. The discoveries in the new area are exceptional for this period. A grave near the surface was excavated (figure 2) and five habitation structures were identified, accompanied by four pits (figure 3). Three of the habitation structures were dug in the soil and correspond to the first phase of occupation. The two other are older and correspond to another type of architecture. These huts were outlined by groups of stones used to secure the posts that supported the walls and roof, as revealed by the foundation of one of them.

Figure 2 | Grave discovered in the centre of a hut and may be linked with its foundation.



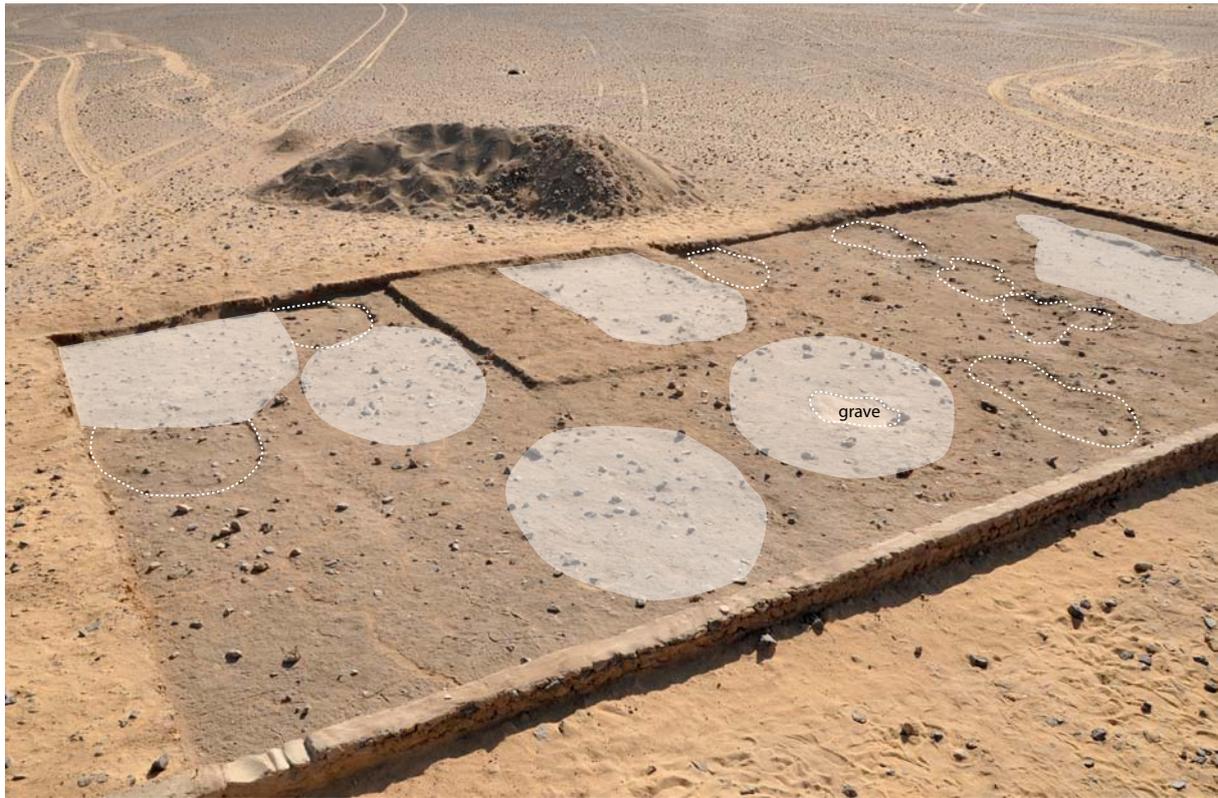


Figure 3 |View of the 128 m² area opened in Wadi el-Arab, which revealed the presence of six huts (white circles) and many pits (dotted lines).

The latter was centred on a human body previously placed in a pit possibly linked with the foundation of the habitation.

As usual for this site, the artefacts are abundant and correspond mainly to destruction levels. For this reason they were taken by surface units of 4 square meters which permit to gain saved time in the excavation process. The sediment was sieved with screens of 2 to 5 mm. Among the faunal remains, two new bones of domesticated cattle were discovered (Honegger and Chaix, forthcoming).

Wadi el-Arab is the only site in Africa that reveals the remains of a Mesolithic village with many successive phases characterized by the presence of clearly identified habitation structures. In the Nile Valley, the well known site E-75-6 at Nabta Playa, dated around 7000 BC, is characterized by similar huts with foundations dug in the sand (Wendorf and Schild 2001). The alignment of the huts suggests a general organisation of the settlement along a main street (figure 4) and it seems that Wadi el-Arab follows a similar plan, if we consider the alignment of the three huts belonging to the more recent phase. Since the excavation of the habitation structure at el-Barga and a first preliminary report on Prehistoric habitations in Sudan (Honegger 2006), new excavations have revealed habitation remains dated to the Mesolithic. In Central Sudan near Omdurman some habitations were partly built with earth (*galus*) in a stratified settlement of the same period as Wadi el-Arab (Salvatori and Usai 2009).

Close to Kerma on Saï Island, postholes and some oval structures dug in the sand seem to correspond to Mesolithic occupation, but the C14 dates are more recent (Neolithic period) and the attribution of the remains is still problematic (Garcea 2006).

Wadi el-Arab gives the possibility to explore the organisation and the functioning of successive sedentary settlements of the beginning of the Holocene. Due to the depth of the stratigraphy, it is probable that this succession has a duration of two millennia.

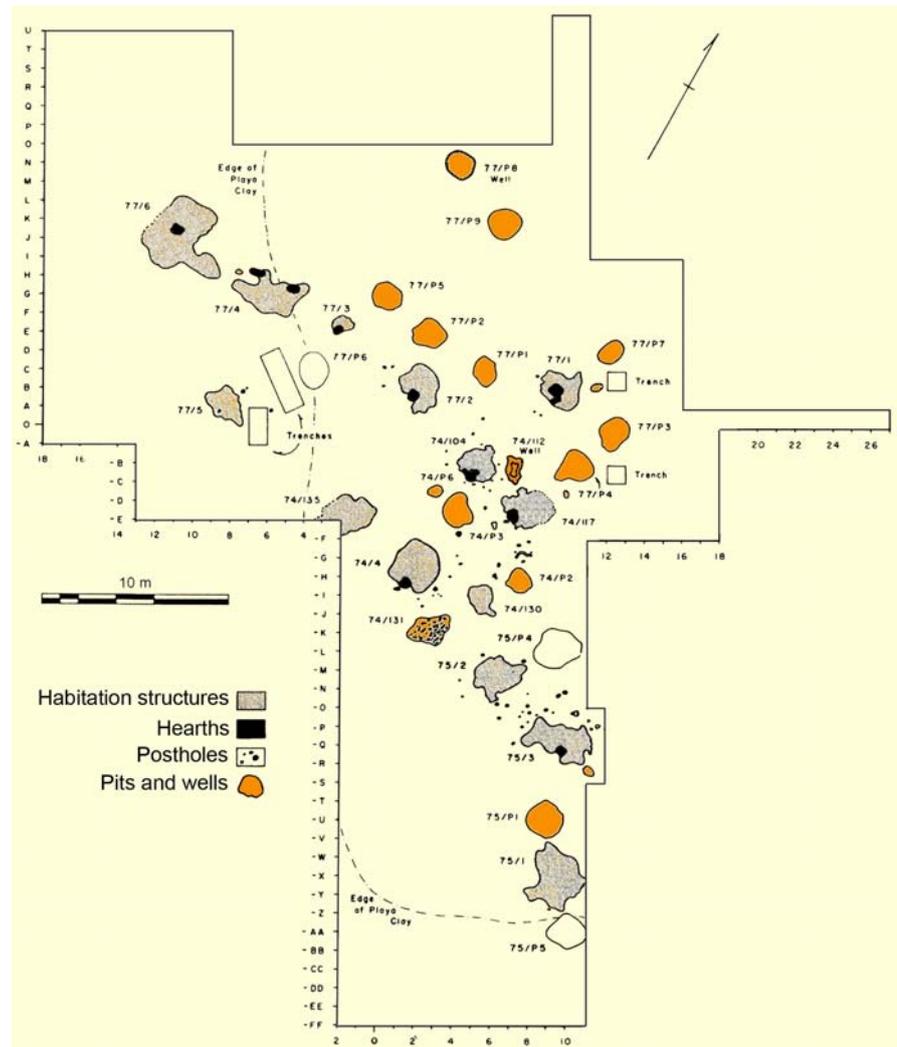


Figure 4 | The settlement E75-6 at Nabta Playa with its huts aligned along a kind of street (after Schild et alii 1996, figure I: 104, modified).

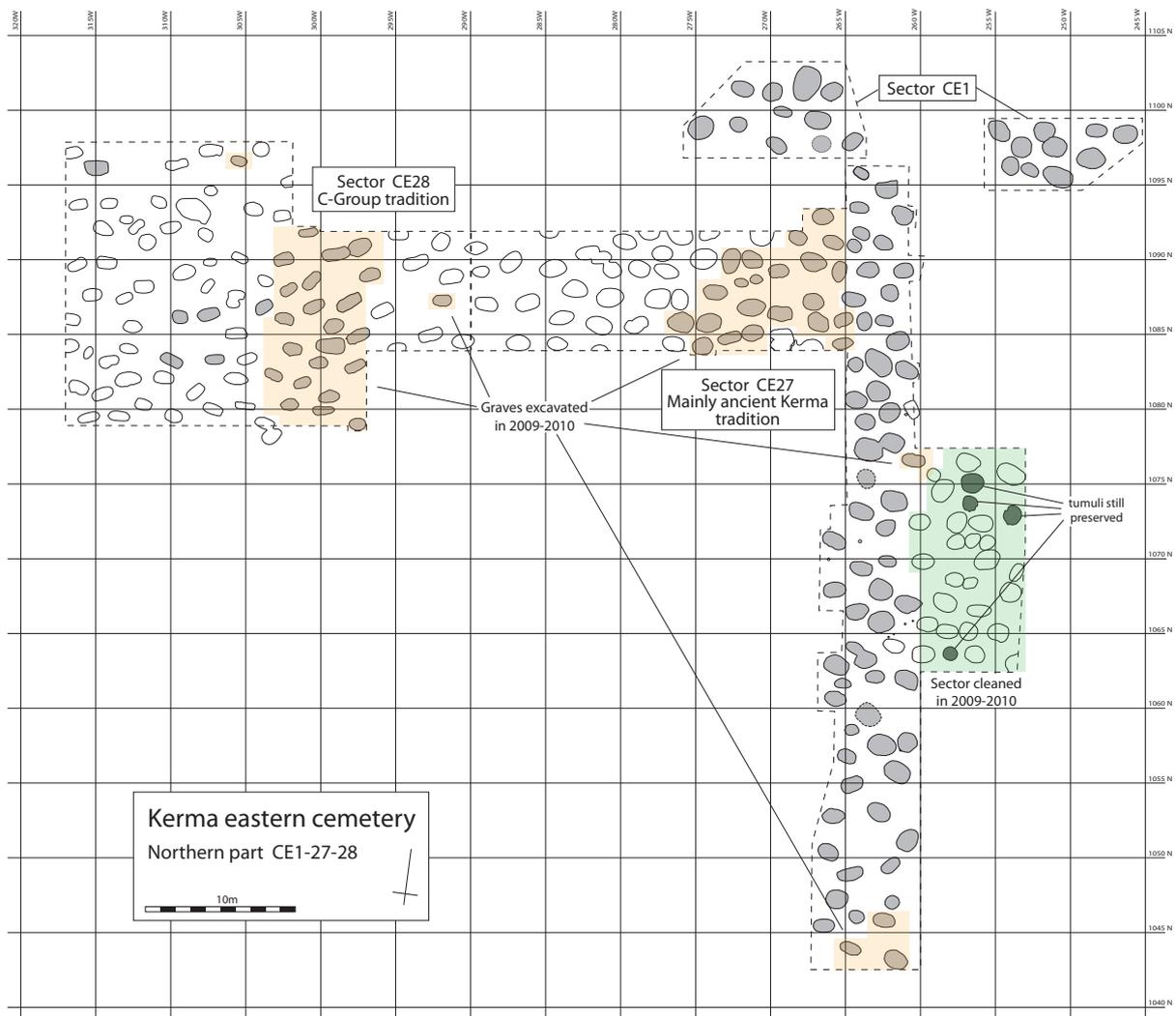


Figure 5 | Plan of the excavation in the northern part of the eastern cemetery with the different sectors and their cultural tradition.

In the middle of the eastern cemetery, we halted the excavation of the Pre-Kerma agglomeration in its western direction because the surface cleaning became problematic due to the density of artefacts and structures connected with the Middle Kerma graves. It was too difficult to reach the Pre-Kerma surface without damaging the more recent remains. Moreover, the structures identified last year (Honegger and Bonnet 2009) were not all dated to the Pre-Kerma Period; the radiocarbon dating of the fill of two pits gave results around 2000 BC, one millennium later than the Pre-Kerma agglomeration. Before publishing the final results of this long excavation (begun December 1994), it will be necessary to explore one more time the stratigraphic cross-sections of the main fortifications identified in the north to understand the building process (Honegger 2007).

In the most ancient sector of the Kerma cemetery, we continued to explore sectors CE27 and CE28 in order to clarify the spatial distribution of the graves and to understand the beginnings of the Kerma civilisation, which is characterised by the coexistence of the ancient C-Group of Lower Nubia and ancient Kerma traditions (figure 5). In sector CE27 where 60 graves were excavated last year and in 1998-1999, 27 new graves were cleared. Many of them were plundered, most likely in recent times following Reisner's excavations. The majority of the graves were despoiled in modern times; however, unlike the pillage that occurred in antiquity, it was not limited to the part of the burial where grave goods were concentrated (specifically the head). In fact, it affected the whole body, disturbing and destroying a large part of the grave. This phenomenon is noted predominantly in the western part (CE28) where the erosion is the most active. There, the graves are closer to the surface and more accessible. In the eastern part (CE27) where a thick layer of sand has protected the graves and the tumuli, modern plundering is absent and only a few graves were pillaged in antiquity. This probably occurred a short time after the funerary ceremony by those who knew exactly where to find burial goods.

The state of preservation of the eastern part of the excavation is particularly good, especially in the area opened this winter (figure 5) and led to the discovery of four well preserved tumuli (figure 6 and 7). Three of them are composed of mud, black stone and white gravel, whereas the fourth, of C-Group tradition, is made of mud, white gravel at the top and stelae arranged around the tumulus. Of small dimensions, the latter must belong to a child. Thirty years ago, Charles Bonnet discovered not far away – in sector 1, more to the north – the same type of tumuli, including a small one of C-Group tradition (Bonnet 1982). On the surface, complete pots were still preserved upside down on the northern edge of the tumuli, but in most cases, the pillagers broke the vases and only sherds were found. In the new area where the tumuli are still preserved, a clay figurine of a giraffe was discovered in the sand during the excavation (see cover image).



Figure 6 | View of three ancient Kerma tumuli built with mud and stones with deposits of pottery on the northern edge.



Figure 7 | View of a small tumulus of C-Group tradition with stela arranged around the perimeter.

Usually the most common animal figurine found in Kerma represents a bovine (Ferrero 1984), but in this case the lump on the top of the head between the ears is characteristic for the determination of the animal even if the neck is not so long for a giraffe. The punctuated decoration on the sides may represent the typical markings of this animal. Like other figurines found in the cemetery, the break at its base indicates that it belonged to an offering palette. The giraffe is known later in Kerma civilisation, particularly on the wall of the chapel of KXI dated to the Classic Kerma and as inlaid decorations on a funerary wooden bed of the same period (Bonnet & al. 2000). This animal seems to have a mythological significance and it is possible that it begins during the ancient Kerma period with this example.

The interrelation between C-Group and Kerma traditions is still difficult to understand. In sectors 27 and 1, the finds are mainly of ancient Kerma tradition, but fine C-Group black pottery is also present (Privati 1982). In some cases, the typical C-Group tumuli with stelae are present as well. In contrast, sector 28 is completely dominated by C-Group pottery (figure 8) and even if the tumuli have disappeared in this eroded area, the shape of the burial pits is more rectangular than rounded graves of the sector 27. It is now difficult to understand whether the C-Group tradition corresponds to a distinct ethnic population or if it is merely associated with a particular social strata within a larger population. One of the aims of the anthropological approach is to answer this question (cf. *infra* C. Fallet). In all cases the dichotomy between the two areas represents an opportunity to clarify the composition of the Kerma civilisation.

Figure 8 | Sample of ancient C-Group sherds found in the sector CE28 of the eastern cemetery.



Only a few of the tombs excavated were still intact, but they did not contain many grave goods. However, one of these were particularly interesting because of the many luxuries it contained: stone and copper beads, stone bracelets and bone rings (figure 9). In one case, an ancient Kerma grave was plundered near the head of the deceased and then reused for another burial. The new grave, some 50 cm above the first burial, included reused stelae taken from C-Group tumuli and installed against the walls of the pit, before it was covered by earth (figure 10). This atypical grave probably dates to the Kerma period as the body is placed in the position common for this time and the installation of such stones inside the pit is better known further south, in the Fourth Cataract area. Lastly, we want to mention an unusual discovery in a cemetery: a small shallow pit that contained a single bone, a femur carefully wrapped with pieces of leather that form three successive layers (figure 11). The bone belongs to an immature individual and is entirely covered with cut marks (butchery marks?) accompanied by some larger impacts. Without a more detailed analysis of these marks it is difficult to interpret this unique find. Nevertheless it is possible that it is linked with the presence of other traumas observed on some skeletal remains, traumas that resulted in non natural death (cf. *infra* C. Fallet).

Figure 9 | Copper beads, necklaces, bracelets and bone rings found in an ancient Kerma grave.





Figure 10 | View of a reused ancient Kerma grave with a body surrounded by stelae taken from C-Group tumuli.



Figure 11 | Small grave containing a single bone: a femur carefully wrapped in pieces of leather.

PALEOANTHROPOLOGICAL STUDY OF THE OLDEST SECTORS OF THE EASTERN CEMETERY

During 2010, a study was conducted on all skeletons originating from the oldest sectors of the eastern necropolis (1998-1999 and 2004-2010 excavations). Our results, which concentrate on the determination of the gender, age at death and the traumatic pathologies of the individuals, have the aim of understanding this space in terms of selection of individuals for burial in the cemetery and spatial distribution of graves. These results reflect only the current state of research and will inevitably be enriched with additional data obtained from continued excavations.

The sectors under consideration have the peculiarity of encompassing two different cultural zones. Indeed, the tombs of sector CE28 only contain ceramic material dated to the early C-Group and the pits are almost always subrectangular; whereas sector CE27 revealed ancient Kerma ceramics and circular pits. While these groupings may appear somewhat simplistic due to the fact that some C-Group ceramics can be found in sector CE27, we propose to systematically compare these two sectors, which generally present different traditions.

Corpus

The study corpus comprises 110 individuals from 107 excavated tombs. We shall only consider 107 individuals, thus excluding the foetus in tomb 332, an immature skeleton in tomb 344, only accounted for by his left femur and a woman buried at a more recent period in a reused tomb. The bones present various states of preservation. The majority of the tombs were plundered in antiquity, but the activity focused around the deceased's head and minimally disturbed the rest of the body. However, a small number of tombs located in sector CE28 suffered from more violent plundering, probably early in the 20th century, which greatly disturbed the entire burial and caused important fragmentation of the bones. The crania of individuals discovered during the 1998-1999 excavations are currently stored at the Department of Anthropology at the Université de Genève. As for the material recovered from the 2004-2010 excavations, it is stored in its entirety in the storage rooms of the Kerma dig house.

Methods

We were able to make the necessary observations on 94% of the corpus. These observations were formatted into a catalogue and entered in the Kerma eastern necropolis database (cf. *infra* P. Marti). Sex was determined by the coxal bone using the Bruzek methods (1991 and 2002) as well as by *probabilistic sex diagnosis* of the hip bones (Murail et al. 2005). Using both methods facilitated the sex determination of more individuals and the gathering of more reliable data because, ultimately, they lead to the same results.

We also made observations on the crania using the method of Ferembach et al. (1979) as a secondary sex diagnosis tool. The age-at-death of each adult was estimated using the Schmitt method (2001), by observing the sacropelvic surface of the ilium; that of the immature individuals was determined using the teeth development stages described by Bath-Balogh and Fehrenbach (2006). Determination of the 1998-1999 material was performed by Christian Simon†. For this sample we were only able to use the determination of sex and age; we were unable to conduct new observations. The pathological study only takes into account fractures and thus relates only to the individuals recovered from the recent excavations.

Results

From a total of 90 adults, 71 date to the ancient Kerma period and 19 to the C-Group. The total number of immature skeletons equals 17, 9 of which belong to the ancient Kerma and 8 to the C-Group. Figure 12 summarises these results as well as the determination of sex for the adults. As for age-at-death of the individuals, the immature individuals are divided into 5-year age groups and the adults – for whom an individual age estimation is more problematic – fall into categories: 20-29 years and 30+ years.

Figure 12 | Distribution of adult and immature individuals.

	Adult			Immature	Total
	Men	Women	Undetermined		
Ancient Kerma (CE27)	43	23	5	9	80
C-Group (CE28)	9	5	5	8	27
Total	52	28	10	17	107

On the plan of the excavated tombs (figure 13), we have distinguished the adults with regards to their sex (men, women, undetermined) and the immature individuals into two groups: children under the age of 15 and young adults between the ages of 15 and 19. The latter group is treated as separate because the individuals biologically do not belong with the immature individuals and are not yet considered adults. Although not all the tombs drawn on the plan have been cleared, we can nonetheless make a few observations. Masculine burials are predominant in the ancient Kerma zone (presented in the excavation as a wide band oriented north-south, sector CE27, and extending west). The majority of women can be found in a relatively well delineated zone in the north-east. Almost 90% of the immature burials (ages 1-14) are concentrated in the north, with half of the sample belonging to the C-Group.

Eighteen individuals present mended fractures: on hands, forearms and on five skulls, which present trauma on the parietal and frontal bones. Rib fractures were noted only twice; they may have been more numerous but remained undetected because of the fragmentation of these fragile bones. A single individual presented leg fractures and four men show multiple fractures.

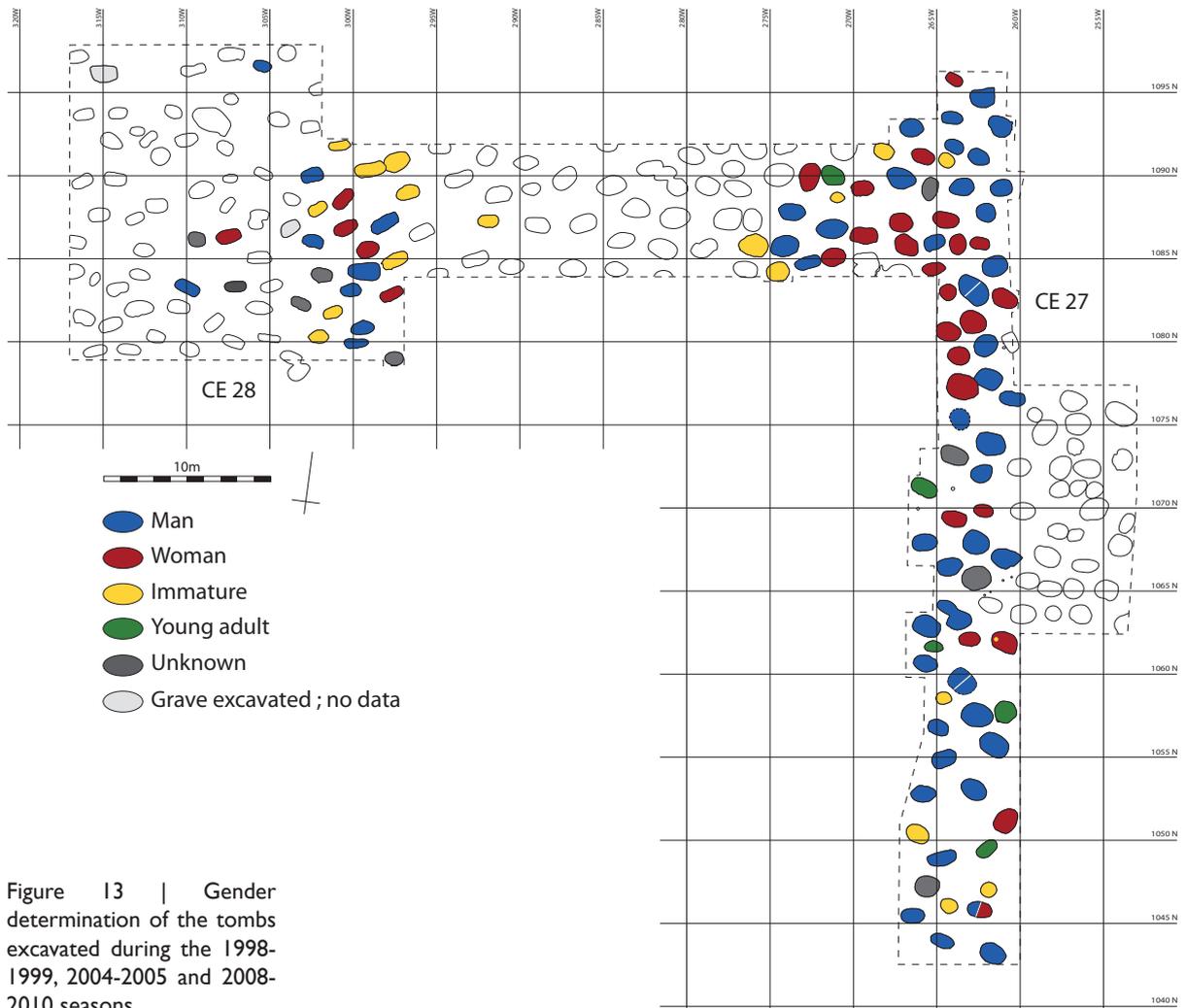


Figure 13 | Gender determination of the tombs excavated during the 1998-1999, 2004-2005 and 2008-2010 seasons.

Discussion

If we consider the proportions for the ancient Kerma and the early C-Group respectively (figure 14), we note that the ancient Kerma sector leads with eighty interred individuals compared to only twenty-seven for the C-Group. The higher number of male subjects in the ancient Kerma sectors cannot be explained by the number of undetermined individuals; even if all of these were female, the difference between the two would remain substantial. We must therefore suggest the possibility of funerary selection based on sexual criteria as well as the possibility of spatial distribution based on gender, which is conceivable when observing the distribution of individuals on the plan. As for the early C-Group sample, it presents completely different trends. Males do not clearly dominate since the number of immature skeletons is almost identical and the gap between males and females is smaller. The inferiority of the female sample can be compensated for by including individuals whose sex could not be determined. One might also think of the possibility of specific sectors or a selection of interred individuals. However, the total sample is low and a detailed analysis is difficult. At the moment, we observe two different dynamics, even though these may result from the choice of excavation zone.

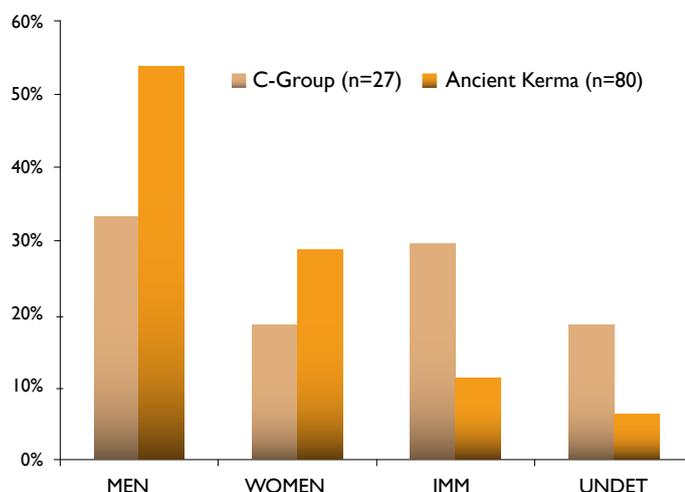


Figure 14 | Sexe of the individuals in the oldest sectors.

In considering the two estimators used in paleodemography – infant mortality and proportion of immature individuals – it is possible to estimate the differences inferred from the funerary selection based on number estimates. According to Masset and Bocquet-Appel (Masset 1973: 96-100; Bocquet & Masset 1977; Bocquet-Appel 2008), we know on the one hand that infant mortality (0-1 year of age) of interred populations is variable and, on the other, that childhood mortality, expressed by the ratio of the number of children deceased between the ages of 5 and 9 and the number of those having died between 10 and 14 years of age ($D_{5,9} / D_{10,14}$), is on the order of 2 to 5. We also know that these values are comparable to the historical demography of rural populations of the 17th and 18th centuries. These ratios will be examined with regards to the ancient Kerma period.

The absence of children under the age of one at Kerma does not indicate a low infant mortality rate. Instead, our sample reflects a known funerary dynamic that almost systematically excludes (or severely limits) this age group from the cemetery population. Newborns may have received a different funerary treatment that did not help the preservation of their bones or they were not included in the necropolis or their graves were not preserved (figure 15).

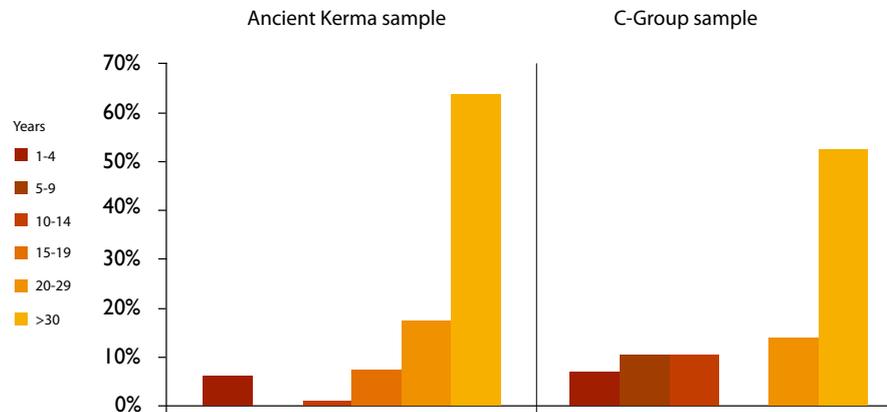


Figure 15 | Age-at-death of the individuals in the oldest sectors.

Concerning infant mortality, the ratio $[D_{5-9} / D_{10-14}]$ is 3 and it fits in the variability of the interred populations (2 to 5) as well as that of the historical populations (2 to 3). The proportion of deceased individuals of these two groups may reflect natural demographic dynamics.

As for the proportion/ratio of immature skeletons on the totality of skeletons of 5 years and older ($[D_{5-9} / D_{5+}]$ proportion of immature individuals), it comes to 0,1408. This fits with those calculated by Bocquet-Appel (2002: 639-640) for seventy-eight reference sites of the European Mesolithic and Neolithic, but remains low. The proportion of young individuals examined in detail appears low once again, which strengthens the idea of a funerary selection geared toward adults, preferably male. The extension of the excavation area, notably in the north-east, should bring complementary information regarding the spatial distribution between men and women, giving a more precise idea on possible gender-based concentrations. The distribution of immature skeletons, particularly north of the C-Group zone, hints to the possibility of a space reserved for this age group. An extension of the excavation area would be necessary here as well.

We can definitely see the possibilities of an anthropological approach conducted on a substantial series of well documented burials, but we realise that the issues of sampling and extension of the studied surfaces are vital.

This brings forth the problem of extending the excavation surface in a cemetery so vast that a comprehensive research strategy cannot be justified, even under the very real threat of destruction due to agricultural expansions or vehicular traffic.

Additionally, it would be quite desirable to have a finer understanding of chronology. If we are to address the issues of composition of the interred population and funerary selection, it is important to know the timeframe applicable in order to determine whether we are dealing with one, two or several generations at the same time.

In conclusion, we would like to emphasise the potential of the osteological collection of Kerma. Its state of preservation enables the development of promising methodological approaches (comparison of sex determination methods, development and testing of morphometric methods) and could also be the springboard for more specific studies on fractures or activity markers. In the future, the collection could become a reference for ancient Kerma populations, perhaps the C-Group as well.

The excavation of the eastern necropolis at Kerma conducted these last thirty years by the Swiss archaeological mission has generated enormous quantities of information – whether archaeological, anthropological and archaeozoological material or contextual data. The information gathering process was made difficult due to the multiplicity of scholars, the duration and scope of the project, the lack of technical means and the considerable amount of work to be performed. The necropolis contains between 30,000 and 50,000 tombs, only 371 of which were excavated by the Swiss team. Resumption of work in the oldest sectors of the cemetery emphasized the need to standardise both old and new documentation in order to tally a complete inventory of this funerary assemblage, in preparation for its publication.

The design of a relational database started in 2009 and continues to this day. In the first phase, we opted for an inventory type model in order to produce coherent and uniform data for the necropolis in its entirety. It appears difficult – not to say impossible – to group in a single interface the information gathered for each tomb, whether the remains themselves or their context. Therefore we decided to create different databases, linked to each other and made accessible from a specific data field, the identification number given to each tomb (figure 16).

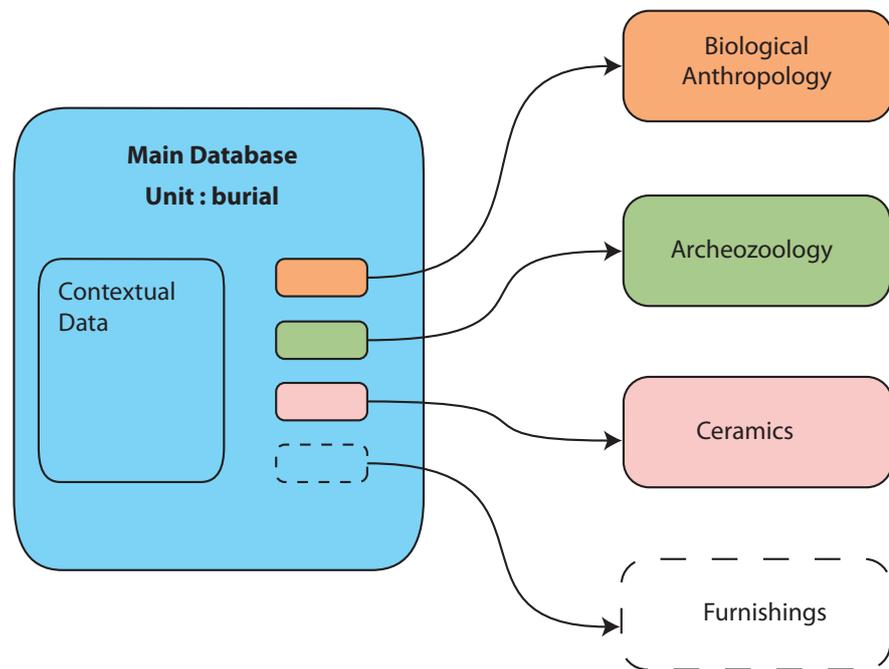


Figure 16 | Schematic plan of the database of the Kerma cemetery.

Figure 17 | Example of a part of the database devoted to the description of the burial.

The screenshot shows a web application titled "Cimetière oriental de Kerma". At the top, there are navigation buttons and a menu. Below that, a header bar contains the title and several icons. The main content area is divided into several sections:

- Metadata:** Fields for "Inv. Tombe" (00308), "Campagne" (2008-2009), "Coordonnées N-S" (1093 N), "Altitude sommet" (cm), "Secteur" (CE27), "Datation" (KA I), and "Coordonnées E-W" (261 W).
- Navigation Tabs:** "Aménagements", "Sépulture", "Habillemeent et parure", "Mobiliier funéraire", and "Faune".
- État de la sépulture:** Checkboxes for "intact", "partiellement pillé" (checked), and "sévérement pillé".
- Description:** A text box containing: "Bonne conservation (peau, cheveux, cuir, natte végétale). Seuls les pieds et une partie du tronc sont en place. Evt le négatif d'un pot à l'est de la fosse".
- Aménagement intérieur:** Checkboxes for "1 peau de bœuf", "2 peaux de bœuf", "Lit", "Natte" (checked), "Lit végétal", "Coussin végétal", "Ocre", and "Autre".
- Description (interior):** A text box containing: "Natte déposée sur le fond de la fosse, conservée sous forme de fragments".
- Nombre d'individus:** A field set to "1" with a button "Ouvrir Base Anthropologie".
- Individus:** A table with columns for "Individu", "Orientation", "Prob. Standard", "Contractée", "Age", and "Sexe". The first row shows "308", "Prob. Standard", "Contractée", "30-60 an:", and "1".
- Plan View:** A diagram of the tomb showing the layout of the body and associated items, with coordinates "1093 N" and "261 W" and a label "Tombe 308".

Thus basic information on each of the burials is presented in a first interface: exterior and interior layout and organisation, number of individuals and their state of preservation, clothing of the deceased, furnishings and accompanying fauna. Anthropological data pertaining to each individual are presented in a second and more specialised database (study by C. Simon†, C. Fallet). At least two other platforms are anticipated: fauna, including bucrania (study by L. Chaix) and ceramics (study by B. Privati). Subsequently, it will be possible to add – in the form of new modules – typological data related to the furnishings, a morphological study of clothing (loin cloths, sandals, etc.), or any other collection of data related to specific research. In other words, we are creating the foundation on which can be built different in-depth studies in the various fields related to the necropolis and its remains.

During the last excavation campaign (2009-2010), a new data acquisition form was tested in the field, based on this preliminary work. The lacunae noted during fieldwork resulted in important adjustments made to the database. At present, the recent data collected from the oldest sectors of the necropolis have been entered in the database and standardised. The next step is to include the documentation of the older excavations led by Charles Bonnet, notably in the Middle Kerma and Classic Kerma sectors.

The excavation carried out in the western sectors at Dukki Gel brought to light new architectural features belonging to two temples of Tuthmosis Ist as well as a remarkable building located outside the walls of the town. In the Nubian religious complex were discovered the foundations of another temple of oval shape and – as the previous one – encircled by several fortified walls formed by many rounded bastions.

The XVIIIth dynasty town

The town established by the Egyptians represented an enormous architectural work: three temples protected by a massive defensive system were erected together with an outside wall building located at the south-west close to its entrance, a twenty meters long staircase going through the fortifications led to the main temple's sanctuary. The building, the front walls of which are in the alignment of the central temple's lateral wall clearly belonged to the initial overall planning.

Figure 18 | Plan of the religious quarters and a large building during the reign of Tuthmosis Ist.

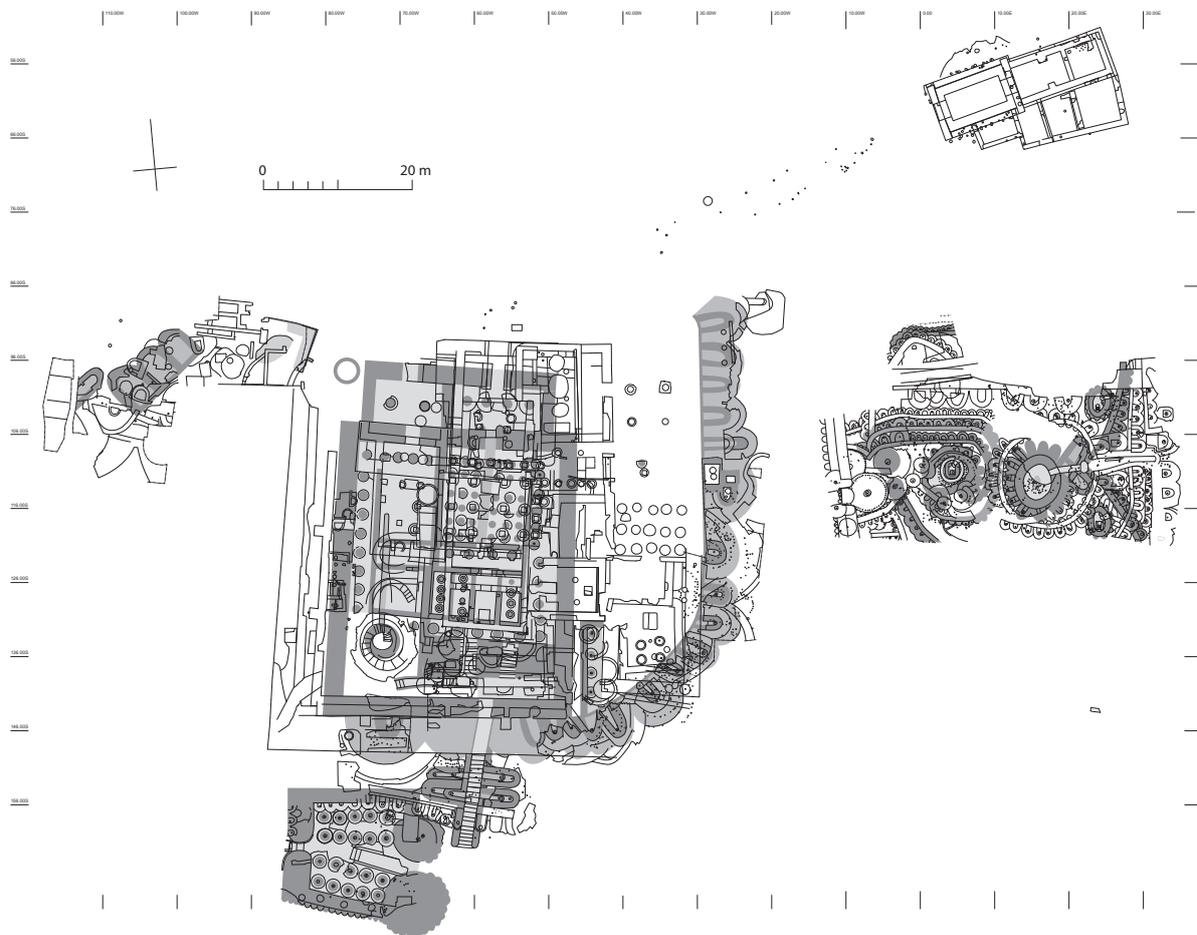




Figure 19 | Hypostyle hall remains of the large building erected by Tuthmosis Ist.

Another perpendicular axis is defined by the eastern gate of the fortifications, which curiously faced the two towers which protected the entrance of the Nubian cultural centre. This eastern axe ends up in the eastern entrance of the Nubian centre. It is thus evident that the Egyptian town and the Nubian complex were linked by a common architectural project (figures 18 and 20).

The central and western temples

The clearance of the levels of the beginning of the XVIIIth dynasty revealed that the two earlier temples were inscribed in a quadrilateral area of 26 meters sides enclosed by a 4 meters width temenos. A very thick wall, probably pertaining to a pylon, was built further north, leaving enough space for two courtyards with porticoes. The two wells of Dukki Gel were associated to the temples from the outset.

The main original feature of this general plan is certainly the peripteral structure. We found the traces of its 36 column bases made of mud bricks. They were placed rather close to the wall. Examples of such external colonnades are not frequent, they are attested around the temples of Queen Hatchepsout at Buhen and Elephantine. Last year the excavation seemed to show that the transformations of the hypostyle hall under Tuthmosis III had destroyed all previous remains. However the researches of this year led to identify 15 bases of columns made of mud bricks belonging to the

most ancient hypostyle hall (figure 19). We can thus reconstruct an impressive hall formed by 6 rows of 6 columns entirely made of mud bricks and which extended to the peripteros. The intercolumniation of the 6 northern columns differs from that observed on the other sides, as they were built in line with those of the hypostyle hall. A central path preceded by a monumental mud brick door led into the pronaos and the sanctuary. Behind the temple the temenos was crossed by two passages, one conducting out of the town and the other joining an underground passage with stone and mud brick steps linked to the southern well. The plan of the early stages of the western temple is not entirely known, as the hypostyle hall has not yet been cleared. The bases of the peripteros had been partially destroyed or enlarged by a new portico supported by stone pillars resting on circular bases. This construction is probably dating to the reign of Hatchepsout whereas the previous mud brick building belongs to the reign of Tuthmosis Ist or II. This relative chronology was reconstructed by the fragments of inscribed decorations and the pottery sherds still in study.

The Nubian religious complex

The continuation of the work in the Nubian centre contemporary to the XVIIIth dynasty enabled us to recover another oval shape temple established to the west of the one studied last year. It was also encircled by a wall reinforced by many subcircular bastions. The study of these remains is very difficult since the whole

Figure 20 | Enclosure wall and bastions of the Egyptian city after restoration.



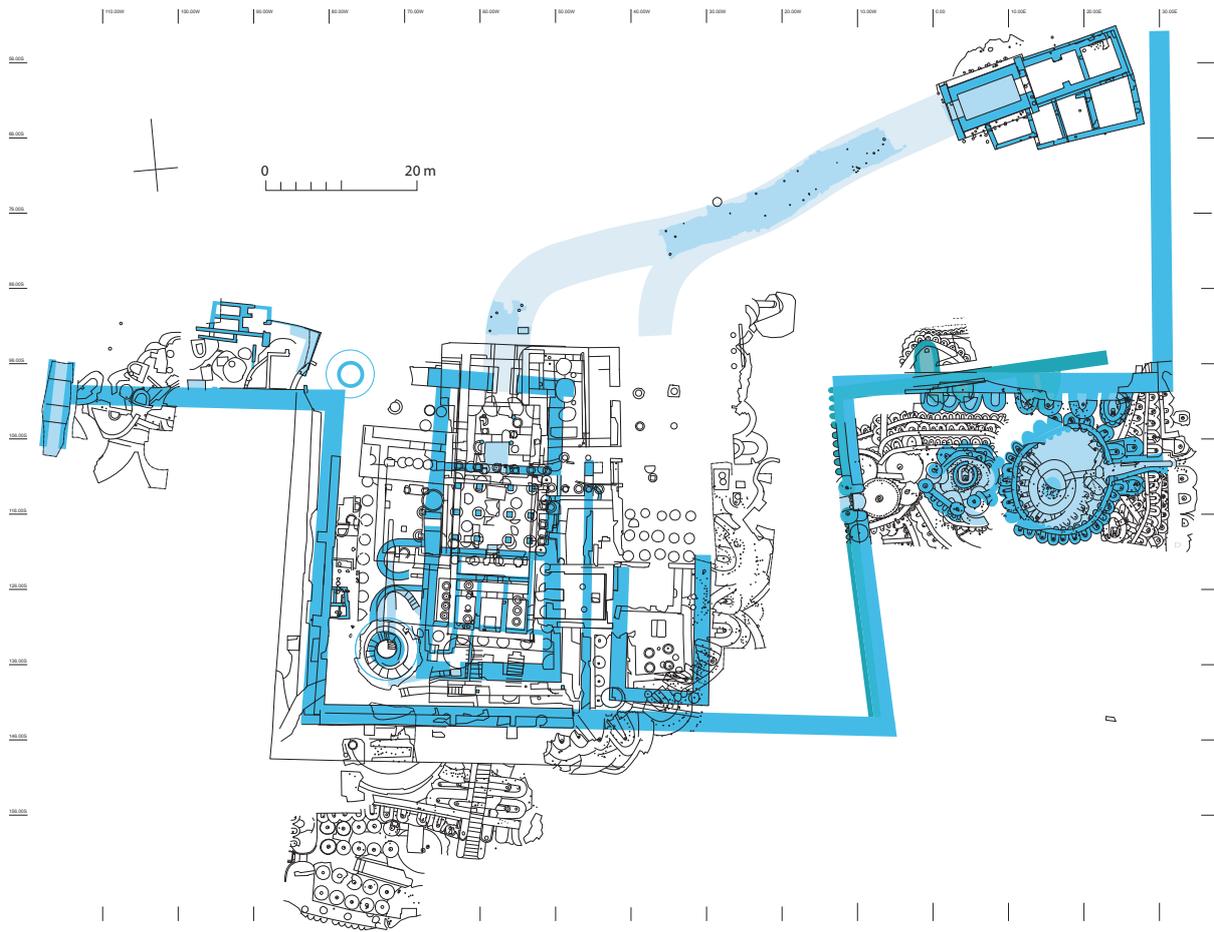


Figure 21 | Plan of the religious quarters after the transformation of the enclosure wall under Tuthmosis III.

cultural area was reshaped several times. This architectural complex is unique and must have provided a startling contrast to the Egyptian town (figures 21 and 22). We can identify here the roots of African traditional architecture. its peculiar proximity to the town raises the question of the relations between the conquering Pharaoh and the heirs of the long Kerma cultural traditions. The sort of agreement reached with the Nubians at the beginning of the XVIIIth dynasty changed under Tuthmosis III who built a new enclosure of the Egyptian town which destroyed the two towers of the Nubian religious complex and prevented any further development to the north. The Nubian temples remained in activity and a new entrance was built.

The north-western building

This new discovered out wall building was oriented east-west and was linked to the central temple of Tuthmosis Ist through the stairway. Its entrance was flanked by two large towers of 6 meters in diameter and was therefore very narrow. It opened into a large hypostyle hall with 4 rows of 5 columns, the bases of which measured 2 meters in diameter. This large hall of trapezoidal shape measured 12 to 14 meters for an axial length of 16 meters (figure 21). The double alignments of columns converge

to the western door which opened into other rooms. The lateral walls of 2 meters width were strengthened by small bastions. The columns were established in the ground at a depth of two meters on a sandy layer. Their height must have been important, about eight meters, considering their width and the deepness of their implantation.

In view of the topography of the site permits, it is possible to propose a length of about 50 meters for this building. It will require a considerable effort to reach all of its remains, some of them being located at a depth of about three meters. The function of this building has yet to be defined but it might correspond to a palace or an official building at the disposal of the king to store the products collected out from the colonized territory. It was burnt and suffered much destruction. Then it has been partially recovered by bastions belonging to an enclosure which we date of the reign of Hatchepsout.

This extraordinary building has been influenced by Nubian construction's techniques and the Egyptians adapted their architectural traditions to the local knowhow. The discoveries of Dukki Gel yielded very precious information on the relations between the Egyptians invaders and the Kerma populations : the deference to the indigenous religion and the use of the local labor workforce and building techniques offer new perspectives on the strategies developed during the conquest.

Figure 22 | Bastions and gate of the Nubian religious complex with its circular temple.



During the 2009-2010 season, the excavations at Dukki Gel brought to light approximately six thousand ceramic sherds, discovered in seven excavation areas. With the exception of the upper layers or the Napatan fill levels, the majority of the material is to be related to the structures dated to the Egyptian occupation of the XVIIIth Dynasty.

A preliminary study of the sherds revealed that the majority of the ceramic vessels were made of silt clays of types NILE B (particularly NILE B2) and NILE C, probably produced locally. Marl clays were rather rare. Three of the excavation sectors have caught our attention.

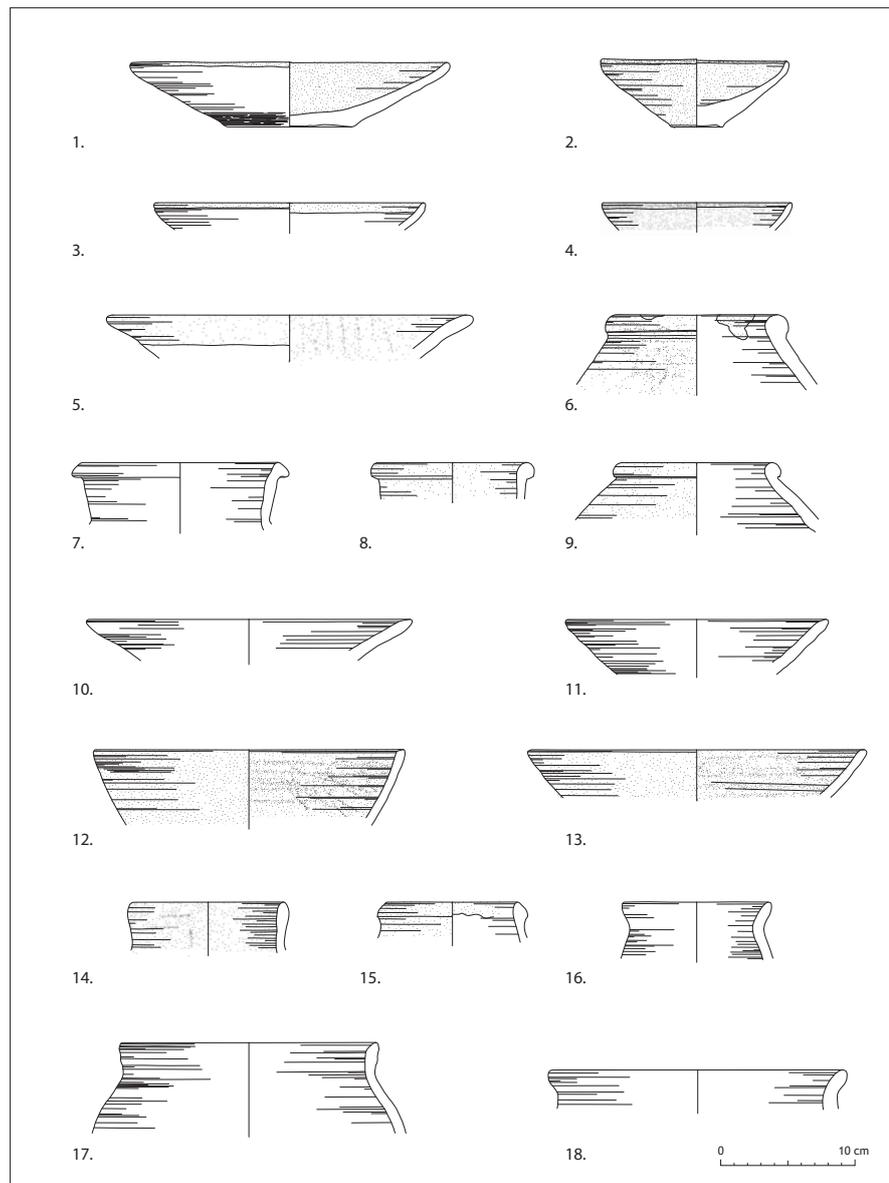
The excavation of a peripteral portico delineating the central and western temples of the city's Egyptian religious quarter has revealed materials that can be ascribed to the first half of the XVIIIth Dynasty. These assemblages were composed of forms widely found in cult buildings: plates, bowls of various sizes, jars, jar stands, beakers with a pierced bottom, beer jars and censers. Numerous plates or basins are decorated with a red slip along the rim or on the interior; this is also the case for several jars.

Certain features are characteristic of the reign of Tuthmosis III, notably splash decoration. Their presence on site is due to the installation of masonry dated to the reign of this pharaoh, its foundations reaching architectural remains of earlier periods particularly in the southern area of the portico. Other elements are part of an older tradition and are directly associated with the columns of the peripteros, most likely built during the reign of Tuthmosis Ist. Thus are dated the numerous bowls and plates entirely covered with a red slip (figure 23.1) or with a red slip and a black rim (figures 23.2 and 23.4) and the fragment of a basin (figure 23.5) and the rim of a jar (figure 23.6) showing a polished surface with a cream-coloured slip. Let us also note a fragmentary bowl made from darkened clay with a red band around the rim (figure 23.3), the reverse of jars mentioned above.

In the western section of the portico, the bottom of a ceramic canopic jar was discovered. Decorated with a rosy beige slip with vertical burnishing marks, it is similar to another canopic jar bearing a hieroglyphic inscription discovered in 2008-2009. Sherds of Kerma ceramics complete these ensembles, but in limited quantities that appear to increase nearer the southern well.

South of the sanctuary of Tuthmosis Ist, in the central temple, a subterranean stairwell leading to the well was partially cleared. The material recovered from this sector is comprised of jars, plates, bowls, beer jars, censers and rare conical bread moulds. Vessels decorated with red slips on the rim or the body are

Figure 23 | Various pottery of the XVIIIth Dynasty.



numerous, but there are also those with black rims or with surfaces covered with a cream-coloured slip (figure 23.8) as well as forms of jars or plates attested in Egypt during the early XVIIIth Dynasty (figures 23.7 and 23.9). There again, Kerma sherds are mixed with the Egyptian ceramics and the group appears to confirm a construction phase of this structure during the reign of Tuthmosis Ist.

In 2007-2008, a deposit containing, among other things, fragments of a jar decorated with a fish motif was discovered in front of the entrance to the stairwell. Prior to excavation, the clearing of this area brought to light four additional fragments of this jar, two of which helped partially complete the motif.

The work in the Nubian religious complex located east of the site was continued, a second sanctuary being unearthed west of the first. Like the latter, it featured a system of successive enclosure walls outside of which numerous sherds were collected, probably cult vessel discards. These form a particularly interesting assemblage, contemporaneous with phases prior to the reign of Tuthmosis III. The ensemble is comprised of storage jars (figures 23.17-18), jars entirely or partially covered with a red slip (figure 23.15), showing burnishing traces (figures 23.14 and 24), plates with straight sides (figures 23.10-11), horizontally polished red-slipped bowls or basins (figures 23.12-13), beer jars (figure 23.16) and an important quantity of conical bread moulds. We can also mention a small quantity of common Nubian ceramic fragments that were not wheel-thrown.

The characteristics of this assemblage are strikingly different from those found in the neighbouring Egyptian temples, contemporaneous with the reign of Tuthmosis Ist. Indeed, the wide straight sides of the plates or the polishing of the interior surface (sometimes exterior) are well known in Egypt during the Second Intermediate Period and at the beginning of the XVIIIth Dynasty. Moreover, similar material was discovered during the 2008-2009 season, in a similar context east of the first Nubian temple.

Figure 24 | Sherds with burnishing traces, XVIIIth Dynasty.



In order to protect the eastern cemetery from destruction made by vehicular traffic and by the extension of the cultivated area, the embankment created last year was reinforced with the help of a tractor. Moreover a new topographical plan of the NCAM concession was drawn after the limits were redefined in presence of Dr. Salah Mohamed Ed Din, Mr. Abdelhai Abdelsawi, Mr. Salah Hassan (governor of the area), the excavation's police, Charles Bonnet and Matthieu Honegger (figure 25).

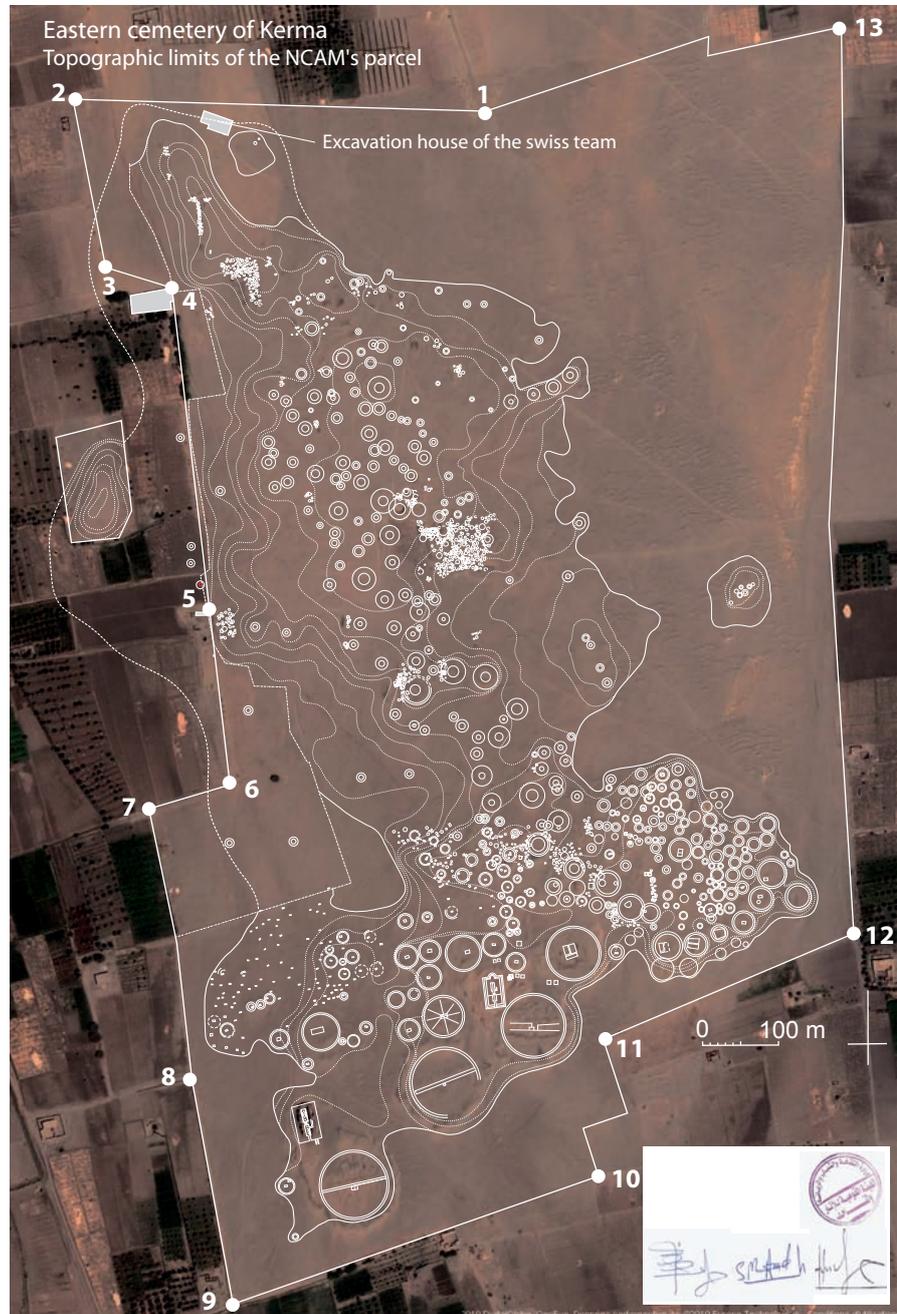


Figure 25 | Plan of the eastern cemetery with the topographical limits of the NCAM concession (National Corporation of Antiquities and Museums).

Figure 26 | View of the new house and its courtyard.



With the same idea of protection and our involvement with the preservation of the archaeological sites, we built a new house for a part of the team on the northern edge of the cemetery (figure 26 and 27). Close to the dig house, the dwelling of the new *gaffir* of the eastern cemetery was constructed in order to assure a permanent presence at the cemetery. The latter is constantly damaged by the new tracks made by vehicles and by the attempts of the cultivators to extend their fields onto the archaeological concession.



Figure 27 | Feast for the inauguration of the new house.

BIBLIOGRAPHY

- ASTON 2006 ASTON, D. A. 2006. « Making a splash. Ceramic decoration in the reigns of Tuthmosis III and Amenophis II », in : CZERNY, E. & alii (eds.) « Timelines. Studies in honour of Manfred Bietak », *Orientalia Lovaniensia Analecta*, 149, vol. I, Louvain : 65-74.
- BATH-BALOGH & FEHRENBACH 2006 BATH-BALOGH, M. & FEHRENBACH, M.-J. 2006. *Illustrated dental embryology, histology, and anatomy*, 2nd edition, St-Louis, Elsevier Saunders.
- BOCQUET-APPEL & MASSET 1997 BOCQUET-APPEL, J.-P. & MASSET, C. 1977. « Estimateurs en paléodémographie », *L'Homme*, vol. 17, n°4: 65-90.
- BOCQUET-APPEL 2002 BOCQUET-APPEL, J.-P. 2002. « Palaeoanthropological Traces of a Neolithic Demographic Transition », *Current Anthropology*, vol. 43, n° 4: 637-650.
- BOCQUET-APPEL 2008 BOCQUET-APPEL, J.-P. 2008. *La paléodémographie, 99,99% de l'histoire démographique des hommes ou la démographie de la Préhistoire*, Paris, Errance.
- BONNET 1982 BONNET, C. & collab. 1982. « Les fouilles archéologiques de Kerma (Soudan) », *Genava*, n.s., 30: 1-42.
- BONNET 1999 BONNET, C. 1999. « Kerma : rapport préliminaire sur les campagnes de 1997-1999 », in : BONNET, C. & collab. « Les fouilles archéologiques de Kerma (Soudan) », *Genava*, n.s., 47: 57-76.
- BONNET 2007 BONNET, C. 2007. « La ville de Doukki Gel après les derniers chantiers archéologiques », in : BONNET, C., HONEGGER, M. & collab. « Les fouilles archéologiques de Kerma (Soudan) », *Genava*, n.s., 55: 187-200.
- BONNET, VALBELLE, PRIVATI & AL. 2000 BONNET, C., VALBELLE, D., PRIVATI, B. & al. 2000. « Edifices et rites funéraires à Kerma », Paris, Errance.
- BOURRIAU 1992 BOURRIAU, J. D. 1992. « Relations between Egypt and Kerma during the Middle and New Kingdoms », in : DAVIES, W. V. (ed.) *Egypt & Africa : Nubia from Prehistory to Islam*, London: 129-144.
- BOURRIAU & ALII, 2005 BOURRIAU J. D., DE MEYER M., OP DE BEECK L. & VEREECKEN, S. 2005. « The Second Intermediate Period and Early New Kingdom at Deir Al-Barsha », *Ägypten und Levante*, XV: 101-129.
- BRUZEK 1991 BRUZEK, J. 1991. *Fiabilité des procédés de détermination du sexe à partir de l'os coxal : implication à l'étude du dimorphisme sexuel de l'homme fossile*, Paris, unpublished thesis.
- BRUZEK 2002 BRUZEK, J. 2002. « A method for visual determination of sex, using the human hip bone », *American Journal of Physical Anthropology*, 117: 157-168.
- CHAIX & HONEGGER (forthcoming) CHAIX, L. & HONEGGER, M. forthcoming. « New data on animal exploitation from the Mesolithic to the Neolithic periods in Northern Sudan », in : *Climate and ancient societies* (Conference held at the University of Copenhagen, 21-23 oct. 2009).
- FEREMBACH 1979 FEREMBACH, D. & alii. 1979. « Recommandations pour déterminer l'âge et de sexe que le squelette », *Bulletins et Mémoires de la Société d'Anthropologie de Paris*, 13: 7-45.
- FERRERO 1984 FERRERO, N. 1984. « Figurines et modèles en terre mis au jour dans la ville de Kerma », in : BONNET, C. & collab. « Les fouilles archéologiques de Kerma (Soudan) », *Genava*, n.s., 32: 21-25.

- GARCEA 2006 GARCEA, E. 2006. « Semi-permanent foragers in semi-arid environments in north Africa », *World Archaeology*, 38, 2: 197-219.
- HONEGGER 2005 HONEGGER, M. 2005. « Kerma et les débuts du Néolithique africain », in : BONNET, C., HONEGGER, M. & collab. « Les fouilles archéologiques de Kerma (Soudan) », *Genava*, n.s., 53: 239-249.
- HONEGGER 2006 HONEGGER, M. 2006. « Habitats préhistoriques en Nubie entre le 8^e et le 3^e millénaire av. J.-C. : l'exemple de la région de Kerma (main paper) », in : CANEVA, I. & ROCCATTI, A. (eds.) *Tenth International Conference of the Society for Nubian Studies* (Roma, 9-14 september 2002). Roma, Libreria dello Stato: 3-13.
- HONEGGER 2007 HONEGGER, M. 2007. « Aux origines de Kerma », in : BONNET, C., HONEGGER, M. & collab. « Les fouilles archéologiques de Kerma (Soudan) », *Genava*, n.s., 55: 201-212.
- HONEGGER & BONNET 2009 HONEGGER, M. ; BONNET, C. & collab. 2009. « Kerma (Soudan), report to the 2008-2009 season », *Documents de la mission archéologique suisse au Soudan*, 1, Neuchâtel, Université de Neuchâtel.
- MASSET, 1973 MASSET, C. 1973. « La démographie des populations inhumées. Essai de Paléodémographie », *L'Homme*, vol. 13, n°4: 95-131.
- MURAIL & ALII 2005 MURAIL, P., BRUZEK, J., HOUËT, F. & CUNHA, E. 2005. « DSP: A tool for probabilistic sex diagnosis using worldwide variability in hip-bone measurements », *Bulletins et mémoires de la Société d'Anthropologie de Paris*, 17 (3-4): 167-176.
- PRIVATI, 1982 PRIVATI, B. 1982. « Nouveaux éléments pour une classification de la céramique du Kerma ancien », in : BONNET, C. & collab. « Les fouilles archéologiques de Kerma (Soudan) », *Genava*, n.s., 30: 27-36.
- RUFFIEUX 2009 RUFFIEUX, P. 2009. « Poteries découvertes dans un temple égyptien de la XVIII^e dynastie à Doukki Gel (Kerma) », *Genava*, n.s., LVII: 121-134.
- SALVATORI & USAI 2009 SALVATORI, S. & USAI, D. 2009. « El Salha Project 2005: New Khartoum Mesolithic sites from central Sudan », *KUSH*, 19: 87-96.
- SCHILD & ALII 1996 SCHILD, R., KRÓLIK, H., WENDORF, F., CLOSE, A. E. 1996. « Architecture of Early Neolithic huts at Nabta Playa », in KRZYŻANIAK, L., & alii (eds.) *Interregional Contacts in the Later Prehistory of Northeastern Africa*, Poznań Symposium, 12th September, 1992, Poznań Archaeological Museum: 101-114.
- SCHMITT 2001 SCHMITT, A. 2001. *Variabilité de la sénescence du squelette humain. Réflexions sur les indicateurs de l'âge au décès : à la recherche d'un outil performant*, Thesis presented to Bordeaux I University (unpublished).
- WENDORF & SCHILD 2001 WENDORF, F. & SCHILD, R. 2001. *Holocene Settlement of the Egyptian Sahara, volume 1, The Archaeology of Nabta Playa*. New York, Kluwer Academic.

FIGURES

- Matthieu Honegger Figures 1, 3, 6, 7, 20, 22, 25
 Bastien Jakob Figures 2, 10
 Camille Fallet Figures 11, 12, 14, 15
 Philippe Marti Figures 5, 8, 9, 13, 16, 17, 26, 27
 Team of Charles Bonnet Figures 18, 19, 21
 Philippe Ruffieux Figure 23
 Jean-Michel Yoyotte Figure 24

SUMMARY

- Matthieu Honegger & Charles Bonnet Archaeological excavations at Kerma (Sudan)
Preliminary report to the 2009-2010 season
- Matthieu Honegger Mesolithic and early Neolithic habitation remains
of Wadi El-Arab
- Matthieu Honegger The ancient Kerma area of the eastern cemetery
- Camille Fallet Paleoanthropological study of the oldest sectors
of the eastern cemetery
- Philippe Marti The Kerma eastern cemetery :
design of a relational database
- Charles Bonnet New discoveries at Dukki Gel
- Philippe Ruffieux The pottery of Dukki Gel
- Matthieu Honegger Protection of the eastern cemetery
and building of the new house