# K E R M A

2011-2012

SOUDAN

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Cover figure : The northern part of the Kerma cemetery. Photo: Matthieu Honegger



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Matthieu Honegger

# ARCHAEOLOGICAL EXCAVATIONS AT KERMA (SUDAN) PRELIMINARY REPORT TO THE 2011-2012 SEASON

The investigations of the Swiss Archaeological Mission started on 3rd of December 2011 and ended on 31st of January 2012. As usual, the mission was organised in two teams.

The team directed by Matthieu Honegger worked in the eastern cemetery of Kerma and at the site of Wadi El-Arab. The team was composed of the *rais* Khidir Magbul who supervised six local workers. Two Swiss specialists worked in their respective domains: Marc Bundi (supervision of the construction of the walls protecting the eastern cemetery, work in the Museum and in the new resthouse) and Daniel Conforti (archaeology and drawing). Seven collaborators or students from Neuchâtel (Camille Fallet, Bastien Jakob, Julien Spielmann, Philippe Marti, Laure Bassin, Laure Prétôt, Alice Vanetti) and a curator of the Kerma Museum (Shahinda Omer) participated in the mission.

This year, the team was strengthened by the presence of four persons who each stayed at least three weeks in January. Veerle Linseele (Dr., University of Leuwen) came to study the fauna of Wadi El-Arab as a replacement of Louis Chaix (see her contribution in this volume). Martin Williams (Prof. emeritus, University of Adelaïde) led a campaign of geological observations to study the sedimentary and geomorphological history of the region, in particular around Wadi El-Arab (see his contribution in this volume). Michel Mauvilly (archaeologist in the Department of Archaeology of Fribourg) came to complete the excavation team. He assisted, amongst others, Hélène Delattres for a week in her program of prospection around Sedinga, to the North of Kerma. Finally, Stéphane Goël (film maker, Climage), who realised a few years ago the film "Sur les traces des pharaons noirs", followed the work of the mission in order to produce short films for the future exhibition which will take place in the museum of the Latenium (Neuchâtel) in 2014.

Since august 2011, Isabelle Crèvecoeur (CNRS, Université de Bordeaux) resumed the study of the skeletons of both cemeteries of El-Barga (Mesolithic and ancient Neolithic), where the excavations ended a few years ago. After a second stay at Neuchâtel during the summer of 2012 to examine the collection, she delivers her first results in this volume.

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 made up of the *rais* Gad Abdallah, Saleh Melieh, Abdelrazek Omer Nuri and Idriss Osman Idriss who supervised 60 local workers. Abdelmagid Mahmud, director of the museum participated to the excavation. Five specialists from Switzerland worked in their respective domains: Philippe Ruffieux (ceramology), 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 publication of the engraved blocs of Dukki Gel.

The Swiss Mission was supported by Dr. Abdelrahman Ali, the new director of the National Corporation of Antiquities and Museums of Sudan (NCAM) and his collaborators, Mr. El-Hassan Ahmed Mohamed and Dr. Salah Eddin Mohamed Ahmed. This project is supported by the Swiss National Fund (SNF 100012-137784/1), the State Secretariat for Education and Research of the Swiss Confederation, the Foundation Kerma and the University of Neuchâtel (Switzerland). For more information, see www.kerma.ch

The investigations during this campaign focused on the following sites:

- Wadi El-Arab, where destructions of a part of the site led us to extend the stratigraphic trenches to better understand the succession of human occupations and the sedimentation processes. A new surface of 64 square metres was opened to the west to search for the presence of additional huts dug into the ground.

- The eastern cemetery with the continuation of the excavation in the area of Ancient Kerma. In parallel, the low protection wall was completed with the building of a new section of about 1000 metres.

- Dukki-Gel, where Charles Bonnet continued his work on temples, sanctuaries and fortifica-tions of Nubian or Egyptian traditions (18$^{th}$ dynasty). He also pursued the restoration of the site by reconstructing in mud brick the foundations of the main buildings.

Matthieu Honegger

# EXCAVATIONS AT WADI EL-ARAB AND IN THE EASTERN CEMETERY OF KERMA

As every year at Wadi El-Arab, we noticed that the site was partially destroyed by people looking for gold (figure 1). The main statigraphic trench had been emptied, enlarged and dug down to the bedrock. Other surfaces cleaned down some centimetres had been destroyed. These regular destructions are problematical. We have tried various methods to protect or camouflage the sections excavated, and have set up panels in Arabic and English nearby. These measures have however proved ineffectual, and the best method of protecting the site will be, in the final resort, to discontinue the excavations. This should occur within a few seasons, given that we have accumulated a wealth of information regarding the main characteristics of the site.

We have taken advantage of the widening of the main stratigraphic cut, as well as of another hole almost 2 metres deep, to expose more extensive stratigraphic cuts; one in an east-west direction, as last year, and another perpendicular to the slope on a north-south axis (figure 2). This operation has allowed us to complete our observations regarding the successive occupations, to better understand their respective extent, and their dates. We benefited from the presence of Martin Williams, who undertook a geoarchaeological study to determine the sedimentary processes as well as the environmental context (see his contribution in this volume). Samples were also taken to obtain OSL dates. At the archaeological level, the strata varied considerably laterally, particularly as regards their thickness, due in particular to the irregular profile imposed by the bedrock. A series of radiocarbon dates have been obtained. They confirm that the initial occupation occurred during the late 9$^{th}$ millennium BC, whilst the main archaeological level with habitation structures (Honegger 2011a) is dated ca. 7300-7000 BC (all dates expressed in BC are calibrated).

With a view to completing our knowledge regarding the most recent occupations identified at Wadi El-Arab, we opened a new surface of 64 square metres to the west of the areas already excavated (figure 2). We were hoping to not only find better preserved remains for this period, which we had estimated as dating from 6300-6000 BC, but also a continuation of the alignment of the three huts previously discovered, dating from a millennium earlier. Our expectations were only partially fulfilled, in that the more recent levels were more poorly preserved than hoped, since small drainage gullies cut by rain-water had partially destroyed the strata. We were however able to collect archaeological material from the more recent levels, which were confirmed by the presence of pottery, with an increasing proportion of undecorated burnished ware. The radiocarbon date for this level is between 5600-5400 BC, which is more recent than previously estimated, and which proves that the site had been occupied over a period spanning three millennia, with

unfortunately a poor state of preservation for the more recent occupation levels. Beneath this level, we were unable to identify a continuation of the habitation structures already known. The effects or erosion and site perturbation rendered any interpretation too problematical.

Whilst exposing the archaeological levels, the strata were excavated with particular attention for the earliest period of occupation (ca. 8300-8000 BC), with a view to collecting a larger sample of material. Unfortunately, this level was poorly provided with archaeological material other than knapped flint tools. Whilst excavating these levels, a tomb was discovered at the base of the sedimentary strata, in a pit dug from a poorly identified level. Laid out in a flexed lateral position, this inhumation joins the eight others previously found at Wadi El-Arab on the surface or in intermediary levels. As with the site of El-Barga (Honegger 2004, 2006), the entire sequence of Mesolithic occupations shows a close proximity between habitation and funerary areas.

These past few years, the faunal remains of large ruminants, some of which appeared to belong to domesticated bovids, had particularly attracted our attention, since they dated from a very early period (ca. 7200 BC) for animal domestication in Africa (Chaix 2011, Honegger 2005, 2007). Veerle Linseele re-examined this material, and demonstrated that in the final analysis these remains belonged to other species of bovids (see his contribution in this volume). This result substantially alters our perception of the Final Mesolithic and Initial Neolithic of the region. Rather than seeing a progressive transition towards a productive economy, with the

Figure 1 | Clandestine digs at the site of Wadi El-Arab at the start of the excavation season. Two pits have been dug down to the bedrock.

Figure 2 | View of the excavations at Wadi El-Arab at the end of the campaign. In the foreground, the surface excavated this year looking west, and in the background, the L-shaped stratigraphic cut.

discreet beginnings of bovid domestication spread over more than a millennium, in the image of Nabta Playa and Bir Kiseiba in Southern Egypt (Wendorf 2001), our vision is now turned towards a later introduction of Neolithic attributes, which conceivably arrived almost simultaneously (bovids, caprines, agriculture). The cemetery of El-Barga, qualified as Neolithic by the presence of a bovid skull placed on a tomb, was in use between 6000-5500 BC, at a time when the material culture was undergoing rapid change with the development of polished stone (axe blades, personal ornaments), burnished ware and bifacially retouched flint tools. Still to be determined is whether caprines and agriculture arrived simultaneously in the region of Kerma. At present they are only evidenced from the 5$^{th}$ millennium BC (Chaix and Honegger, forthcoming), but this observation is of little value, since it is due to the rarity of sites dating from the 6$^{th}$ millennium, with El-Barga and Wadi El-Arab being exceptions at this point in time.

The observations made over the last decade at different sites in the region of Kerma, allow us to propose a first summary of the sequence of cultures, accompanied by a brief description of the pottery (figure 3). The first occupations identified in the Holocene are no earlier than 8300 BC, when the Mesolithic develops, characterised by an economy based of predation and the development of pottery. The habitations for this period are huts with sunken floors, suggesting a tendency towards sedentism, which is confirmed by the appearance of the first cemeteries, either close to, or within the inhabited area. The evolution of pottery shows different phases, the best-known of which are dated between 7500 and 6700 BC. The appearance of the Neolithic dates to the early 6$^{th}$ millennium BC, without any clear indication as to whether it is a gradual uptake or a more radical change. Archaeological remains

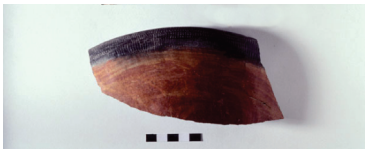
## Phases / sites / pottery style:

## Comparisons:

**Recent Pre-Kerma** 2700-2600 BC
Boucharia II
Polished pottery, black top, rippled limited to the rim, geometric incised pattern

Similarities with sites between the 2nd and the 4th cataracts (Saï Island, Soleb, etc.)

**Middle Pre-Kerma** ca 3000 BC
Eastern cemetery
Polished pottery, black top, rippled limited to the rim



Similarities with the Pre-Kerma in Arduan island

**Neolithic II** 5000-4000 BC
Kadruka / Eastern cemetery
Burnished pottery, black top, rippled

Similarities with Abkan and central Sudan Neolithic

**Neolithic I** 6000-5500 BC
El-Barga II
First burnished pottery, rocker stamp

No comparison in Nubia

**Mesolithic IV** 6300-6000 BC
Wadi El-Arab V
Rocker stamp, bifacial lithic tools

Similarities with El-Jerar phase

**Mesolithic III** 7200-6300 BC
Wadi El-Arab III-IV
Earing bone pattern, dotted wavy line

Similarities with El-Nabta phase

**Mesolithic II** 7800-7200 BC
El-Barga I / Wadi El-Arab II
Alternative pivoting stamp

Similarities with other sites between the 2nd and the 3rd cataract

**Mesolithic I** ca 8300 BC
Boucharia I - Wadi El-Arab I
First pottery, return technique

No comparison in Nubia

Figure 3 | (Left page) Prehistoric cultural phases in the Kerma Region, as defined by the pottery decoration and its surface treatment. Each phase is $^{14}C$ dated and the earliest phases were obverved at Wadi El-Arab. Some preliminary comparisons are proposed with other Nubian sites (Photos by Nicolas Faure).

become frankly plentiful during the 5th millennium, particularly with the presence of numerous cemeteries (Reinold 2000, Welsby 2001). On the other hand, there are no archaeological remains for the 4th millennium in Upper Nubia. This absence is surprising given the spectacular development in Upper Egypt of the Pre-Dynastic period and the A Group in Lower Nubia. It is from 3200 BC that evidence appears with the development of the Pre-Kerma. Its evolution continues until the beginning of the Kerma civilisation (2500 BC), which is currently the subject of our research programme in the eastern cemetery of Kerma, where we are excavating the earliest sector.

This year we have been able to complete our programme in the oldest section of the eastern cemetery of Kerma, where two cultural sequences appear to follow each other (Honegger 2011b). Sixty-five burials have been excavated (figure 4 and cover figure), of which many have been substantially destroyed by grave robbers in times past. The observations appear to confirm our previous conclusions, in that the initial phase is characterised by the Early C Group (Phase Ia), whilst the next phase represents Early Kerma with the assimilation of certain elements of the C Group, especially the black bowls with incised geometric decorations. The seven new $^{14}C$ dates obtained this year from the material in the graves did not confirm the picture previously proposed, in which we discerned a chronological evolution between the

Figure 4. Extant grave with tumulus from Early Kerma, with, in the background, the pits of sepulchres already excavated.

Figure 5. Red pot with a black rim dating from Early Kerma, engraved once fired with the image of at least four bovids.

western and eastern sides of the excavated area (Honegger 2011b, fig. 9). To the contrary, they tend to harmonise the ensemble, dating the majority of the tombs between 2600-2400 BC. This means that the transition between the C Group and Early Kerma took place over a period of less than two centuries. The error margins associated with carbon 14, do not allow us in this instance to fine tune the chronological subtleties, and in the final analysis, it will be the typological study of the material which will allow us to understand the evolutionary process, and demonstrate the greater age of one tradition with regards to another.

Our future investigations will focus on a slightly more recent sector. We will in fact reinitiate excavations in sector CE 23, partially studied some 15 years ago by Charles Bonnet (1997). According to the typology of Béatrice Privati (1999), this sector belongs to Early Kerma phase II, which immediately follows the period we have just studied.

Other than the usual grave goods, we must mention two discoveries which are out of the ordinary. This winter, a pot discovered as a surface find, unfortunately fragmented, was decorated with at least four engraved bovids on its belly (figure 5). The engraving was made after firing on the red belly, previously decorated with

Figure 6. Dagger with ivory handle, with a blade made of a copper alloy, golden guard and rivets. It was discovered in a tomb visible on the surface, in a sector dating from Middle Kerma.

impressed comb motifs. We know of other examples of bovids as secondary incised decorations, such as the famous storage jar of the A Group, decorated with a long-legged bovid, in a schematised style comparable to the examples from Kerma (Bonnet 1997). This discovery helps to confirm, if such was still necessary, the importance of bovids and pastoralism at Kerma. The other object was found last year, in an eroded section further to the south in the cemetery, close to the M cemetery excavated by George A. Reisner, dating from the end of Middle Kerma. It is a dagger with an ivory handle, a wooden sleeve which had decomposed, five gold rivets and one in bronze, a gold guard and a cloth sheath (figure 6). It belonged to a grave located only a few centimetres from the surface. If the upper part of the skeleton was absent due to an ancient robbery, the dagger was intact and still in place at the waist of the body.

Fieldwork was conducted in two weeks during 12-26 January 2012. A total of 42 well or trench sections were logged and 18 kg of samples collected for analysis, including 9 samples for radiocarbon ($^{14}C$) dating and 15 duplicate sediment samples for optically stimulated luminescence (OSL) dating (figure 7). The work had two primary aims: to establish the nature and distribution of the major geomorphic elements within the landscape surveyed, and to determine the changing patterns of late Quaternary erosion and deposition within this region. Subsidiary aims were to clarify the depositional history of the Wadi El-Arab archaeological trenches (figure 8) and to test the hypothesis that a large early to mid-Holocene lake occupied part of the region between the Nubian Sandstone plateau to the east and the main Nile valley to the west. In the event, all four aims were successfully accomplished.

## Geomorphology

On a transect from east to west the major geomorphic units are:
(a) Mesozoic Nubian Sandstone plateaux and outliers, with sporadic outcrops of unweathered and resistant Cenozoic basalts, which have caused localised tilting and deformation of the much older Nubian Sandstones and form low residual hills up to 150 m high. The sandstones consist mainly of medium to coarse sub-angular to sub-rounded quartz sand grains in a matrix of silica. A resistant cap rock of very hard iron cemented sandstone or 'ferricrete' is also common in more elevated areas.
(b) Older pediments ('glacis') eroded across weathered Nubian Sandstone, forming a discontinuous upper erosion surface ('upper pediplain') flanking the plateaux. (A 'pediment' is a gently sloping erosion surface at the foot of an upland area graded to a local base level – in this case the Nile. Coalescing pediments form 'pediplains'). A discontinuous and truncated red fossil soil overlies the older pediments and associated ephemeral stream channels.
(c) Younger pediments cut across weathered Nubian Sandstone and locally across the older pediments, forming a widespread lower erosion surface ('lower pediplain') flanking the plateaux. A vesicular younger fossil soil overlies the lower pediments and shows abundant signs of bioturbation from termites active during a previously wetter period when the grass cover was at least seasonally abundant. There were at least two phases of calcium carbonate precipitation associated with the formation of the younger pediments, with eolian dust as the most probable source of the carbonates and clays within the fossil soil. In places along the lower pediplain, the Nubian Sandstone Formation consists of purple and red siltstones and mudstones, which in places contain fine gypsum crystals. These deposits are quarried by the local people and used to plaster the exterior of their mud brick houses.
(d) Upper Quaternary Nile gravels deposited by high-energy channel flows.
(e) Feather-edge of Nile flood plain with a veneer of alluvial clays overlying

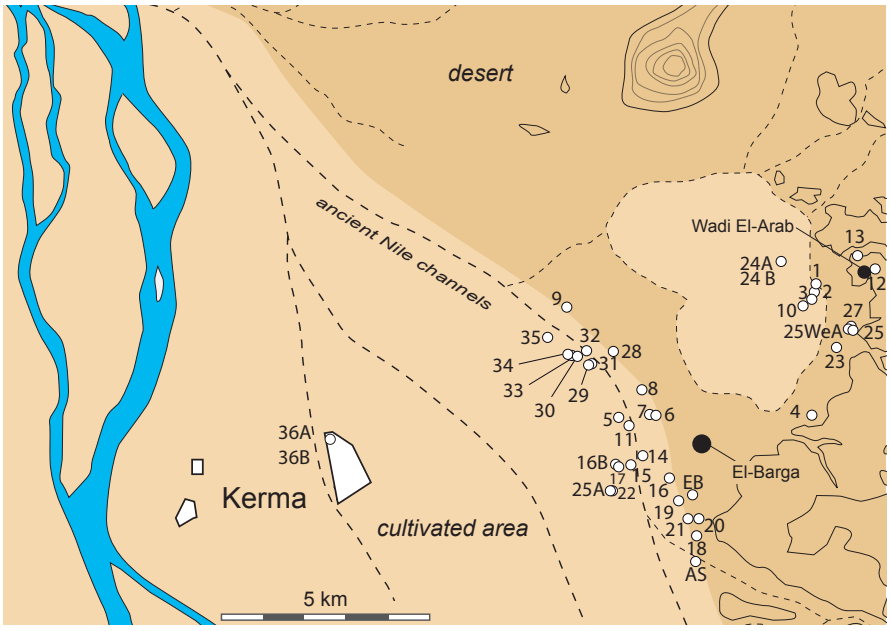



Figure 7 | Map of the Kerma region with the location of the stratigraphic sections observed in January 2012.

sheet flood sands and gravels from the Nubian Sandstone plateaux with sandstone bedrock at shallow depth.

(f) Alternating horizontally bedded fluvial clays and sands laid down along the eastern margin of the former Nile flood plain.

(g) Terminal Pleistocene and Holocene Nile flood plain with clay units thinning eastwards.

(h) Terminal Pleistocene and Holocene Nile channels with cross-bedded sands and sporadic lenses of silty clay.

(i) Modern Nile channels and flood plain.

## Upper Quaternary erosion and deposition

Given that the reconnaissance survey was only a fortnight in duration, the following inferences must be regarded as provisional and in need of further testing. However, they should provide a useful first approximation towards an Upper Quaternary history of erosion and deposition in this region. Previous work in the eastern Sahara and in the Blue and White Nile valleys (Williams 2012) has demonstrated that Nile flow was stronger and the summer monsoon rains reached further north during the last interglacial ~125 000 years ago (125 ka) and again at ~102 ka, ~80 ka and ~55 ka. The last glacial maximum (21 ± 2 ka) was very cold, dry and windy in this entire region. The return of the summer monsoon and northward advance of the intertropical convergence zone (ITCZ) into the desert of northern Sudan is dated at 14.5-13.1 ka. There have been wetter intervals of diminishing intensity around 9.7-9.0, 7.9-7.6, 6.3 and 3.2-2.8 ka.

The following sequence of events is based upon detailed examination of 42 stratigraphic sections. For each section a record was kept of the thickness of each stratigraphic unit, its Munsell Chart colour (both wet and dry), soil structure, consistence and hardness, field texture (to within ~5 % clay content, for sixteen soil textural classes), sand particle shape and degree of roundness (under x 10 and x 20 magnification), sedimentary structures, carbonate concretions (shape, size and %), and presence of any shells, charcoal or other material. Where appropriate, samples were also collected for OSL and/or $^{14}C$ analysis.

(a) Prolonged and widespread weathering of the Nubian Sandstone under a wetter climate with a relatively dense plant cover. Humid climate.
(b) Vertical incision into the sandstone plateau. Humid climate.
(c) Formation of the upper pediment surface ('upper pediplain') by seasonal or ephemeral stream channels debouching from narrow valleys in the plateau and radiating out from the point of channel outlet. Semi-arid climate.
(d) Development of a red soil on the upper pediment. Sub-humid climate.
(e) Fall in regional base level (Nile incision), renewed vertical stream incision and dissection of the upper pediplain. Sub-humid climate.
(f) Lateral erosion and formation of the lower pediment surface ('lower pediplain'). Semi-arid climate.
(g) Accumulation of fine-grained calcareous wind blown dust, followed by precipitation of calcium carbonate within the weathering profile of the Nubian Sandstone. Semi-arid climate.
(h) Formation of a widespread soil on the lower pediplain surface. Termites active under a moderately dense grass cover. Sub-humid climate.
(i) Further accumulation of fine-grained calcareous wind blown dust, followed by precipitation of calcium carbonate within the weathering profile of the Nubian Sandstone and within the soil subsurface. Semi-arid climate.
(j) Local erosion of the soil and deposition of wadi gravels directly over eroded Nubian Sandstone bedrock. Semi-arid climate.
(k) Deposition of Nile gravels under a high-energy flow regime, followed by deposition of alluvial clays above the channel gravels. Seasonally wet climate.
(l) Nile incision, lowering of regional base level and at least three phases of fluvial sand and silty clay deposition across the eastern flood plain, mantling the underlying lower pediplain and wadi gravels. The regional climate was probably becoming progressively more arid.
(m) Progressive westward migration of main Nile channel, possibly as a result of neo-tectonic uplift to the east and down tilting to the west, with abandonment of at least three generations of Nile paleochannels east of the present Nile channel. The regional climate probably alternated between arid and semi-arid, with millennial scale variability.

## Depositional history of the Wadi El-Arab archaeological site

Detailed examination of every trench face exposed by 23 January 2012 at the Wadi El-Arab archaeological excavation (sector 611W), supplemented by inspection of five additional nearby sections or trenches, revealed the following sequence of events:

(a) Weathering of the Nubian Sandstone bedrock to form a surface saprolite horizon ('Unit 1'; 'Saprolite' is weathered or partially weathered bedrock, which is *in situ*).
(b) Initial precipitation of calcium carbonate on surface of sub-rounded disaggregated Nubian Sandstone quartz sand grains to form sporadic soft partly cemented aggregates.
(c) Continued precipitation of carbonate, concentrated at the surface of the Nubian Sandstone (this reflects the permeability difference between the fully weathered and disaggregated sandstone and the partially weathered and more consolidated rock beneath).
(d) Episodic erosion of the sandstone saprolite upslope and transport down slope by raindrop impact and slope wash ('ruisellement diffus').
(e) Continued down slope accumulation of reworked sandstone saprolite coincides with initial human occupation, resulting in scatted artefacts in this deposit ('Unit 2').
(f) Occupational debris continues to accumulate, with provenance of some reworked sediments and artefacts from up to 90 metres upslope, leading to incorporation of older flakes.
(g) A single extreme rainstorm causes localised erosion from shallow braided channels, resulting in cut and fill structures lined with imbricated sandstone fragments or clasts.
(h) Maximum occupation during a wetter Holocene phase (fish, shells, savanna fauna) with organic staining of the upper depositional unit ('Unit 3').
(i) Development of platy hard-setting surface horizons 5-12 cm thick as a result of leaching of fine eolian dust and precipitation of illuvial clay in the near surface horizon by processes of subsurface lateral eluviation. Such horizons would help tp preserve the underlying deposits from erosion by wind and water. ('Eluviation' is the movement of fine particles through the soil both vertically and laterally. 'Illuviation' is the precipitation and accumulation within the soil of fine particles leached from the surface or overlying horizons).
(j) Deposition of a surface layer up to 15 cm thick of wind abraded quartz sand particles.
(k) Formation of a protective surface layer of platy sandstone clasts to form a 'desert pavement'. This surface layer would also serve to protect the unconsolidated underlying deposits from erosion.

## Testing the Holocene lake hypothesis

Earlier interpretation of the satellite imagery seemed to suggest the presence of a former lake located between the base of the Nubian Sandstone plateau in the east and the Nile flood plain in the west. My aim was to test this hypothesis on the ground.

Lakes occupy depressions in the landscape that eventually become filled with sediment and have been widely used as indicators of wetter climates in areas now arid. Lakes can also form as a result of damming of a river channel by dunes, lava flows or landslide barriers. The most effective way to establish former lake levels is to map the former shorelines. Lake sediments will tend to be coarser at the margins and progressively finer towards the lake centre. Permanent freshwater lakes will support a fauna ranging from fish and turtles to aquatic mollusca and ostracods. We would expect to find gastropod shells in the beach sediments of the former lake, and coarser sediments indicative of a shallowing lake or regressive lake sequence. If the lake became deeper, we would expect a transgressive sequence of finer sediments overlapping coarser sediments.

With these general principles in mind, over twenty well and shallow trench sections on and close to the putative lake were examined with care. In no case was any evidence of a former lake forthcoming. In fact, the area allegedly occupied by a lake

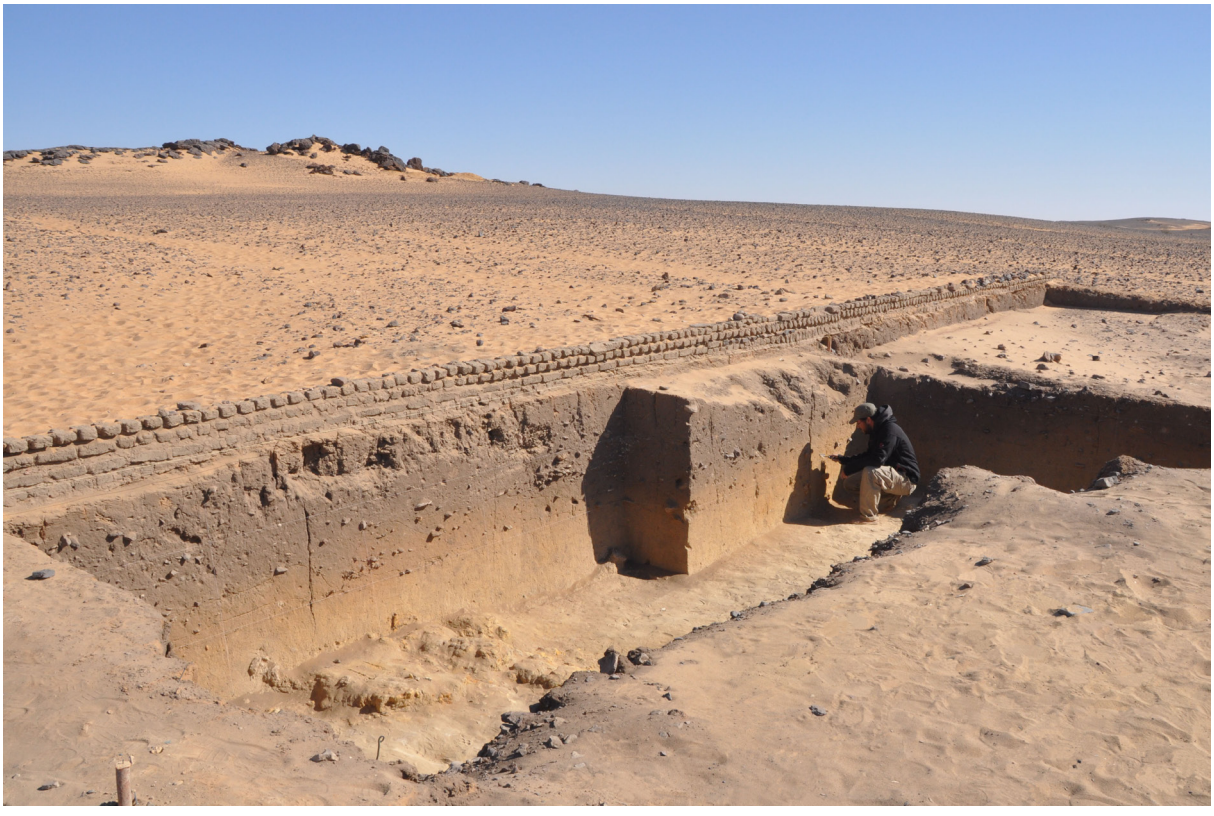


Figure 8 | Stratigraphic trench at Wadi El-Arab.

is part of the lower pediment surface. Nubian Sandstone is present at shallow depth and the surface is characterised by an abundance of sandy distributary channels. These channels radiate out from the higher ground and support groves of sporadic acacia trees where the sands are deepest along the shallow drainage channels. There never was a lake in this area. There is no obvious closed depression and the postulated lake floor appears to be part of the lower pediplain, sloping very gently to the west. It remains possible that part of the area I did not have occasion to survey in detail may have operated as a back swamp of the early Holocene Nile – a topic for future checking in the field.

Veerle Linseele

# ANIMAL REMAINS FROM THE EARLY HOLOCENE SEQUENCE AT WADI EL-ARAB

Faunal remains excavated by the Swiss Archaeological Mission at Kerma have since long been studied by Louis Chaix. A few years ago, I first got involved too when I analysed fish remains from the Mesolithic settlement site at El-Barga (7500-6900 BC) (Honegger 2006). I am attached to the archaeozoology lab at the Royal Belgian Institute of Natural Sciences (Brussels), amongst others renowned for its expertise in the identification of North African freshwater fish. In 2011, I was asked to continue the work of Louis Chaix on the prehistoric sites of the Kerma area. This fits well with my own research agenda, focussing amongst others on early food production in northeastern Africa, as the Kerma area is a key area in this respect.

Large faunal datasets have been described for the Mesolithic and Neolithic in the Nile Valleys of Central Sudan (Gautier *et al.* 2002, Gautier and Van Neer 2011). Also for Egypt the Early Holocene is relatively well studied, although the available data are mainly from the deserts (Riemer 2007, Lesur *et al.* 2011). From the contemporary Kerma area, which is actually situated in-between Egypt and Central Sudan, not much is known. Hence the importance of its Early Holocene sites and their faunal remains.



Figure 9 | Precaudal vertebra of Nile perch (left) and two vertebrae of *Polypterus* sp. (right) from Wadi El-Arab, the most commonf fish taxa at the site.

In January 2012, I stayed at Kerma for three weeks, to analyse faunal remains from the previous and ongoing excavation campaign in sectors 610, 611 and 612W at Wadi El-Arab. It was quickly clear to me that the large variation of animal species present would make it extremely difficult to obtain reliable identifications in the field. I therefore prepared a large selection of bones for official export to Belgium to be studied there in the lab, with the necessary reference collections of recent skeletons. The results presented below are still preliminary, based on my on site assessments and ongoing analyses in the lab.

The faunal remains from Wadi El-Arab mainly consist of bones of vertebrate animals but large amounts of shells are also present. Among the shells several types of gastropods were attested including *Pila* sp., *Lanistes carinatus*, *Cleopatra bulimoides* and *Zootecus insularis*. The latter is the most common gastropod. It is a small land snail species, typical for arid areas, while all others are freshwater taxa. The freshwater bivalves are mainly represented by *Coelatura* cf. *aegyptiaca* and by *Chambardia rubens*. In fact, *Coelatura* is by far the most common shell at Wadi El-Arab. In contrast, at El-Barga, no *Coelatura* has been recorded and the shells there are dominated by *Pila* (Chaix and Linseele forthcoming). *Pila* is usually common at Mesolithic or Neolithic sites in Central Sudan.

At least about ten species of fish were caught by the occupants of Wadi El-Arab. Most common are Nile perch (*Lates niloticus*), a typical deep water fish, and

*Polypterus* sp., a fish from marshy, vegetated environments (figure 9). Also present are clariid catfish (*Clariidae*), tilapia (*Tilapiini*), as well as *Synodontis* and *Bagrus* catfish. Cyprinids have also been found, but in small amounts only. This contrasts with El-Barga where these fish were the dominant taxon. The fish composition of both sites in the Kerma area is different from what has usually been recorded in Central Sudan, where clariid catfish abound (Chaix and Linseele forthcoming). The difference in aquatic fauna, both shells and fish, between Wadi El-Arab and El-Barga is remarkable and suggests that the exploited water basins looked different and/or that exploitation happened during different parts of the year.

Reptiles are represented by snake (*Serpentes*), monitor lizard (*Varanus* sp.), crocodile (*Crocodylus niloticus*) and turtle, including soft-shelled turtle (*Trionychidae*). Apart from pieces of ostrich (*Struthio camelus*) egg shell, bird remains are rare and no species have been yet identified. Mammals are mainly represented by bovids. Species of various sizes are present, ranging from the very small dikdik (*Madoqua saltiana*) to the large roan antelope (*Hippotragus equinus*) (figure 10) and buffalo (*Syncerus caffer*). Hare (*Lepus capensis*) is relatively well represented too and also carnivores of different size classes and warthog (*Phacochoerus aethiopicus*) and have been recorded. Small mammals, such as rats and mice, have been identified as well. Moreover, very large mammals are present among which hippo (*Hippoptamus amphibius*), giraffe (*Giraffa camelopardalis*) (figure 11) and rhinoceros (*Diceros bicornis*/*Cerathotherium simum*). Generally, like also attested at El-Barga, the mammals fit with a savannah type of environment as is also known from contemporary Central Sudan, and which is obviously very different from the current arid environment. Based on faunal remains from Central Sudan, Gautier (1983) had reconstructed a shift 400 km northward of vegetation and climate zones compared to the present day situation. More precise species identifications have to be awaited, but from these first data from the Kerma area it seems that the northward shift may even have been larger.


Figure 10 | Distal metapodal of dikdik (top) and distal metapodal of roan antelope (bottom) from Wadi El-Arab. Respectively the smallest and the largest antelope species found.

Some of the animal remains from Wadi El-Arab (e.g. the land snails, snakes, rats and mice) represent intrusives that were not brought to the site intentionally by its human occupants. Others clearly served as raw material for the production of various objects (e.g. ostrich egg shell) but most animal remains are food refuse. Some bones with butchery marks have been found, testifying of this. Shells produce a lot of waste relative to their food value, hence the occurrence of large concentrations at places where they were eaten, such as found at Wadi El-Arab. In any case, it is clear that Wadi El-Arab, like El-Barga, fits in the image of the Mesolithic of Sudan being a period with a rich environment where a wide variety of food resources was available (Gautier 1983 for example).

The latest analyses on fauna from Wadi El-Arab did not allow confirming the presence of cattle, domestic nor wild, although several diagnostic large bovid bones were recorded. Verification is needed but it seems that they all belong either to roan


Figure 11 | Giraffe talus from Wadi El-Arab.

antelope or buffalo. The state of preservation of the material and the presence of several large bovid species clearly makes identification not straightforward. In any case, it seems that the earlier claims for the presence of domestic cattle, with its implications for the spread of food production in northeastern Africa, have to be re-evaluated (see Chaix 2011, Chaix and Honegger forthcoming). In view of its importance, this subject will be given priority in the faunal studies and publications of Wadi El-Arab. Further studies of the fauna from Wadi El-Arab will also yield more precise data on the species present and their relative importance. The analysis of the faunal composition throughout successive layers is hoped to yield indications for changes in the natural environment and/or changes in subsistence strategies. Moreover, intra site comparisons, may reveal functional differences between structures.

Isabelle Crèvecœur

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# FIRST ANTHROPOLOGICAL INSIGHTS ON THE EARLY HOLOCENE FUNERARY ASSEMBLAGES FROM EL-BARGA

The Early Holocene site of El-Barga, situated in Nubia more than 10 kilometers east from the city of Kerma, has been excavated the last decade by the Swiss archaeological mission in Sudan (*i.e.* Honegger 2003 and 2006). Two occupations have been identified based on archaeological and radiometric data, a Mesolithic settlement and an early Neolithic cemetery (Honegger 2006). This location is of uppermost importance in the Nubian Nile valley since it documents the transitional period leading to the onset of the Neolithic (*ibid*.).

Here we present the first exhaustive inventory of the human remains associated to the two cemeteries together with preliminary observations on the funerary practices and morphological characteristics of the two groups.

## Osteological material

The osteological material available for study is mainly composed of cranial remains and selected infra-cranial bones. The present work is based on the analysis of the preserved osteological collection, and it has been completed by the additional notebook observations made on the field by L. Chaix and the drawings of the burials.

The Mesolithic funerary area delivered a minimal number of 44 individuals for 41 excavated burials. Most of them where found in primary position and related to individual deposits. The burials N° 139 and 140, both include remains from a second individual whose relation with the primary deposit is unknown. A mention in the notebook of supplementary teeth in the filling of the structure for N° 140, could argue for intrusive material in this latter case. Notably, the burial N° 119 contains the remains of a pregnant women and her fetus close to the term.

Hundred burials have been excavated in the Neolithic cemetery. They gave a minimal number of 105 individuals. Like the Mesolithic assemblage, most of the remains were individual deposits found in primary position. Two double primary burials are presents (N° 47 and 21-22). The first one include an adolescent (N° 47b) and an infant (N° 47a). The second deposit is composed of one adult woman (N° 22) and an infant (N° 21). In the first case, the simultaneity of the deposit is attested by the undisturbed lower limbs of both individuals that lay on each other; in the second case by the undisturbed pelvic girdle of the adult N° 22 on which lies the head of the infant N° 21. The lower part of N° 21's body is absent, but the field drawing suggests that it may have been later disturbed by the deposit of the child N° 18, north to the N° 21-22 structure. Three collective deposits have been identified in the burials N° 8, 9 and 13. In the first two cases, the structures include two adults, one in primary position, the other one in reduction. In the latter case (N° 13), the left humerus of

Figure 12 | Picture of the structure containing the burials N° 65, 68 and 69.

the adult woman (N° 13a), have been disturbed by the deposit of an infant (N° 13b). Finally, several structures or group of deposits raised question about their nature, whether they are collective or simultaneous. For instance two groups of individuals (N° 65-68-69-70 and 91-94-95) are apparently buried in close relationship, but the absence of contact between the individuals prevents their classification as multiple deposits (figure 12). In the meantime, a collective burial seems unlikely since the individuals are buried in filled-up space.

### Biological identity

During the excavations, very few coxal remains were gathered and preserved. Only five individuals (three from the Mesolithic sample and two from the Neolithic sample) were available for sexual diagnosis following the methods of Bruzek (2002) and Murail *et al.* (2005). Fortunately, morphological observations in relation to the determination of the sex were made on the field by L. Chaix on the coxal bones, as well as on the cranium and the mandibles. Additional information were collected by J. Desideri on the available cranial and mandibular remains using the standards of Acsádi & Nemeskéri (1970). Finally, since the mandibles were collected for most of the individuals, we decided to use the discriminant functions from Giles (1964) as an additional indication. To stay conservative, we attributed a sex to the individuals for which coxal and cranial morphological features were described by both observers as hyper-feminine or hyper-masculine, and consistent with the mandibular metric results. When the morphological characteristics of the coxal bone were not recorded, or that the observations came from one observer only, the same approach led to a diagnosis as « possible Male / possible Female (pM / pF) ». In any other case, the sex is considered as undetermined.

The estimation of the age-at-death of immature individuals was assessed using the standards of Moorrees *et al.* (1963a, b). This method allows to include de results for deciduous and permanents teeth in a 95 % confidence interval. In the rare occasion where the teeth were not present, bone maturation was taken into account (Scheuer and Black 2000). With the absence of most of the pelvic remains, it was not possible to apply the reliable and accurate method of Schmitt (2005) for the estimation of the age-at-death of the adults. Given the strong dependence of the senescence processes on populationnal, environmental and behavioral factors (Bruzek *et al.* 2005), we chose to include all the mature remains into one age group [>20].

The results of the determination of the age-at-death and the sexual diagnosis for both samples are given in the figure 13.

| | IMMATURE | | | | | MATURE | | | UND |
|---|---|---|---|---|---|---|---|---|---|
| | [0-1] | [1-4] | [5-9] | [10-14] | [15-19] | [>20] | F (pF) | M (pM) | |
| MESO | 1 | 3 | 3 | - | - | 28 | 10 (4) | 11 (3) | 4 |
| | | | 1 | | | | | | |
| | | | | 1 | | | | | |
| | | | | | 3 | | | | |
| NEO | 5 | 15 | 5 | 3 | 1 | 44 | 24 (9) | 10 (9) | 4 |
| | 5 | | | | | | | | |
| | | 11 | | | | | | | |
| | | | 6 | | | | | | |
| | | | | 1 | | | | | |
| | | | | | 5 | | | | |

Figure 13 | Repartition by age class and sex of the Mesolithic (MESO) and Neolithic (NEO) samples. UND = undetermined, F = Female, pF = probable Female, M = Male, pM = probable Male. The numbers into parentheses are included into the F and M count. Grey rectangle represents the number of individuals included in two age groups.

## Funerary practices

### *Treatment of the deceased*

Among the Mesolithic sample, the orientation of 36 individuals and the position of 35 could be observed. There is a clear pattern in the orientation of the heads toward the NW quadrant (43 % of the bodies), and the NE quadrant (24 %). The individuals are buried preferentially on the right side in flexed position (83 %, with 60 % on the right side), with the upper and lower limbs in hyperflexion (this term refers here to angles < 30°). In most of the cases, the hyperflexed position of the members can be related to the constrains of the fossa. However, a fraction of the flexed bodies (14 %) exhibits a hypercontracted posture. Together with the presence of clear effects of constrain on the some parts of the body, it suggests the use of ties or perishable containers to bury the deceased. There is no statistical difference between women and men regarding the orientation, the position and the side of the buried bodies. Noticeably, none of the immature individuals is in hypercontracted position, and the two only individuals buried in extended position are children (N° 5 and 120).

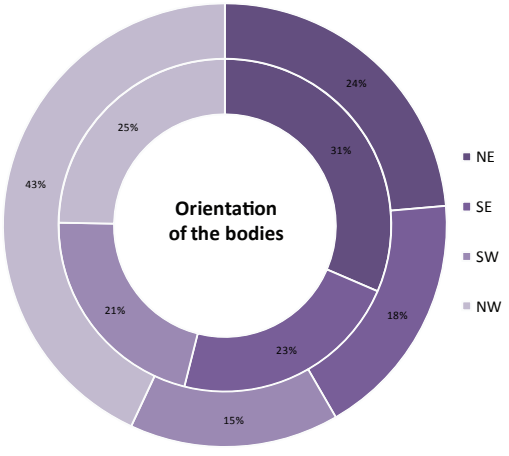


Figure 14 | Frequency of body orientations for each cardinal quadrant. Mesolithic = external circle; Neolithic = internal circle; NE = Northeast quadrant; SE = Southeast quadrant; SW = Southwest quadrant; NW = Northwest quadrant.

Within the Neolithic assemblage, the orientation of the deceased observed for 89 cases is more balance, with a slight dominance of the NE quadrant (31 %) compared to the others (NW - 25 %; SE - 23 %; and SW - 21 %). Figure 14 illustrates the pattern of orientation in both samples. While the differences are not statistically significant, the prevalence of the NW quadrant in the Mesolithic sample (external circle) is clearly visible.

Regarding the position of the bodies (86 observations), the Neolithic individuals are also mainly in flexed position (73 %) with the members in hyperflexed posture, but the side of deposition is more balanced (47 % on the right side, 36 % on the left). A higher percentage of the deceased are in hypercontracted posture (21 %) compared to the Mesolithic sample, but no fully extended position (body and members) is recorded. No pattern emerges in relation to the sexual diagnosis or the age-at-death.

*Burial selection and probability of death*

Regarding the gender repartition, there is a clear difference within and between both samples. The inter- and intra-group comparisons include the « probable Male/ probable Female » cases, but their exclusion do not change the results. While there is no significant difference within the Mesolithic sample in relation to the gender representation, the null hypothesis (X2) is clearly rejected within the Neolithic sample. The significant prevalence of female individuals (figure 15) in the Neolithic sample suggests that a selection of the deceased in relation to the gender occurred.

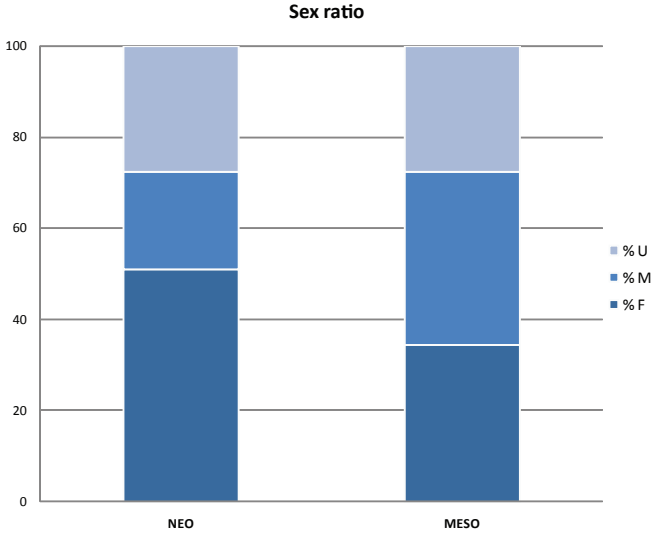


Figure 15 | Histogram of the sex ratio in the Neolithic and Mesolithic samples.
U = undetermined,
M = Male; F = Female.

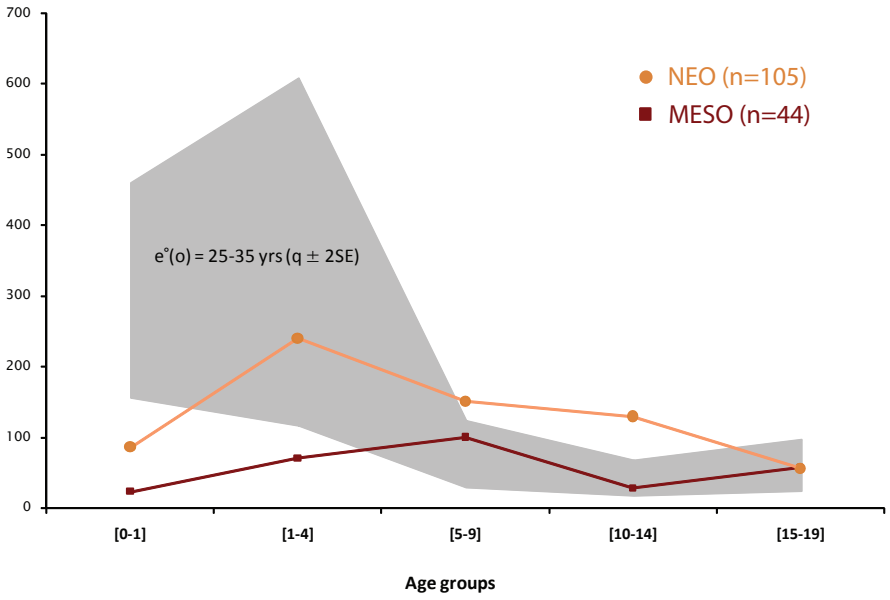


Figure 16 | Mortality quotients for the Mesolithic and Neolithic samples compared to the theoretical mortality rates of Ledermann (1969) for a population with an life expectancy at birth between 25 and 35 years.

To discuss potential demographic anomalies (Sellier 1995) in both samples, we grouped the immature remains into the five conventional age classes following the method of minimization of the anomalies (Sellier 1996). The two demographic curves are compared to the theoretical mortality tables of Ledermann (1969) for a population with an life expectancy at birth between 25 and 35 years (figure 16).

If we compare the mortality quotient of the two samples before adulthood (20q0) with the theoretical one for a life expectancy at birth between 25 and 35 years, there is a strong anomaly within the Mesolithic group. The proportion of immature in the Neolithic sample (53.5 %) is close to the theoretical mean value (comprise between 45 % and 64 %), while the Mesolithic sample possesses a significant deficit of immature individuals far beyond the theoretical interval (figure 17).

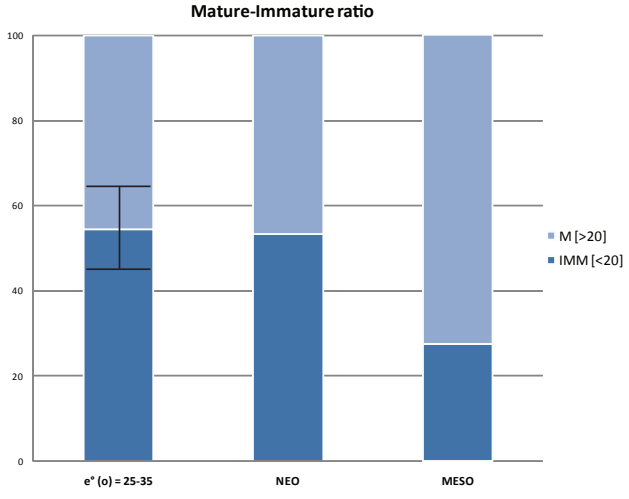


Figure 17 | Histogram of the ratio between mature and immature individuals in the Neolithic and Mesolithic samples compared to the theoretical values of Ledermann (1969) for a population with an life expectancy at birth between 25 and 35 years. M = Mature; IMM = Immature.

Although the Neolithic group does not exhibit anomaly at the overall immature scale, the examination of each age class quotient reveals that the first class is under-represented whereas the [5-9] and [10-14] groups are over-represented. In the Mesolithic assemblage, the anomalies concern the two first classes [0-4]. It worth noting that the only individual in the [0-1] group is the fetus from burial N° 119.

The causality of these anomalies could be multifactorial, related to post-depositional processes and excavation limits, or biological and cultural factors (demographic crises or selection). It is difficult to assess the impact of external factors (like differential conservation) on the deficit of young children in the Mesolithic sample. However, the fact that the mortality quotients of the three higher age classes follow the theoretical values, and that the preservation state of the individuals from the [5-9] class is very good, could indicate that a selection (in relation to age or particular funerary practices) might have occurred. The same could be argued for the first age class in the Neolithic sample, but the anomaly is weaker than in the Mesolithic sample. On the other hand, the high mortality quotients of the older immature individuals [5-14] has to be underlined. This information will be confronted to the state health indicators of this population. For instance, preliminary observations indicates a high number of enamel hypoplasia on the teeth of the individuals belonging to these age groups.

*Spatial repartition*

Figure 18 shows the spatial organization of the Mesolithic and Neolithic assemblages in relation to the gender and the immature status.

Some preliminary observations seem to indicate a Male/Female gradient in the Mesolithic area, with most of the women present to the North. Similarly, the individuals showing strong non-masticatory tooth wear affections in association with degenerative changes of the temporo-mandibular join are mainly women located in the same northern area.

The patterns seem less visible in the Neolithic cemetery. Three groups emerge. The central one is the most numerous and has a higher percentage of immature individuals. Southeast of this concentration, the second assemblage contains more adults women. Interestingly, if we look at the most common object found in association with the Neolithic burials (ivory bracelet found in 34 burials), the only four adults wearing it on the left forearm are women either isolated from the central concentration (N° 9a) or belonging to the south-east grouping (N° 53, 64 and 89).

A larger scale combination of the biological information and the archaeological data is of course needed to go into these first insights in depth, and should be tested statistically.

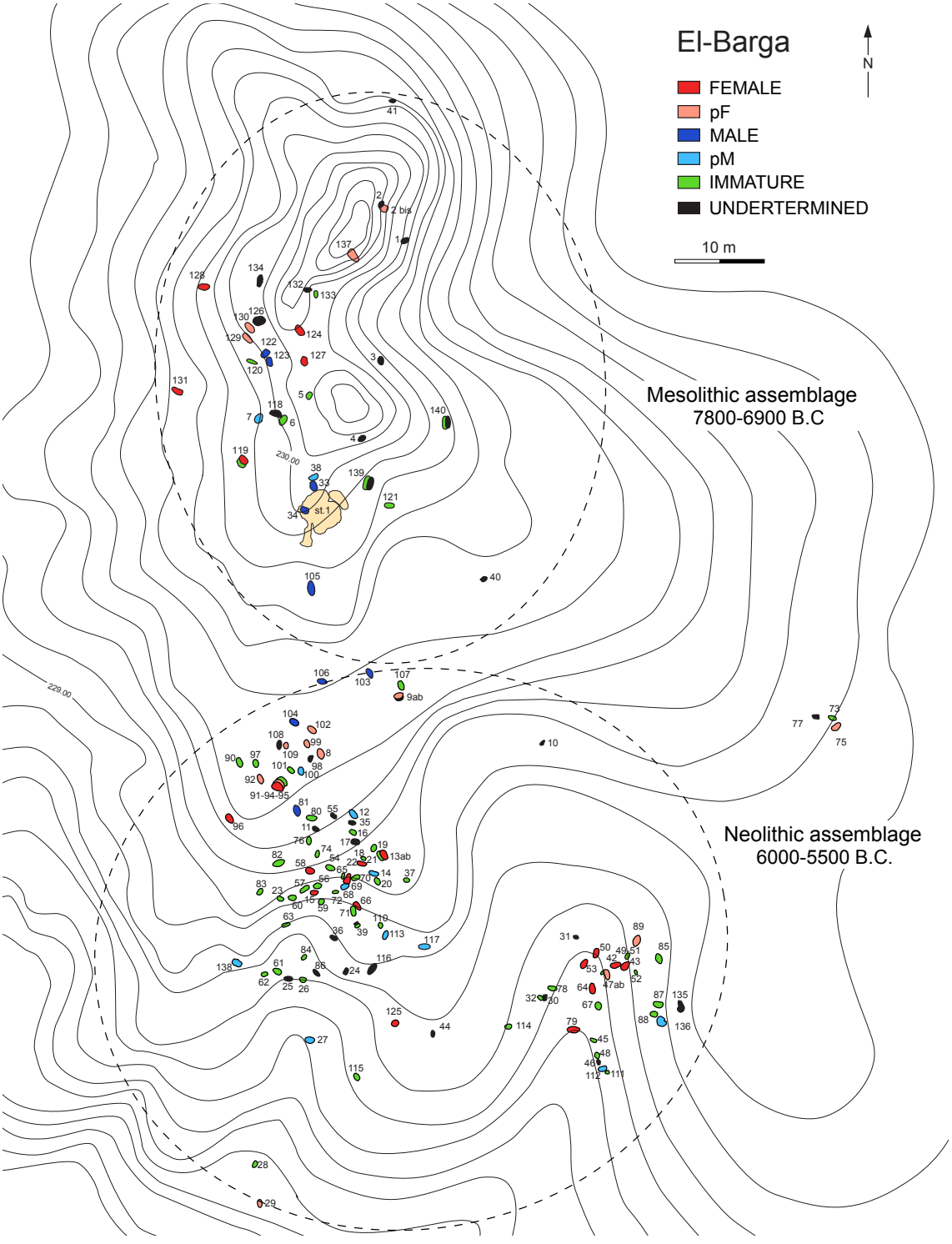


Figure 18 | Map of the El-Barga site with spatial organization in relation to the gender and the age-at-death.

## Biological characteristics

The Mesolithic individuals are extremely robust. They exhibit strong muscular attachments on the cranium and the infra-cranium skeleton. On the mandible, the spina mentalis are exceptionally developed and often associated with robust coronoïd processes and degenerative changes of the temporomandibular join. Dental avulsions of upper incisors are present in 35 % of the adults and severe dental attritions suggest non-masticatory wear activities. Enthesopathies are frequent on the humerus and the tibia (insertions for the deltoid and soleus muscles), as well as osteoma and spines on the femoral diaphysis. Healed fractures of the forearm are present on three individuals and seven crania show signs of trauma (marks, perforation or deformation).

The Neolithic sample is more gracile. A small number of mandibles presents temporo-mandibular lesions and heavy dental wear pattern, but the spina mentalis are never as developed as in the Mesolithic sample. Five individuals show evidence of cranial trauma and only one adult (woman N° 96) exhibits the avulsion of the upper central incisors. The most striking feature is related to the expression of a Carabelli structure (pit, furrow or tubercle) on 71,9 % of the immature individuals. This trait is statistically more frequent in the Neolithic sample and amongst immature remains.

The morphological comparison of the mandibles and the teeth of the Mesolithic and Neolithic samples underlines some major differences between both groups. The Mesolithic individuals exhibit long and wide mandibles, characterized by high mandibular corpus and wide ramus. The Neolithic mandibles significantly differ

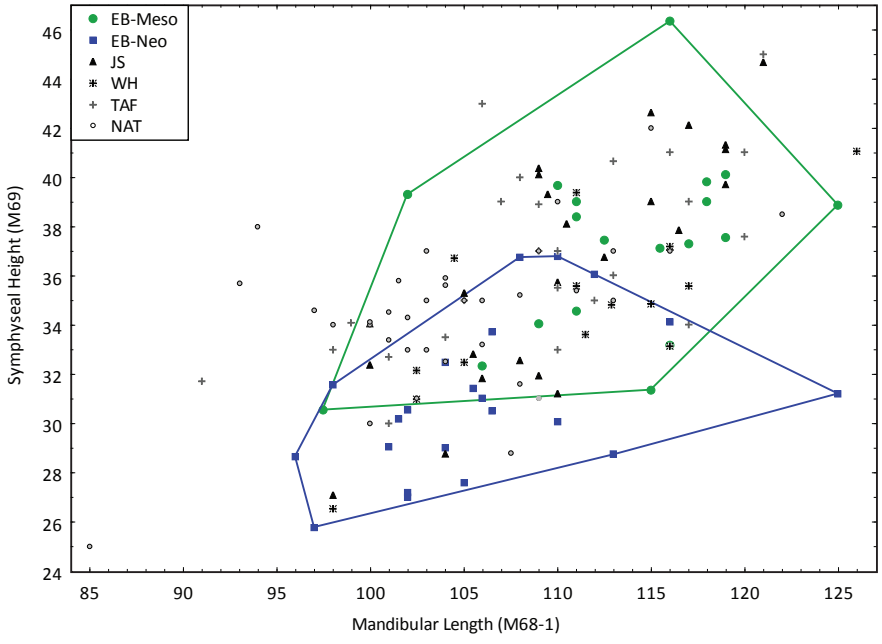


Figure 19 | Bivariate plot of the length of the mandible in relation to the height of the corpus at the symphysis. JS = Jebel Sahaba; WH = Wadi Halfa. TAF = Taforalt; NAT = Natufian populations (Bocquentin 2003).

from the Mesolithic one regarding all these dimensions. The mandibles are shorter, narrower and the weak and constant height of the corpus causes the robustness index to be significantly greater than in the Mesolithic sample. When compared to Epipaleolithic populations from North Africa and southwest Asia, the Neolithic sample stands clearly aside from these comparative samples regarding the height of the corpus, while the Mesolithic one is close to the Jebel Sahaba, Taforalt and Wadi Halfa groups (figure 19).

Regarding dental dimension and morphology, if the Mesolithic sample possesses, on average, higher dental diameters than the Neolithic individuals, there is a statistical significant difference ($p = 0.01$; t-test) in terms of shape of the lower second molars (LM2) and the lower second premolars (LP2). The first observation can be explained by the fact that Mesolithic individuals possess a higher frequency of molars with fifth cusps than the Neolithic group. Differences on the LP2s are related to proportionally higher bucco-lingual diameters in the Mesolithic sample.

Through this preliminary overview of the Mesolithic and Neolithic human remains from El-Barga, we wanted to emphasized the anthropological potential of this collection to understand the cultural behaviors and biological affinities of the early Holocene populations in the Nubian Nile valley.

The data collected during this new field season of archaeological work at Dukki Gel (Kerma) change little by little the image we had of this site (Bonnet 2007, 2009a, 2009b, 2010a, 2010b, 2011a ; Valbelle 2011). Its interpretation, however, remains difficult, due to the fact that the remains anterior to the Egyptian conquest suggest a settlement fare more extended than it was thought so far, and with a very peculiar architectural character (Bonnet and Valbelle 2010). The large amount of Classic Kerma pottery uncovered in the foundations of some of the structures confirms that they were contemporary with this most blooming period of the kingdom, characterized by large-scale constructions in the main city (Ruffieux 2005, 2007, 2009 and 2010). The settlement of Dukki Gel may have its origins in the digging of two wells. The presence of a workshop zone dedicated to metalwork is attested by numerous pipe fragments. The edifices attributable to this Nubian settlement have an oval or circular plan. The thick precinct which protected them had several gates made monumental by the massive towers flanking them. We will see that inside, almost opposite, buildings with impressive dimensions were erected (figure 20).

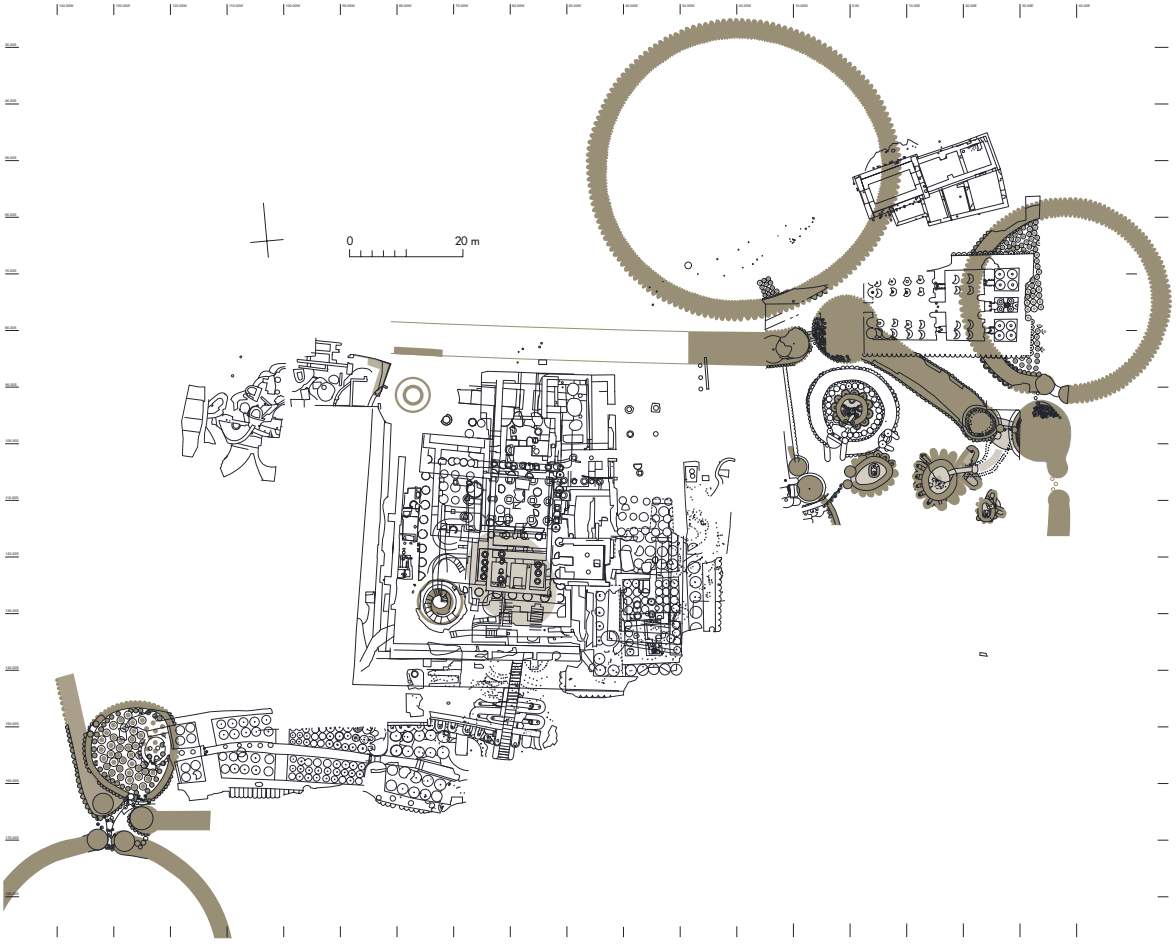


Figure 20 | Plan of the Nubian town of Dukki Gel at the end of the Classic Kerma (1600-1500 BC).

Figure 21 | A small Nubian palace at the northern side of the precinct.

## The Nubian settlement

This season, two new circular buildings were discovered in the vicinity of the gates at the northern side and at the south-western corner of the precinct. Their walls, relatively thick (0.6 and 1 m), strengthened by semi-circular buttresses placed side by side (0.8 by 0.5 m and 1.5 by 0.8 m), surround spaces with a diameter of 3.5 m for one and 4.5 by 3.5 m for the other. In both cases, the door is at the southern side (figure 21). They show the same disposition inside, i.e. a circular base perhaps serving as an offering table probably surmounted by a canopy, as suggested by four column bases made of soil. In the axis of the gate, three or four steps lead to a seat made of a soil strengthened by reed segments. Two other seats or benches are placed on both sides. In the following phase, the two constructions are enlarged. A colonnade would run along the inside wall of the largest one (diameter : 15 m), studied last season, the doors of which open to the oval temples. The other construction, with a diameter of 10 m, is equipped with several rows of columns. In the present state of our researches, we propose to consider these buildings as ceremonial palaces.

Today, four gates are identified throughout the precinct : in the middle to the north, at the north-eastern corner, in the middle to the east, and at the south-western corner. The towers flanking the two northern doors are particulary huge, with a diameter of 6 and 12 m respectively. We were quite surprised to discover that these two gates were facing circular buildings of exceptional dimensions, with a diameter of about 35 m for the north-eastern one, which was partially excavated, with a wall

2.60 m thick. Sixty-five column bases, with a diameter of 0.80 m, have already been cleared. The door of this edifice, also flanked by towers, would open to the south. About thirty meters in front of the eastern precinct wall, in the axis of the door, we cleared a segment of rounded wall, about 2.60 m thick, suggesting the existence of another similar monument. Test-pits dug to the south-west also revealed the presence of identical remains.

This town of Dukki Gel, which we had first considered as a foundation of I, is thus much older than we first thought. It is likely that a link with the town already existed at the time when the deffufa, the major temple, was erected. The precinct wall, also anterior to the conquest, was later destroyed by the Egyptians. As a unique case, the Nubian settlement of Dukki Gel raises many questions. The architectural structures are obviously neither devoted to the living nor to the handicraft, and have no equivalent in Kerma. They apparently pertain to a different architectural tradition. Moreover, the processes of construction displayed are different from those observed in the main town. Was the precinct a temenos for a privileged site of symbolic

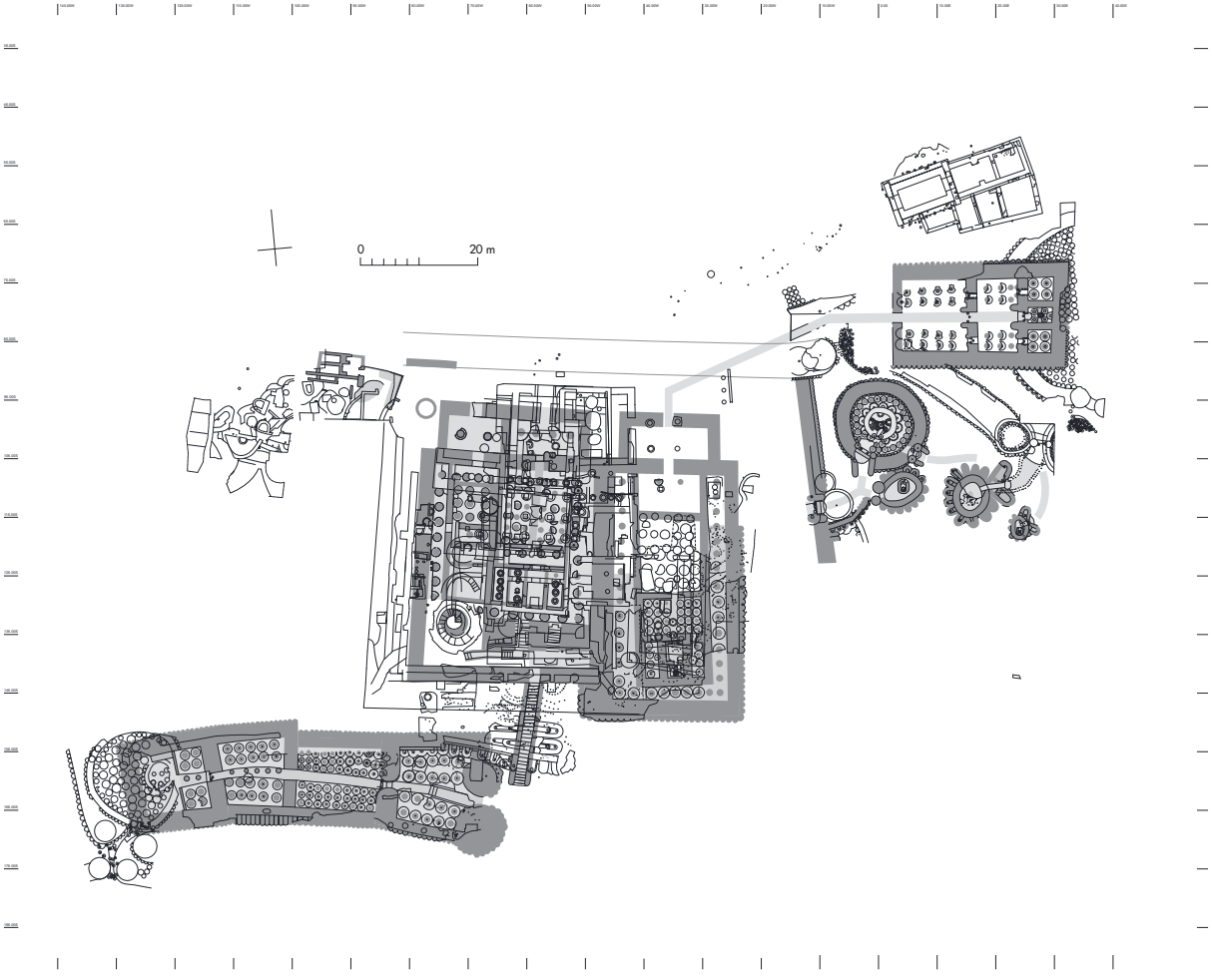


Figure 22 | Plan of the Egyptian menenou of Thutmose I$^{st}$.

importance both on the cultual and political levels, as well as the expression of the king's power ? We know that the rulers of Kerma allied with other populations to defend their territory. The monuments installed outside the precinct, facing the entrances, may be related to the presence of allied chieftains. Their extraordinary dimensions do remind us of the gigantism of the last royal tumuli of the eastern necropolis. Could these be ceremonial palaces as well ?

## The establishment of Thutmose I

It is probably during the last century of the Classic Kerma (1600-1500 BC), marked by many conflicts, that the inhabitants of Dukki Gel are forced to abandon their town, soon invaded by the Egyptians. The precinct and most of the monuments, with the exception of two temples, are levelled down. The architectural program realised under Thutmose I comprises three impressive temples as well as two ceremonial palaces partially established on the remains of the levelled off precinct and of the large circular monuments (figures 22 and 23). The south-western one is

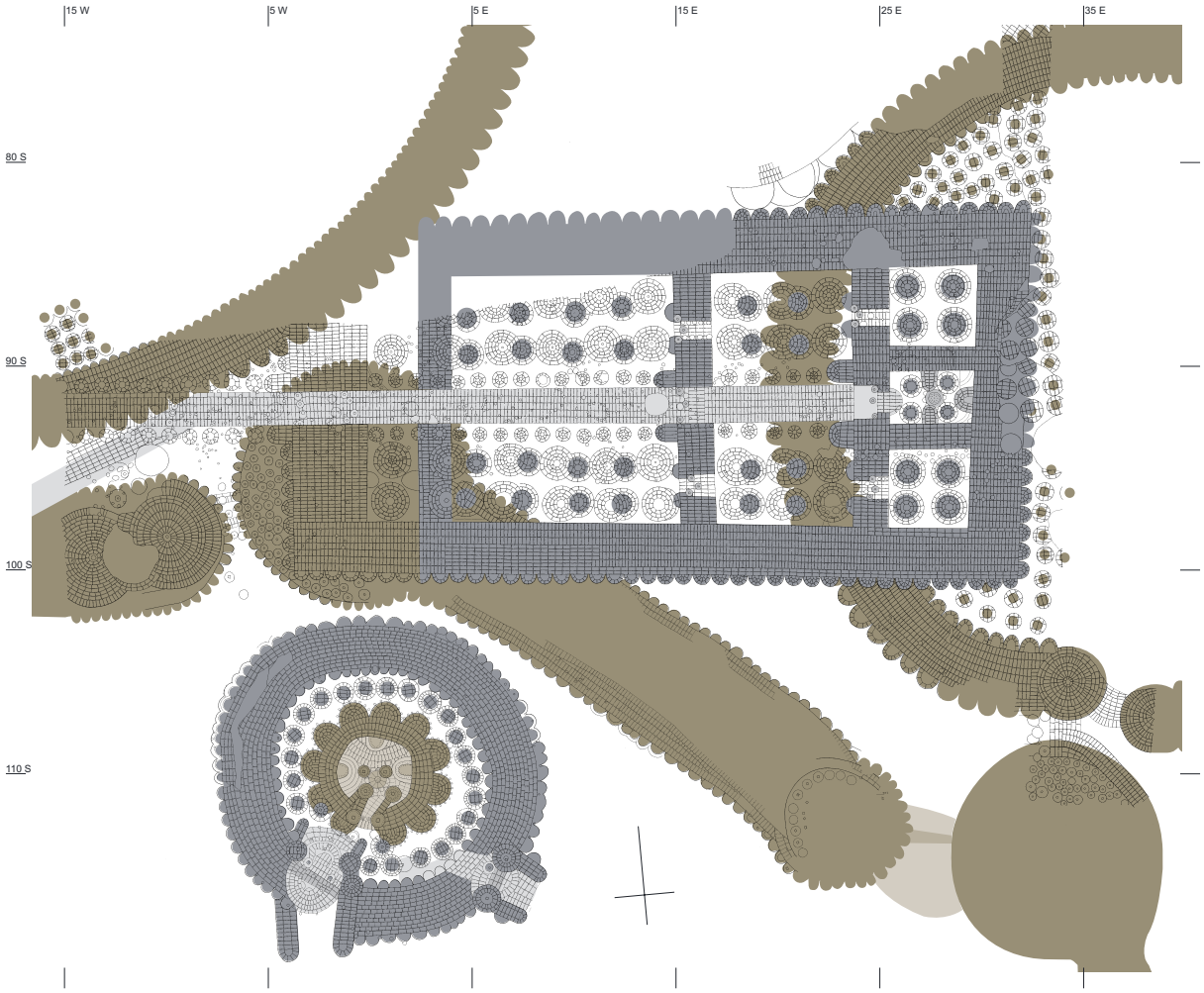


Figure 23 | Plan of the ceremonial palace of Thutmose I[st] established on the remains of the large circular monuments.

Figure 24 | General view of the north- eastern palace of Thutmose I$^{st}$, rebuilt by Hatshepsut.

about 70 m long, its western extremity is destroyed, probably during a revolt under the reign of Thutmose II. In the destruction layers were still preserved the domestic ovens of a Napatan dwelling installed on Classic Kerma strata.

Another edifice, measuring about 35 to 40 by 18 m, was entirely cleared to the north-east (figure 24). Its thick walls are strengthened outside by small semi-circular buttresses. An avenue paved with mud-bricks would link it to the eastern temple. It was probably covered, as it was delimited by columns and perhaps a low wall, a hypothesis reinforced by the presence of a door, more than ten meters away from the front wall. The width of the opening in the front wall is suggested by door post holes and the position of the middle bolt. As is often the case in Dukki Gel, the door post holes are made of a hardened silt ball of good quality, on the surface of which traces of wear can clearly be seen, forming a depression. The first chamber comprises 24 columns forming two rows on each side of a central aisle arranged in the same axis as the one leading to the temple and then to the second hypostyle hall, which comprises 12 columns. The columns forming the central aisle are distinguished by their small diameter. Three doors open through the transversal wall separating the two hypostyle halls. The back of the edifice comprises three chambers. Each of the lateral rooms is equipped with four columns. They are accessible from the second hypostyle hall by subsidiary doors, their opening being strengthened by posts, at least in its lower parts. The axial room, measuring 4.10

by 2.60 m, shows a somewhat lower level. It was reached by passing through a double-door and going down two rounded steps (figure 25). Curiously, it shows the same features as those described above for the two Nubian palaces, i.e. a pedestal or offering table placed under a canopy and three seats, which were also made of mud-brick and galous. Their perimeter is also marked by rows of reed-sized small holes. We could note that the column bases supporting the canopy and the lateral seats encroach upon the edges of the pedestal.

The excavation of the hypostyle halls have revealed a more ancient phase : the original building was 6 m shorter, the first hypostyle hall being equipped with 4 rows of 5 columns only. Their location is clearly visible, as the new foundations are slightly shifted in comparison to the previous ones. Traces of rubefaction show the destruction of the first edifice which had been levelled off. On the base of these observations and by considering the historical data, one can imagine that the palace was built by Thutmose I, then destroyed by a Nubian coalition and finally rebuilt under Thutmose II and Hatshepsut.

Figure 25 | The throne-room of the ceremonial palace of Hatshepsut.

## Restoration works at the sites of Kerma and Dukki Gel

A large-scale program of protection of the remains and of presentation of the excavated sites has been underway for several years, aiming at minimizing the damages caused by wind erosion, visitors and the many burrows dug by wild dogs. As many as 131,000 medium-sized mud-bricks were moulded and used to protect the remains and to reconstruct the plan of the most significant structures, i.e. one of the Nubian circular palaces (figure 26), the eastern temple of Thutmose I and the palace of the same king to the south-west. The originality of the site of Dukki Gel, where several architectural traditions were expressed, is thus more easily perceived. The Egyptian mud-brick architecture perceptively differs from the stone patterns and uses other technical solutions to solve static problems. We notably see that the deep circular foundations of the columns occupy the whole surface of the chambers. In the ancient city, restoration works were notably carried out on defence edifices and structures related to a communication route apparently leading to the Nubian establishment of Dukki Gel. Parallel to the studies carried out in the field, ongoing trials with 3D computer graphics will help to get an idea of the height and inner layout of the monuments.

Figure 26 | A Nubian ceremonial palace after restoration.

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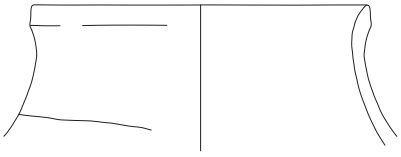

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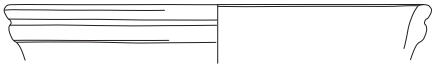

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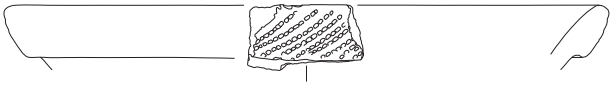

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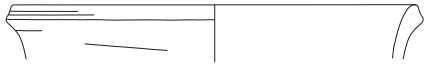

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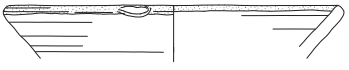

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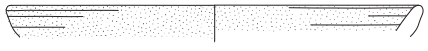

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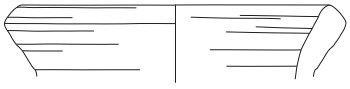

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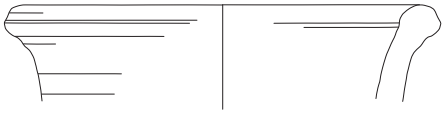

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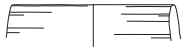

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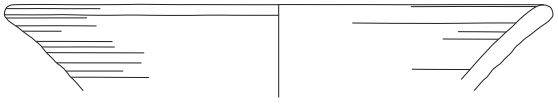

18.

# THE POTTERY OF DUKKI GEL (2011-2012 CAMPAIGN)

The 2011-2012 campaign at Dukki Gel focussed on two areas situated next to the three Egyptian temples excavated during the previous campaigns. These two areas, to the south-west and north-east of the pharaonic sacred buildings, are distinguished by a more or less important accumulation of sand mounds directly covering the brick remains levelled off since the conquest of the kingdom of Kerma by Thutmose I and then along the architectural development of the town.

We are thus facing first a mixed pottery material coming from the mounds and testifying a very long occupation of the site (from the Classic Kerma to the Meroitic Period), and second a material preserved in the layers of remains, or caught in the masonries, which informs us on the occupation of the different buildings uncovered.

To the south-west, the excavation of a long pharaonic building of palatial type probably dating back to the reign of Thutmose I (Bonnet 2010: 23-24; 2011: 29-30), started in the previous campaigns, was continued. The western end of this edifice, entirely destroyed, was replaced in the Napatan period by a small construction poorly preserved and inserted in a space marked by the presence of several ovens of the same type as those observed in the large area of the bakeries and butcheries to the west of the temples (Bonnet 2005: 233-235). A large jar typical of this period (Ruffieux 2007: 223 [17-20]), its neck broken and recarved, was deposited close to one of these ovens and contained animal remains (bovids and caprids, identification courtesy of Veerle Linseele).

Several circular mud brick structures as well as a precinct wall and its door, of Nubian style and preceding the Egyptian palace, would occupy this perimeter, yielding a small amount of very fragmentary material dating back to the New Kingdom and mainly of the Classic Kerma. If the lack of clearly identifiable shapes prevents a more precise typological analysis, the association of these two traditions and their proportional repartition allows to date these buildings to the early 18$^{th}$ Dynasty.

The entrance of a large circular construction was identified to the south of the precinct. The presence of this building seems confirmed by a sondage carried out about 30 m to the south. The few sherds gathered on the remains pertain exclusively to the Classic Kerma tradition.

The north-eastern area has required most of our attention. The clearing of a large Egyptian palace oriented to the east and erected to the south of the ceremonial palace of Thutmose III has yielded a very fragmentary pottery, where the traditions of the New Kingdom and of the Classic Kerma are almost equally represented. The Egyptian ensemble comprises fragments of beer jars and storage jars, with a

Figure 27 | (Left page) Egyptian and Nubian pottery found at Dukki Gel.

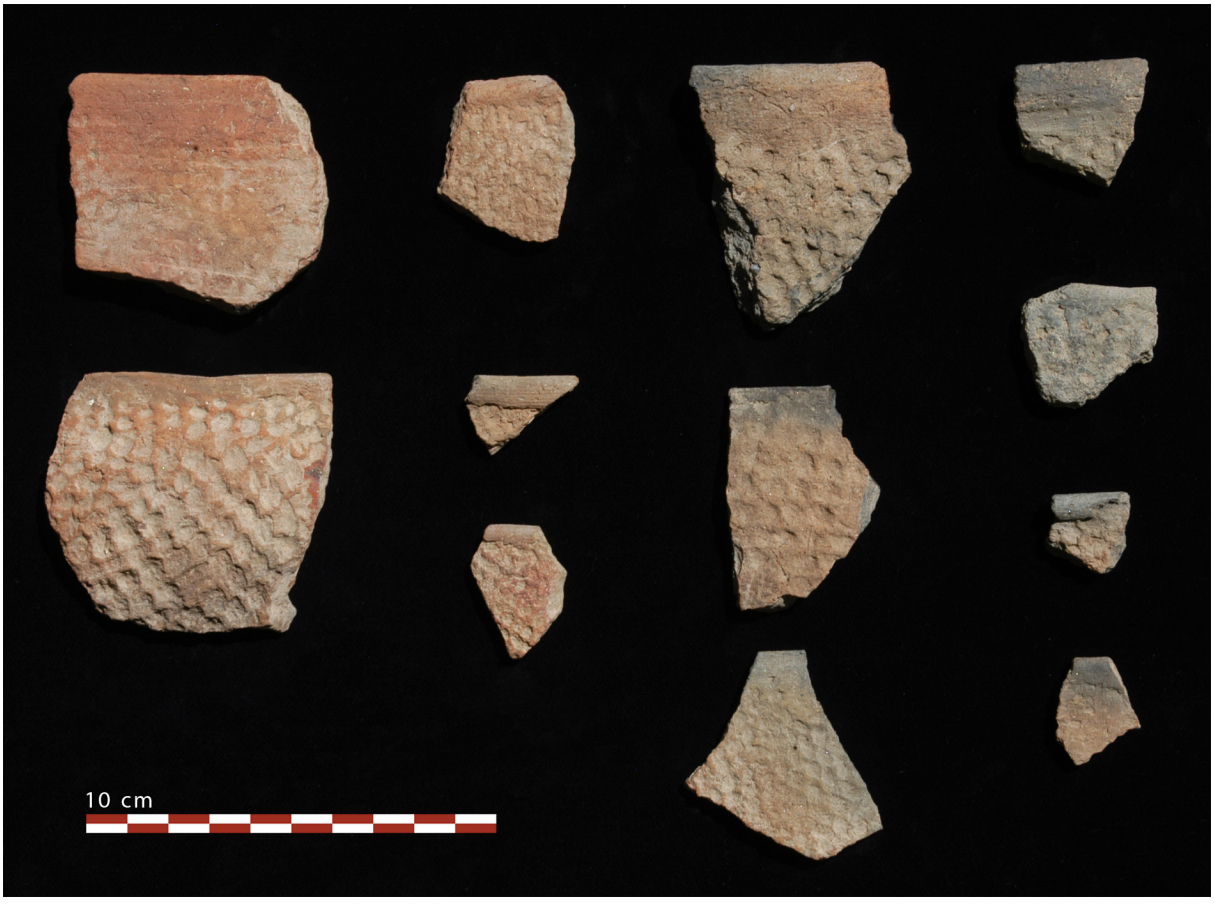


Figure 28 | Mat impressed rough Nubian ware.

specimen decorated with a red slip and vertical burnish (see Ruffieux 2010: 27, figure 24; 2011: 36, fig. 28), plates (figure 27.1), large bowls (figure 27.3), 'flowerpot' beakers, and miniature vessels. The Nubian pottery is represented by vessels made of a black polished paste (figure 27.4), 'tulip' vases as well as an unpolished pottery, with incised patterns or imprints of basketry (figure 27.2) on the surface. This ensemble is clearly reminiscent of the one uncovered during the clearing of the eastern Egyptian temple in 2010-2011, and apparently dates back to the same period (Ruffieux 2011).

To the north-east and to the east of this building, the discovery of a large circular edifice with columns pertaining to the Nubian tradition yielded an ensemble of the Classic Kerma, comprising black polished or red polished with black top bowls and large bowls (figure 27.5), 'tulip' vases with silvery stripe (figures 27.6, 29.2), globular polished jars with black rim (figures 27.7, 27.9, 27.11 and 29.1), or with broad vertical, converging or diverging rim, decorated with impressions (figures 27.8, 27.10 and 30), as well as pots with a rough paste and basketry imprints on the surface (figure 28).


Figure 29 | Polished Classic Kerma ware.

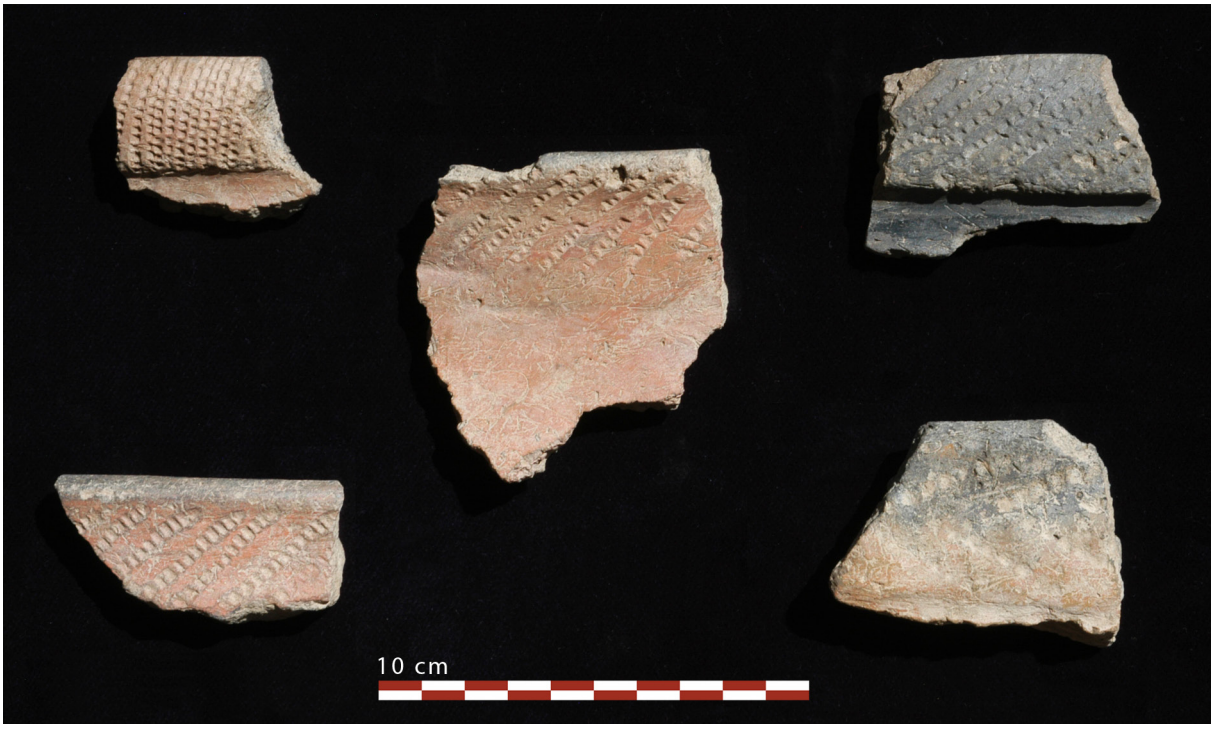


Figure 30 | Impressed Classic Kerma ware.

This material, very similar to the one found in the royal tomb of the western necropolis of Kerma (Bonnet 2000: 145-146, Privati 2000: 188-192), apparently dates back to the end of the Classic Kerma, i.e. the 'Kerma Classique V' in Privati's classification (Privati 2004: 186).

Associated with the Kerma material, but clearly representing a minority, the Egyptian pottery shows features of the early 18th Dynasty and comprises storage jars (figs. 27.14 and 27.15); moreover, one of the vessels of the zir type (figure 27.15) is also attested in other sites of Upper Nubia at the same period, notably in Sesebi (Spence, Rose *et al.* 2011: 37, fig. 5, 11/131), or in Sai (Budka 2011: 27, pl. 4). Beer jars and large bowls (figure 27.18) are also found, as well as bowls with red rim (figure 27.12) or with a burnish on a red slip (figure 27.13), sometimes with a creamy-white slip, libation beakers of the 'drop pot' type (figure 27.17), comprising a rounded base showing traces of finishing with a blade (figure 27.16). The whole of this Egyptian material is generally made of an alluvial fabric NILE B1 or NILE B2.

The presence of another huge circular building to the north of the palace of Thutmose I was confirmed by a sondage in which were found many sherds of the Classic Kerma and which, according to our first observations, pertain to the same typology. It is probably contemporaneous with the former.

At the end of this excavation campaign at the site of Dukki Gel, one observes a transition in the pottery register: the most ancient structures discovered to this day, the architecture of which is clearly different from those of the Egyptian period, yield ensembles of the Classic Kerma – thus representing the first archaeological contexts dating back to this period at the site – in which 15 % of Egyptian pottery witness the growing influence of the pharaonic state. This balance of power is apparently reversed from the beginning of the conquest of Thutmose I (Ruffieux 2011: 36), and is later even stronger.

Moreover, it is interesting to note that the composition of the pottery ensembles remains in accordance with the apparently mainly political and religious role of this site, thus excluding pottery used for domestic or handcraft purposes and concentrating on the religious and cult practices.

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SUMMARY




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