

# New Data on Animal Exploitation from the Mesolithic to the Neolithic periods in Northern Sudan

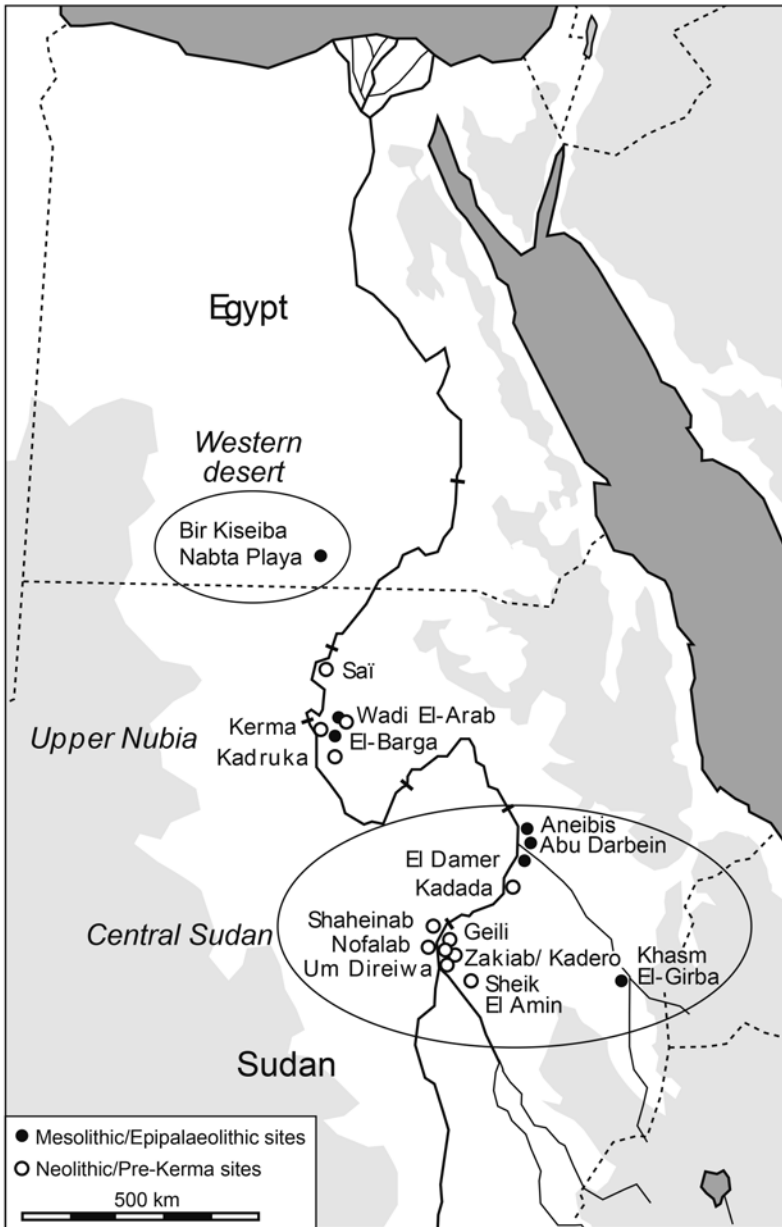
*Louis Chaix and Matthieu Honegger*

## Abstract

Northern Sudan and southern Egypt are important regions for the understanding of climatic variations at the beginning of the Holocene period and of the first steps towards the adoption of domesticated cattle in Africa. However, insufficient research has been conducted to propose a precise scenario of these phenomena, and the archaeological sites considered are often very eroded. This is particularly the case with the well known sites of the Nabta Playa area (Wendorf & Schild 2001). There is still much discussion, therefore, about the dating of these sites, about the chronological homogeneity of the remains collected and the high degree of fragmentation of animal bones (e.g. Wengrow 2003). The scenario of the first steps in local cattle domestication in southern Egypt at the beginning of the Holocene remains a hypothesis more than a demonstration.

## Introduction

The Holocene chronology of human occupations is relatively well known in two regions of the Nile valley (fig. 1). In Lower Nubia, the sequence of Nabta Playa and Bir Kiseiba, 200 km west of the Nile, is the most complete, from 8800 to 3000 BC. This sequence shows very early, and controversial, indications of pottery manufacture and cattle domestication (Wendorf & Schild 2001). In the south, central Sudan is rich in sites from the Mesolithic and Neolithic periods (from 7000 to 3500 BC), but the introduction of domesticated cattle occurs more than 3,000 years later than in Lower Nubia. Between these two regions more than 700 km apart, we have tried to build a new chronological framework in the area of Kerma, south of the Third Cata-



**FIGURE 1.** Map of Egypt and Nubia with the localisation of the main area where a chronological framework was established for the Holocene pre-history. Between them is located the area of Kerma from where are coming the new data presented in this paper. Other sites mentioned in the text are indicated.

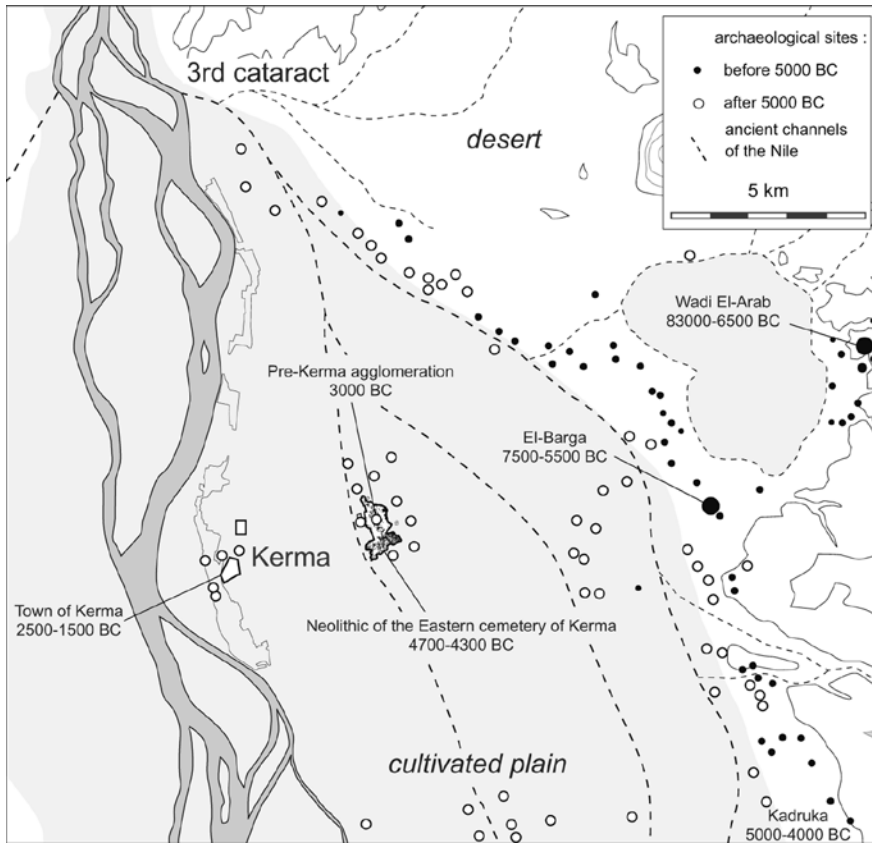
ract, to follow the evolution of human societies during the Holocene period. We want to present here the main results of animal exploitation from the Mesolithic to the Neolithic, and even later periods. We will then propose a synthesis of the process of cattle adoption in northeastern Africa, including its relation with climate fluctuations and cultural influences.

## Archaeology in the Kerma Area

In the last ten years, survey work and excavations undertaken in the Kerma region have brought to light remains from several periods. Four hundred and forty sites have been identified (Honegger 2007; Honegger et al. 2009). A great number of them are eroded and partially destroyed by agricultural fields, but others are better preserved and are, occasionally, of significant archaeological interest. The spatial distribution of sites shows a distinctive split between the occupations located on the alluvial plain and those outside, along the desert edge.

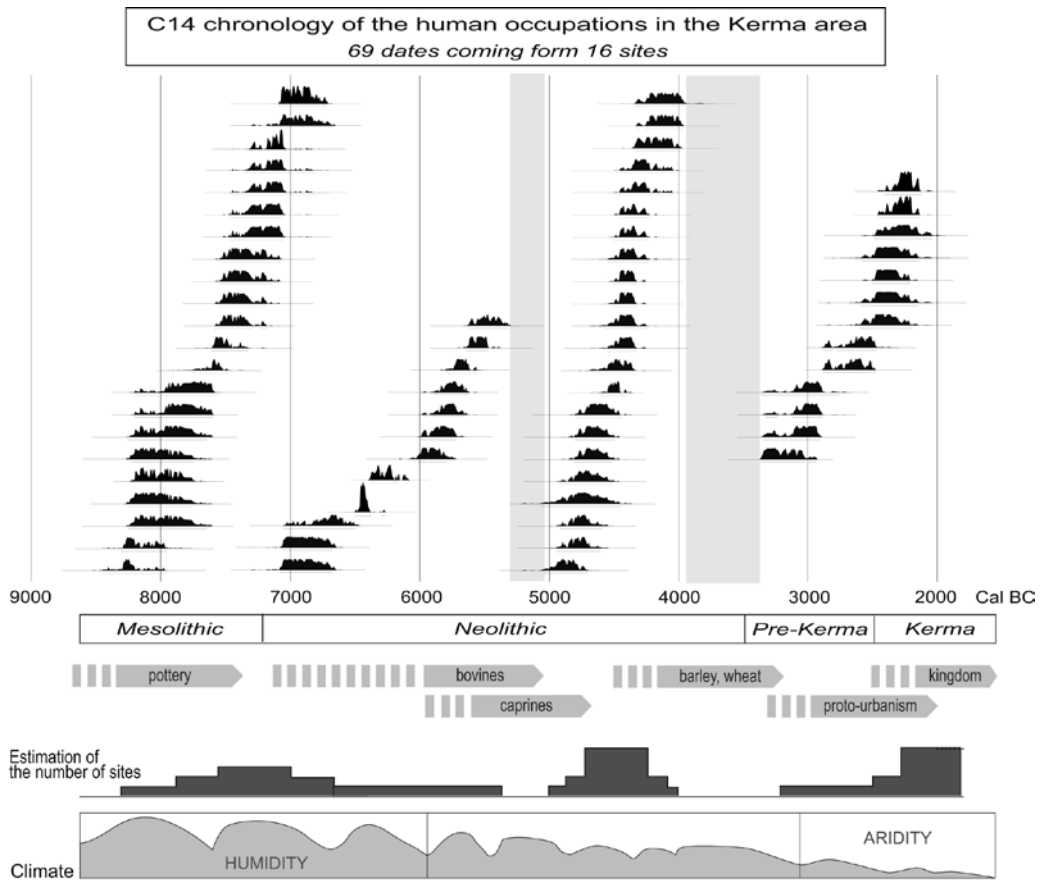
The sites of the first half of the Holocene period are located outside the alluvial plain and correspond to an older and more humid climatic phase (fig. 2). Access to the alluvial plain might have been difficult and human groups thus preferred settling on small mounds near its edge, safe from the Nile flood. They also settled around a wide depression, which was filled by an ancient swamp fed by rainwater and Nile floods. The most important sites excavated are Wadi el-Arab and el-Barga (Honegger 2006; Honegger et al. 2009). The first contains stratified layers with settlements and graves dated from 8300 to 6500 BC. The second has revealed a habitation structure dug into the sandstone bedrock and includes an important archaeological assemblage dated to about 7400 BC. Two cemeteries were found nearby that were in use from 7800 to 5500 BC.

The sites of the second half of the Holocene period correspond to a more arid climate and, logically, they are found within the alluvial plain nearer to then-extant Nile channels. These sites belong to different archaeological periods such as Middle Neolithic, Pre-Kerma, Kerma, Napatan and Meroitic periods as well as later ones. The most important are eroded habitation sites partially washed away by Nile floods. We have also included in our study cemetery sites from the region of Kadruka, often located at the same zone as settlements, from which faunal remains were collected.



**FIGURE 2.** Map of the Kerma area showing the distribution of the sites during the Holocene period. The most important of them are indicated and were excavated during these last 15 years or are still excavated today.

According to a recent study on climatic changes in the eastern desert (Kuper and Kröpelin 2006), there is a change in the location of human installations during the Holocene. This occurred around 5500 and 5000 BC and is signaled by the shifting of sites closer to the Nile River. In Kerma, we observe the same phenomena but at a local scale. The difference with Kuper and Kröpelin's study is that the sites at Kerma before 5500 BC are much closer to the alluvial plain than in Egypt, where they are located further in the desert. This situation is due to the fact that the authors did not include



**FIGURE 3.** Chronological framework of the Kerma area obtained with 69  $^{14}\text{C}$  dates made between 8300 BC and 2000 BC. The principle innovations are indicated as well as an estimation of the number of sites for each period and the schematic climatic fluctuation (after Hassan, 2002).

in their study all the dated sites located between the second and the fifth cataract, which means that their appreciation of the situation in the Sudanese Nile valley during the Holocene is not really representative.

In Kerma, the chronological and cultural frameworks are known from 8300 BC to the present with exceptional continuity (all the dates in BC are calibrated). More than 60  $^{14}\text{C}$  dates were obtained from sites that show original cultural features from Epipalaeolithic times to the ancient Kerma period (Honegger 2009; fig. 3). They include the results obtained by our col-

league Jacques Reinold on the cemeteries of Kadruka (Reinold 2000, 2001 and 2004). The chronology is interrupted by two gaps and we do not know if the absence of sites during these periods is linked to climatic changes, demographic decrease or if it results from the current state of research. Trial or long-term excavations of important sites were made in order to understand the major evolutionary stages of Nubian societies, such as the invention of pottery, the shift to a sedentary way of life, the transition to stockbreeding and agriculture, and urbanisation and state formation (Honegger 2009). An estimation of the number of sites grouped according to periods shows a typical situation for the Sudanese Nile valley: a high density of Epipalaeolithic (Mesolithic), Middle Neolithic and Kerma sites. The most problematic gap is that of the fourth millennium. It corresponds to Predynastic times in Egypt and it is difficult to understand why there are so few sites dated to this period in Upper Nubia.

The analysis of pottery style and technique offers the possibility of reconstructing the cultural influences between the different regions (Honegger and Gatto, in prep.):

- The first pottery found in Kerma, dated to around 8300 BC, consists primarily of sherds decorated using the return technique. No comparison is known except in Acacus (Libya), where this decoration is present at a later period.
- The el-Barga style pottery (7800–7200 BC) is characterised by a monotonous decoration composed of alternating pivoting stamps. We find similar decorations between the Second and Third cataracts, and in the Nubian Desert. It appears to be a regional cultural group distinctive from that of Nabta Playa and Central Sudan.
- The next phases were identified in Wadi el-Arab. They developed between 7200 and 6200 BC and can be related with the sequence of Nabta Playa, with the Nabta and the el-Jerar phases. We will see that the first introduction of domesticated cattle dates to this period.
- Finally, the Middle Neolithic phase (5000–4000 BC) is characterised by burnished pottery, with the first evidence of red and black top ware, and ripple ware decoration. Today, there is no attempt to define regional cultural variations, but such characteristics can be found on Badarian pottery as well as on Abkan and central Sudan Neolithic ceramics. This is the period of fully fledged pastoral societies.

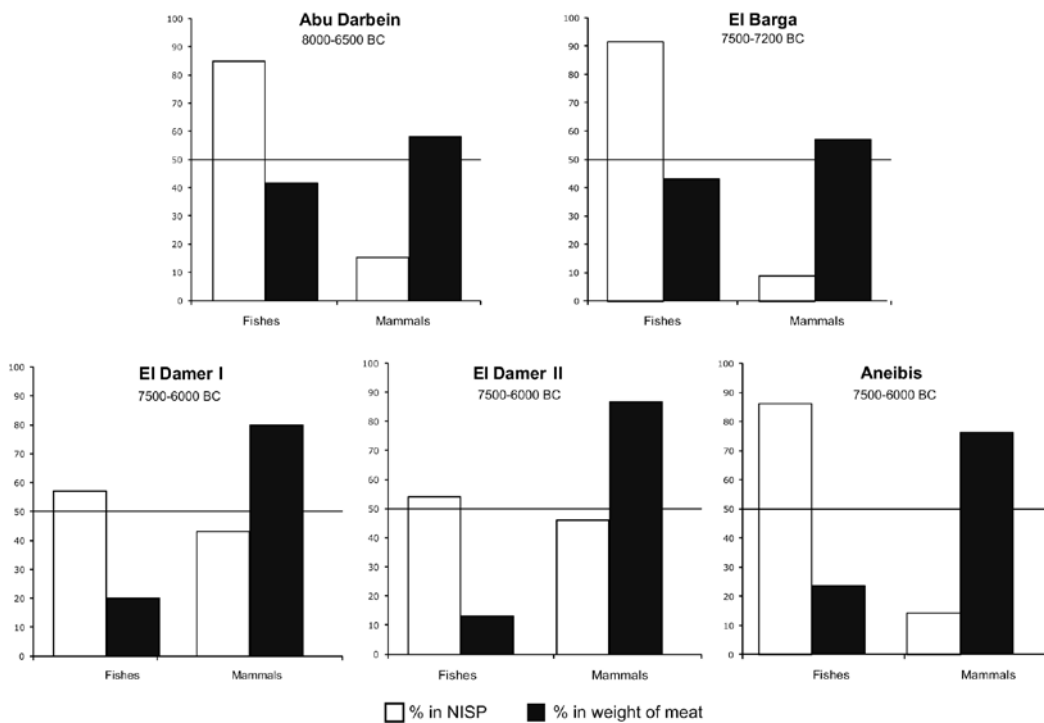
## Analysis of faunal remains

### *Mesolithic (8300–7200 BC)*

In the area of Kerma, the Mesolithic period is known from sites such as el-Barga and Wadi el-Arab. The study of the faunal remains attests to a broad spectrum economy” with the exploitation of a multitude of environments, characterised by large amounts of aquatic resources in terms of number of specimens (Peters 1995). However, if we speak of the quantity of meat available, this vision must be corrected as mammals, particularly bovines, represent, by weight, the main source of proteins (fig. 4). Domesticated cattle are not known at this time in Sudan.

The Mesolithic sites in our area and also in central Sudan are clearly linked to the Nile or to other permanent rivers like the Atbara. The proportions of fish and molluscs are high in terms of NISP (number of identified specimens) and the rest of the spectrum shows the presence of various animals from the deciduous savannah, which had a pluviometry of between 300 and 400 cubic cm per year (Peters 1991 and 1995). Amongst the mammals, the presence of giraffes and elephants is indicative of large trees, and different bovids are clearly linked to riverine forests. Medium and small antelopes form the bulk of the game species. Meanwhile, some gazelles (such as *Gazella dorcas*) indicate hunting activities in more arid zones. Reptiles, tortoises and snails are not rare but they represent, like birds, marginal activities. In contrast to the Egyptian Nile valley, wild cattle are unknown in the Kerma area, as in central Sudan, with the exception of Khashm el-Girba in the Atbara region, a site dated to around 10,000 BC (Marks et al. 1987; Peters 1986; Linseele 2004). This last site is problematic because among all the sites of the early Holocene period in Sudan, it is the only one that contains wild cattle. In our view, there are two possible explanations for this: either it belongs to an isolated ecological area disconnected from the other sites and their environments, or there is a problem of connection between the <sup>14</sup>C sample, the lithic industry and the faunal remains, which is a relatively common situation in north African archaeology. As we have seen above, fish are abundant and varied. Some specimens are quite large: amongst the Clariidae at el-Barga, two individuals measure more than one metre and two Nile perch exceed 1.50 metres.

The analysis of the faunal remains from the different sites in our area and



**FIGURE 4.** Proportion in different Mesolithic sites of the number of mammals bones and fishes (NISP) compared to the weight of meat calculated on the same samples (after Peters 1995). If the fish remains are much more numerous, they represent often a small part of the alimentation.

in central Sudan indicates that Mesolithic people had a sedentary way of life linked to the presence of a permanent water source and within a limited area. The presence of cemeteries is another indication of a non-mobile population.

#### *Ancient Neolithic (7200–5500 BC)*

Few sites from this period are known in our area and the faunal remains are scarce and badly preserved. The majority come from surface sites with the well-known problem of differential preservation, except for the site of Wadi el-Arab where we can observe stratified layers of 40 to 70 cm. Despite the scarcity of the recovered remains, the few finds indicate a deep change:

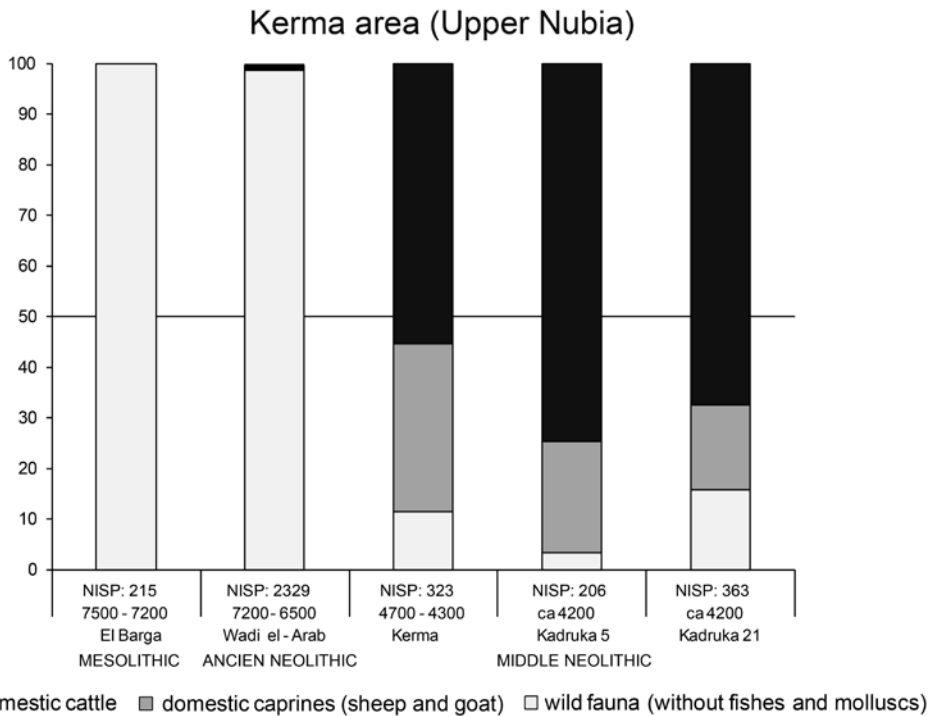


the appearance of domestic cattle in very low proportions (fig. 5; Honegger & Chaix, in prep.). With the exception of these rare remains of domestic bovines, the majority of the fauna consists of game animals (such as elephant, various bovids and warthog). It is important to note that caprines, originating from the Middle East, are not present in the layers of this site. Fish and molluscs were also exploited, but in many cases the preservation of the site can explain their paucity or even their absence.

At el-Barga, a grave dated about 5750 BC revealed a cattle skull (bucranium), deposited on the body of a child (Honegger 2005). This deposit is proof of the importance of cattle in funerary practices and in society and it means that this cemetery of el-Barga (6000–5500 BC), with more than 100 graves, is the most ancient cemetery known in Africa from Neolithic times. It is possible that the economic importance of bovines was growing during the sixth millennium and that the numbers of this animal increased, but the few sites of this period known in the Kerma area do not present enough evidence to confirm this. Cattle graves are known in other places in the Sahara at the same period, such as the grave found in Nabta Playa and dated to about 5400 BC (Paris 2000; Gautier 2007b; Wendorf and Schild 2001).

#### *Middle Neolithic (5000–4000 BC)*

This period is attested in the area of the Third Cataract by some sites, mainly found on the surface. Furthermore, we have added two sites located south of Kerma – Kadruka 5 and 29 – which also date to the fifth millennium. Three of these sites each delivered more than 200 bones, a number large enough to be statistically interesting and upon which some conclusions may be drawn. Despite the problems of preservation, one can observe that in all these settlements cattle are clearly dominant, followed by caprines where sheep and goats are attested. Wild animals are very rare and hunting activities do not represent a substantial part of the economy. Fish remains are generally not preserved, except for some large vertebrae. Many graves of the cemeteries at Kadruka contain cattle skulls located close to the body (Reinold 2004, 2006). In central Sudan the sites from the Middle Neolithic are numerous and relatively well studied (Sobocinski 1977; El Mahi 1982; Gautier 1983; Chaix 2003; Gautier 2007a). Even if the samples vary – from a few dozen determined bones to nearly a thousand specimens – the trend is the same with a substantial dominance of cattle and caprines compared with the disappearance of the wild animals.



**FIGURE 5.** Comparisons of the faunal spectrum between different sites from Kerma area.

To us, this period shows the most important change, namely pastoralism becoming the principal way of life and announcing the first complex pastoral societies. Rare measurements and observations show that the cattle were strongly built animals with long horns, very similar to those later found at Kerma (Chaix 2007a and forthcoming b).

#### *Late Neolithic/Pre-Kerma (4000–2500 BC)*

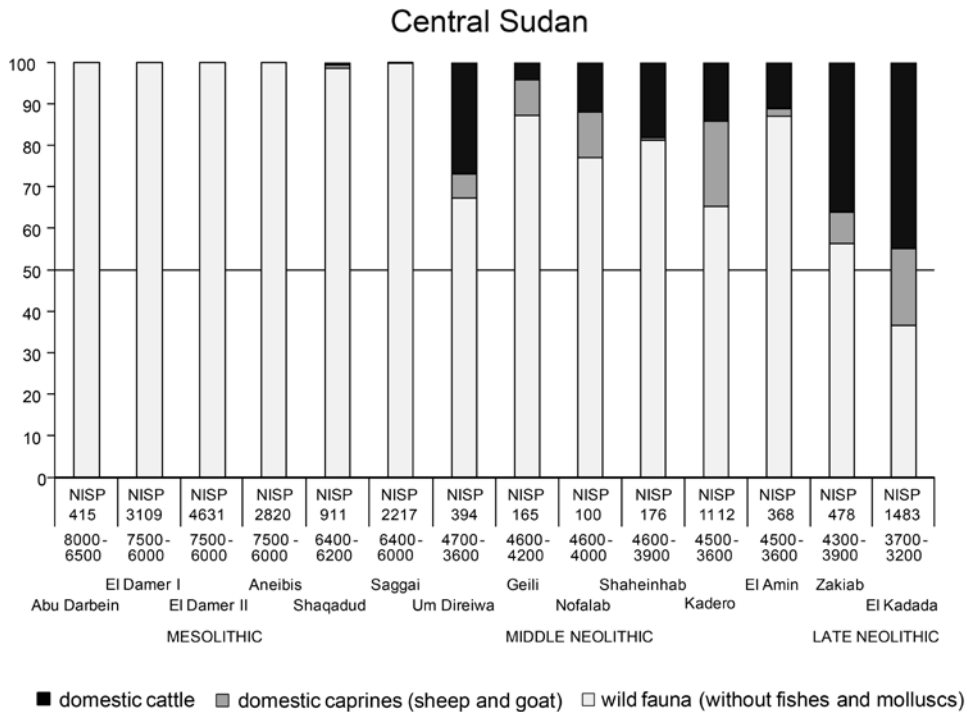
Pre-Kerma culture, which is contemporary with the A-Group in Lower Nubia (Predynastic period), is known from a few sites located between Kerma and the Second Cataract. At Saï Island (2900–2600 BC; Gueus 2004), many storage pits have revealed faunal remains where caprines (sheep and goats) are clearly dominant and cattle represent only a small part of the total (Chaix, forthcoming a). On Site No. 21 at Kerma (Honeg-

ger 2004), cattle come in first place with seven bones from a total of eleven discovered.

This suggests that the Pre-Kerma culture (3500–2500 BC; Honegger, 2004), with one of the first agglomerations known in Africa (fortified and comprising several cattle enclosures) is the forbearer of the Kingdom of Kerma (2500–1500 BC). As at the capital of Kerma (Bonnet and Valbelle 2004) or the rural settlement of Gism el-Arba (Gratien et al. 2003), the exploitation of the animal world is entirely based on stockbreeding of cattle and caprines, forming more than 90 % of the fauna (Chaix 2007b). Since Middle Neolithic times, cattle played an important role in the beliefs and ideology of the communities (Chaix and Grant 1992). It is regularly implied in the funerary tradition with bucrania placed in or near the graves. The most spectacular example is the deposit of 5,600 skulls close to a Middle Kerma grave dated c. 1900 BC (Chaix 2001; Chaix and Hansen 2003).

## Conclusion

The faunal remains of the Kerma area confirm and clarify the scenario of pastoralism spreading from the western desert in southern Egypt to central Sudan. The evidence at Nabta Playa and Bir Kiseiba shows the presence of few cattle – probably domesticated or in the process of becoming domesticated – from 8800 to 6000 BC (fig. 6). Even if these data are controversial, our research in Kerma tends to confirm this local process of cattle domestication which happened before the introduction of caprines, and probably of bovines, from the Middle East around 6000 BC (Blench and MacDonald 2000; Hanotte et al. 2002; Pérez-Pradal et al. 2010). In Kerma, the first occupations analysed reveal a typical Mesolithic economy such as that known in central Sudan for the eighth millennium. Wild or domesticated cattle are not present. The next phase, which was called Ancient Neolithic, is characterised by an economy very similar to the Mesolithic one and is mainly based on hunting and fishing, but with the presence of a few cattle bones. This phase begins around 7200 BC at Wadi el-Arab and ends in the 6<sup>th</sup> millennium. The situation is different in central Sudan where this phase is not yet represented and where we see a quick transition from a Mesolithic way of life to full pastoral societies. The pastoral economy appears in our area only with the Middle Neolithic, between 5500 and 5000 BC, where the faunal spectrum is clearly dominated by bovines and caprines. It is in this period



**FIGURE 6.** Spread of the pastoral economy from the North (Nabta Playa) to the South (Central Sudan) between 8800 BC and 5000 BC (after El-Mahi, 1982; Gautier, 1983, 1986, 2007; Chaix 2003).

that the first dogs appear in cemeteries and that the first attempts at the cultivation of barley followed by wheat are made (Reinold 2000).

The terminology used in Sudanese Holocene prehistory has been criticised on many occasions for being too influenced by European traditions. The term Mesolithic introduced by Arkell (1949) could be replaced by Epipalaeolithic or Pre-pastoral phase (Garcea 2004) where it would be important to distinguish if the pottery is present or not. The term Ancient Neolithic, that we use according to Wendorf's terminology, is characterised by an economy based essentially on game, gathering and fishing and is not very different from the term Mesolithic. It could be called the Proto-pastoral phase. Finally, with the Middle Neolithic there is a shift towards the emergence of a full pastoral economy.

If the diffusion of the Ancient Neolithic (or Proto-pastoral phase) from Nabta Playa to central Sudan takes time, we see a quick spread of the full pastoral economy from north to south at a moment that corresponds to the main climatic change, if we consider the work of Kuper and Kröpelin (2006). With more arid conditions, populations settle close to the Nile River and in other humid ecosystems. As mentioned in different works since ten years ago (see for instance Hassan 2002), dryer climatic conditions and the necessity of adaptation to these new conditions can stimulate the adoption of innovation, which is probably the case with the quick spread of pastoral way of life in Northern Africa.

## Note

This paper was written in November 2010. Since this date, our researches in the area of Kerma do not confirm the presence of cattle or of *aurochs* before 6000 BC. It means that the long process of local domestication supposed by the discoveries of Nabta Playa and Bir Kiseiba is not confirmed by our results.

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