
PALAEOLITHIC BIG GAME HUNTING AT HP766 IN
WADI UMM RAHAU, NORTHERN SUDAN



Achilles Gautier, Daniel Makowiecki, Henryk Paner & Wim Van Neer

Abstract


HP766, discovered by the Gdansk Archaeological Museum Expedition (GAME) in the region immediately upstream the Merowe Dam in North Sudan and now under water, is one of the few palaeolithic sites with animal bone remains in the country. The archaeological deposits, the large size of the site, the lithics and the radiocarbon dates indicate occupation of a silt terrace of the Nile in late MSA and perhaps LSA times. Large and very large mammals predominate markedly among the recovered bone remains and it would seem that the palaeolithic hunters focused on such game. They could corner these animals on the site which is partially surrounded by high bedrock outcrops. Moreover swampy conditions of the site after the retreat of the annual Nile flood may have rendered less mobile the prey animals. According to this scenario, HP766 would testify to the ecological skills and generational memory of late prehistoric man in Sudan.

Résumé


HP766, découvert par la Gdansk Archaeological Museum Expedition (GAME) dans la région immédiatement en amont du Barrage de Méroé au nord du Soudan et maintenant sous eau, est un des rares sites paléolithiques avec des restes animaux dans le pays. Les dépôts archéologiques, la grande superficie du site, les artefacts lithiques et les dates au radiocarbène indiquent l'occupation d'une terrasse de silt du Nil au cours du MSA tardif et peut-être du LSA. Les mammifères de grande et de très grande taille prédominent parmi les restes osseux recueillis et les chasseurs paléolithiques paraissent s'être concentrés sur ce gibier. Ils pouvaient piéger ces bêtes sur le site en partie barré par de hauts affleurements de la roche mère. En outre, les conditions marécageuses du lieu après le retrait de l'inondation annuelle du Nil pouvaient rendre moins mobiles les animaux piégés. D'après ce scénario, HP 766 témoignerait du savoir écologique et de la mémoire générationnelle de l'homme préhistorique tardif au Soudan.


Keywords: Archaeozoology, hunting strategies, Palaeolithic, Sudan


Achilles Gautier  achiel.gautier@ugent.be

 Research Unit Palaeontology, University of Ghent, Belgium


Daniel Makowiecki  makdam@umk.pl

 Institute of Archaeology, Nicolaus Copernicus University, Torun, Poland

Henryk Paner  h.paner@archeologia.pl

 Gdansk Archaeological Museum, Poland

Wim Van Neer  wim.vanneer@naturalsciences.be

 Royal Belgian Institute of Natural Sciences, Brussels, Belgium

DOI 10.3213/2191-5784-10222 Published online October 27, 2012 © Africa Magna Verlag, Frankfurt M.

The Gdansk Archaeological Museum Expedition (GAME), directed by the third author, has carried out fieldwork in Sudan since 1993. It has explored the Fourth Nile Cataract Region east of the planned Merowe dam. The archaeological project originally known as the Hamdab Project discovered numerous sites of varying age (PANER 1998, 2003; PANER & PUDLO 2010). Of special interest is the site labeled H(amdab) P(roject)766, as it yielded a rich harvest of Palaeolithic artifacts and animal bones. Such associations are extremely rare in Sudan and this paper concentrates on the site which is now unfortunately under water.

HP766 lies in a bend of the north-western sector of Wadi Umm Rahau (*Fig. 1*) at the foot of a rocky ridge, approximately 2 km north of the village of El Argub, about 40 km north-east of the town of Karima (18°49' 46.45" N; 32°01' 49.52" E) and some 1800 m from the present-day main Nile channel. Between the site and the Nile a palaeochannel appears to be present. The site lies about 12 m above lower Nile level, *ca* 4 m above the general floor of the wadi and is cut by a small seasonal channel. It extends over some 9000 m² and is enclosed by steep outcrops of the Basement Complex (WHITEMAN 1971: 41, fig. 22) reaching 4 to 8 m above the site, along its western, north-western, northern and north-eastern sides.

Field work at the site took place from early February to early March 2006 and from late February to late March 2007, but this paper deals only with the finds collected in the first season, as the finds of the second excavation have become available for study only recently. Most of the artifacts and bones were collected by hand from the surface. A much more restricted number of finds came to light during the excavation of eight 5x5 m squares (200 m²), further subdivided in one meter squares, of which the spoils were passed through a sieve with a 2x2 mm mesh. In total almost 9000 lithics and some thousand bones were collected. The excavation revealed the following sequence.

Surface and layer 1: eolian sand with weathered silt, gravel, many lithics (8075 finds), 695 bones; thickness 15 to 18 cm.

Layer 2: compact fine sand with broken fossil root casts, much less gravel; lithics (415 finds) and 166 bones; the field notes also refer to the presence of black powdery stuff possibly derived from carbonized material; thickness 7 to 10 cm.

Layer 3: Nile silt with some gravel in the upper part (*ca* 10 cm); lithics (123 finds) and 123 bone remains; excavated to 35 cm below surface. In the test trench within the excavated area of the first season, this silt was excavated to 320 cm below surface.

Marcin Waś (manuscript on file in the Gdańsk Archaeological Museum) attributes most of the lithics to the Terminal MSA and the LSA, but in layer 3 some Neolithic artifacts were registered, indicating late and deep reworking of some parts of the site. Dr Schild (pers. comm.) looked at most of the lithics of layer 1 and 2. The artifacts inspected are abraded but show silt polish. Chips and smallish specimens are lacking, suggesting gravitational sorting, most probably of lithics originally embedded in layer 3. According to Dr Schild the artifacts he saw can be attributed to the late MSA. The faunal collection consists of many fragmented bone remains, with blackish discolorations, many weathering cracks and irregular post-depositional fractures, in a few cases with some adhering calcareous cement. No clear evidence of rolling was observed. The

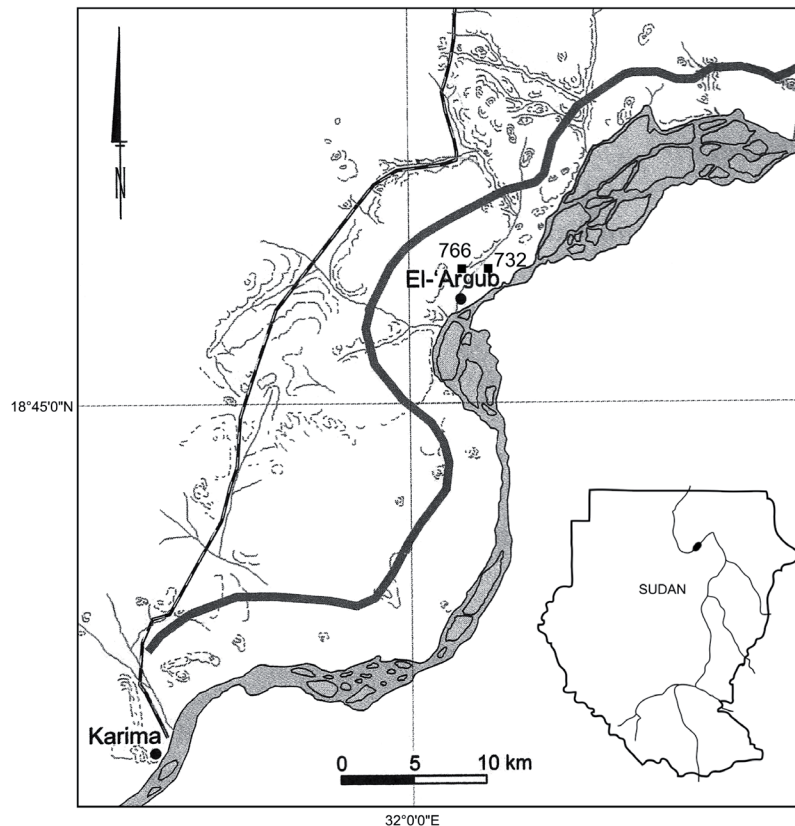


Fig. 1. Location of HP766 and HP732 in the Wadi Umm Rahau, based on the map of the GAME concession.

weathering and discolorations suggest an original burial in slowly accumulating silt. As a result of the weathering and encrustation no clear evidence of butchering or other human activities was detectable on the bones.

The carbonates of six bone samples were radiocarbon dated and calibrated with the program OxCal v.3.10 (samples Poz-17727 and 17732), and OxCal v.4.1.5 (samples Poz-457223, 45725, 45726 and 45727) in the Poznan Radiocarbon Laboratory.

Poz-17727, HP766, square 8, section 23, layer 1 (carbonate):
12360 ± 60 bp.
95.4% probability: 13550 BC – 12950 BC.

Poz-17732, HP766, square 8, section 24, layer 1 (carbonate):
18360 ± 90 bp.
95.4% probability: 20250 BC – 19400 BC.

Poz-45723, HP766, square 1, layer 2/3, inv. no 9 (0.4%N, 3.4%C; carbonate): 17670 ± 110 bp.
95.4% probability: 19481 BC – 18588 BC.

Poz-45725, HP766, square 1, layer 2, inv. no 7 (carbonate):
18310 ± 110 bp.
95.4% probability: 20290 BC – 19541 BC.

Poz-45726, HP766, square 2, layer 3, inv. no 60 (carbonate):
21450 ± 140 bp.
95.4% probability: 24138 BC – 23161 BC.

Poz-45727, HP766, square 6, section 25, layer 3, inv. no 3 (carbonate): 19820 ± 120 bp.
95.4% probability: 22145 BC – 21342 BC.

As is generally the case with dates on carbonates, the results are minimal ages. Marked contamination by secondary carbonates during the fossilization processes in the silt are quite probable. Anyhow, the dates suggest intermittent occupation of the site over a period of more than ten thousand years.

Another Palaeolithic site, known as HP732, is located on the southern bank of Wadi Umm Rahau, some 1900 m NE from the village of El Argub and 1200 m upstream of HP766. M. WAS (2010) published a short report, mainly focusing on the lithics. The site covers an area of some 800 m², of which 25 m² were excavated. From the surface and the excavation 2580 artifacts were collected. This assemblage was tentatively attributed to the earlier MSA incorporating later MSA finds. According to P. Van Peer (pers. comm.) the finds can better be classed with the very late MSA and even LSA. The main finds of the site would hence be datable to the same general period as those of HP766, which is most satisfying as both sites are situated near each other in the same geoarchaeological context. From the surface, some Kerma-related shards were also collected, as well as 95 small bone fragments. These show diverse preservation and include fragments without discoloration, suggesting a Holocene age of the

latter finds as do the Kerma-related shards. Most likely HP732 can be interpreted as a much less intensively used site, which suffered more reworking and erosion with the result of a much higher density of lithics and protracted destruction of animal remains. Anyhow, both HP 766 and HP732 suggest that Wadi Umm Rahau was no doubt attractive to Palaeolithic hunters.

The formation of the excavated part of HP766, keeping in mind the extension of the site (excavated area *ca* 2 %), can be interpreted as follows. Repeated Palaeolithic occupation of HP766 occurred during the later aggradation of an alluvial silt terrace related to the late Pleistocene Nile and the palaeochannel near the site. It was followed by discrete erosion and deposition of wadi-related fine sand, some gravel, reworked artifacts and bones. The third phase of deposition at HP766 is characterized by marked erosion and eolian activity, with the extensive reworking of the Nilotic silt, artifacts and bones, continuing in places into the earlier Holocene, and forming a kind of lag deposit.

Archaeozoology

Most of the identifications were carried out with the aid of the modern reference collections in the Royal Museum of Central Africa, Tervuren, and the Royal Belgian Institute of Natural Sciences, Brussels, in early March 2007 and late June – early July 2009. This permitted the separation of the material in five groups. Some fifty finds show diagnostic features allowing the identification to species or a more general category. A much larger amount of some 300 finds is roughly dividable into two groups: remains of large mammals and very large mammals. Based on the sizes of the identified finds, the large size group most probably includes remains of animals in the size range of equids, large antelopes such as roan antelope, buffalo or wild cattle, while the very large group mainly consists of remains possibly of dromedary, giraffe or such bulky creatures as hippopotamus or rhinoceros. Some of the remains in both groups derive from skulls, teeth, vertebrae, ribs and various bones of the appendicular skeleton, but a precise identification was impossible. Moreover, one large and thick bone suggests that an elephant (*Loxodonta* or *Elephas*?) may be present in the very large size group. It is not surprising that the number of finds in this group exceeds markedly that of the large size group. Diagnostic features of larger bones are much more often obliterated by fragmentation and, in a way, the observed distributions validate the efforts to divide the non-identifiable remains into acceptable size categories. A fourth group (large/very large mammals) contains remains we did not dare to attribute, but that certainly not derive from animals smaller than the ones in the large or very large size groups. A few remains seem to originate from medium-sized mammals, for example,

Rhinoceros including black rhino (<i>Diceros bicornis</i>)	4
Wild ass (<i>Equus africanus</i>)	1
Common zebra (<i>Equus burchelli</i>)	2
Wild ass/ common zebra	19
Hippopotamus (<i>Hippopotamus amphibius</i>)	2
Wild dromedary (<i>Camelus thomasi</i>)	3
Roan antelope (<i>Hippotragus equinus</i>)	1
Buffalo/ wild cattle (<i>Syncerus caffer/Bos primigenius</i>)	5
Giraffe (<i>Giraffa camelopardalis</i>)	13
Total identified mammals	52
Medium-sized mammals	4
Large mammals	48
Very large mammals	364
Large/very large mammals	71
Total bones	539

Tab. 1. The faunal remains of HP766 (total fragment counts).

	HP766		Recent	
			A	B
Black rhinoceros (<i>Diceros bicornis</i>)				
lunare, GL	68.8		60–77	71–84
GB	46.6		40.5–56	53–63
Common zebra (<i>Equus burchelli</i>)			C	D
upper P3/4, B	26.5		21.5–28.5	25.7–31.5
lower M3, L	34.5			
B	13.9			
Wild ass (<i>Equus africanus</i>)				
lower P2, L	32.1			
B	14.8			
Common zebra/wild ass			E	F
Phalanx 2, GL	44.5	44.7	35.4–42.5	41/43
Bp	-	45.9	41.0–44.0	46/48
SD	42.7	39.7	32.7–38.0	40/40
Bd	45.9	43.3	31.6–41.5	39/42
Roan antelope (<i>Hippotragus equinus</i>)			G	
Phalanx 3, DLS	60.6		50/55	
Ld	53.2		44/48	
Bfd	22.6		-	

Tab. 2. Some measurements of identified bones from HP766. A & B: black rhinoceros (*Diceros bicornis*), white rhinoceros (*Ceratherium simum*) (GUÉRIN 1980); C & D: common zebra (*Equus burchelli*), Grévy's zebra (*E. grevyi*) (EISENMANN 1980); E & F: wild ass (*E. africanus*) (UERPMANN 1991), common zebra (*E. burchelli*) (VAN NEER 1989) G: roan antelope (*Hippotragus equinus*) (VAN NEER 1989).

reduncine or alcelaphine antelopes (compare with PETERS 1991: 212, tab. 10-5); they form the fifth group. **Table 1** gives the inventories of the identified mammals and the other groups for the total collection as available, because several provenances were lost during the analysis. The fact that provenances were not considered does not affect the results of this study as all the finds derive originally from the silt layer 3.

In the following, the identified finds will be described by species, wherever possible with some measurements (**Tab. 2**) as proposed by A. VON DEN DRIESCH (1976). As already noted, up to now only a few Palaeolithic sites with animal remains are known from Sudan. BATE (1951) described restricted faunal assemblages from two Middle Palaeolithic occurrences on the Blue Nile, Abu Hugar and Singa. A human skull cap of Singa is attributed to archaic *Homo sapiens* and has been dated between 170 and 150 ky ago (KLEIN 1999: 312, fig. 5.29 and 398). As a single assemblage, some animal remains have been described from two sites with Lower Pleistocene artifacts, Kaddanarti and Kabrinarti north of Dongola (CHAIX *et al.* 2000). Affad 23 is a late Middle Palaeolithic site in the Southern Dongola Reach with a fauna dominated by small and medium-sized ruminants (OSYPIŃSKI *et al.* 2011). As to the many finds from the Wadi Halfa region, they compare well with finds from further north along the Nile (GAUTIER 1968, 1987) and are best added to the archaeozoological record of the Palaeolithic and Holocene hunter-gatherers of the Nile in Egypt. Holocene sites of the Central Sudan referred to in the following are: Saggai, Kadada, Kadero, Abu Darbein and related occurrences, Khasm-el-Girba and Shaqadud (GAUTIER 1983, 1986; GAUTIER & VAN NEER 2011; PETERS 1995; PETERS 1986b; MARKS *et al.* 1987; PETERS 1991). Faunal inventories of Holocene sites in north-western Sudan are given by PÖLLATH (2007). The references to the available collections listed here as well as references to present-day mammals in Africa and their ecology (HALTENORTH & DILLER 1979; KINGDON 1997) are not repeated in the following description.

Lion (Panthera leo)

A loose, quite well-preserved lower molar (M1), collected from layer 2, represents this larger felid. Almost no finds of lion are recorded in the Central Sudanese archaeofaunas. People may have avoided contact with this carnivore. Formerly, lions occurred at most altitudes and in most vegetation types, except extensive forest and the driest deserts. They hunt mainly game between 50 and 300 kg, but ROSEVEAR (1974) records that lions have been seen to drive hyenas away from their prey. This suggests that lions scavenge occasionally.

Medium-size felid, probably leopard (Panthera pardus)

A very poorly preserved fragment of the posterior part of a mandible from layer 1 seems to be assignable to a carnivore about 0.6 times the linear size of a lion, striped or spotted hyena (*Hyaena hyaena*; *Crocuta crocuta*), very likely a leopard or cheetah (*Acinonyx jubatus*). Leopards are hunters, but scavenge occasionally; cheetahs appear to be exclusive hunters. Both felids are still widely distributed in Africa. Some finds from Saggai, Kaddada and sites near Khasm-el-Girba pertain to leopard.

*Rhinoceros, including black rhinoceros
(Diceros bicornis)*

This pachyderm is represented by a carpal bone, a distal fragment of a tibia, a proximal fragment of a metapodial and a third phalanx. The carpal is a complete *os carpi intermedium* or lunare and its measurements can be compared with its homologs of the two extant African rhinoceroses, the black one (*Diceros bicornis*) and the white one (*Ceratotherium simum*), as given by GUÉRIN (1980). The measured finds (**Tab. 2**) can be attributed to the black rhino, but that does not exclude the presence of white rhino in the assemblage. Rhinoceroses, either black or white, have been recorded in small quantities from a few Holocene sites in the Central Sudan. A fragmentary femur from Singa represents probably a white rhino, because of the size of the find. An upper cheek tooth from Abu Hugar could not be identified more precisely. Black rhinos are browsers and favour edges of thickets and open country with shrubs and woody regrowth. The white species is a grazer and does or did well in grassland. Both vegetation types were no doubt present near the site.

*Common zebra (Equus burchelli) and wild ass
(Equus africanus) (Fig. 2, B to D)*

With a total of 22 finds equids are the best represented mammal group. The collection consists of some dental remains, including several cheek teeth splinters, but also an incomplete upper tooth, most likely P3/4 (layer 1), and two more or less complete lower teeth, P2 and

M3 (both layer 2), as well as remains of vertebrae, long and short bones including two well-preserved second phalanges. On the basis of the present-day distributions and the fossil record, the HP766 equids can be assigned to wild ass (*Equus africanus*) or the zebra group. In the zebra group, we have to choose between common zebra (*E. burchelli* or *E. quagga*, depending on the nomenclature followed) and the larger Grévy's zebra (*E. grevyi*). Two dental criteria retained by ARAMBOURG (1938) allow distinguishing wild ass and zebras. In the upper cheek teeth, asinians separate from zebras by the flat to buccally convex valley bottoms passing with an angle in the walls of the styles. The fossil upper P3/4 shows part of a rounded valley smoothly passing in the para-style wall and can therefore be attributed to zebra. As recorded by CHURCHER & RICHARDSON (1978: 410), the protocones of Grévy's zebra are subtriangular, those of common zebra more bilobate with a larger distal lobe, as also shown by EISENMANN (1980: 80, fig. 42; Pl. 16, fig. 1 and 2). What is left of the fossil shows a bilobate protocone and in fact resembles well the M1 in the teeth series of common zebra figured by EISENMANN (*ibid.*: Pl. 16, fig. 2). According to Churcher and Richardson however, common zebra would usually not have a pli caballin, but as shown by Eisenmann such a pli is often seen in this zebra and present in vestigial form in our fossil. All in all, the fossil P3/4 can be attributed with confidence to common zebra.

As to the lower teeth of equids, their diagnostic features are less reliable than those of the upper teeth (CHURCHER & RICHARDSON 1978: 411). Moreover, the first and last jugal tooth do not show the diagnostic features

well. ARAMBOURG (1938) established that in the lower cheek teeth of asses, the valley between the protoconid and the hypoconid does not penetrate as deeply in the metaconid-metastylid neck as it does in zebras, but this feature is not visible on P2's. However, a small fold was observed on the lingual paraconid of the fossil P2, also seen in modern asses of the reference material, in the figures of recent wild asses in STEHLIN & GRAZIOSI (1935: 8, fig 5A and 6A) and on P2's of wild ass from the Egyptian Palaeolithic, as identified by GAUTIER (1968). It was not seen in

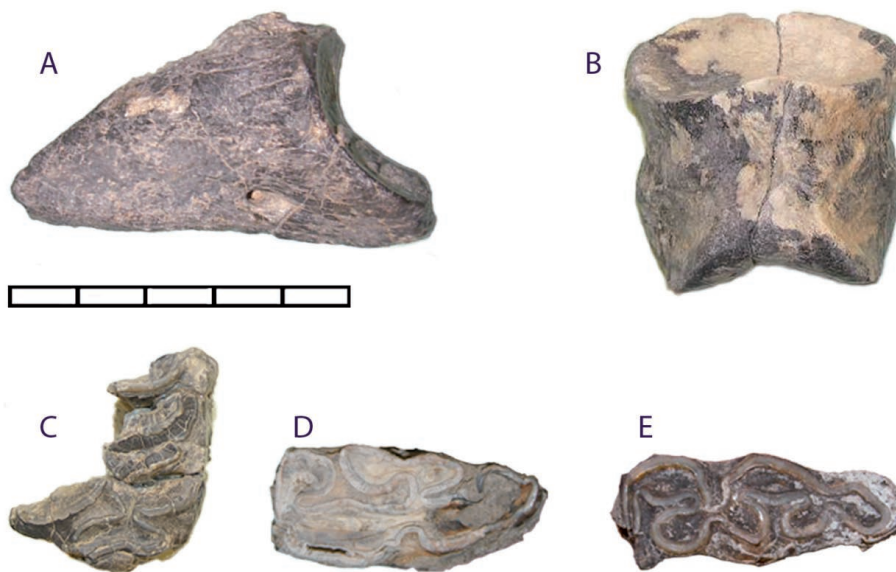


Fig. 2. Some bone finds from HP766. A: third phalanx, roan antelope (*Hippotragus equinus*); B: second phalanx, common zebra (*Equus burchelli*) or wild ass (*Equus africanus*); C: upper P3/4, common zebra (*E. burchelli*); D: lower P2, wild ass (*E. africanus*); E: lower M3, common zebra (*E. burchelli*). Scale for the upper row equals ca 5 cm and ca 4 cm for the lower row.

the several common zebras and the few Grévy's zebras of the reference material. Moreover, the latter zebra has often a marked protostylid in its P2, much less frequently encountered in common zebra and absent in wild ass (EISENMANN 1976: 350, fig. 1 and tab. 1). The fossil P2 does not show a protostylid. Identification of the specimen as wild ass appears acceptable.

The lower M3 is more difficult to assess. According to ARAMBOURG (1938), in asinian cheek teeth the valley between the protoconid and the hypoconid does not penetrate deeply in the metaconid-metastylid root. The fossil has a deep valley and is no doubt attributable to zebra, but further identification, following CHURCHER & RICHARDSON (1978), is not possible. The rounded walls of the protoconid and the hypoconid suggest Grévy's zebra, but the other diagnostic traits referring to the valley between the metaconid and the metastylid and the shape of the latter are not convincing. The chance that three equids contributed to the HP766 fauna is limited. Most likely the fossil tooth is a not very diagnostic M3 of a common zebra.

Some measurements (*Tab. 2*) have been compared with homologous data for extant African equids. Today wild asses measure about 115 to 125 cm at the withers, common zebras are generally larger (*ca* 125–140 cm), and Grévy's zebras are even larger (*ca* 145–160 cm). The few HP766 measurements suggest an equid within the range of larger extant wild asses or common zebras. In extant Grévy's zebra the minimum transverse distances across the mesostyle-protococone and across the protoconid/hypoconid-metastylid would be 26 and 15 mm respectively, but decidedly less in other extant zebras (CHURCHER & RICHARDSON 1978). The measurements of EISENMANN (1980: tabs. 38 and 39) indicate clearly that there exists a zone of overlap. Our transverse dental measurements concern the complete teeth and are therefore higher than the measurements used by Churcher & Richardson. On the other hand the fossil ancestors of recent mammals are often larger than their present-day descendants. Summing up, our measurements of the teeth attributed to zebra have a good chance to relate to large common zebra.

Fossil data do not contradict our identifications. Wild ass has been identified in Holocene contexts of Sudan west of the Nile, and east of the Nile in late Pleistocene contexts of the Khasm-el-Girba region. In the latter region, it may have been replaced in later occurrences by common zebra. Common zebra has also been recorded in various Quaternary sites in the Maghreb and Libya (CHURCHER & RICHARDSON 1978: 408, 412). Three equid teeth from Abu Hugar were not identified further. In the Kaddanarti/Kabrinarti collection wild ass may be present. The co-occurrence of

common zebra and wild ass in our collection does not pose a problem. Common zebras have been frequent in non-desertic Africa in steppic to woodland environments, but they need to drink frequently. Wild asses prefer semi-desert to dwarf-shrub country and can go without water for several days. The zebras encountered at HP766 may have lived close to the Nile, while the wild asses roamed further from the river in the rocky country of the Batn-el-Hagar, visiting the Nile valley only to drink.

Hippotamus (Hippopotamus amphibius)

A distal fragment of a radius and a fragment of the *processus anconaeus* or "beak" of an ulna represent this pachyderm. Remains of hippo occur in small quantities in most Holocene sites of the Central Sudanese Nile. Hippo has been also recorded from the Pleistocene occurrences in Singa, Abu Hugar, Kadanarti/Kabrinarti and Affad 23. The animals prefer shallow aquatic habitats from where they go foraging on land by night consuming quite a few kilograms of plants.

Wild dromedary (Camelus thomasi)

One thoracic vertebra and two right *os carpi radiale* or scaphoids represent what is left of at least two large camelids. One of the scaphoids could be compared with its homolog in domestic dromedary, which is decidedly more slender than the same bone in domestic camels (STEIGER 1990: 37, fig. 23); the HP766 specimen derives without any doubt from a dromedary.

Remains of large camelids have been recorded from a few African contexts going back as far as the upper Pliocene (GENTRY 1978). As to *C. thomasi*, it was originally described from the Acheulian at Palikao (Ternifine) and recorded from the Wadi Halfa region at site 1040, interpreted as a kill site of about the same age as site 1017 (GAUTIER 1966). The latter is the type site of the Khormusan, now known to lie beyond the limits of C14 dating and attributed to the late Middle Palaeolithic (PAULISSEN & VERMEERSCH 1987). Some other finds were recorded from older Middle Palaeolithic sites at Bir Sahara and Bir Tarfawi in the Western Desert (GAUTIER 1993). Osteomorphologic and other evidence indicate that *C. thomasi* is related to the domestic dromedary and probably its ancestor. *C. thomasi* was also present on the Arabian Peninsula and domestication of the dromedary took probably place there (PETERS 1997, 1998). Dromedaries are adapted in physiology for survival in harsh desert conditions and can go without water for long periods.

Giraffe (Giraffa camelopardalis)

A total of thirteen bones of this large ruminant were collected. They include an atlas fragment, three fragments of cervical vertebrae (one vertebra?) and some fragments of long and short bones. Remains of the extant giraffe occur in limited quantities in the Holocene sites of Sudan, but at Abu Hugar a sivatherine giraffid appears to be present. Giraffes are typical dwellers of open woodland and other open country with abundant trees, browsing above 2 m and below 5 m elevation, but they often have extensive home ranges, so their presence at HP766 should not surprise us.

Roan antelope (Hippotragus equinus) (Fig. 2, A)

In layer 2, an antelope is represented by a well-preserved third phalanx. Morphology and size permit to attribute the specimen to a large (male?) roan antelope. Prehistoric ancestors of many African mammals are often larger than their extant descendants. Roan antelopes are typical savannah and woodland dwellers, occurring also in drier land, but within reach of water; they seem to prefer localities with few competitors. No Palaeolithic finds are known from Sudan, but the species occurs sporadically in some Holocene sites.

Large bovid, wild cattle (Bos primigenius) or buffalo (Syncerus caffer)

A cattle-like bovid is represented by a fragmentary cervical vertebra, the remnant of a pelvis, two distal fragments of a tibia and the distal fragment of a metapodial. None of these finds shows diagnostic features which allow to separate cattle (*Bos primigenius*) from African buffalo (*Syncerus caffer*) (PETERS 1986a) or its fossil relatives (PETERS *et al.* 1994). Wild cattle were a frequent game of the Palaeolithic and Holocene hunter-gatherers along the Egyptian Nile Valley. It penetrated apparently quite deeply into the Sudan, for it is recorded from Terminal Pleistocene sites in the Khasm-el-Girba region along the Upper Atbara River, replaced later by extant buffalo. A large buffalo from Singa is now included in *Pelorovis antiquus*, which PETERS and collaborators (1994) consider to be a fossil *Syncerus* species (*S. antiquus*) or even an extinct subspecies of the extant buffalo (*S. caffer antiquus*). Buffalo finds from the Kaddanarti/Kabrinarti assemblage have not been identified precisely. The few finds from Affad 23 are either wild cattle or buffalo. Holocene buffalo finds from the Central Sudanese Nile have been identified as extant buffalo. In view of the foregoing, the HP766 finds are put on record in the same way as those of the Affad site. Extant savannah buffaloes

prefer lush grassland near permanent water, where they are often seen lying in wallows. Wild cattle also prefer humid environments such as the ones found along the Egyptian Nile.

Palaeoecology and function of the site

The excavated sequence and the other data suggest a repeated occupation of HP766 with limited transport of artifacts and animal remains now mainly concentrated in the upper and superficial layer. The identification rate or the relative proportion of the identified remains compared to the total number of bone remains is about 10 % and suggests good sampling conditions, that is no significant loss of small bones and smaller animals. Nevertheless, the predominance of big game is striking, for smaller game is represented only by a few remains (about 1 %). Among the larger game finds, several suggest the original presence of complete carcasses or killing and butchering on the site. It appears difficult to attribute the marked predominance of large and very large game to differential preservation and a comparable destruction of smaller remains, that is remains derived from medium-sized game. The fact that among the few smaller game remains only lion and a medium-sized carnivore, probably leopard, were identified, corroborates this view. Predators or scavengers are at the top of the food pyramid and occur only sporadically with respect to plant-eating game at most sites. If differential destruction of medium-sized animal remains occurred, the survival of the remains of two carnivores appears strange. However, selective hunting concentrating on big game may explain the exceptional HP766 carnivores as opportunistic kills of carnivores attracted to the site by the big kills made by the Palaeolithic hunters. The large size of the site and the radiocarbon dates suggest use of the site for a quite long period. HP766 is surrounded on three sides by Basement Complex outcrops, which may have allowed the hunters to corner game at the locality. Game in small groups or solitary as, for example, a rhinoceros or a lone buffalo expelled from the herd no doubt followed the Wadi Umm Rahau during the season of the low Nile, seeking food in the wadi or coming from the Nile after drinking or going there to drink. Back swamp conditions on the site after the retreat of the annual Nile flood may have helped the hunters, for such conditions would no doubt incapacitate their often bulky or large prey animals stuck in the mud. Such swampy conditions may also have permitted hippopotamus to live on the site. Palaeolithic use and knowledge retained over generations of particular interesting locations are well exemplified at Zwoleń, a Middle Palaeolithic site in the Central European plain, Poland (SCHILD 2005). So, the protracted use of HP766 by late *Homo sapiens* should not surprise us. As said,

in Sudan only a few Palaeolithic sites with preserved bone remains have been recorded until now, and only Affad 23 in the Southern Dongola Reach allowed the reconstruction of hunting practices (OSYPIŃSKI *et al.* 2011). That site appears to have been a workshop where people hunted opportunistically mainly smaller game coming near the site. The finds of HP766 are totally different and the site appears to illustrate specialized big game hunting and the recurrent use of the locality because of its geomorphology and perhaps occasional swampy conditions in the Wadi Umm Rahau, the latter being a natural road regularly used by game to and from the Nile. As to HP732, upstream on the other bank of the wadi, it can be contrasted with HP766 as what might be left of a much less frequently used site due to hunters not concentrating on large and larger game.

As known, interpretation of fossil mammal spectra in terms of landscape and climate is hampered by the facts that the present-day distributions of game are seriously affected by human activities and that the ecological tolerances of the ancestors of present-day game are difficult to gauge. Moreover, if the Palaeolithic hunters focused on big game, the faunal spectrum of HP766 is biased. However, most of the game these hunters brought down is also known from the early Holocene sites further south along the Nile and elsewhere in Sudan. This period would be characterized by a northward shift of climatic belts of a few hundred kilometers and an annual rainfall of some 400 mm (GAUTIER & VAN NEER 2011). The HP766 game suggests comparable conditions and, at first sight, if our hunters had regularly access to big game, maybe even better climatic conditions than during the early Holocene. However, our Palaeolithic hunters went perhaps for big and more dangerous game whenever opportunities presented themselves, because smaller game was not very plentiful, implying that the climate may have been rather dry.

Conclusions and summary

The excavated archaeological sequence of HP766, the large size of the site, the radiocarbon dates and the preservation of the archaeological finds suggest recurrent occupation of the site for several thousands of years by Palaeolithic hunters during the final aggradation of a Late Pleistocene silt terrace of the Nile. The hunters left behind well-preserved lithics attributable to the late MSA and perhaps the LSA, as well as animal remains of game killed and butchered on the site. The recovered bone remains derive almost all from large and very large game, with only a few remains of medium-sized mammals including two carnivores. The composition of the assemblage is not well explainable as the result of differential preservation of larger game, with smaller

prey animals in the game bag having been removed by weathering and reworking in Holocene times. Rather, HP766 may testify to big game hunting, made possible by the fact that the site is partially surrounded by high bedrock outcrops, allowing the hunters to corner large game at the place. The hunters may also have profited from back swamp conditions on the site after the retreat of the annual Nile flood, incapacitating the cornered prey animals. If this interpretation holds, HP766 underscores the environmental skills and generational memory of late prehistoric *Homo sapiens* in Sudan. The detailed study of the lithics and further faunal analysis will no doubt add to this first explanation of the site.

Acknowledgments

The first author is indebted to M. De Dapper (Research Unit Physical Geography, University of Ghent), Ph. Van Peer (Research Unit Archaeology, University of Louvain), R. Schild (Institute of Archaeology and Ethnology, Polish Academy of Sciences, Warsaw) for comments on the context and finds of HP766 and HP732. Bjorn De Wilde, voluntary collaborator in the palaeontological unit at the Ghent University, drew the location map and Bert Van Bocxlaer, his younger colleague in the same unit, composed the plate with photographs provided by the second author (D. M.) The latter thanks Synthesis (BE-TAF-2954) for financial support, and the Royal Museum of Central Africa, Tervuren, and the Royal Belgian Institute of Natural Sciences, Brussels, for access to their collections.

References

- Arambourg, C. 1938. *Mammifères fossiles du Maroc*. Mémoires Société des Sciences Naturelles du Maroc 46.
- Bate, D.M.A. 1951. The mammals of Singa and Abu Hugar. *Fossil Mammals of Africa* 2, 1–28.
- Chaix, L., Faure, M., Guérin, C. & Honegger, M. 2000. Kaddanarti, a Lower Pleistocene assemblage from Northern Sudan. In: Krzyżaniak, L., Kroeper, K. & Kobusiewicz, M. (eds.), *Recent Research into the Stone Age of Northeastern Africa*. Poznan Archaeological Museum, Poznan, pp. 33–46.
- Churcher, C.S. & Richardson, M.L. 1978. Equidae. In: Maglio, V.J. & Cooke, H.B.S. (eds.), *Evolution of African Mammals*. Harvard University Press, Cambridge, pp. 379–422.
- Eisenmann, V. 1976. Le protostylide: valeur systématique et signification phylétique chez les espèces actuelles et fossiles du genre *Equus* (Perissodactyla, Mammalia). *Zeitschrift für Säugetierkunde* 41 (6), 349–365.
- Eisenmann, V. 1980. *Les chevaux (Equus sensu lato) fossiles et actuels: crânes et dents jugales supérieures*. Cahiers de paléontologie. C.N.R.S., Paris.

- Gautier, A. 1966. *Camelus thomasi* from the Northern Sudan and its bearing on the relationship *C. thomasi* – *C. bactrianus*. *Journal of Paleontology* 40 (6), 1368–1372.
- Gautier, A. 1968. Mammalian remains of the northern Sudan and southern Egypt. In: Wendorf, F. (ed.), *The Prehistory of Nubia*. Vol. I. Fort Burgwin Research Center & Southern Methodist University, Dallas, pp. 80–99.
- Gautier, A. 1983. Animal life along the prehistoric Nile; the evidence from Saggai 1 and Geili (Sudan). *Origini* 13, 50–115.
- Gautier, A. 1986. La faune de l'occupation néolithique d'el Kadada (secteurs 12-22-32) au Soudan Central. *Archéologie du Nil Moyen* 1, 59–111.
- Gautier, A. 1987. Fishing, fowling and hunting in late palaeolithic times in the Nile valley in Upper Egypt. *Palaeoecology of Africa* 18, 429–440.
- Gautier, A. 1993. The Middle Paleolithic archaeofaunas from Bir Terfawi (Western Desert, Egypt). In: Wendorf, F., Schild, R., Close, A.E. & Associates (eds.), *Egypt during the Last Interglacial. The Middle Paleolithic of Bir Tarfawi and Bir Sahara East*. Plenum Press, New York, pp. 121–143. http://dx.doi.org/10.1007/978-1-4615-2908-8_8
- Gautier, A. & Van Neer, W. 2011. The fauna of Kadero and the arrival of pastoralism in the Nile Valley of Central Sudan. In: Chlodnicki, M., Kobusiewicz, M. & Kroeper, K. (eds.), *The Lech Krzyżaniak Excavations in the Sudan. Kadero*. Studies in African Archaeology 10. Poznan Archaeological Museum, Poznan, pp. 375–407.
- Gentry, A.W. 1978. Tragulidae and Camelidae. In: Maglio, V.J. & Cooke, H.B.S. (eds.), *Evolution of African Mammals*. Harvard University Press, Cambridge, pp. 536–539.
- Guérin, C. 1980. *Les rhinocéros (Mammalia, Perissodactyla) du Miocène Terminal au Pleistocène (sic) Supérieur en Europe Occidentale. Comparaison avec les espèces actuelles*. Documents des laboratoires de géologie Lyon 79.
- Haltenorth, Th. & Diller, H. 1979. *Elseviers gids van de Afrikaanse zoogdieren*. Elsevier, Amsterdam/Brussels.
- Kingdon, J. 1997. *The Kingdon Field Guide to African Mammals*. Academic Press, San Diego.
- Klein, R.G. 1999. *The Human Career*. University of Chicago Press, Chicago & London.
- Marks, A.E., Peters, J. & Van Neer, W. 1987. Late Pleistocene and Early Holocene occupations in the Upper Atbara River valley. In: Close, A.E. (ed.), *Prehistory of Arid North Africa. Essays in Honor of Fred Wendorf*. Southern Methodist University Press, Dallas, pp. 137–161.
- Osypiński, P., Osypińska, M. & Gautier, A. 2011. Affad 23, a late Middle Palaeolithic site with refitted lithics and animal remains from the Southern Dongola Reach, Sudan. *Journal of African Archaeology* 9 (2), 177–188. <http://dx.doi.org/10.3213/2191-5784-10186>
- Paner, H. 1998. The Hamdab Project. Preliminary report of results from work in the Fourth Cataract region, 1996–1997. *Gdańsk Archaeological Museum African Reports* 1, 115–133.
- Paner, H. 2003. Kerma culture, rock art, dome graves and other discoveries in the Fourth Nile Cataract region. *Gdańsk Archaeological Museum African Reports* 2, 163–183.
- Paner, H. & Pudlo, A. 2010. Settlements in the Fourth Cataract GAME Concession in the light of radiocarbon analysis. *Gdańsk Archaeological Museum African Reports* 7, 131–146.
- Paulissen, E. & Vermeersch, P. 1987. Earth, man and climate in the Egyptian Nile valley during the Pleistocene. In: Close, A.E. (ed.), *Prehistory of Arid North Africa. Essays in Honor of Fred Wendorf*. Southern Methodist University, Dallas, pp. 29–67.
- Peters, J. 1986a. *Osteomorphology and Osteometry of the Appendicular Skeleton of African Buffalo, Syncerus caffer (SPARRMAN, 1779) and Cattle, Bos primigenius f. taurus (BOJANUS, 1827)*. Occasional Papers, Laboratorium voor Paleontologie, Rijksuniversiteit Gent 1.
- Peters, J. 1986b. Bijdrage tot de archeozoölogie van Soedan en Egypte. Unpublished Ph.D. thesis, Ghent University.
- Peters, J. 1991. The faunal remains from Shaqadud. In: Marks, A.E. & Mohamed-Ali, A. (eds.), *The Late Prehistory of the Eastern Sahel. The Mesolithic and Neolithic of Shaqadud, Sudan*. Southern Methodist University Press, Dallas, pp. 197–235.
- Peters, J. 1995. Mesolithic subsistence between the 5th and the 6th Nile Cataract: the archaeofaunas from Abu Darbein, El Damer and Anebis, (Sudan). In: Haaland, R. & Magid, A.A. (eds.), *Aqualithic Sites along the Rivers Nile and Atbara, Sudan*. Alma Mater Forlag, Bergen, pp. 178–244.
- Peters, J. 1997. Das Dromedar: Herkunft, Domestikationsgeschichte und Krankheitsbehandlung in frühgeschichtlicher Zeit. *Tierärztliche Praxis* 25, 559–565.
- Peters, J. 1998. *Camelus thomasi* Pomel, 1893, a possible ancestor of the one-humped camel? *Zeitschrift für Säugetierkunde* 63, 372–376.
- Peters, J., Gautier, A., Brink, J.S. & Haenen, W. 1994. Late Quaternary extinction of ungulates in sub-Saharan Africa: a reductionist's approach. *Journal of Archaeological Science* 21 (1), 17–28. <http://dx.doi.org/10.1006/jasc.1994.1004>
- Pöllath, N. 2007. History hidden in bones: Holocene environmental change in northwestern Sudan. In: Bollig, M., Bubbenzer, O., Vogelsang, R. & Wotzka, H.P. (eds.), *Aridity, Change and Conflict in Africa*. Colloquium Africanum 2. Heinrich-Barth-Institut, Köln, pp. 91–104.
- Rosevear, D.R. 1974. *The Carnivores of West Africa*. Trustees British Museum (Natural History), London.
- Schild, R. (ed.) 2005. *The Killing Fields of Zwolen. A Middle Paleolithic Kill-Butchery-Site in Central Poland*. Institute of Archaeology and Ethnology, Polish Academy of Sciences, Warsaw.

- Stehlin, H.P. & Graziosi, P. 1935. *Ricerca sugli Asinidi fossili d'Europa*. Mémoires de la Société Paléontologique Suisse 56.
- Steiger, C. 1990. *Vergleichend morphologische Untersuchungen an Einzelknochen des postkranialen Skeletts der Altweltkamele*. Inaugural-Dissertation der Tierärztlichen Fakultät Ludwig-Maximilians-Universität München. Institut für Paläoanatomie, Domestikationsforschung und Geschichte der Tiermedizin, München.
- Uerpmann, H.-P. 1991. *Equus africanus* in Arabia. In: Meadow, R.H. & Uerpmann, H.-P. (eds.), *Equids in the Ancient World* 2. Reichert, Wiesbaden, pp. 12–33.
- Van Neer, W. 1989. *Contribution to the Archaeozoology of Central Africa*. Annales Musée Royal d'Afrique Centrale, Sciences zoologiques 259.
- von den Driesch, A. 1976. *A Guide to the Measurements of Animal Bones from Archaeological Sites*. Peabody Museum Bulletin (Harvard) 1.
- Wąs, M. 2010. Palaeolithic materials from Upper Nubia (Sudan): results of excavations at site HP732. *Gdańsk Archaeological Museum African Reports* 6, 217–229.
- Whiteman, J. 1971. *Geology of the Sudan Republic*. Oxford University Press, Oxford.