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SOMMAIRE

A revision of the faunal remains from two Central Sudanese sites : Khartoum Hospital and Esh Shaheinab

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RESUMÉ

Révisions des restes d'animaux de deux sites du Soudan central : Khartoum-Hospital et Esh-Shaheinab

La faune de deux sites soudanais partiellement décrite par D. Bate est réétudiée ici en détail. Il s'agit de Khartoum-Hospital (8 000 B.P.) et de Esh-Shaheinab à trente miles au nord du Khartoum sur la rive gauche du Nil (6 000 à 5 000 B.P.). Khartoum-Hospital était habitée par des chasseurs-cueilleurs (mésolithique de Khartoum au sens de Arkell). La faune est très riche, de plus de cinquante espèces de mollusques, poissons, reptiles, oiseaux et mammifères. Il n'y a aucun animal domestique, les espèces dominantes sont les poissons (*Clarias* sp., *Synodontis* sp.), les tortues d'eau douce et les antilopes (*Kobus kob*). Les habitants étaient surtout tournés vers le fleuve. La plupart des mammifères trouvés à Khartoum ne vivent aujourd'hui que plus au Sud entre les isohyètes de 400 et 800 mm.

Esh-Shaheinab a fourni poissons et reptiles mais aussi de nombreuses espèces de mammifères sauvages (Porc-épic, Eléphant, Rhinocéros, Hippopotame, plusieurs antilopes) et domestiques. Il s'agit d'une économie mixte de chasseurs-cueilleurs-éleveurs, moins tournés vers le fleuve que les habitants de Khartoum. La présence d'une Chèvre naine n'est pas confirmée. Par contre, le Chien est fermement attesté. Les animaux domestiques représentent 40 % des restes de mammifères, ce qui est assez peu par rapport aux sites de cette époque situés autour de trente kilomètres au Nord de Khartoum sur la rive droite. La différence de topographie entre les deux rives du Nil explique cela. Enfin, l'environnement de Esh-Shaheinab est plus sec que celui de Khartoum-Hospital.

ZUSAMMENFASSUNG

Wiederaufnahme von Untersuchungen der Tierreste von 2 Fundstätten im Zentralsudan — Khartoum-Hostpital und Es Shaheinab

Vergleich der Fauna von 2 Fundstätten im Zentralsudan (Karthoum-Hospital 8000 B.P. und Es Shaheinab 6000 bis 5000 B.P.). Fischsammler aus KH werden mit Jäger-Hirten von Es verglichen. Vorhandensein eines domestizierten Hundes in Es und Abwesenheit von domestizierten Tieren in KH, Vieh und Ziegen in Es.

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Проверка животных следов в двух районах Центрального Судана (Хартумской Болницы (ХБ) и Эс Шейнаб/ЭС)

Сравнение фаун в двух районах Центрального Судана (ХБ – 8 000 ВР и ЭШ – 6 000 – 5 000 ВР). Рыбаки собиратели ХБ противопоставлялись охотникам пастухам ЭШ.В районе Хартумской Больницы отсутствуют следы домашных животных, но в районе Эс Шейнаба обнаружены следы собак, скот и коз.

ABSTRACT

A revision of the faunal remains from two Central Sudenese sites : Khartoum Hospital and Esh Shaheinab

Comparison of the fauna from two Central Sudanese sites : Khartoum Hospital (KH ; 8 000 - 7 000 B.P.) and Esh Shaheinab (ES ; 6 000 - 5 000 B.P). Hunter-gatherers from KH are compared with pastoralists from ES with large and small livestock (goat sheep) and dog.

I - INTRODUCTION

The Khartoum Hospital site, usually referred to as « Early Khartoum », was excavated in 1944-45 by A.J. Arkell for the Sudan Government Antiquities Service. The faunal remains were sorted at the site and « any fragment of bone, which from its articular surface was likely to lead to the identification of the species to which it belonged, as well as every tooth and fragment of horn core, was kept. » (Bate, 1949 : 15). A selection of these elements was sent to Dr. Derry in Cairo, who made preliminary identifications. Later the collection was forwarded to the British Museum (Natural History, London) for detailed analysis by various specialists ; therefore the faunal report by Miss Bate *(ibid.)* contains contributions of several authors.

Esh Shaheinab is situated on the left bank of the Nile about 30 miles north of Khartoum. The excavation was again carried out by A.J. Arkell for the Sudan Government Antiquities Service in 1949-50. An appreciable amount of the animal remains were discarded in the field and the collection submitted to Miss Bate for study contained almost nothing but avian and mammalian remains. Miss Bate died before she should complete her study and her notes were organized and published by Arkell (Bate, 1953).

On the basis of the foregoing, we can conclude that the bone material from both sites, available in the British Museum (Nat. Hist., Osteology Room) is small compared to the original amount of bone found. Moreover our analysis shows clearly that certain specimens are no longer present, while some others were never described. It is obvious that it is dangerous to draw far reaching conclusions on the basis of such collections. However, as the analysis of the ceramic and stone industries led to the distinction of the « Khartoum Mesolithic » and the « Shaheinab Neolithic » *sensu* Arkell (1949, 1953) and as each new paper on the Central Sudanese prehistory refers to these descriptions, a revision of the faunal samples remains of interest.

New excavations were carried out recently at Esh Shaheinab (Haaland, 1981, no date). Tigani El Mahi (1979, 1982) discusses the collected fauna, but the sample is quite small and the results are preliminary.

In the following descriptions, we will use abbreviations to refer to the sites ; Khartoum Hospital becomes KH, Esh Shaheinab will be ES.

II - DESCRIPTION OF THE FAUNAL REMAINS

Molluscs

Both sites contained a large number of shells, which were mostly identified by Major M. Conolly (KH) and Mr. C.P. Castell (ES). Unfortunately none of this material appears to be available for restudy. We, therefore, can include only a list (Table 1), taxonomically updated on the basis of Mandahl-Barth (1954, 1983), Crowley and Pain (1962), Brown (1981), Gautier (1983) and Van Damme (1984).

Fish

Fish were said to form the most frequent vertebrates at KH. Dr. Trewavas examined these remains and described them to eight genera, still commonly found living in the Nile : *Polypterus* sp., *Labeo* sp., *Clarias* sp., *Synodontis* sp., *Clarotes* sp., *Lates* cf. *niloticus, Tilapia* sp. and *Hydrocyon forskalli.* Some clariid remains were identified as *Clarias lazera*, now known as *C. gariepinus.* Besides, Mr. Arkell distinguished spines of *Bagrus* sp. during the excavations. Nine other fragments, which we found in the mammalian collection were examined by Dr. W. Van Neer (Leuven ; cf. Van Neer, 1984), whom we quote *verbatim*.

Protopterus aethiopicus, African lungfish

One lower and one upper tooth plate, from individuals of some 30 and 60 cm TL (total length). Lungfish are able to survive in shallow deoxygenated water and can aestivate burrowed in the mud of the Nile floodplain when it dries out. These fish therefore can be harvested most easily in shallow evaporating pools or be dug out from their burrows.

Lates niloticus, Nile perch

Three gill rakers (max. L : 37.0, 43.0, 48.0).
One dorsal fin ray (max. L : 47.0, max. B : 10.9).
One second dorsal fin ray (max. L : 59.0 ; max. B : 20.6).
One second anal fin ray (max. L : 42.0 ; max. B : 15.9).

Three dorsal fin rays, cemented by kankar. Most of the Nile perches in this sample are large individuals (50 to 80 cm TL). This may indicate that they were captured in the main Nile channel.

Concerning the Esh Shaheinab fish remains, Miss Bate (1953 : 10) wrote : « The occupation debris contained many fish bones, particulary vertebrae, but fish did not make up quite such a high proportion of the vertebrate fauna as at Early Khartoum. *Clarias* sp., *Synodontis* sp. and *Lates* cf. *niloticus* were recognized ; but as there was no doubt that there would be among the fish remains only species that are living in the Nile today, the majority of the fish bones were discarded on the spot. » *Synodontis, Lates* and *Tilapia* are each represented by one fragment in the mammalian collection studied by us ; the identifications are also due to Dr. Van Neer.

Reptiles

Remains of reptiles from KH represent, following Dr. Swinton, five genera : *Crocodylus* sp., *Python* sp., *Varanus* sp., *Trionyx* sp. and *Testudo* spp.. *Trionyx* sp. was said to be most abundant.

At Esh Shaheinab, the reptilian remains (*Crocodylus* sp. ; *Python* sp., *Varanus* sp. and *Trionyx* sp.) were discarded as being of little interest. A few specimens only were forwarded to the British Museum (Nat. Hist.) ; they include an anterior end of the plastron identified by Mr. J.C. Battersby as *Testudo hermanni.* None of these remains was available for restudy at the time of our visit.

Recent research by Dr. F. de Broin (Musée d'Histoire Naturelle, Paris) on material from Central Sudanese contexts similar to those of KH and ES, suggests that at least four different freshwater turtles are present (Gautier, 1983). Hence it is likely that at both sites a number of turtle species were overlooked. In the KH and ES collections we studied, we found respectively two articulating vertebrae and four limbbones attributable to a monitor, most probably *Varanus niloticus*. This is the most common monitor species along the Nile.

Birds

According to Miss Bate, the collections contained respectively 3 (KH) and 111 avian (ES) fragments. About the KH material, she writes (1949 : 48) : « One of the bird bones preserved is the distal end of a humerus of an anatine bird which resembles closely in size and shape this bone in the Spurwinged Goose, *Plectropterus gambensis* of which various races occur over the greater part of Africa today. The other two bones have not yet been identified. » The ES bird remains appear never to have been analysed, even in a cursory way.

During our re-analysis, we found, among the mammalian remains of both sites, many avian bone fragments. We did not find back the humerus described by Miss Bate, although the available KH collection yielded 10 avian bones. For ES seven bone fragments could be added to the original 111.

Mrs D. Matthiesen (Gainesville, Florida) kindly provided the identifications. The KH faunal sample consists entirely of Spurwinged Goose *(Plectropterus gambensis)*. The ES collection is dominated (more than 80 %) by helmeted guineafowl *(Numida meleagris)*. Other birds present are the already mentioned spur-winged goose, anatids, birds of prey including a buzzard and a vulture, Clapperton's Francolin *(Francolinus clappertoni)*, Crocodile Bird *(Pluvianus aegyptius)* and a Bustard.

Mammals

Mammalian remains form the largest part of the present collections. In principle all this material should have been described by Miss Bate, but an appreciable number of specimens appear to have been not yet examined. Moreover, a lot of specimens described by Bate are missing. The mammalian fauna is summarized in Tables 2 (KH) and 3 (ES) in which we list the two collections as follows :
(D) : material described by Miss Bate, which we found back and of which the identifications were verified ;
(DM) : material described by Miss Bate but missing and of which we could correct or adapt the identification, on the basis of various considerations ;
(NI) : material which had not yet been identified.
In the following, we re-analyse the available material (D and NI) with the aid of the comparative collections of the British Museum of Natural History (London), our laboratory (Gent), the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels and the Koninklijk Museum voor Midden-Afrika, Tervuren. Data concerning the recent biogeography and ecological requirements of African mammals are gleaned from Mackenzie (1954) and others (see references). We also used the osteometrical and osteomorphological data found in Van Neer (1981). Measurements on bone fragments are taken according to von den Driesch (1976), unless indicated otherwise. More measurements could have been recorded, but only a few diagnostic values are listed. A vertical line behind a column of measurements indicates one specimen. The sequence in which the mammals are described follows Anderson and Jones (1967).

Wild mammals

Lepus sp., Hare

Lagomorph remains are limited to the ES collection. They include three jaws, five humeri and two metatarsals. No definite identification can be made as two species, more precisely the Cape hare *(L. capensis)* and Whyte's hare *(L. whytei)*, could be present. Both hares prefer savanna vegetation, although the latter may have a predelection for more humid areas.

Euxerus erythropus, Striped Ground Squirrel

A sciurid has been recognized among the ES remains. On the basis of their relative size and biogeographical considerations, these remains can be attributed to the striped ground squirrel, *Euxerus erythropus*. This squirrel is adapted to various environments, from semi-desert to woodlands and open savanna, but it also occurs in cultivated areas.

Hystrix cristata, North African Porcupine

In the available KH collection, only an incomplete lower jaw (P4-M3, AL : 35.5 ; AL = alveolar length) and an ulna of a subadult individual, both derived from a porcupine, were found. An identification as North African Porcupine

(Hystrix cristata) causes no problems, as body size or biogeographical distribution exclude the other two African porcupines, i.e. the African Brush-tailed Porcupine *(Atherurus africanus)* and the Cape Porcupine *(H. africae-australis)*. The North African porcupine is well adapted to a wide range of habitats, from sahel vegetation to tree savanna, but it is absent in the true desert or rainforest.

Thryonomys swinderianus, Marsh cane Rat

Remains of a Cane Rat occur only in the KH collection. They include the following cranial remains : an anterior portion of a skull with fragmentary incisor, P4 and M1-2 ; a right maxilla with P4 and M1-2 and a left maxilla with P4 and M1-2. Miss Bate ascribed them to *Thryonomys arkelli* nov. sp. (Arkell's Reed Rat), the first fragment being the holotype (Bate 1947, 1949).

This new species was based on the following arguments. First, the relative position of three grooves on the upper incisor of *T. arkelli* would be different from that in *T. gregorianus*. Second, the upper incisor of *T. arkelli* would differ from that of *T. swinderianus* in having narrower grooves. Third, measurements on the upper incisor of the holotype would show more affinities with *T. gregorianus*. Fourth, measurements on the upper M2 of both holotype and paratypes suggested that the fossil surpassed recent *T. swinderianus* in size. Ansell (1966) proved that the position of the grooves on the upper incisor is very variable. Comparing the distance from the mesial border to the outer groove with the total width of the upper I1, he found a mean value of 50 % for 16 specimens of *T. swinderianus*, while five *T. gregorianus* provide a 56.5 % mean value. Van Neer (1981) found slightly higher mean values and also a higher variability (Table 4). The form of the grooves also varies appreciably from specimen to specimen. Furthermore, it seems to us that the width of the upper incisor suggests an identification as *T. swinderianus*, since the holotype value is closer to the mean value of recent *T. swinderianus* specimens (Table 4). The width of the second upper molar clearly corroborates this identification, because the holotype value is above the maximum value of *T. gregorianus* (10 specimens) and again close to the mean of *T. swinderianus*. For us, there is no reason not to include the material in *Thryonomys swinderianus*. Moreover, although Miss Bate writes that the upper incisor resembles that of *T. swinderianus* in the great width of the outer segment and in the narrowness of the grooved medial segment, the figured specimen (Bate 1949 : 20, fig. 2a) definitely does not fit in with that description.

The only postcranial element, a distal fragment of a humerus, comes from a medium-sized animal (Bd : 15.4, BT : 12.9).

The Marsh Cane Rat inhabits riverine environments with dense grass vegetation or reeds, but one finds it also in the undergrowth of forests.

Gerbillidae indet., Small rodent

All the small rodents are missing in the KH collection. The ES collection yielded an incomplete lower jaw and a right femur, probably derived from a gerbillid. These fragments cannot be identified more precisely because good comparative material is missing in the collections available to us. The mandible was identified by Miss Bate as *Tatera* cf. *robusta*. Anyhow, these specimens are no doubt

intrusive, the jaw being certainly much younger than the main assemblage, because it looks much more recent.

Canis sp., probably *C. aureus*, Jackal, probably Golden Jackal

Remains of medium-sized canids were only found back in the ES collection. They were attributed to two jackal « species » (*Canis* ? cf. *aureus soudanicus* or *Canis* sp.) by Miss Bate. The second excavation at Esh Shaheinab yield no canid remains (Tigani el Mahi, 1982 : 43). We compared the ES-specimens with recent material using criteria to distinguish the various African and Near Eastern canids (Stockhaus, 1962 ; Lawrence, 1967 ; Rosevear, 1974 ; Clutton-Brock *et al.* 1976 ; Osborn and Helmy, 1980). Thus it became apparent that Dog was present. The canid remains must, therefore, be divided into three groups : Jackal, Dog and dog and/or jackal. Measurements on the better preserved specimens are listed with those on dogs.

Jackals are represented by four mandibles. Their identification is based on the relative slenderness of the jaw, the implantation of the teeth on a more or less straigth line, the form of the teeth, especially the higher crowns, and the habitus of the lower P4 and M1 (Osborn and Helmy *ibid.* : 368, fig. 111). On the basis of recent biogeographical data, an identification as Golden Jackal *(C. aureus)* is most likely.

Mungos mungo, Banded Mongoose

This species is represented by two maxilla fragments in the KH sample. The general habitus of the upper P4, M1 and M2 as well as the size of the teeth and maxillae (Rosevear, 1974 : 265) provide enough arguments to distinguish them from their homologs in larger mongooses such as *Herpestes Ichneumia* and *Atilax*. The Banded Mongoose lives in all kinds of savanna, generally in the vicinity of water.

Large mongoose

Two KH mandible fragments, the first with C1, P2-4 and M1, the second with P2-P3 can be ascribed to a large mongoose. To this sample, species such as the White-tailed Mongoose *(Ichneumia albicauda)*, the Water Mongoose *(Atilax paludinosus)* and the ichneumon *(Herpestes ichneumon)* may have contributed. The bone material however is too incomplete to allow a final identification.

Viverra civetta, African Civet

This larger viverrid is represented by an anterior portion of a lower jaw without teeth. We found this fragment in the KH collection, but it appears to belong to the ES collection. Miss Bate's description (1953 : 12) : « *Civettictis* sp. - The Civet, represented only by the anterior end of a left side lower jaw with no teeth... », is certainly applicable to the specimen. We, therefore, will include it in the ES collection. African civets are adapted to various environments including savanna as well as woodland, most of the time in the vicinity of water.

Felis silvestris, African Wild Cat

The ES collection yielded a distal metapodial, attributable to a felid, somewhat larger than a housecat. An identification as African Wild Cat does not pose particular problems. Other small felids such as the Sand Cat *(Felis margarita)* can be excluded on the basis of their recent biogeography and habitat preferences ; also, there is no evidence for housecats in the period and region considered. *F. silvestris* lives in all kinds of environments except for the true desert and the rainforest.

Felis caracal/F. serval, Caracal and/or Serval

A medium felid is represented in the KH assemblage by two sub-adult distal femur fragments. Two species should be taken into account, i.e. the Caracal *(F. caracal)* and the Serval *(F. serval)*. Due to the lack of typical osteomorphological features, no further identification could be made. Both species are mainly inhabitants of the savanna, but the Caracal can survive in drier conditions than the Serval.

Panthera leo, Lion

Lion is represented by a distal fragment of a metapodial (Bd : 19.7) and the proximal end of a first phalanx (Bp : 13.7), both from the KH collection. The size of these fragments excludes any other identification. The Lion is well adapted to several environments, from semi-desert to dense wooded savanna, but it is obvious that its presence is determined by the available game resources.

Small carnivores

This category comprises 3 humerus fragments in the KH collection, which could not be attributed specifically. Several members of the Mustelidae and Viverridae may have contributed to this sample.

Loxodonta africana, African Elephant

The ES bon sample yielded four postcranial fragments which could be assigned to this proboscidean, including a proximal tibial epiphysis of a subadult animal. The African Elephant lives in all kinds of environments except the desert.

Diceros bicornis/Ceratethorium simum, Black and White Rhinoceros

Rhinocerotid remains, limited to the ES collection, were attributed tentatively to the Black Rhinoceros by Miss Bate, on the basis of one diagnostic maxilla fragment. Recently, Guérin (1980) published a key to distinguish among the five actual rhinocerotids on the basis of osteometric data. With the aid of it, the rhinoceros remains could be separated into three groups (cf. Table 4). African rhinocerosses live in various environments, including woodlands, gallery forests and grasslands with stands of trees.

Hippopotamus amphibius, Hippopotamus

The KH and ES collections yielded respectively 29 et 13 hippopotamus fragments. Among these, tooth fragments, carpals, tarsals and phalanges are the most plentiful. Furthermore, several artefacts made of hippopotamus ivory were found at ES ; they are not included in our counts. The presence of hippopotamus at both sites is of course linked with the Nile.

Phacochoerus aethiopicus, Warthog

The Warthog is represented in the KH collection by 32 fragments, mainly incomplete molars. The ES collection yielded only a calcaneus, attributable to Warthog on the basis of criteria established by Van Neer (1981, pl. 46). Warthogs are typical inhabitants of open savannas, avoiding areas with dense vegetation.

Giraffa camelopardalis, Giraffe

The KH collection yielded one upper giraffid premolar ; postcranial remains of Giraffe are completely restricted to the ES collection. These could be easily recognized because of their large size and typical morphology. Among the 72 fragments, carpals, tarsals and metapodials are the most abundant. Giraffes occur in open grass savannas with scattered trees and shrubs as well as in dense tree savannas or gallery forests.

Ourebia ourebi, Oribi

Thirteen cranial fragments from the KH site and three maxillae from ES are assigned to the Oribi, *Ourebia ourebi*. This material could be distinguished from the common Bush Duiker *(Sylvicapra grimmia)* on the basis of some osteomorphological differences described by Van Neer (1981). None of these fragments were recorded by Miss Bate, who writes that in the KH sample, small antelope material consists exclusively of worked distal metapodial ends mainly from Oribi but probably also from Soemmerring's Gazelle *(Gazella soemmerringi)*. The rarity of small antelope remains made her furthermore assume that Oribi might have been obtained from a distance, especially for their cannonbones. In our opinion, small antelopes were not necessarily rare. Their relative low frequency with predominance of certain skeletal elements can be explained better by assuming that both the taphonomic filter and sampling bias affected the quantity and kind of small antelope remains. Oribi prefers grasslands and open savannas, not necessarily close to water.

Sylvicapra grimmia ?, Common Bush Duiker ?

One upper third molar from KH can be ascribed tentatively to the Bush Duiker on the basis of certain morphological characteristics established by Van Neer (1981). Bush duikers are adapted to various types of savanna, but occur mainly in areas where enough cover is present.

Small antelope

Both collections also yielded a few postcranial fragments not assignable to any of the small antelopes discussed above. This is due to the lack of distinctive osteomorphological features and the fragmentation of these remains.

Tragelaphus scriptus, Bushbuck

This antelope has been recognized in the KH collection on the basis of three molars. They show a typical tragelaphine pattern (Gentry, 1978 : 544, fig. 27.1) and are too small to represent the Sitatunga described in the next section. The identification of a typical tragelaphine horn core fragment as Bushbuck remains doubtful as it is too small. Bushbuck lives in gallery forests, semi-open savannas and woodlands, most of the time in the vicinity of water.

Tragelaphus spekei, Sitatunga

Two upper molars from the KH site are unquestionably derived from the Sitatunga. This medium antelope is a typical inhabitant of marshy places with well developed vegetation.

Redunca redunca, Bohor Reedbuck

Bohor Reedbuck is well represented in KH collection by 24 specimens, including nine horn core fragments and three molars. The identification of the horn cores is based on their typical curve and on the grooves of the surface, while the molars could be assigned on the basis of their reduncine pattern (Gentry, 1978 : 544, fig. 27.1) and relative size. The identification of the postcranial remains is based on data from Van Neer (1981). The Bohor Reedbuck prefers open grasslands with stands of trees and shrubs and woodlands.

Kobus kob, Kob

About 45 % of the available KH material can be ascribed to Kob. It consists mainly of cranial remains ; among postcranial fragments distal ends of metapodials are frequent. Fourty-one horn core fragments can be definitely assigned to this antelope ; some 24 other and smaller fragments probably represent the same species. The two horn cores, identified by Miss Bate as *Onotragus* cf. *megaceros* (Nile Lechwe) cannot, in our opinion, be separated from those of recent or fossil *Kobus kob*. The same applies for the horn core fragments described as « Antilope sp. ». A few horn core fragments labeled ? *Adenota leucotis* also pertain to kob, since *A. leucotis* has been sunk in *Kobus kob*. The postcranial remains were ascribed to *Kobus kob* on the basis of osteometrical data from Van Neer (1981). A few of the smaller specimens assigned to Kob may pertain to large Bohor Reedbuck. Kob generally inhabits grasslands with permanent water in the vicinity.

Gazella rufifrons, Red-fronted Gazelle

Five gazelle horn cores from the ES collection were ascribed to *Gazella rufifrons* by Miss Bate. These horn cores differ in form from those of other gazelles living

in the Sudan, such as Dorcas Gazelle *(Gazella dorcas)*, Dama *(G. dama)* and Soemmerring's Gazelle *(G. soemmerringi)*, but match closely those of recent Red-fronted Gazelle. This gazelle nowadays lives in the drier savannas between 9 ° and 16 ° NB.

Gazella sp., Large gazelle

ES yielded an incomplete lower jaw which can be assigned to a gazelle on the basis of the occlusal molar pattern and the presence of the so-called goat-fold, typical for gazelles. The occlusal length of P2-M3 (± 82), compared with the measurements of Stöckmann (1975 : VI) indicates a large gazelle. Three such herbivores still occur in the Sudan : Dama *(Gazella dama)*, Soemmerring's Gazelle *(G. soemmerringi)* and Grant's Gazelle *(G. granti)*. An identification as Dama seems most probable because Soemmerring's Gazelle is actually found only east of the Nile, while Grant's Gazelle is confined to the extreme southeast of the Sudan (Gentry, 1964).

The three mentioned gazelles live in grasslands with shrubs, but Dama can resist much drier conditions and therefore is also found in the Sahelian subdesert.

Medium antelope

A medium antelope is represented by a proximal and a distal femur fragment from ES. The first fragment can probably be ascribed to the Bohor Reedbuck on the basis of its size, although large Bushbuck or small Sitatunga cannot be excluded. The second fragment is too incomplete to allow any specific identification.

Tragelaphus strepsiceros, Greater Kudu

Nine postcranial bone fragments from ES can be attributed to a large, fairly gracile antelope. It differs from more heavily built antelopes such as Tiang or Topi *(Damaliscus lunatus)*, Hartebeest *(Alcelaphus buselaphus)* and Waterbuck *(Kobus ellipsiprymnus)* in having more slender limbbones, with moreover some typical features also found in Greater Kudu *(Tragelaphus strepsiceros)*. For example, the anterior part of the ulnar *tuber olecrani* is reduced in size but the posterior one remains well developed ; the proximal shape of the metacarpus is more squarish than in other large antelopes. The Greater Kudu is a typical savanna-dweller, preferring areas with *Acacia*-vegetation.

Damaliscus lunatus/Alcelaphus buselaphus, Topi and/or Hartebeest

A large antelope, Tiang *(D. lunatus)* or Hartebeest *(A. buselaphus)* is represented in the KH collection by at least 33, mainly cranial, fragments. In most cases, the distinction between Tiang (Topi) or Hartebeest cannot be made on the basis of dental material. Only the size of the postcranial remains may provide a clue ; on the average, the Tiang is smaller than Hartebeest. The available limb bone fragments are fairly small and therefore probably pertain to Tiang. Two horn core fragments can probably also be ascribed to the Topi. Miss Bate identified

one hoof-phalanx as that of *Onotragus* cf. *megaceros* (Nile lechwe). In our opinion, this specimen also represents an alcelaphine. Both Topi and Hartebeest are found in various environments, from tree savanna to semi-desert.

Hippotragus equinus, Roan Antelope

The Roan Antelope is probably represented in the KH collection by nine, mainly cranial fragments, two of which are doubtful. This large antelope inhabits savannas and gallery forests, always in the vicinity of water.

Kobus ellipsiprymnus, Waterbuck

At least two KH fragments belong to this larger reduncine : a skullfragment with the basis of the horn core representing a subadult male and an upper molar, considerably larger than its homolog in Kob. An identification of two other cranial fragments as Waterbuck remains doubtful. The Waterbuck prefers grasslands with stands of bushes or trees in the vicinity of permanent water.

Large antelope

The ES collection yielded seven fragments of large antelopes which do not allow a specific identification. All large antelopes mentioned in the four previous sections might be present among these remains.

Syncerus caffer, African Buffalo

About 20 % of the bones from the KH collection pertain to Buffalo, dental material being the most frequent. The worn tip of a horn core described by Miss Bate is no longer available in the collection. Some measurements follow :

Upper jaw, M1/2, OL	: 27.5	29.0	30.5	32.0	34.0
M3, OL	: 29.5	30.0	31.0	32.0	32.5
Lower jaw, M1/2, OL	: 27.0	27.5	28.5	30.5	31.0
M3, OL	: 36.5				
Os metacarpale III + IV, Bd	: 74				
Os metatarsale III + IV, Bd	: 67	70			
P. proximalis, GLPe	: 73	74			
Bp	: 33.5	37.5			
Bd	: 33.0	37.0			
P. media, GL	: 52	53	54		
Bp	: 34.0	35.0	39.5		
Bd	: 28.5	27.5	34.5		
P. distalis, DLS	: 74	80	86		
Ld	: 63	69	65		
BFp [1]	: 28.5	26.0	30.5		

As the size of the measured specimens indicate, the KH buffalo clearly is a large form indicating savanna conditions. Buffaloes are adapted to a wide range of environments, ranging from every dry grass savannas to equatorial forests.

1. BFp = Breadth of the *facies articularis proximalis* = breadth of the proximal articular surface (Peters, in preparation).

Domestic mammals

Remains of domestic animals were found only at Esh Shaheinab. They include Dog, Sheep, Goat and Cattle. Measurements of the domestic animals of Esh Shaheinab have been compared with those obtained at Manching (Bavaria, Iron Age ; Boessneck *et al.*, 1971) and Eketorp (Sweden, Medieval ; Boessneck *et al.*, 1979). The nomenclature of the domestic animals is based on Bohlken (1961).

Canis lupus f. *familiaris*, Dog

Eight cranial fragments can be attributed to a medium dog. The identification of the maxillae is based on the form and relative position of the protocone of the upper carnassial (P4). This tooth does not seem to be very variable in jackals, having a well developed protocone and a relative slender habitus. In dogs the variation is marked (Stockhaus, 1962 : 227, fig. 6) and in many cases, this P4 undergoes a reduction in size (due to the shortening of the head ?) and the protocone becomes less developed. The tooth thus acquires a compact habitus, which, in our opinion, may be a good criterium to distinguish Dog from Jackal. Some types of Dog with elongate skulls however have a slender P4 with a well developed protocone. Teeth with such a habitus can be either Jackal or Dog and should be identified as *Canis* sp.

Mandibles and lower carnassials (M1) could be attributed to Domestic Dog on the basis of criteria listed in Osborn and Helmy (1980 : 365). Measurements on the better preserved specimens of both Jackal (listed with an asterisk) and Dog are given below :

Upper jaw, M1-M2, AL	:	16.9	17.1		
Lower jaw, P1-M3, AL	:	62	± 71		
P2-M3, AL	:	58	± 64		
P1-P4, AL	:	35.5	37.5	32.2*	
P2-P4, AL	:	29.7	30.7	28.3	
M1-M3, AL	:	29.6	± 33.5		
M1, CL	:	16.7*	17.3*	20.0	20.2
CB	:	7.2		7.8	7.6

The measurements on dogs were compared with those obtained by Boessneck and collaborators (1971, 1979). They indicate animals with a shoulderheight of approximately 45 cm ; jackals are about the same size. The distinction therefore between Jackal and Dog at Esh Shaheinab cannot be made easily, although it appears that the first is more slenderly built. Problematic remains can be labeled *Canis* sp.

Ovis ammon f. *aries*, Sheep and/or *Capra aegagus* f. *hircus*, Goat

About 15 % of the available ES bone material can be attributed to small livestock. The collection contains cranial as well as post-cranial material. Among the cranial material, we found eleven horn core fragments which could be attributed to goats. We also noted an appreciable amount of younger animals, i.e. animals still with milkdentition. Measurements on the better preserved specimens are given below :

Lower jaw, P2-M3, OL	:	68	69	71		
P2-P4, OL	:	20.9	21.7	22.7		
M1-M3, OL	:	48.4	49.2	49.4		
Pd2-Pd4, OL	:	24.6	25.3	26.0	27.2	29.9
Scapula, LG	:	26.0				
BG	:	22.3				
P. proximalis, GLPe	:	39.0				

As the specimens labeled « Twisted horned Goat or Sheep (*Capra* or *Ovis* sp.) » and « ? Sheep (? *Ovis* sp.) » by Miss Bate are not available anymore, all the bone material in the collection should belong to the Dwarf Goat, which Miss Bate thought to be present. We cannot agree with the proposed subdivision of small livestock remains. A comparison of the ES horn cores with those of recent Sudanese goats did not indicate sufficient differences in form or in size. The ES goats probably resembled the Sudanese Nubian Goat, which has medium-sized, slightly diverging back sweeping horns, homonymously twisted in the male, scimitar-shaped or homonymously twisted in the female. It is nowadays the most numerous of all goat breeds in the Sudan and constitutes the bulk of goat populations in riverine and urban districts (Epstein, 1971, Vol. 2, p. 299).

As to the mandible remains, Miss Bate ascribed them also to a dwarf goat. Generally mandibles of sheep cannot be distinguished from those of goats (Boessneck *et al.* , 1964). Moreover, we compared our measurements on the Esh Shaheinab material with the few numerical data on African dwarf goats found in Chang and Landauer (1950). These authors described the skull of the dwarf goat as : « reduced in length as well as in width and height and in the cranial as well as in the facial regions » (*ibid.* : 369). Unfortunately, they recorded only the mandibular length of a one year old dwarf goat, but this measurement would be about 25 % smaller than in a normal goat of comparable age. The P2-M3 length of normal sized prehistoric and recent ovicaprines described by various authors (Clason, 1967 ; Boessneck *et al.*, 1971) and in our collection varies between some 62 and 80 mm ; correspondingly dwarf goats would have P2-M3 L between 46.5 and 60 mm. On the basis of the foregoing the ES mandibles certainly cannot be classified as belonging to dwarfed animals.

The length of the first phalanx (39.0) was also compared with that recorded for the mentioned dwarf goat breed ; again the size difference is clear. Summing up then, we can say there is no evidence for a dwarf caprine breed at ES. Futhermore, if we compare our measurements with those from Manching (Boessneck *et al. ibid.*) and Eketorp (Boessneck *et al.*, 1979), the approximate height at the withers of the ES livestock, calculated on the basis of the mandibles, is about 65 cm, which is again too high for so-called dwarf goat breeds (Epstein, 1971, Vol. 2, p. 211).

Bos primigenius f. taurus, Cattle

Nine postcranial bone fragments can be ascribed to Cattle on the basis of their osteomorphology (Peters, in preparation). Measurements on the better preserved specimens follow :

Humerus, BT	:	± 68		
Ulna, LO	:	95		
Os centroquartale, GB	:	53	54	60

These data are slightly above the mean values found at Manching (Boessneck *et al.*, 1971) and Eketorp (Boessneck *et al.*, 1979). We therefore estimate the shoulderheight of the Esh Shaheinab cattle at 105-120 cm, although it is obvious that the bone sample is too small to allow very reliable estimations.

It should be noted that we did not find a single fragment of the approximately one hundred cranial remains ascribed by Miss Bate to *Syncerus* or *Homoioceras*. The same author also recorded 24 distal metapodial ends, of which only two were available. In our opinion, most of this sample will prove to belong to Cattle, if ever found back. Tigani el Mahi (1982) found an appreciable amount of cattle remains during the second ES excavations ; their identification was confirmed in our laboratory (Gautier pers. comm.).

Wild or domestic mammals

The ES bone sample yielded some remains which could not be attributed specifically. We therefore labeled 12 canid remains as « Dog and/or Jackal (*Canis* sp.) » and another 12 as « Cattle and/or Buffalo (Large bovid) ».

III - SUMMARY AND CONCLUSIONS

The faunal remains from two Holocene Central Sudanese Nilotic sites, originally identified and described by Miss Bate (1947, 1949, 1953) some 35 years ago were re-analysed. However, as a result of selective sampling of the faunal material and the vicissitudes the material was subject to before it finally came to rest in the Osteology Room of the Bristish Museum (Nat. Hist.), the collections available for restudy are no doubt biassed. Hence a detailed interpretation of their palaeoecological and palaeoeconomical significance is not warranted.

The Khartoum Hospital site, dating from the 8th millennium B.P. (Adamson *et al.*, 1974) was inhabited by typical hunter-gatherers, acquainted with the use of pottery (Khartoum Mesolithic *sensu* Arkell, 1949). Its fauna is very rich, containing over 50 species of molluscs, fish, reptiles, birds and mammals, but no trace of domestic mammals is found. The collection, dominated by fish (*Clarias* sp., *Synodontis* sp.), freshwater turtles (*Trionyx* sp.) and antelopes inhabiting riverine environments such as kob (*Kobus kob* ; over 44 % of the mammalian assemblage) clearly indicates that the Nile ecosystem was of major importance to the site inhabitants, while the hinterland was used to a lesser extent. A comparable situation existed at Saggai 1 (30 km north of Khartoum ; Gautier, 1983) and maybe also at Shabona (140 km south of Khartoum ; Clark, 1973), both belonging to the same cultural tradition as the Khartoum Hospital inhabitation.

Most of the animals and especially the mammals, found in Hospital Khartoum are today confined to southern Sudan and are generally not found north of the low rainfall savanna belt *sensu* Wickens (1975, 1982) with an annual rainfall between 400 and 800 mm. We therefore assume that at the time the site was occupied, similar ecologic and climatic conditions prevailed. A more elaborate evaluation by Gautier (1983) on the basis of the faunal spectrum found at Saggai 1 estimates an annual precipitation, for the period considered, of some 500 mm. It takes into account the present day degradation of the area and the

possible buffering effect of the Nile. The much higher precipitation estimate of Miss Bate (1949 ; 800 mm) was based on wrongly-identified specimens such as the lechwe *(Kobus leche)*.

As the Esh Shaheinab site, dated between the 6th and 5th millenium B.P., remains of fish, reptiles, typical game mammals such as Porcupine, Elephant, Rhinoceros, Hippopotamus and several kinds of antelopes as well as domesticates were recognized. This assemblage points to a mixed hunting-gathering-herding economy. In comparison with Khartoum Hospital, it appears that fish remains were not so numerous at Esh Shaheinab, probably suggesting that fish were less important in the diet of the prehistoric inhabitants of Esh Shaheinab. However, the major difference with Early Khartoum is no doubt the presence of both small and large livestock. Contrary to Miss Bate's belief, no osteological or osteometrical arguments are present which support her idea of two different goat breeds, i.e. a normal sized and a dwarf breed. We only found evidence for normal sized breeds of small livestock. Our study also revealed the presence of Dog among the canid remains formerly identified as Jackal.

The bone material labeled by Miss Bate as *Syncerus* or *Homoioceras* (cf. Table 3) was not available for study. Most probably it can be assigned to Cattle, for which good evidence is available in the collection and through the new excavations at the site (Tigani El Mahi, 1982). Anyhow, one cannot estimate accurately the ratio wild *versus* domestic mammals from the data evaluated here. However, if the bone material labeled *Syncerus* or *Homoioceras* is ascribed to Cattle, livestock would make up 40 % of the mammalian assemblage [1]. This percentage is slightly lower than the one found by Tigani El Mahi (1982 : 43 ; 51.6 %). At other Central Sudanese Nilotic sites of comparable age, for example Kadero (Gautier, 1984), Umm Direiwa, El Zakiab and El Nofalab (Tigani El Mahi, *ibid.*), all within a radius of some 30 km north of Khartoum on the right bank of the Nile, livestock forms up to 90 % of the mammalian assemblages. This suggests a difference in importance of livestock between settlement on the left bank (40-50 % ?) and on the right bank (ca. 70-90 %). Probably it can be explained by the topography of the immediate vicinity of the site : the left bank of the Nile had (and still has) a relatively small floodplain with good pasture, therefore the inhabitants still included an appreciable amount of game in their diet. The right bank had a much wider floodplain and was hence more suited to pastoralist activities.

The faunal spectrum found at Esh Shaheinab furthermore indicates a drier environment compared to the one that prevailed during the occupation of the Khartoum Hospital site. This can be inferred from the disappearance of Marsh Cane Rat *(Thryonomys swinderianus)* and Kob *(Kobus kob)*, and the appearance of for example Red-fronted Gazelle *(Gazella rufifrons)*. This can be explained best by assuming a climatic and landscape deterioration, although men and his flocks may have interfered to a certain extent.

We would like to end with a more general consideration, referring to what Grigson (1978) writes in her « Towards a blueprint for animal reports in archaeology ». She insists that such reports should normally contain information

1. Percentage calculated on the basis of the entire ES assemblage minus the small intrusive rodents and the Dog and indeterminate canid remains. The exclusion of these groups is based on the fact that these remains do not pertain to animals killed by people for consumption or some other use.

about the place of storage of the animal remains dealt with and continues as follows : « It cannot be too strongly stressed that all scientific work should be repeatable ; the very nature of archaeology ('excavation is destruction') can preclude this, but there is no excuse for not keeping all the archaeological and scientific evidence that can be preserved. In the case of bones, this means proper conservation and storage » (Grigson, *ibid.* : 122). The collections studied here were apparently not always treated with the deference archaeozoologists dream of. Many factors are responsable, but no doubt the main ones are the lack of good storage facilities and even more the lack of staff to deal efficiently with incoming collections, as is the case almost everywhere in scientific institutions with depositories. Thus Grigson's devout wish will generally not be complied with as nicely as we expect. The scrupulous archaeozoologist should be aware of this and contribute as much as he or she can to the solution of this recurrent problem.

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Table 1. — Updated list of the Khartoum Hospital and Esh Shaheinab molluscs.

Molluscs		Frequency(1)	
Published nomenclature by BATE (1949; 1953)	Recent nomenclature	KH	ES
Freshwater Gastropods			
Viviparus unicolor	Bellamya unicolor	RR	FF
Ampullaria wernei	Pila wernei	FFF	FF
Lanistes carinatus	Lanistes carinatus	F	F
Bithynia sennaariensis	Gabbiella senaariensis	F	-
Cleopatra bulimoides	Cleopatra bulimoides	F	FFF
Melanoides tuberculata	Melanoides tuberculata	-	R
Bulinus truncatus	Bulinus truncatus	RR	-
Freshwater Bivalves			
Unio (Horusia) parreyssi	Caelatura aegyptiaca	-	R
Unio (Nitia) teretiuscula	Caelatura teretiuscula	-	F
?Aspatharia wahlbergi hartmanni			
Aspatharia marnoi	Spathopsis wahlbergi	RR	F
?Chambardi locardi			
Aspatharia rubens	Spathopsis rubens	F	FF
Mutela angustata			
Mutela nilotica	Mutela nilotica	R	RR
Aetheria elliptica	Etheria elliptica	R	FF
Corbicula africana			
Cyrena (Corbicula) cf. artini	Corbicula consobrina	RR	RR
Land snails			
Zootecus insularis	Zootecus insularis	FFF	FF
Limicolaria flammata			
Limicolaria kambeul	Limicolaria cailliaudi	FFF	FF
Pupoides sennaariensis	Pupoides senaariensis	RR	-
Trochonanina sp.	Trochonanina sp.	RR	-

(1) RR = Very Rare (≤5); R = Rare (≤20); F = Frequent (≤100); FF = Very Frequent (≤500); FFF = Very Abundant (>500)

Table 2. — Critical faunal list of the Khartoum Hospital mammalian fauna.

Animal group/species	D(1)	DM(2)	NI(3)	Identifications by Miss BATE
North African porcupine (Hystrix cristata)	1	4	1	Hystrix sp.
Marsh cane rat (Thryonomys swinderianus)(4)	3	-	1	Thryonomys arkelli
Multimammate rat (Praomys natalensis?)	-	1	-	Rattus (Mastomys) cf. coucha
Nile rat (Arvicanthis niloticus)	-	4	-	Arvicanthis sp.
Jackal (Canis sp., probably C. aureus)	-	1	-	Canis? lupaster
Banded mongoose (Mungos mungo)	2	-	-	Mungos sp.
Large mongoose (Herpestinae indet.)	2	2	-	Atilax cf. paludinosus
Small carnivore	-	-	3	
Striped hyena (Hyaena hyaena)	-	1	-	Hyaena cf. hyaena
(African) wild cat (Felis silvestris)	-	2	-	Felis sp. (cf. ocreata)
Caracal and/or serval (Felis caracal/F. serval)	-	-	2	
Leopard (Panthera pardus)	-	1	-	Panthera cf. pardus
Lion (Panthera leo)	-	-	2	
African elephant (Loxodonta africana)	-	1	-	Loxodonta cf. africanus
Burchell's zebra or African wild ass (Equus burchelli/E. africanus)	-	1	-	Equus sp.
Rhinoceros (Rhinocerotidae indet.)	-	?5	-	Diceros cf. bicornis
Warthog (Phacochoerus aethiopicus)	24	1	7	Phacochoerus sp.
Hippopotamus (Hippopotamus amphibius)	+4	?	25	Hippopotamus cf. amphibius
Giraffe (Giraffa camelopardalis)	-	-	1	
Oribi (Ourebia ourebi)	-	-	13	
Common bush duiker (Sylvicapra grimmia)	-	-	?1	
Small antelope	?	?	2	?Ourebia sp.
Bushbuck (Tragelaphus scriptus)	-	-	3	
Sitatunga (Tragelaphus spekei)	-	-	2	
Bohor reedbuck (Redunca redunca)	-	-	15	Antilope sp.
Kob (Kobus kob)	?	-	+260	Antilope sp./Onotragus cf. megaceros/
Medium antelope	-	-	24	?Adenota leucotis
Waterbuck (Kobus ellipsiprymnus)	-	-	2+?2	
Topi and/or hartebeest (Damaliscus lunatus/ Alcelaphus buselaphus)	3	-	33	Antilope sp. (large)/Onotragus cf. megaceros
Roan antelope (Hippotragus equinus)	-	-	9	
Buffalo (Syncerus caffer)	+55	2	+60	Syncerus cf. aequinoctialis
TOTALS	94	26	468	

(1) (D): material described by Miss BATE, which we found back and of which the identifications were verified.

(2) (DM) : material described by Miss BATE but missing and of which we could correct or adapt the identification, on the basis of various considerations.

(3) (NI) : material which had not yet been identified.

(4) These remains are still available, but are not stored in the Osteology Room (information given by Dr. J. CLUTTON-BROCK).

Table 3. — Critical faunal list of the Esh Shaheinab mammalian fauna.

Animal group/species	D(1)	DM(2)	NI(3)	Identifications by Miss BATE
WILD MAMMALS				
Grivet monkey (Cercopithecus aethiops)	-	5	-	Cercopithecus cf. aethiops
Hare (Lepus sp.)	75	-	5	Lepus sp.
Small rodent (Gerbillidae indet.)	1	-	1	Tatera cf. robusta
Striped ground squirrel (Euxerus erythropus)	4	-	-	Euxerus cf. erythropus
North African porcupine (Hystrix cristata)	-	20	-	Hystrix sp.
Jackal (Canis sp., probably C. aureus)	2	-	2	?Canis aureus soudanicus
Ratel (Mellivora capensis)	-	?4	-	Mellivora sp.
Otter (Lutrinae indet.)	-	2	-	Lutrine
Genet (Genetta sp.)	-	2	-	Genetta cf. tigrina
African civet (Viverra civetta)	1	-	-	Civettictis sp.
Slender mongoose (Herpestes sanguineus)	-	2	-	Herpestes (Myonax) sanguineus
Striped hyena (Hyaena hyaena)	-	1	-	Hyaena cf. hyaena
(African) wild cat (Felis silvestris)	-	1	-	Felis cf. lybica
Leopard (Panthera pardus)	-	2	-	Panthera cf. pardus
Lion (Panthera leo)	-	4	-	Panthera cf. leo
African elephant (Loxodonta africana)	-	9	4	Loxodonta africana
Black rhinoceros (Diceros bicornis)	17	-	-	Diceros bicornis/Rhinoceros sp.
White rhinoceros (Ceratotherium simum)	2	-	-	Rhinoceros sp.
Rhinoceros (Rhinocerotidae indet.)	39	-	21	Rhinoceros sp.
Warthog (Phacochoerus aethiopicus)	-	22	1	Phacochoerus sp.
Hippopotamus (Hippopotamus amphibius)	7	-	13	Hippopotamus cf. amphibius
Giraffe (Giraffa camelopardalis)	60	3	9	Giraffa sp.
Oribi (Ourebia ourebi)	-	-	3	
Common bush duiker (Sylvicapra grimmia)	-	2	-	Sylvicapra cf. grimmia
Small antelope	-	4	2	?Sylvicapra cf. grimmia
Red-fronted gazelle (Gazella rufifrons)	5	-	-	Gazella sp. (cf. rufifrons)
Large gazelle (Gazella sp.)	-	3	1	Gazella sp.
Medium antelope	-	-	2	
Greater kudu (Tragelaphus strepsiceros)	-	1	9	Strepsiceros cf. strepsiceros
Roan antelope (Hippotragus equinus)	-	2	-	?Hippotragus equinus
Large antelope	1	7	7	Aegoryx algazel/Oryx sp./Antelope (indet.)
DOMESTIC MAMMALS				
Dog (Canis lupus f. familiaris)	6	-	2	Canis sp./?Canis aureus soudanicus
Sheep (Ovis ammon f. aries)	-	1	-	?Ovis sp.
Goat (Capra aegagrus f. hircus)	10	1	1	Capra sp./?Ovis sp.
Small livestock (Sheep and/or goat)	31	12	3	Capra sp./?Ovis sp.
Cattle (Bos primigenius f. taurus)	-	-	9	
DOMESTIC OR WILD MAMMALS				
Dog and/or jackal (Canis sp.)	5	-	7	Canis sp./?Canis aureus soudanicus
Cattle and/or buffalo (Large bovid)	-	127	12	Syncerus or Homoioceras
TOTALS	189	237	115	

(1) (D) : material described by Miss BATE, which we found back and of which the identifications were verified.

(2) (DM) : material described by Miss BATE but missing and of which we could correct or adapt the identification, on the basis of various considerations.

(3) (NI) : material which had not yet been identified.

	Width of the upper incisor				Relative position of the grooves on the upper incisor(1)				Width of the upper M2			
Khartoum Hospital Thryonomys arkelli (BATE)	5.4 mm (Holotype)				53% (Holotype)				6.7 mm (Holotype)			
Recent(2)	min.	max.	$\bar{x}$	n	min.	max.	$\bar{x}$	n	min.	max.	$\bar{x}$	n
Thryonomys gregorianus	3.1	5.7	4.8	14	49%	61%	57.9%	14	5.4	6.2	5.8	10
Thryonomys swinderianus	4.1	7.1	5.6	43	42%	61%	52.3%	43	6.1	7.8	7.1	40

(1) i.e. the distance from the mesial border to the outer groove versus the total width of the upper I1.

(2) Based on data from VAN NEER (1981).

Table 4. — Comparison between recent and fossil Thryonomids.