



ARCHAEOZOOLOGY OF THE NEAR EAST

VIII

Actes des huitièmes Rencontres internationales
d'Archéozoologie de l'Asie du Sud-Ouest et des régions adjacentes

Proceedings of the eighth international Symposium on the
Archaeozoology of southwestern Asia and adjacent areas

TOME II

edited by

Emmanuelle VILA, Lionel GOURICHON,

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Aswa VIII

Lyon 28 juin-1^{er} juillet 2006

Lyon, June 28th-July 1st, 2006

Ouvrage publié avec la participation de la Région Rhône-Alpes et de l'UMR 5133,
Archéorient, Maison de l'Orient et de la Méditerranée

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**THE HUNT FOR WILD DROMEDARIES AT
THE UNITED ARAB EMIRATES COAST DURING
THE 3rd AND 2nd MILLENNIA BC.
CAMEL BONES FROM THE EXCAVATIONS
AT AL SUFOUH 2, DUBAI, UAE**

Angela VON DEN DRIESCH,¹ Helmut BRÜCKNER,² Henriette OBERMAIER,³ Anja ZANDER⁴

ABSTRACT

This paper presents results obtained from a huge assemblage of camel bones unearthed during archaeological excavations at Al Sufouh 2, Dubai, UAE. Based on the geological investigations carried out around the ancient site, the radiocarbon dates obtained, and the morphology, age structure and size of the camel bones, the site represents a hunting and butchering site for wild dromedaries which was in use during the Umm an-Nar and Wadi Suq periods (second half of the 3rd millennium to first half of the 2nd millennium BC). The material offers the largest number of measurable bones of wild dromedary known until now.

Keywords: South-east Arabia, Dubai, United Arab Emirates, wild dromedaries, hunting practices, domestication.

RÉSUMÉ

Cet article présente les résultats de l'analyse d'une accumulation considérable d'ossements de camélidés mise au jour au cours des fouilles archéologiques d'Al Sufouh 2 à Dubaï (EAU). D'après les investigations géologiques menées autour du site antique, les datations radiocarbone obtenues ainsi que la morphologie, la taille et la structure des âges de ces ossements de camélidés, le gisement correspond à un site de chasse au dromadaire sauvage sur lequel s'effectuaient également des activités de boucherie. Il était

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occupé durant les périodes Umm an-Nar et Wadi Suq (seconde moitié du III^e millénaire à la première moitié du II^e millénaire av. J.-C.). Ce matériel de faune représente la plus grande série d'ossements mesurables de dromadaires sauvages connue jusqu'à présent.

Mots-clés : *Sud-Est de l'Arabie, Dubai, Émirats Arabes Unis, dromadaires sauvages, pratiques de chasse, domestication.*

INTRODUCTION

The archaeological site of Al Sufouh 2 is located between Dubai City and the Jebel Ali Free Zone, 1 km south of the present coastline. Here, members of the Institute of Near Eastern Studies of the University of Munich, in cooperation with the Department of Tourism and Commerce Marketing of Dubai, conducted excavations in seven campaigns from 2001 until 2004. The main area of excavation stretches along the north-western slope of a low sand dune running roughly parallel to the present coastline. It is a desert-like environment (*fig. 1*).



Fig. 1—Excavation area of Al Sufouh 2 seen from the south.

From the very beginning of the excavations it became clear that we were dealing with the only slaughtering place for camels so far discovered in the United Arab Emirates. The excavated bone accumulations comprise the remains of almost 18,000 bones, representing at least 123 individual dromedaries, as well as a few bones of other mammals (*table 1*) and (not listed here) birds and extensive marine faunal remains including fish, shellfish and crustaceans. A total of *ca* 30 fireplaces were found between the bone accumulations in several of the trenches.

		N	Weight (g)
Domestic mammals	Cattle	5	59
	Goat	2	22
	Sheep or goat	12	57
	Dog	9	90
Total domestic		28	228
Wild mammals	Wild dromedary ¹⁾	17,812	787,000
	Goitred gazelle, <i>Gazella subgutturosa</i>	8	63
	Unidentified gazelle, <i>Gazella</i> ssp.	49	178
	Arabian oryx, <i>Oryx leucoryx</i>	13	230
	Striped hyena, <i>Hyaena hyaena</i>	1	12
	Bottlenose dolphin, <i>Tursiops truncatus</i>	2	28
Total wild		17,913	787,739

¹⁾The scientific name *Camelus dromedarius* given by Linné (1758) is only valid for the domestic dromedary. Gentry *et al.* (2004) avoided defining the wild dromedary. Therefore no Latin name is given here as there is no definite convention about the wild progenitor of the domestic form.

Table 1—Mammal species identified from Al Sufouh 2.

STATE OF PRESERVATION AND SPECIES IDENTIFICATION OF THE CAMEL BONES

The camel bones in the uppermost layers were heavily CaCO₃-encrusted, sometimes infiltrated with sand and gypsum and often splintered. However, these encrustations did not affect bones from the deeper layers. Except for a few sections of vertebrae and various almost complete carpal and tarsal articulations, the bones were not found in anatomical order (*fig. 2*), and only very few long bones were preserved in their total length. These features as well as cut and chop marks characterise the material as being the remnants of butchered animals.



Fig. 2—Camel bone accumulation in trench D6.

Unfortunately the camel bones from Al Sufouh 2 were in a poor state of preservation. Many of them were too fragmented and their surfaces too corroded to be distinguished in terms of the morphological features presented by Steiger (1990). She carried out an exhaustive comparative osteological study of the postcranial skeletons of the two old world camelids, dromedary and bactrian camel. We were able to identify only about 20% of the total bone material, including some of the better preserved skull elements (*fig. 3*), as definitely belonging to the dromedary, but we succeeded in determining that almost all of the smaller, better preserved bones such as carpals or tarsals, were those of dromedaries. From this we can conclude that the entire assemblage of camelid material belonged to the dromedary, a conclusion that is supported by the age of the remains (see below) and the original geographic distribution of the two camel species.



Fig. 3—Almost complete dromedary skull in trench D6.

DATING

Pottery or other clay objects, and metal or flint objects, by which the deposits might be dated, were rarely found together with the bone accumulations. The most numerous small finds were pottery shards (fewer than 100) of differing quality. The style and shapes of some rim fragments are typical of the Wadi Suq period, a culture dating to the first half of the second millennium BC. There are also several bronze arrowheads and other bronze objects, but the most interesting metallic find is an axe blade made from copper, identical to axe blades found in sites of the Umm an-Nar culture from the 3rd millennium BC (Gruber *et al.* 2005). To sum up, all of the artefacts found at Al Sufouh 2 date from a period between the middle of the third through the middle of the second millennium BC.

A total of 12 samples from bones found in different trenches and layers, and one *Terebralia palustris* shell, were sent to the *Leibniz Labor für Altersbestimmung und Isotopenforschung* in Kiel, Germany,

for radiocarbon dating. Only 6 samples contained enough collagen for a reliable dating (*table 2*). Five of the 6 samples, including the *Terebralia*, indicate a time span from the middle of the 3rd millennium to middle of the 2nd millennium calibrated BC, consistent with the archaeological dating, although one sample indicates a date of about 400 BC. The earliest radiocarbon date (*ca* 2600 cal. BC, 2 sigma range 2929-2192 cal. BC) was obtained from a cattle mandible, which possibly did not arrive at the site in the same context as the camel bones. The earliest date derived from camel bone is about 2100 cal. BC (2 sigma range 2406-1856 cal. BC).

Laboratory no.	Species	Skeletal part	Trench	Radiocarbon age BP	Calibrated ages cal. BC	2 sigma range cal. BC
KIA-17944	<i>Terebralia palustris</i>	Shell	D7, level 2	3570 ± 34	1916, 1895, 1895	1981-1867
KIA-17945	Camel	Radius	C6, level 3	2379 ± 175	404	834-42
KIA-17946	Camel	2 Vertebrae	C6, level 8	3078 ± 62	1379, 1335, 1320	1457-1207
KIA-22178	Cattle	Mandible	13, level 4	4066 ± 152	2616, 2614, 2579	2929-2192
KIA-22181	Camel	Vert. thorac.	C7, level 9	3592 ± 100	1939	2203-1686
KIA-22183	Camel	Phalanx 1	1S, level 14	3691 ± 119	2122, 2097, 2086, 2085, 2040	2406-1856
KIA-22184	Camel	Vert. thorac.	1S, level 5	3391 ± 106	1687	1940-1485

Table 2—Radiocarbon dates of faunal remains from Al Sufouh 2.

BONE SIZE

Bone measurements are the basis for the evaluation of animal sizes. In their publication *The Appearance of the domestic Camel in SE—Arabia*, Hans-Peter and Margarete Uerpmann (2002) re-evaluated the published measurement data for prehistoric camel bones found in the UAE (Neolithic, Bronze and Iron Age) and measured new finds. In figure 4, except for Al Sufouh 2 the data are taken from the cited work, it can be seen, that no significant size differences exist between the camel remains from the site of Umm an-Nar (an island near Abu Dhabi) and those from Tell Abraq (a site situated at the coast about 170 km further north-east) during the Umm an-Nar and Wadi Suq periods. It is, however, obvious that the camel bones from the Iron Age levels of Tell Abraq were generally smaller than those of the earlier camels. The reduction in size corroborates the inference that after a decrease during the Wadi Suq periods the increase in number of camel bones in the archaeological sequence at Tell Abraq resulted from the domestication of the dromedary. If this is so, then one must also conclude that the Bronze Age camel remains from Umm an-Nar and from Tell Abraq represent a wild population.

Comparing the measuring results from the camel bones from Al Sufouh 2 with the Tell Abraq results presented by the Uerpmanns (*fig. 4*), yields a fairly good agreement, though the bones from Al Sufouh are even larger than the Umm an-Nar finds. Thus, following the Uerpmann's hypothesis, the camel bones unearthed at Al Sufouh 2 belonged to wild dromedaries and consequently they must have been hunted and butchered at the site under study.

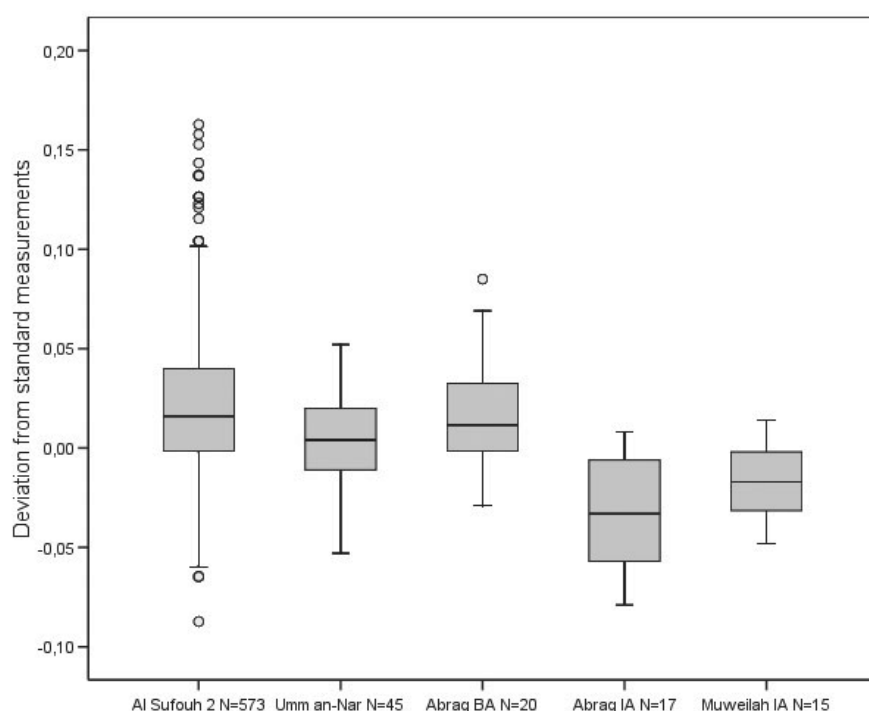


Fig. 4—Size distribution on the basis of LSI values for dromedaries from different Bronze Age and Iron Age sites in the Emirates. Except for Al Sufouh 2, the data were taken from Uerpmann and Uerpmann (2002).

AGE CLASSES AND SEX DISTRIBUTION

The age classes recorded from the long bones and the phalanges 1 and 2—(admittedly, determining the age distribution on the basis of the teeth-bearing skull elements was less satisfactory)—demonstrate that a majority of the hunted animals was “older” young and subadult dromedaries aged between 1½ to 3½ years old. No bones of calves 6 months or younger were identified, and there are no foetal bones in the assemblage.

Sex can be determined from the skeleton of a camel on the basis of the size of the upper and lower canine teeth, these being much larger in males than in females. A second indication is the pelvic bone, in particular the region of the acetabulum with the attaching ilium and pubis. This is a characteristic feature of all mammals which give birth to only one offspring at a time (Lemppenau 1964). Only a part of these sex-diagnostic bone elements was well enough preserved in the Al Sufouh 2 materials to enable a determination of sex (a so-called Minimum Number of Individuals, MNI, of 23 females and 49 males). From these it seems that the remains of male animals are about twice as frequent at Al Sufouh 2 as those of females.

Taking the logarithmic size indices (LSI) of the measurements as a measure of the distribution of the sexes (*fig. 5*) results in a curve with two peaks. The peak to the left of the mean value represents the females and younger males. The small peak to the right of the mean indicates the adult, rather large males. Although the distribution of the LSI-values does not demonstrate a predominance of males, this is quite possible as the left hand maximum includes both females and younger males. However, it is worth pointing out that the age and sex distribution is not necessarily that of the original herds but rather of those individuals that were selected as prey and whose bones were left at the site.

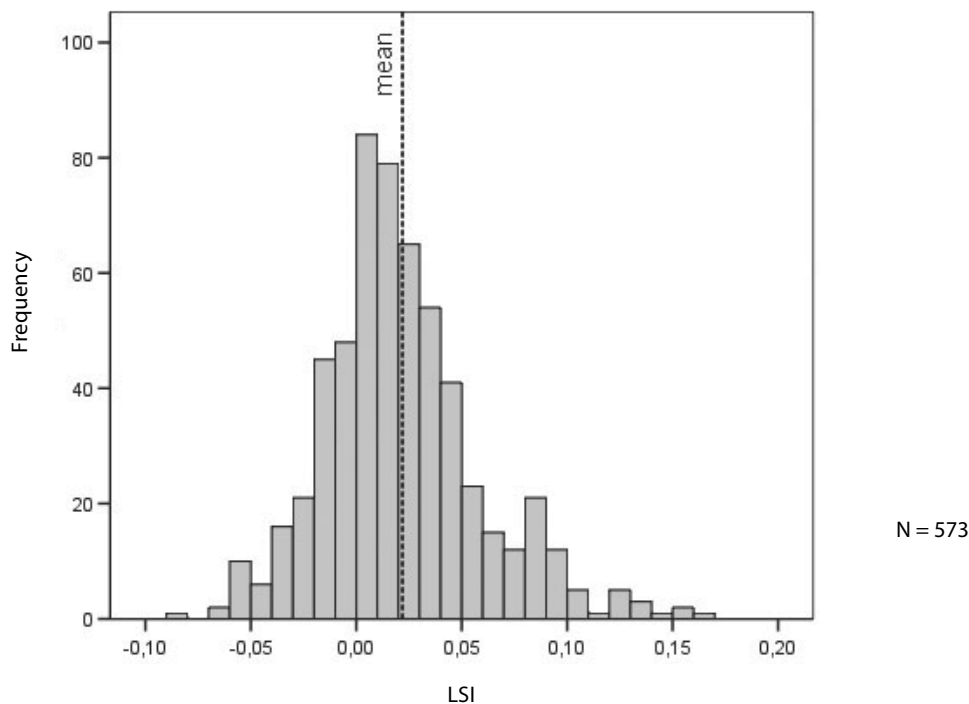


Fig. 5—Possible sex distribution of dromedaries from Al Sufouh 2 on the basis of the LSI-values.

ANCIENT ENVIRONMENT

The question “*Why were the camels hunted at this specific locality?*”, requires a closer look on the ancient environment of the site. During the excavations, shells of the large gastropod *Terebralia palustris* were found all over the site, sometimes in masses. *T. palustris* is typically a dweller of mangrove swamps. Geological investigations carried out in the vicinity of the site have revealed no evidence for mangrove swamps during the site’s occupation in the later third and early second millennium BC. Mangrove vegetation had been present in much earlier times, namely in the late 6th and early 5th millennia BC; it was submerged by a rise in sea level in the second half of the 5th millennium BC. Soon afterward the tidal creek system was established, locally known as *khors* (Zander, Brückner 2005). The *khor* environment is characterised by broad intertidal flats with occasional islands of *sabkha* covered by dense halophytic vegetation (fig. 6). Here, *Terebralia palustris* apparently found ideal living conditions. That *T. palustris* can thrive in the absence of mangroves was shown by investigations of various khors along the Gulf of Oman (Feulner 2000), and is supported by observations elsewhere, e.g. the Seychelles (Fratini, pers. comm.) and, reportedly, Iran (Hogarth, pers. comm.; Feulner 2006).

Our palaeogeographic studies also showed that the Al Sufouh 2 archaeological site was situated directly by a former coastline that consisted of a low cliff of outcropping beachrock (cemented bioclastic sand) bordering a tidal creek. The beachrock provided a solid, flat platform along a generally sandy coast (fig. 6) and apparently represented a preferred place for butchering camels and building fireplaces. Waste (bones, etc.) could either be thrown into the creek or used as combustible material.



Fig. 6—A possible modern analogue to the Al Sufouh 2 site—a beachrock platform with halophytic vegetation, adjacent to a lagoon and tidal creek in Umm Al-Qaiwain, UAE.

DISCUSSION

Why were the dromedaries hunted at this particular site?

Nothing is known about the feeding behaviour of wild dromedaries as this species was exterminated when scientists started to describe animal behaviour in detail in the 19th century AD. So far archaeological excavations in south-east Arabia did not provide evidence for wild dromedaries from younger periods than the Iron Age.

Observation of free-grazing domestic dromedaries in Africa revealed that in areas where salty plants are growing, the camel is very fond of these plants, which are important for its wellbeing. The chemical process of halophytes is usually dominated by sodium chloride (NaCl), sometimes sodium sulphate (Na_2SO_4) and sometimes organic sodium salts, depending on the available minerals. It is recorded that such salty plants together with dry grass, supplying carbohydrate, form a well-balanced diet for camels (Gauthier-Pilters, Dagg 1981, p. 42). In the northern and central Sahara free-grazing domestic herds make periodic visits to regions where the salty plants grow, alternating between rocky and dune pastures—an observation which may apply also for the wild camels of Al Sufouh 2. The animals may have varied their feeding grounds, seasonally or otherwise, between the dunes and the khors.

It is easy to imagine that the local hunters, who knew this behaviour well, waylaid the grazing animals and encircled one or more suitable individuals, when the wild dromedaries of Al Sufouh were visiting the khors in order to meet their requirements for salt. While a group of hunters possibly threw lassos at this

animal, other members of the hunting party may have attacked it with arrows and other weapons (or simply with stones?), a hunting practice depicted in a rock painting in south Arabia (*fig. 7*). After the animal was exhausted it was pulled down and killed by a deep cut through the throat. Hunting down the animal in this way may have been relatively easy, because in this muddy environment the prey could not run away quickly. It is obvious that a cadaver of a camel as a whole is much too heavy for transport. The hunted individual was butchered at a convenient site, *i.e.* at the flat platform of the beach rock, the meat partially prepared at the site (as testified by the many fireplaces) and the major part of the meat together with the skin taken home, wherever this may have been. It is very likely too that the hunters dried the meat on the spot for conservation. According to our knowledge of the domestication history of the donkey (Uerpmann 1987), it is quite possible that UAE hunters possessed domestic donkeys at that time to carry home their heavy prey. Alternatively, it is possible that boats were used for transportation along the coast.



Fig. 7—Rock art demonstrating a hunting scene on a wild dromedary (according to Anati 1968).

If this hunting procedure was repeated over a long period of time, *i.e.* from 2100 to 1300 BC as implied by the radiocarbon dating results, the verified minimum number of individuals (MNI) of *ca* 123 camels appears very low, representing an average of 15 to 16 camels hunted in one hundred years. Even though the MNI is almost certainly an underestimate, the actual number of camels killed and butchered per century at a single site may still have been relatively small. Al Sufouh 2 may not have been the only hunting and butchering site in the environs of the former creek. Alternatively, wild camel herds may not have frequented that specific site regularly every year over many centuries and hunting may have only taken place sporadically.

There are many examples from other prehistoric sites for such hunting behaviour, although admittedly not for camels. At Šan-Koba, Taš-Air I and other cave sites on the Crimean peninsula, wild boars were hunted and butchered at the transition from Mesolithic to early Neolithic times (Benecke 1994, p. 251).

Another, more spectacular and better known example is the Palaeolithic site of Solutré in Burgundy, France. Here, near the *Rocher de Solutré*, a Jurassic limestone escarpment, massive accumulations of horse bones were found in the Magdalenian horizon (*ca* 20,000 to 16,000 years BP), demonstrating horse hunting over a long period of time (Turner 2002). New excavations and modern studies of the animal bones have led to the currently accepted view that hunters intercepted animal herds as they moved through the Solutré valley during their seasonal transhumance from the alluvial plain of the Saône to the Mâconnais uplands (Turner 2002, *fig. 49*). Parties of hunters drove their prey into natural rock traps along the flank of the rock just under the fault line, where they could be killed by hunters armed with spears and darts waiting in ambush for horses forced to pass one by one between the large boulders. This dramatic scene is reconstructed in a

picture exhibited in the Museum of Solutr  near the site. These people obviously butchered their prey near the killing place and took the skins and meat with them, leaving the bones behind—similarly to the situation found at Al Sufouh.

FINAL CONCLUSIONS

The camel bones at Al Sufouh 2 represent a unique opportunity to investigate the history of the dromedary in south-east Arabia. It is the only site with such a huge amount of osteological material: almost 18,000 bones and bone fragments deriving exclusively from wild dromedaries have been excavated. Most of the arguments proposed for the understanding of the biological and cultural background of this extraordinary bone accumulation support the conclusion that Al Sufouh 2 was a prehistoric hunting place where people preyed on wild dromedaries and butchered them at the site. The wild nature of the camels is evidenced by the bone size measurements, which match those of camel bone material found at other contemporary sites in the UAE, and are much larger than the subsequent remains of undoubted domesticated camels. According to the radiocarbon dating of the bones, hunting was practised over a long period of time, probably from the second half of the 3rd millennium to the second half of the 2nd millennium. It is not possible to say from the present evidence to what extent the site was, or could have been, used on a regular basis over this long period of time. One must reckon that in many years humans and/or camels did not frequent the site because of the prevailing ecological conditions.

The determined age classes demonstrate a predominance of “older” young and subadult dromedaries, aged between 1½ and 3½ years, mainly young males and subadult females, although the hunters were also able to kill powerful adult bulls. No bones of calves 6 months or younger were identified. This suggests two possibilities: either the dromedary herds never visited the site in the colder season of the year when young calves were present, or very young dromedaries were deliberately not killed by the hunters.

A more detailed report on the faunal remains from Al Sufouh 2 together with documentation of the bone measurements is published in *Documenta Archaeobiologiae*, the Annual of the State Collection for Anthropology and Palaeoanatomy Munich (von den Driesch, Obermaier 2007).

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