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THE STATUS OF FALLOW DEER IN ANCIENT EGYPT: AUTOCHTHONOUS OR INTRODUCED?

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ABSTRACT

Although the fallow deer is present in ancient Egyptian iconography, its presence as an indigenous wild animal is still controversial. Some scholars believe that it was not autochthonous to Egypt, while others are convinced that it occurred at least in small numbers. Until the 1980s, hardly any fallow deer remains had been recovered at ancient Egyptian sites. Recently however, 35 bone remains of *Dama* were excavated at the New Kingdom site of Qantir/Piramesse in the eastern Delta, once the state's capital. The levels producing these remains date to between the 14th and 10th centuries BC. The presence of fallow deer in Egypt is here re-examined, based on observations of the finds at Qantir and drawing upon the published data.

Keywords: Fallow deer, Ancient Egypt, iconography, bone remains, zoogeography.

RÉSUMÉ

Alors que le daim a pu être mis en évidence dans l'iconographie de l'Égypte ancienne, sa présence indigène à l'état sauvage fait encore l'objet de discussions et de controverses. Quelques spécialistes pensent qu'il n'est pas autochtone en Égypte, tandis que d'autres sont convaincus qu'il s'y trouvait en petit nombre. Jusqu'aux années quatre-vingts, peu de vestiges de daims avaient été récoltés sur les sites archéologiques égyptiens. Cependant, récemment, trente-cinq ossements de Dama *ont été retrouvés dans le Delta oriental au cours des fouilles du site du Nouvel Empire de Qantir/Piramesse, autrefois capitale du pays. Les niveaux de découverte de ces vestiges sont datés entre le XIV^e^ et le X^e^ s. av. J.-C. La présence du daim en Égypte a été réexaminée en fonction des observations faites sur les trouvailles de Qantir et en utilisant les données publiées.*

Mots-clés : *Daim, Égypte ancienne, iconographie, restes osseux, zoogéographie.*

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INTRODUCTION

As deer are represented in Predynastic and Dynastic iconography and *hnn* is a generic term for deer in ancient Egyptian hieroglyph writing, it has been discussed whether they were part of the indigenous fauna of ancient Egypt. Some scholars have stated that deer were present in Holocene Egypt in spite of its rareness in the archaeozoological record and the lack of detail in the images of the species (Bénédite 1918; Keimer 1934; Joleaud 1935; Haltenorth 1959; Nibbi 1980; Boessneck 1988; Osborn, Osbornová 1998). Other authors suggested that deer never occurred in the wild in Egypt, but were introduced as tribute or through trade (Dawson 1934; Allen 1939). Based on the evidence available at this time the distribution status of fallow deer in Predynastic and Dynastic Egypt will be examined.

ICONOGRAPHIC AND ARCHAEOZOOLOGICAL EVIDENCE

Representations of deer in ancient Egyptian iconography will be outlined very briefly here, as there is detailed previous research (Dawson 1934; Butzer 1977; Darby *et al*. 1977; Houlihan 1987; see also Kitagawa forthcoming). At least 30 depictions of deer have been recorded so far in ancient Egyptian art (*table 1*). Although the periods in which deer were depicted last from Predynastic to Ptolemaic times, most of the pictorial evidence antedates the 18th Dynasty. Thereafter only a single representation is known which dates to the Ptolemaic Period. In past publications the deer depicted had been identified as red deer, axis deer or Mesopotamian fallow deer, but some authors agree that the latter species is the one which is primarily represented (Dawson 1934, p. 145; Boessneck 1988, p. 37; Osborn, Osbornová 1998, p. 153-154).

Bone remains of fallow deer from natural or archaeological late Quaternary contexts are scarce. One upper fourth premolar (P^4) found in Pleistocene strata at Qau el-Kebir/Anteopolis was attributed to deer by Parona (1918). The identification, however, is insecure given the incompleteness of the specimen and its possible confusion with antelope species (Gautier 1984, p. 47; Peters 1986, p. 9 and pers. comm. 2006). From Upper Egypt two pieces of worked antler dating to the New Kingdom (one from Deir el-Medina and the other from Qau el-Kebir) were reported respectively by Dawson (1934) and Keimer (1934).

In archaeological contexts in Lower Egypt, however, deer bones have only been retrieved from two sites in the eastern Delta, namely Tell el-Dab‘a and Qantir/Piramesse (*fig. 1*). From Tell el-Dab‘a one radius and one metatarsus out of 67,604 identified mammalian specimens were reported and identified as Mesopotamian fallow deer *Dama mesopotamica* (Boessneck, von den Driesch 1992, table 1, 3). Both come from Middle Bronze Age contexts, one from a Middle Kingdom stratum and the other from a level dating to Middle Kingdom/Second Intermediate Period (Boessneck, von den Driesch 1992, p. 34, table 3). From Qantir, the Egyptian state’s capital during the reign of Rameses II, 35 fallow deer bones were recognised in an assemblage totaling 7121 identified mammalian remains (Kitagawa in preparation). The strata in Qantir cover a period lasting from the 16th to the 10th century BC, with the main occupations during the first half of the 18th to the 20th Dynasty. Since 1980 four areas named QI, QIV, QV and QVII have been excavated. Deer bones begin to occur in the faunal record of Qantir from the late 18th Dynasty onward and 70% of them have been collected in 18th/19th Dynasty contexts. The majority of the deer bones were retrieved from QI (N = 30), an area where chariots, workshops and military installations dating from the late 18th to the 19th Dynasty were unearthed. QIV yielded some deer remains (N = 4). Here several buildings including horse stables, a palace-like structure and a glass workshop from the late 19th to the early 20th Dynasty could be discerned. Area QVII produced but a single deer bone.

From the skeletal distribution of the deer bones it can be seen that both cranial and post-cranial skeletal elements occur (*table 2;* Kitagawa forthcoming *table 3*), implying the presence of living animals in the site environs. By applying to our material the long bone fusion data established for European fallow deer by Pohlmeyer (1985, table 2), it becomes obvious that the deer remains collected at Qantir/Piramesse essentially represent adult individuals, although two juveniles could also be recognised.

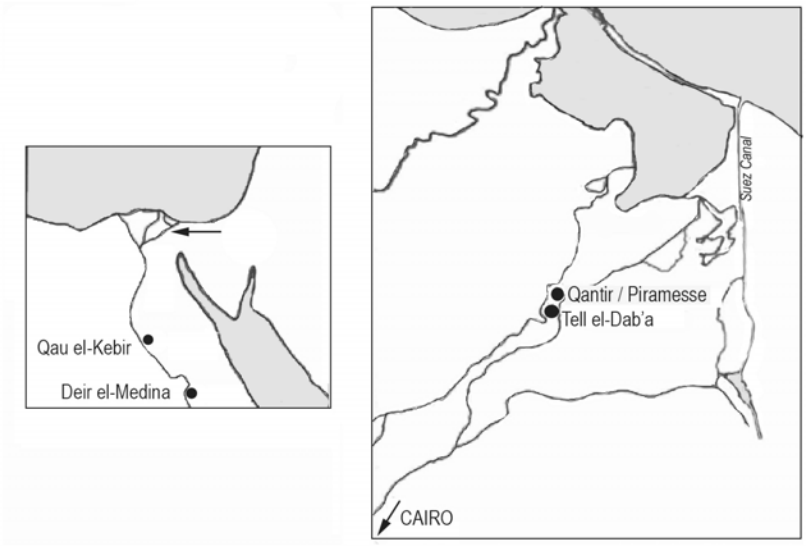

Fig. 1—Maps of Egypt and the eastern Delta.

Period	Object (number of finds)	N
Predynastic Period *ca* 5300-3000 BC	Cosmetic palette (1), Ivory knife handles (4), Rock drawing (1), (Bas-)Relief/painting (1),	7
Early Dynastic Period (1-2 dyn.) *ca* 3000-2686 BC	Mace head	1
Old Kingdom (3-8 dyn.) 2868-2160 BC	Tomb reliefs (7), Relief? (1)	8
Middle Kingdom (11-14 dyn.) 2055-1650 BC	Tomb reliefs (all)	7
Second Intermediate Period (15-17 dyn.) 1650-1550 BC	Diadem (dating and geographic origin uncertain)	1
New Kingdom (18-20 dyn.) 1550-1069 BC	Tomb reliefs (3), Relief (1)	4
Ptolemaic Period 332-30 BC	Tomb relief	1

Table 1—Types and frequencies of deer representations sorted by period.

Square	Body parts	N	Skeletal elements (number)
QI	Skull	5	Antler (2), Pedicle (1), Maxilla (1), Mandibula (1)
	Vertebrae and Costa	5	Lumbar vertebra (3), Caudal vertebra (1), Rib (1)
	Fore limb bones	4	Scapula (1), Metacarpus (2), Radius + Ulna + Os carpale II/III + Metacarpus (1)
	Hind limb bones	11	Pelvis (1), Femur (2), Talus (4), Tibia (1), Metatarsus (3)
	Toe bones	5	Phalanx 1 (1), Phalanx 2 (4)*one hind
QIV	Fore limb bones	2	Scapula (1), Radius (1)
	Hind limb bones	1	Tibia
	Toe bone	1	Phalanx 1
QVII	Fore limb bone	1	Os carpi intermedium

Table 2—Qantir/Piramesse: skeletal elements and frequencies of deer bones.

ON THE STATUS OF FALLOW DEER IN ANCIENT EGYPT

At the present time, fallow deer are not indigenous to Egypt (Chapman, Chapman 1975; Osborn, Helmy 1980). Consequently, those authors who hypothesised that deer were native to ancient Egypt had to base their arguments on the iconography and the aforementioned fragments of antler. While antlers could have been imported to Egypt as raw materials, the deer representations certainly present the stronger evidence. Nevertheless, not only are they relatively rare in the iconographical record (Houlihan 1987, p. 243), they are also drawn inaccurately. A good example of this is the relief in the Tomb of Puyemre showing a calf suckling an antlered animal (Osborn, Osbornová 1998, p. 154) (*fig. 2*). No doubt the conventional way of depicting animals in ancient Egyptian art may have allowed artisans to include deer in landscape and life cycle drawings, even in the absence of living examples.

Fig. 2—Deer depiction in the Tomb of Puyemre (redrawn by M. Schulz).

As for the deer remains collected in the eastern Delta, most specimens originate from archaeological contexts post-dating the early 18th Dynasty, apart from the two post-cranial bones recorded from Tell el-Dab'a. In the absence of any deer bones in Egyptian archaeo-faunas predating the 2nd millennium BC (Kitagawa forthcoming), *i.e.* at a time when landscape deterioration was less advanced and game still important in terms of meat provisionning, it is difficult to believe that deer was simply "overlooked" by the hunters. The limited distribution of deer remains in time and space (eastern Delta) leads us to assume that in Holocene times deer were not native to Egypt and were imported from elsewhere. This does not, however, exclude the possibility of breeding deer in captivity after their introduction. This is the most likely explanation for the relatively high frequency of deer bones in the late 18th and 19th Dynasty levels at Qantir. After the animals had died, skeletal parts were brought to the workshop area in QI, where the working of bone co-existed with that of bronze, leather and wood (Kitagawa in press).

In terms of contact with neighbouring lands, the long-distance trade in animals is noticeable in many instances, *e.g.* at Predynastic Hierakonpolis (Van Neer *et al.* 2004) or late Dynastic Tuna el-Gebel (von den Driesch *et al.* 2004). At Qantir isolated skeletal elements of exotic species such as elephants, giraffes and lions were identified (Boessneck, von den Driesch 1982), and recently a complete adult male olive baboon was found *in situ* at Tell el-Dab'a (von den Driesch 2006, p. 312-314). These taxa demonstrate a trade in living animals and/or their secondary products, such as skins, bones and ivory, from regions located farther south.

Concerning the species of deer present at Qantir, the common view is that it must be the Mesopotamian fallow deer *Dama mesopotamica* for reasons of zoogeography. It should be noted, however, that intense

cultural contacts and exchanges existed not only with the south-west Asian Hittites but also with the Aegean Bronze Age cultures. Evidence for the latter comes *e.g.* from the Minoan-style frescoes at Tell el-Dab'a (Bietak 1992, 1995; Bietak, Marinatos 1995) and the Mycenaean pottery finds at Qantir (Pusch 2000; Mountjoy, Mommsen 2001). The hypothesis of whether European fallow deer *Dama dama* were also introduced to the eastern Delta was therefore tested.

To examine this assumption we compared the osteometrical data available for the two species of fallow deer (following the taxonomy published by Wilson, Reeder 1993, p. 387), since Mesopotamian fallow deer are, on average, larger than their European relatives (*fig. 3*), although there can be a considerable overlap in size between female Mesopotamian and male European fallow deer. The sites, their dating and the metrical data compiled for this contribution are given in tables in the appendix.

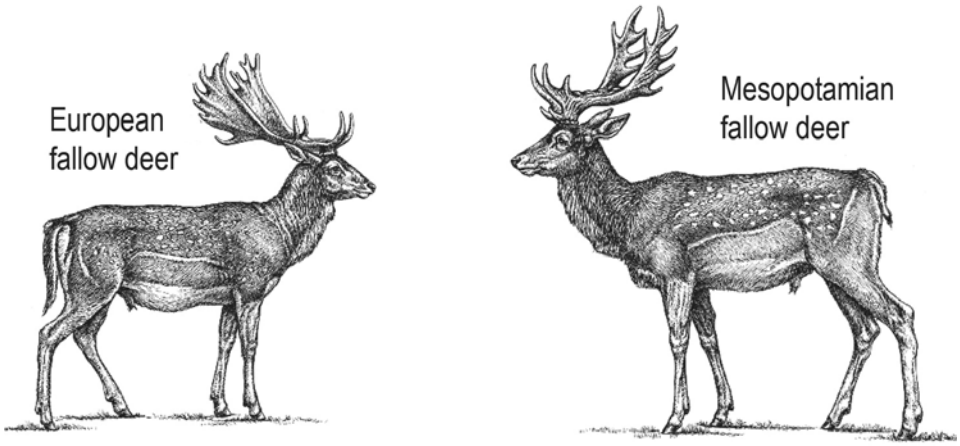

Fig. 3—Male European and Mesopotamian fallow deer (drawing by M. Schulz).

The osteometrical data (after von den Driesch 1976) obtained from the Qantir specimens fall into the range of both species: the Smallest Length of the Collum (SLC) of the scapula, the Breadth of the distal end (Bd) of the tibia, one datum of Greatest Length of the lateral half (GLl) of the talus and the Breadth of the proximal end (Bp) of the first and second phalanx fit the overlapping value zones between the two species, and thus are comparable to female Mesopotamian fallow deer or male European fallow deer. One datum, the distal breadth (Bd) of a tibia, clearly suggests male Mesopotamian fallow deer. Two other measurements, the Greatest Lateral length (GLl) in the talus and the proximal Breadth (Bp) in the second phalanx fit rather the size ranges of European fallow deer (Kitagawa forthcoming), although the author is aware of the fact that the difference between the talus GLl from Qantir and the smallest value recorded for Mesopotamian fallow deer tali is negligible. The first value, moreover, was obtained from the same specimen of which the Dl (Depth of the lateral half) and Bd measurements fit the range of size overlapping. Another problem in evaluation of the size of tali arises from the fact that it is difficult to judge whether the specimen pertained to an adult individual. Hence the smaller talus from Qantir could also be from a subadult Mesopotamian fallow deer or, if adult, to either a female Mesopotamian or a male European fallow deer.

As expected, the osteometrical data confirm the presence of Mesopotamian fallow deer amongst the deer remains. Contrary to earlier opinions, however, it is not unlikely that both fallow deer species were introduced to Pharaonic Egypt. While Mesopotamian fallow deer might have been traded overland, its European relative would have had to be brought by ship to the Delta.

(mm)	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Qantir (N = 1)					**23.0**										
MFD (N = 20)				22.5											33.0
EFD (N = 48)	19.5								27.2						

Table 3a—Scapula: Smallest Length of the collum (SLC).

(mm)	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
Qantir (N=1)							(38.0	UF)							
Tell el-Dab`a (N = 1)								**39.5**							
MFD (N = 17)						37.0									46.5
EFD (N = 84)	31.6									42.0					

Table 3b—Radius: Breadth of the distal end (Bd); UF: unfused distal end.

(mm)	31	32	33	34	35	36	37	38	39	40	41	42	43
Qantir (N = 2)								**38.0**					**43.0**
MFD (N = 30)						36.0							43.5
FFD (N = 115)	31.7									40.9			

Table 3c—Tibia: Breadth of the distal end (Bd).

(mm)	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Qantir (N = 2)							**41.7***		**43.0****					
MFD (N = 24)								42.0						48.6
EFD (N = 159)	35.7										45.1			

Table 3d—Talus: Greatest Length of the lateral half (GLl); *, ** same individuals in talus Dl (e) and Bd (f).

(mm)	20	21	22	23	24	25	26
Qantir (N = 2)				**23.3***	**24.5****		
MFD (N = 24)			22.0				26.5
EFD (N = 152)	19.7					25.1	

Table 3e—Talus: Depth of lateral half (Dl); *, ** same individuals in talus GLl (d) and Bd (f).

(mm)	22	23	24	25	26	27	28	29	30	31	32
Qantir (N = 2)				**25.0** **25.7***							
MFD (N = 24)				25.5						32.0	
EFD (N = 158)	22.3							29.5			

Table 3f—Talus: Breadth of the distal end (Bd); * same individual in talus GLl (d).

Table 3—Osteometrical data of fallow deer (*modified after Kitagawa forthcoming,* table 4)
MFD: Mesopotamian fallow deer, EFD: European fallow deer.

(mm)	14	15	16	17	18	19	20	21
Qantir (N = 1) a/p					**18.0**			
MFD (N = 30) p			16.5				20.0	
MFD (N = 40) a/p			16.0					21.0
EFD (N = 83) a	13.9			17.3				
EFD (N = 71) p	13.9					18.9		
EFD (N = 21) a/p			16.0					21.0

Table 3g—Phalanx 1: Breadth of the proximal end (Bp); a/p: anterior/posterior, a: anterior, p: posterior.

(mm)	13	14	15	16	17	18	19
Qantir (N = 2)	**13.8** a/p		**15.7** p				
MFD (N = 24) a			15.5			18.5	
MFD (N = 26) p				16.0			19.0
MFD (N = 10) a/p			15.0				19.0
EFD (N = 8) a, a/p	13.0				17.0		

Table 3h—Phalanx 2: Breadth of the proximal end (Bp); a/p: anterior/posterior, a: anterior, p: posterior.

Table 3—Osteometrical data of fallow deer (*modified after Kitagawa forthcoming,* table 4)
MFD: Mesopotamian fallow deer, EFD: European fallow deer (continued).

CONCLUSIONS

Identification of the deer species depicted in ancient Egyptian art is hardly possible, due to stylistic modifications and the insufficient knowledge of deer habitats by the artisans, although they are usually referred to as Mesopotamian fallow deer because of the geographical proximity of this species. However the osteometrical data of the specimens excavated in Egypt suggest that two deer species may have been present in the Delta. Considering the trade connections between ancient Egypt and the Aegean during Minoan and Mycenaean times, it cannot be entirely ruled out that European fallow deer were imported into Pharaonic Egypt. This assumption, however, should be backed up by additional research including the analysis of stable isotopes.

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BIBLIOGRAPHY

Allen G.M. 1939, "A checklist of African mammals", *Bulletin of the Museum Comparative Zoology* 83, p. 1-763.

Becker C. 1986, *Kastanas: Ausgrabungen in einem Siedlungshügel der Bronze- und Eisenzeit Makedoniens 1975-1979, Die Tierknochenfunde,* Prähistoriche Archäologie in Sudosteuropa 5, Berlin.

Bénédite G. 1918, "The Carnavon ivory", *Journal of Egyptian Archaeology* 5, p. 1-15, p. 225-241.

Bietak M. 1992, "Minoan wall paintings unearthed in ancient Avaris", *Egyptian Archaeology* 2, p. 26-28.

Bietak M. 1995, "Connections between Egypt and the Minoan world: new results from Tell el-Dab'a/Avaris", *in* W.V. Davies, L. Schofield (eds), *Egypt, the Aegean and the Levant,* British Museum, London, p. 19-28.

Bietak M., Marinatos N. 1995, "The minoan wall paintings from Avaris", *Ägypten und Levante* 5, p. 49-62.

Boessneck J. 1988, *Die Tierwelt des Alten Ägypten*, Beck C.H., München.

Boessneck J., Driesch A. von den 1979, *Die Tierknochenfunde aus der neolithischen Siedlung auf dem Fikirtepe bei Kadiköy am Marmarameer,* Institut für Palaeoanatomie, Domestikationsforschung und Geschichte der Tiermedizin, München.

Boessneck J., Driesch A. von den 1982, "III. Elefanten-, Löwen- und andere Tierknochen aus der Palastanlage der Ramessidenzeit bei Qantir im östlichen Nildelta", *Münchener Ägyptologische Studien* 10, p. 136-143.

Boessneck J., Driesch A. von den 1989, "Die Faunenreste vom Tell Halawa am Assad-See/Nordsyrien (Drittes und anfang zweites Jahrtausend. v. Chr.)", *in* W. Orthmann (ed.), *Halawa 1980-1986*. Saarbrücker Beiträge zur Altertumskunde Band 52, Bonn, p. 113-152.

Boessneck J., Driesch A. von den 1992, *Tell el-Dab'a VII: Tier und historische Umwelt im Nordost-Delta im 2. Jahrtausend v. Chr. anhand der Knochenfunde der Ausgrabungen 1975-1986*, UZK 10, Wien.

Bökönyi S. 1971, "Angaben zum frühholozänen Vorkommen des Damhirsches, *Cervus (Dama) dama* (Linné, 1758), in Europa", *Säugetierkundliche Mitteilungen* 19, p. 206-17.

Bökönyi S. 1990, *Kamid el-Loz. 12. Tierhaltung und Jagd. Tierknochenfunde der Ausgrabungen 1964 bis 1981,* Saarbrücker Beiträge zur Altertumskunde 42, Dr. Rudolf Habelt GMBH, Bonn.

Butzer K.W. 1977, "Hirsch", *in* W. Helck, E. Otto, W. Westendorf (eds), *Lexikon der Ägyptologie* II, Otto Harrassowitz, Wiesbaden, p. 1220.

Chapman D., Chapman N. 1975, *Fallow Deer: Their History, Distribution and Biology*, Terence Dalton, Lavenham.

Darby W.J., Ghaliousngui P., Grivetti L. 1977, *Food: The Gift of Osiris*, 2 vol., Akademic Press, New York.

Dawson W.R. 1934, "Deer in Ancient Egypt", *Journal of the Linnean Society of London* 39, p. 137-145.

Driesch A. von den 1976, *A Guide to the Measurement of Animal Bones from Archaeological Sites,* Harvard University, Peabody Museum Bulletin 1, Cambridge.

Driesch A. von den 2006, "Ausgefallenes Wild in Pi-Ramesse (Qantir) und Auaris (Tell el-Dab'a) und seine kulturgeschichtliche Ausdeutung", *in* E. Czerny, I. Hein, H. Hunger (eds), *Timelines Studies in Honour of Manfred Bietak* vol. III, Orientalia Lovaniensia Analecta 149, Leuven, p. 319-315.

Driesch A. von den, Boessneck J. 1990, "Die Tierreste von der mykenischen Burg Tiryns bei Nafplion/Peloponnes", *in* H.-J. Weisshaar, I. Weber-Hiden, A. von den Driesch, J. Boessneck, A. Riegerand, W. Böser (eds), *Tiryns. Forschungen und Berichte* 11, von Zabern, Mainz, p. 87-164.

DRIESCH A. VON DEN, KESSLER D., PETERS J. 2004, "Mummified baboons and other primates from the Saitic-Ptolemaic animal necropolis of Tuna el-Gebel, Middle Egypt", *Documenta Archaeobiologiae* 2, p. 231-278.

GAUTIER A. 1984, "Quaternary mammals and archaeozoology of Egypt and the Sudan: a survey", *in* L. Krzyzaniak, M. Kobusiewicz (eds), *Origin and Early Development of Food-Producing Cultures in North-Eastern Africa,* Polska Akademia Nauk, Poznan, p. 43-56.

HALTENORTH T. 1959, "Beitrag zur Kenntnis des Mesopotamischen Damhirsches-*Cervus mesopotamicus* Brooke, 1875", *Säugetierkundliche Mitteilungen* 11 (9), p. 15-39.

HOULIHAN P. 1987, "Some remarks on deer (Cervidae) in Ancient Egypt", *Journal of Egyptian Archaeology* 73, p. 238-243.

JOLEAUD L. 1935, "Les Ruminants Cervicornes d'Afrique", *Mémoires de l'Institut d'Égypte* 27, p. 1-85.

KEIMER L. 1934, "Sur deux fragments de cornes de Daim trouvés à Deir el-Medineh", *Mémoires de l'Institut français d'Archéologie orientale du Caire* 46, p. 273-308.

KITAGAWA C. in press, "Beyond the Household Activities", *Proceedings of the 5th meeting of the (ICAZ) Worked Bone Research Group, Velico Turnovo, Bulgaria 2005*.

KITAGAWA C. in preparation, *Animals at the New Kingdom Capital of Piramesse/Qantir (North-eastern Delta, Egypt).*

KITAGAWA C. forthcoming, "On the presence of deer in ancient Egypt: analysis of the osteological record", *Journal of Egyptian Archaeology* 94.

KUSSINGER S. 1988, *Tierknochenfunde vom Lidar Höyük in Südostananatolien (Grabungen 1979-1986),* Ph.D., Dissertation Institut für Paläoanatomie, Domesticakationsforschung und Geschichte der Tiermedizin der Tierärtzlichen Fakultät der Ludwig-Maximilians Universität München, Munich.

MOUNTJOY P.A, MOMMSEN H. 2001, "Mycenaean Pottery from Qantir-Piramesse, Egypt", *British School at Athens* 96, p. 123-155.

NIBBI A. 1980, "The significance of deer in the ancient Egyptian landscape", *Göttinger Miszellen* 41, p. 61-66.

OSBORN D.J., HELMY I. 1980, "The contemporary land mammals of Egypt (Including Sinai)", *Fieldiana Zoology*, New Series 5, p. 1-579.

OSBORN D.J., OSBORNOVÁ J. 1998, *The Mammals of Ancient Egypt*, Aris, Phillips, Warminster.

PARONA C.F. 1918, "Ragguagli sopra gli ossami fossili trovati in una tomba presso Anteopolis (Monte di Gau, Alta Egitto)", *Atti della Reale Accademia del Scienza di Torino* 53, p. 511-522.

PETERS J. 1986, *Bijdrage tot de Archeozoölogie van Soedan en Egypte*, Ph.D., Rijksuniversiteit, Gent.

POHLMEYER K. 1985, *Zur vergleichenden Anatomie Von Damtier (*Dama dama *L. 1758), Schaf (*Ovis aries *L. 1758) und Ziege (*Capra hircus *L. 1758), Osteologie und postnatale Osteogenese,* P. Parey, Hamburg, Berlin.

PUSCH E.B. 2000, "Piramesse", *in* D.B. Redford (ed.), *The Oxford Encyclopedia of Ancient Egypt*, vol. 3, Oxford University Press, Oxford, p. 48-50.

VAN NEER W., LINSEELE V., FRIEDMAN R.F. 2004, "Animal burials and food offerings at the elite cemetery HK6 of Hierakonpolis", *in* S. Hendricks, R.F. Friedman, K.M. Cialowicz, M. Chlodnicki (eds), *Egypt at its Origins. Studies in Memory of Barbara Adams*, Orientalia Lovaniensia Analecta 138, Leuven, p. 67–130.

VOGLER U. 1997, *Faunenhistorische Untersuchungen am Sirkeli Höyük/Adana, Türkei (4.-1. Jahrtausend v. Chr.),* Ph.D., Dissertation Institut für Paläoanatomie, Domesticakations-forschung und Geschichte der Tiermedizin der Tierärtzlichen Fakultät der Ludwig-Maximilians Universität München, Munich.

WILSON E., REEDER D.M. (eds) 1993, *Mammal Species of the World. A Taxonomic and Geographic Reference* (2nd ed.), Smithsonian Institution, Washington DC.

ZIEGLER R., BOESSNECK J. 1990, "12 Tierreste der Eisenzeit II", *in* V. Fritz (ed.), *Kinneret Ergebnisse der Ausgrabungen auf dem Tell el-`Orēme am See Gennesaret 1982-1985,* Abhandlungen des Deutschen Palästinavereins 15, Otto Harrassowitz, Wiesbaden, p.133-229.

a: Scapula	Site	Period	SLC	N	BG	N
	Qantir	B	23.0	1	24.8 (F)	1
D. m.	Kamid el-Loz	B	25.0-33.0	8	32.0-39.0	8
	Kinneret	I	24.0-32.0 (F 24.0, M 32.0)	3	31.0-37.0 (F 31.0-31.5, M 35.0-37.0)	6
	Halawa	B	(29.0 M)	1	38.5 (M)	1
	Lidar Höyük	B	22.5-25.5	3	29.5-35.5	4
		I	24.5, 28.0	2	32.5, 33.5	2
	Sirkeli Höyük	B	-	-	35.5	1
		B/I	-	-	32.5 (F)	1
D. d.	Fikirtepe	Neo	20.5-24.0 (F 20.5-21.0, M 23.0-24.0)	7	28.0-32.0 (F 28.0-28.5, M 30.5-32.0)	7
	Tiryns	B/I	21.5 (F), 25.5 (M)	2	26.5 (F), 31.0 (M)	2
	Sitagroi	Neo	21.0, 22.0	2	30.0	2
	Kastanas	B	21.0-26.3	(6)	27.4-33.7	(10)
		I	19.5-27.2	(9)	27.1-34.6	(14)
		All	19.5-27.2	27	26.6-34.9	43

b: Radius	Site	Period	Bd	N
	Qantir	B	(38.0) unfused distal end	1
	TD	B	39.5 (F)	1
D. m.	Halawa	B	39,0	1
	Lidar Höyük	B	37.5-46.5	8
	Sirkeli Höyük	B/I	37.0	1
		I	41.0-44.0	6
D. d.	Fikirtepe	Neo	33.0-40.0 (F 33.0-34.0, M 40.0)	3
	Sitagroi	Neo/B/Others	33.0-40.5	6
	Kastanas	B	32.8-40.1	(8)
		I	31.6-42.0	(32)
		All	31.6-42.0	75

c: Tibia	Site	Period	Bd	N
	Qantir	B	38.0, 43.0	2
D. m.	Kinneret	I	40.0-43.5 (M 43.5)	5
	Halawa	B	39.0-42.5	4
	Lidar Höyük	B	36.5-43	9
		I	42.5	1
	Sirkeli Höyük	Chal.	40.0, 42.5	2
		I	32.5*, 36.0-42.5	9
D.d.	Fikirtepe	Neo	34.5-38.0 (F 34.5-35, M 37-38)	6
	Sitagroi	Neo	35.0, 36.5	2
		B	34.0-36.0	4
	Kastanas	B	33.8-38.9	(16)
		I	33.0-40.7	(43)
		All	31.7-40.7	137

Appendix—Comparative measurements of fallow deer.

D.m.: Dama mesopotamica*, D.d.:* Dama dama*, Neo: Neolithic, Chal: Chalcolithic, B: Bronze Age, I: Iron Age, All: all periods in publications, N: number, F: female, M: male, a: anterior, p: posterior, a/p: anterior/posterior. Other abbreviations for measurements: see von den Driesch 1976. * One specimen with a Bd of 32.5 mm (Vogler 1997, p.153, table 56) which clearly is outside the range of measurements obtained on* Dama mesopotamica *tibiae from other sites. Since this value is even below the most of smallest distal tibia values obtained in* Dama dama*, it seems likely that it results from a measurement error. Moreover, relative to the shaft the Bd value definitely seems to low. It was, therefore, excluded from* table 3-c. Dama mesopotamica*: data from Kamid el-Loz: Bökönyi 1990; Kinneret: Ziegler, Boessneck 1990; Halawa: Boessneck, von den Driesch 1989; Lidar Höyük: Kussinger, 1988; Sirkeli Höyük: Vogler 1997.* Dama dama*: data from Fikirtepe: Boessneck, von den Driesch 1979; Sitagroi: Bökönyi 1971; Kastanas: Becker 1986; Tiryns: von den Driesch, Boessneck 1990.*

d: Talus	Site	Period	GLl	N	GLm	N	Dl	N	Bd	N
	Qantir	B	41.7, 43.0	2	39.7, 41.1	2	23.3, 24.5	2	25.0, 25.7	2
D. m.	Kamid el-Loz	B	43.0	2	-	-	-	-	27.0, 28.5	2
	Kinneret	I	45.0-48.5 (M46.0-48.5)	6	42.0-45.0 (M45.0)	5	22.0-26.5 (F22.0, M26.0-26.5)	6	29.0-31.0 (M29.5-31.0)	6
	Halawa	B	42.0-46.0	5	40.5-44.5	5	23.0-25.0	5	25.5-28.0	5
	Lidar Höyük	B	42.5-46.5	3	41.0, 44.0	2	24.0-26.0	3	27.0, 28.5	2
		I	45.5	1	44.0, 44.5	2	27.0	1	32.0	1
	Sirkeli Höyük	B	45.0, 47.0	2	43.5, 45.5	2	26.0, 26.2	2	27.5, 28.5	2
		I	43.0-46.5	6	40.0-44.0	6	24.0-26.0	6	26.5-29.0	6
D. d.	Fikirtepe	Neo	36.5-43.0 (F 36.5-37.8, M38.5-43.0)	11	33.5-40.5 (F 33.5-35.0, M36.5- 40.5)	12	20.5-24.5 (F20.5-21.0, M21.5-24.5)	13	23.0-27.0 (F23.0-23.5, M23.0- 27.0)	12
	Tiryns	B/I	35.7 (F)	1	34.0 (F)	1	19.7 (F)	1	22.3 (F)	1
	Sitagroi	Neo	40.0-44.0	4	-	-	-	-	25.0-29.5	4
		B	39.0-44.0	7	-	-	-	-	25.0-29.0	7
	Kastanas	B	37.8-41.4	(15)	36.8-39.4	(14)	21.3-23.3	(15)	23.5 - 26.5	(15)
		I	38.2-45.1	(45)	35.9-42.4	(42)	20.7-25.1	(42)	23.0 - 28.7	(42)
		All	36.8-45.1	136	36.0-42.4	138	20.1-25.1	138	23.2-28.7	134

e: Phalanx 1	Site	Period	GLpe	N	Bp	N	SD	N	Bd	N	
	Qantir	B	46.5	1	18.0	1	15.0	1	17.0	1	a/p
D. m.	Kinneret	I	51.0	1	20.0	1	15.0	1	18.2	1	a
		I	47.0-54.0	4	18.0-21.0	4	12.0-14.5	4	16.0-17.5	4	p
	Lidar Höyük	All	43.0-53.5	36	16.0-20.0	35	11.0-16.0	34	14.0-17.5	34	a/p
		All	48.5-56.0	26	16.5-20.0	26	11.0-14.5	22	13.0-17.5	22	p
	Sirkeli Höyük	Chal.	50.0	1	19.0	1	12. 5	1	16.5	1	a/p
		I	47.5-58.5	3	16.0-21.0	4	12.0-15,2	3	14.5-19.0	6	a/p
D. d.	Sitagroi	Neo	42.0-47.0	6	16.0-21.0	6	11.0-16.5	5	14.5-20.0	6	a/p
		B	39.0-48.0	14	16.0-19.5	14	11.0-12.8	13	13.0-17.0	14	a/p
		Others	44.0	1	17.0	1	13.0	1	20.5	1	a/p
	Fikirtepe	Neo	39.5-43.0 (F39.5-41.0, M43.0)	8	14.0-16.0 (F14.0-14.5, M14.7-16.0)	7	10.0-12.0	8	12.5-14.0	8	a
		Neo	43.5-46.5 (F43.4-44.0, M46.5)	3	15.5 (F)	1	10.0-11.0 (F10.0-10.5, M14.0-14.7)	4	13.5-14.7 (F13.5, M14.0-14.7)	4	p
	Kastanas	B	40.1-49.5	(9)	13.9 - 17.1	(9)	-	-	12.5-15.3	(9)	a
		I	40.2-49.4	(23)	14.0 - 17.3	(23)	-	-	12.4-15.0	(23)	a
		All	40.0-50.0	76	(13.8)-17.3	76	-	-	12.1-15.4	75	a
		B	44.1-51.4	(8)	14.7-18.0	(8)	-	-	13.0-15.3	(9)	p
		I	42.9-52.9	(16)	15.1 - 17.8	(15)	-	-	12.8-15.4	(16)	p
		All	40.7-54.5	68	13.9-18.9	70	-	-	11.9-15.6	72	p

Appendix (continued).

f: Phalanx 2	Site	Period	GLpe	Bp		N	SD	N	Bd	N	
	Qantir	B	33.0	1	13.8	1	10.5	1	11.5	1	a/p
		B	34.5	1	15.7	1	12.2	1	13.5	1	p
D. m.	Kinneret	I	35.0	1	19.0	1	14.5	1	15.5	1	a/p
	Halawa	B	37.0	1	16,5	1	13.0	1	14.0	1	p
	Lidar Höyük	All	31.5-38.5	25	15.5-18.5	24	11.0-14.5	24	12.5-15.5	24	a
		All	32.5-39.0	28	16.0-19.0	26	12.0-13.5	27	12.5-18.0	27	p
		All	33.5-35.0	4	15.0-18.0	4	11.5-14.0	4	12.0-13.5	4	a/p
	Sirkeli Höyük	B	36.5	1	18.5	1	-	-	15.5	1	a/p
		I	34.0-37.0	4	16.5-18.7	4	12.0-13.5	4	13.2-15.0	4	a/p
D. d.	Fikirtepe	Neo	26.0 (F)	1	13.0 (F)	1	9.7 (F)	1	11.0 (F)	1	a
	Sitagroi	Neo	29.0-33.5	4	14.0-16.0	4	10.0-11.5	4	11.8-13.0	4	a/p
		B	29.0-33.0	3	14.0-16.5	3	10.2-12.0	3	11.0-13.0	3	a/p
		Others	29.0-32.5	3	13.0-17.0	3	9.5-12.0	3	9.5-13.0	3	a/p

Appendix (continued).