

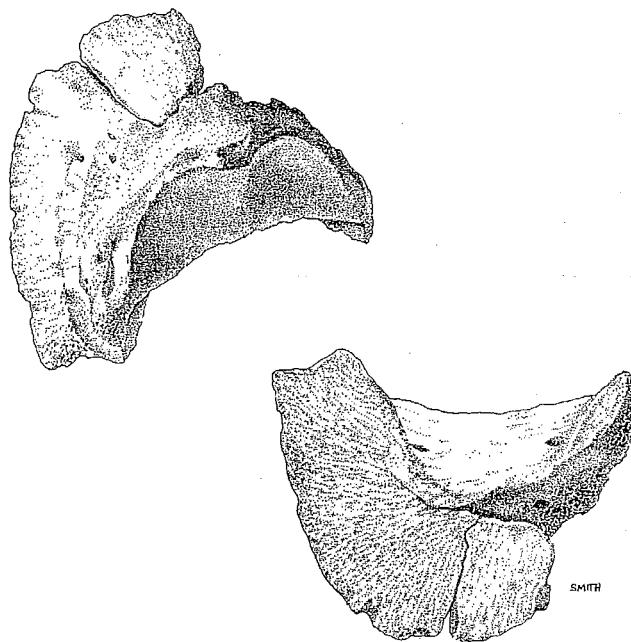


ARCHAEOZOOLOGY OF THE NEAR EAST III

Proceedings of the third international symposium on the
archaeozoology of southwestern Asia and adjacent areas

edited by

H. Buitenhuis, L. Bartosiewicz and A.M. Choyke



ARC - Publicaties 18
Groningen, The Netherlands, 1998

Cover illustration: Dorsal and palmar aspects of a
Bronze Age horse phalanx from Arslantepe, Turkey,
identified by Sándor Bökönyi.
Courtesy by the artist, Patricia Smith (Reduction: 64%).

Copyright:
Centre for Archeological Research
and Consultancy, Rijksuniversiteit Groningen The Netherlands

Printing: RCG -Groningen

Parts of this publication can be used if source is clearly stated.
Information: Centre for Archeological Research and Consultancy
Poststraat 6, 9712 ER Groningen, The Netherlands

ISBN 903670791-9
NUGI 644/821/835

Preface

This publication is the result of the third international symposium on archaeozoology of southwestern Asia and adjacent areas, held in Budapest, Hungary from 2 - 5 September 1996. The editors would like to thank all colleagues of the Working Group who helped with the translation of abstracts. Financial support for the publication was given by the Acker Stratingh Stichting, Groningen, The Netherlands.



Participants of the 3rd ASWA Conference, Budapest 1996
(Photo: Péter Komjáthy, Aquincum Museum)

Standing, left to right: B. De Cupere (Belgium), G. Bar Oz (Israel), H. Buitenhuis (The Netherlands), R. Rabinovich (Israel), L. Leblanc (New Zealand), N. Benecke (Germany), H. Hongo (Japan), N. Russell (USA), J. Speth (USA), A. Patel (India), E. Stephan (Germany), C. Cavallo (The Netherlands), W. Van Neer (Belgium), A.T. Clason (The Netherlands), T. Dayan (Israel), L. Van Es (The Netherlands), C. Becker (Germany), R. Meadow (USA), M. Mashkour (France), F. Poplin (France), E. Vila (France), Mrs. Poplin (France), L. Bartosiewicz (Hungary), E. Pellé (France), P. Ducos (France).

In front, left to right: E. Tchernov (Israel), L. Martin (Great Britain), A. Choyke (Hungary), I. Zohar (Israel).

Participants not shown in picture: D. Carruthers (Great Britain), D. MacHugh (Ireland), S. Witcher (Great Britain).

Contents

Preface

E. Tchernov	7
An attempt to synchronise the faunal changes with the radiometric dates and cultural chronology in Southwest Asia	
R. Rabinovich	45
“Drowning in numbers” - gazelles dominance and body size groups in the archaeozoological record	
G. Bar Oz, T. Dayan and D. Kaufman	72
Taphonomic analysis of the faunal remains from Neve David	
L. Kolska-Horwitz and P. Ducos	80
An investigation into the origins of domestic sheep in the southern Levant	
S. Bökönyi	95
Animal husbandry, hunting and fishing in the Ras Al-Junayz area: a basis for human subsistence	
S. Whitcher, C. Grigson and Th.E. Levy	103
Recent faunal analyses at Shiqmim, Israel: a preliminary analysis of the 1993 assemblage	
L.J.M. van Es	117
A weasel femur (<i>Mustela nivalis</i> Linne 1766) from the Iron Age of Tell Deir 'Alla (Jordan)	
E. Vila	120
Interpreting the faunal remains of El Kowm 2 - Caracol (IVth millennium BC, Syria)	
M. Al-Zawahra and A. Ezzughayyar	130
Equid remains from Bronze Age periods of site 4 of Tell Jenin, Palestine	
D. MacHugh, R.T. Loftus, C.S. Troy and D.G. Bradley	135
DNA and the origin of domestic cattle	
N. Russell	145
The Mesolithic-Neolithic transition in the faunal assemblage from Konispol Cave, Albania	
L. LeBlanc	160
The accumulation and significance of micromammals in an Albanian cave site	
C. Becker	166
New data on the distribution of fallow deer in Europe during the Late Pleistocene and Holocene	
N. Benecke	172
Animal remains from the Neolithic and Bronze Age settlements at Kirklareli (Turkish Thracia)	
R. Meadow and A. Patel	180
The exploitation of wild and domestic waterbuffalo in prehistoric northwestern South Asia	
M. Mashkour	200
The subsistence economy in the rural community of Geoktchik Depe in Southern Turkmenistan: Preliminary results of the faunal analysis	
L. Bartosiewicz	221
Interim report on the Bronze Age animal bones from Arslantepe (Malatya, Anatolia)	
A.T. Clason and H. Buitenhuis	233
Patterns in animal food resources in the Bronze Age in the Orient	
W. Van Neer and M. Uerpmann	243
Fish remains from the new excavations at Troy	
H. Hongo	255
Patterns of animal husbandry in Central Anatolia in the second and first millennium BC: faunal remains from Kaman-Kalehöyük, Turkey	
B. De Cupere and M. Waelkens	276
The antique site of Sagalassos (Turkey): faunal results from the 1990 - 1994 excavation seasons	
B. De Cupere, W. Van Neer and M. Waelkens	285
Modern and ancient Ovicaprine herding in the Sagalassos area (Burdur Province, Turkey)	

THE SUBSISTENCE ECONOMY IN THE RURAL COMMUNITY OF GEOKTCHIK DEPE IN SOUTHERN TURKMENISTAN: PRELIMINARY RESULTS OF THE FAUNAL ANALYSIS

Marjan Mashkour¹

Resumé

Ce papier présente les résultats de l'analyse archéozoologique des deux premières campagnes de fouille (1994 et 1995) du site de Geoktchik Depe situé dans la plaine de dehistan au sud ouest du Turkménistan. Le site comprend plusieurs séquences chronologiques couvrant la période de l'Age du Fer (1300 av. J.C.) jusqu'au début de la période islamique (7-8^e siècles). Cette étude révèle une économie de subsistance qui repose essentiellement sur l'élevage des Caprinés. Une tendance vers l'augmentation de la part des Bovins et des Suidés est sensible dans les dernières phases de l'occupation du site. Parmi les animaux sauvages, le sanglier et la gazelle contribuent également à la diète carnée. Les équidés domestiques interviennent aussi de manière non négligeable dans l'apport alimentaire. Sur le plan des modifications du paysages, le spectre de faune indique un assèchement général par rapport à l'environnement actuel de la plaine. L'abandon progressif des occupations et des réseaux d'irrigation semble être l'une des causes déterminantes de cette évolution.

Introduction

In October 1994 the first campaign of excavation at Geoktchik Depe in the southwest of Turkmenistan was initiated by the joint French-Turkmen Mission under the scientific direction of Dr. O. Lecomte and Prof. E. Atagarryev. In continuity with the scientific approach that led to the archaeological research into the Sasanian levels at Tureng Tepe in Iran, this archaeological project had a variety of aims including the following:

- study of the cultural borders from the first millennium BC to the beginning of the Christian era.
- accumulation of evidence relating to the specificities and cultural interactions between the various societies studied here.
- the nature of the settlement of the nomadic populations in Central Asia.
- and finally working out an exhaustive archaeological map of this region as a solution to an underlying question that is the nature and the forms of human occupation of the Misrijan Plain from the Iron Age (13th century BC) to the Timourid period (14th century AD).

Historical and geographical situation

The province known in Antiquity as Hyrcania is today divided between Iran and Turkmenistan. The alluvial plain of Atrek, in the south-west of Turkmenistan by the Caspian sea and also known as the Plain of Meshed-Misrijan or Dehistan, forms its northern part and the plain of Gorgan in Iran its southern limits (Fig. 1).

The Plain of Dehistan is bordered in the south by the Atrek river, in the east by the piedmonts of Kopet Dagh and in the north by the deserts of Saynaksar and Kyzylkum. Today it is an arid region very weakly cultivated although the very same Atrek river originally helped its agricultural prosperity. In contrast, the Plain of Gorgan located in the piedmont of Alborz and watered by the Gorgan river and its tributaries, is a rich agricultural region.

¹ URA 1415/CNRS, MNHN, Laboratoire d'Anatomie Comparée, 55, rue Buffon 75005 Paris-France.

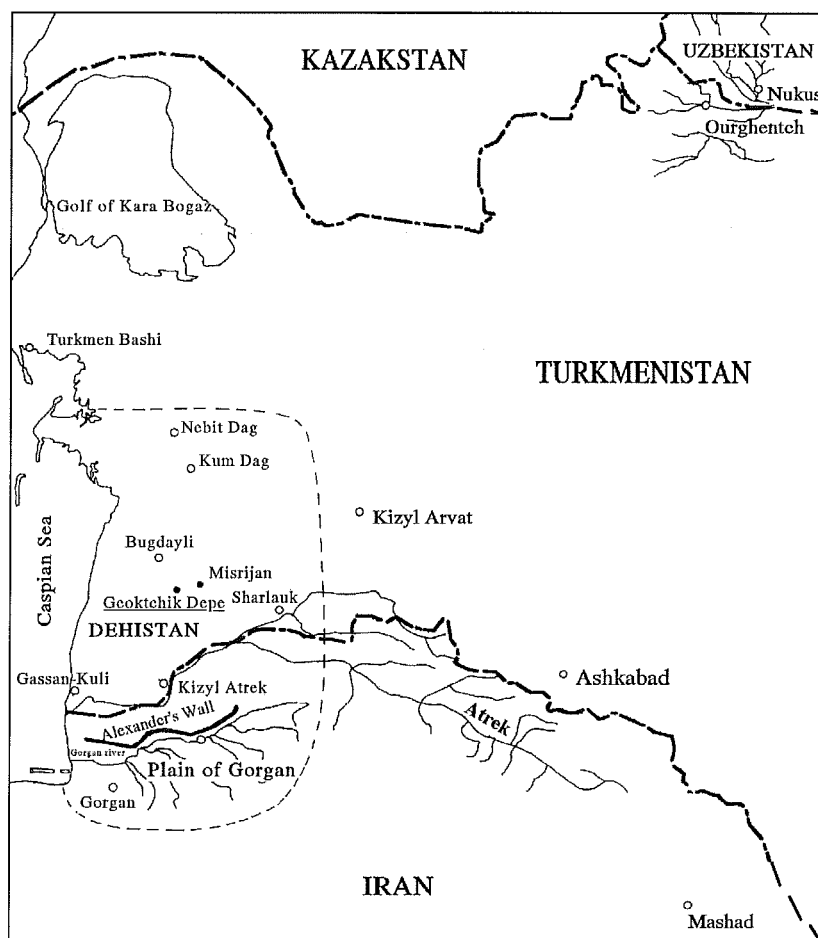


Figure 1. Geographic position of Geoktchik Depe in southwest Turkmenistan and northeast Iran. The dotted line indicates the approximate borders of ancient Hyrcania.

The Plain of Meshed-Misrijan or Dehistan

The geographical situation of the Plain of Dehistan, next to the plain of Gorgan in Iran, makes it a special area for the study of cultural interactions between the north part of Iran and Central Asia. The studies, led by Soviet and Turkmen archaeologists from the 1950's in this region, have revealed three major occupations: during the Iron Age (13th-8th century BC), the early Middle Ages (6th-8th century AD) and the late Middle Ages (9th-16th century AD). Actually the image of the Plain of Misrijan reflected in these researches remains incomplete due to a lack of excavations and does not provide an idea of the possible occupations between the end of Archaic Dehistan (8th century BC) and the beginning of the early Middle Ages (5th-6th century).

One of the principal results of these investigations is to reveal the existence in the beginning of the early Iron Age of an original cultural complex, called the *Archaic Dehistan*, attested also in the Gorgan and Damghan Plains in Iran, similarly dated to the 13th-8th century BC, associated with a dense and complex irrigation system. The sites of this period form, as far as we know, the oldest occupation on the plain of Dehistan (Lecomte, 1993 unpublished; Lecomte and Mashkour, 1996).

The considerable advantage presented by this region, deserted in the 14th century, is that it did not see any of the upheavals that were caused elsewhere by the large-scale farming and uncontrolled urbanization. It is presently characterized by a very small rural population, mostly camel and/or caprine herders.

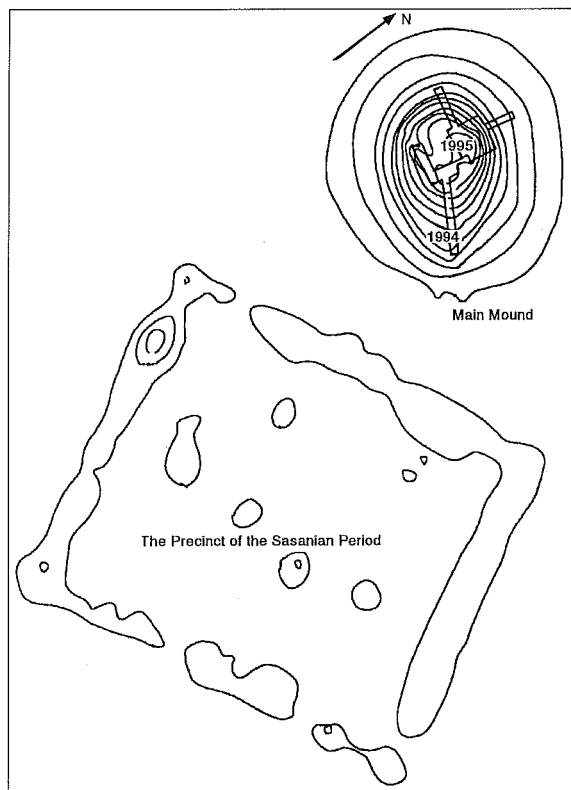


Figure 2. Topographic map of the site of Geoktchik Depe. The dotted line indicates excavated areas (drawing by courtesy of Dr. O. Lecomte)

The site of Geoktchik Depe (Fig. 2)

Eighteen km northwest of the modern village of Madau and 14 km west of the medieval town of Misrijan, the archaeological site of Geoktchik Depe covers 5.5 hectares immediately to the south of the Shahduz Canal and is composed of two principal structures :

1. the mound itself, truncated and with sharp slopes is a dozen meters high.
2. at a short distance to the southeast of the mound lies a rectangular precinct surrounding remains from the Sasanian or Sasanian-Islamic period. Two excavations were carried out in 1994 and 1995. At the end of the last campaign a spectacular, almost 12 meter high building, rather like the mound itself, was exposed. Among the possible interpretations for this remarkable construction is a defensive function. Further investigations might clarify its exact function (Lecomte, 1995).

Faunal Analysis

This preliminary report is the result of the analysis of the zoological remains from the two first campaigns of 1994 and 1995. The study was done in a field laboratory during October 1995. Local comparative skeletons have been collected as far as possible.

The state of conservation of the bones is quite satisfactory. In spite of the dryness of the climate and the salinity of the soil the bone surfaces were not damaged, and cut marks could be clearly seen. Nevertheless, variable conservation conditions could be observed in some structures, such as in the disturbed human grave that contained many fragmented animal bones (*cf. infra*). Here, all the bones were extremely fragile and needed consolidation before removal.

The faunal spectrum

Almost 1800 bone remains allocated to different occupation periods of the site have been gathered from 67 structures. According to a stylistic periodization of the archaeological finds and the stratigraphic sequence at the site the archaeologists have defined four major periods that might be more precisely divided given new data from the next excavation campaigns. (Lecomte, 1994; Lecomte and Mashkour, in press; and Lecomte, pers. comm.). The first one is referred to as the "Deep Levels" ("DL"; ca 13th/9th century BC), because the remains stem from a deep sounding in the north part of the hill excavated by the Turkmen archaeologist E. Muradova, who used artificial layers and not natural stratigraphy. These levels might correspond to the early phases of the Archaic Dehistan cultural complex (13th/8th centuries BC), but this hypothesis must be confirmed by further investigations. The second period is the Archaic Dehistan (AD), corresponding to the late phases of this period (ca 8th century BC; Lecomte, pers. comm.). The two next periods are the Sasanian (S; 3rd-7th centuries AD) and the Sasanian/Islamic (SI; 7th/8th centuries AD).

The osteological remains from these structures have been regrouped following this chronological framework and almost 7% of the NISP (Number of the Identifiable bone Specimens) belongs to the "Deep Levels", 59% to the Archaic Dehistan, 18.5% to the Sasanian period, 6% to the Sasanian/Islamic and 9.5% to unreliable contexts (mixed Archaic Dehistan and Sasanian and sub-recent) which have been eliminated from the analysis (Table 1 and Appendix I).

In all periods the faunal spectrum is mostly composed of domestic mammals (93 to 97% of the NISP). The wild mammals include gazelle, boar and a few carnivores (3 to 8%). Within the micro-fauna (5% of the total remains), there are different categories of animals such as birds and amphibian/reptiles that will be precisely identified once transferred to the Laboratoire d'Anatomie Comparée in Paris.

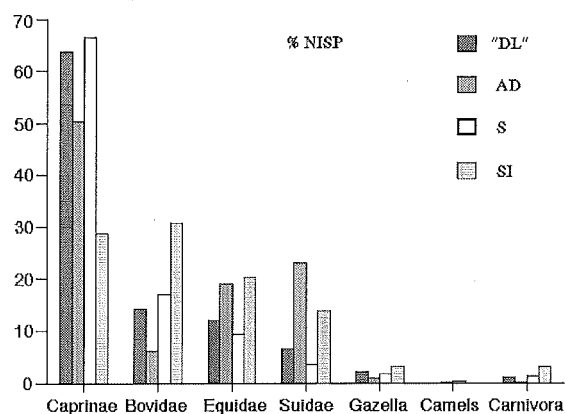


Figure 3. Relative proportions of the number of identifiable bones for the major taxa.

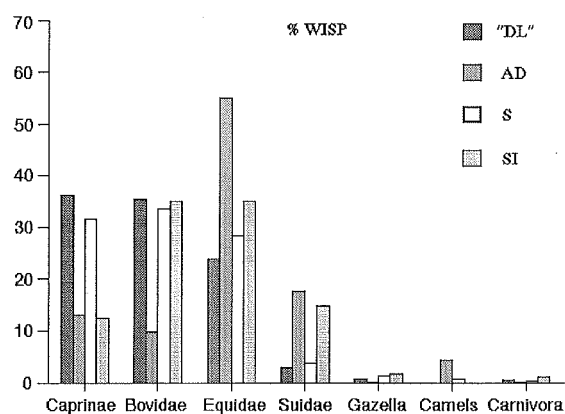


Figure 4. Relative proportions of bone weight for the major taxa.

The evolution of the NISP of the principal ungulates and their weights in the four above mentioned periods is shown in Figures 3 and 4. Taking into account the differences in number of remains for each period, it was necessary to test statistically the reliability of this development. This comparison of the percentages, applied to the more common ungulates, caprinae, cattle, equids and pig, shows that the fluctuations seen in Figure 3 are generally highly significant, except between the "Deep Levels" and Sasanian period (Table 2). This may be due to problems of excavation of these Deep levels exposed above. A new sounding in the next campaign may clarify the situation. The important point for the moment is the marked difference between the Archaic Dehistan, Sasanian and Sasanian/Islamic periods for which the archaeological contexts are definitely sure. The graph shows that in all the periods caprinae are dominant in terms of NISP (Fig. 3), but as is shown by the weight graph (Fig. 4), the meat of cattle and equids is also important in the subsistence economy of Geoktchik Depe in almost all periods. For a more focused analysis, the development of the MNI (Minimum Number of Individuals) of the four principal mammalian groups was compared for the occupation periods at the site (Fig. 5a-d). Some points must be stressed in view of these MNI graphs.

Both quantifying parameters (NISP and MNI) show that caprinae are the most common species in the three first periods and diminish in the Sasanian/Islamic period. Cattle is important in the first period and then falls dramatically to a very low rate (less than 5%) and tends to progressively increase in the two following periods until it exceeds the caprinae in the Sasanian/Islamic phase. Equids have a constant frequency in the first three periods and are three times more frequent in the Sasanian/Islamic period. The pig/boar group is weakly present in the first and third period, and highly represented in the other two. It even takes the highest place in the Sasanian/Islamic period. The proportions of gazelle remain constant during the whole occupation at the site. Interestingly, the camel is only present in the Sasanian period and in very low numbers. The carnivores, which are not

	" Deep Levels "				Archaic Dehistan				Sasanian				Sasanian/Islamic				
	NISP	%	MNI	W (g)	NISP	%	MNI	W (g)	NISP	%	MNI	W (g)	NISP	%	MNI	W (g)	%
Caprinae	52	43.33	6	403	307	34.46	10	1190	128	39.88	8	1615	20	18.69	4	345	8.26
Sheep (<i>Ovis aries</i>)	6	5.00	1	80	18	2.02	4	70	5	1.56	1	0	5	4.67	0	0	0.00
Goat (<i>Capra hircus</i>)	0	0.00	2	0	12	1.35	3	8	14	4.36	2	0	2	1.87	0	0	0.00
Urial sheep (<i>Ovis vignei</i>)									1	0.31							
Total Caprinae	58	48.33	9	483	337	37.82	17	1268	148	46.11	11	1615	27	23.36	4	345	8.26
Cattle (<i>Bos taurus</i>)	13	10.83	4	472	41	4.60	1	958	38	11.84	3	1716	29	27.10	5	964	23.08
Equids	11	9.17	1	318	7	0.79	1	380	19	5.92	0	1400	19	17.76	3	970	23.22
Donkey (<i>Equus asinus</i>)	0	0.00	0	0	121	13.58	0	5000	1	0.31	0	0	0	0.00	0	0	0.00
Horse (<i>Equus caballus</i>)	0	0.00	0	0	0	0.00	0	0	1	0.31	1	50	0	0.00	0	0	0.00
Total Equids	11	9.17	1	318	128	14.37	1	5380	21	6.54	1	1450	19	17.76	3	970	23.22
Camelids	0	0.00	0	0	1	0.11	1	428	1	0.31	1	40	0	0.00	0	0	0.00
Suids	6	5.00	1	40	141	15.82	3	1518	7	2.18	2	193	12	11.21	6	382	9.15
Boar (<i>Sus scrofa scrofa</i>)	0	0.00	0	0	14	1.57	1	200	1	0.31		0	1	0.93	0	32	0.77
Total Suids	6	5.00	1	40	155	17.40	4	1718	8	2.49	2	193	13	12.15	6	414	9.91
Goitred gazelle (<i>Gazella subgutturosa</i>) Carnivore	2	1.67	1	10	7	0.79	2	10	4	1.25	1	70	3	2.80	1	50	1.20
Rodent	1	0.83	0	6	1	0.11	1	8	3	0.93	1	20	3	2.80	0	30	0.72
Bird	0	0.00	0	0	5	0.56	2	0	1	0.31	1	0	0	0.00	0	0	0.00
Fish	1	0.83	1	2	7	0.79	5	12	5	1.56	3	1	1	0.93	1	0	0.00
Amphibian	0	0.00	0	0	1	0.11	1	0	5	1.56	2	0	0	0.00	0	0	0.00
Reptile	0	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0.00
Molluscs	0	0.00	0	0	0	0.00	0	0	23	7.17	1	30	0	0.00	0	0	0.00
Unidentified	28	23.33		120	207	23.23		255	63	19.63		132	11	10.28		20	0.48
TOTAL	120	100.0		1809	891	100.0		17135	321	100.0		6913	107	100.0		4177	100.0
Human	1		1	20	127		4	1078									

Table 1. Geoktchik Depe. Faunal spectrum (NISP= number of identified specimens; MNI= minimum number of individuals; W= weight).

Caprinae				DL	AD	S	SI	
Period	NISP	Total	%					
Deep Levels	58	91	0.637	DL	0.000	-2.394	0.395	-4.488
Archaic Dehistan	337	669	0.504	AD	2.394	0.000	4.082	-3.554
Sasanian	148	224	0.661	S	-0.395	-4.082	0.000	-5.744
Sasanian/Islamic	27	89	0.303	SI	4.488	3.554	5.744	0.000

Bovidae				DL	AD	S	SI	
Period	NISP	Total	%					
Deep Levels	13	91	0.143	DL	0.000	-2.842	0.585	2.902
Archaic Dehistan	41	669	0.061	AD	2.842	0.000	4.943	8.099
Sasanian	38	224	0.170	S	-0.585	-4.943	0.000	3.039
Sasanian/Islamic	29	89	0.326	SI	-2.902	-8.099	-3.039	0.000

Equidae				DL	AD	S	SI	
Period	NISP	Total	%					
Deep Levels	11	91	0.121	DL	0.000	1.601	-0.722	1.667
Archaic Dehistan	127	669	0.190	AD	-1.601	0.000	-3.347	0.531
Sasanian	21	224	0.094	S	0.722	3.347	0.000	2.862
Sasanian/Islamic	19	89	0.213	SI	-1.667	-0.531	-2.862	0.000

Suidae				DL	AD	S	SI	
Period	NISP	Total	%					
Deep Levels	6	91	0.066	DL	0.000	3.631	-1.180	1.749
Archaic Dehistan	155	669	0.232	AD	-3.631	0.000	-6.572	-1.827
Sasanian	8	224	0.036	S	1.180	6.572	0.000	3.520
Sasanian/Islamic	13	89	0.146	SI	-1.749	1.827	-3.520	0.000

Table 2. Comparison of the percentage of the principal mammals in the four periods at Geoktchik Depe (Statistical test after Schwartz, 1980: 283; matrices computed by A. Tresset/URA 1415).

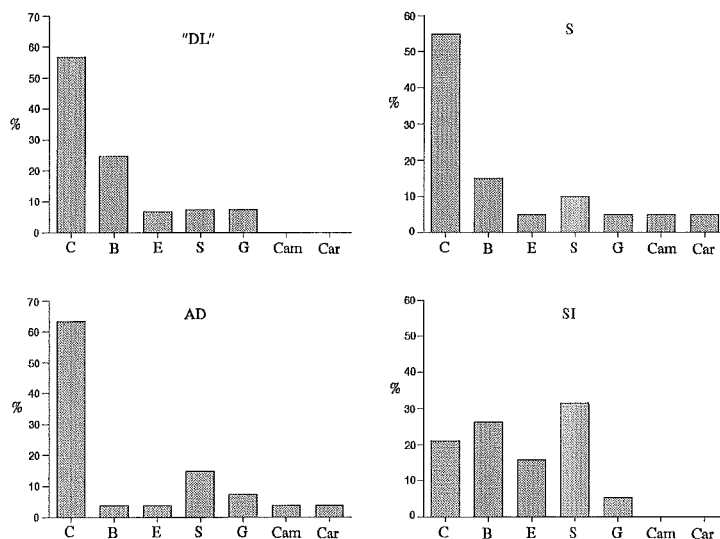


Figure 5. Percentual proportions of the MNI of the principal ungulates in the different chronological units (C=Caprinae; B=Bovidae; E=Equidae; S=Suidae; G=Gazella; Cam=Camelids; Car=Carnivores).

part of the meat consumption refuse, are present only in the Archaic Dehistan and the Sasanian Period, indicating exploitation for pelts.

To summarize the situation, it seems that some critical changes occur in the Sasanian/Islamic period in terms of animal exploitation at Geoktchik Depe, expressed by the diminishing proportions of caprinae in the diet and the increased importance of the pig/boar, cattle and equids.

Pastoralism at Geoktchik Depe

Three types of information have been used for age determinations and the reconstruction of the kill-off patterns of the principal domestic mammals; epiphyseal fusion of the bones (Barone, 1976), dental eruption (Silver, 1969; Rowley-Conwy, 1993) and wear stages (Ducos, 1968; Payne, 1973; Rowley-Conwy, 1993). Unfortunately this information is not equally available for the major ungulates in all the occupational periods at the site, to provide an accurate image of the nature of pastoral activities. These data have been combined in diagrams where each line refers to a single individual (Fig. 6a-d, 7a-b. and 8)². Even though it is difficult to combine these different data, it is however possible to distinguish some tendencies on the nature of animal husbandry.

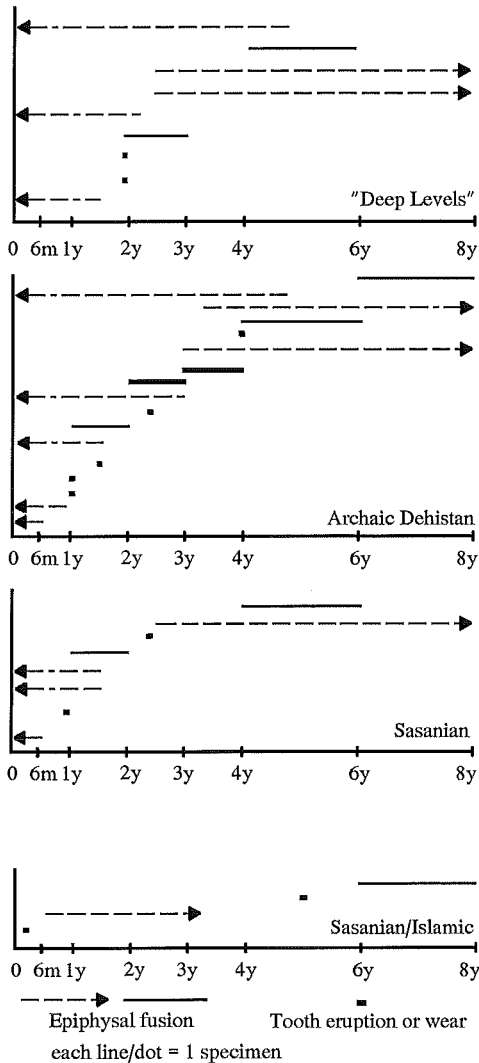


Figure 6. Age estimation of sheep/goat.

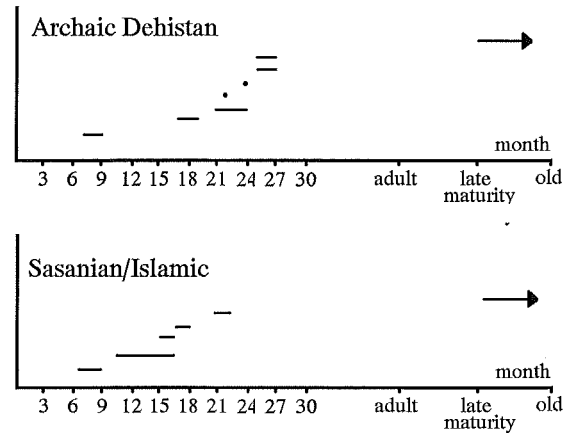


Figure 7. Age estimation of pig.

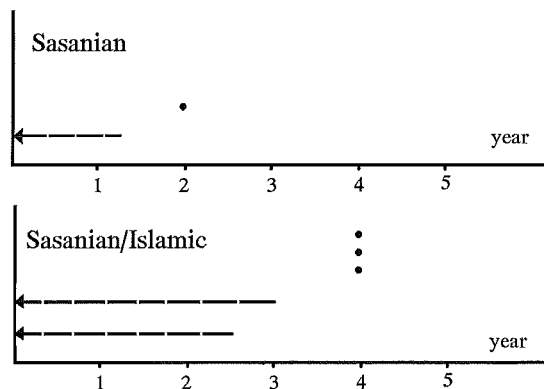


Figure 8. Age estimation of cattle.

² All the overlapping ages given by different methods have been eliminated in order not to overestimate one stage or another.

The most abundant data is provided by sheep/goat, although the last period is too poorly documented. It seems that almost 55% of the individuals in the first period, almost 58% in the Archaic Dehistan and 77% in the Sasanian period are younger than three years old. In spite of the unequal amounts of data, there is a tendency for early slaughter in the three first periods which seems to be reinforced in the Sasanian period. These diagrams reflect principally a meat oriented exploitation. It should be noted however, that in the Archaic Dehistan Period, 35% of the individuals are more than three/four years old, a fact that could logically suggest a secondary products age profile besides meat.

For pigs (Fig.7a-b), there is no ambiguity concerning the aims of herding. In the Archaic Dehistan and Sasanian period, a subadult slaughter pattern is visible, with a slight shift to younger stages (about one year less) in the latter. Maybe this is due to the fact that pigs need a more important food supply during the winter because of seasonal deficiencies. This shift might be the expression of difficulties inherent to long term care.

Ageing data for cattle are limited but interesting (Fig. 8). In the Sasanian and the Sasanian/Islamic periods there are mostly subadult animals. Only one individual reached more than five years. These data are relatively scarce but point to a meat production aim for the cattle.

For the equids the very sparse data for each period prohibit any reliable interpretation concerning their herding. In the first period there is only evidence of at least one 42 months old equid, and in the next period of an individual of the same age. In the Sasanian period there are two documented cases being more than 15 months old as in the last period of occupation, where there is one more individual of about one year. These finds can be ascribed to consumption activities, as evidenced by the multiple cut marks left on the bones.

Size of the animals

Few complete bones were available among the remains and these do not allow a detailed analysis of size variations of the ungulates at the site. However, the corresponding withers heights have been calculated by reference to different factors as published by von den Driesch and Boessneck, 1974; Teichert, 1990; quoted in Weinstock 1993 (Table 3, Appendix 2 and 3).

Caprinae (cf. Schramm, 1967 for factors quoted by von den Driesch and Boessneck, 1974).

	Feature No.	GL	WH
Metacarpal	438	165.0	94.9

Pig/Boar (cf. Teichert, 1990 for factors).

	Feature No.	GL	WH
Metacarpal 4	434	87.0	62.2
Talus	434	42.5	76.1
Metatarsal 3	434	93.0	92.5
	438	98.4	97.5

Equids (cf. Kiesewalter, 1888 for factors quoted by von den Driesch and Boessneck, 1974).

	Feature No.	GL	WH
Metacarpal	454	170	109.0
	303	151	96.8
Metatarsal	454	205	109.3
	303	225	119.9
	N225-250	221	117.8

Table 3. Calculations of withers heights (WH) of the principal mammals at Geoktchik Depe.

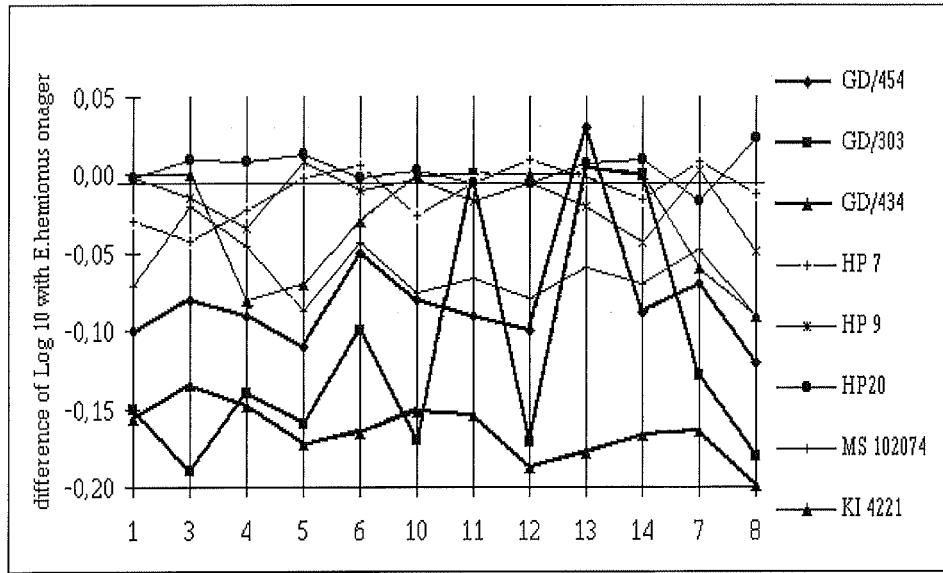


Figure 9. Ratio diagram of individual dimensions of three equid metacarpals from Geoktchik Depe (GD) with young hemionos (HP) and asses (MS, KI);(Table 3).

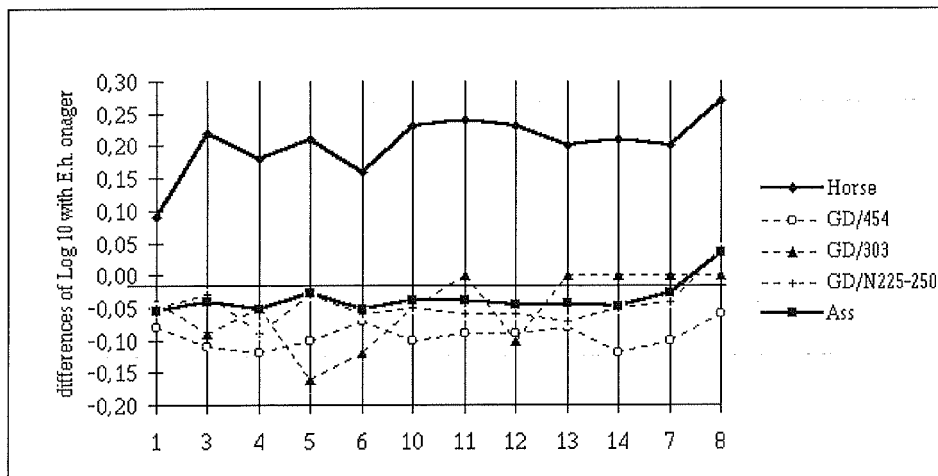


Figure 10. Ratio diagram of three equid metatarsals from Geoktchik Depe in comparison with the average dimensions of horse (*E. caballus*) and domestic ass (*E. asinus*); (Table 3)

The only complete bone from a caprine is a metacarpus belonging to a wild sheep, Urial (*Ovis vignei*), measuring 95 cm at the withers.

For the cattle, adult limb bones were not available to allow the estimation of withers height. Also, it could not be determined whether the specific type of the cattle was humped or unhumped. Cattle found nowadays in the vicinity of the site are humped animals and forage in semi-liberty near ponds.

Most of the measurable bones allocated to the wild boar originate principally from the Archaic Dehistan pit 434 (Plate 1) and the Sasanian period. The average of their withers heights calculated from the metapodial bones and talus, is 82 cm and ranges from 62 to 97.5 cm, which illustrates their very large size. It is noteworthy that the largest withers heights come from a Sasanian context. It seems that the exaggerated size of the wild boars in the depictions of the Sasanian plates or *bas-reliefs* must have had some reality (i.e. Taq-i-Bostan near Kermanshah, Fukai and Horiuchi, 1969).

Equids have the most abundant osteometrical data. Actually, during the 1995 campaign, a complete skeleton of a juvenile ass (about 24 months old) in an Archaic Dehistan pit (454) was exposed. Lying on a layer of ashes from a nearby hearth (Tandir), and without any sign of carbonization or cut marks, this young animal was buried on top of the mound, a fact that remains unexplained (Plate 2 and 3)³.

All the other exposed complete bones belong to the Archaic Dehistan period and by their small size and morphology could be allocated to asses (*Equus asinus*; Appendix 3 and 4; Fig. 9-10).

The average of the withers heights is 108.6 cm and ranges between 96.8 and 120 cm. Besides, there is evidence of the presence of horse (*Equus caballus*) at the site from cranial remains. The morphological features of the teeth (the size, the shape of the double knot; see Eisenmann, 1986) of one specimen belonging to the Sasanian period refers to a caballin form (Eisenmann, 1980; 1981; Eisenmann, pers. comm.; Plate. 4).

Other points relating to the morphology of the animals in Geoktchik Depe are the presence of a few goat horn cores all showing twisted lines (Plate 5 and 6) and also the presence of hornless sheep.

In the Sasanian period, gazelle horn cores have saw marks on the proximal end and may have been used as implements (Plate 7). Also, cut marks left on the basis of some of the goat horn cores suggest the use of the horn, possibly for ornaments.

The Human Grave (US 303/433)

On the top of the mound a human grave oriented east/west, belonging to the Archaic Dehistan Period, according to the typology of the grave goods⁴, was exposed during the first campaign (Lecomte, 1994). Its excavation during 1995 revealed a very disturbed organization. The north and south limits of the grave could be seen approximately. A compact mass of mud was found in the middle of the grave. The human bones no longer lay in their original anatomical position and were very fragmented. There was a significant number of animal bones, belonging to both large and small mammals (Fig 11). Obviously the grave contained four people, including two juveniles, as is shown by the recovery of four distinct astragali and calcanei. The excavation of the grave was interrupted by the end of the 1995 campaign and will be continued in the following season of excavation. The disturbance of the grave as well as the presence of animal bones in this grave remains unexplained for the moment.

³ In the absence of any evidence for its consumption I did not include this individual in the dietary analysis of the site.

⁴ Especially a projectile point with a spur, typical of the Iron Age.

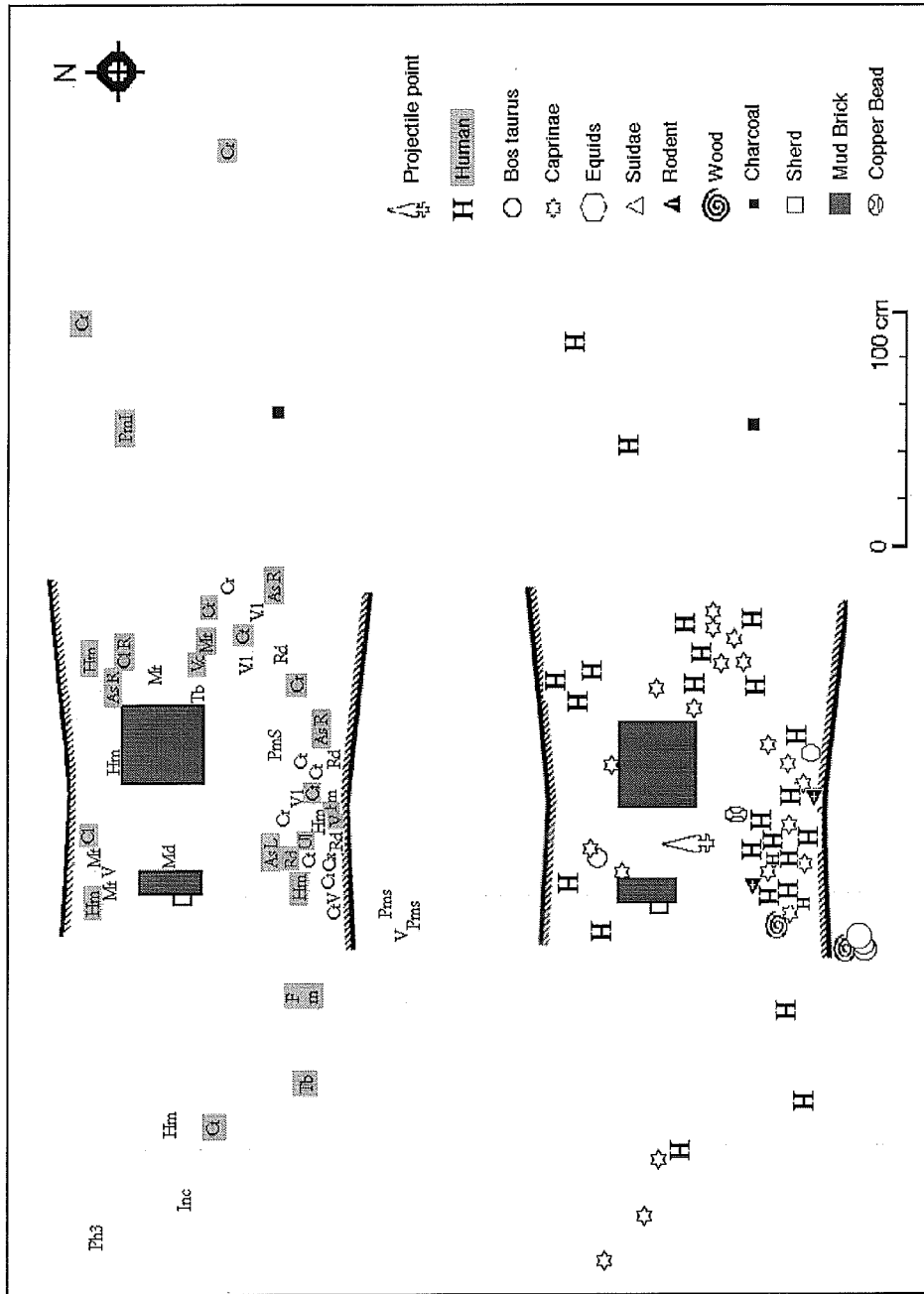


Figure 11. Geoktchik Depe - structure 303/433, disturbed human grave. Top: distribution by skeletal elements. (As= Astragalus; Cl= Calcaneum; Cr= Cranium; Ct= Costa (rib); Cx= Coxal; Fm= femur; Hm= humerus; Inc= incisor; Md= Mandible; Mt= metatarsus; Ph3= phalanx 3; Pml= Premolar Inferior; PmsS= Premolar Superior; Tb= tibia; Ul= ulna; V= Vertebra; VI= Vertebra lumbar; L= left; R= right). Bottom: distribution by species and archaeological finds.

Discussion

The faunal analysis of the Iron Age/Islamic site of Geoktchik Depe, located in the ancient province of Hyrcania in the southwest of Turkmenistan, produced the first archaeozoological data from the western part of the country. It is all the more important, because it covers a long sequence of two thousand years and possibly permits a long term understanding of man/animal interactions, although on a local scale. Through this preliminary analysis, it was possible to discern general economic tendencies which of course, need to be confirmed by more faunal data.

The general characteristics of Geoktchik Depe are :

- Its subsistence economy was based on domestic animals during the Iron Age until the Islamic period.
- Among those domesticates, caprinae in the first periods and cattle and pig/boar at the end of the occupation are the most common domestic species.
- The presence of horse and, curiously, the absence of the hemione, at least at this stage in the studies.

Many questions and assumptions arise:

Is the increase in cattle, apparent in the faunal spectrum, evidence of increase in its stock? If so, the intensification of this type of herding also means availability of pasture, through diminution of agricultural lands.

If not, does this progressive increase in cattle reflect changes in diet, also expressed by the increase pig and equids in the last period?

The paucity of both comparative archaeozoological data as well as detailed historical documents makes it difficult to understand the reasons for these variations. For Turkmenistan the rare faunal analyses are from older sites such as Jeitun, a neolithic occupation near Ashghabat (Harris et al., 1993; Masson and Harris, 1994) or the Chalcolithic site of Ilgynly Depe near Altyn Depe (Kasparov, 1994) and also the Bronze Age site of Gonur Tepe in the Merv Oasis, about 400 km east of Ashghabat⁵. The main difference of recent occupation of Geoktchik Depe in comparison with the two first sites, is its lower faunal diversity. In the two prehistoric sites more than 40% of the remains came from wild species, whilst in Geoktchik they are only 3% of the total. The similarities are more visible with the Bronze Age site of Gonur Tepe, where wild species never exceed 5% of the faunal remains (Moore *et al.*, 1993). In spite of this fact, the herding aims seem to differ at the two sites: in Gonur Tepe secondary production in addition to meat and the opposite in Geoktchik Depe. But for the Iron Age and after no comparative data exist for the moment, even less in the studied region.

Another aspect worth mentioning is the very low contribution of bird and fish to the diet of the inhabitants of the site. The low rate is surprising, especially with regard to fish consumption, considering the proximity of the site to the Caspian Sea (80 km).

In addition, the faunal remains from Geoktchik Depe reveal more favorable ecological conditions than those demonstrated for Tappeh Hessar in the Gorgan plain in Iran (Meder, 1989) and Gonur Tepe, both Bronze Age sites. The presence of the wild boar, which requires a humid environment, is one of the indicators of better ecological conditions in the Dehistan Plain. These might have been also helped by the dense irrigation network. The geomorphological analyses of the site, now in progress, might bring us more detailed information on the subject. At Gonur, the decrease of the boar proportions in its second phase (Gonur period 2/BMAC period 2000-1750 BC), according to the authors, indicated “... *that the thickets of the natural delta has been transformed into agricultural areas ...*” (Moore et al, 1994: 423). Thus, one could ask whether the increase in boar proportions at Geoktchik Depe, around the AD 7th/8th centuries, indicates the abandonment of agricultural lands. This suggestion is also supported by an increase in the contribution of cattle, implying the presence of pastures.

⁵ See also Ermolova, 1996.

In addition to these environmental considerations, the large scale irrigation network, still visible in the Meshed-Misrijan Plain, indicates the presence of sedentary communities, dependent on agriculture and cohabiting with pastoral nomads as known from classical sources⁶.

How far did this nomad/sedentary interaction extend, without forgetting the weight of multiple political institutions in the region such as the Achaemenids or the Sasanians who followed ?

This faunal study as well as parallel archaeological investigations, are the first steps towards a better understanding of the above questions that stress the complex economy of these eventful regions. Future archaeological campaigns in Geoktchik Depe are promising in this respect.

Acknowledgments

I would like to especially thank Dr. Vera Eisenmann for her great help and patience in the interpretation the equid data. I also thank Dr. Olivier Lecomte for his insightful comments on this paper. Finally, I am thankful to the URA 1415/CNRS for its scientific and financial support and to Ms. Ellen Vuosalo Tavakoli and Ms. Alice Choyke for the correction of the English text.

References

- Barone, R. 1976. *Anatomie Comparée des Mammifères domestiques*. Tome I. Ostéologie. texte. Paris, Vigot.
- Briant, P. 1982. *Etat et Pateurs au Moyen-Orient ancien*. Maison des Sciences de l'Homme. Paris and Cambridge, University Press.
- Briant, P. 1984. *L'Asie centrale et les royaumes moyen orientaux au premier millénaire av. n.é.* Paris.
- Briant, P. 1996. *Histoire de l'empire perse. De Cyrus à Alexandre*. Paris, Fayard.
- Driesch, A. von den and J. Boessneck, 1974. Kritische Anmerkungen zur Widerristhöhenberechnung aus Längenmassen vor- und frugeschichtlicher Tierknochen. *Säugetierkundliche Mitteilungen*. BLV editions, N° 40. Bd. 4.: 325-348
- Ducos, P. 1968. *L'origine des animaux domestiques en Palestine*. Inst. de Préhistoire de Bordeaux edition.
- Eisenmann, V. 1980. Les Chevaux (*Equus sensu lato*) fossiles et actuels: crânes et dents jugales supérieures. *Cah. Paléont.* 186p. 67 fig. 22pl. 72 tabl.
- Eisenmann, V. 1981. Etude des dents jugales inférieures des *Equus* (Mammalia. Perissodactyla) actuels et fossiles. *Palaeovertebrata* 10/3-4: 127-226.
- Eisenmann, V. 1986. Comparative Osteology of Modern and Fossil Horses, Half-asses, and Asses. In: R. H. Meadow and H.-P. Uerpmann (eds.), *Equids in the Ancient World*. Wiesbaden, Dr. Ludwig Reichert edition: 67-116.
- Eisenmann, V. and S. Beckouche, 1986. Identification and Discrimination of Metapodials from Pleistocene and Modern *Equus*. Wild and Domestic. In: R. H. Meadow and H.-P. Uerpmann (eds.), *Equids in the Ancient World*. Wiesbaden, Dr. Ludwig Reichert edition: 117-163.
- Ermolova, N.M. 1996. Nouveaux matériaux pour l'étude des restes de mammifères de l'ancienne Turkménie. *Fiches d'ostéologie animale pour l'archéologie* no 7, sous la direction de Jean Desse et Nathalie Desse-Berset. APDCA, Valbonne-Sophia Antipolis. 17 p. (Translated into French by J. Gaudy CRA/CNRS).
- Fukai, S. and K. Horiuchi 1969. *Taq-i Bostan I*. (Report 10). Tokyo, The Tokyo University Iraq-Iran Archaeological Expedition.
- Harris, D.R., V.M. Masson, Y.E. Berezkin, M.P. Charles, C. Godsen, G.C. Hillman, A.K. Kasparov, G.F. Korobkova, K. Kurbansakhatov, A.J. Legge, S. Limbrey 1993. Investigating early agriculture in Central Asia: new research at Jeitun, Turkmenistan. *Antiquity* 67: 324-338.

⁶ For a detailed study on the subject cf. Briant, 1982, 1984 and 1996.

- Kasparov, A.K. 1994. Patterns in caprine exploitation at Ilgynly-Depe, Turkmenystan. In: *New Archaeological Discoveries in Asiatic Russia and Central Asia. Archaeological Studies*. Saint-Petersbourg 16: 36-38.
- Lecomte, O. 1993. *Mission archéologique de Dehistan*. Projet présenté à la commission consultative des recherches archéologiques à l'étranger. 11p. unpublished.
- Lecomte, O. 1994. *Mission archéologique de Dehistan*. Rapport sur la première campagne de fouilles (1994) à Geoktchik Depe (plaine de Meshed-Misrijan. Turkmenistan). 10 p. unpublished.
- Lecomte, O. 1995. *Mission archéologique de Dehistan*. Rapport sur la seconde campagne de fouilles (1995) à Geoktchik Depe (plaine de Meshed-Misrijan. Turkmenistan). 15 p. unpublished.
- Lecomte, O. and M. Mashkour, 1996. Hyrcanie and Dehistan from the Iron Age to the Islamic Period (13th century BC - 8th century AD). *Iranian Journal of Archaeology* 10/2: 9-21. (in Persian, summary in English: 2-3).
- Masson, V. M. and D.R. Harris 1994. New excavations at Jeitun. Turkmenistan: The first five years. In: *New Archaeological Discoveries in Asiatic Russia and Central Asia. Archaeological studies*. Saint-Petersbourg 16: 14-16.
- Meder, O. G. 1989. The Geomorphological and ecological setting of Tappeh Hesar in the Damghan Plain. 1976. In: R.H. Dyson Jr. and S.M. Howard (eds.), *Tappeh Hesar; Reports of the Restudy Project. 1976*. Florence, Le Lettere edition: 7-12.
- Moore, K. M., N.F. Miller, F.T. Hiebert, R.H. Meadow 1994. Agriculture and herding in the early oasis settlements of the Oxus Civilization. *Antiquity* 68/259: 418-427.
- Payne, S. 1973. Kill-off patterns in sheep and goats. The mandibles from Aşvan Kale. *Anatolian studies* 23, 17 fig. 1 tab.: 281-303.
- Rowley-Conwy, P. 1993. Season and Reason: The Case for a Regional Interpretation of Mesolithic Settlement Patterns. In: G.L. Peterkin, H. Bricker and P. Mellars (eds.), *Hunting and Animal Exploitation in the Later Palaeolithic and Mesolithic of Eurasia*. Archaeological Papers of the American Anthropological Association n° 4: 179-188.
- Schwartz, D. 1980. *Méthodes statistiques à l'usage des médecins et des biologistes*. Paris, Flammarion Médecine Science edition.
- Silver, A. 1969. The Ageing of Domestic Animals. *Science in Archaeology* 26. London, Thames and Hudson: 283-302.
- Teichert, M. 1990. Withers height calculations for pigs. Remarks and experience. *Handout distributed at the 6th ICAZ Conference*. Washington D.C. May 1990.
- Weinstock, J. 1993. Two complete pig (*Sus*) skeletons from southern Germany: considerations of limb proportions and ageing criteria. *Archaeozoologia* VI/I: 71-92.

Stratig. Units	Periods	Caprinae	Sheep	Goat	Cattle	Equid	Camel	Pig	Boar	Gazelle	Carnivore	Human	Rodent	Bird	Fish	Amphibia	Reptile	Mollusc	Unid.	TOTAL	
North Sounding																					
200-225/F28	DL	10	1									1		1					6	19	
225-250/F29	DL	3				1													4	4	
250-275/F41	DL	3																	2	5	
275-300/F30	DL	5	2		2														9	9	
300-325/F42	DL	4																	4	4	
325-350/F40	DL	8			3			1		2									4	15	
350-375/F33	DL	5	2		3			3			1								3	16	
375-400/F34	DL	3			1														3	8	
425-450/F32	DL	4			6	4													9	23	
450-475/F31	DL	3	1			4													8	8	
475-500/F37	DL					1														1	
550-575/F43	DL					1														1	
600-625/F44	DL	1																		1	
650-675/F39	DL	1																	1	2	
675-700/F38	DL	1																		1	
725-750/F45	DL							1											1	1	
825-850/F36	DL	1			1			1											1	3	
subtotal		52	6	0	13	11	0	6	0	2	1	1	0	1	0	0	0	0	28	121	
117/F19	B.S					2														2	4
205/F35	B.S	1			2	1														4	4
301/F13	AD	4										1							3	8	
303/F20	AD	19		1	4	3			3			48		1					52	131	
432	AD	2						7	3					1					2	15	
433	AD	28		1	4	3		5	1			77	5						30	154	
434	AD	186	16	7	12	12		127	11	3	1	1		3		1		134	502		
451	AD	1	1	1	3														3	8	
454	AD	63	1	2	18	119		2						2	1				17	225	
455	AD	4		1																5	
subtotal		308	18	12	43	128	0	141	14	7	1	127	5	7	1	1	0	0	243	1056	
430/F60	AD&S	2				1		1				1							3	8	
431	AD&S	1				1														2	
438	AD&S	31	1	6	10	1	1	6											3	59	
subtotal		34	1	6	10	3	1	7	0	0	0	1	0	0	0	0	0	0	6	69	

Appendix 1: Geoktchik Depe. Taxonomic distribution in the stratigraphic units of the 1994 and 1995 campaigns. (Periods: DL= "Deep Levels"; B.S.= Before Sasanian; B.S/I.= Before Sasanian/Isamic; AD= Archaic Dehistan; S= Sasanian; SI= Sasanian/Isamic; SR= Sub Recent).

Appendix I continued

Strang. Units	Periods	Caprinae	Sheep	Goat	Cattle	Equid	Camel	Pig	Boar	Gazelle	Carnivore	Human	Rodent	Bird	Fish	Amphibia	Reptile	Molluscs	Unid.	TOTAL
203/F2	B, S/I	14			5	9		1	1	1	3						23		6	63
116/F15	S	6			1															7
120/F16	S			1																1
204/F46	S	1			1			2												5
204/F47	S	7			7			2												10
440	S	2			1			1							4					7
441	S				3								1							2
444	S				1															2
445	S				1															2
446/F69	S				1										1					3
North Sounding																				
15-43/F26	S	11			2								1							14
43-60/F27	S	3	1		1								2							7
60-70/F24	S	7	1	5	2					1										16
70-100/F22	S	3		3	3			1	1											17
100-125/F25	S	6		2	2															31
125-150/F21	S	58	2	5	7					2										7
175-200/F23	S	10	1	1	2	5				2										22
subtotal		129	5	14	38	21	1	7	1	4	3	0	1	5	5	0	23	1	73	331
102/F6	SI	3																		11
106/F11	SI																			1
107/F9	SI	1																		1
108/F10	SI	2			3			1												6
109/F18	SI	4			7			6												17
121/F1	SI	8		1	9	16		1	1											39
125/F4	SI	1		2	6	3		2		1										16
126/F3	SI	1		3	3															7
202/F14	SI				1			2												4
subtotal		20	5	2	29	19	0	12	1	3	0	0	0	1	0	0	0	1	12	105
101/F12	SR	1				1														2
104/F8	SR																			1
405/F59	SR	4										1								1
408/F55	SR	3																		6
425	SR	4																		3
427	SR	1		1																6
428/F54	SR	5		1	4	9														11
439/F68	SR			1	1	1		8					2							8
436/F53	SR	15			1															1
437/F61	SR	2	1		4	3		8												7
subtotal		35	1	2	9	14	0	16	0	0	0	3	0	3	0	0	0	0	19	102
TOTAL		578	36	36	142	196	2	189	16	16	5	132	6	17	6	1	23	2	381	1784

Appendix 2. - Metrical data of the Equids

For measurement codes cf. Eisenmann, 1980,1981, 1986

Lower cheekteeth

N-175-200/F23	OL	OW	LFLdk	Ht	
P2	37	16	16.5	59.5	
P3	28.2	17.5	15	17.8	69
427	OL	OW	LFLdk	Ht	
P2	30.7	15.7	16.8	13	
P3	27	17.5	14.5	16.4	
M1	(25)	15	10	15.9	56
454	OL	OW	LFLdk	Ht	
M1	26.1	13.1	11	14	

Upper cheekteeth

121/F1	OL	OW	LPHt	
Left				
P2	36.5	22.4	8.4	29.2
P3	27.3	25	11.4	31
P4	25.5	27	12.8	30.1
Right				
M1	23.1	26.4	11.5	23
M2	24.5	26	13.1	26.5
M3				
454	OL	OW	LPHt	Note
P1				decidious
P2				decidious
P3				decidious
P4				decidious
M1	24.5	23.6	12.7	
M2	24.1	29.2	12	
M3				

Skull	13	14	15	16	18	21	22	24	23	25	26
454	156	150	84.5	51.1	385	64.1	47.8	160	284	86	102

METAPODIALS	1	3	4	5	6	7	8	10	11	12	13	14	note
Metacarpal	454	170	21.5	17	33.7	24.1	29.1	9.4	32	31.6	23.4	29.5	
303	(151)	16.9	15.2	30	21.7	25.5	7.8	(26)		20.1			juv
434			17.5	36.4	25.1	29.5	10						
Metatarsal													
454	205	19.7	19	32.4	30	28.3	7.5	30.2	30.5	24.7	19.7	19.9	
303	(225)	20.5	22.8	28.3	26.5			33.8		24.1			
N225-250	221	23.6	20.4	38	30.4	32.8	9.6	34	32.7	26.1	20.2	23.2	

- OL** Occlusal Length
- OB** Occlusal Breadth
- LF** Length of the Postflexide
- LP** Length of the Protocone
- Ht** Height of the Crown
- Ldk** Length of the Double Knot (Eisenmann, 1986).

Age and Location	2 years /Leiden	2.5 years/Amsterdam	2 years/Kiel	4 years/Moscow	3 years/Kiel
Species	Hemione/Persia	Hemione/Persia	Hemione/Persia	Domestic Ass	Domestic Ass
Measurements	HP 7	HP 9	HP20	MS 102074	KI 4221
1	198.0	211.0	211.0	180.0	148.0
3	23.5	25.0	26.5	24.7	19.0
4	20.0	19.5	21.5	19.0	15.0
5	43.0	44.0	44.5	35.3	29.0
6	27.5	26.5	27.0	24.5	18.5
10	36.5	38.5	39.0	32.5	27.3
11	38.0	37.0	38.0	33.0	27.0
12	30.0	29.0	29.0	24.5	19.1
13	24.0	23.0	24.5	21.0	16.0
14	25.0	23.5	26.5	22.1	17.7
7	35.0	34.5	33.0	30.7	23.5
8	12.0	11.0	13.0	10.0	7.8

Appendix 3. Measurements of recent Equid metacarpals used in comparison in Fig. 9 .

(Measurements by courtesy of Dr. Vera Eisenmann and for the codes cf. Eisenmann, 1986).

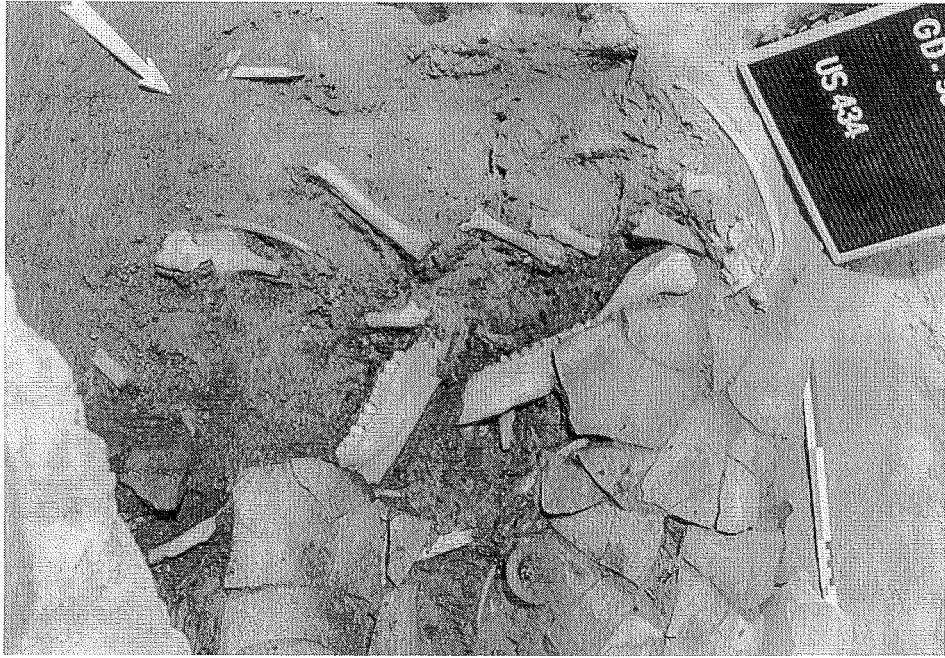


Plate 1. Pit 434, "the boar pit"

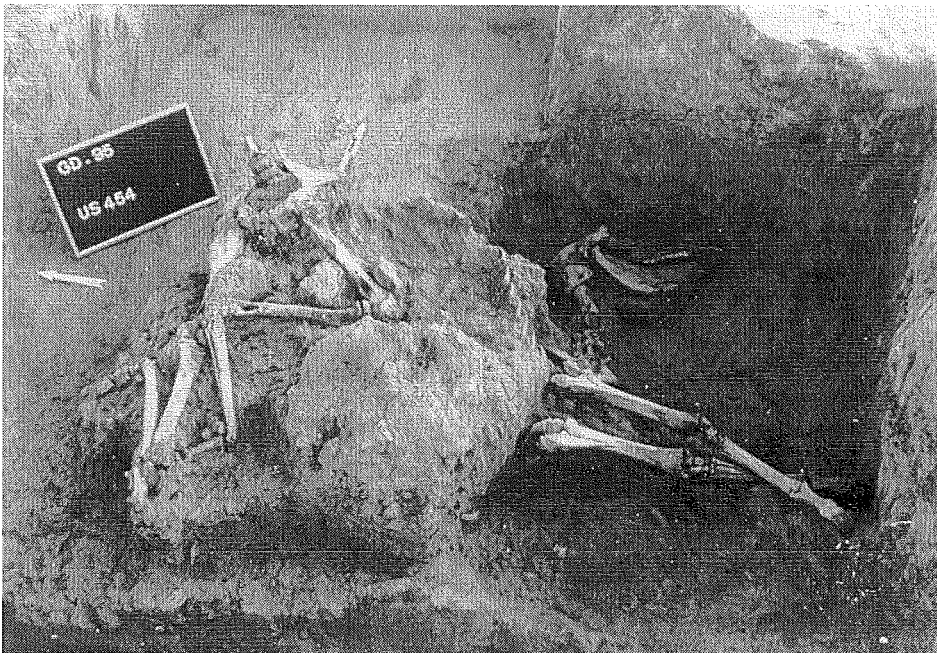


Plate 2. Stratigraphical unit 454, a complete skeleton of a young ass

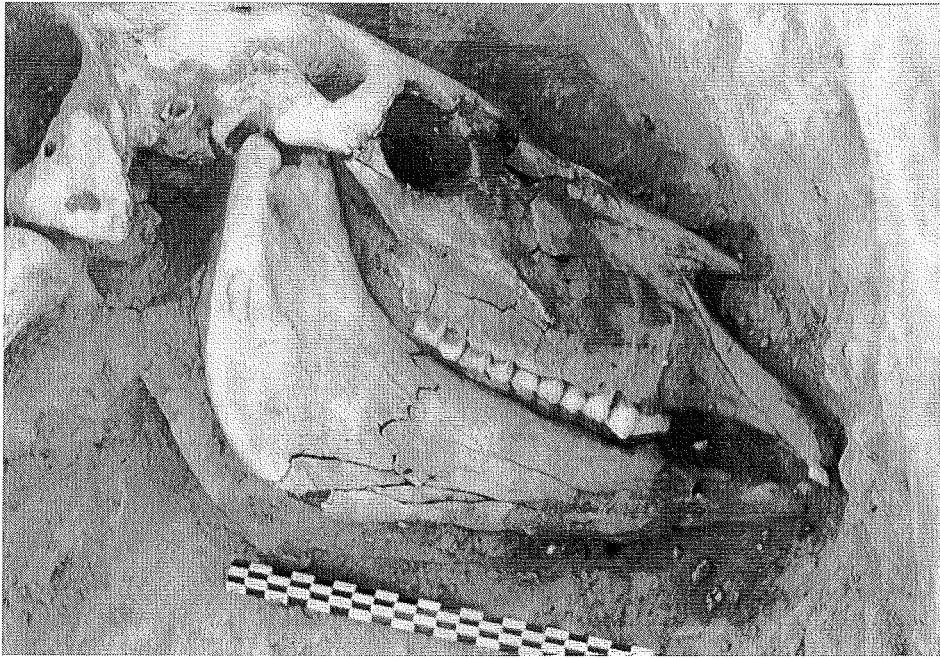


Plate 3. Stratigraphical unit 454, the skull of the ass

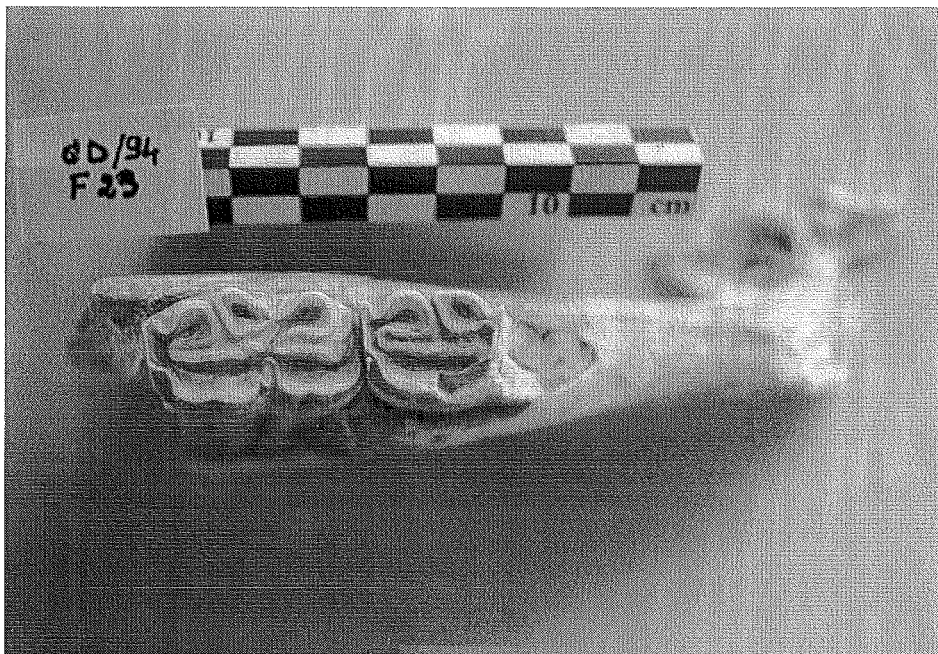


Plate 4. Stratigraphical unit N-175-200/F23, right mandible of a horse with P2 and P3 present



Plate 5. Stratigraphical unit N-70-100/F22, right horncore of *Capra hircus*
(Bd= 58.7 mm)

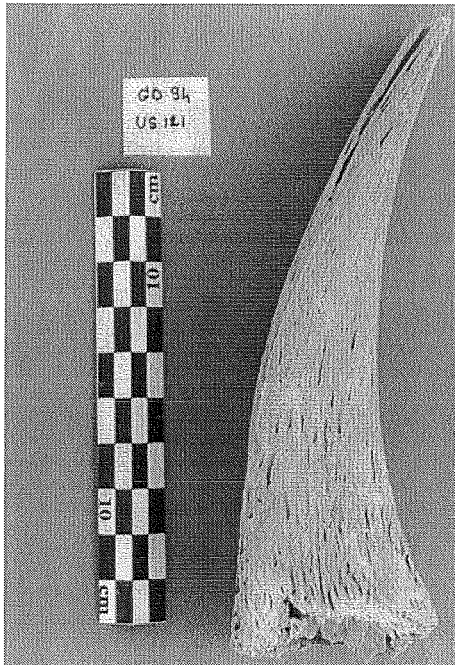


Plate 6. Stratigraphical unit 121/F11, left
horn core of *Capra hircus*
(Bd= 47.6 mm)

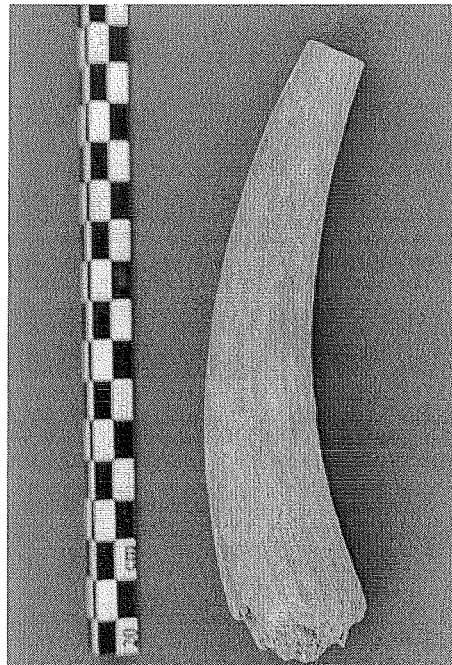


Plate 7. Stratigraphical unit N-60-70/F24,
left horn core of *Gazella subgutturosa*,
with saw marks on upper end (Bd= 31.1
mm)