ARCHAEOZOOLOGY OF THE NEAR EAST VI

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

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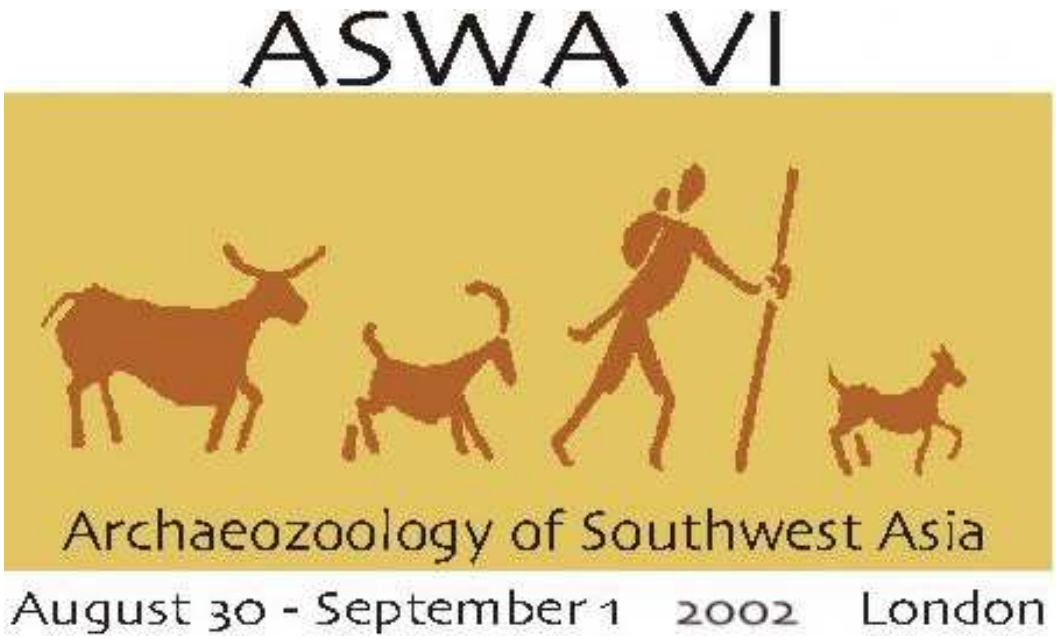

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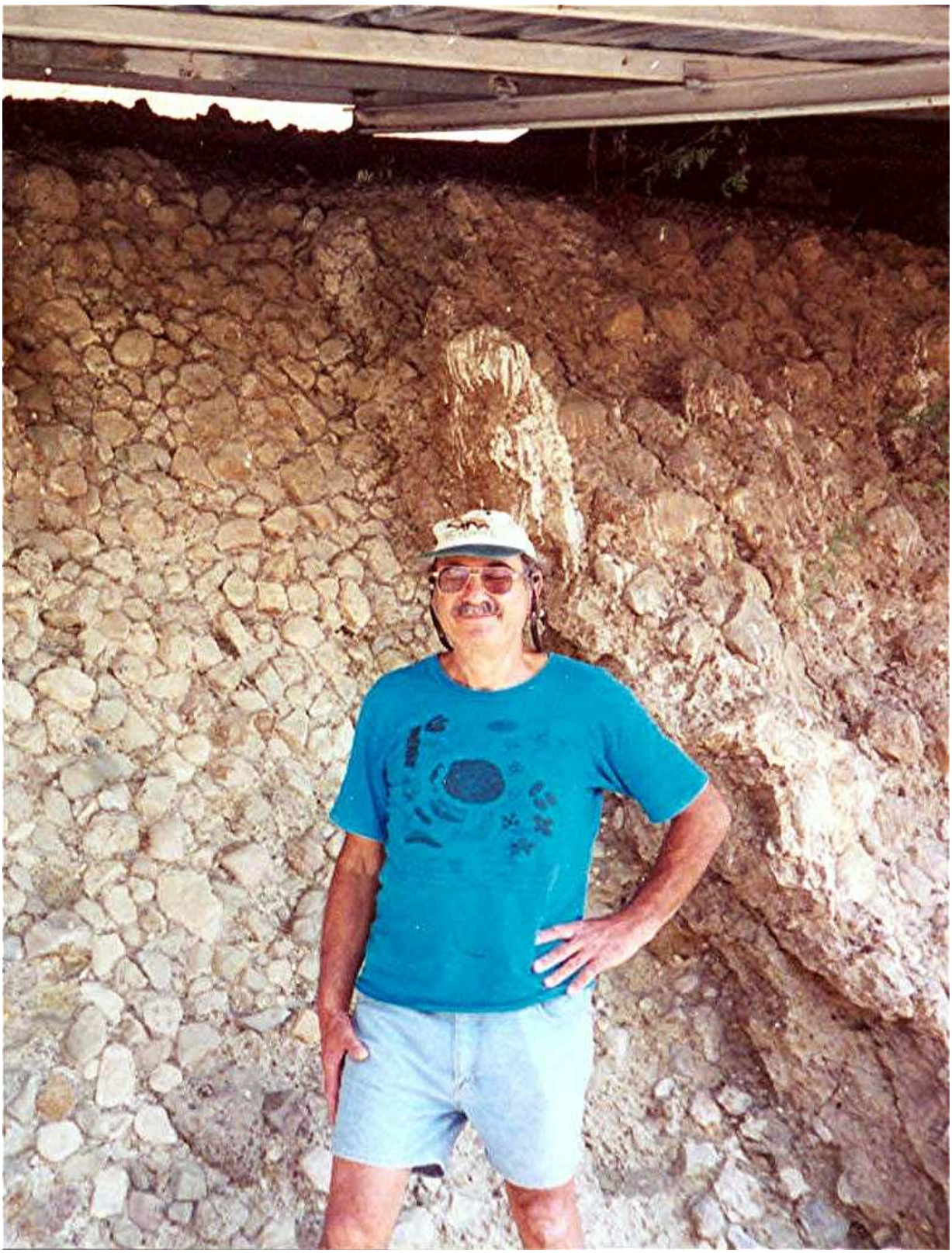

Prof.Dr. Eitan Tchernov

This volume is dedicated to the memory of Prof. Dr. Eitan Tchernov, in fond memory of his enthusiasm and support to many in the field of archaeozoology**.**

Preface

The ASWA VI meeting was held at the Institute of Archaeology, University College London, from 30th August-1st September 2002, timetabled to follow on the heels of the ICAZ meeting in Durham, UK. Over 55 participants attended the meeting, travelling from 13 countries, bringing the latest research results from our field. As usual, it was a pleasure to see so many doctoral students presenting their research – a sign for a very healthy future for zooarchaeology in south west Asia. It is still unfortunate, however, that colleagues from some Middle Eastern countries were unable to attend due to financial and political constraints.

Presentations were organized into the following six themes, which highlight the scope of the ASWA membership: Animals in Palaeolithic and Epipalaeolithic Levant; Neolithic Patterns of Animal Use; Animals in Neolithic Anatolia; Animals in the Chalcolithic and Bronze Ages; Iron Age, Nabatean and Roman Patterns of Animal Use; Animals in Ancient Egypt. There was also a poster session, and contributors were invited to submit papers to this volume.

As always with the ASWA forum, the meeting served to welcome new scholars to the group, but was also very much a reunion of old friends and colleagues who have been sharing new information and discussing issues of joint interest for many years now. In this vein, it is a great sadness that ASWA VI was the last international meeting attended by Prof. Eitan Tchernov, an original founder of the group and mentor and inspiration to so many. For many of us, it was the last time we saw Eitan, and experienced his usual incisive comment, unstoppable enthusiasm for the subject, and warm friendship. He will be greatly missed.

ASWA VI was supported by the Institute of Archaeology, UCL, who provided facilities and financial and administrative help. In particular, the organizing team was aided greatly by the administrative assistance of Jo Dullaghan at the Institute. ARC bv (Archaeological Research and Consultancy, Groningen, The Netherlands) once again shouldered the finances of the publication of the proceedings, and we are extremely grateful for their continuing support. Many thanks are also due to the postgraduate student helpers from the Institute of Archaeology who made the meeting run so smoothly: Banu Aydinoğlugil, Jenny Bredenberg, Chiori Kitagawa, Peter Popkin, and Chris Mosseri-Marlio (who also produced the logo reproduced on the frontispiece of this volume).

Many thanks to all the participants for making the meeting such a success!

Louise Martin
London 2005

Participants of the 6th ASWA Conference, held at the Institute of Archaeology, University College London.

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ANIMAL RESOURCE EXPLOITATION AT QUMRAN CAVE 24 (DEAD SEA, ISRAEL) FROM THE PRE-POTTERY NEOLITHIC TO THE CHALCOLITHIC

F. Alhaique[1] and A. Gopher[2]

Abstract

Recent excavations at Qumran cave 24, near the Dead Sea, revealed a long stratigraphic sequence spanning from the Late Natufian/PPNA to the Chalcholitic. The presence of archaeologically sterile layers at different levels along sequence suggests that human occupation was not continuous and the general scarcity of artifacts indicates that occupation was always temporary. Archaeological materials include flint and ground stone artifacts, pottery and bone tools, and these were recovered together with an abundant faunal assemblage of over 7800 fragments, mainly coming from the PPNB levels. In general *Gazella gazella* and *Capra ibex* are the most frequent species, while *Bos primigenius* and *Sus scrofa* are much less abundant. Domestic caprines start to appear in the PPNB, but wild animals always outnumber domestic ones until the Chalcholithic when the proportions are inverted. Human modifications show mainly the exploitation of ungulates, but occasionally also of some small species such as the wild cat and more rarely the fox. The presence of this latter species, the most common carnivore, is instead more often associated with natural accumulation rather than human hunting. Although this site represents only an ephemeral seasonal camp, the investigations carried out may be relevant to improve our knowledge on patterns of land use and mobility in the different time periods.

Résumé

Des fouilles récentes dans la grotte de Qumran 24, proche de la Mer Morte, ont mis en évidence une longue séquence stratigraphique couvrant le Natoufien final/PPNA au Chalcolithique. La présence de couches archéologiques stériles à plusieurs niveaux de la séquence suggère que l'occupation humaine n'était pas continue et la rareté des artefacts indique que la fréquentation du lieu étaient toujours temporaire. Le matériel archéologique est constitué de silex, des meules en pierre, de la poterie et de l'industrie osseuse trouvé ensemble avec un abondant assemblage faunique de plus de 7800 fragments provenant essentiellement du niveau PPNB. En général *Gazella gazella* et *Capra ibex* sont les espèces les plus fréquemment rencontrées, alors que *Bos primigenius* et *Sus scrofa* sont beaucoup moins représentées. Les caprinés domestiques commencent à apparaître au PPNB, mais les espèces sauvages sont largement plus importants jusqu'au Chalcolithique où les proportions sont inversées. Les modifications montrent surtout l'exploitation des ongulés mais occasionnellement aussi celle des espèces de petite taille comme le chat sauvage et le renard. La présence de ce dernier, le carnivore le plus représenté, est en revanche plus en relation avec les accumulations naturelles, plutôt que la prédation par l'homme. Malgré le fait que ce site représente seulement un campement saisonnier éphémère, les recherches menées pourront améliorer nos connaissances sur le mode d'occupation du territoire et la mobilité à différentes périodes.

Key Words: Mammal exploitation, seasonal camp, Pre-Pottery Neolithic, Israel.

Mots Clés: Exploitation des mammifères, campement saisonnier, Néolithique pré-poterie, Israel.

Introduction

Qumran 24 is a small cave located near the Dead Sea in the Jordan Valley, at about 285 m below sea level (Fig. 1). Excavations were carried out by the Institute of Archaeology of the Tel Aviv University between 1997 and 1998 and revealed a long stratigraphic sequence spanning from the Natufian/Pre-Pottery Neolithic A to the Chalcolithic. More recent periods were also documented (Patrich 1994).

Several uncalibrated radiocarbon dates have been obtained for the early strata ranging from about 10,100 to 5,500 years bp.

A few Natufian finds were recovered from a small test pit at the base of the cave and included some flint implements and worked bone items. The Pre-Pottery Neolithic A (PPNA) is not very conspicuous and was identified by some flint items. The major finds in the Neolithic sequence of the cave relate to stages of the Pre-Pottery Neolithic B (PPNB). These are represented by flint and bone tools as well as ground stone implements. The Pottery Neolithic (PN) layers at the site were assigned to the

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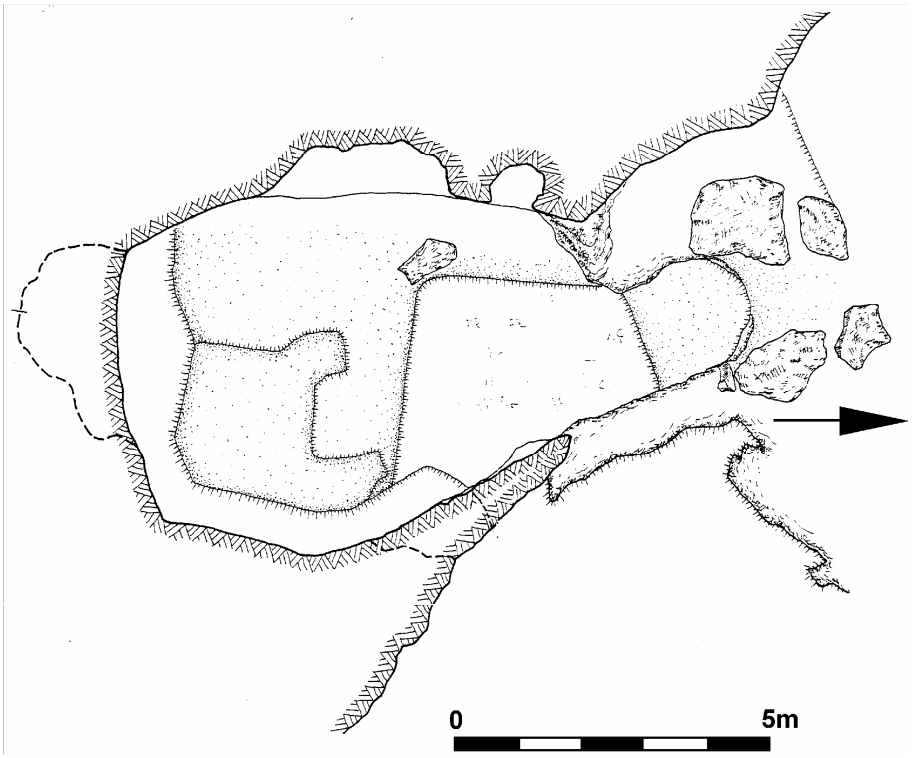

Fig.1. Plan of the Qumran cave 24. The faunal sample comes from the central part of the excavation. The arrow indicates North.

Wadi Raba culture of the 5th millennium bc (uncalibrated) on the basis of pottery and flint. The latest entity dealt with here is the Ghassulian period in the Chalcolithic, represented in the cave by pottery sherds, flint items and small finds including a stone `violin' figurine.

The presence of archaeologically sterile layers at different levels along the stratigraphic sequence suggests that human occupation was not continuous and the general scarcity of artifacts indicates that occupation was always temporary. Although this site represents only an ephemeral camp, the investigations carried out may be relevant to improve our knowledge on patterns of land use and mobility in different time periods.

The peculiar climatic and environmental conditions in the Dead Sea region allowed the excellent preservation of organic materials including vegetable matter and a large faunal assemblage.

The abundant animal remains recovered at this site are very fragmented by both past human activities and post-depositional agents. Among the latter, an important role was played by the crystallization of salt and other minerals within micro-fractures that increased the fragmentation of the bones. This process affected even teeth that were often reduced to small enamel splinters, while they are usually better preserved in archaeological assemblages. It is also possible that some damage to bone surfaces, such as exfoliation, may have been produced or accelerated by crystal growth.

The total faunal sample analyzed from Qumran 24 includes over 11,200 specimens (excluding birds). In this paper only the materials from the central portion of the cave, whose stratigraphic position is more certain, will be described; in fact, the sectors along the cave walls evidenced mixing and later intrusions. For example, some dromedary bones which supposedly belonged to the Pre-pottery Neolithic layers (a very important find for the presence of this species in the area) turned out to be only few hundred years old by direct radiocarbon dating.

The results of the over one thousand bird bones collected from this site have been already published elsewhere (Recchi and Gopher 2002).

From all the archaeological layers of the central part of the cave a total of 7,810 mammal remains have been recovered by dry sieving (mesh size 2.4 mm). Only 10.6% of them were identifiable at least to genus level, 42.6% were attributed to more general taxonomic categories, while 46.8% were completely unidentifiable. Nevertheless all specimens were examined for possible modifications pro-

duced by humans or other agents. The proportion of unidentifiable fragments, together with those attributed only to more general categories, varies from one layer to the other, ranging from 76.5% in the Chalcolithic to 55.4% in the PPNB.

Species representation

In general, among the identified mammal remains (Table 1), the most frequent species are *Gazella gazella* and *Capra ibex*, while *Bos* and *Sus scrofa* are much less abundant; the first domestic caprines, both sheep and goat, appear in the PPNB. Unfortunately the scarcity of archaeological finds did not allow finer stratigraphic distinctions within this period, but presumably these animals belong to the later phases of the PPNB. It is so far assumed that clear evidence for caprine domestication appears in this region only during the middle-late PPNB (Bar Yosef and Meadow 1995; Horwitz 1993; Horwitz *et al* 1999). Domestic cattle and pig are definitely present at Qumran 24 only in the Chalcolithic layer. Three remains of a small equid, probably *Equus asinus* or *E. hemionus*, complete the ungulate sample.

Observing the frequencies of the most common ungulates along the stratigraphic sequence (Fig. 2), it is possible to see that wild species are always largely dominant in all periods and are taken over by domestic ones only in the latest prehistoric occupation phases. Gazelle, which is prevalent over the other small herbivores until the PPNB/PN, decreases along the sequence, while there is a corresponding increase in caprine frequency. It is only in the Chalcolithic that domestic caprines become prevalent over the total number of ibex and gazelle.

Fox is the most frequent animal after the main herbivores and different species are present: besides *Vulpes vulpes,* probably also *V. rueppelli* and *V. cana* (Fig. 3). These last two small carnivores are desert-adapted animals and they have not been identified before in Pre-Pottery Neolithic sites of this region (e.g., Clutton-Brock 1979; Noy *et al* 1980; Tchernov 1994). *Lepus capensis* is the second most abundant small mammal and was found in almost all the archaeological layers. Among the hedgehogs all three species present in the area have been recovered: *Erinaceus concolor, Paraechinus aethiopicus, Hemiechinus auritus*. The few fragmented bones of a medium sized canid do not allow a precise identification and could belong to a dog, a jackal or a small wolf. The wild cat is very rare and

Table 1. Number of identified Specimens (NISP) in the different archaeological layers and percentages. Minimum number of individuals (MNI) is reported in parentheses.

SPECIES	Natufian/ PPNA		PPNA/B		PPNB		PPNB/PN		Pottery Neolithic		Chalco-lithic		Total	
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Erinaceida			3(2)	1.9	4(2)	0.9							**7(4)**	**0.8**
Procavia capensis					4(1)	0.9							**4(1)**	**0.5**
Lepus capensis			7(1)	4.3	16(1)	3.6	3(1)	4.4	2(2)	3.6	3(2)	4.4	**31(7)**	**3.7**
Vulpes sp.			10	6.2	12	2.7			1	1.8			**23**	**2.8**
Vulpes cana			2(2)	1.2	2(1)	0.5							**4(3)**	**0.5**
Vulpes cf. *rueppelli*			13(1)	8.1	16(2)	3.6							**29(3)**	**3.5**
Vulpes vulpes			20(2)	12.4	48(2)	10.9	6(1)	8.8	6(1)	10.7	1(1)	1.5	**81(7)**	**9.8**
Canis sp.					7(1)	1.6	3(1)	4.4	2(1)	3.6			**12(3)**	**1.4**
Felis silvestris	1(1)	2.9	1(1)	0.6	4(2)	0.9			1(1)	1.8			**7(5)**	**0.8**
Martes sp.					1(1)	0.2							**1(1)**	**0.1**
Equus sp.					1(1)	0.2	1(1)	1.5			1(1)	1.5	**3(3)**	**0.4**
Sus scrofa			5(1)	3.1	24(3)	5.4	1(1)	1.5			2(1)	2.9	**32(6)**	**3.9**
Capra sp.					2	0.5							**2**	**0.2**
Capra ibex	1(1)	2.9	30(3)	18.6	64(3)	14.5	11(1)	16.2	24(1)	42.9	11(1)	16.2	**141(10)**	**17.0**
Capra hircus					5(1)	1.1	1(1)	1.5			1(1)	1.5	**7(3)**	**0.8**
Ovis aries					2(1)	0.5	1(1)	1.5	4(1)	7.1	1(1)	1.5	**8(4)**	**1.0**
Ovicaprine (dom.)					57(3)	12.9	16(2)	23.5	6(2)	10.7	29(3)	42.6	**108(10)**	**13.0**
Gazella gazella	32(1)	94.1	70(4)	43.5	161(5)	36.4	25(2)	36.8	10(1)	17.9	13(1)	19.1	**311(14)**	**37.5**
Bos sp.					9(2)	2.0							**9(2)**	**1.1**
Bos primigenius					3(1)	0.7							**3(1)**	**0.4**
Bos taurus											6(1)	8.8	**6(1)**	**0.7**
Total	**34**	**100**	**161**	**100**	**442**	**100**	**68**	**100**	**56**	**100**	**68**	**100**	**829**	**100**

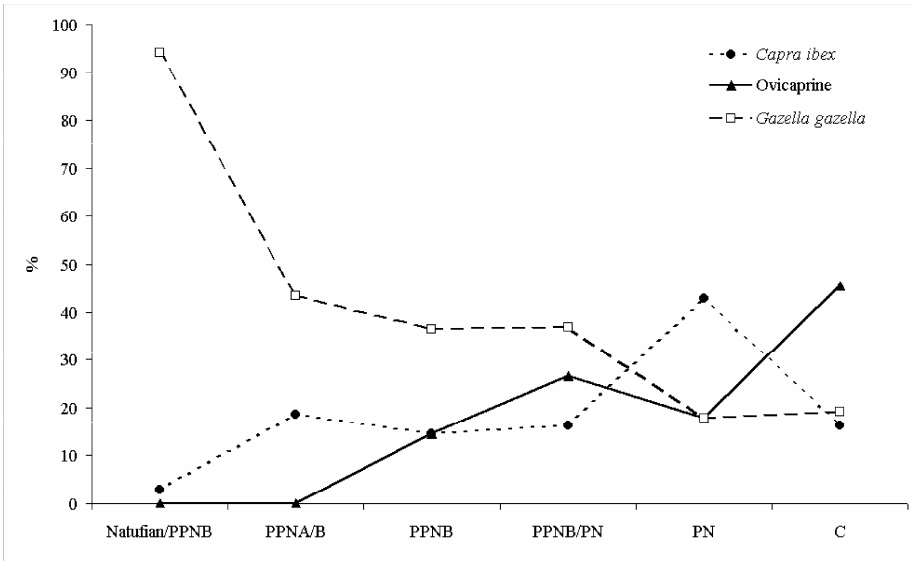

Fig. 2. Relative frequency of *Gazella gazella, Capra ibex* and caprines in the different layers.

was identified mainly in the lower part of the stratigraphic sequence. Only four hyrax remains, probably belonging to the same individual, were collected in the PPNB layer. Finally, one specimen, a fragment of distal radius, was attributed to *Martes* sp.

Minimum Number of Individuals (MNI, Table 1) was also calculated for each species, but because of the high fragmentation and the small size of the identified sample, the resulting values are exceedingly small and therefore not very informative. However, they confirm in general the proportions among species evidenced by the Number of Identifiable Specimens (NISP).

On the basis of the few measurements available (Horwitz *et al* 1990), because of fragmentation, and on general size, it has been possible to suggest the presence of both sexes for gazelle, probably with a slight prevalence of males. For ibex, males and females are also present, but it has not been possible to ascertain the real proportions between the two sexes.

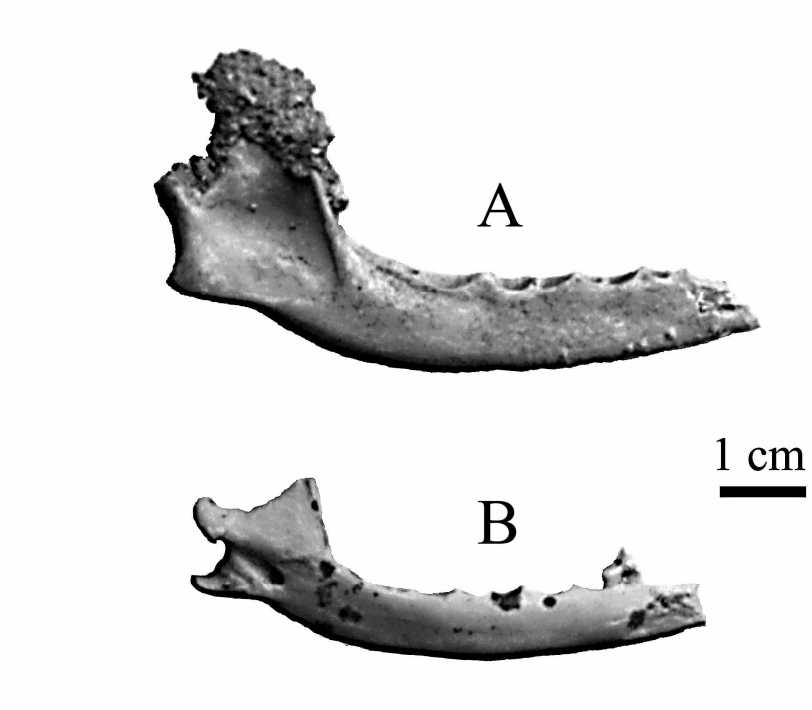

Fig. 3. Mandibles of *Vulpes vulpes* (A) and *Vulpes cana* (B).

Very few pathologies have been detected in this assemblage, all in the PPNB layer. They occur on bones of fox, mainly on metapodials, on a phalanx and a vertebra. Some of these anomalies represent healed fractures, while others may be related to the old age of the animal. An ibex mandible as well as a large ungulate vertebral spine showed signs of bone disease.

Anatomical representation and age determination

Because of the small size of the identified samples, analysis of body-part profiles could be done only in the PPNA/B and the PPNB for gazelle, ibex and caprines.

In the lower layer *Gazella gazella* and *Capra ibex* are represented by almost all skeletal elements (Fig. 4). Only the proximal portion of the hind limb for the ibex and the scapula for both species are completely absent. Minimum Number of Elements (MNE) have been used, using the Kolmogorov-Smirnov test, to assess similarities or differences in anatomical representation between each of the two small ungulates and an ideal complete bovid skeleton. In both cases the frequency of body portions are statistically similar to the whole animal. The same test, however, showed some differences between the two species.

In the PPNB layer, all skeletal elements of the small ungulates seem to be represented with few exceptions (Fig. 5). However, the Kolmogorov-Smirnov test revealed that, in this case, the proportions of body-parts are always statistically different from a complete skeleton. Comparisons between species showed again differences between gazelle and both ibex and ovicaprines. Domestic and wild ovicaprines were, on the other hand, statistically comparable.

Body part profiles of *Gazella gazella* and *Capra ibex* from the PPNA/B and the PPNB have been also compared and for both species anatomical distribution was similar in the two layers.

An analysis of the age at death was possible only in the PPNA/B and the PPNB for gazelle, ibex and caprines (Table 2 and Fig. 6). Although the samples are very small, in both layers there is a relatively higher proportion of young age classes for *Gazella gazella* compared to *Capra ibex*, for which adult individuals are prevalent. Domestic caprines, present only in the PPNB, show a pattern that is very similar to ibex. A feature comon to all species is the complete absence of senile animals.

It is interesting to note the presence in all layers, except the Natufian/PPNA, of fetal bones attributable to small ungulates, suggesting that human occupation occurred in late winter-spring. This occurrence involves wild species in the Pre-pottery Neolithic and also caprines during the Pottery Neolithic and the Chalcolithic, assuming for these early domesticates a restricted birthing season more similar to the wild species. Occupation in other periods of the year, although always ephemeral, cannot be completely excluded. A similar situation was seen in the Pre-pottery Neolithic site of El Khiam, but in this case the proportion of fetal bones is extremely high (Ducos, 978). The presence of several remains of very young herbivores (less than 6 months old) in the PPNA/B and PPNB layers indicates that in these periods humans probably frequented the cave also during the summer.

Table 2. Number of individuals in the age at death for *Gazella gazella, Capra ibex,* and caprines in the PPNA/B and PPNB.

	Very Young	Young	Young-Adult	Adult	Senile	Total
Gazella gazella PPNA/B	1	1	1	1		4
Gazella gazella PPNB	2	1	1	1		5
Capra ibex PPNA/B		1		2		3
Capra ibex PPNB			1	2		3
Caprine PPNB			1	2		3

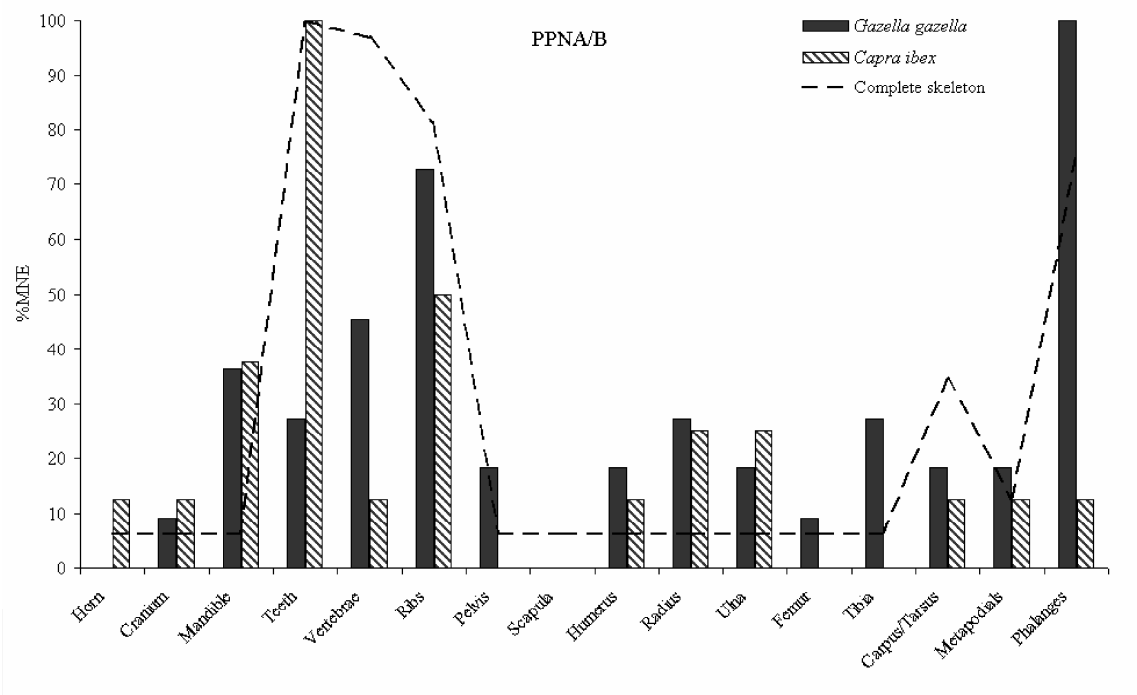

Fig. 4. Standardized Minimum Number of Elements (%MNE) for *Gazella gazella* and *Capra ibex* in the PPNA/B level compared to a complete bovid skeleton.

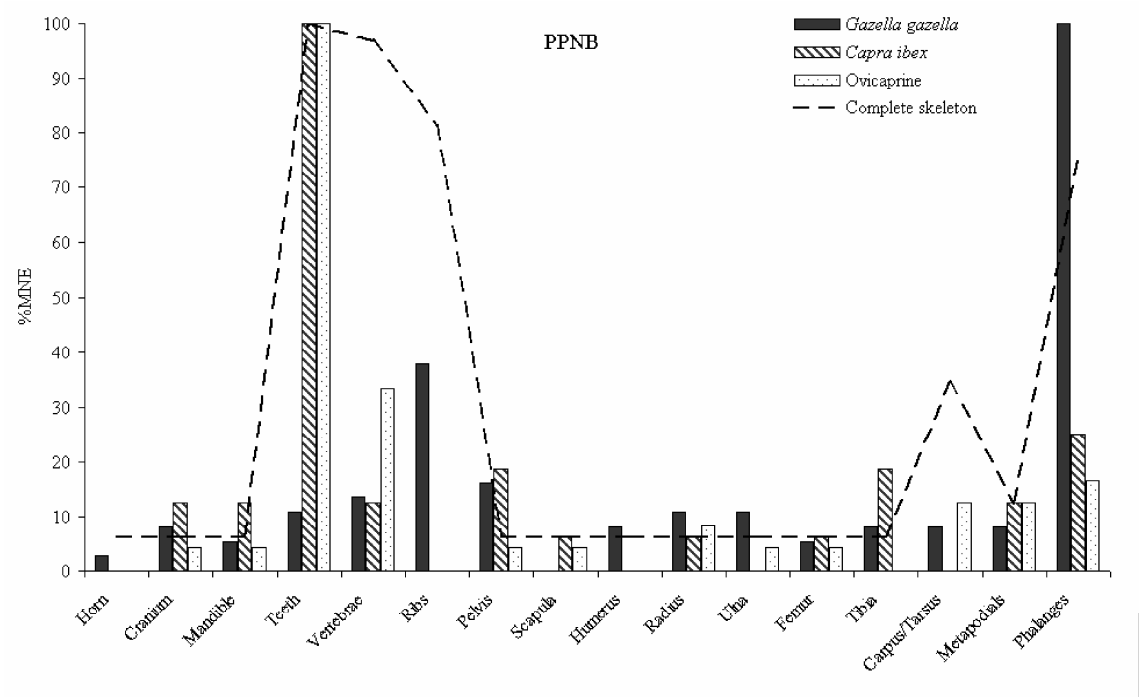

Fig. 5. Standardized Minimum Number of Elements (%MNE) for *Gazella gazella, Capra ibex* and ovicaprines in the PPNB level compared to a complete bovid skeleton.

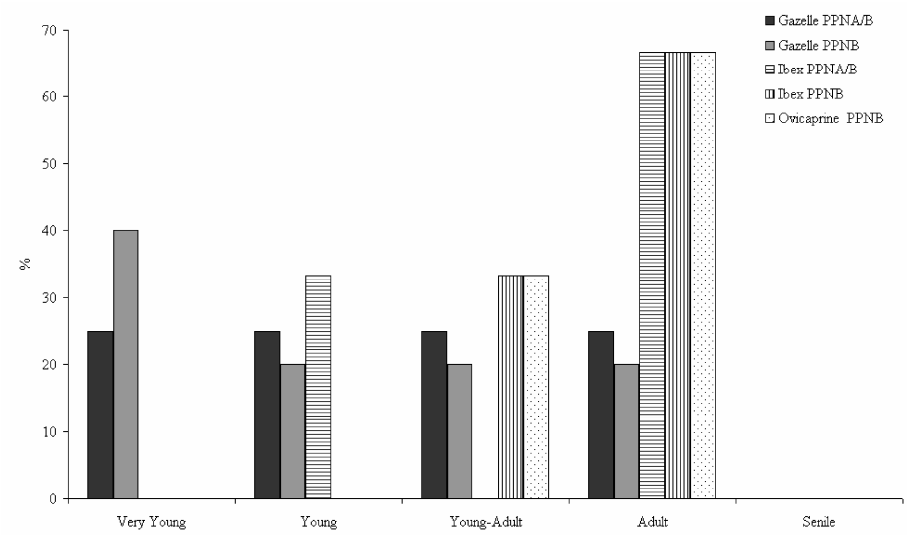

Fig. 6. Proportion of age classes for *Gazella gazella, Capra ibex* and ovicaprines in the PPNA/B and PPNB.

Bone modifications

Human modifications, such as cut marks and impact fractures, have been detected in all layers (Table 3), mainly on remains of gazelle, ibex and wild boar. Different stages of carcass processing, from skinning to marrow extraction, have been recognized.

Disarticulation marks are in general prevalent and sometimes such traces occur in the same location on different species of similar size. Many long bones of the three main taxa had been opened to extract marrow and in one case from the PPNB/PN layer even a first phalanx of a caprine had an impact fracture. Among the carnivores, disarticulation marks are present on two distal humeri (Fig. 7) and one ulna of wild cat from the PPNA/B and the PPNB layers. Considering the low number of *Felis silvestris* remains it can be assumed that in these two periods all cats are the results of human hunting. Only in one case, in the PPNA/B layer, disarticulation marks were detected on the tibia of a fox that is, in contrast, the most common predator. This situation, together with the fact that some of the identified *Vulpes* bones may belong to desert adapted species, suggests that foxes used the cave as a den. Further support for this hypothesis is the presence of very young individuals and the fact that the few carnivore gnaw marks detected on the bones (0.8%) are almost always referable to small predators like the fox.

No butchering marks were detected on hare bones, but carnivore damage is also almost completely absent. Therefore it is not possible to ascertain the agent responsible for the accumulation of this species. Traces of rodent gnawing (Table 3) are relatively frequent (2.3%) indicating that the abundant microfauna collected in all layers (27.5% of the total number of bone fragments recovered, ranging from 33.5% in the PPNB to 4.5% in the Natufian/PPNA) represents not only animals accumulated by predators, but also small rodents living inside the cave.

Table 3. Number of modified bones and percentages in the different layers
(percentages are calculated on the basis of the total number of bones in each layer).

	Natufian/ PPNA		PPNA/B		PPNB		PPNB/PN		Pottery Neolithic		Chalcolithic		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Burning	1	0,9	41	6.1	570	11.3	159	18.8	256	48.1	386	62.2	1413	18.1
Human modification	1	0.9	12	1.9	36	1.1	9	1.6	9	2.0	4	0.7	71	1.3
Bone tool	1	0.9			13	0.4			1	0.2	3	0.5	18	0.4
Carnivore modification			10	1.6	22	0.7	1	0.2	3	0.7	7	1.3	43	0.8
Rodent modification			33	5.2	75	2.3	12	2.1	9	2.0	20	3.6	149	2.7

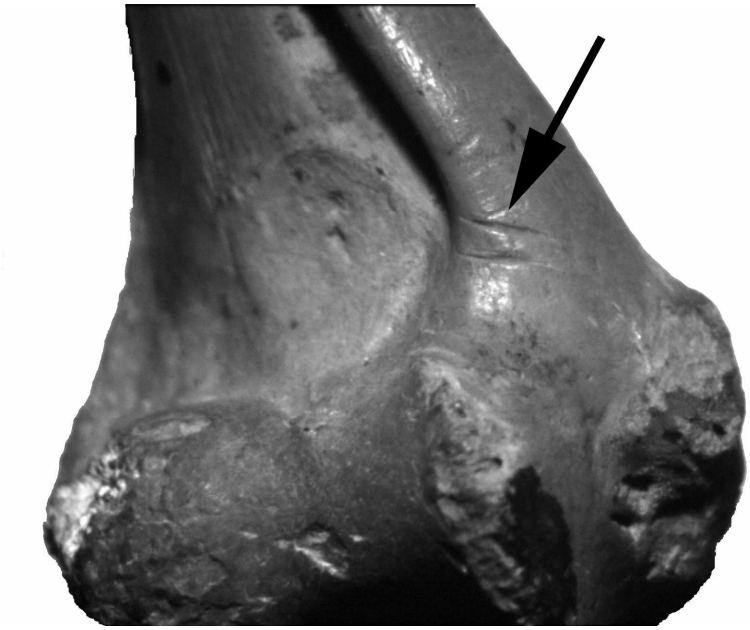

Fig. 7. Distal humerus of *Felis silvestris* with cut-marks.

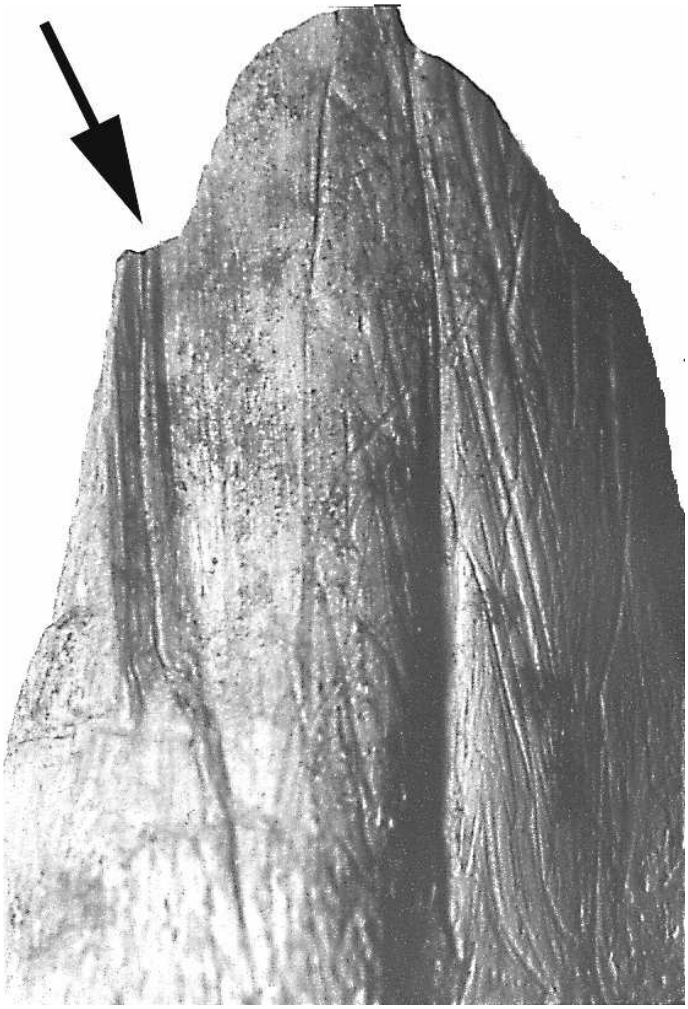

Fig. 8. Proximal metacarpus of *Capra ibex* with incision (arrow) and scraping marks.

Burned bones are present in all archaeological layers, and their frequency rises through time (Table 3) with a marked increase in the Pottery Neolithic and in the Chalcolithic. The high proportion of unidentifiable bones in the Chalcolithic could also be explained by such heavy burning because combusion makes the bones more fragile (Stiner *et al* 1995).However, there is no evident patterning in the location of these traces of burning; they sometimes also occur on the microfauna and often bone fragments are calcined, especially in the most recent period. All this evidence suggests that in most cases burning was accidental or related to discard or cleaning practices rather than the direct result of cooking processes.

In the assemblage presented in this paper, 18 bone artifacts, bone tool fragments, and specimens with manufacturing traces were recognized. Three of the identifiable tools are points coming from the PPNB layer, while a single spatula on a rib of a large ungulate was recovered in the Pottery Neolithic layer. One expedient tool on a long bone shaft fragment of a small ungulate was also found in the PPNB. In general the skeletal elements preferentially used were the metapodials of small herbivores. The presence of specimens with initial stages of working or fragments discarded during the manufacturing process (Fig. 8), indicates that in some cases the tools were made at the site. In relation to this, the preliminary results of the use wear analysis on the lithic industry (Lemorini pers. comm.) seem to witness traces of activities related to bone sawing and scraping on a few tools.

Discussion and Conclusion

Although the sample of identified specimens is relatively small, it has been possible to present some general patterns for the different layers. As regards species abundance, the relative frequency of the three main ungulates (Fig. 2) show a constant decrease in gazelle remains accompanied by a corresponding increase in caprines. Such an increase seems to be a common feature during the Pre-Pottery Neolithic in sites of the Southern Levant (Horwitz *et al* 1999) and is probably related to a change in climatic and environmental conditions.

Small wild ungulates are always dominant in the assemblage except in the Chalcolithic, even in periods when domestication was already established. This pattern is possibly related to the function of the site as an ephemeral seasonal camp where people, moving with their herds, preferred to exploit mainly wild resources rather than draw on their own flocks.

At least in the Pre-Pottery Neolithic, the carcasses of the animals were butchered using a similar standardized procedure for the different small herbivores. The exploitation was very intensive and sometimes even the smallest bones were opened for marrow. The marked change in frequency and intensity of burning in the Pottery Neolithic and in the Chalcolithic may be related to changes in practices of refuse disposal or cleaning.

The relative prevalence of points among the bone tools in the PPNB is different from the findings in some village sites such as Yiftahel where spatulas are more abundant (Garfinkel and Horwitz 1988; Marder *et al* in press). Site function may again be the cause of such differences although other settlements, such as Jericho in that area, have similar high proportions of points (Garfinkel and Horwitz 1988; Marshall 1982).

Although human subsistence was always based on herbivores, other mammalian species were also occasionally exploited for food, in particular the wild cat, and sometimes the fox during the PPNA/B and PPNB. The presence of burned hyrax bones in the PPNB could suggest the consumption of this animal. Birds were also used as food and their bones were employed as raw material for the production of tools and ornaments (Recchi and Gopher 2002). The exploitation of `minor' species has also been reported from other Neolithic sites in the Southern Levant (e.g. Clutton-Brock 1979; Tchernov 1994), but often only very general information is available without detailed taphonomic data. Furthermore the lack or scarcity of smaller species at some sites may only be a matter of the recovery method employed during the excavations.

Considering the ephemeral nature of human occupation, it is likely that the different species of fox identified at Qumran 24 used the cave as a den probably when people were not present. Their remains are therefore probably the result of natural accumulation rather than human hunting, as suggested by characteristics of gnaw marks, age composition and the almost complete absence of human modifications on the bones.

Body-part representation for the three main species in the PPNA/B and PPNB indicates the presence of almost all parts of the skeleton, although some human selection and/or differential preservation have surely biased the assemblages of the different layers. The animals were often introduced as complete carcasses, probably because of the relatively small size that allowed easy transportation of these herbivores. It is interesting to note in the PPNB that the anatomical pattern for ibex and domestic caprines is statistically comparable indicating similar carcass treatment or preservation for the two ungulates. Comparisons between the PPNA/B and PPNB suggest that no relevant changes occurred during this time span.

The analysis of the age at death for the same two layers shows differences between gazelle and ibex, suggesting diverse hunting strategies for these species. In this case too, there are no important changes within the Pre-Pottery Neolithic. As for the skeletal elements, although the sample is small, caprines seem to show an age pattern similar to ibex.

Different lines of evidence suggest that there are almost no relevant changes between the PPNB and PPNA/B. However, although caution must be applied due to small sample sizes, it is possible to identify some constant features throughout the stratigraphic sequence. From the Pre-Pottery Neolithic to the Chalcolithic, the site was likely to have been used as a temporary camp suggesting that even when humans became sedentary some groups or portions of the main population remained mobile, at least in the later periods (i.e. Pottery Neolithic and Chalcolithic), as part of a transhumant pastoralism. Probably as a result of the ephemeral nature of the occupation, hunting played a very important role in all periods even when, as in the Chalcolithic, domestic animals became prevalent over wild species.

The season of occupation seems always to have been late winter-spring, at least since the PPNA/B, with an extension into the summer in the Pre-Pottery Neolithic layers. These data seem to suggest that at least in this area migration routes and their seasonal cycle were not dramatically affected by variations in climatic and environmental conditions, nor by the important changes that occurred in the economy of human populations with the introduction, and then the increasing importance, of domestic species. However, more detailed investigations on the archaeological finds in this cave, as well as other researches in other sites of this region, are needed to support this hypothesis and to better understand land use strategies adopted by prehistoric populations.

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