ARCHAEOZOOLOGY OF THE NEAR EAST III

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

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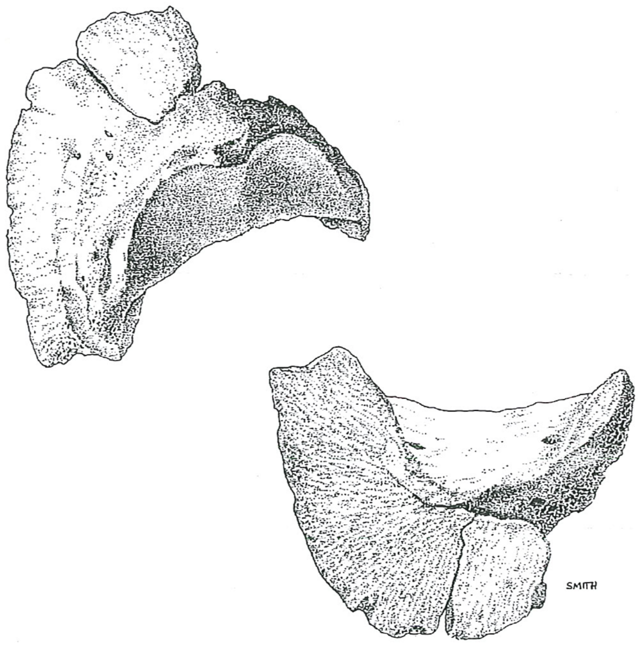

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Cover illustration: Dorsal and palmar aspects of a
Bronze Age horse phalanx from Arslantepe, Turkey,
identified by Sándor Bökönyi.
Courtesy by the artist, Patricia Smith (Reduction: 64%).

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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. Whitcher (Great Britain).

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THE ACCUMULATION AND SIGNIFICANCE OF MICROMAMMALS IN AN ALBANIAN CAVE SITE.

ANALYSIS OF THE KONISPOL CAVE FAUNAL COLLECTION.

Léola LeBlanc[1]

Résumé

Le résultat d'étude taphonomique d'ossement des micromammalia a Konispol Cave, Albania a donnée les epreuves que les plupart de ces ossements sont deposé par le chouette effraie.

Introduction

The following presentation is based on results obtained from the first joint Albanian-American collaborative project in Albania that began in the summer of 1991. The Archaeological project was under the directorship of Dr. Karl Petruso, at the University of Texas in Arlington, and Dr. Muzafer Korkuti, at the Archaeological Institute in Tirana, Albania. Funding for the project was received by the National Endowment for the Humanities and from the Institute for Aegean Prehistory.

The Konispol cave site is located on Mt. Sarakinoros, near the town of Konispol in the district of Sarande, the southernmost administrative province of Albania (Fig. 1). The cave is a constituent of the Saraqint limestone ridge and rises at an elevation of 400+ m.a.s.l. It's southwest entrance, overlooking the Pavel River Valley and the strait of Corfu, acts as a natural shield from the cold north winds. Overall measurements for the cave are approximately 50 m long, 6 m in maximum depth, and 6 m in maximum height (Fig. 2).

The objectives of my research at Konispol were to identify and interpret the small faunal remains recovered from the Konispol Cave using both traditional and taphonomic analytical approaches. Two central themes guided this analysis. The first theme addressed our understanding of the environments of ancient human occupation at the Konispol Cave comparing results obtained from microfauna with those of larger mammals. The second theme focused on taphonomic analysis aimed towards the identification of possible predators responsible for the bone of microfauna accumulated in the cave. By examining accumulations and modifications of bones of small faunal remains a more accurate signature of a particular predator can be identified (Andrews 1990). This paper will primarily focus on the second theme.

Taphonomy is crucial to the understanding of bone accumulations and helps detect possible biases in an assemblage by defining, describing, and systematising the nature and effects of processes that act on skeletal remains after death. One of the most important causes of mortality of small mammals are predators. The most likely predator responsible for the bone accumulation at Konispol seemed to be nocturnal owls. The present analysis was aimed at identifying which owl was the primary depositor of small bones collected from the cave.

Three forms of analysis were used in the attempt to identifying the possible owl or owls. These included skeletal element proportion, breakage patterns and degree of digestion on cranial and post-cranial elements. Of the three forms of analysis mentioned the latter is by far the most accurate analysis (Andrews, 1990). The following will focus on results obtained from the analysis of digestion on small mammal remains.

[1] Flat 1, 3 St. John's Ave., Tuakau, New Zealand.

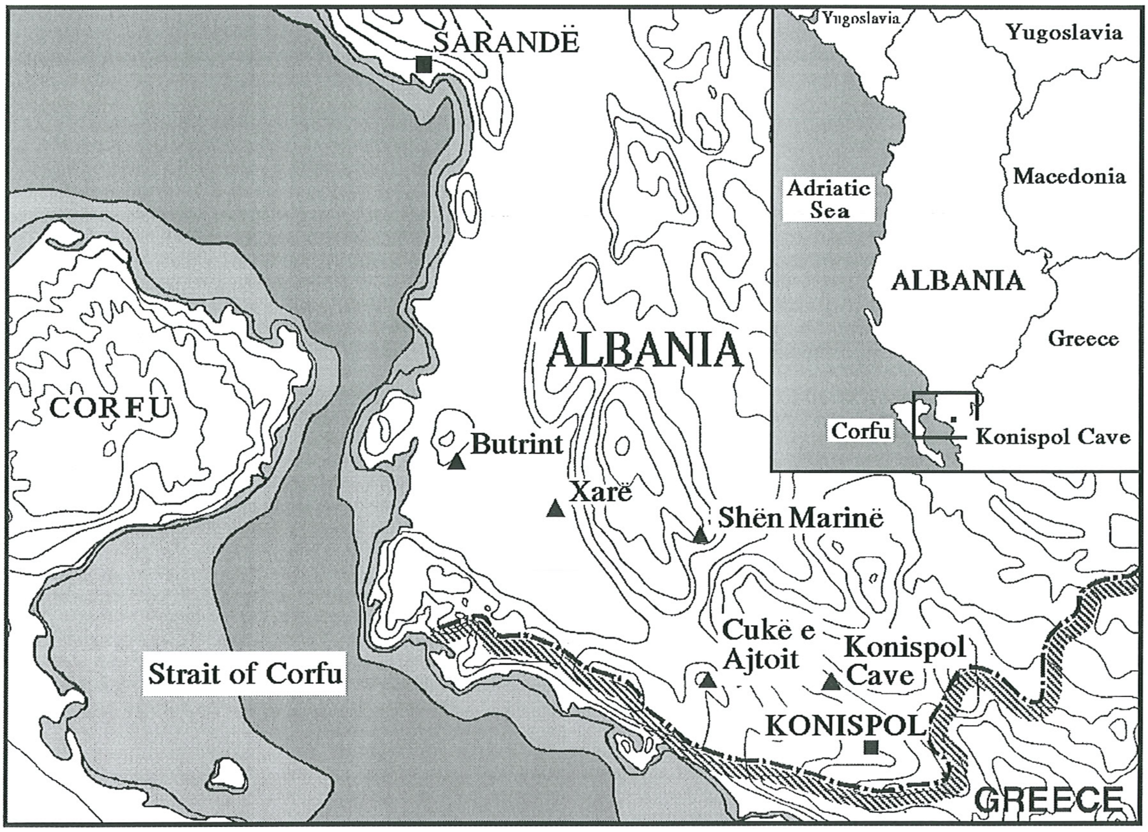

Figure 1. Map of the location of Konispol Cave. From Robert Cooke n.d.

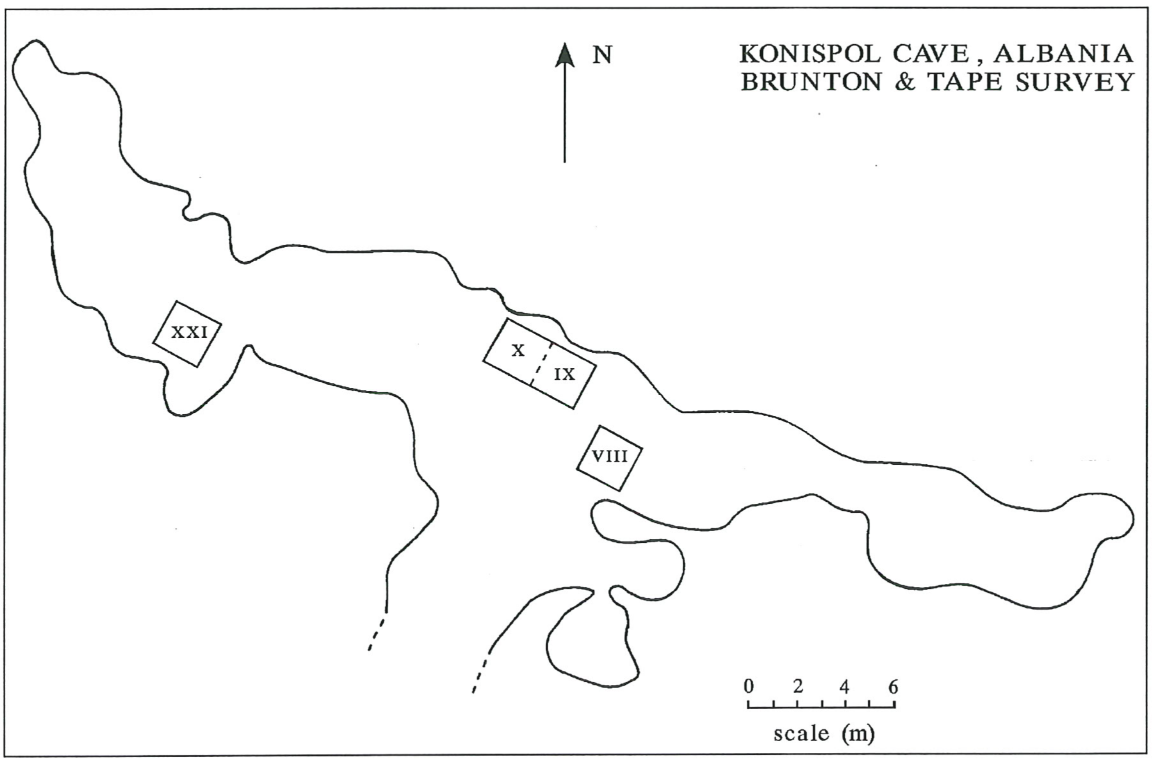

Figure 2. Plan of Konispol Cave. From Petruso *et al.,* 1994: 337.

The methods are based primarily on ongoing actualistic research that has been conducted by Peter Andrews over a period of at least 10-15 years.

Owls are the least destructive predators and tend to swallow their prey whole. Prey is then ejected in the form of pellets which consist mainly of undigested bones (Glue, 1970). Only the 'meaty' bits are digested by gastric juices. According to Peter Andrews, the corrosive effects of digestion on bones and teeth are not duplicated by any other alteration process. Based on the degree of digestion it is possible to identify species-specific patterns of modification that are unaffected by any subsequent form of alteration (Andrews, 1990:64).

Digestion Category	Postcranial Digestion
1 absent or minimal 6-20%	barn owl, snowy owl, long-eared owl, short-eared owl, Verreaux owl, great grey owl
2 moderate 25-50%	European eagle owl, spotted eagle owl, tawny owl
3 moderate to heavy 60-100%	little owl, all diurnal raptors

Table 1. Summary of digestion on postcranial elements (Andrews, 1990).

Examination of prey assemblages allows recognition of four categories of predators by examining the degree of intrusive digestion of the articular ends (Table 1). It is possible to recognise five categories of digestion on teeth following Andrew's methods (1990-1992);(Table 2).

Digestion Category	Effect	Predator
1	slight penetration of enamel	barn owl, long-eared owl, short-eared owl, snow owl, Verreaux eagle owl
2	deeper penetration of enamel concenttated at tips of incisors	snowy owl, spotted eagle owl, great grey owl, Verreaux eagle owl
3	digestion concentrated on crowns of molars, some loss of surface dentine	European eagle owl, little owl, tawny owl, spotted eagle owl
4	extreme enamel and dentine destruction	little owl, kestrel, peregrine, vivverids, mustelids

Table 2. Summary of digestion category of teeth and responsible predators (Andrews, 1990).

Resilts

I analysed a total of 6013 partial of complete elements. Of these, 4052 bones were identifiable and 1961 were indeterminate. The following trenches were excavated during the 1992 through to 1994 summer season; Trench VIII, Trench IX, Trench X, Trench XII, and Trench XXI. See Figure 2. This paper will focus on Trench XXI which is characterised with enormous concentrations of fossils representing more than 85% of all small faunal elements collected at the cave. The breakdown of the Konispol microfauna is as follows; 55% Cricetidae; 30% Muridae; 13% Chiroptera and 5% Testudinata (Table 3). Trench XXI is by far the most important trench in the cave since it has the highest element bone count and is located directly beneath the breakaway window and the possible roost of owls (Table 4).

Digestion on fossil elements accumulated in Trench XXI almost never exceed a category 1 predator. Corrosion on teeth is mostly restricted to the occlusal corners of the salient angles and rarely penetrates below the alveolar margins. Stomach acids never reach through the enamel and into the dentine of microtine molars. None of the murid or cricetid teeth are affected by digestion although this can easily be explained by the morphology of the tooth's crown which is rounded and lacks salient angles (Andrews, 1990: 65).

Taxon	Helle-nistic.	Iron Age	Late BA	Early BA	Bronze Age	Early Neo.	Late Neo.	Middle Neo.	Early Neolithic	Meso-lithic
Pitymys thomasi		2	1	24		10	9		8	501
Mus macedonius										66
Mus sp.										5
Apodemus sylvaticus						1	1		2	25
Apodemus mystacinus							1			49
Glis glis	1		2	13	1	9	18	6	7	27
Cricetulus migratorius				6					1	32
Crocidura saveolens			1	6					4	92
Talpa europaea										3
Testiudinata		9	10	5	6	6	7		22	
Reptilia			1	1		1	6		1	20
Squamata	9	1	2	2					2	
Chiroptera	1	1	3	9		2	6		2	321
NISP	**11**	**13**	**18**	**66**	**7**	**29**	**49**	**6**	**49**	**1141**

Table 3. Species present at Konispol Cave

Frequencies of digested isolated molars average at 8% which is considered a category 2 predator. A category 1 predator usually has a frequency of digestion of 1-3% for all teeth analysed. However, incisor digestion (14%) and femora digestion (12%) fall into a category 1 predator pattern. Frequencies of digested molars still in the mandible and maxilla averaged at 4% and frequencies of digested incisors averaged at 1%. Therefore, postcranial has a category 1 level of digestion. Cranial has a category 1 and 2 level of digestion. Levels of digestion and frequencies of digestion, along with high relative abundance, suggest that the Barn owl is the most likely predator responsible for the accumulation in Trench XXI. The high frequency level of digested isolated molars (8%) could be explained by a sampling error. Many of the isolated molars could have been thrown out with sediment extracted from the trench at the time of excavation. The high frequency level of digested isolated molars could further be explained by young owl digestion which is more harmful to bones. Because young owls are smaller in size they have greater difficulty in breaking down prey items and therefore have higher levels of stomach acids. It cannot really be a category 2 predator, (snowy owl, spotted eagle owl, great grey owl or long-eared owl), since these species of owls do not inhabit this particular habitat consisting of open ground, Mediterranean climate and cave roost.

Presence of Chiroptera skeletal elements I discuss separately since little literature has been published on the subject of digestive effects on bat bones and results observed in the Konispol faunal assemblage lead me to believe that bats were preyed upon by owls. Analysis of digestion of Chiroptera femora has revealed that 3% of the femora collected display signs of light digestion. This coupled with the high frequency of bat bones in Trench XXI, and the Mesolithic, lead me to believe that Vespertilionidae and Rhinolophidae were among the species consumed by a barn owl.

Taxon	Trench XXI		Trench XII		Trench X		Trench IX		Trench VIII	
	N	%-RA	N	%-RA	N	%-RA	N	%-RA	N	%-RA
skeletal elements										
mandible	423	97.4	12	85.7					3	50.0
maxilla	88	93.6							1	100.0
incisors	100	50.5	17	77.2	4	66.6			8	80.0
molars	360	15.8	13	92.8					6	60.0
femur	396	10.7	17	71.2	1	100.0	1	100.0	6	75.0
tibia	366	99.0	11	98.5					4	100.0
pelvis	212	93.8	7	70.0					4	100.0
calcaneus	12	66.6								
humerus	319	99.7	11	91.6	1	100.0			5	83.3
radius	63	98.4	3	75.0					1	100.0
ulna	150	96.1	6	75.0					1	100.0
scapula	61	98.3	7	87.5			2	100.0	2	41.6
ribs	73								3	
vertebrae	336				1				15	
phalanges	8								1	
Breakage										
Humerus										
complete	209	65.7	8	73.0					2	40.0
proximal	32	10.1	2	18.0					1	20.0
shaft	5	1.6	1	9.0					1	20.0
distal	72	22.6							1	20.0
Ulna										
complete	53	35.6	2	33.0						
proximal	75	50.3	4	66.0					1	100.0
shaft	9	6.0								
distal	12	8.1								
Femur										
complete	231	58.6	4	23.0			1	100.0	2	33.0
proximal	92	23.4	10	58.0	1	100.0				
shaft	42	10.7	1	5.0					2	33.0
distal	29	7.4	2	18.0					2	33.0
Tibia										
complete	123	36.5	6	55.0					2	50.0
proximal	107	31.8	1	9.0					2	50.0
shaft	56	16.6	2	18.0						
distal	51	15.1	2	18.0						
Modifications										
%postcrania/crania		212		307						271
%fem+hum/man+max		139		233						
%tib+rad/fem+hum		60		50						
%max breakage:%cpl. Skull		39								
%max without zygomatic		40								
%isolated molars		101		325				600		
%isolated incisors		481								
%man breakage:%cpl man		60		300						33
%molars digested		8		6						
%incisors digested		14		12						
%femora digested		12		11		100				

Table 4. Skeletal elements, breakage and corrosion for the Konispol Cave fauna. *RA = Relative Abundance and only applies to skeletal elements. Breakage patterns and modifications are based on %.

High bat bone counts do not figure so prominently in any other trench nor do their elements display signs of digestion after the Mesolithic.

The preceding taphonomic analysis suggests that the barn owl was the primary depositor of the micro-faunal remains in Konispol Cave. Rounding of a few cranial and postcranial elements could also point to fluvial processes present in the cave. The argument can further be reinforced by comparing results from the Konispol cave with typical characteristics of a barn owl pattern based on actualistic research by Peter Andrews.

A summary of Peter Andrews' (1990:180) characteristics of barn owl assemblages are as follows:

1. approximately half or more of the assemblage is composed of a single species;
2. in Europe that species is usually a microtine;
3. soricids are always common, sometimes the most common group;
4. the most common prey species is usually the most common species within certain size limits in the owl's hunting area;
5. prey is selected from the microtine - murid - soricid group and other prey is rare;
6. six or more species may be present as minor elements of the prey assemblage;
7. size range of prey is from small shrews to rabbits, with the larger prey species being either small individuals of juveniles;
8. very small prey and invertebrates are avoided;
9. within these size limits, the size distribution of the prey is a direct reflection of the size distribution of the mammal community from which it is derived;
10. within these size limits, and within the limits of the microtine - murid - soricid group, barn owl prey gives an accurate representation of the species composition of that part of the small mammal community.

A possible rival to the barn owl as bone accumulator was the long eared owl whose taphonomic effects closely resemble those of the the barn owl. However, the long eared owl does prefer to roost in trees and as a rule does not use the same nest year after year (Andrews, 1990:183). The accumulation of bones deposited in Trench XXI is the result of pellet accumulation over many years. The barn owl then seems to best represent the possible accumulator of the thick fossil deposit. Barn owls are characterised by strong preferences for roosting and nesting places and use the same roost yearly therefore resulting in great pellet build up (Andrews, 1990:178).

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