KSPA

Kölner Studien
zur Prähistorischen Archäologie

3

Yuri E. Demidenko
and Thorsten Uthmeier

Kiik-Koba Grotto
Crimea (Ukraine)

VML

Orders:

Verlag Marie Leidorf GmbH
Dr. Bert Wiegel
Stellerloh 65

D – 32369 Rahden/Westf.
Germany

Yuri E. Demidenko and Thorsten Uthmeier
Kiik-Koba Grotto, Crimea (Ukraine).
Re-analysis of a key site of the Crimean Micoquian.

With contributions by Gennadiy A. Khlopachev and Mikhail V. Sablin

Kölner Studien zur Prähistorischen Archäologie 3 (Rahden/Westf. 2013)

181 pages, 65 figures, 33 tables.
Text in English

Hardcover: 21,0 x 29,7 cm
ISBN 978-3-86757-363-4

Prize:49,80 Euro

We hereby order ..... copies

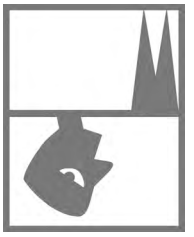
Date, Signature

Yuri E. Demidenko and Thorsten Uthmeier

KIIK-KOBA GROTTO, CRIMEA (UKRAINE)

KÖLNER STUDIEN ZUR PRÄHISTORISCHEN ARCHÄOLOGIE

Band 3



Herausgegeben von

Heinz-Werner Dämmer, Jürgen Richter und Andreas Zimmermann

für das

Institut für Ur- und Frühgeschichte der Universität zu Köln

Yuri E. Demidenko and Thorsten Uthmeier

KIIK-KOBA GROTTO, CRIMEA (UKRAINE)
RE-ANALYSIS OF A KEY SITE OF THE CRIMEAN MICOQUIAN

with contributions by

Gennadiy A. Khlopachev and Mikhail V. Sablin

Verlag Marie Leidorf GmbH · Rahden/Westf.
2013

181 Seiten mit 65 Abbildungen und 33 Tabellen

Gedruckt mit Unterstützung durch den SFB 806 “Our Way to Europe”, Universität zu Köln

Bibliografische Information der Deutschen Nationalbibliothek

Demidenko, Yuri E. / Uthmeier, Thorsten:
Kiik-Koba Grotto, Crimea (Ukraine) ; Re-Analysis of a Key Site of the Crimean Micoquian / von Yuri E. Demidenko und Thorsten Uthmeier.
Rahden/Westf. : Leidorf, 2013
(Kölner Studien zur Prähistorischen Archäologie ; Bd. 3)
ISBN 978-3-86757-363-4

Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie.
Detaillierte bibliografische Daten sind im Internet über http://dnb.ddb.de abrufbar.

Gedruckt auf alterungsbeständigem Papier

Verlag Marie Leidorf GmbH
Geschäftsführer: Dr. Bert Wiegel
Stellerloh 65 D-32369 Rahden/Westf.

Tel: +49/(0)5771/9510-74
Fax: +49/(0)5771/9510-75
e-mail: info@vml.de
Internet: http://www.vml.de

ISBN 978-3-86757-363-4
ISSN 1868-2286

Universität Köln, Institut für Ur- und Frühgeschichte, Weyertal 125, D-50923 Köln
E-mail: secretary.prehistory@uni-koeln.de - Homepage: http://www.uni-koeln.de/phil-fak/praehist

Umschlagentwurf: Harwig H. Schluse, Köln
Cover image: The hand which held the tools (watercolour by Jürgen Richter after G.A. Bonch-Osmolowski’s reconstruction of the Neanderthal hand)
Satz, Layout, Bildbearbeitung: Lutz Hermsdorf-Knauth, Köln
Redaktion: Ursula Tegtmeier, Köln

Druck und Produktion: druckhaus koethen GmbH, Köthen

CONTENTS

VII LARGE MAMMALIAN FAUNA FROM LAYER IV OF KIIK-KOBA GROTTO: A ZOOARCHAEOLOGICAL ANALYSIS OF THE BONE ASSEMBLAGE

Mikhail V. Sablin

VII.1 INTRODUCTION

Kiik-Koba Grotto is one of the most famous Palaeolithic sites in Crimea since the remains of two Neanderthals were found there in 1924–1925 by Bonch-Osmolowski. Excavations at the site have revealed six lithological layers in the cave's deposits. Layers VI and IV contain most of the Lower and Upper archaeological layer finds, reflecting use of the cave in the Middle Palaeolithic. The majority of flint artefacts and artificially broken mammal bones, as well as pits, evidence of fire use and Neanderthal remains are associated with the Layer IV/Upper archaeological Layer.

The animal bone collections from Kiik-Koba were first investigated by V. I. Gromova and V. I. Gromov (1937). Faunal remains were classified into two categories after the 1920s excavations: very fragmentary finds, which were bagged together with only an approximate location within a square (stored at Kunstkamera Museum, St.-Petersburg, Russia), and well preserved bones, which were given individual catalogue numbers (stored in the Zoological Institute, St.-Petersburg, Russia). GROMOVA & GROMOV (1937) identified 18 species of mammals for lithological layers VI–III at Kiik-Koba. Unfortunately, these researchers calculated faunal remains for layers III and IV combined. Many bones from layer III are not, however, Palaeolithic ones and their presence there is not the result of Middle Palaeolithic human activity, but due to natural factors. They may well represent some more recent intrusive materials. BONCH-OSMOLOWSKI (1940) used Gromova and Gromov's data for his fundamental monograph on Kiik-Koba Grotto.

In the present chapter, data collected during the examination of fossil bones from layer IV will be presented. The original complete collection was reexamined and recalculated. Only correctly labelled bones were used for analyses. As a result (**Tab. VII-1**), the characteristics of the faunal assemblage changed. This chapter focuses on a zooarchaeological analysis of the bone assemblage: species composition, skeletal part representation, evidence of human modification and spatial distribution of the bones within the cave. Carnivore gnawing and charring traces were also noted.

VII.2 QUANTIFICATION OF THE BONES

Altogether some 3094 complete bones, bone fragments and indeterminate bone pieces from Kiik-Koba layer IV were recorded during the analysis. The excavated area was about 44 sq. m. These remains include materials studied by Gromova, Gromov and Bonch-Osmolowski.

2593 indeterminate bone pieces were recovered during the 1920s excavations. The average density per square for layer IV is about 58.9 pieces and most of the fragments are

Tab. VII-1 Basic data for faunal remains from layer IV of Kiik-Koba Grotto.

Species	NISP	MNI	% NISP	% MNI
Mammuthus primigenius (mammoth)	44	4	8.78	15.38
Coelodonta antiquitatis (wooly rhinoceros)	3	1	0.60	3.85
Equus latipes (horse)	98	6	19.56	23.07
Equus hydruntinus (wild ass)	2	1	0.40	3.85
Megaloceros giganteus (giant deer)	240	7	47.90	26.92
Cervus elaphus (red deer)	17	2	3.39	7.69
Bison priscus (bison)	9	1	1.80	3.85
Saiga tatarica (saiga)	87	3	17.37	11.54
Ovis sp. (wild sheep)	1	1	0.20	3.85
Total	**501**	**26**	**100**	**100**

NISP = number of specimens identifiable to species
MNI = minimum number of individuals

related to the central part of the cave (**Fig. VII-1**) – in squares 34 (n = 310), 25 (n = 261), 26 (n = 253), 21 (n = 241), 16 (n = 237) (for the excavation plan with square numbers see Fig. II-6 in Chapter II). This appears to have been the main area for human activity. All fossil bones from layer IV are well preserved and bright-yellow; charring of the material is very slight. It would appear that the human inhabitants did not use fresh bones as fuel for burning and heating, but preferred to use wood.

Altogether 501 complete bones and bone fragments could be identified to skeletal elements – 16.2 % of the total bone amount. The average density per square is about 11.4 identifiable bones. The highest concentrations are in squares 26 (n = 82) and 34 (n = 63). This is a typical cooking debris bone assemblage. The amount of identifiable specimens from layer IV is unfortunately not large enough for statistical analysis.

The identifiable faunal remains are from at least 26 individuals of herbivores. At the same time, no carnivore remains were found in the layer. Mean number of identified specimens/minimum number of individuals (NISP/MNI) is 19.3 identifiable bones/animal. Traces of carnivore gnawing were recorded on only one identifiable specimen, a bison astragalus from square 20. These traces of modification are comparable to that recorded on bones chewed by wolves (Haynes 1983).

Giant deer dominates the fauna and 240 bones (47.90 %) were identified to species level. Other herbivores such as horse (19.56 %), saiga (17.37 %), mammoth (8.78 %), red deer (3.39 %), bison (1.80 %), wooly rhinoceros (0.60 %), *Equus hydruntinus* (0.40 %) and wild sheep (0.20 %) are present (see **Tab. VII-1**). During the layer IV sedimentation processes, the landscape around Kiik-Koba likely corresponded to semi-arid steppe or forest-steppe since the mammals are adapted to a dry and cold climate.

VII.3 SKELETAL PART REPRESENTATION AND SPATIAL DISTRIBUTION OF THE BONES

Mammuthus primigenius

Remains of two adult, one subadult and one juvenile mammoth are present in the faunal assemblage (**Tab. VII-2**). NISP/MNI is 11 bones/animal. Fragments of teeth are rare (2 specimens): only 4.5 % of the bone total amount. One rib (2.3 %) and 6 long mammoth bones fragments (13.6 %)

	Mammuthus primigenius **mammoth**			***Coelodonta antiquitatis*** **rhinoceros**			***Equus latipes*** **horse**			***Equus hydruntinus*** **wild ass**		
Skeletal elements	**NISP**	**MNI**	**age**	**NISP**	**MNI**	**age**	**NISP**	**MNI**	**age**	**NISP**	**MNI**	**age**
cranium	.	.	.	.	.	.	2	1	ad	.	.	.
mandible	.	.	.	.	.	.	1	1	ad	2	1	ad
maxillary teeth	2	1	ad	2	1	ad	28	3	2ad+sad	.	.	.
mandibular teeth	.	.	.	.	.	.	43	5	ad	.	.	.
cervical	.	.	.	.	.	.	1	1	ad	.	.	.
pelvis	.	.	.	.	.	.	2	1	ad	.	.	.
rib	1	1	ad	.	.	.	.	.	.	.	.	.
scapula	.	.	.	.	.	.	3	1	ad	.	.	.
carpals	1	1	ad				3	1	ad			
metacarpal	2	1	ad				4	2	ad	.	.	.
femur	.	.	.	.	.	.	3	1	ad	.	.	.
patella	.	.	.	.	.	.	1	1	ad	.	.	.
tibia	.	.	.	1	1	ad	2	2	ad	.	.	.
long bones indet.	6	1	ad	.	.	.	.	.	.	.	.	.
astragalus	.	.	.	.	.	.	2	2	ad			
metatarsus	2	1	ad	.	.	.	1	1	ad	.	.	.
sesamoids	18	2	ad	.	.	.	.	.	.	.	.	.
phalange 1	2	1	sad	.	.	.	.	.	.	.	.	.
phalange 2	4	1	juv	.	.	.	.	.	.	.	.	.
phalange 3	6	2	ad+sad	.	.	.	2	1	ad	.	.	.
Total	**44**	**4**	**2ad+1sad+1juv**	**3**	**1**	**ad**	**98**	**6**	**5ad+1sad**	**2**	**1**	**ad**

NISP = number of specimens identifiable to species
MNI = minimum number of individuals
juv = juvenile
ad = adult; sad = subadult

Tab. VII-2 Counts and percentages of skeletal elements of proboscidea and perissodactyla remains from layer IV of Kiik-Koba Grotto.

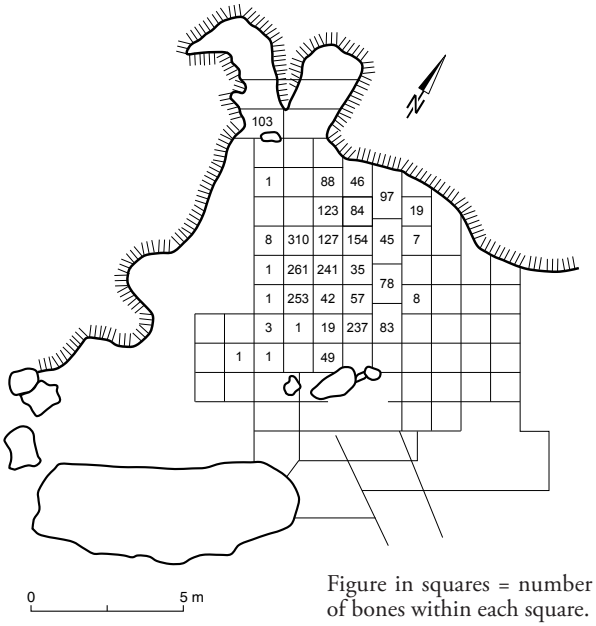


Fig. VII-1 Spatial distribution of indeterminate bones within layer IV at Kiik-Koba Grotto.

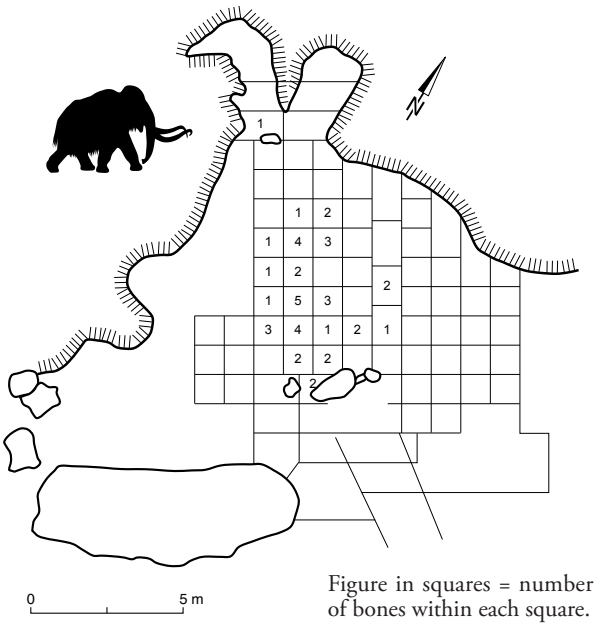


Fig. VII-2 Spatial distribution of mammoth (*Mammuthus primigenius*) bones within layer IV at Kiik-Koba Grotto.

were recovered during the excavation. Foot fragments (carpals, tarsals, sesamoids and phalanges) dominate – 79.5 %. The *Mammuthus primigenius* bones are evenly distributed within the cave (**Fig. VII-2**).

Coelodonta antiquitatis

Two tooth fragments and one complete tibia of an adult wooly rhinoceros were found at the remote squares 14, 71 and 79 respectively (**Fig. VII- 3**). NISP/MNI is 3 bones/animal.

Equus latipes

Equus latipes was the secondary food source for ancient hunters. NISP/MNI is 16.3 bones/animal. Among the 98 bones attributed to the horse, 74 (75.7 %) belong to the cranial skeleton (see **Tab. VII-2**). These include 71 tooth fragments and 3 cranial fragments. The highest minimum number of individuals for *Equus latipes* (5) was counted on lower cheek teeth. The remains of five adult and one subadult horse are present in the faunal assemblage. One cervical vertebra, three scapulas and two pelvises were identified. Fragments of legs are not very common: 18 specimens or 18.4 % of the bone total amount. Most of the horse bones (all skeleton elements) are evenly distributed within the cave. Nevertheless, a rather high number of *Equus latipes* bones are found concentrated in squares 26 (n = 12), 34 (n = 11), 16 (n = 8) and 1 (n = 7) (**Fig. VII-4**). Two fragments of the same broken lower cheek tooth were recorded in two remote squares (4 and 41). All parts of the horse carcass, including low, medium and high food utility cuts, are represented in the assemblage, suggesting that whole animals were brought to the cave for butchering.

Equus hydruntinus

Two mandible fragments of the wild ass were found at central squares 22 and 37 (**Fig. VII-5**). NISP/MNI is 2 bones/animal.

Megaloceros giganteus

Giant deer was the primary food source for Middle Palaeolithic hunters. More than two hundred *Megaloceros giganteus* bones from layer IV were recorded during the present

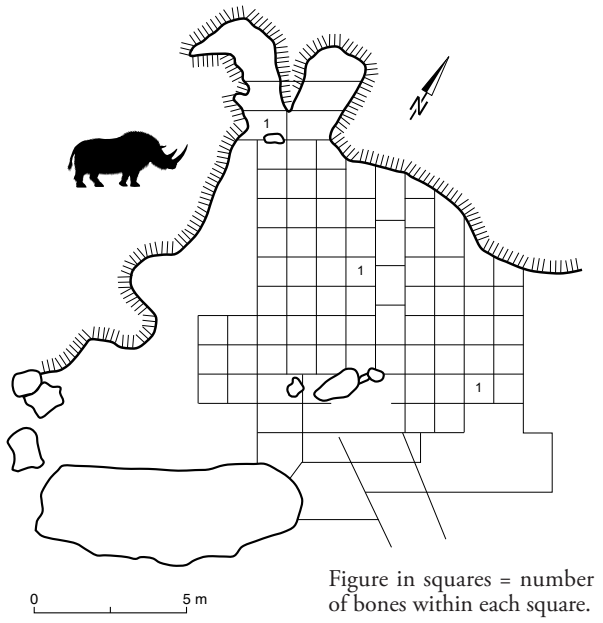


Fig. VII-3 Spatial distribution of wooly rhinoceros (*Coelodonta antiquitatis*) bones within layer IV at Kiik-Koba Grotto.

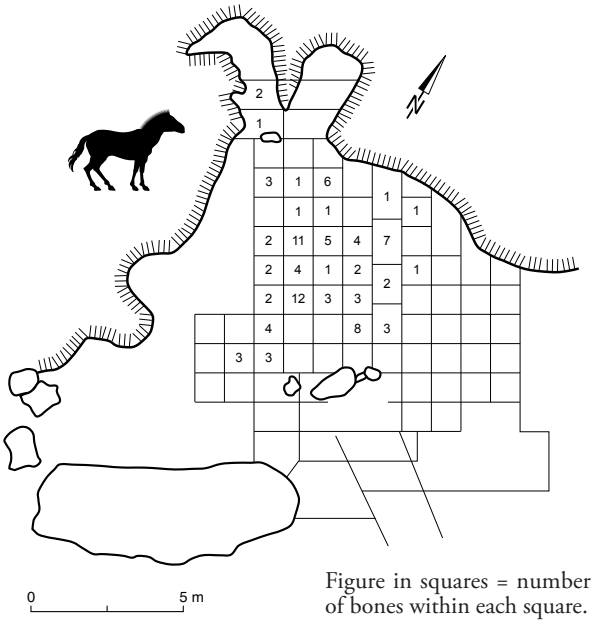


Fig. VII-4 Spatial distribution of horse (*Equus latipes*) bones within layer IV at Kiik-Koba Grotto.

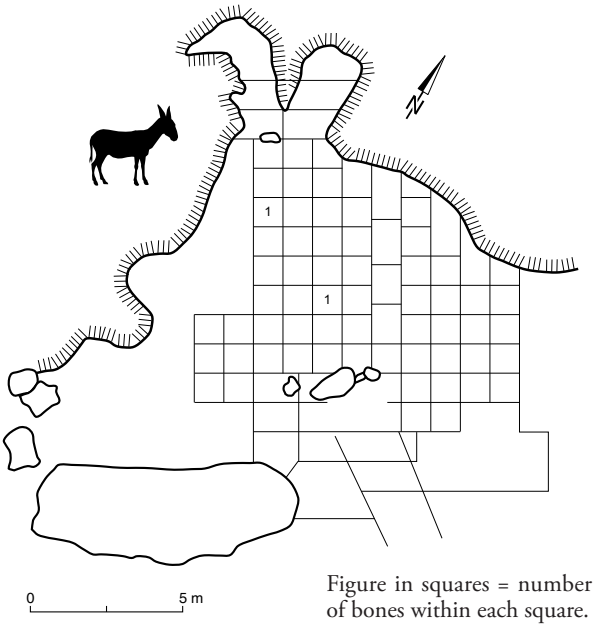


Fig. VII-5 Spatial distribution of *Equus hydruntinus* (wild ass) bones within layer IV at Kiik-Koba Grotto.

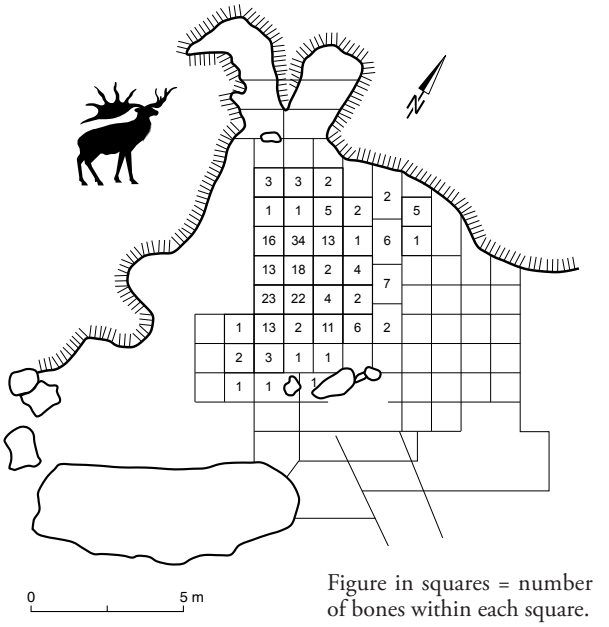


Fig. VII-6 Spatial distribution of giant deer (*Megaloceros giganteus*) bones within layer IV at Kiik-Koba Grotto.

analysis (**Tab. VII-3**). NISP/MNI is 34.3 bones/animal. Cranial parts are not very common: 1 antler, 4 fragments of the cranium and 8 teeth, or 5.4 % of the giant deer bone total amount. Fragments of long bones are extremely rare – 3 foreleg and 5 rear-leg specimens (3.3 %). Carpals (12 fragments) and tarsals (12 fragments) are abundant in the collection: 10 % of the bone total amount. These bones were evidently broken for the extraction of marrow. Sesamoids are very numerous – 66 specimens (27.5 %). The highest minimum number of individuals for the giant deer (6) was counted on foot external sesamoids. The remains of six adult and one subadult animal are present in the faunal assemblage. Phalanges are also very numerous – 80 specimens (33.3 %). Thus, the foot fragments are predominant – 70.8 % of the total amount of giant deer bones. These remains may have been transported as carcass portions into the cave. The spatial distribution for most categories of giant deer skeletal remains is random. The largest amount of *Megaloceros giganteus* bones (all skeleton elements) are represented in the cave's central part in squares 34 (n = 34), 40 (n = 23), 26 (n = 22), 25 (n = 18) and 38 (n = 16) (**Fig. VII-6**).

Cervus elaphus

Nine cranial parts of red deer are recorded – 2 fragments of the cranium and 7 teeth – 52.9 % of the red deer bone total amount. Among the 17 remains attributed to the species, 8 (47.1 %) belong to leg bones (see **Tab. VII-3**). The *Cervus elaphus* bones are spatially grouped into two clusters – bones from squares 28 (n = 1), 41 (n = 1) and 42 (n = 1) and bones from other squares (**Fig. VII-7**). NISP/MNI is 8.5 bones/animal.

Bison priscus

Two cranial parts (mandible and lower cheek tooth) have been attributed to the species. The other seven bones are leg bones. NISP/MNI is 9 bones/animal. All bones of *Bison priscus* (steppe bison) are closely grouped within the cave's central part in squares 34 (n = 3), 25 (n = 2), 20 (n = 1) and 19 (n = 1) (**Fig. VII-8**).

	Megaloceros giganteus **giant deer**			***Cervus elaphus*** **red deer**			***Bison priscus*** **steppe bison**			***Saiga tatarica*** **saiga**			***Ovis* sp.** **wild sheep**		
Skeletal elements	**NISP**	**MNI**	**age**	**NISP**	**MNI**	**age**	**NISP**	**MNI**	**age**	**NISP**	**MNI**	**age**	**NISP**	**MNI**	**age**
antlers	1	1	ad	.	.	.	.	.	.	2	1	ad	.	.	.
cranium	2	1	ad	1	1	ad	.	.	.	.	.	.	.	.	.
mandible	2	2	ad	1	1	ad	1	1	ad	9	3	ad	.	.	.
maxillary teeth	5	2	ad+sad	3	1	ad	.	.	.	10	2	ad	.	.	.
mandibular teeth	3	2	ad+sad	4	2	ad	1	1	ad	20	2	ad	.	.	.
humerus	1	1	ad	.	.	.	.	.	.	1	1	ad	.	.	.
radius	1	1	ad	1	1	ad	.	.	.	2	1	ad	.	.	.
ulna	1	1	ad	.	.	.	.	.	.	.	.	.	.	.	.
carpals	12	3	ad	2	1	ad	.	.	.	7	2	ad	.	.	.
metacarpal	27	3	ad	2	1	ad	.	.	.	9	3	ad	.	.	.
femur	3	2	ad	.	.	.	.	.	.	.	.	.	.	.	.
patella	.	.	.	.	.	.	1	1	ad	.	.	.	.	.	.
tibia	2	1	ad	.	.	.	.	.	.	1	1	ad	.	.	.
calcaneum	4	2	ad	.	.	.	.	.	.	1	1	ad	.	.	.
astragalus	3	2	ad	.	.	.	1	1	ad	3	2	ad	1	1	ad
tarsals	12	2	ad	.	.	.	.	.	.	.	.	.	.	.	.
metatarsus	15	3	ad	1	1	ad	.	.	.	6	1	ad	.	.	.
sesamoids	66	6	ad	.	.	.	4	1	ad	1	1	ad	.	.	.
phalange 1	35	2	ad	1	1	ad	.	.	.	8	1	ad	.	.	.
phalange 2	31	2	ad	1	1	ad	.	.	.	6	1	ad	.	.	.
phalange 3	14	2	ad	.	.	.	1	1	ad	1	1	ad	.	.	.
Total	**240**	**7**	**6ad+1sad**	**17**	**2**	**ad**	**9**	**1**	**ad**	**87**	**3**	**ad**	**1**	**1**	**ad**

NISP = number of specimens identifiable to species
MNI = minimum number of individuals
ad = adult
sad = subadult

Tab. VII-3 Counts and percentages of skeletal elements of artiodactyla remains from layer IV of Kiik-Koba Grotto.

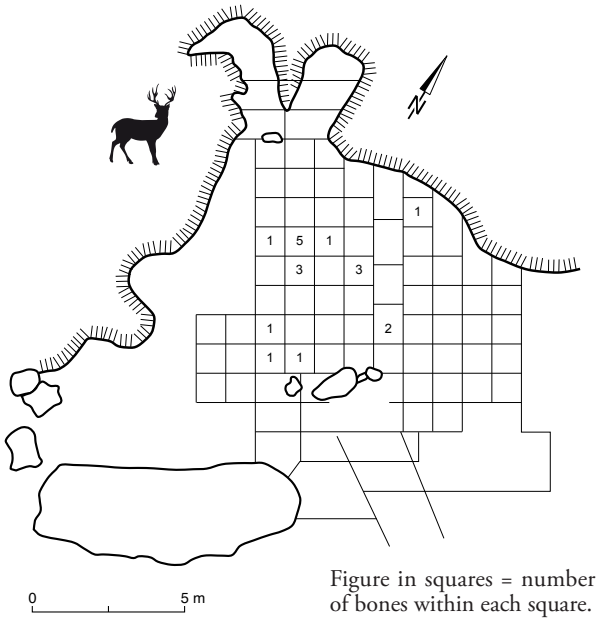


Fig. VII-7 Spatial distribution of red deer (*Cervus elaphus*) bones within layer IV at Kiik-Koba Grotto.

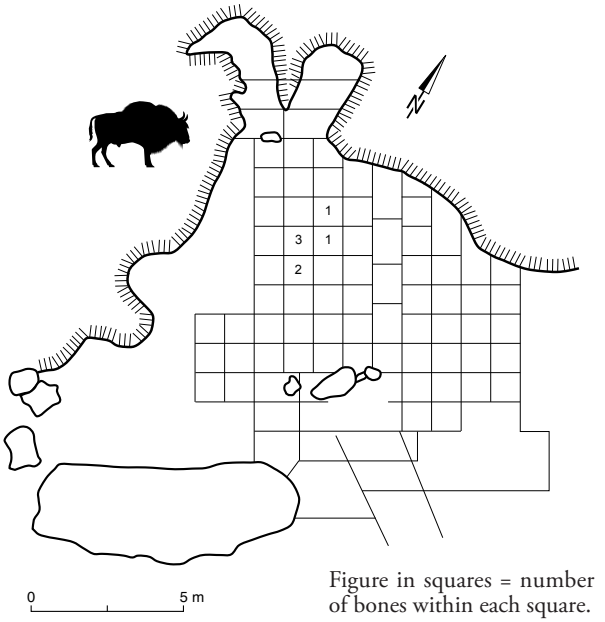


Fig. VII-8 Spatial distribution of steppe bison (*Bison priscus*) bones within layer IV at Kiik-Koba Grotto.

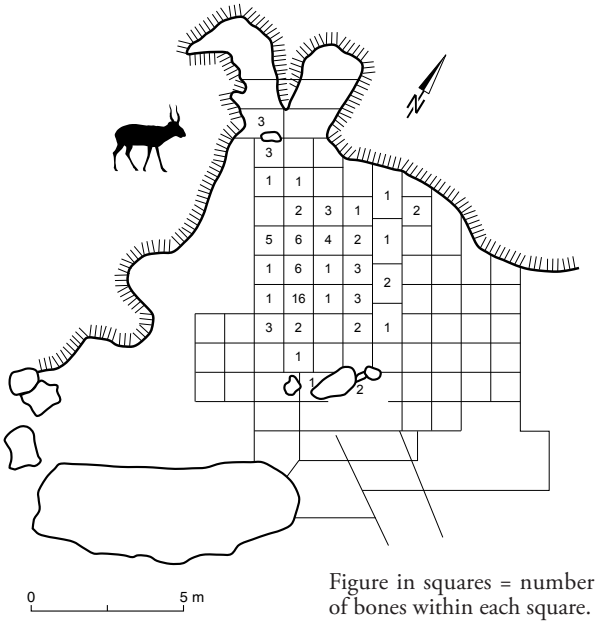


Fig. VII-9 Spatial distribution of saiga (*Saiga tatarica*) bones within layer IV at Kiik-Koba Grotto.

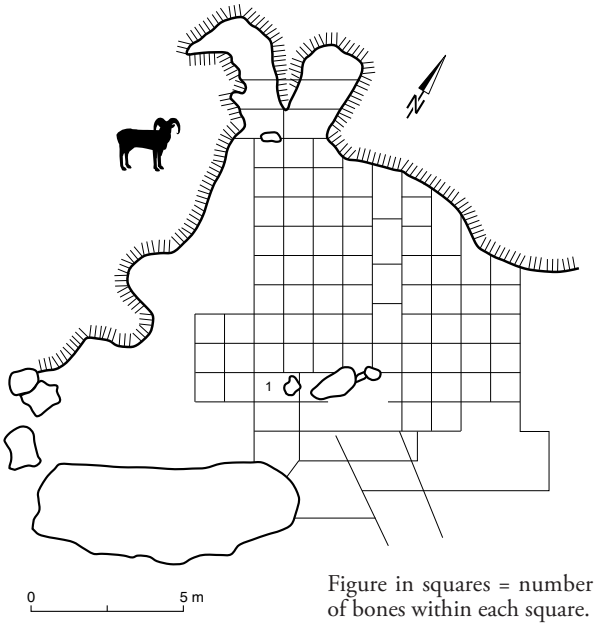


Fig. VII-10 Spatial distribution of wild sheep (*Ovis* sp.) bones within layer IV at Kiik-Koba Grotto.

Saiga tatarica

Cranial parts of the species are numerous (2 antlers, 9 mandible fragments and 30 teeth): 46.1 % of the saiga bone total amount (see **Tab. VII-3**). The highest minimum number of individuals (3) was counted on lower cheek teeth and metacarpals. All animals were adult. NISP/MNI is 29 bones/animal. Fragments of long bones are extremely rare – 3 fore-leg and 1 rear-leg specimens – 4.6 %. Foot fragments dominate – 48.4 % of the bone total amount. Most parts of the antelope carcass are represented in the assemblage, suggesting that whole animals were brought into the cave for butchering. The spatial distribution for most categories of saiga skeletal remains is random. A high number of bones is concentrated in square 26 (16 pieces). The rest of the *Saiga tatarica* remains are rather evenly distributed within the cave (**Fig. VII-9**).

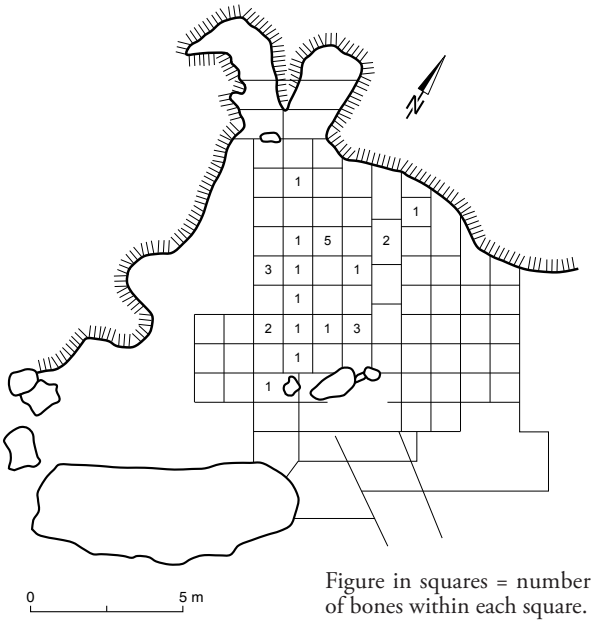


Fig. VII-11 Spatial distribution of identifiable bones with cut marks within layer IV at Kiik-Koba Grotto.

Ovis sp.

Only a single *Ovis* sp. bone (an astragalus) is represented in square 43 (**Fig. VII-10**). NISP/MNI is 1 bones/animal.

As a whole, results of examination of the faunal remains indicate that portions of mammoth and giant deer carcasses and complete carcasses of horse and saiga were transported into the cave, where they were entirely exploited. The cave's human inhabitants also did little hunting for other herbivores and preferred adults (84.6 % of the total number of individuals). Though some specific concentrations were revealed, the spatial distribution for most categories of herbivore skeletal remains is random.

VII.4 HUMAN MODIFICATION OF THE BONES

Cut marks were recognised on 16 giant deer bones, 4 mammoth bones, 3 horse bones, 1 bison bone (astragalus) and 1 wild sheep bone (astragalus). They represent 6.67 %, 9.09 %, 3.06 %, 11.1 % and 100 % respectively of the total NISPs for these herbivores. Impact notches were observed only on 1 bone of giant deer (second phalange) and 3 mammoth bones (fragments of long bones). The spatial distribution of bones with butchery marks shows that they are more common in squares 20, 16 and 39 (**Fig. VII-11**). A significant part of the cutting up and the cooking of the game occurred within the cave's central zone. Despite the low counts, the different locations of the cut marks and the presence of impact notches show that several stages of butchery processes had been carried out.

Cut marks on giant deer remains were observed on the distal part of the humerus, the distal part of the metacarpal, two astragalus, four first phalanges and eight second phalanges. These bone modifications were produced during carcass disarticulation. All giant deer long bones and phalanges were artificially broken for marrow extraction. Absence of cut marks produced during primary butchery activities (skinning) on *Megaloceros giganteus* bones combined with the relatively high number of foot bones, suggest that these remains may have been transported as carcass portions into the cave.

No complete long mammoth bone was recorded during the analysis. All were artificially splintered for marrow extraction. The impact notches are observed on two bones. Two fragments of long bones, one phalange and one rib of mammoth have visible butchery traces – cut marks.

Cut marks on horse remains were observed on the cervical vertebrae, pelvis and distal part of the metacarpal. These bone modifications were produced during stripping or peeling off the muscle (filleting) and carcass disarticulation (Binford 1981). Horse long bones were also chosen for marrow extraction.

The location of cut marks on bison and the wild sheep astragalus indicates the same butchery technique which was used on the carcasses of the other herbivores.

No skinning traces were recorded on herbivore bones.

Altogether 12 bones (6 of giant deer, 3 of horse, 2 of *Equus hydruntinus* and 1 of wild sheep) were charred by fire. This comprises 2.4 % of the total amount of identifiable bones.

VII.5 CONCLUSIONS

Analysis of the fossil mammal remains from layer IV at Kiik-Koba Grotto and their spatial distribution make it possible to come to some conclusions. The landscape around Kiik-Koba likely corresponded to semi-arid steppe or forest-steppe and the cave's human inhabitants procured a rich assortment of herbivores (9 species), preferring to hunt adult giant deer, saiga, horse and mammoth. Evidence from Kebara Cave (Israel) strongly suggests that Middle Palaeolithic humans were capable hunters of both smaller and larger animals (Speth & Tchernov 1998). The careful analysis of the layer IV faunal assemblage shows that Kiik-Koba was not a hunting camp (a kill site), where skinning and primary butchering of animals took place. It was a permanent camp or a living base settlement. Portions of mammoth and giant deer carcasses and complete carcasses of horse and saiga were transported into the cave for complete exploitation there. A significant part of cutting up and cooking game occurred within the cave's central zone. As it appears from the fauna analysis, the human inhabitants did not use bones for burning and heating.

REFERENCES

Binford 1981: L.R. Binford, Bones: ancient men and modern myths (New York 1981).

Bonch-Osmolowski 1940: G.A. Bonch-Osmolowski, Kiik-Koba grotto. Paleolithic of the Crimea, vol. 1 (Moscow 1940) (in Russian, with French summary).

Gromova & Gromov 1937: V.I. Gromova & V.I. Gromov, Materials on Crimean Paleolithic fauna studies connected to some stratigraphy questions. Proceedings of the Soviet INQUA (Moscow), Section 1 (Moscow 1937) 52–96 (in Russian).

Haynes 1983: G. Haynes, A guide for differentiating mammalian carnivore taxa responsible for gnaw damage to herbivore limb bones. Paleobiology 9 (2), 1983, 164–172.

Speth & Tchernov 1998: J.D. Speth & E. Tchernov, The role of hunting and scavenging in Neandertal procurement strategies: New evidence from Kebara Cave (Israel). In: T. Akazawa, K. Aoki & O. Bar-Yosef (eds.), Neandertals and Modern Humans in Western Asia (New York 1998) 223–240.