Demidenko Y.E., Otte M. & Noiret P. (dir.) - *Siuren I rock-shelter. From Late Middle Paleolithic and Early Upper Paleolithic to Epi-Paleolithic in Crimea.*
Liège, ERAUL 129, 2012, p. 55-63.

5 - ZOOARCHAEOLOGICAL ANALYSIS OF THE FAUNAL ASSEMBLAGES FROM SIUREN I, CRIMEA (UKRAINE)

Jessica MASSÉ & Marylène PATOU-MATHIS

Résumé
L'abri de Siuren-I, situé en Crimée (Ukraine), démontre une longue séquence archéologique. Les analyses technologiques et typologiques des artéfacts lithiques découverts dans les Unités F, G et H confirment la présence en Europe orientale de deux industries aurignaciennes différentes, réalisée par les Hommes anatomiquement modernes autour de 28500 ans BP. La faible proportion d'outils micoquiens, ayant pour artisans les Néanderthaliens, trouvée dans les unités G et H, suggère une alternance d'occupations par des Néanderthaliennes et des Hommes anatomiquement modernes (Demidenko 2000). Les informations qu'offre le site de Siuren-I sont donc de première importance en ce qui concerne la possible coexistence de deux groupes humains auteurs d'industries différentes, lors de la période de transition entre le Paléolithique moyen et le Paléolithique supérieur. Les analyses des restes fauniques, d'abord taphonomiques, attestent d'une accumulation anthropique des vestiges osseux et suggèrent une alternance relativement rapide des occupations humaines. Les études archéozoologiques suggèrent une acquisition opportuniste des proies dans un environnement qui devient plus forestier vers le haut de la séquence et un traitement différentiel des carcasses selon la taille de l'animal, et ce, quelle que soit l'Unité archéologique. Le site semble avoir servi à plusieurs reprises de campements temporaires. La continuité dans les stratégies de subsistance suggère une homogénéité comportementale entre les Préhistoriques du Paléolithique moyen et ceux du Paléolithique supérieur.

Mots-clés : Archéozoologie, Micoquien, Aurignacien, *Saiga tatarica.*

Abstract
Siuren-I is a stratified rockshelter situated in Crimea (Ukraine) with a long archaeological sequence. Technological and typological analyses of the lithic artefacts discovered in units F, G and H confirm the presence of two different Aurignacian assemblages, produced by anatomically Modern Humans, around 28 500 yrs BP in Eastern Europe. The small proportion of Micoquian tools, attributed to Neanderthals, found in units G and H, suggests a succession of Neanderthal and modern human occupations (Demidenko 2000). The information that the site of Siuren-I can provide is important to answer the questions raised by the possible coexistance of the two authors of those different industries, in the transitional period between the Middle and Upper Palaeolithic in Europe. The analysis of the faunal remains, beginning with taphonomic analyses, attests to the anthropic nature of their accumulation and suggests a relatively fast alternation of the human occupations. The archaeozoological studies propose an opportunistic acquisition of prey and a differential treatment of the carcasses according to their size, and this, throughout the archaeological sequence. The site seems to have been used, more than once, as temporary camp. Continuity in the strategies of subsistence suggests a behavioral homogeneity between the Middle Palaeolithic people and Upper Palaeolithic people.

Keywords : Archaeozoology, Micoquian, Aurignacian, *Saiga tatarica*

Introduction

Archaeological data concerning the Middle to Upper Paleolithic transition, around 30,000 BP in the Crimea (Ukraine) suggest a sporadic occupation by anatomically modern humans. Indeed, while 34 Neandertal sites have been discovered, only two stratified sites, Buran-Kaya III and Siuren I, show the presence of AMH in the Crimea (Chabai 1998) (fig. 1). Their study is thus of critical importance to understand the behavior of the last Neandertals and the first anatomically modern humans in Eastern Europe and their possible co-existence.

The ultimate goal of this study is to demonstrate the differences and/or similarities between the last Neandertals and the first Homo sapiens behavior by using the the zooarchaeological analyses. We present here the results obtained from the faunal material of Siuren I, a site in southwest Crimea. Discovered in 1879-1880, this rock shelter was excavated several times: from 1926 to 1929; 1981-1982 and in 1994 and 1997. The final season revealed three in situ Units, separated by limestone-rich horizons, evidence of roof-fall. Within a thickness of about one meter, nine levels have been identified: four in Unit F (Fa1 and 2, Fa3, Fb1 and 2 and Fc), four in Unit G (Ga, Gb1 and 2, Gc1

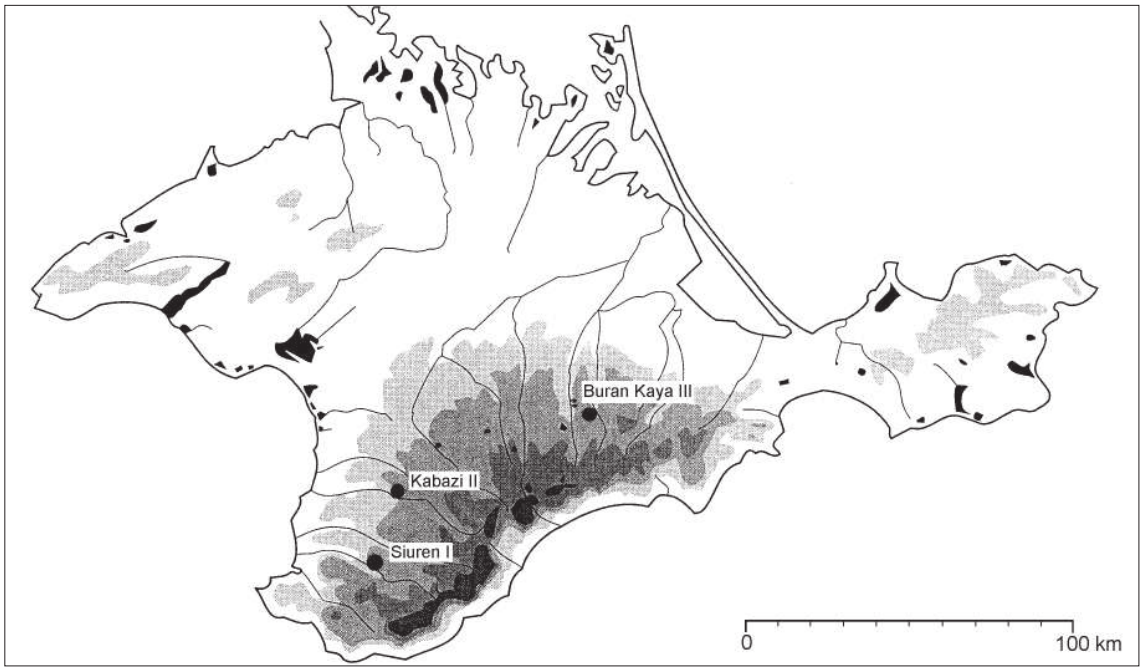

Figure 1 - Upper Paleolithic sites in the Crimea (Ukraine) (in Chabai 2000).

and 2, Gd) and one in Unit H. Radiometric dates place these different occupations between 31,500 and 27,000 BP, during the Arcy (Unit G) and the Maisières (Unit F) Interstadials. The lithological strata indicate a rapid sedimentation rate, with three meters of deposits accumulating over a period of 2-4000 years (Pettit 1998, 1999 in Demidenko & Otte 2000-2001) (tabl. I). Taphonomic analyses of the faunal material from Units F, G and H have enabled reconstruction of the paleoecological context in which Neandertals and modern humans evolved during this transition period and have confirmed the anthropic nature of the faunal accumulations. In addition, paleoethnographic analysis has led to the formulation of hypotheses related to subsistence behavior, acquisition and treatment of prey, and to site function.

The site of Siuren I is located at the crossroads of two topographically distinct regions: the foothills of the Crimean Mountains and the steppe. The diversity of species present in Units F, G and H also attest to a mosaic environment. While the presence of horse (*Equus caballus*), saiga antelope (*Saiga tatarica*) and bison (*Bison priscus*) confirm the proximity of open areas, red deer (*Cervus elaphus*) and megaloceros (*Megaloceros giganteus*) (discovered in levels Ga, Gb1-Gb2 and Gc1-Gc2) show evidence of a wooded environment. In addition, the lack of Cervidae in level Gd and Unit H, and the increase of red fox (*Vulpes vulpes*) in relation to arctic fox (*Alopex lagopus*) starting with level Gb1-Gb2, suggest climatic warming toward the top of the sequence (level Ga and Unit F) (fig. 2). Unit H, based on dates, was probably formed during the stadial phase preceding the Arcy Interstadial.

Results of taphonomic analysis

The faunal material from the three Units is represented by more than 14,000 bones, of which more than 85% are Indeterminate fragments (tabl. II).

Unit F

It is important to mention that a preliminary analysis of the faunal assemblage from Unit F was carried out by López Bayón in 1996 and 1998. For the present study, few bones belong to this Unit (NR = 175), which limits data interpretation. However, the analysis of bone surfaces revealed taphonomic differences between each level.

The fauna from the assemblages in sub-horizon Fa3 and level Fb1-Fb2 are highly fragmented. In fact, around 75% of the fragments are less than 20 mm long. For level Fc, around 60% of the bones have a maximum length between 20 and 50 mm. Having only 19 preserved bones, this level is extremely poor. (tabl. III). Only the fauna discovered in level Fb1-Fb2 show evidence of weathering. The combination of crackling, desquamation and scaling correspond to stage 2 as defined by Behrensmeyer (1978) and involves burial after a relatively short

Units	Levels	Square meters excavated	Thickness (cm)	Soil composition
F	a1-a2			
	a3		10	Clay, éboulis
	b1-b2	10	10	Silt, sand and éboulis
	c	2	3	Clay, limestone, sandstone, quartz and éboulis
G	a	12	10	Sand, limestone
	b1-b2	12	25	Limestone,éboulis
	c1-c2	12		Limestone
	d	12	7	Sand, éboulis
H		12	4	Clay

Table I - Summary of chronostratigraphic and lithological contexts of Siuren I.

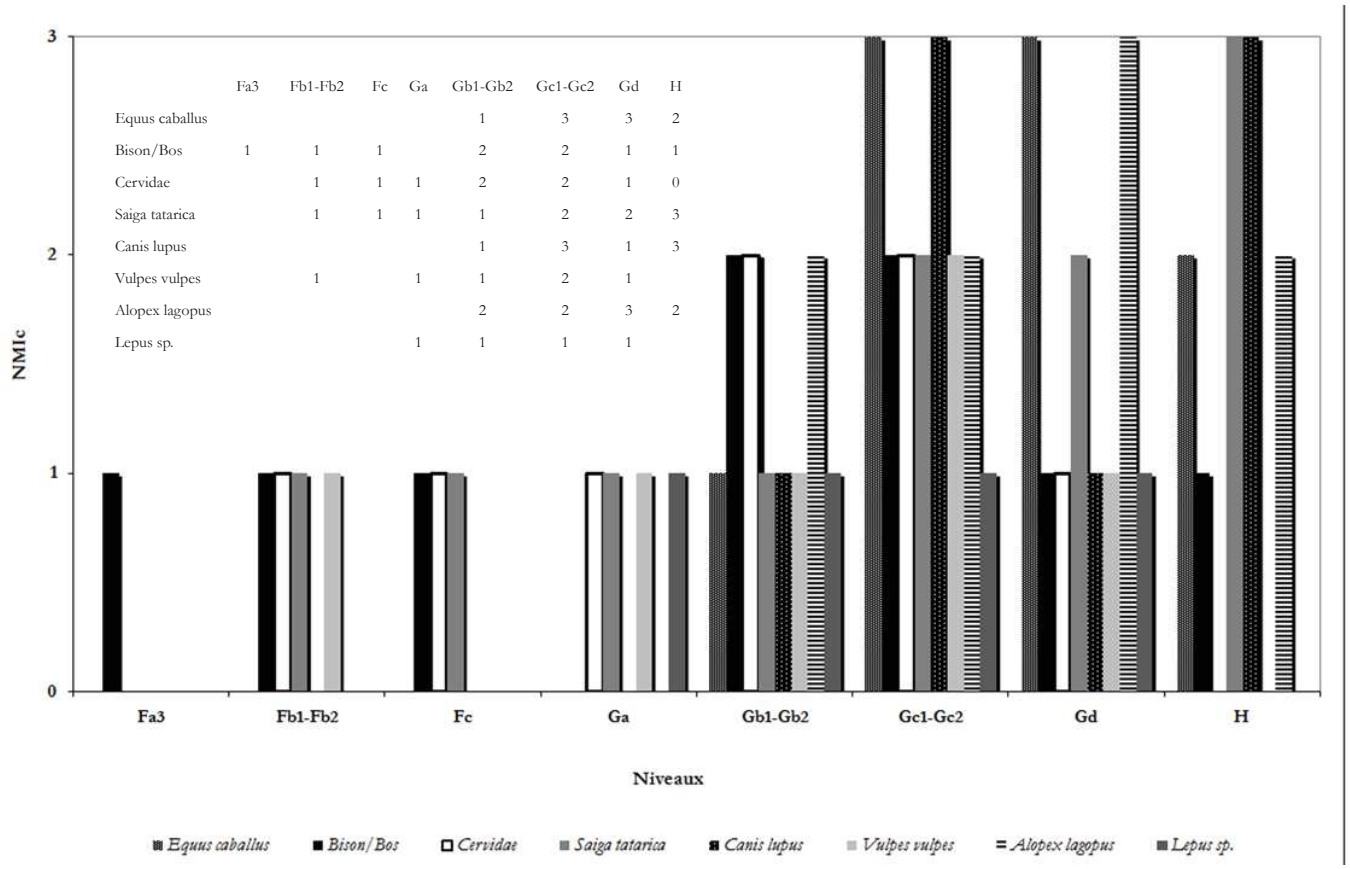

Figure 2 - Minimum number of some species for Units F, G and H at Siuren I.

period exposed to open air. These remains are also the only ones to show biological alterations. Vermiculations resulting from the action of plant rootlets have been identified which suggests a humid climate during the formation of this level (Auguste 1994). The fauna from level Fc, in turn, present so many dissolution pits that observation of other alterations is impossible (fig. 3).

Unit G

The faunal remains from the different levels in Unit G are well preserved and their surfaces have few alterations. However, the degree of fragmentation is important with more than 60% of the bones having a length under or equal to 20 mm (tabl. III). Weathering traces are relatively rare.

Concerning the bones from levels Ga and Gb1-Gb2, the combination of crackling, desquamation and scaling correspond to stage 2, suggesting a fairly rapid burial. For levels Gc1-Gc2 and Gd, the proportion of traces linked to climato-edaphic phenomena is relatively low, reflecting less intense action and shorter length of exposure to air than for the preceding two levels. The high proportion of remains with traces of dissolution and percolation (deposits of manganese and iron oxides), especially for level Gc1-Gc2, indicate a fairly humid environment (Auguste 1994) (fig. 4). The vermiculations left by plant rootlets are more common in level Gd and in square meters 8E and 9E. Evidence of carnivore activity was observed on only 15 bones, four of which are from level Gb1-Gb2 (on the root of an upper wolf canine, a saiga antelope phalange, and a tibia and diaphysis of a long bone of unidentified large mammal). Nine other traces were discovered on bones in level Gc1-Gc2 (on a tooth, a first and a second saiga antelope phalanges, three metatarsal fragments, a humerus and a second phalange of bovines, as well as on a diaphysis of a long bone of an unidentified large mammal). Finally, in level Gd, two marks left by carnivores were

	F					G						H	
	Fa3	**Fb1-Fb2**	**Fc**	**F**	**%**	**Ga**	**Gb1-Gb2**	**Gc1-Gc2**	**Gd**	**G**	**%**	**H**	**%**
NRDt	1	105	9	**115**	**65,71**	20	396	560	354	**1330**	**11,67**	**280**	**10,35**
NRDa		2		**2**	**1,14**	4	12	186	57	**259**	**2,27**	**146**	**5,4**
NRI	43	5	10	**58**	**33,14**	236	1805	5583	2186	**9810**	**86,06**	**2278**	**84,25**
NRT	**44**	**112**	**19**	**175**	**100**	**260**	**2213**	**6329**	**2597**	**11399**	**100**	**2704**	**100**

Table II - Composition of the faunal assemblages from Units F, G and H at Siuren-I. NRT: Total Number of Remains; NRI: Number of Indeterminate Remains; NRDa: Number of Anatomically Determinate Remains; NRDt: Number of totally Determinate Remains.

Figure 3 - Right cubonavicular of saiga antelope with traces of dissolution, level Fc at Siuren I Unit G.

Figure 4. Unidentifiable bone splinters showing evidence of percolation, level Gc1-Gc2 at Siuren-I Unit H.

identified on a red fox tibia and an ulna of indeterminate fox. Moreover, traces of ochre were observed on eight bones: two from level Ga (on saiga antelope cranial fragments), one from Gb1-Gb2 (on a diaphysis of a long bone from unidentifiable large mammal), one from Gc1-Gc2 (on a medium-sized mammal rib) and four from Gd (on ribs of a hare, a bovine, and a medium and a large mammals).

Unit H

As in Unit G, the fragmentation of bones in Unit H is important. Nearly 70% of the bones have a maximum length of less than 20 mm and more than 96% less than 50 mm (tabl. III). Few bones show climate-edaphic alterations, exposure to open air was even shorter than for the material in Unit G. The main alteration agent is water, in a proportion similar to that in Unit G. Regarding biological agents, plants altered a quarter of the material while no traces of carnivores were found. Wear due to movement is sporadic. Traces of ochre were observed on a rib of a large mammal.

Prey acquisition

The taxonomic determination and quantification of faunal remains have enabled us to estimate the minimum number of individuals present at the site (MNI), as well as the population structure (age, sex and seasonality at death). The results of these analyses show that the occupants of Siuren I hunted a limited number of individuals belonging to seven different species. A limited exploitation of the surrounding resources suggests that, in each level, this site was either a location of recurrent short occupations or a base camp for a reduced number of people.

Unit F

As mentioned above, a preliminary analysis of part of the faunal assemblage from Unit F was carried out by López Bayón. Having only raw quantitative results available for NRT (Total Number of Remains; Fa=310; Fb1-Fb2=1980; Fc=41), only our results were considered for interpretations (tabl. IV). The small size of the sample clearly limits data interpretation. Indeed, only a single bovine tibia could be identified in Fa3. Levels Fb1-Fb2 and Fc yielded remains of saiga antelopes, bovines and red deer. In addition, red fox was identified in Fb1-Fb2 (Tabl. V). The rarity of data concerning the taxa and the population structure prevents any formulation of hypotheses related to the subsistence behavior of the occupants of Unit F.

Unit G

Levels Ga and Gb1-Gb2, combined because of the difficulty in isolating them, have yielded 15 individuals (aside from rodents and birds; tabl. V). Based on population structure, preservation of the anatomical elements and human traces, it seems that two saiga antelopes (an adult and a mature adult), a megaloceros (a mature adult), two bovines (a sub-adult and an adult sensu lato) and an arctic fox (an adult) were hunted. A horse (an adult, likely a pregnant female given the presence of two fetal bones), a bovine and a cervid (an adult sensu lato), were also hunted or scavenged. As for the wolf, red fox, arctic fox and hare, it could

	F						G								H	
	Fa3		Fb1-Fb2		Fc		Ga		Gb1-Gb2		Gc1-Gc2		Gd			
Classes	NRT	%	NRT	%	NRT	%	NRT	%	NRT	%	NRT	%	NRT	%	NRT	%
>10mm	27	61,36	63	56,25	1	5,26	82	31,66	796	36,38	1842	29,15	877	33,14	874	34,05
10>20mm	12	27,27	22	19,64	3	15,79	127	49,03	762	34,83	2185	34,58	855	32,31	914	35,61
20>50mm	4	9,09	17	15,18	11	57,89	48	18,53	558	25,5	2035	32,21	823	31,1	679	26,45
50>100mm			8	7,14	3	15,79	2	0,77	66	3,02	240	3,8	89	3,36	92	3,58
>100mm	1	2,27	2	1,79	1	5,26			6	0,27	16	0,25	2	0,08	8	0,31
TOTAL	44	100	112	100	19	100	259	100	2188	100	6318	100	2646	100	2567	100

Table III - Distribution of the faunal assemblages from Units F, G and H at Siuren-I according to the maximum length (in Massé, 2008). NRT: Total Number of Remains.

not be determined whether their presence was intrusive or anthropic. In Gc1-Gc2, the presence of 19 individuals was calculated (aside from rodents and birds; Table V). Animals likely hunted include: two saiga antelopes (an adult and a mature adult male), three horses (a juvenile, one 5-7 years old and one 9-10 years old), two bovines (a juveniles and an adult sensu lato), a megaloceros (a sub-adult), a red fox, an arctic fox and a hare. The presence of two bones from a fetus aged between 230-300 days indicate that one of the adult horse, killed during winter, was a pregnant female (fig. 5). A red deer (adult *sensu lato*) was either hunted or scavenged. Foxes are likely intrusive, as is a small carnivore (mustelid?). The origin could not be determined for the three wolves (a juvenile and two adults, including one female). Finally, for Gd, 13 individuals were estimated (aside from rodents and birds; tabl. V). Two saiga antelopes (an adult and a mature adult), a bovine (adult sensu lato) and an arctic fox (adult female) were probably hunted. Three horses (one 3-4 years old, one 5-6 years old and one around 10 years old) and a cervid (very young adult) were either hunted or scavenged. The origins of the wolf, red fox, two arctic foxes and the hare remain unidentified.

Figure 5 - Diaphysis of a femur of an equid fetus, level Gc1-Gc2 at Siuren-I.

Unit H

Of the 12 individuals in Unit H (aside from rodents and birds; tabl. VI), three saiga antelopes (a juvenile, an adult and a mature adult), a bovine (an adult sensu lato), and an arctic fox (an adult) were probably hunted. Two horses (a juvenile and an adult) were either hunted or scavenged. The two other arctic foxes and the three wolves seem intrusive.

Prey processing

During analysis of the fauna from the different levels of Siuren I, a differential representation of anatomical elements according to species, particularly by species size, was observed. At an archaeological site, an important deficit may result be due to several factors: differential preservation, the action of climato-edaphic agents, the arrival of carnivores after a human occupation, as well as the human occupants themselves. Statistical tests on the remains of saiga antelopes (Massé, 2008), the most abundant species in Units G and H, show the lack of correlation between the percentage of UAM and mineral density of the bone (Lyman 1994). Thus, the frequency of the different anatomical elements present in levels Gb1- Gb2, Gc1-Gc2 and Gd, as well as in Unit H do not result from differential preservation. In addition, taphonomic analyses have shown that the most important agent of climato-edaphic alteration was percolating water and that disturbance of the site by carnivores was minor (the rock shelter was not used as a den). By contrast, we observed, in each level, traces of human origin: butchery striae, fracture impacts, and evidence of burning. The faunal assemblages of Units G and H are incontestably of human origin; therefore hypotheses concerning carcass treatment for most of the herbivores, some of the foxes and a few hares could be proposed.

Unit F

Traces due to human breakage of the bones were identified on a few fragments belonging to each of the three levels in Unit F. In addition, nearly all of the bones in level Fa3 are calcined. These observations provide further support for the human origin of Unit F, however, the rarity of faunal material studied limits the analysis related to patterns of prey treatment.

	Fa3			Fb1-Fb2			Fc		
TAXA	**NR**	**NME**	**NMIc**	**NR**	**NME**	**NMIc**	**NR**	**NME**	**NMIc**
Bovinae(Bison/Bos)	1	1	1	2	2	1	1	1	1
Cervus elaphus				99	7	1	1	1	1
Cervidae				2	2				
Saiga tatarica				1	1	1	9	9	1
Sub-Total Ungulates	**1**	**1**	**1**	**105**	**12**	**3**	**11**	**11**	**3**
Vulpes vulpes				1	1	1			
Sub-Total Carnivores				**1**	**1**	**1**			
TOTAL	**1**	**1**	**1**	**106**	**13**	**4**	**11**	**11**	**3**
Artiodactyla				1					
Large Mammals				1					
TOTAL	**1**	**1**	**1**	**107**	**13**	**4**	**11**	**11**	**3**
NRI	**43**			**5**			**8**		
NRT	**44**			**112**			**19**		

Table IV - Minimum number of identified elements and individuals in the faunal assemblages from Unit F at Siuren-I (in Massé 2008). NR: Number of Remains; MNE: Minimum Number of Elements; MNIc: Minimum Number of Individuals by Combination; NRT: Total Number of Remains; NRI: Number of Indeterminate Remains; NRDa: Number of Anatomically Determinate Remains.

	Ga			Gb1-Gb2			Gc1-Gc2			Gd		
TAXA	NR	MNE	MNIc	NR	MNE	MNIc	NR	MNE	MNIc	NR	MNE	MNIc
Equus caballus				6	5	1	44	23	3	23	9	3
Bison/Bos				121	26	2	25	11	2	24	12	1
Megaloceros giganteus				91	8	1	34	19	1			
Cervus elaphus				27	3	1	4	3	1			
Cervidae	3	2	1							2	2	1
Bovinae/*Megaloceros*							3	1				
Saiga tatarica	11	9	1	67	28	1	176	93	2	170	52	2
Sub-Total Ungulates	14	11	2	312	70	6	286	150	9	219	75	7
Canis lupus				5	5	1	50	38	3	5	5	1
Vulpes vulpes	1	1	1	3	3	1	21	18	2	6	5	1
Alopex lagopus				12	12	2	46	42	2	59	41	3
Vulpinae	1	1		31	16		111	33	1	44	13	
Carnivores							1	1	1			
Sub-Total Carnivores	2	2	1	51	36	4	229	132	9	114	64	5
Lepus sp.	1	1	1	1	1	1	12	11	1	9	7	1
Lepus/Vulpinae							3	2		37	15	
TOTAL	17	13	4	364	107	11	530	295	19	333	161	13
Artiodactyla	1	1					13	1				
Large Mammals	2	2		5			72			23		
Medium Mammals				1			75			13		
Small Mammals	1	1					17			18		
Indeterminate Mammals				6	2		9	7		3		
NRDa	4	4		12	2		186	8		57		
TOTAL Mammals (aside from rodents)	21	17	4	376	109	11	716	303	19	390		13
Rodents	2	2	1	8	8	1	10	9	2	8	7	1
Birds	1	1	1	24	12	2	20	14	3	13	9	1
TOTAL	24	20	6	408	129	14	746	326	24	411	177	15
NRI	236			1805			5583			2186		
NRT	260			2213			6329			2597		

Table V - Minimum number of identified elements and individuals in the faunal assemblages of Unit G at Siuren-I. NR: Number of Remains; MNE: Minimum Number of Elements; MMIc: Minimum Number of Individuals by Combination; NRT: Total Number of Remains; NRI: Number of Indeterminate Remains; NRDa: Number of Anatomically Determinate Remains.

Unit G

In levels Ga and Gb1-Gb2, butchery striae were identified on five bones. They reflect the disarticulation of a posterior horse limb, an anterior bovine limb, an extremity of a posterior cervid limb and a saiga antelope carpal (fig. 6). A skinning striation was observed on an arctic fox tibia (fig. 7). At least 21 ungulate long bones, from medium to large size, including two belonging to the horse, five to the bovines, two to the cervids and two to the saiga antelopes, were split open in order to obtain the marrow. The saiga antelopes were probably transported whole to the rock shelter (presence of the axial skeleton) and skinned outside. Only certain parts of the carcasses of megaloceros, bovines and horse were brought back to the site (fig. 8). Regarding red deer, the exclusive presence of cranial remains suggests that antlers were sought out. (Antlers were not found in the material). The principal area for carcass treatment is found in squares 8C and 7C.

In Gc1-Gc2, 35 bones show butchery marks produced, for the most part, during carcass disarticulation. A posterior horse limb, an anterior bovine limb, an anterior megaloceros limb, a red fox, an arctic fox and a hare were all disarticulated. The long bones of medium and large ungulates were cracked to reach the marrow. Among the diaphyses with marks reflecting such breakage, five belong to the horses (including three tibias), seven to the bovines (including six metapodials), eight to the cervids (including seven metapodials) and 15 to the saiga antelopes (including all bone types). As in level Gb1-Gb2, the saiga antelopes were probably transported whole (presence of costal cartilage) and skinned outside the shelter. All stages of the treatment process are attested by the presence of striae. The differential representation of anatomical units suggests a different treatment for the larger species. In fact, horses, bovines and cervids seem to have been dismembered, and perhaps partially consumed, at the kill site (fig. 8). The principal area for carcass treatment is in squares 6D and 7C. Concerning the wolf, the simultaneous presence of numerous metapodials, phalanges, coccygeal vertebrae and canines may suggest the presence of a skin having preserved the paws, tail and skull of the animal.

Finally, level Gd yielded 14 bones with butchery marks, of which four disarticulation marks belong to the saiga antelopes. A skinning mark was observed on an anterior arctic fox limb. Nine bones from medium-sized mammals confirm the reali-

TAXA	NR	NME	NMIc
Equus caballus	38	14	2
Bovinae (Bison/Bos)	25	14	1
Saiga tatarica	89	52	3
Sub-Total Ungulates	**152**	**80**	**6**
Canis lupus	9	9	3
Alopex lagopus	11	9	2
Vulpinae	89	63	1
Sub-Total Carnivores	**109**	**81**	**6**
TOTAL	**261**	**161**	**12**
Large Mammals	54		
Medium Mammals	49		
Small Mammals	40		
Indeterminate Mammals	3		
NRDa	**146**		
TOTAL Mammals (aside from rodents)	**407**	**161**	**12**
Rodents	5	3	1
Birds	14	9	1
NRI	**2278**		
NRT	**2704**		

Table VI - Minimum number of identified elements and individuals in the faunal assemblage of Unit H at Siuren-I. NR: Number of Remains; MNE: Minimum Number of Elements; MNIc: Minimum Number of Individuals by Combination; NRT: Total Number of Remains; NRI: Number of Indeterminate Remains; NRDa: Number of Anatomically Determinate Remains.

zation of all stages of the butchery process. At least 23 long bones with marrow from medium and large herbivores, including bovine (3), cervid (2 metacarpals) and saiga antelopes (3) were cracked and processed at the site. The largest ungulates, for their part, underwent differential transport, in which certain parts were either consumed at the kill site or, after having been brought back to the site, were then transported to another place (fig. 8). Squares 6D and 6C were probably the principal area for carcass treatment.

Figure 6 - Saiga antelope pyramidal with disarticulation striae, level Gb1-Gb2 at Siuren-I.

Figure 7 - Polar fox tibia with skinning striae, level Gb1-Gb2 at Siuren-I.

Unit H

In Unit H, the 11 bones with butchery marks belong to the saiga antelopes (disarticulation marks on three bones), the horses (two extremities of posterior limb show disarticulation marks), the undetermined fox (skinning mark), the large mammals (disarticulation marks on four bones and meat removal on one) and the medium-sized mammals (one unidentified). The intentional breakage of 13 long bones, including one belonging to a horse and six to a bovine, is attested. As in Unit G, differential transport depending on animal size can be proposed. Horses and bovine were likely dismembered at the kill site and

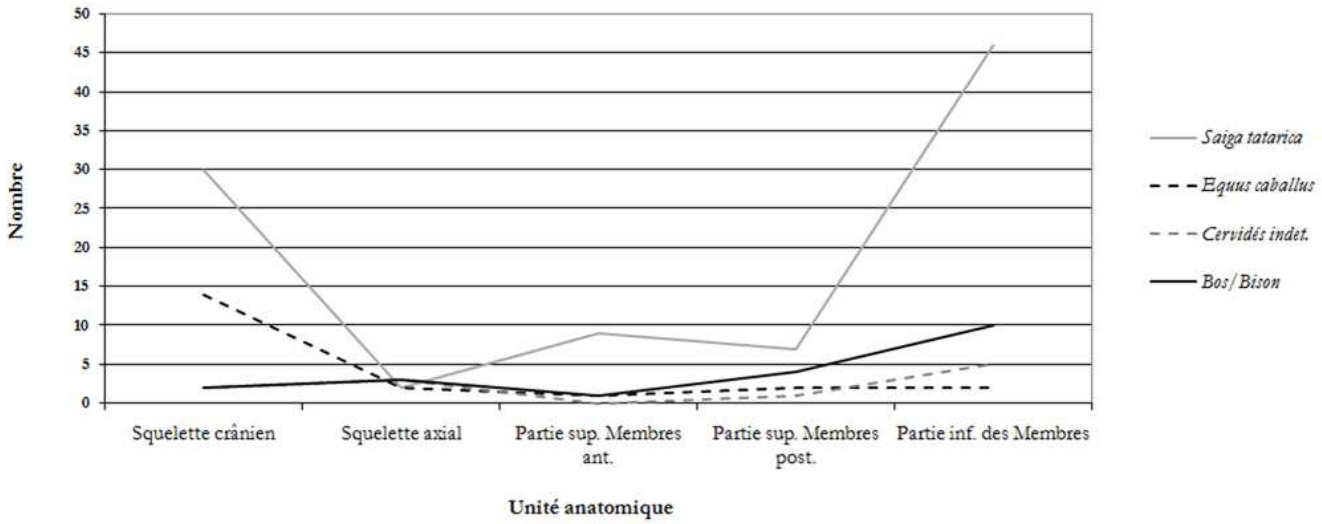

Figure 8 - Representation of anatomic units of the taxa of Unit G at Siuren I, susceptible to have been subject to differential transport based on the MNE (in Massé 2008).

some particularly nutritious parts brought to the site (O'Connell *et al.* 2002: in Klein *et al.* 1999) (fig. 10). Square 6E appears to have been privileged for carcass treatment. The presence of two wolf canines, the only cranial elements, may have resulted from deliberate collection by humans.

Discussion

Taphonomic analysis of the faunal remains from Unit F shows that the alteration visible on bone surfaces in Fb1-Fb2 was due to minor weathering, suggesting relatively rapid burial. Non-human biological agents did not significantly affect the bones. Indeed, only plant activity, after burial of the bones for level Fb1-Fb2, was observed, indicating the presence of vegetal cover and thus a fairly humid climate. Despite the small amount of material and the lack of intentional cut marks, evidence of fresh bone breakage, a high proportion of burned bones, the discovery of lithic artifacts and hearths (three in Fa3, five in Fb1-Fb2, and traces of at least one in Fc, Otte *et al.* 1996) confirm human activity in Unit F. In addition, several pieces of hard animal material were discovered: three points and an awl found during the 1920s, as well as two points, three awls and a perforated canine from level Fb1-Fb2 found during the 1990s (Demidenko & Otte 2000-2011). The rarity of bone material prevents us from proposing a hypothesis regarding the acquisition strategies or the prey treatment by the occupants of Unit F.

Taphonomic analysis of the fauna from Unit G revealed that the four levels seem to have been formed by a relatively rapid accumulation rates with a shorter exposure period for the first two levels (Ga and Gb1-Gb2). Vegetation is the most important non-human biological agent affecting the material. Carnivore marks are rare and even absent in certain levels. Therefore, humans were the principal agent responsible for these faunal assemblages. This fact is also supported by the discovery of many bones showing striae, evidence of long bone breakage and burning. Bone tools were also found. The 1920s collection (Lower layer) contains five points and 45 awls. One point and five awls were recovered during the 1990s excavations (in levels Gb1-Gb2 and Gc1-Gc2). Eight marine shell beads (*Aporrhais pespelecani*) and another river shell bead (*Taeodoxus fluviatilis*) were discovered in the Lower layer (1920s excavations) and in level Gc1-Gc2 (1990s excavations) (Demidenko & Otte 2000-2001). Analysis of the taxa distribution from the Unit G assemblages shows that most of the species are recurrent throughout the sequence. It also demonstrates the acquisition of species of different size, from fox to megaloceros. While arctic fox dominate the assemblage in terms of the number of individuals, it is probably intrusive in nature. Therefore, the saiga antelope is the dominant species in terms of MNE (Minimum Number of Elements) (tabl. IV, V and VI). The other large mammal species (*Equus caballus*, *Bos/Bison*, *Cervus elaphus* et *Megaloceros giganteus*) are represented by low numbers of individuals (one or two) per level, except for the horse which is represented by three individuals in levels Gb1-Gb2 and Gc1-Gc2 (fig. 2). Avifauna and indeterminate small mammals are present in each level; the lack of anthropic marks suggests that they are probably intrusive.

Figure 9 - Diaphysis of a large mammal long bone with evidence of breakage of fresh bone to obtain the marrow, level Gd at Siuren-I.

The small number of individuals, combined with the relative diversity of species recovered at Siuren I, reflects opportunistic hunting in a steppe environment and along forest edges (Farizy & David 1989). The discovery, in level Gc1-Gc2, of a fetal bone showing relatively advanced development suggests the killing of a pregnant mare between December and March, excluding definitively the spring season (A. Burke, pers. comm.). Hypotheses regarding the processing of each species can be propose by the representation of skeletal elements present in Unit G. Small species – fox and hare – seem to have been brought to the site whole. Human-made striae on their bones suggest principally skinning activity. Saiga antelope was also brought to the site whole: the different cut marks observed represent all stages of processing. The differential representation of anatomical units of the largest ungulates suggests a different strategy than that used for antelope. Horses, bovines and cervids would have been dismembered at the kill site and certain parts, notably the most nutritious, would have been consumed at Siuren I or further transported to another sites. This hypothesis is supported by the rarity of dismembering marks, compared with disarticulation and defleshing marks.

Finally, the taphonomic study of the faunal remains from Unit H has shown that climato-edaphic agents moderately affected the assemblage. By contrast, water runoff (prior to burial) and infiltration, mainly percolation (after burial), significantly affected the assemblage. Vegetation altered a non-negligible amount of material. Carnivores, however, left no traces on the bones. As in the other two units, humans seem to have been the only ones responsible for this faunal assemblage. Unit H presents a narrower range of taxonomic variability than in the Unit G levels, but saiga antelope and horse remain the two dominant species. The absence of human-made cut marks on the wolf, avifauna and small rodent remains would suggest their intrusive origin.

Conclusion

The rapid burial of faunal material ensured a good state of preservation of the bones. Carnivores played only a minor role, posterior to the human occupations. The faunal assemblages of the three Units are of human origin. The hunting of a limited number of individuals belonging to different forest species (red deer and megaloceros) in the upper levels of Unit G, steppe species (horse, bovines and saiga antelope) and ubiquitous species (foxes) in the three Units, appears to have been relatively

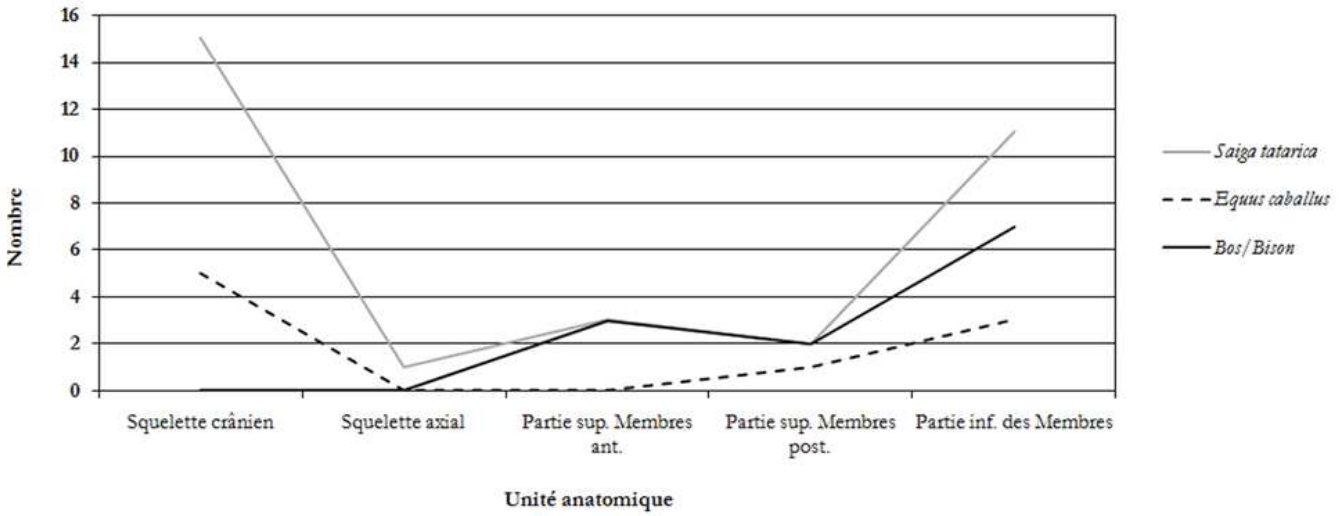

Figure 10 - Representation of anatomic units of the taxa of Unit H at Siuren-I, susceptible to have been subject to differential transport based on the MNE (in Massé 2008).

opportunistic. Moreover, the scavenging of large mammals cannot be excluded. The preservation of saiga antelope bones uncorrelated to their density shows that differential representation of anatomical units is the result of human activity. Prey processing strategies therefore appears to have been conditioned by the size of the species hunted. The smallest (saiga antelope, fox and hare) appear to have been brought to the site whole and the largest (horse, bovines, deer and megaloceros) quartered. The results of zooarchaeological analyses suggest the practice of several butchering activities, including skinning, disarticulation, defleshing, bone marrow extraction and meat consumption. The presence of many hearths, butchery areas and bone tools, as well as flintknapping activities, reflects the practice of different economic and technological activities at the site (Demidenko & Otte 2000-2001; Otte *et al.* 1996). The Siuren I rock shelter, based on the diversity of activities and the relatively low density of fauna and lithic material, likely served as a repeatedly used short-term camp (in winter for level Gc1-Gc2). Our zooarchaeological interpretations corroborate the stratigraphic and lithic data indicating behavioral homogeneity throughout the sequence and this, despite paleoecological changes. Unfortunately, they do not allow differentiation between the Neandertals or the anatomically modern humans that occupied the site over time.