

# ANIMAL BONES FROM THE HALMYRIS FORT (Murighiol commune, Tulcea County)

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**Key words:** Murighiol, Holocene, archaeological excavations, animal bones, fish, bird and vertebrata remains.

**Abstract.** This paper analyzes the animal bones found on the Western side of the Murighiol fort during 2002-2005 archaeological excavations: fish, bird and vertebrata remains.

**Cuvinte cheie:** Murighiol, Holocene, săpături arheologice, oase de animale, pești păsări și vertebrate.

**Rezumat.** În acest articol sunt analizate oase de animale, pești, păsări și alte vertebrate găsite în zona de Vest a cetății de la Murighiol în perioada 2002-2005.

The ancient site, located close to the present day Murighiol commune, Tulcea County, is known as one of the few large settlements on the Sf. Gheorghe branch of the Danube River. Geologically, the zone has the platform basement formed by Protherozoic crystalline stratum covered by Triassic and few Cretaceous deposits, with chalky limestone sediments that come out at the surface; above these older sediments lie Quaternary alluvial deposits, loessoid deposits, sometimes sandy deposits; the big Delta of the Danube, the greatest part of very new origin, mostly Holocene lies towards NE, beyond the Sf. Gheorghe branch. Geographically, this one is limited to NE by the Danube branch that forms a large flood-plain, sometimes with dead channels, being followed to the south by a higher part, slightly undulated up to the bottom of the Murighiol hill; that one continues like an islet the Tulcea hills. Pedologically, we find, besides the flood-plain soils (especially light brown sometimes turned into salted soils from which the name Halmyris), also disseminated spots of brown soils – that occurred in the past under a forest vegetation. The vegetation, besides a zone with a subfossil xerophilic vegetation typical for alluvial plain, show a steppe character to the south, with agricultural crops and secondary meadows; only on the Murighiol hill, spots of forest survived, containing particularly thermophilic oak species with *Acer tataricus*, a xerophilous tree. Beside the forest on the hill a secondary ligneous vegetation planted by man, containing autochthonous species but also allochthonous one (false acacia woods) developed. Azonal halophyte vegetation appears in the region too. The climate is gentler than inside Dobrogea, being directly influenced by the Danube Delta. A zoological reserve, called “Plopul/Poplar” exists today in the zone.

In what follows, we shall investigate a significant lot of animal bones found in the 6<sup>th</sup> century barrack blocks no. I-IV situated on the western side of the fort during 2002-2005 archaeological excavations carried out by principal investigator of the site, Dr. M. Zahariade. I thank him for his kind offer made to me to publish the archaeo-zoological material and for providing some archaeological information on the location and circumstances of discovery, of critical importance for the interpretation of the animal remains.

The fauna remains appear extremely fragmentary, but relatively rich in number. Around 700 fragments have been counted within the entire lot. About 150 pieces belong to the group of lamellibranchiate mollusks, represented through valves of fresh water shells pertaining to the *Unio* genus, with two species: *Unio pictorum* and *Unio crassus*, The first is more abundant. It is noticeable that these valves have different sizes. Some are large and full-grown, some smaller representing individuals in distinct stages of development. Many are not fully matured that shows that the shells were not uniformly and in a predatory manner gathered by the occupants of the barracks. The shells were gathered for food purposes indicating that some soldiers originated from the Mediterranean basin where the lamellibranchiate mollusks are part of the daily diet of the population. Although relatively abundant, because of their specific size, they can not be considered of economic importance but, like nowadays, rather a gastronomic habit.

Of great importance for the animal economy is the group of the vertebrate summing up 495 identified remains. They belong to three different groups with a real importance for the animal economy (Table 1). The about 50 pieces considered as unidentifiable pertain in fact to the mammals, but due to their excessive fragmentation was impossible to establish the osseous segment and the species.

Table 1

The frequency per fragments of the vertebrate groups at Halmyris (Murighiol 2002)

Group	Fragments	
	No. abs.	%
Fish	109	22.03
Birds	11	2.22
Mammals	375	75.75
Total	495	

The **fish** (*Pisces*) class represents one fifth of the determined sample (Table 1). Part of the fragments originates in *Teleostaea* – bony fish – grouping that includes the great amount of the sample. Few remainders were preserved from *Acipenseridae*-sturgeons grouping – fish with partial bony skeleton because of their cartilaginous nature. However, their external radiuses (ceratotrichia I) of the fins representing the linkage with the basal parts, usually ossifies and are preserved in most of the cases. One presumes the existence of three or four long-sized, over one, one and a half meter exemplaries, They could be the big Black Sea sturgeon – the great sturgeon (*Huso huso*) and the Russian sturgeon (*Acipenser Güeldenstaedti*), typical for the Lower Danube, Delta, and the Black Sea. The difference up to 109 bones is made by bony fish remains.

Some of them could be determined: a complete left opercula of a carp (*Cyprinus carpio*), 40 cm in length; another half opercula from the right side, belonging to another Cyprinid, but smaller; a left lower pharyngeal bone from a carp no elder than a summer; a part of the posterior epiphyses of the basioccipital, in the zone were is placed the “sour bone”, originating in a carp of 30 cm; a ceratotrichia I, with the characteristic teeth of the dorsal fin of a medium-sized goldfish (*Carassius carassius*); two dentaries, one with three teeth and another one with four from two individuals of pike (*Esox lucius*), of medium size, 40 cm were found also. The other remains are vertebra of different dimensions, two piles of 12-15 mm in diameter, undetermined as species. Individuals of 30-35 cm in length were presumed, taking into account their dimensions. Another grouping of vertebra, 20-25, 32-36 and 47 mm in diameter (one of them), have the epiphysis broken, making impossible to determine the species. These ones originate in larger exemplars, probably oldest carps or wells catfish (*Silurus glanis*) of big dimensions.

The **birds** sum up 11 fragments. Three of them belong to a very large exemplary, maybe a water bird, a stork (*Ciconia*): proximal epiphyses of a humerus broken, a portion of the proximal epiphyses and diaphyses of a radius and a complete ulna, of 230 mm in length. These three bones that were intentionally sliced representing the meaty part of the right wing; a femurus keeping the distal part (Bd. 13 mm) comes from an individual of a small size (like a hen); a fragments from a clavicle, and possibly the lower part of the pelvic girdle may belong to the same individual of small size; a fragment of a humerus (young individual) could originate in a hen; the other remains are small and insignificant. Bones of domestic hen (*Gallus domestic*) were not found, even if the species was bred in the region from the La Tène epoch.

Three fourths of the sample belongs to mammals (Table 1). This grouping of **Vertebrata**, always has the better representation in the faunal assemblages; it represent the most important category, due to their diversity in taxon and to their importance in the animal economy of the human communities. Five domestic species were determined: *Bos taurus* (cattle), *Ovis aries* (sheep), *Sus scrofa domesticus* (pig), *Equus caballus* (horse, in its broad sense) and *Canis familiaris* (dog) and eight wild species, in their systematic order are: *Lepus europaeus* (brown hare), *Castor fiber* (beaver), *Vulpes vulpes* (fox), *Canis lupus* (wolf) – these one with few remains, but important mostly for zoologists and geographers; other four wild species as: *Sus scrofa ferus* (wild boar), *Cervus elaphus* (deer, called Carpathian our days), *Capreolus capreolus* (roe deer) and *Bos primigenius* (auroch) – feebly represented in our sample, by a single bone.

Table 2

The mammal-distribution of species per bony segments, fragments and presumed individuals at Halmyris (Murighiol 2002)

Species	Bony fragment																					Fragments	%	Presumed individuals	%				
	Homcores /Antlers	neural skull	Facial skull	Upper maxilla	Upper teeth	Lower maxilla	Lower teeth	Vertebrae	Ribs	Scapula	Humerus	Radius	Cubitus	Coxal	Femur	Tibia	Astragalus	Calcaneus	Metacarpz	Metatarsus	Metapodals					Phalanx I	Phalanx II	Phalanx III	
<i>Bos taurus</i>	-	-	-	-	-	1	3	25	13	4	3	4	5	3	9	9	1	1	5	8	2	-	-	2	98	26.14	10	15.62	
<i>Sus domesticus</i>	-	5	7	14	8	8	7	2	3	5	3	-	2	3	-	3	-	1	-	-	3	1	-	-	75	20.00	13	20.31	
<i>Ovis aries</i>	3	1	-	-	-	-	-	-	-	-	1	1	-	1	-	3	-	1	1	2	-	1	-	-	15	33	8.80	5	7.82
"ovicaprinae"	-	-	-	1	1	4	-	7	2	-	1	-	-	-	-	1	-	-	-	1	-	-	-	-	18				
<i>Equus caballus</i>	-	-	-	-	-	-	-	1	-	-	1	1	-	1	-	-	-	-	-	-	1	1	-	-	6	1.60	3	4.69	
<i>Canis familiaris</i>	-	-	-	-	-	2	-	1	3	1	1	-	1	1	-	1	-	-	-	-	2	-	-	-	13	3.46	3	4.69	
<i>Lepus europaeus</i>	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	2	0.54	1	1.56	
<i>Castor fiber</i>	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0.54	1	1.56	
<i>Vulpes vulpes</i>	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	1	-	-	-	3	0.80	1	1.56	
<i>Canis lupus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	0.26	1	1.56	
<i>Sus scrofa ferus</i>	-	4	4	12	10	17	5	4	5	4	5	1	-	3	1	5	2	3	-	-	3	1	-	-	89	23.74	16	25.00	
<i>Cervus elaphus</i>	4	2	-	-	2	6	-	5	2	2	2	3	1	2	4	3	-	-	4	4	1	-	1	-	48	12.80	7	10.93	
<i>Capreolus capreolus</i>	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	1	-	-	-	-	4	1.06	2	3.13	
<i>Bos primigenius?</i>	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	0.26	1	1.56	
<b>Total=375</b>																									<b>64</b>				

Table 3

The ratio domestic-wild mammals

Group	Fragments		Presumed individuals	
	No. abs	%	No. abs	%
Domestic	225	66,00	34	53.13
Wild	150	40.00	30	46.87
Total			64	

Next we deal with the description of each species, providing metric data (Tables 4-11), the measurements were taken in mm; also we insist on the distribution of the bones of each species, the frequencies as fragments and presumed individuals (Table 2), kill-off patterns, etc... On the base of these data we try to sketch the peculiarities of the animal rising, not only by the military that defended the Halmyris fortress.

Table 4

*Bos taurus* (Murighiol 2002)

Bone	Dimensions	No.	Var.	Average
LOWER TEETH	Length. M <sub>3</sub>	1	37	-
SCAPULA	Length artic. head	1	77	-
	Length artic. surface	1	67	-
	Width art. surface	1	50	-
	Width min. col	1	59	-
HUMERUS	Width inf. epif.	1	86	-
	Width artic. inf. surf.	1	78	-
RADIUS	Width sup. epif.	1	88	-
	Width artic. inf. surf.	1	81	-
ULNA	Width radial surface	3	42-47	44.33
	Height olecran	1	119	-
COXAL	Diam. acetab.	1	62	-
FEMUR	Width artic. head	2	43; 45	-
	Width inf. epif.	1	93	-
TIBIA	Width inf. epif.	5	58-68	62.40
	Width artic. inf. surf.	5	47-61	49.20
CALCANEUS	Length max.	1	138	-
	Width max.	1	40	-
ASTRAGALUS	Length max.	1	65	-
	Width troch. inf.	1	42	-
METACARPUS	Width sup. epif.	1	58	-
METATARSUS	Width sup. epif.	2	43; 53	-
	Width inf. epif.	1	66	-
PHALANX III	Length plant.	2	78; 80	-
	Width plant. surface	2	31; 33	-
	Width artic. surface	2	28; 30	-

The **cattle**, known as big horned, has the highest frequency in fragments (they are the taller species among domestics, consequently the remains obtained by cutting are very numerous and of big dimensions, well preserved during times). As MNI (minim number individuals) they rank the second, below the swine (pig and boar).

The body part distribution (Table 2) emphasizes the lacking of the cores and of the neural and facial skull, just a mandible and three isolated teeth were found; among vertebrae, the atlas was not found, suggesting that for the army existed an administrative department, obliged to supply (at least partially) the food for the troupes in the region; it is supposed the meat for consumption was in a great measure ready sliced, the cattle head was not used in diet, being refused after the brain was taken out.

Table 5

*Bos taurus*-complete long bones-withers height (Murighiol 2002)

Bone	TIBIA	METACARPUS		METATARSUS		
	1	1	2	1	2	3
Dimensions						
Length max.	298	(170)	189	213	215	227
Width sup. epif..	(90)	58	62	47	47	47
Width inf. epif.	68	-	58	58	56	(53)
Width min. diaf.	46	32	34	28	28	25
Index I	15.43	34.11	32.80	22.06	21.86	20.70
Index II	-	-	30.68	27.23	26.04	23.34
Index III	-	18.82	17.98	13.14	13.02	11.01
Sex	-	ox	ox	ox	ox	ox
Height (mm)	1028	1042	1159	1171	1182	1248
	Individuals		Var.		Average	
Height (mm)	6		1028-1248		1138	

Table 6

*Sus scrofa domesticus* and *Sus scrofa ferus* (Murighiol 2002)

Bone	Dimensions	<i>Sus scrofa domesticus</i>			<i>Sus scrofa ferus</i>		
		No.	Var.	Average	No.	Var.	Average
MAXILLA	Length molars	2	78; 78	-	3	82-88	84.67
	Length M <sup>3</sup>	4	34-37	35.50	4	41-46	42.75
MANDIBULA	Length M <sub>3</sub>	1	41	-	5	44-52	47.40
SCAPULA	Length artic. head	1	35	-	3	48-51	49.67
	Length artic. surf.	1	31	-	3	38-44	41.33
	Width artic. surf.	1	26	-	3	34-38	35.67
	Width min. col	1	24	-	3	30-36	33.67
HUMERUS	Width inf. epif.	-	-	-	4	51-52	51.50
	Width artic. inf. surf.	-	-	-	4	34-42	38.25
RADIUS	Width inf. epif.	-	-	-	1	43	-
ULNA	Width rad. surface	1	26	-	-	-	-
COXAL	Acetab. diam.	-	-	-	3	45-48	46.00
TIBIA	Width inf. epif.	2	30; 33	-	3	37-38	38.33
CALCANEUS	Length max.	-	-	-	2	54; 58	-
	Width max.	-	-	-	2	33; 33	-
ASTRAGALUS	Length max.	-	-	-	2	100; 107	-
	Width inf. troch.	-	-	-	2	28; 28	-
METACARPUS	Length max.	-	-	-	1	102	-
	Height	-	-	-	1	1.065	-
METATARSUS	Length max.	-	-	-	1	112	-
	Height	-	-	-	1	1.052	-
PHALANX I	Length max.	1	47	-	1	55	-
	Width sup. epif.	1	22	-	1	25	-

As far as the measurements (Table 4) one can assume that, for several bones a broad metrical variation was established, due partially to the sexual dimorphism, sometimes because of a large gap between the minimum and maximum value. The fact is quite visible when estimating the withers heights (Table 5). Different withers heights were presumed, generally the small values prevail, but a value of 1.25 cm was obtained from a metatarsus of a young exemplar. It should be possible that in Halmyris, also in other later

roman sites from Dobrudja, a breed of ameliorated cattle survived, as a residuum, being brought in the region by the roman administration in the 1<sup>st</sup> century A.D., to replace or to improve the autochthonous primitive breed<sup>1</sup>. From the same Table 5, we can say that all the determined individuals were gelded (bulls).

Table 7

*Ovis* (Murighiol 2002)

Bone	Dimensions	Ovis	
		No.	Var.
HUMERUS	Width inf. epif.	1	27
	Width artic. inf. surf.	1	25
RADIUS	Width sup. epif.	1	26
	Width artic. sup. surf.	1	24
COXAL	Acetab. diam.	1	30
TIBIA	Width sup. epif.	1	46
	Width inf. epif.	2	(26); 27
METACARPUS	Width inf. epif.	1	29 m?
METATARSUS	Width sup. epif.	1	24
PHALANX I	Length max.	1	38
	Width sup. epif.	1	14
	Width min. diaf.	1	12
	Slenderness index	1	31,57

Table 8

*Equus caballus* (Murighiol 2002)

Bone	Dimensions	No.	Var.
HUMERUS	Width inf. epif.	1	77
	Width artic. inf. surf.	1	72
RADIUS	Width sup. epif.	1	80
	Width artic. sup. surf.	1	72
METAPODUS	Width inf. epif.	1	(52)
PHALANX I	Length max.	1	93
	Width sup. epif.	1	49
	Width inf. epif. on tuber	1	44
	Width artic. surf. inf. epif.	1	43
	Width min. diaf.	1	35
	Slenderness index	1	37.63
	Inf. epif. index	1	102.32

Little information about kill-off patterns exist due to the reduced amount of teeth. Also, few data were furnished studying the suture stages of the epiphysis of long bones: according to them a distal metatarsus not fused (up to 2.5 years) was identified; among the 25 vertebrae just two have the body not epiphysed (below 4 – 4.5 years) and another two ones have the body just fused (4.5 years). Consequently the dominance of matures and elderly (even) was emphasized.

As fragments' distribution the pig ranks the second but he falls in the first place as MNI. Always the better representation of maxillary fragments determines a great NMI, but more closed to reality. Also a better representation of the kill-off patterns is obtained. The pig sample is extremely fragmented, no complete long

<sup>1</sup> S. Haimovici, *Studiul arheozoologic al resturilor din două nivele aparținând secolelor II-III și IV găsite în situl autohton de la Telița Amza (nordul Dobrogei)*, Peuce 1, 2003, p. 490-491; idem, *Studiul arheozoologic al resturilor de la Dinogetia (Garvăn) aparținând epocii romane târzii*, Peuce 10, 1991, p. 357; idem, *Studiul arheozoologic al unor resturi faunistice descoperite în nivelul aparținând secolului al VI-lea p. Chr. al cetății Histria – under press.*

bones were found, to estimate the height. Few measurements were taken, indicating that the pig belonged to a taller breed (Table 6); sometimes a limit between domestic and wild swine was difficult to establish. We believe that the breeding of the pig in free conditions, besides the increased density of the boar in neighboring favored the interbreeding between the domestic females and boars, as a result the increasing of the pig withers height. The phenomenon is well-known in the present-days Danube Delta. As to the age class distribution, the situation is characteristic to a species bred just for meat and fat; we found exemplars killed below one year (young towards adults), adults and hardly matures, no old animals.

The **sheep** or small horned, with an important place in the animal economy, ranks the third. Only *Ovis aries* – sheep was found, the goat missing. A differential diagnosis was established for a small amount of sample, the greatest part of the material was introduced in the artificial category “caprovines”. No measurements were taken due to higher degree of fragmentation. Two ram horn cores were identified and a third one much longer. The bottom of the cores was cut to obtain the horn for making different wares, but this raw material did not preserved in time. This was not done by a specialist. Also, the tips of the pieces were cut in all cases. Morphologically, the cores are not too bulky; at a half of the distance from the base they change the direction, turning outwards. Core of ewes were not identified, but this fact do not testify that the females had hornless skulls. The sample indicates that the three remains indicate three males among the five presumed individuals. Therefore the other two exemplars are females. The situation is ridicule for a sheep flock; thereto young animals were not identified. We speak about other aspects (cultural) than economic ones. The age class distribution outlines animals killed between 1.5-4-5 years.

The **horse** sample includes few remains, six fragmentary bones excepting the Phalanx I completely preserved. As a result we have no information concerning its morphology and size. Three exemplars were found: the first one is a younger (the aspect of the radius), the other ones are certainly, matures. The ass was not found (possibly due to scarcity of sample), although it was quite frequently used by the Roman-Byzantine armies in Dobrogea.

The **dog** is well represented by 13 remains from three individuals: one of small size, another one of medium size and the third taller. A rib bears a cut-mark intentionally made, but not for taking off the meat. In our opinion the militaries from Halmyris did not used the dog meat in diet.

The wild mammals spectrum is diversified in species, they were hunted mainly for consumption and other purposes; some items give to specialists information concerning the bio-geographical environment in the past.

Two bones belong to **brown hare**, a distal humerus, with the Bd – 14 mm and diaphyses of a radius, with a posterior concavity and an internal ridge. The species was used for its meat and fur. Its importance in diet is insignificantly due to the smallness of the tall.

The **beaver** is an element indicative for landscape. Its needs claimed tranquil river courses with riparian forests containing light essence trees. It is important because, for the second time we found it during the 6<sup>th</sup> century A.D in the north of Dobrogea, the species extinct later from local fauna<sup>2</sup>. It was hunted for meat, but mainly for fur and other bony parts. A fragmentary mandible with two teeth and a humerus not epiphyseal proximal and distal (from a young exemplar) belong to the same animal.

The **fox** sample includes three bones of the same animal: a metapodium, a radius with the proximal breadth of 10 mm and a coxal with the diameter of acetabulum – 13 mm. Only the fur is used from fox. Its links with the environment are feeble, as a non indicative element of the landscape.

The **wolf** has a single fragment, a coxal with the acetabulum diameter – 28 mm. We speak about a wolf and not a dog of big size. The fur wolf is not of good quality and it was hunted for its damages among sheep flock and roe deer population. The next four species are of big size, their hunting having an increased economic importance.

The **wild boar** has an increased frequency, surpassing the pig; as NMI is better represented than cattle, so we must consider the species as the preferred mammal for hunting at Halmyris. It was difficult to separate its material from that of pig, because hybrid exemplars certainly existed. Were preferred at hunting only adults and matures, the young animals missing. Probably this type of hunting was practiced by soldiers. It would be an interesting fact, keeping in mind by our contemporaneous, showing how it must be a hunting, ecological one. All the body parts are represented in the sample, mainly by mandibles. A sexual dimorphism was emphasized. An average of 1.06 m (tall) was estimated for two individuals.

<sup>2</sup> Idem, Peuce 19, 1991 (see the table with the frequencies).

Table 9

*Cervus elaphus* and *Capreolus capreolus* (Murighiol)

Bone	Dimensions	<i>Cervus elaphus</i>			<i>Capreolus capreolus</i>	
		No.	Var.	Average	No.	Var.
MANDIBLE	Length P2-M3	1	130	-	-	-
	Length M1-M3	1	80	-	-	-
	Length. M <sub>3</sub>	1	35	-	-	-
SCAPULA	Length artic. head	1	62	-	-	-
	Length artic. surf.	1	46	-	-	-
	Width artic. surf.	1	44	-	-	-
	Width min. col	1	38	-	-	-
HUMERUS	Width inf. epif	2	67; 69	-	-	-
	Width artic. surf.	2	57; 52	-	-	-
RADIUS	Width sup. epif.	2	62; 66	-	-	-
	Width sup. artic. surf.	2	58; 61	-	-	-
	Width inf. epif.	1	54	-	-	-
FEMUR	Width artic. head	1	37	-	-	-
	Width inf. epif.	2	61; 66	-	-	-
TIBIA	Width sup. epif.	-	-	-	1	36
	Width inf. epif.	2	49; 52	-	-	-
	Width inf. artic. surf.	2	44; 48	-	-	-
METACARPUS	Width sup. epif.	4	42-46	44.25	-	-
METATARSUS	Length max.	1	(233)	-	-	-
	Width sup. epif.	1	(35)	-	1	24
	Width inf. epif.	2	45; 46	-	-	-
	Width min. diaf.	1	19	-	-	-
	Slenderness index	1	8.5	-	-	-
PHALANX II	Height	1	1,049			
	Length max.	1	46	-	-	-
	Width sup. epif.	1	22	-	-	-
	Width min. diaf	1	17	-	-	-
	Slenderness index	1	36.96	-	-	-

The **red deer** is represented in our sample by a lesser material than the wild boar. Usually it ranks the first among wild species. All the body parts are represented in the assemblage. Firstly we talk about the antlers. Four big pieces were found, bearing work marks; usually the base of the perch is missing, therefore we couldn't establish if they were gathered from the forest or from the hunted males. One of them bears the "the wolf" branch, a rather rare thing. Traces of cutting and chopping were observed on the pieces, their working was not finished by the human action, consequently they were refused. We think the militaries in Halmyris didn't know that, the surface prepared for cutting (in case of fresh antler), must be firstly a little burned to make it softly and more flexible, less friable. This method was used since Paleolithic for rein deer antlers working and later for the red deer antlers. The traces of burning on the antlers revealed the using method.

None of the bones were completely, excepting a medium phalanx. So we can't furnish withers height estimations. An obvious sexual dimorphism was recorded at the red deer population. Age relating, animals killed below 1.5 years and over 5 years were not identified.

An interesting fact was noted when we studied the cutting-marks on the bones: in the part where the bone was cut many and successively traces were observed. That means that, "the butcher" of the animals was not specialized in butchery, maybe the operation was made instantaneously by soldiers; therefore, the great portions of deer meat were not brought into the settlement, from another location where, maybe existed specialized butchers.

The **roe deer** is represented by two individuals; one of them is a male (on the base of an antler). It is a species of medium size, like a sheep.



Table 10

*Canis familiaris* (Murighiol 2002)

Bone	Dimensions	No.	Var.
MANDIBLE	Length cond.	1	154
	Length post C. cond.	1	134
	Length. post C. ap. ang.	1	135
	Length post C – çșancrura	1	129
	Length P <sub>2</sub> -M <sub>3</sub>	2	(69); 72
	Length M <sub>1</sub>	2	24; 25
	Height max.	2	77; 81
	Height to M <sub>1</sub>	2	26; 26
	Thick to M <sub>1</sub>	2	13; 13
	Skull basal length:		
	1. by Dahr		156,1
2. average by Brinkmann			173
general average		169	
SCAPULA	Length artic. head	1	35
	Length artic. surf.	1	32
	Width min. col	1	31
HUMERUS	Width inf. epif.	1	22
COXAL	Length max.	1	(147)
	Acetab. diam.	1	23
TIBIA	Width inf. epif.	1	27

Table 11

*Vulpes vulpes* (Murighiol 2002)

Bone	Dimensions	No.	Var.
RADIUS	Width sup. epif.	1	10
COXAL	Acetab. diam.	1	15

The **uroch** has a single bone, a distal part of a rib, with a broad of 58 mm. That animal is of big size. If the piece originates in a large urochs and not in a domestic male, that means, *Bos primigenius* yet survived until the 6<sup>th</sup> centuries A. D. nearest the Danube Delta.

The wild boar and red deer indicated a wooden landscape, even swampy. The roe deer and urochs, the forest-steppe elements indicated wide open environments.

In after part we talk about the characteristics of the animal husbandry that, in our case is not typical to a customary settlement, but to a military unit adjacent to Halmyris fortress, this one having as objective to defend the northern boundary of the Byzantine Dobrogea. Certainly, the faunal assemblage brought to light during excavations represent kitchen remains accrued from the daily meal of the soldiers. Some other animal remains used to come from other activities performed by the soldiers or their co-habitants, remains that were thrown away too.

*Some words about the soldiers' food in the barracks.* The Bivalves (mollusks) remains illustrate their using as food, though they are small, furnishing an insignificant amount of meat. So their role in diet was negligible. We should consider that the soldiers practiced the gathering, an ancestral occupation and did not buy the mollusks from other persons.

One can not say the same thing about fishing that occupationally is related to water courses, in our case to the Danube Delta. Fish represented an important component of their daily soldiers' diet. Big exemplars of sturgeons, carps, pikes etc. were captured.

Also they hunted and captured (maybe gathered eggs in spring) big water birds. The cut marks on their bones point out that, their hunting was practiced intentionally during spare time, as a entertainment.

The mammals assured the highest quota of meat (animal protein), essential to a balanced menu. The animal proteins furnished by cattle don't originate in animals bred by soldiers; rather they were brought into the fortress by a special corps of the army, charged with the slaughtering of the bovines. All the complete metapodii came from geld animals. Maybe, the oxen were, primarily used as draught animals (or other purposes); afterwards, at an oldest stage they were killed (primarily were bought from marketplace), transformed in food for soldiers, but not of first quality, the meat quota furnished by cattle is higher and very important.

The other domestic species used as food are pigs and sheep. It seems the horse was not used in diet. At Murighiol, the pig and sheep have a higher frequency, surpassing the cattle, as MNI (though a pig totals about 1/3 from the beef meat amount). We suppose, the pig was bred by soldiers and also killed by them. The vicinity of the Delta assured favorable conditions for pig flocks that lived in semi wildness conditions.

Sheep have a lower percentage than pig (a mature pig weights about three sheep); they were kept only to be slaughtered (by militaries of course), even if bones from lambs were not be found.

Occupationally speaking, hunting had a highest quota at Halmyris. The militaries practiced it either for economic purposes or to train the psychic and the weapons. Besides fishing, the hunting, and capture of birds covered about half of the animal protein necessary/ per day, the task of the administrative corps being easier in soldiers' food. As mentioned above, among wild species the boar is more frequent than red deer, a fact in connection to the surroundings. The red deer is pretty abundant in the 6<sup>th</sup> century A.D. in Dobrogea, present-days its area is closed to the Carpathian Mountains. As for the meat amount, a red deer male weights like two boars, for that reason the frequencies of two species are equally.

After hunting and slaughtering a lot of "inedible" products outcomes: antlers, horn cores, fur, skin, bones, teeth, used by soldiers in many purposes; they were not specialists in manufacturing of these raw materials (see the case of deer antler working).

Taking into account the peculiarities of domestic and wild mammals, we can outline the biogeographic features of the Halmyris environment in the 6<sup>th</sup> century AD geologically and geographically, the milieu was not too different from present days. It is possible, beside the Sf. Gheorghe branch another one would developed to south, that opened towards the existing Sinoe lakes system; this one, most likely was a bay of the Black Sea, with salted waters because the Argamum fortress was yet a maritime habitation. The closing of the bay and its turning into a lake with fresh waters started many times ago. Also the Danube Delta, used to be shorter than present-day; during 1,500 years up to now it took another part of the sea. The terrestrial space was seemingly to our-days but the vegetation was different; extensive forests, containing thermophilic mixed oak developed throughout, inclusively nearby the waters, but today they were extinct. Due to these woods, the environment of the fortress was not as arid as present. So, the surroundings consisted in waters and forests (low or higher forest zone).

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- Hoddinott 1981 – R.F. Hoddinott, *The Thracians*, Thames and Hudson 1981.
- Isaac 1986 – B. Isaac, *The Greek Settlement in Thrace until the Macedonian Conquest*, Studies of the Dutch Archaeological and Historical Society X, Leiden, 1986.
- Jordanov 2000 – K. Jordanov, *Kingdoms and Policy*, in: *The Ancient Thrace*, Sofia, 2000, 99-130.
- Kashuba 1997 – M. Kashuba, *Hlingenii II-sursa istorică pentru studiul de la cultura hallstattiană de haut-époque Saharna*, in: *The Thracian World at the Crossroads of Civilizations. Reports and Summaries. The 7<sup>th</sup> International Congress of Thracology*, Constanța-Mangalia-Tulcea 1996, Bucharest, 1997 I, 394-397.

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P.S. Grupajul de studii dedicate sitului de la Halmyris publicat în prezentul număr al revistei nu respectă normele cerute mai sus întrucât a fost transferat de la revista *Dacia*, unde normele de citare sunt altele.

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