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Review

STUDY ON ANIMAL BONE MATERIAL EXCAVATED FROM AN ARCHEOLOGICAL SITE FROM THE EARLY CHALCOLITH AND THE LATE IRON AGE NEAR THE VILLAGE OF SREDETS, BULGARIA

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ABSTRACT

The aim of the present research was to perform an archaeozoological analysis of animal bone material obtained from excavations near the village of Sredets, Stara Zagora region, Bulgaria. The osteoarchaeological finding was species-determined by morphological methods. The osteological material contained an entire skeleton of a sacrificed horse and 1015 species-determined bones and bone fragments belonging to a total of nine species of mammals of domestic and wild origin. The osteological finding from domestic mammals was predominant, amounting to 941 pieces of bones. The cattle bones took up a leading position of the total number of identified bones – 49,80% from the Early Chalcolithic Age and 58,14% from the Late Iron Age. The greater part comprised food remains from ancient inhabitants, indicated by the strong fragmentation of the animal bones, and traces of a mechanical impact as a result of an interaction with hard objects (portioning), as well as traces of thermal processing (burning). In a ritual pit from the Late Iron Age, a skeleton of a sacrificial horse was found. The horse was part of the livelihood and economic activity in these lands, marked the high social status of its owner, and, therefore, was sacrificed during funerals or other rituals.

Key words: osteoarcheology; animal bone artefacts; Early Chalcolithic Age; Late Iron Age, archaeozoology; Bulgaria

INTRODUCTION

On the territory of Bulgaria, archaeologists continue to excavate and study different historical sites, providing material for the osteological examination of animal and human bones. The discovered animal bone artefacts, collected during excavations, constitute a valuable source of information for the clarification of questions related to the livelihood of prehistoric populations during the respective period of human development, as well as the concurrent existence of the animal world (1-3).

Using osteological material, one can draw conclusions on the variety of animal species: about their prevalence, spread and the impact of climate conditions on animal populations (4, 5).

The bone fossils provide interesting data on the origin, taming and evolution of the domestic and wildlife. Osteological and osteometric studies report interesting findings regarding the physical type of the animals belonging to a certain age. Characteristic and temporal changes may be traced, especially over a relatively long period. They are mostly expressed in domestic animals due to their utilization by humans. The process of domestication must not be regarded in isolation, or on its own, because it has a significant and actual impact on the main spheres of human activity – social, cultural, livelihood, religious, etc. The nature of domestication of wildlife has two sides – one, related to the search of historical and scientific proof about the mechanisms of domestication of individual species, and another – reflecting the changes in

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life, thinking and social structure of human society (6-12).

The aim of the present research is to perform an archaeozoological analysis of animal bone material obtained from excavations near the village of Sredets, Bulgaria.

MATERIALS AND METHODS

1. Archaeological background

In the autumn of 2020 a rescue archaeological excavation on site A27 near the village of Sredets, Stara Zagora region was undertaken following the works on building an intersystemic gas connection between Bulgaria and Greece. The area allocated to the excavation was 120 m long and 30 m wide **(Figure 1).** According to the found materials, the studied structures may be attributed to two epochs – Early Chalcolithic (ECH) and Late Iron Age (LIA).

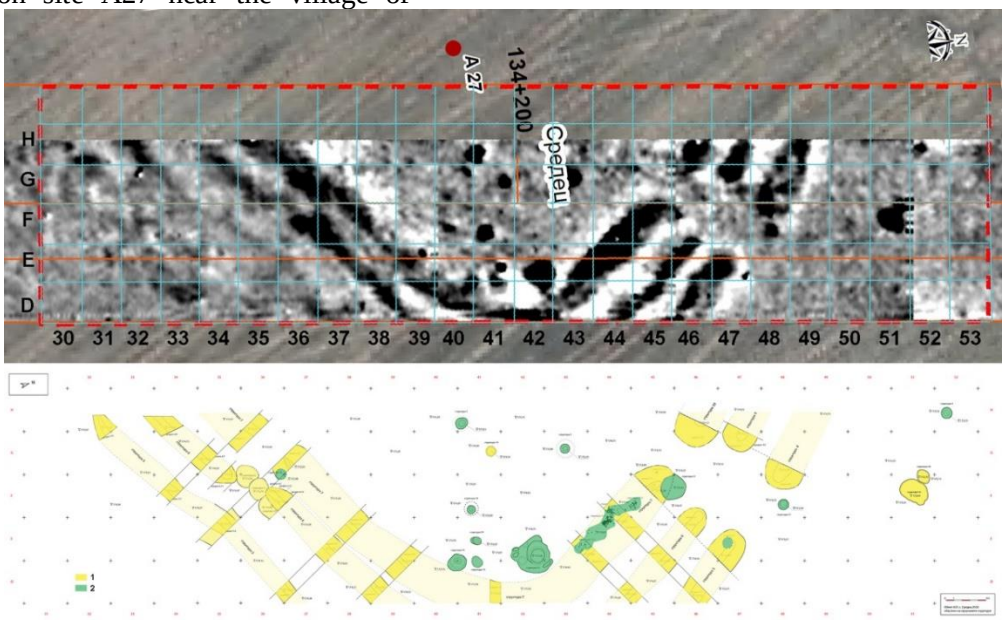

Figure 1. General plan of the site and the studied structures. 1- Early Chalcolithic Age (in yellow), 2 – Late Iron Age (LIA) (in green).

Early Chalcolithic Age (5900-5750 BC): Three concentric trenches and five pits – four outside and one within the area surrounded by the trenches, can be attributed to this period. **(Figure 2).**

Figure 2. Northeastern entrance to the space encircled by the trenches. Early Chalcolithic Age.

A small height dating to the Early Chalcolithic Age was found encircled by three concentric trenches, enclosing a rounded quadrangular space with a surface area of over 3 decares. Only one Early Chalcolithic structure was studied within the areas allocated for excavation – a pit with a specific character of the deposit.

The inner V-shaped trench had a width between 4,50 m and 5,40 m and depth between 2,50 m and 3,10 m, with a 3,30 m interruption at its northeastern side.

The middle trench was between 2,50 m and 3,40 m wide, and 1,55 m and 1,90 m deep, whose form varied between U-shaped or trapezoid. The trench showed two interruptions – one 7,80 m wide at the northeastern side, and another 3,5 m wide at the southeastern side.

The external trench was between 2,50 m and 4,0 m wide, and 1,10 m to 1,75 m deep, varying from U-shaped to trapezoid. In the area at the northeastern side, the trench showed a 5,50 m wide interruption.

Late Iron Period (V- I century BC): The only surface structure – a fireplace, as well as 11 ritual pits could be dated to this period. They had a different shape and size, and a complex profile of their main section – a funnel-shaped upper part and cylindrical/honeycomb/pear-shaped lower part. Their content was multi-layered, whereas the deposit was notable for its different content – a complete lack of such, or one or several ceramic vessels, and sacrificed animal – a horse. In one of the pits, a fragment from a black varnished kylix was dated to the middle of Vth century BC.

2. Materials

Bones and bone fragments, amounting to 1015 were examined and dated to the abovementioned two periods.

3. Methods: Morphological methods

- The long bones and the bones of the heads of domestic and wild mammals were species-determined by the color comparative catalogue of France 2008 (13).
- The differentiation of cattle bones from large ruminant bones (LR) was performed in view of the osteological differences in the superficial bone relief, as well as according to the anatomical proportions and metric indicators.
- The metrical differences between the limb bones of grey steppe cattle and tour were considered according to Tsalkin 1960 (14) and Tsalkin 1961 (15).
- The differentiation of sheep and goat bones were noted according to their morphological characteristics. In addition, the methods of Gromova 1953 (4), Boessneck 1969 (16) and Simon 1987 (17) were used. The authors described the head bones, the thoracic and pelvic limb bones, as well the differences in the shape and the occlusal surface of the premolars and molars of the lower jaw. The indicated methods illustrated the differences in the bone system between the sheep and the goat with pictures, used in the present comparative analysis.
- The determination of fragments of the distal end of the tibia of the domestic sheep and goat have been described in detail, according to the methodology and schematic illustration, proposed by Kratochvil 1969 (18).
- Indices for the osteometric measurement of bones were determined for the species sex differentiation according to a methodology described by Hegner 1962 (19) and Schramm 1967 (20). The latter include anatomical differences of the bones of the head, vertebrae, tubular bones and the pelvis.
- Differences in the lower jaw and the teeth between the goat and the sheep were used according to Halstead et al. 2002 (21), who studied the wear and profile of premolars and molars.
- The species differentiation of bones from the Canis genus was based on differences in the skulls of a wolf and a dog according to Gurskii 1973 (22). The method was based on the changes in the proportions and some osteologic indicators of the head bones.
- According to the Bökönyi method 1970 (23), we determined the minimal number of individuals (MNI) from which the examined osteological material originated. The method is based on the age separation of the bones of the different species into four main groups – young (juvenilis), young adults (subadultus), adult (adultus) and mature (geriatric) (matures+senilis).
- The degree of preservation of the bones was determined according to Behrensmeyer 1978 (24). The author presents six degrees (0-V) of bone preservation. At the 0 degree the surface did not show any changes/scaling or other deviations from the norm. The highest degree of fragmentation was Vth, where the original form of the bone could not be determined.

RESULTS

1. General archaeozoological finding

The osteological material from the site near the village of Sredets, Stara Zagora region contained 1 entire skeleton of horse and 1015 species-determined bones and bone fragments (including 4 separate horse bones) belonging to a total of 9 species of mammals of domestic and wild origin **(Table 1).** The osteological finding from domestic mammals was predominant, amounting to 941 pieces of bones/ bone fragments.

The most commonly encountered fragments were metapodia from small and large mammals. A large quantity of whole bones was found from the skeleton of the carpal and tarsal joints, as well as bones of the digits and vertebrae from various parts of the spinal column.

Part of the bones showed traces from a mechanical impact through an interaction with hard objects (portioning) and indicated thermal processing, expressed in changes in their colour from dark brown to black (burning).

Table 1. *Distribution of the bones according to epochs and archaeological structures.*

EARLY CHALCOLITHIC AGE										
Structures	**Cattle**	**Goat or Sheep / Goat**	**Pig**	**Dog**	**Deer**	**Doe**	**Rabit**	**Cat**	**Horse**	
Structure 4	49	22/0	22		1					
Structure 5	105	9/14	28		2					
Structure 6	141	8/22	77		3	4				
Structure 7	92	14/29	113	5	19	8	1	1		
Structure 8	43	0/2	7		24					
Structure 9	35	1/5	12		7					
Structure 10	8	0/2	11		5					
Structure 18	1		1							
Structure 21	8	0/1	3							
Structure 22	2		5							
TOTAL	**484**	**54/75**	**279**	**5**	**61**	**12**	**1**	**1**	**-**	**972**
LATE IRON AGE										
Structures	**Cattle**	**Goat or Sheep / Goat**	**Pig**	**Dog**	**Deer**	**Doe**	**Rabit**	**Cat**	**Horse**	
Structure 3	4								1 entire skeleton	
Structure 12	3									
Structure 15	4	2/0								
Structure 17	5	0/3	5							
Terrestrial structures (7.0.1, 7.0.2, 7.2.1, 7.3.1)	9		2	2					4	
TOTAL	**25**	**2/3**	**7**	**2**	-	-	-	-	4	
TOTAL /ECH+LI/	**509**	**56/78**	**286**	**7**	**61**	**12**	**1**	**1**	**4**	**1015**

2. Early Chalcolithic archaeozoological finding

A total of 972 pieces of bones and bone fragments belonging to eight mammal species attributed to the Early Chalcolithic Age **(Table 2).**

Table 2. *Distribution of the bones according to species and their minimum number of individuals (MNI) during the Early Chalcolithic period.*

SPECIES	**BONES**		**MNI**	
	Number	**%**	**Number**	**%**
Cattle	484	49,8	143	37,74
Goat or Sheep	54	5,56	22	5,80
Goat	75	7,72	31	8,18
Pig	279	28,70	135	35,62
Dog	5	0,51	3	0,79
Deer	61	6,28	38	10,03
Doe	12	1,23	5	1,32
Rabit	1	0,10	1	0,26
Cat	1	0,10	1	0,26
Total	**972**	**100**	**379**	**100**

Table 2 shows that most numerous were the remains from domestic animals, followed by large ruminants (especially cattle), small ruminants (sheep and goat), pig, dog and cat. The material originated from at least 379 individuals (MNI), with 74 bone pieces from wild fauna distributed among 44 MNI. Deer bones, including the large number of found antlers and their fragments, were prevalent among the wild animals – 61 pieces **(Figure 3).**

A distinctive trait of the finding was that predominantly acropodium and stylopodium bones had been preserved.

Figure 3. External trench – a pile of deer antlers at the bottom near the entrance to the trench. Early Chalcolithic Age.

3. Late Iron Age archaeozoological finding

The bone material from the Late Iron Age comprised 43 species-identified bones and bone fragments, attributed to 22 MNI from 5 mammal species **(Table 3).**

Twenty-five bones and bone fragments from large ruminants were identified as 58,14% of the total number of bones for the period. They belonged to 13 animals, respectively 59,08% of the total number of individuals, whereas the small ruminants were represented mostly by the goat. The osteological finding consisted of 3 bones, or 6,98% of the total number.

The pig bones comprised 7 identified bone fragments and which took up a second position per total number. They belonged to 3 MNI, or 13,64% of the total MNI.

Table 3. *Distribution of bones per animal species and their MNI during the Late Iron Age.*

SPECIES	BONES		MNI	
	Number	**%**	**Number**	**%**
Cattle	25	58,14	13	59,08
Goat or Sheep	2	4,65	1	4,55
Goat	3	6,98	2	9,09
Pig	7	16,28	3	13,64
Dog	2	4,65	1	4,55
Horse	4	9,30	2	9,09
Total	**43**	**100**	**22**	**100**

In the present study of an archaeological site dated to Late Iron Age also found a sacrificed horse skeleton **(Figure 4).** The osteological examination showed that the skeleton belonged to a grown-up male individual. During the osteometric analysis it was found that the height at the withers reached 168 cm. Perhaps the horse had been buried with a ritual purpose considering the fact that it was found in a ritual pit. In addition to the skeleton, there were 4 other singular horse bones (2 cervical vertebrae and 2 femur) from the same animal species, respectively at least 2 horses or 9,09% of the total number of individuals.

(**a**) (**b**)

Figure 4. Pit from the Late Iron Age (archaeological structure 3): (**a**) Horse skeleton in situ; (**b**) Horse skull in situ.

DISCUSSION

The osteological material from the site near the village of Sredets, Stara Zagora region contained 1015 species-determined bone fragments. The osteological finding from domestic mammals was predominant. The greater part comprised food remains from the ancient inhabitants, indicated by the strong fragmentation of the bones, as well as the traces from a mechanical impact during the interaction with hard objects. The finding corresponds to other data (3, 8, 9, 28). However, it cannot be ascertained if the latter had occurred before the thermal processing of the animal remains and during the dismembering of the killed animals (portioning), or during their preparation for consumption. Furthermore, part of the bones bore traces of thermal processing, expressed in changes in their colour from dark brown to black (burning).

A distinctive trait of the finding was that predominantly acropodium and stylopodium bones and vertebrae from various parts of the spinal column had been preserved. We think that this may be due to the thick substantia compacta of the indicated bones, which made them comparatively resistant to external impacts.

1. Cattle (Bos prirmigenius f. taurus L.)

The cattle bones took up a leading position of the total number of identified bones – 49,80% from the Early Chalcolithic Age and 58,14% from the Late Iron Age. Cattle bones were found on almost all archaeological sites from the late pre-historic periods on the territory of the country. In the region of the village of Ovcharovo the most represented cattle bones amounting to 9 922 pieces were distributed among 628 MNI. The latter was allocated to the following epochs: 120 pieces from the Early Chalcolithic Age, 269 from the Middle and 239 from the Late (2). In his study on the prehistoric village near the District Hospital, Kostov 2007 (9) found the same tendency in a large number of cattle bones from the Neolithic – 49,04% from the group context, 54,92% from the Early Chalcolithic Age, and 51.67% from the Late Chalcolithic Age.

2. Pig (Sus scrofa)

The present study determined that in the examined archaeological site, the second most numerous bones belonged to the pig – 28,70% of the total number of bones from the Early Chalcolithic Age, resp. 16,28% from the Late Iron Age; distributed among 135 individuals. A great part of the bones carried traces from a sharp object on their surface, perhaps owing to the portioning of carcasses for consumption. The full ossification of the skeleton in domestic animals was reached at the age of 20-24 months, while in wildlife – the metaepiphyseal cartilage of the tubular bones was observed on the 3rd year (10). The bones of the domestic pig were found to be strongly fragmented reaching IV-V degree on the Behrensmeyer scale 1978 (24).

The differentiation between domestic and wild representatives is a comparatively difficult and precise process. In primitive domestic animals the width of the skull is relatively larger, and also the occipital bone is more vertically positioned, the lacrimal bone has an almost square shape and the parietal bone is relatively wide. The tubular bones from the area of the limbs are shorter and have thinner diaphyses (25). Domestic pigs in Eastern Europe were typical representatives of eastern (*Sus striatosus*) and western (*Sus scrofa*) origin. During the prehistoric periods, the domestic pig (*Sus scrofa f. domestica L.)* occupied a distinctive place in the life of the population on these lands. During the Chalcolith in the village of Ovcharovo, the species ranked second per quantity of osteological findings, and took up a first position among the other bones per number of individuals from which it originated (the authors). This fact underscores its notable economic importance as an animal species in the context of breeding and hunting of its wild representatives (2). In the Kazanlak habitation mound the Chalcolithic pig ranked fifth per number of bones (26). Its percentile presence was significantly higher in the village of Golyamo Delchevo, where it surpassed the number of other mammals (6). During the Late Eneolithic and Early Bronze settlements near the town of Sozopol, adult individuals from the domestic pig species predominated the bone material in comparison to the other groups (27)].

3. Small ruminants (Goat (Capra hircus) and Sheep (Ovis aries)

A total of 134 bones and bone fragments from small ruminants (goat and sheep) were found belonging to at least 53 individuals attributed to the observed Early Chalcolithic period, resp. 3 MNI from the Late Iron Age. Due to the difficult differentiation of the osteological material between the ovine and caprine species, the finding was divided into small ruminants that could be either sheep or goats, and caprine consisting only of goat bones. The small ruminant bones, incl. goat bones took up 13,28% from the Early Chalcolithic Age, resp. 11,63% from the Late Iron Age. The established volume of the finding shows that small ruminants were third in number after the cattle and the pigs. The bone material was distributed unevenly between the parts of the skeleton. Most numerous were the bones and bone fragments of the skull, thoracic limbs, with considerably fewer pelvic limb ones – individual bones of the digits, carpal and tarsal joint were found. In addition, some parts of the vertebral column were missing.

Dissimilar of the present study, bones from wild goats Bone remains from wild goats have been found in almost all of our prehistoric settlements (6, 9, 28). Bone remains were discovered on many sites, but due to difficult differentiation between the domestic and wild, they were named “goat” bones, without assigning them to any particular species (9), (27). The earliest traces of the domestic goat dating to the Neolithic were found in the Devetashka cave (1). Horns, mostly fragmented, were found in the bone material from the Early Neolithic Age.

Goat (*Capra hircus*) horns living in other periods – most often during the Chalcolith were found on archaeological sites near the village of Golyamo Delchevo and the village of Ezero on the territory of the country (6, 7). Similar to the present study, data for goat bones were linked to other sites, but due to the limited number and/or strong fragmentation no necessary osteometric measurements were performed (3, 8, 9).

4. Deer (Cervus elaphus L.)

Deer bones were prevalent among the wild animals – 61 pieces. This fact is confirmed by the large number of found antlers and their fragments. Deer bones were discovered in almost all sites from the Chalcolith around the country [6], [9], [28]. This proves that deer had been widely spread at the time and was a hunted animal. Among the bone remains from the habitation mound near Dolnoslav, the deer ranked first per number of individuals among the other wildlife representatives (11). In the habitation tumulus Yasatepe near the town of Plovdiv, the deer was represented by 5,22% as bones, and 3,74% as minimal number of individuals from the Late Chalcolith (29). In the habitation mound Golyamo Delchevo, Varna region these percentages ranged between 19,42% and 25,63% throughout the different periods of the Chalcolith [6]. In the region of the village of Ovcharovo, the deer bones ranged between 25,09% and 14,87% (2).

5. Doe (Capreolus capreolus)

The number of doe bones amounted to a total of 12, originating from at least five individuals, respectively 1,23% of the total number of bones and were distributed among 1,32% of MNI. The identified bones came from the metapodia of the limbs.

The doe has been an object of study in other archaeological sites, which allows a comparative analysis of the data from different studies. Detailed osteometric data have been obtained in very few of them. Ivanov et al. 1975 (6) in Golyamo Delvchevo and Ivanov et al. 1979 (7) in Ezero, Kovachev 1988 (30) in Kazanlak, as well as Kostov 2009 (28) on the site near the District Hospital, Stara Zagora have analysed as comprehensibly as possible the bones of the doe, and other animal species.

6. Other kind of animals

The present study from the region of the village of Sredets showed only separate individual bones from a hare and a cat. In comparison, in the Azmashka tumulus near the town of Stara Zagora 5 hare bones were identified (*Lepus europaeus Pall*). They belonged to 4 individuals – 1 from the Early Chalcolithic Age, and 3 – from the Late Chalcolithic Age. The Chalcolithic material from the habitation mound near the village of Golyamo Delchevo showed that the hare was represented by 0,14% of the bones and 0,73% of MNI (6). However, in the Late Neolithic period from the region of Yasatepe, the hare bones comprised only 0,1% of all bones and 0,5% of the individuals (29). The percentages in the habitation mound near Ovcharovo were also insignificant – 0,41% and respectively MNI 1,55%. In the habitation mound near the village of Ezero from the Late Neolithic Age, the percentages were 0,59% and 1,07% [7]. Our results confirm the view of some authors, that perhaps the environmental conditions for the spread of the hare on our lands were relatively unfavourable for this animal species (7-9).

7. Horse (Equus caballus)

The osteological material from the site near the village of Sredets, Stara Zagora region contained 1 entire horse skeleton, and 4 separate horse bones. Identifying any equid (horse, donkey and hybrid bones) remains, especially the metacarpal and metatarsal bones is a challenge in archaeozoological research (30, 31). Gündem 2024 (31) described some remains of donkeys and mules which accounted for approximately 1,8% of the mammal remains, but no horse bones had been found. Nehring 1989 (32) reported the finding of wild donkey bones (*Equus hemionus onager*), yet later these results were refuted (33). The latter identified them as belonging to a smaller horse.

We have not found any data to prove that this species was used for consumption. More likely, the horse was part of the livelihood and economic activity in these lands, marked the high social status of its owner, and, therefore, was sacrificed during funerals or other rituals (28, 31, 34).

CONCLUSIONS

The osteological finding from domestic mammals was predominant in the archeological excavation near the village of Sredets, Stara Zagora region. The greater part comprised food remains from the ancient inhabitants, except the horse remains. The horse was sacrificed during rituals.

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