

## ARCHAEOZOOLOGICAL ASPECTS CONCERNING THE ECONOMIC LIFE DURING LATE BRONZE AGE IN PALATCA

DIANA BINDEA, IMOLA KELEMEN

**Abstract:** The archaeozoological material analyzed in the present research comes from Palatca, a settlement in Cluj county, 40 km E-NE from Cluj-Napoca. It is here that the archaeological excavation in 2001 took place. The sample which cumulates 342 remains belongs to the Bădeni culture III - Deva and it was discovered in a place called „Togul lui Mândrușcă”. They are all mammal remains, with the exception of one gastropod shell. Animal breeding was the primordial activity of the people from this settlement. The high frequency of domestic mammals attests the importance of this activity within the community. A small percentage of wild mammals were discovered, which underlines the reduced use of wild species as a food source. On the basis of the number of fragments (NR), we estimated that the first place among the food sources in the settlement of Palatca was occupied by cattle. Caprovines follow closely, and the third place is represented by swine. We have a slightly different situation if we calculate everything according to the minimum number of individuals (MNI). All the other wild species identified: the roe deer, the wild boar and the hare are represented in the archaeozoological sample with one fragment each, with an exception: the red deer. Hunting wild birds, fishing or picking mollusks seem to have played an insignificant role in the economy of the Palatca settlement.

**Keywords:** archaeozoology; fauna; bones; Palatca; Bronze Age; Bădeni III - Deva culture.

The place for the 2011 excavation, from where we obtained the materials analyzed in the present paper - Palatca commune - is situated in Cluj county, 40 km E-NE from the city of Cluj-Napoca. The first archaeological discovery at Palatca was a habitation on a high place in the northern part of the village from where Neolithic stone axes and animal bones were recovered<sup>1</sup>. In the autumn of 1948 the terrain was examined south of the village, on Valea Țagului, in the spot called “La Pădure” or “Chesăul Mare”, after which the research team composed of M. Macrea and Gy. László noticed the existence of a Bronze Age habitation, with houses and hearths<sup>2</sup>.

In the last years research has been resumed in the late Bronze Age habitation from Palatca in the place called “Togul lui Mândrușcă”. The systematic excavation, done during 6 campaigns, starting from 1991 was supervised by M. Rotea and the 2001 campaign was the one they found the fauna sample analyzed and presented in the present paper. The archaeological material found at Palatca, mostly ceramics, but

<sup>1</sup> Roska 1942, p. 154.

<sup>2</sup> Soroceanu 1972, p. 165-172; RepCluj 1992, p. 303.

also other pieces made from burnt clay, bronze, bone or horns and the osteological ones, were attributed by the chief of the excavations to the Bădeni III-Deva culture, a synthetical cultural entity, dated back to the beginning of the Late Bronze Age period in the east arch of the western Carpathian Mountains<sup>3</sup>.

### Fauna in the Palatca – “Togul lui Mândrușcă” site

The fauna sample discovered during the archaeological diggings done in 2001 totals 342 determined bone remains which were all recovered from the layer of culture. Except for a shell belonging to a gastropod (an invertebrate) all the other fragments belong to mammals. The aspect of the material indicates that all the fragments are debris from kitchen.

All the 6 domestic species usually found in archaeozoological samples have been identified: *Bos taurus* (cattle), *Ovis aries* (sheep), *Capra hircus* (goat), *Sus scrofa domesticus* (pig), *Equus caballus* (horse) and *Canis familiaris* (dog). To these domestic mammals we can attribute 289 bone remains, which represent 96.98% (table 1, fig. 1) from the total of identified animals. Thus the quota of wild species is very small, just 9 fragments, a 3.02% belong to 4 identified mammals: *Cervus elaphus* (red deer), *Capreolus capreolus* (roe deer), *Sus scrofa ferus* (wild boar) and *Lepus europaeus* (hare).

Another identified group is that of the rodents. A skull and a left mandible, based on the dentition<sup>4</sup>, have been identified as belonging to the species *Cricetus cricetus* (common hamster). Besides these another 8 fragments coming from the post-cranial skeleton very probably belong to rodents, without being able to say whether from the common hamster or a different species, but they most certainly come from 2 rodent individuals. These remains were excluded from the statistics, partly because rodents are not consumed, partly because they could be an intrusion into the layer of habitation.

### Species analysis

*Bos taurus* (cattle) cumulated 133 remains, representing 44.63% of the total of mammals (fig 2). Judging by the number of remains (NR) this species occupies first place in the livestock economy. In our opinion the lack of jaw fragments, based on which the minimum number of individuals (MNI) is calculated, led to an undervaluation of this species. Thus, based on the available material, we were able to identify a minimum of 5 individuals. These represent just 20% of the total number of estimated individuals, a percentage which places bovines on third place, after sheep/goats and pigs.

Age repartition<sup>5</sup> of the estimated individuals is as follows: 1 individual under 12 months (distal epiphysis of humerus not ossified), 1 individual approximately 18 months old (primary phalange with proximal ossification line visible), 2 individuals approximately 30-32 months old (degree of jaw dental wear) and 1 individual over

<sup>3</sup> Rotea 1994, p. 42; Rotea 1997, p. 13.

<sup>4</sup> Hillson 1986, p. 63.

<sup>5</sup> Silver 1963, p. 252-253.

4 years old (based on the jaw bone). If we follow the repartition of bone remains belonging to domestic bovines based on anatomical elements (table 2) we notice the existence of a large number of isolated teeth (28). By eliminating this category we notice a balanced distribution of fragments from meaty areas (with developed muscles) as compared to remains from non-meaty areas of the skeleton. Thus the ratio is 49.04% meaty / 50.96% non-meaty areas.

	NR	%	MNI	%
<i>Bos taurus</i>	133	44,63	5	20
<i>Ovis aries</i> / <i>Capra hircus</i>	86	28,85	7	28
<i>Sus scrofa domesticus</i>	44	14,76	6	24
<i>Equus caballus</i>	21	7,04	2	8
<i>Canis familiaris</i>	5	1,67	1	4
<b>Total domestic</b>	<b>289</b>	<b>96,98</b>	<b>21</b>	<b>84</b>
<i>Cervus elaphus</i>	6	2,01	1	4
<i>Capreolus capreolus</i>	1	0,33	1	4
<i>Sus scrofa ferus</i>	1	0,33	1	4
<i>Lepus europaeus</i>	1	0,33	1	4
<b>Total wild</b>	<b>9</b>	<b>3,02</b>	<b>4</b>	<b>16</b>
<b>Total determined mammals</b>	<b>298</b>	<b>100</b>	<b>25</b>	<b>100</b>
Large-sized ribs	19			
Small-medium sized ribs	24			
<b>Total mammals</b>	<b>341</b>			
Gastropods	1			
<b>Total</b>	<b>342</b>			

Table 1. Frequency of fauna remains at Palatca detailed on species.

Fauna material belonging to domestic bovines unfortunately did not offer us possibilities to estimate their size and sex (no bone was recovered whole). Also the horn identified in an advanced fragmentary state did not give us any clues of the morphologic type ("primigenius" of "brachyceros") of the cattle species from Palatca.

*Ovis aries*/*Capra hircus* (sheep/goat) are represented by 86 bone fragments, representing 28% of the total number of mammals. Because of difficulties of distinguishing between sheep and goats, based on morphological particularities of the skeleton, these two species will be treated together, being included in the artificial group created in archaeozoology named caprovines (sheep/goats). In this group 13 fragments belong to sheep and 4 belong to goats.

The rather large number of jaw bones with fragments discovered *in situ* allowed for an estimate of a number of individuals larger than in the case of bovines. Thus, though from looking at the number of remains, caprovines seem to be far away from bovines, by looking at the minimum number of individuals small horned animals occupy first place with 28%. The 7 estimated individuals have the following age repartition: 2 individuals under 1 year, one of these around 8-10 months (mandible with deciduous teeth), 1 individual approximately 26-28 months (wear of mandible teeth), 2 individuals of approximately 2.5 years (based on mandible remains), 2 individuals

<i>Species</i> Anatomical element	<i>Bos taurus</i>	<i>Ovis / Capra</i>	<i>Sus domesticus</i>	<i>Equus caballus</i>	<i>Canis familiaris</i>	<i>Cervus elaphus</i>	<i>Capreolus capreolus</i>	<i>Sus ferus</i>	<i>Lepus europaeus</i>
Horns	1	1				2			
Skull	6	2	2						
Maxilla	3		4						
Mandible	13	8	12						
Isolated teeth	28	26	10	11	1	1			
Atlas		1							
Axis	1	1							
Scapula	4	5	2	2		2			
Humerus	11	11	1						
Radius	5	4		1	1	1			
Ulna	2	1	1						1
Carpale	4								
Metacarpus	4	5	4		1			1	
Pelvis	4	2	1				1		
Femur	4	2	1						
Patella									
Tibia	9	2	1	1					
Calcaneus			1		1				
Astragalus	3	1							
Centrotarsale	2								
Metatarsus	4	1	1	1	1				
Metapodial	3	6							
Sesamoid				2					
Phalanx I	8	1	1	1					
Phalanx II	3			2					
Phalanx III	1		1						
Vertebrae	10	6	1						
<b>Total</b>	<b>133</b>	<b>86</b>	<b>44</b>	<b>21</b>	<b>5</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>1</b>

**Table 2.** Repartition of bone remains from Palatca on anatomical elements.

over 3.5 years (femur and proximally ossified tibia) and of one individual we can only say that it was over 2 years old at the moment of slaughtering (based on the wear of the definitive premolar teeth). For this individual we do not know the species. One of the individuals over 3.5 years of age was a goat, the rest of them being sheep (determining the species was based on mandible fragments)<sup>6</sup>. From goats we have a right horn slightly broken, with a “sword” like tip with traces of drilling at the base, a distal

<sup>6</sup> Boessneck et alii 1964, p. 34-35.

fragment of a humerus, a fragmentary pelvis, and a proximal fragment of a tibia. The horn and the pelvis possibly indicate a male individual. No sheep horns were identified. We believe that a sheep astragalus belongs to a female individual<sup>7</sup>.

The anatomical element distribution of the fragments indicates a slightly higher percentage of fragments from meaty regions (55%) as compared to those from non-meaty regions (45%). This ratio was obtained after removing the 26 fragments representing isolated teeth.

*Sus scrofa domesticus* (domestic pigs) have a total of 44 fauna remains coming from a minimum of 6 individuals. With 14.76% of the total remains from mammals the pig occupies third place. As for the number of individuals domestic pigs occupy second place with 24%, after caprovines and above bovines. The ages for slaughtering of the 6 estimated individuals are as follows: under 1 year - 2 individuals (approximately 8-10 months), one of which was a male; 16-17 months - 1 individual; between 1.5-2 years - 2 individuals; over 2.5 years - 1 male individual. Sex determination was possible for three individuals, the two males previously mentioned and one female (based on an isolated canine tooth). Age estimation in the case of domestic pigs was based on teeth wear and eruption from jaws and mandible fragments.

Following the distribution of fauna remains of the pig on anatomical elements we noticed that most of the fragments come from body areas with poorly developed muscles. Thus the ratio for non-meaty areas compared to meaty areas is 76.5 / 23.5%.

*Equus caballus* (horse) is well represented in the analyzed fauna sample, with 7.04% of fragments and 8% of number of individuals. From the 21 fragments attributed to horses half are isolated teeth. Only four fragments come from meaty body areas (2 scapulae, 1 radius and 1 tibia), the rest (except for 2 sesamoids) belong to the autopod. For a secondary phalange, the calculus of the distal index ( $47.5 \times 100/50 = 95$ ) means it belongs to a posterior leg<sup>8</sup>. The horse is represented by at least 2 individuals: one sacrificed under 2 years of age (two of the isolated molars are lacteals) and one whose age we do not know for sure; we can only say that he was over two years of age at the moment of sacrifice (distally ossified tibia and permanent dentition).

*Canis familiaris* (dog) has 1.67% according to the number of remains. From this species we have 5 fragments (1 canine tooth, 1 radius, 1 metacarpus III, 1 calcaneus and 1 metatarsus IV), probably from a single adult individual. As for the minimum number of individuals the frequency of the dog is 4%.

*Cervus elaphus* (red deer) takes first place when it comes to wild animals but its frequency is very small, of only 2.01% judging from the number of fragments and of 4% judging by the number of individuals. Six fauna remains from this species have been identified (2 insignificant horn fragments, 1 isolated upper-jaw molar, 2 scapular fragments and a distal radius fragment). It is possible that all these remains come from a single individual over 4 years old (male, because of the horns).

*Capreolus capreolus* (roe deer) has been identified based on 1 pelvis fragment from a single individual whose age cannot be estimated.

<sup>7</sup> Boessneck et alii 1964, p. 102.

<sup>8</sup> Udrescu et alii 1999, p. 103.

*Sus scrofa ferus* (wild boar) has been identified based on 1 whole metacarpus III from an individual over 2 years of age whose estimated shoulder height is 88.035 cm<sup>9</sup>. This value, rather small, could indicate a female wild boar but also a mixed, intermediate pig - wild boar (resulting from mixed breeding of the domestic pig with the wild one).

*Lepus europaeus* (hare) is represented by a proximal ulna fragment, with the ossification limit of the olecranon tuberosity visible, indicating an immature individual.

Since roe deer, wild boar and hare are represented by only one fragment each, they register the lowest percentages: just 0.33% according to the number of remains and 4% according to the number of individuals.

In the table representing the frequency of species the 43 rib fragments were put separately due to the difficulty of establishing the species. A number of 19 rib fragments come from large animals (bovines, horse, red deer) and 24 belong to medium or small sized animals (sheep, goat, pig, roe deer, etc).

Part of the fauna remains was completely or partially burned. If we compare the burnt fragments to the whole batch we get a small percentage of 1.95%. Out of the 19 burnt bone fragments 9 could not be specifically determined, a large number being attributed to large animals. With just one exception - a calcinated fragment - the bones were burnt black either integrally or had black burning spots. From the sample of determined fauna material 10 fragments had traces of fire contact, as follows:

- *Bos taurus*
  1. upper isolated premolar tooth, partially burnt black
  2. root of an isolated tooth, burnt black
  3. astragalus with the lateral half calcinated
  4. metapodial (?) proximally processed, partially burnt black
  5. primary phalange partially burnt black
- *Equus caballus*
  1. tibia with a black burning spot on the lateral distal epiphysis
  2. big sesamoid completely burnt black
- *Ovis aries / Capra hircus*
  1. fragmentary humerus shaft (?) burnt black
- *Sus scrofa domesticus*
  1. metacarpus V, proximal fragment, with traces of burning

On a series of fragments we could see visible traces from objects used in meat processing: humerus cap, shaft fragment of tibia and secondary phalange belonging to bovines, scapula and metacarpus with drilling traces, belonging to caprovines.

We can consider the following three pieces to be bone objects:

- Left bovine mandible (inv. no. P176320), fragment from the proximal side with symphysis, incisor tooth socket and foramen mentale. At the distal end of the piece the mandible wall is cut in a zigzag shape. It is possible that this object was used to decorate ceramics. There are no wear traces resulting from contact with a hard surface. Dimensions: length = 105 mm, piece maximum width (height of the mandible) = 32.2 mm.

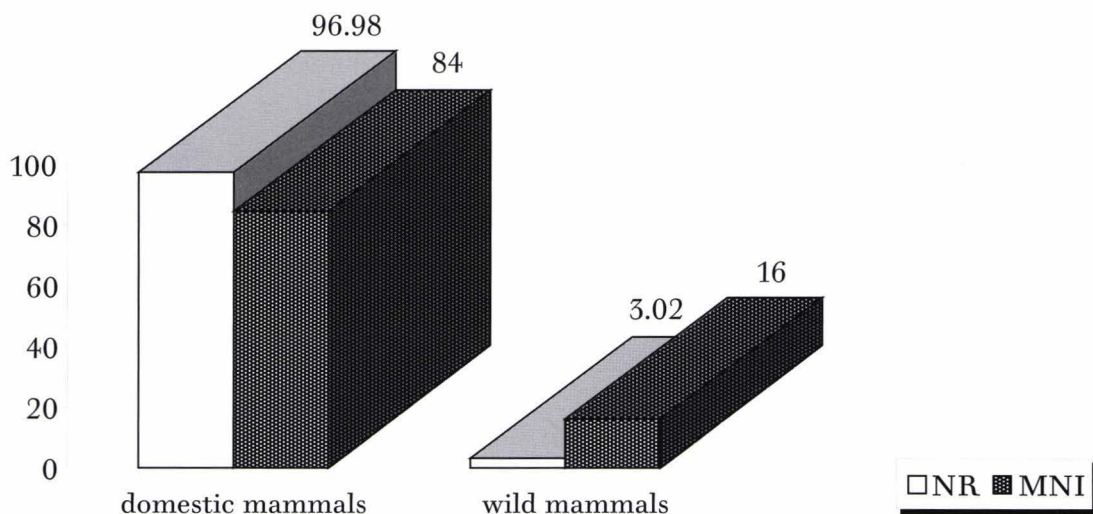
<sup>9</sup> Udrescu et alii 1999, p. 86.

- Object (inv. no. P176319) made probably from the shaft of a long bone, from a large-sized animal (the aspect of the piece allows us to suppose a pig fibula, proximal fragment) with the part corresponding to the medullar shaft grinded, with the distal end broken – object with unknown destination. Dimensions: length 73.5 mm, piece width = 12.6 mm.
- Fragment from an object (inv. no. P176318) whose usage is difficult to say; anatomically it could be a proximal metapodial fragment from a large-sized animal, polished on the external face both at the articulation and at the extraarticulation, with drilling traces, almost completely burnt black. Dimensions: length = 45.7 mm, width = 44.5 mm.

The metric data of the fauna remains from Palatca are included in Annex 1.

### Exploitation of animals in the Palatca habitation

The archaeozoological study realized on the fauna material from Palatca reveals the fact that the main occupation of the inhabitants of this settlement was animal husbandry.



**Fig. 1.** Domestic / wild mammals' ratio (%) in Palatca habitation.

The increased frequency of domestic mammals, of 96.98% according to the number of fragments, and of 84% according to the number of individuals proves the significance of this occupation. The reduced importance of hunting in obtaining meat is proven by the very low percentage of wild animals, 3.02% according to the number of remains and, slightly higher, of 16% according to the number of individuals.

Ratios calculated based on the number of fragments set domestic bovines in first place which due to their high percentage (44.63% according to the number of remains) would constitute the main food group in the Palatca settlement. Cattle are followed by caprovines with a percentage of 28.85%, according to the number of



remains, and third place goes to domestic pigs that, according to the same criteria (NR) have a percentage of 14.76%.

The facts are distorted if we take into account percentages calculated after the minimal number of individuals. This discrepancy is in our opinion an effect of the low frequency of jaw remains, key element in estimating the number of individuals. Thus in this case we consider the group of bovines to be undervalued with regards to the estimated number of individuals. With a percentage of 20% (NMI) cattle occupy themselves on third place, preceded by sheep/goats that have the highest percentage 28% and pigs with a frequency of 24%. Taking into account the fact that the fauna sample we analyzed is numerically small, these percentages (NMI) can be relative, the reason why, in our opinion, domestic bovines were the main group used by the prehistoric community from Palatca along which caprovines and pigs had an important place.

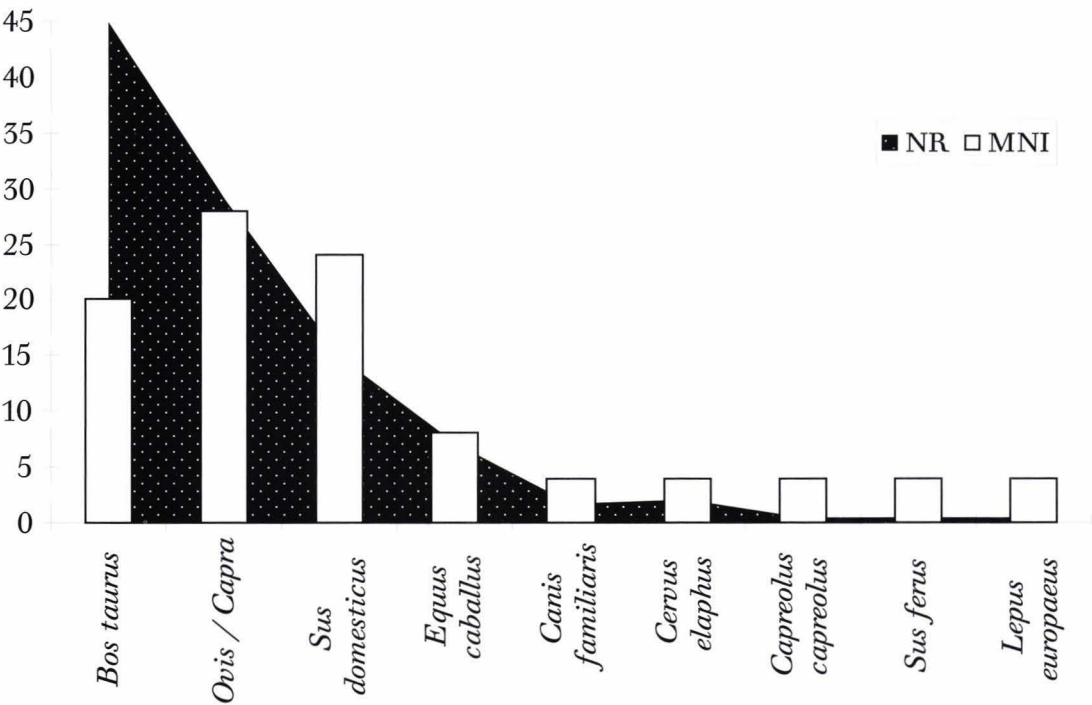


Fig. 2. Frequency of mammals in the Palatca site.

Distribution of the main domestic species whose usage was based on age groups (fig. 3) proves the higher percentage of bovines sacrificed between 2 and 3 years of age (40%) and an equality of percentages in the case of those under 1 year, 1-2 years and over 3 (4) years. This repartition indicates the growth of these species both for their main animal product - meat as well as secondary products (milk, skins, agricultural work), and identifying the three pieces manufactured from bone and described earlier, most likely obtained from cattle bones (most likely a mandible) proves the use of skeletal remains as primary resources for making different objects.



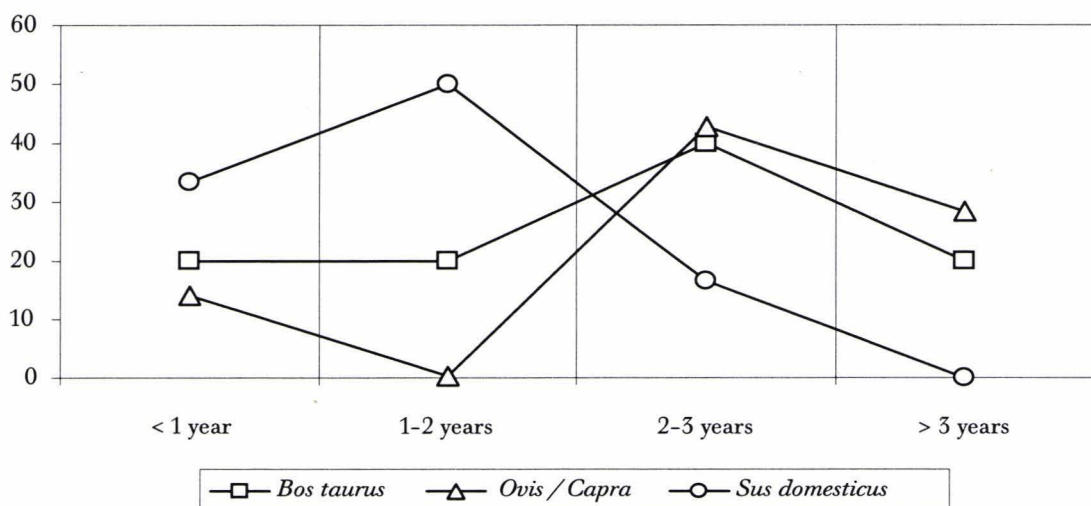


Fig. 3. Age group repartitions of individuals from the main domestic mammals used in the Palatca settlement.

As for sheep/goats the highest percentage is represented by animals sacrificed between 2-3 years of age (42.8%), mature animals (over 3 years old) have a lower percentage (28.5%), and the percentage represented by young animals is even lower (14.2%). We notice a complete lack of animals sacrificed between 1-2 years. The high rate of animals older than 2 years that were sacrificed suggests a usage of caprovines mostly for secondary products and for reproduction.

The ratio sheep/goat is 15.12 / 4.65% according to the number of remains and of 71.42 / 14.28% according to the number of individuals, the rest up to 100% in both cases being represented by the group of sheep/goats. Usage of hard materials from small horned animals in manufacturing activities can be suggested, since the horn from the male goat shows signs of an attempted sectioning at the base.

The strategy for exploiting pigs, as reflected by the slaughtering age is typical for this species, raised exclusively for meat and fat. Proof of this comes from the high percentage of animals between 1-2 years (50%), the age when the prehistoric pig reached the optimum body weight as a meat source. Also a reproductive batch was kept. The percentage of individuals under 1 year slaughtered is 33.3%, and of those with an age between 2-3 years is 16.6%. Animals over 3 years were absent.

The horse occupies fourth place when it comes to domestic mammal exploitation at Palatca with a rather important percentage, over 7%, both as number of fragments and as number of individuals. It was an animal used as food by the Palatca community, bone fragments from this species look like domestic waste, and the two bones (the tibia and the sesamoid) having traces of fire contact, can be the result of roasting meat.

The importance of hunted mammals was, like we stated earlier, very small. Except for the red deer, with a percentage of 2.01% (number of fragments) all the other wild species identified, roe deer, wild boar and hare, are represented each in the

archaeozoological batch by a single fragment signifying 0,33%. Their quota is slightly higher when analyzing the number of individuals, 4% for each wild species (red deer included). This time we have an overvaluation of hunted mammals, due to the fact that we attribute a single determined fragment of roe deer, wild boar and hare to an individual. Thus, an overvaluation we cannot avoid, because of the inconveniences of the estimation method for the establishment of the minimal number of individuals. Hunting wild birds, fishing and gathering shells seem to have had an insignificant role in the economy of the Palatca settlement.

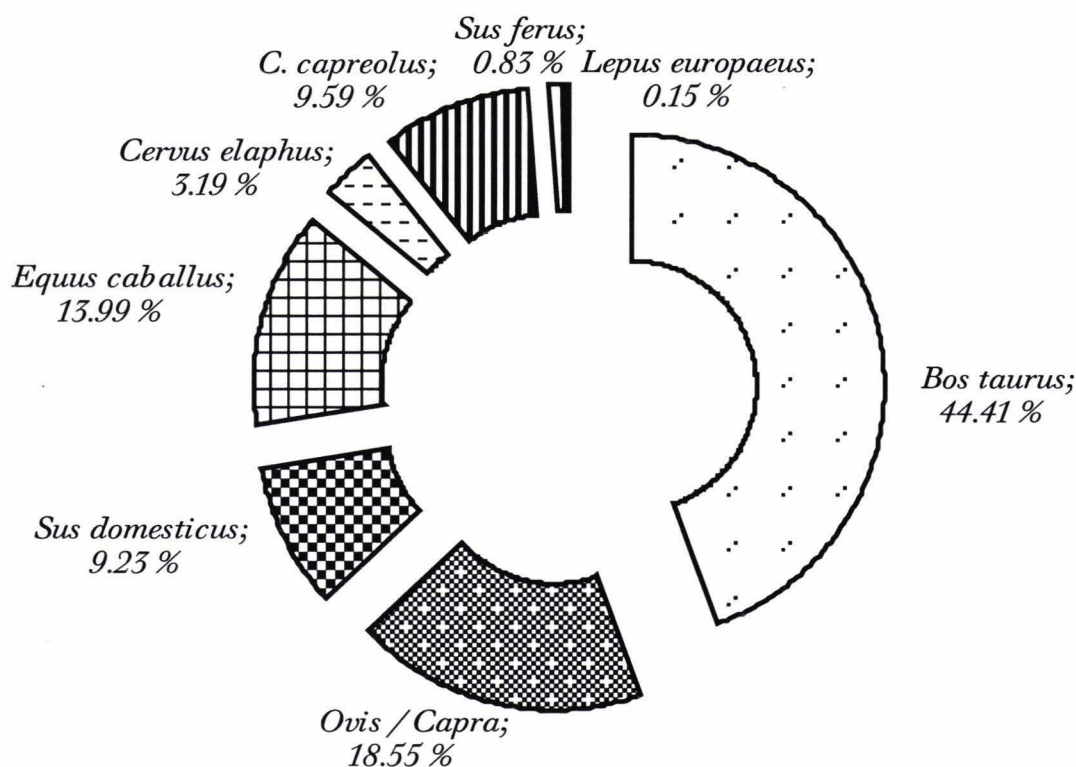


Fig. 4. Estimated meat quantity obtained from exploited or hunted species at Palatca.

The very important role played by domestic species in insuring meat consumption (fig. 4) by the population from the analyzed area is also proven by their high importance as to how much meat could be obtained from them<sup>10</sup>.

From the estimated total of 2,500 kg of meat, almost half (44.41%) came from bovines, due to their large size they obviously offered much more meat when compared to caprovines (9.23%) and pigs (18.55%), though the latter are present in larger numbers. Even more so, the quantity of meat provided by 7 sheep or goats is much smaller than that of 2 horses (13.99%) and a single wild boar (9.59%). Red deer meat has a percentage of 3.19% and the one from roe deer and hare is completely insignificant, 0.83% and 0.15% respectively.

<sup>10</sup> Clason 1968, p. 153; Smith 1975, p. 93-106.

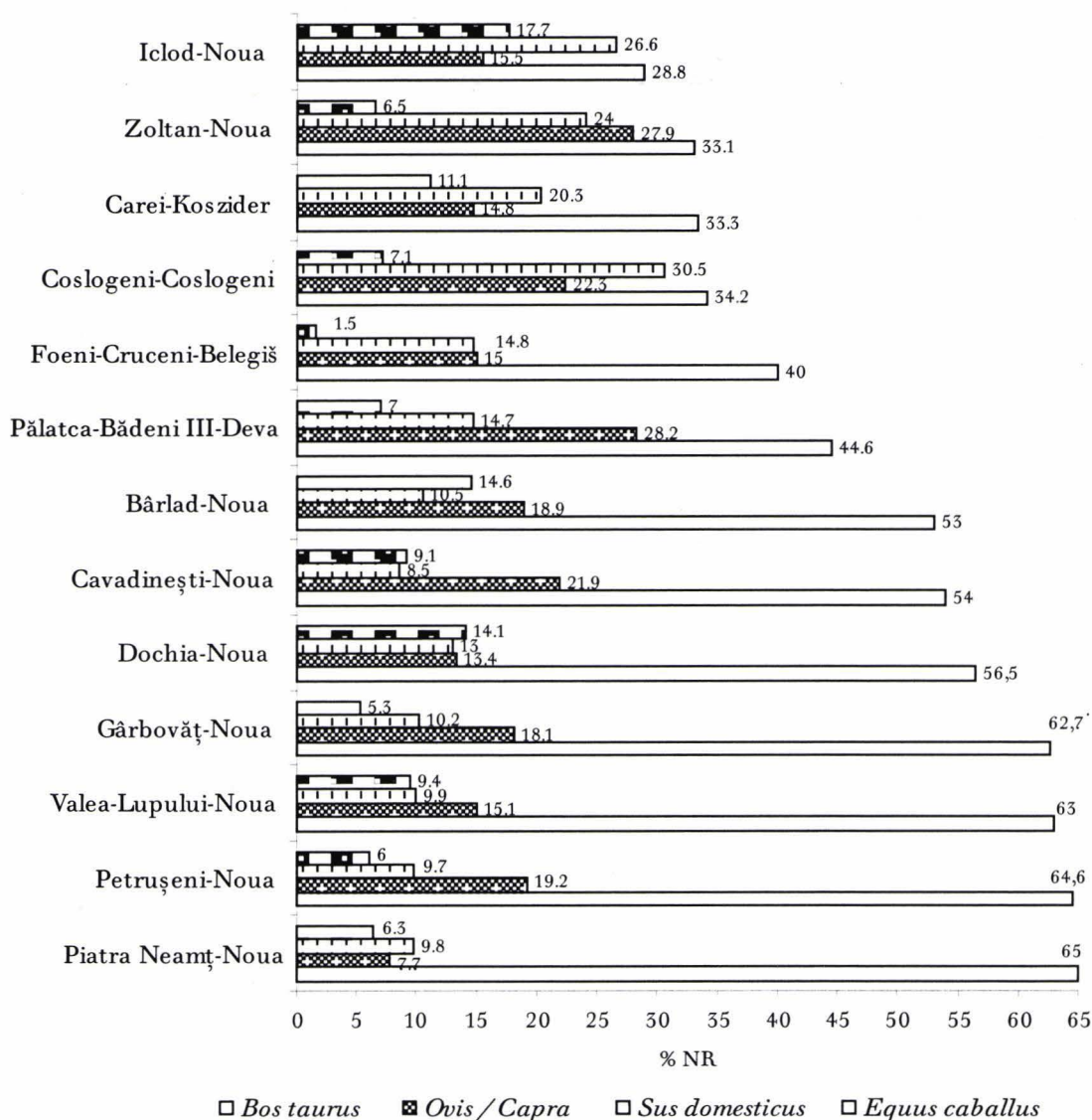


Fig. 5. Frequency of main domestic mammals in Late Bronze Age settlements.

### Similarities with other Bronze Age settlements

Archaeozoological analysis done on fauna materials from Late Bronze Age in Transylvania is scarce.

The most representative sample comes from the site from Zoltan<sup>11</sup>, belonging to the Noua culture. There are 2 other samples dating from late Transylvanian Bronze Age, though small in number of pieces: Iclod, Noua culture<sup>12</sup> and Carei - "Bobald", Koszider level<sup>13</sup>. The ratio domestic / wild species proves that in all three settlements

<sup>11</sup> El Susi 2002a, p. 165.

<sup>12</sup> Bindea 2005, p. 80; Bindea 2008, p. 97-98.

<sup>13</sup> El Susi 2002b, p. 244.

the percentage of domestic mammals is smaller than at Palatca: 81.48 / 18.52% at Carei, 88.9 / 11.1% at Iclod and 92.1 / 7.9% at Zoltan. These sites present however a trait common to all Late Romanian Bronze Age settlements: a predominance of domestic mammals (fig. 5).

As for quotas of the main domestic mammals in Transylvania, at Iclod, Carei and Zoltan cattle represent a small percentage (about 30%) while the other species are represented in great numbers. When compared to these two settlements cattle are better represented at Palatca, 44.6%, a percentage similar to that from the Cruceni-Belegiș site from Foeni<sup>14</sup>. In many settlements belonging to the Noua culture in Romania, from outside the Transylvanian area, the importance of exploiting bovines is proven by register percentages of over 50%: - Dochia<sup>15</sup>, Cavadinești<sup>16</sup>, Bârlad<sup>17</sup> - or even over 60% - Piatra Neamț<sup>18</sup>, Valea Lupului<sup>19</sup>, Gârbovăț<sup>20</sup> and in the site from Petrușeni in the Republic of Moldavia<sup>21</sup>.

The amount of caprovines is similar to the one from the settlements from Palatca and Zoltan, about 28%, while at Iclod the percentage is significantly smaller, 15.5%. Sheep /goat do not precede domestic bovines in any of the settlements from the Late Romanian Bronze Age, like we can see in Kastanas<sup>22</sup>, Macedonia, where small horned animals play a key role in the economy of the settlement, (40.5%), situation that can be explained by environmental conditions proper for their growth. Domestic pigs have a smaller percentage at Palatca, 14.7%, than at Iclod, 26.6%, Zoltan, 24% and Carei, 20.3%, values very similar to those registered in Foeni and Bârlad. The horse is highly present in Late Bronze Age settlements: in Transylvania, at Palatca and Zoltan, the percentage for this species is around 7%, while slightly higher at Carei and Iclod, with about 10%.

As for wild mammals, generally they are very poorly represented in the Late Bronze Age (fig. 6).

We can suppose that in Transylvanian sites the percentage of hunted species is slightly high, however hunting is not as important as at Foeni, where the red deer percentage is over 18%. Settlements with very low percentages of the main wild mammals (under 2% the red deer and under 1% the aurochs, the roe deer and the wild boar) dating from the Late Bronze Age are, besides Palatca, the ones from Coslogeni<sup>23</sup>, Gârbovăț, Bârlad, Valea Lupului, Petrușeni and Dochia.

The cultural horizon Bădeni III - Deva, being a synthetic cultural entity containing elements from Wietenberg and Otomani<sup>24</sup>, we believe that a comparison between

<sup>14</sup> El Susi 2001, p. 224.

<sup>15</sup> Bejenaru, Stupu 2001, p. 108.

<sup>16</sup> Haimovici 1983, p. 99.

<sup>17</sup> Haimovici 1964, p. 220.

<sup>18</sup> Haimovici 1964, p. 220.

<sup>19</sup> Haimovici 1962, p. 297; Haimovici 1963, p. 172.

<sup>20</sup> Haimovici 1991, p. 163.

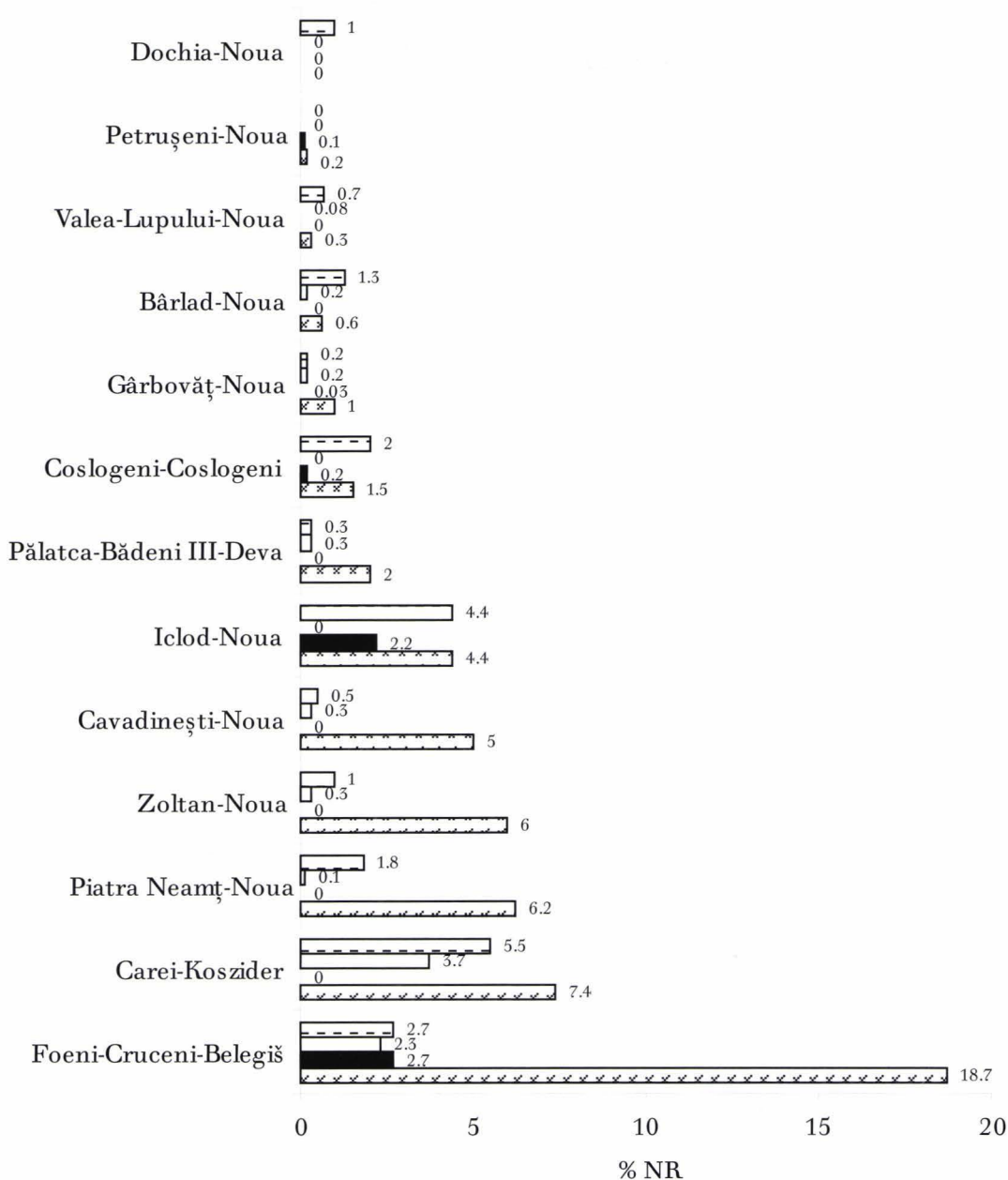
<sup>21</sup> Levitsckii, Sava 1993, p. 130.

<sup>22</sup> Becker 1986, p. 333.

<sup>23</sup> Udrescu 1995, p. 106.

<sup>24</sup> Rotea 1997, p. 13-14.





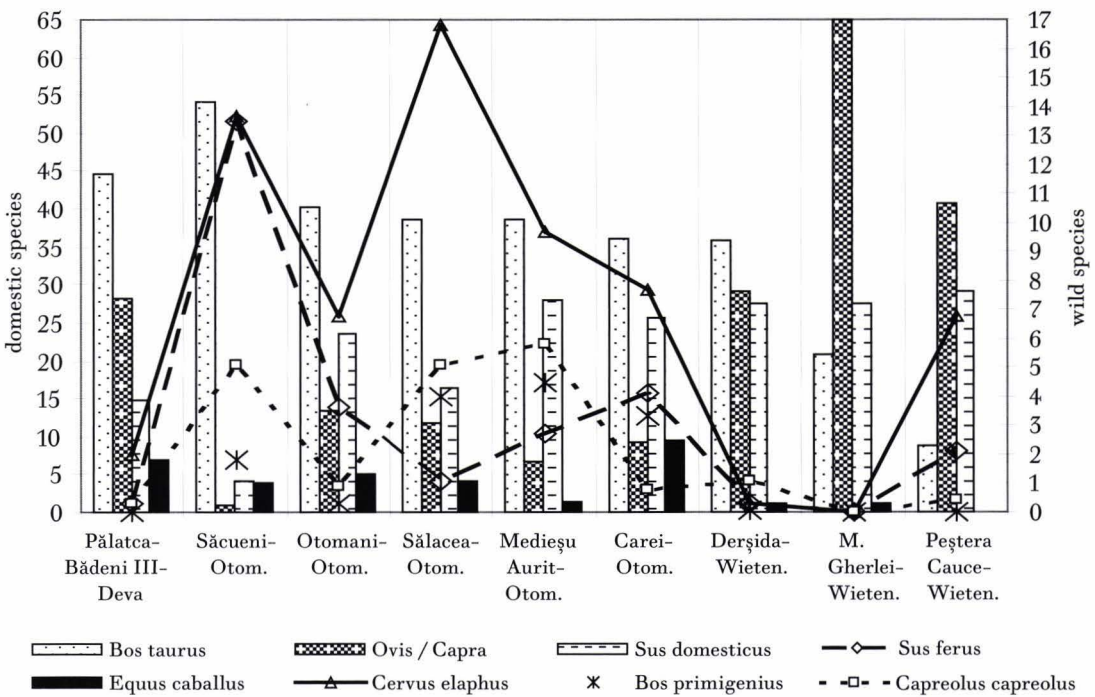
▨ *Cervus elaphus* ■ *Bos primigenius* ▤ *Capreolus capreolus* □ *Sus ferus*

**Fig. 6.** Frequency of the main wild mammals in settlements belonging to the Late Bronze Age.

the settlement from Palatca and settlements belonging to this Middle Bronze Age culture from Transylvania is very fortunate (fig. 7). The percentage of bovines is greater at Palatca as compared to other settlements; except for Săcueni<sup>25</sup>. The important role

<sup>25</sup> Bader 1978, p. 131-132.

played by sheep and goats at Palatca (considering the minimum number of individuals it is the largest group) is also highlighted at Derșida<sup>26</sup>, where all of the three main groups (bovines, caprovines and swine) were widely used in alimentation. Still these two sites fall behind the Wietenberg settlements from Mintiu Gherlei<sup>27</sup> și Peștera Cauce<sup>28</sup>, where it seems exploitation of small horned animals was the most important in the economical life of the communities.



**Fig. 7.** Frequency of the species (NR) from Palatca as compared to other Wietenberg and Otomani sites from Transylvania.

The growth of pigs had a smaller role as compared to Otomani settlements from Transylvania: Otomani<sup>29</sup>, Săcueni, Sălăcea, Medieșu Aurit<sup>30</sup>, where besides the fact that pig percentages are high, this species occupies second place in the process of animal exploitation, being better represented than caprovines. As for wild mammals it seems that in the middle Bronze Age hunting was more intense in Transylvania (except for Derșida and Mintiu Gherlei) as compared to the end of the Bronze Age.

<sup>26</sup> Bindea 2008, p. 85-91.  
<sup>27</sup> Meșter et alii 2005, p. 116; Bindea 2008, p. 93-94.  
<sup>28</sup> El Susi 2005, p. 95-97.  
<sup>29</sup> Haimovici 1987, p. 49.  
<sup>30</sup> Bader 1978, p. 131-132.

## Bibliography

- Bader 1978 T. Bader, *Epoca bronzului în nord-vestul Transilvaniei. Cultura pre-tracică și tracică*, București 1978.
- Becker 1986 C. Becker, Kastanas. *Ausgrabungen in einem Siedlungshügel der Bronze- und Eisenzeit Makedoniens 1975-1979. Die Tierknochenfunde*, PAS 5, Berlin 1986.
- Bejenaru, Stupu 2001 L. Bejenaru, M. Stupu, *Aspecte arheozoologice privind comportamentul ocupațional al populației de cultură Noua din zona depresiunii Cracău - Bistrița*, Natura și Omul, Muzeul județean de Științe Naturii Prahova, Ploiești 2001, p. 103-109.
- Bindea 2005 D. Bindea, *Zoarcheological aspects regarding pre- and protohistorical sites from Transylvania*, in M. Neagu (ed.), *In honorem Silvia Marinescu-Bilcu - 70 de ani, CCDJ XXII, Călărași 2005*, p. 63-84.
- Bindea 2008 D. Bindea, *Arheozoologia Transilvaniei în pre- și protoistorie*, Cluj-Napoca 2008.
- Boessneck et alii 1964 J. Boessneck, H. Müller, M. Teichert, *Osteologische Unterscheidungsmerkmale zwischen Schaf (Ovis aries) und Ziege (Capra hircus)*, Arbeiten aus der Land-wirtschaftlichen Fakultät der Martin-Luther-Universität Halle-Wittenberg, Band 78, Heft 2, Berlin 1964, p. 1-129.
- Clason 1968 A. T. Clason, *Niderwil eine Siedlung der Phyner culture*, Bd. III, *Naturenwissenschaftliche unterzuhungen*, VI, Viehzugt, Jagt und Knochenindustrie der Phyner Kultur, 1968, p. 153.
- El Susi 2001 G. El Susi, *Situl de la Foeni - „Cimitirul Ortodox” (jud. Timiș). Fauna din nivelele de epoca bronzului*, Thraco-Dacica XXII, 1-2, 2001, p. 223-237.
- El Susi 2002a G. El Susi, *Cercetări arheozoologice în așezarea de epoca bronzului (cultura Noua) de la Zoltan (jud. Covasna)*, Angustia 7, Sf. Gheorghe 2002, p. 153-172.
- El Susi 2002b G. El Susi, *Cercetări arheozoologice în așezarea de epoca bronzului de la Carei-„Bobald” (județul Satu-Mare)*, Thraco-Dacica XXIII, 1-2, 2002, p. 243-265.
- El Susi 2005 G. El Susi, *Cercetări arheozoologice*, in S. A. Luca, C. Roman, D. Diaconescu, H. Ciugudean, G. El Susi, C. Beldiman, *Cercetări arheologice în Peștera Cauce (II) (sat Cerișor, comuna Lelese, județul Hunedoara)*, Bibliotheca Septemcastrensis V, Sibiu 2005, p. 95-154.
- Haimovici 1962 S. Haimovici, *Sravnitenoe izucenie faunisticeschih ostatkov epoh neolita i bronzî naidennih v poselenii u Valea Lupului*, Analele Științifice ale Universității Al. I. Cuza Iași, Secțiunea II. Științe naturale, a. Biologie, tomul VIII, fasc. 2, Iași 1962, p. 291-326.
- Haimovici 1963 S. Haimovici, *Studiul resturilor de faună din așezarea de la Popești aparținând epocii bronzului*, Analele Științifice ale Universității Al. I. Cuza Iași, Secțiunea II. Științe naturale, a. Biologie, tomul IX, fasc. 1, Iași 1963, p. 147-156.
- Haimovici 1964 S. Haimovici, *Studiul asupra resturilor de faună descoperite în așezările aparținând culturii Noua de la Bârlad și Piatra Neamț*, ArhMold II-III, 1964, p. 217-236.



- Haimovici 1983 S. Haimovici, *Studiul paleofaunei de cultură „Noua” descoperită în stațiunea de la Cavadinești (jud. Galați)*, Carpica XV, Bacău 1983, p. 97-103.
- Haimovici 1987 S. Haimovici, *Studiul paleofaunei din așezarea eponimă a culturii Otomani - epoca bronzului*, Crisia XVII, Oradea 1987, p. 37-54.
- Haimovici 1991 S. Haimovici, *Materialul faunistic de la Gârbovăț. Studiu arheozoologic*, ArhMold XIV, 1991, p. 153-166.
- Hillson 1986 S. Hillson, *Teeth* (Cambridge manuals in archaeology), Cambridge University Press 1986.
- Levitsckii, Sava 1993 O. G. Levitsckii, E. N. Sava, *Nouvelles recherches des établissements de la culture Noua dans la zone comprise entre le Prout et le Nistru*, Culture et civilisation au Bas Danube X, Călărași 1993, p. 125-156.
- Meșter et alii 2005 M. Meșter, D. Pop, Gh. Lazarovici, D. Bindea, *Mintiu-Gherlei - Campania 2000. Raport arheologic*, Angustia 9, Sf. Gheorghe 2005, p. 113-120.
- Roska 1942 M. Roska, *Erdély régészeti repertórium* I. Óskor, Thesaurus antiquitatum transsilvanicarum, Tom I. Praehistorica, Kolozsvár 1942.
- Rotea 1994 M. Rotea, *Penetrația culturii Otomani în Transilvania. Între realitate și himeră*, Apulum XXXI, 1994, p. 39-57.
- Rotea 1997 M. Rotea, *Cercetări arheologice la Palatca - „Togul lui Mândrușcă”. Observații preliminare*, RevBistriței X-XI, 1997, p. 13-19.
- Silver 1963 I. A. Silver, *The Ageing of Domestic Animals*, in D. Brothwell, E. Higgs, G. Clark (eds.), *Science in Archaeology*, London 1963, p. 250-268.
- Smith 1975 B. D. Smith, *Towards a more accurate estimation of the meat yield of animal species at archaeozoological sites*, in A. T. Clason (ed.), *Archaeozoological Studies*, Oxford - Amsterdam 1975, p. 93-106.
- Soroceanu 1972 T. Soroceanu, *Așezarea de tip Wietenberg de la Palatca (j. Cluj)*, Centenar muzeal Orădean, Oradea 1972, p. 165-172.
- Udrescu et alii 1999 M. Șt. Udrescu, L. Bejenaru, C. Hrișcu, *Introducere în arheozoologie*, Iași 1999.
- Udrescu 1995 M. Șt. Udrescu, *Observații preliminare privind creșterea animalelor și vânătoarea în așezarea de la Coslogeni (jud. Călărași); date zooarheologice*, CCDJ XIII-XIV, Călărași 1995, p. 103-108.

Diana Bindea

National History Museum of Transylvania, Cluj-Napoca

diana\_bindea@yahoo.com

Imola Kelemen

Szekler Museum of Ciuc, Miercurea Ciuc

kelemenimola@csikimuzeum.ro

## Annex 1

## Metric data (mm) of fauna remains in the settlement at Palatca

*Bos taurus*

Maxilla								
L dp <sup>4</sup>	21,6							
L M <sup>1</sup> -M <sup>3</sup>	76	82,7						
L M <sup>3</sup>	29,5	30,5						
Mandible								
L P <sub>2</sub> -P <sub>4</sub>	48,4							
Bc	41	41,3	46*					
Axis								
B dens	39							
SBV	48							
Radius								
Bp	73,6*							
SD	41							
APD df.	20,7							
Ulna								
BPC	41							
Metacarpus								
Bd	57,6							
APD p	29,2							
Pelvis								
LA	50,5	61*						
BA	53,3							
Tibia								
Bd	56,5	57						
BFd	39,7	39						
APD d	42,2	40,1						
Astragalus								
GLl	59							
GLm		61,9						
DI	34,2		32,7					
Dm		41	31,2					
Bd		45,3						
Centrotarsale								
GB	55,7	62						
APD	50	61,7						
Metatars								
SD	30,8							
APD df	33,6							
Bd	63,2							
APD d	34,5							
Phalanx I								
GL	58,8	59	60,1	60,7	61,2	61,6	65	60,3
Bp	25,6	25,7	25,3	34,8	28,8	33	31,7	
SD	22	20,4	21,8	29	24,3	29,5	30	
Bd	23,5	24,6	25,2	36	27	31	31,9	

Phalanx II			
GL	43,6	44,4	
Bp	33,3		
SD	26		
Bd.	24,5		
Phalanx III			
DLS	77*		
MBS	23,9		
Ld	64		
LF	28,4		
BF	23,5		
Lumbar vertebrae			
H	86	87,4	
SBV	21,5	24,5	
BPacr	53	51	
BPacd		37	

*Ovis aries / Capra hircus*

Horncore			
GL	156* <sup>c</sup>		
LD <sub>b</sub>	36,7		
SD <sub>b</sub>	24,6		
C <sub>b</sub>	104		
Sex	M?		
Mandible			
L dp <sub>2</sub> -dp <sub>4</sub>	29°	33,5°	
L dp <sub>4</sub>	14,6	17	
L P <sub>2</sub> -M <sub>3</sub>		72,6	
Atlas			
GL	39°		
BF <sub>cr</sub>	41*		
BF <sub>cd</sub>	43		
H	30*		
Axis			
BF <sub>cr</sub>	42,1°		
SBV	23,4		
B dens	20,6		
Scapula			
LG	18,8		
SLC	16,7		
Humerus			
Bd	30,2°	37,1° <sup>c</sup>	31,2
BT	27,8		27
APD d		33,1	
Radius			
Bp	29,2°		
BF <sub>p</sub>	27		
APD p	15,5		
Metacarpus			
SD	15,5		
APD df	10,7		

Pelvis LA	29,5°
Femur Bd APD d	28° 29,2
Tibia Bp APD p SD APD df Bd BFd APD d	22,3° 24 17 13,1 29,8 21,8 23,3
Metatarsus SD	16
Astragalus GLl GLm Dl Dm Bd	29° 28 17 16,4* 20,1
Phalanx I GL Bp SD Bd	38,7° 11,8 8,5 10,3

*Sus domesticus*

Maxilla L Calv L P <sup>1</sup> -P <sup>4</sup> L P <sup>2</sup> -P <sup>4</sup>	15 40 34,6
Mandible L Calv L dp <sub>1</sub> -dp <sub>4</sub> L dp <sub>2</sub> -dp <sub>4</sub> L dp <sub>4</sub> Sex	16,5 51,5 39 18,6 M M
Scapula GLP LG BG SLC	40,8 31 26,2 25,5
Ulna BPC DPA	26,5 47,6
Metacarpus III Bp	22 22,1

Pelvis	
LA	31,2
SH	23,7
SB	11,6
Tibia	
SD	21,2
APD df	17
Bd	32,4
BFd	23,4
APD d	27,2
Calcaneus	
GL	23,2
Metatarsus II	
Bp	6,8
Phalanx III	
DLS	23,5*
MBS	7,2
Ld	22*
LF	14
BF	11,5

### *Equus caballus*

Scapula	
GLP	84,6
LG	45,3      42,7
BG	43,6
SLC	61
Radius	
Bd	82,3
BFd	64,8
APD d	55
Tibia	
Bd	65,5
BFd	50
APD d	41,2
Metatarsus II	
Bp	15,7
APD p	20,7
Phalanx I	
GL	80,4
Bp	55,6
BFp	49,7
SD	33
Bd	44,4
BFd	41,2

Phalanx II		
GL	50	
Bp	53,5	55,5
BFp	44,1	49
SD	47,4	47,4
Bd	47,5	
$I_d = Bdx100/GL =$	95	
$47,5x100/50$		

*Canis familiaris*

Canine	
L C	10,3
Radius	
SD	11,9
APD df	8
Bd	24,1
BFd	20,3
APD d	13
Metacarpus III	
GL	60,7
Bp	8
SD	6,5
Bd	8,6
Calcaneus	
GL	43
GB	18,3

Metatarsus IV	
GL	73,5
Bp	8,6
SD	11,2
DAPd	8

*Sus scrofa ferus*

Metacarpus III	
GL	84,8
Bp	24,7
SD	17
Bd	19,7
Talia (Teichert)	880,35

*Cervus elaphus*

Scapula	
GLP	59,4
LG	45
BG	39,6

*Lepus europaeus*

Cubitus	
BPC	9,3
DPA	11,9
LO	10,8
SDO	11,7

\* - approximate metric values

° - *Ovis*; ° - *Capra*

APD - Antero-posterior diameter; APD d - Antero-posterior diameter of the distal end; APD df - Antero-posterior diameter of the diaphysis; APD p - Antero-posterior diameter of the proximal end; B dens - Breadth of the dens; BA - Breadth of the acetabulum; Bc - Breadth of the condyle process; Bd - Breadth of the distal end;

BF - Breadth of the Facies articularis; BFcr - Breadth of the Facies articularis cranialis; BFcd - Breadth of the Facies articularis caudalis; BFd - Breadth of the Facies articularis distalis; BFp - Breadth of the Facies articularis proximalis; Bp - Breadth of the proximal end; BPacr - Breadth across the Processus articulares craniales; BPacd - Breadth across the Processus articulares caudales; BPC - Breadth across the coronoid process; BT - Breadth of the trochlea; Cb - circumference of the base; Dl - Depth of the lateral half; DLS - Length of the sole; Dm - Depth of the medial half; DPA - Depth across the Processus anconaeus; GB - Greatest breadth; GL - Greatest length; GLl - Greatest length of the lateral half; GLm - Greatest Length of the medial half; H - Height; L C - Length of the canine; L Calv - Length of the canine alveolus; L dp<sup>4</sup> - Length of the deciduous 4<sup>th</sup> upper premolar; L dp<sub>4</sub> - Length of the deciduous 4<sup>th</sup> lower premolar; L dp<sub>1</sub>-dp<sub>4</sub> - Length of the deciduous premolar row; L dp<sub>2</sub>-dp<sub>4</sub> - Length of the deciduous (2<sup>nd</sup>-4<sup>th</sup>) premolar row; L M<sup>1</sup>-M<sup>2</sup> - Length of the upper molar row; L M<sup>3</sup> - Length of the upper 3<sup>rd</sup> molar; L P<sub>1</sub>-P<sub>4</sub> - Length of the lower premolar row; L P<sub>2</sub>-P<sub>4</sub> - Length of the lower (2<sup>nd</sup>-4<sup>th</sup>) premolar row; L P<sub>2</sub>-M<sub>3</sub> - Length of the lower cheekrow; LA - Length of the acetabulum; Ld - Length of the dorsal surface; LDb - Large diameter of the base; LF - Length of the Facies articularis; LG - Length of the glenoid cavity; LO - Length of the olecranon; MBS - Middle breadth of the sole; SBV - Smallest breadth of the vertebra; SD - Smallest breadth; SB - Smallest breadth of the shaft of ilium; SDb - Small diameter of the base; SDO - smallest depth of the olecranon; SH - smallest height of the shaft of ilium; SLC - Smallest length of the Collum scapulae.