

## An osteometric survey of pig (*Sus domesticus*) in Bronze Age settlements on Romania's territory

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### Introduction

A considerable problem for archaeologists is to clearly assign individual specimens as wild or domestic *Sus*, taking in account their coexistence in samples and crossbreeding process of these two forms. From this reason, new biometric data which could contribute in a better separation of wild and domestic forms are agreeable. Therefore, we propose to characterize and distinguish interpopulational differences in pig of Bronze period focusing in analysis on those bones which criteria are certainly belong of pig. Bronze Age in Romania is divided into: Early (3500-2200 BC), Middle (2200-1600/1500 BC) and Late Bronze Age (1600/1500-1100 BC).

### Material and Methods

This study is based on pig remains recovered in assemblages dating from Bronze Age from Romania. The regions of Romania that have yielded Bronze Age fauna for archaeozoological analysis are: Moldavia (assemblages: Bârlad, Piatra Neamț, Gârbovăț, Sărata Monteoru, Bogdănești, Mândrișca, Piatra Neamț, Popești, Poșta Elan, Erbiceni, Trușești, Valea Lupului, Foltești), Transylvania (assemblages: Derșida, Mintiu Gherlei, Otomani, Pecica, Carei, Livezile, Iclod), Banat (assemblages: Moldova Veche Ostrov, Gornea Păzârșite, Foeni), Wallachia (assemblages: Glina, Verbita, Popești, Căscioarele) (Haimovici, 1966; 1968; 1970; 1978; Haimovici & Popescu, 1978; Bindea, 2008). The following anatomical elements were analyzed: mandible, maxilla, humerus, scapula, radius, tibia, calcaneus and astragalus. All measurements discussed in this study were taken according to von den Driesch (1976). The withers heights have been estimated according to Teichert's coefficients using astragalus (Udrescu *et al.*, 1999). The descriptive analysis was realized out separately for each variable. We described the variability using coefficient of variation (CV %), which is dimensionless and allows a comparisons of variability of large and small bones. The measurements of variables are compared using one-way ANOVA test. In statistical analysis XLStat version 2012.4.01 was used.

### Results and Discussion

In Bronze period the pig represented a principal alimentary resource for human population, having the largest implication in Early Bronze period according to domestic swine bones came from assemblages. This aspect is illustrated in figure 1. Bone remains identified in material belonging to Early Bronze period represents more than 34% of total domestic mammals identified (in samples of Wallachia region). The lower frequencies of pig remains were accepted in samples from Moldavia region in Transition Eneolithic - Bronze period (6.51% of domestic mammal).

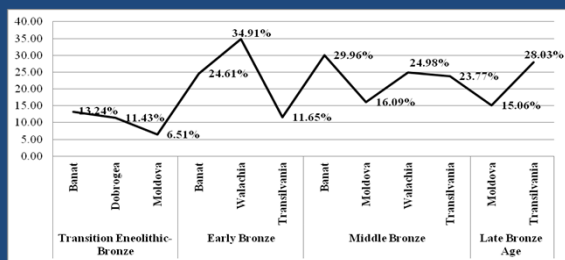


Figure 1. Pig proportions (%NISP calculated from the domestic mammals) in studied samples.

### Table 2. Summary statistics for measurements of pig remains.

Abbreviations: n - number of bones examined; SD - standard deviation; Min, Max - Minimum, Maximum range measurement; CV - coefficient of variation in %, CL - confidence level a mean of population; GL - Greatest length; GLP - Greatest length of the Processus articularis; SLC - Smallest length of the Collum scapulae; BG - Breadth of the glenoid cavity; BT - breadth of the trochlea; Bd - breadth of the distal end; Dd - breadth of the distal end; SD - Smallest breadth of diaphysis; Bp - breadth of the proximal end; BFP - breadth of the Facies articularis proximales; GB - Greatest breadth.

Anatomical element	Variable	n	Mean (mm)	SD	Min.	Max.	CL (95%)	CV%
maxilla	GL P2-P4	27	40.66	8.0	31	44	2.3	19.67
	GL M1-M3	77	69.35	4.21	55.5	80	0.95	6.07
	GL M3	123	33.43	3.19	27	43	0.56	9.5
mandibula	GL m1-m3	62	71.49	5.11	56	85	1.29	1.8
	GLm3	192	34.98	3.48	22.5	41	0.49	1.4
scapula	GLP	22	36.55	5.09	28	49	2.26	13.92
	SLC	31	24.98	4.53	20	39	1.66	18.12
	LG	19	31.82	5.37	24	42	2.59	16.88
	BG	22	23.94	3.4	17	30	1.51	14.21
humerus	BT	14	32.48	2.46	28.5	36.2	1.42	7.56
	Bd	77	40.20	3.97	26	46	0.9	9.87
	Dd	15	35.21	9.06	18	45	5.01	25.72
	SD	5	18.84	5.28	11.8	25	6.55	28.02
radius	Bp	42	30.44	1.86	27	36	0.58	6.12
	BFP	37	21.73	2.78	17.5	32	0.93	12.8
tibia	Bd	77	40.20	3.97	26	46	0.9	2.2
	BFD	1	-	-	26.4	-	-	-
calcaneus	GL	5	63.9	3.1	80	83.5	3.9	4
	GB	5	28.6	4.22	24	32	5.24	14.75
astragalus	GL	53	42.98	2.8	38	48	0.77	1.7
	GB	42	25.98	2.46	21	32	0.76	2.92

The complete metapodials providing data on withers height are absent in our samples, therefore the withers height is established by means astragalus (figure 2).

Table 2 provides summary statistics for measurements of the bones.

The degree of variability of measurements differs when the CV % of variables are compared (table 2, figure 3).

The high variability was underlined by humerus, in specially: Breadth of diaphysis (SD): CV % = 28.02 and Depth of the distal end (Dd): CV % = 25.72. Low variability was obvious in case of the upper and lower molars (CV % = 1.4 - 9.5), tibia (length of tibia CV% = 2.2) and astragalus (Length of astragalus (GL) CV % = 1.7).

The most accurate results were obtained for the lower molars (length of cheek tooth row (CV%= 1.8) and the third molar (CV% = 1.4). In the case of this anatomical element considerable difference between measurements was obtained. A significant differences between size of this molar was obvious in three assemblages: Mândrișca, Bogdănești and Cernavodă (One Way ANOVA: F=6.3; p<0.05).

### Conclusion

The lower third molar is clearly the most distinctive character that can characterize different populations of pigs. Taking in account the significant differences between the samples belonging the two different subperiod (Transition Eneolithic - Bronze period: Cernavodă and Middle Bronze: Mândrișca and Bogdănești) and high variability for some of postcranial bones (humerus and scapula) we can conclude that in Bronze Age is typified by the presence of admixture of breed in special.

This supposition could be underlined by the increase of withers heights of pig towards Late Bronze. Our study offer some range sizes of anatomical elements which can be used like a criteria to identify domestic swine specimens.

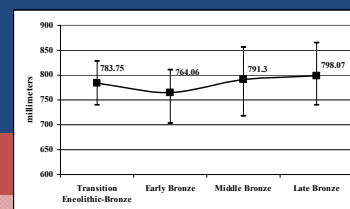


Figure 2. Variation in withers heights of pig in Bronze Age in Romania

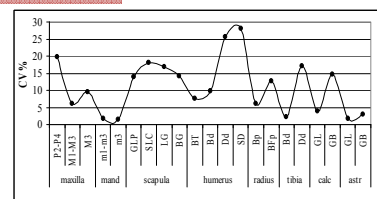


Figure 3. The degree of variation in pig measurements (CV %) in Bronze period in settlements on Romania's territory

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