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The importance of domestic mammals during the La Tène Period in Romania

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ABSTRACT: Mammal remains of the La Tène Period in Romania are described in terms of their frequencies based on the number of identified specimens and in terms of the morphology and size of the animals consumed. The species discussed are cattle, sheep, goat, pig, dog, and horse. Wild species are considered as a single group, and are not discussed in detail. A summary of previous and recent studies in the area shows that regional and sub-regional variation characterizes the assemblages.

KEY WORDS: ROMANIA, LA TÈNE, ANIMAL HUSBANDRY

RESUMEN: Restos de mamíferos del periodo La Tène en Rumanía se describen en términos de sus frecuencias basadas en el número de especímenes identificados como así también en términos de la morfología y el tamaño de los animales consumidos. Las especies en discusión son: vaca, oveja, cabra, cerdo, perro y caballo. Las especies salvajes se consideran como un solo grupo y no serán discutidas en detalle. Un esquema de previos y recientes estudios en el área muestra que las variaciones regionales y subregionales caracterizan el conjunto.

PALABRAS CLAVE: RUMANÍA, LA TÈNE, GANADERÍA

INTRODUCTION

This study concerns the Geto-Dacian culture, which occupied the Carpatho-Danubian basin, in the territory named Dacia. The study will mainly focus on subsistence as reflected by archaeozoological analyses for the La Tène period in the modern territory of Romania. Previous archaeozoological syntheses for the La Tène period (Udrescu, 1985a, 1985b; Haimovici, 1987) discuss the fauna discovered in the southern and eastern parts of the country. The goals of this paper are: (a) to present archaeozoological data for the La Tène period from all regions of the country, i.e. to summarize the data presented by previous studies, as well as to include previously unpublished results; and (b) to provide a source of comparison for archaeozoological studies in other parts of Europe.

The Geto-Dacians belonged to the north-Thracian branch of the Thracian tribes living east of the North Balkan Peninsula. The Geto-Dacians' separation into the north branch of the Thracian tribes took place at the beginning of the Iron Age. In Romanian historiography, "Geto-Dacians" refers

to all of the North-Thracian tribes from the Carpatho-Danubian region. The names "geți" (Γεταz, *Getae*) and "daci" (Δάκοz, Δάκαz, *Daci*) were used by Greek and Latin writers to differentiate the tribes of the Lower Danube (geți) from those located in the central and west parts (daci) of the Carpatho-Danubian space (Crișan, 1993). The most ancient references of the Greek and Latin writers to the Carpatho-Danubian territories were made by Hecataeus of Miletus, Herodotos, and Thycidides, and they report on events that took place by the end of the 6th century B.C. Subsequent written sources concur that these two names refers to the same population, which lived north of the Balkans and between the Carpathian mountains, the Middle Danube, and the west shore of the Black Sea.

The Geto-Dacians had a state organization as early as the 1st century B.C., which was characterized by a tributary type of exploitation. The society was divided into nobles (*pileati*) who, along with the priests, lived on the *acropole*, and ordinary people (*comati*) who inhabited the rural settlements (Crișan, 1993). The Geto-Dacians were in contact with other populations such as Bastarns, Scythians, and Celts, but the main external influences were the Greeks, beginning with the 7th century B.C., and the Romans in 106 A.D. After the Roman conquest the Geto-Dacians were assimilated and took the name of Daco-Romans. This population lies at the origin of the modern Romanians.

The Geto-Dacians' settlements were economic, political, military, and ritual establishments. They represent proto-urban agglomerations similar to the Celtic *oppidum*. Their function was analogous to that of the Mediterranean towns, but the Geto-Dacian settlements do not meet the same criteria of public utility (Crișan, 1993). In the Geto-Dacian language ("daco-moesica") the settlements were called *dava*. The *oppidum* type of civilization begins in Dacia in the 4th century B.C. and reaches its apogee between the middle of the 2nd century B.C. and the beginning of the 2nd century A.D. During those times the Geto-Dacians settlements had a formal level of organization consisting of a fortified zone (*acropole*), situated on a strategic point/promontory, and the surrounding civil settlement in the open area (Crișan, 1993).

Geto-Dacian Iron Age

The terms "Hallstatt" and "La Tène" have been used for a long time as synonyms for the first and second Iron Age periods. These concepts are of Central European origin, and they do not entirely fit to the Carpatho-Danubian region. However, for the purpose of eliminating confusions, Romanian research has continued to use Hallstatt and La Tène as synonyms for the two Iron Age periods; the "La Tène" term has the same meaning as the analogous cultural phenomenon in Central and Western Europe, which was that of receiving and interpreting Greek and Hellenistic influences by the indigenous populations.

The Romanian La Tène is divided in three general phases: the ancient phase (c. 450-300 B.C.), the middle phase (c. 300-200 B.C.) and the late phase (c. 200 B.C.-106 A.D.). This latter one corresponds to the period of maximum development of the Geto-Dacian culture, and it is subdivided into several sub-phases.

Environment

Romania has a transitional type of temperate-continental climate, specific to Central Europe, with four clearly defined seasons. Local differences are caused by altitude and by slight oceanic (to the west), Mediterranean (to the south-west), and continental (to the east) influences. The Central Transylvanian Basin is separated from the Plain of Moldavia to the east by the Carpathian Mountains, and from the Walachian (Romanian) Plain to the south by the Transylvanian Alps. Varied forms of relief, which were suitable for agriculture and animal husbandry, are geographically represented in this vast region. There are three major, well-differentiated relief steps: the highest is represented by the Carpathian Mountains, the middle by the Sub-Carpathians, the hills and the tablelands, and the lower by the plains, the river meadows, and the Danube Delta. The most characteristic feature of the topographic components is their distribution in the form of an amphitheatre. The mountains form an arch in the central part and cover 31% of the country's area, the hills and tableland occupy 36%, and the plains take up to 33%. The mountains encircle Transylvania, the Transylvanian tablelands. A belt of hills and elevations, which rise no higher than 1000 m, dominate the relief in this area. The Sub-Carpathians to the east and south of the mountains have lower altitudes, between 100 and 500 m. To the east and south lie the two plateaus, Moldova and Dobrogea tablelands, with altitudes of 400 to 600 m. The plains, formerly sea

and lake bottoms, cover the southern and western parts of the country and are low and extremely flat. Between the Carpathians and the Danube lies the Romanian Plain, and to the west stretches the Western Plain, which is crossed by many rivers. The multi-tiered relief structures the climate, the soil, the vegetation and the fauna and implicitly the human settlements. The network of rivers is radial-shaped, with 98% of the rivers springing from the Carpathian Mountains and being collected through tributaries by the Danube. The Danube flows into the Black Sea through three arms, which form a delta. The forests, which in ancient times and during the Middle Ages used to cover almost the entire area of Romania (except for its southeast), gradually were cleared for farming land. Today forest accounts for 26.2% of the country's area, consisting of beech, common oak and evergreen oak, coniferous trees, hornbeam, elm, lime and other species. Alpine pastures cover extensive areas at altitudes higher than 1800 m and are used mainly for sheep breeding.

During ancient times, agriculture and animal husbandry were constantly practiced, their economic importance differing according to regional forms of relief and environment.

ARCHAEOZOOLOGICAL STUDIES

Archaeozoological studies in Romania have addressed archaeological questions mainly related to subsistence practices such as animals present and/or consumed in each site, proportion of wild species *versus* domestic fauna, and animal use. They have also addressed questions such as variability, differentiation, or diminution of the characteristics related to the domestication processes, through morphological and statistical studies. They have tried to bring insight to the knowledge of the endemic types that lies at the origin of the modern races of domestic animals. They also emphasized some of the aspects of animal microevolution. In essence, these approaches were mainly concerned with the biological aspects of faunal remains from archaeological sites, and less with the anthropological ones (i.e. human behavior) (Reitz & Wing, 1999).

Bone assemblages from excavated settlements and cemeteries, as well as from some high status tombs, have been studied. The La Tène settlements yielded large samples of bones, mostly from animals that had been butchered and consumed. The fauna discovered in cemeteries came from animals that had been sacrificed and buried. The regions of the country that have yielded suitable fauna for archaeozoological analysis are: Moldova, Muntenia, Oltenia, Dobrogea, Transylvania, and Banat (Figure 1). The settlements studied are as follows: Lozna (Haimovici, 1987), Lunca Ciurei (Haimovici, 1987), Bîtca Doamnei (Haimovici, 1987), Brad (Haimovici, 1987), Răcătău (Haimovici, 1989), Florești (Haimovici, 1987), Piatra Șoimului (Haimovici, 1993) in Moldova; Grădiștea (Udrescu, 1992; Tarcan-Hrișcu *et al.*, 1996; Hrișcu *et al.*, 1997), Căscioarele (Hrișcu *et al.*, 1996), Cîrlomănești (Udrescu, 1977), Radovanu (Udrescu, 1985a), Popești (Udrescu, 1985a), Piscu Crăsani (Udrescu, 1985a), Zimnicea - settlement and necropolis - (Haimovici, 1972, 1983), Vlădiceasca 1 (Udrescu, 1989), Vlădiceasca 2 (Ionescu, 1976), Cătunu (Haimovici, 1987), Peretu (Bolomey, cited in Haimovici, 1987) in Muntenia; Mărgărițești (Udrescu, cited in Haimovici, 1987) in Oltenia; Agighiol (Bolomey, 1968) in Dobrogea; Pecica (Haimovici, 1978) in Transylvania; Stenca Liubcovei (El Susi, 1985) and Divici (El Susi, 1996) in Banat.

There are some limitations to this study that concern with several variables. First, not all the data for the settlements in Moldova were available, so data from a synthesis (Haimovici, 1987) were mainly used here. Information on sampling intensity and recovery methods was not usually recorded. Some of the samples do not display significantly comparable frequencies, due to their small size, like Pecica and Vlădicesca 2. On the other hand, Căscioarele, which has also yielded a small sample, displays a similar pattern to the larger assemblages in the same region. These settlements were included in the analysis even if there still may be coincidence in the results obtained. The Geto-Dacian settlements usually yield well-preserved bones in high quantities, and the contextual information and stratigraphy are generally clear. An exception to the rule was the fauna recovered at Căscioarele where the five settlements excavated in this area have yielded only 403 faunal remains.

Chronologically, the settlements in Moldova are dated to a longer time span (400 B.C.-100 A.D.) and are located in different geographic units, such as the sub-Carpathian area, and plains. The settlements in Muntenia are generally dated to 200-100 B.C. and are located in plains, where the climate is today drier than in Moldova.

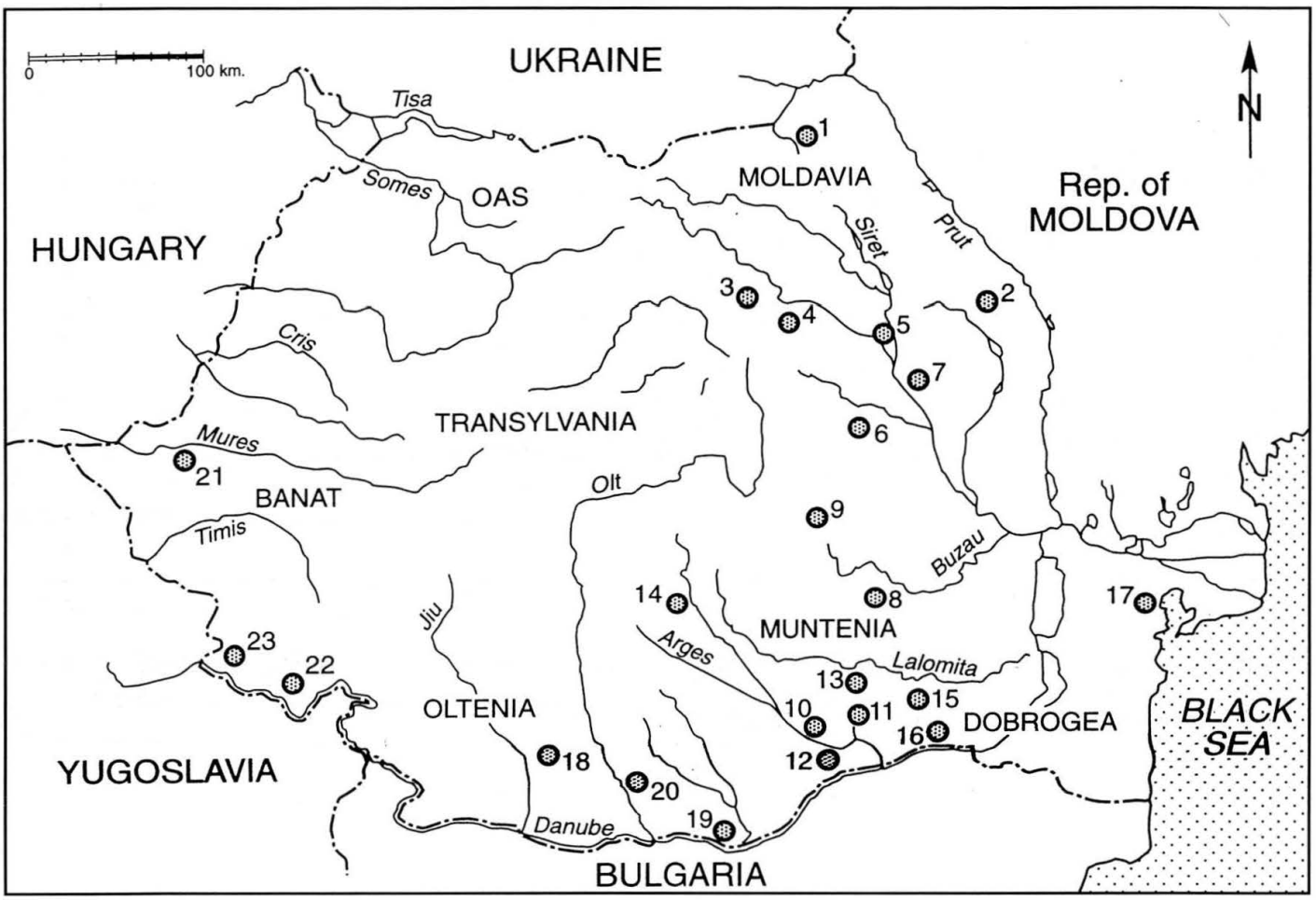

FIGURE 1

Map of Romania showing the Geto-Dacian sites that have been zooarchaeologically analyzed. Legend: 1. Lozna Illibicioc; 2. Lunca Ciurei; 3. Bîtca Doamnei; 4. Piatra Șoimului; 5. Brad; 6. Florești; 7. Răcătău; 8. Grădiștea; 9. Cîrlomănești, 10. Radovanu, 11. Vlădiceasca 1, 12. Popești; 13. Piscu Crăsani; 14. Căunu; 15. Vlădiceasca 2; 16. Căscioarele; 17. Agighiol; 18. Mărgărițești; 19. Zimnicea; 20. Peretu; 21. Pecica; 22. Stenca Liubcovei; 23. Divici.

1. ASSEMBLAGE VARIABILITY: Among the animal resources, domestic birds and mammals constitute the majority; however, because the number of remains attributed to domestic birds (hen and goose) is small, they were not included in this study. Animal husbandry was an important subsistence activity during La Tène in Romania, but wild mammal remains are still present, even if only in smaller amounts. As Table 1 shows, the percentage of domestic mammals and wild mammals vary from one region to another, as well as from one site to another. In Moldova, the percentages of domestic mammals range between 78% at Piatra Șoimului and 96% at Răcătău. In Muntenia, the percentages of domestic mammals are slightly higher: from 86% at Vlădiceasca 2 and 99% at Căscioarele. In Banat and Transylvania the percentages are the lowest. The minimum value is 67% at Pecica, and the maximum 71% at Divici. The wild mammal species were better represented in Banat and Transylvania, with values of about 30 %. Thus, the main regions of the country show differences and similarities, as well as local variability in terms of the importance of animal husbandry, the maximum values being recorded in Muntenia. The differences from one region to another, as shown by the data, may be related to different regional adaptations to the local environment. It is possible that Muntenia was a more favorable land for animal husbandry due to its lower plains and drier climate, in comparison to Moldova, Banat, and Transylvania where more hilly regions prevailed.

The domestic mammals identified in the La Tène settlements in Romania, as well as their frequencies based on NISP (specimen count or number of identified specimens), are shown in Table 1.

	Total mammals	Domestic mammals		Wild mammals		Cattle		Sheep/Goat		Pig		Horse		Dog	
Region/ Site	NISP	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Moldova															
Piatra Soimului	929	725	78.04	204	21.96	403	43.38	126	13.56	174	18.73	18	1.94	4	0.43
Racatau	1848	1771	95.83	77	4.17	734	39.72	350	18.94	609	32.95	71	3.84	7	0.38
Muntenia															
Cascioarele	211	208	98.57	3	1.43	84	39.81	63	29.86	44	20.85	10	4.74	7	3.32
Vladiceasca 1	1905	1644	86.29	261	13.71	817	42.89	410	21.52	258	13.54	69	3.62	90	4.72
Vladiceasca 2	584	501	85.78	83	14.22	305	52.23	52	8.90	66	11.30	57	9.76	21	3.60
Piscu Crasani	7008	6642	94.77	366	5.23	2245	32.03	2119	30.24	1753	25.01	381	5.44	144	2.05
Popesti	1894	1839	97.09	55	2.91	719	37.96	535	28.25	436	23.02	111	5.86	38	2.01
Radovanu	4874	4596	94.29	278	5.72	1801	36.95	1109	22.75	1374	28.19	246	5.05	66	1.35
Cirlomanesti	2818	2713	96.27	105	3.73	762	27.04	1167	41.41	697	24.73	74	2.63	13	0.46
Gradistea	2257	2028	89.85	229	10.15	919	40.72	511	22.64	440	19.49	135	5.98	23	1.02
Banat + Transylvania															
Stenca Liubcovei	916	650	70.96	266	29.04	253	27.62	161	17.58	227	24.78	5	0.55	4	0.44
Divici	1584	1126	71.08	458	28.92	137	8.65	136	8.59	843	53.22	8	0.51	2	0.13
Pecica	410	276	67.31	134	32.69	72	17.56	35	8.54	96	23.41	34	8.29	39	9.51
Total	27238	24719		2519		9251		6674		7017		1219		458	
Note: the percentages were calculated on the basis of Total NISP															

TABLE 1

The relative importance of domestic and wild species.

They consist of cattle (*Bos taurus)*, sheep (*Ovis aries)*, goat (*Capra hircus)*, pig (*Sus domesticus)*, horse (*Equus caballus)*, and dog (*Canis familiaris)*. Cattle dominate the two assemblages in Moldova with an average of 41.55%. Pig comes on the second place (25.84%), while sheep/goat on the third (16.25%). In Muntenia, the average value for cattle is of 38.7%, while sheep/goat has a higher average value (25.7%) than pig (20.77%). In Banat and Transylvania the average value of pig increases substantially, reaching 33.81%.

The remains of horse and dog are generally less frequent (see Table 1), and their relative frequencies also differ between sites and regions. The average values for the entire country are 4.47% for horse, and 2.26% for dog. For the two settlements in Moldova the average value for horse is 2.89%. In Muntenia, the percentages seem to be higher, with a minimum value of 2.63% at Cîrlomănești and a maximum value of 9.76% at Vlădiceasca 2. As for Banat, the percentages are extremely low, e.g. 0.55% at Stenca Liubcovei, and 0.51% at Divici. The more humid environment in this area was probably not favorable for keeping horses. The percentage of horse is higher at Pecica in Transylvania (8.29%) due to the small size of the assemblage. Dog has even lower frequencies, with values comprised between 0.38% (Răcătău) and 4.72% (Vlădiceasca 1), and a very high value is recorded for the settlement at Pecica (9.51%). In Muntenia the percentages are higher than in Moldova, with an average value of 2.32%. This phenomenon may be related to the higher percentage of caprovines in this region. The high percentages of dog and horse at Pecica and Vladicëasca 2 are responsible for lower percentage of cattle, sheep/goat, and pig. These samples are small in comparison to the others, and it is possible that the data obtained are not revealing. On the other hand, the settlement of Cascioarele, which has an even smaller sample than the other two mentioned above, displays a pattern that is similar to that obtained for most of the settlements in Muntenia. Further excavations in these areas are required in order to confirm the pattern obtained.

In order to account for the regional and local variability among the domestic species, a chi-square test of independence using Systat was applied. Table 2 presents the standardized residuals obtained for each species and site. The resi-

duals represent the difference between the observed and expected frequencies. Negative values show that the observed frequency was lower than the expected one, and positive values show that the observed frequency exceeded the expected one. Standardized residuals outside the limits of approximately ± 2 show that the difference from expectation is significant. The calculated chi-square value in Table 2 is significant at $p \leq 0.0005$, confirming that the variables (i.e. species and sites) are not independent. This means that the differences between sites and regions have a real basis, and probably are not the result of sampling.

In order to obtain a clearer pattern of association, the chi-square test was complemented by a correspondence analysis. The first two factors account for more than 80% of the variability (see Table 3), and the variable coordinates are presented in Table 4. The coordinates of these factors were plotted in Figure 2 in order to show correspondences between sites and assemblages. The plot shows two patterns of association. The first pattern shows the proportional representation of species in the assemblages. According to Factor 1, there seems to be a strong association between cattle, sheep/goat, horse, and dog, and a separation of this grouping from pigs. This distinct separation of the two groups mentioned above may suggest that Factor 1 may indicate mobility and/or herding behavior. The distribution of species on Factor 2 shows less separation than on Factor 1, but there is still a distinction between sheep/goat on one extreme and dog on the other extreme, with horses, cattle, and pigs in the middle. At present this distribution cannot be easily explained.

The second pattern of association shows the sites' position in relation to the species. Factor 1 indicates that most of the sites are positively associated with sheep/goat, cattle, horse, and dog, and only a few with pig. All of the sites have high percentages of cattle; variability seems to depend on the relationship between percentages of sheep/goat *versus* pig. The majority of sites have higher percentages of the former whereas a few sites have higher percentages of the latter. Divici, on the other hand, has a high percentage of pig remains. This settlement is located in the west Danube Valley, and the swampy and forested environment in this area seems to have been more favorable for pigs than for cattle and caprovines. The distribution of sites along Factor 2 is again fairly compact, but the fact that Cîrlomănești is associated with sheep/goat and Divici is associated with pigs may mean that factor 2 is indicating some influence of altitude or environmental zone. The settlement of Cîrlomănești is located in the sub-Carpathian area, at an altitude of 200m, while Divici is located at lower altitude.

A similar analysis was conducted by adding the wild species and performing the necessary percentage calculations. The chi-square value obtained is significant (see Table 5). The first two factors of variation account for more than 80% of the variability (see Table 3), and the variable coordinates (see Table 4) are plotted in Figure 3. Factor 1 tends to oppose wild animals from domestic ones, particularly cattle, sheep/goat, and horse. The distribution of assemblages along Factor 1 shows a majority exhibiting high proportions of cattle, sheep/goat, and horse. However, a substantial minority exhibits increased proportions of pig and wild animals. The distribution of sites and species on Factor 2 seems to mirror their distribution along Factor 1 in Figure 2. This distribution is assumed to result from the same underlying causes.

The general patterns observed on Figure 2 are the opposition between pig and the other domestic animals, as well as the opposition between sheep/goat and dog, which may suggest that dogs were not used for herding flocks and that that may have had another usage. Possible other options include hunting, food, and pets. As noted earlier the separation of pigs from other domesticates may rest on the degree of mobility or tendency of herding.

The larger picture in Figure 3 shows the relationships between all mammals, rather than simply the domestic ones. The strong clustering of large domesticates and the majority of sites, as noted above, indicate a heavy reliance on these taxa in the most cases. However, there is an interesting minority of assemblages that exhibit an increased emphasis on dogs, pigs and wild animals. Assemblages in the upper right quadrant show increased emphasis on dogs and/or wild animals, possibly suggesting heavier reliance on hunting. The lower right quadrant shows only one assemblage (Divici) with an emphasis on pig and wild animals. The adaptation suggested by this mixed emphasis is infrequent.

It seems that in Muntenia the majority of sites were more oriented toward animal husbandry than hunting, although some showed an increased emphasis on hunting. In Banat and Transylvania hunting and raising pigs seems to be an important part

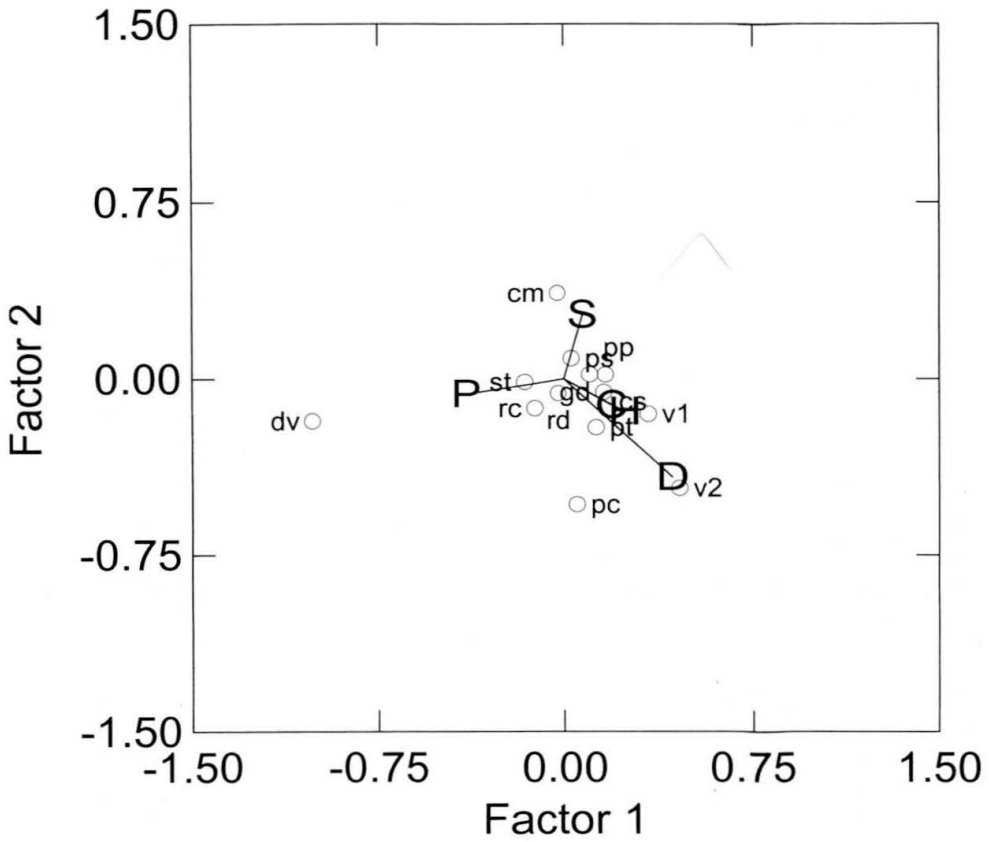

FIGURE 2

Plot of domestic species and sites. Legend: C = cattle; D = dog; H = horse; P = pig; S = sheep/goat; cs = Căscioarele; cm = Cîrlomănești; dv = Divici; gd = Grădiștea; pc = Pecica; pt = Piatra Șoimului; ps = Piscu Crăsani; pp = Popești; rc = Răcătău; rd = Radovanu; st = Stenca Liubcovei; v1 = Vlădiceasca 1; v2 = Vlădiceasca 2.

of the adaptive strategy. It may be that these areas had better wild game resources, or it may be that the area was less suitable for domestic animals. However, in rare cases wild animals and pigs were important components of the adaptive strategy. Cattle, horses, and dogs are symbols of wealth, and differences in social status may also account for regional variability.

2. MORPHOLOGICAL AND BIOMETRICAL CHARACTERISTICS:

• Cattle *(Bos taurus)*

The morphological characteristics of the few cranium fragments available show the presence of two cattle morphotypes, *primigenius* (i.e. broad and straight frontal ridge, flat and even front) and *brachyceros* (i.e. narrow and wavy frontal ridge hollowed in the middle, narrow and relatively long front). Most of the horn cores are short and thin, characteristic of the *brachyceros* type, and some, very rare, have the features of the *primigenius* type, i.e. they are long and thick. Some of these morphological characteristics were resulting from sexual dimorphism and castration. Today, Spanish cattle kept for bullfights and Scottish cattle may be considered as representatives of the *primigenius* type. As for the *brachyceros* type, the cattle of the brown group are the best-known representatives (Bökönyi, 1974). The Geto-Dacians' cattle were morphologically heterogeneous and, according to Haimovici (1987), they seem to be more similar in terms of form and size to those from the north-Pontic regions, and especially to those from the fortress of Olbia.

A special characteristic of the cattle found in some of the Geto-Dacian settlements is the presence of hornless individuals. Arerander (1896, cited in Bökönyi, 1974) described the *akeratos* type, and he suggested that these cattle become more numerous to the north, due to the cold. Nine

Site/Species	Cattle	Sheep/Goat	Pig	Horse	Dog
Cascioarele	0.698	0.795	-1.958	-0.08	1.603
Cirlomanesti	-7.950	15.533	-2.636	-5.169	-5.256
Divici	-13.854	-9.824	29.273	-6.378	-4.13
Gradistea	5.809	-1.898	-5.655	3.499	-2.378
Pecica	-3.079	-4.672	1.994	5.527	14.985
Piatra Soimului	7.994	-5.156	-2.217	-2.969	-2.574
Piscu Crasani	-4.829	7.004	-3.051	2.954	1.887
Popesti	1.173	1.383	-3.766	2.133	0.673
Racatau	2.766	-6.143	4.739	-1.748	-4.506
Radovanu	1.952	-4.24	1.919	1.285	-2.076
Stenca Liubcovei	0.624	-1.283	3.128	-4.779	-2.318
Vladiceasca 1	8.133	-1.909	-9.66	-1.341	10.788
Vladiceasca 2	8.581	-7.279	-6.391	6.497	3.846
Chi-square = 2849.720 Degrees of freedom = 48 Probability = 0.000					

TABLE 2

Standard residuals for domestic species.

	Domestic		Domestic + Wild	
Factor	Eigenvalue	Percent	Eigenvalue	Percent
1	0.064	55.880	0.100	58.580
2	0.031	26.470	0.041	24.170
3	0.016	14.040	0.016	9.660
4	0.004	3.610	0.011	6.280
5			0.002	1.310

TABLE 3

Factors of variability.

hornless individuals have been found in the Geto-Dacian settlements from Romania. According to Haimovici & Beleniuc (1983) and Haimovici (1987) this apparently high representation of hornless individuals seems to support the presence of a hornless breed instead of a non-transmissible variation. Haimovici (1987) also argues that this type, probably raised by the Geto-Dacians, coexisted with the horned type, and was not genetically bundled with the larger hornless type raised by the Scythians from the North-Pontic regions. Today, some breeds of hornless cattle are kept in Scotland, Scandinavia and Northern Russia (Haimovici, 1967). Greek historians, such as Herodotos and Strabo, also mention the hornless type of cattle, in the 5th century B.C. They suggest that hornlessness is either due to the low temperatures in the Nordic regions or even to a removal of the horns because of their sensitivity to freezing. Claudius Aelianus notes the presence of this breed in Moesia, and he argues that this phenomenon has no external cause and that these individuals appear only sporadically

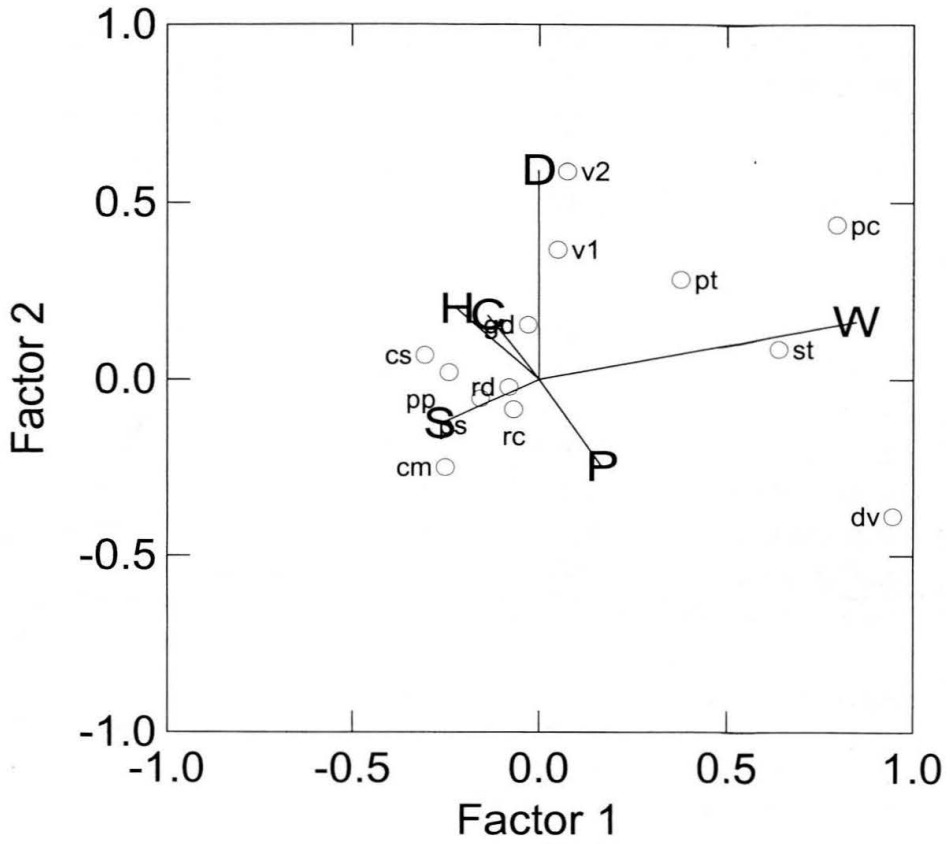

FIGURE 3

Plot of domestic species, wild species and sites. Legend: C = cattle; D = dog; H = horse; P = pig; S = sheep/goat; W = wild; cs = Căscioarele; cm = Cîrlomănești; dv = Divici; gd = Grădiștea; pc = Pecica; pt = Piatra Șoimului; ps = Piscu Crăsani; pp = Popești; rc = Răcătău; rd = Radovanu; st = Stenca Liubcovei; v1 = Vlădiceasca 1; v2 = Vlădiceasca 2.

amongst the cattle population (Haimovici, 1987). According to Rütimeyer (1865) and David (1897), the hornless cattle are not an independent type but a variant of other types. This opinion is well supported by the fact that hornless individuals can be bred through selection.

The withers height estimated on the basis of the metapodials (Table 6) shows great variability within the cattle population. The lowest withers height value is 98.6 cm at Zimnicea, while the highest is 125.7 cm at Popești. The mean value for the entire country is 112.5 cm (Zalkin coefficient). In Moldova, the average is 113.1 cm, while in Muntenia 112.8 cm. The average withers height for Europe in general, is 111 cm (Audoin-Rouzeau, 1991a).

• Sheep/Goat (*Ovis aries/Capra hircus)*

The skeletons of these two species are similar in many aspects and, except for the metapodials, horns, phalanges, and some parts of the cranium, could not be separated easily. For this reason many remains are included within the *Ovis-Capra* group. Both sheep and goat were found in the Geto-Dacian settlements. Usually sheep are more numerous than goats (Udrescu, 1985a; Haimovici, 1987). Even if the cranial remains were fragmentary they could reveal some of the morphological characteristic for both species. As Haimovici (1987) notes, male goats had very strong horn cores, twisted and turning outwards, which are characteristic of the "prisca" type. The she-goats had a straighter line on their horn cores and were only slightly twisted. The twisted horns became more frequent beginning in Neolithic times (Bökönyi, 1974).

As for sheep, the cranial fragments show moderate sized horns in males, triangular in section at their base. Females are generally hornless or they have very short horns, usually resembling goats. Horns with typical morphological characteristics resulting from castration have not been found

	Domestic		Domestic + Wild	
Species	Factor 1	Factor 2	Factor 1	Factor 2
Cattle	0.189	-0.111	-0.136	0.181
Sheep/Goat	0.075	0.273	-0.265	-0.126
Pig	-0.391	-0.065	0.168	-0.249
Horse	0.241	-0.139	-0.218	0.199
Dog	0.430	-0.419	-0.002	0.590
Wild			0.849	0.163
Sites				
Cascioarele	0.166	0.018	-0.305	0.069
Cirlomanesti	-0.026	0.364	-0.250	-0.250
Divici	-1.016	-0.179	0.948	-0.388
Gradistea	0.159	-0.056	-0.030	0.154
Pecica	0.052	-0.535	0.798	0.437
Piatra Soimului	0.128	-0.206	0.376	0.282
Piscu Crasani	0.030	0.087	-0.156	-0.054
Popesti	0.103	0.019	-0.240	0.020
Racatau	-0.118	-0.125	-0.069	-0.085
Radovanu	-0.023	-0.061	-0.081	-0.022
Stenca Liubcove	-0.158	-0.013	0.642	0.085
Vladiceasca 1	0.334	-0.150	0.050	0.366
Vladiceasca 2	0.459	-0.466	0.075	0.587

TABLE 4

Variable coordinates.

Site/Species	Cattle	Sheep/Goa	Pig	Horse	Dog	Wild
Cascioarele	1.457	1.453	-1.405	0.181	1.833	-3.738
Cirlomanesti	-6.306	17.609	-1.075	-4.641	-4.995	-9.639
Divici	-17.288	-12.996	21.531	-7.469	-4.773	25.738
Gradistea	5.506	-2.123	-5.866	3.382	-2.427	1.403
Pecica	-5.699	-6.632	-0.936	3.654	12.228	15.604
Piatra Soimului	4.925	-6.910	-4.223	-3.656	-2.940	12.740
Piscu Crasani	-2.771	9.010	-1.233	3.804	2.410	-11.081
Popesti	2.986	2.947	-2.351	2.850	1.090	-9.079
Racatau	4.245	-5.112	6.092	-1.287	-4.319	-7.183
Radovanu	3.579	-2.963	3.340	1.189	-1.762	-8.137
Stenca Luibcovei	-3.294	-4.426	-0.584	-5.622	-2.905	19.697
Vladiceasca 1	6.683	-2.930	-10.507	-1.761	10.242	6.391
Vladiceasca 2	7.573	-7.737	-6.885	6.037	3.568	3.945

Chi-square = 4640.402
Degrees of freedom = 60
Probability = 0.000

TABLE 5

Standard residuals for domestic and wild species.

Site/Region	Chronology	Site type	Species							
			Bos taurus		Ovis aries		Capra hircus		Equus caballus	
			Var	X	Var	X	Var	X	Var	X
Moldova										
Lozna	III-II B.C.	S	111.4-124.4	115.3	-	-	-	-	-	-
Lunca										
Ciurei	III-II B.C.	S	-	121.7	-	63.1	-	-	-	140.7
Bitca										
Doamnei	II B.C.-I A.D.	S	-	110	-	-	-	-	-	-
Piatra										
Soimului	I B.C.-I A.D.	S	105.1-107.0	105.8	51.8-59.8	57.1	54		-	-
Brad	IV B.C.-I A.D.	S	103.4-126.0	111.6	50.0-73.5	60.6	60.9-66.2	62.7	126.3-144.8	133.8
Racatau		S	-	110	-	62	-	67.2	-	133
Floresti	I B.C.-I A.D.	S	-	110	-	-	-	-	-	-
Muntenia										
Gradistea	II-I B.C.	S	103.4-124.0	110.1	56.3-61.1	59.2	62.7-67.3	65	-	130.1
Cascioarele	IV-I B.C.	S	105.6-121	113.6	-	68.7	-	-	-	-
Cirlomanesti	II-I B.C.	S	103.5-125.1	113.9	52.0-67.9	60.5	60.8-68.4	63.3	-	-
Radovanu	II-I B.C.	S	104.1-124.6	113.6	52.6-63.9	59.7	64.7-68.4	66.1	128.2-132.7	130.9
Popesti	II-I B.C.	S	104.6-125.7	115.8	53.8-65.2	58.2	62.1-65.0	63.3	130.8-138.0	135
Piscu										
Crasani	II-I B.C.	S	103.2-130.1	114.7	50.9-70.2	60.2	58.6-71.9	65.6	125.0-137.0	132.6
Zimnicea	IV-I B.C.	S	98.6-122.4	110.2	51.4-64.1	58	58.7-67.2	62.6	128.2-141.7	132.8
Margaritesti	III-I B.C.	S	109.8-117.1	114.6	-	-	-	-	136.5-139.1	137.8
Vladiceasca 1	II-I B.C.	S	107.0-130.4	116.7	53.6-65.2	57.4	69.6-73.0	71.3	134.9-139.9	137.4
Vladiceasca 2	III-I B.C.	S	101.4-108.4	104.9	67.1-73.8	70.4	-	-	138.3-140.2	-
Catunu	II-I B.C.	S	-	-	-	-	-	-	130.3-140.3	135.3
Zimnicea	IV-II B.C.	N	-	-	-	-	-	-	129.5-145.6	136.7
Peretu	IV-III B.C.	T	-	-	-	-	-	-	-	131.6
Dobrogea										
Agighiol	IV B.C.	T	-	-	-	-	-	-	132.4-145.9	139.1
Banat										
Stenca										
Liubcovei	III B.C. - I A.D.	S	-	-	-	62.7	59.8-64.4	61.62	-	-
Transylvania										
Pecica	La Tene	S	103.6-110.4	106.9	-	-	-	-	-	-
S= settlement; N= necropolis; T= tomb										

TABLE 6

Withers height values for the main domestic species.

(Haimovici, 1987). The earliest hornless sheep seem to have emerged around 7500 B.C. in South West Asia and spread into South East and Central Europe in the middle Neolithic. They become common from the Bronze Age onwards, and today they are most frequent in both sexes of domestic sheep (Bökönyi, 1974). Chaix (1977) argues that the first hornless sheep date from Early Bronze Age. The analyses in Hungary show that the earliest hornless sheep was found in Southern Hungary around 5000 B.C (Bökönyi, 1974).

At Răcătău (Haimovici, 1985), a fragment of a male cranium was found with four horns: two anterior and two posterior. The author suggests the magic or ritual functionality of this piece, arguing that this phenomenon was extremely rare and that the primitive populations were not accustomed to it. Four-hornedness is an anomaly characteristic of domestic ruminants, and some authors believe that it is caused by domestication (Bökönyi, 1974). Krysiak (1937) notes that multi-hornedness occurs more frequently in caprovinae and rarely in bovinae kept under similar conditions, and he suggests that this may be independent of the domestication process.

The average sheep withers height value is 61.5 cm, with the lowest value at Piscu Crasani and the highest at Cîrlomănești (see Table 6). During Iron Age in Europe the mean withers height was of 60.3 cm, ranging between 55 and 65 cm (Audoin-

Rouzeau, 1991b). According to Bökönyi (1974), in Eastern Europe the average withers height for sheep was 60 cm. During the Bronze Age in Romania sheep were bigger than in the Neolithic or Iron Age, and their withers height was almost 65 cm (Haimovici, 1968). The average goat withers height value in Romanian La Tène is 64.87 cm, ranging from 58.6 cm at Piscu Crăsani to 73 cm at Vlădiceasca 1 (see Table 6).

• Pig (*Sus domesticus*)

The pig assemblages are generally highly fragmented, making morphological analysis difficult. During La Tène in Romania, as well as elsewhere in contemporary Europe, the pig still had the long snout characteristic of its wild ancestor. Pig size was also generally small, withers height reaching only 70 cm. The calculation of the withers height is theoretical because it usually reflects the tall withers, which is a characteristic that has been inherited from the wild swine, and not the real size of the animal. Therefore, pig withers height is not expected to account for a better husbandry practice. Withers height is by itself an approximate value of a biological parameter and represents one of the aspects of the variation within the domestic forms (Udrescu *et al.*, 1999). It is, however, generally agreed that the metrical data are most important for a biometrical analysis. Therefore, the differences between the dimensional variations should be interpreted with prudence because of the disparities in withers height that appear when measuring different bones (Weinstock, 1993; Forest, 1998). The withers height obtained from the measurements taken on metapodials show lower values than those obtained on other bones, with 7% in average (Forest, 1998). In a recent attempt to subsume both zootechnical and archaeozoological data, Forest (1998) asserts that pig withers height value is imprecise and that this value does not prove to be efficient for an accurate analysis of inter-specific variations. The measurements taken on dentition and long bones show that during the Bronze Age in Romania pig was more massive than the *palustris* type from the Neolithic and was similar in size to that from the Oriental regions (Haimovici, 1968). During La Tène, the withers height began to decrease again. A similar size pig was found in the Celtic settlements from Bavaria (Boessneck *et al.*, 1971). The decrease in size may be a consequence of the expansion of agriculture, to the detriment of forest areas, to which pig is well adapted.

• Horse (*Equus caballus*)

Horse was an important species for the Geto-Dacians and it was probably the only species that was given special care. They were buried in the necropolis from Zimnicea (400-200 c. B.C.). They were also found in high status tombs, at Peretu (400-300 B.C.) and Agighiol (400 B.C.).

Bökönyi (1968), in his study of Iron Age horses, distinguished two groups of horses in Europe. The first group (Oriental) encompassed medium sized horses from the eastern part of Central Europe and from Eastern Europe, with broad foreheads, long skulls and short facial parts. Their mean withers height value is 136-137 cm, and it ranges from 121.9 to 149.4 cm. This group included Scythian and Russian horses of South Russia, the Kurgan horses of Altai, the Hallstatt horses from Slovenia, the Thracian horses from Bulgaria and the early Iron Age horses from Romania. The second group (Occidental) was comprised of smaller size horses, with a mean withers height of 126-126 cm, and a range of 109.9 and 149.4 cm. These horses had narrower foreheads and relatively long facial parts. The group was represented by the Hallstatt horses from Austria and Germany, as well as by the Celtic horses from Germany and Switzerland. Eastern (steppe) horses had thicker bone extremities than the western (mountain and forest) group.

The exhumation of 12 individuals, each of them buried in a separate pit, at the necropolis from Zimnicea in Muntenia, was of major importance in describing the morphological characteristics of the Geto-Dacians horses. According to Haimovici (1983), the Geto-Dacians horses were divided in two groups. The first one included the "ordinary" horses that had a large head, with the facial part and the snout moderately long. Its limbs were well proportioned, and the distal part large. They had a small overall size, but were larger than the Occidental group. This type of horse was probably used for traction and agriculture and maybe even for riding. Even though these horses were mainly found in settlements, one individual was found in the high status tomb from Agighiol in Dobrogea (Bolomey, 1968); its withers height was 132.4 cm. The second group, so-called "elite", was represen-

ted by larger individuals, which were probably used only by the aristocratic class. Their withers height was about 140 cm or even higher, but they did not reach the 150 cm size of the Scythian or Kurgan horses (Haimovici, 1983). According to Haimovici (1983), the "elite" horses had long limbs due to the elongation of the proximal part of their legs (while modern riding horses have the distal part very long), and this has substantially contributed to increase their withers height. Their withers were tall and their croup relatively low. Their head was smaller in comparison to the "ordinary" type, their neck was long and their limbs were longer and more slender. The "elite" type was, however, rare. Its presence is also confirmed by the artistic representation on the silver helmet found in the princely tomb from Agighiol, which displayed a horse with long limbs, low croup, tall withers, medium size head, and short mane. The above-mentioned groups are not exclusive, because intermediate forms are present and reflect the heterogeneous character of the horses kept by the Geto-Dacians. As for the origin of the "elite" horses, both Haimovici and Bolomey agree that they were not imported from the Scythians and that these tall size individuals could be obtained by improving the local stock of animals because by the end of the Bronze Age in Romania an indigenous stock of tall horses, around 140 cm, was present (Haimovici, 1987). Through breeding, high quality forage and use of castration, this indigenous stock could have resulted in the tallest size individuals during the Iron Age. According to Haimovici (1983), the high frequency of castrate animals found among the horse fauna, and the fact that castrating individuals younger than two years of age can improve the withers height by 4 to 6 cm supports this hypothesis. The average withers height value obtained for Romania is of 134.7 cm, with a minimum of 125 cm at Piscu Crăsani, and a maximum of 145.6 cm for one of the horses found at the necropolis of Zimnicea (see Table 6). The mean withers height in Europe during Iron Age is 127.89 cm, ranging between 121 and 132.9 cm (Audoin-Rouzeau, 1991c).

Bökönyi (1974) notes that the Hellenistic kingdom and Rome imported tall horses from the Scythians to improve their military power. However, since trade between these states and Dacia is well documented for the Iron Age, it seems more efficient to import these specimens from the closer source.

• Dog (*Canis familiaris*)

Morphological features seem to show the beginning of different dog breeds during the La Tène period. However, the number of complete skulls is extremely low, and a conclusion in this respect is premature. The basal length of the cranium calculated with the Dahr coefficient, and the withers height values, generally show the presence of all sizes of dogs, from small to large. The preponderant category is that of medium size dogs, with a basal length between 160-180 mm and withers height between 50-60 cm (Haimovici, 1987). The average withers height values vary between 48.4 and 66.3 cm in the Geto-Dacian region (Udrescu, 1990). At Radovanu, the average withers height value was 59.5 cm, while at Piscu Crăsani it was 57.4 cm. At Grădiștea the average withers height value was 52.3 cm, while at Pecica, the basal length obtained for two individuals was 156 and 187 mm. A question related to the size of dogs during La Tène is whether the small sized dogs were present before the Roman conquest. One small individual with a cranial basal length of only 131.5 mm was found at Piscu Crăsani. An even smaller individual was found at Stenca Liubcovei where a basal length of 127.1 mm was obtained. Small individuals were also found in the high status tomb from Peretu. Dwarf dogs, of 23-25 cm withers height, are mainly known from the Roman period (Bökönyi, 1974), and some individuals have been found in the Celtic *oppidum* at Manching (Boessneck *et al.*, 1971). Thus, small size dogs are present during the Geto-Dacian period, but they seem to have been rare.

As for the use of this species for food, the presence of burnt bones amongst culinary refuse seems to favor this possibility (Hriscu *et al.*, 2000). Bökönyi (1974) notes that "The brain seems to have been a favorite delicacy for prehistoric man, for Neolithic and Bronze Age dog skulls have often been found whose brain case was opened with a cut along the medial plane or by cutting off the os occipitale; sometimes holes were made on the side of the skull so that the brain could be removed". At Manching, dog was eaten (Boessneck *et al.*, 1971) and in Gaul (600-100 B.C.), there is no doubt that dog meat was eaten and that dog was butchered (Meniel, 1987). In Germany slaughtering of dogs for meat was forbidden only in 1986 (Geppert, 1990). In Romania, the low percentage of dog remains shows that, even if the species was eaten, this happened only occasionally.

Primarily, dogs were used for hunting, companionship, to tend flocks and to guard dwellings.

3. BUTCHERY: The study of butchery has continued to be an important topic because of its major contribution in distinguishing several aspects of human-animal interactions. Butchering animal carcasses is a significant taphonomic factor in the formation of humanly created assemblages. It is important to deduce not only how humans reduce animal carcasses into consumable parts but also how those behaviors are reflected archaeologically. Butchery analyses provide information about the resources exploited by people and the manner in which these resources were exploited. Butchery is also related to transport processes and can reveal practices such as abandonment, transport, and different uses of the bones. The type of butchery mark can also reveal interesting information about the butchery stages such as kill-butchery stage, secondary butchery stage, and final butchery-consumption stage, and thus, to the type of site. According to Binford (1978: 48), "butchering is not a single act but a series of acts beginning when the animal is killed and continuing at varying junctures until the animal is totally consumed and discarded." Lyman (1987) has termed the activities involved in butchering as *butchering process* or *butchery technique* and the result of the process as *butchering pattern.*

Few analyses on butchery processes and patterns have been done in Romania; however, some analyses for the settlements in Muntenia (Udrescu, 1985b) show different types of cut marks that seem to suggest two types of cutting tools on some of the remains. Some cuts were fine, probably from filleting and meat detachment, and some cuts were heavy, probably from dismemberment. The fine type of cut marks is most frequently encountered, but the second type constantly appears on all bones. Besides these sorts of traces, many breakages done with cutting tools and other heavy tools have been noted. These breakages were probably done in order to extract the marrow inside the bones and probably to facilitate carcass portioning. The breakages were more frequent on humerus, radius, femur and tibia; these bones were found more fragmented than other parts of the body that have a low-meat quality (e.g. metapodials).

The head was detached from the body by repeated chopping in the atlas/axis region, a pattern seen consistently in all analyzed settlements. Most of the assemblages have preserved the odontoid process and a part of the vertebral centrum, and this operation was most evident in cattle.

There is no evidence for the methods of slaughter. It is possible that this was done in the most vulnerable zones of the body, instead of heavy blows on the head. Several blows for cattle and only one for sheep and goats achieved the detachment of the horns. For these species, as well as for pigs, the head was split in half for extracting the brain. The mandible was detached from the cranium by several blows about 3.5-5 cm below the condyle and the coronoid apophysis. The articular part of the mandible usually remained attached to the articulation and could be found during excavations. As part of this process, the tongue was probably detached as well. The detachment of the head from the body, of the mandible from the cranium, or of the tongue were probably accompanied by the removal of the horns and of the brain (Udrescu, 1985a, 1985b; Udrescu *et al,* 1999).

SOCIAL ORGANIZATION

One analysis of Romanian data was intended to provide information regarding social organization as deduced from the fauna found on the *acropole* at Răcătău (Hrișcu & Bejenaru, 1998). Most Romanian studies are concerned with high status tombs that belonged to tribal aristocracy members (e.g. Agighiol, Peretu). The study of the fauna from the *acropole* at Răcătău analyzes two houses and the sanctuary area, and provides comparative data with those obtained for the habitation site analyzed by Haimovici (1989). The small sample obtained from *acropole* and sanctuary area (1047 NISP) did not reveal significant information concerning the sacerdotal and/or aristocratic group that probably lived there. Dog remains were absent in the sanctuary area. The distribution of other species does not differ significantly from that obtained by Haimovici for the habitation site. Also, the distribution of skeletal elements does not bring insight into a specific "attitude" related to a "sacred" activity. It is possible that the animals were slaughtered outside the sanctuary area, that only small parts of the body were deposited, and that the part of the body selected to be deposited was not as significant as the selection of the animal to be sacrificed.

CONCLUSIONS

Animal husbandry was of great importance during La Tène in Romania. The domestic mammals raised by the Geto-Dacians were cattle, sheep, goats, pigs, horses, and dogs. The frequencies obtained for each species vary from one site to another, as well as from one region to another, mainly due to local environmental factors. Cattle were generally the most frequent species, similar to the general situation in Central and Eastern Europe in prehistoric times. This species was better adapted to the environment and more likely to be found because of the presence of its wild ancestor in the area, and it also had a multiple use (primary products, secondary products, and traction) in comparison to other domesticates. Most of the sites show more or less variation of the main domesticates. Some sites have increased emphasis on hunting, suggesting a larger contribution of the wild species to the diet while, in rare instances, there is notable reliance on raising pigs and hunting. Horse and dog remains have generally low representation among the domestic fauna. However, the horse had a special place if we consider the revolution it created in transport, trade and the development of warfare. Horse was also significant in people's imagination about the afterlife. This phenomenon is especially reflected by the practice of burying it. Dogs were of varied sizes, were apparently used in hunting, and were occasionally eaten.

Generally, the main domestic animals were of small size, primitive, with low productivity rates. It is possible that the cooler and more humid climate during the Iron Age contributed to their decrease in size, and/or the Geto-Dacians did not use rational techniques in order to improve the size and productivity of their domestic animals. Only horse was given special care and that led to the emergence of tall size individuals.

The patterns revealed in the present analysis raise some interesting questions for future research. Do these patterns show simply adaptations to local environmental conditions? What effect, if any, of the social environments is reflected in these assemblages? For example, does the differentiation seen amongst these assemblages reflect specialized production within a centralized economic system? Do these pattern reflect intensification of production in order to fulfill social obligations? What demographic models might account for the observed patterning? Are we looking at a number of different populations, each with its own adaptations, or are we looking at specialization within a single population? Further research will contribute to the interpretation of the data presented here.

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