

ANIMAL EXPLOITATION IN BABADAG CULTURE. ARCHAEOZOOLOGICAL DATA FOR THE SITES OF GARVĂN-MLĂJITUL FLORILOR AND JIJILA-CETĂȚUIE (TULCEA COUNTY, ROMANIA)

Eliza-Ioana CREȚU*
Simina-Margareta STANC**
Sorin-Cristian AILINCĂI***
Luminița BEJENARU****

Cuvinte-cheie: *arheozoologie, cultura Babadag, Epoca Fierului, Dobrogea, resurse animale.*

Keywords: *archaeozoology, Babadag culture, Iron Age, Dobruja, animal resources.*

Rezumat: *Materialul faunistic studiat în acest articol provine din siturile arheologice de la Garvăn-Mlăjitul Florilor și Jijila-Cetățuie, situate în nordul Dobrogei și dateate în perioada timpurie a epocii fierului, cultura Babadag (secolele X–IX a.Chr.). Analiza arheozoologică a constatat în identificări anatomice și taxonomice, evaluare tafonomică, cuantificări (după numărul de resturi și după numărul minim de indivizi), estimarea vârstei de sacrificare, estimarea sexului și osteometrie. Majoritatea resturilor faunistice studiate provin de la mamifere, înregistrându-se 71,97% la Garvăn și 95,08% la Jijila, dar au mai fost identificate și resturi de păsări, reptile, pești și moluște. Analizând resturile de mamifere, s-a observat că cele mai multe aparțin speciilor domestice, într-un procent de 88,24% la Garvăn și 95,28% la Jijila, drept dovadă că principala ocupație a populației de cultură Babadag era reprezentată de creșterea animalelor. Cele mai frecvente specii de mamifere domestice sunt: bovina domestică, ovicaprinele și porcul, iar dintre cele sălbatice cerbul și mistrețul. Pescuitul se dovedește a fi o activitate economică importantă în cadrul acestor așezări, având în vedere că în situl de la Garvăn, resturile de pești reprezintă 26,37% din totalul eșantionului faunistic. Strategia de exploatare a animalelor este una eficientă, urmărindu-se obținerea atât a produselor primare*

* Eliza-Ioana CREȚU: „Alexandru Ioan Cuza” University of Iași, Faculty of Biology, Iași, Romania; e-mail: cretuelizaioana99@yahoo.com

** Simina-Margareta STANC: „Alexandru Ioan Cuza” University of Iași, Faculty of Biology, Iași, Romania; e-mail: simina.stanc@uaic.ro

*** Sorin Cristian AILINCĂI: University of Bucharest, Faculty of History, Bucharest, Romania; e-mail: sailincai@gmail.com

**** Luminița BEJENARU: „Alexandru Ioan Cuza” University of Iași, Faculty of Biology, Iași, Romania; Romanian Academy, Iasi Branch, “Olga Necrasov” Center of Anthropological Research, Iasi, Romania; e-mail: lumib@uaic.ro

cât și a celor secundare. Astfel de asemănări s-au întâlnit și în alte eșantioane faunistice atribuite culturii Babadag din sud-estul României, precum cele de la Satu Nou-Valea lui Voicu și Babadag, subliniind caracteristici comune în strategia de subsistență a acestei culturi.

Abstract: The faunal material studied in this article comes from the archaeological sites of Garvăn-Mlăjitul Florilor and Jijila-Cetățuie, located in northern Dobruja and dated to the early Iron Age, Babadag culture (10th–9th centuries BC). The archaeozoological analysis involved anatomical and taxonomic identification, taphonomic assessment, quantifications (based on the number of remains and the minimum number of individuals), estimation of slaughter age, sex estimation, and osteometry. Most of the studied faunal remains come from mammals, with percentages of 71.97% at Garvăn and 95.08% at Jijila, but remains of birds, reptiles, fish, and molluscs were also encountered. Analyzing the mammal remains, the majority belong to domestic species, with 88.24% at Garvăn and 95.28% at Jijila, indicating animal husbandry as the main occupation of the Babadag culture population. The most common domestic mammal species are cattle, sheep/goat, and pig, while the most representative wild mammals are red deer and wild boar. Fishing was an important economic activity within these settlements, as evidenced by the fact that fish remains represent 26.37% of the total faunal sample at Garvăn. The strategy for animal exploitation was efficient, aiming to obtain both primary and secondary products. Similar patterns have been observed in other faunal assemblages attributed to the Babadag culture in southeastern Romania, such as Satu Nou-Valea lui Voicu and Babadag, highlighting common characteristics in the subsistence strategy of this culture.

Introduction

This paper aims to evaluate the faunal material from the archaeological sites of Garvăn–Mlăjitul Florilor and Jijila–Cetățuie. These two settlements are attributed to communities that populated part of the Lower Danube region during the Early Iron Age (10th–9th centuries BC), known generically as the Babadag culture¹. Currently, around 100 settlements associated with this culture have been identified. Funeral practices are known only from few burials within habitation structures, with no cemeteries yet discovered².

Evidence of habitation shows a preference for the major watercourses, especially the Danube, its lakes and tributaries. Another area with a high density of sites is the present-day Razelm–Golovița–Sinoe lacustrine complex, particularly between Babadag and Enisala, where resource exploitation around the fortified settlement of Babadag has been suggested³ (Fig. 1).

There is limited knowledge about the economy of these communities. Analyses of some faunal materials indicate the important role of animal husbandry, particularly cattle, as well as sheep, goat, and pig. Fishing and hunting had a smaller contribution to food procurement⁴. Direct evidence of plant cultivation is limited to the discovery of wheat, barley, oat, and millet seeds in some storage pits in the Babadag settlement⁵.

¹ MORINTZ 1964; MORINTZ 1987; JUGĂNARU 2005; AILINCĂI 2013; AILINCĂI 2016.

² AILINCĂI 2015.

³ AILINCĂI *et alii* 2023.

⁴ STANC, MALAXA, AILINCĂI 2019.

⁵ CÂRCIUMARU 1996, p. 63.

Returning to activities related to animal husbandry, hunting, and fishing, some overall differences can be observed among the analyzed faunal assemblages. This variation may indicate access to different resources or the specialization of certain communities in specific activities, such as fishing, as it is the cases of Enisala or Niculițel⁶. To complete this picture and to enrich data related to wild fauna, any new contribution can be particularly valuable. In this context, it is important to note that for several frequently cited sites in archaeological literature, such as Garvăn–*Mlăjitul Florilor* and Jijila–*Cetățuie*, there are no information regarding the exploitation of animal resources.

Archaeological context: the sites of Garvăn–*Mlăjitul Florilor* and Jijila–*Cetățuie*

Although the both site are located in northern Dobrudja, the two settlements functioned in distinct landscape types (Fig. 2). The settlement of Garvăn–*Mlăjitul Florilor* was positioned on a slightly higher promontory, on the northern shore of Lake Jijila (dry today) (Fig. 3), while the fortification from Jijila–*Cetățuie*, Popa Isac point, was constructed in a hilly area that marks the northern slopes of the Măcin Mountains, along the Jijila Valley (Fig. 4).

Identified in 1959 by the archaeological team led by Gheorghe Ștefan⁷, the site of Garvăn–*Mlăjitul Florilor* was investigated by Gabriel Jugănaru over several campaigns in 1992, and 1994–1995. Numerous habitation structures (e.g. dwellings, pits, hearths, etc.) were identified within the excavated area, disposed on at least three levels. The archaeological material discovered consists mainly of pottery, but the published findings also include various bone, stone, and metal tools. Despite the stratigraphic context that has been frequently invoked, the research has been only briefly published⁸.

The fortification of Jijila–*Cetățuie* was partially investigated more recently (2001, 2003–2005), data obtained being published in a monograph⁹ from which, however, the information regarding the faunal study is absent. The habitat structures (pits only) were arranged on a high plateau with steep slopes, difficult to access from the north, east, and west. Access was probably only from the south, where a fortification consisting of two waves, with ditches to the outside, was constructed.

There are no C¹⁴ data for these two sites, but they should fall within the chronological limits of the Babadag culture. The available data so far from Babadag, Enisala, Jurilovca, Bucu, and Niculițel indicate a chronological interval between the beginning of the 10th century BC and most likely the beginning of the 8th century BC¹⁰.

⁶ STANC, MALAXA, AILINCĂI 2019.

⁷ ȘTEFAN *et alii* 1959, p. 646–648.

⁸ JUGĂNARU 1997; LÁSZLÓ 1997; JUGĂNARU 2005; MIHAIL, AILINCĂI, JUGĂNARU 2022.

⁹ SÎRBU, AILINCĂI, SIMION 2008.

¹⁰ AILINCĂI, CAROZZA, ȚÂRLEA 2022; AILINCĂI *et alii* 2023.

Material and Methods

The studied faunal samples come from the archaeological sites of Garvăn–Mlăjitul Florilor and Jijila–Cetățuie (Tulcea County), being attributed to the Babadag culture (10th–9th centuries BC). The faunal sample from Garvăn–Mlăjitul was recovered during the archaeological campaigns of 1992, 1994, and 1995, summing 182 skeletal remains, while that of Jijila–Cetățuie was collected in 2001 and 2003, comprising a total of 305 remains. The archaeozoological analysis, conducted at the Archaeozoology Laboratory of the Faculty of Biology, “Alexandru Ioan Cuza” University of Iași, included anatomical and taxonomic identifications, taphonomic evaluation, quantification, estimations of age at slaughter and sex, and osteometry. This approach allowed for a deeper understanding of the economic and cultural practices related to fauna within the studied settlements.

For anatomical and taxonomic identifications, the laboratory’s available reference osteological collections were used, alongside comparative anatomy atlases¹¹. The separation of similar species, such as *Ovis aries* (sheep) and *Capra hircus* (goat), was based on distinct morphological criteria in adult skeletons, following methodologies detailed in reference studies¹².

The taphonomic evaluation focused on analyzing marks identified on faunal remains, mainly to highlight anthropic (e.g. butchering, processing, burning), and natural activities (e.g. carnivores, soil properties). A detailed study of these osteological modifications aid in reconstructing economic activities, food processing practices, and the use of faunal resources, thereby enhancing the understanding of lifestyle and ecological interactions within these settlements. The quantification of animal remains was based on calculating the number of identified specimens (NISP), and estimating the minimum number of individuals (MNI). Age at slaughter was estimated based on dentition¹³ and on the postcranial skeleton¹⁴. Sex identification was possible for only two species: *Sus domesticus* (pig) and *Bos taurus* (cattle). Sex differentiation in pig was based on morphological criteria (canine teeth), while for cattle the morphometric characteristics of the metapodials were used¹⁵.

Osteometrics were conducted following the standards established in the Von den Driesch’s guide (1976), the measurements being taken with an accuracy of up to 0.5 mm. The morphometric data were used to distinguish between domestic and wild of a same species (e.g. *Sus domesticus/Sus scrofa*), and to estimate withers height for certain domestic mammals. For cattle, the coefficients calculated by Fock (1966) were applied; for sheep, Teichert’s coefficients (1975); for dog, Harcourt’s coefficients (1974).

Results and Discussion

The faunal remains primarily belong to the class Mammalia (71.97% at Garvăn–Mlăjitul Florilor, and 95.08% at Jijila–Cetățuie), with additional species from the

¹¹ GHEȚIE, PAȘTEA, RIGA 1954; COȚOFAN *et alii* 1985.

¹² BOESSNECK, MÜLLER, TEICHERT 1964; PRUMMEL, FRISCH 1986.

¹³ SCHMID 1972.

¹⁴ BARONE 1976; REITZ, WING 2008.

¹⁵ UDRESCU, BEJENARU, HRISCU 1999.

classes Aves, Reptilia, Pisces, and Mollusca (**Table 1**). Of the total mammal remains, 9.16% could not be identified to the species level due to high fragmentation in the sample of Garvăn–Mlăjitul Florilor, and 19.65% at Jijila–Cetățuie.

Table 1. Distribution of animal remains by taxonomic group (NISP = number of identified specimens).

Sample Taxonomic group	Garvăn–Mlăjitul Florilor		Jijila–Cetățuie	
	NISP	%	NISP	%
Mammals	131	71.98	290	95.08
Birds	1	0.55	0	0
Reptiles	2	1.10	2	0.66
Fish	48	26.37	11	3.61
Molluscs	0	0	2	0.66
Total sample	182	100	305	100

According to the number of identified specimens (NISP), most mammal remains were attributed to domestic species (88.24% at Garvăn–Mlăjitul Florilor, and 95.28% at Jijila–Cetățuie) (**Table 2**). The list of identified domestic mammal species includes: *Bos taurus* (cattle), *Ovis aries/Capra hircus* (sheep/goat), *Sus domesticus* (pig), *Equus caballus* (horse), and *Canis familiaris* (dog). The most represented species as NISP is cattle (40.24% of total identified mammals in the Garvăn–Mlăjitul Florilor sample, and 70.82% at Jijila–Cetățuie), followed by pig at Garvăn–Mlăjitul Florilor with a percentage of 19.33%, and by the sheep/goat group at Jijila–Cetățuie with 11.16%. Horse is represented by 8.40% remains at Garvăn–Mlăjitul Florilor, and 1.72% at Jijila–Cetățuie. Dog was not consumed within the communities but it was used for guarding purposes.

The remains attributed to wild mammal species belonged to *Cervus elaphus* (red deer), *Sus scrofa* (wild boar), *Capreolus capreolus* (roe deer), *Lepus europaeus* (hare), and *Meles meles* (badger). Red deer and wild boar were the only species identified in the Garvăn–Mlăjitul Florilor site, occurring in equal percentages (**Table 2**).

Table 2. Quantification of faunal remains (NISP = number of identified specimens, MNI=minimum number of individuals).

Taxon	Garvăn–Mlăjitul Florilor				Jijila–Cetățuie			
	NISP	% NISP	MNI	% MNI	NISP	% NISP	MNI	% MNI
<i>Bos taurus</i> (cattle)	48	40.34	2	16.67	165	70.82	6	25.00
<i>Ovis aries/Capra hircus</i> (sheep/goat)	7	5.88	1	8.33	26	11.16	6	25.00
<i>Sus domesticus</i> (pig)	17	14.29	3	25.00	17	7.30	4	16.67
<i>Equus caballus</i> (horse)	10	8.40	1	8.33	4	1.72	1	4.17
<i>Canis familiaris</i> (dog)	23	19.33	2	16.67	10	4.29	2	8.33
total domestic mammals	105	88.24	9	75.00	222	95.28	19	79.17
<i>Cervus elaphus</i> (red deer)	7	5.88	1	8.33	5	2.15	1	4.17

Taxon	Garvăn-Mlăjitul Florilor				Jijila-Cetățuie			
	NISP	% NISP	MNI	% MNI	NISP	% NISP	MNI	% MNI
<i>Capreolus capreolus</i> (roe deer)	0	0	0	0	1	0.43	1	4.17
<i>Sus scrofa</i> (wild boar)	7	5.88	1	16.67	1	0.43	1	4.17
<i>Lepus europaeus</i> (hare)	0	0	0	0	3	1.29	1	4.17
<i>Meles meles</i> (badger)	0	0	0	0	1	0.43	1	4.17
total wild mammals	14	11.76	2	25.00	11	4.72	5	20.83
total identified mammals	119	100	12	100	233	100	24	100
total unidentified mammals	12				57			
total mammals	131				290			
birds	1				0			
reptiles	2				2			
fish	48				11			
molluscs	0				2			
total sample	182				305			

Table 3. Estimated age of slaughter for the identified mammal species (MNI=minimum number of individuals).

Taxon	Garvăn-Mlăjitul Florilor			Jijila-Cetățuie		
	Mature MNI	Immature MNI	Total MNI	Mature MNI	Immature MNI	Total MNI
<i>Bos taurus</i>	1	1	2	2	4	6
<i>Ovis aries/</i> <i>Capra hircus</i>	0	1	1	2	4	6
<i>Sus domesticus</i>	2	1	3	2	2	4
<i>Equus caballus</i>	1	0	1	1	0	1
<i>Canis familiaris</i>	2	0	2	1	1	2
total domestic mammals	6	3	9	8	11	19
<i>Cervus elaphus</i>	1	0	1	1	0	1
<i>Capreolus capreolus</i>	0	0	0	1	0	1
<i>Sus scrofa</i>	2	0	2	1	0	1
<i>Lepus europaeus</i>	0	0	0	1	0	1
<i>Meles meles</i>	0	0	0	1	0	1
total wild mammals	3	0	3	5	0	5
total identified mammals	12			24		

Bird remains were identified only in the sample of Garvăn-Mlăjitul Florilor, accounting for 0.56% of the total. Fish were represented by 26.37% remains at

Garvăn–Mlăjitul Florilor, and 3.61% at Jijila–Cetățuie, with species identified from the genus *Acipenser* as well as species of Teleostei (i.e., *Cyprinus carpio* and *Silurus glanis*). Due to the nearby water sources, the two communities also exploited aquatic resources, which provided a significant supplementary food supply. Among reptiles, remains of *Testudo graeca* (greek tortoise) were identified at Jijila–Cetățuie, and *Emys orbicularis* (european pond turtle) at Garvăn–Mlăjitul Florilor, both represented by two remains each. Molluscs were found only in the Jijila–Cetățuie sample, accounting for 0.66%, represented by two shells of *Helix*.

According to archaeozoological data, the exploitation strategy for the main domestic mammal species was efficient, as it aimed to obtain both primary and secondary products. Thus, in the Jijila–Cetățuie sample, cattle were predominantly slaughtered until the age of two years old (i.e. three individuals aged 18–24 months, one aged 6–12 months, one older than 48 months, and one older than 10 years), while at Garvăn–Mlăjitul Florilor there was no specific age preference noted (Table 3). For sheep/goat, there was observed a similar tendency to slaughter at an immature age in the settlement of Jijila–Cetățuie (i.e. three individuals aged 12–18 months, two aged 24–36 months, and one aged 3–6 months). Pig was utilized mainly for meat, with slaughter often occurring when the animals reached their maximum weight (i.e. one individual older than 3 years, one aged 24–36 months, one aged 13–18 months, and one aged 6–9 months) (Table 3).

The taphonomic evaluation revealed the origin of the two samples, both representing household waste. About 18% of faunal remains from Garvăn–Mlăjitul Florilor exhibited butchering marks, 3.84% showed traces left by carnivores' teeth, while 1.64% exhibited burn marks. In the Jijila–Cetățuie sample, 14.42% of the remains displayed cut marks, 3.27% showed burn marks, and 0.65% had marks left by the teeth of carnivorous animals (Table 4).

Table 4. Distribution of remains with taphonomy evidence (NISP = number of identified specimens).

Taphonomy	Garvăn–Mlăjitul Florilor		Jijila–Cetățuie	
	NISP	%	NISP	%
Remains with butchering traces	27	17.83	44	14.42
Remains with burn traces	3	1.64	10	3.27
Remains with animal teeth marks	7	3.84	2	0.65
total sample	182		305	

In the Jijila–Cetățuie sample, sex estimation was done for two individuals of *Sus domesticus* (i.e., one male and one female), and for one individual of *Bos taurus* (i.e., one female) (Table 5). At Garvăn–Mlăjitul Florilor, one female of each of the two species, pig and cattle, was identified.

Table 5. Sex estimation and withers height in cattle (GL=greatest length, Bp=breadth of proximal end, Bd=breadth of distal end, SD=smallest breadth of diaphysis).

Sample	Jijila-Cetățuie	Garvăn-Mlăjitul Florilor
anatomical element	metatarsal	metatarsal
GL (mm)	210	229
Bp (mm)	45	51
Bd (mm)	47	56
SD (mm)	21	28
I2=Bp × 100/GL	21.43	22.27
I3=SD × 100/GL	10.95	12.23
I4=Bd × 100/GL	22.38	24.45
Sex estimation	female	female
Withers height (mm)	1123.5	1374

By measuring some long bones found whole, the withers height was estimated for *Bos taurus*, *Ovis aries*, and *Canis familiaris*. The withers height for cattle was estimated using two metatarsals, resulting in heights of 1123.5 mm and 1374 mm (Table 5). For sheep, a metacarpal and an astragalus were used, obtaining heights of 645.48 mm and 691.74 mm (Table 6). In dog, an average of 510.69 mm withers height resulted from the values corresponding to eight long bones (i.e., one ulna, one radius, three femurs, two tibiae, and one humerus) (Table 6).

Table 6. Withers height estimation based on osteometric data (in mm).

Sample	Taxon	Anatomical element	GL (greatest length)	Withers height	
Jijila-Cetățuie	<i>Bos taurus</i>	metatarsal	210	1123.5	
	<i>Ovis aries</i>	metacarpal	132	645.48	
		astragalus	30.5	691.74	
Garvăn-Mlăjitul Florilor	<i>Bos taurus</i>	metatarsal	229	1374	
	<i>Canis familiaris</i>	ulna	186	510.87	510.69
		radius	159	486.11	
		femur	170	520.84	
		femur	169	517.70	
		femur	171	523.98	
		tibia	168	487.87	
		tibia	174	505.63	
humerus	163	532.55			

Comparative analysis with other settlements from the early Iron Age, associated with the Babadag culture, reveals similarities in terms of animal resources for local economy. These are notable in the samples from Niculițel–Cornet¹⁶, Satu Nou–Valea

¹⁶ STANC, RADU 2013.

lui Voicu¹⁷ and Babadag¹⁸. In all samples, mammals, particularly domestic species, predominated, with the percentage of remains varying between 88.24% at Garvăn–Mlăjitul Florilor and 98.39% at Satu Nou (Fig. 5). Among these, cattle are the most represented, except of the Satu Nou sample, where sheep/goat remains account for the highest proportion at 47.23% of the total identified mammals, followed by pig at 34.17% and then cattle at 14.49%. At Jijila–Cetățuie, Babadag, and Niculițel, a similar pattern is observed concerning the proportions of domestic mammals, with firstly cattle followed by sheep/goat and then pig. In contrast, at Garvăn–Mlăjitul Florilor, pig remains were the second most abundant (Fig. 6).

Conclusions

Considering the highest proportion of the identified domestic mammal remains, it can be concluded that animal husbandry was the main occupation of the Babadag culture populations at Garvăn–Mlăjitul Florilor and Jijila–Cetățuie. The local economies were focused on the breeding of cattle (*Bos taurus*), pig (*Sus domesticus*), and sheep/goat (*Ovis aries/Capra hircus*). The animal exploitation strategy in the economy of the Babadag culture communities was efficient, as it aimed to obtain both primary and secondary products.

Hunting was practiced occasionally to supplement the animal protein requirements, as it is indicated by the small number of the wild mammal remains. Most species are large-sized, such as the red deer (*Cervus elaphus*) and wild boar (*Sus scrofa*). Another essential source of sustenance was fishing, evidenced by the presence of fish remains across the analyzed samples.

BIBLIOGRAPHY

AILINCĂI 2013 – S. C. Ailincăi, *Începuturile epocii fierului în Dobrogea*, SCIVA 64/3–4 (2013), p. 223–292.

AILINCĂI 2015 – S. C. Ailincăi, *Trăind cu morții. Înmormântări în așezările de la începutul epocii fierului între Balcani, Tisa și Nistru*, Centrul de Studii Transilvane, Cluj-Napoca, 2015.

AILINCĂI 2016 – S. C. Ailincăi, *Before the Greeks. The Early Iron Age in Dobruđa*, in: F. Gogâltan, C. Cordoș (eds.), *Prehistoric Settlements: Social, Economic and Cultural Aspects. Seven Studies in the Carpathian Area*, Cluj-Napoca, 2016, p. 201–236.

AILINCĂI, CAROZZA, ȚÂRLEA 2022 – S. C. Ailincăi, L. Carozza, A. Țârlea, *Once again on the Early Iron Age chronology at the Lower Danube. New radiocarbon data from Babadag*, in: P. Delev, T. Stoyanov, S. Yanakieva, H. Popov, A. Bozkova, M. Vassileva, J. Tzvetkova, M. Damyanov, P. Ilieva, J. Emilov (eds.), *Ancient Thrace: Myth and Reality. The Proceedings of the Thirteenth International Congress of Thracology*, vol. I, Sofia, 2022, p. 21–28.

AILINCĂI et alii 2023 – S. C. Ailincăi, A. Țârlea, A. Adamescu, F. Mihail, A. D. Stănică, *A Travel Back in Time. The Babadag-Enisala Area at the Beginning of the 1st millennium BC*, in: G. Nuțu, S. C. Ailincăi, A. Țârlea, E. Ștefan (eds.), *Heripreneurship. Sustainable Tourism, Heritage Management and the Cultural and Creative Industries: Creating New Investment Opportunities at Places of Cultural Significance. Proceedings of an International Conference*, Biblioteca Istro-Pontica. Seria Patrimonium 11, Cluj-Napoca, 2023, p. 249–266.

¹⁷ BĂLĂȘESCU et alii 2015.

¹⁸ STANC, AILINCĂI 2013.

BARONE 1976 – R. Barone, *Anatomie Comparée des Mammifères Domestiques*, T1, Paris, 1976.

BĂLĂȘESCU *et alii* 2015 – A. Bălășescu, V. Radu, M. Constantinescu, S. C. Ailincăi, *Animal Exploitation in Babadag Culture. Satu Nou-Valea lui Voicu Site (Oltina, Constanța County)*, *Dacia N. S.* 59 (2015), p. 227–240.

BOESSNECK, MULLER, TEICHERT 1964 – J. Boessneck, H. Muller, M. Teichert, *Osteologische Unterscheidungsmerkmale zwischen Schaf (Ovis aries) und Ziege (Capra hircus)*, *Kuhn Archiv* 78 (1964), p. 1–129.

CÂRCIUMARU 1996 – M. Cârciumar, *Paleoetnobotanica*, Iași, 1996.

COȚOFAN *et alii* 1985 – V. Coțofan, S. Chițescu, M. Micle, M. Cornilă, V. Nicolescu, C. Radu, I. Popovici, R. Palicica, *Anatomia comparată a animalelor domestice*, vol. I, București, 1985.

FOCK 1966 – J. Fock, *Metrische Untersuchungen an Metapodien Einiger Europäischer Rinderrassen*, Ph.D. Thesis, LMU-München, München, 1966.

GHEȚIE, PAȘTEA, RIGA 1954 – V. Gheție, E. Paștea, I. Riga, *Atlas de anatomie comparată*, vol. I, București, 1954.

JUGĂNARU 1997 – G. Jugănar, *Manifestări ale Primei Epoci a Fierului în Dobrogea (Descoperirile de la Garvăn-Mlăjițul Florilor jud. Tulcea)*, in: G. Simion (coord.), *Premier Age du Fer aux Bouches du Danube et dans les régions autour de la Mer Noire. Actes du Colloque International*, Tulcea, 1997, p. 99–102.

JUGĂNARU 2005 – G. Jugănar, *Cultura Babadag*, Constanța, 2005.

LÁSZLÓ 1997 – A. László, *Despre originea, evoluția și cronologia primei epoci a fierului la Dunărea de Jos*, în: G. Simion (coord.), *Premier Age du Fer aux Bouches du Danube et dans les régions autour de la Mer Noire*, Tulcea, 1997, p. 77–84.

MIHAIL, AILINCĂI, JUGĂNARU 2022 – F. Mihail, S. C. Ailincăi, G. Jugănar, *Obiecte din piatră și materii dure animale descoperite în situl de la începutul epocii fierului de la Garvăn-Mlăjițul Florilor (com. Jijila, jud. Tulcea)*, in: V. Diaconu (ed.), *Ab Lapide ad Metallum. Studia in Honorem Professoris Marin Cârciumar*, Brăila, 2022, p. 353–382.

MORINTZ 1964 – S. Morintz, *Quelques problèmes concernant la période ancienne du Hallstatt au Bas Danube a la lumière des fouilles de Babadag*, *Dacia N.S.* 8 (1964), p. 101–118.

MORINTZ 1987 – S. Morintz, *Noi date și probleme privind perioadele hallstattiană timpurie și mijlocie în zona istro-pontică (Cercetările de la Babadag)*, *Thraco-Dacia* 8/1–2 (1987), p. 39–71.

PRUMMEL, FRISCH 1986 – W. Prummel, H.-J. Frisch, *A Guide for Distinction of Species, Sex and Body Side in Bones of Sheep and Goat*, *Journal of Archaeological Science* 13 (1986), p. 567–577.

REITZ, WING 2008 – E. J. Reitz, E. S. Wing, *Zooarchaeology*, New York, 2008.

SCHMID 1972 – E. Schmid, *Atlas of Animal Bones*, Amsterdam, 1972.

SÎRBU, AILINCĂI, SIMION 2008 – V. Sîrbu, S. C. Ailincăi, G. Simion, *Jijila-Cetățuie. O așezare fortificată a culturii Babadag în nord-vestul Dobrogei/Jijila-Cetățuie, un établissement fortifié de la culture Babadag au nord-ouest de la Dobroudja*, Brăila, 2008.

STANC, AILINCĂI 2013 – S. Stanc, S. C. Ailincăi, *Studiul preliminar asupra unui eșantion faunistic provenit din situl de la Babadag (cultura Babadag)*, în: S. C. Ailincăi, Al. Țârlea, C. Micu (eds.), *Din preistoria Dunării de Jos. 50 de ani de la începutul cercetărilor arheologice la Babadag*, Tulcea, 2013, p. 503–510.

STANC, MALAXA, AILINCĂI 2019 – S. M. Stanc, D. I. Malaxa, S. C. Ailincăi, *Analiza resturilor faunistice provenite din așezarea din prima epocă a fierului de la Enisala-Palanca (comuna Sarichioi, județul Tulcea, sud-estul României)*, *Tyragetia* 13/1 (2019), p. 243–251.

STANC, RADU 2013 – S. Stanc, V. Radu, *Exploatarea resurselor animale de către locuitorii așezării de la Niculițel (cultura Babadag): date arheozoologice*, în: S. C. Ailincăi, Al. Țârlea, C. Micu (eds.), *Din preistoria Dunării de Jos. 50 de ani de la începutul cercetărilor arheologice la Babadag (1962–2012)*, Brăila, 2013, p. 495–502.

ȘTEFAN *et alii* 1959 – Gh. Ștefan, I. Barnea, M. Chișvasi-Comșa, B. Mitrea, *Săpăturile de la Garvăn, Materiale și Cercetări Arheologice* 6 (1959), p. 629–651.

TEICHERT 1975 – M. Teichert, *Osteometrische Untersuchungen zur Berechnung der Wideristhöhe bei Schafen*, in: A. T. Clason (ed.), *Archaeozoological Studies*, Amsterdam, 1975, p. 51–56.

UDRESCU, BEJENARU, HRISCU 1999 – M. Udrescu, L. Bejenaru, C. Hriscu, *Introducere în Arheozoologie*, Iași, 1999.

VON DEN DRIESCH 1976 – A. Von den Driesch, *A Guide to the Measurement of Animal Bones from Archaeological Sites*, Peabody Museum Bulletin 1, Cambridge, 1976.



Fig. 1. Location of sites attributed to the Babadag culture.



Fig. 2. Geographical location of the analysed sites: Garvăn-Mlăjițul Florilor and Jijila-Cetățuie.



Fig. 3. *Garvăn-Mlăjitul Florilor*: aerial view from the west (2007).



Fig. 4. *Jijila-Cetățuie*: aerial view from the northwest (2007).

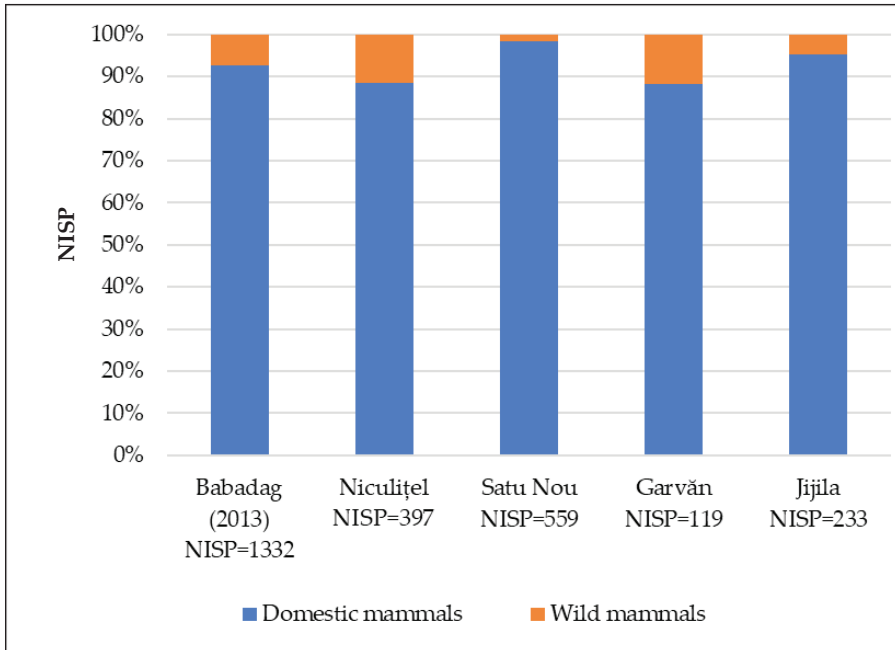


Fig. 5. Comparative distribution of domestic and wild mammals in settlements of Babadag culture (NISP = number of identified specimens).

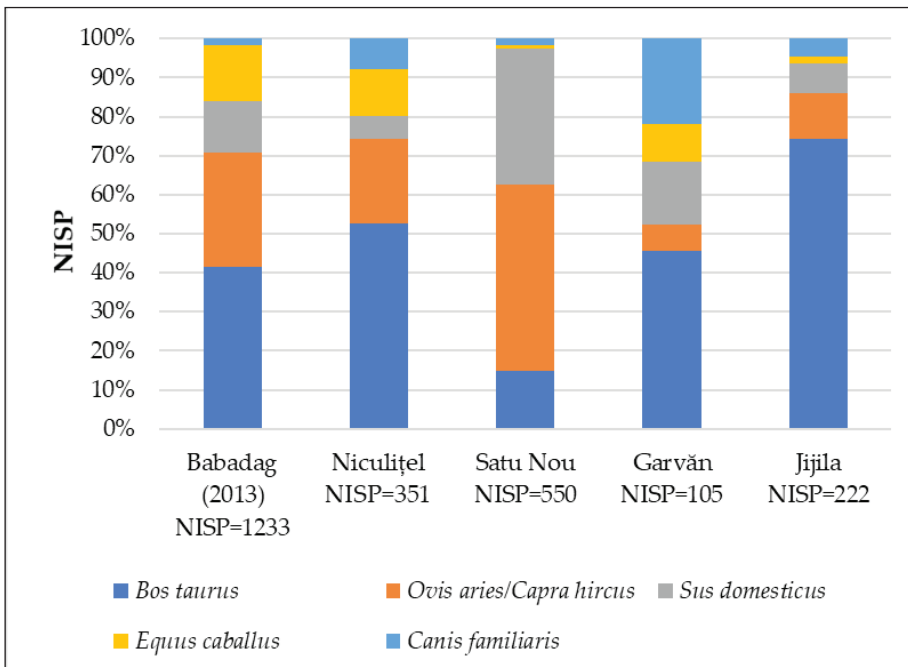


Fig. 6. Comparative distribution of domestic mammal species in settlements of Babadag culture (NISP= number of identified specimens).