

## OVERALL EVALUATION OF BIOLOGICAL REMAINS DISCOVERED IN THE CHALCOLITHIC SITE (CUCUTENI CULTURE, V<sup>th</sup>-IV<sup>th</sup> MILLENNIA CAL B.C.) OF COSTEȘTI (IAȘI COUNTY, ROMANIA)

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### Abstract

*Research of pollen, spores, phytoliths and animal remains was performed in the Chalcolithic settlement (Cucuteni culture, V<sup>th</sup>-IV<sup>th</sup> millennia cal B.C.) of Costești (Iași County, Romania). Archaeobotanical data are correlated with those of archaeozoology in order to achieve an understanding of the site formation processes, the economic and environmental contexts of the Chalcolithic settlement. Palynological analysis testified the presence of deciduous trees such as linden and oak. Willow, alder and birch probably inhabited banks of river whose course goes right near the site. Regarding the herbaceous plants, there were identified both spontaneous taxa and other taxa which could be cultivated. Cereal inflorescence phytoliths have been identified. In the archaeozoological sample, butchering and the manufacturing originated the fragmentation of remains. The majority of animal remains are from domestic mammals, with the predominance of sheep/goat, followed by cattle and pig. The hunting of wild mammals is less important in the food provisioning system; as game species, red deer, wild boar and aurochs are dominant. Harvesting of molluscs is testified by a very small number of remains. According to these data, the economy of the Chalcolithic settlement from Costești was based on the plant cultivation and animal husbandry, and also on forest and even aquatic resources.*

**Keywords:** Archaeobotany; Archaeozoology; Chalcolithic; Cucuteni culture; Costești

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### Introduction

The site of Costești (Iași County; 47° 14' 22" N, 26° 55' 01" E) is located in Eastern Romania (Fig. 1), in a hilly region, very rich in prehistoric and historical sites [1-4]. The site stands at about 250 m above sea level, in a microzone of the Moldavian Plateau named Ruginoasa-Strunga Saddle.

The pedological and archaeological findings for this area reveal the anthropogenic influence in the past on the evolution of soils. A clustered settlement distribution is observed in both the northern and south-eastern extremities of the saddle; the axis of this saddle appears to have been an open, unforested space that was used for agricultural purposes and probably as a travel corridor since the Neolithic period [5].

The Cucuteni settlement from Costești appears extremely compact, with a high density of lithic materials, pottery, and biological remains. It was mentioned since the interwar period,

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and several archaeological works (of professionals but also of amateurs) were carried out in time. Recent archaeological excavations, made in the last years (2012-2014) in the circumstances of a rapidly degradation of the site (Fig. 2), unveiled a stratigraphy with levels belonging not only strictly to Cucuteni culture (V<sup>th</sup>-IV<sup>th</sup> millennia cal B.C.), but also to ulterior occupations (Horodișteea-Erbiceni and Medieval) that disturbed in some points the cucutenian level [1].



Fig. 1. Location of Costești site (<https://www.google.ro/maps>).



Fig. 2. Proximity of Costești site.

The present paper concerns the biological remains (pollen, spores, phytoliths and animal remains) found in the Cucuteni level of the Costești site, with the goal to understand the formation processes (e.g. accumulation of remains in the site), and also to reconstruct the economic and environmental contexts of the chalcolithic settlement.

## Materials and Methods

This study refers to archaeobotanical and archaeozoological assemblages corresponding to the Cucuteni cultural level. There are some limitations to the archaeozoological analyses that concern with not sieving the assemblages, that could cause an overrepresentation of certain taxa (e.g. large animals – the ungulates in particular), but also an underrepresentation of other (e.g. wild smaller animals – such as some carnivores).

A number of four palynological samples, drawn from the Cucuteni cultural level, were processed according to a standard chemical protocol used for recovering fossil pollen from sediments (HCl – 10%, NaOH – 10%, HF – 40%, ZnCl<sub>2</sub>, acetolysis).

Approximately 4 g. of sediment was treated with HCl to remove the carbonates, in order to perform phytoliths analysis. Organic matter was removed with a 30% hydrogen peroxide heated at 60°C until reaction subsided. Densimetric separation of phytoliths was carried out using a heavy liquid solution (Sodium Polytungstate, d = 2.3). Microscopic observations were performed at 600 x magnification.

Pollen grains and phytoliths were distinguished using published guides [6-11].

The archaeozoological sample was analysed according to standard procedure [12, 13]. The faunal remains, anatomically and taxonomically identified, are described in terms of their frequency based on the number of identified specimens (NISP) and the minimum number of individuals (MNI).

## Results and Discussions

Archaeobotany. Sediments of four vessels, discovered in the Cucuteni level of Costești site, were sampling for palynological analysis. Three miniature vessels were discovered in 2013, and the fourth, a pot, in 2014 [1]. The pollen preservation was not optimal under the anthropogenic influence, including burning process [14]. Nevertheless, a large variety of taxa has been identified [14], but we have to maintain a high caution in interpreting the results, given that the complex internal structure of the site disrupted the natural pollen rain distribution.

Palynological data [14] testify the presence of deciduous trees such as linden (*Tilia*) and oak (*Quercus*). Willow (*Salix*), alder (*Alnus*) and birch (*Betula*), probably inhabiting banks of river whose course goes right near the site.

Non-arboreal pollen is conspicuously more abundant than arboreal pollen (Fig. 3). Regarding the herbaceous plants, pollen of Poaceae, Anthemideae (Asteraceae) and Chenopodiaceae were dominant. Other spontaneous herbs taxa belonging to Rosaceae, Apiaceae, Scrophulariaceae, Lamiaceae are present in all samples. Pollen grains of plants related to human activities were also identified: sorrel (*Rumex* type); knotgrass (*Polygonum aviculare* type); wormwood (*Artemisia*).

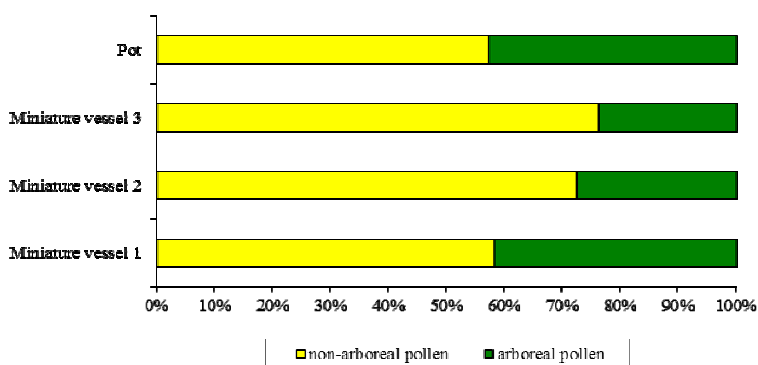


Fig. 3. Non-arboreal versus arboreal pollen.



Fig. 4. *Artemisia* pollen.

On the contrary, phytoliths are very abundant and exceptionally well preserved in the archaeological sample. The most common form is rondel-trapeziform short cell (Fig. 4), and relatively high percentages of sinuate-trapeziform are recorded, with both highlighting the abundance of Pooideae group. Cereals are evidenced by the elongate dendritic phytoliths, which are very well-represented. While this class of phytoliths is scarcely recorded in natural soil assemblages, it might be very well-represented in archaeological sites in which cereal grains have been processed [15].

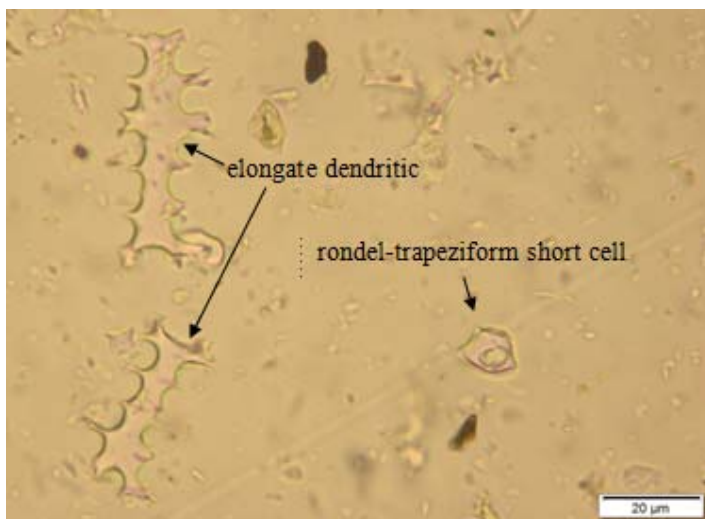


Fig. 5. Phytolith morphotypes: elongate dendritic & rondel-trapeziform short cell.

Archaeozoology. The archaeozoological sample of Cucuteni level comprises 1555 remains, from a total of 4454 discovered in the prehistoric site of Costești during the 2012-2014 archaeological excavations [1]. The faunal remains are distributed as follows: 1529 of mammals, 23 of molluscs (3 of snail and 20 of bivalve remains) 2 of birds, and 1 of tortoise. The animal remains are strongly broken up, so that 778 (50% of the sample) mammal remains have been not identified until species level (Fig. 6). Culturally derived fractured bones are represented with prevalence in the Cucuteni site of Costești. As cultural factors that originated fragmentation, we identified the butchering and the manufacturing. The majority of the faunal

remains recovered have a domestic origin, mainly as food remains, and only 9 fragments are artefacts with manufacturing marks.

The economic resources emphasized by the archaeozoological analysis are: animal husbandry, hunting and harvesting (Fig. 6).

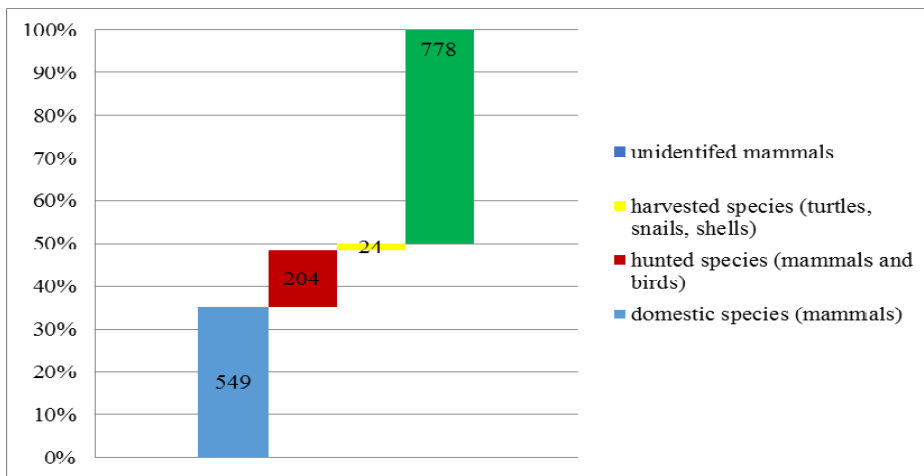


Fig. 6. Percentage distribution of animal remains (N = 1555), grouped by palaeoeconomic categories.

Domestic mammal remains present a proportion of 35%, showing the animal husbandry as an important occupation and food resource. Considering the NISP, sheep/goat (*Ovis aries/Capra hircus*) and cattle (*Bos taurus*) are dominant – each with about 14% of total sample, while pig come on the second place with about 6.5% remains (Fig. 7). In terms of MNI, sheep/goat surpasses cattle and pig, while the predominance of cattle is a general pattern specific for the Cucuteni sites [16, 17]. The fourth domestic species, dog (*Canis familiaris*), has a very low frequency (0.6% NISP of total sample); there is no evidence that dog was consumed in the Cucuteni site of Costești.

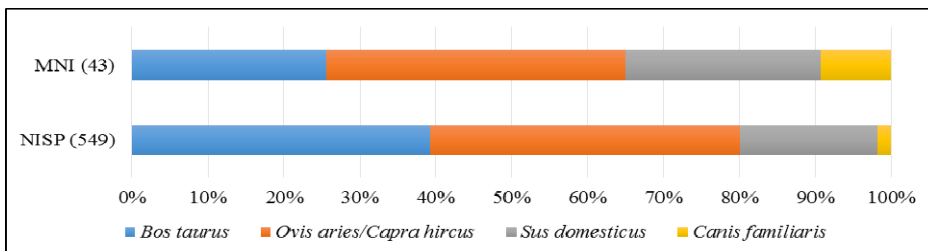


Fig. 7. Relative importance of domestic mammals.

Wild animals have a proportion of only 13% of remains. As game species, red deer (*Cervus elaphus*) is dominant with about 6% NISP of the total sample, and we have to mention that, in many other Cucuteni assemblages, red deer is the most frequent game species [16, 17]. Wild boar (*Sus scrofa*) is on the second place (2.5%), followed by aurochs (*Bos primigenius*) and horse (*Equus ferus*) – each with 1.3%. Other hunted animals have a lower frequency as NISP, less than 1% - roe deer (*Capreolus capreolus*), hare (*Lepus europaeus*), beaver (*Castor fiber*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), badger (*Meles meles*) and bear (*Ursus arctos*) (Fig. 8). If we compare the frequency of NISP with MNI, we remark a contrast in the case of

reed deer because of the increased number of antler fragments, and also in the case of wild boar reflecting a more pronounced fragmentation.

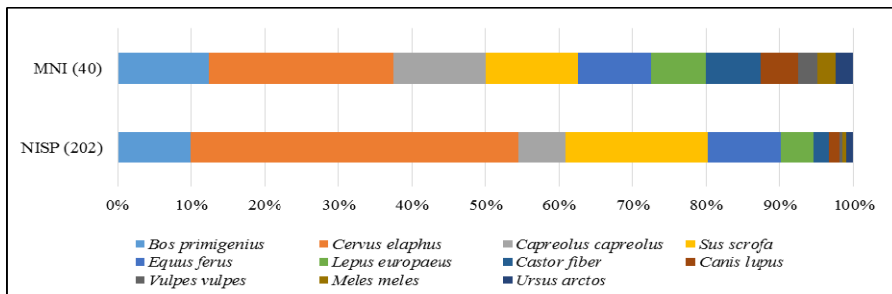


Fig. 8. Relative importance of wild mammals.

Considering the ecological characteristics of the identified wild animals, their remains were grouped in: forest species (*Cervus elaphus*, *Sus scrofa*, *Ursus arctos*), forest edge-open field species (*Capreolus capreolus*, *Bos primigenius*, *Equus ferus*, *Lepus europaeus*), water-related species (*Castor fiber*, *Emys orbicularis*, *Unio* sp.) and eurytopic species (*Canis lupus*, *Vulpes vulpes*, *Meles meles*). Forest species are dominant, followed by forest edge-open field species, and then by water-related species (Fig. 9).

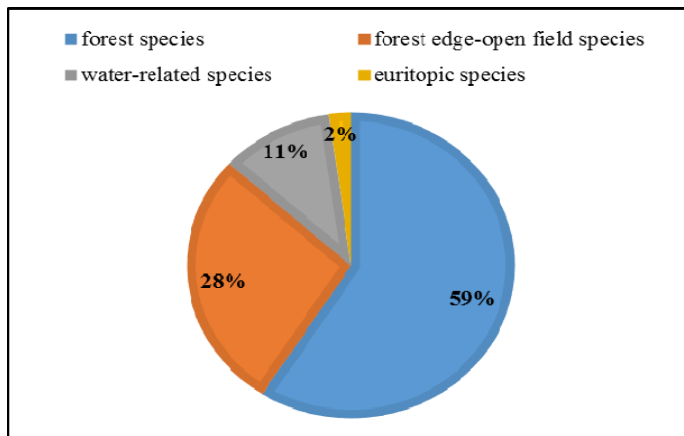


Fig. 9. Distribution of wild animal remains according to the ecological characteristics of species (% NISP).

### Conclusions

The correlated main results, archaeobotanical and archaeozoological, converge to conclude that the Chalcolithic settlement (Cucuteni culture) from Costești (Iași County, Romania) was situated in an appropriate area for cereal cultivation and animal husbandry (especially sheep/goat, but also cattle and pig). The abundance of elongate dendritic phytoliths and also the presence of some anthropogenic pollen indicators (i.g. sorrel, knotgrass, wormwood) strengthen the hypothesis that this community was a group of agriculturalists.

An emphasis was placed also on the exploitation of the resources offered by the environment: forest, forest edge-open field and aquatic ecosystems. Pollen of deciduous trees taxa (linden, oak), as well as skeletal remains of forest animal species (red deer, wild boar, bear) suggests the proximity of the forest. Presence of spontaneous taxa of herbaceous plants fit in

with the animals of forest edge-open field (roe deer, aurochs, wild horse, and hare). Woods such willow, alder, birch, and animals such as beaver, pond turtle and freshwater mussels indicate aquatic ecosystems.

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