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CHALCOLITHIC AGROPASTORALISM TRACES IN THE SITE OF RĂUCEȘTI (NEAMȚ COUNTY, ROMANIA): PHYTOLITHS AND ANIMAL REMAINS

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Abstract

Phytoliths and animal remains deriving from the Chalcolithic site of Răucești (Neamț County, Romania) are used for obtaining a set of data regarding the palaeoenvironment and the resources of subsistence that were available for the Cucutenian community from this settlement. The information obtained in this study is very important considering the precarious preservation state of the archaeological site that has been destroyed in a systematic manner due to agrarian works. Phytolith analysis discloses the dominance of spontaneous grasses, but the results also highlight the presence of grains inside the site. Thus, an open environment is delineated around the settlement, an image that is also testified by the archaezoological data. The analysis of animal remains brings in new clues regarding the palaeoeconomy of the settlement: animal husbandry and hunting were practiced by the Cucutenian community of Răucești.

Keywords: *Phytoliths; Animal Remains; Chalcolithic; Cucuteni; Răucești (Neamț)*

Introduction

Research regarding prehistoric sites provides information regarding archaeological context, including the mobile patrimony that is the main cultural landmark of a human community. In many cases, the preservation state of the archaeological artefacts is conditioned by the preservation extent of the sites. Modern agriculture, present constructions, infrastructure, and landslides are the most common factors affecting prehistoric sites. Due to the fact that degradation of the human settlements is an irreversible process, obtaining a wide set of archaeological and palaeoenvironmental data, that will retrace the prehistoric habitat, is necessary.

The present study refers to the Chalcolithic site of Răucești (Neamț County). It has been ascertained that this site, belonging to the Cucuteni culture (V^{th}-IV^{th} millennia cal B.C.), is being systematically destroyed by agricultural works [1]. Although the structures of this prehistoric settlement have not been preserved, the bioarchaeological research can provide information regarding the inhabitation features. Thus, regarding the palaeoenvironment and subsistence resources, studying the phytoliths and fauna remains is implied.

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Phytoliths, characteristic silica bodies formed in fleshy tissues of plants, are very important for paleoenvironmental and palaeoecological reconstruction, for human and animal paleo-diet [2-5]. These can be preserved even in oxidative conditions for thousands or even billions of years. Even if phytoliths analysis has its boundaries, interrelated with other types of analysis, as archaeological ones, it can be the key for a better understanding of human behaviour, of subsistence strategies and/or aspects regarding rituals practiced by different communities.

Studying the phytoliths in the site from Răucești can help us to describe the vegetal environment in this area. The correlation of the archaeobotanical and archaezoological data can lead to obtaining data concerning the subsistence resources of the Cucutenian community. There are not many Cucutenian sites on the East side of the Carpathians that benefit from an integrated analysis of the bioarchaeological data [6-8]. Despite the archaeological patrimony they provide, only few prehistoric sites in the Subcarpathian area of Moldavia benefited from multidisciplinary/interdisciplinary analysis [9-18].

Study area

The Cucutenian site of Răucești (47°14′25″ N, 26°25′01″ E) is situated in the sub-Carpathian area of Moldavia (Fig. 1), upon contact with Suceava Highlands, taking up an area of 1.5ha. Located in the southern extremity of Răucești village, in a place called "Dealul Munteni", this Chalcolithic site takes up a portion of the eastern slope of a hill descending towards the meadows of Moldova River (Fig. 2).

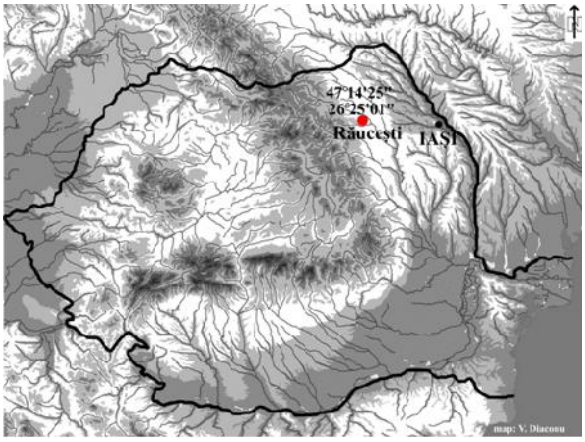

Fig. 1. Location of Răucești site (Neamț County, Romania).

Fig. 2. Study area - Răucești site (https://earth.google.com).

The area in which the site is located is overlooked by hills with a rather steep slope and with a shale soil. The site is bordered by steep slopes on the north-eastern and north-western sides, most likely increasing the defensive quality of the lay-out. At the foot of the hill on which the lay-out is situated, the Sărata stream flows, fed by many semi-permanent right side affluents. Close to the site, on the foot of the northern slope there lies an abounding spring. At about 300m south-west from the lye-out, on the top of the hill, many springs are found that create a marsh with characteristic vegetation like rush, willow and black alder.

Due to its dominant position, the Chalcolithic site of Răuceşti represented a centre point around which many Cucuteni communities of less importance probably gravitated, and thus controlling a wide area of the middle basin of the Moldova River. A very important fact is that the site is located near (at maximum 5 km) the salty springs on the territory of Oglinzi Village that have been exploited in the Neolithic [19, 20].

Archaeological data

The archaeologic site of Răuceşti has been researched in 1978, 1979, and in 1986 respectively, archaeologic complexes of Cucuteni *A* and *B* phases being revealed. Sporadic, Cucuteni *A-B* and *B* materials have been pointed out. The most intense habitation of the settlement has taken place along the Cucuteni *A* phase [19, 21-23].

The precarious preservation state of the site has dictated to retake the archaeological research in 2015. The main aim of the research has been recuperating the mobile inventory, identification of habitation and defensive structures and establishing the relations between this settlement and those close to it. In the recent archaeological excavation, in 2015, 4 sections have been dug up in different areas of the site, totalizing 84m^2 surface (Fig. 3).

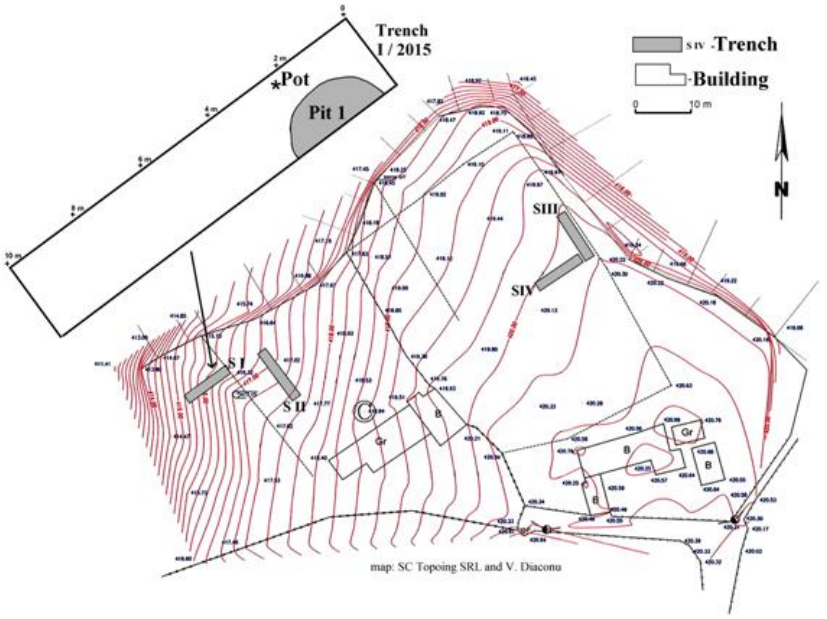

Fig. 3. Plan of excavation area of Răuceşti site (2015).

In sections I (S. I), II (S. II) and IV (S. IV), many complexes have been identified, such as waste pits, and in section III (S. III), a portion of one of the defensive ditches has been detected.

In the S. I, in an undisturbed context at a depth of 0.40m, a quite well preserved pot (an amphorette) has been discovered (Fig. 4), its stem being broken of yore. It sizes: 9.5cm high, a

maximum diameter of 11cm, diameter of the jaw is 3cm (Fig. 5). Considering the stratigraphic setting and the morphological features, the pot is assigned to the Cucuteni *A* phase. As it is a small recipient, we can assume it was used for preserving or consuming of some liquids. Its ceremonial use is not excluded. Phytolith analysis could provide data in this regard. It needs to be mentioned that in 2015 excavation and previous ones [24], many anthropomorphic and zoomorphic statues have been discovered, proving complex spiritual manifestations at this Chalcolithic community.

Fig. 4. The pot - *in situ*.

Fig. 5. The pot: after excavation (a, b) and after a primary treatment (c, d).

Pit no. 4 gave another interesting complex, discovered in S. IV. It is a closed complex, dome shaped, only a quarter of it has been researched. The pit is 0.9m deep, its filling consisting in many layers of soil, burn and ashes. It is the only pit in which the bone remains have been better preserved as well as the painting on the ceramics. Thus, based on the pottery remains, the complex can be assigned to Cucuteni *A3* phase.

We have to mention that the pottery remains discovered during recent excavation is poorly preserved and the painted pot fragments are scarce.

Materials and Methods

To study the phytoliths, a few grams of sediment (4.14g) have been taken from the cultural layer of section S. I, and 5 grams of sediment have been sampled from the pot. Phytoliths were extracted from sediment samples using HCl and H_2O_2 baths, sieving, clay removal and densimetric separation [25]. They were mounted in immersion oil and examined using an optical microscope (400×). Many classification systems [26-28] and *International code for phytolith nomenclature* - ICPN [29] have been taken into account to group the phytoliths in different morphotypes.

Animal remains were recovered from the pit no. 4, but without sieving of the sediment, which may have caused a loss of certain little pieces. The faunal remains analysis was achieved following the archaeozoological methodology, mainly consisting of anatomical, taxonomical and taphonomic identifications [30]. Because the sample was very small (32 remains), the quantification of animal remains has not been realized.

Results and Discussions

a. The phytoliths analysis has revealed in total, in both samples, 12 morphotypes: elongate, dendritic elongate, acicular, short acicular, bulliform, rondel and trapeziform, trapeziform sinuate, polylobate, saddle, cross, bilobate, globular (Fig. 6). Among the phytoliths, starch granules have been identified.

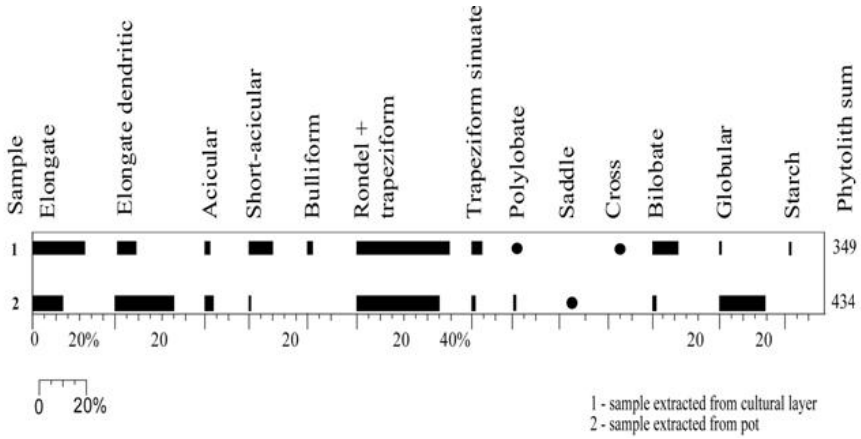

Fig. 6. Phytolith diagram from Răucești site.

Elongate, acicular, short acicular and bulliform types form mostly in long epidermic cells of grasses [26-28, 31]. Rondel and trapeziform, trapeziform sinuate, bilobate, polylobate, saddle exclusively form in short epidermic cells of grasses. Based on them, the main subfamilies of Poaceae family can be identified [26, 28]. Rondel and sinuate, and also polylobate are mostly found in Pooideae. Bilobate and cross are found mostly in Panicoideae [26-28, 32, 33]. Bilobate phytoliths may derive from Panicoideae and Arundinoideae leaves such as *Phragmites australis* or *Molinia caerulea* [34]. Saddle phytoliths are significantly produced by species of Chloridoideae subfamily [27, 28], such as C4 metabolism taxa growing in warm, dry and semi dry areas with very low soil humidity. Globular phytoliths are considered as being characteristic for Dicotyledonous plants [35-38]. Usually they can be used

as indicators of forests or of fuel wood use [4]. Acicular and short-acicular type phytoliths can belong to Poaceae or families such as Asteraceae, Boraginaceae and Urticaceae [34]. Dendritic phytoliths have also been identified. These are deriving from the inflorescence of grasses (e.g. husk) and are most likely indicative of cultivated crop plants which may include *Triticum* sp. (wheat), *Hordeum vulgare* (barley), *Avena sativa* (oat), or *Secale cereale* (rye) etc.

Analysis of the phytoliths in the cultural layer has highlighted 11 morphotypes: elongate, elongate dendritic, acicular, short-acicular, bulliform, rondel and trapeziform, trapeziform sinuate, polylobate, cross, bilobate, globular (Fig. 6).

The main phytoliths are rondel and trapeziform, taking up to 40% from the total. The Pooideae subfamily that includes species such as wheat, rye and barley is best represented. Elongate phytoliths come in second (22%). Bilobate morphotype represent 11% of the total identified phytoliths in this sample. Taxa belonging to Panicoideae and/or Arundinoideae subfamilies were thus present in the site of Răuceşti. In the actual flora, Panicoideae subfamily mostly comprises taxa that grow in warm and humid conditions [28, 39-41]. Cross form testifies once more the presence of taxa in the Panicoideae subfamily. All these types are associated here with acicular (10.6%) and short-acicular (1.7%). Dendritic phytoliths take up little more than 7%, meanwhile bulliforms approximately 2%. The abundance of the bulliforms type occurs in very high perspiration conditions, being thus used as an indicator for hydric stress [42]. The recorded data in our study does not indicate water over saturation.

Starch granules have been also identified in this sample. They can be found in the majority of vegetal tissue, but they mainly occur in depositing organs such as rhizomes, tubers, grains.

The phytoliths spectrum extracted from the pot sample (Fig. 6) show the evident dominance of rondel and trapeziform class (35%), followed by dendritic phytoliths (over 25%) and globular morphotype (over 19%). Elongate forms take up approximately 12%. Other morphotypes associated to this spectrum are: acicular, short-acicular, sinuate trapeziform, polylobate, saddle, bilobate, which appear in very low percentages (under 5%).

It is ascertained that the two samples carry forth about the same assemblages and frequencies of phytoliths. Nevertheless, there are some differences: cross and bulliform morphotypes, scarcely identified in the cultural layer, have not been identified in the pot, possibly due to spatial distribution of taxa, but also aspects regarding the selectivity of some vegetal parts need to be taken into account in case of an intended contribution to the pot. Also, no starch granules have been found in the pot. Another aspect emerging from the comparative analysis of the two samples is the percentage of globular phytoliths is significantly higher in the pot (almost 20%) compared to the cultural layer sample (under 5%). This shows a greater amount of Dicotyledonous leaves in the pot, that can be intended or it is very likely that a small leafy branch could have been used to stir the liquid content of the vase that may have been used to preserve a beverage. The analysis shows that the prevalence of the dendritic elements from the pot is significantly higher than in the sample taken from the cultural layer. Not to be excluded the possibility that there were fermenting cereal grains. In any case, the high percentage of dendritic phytoliths shows the presence of grains and their processing inside or close to the site. Cereal cultivation was practiced by Chalcolithic communities of Răuceşti.

b. Archaeozoological data. Excepting the highly fragmented state of bones, the conservation of animal remains is relatively good indicating proper edaphic condition in the pit no. 4. Cultural factor, as butchering, favored the bone fragmentation. We can add the feeding carnivores, whereas few animal remains keep gnawing marks.

The analysis of archaezoological remains in pit no. 4 highlighted domestic species such as cattle (*Bos taurus*) and sheep/goat (*Ovis aries/Capra hircus*). Also, remains of wild forest animal species have been identified: wild boar (*Sus scrofa*) and red deer (*Cervus elaphus*). The identified animals are common species, also found in contemporary sites in close proximity of

the site – Târpești [43], Traian [44], Ghelăiești [45], Pometea [46], and also in further settlements belonging to Cucuteni culture [47].

Conclusions

Bioarchaeological analysis highlights data regarding subsistence resources of the Chalcolithic population of Răucești, and also palaeoenvironmental aspects.

Phytoliths show the dominant presence of grasses. Cereals are confirmed as being part of plants used by this community. Globular phytoliths found in larger amounts in the pot suggest the presence of Dicotyledonous plants in the area. The starch granules could be proof of rhizome and tuber existence in the site that could have been used as food. There is also the possibility that these granules could derive from grains.

Archaezoological data, although limited due to the small number of analysed remains, offers information on the palaeoeconomy of the settlement (practicing animal husbandry and hunting), and its environment (open spaces around the site for cattle and sheep/goat herds, forest areas, not far from the settlement, where red deer and wild boar hunting could take place).

Thus, animal husbandry completes the overview offered by phytoliths analysis in describing the agro-pastoral life (cereal cultivation and cattle, sheep/goat pastoralism) on which the Cucuteni culture community of Răucești (Neamț County) stands on.

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