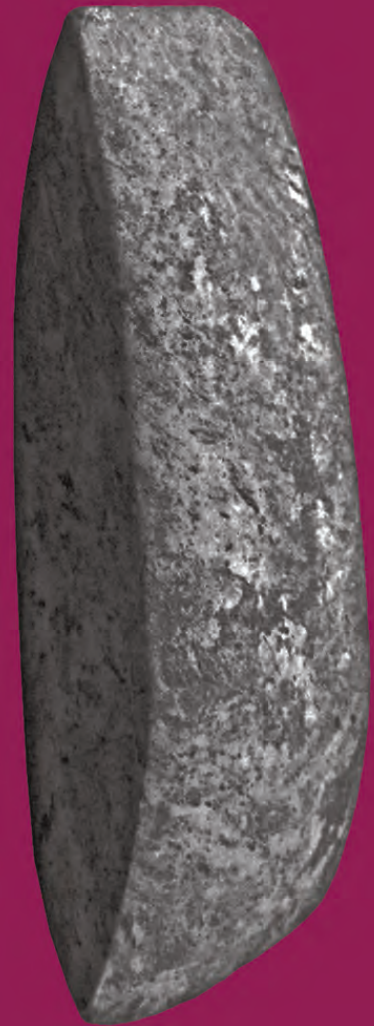


NEOLITHIC IN MACEDONIA: RECENT RESEARCH AND ANALYSES



НЕОЛИТОТ ВО МАКЕДОНИЈА
ТЕКОВНИ ИСТРАЖУВАЊА И АНАЛИЗИ

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RECENT RESEARCH AND ANALYSES

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ТЕКОВНИ ИСТРАЖУВАЊА И АНАЛИЗИ RECENT RESEARCH AND ANALYSES

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Foreword

This is the 6th volume of the edited book that is related to already traditional conference of the Center for Prehistoric Research, particularly focused on the Neolithic of Macedonia and the Balkans. Same as the conference this publication also brings together various specialists exploring different modes of life of the first farmers inhabiting the Balkans, thus promoting new perspectives in research methods and proposing a variety of possibilities in the understanding of the agricultural societies.

Arousing from the papers presented on the conference this publication intends to archive the current knowledge gained from the more intensive exploration of the Neolithic communities in the Balkans. Being exposed to meticulous audience the presentations were facing thorough discussions and therefore were developed into papers with solid data and elaborations on the social, economic and ritual life of the people that introduced novel modes of living in Southeast Europe approximately 8500 years ago. In that manner this volume also exposes the latest research of the Neolithic pottery, tools, diet and architecture of the first farmers in this region.

This year's edition of the 'Neolithic in Macedonia' volume starts with two papers on pottery. First one is Clare Burke's observation of the technological features of the Starčevo pottery and how the relationship in pottery making can be detected among several neighboring settlements in the region of Lebane. Furthermore she identifies the traces of Anatolian traditions in the vessels production in the Balkans that additionally confirms the evident links between these regions. The following paper also elaborates the pottery making but in terms of its aesthetic components. Ljubo Fidanoski emphasizes the notion of proportions in modeling of the Neolithic vessels and that they were produced in terms of protomatematics and anthropometry.

With the subsequent papers the volume shifts from pottery production to manufacture of lithic tools and food economy. The work of Vesna Vučković and Elena Stojanova Kanzurova is focused on the lithic technology, particularly the one from the site of Tumba Madjari. They identify the local resources and the technological skills the craftsmen used in order to fabricate the flint tools in the Middle Neolithic of Skopje region. The following paper considers the use of plants and domestic space among the Neolithic tells of Pelagonia. Sabanov, Antolin, Soteras and Naumov demonstrate the advantage of archaeobotanical analysis in detecting the crops that were majorly employed in the diet, but they also highlight the observation of micro-refuse remains in order to trace the activities performed in the dwellings.

The next paper also deals with the region of Pelagonia and particularly with the latest research on the site of Vrbjanska Čuka. Naumov, Mitkoski, Talevski and Stojanovski present the contextual data from the excavation of this tell in 2020 and 2021 with particular focus on the architecture and its features in different Neolithic levels. This volume is enclosed with the last paper authored by Igor Tolevski where he also gives a report overview of the latest excavation on the site of Bojkovci in the region of Radoviš. He brings the site in the environmental context and demonstrates the characteristics of the architecture and material culture in this Late Neolithic settlement.

Although being composed of several papers this edition of 'Neolithic in Macedonia' gives an extensive elaboration of the latest knowledge in terms of technology, economy and habitation of the first farmers. All these papers provide thorough examination of the material culture, architecture and organic remains in order to demonstrate the modes of everyday life of the agricul-

tural societies from the beginning until the end of the Neolithic period. Furthermore the authors promote novel research approaches and state of the art methods in order to reach a consistent notion of the world in which these farmers lived. That is moreover the substantial principle of the Center for Prehistoric Research which intends to encourage the implementation of the advanced multidisciplinary methods in prehistory and to present their outcome in this volume that has been continuously published since 2016.

Клер Бурк

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Врски на керамиката:

Репертоарот на керамиката Старчево во Свињаричка Чука, Србија

Potting Links:

The Starčevo Ceramic Repertoire of Svinjarička Čuka, Serbia

Анстракт

Трудов, накусо, ги резимира првичните набљудувања на производството и употребата на фазата Старчево керамичка колекција од новооткриениот локалитет Свињаричка Чука, како дел од проектот НЕОТЕК. Со вклучувањето на типолошки и технолошки пристапи, на макроскопско ниво, веќе се очигледни врските со други локалитети, особено во околниот регион, не само во однос на идеите за тоа како треба да изгледа еден керамички сад, туку и во однос на тоа како треба да биде изработен, вклучувајќи ги наследените врски со анадолското керамички традиции.

Клучни зборови: технологија на керамички садови, Старчево, Србија, неолит

Abstract

This paper briefly summarises preliminary observations about the production and consumption of the Starčevo ceramic assemblage from the new site of Svinjarička Čuka as part of the NEOTECH project. Through integrating typological and technological approaches, it is already possible to see at the macroscopic level strong links to other sites, particularly in the same the surrounding region, not only in terms of ideas about what a vessel should look like but also in terms of how it should be made, including some potential ancestral links to Anatolian potting traditions.

Keywords: Pottery Technology, Starčevo, Serbia, Neolithic

Introduction

The Early Neolithic is a fascinating period of cultural and evolutionary transition in relation to the organisation and expression of human groups which has been related to population expansion and migration (Ammerman and Cavalli-Sforza 1973; Whittle *et al.* 2002; Özdoğan 2011;

Rakićević, T.; and Pendžerkovski, J. 1970. Explanatory notes for the General Geological map of Kožuf, 1:100000 – *Federal Geological Survey*. Belgrade: 47.

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Goce Naumov

Center for Prehistoric Research

Raül Soteras

German Archaeological Institute

Употребата на растенијата и домашните простори во раниот неолит во Пелагонија: прелиминарни резултати од интегрираниот археоботанички пристап и проучувањето на микро-отпадоци

The use of plants and domestic spaces in the Early Neolithic Pelagonia Valley. Preliminary results of the integrated archaeobotanical and micro-refuse approach

Овој труд ги сумира прелиминарните резултати од археоботаничките анализи заедно со информациите собрани преку пристапот на микро отпад со фокус на два ранонеолитски локалитети во Пелагонија во Северна Македонија: Врбјанска Чука и Велушка Тумба. Главната тема што се разгледува е употребата на растенија и домашни простори, со аспекти како земјоделството, исхраната и активностите во домаќинството. Се верува дека исхраната и економијата на овие заедници најмногу зависат од земјоделството, а дијахронските согледувања ја покажуваат неговата поголема релевантност во подоцнежните фази од раниот неолит. Поголемиот дел од посевот се житни култури, а доминантна е еднозрнестата пченица, но и други видови како што се двозрнестата пченица, јачменот и пченицата *Timopheevi*, а кои исто така се изобилни. Мешунковидните растенија како грашокот и леќата биле исто така важни. Сепак, се береле и диви видови кои се носеле во селото, најверојатно за потребите на исхраната. Тоа најчесто биле овошја, апетисани и лиснат зеленчук. Примената на методот со микро-отпадоци ги објасни активностите што се изведувале во куќите и помогна да ги идентификуваме остатоците од отпадот формиран при готвење, просторот за преработка на култури, просторот за отстранување на отпадоци, при што, се објасни и користењето на домашните простори.

Клучни зборови: ран неолит, Пелагонија, палеоисхрана, археоботаника, активности во домаќинството

This paper summarizes the preliminary results of archaeobotanical analyses coupled with information gathered through the micro-refuse approach with focus on two early Neolithic sites in the Pelagonia Valley in North Macedonia; Vrbjanska Čuka and Veluška Tumba. The main topic considered is the use of plants and domestic spaces, with aspects like agriculture, diet and household activities being discussed. The diet and the economy of these communities is believed to depend mostly on agriculture, and the diachronic observations show its higher relevance in the later phases of the Early Neolithic period. The majority of crops are cereals with einkorn being the dominant one, but other species such as emmer, barley and *Timopheevi* wheat are also significantly abundant. Pulses; like pea and lentil, were important as well. Nevertheless, wild species were also gathered and brought to the village; most probably for consumption purposes. They were most commonly fruits; nuts and leaf vegetables. Micro-refuse approach illuminated the activities which were performed in the houses and helped us identify cooking waste residues, areas of crop processing, areas of litter disposal, and in that way clarified the use of domestic spaces.

Keywords: Early Neolithic, Pelagonia, paleodiet, archaeobotany, household activities

The Neolithic way of life and the subsistence strategies based mainly on agricultural goods have first developed in the Near East and for the first time on the European continent they started to appear in the western Aegean; in regions of modern-day Greece. The oldest evidence for agriculture in these regions starts appearing in the first quarter of the 7th millennium BC (Douka *et al.* 2017; Perlès *et al.* 2013). The influence started to spread northwards several centuries later initially following river valleys; and there are first agricultural settlements appearing around 6200 BC in the territories north from the border of modern-day Greece (Naumov 2015; Porčić *et al.* 2020). On its way towards the north; the Neolithic influence started to spread into the regions with a different natural setting for the first time. Namely; agriculture developed in the regions with sub-Mediterranean climate; and initially spread longitudinally staying in the Mediterranean climate zone. When; in the second half of the 7th millennium; the influence started moving northward through the Balkan Peninsula the Neolithic way of life started being implemented in the regions of increasingly continental temperate conditions (Ivanova *et al.* 2018). Due to the environmental constraints the early farmers needed to adapt to the new conditions and develop new strategies in crop and animal husbandry; which is why the studying of agricultural practices; diet and everyday activities of these communities plays an important role for the research of the implementation and spread of the Neolithic way of life. One such region; with evidence for occupation and agriculture in the Early Neolithic; is a valley named Pelagonia; which is the focus for this paper. The Pelagonia Valley is located in the Central Balkans; with a north-south orientation; and connects the area to the Thessalian plain; one of the earliest focuses of Neolithisation.

In the region of Central Balkans; the research of topics such as crop cultivation; role of domestic and wild plants in the diet; and everyday household activities has so far been mainly based on the indirect evidence; such as the finds that can be connected to crop cultivation (tools for soil preparation; sickles; grindstones; objects for storage etc.); vicinity of water bodies or fertile soil; architectural features of the dwellings and so on. Also; conclusions were often made based on the archaeobotanical data from neighbouring regions; such as Greece; Bulgaria; and even Anatolia (Filipović and Obradović 2013). Such evidence gives only a rough picture about the plant exploitation and gives little information on the crop husbandry practices; the diet and the everyday household activities. Archaeobotanical studies play a key role in the understanding of the Early Neolithic economy; especially when it comes to the adoption

of new subsistence strategies like agriculture and crop husbandry. Despite the recognized relevance of the region of Central Balkans for the research of the Early Neolithic and the numerous documented and excavated sites; the archaeobotanical studies are still not at an enviable level. Since the Neolithic is the time when first settlements and permanent dwellings start to appear; the samples obtained from the identified house floors can give important insight into the activities that were taking place indoors and; in that way; researchers can get a chance to better understand the household economy. As is the case with the analysis of fossilized plant remains; the analyses of micro-residues from the house floors (Ullah *et al.* 2015) are rarely performed even when the preservation of architectural features is at a high level.

In this paper we bring preliminary insights into the aforementioned topics which are based on the information gathered through an integrated archaeobotanical and micro-refuse approach (Antolín *et al.* 2020) implemented at two sites in this valley. This approach combines the data provided by the analysis of direct evidence on plant use- the fossilized plant remains; and the data provided by the analysis of small organic and inorganic elements (bone; shell; seeds; chaff; charcoal; daub; pottery; stone flakes; other artifacts etc.) which are also recovered by the processing of the archaeobotanical samples and which represent residues from anthropogenic activities in the past (Ullah *et al.* 2015; Antolín *et al.* 2021). With this approach we got a chance to illuminate knowledge on the crop species which were cultivated; wild plants which were gathered and domestic activities in the Early Neolithic in Pelagonia.

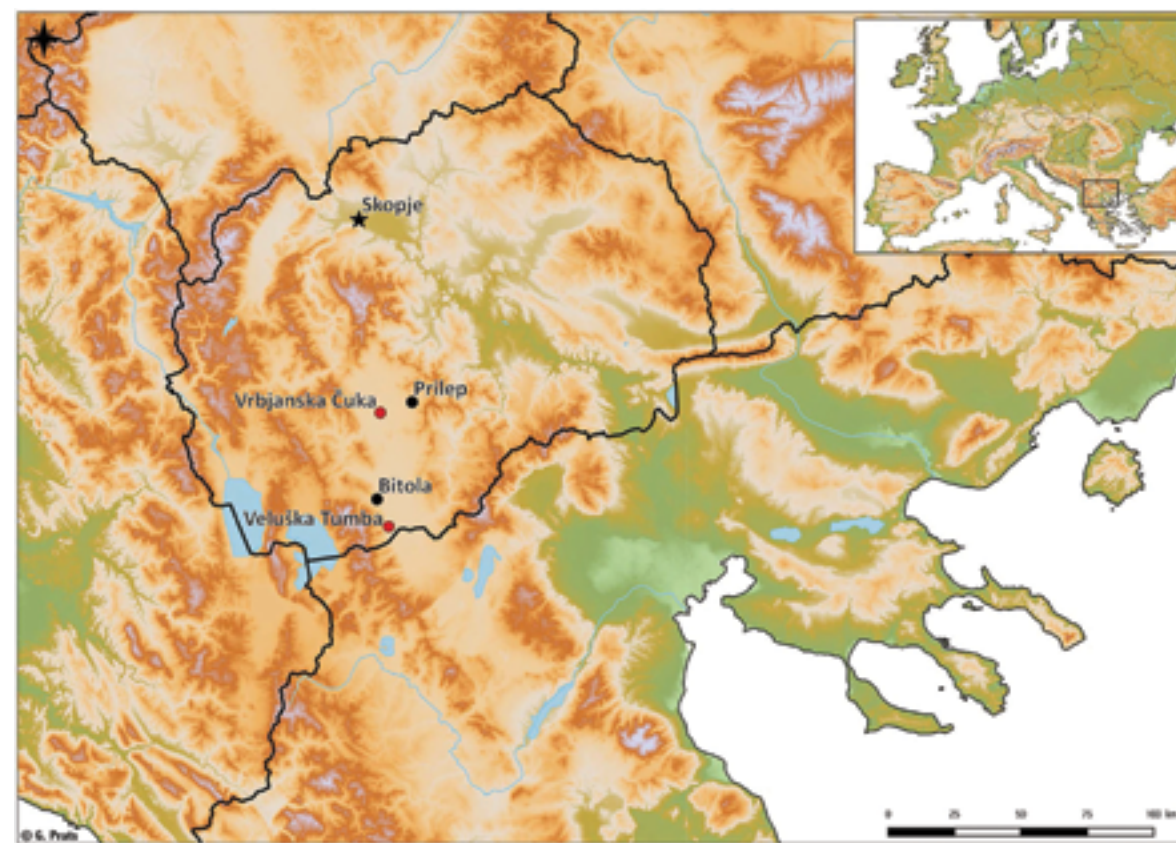


fig. 1

The sites under study

The focus of this research are two Early Neolithic tell sites located in the Pelagonia valley – Vrbjanska Čuka and Veluška Tumba. Pelagonia is an elongated valley situated in the Southwestern parts of North Macedonia with a small part stretching into Greece (**fig. 1**). It is surrounded by many mountains (with peaks up to 2600 m) and has continental climate. The largest river in the valley is Crna Reka; which had many tributaries in the past that are now dried out. The topography and fertile soil made this area suitable for agriculture and the foundation of settlements. Throughout the valley there is evidence for Early Neolithic occupation and the most common settlement types are tells; which point to a high level of sedentarism and construction of permanent villages which were in use for many generations (Naumov 2016; Naumov 2020). Vrbjanska Čuka and Veluška Tumba are both large tells which dominate the flatlands and the surrounding smaller sites. The site Vrbjanska Čuka is located in the north of the valley near to the city of Prilep and Veluška Tumba more to the south close to the border with Greece; next to the city of Bitola (**fig. 1**).

Vrbjanska Čuka was excavated several decades ago; with campaigns starting in 1979 and continuing for several years in the 1980's when the site was systematically studied for the first time (Kitanoski 1989; Kitanoski *et al.* 1990). The archaeological excavations recommenced in 2016 and are ongoing. In this new set of campaigns; the site and the material has been studied with a more interdisciplinary approach where geomagnetic scanning; digital topography; 3D modeling; use-wear analysis; lipid and isotope analysis; radiocarbon dating; archaeozoology and archaeobotany studies are being implemented (Beneš *et al.* 2018; Naumov *et al.* 2018; Naumov *et al.* 2021). Vrbjanska Čuka is one of the biggest Early Neolithic tell sites in Pelagonia which covers an area of around 2500 m². It has the stratigraphic deposits reaching 3.5 meters in height; with several building phases in the end of the Early Neolithic in terms of Balkan chronology (Naumov *et al.* 2021). The radiocarbon dates indicate that the Neolithic settlement was first established around 6000 BC and stopped being occupied approximately 3 hundred years later (Naumov *et al.* 2018). The settlement was enclosed by a ditch and was densely inhabited consisting of more than 20 buildings. A remarkable preservation of architectural object has made it possible to identify many buildings with massive wattle and daub walls where multiple floor levels were documented (Naumov *et al.* 2021). Apart from buildings; many smaller architectural features and objects were also documented; such as ovens; bins; platforms; pits and so on; as well as numerous small finds; like sickles and grindstones. Many of them seem to have been used for food preparation; crop processing and storing; and are in accordance with the practice of agriculture (Mazzucco *et al.* 2022; Naumov *et al.* 2018; Naumov *et al.* 2021).

Another large tell site in the Pelagonia valley is Veluška Tumba; situated approximately 50 km to the south from Vrbjanska Čuka. The archaeological excavations at Veluška Tumba started in the 1970s and continued in the 1980s mostly focusing on the central part of the tell. Afterwards; no excavations were conducted until 2013 when a small campaign took place; and finally; from 2017 onwards; systematic multi-disciplinary research began. This new ongoing research; apart from excavation and revisions in stratigraphy and material culture; includes geomagnetic scanning; geological examinations; isotope analysis; radiocarbon dating and archaeozoological and archaeobotanical studies (Naumov *et al.* 2020; Naumov and Gulevska 2020). Veluška Tumba is another large tell with a height of almost 4 meters of cultural layers showing continual occupation in the period of Early Neolithic. The radiocarbon dates place the existence of the settlement

between 6000 and 5600 BC which makes it roughly contemporaneous to Vrbjanska Čuka (Naumov *et al.* 2018). The conditions for the preservation of the architectural features were less favourable than at Vrbjanska Čuka; still it was possible to determine different building phases and architectural features. Remains of plastered floors; daub which was used for the construction of walls; post-holes and several well-preserved architectural objects were documented (Naumov and Gulevska 2020). The numerous artifacts discovered include very fine pottery with white painted patterns; anthropomorphic house models and figurines; but also tools which most probably served for cultivation and processing of the



fig. 2

crops (Naumov *et al.* 2009; Naumov and Gulevska 2020). As a result of such precious finds and impressive material culture Veluška Tumba served as the eponymous site for the Velušina-prodin cultural group; characteristic of Pelagonian Neolithic.

Materials and methods

The data presented in this paper was gathered through analysis of archaeobotanical samples gathered in 2019 during excavation campaigns at both sites. At Vrbjanska Čuka; a total number of 43 samples were retrieved from different deposits and buildings. The sampling was carried out systematically and horizontally where different samples were taken from different features in the same occupational phase (**fig. 2**). The preliminary results presented here originate from 22 samples which come from 18 different stratigraphic units. As far as 2019 campaign at Veluška Tumba is concerned; the excavation included the revision of the profile made by researchers in the previous decades; the opening of a small control trench and coring for geological analysis (Naumov *et al.* 2020). This kind of excavation enabled the sampling for archaeobotanical analysis to be done vertically. Every stratigraphic unit documented in the profile was sampled and some stratigraphic units were also sampled in the control trench (**fig. 3**). Apart from this; many smaller samples come from geological cores which were drilled at different locations of the tell. There were a total of 87 samples acquired with very different sizes due to the origin of the samples. The preliminary results in this paper were gathered by analyzing a total of 17 samples from Veluška Tumba.



fig. 3

Before any sample processing; the volume of each sample is documented. For retrieving the plant macroremains; the wash-over method (Kenward *et al.* 1980) was used. Before the procedure begins the whole sample is soaked in water. This technique requires taking a small fraction

of the soaked soil and its gentle disintegration in a bowl by adding more water; which then lets the charred organic components be separated by flotation. The charred contents are decanted over a column of sieves with different mesh sizes. These make up the organic (light) fraction and are divided on sieves with mesh size of 2mm and 0.35 mm. The same procedure is repeated until the remaining sediment in the bowl is barren of all the charred material and only the heavy components at the bottom remain. The bowl is then emptied and the heavy remaining material is subsequently divided into 8 mm; 2 mm; and 1mm fractions making up the inorganic (heavy) fraction. A small amount of soaked soil is again added to the bowl and the same procedure repeated until the whole sample has been processed. After drying and packing each sample is composed of 5 fractions – 0.35 and 2 mm light; and 1; 2 and 8 mm heavy.

The plant remains from all the fractions are sorted and classified if possible. If the 0.35 mm fraction is too large the subsampling is performed. Later the total number of remains for all taxa with 3 or more remains is multiplied to get the estimated number of remains in the whole sample. The 2 mm light fraction is always analyzed entirely. The identification of the plant remains and their taxonomic classification is done with the help of a stereomicroscope with magnification up to 40 times. This is done based on the observation of morphological traits of all the seeds and fruits recovered and with the help of a reference collection and atlases for the identification of plant species (Bojnanský and Fargašová 2007; Cappers *et al.* 2012; Jacomet 2006). All the classified remains are counted and the data is inserted into ArboDat (Kreuz and Schäfer 2002); which is an Access database specified for archaeobotanical analysis. Aside from the information on the sample and the archaeological context (site; date of excavation; date of sieving; stratigraphic unit; type of unit; quadrant; sample number; sample volume) this database contains information on plant taxa and the taphonomy of plant remains (taxon; ecological group; type of remain; way of preservation; number of remains; number of fragments).

The micro-refuse approach (Ullah *et al.* 2015) involves sorting and observation of specific elements in all the five fractions in each sample; and comparing their volumes. First the volume of each fraction is noted. Further; over 30 variables including any recognizable category preserved in the fractions are quantified. The observed and quantified elements are as follows: bone; bone charred/calcined; fish bone; complete shell; shell fragment; microfauna; microfauna charred/calcined; rodent pellets; charred seed/fruit; mineralized seed/fruit; chaff; straw; tuber; charcoal; other organic remains; daub (ml.); daub with spikelet impressions; daub with flat side; stones/pebbles; stones/pebbles (ml.); pebbles/sand (ml.); heavy mineral; other stones; quartz flake; flint flake; pottery; modern roots; other. These small-sized remains become visible due to sample processing by washing; and would otherwise stay unrecovered. The main goal of this method is to observe patterns in their occurrence which can reflect anthropogenic activity in different areas of the houses (for example cereal processing; meat processing; waste disposal) (Antolín *et al.* 2020). This method was so far only applied to the material from Vrbjanska Čuka since the samples were spread in a horizontal manner and because the samples were taken from defined buildings and features.

Results

The total volume of the 21 samples from Vrbjanska Čuka before processing was 132 liters; and the 17 samples from Veluška Tumba were made up of 52 liters of soil. Both sites have shown a high number and density of remains per litre of sediment indicating good preservation conditions. In total for both sites; we have recovered almost 9000 carpological remains; that is remains of seeds; fruits and other plant parts in relation to the fruit. The sample with the biggest density of classified carpological remains had over 1,750 remains per litre of sediment;

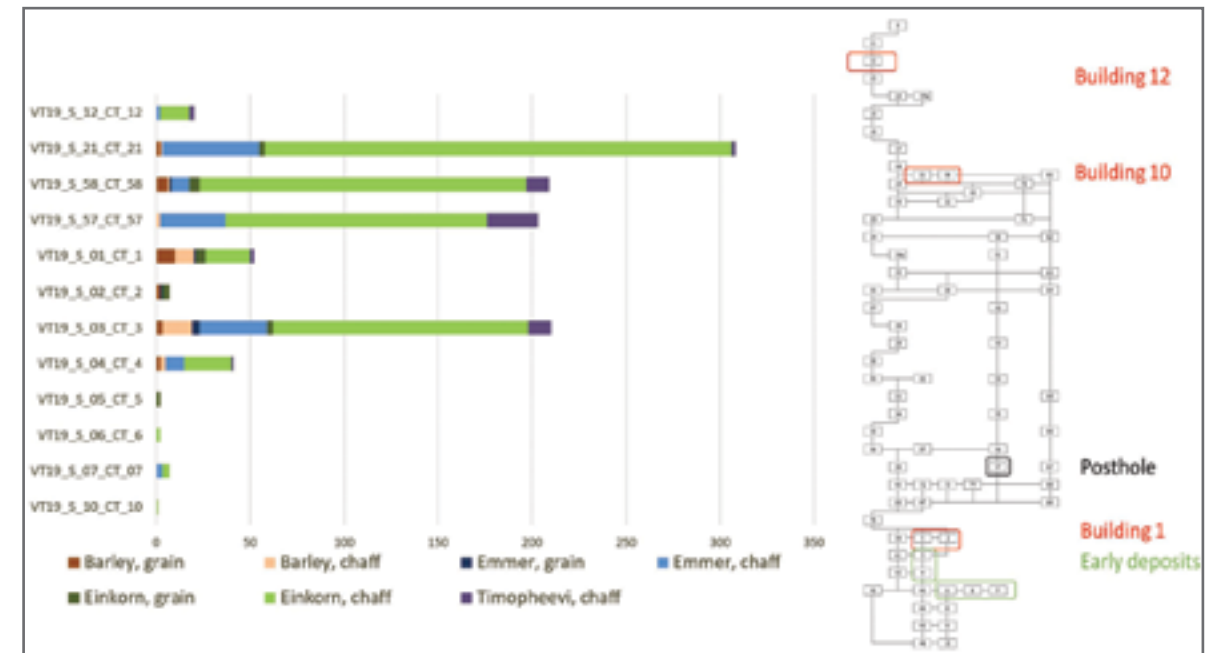


fig. 4

yet the average density of remains is a little above 100/litre of sediment. Both sites show similar trends when it comes to relative abundances of classified carpological remains; so their relative frequencies will here be considered grouped up. The plant remains were mostly preserved by charring (99.6%) but some remains come in a mineralized state (0.4%).

The majority of plant remains belong to cultivated crop plants (74%); of which most are the remains of cereal chaff (59.5% of total) and grain (13% of total); and a small percentage comes from legume seeds (1.5 % of total). Among the plants which were cultivated in the past the dominant species is einkorn (*Triticum monococcum*) at both sites; followed by emmer (*Triticum dicoccum*) (tab. 1). Apart from these two; another species from the genus *Triticum*; *Triticum timopheevi* (sometimes referred to as “new-glume” or “new-type” wheat) is present at both sites; and on Vrbjanska Čuka two-grained einkorn is also documented in somewhat smaller quantities. Among the cereals; barley (*Hordeum vulgare*) also occurs relatively commonly at both sites and it is represented by at least two cultivars; hulled and naked variety. As mentioned above; pulses comprised a less abundant crop group; but two species; lentil (*Lens culinaris*) and pea (*Pisum sativum*); were regularly encountered. Only two specimens of bitter vetch (*Vicia ervilia*) were encountered at Vrbjanska Čuka.

The sampling at Veluška Tumba gave us the opportunity to observe the different stratigraphic layers which were documented in the profile (fig. 3). The preliminary results indicate an interesting trend in the occurrence of domesticated plant taxa. The samples which originate from the lowermost layers (correlating to stratigraphic units 10; 7; 6 and 5 – fig. 4) had very little or no plant remains originating from crop plants. The crop plant taxa in these samples make up 11% of the total classified carpological remains; and gathered plants make up 40%. The domesticated plant taxa show up in much larger quantities in the upper layers. Among the layers with a higher abundance of domesticated taxa; in the four of the lowest ones (correlating to stratigraphic units 4; 3; 2; 1) barley has a percentage of 13 %; and in the upper layers (57; 58; 21; 12) it is occurring only as a very small proportion of the crop taxa with only 1% (fig. 4).

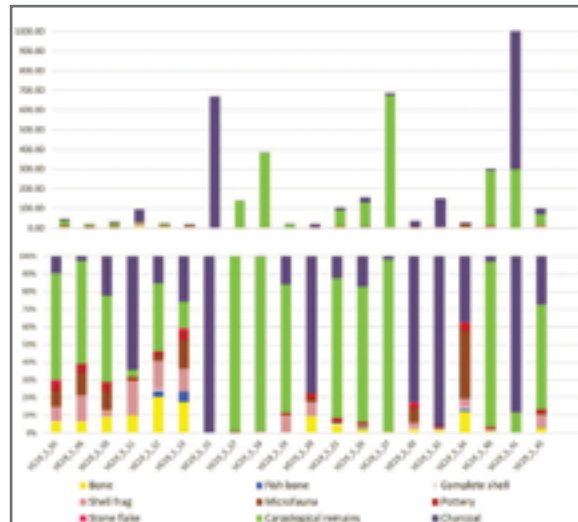


fig. 5

Besides the cultivated plants; the remaining taxa are wild plants of which some are edible and could have been intentionally gathered. They were considerably abundant at both sites (**tab. 1**) and account for 20% of all the classified carpological remains from both sites. The rest of the wild plants (5.5%) could have been brought to the site accidentally or could be the remains of weeds which were growing on the cultivated fields. Fat-hen (*Chenopodium album*) is remarkably abundant at Vrbjanska Čuka; and is also the most abundant species among gathered plants at Veluška Tumba. Next; there are several species with edible berry-like fruits which come up in substantial quantities. These are primarily elderberry (*Sambucus* sp.) and bramble (*Rubus fruticosus*) abundant at both sites. Then; sloe (*Prunus spinosa*) and wild strawberry (*Fragaria vesca*); both somewhat abundant at Vrbjanska Čuka and represented by one specimen at Veluška Tumba; and cornelian cherry (*Cornus mas*) with a single find at both sites. Apart from these; hazel (*Corylus avellana*) at both sites; and apple/pear (*Malus/Pyrus*) at Vrbjanska Čuka also fall into the category of gathered plants and were less abundant.

The preliminary results of the micro-refuse analysis conducted at Vrbjanska Čuka show suggestive trends in the occurrence of observable elements of some samples (**fig. 5**; **fig. 6**). Since the samples originate from architectural features; most of them have a large quantity of daub present. 15 out of 20 samples have bone and shell remains present in at least a small amount; and the carpological remains and pottery fragments have the same ubiquity. In several samples (17; 18; 19; 21; 26; 27; 40) the carpological remains make up the about 80% of all the counted elements in the sample (graph 2). Charcoal was present in all samples but one; sometime in smaller amounts and at times being the dominant element (samples 15; 20; 30; 31; 41). The stone flakes were documented in 6 samples; usually in low quantities.

Discussion

The results of archaeobotanical analysis at Vrbjanska Čuka and Veluška Tumba indicate that in Pelagonia agriculture was practiced in the Early Neolithic. Since both sites show a very similar picture; and we have analyzed almost three times more material from Vrbjanska Čuka; we can imply that the results can be sufficiently accurate to characterize the main economic plants already at initial stages of research. The biggest number of recovered plant remains at both sites belongs to crop plants. Certainly; the most important crop at both sites; and in all the phases is einkorn (**tab. 1**; **fig. 4**). Since there are einkorn; emmer; *T. timopheevi*; two varieties of barley; as well as two surely confirmed pulses present; we can say that the crop choice is remarkably diverse; and we cannot exclude a possibility that future investigations may expand the list of cultivated plants in the area. Such a picture points to a big significance of crop husbandry; and henceforth to the principal role of agriculture in the subsistence strategy already in the Early Neolithic times. The crop spectrum is similar to the situation on the Early Neolithic sites in the surrounding regions; like the ones in Greece and Bulgaria where plenty of data has been gathered (Marinova and Valamoti 2014). However; since no oil plants have been discovered yet;

and the cereal and legume spectrum taxonomic is narrower than in the Near East (i.e. absence of naked wheat and chickpea) from where these crops originate; it is possible that the environmental factors influenced the choice of crops which were cultivated. Further research; which will include investigations of other aspects of crop cultivation; such as sowing and harvesting time; will bring more information needed to conclude on this topic (for some preliminary results in this sense see Mazzucco *et al.* 2022).

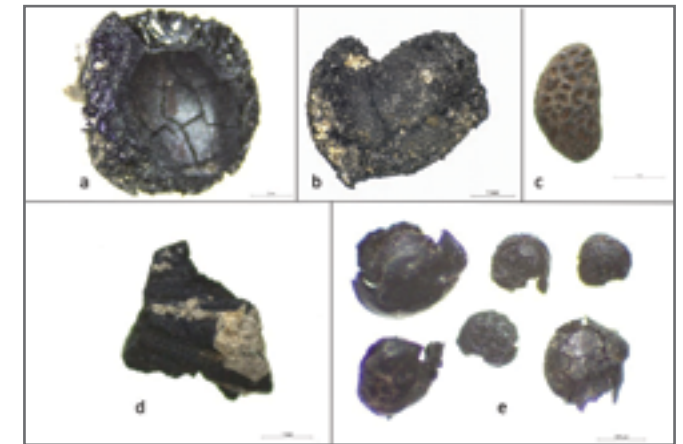


fig. 6

The vertical distribution of the samples from Veluška Tumba made it possible to observe temporal changes which were particularly notable when it comes to the relative abundances of crop taxa in the archaeobotanical assemblage (**fig. 4**). First; the samples coming from stratigraphic units correlating to the earliest phases of occupation at the site (stratigraphic units 10; 7; 6; 5) had a very small percentage of remains of domesticated species among the total number of classified remains in comparison to later phases. If confirmed after more extensive sampling in the near future; this could give a strong indication that at the initial phases of life in this settlement people relied more on the gathered plants in their diet; since their occurrence in these samples had a higher percentage; and that agriculture gained in importance gradually. The next observation concerns the importance of barley in different phases. In the layers where crop plants already have a higher occurrence; the ones correlating to earlier phases (stratigraphic units 4; 3; 2; 1) display a higher significance of barley as a crop; and its importance seems to be diminishing in the later phases of life in this settlement. This might be in connection to the development and mastering of the agricultural practices in the new kind of environmental setting in the later phases of occupation; since barley is a more resilient crop (shorter and earlier growing period; low-demanding in terms of soils) but not as palatable as different species of *Triticum*; and is often used as animal fodder (Zohary and Hopf 2000; 59). Nevertheless; barley has multiple uses (i.e. the production of beverages) that must not be underrated; and only after a more extensive sampling and a context-based taphonomic analysis it will be possible to give a more accurate interpretation of these results. With the available data; it seems that it is possible that one can here follow how through a few generations the villagers started relying fully on agriculture; and through another few generations overcame the environmental constraints and developed their own preferences when it comes to crop husbandry. Nevertheless; our research is at very initial stages and more comprehensive data needs to be collected to confirm such assumptions.

Plenty of wild plants with edible seeds and fruits were present in notable amounts at both sites. They were mostly represented by charred seeds; but on several occasions whole fruits were recovered in a charred state (**fig. 6**). Very often these remains were recovered in contexts related to food preparation or consumption which further confirms their intentional gathering. Their large amount indicates that gathering was an important activity and that harvested goods were plausibly stored within the houses (Antolín *et al.* 2020). These practices are in accordance to the situation in the surrounding areas in the Neolithic period (Marinova *et al.* 2013; Filipović *et al.* 2018; Valamoti 2015). Apart from fleshy fruits and nuts which were commonly gathered in prehistory; a plant which drew the attention of the inhabitants of Vrbjanska Čuka and Veluška

Tumba was fat-hen; which could have been gathered for the consumption of its green; tasty leaves and small; nutritious seeds (**fig. 6**). This plant could occur at archaeological sites due to unintentional gathering in the past since it commonly grows as a weed among cereal crops; but since it was immensely abundant at Vrbjanska Čuka; and was also present at Veluška Tumba in large quantities we excluded this possibility. The interpretation of the charred seeds of fat-hen at prehistoric sites as a result of gathering and consumption is not uncommon and many researchers agree that prehistoric people did not see it as merely a weed plant (Marinova *et al.* 2013; Mueller-Bieniek *et al.* 2020). The plants with edible; tasty and nutritious fruits and leaves which were available for gathering in the surrounding; were rich in vitamins; minerals and fibers that; together with cereals and legumes rich in carbs and proteins; made the diet of Early Neolithic people well balanced. Of course; this all refers to the plant part of the diet but a big proportion of energy; especially rich in proteins and fats; was introduced through animal products; as indicated by archaeozoological and pottery residue analysis (Naumov *et al.* 2021).

The samples for Vrbjanska Čuka were spread out in a horizontal manner which has provided a chance to observe spatial patterning indicating human activities in the past with the application of micro-refuse approach (**fig. 5**). Most of the samples consist of building debris mixed with residues of several daily activities. Some of the observed patterns are very obvious and straightforward; as is shown by sample 15. This sample came from a posthole and therefore only charcoal; which represents remains of the post; was recovered. Some other samples give more significant results; such as sample 18 in which almost exclusively cereal grains and chaff were recovered and in large amounts. This sample was collected from a burnt area next to two oval bins which; therefore; probably served as cereal processing installations. The sample 27 contained plenty of carpological remains; and since it is coming from an area near an oven; we can assert that these remains represent food preparation. Also, plenty of unidentified charred objects, which might represent charred remains of food, were also discovered in this sample which is in accordance with such assumptions. Further microscopic analyses need to be conducted on these remains to confirm their nature. The sample number 17 consisted of almost only plant remains; and given the fact that the vast majority of these are chaff and husks; we can assume that it is connected to activities of cereal processing like de-husking. Sample number 40 also has a high number of carpological remains and the cereals are represented mostly by chaff remains which also indicate crop processing; and it is most probably a mixed accumulation of processing by-products. Another rich sample is the sample 41 which has an extremely large concentration of charcoal but also carpological remains. This sample represents a layer of plaster from one of the buildings and is most probably a combustion residue.

Different types of variables; apart from plant remains; also give to noteworthy results (**fig. 5**). The refuse deposits are characterized by a mixture of charcoal; seeds; chaff; bone fragments and potsherds of which the best representative is the sample 11; but some other samples point to the same situation. The sample 11 is coming from a pit and this way we can confirm its role as a place for refuse. Sample 13 is similar but perhaps more indicative of consumption residues; with burned bone fragments; fish remains; shells and so on.

By the observation of the patterns in the occurrences of small remains in the samples; we can say that people at Vrbjanska Čuka used the domestic spaces and architectural installations for conducting tasks like cereal processing. The last phases of crop processing and de-husking which involve activities like fine-sieving and sorting were probably conducted on a daily basis before food preparation. The crop cleaning by-products and food remains could end up in fire installations or refuse pits.

Conclusion

Based on the results of an integrated archaeobotanical and micro-residue analysis; even though still at a preliminary level; we can draw first conclusions about several important topics. In the Early Neolithic Pelagonia; communities depended on agriculture as a main subsistence strategy. A broad crop spectrum shows similarities to sites in the surrounding areas; but a small reduction in diversity was observed. This possibly indicates adaptations to the environmental constraints; but might also represent the preferences of the community. Further research will confirm whether the absence of some species is not just due to the preliminary state of the analyses here presented. The assumption that the importance of agriculture is less prominent in the earliest periods of the life at the settlement at Veluška Tumba is notable; but needs further confirmation. As expected in an agricultural community; the plant part of the diet is mainly coming from cultivated species; but a strong input is coming from collected wild fruits and leafy greens as well.

Speaking of the domestic activities; we have evidence that cooking; cereal processing and other alimentary and post-harvest activities were performed in the houses. It was also possible to trace microscopic evidence of rubbish disposal and consumption residues. All the results give important insights and testify that the preservation conditions at these two sites are at an admirable level. This gives a very promising note to the future investigations at Vrbjanska Čuka and Veluška Tumba and the integrated approach presented here will continue to be implemented.

Acknowledgements

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Used Illustrations

Fig. 1. Map showing the location of the sites. Map: G. Prats.

Fig. 2. The excavated area at Vrbjanska Čuka. The red outlined area is indicating where the samples in 2019 campaign were collected from. Photo: Hristijan Talevski.

Fig. 3. The profile and the control trench at Veluška Tumba. The red outlined area is indicating where the samples in 2019 campaign were collected from. Photo: Goce Naumov.

Fig. 4. Graph representing the amount of remains of each crop (grain and chaff separately) at Veluška Tumba (left) in correlation to the stratigraphic units from 2019 campaign presented on a Harris matrix (right). The numbers on the graph represent the total number of remains per litre of sediment in each sample. Graph: Ferran Antolín; matrix: Goce Naumov.

Fig. 5. Two graphs representing the total number (top) and the relative frequencies (bottom) of different variables observed in the micro-refuse analysis in each sample. The numbers for each sample were obtained by dividing the total number of remains in each category by the number of liters of sediment, so the samples of diverse size are comparable. Graphs: Amalia Sabanov.

Fig. 6. Charred remains of wild gathered plants which were recovered at Vrbjanska Čuka and Veluška Tumba: a – fruit of sloe (*Prunus spinosa*), b – fruit of elderberry (*Sambucus* sp.), c – seed of bramble (*Rubus fruticosus*), d – fruit stone of hazel (*Corylus avellana*), e – seeds of fat-hen (*Chenopodium album*). Photos: Raül Soteras.

Tab. 1. Table with results of the archaeobotanical analysis at Vrbjanska Čuka and Veluška Tumba, with total numbers of classified remains of cultivars and gathered plants presented.

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Cultivated plants	Vrbjanska Čuka	Veluška Tumba
Hulled barley, grain (<i>Hordeum vulgare</i> var. <i>vulgare</i>)	39	16
Naked barley, grain (<i>Hordeum vulgare</i> var. <i>nudum</i>)	17	9
Barley, chaff (<i>Hordeum vulgare/distichon</i>)	15	29
Emmer, grain (<i>Triticum dicoccum</i>)	37	7
Emmer, chaff (<i>Triticum dicoccum</i>)	280	148
Einkorn, grain (<i>Triticum monococcum</i>)	112	23
Einkorn, chaff (<i>Triticum monococcum</i>)	1334	773
2-grained einkorn (<i>Triticum monococcum</i>)	24	0
<i>Timopheevi</i> wheat, chaff (<i>Triticum timopheevi</i>)	96	58
Lentil (<i>Lens culinaris</i>)	48	8
Garden Pea (<i>Pisum sativum</i>)	60	4
Bitter vetch (<i>Vicia ervilia</i>)	2	0
Garthered plants		
Fat-Hen (<i>Chenopodium album</i>)	1480	88
Cornelian-Cherry (<i>Cornus mas</i>)	1	1
Hazel (<i>Corylus avellana</i>)	1	2
Wild Strawberry (<i>Fragaria vesca</i>)	5	1
Apple/Pear (<i>Malus/Pyrus</i>)	3	0
Sloe (<i>Prunus spinosa</i>)	7	1
Bramble (<i>Rubus fruticosus</i>)	19	3
Elderberry (<i>Sambucus</i> sp.)	12	14

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На археолошкиот локалитет Врбјанска Чука се вршеа ископувања и во последните две години, така што се продолжи со истражување на неговиот централен дел кое започна во 2016 година. Во рамки на овие две кампањи целта беше да се проучат преостанатите антички и средновековни елементи присутни во овој дел на тумбата, како и да се регистрираат сите појави во последните неолитски хоризонти. Притоа се открија нови доцноантички градежни содржини и средновековни гробови и јами, а се документираа елементи и од последните објекти градени во неолитската населба пред нејзиното напуштање. Во 2021 година, исто така, детално се проучуваа сочуваните остатоци од најраните фази на оваа населба, а кои биле во голема мера оштетени со експлоатацијата на песок во 1970-те години и со вадењето на големиот неолитски амбар од Градба 1 во 1980-те години. Притоа, се направи увид во начинот на кој е извршен упад и оштетување на археолошките слоеви, но, исто така, се истражуваа и малубројните остатоци од повеќе неолитски фази во кои се содржани архитектонски елементи и фрагменти од материјална култура.

Клучни зборови: Пелагонија, тумба, неолит, доцна антика, среден век, архитектура

Excavations have been carried out at the archaeological site Vrbjanska Čuka in the last two years, so that the research of its central part which started in 2016 continued in 2020 and 2022 as well. Within these two campaigns, the goal was to study the remaining Classical and Medieval

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This is the 6th volume of the edited book that is related to already traditional conference of the Center for Prehistoric Research, particularly focused on the Neolithic of Macedonia and the Balkans. Same as the conference this publication also brings together various specialists exploring different modes of life of the first farmers inhabiting the Balkans, thus promoting new perspectives in research methods and proposing a variety of possibilities in the understanding of the agricultural societies. This edition of 'Neolithic in Macedonia' gives an extensive elaboration of the latest knowledge in terms of technology, economy and habitation of the first farmers. All these papers provide thorough examination of the material culture, architecture and organic remains in order to demonstrate the modes of everyday life of the agricultural societies from the beginning until the end of the Neolithic period. Furthermore the authors promote novel research approaches and state of the art methods in order to reach a consistent notion of the world in which these farmers lived. That is moreover the substantial principle of the Center for Prehistoric Research which intends to encourage the implementation of the advanced multidisciplinary methods in prehistory and to present their outcome in this volume that has been continuously published since 2016.



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