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FROM THE EDITOR

The sixteenth volume of *Studia Praehistorica* is now available both as an open access digital journal and as a print version. It presents to your attention ten papers covering periods from the Neolithic to the Bronze Age and territories from the Central Balkans to the Aegean and Anatolia, as well as a discussion paper on faunal analysis in Bulgarian prehistory. Readers will find here reports on recent excavation projects, archaeological and scientific analyses of finds, discussions on new radiocarbon evidence, critical reviews, and theorizing discourses, both in solid, conventional approaches and refreshing and even surprising insights. I hope you'll enjoy this new read and kindly urge you to submit contributions to the next volume.

KB

THE FUTURE NEOLITHIC IN THE AEGEAN

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Abstract

Scholars working in the Aegean are used to associating the term Neolithic always with plant cultivation and domesticated animals. On the other hand, the recent trends in redefining the Neolithic reveal that the Neolithic is marked not only by the onset of farming and animal husbandry, but also by sedentism, structural transformation, symbolic behavior and sensory perception of landscape etc. This essay reveals that the Aegean 9th millennium BC communities show the same general trends as the Cypriot and Anatolian Pre-Pottery Neolithic, and it is necessary to consider a Neolithic period without pottery in the Aegean.

Keywords: Aegean – Neolithic – PPNA – Cyprus – Central Anatolia – Western Anatolia.

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Introduction: Defining (or re-defining) the ‘Neolithic’

It is generally accepted that the transition from a hunter-gatherer to a farming way of life is what defines the start of the Neolithic in Europe. But I agree with J. Thomas that, ‘farming’ and ‘the Neolithic’ are not quite the same thing: ‘*Farming is an economic system that involves control over the reproduction of animals and plants, while the Neolithic is a form of sociality that is often (but not always) associated with it*’ (Thomas 2013, 678). One of the recent trends in redefining the Neolithic reveals that the Neolithic is marked not only by the onset of farming, but also by the emergence of complex symbolic and socio-political systems (Cauvin 1989; Hayden 1993; Hodder 1990). In addition, archaeological evidence in the Near East and Anatolia shows that the earliest sedentism and monumental buildings began without agriculture and animal husbandry. The discoveries at Göbekli Tepe (ca. 9500 cal. BC) indicate that sedentary hunter-gatherer groups had already developed complex, perhaps religious ideas, together with monumental ceremonial sites to practice the communal rituals (Dietrich et al. 2012). Interpretative approaches concerned with how farmers thought about the world through a variety of metaphors linked to domestication now dominate especially the North European Neolithic (Hod-

der 1990; Thomas 1991 & 1993). Monumentality, social memory, structural transformation, cultural landscape and sensory perception of the environment are argued to be the motive forces of the North European Neolithic (Bradley 2000; Hodder 1990; Thomas 1991, 1999 & 2007; Tilley 2007; Whittle 2003). On the other hand, scholars working in Southeast Europe are used to associating the term Neolithic always with plant cultivation and domesticated animals.

Like the Aegean Mesolithic groups, the Near Eastern (especially the Tigris Basin) Pre-Pottery Neolithic A (PPNA) groups were hunters and gatherers (Perlès 2014). No element suggests pre-domestic cultivation; in addition, wild cereals were rare or absent (Willcox & Savard 2011). So why call the Near Eastern PPNA societies 'Neolithic'? Are sedentism and social and ritual complexity of these societies making them Neolithic societies? Central Anatolian Pre-Pottery Neolithic and the Cypriot PPNA communities engaged in intensive hunting and gathering with some cultivation. No domesticated animals occurred. Buildings very similar to large communal buildings were also found. Is the Neolithic characterized by sedentism or some cultivation or animal management or symbolic and ritual behavior? It seems that all of these traits characterized the Neolithic and a period known in geology as the Younger Dryas (10,700–9600 cal. BC) created the border between the Epipalaeolithic and the Neolithic in the Near East (e.g. Benz et al. 2015). In this essay I would like to discuss how to redefine the Neolithic in the Aegean. Before presenting my approach, it is necessary to focus on the Pre-Pottery Neolithic of Central Anatolia and Cyprus.

A view from Central Anatolia and Cyprus

The Neolithic in Central Anatolia is a distinct phenomenon. Ninth millennium cal. BC Central Anatolia is characterized by sedentary communities engaging in intensive hunting and gathering (Özbaşaran 2011; Stiner et al. 2014). The earliest Neolithic communities in the region are best documented at the sites of Aşıklı Höyük and Boncuklu. Pınarbaşı has also revealed a ninth millennium cal. BC occupation. At both Aşıklı and Boncuklu (fig. 1), oval structures with mud-brick walls and a central hearth were found (Özbaşaran 2012; Baird et al. 2012 & 2018). Human remains were discovered beneath the floors. The architectural tradition at Pınarbaşı is different as the site is characterized by sunken curvilinear buildings with wattle and daub superstructures (Baird et al. 2018). An oval, ca. 10-meter communal building was also found at Aşıklı. The chipped stone assemblages of Central Anatolian sites were dominated by obsidian and characterized by microliths.

No domestic animals were present at all sites, but at Aşıklı Höyük and Boncuklu, caprines were managed (Stiner et al. 2014; Baird et al. 2018). Crop plants are preserved, including familiar founder crops as einkorn, emmer wheat and barley, but the gathering of wild food resources and the hunting of animals remained significant to the subsistence economy. On the other hand, there are no domesticated cereals and

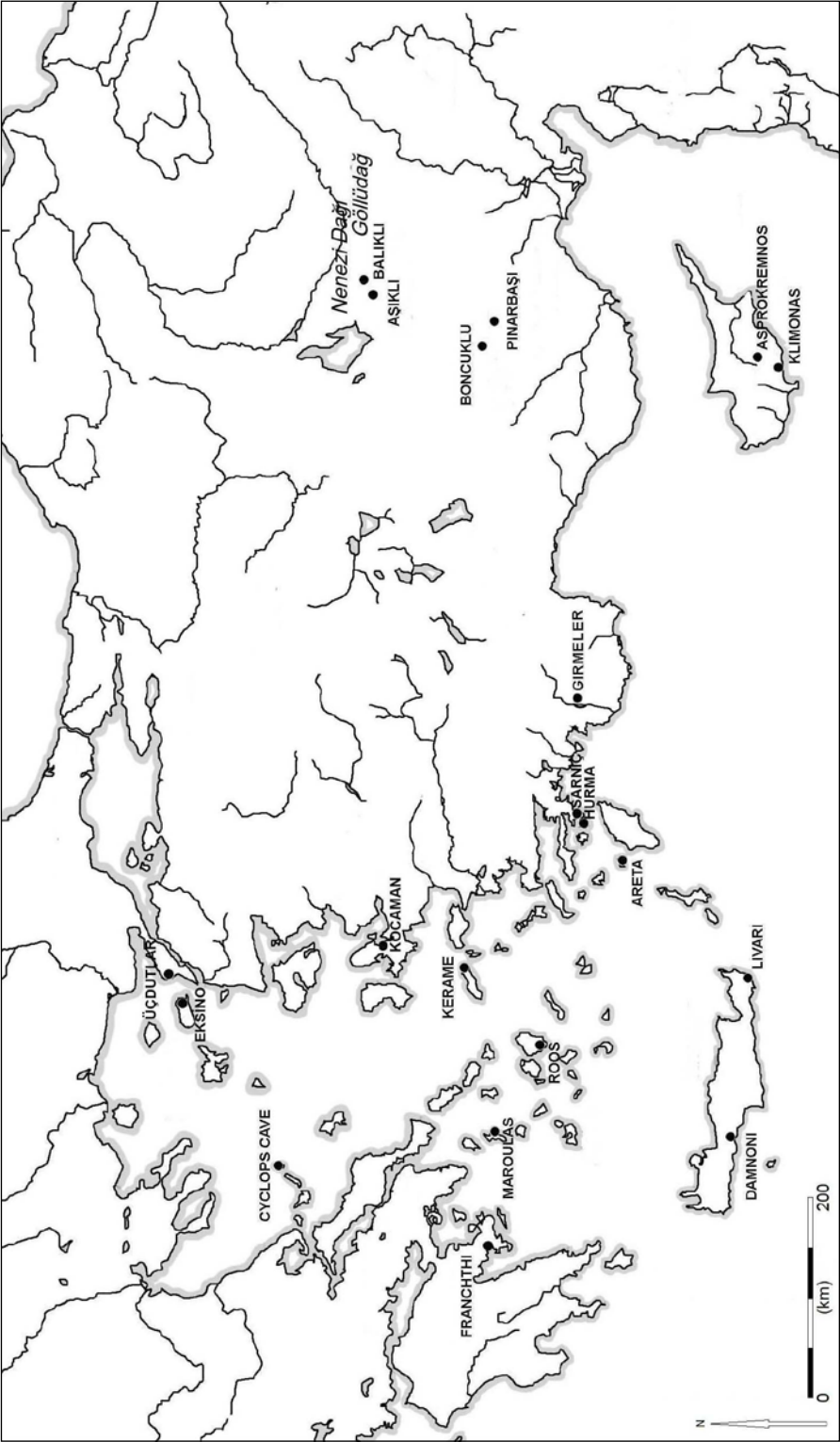


Figure 1. Map showing the sites mentioned in the text. Image Credit: the author.

animals at Pınarbaşı, which is considered a Pre-Pottery Neolithic settlement (Baird et al. 2018).

For many years, the Khirokitia Culture (ca. 7000–5500 cal. BC) was the earliest known Pre-Pottery Neolithic culture in Cyprus. The perspective on Cyprus changed abruptly with the discovery of PPNA (ca. 9000–8400 cal. BC) and PPNB (ca. 8400–7000 cal. BC) sites such as Ayia Varvara Asprokremnos, Ayios Tychonas Klimonas, Parekklisha Shillourokambos, Kissonerga Mylouthkia, Akanthou–Tatlisu Arkosykos and Ais Giorkis (Simmons 2014; Knapp 2020). It is accepted that the Cyprus PPNA groups had arrived from the mainland. The establishment of sedentary communities allowed intensive hunting of wild boar (Vigne et al. 2012 & 2017; Knapp 2020). The chipped stone industry is characterized by projectile points, burins and micro-drills. At Klimonas, cereal chaff of barley (*Hordeum spontaneum/distichon*) and emmer wheat (*Triticum dicoccum/dicoccoides*) were used as building material. This evidence indicates that cereals were probably cultivated locally (Vigne et al. 2012 & 2017). The presence of sickle blades may also indicate harvest activities. The earliest buildings were of the round house type. A circular communal building ten meters in diameter was also found at Klimonas (Vigne et al. 2017).

The evidence from the Aegean islands and the Western shore of Anatolia

The recent excavations in the Aegean islands show that hunting/gathering/fishing semi-sedentary or quasi-sedentary communities arose in the region several hundred years before the appearance of farming. The site of Maroulas on Kythnos is dated to the first half of the 9th millennium cal. BC. At Maroulas, remains of more than 30 circular or oval stone dwellings, occasionally with stone pavements, were found (Sampson et al. 2010). Burials were recovered under the floors of dwellings or between them. Evidence of secondary burials, including skull removal was also present. The people at Maroulas subsisted on a variety of resources, such as fish, land snails, pigs, and edible plants. Basin-like grinding stones may have been used for food processing. The presence of hare, fox, and birds at Maroulas suggests that these animals were also hunted. *Patella* was also systematically collected from inshore, and many of which could be stored. Only young pigs are present at the site and they were managed or were in a transitional stage of domestication (Trantalidou 2003 & 2010). The evidence of fishing from Maroulas is significant. The fishers applied a highly selective fishing strategy. They targeted a specific, rather restricted range of taxa.

The small-scale excavation at the contemporary site of Kereme I on Ikaria (Dodecanese) yielded no architectural structures except hearths and some stone rings. Both at Maroulas and Kereme I, the lithic industry consists of flake-based technology. The most frequent tools are denticulated-notched forms, end-scrapers, perforators and arched backed pieces (Sampson et al. 2012). Only a few Melian obsidians were found and blade elements are represented almost exclusively on obsidian. Again a few Melian obsidian tools were also found at the contemporary site of Damnoni in Crete (Carter et al. 2018).

The Cyclope Cave on Gioura has also revealed a ninth millennium cal. BC occupation. The site's subsistence economy was based mainly on marine fishing and bird hunting. The evidence of fishing from the Cyclops Cave seems to indicate seasonal and inshore fishing. Sea mussels and land snails also played an important role in the diet. Osteometric data show that goats were managed or were in a transitional stage of domestication (Trantalidou 2003). The lithic industry of the Cyclope Cave is marked by flake technology. Flake tools, end-scrapers, retouched flakes and notched tools are characteristic (Sampson et al. 2008; Kaczanowska & Kozłowski 2008). Similar chipped stone artifacts with some differences (e.g. macrotools or retouched blades) were also found at Livari in Crete, Stélida and Roos on Naxos, and Areta on Chalki (Sampson et al. 2016; Carter et al. 2016; Sampson 2019). No excavations have been conducted at these sites and no absolute dates have so far been determined. The most recent surveys in the Gelibolu, Karaburun and Bozburun Peninsulas also point to the presence of a dense hunter-gatherer population with flaked-type of microlithic industry (Özbek & Erdoğan 2015; Çilingiroğlu et al. 2020; Atakuman et al. 2022).

The late 9th millennium cal. BC site of Girmeler is situated in the Eşen Valley on the Southwestern Anatolian coast. Girmeler consists of two caves with a mound in front. A small trench in the remaining base of the mound revealed probably an oval structure with a lime-plastered floor (Takaoglu et al. 2014). The lime-plastered floor included small particles of stones and was evidently renewed at least twice. Two postholes gouged into the plaster floor have also been noted. The structure appears to have had superstructures of wattle and daub. It also contains two circular sunken mud-plastered basins, hearths and a sunken rectangular feature. These features show the long term and regular use/reuse of the structure.

The chipped stone industry of the Girmeler Cave consists of flake-based technology (Erdoğan et al. 2021). Tools are rare and consist of end and circular scrapers on flakes, perforators, blades, and bladelets. Some blades have parallel lateral edges. No microliths were found at the site, but there are some sickle blades. The preliminary analysis of animal bones indicates that *Sus scrofa* (wild boar), *Capreolus capreolus* (roe deer), *Dama dama* (European fallow deer), *Capra aegagrus* (wild goat), *Caracal caracal* (caracal), *Vulpes vulpes* (red fox) and *Lepus europaeus* (European hare) were common at the site, indicating that hunting was part of the subsistence strategy of the settlers of the site (Erdoğan et al. 2021). Fish and birds were also consumed. Aurochs were not detected in the animal bone assemblage. Charred plant remains from the site were poorly preserved. Some of the grains belong to barley (*Hordeum* sp.), wheat (*Triticum* sp.) and feather grass (*Stipa* sp.). Glume bases of glume wheats are also present in the samples (Erdoğan et al. 2021). The presence of sickle blades may indicate harvest activities. Large grinding stones were also discovered.

The Aegean vs Central Anatolia and Cyprus

The 9th millennium cal. BC Aegean communities can be compared with the Anatolian Pre-Pottery Neolithic and Cypriot PPNA communities. All are characterized by a sedentary community engaged in intensive hunting (table 1). Comparisons between the Aegean, Central Anatolian, and Cypriot PPNA communities show that people lived in oval structures. Intramural/subfloor burial customs were practiced in both the Aegean and Central Anatolia. The term sedentism is used in many different ways and encompasses a range of settlement forms. For example, Higgs & Vita-Finzi (1972) defined *sedentary-cum-mobile* societies as ‘a mobile element associated with sedentary occupation’. The sedentism in Central Anatolia, Cyprus, and the Aegean refers to semi-sedentary or quasi-sedentary mobility patterns wherein macrobands at base camp settlements are annually inhabited by at least some members of the group, for example, the aged. It seems different types of environments show sedentism developing along quite different paths.

Archeozoological and botanical data suggest that the quest for food became more diversified. Subsistence at Central Anatolian sites was mostly dependent on the gathering of wild food resources and the hunting of animals (Baird 2012; Baird et. al. 2012; Özbasaran 2012). The Central Anatolian Pre-Pottery Neolithic and the Cypriot PPNA communities also practiced agriculture. The subsistence strategy of Girmeler is similar to the Pre-Pottery Neolithic Central Anatolia as well as the Cypriot PPNA, which was mostly dependent on the gathering of wild food resources and the hunting of animals. Glume wheats were also a real component of the subsistence strategy. The subsistence

The Aegean islands (Maroulas)	Central Anatolian Early PPN (Aşıklı, Boncuklu)	Cypriot PPNA (Asprokremnos, Klimonas)	The Aegean Western coast (Girmeler)
8800–8000 cal. BC	8500–8000 cal. BC	9000–8400 cal. BC	8200–7700 cal. BC
circular/oval buildings	circular/oval buildings	circular/oval buildings	circular/oval buildings
intramural/sub-floor burials	intramural/sub-floor burials		intramural/sub-floor burials
fishing–hunting–gathering	hunting–gathering	hunting–gathering	fishing–hunting–gathering
goat and pig managed	caprines managed		
	some domesticated cereals	some domesticated cereals	some domesticated cereals
flaked-type of industry	microlithics / projectile points	projectile points	flaked-type industry
sedentism	sedentism	sedentism	sedentism

Table 1. Comparative characteristics of Cypriot PPNA, Central Anatolian Pre-Pottery Neolithic, the Aegean Islands and the Aegean Western Coasts.

of the Aegean sites was mostly dependent on fishing, gathering and small game hunting. Geographical location seems to be the major determinant of diet. No domestic animals were present in all regions, but caprines were managed at Aşıklı Höyük and Boncuklu, pigs at Maroulas and goats in the Cyclope Cave.

The chipped stone industries of Central Anatolia and the Cypriot PPNA are different from those of the Aegean. The chipped stone industries of the Central Anatolian Pre-Pottery Neolithic were dominated by obsidian and characterized by microliths (Özbaşaran 2011). The chipped stone industry of Cyprus PPNA is characterized mainly by projectile points. Tools of the communities were probably intimately related to their natural environments (i.e. islands, plateaus etc.) and needs.

The new ancient DNA evidence

Although DNA studies on early Holocene human skeletons of Girmeler are still in their infancy, initial results show that the 9th millennium BC people at Girmeler possessed a very ancient gene comparable to the Central Anatolian Pınarbaşı Epipalaeolithic people.

The aDNA evidence showed that the earliest Girmeler people were the ancestors of the first Neolithic communities that started the Neolithic way of life in Western Anatolia and possibly spread to southwestern Europe. Again, the aDNA studies show that there was no mass migration to the Aegean from the Near East and especially from the Levant in the early Neolithic, ca. 7th millennium BC.¹ All these new data highlight the acculturation models in the transition to the Neolithic way of life in the Aegean.

Towards a new Aegean Neolithic

I agree with Tilley (2007) and others (e.g. Hodder 1990; Thomas 1999; Whittle 2003) that the start of the Neolithic in Europe was neither technological nor economic in character but a matter of changing ideologies of modes of thought mediated through material forms: ‘The Neolithic was a matter of mind over matter or circumstances, a triumph of the will, a new set of ideas’ (Tilley 2007, 329). The start of the Neolithic should be understood not as an economic adjustment, but as a cognitive transformation that redefined human self-awareness.

The 9th millennium cal. BC communities in the Aegean, Cyprus and Central Anatolia show roughly the same general trend. On the other hand, they have their own regional distinct features. It is clear that a number of traits traditionally associated with the Neolithic of Central Anatolia and Cyprus appeared in the 9th millennium cal. BC communities of the Aegean, including sedentism, burial customs, animal management and the use of plant foods (Girmeler). It should be considered that the transition to the Neolithic way of life in the Aegean followed the Younger Dryas, like it was in Anatolia and Cyprus. We may start to think about a Pre-Pottery Neolithic period in the Aegean.

¹ Mehmet Somel, NEOGENE Synthesis Workshop, 20/04/2022.

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BLACK IS ALWAYS IN FASHION: EARLY PRODUCTION OF DARK BURNISHED WARE IN THE NEOLITHIC OF UPPER THRACE

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Abstract

This paper aims to re-evaluate the diagnostic significance of the Dark Burnished Ware in the Thracian Early Neolithic (first half of the sixth millennium BC). It focuses on the dark surface burnished ware produced in the southeast of Thrace and particularly in the Middle Maritsa Valley. There is a noticeable difference between the dark surface ware produced in the different parts of Upper Thrace. In the west and north parts of the region, it is characterized by dark brown and dark grayish surfaces respectively, and by conservative non-painted decoration techniques. The assemblages in the Middle Maritsa Valley include mostly black and brown-black burnished ware in greater amounts compared to the rest of Upper Thrace. Multiple decoration techniques were used in the latter part of Thrace, some of which can be considered closely associated with the dark burnished ware. The dark burnished ware production in the Middle Maritsa Valley has been attested since the very beginning of the Neolithic in amounts close to, and later even greater than, the red slipped ware. The role of the Maritsa Valley as a communication route is of particular interest in regards to the origins and distribution of the dark burnished ware production, as it most probably facilitated the early contacts between Upper Thrace and the neighboring areas to the south and southeast.

Keywords: Early Neolithic – Dark Burnished Ware – pottery production – Upper Thrace – statistical analysis.

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Introduction

This paper is focused on the diagnostic significance of the Dark Burnished Ware (DBW) in the Early Neolithic of Upper Thrace (in Eastern Balkan terms, this period roughly corresponds to the first half of the sixth millennium cal BC). The subject of the

research is the dark surface burnished ware produced in the southeast of Thrace and particularly in the Middle Maritsa Valley. Several well-studied assemblages from the area demonstrate the dynamic processes that took place there. In this paper I will argue that the production of large amounts of DBW in the southern parts of Upper Thrace predates that in the northern parts, which in turn is an indication of the origins of this tradition and the direction of its transmission.

Early Neolithic material culture in the area has traditionally been labeled as the Karanovo I culture of which the Red Slipped Ware (RSW) and often white painted ware is considered the most diagnostic marker. The culture-historical approach views the development of this culture as a dynamic process, which includes several phenomena with a varying territorial and chronological range, with the Karanovo II culture, developing at some sites in Upper Thrace, while the rest continue more or less the production of the Karanovo I material culture. The dynamics of the development of the material culture during the Early Neolithic, as well as the many local variants and differences, demonstrate the need for a re-evaluation of the established culture-historical model.

No matter which of the neolithization theories we accept, it is certain that Upper Thrace was completely settled by farming communities in the beginning of the sixth millennium BC. At least for now, no proof has been found suggesting that the Maritsa River was used as a neolithization route during these initial phases. But, as it will become apparent, the significance of this river as a communication route became crucial as soon as the area had been settled.

The focus of this paper is one particular part of Upper Thrace, namely the southeastern part of the Middle Maritsa Valley (fig. 1), past the village of Skobeleva, up until the end of the midstream, near the modern border between Bulgaria and Turkey. In this area, the river takes a slight turn and flows from the northwest to the southeast. The surrounding slopes are higher and the river collects more water, running through a relatively narrow valley. The research in the area provides a relatively compact cluster of investigated Early Neolithic settlement sites, which permits some conclusions to be made regarding the characteristics of their assemblages, setting them apart from the rest of the assemblages in Upper Thrace. Considering some indirect evidence from the Arda River area, future research might well expand this region, in terms of regional specifications of the assemblages. Nevertheless, as far as the current research goes, this is the approximate area in which visible changes in what we consider to be the 'classic' ceramic repertoire of the Karanovo I culture occur, practically as soon as the area was settled. The earliest material recorded there gives a slightly different picture of the ceramic tradition from that in the rest of Upper Thrace. So far, the conclusions concerning the ceramic assemblages in the area were automatically transferred from the well-studied ones from the north and west parts of Upper Thrace, but the new evidence fills the gaps, and permits a re-evaluation of the specific local character of the Early Neolithic assemblages here. For convenience, further in the text I will refer to the described area

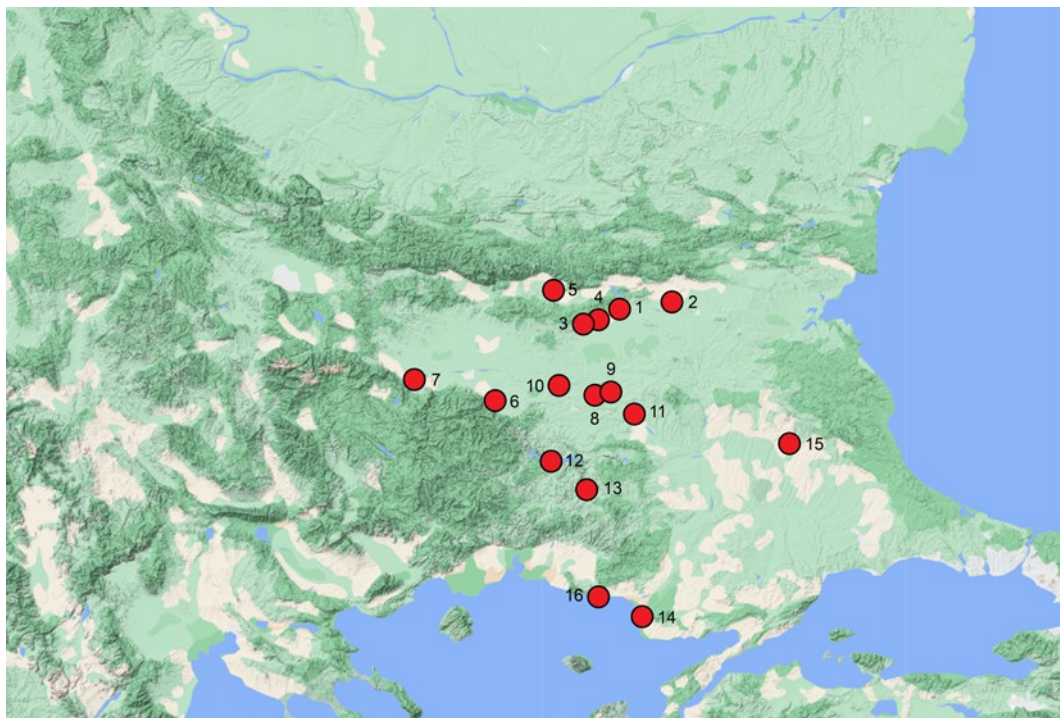


Figure 1. Map of Early Neolithic sites in Thrace, in order of appearance in the text: (1) Tell Karanovo; (2) Glufishevo; (3) Tell Okrazhna bolnitsa; (4) Tell Azmak; (5) Tell Kazanlak; (6) Muldava; (7) Tell Kapitan Dimitriev; (8) Nova Nadezhda; (9) Simeonovgrad; (10) Yabalkovo; (11) Tsiganova mogila; (12) Kardzhali; (13) Krumovgrad; (14) Hoca Çeşme; (15) Aşağı Pınar; (16) Makri. Image Credit: Google My Maps 2022 and the author.

simply as ‘The Middle Maritsa Valley’, even though the actual Middle Maritsa Valley includes a wider territory.

Dark Burnished Ware

DBW has been attested in all parts of Upper Thrace in different stages of the Early Neolithic, but there is a noticeable difference between DBW produced in the different parts of Upper Thrace according to evidence from the assemblages that were analyzed in-depth. In the west and north parts of the region, it is dominated by dark brown or grayish surfaces respectively. In both cases, the decoration is rather conservative and mostly consists of channeling. In contrast, the dark ware in the study area has predominantly black and dark grey-black surface, usually burnished or even polished. The paste is fine, usually thin-walled, with fine temper (fig. 2).

At Tell Karanovo, grey ceramic ware occurs in the Karanovo I and II layers. The surface is smoothed or well smoothed in the Karanovo I layer, and well or very well smoothed in the Karanovo II layer; in both cases it was left dull. Vessels with a slightly

polished surface appear in the Karanovo II layer. No slip has been identified (Nikolov 1997, 106f). The surface color varies in a relatively wide range of the dark gray spectrum, often with a shade of light brown, dark brown or black. Compared to the Karanovo I layer, the relative number of darker and gray surface sherds increases in the Karanovo II assemblage. Gray-black burnished ware has been identified for the first time in the final 'horizons' of the Karanovo II layer; in fact, it has specifically been pointed out that black



Figure 2. Dark Burnished Ware from Nova Nadezhda, variations of surface colors.
Image Credit: Nova Nadezhda Project.

burnished pottery did not appear at the tell site before the Late Neolithic (Nikolov 1997, 112, Tab. 6.1). My recent statistical analysis of a stratified sample from the ceramic assemblage confirmed these conclusions.

Ceramic assemblages from other sites in Upper Thrace, e.g., the flat site of Glufishevo and Tell Okrazhna bolnitsa in Stara Zagora, also demonstrate that red slipped and white painted ware production was discontinued in the later phase of the Early Neolithic, labeled as the Karanovo II culture (Nikolov 2004).

Authors have rarely discussed the number of DBW sherds; moreover, they have usually overlooked DBW in favor of RSW but one can safely assume that large numbers of fine DBW sherds would not go unnoticed. However, published evidence suggests that at these sites, fine DBW was rarely found, if found at all, prior to the 'Karanovo II culture' layers.

At Tell Azmak, the amount of DBW becomes noticeable only in the final stages of the Early Neolithic, but coexists with the red slipped and white painted ware; this was the reason for the earlier authors to label the Early Neolithic there as 'Azmak variant of the Karanovo I culture' (Georgiev 1965 & 1974). It seems that similar tendencies could be identified for the upper half of the Early Neolithic layer at Tell Kazanlak (Nikolov 1997, 142ff), even though DBW pottery there is commonly found later, in horizons X and IX, that were identified as belonging to the Protokaranovo III period (Andreeva 2021).

The evidence concerning the existence and amount of DBW in some assemblages (e.g., from Muldava) is inconclusive. This would make any statements regarding this type of ware uncertain and speculative. Some grey and darker sherds and vessels have been recorded at Muldava (Detev 1968), however the information remains insufficient.

DBW was found at Tell Kapitan Dimitriev in the western part of Upper Thrace, but was described as 'brown', 'grey-brown' or 'lighter grey-black', 'burnished or smoothed', 'unslipped ware'. The number of sherds belonging to this category, however, has not been discussed. Also, it seems that no distinction has been made between dark fine ware and dark semi-fine and coarse ware (Stefanova 1999). No information about an increase in the significance of DBW in the later stages of the Early Neolithic is available in the publications for sites in the western parts of Upper Thrace, but my recent statistical analysis of the ceramics from the 2002–2005 excavation at Tell Kapitan Dimitriev confirmed that DBW is dominated by the described surface colors. There are very few dark sherds (usually brown and grey-brown) in the earliest layers and their relative number, while slightly increasing in the later Early Neolithic layers, never exceeds that of RSW and never becomes a dominant trend in the local ceramic production.

However, this does not seem to be the case in the Middle Maritsa Valley where DBW has been identified in larger numbers, close to those of RSW in the early stages; in the later stages of occupation, DBW significance increases, its relative number exceeding RSW.

Dark Burnished Ware in the Middle Maritsa Valley

In order to understand the dynamics of Early Neolithic ceramic production in the Middle Maritsa Valley, I will use a comparative analysis between the fine ware groups in the area. In order to demonstrate the significance of DBW, however, it would suffice to compare RSW and DBW, which is why in this paper, I will not focus on the rare light surface fine ware.

As a result of multiple research projects and rescue excavations in the last couple of decades in the study area, new evidence was uncovered, which will allow the re-evaluation of the role of DBW in the region, as well as the role of the Middle Maritsa Valley in the following transmission of this tradition in Upper Thrace from the areas to the south and southeast, where the DBW tradition has been identified in earlier contexts.

A central position in this article is reserved for the site of Nova Nadezhda, because the whole ceramic assemblage has been investigated and statistically analyzed. Nova Nadezhda is located in the floodplain of the Middle Maritsa Valley and covers an area of more than 5 ha. It occupies a T1 terrace, approximately 300 m from the modern right bank of the Maritsa River. Rescue excavations were carried out in the north periphery of the site (North area) in 2013 and 2014. The Early Neolithic settlement was enclosed by five successive ditches, some of them with multiple recuts. The excavated area yielded ritual pits, the remains of two houses, several thermal installations and burials. (Bacvarov et al. 2014 & 2015; Bacvarov et al. 2016, fig. 2; Nikolova 2021) The project was relaunched in 2018 and is currently ongoing, with the excavation focused on the South area of the site (Bacvarov et al. 2019, fig. 1).

The following consideration of the pottery from Nova Nadezhda is based on the analysis of the complete Early Neolithic ceramic assemblage (more than 32,000 potsherds) from the North area,¹ as well as on my observations on material from the South area.

The most diagnostic feature of this category is the very dark color of the surface – black, brown-black or dark grey-black. It can easily be called Black Burnished Ware, instead of the more neutral label DBW, which would apply for Upper Thrace in general. At Nova Nadezhda, DBW always demonstrates carefully treated burnished or polished surfaces, usually with no visible traces from the smoothing tool (fig. 3). The fabric is visibly fine, with small amount of fine sand temper and occasionally finely cut chaff temper (Spataro et al. 2019, fig. 3.2, 3, 5, 6, 9, and 11).

The archaeometric analyses (Spataro et al. 2019) show that these ceramics were fired in a reducing atmosphere. It is possible that a smudging process (in which pottery was deliberately coated with a layer of fine soot, e.g., by adding green wood during the firing) was used to produce the glossy black burnished ware, but no evidence of a carbon layer was identified on the sherds' surfaces as it is usually difficult to detect carbon layers. Achieving the dark surface color by smudging has been identified in a study of assemblag-

¹ The bigger part of the assemblage was examined by the members of the excavation team in 2016 and the results were processed and analyzed by this author.

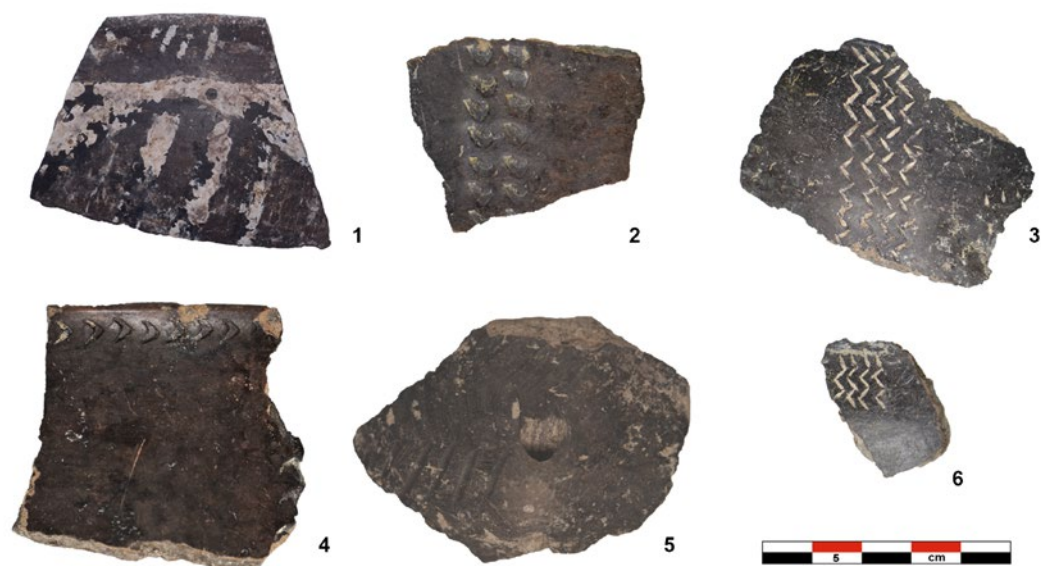


Figure 3. Dark Burnished Ware sherds from Nova Nadezhda, various decoration techniques. Image Credit: Nova Nadezhda Project.

es of a later date from other sites in Thrace, e.g., the late Neolithic pottery from Makri (Yiouni 1995). This technique could have been used earlier, but so far there is no evidence to confirm this.

A consideration of a large ceramic assemblage permits the use of a statistical analysis whose results can be regarded as fairly accurate. It is thus possible to get better insights into the significance of DBW in Nova Nadezhda.

Because of the specifics of the Early Neolithic deposits and the archaeological features in the North area of Nova Nadezhda (e.g., recuts of ditches), earlier material could be found in later contexts. This means that despite the relatively clear stratigraphic position of each feature, they have to be grouped together when considering the finds. Three main groups of features with varying informational value can be distinguished at Nova Nadezhda, supported by the stratigraphic evidence and the radiocarbon dates. The results therefore need to be carefully evaluated in order for the conclusions to be as accurate as possible. The published ^{14}C dates (Bacvarov et al. 2016, table 2) show that the Early Neolithic occupation at Nova Nadezhda spans almost the entire first half of the sixth millennium BC.

The earliest features include the innermost ditch, most of the pits and some other cuts, the latest being the remains of a residential structure. The next chronological group includes the ditches that truncated the latter features and that in turn had been disturbed by later ditches or were uncovered beneath later features. The ceramics from them should

be considered mixed and while they shouldn't be completely disregarded, their value within the statistics should be taken with a grain of salt. The latest group consists of features (a burnt house, ditches, etc.) that do not include earlier materials, or at least not enough to influence the results of the statistical analysis. The few sherds found in and around the burials were not included in the analysis, as they did not originally belong to these contexts, but have rather come from truncated features.

Chronologically, these three groups can be clearly distinguished and while the conclusions for the second group should be handled carefully, the earliest and latest features can be considered fairly 'clean'. Any comparison between them will thus yield accurate results. Even if we are to completely disregard the ceramics from the second group because of the high possibility of them being mixed, it would still be correct to compare quantitatively DBW with the other categories of fine ware, even though a large part of the material comes from ditches.

There is a considerable amount of DBW in the early features, representing approximately 32% of all fine ware and approximately 3:5 ratio compared to RSW. Its significance within the assemblage grows to quantities greater than those of RSW in the later features, becoming the dominant trait of the fine ware or around 45% of all fine ware, with approximately 4:3 ratio compared to RSW (fig. 4).

This would suggest that the later stages of occupation at Nova Nadezhda could have been contemporary to the Karanovo II layer at the eponymous tell site, as well as to the deposits of the 'Karanovo II culture' at Glufishevo and Tell Okrazhna bolnitsa (Nikolov 2011), and to the upper Early Neolithic layers at Tell Azmak. Even though the relative amount of DBW in the earlier layers at the latter site is unclear, it could not

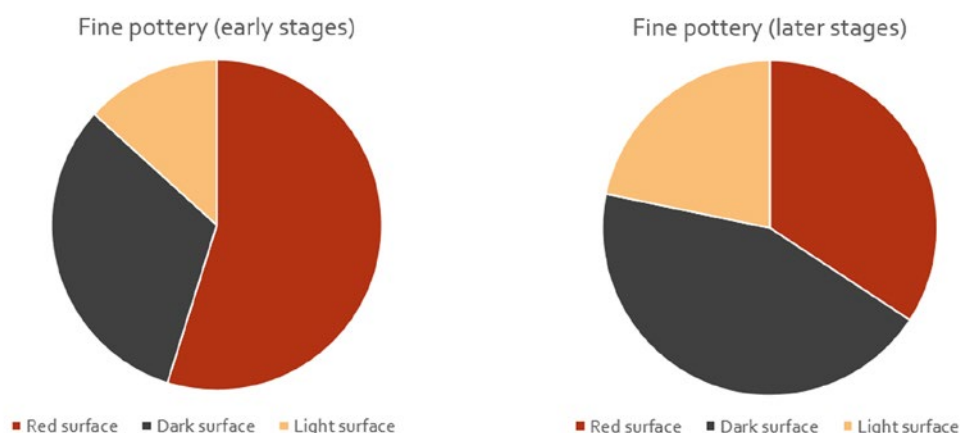


Figure 4. Fine ware from Nova Nadezhda: amounts of dark, red and light ware in the early stages of occupation (left), and in the late stages of occupation (right). Image Credit: A. Tsurev.

have been very different from that of layer I at Tell Karanovo, as the similarities between these two assemblages have been emphasized numerous times. This would mean that the DBW production in the Middle Maritsa Valley predates that in the rest of Upper Thrace. When DBW became the dominating trait of the ceramic production, we see changes to the north as well.

More evidence regarding this ware comes from other excavated sites in the Middle Maritsa Valley. Simeonovgrad (A.K.A. Chavdarova cheshma) is one of the closest sites to Nova Nadezhda being located ca. 8 km downstream, on the right bank of the Maritsa River. It was excavated in 1968 (Aladzhov 1985) and later between 1978 and 1982 (Raduncheva 1996 & 2002). Any resemblance between the pottery assemblages of both sites in this case should not surprise, considering the proximity of the two settlements. Only a small part of the ceramic assemblage from Simeonovgrad has been preserved at Haskovo Regional Museum of History. The scarce contextual information about the ceramics from the site does not permit any other inferences than the general characteristics of the assemblage. The preserved material includes mostly walls from red slipped and white painted ware but there are more than a few DBW sherds as well.¹ Notwithstanding that there was an obvious tendency for excavators and museum curators in the past to preserve even smaller white painted sherds at the expense of any other fine ceramics, about a quarter of the preserved batch were DBW, including some partially preserved vessels (fig. 5).

The flat site of Yabalkovo is located ca. 30 km upstream from Nova Nadezhda, on the right bank of the Maritsa River. Large scale rescue excavations took place there between 2000 and 2012. Excavation results and materials have been published in multiple articles and a monograph (Roodenberg et al. 2014). There are many similarities between Nova Nadezhda and Yabalkovo – including but not limited to the enclosure ditches and the site's location – and this makes a particularly important case for comparison between their ceramic assemblages. The preliminary analyses of the Yabalkovo assemblage (cf. Leshtakov 2014) shows that it includes the DBW category, with similar characteristics to Nova Nadezhda and Simeonovgrad. It is worth noting that a small percentage of pottery has been reported as having black slip (Leshtakov 2014). Although identified only macroscopically, it is possible that such cases exist elsewhere as well, even though slip layers are very hard to register that way, and self-slip does sometimes leave the surface layer looking like slip (Spataro et al. 2019).

Tsiganova mogila is another site in the Middle Maritsa Valley; a single test trench was excavated there while clearing and recording an exposed profile at the periphery of the tell site (Leshtakov 1997). Published information confirms the presence of DBW in the ceramic assemblage, with similar characteristics to what has so far been established in the area (Stefanova 1997).

¹ Some sherds and pots from the site have been published and discussed by various authors (cf. Nikolov 2002). In 2021, I investigated the ceramics preserved at Haskovo Regional Museum of History and in this paper I use the results from the analysis.

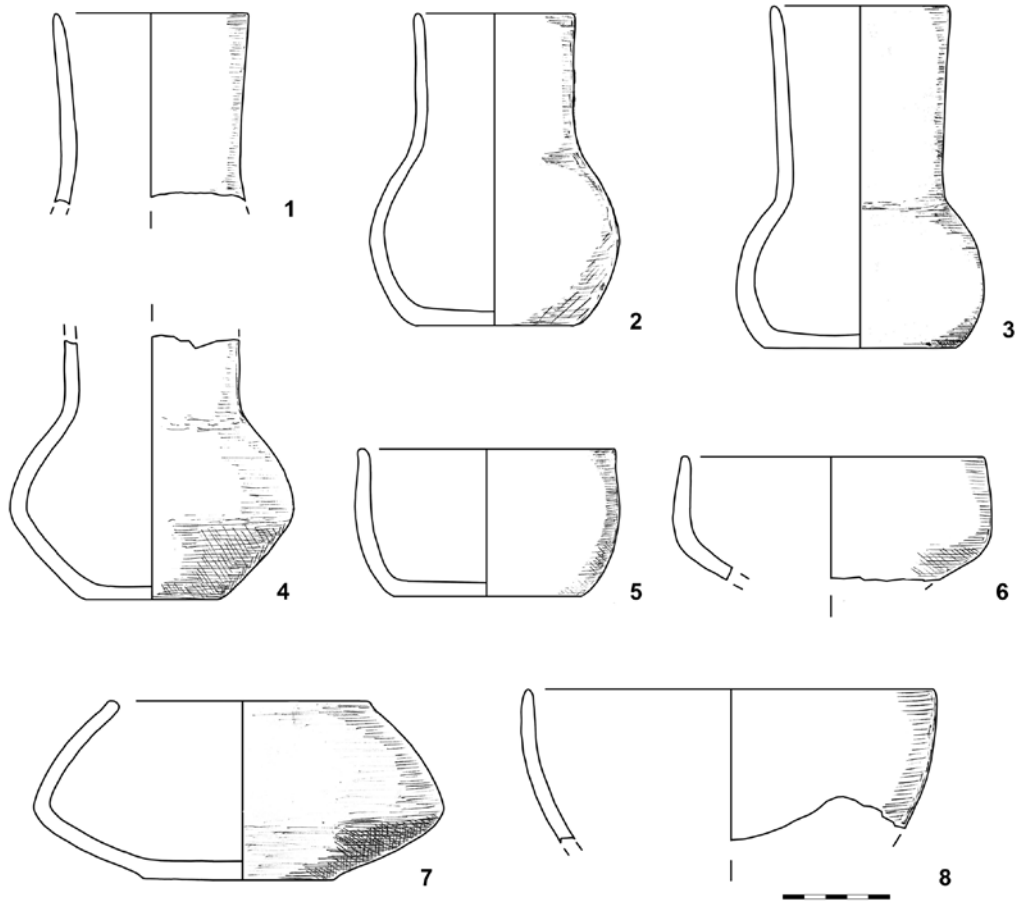


Figure 5. Dark Burnished Ware from Simeonovgrad. Image Credit: A. Tsurev.

The Early Neolithic sites of Kardzhali and Krumovgrad are located near the Arda River, one of the major tributaries of the Maritsa. Excavations there were carried out around the middle and second half of the twentieth century (Peykov 1978; Kanchev & Chohadzhiev 1994), and most of the material has not been preserved. The remaining sherds at Kardzhali Regional Museum of History as well as photos in the archives of the National Institute of Archaeology and Museum of the Bulgarian Academy of Sciences clearly show the presence of DBW in the assemblages of these sites (figs. 6 and 7.22–23).¹ The presence of DBW suggests that the early distribution of this ceramic category was not restricted to the Middle Maritsa Valley in Upper Thrace, but included at least some of the tributaries of the Maritsa.

¹ Fig. 6.2 (up) shows light ware sherds for comparison.



Figure 6. *Dark Burnished Ware from Krumovgrad, not to scale. Negative No: (1) 78-1228; (2) 78-1232; (3) 78-1233; (4) 78-1279; (5) 78-1284; (6) 78-1255; (7) 78-1274. Image Credit: The Photo Archives of the National Archaeological Institute and Museum of the Bulgarian Academy of Sciences. Author R. Staneva, 1978.*

The DBW decoration techniques identified in the ceramic assemblages in the Middle Maritsa Valley demonstrate a great variety, including channeling, both narrow and wide, incisions, stabbing, impressions or combinations of two of these as well as painted decoration in single cases. It is important to say, however, that DBW is relatively rarely decorated at all, compared to RSW. These decoration techniques are not exclusive to DBW, but a definite preference for them was identified (fig. 7). This is especially well demonstrated at Tsiganova Mogila; despite the very small excavation area, a large number of sherds with incised and punctate decoration was found, many of them dark burnished (Stefanova 1997, fig. 12).

There are rare examples of decoration techniques that are common for DBW to be used on RSW and vice versa, the most notable examples being the painted decoration on certain DBW sherds, or channeling that is not uncommonly found on RSW. This practice has been discussed before for the site of Yabalkovo (Leshtakov 2004), and was identified at Kardzhali, Simeonovgrad and other sites in Upper Thrace that are not located in the Middle Maritsa Valley. The example from Nova Nadezhda in Figure 8 is decorated with a combination of white paint and channeling; it was until recently unique, but more cases have been found in the past few years. The implications of these interchangeable decorations are numerous, considering the coexistence of these different traditions in the same area; the dominant role of one or the other can demonstrate different trends and influences, movements of people and ideas in both directions along the Maritsa River, and fluid changes in the overall ceramic style in the area and eventually the whole region, to name a few.

The formal analysis shows another similar tendency (figs. 9 and 10). The DBW repertoire is dominated by cylindrical bowls, spherical bowls (sometimes with a rounded carination) and spherical pots with tall and narrow necks (also referred to as 'bottles'; cf. Leshtakov 2014). However, this does not mean they are exclusive to the category, but rather are rarely associated with any other group. The same could be said about RSW, which includes predominantly tulip beakers, short necked spherical bowls and fine conical bowls (dark surface conical bowls are also common but they usually belong to the semi-fine ware). At Nova Nadezhda, the production of dark burnished pots whose shapes are usually associated with RSW is more common than the other way around. It is also noteworthy that this relationship between form and ware is much stronger for the earlier features, while for the later features, such distinctions are blurred and the same shapes were more often produced in different wares. It is thus reasonable to assume, and I am certainly tempted to do so, that the DBW and RSW production in the area is indicative of the coexistence of two separate ceramic traditions, and that it resulted in the two groups occasionally adopting each other's decoration and shapes.

The radiocarbon dates from the area that correspond to the material described above, demonstrate a relatively long development of the assemblages. The published dates from Nova Nadezhda (Bacvarov et al. 2016, table 2) from one of the features as

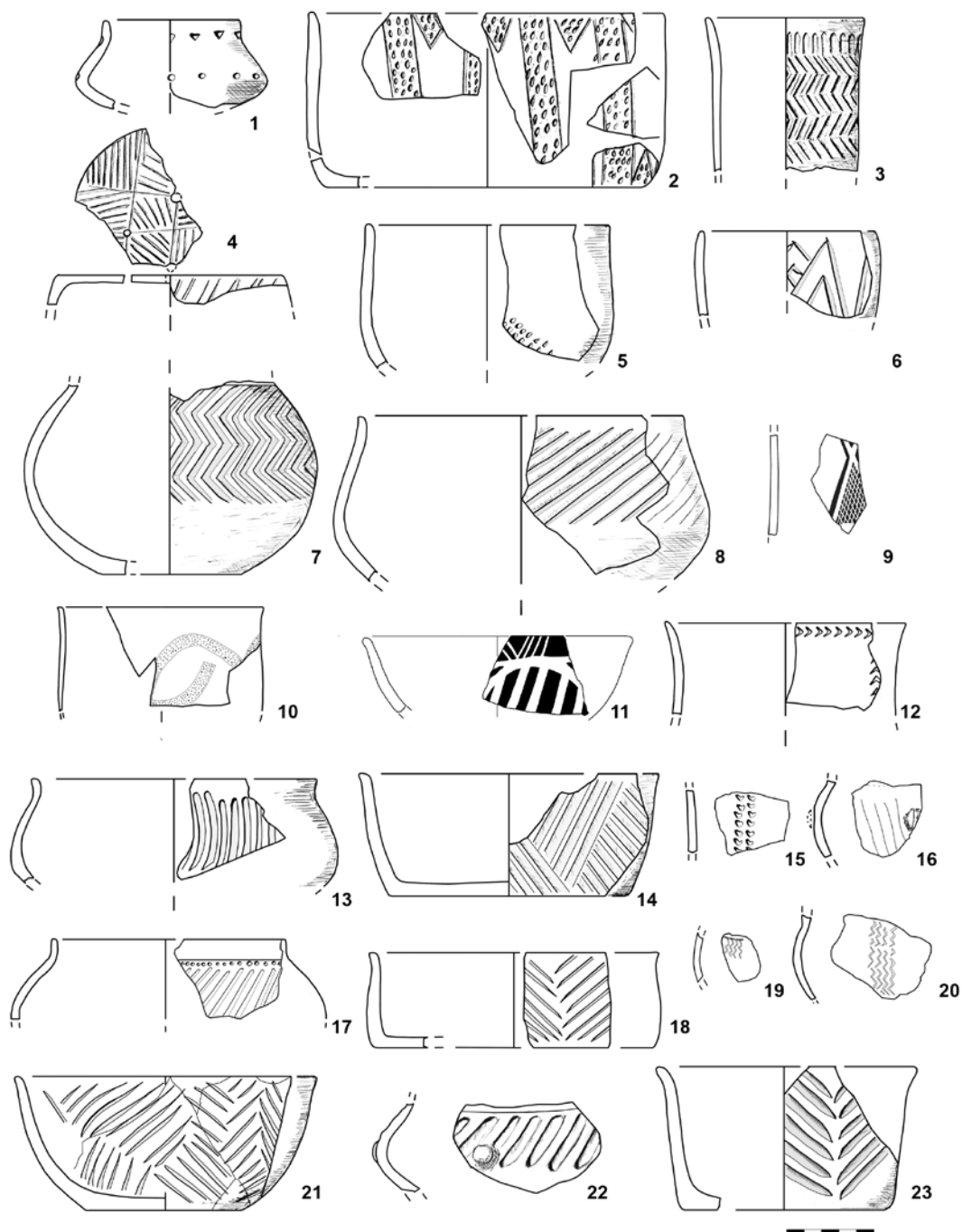


Figure 7. Dark Burnished Ware, various decoration techniques: (1–21) Nova Nadezhda; (22 and 23) Kardzhali. Image Credit: Nova Nadezhda Project and A. Tsurev.

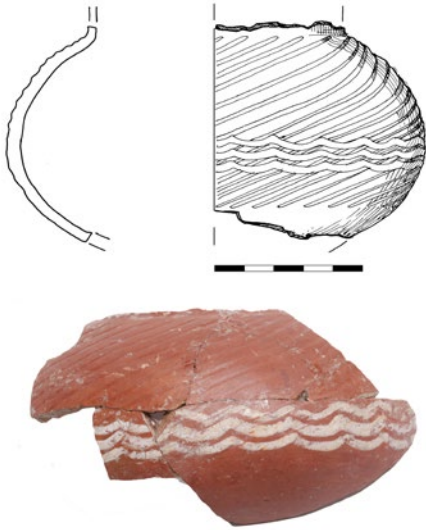


Figure 8. Red Slipped Ware with channeled and painted decoration from Nova Nadezhda. Image Credit: Nova Nadezhda Project.

well as some of the burial contexts show the time span of the three major phases of one of the ditches and the slightly later dates of the burials. A series of thirty-seven radiocarbon dates is available for the North area of Nova Nadezhda; it reveals a sequence spanning the whole first half of the sixth millennium BC, with the mentioned groups of features forming clusters of dates, spanning roughly between ca. 6000–5850 cal BC for the first group; a wider range for the second group, partially overlapping the earlier one because of the mixed materials (c. 5900–5750 cal BC), and roughly between c. 5750–5600 cal BC for the final group of features (Nikolova 2022, tabl. III–47).¹ The available radiocarbon dates for Yabalkovo (Roodenberg 2014, fig. 2) confirm more or less the same time span. No other radiocarbon dates are available for the sites in the area.

Comparing this with the chronology adopted to the north and west parts of Upper Thrace (Nikolov 2011), the beginning of the Neolithic development in the Middle Maritsa Valley coincides with the ‘classic Karanovo I phase’, and its later stages are contemporary to the later development of the Azmak variant and with Karanovo II phase.

Discussion

I will not discuss the possible origins of the DBW tradition in detail here, as they have been discussed previously with references to Hoca Çeşme, and Aşağı Pınar and sites in the Marmara region where dark ware has been found in contexts earlier than or contemporary to the ones discussed above. The amounts of this ware also seem to be comparable to the ones at the sites in the Middle Maritsa Valley or greater than them, and

¹ The radiocarbon dates from the burials are not included, since no pottery can be attributed to them.

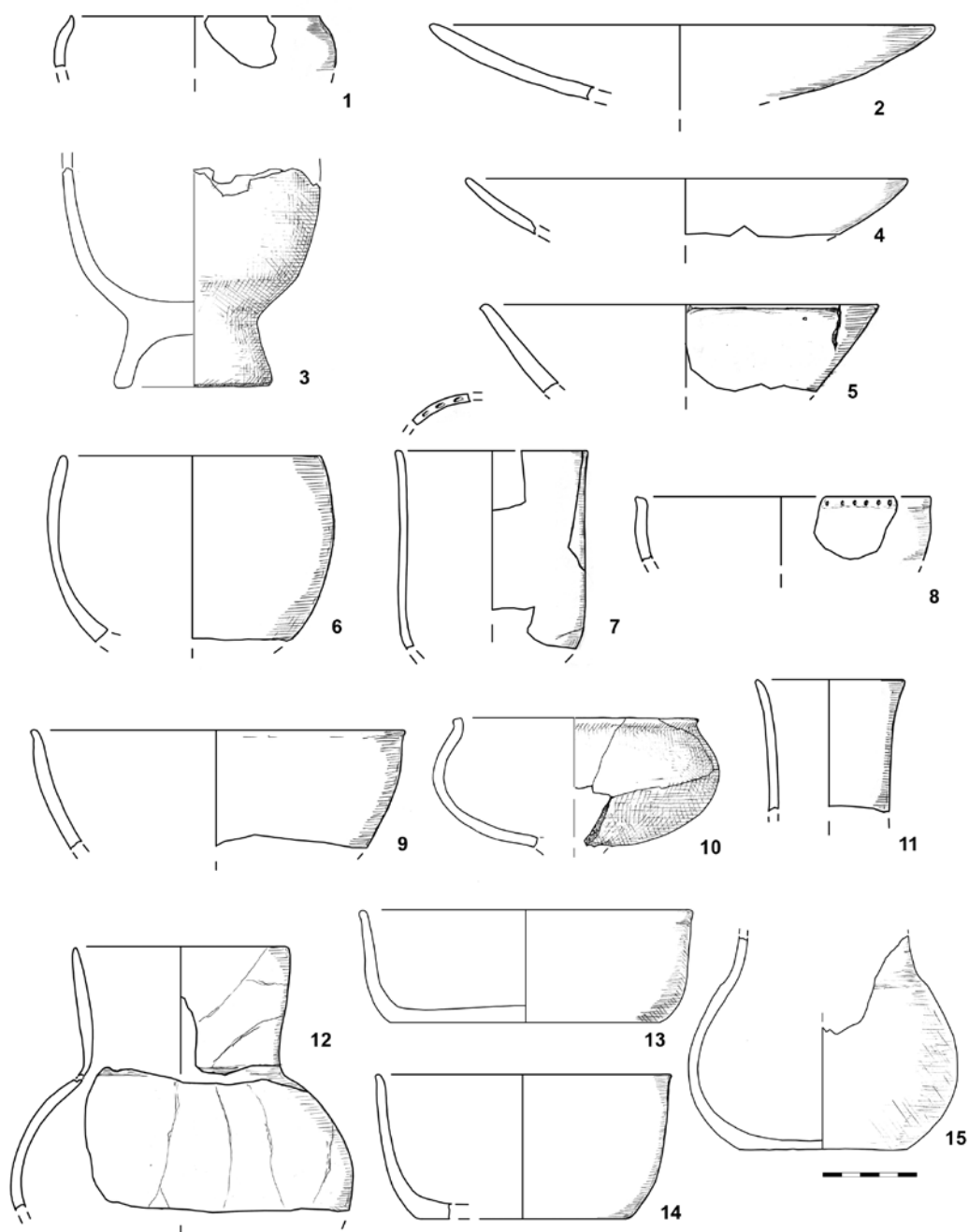


Figure 9. Dark Burnished Ware from Nova Nadezhda, common shapes: (1–11) Early features in the North area; (12–15) dark burnished ware from the South area. Image Credit: Nova Nadezhda Project.

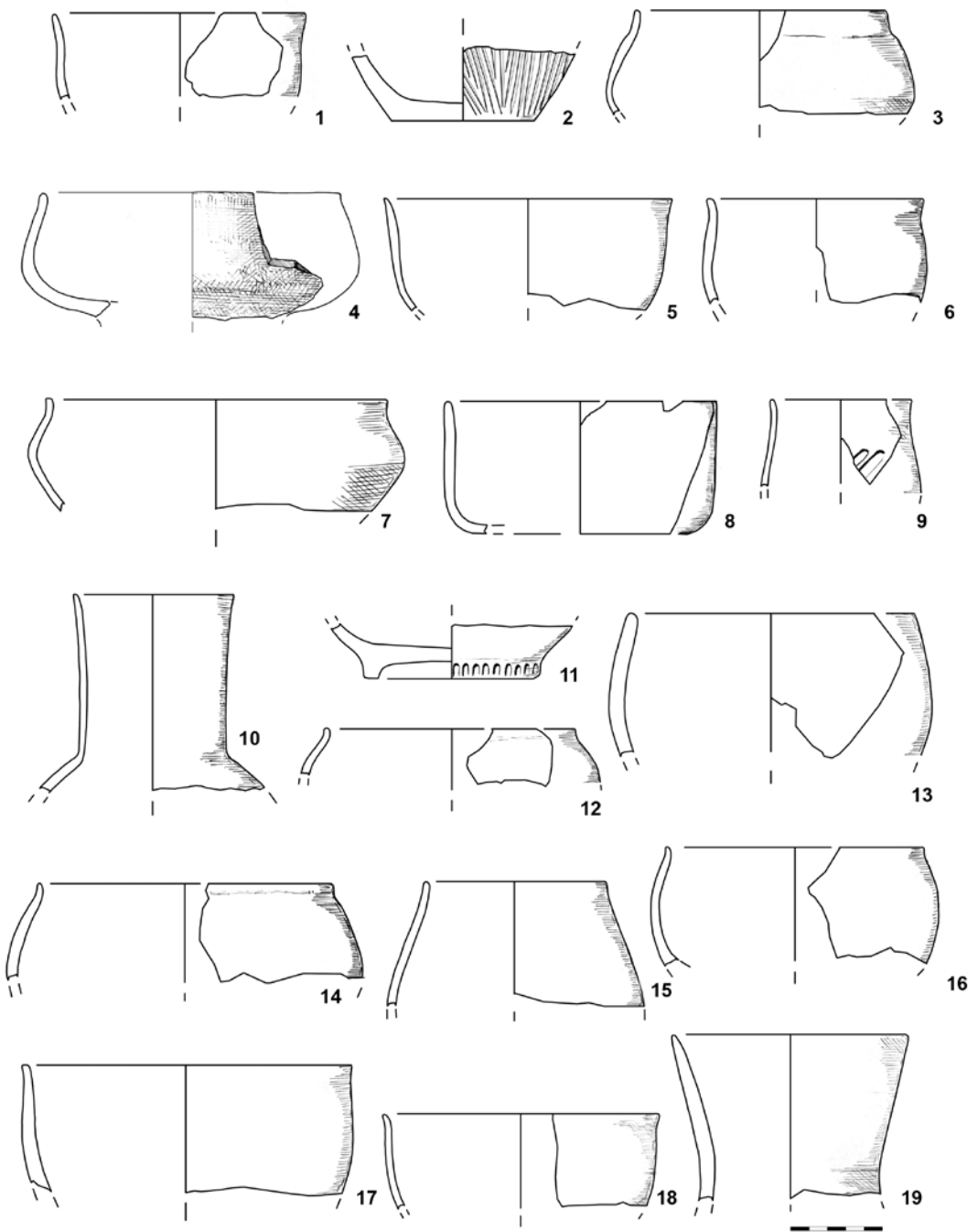


Figure 10. Dark Burnished Ware from Nova Nadezhda, common shapes, later features in the North area. Image Credit: Nova Nadezhda Project.

the decoration techniques in these assemblages correspond almost completely (Nikolov 1998; Leshtakov 2004; Özdoğan 2013 & 2016).

Some similarities identified at Makri on the Aegean coast of Thrace are particularly interesting and have been rarely discussed before, so I would like to emphasize them here. The early sixth millennium BC occupation of the Aegean coast of Thrace has been investigated in the recent decades (Ammerman et al. 2008). Recent projects in the area, especially MAPFARM (cf. Urem-Kotsou et al., this volume), have been very successful, with more and more Neolithic sites being recorded.

The evidence from the earlier layers at Makri (I) suggests that ceramics from this site, contemporaneous with the Early Neolithic assemblages from the Middle Maritsa Valley as it is, includes mostly dark pottery, and RSW and white painted decoration appeared only occasionally. The radiocarbon dates from Makri (Reingruber 2016) suggest that the middle Neolithic layers of the site chronologically overlap with Nova Nadezhda and Yabalkovo, but in regards to pottery production technology, the Karanovo I influence there is (almost) neglectable. The complete shapes and the sherds that have been published from the site (Efstratiou et al. 1998, fig. 31; Efstratiou & Urem-Kotsos 2006, fig. 5), also closely resemble DBW in the Middle Maritsa Valley.

What seems important to note here is that the evidence does not suggest the replacement of a ceramic tradition with another one, but instead demonstrates mutual infiltration of ceramic innovations with varying intensity. How the DBW tradition might have arrived in Thrace is a subject to further research. The intensifying excavation projects in the area are definitely a promising beginning.

The currently established model suggests that the appearance of the dark burnished pottery tradition should be related to the disappearance of the red surface and white painted ware in some parts of Thrace, corresponding to the Karanovo II layer at the eponymous site. This occurrence is attributed to the expansion of the so-called Circumpontic zone, carrying the tradition of DBW and replacing the existing tradition in the mentioned area of Thrace (Nikolov 1998). Elsewhere the production of red surface painted ware continued until the end of the Early Neolithic, with the amounts of DBW increasing (e.g., Tell Azmak). Whether or not the described early appearance of DBW in this particular part of Thrace could be considered an earlier expansion of this zone, or merely the first sign of it, is up for discussion. Could we consider this an expansion in the cases where RSW was not replaced, but rather the two traditions coexisted? It seems apparent that the process started earlier than previously thought, but was only clearly seen in the Karanovo II layer, because of the disappearance of the previously dominant pottery tradition.

Early radiocarbon dates and early stratigraphic features with an abundance of dark burnished pottery existing simultaneously with red surface pottery suggest that DBW made its way into Upper Thrace much earlier than previously thought. DBW coexisted with RSW since the beginning of the occupation of the area and it is obvious in this case that the spread of dark ware did not result in the disappearance of either the red

surface pottery or the white painted tradition. Perhaps the reason for the Karanovo II phenomenon should be sought elsewhere and not simply in the arrival of a new pottery tradition. Interchanging shapes and decoration techniques between the different groups of fine ware, assuming they have completely different origins, show the intertwining of these traditions in this particular area very early on, suggesting contacts between the Early Neolithic communities and maybe even two-way migrations.

Conclusion

The evidence presented here shows that as soon as Upper Thrace was settled, the Maritsa River started functioning as a major communication route, although this might not have been the case during the initial settlement phase. In a way, the new arrivals in Thrace closed the circle back to the Aegean and Marmara regions and opened this route for the influence and maybe even the movement of groups of people from and to the south and southeast, where the DBW tradition seems to have had deeper roots, resulting in the appearance of a specific mixed local pottery tradition that most probably later influenced the rest of Thrace. The changes that occurred during the third occupational phase at Hoca Çeşme (Nikolov 2011), for example, could suggest the same mutual infiltration.

Although there is insufficient evidence regarding the existence and quantity of DBW in the early stages of the Early Neolithic of Upper Thrace, as I said, it can be safely assumed that a mass production of this fine ware category would not go unnoticed by researchers. This means that we are presented with a relatively well-defined sub-region of Upper Thrace where DBW seems to have been produced in great quantity very early on. The origins of the technological know-how that was needed to achieve this is outside the 'Karanovo I culture area' and it probably arrived in Thrace as a result of social interaction between different farming groups. The role of the Maritsa Valley as a communication route should be recognized, especially in regards to the origins and distribution of the DBW production, as it most probably facilitated the early contacts between Upper Thrace and the neighboring areas to the south where the DBW production tradition seems to have originated. As to why certain ceramic assemblages followed a very different pattern of development throughout the Early Neolithic and why the characteristics of this ware vary between settlements, I believe the answer lies not with the proximity of these settlements to each other, but rather with stronger connections (economic, ancestral etc.). Proximity does not always guarantee close similarity, which is visible in other aspects of the material culture and the pottery in particular. But proximity does permit the 'physical' distribution of a new technology, while the further we go, the more likely it is that only the idea was passed along, instead of the know-how itself. This might explain the varying success in achieving truly dark black surface color at different settlements across Thrace in the Early Neolithic.

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SHOULD WE CONSIDER DITCH ENCLOSURES AS AN ELEMENT OF THE NEOLITHIC PACKAGE?

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Abstract

The article presents the earliest Neolithic ditch enclosures that have been registered throughout the Near East and the Balkans. The history of research indicates gaps both in the publishing state of the ditches and the analyzing strategies. All this restricts the in-depth study of this phenomenon and results in tentative conclusions. The time and space distribution of the known so-far ditches helps however for the distinguishing of some regional patterns and/or interregional similarities. It appears that the ditch-digging practice existed since the time of the Pre-Pottery Neolithic (PPN) in the Fertile Crescent. There, single ditches were combined with stone walls. Around the mid-seventh millennium BC, ditches occurred sporadically in Western Anatolia and probably in Northern Greece. At the turn of the sixth millennium BC, ditch enclosures became a common feature for the architectural organization of settlements in the regions of Marmara, Thessaly, Macedonia, Thrace, the southeast parts of the Central Balkans, as well as in the Southern Caucasus. They differ significantly from the PPN enclosures, which suggests that the idea of their construction evolved in the course of time. The Early Neolithic enclosures in Thrace, for example, display elaborate circular or oval layout of multiple ditches where rich depositional activities have taken place.

If we are to assume that the ditch-digging practice originated in the PPN of the Levant and Mesopotamia, then its distribution should have been associated with the Neolithic dispersal westwards of the core area of formation. The final part of the paper is dedicated to the ambiguous concept of the Neolithic package, with a discussion on whether ditch enclosures can be considered as part of the assemblage.

Keywords: Early Neolithic – ditch enclosures – Neolithic package – Balkans – Anatolia.

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Introduction

The Neolithic way of life – its origin, development and establishment both in Anatolia and the Balkans – has been the subject of ongoing interest and debates ever since the

beginning of prehistoric studies in said regions. The various aspects associated with this new lifestyle, such as an agricultural economy, sedentism, pottery production, different toolkits, religious beliefs etc., are all embodied in the well-known term ‘Neolithic package’. Its ever-changing concept in spatio-temporal terms, and its content for that matter, provides a background for the dynamic processes of tradition, adoption, adaptation and acculturation that the first farmers underwent at one time or place or another.

Researchers have invested a lot of time in studying the diverse nature of the first Neolithic societies, and yet we are challenged with every new discovery. A good example for the latter is the phenomenon of ditch enclosures whose number increased sharply in the past decade, in the territories of South Bulgaria, North Greece, North Macedonia and Northwest Turkey. The ditches and their nature are a live topic in these neighboring areas, puzzling archaeologists with questions mostly regarding their purpose. And although enclosures are a relatively new aspect of the Neolithic in the Balkans, they have been thoroughly studied in the Central and Western European prehistory. Thus, some of the already well-established interpretative models have been adopted from the West. Most modern opinions reject the defensive function of ditch enclosures in favor of their symbolic and/or ritual character. Interpreting enclosures is beyond the scope of this study; the focus here is rather on ditches from the initial Neolithic stages found both in the primary and subsequent core areas of neolithization. Following the steps of their occurrence and distribution across Anatolia and the Balkans might be the path to identify enclosures as a long-term tradition or a new fashion for the respective regions.

Ditch enclosures in the early Neolithic stages

History of research and research problems

Ditch enclosures in the two regions of interest here – the Balkans and Anatolia – have been recorded mostly during the last two decades. This does not reflect the state of Neolithic research in the Balkans; a great part of the peninsula has been extensively studied throughout the past century, especially to the south and east. The reason behind the recent ‘boom’ of ditch appearances, apart from large-scale excavations and application of geomagnetic prospection, are the research strategies of the time. Settlement mounds with their thick deposits and residential facilities were mainly selected for excavations in the past. Less attention has been paid to the periphery of the sites where enclosures of various type could be identified. Fewer than ten Early Neolithic¹ (EN) ditches were known until the end of the twentieth century. Examples come from Thessaly (Soufli Magoula and Achilleion), Greek Macedonia (Nea Nikomedeia, Servia, and Giannitsa B), the Middle Struma Valley (Kovačevo), and the Lower Danube (Cârcea); however, only small sections of the mentioned ditches have been revealed (Theocharis 1973; Gimbutas et al. 1989;

¹ EN here refers to this period in Balkan terms; according to the periodization in Northern Greece, it includes the Initial, Early and the beginning of the Middle Neolithic. In chronological terms, this is the time from the middle/end of the seventh to the mid-sixth millennium BC.

Hurtley 1939, 43ff; Mould & Wardle 2000, 33; Pyke & Yiouni 1996; Chrysostómu & Chrysostómu 1993; Lichardus-Itten et al. 2002, 115f; Nica 1977). At the time, it was considered that such enclosures must have been built for defensive or drainage purposes (Andreou et al. 1996, 553ff; Demoule & Perles 1993, 370; Jacobsen 1981, 314; Perlès 2001, 175; Lazarovici 1990; Todorova & Vajsov 1986; Raduncheva 1992).

The Neolithic¹ research in Anatolia, the Levant, Mesopotamia, and the Zagros region developed differently in terms of timing, intensity and methodology. In the 1950s and 1960s, excavations were concentrated in the Southern Levant, North Mesopotamia (south of East Taurus) and partially at the Central Plateau. It was during the late 1980s when more systematic research began in Western and Northwestern Anatolia which increased in the twenty-first century (Karul 2022, 231ff; Özdoğan 2022, 6ff). Ever since the archaeological map of Turkey and the neighboring areas is being constantly expanded. Most of the ditches known so far are situated exactly in the northwestern part of Anatolia (mainly in the Marmara area), as well as in the Southern Caucasus; thus, they have been discovered in the last 20 years. Only three examples have been recorded earlier during the second half of the past century and it is worth noting that all are of different geographical and chronological position. These are from: the PPNA level of Tell es-Sultan in the Southern Levant (Kenyon 1957); the PPNB/C (?) period of Kalavassos-Tenta in Cyprus (Todd 1982 & 2001); and most probably from the archaic Fikirtepe phase at Pendik, south of Istanbul (Harmankaya 1983; Özdoğan 1983 & 2013). The PPN ditches have been interpreted as elements of fortification systems as both are combined with stone perimeter walls.

As I have already highlighted, the beginning of the new century came with the wide recognition of ditch enclosures. We are now aware of more than 100 EN (including PPN) ditches at about 50 sites, which cover the timespan roughly between the tenth/ninth and the mid-sixth millennium BC (fig. 1). Regardless of the considerable database of ditch sites, they are rarely and only partially published, often in dig reports. The most common information concerns dimensions and sometimes layout along with relative chronology and/or stratigraphic data. Usually, the chronology of the features is provisionally stated within broad timeframes (e.g., EN or Early/Middle Neolithic, and even just Neolithic). My intention here is not to criticize the excavators as most of the ditches have been revealed during rescue projects and thus the chronology of the sites is yet to be clarified. Although some of the ditches have been radiocarbon dated using bone/grain/charred wood samples from their backfills, the ¹⁴C dates from ditches are of tentative reliability. When dating such samples, one must be aware that a ditch fill was formed as the result of various processes including secondary interventions, and mixing of data shouldn't be ignored. Hence, materials of an earlier age may end up in the lower layers of the fill and vice versa. Generally, the samples are obtained as close to the ditches' bottoms as possible

¹ All stages of the Neolithic and the Early Chalcolithic according to the Anatolian periodization scheme.



*Figure 1. Map showing the distribution of the earliest ditches in the study area.
Image Credit: Microsoft Encarta 2009 and N. Nikolova.*

so their initial phase of use could be determined. When it's possible to rule out the mixed character of a fill, such a date should be considered as a *terminus ante quem* for the digging of the ditch. And in theory, the *terminus post quem* for the abandonment or the end of a ditch's functioning should be a date derived from the uppermost layer of the fill. Ideally, dates from the bottom and top fill layers should display the lifespan of a ditch. Ditches that have been dated in the described manner are still rare examples. At the same time, when ditch fills have been dated, the particular dates are published mostly in calibrated BC years and not as raw radiocarbon BP dates. This presents an obstacle when trying to pinpoint the exact time of a ditches' existence. Accordingly, this does not allow a precise comparative analysis of the enclosures' chronological aspects.

In relation to the publishing state of ditches is the lack or the scarce information about the content of their backfills, i.e., sediment characteristics, finds including ceramic sherds and various objects, faunal and plant remains, etc. With few exceptions, the data regarding different depositional practices associated with the ditches is nearly absent. Moreover, the phases of ditches' use and their maintenance activities – such as cleanings and repairs – are rarely discussed. Topics about digging the ditches including methods and techniques, used tools, strategies and labor organization are yet to be explored. Such re-

search problems and gaps in publications restrict the in-depth characterization and above all the interpretation of the specific ditches and ditch enclosures as a phenomenon.

Time and space distribution

The available evidence allows the identification of more than 100 ditches across the Balkans, Anatolia, the South Caucasus, the Levant, and North Mesopotamia. For the most part, they are considered to be of an EN age, including the PPN in the Near East and the Early Chalcolithic in Anatolia. In respect to the timespan, the EN extends to the mid-sixth millennium BC in some regions of the Balkans (e.g., Thrace, the Struma River Valley, and the Lower Danube). Here I will briefly present the spatio-temporal distribution of the ditches as their general description follows in the text. There might be more examples not listed here, as it is not the purpose of the article to present a detailed catalogue of the ditches, but rather the most and best studied sites have been considered for this review.

(1) *Northern Mesopotamia, the Levant, and Southeast and Central Anatolia.* The evidence of ditches in this area – considered as the primary core area of Neolithic formation (Özdoğan 2022, 11) – is scarce (fig. 2.1–3). The earliest ditch is found in the western part of Tell es-Sultan and is associated with its PPNA level (Kenyon 1957, 67ff). A stone wall runs parallel to the ditch's inner side. Later, during the PPNB level of the mound, a new and more massive stone wall replaced the former 'fortification enclosure' as interpreted by Kathleen Kenyon. Another ditch comes from the site of Mezraa-Teleilat in the Upper Euphrates Basin (Özdoğan, E. 2010; Özdoğan et al. 2011, 49, 62, fig. 21). A deep cut interpreted as a ditch was excavated within a test trench in the western periphery of the mound. It might have been associated with a stone wall uncovered in another test trench. The exact time of the use of the ditch has not been clarified but an interval between the PPNB and the early Ceramic Neolithic has been proposed. Another stone wall and a ditch outside of it was revealed at the site of Kalavassos-Tenta in Cyprus (Todd 1982, 46). The fortification system bounds the settlement to the south and probably to the southwest and southeast. The dating of the ditch is debatable but either the PPNB or the beginning of PPNC has been suggested.

(2) *The Southern Caucasus.* A cluster of ditch enclosures is situated along the Kura River Valley in Georgia and Azerbaijan, mostly at the right bank of the river's middle course (fig. 2.4–9). The sites are both tells and flat settlements. They belong to the Shulaveri-Shomu/Šulaveri-Šomutepe cultural group and date to the first half of the sixth millennium BC (Hamon 2008; Hansen et al. 2013). There are at least six sites at which single enclosures or two to fourteen non-contemporaneous ditches were identified. Most ditches were excavated over a short length and/or within narrow trenches; therefore, published information is limited. The ditches are thought to have partially or, less commonly, completely enclosed the settlement area and existed for a relatively short time (Ioseliani 2017). The best-studied site, which impresses with the number of ditches recorded there, is the settlement mound of Aruchlo. At least 14 ditches that have various directions and

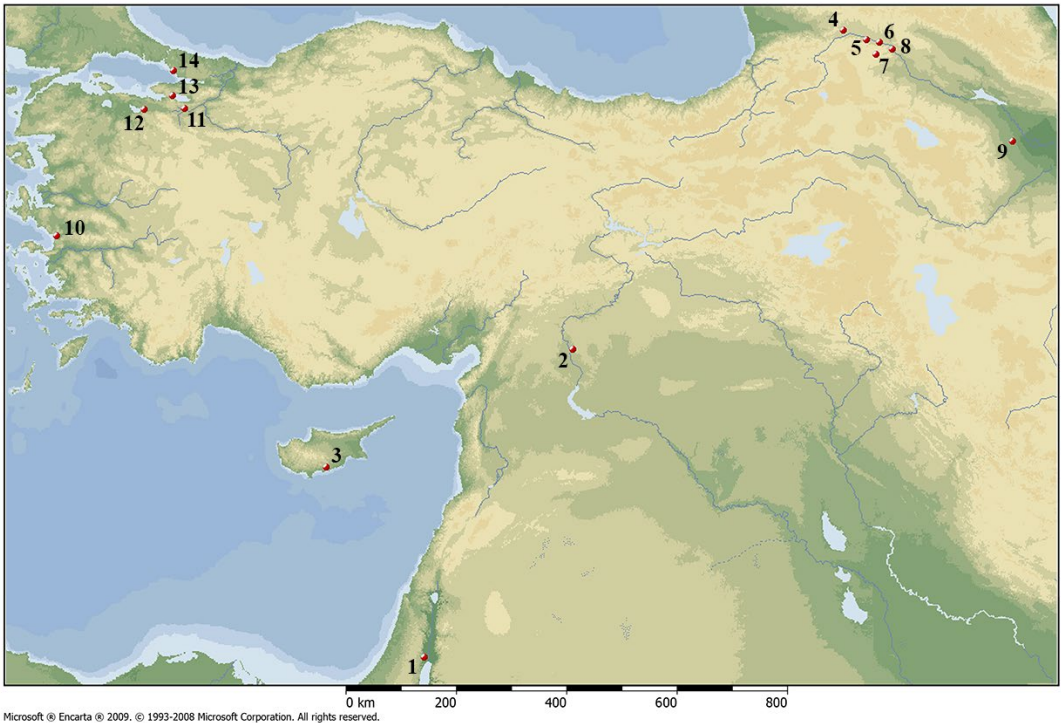


Figure 2. Map showing the distribution of Pre-Pottery Neolithic and Pottery Neolithic ditches in the Near East: (1) Tell es-Sultan; (2) Mezraa-Teleilat; (3) Kalavassos-Tenta; (4) Aruchlo; (5) Imiris Gora; (6) Khramis Didi Gora; (7) Toire tepe; (8) Šomutepe; (9) MPS 4; (10) Çukuriçi Höyük; (11) Barcın Höyük; (12) Aktopraklık; (13) Ilıpınar; (14) Pendik. Image Credit: Microsoft Encarta 2009 and N. Nikolova.

positions within the settlement plan, cut each other (Hansen & Ullrich 2017, 210, fig. 23; Ioseliani 2017, 224). Some are located at the periphery of the mound and others run at its core area. Small parts of them have been exposed and thus it is not possible to determine an overall layout. The excavators believe that the ditches did not have protective or drainage functions, nor were they a source of building material, but rather were dug as part of ritual practices (Hansen et al. 2017, 297ff). Small sections of ditches were also studied at several other sites in the region, e.g., Imiris Gora, Khramis Didi Gora, Šomutepe, Toire tepe, and MPS 4 (Ioseliani 2017, 228ff). During a large-scale geophysical survey project in the Mil Plain (Azerbaijan), more ditch enclosures were recorded, the dating of which is still unclear (Fassbinder & Becker 2017).

(3) *Western and Northwestern Anatolia.* Several sites where ditches have been excavated to varying extents are located immediately to the south and east of the Marmara Sea (fig. 2.11–14). They are mostly from the archaic and classical phases of the Fikirtepe culture in the region. The earliest one seems to be the ditch exposed in the northern end of the excavated area of Barcın Höyük phase VIe that is dated to the mid-seventh millennium

BC (Gerritsen & Özbal 2016). During the next phase, the ditch had been replaced by a wooden wall that enclosed a row of buildings to the south (Gerritsen & Özbal 2019, 60, fig. 2). A possible ditch was documented at the western periphery of the site of Pendik belonging to the archaic phase of Fikirtepe or ca. the late seventh and the early sixth millennium BC (Özdoğan 2013, 217, fig. 24). During its initial phase X/1, the settlement mound of Ilipınar was delimited to the north by a ditch or a so-called channel. The phase is dated to 6000–5900 cal. BC. After a short period of time, the ditch had been filled and houses appeared above it (Roodenberg 2008, 2f). The ditches at Aktopraklık have been more extensively studied. A ditch enclosed the oval-shaped area of Aktopraklık B, probably at one of its latest phases, ca. 5750–5600 cal. BC (Karul 2020). The inner side of the ditch was flanked by the backside of a row of buildings, thus resembling a wall. Another ditch was registered north of the former one, but only a small part of it was excavated. It has been suggested that the settlement area had been divided into separate enclosed units (Karul 2017, 130ff). Aktopraklık A is the latest area of habitation at the site. It was enclosed by a circular ditch – as shown by the geomagnetic prospection – of which a trench has been excavated. This area has been dated roughly to ca. 5600–5500 cal. BC (Karul 2017, 104–107).

A depression at the northern periphery of the site of Çukuriçi Höyük, close to the eastern Aegean coast (fig. 2.10), has been assumed to represent a filled ditch. It was not excavated yet as some houses built above it had sunk partially in it. This feature probably belongs to the time before level X or before 6400 cal. BC (Brami et al. 2016, 5, 10; Horejs 2017).

(4) *Thessaly and Greek Macedonia*. Thus far, no ditch enclosures have been recorded south of Thessaly, most probably due to the terrain characteristics as well as the state of research in the region. All known ditches are situated in Thessaly and predominantly in Macedonia (fig. 3). Ditches were dug less frequently in the initial stages of the Neolithic, while during the Middle and especially the Late Neolithic, they became a typical element of the settlement organization. They enclose both tells and flat settlements – entirely or partially, and sometimes run through the center of the sites. Besides ditches, stone enclosures are also a common enclosure type for the Western Aegean coast.

Several examples come from Thessaly (fig. 3.1–6); they were all excavated in small areas and usually no thorough information has been given. The earliest one is probably the ditch from Soufli dated to the second phase of the EN (Perlès 2001, 175; Toufexis 2017, 387). Other ditches in the region were found at Neraidas, Makrychori I (ditch II), Elateia, Agia Varvara, and Achilleion (Gimbutas et al. 1989; Reingruber et al. 2021; Souvatzi et al. 2021, 1184; Toufexis 2017, 168ff, 392ff). Several more ditch enclosures have been mapped by geophysical surveying in Eastern Thessaly but their dating remains uncertain (Kalayci et al. 2017; Simon et al. 2015).

A greater number of ditches has been recorded in the western and central parts of Macedonia (fig. 3.7–18). Most of the sites are flat settlements that have been enclosed by one to four successive ditches. The earliest ones seem to have been dug in the beginning of

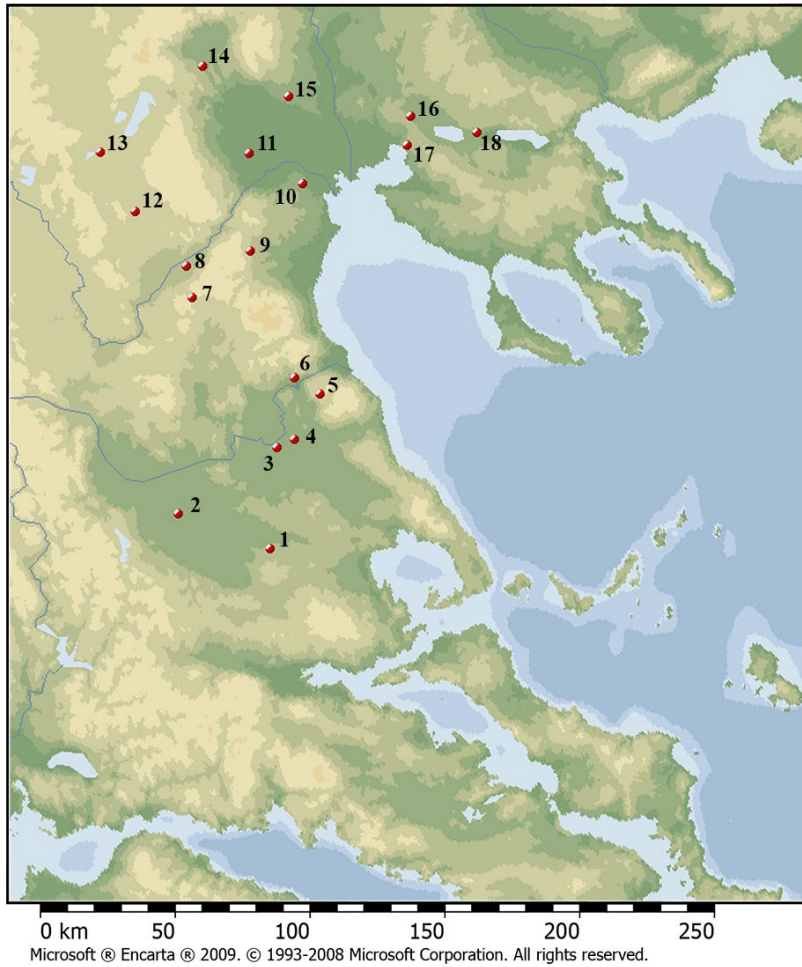


Figure 3. Map showing the distribution of ditches in the Early and the beginning of the Middle Neolithic in Thessaly and Greek Macedonia: (1) Achilleion; (2) Agia Varvara; (3) Neraidas; (4) Soufli; (5) Elateia; (6) Makrychori I; (7) Servia; (8) Kriovrisi; (9) Agios Nikolaos; (10) Paliambela Kolondros; (11) Nea Nikomedeia; (12) Pontokomi; (13) Anarghiri XI; (14) Apsalos–Grammi; (15) Giannitsa B; (16) Lete I; (17) Stavroupoli; (18) Koroneia. Image Credit: Microsoft Encarta 2009 and N. Nikolova.

the Neolithic in the area, although probably not at its initial phase, e.g., Nea Nikomedeia, Giannitsa B, and Agios Nikolaos in Rhitini (Pyke & Yiouni 1996; Chrysostómu 2003; Toufexis 2017, 411). However, most of the ditches date to the end of the EN and the beginning of the (Greek) Middle Neolithic: Servia, Kriovrisi, Apsalos–Grammi, Anarghiri XI, Pontokomi, Paliambela, Lete I, and Koroneia (Karamitrou-Mentessidi et al. 2013; Kotsakis 2020; Ridley et al. 2000; Chondrogiánni-Metóki 1995; Chrysostómu et al. 2003; Chrysostómu & Giankoúlís 2018; Pappá & Tzanavári 2014; Kótsos 2017, 53ff).

Regardless of their chronological position, however, most ditches belong to the earliest occupational phases of the respective settlements. They had been filled shortly after the initial digging and the area above them was built upon, i.e., they were not of vital importance for defensive or other similar purposes (Demoule & Perles 1993, 370).

(5) *Vardar, Mesta, and Struma River Valleys, Sofia and Zlatitsa-Pirdop Basins*. Ditch enclosures in this wide area are concentrated mostly in the Upper Vardar and Middle Struma Valleys. The middle and upper courses of the Vardar River run in what is now the Republic of North Macedonia (fig. 4.1–4). Only small segments from three ditches have been excavated there – at Cerje–Govrlevo and Tumba–Brvenitsa, both dated within the first two centuries of the sixth millennium BC (Abazi & Tolevski 2019; Fidanoski 2015). Several ditch enclosures were detected recently as a result of magnetic prospection projects. These are single or multiple concentric ditches enclosing settlement mounds and are situated almost exclusively in Pelagonia (Naumov et al., 2014; 2017; Rujak et al. 2019). Even though most of them are considered to be of an EN age, when archeological excavations have not been conducted, the date remains conjectural and is yet to be verified. The dating of the single circular enclosure ditch at Vrbjanska Čuka appears to be unquestionably attributed to the EN, as excavations take place within the enclosed area and the prehistoric occupation of the mound dates exclusively to the beginning of the Neolithic (Naumov et al. 2016 & 2018).

There is only one recorded ditch along the upper course of the Mesta River (fig. 4.10), at the site of Eleshnitsa, and it was used at the very beginning of the sixth millennium BC (Raduncheva & Nikolov 1985, 22). The ditches in the Middle and Upper Struma Valley are located mostly along its right bank and date mainly to the later phases of the EN in the region, roughly between 5700 and 5500 BC (fig. 4.5–9): Kovačevo Ic, Ilindentsi, Brezhani, and Drenkovo–Garleshki nivi (Grębska-Kulow 2017, 253f; Grębska-Kulow & Zidarov 2020, 175ff; Lichardus-Itten et al. 2002, 115f). The ditch at Bersin might be of a slightly older age, probably towards the beginning of the sixth millennium BC (Vandova 2020). Only small segments of the listed features' length or circumference were excavated.

Immediately to the north and northwest of the Upper Struma Valley are situated the Sofia and Zlatitsa-Pirdop Basins. The best-studied ditch enclosure in the whole area presented here comes from the site of Slatina-Sofia in the Sofia Basin (fig. 4.11). The calibrated radiocarbon dates from the two parallel ditches and the houses built above them are concentrated within the first century of the sixth millennium BC (Nikolov & Takorova 2021, 17f). If we assume that these dates determine a *terminus ante quem* for the digging of the ditches and that they are part of the organizational plan of the initial settlement there, then a date at the end of the seventh millennium BC seems reasonable.

There are two probable ditches in the Zlatitsa-Pirdop Basin – one around the settlement mound of Mirkovo and another at the site of Chavdar (fig. 4.12–13) – both of which should be dated to the end of the EN in the area (Dumanov et al. 2013; Georgiev 1981, 69).

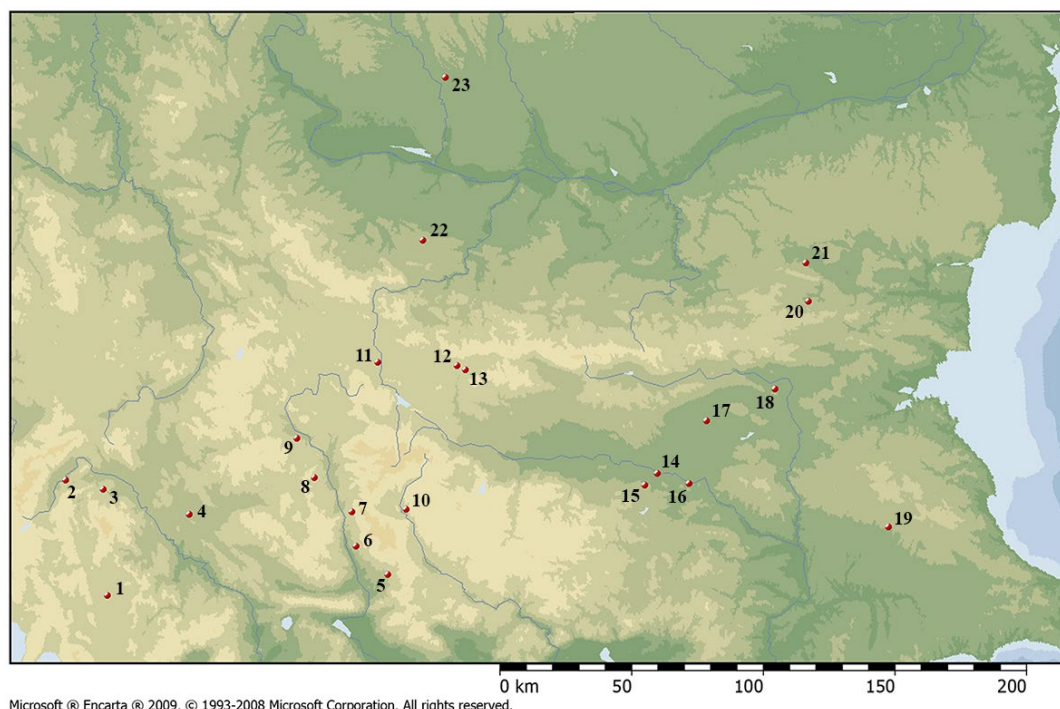


Figure 4. Map showing the distribution of Early Neolithic ditches in the Eastern and Southwestern Balkans: (1) Vrbjanska Čuka; (2) Tumba–Brvenitsa; (3) Cerje–Govrlevo; (4) Anzabegovo; (5) Kovačhevo; (6) Ilindentsi; (7) Brezhani; (8) Drenkovo–Garleshki nivi; (9) Bersin; (10) Eleshnitsa; (11) Slatina–Sofia; (12) Mirkovo; (13) Chavdar; (14) Yabalkovo 1; (15) Yabalkovo 2; (16) Nova Nadezhda; (17) Pilyov kaynak; (18) Kazlacha; (19) Aşağı Pınar; (20) Varbitsa; (21) Ovcharovo–Gorata; (22) Ohoden; (23) Cârcea–Viaduct. Image Credit: Microsoft Encarta 2009 and N. Nikolova.

(6) *Thrace*. Six ditch enclosures are known altogether in the upper and eastern parts of Thrace (fig. 4.14–19). There is no evidence for such sites in Aegean Thrace at this time. All of the examples represent multiple (but, for the most part, non-contemporaneous) enclosure ditches – up to five at one enclosure, entirely or partially surrounding the residential area. Most of the sites are relatively extensively studied by large-scale excavations – e.g., Nova Nadezhda (fig. 5), Yabalkovo (figs. 6 and 7), and Aşağı Pınar – or geomagnetic prospection projects such as at Kazlacha and Pilyov kaynak (cf. references in Nikolova 2018 & 2021). The enclosed sites seem to have existed for a long time: from ca. three centuries (Yabalkovo 1 and 2) through 450 years (Nova Nadezhda), to the impressive timespan of more than a millennium (Aşağı Pınar),¹ although the latter case displays changes

¹ The Early Neolithic ditch enclosures in Thrace, including all the available radiocarbon dates from the sites, is the topic of the author's unpublished PhD thesis (Nikolova 2022). For the published radiocarbon dates from Nova Nadezhda, Yabalkovo and Aşağı Pınar see: Bacvarov et al. 2016, table 2; Roodenberg 2014, table 1; Özdoğan 2013, 186; Thissen & Reingruber 2017, 154f.

Should we consider ditch enclosures as an element of the Neolithic package?

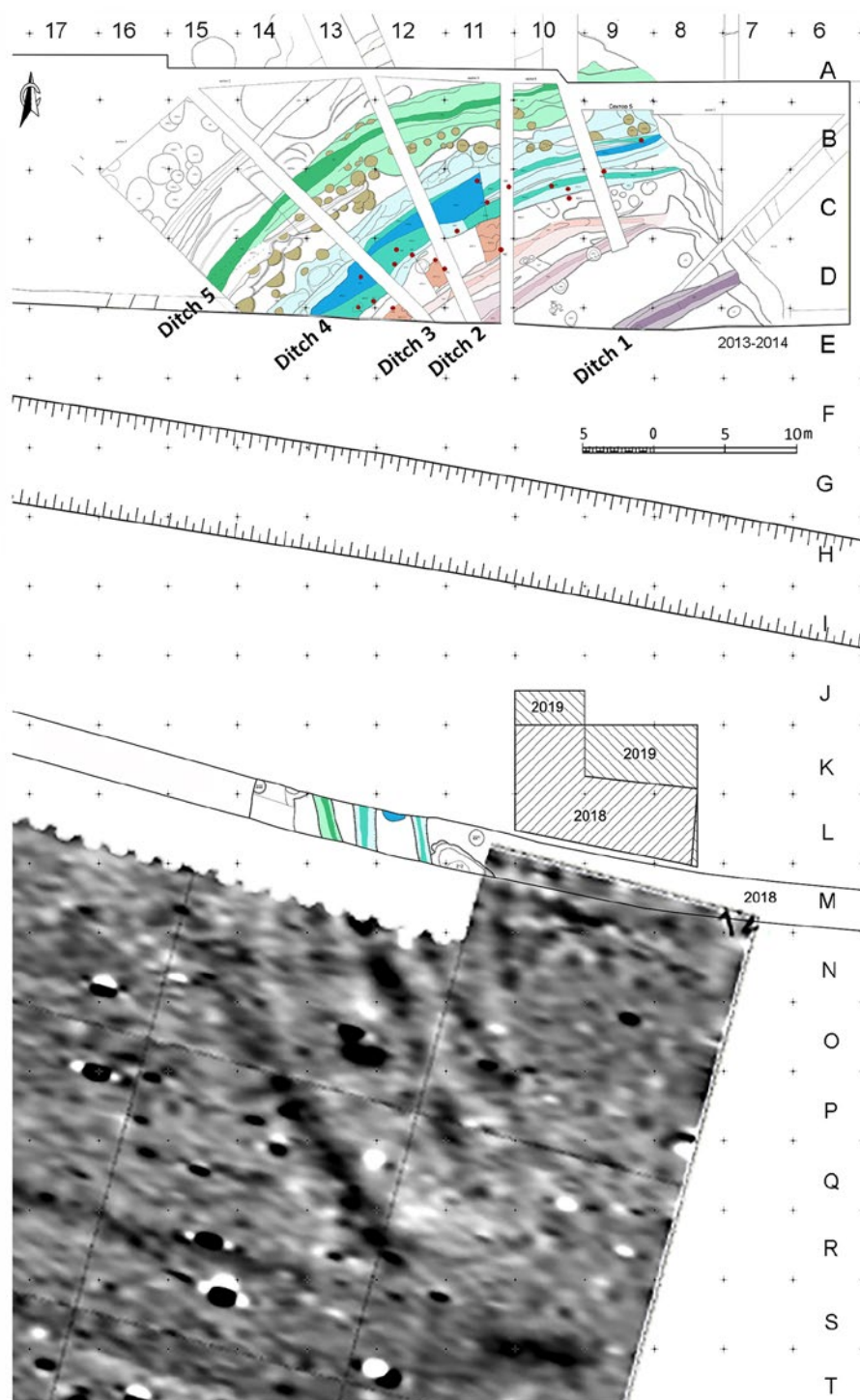


Figure 5. The enclosure at Nova Nadezhda. Image Credit: Bacvarov et al. 2020 and N. Nikolova.

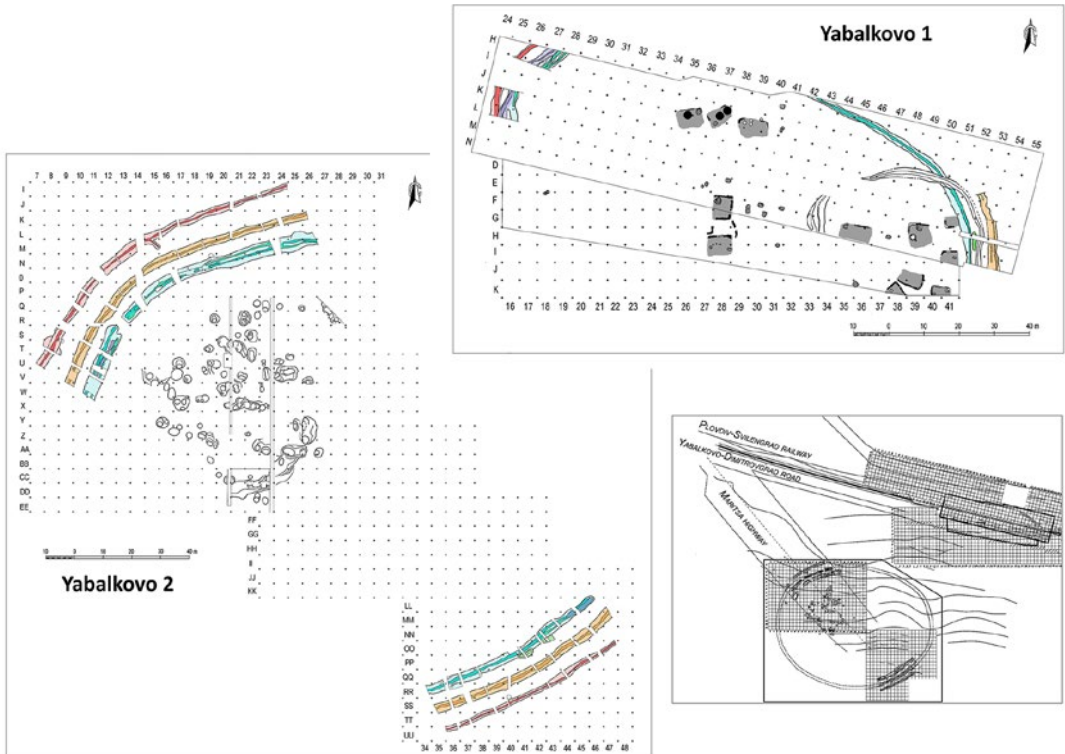


Figure 6. The enclosures of Yabalkovo 1 and 2. Image Credit: Roodenberg et al. 2013, fig. 1 and N. Nikolova.

in the house and enclosure construction as well as in the settlement layout during the different occupational phases (Özdoğan & Schwarzberg 2020). Obviously, the ditches were dug immediately or shortly after the settling of the respective locations. And the tradition of constant re-digging of the old and digging of new ditches seems to have lasted until the places had been left for good or a new enclosure tradition was adopted (evident only at Aşağı Pınar).

Most of the ditches in Thrace were dug, used, and filled within an interval of around 200 years: between 5900/5850 and 5700/5650 cal. BC (the circular enclosure at Yabalkovo 2; Aşağı Pınar; most of the ditches at Nova Nadezhda; enclosure E at Kazlacha). One of the earliest features is the innermost ditch at Nova Nadezhda which dates to the very beginning of the sixth millennium BC. Probably, the use of some or all the ditches at Yabalkovo 1 should be dated around the same time.

The site of Kazlacha presents a specific case as there, five different enclosures (A to E) – consisting from a single or up to four concentric ditches – cut each other. The site has been studied through geomagnetic prospection, electrical resistivity tomography and small-scale trench excavations (Petrova et al. 2016; Petrova & Zidarov 2012; Zidarov



*Figure 7. Aerial photograph of the enclosure of Yabalkovo 2.
Image Credit: Leshtakov 2014, 213, fig. 76.*

et al. 2015 & 2016). The latest enclosure (A) seems to belong to the beginning of the Late Neolithic in the area (Petrova & Valchev 2021). Enclosure E provides ceramic sherds typical for the white-on-red painted phase of the EN in Thrace (Petrova et al. 2016). In respect to the geomagnetic map, two of the enclosures (B and C) appear to be overlapped by enclosure E and thus are probably earlier. Their exact chronological position is yet to be clarified but a date within the first century of the sixth millennium BC or even a bit earlier can be proposed.

The distribution of EN ditch enclosures north of the Balkan Range is somewhat poorly represented at the current state of research (fig. 4.20–23). There are some features with debatable ditch interpretation south of the Danube (Ohoden, Ovčarovo-Gorata, and Varbitsa). There are a couple of examples situated north of the river as well (Cârcea-Viaduct and Ostrovu Golu). No thorough analysis is possible until further information about these and more ditch sites is acquired.

General description

As the presented review clearly shows – despite the scarce evidence in some of the regions – ditches enclose tell, flat-extended and stratified sites. Enclosed tell sites are predominant in the Levant, Northern Mesopotamia, Thessaly and along the Upper Vardar. Settlement mounds and flat sites are both enclosed in Western/Northwestern Anatolia, Central and Western Macedonia. And finally, ditches in Thrace and in West Bulgaria usually surround flat and stratified sites. In rare cases, the residential type of the sites is yet to be confirmed, e.g., Kazlacha. Most of the ditches surround the settlement area only partially – from one or more sides – or there is no information about their overall layout due to the small excavated areas. Only about ten percent of the ditches enclose entirely the habitation areas; they have a round or an oval layout, recorded mostly in Northern Greece and in Thrace (fig. 8.1a–c). Some enclosures form a C-shape or an almost complete circle but are open at one side usually towards a small river, a ravine or another topographic feature, e.g., Nova Nadezhda (fig. 8.2a–b). Sometimes arch-shaped or linear ditches (fig. 8.3a and b) run through the inhabited space, i.e., enclosing or blocking certain areas within the settlements, e.g., Aruchlo, Imiris Gora, Khramis Didi Gora, Achilleion, and Servia. According to the enclosed area, the sites can be divided into three major groups: 0.1 to 0.5 ha (Aruchlo, Kalavastos-Tenta, Aktopraklık A, Apsalos-Grammi, Anarghiri XI, and all five ditches at Nova Nadezhda); 1 to 2 ha (Aktopraklık B, Vrbjanska Čuka, ditch II at Aşağı Pınar, Yabalkovo 1, Kazlacha, Brezhani, Drenkovo – Garleshki nivi, and Mirkovo); and areas between 2.5 and 4 ha that have been documented at Yabalkovo 2 where the three circular ditches enclose 2.5 to 3.8 ha respectively.

The most common enclosure type is the so-called continuous ditch that is either a straight line, arc-shaped, a circle, or an oval around the site (fig. 8.1–3). Rarely, one or two entrances in the forms of breaks are identified along the ditch (the inner circular ditch at Yabalkovo 2 and ditch II at Aşağı Pınar). Less common are the segmented ditches (or interrupted ditches) that consist of separate cuts of various size but similar shape (the

segmented ditch at Yabalkovo 2, ditch I at Aşağı Pınar, and Lete I). The available information until now indicates that such ditches enclose only partially the respective areas (fig. 8.4a–b).

More than a half of the enclosures are made up of single ditches; one third of them, however, are combined with a contemporaneous enclosure element, mostly palisades (e.g., Govrlevo and Ilindentsi). The multiple enclosure type consists of two to six ditches that usually functioned one after another and for the most part, consecutively from the innermost towards the outermost. Just in five cases, a ditch from multiple enclosures was used simultaneously with a different type of enclosing feature, again mostly wooden walls (e.g., the inner ditch at Slatina and the outermost ditch at Nova Nadezhda). Sometimes stone or mudbrick walls were erected parallel to the inner or rarely to the outer sides of the ditches (e.g., Kalavassos-Tenta, Aktopraklık A, ditch II at Makrychori I, and ditch 2 at Agia Varvara). The site of Aruchlo is an exception as 14 ditches have been documented there in various parts of the settlement.

The larger part of the ditches – when such information is available – have a V and/or U-shaped cross section with relatively narrow bottoms. This refers mainly to the examples from Thrace and Northern Greece, and partially from Northwest Anatolia and the Southern Caucasus. The trapezoidal cross section with a wide flat bottom is more common for the ditches in the Struma Valley and Sofia Basin. The depth of the ditches is quite often damaged by construction activities in later periods or due to modern agricultural cultivation. When the ditches are considerably well preserved, they measure 3.50 to 5 m deep (two ditches at Aruchlo, Apsalos–Grammi, the middle and outer circular ditches

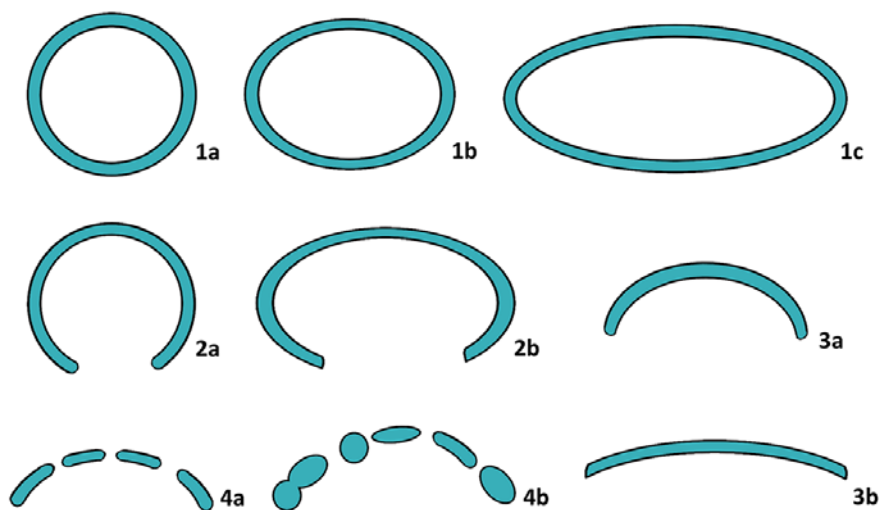


Figure 8. Major types of ditch enclosures: (1–3) continuous ditches; (4) segmented ditches. Image Credit: N. Nikolova.

at Yabalkovo 2). The average depth of most ditches, however, varies between 1 and 2.50 m, and their width varies from 1/1,50 to 4–6 m; only rarely the width reaches between 9 and 12 m (two ditches at Aruchlo, Aktopraklık B, and Apsalos–Grammi). Generally, the shape of the bottom is related to the cross section of the ditch, i.e., flat or sometimes pointy narrow bottoms are common for the V-shaped profiles, U-shaped profiles result in rounded and somewhat wider bottoms, and trapezoidal profiles go usually with wide and leveled bottoms. The bottoms of the V- and U-shaped ditches measure 0.20–0.40 to 0.60–1 m wide and in just few cases reach 1.50 or 2 m. The bottom width of the trapezoidal ditches is between 2 and 3.50–4 m.

There is no apparent relation between the ditch type and the chosen construction shape, i.e., both continuous and interrupted ditches can be of various size and shape and the same applies to the enclosure type; the size doesn't determine whether it would surround the settlement area completely or partially.

The character of the backfills of enclosure ditches is a rarely discussed topic. Usually, attention has been paid to the presence of burnt house debris and human skeletal remains but not to the nature and the formation processes of the fills themselves. Burnt house debris in the form of separate daub pieces or compact layers and heaps have been documented mostly in Thrace (Yabalkovo 2, most of the Nova Nadezhda ditches and especially ditch 4) and Northern Greece (ditch II at Makrychori I, Achilleion, Servia, Apsalos–Grammi, Agios Nikolaos, Pontokomi, one of the ditches at Paliambela, ditch 2 at Lete I), but also in other regions (Tumba–Brvenitsa, Aktopraklık A). Separate and/or disarticulated human bones were found within the fills of some ditches (Achilleion, three of the ditches at Paliambela, the inner ditch at Slatina, Cârcea–Viaduct, the triple ditch system at Yabalkovo 2). Primary and secondary burials are dug into the fills of the enclosures at various levels and depths (Kalavassos–Tenta, Aktopraklık B, Ilipinar, Koroneia, ditch 4 at Nova Nadezhda, the three circular ditches in Yabalkovo 2). All of the burials known so far were dug in the partially or completely filled ditches, mostly within their boundaries or close to their sides. The use of ditches as places for funerary activities is the next or the final phase of their function, even though their initial form and purpose had obviously changed.

The dynamic concept of the Neolithic package

Ever since the introduction of Childe's Neolithic package of traits – describing the main results of the new way of life arranged in an assemblage of ten essential elements – the diffusionists have been in a constant attempt to identify its components and to improve its content. Childean components can be summarized as follows: agricultural economy based on domesticates (plants and animals); sedentism; surplus storage; population growth; household and community level organization; ritual activity and iconography; trade network; ceramic production; weaving (Childe 1958, 59ff). M. Zeder (2009, 18) studied these elements and argued that they had appeared in different ways at different

times and places in the Near Eastern Epipaleolithic, PPN and early PN, and thus evidence diverse processes.

An extensive review of the use of the term, its contents and changes in the course of time, has been published by Ç. Çilingiroğlu (2005) who emphasized its ambiguity and concluded that ‘there is no ultimate list for the Neolithic Package’, but it rather encompasses technological, economic, social and ideological aspects of the Neolithic. Çilingiroğlu focused on the small finds, rather than on domesticates, dividing the group into technological tools, prestige objects and symbolic items. And in order to define the origin of the package, she traced back the temporal and spatial appearance of the respective finds in Southwest Asia, Anatolia and the Balkans.

M. Özdoğan broke down the homogenous Neolithic package into distinct packages of specific time and space frameworks. He defined 94 components of the assemblage arranged into more than 10 major groups: subsistence, settlement and architecture, symbolic representations, imported raw materials, technological tools, status objects, special tools and objects, special crafts, etc. (Özdoğan 2010). The distribution patterns of the different components were then traced, resulting in the differentiation of seven geographical zones that show similar traits during the initial stages of neolithization (Özdoğan 2014, 35ff). The first zone A is the primary core area of Neolithic formation where the new way of life begun as early as the eleventh or tenth millennium BC, i.e., the Zagros region, the Upper Euphrates – Tigris Basin, the Southern Levant and Central Anatolia (Özdoğan 2022, 11). The six other zones follow the westward expansion of the Neolithic from Anatolia, the Aegean and the Balkans, to the Central and Western Mediterranean and Central Europe. I will not go into more detail about all the conclusions of this study; what is important here is to highlight some of its results that relate to this paper. All the items from zones B to D – which cover Western and Northwestern Anatolia, the Aegean, and parts of the Balkans including Greece, North Macedonia, Bulgaria, and eastern Serbia – have parallels in some areas of zone A but in different ratios. For example, an item that might be very rare in zone A may turn out to be a common item in any of the other zones or vice versa. It also turned out that most objects were transferred from the eastern parts of the primary core area, rather than from Central Anatolia (Özdoğan 2014, 36ff). The apparent mixed pattern of origins suggests that there must have been various paths, diverse models and different timings of the Neolithic dispersal. According to the evidence from the Neolithic packages, the new way of life in zones B to D was introduced by demic diffusion of which three major ‘waves’ can be traced. The appearance of the Neolithic in zones E and F – further from the core area of neolithization – was the result of interaction or cultural contacts (Özdoğan 2014, 47).

I. Hodder (2012, 195ff), on the other hand, prefers the term ‘entanglement’ rather than ‘package’. He believes that over a long period of time, the various elements became dependent on each other but also changed in a certain direction. B. Erdoğan (2017, 40) shares the latter opinion and discusses a ‘web of complex relations’ instead of a package.

The interactions between different societies resulted in their diverse identities and changes in their material culture.

It is now clear that the concept of the Neolithic package develops in time and, more importantly, with the increase of new evidence. It serves as a tool of encompassing similar cultural and material traits over wide geographic regions and thus displays how the new way of life adapted and changed after its arrival at the secondary cores of Neolithic formation.

Discussion

Since the focus of this paper is on the question of whether ditch enclosures should be added to the Neolithic package(s) list, it is time to put the evidence for this theory to a test. In doing so, I chose to follow the methodology introduced by M. Özdoğan (2010 & 2014). The necessary requirement here is that any element of the packages must have its antecedents somewhere in the primary core area of the Neolithic formation. In addition, this precise component should appear in most, if not in each, of the assemblages from the secondary core areas. The degree to which the element is represented may vary from region to region or even from site to site. And lastly, it is essential to trace whether the element of interest existed at the so-called initial settlement sites in the respective regions. As it was already commented in the 'history of research and research problems' section earlier, the lack of systematic dating of the ditches together with their unclear chrono-stratigraphic position at the sites – of course, there are several exceptions to this – sets the limits of the approach. Nevertheless, the available data allow some provisional results.

The spatial distribution of ditch enclosures demonstrates that there are in fact such features originating from the core area of neolithization, with examples from the Upper Euphrates Basin (Mezraa-Teleilat), the Southern Levant (Jericho), and Cyprus (Kalavassos-Tenta). It is unlikely that these are all the cases in the core area but we should keep in mind that most sites have been investigated in the past century; their peripheral areas have rarely been excavated and no geophysical prospection has been used. However, the three ditches from the primary core of neolithization are all considered to be of a PPN age. It is thus possible to suggest that these were some of the ditch enclosures' forerunners.

Going westwards into the secondary cores of Neolithic formation, it is hard to miss out the wide blank spot of Central, Northern and Western Anatolia, where no ditches have been recorded up until now. Again, this might be considered the result of research strategies. Thinking about the routes and stages of the Neolithic dispersal, as described by M. Özdoğan (2011 & 2022) but also by V. Nikolov (1987 & 2011), it is in that direction that enclosures should be sought. Two sites shed light on the process of early Neolithic dispersal to the west and northwest, towards the Aegean coast and Northwest Anatolia. The evidence come from Barcın Höyük and possibly from Çukuriçi Höyük. Both sites are considered as initial settlements of migrants from the core area. The ditch at Barcın delimits the first occupational phase at ca. 6600–6500 cal. BC, and the feature at Çukuriçi

is thought to have existed sometime before 6400 cal. BC. These two sites display different cultural traditions and their inhabitants most probably have different origin within the core area. Thus, the ditch digging practices were adopted and transferred separately from and into diverse regions. Later on, during the Fikirtepe culture in the Marmara region, more enclosures were made. It seems reasonable to suggest that this tradition was brought there by the Barcin inhabitants, since this is the earliest example in the area. In such a scenario, the ditches as an element of the packages are presented worse in the core area of neolithization but became common for the secondary core.

The next step is to trace the ditch occurrence throughout the west Aegean coast and mainland Greece. In the light of the new radiocarbon dates for Thessaly and Greek Macedonia, the initial phases of the Neolithic there are set at ca. 6600/6500 cal. BC (Maniatis 2014; Reingruber et al. 2017; Thissen & Reingruber 2017, 129ff). There is no definite evidence of ditch digging during that time. Admittedly, enclosures have been attested at some of these early sites (e.g., Nea Nikomedeia, Paliambela Kolindrou, and Giannitsa B) but it is yet to be clarified whether the dates correspond to the ditches. However, in the last two or three centuries of the seventh and the early sixth millennium BC, ditch enclosures were already a common trait for the region, having been dug up with the settling of the sites. This might have been the result of another Neolithic dispersal wave, probably caused by the 8.2 ka BP event (Weninger et al. 2006 & 2014). Should we consider that these were new people coming from different points in the core area or its immediate neighborhoods, e.g., the western parts of Central Anatolia or the eastern Aegean? And if so, were those the people who brought the enclosure-related practices to Northern Greece? Even though such questions will remain unanswered for the time being, the idea of ditch enclosures developed considerably in the Western Aegean and was probably then transferred to the west and northwest.

Following the Struma route of neolithization (Nikolov 1987), one could identify a dense enclosure network concentrated along the middle course of the river. These enclosures, however, seem to belong to later stages of EN in the region. This is not to say that ditches were not known since the introduction of the Neolithic there. A double ditch system at Slatina in the Sofia Basin seems to date back to the late seventh millennium BC. The site of Slatina-Sofia appeared with a fully developed Neolithic assemblage that in many ways could be traced back to Central Anatolia. And since the ditches were dug in its earliest phase of occupation, the enclosure should be considered a part of this initial culture and a Near Eastern origin should be suggested.

The final region of examination here is Thrace. Three major routes for the introduction of the Neolithic have been proposed over the years: (1) following the Mesta River and then from the west to the east along the Maritsa River (Nikolov 2000, 9); (2) from the north to the south as population from north Central Bulgaria crossed the Balkan Range passages (Todorova & Vajsov 1993, 62); (3) and from the south to the north along the Maritsa and Tundzha Rivers (Boyadzhiev 2006; Özdoğan 2022a, 411). The inten-

tion of this paper is not to go into details about the neolithization process, which no doubt is the needed background for the Neolithic-packages-related research, but it rather concerns only the EN enclosure evidence. I will just note here that the Struma route has widely been acknowledged, but the passing from Eastern to Upper Thrace and vice versa is worth considering as well, although probably not in the initial Neolithic stages. The ditches in the two distinct parts of Thrace display many similarities (e.g., Yabalkovo and Aşağı Pınar); furthermore, their ceramic assemblages share common traits. It seems that the ditches are part of the tradition there since the very beginning of the Neolithic, as is shown by radiocarbon dates from Nova Nadezhda, Yabalkovo 1, and probably Kazlacha. They appeared in an already developed form of great variety and complicated layouts: circular systems, multiple ditches, multiple enclosure systems, and segmented ditches. It thus seems obvious that this must have been a transferred knowledge, and it is only a question of its origin. Two possible answers come to mind. Firstly, the know-how was somehow directly transferred from the core area of Neolithic formation and since no such elaborate examples are recorded there, it seems to have evolved and/or adapted to the new environment. And secondly, the enclosure building knowledge was adopted earlier in the central and western parts of Anatolia (even though no ditches have been discovered in Central Anatolia thus far) and then transmitted to the Balkans. It was during that dispersal that the idea developed through time. An alternative to the latter route could be explained by the insular model proposed by C. Perlès (2001). According to this scenario, groups of people traveling both by the sea route and the inlands arrived at the shores of the Western Aegean. The mainland areas of Thessaly and Greek Macedonia were subsequently settled. If we take into account the described route, then the ditch digging should have been distributed from the east (the core area) to the west (Greece) and then to the northern parts of the Balkans along the Vardar, Struma and Mesta River Valleys. This will provide the time for the enclosures to change considerably until their arrival in Thrace in a whole different form.

With all that being said, and if we adhere to the concept of the Neolithic package(s), it seems that the theory in question stood the test, i.e., most of the necessary requirements for a specific element to be considered a part of the package have been met. Enclosure ditches exist in the primary Neolithic formation area, although in a limited number. They are present in different ratios in all the neighboring secondary cores of neolithization. When radiocarbon dates are available, it seems that ditches have been dug since the initial stages of the Neolithic in the respective regions, however only rarely. Usually, the enclosures are part of the earliest settlement layouts, and with the time the ditch-digging practice became a common feature for the Balkan Neolithic.

At the end, I will emphasize again the provisional character of these results. This paper's focus was on the distribution and possible origin of the EN ditch digging based on the scarce published evidence. However, the ditch enclosures might have been a much more common element of the settlement pattern than one would expect them to be. This

is apparent when the research strategies include excavation at the sites' periphery and geo-physical prospection. Hence, the accumulation of new evidence will contribute significantly to this initial investigation of the EN ditch enclosures.

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RECENT FIELDWORK AT THE NEOLITHIC SITE OF VELUŠKA TUMBA IN PELAGONIA

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Abstract

Veluška Tumba is one of the most interesting Neolithic settlement sites in Pelagonia in terms of its stratigraphy, architecture and material culture. In 2017, a research project was launched, with new scientific approaches that apart from the standard knowledge of layers, buildings and artifacts, aimed to reconstruct the internal organization of the settlement and its natural environment, as well as to gain a detailed insight into the stratigraphy, chronology, architectural features, production of vessels, tools and cult objects, and the diet of the inhabitants of this impressive mound which had an uninterrupted development in the Neolithic resulting into the formation of deposits measuring almost 4 m. Therefore, in addition to the usual archaeological methods, geoarchaeological, archaeobotanical and radiocarbon analyzes were used in the last few years of research at the site, as well as a Harris Matrix to record all archaeological features, which in turn provided a very detailed insight into several aspects of the Neolithic life.

Keywords: *Pelagonia – Neolithic – tell – architecture – material culture.*

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Introduction

Wetlands had crucial role in the inhabitation of areas that would provide stabile and continuous subsistence of the first farmers in the Balkans. One such region is the valley of Pelagonia that was also covered by marshes, particularly in its central part (Dumurdzanov et al. 2004; Mirčovski et al. 2015; Naumov et al. 2021a). This natural setting enabled access to a variety of resources that resulted in the appearance of a number of tell sites in Pelagonia around 6000 BC (Simoska & Sanev 1976; Naumov 2016a). One of these tells is Veluška Tumba, an eponymous site that was used to label the Neolithic communities in the valley of Pelagonia (Simoska & Sanev 1975; Garašanin 1979). Due to its good preservation and undisturbed layers, it is quintessential for studying the first

agricultural societies in the region, especially their architecture, pottery, tools, imagery, subsistence and environment.

The archaeological site of Veluška Tumba is an artificial mound created gradually through the continuous habitation of this area in the Neolithic. It is located 400 m south of the village of Porodin, although formally it belongs to the land of the Velušina village, which is 1.5 kilometers southwest of the tell and where its name comes from (fig. 1). The Veluška River passes close to the site as it flows from Baba Mountain toward the plains and is the main water source, both today and in the Neolithic. Geological research around the site indicates the existence of water surfaces, so it can be considered that the Neolithic village itself was located next to a wetland or river that in earlier periods flooded its periphery (Naumov et al. 2020). Such a natural environment indicates excellent conditions for agriculture near the tell site, as well as for its continuous occupation.

As a result of this natural environment, the Neolithic village functioned efficiently for a long period of time, which is evidenced by the height of the tell, as well as its area of 270 x 180 m (fig. 2). Research in the last few years confirmed that the settlement was founded on a natural sandy mound where 3.83 m of cultural layers were gradually deposited in the Neolithic. From the 31 identified Neolithic layers, 12 architectural phases were recorded, that is, buildings erected on top of each other. It is evident that this site was inhabited continuously for a long period of time around 6000 BC, without any interruptions caused by natural or social changes (Naumov 2022; Naumov et al. 2020).

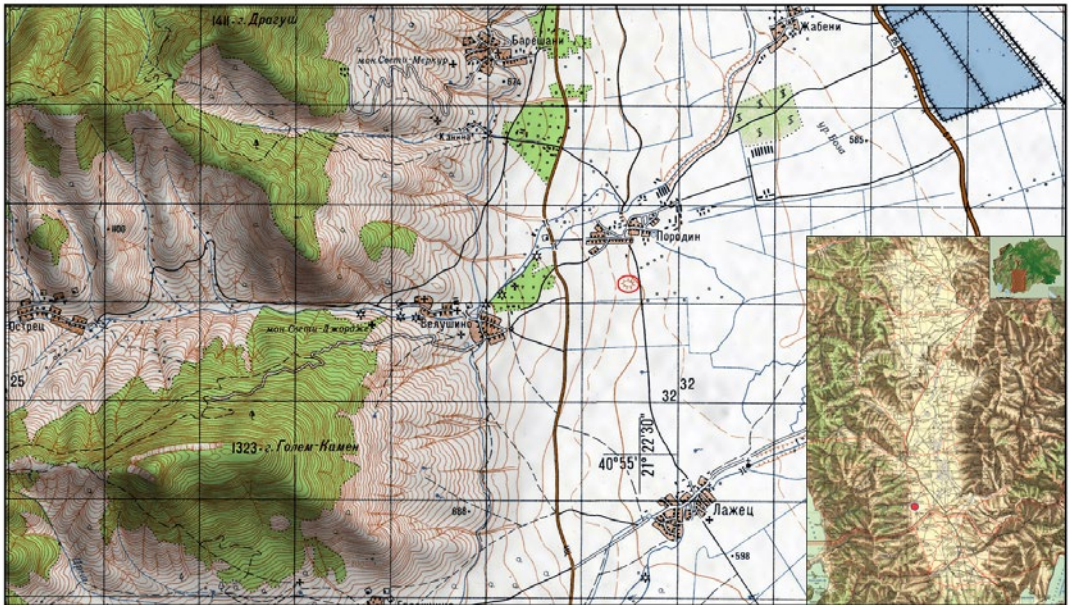


*Figure 1. Contour map showing the location of Veluška Tumba in Pelagonia.
Image Credit: G. Naumov.*



Figure 2. View of Veluška Tumba from the west. Image Credit: G. Naumov.

Due to its specificity and dominance in relation to the surrounding flatlands, this site attracted attention as early as the 1950s when it was first documented (Grbić et al. 1960). Then in the 1970s, excavation at the central part of the tell began, which partially continued in the 1980s (Sanev & Simoska 1983; Simoska 1986; Simoska & Sanev 1975). After a long research hiatus, in 2013, smaller excavations were made on the upper layers (Stojanova Kanzurova 2017). In 2017, new multidisciplinary research on this site was initiated in which Veluška Tumba is studied through geomagnetic mapping, small scale excavation, geological, radiocarbon and archaeobotanical analyses, re-evaluation of the stratigraphy and material culture, as well as prospection of the surrounding landscape to determine the density and arrangement of neighboring sites (Antolín et al. 2020; Naumov 2022; Naumov et al. 2017 and 2020; Sabanov et al. 2022). Several teams from the Center for Prehistoric Research in Skopje, the Institute for the Protection of Cultural Monuments and Museum in Bitola, the University of Basel, the Biosens Institute, the University of Belgrade and the University of South Bohemia are involved in this project.

These investigations have been carried out continuously for six years yielding evidence on the settlement pattern (linear layout of the buildings in the northeast-southwest direction and presence of a ditch), the daub structures (burnt or unburnt), the environment (wetland and abundance of wild fruits), the rich diet (cereals, lentils, peas, cattle, sheep and pigs), the pottery (continuous production of standardized vessels), and the various imagery (figurines and anthropomorphic models of houses; Naumov et al. 2020; Sabanov et al. 2022).

Having been preceded by a geomagnetic mapping and ground reconnaissance of the surrounding area, in 2019 the re-evaluation of the Veluška Tumba's stratigraphy began by reexamining the existing profile and starting a test trench within the limits of the dig

in the 1970s. Thus, the stratigraphic features of the Neolithic settlement were defined, and samples were taken for radiocarbon dating (fig. 3). This made it possible to determine the dynamics of living through the continuous renewal of buildings, but also to verify its chronology. This partially confirmed and expanded the knowledge from the 1970s when radiocarbon analyses were made that together with the new results indicate a time span from the end of the seventh to the mid-sixth millennium cal. BC (Naumov 2022; Valastro et al. 1977). The most recent studies of Veluška Tumba enable a much more thorough understanding of this Neolithic settlement, especially its architectural features. This paper will therefore outline the excavations at the tell site from 2020 to 2022, with an emphasis on the more significant structures, the clay installations in the interior and the material culture, while the latest results of the radiocarbon, archaeobotanical and geoarchaeological analyses will be presented in detail on another occasion.

The excavations in 2020

The excavations began next to the western profile and the 2019 test trench, so that the lower layers of the site could be investigated. During this campaign, two quadrants measuring 5 x 5 m each were opened providing insight into the earlier phases of Neolithic occupation (fig. 4). Being located next to the western profile of the 1970s trench, these quadrants represent a continuation of the excavations from forty years ago, which in some parts of the trench were interrupted at an elevation of ca. 1.5 m above the natural. There-



Figure 3. West profile of the trench at Veluška Tumba. Image Credit: G. Naumov.



Figure 4. The excavation trench at Veluška Tumba. Image Credit: D. Bežanovski.

fore, the unfinished parts of the trench are being investigated through ongoing research and a detailed insight into the beginnings and early development of the settlement could be obtained. As the excavations of the trench in the 1970s stopped at different elevations, the ‘new’ quadrants were opened at these levels, that is, with a small difference in elevation. The surface of quadrant I is slightly lower than of the adjacent quadrant II where several structures built on top of each other were investigated. In quadrant II, just one level is under excavation because of a specific building that we intend to excavate completely. Consequently, the excavation in quadrant I enabled the understanding of the stratigraphy and architectural dynamics of the site, while quadrant II provided significant information about the organization of the space in one house and about the activities within (figs. 5 and 6). All features in these quadrants were recorded in stratigraphic units (SU), thus creating a Harris Matrix that provides a clear insight into the arrangement of the architectural elements (fig. 7). In this paper, I will discuss in detail the features revealed in the two explored quadrants.

Despite the small excavated area, the quadrants yielded an abundance of results on the layout of the buildings and their architectural features. The numbering of the structures discovered in 2020 was a continuation of those in 2019, when in the western profile of the 1970s trench, the remains of 12 structures built on top of each other were registered, from the lowest layers to the highest (Naumov et al. 2020). Therefore, the buildings identified in both quadrants in 2020 were recorded with numbers from 13 to 17. Also, the detailed records of the finds demonstrate the amount and variety of objects preserved and used in these structures that are considered as household units. They and their material

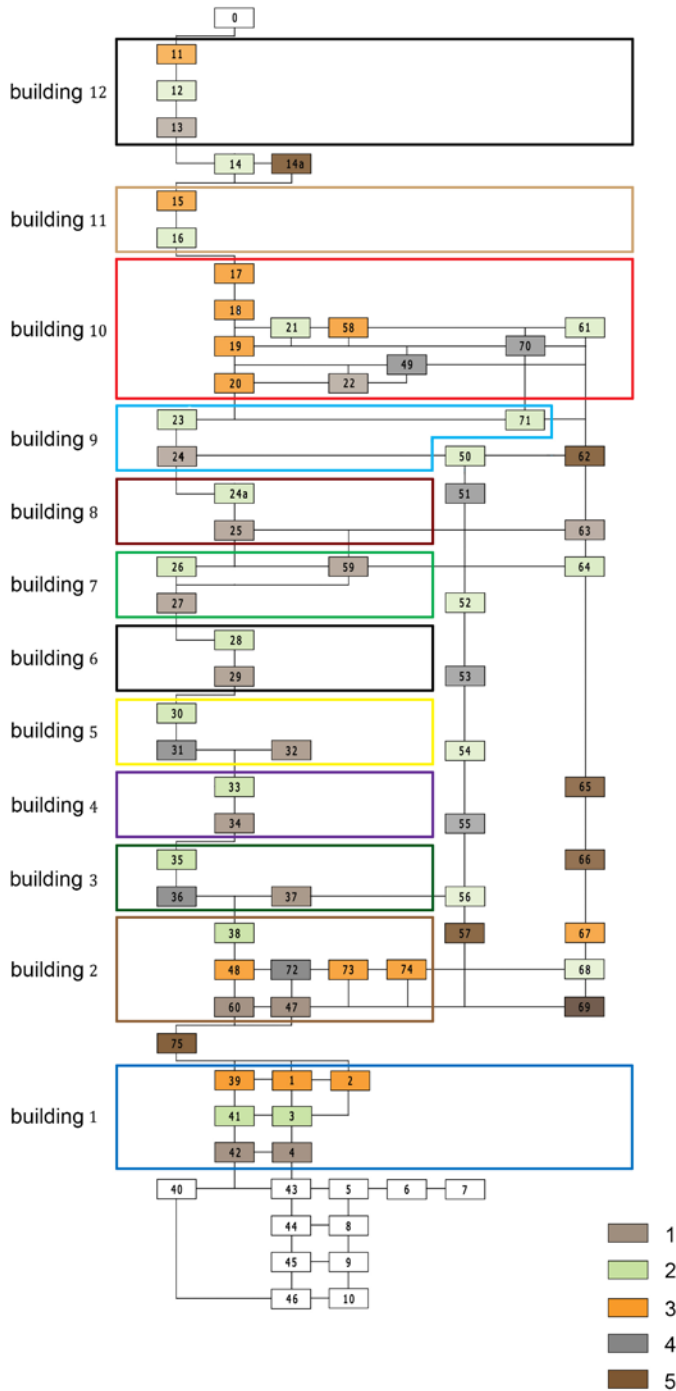


Figure 5. Stratigraphic units of the west section. Key: (1) plaster; (2) sediment/daub; (3) burnt daub; (4) ashes; (5) pit. Image Credit: G. Naumov.



Figure 6. View of the excavation trench and quadrants I and II.

Image Credit: D. Bežanovski & G. Naumov.

culture adequately correspond to the existing knowledge on the early Neolithic Balkans, but they also contribute to a new comprehension of their construction, production and use. Therefore, the architectural features will be presented according to the determined features in the two quadrants, and below they will be discussed in the context of previous knowledge on the stratigraphy and architecture of Veluška Tumba (Simoska & Sanev 1975; Naumov et al. 2020).

Quadrant I

This is a north extension of the 2019 test trench connecting to the northern edge of the 1970s dig. It was excavated in order to explore the archaeological layers in the eastern part of the earlier trench next to quadrant II. The uppermost layers are related to building 2, which was identified in 2019 (Naumov et al. 2020), starting with the levels associated with a small oven (SU 48) and the floor (SU 60), of which new sectors were uncovered (SU 79). Above the floor, a thin layer of sediment/unburnt daub was also documented, which is an integral part of the walls of this building, previously registered as SU 38 (fig. 7).

No sediments or geological features were registered between the layers of the structures built on top of each other. Thus, part of building 14 was discovered immediately below building 2, of which only the eastern part was uncovered, while its remaining area extends under the layers in the western profile (fig. 7). The uncovered features of building 14 include the floor made of clayish compact plaster (SU 83 and 84), postholes (SU 91 and 99), loose daub mixed with soot (SU 81), remains of unburnt daub (SU 80) and a concentration of rocks and pottery (SU 81). It is evident that this building also has the usual architectural elements like the other at the settlement, with the evidence of uneven firing of the daub being more clearly visible. The concentration of rocks could be

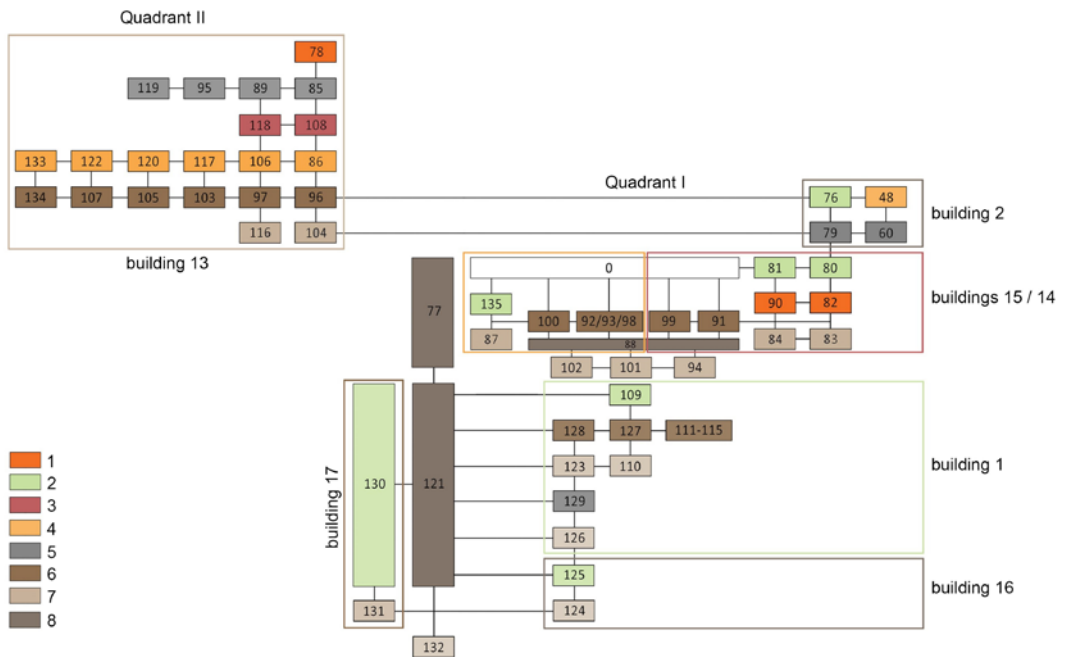


Figure 7. Stratigraphic units of the earliest levels of Veluška Tumba. Key: (1) burnt daub; (2) unburnt daub; (3) cluster of finds; (4) clay installation; (5) ashes; (6) posts; (7) plaster; (8) ditch. Image Credit: G. Naumov.

explained with the collection of this material for domestic activities as the production of grinding stones, cooking with heated stones, or for particular construction works.

The remains of one of the walls of building 14 were also uncovered – a foundation trench running northeast-southwest, with postholes (SU 92–95, 98, and 100) on its bottom (fig. 8). Unfortunately, due to the excavations in the 1970s and to the damage from a World War I ditch (Simoska & Sanev 1975), the remains of the walls of building 15 were not found but only parts from its floor (SU 87), with some indications that it had an earlier phase (SU 94), as well as the paved alley between it and building 14 (SU 101 and 102; fig. 7). Alternatively, the pavement could have been part of the floor of one of these buildings; given the small excavated area, however, it is currently not possible to find evidence in favor of one or the other option.

The remains of building 14 overlapped parts from building 1, which was first identified in the 2019 test trench (Naumov et al. 2020). Only the southeast corner of this structure is located in quadrant I, where the renewed plaster floor (SU 110, 123, and 126) and the soot sediment between its two phases (SU 129) were revealed, as well as postholes (SU 111–115, 127, and 128) and a unburnt daub wall (SU 109; fig. 7). These features correspond well to what was found in 2019: the floor (SU 4 and 24) and the remains from a fallen wall (SU 3 and 41). The profile of the 2019 test trench clearly shows the remains of burnt daub walls, but they were not identified in quadrant I. This situation is similar to some other buildings at Veluška Tumba where the walls were not uniformly burnt, e.g., buildings 2, 10, and 12.

Another structure (building 16) was discovered under the remains of building 1 that could not be detected in the profiles of the test trench, demonstrating that there is architecture beneath this building as well. The plaster floor (SU 124) and a unburnt daub wall (SU 125) of building 16 are preserved; similarly to the later houses, they extend in the north and west profiles of the trench. To the west of this house, a ditch (SU 121) was identified that is most likely the end of SU 77 (fig. 7). As some plastering was uncovered at its bottom (SU 132), it still remains unclear whether it was dug in World War I or in the Neolithic, moreover that the eastern edge of the floor of building 16 follows the line of the ditch (fig. 9).

East of the ditch, an unburnt daub wall (SU 130) was uncovered belonging to building 17, as well as a floor of compact plaster (SU 131). Therefore, the bottom of the ditch is located between buildings 16 and 17 that have almost identical floor elevations. Considering the plastering at the bottom of the ditch (SU 132), it seems more plausible to suggest that it dates to the Neolithic. Also, it should not be ruled out that buildings 16 and 17 were in fact parts of the same house that had been cut in halves by the ditch (fig. 9).

The elevations of the sediment layers of the walls and the floor of building 17 corresponds to those of buildings 1 and 16. It is yet not clear whether building 17 lasted longer and was used throughout the two different life phases of the neighboring houses or whether there was another structure on top of it that could have not still been iden-

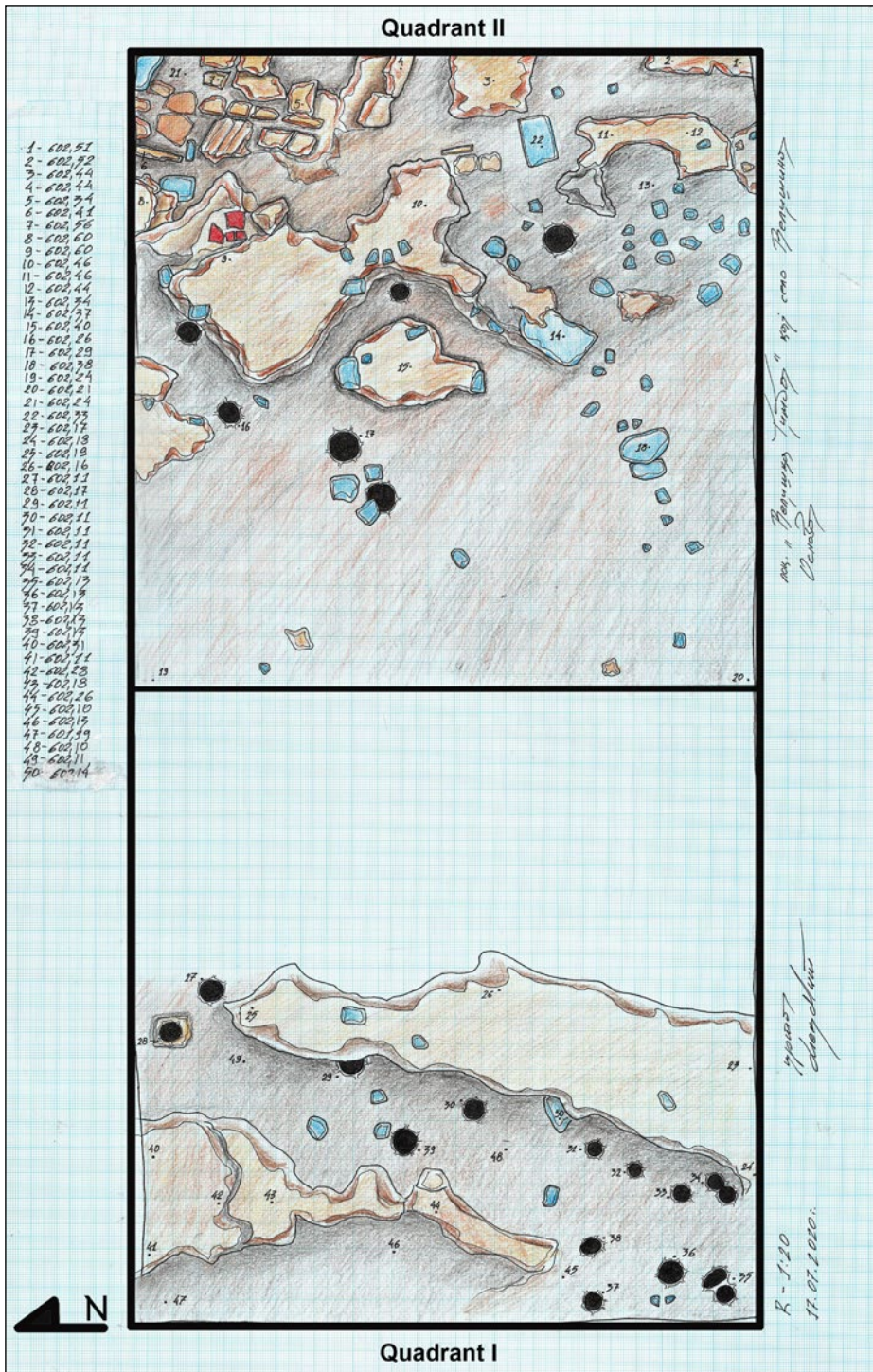


Figure 8. Archaeological contexts in quadrants I and II. Image Credit: A. Mitkoski.

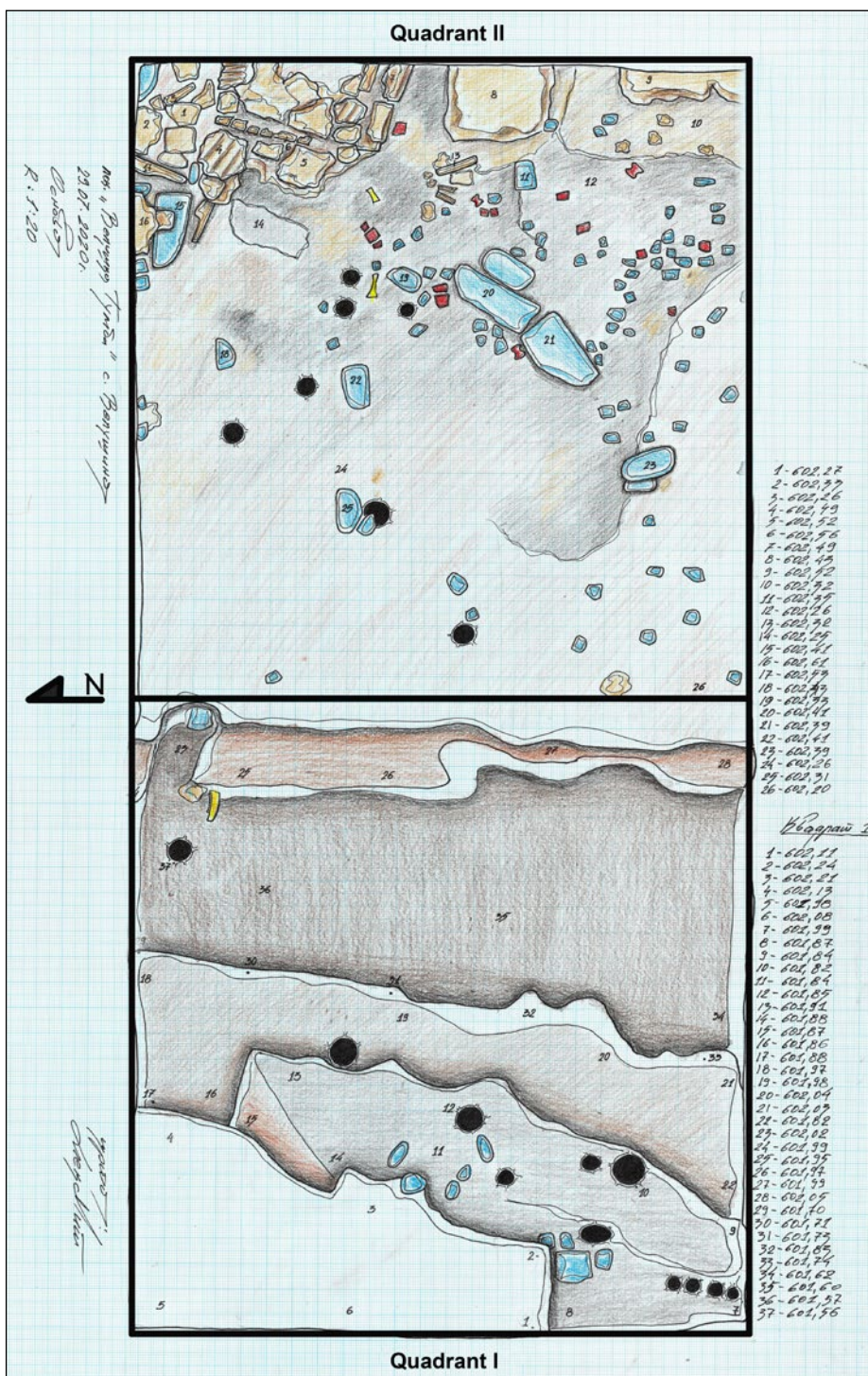


Figure 9. Archaeological contexts in quadrants I and II. Image Credit: A. Mitkoski.

tified in the wall sediments and that could have existed simultaneously with building 1. I should remind here that only a small part of building 17 was uncovered in quadrant I, while its larger part is located in quadrant II, of which only the uppermost layers are thus far excavated (building 13). Building 13 overlaps building 17 and is positioned at the approximate elevations of buildings 2 and 14; it is thus after its complete excavation that the structural stratigraphy beneath it will be recorded.

Quadrant II

Quadrant II was opened east of quadrant I, for the only reason to investigate building 13, which is stratigraphically later than buildings 1, 14, 15, 16, and 17. It was identified at similar elevation as building 2 and was also built of daub and burnt down (fig. 10). Considering the ditch (SU 77) between buildings 13 and 2, and that building 2 was identified only in the western profile, it is not clear whether they are parts of the same structure, or they belong to two different structures. The possible expansion of the trench in the future could bring more precise information about this context, although at the moment they are defined as separate structures.

Building 13 was apparently a massive house that occupied a large area, which is evidenced by the large pieces of burnt daub and the clay installations found in it (fig. 7). Its daub walls had burned intensely (SU 78), and its posts functioned as a frame and reinforcement (SU 96, 97, 103, 105, and 107). The floor was made of compact plaster (SU



Figure 10. View of building 13 from the west. Image Credit: G. Naumov.

104 and 116), and the soot sediment that covered it, came from the fire in the building, but also from certain household activities (SU 85, 89, 95, and 119) that took place between several installations: a grinding installation with a massive stone (SU 86), a larger (SU 106) and a smaller tub (SU 122), a bin (SU 117), and a concentration of several larger and smaller grinding stones (SU 120). In several areas of the floor of building 13, clusters of animal bones, weights and pottery (SU 108 and 118) were discovered in the soot layer, which suggests that food was prepared in the building and that weaving was performed as well (fig. 11).

Special note should be given to the clay installations and the grinding stones in building 13. The SU 86 bin was recorded in the north and east profile of quadrant II and as most of its remains have not still been uncovered (fig. 12), it is not clear whether it's a storage bin or an oven. Its massive walls show it is a massive installation. In front of it, there is a large grinding stone of almost perfect rectangular shape, entirely smoothed.

Remains of another large installation and walls of smaller tubs and bins were discovered south of SU 86 (fig. 7). SU 133 was recorded next to the east profile of quadrant II; damaged as it was, it could have been an oven or a grain-grinding platform. The upper surface of the burnt daub installation is smoothed but because of its bad state of preservation, its form could not be restored. North and west of it, only small walls of what are supposed to have been tubs for grain grinding were recorded. Larger and smaller grinding



Figure 11. Architectural contexts in building 12. Image Credit: G. Naumov.



Figure 12. Grinding stone installation in building 13. Image Credit: G. Naumov.

stones were uncovered in this area, which is indicative of the activities in this part of the building (fig. 11). Considering these elements in building 13, it can be suggested that they are part of a system of installations for preparing and baking bread, common for several Neolithic settlement sites in North Macedonia.

The remains of daub installations and the floor extend beyond quadrant II, and thus it can be expected that building 13 continues to the southeast. The presence of larger

installations near the east and north profiles indicates that the walls of the building are probably located in these parts, because at the Neolithic settlements in Pelagonia, such features are usually positioned in the peripheral areas of the dwellings (Grbić et al. 1960; Mitkoski 2005; Naumov et al. 2021a). In the southeast corner of the quadrant, a smaller trench was clearly outlined in the soot and ashes covering the floor of building 13, filled with small pieces of burnt daub (SU 134). It starts near SU 133 and continues straight towards the south profile (fig. 9). Since it doesn't change its direction to the west, it is yet not clear whether the trench is a corner of a structure that was later built on top of building 13, or whether it is the remains of some activities in building 13. Such trenches were also found between buildings 14 and 15.

The excavations in 2021

In 2021, the investigation of the architecture recorded in 2020 continued, but only in quadrant I, due to the smaller funding. All stratigraphic units were incorporated into the Harris Matrix, which enabled the registration of the architectural features and activities of the earliest inhabitants of the settlement (fig. 13). The work was focused on some of the earliest Neolithic buildings at Veluška Tumba, and the remaining parts of building 1 and the area around and below it were investigated. The excavation started by following the remains of its wall (SU 136/109) – one of the last contexts recorded in 2020. In this way, the excavation continued at the same place where it was stopped in the last archaeological campaign and the features that are closest to the natural were registered.

The daub wall is unevenly preserved as it was leveled before the construction of building 14. After the removal of the wall's remains, the floor was revealed (SU 137/110/123). It turned out that it is not just a single layer of plaster that is related with the floor, but it's a much more complex unit which will be discussed below. Here it is important to point out that to the east of the remains of the floor, holes of massive posts (SU 138) were recorded, which are probably associated with another wall of this building (fig. 13). Due to the small excavated area, it was not possible to determine exactly which wall of building 1 they belong to, although they seem to be related the east one.

Northeast of the remains of the floor (on which there were also overturned grinding stones) and the postholes, a hearth was discovered consisting of ashes, soot and a circle of large rocks (SU 140). Its presence further complicates the determination of the area of building 1 as it seems that the house extends to the east and this hearth could have been inside it, at least in one of its phases (fig. 14). The excavation of the floor and the hearth demonstrated the stratigraphic complexity of building 1 as below SU 137 and 140, layers of compact whitish plaster and dense soot and ashes were revealed (SU 144, 145, 148, 151, and 153) that suggest continuous and frequent renewal of the plaster and constant use of what would later be defined as a hearth (SU 140). These densely distributed stratigraphic layers indicate that one of the earliest buildings in the investigated area of Veluška Tumba was used for a very long time. Moreover, since very few animal bones and vessels

were discovered here, it seems that this area had often been cleaned. Due to the small excavation area and the absence of architectural elements in the lower layers (especially posts), it is currently difficult to confirm whether these intensive burning activities (heating or cooking) were carried out in building 1 or in an earlier building, which could not be found in quadrant I. Also, these layers of remains from fire and of plastering measure 0.38 m thick; they were recorded in a smaller unit of 2.6 by 1.2 m, and do not cover the whole area of the floor (figs. 15 and 16).

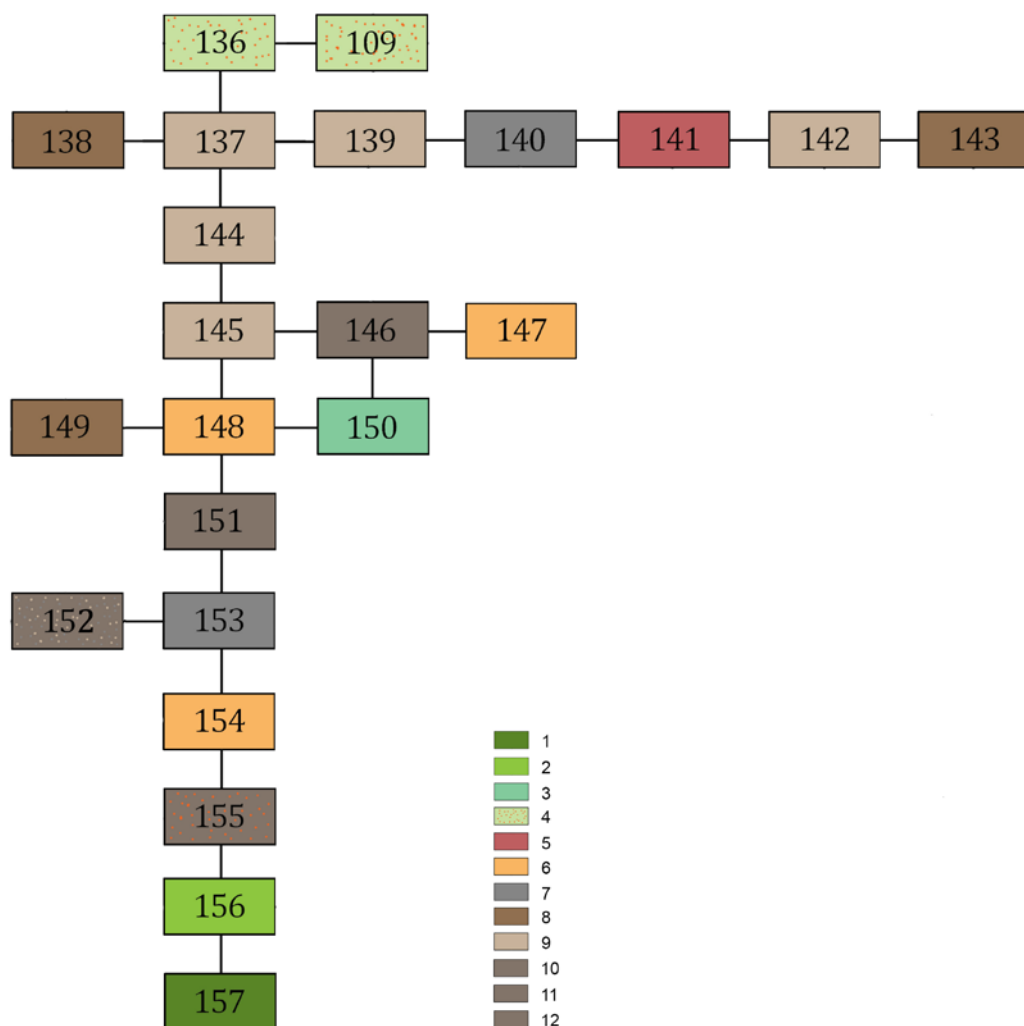


Figure 13. Stratigraphic units from the excavations in 2021. Key: (1) sandy natural soil; (2) compact clay foundation; (3) trenches; (4) unburnt daub with inclusions of small burnt daub lumps; (5) rock cluster; (6) brown soil; (7) ashes/soot; (8) posts; (9) plaster; (10) black compact soil; (11) soil with inclusions of burnt daub; (12) soil mixed with ashes and plaster pieces. Image Credit: G. Naumov.



Figure 14. View of the earliest buildings at Veluška Tumba. Image Credit: G. Naumov.

North and east of the floor (and the layers below it), there is only black dense soil (SU 146) and brown soil (SU 147), respectively, containing almost no archaeological finds or architectural units, which indicates that this area was used for a completely different purpose. Only one small unit consisting of narrow trenches and furrows (SU 150) was recorded in SU 146, but it cannot be related to any structure.

A small part of building 16, which was recorded in 2020, is overlapped by building 1, but its floor (SU 124) was not found to the west. This suggests that it extends to the east, where it was probably truncated by the ditch SU 121. The remains of building 17 could be part of the same structure, but this will be cleared out in the next campaigns.

Under the layers with remains of plastering and burning (building 1), sediments containing no plaster and soot were uncovered (SU 154), with a larger quantity of pottery sherds. Under this unit, a dense layer of wheat grains, small pieces of burnt daub and single sherds was recorded (SU 155), which again indicates the remains of construction activities, but outside of quadrant I (fig. 15) as no remains of walls (daub and postholes) and floor (plaster) were found in this area.

Under SU 155, compact greenish clay (SU 156) was recorded that could have been used for the leveling of the natural surface (fig. 16). This is also evidenced by the virgin soil below it (SU 157), which is dark greenish fine sand. It can thus be concluded that the natural sandy terrain was leveled with compact clay layer on which the local community constructed its first houses. Such a situation has been ascertained in the earliest layers of other Pelagonian tell sites, so it can be considered that it was the regular practice of the Neolithic communities during the transformation of natural places into settlements.



Figure 15. Archaeological contexts under building 1 in quadrant I. Image Credit: G. Naumov.

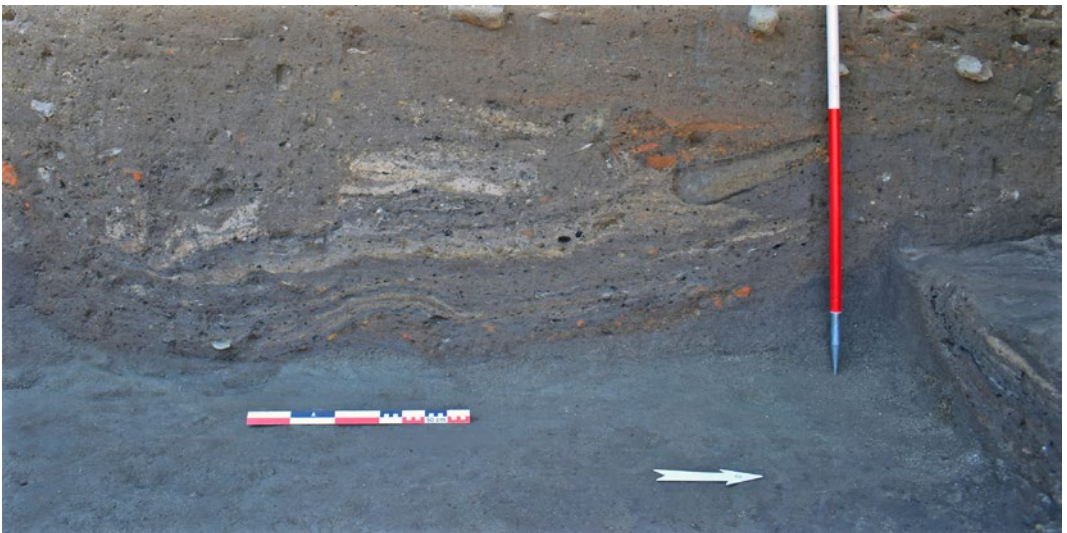


Figure 16. Archaeological layers above the natural in quadrant I. Image Credit: G. Naumov.

The excavations in 2022

In quadrant I, work continued on the earliest layers dating from the foundation of the settlement. The investigation in quadrant II was also resumed. The excavation area was extended to the east and south in order to uncover building 13, and for this purpose, quadrants III, IV, and V were opened. In quadrant V, no archaeological finds were discovered in context, because this area was excavated in the 1970s down to sterile soil (Simoska & Sanev 1975). Although smaller in scope, the 2022 campaign provided insights into the formation processes of the tell site and into the architectural features of some of the earliest structures at Veluška Tumba.

Quadrant I

The excavation continued of the unit whose function could not be previously identified, as well as the space around it. The work was focused on its northern part that actually ends in the middle of the quadrant. Remains of white plaster (SU 162) were found, as a continuation of the one from 2021. Considering the elongated shape and shallow depth of this feature (SU 168), it remains unclear whether it is a pit or a pit-house (fig. 17). It measures 1.78 m (NS) x 2.21 m (EW), and 4.20 m diagonally from its eastern end to the west profile of the quadrant where it is 2.10 m wide. Given its size – at least 5 m long and 2 m wide – it seems more plausible that it is a pit-house than a pit or a ditch, although no construction elements as post holes and daub walls related to it were uncovered. A single



Figure 17. Stratigraphic unit 168 in quadrant I. Image Credit: G. Naumov.

post hole (SU 184) and a pit (SU 195) were discovered on its edge. Intensive activities took place at this place that were not accompanied by the deposition of ceramic sherds (found in a very small number) or animal bones but are reflected by the formation of the following layers: soot and ash (SU 168), brown unburnt clay (SU 183), green compact sediment between them (SU 197), and greenish sediment mixed with soot (SU 206), all of them covering the natural (fig. 18).

In any case, such a feature has been identified for the first time in the North Macedonian Neolithic archaeology. It should be analyzed on the background of the characteristics and types of pit-houses in the early Neolithic Balkans, as well as of various types of pits and ditches/trenches that could have multiple uses. It should be considered especially in relation to the formation processes in the very beginning of the Neolithic settlement

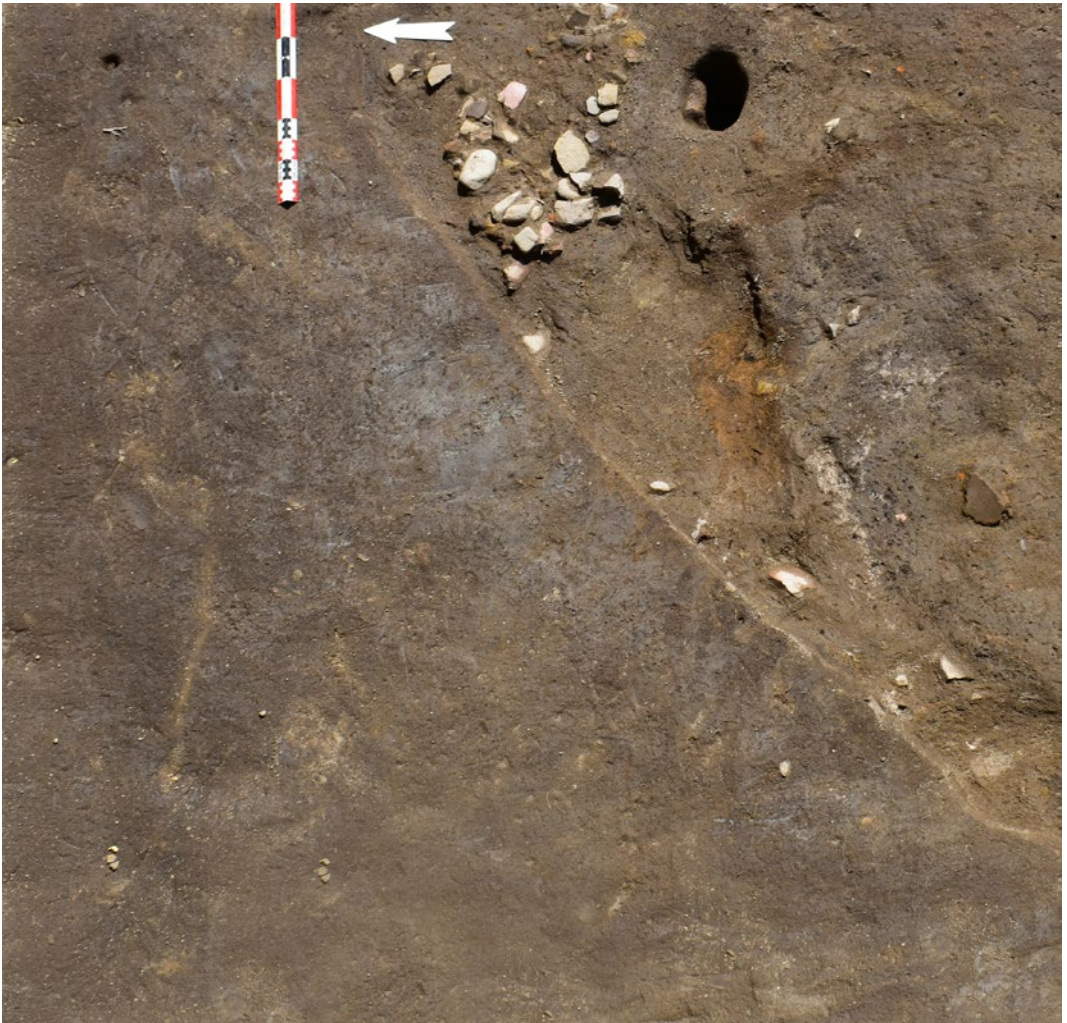


Figure 18. Archaeological context in SU 168. Image Credit: G. Naumov.

as it was created immediately after the initial leveling of the space above the sterile soil. Although structural elements (floors, walls, postholes) were not registered at this level, it does not mean that they are absent in the earliest layers of the settlement. They might be located in the area that has not yet been excavated, or, alternatively, there were pit-houses which, except in rare and poorly grounded exceptions, are not common in Pelagonia (Kitanoski et al. 1980).

Quadrants II, III, and IV

The excavation of the remains of building 13 turned out to be far more complex than what had been expected in 2021. In quadrant III, several contexts related to the storage and processing of cereals were discovered, as well as structural elements that indicate the massiveness of this house (fig. 19). After removing the daub pieces from the fallen east and south walls (SU 158), several storage bins and a partition wall were uncovered as well as a larger bin (SU 163 and 172) and a large fine pot in front of it (fig. 20).

To the southwest of this bin, a wall was discovered running southeast-northwest (SU 165). It is disturbed by a series of smaller bins (SU 174 and 176), and it is yet not clear whether this is part of another building or if it remained unfinished and was later de-



Figure 19. Remains of building 13 in quadrants II, III, and IV. Image Credit: H. Talevski.



Figure 20. Installations in the northeast part of building 13. Image Credit: G. Naumov.

stroyed in order to install the bins. It is noteworthy that in the same line of these features, to the west, another smaller bin (SU 178) was discovered, which in turn was attached to a larger elliptical bin (SU 177). This larger bin connects to a burnt daub wall (SU 186) and it is not clear whether the wall belongs to building 13 or is a part of the bin (fig. 21).

Next to it, another wall was discovered in quadrant IV running north-south (SU 187). It ends just before the bin SU 177 and the wall SU 186 (fig. 19). It remains unclear whether these features and the grinding stones uncovered in 2021 in quadrant II are part of the same building 13 or belong to different structures.

Another smaller bin (SU 164) was also discovered in quadrant IV, as well as house walls in the north profile of quadrant III, between bin SU 177 and the one discovered in 2021, with a large tile-like grinding stone inserted in it. Thus, the relationship between these three features and their connection to the same building is even more confusing, considering that there is a wall between them (SU 186 and 187). One would expect to find another parallel wall of a neighboring house next to this one, but no such wall has been discovered so far.

In several areas in quadrants III and IV, the remains of a plastered floor (SU 188) and soot sediments (SU 191–195) were recorded. Also, ca. thirty grinding stones were discovered in these two quadrants, the largest number of grinders found so far in a Neolithic house in North Macedonia. As these grinding stones are arranged around bins, it is obvious that there was an intensive preparation of flour in these facilities. The absence of an oven in this complex is surprising, but it might not have been discovered yet.



Figure 21. Installations and postholes in building 13. Image Credit: G. Naumov.

The concentration of bins in one area is particularly interesting. At least eight bins are positioned between the partition wall and the north profile, a relatively small space for such a number of installations (fig. 22). This means that the activities related to the processing of cereals took place mostly in this part of the house, although another bin was registered south of the partition wall. On the other hand, most of the grinding stones were found throughout the building and not only in the bins area, and it is an open question whether they were used during the life cycle of the house or were scattered there as a result of its symbolic abandonment; such a practice has been identified at several Neolithic sites in North Macedonia (Fidanoski & Tomaž 2010; Naumov et al. 2021a).

Material culture

Ceramic assemblage

Thousands ceramic sherds were uncovered during the excavations that enable an overview of the main typological features of vessel production in each of the discovered buildings. Although building 2 was recorded in 2019, elements of its floor and walls were also investigated in the next campaigns. The preliminary analysis of the material from this building indicates that the open and semi-open mouth bowls are the most common shape; they are made of fine fabric and are red slipped (fig. 23). Within the fine ware, the small spherical and larger jars are also typical, painted with white triangular patterns (fig.



Figure 22. Installations in the north part of building 13. Image Credit: H. Talevski.

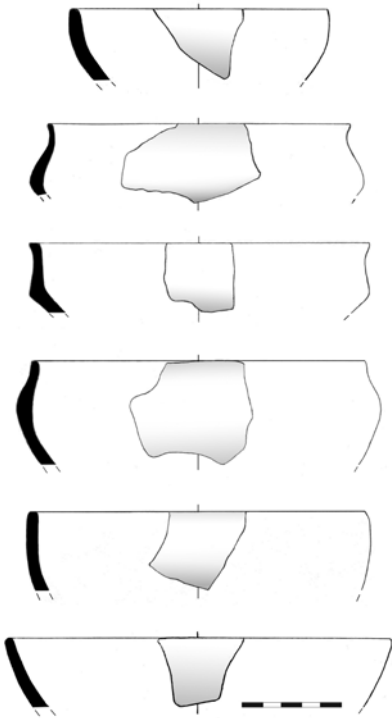


Figure 23. Early Neolithic vessels from Veluška Tumba. Image Credit: G. Naumov.

25). As for the coarse ware, low necked pots and storage jars decorated with barbotine were often in use. A perforated lid was also discovered, indicating that some of the vessels were covered, most likely to protect their contents.

Considering that a large part of building 13 was excavated, and that it is located approximately at the same elevation as building 2, several sherds were discovered corresponding to a certain extent with those of the latter structure. Semi-open, open, and closed mouth bowls predominate, some of them decorated with white painted elongated triangles, lozenges and curved lines, while a few have impressions and notches on the rims (figs. 23 and 24). Among the bowls, carinated profiles and small nipple-like buttons are common. The spherical pots and jars are also present, decorated with white painted elongated triangles, oblique and curved lines (fig. 25). The storage jars and cooking pots are also frequent in this building; some of the storage jars also have a rib inside, probably for placing a wooden drain, while others have a button-like mas-

sive handle and mat impressions on the base. Some storage jars are decorated with loosely arranged or finger trailed barbotine.

In building 14, the semi-open, open, and closed mouth bowls are common, sometimes decorated with finger impressions. Carinated bowls were also used, and some have nipple-like buttons or were decorated with black paint on a red surface (figs. 23 and 24), or with white-painted stair-like lines or strips filled with vertical lines (fig. 25). Small globular vessels were also found among the fine ware, while the coarse ware consists of low-necked pots decorated with pinched impressions, as well as storage vessels covered with barbotine, sometimes with cordons and handles near the rim or on the belly.

Building 15 is located next to building 14, but as only a small part of it was excavated, just a few sherds were found, except for fragments from semi-open mouth bowls and low-necked pots (figs. 23 and 24). Considering the posthole trench (SU 88) between these two buildings, some of the sherds from it were probably extracted from these buildings during the leveling of the surface before the construction of the later houses. SU 88 yielded closed and semi-open mouth bowls, sometimes featuring carinated profiles and decoration of finger impressions and nipple-like buttons on the rim. Other shapes include low necked pots and small cups.

The assemblage of building 1 includes closed, open, and semi-open mouth bowls, some with notched rims or carinated profiles (figs. 23 and 24). White-painted crescents and lozenges appear that are also common for the pottery from the upper layers of the site (fig. 25). Jars are often decorated with large, elongated triangles, Y-motifs, long zig-zag lines, and strips filled with oblique or vertical lines (fig. 25). Among the fine ware, small globular pots are present, while the coarse ware include low-necked pots decorated with pinched impressions and storage jars, sometimes with massive rosettes and handles or barbotine stretched in long vertical lines.

Other ceramic objects

Small ceramic finds mostly include imagery, altars, and models (fig. 26). An anthropomorphic figurine with the arms placed on the torso and a head from a zoomorphic fig-

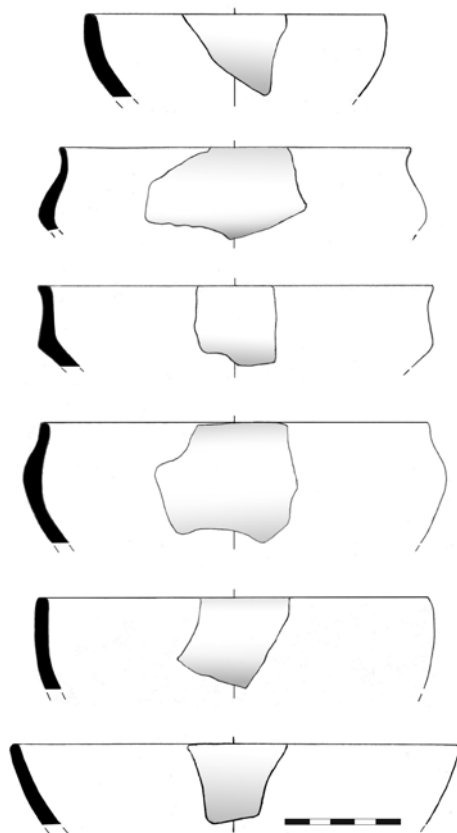


Figure 24. Early Neolithic vessels from Veluška Tumba.

Image Credit: G. Naumov.

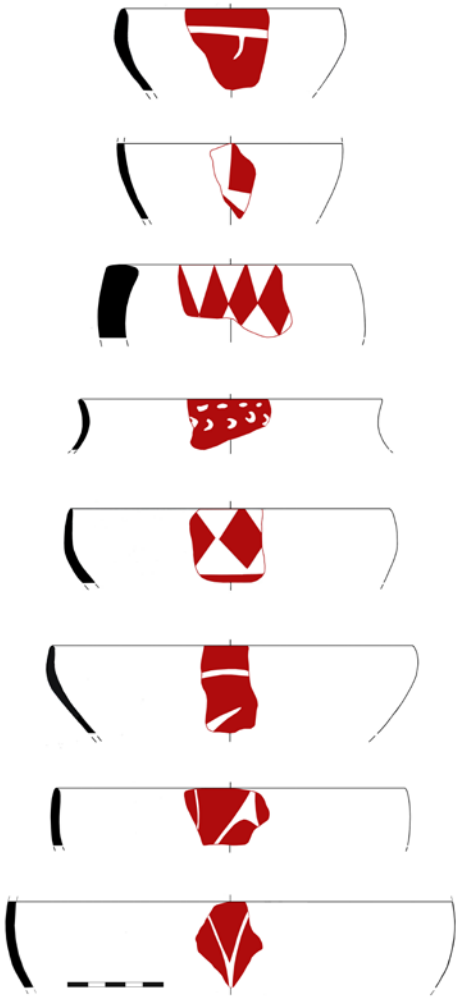


Figure 25. White-painted early Neolithic vessels from Veluška Tumba. Image Credit: G. Naumov.

urine were found in building 2, while building 13 yielded a stylized cylindrical figurine. Several fragments of elongated deer heads with conical muzzles and almond-shaped eyes were also uncovered in buildings 1 and 14. These are animal protomes typical for the high legged house models that are specific to Veluška Tumba and Tumba Porodin (Grbić et al. 1960; Simoska & Sanev 1975). The frequent appearance of deer heads at the site suggests a special relationship of the Veluška Tumba population with this animal. Several fragments from long legs that also belong to such models should be added here, quite rare, or completely absent at other tell sites in Pelagonia. This demonstrates reverence for deer at this Neolithic settlement and its inclusion in the symbolic and mythical sphere. As for the anthropomorphic house models, several fragments of cylinders and cubes were discovered in building 13. More corner- and leg fragments – one of them with zig-zag decoration – from altars ('cult tables') were found in the trench and in building 14. Several loom weights were found in building 13, and a fragment from a ceramic bracelet was discovered in building 1. All these clay objects point to particular Pelagonian traditions in the Neolithic which are associated with local beliefs and rituals, but also with the aesthetics of the inhabitants of Veluška Tumba.

Tools

Stone tools include grinding stones, grinders, flint cores, flakes and several blades. Flint tools were found in buildings 1 and 13, while flakes and cores were found in several contexts, suggesting that chipped stone production was carried out in several stages, from the earliest phases of settlement development and within the dwellings as well.

The grinding stones are numerous, especially in building 13 where they were discovered in a context related to domestic activities. There are dozens of larger and smaller grinding stones made of several types of stone. It is noteworthy that most grinding stones in building 13 were turned upside down, except for the one in front of SU 86. This again

confirms the already established Neolithic practices of turning over the grinding stones before the abandonment of the dwellings and workshops (Fidanoski & Tomaž 2010; Naumov et al. 2021a).

Several bone tools were also discovered (fig. 26), usually awls, chisels, and spatulas, mostly found in building 13 but also in buildings 1 and 2.

Conclusion

Veluška Tumba is one of the most impressive Neolithic tell sites in Pelagonia considering its stratigraphy, architecture and material culture. With an area of 4.8 ha and early Neolithic deposits measuring 3.83 m thick, it is one of the most prominent settlements in the region that shows a long Early Neolithic continuity. This is due to the excellent natural conditions in which the settlement was established, such as the proximity of a wetland,



*Figure 26. Selection of finds from the recent excavations at Veluška Tumba.
Image Credit: G. Naumov.*

fertile soils, and wealth of resources. Geoarchaeological research has confirmed the presence of early Neolithic remains 100 meters south of the tell covered with 0.80 cm of topsoil, so that Veluška Tumba may have been much larger in the initial stages or there was a smaller settlement right next to it (Naumov et al. 2020). This attractiveness of the space is also confirmed by the large number of other tells concentrated near this marshy area, such as those close to the villages of Porodin, Žabeni, Kanino, Lažec, Meditlia, Kremenica, etc. (Naumov 2021; Naumov & Stojkoski 2015; Simoska & Sanev 1976).

The excavations conducted in the last four years, as well as the geomagnetic scanning in 2017 and 2022 confirmed a linear layout of the buildings with a southwest-northeast alignment, surrounded by a double ditch (Naumov et al. 2017). The presence of a ditch has been identified in the area near buildings 16 and 17, but it remains unclear whether it dates from the Neolithic or from World War I, as was pointed out by researchers in the 1970s (Simoska & Sanev 1975). In any case, although a novelty in North Macedonian archaeology, such circular ditches are common for Neolithic settlements in the Balkans (Abazi & Tolevski 2019; Bacvarov et al. 2016; Draşovean & Schier 2010; Fidanoski 2015; Harding et al. 2006; Hofmann 2012; Kokkinidou & Nikolaidou 2004; Naumov et al. 2021a; Nikolova 2021; Parkinson & Duffy 2007; Pyke 1996; Spasić 2013).

As for the architecture, it should be emphasized that 18 buildings were recorded during the excavations of Veluška Tumba. Due to the test nature and the small area of the excavations, these buildings are partially revealed, mostly in the west stratigraphic profile of the 1970s trench. However, this test approach also allows to determine the basic characteristics of the buildings in this area. Thus, it can be concluded that most of them were not intentionally or unintentionally set on fire, while the burnt houses are very few, which somewhat differs from the practices at some other tell sites in Pelagonia, such as Vrbjanska Čuka and Tumba-Optičari (Naumov et al. 2020; Simoska & Kuzman 1990). Such is the case with building 13, which is still under investigation, and from which its northeastern part was discovered. The burning of this building allows one to perceive the massiveness of its walls, as well as the large number of bins in which cereals were processed and near which there are thirty grinding stones. This early Neolithic building contains the same architectural elements and interior as some structures at other sites in Pelagonia, but also in the Skopje and Polog regions (Abazi & Tolevski 2019; Zdravkovski 1988; Kanzurova 2021; Naumov et al. 2021a; Sanev 1988).

What makes the architecture of Veluška Tumba specific is the large elliptical cut in the earliest layers of the site that could suggest a possible existence of a pit-house. Such dwellings are rare or unrecorded in the North Macedonian Neolithic, but they are found at early Neolithic sites in Serbia and Greece, so their presence at Veluška Tumba should not be surprising (Horejs et al. 2019; Kitanoski et al. 1980; Kotskakis 2018).

Apart from the architecture, the relations of Veluška Tumba with other settlements in Pelagonia and the Balkans are evidenced by its pottery assemblage. The types of vessels used by the population of this tell site are common for the Pelagonia basin (semi-open

and open bowls, slightly carinated bowls, jars and pots), but similar shapes are present in other Balkan regions. What makes Veluška Tumba exceptional are the white painted patterns. Both in the 1970s and in the recent excavations, patterns unique to this site were recorded, but some of them are also present at other tells in Pelagonia, such as Vrbjanska Čuka and Tumba-Optičari (Naumov et al. 2020; Simoska & Kuzman 1990). Some of the white painted decorative elements of the pottery are also present in the Ohrid and Korça regions, which in turn indicates the close ties between the communities that lived in these areas (Kuzman 2017; Naumov 2016b; Ruzi 2009).

Veluška Tumba is also specific for its imagery, especially the anthropomorphic house models and the zoomorphic altars. Although these sophisticated forms of Neolithic beliefs are common for the entire Pelagonia, the elements of the human body and the architecture of the models, as well as the frequent presence of deer on the altars, is what makes this tell distinctive. Their specific features were also emphasized during the initial investigations at the site (Simoska & Sanev 1975), but the discovery of parts of such models during the new excavations points to the special character that these symbolic objects had within the early Neolithic settlement (Naumov et al. 2020).

Although smaller in scope, the research at Veluška Tumba contributed to significant new insight into the beginnings of this site. If the recent results are coupled with those obtained in the 1970s, a very thorough reconstruction of the settlement and its environment can be done. It provides an insight into almost all spheres of life of the Neolithic communities in Pelagonia and especially into the way they built the houses, made and modified the vessels, worshiped their ancestors and nature, and prepared food, clothes and domestic inventory, etc. In this way, much new information is provided that can help in interpreting the social, economic and symbolic components that were an integral part of the life of those who established Veluška Tumba and lived continuously on it. Future research at this site will continue in that direction, both in the domain of excavation and through the application of new scientific methods that will help to understand some of the first farmers in Pelagonia.

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NEOLITHIC GRINDING PRACTICES AT SVINJARIČKA ČUKA, SERBIA

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Abstract

Recent research on the neolithization process has highlighted Svinjarička Čuka as a key site in South-eastern Europe with some of the earliest well-preserved Early to Middle Neolithic (associated with the Starčevo horizon) architecture and a rich inventory of finds with analogies in Southwestern Asia. Among the latter, grinding and pounding tools are prominent due to their crucial role in plant food processing, which is one of the main components of the 'Neolithic Package'.

This paper presents a selection of 31 grinding tools comprising handstones, netherstones, pestles, mortars and abraders, which were subjected to a multivariate investigation comprising an analysis of shape and surfaces as well as use-wear and residue analysis with the aim of reconstructing foodways based on crushed foodstuffs at the site. Based on the shapes and use mode, four types of grinding kits and one type of abradar could be distinguished. Three kits were used to process low-fat grains, two of them most probably for cereals. The abraders were possibly involved in the production of pottery.

Key words: Neolithic – grinding stones – use-wear – Serbia.

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Grinding and pounding tools (GPT) and the neolithization process

Grinding and pounding tools (see table 1 for an overview of terms and definitions) are among the most frequent find categories in the archaeological record, as they are universal crushers for food stuff and other materials. Usually, they are part of the standard inventory in households, where they appear as pairs of active and passive tools.

Terms	Other known labels	Role	Use	Haptic	Possible motions
<i>Handstone</i> : flat active tools that are held horizontal.	Grinder, ball, sphere, rubbing stone, <i>Läufer</i> , <i>Molette</i> , hammerstone.	Active: it is moved on another surface	Grinding (crushing by applying pressure); pounding (crushing by hitting); dehusking.	One or two hands, depending on the size.	Horizontal: circular, oval, bidirectional flat, bidirectional pendular. Vertical: bidirectional.
<i>Pestle</i> : active tools that are held vertical.	Pounder for mortar, <i>pilons</i> , <i>Stößel</i> .	Active: it is moved on another surface	Grinding (crushing by applying pressure); pounding (crushing by hitting); dehusking.	One or two hands, depending on the size	Horizontal: bidirectional – rolling on the surface, circular-flat, bidirectional flat. Vertical: bidirectional. Oblique: circular-lateral.
<i>Netherstones</i> : passive tools standing on the ground, set into the ground, or on stone pavements and other installations.	Grinding stone, quern, slab, grinding dish, mortar, <i>mortiers</i> , <i>Reibsteine</i> , <i>Unterlieger</i> .	Passive: remains immobile during work.	Grinding (crushing by applying pressure); pounding (crushing by hitting); dehusking.	Lying horizontally or standing obliquely.	See above.

Table 1. Overview of the terminology used in the paper.

Generically, these tools are associated by archaeologists with the crushing of cereals and pulses, but there is an ample ethnographic record attesting the processing of all kinds of herbs, seeds, tubers, spices, drupes, nuts, fruits, legumes, berries, tobacco, meat and fish, and diverse types of minerals and pigments (e.g., Adams 2002; Dubreuil 2002; Dubreuil et al. 2015; Cappers et al. 2016; Nixon-Darcus & D’Andrea 2017; Shoemaker et al. 2017; Dietrich 2021a & b). In archaeological research, there was a tendency to neglect GPT, partly because their functions seemed to be clear, partly because no research agenda existed beyond provenance studies of raw materials. Another reason is the overall uniform appearance of these objects over longer periods of time. Consequently, they were considered less useful in defining chronological and regional differences – an assumption which is changing gradually (Dietrich 2022). Overall, the state of research for these tools is very inconsistent in time and space. However, in the last decades the interest in functional analyses has raised considerably (Adams 2002 & 2014; Adams et al. 2009; Dubreuil et al. 2015; Dietrich 2021a & b). Especially in periods and regions linked to the earliest large-scale integration of cereals into the diet and the onset of agricultural societies, like the period discussed here (Starčevo–Körös–Criş Culture, 6200–5500 BC), GPT have started to gain more attention, as their role as indicators for changes in subsistence, diet, innovations in cooking practices and in the development of local cuisines is a central one.

Regarding Serbia, there are two studies that include analyses of large numbers of Neolithic GPT: the comprehensive book on all macro-lithic tools done by D. Antonović (2003) comprising finds from Belovode, Čučuge, Divostin, Donja Branjevina, Lepenski Vir, Supska, Velesnica, and Vinča, and the more recent monograph by V. Vučković (2019) on macro-lithic tools from the Central Balkans, including the sites Motel Slatina, Turska Česma, Medjureč, At, Potporanj, Benska bara, Kremenilo, Vrajan, Čelina, Koraća Han, Pavlovac, Tumba Madžari, with a focus on the Late Neolithic layers from these sites. Both studies can help to integrate the finds from Svinjarička Čuka into a wider picture although the comparison to Early Neolithic finds is limited. A recent study on abrasive tools from Serbia is indicative for the reconstruction of grinding practices, too (Antonović & Dimić 2022).

In a wider picture, most of the grinding stones from Svinjarička Čuka belong in a time frame coinciding with the early stages of the neolithization process of the Central Balkans (Horejs et al. 2019 & 2022). Bulgarian, Romanian and Hungarian finds still await analysis and GPT from the Southern Balkans (esp. Greece) have been the subject of an ERC-Project but not yet fully published (Valamoti et al. 2020). Their analysis is all the more important from the perspective of innovation and traditions in foodways linked with the consumption of plants, especially with cereals, which is one of the main aspects of the ‘neolithization’ in its broader understanding as a complex process including the transmission and adoption of sedentism, domestication, of agriculture and livestock economies, and of new tools (including GPT) and technologies in order to support these changes; in other words, the adoption of a new way of life within a larger area (Sharl 2004; Schier 2009; Watkins 2008; Özdoğan 2010 & 2014; Guilaine 2019; Horejs 2019).

There is increased evidence for plant food and the wide use of natural resources like wild grasses, tubers and roots, drupes and nuts prior to the neolithization of South-eastern Europe (Zupancich & Cristiani 2020), and even the culinary practice of crushing plants, which would become common in the Neolithic, is attested (Revedin et al. 2010). Obviously, a part of the vegetal diet was (systematically?) crushed prior to consumption beyond the simple removal of shells, which can be interpreted as a cooking practice. However, tools used in this process where ad hoc implements (Cristiani et al. 2021) and even the early ‘pestle’ from the Franchthi Cave used both for grinding and pounding of tubers, rhizomes or nuts (Revedin et al. 2010) is not a standardized tool.

This changed in the Neolithic. At the time when the Balkans were ‘neolithized’, a broad spectrum of GPT, stone vessels, and culinary practices linked with the crushing of cereals and pulses was already in use in Southwestern Asia. Typical grinding and pounding kits from Upper Mesopotamia include netherstones used with one-or two-handed handstones and mortars and pestles (Dietrich 2021a & b). A part of these elements had already been transported along the coastline to Western Anatolia and Greece, including kits for the production of coarse flour to porridges and fine flours to breads as well as mortars and pestles. The latter are missing from Central Anatolia, which has a separate development (Dietrich 2022, with references therein).

Approximately in the mid-seventh millennium BC, surprisingly at the same time with the spread of the invention of pottery, grinding kits for the production of fine flour to bread became the supraregionally predominating tool (Dietrich 2022). Within the entirety of Southwestern Asia and in Southeastern Europe, and also at Svinjarička Čuka, the dominant type now is the netherstone with a two-handed handstone used with bidirectional motions. The handstone has the same width as the surface of the netherstone or is smaller, being used with two hands as a rule. This is a difference in comparison with Central Europe, where handstones are significantly heavier and larger than the netherstones as dominant type. However, the origin and development of the saddle querns are still under discussion (see Stroulia et al. 2017; Dietrich et al. in preparation, a). This difference as well as the absence of mortars and pestles in the latter region, the use of different rock types for the production of GPT, and the production of divergent meals mark the existence of two separate culinary provinces, one in Southwestern Asia and another one in Central Europe, with Southeastern Europe being a melting pot of convergent traditions (Dietrich 2022).

The site of Svinjarička Čuka

The neolithization process along the Vardar–Morava River Corridor forms a key for understanding the complexity of the substantial transformation from hunter-gatherers into sedentary farming communities in the Balkans starting around 6200–6000 BC. The site of Svinjarička Čuka is strategically situated within this river system on the small elevated Svinjarička River terrace northeast of Caričin Grad in the Lebane District of south Serbia (fig. 1). The site is a part of concentration of prehistoric sites in the Leskovac Basin (Bulatović & Jović 2009) which have been investigated since 2017 within the Pusta Reka Research Collaboration between the Austrian Academy of Sciences (Barbara Horejs), the Archaeological Institute in Belgrade (Aleksandar Bulatović) and the Archaeological Museum of Leskovac. This stratified site has been excavated since 2018; the main chronological phases belong to the Early and Middle Neolithic, the Chalcolithic, the Middle and Late Bronze Age, and the Early Iron Age.

The Neolithic domestic features consist of accumulations of stones, burnt clay and daub, pits and ovens, representing dwellings with stamped floor and outdoor areas; radio-carbon dates so far start from 5700 BC (Horejs et al. 2019 & 2022). Until now, an earlier and a later phase of Starčevo domestic occupation have been identified. The bedrock has not yet been reached, and even earlier structures are expected, as ^{14}C dates (ca. 6100–6000 BC) from drilling cores show (Horejs et al. 2022 & forthcoming). Most grinding stones have been found in use horizons nearby the dwellings, in pits and in outdoor areas (see chronology in table 3).

The geological setting is advantageous for the exploitation of several rock types for the production of grinding stones. The site is positioned in the Neogene Leskovac Basin at the border of the Carpatho-Balkanides to the east, and the Serbian-Macedonian Massif in the south and west (Marović et al. 2007). The complex geological setting of the



Figure 1. Above: Map showing the location of Svinjarička Čuka. Image Credit: M. Börner & L. Dietrich. Below: Aerial view of the Svinjarička Čuka River terrace to the south and the excavation trenches N1 (front) and S1 (back). Image Credit: M. Börner.

Carpatho-Balkanides is dominated by greenschists, flysch, sandstones, limestones, metamorphic rocks, volcanic-sedimentary rocks, ultramafic rocks and gabbros (Dimitrijević 1997). The principal lithological units within the Serbo-Macedonian Massif are crystal-line schists, amphibolites, gneiss, micaschists, greenschists, marbles and quartzites (Pavlović et al. 2012, 349f).

During the Miocene, the Serbian Lake System (SLS) developed, which also included the Leskovac Basin. The latter is shaped by three extensive neotectonic units, the Donja Toplica and Leskovac depressions, and the elevated Pečenjevack Block situated between the two (fig. 2). Linked to the Oligocene volcanic history of the area is the formation of the Lece Volcanic Complex (LVC), the second largest volcanic province in all of present-day Serbia. The volcanic sequence of the LVC essentially represents interlayering repeated lava flows and pyroclastic events with volcanoclastic rocks and andesites as the prevailing rock types (Kostić et al. 2017).

The two main lithologies determined for Svinjarička Čuka grinding stone assemblage are volcanic rocks (andesites) and (mica-rich) gneiss (table 3). The sources of those rock raw materials can be found in primary as well as secondary position close to the archaeological site, notably in the small river (Svinjarička) the settlement is located on. Primary sources of the volcanic rocks occur within the southeastern extension of the LVC less than 10 km west of the site. Deposits of micaschists and micaceous (biotitic) gneiss are found on every hill raising from the Leskovac Basin, including the hillock the Byzantine city of Justiniana Prima is located on.

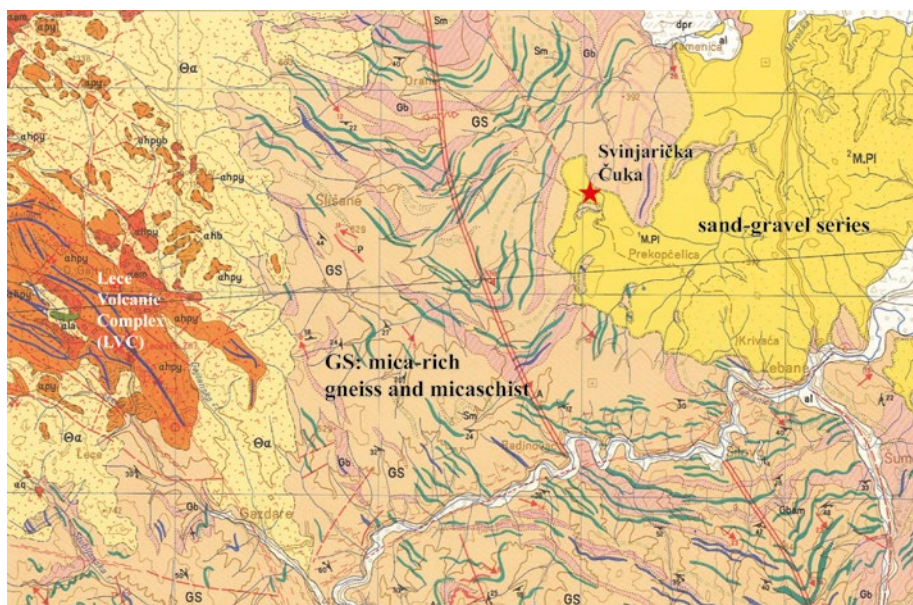


Figure 2. The geological setting around Svinjarička Čuka. Image Credit: adapted by M. Brandl from SGZB 1969.

The GPT from Svinjarička Čuka

Two main approaches used in the investigation of the GPT from Svinjarička Čuka are the functional analysis, including reconstruction of the crushed foodstuffs and meals, body positions and motions of the users, and processing techniques, and the formal analyses, including reconstruction of kits and types to reconstruct Neolithic grinding practices.

Several comprehensive studies on functional approaches of grinding and pounding tools have been published (Adams 2002 & 2014; Adams et al. 2009; Dubreuil 2002; Hamon 2008, Delgado-Raack & Risch 2008; Dubreuil et al. 2015; Hayes et al. 2018; Dietrich & Haibt 2020; Dietrich 2021a & b, all with references therein; particularly for Serbia: Antonović 2003 & Vučković 2019; Antonović & Dimić 2022). Despite of this fortunate development no common protocols on either terminology or recording procedures have been established yet. Thus, for the present study, following features and descriptive criteria have been established, with ‘markers’ being defined as combination of two or more attributes:

Attributes	Descriptive criteria
Flattening of the surface	Strong/medium/weak
Grains	Rounded/flattened/broken
Striations	Deep/fine; short/long
Polish (intensity)	High reflective/low reflective/dull
Polish (distribution)	Covering/concentrated
Erosion	Thinning down at sides and corners
Concaveness	Thinning down in a concave shape
Wear marker 1	Deep parallel gouges with rounded and flat spots in between
Wear marker 2	Flattened area with small fine striations
Wear marker 3	Loose rounded spots with fine striations
Wear marker 4	Field of scar negatives
Wear marker 5	Extended zone with flat plateaus on grains
Burning traces	Black- greyish traces
Pigments	Pigments of different colors
Breakage	Scar marks
Texture (tactile)	Very smooth/smooth/rough
Production marker 1	Flake negatives
Production marker 2	Peaking in steps
Production marker 3	Peaking
Curation marker 1	Peaking/Roughening
Curation marker 2	Both sides as active working faces

Table 2. Descriptive criteria of the attributes.

Both netherstones and handstones, as well as mortars and pestles have been recovered from the site (table 3).

No.	Code	Length cm	Width cm	Thickness cm	Weight g	Production/ Wear marker	Type	Rock	Chronol- ogy
1	CU21_0075 _07_0001	4.1	5.5	4.6	69	flatt.	hand- stone	vulca- nite	Neolithic
2	CU21_0085 _07_0001	5.4	4.3	4.4	108.9	flatt.	unde- fined	vulca- nite	Neolithic
3	CU21_0104 _07_0001 Fig. 9.4	5.6	6.5	3.7	172	WM1, flatt. burn.	nether- stone	vulca- nite	Neolithic
4	CU21_0123 _07_0001 Kit 1	14	8.2	3.2	218	WM1, flatt., burn	nether- stone	vulca- nite	Neolithic
5	CU21_0131 _07_0001 Type abrader	8.5	6.4	2.2	178	flatt., long striations	abrader	mi- ca-rich gneiss	Neolithic
6	CU21_0136 _07_0001	5.7	5.5	3.5	176	flatt., burn., long striations	hand- stone	vulca- nite	mixed
7	CU21_0155 _07_0001	5.4	5.2	4.7	158	Flatt.	unde- fined	vulca- nite	Neolithic
8	CU21_1050 _07_0001	9.3	6.4	2.7	211.6	flatt., striations, long, concave	nether- stone	sand- stone	mixed
9	CU21_1057 _07_0001 Kit 1 Fig. 8	15	12.4	5.5	2150	PM1; CM1; CM2 WM1	hand- stone	vulca- nite	Bronze Age
10	CU21_1057 _07_0002 Kit 3 Fig. 6.2	20.3	8.8	7.2	1950	PM3; WM4; break	pestle	vulca- nite	Bronze Age
11	CU21_1057 _07_0003 Kit 1, 2 Fig. 5	25.5	18.8	4.6	4350	PM1; CM1 WM 1, 2, 4, 5	nether- stone	vulca- nite	Bronze Age
12	CU21_1057 _07_0004 Kit 1 Fig. 7	18	10.4	5.7	2300	PM1; CM1, CM2 WM1	hand- stone	vulca- nite	Bronze Age
13	CU21_1061 _07_0001	11.3	6.4	4.8	288	flatt.	unde- fined	vulca- nite	Neolithic
14	CU21_1061 _07_0002 Kit 1, 3				40000	PM 2; WM1; WM 3	neth- erstone (mortar)	vulca- nite	Neolithic
15	CU21_1074 _07_0001 Kit 1	2.9	4.7	5.9	96	flatt.	unde- fined	vulca- nite	mixed
16	CU21_1089 _07_0001	4.6	2.6	3.9	62.5	flatt.	unde- fined	vulca- nite	Neolithic
17	CU21_1090 _07_0001	12.6	7.9	7.9	1006	WM1, flatt., scar marks	unde- fined, possible hand- stone	vulca- nite	Neolithic

No.	Code	Length cm	Width cm	Thickness cm	Weight g	Production/ Wear marker	Type	Rock	Chronol- ogy
18	CU21_1099_07_0001 Kit 1 Fig. 6.1	14.6	13.3	5.2	1300	PM1; CM1; curated from a netherstone; WM1	hand- stone	vulca- nite	Neolithic
19	CU21_1110_07_0001	8.4	6.2	3.2	294	flatt.	unde- fined	amphi- bolite	Neolithic
20	CU21_1110_07_0002 Kit 3	33.5	22.8	16.8		PM1; PM2; WM3	neth- erstone (mortar)	vulca- nite	Neolithic
21	CU21_1111_07_0001	8.4	4.8	5.4	243	undefined	possibly hand- stone	vulca- nite	Neolithic
22	CU21_1125_07_0001	8.7	3.2	4.55	97	flatt.	hand- stone	vulca- nite	Neolithic
23	CU21_1125_07_0002	7.8	4.6	1.7	89.33		unde- fined	mi- ca-rich gneiss	Neolithic
24	CU21_1127_07_0001 Type abrader Fig. 9.1	19.6	10.6	4.9	453	WM6	abrader	mi- ca-rich gneiss	Neolithic
25	CU21_1127_07_0003 Type abrader Fig. 9.3	14.9	10.8	3.6	258	WM6	abrader	mi- ca-rich gneiss	Neolithic
26	CU21_1127_07_0004 Type abrader Fig. 9.2	13.3	11.1	3.2	573	WM6	abrader	mi- ca-rich gneiss	Neolithic
27	CU19_1054_07_0001 Kit 2	15.3	10.7	4.2	1093	WM1	hand- stone	mi- ca-rich gneiss	mixed
28	CU19_0067_07_0001	10.1	7.8	4.9	488	flatt.	unde- fined	vulca- nite	mixed
29	CU19_1051_07_0001	14.4	13.5	4.9	1276	flatt., concave, fine striations	neth- erstone	mi- ca-rich gneiss	Iron Age
30	CU22_1137_7_3 Kit 4 Fig. 10.1	47.8	35.5	18.5	4000	WM1	neth- erstone	vulca- nite	Neolithic
31	CU22_1137_7_5 Kit 4 Fig. 10.2	18.5	11.8	6.3	1700	WM1	hand- stone	vulca- nite	Neolithic

Table 3. Selection of GPT from the 2019 and 2021 excavations seasons.

Based on their shapes and deformation, they can be classified into four kits. This kind of classification is more convenient than individual classifications as it allows the

description and analyses of motion and grinding techniques in addition to shapes and deformations in a comprehensive system.

Kit 1. Flat netherstones and two-handed equally wide handstones (similar to Form 2 in Zimmermann 1988; figs. 2/1 and 5–8). For now, it seems that this is the most widespread type in the Neolithic of the Central Balkans (cf. Antonović 2003; Vučković 2019), but additional research is necessary, especially for the Early Neolithic. Grinding with this kit would be possible longitudinally or transversally on the netherstone. Experiments made with comparable replicas (Dietrich 2021a & b) allow a valid reconstruction of the processing techniques. These were based on bidirectional grinding with back- and forth motion and very hard pressure, especially due to the use of heavy handstones with both hands. During grinding, hands can be positioned either at both ends or in the middle of the handstones. Experiments show that both positions are equally effective and comfortable (Dietrich 2021b) so that the operation *modi* are most probably culturally conditioned.

Kit 1 is the most widespread at the site, as far as it can be reconstructed on fragments. All pieces (Table 3, Nos. 4, 9, 11, 12, 15, and 18) are heavily used and most of them are broken. Originally, similar netherstones may have been up to 46 cm long and up to 32 cm wide (Vučković 2019); one completely preserved piece at the site has a length of almost 27 cm and a width of almost 20 cm (Dietrich et al. in preparation, a). Most probably appropriately large natural boulders from the immediate vicinity (see above geological description) were chosen and used as grinding stones, minimizing, or avoiding the necessity of modification; flaking has been observed only on one piece (table 3, No. 11). No handstone belonging to kit 1 is completely preserved, and use-wear indicates that their length was almost consistent with the width of the netherstone. Handstones Nos.

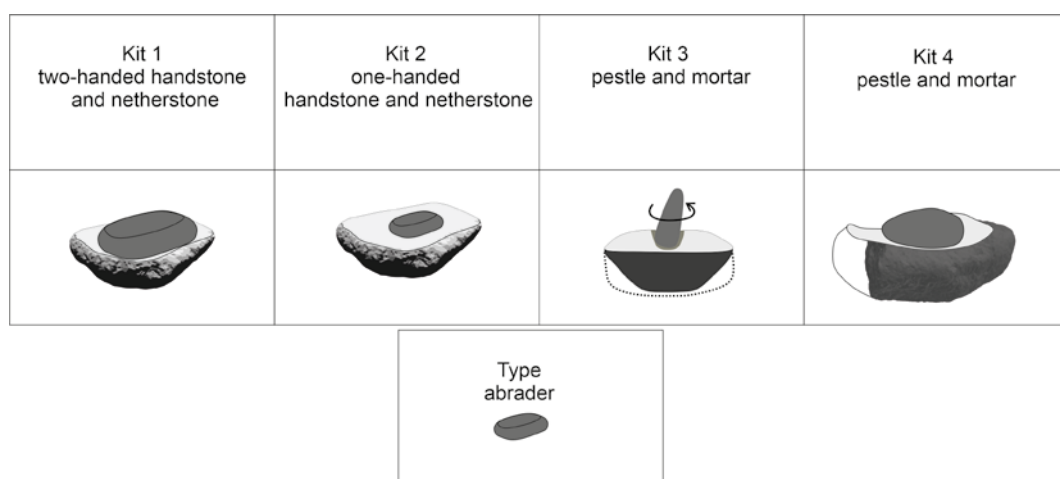


Figure 3. Schematic reconstruction of the grinding kits at Svinjarička Čuka. Image Credit: L. Dietrich.

9, 12, and 18 of ovoid or irregular contour can be attributed to this kit. Most probably, as also in the case of kit 4 (see below) handstones were recycled from broken netherstones, as indicated by some pieces with double-used faces and divergent oriented wear (fig. 8).

The typical wear marker on their surfaces is a combination of deep parallel striations and small flat and rounded spots between these lines (table 3, No. 1; figs. 4 and 5–8; Horejs et al. 2022; Dietrich et al. in preparation, b). Similar markers are attested in other Neolithic sites in Serbia (Vučković 2019, fig. 6.1.a; 6.2.20; Antonović & Dimić 2022, fig. 7) and they are consistent with the processing of hard grains to fine flour (Dietrich 2021a & b). Archaeobotanical analyses by D. Filipović revealed the presence of emmer and einkorn as main cereals at the site (Horejs et al. 2022). Thus, based on this multivariate approach, we interpret the archaeological evidence as suggesting the processing of emmer and einkorn to fine flour for bread-like products as main practice for the consuming of cereal food, and one of the most important foodways at the site.

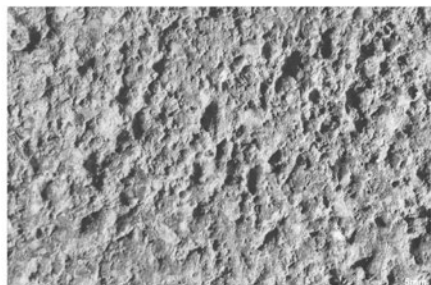
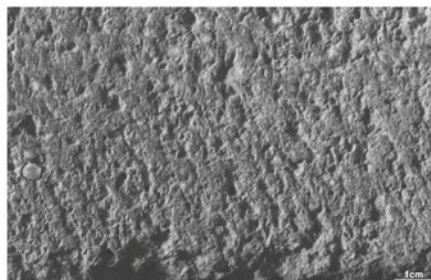


Figure 4. Wear marker 1. Image Credit: L. Dietrich.

Kit 2. Flat to concave netherstones and one-handed handstones, probably belonging to the Bronze Age. Only one complete preserved handstone (Table 3, No. 27) indicates the existence of this kit, which will not be discussed in the present paper since it is focused on Neolithic grinding kits.

Kit 3. Kits of mortars and pestles are intriguing tools which, based on ethnographic evidence from the American Southwest, have always been interpreted as pounding implements (Adams 2002). In Southwestern Asia (Dietrich 2021a & b) and Southeastern Europe (Horejs et al. in preparation) wear traces indicates that they are not used for pounding though, but for rotary grinding. The pieces from Svinjarička Čuka (table 3, Nos. 10, 14, and 20; fig. 6), which will be discussed in detail in a separate study in their specific context, represent the northern frontier of the spread of these implements; they are very similar in shape and function to their Asian counterparts (Dietrich 2021a; Horejs et al. in preparation). Objects with a depression labelled as ‘mortars’ have been found at other (Late Neolithic) sites in the Balkans (Vučković 2019) as well as in Early Neolithic Greece (Bekiaris et al. 2020). Although not numerous, some objects from the latter region

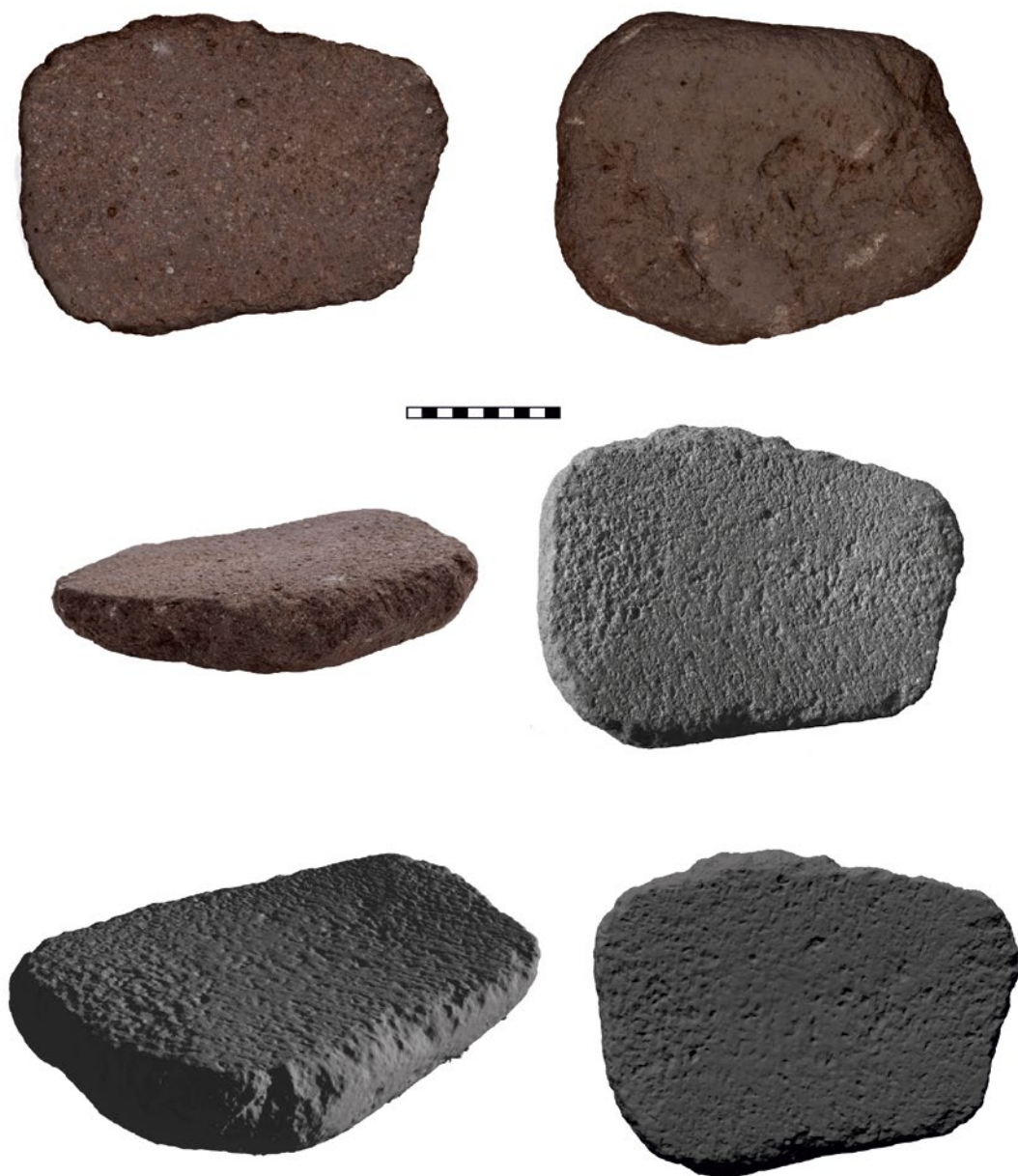


Figure 5. Grinding stone, table 3, No. 11. Image Credit: L. Dietrich.



Figure 6. Grinding stones, table 3, Nos. 10 (2) and 18 (1). Image Credit: L. Dietrich.



Figure 7. Grinding stone, table 3, No. 12. Image Credit: L. Dietrich.



Figure 8. Grinding stone, table 3, No. 9. Image Credit: L. Dietrich.

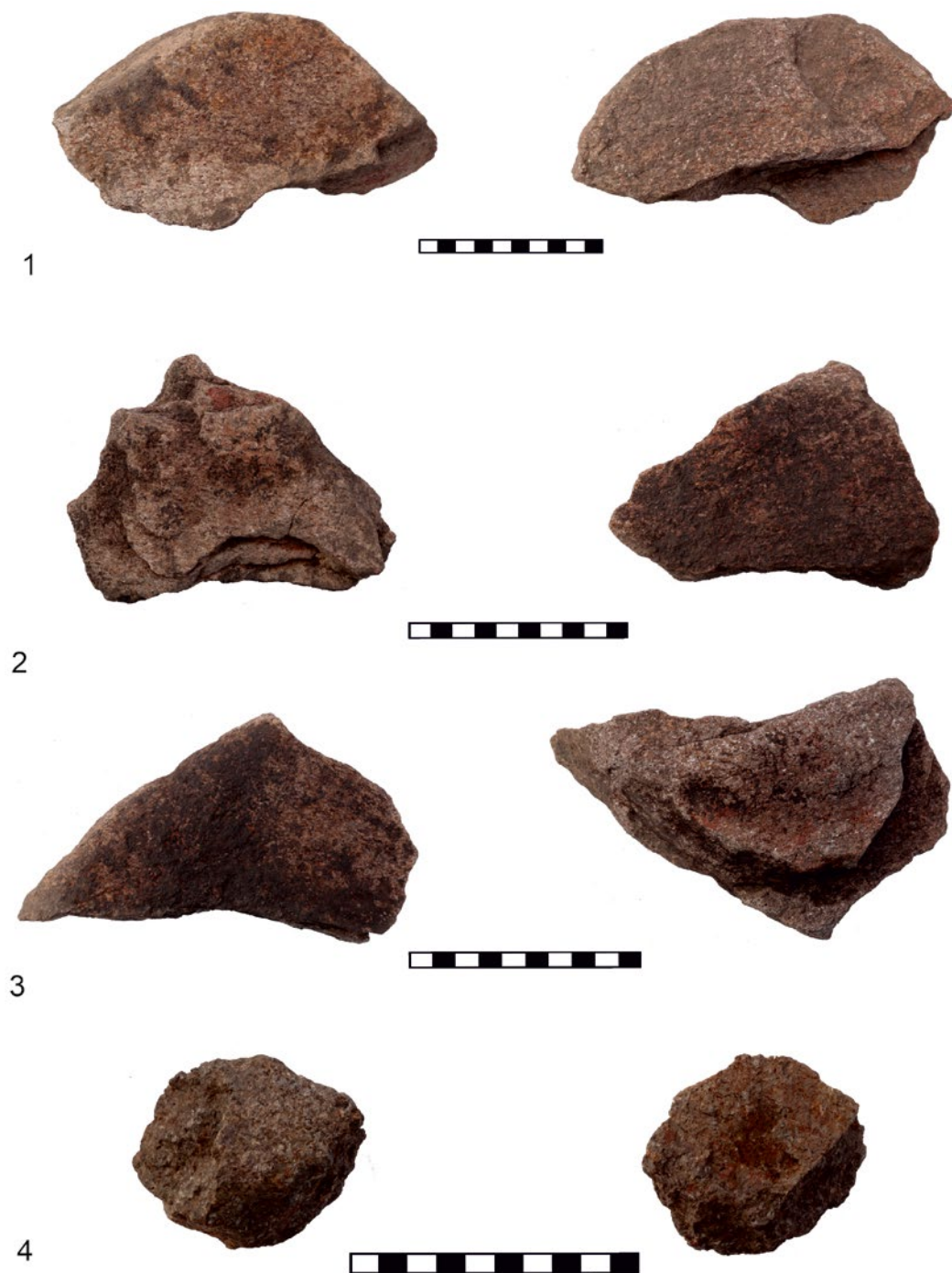


*Figure 9. Grinding stones, table 3, Nos. 15 (1), 26 (2), 25 (3) and 3 (4).
Image Credit: L. Dietrich.*

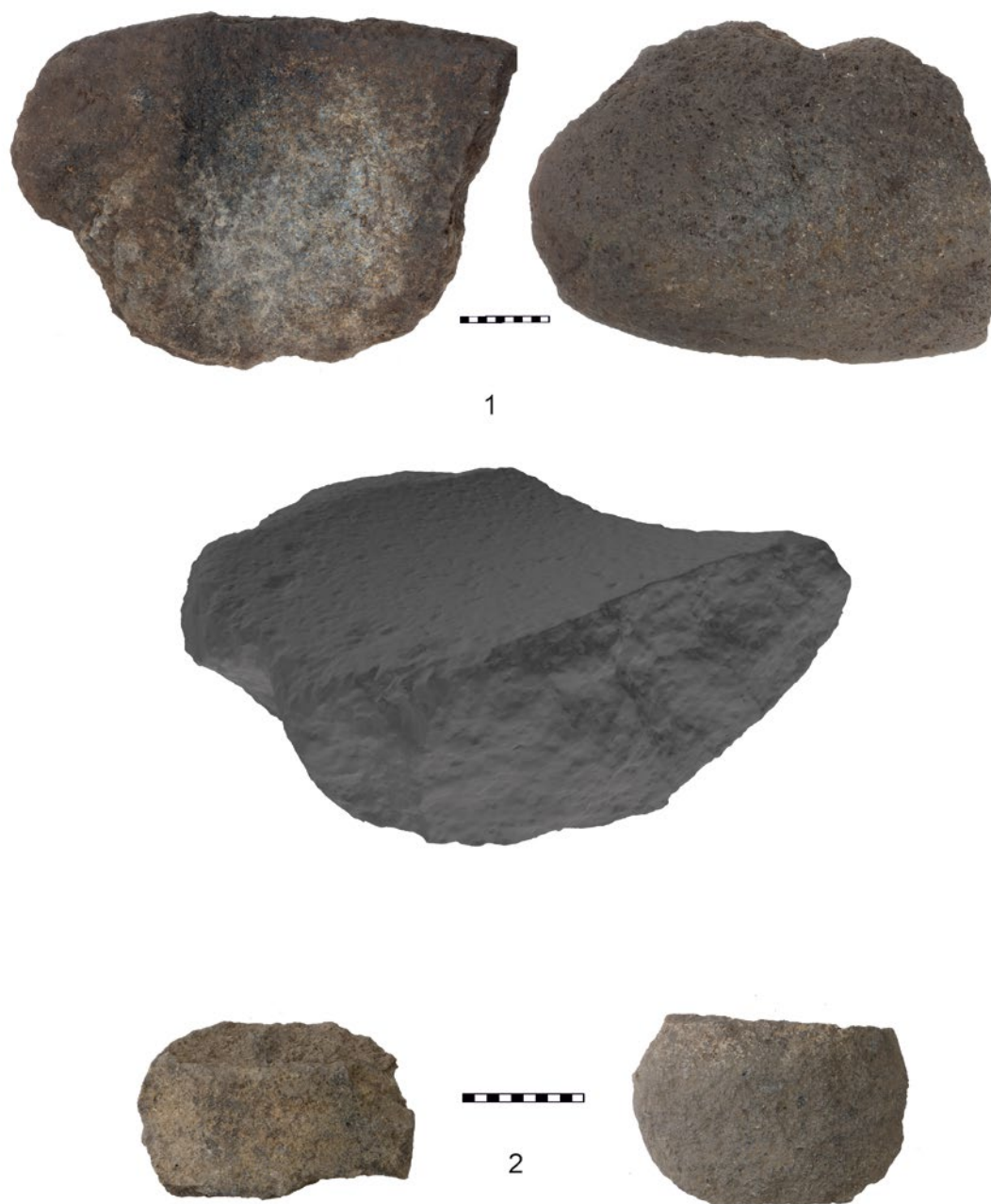


Figure 10. Grinding stones, table 3, Nos. 30 (1) and 31 (2). Image Credit: L. Dietrich.

present striking similarities with the Serbian objects, especially through their contexts – as fixed components of households’ inventories (Karamitrou-Mentessidi et al. 2015). Although earlier objects labelled as ‘mortars’ have been mentioned from Mesolithic contexts (Radovanović & Voytek 1997), they represent a different category of finds with deviant shapes and contexts, and most probably were used with different processing techniques, like pounding, as it has been already suggested (Srejšović 1969).

Up to now, the objects in Svinjarička Čuka are earlier than the previously published pieces from the Balkan Neolithic, but this most probably represents only a research gap. Hopefully, the present paper will bring this category of finds into the spotlight of Balkan research. The only preserved pestle (table 3, No. 7; fig. 6) has been shaped by pecking into a pear-like shape. Its base is heavy and rounded. Typical wear on the mortars’ working faces is rounding of the grains, which is consistent with the wear produced through rotary grinding during experiments with similar pieces of soaked pulses (Dietrich 2021a), thus possibly indicating an Anatolian influence in the Central Balkans, as a preliminary consideration for further research (see also Dietrich 2022). However, the functional reconstruction of the objects from Svinjarička Čuka is still in progress. Chronologically later pieces belonging to the Late Neolithic in the Central Balkans (Vučković 2019) show deviant wear markers and other uses, possibly representing later (local) developments.

Kit 4. Massive netherstones and heavy two-handed handstones. The existence of this kit is indicated by two pieces discovered in the 2022 excavation season, belonging to a larger complex of five GPT associated with a use horizon of the Starčevo settlement (table 3, Nos. 30 and 31; fig. 11). The working face of the thick, massive netherstone (Nr. 30) is well preserved. The netherstone has a length of almost 48 cm and a width of 35.5 cm while its weight overpasses 40 kg. This impressive size clearly indicates its (original) purpose and/or use as fix component in a household inventory, probably in the outdoor area. Wear marker 1 dominates both on the working faces of the netherstone and of the complementary handstone. The latter is broken at two sides, possibly intentionally, but its length of 18.9 cm is preserved entirely, fitting perfectly on the working face of the netherstone. The deformations of the working faces, the orientation of wear marker 1 on both handstone and netherstone, the shape of the netherstone’s base as well as the shape and weight of the handstones are indicative for the way of using and the processing techniques. We can reconstruct a bidirectional back-and-forth motion based on the moving of the handstone with both hands, repeatedly on the same trace and on a distance equal to an arm-length. Experiments (Dietrich 2021b) point at this processing as a more ergonomic way than moving the handstone on the entire face of the lighter netherstone, like with kit 1. Most probably, as indicated by its base with two sloping facets, the massive netherstone belonging to kit 4 was either sunk into the ground or fixed with stones on both sides, in a horizontal position, while the much lighter netherstone of kit 1 was only standing directly on the ground, thus being less

stable than the netherstone belonging to kit 4. Also, the body positions were possibly consequently different, as the lighter netherstone could have been placed in different heights, positions and/or on other objects.

Type 'Abraders' (table 3, Nos. 24–26; fig. 10). This term describes several hand-held tools made of schist with a uniform flat surface and deep thin parallel striations (table 2: wear marker 6) and occasional some grayish pigments, whose function is not clear yet. Blackish and reddish pigments could indicate functions for the processing of pottery, but this hypothesis needs to be verified through further analyses.

Undefined. The largest number of objects cannot be attributed to one of the four kits.

Results

Combined functional and contextual analyses show the use of Early Neolithic GPT as crushers, for (a) the processing of cereals, possibly of pulses, and (b) hypothetically, for the production of pottery. The processing of cereals and pulses was done through three main techniques, using different kits, motions and body positions for each of these techniques, as described above. Main differences between the kits (Kit 1 versus 4) regard both the processing techniques for the same, dominant meal at the site (fine flour made of cereals for bread-like products) as also the intended products (Kits 1 and 4 versus 3 for cereals or pulses).

Most finds at the site can be linked to the production of fine particles (fine flour) through bidirectional motions using two hands with very hard pressure. All finds belonging to kits of these types (1 and 4), either representing the upper or the lower part of the kit, are in fragmented condition, and have been heavily worn. Some of the GPT were clearly intended as fixed inventories of households, while most of them were discarded after use in pits or left in the outdoor areas.

Thus, excavations and related material and scientific analyses at Svinjarička Čuka offer new data for the neolithization process of the Central Balkans from insights of foodways related to processing and consuming of founder crops. A total area of 225 m² at the small elevated river terrace has been investigated so far and revealed Starčevo Neolithic domestic features of an earlier and later phase dating to the 57th and 56th centuries cal. BC with fixed installation of grinding and pounding tools. This contribution offers the first reconstruction of the grinding practices of this Starčevo-associated site, which let us assume not only various grinding and pounding techniques, but also a further insight into the neolithization process of the region. Various other domestic activities can be related with the house contexts, such as textile production, polished stone tool production or food preparation.

The domestic features of this important site have been presented recently in more details (Horejs et al. 2022). In addition, the rich pottery repertoire, including several sizes and shapes of small to very large vessels with and without decoration (Burke in Horejs et

al. 2022) indicate the probable existence of other, complementary foodways, which will be analyzed in the near future.

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SURVEYING THE NEOLITHIC FARMERS IN AEGEAN THRACE WITH DIGITAL TECHNOLOGIES

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Abstract

Some 27 Neolithic settlement sites have been recorded in Aegean Thrace thus far, of which only few have been excavated, and these by limited trench excavations providing very fragmentary evidence for their intra-site organization, architecture and other aspects of life. The exception to this is Makri near Alexandroupoli, which has been excavated almost in its whole extent revealing rich data for the organization of the settlement and the duration of its habitation. In order to improve the knowledge about the Neolithic settlers of Aegean Thrace, an ongoing project focusing on the Neolithic settlements in the provinces of Rhodope and Xanthe was designed, with the aim to investigate their intra-site organization, duration of habitation, palaeoenvironment, and environmental changes that may have affected the habitation. To this end, archaeological surface survey, multi-component geophysical research, pa-

laeogeographical and geological investigations including borehole cores, and radiocarbon dating of the samples from drilling cores were undertaken at eight Neolithic settlements. In this paper, we present the results of archaeological surface survey of the settlements and digital technologies developed and applied in this research segment with particular focus on Diomedea, which appears to stand out from the rest with its exceptionally large size.

Keywords: Neolithic – Aegean Thrace – archaeological survey – digital technologies – Xanthe Prefecture – Diomedea.

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Introduction

Archaeological investigations of the Neolithic period in Aegean Thrace were initiated a century ago with the excavations at the settlement site of Paradimi, which became an eponym of the Neolithic in the area known as ‘Paradimi culture’ (Matsas 2017; Bakalakakis & Sakellariou 1981). Since then, generations of archaeologists have contributed to the research on the beginning of farming in this region which, however, remained poorly known in spite of their efforts. The lack of data is due, in part, to the limited archaeological research on the Neolithic, but also because of the complex paleoenvironmental history of the region, which has affected the visibility of the archaeological finds. Due to the rise of the sea level during the Holocene, a large zone of the plain in the coastal area has been covered by water, while rivers and numerous streams of the Rhodope Mountain Range have formed alluvial deposits in the lowlands, contributing substantially to the constant environmental changes and the formation of lagoons, lakes and marshes (Efstratiou 2016; Koukousioura et al. 2012; Pavlopoulos 2010; Pavlopoulos et al. 2013).

The earliest evidence for the presence of farmers in Aegean Thrace comes from the settlement site of Makri in the province of Evros, where material (e.g., pottery and stone tools) characteristic for the early Neolithic was uncovered in a limited area during the systematic excavations at the site. Radiocarbon dates place the earliest activities in the settlement between 6400–6010 cal. BC (Ammerman et al. 2008, 148), or perhaps more plausibly between 6200–6100 cal. BC (Efstratiou 2016, 108). Another unique example of the presence of early Neolithic farmers in Aegean Thrace comes from the borehole core extracted from the settlement of Krovili in the province of Rhodope, which was established around 6000 BC according to radiocarbon dates (Ammerman et al. 2008, 144). Although archaeological research at Makri and Krovili has documented the presence of the early Neolithic farmers in the region, apart from the small assemblage of finds, they failed to yield any evidence of the layout, size, architecture or spatial organization of the early settlements. During the later phases of the Neolithic, from the mid-sixth millennium onward, the evidence for the presence of Neolithic farmers in Thrace gradually increases, although the data on the spatial organization, economy and other aspects of their culture remains quite scarce (Efstratiou et al. 1998; Efstratiou & Kallintzi 1994; Efstratiou & Urem-Kotsou 2006).

The number of Neolithic settlements in Aegean Thrace identified so far amounts to 27. All are located in the plain enclosed by the range of the Rhodope Mountains to the north and by the sea to the south. Most of them are known only from surface findings (Kallintzi & Papadopoulos 2010 and 2015). Exceptions to this are several sites, which were partially investigated with trial trenches or small-scale excavations like Diomedeia (Kallintzi & Papadopoulos 2010 and 2015), Lafrouda (Rhomniopoulou 1965), Paradimi (Bakalakis & Sakellariou 1981) and Paradisos (Hellström 1987), or with borehole cores like Lafrouda (Ammerman et al. 2008; Efstratiou 2016) and Krovili (Ammerman et al. 2008) (fig. 1). None of them has provided enough data for the study of settlement size, intra-site organization and the duration of their occupation, apart from Makri which has been excavated almost in its whole extent, revealing rich data for the organization of the settlement in the later habitation phases dating to the Late Neolithic (Efstratiou & Kallintzi 1994; Efstratiou et al. 1998; Efstratiou & Urem-Kotsou 2006).

Most of the identified settlement sites in the region belong to the tell type, while a small number fall into the flat-extended type. Evidence from other regions in Greece (e.g.,

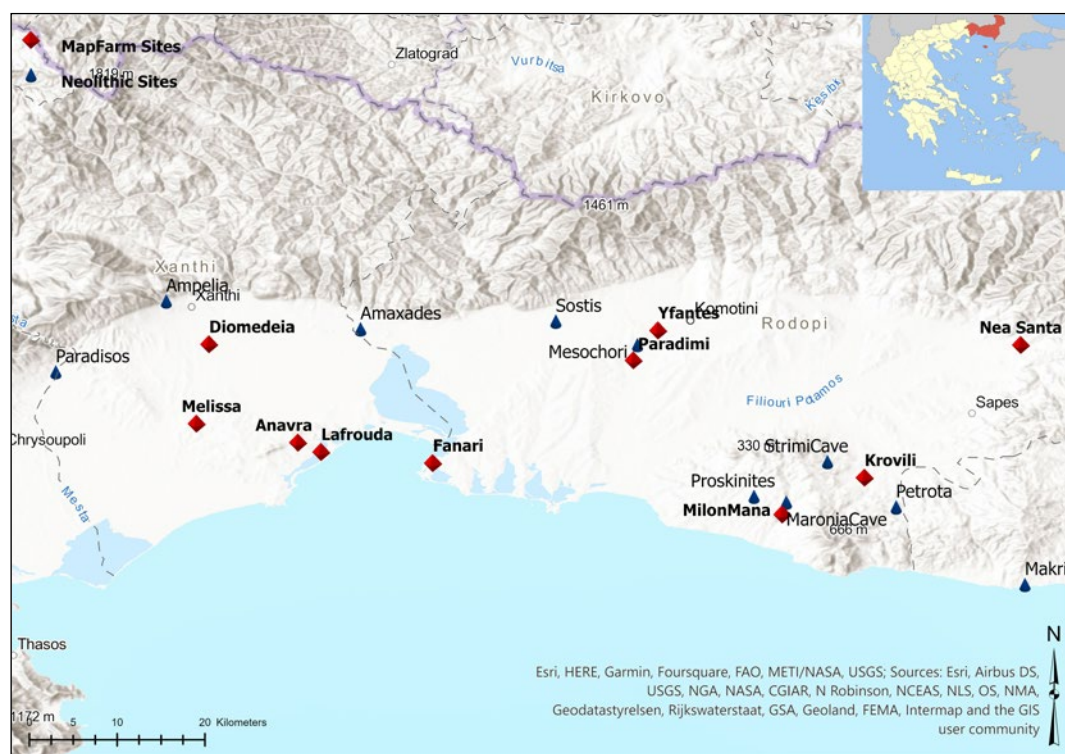


Figure 1. Map of Aegean Thrace showing the sites mentioned in the text. Image Credit: Esri, HERE, Garmin, Foursquare, FAO, METI/NASA, USGS; Sources: Esri, Airbus DS, USGS, NGA, NASA, CGAIR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community & MapFarm Research Project.

Thessaly, Central and West Macedonia), where both type of settlements were investigated by systematic excavations, suggests that tell and flat-extended sites may differ significantly in their intra-site organization and in the use of habitation space, which have been related to the social organization of their residents (Kotsakis 2014 and references therein). In the case of tell sites, the houses were more densely packed and were built one above another, on the same spot, resulting in the accumulation of the deposits and thus in the increasing height of the settlements. Conversely, the flat-extended sites are characterized by a dispersed and shifting habitation pattern, with the houses built on different spots, which resulted in the horizontal displacement of the settlement. They were less densely inhabited, with the houses separated by large open spaces.

In order to improve the knowledge about the Neolithic settlers of Aegean Thrace, we launched the project 'Mapping the Early Farmers in the Aegean Thrace' (MapFarm) focusing on 10 out of 23 Neolithic settlements identified in the provinces of Rhodope and Xanthe thus far. The aim of this ongoing project is to investigate the intra-site organization of the selected settlements, the duration of their habitation, local palaeoenvironmental characteristics and possible environmental changes in the settlement area that may have affected the habitation. To this end archaeological surface survey, multi-component geophysical research, and geological investigations were undertaken at selected sites of both tell and flat-extended type. In addition to palaeogeographical and palaeoenvironmental research, the settlements were also investigated with borehole cores that have provided samples for radiocarbon dating.

Here we present the results of the archaeological surface survey of the settlements and digital technologies developed and applied in this research segment, with particular focus on the settlement of Diomedea (fig. 2) that appears to stand out from the rest with its exceptionally large size.

The archaeological surface survey

Systematic archaeological surface survey was carried out at four tell sites (Diomedea, Paradimi, Yfantes, and Krovili), and at two flat sites (Nea Santa and Mylon Mana). The other two tell sites included in the project (Lafrouda and Fanari), and the two flat sites (Anavra and Melissa) were excluded from archaeological surface survey because of the very low visibility at all four sites (fig. 1). They are not cultivated and thus the entire surface area of these sites is covered by thick vegetation.

The aim of the surface survey was to provide evidence for the settlement size as indicated by the distribution and the density of surface finds. The chronology of the settlement habitation was approached, at this stage of research, through typology of pottery collected from the surface. To obtain accurate results for the distribution and the density of surface finds in a very short period of time, we have developed a technique for digital recording of surface finds in the field, which relies on the potentials of modern mobile devices and web technologies, in combination with the application of Geographic In-



Figure 2. The tell site of Diomedea. Image Credit: MapFarm Research Project.

formation Systems (GIS). This technique enabled direct digital recording of the exact location of artifacts in the field using mobile phones, the rapid extraction of collected data and their analysis with GIS. The application of this technique has significantly reduced the time required for recording in the field, providing at the same time a more efficient, precise and fast analysis of data.

Methodology

The systematic surface survey was based on a recording technique that employs mobile devices and web technologies. The technique exploits the GPS module of the mobile phones in order to record the exact location of each surface find, resulting in density maps of higher accuracy compared to the traditional recording techniques that use grid, which limit the accuracy by the size of the grid. In addition, the application of this technique reduced significantly the time needed to conduct the systematic surface survey, as it does not require any sort of preparation of the field (e.g., grid creation), increasing at the same time the speed of recording of surface finds thanks to the automated digital entry. Finally, the automated recording of both the total number of findings and their geographical data ruled out the possibility of random incorrect digital entries, since the survey data are initially recorded in digital form (born digital).

The trend towards the use of mobile devices, combined with the improvement of their location sensors, led to the creation of a series of mobile applications that have been

used in archaeological research (Cascalheira et al. 2014). Most of them aim to record sites of archaeological interest, such as the ALERTMobile application, which has been used to record and manage coastal archaeological sites in western France. This application led to a significant reduction of data collection time in the field, increased the degree of homogenization of data and allowed their more efficient and centralized analysis (Barreau et al. 2013). A similar system for recording, processing, managing and publishing archaeological data using mobile phones is OpenDig (Vincent et al. 2013), which was developed and used during the archaeological excavation at Amman, Jordan. Cascalheira et al. (2017) suggest the use of smartphones, in combination with external sensors, to record with high accuracy not only the geographical location of the artifacts, but also their dimensions. High performance mobile GPS receivers have been used for georeferencing archaeological objects in intensive surface survey in Alicante province in Spain (Mira 2015). More recently, Sobotkova et al. (2021) presented the deployment of a mobile digital recording system based on FAIMS Mobile Platform that digitally integrates a collection of structured data, geospatial data, photos, and text.

The digital recording technique that was developed and applied to the research in our MapFarm Project, utilizes OpenDataKit software (hereafter ODK) (Hartung et al. 2010), which is a set of open source tools that can be used in data collection and management. The software provides an application for mobile devices with Android operating system, which through a series of customized data entry forms, can be used for data collection. It also offers the ability to create complex recording forms for data collection, which may include photos, geographical locations via the GPS receiver, the ability to view or hide specific fields in the recording form, depending on the user's previous choices, execute calculations, etc. In addition, it offers an application for managing the recording forms and the data collected. This application can be installed on a web server and synchronizes the data between the mobile devices and the database. Another important feature of the ODK is that the recording forms can be filled in and stored in the mobile phone offline, while the synchronization with the server will take place when the device is back online. This is particularly important for archaeological surface surveys conducted in remote areas without internet access. The ODK software has been used to collect data in several projects, such as epidemiological surveys to record cases (Raja et al. 2014), agricultural investigations to record different kind of crops (Ouma et al. 2019), but also in archaeological research mainly for the recording of sites through extensive surface research (Deacon et al. 2018).

The archaeological surface survey of prehistoric sites in the provinces of Rhodope and Xanthi, in which the digital recording technique of the findings was applied, consisted of three stages: (a) design of digital forms for data collection, (b) recording of archaeological surface finds in the field, and (c) analysis of the data collected in the field with GIS and creation of digital maps.

Most of the land on which the selected Neolithic sites are located consists of small private fields, cultivated with a variety of crops that have influenced the organization and

the implementation of the surface survey. More specifically, each field was numbered according to the Greek cadastral maps and was investigated as a separate unit, thus facilitating the management of the individual information, the research process including recording and collection of archaeological finds. The cultivation of crops in rows helped the survey team members to walk across the field in controlled parallel to each other, four to six meters apart. The data was recorded separately by each field walker in the ODK mobile application. The recording of the archaeological finds in the data entry form includes the exact location of each finding by just clicking on the record button on the screen. Each finding is thus geolocated and the data are automatically recorded.

The recording of the archaeological finds in the data entry form includes the exact location of each finding without being collected. The exception to this were finds with characteristics that were considered useful for dating, such as ceramic sherds (e.g., handles, rims, bases), pottery with characteristic decoration and other types of specific finds (e.g., lithic tools and figurines). These were collected and stored separately according to the area they were found, for further study. In the case of findings that were of particular interest, individual recording in the field was supplemented with an *in situ* photo of the find, using a variant of the digital form which enables one to embed a photo taken with the camera of the same mobile device. After completing the surface survey in a field, the data was stored in the mobile phone. When there was an internet connection, the data stored on the mobile device was sent to the central server. The geographic data collected on the central server was then exported in a format compatible with a geographic information analysis system. To better illustrate the distribution of the finds in the area (fig. 3), digital backgrounds were created from high resolution orthophotos and 3D models of the archaeological sites using an unmanned aircraft (drone), and Ground Control Points, whose coordinates were measured with high accuracy RTK GPS receiver (Nagendran et al. 2018).

Results

The archaeological surface survey undertaken within the MapFarm Project includes six Neolithic sites located in the provinces of Rhodope and Xanthi. Collected surface pottery at most of the sites is typical for the Late Neolithic in Aegean Thrace (second half of the sixth millennium cal. BC) (fig. 4), testifying that most of the settlements were inhabited during the Late Neolithic at least in the later stages of their habitation. None of them provided evidence for habitation in the earlier phases of the Neolithic, while few were inhabited in the Early Bronze Age and during Antiquity including Diomedea.

In the study area, tell sites prevail, though flat-extended sites are not unknown. As has been proposed, different site types may have distinctive intra-site organization that may be related to the social organization of their residents. To investigate this issue, both tell and flat sites were included in the project. Precise recording of surface finds with digital techniques did not reveal clear differences between the two site types in terms of the distribution and the density of finds. It appears, however, that the concentration and the

density of finds tend to be higher in the center of the tell sites (fig. 5), though some deviate, with Diomedea being the most representative (fig. 7 and the discussion below). At the flat extended sites, which are admittedly fewer, the concentration of finds was attested in the seemingly central part of the site, although the density and distribution of finds were patchier than at tells, at least at Nea Santa where the central part of the site is also

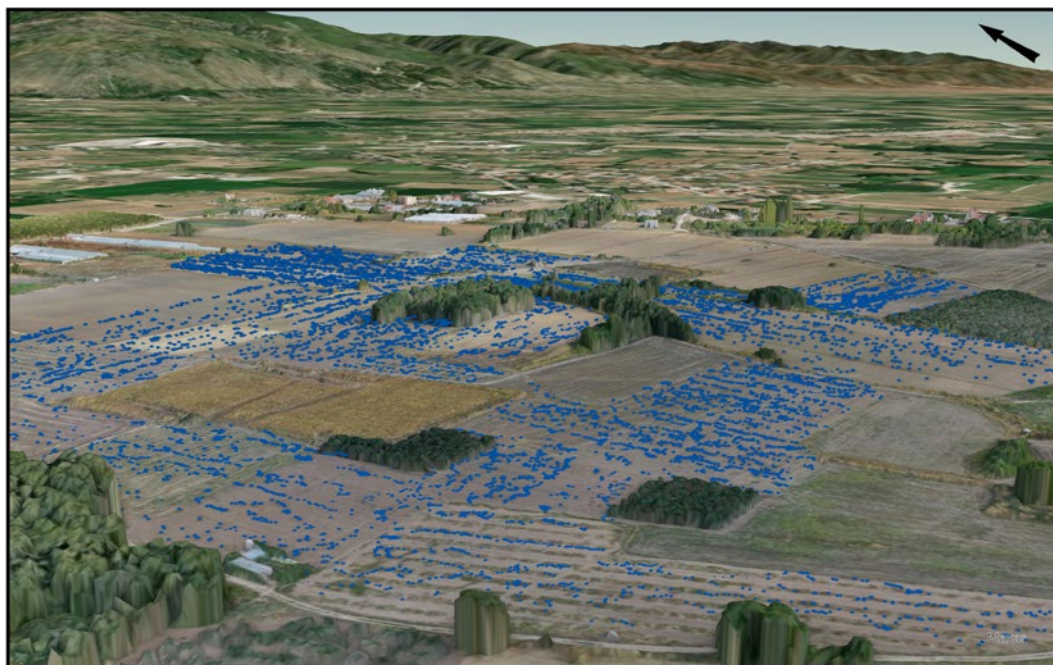


Figure 3. 3D model of the archeological site of Diomedea. The core of the tell is approximately in the center of the site, covered with trees. Image Credit: MapFarm Research Project.



Figure 4. Pottery sherds collected from the surface of the site of Diomedea. All are characteristic of the early phase of the Late Neolithic (second half of the sixth millennium cal. BC). Image Credit: MapFarm Research Project.

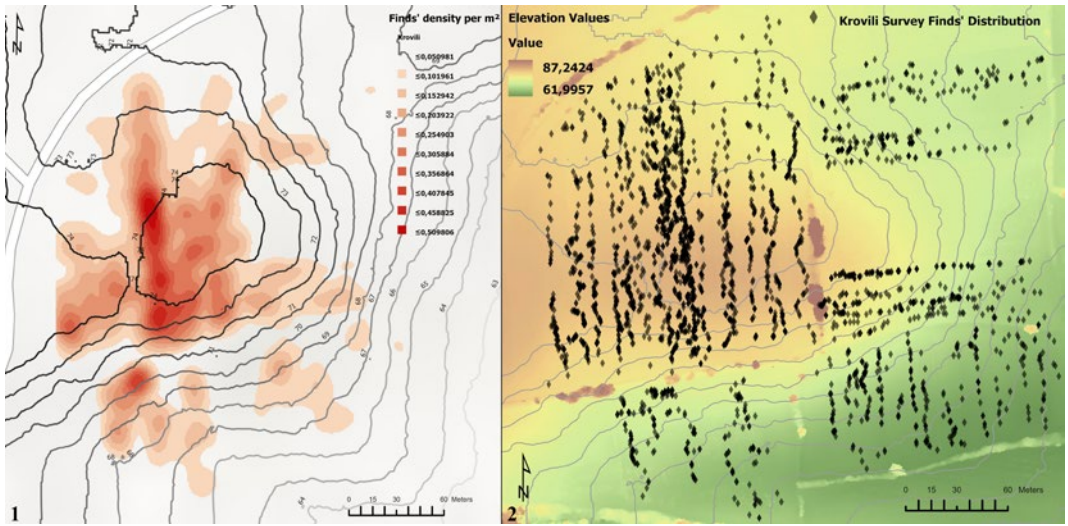


Figure 5. The tell site of Krovili. Maps showing the density (1) and the distribution (2) of surface finds. Image Credit: MapFarm Research Project.

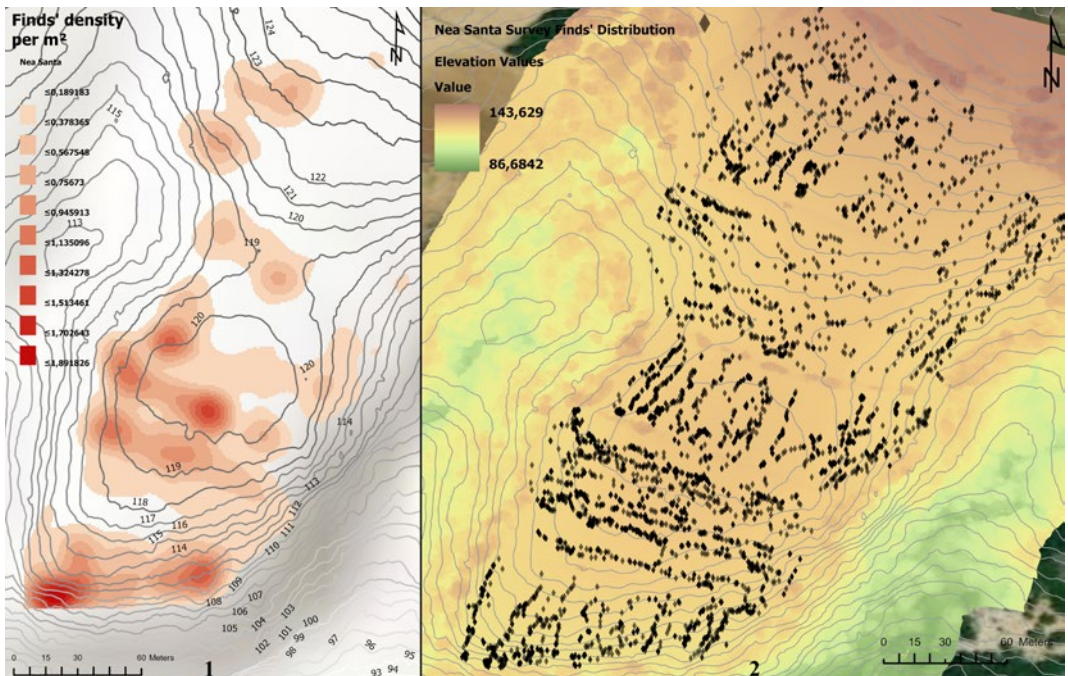


Figure 6. The flat-extended site of Nea Santa. Maps showing the density (1) and the distribution (2) of surface finds. Image Credit: MapFarm Research Project.

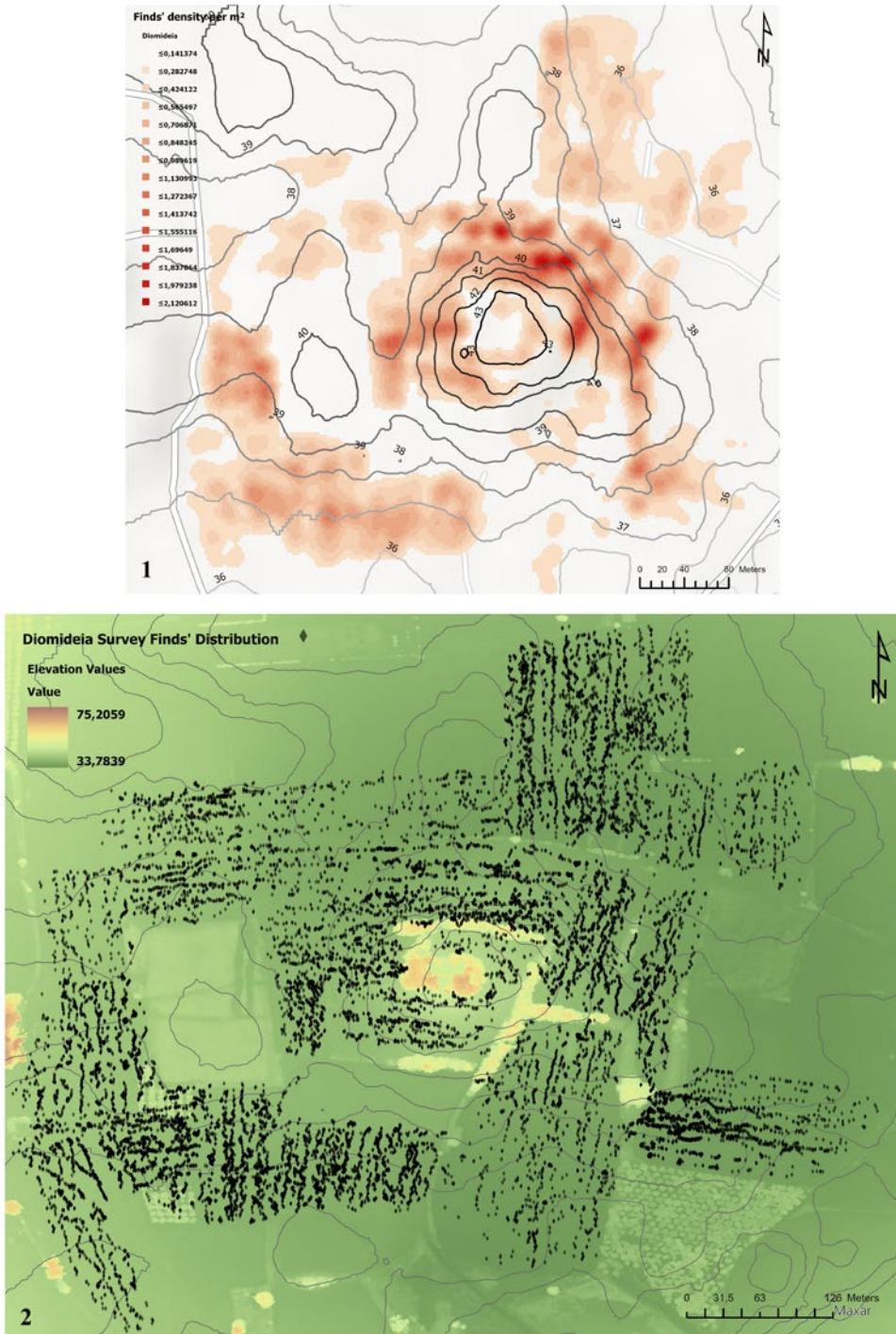


Figure 7. Diomedea. Maps showing the density (1) and the distribution (2) of surface finds. Image Credit: MapFarm Research Project.

the highest area (fig. 6). Observed differences between tell and flat-extended sites could reflect the diversity in the intensity of activities in the most recent phases of habitation of the two site types and the shallow depth of finds, which must be quite close to the surface in the areas with densely distributed finds and thus exposed easier by ploughing.

At Diomedia, areas with concentrations of archaeological finds are revealed without having a smooth fluctuation, with the highest densities of finds being observed in the southwest and northeast sector without corresponding values close to the core of the tell site (fig. 7.1). It should be mentioned, however, that some fields were not surveyed due to low visibility while others were covered by thick vegetation and therefore not accessible (fig. 7.2). Few areas at Diomedeia remained unrecorded for those reasons, but an attempt was made to systematically record the fields surrounding them in order to reduce the information gap.

The results of the analysis of collected surface pottery at Diomedeia testify to the habitation of the settlement during both phases of the Late Neolithic, the Early Bronze Age and the ancient historical times. Habitation in those periods has already been identified by archaeological investigations undertaken in the past, which have also indicated that the site must have been large in size (Kallintzi & Papadopoulos 2010, 2015, and 2017). The results of the archaeological surface survey carried out by the MapFarm Project team clearly show that Diomedeia stands out by far from the other sites regarding the extent of the area containing Neolithic surface material, indicating that the Neolithic site at Diomedeia was unusually large (figs. 8 and 9).

The distribution and the density of finds dating to different periods provide further interesting information for the habitation at Diomedeia (fig. 9). Neolithic pottery was found in all investigated fields as is the case with the material dating to ancient historical times. There are some differences, however, regarding the density of finds that belong to different periods. The density of surface material dating to ancient historical times was much higher in the eastern area of the settlement, indicating that the core of the settlement in that times was to the east of the prehistoric tell. Neolithic finds, on the contrary, were more frequent in the northern, western, and southern parts of the area around the tell and on the tell itself. The habitation in the Bronze Age appears to extend in the area to the north of the tell.

It has been suggested that the size of the prehistoric tell of Diomedeia was larger than it is today, according to the records of the local Archaeological Ephorate of Xanthe. The area of the settlement has been intensively cultivated with modern agricultural machinery, which must have contributed to its erosion. The excavations with several trial trenches indicate that the Neolithic site of Diomedeia may have been unusually large in size, a fact that the excavators have explained with dispersed intra-site habitation, at least in some parts of the settlement.

The results of the systematic archaeological surface survey at Diomedeia carried out within the MapFarm Project confirm the above suggestions. Moreover, the astonishing

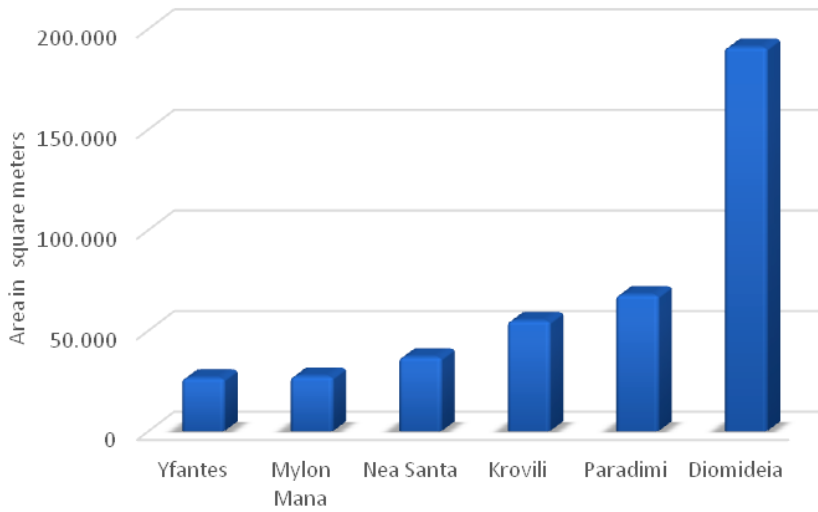


Figure 8. The total extent of the distribution of finds at six sites investigated by archaeological surface survey within the MapFarm Project. Image Credit: MapFarm Research Project.

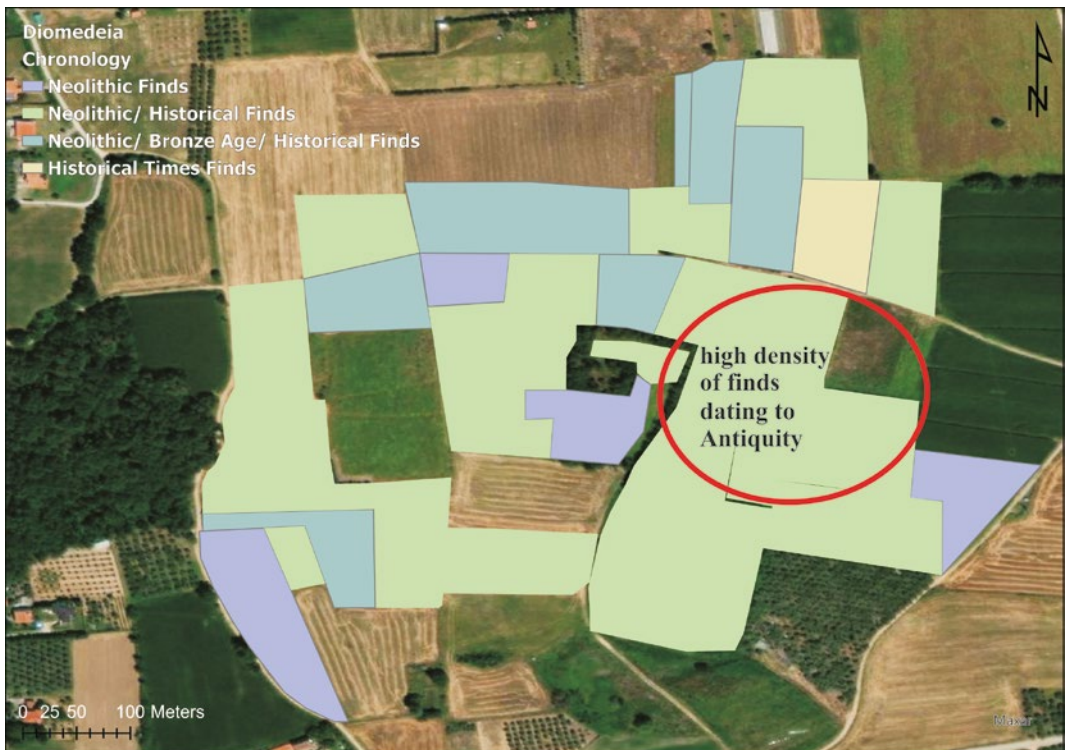


Figure 9. Diomedeia. Map showing the distribution of surface finds dating to different periods. Image Credit: MapFarm Research Project.

extent of the distribution of the recorded Neolithic finds, coupled with their density, indicates much larger area of activities during the Neolithic suggesting a complex history of the Neolithic settlement. The preliminary results of the multi-component geophysical research conducted throughout the settlement support suggestions of dispersed habitation in the area further from the mound's core.¹ In addition to the dispersed habitation, such a large size of the Neolithic settlement may also be related to a shifting habitation pattern during the long period of the early and the late phases of the Late Neolithic² in which the settlement was inhabited, according to the surface pottery. Characteristic pottery for both phases of the Late Neolithic was also uncovered during the trench excavations (Kallintzi & Papadopoulos 2017). The complex and long history of the settlement's pre-historic habitation is further supported by significant differences in the thickness of the archaeological deposits uncovered by the borehole core investigations. At the top of the tell, archaeological deposits extracted by a single drilling core measure nine meters, while three drilling cores extracted in the area with prevailing Neolithic surface material located at some distance from the tell measure from ca. 1.60 to 5.90 m.³ Numerous samples from the borehole cores that have been sent for radiocarbon dating are expected to shed further light on the habitation pattern at Diomedeia.⁴

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¹ Multi-component geophysical research has been carried out by the team from the GeoSat ReSeArch Laboratory (FORTH): A. Sarris, N. Papadopoulos, N. Argyriou, K. Simyrdanis, and D. Oikonomou (see <https://mapfarm.he.duth.gr>).

² The Late Neolithic in northern Greece lasted almost one thousand years (Andreou et al. 2001, 260, table 1). The early phase of the Late Neolithic dates to ca. 5400–4900 BC, while its later phase dates to 4900–4500 cal. BC.

³ Palaeogeographical and geological investigations including borehole core drillings were carried out by the team from the Aristotle University, School of Geology: K. Vouvalidis, I. Hronis and S. Doani (see <https://mapfarm.he.duth.gr>).

⁴ In charge of the radiocarbon dating of the samples from the investigated settlements is the team from the Laboratory for Archaeometry of the Institute of Nanoscience and Nanotechnology, Demokritos National Center for Scientific Research: Y. Maniatis, G. Polymeris, and M. E. Kyriazi (see <https://mapfarm.he.duth.gr>).

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NEW EVIDENCE ON THE EARLY CHALCOLITHIC IN THE LOWER YANTRA VALLEY: THE SITE OF ORLOVETS – PAPAZ CHESHMA, VELIKO TARNOVO DISTRICT

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Abstract

This paper presents the preliminary results of the 2020 rescue excavations that took place ahead of pipeline construction near the village of Orlovets, Veliko Tarnovo District, at a multi-period site situated on the southern slope of an elevated terrace near high flow rate springs, in an area characterized by a density of prehistoric sites. The earliest occupation of the site is represented by a series of features dated back to the first half of the fifth mill. BC. The paper aims to introduce the newly obtained empirical data as a small contribution to the general picture of habitation and diversity of the activities of the ancient communities. The Chalcolithic features include large cut features (or dug-in parts of more complex features), simple single pits and large storage vessels. The available evidence suggests a small-sized and possibly short-termed or occasional recurrent occupation in the area. The presentation of the ceramic assemblage is focused on steady and repetitive combinations of shapes and decoration techniques common for the site while the regional characteristics of the pottery style and the diagnostic chronology of certain elements are briefly addressed. Based on pottery evidence, at least two main episodes of occupation could be distinguished: an earlier phase in the beginning of the Early Chalcolithic that is related to most of the excavated features, and a later phase represented by a single feature dating to the Middle Chalcolithic.

Keywords: Chalcolithic – Yantra River Basin – cut features – human occupation – settlement pattern – ceramic assemblage – pottery style.

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Introduction

This paper presents the major results of a recently excavated Early Chalcolithic site near the village of Orlovets in the Lower Yantra Basin, with an emphasis on the field evidence and recovered materials. As the data collection is still under study, the observations and conclusions given here should be considered preliminary. For the same reason, in-depth discussions and analyses remain beyond the scope of the paper.

Cultural environment (fig. 1)¹

The village of Orlovets is well known in prehistoric studies due to the long-lasting efforts of a local archaeologist, Petar Stanev. Besides the excavations at the eponymous Neolithic site in the Ada Kuzu locality, he also initiated extensive field surveys and provided the first archaeological map of the lands of the modern village, with the location of sites and monuments spanning from the Neolithic to the Late Middle Ages (Stanev et al. 1994; Stanev 2008). He mentioned for the first time a prehistoric site situated in the Papaz Cheshma locality (Turkish for ‘the priest’s fountain’), immediately east of the fresh-water springs and the stone fountain that gives the name of the whole vicinity (Stanev et al. 1994, 89ff; Stanev 2008, 167).² According to the published information, the earliest material there dates back to the end of the Early or the beginning of the Late Neolithic. The Neolithic site (ca. 4 ha) is partially overlapped by another one (ca. 3 ha) whose surface finds have been dated to the Early Chalcolithic.³ Thus the site in question appears to be the nearest more or less contemporary presumed settlement to the Chalcolithic features excavated on the route of the pipeline in 2020 and reported in this paper.

Another Middle Chalcolithic flat site was investigated by small-scale excavations made in 2003–04 in the Erendzhika locality situated on the right bank of Lanalan Dere, a right tributary of the Yantra, ca. 2.6 km west of the modern village and 3.6 km north of the site of Papaz Cheshma (Chohadzhiev et al. 2005; Chohadzhiev, S. 2021). Possible connections between the two sites will be examined in detail further in the text. Here it is noteworthy to draw attention to the fact that the site of Erendzhika remained unnoticed by the early field surveys and was localized only after some heavy machine digging that took place there in the mid-1990s.

In the environs of Orlovets, two possible tell sites were identified at a distance of 260 m from each other, in the Bakardzhy Alan locality, some 2.5 km north of the village.

¹ The information for four of the sites shown on the map comes from the Archaeological Map of Bulgaria Automatic Information System and was kindly provided to the authors by Alexander Chohadzhiev: two tell sites, Petko Karavelovo – Manastira (registration card No. 0700127) and Lozen–Chiflika (registration card No. 10007420); and two sites in the vicinity of the village of Lozen, Doynoolu (registration card No. 0750031) and Balinovo (registration card No. 0750030).

² The site excavated in 2020 is situated in the same locality but the one identified by Stanev et al. is located on another terrace to the southeast; a small gully separates it from the excavated area.

³ The site was visited again in 2011 during field surveys along the route of the Nabucco Pipeline Project, and the provisional determination of a Neolithic/Chalcolithic site with horizontal stratigraphy was confirmed (Chukalev et al. 2012, 589).

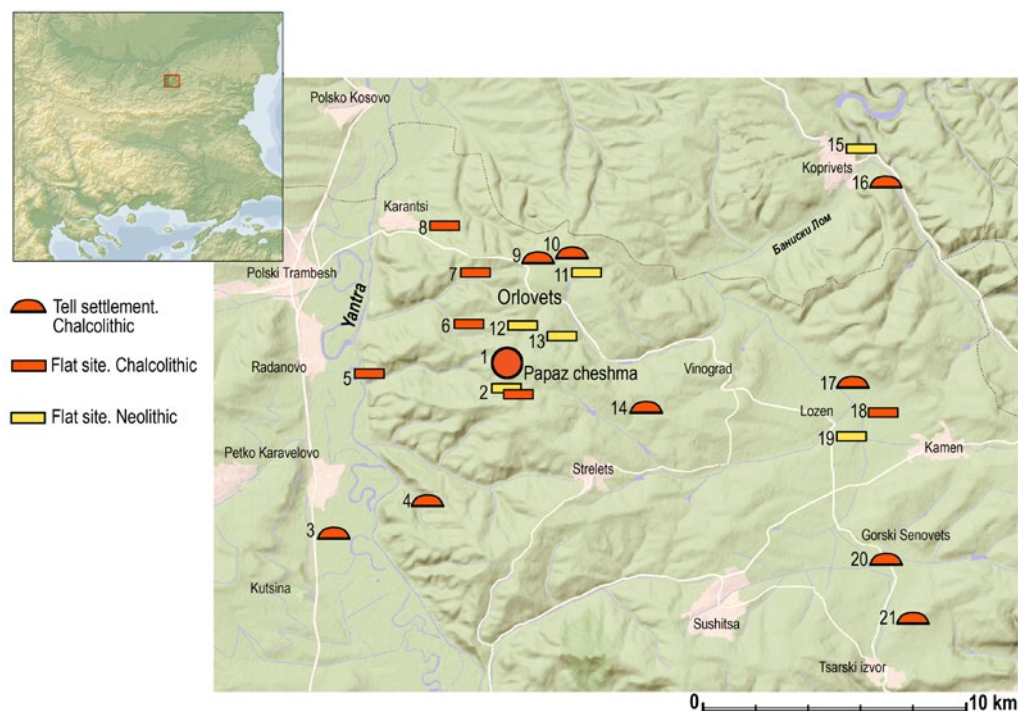


Figure 1. Map showing the major Neolithic and Chalcolithic sites in the area: (1) Orlovets – Papaz Cheshma 1; (2) Orlovets – Papaz Cheshma 2; (3) Tell Petko Karavelovo; (4) Petko Karavelovo–Manastira; (5) Radanovo – Beli Bryag/Kurta; (6) Orlovets–Domuzluka / Manda gyol; (7) Orlovets–Erendzhika; (8) Karantsi–Glava; (9) Orlovets – Bakardzhy Alan Tell 1; (9) Orlovets – Bakardzhy Alan Tell 2; (11) Orlovets – Ada Kuzu; (12) Orlovets – Stopanski Dvor; (13) Orlovets – Dyado Genova Cheshma; (14) Vinograd–Klisedzhik; (15) Koprivets–Pchelina; (16) Tell Koprivets; (17) Lozen–Doynoolu; (18) Lozen–Balinovo (19) Lozen–Chiflika; (20) Gorski Senovets – Mogilata; (21) Tsarski Izvor. Image Credit: Encarta 2008 & Google Maps and the authors.

Both yielded Early Chalcolithic surface material, while the larger one provided also material suggesting longer occupation extending into the Late Chalcolithic (Stanev et al. 1994, 92; Stanev 2008, 166). A third Early Chalcolithic tell (?) site was localized by P. Stanev in 2001 in the Manda Gyol locality, 2.5 km west of the modern village, close to a modern spring water fountain (Stanev 2008, 167).¹ In the absence of further investigations, the nature of these three sites remains questionable; still, they do suggest the existence of a network of more or less contemporary sites and hence a rather dense Early Chalcolithic occupation in the area. The list of Chalcolithic sites in the environs of Orlovets can be tentatively extended with two sites identified so far only by the field surveys in the Yantra Valley made by S. Stefanov from 1928–1950. The first one is a flat site located ca. 1 km

¹ Approximately in the same location, Early/Middle Chalcolithic pottery from a looters' trench was collected in 2005; it is shown on the map in figure 1 as Domuzluka.

east of the neighboring village of Karantsi, in the Glava locality less than 3 km NW of Orlovets-Erendzhika (Stefanov 1956, 40f, fig. 34; Leshtakov 2005, 38). The second site was localized based on scattered surface material of presumably Early Chalcolithic and Bronze Age date in the southern foothills of the so-called Bely Bryag/Kutra hillfort, the ruins of which were still visible at the time of the survey some 2 km NE of the modern village of Radanovo, at the confluence of the Yantra and Lanalan Dere, ca. 3.2 km west of Orlovets-Erendzhika (Stefanov 1956, 39).

Beyond any doubt, the most important Chalcolithic site in the area is the tell site of Petko Karavelovo located on the left bank of the Yantra, some 8 km southwest of Orlovets – Papaz Cheshma (Chohadzhiev, A. 2021, with ref.). The long uninterrupted stratigraphic sequence spanning from the Early to the Late Chalcolithic, the regular systematic investigation and the large series of radiocarbon dates (cf. Chohadzhiev, this volume) altogether provide a steady basis for correlations and comparisons and demonstrate the significance of Tell Petko Karavelovo as a key site for our understanding of the Chalcolithic in the Middle/Lower Yantra Basin.

The site: location, natural environment, excavations, general information

The village of Orlovets is located in the easternmost part of Polski Trambesh Municipality and the northeastern part of Veliko Tarnovo District, north central Bulgaria. It lies on the Yantra-Rusenski Lom watershed, the natural border between the central and the eastern part of the Danubian Plain. The archaeological site in the Papaz Cheshma locality is situated ca. 3.2 km and 214 degrees southwest of the center of the village. The landscape is dominated by hilly plains cut by a network of river valleys, deep ravines and gullies running east–west towards the Yantra River.

The site is located on the southern slope of an elevated terrace surrounded from the south–southwest by the steep scarps of a small stream that sheds its waters into the Sardere, a right tributary of the Yantra (fig. 2). According to local informants, the whole area was covered in the past by thick deciduous vegetation, dominated by *Quercus*, *Carpinus* and *Tilia* sp., preserved nowadays on the gentle hills rising along the right bank of the Yantra. Today the area of the site is arable land with a thin layer of eroded grey forest soil covering a thick loess horizon. Beneath the loess deposits, the bedrock geology around Orlovets is relatively uniform, consisting of clayey and siliceous limestones and marls of the Aptian (early Cretaceous) Kovachevets formation (Hrishev et al. 1993). Indeed, the excavation exposed outcrops of layered bedrock marls and limestone rocks on the southwestern edge of the terrace. The area of Orlovets is well-supplied with groundwater. Freshwater sources are available in the immediate proximity of the site, captured in the past in a stone fountain, the remains of which are still visible on the ground.

The archaeological investigation took place in the spring and summer of 2020. Based on the scattered surface materials, the site has a horizontal stratigraphy and a tenta-



Figure 2. Aerial images of the site and its vicinity: (1) view prior to excavations; (2) panoramic view from the southwest. Image Credit: A. Chohadzhiev.

tively estimated total area of more than 17 acres. The full-scale salvage excavation covered an area of 3.2 acres and revealed a multi-period site with more than 170 features of diverse nature, dating from the Early and Final Chalcolithic, the Late Bronze and the Iron Age, as well as sporadic remains of occupation in the time of the Second Bulgarian Kingdom (thirteenth century AD) and the early twentieth century (fig. 3; Petrova et al. 2020 &

2021). The aim of the paper, as it was stated in the beginning, is to present the major data related to the earliest period of occupation and settling of the site, the first half of the fifth mill. BC or the Early Chalcolithic according to the chronological scheme generally accepted in Bulgarian prehistory. However, an overview of the scope, parameters and the main results of the excavations is necessary in order to clarify the context and the state of preservation of the earliest features and material remains. The excavated area was limited to a strip measuring 35 m wide and 370 m long (that is, the zone affected by the pipeline construction), following the west–southwest oriented curve of the slope. Thus, the investigated area comprised two joint projections: one stretching east–west on a south facing slope, and another going down in a southwest direction on an east–southeast facing slope. The elevation range is ca. 20 m, with the highest point of 282 m.a.s.l. in the northern part and the lowest point of 262 m.a.s.l. in the southwestern part of the explored area. Hence, the surface of the explored area is sloping in more than one direction, with the slope's angle varying in the range from 4 to more than 11 degrees (fig. 2). The complicated topography, combined with deforestation and subsequent intensive tillage of the land pre-determined the poor state of preservation of cultural deposits over large parts of the area, which was affected by severe soil erosion and subsoil exposure and other natural hazards, e.g., landslides, formation of loess gullies and sediment deposition at the foot of the slope. However, the longevity of site use is combined with a certain pattern in the spatial (zonal) distribution of features pertaining to each period (fig. 3). This ultimately led to the fact that the remains of the different occupation phases are affected by varying degrees by the aforementioned negative factors.

Only ten features could be positively assigned to the Early Chalcolithic (fig. 3). Almost all of them were located over a rather limited area (ca. 200 m²) occupying the middle part of the slope (features 2, 62, 74, 75, 120, 130, 131, and 159). Besides topography, they all yielded roughly contemporary archaeological material, which allows them to be considered a unit/complex. The only exceptions are the 'isolated' feature 63 and the minute remains of feature 174, both situated at the foot of the slope. The former may be considered an 'outlier' also in terms of relative chronology, providing distinctively later ceramic material compared to the main complex, and will be described separately.

The Early Chalcolithic complex in the middle part of the slope

The available evidence (though limited by the spatial boundaries of the project) suggests a small-sized and possibly short-termed occupation of this particular area.

Noteworthy is the fact that no Early Chalcolithic ceramic material has been identified among the surface finds collected during the preliminary field survey (Chukalev et al. 2013, 595).¹ During the excavations, stray Early Chalcolithic pottery sherds were

¹ The proximity of the prehistoric site on the neighboring terrace south of the gully raised some doubts about the stated absence of similar material on the route of the pipeline. However, the same negative observation was confirmed on our first visit to the site.

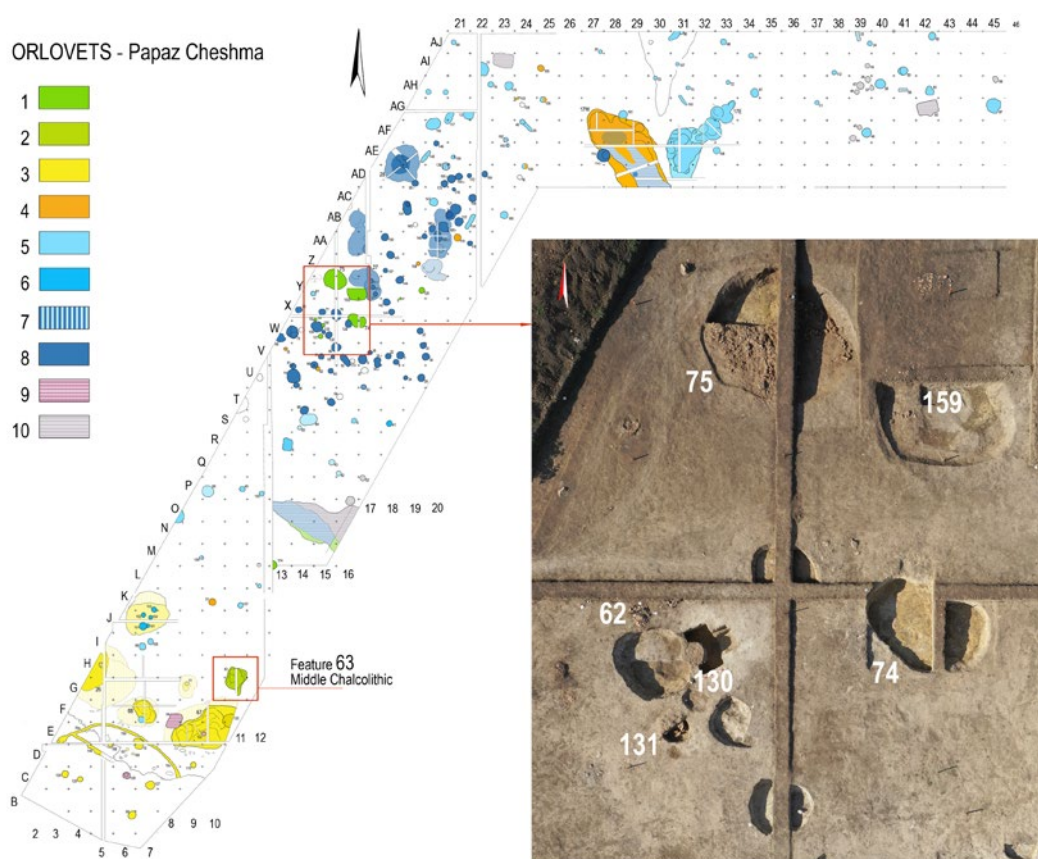


Figure 3. General layout of the site and an orthophoto of the area of the Early Chalcolithic complex: (1) Early Chalcolithic; (2) Middle Chalcolithic; (3) Final Chalcolithic; (4) Late Bronze Age; (5) Early Iron Age; (6) Early Iron Age (Basarabi); (7) Early/Late Iron Age (?); (8) Early/Late Iron Age transition; (9) Middle Ages; (10) twentieth century (1912). Image Credit: the authors & A. Chohadzhiev.

identified in the lower part of the cultural deposit exclusively in the small area outlined by contemporary features. However, no discernible cultural deposit can be securely associated with the Early Chalcolithic. Both anthropogenic and natural factors such as intensive Iron Age occupation of the same area as well as modern ploughing and erosion resulted in the obliteration of above-ground remains from this early period.

Thus, no proper dwelling remains could be identified within the explored area. All Early Chalcolithic features could be classified into three main types: large cut features (or dug-in parts of more complex features), simple single pits and large storage vessels. The latter can be subdivided into two groups: storage vessels (containers) in small pits dug especially for the purpose, and large vessels, fragmented *in situ* and partially dug into the ancient terrain.

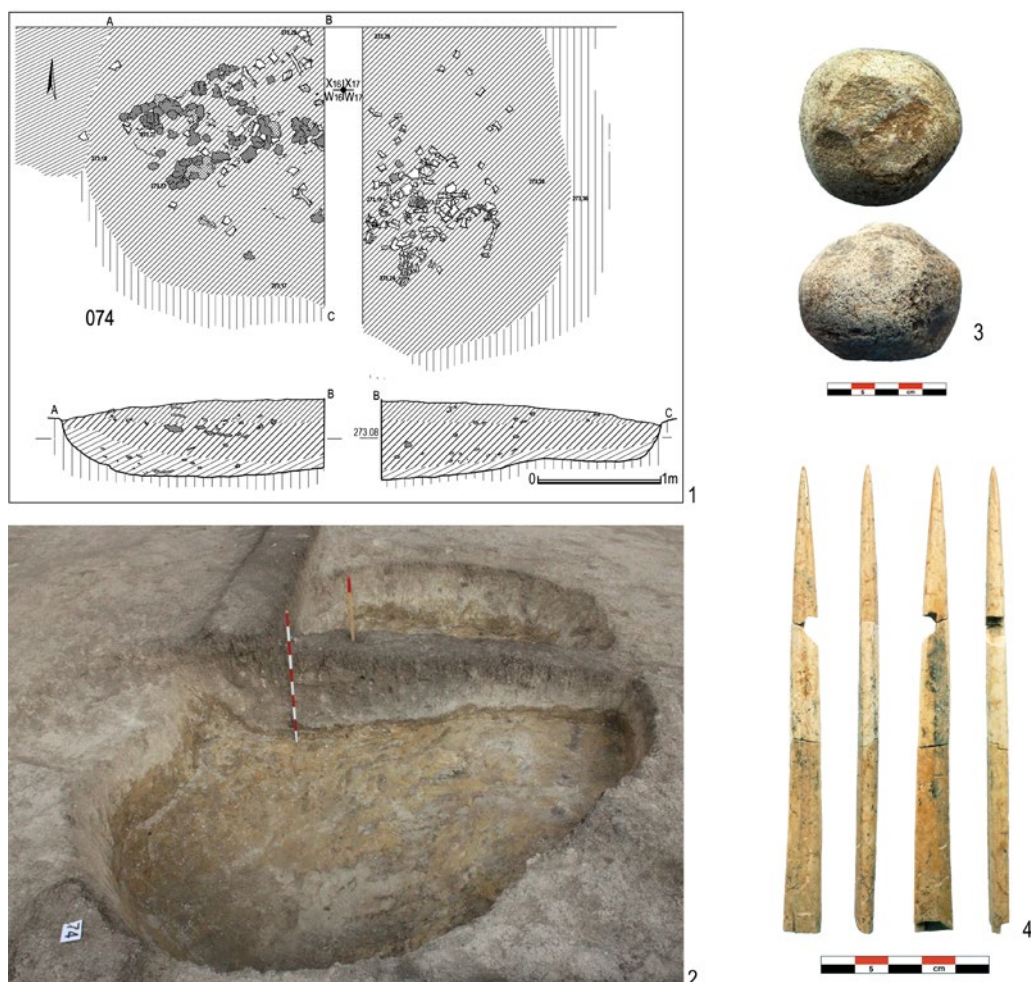


Figure 4. Feature 74: (1) layout and profile; (2) view from the west; (3) stone pestle; (4) bone projectile point. Image Credit: the authors.

The first group comprised three cut features (Nos. 74, 75, and 159), all located within an area of ca. 100 m² (figs. 3–5). All three shared some common features such as the irregular oval outlines and the large size (up to 14 m²), however, they also contained certain peculiarities, briefly described below.

Feature 74 (fig. 4). It is a large cut feature of sub-oval layout measuring 3.10 to 2.40 m, with steep sides and a fairly flat bottom, slightly deeper in the middle part. It was initially identified as an accumulation of debris lying in the lower part of the brown cultural layer. The outlines of the feature became visible at a depth of 0.40 m below the top surface (273.40 m.a.s.l.) as a darker spot against the light grey-yellowish background of the virgin soil. The maximum depth of the feature varies from 0.65 m in the eastern part to 0.85 m in the western part. Three main layers were distinguished in the fill. The upper fill was

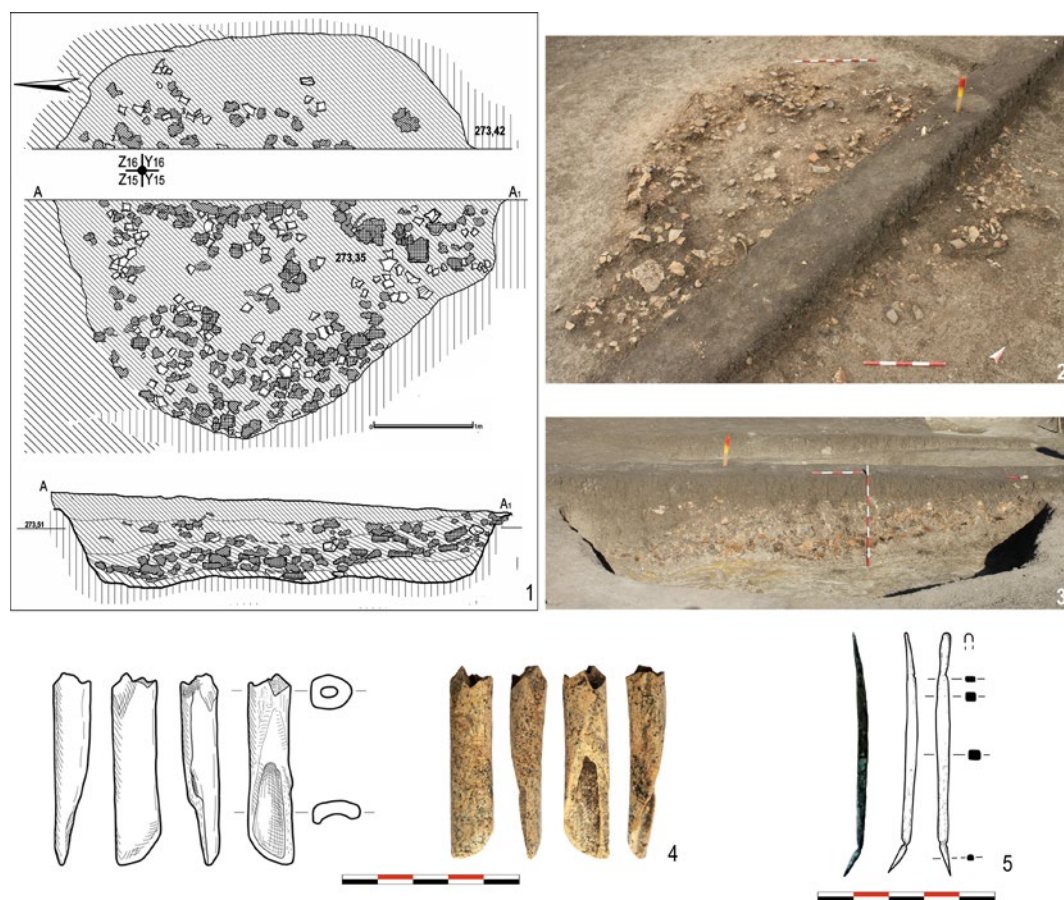


Figure 5. Feature 75: (1) layout and profile; (2) view from the southeast; (3) profile from the west; (4) bone tool; (5) metal awl. Image Credit: the authors.

of darker brown-greyish color and coarse texture, and a maximum thickness of 0.20 m. It is associated with the top accumulation of debris, comprising burnt clay rubble in the western part and scattered pottery sherds and animal bones concentrated mainly in the eastern part of the feature. An intact ceramic vessel (fig. 9.1) found upside-down is also associated with this layer. The main fill was of lighter grey-brown color and fine texture. It was comparatively abundant in pottery sherds and animal bones, however, without visible concentrations. The lowest fill was of light-mottled beige-grey sediment, accumulated mostly around the periphery of the walls.

Feature 75 (fig. 5). It was situated ca. 15 m NW of the previous one. Initially, it was identified as a large spot of compactly accumulated burnt clay rubble and ceramic sherds, all bearing fire traces. The topmost material was exposed at the basis of the brown deposit. However, the outlines of the feature became visible only after reaching the level of the light

virgin soil, ca. 0.10 m deeper. Similar to No. 74, this feature had a sub-oval layout measuring 4.5 x 4.0 m (ca. 14.5 m²), with gently sloping sides and a fairly flat bottom reached at a depth of 0.90 m. The main fill was composed almost exclusively of heavily burnt clay rubble. The top layer displayed evident signs of *in situ* weathering and abrasion. Most of the rubble can be identified as wall daub, yet only a small portion bore readily visible imprints of wooden construction. Wide and flat wooden imprints prevailed, yet examples of wattle were encountered as well. A large number of pottery sherds (with many refits) were found scattered among the clay debris. The composition of the assemblage shows equal portions of fine and kitchenware, as well as many sherds belonging to large clay containers. Almost without exception, the ceramic material bore clear signs of fire. Besides pottery, feature 75 yielded only a few other artifacts including bone (fig. 5.4) and stone tools, flint artifacts and broken grinding stones. Of special interest is the discovery of a small awl (fig. 5.5) made of copper alloy, found among the top layer of burnt debris and initially associated with the Early Chalcolithic feature (Petrova et al. 2021, 403). However, the XRF analysis indisputably proved that the artifact is made of tin bronze and should be considered intrusive.¹

Feature 159. This is the last example in the group of large pits located immediately to the southeast of No. 75. Its fill demonstrates certain similarities with feature 74 but was re-cut and badly disturbed by two large pits from the Iron Age (fig. 3).

The simple pits are represented by a single example, feature 120, located ca. 15 m east of the large cut features. The area is severely affected by soil degradation and exposure of subsoils. Thus, the remains of the pit were identified immediately below the plowzone, on the level of the virgin soil as a hardly discernible spot with circular outline, 1.1 m in diameter. The excavation revealed a shallow pit, semi-circular in section and 0.35 m deep. A few Early Chalcolithic sherds found in the topsoil nearby suggest that the upper part of the pit was destroyed by erosion and modern agriculture. The pit fill contained light grey-brown sediment, a modest amount of pottery sherds, and a poorly preserved horn tip.

The last feature type containing large storage jars is represented by four examples. One of them, feature 2 (fig. 6.1 and 2) was registered during the evaluation dig and together with feature 120 marked the easternmost point of Early Chalcolithic occupation within the explored area of the site. The remains of a large storage vessel (a thick-walled holemouth jar) were unearthed on the level of the virgin soil, immediately below the plowzone. Only the base of the vessel was preserved *in situ* and dug into the virgin soil. Rim and body parts were found fallen in the interior while a small scatter of sherds in the topsoil around the vessel suggested that the upper part of the feature was destroyed by recent ploughing.

The rest of the features were found next to each other in a small area of about 15 m² and could be regarded as a complex. One of the vessels (feature 62) was discovered frag-

¹ The contents of Sn is more than 32 percent.

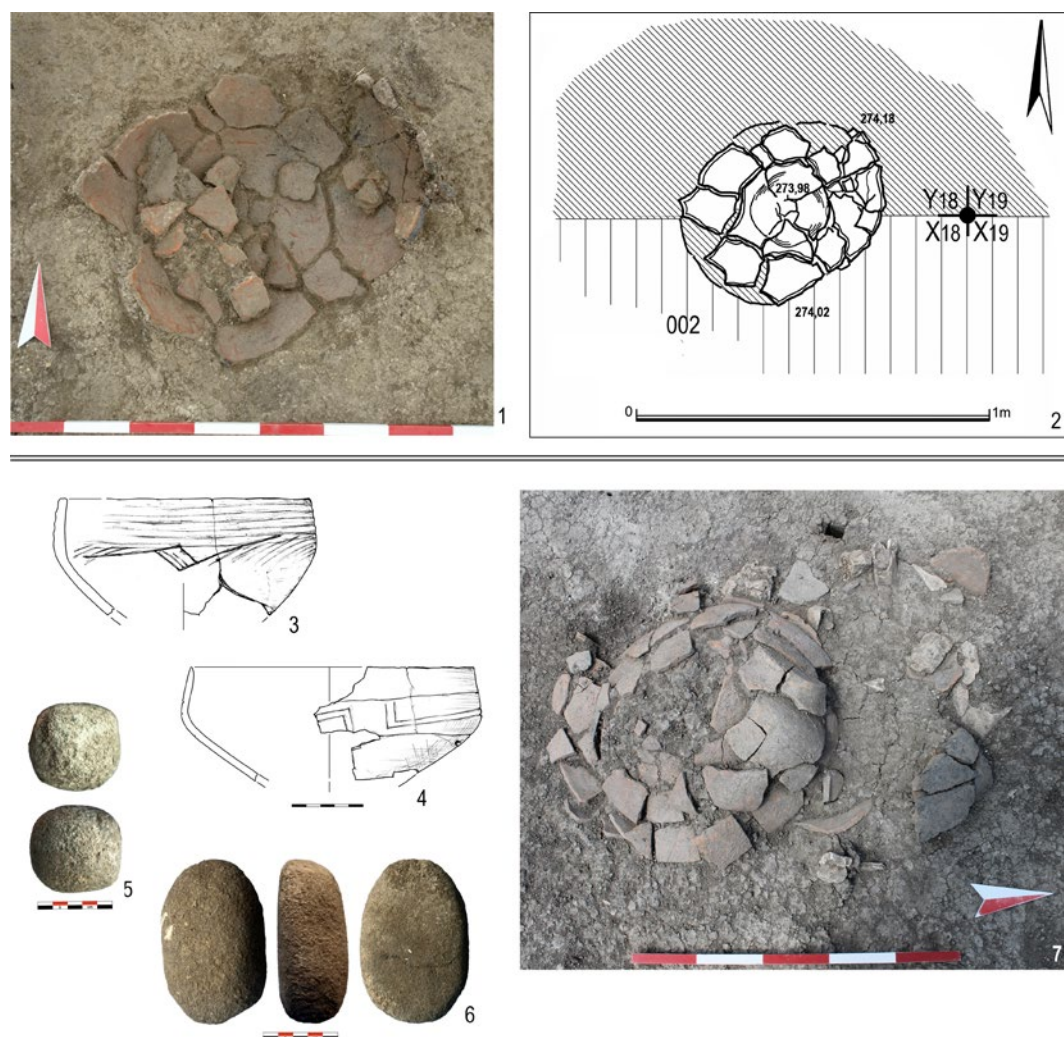


Figure 6. Features 2 and 62: (1–2) feature 2, the lower part of a storage jar dug into the virgin soil; (3–4) bowls with channeled and incised decoration from feature 62; (5–6) stone pestles, feature 62; (4) storage jar slightly dug into the subsoil, feature 62. Image Credit: the authors.

mented *in situ*, with the lower part slightly dug into the subsoil level (fig. 6.7). Both the position and the shape of the vessel are similar to that of feature 2. However, among the fragments of the vessel were discovered also refits of fine ware (fig. 6.3 and 4), cattle bones, and two stone pestles (fig. 6.5 and 6).

Of special interest are the other two features (130 and 131) registered on the same level south of feature 62 (figs. 7 and 8). Feature 130 contained a richly decorated thick-walled pithoid jar put in a small pit especially cut for the purpose (fig. 7.2–4). Its position suggested that the mouth of the vessel was originally visible above the surface. The fill of

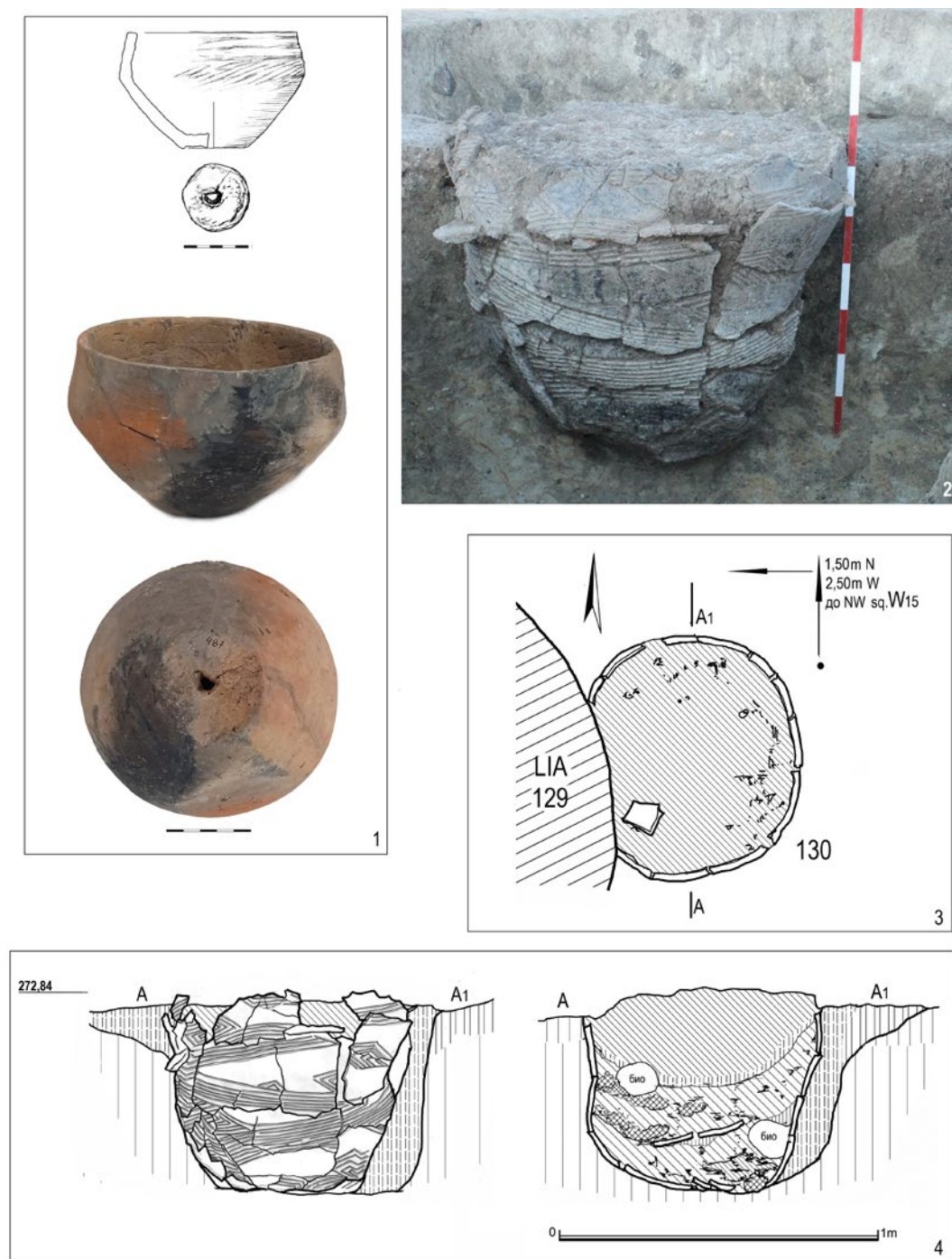


Figure 7. Feature 130, ceramic container in a pit: (1) ceramic vessel found on the bottom of the container; (2) the container, view from the east; (3–4) layout and profiles of the pit and the container. Image Credit: the authors.

the container reminds of a typical ‘household waste’: burnt clay rubble, small charcoals, animal bones, small pottery sherds, and the rim parts of the container itself. However, a small ‘deposit’ was discovered on the bottom of the container comprising the broken parts of a complete fine bowl (fig. 7.1) with a perforated base and several knucklebones that provided evidence for intentional deposition.

Feature 131 (fig. 8) was identified 1.20 m south of the previous one as a small compact heap of burnt rubble. It turned out to seal a small pit containing a second, smaller in capacity, richly decorated container (fig. 8.1). Unlike the first one, the pit was slightly larger than the vessel itself. The fill of the pit and the container was soft grey-brownish sediment, rich in burnt clay rubble and the fallen parts of the container (fig. 8.2 and 3).

Ceramic assemblage

The pottery collection from the Early Chalcolithic features uncovered in the middle section of the excavated area is still in the process of recording and analysis.¹ Hence, the paper presents an overview of the main data and the observations made should be regarded as preliminary and subject to revision. Detailed comparative analysis is beyond the scope of the study and the parallels were limited mainly to neighboring sites with well-established stratigraphy and chronology.

Technological groups and fabrics

The assemblage comprises the three main categories traditionally designated as fine or tableware, kitchenware (semi-coarse pottery), and storage jars or containers (thick-walled vessels of significant size and capacity).

The bulk of the material is highly fragmented. In most cases, the surface of the vessels is abraded to varying degrees, while a large part of the sherds bears traces of moderate to strong exposure to secondary firing. Thus, the original appearance of the vessels is only very rarely preserved, hindering the proper assessment of important criteria like fabric color, surface treatment and especially the presence or absence of additional surface coating/slip.

As a whole, the surface of most of the fine ware is carefully treated and well smoothed. Pottery fabric can be defined as ‘soft’ in touch and appearance. The paste is fine to semi-fine, tempered with tiny mineral inclusions, mainly fine-grained sand, mica and chamotte.² A small part of the analyzed sherds is in a better state of preservation and bears traces of fine slip and burnishing; it is possible to assume that similar surface treatment was common for the fine ware as a whole.

¹ Some of the pots, namely the large storage vessels, are still undergoing restoration. A detailed analysis of the whole assemblage will be the subject of a separate publication.

² Similar observations were made by P. Leshtakov when analyzing the Early Chalcolithic fabrics from Kachitsa (Leshtakov 2010, 41). In both cases, the ‘soft’ appearance of the fabric is not necessarily related to low firing temperature but might be also the result of specific post-depositional processes and/or conditions.

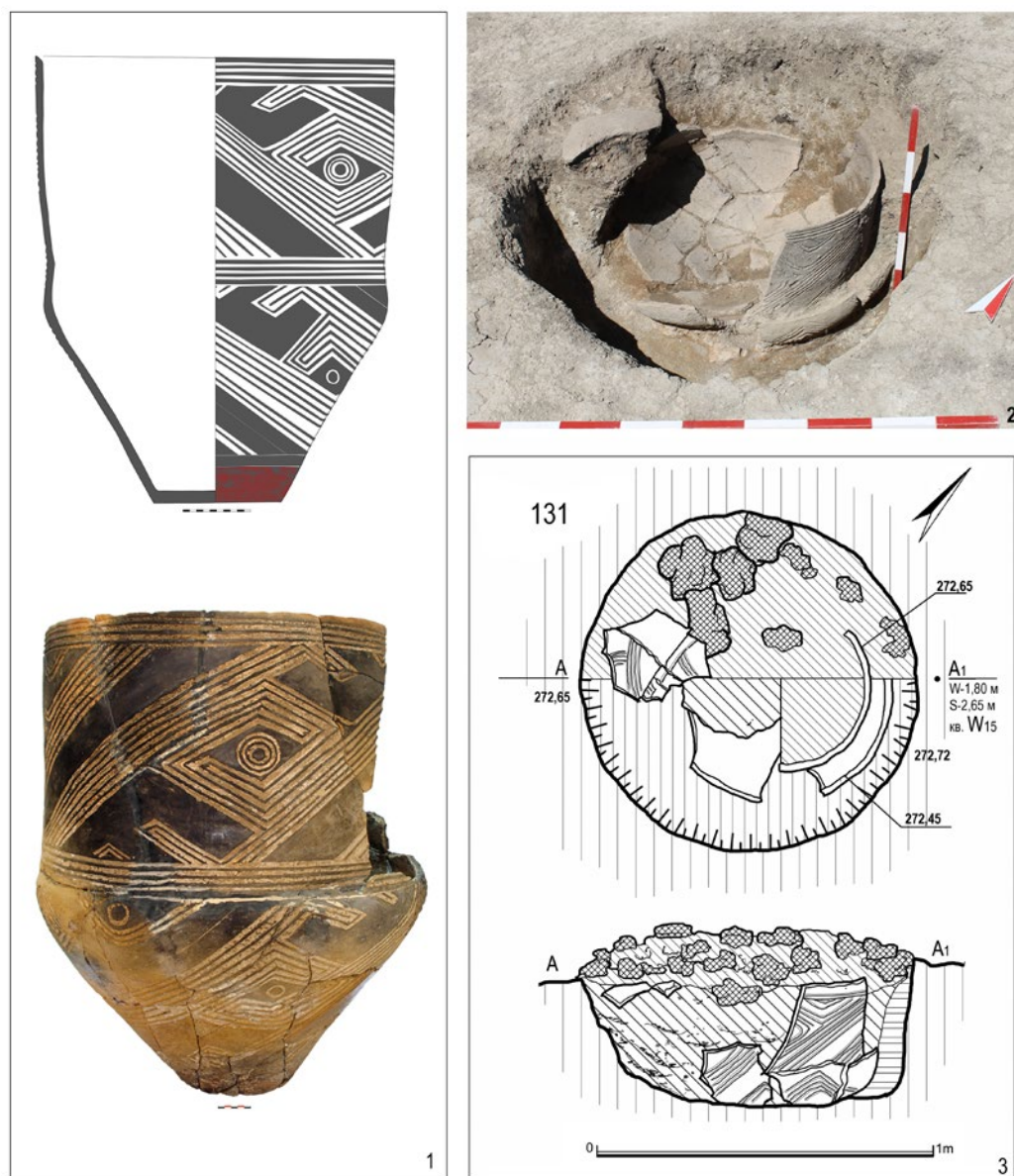


Figure 8. Feature 131, ceramic container in a pit: (1) the decorated container; (2) the vessel in situ; (3) layout and profile of the pit and the container. Image Credit: the authors.

Shapes and decoration

The complex is dominated by vessels of rounded and smooth curvilinear profiles. Sharply carinated biconical or cylindrical–conical profiles are virtually absent. Pot bases are usually flat and relatively wide. Simple open shapes are the majority in all categories, demonstrating a high diversity of proportions and profiles, yet forming readily recognizable groups based on form–capacity–function criteria (figs. 9–12).

The assemblage shows a high percentage of decorated vessels. Main ornamental techniques include channeling, incision and excision, the latter combined with white in-crustation (figs. 9.4; 10.12; 11.12 and 14; 12.5–6, 8, and 10). Graphite painting occurs only in a few cases (fig. 9.12); however, this might be a consequence of conflagration and/or post-depositional processes. Plastic decoration is relatively common, yet the type range is limited to horizontal cordons with finger impressions (figs. 10.8–10), rows of shallow impressions (figs. 10.7; 12.1 and 3), and small oval or round plastic knobs (fig. 11.6, 8, and 11). Several steady and repetitive combinations of shapes and decoration techniques are observed within individual categories and will be discussed in detail below.

One of the main shapes within the group of fine ware is represented by numerous examples of cylindrical–conical or slightly biconical bowls with gentle carination and tapered, rounded rims. Despite the small variations in the curve of the profile, the visual similarity is due to the almost identical manner of decoration, combining delicate horizontal channeling on the upper part of the body with strips of oblique channeling below the carination (fig. 9.2–3 and 5–6). A distinctive decorative element present on several

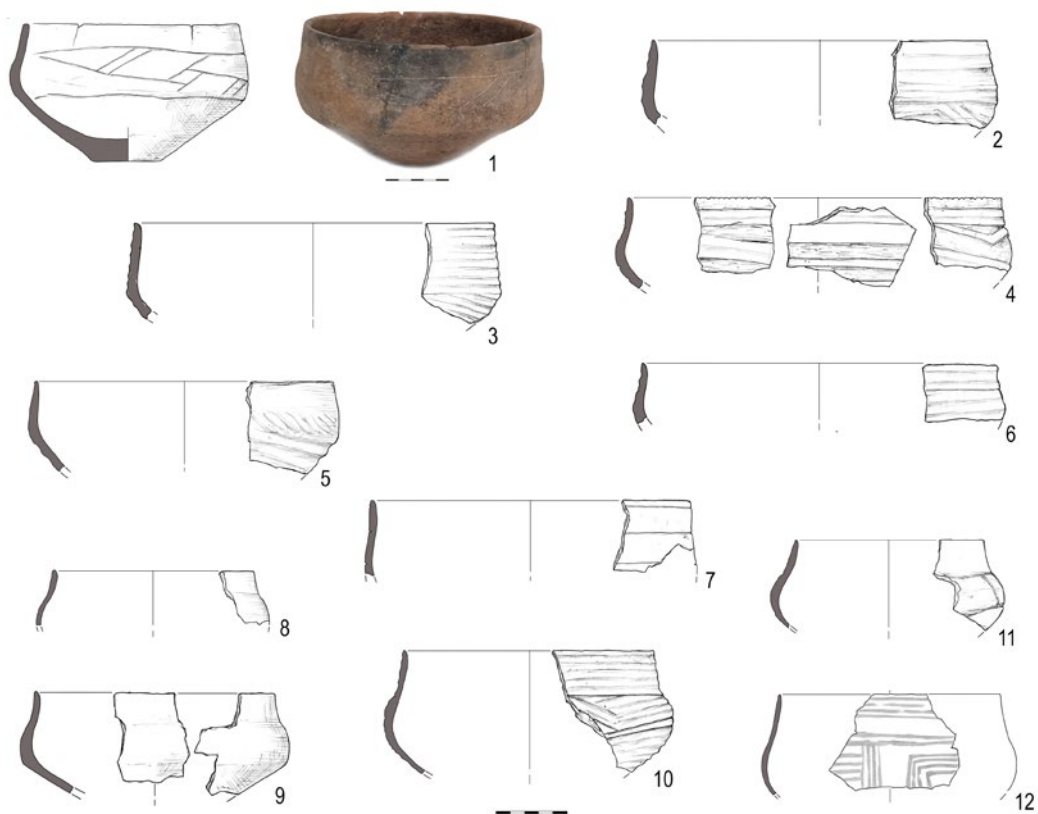


Figure 9. Pottery from feature 74. Image Credit: the authors.

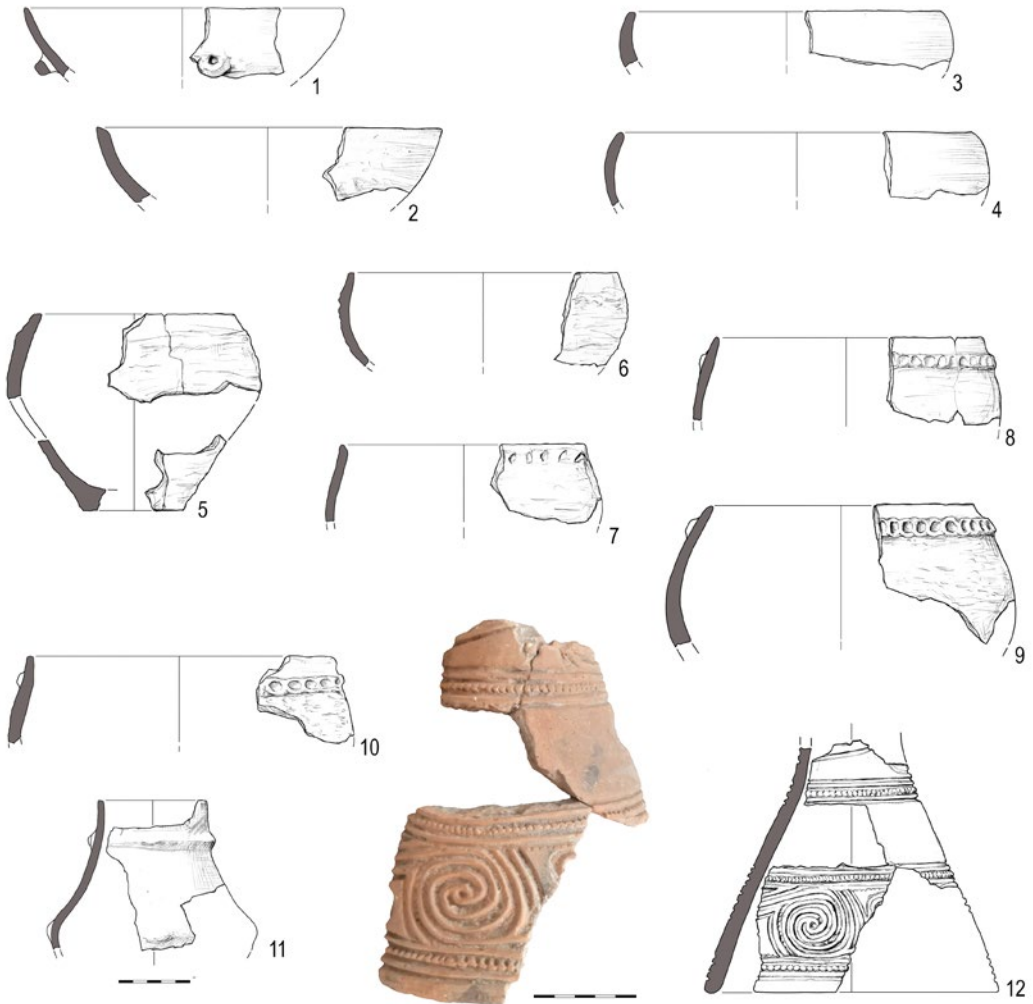


Figure 10. Pottery from feature 74. Image Credit: the authors.

vessels of the same group, is the use of fine and carefully made incisions. As a rule, the incisions outlined diamond-shaped or angular linear motifs on the upper part of the body. Fine incisions are frequently combined with channeling (the examples come exclusively from features 62 and 75; figs. 6.3 and 4; 11.10 and 11) or are used separately (fig. 9.1). In several cases, the channeling is combined with wide, finely executed shallow strips and diamond-shaped ornaments organized in angular meanders (figs. 9.4; 11.12 and 14). The decoration could be supplemented by fine notches on the rim tip (fig. 11.14).

The combination of shape and decoration should be considered a chronologically diagnostic trait; the manner of application as well as the organization of the channeled

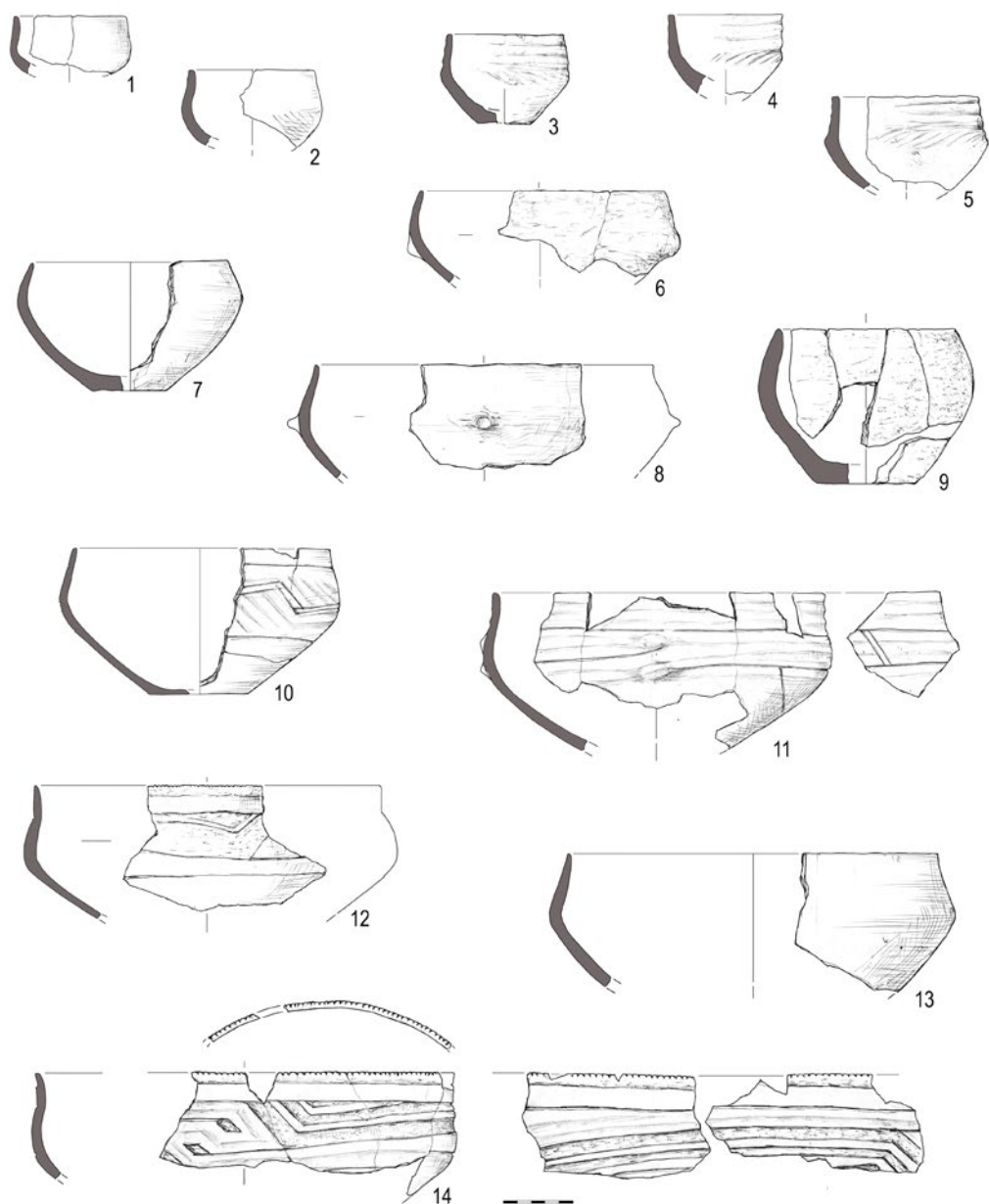


Figure 11. Pottery from feature 75. Image Credit: the authors.

decoration is reminiscent of ‘archaic’ (Late Neolithic) decoration traditions. Certain parallels originate from the early occupation levels of Tell Petko Karavelovo and from the cut features associated with the lowest stratigraphic level XVIII of Tell Ruse (Popov 1998, 186f). North of the Danube, similar fine incisions are attested in ceramic assemblages

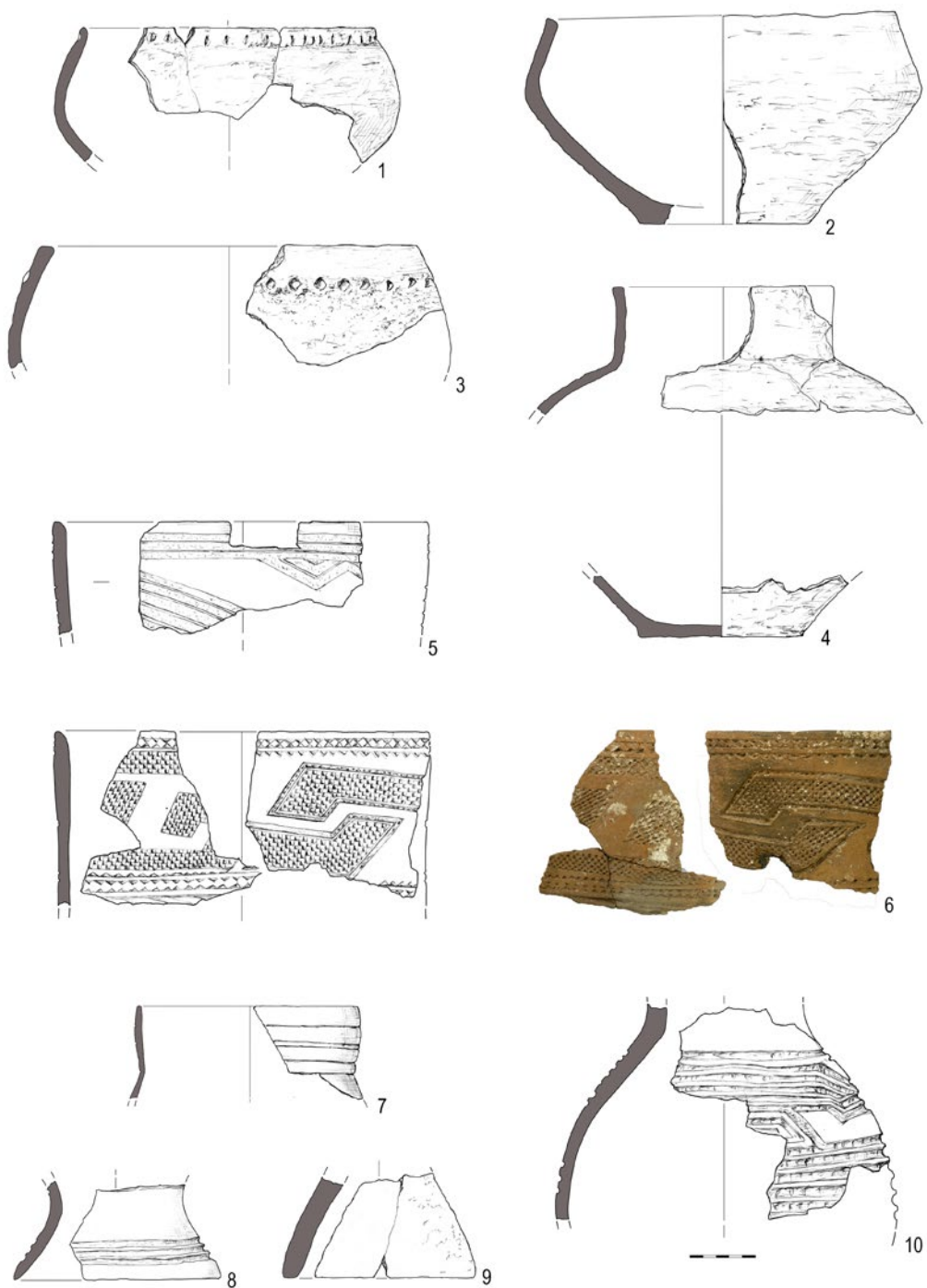


Figure 12. Pottery from feature 75. Image Credit: the authors.

associated with the Bojan-Giulești cultural tradition (Comsa 1974, pl. 15, 2–9; Zaharia 1967, 10, Abb. 4, 1, 4–5).

Another, more heterogeneous group identified mainly among the material from feature 74, incorporates similarly shaped but smaller vessels, often with a more distinctive transition between the upper and the lower part of the body. This group comprises both plain vessels (fig. 9.8 and 9) and examples of incised (fig. 9.11) and channeled decoration (fig. 9.10), as well as a single example of well-preserved graphite painting (fig. 9.12).

A recognizable group was recorded exclusively in the assemblage from feature 75 comprising small bowls/cups of cylindrical–conical form and gently curved profile. The inner surface always is irregular and roughly treated, which allows their alternative interpretation as small lids. All are of similar size, either plain (fig. 11.1 and 2) or decorated with the typical combination of horizontal and oblique channeling (fig. 11.3–5).

One example with an identical shape but of larger size deserves attention (fig. 7.1). The outer surface is smoothed and decorated by channeling while the inner surface and the base are left untreated. The base has a small central perforation made during manufacturing. The pot was found in a large container (feature 130), in a context suggesting intentional deposition (*vide supra*). The perforation points to some purpose of the vessel other than ordinary tableware, yet the precise function remains unknown. A similarly perforated base has been published among the fine ware from the eponymous site of Giulești in Muntenia (Comşa 1974, pls. 14 and 12).

Shallow bowls represented by hemispherical examples with either inverted or slightly everted rim (figs. 10.1–4 and 11. 6–9) occur in both fine and semi-coarse (kitchenware) groups.

The main types identified within the semi-coarse (so-called kitchenware) category demonstrate certain standardization in terms of both shape and decoration. Bowls and deep bowls (jar-like vessels) are of hemispherical or rounded biconical shape. Besides plain vessels (figs. 10.5 and 6; 11.9; 12.2 and 4), decorated examples include mainly vessels with barbotine or rusticated surface demarcated from the smoothed and burnished upper part by a horizontal plastic band or a row of shallow impressions (figs. 10.7–10; 12.1 and 3).

Closed shapes are underrepresented in the current study, mainly due to the high level of fragmentation. Common forms include medium-large jars with a straight cylindrical neck (fig. 12.4 and 7). An unusual shape is a small-sized biconical thin-walled jar with an elongated upright neck decorated with a plain plastic band under the rim and traces of graphite painting (fig. 10.11).

We have to mention also a group of large plain holemouth vessels with elongated bodies and massive bases, most probably used for storage. Both vessels found in features 2 and 62 belong to this category (fig. 6.1–2, 7).

Storage vessels/containers

Most of the thick-walled pottery recovered from the site belongs to the group of rich-

ly decorated storage vessels or containers regarded as diagnostic elements in the Early Chalcolithic pottery repertoire of the area. The sherds recovered during the excavations are usually decorated body parts providing little or no information about the shape of the vessels or the ornamental composition. Decoration techniques include groups of parallel wide and deeply cut excised strips/grooves with white incrustation, organized in meander-like angular motives. On the basis of diagnostic fragments, the shape of the vessels could be defined as cylindrical in the upper part and conical in the lower part; the bases are more often flat and heavy (figs. 8.1; 12.5–6, and 10). In most of the cases the inner surface is roughly treated.

Two complete or near-complete examples were found in feature 130 and 131 (figs. 7 and 8). The container from feature 131 (fig. 8.1) is of cylindrical–conical shape and has a rounded carination; the base is flat and heavy.¹ Traces of red ochre coloring are visible in a 5.5 cm wide strip near the base. The height of the vessel is 65 cm and the rim diameter is 55 cm. A tentative estimation of the volume gives ca. 120 l/cm³ at full capacity. The excised and incrustated decoration is finely executed and finds its best parallels in the lower levels of Petko Karavelovo.² An almost identical container was found there, deposited (as a foundation offering?) under the wooden platform of a dwelling dated to the beginning of the Early Chalcolithic (Chohadzhiev et al. 2019, 46). Similar, though not identical parallels are known from the flat site of Shtraklevo in the Rusenski Lom Valley dating to the Bojan-Vidra phase (Popov 1992, 26, fig. 12.6). However, the published vessels are smaller in size and have hollow pedestals.

Less frequent in the assemblage is the combination of excised strips and chessboard decoration organized again in angular meander-like motifs (fig. 12.6).

A distinctive shape is the example of a high conical pedestal excessively decorated with deep incisions outlining spiral-shaped motifs (otherwise not common for the assemblage, which is dominated by angular ornaments) combined with strips of small, deeply cut zigzags reminiscent of the Vadastra decorative traditions (fig. 10.12).

Later Chalcolithic features

Feature 63 (figs. 13 and 14). As mentioned above, one of the Chalcolithic features demonstrates a clear deviation from the rest in terms of both topography and chronology. It was situated in the southwest part of the excavated area and at a lower elevation. It was a large cut with a sub-oval outline measuring 5.80 x 4.5 m, with steep sides and irregular, 0.85 m deep bottom. A shallow step-like cut was annexed to the south. The separate fills were observed in the cut section (fig. 13). The uppermost is of a very dark, grey silty sediment accumulated most probably by natural processes. It overlaid the main fill of greyish

¹ The second container is still waiting for restoration, yet it seems to be of the same or very similar shape but larger in size and capacity (the rim diameter is ca. 65 cm).

² According to A. Chohadzhiev (pers. communication), at Petko Karavelovo, the same technique is applied in a visibly different (less careful) manner. This observation might be important, taking into account the small distance between the two sites.

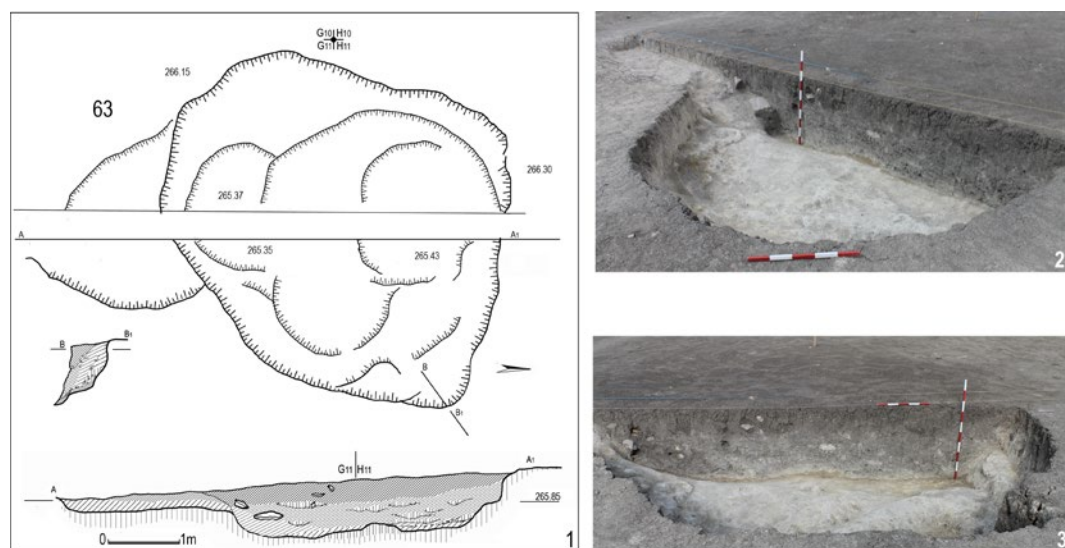


Figure 13. Feature 63. Image Credit: the authors.

sediment, which yielded a modest collection of highly fragmented pottery and a few animal bones.

Despite the paucity of material, the assemblage demonstrates distinctive morphological differences. The pottery is highly fragmented, yet the surface of the sherds is much better preserved. The surface of the thin-walled vessels is slipped and burnished. Surface colors tend to be dark, varying from dark grey-brown to almost black. Diagnostic sherds are rather scarce (fig. 14). The main decoration technique comprises finely executed horizontal channeling. It covers the upper parts of thin-walled biconical bowls with sharp carination and almost uniform size (fig. 14.2–3, and 5). The channeled bowls find several fine parallels in the recently published ceramic assemblage of Orlovets–Erendzhika (Chohadzhiev, S. 2021, figs. 14.8; 17.4, and 5; 18.3). A similar shape of coarser fabric is decorated with vertical incisions (fig. 14.4). Graphite painting is preserved only on very small, atypical sherds (not illustrated).

In the group of kitchenware, we should notice the single example of a completely preserved profile. It is a medium-sized and thick-walled shallow bowl of truncated conical shape with a wide flat base (fig. 14.1). Diagnostic is the combination of the rusticated outer surface and large lugs, indicating the primary function of the vessel for food preparation. The parallels of this simple and common shape are widespread and numerous. Again, it is worth noting the number of parallels published from the neighboring site of Erendzhika dating to the Middle or the beginning of the Late Chalcolithic (Chohadzhiev, S. 2021, 196, 204–205 with ref.). Other diagnostic shapes include fragments of bi-cylindrical bowls (fig. 14.6).

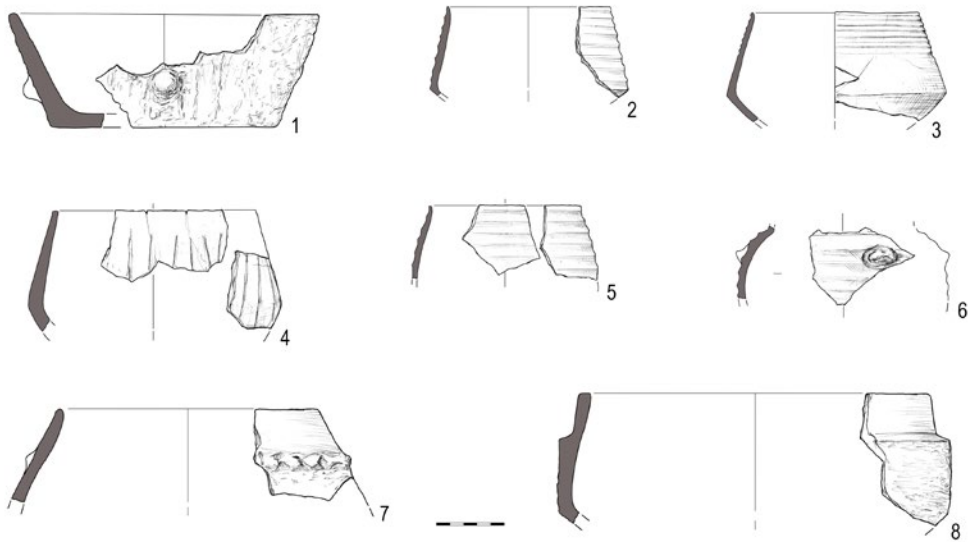


Figure 14. Pottery from feature 63. Image Credit: the authors.

Relative and absolute chronology

The results from the study of the pottery assemblages of Orlovets allow some preliminary observations on the relative chronology of the fifth millennium BC occupation at the site. Although the main ceramic assemblage is limited in range and selective in origin, it seems fairly homogeneous in composition. Taking into account the short distance between the two sites and the long stratigraphic sequence of Petko Karavelovo, it is not surprising to find there the best parallels of the assemblage discussed here. Minor differences, therefore, are more probable to reflect micro-regional variations rather than chronological issues. According to preliminary observations, the pottery assemblage of Orlovets – Papaz Cheshma is best compared to the pottery from the earlier occupation levels (i.e., Petko Karavelovo A; see Chochadzhiev, A., this volume). The early dating is further supported by the comparison of Orlovets and the material from the cut features of the earliest (XVIII) building level of Tell Ruse (Popov 1998, 186f). A later (episodic?) occupation of the site is attested in the pottery material from feature 63. Based on the few diagnostic elements, it could be tentatively compared to the ceramic complex of Orlovets–Erendzhika and dated to the Middle Chalcolithic.

So far, only two radiocarbon dates are available for the site (table 1). The first date was made on a cattle bone found in the fill of feature 74, and the second one is on a cattle tooth from the later (?) feature 63. The number of dates is insufficient if we want to set the absolute chronological limits of the separate features and the site as a whole. Moreover, the two dates yielded almost identical values, which contradicts the relative dating suggested by pottery analysis. The ^{14}C date for feature 74 seems later than expected,

especially when compared to the sequence of calibrated dates for Petko Karavelovo (cf. Chochadzhiev, A., this volume).

Lab No.	Feat. No.	Species dated & sample type	BP value	$\delta^{13}\text{C}$	$\delta^{15}\text{N}$	C/N ratio	Calibrated date (BC) 95.4% probability
SUERC-97023	74	<i>Bos taurus</i> , radius	5822 $\pm$ 25	19.7	7.7	3.5	4784–4556
SUERC-97024	63	<i>Bos taurus</i> , molar	5807 $\pm$ 24	20.1	6	3.4	4724–4551

Table 1. Radiocarbon dates from Orlovets.

Plant remains

Despite systematic sampling of sediments from the fills, charred plant macro-remains appeared to be scarce in the Early Chalcolithic contexts. Most common finds comprise charred wood macro-remains, belonging mainly to *Quercus* sp. and sporadically to *Alnus* sp. (feature 74). Well-represented are also fragments of charred Cornelian cherries, providing evidence that these wild fruits were gathered and stored for consumption. However, maybe due to taphonomic processes, no cultivated crops have been identified in the sampled contexts, with the prominent exception of the later feature 63. Although in minute quantities, its fill yielded a variety of staple crops, including einkorn (*Triticum monococcum*), emmer (*Hordeum vulgare*) and lentils (*Lens culinaris*), as well as some wild plants as wild blackwheat (*Polygonum convolvulus*).

Faunal remains

The study of the faunal remains from the site is still ongoing and will be published elsewhere. Hence, we can only mention here the preliminary observations made on the Early Chalcolithic assemblage both in the field and in the lab. In terms of taxonomic diversity, the complex is rather homogeneous, dominated by cattle (*Bos taurus*). Cattle bones have been identified in all Early Chalcolithic features studied so far, occupying more than 90 percent of the total assemblage. The share of small ruminants (*Ovis/Capra*) and domestic pigs is equally insignificant. Faunal remains found in features 62 and 75 bear traces of thermal treatment (scorching and probably roasting). Wild species are underrepresented, especially in comparison with the Final Chalcolithic and Bronze Age assemblages from the site. Noteworthy is the high number of hare remains; however, most of the bones actually belong to the incomplete skeleton of a single individual found in feature 159. Some of the long bones bear light traces of modification (polishing), while two metapodials (hind foot) with pierced distal parts were most probably designed to be used as pendants/ amulets.¹

¹ Feature 159 was intersected by two Iron Age pits, which casts doubt on the context of the hare bones. However, hare bones and similarly pierced metapodials are not uncommon in the Early Chalcolithic faunal assemblage from Petko Karavelovo (A. Chochadzhiev, pers. communication).

Conclusion

The rescue excavations at Orlovets – Papaz Cheshma led to the accidental discovery of a new prehistoric site with short-term occupation in the Early Chalcolithic and sporadic traces of human activity tentatively dated to the Middle Chalcolithic. The area of the Early Chalcolithic settlement is probably less than 0.5 acre, though the estimation is only tentative due to the low visibility of surface material. Factors like natural erosion, intensive later activities and modern agriculture led to severe obliteration of the original Early Chalcolithic remains and made it impossible to distinguish a cultural layer explicitly dated to this earliest period. However, indirect evidence for the existence of above-ground residential structures comes from the burnt clay rubble, found in the fills of pits and cut features. Large dugouts or cut features similar to those investigated at Orlovets are not unknown in the region. A short review of the published data reveals a number of close parallels in terms of shape and size, dating from the earliest Early Chalcolithic phases south (Popov 1992) and north of the Danube (Stefan 2010). In the majority of the sites assigned to the Bojan–Giulești cultural tradition, cut features are the dominant evidence of human occupation, sometimes accompanied by the remains of above-ground structures (Stefan 2010, 8, fig. 3, pl. I). Thus, the features at Orlovets made no exception. On the other hand, the exceptional discovery of two pits with richly decorated pithoid jars seems to add important new evidence in relevance to the vast and ongoing discussion on the interpretation of prehistoric pits and pit sites (Boyadzhiev 2006; Nikolov 2011; Boyadzhiev 2013; Bacvarov & Gorczyk 2018).

The brief overview of ceramics from the site emphasized the role of regional variability and local peculiarities in the study of ceramic assemblages.

The glimpse offered by the prehistoric map of the area shows both the density and the diversity of human occupation remains during the 5th millennium BC, with a settlement pattern range comprising large permanently inhabited tell-sites, smaller tell-like settlements, and flat sites of various sizes. However, the current state of research and the available data are insufficient to solve the problems of relationship and synchronicity, i.e., whether the distribution of sites reflects a dense network of contemporary habitation places or, more likely, it reflects certain dynamics in the human-environment interactions. Sites like Orlovets-Papaz Cheshma and Eréndzhika seem to provide arguments in support of the latter. In any case, the available data points to the co-existence in the region of tell-settlements and a variety of nearby sites indicating human presence and activities, a fact already discussed in the literature (Leshtakov 2005, 38, 41-42).

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PIXE AND XRF ANALYSES OF COPPER ARTIFACTS FROM THE GUMELNIȚA AREA (ROMANIA)

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Abstract

The main aim of this research is to expand the knowledge of the early stages of copper metallurgy in the Chalcolithic within the Gumelnița communities through compositional analyses (PIXE, XRF) performed on a group of copper objects that originated from several sites belonging to Kodzhadermen–Gumelnița–Karanovo VI (KGK VI) communities in southeast Romania (Chitila–Fermă, Măriuța, Sultana–Malu Roșu, Sărulești, and Vidra). All analyses were performed at the Horia Hulubei National Institute for Research & Development in Physics and Nuclear Engineering (Romania), and the investigated items belong to the collections of the Lower Danube Museum in Călărași and the Bucharest Municipality Museum. The resulting data were used as a starting point of a discussion on the possible prehistoric copper sources used by prehistoric people to manufacture the analyzed artifacts.

Keywords: Northern Balkans – Copper Age – Gumelnița – copper artifacts – elemental analyses.

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Introduction: short outline of previous work

In the second half of the 5th millennium BCE, an important cultural synthesis occurred between the Eastern Balkans and the Carpathians. In Romania, it is labeled as Gumelnița (after the eponymous settlement site near Oltenița city), and in Bulgaria, as

Kodzhadermen–Karanovo VI and as Varna in the Black Sea coastal area. The so-called Kodzhadermen–Gumelnița–Karanovo VI (KGK VI) group occupied southeast Romania, the southern parts of the Republic of Moldova and Ukraine, east Bulgaria on both sides of the Balkan Range, and to the south extended to the Aegean (Lazar et al. 2018b).

First chemical analyses on Chalcolithic copper artifacts from Romania were performed by S. Junghans, E. Sangmeister, and M. Schröder in the 1960s, as part of a large-scale project within which more than 22,000 objects were sampled and analyzed. Ten artifacts from the Bucharest Municipality Museum were included in this project (Junghans et al. 1968, 238f).

Other archaeometric analyses were performed on copper artifacts from the tell sites of Luncavița (Micu & Belc 2005, 48) and Pietrele–Măgura Gorgana (Hansen et al. 2008, 70ff).

The first step in reconstructing the *chaîne opératoire* of southeast European copper mining in the fifth millennium BCE is the identification of the provenance of raw material sources exploited. Previous research demonstrated that several copper mines operated in the Chalcolithic. For example, the prehistoric exploitation of the Ai Bunar mine was confirmed by archaeological excavations in the 1970s (Černych 1978). Another possible source of ore that was identified by lead isotope analyses is the Majdanpek mine in eastern Serbia. Some authors have suggested that remains from Chalcolithic mining activities could have been destroyed by recent mining exploitation (Pernicka et al. 1993, 25).

It has been accepted that the copper used by the Gumelnița people probably derived from the same sources (e.g., Majdanpek, Ai Bunar), considering the extended social networks created by the KGK VI communities along the Danube, Northeastern Bulgaria and the Black Sea coast. This assertion is sustained by the lead isotope and chemical analyses performed on the copper objects from the tell site of Pietrele–Magura Gorgana, which led to the conclusion that ore deposits in Serbia (e.g., Majdanpek) and Bulgaria (e.g., Chelopech, Burgas-Strandzha, and Ai Bunar) could have been the sources of the raw copper used here (Hansen et al. 2008, 70ff).

These exchange networks were based on previously existing connections between the Mediterranean and Southeast and Central Europe like *Spondylus* sp. distribution routes (Lazăr et al. 2018a). The maximum network development in the KGK VI area coincided with the emergence of metallurgy in Southeast Europe (Lazăr et al. 2018b). This fact determined the wider distribution of similar morphological metal forms in the Southeastern Europe, in the KGK VI area.

The copper artifacts found at Chitila–Fermă, Măriuța, Sultana–Malu Roșu, Sărulești, and Vidra were first submitted to primary morphological analysis. The main morphological characteristics are briefly presented in this article.

We also focused on the archaeological context of the artifacts. The majority of them were discovered in settlements, except for an awl found at the cemetery of Măriuța and a bracelet found in a funerary context at the tell site of Chitila–Fermă.

Detailed information on the archaeological context was provided where it was available. Twelve items from Sultana–Malu Roșu and Măriuța were not published.

Furthermore, we submitted the investigated items to non-invasive analyses (PIXE and XRF) in order to determine whether objects with similar morphological characteristics with the artifacts found in Northeast Bulgaria share the same raw material sources. Our aim was to correlate the trace elements detected by the PIXE and XRF analysis with the available data on copper raw material sources exploited by the prehistoric communities in the Balkan area.

Archaeological material and its context

The analyzed artifacts were uncovered at tell or flat sites as well as at cemeteries in the Mostiștea valley in the counties of Călărași (e.g., Măriuța, Sultana–Malu Roșu, and Sărulești) and Ilfov (e.g., Vidra and Chitila–Fermă) (fig. 1; table 1).

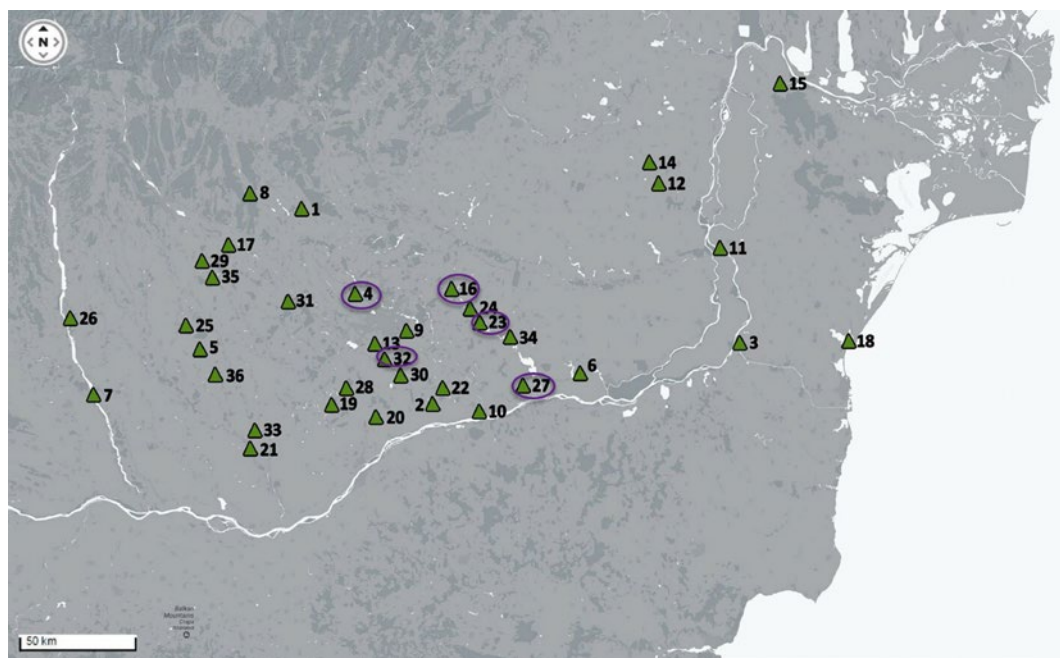


Figure 1. Map showing the distribution of copper artifacts in the Gumelnița area. The sites of origin of the artifacts analyzed in the paper are shown in purple ellipses. (1) Bușani-La Pod; (2) Căscioarele-Ostrovel; (3) Cernavodă; (4) Chitila; (5) Ciolăneștii din Deal; (6) Cunești; (7) Drăgonești-Olt; (8) Geangoiești; (9) Glina; (10) Gumelnița; (11) Hârșova; (12) Însurăței; (13) Jilava; (14) Lișcoteanca; (15) Luncavița; (16) Măriuța; (17) Morteni; (18) Năvodari; (19) Petru Rareș; (20) Pietrele; (21) Poroschia; (22) Radovanu; (23) Sărulești; (24) Șeinoiu; (25) Siliștea-Gumești; (26) Slatina; (27) Sultana-Malu Roșu; (28) Tangâru; (29) Teiu; (30) Vărăști; (31) Vânătorii Mici; (32) Vidra; (33) Vitănești; (34) Vlădiceasca; (35) Ziduri; (36) Gărăgău.

ID	Type (inventory number)	Context	Height/thickness	Image / reference
1	awl (32909)	Măriuța 1988, S IV, sq. 1; -1.78 to -1.93 m	15.6 / 0.4 cm	fig. 3.1 / Şimon 2014
2	awl (32908)	Măriuța 1988, S IV, sq. 1; -1.78 to -1.93 m	6.8 / 0.2 cm	fig. 3.7 / Şimon 2014
3	wire (43246)	Măriuța 2001, S B, Sector 2, sq. E2; -0.86; SU 1005, domestic waste area	7.6 / 0.2 cm	fig. 3.6
4	awl (51488)	Măriuța necropolis 2005, grave 4, S 19, sq. C2; -1.57 m	12.5 cm	fig. 3.3 / Lazăr & Parnic 2007
5	pin with plate-shaped end (53181)	Măriuța 1989, S IV, sq. 11; -2.37 m	11.2 / 0.2 cm	fig. 3.5 / Şimon 2014
6	awl (54308)	Măriuța 2008, S C, Sector 2, sq. B6; SU 1208; domestic waste area	11.6 / 0.2 cm	fig. 3.2
7	chisel (54309)	Măriuța 2008, S C, Sector 1, sq. A3; SU 1204; debris SL 6	4,8 / 0.4 cm	fig. 3.10
8	awl (55565)	Măriuța 2010, S B, Sector 1, sq. B2; SU 1040; SL 8 floor	13.4 / 0.4 cm	fig. 3.4
9	awl with bone handle (45441)	Măriuța 2000, S B, Sector 1, sq. A3; SU 1002; -0.75; domestic waste area	4.1 / 0.2 cm	fig. 3.8, 11
10	awl (45441)	Măriuța 2000, S B, Sector 1, sq. A3; SU 1002; -0.75; domestic waste area	8.8 / 0.2 cm	fig. 3.9
11	awl	Sultana-Malu Roşu 1975, close to house 4	7.71 / 0.42 cm	Lazăr et al. 2018b
12	awl	Sultana-Malu Roşu 1975	9.59 / 0.42 cm	Lazăr et al. 2018b
13	awl	Sultana-Malu Roşu	5.08 / 0.21 cm	Lazăr et al. 2018b
14	awl	Sultana-Malu Roşu, house 1/1983, S XI, sq. 5, -1 m	14.55 / 0.26 cm	Lazăr et al. 2018b
15	awl	Sultana-Malu Roşu, house 1/1983, S XI, sq. 5, -1 m	5.20 / 0.40 cm	Lazăr et al. 2018b
16	awl	Sultana-Malu Roşu, house 1/1983	5.00 / 0.60 cm	Lazăr et al. 2018b
17	Chisel	Sultana-Malu Roşu 1983, S XIII, sq. 3, -0.90 m, ash layer	15.90 / 0.80 cm	Lazăr et al. 2018b
18	awl (nr. inv. 54434)	Sultana-Malu Roşu 2003, house 2	5.33 / 0.33 cm	fig. 2.3
19	awl (nr. inv. 54433)	Sultana-Malu Roşu 2003, house 2	6.20 / 0.32 cm	fig. 2.4
20	awl (nr. inv. 54432)	Sultana-Malu Roşu 2003, house 2	11.31 / 0.41 cm	fig. 2.2
21	hook (44013)	Sultana-Malu Roşu 2002, S II, sq. 2; -1.50 to -1.60 m	7.00 / 0.5 cm	fig. 2.6
22	awl (47104)	Sultana-Malu Roşu 2004, S Y, sq. D1; -1.58 m	7.7 / 0.2 cm	fig. 2.5
23	awl (47105)	Sultana-Malu Roşu 2004, S Y, sq. D1; -1.91 m	11 / 0.3 cm	fig. 2.1
24	awl (14384)	Vidra, Gumelnița layer	5.5 / 0.3 cm	Comşa 1978
25	awl (14386)	Chalcolithic, unknown provenance	7.1 / 0.4 cm	Darie & Georgescu 2017
26	awl (14387)	Vidra, Gumelnița layer	9.4 / 0.4 cm	Mareş 2002
27	awl (14389)	Vidra, Gumelnița layer	8.7 / 0.3 cm	Comşa 1978

ID	Type (inventory number)	Context	Height/thickness	Image / reference
28	awl (14391)	Vidra, Gumelnița layer	7.4 / 0.2 cm	Comșa 1978
29	awl (14392)	Chalcolithic, unknown provenance	10.3 cm	Comșa 1978
30	awl (14393)	Vidra, Gumelnița layer	9.2 / 0.2 cm	Comșa 1978
31	awl (14394)	Vidra, Gumelnița layer	13.4 / 0.4 cm	Comșa 1978
32	awl (14395)	Chalcolithic, unknown provenance	10 / 0.4 cm	Comșa 1978
33	awl (14396)	Vidra, Gumelnița layer	12 / 0.4 cm	Comșa 1978
34	awl (14398)	Vidra, Gumelnița layer		Comșa 1978
35	awl (14400)	Chalcolithic, unknown provenance	9.5 / 0.4 cm	Comșa 1978
36	awl (14401)	Vidra, Gumelnița layer	9.7 / 0.2 cm	Mareș 2002
37	awl with bone handle (14402)	Vidra, Gumelnița layer	5.4 cm	Comșa 1978
38	awl with bone handle (14404)	Vidra, Gumelnița layer	8.6 cm	Comșa 1978
39	awl with bone handle (14405)	Vidra, Gumelnița layer	8.7 cm	Comșa 1978
40	awl with bone handle (14406)	Vidra, Gumelnița layer	6.00 / 0.3 cm	Comșa 1978
41	awl with bone handle (16149)	Chalcolithic, unknown provenance	8.5 / 0.3 cm	Darie & Georgescu 2017
42	chisel (14382)	Vidra, Gumelnița layer	3.5 / 0.4 cm	Comșa 1978
43	chisel (14383)	Chalcolithic, unknown provenance	3.9 / 0.2 cm	Darie & Georgescu 2017
44	chisel (14390)	Chalcolithic, unknown provenance	6.1 / 0.5 cm	Comșa 1978
45	chisel (14397)	Chalcolithic, unknown provenance	7.2 / 0.5 cm	Darie & Georgescu 2017
46	double volute pin (14408)	Vidra, Gumelnița layer	3.2 / 1.5 cm	Comșa 1978
47	double volute pin (14409)	Vidra, Gumelnița layer	6.5 / 0.2 cm	Comșa 1978
48	double volute pin (14410)	Sărulești, Gumelnița layer	12.76 / 3.18 cm	Comșa 1978
49	double volute pin (14411)	Sărulești, Gumelnița layer	13 / 2.4 cm	Comșa 1978
50	double volute pin (14413)	Vidra, Gumelnița layer	5.2 / 2.1 cm	Darie & Georgescu 2017
51	Vidra type axe (14415)	Vidra, Gumelnița layer	17.2 cm	Vulpe 1975
52	hook (14451)	Vidra, Gumelnița layer	6.3 / 0.4 cm	Comșa 1978
53	miniature axe (15589)	Vidra, Gumelnița layer	8.2 / 1.4 cm	Darie & Georgescu 2017
54	bracelet with overlapping ends (173031)	Chitila-Fermă tell	6.4 / 1.4 cm	Boroneanț 1992

Table 1. List of the artifacts included in the study.

Firstly, we focused on the copper artifacts found at the tell site of Vidra. Most of them are awls (18), five still with their bone handles (Darie & Georgescu 2017).

The items from the tell site of Sultana–Malu Roșu included mostly tools (11 awls, a chisel and a hook; Lazăr et al. 2018b) (fig. 2). The copper awls from Măriuța (fig. 3.1-4, 7-9) are typologically comparable to those from Sultana–Malu Roșu and Vidra. We also studied a chisel (fig. 3.10) and a piece of copper wire (fig. 3.6). The artifacts were recovered from a domestic waste area or were associated with houses and are therefore related to everyday activities, except for an awl found in grave 4 of the Măriuța necropolis (fig. 3.3; Lazăr & Parnic 2007).

One spectacular artifact is the Vidra type hammer-axe from the eponymous tell site. It is exquisitely made and has a pentagonal outline, an oval shaft-hole and a wide semicircular blade (Vulpe 1975).

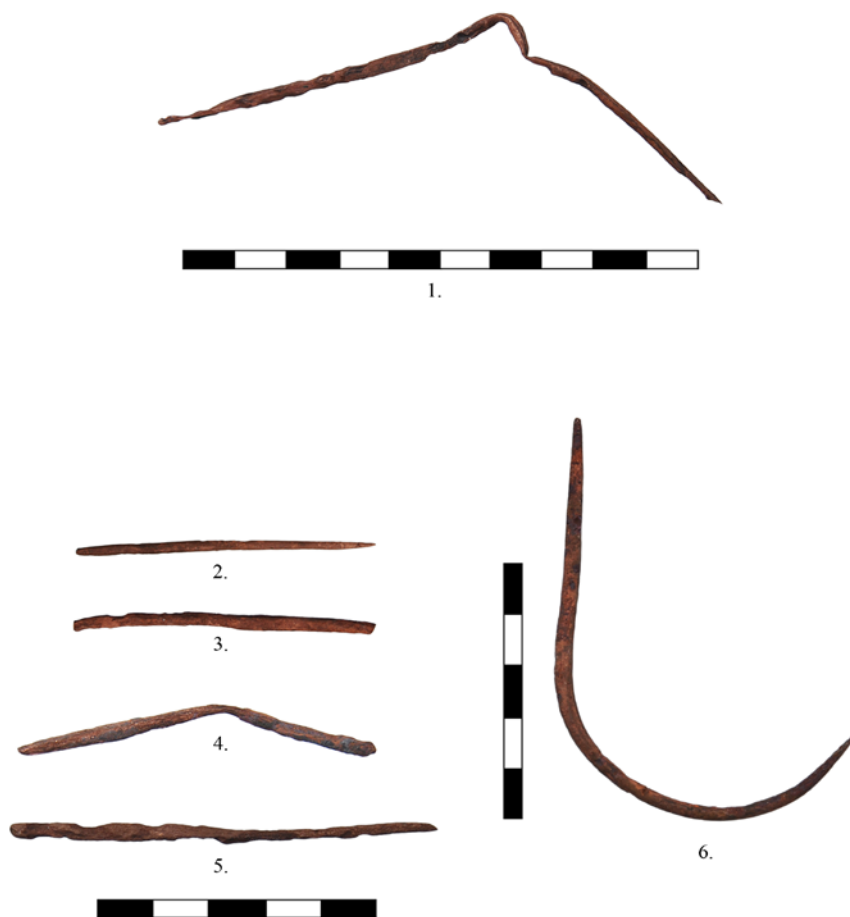


Figure 2. Copper tools (1–5) and a hook (6) from the tell site of Sultana–Malu Roșu.



Figure 3. Copper objects from the site of Măriuța: (1–4 and 7–9) awls; (5) pin with a plate-shaped end; (6) wire; (10) chisel; (11) bone handle.

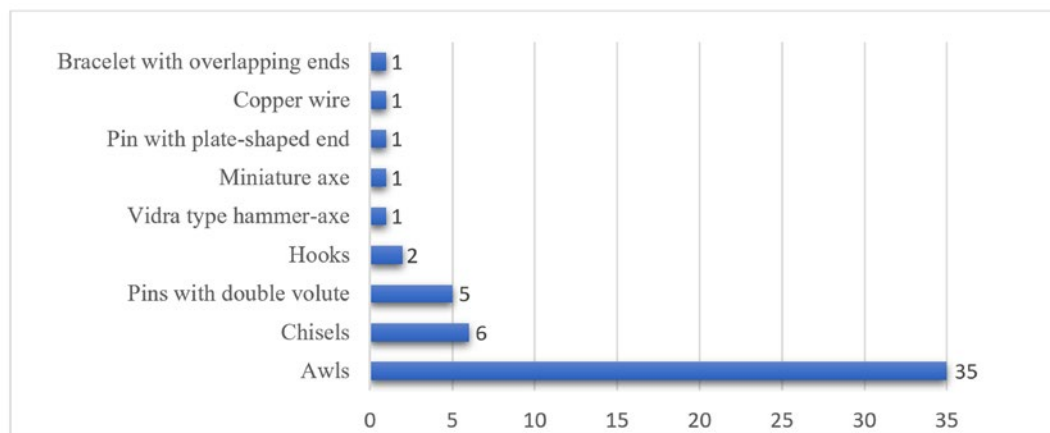


Figure 4. Types of copper artifacts included in this study.

In the copper ornaments category, we analyzed the double-volute pins from the Gumelnița cultural layers of Vidra and Sărulești (Darie & Georgescu 2017, 65), and one plate-shaped pin from Măriuța (fig. 3.5), as well as a bracelet with overlapping ends which was found near the skeleton in grave 2 at the tell site of Chitila–Fermă in 1982 (Boroneanț 1992, 70).

As is shown in figure 4, most of the examined artifacts are awls, which are a common typological category in the study area. The majority of them have a rectangular cross-section at the proximal end and a circular cross-section at the distal end; some of them are bent in distinct parts.

Methods

In order to identify trace elements that can be linked to raw material sources that were exploited in the Chalcolithic, we analyzed 35 copper items using PIXE and XRF methods.

Particle Induced X-ray Emission (PIXE)

For this analysis, a 3MV Tandetron™ particle accelerator at the Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH) was used to generate and deliver the proton beam onto the samples (Burducea et al. 2015). For this study, the AirBeam system was used in order to extract the proton beam ‘in-air’ and perform PIXE measurements in atmospheric pressure conditions. It has previously been used for various samples, with excellent results (cf. Opreș et al. 2022; Mirea et al. 2021).

Thus, a proton beam was generated, accelerated and transported to the IBA chamber. In high vacuum conditions, the energy was situated at 3 MeV. Through a thin silicon nitride window (Silson, UK), the proton beam was extracted in air and used to probe each sample. For this, the proton beam’s energy was calculated at approximately 2.835

MeV (SRIM simulations, starting from a 3 MeV beam inside the IBA chamber, in high vacuum conditions). The resulting characteristic X-ray spectra were recorded using a Silicon Drift (SDD, Amptek, USA) and analyzed with the Gupix software (Maxwell 1989).

Energy Dispersive X-Ray Fluorescence (ED-XRF)

The ED-XRF analyses were performed with a portable Bruker Tracer S1 Titan spectrometer which uses a Rhodium (Rh) anode tube to generate an X-ray beam to probe the samples. The generated beam has a maximum energy of 50 keV, but is usually limited at 40 keV. The beam passes through a collimator before probing the sample. The incident beam is characterized by a spot with 8 mm in diameter on the selected samples. A Silicon Drift Detector (SDD) positioned backwards at an angle of approximately 45° with respect to the Rh-anode tube, is used to record characteristic X-ray spectra. One point was analyzed on each sample; each point was exposed to the incident X-ray beam for 60 seconds. For this study, a work-mode dedicated to metal alloys was used. The point on each sample where the analysis was performed was chosen close to the point of the PIXE analysis due to the sample's nature. Each characteristic spectra was analyzed in order to identify composing elements and obtain their concentrations. The results obtained are expressed in parts-per-million (ppm).

Results and discussion

The results obtained are shown in tables 2 and 3. Considering the nature of the samples, a more invasive method to prepare the surfaces for analysis was unavailable. Due to this fact, the presence of a series of chemical elements that cannot be considered as part of the composing alloy can be noted: silicon, iron and aluminum. Their concentrations can be considered low, and their presence can be explained with the time the samples spent buried. The main composing element, copper, can be found in concentrations above 98% for all the pieces. The remaining elements are to be considered as trace elements and may be used to identify the provenance mine.

The results of the two analytical techniques indicate the same percentages for the elements identified. The composing elements, the elements characteristic for the soil where the samples were uncovered, and the trace elements were mostly identified by both techniques, and the calculated concentrations remained stable for each sample.

Following the procedures developed by E. Pernicka (1999 & 2014), we divided the samples analyzed using three trace elements: silver, cobalt and selenium. Following this, the bulk of the samples was divided, and two distinct groups were formed. One contains silver but neither cobalt nor selenium, and the other contains cobalt and selenium but not silver (fig. 5). Based on Pernicka 2014, cobalt is specific to the copper mine of Majdanpek whereas silver is specific to Ai Bunar. Considering the geographic location of the sites of origin of the artifacts, and the fact that these two mines were in use at the time the samples have been dated to, the provenance source of 13 of the analyzed samples containing cobalt might have been Majdanpek while the raw material for the other 23 might have come

XRF	Al	Si	P	S	Co	Fe	Ni	As	Ag	Pb	Cu	Area
14382	0.36	0.48	0.06	0	0	0	0	0	0.14	0.37	98.34	middle
14384	0.35	0.54	0	0	0.03	0.21	0.07	0	0	0	98.71	middle
14385	0.25	0.65	0	0	0.03	0.05	0.07	0	0	0	98.69	middle
14385	0.22	0.37	0.09	0.52	0.03	0.64	0.26	0.47	0	0	97.34	middle
14386	0.11	0.55	0.04	0.12	0	0.23	0.12	0	0.13	0	97.83	middle
14387	0.55	0.45	0.15	0.04	0	0.12	0.09	0	0.26	0	98.18	middle
14389	0.19	0.11	0.1	0.02	0	0.02	0	0	0.12	0	99.01	middle
14390	0.31	0.75	0.09	0	0	0.14	0.06	0	0.18	0	98.32	proximal
14392	0.57	0.48	0	0.01	0.03	0.04	0.05	0	0	0	97.37	middle
14394	0.63	0.24	0	0.03	0	0.06	0	0	0.1	0	98.79	middle
14397	0.36	0.49	0	0	0	0	0	0	0.19	0	98.93	middle
14398	0.54	0.57	0	0.02	0.03	0.06	0.1	0	0	0	98.29	middle
14401	0.14	0.77	0	0.04	0.02	0.04	0.31	0.16	0	0.11	96.64	middle
14408	0.12	0.04	0	0	0.04	0.07	0.09	0.08	0	0.09	99.42	middle
14408	0.19	0.56	0.05	0	0.03	0.24	0	0.27	0	0.12	98.07	volute
14410	0.52	0.37	0.09	0.02	0	0.06	0.07	0	0.11	0	98.49	double volutes area
14410	0.44	0.18	0.16	0.04	0.03	0.27	0	0	0	0	98.85	double volutes area
14411	0.22	0.08	0	0.04	0	0.21	0.12	0	0.1	0	98.67	double volutes area
14415	0	0.65	0	0	0	0.02	0.05	0	0.11	0.04	99.08	proximal
32908	0.05	0.58	0	0	0	0	0.05	0.07	0.15	0	98.52	middle
32909	0.43	0.63	0	0	0	0.06	0.14	0	0.14	0	97.74	proximal
43246	0.56	0.43	0	0	0.05	0.04	0	0	0.19	0	98.72	middle
44013	0.54	0.36	0	0	0.02	0.04	0.06	0	0	0	98.86	proximal
47104	0.69	0.59	0	0	0	0	0	0	0.17	0	98.24	flat end
47105	0.71	0.46	0	0.01	0	0.01	0.08	0	0.44	0	97.86	middle
51488	0.57	0.65	0	0	0.02	0.03	0	0	0	0	98.55	proximal
53181	0.55	0.41	0.15	0	0	0.04	0	0	0.16	0	98.42	proximal
54309	0.34	0.74	0	0	0.05	0.32	0	0	0.11	0	98.42	flat end
54432	0.47	0.53	0	0	0	0.02	0	0	0.18	0	98.73	proximal
54433	0.18	0.49	0	0	0	0.04	0.13	0.17	0.12	0	98.22	flat end
54434	0.41	0.34	0	0	0	0	0.09	0	0.23	0	98.41	middle
54434	0.58	0.74	0.04	0.01	0	0.04	0.11	0	0.32	0	97.46	middle
173031	0.43	0.76	0.04	0.02	0	0.06	0	0	0.06	0	98.57	superposed ends
45411_1	0.37	0.43	0.13	0	0	0.02	0	0	0.14	0	98.62	rectangular end
45411_2	0.51	0.58	0.07	0.01	0	0.06	0	0	0	0	98.44	flat end

Table 2. Results from XRF measurements.

PIXE	Al	Si	P	S	Co	Fe	Ni	As	Ag	Pb	Cu	Area
14382	0.14	0.15	0	0	0	0	0	0	0.18	0.31	99.13	middle
14384	0.18	0	0	0	0.04	0	0	0	0	0	99.12	middle
14385	0.12	0	0	0	0.03	0	0	0	0	0	99.09	middle
14385	0.12	0.13	0	0	0.03	0.27	0.02	0.21	0	0	98.21	middle
14386	0.09	0.14	0	0	0	0.27	0.01	0	0.19	0	98.28	middle
14387	0.11	0.12	0	0	0	0.23	0.03	0	0.42	0	98.93	middle
14389	0.11	0.11	0	0	0	0.03	0	0	0.19	0	98.43	middle
14390	0.18	0.21	0	0	0	0.09	0	0	0.23	0	98.99	proximal
14392	0.12	0.08	0	0	0.01	0.09	0.08	0	0	0.23	99.33	middle
14394	0.32	0.21	0	0	0	0.03	0	0	0.19	0	99.02	middle
14397	0.28	0.23	0	0	0	0	0	0	0.24	0	98.74	middle
14398	0.16	0.03	0	0	0.01	0.12	0.13	0	0	0.18	98.28	middle
14401	0.09	0.12	0	0	0.03	0.05	0	0	0	0.13	98.43	middle
14408	0.08	0.09	0	0	0.02	0.08	0	0	0	0.12	99.12	middle
14408	0.1	0.12	0	0	0.03	0.17	0	0.1	0	0.18	98.92	volute
14410	0.06	0.21	0	0	0	0.04	0.02	0	0.17	0.14	98.88	double volutes area
14410	0.21	0.09	0	0	0.01	0.29	0	0	0	0.22	99.13	double volutes area
14411	0.12	0.03	0	0	0	0.32	0.17	0	0.13	0.28	98.92	double volutes area
14415	0	0.23	0	0	0	0.21	0.07	0	0.19	0.08	99.12	proximal
32908	0	0.21	0	0	0	0.12	0.08	0	0.21	0	98.84	middle
32909	0	0	0	0	0	0.08	0	0	0.21	0	98.64	proximal
43246	0.31	0.28	0	0	0.03	0.07	0	0	0.27	0	99.03	middle
44013	0.21	0.19	0	0	0.02	0.03	0	0	0	0	99.32	proximal
47104	0.32	0.31	0	0	0	0	0	0	0.22	0	98.87	flat end
47105	0.23	0.19	0	0	0	0	0	0	0.63	0	98.74	middle
51488	0.14	0.15	0	0	0.03	0.06	0	0	0	0	99.21	proximal
53181	0.32	0.21	0.03	0	0	0	0	0	0.2	0	98.84	proximal
54309	0.21	0.23	0	0	0.03	0.21	0	0	0.19	0	99.08	flat end
54432	0.04	0.03	0	0	0	0	0	0	0.27	0	98.63	proximal
54433	0.17	0.39	0	0	0	0	0	0	0.22	0	98.93	flat end
54434	0.17	0.14	0	0	0	0	0	0	0.32	0	98.95	middle
54434	0.09	0.11	0.01	0	0	0	0	0	0.41	0	98.43	middle
173031	0.11	0.42	0	0	0	0.03	0	0	0.11	0.11	99.21	superposed ends
45411_1	0.21	0.21	0.08	0	0	0	0	0	0.18	0	98.72	rectangular end
45411_2	0.31	0.29	0.03	0	0	0.05	0	0	0	0	99.02	flat end

Table 3. Results from PIXE measurements.

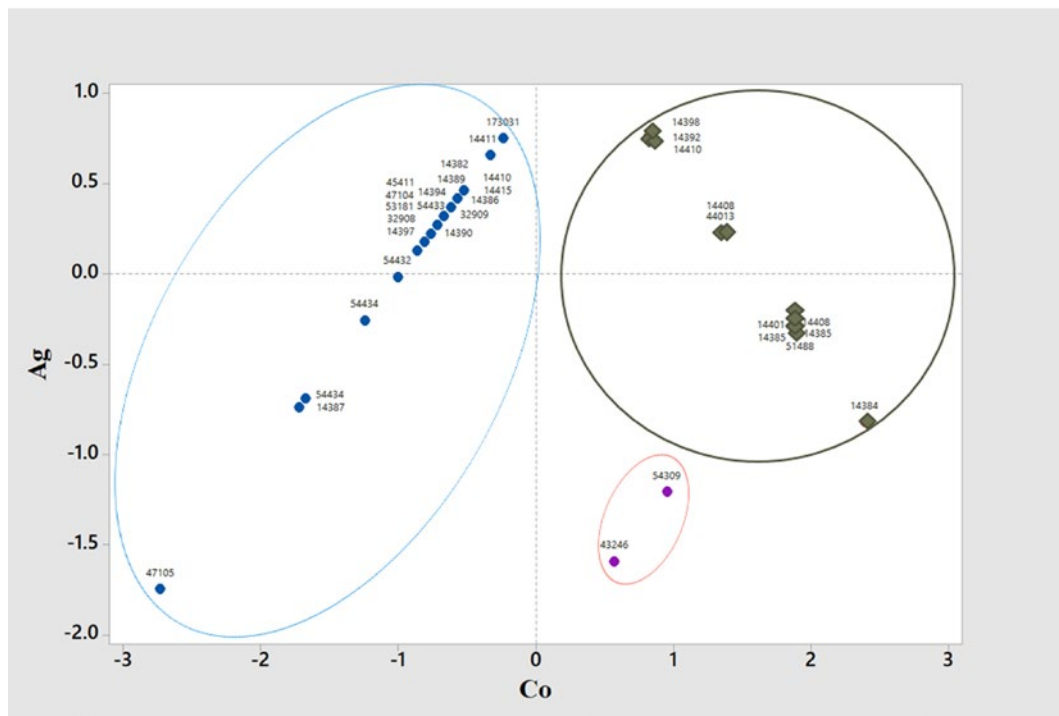


Figure 5. Diagram showing the variations of Ag and Co in the results of the PIXE analyses.

from Ai Bunar. Also, two samples were identified to have both cobalt and silver traces in their composition, and the possible explanation is the usage of re-cast metal.

Conclusions

This short investigation of a copper items assemblage offers new insights into the KGK VI metallurgy in Southeast Romania. We tried to correlate copper sources exploited by KGK VI people with the data resulting from compositional analyses (PIXE and XRF). Both techniques reveal copper as the main composing element (~98% and over) and trace elements such as cobalt and silver for all investigated items. Based on these results and on a comparison with Pernicka et al. 1999 & 2014, the copper sources used to manufacture the investigated artifacts could be at Majdanpek and Ai Bunar. However, the increasing presence of metal objects with similar morphological and compositional characteristics in the KGK VI communities, especially during the Gumelnița A2 phase, could be a strong indicator of the standardization of copper recipe production, but also a sign of growth of the interactions and communications between metal workshops and tell communities on both sides of the Danube.

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TO PIT THE PIG: THE CURIOUS CASE OF FEATURE E63 AT TELL PETKO KARAVELOVO

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Abstract

This paper includes a detailed analysis of feature E63 at Tell Petko Karavelovo which is a pit excavated in 2021 measuring 0.83–0.87 m in diameter and 0.45 m in depth. Four different layers were identified in the fill. The deposit could be defined as ‘odd’ and consists of burnt daub pieces, sherds, stone tools, fragments of oven base plaster, unfired loom weights, crow wing bones, and an almost complete skeleton of a piglet which was killed by a heavy blow on the head. Both radiocarbon dates and stratigraphic evidence show that feature E63 belongs to the Petko Karavelovo B phase (middle Chalcolithic), ca. 4700 cal. BC.

There is enough evidence to suggest that the pig was sacrificed. Based on the deposit’s analysis and on various later examples of pig sacrifice we will argue that pit E63 represents the remains of a special social practice performed by women.

Keywords: Balkan Chalcolithic – ritual pits – structured deposition – pig sacrifice – loom-weights – gender roles in prehistory.

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In 2014, a peculiar pit was excavated at Tell Petko Karavelovo which was recorded as feature 103 and published as ‘(Not just) another extraordinary pit’ (Chohadzhiev

2017). At the time, we were confident that its deposit shows a unique combination of elements. Seven years later, the site yielded another pit labeled as feature E63¹ that seems similar to feature 103 (Chohadzhiev et al. in print, fig. 3).

Feature E63 was uncovered in the northern part of trench E (Chohadzhiev et al. 2019, 46f, fig. 1), grid square 79 (fig. 1), in an area that had been completely topped by the well-preserved ruins of a burnt house (feature D3; Chohadzhiev et al. 2020 and 2021). The latter belongs to the PK-B phase of the site and dates to the middle Chalcolithic or the Polyanitsa IV period. The north part of pit E63 was covered by a clayish layer, which had initially been interpreted as the floor of the northern room of an unburnt house (feature E67) but it was later established that this part of the house had been truncated by the builders of the later structure D3; they deposited yellowish clay there, much alike the floor of the earlier house E67 (see the area labeled as '3' in fig. 2), but lacking the wooden platforms of its southern part. It is thus not clear whether the pit is earlier or later than E67. It definitely predates the clay level that preceded the construction of house D3 of the PK-B2 occupational phase while house E67 belongs to the latest stage 4 of the PK-A phase. The pit truncates the burnt debris of house D9, which dates to the second phase of the site (PK-A2), and is thus later than it (fig. 2). No structures of the PK-A3 phase were identified in this part of the site but the poorly preserved remains of house F14 were uncovered 2 m to the west (Chohadzhiev et al. in print), and the pit penetrates the off-house layer. As noted with the case of pit 103, some pits at tell sites are not related to a certain building level but are located between two levels (Chohadzhiev 2017, 11). This is completely valid for E63, too, as this pit represents a very short moment in the settlement's life compared to the time span of a house or a layer. Therefore, in the relative chronology of the site, pit E63 should be positioned between the PK-A3 and PK-B2 phases. Based on the radiocarbon dates (fig. 30.3), it seems more likely that it belongs to the B1 phase rather than to A4 which can be associated with the beginning of what is accepted as middle Chalcolithic (Chohadzhiev 2021, 154).

Pit E63 was first recorded as a hearth because it appeared as an ashy spot of elliptical shape measuring 1.16 x 0.85 m, at an elevation of 1.90 m below datum (BD)². Several rocks were unearthed in its outlines, and some more rocks were found immediately to the south (fig. 3). At first, they were not linked with feature E63 mostly because of the sloping terrain³ (fig. 1) but it later became clear that they seem to have been part of it.

¹ Since 2017, letter indexes have been added to the identifications of all features showing which trench they were uncovered in.

² The main datum point of Tell Petko Karavelovo is 48.20 m AMSL, while the highest preserved point of the mound was 48.60 m AMSL.

³ The big 'depression' in the terrain was first recorded in the ruins of house D3 (Chohadzhiev et al. 2020, 302, fig. 1; 2021, 273). It has recently been argued that this sagging of the ground was due to the decay of the wooden floor platforms in the southern parts of trench E, and the sinking of the upper layers.

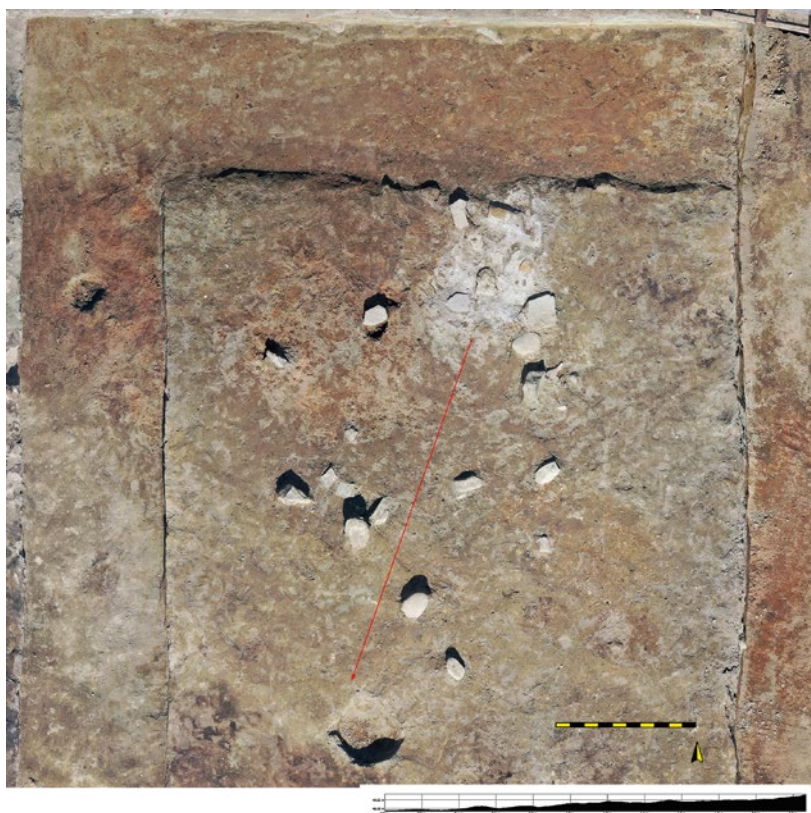


Figure 1. Orthophoto of pit E63 (ash top and rocks) at the initial level of its recording. The slope is shown with a red arrow. Image Credit: A. Chohadzhiev.

The abundance of ash and the presence of rocks, animal bones, and burnt pieces of clay plaster were those misleading clues that were the reason for the initial misidentification of this feature. Accordingly, the immediate area was excavated as if it was a part of the burnt debris of house D9 below it (fig. 4). It was only after the removal of the grayish sediments east of the spot (fig. 5) that it became clear it was in fact a pit. The burnt ruins of house D9 were truncated by two other cuts (features E62A and E62B) that dated later than the house and earlier than pit E63 (fig. 5.1). It seems that they were used for the extraction of sintered daub rather than for depositional purposes. The bottoms of both E62A and E62B reach the white layer of house D9 (for the microstratigraphy of the early Chalcolithic houses at Petko Karavelovo, see Chohadzhiev 2021). Thus, pit E63 truncates two different contexts: the ruins of the burnt house D9 to the southwest, and the earlier cuts that had already removed the top layers of D9, to the northeast. The excavation strategy faced a difficult methodological challenge because of these circumstances. The decision to dig the two parts consecutively, using the ‘natural border’ of the earlier cuts as a cross-section, might have not been the best for the photographic records but was the least harmful



Figure 2. Aerial photo of the upper level of pit E63: (1) the pit; (2) the burnt ruins of house D9; (3) clayish cover. Image Credit: A. Chohadzhiev.

for the exploration procedures. And to cap it all, a rodent had dug a narrow tunnel to the west and north of the pit penetrating the pit's deposit from the north.

After the excavation of feature E62B, it became obvious that E63 is a not a common pit. Its upper layer (I) contains mostly white ashes, fragments of oven base plaster lying with their face up, pieces of burnt wall daub, and ceramic sherds. There were also objects of unburnt clay, but they were badly preserved and could not be identified (figs. 6a and 7.6). The layer is 5 cm thick at the periphery and about 8 cm in the center of the pit. The diameter of the pit at this level is between 0.83 and 0.87 m, which makes it an almost regular circle. At the bottom of this layer, fragments of oven base plaster were arranged

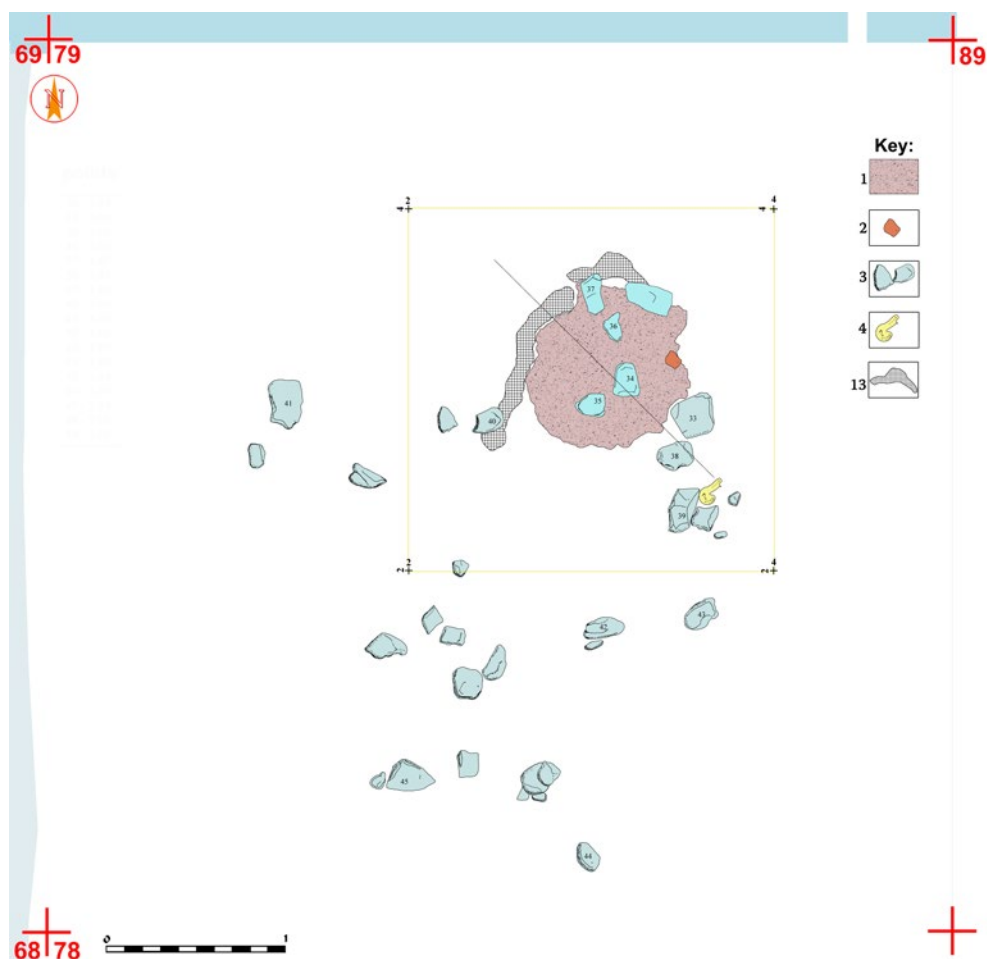


Figure 3. Drawing of pit E63 at the initial level of its recording. The yellow box shows the area shown at the other levels of the deposit in figure 6. Image Credit: A. Chohadzhiev.

Elevation points (m below datum): (33) 1.93; (34) 2.00; (35) 1.98; (36) 2.02; (37) 1.97; (38) 1.92; (39) 1.84; (40) 1.90; (41) 1.76; (42) 1.98; (43) 1.98; (44) 1.98; (45) 2.26; (46) 2.08; (47) 2.04; (48) 2.06; (49) 2.06.

Key: (1) ash; (2) piece of burnt daub; (3) rocks; (4) bones; (13) rodent tunnel.

horizontally, as well as some large pieces of burnt daub and sherds (figs. 6b and 7.16). They lay on a thin gray-greenish clay layer that topped the lower layer (No. 17 in fig. 7).

The thickness of layer II varies from 16 to 20 cm as it is thicker in the west part (No. 7 in fig. 7). It consists almost entirely of burnt daub, mostly broken in small pieces or powdered to dust, but there were also some large pieces measuring more than 20 cm across, some of them bearing wood frame or wattle imprints (fig. 29). What is impressive is the relative high compactness of this layer. In primary contexts, burnt debris usually is less compact, and even when it's relocated, such density is rare. This observation seems to



Figure 4. The top of the pit, photographed when E63 was still considered as a hearth. Image Credit: A. Chohadzhiev.

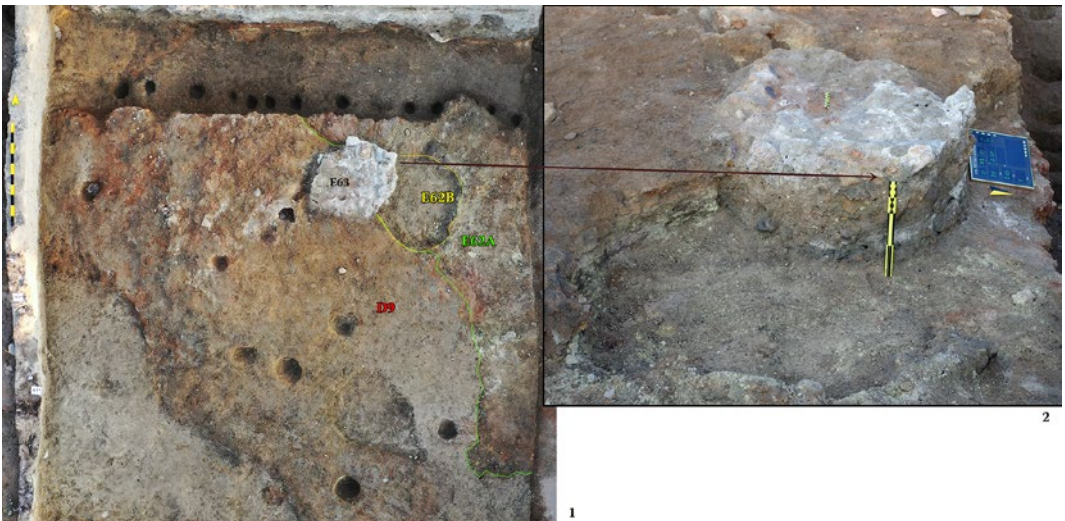


Figure 5. Pit E67 at the level of the burnt debris of house D9, and the other two cuts to the east (E62A and B): (1) orthophoto; (2) view from the east. Image Credit: A. Chohadzhiev.

suggest that the compaction of the layer was intentional. The assumption that the daub was excavated from the same burnt house that the pit had truncated seems logical but is not fully proven. On the bottom of this layer, that appears to be at the middle of the pit, a concentration of animal bones was recorded, mostly in the southeastern half (fig. 6c). The bones occur in three major clusters: limbs, ribs, and pelvic bones to the northeast (fig. 8.1–2); skull and cervical vertebrae to the southeast (fig. 8.2–3); and ribs, vertebrae, and some limb bones in the middle. Even before the osteological study was completed, it became obvious that most of the bones belong to a young pig. The position of the skull is quite puzzling (fig. 9) as it seems that the pig was decapitated and the head with the uppermost cervical vertebrae was deposited in the pit with the snout up. Later, when the soft tissues decayed, the mandible fell to the north, while the maxilla and the parietal part

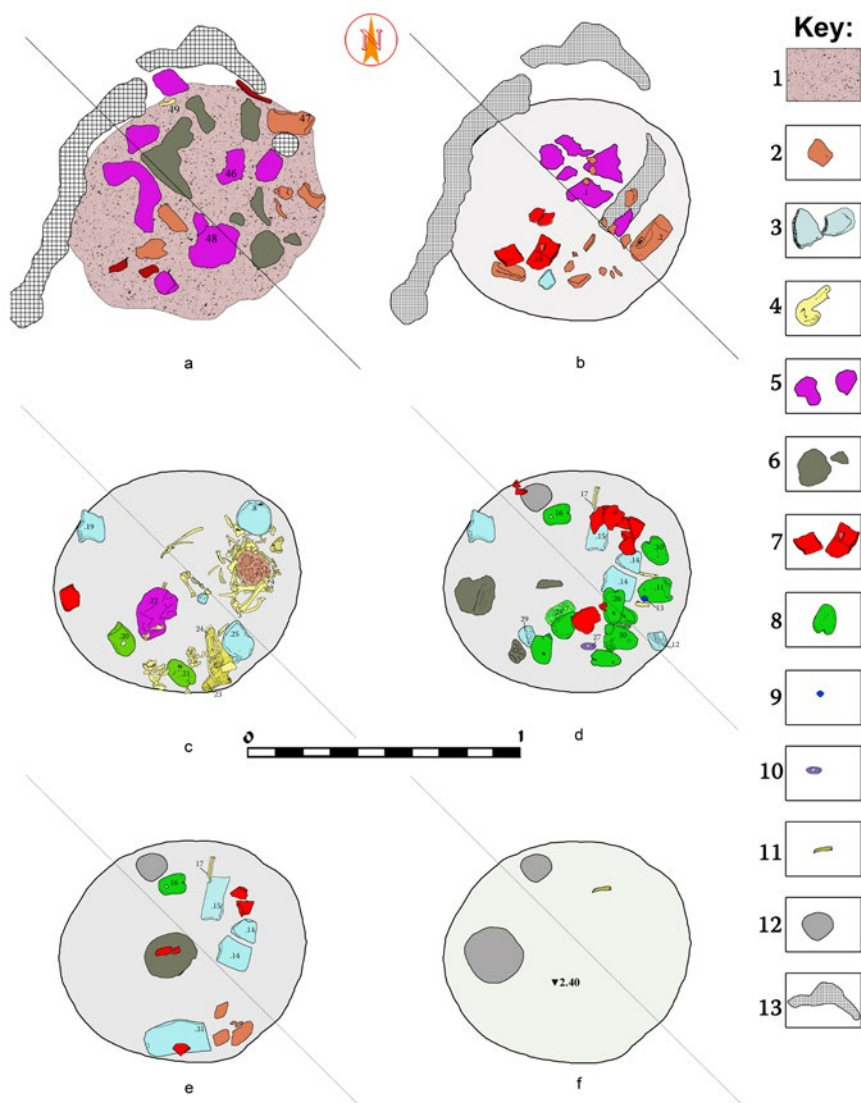


Figure 6. Different levels of the deposit of pit E63. The diagonal line shows the place of the cross-section in figure 7. Image Credit: A. Chohadzhiev.

Elevation points (m below datum): (1) 2.10; (2) 2.11; (3) 2.20; (4) 2.21; (5) 2.24; (6) 2.24; (7) 2.26; (8) 2.17; (9) 2.27; (10) 2.29; (11) 2.27; (12) 2.27; (13) 2.28; (14) 2.32; (15) 2.33; (16) 2.30; (17) 2.41; (18) 2.06; (19) 2.08; (20) 2.17; (21) 2.12; (22) 2.21; (23) 2.12; (24) 2.23; (25) 2.21; (26) 2.23; (27) 2.24; (28) 2.27; (29) 2.22; (30) 2.28; (31) 2.30; (32) 2.39; (33) 1.93; (34) 2.00; (35) 1.98; (36) 2.02; (37) 1.97; (38) 1.92; (39) 1.84; (40) 1.90; (41) 1.76; (42) 1.98; (43) 1.98; (44) 1.98; (45) 2.26; (46) 2.08; (47) 2.04; (48) 2.06; (49) 2.06.

Key: (1) ash; (2) piece of burnt daub; (3) rocks; (4) bones; (5) oven plasters; (6) spots of pure gray-greenish clay; (7) ceramics; (8) loom-weight; (9) flint; (10) shell; (11) antler; (12) post negative; (13) rodent tunnel.

slid southwards. To be completely objective, it should be noted that it is also possible that the pig's muzzle was torn deliberately. Between the jaws, several ribs and rib fragments occur. The northeastern cluster consists of an articulated back limb, some ribs, vertebrae, and several scattered broken pieces of other long bones. The middle of this concentration is covered by a big and very compact piece of burnt daub. In the process of excavation, it was impossible to detach the bones that were almost welded to the daub (fig. 10). These were mostly pelvic bones and an articulated part of the back limb joint. In the northern part of this concentration, a large stone pounder was found that had literally smashed the bones directly beneath it (figs. 6c.8, 8.2, and 10). The pounder (fig. 24.5) is a simple rounded rock with traces of very short use. A very similar but somewhat flatter pounder was unearthed next to the skull (figs. 6c.25 and 9). This layer of the fill also yielded two unfired loom weights made of pure, gray-greenish clay (figs. 6c.20–21 and 8.3–4), one

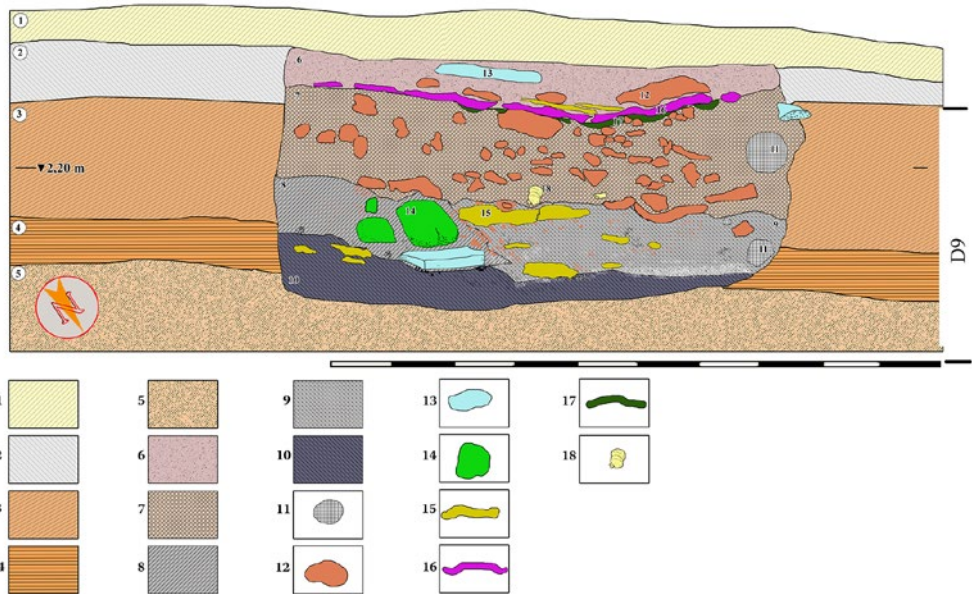


Figure 7. Cross-section of pit E63. Image Credit: A. Chohadzhiev.

Key: (1) clayish yellow layer; (2) gray layer under feature E67 (the off-house sediments of feature F14?); (3) the upper burnt daub layer of house D9; (4) the burnt platform of house D9; (5) the white grainy layer of house D9; (6) layer I (mostly ash and small charcoal pieces) of the deposit of pit E63; (7) layer II (mostly burnt daub) of the deposit of pit E63; (8) layer III (gray sediments, small amount of charcoal and ash (but more than 7.9) and burnt daub) of the deposit of pit E63; (9) layer III (gray sediments, small amount of charcoal and burnt daub (but more than 7.8) of the deposit of pit E63; (10) layer IV (dark gray sediments with lot of charcoal) of the deposit of pit E63; (11) rodent tunnel; (12) a large piece of burnt daub; (13) rock; (14) loom weight; (15) yellow clay horizontal plaster; (16) piece of oven base plaster; (17) greenish clay horizontal plaster; (18) pig bones.



Figure 8. The pig bones as being unearthed during the excavation. Image Credit: A. Chohadzhiev.



Figure 9. The skull of the pig and some of the loom weights around it. Image Credit: A. Chohadzhiev.



Figure 10. A large piece of burnt daub (left); the pig's pelvic bones stuck to it after the daub was removed (right). Image Credit: A. Chohadzhiev.



Figure 11. The skull of the pig, the loom weight with a mole jaw on top of it (black arrow), and a piece of oven base plaster (yellow arrow). Image Credit: A. Chohadzhiev.

directly west of the skull and another just 20 cm to the west. A large piece of oven base plaster lay just north of the two weights (fig. 11.1; note the yellow arrow). The osteological analysis showed that besides the pig, there are single bones and teeth of cattle, sheep, and a European mole in this layer. The mole's jaw fragment was discovered directly on one of the weights (fig. 11.2; note the black arrow) mixed with some vertebrae of the pig and covered with small charcoal and clay pieces from the pit's fill. They are a clear indication that the mole jaw is part of the deposit rather than being a later inclusion. The bottom of this layer was recorded at ca. 2.25 m BD, the boundary between it and the lower layer having been clearly distinguishable as layer III is much darker, gray, with only small pieces of burnt daub. Between the two layers, there was a thin streak of yellowish clay that didn't cover the entire area of the pit but only an irregular spot in the middle (fig. 12; note the black arrow). Even though this clay doesn't seal off the lower layer, it seems also obvious that it separated the two layers in some way.

Layer III is gray, compact, saturated with small charcoal and burnt daub pieces. It is noteworthy that its western part (No. 9 in fig. 7) contains less burnt daub pieces than the

eastern side (No. 8 in fig. 7), but includes more charcoal and ashes. It measures from 9 to 11 cm thick and yielded numerous objects, the loom weights being the most significant ones. They are of the same type as the two weights found in the upper layer: made of pure, gray to green clay, some of them with a yellow tint (fig. 13). None of them was fired and they were very fragile and difficult to excavate. As they started to disintegrate soon after having been unearthed and exposed to dry air, immediate conservation was required (fig. 14). Most of the weights were clustered in the southeast half of the pit, almost on the same place where the pig bones were found. The single exception was uncovered in the north periphery of the pit (No. 16 in fig. 6d). The detachedness of this weight can be explained by its lowest position of all weights in the pit: 18 cm below the topmost weight (No. 21 in fig. 6c) and 7–9 cm below the main cluster of weights. What is noteworthy in the weights' positions is that some of them lay horizontally, but others are tilted. This clearly shows that they were not arranged separately in the pit, but most likely were placed or even dumped together with other stuff of the deposit, or were somehow packed together. One of the weights (No. 30 in fig. 6d) was seriously deformed by the large pounder that lay directly upon it, just below the pig's mandible (No. 25 in fig. 6d). This deformation (fig. 23.7) seems to suggest that the weight was not only unfired, but was even freshly



Figure 12. The border between layers II and III of the deposit, with the area of yellow clay (black arrow). Image Credit: A. Chohadzhiev.

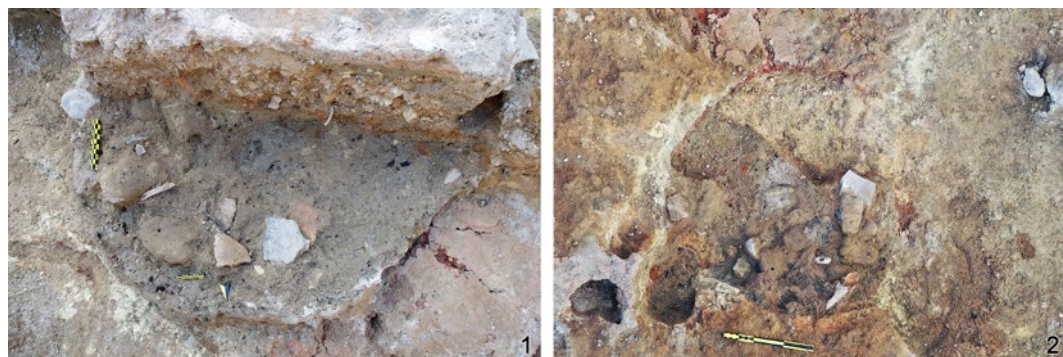


Figure 13. (1) Loom weights in layer III of the deposit. northern half; (2) the southern half of the pit. Image Credit: A. Chohadzhiev.



*Figure 14. The state of preservation of a loom weight during the excavation.
Image Credit: A. Yanakieva.*

made just before the deposition (fig. 15; note the yellow arrow). A perforated mussel shell lay very close to this weight (No. 27 in fig. 6d; fig. 15, note the red arrow). Two flat stone slabs were uncovered under the weights. They look like grinding stones but have no traces of such use. The bigger one (No. 14 in fig. 6d and e) is split in two pieces. Traces of some wicker work were identified below it, and even though there is no conclusive evidence that it was a basket, it definitely was made of wicker twigs (fig. 16). The second rock lay just 7 cm to the north (No. 15 in fig. 6d and e). It also looks like a grinding stone and even might have been shaped as such but was never used. It was covered by ceramic sherds. On its north edge, two very fine bones were uncovered (No. 17 in fig. 6d and e; fig. 17). Their position looked strange: they were parallel to each other, as if they had still been kept together by the tissue. The osteological analysis made it clear that these were wing bones (radius+ulna and carpometacarpus) from a hooded crow, and their position shows that the whole severed wing of the bird was deposited in the pit, not just the bones. In the southernmost edge of the pit lay a flat saddle quern measuring 23 x 13 cm (No. 31 in fig. 6e). Its end was touching the pit wall and it was slightly sloping to the inside (fig. 18; note the yellow arrow). On the same level, 18 cm north of the grinding stone, a rounded lump of gray-yellowish clay was recorded (fig. 18; note the red arrow). The bad state of preservation of this object does not allow proper identification. It might be a fully disintegrated loom weight. Such amorphous lumps of pure clay also appeared in the upper layer.

The lowest layer IV of the pit's fill is dark gray in color and contains a lot of small charcoal pieces. Its thickness varies from 10 cm to the east to 3 cm to the west (No. 10 in



Figure 15. Layer III of the deposit. A deformed weight (yellow arrow) and a perforated shell (red arrow). Image Credit: A. Chohadzhiev.



Figure 16. The wattle remains on the bottom side of a stone slab (right) and the imprint on the soil after the removal of the slab (left). Image Credit: A. Chohadzhiev.



*Figure 17. The bottom part of layer III and the wing bones of a hooded crow.
Image Credit: A. Chohadzhiev.*



*Figure 18. The border between layers III and IV, with a large saddle quern
(yellow arrow) and a clay lump (red arrow). Image Credit: A. Chohadzhiev.*

fig. 7). It is surrounded entirely by the white grainy layer of the burnt house and is very well distinguishable. It contains a single artifact, an antler pickaxe. The half-broken tool lay in the north part of the pit, almost directly on the bottom (fig. 19; note the red arrow). It is rather tempting to assume that it was this pickaxe that the pit was dug out with or that the pig was killed with this tool, and that later it was the first thing that had been deposited or dumped inside. And while the formal logic supports both scenarios, there is no conclusive evidence for any of them. The two postholes (figs. 6f and 20) identified at the bottom of the pit seem to be later than house D9 and earlier than pit E63, since the two events – the destruction of D9 and the digging of E63 – were divided by at least two occupational phases. No postholes were recorded in the upper levels of the pit.



Figure 19. Layer IV of the deposit, with an antler tool (red arrow). Image Credit: A. Chohadzhiev.



Figure 20. The excavated pit E63 dug in the burnt debris of house D9. Image Credit: A. Chohadzhiev.

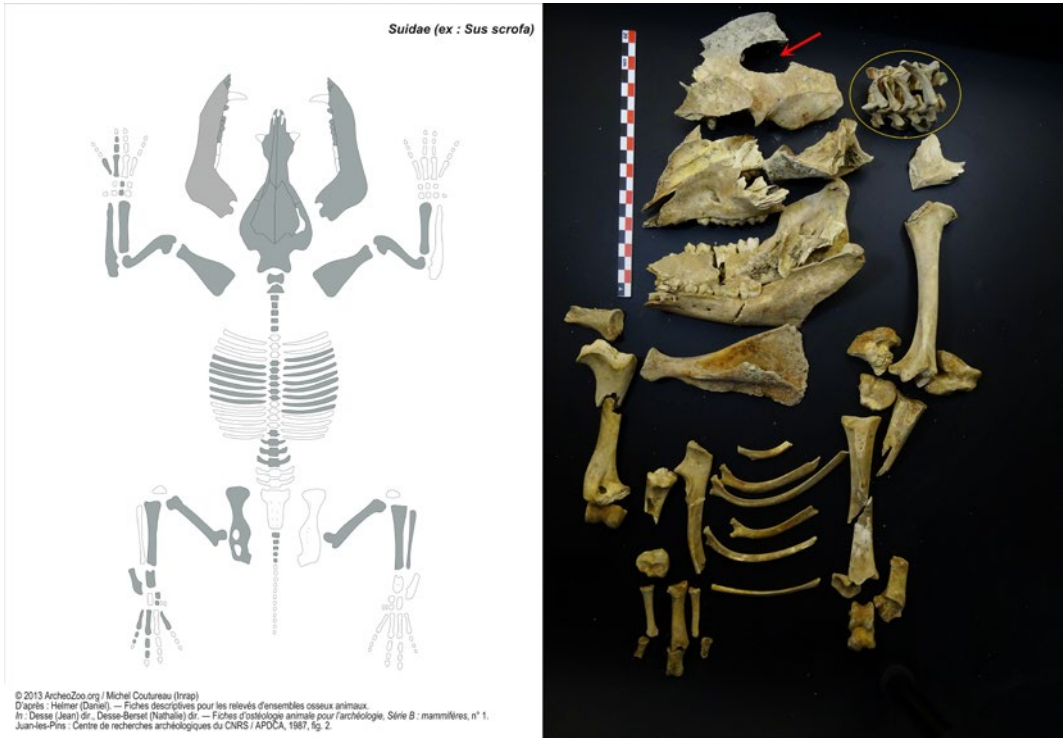


Figure 21. *The skeletal remains of the pig. Image Credit: N. Karastoyanova.*

It was only after the analysis of the field evidence and especially of the deposit's structure that it became clear that the rocks scattered in and around the ashy spot on the top seem to have sealed the pit; they formed a low mound on it and for a certain period marked the place. The pit measured 0.45 m deep, not counting the rock top. With an average diameter of 0.84 m and with an almost cylindrical shape, it has a volume of about 0.25 m³.

In order to provide deeper insight into the meaning of pit E63 deposit, one should consider its structure. Two key elements immediately attract notice: the pig and the loom weights. The osteological analysis shows that the almost entirely preserved skeleton belongs to a pig; it was probably domestic, even though it's hard to be sure because of the young age of the individual (fig. 21). The bones were in very poor condition and very fragile, again due to the pig's young age. All joints were unfused, and the teeth were deciduous. Only the first molar has erupted, indicating that the individual was less than six months old when killed. No traces were found on the bones except the skull. On the frontal and parietal bones, there was an elliptical hole measuring 22 x 38 mm (fig. 21; note the red arrow) and resembling the cross-section of a small axe. Only some of the phalanges and metapodials were missing; they could easily have decayed, being so fragile. The bones have traces of thermal treatment at low temperature (300°C or 400°C).

The position of the bones in the pit is quite puzzling. On the one hand, they were in an obvious disorder, but on the other hand, many of the skeletal elements were clearly articulated. There are several possible explanations for this circumstance. It is clear that the pig was not consumed in portions, and it cannot be a question of ritual feasting, which is the most common explanation for the presence of the combination of animal remains and the involvement of fire in pit contexts (Chapman 2000a, 81; Nikolov 2011b, 216). It is possible that after it was roasted, the pig was torn into several pieces that were placed in the pit, and maybe some were eaten by the participants in this event. Dismembering a roasted piglet is easy to do with bare hands and this explains the absence of cutting marks. But the simplicity of this explanation is slightly deceptive. There is obvious articulation in some skeletal remains such as the skull and the cervical vertebrae, the pelvic bones, and the rear limbs, as well as several columns of the backbone. So maybe after the pig was killed with a heavy blow on the head and roasted, it was placed in the pit intact. The bone displacements occurred during the post-depositional processes associated with the decomposition of soft tissue and the deposition of abundant amount of burnt daub in this part of the fill. It is even possible that the piglet, the loom weights, and some rocks were deposited in the pit in a basket, the evidence of which has been discussed above. The integrity of the pig's carcass suggests that it was sacrificed and offered. The similar pit 103 yielded 73 faunal remains, all of them belonging to wild animals, a single individual of each species: red deer, roe deer, fox, wisent or aurochs, golden eagle, and three shells of different river mussels (Chohadzhiev 2017, 15f). The inclusion of wild animal remains in the deposit does not imply sacrifice, which requires prior selection of the sacrificial animal. Moreover, there were only bones from different animals, all of them adults. In the case of pit E63, it was obviously a different practice involving a young piglet (most likely intact), a wing of a hooded crow, a mole jaw, single bones and teeth of sheep and cattle, as well as vertebrae from a common chub and a common barbel (fig. 22). It is clear that the pig and the wing of the hooded crow were deliberately chosen to be buried in the pit. The



Figure 22. Fish vertebrae: (1) common chub; (2) common barbel. Image Credit: N. Karastoyanova.

rest of the bones were either part of a feast meal or were included in the deposit by chance during the digging and backfilling of the pit.

Pit E63 yielded an assemblage of at least 15 clay objects, most of which can be identified as loom weights (fig. 23.1–15). All of them were made of pure, untempered clay. Their state of preservation was very poor, and a long process of field consolidation and laboratory restoration was required. Complete restoration was impossible for some of the objects (fig. 23.12 and 15) but they are definitely fragments from loom weights, while during the excavation, three more clay lumps were identified in the pit and their condition was so bad that they were beyond preservation. Two of the preserved items differ from the others. One of them is perforated only from the one side (fig. 23.13), while the other is not perforated at all (fig. 23.14). They also have a different shape, rounded at both ends.



Figure 23. The loom weights from pit E63 (1-15); Image Credit: A. Chohadzhiev; (16) carved vulvar image from the Upper Paleolithic, Laussel, France (from Marshack 1972, fig. 169b); (17) Middle Egyptian hieroglyphic sign for 'vulva and pelvis' (from Allen 2010, 430, sign No 280a); (18) a loom weight with an incised triangle from Tell Karanovo (from Nikolov 2002, tabl. 5); (19) an early Sumerian cuneiform sign for woman (from Omiglot. The online encyclopedia of writing system and languages. https://www.omniglot.com/images/writing/sumerian_glyphs.jpg).

Both were uncovered in the topmost layer of the deposit; two more weights were found at the bottom of layer II (fig. 23.11 and 12), while the rest were in layer III. They can be considered as roughouts or unfinished weighs. All completely preserved weights (fig. 23.1–11) are quite similar in size and shape. Their height varies from 11.2 to 13.4 cm; the width, from 7 to 9 cm; and the thicknesses, from 4.2 to 5.4 cm. The weight of the 11 loom weights varies from 470 to 560 g. Their shape is rounded, with a narrower upper and a wider lower part, which in turn is divided into two halves by shallow groove. This type of loom weights dominates in the early phases of Tell Petko Karavelovo. The lower part is visually reminiscent of the female gluteal cleft. The similarity to certain Paleolithic rock art ‘vulvar’ images is obvious (fig. 23.16; Goode 2021). Strangely or not, the Middle Egyptian hieroglyphic sign for ‘vulva and pelvis’ (fig. 23.17) strongly reminds the outlines of the loom weights from pit E63 (Allen 2010, 430, sign No. 280a). The anthropomorphic images on the Chalcolithic loom weights are always female or represent female attributes (Chohadzhiev 2011, 263). The incised signs on some Chalcolithic weights represent the female pubic triangle (fig. 23.18; Nikolov 2002, 320, tabl. 5). Their iconography is exactly the same as what we see later in the early Sumerian cuneiform sign for ‘woman’ (fig. 23.19). This seems to suggest that the loom weights were not just female tools, but that the original idea of the feminine principles was implemented deep in their essence.

None of the weights from pit E63 has a thread groove on the upper side of the hole, which is clear indication that they were never used, unlike the assemblage of 21 unfired loom weights from house 127; they were unearthed in their original order together with a perforated bone that likely served as a shuttle, and all of them have thread grooves (Chohadzhiev & Gurova 2016, 109). One of the weights from the deposit of pit E63 has a bone (most likely from the piglet) stuck in the clay (fig. 23.3), while another has a ceramic sherd driven in it (fig. 23.7). As was mentioned above, the latter had been partially deformed by the stone pounder lying on it (No. 30 in fig. 6d). The cracks that can be seen on the weights’ surfaces could have appeared only if the clay body was still in its plasticity state. The cracks and the objects planted in the clay are conclusive evidence showing that the weights were not simply unfired and unused, but that they were freshly made just before having been deposited in the pit. Based on these observations, a good case can be made for the contention that the weights served as a votive deposit and were not used in real textile production. Some of them have traces of carbonized wattle (fig. 23.2 and 10). The imprints on one of the rocks and one of the weights (fig. 23.10) suggest that they are the remains of a basket or a grid made of wicker twigs. The archaeobotanical analysis showed that it was made from plants of the *Viburnum* genus.

Nine stone objects were uncovered in the pit’s deposit (fig. 24). Only three of them can be defined as tools: the flat saddle quern (fig. 24.1) and the two pounders (fig. 24.4 and 5). All three have traces of short use. One sharp rock resembles a chisel or axe with an obvious proximal edge, but this is its natural form and it was never deliberately shaped (fig. 24.9). This object is broken and only one half is included in the deposit. Similarly, a

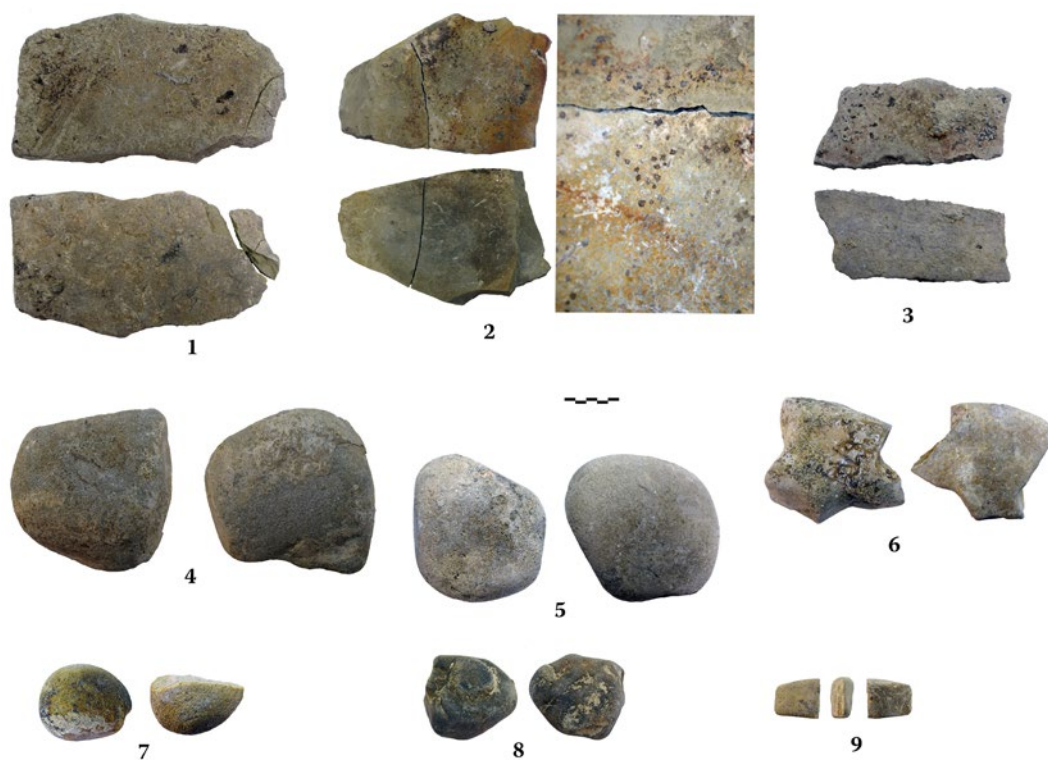


Figure 24. Stone objects from pit E63. Image Credit: A. Chohadzhiev.

half of a globular rock that resembles a pounder was found in the pit (fig. 24.7). The three stone slabs (fig. 24.1–3) were uncovered on the bottom of layer III and all bear traces of having been in contact with the wicker twigs.

The chipped stone assemblage from pit E63 is remarkable in respect of raw material and composition (figs. 25 and 26). It consists of 17 artifacts: 2 blades, 9 flakes, and 6 flake fragments (i.e., pieces without proximal parts). Both blades, a proximal and a mesial fragment, were made of flint (fig. 25.1 and 2). The raw material of the smaller blade is of the highest quality: Ludogorie flint, type Ravno. The fracture of the blade suggests that it was submitted to secondary debitage, perhaps because of the quality of the raw material. Among the flakes and fragments, the raw material of lower quality predominates. There are 6 items of light grey, coarse grain material (silicified limestone), and 6 cortical pieces (fig. 26.1). There is another type of raw material within this debitage group: microcrystalline beige-greyish flint with white thin cortex (fig. 26.2). In this small assemblage, no artifacts have utilization traces and what makes it distinguishable are the raw materials that are relatively rare in the chipped stone assemblage from Tell Petko Karavelovo.

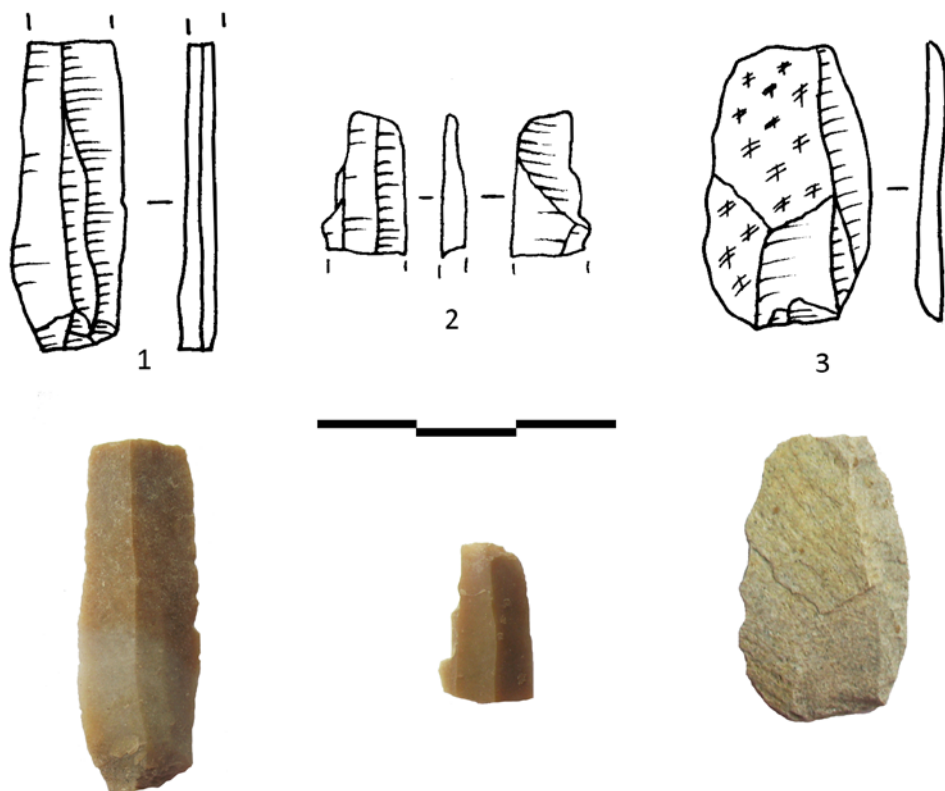


Figure 25. Blades (1–2) and a cortical flake (3) from pit E63. Image Credit: M. Gurova.

Pit E63 wielded three more artifacts: a perforated river mussel shell, a piece of belemnite, and an antler tool. The perforated shell (fig. 27.1) was found in layer III, just under the skull of the pig and among the loom weights. It was made an adornment by a relatively large (2 x 1 cm) elliptical perforation. What is unusual is the perforation technique: chipping rather than sanding which is the usual practice identified for this site.

The belemnite¹ was unearthed in layer III (fig. 27.2). The piece is shaped as a semi-cylinder by detaching the sharp point and splitting the fossil longwise in two. Belemnites are not a rarity at Tell Petko Karavelovo.

The antler shaft-hole tool was found on the very bottom of the pit (fig. 27.3). It is not fully preserved and its rear part is missing, as the fracture is transverse to the hole. The working edge of the tool is shaped asymmetrically like an adze, perpendicularly to

¹ Belemnites are a group of coleoid cephalopods whose fossil remains are common in Jurassic and Cretaceous marine sediments. They originated during the Late Triassic and went extinct at the Cretaceous/Paleogene boundary (Hoffmann & Stevens 2020, 95). Belemnite deposits have been identified some 3 km northeast of Tell Petko Karavelovo, on the steep right bank of the river Yantra.



Figure 26. Chipped stone artifacts from pit E63: (1) flakes of coarse-grain raw material; (2) flakes and fragments of better quality flint. Image Credit: M. Gurova.

the shaft-hole axis. The hole is almost circular, with a diameter of 1.7 cm. There is no agreement in the literature for the use of this tool type. They have mostly been accepted as pickaxes for digging earth or as battle axes (for a discussion, see Boyadzhiev 2014, 61ff). Strangely, both uses fit perfectly to the two possible interpretations: the tool that the pit was dug out with or the weapon the pig was killed with. Its working edge is 12 mm wide, while the width at the end of the curved part is 22 mm, where the thickness is about 33 mm. The comparison of this tool and the hole in the pig's skull shows that the sizes correspond to each other. If it was really the killing instrument, the blow was very heavy, resulting in a penetration of at least 5 cm in the head.

The ceramic assemblage of pit E63 is not homogenous (fig. 28). Contrary to pit 103, where ten vessels were restored from all the sherds in the deposit (Chohadzhiev 2017, 13f, fig. 8–11), E63 yielded only single ceramic fragments. They all show the conservative style of ceramic production in the PK-A and B phases. The absence of necked pots is fully confirmed in this assemblage, too. Some of the sherds were secondarily fired and probably come from the burnt debris of house D9. In fact, no evidence connects any of the ceramics to the deliberate deposit of the pit. Most numerous are the large open vessels with a simple profile (fig. 28.2–4, 7, and 9). The underrim is well smoothed and



Figure 27. Artifacts from pit E63: (1) perforated shell; (2) belemnite; (3) antler tool. Image Credit: A. Chohadzhiev.

the rest of the surface is covered with barbotine, the border between them being emphasized by either a row of nail impressions (fig. 28.2) or an impressed cordon (fig. 28.3). This type of vessels predominates in both the early and middle Chalcolithic pottery. The differences are mostly in the shape (Chohadzhiev 2017, 14) but these ceramics could not be attributed to a specific phase as no carination sherds were found in E63. The plain bowls with cylindrical upper part and inverted conical lower part (fig. 28.1) and the with narrow-line graphite painting style (fig. 28.12 and 13) are common in the end of the early Chalcolithic at the site. The two preserved bases are flat.

The two uppermost layers of the deposit contain mostly burnt daub. Besides the powdered dust, there are also numerous small daub pieces as well as large architectural

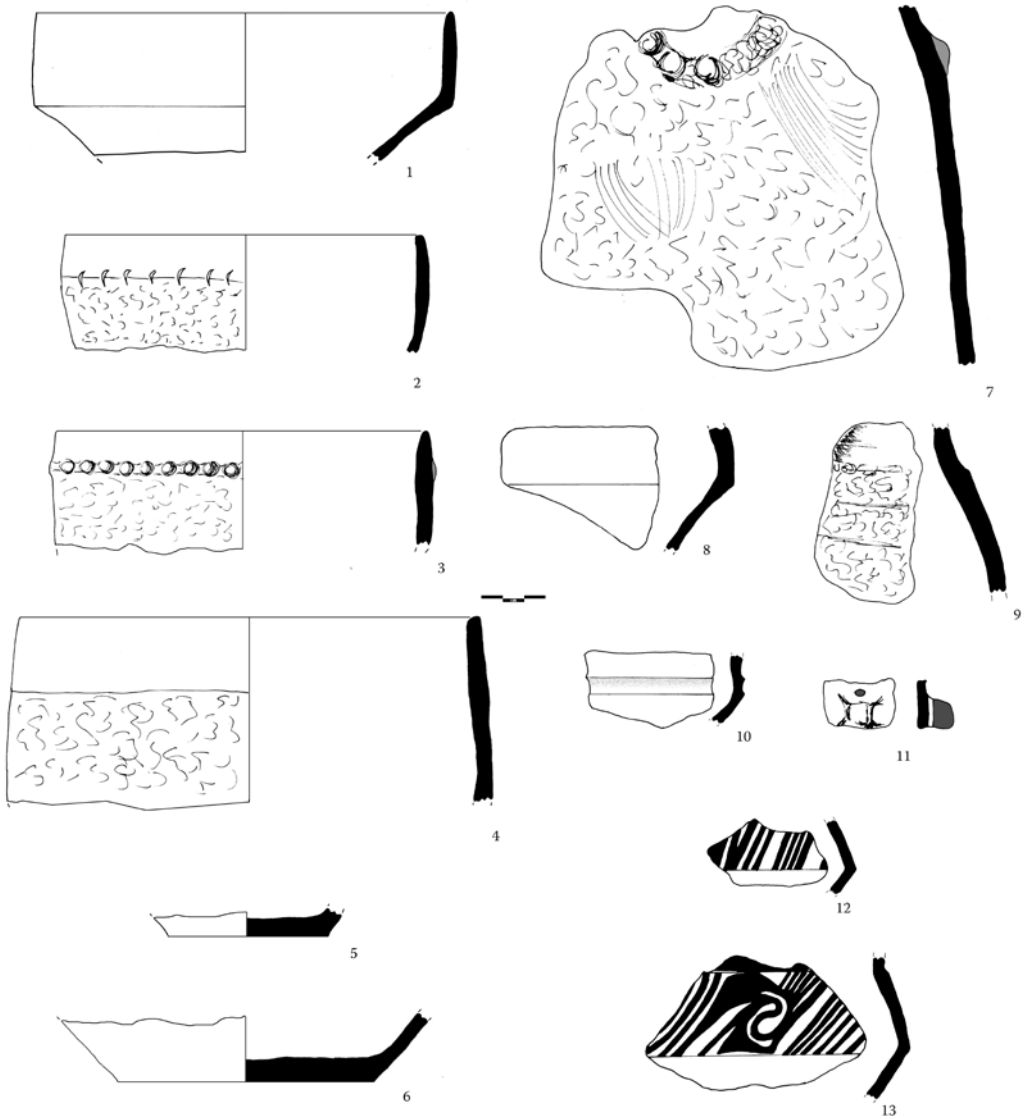


Figure 28. Ceramic sherds from pit E63. Image Credit: A. Yanakieva.

details (fig. 29) with all features common for the early Chalcolithic house debris (Chohadzhiev 2021, 162ff). The manner of filling the pit and the abundance of burnt daub in the cap of the deposit closely resembles pit 103 (Chohadzhiev 2017, 11f). Based on the detailed definition of ‘structured deposition’ at the late Neolithic pit site of Sarnevo in Upper Thrace, the burnt daub is always present in the pits’ sealing as well as in the deposits (Bacvarov 2017, 230ff). Tell Petko Karavelovo offers another perspective to this

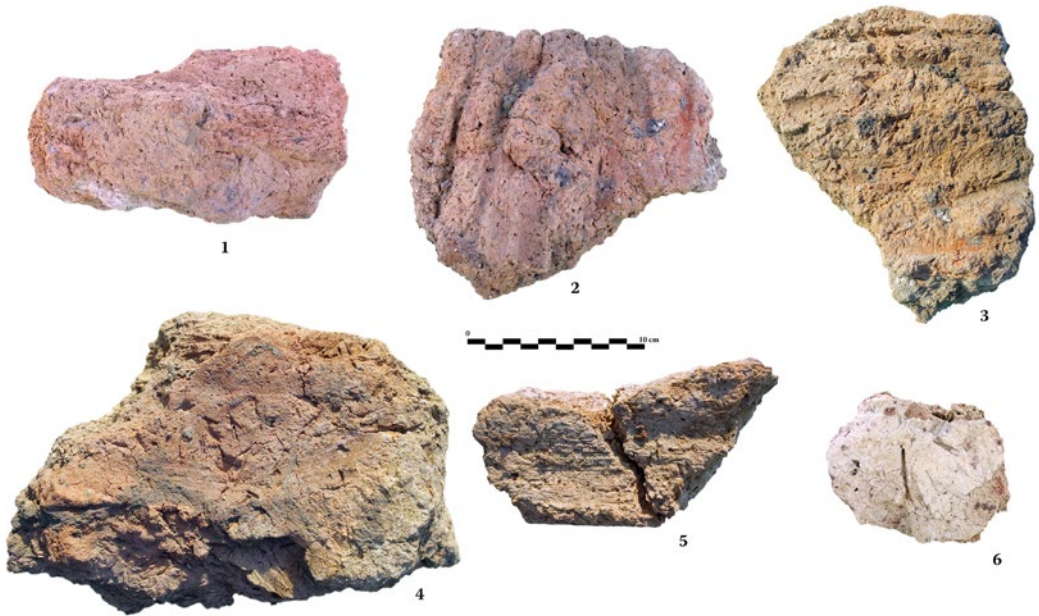


Figure 29. Burnt daub pieces from the deposit of pit E63, probably excavated from house D9. Image Credit: A. Chohadzhiev.

substantial observation. While at pit sites, the pits were dug out in the bare ground, at tell sites, almost every pit truncates structural debris. In the cases of pits 103 and E63, the burnt daub that had been excavated during the digging of the pit, was returned as backfill. The inclusion of the burnt house debris to the ‘structured deposition package’ is thus not necessarily false, but is certainly a point to be wary off.

Deliberate deposition of oven base plaster pieces is represented in both pits 103 and E63. It was identified only in the topmost layers. The practice of intentional removal of oven base plaster is well attested at Tell Petko Karavelovo (Chohadzhiev 2017, 18f), and the evidence from both pits obviously shows what could have happened with the removed pieces.

Although pit E63 was very carefully excavated, it yielded no charred grain but only charred wood. Of the total of 16 plant remains, 4 are of oak (*Quercus* sp.), 4 of ash tree (*Fraxinus* sp.), 3 of elm (*Ulmus* sp.), 3 of guelder rose (*Viburnum* sp.), and 2 of alder (*Alnus* sp.). And while the ash and oak remains were found mostly in the ashy topmost layer, the *Viburnum* and the alder appeared at the bottom of layer III and seem to have been the remains of a wicker grid or even a basket. The use of *Viburnum* in the wattle of wall construction is well recorded for the middle Chalcolithic house D3 (Chohadzhiev et al. 2021, 273, fig. 2). It does not need much courage to speculate that most of the deliberate-

ly deposited items in E63 – the weights, the rocks and the piglet – were placed in a basket. At the end, a fire was started on top of the pit, but only for a short time and it did not affect the loom weights in the deposit.

The deposits of both pits 103 and E63 not only demonstrate similar structure and pattern but also yielded very close radiocarbon dates, even though different material was dated, and at different laboratories: 5818 ± 26 BP (SUERC 104018) from a pig bone from E63¹ (fig. 30.1), and 5805 ± 20 BP (UCIAMS 187054/ULA 6800) from charred wood from 103 (fig. 30.2; Chohadzhiev 2017, 18, fig. 15). A close look at the uncalibrated date intervals shows that they overlap for a period of 33 years between 5825 and 5792 BP. The calibration spreads these two dates in the time span roughly between 4750 and 4600 cal BC, but their positions in the chrono-stratigraphic model for the site seem to suggest that the two depositional events occurred in a very short period around the year 4700 cal BC (fig. 30.3).²

* * *

Pit E63 offered abundant material for reflection on the issues of structured deposition and ritual pits. Since it was first released (Richards & Thomas 1984), the ideas of structured deposition had been elaborated and widely discussed (cf. Garrow 2012).

In this paper, we wouldn't like to theorize but just to find a proper place for our 'humble pit', as J.C. Chapman called this class of feature (2000a, 61). It contains most of the elements included by K. Bacvarov in his definition of the 'Late Neolithic ritual package' (2017, 230ff): ceramic sherds; broken grinding stones; faunal remains; burnt daub; artifacts (imitations?) that were made especially for pit deposition (here, the loom weights); sealing and separating the layers with pure clay; presence of mussel shells and bird bones; objects of different and uncommon raw materials (here, the chipped stone assemblage). And having completed this recipe, we would perhaps be satisfied and stopped there, if it was not for the pig. Sacrificing piglets and burying the remains in pits is a well-documented practice in the Hittite society, both by written sources and archaeologically (Collins 2001). This made us dig deeper in the issues of pig sacrifice, as the case of pit E63 seems to be one of the earliest records of a deliberate piglet sacrificial deposition and offers curious details and complex archaeological evidence. The following trip through the ritual practices of ancient societies does not aim to prove any connection, but rather to try – using written sources and examples from later time – and recalibrate our focus from seeing what we know towards finding out more and seeking deeper beyond what

¹ A bone from the piglet was selected for radiocarbon dating as it was the 'main character' in pit E63, and because of the individual's young age.

² This model is based on features with reliable stratigraphic position. As the stratigraphy of the excavated features is not the same in the different trenches, the place of certain feature in the area has also been considered in relation to the features it is in a direct superposition with. Thus, in trenches E and F, pit E63 is overlapped by features D3, E5, and E11, while in trench B, pit 103 truncates features 50 and 67 and is obviously later than them and feature 127.

To pit the pig: The curious case of feature E63 at Tell Petko Karavelovo

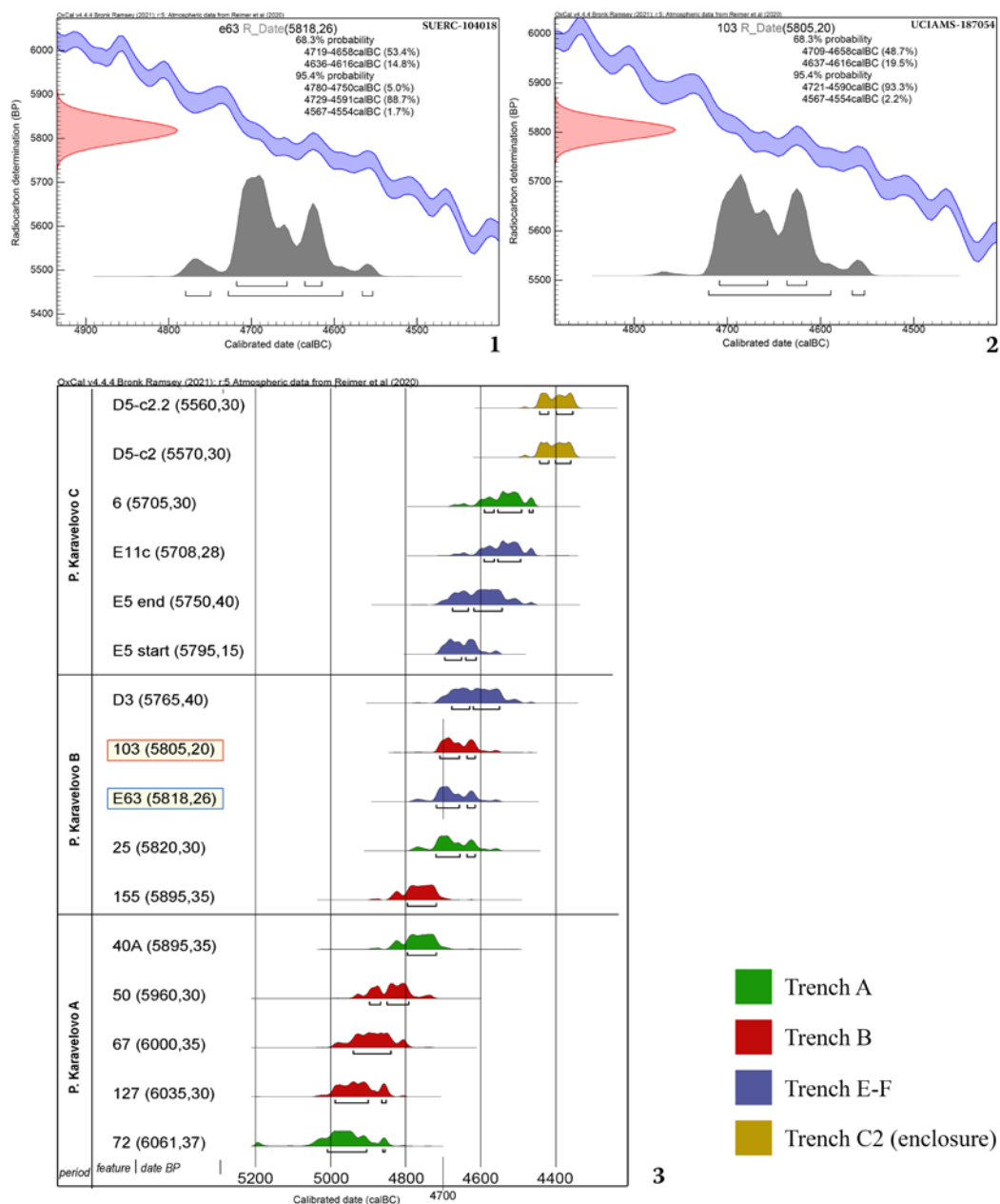


Figure 30. Radiocarbon dates: (1) ^{14}C date on a pig bone from pit E63; (2) ^{14}C date on charred wood from pit 103; (3) unmodeled radiocarbon sequence of Tell Petko Karavelovo. Image Credit: A. Chohadzhiev.

would usually be labeled as another ‘extraordinary’ or simply ‘ritual pit’.

Pigs nowhere enjoyed particularly high status in the ancient world. They were never viewed as sacred animals, and certain societies even had pork prohibitions. Usually, the restrictions on pork consumption were associated with the fact that pigs are scavengers, their squeal is unpleasant, and they live in a sty and eat everything, including their own excrements (Collins 2006, 156f). The relation between the taboos and the awareness of the danger of pork consumption due to Trichinosis has been timidly proposed by Koot van Wyk (2014). He even argued that ‘It is remarkable that all the animals listed by Moses in Leviticus 11 as unclean for eating, are nearly all appearing in the researches between 1833–2005 on *Trichonella*, e.g., cockroaches [*sic!*], horse, dog, cat, pig, fox, bear, crocodile, rats, etc.’ (2014, 112). The osteological analyses of the early Chalcolithic faunal remains from Tell Petko Karavelovo are positive that management and consumption of pigs were essential for the subsistence of this community (Karastoyanova & Chohadzhiev 2017), and a taboo on pork is unlikely. And although pork was not the subject of a dietary taboo in most ancient societies, ‘pigs are rarely featured in art, infrequently mentioned in texts, and their cultic use is extremely limited’ (Collins 2006, 160). B.J. Collins also reasoned that ‘As a symbol of fecundity, pigs were invoked in analogic magic in order to secure the wellbeing of the community... [and] the goddesses to whom a pig is offered... all have associations with birth and fertility’ (2006, 170).

A very distinctive feature of the female Greek festival of the Thesmophoria was the piglet sacrifice. The resemblance between the ‘late Neolithic ritual package’ at pit sites in Upper Thrace and the Thesmophoria was first demonstrated by Bacvarov (2017, 229 and 232). ‘It is a festival to honor the goddess of agriculture [Demeter], in which the women of the community celebrate among themselves’ (Collins 2001, 235). Piglet bones occur frequently in places of worshiping chthonic deities such as Demeter and Persephone (Ruscillo 2013, 185), as the rituals included deposition of piglets into caverns and pits (*megara*) and later use of their remains (McLardy 2015, 2). Such pits, besides piglet bones, often contain other stuff: bones of birds, potsherds (McLardy 2015, 5), shells and fishbones (Ruscillo 2013, 189). All these elements are present in pit E63. Another clue linking it to the Thesmophoria is the basket. Baskets (usually called ‘*kanoûn*’) appear frequently on Greek vases illustrating sacrificial ritual, where they are shown as low flat objects with raised horn-like projections around the sides (Van Straten 1995, 31ff). Although these baskets were usually used in the pre-kill part of the sacrificial ritual, they frequently occurred in some post-kill contexts, as part of the entire offering complex (Van Straten 1995, 162ff). Overall, pig sacrifice was particularly common for the cult of Demeter (Ekroth 2014, 333).

Piglet sacrifice also happened in ancient societies for substitution, for purification, or in military rituals (Collins 2006, 173ff). A small pig was the usual sacrifice among the Romans and Etruscans in rituals ratifying alliances, either matrimonial or political (Gladhill 2016, 53f). A shocking parallel could be found between the hole in the skull of

the pig from E63 and Livy's description of the way a pig was killed by the early Romans. The kill was performed by means of stone or flint blade with a blow on animal's head and later several smashing hits with stone on the body (Gladhill 2016, 60).

Choosing a pig of young age for sacrifice is a multicultural phenomenon. It might be explained with the fact that swine is a surplus animal (of low agricultural value) and has high reproductivity (Hamilakis & Konsolaki 2004, 143). It is the high reproductivity that seems to be the reason for the direct connection of pigs and fertility rites; it also explains why pig sacrifice is a preferable female activity. Rituals as Thesmophoria and allusions to Demeter, Kore and Persephone were contextualized by M. Gimbutas for the prehistoric Balkans exactly for the relation between pigs and the 'Vegetation Goddess' (1982, 211f).

The strong 'sense of femininity' in the case of pit E63 is also emphasized by the presence of loom weights. Tools of textile production are not rare in prehistoric pit deposition, but so far, there are no parallels connecting them directly to the deposition of sacrificed pigs. Spinning and weaving tools have been found frequently in Greco-Roman votive deposits and sanctuaries (Gleba 2009). Most loom weights may have been used before the dedications but at least some of them were made for this purpose only. Occasionally, the recipient is labeled by an inscription. Most common are dedications to Athena and Hera, but loom weights, dedicated to Demeter/Ceres are very frequent, too (Gleba 2009, 70f). Textile production and its tools in antiquity were undisputedly related to women (Barber 1994, 29ff; Nixon 1999, 561ff; Brown 1970, 1075f; Nunley 2002).

The role of women in pig management has been discussed in detail by Collins (2006, 168f). Moreover, she adduced examples from Roman literature that indisputably confirm the connection between the pig and female genitalia, e.g. M. Terentius Varro's 'For our women, above all however the wet nurses, identify the female vulva of virgins with *porcum* and the Greek with *choiros* indicating that it is a suitable symbol of a wedding' (Res Rusticae II, 4: 9–10, as cited in Collins 2006, 169f).

In a prayer, the Hittite king Mursili II (1345–1315 BC) refers to the troublesome Kaska people as 'swineherds and weavers of linen' (van Wyk 2014, 113). Its arrogance and contempt aside, it's as if this quote describes the people who made pit E63 more than three millennia earlier. Collins explained this description of Kaska with the fact 'that pig raising and weaving were tasks performed by women. Given the Hittite concern with preserving masculinity, the characterization was thus not a favorable one' (2006, 157).

The presence of avian bones in pit depositions, especially accompanied by ornithomorphic figurines as was the case at Tell Yunatsite (Boyadzhiev et al. 2021, 298f) is an indicator for the special place of birds in the mythological beliefs of the Copper Age. The golden eagle wing bone from pit 103 is also a clue for the significance of bird wings in pit depositions (Chohadzhiev 2017, fig. 14.4). For pit E63, it's all too obvious that the crow wing was deliberately deposited in the pit, maybe on one of the rock slabs. Avian remains from archaeological contexts are still underresearched (cf. Dirrigl et al. 2020). On the other hand, a crow wing is a frequent attribute of witchcraft and magic as crows and

ravens are well known for their intelligence. Traditionally, they show up in the realm of magic and mystery, appearing in spells, occultism, religions and folklore, usually as mediators between the worlds of humans, dead, ancestors and gods. The reason for the special attitudes to crows could be also rooted in the fact that corvids are among the few animals that exhibit social response to a dead member of their species (Swift & Marzluff 2015).

The belemnite semi-cylinder is another object from E63 that can be linked with magical practices. Some primitive societies associated belemnites with heavenly interventions (see examples in Boyadzhiev 2014, 104ff). A reflection of their meaning in the Copper Age can be found in their presence as grave goods at cemeteries as Polyanitsa and Sushina, in both male and female burials (Boyadzhiev 2014, 115).

An identification of the deposition of a pig and loom weights in pit E63 as a female social practice is certainly disputable. It does represent an 'odd deposit' in the sense used by Garrow (2012, 94), but there is a thin thread that connects everything in this pit with ritual or magic. It was not just a sacrificial pit as the piglet was not the only part of the deposit. Burying the leftovers from sacrifices dedicated to the gods of the Underworld is well documented practice in ancient societies (Ekroth 2014, 329). But in the case of pit E63, a distinct sequence of activities was identified that seems to follow certain – well known to the depositional actors – patterns, which could be defined as 'highly formalized or structured behaviour' (Richards & Thomas 1984, 191). The discussion on archaeological identification of ritual actions is old but irresolvable. The distinction between practical and ritual is a 'product of post-Enlightenment rationalism' (see discussion in Brück 1999). Pit E63 at Petko Karavelovo shows a record of a social practice that was very well-reasoned for the people who performed it. And even though the practice could not be recovered completely, one can speculate on the story behind it and on the actors involved. There are only two major differences between the 'female' pit E63 and feature 103; in the deposit of the latter, instead of loom weights, the main elements are ceramic vessels, and instead of a pig, there are remains of one individual each of the following species: red deer, roe deer, fox, wisent (or auroch), and golden eagle. They are all wild animals and can be obtained only by hunting. The paradigm says that hunting is traditionally a male domain, especially in complex societies, despite the modern trends of denying the traditional perceptions of gender roles (for discussions and argumentations see Gurven & Hill 2009). Thus, the opposition between the 'female' pit E63 and the 'male' pit 103 is obvious. It is pure speculation that two pits at the tell site that are located less than 15 m away from each other, are the archeological record of a single event of 'matrimonial alliance', which happened sometime shortly after 4700 BC. However...

Disclaimer

All interpretations, allusions and speculations in this paper were made by Alexander Chohadzhiev. The other co-authors took part with their expertise and scientific reports. Nadezhda Karastoyanova analyzed the faunal remains. The chipped stone assemblage was

studied by Maria Gurova. The conservation and restoration were performed by Alexandra Yanakieva who had also excavated pit E63 at Tell Petko Karavelovo. The archaeobotanical analysis was done by Paul Bacoup and Pauline Méphane.

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CHRONOLOGICAL SEQUENCE OF THE EARLY BRONZE AGE GRAVES IN THE PAMUKLI BAIR BARROW AT MALOMIROVO AND THE PIT-GRAVE CULTURE EXPANSION IN THE MIDDLE TUNDZHA VALLEY

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Abstract

The archaeological excavations of a joint Polish-Bulgarian team in 2021 at the the Pamukli Bair Barrow, near the village of Malomirovo in the Middle Tundzha River Valley, Upper Thrace, revealed ten Early Bronze Age graves, three Middle Bronze Age graves, and a Late Antique grave. Three constructive and five chronological phases were distinguished in the Bronze Age life of the barrow. The sequence of the Bronze Age features was additionally sustained by 19 radiocarbon dates, for which a Bayesian model was created. The first constructive and chronological phase dated back to 3104–2922 cal. BC (with an even earlier possible dating for one of the features, 3321–3016 cal. BC) and is related to three inhumation burials in a semi-supine position, with the head to the east, as well as scattered bones of a male individual. Three small barrow fills were piled above the three graves. The second constructive and chronological phase dated back to 2911–2892 cal. BC and is related to two graves that present all the characteristics of the Early Pit-Grave Culture. Feature 17 yielded three stone anthropomorphic stelae as well. The second barrow fill was constructed above these two graves. The third constructive and chronological phase dated back to 2881–2808 cal. BC and is related to two more features that could mark the end of the Early Pit-Grave period. Above them, the last barrow fill was piled and thus, the barrow reached its modern dimensions. Two Late Pit-Grave Culture graves were dug in the central part of that fill. They mark the fourth chronological Bronze Age phase dating back to 2681–2506 cal.

BC. The fifth phase dated back to 1736–1623 cal. BC and is related to three contracted burials dug in the southern sector of the barrow. The Malomirovo sequence is the largest set of radiocarbon dates from a Bronze Age barrow in Upper Thrace. The combination of stratigraphic evidence and radiocarbon dates makes it a good starting point for further chronological and morphological studies of the Early and Middle Bronze Age mortuary practices in the region.

Key words: Early Bronze Age – Upper Thrace – mortuary practices – barrow graves – Pit-Grave Culture.

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It was only in the twenty-first century that the Early Bronze Age (EBA)¹ barrow graves in the Middle Tundzha (*Tönzos*) Valley became the target of systematic research and analytical studies (fig. 1). Since 2004, 19 barrows were excavated there, with more than 100 EBA graves investigated (fig. 2). Currently, the complete information about the investigations of only six barrows of this lot has been published (Agre 2015; Iliev & Bakardžiev 2020), only a few radiocarbon dates are available and the stable isotopes- and paleo-diet analyses are in their beginning (Gerling 2015; Privat et al. 2018).

Generally, the mortuary practices reflected in the EBA barrow graves from this area and, on a larger scale, from Upper Thrace, have been considered different from the ones north of the Balkan Range. This is suggested by the large number of graves in the barrows in the Tundzha area (up to 16 in a single barrow) and the presence of visible cultural connections to the local EBA communities as seen in the pottery in some of the burials. However, one of the issues discussed was the importance of the expansion of the Pit-Grave Culture (PGC)² in the changes observed in the funerary rituals in Upper Thrace during the EBA (Kaiser & Winger 2015; Alexandrov & Kaiser 2016; Alexandrov 2020).

As this small introduction clearly shows, the EBA barrow graves in the Middle Tundzha Valley could provide a large set of data that would help for a better understanding of the EBA development in Upper Thrace and, on a larger scale, in the Eastern Balkans. This was one of the reasons for the joint Polish-Bulgarian team to investigate a BA barrow there, trying to collect as much new evidence as possible related to the questions discussed above. Such a barrow was investigated in 2021 near Malomirovo village. The excavations revealed a sequence of graves from the Early and Middle Bronze Age that, in our opinion, could be a good starting point for a discussion on the chronology and nature of the barrow graves there as well as on the cultural changes in Upper Thrace during the fourth–third millennium BC.

The Pamukli Bair Barrow at Malomirovo

The excavated barrow was located at the top of a prominent hill called Pamukli Bair (fig. 3) rising above the valleys of Popovska and Kurudzhadere Rivers (left-bank tributaries

¹ This article uses the tripartite division and chronology of the Bronze Age in Bulgaria; cf. Leshtakov 2006; Alexandrov 2018.

² In recent years, the term *Yamnaya*/*Yamna Culture* has also been frequently used.

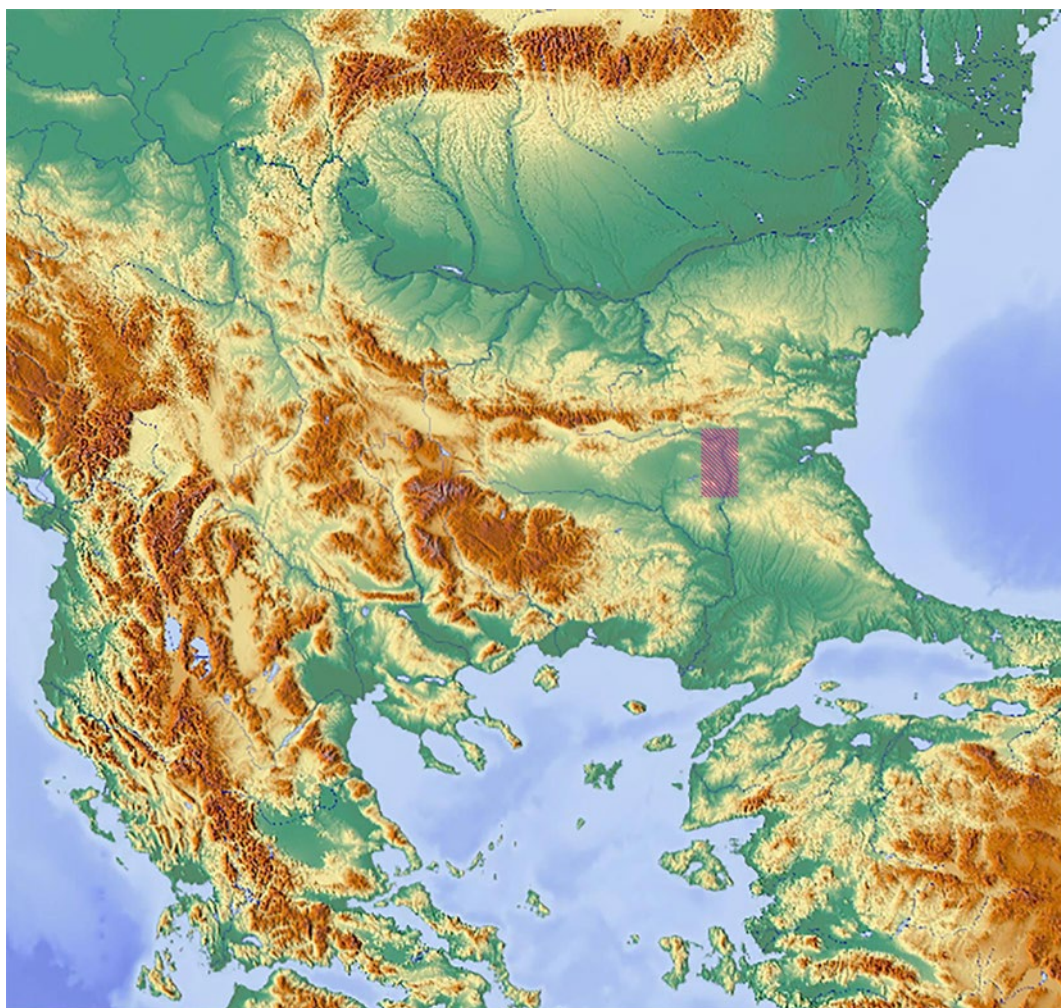


Figure 1. Map showing the region of the Middle Tundzha River. Image Credit: OpenStreetMap and the authors.

of the Tundzha River) near Malomirovo village (Elhovo Municipality, Yambol District). It is a part of a barrow cemetery aligned west-east that includes the famous Goliamata Mogila Barrow, with several Bronze Age burials as well as a royal grave of the fourth century BC investigated (Agre 2011). Before the twenty-first century, the Pamukli Bair Barrow survived in good condition. However, in the last decades, several looters' trenches disturbed its central part. At the start of excavations in 2021, the scars of these destructions were clearly visible as depressions in the central part of the barrow. In the bottom part of one of the trenches made in 2005, the looters found an inhumation grave, the bones of the buried person/s showing signs of thick red ochre coloration. During the rescue intervention, the archaeologists found two golden hair-rings near the damaged bones that are currently curated at the Elhovo Museum (Alexandrov et al. 2018, 475, cat. Nos. 144 and 145).

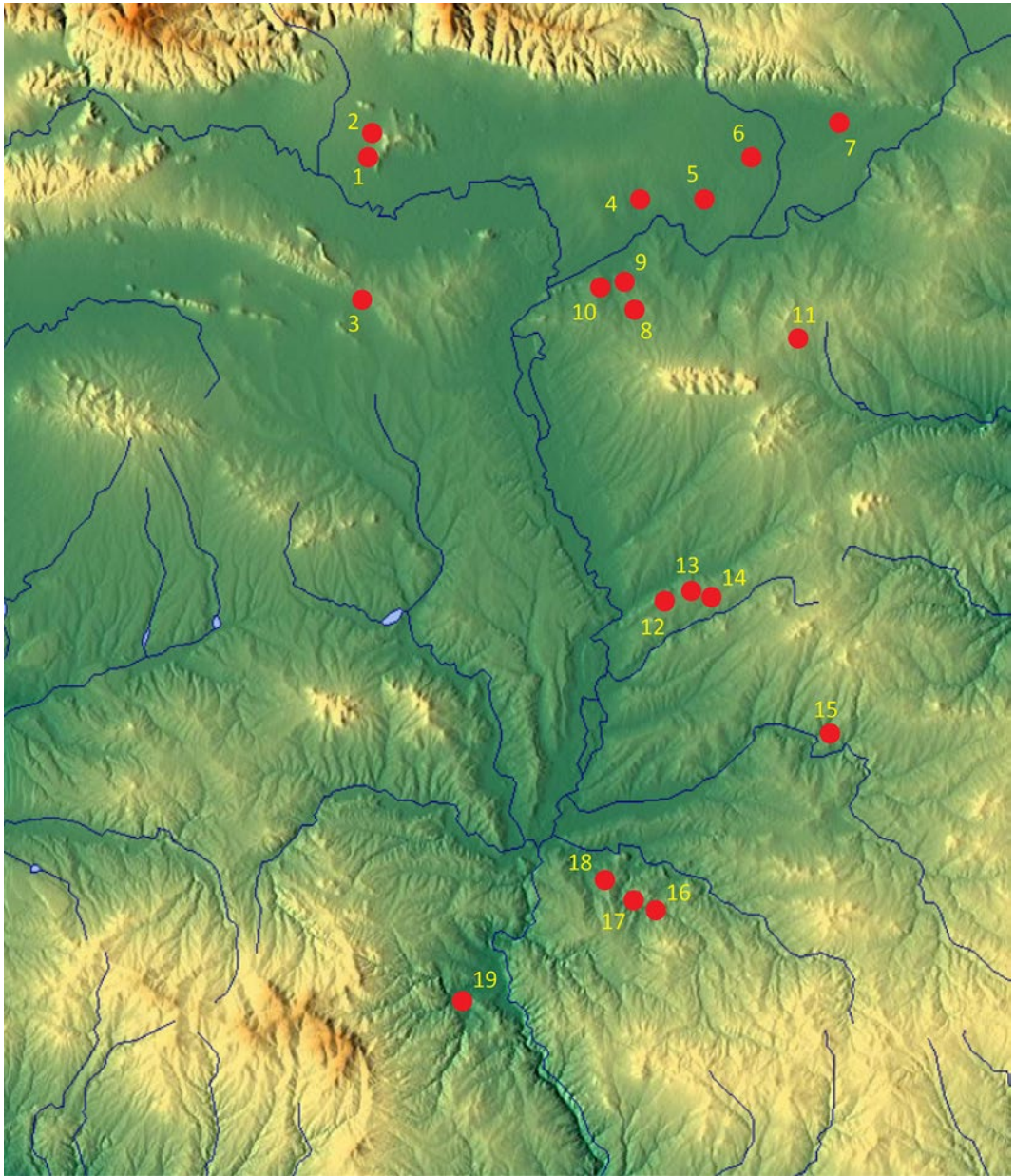


Figure 2. Map showing the investigated Bronze Age barrows in the Middle Tundzha River region: (1) Gabrova Barrow, Kamen; (2) Shekerdza Barrow, Kamen; (3) Sabev bair, Drazevo; (4) Zimnitsa; (5) Straldza; (6) Atolovo; (7) Tonchova Barrow, Venets; (8) Golyamata mogila, Mogila; (9) barrow 2, Mogila; (10) barrow 3, Mogila; (11) Irechekovo; (12) Lozyanska Barrow, Boyanovo; (13) barrow 1 at Bailar Kairyak, Boyanovo; (14) barrow 3 at Bailar Kairyak, Boyanovo; (15) Golyamata Mogila Barrow, Popovo; (16) Golyamata Mogila Barrow, Malomirovo; (17) barrow 2, Malomirovo; 18. Pamukli Bair Barrow, Malomirovo; (19) Sechenata Mogila Barrow, Sinapovo. Image Credit: <https://maps-for-free.com> and the authors.



*Figure 3. Photos of Pamukli Bair Barrow, Malomirovo, before the excavations.
Image Credit: P. Włodarczak.*

The barrow itself – a segment of a sphere with a basal diameter of ca. 40 m and 3.5–4.0 m high – was completely excavated revealing features from the Early and Middle Bronze Ages and the Late Antiquity. The barrow was constructed during the EBA by piling up consecutive layers of ancient humus and weathered chalk rock. Three main stages of barrow formation were distinguished related to the successive enlargement of its dimensions. Eight EBA grave contexts were related to these stages. After the final enlargement of the barrow, two EBA graves, three MBA graves and a Late Antiquity grave were dug into the already existing barrow fill (figs. 4–6). All these features form a complex stratigraphic system. In a combination with the series of 19 radiocarbon dates obtained, they create an important chronological sequence for recognizing both mortuary practices and cultural changes at the end of the fourth and the first half of the third millennium BC in Upper Thrace.

The investigated features and their relative chronology

Construction & chronological phase 1 (features 18, 19, and 21).

The burial context that initiated the construction of the barrow (labeled as feature 19) was located in its central part. The grave-pit was dug into the original ground level to a depth of 0.75 m, cutting the rubble of the chalk rock. It was rectangular with clearly rounded corners and dimensions 1.60 by 1.30 m. There were no signs of covering the pit or its bottom. The deceased, 30–40 years old female, was laid at the bottom in an articulated semi-supine position to the right, with the arms bent at the elbows and with the palms towards the skull. The body was aligned northeast (head) – southwest, facing northwest. The skull and the upper part of the skeleton were postdepositionally damaged, possibly due to the 2005 looters' activities. No equipment or traces of red ocher were recorded in the grave (figs. 7 and 8). Above the grave-pit, dark humic soil was piled, thus forming the first barrow with a diameter of 14 m and approximately 1 m height (fig. 6).

Northeast of that barrow, a second small one was investigated (labeled as feature 18). In its center, an oval pit 1.91 by 1.37 m was dug at a depth of 1.12 m in the ancient humus level and the virgin soil. In its filling, starting from the upper part, numerous human skeletal remains mixed with large stone blocks were discovered. The bones belonged to a 25–35 years old male individual. A small silver bead and an antler tool were found at the bottom of the pit. It was surrounded by a circle with a diameter of 14–15 m made of small- and medium-sized rocks (figs. 9 and 10). Above it, a low, but quite extensive barrow was created of earth and numerous rocks.

Southeast of feature 18, a smaller oval feature 4.6 by 3.6 m was investigated that was made of small-sized rocks (labeled as feature 21). In the middle of the oval, a shallow grave-pit (about 20 cm below the rocks level) was uncovered. There were no signs of covering the pit or its bottom. At the bottom of the pit, the body of a male individual ca. 20 years old was laid in an articulated semi-supine position to the left aligned east (head) – west. A lump of red ocher was found near the left forearm (figs. 11 and 12).

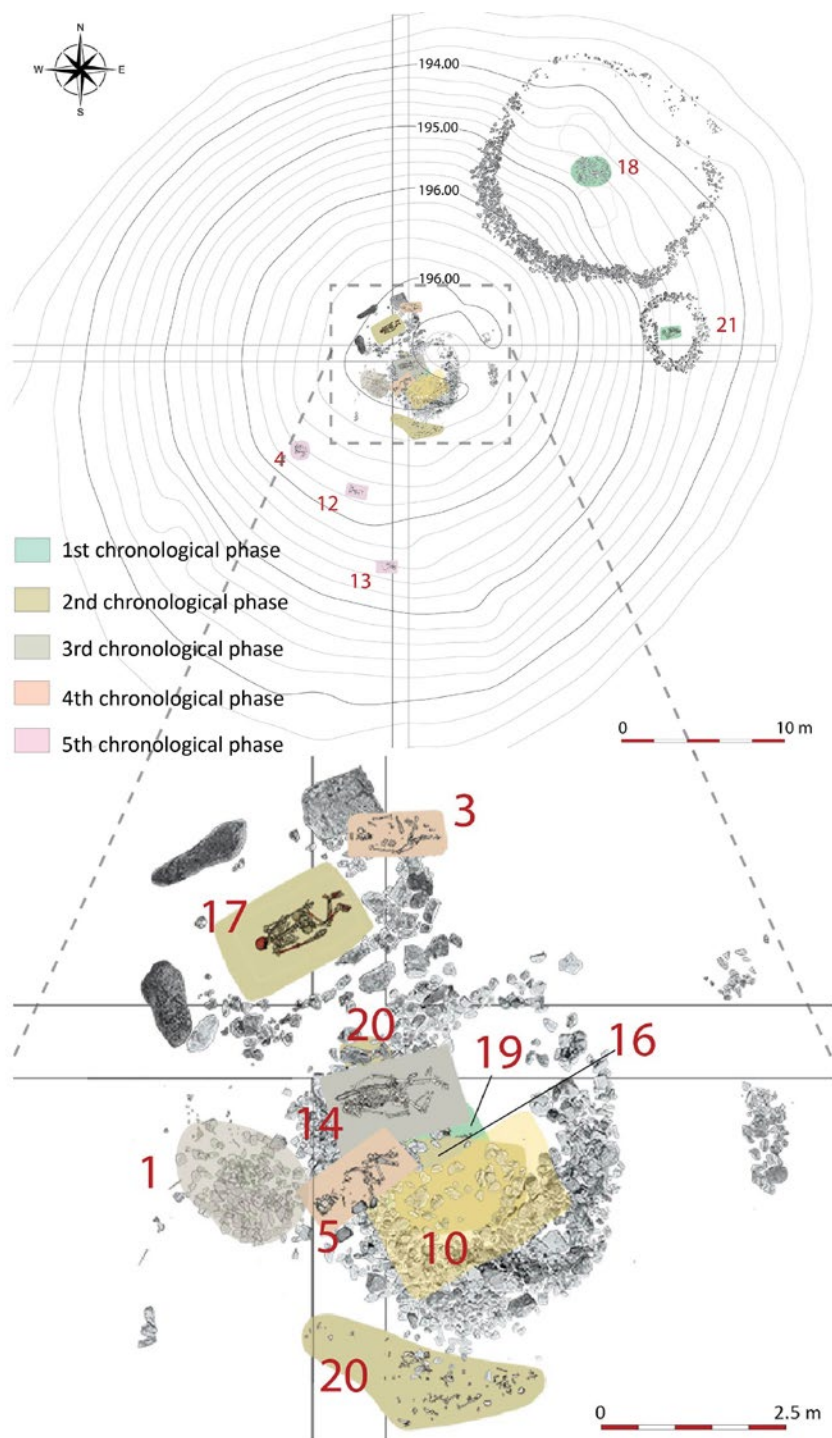


Figure 4. Layout of investigated features at Pamukli Bair Barrow, Malomirovo. Image Credit: M. Podsiadlo.

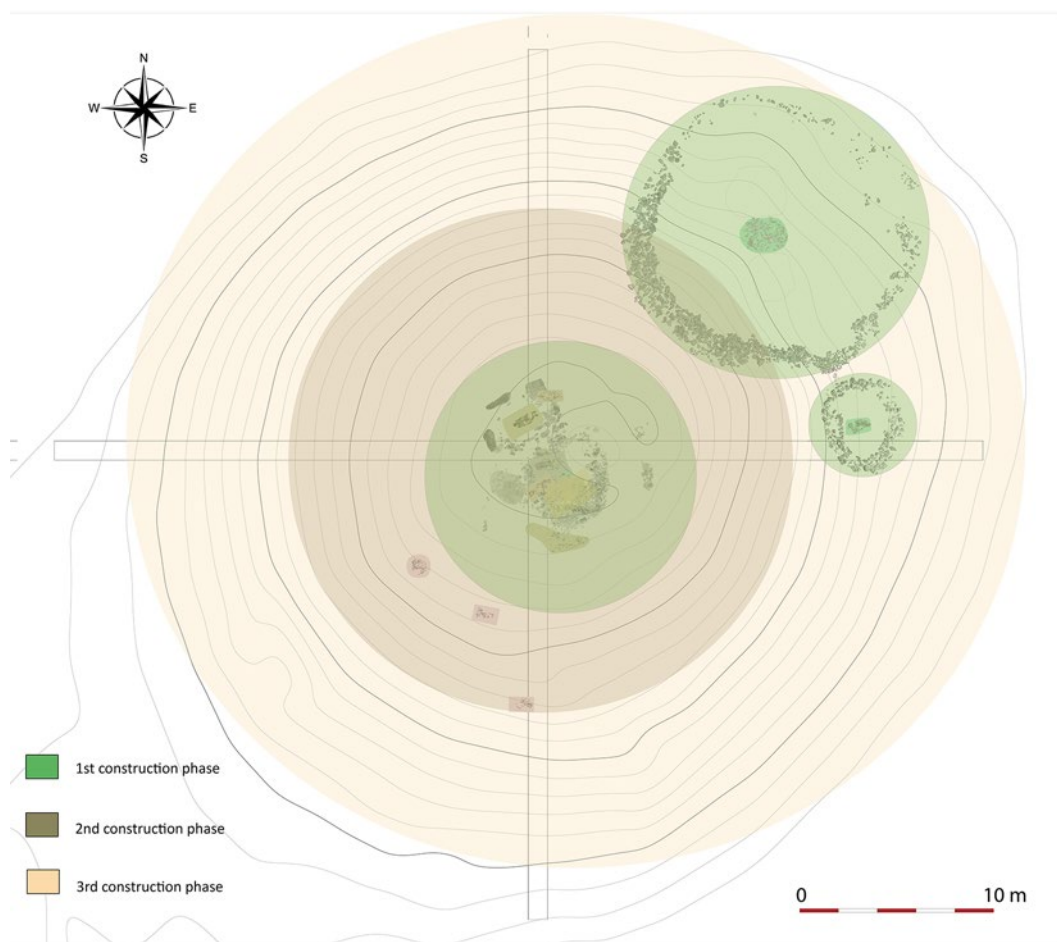


Figure 5. Graphic representation of the barrow construction phases of the Pamukli Bair Barrow, Malomirovo. Image Credit: M. Podsiadlo.

It is difficult to establish a clear stratigraphic relation between the three graves. The location of the stone circles connected to features 18 and 21 at a similar level (ancient humus) indicates their possibly similar date. At the same time, both features were placed outside the small barrow piled above feature 19. It can be safely assumed that all these three mortuary complexes are related to construction phase 1, and represent an elaborate ceremonial funeral complex formed by three circular or oval zones associated with features 18, 19, and 21 (fig. 5).

Construction & chronological phase 2 (features 16, 17, and 20)

The next construction and chronological period in the barrow's history is related to another three features. The first one (labeled as feature 16) consisted of a grave-pit covered with west–east oriented wooden planks that was dug in the central part of the

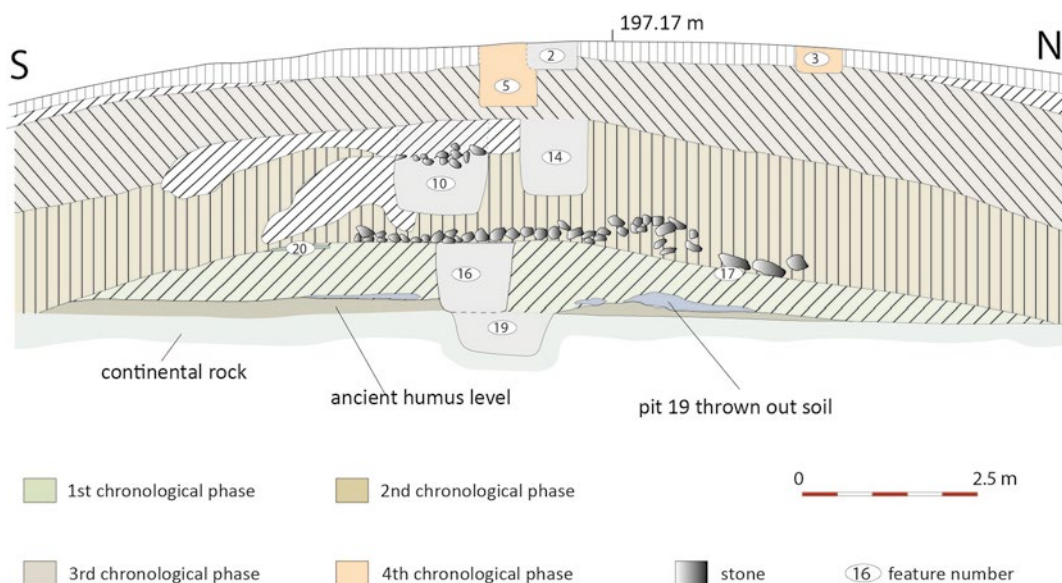


Figure 6. Drawing of the central part of the north–south profile of Pamukli Bair Barrow, Malo-mirovo. View from the east. Image Credit: M. Podsiadlo.

barrow fill piled above the primary grave, and an oval-shaped stone feature constructed above it measuring 5.4 by 4.7 m and 0.7–0.8 m high. Both the grave-pit and the stone feature were badly truncated by a looters' trench (labeled as feature 11). Moreover, another rectangular looters' trench was excavated in the western part of feature 16 measuring 2.65 x 1.65 m (labeled as feature no. 10). Those illegal activities destroyed the northern part of the stone structure as well as the grave itself. The two golden hair-rings mentioned above were also found there. In 2021, human bones were found at the bottom of the grave-pit and in its upper layers that could not be reliably associated with specific burial (figs. 13 and 14).

Between the rocks of feature 16 as well as in its immediate vicinity, human bones were discovered belonging to at least three individuals aged 20–35 years. The skeletal remains were incomplete and disarticulated. These agglomerations of scattered bones were labeled as feature 20. They were, most likely, related to the construction of feature 16 (figs. 13, 15, and 16). In our opinion, the human bones in feature 10 could alternatively be connected to features 16 and 20. This assumption seems to be confirmed by the radiocarbon dates presented below.

North of feature 16, feature 17 was discovered. Its rectangular grave-pit was dug into the first barrow fill, the ancient humus level and the continental rock. From the south, the grave-pit edge was marked by a cluster of rocks, some of them related to the stone feature 16. Three stone stelae surrounded the pit from the east, north and west, the

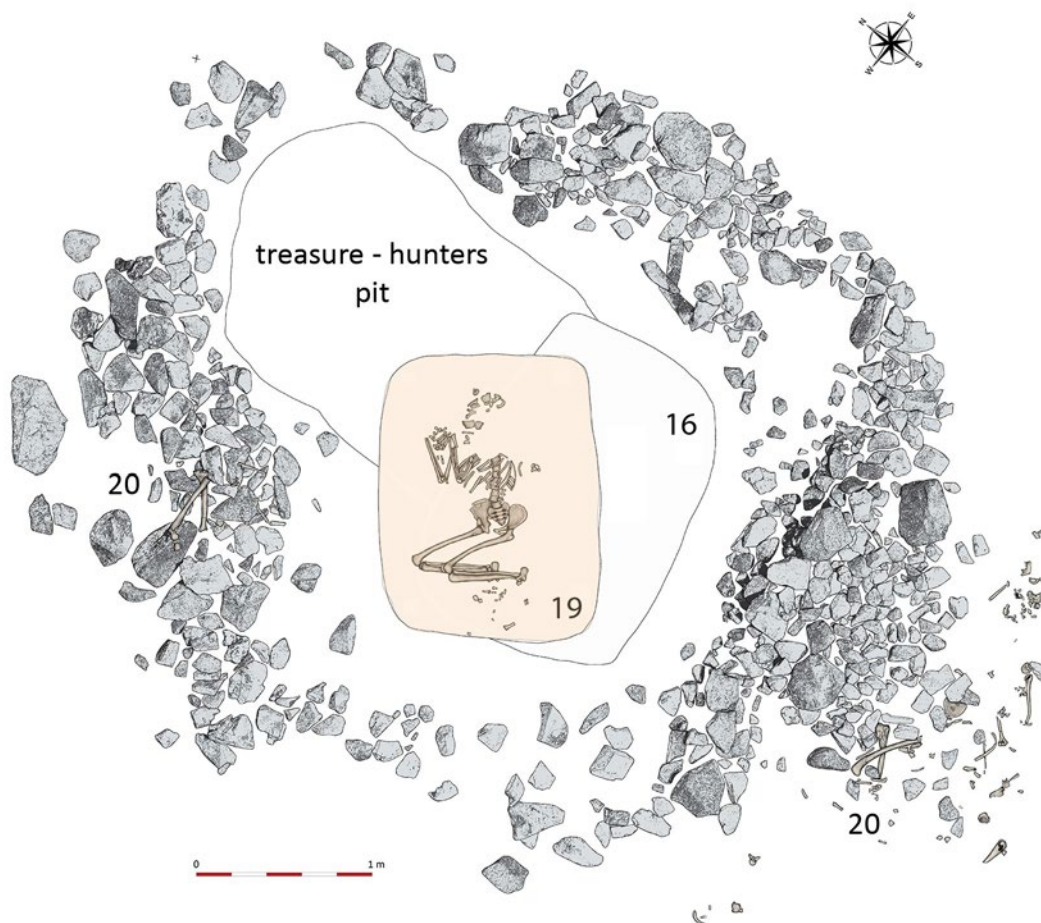


*Figure 7. Drawing of feature 19 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: M. Podsiadło.*

pit itself being covered with wooden planks. At its bottom, a skeleton of a male individual about 70 years old was uncovered in a supine position with flexed legs and head oriented to the west (figs. 17 and 18). Two silver hair-rings were found in the grave, one each on both sides of the skull. The skull and some postcranial elements were intensively colored with red ocher.

The construction levels of the two graves discussed were generally the same, both pits being dug from the upper level of the first barrow fill piled above feature 19. It can therefore be assumed that features 16, 17, and 20 were built before the significant enlargement of the barrow in the second phase of its construction. This enlargement included piling a second barrow fill above the three discussed features, with a diameter of ca. 25 m that also increased the height of the barrow to 2.5 m (figs. 5 and 6).



*Figure 8. Photo of feature 19 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*

Construction & chronological phase 3 (features 1 and 14)

Two features are related to this phase. Feature 14 was located in the central part of the barrow, above the stone feature 16. The upper part of its grave pit was hard to distinguish. However, we could establish that its bottom and lower parts of the walls were boarded longitudinally with wooden planks. The buried person, a 15–18 years old male individual, lay in a supine position with flexed legs on the wooden planks oriented west (head) – east. The deceased held in his palm an unspecified long wooden object that was placed near his left arm. Lumps of bright red ocher were clumped around the skull (figs. 19 and 20).

The other feature (No. 1) related to this phase was a stone pavement with human bones scattered around it (figs. 21 and 22). It was located at a depth of about 1 m be-

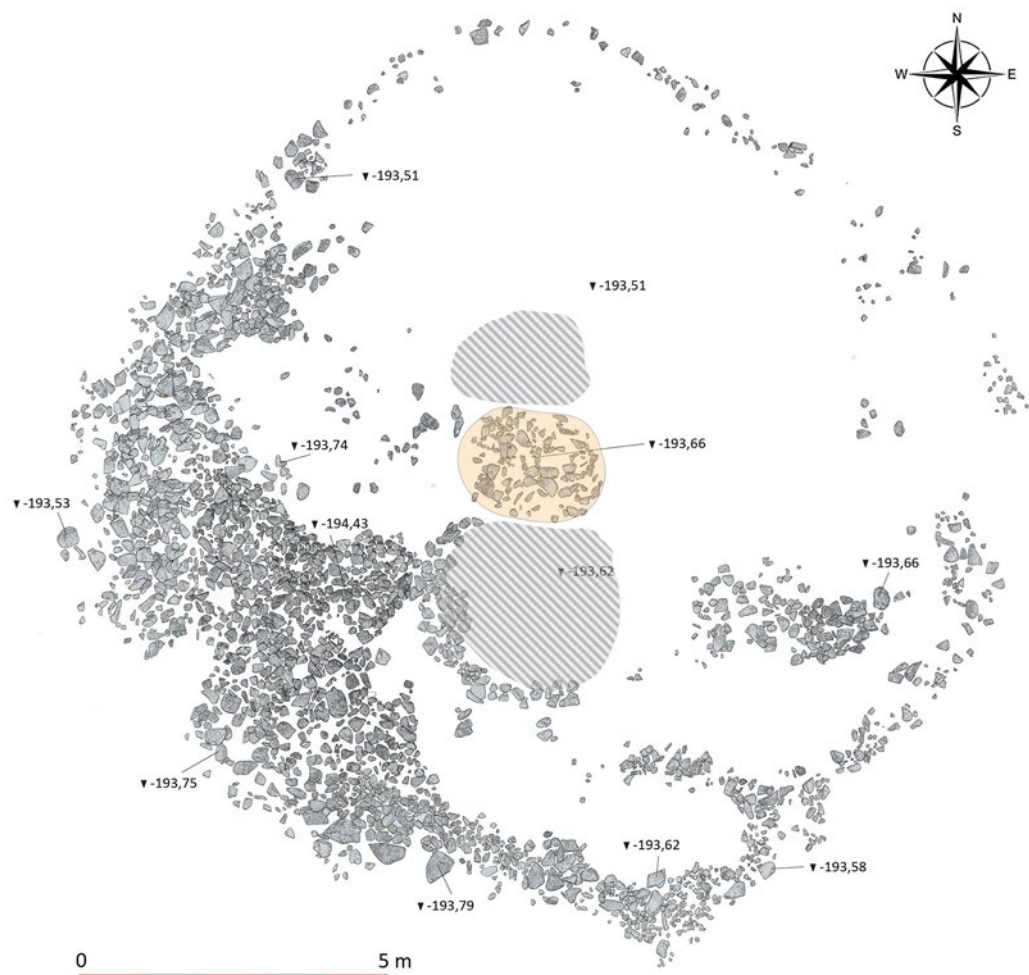


*Figure 9. Drawing of feature 18 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: M. Podsiadlo.*

low the top of the barrow and about 1 m above the bottom of feature 14. That places it more or less at the level where the top of the grave-pit of feature 14 should have been. Stratigraphically, it is also quite clear that feature 1 was constructed before the enlargement of the barrow. The relationship between features 1 and 14 would thus be similar to the scattered human bones (feature 20) around the grave-pit of feature 16 in the second chronological phase.

These two features were related to the last phase of the barrow construction. This last enlargement included piling a third barrow fill above feature 14 and the adjacent stone pavement with human remains, with a diameter of approximately 45 m that increased the height of the barrow to 3.9 m.



*Figure 10. Photo of feature 18 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*

Chronological phase 4 (features 3 and 5)

Two graves (features 3 and 5) were dug in the central part of the barrow fill without additional piling. Due to their shallow depth, the outlines of the grave-pits could not be identified. The small thickness of the fills also indicates that the mound was slightly leveled (due to erosion?). Perhaps this could also be the reason why no remains of wooden covering were found in these features. The arrangement of the skeletal remains in both cases indicated their decomposition in an empty space, which in turn suggests the presence of a chamber roof. Both deceased lay in an articulated supine position with flexed legs, arms alongside the body, slightly bent at the elbows, with palms at the abdominal/pelvic area. In feature 5, faint traces of red ocher staining were recorded. No other grave inventory was found in both graves (figs. 23–26).

Chronological phase 5 (features 4, 12, and 13)

Three more graves were discovered in the southwest part of the barrow (labeled as features 4, 12, and 13). The deceased were buried in simple shallow pits in contracted position: on the side (feature 4) or on the back (features 12 and 13). The skeletons were not stained with red ocher. No equipment was discovered (fig. 4).

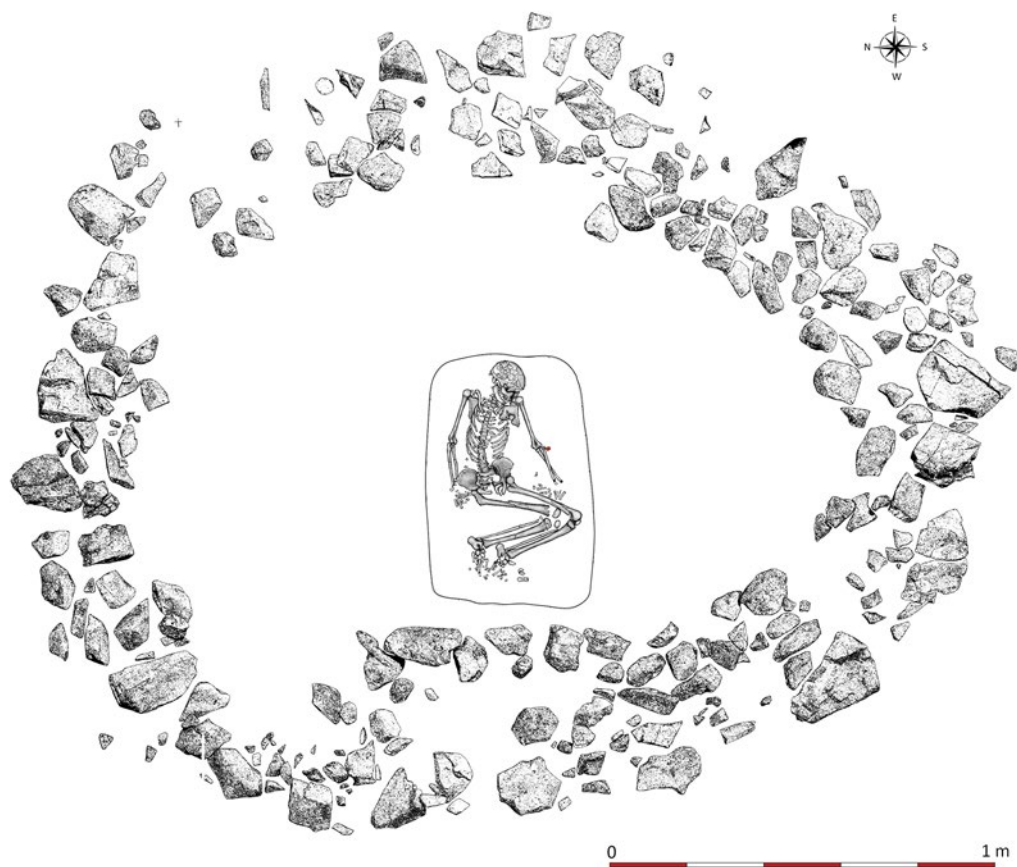


*Figure 11. Drawing of feature 21 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: M. Podsiadło.*

Chronological phase 6 (feature 2)

Last in the chronological sequence of the graves in the Pamukli Bair Barrow at Malomirovo was feature 2, an articulated inhumation in a shallow pit located in the central part of the barrow (fig. 4). An iron buckle was found in the abdominal area.

As mentioned above, according to some formal criteria such as grave facility and its equipment, body position and treatment, grave inventory, etc., the graves from the first four chronological phases could be dated to the EBA; the three graves from the fifth phase, to the MBA; and feature 2, to the Late Antiquity. Their general characteristics will be discussed in detail below.

Absolute chronology of the Malomirovo graves

A long series of 19 radiocarbon dates was obtained for the burials from the Pamukli Bair Barrow at Malomirovo. All measurements have been made in Poznań Radiocarbon



*Figure 12. Photo of feature 21 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*

Laboratory on human bone samples. To calibrate the results, the 2021 version of OxCal v4.4.4 program of C. Bronk Ramsey was used applying the IntCal20 calibration curve (Reimer et al. 2020).¹ The calendar age of individual samples is presented in table 1.² The BA features, according to the Bayesian method, were confronted with the sequence of the five chronological phases presented above in order to build a model with a higher precision of dating. This procedure is of little importance for phase 5 dating as its features are separated from the others by a long chronological hiatus. However, the effects obtained for phases 1–4 are interesting. The model of the five specified phases (fig. 27) was created using the PHASE function of the OxCal program.

¹ The calibrated dates discussed below are presented in 68.2% confidence level.

² Feature 2, dated to the Late Antiquity, was excluded from further analysis.

Feature no.	Relative chronology	Lab code	Age BP	Calendar age (68.2%)	Sample features
1	EBA	Poz-150129	4170 ± 35	2877–2677 BC	4,3%N, 16,4%C, 7.2%coll
2	Antiquity	Poz-141995	1605 ± 30	421–535 AD	0.9%N 6.0%C, 3.9%coll
3	EBA	Poz-141943	4080 ± 30	2836–2504 BC	0.6%N 6.3%C, 1.2%coll
4	MBA	Poz-141949	3365 ± 30	1733–1614 BC	0.9%N 7.1%C, 4.4%coll
5	EBA	Poz-141948	4115 ± 30	2850–2587 BC	0.7%N 5.6%C, 4.7%coll
10	EBA	Poz-141996	4290 ± 35	2920–2884 BC	1.9%N 9.5%C, 7.2%coll
10	EBA	Poz-141998	4260 ± 35	2912–2875 BC	2.5%N 11.5%C, 7.6%coll
12	MBA	Poz-141992	3365 ± 35	1736–1566 BC	1.1%N 7.3%C, 5.3%coll
13	MBA	Poz-141993	3410 ± 35	1744–1632 BC	1.6%N 8.2%C, 3.9%coll
14	EBA	Poz-141950	4105 ± 30	2846–2582 BC	0.6%C 5.2%C, 5.5%coll
16	EBA	Poz-141956	4465 ± 35	3328–3033 BC	0.7%N 5.2%C, 5.4%coll
16	EBA	Poz-150130	4300 ± 35	3002–2885 BC	2.3%N, 7.4%C, 6.2%coll
17	EBA	Poz-141946	4315 ± 35	3008–2890 BC	2.4%N 10.9%C, 8.3%coll
18	EBA	Poz-141953	4390 ± 40	3092–2923 BC	0.9%N 6.4%C, 2.3%coll
18	EBA	Poz-141997	4365 ± 35	3013–2918 BC	0.6%N 4.8%C, 4%coll
19	EBA	Poz-141947	4440 ± 35	3321–3016 BC	2.7%N 10.2%C, 9.5%coll
20	EBA	Poz-141954	4270 ± 35	2911–2881 BC	1.2%N 6.7%C, 5.7%coll
20	EBA	Poz-141999	4310 ± 35	3007–2887 BC	1.4%N 6.8%C, 5.1%coll
21	EBA	Poz-141952	4395 ± 30	3081–2928 BC	0.6%N 5.9%C, 2.8%coll

Table 1. List of ^{14}C dates from the Pamukli Bair Barrow at Malomirovo.

Phase 1, related to features 18, 19, and 21, and to the first barrow fill/s, falls into the 3104–2922 cal. BC range. Feature 19 was also dated by Poz-141956 sample obtained from a bone found in the lower part of feature 16. Most probably, the bone in discussion had been re-deposited during modern looters' activities. In the model presented, a similar age for the construction of the three phase 1 features was assumed. However, considering the fact that feature 19 was the first one to be constructed, it is possible to shift its dating to a slightly older range (3321–3016 cal. BC).

Phase 2, which includes features 16, 17, and 20, as well as the human skeletal remains from feature 10, dates to the 2911–2892 cal. BC range. The enlargement of the barrow related to piling additional barrow fill should also be dated to this period. The precisely defined range for this period (less than 20 years) is noteworthy.

Phase 3 associated with features 1 and 14, and, most likely, with the construction of the latest barrow fill as well, dates to 2881–2808 cal. BC.

Phase 4, related to features 3 and 5, dug into the latest embankment of the barrow, dates to the 2681–2506 cal. BC range.

Latest in the BA sequence are the three features from the southeast sector of the barrow (4, 12, and 13) dating back to 1736–1623 cal. BC or Middle Bronze Age.

This model is not the only possibility of interpreting the sequence from the excavated barrow. Despite the already mentioned possible interpretations of the position of feature 19, it could also be assumed that features 1, 3, 5, and 14 (i.e., all four latest EBA contexts) belonged to a period close to each other. In such a case, features that differ significantly in terms of the funerary rituals would be placed in one phase, and the compatibility of the dating results would be clearly smaller. It should be emphasized that with each attempt to model the chronology of EBA features, one cannot assume a generational continuity between the distinguished phases. The analyzed place of ceremonial funeral activity is therefore the sum of several independent episodes, clearly separated in time (table 2).

Phase	Phase of barrow construction	Graves	General chronology	Cultural characteristic	Calculated age BC
5		4, 12, 113	MBA		1736–1623
4		3, 5	EBA	Late PGC	2681–2506
3	III	1, 14	EBA	Early PGC (late stage)	2881–2808
2	II	16, 17, 20	EBA	Early PGC	2911–2892
1	I	18, 19, 21	EBA	‘Pre-Yamna’	3104–2922

Table 2. Dating of distinguished phases of the Pamukli Bair Barrow at Malomirovo.

The Pamukli Bair Barrow at Malomirovo, the EBA barrow graves in Upper Thrace, and the Pit-Grave Culture impact

During the last two decades, the mortuary practices of the PGC were defined in detail for the regions of the North Pontic steppe and Southeast Europe. Their specific characteristics and, in particular, those of the earlier phase of this culture were elucidated (Heyd 2011; Rassamakin 2013a; Kaiser 2019). They include the original construction of the grave, the position of the body and the use of red ocher and typical elements of the equipment. Compared to the greater variety of features of the barrow rituals in the fourth millennium BC (Rassamakin 2013a), a later unification of the mortuary practices was also emphasized. In the vast areas of the western part of the Eurasian steppe, at the turn of the fourth and third millennium BC, a unified type of inhumation appeared. The deceased was buried in a rectangular chamber covered with wooden roof. The body was laid on an organic mat in a supine position with vertically flexed legs and the arms alongside the body oriented west (head) – east. The use of red dye in the burial (most often, ocher) played an important role in the ritual as well. Barrow graves with such characteristics have been found in all regions of the west part of the PGC complex, including present-day north and southeast Bulgaria.

Another issue recently discussed is the homogeneity of the PGC funerary rituals

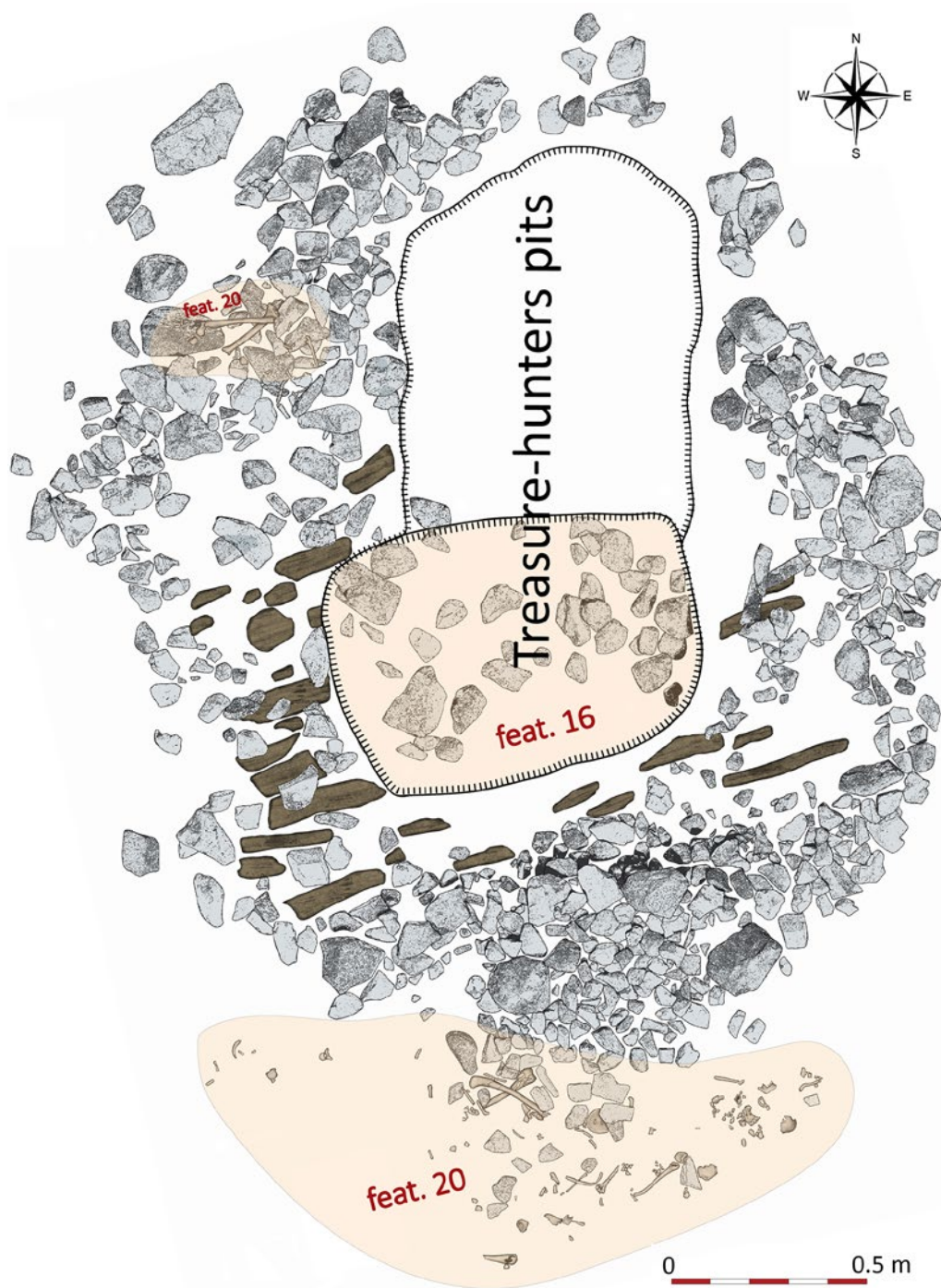


Figure 13. Drawing of features 16 and 20 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: M. Podsiadło.



*Figure 14. Photo of feature 16 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*

itself. Some PGC graves showed a deviation from the main rituals such as lack of red ochre or different position of the body. Such deviation from the supra-regional scheme may have resulted from both the impact of local traditions and the overlapping of the PGC trend with the above described older funerary customs. The latter phenomenon was argued for the PGC in the Northwest Black Sea zone (Ivanova 2015).

The thorough investigation of the fourth–third millennium BC mortuary practices drew attention to the presence of other types of barrow graves in both North Pontic and Balkan regions. Some new discoveries made it possible to distinguish groups of graves with characteristics different from the patterns described above. First, extended inhumations were identified there (Manzura 2010; Alexandrov 2010; Frînculeasa et al. 2017a; Włodarczak 2020), usually related to the post-Mariupol tradition, and in the recent years more often referred to as the Kvityana Culture pattern (Ivanova 2015; Frînculeasa et al. 2017a). In the North Balkans, a chronological horizon of individual inhumation graves in a crouched position on the side or in a semi-supine position, with the arms in front of the head was also distinguished and dated to 3300–3100 cal. BC (Frînculeasa et al. 2019; Alexandrov, in print). Such graves show patterns known from the mortuary practices of



*Figure 15. Photo of feature 20 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*



*Figure 16. Photo of feature 20 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*



Figure 17. Drawing of feature 17 at the Pamukli Bair Barrow, Malomirovo. Image Credit: M. Podsiadło.



Figure 18. Photo of feature 17 at the Pamukli Bair Barrow, Malomirovo. Image Credit: P. Włodarczak.

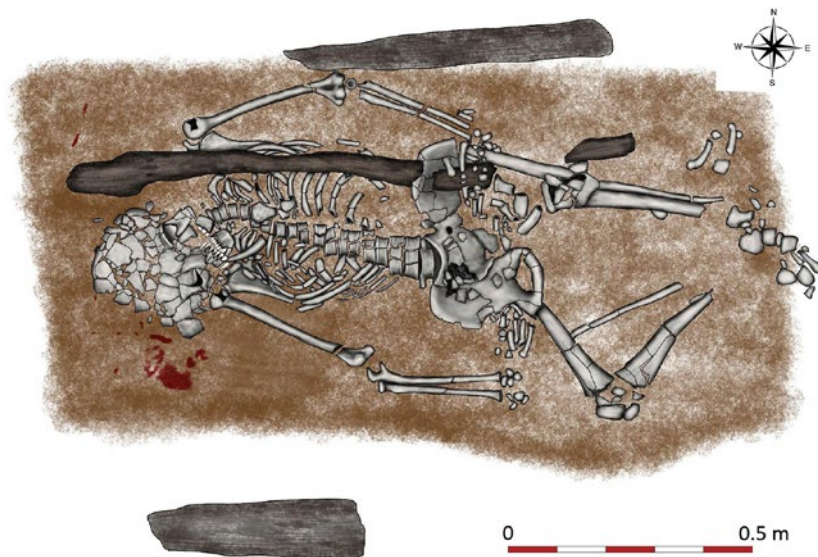


*Figure 19. Drawing of feature 14 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: M. Podsiadło.*



*Figure 20. Photo of feature 14 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*

the Zhivotilovka–Volchansk group as well as from the late groups of the Trypillia culture (e.g., Usatovo or Gordinești). In Muntenia, a specific group of multiple graves, often richly equipped, was also distinguished and dated back to the second half of the fourth millennium BC (Frînculeasa et al. 2019). Such graves have been discovered in the Tundzha area as well, e.g., at Gabrova Mogila near Kamen (Dimitrova 2014) or at the Sabev Bair Barrow near Drazhevo (Iliev & Bakardžiev 2020).

So, where is the place of the Pamukli Bair Barrow at Malomirovo in the general picture described above and how it could contribute to the better understanding of the EBA mortuary practices in Upper Thrace? Since the 1980s (Panayotov & Dergačov 1984; Panayotov 1989), the problems of the cultural affiliation of the EBA barrow graves in Southeast Bulgaria were largely discussed. In some earlier analyses, all the EBA barrow graves from the area have been related to the PGC (cf. Nikolova 2000, for Sazliyka River area; cf. Iliev 2011, for the Tundzha River area). Recently, some more nuanced investigations were published, with an attempt to distinguish spatial/chronological patterns in the EBA barrow graves from the region and relate some of them to a migration of Pit-Grave population from the north (Alexandrov 2020), or to connect their appearance to a common, fourth–third millennium BC cultural and religious horizon (Leshtakov 2011). Considering all this as well as the rapid increase of the number of the EBA barrow graves investigated in Upper Thrace, we believe that the Pamukli Bair Barrow could contribute to a much better understanding of the problems discussed.

At first, we shall consider the nature of the graves in the Pamukli Bair Barrow chronological phase 2. Since feature 16 was severely damaged in modern days, the main attention will be paid to feature 17, a spectacular burial of an adult or senior male individual that shows the following characteristics of the mortuary practices:

- regular rectangular chamber covered with wooden planks (with longitudinal arrangement of boards);
- rectangular mat made of organic material on which the body of the deceased was laid;
- articulated inhumation of a male individual in a supine position with flexed legs, arms alongside the body; head to the west;
- use of red ocher in the ritual (with a specific strong coloration of the upper part of the skull);
- presence of silver hair-rings;
- presence of stone stelae at the top of the chamber.

As discussed earlier, all these characteristics represent the whole set of features characteristic for what is considered to be the early chronological stage of the PGC (Dergacev 1986; Frînculeasa et al. 2017a; Kaiser 2019) or has been defined as ‘Yamnaya package’ (Harrison & Heyd 2007; Heyd 2011). In addition, based on the detailed osteological analyses by Dr. Martin Trautmann, the anatomical characteristics of the individual from feature 17 could be recognized as distinctive for a representative population of Eastern

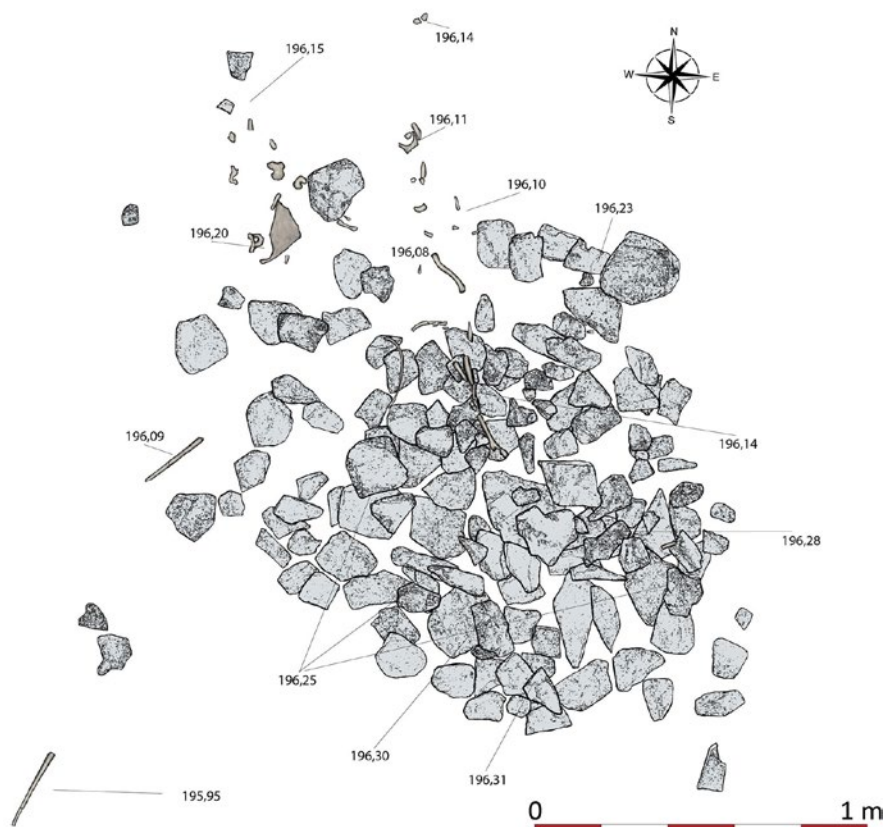


*Figure 21. Drawing of feature 1 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: M. Podsiadło.*



*Figure 22. Photo of feature 1 at the Pamukli Bair Barrow, Malomirovo.
Image Credit: P. Włodarczak.*

European steppe origin, appearing in Southeast Europe around 3100/3000 BC.

Similar graves are also known from other sites in the central Tundzha area, e.g., graves 24 and 29 in barrow 1 at Mogila (Iliev & Bakārdžiev 2020, Taf. 6.1–3, 9.5 and 6), Zimnitsa (Alexandrov & Iliev 2010), Straldza (Alexandrov & Iliev 2016), and Gabrova Mogila near Kamen (Dimitrova 2014, 72, obr. 4.4). A particular element of the structural characteristics of the early PGC graves from the Tundzha area are the stone wreaths surrounding the burial chambers accompanying the wooden roof, as in the case of features 16 and 17 in the Pamukli Bair Barrow at Malomirovo. Features of a similar type are known from Baylar Kayryak at Boyanovo, barrow 1, graves 13, 17, and 19/20 (Iliev & Bakārdžiev 2020, 114, 117, 118), or from Golyam Kayryak, barrow 1, graves 24 and 29 (Iliev & Bakārdžiev 2020, 81, 84). The burial mounds at Boyanovo and Mogila discussed here are similar to the Pamukli Bair Barrow in other aspects as well: the presence of secondary structures in the form of scattered incomplete human remains near the early PGC graves, such as features 1 and 20 at Malomirovo, feature 26 at Mogila, and feature 21 at Boyanovo.

The grave facilities of features 16 and 17 at the Pamukli Bair Barrow were constructed into- and on the upper part of the earlier barrow piled above feature 19. The use of an already existing barrow for the construction of PGC grave facilities is to be found at several more sites in the central Tundzha region as well. In the study area, examples of such stratigraphic sequence come from the above-mentioned barrows at Boyanovo and Mogila, as well as from Lozianska Mogila near Boyanovo (Agre 2015), Gabrova Mogila near Kamen (Dimitrova 2014), Golyamata Mogila near Popovo (Arpe 2007), and probably Sechenata Mogila near Sinapovo (Agre & Dichev 2013). Usually, the construction of these PGC graves was connected to a significant enlargement of the size of the original barrow. In the case of Malomirovo, this enlargement happened in two stages. The first one was related to a barrow fill piled above features 16, 17, and 20. The grave-pit of feature 14 was dug in that fill, and the last barrow fill was built up above it, the barrow thus reaching its final size with dimensions about 3.5 times larger than the original barrow constructed above feature 19. Feature 14 itself demonstrates more or less elements of the mortuary practices characteristic for the early PGC burials, and hence should probably be related chronologically to the end of this period.

In the middle Tundzha area, several barrows were, most probably, built in a similar way, such as Lozianska Mogila at Boyanovo (Agre 2015, 4F, fig. 3), barrow 1 in the Golemiya Kayryak locality near Mogila (Iliev & Bakārdžiev 2020, Taf. 1.1) and Sekerdzha Mogila near Kamen (Dimitrova 2014, 76, obr. 8). Such a phased build-up of the barrow, combined with the successively dug-in burials of the early PGC, is a custom known in both the North Pontic area and the Danube zone. Here, we will only present two examples: Smeeni “Movila mare” in the Lower Danube region (Frînculeasa et al. 2017b) and the Török-halom Barrow at Kétegyháza in the Pannonian Plain (Ecsedy 1979, 24, fig. 14).

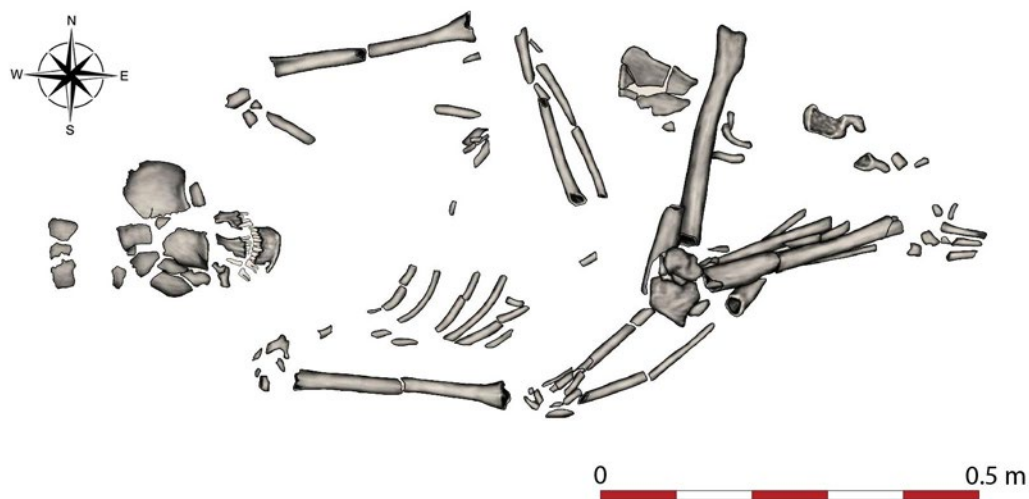


Figure 23. Drawing of feature 3 at the Pamukli Bair Barrow, Malomirovo. Image Credit: M. Podsiadło.



Figure 24. Photo of feature 3 at the Pamukli Bair Barrow, Malomirovo. Image Credit: P. Włodarczak.

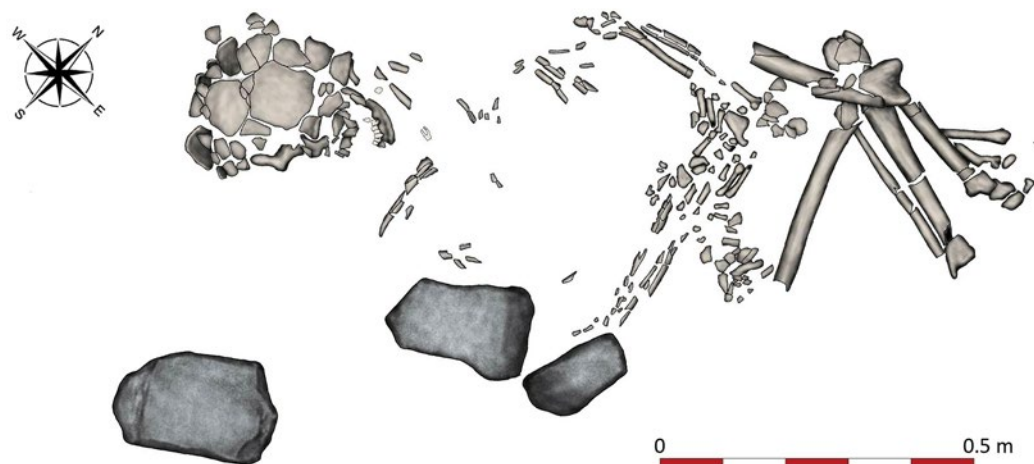


Figure 25. Drawing of feature 5 at the Pamukli Bair Barrow, Malomirovo. Image Credit: M. Podsiadło.



Figure 26. Photo of feature 5 at the Pamukli Bair Barrow, Malomirovo. Image Credit: P. Włodarczak.

The Malomirovo chronometric evidence indicates that the horizon of the early PGC burials described above dates to the beginning of the third millennium BC. However, one cannot be certain whether this determination should be considered valid for the entire middle Tundzha area and, in a larger scale, for Upper Thrace. Considering that only a few radiocarbon dates from the region have been published so far, this question remains to be answered. However, a recently obtained ^{14}C date for the PGC grave 18 from barrow 1 at Boyanovo, Baylar Kayryak (Iliev & Bakārdžiev 2020, 117, Taf. 53.3 and 4) is slightly earlier than Malomirovo, feature 17, entering the 3099–2938 cal. BC range (95.4 % probability). A similar date (3089–2915 cal. BC, 95.4 % probability) was yielded by grave 4 from Kangalova Barrow at Troyanovo (some 40 km west of Malomirovo, in the Sazliyka River area).¹ Both graves revealed all the characteristics of the early PGC mortuary practices. On a supra-regional scale, this age is often indicated for the earlier PGC phase (cf. Preda-Bălăniță et al. 2020, 87). If one recognizes the correctness of all this radiocarbon dating, then it should be assumed that around 3100–3000 BC, two types of rituals were contemporaneously performed: an early PGC and a second one of an earlier origin (in the type of graves of phase 1 from Malomirovo).

The phase 1 graves at Malomirovo, dated at the turn between the fourth and third millennium BC, differ morphologically from the ‘classic’ burials of the early PGC listed above. The bodies of the deceased from features 19 and 21 were arranged in a different way, with their heads in the eastern sector. This orientation is also known from other barrow graves in Southeast Bulgaria, usually associated with the earliest phase of the respective barrow construction. In the central Tundzha region, such primary graves are known from several barrows as follows: Bailer Kayryak at Boyanovo, barrow 1, grave 19/20 (Iliev & Bakārdžiev 2020, 178, Taf. 54.2–4); Lozianska Mogila at Boyanovo, grave 21 (Agre 2015, 30, fig. 42); Sabev Bair at Drazovo, inhumation graves 1 and 2 (Iliev & Bakārdžiev 2020, 90ff); Golemiya Kayryak at Mogila, barrow 1, grave 30 (Iliev & Bakārdžiev 2020, 134, Taf. 10.3–4), and Sechenata Mogila at Sinapovo, grave 6 (Agre & Dichev 2013). Apart from the body orientation and position, these graves are characterized by the complete absence or only a symbolic presence of red ocher (as in feature 21 at Malomirovo).

The listed features mark a particular horizon of barrow graves, often earlier than PGC ones. The first Bayesian model of Malomirovo, phase 1 presented here could indicate that in the Middle Tundzha region, such burials date back to the turn between the fourth and third millennium BC. Similar date provided grave 6 at Merichleri,² located further west in the Maritsa River Valley as well: 4340 ± 30 BP, 3072–2895 cal. BC (Iliev 2018; Mathieson et al. 2018, suppl. table 1; Minkov 2021, fig. 3).

¹ An unpublished radiocarbon date. Excavations directed by S. Alexandrov and I. Kirov in 2015 (Alexandrov & Kirov 2016).

² The grave in discussion – an articulated semi-supine inhumation with the head to the east – is earlier than two supine inhumations with flexed legs and head to the west typical for the PGC (Iliev 2018; Minkov 2021, fig. 3).

However, an older date was obtained for the multiple grave 30 in Gabrova Mogila at Kamen: LTL16866A: 4463 ± 45 BP, 3330–3029 cal. BC (Modi et al. 2019, table 1). Similar dates come from barrow graves in the Sazliyka River area as well, e.g., Mednikarovo, barrow 4, grave 1; Beli bryag, barrow 5, grave 2/2; and Ovchartsy, barrow 2, grave 1 (Alexandrov 2020, table 2). All they were primary graves with articulated inhumations in a semi-supine position, with the head oriented to the east (Panayotov & Alexandrov 1995, fig. 13; Alexandrov 2020, fig. 7.1; Alexandrov et al. 2016, fig. 2.2). An interesting fact is that silver beads similar to the one from Malomirovo, feature 18, were found in a Mednikarovo grave as well (Panayotov & Alexandrov 1995, fig. 14). All they mark the earliest so far radiocarbon-dated horizon of barrow graves in Upper Thrace. As mentioned above, according to the first Bayesian model, Malomirovo phase 1 graves should be later than this horizon. If we accept the second possibility for the chronological model, feature 19 – the primary grave – could enter this earlier barrow group, thus enlarging its spread further east, into the Tundzha area as well.

In our opinion, the combination of stratigraphic evidence and numerous radiocarbon dates from Malomirovo makes it a good starting point for further chronological and morphological studies. Although not all the EBA grave-types in Upper Thrace are presented there, the Pamukli Bair Barrow clearly indicates that at the turn of the fourth and third millennium BC, the mortuary practices were

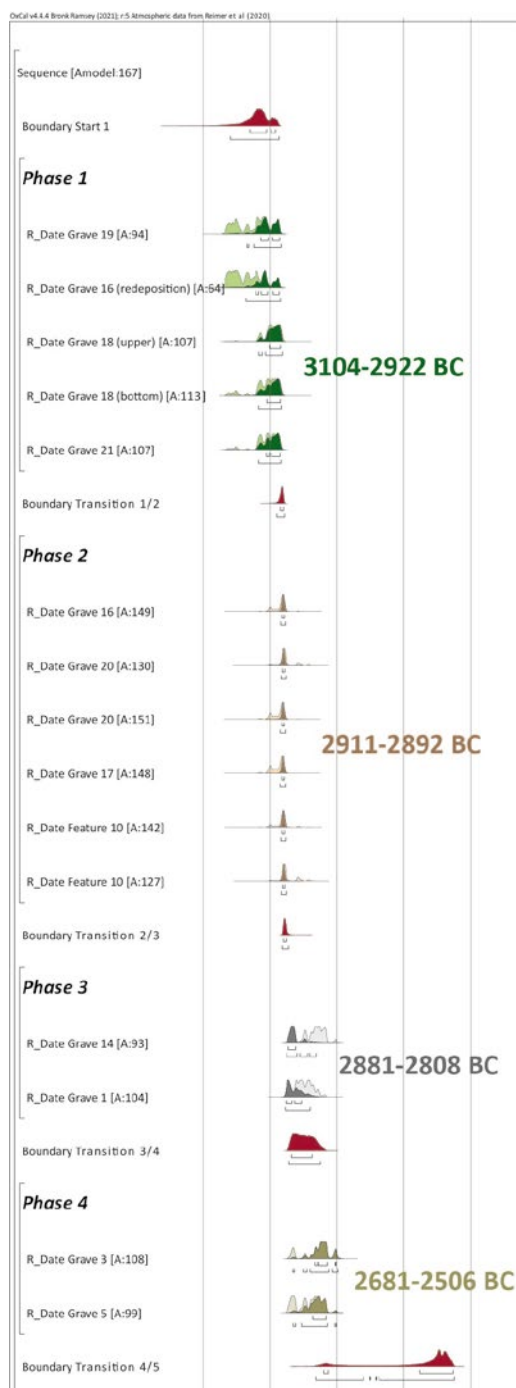


Figure 27. Bayesian model of the ^{14}C dates from Pamukli Bair Barrow, Malomirovo based on 68.2% confidence range. Image Credit: P. Włodarczak.

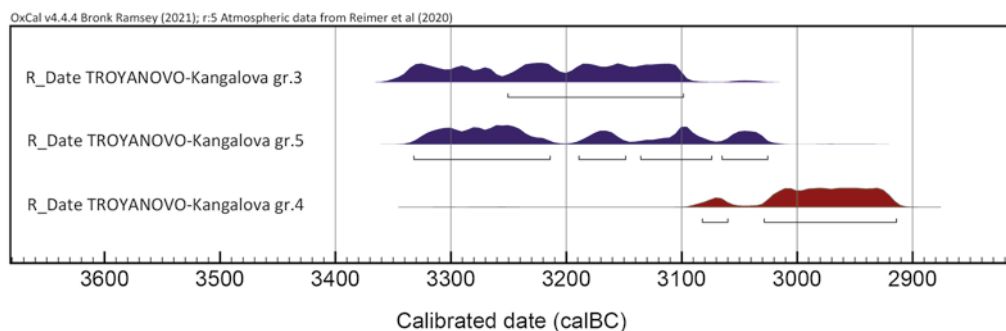


Figure 28. Chronological sequence of graves 3–5 in the Kangelova Barrow at Troyanovo. Image Credit: S. Alexandrov.

multi-faceted. The value of the Malomirovo sequence will become even greater with the possibility of comparing it to series from other EBA barrows in Upper Thrace and the Lower Danube.

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CHALLENGES AND NEW DIRECTIONS IN FAUNAL ANALYSIS IN BULGARIAN PREHISTORY: A VIEW FROM THE PAST DECADE

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Abstract

This paper discusses some of the major challenges facing the successful integration of faunal studies into broader archaeological investigations in Bulgarian prehistory and presents some of the lessons learned by a zooarchaeologist over the past decade in Bulgarian archaeology. In scope, the paper considers three fundamental issues that affect faunal analysis of prehistoric assemblages: recovery, quantification, and the integration of zooarchaeology with archaeometry. This is not meant to be an exhaustive list of priorities for faunal researchers; rather, it addresses issues common to bone assemblages across time and space and should therefore be applicable to researchers working in any period of prehistory or later. Each theme is illustrated with concrete examples from the author's field and lab work. This article is meant to serve as a roadmap for early career scholars with an interest in learning zooarchaeological methods and interpretation, but has a larger agenda: to demonstrate the value of methodologically robust faunal studies to larger issues of archaeological concern within Bulgarian prehistory, including – but not limited to – chronology, migration, economies, and the rise of political complexity and social inequality. As in many places, much work remains to successfully move zooarchaeology from niche specialty into major contributor to archaeological interpretation.

Keywords: zooarchaeology – recovery – quantification – archaeometry – Bulgarian prehistory.

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Introduction

In this paper, I would like to discuss some of the fundamental challenges facing faunal researchers working on assemblages from prehistoric sites in Bulgaria and hopefully, to offer some thoughts and potential solutions for overcoming these challenges that arise out of the nearly 10 years that I have spent studying animal bone assemblages in the country. This paper is primarily intended as a roadmap for early career scholars and students

of zooarchaeology, whether Bulgarian students enrolled in a university or foreigners who, like me, found appeal in Bulgaria's rich cultural heritage and the fascinating diversity of archaeological sites and materials. But I also hope that this paper will serve to demonstrate the potential for carefully analyzed and interpreted faunal collections to weigh in on broader issues of archaeological significance in Bulgarian prehistory, including – but not limited to – chronology, migration, economies, and the rise of political complexity and social inequality.

I began my zooarchaeological career in Bulgaria over 10 years ago, as a student at the early Neolithic site of Illindentsi–Masovets. In the years since, I have examined collections of animal bones from numerous archaeological sites, including prehistoric sites from the early and late Neolithic, the Late Bronze and Early Iron Ages, and even later sites from the Roman period and Late Antiquity. Here I will only discuss some of those sites (fig. 1). Obviously, no two faunal collections are the same, but I was surprised by the variability even within assemblages from sites of the same chronological period. For example, at Illindentsi, the limited bone assemblage was highly fragmented and thus difficult to

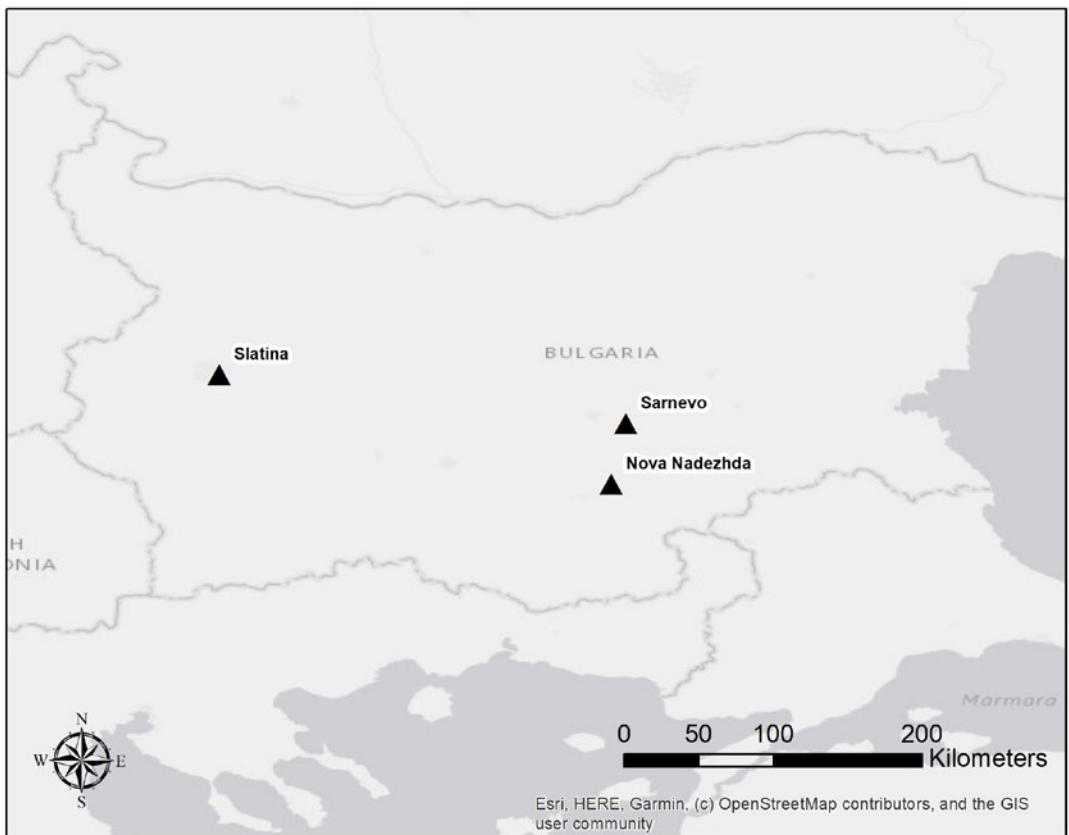


Figure 1. Map with locations of sites discussed in the text. Image Credit: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community.

identify, whereas the assemblage from the site of Slatina in the Sofia Basin (also an early Neolithic site) contained a higher number of intact bones, which enabled a larger suite of statistical and biometric approaches.

Since faunal assemblages vary so greatly even within similar geographical or chronological contexts, there can be no 'one size fits all' strategy for analyzing them. Even the methodological considerations discussed in this paper can only serve as a rough guide, a set of prescriptions that will apply more to some assemblages than to others. Nevertheless, I consider them fundamental to good zooarchaeological practice and in one form or another, applicable to all faunal studies, regardless of size, preservation, or antiquity. I divide this paper into three parts: recovery, quantification, and zooarchaeology and archaeometry. The first part, recovery, deals with the very real consequences of collection methods on zooarchaeological interpretation. The second, quantification, gives a very brief introduction to measures of abundance as they have been traditionally applied to Bulgarian faunal assemblages and discusses some of the shortcomings and potentialities of each. The final, and in many ways most exciting part of this paper, deals with the role that zooarchaeology should play within the larger field of archaeometry, or the application of scientific techniques to archaeological problems.

A quick note at the beginning: throughout this article I use the term zooarchaeology rather than archaeozoology, even though in both practice and theory, Bulgarian faunal analysis owes an intellectual debt to Central European animal studies, who typically use the term archaeozoology when discussing the study of archaeological bone assemblages. There are real differences between these terms, rooted both in intellectual traditions and in their analytical focus as discussed by Bartosiewicz (2001), but in practice, they are often used synonymously. As a scholar trained in the Anglo-American tradition of faunal studies, which emerged out of archaeology's processual movement, I use the term zooarchaeology.

Recovery

Because animal bones are affected in particular ways by a multitude of taphonomic factors, special consideration is required during excavation to ensure that a representative sample is available for analysis. Early sieving experiments in the 1970s at Sesklo and Argissa Magoula (Payne 1972) and elsewhere (Clason & Prummel 1977) demonstrated the efficacy of both dry and wet (flotation) sieving for recovering bones that are often missed in hand-picked and troweled assemblages. Since that time, numerous experiments have confirmed this assertion, demonstrating that recovery techniques (e.g., Gordon 1993; Cannon 1999; James 1997).

A full history of these experiments is not possible here, but the lesson of these and other actualistic studies of recovery is that generally speaking, systematic sieving leads to a greater representation in faunal assemblages of both smaller skeletal elements (e.g., phalanges), and the elements of smaller taxa, helping to mitigate bias toward larger bodied

species (e.g., cattle). The effect is even more pronounced for microfauna, fish, and small invertebrates – species crucial to seasonality studies and paleoenvironmental reconstruction.

These points can be illustrated using some of the faunal data from the early Neolithic (late seventh to mid-sixth millennium cal BC) site of Slatina in the Sofia Basin, where I conducted a limited program of sieving between 2016 and 2017 using a 6mm dry sieve. I began in the first year by sieving all soils from one excavation block and select soils from another. My sieving decisions were limited by the availability of time and labor, but the goal was to completely sieve an entire quadrant for comparison with unsieved quadrants. The following year, the strategy was modified to focus on ‘high priority’ contexts, such as house floors and interhouse spaces. In total, 35.16 m³ of sediment were passed through the dry sieve.

The sieved sediments from 2016 and 2017 represent about five percent of the total excavated volume over the same period. This number is probably inflated because sediment volume was not recorded from every excavation quadrant. Although small, I think

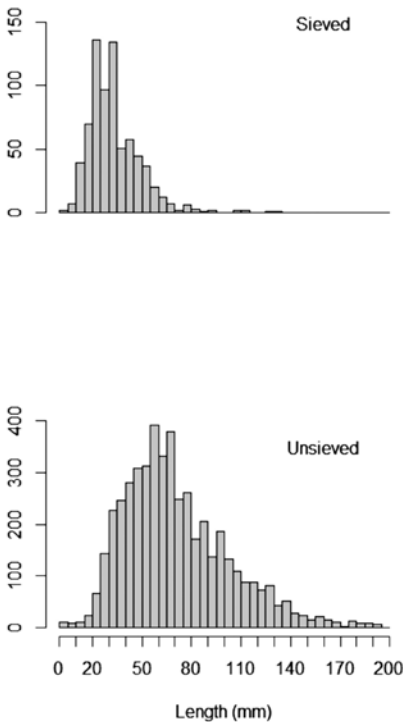


Figure 2. Histogram of fragment length for sieved and unsieved portion of the Slatina assemblage. Image Credit: J. Gorczyk.

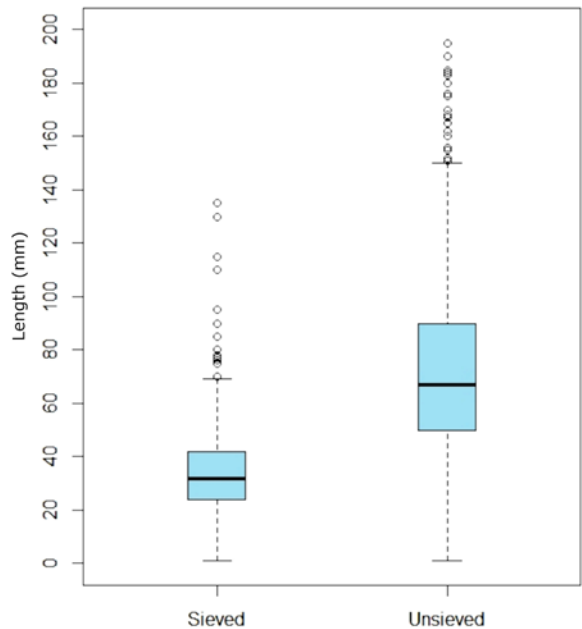


Figure 3. Boxplot of fragment length (mm) for sieved and unsieved portions of the Slatina assemblage. Image Credit: J. Gorczyk.

the sieved portion of the assemblage does provide a preliminary glimpse into recovery biases and demonstrates that they were an issue at Slatina. For example, figure 2 shows the size distribution of faunal remains by recovery method. As expected, the sieved sample is characterized by smaller fragment sizes (mean=34.4 mm) than the hand-collected samples (mean=73.8 mm). For comparative purposes, bone fragments larger than 200 mm (only present in the hand-collected sample) have been omitted from the histograms. Figure 3 highlights the greater range in fragment sizes within the hand-collected assemblage, which is characterized by more outliers and has a larger midspread than the sieved portion. This is likely driven by the greater number of both larger and more complete bones in the hand-collected assemblage.

One of the most dramatic effects of sieving was the recovery of bones from unfused specimens (representing younger animals), which tend to get missed during hand collection due to their smaller size. Figure 4 shows that there does seem to be a difference in the sieved and unsieved sub-assemblages in the number of younger bones (the 'younger' category includes fetal, infantile, and juvenile) recovered. This difference is significant ($\chi^2=56.7$, $p<.001$), indicating that these differences are likely due to excavation technique.

The limited program of sieving implanted at Slatina led to a greater recovery of sheep-sized and hare-sized bones. This played a critical role in the interpretation of animal husbandry during the earlier phases of the settlement, which was dominated not by cattle as in later phases (Bökönyi 1992), but by domestic caprines. It also led to greater recovery of bones from younger species, which aided in the interpretation of mortality profiles, one of zooarchaeology's most important proxies for studying prehistoric animal management practices.

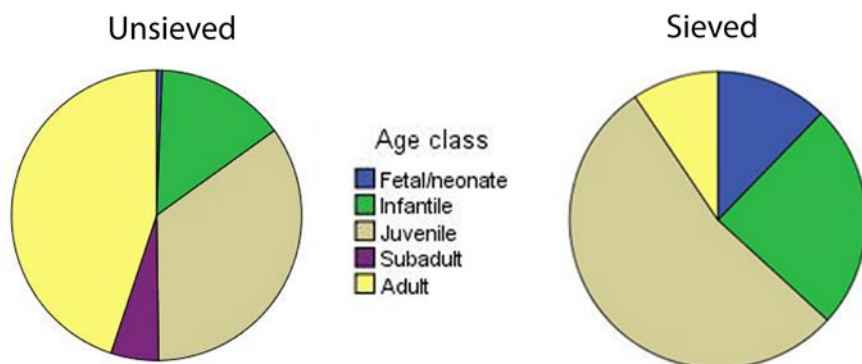


Figure 4. Proportional representation of age classes by excavation technique.
Image Credit: J. Gorczyk.

Quantification

Quantification – how animal bones and the populations they represent are counted – remains one a thorny issue in zooarchaeology. Discussions of quantification abound in the literature and cannot be summarized here, so I refer the reader to Reitz & Wing (1999), O'Connor (2000), Gifford-Gonzalez (2018) and Lyman (1994 & 2008). Ultimately, choices about quantitative methods must be informed by a project's research questions, suited to the assemblage at hand, and robust enough that they measure what they purport to measure. Here, I want to discuss only a small subset of quantitative measures and the problems (and opportunities) they present to researchers working in Bulgarian prehistory.

A review of archaeological reports in the Bulgarian literature in the early postwar period (1950s), mostly from articles published in *Arheologia* (journal of the National Institute of Archaeology & Museum of the Bulgarian Academy of Sciences) and individual chapters within site excavation volumes, reveals that when faunal data are presented at all, prior to 1960 they tended to be given very limited treatment, and not formally quantified at all (e.g., Slatina stuff). Beginning in the 1960s and 1970s, detailed quantitative measures of faunal remains were present in many site volumes (e.g., Ivanov & Vasilev 1975 and 1979). At that time, following trends from Central European archaeozoology (e.g., Boessneck 1969; Bökönyi 1969 & 1970; Uerpmann 1979), faunal researchers in Bulgaria began using two common measures of quantification: number of identified specimens (NISP) and minimum number of individuals (MNI).

NISP is the most commonly used quantitative method in faunal reports in Bulgaria and most of Europe, and in many ways, is the easiest measure to calculate: one simply adds up the numbers of specimens identified to a particular taxonomic grouping (e.g., species, genus, or higher). But this simplicity can be deceptive since assumptions about what constitutes a specimen and what counts as identifiable may vary considerably between analysts and is not always clearly defined. Inter-analyst conceptions of 'specimen' vary (cf. Lyman 1994), although many agree (e.g., Reitz & Wing 1999; Gifford-Gonzalez 2018) that it is best defined as a discrete bone unit, fragmentary or complete. Thus, a long bone shaft fragment would count as one specimen as would the complete long bone itself. Regardless of how it is defined, researchers should always explicitly state how categories such as 'identified' and 'specimen' were constructed.

A more serious issue with NISP is interdependence, the potential for several specimens to come from the same individual, thereby inflating the count. Gautier (1984) argued that interdependence has a minimal effect on NISP; however, his argument relied on the assumption that the deposition of each specimen is taphonomically independent of the others (Lyman 2008, 38), a scenario not borne out by ethnographic studies on the division and sharing of articulated carcass segments (e.g., Marshall 1994) or those on breaking bones for grease or marrow extraction (e.g., Outram 2001).

The impacts of interdependence on faunal assemblages will vary greatly on Bulgarian prehistoric sites, since they exhibit much variation in the degree of fragmentation and

preservation. Conventional wisdom dictates that fragmentation will inflate NISP counts to a certain point, at which time NISP will decrease as bone fragments become more difficult to identify (Marshall & Pilgram 1993, 265). That is, the relationship is linear only to a point. For assemblages that are characterized by moderate to high degrees of fragmentation, this could present a serious problem. However, Cannon's (2013) fragmentation experiment, which lent empirical support to Marshall's and Pilgram's observations, suggested that fragmentation's inflating effect on NISP is not as high as some had feared, meaning that NISP should continue to be used as a baseline quantitative measure for prehistoric faunal assemblages.

Given the high degree of variability in bone fragmentation on Bulgarian prehistoric sites, which I mentioned in the introduction, I would encourage faunal analysts to explore and document the statistical relationship between fragmentation and NISP. To start, I recommend recording specimen fragment size during analysis. For instance, I typically record the percentage (e.g., 'complete', '> ¾', 'between ½ and ¾', 'between ¼ and ½', and '< ¼') of the entire element represented by each fragment, following Binford's criteria (1981), although this is not the only method.

A second commonly used method of quantification in use for decades is minimum number of individuals (MNI). It appears that in Bulgarian faunal reports, MNI was initially adopted to counter some of the problems inherent to NISP but to also estimate the actual number of animals represented by a context, an occupational layer, or an entire site. MNI is a derived measure that is calculated from fragment counts (usually from NISP). Several methods of calculating MNI have been developed in the days since White first introduced the method to zooarchaeology. In his original formulation, he simply took the highest count of a single element from a skeleton, accounting for side (White 1952, 397). Klein & Cruz-Urbe (1983) also used this approach, accounting for side but not age or sex, although they considered it an option. Bökönyi (1970) calculated MNI separately for individual age classes and animal size. As with NISP, faunal researchers must document how MNI is calculated to facilitate comparisons with other assemblages.

Major criticisms of MNI have been offered by Grayson (1984), Plug & Plug (1990), and later with extreme prejudice by O'Connor (2000, 60f). These critiques are now common knowledge among zooarchaeology students. As demonstrated by Marshall & Pilgram (1993), as a function of NISP, MNI drops off considerably with increasing fragmentation. It is therefore susceptible to the vagaries of NISP calculation and even more affected by fragmentation than NISP. Perhaps the most serious problem is that as a derived measure, MNI is not additive and therefore must be recalculated at various levels of aggregation: one cannot simply add up MNI counts from various contexts or stratigraphic units and arrive at a reasonable estimate of animals without good reason to suspect that bones from the same individual could not occur across different units. This renders them inappropriate for most statistical analyses. Summarizing Grayson, Gifford-Gonzalez (2018, 401) points out that in stratified sites, specimen in-

terdependence cannot be guaranteed, eliminating one of the major arguments in favor of using MNI.

I dislike MNI for all these reasons, but also because with rare exception, I do not think the number of individual animals is the appropriate analytical focus of most zooarchaeological studies. Rather, I believe that the number and proportional representation of carcass parts are of greater interpretive value to faunal analysts trying to reconstruct the practices of consumption and discard that have created the faunal record. Therefore, I prefer to use other methods, such as minimum number of elements (MNE) to estimate these frequencies. In one way or another, MNE underlies many, if not most, derived measures such as MNI and MAU (Marean et al. 2001, 333), so its calculation should be documented by researchers for each assemblage.

Methods for calculating MNE vary but can be grouped into two large categories: ‘overlap’ methods and ‘landmark’ or fractional methods (Gifford-Gonzalez 2018, 190). Because they are simpler to use, I prefer landmark systems, which operate by dividing each skeletal element into a series of osteologically recognizable features (‘landmarks’), for example, the greater trochanter of the femur. Oftentimes called ‘diagnostic zones’ (Watson 1979; Dobney & Reilly 1988), these features must: (a) occur only once per element per side; and (b) be more than 50 percent complete to be counted. Wherever possible, landmarks should be defined on elements that exist across all taxa under consideration. Returning to the issue of fragmentation noted above, one drawback of landmark systems is that in highly fragmented assemblages, where more than 50 percent of the element is not likely to occur, they will be less effective for estimating taxonomic abundance. Finally, perhaps the single greatest advantage of landmark systems is that landmarks can be simply tallied up across contexts and units, rendering other measures based on them (e.g., MNE) immune to the problems of derived measures discussed above.

The late Neolithic (5400–5200 cal BC) site of Sarnevo in the Stara Zagora District illustrates this concept. Here, faunal remains were deposited together with other material culture in dozens of pits located in a field close to a tell site (Bacvarov & Gorczyk 2018, 141). Initially, Karastoyanova (2011) investigated the bone assemblage from the largest of these pit features, Feature 9, and quantified the remains by both NISP and MNI. Using both measures, she demonstrated that cattle were the most abundant taxon represented in Feature 9 (Karastoyanova 2011, 21). When the analysis was expanded to include a larger number of pits from the site (2013), MNI could not be used to compare taxonomic abundance across pits, for the reasons stated above. When quantified by diagnostic zones (following Watson 1979), the taxonomic composition for individual pits accorded well with Karastoyanova’s data: cattle were the most abundant taxon followed by fallow deer and sheep.

This demonstrated that for a single feature, using MNI alongside NISP provided a reliable indicator of taxonomic abundance. However, using diagnostic zones enabled comparison across pit features at Sarnevo and lent additional empirical support to the argument that the pit features demonstrated various configurations of a ‘ritual package’ that

included, among other components, animal bone remains of large consumption events that occurred elsewhere and were later distributed among the pits (Bacvarov & Gorczyk 2018, 153).

Faunal analysis and archaeometry

The final area in which I see great potential for zooarchaeology to contribute to Bulgarian prehistory is within archaeometric, or archaeological science applications. Using animal bone samples for radiocarbon dating has been an established practice for decades, but other obvious examples are ancient DNA (aDNA) analysis, stable isotopic analyses, and zooarchaeology by mass spectrometer (ZooMS). Faunal remains are critical to each of these approaches not only because they provide the raw materials used by each, but also because these techniques produce information about the life history of individual animals or animal communities that cannot be gleaned from traditional osteological study: information such as diet, mobility, birth seasonality, lineage, habitat, and more. Soil micromorphology, an indirect technique which can be used to study animal dung deposits, investigates many of these same issues. Bulgarian Neolithic sites are particularly good candidates for soil micromorphology, because they are often stratified, and the good preservation of house remains makes it easy to identify interhouse spaces where animals may have been kept while alive.

Returning to the early Neolithic site of Slatina, the combined zooarchaeological and stable isotopic analyses produce more information than either could alone. Although I was ultimately unable to secure funding to perform soil micromorphology on the suspected dung samples I collected, the pilot isotopic study yielded critical information on the location of animals in the landscape at various times of the year. This in turn helped to identify the rhythms of human-animal interaction on the daily and seasonal scales.

For example, stable oxygen analysis from sequentially sampled dental enamel from sheep yielded valuable information on the timing of sheep births at Neolithic Slatina. The y-axis of figure 5 (x_0/X) represents time series data from the growth of individual teeth divided into twelve increments, each representing one month, with January on the bottom. Figure 5 demonstrates that the inhabitants of Slatina scheduled lambing around April–May. These results are similar to those from another early Neolithic site, Nova Nadezhda, which also clustered around April–May (Balasse et al. 2020). In both cases, a reference sample of modern sheep from Kemenez was used for comparison. The Kemenez sheep birth distribution is earlier than both Slatina and Nova Nadezhda, with births clustering around February and March, and is argued to represent a ‘natural’ birth seasonality unaffected by human intervention. Thus, the isotopic study of sequential enamel samples at both Slatina and Nova Nadezhda provides valuable insight into human decision making during the earliest period of animal husbandry in Bulgaria. As more comparative data become available from prehistoric sites across Bulgaria, it will be interesting to investigate the full suite of Neolithic husbandry practices.

The isotopic data from Slatina also provide clues as to where domestic animal communities could be found in the prehistoric landscape. By examining the carbon-13 ($\delta^{13}\text{C}$) values from the same sequentially sampled herbivore (cattle and sheep) teeth and comparing them with the $\delta^{13}\text{C}$ values from roe deer – a known forest dweller – it becomes clear that sheep and cattle molars do not exhibit the ‘canopy’ effect, where animals feeding on plants near the forest floor exhibit depleted $\delta^{13}\text{C}$ values as a result of the depletion gradient from canopy to forest floor (van der Merwe & Medina 1991; Doppler et al. 2017). Compared to the mean $\delta^{13}\text{C}$ value of -27.9 parts per mille (‰) for the roe deer, the sheep and cattle values are much higher, suggesting feeding in open areas (fig. 6). Since it has been shown that an alluvial forest environment persisted near Slatina in the early Neolithic (Marinova & Ntinou 2018), it must have been the intention of human groups to prevent domestic herbivores from freely feeding there, grazing them instead in open areas of the landscape, perhaps those that had already been cleared to provide wood and space to grow crops.

Both isotopic analyses provide much more information about the lived experience of animals, and the people who cared for them, than osteological alone study could. These and other archaeometric approaches need to be more regularly incorporated into the study of Bulgarian prehistory. There are promising moves in this direction (e.g., de

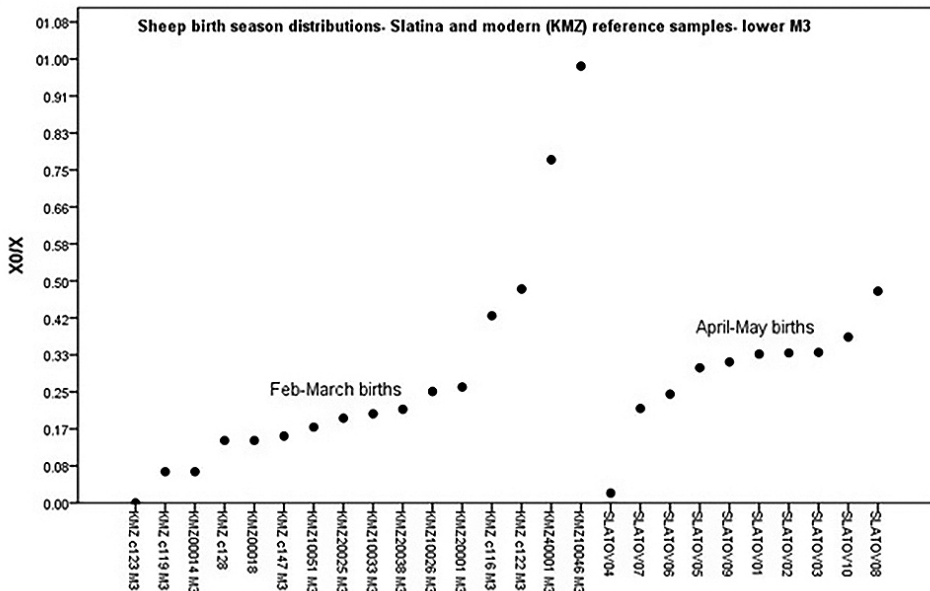


Figure 5. Results of the normalization function for sheep sequential tooth enamel samples. The y axis represents time series data for tooth formation, divided into 12 increments, representing the months of the year (January at the bottom). Comparison between Slatina samples and modern reference samples from Kemenez. Image Credit: from Balasse et al. 2017 & 2020.

Groene et al. 2018), but faunal research has much to do to catch up with, for example, archaeobotanical studies.

Discussion

The three themes discussed above represent only small fraction of the possible considerations for the zooarchaeology of prehistoric Bulgaria. I chose them not only because I believe they are fundamental to all faunal analyses, but also because they represent three arenas in which I have witnessed major growth over the past decade, and which merit some further discussion here.

Recovery methods are vitally important aspects to any faunal study. Although many factors that adversely affect the composition of bone assemblages are taphonomic and out of the archaeologist's control, systematic recovery is easy, fast, and can be built into any project from the initial stages.

At Slatina, sieving selected sediments through 6mm mesh led to an increase in overall sample size, an important consideration for researchers working on small excavations where the faunal sample is already limited. Such limited excavations should especially consider sieving. As the Slatina sieving experiment demonstrated, even projects constrained by time, funding, or labor availability can still benefit from sieving to help

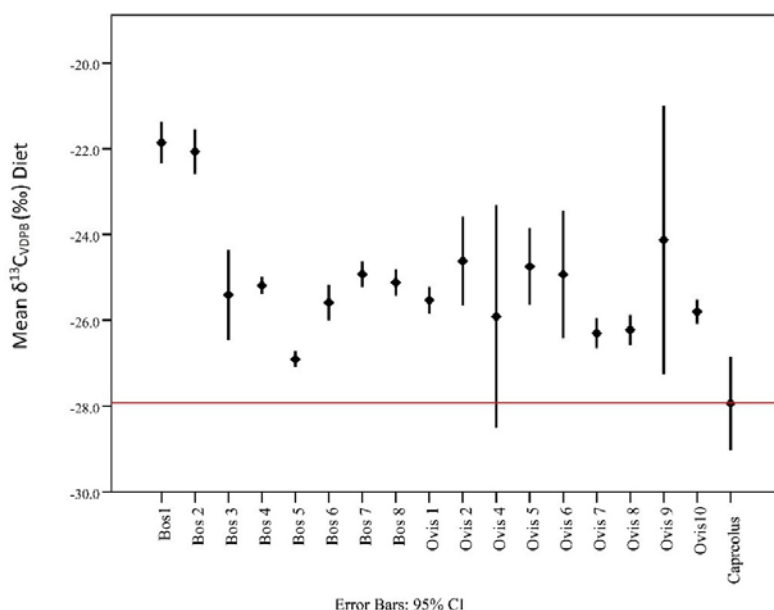


Figure 6. Mean carbon ($\delta^{13}C$) values corrected for diet (14.00 ‰ depletion) for cattle and sheep molars. Red line represents the cutoff for the 'canopy effect', determined from the mean value of the Slatina roe deer (*Capreolus*). Image Credit: J. Gorczyk.

identify and control for potential biases in archaeofaunal assemblages. Sieving is also crucial because it leads to the recovery of bones from age cohorts that are often underrepresented in hand-picked assemblages. This has a major impact on the interpretation of mortality profiles, which are crucial to reconstructing herding strategies, seasonality, and practices of consumption.

Sieves can be easily constructed using inexpensive material from local hardware stores and can be built to fit directly over a standard wheelbarrow. The extra time they add is negligible, especially when considering the range and quality of data that they add. They should be implemented on both research and salvage projects, to ensure comparability in bone assemblages recovered from prehistoric sites across the country. The sieving program at Slatina was far from perfect. For instance, using 6mm mesh did not lead to greater recovery of birds, microfauna, fish, or invertebrates. These species are often critical for paleoenvironmental reconstruction, so researchers who are interested in using zooarchaeology for that purpose could place a 1mm sieve beneath the 6mm sieve and should also implement a robust flotation strategy.

Regarding measures of quantification, there is no right or wrong answer to which a researcher should choose. Ultimately, methodological choices should be driven by the research questions at the center of the analysis. Truly the best strategy would be to use several measures of quantification, especially those that complement each other by reducing some of the negative effects inherent to both primary and derived measures. The issues of recovery bias and quantification are interlinked, as demonstrated above. As a simple specimen count, NISP will obviously be affected if certain taxa or skeletal elements are underrepresented in an assemblage due to recovery bias. In turn, derived measures such as MNI will be affected.

In contrast to some faunal researchers (e.g., O'Connor 2000), I do not believe that MNI is a useless method of quantification. There may be some instances in which it is desirable to estimate the number of animals present in a discrete context. A good example would be animal burials. The number of animals included in a burial (whether or not human remains are also present) can inform archaeologists about funerary rites, animal sacrifice, and human-animal kinship. In my experience, animal burials are rare in earlier prehistory in Bulgaria, with more spectacular examples present in later periods. Nevertheless, in such cases MNI may provide more relevant information than either NISP or MNE.

Finally, zooarchaeology and archaeometry are natural partners, and animal bones have always provided an important source of raw materials for scientific techniques in archaeology, namely radiocarbon dating. But with isotopic archaeology (Pollard 2011) a now established field of the discipline, and with the proliferation of aDNA studies on prehistoric migration throughout the Near East and eastern Mediterranean, Bulgarian prehistory stands to benefit immensely from ongoing collaborative effort between archaeologists and specialists as well as the development of the infrastructure necessary to

perform various scientific techniques.

The thread that ties these themes together is the desire (and need) for zooarchaeology to move away from being a niche discipline whose lessons are known only to specialists and whose results are ‘banished to the appendix of the site volume’ (Sykes 2014). This is a foundational concept for social zooarchaeology, which aims to study the non-subsistence roles that animals play in prehistoric societies (Russell 2012, 8), but it should be of major concern for all faunal researchers and archaeologists, regardless of their interpretive framework. There are many ways that Bulgarian prehistory specifically would benefit from such an integration, but here I will focus on the concept of neolithization – the spread of farming communities throughout southeastern Europe – an important research topic for Bulgarian prehistory. There are two specific realms in which a greater unification of faunal data and archaeological interpretation will enhance our understanding of the timing and characteristics of neolithization.

The first deals with the unique ecological relationships between animals, plants, and humans that characterized Neolithic communities. Recent scholarship has demonstrated that Neolithic crop and animal husbandry systems were highly contingent, shaped by a complex interplay of climatic variables that constrained and enabled the spread of early farming communities (e.g., Ivanova et al. 2018; Krauß et al. 2018). Local manifestations of the Neolithic ‘package’ of domestic cereals and herbivores can be seen as adaptive mechanisms that enabled Neolithic communities to cope with the varying climates encountered on their move through higher latitudes, leading in turn to the creation of novel environmental niches. Untangling this web of ecological relations requires specialist fields such as zooarchaeology to engage with complementary forms of analysis at the onset of an archaeological project. The limited isotopic data from Slatina demonstrated this potential, as they produced important information that could not be gleaned from that faunal analysis alone.

Second, Bulgarian faunal data (alongside other data, such as archaeobotanical) have been incorporated into numerous metanalyses that have attempted to investigate neolithization over broad chronological and geographic swaths of Europe (e.g., Conolly et al. 2011 & 2012; Orton et al. 2016). Often associated with the use of ‘Big Data’ in archaeology, such studies investigate large scale trends in the adoption and adaptation of the Neolithic package throughout Europe, highlighting variation in crop and animal husbandry practices that may be correlated with population dynamics, climate, and cultural factors. But metanalyses necessarily involve the loss of data granularity as datasets are aggregated, cleaned, and standardized to facilitate comparative analysis. Oftentimes the local, regionally specific characteristics of neolithization are glossed over in favor of a broad narrative. It is thus critically important to have robust, site based integrated archaeological studies to provide contextualizing information about human-animal relationships during the Neolithic.

Conclusion

While there is still much work to be done to build the infrastructure necessary to provide the zooarchaeological expertise to accommodate the huge body of prehistoric materials produced from Bulgarian excavations every year, the situation is much improved since the time I first arrived in 2011. This is largely due to the efforts of a few dedicated faunal researchers, and the small but significant increase in the number of students in academic archaeology who choose to focus their studies on faunal analysis. The challenge before us is to continue to foster interest in both zooarchaeological method and interpretation among younger students as well as to open dialogue with scholars who may not consider faunal evidence to be as important as other data classes, such as ceramics. Where possible, training opportunities outside of the university, such as zooarchaeological field schools, should be encouraged. In all our efforts, we should strive for a greater integration of zooarchaeological and other datasets within larger questions of archaeological interest in Bulgarian prehistory.

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